

Features

- Synchronize up to 1024 Delay Generators with less than 15 ps jitter (with an amplifier)
- Optical fiber interconnection enables up to 1 km distance between equipment's
- Controlled via Ethernet, Web Page and Front Panel
- 19", 2U chassis

Applications

- Laser Timing System
- Synchronous Multi-channel
- Synchrotron Timing System



Description

GFT3022 provides master triggers and time base while generating an optical serial data stream over an optical network to synchronize many local delay generators.

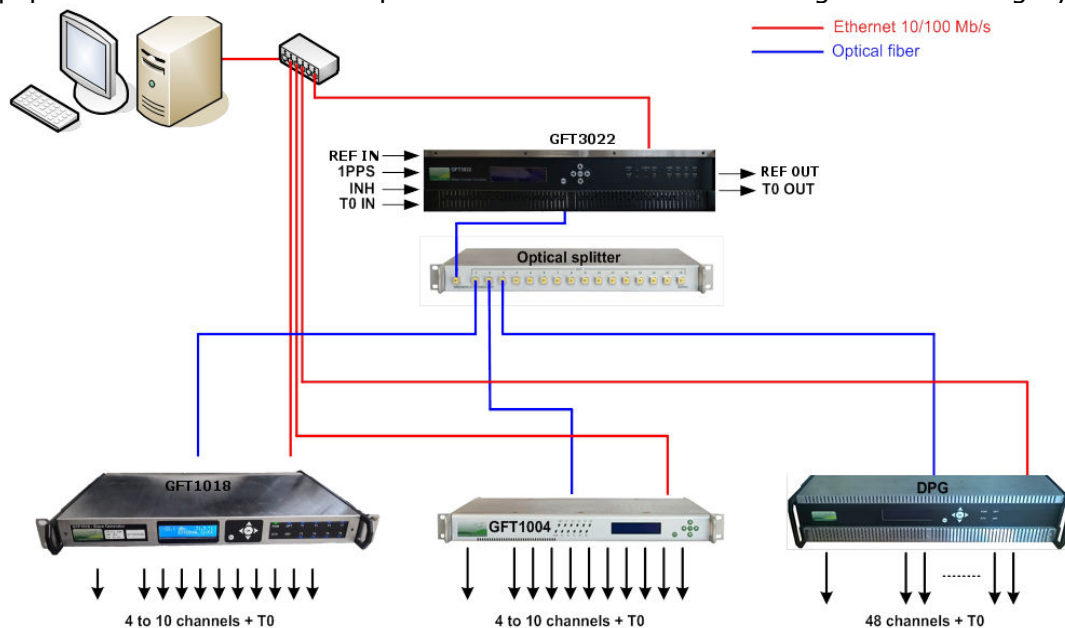
The clock reference of the GFT3022 can be external or internal. In some applications the GFT3022 can also generate a clock to synchronize other devices (Laser Oscillator, etc ...).

The GFT3022 can respond to an external hardware single-shot trigger or generate an internal single-shot trigger.

To prevent erroneous outputs, the user can stop the single-shot with a hardware level preset. An additional security measure is enabled if the external clock reference is lost, returning the GFT3022 to a preset frequency.

All parameters may be locally controlled over front panel, and remotely controlled over Ethernet and Internet (internal web server) interface.

The main application of the GFT3022 is in picosecond timing systems to provide several hundred trigger pulses to equipment distributed over important areas encountered in large Laser Timing Systems.



