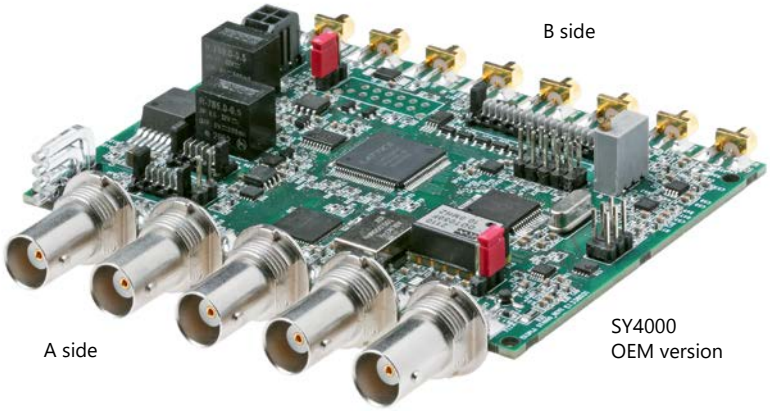
Digital Delay Generator

SY4000



The Ekspla's digital delay generator SY4000 is designed to create up to 8 delayed output pulse sequences precisely synchronized with the internal or external clock. Digital delay generators can provide precise delays for triggering, syncing, delaying, and gating events.

Our SY4000 digital delay generator is mainly employed for synchronization and control of different laser components: AOM drivers, Pockels cell drivers, laser diode drivers, flash lamp drivers, photodetectors, data acquisition systems, etc.

Ekspla can provide both encased and OEM versions of SY4000 digital delay generator. The encased digital delay generator version can be controlled via RS232, USB, LAN, WLAN and also contains a user-friendly configuration software as well as an internal power supply. These communication options as well as software are also available in SY4000 digital delay generator's OEM version and can be reached by adding additional Ekspla's OEM communication board upon customer's request. The encased digital delay generator is an optimal solution for laboratory use while SY4000 OEM version is ideal for integration and is frequently paired with an additional Ekspla's OEM communication board.

FEATURES

- *8 independent output channels*
- *Ultra-stable internal clock 0.2 ppm*
- *Precise delay/pulse width control in range 2 ns to 150 ms*
- *25 ps timing resolution*
- *Hi-accuracy synchronization (locking) to external pulse train*
- *Jitter < 30ps*
- *DAC/AWG output*
- *Both 50 Ω (6 outs) and differential (8 outs) outputs present*
- *Frequency divider / Burst (software and hardware triggered) / Gating / Single shot*
- *Communications:*
  – OEM version – CAN BUS
  – Encased version – LAN, WIFI (optional), RS232, USB (VCP) – via REST API or DLL's.

APPLICATIONS

- *Mode locked and Q-switched fs, ps & ns lasers*
- *Triggering of a data acquisition system*
- *General purpose pulse generator*
- *Precise system clock source*
- *Laser pulse train conversion into a clean clock source*
- *All functions above at once*

