



# 9530 Series

## Digital Delay Pulse Generator

Our 9530 Pulse Generator provides the latest in laser timing and synchronization. Offering a unique 1U 19" rackmount package with all rear panel connections, it is well suited for integration into your rack timing and control systems.

### Key Features

- 250 ps Timing Resolution
- < 50 ps Channel to Channel Jitter
- 1U Rackmount Ready
- Easy Programming Interface
- 4 or 8 Independent Channel Outputs
- Free LabVIEW Driver
- Ethernet, USB, RS232 Standard
- Full Customer Support
- 2 Year Warranty



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# 9530 Digital Delay/ Pulse Generator

The Model 9530 Digital Delay / Pulse Generator represents the latest in timing and synchronizing capabilities. With a unique 19" 1U form factor, the model 9530 is clearly our most innovative instrument to accurately synchronize any series of events.

The 9530's eight independent outputs, dual trigger/ gate inputs and external clock reference input make it ideal for laser system timing applications. The system can directly phase lock to an external timebase up to 100 MHz in frequency and down to 20 mV in amplitude. This allows synching directly to a laser photodiode signal and provides complete system timing relative to the laser timing with low jitter. The 9530 also provides a

clock output that is capable of driving a 50 ohm load and can be used to provide a master timebase to other delay generators or equipment.

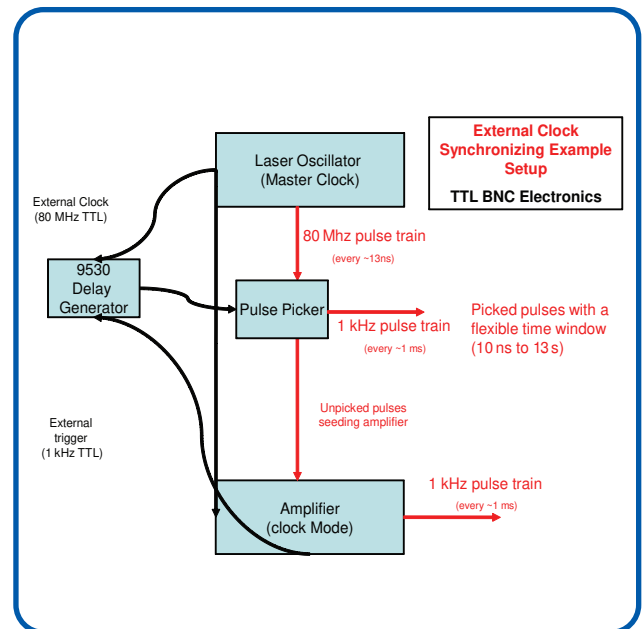
The core technology in precision timing of the 9530 offers 250 ps Delay & Width resolution and 50 ps internal jitter. Ethernet / USB interface, complex burst sequences, Divide-by-N, Setting Profiles, Clock Divider, Pulse Picking and Negative Delays allow users great flexibility in setting up an experiment or synchronizing multiple events. Complimentary NI certified LabVIEW drivers available.

## Advanced Features/Options

- Clock input/output – allows master clock input from 10 MHz to 100 MHz with complete system timing relative to that signal with low jitter
- Field programmability–custom features, upgrades and fixes via fully programmable FPGA
- Settings / Programming saved on front panel power down

## Channel Properties / Advanced Programming Modes

- Multiplexing - selectively combine the timing of any or all channels to one output
- Burst - Each channel can have a separate number
- Duty Cycle - N pulses on, M pulses off
- Channel Referencing - Any or all channels can reference the timing of any channel rather than T0
- Wait - The system will wait for a specified number of cycles before producing pulses



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## SYSTEM SPECIFICATIONS

### I/O CONFIGURATION

Models/Outputs	9534 - 4 independent channel outputs 9538 - 8 independent channel outputs
Inputs	2 inputs - 1 trig input / 1 gate input
Memory	24 configuration storage slots

### INTERNAL RATE GENERATOR

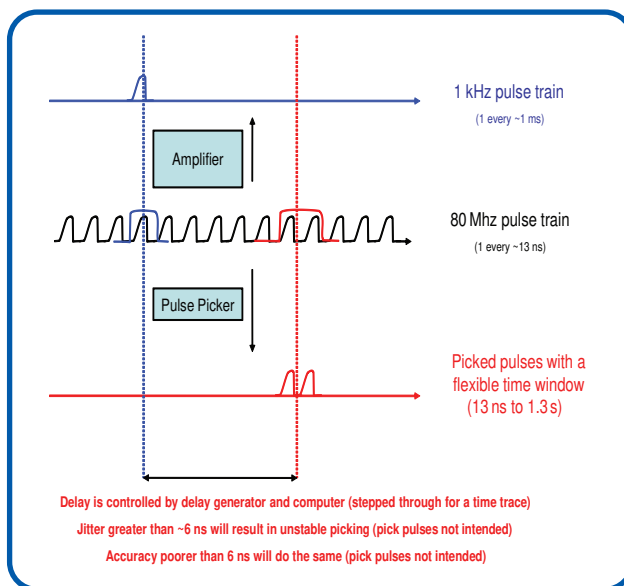
rate	0.0002 Hz to 10.000 MHz
resolution	10 ns
accuracy	1 ns + .0001 x period
jitter	50 ps RMS
settling	1 period
burst mode	1 to 9,999,999 pulses
timebase	100 MHz, low jitter PLL
oscillator	50 MHz, 25 ppm
system output modes	single shot, burst, duty cycle, continuous
pulse control modes	internal rate generator, external trigger, external gate