Picosecond Timing System Application with 3 Local Delay Generators

General Specifications

Timing System	
Distance between equipment	>1 km (GFT3022 to local delay generator)
# of local delay generators	Up to 1024 (with amplifier)
Internal Time base	
Frequency	160 MHz
Accuracy / stability	10^{-8} / ± 5 ppb
Optical data stream Output (TS OUT)	
Repetition rate	160 Mb/s (up to 200 Mb/s as an option)
Optical Power / Wavelength	> 0 dBm / 1550 nm $\pm$ 10 nm
Rise and fall time	< 1 ns
Connector	SC/APC with shutter
T0 output (T0 OUT)	
Source	Single or Repetitive trigger
Amplitude	2.5, to 10 V under 50 Ω , 10 mV step
Rise / Fall time	< 2 ns, < 5 ns
RMS jitter	15 ps to local delay generator (T0 output)
Width	100 ns to 10 ms (6.25 ns resolution)
Clock output (REF OUT)	
Shape	Square
Frequency	10 MHz $\pm$ 0.1 ppm
Amplitude	5 V $\pm$ 10 %, 50 Ω
Rise & Fall time	< 3 ns
Trigger input (TRIG IN)	
Threshold	+1.5 V, Internal 50 Ω load
Inhibition Input (INH)	
Threshold	Active high, Threshold = +1.5 V, Internal 50 Ω load
Input to inhibition of trigger	< 100 ns
Minimum pulse width	> 6.25 ns
Clock Input (REF IN)	
Shape	Sinewave or Square
Threshold	0 V, Internal 50 Ω load
Level	-3 dBm min.
Frequency	10 MHz
Internal to external timebase	Automatic
General specifications	
User Interface	Local PAV, Ethernet / Internet (Web page)
Size	Rack 19", 2U, 355 mm
Power	90 to 250 VAC / 1 AT
Option	
Option 1	Repetition rate between 140 to 200 Mb/s ((ask when ordering)
Option 2	Specific Clock Input frequency 10 MHz to 100 MHz (ask when ordering)
Option 3	Custom timing system (ask when ordering)

Functional overview

Block Diagram

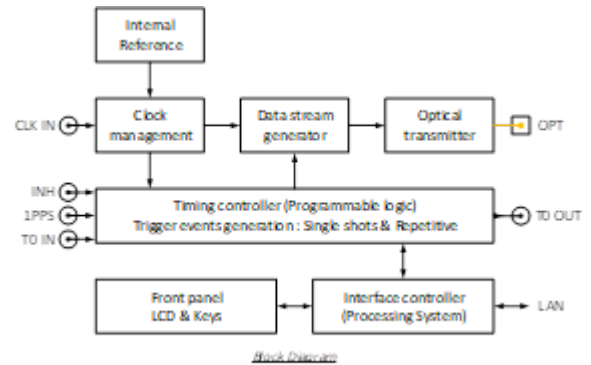
The GFT3022 includes the following functions: Clock Management, Timing Control, Data Stream Generator, Optical transmitter and an Interface Controller.

Clock Management

Provides a 160 MHz time base from an internal clock or an external 10 MHz clock.

Timing Control

This function provides a repetitive trigger and single-shot triggers.



Every channel of local Delay Generator can be triggered by one of these triggers.

Repetitive triggers (F1, F2, and F3) are made with three synchronous counters. The frequency of each repetitive trigger is programmable by the user according to the following values:

- $F0 = 1 \text{ kHz}$ (fixed frequency)
- $F1 = F0 / M$
- $F2 = F0 / N$
- $F3 = F0 / O$

M, N, O are adjustable from 1 to 60,000 with $F1 > F2 > F3$

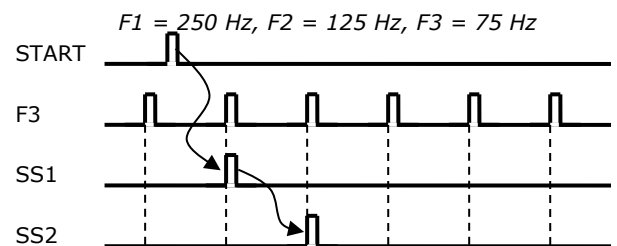


Example of Repetitive Triggers:

Single-shot triggers (SS1 & SS2) This pair triggers is synchronized with the F3 repetitive trigger and started by a user command, or by external signal on the Trigger input.

In a single-shot experiment application:

- SS1 is used to activate low frequency equipment very early in the triggered event like a high voltage power supply, for example.
- SS2 is used to activate fast equipment near or during the triggered event like a digitizer for diagnostics.



Single Shot Trigger

Data Stream Generator

This function organizes the timing control events (Repetitive Trigger, Single Shots, Inhibition) in a serial data stream.

