



Programming Manual | **Model 675**

Function Generator Operating Mode

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1. PREFACE

Scope of this document is to describe the use of SCPI commands with the Model 675 Series Arbitrary Waveform Generator when used in Function Generator Operational Mode (AFG).

1.1 ABBREVIATIONS AND TERMS

Abbreviation	Description
SW	Software
UI	User Interface
API	Application Programming Interface
SCPI	Standard Commands for Programmable Instruments
AFG	Arbitrary Function Generator
VISA	Virtual Instrument Software Architecture

Table 1: Abbreviations and terms

2. PREREQUISITES

This document requires to use the software Simple TrueArb release 3.0.3.0 or greater.

2.1 Revision History

Rev.	Document Changes	Date
1.3	[SOURCE{n}]:FUNCTION[:SHAPE] - Added Double Pulse carrier Added: [SOURCE{n}]:DOUBLEPULSE:PULSE[m]:AMPLitude [SOURCE{n}]:DOUBLEPULSE:PULSE[m]:TRANSition[:LEADing] [SOURCE{n}]:DOUBLEPULSE:PULSE[m]:TRANSition:TRAILing [SOURCE{n}]:DOUBLEPULSE:PULSE[m]:WIDTh [SOURCE{n}]:DOUBLEPULSE:PULSE[m]:DELay	
1.4	Added: [SOURCE{n}]:COUPLE:STATe [SOURCE{n}]:COUPLE:AMPLitude:STATe [SOURCE{n}]:COUPLE:AMPLitude:RATio [SOURCE{n}]:COUPLE:AMPLitude:OFFSet [SOURCE{n}]:COUPLE:OFFSet:STATe [SOURCE{n}]:COUPLE:OFFSet:RATio [SOURCE{n}]:COUPLE:OFFSet:OFFSet [SOURCE{n}]:COUPLE:FREQuency:STATe [SOURCE{n}]:COUPLE:FREQuency:RATio [SOURCE{n}]:COUPLE:FREQuency:OFFSet [SOURCE{n}]:COUPLE:PHASe:STATe [SOURCE{n}]:COUPLE:PHASe:RATio [SOURCE{n}]:COUPLE:PHASe:OFFSet [SOURCE{n}]:COUPLE:DCYCLe:STATe [SOURCE{n}]:COUPLE:DCYCLe:RATio [SOURCE{n}]:COUPLE:DCYCLe:OFFSet [SOURCE{n}]:COUPLE:LEADing:STATe [SOURCE{n}]:COUPLE:LEADing:RATio [SOURCE{n}]:COUPLE:LEADing:OFFSet [SOURCE{n}]:COUPLE:TRAILing:STATe [SOURCE{n}]:COUPLE:TRAILing:RATio [SOURCE{n}]:COUPLE:TRAILing:OFFSet [SOURCE{n}]:COUPLE:SYMMetry:STATe [SOURCE{n}]:COUPLE:SYMMetry:RATio [SOURCE{n}]:COUPLE:SYMMetry:OFFSet [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:AMPLitude:STATe [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:AMPLitude:RATio [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:AMPLitude:OFFSet [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:LEADing:STATe [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:LEADing:RATio [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:LEADing:OFFSet [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:TRAILing:STATe [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:TRAILing:RATio [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:TRAILing:OFFSet [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:WIDTh:STATe [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:WIDTh:RATio	19 September 2019

Rev.	Document Changes	Date
	[SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:WIDTH:OFFSET [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:DELAY:STATE [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:DELAY:RATIO [SOURCE{n}]:COUPLE:DOUBLEPULSE:PULSE[m]:DELAY:OFFSET [SOURCE{n}]:VOLTAGE:LIMIT:HIGH [SOURCE{n}]:VOLTAGE:LIMIT:LOW	
1.5	Added: - AFGControl:APPSwitch to allow switch in SPG application - Changed the Double-Pulse index from [m] to [k] because m is already used for the trigger outs. Added: - [SOURCE{n}]:BURST:WAIT:STATE - [SOURCE{n}]:BURST:DURATION - [SOURCE{n}]:VOLTAGE:BASELINE:OFFSET Modified and corrected: 'Model' parameter returned by *IDN? query	23 June 2021
2.0	Added: MEMory:NStates? MEMory:STATE:CAtalog? MEMory:STATE:NAME MMEMory:CAtalog[:ALL]? MMEMory:CDIRectory MMEMory:COpy MMEMory:DATA MMEMory:DATA:SIZE? MMEMory:DELeTe MMEMory:DOWNload:DATA MMEMory:DOWNload:FNAME MMEMory:EXPort MMEMory:IMPort MMEMory:LOAD:ALL MMEMory:MDIRectory MMEMory:MOVE MMEMory:MSIS MMEMory:OPEN MMEMory:OPEN:SETup MMEMory:RDIRectory MMEMory:SAVE:SETup MMEMory:STORE:ALL MMEMory:UPLoad? OUTPut[#]:BLOffset OUTPut[#]:DELay OUTPut[#]:SERies[:IMPedance]	3 May 2022

Rev.	Document Changes	Date
	OUTPut[#]:LOAD[:IMPedance] OUTPut[#]:NOIse:LEVel DISPlay[:WINDow]:TEXT:CLEar DISPlay[:WINDow]:TEXT[:DATA] DISPlay:FOCus [SOURce[n]]:RUNMode [SOURce[n]]:MODulation:FREQuency [SOURce[n]]:MODulation:MODE [SOURce[n]]:MODulation:PERiod [SOURce[n]]:MODulation:SOURce [SOURce[n]]:MODulation:FUNCTion [SOURce[n]]:MODulation:FUNCTion:WAVE [SOURce[n]]:MODulation:FUNCTion:EFILe [SOURce[n]]:MODulation:FSK:HOPFrequency [SOURce[n]]:MODulation:PSK:HOPPhase [SOURce[n]]:SWEep:SPACing:WAVE AFGControl:CONFigure:CNUMber? AFGControl:RESET[:IMMediate] AFGControl:RUN[:IMMediate] AFGControl:RSTATe? AFGControl:SRESTore AFGControl:SSAVe SYSTem:KLOCK[:STATe] SYSTem:SECurity:IMMediate TRIGger[:SEQuence]:LEVel MARKer:LEVel[#] MARKer:LINK[#] MARKer:CONTInuous[:SKEW][#] MARKer:TRIGgered[:SKEW][#] MARKer[:STATe][#] *CAL? *TST? CALibration[:ALL] DIAGnostic[:ALL] LICense:INSTall LICense:ERRor? LICense:HID? LICense:LIST? WLISt:LIST? WLISt:NAME? WLISt:SIZE? WLISt:WAVEform:DATA? WLISt:WAVEform:DElete	

Rev.	Document Changes	Date
	WLISt:WAVEform:IMPort WLISt:WAVEform:LENGth? WLISt:WAVEform:PREDefined? WLISt:WAVEform:TYPE? MIM:CAPTure MIM:RELease MIM:ID? MIM:SLAve? MIM:FORWard? MIM:CAPTured? MIM:NUMber? *OPT? *PSC *RCL *SAV DELeTe:SETUp RECALL:SETUp AFGControl:COUPLEParam	
2.1	Modified FileSystem commands Modified EFILE and USER arguments usage in commands: - [SOURce[n]]:FUNctIon[:SHApe] - [SOURce[n]]:AM:INteRnal:FUNCTion - [SOURce[n]]:PM:INteRnal:FUNCTion - [SOURce[n]]:FM:INteRnal:FUNCTion - [SOURce[n]]:PWM:INteRnal:FUNCTion - [SOURce[n]]:SWEep:SPACing Modified some MEMory commands - MEMory:SAVE - MEMory:RECall - MMEMory:LOAD:STATe - MMEMory:STORe:STATe Modified EFILE Commands description: - [SOURce[n]]:FUNctIon:EFILE - [SOURce[n]]:AM:INteRnal:FUNCTion:EFILE - [SOURce[n]]:FM:INteRnal:FUNCTion:EFILE - [SOURce[n]]:PM:INteRnal:FUNCTion:EFILE - [SOURce[n]]:PWM:INteRnal:FUNCTion:EFILE - [SOURce[n]]:SWEep:SPACing:EFILE Modified [SOURce[n]]:BURSt:MODE command	13 July 2022

Rev.	Document Changes	Date
2.2	Modified or fixed commands: MMEMory:IMPort MMEMory:OPEN WLISt:WAVeform:IMPort WLISt:WAVeform:DATA? WLISt:WAVeform:TYPE? MARKer:LINK TRIGger[:SEQuence]:LEVel *TST?	27 September 2022
2.3	Modified TRACe commands: - TRACe[n][:DATA] description and data format - TRACe[n]:RECall description - TRACe[n]:SAVE description - TRACe[n]:POINts description Fixed Status commands: - STATus:OPERation[:EVENT]? - STATus:OPERation:CONDition? - STATus:OPERation:ENABle - STATus:QUEStionable[:EVENT]? - STATus:QUEStionable:CONDition? - STATus:QUEStionable:ENABle? - STATus:PRESet	17 October 2022
2.4	Added application info in *IDN? command.	7 November 2022

Table 2: Revision History

3. SYNTAX AND COMMANDS

3.1 COMMAND SYNTAX

3.1.1 Syntax Overview

Control the operations and functions of the instrument through the LAN interface using commands and queries. The related topics listed below describe the syntax of these commands and queries. The topics also describe the conventions that the instrument uses to process them. See the Command Groups topic for a listing of the commands by command group or use the index to locate a specific command.

Refer to the following table for the symbols that are used.

Symbol	Meaning
< >	Defined element
::=	Is defined as
	Exclusive OR
{ }	Group; one element is required
[]	Optional; can be omitted
...	Previous elements can be repeated
()	Comment

Table 3: Syntax symbols and their meanings

3.1.2 Command and Query Structure

3.1.2.1 Overview

Commands consist of set commands and query commands (usually called commands and queries). Commands modify instrument settings or tell the instrument to perform a specific action. Queries cause the instrument to return data and status information.

Most commands have both a set form and a query form. The query form of the command differs from the set form by its question mark on the end.

For example, the set command *OUTPut1:STATe ON* has a query form *OUTPut1:STATe?*.

Not all commands have both a set and a query form. Some commands have only set and some have only query.

3.1.2.2 Messages

A command message is a command or query name followed by any information the instrument needs to execute the command or query. Command messages may contain five element types, defined in the following table.

Symbol	Meaning
<Header>	This is the basic command name. If the header ends with a question mark, the command is a query. The header may begin with a colon (:) character. If the command is concatenated with other commands, the beginning colon is required. Never use the beginning colon with command headers beginning with a star (*).
<Mnemonic>	This is a header subfunction. Some command headers have only one mnemonic. If a command header has multiple mnemonics, a colon (:) character always separates them from each other.
<Argument>	This is a quantity, quality, restriction, or limit associated with the header. Some commands have no arguments while others have multiple arguments. A <space> separates arguments from the header. A <comma> separates arguments from each other.
<Comma>	A single comma is used between arguments of multiple-argument commands. Optionally, there may be white space characters before and after the comma.
<Space>	A white space character is used between a command header and the related argument. Optionally, a white space may consist of multiple white space characters.

Table 4: Message symbols and their meanings

3.1.2.3 Commands

Commands cause the instrument to perform a specific function or change one of the settings. Commands have the structure:

[:]<Header>[<Space><Argument>[<Comma><Argument>]...]

A command header consists of one or more mnemonics arranged in a hierarchical or tree structure. The first mnemonic is the base or root of the tree and each subsequent mnemonic is a level or branch of the previous one. Commands at a higher level in the tree may affect those at a lower level. The leading colon (:) always returns you to the base of the command tree.

3.1.2.4 Queries

Queries cause the instrument to return status or setting information.

Queries have the structure:

[:]<Header>?

[:]<Header>?[<Space><Argument>[<Comma><Argument>]...]

3.1.3 Command Entry

3.1.3.1 Rules

The following rules apply when entering commands:

- You can enter commands in upper or lower case.
- You can precede any command with white space characters. White space characters include any combination of the ASCII control characters 00 through 09 and 0B through 20 hexadecimal (0 through 9 and 11 through 32 decimal).
- The instrument ignores commands consisting of any combination of white space characters and line feeds.

3.1.3.2 Abbreviating

You can abbreviate many instrument commands. Each command in this documentation shows the abbreviations in capitals. For example, enter the command *SOURce1:VOLTage* simply as *SOUR:VOLT*.

3.1.3.3 Concatenating

Use a semicolon (;) to concatenate any combination of set commands and queries. The instrument executes concatenated commands in the order received. When concatenating commands and queries, follow these rules:

1. Separate completely different headers by a semicolon and by the beginning colon on all commands except the first one.
For example, the commands *SOURce1:VOLTage 1V* and *SOURce1:VOLTage:OFFSet 0.5V*, can be concatenated into the following single command:
SOURce1:VOLTage 1V;; SOURce1:VOLTage:OFFSet 0.5V
2. Never precede a star (*) command with a semicolon (;) or colon (:).

3.1.3.4 Terminating

This documentation uses <EOM> (end of message) to represent a message terminator.

Symbol	Meaning
<EOM>	Message terminator

Table 5: Message terminator and meaning

For messages sent to the instrument, the end-of-message terminator must be the END message (EOI asserted concurrently with the last data byte). The instrument always terminates messages with LF and EOI. It allows white space before the terminator. For example, it allows CR LF.

3.1.4 Parameter Types

Parameters are indicated by angle brackets, such as <file_name>. There are several different types of parameters, as listed in the following table. The parameter type is listed after the parameter. Some parameter types are defined specifically for the instrument command set and some are defined by SCPI.

Parameter type	Description	Example
Boolean	Boolean numbers or values	ON or 1 OFF or 0
NR1 numeric	Integers	0, 1, 15, -1
NR2 numeric	Decimal numbers	1.2, 3.141, -6.5
NR3 numeric	Floating point numbers	3.1415E+9
NRf numeric	Flexible decimal numbers that may be type NR1, NR2, or NR3	See NR1, NR2, and NR3 examples in this table
String	Alphanumeric characters (must be within quotation marks)	"Testing 1, 2, 3"

Table 6: Parameter types, their descriptions, and examples

3.1.4.1 Quoted String

Some commands accept or return data in the form of a quoted string, which is simply a group of ASCII characters enclosed by a single quote (') or double quote ("). For example: "this is a quoted string". This documentation represents these arguments as follows:

Symbol	Meaning
<QString >	Quoted string of ASCII text

Table 7: String symbol and meaning

A quoted string can include any character defined in the 7-bit ASCII character set. Follow these rules when you use quoted strings:

1. Use the same type of quote character to open and close the string. For example: "this is a valid string".
2. You can mix quotation marks within a string as long as you follow the previous rule. For example, "this is an 'acceptable' string".
3. You can include a quote character within a string simply by repeating the quote. For example: "here is a "" mark".
4. Strings can have upper or lower case characters.
5. A carriage return or line feed embedded in a quoted string does not terminate the string, but is treated as just another character in the string.

Here are some invalid strings:

- "Invalid string argument" (quotes are not of the same type)
- "test<EOI>" (termination character is embedded in the string)

3.1.4.2 Units and SI Prefix

If the decimal numeric argument refers to voltage, frequency, impedance, or time, express it using SI units instead of using the scaled explicit point input value format <NR3>. (SI units are units that conform to the System International d'Unites standard.) For example, use the input format 200 mV or 1.0 MHz instead of 200.0E-3 or 1.0E+6, respectively, to specify voltage or frequency.

Omit the unit when you describe commands, but include the SI unit prefix. Enter both uppercase and lowercase characters. The following list shows examples of units you can use with the commands.

- V for voltage (V).
- HZ for frequency (Hz).

The SI prefixes, which must be included, are shown in the following table. You can enter both uppercase and lowercase characters.

SI prefix ¹	Corresponding power
EX	10 ¹⁸
PE	10 ¹⁵
T	10 ¹²
G	10 ⁹
MA	10 ⁶
K	10 ³
M	10 ⁻³
U ²	10 ⁻⁶
N	10 ⁻⁹
P	10 ⁻¹²
F	10 ⁻¹⁵
A	10 ⁻¹⁸

Table 8: SI prefixes and their indexes

1. Note that the prefix m/M indicates 10⁻³ when the decimal numeric argument denotes voltage or time, but indicates 10⁶ when it denotes frequency.
2. Note that the prefix u/U is used instead of "μ".

Since M (m) can be interpreted as 1E-3 or 1E6 depending on the units, use mV for V, and MHz for Hz.

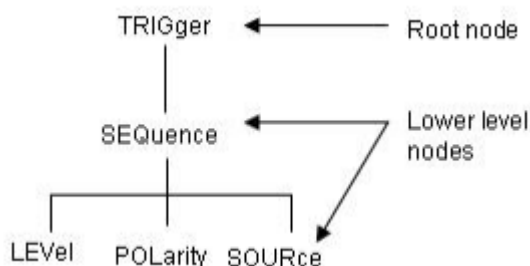
The SI prefixes need units.

Correct: 10MHz, 10E+6Hz, 10E+6
Incorrect: 10M

3.1.5 SCPI Commands and Queries

The Arbitrary Function Generator uses a command language based on the SCPI standard. The SCPI (Standard Commands for Programmable Instruments) standard was created by a consortium to provide guidelines for remote programming of instruments. These guidelines provide a consistent programming environment for instrument control and data transfer. This environment uses defined programming messages, instrument responses and data formats that operate across all SCPI instruments, regardless of manufacturer.

The SCPI language is based on a hierarchical or tree structure that represents a subsystem (see following figure). The top level of the tree is the root node; it is followed by one or more lower-level nodes.



You can create commands and queries from these subsystem hierarchy trees. Commands specify actions for the instrument to perform. Queries return measurement data and information about parameter settings.

4. THE REGISTERS

4.1 Status and events

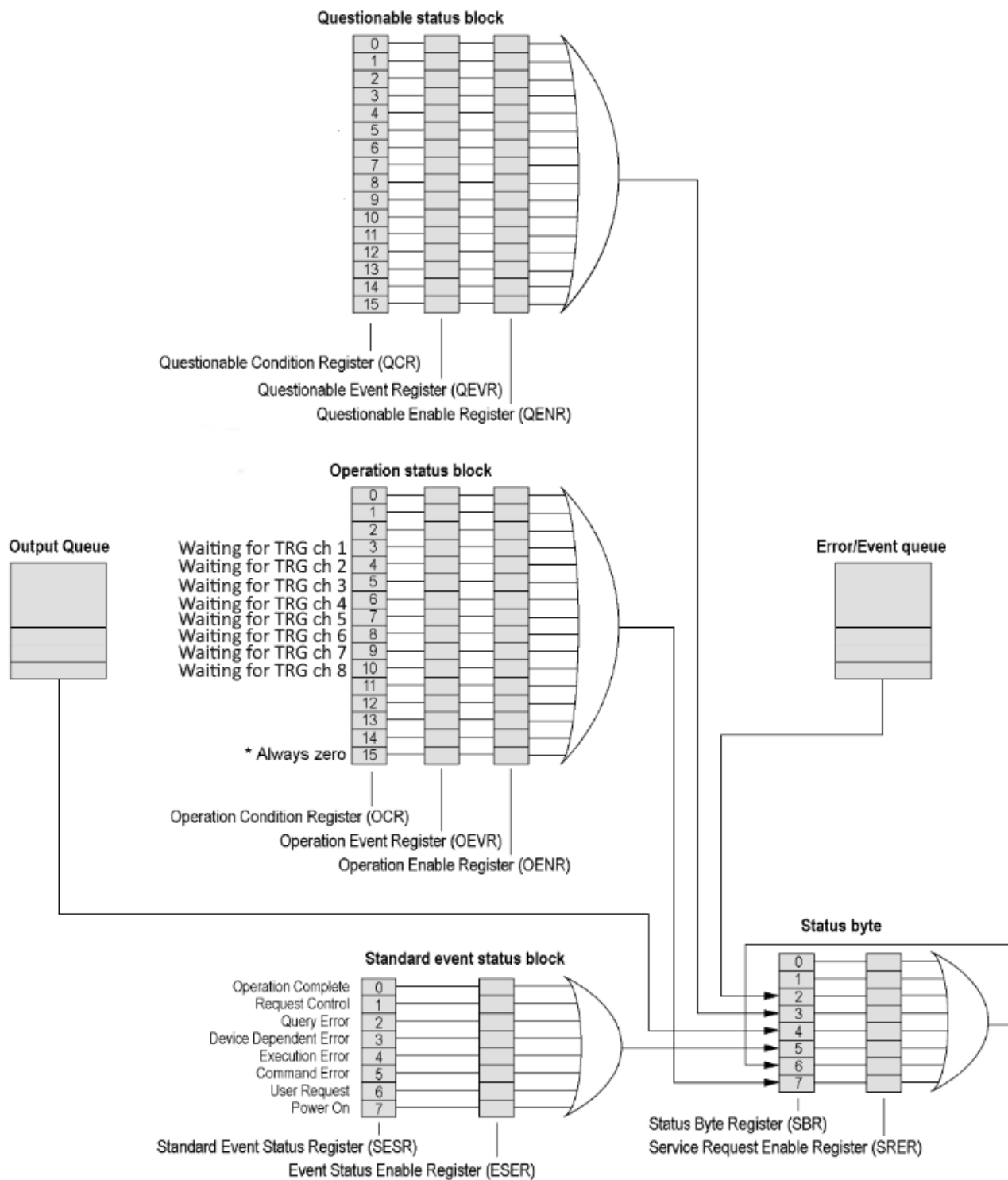
The SCPI interface in the instrument includes a status and event reporting system that enables the user to monitor crucial events that occur in the instrument.

4.1.1 Status and event reporting system

The following figure outlines the status and event reporting mechanism offered in the instrument. It contains three major blocks:

- Standard Event Status
- Operation Status
- Questionable Status (fan-out structure, not used in this version).

The processes performed in these blocks are summarized in the Status Byte.



4.1.2 Status Byte Register (SBR)

The bits of this register are used to monitor the output queue, SESR and service requests, respectively. The contents of this register are returned when the *STB? query is used.

BIT	Name	Description
7 (MSB)	OSS	Operation Summary Status (OSS). Summary of the operation status register.
6	RQS/MSS	Request Service (RQS)/Master Status Summary (MSS). When the instrument is accessed using the serial poll command, this bit is called the Request Service(RQS) bit and indicates to the controller that a service request has occurred. The RQS bit is cleared when serial poll ends. When the instrument is accessed using the *STB? query, this bit is called the Master Status Summary (MSS) bit and indicates that the instrument has issued a service request for one or more reasons. The MSS bit is never cleared to 0 by the *STB? Query.
5	ESB	Event Status Bit (ESB). This bit indicates whether or not a new event has occurred after the previous Standard Event Status Register (SESR) has been cleared or after an event readout has been performed
4	MAV	Message Available Bit (MAV). This bit indicates that a message has been placed in the output queue and can be retrieved.
3	QSS	Questionable Summary Status (QSS). Summary of the Questionable Status Byte register.
2	EAV	Event Quantity Available (EAV). Summary of the Error Event Queue.
1	--	This is not used
0(LSB)	--	This is not used

Table 9: Status Byte Register (SBR)

4.1.3 Service Request Enable Register (SRER)

The SRER is made up of bits defined exactly the same as bits 0 through 7 in the SBR as shown in the following figure. This register is used by the user to determine what events will generate service requests.

The SRER bit 6 cannot be set. Also, the RQS is not maskable.

The generation of a service request with the GPIB interface involves changing the SRQ line to LOW and making a service request to the controller. The result is that a status byte for which an RQS has been set is returned in response to serial polling by the controller.

Use the *SRE command to set the bits of the SRER. Use the *SRE? query to read the contents of the SRER. Bit 6 must normally be set to 0.

7	6	5	4	3	2	1	0
OSB	--	ESB	MAV	QSB	--	--	--

Table 10: Service Request Enable Register (SRER)

4.1.4 Standard Event Status Block (SESB)

Reports the power on/off state, command errors, and the running state. It consists of the following registers:

- Standard Event Status Register (SESR)
- Event Status Enable Register (ESER)

These registers are made up of the same bits defined in the following table. Use the *ESR? query to read the contents of the SESR. Use the *ESE() command to access the ESER

4.1.4.1 Standard Event Status Register (SESR)

BIT	Name	Description
7 (MSB)	PON	Power On (PON). Indicates that the power to the instrument is on.
6	--	Not used.
5	CME	Command Error (CME). Indicates that a command error has occurred while parsing by the command parser was in progress.
4	EXE	Execution Error (EXE). Indicates that an error occurred during the execution of a command. Execution errors occur for one of the following reasons:

BIT	Name	Description
		- when a value designated in the argument is outside the allowable range of the instrument, or is in conflict with the capabilities of the instrument. - when the command could not be executed properly because the conditions for execution differed from those essentially required.
3	DDE	Device-Dependent Error (DDE). An instrument error has been detected.
2	QYE	Query Error (QYE). Indicates that a query error has been detected by the output queue controller. Query errors occur for one of the following reasons: - an attempt was made to retrieve messages from the output queue, despite the fact that the output queue is empty or in pending status. - the output queue messages have been cleared despite the fact that they have not been retrieved.
1	--	Not used.
0 (LSB)	OPC	Operation Complete (OPC). This bit is set with the results of the execution of the *OPC command. It indicates that all pending operations have been completed.

Table 11: Standard Event Status Register (SESR)

When an event occurs, the SESR bit corresponding to the event is set, resulting in the event being stacked in the Error/Event Queue. The SBR OAV bit is also set. If the bit corresponding to the event has also been set in the ESER, the SBR ESB bit is also set. When a message is sent to the Output Queue, the SBR MAV bit is set.

4.1.5 Operation status block

The operation status block contains conditions that are part of the instrument's normal operation. It consists of the following registers:

- Operation Condition Register (OCR)
- Operation Event Register (OEVR)
- Operation Enable Register (OENR)

These registers are made up of the same bits defined in the following table. Use the STATUS:OPERATION commands to access the operation status register set.

4.1.5.1 Operation Condition Register (OCR)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
--	--	--	--	--	WT8	WT7	WT6	WT5	WT4	WT3	WT2	WT1	--	--	--

Table 12: Operation Condition Register (OCR)

From Bit 3 to Bit 10 (WTx = Waiting Trigger Ch x): indicates that the channel is waiting for a trigger event to occur.

When the specified state changes in the OCR, its bit is set or reset. This change is filtered with a transition register, and the corresponding bit of the OEVR is set. The OENR is not used.

4.1.6 Questionable status block

The questionable status register set contains bits which give an indication of the quality of various aspects of the signal together with the fanned out registers as described in the next subsections. It consists of the following registers:

- Questionable Condition Register (QCR)
- Questionable Event Register (QEVN)
- Questionable Enable Register (QENR)

Despite the commands to query these registers are usable (see STATus:QUESTionable commands) , these register are not used in this version.

5. REMOTE CONTROL

You can connect your instrument to a network for printing, file sharing, and Internet access, among other functions. Consult with your network administrator and use the standard Windows utilities to configure the instrument for your network.

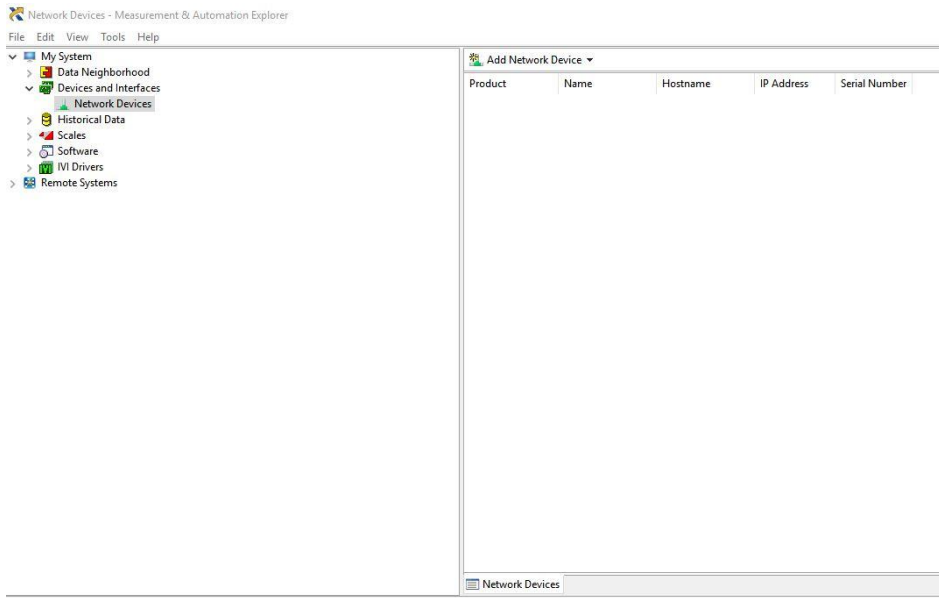
The instrument can be controlled using VXI-11 (LAN) protocol. It allows you to control the instrument remotely by using SCPI commands.

5.1 Prerequisite

NI-VISA

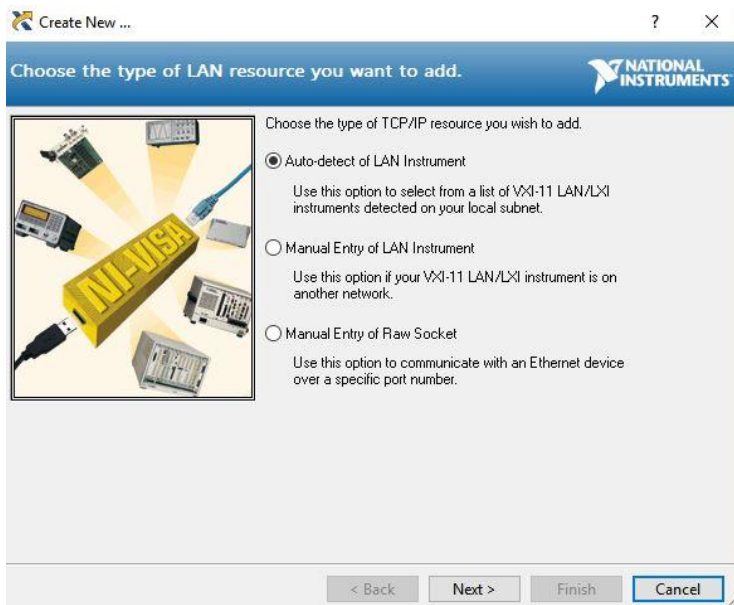
VISA provides the programming interface between the hardware and development environments such as Visual Studio .NET, LabVIEW, LabWindows/CVI, Measurement Studio for Microsoft Visual Studio and MatLab. NI-VISA is the National Instruments implementation of the VISA I/O standard. NI-VISA includes software libraries, interactive utilities such as NI I/O Trace and the VISA Interactive Control, and configuration programs through Measurement & Automation Explorer for all your development needs.

1. Connect your LAN cable to the instrument.
2. On the Client-PC you must install the latest NIVISA package that you can find here <https://www.ni.com/it-it/support/downloads/drivers/download.ni-visa.html>
3. Launch the NI-MAX tool on the Client-PC

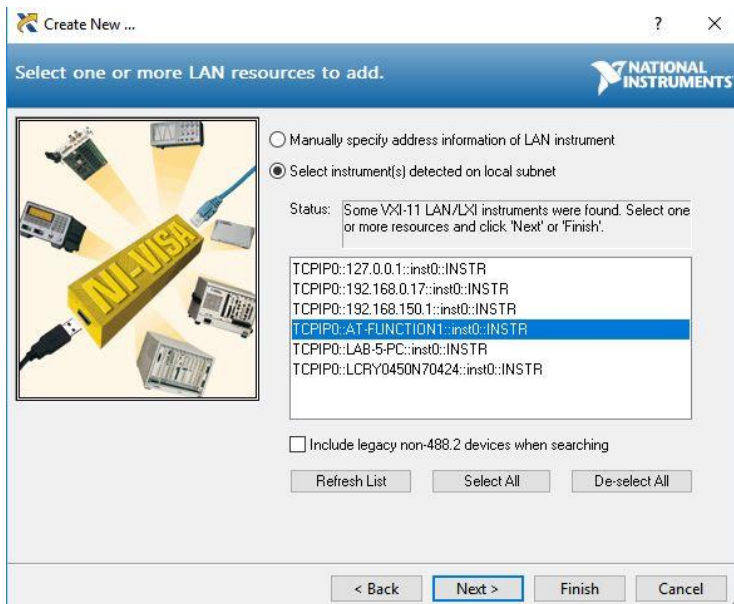


Press Add Network Device → VISA TCP/IP Resource...

4. Select Auto-detect of LAN Instrument



5. The panel will retrieve the discovered instruments on the LAN network, you should select the AT-FUNCTION series one.

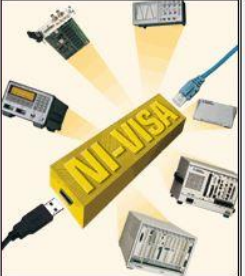


6. Specify an Alias for the selected resource

Create New ... ? X

Specify an alias for this resource (optional).

 NATIONAL INSTRUMENTS



You can specify an alias for this device. An alias is a logical name for a device that makes it easier to identify your instrument.

Use aliases in your code when opening sessions to devices without specifying their full VISA resource strings.

You may assign or change the alias at a later time through the alias editor or by clicking on the device to rename it.

Type in the alias you want to assign to this device or leave the alias field blank to not assign an alias to this device.

Resource Name: TCPIP0::AT-FUNCTION1::inst0::INSTR

Alias:

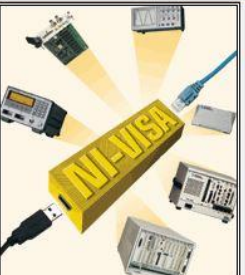
< Back Next > Finish Cancel

7. Press Finish

Create New ... ? X

Review resource details.

 NATIONAL INSTRUMENTS



Measurement & Automation Explorer is ready to create the following device(s):

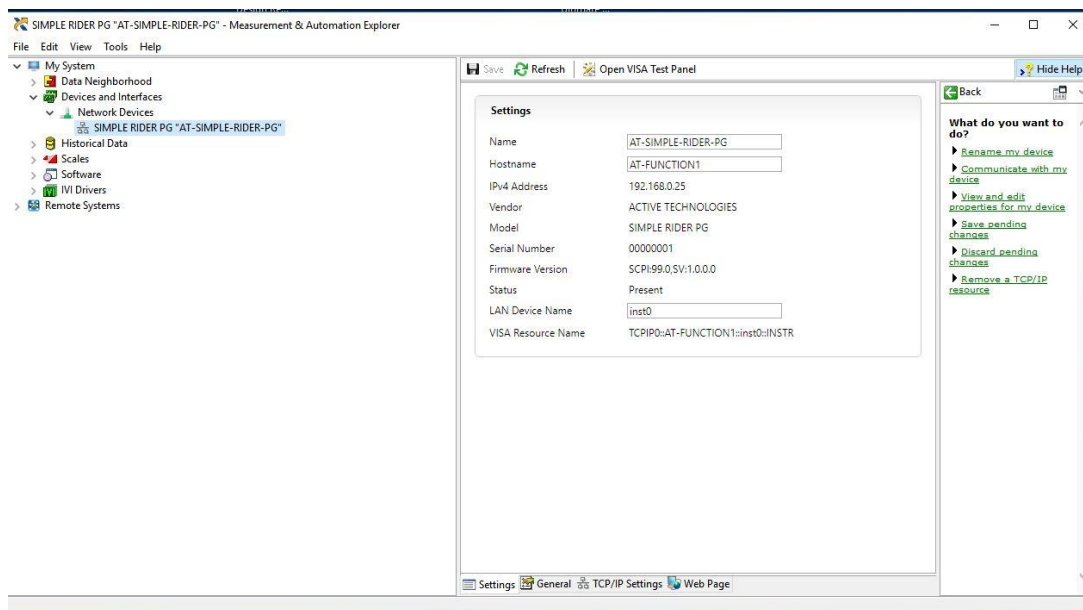
Click Finish to create your device(s).

Click Cancel to leave this wizard without creating your device(s).

