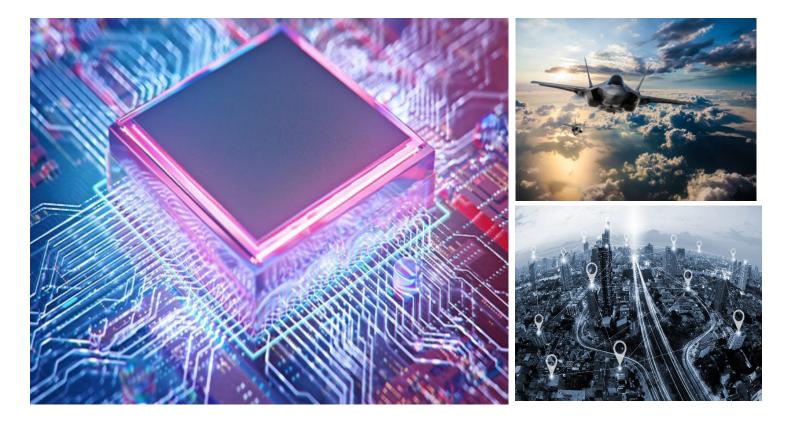
# Model 685C | 3 GS/s 16 Bit Vertical

#### High Performance Arbitrary Waveform Generator





#### **Features**

- 2, 4 or 8 Analog Channels
- 3 GS/s / 16-bit Vertical Resolution
- 320 ps Rise/Fall Time
- Up to 4 Gpts Waveform Memory per Channel
- Up to 32 Digital Channels in Synchronous with Analog Generation

## **Applications**

- Aerospace and Defense
- Institute and University Research
- Semiconductor Tests
- Automotive
- IoT



Model 685C Arbitrary Waveform Generator

### **Features & Benefits**

- Sample rate can be programmed in from 1 S/s to 3 GS/s with 16-bit vertical resolution, ensures exceptional signal integrity.
- Arbitrary waveform memory up to 4 Gpts for each analog channel
- Mixed Signal Generation 2, 4, or 8 Analog channels with 8, 16, or 32 synchronized Digital Channels for debugging and validating digital design.
- Digital outputs provide up to 750 Mb/s data rate in LVDS format. LVDS to LVTTL adapter is available
- Advance sequencer with up to 16384 user-defined waveforms provides the possibility of generating complex signal scenarios with the most efficient memory usage
- Windows-based platform with 7in touchscreen, front panel buttons and knob
- Compact form factor, convenient for bench top and fully fit with 3U 19" rack-mount standard
- LAN, USB-TMC and GPIB interfaces for remote control

#### Model 685C Front



### Model 685C Back



## Model 685C Arbitrary Waveform

### Model 685C User Interface

#### Simple Rider AFG: Function Generator Mode Interface

**Simple Rider AFG** UI is designed using a touchscreen interface; it has been developed to put all the capabilities of modern Waveform Generators right at your fingertips. All instrument controls and parameters are accessible through an intuitive UI that recalls the simplicity of modern tablets and smartphones. Scientists and engineers can use gestures and touch commands to create advanced waveforms or digital patterns with ease.

- The swipe gesture gives easy access to the output waveform parameters.
- A touch-friendly virtual numeric keypad has been designed to improve the user experience with regard to entering data.
- CARRER-CRI
   SIMPLE AF G
   Water

   Amplitude
   Vp
   12000.0 m
   Programscyttel
   1.000000000000 M

   Offset(V)
   0.0000
   Phase(deg)
   1.0000
   0.000
   Image: Contraction of the contraction of t
- Time-saving shortcuts and intuitive icons simplify the instrument setup.

#### Simple Rider TrueArb: AWG and DPG Mode Interface

In the **Simple Rider True-Arb** interface, the users can define complex waveforms with up to 16,384 sequence entries of analog waveforms and digital patterns, define their execution flow by means of loops, jumps, and conditional branches.

Digital output combined and synchronized with analog output signals is an ideal tool to troubleshoot and validate the digital design. The waveform memory length of up to 4 GSamples on each channel combined with up to 16,384 and up to 4,294,967,294 repetitions, make the Model 685C the ideal generator for the most demanding technical applications.

Thanks to the intuitive and easy waveform sequencer user interface, you can create the most complex waveform scenarios with just a few screen touches.

Up to 4 instruments can be synchronized together in order to obtain a 32 analog – 128 digital channel generator. A dedicated synchronization bus guarantees intra-chassis synchronization.

Model 685C supports the standard Ethernet interface for remote control and easy customized instrument programming.

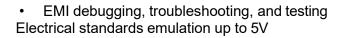


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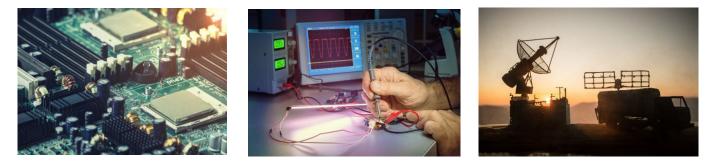
## Model 685C Arbitrary Waveform

### Model 685C Applications Automotive

Today's cars include highly sophisticated and electronically controlled units with sensitive electronic components. The Model 685C combines a 3 GSa/s sampling rate with a 16-bit vertical resolution. It represents an ideal and a successful tool for addressing the new testing challenges in the automotive industry. It includes these features:







### **Semiconductor Testing**

Emulation of complex signals generated with inclusion of noise or distortions may become an excellent way to provide Compliance Components Test to help semiconductors engineers. The fast edges and pulse generation can be used to provide characterization in fast power devices.

# **Research Applications**

Research centers and Universities are key users of the Model 685C. Complex waveform and/or sophisticated Pulses emulation based on variable edges or multilevel could be perfectly created. The combination of fast edge generation, excellent dynamic range and easy-to-use user interface meet perfectly for scientists and engineers working on Quantum Research or on large experiments such as Accelerators, Tokamak, or synchrotrons to emulate signals without creating specific test boards.

# **Aerospace and Defense Applications**

The Model 685C works perfectly with electronic warfare signals, such as those produced by radar or sonar systems. It can create pulses useful in pulse electron beams, X-ray sources, flash X-ray radiography, lightning pulse simulators, and high-power microwave modulators. These features of Model 685C are useful in the aerospace and defense industry.

### **Model 685C Specifications**

All specifications are typical unless noted otherwise. The guaranteed performances are referred to a calibrated instrument that has been stored for a minimum of 2 hours within the operating temperature range of  $5^{\circ}$ C to  $40^{\circ}$ C and after a 45-minute warm-up period. Within  $\pm 10^{\circ}$ C after auto-calibration.

