The Emerald
Digital Delay Pulse Generator

The Emerald 9250 series pulse generator was designed to meet the growing demand for an affordable yet high resolution system synchronizer. This precision delay generator comes standard with a 280 ppb TCXO oscillator and 5ps timing resolution for high performance in a compact packaging.

- 4 Independent Channel Outputs
- 5 ps Delay Resolution
- TCXO 280 ppb oscillator
- < 15 ps RMS Jitter
- "Virtual" Channel Timers
- Fast Rise Time, < 2 ns
- 8 Independent Pulses (width & delay) with the virtual timers
- Up to 20MHz External Trigger Rate
- Wireless Option Via Bluetooth
- Full Customer Support

**Quantum Composers, Inc.**
P.O. Box 4248
Bozeman, MT 59772

Phone (406) 582-0227
Fax (406) 582-0237
Toll Free +1.800.510.6530

www.quantumcomposers.com
sales@quantumcomposers.com

The Emerald Pulse Generator

The Emerald comes standard with 4 independent outputs and a TCXO 280ppb oscillator. The resolution and accuracy of the width, delays, and period counters is improved over previous instruments and allows for finer adjustments and more precise synchronization. This model also features virtual channels adding 4 "virtual" channels which effectively double the number of channel timers the unit may utilize and a "Period Counter" which measures the time between incoming external trigger pulses. The Emerald also offers an optional (TZ50), for driving 50 ohm loads & adjustable output module. With intuitive, streamlined GUI control of timing parameters and quick recall of up to 6 system configurations, the instrument is instantly ready for use. Complete control of the Emerald is provided through the standard USB interface or optional Bluetooth connectivity.

Digital Delay Output Modes
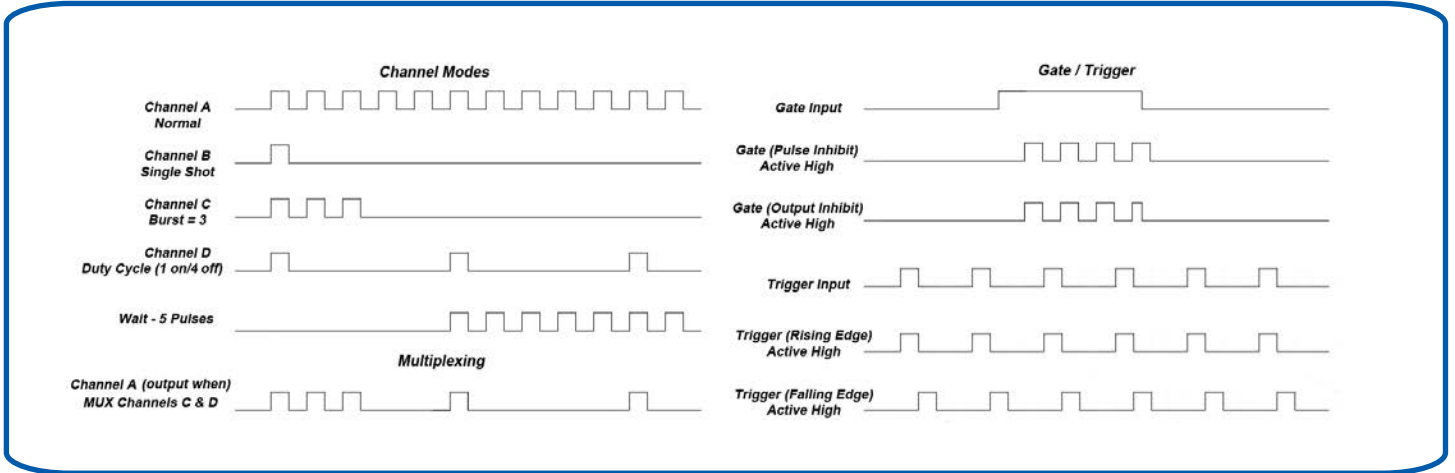
Special Features

Bluetooth Wireless Connectivity

The 9250 will feature a unique Bluetooth wireless option. This allows the pulse generator to communicate with Bluetooth enabled devices such as laptops, tablets, or smartphones. The included GUI software can be paired with the Bluetooth device to program or control the instrument wirelessly.