SY4000 desktop version

SPECIFICATIONS

Model	SY4000
OUTPUT SPECIFICATIONS (GENERAL)	
Channel modes	Single shot, burst, normal, duty cycle, frequency divider
Delay range	0 to 150 ms
Negative delay	-150 ms
Pulsewidth	2 ns to 150 ms
Resolution	25 ps
Accuracy	25 ps + 0.000001 × delay
Time base	100 MHz, 0.2 ppm
Jitter	< 30 ps
Burst mode	1 to 65535
Output level	2.5 V, 4 V
Impedance	50 Ω
Slew rate	1.5 V/ns
OUTPUT SPECIFICATIONS (INTERNAL GENERATOR)	
Mode	Duty cycle
Rate	50 ns to 100 sec
Resolution	10 ns or 300 ps
Accuracy	5 ns + 0.000001 × period
Jitter	100 ps RMS
Burst	0 ... 65535
INPUT SPECIFICATION (EXTERNAL TRIGGER)	
Rate	DC to 20 MHz
Threshold	1.3 V
Input level	LVTTL, TTL
Slope	rising
Jitter	< 100 ps RMS
Delay	< 13 ns; < 70 ns
COMMUNICATION OPTIONS	
Control interfaces (OEM board)	CAN by default. RS232, USB, LAN, WLAN with additional communication board, provided upon request
Control interfaces (encased version)	CAN, RS232, USB, LAN, WLAN
POWER REQUIREMENTS	
Power supply requirements (OEM board)	12 V DC, 500 mA
Power supply requirements (encased version)	90...264 V, 50–60 Hz
DIMENSIONS (NOT INCLUDING CONNECTOR)	
OEM board (L × W × H)	100 × 77 × 20 mm
Encased version (L × W × H)	105 × 86 × 85 mm
ACCESORIES	
CAN-USB adapter	Ekspla's CAN-USB adapter is required at evaluation stage for SY4000 OEM version board if communication via CAN interface is needed. Cable between adapter and board and beetween adapter and PC are included by default
Communication board	Ekspla's communication board which allows to control SY4000 OEM board via RS232, USB, LAN, WLAN interfaces. Can be provided upon request
Input power cables	Included by default

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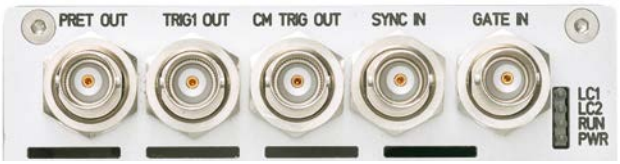
HIGHLIGHT FUNCTIONS OF EKSPLA'S SY4000 DIGITAL DELAY GENERATOR

- **Locking to an external clock source** (typically photo-diode pulse train). Triggering system is locked to the laser oscillator and trigger time is always in phase with the optical pulse.
- **Trigger rate control and limiter circuit.** It helps to protect laser components from damage due to exceedingly high/low triggering rates.
- **Single ended and differential outputs.**
- **Instant switch between two configurations in delay blocks.** Burst counter, gate input, frequency divider or software commands may serve as the configuration switching signal sources. Configuration switch is used to control optical pulse pickers (EO or AOM) in a highly flexible manner.
- **Low jitter sync pulse output** used for high-speed acquisition systems like streak camera triggering. Typical jitter is 3...5 ps with the respect to the optical pulse.
- **Control connector.** Software-controllable multiplexer may divert any of the output signals to this connector to monitor what is on other connectors without disturbing them.
- **Clock output: 1:1, 1:2 frequency.**
- **Up to 4 pulse outputs can be combined** to single signals by OR, AND, NOT logical operations.
- **DAC output,** controlling, e.g. AOM pass though.

INPUT/OUTPUT SIGNAL DESCRIPTION



COAXIAL CONNECTORS, A-SIDE, BNC TYPE

Name	Description	Amplitude	Pulse parameters	Shape
PRET OUT	Precise trigger, locked to the optical clock. Delay is adjustable in optical clock period time units. Jitter in respect to the optical pulse is ~4 ps RMS, almost independent on delay	>1 V on 50 Ω, AC output, capacitor @ output	Rise time ~200 ps, width adjustable >100 ns	Positive pulse
TRIG1 OUT	General purpose or control sync out	2.5 V @ 50 Ω	Select-able multiplexer to OUT0...OUT8 blocks, Optical clock, Optical clock/2	Logic level or pulse with programmable timing
CM TRIG OUT	Common trigger, general purpose output	2.5 V @ 50 Ω	OUT0 block, programmable pulse parameters	Logic level or pulse with programmable timing
SYNC IN	External synchronization input. Trigger or Configuration switch source	LVTTL 0.1 mA pull down to low level	Frequency ≤ 100 MHz, PW ≥ 10 ns	Positive pulse
GATE IN	Burst trigger or configuration switch control functions	LVTTL, 0.1 mA pull down to low level	Level or pulse with PW > 20 ns	Level or pulse

