9520 Pulse Generator

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 is the only multi-channel pulse generator to permit 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.

The 9520 Series Pulse Generator offers dual inputs, functioning as dual triggers or trigger/gating through BNC or optical connections. This is particularly important to stop continuous pulsing with a secondary trigger signal. The user also has per channel source 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, 35V high voltage electrical, and optical at either 820nm or 1310nm. 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. Another feature is Illuminated On - a backlight that illuminates on each channel during a pulse condition. Clock-In functionality gives the user the ability to synchronize using a master clock from 10 MHz to 100 MHz.

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9520 Key Features

- 250ps timing resolution with 50ps jitter
- Complete channel and system setup stored in memory - Provides 12 memory storage slots
- **Remote programmability** - The entire 9520 instrument series offers RS232 & USB standard with GPIB and Ethernet as an option. Complimentary LabVIEW ™ driver included.
- Modular design allowing several different outputs in one instrument from stock
- Dual inputs (gate/trigger, trigger/trigger)

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, rising or falling edge, with either positive or negative reference
- **Wait** - The system will wait for a specified number of cycles before producing pulse

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
- 800nm and 1300nm optical outputs available with ST connectors
- Optical inputs available with ST connectors
- **Illuminated On** - a backlight that illuminates on each channel during a pulse condition
- **Incrementing** - provides automatic high speed incrementing/decrementing of delay and/or pulsewidth for each channel.

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.

Illuminated channel enable buttons – each channel has a designated enable/disable button. When individual channels are active or enabled the buttons are illuminated. This allows for easy reference and avoids any confusion of outputs operability. The run/stop indicator on the front panel display as well as an illuminated run/stop button offer further clarity of programming at an easy glance.

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 10MHz to 100MHz. This also provides multiple pulse generators to be phase-locked together running under a common clock.

Individually selectable channel gating – The user now has per channel source options (any of the output or input channels, or a global gate input) as well as method selection (pulse inhibit, or output inhibit).

Individual channel rates – Each channel can have individual channel rates (either To or Tx... where Tx is the alternate channel rate for that specifi c 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

Dual Inputs – The 9520 series Pulse Generator now offers dual trigger or gating BNC or optical inputs. The user can specify trigger/trigger, gate/trigger, or gate/gate. This is particularly important to stop continuous pulsing with a secondary trigger signal.

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System Specifications

I/O Configuration

Output Modules	9522 - 1 module (2 independent output channels)
	9524 - 2 modules (4 independent output channels)
	9524 - 4 modules (8 independent output channels)
Input Modules	1 module (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 *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

Delays

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

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 individual channels

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

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Module Specifications Continued

Trigger/Gate Dual Input Module (standard) Cont.

Resolution	10mV
Input Impedance	1Mohm + 40pF or 50ohm
Insertion Delay	< 100 ns
Jitter	800ps RMS

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	820nm or 1300nm
Max Signal Rate	5 MBd
Max Link Distance	1.5km
Connector Type	ST

Optical Input Module (Opt. IL82 / Opt. 130)

Dual channel fiber optic input module for fiber optic test signals or trigger inputs for high noise environments.

Wavelength	820nm or 1300nm
Max Signal Rate	5 MBd
Max Link Distance	1.5km
Connector Type	ST
Insertion Delay	<300ns
RMS Jitter	<1.4ns

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 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
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

L82	Dual channel, 820nm optical output module
L130	Dual channel, 1300nm optical output module
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
DD25	Dual channel, 1.0 A LED constant current (PWM controlled) driver module

Input Modules

Standard

IA15	Dual channel, 1 trigger / 1 gate input module

Optional

IL82	Dual channel, 820nm optical input module
IL130	Dual channel, 1300nm optical 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
SRM	Single Rackmount
DRM	Dual rackmount

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

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