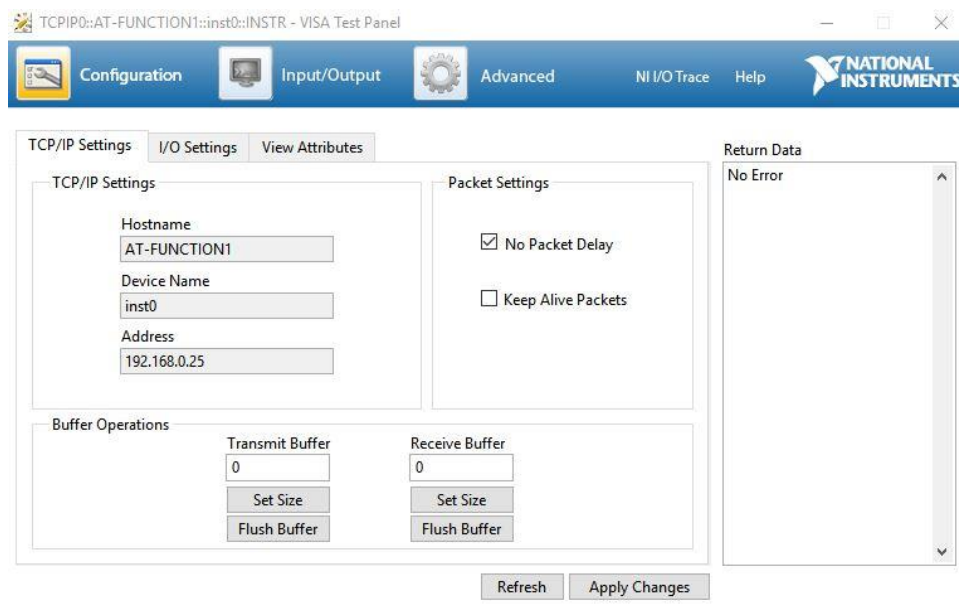
☐ Launch alias editor on Finish.

< Back Next > Finish Cancel

8. The AT-FUNCTION resource will be available in the Network Devices list

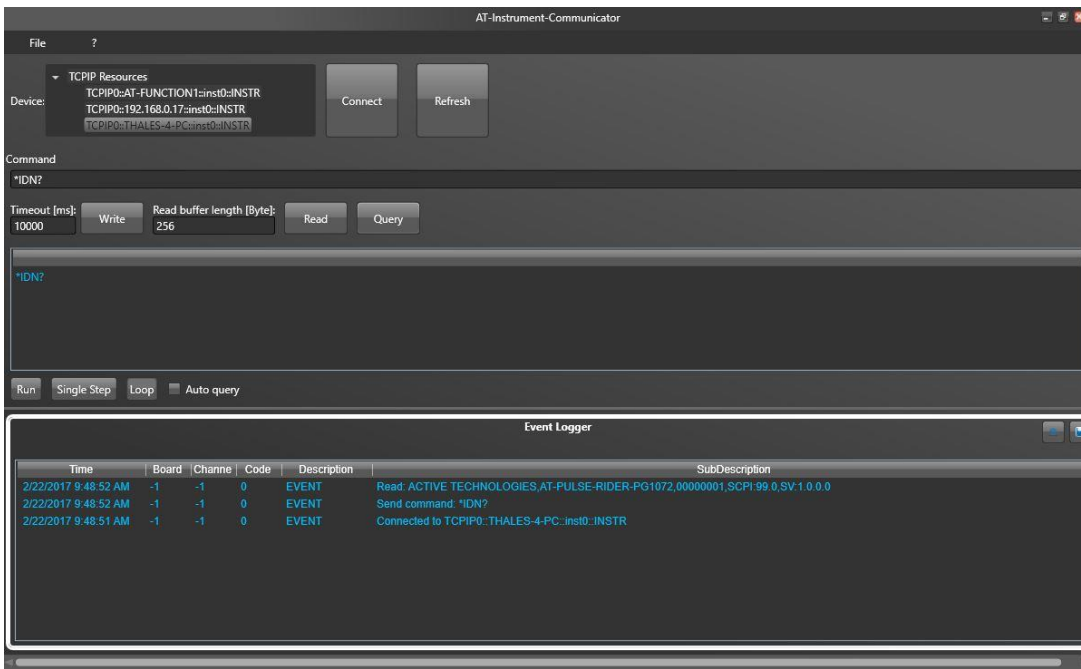


9. Now you can use send the SCPI commands to the AT-FUNCTION resource using the NI Visa Test Panel or the AT-Instrument-Communicator



10. On the Client-PC (IP Address) or AWG instrument (LocalHost), launch the AT-Instrument-Communicator tool

5.1.1 AT Instrument Communicator



The AT-Instrument-Communicator software is a client-side component tool that uses NI-VISA on each remote PC, you must install a copy of NIVISA to make use of this client-side component (please follow the Prerequisite steps).

1. On the Client-PC launch the *AT Instrument Communicator* setup you can find in the folder "SDK_SIMPLE_RIDER_AFG_WEBSITE" and install the software.
2. Select the AT-FUNCTION resource on the Device list
3. Press the Connect button
4. If the instrument connection will be established, the SCPI command button will be enabled.
5. Write *IDN? in the command
6. Press the Query button
7. In the Event Logger list, the instrument should respond like this:
ACTIVE TECHNOLOGIES,AWG4012,T0302I000001,SCPI:1999.0,SV:AFG.1.0.0 where

T0302I000001 is the serial number, SCPI:1999.0 is the SCPI command version and SV:AFG.1.0.0 is the Application and Software Version.

8. A command script is a list of SCPI commands (one command for each line) saved in a txt file; you can send a command script using the File → Load Script menu item.

5.2 Analog data format (.txt file only)

The analog waveform can be imported into the instrument using a .txt file. For analog waveform you have to create a single column of values (signed integer or signed decimal, the header is not allowed) separated with 'new line'. These values are imported into the instrument normalized so that the user can easily adjust waveform's amplitude/offset using the corresponding SCPI commands.

5.3 Digital Data format (.txt file only)

For a digital waveform you have to create a single column of values (unsigned integer range $[0..(2^{32} - 1)]$, the header is not allowed) separated with 'new line'.

5.4 Granularity

About the imported waveform, the minimum digital waveform's length is 4 symbols while the minimum analog waveform's length is 2 samples; for both the granularity is 1.

5.5 Transferring Data File

When transferring data file, it is convenient to send data in chunks. This allows better memory management and enables you to stop the transfer before it is completed. It also helps the external controller to report the progress of the operation to the user.

5.5.1 Block Data Format

Block data is a transmission format which is suitable for the transmission of large amounts of data. A command using a block data parameter with definite length has the following structure:

Example: HEADer:HEADer #45168xxxxxxxx

The hash symbol # introduces the data block. The next number indicates how many of the following digits describe the length of the data block. In the example the 4 following digits indicate the length to be 5168 bytes. The data bytes follow. During the transmission of these data bytes all End or other control signs are ignored until all bytes are transmitted.

5.6 Byte Order During Transfer

Waveform data is always transferred using little-endian format.

6. COMMAND GROUPS

The following commands refer to the parameters [n] and [m] that depend on the instrument model.

Model	Parameter n = Available Channels	Parameter m = Available Marker Outputs
AWG4012	1 2	1
AWG4014	1 2 3 4	1 2
AWG4018	1 2 3 4 5 6 7 8	1 2 3 4

Table 13: Models and available parameters

6.1 IEEE Mandated and Optional Group Commands

All AFG IEEE mandated and optional command implementations are based on the SCPI standard and the specifications for devices in IEEE 488.2.

Command	Description
*CAL?	Performs a full calibration of the AWG.
*CLS	Clears all event registers and queues.
*ESE	This command sets or returns the status of Event Status Enable Register (ESER). (See Status and events chapter).
*ESR?	Returns the status of Standard Event Status Register (SESR)
*IDN?	This command returns identification information for the AFG. Refer to Std IEEE 488.2 for additional information.
*OPC	Set or query the operation complete message.
*OPT?	Returns the implemented options for the AFG.
*PSC	Set or query power-on status clear
*RCL	Recall instrument settings from setup memory
*RST	Resets the AFG to its default state.
*SAV	Save instrument settings to setup memory
*SRE	Sets or returns the bits in the Service Request Enable Register (SRER).
*STB?	Read the Status Byte Register
*TRG	This command generates a trigger event. This is equivalent to press and release the trigger button on the front panel.

*TST?	Performs the self diagnostic procedure.
*WAI	Ensures the completion of the previous command before the next command is issued.

Table 14: IEEE Mandatory group commands

6.2 File System Group Commands

You can use the file commands to manipulate files and directories in the file system. The following table describes the file commands.

Command	Description
FILEsystem:CATalog?	Query the list of file and directory in the current working directory
FILEsystem:COpy	Copy a file from one location in the file system to another location
FILEsystem:CWDirectory	Change the current working directory in the file system
FILEsystem:DElete	Delete a file or directory in the file system
FILEsystem:HARDdisk?	Query the hard disk drive present on the instrument
FILEsystem:LOCK	Lock or unlock a file in the file system, or query if a file is locked (no longer available)
FILEsystem:MDIRectory	Create a directory in the file system
FILEsystem:UDISK?	Query the USB-disk drive connected to the instrument

Table 15: File System Commands

6.3 Memory Group Commands

Memory commands let you manage the setup memory. The following table describes the memory commands.

Command	Description
*RCL	Recall instrument settings from setup memory
*SAV	Save instrument settings to setup memory
DElete:SETUp	Deletes a configuration.
MEMory:NSTates?	Returns the total number of available configurations saved in the instrument.
MEMory:RECall	Recall a specified project file in the file system
MEMory:SAVE	Save the current project file in the file system

Command	Description
MEMory:STaTe:CATalog?	List the names of available configurations saved in the instrument.
MEMory:STaTe:NAME	Copies a configuration or returns the name of the predefined memory states.
MEMory:STaTe:DELeTe	Delete the setup memory
MEMory:STaTe:LOCK	Lock or unlock the setup memory and query whether the memory is locked
MEMory:STaTe:VALId?	Query the availability of setup memory
RECALL:SETUP	Restores the instrument settings from a configuration name.

Table 16: Memory Commands

6.4 Mass Memory Group Commands

Mass memory commands let you change mass memory attributes. The following table describes the mass memory commands.

Command	Description
MMEMory:CATalog[:ALL]?	Returns the entire list of files and directory located in the current directory.
MMEMory:CDIRectory	Sets or returns the current directory of the file system on the instrument.
MMEMory:COpy	Copies a source file in a target file.
MMEMory:DATA	Sets or returns block data to/from file in the current mass storage device.
MMEMory:DATA:SIZE?	Returns the size in bytes of a selected file.
MMEMory:DELeTe	Deletes a file or directory from the instrument's files system.
MMEMory:DOWNload:DATA	Downloads data from the host computer to instrument's Mass Memory.
MMEMory:DOWNload:FNAME	Specifies file name for downloading data from the computer to instrument's Mass Memory.
MMEMory:EXPort	Exports a waveform from the current waveform list to an archive file (.zip).
MMEMory:IMPort	Imports a file into the instrument's waveform list.
MMEMory:LOAD:ALL	Loads a configuration file and set it as current configuration.
MMEMory:LOAD:STaTe	Copy a setup file to internal setup memory

Command	Description
MMEMory:MDIRectory	Creates a new directory in the current path on the Mass Memory system.
MMEMory:MOVE	Moves a file on Mass Memory device.
MMEMory:MSIS	Sets or returns a mass storage device used by all MMEMory commands.
MMEMory:OPEN	Loads a file into the instrument waveform list.
MMEMory:OPEN:SETup	Loads a configuration file and set it as current configuration.
MMEMory:RDIRectory	Removes an empty directory.
MMEMory:SAVE:SETup	Saves the current configuration in an archive (.zip).
MMEMory:STORE:ALL	Saves the current configuration in an archive (.zip).
MMEMory:STORE:STATe	Copy a setup file from setup memory to a specified file in the file system
MMEMory:UPLoad?	Returns the contents of a file

Table 17: Mass Memory Commands

6.5 Output Group Commands

Output commands let you set output attributes. The following table describes the output commands.

Command	Description
OUTPut[n]:BLOffset	Sets or returns the Base Line Offset parameter
OUTPut[n]:DElay	Sets or returns the Delay parameter.
OUTPut[n]:IMPedance	Set or query the output load impedance
OUTPut[n]:LOAD[:IMPedance]	Sets or returns the Load Impedence parameter
OUTPut[n]:LOW:IMPedance	Set or query the instrument output low impedance
OUTPut[n]:NOise:LEVel	Sets or returns the level expressed in percentage of full scale of white noise that is added to the signal
OUTPut[n]:POLarity	Set or query the polarity of the waveform on a specified channel
OUTPut[n]:SERies[:IMPedance]	Sets or returns the output Series Impedence parameter
OUTPut[n][:STATe]	Set or query the output state (on or off) on a specified channel

Table 18: Output Commands

6.6 Display Group Commands

Display commands let you to manage features related to the user interface.

Command	Description
DISPlay:CHANnel	Change the selected output page on the user interface
DISPlay:FOCus	Selects the channel displayed on the instrument display
DISPlay[:WINDow]:TEXT:CLEar	Delete text message
DISPlay[:WINDow]:TEXT[:DATA]	Set or query the text message displayed
HCOPY:SDUMp[:IMMediate]	Create a screen shot of the display screen

Table 19: Display Commands

6.7 Source Group Commands

Source commands let you set output waveform parameters. The following table describes the source commands.

Command	Description
[SOURce]:ROSCillator:SOURce	Set or query the clock reference input source
[SOURce]:ROSCillator:FREQuency	Set or query the clock reference input frequency
[SOURce[n]]:COMBine:FEED	Set or query whether to add internal noise to an output signal for the specified channel
[SOURce[n]]:FREQuency	Set or query the output waveform frequency
[SOURce[n]]:FUNCTion:WAVE	Set or query the output waveform from waveform list (WAVE)
[SOURce[n]]:FUNCTion:EFILe	Set or query the output waveform from file (EFILe)
[SOURce[n]]:FUNCTion:RAMP:SYMMetry	Set or query ramp waveform symmetry
[SOURce[n]]:FUNCTion[:SHAPE]	Set or query the shape of the carrier waveform
[SOURce[n]]:INITDElay	Set or query the initial delay

Command	Description
[SOURce[n]]:PHASe[:ADJust]	Set or query the output waveform phase
[SOURce[n]]:POWER[:LEVel][:IMMediate][:AMPLitude]	Set or query the internal noise level added to the output signal
[SOURce[n]]:RUNMode	Sets or query the run mode.
[SOURce[n]]:VOLTage:BASELINE:OFFSET	Sets or returns the Base Line Offset parameter
[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH	Set or query the output signal high level
[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW	Set or query the output signal low level
[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]	Set or query the output amplitude
[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet	Set or query the output offset
[SOURce[n]]:VOLTage:LIMit:HIGH	Set or query the output amplitude upper limit
[SOURce[n]]:VOLTage:LIMit:LOW	Set or query the output amplitude lower limit
[SOURce[n]]:VOLTage:UNIT	Set or query the output amplitude units

Table 20: Source Commands

6.8 Pulse Waveform Source Commands

Command	Description
[SOURce[n]]:PULSe:DCYCLe	Set or query the pulse waveform duty cycle
[SOURce[n]]:PULSe:PERiod	Set or query the pulse waveform period
[SOURce[n]]:PULSe:TRANSition[:LEADing]	Set or query the pulse waveform rising edge time
[SOURce[n]]:PULSe:TRANSition:TRAILing	Set or query the pulse waveform falling edge time
[SOURce[n]]:PULSe:WIDTh	Set or query the pulse waveform width

Table 21: Pulse Waveform Source Commands

6.9 Double Pulse Waveform Source Commands

Command	Description
[SOURce[n]]:DOUBLEPULSe:PULSe[k]:AMPLitude	Set or query the amplitude of the first or of the second pulse of the double pulse waveform.

Command	Description
[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition[:LEADing]	Set or query the rising edge of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:TRAIling	Set or query the falling edge of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:DOUBLEPULSe:PULSe[k]:WIDTh	Set or query the width of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:DOUBLEPULSe:PULSe[k]:DELay	Set or query the delay of the first or of the second pulse of the double pulse waveform.

Table 22: Double Pulse Source Commands

6.10 Modulation Source Commands

Command	Description
[SOURce[n]]:MODulation:FREQuency	Sets or query the frequency of the modulating waveform
[SOURce[n]]:MODulation:FSK:HOPFrequency	Sets or queries the frequency hop of the FSK modulation
[SOURce[n]]:MODulation:FUNCTion	Sets or query the modulating law
[SOURce[n]]:MODulation:FUNCTion:EFILe	Set or query a modulating waveform from file (EFILE)
[SOURce[n]]:MODulation:FUNCTion:WAVE	Set or query a modulating waveform from Waveform List
[SOURce[n]]:MODulation:MODE	Sets or query the modulation type
[SOURce[n]]:MODulation:PERiod	Sets or query the period of the modulating waveform
[SOURce[n]]:MODulation:PSK:HOPPhase	Sets or queries the phase hop of the PSK modulation
[SOURce[n]]:MODulation:SOURce	Sets or query the source of the modulating law

Table 23: Modulation Source Commands

6.11 Amplitude Modulation Source Commands

Command	Description
[SOURce[n]]:AM[:DEPTH]	Set or query Amplitude Modulation depth

Command	Description
[SOURce[n]]:AM:INTernal:FREQuency	Set or query internal modulation frequency
[SOURce[n]]:AM:INTernal:FUNcTION	Set or query modulation waveform
[SOURce[n]]:AM:INTernal:FUNcTION:EFILe	Set or query a modulating waveform from file (EFILe)
[SOURce[n]]:AM:SOURce	Set or query the Amplitude Modulation source
[SOURce[n]]:AM:STATe	Enable or disable AM and query the state of AM

Table 24: Amplitude Modulation Source Commands

6.12 Frequency Modulation Source Commands

Command	Description
[SOURce[n]]:FM[:DEViation]	Set or query the peak frequency deviation
[SOURce[n]]:FM:INTernal:FREQuency	Set or query the internal modulation frequency
[SOURce[n]]:FM:INTernal:FUNcTION	Set or query the internal modulation waveform
[SOURce[n]]:FM:INTernal:FUNcTION:EFILe	Set or query the modulating waveform from file (EFILe)
[SOURce[n]]:FM:SOURce	Set or query the frequency modulation source
[SOURce[n]]:FM:STATe	Enable or disable Frequency Modulation and query the FM state

Table 25: Frequency Modulation Source Commands

6.13 Phase Modulation Source Commands

Command	Description
[SOURce[n]]:PM[:DEViation]	Set or query the peak phase deviation of phase modulation
[SOURce[n]]:PM:INTernal:FREQuency	Set or query the internal modulation frequency
[SOURce[n]]:PM:INTernal:FUNcTION	Set or query the internal modulation waveform
[SOURce[n]]:PM:INTernal:FUNcTION:EFILe	Set or query the PM modulating waveform from file (EFILe)
[SOURce[n]]:PM:SOURce	Set or query the Phase Modulation source
[SOURce[n]]:PM:STATe	Enable or disable PM modulation and query the PM modulation state

Table 26: Phase Modulation Source Commands

6.14 FSK Modulation Source Commands

Command	Description
[SOURce[n]]:FSKey[:FREQuency]	Set or query the FSK hop frequency

Command	Description
[SOURce[n]]:FSKey:INTernal:RATE	Set or query the FSK internal modulation rate
[SOURce[n]]:FSKey:SOURce	Set or query the FSK modulation source
[SOURce[n]]:FSKey:STATe	Enable or disable FSK modulation and query the FSK modulation state

Table 27: FSK Modulation Source Commands

6.15 PSK Modulation Source Commands

Command	Description
[SOURce[n]]:PSKey[:FREQuency]	Set or query PSK internal modulation rate
[SOURce[n]]:PSKey:PHASe[:ADJust]	Set or query the PSK hop phase
[SOURce[n]]:PSKey:SOURce	Set or query PSK modulation source
[SOURce[n]]:PSKey: STATe	Enable or disable PSK modulation and query the PSK modulation state

Table 28: PSK Modulation Source Commands

6.16 PWM Source Commands

Command	Description
[SOURce[n]]:PWM[:DEVIation]:DCYClE	Set or query the Pulse Width Modulation deviation
[SOURce[n]]:PWM:INTernal:FREQuency	Set or query the Pulse Width Modulation frequency
[SOURce[n]]:PWM:INTernal:FUNCTion	Set or query the PWM modulating waveform
[SOURce[n]]:PWM:INTernal:FUNCTion:EFILe	Set or query the modulating waveform from file (EFile)
[SOURce[n]]:PWM:SOURce	Set or query the Pulse Width Modulation source
[SOURce[n]]:PWM:STATe	Set or query the Pulse Width Modulation status

Table 29: PWM Source Commands

6.17 Sweep Modulation Source Commands

Command	Description
[SOURce[n]]:FREQuency:MODE	Set or query the frequency sweep state
[SOURce[n]]:FREQuency:STARt	Set or query the sweep start frequency
[SOURce[n]]:FREQuency:STOP	Set or query the sweep stop frequency
[SOURce[n]]:SWEep:HTIME	Set or query the sweep hold time
[SOURce[n]]:SWEep:MODE	Set or query the sweep mode
[SOURce[n]]:SWEep:NSTEP	Set or query the number of step of the upstairs sweep

Command	Description
[SOURce[n]]:SWEep:RTIME	Set or query the sweep return time
[SOURce[n]]:SWEep:SPACing	Set or query the sweep spacing
[SOURce[n]]:SWEep:SPACing:EFILe	Set o query the the sweep profile from file (EFILe)
[SOURce[n]]:SWEep:SPACing:WAVE	Set o query the the sweep profile from wave in waveform list
[SOURce[n]]:SWEep:TIME	Set or query the sweep time

Table 30: Sweep Modulation Source Commands

6.18 Burst Source Commands

Command	Description
[SOURce[n]]:BURSt:DURation	Sets or queries the duration of the burst for Noise waveform in Burst mode
[SOURce[n]]:BURSt:MODE	Set or query the burst mode
[SOURce[n]]:BURSt:NCYCles	Set or query the burst count
[SOURce[n]]:BURSt:WAIT:STATe	Sets or returns the condition of the channel during the waiting of the trigger in burst mode.
[SOURce[n]]:BURSt[:STATe]	Enable or disable burst mode and query the burst mode
[SOURce[n]]:BURSt:TDElay	Set or query burst mode trigger delay time

Table 31: Burst Source Commands

6.19 Coupling Source Commands

Command	Description
[SOURce{n}]:COUPLE:STATe	Enable or disable the channel coupling
[SOURce{n}]:COUPLE:AMPLitude:STATe	Enable or disable the channel coupling for the amplitude parameter
[SOURce{n}]:COUPLE:AMPLitude:RATio	Set or query the ratio for the amplitude parameter in coupling mode
[SOURce{n}]:COUPLE:AMPLitude:OFFSet	Set or query the offset for the amplitude parameter in coupling mode
[SOURce{n}]:COUPLE:OFFSet:STATe	Enable or disable the channel coupling for the offset parameter

Command	Description
[SOURce{n}]:COUPLE:OFFSet:RATio	Set or query the ratio for the offset parameter in coupling mode
[SOURce{n}]:COUPLE:OFFSet:OFFSet	Set or query the offset for the offset parameter in coupling mode
[SOURce{n}]:COUPLE:FREQuency:STATe	Enable or disable the channel coupling for the frequency parameter
[SOURce{n}]:COUPLE:FREQuency:RATio	Set or query the ratio for the frequency parameter in coupling mode
[SOURce{n}]:COUPLE:FREQuency:OFFSet	Set or query the offset for the frequency parameter in coupling mode
[SOURce{n}]:COUPLE:PHASe:STATe	Enable or disable the channel coupling for the phase parameter
[SOURce{n}]:COUPLE:PHASe:RATio	Set or query the ratio for the phase parameter in coupling mode
[SOURce{n}]:COUPLE:PHASe:OFFSet	Set or query the offset for the amplitude parameter in coupling mode
[SOURce{n}]:COUPLE:DCYCLe:STATe	Enable or disable the channel coupling for the duty cycle parameter
[SOURce{n}]:COUPLE:DCYCLe:RATio	Set or query the ratio for the duty cycle parameter in coupling mode
[SOURce{n}]:COUPLE:DCYCLe:OFFSet	Set or query the offset for the duty cycle parameter in coupling mode
[SOURce{n}]:COUPLE:LEADIng:STATe	Enable or disable the channel coupling for the rising edge parameter

Command	Description
[SOURce{n}]:COUPLE:LEADIng:RATio	Set or query the ratio for the rising edge parameter in coupling mode
[SOURce{n}]:COUPLE:LEADIng:OFFSet	Set or query the offset for the rising edge parameter in coupling mode
[SOURce{n}]:COUPLE:TRAILing:STATe	Enable or disable the channel coupling for the falling edge parameter
[SOURce{n}]:COUPLE:TRAILing:RATio	Set or query the ratio for the falling edge parameter in coupling mode
[SOURce{n}]:COUPLE:TRAILing:OFFSet	Set or query the offset for the falling edge parameter in coupling mode
[SOURce{n}]:COUPLE:SYMMetry:STATe	Enable or disable the channel coupling for the ramp symmetry parameter
[SOURce{n}]:COUPLE:SYMMetry:RATio	Set or query the ratio for the ramp symmetry parameter in coupling mode
[SOURce{n}]:COUPLE:SYMMetry:OFFSet	Set or query the offset for the ramp symmetry parameter in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:STATe	Enable or disable the channel coupling for the amplitude parameter of the double pulse waveform
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:RATio	Set or query the ratio for the amplitude parameter of the double pulse

Command	Description
	waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:OFFSet	Set or query the offset for the amplitude parameter of the double pulse waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADing:STATe	Enable or disable the channel coupling for the rising edge parameter of the double pulse waveform
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADing:RATio	Set or query the ratio for the rising edge parameter of the double pulse waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADing:OFFSet	Set or query the offset for the rising edge parameter of the double pulse waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:STATe	Enable or disable the channel coupling for the falling edge parameter of the double pulse waveform
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:RATio	Set or query the ratio for the falling edge parameter of the double pulse waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:OFFSet	Set or query the offset for the falling edge parameter of the double pulse waveform in coupling mode

Command	Description
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:STATe	Enable or disable the channel coupling for the width parameter of the double pulse waveform
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:RATio	Set or query the ratio for the width parameter of the double pulse waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:OFFSet	Set or query the offset for the width parameter of the double pulse waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:STATe	Enable or disable the channel coupling for the delay parameter of the double pulse waveform
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:RATio	Set or query the ratio for the delay parameter of the double pulse waveform in coupling mode
[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:OFFSet	Set or query the offset for the delay parameter of the double pulse waveform in coupling mode

Table 32: Coupling Source Commands

6.20 Device Group Commands

Use the following commands to control the device:

Command	Description
AFGControl:APPSwitch	Switchs from AT-Simple-AFG to AT-True-ARB software or SPG software. Note: Serial Pattern Generator (SPG) application is available only with -PAT option.

Command	Description
AFGControl:AWGSwitch	Switchs from AT-Simple-AFG to AT-True-ARB software
AFGControl:CONFigure:CNUMber?	Returns the number of analog channels available on the instrument
AFGControl:COPY	Copies all parameter data from one channel to the other
AFGControl:COUPLEParam	Sets or returns if a specified parameter for Channel N (with $N \neq 1$) must be coupled with the corresponding one on Channel 1.
AFGControl:RESET[:IMMediate]	This command resets the instrument to its default state.
AFGControl:RSTate?	Returns the running state of the generator.
AFGControl:RUN[:IMMediate]	Initiates the output of the waveform
AFGControl:SREStore	Opens a setup file into the generator's setup memory
AFGControl:SSAVe	Saves a setup file into the generator's setup memory
AFGControl:START	Run the instrument
AFGControl:STATus	Return the status of the instrument
AFGControl:STOP	Stop the instrument

Table 33: Device Commands

6.21 Status Group Commands

Status commands let you determine the status of the instrument. The following table describes the status commands

Command	Description
*CLS	Clear all event registers and queue
*ESE	Set or query the Event Status Enable Register
*ESR?	Return the contents of the Standard Event Status Register
*PSC	Set or query power-on status clear
*SRE	Set or query the Service Request Enable Register
*STB?	Read the Status Byte Register
STATus:OPERation:CONDition	Return the contents of the Operation Condition Register
STATus:OPERation:ENABle	Set or query the mask for the Operation Enable Register
STATus:OPERation[:EVENT]	Return the value in the Operation Event Register

STATus:PRESet	Preset SCPI Enable Register
STATus:QUESTionable:CONDition	Return the contents of the Questionable Condition Register
STATus:QUESTionable:ENABle	Set or query the mask for the Questionable Enable Register
STATus:QUESTionable[:EVENT]	Return the value in the Questionable Event Register

Table 34: Status Commands

6.22 System Group Commands

System commands let you control miscellaneous instrument functions. The following table describes the system commands.

Command	Description
[SYSTem:]DATE	Set and query the system date
[SYSTem:]TIME	Set and query the system time
SYSTem:BEEPer[:IMMediate]	Generate an audible tone
SYSTem:BEEPer:STATe	Set or query the beeper state
SYSTem:ERRor[:NEXT]?	Return the contents of the error event queue
SYSTem:KCliCk[:STATe]	Enable or disable the key-click and user interface touch sound; query the status of key clicks
SYSTem:KLOCk[:STATe]	Resets to factory default
SYSTem:SECurity:IMMediate	Resets to factory default
SYSTem:TLOCk[:STATe]	Lock or unlock the touch screen interface and query the lock state of the UI
SYSTem:ULANguage?	Query the language for the display screen
SYSTem:VERSion?	Return the SCPI conformance version information

Table 35: System group commands

6.23 Trace Group Commands

Trace commands allow you to save, recall, set, and query data points in arbitrary buffer memory. The following table describes the trace commands.

Command	Description
TRACe[n][:DATA]	Send or return waveform data in the Arb Buffer of the selected channel
TRACe[n]:POINts	Query the number of points in the Arb Buffer for waveform data

TRACe[n]:SAVE	Save the contents of Arbitrary Buffer to a file in the system
TRACe[n]:RECall	Recall the contents of Arbitrary Buffer from a specific file in the file system

Table 36: Trace group commands

6.24 Trigger Group Commands

The trigger commands let you control all aspects of triggering. The following table describes the trigger commands.

Command	Description
*TRG	Generates a trigger event
ABORT	Reset and initialize the trigger system
TRIGger[:SEQuence][:IMMediate]	Generates a trigger event
TRIGger[:SEQuence]:IMPedance	Set or query the trigger input impedance
TRIGger[:SEQuence]:LEVel	Set or query the trigger threshold level of an input signal
TRIGger[:SEQuence]:SLOPe	Set or query the slope of the trigger signal
TRIGger[:SEQuence]:SOURce	Set or query the source of the trigger signal
TRIGger[:SEQuence]:THREshold	Set or query the trigger threshold of an input signal
TRIGger[:SEQuence]:TIMer	Set or query the internal rate
TRIGger[m]:OUTPut[:AMPLitude]	Set or query the marker out amplitude
TRIGger[m]:OUTPut:DELay	Set or query the skew of the marker out
TRIGger[m]:OUTPut:LINK	Links the marker out to an output channel
TRIGger[m]:OUTPut:STATe	Enables or disables the marker out

Table 37: Trigger group commands

6.25 Marker Group Commands

The marker commands let you control all aspects of output triggering. The following table describes the marker commands.

Command	Description
MARKer:CONTInuous[:SKEW][#]	Sets or returns the skew of the marker m when in countinuous mode
MARKer:LEVel[#]	Sets or returns the Voltage Level parameter of the marker m
MARKer:LINK[#]	Set or returns the channel linked to the marker m
MARKer[:STATe][#]	Sets or returns the enabling state of the marker

MARKer:TRIGgered[:SKEW][#]	Sets or returns the skew of the marker m when in triggered mode
----------------------------	---

Table 38: Marker group commands

6.26 License Group Commands

License commands let you to manage features related to the options that can be installed through a license file.

Command	Description
*OPT?	Returns the implemented options for the AFG.
LICense:ERRor?	Returns a code about license options loading operation.
LICense:HID?	Returns the instrument HostID unique identifier.
LICense:INSTall	Accepts a license and installs it on the instrument.
LICense:LIST?	Returns the license codes as a comma-separated list of string.

Table 39: License group commands

6.27 Calibration and Diagnostic Group Commands

Command	Description
CALibration[:ALL]	Performs a full calibration of the AWG.
DIAGnostic[:ALL]	Performs the self diagnostic procedure.

Table 40: Calibration and Diagnostic Commands

6.28 Waveform Group Commands

Use the following waveform commands to create and transfer waveforms between the instrument and the external controller:

Command	Description
WLIST:LIST?	Returns a list of all waveform names in the waveform list.
WLIST:NAME?	Returns the waveform name of an element which is in a specific position in the waveform list.
WLIST:SIZE?	Returns the size of the waveform list.
WLIST:WAVEform:DATA?	Transfers waveform data of a waveform in waveform list to the external control program.

Command	Description
WLIST:WAVEform:DELeTe	Deletes a waveform from the waveform list or all imported waveforms.
WLIST:WAVEform:IMPort	Imports a waveform from internal driver or USB driver into the waveform list.
WLIST:WAVEform:LENGth?	Returns the size of the specified waveform in the waveform list.
WLIST:WAVEform:PREDeFined?	Returns true or false based on whether the waveform is predefined.
WLIST:WAVEform:TYPE?	Returns the type of the waveform (analog or digital).

Table 41: Waveform group commands

6.29 Multi Instrument Groups Commands

Use the following commands to synchronize multiple instruments.
The multi instrument synchronization is available on 8 channel models only.

Command	Description
MIM:CAPTure	This command captures all slave instruments
MIM:ID?	This command returns the identification number of the device in the multi-instrument chain.
MIM:CAPTured?	Returns whether the instrument has been captured by a master.
MIM:FORWard:?	Returns whether there is another instrument connected to the "Sync Out" port.
MIM:SLAve?	Returns whether there is another instrument connected to the "Sync In" port.
MIM:NUMber?	Returns the number of captured devices.
MIM:RELease	This command release all the captured instruments.

Table 42: Multi-Instrument group commands and their descriptions

7. COMMAND DESCRIPTIONS

7.1 IEEE MANDATED AND OPTIONAL GROUP COMMANDS

Command	*CAL? (Query Only)
Description	This query runs the self calibration procedure and returns a status code indicating the success or failure of self calibration. During the self calibration the AWG panel will be locked. *CAL? is equivalent to the CALibration[:ALL] command
Group	IEEE Mandated and Optional Group Command
Syntax	*CAL?
Related Commands	CALibration[:ALL]
Arguments	None
Returns	A single <NR1> value, {0 -1}
Example	*CAL? Might return -1 on any failure, 0 on all pass.

Table 43: *CAL?

Command	*CLS
Description	This command clears all the event registers in Standard Event Status Register (SESR), the Status Byte Register SBR (except the MAV bit) and queues that are used in the arbitrary function generator status and event reporting system. There is no query form of this command
Group	IEEE Mandated and Optional Group Command Status
Syntax	*CLS
Related Commands	None
Arguments	None
Returns	None
Example	*CLS Clears all the event registers and queues.

Table 44: *CLS

Command	*ESE
Description	This command sets or queries the bits in the Event Status Enable Register (ESER) used in the status and events reporting system of the arbitrary function generator. The ESER prevents events from being reported to the Status Byte Register (STB). The query form of this command returns the contents of the ESER.
Group	IEEE Mandated and Optional Group Command

	Status
Syntax	*ESE <bit_value> *ESE
Related Commands	*CLS *ESR *SRE *STB?
Arguments	<NR1>::=<bit_value>
Returns	<bit_value>
Example	*ESE 177 Sets the ESR to 177 (binary 10110001), which determines that the PON, CME, EXE, and OPC bits should be set in SBR register. *ESE? Example returns: 186, which indicates that the ESR contains the binary value 10111010.