General Specifications			
Operating Mode		AFG Mode	
		True Arb Mode	
Number of Channels	Model 685C-2C	Model 685C-4C	Model 685C-8C
Analog	2	4	8
Digital Out	0/8 optional	0/8/16 optional	0/8/16/24/32 optional
Marker Out	1	2	4
		Model 685C-2C	
		Model 685C-4C	
Output Channels		Model 685C-8C	
Output Type		Differential DC coupled	
Output Impedance	Sing	gle ended: 50 Ω Differential: 100	Ω
Connectors		SMA on front panel	
DC Amplitude	·		
Amplitude Range		±0.75 V Se. (into 50 Ω)	
		±1.5 V Diff. (into 100 Ω)	
Resolution		100µV (nom), 5 digits	
Amplitude Accuracy (guaranteed)		$\pm (1\% \text{ of }  \text{setting}  + 2\text{mV})^1$	
DC Baseline Hardware Offset (Common mode offset)			
Resolution		< 4 mV or 4 digits	
Range (50 $\Omega$ into 50 $\Omega$ )		-2 V to +2 V	
Range (50 $\Omega$ into High Z load)		-4 V to +4 V	
Accuracy (50 $\Omega$ into 50 $\Omega$ ) (guaranteed)		± (1% of  setting  + 5 mV)	
<b>AC Accuracy</b> (1 kHz sine wave, 0 V offset, > 5 mVp-p amplitude, 50 Ω load) (guaranteed)		± (1% of setting [Vpp] + 5mV)	1

True Arb - Baseband Mode Specifications	Model 685C-2C   Model 685C-4C   Model 685C-8C	
General specifications		
Operating Mode	Variable clock (True Arbitrary) – Baseband mode	
Sample Rate	1 S/s to 3 GS/s	
Sin(x)/x	1.32 GHz @ 3 GS/S	
Run Modes	Continuous, Triggered Continuous, Single/Burst, Stepped, Advanced	
Vertical Resolution	16 bit	
Waveform Length	2G samples per channel (up to 4G samples optional)	
Waveform Granularity	1 if the entry length is > 416 samples	
	32 if entry length is $\geq$ 128 and $\leq$ 416 samples	
Sequence Length	1 to 16384	
Sequence Repeat Counter	1 to 4294967294 or infinite	

<sup>1</sup> The specification is guarantee in the range 0% to 90% of full sale output

Timer	
Range	20 ns to 1.39 seconds
Resolution	± 1 sampling clock cycle
Analog Channel to Channels skew	
Range	0 to 2.63 us
Resolution	100 fs
Accuracy	±(1% of setting + 20 ps)
Initial skew	< 20 ps
Calculated bandwidth (0.35 / rise or fall time)	≥ 1.1 GHz
<b>SFDR @ 100 MHz</b> (Fsa= 6 Gsa/s, measured across DC to Fs/2, excluding fsa - 2*fout and fsa- 3*fout and excluding harmonic)	< - 90 dBc
<b>SFDR</b> (Fsa= 6,16 Gsa/s, measured across DC to Fs/2, excluding fsa - 2*fout and fsa- 3*fout and excluding harmonic) <sup>1</sup>	1 $\mu$ Hz to < 100 MHz: < -90 dBc 100 MHz to ≤ 600 MHz: < -82 dBc 600 MHz to ≤ 1.5 GHz: < -75 dBc 1.5 GHz to ≤ 2 GHz: < -70 dBc 2 GHz to ≤ 3 GHz: < -62 dBc
Rise/fall time (1 Vp-p single-ended 10% to 90%)	≤ 320 ps
Rise/fall time (1 Vp-p single-ended 20% to 80%)	≤ 200 ps
Overshoot (1 Vp-p single-ended)	<6%
Random jitter on clock pattern (rms, typical)	< 2 ps

AFG Mode Specifications	Model 685C-2CD	
·	Model 685C-4CD	
	Model 685C-8CD	
General Specifications		
Amplitude	0 to 3 Vpp Diff. (into 100 Ω)	
	0 to 1.5 Vpp Se. (into 50 Ω)	
Resolution	100 μV (nom), 5 digits	
Operating Mode	DDS mode	
Standard Waveforms	Sine, Square, Pulse, Ramp, more (Noise, DC, Sin(x)/x, Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine	
Run Modes	Continuous, modulation, sweep, burst	
Arbitrary Waveforms	Vertical resolution: 16-bit	
	Waveform length: 16,384 points	
Internal Trigger Timer		
Range	10.4 ns to 88 s	
Resolution	80 ps	
Accuracy	±(0.1% setting + 5 ps)	
Sine Waves		
Frequency Range Sine (50 $\Omega$ into 50 $\Omega$ ) <sup>2</sup>	1 µHz to ≤ 1 GHz: 3 Vpp Diff.	
	1 µHz to ≤ 1 GHz: 1.5 Vpp Se.	
Flatness	DC to 2 GHz: ±0.5 dB	
	(1 Vpp diff., relative to 1 kHz)	
Spurious (measured across DC to Fs/2) <sup>3</sup>	1 μHz to ≤ 250 MHz: < -85 dBc	
	250 MHz to ≤ 500 MHz: < -80 dBc	
	500 MHz to ≤ 1.5 GHz: < -70 dBc	
	1.5 GHz to ≤ 2 GHz: < -60 dBc	
Phase Noise (1 Vp-p, 10 kHz offset)	20 MHz: < -127 dBc/Hz typ.	
	100 MHz: < -123 dBc/Hz typ.	
	1 GHz: < -105 dBc/Hz typ.	

<sup>2</sup> Amplitude doubles on HiZ load <sup>3</sup> SFDR is evaluated @ 1Vpp differential nominal output amplitude provided to the spectrum analyzer through a Minicircuit TC1-1-13M+ balun

