GFT1018

8 Channel Slave Generator

Features

- Eight Independent Delay Channels
  - 1 ps Time Resolution
  - < 100 ps rms Jitter for Optical Triggered Delays
  - 1 Second Range
- Electrical or Optical (optional) Pulse Output
- Three Trigger Modes
  - Internal, External, or Timing System
- Independent Control of Delay
- Controlled via Ethernet, Web Page and Front Panel
- Compact Packaging 1U, 19”

Applications

- Picosecond Timing System
- Components Test
- ATE Application
- System Laser Timing Control
- Control Flash Lamps and Q-Switches
- Precision Pulse Application
- Gate High Speed Cameras
- Instrument Triggering

Description

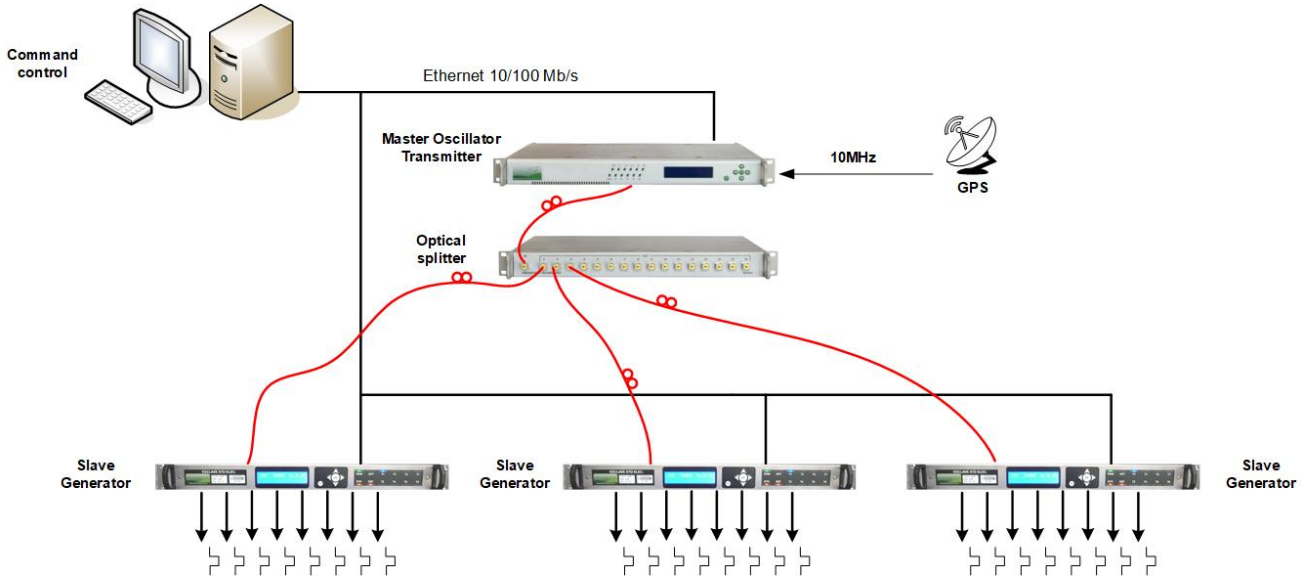
The GFT1018 Slave Delay Generator is specially designed to provide precise pulses in timing system applications where a Master delivers an optical data stream to synchronize Slave Delay Generators (see below).

The GFT1018 provides eight electrical or optical independently delayed pulses on the rear panel. Delays up to 1 second can be programmed with 1 ps resolution, and channel-to-channel jitter less than 100 ps rms.

BNC outputs deliver pulses up to 10 V with 1 ns rise time at 50 Ω. As option SC/PC outputs deliver optical pulses up to 1 mW (0.3 mW typ.)

One input channel, or one synchronized timer, or software commands may be used to trigger all output channels. One T0 channel is used as a time reference for all delayed output pulses.

GFT1018 parameters can be locally controlled from the front panel keys and LCD display, and remotely controlled via Ethernet (10/100 Mb/s) or Internet (Web page from Internal Web server).