Table 45: *ESE

Command	*ESR? (Query Only)
Description	This command returns the contents of the Standard Event Status Register (SESR) used in the status events reporting system in the arbitrary function generator. This command clears the SESR when it reads it. This command is query only.
Group	IEEE Mandated and Optional Group Command Status
Syntax	*ESR?
Related Commands	*CLS *ESE *SRE *STB
Arguments	None
Returns	<NR1> Indicates that the contents of the SESR is a decimal integer.
Example	*ESR? Might return 181, which indicates that the SESR contains the binary number 10110101.

Table 46: *ESR?

Command	*IDN? (Query only)
Description	This command queries the instrument identifier.
Group	IEEE Mandated and Optional Group Command System

Syntax	*IDN?
Related Commands	None
Arguments	None
Returns	<Manufacturer>,<Model>,<Serial Number>,<SCPI Version>,<Software Version> where: - <Manufacturer>::= ACTIVE TECHNOLOGIES, - <Model>::=AWG401X, - <Serial Number>::=indicates an actual serial number, - <SCPI Version>::=SCPI:1999.0, - <Software Version>::={AFG AWG DPG}.{X.X.X} where: • AFG AWG DPG specifies the application (AFG = Simple Function Generator, AWG = True Arb, DPG = Serial Pattern Generator), • X.X.X. specifies the revision.
Example	*IDN? Example returns: ACTIVE TECHNOLOGIES,AWG4012,T0302I000001,SCPI:1999.0,SV:AFG.3.0.29.

Table 47: *IDN?

Command	*OPC
Description	This command causes the instrument to sense the internal flag referred to as the “No-Operation-Pending” flag. The command sets bit 0 in the Standard Event Status Register when pending operations are complete. The query form returns a “1” when the last overlapping command operation is finished.
Group	IEEE Mandated and Optional Group Command Synchronization
Syntax	*OPC *OPC?
Related Commands	None
Arguments	None
Returns	<execution complete>::=1 Where: “1” indicates that all pending operations are complete.
Example	*OPC? Returns 1 to indicate that the last issued overlapping command is finished.

Table 48: *OPC

Command	*OPT? (Query Only)
Description	This command returns the installed options and application licenses.
Group	IEEE Mandated and Optional Group Command License
Syntax	*OPT?
Related Commands	LICense:LIST
Arguments	None
Returns	<opt> ::= <option_description>: <option_value> <option_description> ::= <string> <option_value> ::= <string>
Example	*OPT? Might return the following string: "Memory Option: 128 MSample, Digitals Option: No Digitals, Amplitude Option: 6 VPP"

Table 49: *OPT?

Command	*PSC
Description	This command sets and queries the power-on status flag that controls the automatic power-on execution of SRER and ESER. When *PSC is true, SRER and ESER are set to 0 at power-on. When *PSC is false, the current values in the SRER and ESER are preserved in nonvolatile memory when power is shut off and are restored at power-on.
Group	IEEE Mandated and Optional Group Command Status
Syntax	*PSC {0 1} *PSC?
Related Commands	None
Arguments	<NR1>=0 Sets the power-on status clear flag to false, disables the power-on clear, and allows the instrument to possibly assert SRQ after power-on. <NR1>≠0 Sets the power-on status clear flag true; sending *PSC 1 therefore enables the power-on status clear and prevents any SRQ assertion after power-on
Returns	A single <NR1> value.
Example	PSC 0

	Sets the power-on status clear flag to false.
--	---

Table 50: *PSC

Command	*RCL (No Query Form)
Description	This command restores the state of the instrument from a copy of the settings stored in a specified setup memory location. The settings are stored using the *SAV command.
Group	IEEE Mandated and Optional Group Command Memory
Syntax	*RCL {0 1 2 3 4}
Related Commands	*SAV
Arguments	0, 1, 2, 3, or 4: specifies the setup memory. Location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration, location 2 refers to "MEM_2" configuration, location 3 refers to "MEM_3" configuration and location 4 refers to "MEM_4" configuration.
Returns	None
Example	*RCL 3 Restores the instrument from a copy of the settings stored in memory location 3

Table 51: *RCL

Command	*RST (No Query Form)
Description	This command resets the instrument to its default state. There is no query form of this command.
Group	IEEE Mandated and Optional Group Command System
Syntax	*RST
Related Commands	None
Arguments	None
Returns	None
Example	*RST Resets the instrument.

Table 52: *RST

Command	*SAV (No Query Form)
Description	This command stores the current instrument configuration to a specified setup memory location.

	At the power off or when the application is closed, the current configuration is automatically saved and restored when the application is reopened. Note: If the specified setup memory is locked, this command causes an error.
Group	IEEE Mandated and Optional Group Command Memory
Syntax	*SAV {0 1 2 3 4}
Related Commands	*RCL
Arguments	0, 1, 2, 3, or 4: specifies the setup memory. Location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration, location 2 refers to "MEM_2" configuration, location 3 refers to "MEM_3" configuration and location 4 refers to "MEM_4" configuration.
Returns	None
Example	*SAV 2 Saves the current instrument state in the memory location 2.

Table 53: *SAV

Command	*SRE
Description	This command sets and queries the bits in the Service Request Enable Register (SRER).
Group	IEEE Mandated and Optional Group Command Status
Syntax	*SRE <bit_value> *SRE?
Related Commands	None
Arguments	<bit_value>::=<NR1> Where: <NR1> is a value from 0 through 255. The binary bits of the SRER are set according to this value. Using an out-of-range value causes an execution error.
Returns	<bit_value>
Example	*SRE 48 Sets the bits in the SRER to binary 00110000. *SRE? Example returns: 32, which means that the bits in the SRER have the binary value of 00100000

Table 54: *SRE

Command	*STB? (Query Only)
Description	This command returns the contents of the Status Byte Register (SBR) using the Master Summary Status (MSS) bit. This command is query only.
Group	IEEE Mandated and Optional Group Command Status
Syntax	*STB?
Related Commands	None
Arguments	<bit_value>::=<NR1> Where: <NR1> is a value from 0 through 255. The binary bits of the SBR are set according to this value. Using an out-of-range value causes an execution error.
Returns	<NR1>
Example	*STB? Example returns: 96, which indicates that the SBR contains the binary value 01100000.

Table 55: *STB?

Command	*TRG
Description	This command generates a trigger event. There is no query form of this command.
Group	IEEE Mandated and Optional Group Command Trigger
Syntax	*TRG
Related Commands	ABORT† TRIGger[:SEquence][:IMMediate]
Arguments	None
Returns	None
Example	*TRG Generates a trigger event.

Table 56: *TRG

Command	*TST? (Query Only)
Description	This command executes the Self Diagnostic procedure and returns a status code indicating the success or failure of procedure. During the self calibration the AWG panel will be locked.
Group	IEEE Mandated and Optional Group Command
Syntax	*TST?
Related Commands	None

Arguments	None
Returns	A single <NR1> value. A returned value of 0 indicates no error.
Example	*TST? Might return -1, indicating that the Self Diagnostic procedure failed.

Table 57: *TST?

Command	*WAI
Description	This command is used to ensure that the previous command is complete before the next command is issued.
Group	IEEE Mandated and Optional Group Command Synchronization
Syntax	*WAI
Related Commands	*OPC
Arguments	None
Returns	None
Example	*WAI Prevents the instrument from executing any further commands or queries until all pending commands that generate an OPC message are complete.

Table 58: *WAI

7.2 FILE SYSTEM GROUP COMMANDS

Command	FILEsystem:CATalog? (Query only)
Description	This command returns the list of all file and directory contained in the Current Working Directory. This command is query only. NOTE: By default "C:\Users\awg4010\Pictures\Saved Pictures" is the current directory of the file system. NOTE: In the description of the remaining commands, the 'awg4010' folder will be replaced by <username> folder. NOTE: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by File System commands; it's subdirectories can be accessed via the FILEsystem:CWDirectory command.
Group	File System
Syntax	FILEsystem:CATalog?
Related Commands	FILEsystem:CWDirectory
Arguments	None
Returns	<NR1>,<NR1>[,<file_name>,<file_type>,<file_size>]... Where: The first <NR1> indicates the total amount of storage currently used, in bytes. The second <NR1> indicates the available free space in storage, in bytes. <file_name> is the exact name of a file. <file_type> is DIR for directory, otherwise it is blank. <file_size> is the size of the file, in bytes.
Alias	MMEMory:CATalog:ALL?
Example	FILEsystem:CATalog? Example returns: 32751616,27970560,"SAMPLE1.zip,5412"

Table 59: FILEsystem:CATalog?

Command	FILEsystem:COPY
Description	This command copies source_file into target_file. The file names must include any file extension. If target_file already exists it will be overwritten. Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by this command commands. Note 2: Only files with the following extension can be copied: .jpeg, .png, .bmp, .jpg, .gif, .tiff, .zip, .txt, .trc, .bin.
Group	File System

Syntax	FILEsystem:COPY <filename1>,<filename2>
Related Commands	FILEsystem:LOCK FILEsystem:DELeTe FILEsystem:CWDiretory
Arguments	<filename1>::=<Qstring> specifies a source file name in the instrument file system. <filename2>::=<Qstring> specifies a destination file name in the instrument file system. You can insert absolute or relative path: if the path is relative, it starts from the Current Working Directory.
Returns	None
Alias	MMEMory:COPY
Example	FILEsystem:COPY ""source.txt","D:\My_Waves\target.txt" Copies "source.txt" located in "C:\Users\<username>\Pictures\Saved Pictures" directory in "target.txt" located in "D:\My_Waves" directory.

Table 60: FILEsystem:COPY

Command	FILEsystem:CWDiretory
Description	This command changes or queries the current working directory in the instrument file system. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by this command commands.
Group	File System
Syntax	FILEsystem:CWDiretory <directory_path> FILEsystem:CWDiretory?
Related Commands	FILEsystem:LOCK FILEsystem:DELeTe
Arguments	<directory_name>::=<Qstring> indicates the working directory in the file system that you want to change. The default value is: C:\Users\awg4010\Pictures\Saved Pictures
Returns	<directory_name>::=<Qstring>
Alias	MMEMory:CDIReactory
Example	FILEsystem:CWDiretory "\MyDir" Changes the current directory to ... \MyDir (which must be a subdirectory of ... \Saved Pictures).

Table 61: FILEsystem:CWDiretory

Command	FILEsystem:DELeTe
Description	This command deletes a file or directory from the instrument's accessible files system. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by this command commands.
Group	File System
Syntax	FILEsystem:DELeTe <file_name>
Related Commands	FILEsystem:CWDiretory MEMory:SAVE
Arguments	<file_name>::=<Qstring> specifies a file to be deleted. You can insert absolute or relative path: if the path is relative, it starts from the Current Working Directory.
Return	None
Alias	MMEMory:DELeTe
Example	FILEsystem:DELeTe "text.txt " Deletes the file " text.txt" in the current working directory of the file system.

Table 62: FILEsystem:DELeTe

Command	FILEsystem:HARDdisk? (Query only)
Description	This command queries the hard disk drive. This command is query only.
Group	File System
Syntax	FILEsystem:HARDdisk?
Related Commands	FILEsystem:UDISK?
Arguments	None
Return	<driver1;driver2;driver3...>
Example	FILEsystem:HARDdisk? Example returns: "C:\;D:\;E:\;F:\".

Table 63: FILEsystem:HARDdisk?

Command	FILEsystem:LOCK? (Query only)
Description	No longer available. Use MEMory:STATe:LOCK command.
Group	File System
Syntax	FILEsystem:LOCK?
Related Commands	FILEsystem:CWDiretory
Arguments	None
Return	0

Example	FILEsystem:LOCK? Returns 0.
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Table 64: FILEsystem:LOCK

Command	FILEsystem:MDIRectory (No Query Form)
Description	This command creates a directory in the file system. Note that the process is iterative, then it can create directory and subdirectories. There is no query form of this command. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by this command commands.
Group	File System
Syntax	FILEsystem:MDIRectory <directory_name>
Related Commands	None
Arguments	<directory_name>::=<Qstring> specifies a directory name to be created. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Return	None
Alias	MMEMory:MDIRectory
Example	FILEsystem:MDIRectory "SAMPLE1" Creates a directory named "SAMPLE1" in the Current Working Directory.

Table 65: FILEsystem:MDIRectory

Command	FILEsystem:UDISK (Query only)
Description	This command queries the USB-disk drive. This command is query only.
Group	File System
Syntax	FILEsystem:UDISK?
Related Commands	FILEsystem:HARDdisk?
Arguments	None
Return	<driver1;driver2;driver3...>
Example	FILEsystem:UDISK? Example returns: "G:\;H:\;"

Table 66: FILEsystem:UDISK?

7.3 MEMORY GROUP COMMANDS

Command	DELeTe:SEtUp (No Query Form)
Description	This command deletes a configuration from the Configuration List.
Group	Memory
Syntax	DELeTe:SEtUp <cfg_name>
Related Commands	MEMory:STATe:DELeTe
Arguments	<cfg_name>::=<string>
Returns	None
Example	DELeTe:SEtUp "test" Deletes the configuration named test.

Table 67: DELeTe:SEtUp

Command	MEMory:NSTates? (Query Only)
Description	This command returns the total number of available configurations saved in the Configuration List memory.
Group	Memory
Syntax	MEMory:NSTates?
Related Commands	None
Arguments	None
Returns	A single <NR1> value
Example	MEMory:NSTates? Might return 2.

Table 68: MEMory:NSTates?

Command	MEMory:RECall
Description	This command loads as current project a specified configuration from Configuration List. If the specified configuration does not exist or its format is wrong, this command causes an error. There is no query form of this command.
Group	Memory
Syntax	MEMory:RECall <file_name>
Related Commands	MEMory:SAVE
Arguments	<file_name>::=<Qstring> specifies a setup file to recall.
Returns	None
Example	MEMory:RECall "SETUP1" Loads the configuration named SETUP1 present in the Configuration List as current setup.

Table 69: MEMory:RECall

Command	MEMory:SAVE
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Description	This command saves the current setup configuration of the instrument in the Configuration List. If another configuration with the same name is already present, an error occurs.
Group	Memory
Syntax	MEMory:SAVE <file_name>
Related Commands	MEMory:RECall
Arguments	<file_name>::=<Qstring> specifies a file name in the Configuration List.
Returns	None
Example	MEMory:SAVE "SETUP1" Saves the current project file to a file named "SETUP1 " in the Configuration List.

Table 70: MEMory:SAVE

Command	MEMory:STATe:CATalog? (Query Only)
Description	List the names of available configurations saved in the instrument Configuration List.
Group	Memory
Syntax	MEMory:STATe:CATalog?
Related Commands	None
Arguments	None
Returns	<cfg_name>[,<cfg_name>[,<cfg_name>[,<cfg_name>]]] <cfg_name> ::= <string>
Example	MEMory:STATe:CATalog? Might return Configuration_20190110_183606_568,SETUP1,test

Table 71: MEMory:STATe:CATalog?

Command	MEMory:STATe:NAME
Description	This command copies a configuration with "src_name" in "dst_name" configuration. If a configuration with "dst_name" is already present an error will occur. The query command returns the names referred to the location 0, 1, 2, 3, 4. The names will be ever the same: "MEM_0", "MEM_1", "MEM_2", "MEM_3", "MEM_4".
Group	Memory
Syntax	MEMory:STATe:NAME {0 1 2 3 4 <src_cfg_name>},{0 1 2 3 4 <dst_cfg_name>} MEMory:STATe:NAME? {0 1 2 3 4}
Related Commands	None

Arguments	0, 1, 2, 3, 4, <src_cfg_name>, <dst_cfg_name> where: <src_cfg_name> ::= <string> specifies the source configuration name. <dst_cfg_name> specifies the destination configuration name. 0, 1, 2, 3, or 4: specifies the setup memory. Location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration, location 2 refers to "MEM_2" configuration, location 3 refers to "MEM_3" configuration and location 4 refers to "MEM_4" configuration.
Returns	<cfg_name> where <cfg_name> ::= <string>
Example	MEM:STAT:NAME 1,"TEST_RACK_1" Copies the configuration "MEM_1" in "TEST_RACK_1" MEM:STAT:NAME? 2 Might return MEM_2

Table 72: MEMory:STATe:NAME

Command	MEMory:STATe:DELeTe (No Query Form)
Description	This command deletes the specified configuration. If the specified configuration is locked or not present this command causes an error.
Group	Memory
Syntax	MEMory:STATe:DELeTe {0 1 2 3 4 <"cfg_name">}
Related Commands	DELeTe:SETUp
Arguments	0, 1, 2, 3, 4 or <cfg_name> where: <cfg_name> ::= <string> specifies the configuration. 0, 1, 2, 3, or 4: specifies the setup memory. Location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration, location 2 refers to "MEM_2" configuration, location 3 refers to "MEM_3" configuration and location 4 refers to "MEM_4" configuration.
Returns	None
Example	MEMory:STATe:DELeTe 1 Deletes the configuration "MEM_1". MEMory:STATe:DELeTe "Conf_1" Deletes the configuration named Conf_1.

Table 73: MEMory:STATe:DELeTe

Command	MEMory:STATe:LOCK
Description	This command sets or queries whether to lock the specified configuration. If you lock a configuration, you cannot overwrite or delete the setup file.

Group	Memory
Syntax	MEMory:STATe:LOCK {1 2 3 4 <"cfg_name">},{ON OFF 0 1} MEMory:STATe:LOCK? {1 2 3 4 <"cfg_name">}
Related Commands	None
Arguments	0, 1, 2, 3, 4, <cfg_name>, where: <cfg_name>::= <string> specifies the configuration to locked or queried. 0, 1, 2, 3, or 4: specifies the setup memory. Location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration, location 2 refers to "MEM_2" configuration, location 3 refers to "MEM_3" configuration and location 4 refers to "MEM_4" configuration. ON or <NR1>≠0 locks the specified configuration. OFF or <NR1>=0 allows you to overwrite or delete the specified configuration.
Returns	<NR1> 0 means that the selected memory is not locked, 1 means that it is locked.
Example	MEMory:STATe:LOCK 1,ON Locks the MEM_1 configuration. MEMory:STATe:LOCK "My_Configuration",ON Locks the configuration My_Configuration. MEMory:STATe:LOCK? 1 Might return 1.

Table 74: MEMory:STATe:LOCK

Command	MEMory:STATe:VALid? (Query only)
Description	This command returns the availability of a configuration.
Group	Memory
Syntax	MEMory:STATe:VALid? {0 1 2 3 4 <"src_cfg_name">}
Related Commands	None
Arguments	0, 1, 2, 3, 4, <src_cfg_name> where: <src_cfg_name> ::= <string> specifies the configuration name. 0, 1, 2, 3, or 4: specifies the setup memory. Location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration, location 2 refers to "MEM_2" configuration, location 3 refers to "MEM_3" configuration and location 4 refers to "MEM_4" configuration.
Returns	<NR1>

	1 means that the specified setup memory has been saved. 0 means that the specified setup memory has been deleted.
Example	MEMory:STATe:VALid? 0 Might return 1 that means that the setup memory MEM_0 has been saved.

Table 75: MEMory:STATe:VALid?

Command	RECALL:SETUp (No Query Form)
Description	This command recalls a configuration. This command is equivalent to "AFGControl:SREStore".
Group	Memory
Syntax	RECALL:SETUp <cfg_name>
Related Commands	None
Arguments	<cfg_name>::=<string>
Returns	None
Example	RECALL:SETUp "test" Restores the instrument configuration named "test".

Table 76: RECALL:SETUp

7.4 Mass Memory Group Commands

Command	MMEMory:CATalog[:ALL]? (Query only)
Description	This command returns a list of informations concerning the contents of the current directory of the file system on the instrument. In particular it returns the list of all files and directories present there specifying their names and sizes. It reports also the dimension of free space of the mass storage in bytes. NOTE: By default "C:\Users\awg4010\Pictures\Saved Pictures" is the current directory of the file system. NOTE: In the description of the remaining commands, the 'awg4010' folder will be replaced by <username> folder. NOTE: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands; it's subdirectories can be accessed via the MMEMory:CDIRectory command.
Group	Mass memory
Syntax	MMEMory:CATalog[:ALL]? [<msus>]
Related Commands	MMEMory:CDIRectory MMEMory:MSIS
Arguments	<msus> (mass storage unit specifier) ::= <string>
Returns	<NR1>,<file_entry>,<file_entry>,<file_entry>,... where: <NR1> indicates the free space of the mass storage in bytes, <file_entry> ::= "<file_name>,<file_type>,<file_size>" where: <file_name> ::= <string> is the exact name of the file, <file_type> ::= is DIR for an entry that is a directory, empty/blank otherwise, <file_size> ::= <NR1> is the size of the file in bytes. For <file_type> marked DIR, the file size will always be 0.
Alias	FILEsystem:CATalog?
Example	MMEMory:CATalog? It might return: 3878652,"SAMPLE1.ZIP",2948,"aaa.txt",1024,"MY_WAVES,DIR,0"

Table 77: MMEMory:CATalog[:ALL]

Command	MMEMory:CDIRectory
Description	This command sets or returns the current directory of the file system on the instrument. This command is strictly related to MMEMory:MSIS command that permits to set the mass storage unit <msus> namely the unit used by all MMEMory commands.

	The current directory for the programmatic interface is different from the currently selected directory in the Windows Explorer on the instrument. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEemory commands.
Group	Mass memory
Syntax	MMEemory:CDIRECTory [<directory_name>] MMEemory:CDIRECTory?
Related Commands	None
Arguments	<directory_name> ::= <string>
Returns	<directory_name>
Alias	FILEsystem:CWDIRECTory
Example	Assuming the current <msus> is "C:" and current directory is "C:\Users\<username>\Pictures\Saved Pictures". MMEemory:CDIRECTORY "configurations" Changes the current directory to "C:\Users\<username>\Pictures\Saved Pictures\configurations". Assuming the current <msus> is "D:" MMEemory:CDIRECTORY "tmp" Changes the current directory to "D:\tmp" MMEemory:CDIRECTORY? Returns "tmp" if the current directory is "D:\tmp". MMEemory:CDIRECTORY Changes the current directory to "\" if <msus> is a removable device, or "Users\<username>\Pictures\Saved Pictures" if <msus> is "C:"

Table 78: MMEemory:CDIRECTory

Command	MMEemory:COPY (No Query Form)
Description	This command copies source_file into target_file. The file names must include any file extension. If target_file already exists it will be overwritten.

	Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEemory commands. Note 2: Only files with the following extension can be copied: .jpeg, .png, .bmp, .jpg, .gif, .tiff, .zip, .txt, .trc, .bin.
Group	Mass memory
Syntax	MMEemory:COPY <source_file>,<target_file>
Related Commands	None
Arguments	<source_file>::= <string> <target_file>::= <string> Both of them could be absolute or relative (respect current directory) paths.
Returns	None
Alias	FILEsystem:COPY
Example	Assuming the current <msus> is "C:" and current directory is "C:\Users\<username>\Pictures\Saved Pictures". MMEemory:COPY "source.txt","D:\My_Waves\target.txt" Copies "source.txt" located in "C:\Users\<username>\Pictures\Saved Pictures" directory in "target.txt" located in "D:\My_Waves" directory .

Table 79: MMEemory:COPY

Command	MMEemory:DATA
Description	This command sets or returns block data to/from a file in the current mass storage device. The file path may contain a full file path. However, if the file path only contains a file name, the current directory is assumed. Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEemory commands. Note 2: Only files with the following extension can be manipulated: .jpeg, .png, .bmp, .jpg, .gif, .tiff, .zip, .txt, .trc, .bin.
Group	Mass memory
Syntax	MMEemory:DATA <file_name>,<start_index>,<block_data> MMEemory:DATA? <file_name>[,<start_index>[,<size>]]

Related Commands	MMEemory:CDIRectory, MMEemory:MSIS
Arguments	<file_name> ::= <string> could be absolute or relative path. <start_index> ::= <NR1> is the index of byte of the desired <file_name> where writing/reading operations will start. <size> ::= <NR1> is the size, in bytes, to write/read. <block_data> ::= see Block Data Format chapter (IEEE 488.2 data block).
Returns	<block_data> ::= IEEE 488.2 block data format.
Example	Assuming the current <msus> is "C:" and current directory is "C:\Users\<username>\Pictures\Saved Pictures". MMEemory:DATA "123.TXT",0,#13ABC I Loads "ABC" into 123.TXT in the current directory, starting from position 0. MMEemory:DATA "data.txt",1024,#42048XXXXXX... Inserts 2048 bytes specified by XXXXXX... values of in file "data.txt" in the current directory, starting from position 1024. MMEemory:DATA? "D:\tmp\waveform.txt",2048,1024 Returns #41024XXXX.... where XXXX.... are 1024 bytes of file "waveform.txt" located in "D:\tmp" starting from 2048-th byte.

Table 80: MMEemory:DATA

Command Description	MMEemory:DATA:SIZE? (Query Only) This command returns the size in bytes of a selected file. Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEemory commands. Note 2: Only files with the following extension can be manipulated: .jpeg, .png, .bmp, .jpg, .gif, .tiff, .zip, .txt, .trc, .bin.
Group	Mass memory
Syntax	MMEemory:DATA:SIZE? <file_name>
Related Commands	MMEemory:CDIRectory, MMEemory:MSIS
Arguments	<file_name> ::= <string> it could be absolute or relative path.

Returns	<NR1> is the size, in bytes, of the selected file
Example	Assuming the current <msus> is "C:" and current directory "C:\Users\<username>\Pictures\Saved Pictures". MMEMORY:DATA:SIZE? "data.bin" Might return 1024. MMEMORY:DATA:SIZE? "D:\tmp\waveform.txt" Might return 65535.

Table 81: MMEMory:DATA:SIZE?

Command Description	MMEMory:DELeTe (No Query Form) This command deletes a file or directory from the instrument's accessible files system. Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. Note 2: Only files with the following extension can be deleted: .jpeg, .png, .bmp, .jpg, .gif, .tiff, .zip, .txt, .trc, .bin.
Group	Mass memory
Syntax	MMEMory:DELeTe <file_name>[,<msus>]
Related Commands	MMEMory:CDIRectory, MMEMory:MSIS
Arguments	<file_name> ::= <string> could be absolute or relative path. <msus> (mass storage unit specifier) ::= <string>
Returns	None
Alias	FILEsystem:DELeTe
Example	Assuming the current <msus> is "C:" and current directory is "C:\Users\<username>\Pictures\Saved Pictures". MMEMORY:DELETE "data.bin" Deletes "data.bin" from the current directory. MMEMORY:DELETE "\my\proj\awg\test.txt","D:" Deletes "test.txt" from "D:\my\proj\awg" directory.

Table 82: MMEMory:DELeTe

Command	MMEMory:DOWNload:DATA (No Query Form)
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Description	Downloads data from the host computer to a file in the instrument. The filename must have been previously specified by MMEMory:DOWNload:FNAME. The data in <binary_block> is written to the select file, and any data previously stored in the file is lost. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands.
Group	Mass Memory
Syntax	MMEMory:DOWNload:DATA <binary_block>
Related Commands	MMEMory:DOWNload:FNAME
Arguments	Any IEEE-488 definite or indefinite block
Returns	None
Example	Writes the word "Hello" to the file "D:\Myfile.txt" on internal storage. MMEM:DOWN:FNAME "D:\Myfile.txt" MMEM:DOWN:DATA #15Hello

Table 83: MMEMory:DOWNload:DATA

Command	MMEMory:DOWNload:FNAME (No Query Form)
Description	This command creates or opens the specified filename prior to writing data to that file with MMEMory:DOWNload:DATA. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands.
Group	Mass Memory
Syntax	MMEMory:DOWNload:FNAME <filename>
Related Commands	MMEMory:DOWNload:DATA
Arguments	Any valid file name
Returns	None
Example	Writes the word "Hello" to the file "D:\Myfile.txt" on the internal flash file system. MMEM:DOWN:FNAME "D:\Myfile.txt" MMEM:DOWN:DATA #15Hello

Table 84: MMEMory:DOWNload:FNAME

Command	MMEMory:EXPort (No Query Form)
Description	This command exports a waveform from the current waveform list to an archive file (.zip).

	Note 1 .zip is a zip file with native format. Note 2: It's not possible export a predefined waveform from waveform list. Note 3: If the archive file name is already present in the destination directory, the file will be overwritten. Note4: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. The archive path may contain a full file path. However, if the file path only contains an archive name, the archive waveform will be exported starting from the current directory.
Group	Mass memory
Syntax	MMEMory:EXPort <wfm_name>,<archive_name>
Related Commands	None.
Arguments	<wfm_name>::=<string> is a name in waveform list, <archive_name>::=<string>.zip could be absolute or relative path. The extension .zip must always be specified in archive name.
Returns	None
Example	Assuming the current <msus> is "C:" and current directory "C:\Users\<username>\Pictures\Saved Pictures". MMEMORY:EXPORT "sine1024","d:\waveforms\arc.zip" Exports a waveform named "sine1024" in to "d:\waveform\arc.zip" file.

Table 85: MMEMory:EXPort

Command	MMEMory:IMPort (No Query Form)
Description	This command imports a file into the current configuration waveforms list. Note 1: It's possible import a file only with the following extensions: .txt, .trc, .bin and .zip - native format-.

	Note 2: If the waveform name (wfm_name) has already present in waveform list, an error will be occurred. Note 3: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. The file path may contain a full file path. However, if the file path only contains a file name, the current directory is assumed as destination directory.
Group	Mass memory
Syntax	MMEMory:IMPort <wfm_name>,<archive_name>
Alias	WLISt:WAVEform:IMPort
Related Commands	MMEMory:OPEN
Arguments	<wfm_name>::=<string>, <archive_name> ::=<string>.{zip trc txt bin} could be absolute or relative path.
Returns	None
Example	Assuming the current <msus> is "C:" and current directory is "C:\Users\<username>\Pictures\Saved Pictures". MMEMORY:IMPORT "Test1","D:\TestFiles\waveform1.zip" Imports waveform1.zip file from the removable unit D: in waveform Test1 of waveform list. MMEMORY:IMPORT "Test2"," waveform2.txt" Imports waveform2.txt file in waveform Test2 of waveform list.

Table 86: MMEMory:IMPort

Command	MMEMory:LOAD:ALL (No Query Form)
Description	This command uploads a complete configuration present in an archive (.zip) and apply it in place of the current configuration. This operation is performed in two steps: 1. First the archive is loaded into the configurations list. Note: • The name of the archive file is used as the name of the imported configuration (my_configuration.zip => my_configuration). • If a configuration with the same name is already present, the configuration is replaced.

	• If a configuration with the same name is already present and is locked then an error occurs. • This operation is the same as that it can be done through the software menu: More -> Load From -> Import. 2. Once the archive has been imported into the configuration list, the new configuration will be loaded as current configuration. Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. The archive path may contain a full file path. However, if the file path only contains an archive name, the archive will be searched starting from the current directory. Note 2: When this command is executed the instrument must be in idle state.
Group	Mass memory
Syntax	MMEMory:LOAD:ALL <archive_name>
Related Commands	None
Arguments	<archive_name> ::= <string>.zip specifies a configuration file to be loaded. It could be absolute or relative path.
Returns	None
Example	Assuming the current <msus> is "C:" and current directory is "C:\Users\<username>\Pictures\Saved Pictures". MMEM:LOAD:ALL "configurations\my_configuration.zip" Loads a complete instrument setup from the file "my_configuration.zip" located in "C:\Users\<username>\Pictures\Saved Pictures\configurations" directory.

Table 87: MMEMory:LOAD:ALL

Command Description	MMEMory:LOAD:STaTe (No Query Form) This command imports a configuration saved in an archive (.zip) into the configurations list with the specified name. Note 1: If a configuration with the same name is already present in configuration list then it will be replaced.
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	Note 2: If a configuration with the same name is already present in configuration list and it's locked then an error will occur. Note 3: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEemory commands. The archive path may contain a full file path. However, if the file path only contains an archive name, the archive will be searched starting from the current directory. Note 4: This operation is equivalent to what the user can do through the following user interface menu: Other -> Load from -> Import
Group	Mass memory
Syntax	MMEemory:LOAD:STATe <archive_name>,{0 1 2 3 4 <cfg_name>}
Related Commands	MEMory:STATe:LOCK, MMEemory:STORe:STATe
Arguments	<archive_name>::=<string>.zip specifies a configuration file to be loaded. It could be absolute or relative path. It possible specify the configuration like: - 0 1 2 3 4: location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration... - <cfg_name>::=<string>: specifies the configuration name where will be saved the loaded configuration.
Returns	None
Example	Assuming the current <msus> is "C:" and current directory is "C:\Users\<username>\Pictures\Saved Pictures". MMEemory:LOAD:STATE "SETUP1.zip",1 Loads the configuration file "SETUP1.zip" located in the current directory in "MEM_1".

Table 88: MMEemory:LOAD:STATe

Command	MMEemory:MDIRectory (No Query Form)
Description	This command creates a new directory in the current path on the mass storage system. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEemory commands.

Group	Mass Memory
Syntax	MMEemory:MDIRectory <directory_name>
Related Commands	MMEemory:CDIRectory MMEemory:MSIS
Arguments	<directory_name> ::= <string>
Returns	None
Alias	FILEsystem:MDIRectory
Example	MMEemory:MDIRectory "Waveform" Creates the directory "Waveform" in the current directory.

Table 89: MMEemory:MDIRectory

Command Description	MMEemory:MOVE (No Query Form) Moves <file1> to <file2>. The file names must include the file extension. The file path may contain a full file path. However, if the file path only contains a file name, the file will be searched starting from the current directory. If <file2> already exists it will be overwritten. Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEemory commands. Note 2: Only files with the following extension can be moved: .jpeg, .png, .bmp, .jpg, .gif, .tiff, .zip, .txt, .trc, .bin.
Group	Mass Memory
Syntax	MMEemory:MOVE <file1>,<file2>
Related Commands	None
Arguments	<file1>,<file2> they could be absolute or relative paths.
Returns	None
Example	MMEemory:MOVE "MySetup.zip","D:\Backup.zip" MMEemory:MOVE "D:\arbMonday.txt", "D:\arbTuesday.bin"

Table 90: MMEemory:MOVE

Command Description	MMEemory:MSIS This command selects or returns a mass storage device used by all MMEemory commands. <msus> specifies a drive using a drive letter. The drive letter can represent hard disk drives or external USB storage memory.
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	NOTE 1: Every time the <msus> changes the current directory is reset to the root folder. NOTE 2: If the new <msus> is the "C:" unit, the current directory is reset to "C:\Users\awg4010\Pictures\Saved Pictures" folder.
Group	Mass Memory
Syntax	MMEMory:MSIS [<msus>] MMEMory:MSIS?
Related Commands	MMEMory:CDIRectory
Arguments	<msus> (mass storage unit specifier)::= <string>
Returns	<msus> Note: if the mass storage device has not been defined, the returned <msus> value is the system's default drive which is typically the "C:" drive.
Example	MMEMORY:MSIS "D:" Changes the <msus> to the D: drive where D: is a USB memory. MMEMORY:MSIS? Might return "E:", assuming the current <msus> is the E: drive.

Table 91: MMEMory:MSIS

Command	MMEMory:OPEN (No Query Form)
Description	This command imports a waveform stored in a file (.zip, .txt, .trc, .bin) into the waveform list of the instrument. Note 1: The waveform name will be derived directly from the archive name. Note 2: If the waveform name is already present in the waveform list then an error will occur. Note 3: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. The waveform path may contain a full file path. However, if the file path only contains a waveform name, the waveform will be searched starting from the current directory.
Group	Mass memory
Syntax	MMEMory:OPEN <filepath>

Related Commands	None
Arguments	<filepath> ::= <string>.{zip txt trc bin} could be an absolute or relative path.
Returns	None
Example	MMEMORY:OPEN "D:\TestFiles\WFM_001.txt" After command execution, if no errors occur, waveform WFM_001 will be appear into the instrument's waveform list. WFM_001 was originally located in "D:\TestFiles" directory.

Table 92: MMEMory:OPEN

Command Description	MMEMory:OPEN:SETup (No Query Form) This command uploads a complete configuration present in an archive (.zip) and apply it in place of the current configuration. Note 1: It's an alias of MMEMory:LOAD:ALL command. See its description for more informations. Note 2: The instrument must be in idle state.
Group	Mass memory
Syntax	MMEMory:OPEN:SETup <filepath>
Related Commands	None
Arguments	<filepath> ::= <string>.zip could be an absolute or relative path.
Returns	None
Example	MMEMORY:OPEN:SETUP "D:\TestFiles\mySetup.zip" Opens and applies the setup file mySetup.zip.