Square Waves	
Frequency Range	1 µHz to ≤ 385 MHz
Rise/fall Time (10% to 90%)	800 ps
Rise/fall Time (20% to 80%)	600 ps
Overshoot (1 Vp-p)	<2%
Jitter (rms)	<2 ps
Pulse Waves	
Frequency Range	1 µHz to ≤ 385 MHz
Pulse Width	1 ns to (Period – 1 ns) <sup>4</sup>
Pulse Width Resolution	20 ps or 15 digits
Pulse Duty	0.1% to 99.9% (limitations of pulse width apply)
Leading/trailing edge transition time (10% to 90%)	800 ps to 1000 s
Leading/trailing edge transition time (20% to 80%)	600 ps to 1000s
Transition Time Resolution	2 ps or 15 digits
Overshoot (1 Vp-p)	< 2%
Jitter (rms, with rise and fall time $\geq$ 400ps)	<2 ps
Double Pulse Waves	×2 μ5
	$1 \text{ ulut} = t_0 < 102 \text{ FMU}(z; c)/pp \text{ Diff}$
Frequency Range	1 μHz to ≤ 192.5MHz: 6Vpp Diff. 1 μHz to ≤ 192.5 MHz: 3Vpp Se.
Other Pulse Parameters	Same as Pulse Waves
Ramp Waves	
Frequency Range	1 µHz to 37.5 MHz
Linearity (< 10 kHz, 1 Vp-p, 100%)	≤ 0.1%
Symmetry	0% to 100%
Other Waves	0701010070
Frequency Range Exponential Rise, Exponential Decay	
Sin(x)/x, Gaussian, Lorentz, Haversine	1 μHz to 37.5 MHz 1 μHz to 75 MHz
Additive Noise	
	2 GHz
Bandwidth (-3 dB)	0 V to 0.75 V Single Ended - abs(carrier max value [V <sub>pk</sub> ])
Level	$0 \text{ V to } 1.5 \text{ V Differential - abs(carrier max value [V_{pk]})}$
Resolution	1 mV
Arbitrary	
Number of Samples	2 to 16384
Frequency Range	1 µHz to ≤ 385 MHz
Analog Bandwidth (-3 dB)	470 MHz
Rise/Fall Time (10% to 90%)	800 ps
Rise/Fall Time (20% to 80%)	600 ps
Jitter (rms)	< 2 ps
Frequency Resolution	
Sine, Square, Pulse, Arbitrary, Sin(x)/X	1 μHz or 15 digits
Gaussian, Lorentz, Exponential Rise, Exponential Decay,	
Haversine	
Frequency Accuracy	
Non-ARB	± 2.0 ppm of setting   ± 500 ppb of setting (Opt.)
	± 2.0 ppm of setting ±1 μHz  ± 500 ppb of setting ±1 μHz(Opt.)
<sup>4</sup> Below 1ns width, the pulse amplitude will have some red	uction respect to the set value

<sup>4</sup> Below 1ns width, the pulse amplitude will have some reduction respect to the set value

Modulations		
Amplitude Modulation (AM)		
Carrier Waveforms	Standard waveforms (except Pulse, DC and Noise), ARB	
Modulation Source	Internal or external	
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, ARB	
Modulating Frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz maximum	
Depth	0.00% to 120.00%	
Frequency Modulation (FM)		
Carrier Waveforms	Standard waveforms (except Pulse, DC and Noise), ARB	
Modulation Source	Internal or external	
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, ARB	
Modulating Frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz maximum	
Peak Deviation	DC to 1 GHz	
Phase Modulation (PM)		
Carrier Waveforms	Standard waveforms (except Pulse, DC and Noise), ARB	
Modulation Source	Internal or external	
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, ARB	
Modulating Frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz maximum	
Phase Deviation Range	0° to 360°	
Frequency Shift Keying (FSK)		
Carrier Waveforms	Standard waveforms (except Pulse, DC and Noise), ARB	
Modulation Source	Internal or external	
Internal Modulating Waveforms	Square	
Key Rate	Internal: 500 µHz to 61 MHz, External: 10 MHz maximum	
Hop Frequency	DC to 1 GHz	
Number of Keys	2	
Phase Shift Keying (PSK)		
Carrier Waveforms	Standard waveforms (except Pulse, DC and Noise), ARB	
Modulation source	Internal or external	
Internal Modulating Waveforms	Square	
Key Rate	Internal: 500 µHz to 61 MHz, External: 10 MHz maximum	
Hop Frequency	0° to +360°	
Number of Keys	2	
Pulse Width Modulation (PWM)		
Carrier Waveforms	Pulse	
Modulation Source	Internal or external	
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, ARB	
Modulating Frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz maximum	
Deviation Range	0% to 50% of pulse period	
Sweep		
Туре	Linear, Logarithmic, staircase, and user defined	
Waveforms	Standard waveforms (except Pulse, DC and Noise), ARB	
Sweep Time	30 ns to 2000 s	
Hold/return Times	0 to (2000 s - 30 ns)	
Sweep/Hold/Return Time Resolution	15 ns or 12 digits	
Total Sweep Time Accuracy	≤ 0.4%	
Start/Stop Frequency Range	Sine: 1 µHz to 1 GHz, Square: 1 µHz to 385 MHz	
Trigger Source	Internal/External/Manual	
Burst	1	
Waveforms	Standard waveforms (except DC and Noise), ARB	
Туре	Trigger or gated	
Burst Count	1 to 4,294,967,295 cycles or Infinite	

Timing and Clock	
Sampling Rate	
Range	1 S/s Up to 3GS/s
Resolution	32 Hz
Accuracy	± 2.0 ppm   ± 500 ppb (Opt.)
Output Channels	
Connectors	Mini-SAS HD connector on rear panel (custom pin-out)
Number of Connectors	1, 2, 4
Number of Outputs	8-bits,16-bits,32-bits
Output impedance	100 Ω differential
Output type	LVDS
Rise/fall time (10% to 90%)	< 1 ns
Jitter (rms)	20 ps
Maximum update rate	750 Mbps per channel
Memory depth	512M Samples per digital channel (up to 1G optional)
8 bit LVDS to LVTTL Converter Probe (Optional AT- DTLL8)	
Output Connector	20 position 2.54 mm 2 Row IDC Header
Output Type	LVTTL
Output Impedance	50 Ω nominal
Output Voltage	0.8 V to 3.8 V programmable in group of 8 bits
Maximum Update Rate	125 Mbps@0.8V and 400 Mbps@3.6V
Dimensions	W 2in x H 0.9in x D 3in [52mm x 22mm x 76mm]
Input Connector	Proprietary standard
Cable Length	1 meter
Cable Type	Proprietary standard
Proprietary Mini SAS HD to SMA cable (Optional)	
Output Connector	SMA
Output Type	LVDS
Number of SMA	16 (8 bits)
Cable Type	Proprietary standard
Cable Length	1 meter

Auxiliary Input and Output Characteristics		
Sync in/out		
Connector Type	Infiniband 4X connector on rear panel (custom pinout)	
Master to Slave Delay (typical)	TBD	
Marker Output		
Connectors	SMA on Front Panel	
Number of Connectors	1 2 4	
Output Impedance	50 Ω	

Output level (into 50 Ω)