Timing System Application with 24 Delay Channels

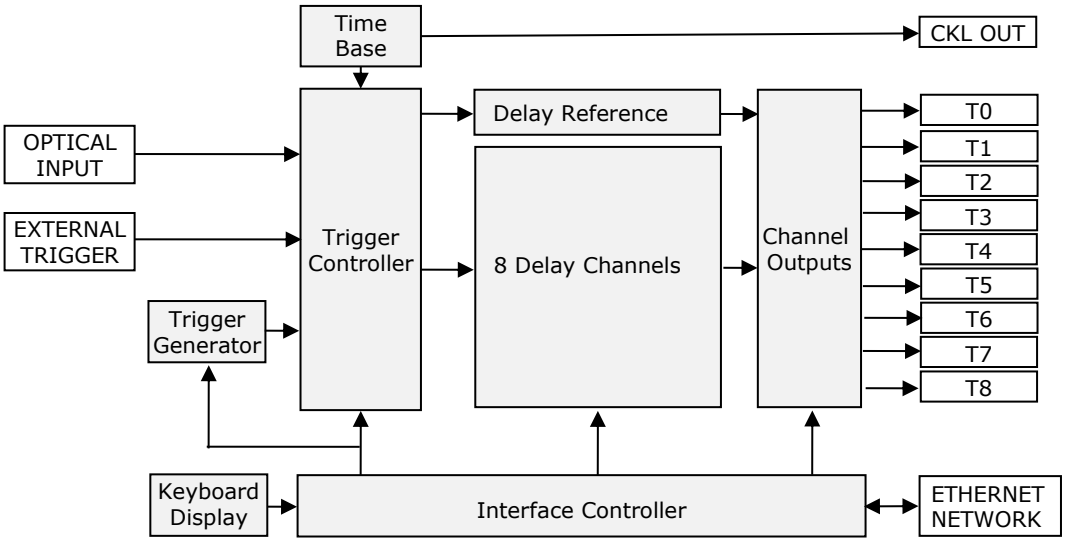
Specifications

Delays Channels	
Number	8 independents
Range	0 to 1 s
Resolution	1 ps
RMS Jitter	
Timing system mode	< 100 ps (T0 GFT1018 to another T0 GFT1018)
External Trigger	< 1.5 ns (External trigger to T0 Output)
Drift	< 200 ps pp @ 24 hours < 500 ps pp @ 7 days < 1000 ps pp up to 7 days
Accuracy	< ± 1 ns pp for a delay between 0 to 1 s
External Trigger Input	
Repetition Rate	Up to 100 kHz
Trigger Level	+5 V /50 Ω
Slope	Positive
Connector	BNC
Internal Trigger	
One Synchronized Generator	Frequency= 1 Hz to 100 kHz in steps of 1 Hz
Optical Input Trigger	
Function	Input for Timing System operation
Sensitivity	Between -10 to -25 dBm
Wavelength	1550 nm ± 10 nm
Connector	SC/APC
Output Pulse T1 to T8	
Amplitude	10 V
Load	50 Ω ± 2%
Rise / Fall time	< 1 ns / 3 ns
Width	Programmable, 100 ns to 1 ms +/- 50 ns, 6.25 ns steps
Form	Square
Connector	BNC
Output T0	
Amplitude	10 V under 50 Ω
Rise / Fall time	< 1 ns / 3 ns
Width	1 µs +/- 100 ns
Clock Output	
Frequency	10 MHz
Load	50 Ω ± 2%
Level	> ± 1 V pp / AC
Form	Square
Connector	BNC
General	
Software	Free Drivers for Windows 11
User Interface	Front panel, Ethernet 10/100 Mb/s, Internet (Web page)
Power Consumption	90 to 240 V / 50 – 60 Hz / 1 A
Temperature	20 to 25°C
Weight / Size	< 8 kg / 19”, 1U, 305 mm
Option	
1: Optical Output Pulse (T1 to T8)	
Amplitude	1 mW (0.3 mW typ)
Rise / Fall time	<1 ns / 3 ns
Form	Square
Width	1 µs +/- 100 ns
Connector	SC/PC
2: 4x Optical Output Pulse & 4 Electrical Output Pulse	

Functional Overview

Block Diagram

The GFT1018 includes the five following functions: Time Base, Trigger Controller, Delay Channel, Channel Outputs and Interface Controller.