Table 93: MMEMory:OPEN:SETup

Command Description	MMEMory:RDIRectory (No Query Form) This command removes an empty directory (folder) from the mass storage system. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. The directory path may contain a full path. However, if only directory name is specified, the directory will be searched starting from the current directory.
Group	Mass Memory
Syntax	MMEMory:RDIRectory <folder>
Related Commands	None
Arguments	<folder>::=<string> could be an absolute or relative path.
Returns	None

Example	If the current directory is "C:\Users\<username>\Pictures\Saved Pictures" MMEMory:RDIRECTory "Test" Removes the empty folder "Test" from the current directory.
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Table 94: MMEMory:RDIRECTory

Command	MMEMory:SAVE:SETup (No Query Form)
Description	This command saves the current configuration in an archive (.zip). Note: It's an alias of MMEMory:STORE:ALL command. See its description for more informations.
Group	Mass memory
Syntax	MMEMory:SAVE:SETup <filename>
Related Commands	None
Arguments	<filename> ::= <string>.zip could be an absolute or relative path.
Returns	None
Example	Assuming the current <msus> is "C:" and current directory "C:\Users\<username>\Pictures\Saved Pictures". MMEMORY:SAVE:SETUP " mySetup.zip" Saves the current instrument's configuration in "C:\Users\<username>\Pictures\Saved Pictures\mySetup.zip " file.

Table 95: MMEMory:SAVE:SETup

Command	MMEMory:STORE:ALL (No Query Form)
Description	This command saves the current configuration in an archive (.zip). Note 1: If an archive with the same name and path is already present then the archive is overwritten. Note 2: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. The archive path may contain a full path. However, if only name is specified, the archive will be saved starting from the current directory.
Group	Mass memory
Syntax	MMEMory:STORE:ALL <filename>
Related Commands	None
Arguments	<filename> ::= <string>.zip could be an absolute or relative path.

Returns	None
Example	Assuming the current <msus> is "C:" and current directory "C:\Users\<username>\Pictures\Saved Pictures". MMEMory:STORe:ALL "D:\mySetup.zip" Saves the current instrument's configuration in mySetup.zip file in drive D:.

Table 96: MMEMory:STORe:ALL

Command	MMEMory:STORe:STAtE (No Query Form)
Description	This command saves a configuration present in the configurations list in an archive (.zip). Note 1: If an archive with the same path and name is already present then it will be overwritten. Note 2: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. The archive path may contain a full path. However, if only name is specified, the archive will be saved starting from the current directory.
Group	Mass memory
Syntax	MMEMory:STORe:STAtE {0 1 2 3 4 <cfg_name>}, <archive_name>
Related Commands	MMEMory:LOAD:STAtE, MMEMory:LOCK[:STAtE]
Arguments	It possible specify the configuration like: - 0 1 2 3 4: location 0 refers to "MEM_0" configuration, location 1 refers to "MEM_1" configuration... - <cfg_name>::=<string> <archive_name>::=<string>.zip specifies the file path. It could be an absolute or relative path.
Returns	None
Example	Assuming the current <msus> is "C:" and current directory "C:\Users\<username>\Pictures\Saved Pictures". MMEMORY:STORE:STATE 1,"setup1.zip" Copies the configuration stored in the setup memory location MEM_1 to a file named "setup1.zip" in the current directory.

Table 97: MMEMory:STORe:STAtE

Command	MMEMory:UPLoad? (Query Only)
Description	This command returns the contents of a file. Note 1: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by MMEMory commands. Note 2: Only files with the following extension can be deleted on removable units: .jpeg, .png, .bmp, .jpg, .gif, .tiff, .zip, .txt, .trc, .bin.
Group	Mass memory
Syntax	MMEMory:UPLoad? <file_name>
Related Commands	MMEMory:CDIRectory MMEMory:MSIS
Arguments	<file_name> ::= <string> could be absolute or relative paths.
Returns	<block_data> ::= IEEE 488.2 block data format
Example	MMEM:UPL? "D:\Myfile.zip" Returns the contents of "Myfile.zip".

Table 98: MMEMory:UPLoad?

7.5 OUTPUT GROUP COMMANDS

Command	OUTPut[n]:BLOffset
Description	This command sets or returns the Base Line Offset parameter of the analog channel "n".
Group	Output
Syntax	OUTPut[n]:BLOffset {MINimum MAXimum DEFault <Volts>} OUTPut[n]:BLOffset? [{MINimum MAXimum}]
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • <Volts> := <NRf> value The value of n indicates the channel number.
Returns	<NRf>
Example	OUTPut1:BLOffset MAXimum Sets the channel 1 Base Line Offset to the maximum value. OUTPut1:BLOffset? Might return 6V.

Table 99: OUTPut[n]:BLOffset

Command	OUTPut[n]:DElay
Description	This command sets or returns the Initial Delay parameter of the analog channel "n".
Group	Output
Syntax	OUTPut[n]:DElay {MINimum MAXimum DEFault <Seconds>} OUTPut[n]:DElay? [{MINimum MAXimum}]
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • <Seconds> := <NRf> value The value of n indicates the channel number.
Returns	<NRf>
Example	OUTPut1:DElay 100ns Sets the channel 1 skew to 100 ns. OUTPut1:DElay? Might return 1.2E-9.

Table 100: OUTPut[n]:DElay

Command	OUTPut[n]:IMPedance
Description	This command sets the output load impedance for the specified channel. The specified value is used for amplitude, offset, and high/low level settings. You can set the impedance to any value from 1 Ω to 1 M Ω . The default value is 50 Ω . The query form of this command returns the current set impedance, minimum or maximum load impedance setting in ohms.
Group	Output
Syntax	The value of n indicates the channel number. OUTPut[n]:IMPedance {MINimum MAXimum DEFault <Ohms>} OUTPut[n]:IMPedance? [{MINimum MAXimum}]
Related Commands	None
Arguments	The value of n indicates the channel number. • MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • <ohms>::=< NR1 >[<units>] Where: <units>::=OHM is the value of the load impedance in ohms
Returns	<ohms>::=<NR1>
Example	OUTPut1:IMPedance 60 Sets the channel 1 (CH 1) load impedance to 60 Ohm.

Table 101: OUTPut[n]:IMPedance

Command	OUTPut[n]:LOAd[:IMPedance]
Description	This command sets or returns the load impedance parameter of the channel "n". The load impedance allows the instrument to adapt the output levels to the load of the device connected to the generator. Please note that the output impedance of the channel does not change.
Group	Output
Syntax	OUTPut[n]:LOAd[:IMPedance] {MINimum MAXimum DEFault <Ohm>} OUTPut[n]:LOAd[:IMPedance]? [{MINimum MAXimum}]
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Ohm > := <NRf> value The value of n indicates the channel number.

Returns	<Ohm>
Example	OUTPut1:LOAD 100 Sets the channel 1 load impedance to 100 Ohm. OUTPut1:LOAD? Might return 50.

Table 102: OUTPut[n]:LOAD[:IMPedance]

Command	OUTPut[n]:LOW:IMPedance
Description	This command sets the instrument impedance to low (5 Ohm) that means the output is short-circuited using a relay. If the output impedance is set to false, the instrument impedance is set to 50 Ohm (default). The query form of this command returns the instrument impedance.
Group	Output
Syntax	The value of n indicates the channel number. ON 1 sets the instrument impedance to 5 Ohm. OFF 0 sets the instrument impedance to 50 Ohm.
Related Commands	None
Arguments	<NR1> 1 means that the instrument impedance is set to Low (5Ohm) 0 means that the instrument impedance is set to 50 Ohm
Returns	<ohms>::=<NR1>
Example	OUTPut1:LOW:IMPedance ON Sets the instrument impedance to Low.

Table 103: OUTPut[n]:LOW:IMPedance

Command	OUTPut[n]:NOIse:LEVel
Description	This command sets or returns the level of noise that is added to the channel "n".
Group	Output
Syntax	OUTPut[n]:NOIse:LEVel {MINimum MAXimum DEFault <Volts>} OUTPut[n]:NOIse:LEVel? {MINimum MAXimum}
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • <Volts> := <NRf> peak level of noise
Returns	<wfm_name>::=<String>
Example	OUTPut1:NOIse:LEVel 1 Sets the noise level to 1Volt for the channel 1.

	OUTPut1:NOIse:LEVel? Might return 1.
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Table 104: OUTPut[n]:NOIse:LEVel

Command Description	OUTPut[n]:POLarity This command inverts the output waveform relative to its average value: (High Level – Low Level)/2. The query form of this command returns the polarity for the specified channel.
Group	Output
Syntax	OUTPut[n]:POLarity {NORMAL INVERTed} OUTPut[n]:POLarity?
Related Commands	None
Arguments	The value of n indicates the channel number. NORMAL sets the specified output waveform polarity to Normal. INVERTed sets the specified output waveform polarity to Inverted.
Returns	<NR1> 0 means the polarity is normal, 1 means the polarity is inverted.
Example	OUTPut1:POLarity NORMAL Sets the channel 1 (CH 1) waveform polarity to Normal.

Table 105: OUTPut[n]:POLarity

Command Description	OUTPut[n]:SERies[:IMPedance] This command sets or returns the Output Impedance of the analog channel “n”.
Group	Output
Syntax	OUTPut[n]:SERIESIMPedance {50Ohm LOW} OUTPut[n]:SERIESIMPedance?
Related Commands	None
Arguments	50Ohm: the output impedance is set to 50 Ohm - LOW: the output impedance is set to Low impedance (about 5 Ohm) The value of n indicates the channel number.
Returns	<50O LOW>
Example	OUTPut1:SERies:IMPedance 50Ohm Sets the output impedance for the channel 1 to 50 Ohm. OUTPut1:SERies:IMPedance? Might return LOW.

Table 106: OUTPut[n]:SERies[:IMPedance]

Command	OUTPut[n][:STATE]
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Description	This command enables or disables the output for the specified channel. The query form of this command returns the output state of the channel.
Group	Output
Syntax	OUTPut[n][:STATe] {ON OFF 0 1} OUTPut[n][:STATe]?
Related Commands	None
Arguments	The value of n indicates the channel number. ON 1 enables the arbitrary function generator output. OFF 0 disables the arbitrary function generator output.
Returns	<NR1> 1 means that the output is enabled. 0 means that the output is disabled.
Example	OUTPut1:STATe ON Sets the arbitrary function generator output channel 1 (OUT 1) to ON.

Table 107: OUTPut[n][:STATe]

7.6 Display Group Commands

Command	DISPlay:CHANnel
Description	This command selects the user interface output channel page. There is no query form of this command.
Group	Display
Syntax	DISPlay:CHANnel {OUT1 OUT2 OUT3 OUT4 OUT5 OUT6 OUT7 OUT8 }
Related Commands	None
Arguments	<channel>:={OUT1 OUT2 OUT3 OUT4 OUT5 OUT6 OUT7 OUT8 } Note: <channel> string depends on the instrument model
Returns	None
Example	DISPlay:CHANnel OUT2 The user interface displays the output2 page.

Table 108: DISPlay:CHANnel

Command	DISPlay:FOCus (No Query Form)
Description	This command selects the channel that is displayed "in front" on a two/four/eight-channel instrument.
Group	Display
Syntax	DISPlay:FOCus {CH1 CH2 CH3 CH4 CH5 CH6 CH7 CH8}
Related Commands	None
Arguments	CH1 CH2 CH3 CH4 CH5 CH6 CH7 CH8 are the page relative to the channels.
Returns	None
Example	DISPlay:FOCus CH2 It shows the channel 2 page on instrument display.

Table 109: DISPlay:FOCus

Command	DISPlay[:WINDow]:TEXT:CLEar (No Query Form)
Description	This command clears the text message from the display screen.
Group	Display
Syntax	DISPlay[:WINDow]:TEXT:CLEar
Related Commands	DISPlay[:WINDow]:TEXT[:DATA]
Arguments	None
Returns	None
Example	The following example writes "Hello" on the display and clears it. DISPlay:TEXT "Hello" DISPlay:TEXT:CLEar It clears Hello.

Table 110: DISPlay[:WINDow]:TEXT:CLEAr

Command	DISPlay[:WINDow]:TEXT[:DATA]
Description	This command sets or returns the text message displayed on the instrument screen.
Group	Display
Syntax	DISPlay[:WINDow]:TEXT[:DATA] <message> DISPlay[:WINDow]:TEXT[:DATA]?
Related Commands	DISPlay[:WINDow]:TEXT:CLEAr
Arguments	<message> ::= <string>
Returns	< message >
Example	DISPlay:TEXT "Hello" Displays "Hello" on the instrument screen. DISPlay:TEXT? Might return "Hello"

Table 111: DISPlay[:WINDow]:TEXT[:DATA]

Command	HCOPY:SDUMp[:IMMediate] (No Query Form)
Description	This command copies the current screen shot image and saves it to a specified file in the file system.
Group	HCOPY
Syntax	HCOPY:SDUMp[:IMMediate] <file_path>
Related Commands	MMEMory:CDIRectory, MMEMory:MSIS
Arguments	<file_path> must be a valid path with file name and extension. Valid extensions are: ".bmp", ".jpg", ".jpeg", ".gif", ".png", ".tiff". It can be absolute or relative path, if it is a relative path it will be combined with the specified path with the commands MMEMory:CDIRectory and MMEMory:MSIS.
Returns	None
Example	HCOPY:SDUMp[:IMMEDIATE] "D:\my_screenshot.png" Copies the screen shot image and creates a graphic file on the USB memory (D:) called screenshot.png.

Table 112: HCOpy:SDUMp[:IMMediate]

7.7 Source Group Commands

Command	[SOURce]:ROSCillator:SOURce
Description	This command sets or queries the reference clock to either internal or external. When you try to set External, if the frequency of the external reference is different from the frequency set through [SOURce]:ROSCillator:FREQUENCY command, this command causes an error and the source will be reset to Internal.
Group	Source
Syntax	[SOURce]:ROSCillator:SOURce {INTernal EXTernal} [SOURce]:ROSCillator:SOURce?
Related Commands	[SOURce]:ROSCillator:FREQUENCY
Arguments	The value of n indicates the channel number. INTernal means that the reference clock is set to internal. EXTernal means that the reference clock is set to external.
Returns	INT EXT
Example	SOURce:ROSCillator:SOURce INTernal Selects the internal clock reference.

Table 113: [SOURce]:ROSCillator:SOURce

Command	[SOURce]:ROSCillator:FREQUENCY
Description	This command sets or queries the clock frequency of the external reference.
Group	Source
Syntax	[SOURce]:ROSCillator:FREQUENCY <frequency> [SOURce]:ROSCillator:FREQUENCY? [MINimum MAXimum]
Related Commands	[SOURce]:ROSCillator:SOURce
Arguments	<frequency>::=<NRf>[<units>] Where: <NRf> is the external reference frequency. <units>::=[Hz kHz MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce:ROSCillator:FREQUENCY 10MHZ Sets the reference clock in to 10 MHz.

Table 114: [SOURce]:ROSCillator:FREQUENCY

Command	[SOURce[n]]:COMBine:FEED
Description	This command sets or queries whether to add the internal noise to the output signal for the specified channel. When you specify the

	internal noise, you can set or query the noise level by using the [SOURce[n]]:POWER[:LEVel][:IMMediate][:AMPLitude] command. To disable the internal noise function, specify "NONE". If the carrier is Noise, this command causes an error.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:COMBine:FEED {NOISe NONE} [SOURce[n]]:COMBine:FEED?
Related Commands	[SOURce[n]]:POWER[:LEVel][:IMMediate][:AMPLitude]
Arguments	The value of n indicates the channel number. NOISe indicates that the internal noise is added to the output signal. NONE disables the internal noise function.
Returns	NOISe NONE
Example	SOURce1:COMBine:FEED NOISe Adds a noise signal to the channel 1 (CH 1) output signal.

Table 115: [SOURce[n]]:COMBine:FEED

Command	[SOURce[n]]:FREQuency
Description	This command sets or queries the frequency of the output waveform for the specified channel. This command is available when the Run Mode is set to any setting other than Sweep. The output frequency range setting depends on the type of output waveform. If you change the type of output waveform, it may change the output frequency because changing waveform types affects the setting range of the output frequency. The output frequency range setting depends also on the amplitude parameter.
Group	Source
Syntax	[SOURce[n]]:FREQuency <frequency> [SOURce[n]]:FREQuency? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the output frequency. <units>::=[Hz kHz MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:FREQuency 500kHz Sets the channel 1 (CH 1) output frequency to 500 kHz when the Run Mode is set to any setting other than Sweep.

Table 116: [SOURce[n]]:FREQuency

Command	[SOURce[n]]:FUNCTION:WAVE
Description	This command sets or queries the waveform used as arbitrary carrier waveform. With this command is possible to select an analog waveform present in the waveform list.
Group	Source
Syntax	[SOURce[n]]:FUNCTION:WAVE <waveform_name> [SOURce[n]]:FUNCTION:WAVE?
Related Commands	[SOURce[n]]:FUNCTION[:SHAPE]
Arguments	The value of n indicates the channel number. <waveform_name>::= <Qstring> specifies a waveform name present in the waveform list.
Returns	<waveform_name>
Example	SOURce1:FUNCTION:WAVE "HAVERSINE" Sets the waveform named "HAVERSINE" present in the current waveform list as arbitrary carrier waveform.

Table 117: [SOURce[n]]:FUNCTION:WAVE

Command	[SOURce[n]]:FUNCTION:EFILe
Description	This command sets or queries the EFILe used as Arbitrary waveform for the Carrier. The file must be present in the file system, the valid file extensions are ".txt", ".zip", ".bin" and ".trc". This file will be automatically insert in the Waveform List. If the file contains more than 16834 samples, it will be decimated. If the Carrier Wave is not set as Arbitrary the command reports an error.
Group	Source
Syntax	[SOURce[n]]:FUNCTION:EFILe <file_name> [SOURce[n]]:FUNCTION:EFILe?
Related Commands	[SOURce[n]]:FUNCTION[:SHAPE]
Arguments	The value of n indicates the channel number. <file_name>::= <Qstring> specifies a file name in the file system. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:FUNCTION:EFILe "WAVE1.txt" Imports the file named " WAVE1" in the Waveform List and sets it as Arbitrary Carrier waveform.

Table 118: [SOURce[n]]:FUNCTION:EFILe

Command	[SOURce[n]]:FUNCTION:RAMP:SYMMetry
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Description	This command sets or queries the symmetry of the ramp waveform for the specified channel. If the carrier is not “Ramp”, this command causes an error.
Group	Source
Syntax	[SOURce[n]]:FUNction:RAMP:SYMMetry <symmetry> [SOURce[n]]:FUNction:RAMP:SYMMetry? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <symmetry>::=<NR2>[<units>] Where: <NR2> is the symmetry. <units>::=PCT MINimum queries the minimum symmetry value. MAXimum queries the maximum symmetry value.
Returns	<symmetry>
Example	SOURce1:FUNction:RAMP:SYMMetry 80.5 Sets the symmetry of the channel 1 (CH 1) ramp waveform to 80.5%

Table 119: [SOURce[n]]:FUNction:RAMP:SYMMetry

Command	[SOURce[n]]:FUNction[:SHAPE]
Description	This command sets or queries the shape of the carrier waveform. Setting the carrier, it is necessary to meet some condition listed in the below table.
Group	Source
Syntax	[SOURce[n]]:FUNction[:SHAPE] {SINusoid SQUare PULSe RAMP PRNoise DC SINC GAUSSian LORentz ERISe EDECay HAVersine ARBB EFILE DOUBLEPULSe} [SOURce[n]]:FUNction[:SHAPE]?
Related Commands	None
Arguments	The value of n indicates the channel number. SINusoid SQUare PULSe RAMP PRNoise DC SINC GAUSSian LO Rentz ERISe EDECay HAVersine ARBB EFILE DOUBLEPULSe If you select a waveform shape that is not allowed with a particular modulation, sweep, or burst, it causes an error and the function does not change. - EFILE option sets Carrier Wave as Arbitrary. - ARBB option sets the waveform present in the carrier arbitrary buffer (see TRACe[n][:DATA] command) as arbitrary carrier. If this buffer is empty a sinusoidal waveform will be created as default.

	If you change the waveform, the output frequency may change to meet the frequency range of the new waveform. The following table shows the combinations of modulation type and the shape of output waveform.				
		Sine, Square, Ramp, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine, ARBB, EFILE	Pulse	Double Pulse	Noise, DC
	AM	✓			
	FM	✓			
	PM	✓			
	FSK	✓			
	PSK	✓			
	PWM		✓		
	Sweep	✓			
	Burst	✓	✓	✓	
Returns	SIN SQU PULS RAMP PRN DC SINC GAUS LOR ERIS EDEC HAV ARBB EFILE DOUBLEPULse				
Example	SOURce1:FUNCTION:SHAPE SQUare Selects the shape of channel 1 output waveform to square waveform.				

Table 120: [SOURce[n]]:FUNCTION[:SHAPE]

Command	[SOURce[n]]:INITDElay
Description	This command sets or queries the initial delay for the selected output channel.
Group	Source
Syntax	[SOURce[n]]:INITDElay <delay> [SOURce[n]]: INITDElay? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <delay>::=<NRf>[<units>] Where: <NRf> is the intial delay value. <units>::=[ns μs ms s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<delay>
Example	SOURce1:INITDElay 300E-9 Sets the output 1 initial delay to 300 ns.

Table 121: [SOURce[n]]:INITDElay

Command	[SOURce[n]]:PHASe[:ADJust]
Description	This command sets or queries the phase of the output waveform for the specified channel. The value is in degrees.
Group	Source
Syntax	[SOURce[n]]:PHASe[:ADJust] <phase> [SOURce[n]]:PHASe[:ADJust]? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <phase>::=<NR3>[<units>] Where: <NR3> is the phase of output frequency. <units>::=[° DEG]. MINimum queries the minimum phase value. MAXimum queries the maximum phase value.
Returns	<phase>
Example	SOURce1:PHASe 45DEG Sets the phase of channel 1 to 45 degrees.

Table 122: [SOURce[n]]:PHASe[:ADJust]

Command	[SOURce[n]]:POWER[:LEVel][:IMMediate][:AMPLitude]
Description	This command sets or queries the internal noise level to add to the output signal for the specified channel. The value represents the peak voltage of the noise level. You can set or query whether to add the internal noise to the output signal using the [SOURce[n]]:COMBine:FEED command. This command reports an error if internal noise is disabled.
Group	Source
Syntax	[SOURce[n]]:POWER[:LEVel][:IMMediate][:AMPLitude] {<voltage> MINimum MAXimum} [SOURce[n]]:POWER[:LEVel][:IMMediate][:AMPLitude]? [MINimum MAXimum]
Related Commands	[SOURce[n]]:COMBine:FEED
Arguments	The value of n indicates the channel number. <voltage>::=<NR3>[<units>] Where: <NR3> is the peak noise level. <units>::=[mV V] MINimum sets or queries the minimum noise level. MAXimum sets or queries the maximum noise level.
Returns	<voltage>

Example	SOURce1:POWer:LEVel:IMMediate:AMPLitude 0.5 Sets the internal noise level that is added to the CH1 output signal to 0.5 V.
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Table 123: [SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude]

Command	[SOURce[n]]:RUNMode
Description	This command sets or returns the run mode for the channel “n”.
Group	Source
Syntax	[SOURce[n]]:RUNMode {CONTInuous BURSt MODulated SWEEP} [SOURce[n]]:RUNMode?
Related Commands	None
Arguments	• CONTInuous: the pattern is repeated circularly until the instrument receive a stop command. • MODulated: the pattern is repeated circularly like for the Countinuous mode but this run mode allows to modulate the pattern for more information about the modulation see the command “OUTPut[n]:MODulation:MODE”. • BURSt: before generating the instrument waits for a trigger event. When the trigger event occurs the behaviour depends on the burst mode, for more information see the command “OUTPut[n]:BURst:TRIGgered:MODE”. • SWEEP the pattern is repeated circularly like for the Countinuous mode but this run mode allows to modulate the pattern for more information about the modulation see the command “[SOURce[n]]:FREQuency:MODE”. The *RST command sets this parameter to CONTInuous.
Returns	CONT MOD BURST SWEEP
Example	SOURce1:RUNMode MODulated Sets the run mode to Modulated for the channel 1. SOURce1:RUNMode? Might return CONTInuous, indicating that the channel 1 run mode is set to Continuous.

Table 124: [SOURce[n]]:RUNMode

Command	[SOURce[n]]:VOLTage:BASELINE:OFFSET
Description	This command sets or returns the Base Line Offset parameter of the analog channel “n”.
Group	Source
Syntax	SOURce1:VOLTage:BASELINE:OFFSET {MINimum MAXimum DEFault <Volts>}

	SOURce1:VOLTage:BASELINE:OFFSET? [{MINimum MAXimum}]
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • <Volts> := <NRf> value The value of n indicates the channel number.
Returns	<NRf>
Example	SOURce1:VOLTage:BASELINE:OFFSET 1 Sets the channel 1 Baseline Offset to 1V. SOURce1:VOLTage:BASELINE:OFFSET? Might return 3V.

Table 125: [SOURce[n]]:VOLTage:BASELINE:OFFSET

Command Description	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH
	This command sets or queries the high level of the waveform for the specified channel. The high level could be limited by noise level to not exceed the maximum amplitude. If the carrier is Noise or DC level, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH <voltage> [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH? [MINimum MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW
Arguments	The value of n indicates the channel number. <voltage>::=<NRf>[<units>] Where: <NRf> is the high level of output amplitude. <units>::=[mV V] MINimum queries the minimum high voltage level. MAXimum queries the maximum high voltage level.
Returns	<high level>
Example	SOURce1:VOLTage:LEVel:IMMediate:HIGH 1V Sets the high level of channel 1 (CH 1) output amplitude to 1 V.

Table 126: [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH

Command Description	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW
	This command sets or queries the low level of the waveform for the specified channel. The low level could be limited by noise level to not exceed the maximum amplitude. If the carrier is Noise or DC level, this command and this query cause an error.
Group	Source

Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW <voltage> } [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW? [MINimum MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH
Arguments	The value of n indicates the channel number. <voltage>::=<NRf>[<units>] Where: <NRf> is the low level of the output amplitude. <units>::=[mV V] MINimum queries the minimum low voltage level. MAXimum queries the maximum low voltage level.
Returns	<low level>
Example	SOURce1:VOLTage:LEVel:IMMediate:LOW -1V Sets the low level of channel 1 (CH 1) output amplitude to -1 V.

Table 127: [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW

Command Description	[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude] This command sets or queries the output amplitude for the specified channel. The measurement unit of amplitude depends on the selection operated using the [SOURce[n]]:VOLTage:UNIT command. If the carrier is Noise the amplitude is Vpk instead of Vpp. If the carrier is DC level this command causes an error. The range of the amplitude setting could be limited by the frequency and offset parameter of the carrier waveform.
Group	Source
Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude] <amplitude> [SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]? [MINimum MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet [SOURce[n]]:VOLTage:UNIT
Arguments	The value of n indicates the channel number. <amplitude>::=<NRf> Where: <NRf> is the output amplitude. This parameter does not have the measurement unit because it is defined by [SOURce[n]]:VOLTage:UNIT command. MINimum queries the minimum amplitude. MAXimum queries the maximum amplitude.
Returns	<amplitude><unit> Where <units>::=[VPP VRMS DBM VPK] VPK is used only for the noise as carrier.

Example	SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 1 Sets the channel 1 output amplitude to 1, the unit depends on the selecting one.
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Table 128: [SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

Command	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet
Description	This command sets or queries the offset level for the specified channel. The offset range setting depends on the amplitude parameter.
Group	Source
Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet <voltage> [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]
Arguments	The value of n indicates the channel number. <voltage>::=<NRf>[<units>] Where: <NRf> is the offset voltage level. <units>::=[mV V] MINimum queries the minimum offset level. MAXimum queries the maximum offset level.
Returns	<offset>
Example	SOURce1:VOLTage:LEVel:IMMediate:OFFSet 500mV Sets the channel 1 offset level to 500 mV.

Table 129: [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet

Command	[SOURce[n]]:VOLTage:LIMit:HIGH
Description	This command sets or queries the higher limit of the output amplitude high level for the specified channel.
Group	Source
Syntax	[SOURce[n]]:VOLTage:LIMit:HIGH <voltage> [SOURce[n]]:VOLTage:LIMit:HIGH? [MINimum MAXimum]
Related Commands	[SOURce[n]]:VOLTage:LIMit:LOW
Arguments	<voltage>::=<NRf>[<units>] Where: <NRf> is the higher limit of output amplitude. <units>::=[mV V] MINimum queries the minimum high limit level. MAXimum queries the maximum high limit level.
Returns	<voltage>
Example	SOURce1:VOLTage:LIMit:HIGH 1V Sets the higher limit of channel 1 output amplitude to 1 V.

Table 130: [SOURce[n]]:VOLTage:LIMit:HIGH

Command	[SOURce[n]]:VOLTage:LIMit:LOW
Description	This command sets or queries the lower limit of the output amplitude low level for the specified channel.
Group	Source
Syntax	[SOURce[n]]:VOLTage:LIMit:LOW <voltage> [SOURce[n]]:VOLTage:LIMit:LOW? [MINimum MAXimum]
Related Commands	[SOURce[n]]:VOLTage:LIMit:HIGH
Arguments	<voltage>::=<NRf>[<units>] Where: <NRf> is the lower limit of output amplitude. <units>::=[mV V] MINimum queries the minimum low limit level. MAXimum queries the maximum low limit level.
Returns	<voltage>
Example	SOURce1:VOLTage:LIMit:LOW 10mV Sets the lower limit of channel 1 output amplitude to 10 mV.

Table 131: [SOURce[n]]:VOLTage:LIMit:LOW

Command	[SOURce[n]]:VOLTage:UNIT
Description	This command sets or queries the units of output amplitude for the specified channel. This command does not affect the offset, high level, or low level of output.
Group	Source
Syntax	[SOURce[n]]:VOLTage:UNIT [VPP VRMS DBM] [SOURce[n]]:VOLTage:UNIT?
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]
Arguments	The value of n indicates the channel number. VPP sets the units of the output voltage to Vp-p. VRMS sets the units of the output voltage to Vrms. DBM sets the units of the output voltage to dBm. The following table shows the possible association between waveform and measurement unit for the amplitude.

		Vpp	Vrms	dBm
	Sine	✓	✓	✓
	Square	✓	✓	
	Ramp	✓	✓	
	Pulse	✓	✓	
	Double Pulse	✓		
	Sinc	✓	✓	
	Noise	✓ (Vpk)		
	DC level			
	Gaussian	✓	✓	
	Lorentz	✓	✓	
	Exponential Rise	✓	✓	
	Exponential Decay	✓	✓	
	Haversine	✓	✓	
	ARBB	✓		
	EFILE	✓		
Returns	VPP VRMS DBM			
Example	SOURce1:VOLTage:UNIT VPP Sets the voltage units to Vp-p.			

Table 132: [SOURce[n]]:VOLTage:UNIT

7.8 Pulse Waveform Source Commands

Command	[SOURce[n]]:PULSe:DCYClE
Description	This command sets or queries the duty cycle of the pulse waveform for the specified channel. The arbitrary function generator will hold the settings of rising edge and falling edge when the duty cycle is varied. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:DCYClE <percent> [SOURce[n]]:PULSe:DCYClE? [MINimum MAXimum]
Related Commands	[SOURce[n]]:PULSe:WIDTh
Arguments	The value of n indicates the channel number. <percent>::=<NR2>[<units>] Where: <NR2> is the duty cycle. <units>::=PCT MINimum queries the minimum duty cycle. MAXimum queries the maximum duty cycle.
Returns	<percent>
Example	SOURce1:PULSe:DCYClE 80.5 Sets the duty cycle of the pulse waveform on channel 1 (CH 1) to 80.5%.

Table 133: [SOURce[n]]:PULSe:DCYClE

Command	[SOURce[n]]:PULSe:PERiod
Description	This command sets or queries the period for the pulse waveform. This command and this query will cause an error if the carrier function is different from Pulse. NOTE: the pulse period is related to the frequency, then if you change the pulse period, it also affects the frequency of the next carrier that you set.
Group	Source
Syntax	[SOURce[n]]:PULSe:PERiod <period> [SOURce[n]]:PULSe:PERiod? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <period>::=<NRf>[<units>] Where: <NRf> is the pulse period. <units>::=[ns μ s ms s] MINimum queries the minimum period. MAXimum queries the maximum period.
Returns	<period>

Example	SOURce1:PULSe:PERiod 200ns Sets the channel 1 pulse period to 200 ns.
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Table 134: [SOURce[n]]:PULSe:PERiod

Command	[SOURce[n]]:PULSe:TRANSition[:LEADing]
Description	This command sets or queries the Rising edge time of the pulse waveform. Note that the value is about the rising edge between 10% and 90%. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:TRANSition[:LEADing] <seconds> [SOURce[n]]:PULSe:TRANSition[:LEADing]? [MINimum MAXimum]
Related Commands	[SOURce[n]]:PULSe:TRANSition:TRAILing
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the rising edge time of pulse waveform. <units>::=[ns μs ms s] MINimum queries the minimum transition time. MAXimum queries the maximum transition time.
Returns	<seconds>
Example	SOURce1:PULSe:TRANSition:LEADing 200ns Sets the channel 1 (CH 1) rising edge time to 200 ns.

Table 135: [SOURce[n]]:PULSe:TRANSition[:LEADing]

Command	[SOURce[n]]:PULSe:TRANSition:TRAILing
Description	This command sets or queries the Falling edge time of the pulse waveform. Note that the value is about the falling edge between 10% and 90%. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:TRANSition:TRAILing <seconds> [SOURce[n]]:PULSe:TRANSition:TRAILing? [MINimum MAXimum]
Related Commands	[SOURce[n]]:PULSe:TRANSition[:LEADing]
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>]. Where: <NRf> is the falling edge of pulse waveform. <units>::=[ns μs ms s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<seconds>

Example	SOURce1:PULSe:TRANSition:TRAIling 200ns Sets the falling edge time to 200 ns.
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Table 136: [SOURce[n]]:PULSe:TRANSition:TRAIling

Command	[SOURce[n]]:PULSe:WIDTh
Description	This command sets or queries the pulse width for the specified channel. Pulse Width = Period × Duty Cycle / 100. The pulse width must be less than the period. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:WIDTh <seconds> [SOURce[n]]:PULSe:WIDTh? [MINimum MAXimum]
Related Commands	[SOURce[n]]:PULSe:DCYClE
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the pulse width. <units>::=[ns μs ms s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<width>
Example	SOURce1:PULSe:WIDTh 200ns Sets the channel 1 (CH 1) pulse width to 200 ns.

Table 137: [SOURce[n]]:PULSe:WIDTh

7.9 Double Pulse Waveform Source Commands

Command	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:AMPLitude
Description	This command sets or queries the amplitude of the first or of the second pulse for the specified channel in the double pulse waveform. Note: If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:AMPLitude [SOURce[n]]:DOUBLEPULSe:PULSe[k]:AMPLitude? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. The value of k indicates the pulse number. <voltage>::=<NRf><units> Where: <NRf> is the amplitude value. <units>::=[mV V] MINimum queries the minimum amplitude value. MAXimum queries the maximum amplitude voltage.
Returns	<voltage>
Example	SOURce1:DOUBLEPULSe:PULSe1:AMPLitude 2 Sets the pulse 1 amplitude value of channel 1 to 2 V.

Table 138: [SOURce[n]]:DOUBLEPULSe:PULSe[k]:AMPLitude

Command	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition[:LEADing]
Description	This command sets or queries the Rising edge time of the first or the second pulse in the double pulse waveform. Note that the value is about the rising edge between 10% and 90%. Note: If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:LEADing <seconds> [SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:LEADing? [MINimum MAXimum]
Related Commands	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:TRAILing
Arguments	The value of n indicates the channel number. The value of k indicates the pulse number.