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Voltage Window	-0.5 V to 1.65 V
Amplitude	100 mVpp to 2.15 Vpp
Resolution	1 mV
Accuracy	±(5% setting + 25 mV)
Switching characteristics	
	0.01
Max Update Rate (True Arb Mode)	3 Gbps
Max Data Rate (True Arb Mode)	3 Gbps @ 1Vpp swing
Max Frequency (AFG Mode)	96.5 MHz (continuous mode)
Rise/fall time (10% to 90%, 2 Vpp)	<150 ps
Jitter (rms)	<10 ps
Marker out to analog channel skew	
Range	True Arb Mode: 0 to 2.3µs
	AFG Mode: 0 to 100 sec. in Contin. Mode, 0 to 2.25 µs in Trig. Mode
Resolution	1/32 of DAC sampling period AFG Mode:5 ps
Accuracy	±(1% of setting + 5 ps)
Initial skew	20 ps
Trigger/Event Inputs	
Connector	SMA on the Front Panel
Number of Trigger Inputs	2 (Trig.in 1, Trig.in 2)
nput Impedance	50 Ω / 1 kΩ
Slope/Polarity nput Damage Level	Positive or negative or both <-15 V or >+15 V
Threshold Control Level	-10 V to 10 V
Resolution	50 mv
Threshold Control Accuracy	±(10% of  setting  + 0.2 V)
Input Voltage Swing	0.5 Vp-p minimum
Minimum Pulse Width (1 Vp-p)	3 ns
Trigger/gate input to Analog Output Delay	Slow (synchronous) trigger AFG mode: < 355 ns (< 405 ns in triggered sweep mode) True Arb mode: <1550 * DAC clock period(ns) + 10 ns Fast (asynchronous) trigger AFG mode: < 335 ns (< 385 ns in triggered sweep mode)
	True Arb mode: <1360 * DAC clock period(ns) + 27 ns
Trigger In to Output Jitter (rms)	AFG mode: < 20 ps
	True Arb mode: 0.29*Dac clock period
Trigger In Programmable Delay Range	0 ps to 2418 ps
Trigger In Programmable Delay Resolution	78 ps
Maximum Frequency	AFG: 65 MTps on Rising/Falling Edge, 80 MTps on Both Edges True Arb mode: 1/ (Period of the Analog Waveform + 48 DAC Clock period) MTps = Mega Transitions per second
Reference clock input	
Connector Type	SMA on Rear Panel
Input Impedance	50 Ω, AC coupled
nput Voltage Range	0.2 Vpp to 2 Vpp
Damage Level	Maximum Input voltage: -0.3 V to 3.6 V
	Maximum input power: 30 dBm (50 Ω)
Frequency Range	5 MHz to 200 MHz
Frequency Resolution	1 Hz

