

Model 745-OEM

4/8 Channel Pulse & Delay Generator

FEATURES

- Four high-resolution delay channels
1 ps resolution
< 5 ps RMS jitter (at short delay)
> 20-second delay range
- Adjustable outputs (amplitude 2 to 5 V and width 100 ns to 10 μ s). 1 ns rise-time into 50 Ω
- Triggers: Burst, Gate, External trigger pre-scaler, Internal frequency generators
- External clock: 10 MHz to 100 MHz
- Compact packaging
- All parameters may be controlled via Ethernet or Internet, or USB
- Option: Four auxiliary delay channels

APPLICATIONS

- Embedded OEM applications
- Component Testing / QC
- ATE Applications
- Laser System Timing Control
- Laser Pulse Picking
- High Precision Pulse / Gate
- Instrument Triggering



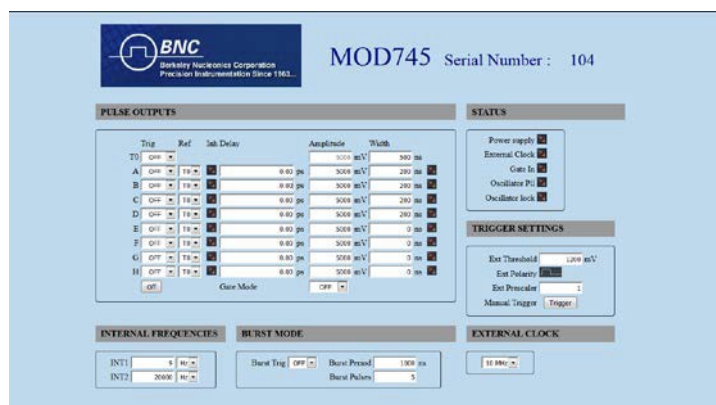
DESCRIPTION

The Model 745-OEM is a compact digital delay generator intended for use in embedded OEM applications. The delay resolution is 1 ps, and the external trigger-to-channel jitter is less than 25 ps. MCX output connectors deliver 5 V, 1 ns rise-time, at 50 Ω . Amplitude and width are adjustable for each output pulse.

One input trigger (TRIG IN), or two internal synchronized timers, or software commands may be used to trigger all output channels.

A T0 output pulse (marking zero delay reference) is generated at each selected trigger.

The Model 745-OEM also provides (as an option) four auxiliary delay channels E to H on the front panel. The delay resolution is 1.25 ns and trigger-to-channel jitter is less than 50 ps.



Control Panel Web Page:

This web page, from an embedded web server, provides a simple method to configure settings for each channel (delay, output amplitude, output width, trigger source, trigger mode), and a simple method to control operation and status of the instrument.

The configuration information of the instrument is stored and saved in the Model 745-OEM (up to 4 different sets of unit configuration can be stored/recalled).

Example of Model 745-OEM control panel



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SPECIFICATIONS

Delay (channel T1 to T4)

Number	4 independent
Range	0 to > 20 seconds
Resolution	1 ps
RMS Jitter	25 ps + delay x 10^{-8} (external trigger to any output) 5ps + delay x 10^{-8} (internal trigger to any output)
Accuracy	< 250 ps + delay x 10^{-8}
Time base	0.05 ppm stability

Output pulse (channel A to D)

Amplitude	2 to 5 V, resolution 10 mV
Load	50 Ω
Width	100 ns to 10 μ s, 5 ns resolution
Pulse Polarity	Positive
Burst Mode	1 to $2^{16}-1$
Rise / fall time	< 1 ns / < 3 ns
Connector	MCX

External Trigger Mode

Input Trigger	Threshold = 0.1 to 5 V into 50 Ω , Slope = positive or negative
Repetition Rate	Single, Repetitive < 1 MHz, or Burst mode
Trigger Prescaler	1 to $2^{16}-1$
Trigger Delay	< 65 ns (insertion delay)

Internal Trigger Mode

Rate Repetitive	From two Timers with frequency = 0.25 Hz to 1 MHz (in steps of 5 ns)
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T0 Output

Amplitude	5 V / 50 Ω , 200 ns width
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Gate

Input	Active high, threshold 1.5 V, positive or negative slope
Function	Output inhibit (Global or individual channel)

Clock IN

Threshold	0 V, internal load 50 Ω
Level	Min -3 dBm
Frequency	10 MHz (or request any frequency up to 100 MHz when ordering from factory)