	<seconds>::=<NRf>[<units>] Where: <NRf> is the rising edge time of pulse waveform. <units>::=[ns μs ms s] MINimum queries the minimum transition time. MAXimum queries the maximum transition time.
Returns	<seconds>
Example	SOURce1:DOUBLEPULSe:PULSe1:TRANSition:LEADing 100ns Sets the first pulse 1 relative to the double pulse of the channel 1 (CH 1) rising edge time to 100 ns.

Table 139: [SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition[:LEADing]

Command Description	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:TRAILing This command sets or queries the falling edge time of the first or the second pulse in the double pulse waveform. Note: If the carrier is different from Double Pulse, this command and this query cause an error. Note that the value is about the falling edge between 10% and 90%. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:TRAILing <seconds> [SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:TRAILing? [MINimum MAXimum]
Related Commands	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:LEADing
Arguments	The value of n indicates the channel number. The value of k indicates the pulse number. <seconds>::=<NRf>[<units>]. Where: <NRf> is the falling edge of pulse waveform. <units>::=[ns μs ms s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<seconds>
Example	SOURce1:DOUBLEPULSe:PULSe1:TRANSition:TRAILing 200ns Sets the falling edge time of the first pulse to 200 ns.

Table 140: [SOURce[n]]:DOUBLEPULSe:PULSe[k]:TRANSition:TRAILing

Command Description	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:WIDTh This command sets or queries the pulse width of the first or of the second pulse in the double pulse waveform for the specified channel. Pulse Width = Period × Duty Cycle / 100. The pulse width must be less than the period.
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	If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:WIDTh <seconds> [SOURce[n]]:DOUBLEPULSe:PULSe[k]:WIDTh? [MINimum MAXimum]
Related Commands	
Arguments	The value of n indicates the channel number. The value of k indicates the pulse number. <seconds>::=<NRf>[<units>] Where: <NRf> is the pulse width. <units>::=[ns μ s ms s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<width>
Example	SOURce1:DOUBLEPULSe:PULSe1:WIDTh 100ns Sets the first pulse waveform width of the double pulse to 100 ns.

Table 141: [SOURce[n]]:DOUBLEPULSe:PULSe[k]:WIDTh

Command Description	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:DELay This command sets or queries the delay for first or the second pulse in the double pulse waveform. Important Note: the delay of the second pulse is a delta delay relative to the end of the first pulse. If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[k]:DELay <delay> [SOURce[n]]:DOUBLEPULSe:PULSe[k]:DELay ? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. The value of k indicates the pulse number. <delay>::=<NRf>[<units>] Where: <NRf> is the initial delay value. <units>::=[ns μ s ms s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<delay>

Example

SOURce1:DOUBLEPULSe:PULSe1:DELay 300E-9

Sets the delay of the first pulse of the double pulse waveform to 300 ns.

[Table 142: \[SOURce\[n\]\]:DOUBLEPULSe:PULSe\[k\]:DELay](#)

7.10 Modulation Source Commands

Command	[SOURce[n]]:MODulation:FREQuency
Description	This command sets or returns the frequency of the modulation law for the channel “n”. This is the dual command of “OUTPut[n]:MODulation:PERiod”. This command works if the main format is not enabled, see command “DISPlay:MAINFormat”.
Group	Source
Syntax	[SOURce[n]]:MODulation:FREQuency {MINimum MAXimum DEFault <Hz>} [SOURce[n]]:MODulation:FREQuency? {MINimum MAXimum}
Related Commands	[SOURce[n]]:MODulation:PERiod DISPlay:MAINFormat
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Hz > := <NRf> frequency of modulation The value of n indicates the channel number.
Returns	< Hz >
Example	SOURce1:MODulation:FREQuency 100e3 Sets the frequency of the modulation to 100 kHz for channel 1. SOURce1:MODulation:FREQuency? Might return 1E3.

Table 143: [SOURce[n]]:MODulation:FREQuency

Command	[SOURce[n]]:MODulation:FSK:HOPFrequency
Description	This command sets or returns the frequency hop of the FSK modulation for the channel “n”.
Group	Source
Syntax	[SOURce[n]]:MODulation:FSK:HOPFrequency {MINimum MAXimum DEFault <Hz>} OUTPut[n]:MODulation:FSK:HOPFrequency? {MINimum MAXimum}
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Hz > := <NRf> FSK hop frequency The value of n indicates the channel number.
Returns	< Hz >

Example	SOURce1:MODulation:FSK:HOPFrequency 1e3 Sets the FSK hop frequency to 1 kHz. SOURce1:MODulation:FSK:HOPFrequency? Might return 100.
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Table 144: [SOURce[n]]:MODulation:FSK:HOPFrequency

Command	[SOURce[n]]:MODulation:FUNCTION
Description	This command sets or queries the waveform used as a modulating waveform.
Group	Source
Syntax	[SOURce[n]]:MODulation:FUNCTION {SINusoid SQUare RAMP NRAMP TRIangle PRNoise EFILE ARBB} [SOURce[n]]:MODulation:FUNCTION?
Related Commands	SOURce[n]]:MODulation:SOURce
Arguments	The value of n indicates the channel number. {SINusoid SQUare RAMP NRAMP TRIangle PRNoise EFILE ARBB} where: -RAMP is Inc. Ramp. -NRAMPp is Dec. Ramp. - PRNoise is Noise. - EFILE option sets Mod. Wave as Arbitrary. - ARBB option sets the waveform present in the modulation arbitrary buffer (see TRACe[n][:DATA] command) as arbitrary modulation waveform. If this buffer is empty a sinusoidal waveform will be created as default.
Returns	<SINusoid SQUare RAMP NRAMP TRIangle PRNoise EFILE ARBB>
Example	SOURce1:MODulation:FUNCTION SIN Sets the sine waveform used for the internal modulation on channel 1.

Table 145: [SOURce[n]]:MODulation:FUNCTION

Command	[SOURce[n]]:MODulation:FUNCTION:EFILE
Description	This command sets or queries the EFILE used as arbitrary modulating waveform. The file must be present in the file system, the valid file extensions are ".txt", ".zip", ".bin" and ".trc". This file will be automatically insert in the Waveform List. If the file contains more than 16834 samples, it will be decimated. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or its subdirectories are accessible by this command.

Group	Source
Syntax	[SOURce[n]]:MODulation:FUNCTION:EFILe <file_name> [SOURce[n]]:MODulation:FUNCTION:EFILe?
Related Commands	SOURce[n]]:MODulation:SOURce
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:MODulation:FUNCTION:EFILe "MODWAVE1.txt" Imports the file named " MODWAVE1" in the Waveform List and sets it as Arbitrary modulation waveform.

Table 146: [SOURce[n]]:MODulation:FUNCTION:EFILe

Command	[SOURce[n]]:MODulation:FUNCTION:WAVE
Description	This command sets or queries the arbitrary waveform name used as a modulating waveform. A wave name must be specified in the waveform list.
Group	Source
Syntax	[SOURce[n]]:MODulation:FUNCTION:WAVE <wave_name> [SOURce[n]]:MODulation:FUNCTION:WAVE?
Related Commands	SOURce[n]]:MODulation:SOURce
Arguments	The value of n indicates the channel number. <wave_name>::=<Qstring> specifies a wave name in the waveform list.
Returns	<wave_name>
Example	SOURce1:MODulation:FUNCTION:WAVE "SINE" Sets the arbitrary waveform used for the internal modulation.

Table 147: [SOURce[n]]:MODulation:FUNCTION:WAVE

Command	[SOURce[n]]:MODulation:MODE
Description	This command sets or returns the type of modulation for the channel "n".
Group	Source
Syntax	[SOURce[n]]:MODulation:MODE {AM FM PM FSK PSK} [SOURce[n]]:MODulation:MODE?
Related Commands	None
Arguments	• AM: amplitude modulation • FM: Frequency Modulation

	• PM: Phase Modulation • FSK: Frequency Shift Key Modulation • PSK: Phase Shift Key Modulation The value of n indicates the channel number.
Returns	< AM FM PM FSK PSK >
Example	Source1:MODulation:MODE AM Sets the modulation type to AM. Source1:MODulation:MODE? Might return AM.

Table 148: [SOURce[n]]:MODulation:MODE

Command	[SOURce[n]]:MODulation:PERiod
Description	This command sets or returns the period of the modulation law for the channel "n". This is the dual command of "[SOURce[n]]:MODulation:FREQuency". This command works if the main format is enabled, see command "DISPlay:MAINFormat".
Group	Source
Syntax	[SOURce[n]]:MODulation:PERiod {MINimum MAXimum DEFault <Seconds>} [SOURce[n]]:MODulation:PERiod? {MINimum MAXimum}
Related Commands	[SOURce[n]]:MODulation:FREQuency DISPlay:MAINFormat
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Seconds > := <NRf> Modulation law period The value of n indicates the channel number.
Returns	< Seconds >
Example	Source1:MODulation:PERiod 10us Sets the modulation law period to 10 us. Source1:MODulation:PERiod? Might return 10E-6.

Table 149: [SOURce[n]]:MODulation:PERiod

Command	[SOURce[n]]:MODulation:PSK:HOPPhase
Description	This command sets or returns the phase hop of the PSK modulation for the channel "n".
Group	Source

Syntax	[SOURce[n]]:MODulation:PSK:HOPPhase {MINimum MAXimum DEFault <Deg>} [SOURce[n]]:MODulation:PSK:HOPPhase? {MINimum MAXimum}
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Deg > := <NRf> degrees of hop of the PSK The value of n indicates the channel number.
Returns	< Deg >
Example	SOURce1:MODulation:PSK:HOPPhase 10 Sets the phase hop to 10°. SOURce1:MODulation:PSK:HOPPhase? Might return 10.

Table 150: [SOURce[n]]:MODulation:PSK:HOPPhase

Command Description	[SOURce[n]]:MODulation:SOURce
	This command sets or returns the source of the modulating law for the channel "n". When the external source is selected the instrument does not consider the selected modulating waveform.
Group	Source
Syntax	[SOURce[n]]:MODulation:SOURce {INTernal EXTernal} [SOURce[n]]:MODulation:SOURce?
Related Commands	[SOURce[n]]:MODulation:WAVEform
Arguments	• INTernal: the modulating law depends on the selected waveform, for more information see command "SOURce[n]:MODulation:WAVEform". • EXTernal: the modulating law is the signal applied to the "Ext Mod" connector. The value of n indicates the channel number.
Returns	< INT EXT NOISE >
Example	SOURce1:MODulation:SOURce EXTernal The modulating source is set to external for the channel 1. SOURce1:MODulation:SOURce? Might return INT.

Table 151: [SOURce[n]]:MODulation:SOURce

7.11 Amplitude Modulation Source Commands

Command	[SOURce[n]]:AM[:DEPTh]
Description	This command sets or queries the AM modulation depth for the specified channel. This command and this query will cause an error if it is not in the AM modulation state.
Group	Source
Syntax	[SOURce[n]]:AM:DEPTh <depth> [SOURce[n]]:AM:DEPTh? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <depth>::=<NR2>[<units>] Where: <NR2> is the depth of modulating frequency. <units>::=PCT MINimum queries the modulation depth minimum value. MAXimum queries the modulation depth maximum value.
Returns	<depth>
Example	SOURce1:AM:DEPTh 70 Sets the depth of the modulating signal on channel (CH 1) to 70%

Table 152: [SOURce[n]]:AM[:DEPTh]

Command	[SOURce[n]]:AM:INTernal:FREQuency
Description	This command sets or queries the internal AM modulation frequency for the specified channel. This command will cause an error if it is not in the AM modulation state.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:AM:INTernal:FREQuency <frequency> [SOURce[n]]:AM:INTernal:FREQuency? [MINimum MAXimum]
Related Commands	[SOURce[n]]:AM:SOURce
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz kHz MHz]. MINimum queries the modulation frequency minimum value. MAXimum queries the modulation frequency maximum value.
Returns	<frequency>
Example	SOURce1:AM:INTernal:FREQuency 10kHz Sets the channel 1 (CH 1) internal modulation frequency to 10 kHz.

Table 153: [SOURce[n]]:AM:INTernal:FREQuency

Command	[SOURce[n]]:AM:INTernal:FUNctIon
Description	This command sets or queries the AM modulating waveform for the specified channel. You can use this command only when the internal modulation source is selected.
Group	Source
Syntax	[SOURce[n]]:AM:INTernal:FUNctIon {SINusoid SQUare TRIangle RAMP NRAMp PRNoise ARBB EFILE} [SOURce[n]]:AM:INTernal:FUNctIon?
Related Commands	[SOURce[n]]:AM:SOURce
Arguments	The value of n indicates the channel number. {SINusoid SQUare TRIangle RAMP NRAMp PRNoise ARBB EFILE} where: -RAMP is Inc. Ramp. -NRAMPp is Dec. Ramp. - PRNoise is Noise. - EFILE option sets Mod. Wave as Arbitrary. - ARBB option sets the waveform present in the modulation arbitrary buffer (see TRACe[n][:DATA] command) as arbitrary modulation waveform. If this buffer is empty a sinusoidal waveform will be created as default.
Returns	SIN SQU TRI RAMP NRAM PRN ARBB EFILE
Example	SOURce1:AM:INTernal:FUNctIon SQUare Selects square as the shape of modulating waveform for the channel 1 (CH 1) output.

Table 154: [SOURce[n]]:AM:INTernal:FUNctIon

Command	[SOURce[n]]:AM:INTernal:FUNctIon:EFILE
Description	This command sets or queries the EFILE name used as a modulating waveform for AM modulation. The file must be present in the file system, the valid file extensions are ".txt", ".zip", ".bin" and ".trc". This file will be automatically insert in the Waveform List. If the file contains more than 16834 samples, it will be decimated. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or its subdirectories are accessible by this command.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:AM:INTernal:FUNctIon:EFILE <file_name> [SOURce[n]]:AM:INTernal:FUNctIon:EFILE?

Related Commands	FILEsystem:CWDirectory
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_path>
Example	SOURce1:AM:INteRnal:FUNCTion:EFILe " MODWAVEAM1.txt" Imports the file named "MODWAVEAM1" in the Waveform List and sets it as Arbitrary modulation waveform.

Table 155: [SOURce[n]]:AM:INteRnal:FUNCTion:EFILe

Command Description	[SOURce[n]]:AM:SOURce
Group	Source
Syntax	The value of n indicates the channel number. [[SOURce[n]]:AM:SOURce [INteRnal EXteRnal] [SOURce[n]]:AM:SOURce?
Related Commands	None
Arguments	The value of n indicates the channel number. INteRnal means that the carrier waveform is modulated with an internal function. EXteRnal means that the carrier waveform is modulated with an external source.
Returns	INT EXT
Example	SOURce1:AM:SOURce INteRnal Sets the channel 1 (CH 1) source of the modulating signal to internal.

Table 156: [SOURce[n]]:AM:SOURce

Command Description	[SOURce[n]]:AM:STATe
Group	Source
Syntax	[SOURce[n]]:AM:STATe { ON OFF 0 1} [SOURce[n]]:AM:STATe?
Related Commands	None

Arguments	The value of n indicates the channel number. ON 1 enables AM modulation. OFF 0 disables AM modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:AM:STATe ON Enables the channel 1 (CH 1) AM modulation.

Table 157: [SOURce[n]]:AM:STATe

7.12 Frequency Modulation Source Commands

Command	[SOURce[n]]:FM[:DEVIation]
Description	This command sets or queries the peak frequency deviation of FM modulation for the specified channel. The range of the frequency deviation setting depends on the waveform selected as the carrier and on its frequency. This command will cause an error if not in the frequency modulation state.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:FM:DEVIation <deviation> [SOURce[n]]:FM:DEVIation?[MINimum MAXimum]
Related Commands	None
Arguments	<deviation>::=<NRf>[<units>] Where: <NRf> is the frequency deviation. <units>::=[Hz kHz MHz] MINimum queries the minimum deviation. MAXimum queries the maximum deviation.
Returns	<deviation>
Example	SOURce1:FM:DEVIation 1.0MHz Sets the channel 1 (CH 1) frequency deviation to 1.0 MHz.

Table 158: [SOURce[n]]:FM[:DEVIation]

Command	[SOURce[n]]:FM:INTernal:FREQuency
Description	This command sets or queries the internal modulation frequency of FM modulation for the specified channel. This command will cause an error if not in frequency modulation state.
Group	Source
Syntax	[SOURce[n]]:FM:INTernal:FREQuency <frequency> [SOURce[n]]:FM:INTernal:FREQuency?[MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz kHz MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:FM:INTernal:FREQuency 10kHz Sets the channel 1 (CH 1) internal modulation frequency to 10 kHz.

Table 159: [SOURce[n]]:FM:INTernal:FREQuency

Command	[SOURce[n]]:FM:INTernal:FUNCTion
Description	This command sets or queries the FM modulating waveform for the specified channel. You can use this command only when the internal modulation source is selected.
Group	Source
Syntax	[SOURce[n]]:FM:INTernal:FUNCTion {SINusoid SQUare TRIangle RAMP NRAMP PRNoise ARBB EFILE} [SOURce[n]]:FM:INTernal:FUNCTion?
Related Commands	[SOURce[n]]:FM:SOURce
Arguments	The value of n indicates the channel number. {SINusoid SQUare TRIangle RAMP NRAMP PRNoise ARBB EFILE} where: -RAMP is Inc. Ramp. -NRAMPp is Dec. Ramp. - PRNoise is Noise. - EFILE option sets Mod. Wave as Arbitrary. - ARBB option sets the waveform present in the modulation arbitrary buffer (see TRACe[n][:DATA] command) as arbitrary modulation waveform. If this buffer is empty a sinusoidal waveform will be created as default.
Returns	SIN SQU TRI RAMP NRAM PRN ARBB EFILE
Example	SOURce1:FM:INTernal:FUNCTion SQUare Selects square as the shape of modulating waveform for the channel 1 (CH 1) output.

Table 160: [SOURce[n]]:FM:INTernal:FUNCTion

Command	[SOURce[n]]:FM:INTernal:FUNCTion:EFILE
Description	This command sets or queries the EFILE name used as a modulating waveform for FM modulation. The file must be present in the file system, the valid file extensions are ".txt", ".zip", ".bin" and ".trc". This file will be automatically insert in the Waveform List. If the file contains more than 16834 samples, it will be decimated. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or its subdirectories are accessible by this command.
Group	Source
Syntax	[SOURce[n]]:FM:INTernal:FUNCTion:EFILE <file_name> [SOURce[n]]:FM:INTernal:FUNCTion:EFILE?
Related Commands	[SOURce[n]]:FM:SOURce

Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:FM:INteRnal:FUNCTion:EFILe "MODWAVEFM1.txt" Imports the file named "MODWAVEFM1" in the Waveform List and sets it as Arbitrary modulation waveform.

Table 161: [SOURce[n]]:FM:INteRnal:FUNCTion:EFILe

Command	[SOURce[n]]:FM:SOURce
Description	This command sets or queries the source of the FM modulating signal for the specified channel. This command will cause an error if not in the frequency modulation run mode.
Group	Source
Syntax	[SOURce[n]]:FM:SOURce[INteRnal EXteRnal] [SOURce[n]]:FM:SOURce?
Related Commands	None
Arguments	The value of n indicates the channel number. INteRnal means that the carrier waveform is modulated with the internal source. EXteRnal means that the carrier waveform is modulated with an external signal.
Returns	INT EXT
Example	SOURce1:FM:SOURce INteRnal Sets the channel 1 (CH 1) source of the modulating signal to internal.

Table 162: [SOURce[n]]:FM:SOURce

Command	[SOURce[n]]:FM:STATe
Description	This command enables or disables frequency modulation (FM). The query version of this command returns the state of frequency modulation.
Group	Source
Syntax	[SOURce[n]]:FM:STATe { ON OFF 0 1} [SOURce[n]]:FM:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON 1 enables FM modulation. OFF 0 disables FM modulation.

Returns	<NR1> 0 means disable FM modulation, 1 means enable FM modulation.
Example	SOURce1:FM:STATe ON Enables the channel 1 FM modulation.

Table 163: [SOURce[n]]:FM:STATe

7.13 Phase Modulation Source Commands

Command	[SOURce[n]]:PM[:DEViation]
Description	This command sets or queries the peak frequency deviation of PM modulation for the specified channel. This command will cause an error if not in PM mode.
Group	Source
Syntax	[SOURce[n]]:PM:DEViation <deviation> [SOURce[n]]:PM:DEViation? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <deviation>::=<NR3>[<units>] Where: <NR3> is the phase deviation. <units>::=[° DEG]. MINimum queries the minimum deviation. MAXimum queries the maximum deviation.
Returns	<deviation>
Example	SOURce1:PM:DEViation 60 DEG Sets the phase deviation for the channel 1 to 60 degrees.

Table 164: [SOURce[n]]:PM[:DEViation]

Command	[SOURce[n]]:PM:INTernal:FREQuency
Description	This command sets or queries the internal modulation frequency of PM modulation for the specified channel. You can use this command only when the internal modulation source is selected. This command will cause an error if not in PM mode.
Group	Source
Syntax	[SOURce[n]]:PM:INTernal:FREQuency <frequency> [SOURce[n]]:PM:INTernal:FREQuency? [MINimum MAXimum]
Related Commands	[SOURce[n]]:PM:SOURce
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz kHz MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:PM:INTernal:FREQuency 10kHz Sets the channel 1 (CH 1) internal modulation frequency to 10 kHz.

Table 165: [SOURce[n]]:PM:INTernal:FREQuency

Command	[SOURce[n]]:PM:INTernal:FUNctIon
Description	This command sets or queries the modulating waveform of PM modulation for the specified channel. You can use this command only when the internal modulation source is selected.
Group	Source
Syntax	[SOURce[n]]:PM:INTernal:FUNctIon {SINusoid SQUare TRIangle RAMP NRAMP PRNoise ARBB EFILE} [SOURce[n]]:PM:INTernal:FUNctIon?
Related Commands	[SOURce[n]]:PM:SOURce
Arguments	The value of n indicates the channel number. {SINusoid SQUare TRIangle RAMP NRAMP PRNoise ARBB EFILE} where: -RAMP is Inc. Ramp. -NRAMPp is Dec. Ramp. - PRNoise is Noise. - EFILE option sets Mod. Wave as Arbitrary. - ARBB option sets the waveform present in the modulation arbitrary buffer (see TRACe[n][:DATA] command) as arbitrary modulation waveform. If this buffer is empty a sinusoidal waveform will be created as default.
Returns	SIN SQU TRI RAMP NRAM PRN ARBB EFILE
Example	SOURce1:PM:INTernal:FUNctIon SQUare Selects square as the shape of modulating waveform for the channel 1 (CH 1) output.

Table 166: [SOURce[n]]:PM:INTernal:FUNctIon

Command	[SOURce[n]]:PM:INTernal:FUNctIon:EFILE
Description	This command sets or queries the EFILE name used as a modulating waveform for PM modulation. The file must be present in the file system, the valid file extensions are ".txt", ".zip", ".bin" and ".trc". This file will be automatically insert in the Waveform List. If the file contains more than 16834 samples, it will be decimated. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or its subdirectories are accessible by this command.
Group	Source
Syntax	[SOURce[n]]:PM:INTernal:FUNctIon:EFILE <file_name> [SOURce[n]]:PM:INTernal:FUNctIon:EFILE?
Related Commands	[SOURce[n]]:PM:SOURce

Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:PM:INTernal:FUNctio:n:EFILe " MODWAVEPM1.txt" Imports the file named "MODWAVEPM1" in the Waveform List and sets it as Arbitrary modulation waveform.

Table 167: [SOURce[n]]:PM:INTernal:FUNctio:n:EFILe

Command	[SOURce[n]]:PM:SOURce
Description	This command sets or queries the source of the PM modulation signal for the specified channel. This command will cause an error if not in PM mode.
Group	Source
Syntax	[SOURce[n]]:PM:SOURce [INTernal EXTernal] [SOURce[n]]:PM:SOURce?
Related Commands	[SOURce[n]]:PM:SOURce
Arguments	The value of n indicates the channel number. INTernal means that the carrier waveform is modulated with an internal source. EXTernal means that the carrier waveform is modulated with an external signal.
Returns	INT EXT
Example	SOURce1:PM:SOURce INTernal Sets the channel 1 (CH 1) source of the modulating signal to internal.

Table 168: [SOURce[n]]:PM:SOURce

Command	[SOURce[n]]:PM:STATe
Description	This command enables or disables PM modulation. The query version of this command returns the state of PM modulation.
Group	Source
Syntax	[SOURce[n]]:PM:STATe {ON OFF 0 1} [SOURce[n]]:PM:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON 1 enables PM modulation. OFF 0 disables PM modulation.
Returns	<NR1>

	0 means OFF, 1 means ON
Example	SOURce1:PM:STATe ON Enables the channel 1 (CH 1) PM modulation

Table 169: [SOURce[n]]:PM:STATe

7.14 FSK Modulation Source Commands

Command	[SOURce[n]]:FSKey[:FREQUENCY]
Description	This command sets or queries the hop frequency of FSK modulation for the specified channel. This command will cause an error if not in the FSKEY state.
Group	Source
Syntax	[SOURce[n]]:FSKey[:FREQUENCY] <frequency> [SOURce[n]]:FSKey[:FREQUENCY]? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the hop frequency. <units>::=[Hz kHz MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:FSKey:FREQUENCY 1.0MHz Sets the hop frequency of channel 1 FSK modulation to 1.0 MHz.

Table 170: [SOURce[n]]:FSKey[:FREQUENCY]

Command	[SOURce[n]]:FSKey:INTernal:RATE
Description	This command sets or queries the internal modulation rate of FSK modulation for the specified channel. This command will cause an error if not in the FSKEY run mode.
Group	Source
Syntax	[SOURce[n]]:FSKey:INTernal:RATE <rate> [SOURce[n]]:FSKey:INTernal:RATE? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <rate>::=<NRf>[<units>] Where: <NRf> is the modulation rate. <units>::=[Hz kHz MHz] MINimum queries the minimum modulation frequency. MAXimum queries the maximum modulation frequency.
Returns	<rate>
Example	SOURce1:FSKey:INTernal:RATE 50Hz Sets the channel 1 (CH 1) internal modulation frequency to 50 Hz.

Table 171: [SOURce[n]]:FSKey:INTernal:RATE

Command	[SOURce[n]]:FSKey:SOURce
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Description	This command sets or queries the source of the FSK modulation signal for the specified channel. This command will cause an error if not in the FSKEY state.
Group	Source
Syntax	[SOURce[n]]:FSKey:SOURce [INTernal EXTernal] [SOURce[n]]:FSKey:SOURce?
Related Commands	None
Arguments	The value of n indicates the channel number. INTernal means that the carrier waveform is modulated with an internal source. EXTernal means that the carrier waveform is modulated with an external signal.
Returns	INT EXT
Example	SOURce1:FSKey:SOURce INTernal Sets the channel 1 (CH 1) modulating signal source to internal.

Table 172: [SOURce[n]]:FSKey:SOURce

Command	[SOURce[n]]:FSKey:STATe
Description	This command enables or disables FSK modulation. The query form of this command returns the state of FSK modulation.
Group	Source
Syntax	[SOURce[n]]:FSKey:STATe { ON OFF 0 1} [SOURce[n]]:FSKey:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON 1 enables FSK modulation. OFF 0 disables FSK modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:FSKey:STATe ON Enables the channel 1 (CH 1) FSK modulation.

Table 173: [SOURce[n]]:FSKey:STATe

7.15 PSK Modulation Source Commands

Command	[SOURce[n]]:PSKey[:FREQUENCY]
Description	This command sets or queries the mod. frequency of PSK modulation for the specified channel. This command will cause an error if not in the PSK state.
Group	Source
Syntax	[SOURce[n]]:PSKey[:FREQUENCY] <frequency> } [SOURce[n]]:PSKey[:FREQUENCY]? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the Mod. frequency. <units>::=[Hz kHz MHz]. MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:PSKey:FREQUENCY 1.0MHz Sets the modulation frequency of channel 1 (CH 1) PSK modulation to 1.0 MHz.

Table 174: [SOURce[n]]:PSKey[:FREQUENCY]

Command	[SOURce[n]]:PSKey:PHASe[:ADJust]
Description	This command sets or queries the hop phase of the modulating signal of PSKEY modulation for the specified channel. The value is in degrees. This command will cause an error if not in PSKEY run mode.
Group	Source
Syntax	[SOURce[n]]:PSK:PHASe[:ADJust] <phase> } [SOURce[n]]:PSK:PHASe[:ADJust]? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <phase>::=<NR3>[<units>] Where: <NR3> is the hop phase of modulating signal. <units>::=[° DEG]. MINimum queries the minimum phase value. MAXimum queries the maximum phase value.
Returns	<phase>
Example	SOURce1:PSK:PHASe:ADJust 85DEG Sets the value for the hop phase of the channel 1 (CH 1) PSK modulating waveform to 85 degrees.

Table 175: [SOURce[n]]:PSKey:PHASe[:ADJust]

Command	[SOURce[n]]:PSKey:SOURce
Description	This command sets or queries the source of the PSK modulation signal for the specified channel. This command will cause an error if not in the PSKEY state.
Group	Source
Syntax	[SOURce[n]]:PSKey:SOURce [INTernal EXTernal] [SOURce[n]]:PSKey:SOURce?
Related Commands	None
Arguments	The value of n indicates the channel number. INTernal means that the carrier waveform is modulated with an internal source. EXTernal means that the carrier waveform is modulated with an external signal.
Returns	INT EXT
Example	SOURce1:PSKey:SOURce INTernal Sets the channel 1 (CH 1) source of the modulating signal to internal.

Table 176: [SOURce[n]]:PSKey:SOURce

Command	[SOURce[n]]:PSKey:STATe
Description	This command enables or disables PSK modulation. The query version of this command returns the state of PSK modulation.
Group	Source
Syntax	[SOURce[n]]:PSKey:STATe { ON OFF 0 1 } [SOURce[n]]:PSKey:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON 1 enables PSK modulation. OFF 0 disables PSK modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:PSKey:STATe ON Enables the channel 1 (CH 1) PSK modulation.

Table 177: [SOURce[n]]:PSKey:STATe

7.16 PWM Source Commands

Command	[SOURce[n]]:PWM[:DEVIation]:DCYCLe
Description	This command sets or queries the PWM deviation in percent for the specified channel. The setting range must meet the following conditions: □ Deviation $\leq$ Pulse Width – PWmin □ Deviation $\leq$ Pulse Period – Pulse Width – PWmin □ Deviation $\leq$ Pulse Width – (Leading Edge Time + Trailing Edge Time) /0.8 □ Deviation $\leq$ Pulse Period – Pulse Width – (Leading Edge Time + Trailing Edge Time) /0.8 □ Where: PWmin is the minimum pulse width. This command will cause an error if not in PWM mode.
Group	Source
Syntax	[SOURce[n]]:PWM[:DEVIation]:DCYCLe <percent> [SOURce[n]]:PWM[:DEVIation]:DCYCLe? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <percent>::=<NR2>[<units>] Where: <NR2> is the PWM deviation. <units>::=PCT
Returns	<deviation>
Example	SOURce1:PWM:DCYCLe 5.0 Sets the channel 1 (CH 1) PWM deviation to 5.0%.

Table 178: [SOURce[n]]:PWM[:DEVIation]:DCYCLe

Command	[SOURce[n]]:PWM:INTernal:FREQuency
Description	This command sets or queries the internal modulation frequency of PWM modulation for the specified channel. You can use this command only when the internal modulation source is selected. This command will cause an error if not in PWM mode.
Group	Source
Syntax	[SOURce[n]]:PWM:INTernal:FREQuency <frequency> [SOURce[n]]:PWM:INTernal:FREQuency? [MINimum MAXimum]
Related Commands	[SOURce[n]]:PWM:SOURce
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz kHz MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.

Returns	<frequency>
Example	SOURce1:PWM:INternal:FREQuency 10kHz Sets the channel 1 (CH 1) internal frequency to 10 kHz.

Table 179: [SOURce[n]]:PWM:INternal:FREQuency

Command	[SOURce[n]]:PWM:INternal:FUNCTion
Description	This command sets or queries the modulating waveform of PWM modulation for the specified channel. You can use this command only when the internal modulation source is selected.
Group	Source
Syntax	[SOURce[n]]:PWM:INternal:FUNCTion {SINusoid SQUare TRIangle RAMP NRAMp PRNoise ARBB EFILE} [SOURce[n]]:PWM:INternal:FUNCTion?
Related Commands	[SOURce[n]]:PWM:SOURce
Arguments	The value of n indicates the channel number. {SINusoid SQUare TRIangle RAMP NRAMp PRNoise ARBB EFILE} where: -RAMP is Inc. Ramp. -NRAMPp is Dec. Ramp. - PRNoise is Noise. - EFILE option sets Mod. Wave as Arbitrary. - ARBB option sets the waveform present in the modulation arbitrary buffer (see TRACe[n][:DATA] command) as arbitrary modulation waveform. If this buffer is empty a sinusoidal waveform will be created as default.
Returns	SIN SQU TRI RAMP NRAM PRN ARBB EFILE
Example	SOURce1:PWM:INternal:FUNCTion SQUare Selects square as the shape of modulating waveform for the channel 1 output.

Table 180: [SOURce[n]]:PWM:INternal:FUNCTion

Command	[SOURce[n]]:PWM:INternal:FUNCTion:EFILE
Description	This command sets or queries an EFILE name used as a modulating waveform for PWM modulation. The file must be present in the file system, the valid file extensions are ".txt", ".zip", ".bin" and ".trc". This file will be automatically insert in the Waveform List. If the file contains more than 16834 samples, it will be decimated. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or its subdirectories are accessible by this command.

Group	Source
Syntax	[SOURce[n]]:PWM:INTernal:FUNctIon:EFILe <file_name> [SOURce[n]]:PWM:INTernal:FUNctIon:EFILe?
Related Commands	None
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> parameter includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:PWM:INTernal:FUNctIon:EFILe "MODWAVEPWM1.txt" Imports the file named "MODWAVEPWM1" in the Waveform List and sets it as Arbitrary modulation waveform.

Table 181: [SOURce[n]]:PWM:INTernal:FUNctIon:EFILe

Command	[SOURce[n]]:PWM:SOURce
Description	This command sets or queries the source of the modulating signal of PWM modulation for the specified channel. This command will cause an error if not in PWM run mode.
Group	Source
Syntax	[SOURce[n]]:PWM:SOURce[INTernal EXTernal] [SOURce[n]]:PWM:SOURce?
Related Commands	None
Arguments	The value of n indicates the channel number. INTernal means that the carrier waveform is modulated with the internal source. EXTernal means that the carrier waveform is modulated with an external signal.
Returns	INT EXT
Example	SOURce1:PWM:SOURce INTernal Sets the source of the modulating signal on channel 1 to internal.

Table 182: [SOURce[n]]:PWM:SOURce

Command	[SOURce[n]]:PWM:STATe
Description	This command enables or disables PWM modulation. The query form of this command returns the state of PWM modulation. Before activate the PWM it is necessary to select the Pulse as carrier.
Group	Source
Syntax	[SOURce[n]]:PWM:STATe {ON OFF 0 1} [SOURce[n]]:PWM:STATe?

Related Commands	None
Arguments	The value of n indicates the channel number. ON 1 enables PWM modulation. OFF 0 disables PWM modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:PWM:STATE ON Enables the channel 1 PWM modulation.