Cannedor Type         SMA on Rear Panel           Output Impedance         S0 0, A, C coupled           Frequency         10 MHz TCXO [100 MHz VCCXO (Optional)           Initial Accuracy (2) 25 °C         ± 10 ppm] ± 50 ppb(Opt.)           Stability vs. Temperature         ± 10 ppm] ± 50 ppb(Opt.)           Angituda         1.65 Vpp           Phase Noise (2) 20 MHz Camer         -140 dBr/hz at 100 Hz; -140 dBr/hz at 100 Hz; -160 dBr/hz at 10 KHz           Phase Noise (2) 100 MHz Camer(Opt.)         -120 dBr/hz at 100 Hz; -160 dBr/hz at 10 KHz           Connector Type         SMA on Rear Panel           Input Impedance         50 0, AC coupled           Frequency         N = 4, 8, 10, 32 for SampleRate = 50.0 FL G/Hz N = 2, 4, 8, 10, 32 for SampleRate = 50.0 FL           Connector Type         SMA on Rear Panel           Input Impedance         50 0, AC coupled           Frequency         N = 4, 8, 10, 32 for SampleRate = 50.0 FL G/Hz N = 2, 4, 8, 10, 32 for SampleRate = 50.0 FL           Damage Level         15 dBm           Sync Cik Out         SMA on Rear Panel           Connector Type         SMA on Rear Panel           Input Impedance         50 0, AC coupled           Frequency         2 * Sampling Rate/N, N = 18, 32,, 2048           Ampl	Reference clock output	
Frequency         10 MHz TCXO [100 MHz VCOCXO (Optional)           Initial Accuracy @ 25 °C         ± 1.0 pm] ± 500 pb/(Opt.)           Aging         ± 1.0 pm/set ± 500 pb/(Opt.)           Stability vs. Temperature         ± 1 pm [± 500 pb/(Opt.)           Amplitude         1.65 Vpp           Phase Noise @ 20 MHz Carrier         -1.20 dBc/Hz at 100 Hz ; -1.40 dBc/Hz at 10 Hz;           Phase Noise @ 100 MHz Carrier(Opt.)         -1.20 dBc/Hz at 100 Hz ; -1.60 dBc/Hz at 10 Hz;           Other Carrier (Opt.)         -1.20 dBc/Hz at 100 Hz;           Implement Corrier(Opt.)         -1.20 dBc/Hz at 100 Hz;           -1.60 dBc/Hz at 10 Hz;         -1.60 dBc/Hz at 10 Hz;           -1.60 dBc/Hz at 10 Hz;         -1.60 dBc/Hz at 10 Hz;           -1.60 dBc/Hz at 10 Hz;         -1.60 dBc/Hz at 10 Hz;           -1.60 dBc/Hz at 10 Hz;         -1.60 dBc/Hz;           Connector Type         SMA on Rear Panel           Input Impedance         F0 dBm te +10 dBm           Parage Lovel         16 dBm           Sync Ck Out         -1.60 dBc/Hz; as 50 Hz; 70 Hz or 150 Hz; 61 GHz           Connector Type         SMA on Rear Panel           Output Impedance         50 Ω, AC coupled           Frequency <sup>6</sup> SMA on Rear Panel           Output Impedance         10 GQ           Connecto	Connector Type	SMA on Rear Panel
Initial Accuracy @ 25 °C         ± 1.0 ppm   ± 500 ppb (Opt.)           Aging         ± 1.0 ppm   ± 500 ppb (Opt.)           Aging         ± 1.0 ppm   ± 500 ppb (Opt.)           Ampitude         1.10 ppm   ± 500 ppb (Opt.)           Ampitude         1.10 ppm   ± 500 ppb (Opt.)           Ampitude         1.65 Vpp           Phase Noise @ 20 MHz Carrier         -120 dBc/Hz at 100 Hz;           -140 dBc/Hz at 100 Hz;         -140 dBc/Hz at 100 Hz;           -140 dBc/Hz at 100 Hz;         -140 dBc/Hz at 100 Hz;           -150 dBc/Hz at 100 Hz;         -150 dBc/Hz at 100 Hz;           -150 dBc/Hz at 100 Hz;         -150 dBc/Hz at 100 Hz;           -150 dBc/Hz at 100 Hz;         -150 dBc/Hz at 100 Hz;           -150 dBc/Hz at 100 Hz;         -150 dBc/Hz at 100 Hz;           -150 dBc/Hz at 100 Hz;         -150 dBc/Hz at 100 Hz;           -150 dBc/Hz at 100 Hz;         -150 dBc/Hz at 100 Hz;           -150 dBc/Hz at 100 Hz;         -150 dBc/Hz at 100 Hz;           Input Power Range         50 AC coupled           Frequency <sup>4</sup> Tupa Atj 250 GBc/Hz at 100 Hz;           Sync Cik Out         -150 dBm hz 0.0 Hz;           Connector Type         SMA on Rear Panel           Output Impedance         50 Q. AC coupled           Frequency         2 * Sampling RateN. N=16.	Output Impedance	50 Ω, AC coupled
Aging       ± 1.0 ppm/year   ± 500 ppb/year (Opt.)         Stability vs. Temporature       ± 1 ppm   ± 50 ppb(Opt.)         Amplitude       1.65 Vpp         Phase Noise @ 20 MHz Carrier       -120 dBc/Hz at 100 Hz; -160 dBc/Hz at 100 Hz; -160 dBc/Hz at 100 Hz;         Phase Noise @ 100 MHz Carrier(Opt.)       -120 dBc/Hz at 100 Hz; -160 dBc/Hz at 100 Hz;         Phase Noise @ 100 MHz Carrier(Opt.)       -120 dBc/Hz at 100 Hz; -150 dBc/Hz at 100 Hz;         Onnector Type       SMA on Rear Panel         Input Impedance       50 Q. AC coupled         Frequency <sup>3</sup> Thr.e.Mz. SampleRate / N where: N = 4, 8, 16, 32 for SampleRate 5 O = 61 GKz         N = 2, 4, 3, 16, 32 for SampleRate = 5.0 GHz       AEG: 122 5 H4z, 335 MHz, 70 MHz or 1540 MHz (selectable)         Input Impedance       10 dBm to 110 dBm         Damage Level       15 dBm         Sync Cik Out       SMA on Rear Panel         Contector Type       SMA on Rear Panel         Output Impedance       50 Q. AC coupled         Frequency       2 * SampleRate 0 Store 0. AC coupled         Sync Cik Out       SMA on Rear Panel         Contector Type       SMA on Rear Panel         Input Impedance       10 Vp into 50 Ohm         External Modulation input       10 MEZ         Connector Type       SMA on Rear Panel <tr< td=""><td>Frequency</td><td>10 MHz TCXO   100 MHz VCOCXO (Optional)</td></tr<>	Frequency	10 MHz TCXO   100 MHz VCOCXO (Optional)
Stabilty vs. Temperature $\pm 1 \text{ ppn}   \pm 50 \text{ ppk}(\text{Opl.})$ Amplitude1.65 VppPhase Noise @ 20 MHz Carrier-120 dBc/Hz at 100 Hz; -140 dBc/Hz at 100 Hz; -150 dBc/Hz at 10 Hz; -150 dBc/Hz at 10 Hz; 	Initial Accuracy @ 25 °C	± 1.0 ppm   ± 500 ppb (Opt.)
Amplitude         1.65 Vpp           Amplitude         1.65 Vpp           Phase Noise @ 20 MHz Carrier         -120 dBcHz at 10 Hz; -140 dBcHz at 10 KHz           Phase Noise @ 100 MHz Carrier(Opt.)         -120 dBcHz at 10 KHz           Phase Noise @ 100 MHz Carrier(Opt.)         -120 dBcHz at 10 KHz           Phase Noise @ 100 MHz Carrier(Opt.)         -140 dBcHz at 10 KHz           Connector Type         50 dBcHz at 10 KHz           Connector Type         50 Q. AC coupled           Input Impedance         50 Q. AC compled           Frequency <sup>6</sup> True Arb, SampleRate > 3.08 + 5.0 GHz           Marge         N = 4.8, 16, 32 for SampleRate = 3.08 + 5.0 GHz           Damage Level         16 dBm           Sync Cit Nott	Aging	± 1.0 ppm/year   ± 500 ppb/year (Opt.)
Phase Noise @ 20 MHz Carrier     -120 dBo/Hz at 100 Hz : -140 dBo/Hz at 10 KHz       Phase Noise @ 100 MHz Carrier(Opt.)     -120 dBo/Hz at 10 KHz       Phase Noise @ 100 MHz Carrier(Opt.)     -120 dBo/Hz at 10 KHz       Phase Noise @ 100 MHz Carrier(Opt.)     -120 dBo/Hz at 10 KHz       External Clock Input     -150 dBo/Hz at 10 KHz       Connector Type     SMA on Rear Panel       Input Impedance     50 0, AC coupled       Frequency <sup>6</sup> Title Arts SampleRate = 5.0 + 6.16 GHz       N = 4, 8, 16, 32 for SampleRate = 3.0 + 5.0 GHz     N = 4, 8, 16, 32 for SampleRate = 3.0 + 5.0 GHz       N = 2, 4, 8, 16, 32 for SampleRate = 3.0 + 5.0 GHz     N = 2, 4, 8, 15, 32 for SampleRate = 3.0 + 5.0 GHz       Sync Cik Out	Stability vs. Temperature	± 1 ppm   ± 50 ppb(Opt.)
-140 dB/Hz at 1 Hz; -150 dB/Hz at 10 HZ; -150 dB	Amplitude	1.65 Vpp
-140 dBc/Hz at 1 KHz;         -150 dBc/Hz at 10 KHz         Phase Noise @ 100 MHz Carrier(Opt.)       -150 dBc/Hz at 10 KHz         External Clock Input       -145 dBc/Hz at 10 KHz         External Clock Input       SMA on Rear Panel         Input Impedance       500 A.C coupled         Frequency <sup>6</sup> Thue Atb: SampleRate / N where:         N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz       N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz         N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz       N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz         N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz       N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz         N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz       N = 4, 8, 10, 32 for SampleRate 5, 0 + 6, 16 GHz         Damage Level       -10 dBm to + 10 dBm         Damage Level       SMA on Rear Panel         Output Impedance       S00 A, AC coupled         Frequency       2 * Sampling Rate/N, N=16, 32,, 2048         Amplitude       1 Vpp into 50 Ohm         External Modulation input       SMA on Rear Panel         Input Impedance       10 KQ         Number of Inputs       1         Input Impedance       10 KQ         Number of Inputs       1         Input Impedance       10 KQ	Phase Noise @ 20 MHz Carrier	-120 dBc/Hz at 100 Hz ;