Clock OUT

Frequency	10 or 80 MHz (or request any frequency up to 100 MHz when ordering from factory)
Level	+/- 1 V, into 50 Ω
Shape	Square

General

Interface Control	USB to UART, Ethernet 10/100Mb/s
User Memory	Up to 4 sets of parameters can be stored/recalled via Ethernet or USB
Software Tool	Free Drivers for Windows 10
Power consumption	25 W
Power supply	+12 V – 0.6A / + 5 V – 3A
Weight	<1 kg
Size	6.93" x 5.04" x 1.38" in 176 x 128 x 35 mm

Options 8C: Four Auxiliary Channels (T5 to T8)

Delay channel

Number:	4 independents
Range:	0 to > 20 seconds
Resolution:	1.25 ns
Jitter	< 50 ps RMS + delay x 10^{-8} (external trigger to any output)
Accuracy:	1 ns + delay x 10^{-8}

Output pulse

Amplitude:	2.5 to 5 V / 50 Ω , common tuning
Width:	100 ns to 10 ms, 5 ns resolution
Rise and fall time:	< 5 ns
Connector:	MCX

Options NP: Narrow Pulse

Provide pulse up to 5 ns width, on the output T1 and T3 adjustable in steps of 1 picoseconds.

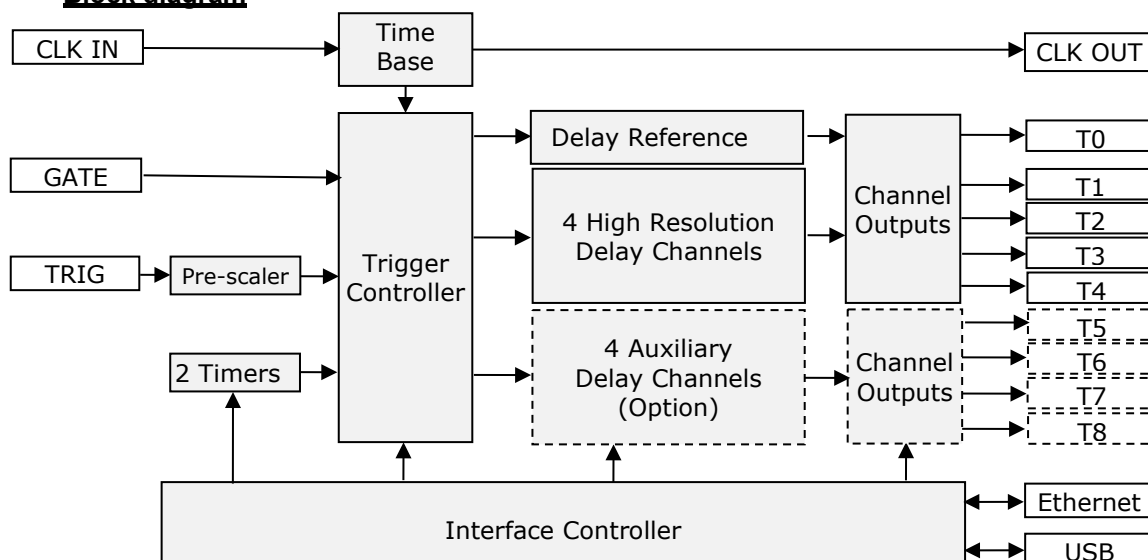


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4/8 Channel Pulse & Delay Generator

FUNCTIONAL OVERVIEW

Block diagram



Time base

The time base is provided from an internal clock reference or an external 10 MHz clock (CLK IN). As an option, the external clock can be up to 100 MHz. Time base is available on the rear panel (CLK OUT)

Delay channel

There are four independent delay channels. The delay from the selected trigger source is adjustable up to 20 seconds in 1 ps increments.

Jitter: The following chart indicates typical RMS jitter at various delays:

Internal Trigger Mode	External Trigger Mode
Delays < 100 ns: 5 picoseconds	Delays < 100 ns: 5 picoseconds
Delays > 100 ns: 15 picoseconds + time base	Delays > 100 ns: 25 picoseconds + time base

Triggering

The Model 745-OEM offers users several methods for triggering delay channels:

- External trigger on the positive or negative slope of your trigger signal and selected level from 0.1 V to 5.0 V.
- Two internal generator triggers are adjustable from 0.25 Hz to 1 MHz in 1 Hz increments (5 ns).
- Software trigger from remote command

Trigger Modes

Burst mode: pulse number 1 to $2^{16}-1$, period 1000 ns to 1 second (depending on the trigger rate)

Trigger Pre-scaler: pre-scaler value applied to the external trigger goes from 1 to $2^{16}-1$

Gate mode: can be set to global or individual channel.