### PROGRAMMABLE TIMING GENERATOR

channel output modes	single shot, burst, duty cycle, normal
control modes	internally triggered, externally triggered and external gate each channel may be independently set to any of the modes
output multiplexer	any/all channels may be multiplexed to any/all outputs
delayed output	0 to 9,999,999 pulses
timebase	same as internal rate generator

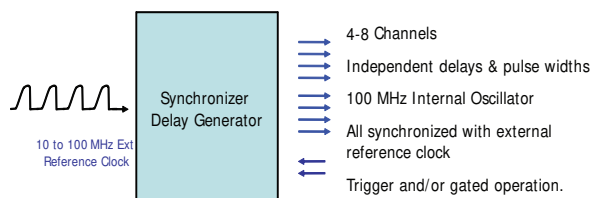
### DELAY

range	0 - 1000 s
accuracy	1 ns + .0001 x setpoint
resolution	250 ps



- Independent Channel Enable/Disable
- Delayed Channel Enable - allows flashlamp/ diodes to be fired, stabilizing the laser before the Q-switch or shutter is enabled.
- Single shot or Burst mode laser pulse bursts, controlling either just the Q-switch or entire laser.
- Duty cycle mode allows firing laser at an optimal rate, but picking pulses out at the user required rate.
- Output multiplexer allows the timing of any combination of channels to be output on any of the output ports, providing very complex pulse trains.

### 9530 EXTERNAL SYNC'D OPERATION



External reference clock input of 50 mV to 2.5 V allows direct syncing to photo diode or high speed logic outputs.

Sync'd operation provides very low external jitter operation.

All modes (internal & external trigger, etc.) are available with the external clock.



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## MODULE SPECIFICATIONS

### TTL/ADJUSTABLE CHANNEL OUTPUTS

output impedance 50 ohm

### TTL/CMOS MODES

output level 4.0 V typ into 1 kohm

rise time 3 ns typ

slew rate 0.5 V/ns

jitter 50 ps RMS

### ADJUSTABLE MODE

output level 2.0 to 20 VDC into 1 kohm  
1.0 to 10 VDC into 50 ohm

output resolution 10 mV

current 200 mA typical, 400 mA max  
(short pulses)

slew rate > 0.1 V/ns

overshoot < 100 mV + 10 % of pulse  
amplitude

rise time 15 ns typ @ 20 V (high imp)  
25 ns typ @ 10 V (50 ohm)  
(10 % - 90 %)

### TRIGGER/GATE DUAL INPUT (STANDARD)

Standard dual channel input, providing one trigger input and one gate input. May be used with the dual trigger firmware option to provide two independent trigger sources.

threshold 0.2 to 15 VDC

maximum input voltage 60 V peak

resolution 10 mV

input impedance 1 Mohm + 40 pF or 50 ohm

insertion delay < 180 ns

pulse inhibit delay < 120 ns

output inhibit delay < 50 ns

jitter < 800 ps RMS

\*Other custom modules available. Call with your request.

### SYSTEM EXTERNAL TRIGGER/GATE INPUT(S) TRIGGER INPUT

function generate individual pulses, start a burst  
or continuous stream

rate DC to 1/(200 ns + longest active  
pulse)

slope rising or falling (maximum of 5 MHz)

behavior used to control the internal rate

### GATE INPUT

function pulse inhibit or output inhibit

polarity active high / active low

behavior used to control the internal rate generator

### STANDARD FEATURES & FUNCTIONS

communications USB/RS232/Ethernet

external clock in 10 MHz - 100 MHz in 1 MHz increments

external clock out 5 MHz - 40 MHz

configuration storage T0, Rate, Chan, 2x ExtPLL, 1 ExtPLL, ½  
ExtPLL, ½ Ext, 40MHz, 20MHz, 10MHz,  
5MHz, and Disabled

### STANDARD OUTPUT MODULES

AT20 quad channel, TTL/CMOS &  
adjustable output module

### OPTIONAL MODULE

TZ50 quad channel, high current  
TTL/CMOS (for driving 50 ohm loads)  
& adjustable output module

### SYSTEM OPTIONS

I incrementing (provides automatic  
high speed incrementing/decrementing  
of delay and/or pulsewidth for each  
channel)

DT15 dual trigger logic – provides  
additional trigger via gate input



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