Phase Noise @ 100 MHz Carrier(Opt.)       -120 dBc/Hz at 10 Hz; -145 dBc/Hz at 10 KHz; -150 dBc/Hz at 10 KHz; -150 dBc/Hz at 10 KHz         External Clock Input       SMA on Rear Panel         Input Impedance       50 Ω, AC coupled         Frequency <sup>6</sup> True Arb; SampleRate 7.00 Hz; N = 4, 8, 16, 32 for SampleRate 3.00 + 50.0 GHz N = 2, 4, 8, 16, 32 for SampleRate 3.00 + 50.0 GHz AFG; 192.5 MHz, 356 MHz, 770 MHz or 1540 MHz (selectable)         Input Power Range       +0 dBm to +10 dBm         Damage Level       5 dBm         Sync Clk Out		-140 dBc/Hz at 1 KHz;
445 dBc/Hz at 1 KHz; 150 dBc/Hz at 10 KHz         External Clock Input         Connector Type       SMA on Rear Panel         Input Impedance       50 Q. AC coupled         Frequency <sup>a</sup> Tue AL; SampleRate N where: N = 4, 8, 16, 32 for SampleRate = 5.0 + 6.16 GHz N = 2, 4, 8, 16, 32 for SampleRate = 5.0 + 6.16 GHz N = 2, 4, 8, 16, 32 for SampleRate = 3.08 + 5.0 GHz AFG: 192.5 MHz, 770 MHz or 1540 MHz (selectable)         Input Power Range       +0 dBm to +10 dBm         Damage Level       155 dBm         Sync Clk Out       SMA on Rear Panel         Connector Type       SMA on Rear Panel         Output Impedance       50 Q. AC coupled         Frequency       2 * Sampling Rate/N, N=16, 32,, 2048         Connector Type       SMA on Rear Panel         Output Impedance       1 Vpp into 50 Ohm         External Modulation input       1 Vpp into 50 Ohm         External Modulation input       10 KΩ         Connector Type       SMA on Rear Panel         Input Impedance       10 KΩ         Number of Inputs       1         Bandwidth       10 HEX with 50 M/S sampling rate         Input Vidage Range       -1 V to +1 V (except FSK, PSK),         FSK, PSK: 0Y + 3.3 V with 1.6SV fixed threshold       Yetrical Resolution         Patter Jumpt In (optional)       DATA[10,.7]		-150 dBc/Hz at 10 KHz
Image: Project State Sta	Phase Noise @ 100 MHz Carrier(Opt.)	
External Clock Input         SMA on Rear Panel           Input Impedance         50 Ω, AC coupled           Frequency <sup>6</sup> True Atb: SampleRate / N where: N = 4, 8, 16, 32 for SampleRate - 5.0 + 6.16 GHz N = 2, 4, 8, 16, 32 for SampleRate - 3.0 + 5.0 GHz AEG: 192.5 MHz, 385 MHz, 770 MHz or 1540 MHz (selectable)           Input Power Range         +0 dBm to +10 dBm           Damage Level         15 dBm           Sync Clk Out         0 GM consection           Connector Type         SMA on Rear Panel           Output Impedance         50 Ω, AC coupled           Frequency         2 * Sampling Rate/N, N=16, 32,, 2048           Amplitude         1 Vpp into 50 Ohm           External Modulation input         0 MA on Rear Panel           Connector Type         SMA on Rear Panel           Output Impedance         1 Vpp into 50 Ohm           External Modulation input         1 Vpp into 50 Ohm           External Modulation input         1 Max on Rear Panel           Input Impedance         10 KΩ           Number of Inputs         1           Input Impedance         10 KΩ           Vertical Resolution         12-bit           Patter Jump In (optional)         12-bit           Connector Type         DATA[0, 7] + Data Select + Load           Internal Data Width		
Connector Type         SMA on Rear Panel           Input Impedance         50.0, AC coupled           Frequency <sup>6</sup> True Arb; SampleRate / N where: N = 4, 8, 16, 32 for SampleRate = 5.0 + 6.16 GHz N = 2, 4, 8, 16, 32 for SampleRate = 5.0 + 6.16 GHz N = 2, 4, 8, 16, 32 for SampleRate = 3.08 + 5.0 GHz AFE: 192: SMHZ, 385 MHz, 770 MHz (selectable)           Input Power Range         +0 dBm to +10 dBm           Damage Level         15 dBm           Sync Clk Out         Connector Type           Connector Type         SMA on Rear Panel           Output Impedance         50.0, AC coupled           Frequency         2 * Sampling Rate/N, N=16, 32,, 2048           Amplitude         1 Vpp into 50 Ohm           External Modulation Input         2 * Sampling Rate/N, N=16, 32,, 2048           Connector Type         SMA on Rear Panel           Input Impedance         1 Vpp into 50 Ohm           External Modulation Input         1 Number of Inputs           Connector Type         SMA on Rear Panel           Input Voltage Range         -1 V to +1 V (except FSK, PSK),           Input Voltage Range         -1 V to +1 V (except FSK, PSK),           Vertical Resolution         12-bit           Pattern Jump In (optional)         DXTA[07] + Data Select + Load           Connector Type         DSUB15           I	External Clock Input	-150 dBC/Hz at 10 KHz
Input Impedance         50 Ω, AC coupled           Frequency <sup>6</sup> True Arts, SampleRate (N where: N = 4, 8, 16, 32 for SampleRate = 5.0 - 6.1 G Hz N = 2, 4, 8, 16, 32 for SampleRate = 3.08 + 5.0 GHz AFC: 192.5 MHz, 270 MHz or 1540 MHz (selectable)           Input Power Range	-	SMA on Rear Panel
True Arb: SampleRate / N where:           N = 4, 8, 16, 32 for SampleRate = 5, 0 + 6, 16 GHz           N = 4, 8, 16, 32 for SampleRate = 5, 0 + 6, 16 GHz           N = 2, 4, 8, 16, 32 for SampleRate = 3, 08 + 5, 0 GHz           AFG: 192.5 MHz, 385 MHz, 770 MHz or 1540 MHz (selectable)           Input Power Range         +0 dBm to +10 dBm           Damage Level         15 dBm           Sync Clk Out         Connector Type           Connector Type         SMA on Rear Panel           Output Impedance         50 Ω, AC coupled           Frequency         2 * Sampling Rate/N, N=16, 32,, 2048           Amplitude         1 Vpp into 50 Ohm           External Modulation input         Connector Type           Connector Type         SMA on Rear Panel           Input Impedance         1 Vpp into 50 Ohm           External Modulation input         Connector Type           Connector Type         SMA on Rear Panel           Input Impedance         10 KQ           Number of Inputs         1           Bandwidth         10 MHz with 50 MS/s sampling rate           Input Typedance         1V to +1V (except FSK, PSK).           Vertical Resolution         12-bit           Pattern Jump In (optional)         DATA[0, T] + Data Select + Load           Input Signals </td <td></td> <td></td>		
N = 4, 8, 16, 32 for SampleRate = 5.0 + 6.16 GHz N = 2, 4, 8, 16, 32 for SampleRate = 3.08 + 5.0 GHz AEG: 192.5 MHz, 355 MHz, 770 MHz or 1540 MHz (selectable)           Input Power Range         +0 dBm to +10 dBm           Damage Level         +0 dBm to +10 dBm           Sync Clk Out         500 AN Rear Panel           Connector Type         SMA on Rear Panel           Output Impedance         500 A. AC coupled           Frequency         2 * Sampling Rate/N, N=16, 32,, 2048           Amplitude         1 Vpp into 50 Ohm           External Modulation input         0 MA on Rear Panel           Connector Type         SMA on Rear Panel           Input Impedance         1 Vpp into 50 Ohm           External Modulation input         10 KΩ           Number of Inputs         1           Input Voltage Range         -1 Vto 11 V (except FSK, PSK), FSK, PSK: 0 V + 3.3 V with 1.6SV fixed threshold           Vertical Resolution         12-bit           Pattern Jump In (optional)         Connector Type           Connector Type         SUB15           Input Signals         DATA[07] + Data Select + Load           Internal Data Width         14 bit, multiplexed using Data_Select           Input Signals         Consc or 10 MHz           Input Signals         Con to V to .83 V/VIH= 2V to .33 V	· · ·	
N = 2, 4, 8, 16, 32 for SampleRate = 3.08 + 5.0 GHz <u>AFG</u> : 192.5 MHz, 335 MHz, 770 MHz or 1540 MHz (selectable)           Input Power Range         +0 dBm to +10 dBm           Damage Level         3 dBm           Sync Cik Out         5 dBm           Connector Type         SMA on Rear Panel           Output Impedance         50 Ω, AC coupled           Frequency         2 * Sampling Rate/N, N=16, 32,, 2048           Amplitude         1 Vpp into 50 Ohm           External Modulation input         Connector Type           Connector Type         SMA on Rear Panel           Input Impedance         10 KΩ           Number of Inputs         1           Bandwidth         10 KΩ           Number of Inputs         1           Bandwidth         10 MHz with 50 MS/s sampling rate           Input Voltage Range         -1 V to +1 V (except FSK, PSK), FSK, PSK: 0 V + 3.3 V with 1.6SV fixed threshold           Vertical Resolution         12-bit           Patter Jump In (optional)         Connector Type           Connector Type         DSUB15           Input Signals         DATA[07] + Data Select + Load           Internal Data Width         14 bit, multiplexed using Data_Select           Input Signals         Cot to 1MHz           Data Rate	Trequency	