Block Diagram

Time Base: This function provides a 160 MHz time base from an internal clock (10 MHz) or from an optical timing system. The time base (10 MHz) is available on the rear panel (CLCK OUT).

Trigger Controller: This function provides different trigger modes to each delay channel.

- External trigger
- Internal trigger from programmable generator between 1 Hz to 100 kHz
- Timing System mode from Optical input

Delay Channel: There are eight delay channels (T1 to T8). The delay of each channel is programmable up to 1 second in 1 ps increments.
The T0 output pulse is used as a time reference for all delayed output pulses.

Channel Output: Each delay channel provides an output pulse. The outputs are designed to drive 10 V, 1 ns under 50Ω loads, (or 1 mW for the Optical Output option).

Interface Controller: It manages internal functions (Time Base, Delay, Outputs Channels, Front Panel operation, Ethernet network and Web pages via embedded web server).

Trigger Modes: Trigger sources may be chosen from TRIG IN input, internal trigger, or optical trigger. The sequence follows 3 phases:

- After an insertion delay, a reference pulse appears at the “T0” output,
- Following the reference, a pulse will appear on each channel after a specified delay,
- At the end of sequence, after the final delayed output pulse, the delay generators are re-armed.

When a sequence is in progress the instrument will not respond to any trigger events.

After power on, all trigger sources are off (INH).

- External Trigger Mode

When the external trigger source is selected, a rising edge on a “DEC” input starts a delay sequence.

- Internal Trigger Mode

In this mode a delay sequence can be started from a programmable internal generator.

Internal trigger is synchronized with the Timing System trigger.

- Timing System Mode

In this mode the GFT1018 receives an optical data stream from a GFT3022 Master Unit.

GFT3022 provides triggers and time base over an optical network to synchronize Slave generators.

GFT3022 provides single-shot and repetitive triggers:

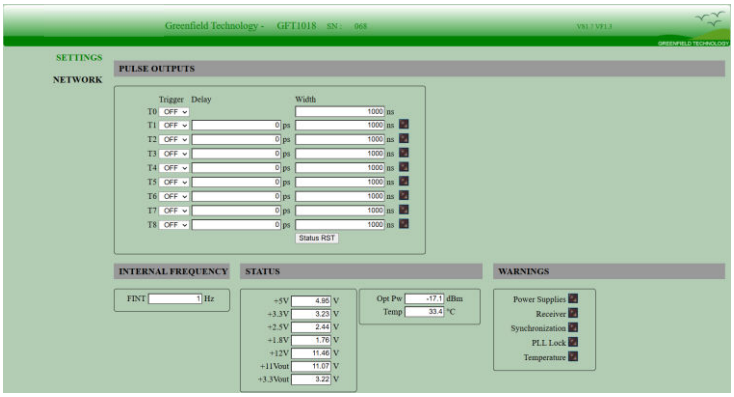
- **Repetitive Triggers** F1, F2, F3 are synchronous with the clock and synchronous between each other. Their frequency of repetition is programmable according to 1 kHz to 1 Hz.
- **Single-Shot Triggers** are started by an external signal or a command. The three triggers SS0, SS1 and SS2 are synchronous with repetitive trigger F3.
  SS0 is used to activate low frequency equipment very early in the event like, for example, high voltage power supplies.
  SS1 and SS2 are used to activate fast equipment near or during the event like digitizers, streak cameras, and calorimeters for diagnostics.

Software Tools

There are three ways to control the generator

- Locally via the front panel (Display, Keyboard, and Indicators)

- Remotely via Internet (Web page from Internal Web server)



GFT1018 Main Web Page

Control panel Web page:

This web page, from an embedded Web server, provides a simple method to configure settings for each channel (delay, output amplitude, output width, trigger source, trigger mode), to control operation, and to display status of the instrument.
The configuration information of the instrument is stored and saved in the GFT1018.
The web page can be opened via Edge, Mozilla Firefox or Chrome.
After connecting a cable from the GFT1018's Ethernet port to your computer network, enter the GFT1018's IP address into your PC's browser (the IP address can be identified or assigned via the front panel). The browser will automatically open the control panel web page on your PC.