Simple Graphical User Interface

The Emerald uses an included custom software application as the primary means of communication. The software allows simplified control of the unit via USB or optional wireless, enabling the user to create complex pulse trains and save them for future recall. The software also allows users to manually input SCPI (Standard Commands for Programmable Instruments) based commands via the Command Terminal Section.
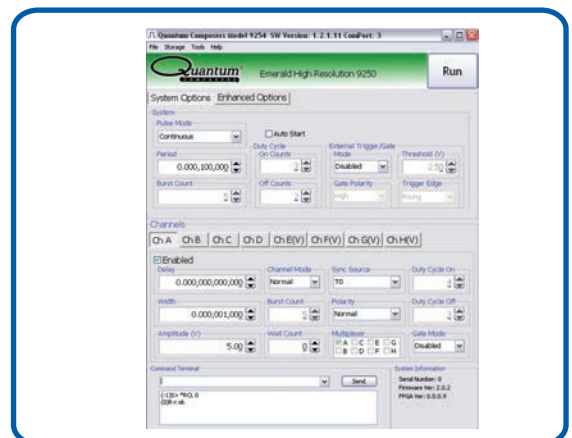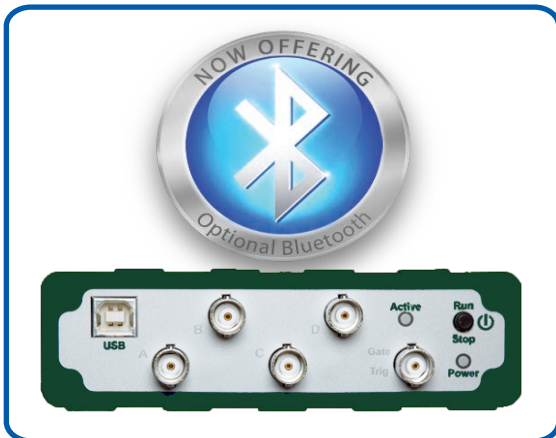
Toll Free Phone (800) 510-6530
Fax Phone Line (406) 582-0237
Email sales@quantumcomposers.com
Web www.quantumcomposers.com

SPECIFICATIONS   Emerald Series

MODEL 9254   4 independent channel outputs
                      (up to 8 independent pulses with virtual timers)

Standard Communications: USB Port
Configurations: 6 Memory Slots

INTERNAL RATE GENERATOR

Rate (To period)	0.00025 Hz to 25Mhz (40ns - 4000s)
Resolution & Accuracy	4 ns
Jitter	< 500 ps RMS
Burst / Duty Cycle Mode	1 to 1,000,000 pulses
Timebase	250 MHz, low jitter PLL
Oscillator	25 MHz, 280 ppb crystal oscillator
Pulse Control Modes	Internal rate generator, external trigger / gate.
System Output Modes	Single, continuous, burst, duty cycle.
Synchronized Update Mode	Updates width and delays on command.

PULSE / DELAY GENERATION

Width Resolution	4 ns
Width Range	8 ns - 4000 s
Width Accuracy	$10 \text{ ns} + 0.0001 \times (\text{width} + \text{delay})$
Jitter (Channel to Channel)	$15 \text{ ps RMS} + (1e\text{ -}8x \text{ delay})$
Delay Resolution	5 ps
Delay Range	±4000 s
Delay Accuracy	$1\text{ns} + (0.0001 \times \text{delay})$
Output Multiplexer	Any / all channels may be OR'd to any / all outputs.
Channel Output Modes	Single Shot, normal, burst, duty cycle
Channel Control Modes	Internally triggered or externally gated. Each channel may be independently set to any of the modes.
TZ50 (Optional)	$3.3 – 5.0$ VDC into $\geq 1K$ ohm , $2.8 – 4.4$ VDC into 50 ohm

EXTERNAL GATE / TRIGGER INPUT

Threshold	0.2 to 15 VDC
Max Input Voltage	30 V Peak
Gate Polarity	Active high / active low
Gate Control Modes	Pulse inhibit / output inhibit
Trigger Edge	Rising or falling
Trigger Rate	DC to 20 MHz
Trigger Input Jitter	< 6 ns RMS
Trigger Minimum Pulse Width	20 ns
Trigger Insertion Delay	< 75 ns
Pulse Inhibit Delay	< 150 ns
Output Inhibit Delay	< 100 ns
Trigger Input	Function System will generate a To pulse for every external trigger pulse.

OUTPUTS

Output Impedance	50 ohm
Output Level	$3.3 – 5$ VDC into ≥ 1 K ohm, $1.7 – 2.5$ VDC into 50 ohm
Resolution	20 mV
Current	5 mA into 1 K ohm, 50 mA into 50 ohm
Rise Time (10%-90%)	< 2ns @ 5 V (high impedance), < 1ns @ 2.5 V (50 ohm)
Overshoot	< 100 mV + 10 % of pulse amplitude

COMMUNICATIONS

Bluetooth (Optional)	Bluetooth 2.1
Antenna	Class II Radio, 4 dBm output transmitter, - 80 dBm typical receiver sensitivity
Range	Typically 20 meters in open air (line-of-sight)
Baud Rate	115200 bits / second

GENERAL

Dimensions/Weight	7.125 x 5.1 x 1.5 inches (18.1 x 13 x 3.8 cm), 1lb
Power & Std. Communications	Power is provided only by an external wall adapter power supply (included)
Voltage	+ 5 VDC ± 250 mVDC
Current	< 1.5A