9520 Series
Digital Delay Pulse Generators

The model 9520 series heightens the capabilities of pulse generation and digital delay to new levels. Cost effective, yet extremely capable, this instrument provides solutions to generate and synchronize multiple pulses and triggers for a wide variety of applications from simple to complex. The 9520 series has the unique cabapility of offering differing rates for all the channels using new clock-divider functions, and provides up to eight independent digitally controlled channels with width, delay, rate, and amplitude control on each output.

Key Features
- 250 ps Timing Resolution
- < 50 ps Channel to Channel Jitter
- 2, 4, or 8 Fully Independent Channel Outputs
- Benchtop Design
- Wide Variety of Channel Output Options
- Free LabVIEW Drivers
- 2 Year Warranty

9520 Series Details

Basic Functions

The 9520 Series Pulse Generator offers dual inputs, functioning as dual triggers or trigger/gating through BNC or optical connections.. The user also has per channel modes options and can keep specific channels free-running and other channels triggered.

Modular output boards provide a variety of output options allowing the user to customize their own instrument from stock. The output modules selection array includes both TTL/CMOS with adjustable amplitude, 35 V high voltage electrical, and optical at either 820 nm or 1300 nm. For those working with optical triggering, optical inputs are available.

The 9520 Series is equipped with standard USB and RS-232 unit and a GPIB and Ethernet module as an option. Our standard programming protocols are backwards compatible and complimentary NI certified LabVIEW™ drivers are available.

Advanced features include an Increment option which provides incrementing delay times and pulse widths after each trigger or internal burst count. Illuminated channel buttons denote if the channel is enabled not a pulse condition. Clock-In functionality gives the user the ability to synchronize using a master clock from 10 MHz to 100 MHz.

New Unique Features

Field programmability – The instrument can now have functions upgraded in the field, such as special or custom feature upgrades and software fixes via a fully programmable FPGA.

User selectable clock reference – The instrument provides additional in/outputs for external clock synchronizing functions. The user can specify their input and output reference frequency from the front panel in discrete values from 10 MHz to 100 MHz. This also allows multiple pulse generators to be phase-locked together running under a common clock.

Individual channel rates – Each channel can have individual channel rates (either To or Tx... where Tx is the alternate channel rate for that specific channel... e.g. T1 for Channel 1). This is similar to having a separate clock for each output.

Settings saved on power down – Users no longer have to save their current settings to a bin before powering down to retain the current settings. The unit will power back up with the last known settings when powered down from the front panel.

Dual Inputs – The 9520 series Pulse Generator now offers dual trigger BNC or optical inputs. The user can specify trigger/trigger, or gate/trigger.

Modular Output and Input Channels
(Outputs come in sets of 2 , 4 or 8)

- **High Voltage Outputs (35 V or 45 V)**
- **Optical Outputs (820 nm or 1300 nm)**
- **Optical Inputs (820 nm or 1300 nm)**
- **High Impedance Outputs- 50 Ohm Impedance Matched (4 v)**
- **High Impedance & High Voltage Outputs (35 v)**

Example Setup- 9528 (8 Channels)

2 AT45 High Voltage Outputs

2 TZ50 High Impedance Outputs

2 Standard Electrical Outputs

2 Standard Electrical Outputs

2 Standard Inputs

Mix Your Output Types

Modular output channels come in sets of two and can be combined with standard or other output channels on the same unit.

SPECIFICATIONS*   9520 Series

MODELS 9522- 1 Module, 2 independent outputs
           9524 - 2 Modules, 4 independent outputs
           9528 - 4 Modules, 8 independent outputs

Input Modules- 2 inputs (1 trigger input/ 1 gate input)
Configuration Storage Slots- 12 Memory Slots
(Automatically saves current configuration on front panel power down.)

See Manual for Full Specifications AND Limitations

CHANNEL OUTPUT CHOICES (comes in sets of 2 channels/module)

AT20 (standard)	TTL/ 2-20 V output
AT35 (optional)	TTL/35 V high voltage output module
AT45 (optional)	4-45 V high voltage, long PW, output module (Limited to 4 channels)
L82 (optional)	820 nm optical output module
L130 (optional)	1300 nm optical output module
TZ50 (optional)	high current TTL/CMOS (for driving 50 ohm loads) & adjustable output module
TZ35 (optional)	dual channel, high current TTL/CMOS (for driving 50 ohm loads) & 35 V high voltage
	output module

INPUT MODULES

IA15 (standard)	dual channel, 1 trigger / 1 gate input module optional
IL82 (optional)	dual channel, 820 nm optical input module
IL130 (optional)	dual channel, 1300 nm optical input module

INTERNAL RATE GENERATOR

rate	0.0002 Hz to 20.000 MHz
resolution	10 ns
accuracy	1 ns + .0001 x period
jitter	<50 ps channel to channel
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	timing of any/all channels may be multiplexed to any/all outputs
wait function	0 to 9,999,999 pulses
timebase	same as internal rate generator
delays	
range	0 - 1000 s
accuracy	1 ns + .0001 x setpoint
resolution	250 ps
pulse inhibit delay	< 120 ns typical
output inhibit delay	< 50 ns typical

MODULE SPECIFICATIONS

TTL /ADJUSTABLE DUAL CHANNEL OUTPUT MODULE (standard)

output impedance	50 ohm

TTL /CMOS MODE

output level	4.0 V typ into 1 kohm
rise time	3 ns typ
slew rate	>0.5 V/ns (10% - 90%)
jitter	50 ps RMS channel to channel

MODULE SPECIFICATIONS (CONTINUED)

ADJUSTABLE MODE

output level	2.0 to 20 VDC into 1 kohm
	1.0 to 10 VDC into 50 ohms
rise time	15ns typ @ 20V (high impedance)
	25ns typ @ 10V (50 ohm)
	(10% - 90%)
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

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	60 V peak
impedance	1.5 K ohm + 40 pF

TRIGGER INPUT

slope	rising or falling
insertion delay	< 160 ns
jitter	< 800 ps
minimum pulse width	2 ns

GATE INPUT

polarity	active high/active low
function	pulse inhibit or output inhibit
channel behavior	global w/ individual channel
pulse inhibit delay	< 120 ns
output inhibit delay	< 50 ns

OPTICAL OUTPUT MODULE (opt. L82 / opt. L130)
Dual channel fiber optic output module for use as a fiber optic test signal or a trigger source in high noise environments.

wavelength	820 nm or 1300 nm
max signal rate	5 MBd
max link distance	1.5 km
connector type	ST

OPTICAL INPUT MODULE (opt. IL 82 / opt. 130)
Dual channel fiber optic input module for fiber optic test signals or trigger inputs for high noise environments.

wavelength	820 nm or 1300 nm
max signal rate	5 MBd
max link distance	1.5 km
connector type	ST
insertion delay	< 300 ns
RMS jitter	< 1.4 ns RMS

STANDARD FEATURES/FUNCTIONS

communications	USB/RS232
modular design	Units may be specified with any combination of output modules and with a variety of Input modules. Custom modules also available.
external clock in	10 MHz - 100 MHz user selectable in discrete values
external clock out	10 MHz - 100 MHz user selectable in discrete values
	To or Ref out (10 MHz – 100 Mhz) user selectable in discrete values

OPTIONS

I - Pulse 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

SRM - 19" Rackmount (Single)