A-SIDE BNC CONNECTORS

Name	Direction	Logic levels	Impedance	Function
PRET OUT	Output	>1.5 V @ 50 Ω	50 Ω	Precision trigger, configurable source
TRIG1 OUT	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	General trigger, configurable source
CM TRIG OUT	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	Master trigger, OUT0 signal
SYNC IN	Input	LVTTL, tolerates 5 V	0.2 mA pull down	Trigger input
GATE IN	Input	LVTTL, tolerates 5 V	0.2 mA pull down	Configuration switch and burst control input

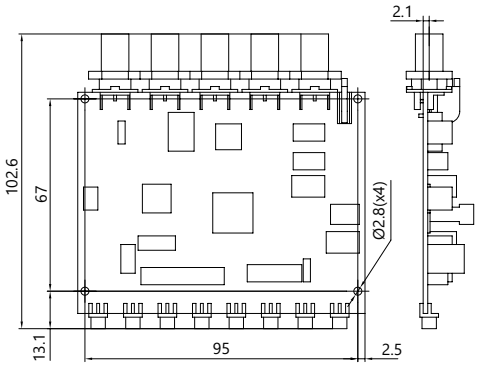
COAXIAL CONNECTORS, B-SIDE, MCX TYPE

Name	Description	Amplitude	Pulse parameters	Shape
AN OUT	DAC output	0...1 V	N/A	Two programmable analog levels
CM TRIG OUT	Common trigger, general purpose output	2.5 V @ 50 Ω	OUT0 block	Logic level or pulse with programmable timing
CM TRIG OUT1	Common trigger, general purpose output	2.5 V @ 50 Ω	OUT0 block	Logic level or pulse with programmable timing
OUT2	General purpose output	2.5 V @ 50 Ω	OUT2 block, AND+OR+NOT logic with OUT1	Logic level or pulse with programmable timing
OUT3	General purpose output	2.5 V @ 50 Ω	OUT3 block, AND+OR+NOT logic with OUT2	Logic level or pulse with programmable timing
OUT4	General purpose output	2.5 V @ 50 Ω	OUT4 block, AND+OR+NOT logic with OUT3	Logic level or pulse with programmable timing
OUT5	General purpose output	2.5 V @ 50 Ω	OUT5 block, AND+OR+NOT logic with OUT4	Logic level or pulse with programmable timing
CLC IN	External clock input	>100 mV	PW >300ps, input frequency 10...100 MHz	Sine, Meander to pulse train from photodiode

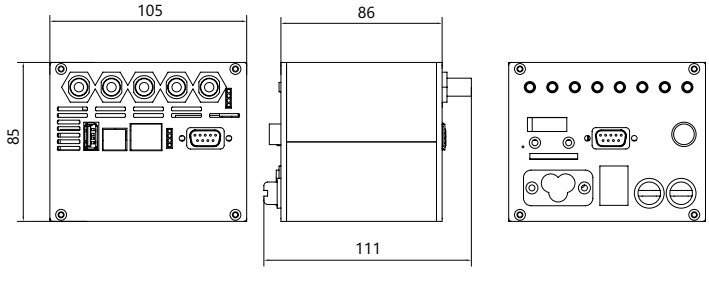
B-SIDE MCX CONNECTORS

Name	Direction	Logic levels	Impedance	Function
AN OUT	Output	1 V @ 50 Ω max	50 Ω	DAC analog output signal
CM TRIG OUT	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	Master trigger, OUT0 signal
CM TRIG OUT1	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	Master trigger, OUT0 signal
OUT2	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	General purpose trigger, OUT2 signal
OUT3	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	General purpose trigger, OUT3 signal
OUT4	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	General purpose trigger, OUT4 signal
OUT5	Output	2.5 V @ 50 Ω, 4.5 V @ 50 Ω jumper configurable	50 Ω	General purpose trigger, OUT5 signal
CLC IN	Input	0.5 V...3.3 V pk-pk, sine or pulses	50 Ω	Clock input

DRAWINGS



Outline drawings of SY4000 OEM version



Outline drawings of SY4000 desktop version

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