Table 183: [SOURce[n]]:PWM:STATE

7.17 Sweep Modulation Source Commands

Command	[SOURce[n]]:FREQuency:MODE
Description	This command sets or queries the frequency sweep state. For the Pulse function the sweep is not allowed.
Group	Source
Syntax	[SOURce[n]]:FREQuency:MODE {CW FIXed SWEEp} [SOURce[n]]:FREQuency:MODE?
Related Commands	[SOURce[n]]:FREQuency [SOURce[n]]:FREQuency:START [SOURce[n]]:FREQuency:STOP
Arguments	The value of n indicates the channel number. CW FIXed means that the instrument is in Continuous Mode. SWEEp means that the instrument is in Sweep Mode.
Returns	CW SWE
Example	SOURce1:FREQuency:MODE SWEEp Specifies the sweep command set for controlling the CH 1 output frequency

Table 184: [SOURce[n]]:FREQuency:MODE

Command	[SOURce[n]]:FREQuency:START
Description	This command sets or queries the start frequency of a sweep for the specified channel. This command is always used with the [SOURce[n]]:FREQuency:STOP command. The start frequency range setting depends on the waveform selected for sweep and on the amplitude in case of Sine function. This command will cause an error if not in the Sweep state.
Group	Source
Syntax	[SOURce[n]]:FREQuency:START <frequency> [SOURce[n]]:FREQuency:START? [MINimum MAXimum]
Related Commands	[SOURce[n]]:FREQuency:MODE [SOURce[n]]:FREQuency:STOP
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the start frequency. <units>::=[Hz kHz MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>

Example	SOURce1:FREQuency:START 10KHz Sets the start frequency of channel 1 (CH 1) to 10 kHz.
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Table 185: [SOURce[n]]:FREQuency:START

Command	[SOURce[n]]:FREQuency:STOP
Description	This command sets or queries the stop frequency of sweep for the specified channel. This command is always used with the [SOURce[n]]:FREQuency:START command. The stop frequency range setting depends on the waveform selected for sweep and on the amplitude in case of Sine function. This command will cause an error if not in the Sweep state.
Group	Source
Syntax	[SOURce[n]]:FREQuency:STOP <frequency> [SOURce[n]]:FREQuency:STOP? [MINimum MAXimum]
Related Commands	[SOURce[n]]:FREQuency:MODE [SOURce[n]]:FREQuency:START
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the stop frequency. <units>::=[Hz kHz MHz]
Returns	<frequency>
Example	SOURce1:FREQuency:STOP 100kHz Sets the sweep stop frequency of channel 1 (CH 1) to 100 kHz.

Table 186: [SOURce[n]]:FREQuency:STOP

Command	[SOURce[n]]:SWEep:HTIME
Description	This command sets or queries the sweep holding time. Holding time represents the amount of time that the frequency remains stable after reaching the stop frequency. This command and this query will cause an error if not in Sweep mode.
Group	Source
Syntax	[SOURce[n]]:SWEep:HTIME <seconds> [SOURce[n]]:SWEep:HTIME? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the holding time in seconds. <units>::=[ns μ s ms s] MINimum queries the minimum holding time. MAXimum queries the maximum holding time.
Returns	<seconds>

Example	SOURce1:SWEep:HTIME 1ms Sets the channel 1 holding time to 1 ms.
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Table 187: [SOURce[n]]:SWEep:HTIME

Command	[SOURce[n]]:SWEep:MODE
Description	This command selects repeat or trigger for the sweep trigger mode for the specified channel. The query version of this command returns the sweep trigger mode for the specified channel.
Group	Source
Syntax	[SOURce[n]]:SWEep:MODE {AUTO MANual} [SOURce[n]]:SWEep:MODE?
Related Commands	None
Arguments	The value of n indicates the channel number. AUTO sets the sweep mode to repeat generation. The instrument outputs a continuous sweep at a rate specified by Sweep Rising Time, Holding Time, and Falling Time. MANual sets the sweep mode to trigger. The instrument outputs one sweep when a trigger input is received and wait on the start frequency.
Returns	AUTO MAN
Example	SOURce1:SWEep:MODE AUTO Sets the channel 1 Trigger mode to repeat. The instrument outputs a continuous sweep.

Table 188: [SOURce[n]]:SWEep:MODE

Command	[SOURce[n]]:SWEep:NSTEP
Description	This command sets or queries the Number of Step of the Upstair Sweep. The step number ranges from 1 to 2,048. This command will cause an error if not in Upstair Sweep mode.
Group	Source
Syntax	[SOURce[n]]:SWEep:NSTEP <step number> [SOURce[n]]:SWEep:NSTEP? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <step number>::=<NR1> Where: <NR1> is the burst count. MINimum queries the minimum number of steps. MAXimum queries the maximum number of steps.
Returns	<step number>
Example	SOURce1:SWEep:NSTEP 8 Sets the channel 1 sweep step to 8.

Table 189: [SOURce[n]]:SWEep:NSTEP

Command	[SOURce[n]]:SWEep:RTIME
Description	This command sets or queries the sweep falling time. Falling time represents the amount of time from stop frequency through start frequency. Falling time does not include holding time. This command and this query will cause an error if not in Sweep mode.
Group	Source
Syntax	[SOURce[n]]:SWEep:RTIME <seconds> [SOURce[n]]:SWEep:RTIME? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the falling time in seconds. <units>::=[ns μ s ms s] MINimum queries the minimum falling time. MAXimum queries the maximum falling time.
Returns	<return time>
Example	SOURce1:SWEep:RTIME 1ms Sets the channel 1 (CH 1) falling time to 1 ms.

Table 190: [SOURce[n]]:SWEep:RTIME

Command	[SOURce[n]]:SWEep:SPACing
Description	This command selects the spacing for the sweep for the specified channel. The query form of this command returns the type for the sweep spacing for the specified channel. Regardless of spacing, the time to walk the sweep profile is given by the sum of sweep rising time, sweep holding time and sweep falling time.
Group	Source
Syntax	[SOURce[n]]:SWEep:SPACing {LINear LOGarithmic UPStair ARBB USER} [SOURce[n]]:SWEep:SPACing?
Related Commands	[SOURce[n]]:SWEep:NSTEP [SOURce[n]]:SWEep:SPACing:EFILe
Arguments	The value of n indicates the channel number. -LINear sets the sweep spacing to linear. -LOGarithmic sets the sweep spacing to logarithmic. -UPStair sets the sweep spacing to stepped. - USER option sets Sweep Wave as Arbitrary.

	- ARBB option sets the waveform present in the sweep arbitrary buffer (see TRACe[n][:DATA] command) as arbitrary spacing waveform. If this buffer is empty a sinusoidal waveform will be created as default.
Returns	LIN LOG UPS USER ARBB
Example	SOURce1:SWEep:SPACing LINear Sets the channel 1 (CH1) sweep spacing to linear.

Table 191: [SOURce[n]]:SWEep:SPACing

Command Description	[SOURce[n]]:SWEep:SPACing:EFILe This command sets or queries an EFILe name used as sweep profile. The file must be present in the file system, the valid file extensions are ".txt", ".zip", ".bin" and ".trc". This file will be automatically insert in the Waveform List. If the file contains more than 16834 samples, it will be decimated. If the Sweep Mode is not set as Arbitrary the command reports an error. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or its subdirectories are accessible by this command.
Group	Source
Syntax	[SOURce[n]]:SWEep:SPACing:EFILe <file_name> [SOURce[n]]:SWEep:SPACing:EFILe?
Related Commands	[SOURce[n]]:SWEep:SPACing
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> parameter includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:SWEep:SPACing:EFILe "SWEEPPROFILE1.txt" Imports the file named "SWEEPPROFILE1" in the Waveform List and sets it as Arbitrary sweep spacing.

Table 192: [SOURce[n]]:SWEep:SPACing:EFILe

Command Description	[SOURce[n]]:SWEep:SPACing:WAVE This command sets or queries a WAVE name used as sweep profile in arbitray sweep mode. A WAVE name must be specified in the waveform list. If the WAVE contains more than 16834 samples, it will be decimated.
Group	Source

Syntax	[SOURce[n]]:SWEep:SPACing: WAVE <wave_name> [SOURce[n]]:SWEep:SPACing:WAVE?
Related Commands	None
Arguments	The value of n indicates the channel number. <wave_name>::=<Qstring> specifies a wave name in the waveform list.
Returns	<wave_name>
Example	SOURce1:SWEep:SPACing:WAVE "SINE" Sets the arbitrary waveform "SINE" in the waveform list as sweep profile.

Table 193: [SOURce[n]]:SWEep:SPACing:WAVE

Command Description	[SOURce[n]]:SWEep:TIME This command sets or queries the sweep rising time for the sweep. The sweep time does not include holding time and falling time. This command will cause an error if not in Sweep mode.
Group	Source
Syntax	[SOURce[n]]:SWEep:TIME <seconds> [SOURce[n]]:SWEep:TIME? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the sweep rising time in seconds. <units>::=[ns μ s ms s] MINimum queries the minimum sweep rising time. MAXimum queries the maximum sweep rising time.
Returns	<sweep time>
Example	SOURce1:SWEep:TIME 100ms Sets the channel 1 (CH 1) sweep rising time to 100 ms.

Table 194: [SOURce[n]]:SWEep:TIME

7.18 BURST SOURCE COMMANDS

Command	[SOURce[n]]:BURST:DURation
Description	This command sets or queries the duration of the burst for Noise waveform in Burst mode (only Triggered modes with finite number of cycles). This command will cause an error if the “n” channel is not in the BURST state and its carrier isn’t Noise.
Group	Source
Syntax	[SOURce[n]]:BURST:DURation <duration> [SOURce[n]]:BURST:DURation? [MINimum MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <duration>:=<NRf> [<units>] Where: <NRf> is the duration value, <units>:=[ns us ms s ks Ms]
Returns	<duration>
Example	SOURce1:BURST:DURation 1ms It sets the duration of the burst for Noise waveform equal to 1ms for the channel 1. SOURce1:BURST:DURation? It might return 100 nanoseconds.

Table 195: [SOURce[n]]:BURST:DURation

Command	[SOURce[n]]:BURSt:MODE
Description	This command sets or queries the burst mode for the specified channel. This command will cause an error if not in the BURST state.
Group	Source
Syntax	[SOURce[n]]:BURSt:MODE { TONECycle TRIGgered TCONtinuous GATEd } [SOURce[n]]:BURSt:MODE?
Related Commands	None
Arguments	The value of n indicates the channel number. TONECycle set 1 Cycle burst mode. TRIGgered set N Cycle burst mode. TCONtinuous set Inf. Cycle burst mode. GATEd means that gated mode is selected for the burst mode.
Returns	TONEC TRIG TCON GATE
Example	SOURce1:BURSt:MODE TRIGgered Selects N Cycle mode as Burst Mode.

Table 196: [SOURce[n]]:BURSt:MODE

Command	[SOURce[n]]:BURSt:NCYCles
Description	This command sets or queries the number of cycles (burst length) to be output in burst mode for the specified channel. This command will cause an error if not in BURST state.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:BURSt:NCYCles {<cycles> INF MINimum MAXimum} [SOURce[n]]:BURSt:NCYCles? [MINimum MAXimum]
Related Commands	None
Arguments	<cycles>::=<NR1> Where: <NR1> is the burst count. The value of n indicates the channel number. The burst count ranges from 1 to 4,294,967,294. INF sets the burst count to infinite. MINimum queries or sets the minimum count. MAXimum queries or sets the maximum count.
Returns	<cycles>
Example	SOURce1:BURSt:NCYCles 2 Sets the channel 1 (CH 1) burst count to 2.

Table 197: [SOURce[n]]:BURSt:NCYCles

Command	[SOURce[n]]:BURSt:WAIT:StAtE
Description	This command sets or return the behaviour of the output during the wait trigger condition in the Burst Run Modes. This parameter Wait Trigger On is active only when the first sample of the carrier and the last one are different.
Group	Control
Syntax	[SOURce[n]]:BURSt:WAIT:StAtE {FIRSTsample LASTsample} [SOURce[n]]:BURSt:WAIT:StAtE?
Related Commands	None
Arguments	- FIRSTsample: the first waveform sample of the carrier waveform is held until the next trigger (button, timer or external) is received - LASTsample: the last waveform sample of the carrier is held until the next trigger is received
Returns	FIRSTsample LASTsample

Example	SOURce1:BURSt:WAIT:STATe FIRSTsample The first sample of the carrier is generated while waiting for a trigger event. SOURce1:BURSt:WAIT:STATe? Might return FIRSTsample.
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Table 198: [SOURce[n]]:BURSt:WAIT:STATe

Command	[SOURce[n]]:BURSt[:STATe]
Description	This command enables or disables the burst mode for the specified channel. The query version of this command returns the state of burst mode.
Group	Source
Syntax	[SOURce[n]]:BURSt[:STATe] {ON OFF 0 1} [SOURce[n]]:BURSt[:STATe]?
Related Commands	None
Arguments	The value of n indicates the channel number. ON 1 enables the burst mode. OFF disables the burst mode.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:BURSt:STATe ON Enables the burst mode for channel 1 (CH 1).

Table 199: [SOURce[n]]:BURSt[:STATe]

Command	[SOURce[n]]:BURSt:TDELaY
Description	This command sets or queries initial delay time in the burst mode for the specified channel. It specifies a time delay between the trigger and the signal output. This command is available only in the triggered burst mode. This command will cause an error if not in the BURST state.
Group	Source
Syntax	[SOURce[n]]:BURSt:TDELaY <delay> } [SOURce[n]]:BURSt:TDELaY?[MINimum MAXimum]
Related Commands	[SOURce[n]]:INITDELaY
Arguments	The value of n indicates the channel number. <delay>::=<NRf>[<units>] Where: <units>::=[s ms μ s ns] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<delay>

Example

SOURce1:BURSt:TDElay 20ms

Sets the channel 1 (CH 1) initial delay time to 20 ms.

Table 200: [SOURce[n]]:BURSt:TDElay

7.19 Coupling Source Commands

Command	[SOURce[n]]:COUPLE:STATe
Description	This command enables or disables the channels coupling between the selected channel and the CH1. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:STATe { ON OFF 0 1} [SOURce{n}]:COUPLE:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling. OFF 0 disables the channels coupling.
Returns	<NR1> 0 means channels coupling disabled, 1 means channels coupling enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1.

Table 201: [SOURce{n}]:COUPLE:STATe

Command	[SOURce{n}]:COUPLE:AMPLitude:STATe
Description	This command enables or disables the channel coupling for the amplitude parameter. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this command to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:AMPLitude:STATe { ON OFF 0 1} [SOURce{n}]:COUPLE:AMPLitude:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1.

	ON 1 enables the channels coupling for the amplitude parameter. OFF 0 disables the channels coupling for the amplitude parameter.
Returns	<NR1> 0 means channel coupling for the amplitude parameter is disabled, 1 means channels coupling for the amplitude parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:AMPLitude:STATe ON Enables the channels coupling for the amplitude parameter

Table 202: [SOURce{n}]:COUPLE:AMPLitude:STATe

Command	[SOURce{n}]:COUPLE:AMPLitude:RATio
Description	This command sets or queries the ratio for the amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:AMPLitude:RATio <ratio> [SOURce{n}]:COUPLE:AMPLitude:RATio? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:AMPLitude:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:AMPLitude:RATio 2.5 Sets the amplitude ratio to 2.5

Table 203: [SOURce{n}]:COUPLE:AMPLitude:RATio

Command	[SOURce{n}]:COUPLE:AMPLitude:OFFSet
Description	This command sets or queries the offset for the amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:AMPLitude:OFFSet <offset> [SOURce{n}]:COUPLE:AMPLitude:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:AMPLitude:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[mV V] MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:AMPLitude:OFFSet 1.5 Sets the Offset for the amplitude parameter to 1.5 V.

Table 204: [SOURce{n}]:COUPLE:AMPLitude:OFFSet

Command	[SOURce{n}]:COUPLE:OFFSet:STATe
Description	This command enables or disables the channel coupling for the offset parameter. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this command to select the parameter that you want to

	couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:OFFSet:STATe { ON OFF 0 1} [SOURce{n}]:COUPLE:OFFSet:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling for the offset parameter. OFF 0 disables the channels coupling for the offset parameter.
Returns	<NR1> 0 means channel coupling for the offset parameter is disabled, 1 means channels coupling for the offset parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:OFFSet:STATe ON Enables the channels coupling for the offset parameter.

Table 205: [SOURce{n}]:COUPLE:OFFSet:STATe

Command Description	[SOURce{n}]:COUPLE:OFFSet:RATio This command sets or queries the ratio for the offset parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:OFFSet:RATio <ratio> [SOURce{n}]:COUPLE:OFFSet:RATio? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:OFFSet:OFFSet

Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:OFFSet:RATio 2.5 Sets the offset ratio to 2.5.

Table 206: [SOURce{n}]:COUPLE:OFFSet:RATio

Command	[SOURce{n}]:COUPLE:OFFSet:OFFSet
Description	This command sets or queries the offset for the offset parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:OFFSet:OFFSet <offset> [SOURce{n}]:COUPLE:OFFSet:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:OFFSet:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[mV V] MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:OFFSet:OFFSet 2 Sets the Offset for the offset parameter to 2 V.

Table 207: [SOURce{n}]:COUPLE:OFFSet:OFFSet

Command	[SOURce{n}]:COUPLE:FREQuency:STATe
Description	This command enables or disables the channel coupling for the frequency parameter. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:FREQuency:STATe { ON OFF 0 1 } [SOURce{n}]:COUPLE:FREQuency:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling for the frequency parameter. OFF 0 disables the channels coupling for the frequency parameter.
Returns	<NR1> 0 means channel coupling for the frequency parameter is disabled, 1 means channels coupling for the frequency parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:FREQuency:STATe ON Enables the channels coupling for the frequency parameter

Table 208: [SOURce{n}]:COUPLE:FREQuency:STATe

Command	[SOURce{n}]:COUPLE:FREQuency:RATio
Description	This command sets or queries the ratio for the frequency parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}.$

	This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:FREQuency:RATio <ratio> [SOURce{n}]:COUPLE:FREQuency:RATio? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:FREQuency:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:FREQuency:RATio 2.5 Sets the frequency ratio to 2.5.

Table 209: [SOURce{n}]:COUPLE:FREQuency:RATio

Command Description	[SOURce{n}]:COUPLE:FREQuency:OFFSet
	This command sets or queries the offset for the frequency parameter in coupling mode.
	The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).
	The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset.
	This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:FREQuency:OFFSet <offset> [SOURce{n}]:COUPLE:FREQuency:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:FREQuency:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset.

	<code><units>::=[Hz kHz MHz]</code> . MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<code><offset></code>
Example	SOURce2:COUPLE:FREQuency:OFFSet 1MHz Sets the Offset for the frequency parameter to 1 MHz.

Table 210: [SOURce{n}]:COUPLE:FREQuency:OFFSet

Command	<code>[SOURce{n}]:COUPLE:PHASe:STATe</code>
Description	This command enables or disables the channel coupling for the phase parameter. Once the channel coupling between two channels have been enabled using the <code>[SOURce{n}]:COUPLE:STATe</code> command, you have to use this command to select the parameter that you want to couple. Note: if <code>[SOURce{n}]</code> will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:PHASe:STATe { ON OFF 0 1 }</code> <code>[SOURce{n}]:COUPLE:PHASe:STATe?</code>
Related Commands	<code>[SOURce{n}]:COUPLE:STATe</code>
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling for the phase parameter. OFF 0 disables the channels coupling for the phase parameter.
Returns	<code><NR1></code> 0 means channel coupling for the phase parameter is disabled, 1 means channels coupling for the phase parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:PHASe:STATe ON Enables the channels coupling for the phase parameter

Table 211: [SOURce{n}]:COUPLE:PHASe:STATe

Command	<code>[SOURce{n}]:COUPLE:PHASe:RATio</code>
Description	This command sets or queries the ratio for the phase parameter in coupling mode.

	The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:PHASe:RATio <ratio></code> <code>[SOURce{n}]:COUPLE:PHASe:RATio? [MINimum MAXimum]</code>
Related Commands	<code>[SOURce{n}]:COUPLE:PHASe:OFFSet</code>
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	<code>SOURce2:COUPLE:PHASe:RATio 2.5</code> Sets the phase ratio to 2.5.

Table 212: [SOURce{n}]:COUPLE:PHASe:RATio

Command	<code>[SOURce{n}]:COUPLE:PHASe:OFFSet</code>
Description	This command sets or queries the offset for the phase parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$.

	This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:PHASe:OFFSet <offset> [SOURce{n}]:COUPLE:PHASe:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:PHASe:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NR3>[<units>] Where:<NR3> is the offset. <units>::=[° DEG]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:PHASe:OFFSet 10DEG Sets the Offset for the phase parameter to 10 degrees.

Table 213: [SOURce{n}]:COUPLE:PHASe:OFFSet

Command Description	[SOURce{n}]:COUPLE:DCYCLe:STATe This command enables or disables the channel coupling for the duty cycle parameter. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this command to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DCYCLe:STATe { ON OFF 0 1} [SOURce{n}]:COUPLE:DCYCLe:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling for the duty cycle parameter. OFF 0 disables the channels coupling for the duty cycle parameter.
Returns	<NR1>

	0 means channel coupling for the duty cycle parameter is disabled, 1 means channels coupling for the duty cycle parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DCYCLe:STATe ON Enables the channels coupling for the duty cycle parameter

Table 214: [SOURce{n}]:COUPLE:DCYCLe:STATe

Command Description	[SOURce{n}]:COUPLE:DCYCLe:RATio This command sets or queries the ratio for the duty cycle parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DCYCLe:RATio <ratio> [SOURce{n}]:COUPLE:DCYCLe:RATio? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:DCYCLe:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DCYCLe:RATio 2.5 Sets the ratio for the duty cycle to 2.5.

Table 215: [SOURce{n}]:COUPLE:DCYCLe:RATio

Command Description	[SOURce{n}]:COUPLE:DCYCLe:OFFSet This command sets or queries the offset for the duty cycle parameter in coupling mode.
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	The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:DCYCLe:OFFSet <offset></code> <code>[SOURce{n}]:COUPLE:DCYCLe:OFFSet? [MINimum MAXimum]</code>
Related Commands	<code>[SOURce{n}]:COUPLE:DCYCLe:RATio</code>
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NR2>[<units>] Where: <NR2> is the offset. <units>::=PCT MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	<code>SOURce2:COUPLE:DCYCLe:OFFSet 10.5</code> Sets the Offset for the duty cycle parameter to 10.5 %.

Table 216: [SOURce{n}]:COUPLE:DCYCLe:OFFSet

Command Description	<code>[SOURce{n}]:COUPLE:LEADIng:STATe</code> This command enables or disables the channel coupling for the rising edge parameter. Once the channel coupling between two channels have been enabled using the <code>[SOURce{n}]:COUPLE:STATe</code> command, you have to use this command to select the parameter that you want to couple. Note: if <code>[SOURce{n}]</code> will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source

Syntax	[SOURce{n}]:COUPLE:LEADIng:STATe { ON OFF 0 1} [SOURce{n}]:COUPLE:LEADIng:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling for the rising edge parameter. OFF 0 disables the channels coupling for the rising edge parameter.
Returns	<NR1> 0 means channel coupling for the rising edge parameter is disabled, 1 means channels coupling for the rising edge parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:LEADIng:STATe ON Enables the channels coupling for the rising edge parameter

Table 217: [SOURce{n}]:COUPLE:LEADIng:STATe

Command Description	[SOURce{n}]:COUPLE:LEADIng:RATio This command sets or queries the ratio for the rising edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:LEADIng:RATio <ratio> [SOURce{n}]:COUPLE:LEADIng:RATio? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:LEADIng:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio.

	MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:LEADIng:RATio 2.5 Sets the rising edge ratio to 2.5.

Table 218: [SOURce{n}]:COUPLE:LEADIng:RATio

Command	[SOURce{n}]:COUPLE:LEADIng:OFFSet
Description	This command sets or queries the offset for the rising edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:LEADIng:OFFSet <offset> [SOURce{n}]:COUPLE:LEADIng:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:LEADIng:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns μs ms s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:LEADIng:OFFSet 10ns Sets the Offset for the rising edge parameter to 10 ns.

Table 219: [SOURce{n}]:COUPLE:LEADIng:OFFSet

Command	[SOURce{n}]:COUPLE:TRAILing:STATe
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Description	This command enables or disables the channel coupling for the falling edge parameter. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATE command, you have to use this command to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:TRailing:STATE { ON OFF 0 1} [SOURce{n}]:COUPLE:TRailing:STATE?
Related Commands	[SOURce{n}]:COUPLE:STATE
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling for the falling edge parameter. OFF 0 disables the channels coupling for the falling edge parameter.
Returns	<NR1> 0 means channel coupling for the falling edge parameter is disabled, 1 means channels coupling for the falling edge parameter is enabled.
Example	SOURce2:COUPLE:STATE ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:TRailing:STATE ON Enables the channels coupling for the falling edge parameter

Table 220: [SOURce{n}]:COUPLE:TRailing:STATE

Command Description	[SOURce{n}]:COUPLE:TRailing:RATio This command sets or queries the ratio for the falling edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).
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	The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:TRAIling:RATio <ratio></code> <code>[SOURce{n}]:COUPLE:TRAIling:RATio? [MINimum MAXimum]</code>
Related Commands	<code>[SOURce{n}]:COUPLE:TRAIling:OFFSet</code>
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	<code>SOURce2:COUPLE:TRAIling:RATio 2.5</code> Sets the falling edge ratio to 2.5

Table 221: [SOURce{n}]:COUPLE:TRAIling:RATio

Command	<code>[SOURce{n}]:COUPLE:TRAIling:OFFSet</code>
Description	This command sets or queries the offset for the falling edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:TRAIling:OFFSet <offset></code> <code>[SOURce{n}]:COUPLE:TRAIling:OFFSet? [MINimum MAXimum]</code>

Related Commands	[SOURce{n}]:COUPLE:TRAIling:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns μs ms s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:TRAIling:OFFSet 10ns Sets the Offset for the falling edge parameter to 10 ns.

Table 222: [SOURce{n}]:COUPLE:TRAIling:OFFSet

Command	[SOURce{n}]:COUPLE:SYMMetry:STATe
Description	This command enables or disables the channel coupling for the ramp symmetry parameter. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this command to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:SYMMetry:STATe { ON OFF 0 1} [SOURce{n}]:COUPLE:SYMMetry:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON 1 enables the channels coupling for the ramp symmetry parameter. OFF 0 disables the channels coupling for the ramp symmetry parameter.
Returns	<NR1> 0 means channel coupling for the ramp symmetry parameter is disabled, 1 means channels coupling for the ramp symmetry parameter is enabled.

Example	SOURce2:COUPLE:STATe ON
	Enables the channels coupling between the CH2 and the CH1.
	SOURce2:COUPLE:SYMMetry:STATe ON
	Enables the channels coupling for the ramp symmetry parameter

Table 223: [SOURce{n}]:COUPLE:SYMMetry:STATe

Command	[SOURce{n}]:COUPLE:SYMMetry:RATio
Description	This command sets or queries the ratio for the ramp symmetry parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:SYMMetry:RATio <ratio> [SOURce{n}]:COUPLE:SYMMetry:RATio? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:SYMMetry:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:SYMMetry:RATio 2.5 Sets the ramp symmetry ratio to 2.5.

Table 224: [SOURce{n}]:COUPLE:SYMMetry:RATio

Command	[SOURce{n}]:COUPLE:SYMMetry:OFFSet
Description	This command sets or queries the offset for the ramp symmetry parameter in coupling mode.

	The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:SYMMetry:OFFSet <offset></code> <code>[SOURce{n}]:COUPLE:SYMMetry:OFFSet? [MINimum MAXimum]</code>
Related Commands	<code>[SOURce{n}]:COUPLE:SYMMetry:RATio</code>
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NR2>[<units>] Where: <NR2> is the offset. <units>::=PCT MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	<code>SOURce2:COUPLE:SYMMetry:OFFSet 20.5%</code> Sets the Offset for the symmetry parameter to 20.5 %.

Table 225: [SOURce{n}]:COUPLE:SYMMetry:OFFSet

Command	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:STATe</code>
Description	This command enables or disables the channel coupling for the amplitude parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the <code>[SOURce{n}]:COUPLE:STATe</code> command, you have to use this command to select the parameter that you want to couple. Note: if <code>[SOURce{n}]</code> will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:STATe</code> <code>{ ON OFF 0 1 }</code>

	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of k indicates the pulse number. ON 1 enables the channels coupling for the amplitude parameter of the double pulse waveform. OFF 0 disables the channels coupling for the amplitude parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse amplitude parameter is disabled, 1 means channels coupling for the double pulse amplitude parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:AMPLitude:STATe ON Enables the channels coupling for the Pulse 1 amplitude parameter of the double pulse waveform.

Table 226: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:STATe

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:RATio
Description	This command sets or queries the ratio for the double pulse amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:RATio <ratio> [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:RATio? [MINimum MAXimum]

Related Commands	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:AMPLitude:RATio 2.5 Sets the Pulse 1 amplitude ratio of the double pulse waveform to 2.5.

Table 227: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:RATio

Command Description	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:OFFSet This command sets or queries the offset for the double pulse amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:OFFSet <offset> [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset.

	<units>::=[mV V] MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:AMPLitude:OFFSet 1.5 Sets the Pulse 1 Offset for the double pulse amplitude parameter to 1.5 V.

Table 228: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:AMPLitude:OFFSet

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADing:STATe
Description	This command enables or disables the channel coupling for the rising edge parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this command to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADing:STATe { ON OFF 0 1} [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADing:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of k indicates the pulse number. ON 1 enables the channels coupling for the rising edge parameter of the double pulse waveform. OFF 0 disables the channels coupling for the rising edge parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse rising edge parameter is disabled, 1 means channels coupling for the double pulse rising edge parameter is enabled.

Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:LEADIng:STATe ON Enables the channels coupling for the Pulse 1 rising edge parameter of the double pulse waveform.
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Table 229: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADIng:STATe

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADIng:RATio
Description	This command sets or queries the ratio for the rising edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADIng:RATio <ratio> [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADIng:RATio? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADIng:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:LEADIng:RATio 2.5 Sets the Pulse 1 rising edge ratio of the double pulse waveform to 2.5.

Table 230: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADIng:RATio

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:LEADIng:OFFSet
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Description	This command sets or queries the offset for the rising edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:DOUBLEPULSE:PULSE[k]:LEADing:OFFSet</code> <code><offset></code> <code>[SOURce{n}]:COUPLE:DOUBLEPULSE:PULSE[k]:LEADing:OFFSet?</code> <code>[MINimum MAXimum]</code>
Related Commands	<code>[SOURce{n}]:COUPLE:DOUBLEPULSE:PULSE[k]:LEADing:RATio</code>
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <code><offset>::=<NRf>[<units>]</code> Where: <code><NRf></code> is the offset. <code><units>::=[ns μs ms s]</code>. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<code><offset></code>
Example	<code>SOURce2:COUPLE:DOUBLEPULSE:PULSE1:LEADing:OFFSet 10ns</code> Sets the Offset for the Pulse 1 rising edge parameter of the double pulse waveform to 10 ns.

Table 231: `[SOURce{n}]:COUPLE:DOUBLEPULSE:PULSE[k]:LEADing:OFFSet`

Command	<code>[SOURce{n}]:COUPLE:DOUBLEPULSE:PULSE[k]:TRAILing:STATe</code>
Description	This command enables or disables the channel coupling for the falling edge parameter of the double pulse waveform.

	Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATE command, you have to use this command to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAILing:STATE {ON OFF 0 1} [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAILing:STATE?
Related Commands	[SOURce{n}]:COUPLE:STATE
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of k indicates the pulse number. ON 1 enables the channels coupling for the falling edge parameter of the double pulse waveform. OFF 0 disables the channels coupling for the falling edge parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse falling edge parameter is disabled, 1 means channels coupling for the double pulse falling edge parameter is enabled.
Example	SOURce2:COUPLE:STATE ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:TRAILing:STATE ON Enables the channels coupling for the Pulse 1 falling edge parameter of the double pulse waveform.

Table 232: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAILing:STATE

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAILing:RATio
Description	This command sets or queries the ratio for the falling edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).

	The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:RATio <ratio></code> <code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:RATio?</code> <code>[MINimum MAXimum]</code>
Related Commands	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:OFFSet</code>
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	<code>SOURce2:COUPLE:DOUBLEPULSe:PULSe1:TRAIling:RATio 2.5</code> Sets the Pulse 1 falling edge ratio of the double pulse waveform to 2.5.

Table 233: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:RATio

Command	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:OFFSet</code>
Description	This command sets or queries the offset for the falling edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.

Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:OFFSet <offset> [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns μ s ms s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:TRAIling:OFFSet 10ns Sets the Offset for the Pulse 1 falling edge parameter of the double pulse waveform to 10 ns.

Table 234: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:TRAIling:OFFSet

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:STATe
Description	This command enables or disables the channel coupling for the width parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this command to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:STATe {ON OFF 0 1} [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of k indicates the pulse number.

	ON 1 enables the channels coupling for the width parameter of the double pulse waveform. OFF 0 disables the channels coupling for the width parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse width parameter is disabled, 1 means channels coupling for the double pulse width parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:WIDTh:STATe ON Enables the channels coupling for the Pulse 1 width parameter of the double pulse waveform.

Table 235: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:STATe

Command Description	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:RATio This command sets or queries the ratio for the width edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:RATio <ratio> [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:RATio? [MINimum MAXimum]
Related Commands Arguments	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:OFFSet The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio.

	MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:WIDTh:RAtio 2.5 Sets the Pulse 1 width ratio of the double pulse waveform to 2.5.

Table 236: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:RAtio

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:OFFSet
Description	This command sets or queries the offset for the width parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} * \text{Ratio} + \text{Offset}.$ This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:OFFSet <offset> [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:RAtio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns μs ms s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:WIDTh:OFFSet 10ns Sets the Offset for the Pulse 1 width parameter of the double pulse waveform to 10 ns.

Table 237: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:WIDTh:OFFSet

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:STATe
Description	This command enables or disables the channel coupling for the delay parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce{n}]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce{n}] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:STATe {ON OFF 0 1} [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:STATe?
Related Commands	[SOURce{n}]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of k indicates the pulse number. ON 1 enables the channels coupling for the delay parameter of the double pulse waveform. OFF 0 disables the channels coupling for the delay parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse delay parameter is disabled, 1 means channels coupling for the double pulse delay parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enables the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:DELay:STATe ON Enables the channels coupling for the Pulse 1 delay parameter of the double pulse waveform.

Table 238: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:STATe

Command	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:RATIo
Description	This command sets or queries the ratio for the delay parameter of the double pulse waveform in coupling mode.

	The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:RATio <ratio></code> <code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:RATio?</code> <code>[MINimum MAXimum]</code>
Related Commands	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:OFFSet</code>
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	<code>SOURce2:COUPLE:DOUBLEPULSe:PULSe1:DELay:RATio 2.5</code> Sets the Pulse 1 delay of the double pulse waveform to 2.5.

Table 239: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:RATio

Command	<code>[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:OFFSet</code>
Description	This command sets or queries the offset for the delay parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: $\text{CHN Parameter} = \text{CH1 Parameter} \times \text{Ratio} + \text{Offset}$.

	This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:OFFSet <offset> [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:OFFSet? [MINimum MAXimum]
Related Commands	[SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of k1 indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns μ s ms s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:DELay:OFFSet 10ns Sets the Offset for the Pulse 1 delay parameter of the double pulse waveform to 10 ns.

Table 240: [SOURce{n}]:COUPLE:DOUBLEPULSe:PULSe[k]:DELay:OFFSet

7.20 Device Group Commands

Command	AFGControl:APPSwitch
Description	This command allows to switch from AT-Simple-AFG software to AT-True-ARB application or SPG application. Note: the SPG software is available only if it is licensed.
Group	Device Commands
Syntax	AFGControl:APPSwitch {TA DPG}
Related Commands	AFGControl:AWGSwitch
Arguments	- TA: runs the True Arb application - DPG: runs the Serial Pattern Generator application
Returns	None
Example	AFGControl:APPSwitch TA Runs the True Arb application.

Table 241: AFGControl:APPSwitch

Command	AFGControl:AWGSwitch
Description	This command allows to switch from AT-Simple-AFG software to AT-True-ARB software.
Group	Device Commands
Syntax	AFGControl:AWGSwitch
Related Commands	AFGControl:APPSwitch
Arguments	None
Returns	None
Example	AFGControl:AWGSwitch Launches the AT-True-ARB software while AT-Simple-AFG is running.

Table 242: AFGControl:AWGSwitch

Command	AFGControl:CONFigure:CNUMber? (Query Only)
Description	This command returns the number of output channels available on the instrument.
Group	Control
Syntax	AFGControl:CONFigure:CNUMber?
Related Commands	None
Arguments	None
Returns	A single <NR1> value that indicates the number of available channels
Example	AFGControl:CONFigure:CNUMber? Might return 2.