Input Power Range+0 dBm to +10 dBmDamage Level15 dBmSync Clk OutConnector TypeSMA on Rear PanelOutput Impedance50 Ω, AC coupledFrequency2 * Sampling Rate/N, N=16, 32,, 2048Amplitude1 Vpp into 50 OhmExternal Modulation inputConnector TypeConnector Type0 A CoupledInput Impedance10 KΩNumber of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK), FSK, PSK, OV + 3.3 V with 1.65V fixed thresholdVertical Resolution2-bitDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable Entries6384Data RateDC to 1 MHzInput RapeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 V		
Damage Level       15 dBm         Sync Cik Out       SMA on Rear Panel         Connector Type       SMA on Rear Panel         Output Impedance       50 Ω, AC coupled         Frequency       2 * Sampling Rate/N, N=16, 32,, 2048         Amplitude       1 Vpp into 50 Ohm         External Modulation input       0 MA on Rear Panel         Connector Type       SMA on Rear Panel         Input Impedance       10 KΩ         Number of Inputs       1         Bandwidth       10 MHz with 50 MS/s sampling rate         Input Voltage Range       -1 V to +1 V (except FSK, PSK),         FSK, PSK: 0 V + 3.3 V with 1.65V fixed threshold       Vertical Resolution         Pattern Jump In (optional)       2 DATA[07] + Data Select + Load         Connector Type       DSUB15         Input Signals       DATA[07] + Data Select + Load         Internal Data Width       14 bit, multiplexed using Data_Select         Number of Addressable Entries       0 C to 1 MHz         Data Rate       DC to 1 MHz         Input Range       VIL = 0 V to 0.8 V / VIH = 2 V to 3.3 V		AFG: 192.5 MHz, 385 MHz, 770 MHz or 1540 MHz (selectable)
Sync Cik Out           Connector Type         SMA on Rear Panel           Output Impedance         50 Ω, AC coupled           Frequency         2 * Sampling Rate/N, N=16, 32,, 2048           Amplitude         1 Vpp into 50 Ohm           External Modulation input         1 Vpp into 50 Ohm           Connector Type         SMA on Rear Panel           Input Impedance         10 KΩ           Number of Inputs         1           Bandwidth         10 MHz with 50 MS/s sampling rate           Input Voltage Range         -1 V to +1 V (except FSK, PSK).           FSK, PSK: 0 V + 3.3 V with 1.65V fixed threshold         Vertical Resolution           Vertical Resolution         12-bit           Pattern Jump In (optional)         Connector Type           Connector Type         DSUB15           Input Signals         DATA[07] + Data Select + Load           Internal Data Width         14 bit, multiplexed using Data_Select           Number of Addressable Entries         16384           Data Rate         DC to 1 MHz           Input Range         VIL = 0 V to 0.8 V / VIH = 2 V to 3.3 V           Impedance         Internal 1 kΩ pull-up resistor to Vcc (3.3 V)	Input Power Range	+0 dBm to +10 dBm
Connector TypeSMA on Rear PanelOutput Impedance50 Ω, AC coupledFrequency2 * Sampling Rate/N, N=16, 32,, 2048Amplitude1 Vpp into 50 OhmExternal Modulation input1 Vpp into 50 OhmExternal Modulation input0 MA on Rear PanelInput Impedance10 KΩNumber of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK), FSK, PSK : 0 + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)DATA[07] + Data Select + LoadInternal Data Width14 bit, multipexed using Data_SelectNumber of Addressable Entries16384Data RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH= 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)PowerInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Damage Level	15 dBm
Output Impedance50 Ω, AC coupledFrequency2 * Sampling Rate/N, N=16, 32,, 2048Amplitude1 Vpp into 50 OhmExternal Modulation input1Connector TypeSMA on Rear PanelInput Impedance10 KΩNumber of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)DATA[07] + Data Select + LoadInput SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesCot 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)PowerInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Sync Clk Out	
Frequency2 * Sampling Rate/N, N=16, 32,, 2048Amplitude1 Vpp into 50 OhmExternal Modulation inputConnector TypeSMA on Rear PanelInput Impedance10 KΩNumber of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)DATA[07] + Data Select + LoadInput SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable Entries16384Data RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 KΩ pull-up resistor to Vcc (3.3 V)Power	Connector Type	SMA on Rear Panel
Amplitude1 Vpp into 50 OhmExternal Modulation inputConnector TypeSMA on Rear PanelInput Impedance10 KΩNumber of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesGData RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)PowerInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Output Impedance	50 Ω, AC coupled
External Modulation inputConnector TypeSMA on Rear PanelInput Impedance10 KΩNumber of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)Power	Frequency	2 * Sampling Rate/N, N=16, 32,,, 2048
Connector TypeSMA on Rear PanelInput Impedance10 KΩNumber of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V + 3.3 V with 1.6SV fixed thresholdVertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesOC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)Power	Amplitude	1 Vpp into 50 Ohm
Input Impedance10 KΩNumber of Inputs10 MHz with 50 MS/s sampling rateBandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)Power	External Modulation input	
Number of Inputs1Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V ÷ 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Connector Type	SMA on Rear Panel
Bandwidth10 MHz with 50 MS/s sampling rateInput Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Input Impedance	10 ΚΩ
Input Voltage Range-1 V to +1 V (except FSK, PSK). FSK, PSK: 0 V ÷ 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)DSUB15Connector TypeDATA[07] + Data Select + LoadInput SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Number of Inputs	1
FSK, PSK: 0 V + 3.3 V with 1.65V fixed thresholdVertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable EntriesDC to 1 MHzData RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Bandwidth	10 MHz with 50 MS/s sampling rate
Vertical Resolution12-bitPattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable Entries16384Data RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH= 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)	Input Voltage Range	-1 V to +1 V (except FSK, PSK).
Pattern Jump In (optional)Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable Entries16384Data RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH = 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)		FSK, PSK: 0 V ÷ 3.3 V with 1.65V fixed threshold
Connector TypeDSUB15Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable Entries16384Data RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH= 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)Power		12-bit
Input SignalsDATA[07] + Data Select + LoadInternal Data Width14 bit, multiplexed using Data_SelectNumber of Addressable Entries16384Data RateDC to 1 MHzInput RangeVIL = 0 V to 0.8 V / VIH= 2 V to 3.3 VImpedanceInternal 1 kΩ pull-up resistor to Vcc (3.3 V)Power	Pattern Jump In (optional)	
Internal Data Width       14 bit, multiplexed using Data_Select         Number of Addressable Entries       16384         Data Rate       DC to 1 MHz         Input Range       VIL = 0 V to 0.8 V / VIH= 2 V to 3.3 V         Impedance       Internal 1 kΩ pull-up resistor to Vcc (3.3 V)         Power		
Number of Addressable Entries     16384       Data Rate     DC to 1 MHz       Input Range     VIL = 0 V to 0.8 V / VIH= 2 V to 3.3 V       Impedance     Internal 1 kΩ pull-up resistor to Vcc (3.3 V)	Input Signals	DATA[07] + Data Select + Load
Data Rate     DC to 1 MHz       Input Range     VIL = 0 V to 0.8 V / VIH= 2 V to 3.3 V       Impedance     Internal 1 kΩ pull-up resistor to Vcc (3.3 V)       Power	Internal Data Width	
Input Range     VIL = 0 V to 0.8 V / VIH= 2 V to 3.3 V       Impedance     Internal 1 kΩ pull-up resistor to Vcc (3.3 V)       Power	Number of Addressable Entries	
Impedance     Internal 1 kΩ pull-up resistor to Vcc (3.3 V)       Power		
Power	Input Range	VIL = 0 V to 0.8 V / VIH= 2 V to 3.3 V
	Impedance	Internal 1 k $\Omega$ pull-up resistor to Vcc (3.3 V)
Source Voltage and Frequency 100 to 240 VAC ±10% @ 45-66 Hz	Power	
	Source Voltage and Frequency	100 to 240 VAC ±10% @ 45-66 Hz

