



# 9530 Digital Delay / Pulse Generator



# 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 100MHz in frequency and down to 20mV 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 250pS Delay & Width resolution and 200pS internal jitter. Ethernet / USB interface, complex burst sequences, Divide-by-N, Setting Profiles, Dual Triggers, Dual Gating, Clock Divider, Pulse Picking and Negative Delays allow users great confidence in setting up an experiment or synchronizing multiple events. Complimentary NI certified LabVIEW™ drivers available.

## Key Features

250ps timing resolution with < 200ps jitter

8 independent outputs with full individual programming and control

Internal rate generator – 10ns period resolution over entire frequency range (20MHz)

Complete channel and system setup stored in memory – Provides 12 memory storage slots

Remote programmability – RS232, USB and Ethernet

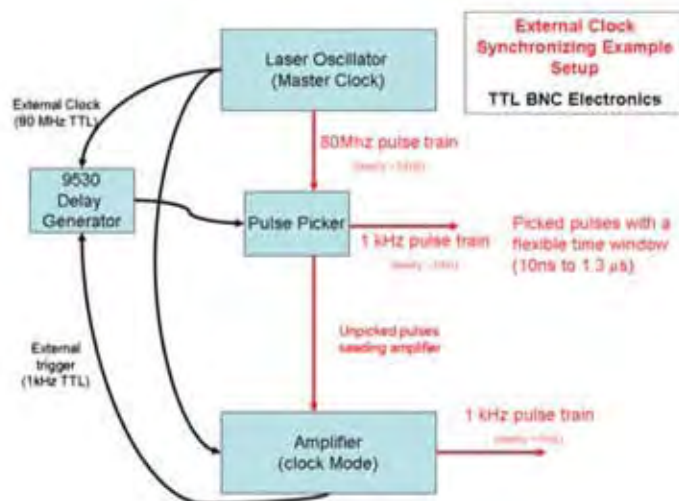
Dual inputs (gate and/or trigger)

## Advanced Features/Options

Clock input/output – allows master clock input from 10MHz to 100MHz 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 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 pulse

# System Specifications

## I/O CONFIGURATION

Models/Outputs	9534 - 4 independent output channels 9538 - 8 independent output channels
Inputs	2 inputs - 1 trig input / 1 gate input

## INTERNAL RATE GENERATOR

Rate	0.0002 Hz to 20.000 MHz
Resolution	5ns
Accuracy	Same as time base
Jitter	50ps RMS
Settling	1 period
Burst Mode	1 to 9,999,999 pulses
Timebase	100 MHz, low jitter PLL
Oscillator	50 MHz, 25ppm

Output Modes	Single Pulse, Burst, Duty Cycle, Continuous
Control Modes	Internal Rate Generator, External Trigger, External Gate

## PROGRAMMABLE TIMING GENERATOR

Output Modes	Single Shot, Burst, Duty Cycle, Continuous
Control Modes	Internally Triggered, Externally Triggered and External Gate <i>Each channel may be independently set to any of the modes</i>

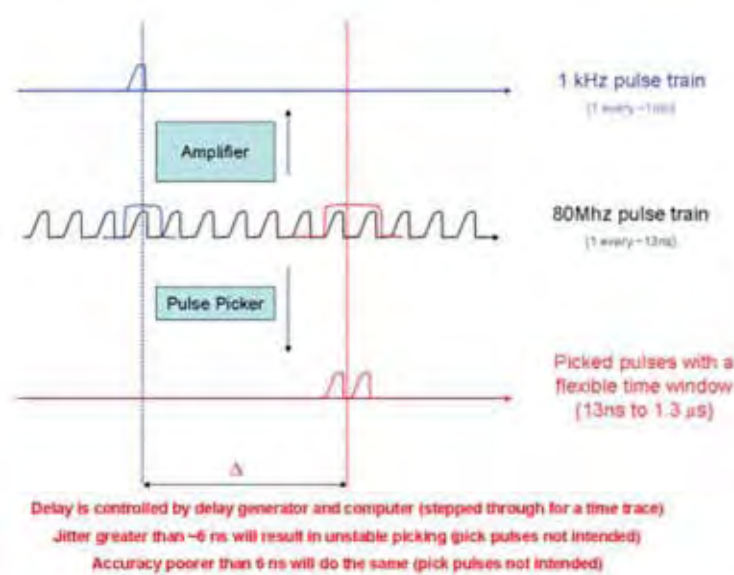
Output Multiplexer	Any/all channels may be multiplexed to any/all outputs
--------------------	--