Table 243: AFGControl:CONFigure:CNUMber

Command	AFGControl:COPY
Description	This command copies all parameter data from the source channel to the others.
Group	Device Commands
Syntax	AFGControl:COPY <source channel>
Related Commands	None
Arguments	<source channel>::=<NR1> Where <NR1> indicates the channel number.
Returns	None
Example	AFGControl:COPY 1 Copies the CH1 parameters into the others channels.

Table 244: AFGControl:COPY

Command	AFGControl:COUPLEParam						
Description	This command sets or returns if a specified parameter for Channel N (with N ≠ 1) must be coupled with the corresponding one on Channel 1.						
Group	Control						
Syntax	AFGControl:COUPLEParam {CH2 CH3 CH4 CH5 CH6 CH7 CH8},{<parametername> ALL},{OFF ON} AFGControl:COUPLEParam? {CH2 CH3 CH4 CH5 CH6 CH7 CH8},<parametername>						
Related Commands	AFGControl:OPMODE						
Arguments	- CH2 CH3 CH4 CH5 CH6 CH7 CH8 specifies the channel that must be coupled to Channel 1. <parametername>::=<string> specified the label of the parameter that must be coupled. Note: the label is the name of the parameter (including any abbreviation dot) without the unit of measure enclosed in square brackets. E.g.: <table><tr><th>Correct Label</th><th>Uncorrect Label</th></tr><tr><td>"Rising Edge"</td><td>"Rising Edge [s]"</td></tr><tr><td>"Load Imp."</td><td>"Load Imp"</td></tr></table> The ALL parameter allows all available parameters to be coupled at the same time. - OFF ON the selected parameter is coupled (ON) or decoupled (OFF) with the correspond parameter of channel 1	Correct Label	Uncorrect Label	"Rising Edge"	"Rising Edge [s]"	"Load Imp."	"Load Imp"
Correct Label	Uncorrect Label						
"Rising Edge"	"Rising Edge [s]"						
"Load Imp."	"Load Imp"						

Returns	0 1 where '0' means that the parameter is decoupled and '1' means that the parameter is coupled.
Example	AFGControl:COUPLEParam CH2,"Period",ON The parameters Period of CH1 e CH2 are now coupled. AFGControl:COUPLEParam? CH2,"Period" Might return 1.

Table 245: AFGControl:COUPLEParam

Command Description	AFGControl:RESET[:IMMediate] (No Query Form) This command resets the instrument to its default state. Parameters such as transition time, skew time will be set to its default value. Note: the behaviour of this command is equivalent to *RST with the exception that before sending the AFGControl:RESET[:IMMediate] command, the instrument must be in Stopped state.
Group	Control
Syntax	AFGControl:RESET[:IMMediate]
Related Commands	*RST
Arguments	None
Returns	None
Example	AFGControl:RESET If the instrument is Stopped, it will reset it to its default state.

Table 246: AFGControl:RESET[:IMMediate]

Command Description	AFGControl:RSTaTe? (Query Only) This command returns the run state of the instrument. This query returns a number composed by one digit for every channel, each digit can be 0 = stopped, 1 = waiting for trigger or 2 = running
Group	Control
Syntax	AFGControl:RSTaTe?
Related Commands	OUTPut[n]:RUNMODE
Arguments	None
Returns	A single <NR1> value. <N8><N7><N6><N5><N4><N3><N2><N1> 0 indicates that the instrument is stopped. 1 indicates that the instrument is waiting for trigger. 2 indicates that the instrument is running.

Example	AFGCONTROL:RSTATE? Might return 2222211, indicating that channel 1 and channel 2 are waiting for trigger, the other ones are running.
----------------	--

Table 247: AFGControl:RSTATE

Command	AFGControl:RUN[:IMMEDIATE] (No Query Form)
Description	This command starts the generation. This is the same to press the run button on the front-panel or display.
Group	Control
Syntax	AFGControl:RUN[:IMMEDIATE]
Related Commands	AFGControl:STOP[:IMMEDIATE]
Arguments	None
Returns	None
Example	AFGControl:RUN Puts the instrument in the run state.

Table 248: AFGControl:RUN[:IMMEDIATE]

Command	AFGControl:SREStore (No Query Form)
Description	This command loads a setup file from the instrument's configuration list, this command is equivalent to "RECALL:SETUP".
Group	Control
Syntax	AFGControl:SREStore <cfg_name>
Related Commands	MMEMory:OPEN:SETUP
Arguments	<cfg_name>::=<string>
Returns	None
Example	AFGControl:SREStore "my_configuration" Loads the setup called "my_configuration".

Table 249: AFGControl:SREStore

Command	AFGControl:SSAVE (No Query Form)
Description	This command saves the instrument current setup with waveforms into the setup memory
Group	Control
Syntax	AFGControl:SSAVE <cfg_name>
Related Commands	MMEMory:SAVE:SETUP
Arguments	<cfg_name>::=<string>
Returns	None
Example	AFGControl:SSAVE "my_configuration" Saves the current setup into "my_configuration".

Table 250: AFGControl:SSAVE

Command	AFGControl:START
Description	This command runs the instrument and starts the generation. There is no query form of this command.
Group	Device Commands
Syntax	AFGControl:START
Related Commands	AFGControl:STOP
Arguments	None
Returns	None
Example	AFGControl:START Sends the start command to the function generator.

Table 251: AFGControl:START

Command	AFGControl:STATus (Query only)
Description	This command queries the status of the function generator. This command is query only.
Group	Device Commands
Syntax	AFGControl:STATus?
Related Commands	None
Arguments	None
Returns	0 if the instrument is in stopped state. 1 if the instrument is in run state.
Example	AFGControl:STATus? Returns the status of the function generator.

Table 252: AFGControl:STATus

Command	AFGControl:STOP
Description	This command stops the instrument. There is no query form of this command.
Group	Device Commands
Syntax	AFGControl:STOP
Related Commands	AFGControl:START
Arguments	None
Returns	None
Example	AFGControl:STOP Sends the stop command to the function generator.

Table 253: AFGControl:STOP

7.21 Status Group Commands

Command	STATus:OPERation:CONDition? (Query Only)
Description	This command returns the contents of the Operation Condition Register (OCR). This command is query only.
Group	Status
Syntax	STATus:OPERation:CONDition?
Related Commands	None
Arguments	None
Returns	<NR1>::=<value>
Example	STATus:OPERation:CONDition? Might return 8, which indicates that the OCR contains the binary number 000000001000; it means that CH1 is waiting for a trigger.

Table 254: STATus:OPERation:CONDition?

Command	STATus:OPERation:ENABle
Description	This command sets or returns the mask of the Operation Enable Register (OENR). Note that the OENR is not used.
Group	Status
Syntax	STATus:OPERation:ENABle <enable_value> STATus:OPERation:ENABle?
Related Commands	None
Arguments	<enable_value>::= <NR1> is the enable mask of the OENR. Range: 0 to 65535.
Returns	<enable_value>
Example	STATus:OPERation:ENABle? Might return 0.

Table 255: STATus:OPERation:ENABle

Command	STATus:OPERation[:EVENT]? (Query Only)
Description	This command returns the value (in decimal) sets in the Operation Event Register (OEVr) and clears the OEVr. OEVr is a transition register for OCR. This command is query only.
Group	Status
Syntax	STATus:OPERation[:EVENT]?
Related Commands	STATus:OPERation:CONDition? STATus:OPERation:ENABle
Arguments	None
Returns	<NR1>::=<value> value showing the contents of the OEVr register.

Example	STATUS:OPERation:EVENT? Might return 24, which indicates that the OEVR contains the binary number 000000011000; it means that the status of Bit_3 and Bit_4 of OCR register has changed.
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Table 256: STATus:OPERation[:EVENT]?

Command	STATus:PRESet (No Query Form)
Description	This command sets the Operation Enable Register (OENR) and Questionable Enable Register (QENR). Both registers are not used.
Group	Status
Syntax	STATus:PRESet
Related Commands	None
Arguments	None
Returns	None
Example	STATUS:PRESET Presets the SCPI enable registers (not used).

Table 257: STATus:PRESet

Command	STATus:QUESTionable:CONDition? (Query only)
Description	This command returns the contents of the Questionable Condition Register (QCR). This command is query only. Note that the QCR is not used.
Group	Status
Syntax	STATus:QUESTionable:CONDition?
Related Commands	None
Arguments	None
Returns	0
Example	STATUS:QUESTionable:CONDition? Allways returns 0.

Table 258: STATus:QUESTionable:CONDition

Command	STATus:QUESTionable:ENABLE? (Query only)
Description	This command queries the mask for the Questionable Enable Register (QENR). Note that the QENR is not used.
Group	Status
Syntax	STATus:QUESTionable:ENABLE?
Related Commands	None
Arguments	None
Returns	0

Example	STATus:QUESTionable:ENABLE? Always returns 0.
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Table 259: STATus:QUESTionable:ENABLE?

Command	STATus:QUESTionable[:EVENT]? (Query Only)
Description	This command returns the value in the Questionable Event Register (QEVr) and clears the QEVr. This command is query only. Note that the QEVr is not used.
Group	Status
Syntax	STATus:QUESTionable[:EVENT]?
Related Commands	None
Arguments	None
Returns	0
Example	STATus:QUESTionable:EVENT? Always returns 0.

Table 260: STATus:QUESTionable[:EVENT]?

7.22 System Group Commands

Command	[SYSTem:]DATE
Description	This command sets or returns the system date.
Group	System
Syntax	[SYSTem:]DATE <year>,<month>,<day> [SYSTem:]DATE?
Related Commands	[SYSTem:]TIME
Arguments	<year>::=<NR1> (Four digit number) <month>::=<NR1> from 1 to 12 <day>::=<NR1> from 1 to 31
Returns	<year>,<month>,<day>
Example	SYSTem:DATE 2012,11,20 Sets the date to November 20, 2012.

Table 261: [SYSTem:]DATE

Command	[SYSTem:]TIME
Description	This command sets or returns the system time (hours, minutes and seconds).
Group	System
Syntax	[SYSTem:]TIME <hour>,<minute>,<second> [SYSTem:]TIME?
Related Commands	[SYSTem:]DATE
Arguments	<hour>,<minute>,<second> <hour> ::= <NR1> specifies the hours. Range: 0 to 23. <minute> ::= <NR1> specifies the minutes. Range: 0 to 59. <second> ::= <NR1> specifies the seconds. Range: 0 to 59.
Returns	<hour>,<minute>,<second>
Example	SYSTem:TIME 10,15,30 Sets the time to 10:15:30. SYSTem:TIME? Might return 12,20,32, indicating the system time is 12:20:32.

Table 262: [SYSTem:]TIME

Command	SYSTem:BEEPer[:IMMediate]
Description	This command causes the instrument to beep immediately. There is no query form of this command.
Group	System
Syntax	SYSTem:BEEPer[:IMMediate]
Related Commands	None

Arguments	None
Returns	None
Example	SYSTem:BEEPer:IMMediate Causes an audible beep.

Table 263: SYSTem:BEEPer[:IMMediate]

Command	SYSTem:BEEPer:STATe
Description	This command enables or disables the instrument beeper. When the beeper is set to ON, the instrument will beep when an error is caused by remote command execution.
Group	System
Syntax	SYSTem:BEEPer:STATe { ON OFF 0 1 } SYSTem:BEEPer:STATe?
Related Commands	SYSTem:BEEPer[:IMMediate]
Arguments	ON 1 enables the beeper. OFF 0 disables the beeper.
Returns	<NR1> 1 means that the beeper is enabled, 0 means that it is disabled.
Example	SYSTem:BEEPer:STATe ON Enables the beeper function.

Table 264: SYSTem:BEEPer:STATe

Command	SYSTem:ERRor[:NEXT]? (Query Only)
Description	This command returns the contents of the Error/Event queue. This command is query only.
Group	System
Syntax	SYSTem:ERRor[:NEXT]?
Related Commands	None
Arguments	<Error number>, <error description> Error number ::= <NR1>. error description ::= <string>.
Returns	<NR1>
Example	SYSTem:ERRor:NEXT? Might return "70, Command keywords were not recognized".

Table 265: SYSTem:ERRor[:NEXT]

Command	SYSTem:KCLick[:STATe]
Description	This command enables or disables the key click sound when you push the front panel buttons, turn the general-purpose knob or touch/click a control on the user interface.

Group	System
Syntax	SYSTem:KCLick[:STATe] { ON OFF 0 1} SYSTem:KCLick[:STATe]?
Related Commands	None
Arguments	ON 1 enables key click sound. OFF 0 disables key click sound.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SYSTem:KCLick:STATe ON Enables the key click sound.

Table 266: SYSTem:KCLick[:STATe]

Command	SYSTem:KLOCK[:STATe]
Description	This command locks or unlocks the instrument front panel controls. The query command returns "0" (OFF) or "1" (ON).
Group	System
Syntax	SYSTem:KLOCK[:STATe] {OFF ON} SYSTem:KLOCK[:STATe]?
Related Commands	None
Arguments	ON or <NR1>≠0 Locks front panel controls OFF or <NR1>=0 Unlocks front panel controls
Returns	<NR1>
Example	SYSTem:KLOCK ON Locks front panel controls. SYSTem:KLOCK? Might return 0.

Table 267: SYSTem:KLOCK[:STATe]

Command	SYSTem:SECurity:IMMediate (No Query Form)
Description	This command erases all configurations and user waveforms and recalls the factory default settings. Calibration data is not erased.
Group	System
Syntax	SYSTem:SECurity:IMMediate
Related Commands	None
Arguments	None
Returns	<NR1>
Example	SYSTem:SECurity:IMMediate Initializes the instrument.

Table 268: SYSTem:SECurity:IMMediate

Command	SYSTem:TLOCK[:STATe]
Description	This command locks or unlocks the touch screen interface. When you set the ON state (lock enabled), the events related to the touch screen will be disabled.
Group	System
Syntax	SYSTem:TLOCK[:STATe] { ON OFF 0 1} SYSTem:TLOCK[:STATe]?
Related Commands	None
Arguments	ON locks the user interface. OFF unlocks the user interface.
Returns	<NR1> 1 means that the UI is locked, 0 means that it is unlocked.
Example	SYSTem:TLOCK:STATe ON Locks the user interface.

Table 269: SYSTem:TLOCK[:STATe]

Command	SYSTem:ULANguage? (Query only)
Description	This command queries the language that the instrument uses to display the information on the screen. This command is query only.
Group	System
Syntax	SYSTem:ULANguage?
Related Commands	None
Arguments	None
Returns	ENGLish
Example	SYSTem:ULANguage? Example returns: ENGLish, which means that the instrument displays information in English.

Table 270: SYSTem:ULANguage?

Command	SYSTem:VERSion? (Query only)
Description	This command returns the SCPI conformance version of the instrument. This command is query only.
Group	System
Syntax	SYSTem:VERSion?
Related Commands	None
Arguments	None
Returns	<SCPI Version>::=YYYY.V

	Where: YYYY indicates the year. V indicates the version number for that year.
Example	SYSTem:VER\$ion? Example returns: 1999.0

Table 271: SYSTem:VER\$ion?

7.23 Trace Group Commands

Command	TRACe[n][:DATA]
Description	This command transfers the waveform data from the external controller to an arbitrary waveform buffer (ARBB) in the Waveform List. It's also possible choose which arbitrary waveform buffer select (between: carrier, modulation or sweep) and to which channel it refers. The name of this waveform will be "ARBB_CH_n_CAR MOD SWE". The query form of this command returns the binary block data. The maximum allowed length is 16384 samples. It's possible to transfer a larger number of samples but only 16384 will be saved in the buffer and the others will be discarded.
Group	System
Syntax	TRACe[n][:DATA] [{CARrier MODulation SWEep}], <binary_block_data> TRACe[n][:DATA]? [{CARrier MODulation SWEep}] Where [{CARrier MODulation SWEep}] is an optional parameter, if not specified CARrier is default.
Related Commands	None
Arguments	The value of n indicates the channel number. CARrier MODulation SWEep specifies the arbitrary buffer target. <binary_block_data> is the waveform data in binary format. Example: #42000<DAB><DAB>...<DAB> The block data is composed by 4 field: • The character "#" that starts the binary block. • The first number (4) indicates number of digits of the byte count field. • The byte count field (2000) tells the length in byte of the transferred data. • <DAB> fields contain the data, each <DAB> is a sample, it is composed by 2 byte that represent a signed number between -32767 and +32767 in little-endian format. After the reception, the waveform is normalized to output the amplitude and the offset set through the specific commands, then

	it isn't important the absolute value of the samples, the best choice is to use the full available range, from -32767 to +32767.
Returns	<binary_block_data>
Example	TRACe1:DATA CAR,#42000<DAB><DAB>...<DAB> Transmits a waveform of 1000 samples to the carrier arbitrary waveform buffer in the Waveform List. It's name is ARBB_CH_1_CAR.

Table 272: TRACe[n]:DATA

Command	TRACe[n]:POINts? (Query only)
Description	This command queries the number of data points of the arbitrary waveform buffer for the specified channel. It's also possible choose which arbitrary buffer select: arbitrary buffer for carrier, modulation or sweep. This command is query only. Note: A generic arbitrary waveform buffer name is "ARBB_CH_n_CAR MOD SWE".
Group	Trace
Syntax	TRACe[n]:POINts? [MIN MAX],[{CARrier MODulation SWEep}]
Related Commands	None
Arguments	The value of n indicates the channel number. MINimum queries the minimum number of samples. MAXimum queries the maximum number of samples. CARrier MODulation SWEep specifies the arbitrary buffer target; if it's omitted, the Carrier arbitrary buffer will be considered as the buffer target. If the target buffer hasn't been previously initialized the query returns 0.
Returns	<NR1>::= number of samples.
Example	TRACe1:POINts? MAX,CARrier Example returns: 16384, which is the maximum number of points for arbitrary carrier buffer of channel 1. TRACe[n]:POINts? , Returns the number of samples of the arbitrary carrier buffer; if this buffer has not been previously initialized the query returns 0.

Table 273: TRACe[n]:POINts

Command	TRACe[n]:SAVE (No query form)
Description	This command saves the contents of arbitrary waveform buffer (carrier, modulation or sweep) of the selected channel to a specified

	file in the file system. The arbitrary waveform buffer must be present in the Waveform List. A generic arbitrary waveform buffer name is "ARBB_CH_n_CAR MOD SWE". Note: This command works only with ".bin" file; if the destination file exist, it will be overwritten. There is no query form of this command. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or subdirectories are accessible by this command.
Group	Trace
Syntax	TRACe[n]:SAVE <filename>,{[CARrier MODulation SWEep]}
Related Commands	TRACe[n]:RECall
Arguments	The value of n indicates the channel number. <filename>::= <Qstring> The name of the file you want to save. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory. Use FILEsystem:CWDirectory? command to know the path of the Current Working Directory. CARrier MODulation SWEep specifies the arbitrary buffer target.
Returns	None
Example	TRACE1:SAVE "waveform1.bin",SWEep Copies the waveform data from the arbitrary sweep waveform buffer of the channel 1 to the file "waveform1.bin".

Table 274: TRACe[n]:SAVE

Command	TRACe[n]:RECall
Description	This command loads the contents of a specified file of the file system in an arbitrary waveform buffer (carrier, modulation or sweep) in the Waveform List for the specified channel n. This command works only with ".txt", ".csv" and ".trc" files. The arbitrary waveform buffer name will be "ARBB_CH_n_CAR MOD SWE". There is no query form of this command. Note: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory or subdirectories are accessible by this command.
Group	Trace
Syntax	TRACe[n]:RECall <"filename">,{[CARrier MODulation SWEep]}
Related Commands	TRACe[n]:SAVE
Arguments	The value of n indicates the channel number.

	<filename>::= <Qstring> is the file name of file you want to load. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory. Use FILEsystem:CWDDirectory? command to know the path of the Current Working Directory. CARrier MODulation SWEep specifies the arbitrary buffer target.
Returns	None
Example	TRACe1:RECall "waveform1.txt",MODulation Recalls the waveform data in the arbitrary modulation buffer of the channel 1 from the file "waveform1.txt". The file is located in the Current Working Directory.

Table 275: TRACe[n]:RECall

7.24 Trigger Group Commands

Command	ABORt
Description	This command resets the trigger event. There is no query form of this command.
Group	Trigger
Syntax	ABORt
Related Commands	*TRG TRIGger[:SEquence][:IMMediate]
Arguments	None
Returns	None
Example	ABORt Resets the trigger system.

Table 276: ABORt

Command	TRIGger[:SEquence][:IMMediate]
Description	This command forces a trigger event to occur. There is no query form of this command.
Group	Trigger
Syntax	TRIGger[:SEquence][:IMMediate]
Related Commands	ABORt *TRG
Arguments	None
Returns	None
Example	TRIGger:SEquence:IMMediate Generates a trigger event.

Table 277: TRIGger[:SEquence][:IMMediate]

Command	TRIGger[:SEquence]:IMPedance
Description	This command sets or queries the impedance of an external trigger signal when you select the external trigger input as trigger source with the TRIGger[:SEquence]:SOURce command. It can be 50 Ohm or 1 KOhm
Group	Trigger
Syntax	TRIGger[:SEquence]:IMPedance {50Ohm,1KOhm} TRIGger[:SEquence]:IMPedance?
Related Commands	TRIGger[:SEquence]:SOURce
Arguments	<impedance>::= {50Ohm 1KOhm} Where: 50Ohm is 50 Ohm selection. 1KOhm is 1K Ohm selection.

Returns	< impedance>
Example	TRIGger:IMPedance 50Ohm It sets the trigger impedance to 50Ohm. TRIGger:IMPedance? It might return 50Ohm.

Table 278: TRIGger[:SEQuence]:IMPedance

Command	TRIGger[:SEQuence]:LEVel
Description	This command sets or queries the threshold of an external trigger signal when you select the external trigger input as trigger source with the TRIGger[:SEQuence]:SOURce command.
Group	Trigger
Syntax	TRIGger[:SEQuence]:LEVel {MINimum MAXimum DEFault <Volts>} TRIGger[:SEQuence]:LEVel? [{MINimum MAXimum}]
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<Volts>::= <NRf> specifies the voltage threshold of external trigger input “n” signal. MINimum sets or queries the minimum threshold level. MAXimum sets or queries the maximum threshold level. DEFault sets the default threshold level (0V).
Returns	<threshold>
Example	TRIGger:SEQuence:LEVel 5.5 Sets the external trigger-in threshold level to 5.5 V. TRIGger:SEQuence:LEVel? It returns -5.

Table 279: TRIGger[:SEQuence]:LEVel

Command	TRIGger[:SEQuence]:SLOPe
Description	This command sets or queries the instrument trigger input edge (or slope) for the external source. Warning: if one or more channels have been programmed in RunMode Burst Gated then the ‘Both’ option will be disabled.
Group	Trigger
Syntax	TRIGger[:SEQuence]: SLOPe {RISING FALLING BOTH} TRIGger[:SEQuence]: SLOPe?
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<slope>::= {RISING FALLING BOTH} RISING specifies a trigger event on the rising edge of the external trigger signal.

	FALLING specifies a trigger event on the falling edge of the external trigger signal. BOTH specifies that a trigger event occurs both on falling and rising edge of the external trigger signal.
Returns	<slope>
Example	TRIGger:SLOPe RISING It sets the trigger slope to rising edge. TRIGger:SLOPe? Might return RISING.

Table 280: TRIGger[:SEQuence]:SLOPe

Command	TRIGger[:SEQuence]:SOURce
Description	This command sets or queries the instrument trigger source.
Group	Trigger
Syntax	TRIGger[:SEQuence]:SOURce {TIMer EXTeRnal MANual} TRIGger[:SEQuence]:SOURce?
Related Commands	None
Arguments	<source>::= {TIMer EXTeRnal MANual} TIMer: the trigger is sent at regular intervals. EXTeRnal: the trigger come from the external BNC connector. MANual: the trigger is sent via software or using the trigger button on front panel.
Returns	TIM EXT MAN
Example	TRIGger:SOURce TIMer It sets the trigger source to timer. TRIGger:SOURce? Might return TIMer.

Table 281: TRIGger[:SEQuence]:SOURce

Command	TRIGger[:SEQuence]:THREshold
Description	This command sets or queries the threshold of an external trigger signal when you select the external trigger input as trigger source with the TRIGger[:SEQuence]:SOURce command.
Group	Trigger
Syntax	TRIGger[:SEQuence]:THREshold <threshold> TRIGger[:SEQuence]:THREshold? [MINimum MAXimum]
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<threshold>::= <NRf>[<units>] Where: <units>::=[mV V] MINimum queries the minimum threshold level.

	MAXimum queries the maximum threshold level.
Returns	<threshold>
Example	TRIGger:SEQuence:THREshold 1 Sets the external trigger input level to 1 V.

Table 282: TRIGger[:SEQuence]:THREshold

Command	TRIGger[:SEQuence]:TIMer
Description	This command sets or queries the timer for the trigger event. The value will be automatically rounded to the closest time interval that the instrument is able to generate.
Group	Trigger
Syntax	TRIGger[:SEQuence]:TIMer <interval> TRIGger[:SEQuence]:TIMer? [MINimum MAXimum]
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<interval>::=<NRf> [<units>] Where: <NRf> is the timer value <units>::=[ns us ms s] MINimum queries the minimum time interval. MAXimum queries the maximum timer interval.
Returns	<interval>
Example	TRIGger:TIMer 0.5 It sets the trigger timer to 0.5 seconds. TRIGger:TIMer? MAXimum It might return 100 seconds

Table 283: TRIGger[:SEQuence]:TIMer

Command	TRIGger[m]:OUTPut:AMPLitude
Description	This command sets or queries the marker out voltage level for the specified channel.
Group	Trigger
Syntax	TRIGger[m]:OUTPut:AMPLitude <voltage level> TRIGger[m]:OUTPut:AMPLitude? {MINimum MAXimum}
Related Commands	None
Arguments	Where m indicates the marker out channel. <level>::=<NRf> [<units>] Where: <NRf> is the trigger output high level. <units>::=[V mV]. MINimum queries the minimum level. MAXimum queries the maximum level.
Returns	<voltage level>

Example	TRIGger1:OUTPut:AMPLitude 2 It sets the marker out voltage to 2 Volts. TRIGger1:OUTPut:AMPLitude? MIN It might return 1 Volts.
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Table 284: TRIGger[m]:OUTPut:AMPLitude

Command	TRIGger[m]:OUTPut:DELAy
Description	This command sets or queries the marker out skew (independent of the Run Mode).
Group	Trigger
Syntax	TRIGger[m]:OUTPut:DELAy <skew> TRIGger[m]:OUTPut:DELAy? [MINimum MAXimum]
Related Commands	None
Arguments	Where m indicates the marker out channel. <skew>:=<NRf> [<units>] Where: <NRf> is the timer value <units>::=[ns us ms s]
Returns	<skew>
Example	TRIGger1:OUTPut:DELAy 1ns It sets the marker out skew to 1 ns. TRIGger1:OUTPut:DELAy? MAXimum It might return 100 nanoseconds.

Table 285: TRIGger[m]:OUTPut:DELAy

Command	TRIGger[m]:OUTPut:LINK
Description	This command sets or queries links the marker output to the selected output. Important Note: On Model 675 in function generator operating mode each marker out can be assigned to the couple of outputs [1 2],[3 4],[5 6],[7 8]
Group	Trigger
Syntax	TRIGger[m]:OUTPut:LINK <output> TRIGger[m]:OUTPut:LINK?
Related Commands	None
Arguments	Where m indicates the marker out channel. <output>:=<NR1> Where: <NR1> is a value from 1 through 8 that means the output channel number assigned to the marker out.
Returns	<output channel>

Example	TRIGger1:OUTPut:LINK 2 Links the marker output channel 1 to the channel 2. TRIGger1:OUTPut:LINK? It might return 2.
----------------	---

Table 286: TRIGger[m]:OUTPut:LINK

Command	TRIGger[m]:OUTPut[:STATe]
Description	This command sets or queries the marker output state and enable or disable the marker out.
Group	Trigger
Syntax	TRIGger[m]:OUTPut:STATe {ON OFF 0 1} TRIGger[m]:OUTPut:STATe?
Related Commands	None
Arguments	Where m indicates the marker out channel. ON 1 enables the marker out for the specified channel. OFF 0 disables the marker out for the specified channel.
Returns	<NR1> 0 means OFF, 1 means ON
Example	TRIGger1:OUTPut:STATe ON Enables the marker out for the channel 1.

Table 287: TRIGger[m]:OUTPut:STATe

7.25 Marker Group Commands

Command	MARKer:CONTInuous[:SKEW][m]
Description	This command sets or returns the marker delay when the run mode is "Continuous" or "Modulated". The edited value is automatically rounded to the closest value that the hardware can implement.
Group	Marker
Syntax	MARKer:CONTInuous[:SKEW][m] {MINimum MAXimum DEFault <Seconds>} MARKer:CONTInuous[:SKEW][m]? [{MINimum MAXimum}]
Related Commands	MARKer: TRIGgered[:SKEW][m]
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Seconds > ::= <NRf> delay of the marker The value of m indicates the Marker Out number.
Returns	< Seconds >
Example	MARKer:CONTInuous:SKEW1 1E-9 Sets the marker delay to 1ns. MARKer:CONTInuous:SKEW1? Might return 1E-6.

Table 288: MARKer:CONTInuous[:SKEW][m]

Command	MARKer:LEVel[m]
Description	This command sets or returns the marker output Voltage Level parameter in Volts. The marker voltage is calculated on 50 Ohm load; the minimum value is 1V@50 Ohm load and the maximum value is 2.5V@50 Ohm load.
Group	Marker
Syntax	MARKer:LEVel[m] {MINimum MAXimum DEFault <Volts>} MARKer:LEVel[m]? [{MINimum MAXimum}]
Related Commands	None
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Volts > ::= <NRf> value The value of m indicates the Marker Out number: there is one marker every 2 analog channels.
Returns	<Volts>

Example	MARKer:LEVel 2.3 Sets the marker 1 level to 2.3V. MARKer:LEVel? MAX Might return 2.5.
----------------	--

Table 289: MARKer:LEVel[m]

Command	MARKer:LINK[m]
Description	This command sets or queries the channel to which the marker “m” is linked. Each marker out can be linked to one of the 2 channels, as shown below: - Marker 1: Ch1 Ch2 - Marker 2: Ch3 Ch4 - Marker 3: Ch5 Ch6 - Marker 4: Ch7 Ch8 For each couple of channels (Ch1 Ch2, Ch3 Ch4, Ch5 Ch6, Ch7 Ch8), CCH1 means the odd channels and CCH2 means the even channels.
Group	Marker
Syntax	MARKer:LINK[m] MARKer:LINK[m]?
Related Commands	None
Arguments	Where m indicates the marker out. <output>::= <CCH1 or CCH2> where: CCH1 means the odd channel of marker m (Ch1 or Ch3 or Ch5 or Ch7), CCH2 means the even channel of marker m (Ch2 or Ch4 or Ch6 or Ch8)
Returns	< output >
Example	MARKer:LINK1 CCH2 Links the marker 1 to the channel 2. MARKer:LINK2 CCH1 Links the marker 2 to the channel 3 (CCH1 of the second couple of channels). MARKer:LINK1? It might return CCH2.

Table 290: MARKer:LINK[m]

Command	MARKer[:STATe][m]
Description	This command sets or returns the Output state of the marker "m".
Group	Marker
Syntax	MARKer[:STATe][m] {OFF ON} MARKer[:STATe][m]?
Related Commands	None
Arguments	• OFF: the marker is fixed to low level (0 V). • ON: the selected marker is turned on. The value of m indicates the marker number.
Returns	0 1 where '0' means OFF and '1' means ON
Example	MARKer:STATe1 ON Turns on the marker 1. MARKer:STATe1? Might return 1 that means that the marker 1 is enabled.

Table 291: MARKer[:STATe][m]

Command	MARKer:TRIGgered[:SKEW][m]
Description	This command sets or returns the marker delay when the run mode is "Burst". The edited value is automatically rounded to the closest value that the hardware can implement.
Group	Marker
Syntax	MARKer:TRIGgered[:SKEW][m] {MINimum MAXimum DEFault <Seconds>} MARKer:TRIGgered[:SKEW][m]? [{MINimum MAXimum}]
Related Commands	MARKer:CONTinuous[:SKEW][m]
Arguments	• MINimum: sets the parameter to the minimum value • MAXimum: sets the parameter to the maximum value • DEFault: sets the parameter to the default value • < Seconds > ::= <NRf> delay of the marker The value of m indicates the Marker Out number.
Returns	< Seconds >
Example	MARKer:TRIGgered:SKEW1 1E-9 Sets the marker delay to 1ns. MARKer:TRIGgered:SKEW1? Might return 1E-6.

Table 292: MARKer:TRIGgered[:SKEW][m]

7.26 LICENSE GROUP COMMANDS

Command	LICense:ERRor? (Query Only)
Description	This query-only command returns a code about license options loading operation.
Group	License
Syntax	LICense:ERRor?
Related Commands	LICense:INSTall
Arguments	None
Returns	A single <NR1> value. 0 indicates no error. -1 indicates a fail condition.
Example	LICense:ERRor? Might return '0' that means no errors has occurred during the options loading procedure.

Table 293: LICense:ERRor?

Command	LICense:HID? (Query Only)
Description	This command returns the instrument HostID unique identifier.
Group	License
Syntax	LICense:HID?
Related Commands	None
Arguments	None
Returns	<string>::= The instrument HostID unique identifier.
Example	LICense:HID? Might return "T0302118450099".

Table 294: LICense:HID?

Command	LICense: INSTall (No Query Form)
Description	This command accepts a license and installs it on the instrument. Restarting the instrument may be necessary to fully activate the additional capabilities.
Group	License
Syntax	LICense:INSTall <license_string>
Related Commands	LICense:ERRor?
Arguments	<license_string> ::= <string>
Returns	None
Example	LICense:INSTall <license_string> Installs license file to unit.

Table 295: LICense:INSTall

Command	LICense:LIST? (Query Only)
Description	This query-only command returns the license codes as a comma-separated list of string. If no license is installed an error occurs.
Group	License
Syntax	LICense:LIST?
Related Commands	*OPT
Arguments	None
Returns	<license_code>[,<license_code> [,<license_code>]]] <license_code> ::= <string>
Example	LICense:LIST? Might return "02f0-4fff-b528-6ef7-f501-4515-8f38-1f54".

Table 296: LICense:LIST?

7.27 CALIBRATION AND DIAGNOSTIC GROUP COMMANDS

Command	CALibration[:ALL]
Description	This command does a full calibration of the AWG. In its query form, the command does a full calibration and returns a status indicating the success or failure of the operation. This command is equivalent to the *CAL? command.
Group	Control
Syntax	CALibration[:ALL] CALibration[:ALL]?
Related Commands	*CAL?
Arguments	None
Returns	<calibration error code> ::= <NR1> 0 indicates no error -1 indicates an error
Example	CALIBRATION:ALL Performs a calibration. CALIBRATION:ALL? Performs a calibration and returns results. For example, it might return 0, indicating that the calibration completed without any errors.

Table 297: CALibration[:ALL]

Command	DIAGnostic[:ALL]
Description	This command executes the self diagnostic procedure. The query form of this command executes the self diagnostic procedure and returns the results in the form of numeric of values of 0 for no errors or -1 for one or more tests failed.
Group	Control
Syntax	DIAGnostic[:ALL] DIAGnostic[:ALL]?
Related Commands	*CAL?
Arguments	None
Returns	A single <NR1> value. 0 indicates no error. -1 indicates that the test failed.

Example	DIAGNOSTIC Executes the self diagnostic procedure. DIAGNOSTIC? Executes the self diagnostic procedure and might return 0, indicating that there are no errors.
----------------	--

Table 298: DIAGnostic[:ALL]

7.28 Waveform Group Commands

Command	WLIST:LIST? (Query Only)
Description	Returns the name of the all waveforms in the waveform list.
Group	Waveform
Syntax	WLIST:LIST?
Related Commands	None
Arguments	None
Returns	[<waveform_name>][,<waveform_name>]... <waveform_name>::=<string>
Example	WLIST:LIST? Might return "DC, EXP_DECAY, EXP_RISE, GAUSSIAN, HAVERSINE, LORENTZ, RAMP_DOWN, RAMP_UP, SINC, SINE, SQUARE, TRIANGULAR, WAVE1".

Table 299: WLIST:LIST?