Transmitter

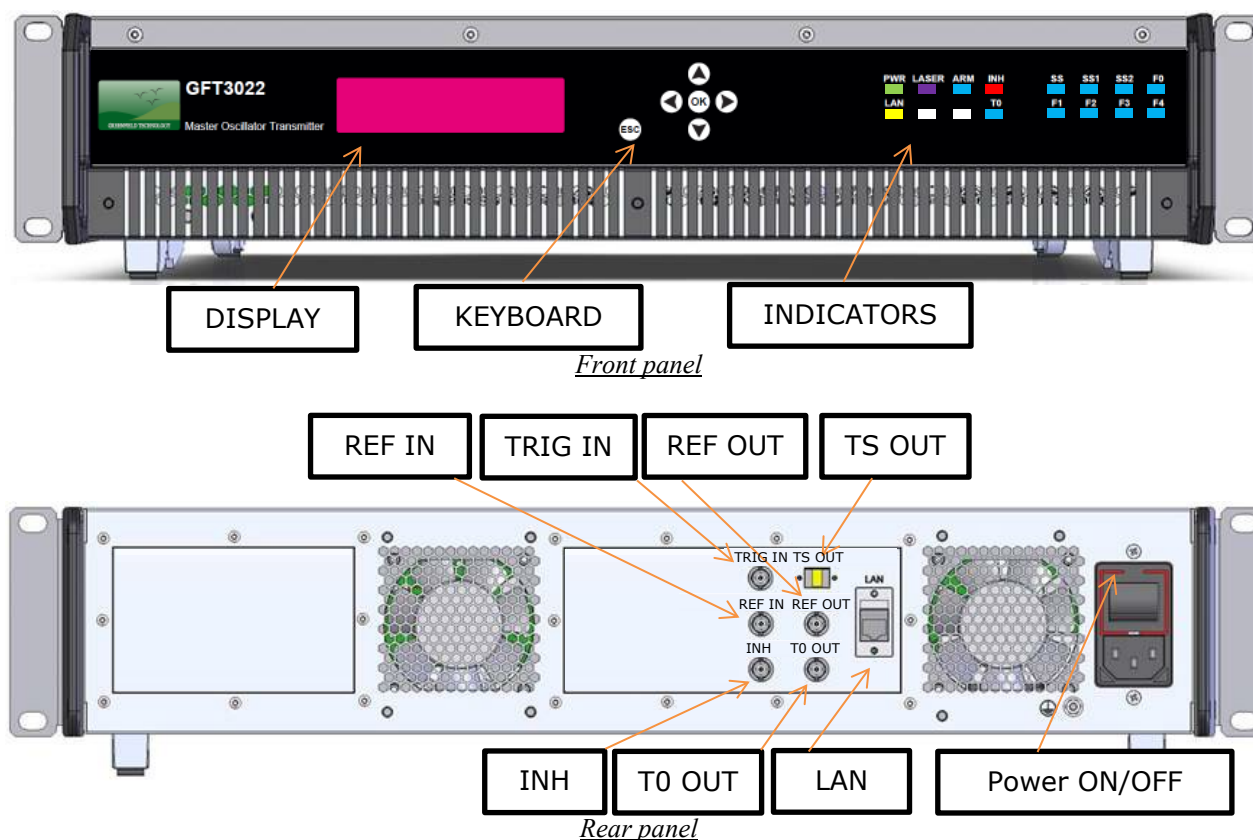
Encodes the data stream, converts the electrical signal to optical signal and delivers a serial optical data stream to synchronize local delay generators.

Interface Controller

This function manages internal functions, front panel operation and Ethernet network. This function is configurable for custom application.

GFT3022 parameters may be locally controlled with the front panel keys and LCD display and remote controlled via an Ethernet interface (10/100/1000Mb/s) (basic ASCII commands or HTML page via web browser).

Front and Rear Panel Interfaces



Connector, Switch, Indicators

Front panel		Rear panel	
Indicators		LAN	Lan connection: RJ45 connector
PWR	Power supply ON (green)	TS OUT	Optical output: SC/APC connector
LASER	Laser ON (purple)	TRIG IN	Trigger input: BNC connector
ARM	Armed (blue)	REF IN	Clock input: BNC connector
LAN	Connected to a network (yellow)	REF OUT	Clock output: BNC connector
INH	Inhibition ON	INH	Inhibition input: BNC connector
T0	Flick at T0 frequency (blue)	T0 OUT	T0 output: BNC connector
SS	Single shot status ON (blue)	PLUG	AC power plug (90-240 V)
SS1	Flick at Single shot SS1 frequency (blue)	I/O	Power ON/OFF switch
SS2	Flick at Single shot SS2 frequency (blue)		
F0	Flick at F1 frequency (blue)		
F1	Flick at F1 frequency (blue)		
F2	Flick at F1 frequency (blue)		
F3	Flick at F1 frequency (blue)		
F4	Flick at F1 frequency (blue)		
- Display to local control - Small keyboard to local control			