Model 685C Arbitrary Waveform Generator		
Max. Power Consumption	Max. 100W Max. 200W Max. 300W	
Environmental Characteristics		
Temperature (operating)	+41 °F to 104 °F [+5 °C to +40 °C]	
Temperature (non-operating)	-4 °F to 140 °F [-20 °C to +60 °C]	
Humidity (operating)	5% to 80% relative humidity with a maximum wet bulb temperature of 84°F (29°C) at or below +104°F (40°C), (upper limit de–rates to 20.6% relative humidity at +104°F (40°C)). Non-condensing.	
Humidity (non-operating)	5% to 95% relative humidity with a maximum wet bulb temperature of 104°F (40°C) at or below +140°F (60°C), upper limit de–rates to 29.8% relative humidity at +140°F (60°C). Non-condensing.	
Altitude (operating)	9,842 feet (3,000 meters) maximum at or below 77°F (25°C)	
Altitude (non-operating)	39,370 feet (12,000 meters) maximum	
EMC and Safety		
Safety	EN61010-1	
Main Standards	EN 61326-1:2013 – Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements	
Immunity	EN 61326-1:2013	
System Specifications		
Display	7", 1024x600, capacitive touch LCD	
Operative System	Windows 10	
External Dimensions	W 17.6 in – H 5.4 in – D 12.6 in (3U 19" rackmount) (445 mm – 135 mm – 320 mm)	
Weight	Max. 26.45 lbs (12 Kg)	
Front panel connectors	CH N OUTPUT (SMA) where N=2,4,8 depending on the model MARKER N OUT (SMA)	
	where N=1,2,4 depending on the model	
	TRG IN N(SMA) where N =1,2	
Rear panel connectors	2 USB 3.0 ports         Ref. Clk. IN (SMA)         Ref. Clk. Out (SMA)         Ext. Mod. IN (SMA)         Sync Clk Out (SMA)         Ext Clk IN (SMA)         Sync IN (Infiniband 4X)         Sync OUT (Infiniband 4X)         Pattern Jump In (DSUB15) (685-XC-FSS opt. only)         POD X[70] where X=A,B,C,D depending on the model (Customized Mini SAS HD)         External Monitor ports (one or more)         2 USB 2.0 ports or more	
	4 USB 3.0 ports	
	Ethernet port (10/100/1000BaseT Ethernet, RJ45 port)	
	2 PS/2 keyboard and mouse ports	
	2 DPI ports	
	1 DVI port	
Hard Disk	1 TB SSD or better	
Processor	Intel® Pentium 3.7 GHz (or better)	
Processor Memory	32 GB or better	