Command	WLIST:NAME? (Query Only)
Description	This command returns the waveform name from the waveform list at the position specified by the index value.
Group	Waveform
Syntax	WLIST:NAME? <Index>
Related Commands	None
Arguments	<Index>::=<NR1>
Returns	<string>::=<wfm_name> is the waveform name specified by <index>.
Example	WLIST:NAME? 21 Might return "waveform21".

Table 300: WLIST:NAME?

Command	WLIST:SIZE? (Query Only)
Description	This query returns the size (number of waveforms) of the waveform list. Names of both predefined and user-imported waveforms are stored in a single list.
Group	Waveform
Syntax	WLIST:SIZE?
Related Commands	None
Arguments	None
Returns	<NR1> At *RST, this returns the number of predefined waveforms.

Example	WLIST:SIZE? Might return 14.
----------------	---------------------------------

Table 301: WLIST:SIZE?

Command Description	WLIST:WAVEform:DATA? (Query Only) This command returns all sample of a waveform (or a portion of them specifying StartIndex and Size parameters) in the waveform list. In this way it possible transfer a waveform from the waveform list to the external control program. The returned bytes represent the waveform's sample. In particular every sample consists of 2 bytes: <table border="1"> <tr> <td colspan="2">Waveform sample – 16 bits format (DAC's sample)</td></tr> <tr> <td>byte offset 1</td><td>byte offset 0</td></tr> </table> The order of bytes uses the little-endian format. It is suggested that the user make use of the StartIndex and Size to append data in multiple queries. Using StartIndex and Size, part of a waveform can be transferred at a time. Very large waveforms can be transferred in chunks. Transferring large waveforms in chunks allows external programs to cancel the operation before it is completed.	Waveform sample – 16 bits format (DAC's sample)		byte offset 1	byte offset 0
Waveform sample – 16 bits format (DAC's sample)					
byte offset 1	byte offset 0				
Group	Waveform				
Syntax	WLIST:WAVEform:DATA? <wfm_name>[,<StartIndex>[,<Size>]]				
Related Commands	None				
Arguments	<wfm_name>::=<string> is the waveform's name in waveform list. <StartIndex> ::= <NR1> specifies the start byte <Size> ::= <NR1> specifies the number of bytes to return.				
Returns	<block_data>::=IEEE 488.2 block data format				
Example	WLIST:WAVEform:DATA? "TestWfm",0,1024 Returns #41024XXXX... where XXXX... are the first 1024 bytes of the waveform called "TestWfm".				

Table 302: WLIST:WAVEform:DATA?

Command Description	WLIST:WAVEform:DElete (No Query Form) This command deletes a specified waveform (or all waveforms) from the currently waveform list. If the deleted waveform is currently loaded into waveform memory, it is unloaded.
----------------------------	---

	Note: When ALL is specified, all deletable waveforms in the database will be deleted in a single action. Note that there is no “UNDO” action once the waveforms are deleted. Use caution before issuing this command. Note: The instrument must be in stopped state.
Group	Waveform
Syntax	WLISt:WAVEform:DELeTe {<wfm_name> ALL}
Related Commands	WLISt:SIZE? WLISt:NAME?
Arguments	<wfm_name>::=<string>
Returns	None
Example	WLISt:WAVEform:DELeTe ALL Deletes all waveforms from the waveform list except 'SINE'. WLISt: WAVEform:DELETE "Test1" Deletes a waveform called "Test1".

Table 303: WLISt:WAVEform:DELeTe

Command	WLISt:WAVEform:IMPort
Description	This command imports the waveform from internal driver or USB driver into the waveform list. File formats supported: TXT: a list of numbers TRC: Lecroy format BIN: binary file, ZIP: file archive native format. Note 1: If the waveform name is already present in the waveform list then an error will occur. Note 2: Only removable units and "C:\Users\<username>\Pictures\Saved Pictures" directory are accessible by this command. The waveform path may contain a full file path. However, if the file path only contains a waveform name, the waveform will be searched starting from the current directory.

	Note 3: This operation is equivalent to what the user can do through the following user interface menu: Wave. List -> Import
Group	Waveform
Syntax	WLISt:WAVEform:IMPort <wfm_name>,<file_name>
Alias	MMEMory:IMPort
Related Commands	WLISt:SIZE? WLISt:NAME? WLISt:WAVEform:DELeTe
Arguments	<wfm_name>::=<string> <file_name>::=<string>.{zip trc txt bin} indicates the absolute or relative path of the waveform file to import.
Returns	None
Example	WLISt:WAVEFORM:IMPort "MyImportedWave", "E:/WaveLib/Test1.txt" Imports a waveform called "Test1.txt" located in E:/WaveLib directory in waveform list; it will be called "MyImportedWave".

Table 304: WLISt:WAVEform:IMPort

Command	WLISt:WAVEform:LENGth? (Query Only)
Description	This query returns the size of the waveform. The returned value represents data points (not bytes).
Group	Waveform
Syntax	WLISt:WAVEform:LENGth? <wfm_name>
Related Commands	None
Arguments	<wfm_name>::=<string>
Returns	<NR1>
Example	WLISt:WAVEform:LENGth? "Sine_360samples" Might return 360 indicating that the waveform contains 360 samples.

Table 305: WLISt:WAVEform:LENGth?

Command	WLISt:WAVEform:PREDefined? (Query Only)
Description	This query returns true or false based on whether the waveform is predefined.
Group	Waveform
Syntax	WLISt:WAVEform:PREDefined? <wfm_name>
Related Commands	None
Arguments	<wfm_name>::=<string>
Returns	0 1 where '0' means FALSE and '1' means TRUE

Example	WLISt:WAVEform:PREDefined? "SINE" Returns 1 indicating that it is a predefined waveform.
----------------	---

Table 306: WLISt:WAVEform:PREDefined?

Command Description	WLISt:WAVEform:TYPE? (Query Only) This query returns if the waveform is analog or digital. Note: assume that in AFG mode all the waveforms present in the waveform list are defined as analog.
Group	Waveform
Syntax	WLISt:WAVEform:TYPE? <wfm_name>
Related Commands	None
Arguments	<wfm_name>::=<string>
Returns	DIGitals ANALog
Example	WLISt:WAVEform:TYPE? "Ramp1000" Returns ANALog.

Table 307: WLISt:WAVEform:TYPE?

7.29 MULTI INSTRUMENT GROUPS COMMANDS

The multi instrument synchronization is available on 8 channel models only.

The following commands have effect on 8 channel models only.

Command	MIM:CAPTure (No Query Form)
Description	This command captures all slave instruments connected to the master in which the command is sent.
Group	Multi Instrument
Syntax	MIM:CAPTure
Related Commands	MIM:RELease
Arguments	None
Returns	None
Example	MIM:CAPTure This command sent on a master instrument, captures the connected slave instruments.

Table 308:MIM:CAPTure

Command	MIM:ID? (Query Only)
Description	This query command allows to indentify the instrument of a chain. The instrument returns its number in the chain starting from the master that is 0.
Group	Multi Instrument
Syntax	MIM:ID?
Related Commands	None
Arguments	None
Returns	<NR1>
Example	MIM:ID? Might return 1 and it indicates the first slave of the chain.

Table 309: MIM:ID

Command	MIM:CAPTured? (Query Only)
Description	This query return whether an instrument is captured by a master
Group	Multi Instrument
Syntax	MIM:CAPTured?
Related Commands	None
Arguments	None
Returns	0 1 where '0' means FALSE and '1' means TRUE

Example	MIM:CAPTured? Might return 1 and it indicates that the instrument has been captured by a master.
----------------	---

Table 310: MIM:CAPTured

Command	MIM:FORWard? (Query Only)
Description	This query returns whether another instrument is connected to the "Synch Out" port of this instrument.
Group	Multi Instrument
Syntax	MIM:FORWard?
Related Commands	None
Arguments	None
Returns	0 1 where '0' means FALSE and '1' means TRUE
Example	MIM:FORWard? Might return 1. 1 indicates that another instrument is present and ready to be captured.

Table 311: MIM:FORWard

Command	MIM:SLAve? (Query Only)
Description	This query returns whether an instrument is slave or master. If it returns 1 it indicates that there is another instrument connected to the "Sync In" port, but it doesn't mean that the slave is captured.
Group	Multi Instrument
Syntax	MIM:SLAve?
Related Commands	None
Arguments	None
Returns	0 1 where '0' means FALSE and '1' means TRUE
Example	MIM:SLAve? Might return 1. 1 indicates that the instrument has another instrument connected to the "Sync In" port.

Table 312: MIM:SLAve

Command	MIM:NUMber? (Query Only)
Description	This query returns the number of captured instruments.
Group	Multi Instrument
Syntax	MIM:NUMber?
Related Commands	None

Arguments	None
Returns	<value> ::= <NR1> is the number of captured instrument.
Example	MIM:NUMber? Might return 2. That indicates that the instrument is master and it captured 2 other instruments.

Table 313: MIM:NUMber

Command	MIM:RELease (No Query Form)
Description	This command sent on the master of a chain releases all captured instruments.
Group	Multi Instrument
Syntax	MIM:RELease
Related Commands	MIM:CAPTure
Arguments	None
Returns	None
Example	MIM:RELease This command sent on a master instrument, releases the captured slave instruments.

Table 314: MIM:RELease

8. COMMAND ERRORS

Command errors are returned when there is a syntax error in the command.

Error code	Error message
-399	Queue Overflow
-398	System Error
-397	No channels available
-396	Error to parsing waveform block data
-395	Waveform not found or not defined
-394	Sequencer not defined or incorrect data
-393	Waveform definition error
-392	Waveform out of range
-391	License option error
-390	Invalid run mode
-389	Subsequence error
-388	File Error
-387	Out of range error
-386	Application error
-385	Data type error
-384	Diagnostic error
-383	Calibration error
-382	Error on loading setting into the instrument
-381	Error on writing the serial number
-380	Error on reading the status of the digital input pins
-379	Waveform length different between channels in one sequencer/subsequencer entry
-378	Unable to set the Attenuation Value; if the Attenuation value is greater than 20dB, the Vocm value must be in the following range: +-250mV
-377	Waveform granularity error: the waveform length must be multiple of 16 samples
-376	Error on digital port: the digital port is disabled
-375	The start operation is failed
-374	The stop operation is failed
-373	The trigger operation is failed
-372	Load configuration error

-371	Import configuration error
-370	Save configuration error
-369	A configuration with the same name is already present
-368	Delete configuration error
-367	The configuration is locked
-366	The parameter is disabled
-365	No digitals programmed
-364	Wrong format
-363	The device is in running status
-362	Load license error
-361	Lock unlock license error
-360	Copy configuration error
-359	Delete waveform error
-358	No valid MSUS
-357	No valid folder
-356	No valid file
-355	IO file error
-354	File system operation error
-353	Start index error
-352	Size error
-351	Load waveform error
-350	Waveform already present error
-349	Wrong path error
-348	Predefined waveform
-347	Wrong block data
-346	Sequencer memory overflow
-345	No license installed
-344	Wrong waveform name
-343	The device is captured from the master device
-342	Multi Instrument management error
-341	DPG license error
-340	Wrong parameter name

-339	It is not possible to couple this parameter
-338	It is not possible to obtain this parameter
0	No error
5	DESIGN ERROR: Too many numeric suffices in Command Spec
10	No Input Command to parse
14	Numeric suffix is invalid value
16	Invalid value in numeric or channel list, e.g. out of range
17	Invalid number of dimensions in a channel list
20	Parameter of type Numeric Value overflowed its storage
30	Wrong units for parameter
40	Wrong type of parameter(s)
50	Wrong number of parameters
60	Unmatched quotation mark (single/double) in parameters
65	Unmatched bracket
70	Command keywords were not recognized
200	No entry in list to retrieve (number list or channel list)
210	Too many dimensions in entry to be returned in parameters
220	; plus End of line commands

Table 315: Command Errors

9. PREDEFINED WAVEFORMS

DC	DC level waveform, 16384 samples, analog, normalized
TRIANGULAR	Triangular waveform, 16384 samples, analog, normalized
EXP_DECAY	Exponential decay waveform, 16384 samples, analog, normalized
EXP_RISE	Exponential rise waveform, 16384 samples, analog, normalized
GAUSSIAN	Gaussian waveform, 16384 samples, analog, normalized
HAVERSINE	Haversine waveform, 16384 samples, analog, normalized
LORENTZ	Lorentz waveform, 16384 samples, analog, normalized
RAMP_UP	Increasing Ramp waveform, 16384 samples, analog, normalized
RAMP_DOWN	Decreasing Ramp waveform, 16384 samples, analog, normalized
SINC	Sync waveform, 16384 samples, analog, normalized
SINE	Sine waveform, 16384 samples, analog, normalized
SQUARE	Square waveform, 16384 samples, analog, normalized

Table 316: Predefined Waveforms

10. PROGRAMMING EXAMPLES

The AFG-SDK contains several example scripts and other examples written using LabView, Microsoft Visual C++, Microsoft C# .NET, Python, Matlab.

The programs run on Microsoft Windows® PC-compatible systems equipped with NIVISA.

NI-VISA is the National Instruments implementation of the VISA I/O standard. NI-VISA includes software libraries, interactive utilities such as NI I/O Trace and the VISA Interactive Control, and configuration programs through Measurement & Automation Explorer for all your development needs.

Use NIVISA in software to write interoperable instrument drivers to handle communicating between software applications and your instrument.

You can download the latest version of NIVISA tools here:

<https://www.ni.com/it-it/support/downloads/drivers/download.ni-visa.html>

The example programs assume that the system recognizes the PC (external controller) resource name.

Refer to the NIVISA section of this manual for details about resource names.

10.1 Example Script

In the folder you can find some text files that show the use of the SCPI commands that controls the main features of the Function Generator. You can send them to the instrument using the AT-Instrument-Communicator.

10.2 Python examples

The Python examples are developed using Python 3.7 32 bit, they show how to communicate with the instrument and how to send a waveform to the instrument memory and generate the signal.

The communication is based on NI VISA, then before run these examples it is necessary to download and install the “pyvisa” that is the VISA version for Python language.

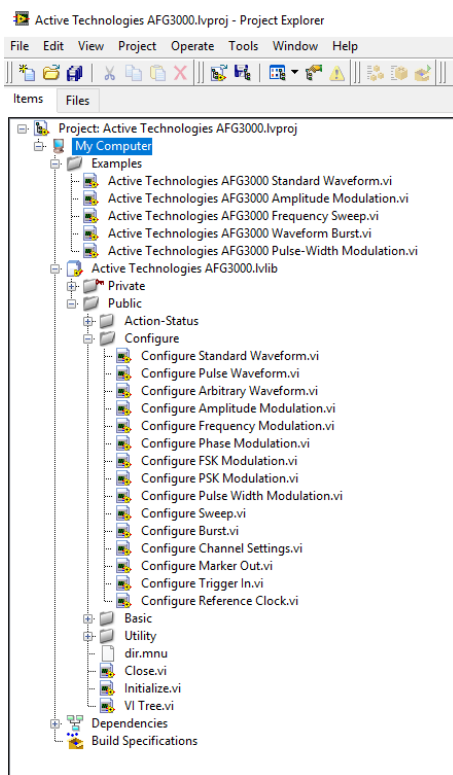
10.3 Matlab examples

The Matlab examples are developed using Matlab R2014b, in the folder you can find 2 files:

- **Send_Wfm_Binary_Block:** this function sends the samples from Matlab workspace to the instrument memory;
- **Generation_Example:** this example creates a parabolic waveform and send it to the instrument using the function showed above. When the generation started on channel 1 there is the parabolic waveform and on the channel 2 there is Sinc function from the instrument predefined. You can change some parameter such as Amplitude, Offset, Frequency and for the function generated in Matlab workspace you can change the Number of Samples and the function.

10.4 LabView examples

The LabView examples require at least LabView 2013 64 bit version, you should copy SDK_AFG SDK_AFG_4010_Rev\Active Technologies AFG3000 folder in ...\\LabVIEW 2013\\instr.lib folder on your computer and open the file Active Technologies AFG3000.lvproj.



The LabView project contains several Vis that control the basic instrument features and five examples located in the folder *Examples*.

Note: for proper usage of Labview's Vis it's necessary that decimal symbol separator is properly set on your PC.

So please check that the Dot symbol "." is set in *Decimal Symbol* field that you can find:

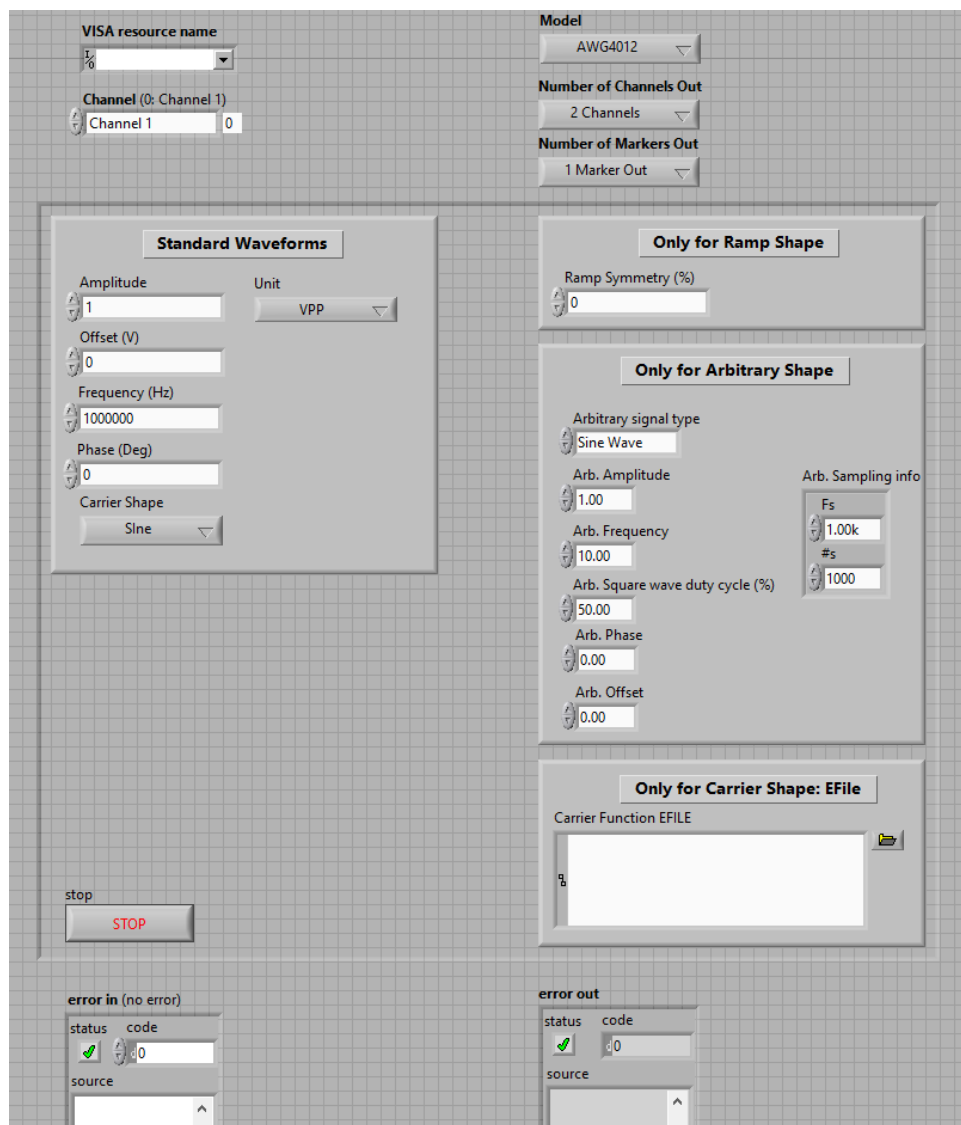
In Windows 10

1. From the **Start** button click **Control Panel**.
2. Click **Region**.
3. On the **Formats** tab click the **Additional Settings** button.

In Windows 7

1. From the **Start** button click **Control Panel**.
2. Click **Regional and Language Options**.
3. On the **Formats** tab, under **Current format**, click **Customize this format**.

Double click on the project tree to launch the Active_Technologies_AFG3000_Standard_Waveform.vi example



This example generates a standard waveform (Sine, Square, Ramp, Pulse, Sync, Gaussian, Lorentz, Exponential, Haversine) in Continuous Mode; before running the VI, you should select the AFG 4000 resources in the VISA resource name control.

You can change the Amplitude, Frequency, Offset, Phase and Symmetry (only for Ramp waveform) output parameters on the fly while the instrument is running.

You can generate an arbitrary waveform selecting from a file (Efile) or an array of sample (connect to the *Basic Function Generator VI* in this example).

A Pseudo Random Noise and a DC Level could also be generated.

Run the VI to start the generation, press the STOP button to stop the waveform generation.

Double click on the project tree to open the
Active_Technologies_AFG3000_Waveform_Burst.vi example

VISA resource name
1/0

Channel (0: Channel 1)
Channel 1 0

Carrier

Amplitude 1 Unit VPP

Offset (V) 0

Frequency (Hz) 10000000

Phase (Deg) 0

Carrier Shape Ramp

The DC level functions is not valid for Burst Mode.

Model
AWG4012

Number of Channels Out
2 Channels

Number of Markers Out
1 Marker Out

Trigger
Send Trigger

Stop VI
STOP

Burst Parameters

Burst Mode Triggered

Burst Selection Infinity Burst Count 5

Delay (s) 0

error in (no error)
status code 0
source

error out
status code 0
source

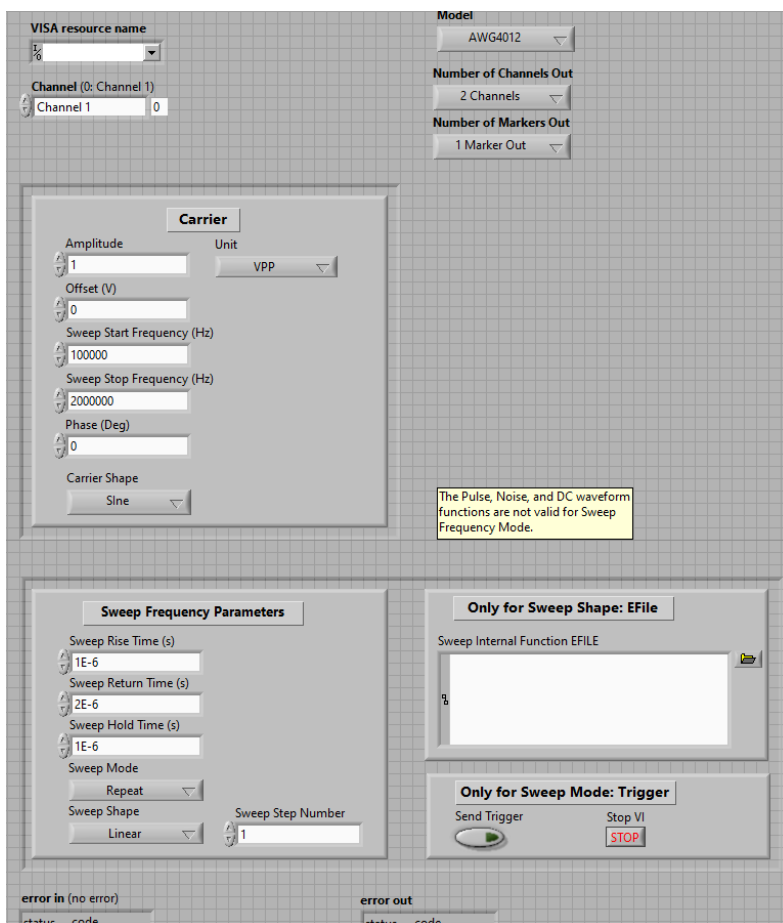
This example generates waveforms in Burst mode for the selected Channel; you can choose the carrier shape (DC waveform is not valid in this mode) and change Amplitude, Frequency, Offset and Phase parameters.

You can also select between Trigger and Gated Mode (consult AFG-4010_UserManual for more informations about these two modality).

Run the VI to initialize the instrument and load the default parameters into the instrument; the Send Trigger button starts the waveform burst.

Press the STOP button to stop the waveform generation.

Double click on the project tree to open the Active_Technologies_AFG3000_Frequency_Sweep.vi example



This VI generates a frequency sweep of a carrier waveform (note that Pulse, PR Noise and DC are not valid waveforms in sweep mode). The sweep parameters that you can change

are Amplitude, Offset, Phase, Start Frequency(Hz), Stop Frequency(Hz), Return Time(s), Rise Time(s) and Hold Time(s).

You can also choose the profile of the Frequency Sweep (Sweep Shape option).

Run the VI to initialize the instrument parameters and start the generation; only for Trigger Sweep Mode press the SEND TRIGGER button to start the frequency sweep, press the STOP button to stop the waveform generation.

Double click on the project tree to open the
Active_Technologies_AFG3000_Amplitude_Modulation.vi example

VISA resource name: 1

Model: AWG4012

Number of Channels Out: 2 Channels

Number of Markers Out: 1 Marker Out

Channel (0: Channel 1): Channel 1 0

Carrier

Amplitude: 1 Unit: VPP

Offset (V): 0

Frequency (Hz): 1000000

Phase (Deg): 0

Carrier Shape: Sine

The Pulse, Noise, and DC waveform functions are not valid for Amplitude Modulation.

Modulation Waveform

AM Frequency (Hz): 100000

Modulation Depth (%): 50

AM Source: Internal

AM Shape: Sine

Only for AM Arbitrary Shape

Arbitrary signal type: Sine Wave

Arb. Amplitude: 1.00

Arb. Frequency: 10.00

Arb. Square wave duty cycle (%): 50.00

Arb. Phase: 0.00

Arb. Offset: 0.00

Arb. Sampling info: Fs 1.00G #s 1000

Only for AM Shape: EFile

This VI generates an amplitude modulated waveform starting from a carrier defined by Shape, Amplitude, Frequency, Offset and Phase parameters (Pulse, PR Noise and DC are not valid waveforms in AM mode).

You can change the AM frequency, the modulation Depth, the AM source (internal waveform or external from a SMA connector) and Shape.

Double click on the project tree to open the Active_Technologies_AFG3000_Pulse-Width_Modulation.vi example

The screenshot shows the front panel of the 'Active_Technologies_AFG3000_Pulse-Width_Modulation.vi' example. The interface is organized into several functional groups:

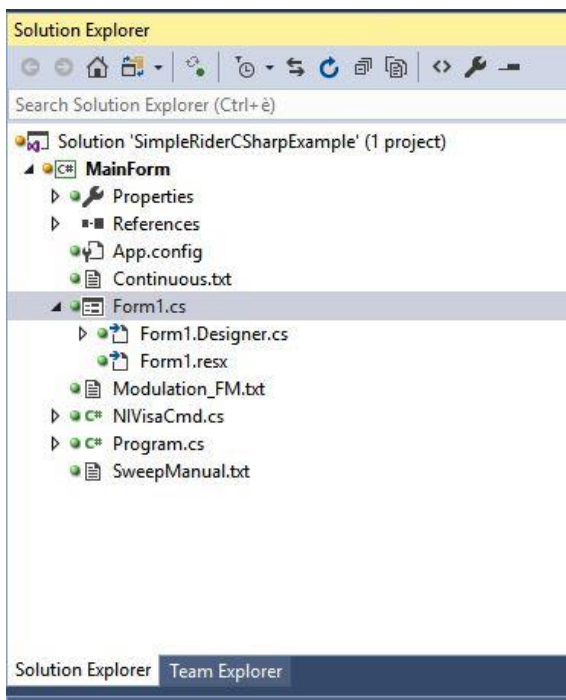
- VISA resource name:** A dropdown menu showing '1' and a percentage symbol.
- Channel (0: Channel 1):** A dropdown menu showing 'Channel 1' and a value of '0'.
- Model:** A dropdown menu showing 'AWG4012'.
- Number of Channels Out:** A dropdown menu showing '2 Channels'.
- Number of Markers Out:** A dropdown menu showing '1 Marker Out'.
- Carrier: Pulse:** A sub-panel containing:
 - Amplitude:** A numeric input field set to '1'.
 - Unit:** A dropdown menu showing 'VPP'.
 - Offset (V):** A numeric input field set to '0'.
 - Phase (Deg):** A numeric input field set to '0'.
 - Period (s):** A numeric input field set to '1E-6'.
 - Width (s):** A numeric input field set to '5E-7'.
 - Pulse Trailing (s):** A numeric input field set to '2E-9'.
 - Pulse Leading (s):** A numeric input field set to '2E-9'.
- PWM Parameters:** A sub-panel containing:
 - PWM Frequency (Hz):** A numeric input field set to '10000'.
 - PWM Deviation (%):** A numeric input field set to '20'.
 - PWM Source:** A dropdown menu showing 'Internal'.
 - PWM Shape:** A dropdown menu showing 'Sine'.
- Only for PWM Shape: EFile:** A sub-panel containing:
 - PWM Internal Function EFILE:** A text input field with a file icon button to its right.

The PWM modulation is the only modulation supported by the Pulse waveform, so the carrier waveform is set Pulse by default.

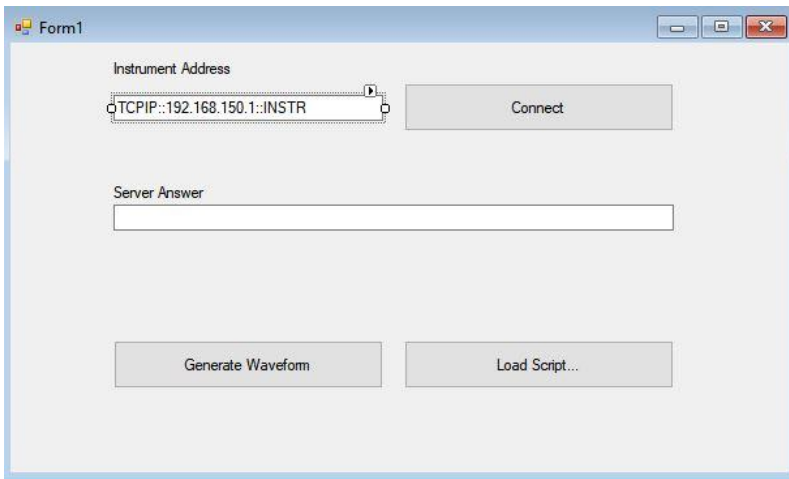
You can change the rectangular Width, Period, duration of Trailing edge, duration of Leading edge and Deviation of the PWM every time you launch the vi (note that all of the previous parameters are linked each others and the deviation has to meet some particular conditions, consult the AFG-4010_UserManual for more details).

10.5 Microsoft C# Example

The C# example is located under the folder AT_AFG_Rider_3000_Series_VS2017_Examples, you need to install Microsoft Visual Studio 2017 to open and launch the solution.



You should compile and launch the example; in the form you have to write the Instrument Address and press the Connect button to establish a connection with the instrument. If the connection works correctly, the instrument should respond to the *IDN? command in the Server Answer textbox.



Clicking on the Generate Waveform button, you will send several SCPI commands to the instrument that will generate a single pulse waveform in Continuous mode.

```
private void btnGenerateWave_Click(object sender, EventArgs e)
{
    // Reset to default
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "*RST");
    // Set the channel 1 parameters
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:FUNCTION:SHAPE SINusoid");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:FREQuency 100MHZ");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:VOLTage:AMPLitude 1");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:VOLTage:OFFSet 0");
    // Set the channel 2 parameters
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:FUNCTION:SHAPE SQUARE");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:FREQuency 5MHZ");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:VOLTage:HIGH 2");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:VOLTage:LOW 0");
    //Turn on the output channels
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "OUTPut1:STATE ON");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "OUTPut2:STATE ON");
    //Start the generation
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "AFGControl:START");
}
```

The *Load Script...* button lets you to load a SCPI command script file; in the project folder there are three available scripts *Continuous.txt*, *Modulation_FM.txt* and *Sweep.txt*.

10.6 Microsoft C++ Example

The C++ example is located under the folder AT_AFG_Rider_3000_Series_VS2017_Examples\AFGRiderMSVC\TCPIP

The example is written in Microsoft® Visual C++

```
#include "visa.h"

#include <stdio.h>
#include <stdlib.h>
#include <string>

static char outputBuffer[VI_FIND_BUFLLEN];
static ViSession defaultRM, instr;
static ViStatus status;
static ViUInt32 count;
static char acBuffer[10000000] = "";
static unsigned int u32Timeout = 20000; //timeout value in milliseconds

static const char acInstrument[] = "TCPIP::192.168.150.1::INSTR"; // instrument address

ViStatus VisaWrite(std::string sInput)
{
    printf("viWrite - %s \n", sInput.c_str());

    status = viWrite (instr, (ViBuf)sInput.c_str(), sInput.length(), &count);

    if (status < VI_SUCCESS)
    {
        viStatusDesc(instr, status, outputBuffer);
        printf("viWrite failed with error code %x - %s\n", status, outputBuffer);
        viClose(defaultRM);
        exit (EXIT_FAILURE);
    }

    // In case of query command, retrieve the output string
    memset(outputBuffer, 0, sizeof(outputBuffer));

    status = viRead (instr, (ViBuf)outputBuffer, sizeof(outputBuffer), &count);

    if (status < VI_SUCCESS)
    {
        viStatusDesc(instr, status, outputBuffer);
        printf("viRead failed with error code %x - %s\n", status, outputBuffer);
        viClose(defaultRM);
        exit (EXIT_FAILURE);
    }

    outputBuffer[strlen(outputBuffer)-1] = 0;

    if(strlen(outputBuffer) > 0)
```

```

    {
        printf("The server response is:\n %s\n\n",outputBuffer);
    }

    return status;
}

int main()
{
    int iIndex = 0;
    FILE* pFile = NULL;
    ViFindList objFindList;

    /* First we will need to open the default resource manager. */
    status = viOpenDefaultRM (&defaultRM);
    if (status < VI_SUCCESS)
    {
        printf("Could not open a session to the VISA Resource Manager!\n");
        exit (EXIT_FAILURE);
    }

    status = viFindRsrc (defaultRM, "?*INSTR", &objFindList, &count, outputBuffer);
    if (status < VI_SUCCESS)
    {
        viStatusDesc(instr, status, outputBuffer);
        printf("viFindRsrc failed with error code %x - %s\n", status, outputBuffer);
        exit (EXIT_FAILURE);
    }

    printf("viFindRsrc - %s\n", outputBuffer);

    /* Now we will open a session via TCP/IP */
    status = viOpen (defaultRM, (ViRsrc) acInstrument, VI_NULL, u32Timeout, &instr);
    if (status < VI_SUCCESS)
    {
        printf ("An error occurred opening the session to %s\n", acInstrument);
        viClose(defaultRM);
        exit (EXIT_FAILURE);
    }

    // Set the timeout attribute
    viSetAttribute (instr, VI_ATTR_TMO_VALUE, u32Timeout);

    //Identify and reset the instrument
    VisaWrite(".*IDN?");
    VisaWrite(".*RST");
    //Set the Channel 1 Parameters
    VisaWrite("SOURce1:FUNCTION PULSe");
    VisaWrite("SOURce1:PULSe:DCYCLe 60");
    VisaWrite("SOURce1:PULSe:DELaY 0");
    VisaWrite("SOURce1:PULSe:PERiod 200ns");
    VisaWrite("SOURce1:PULSe:TRANSition:LEADIng 10ns");

```

```

VisaWrite("SOURce1:PULSe:TRANSition:TRAIling 20ns");
VisaWrite("SOURce1:VOLTage:HIGH 2");
VisaWrite("SOURce1:VOLTage:LOW 0");
//Set the Channel 2 Parameters
VisaWrite("SOURce2:FUNCTion SINusoid");
VisaWrite("SOURce2:VOLTage 3");
VisaWrite("SOURce2:VOLTage:OFFSet 0");
VisaWrite("SOURce2:FREQuency 10MHz");
VisaWrite("SOURce1:FREQuency:MODE CW");
VisaWrite("SOURce2:FREQuency:MODE CW");
// Turn On the Outputs
VisaWrite("OUTPut1 ON");
VisaWrite("OUTPut2 ON");
// Start the generation
VisaWrite("AFGControl:START");
status = viClose (instr);
status = viClose (defaultRM);
printf ("\nHit enter to continue.");
fflush(stdin);
getchar();

return 0;
}

```