- Remotely via LabVIEW software application or PC software application

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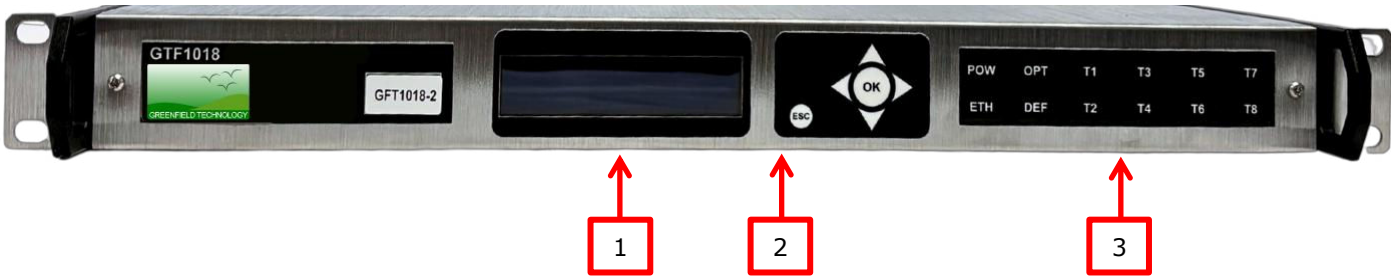
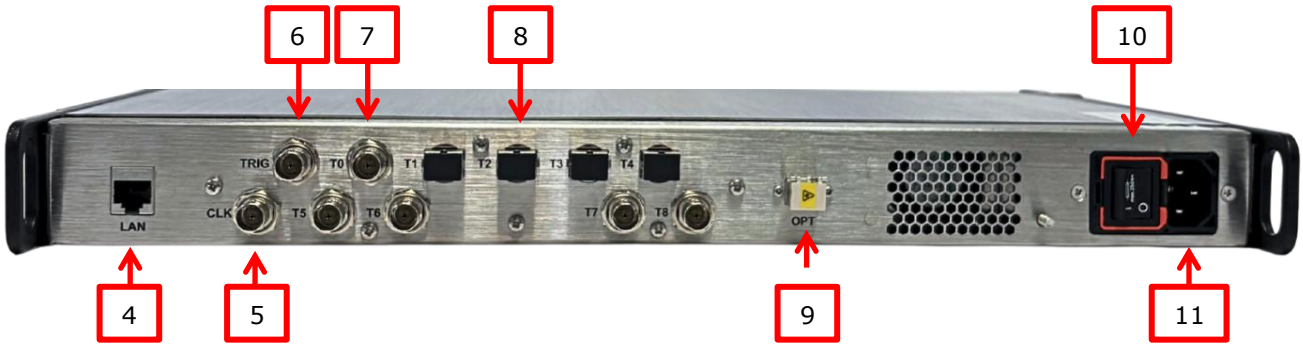
Product Interface

Front panel



Rear panel



Interface

Front Panel			Rear Panel		
1	Display for local control ◄		**Connectors**		
2	Small keyboard for local control		4	RESEAU	LAN connection: RJ45 connector
Indicators			5	CLK	Clock output: BNC connector
	OPT	Synchronized by optical network	6	TRIG	Trigger Input: BNC connector
3	T1	Blinks at the trigger frequency of channel 1	7	T0	T0 output: BNC connector
	T2	Blinks at the trigger frequency of channel 2	8	T1 to T8	T1 to T8 outputs: BNC connector or (option) SC/PC connector
	T3	Blinks at the trigger frequency of channel 3	9	OPT	Optical input: SC/APC connector
	T4	Blinks at the trigger frequency of channel 4	10	I/O	Power ON/OFF switch
	T5	Blinks at the trigger frequency of channel 5	11	PLUG	AC power plug (90-240 V)
	T6	Blinks at the trigger frequency of channel 6			
	T7	Blinks at the trigger frequency of channel 7			
	T8	Blinks at the trigger frequency of channel 8			
	PWR	Power supply ON			
	ETH	RJ45 connected			

Ordering information

Model	Description
GFT1018	Slave generator base version
-∅	8x Electrical outputs
-1	8x Optical outputs
-2	4x Optical outputs and 4x Electrical outputs

Ordering example: GFT1018-1: Slave generator with Optical Outputs