Outputs

Each delay channel output pulse is adjustable in level and width. The outputs are designed to drive an external 50 Ω load. T0 Output pulse is a time reference that marks zero delay.

Interface Control

All parameters may be remotely controlled over Ethernet network or USB interface. An embedded control interface software allows all parameters to be controlled by any PC with a browser. Connect a cable from the Ethernet port to your computer network and enter the unit's IP address into the browser. A virtual control panel will automatically open on the PC.



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Example of channel outputs mode

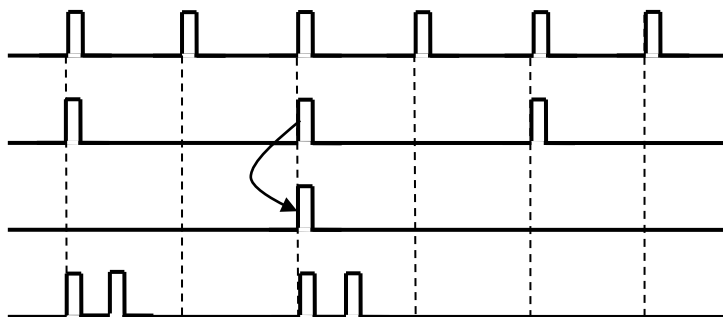
- Repetitive and single trigger

Channel A
(Repetitive from Timer n°1)

Channel B
(Repetitive from Timer n°2)

Channel C
(Single from Command)

Channel D
Burst number = 2
(Repetitive from timer n°2)



- Pulse picking

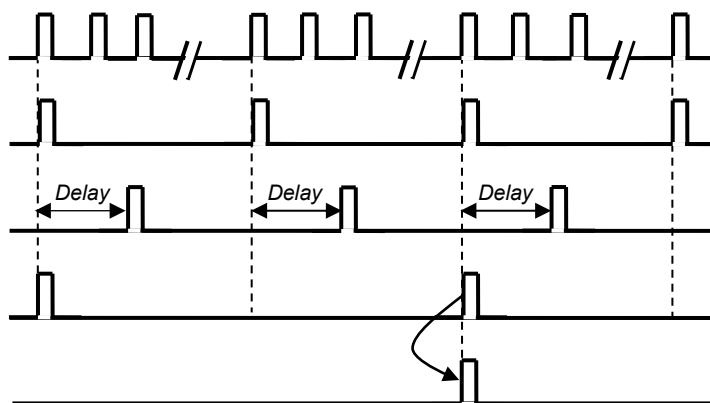
External clock
(80 MHz for example)

Channel A
(From timer N°1 & delay = 0)

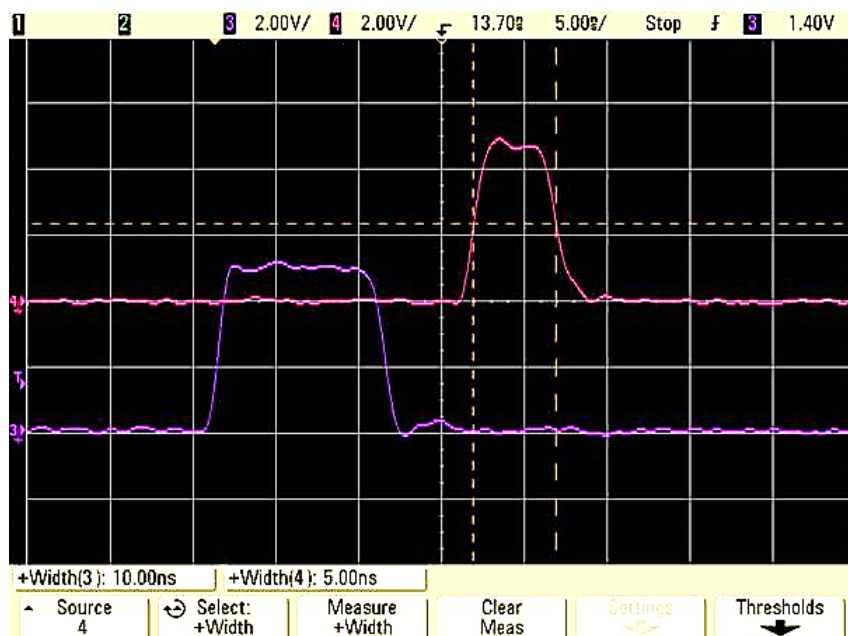
Channel B
(From timer N°1 & delay)

Channel C
(From timer N°2)

Channel D = Pulse picking
(Single shot from command)



“Narrow pulse option” provides a pulse as narrow as <10 ns, on the outputs T1 and T3. The value of the width is adjustable in steps of 1 ps. The narrow output pulse is achieved by ANDing two channel outputs.