Delayed Output	0 to 9,999,999 pulses
----------------	-----------------------

Timebase	Same as Internal Rate Generator
----------	---------------------------------

## Delays

Range	0 - 5000s
Accuracy	1ns + .0001 x Delay
Resolution	250ps
Pulse Inhibit Delay	150ns
Output Inhibit Delay	150ns



## Channel Modes Applications

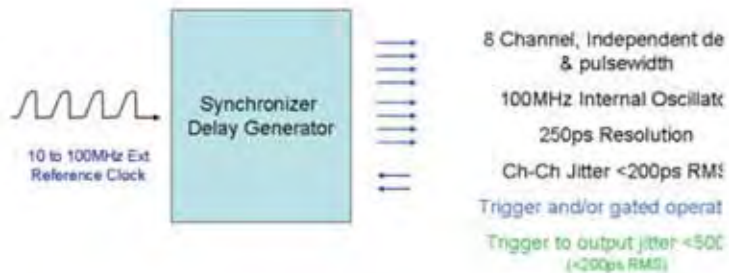
### Independent Channel Enable/Disable

Delayed Channel Enable – allows flashlamp/diodes to be fired, stabilizing the laser before the Qswitch or shutter is enabled.

Single shot or Burst mode laser pulse bursts, controlling either just to Qswitch 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 any combination of channels to be output on any of the output ports, providing very complex pulse trains.



External reference clock input of 50mV to 2.5V 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.

# MODULE SPECIFICATIONS

## TTL/ADJUSTABLE DUAL CHANNEL OUTPUT MODULE (STANDARD)

Output Impedance	50ohm
------------------	-------

### TTL/CMOS MODE

Output Level	4.0v typ into 1 kohm
Rise time	3ns typ
Slew rate	0.5 V/ns
Jitter	50ps RMS

### ADJUSTABLE MODE

Output Level	2.0 to 20 VDC into 1 kohm 1.0 to 10 VDC into 50 ohms
Output Resolution	10mV
Current	200mA typical, 400 mA max (short pulses)
Slew Rate	0.1V/ns
Overshoot	<100mV + 10% of pulse amplitude

## TRIGGER/GATE DUAL INPUT MODULE (STANDARD)

Standard dual channel input module, 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	60V Peak
Resolution	10mV
Input Impedance	1Mohm + 40pF or 50ohm
Insertion Delay	< 100 ns
Jitter	800ps RMS

## SYSTEM EXTERNAL TRIGGER / GATE INPUT(S)

### Trigger Input

Function	Generate individual pulses, start a burst or continuous stream.
Rate	DC to 1/(200ns + longest active pulse)
Slope	Rising or Falling
Behavior	Used to control the Internal Rate Generator

### Gate Input

Function	Pulse Inhibit or Output Inhibit
Polarity	Active High / Active Low
Behavior	Used to control the Internal Rate Generator or any of the



## STANDARD FEATURES/FUNCTIONS

Communications	USB/RS232
External Clock In	10 MHz - 100 MHz User selectable in discrete values
External Clock Out	10 MHz - 100 MHz User selectable in discrete values
Configuration Storage	12 Configurations. Automatically saves current configuration on front panel power down.

## OUTPUT MODULES

### Standard

AT20	Dual channel, TTL/CMOS & Adjustable output module
------	---

### Optional

AT35	Dual channel, TTL/35V high voltage output module
TZ50	Dual channel, high current TTL/CMOS (for driving 50 ohm loads) & adjustable output module
TZ35	Dual channel, high current TTL/CMOS (for driving 50 ohm loads) & 35V high voltage output module

## INPUT MODULES

### Standard

IA15	Dual channel, 1 trigger / 1 gate input 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
COM	Extended Communications – Adds Ethernet & GPIB

\* Other custom modules (led drivers, higher voltages, current sources) available, call with your request.