5 ns/div and
2 V/div

T1 set to 10 ns (in purple) and T3 set to 5 ns (in pink)

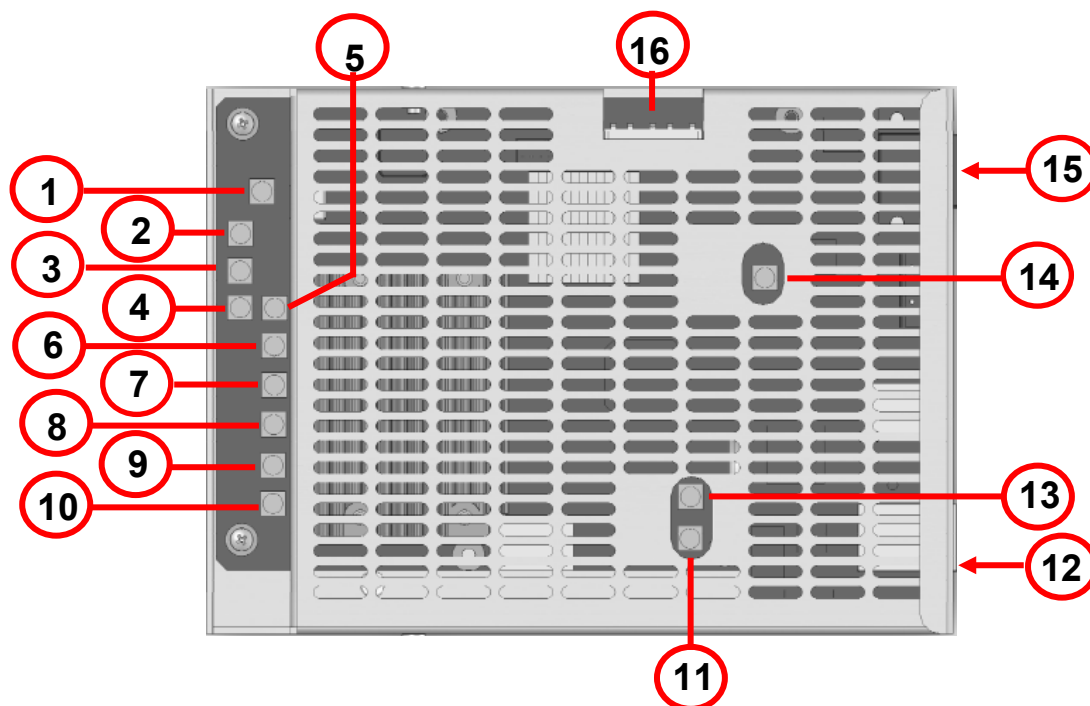


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INPUT / OUTPUT INTERFACE

Top view



Top view of the generator

Connectors, Switches, Indicators

Connectors			
1	Trigger Input: MCX connector	9	T1 Output: MCX connector
2	T5 Output: MCX connector	10	T0 Output: MCX connector
3	T6 Output: MCX connector	11	Clock Input: MCX connector
4	T7 Output: MCX connector	12	Ethernet: RJ45 connector
5	T8 Output: MCX connector	13	Clock Out: MCX connector
6	T4 Output: MCX connector	14	Gate Input: MCX connector
7	T3 Output: MCX connector	15	USB interface: micro-USB connector
8	T2 Output: MCX connector	16	Power input: AMP connector

ORDERING INFORMATION

Model	Description
Model 745-OEM	Base version: 4 high-resolution delay channels
Model 745-OEM-8C	Option 1: Adds 4 auxiliary channels
Model 745-OEM-NP	Option 3: Narrow pulses on T1 and T3

ACCESSORIES (modules to provide specific output pulse shape)

Model	Description
GFT101	Electrical-to-optical Pulse Converter
GFT400	500 ps, 2 V under 50 Ω Pulse Generator
GFT500	200 ps, 4 - 9 V under 50 Ω Step Generator
GFT632	32 - 70 V, 3 ns rise time under 50 Ω Pulse Generator
GFT644	4 channel 50 Ω Line Driver Module