



GFT3001

Master Oscillator Transmitter

Features

- Synchronize up to 256 Delay Generators with less than 15 ps jitter
- Optical fiber interconnection enables up to 1 km distance between equipment
- Local front panel, Ethernet and Internet user interfaces
- 19", 1U compact packaging

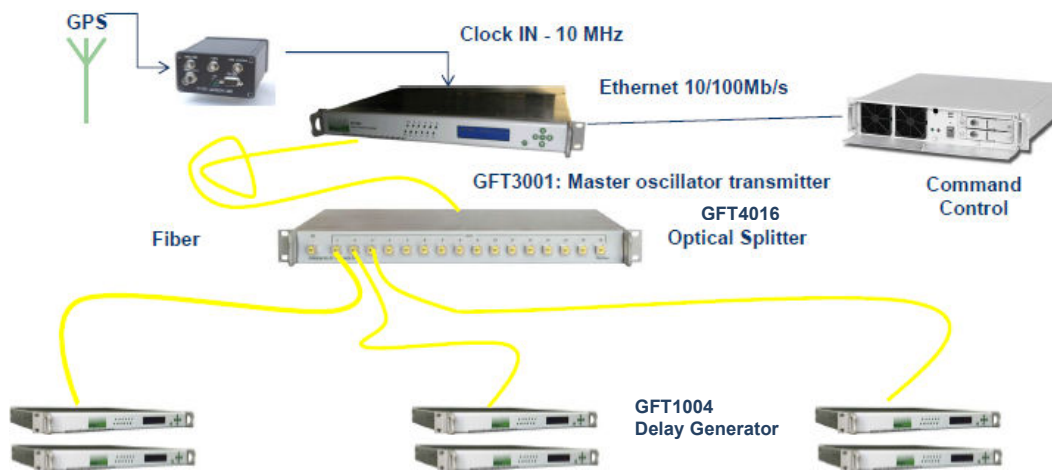
Applications

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



Description

GFT3001 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 GFT3001 can be external or internal. In some applications the GFT3001 can also generate a clock to synchronize other devices (Laser Oscillator, etc ...). The GFT3001 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 GFT3001 to a preset frequency. All parameters may be locally controlled over front panel, and remotely controlled over Ethernet and Internet (internal web server) interface (10/100 Mb/s). The main application of the GFT3001 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 6 Local Delay Generators

Specifications

Timing System	
Distance between equipment	>1 km (GFT3001 to local delay generator)
# of local delay generators	Up to 256
Internal Time base	
Frequency	160 MHz
Accuracy / stability	10 ⁻⁹ / 0.05 ppm
Trigger events source	
Single-shot SS1, SS2 source	From front panel, Ethernet or trigger input
Repetitive trigger events	From 3 counters. Each is programmable 1 kHz to 1/60 Hz
Trigger input	
Trigger active	Slope positive, Threshold =+1 V, Internal load 50 Ω
Inhibition input	
Inhibition active	Active high, Threshold =+1 V, Internal load 50 Ω
Clock input	
Shape	Sine wave or square
Threshold	0 V, Internal 50 Ω load
Level	-3 dBm min.
Frequency	10 MHz
Optical data stream output	
Repetition rate	160 Mb/s (up to 200 Mb/s as an option)
Optical Power / Wavelength	4 dBm mean / 1550 nm
Rise and fall time	< 1 ns
Connector	SC with shutter
T0 output	
Source	Single or Repetitive trigger
Amplitude	2, 5, to 10 V under 50 Ω
Rise / Fall time	< 2 ns, < 5 ns
RMS jitter	15 ps to local delay generator (T0 output)
Width	100 ns to 10 μs
General specifications	
User Interface	Local PAV, Ethernet / Internet (Web page)
Size	Rack 19", 1U, 300 mm
Power	90 to 240 V / 1 A
Software tools	DLL, VI LabVIEW
Options	
Option 1:	Clock Output: Sine wave, 3 dBm, 80 MHz, >-40 dBm Spectral Purity
Option 2:	Specific Clock Input frequency 10 MHz to 100 MHz (ask when ordering)
Option 3:	Programmable Single-Shot sequence (repetitive, single burst, repetitive burst)
Option 4:	More repetitive triggers: up to 3 with fixed frequency (ask when ordering)

Functional overview

Block Diagram

The GFT3001 includes the five following functions: Clock Management, Timing Control, Data Stream Generator, Transmitter and an Interface Controller.

Clock Management

Provides a 160 MHz time base from an internal clock or an external 10 MHz clock. As an option, the external clock can be up to 100 MHz

Timing Control

This function provides 3 repetitive triggers (F1, F2, F3) and a pair of single-shot triggers (SS1 and SS2)

Every channel of the local delay generators can be triggered by one of these 5 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)

$F1 = F0 / M$

$F2 = F0 / N$

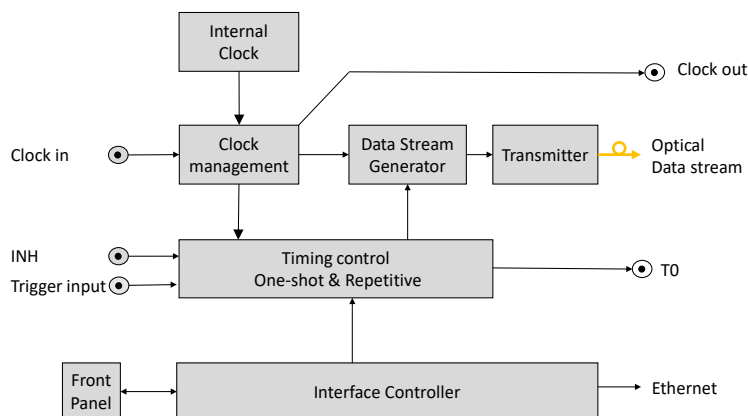
$F3 = F0 / O$

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

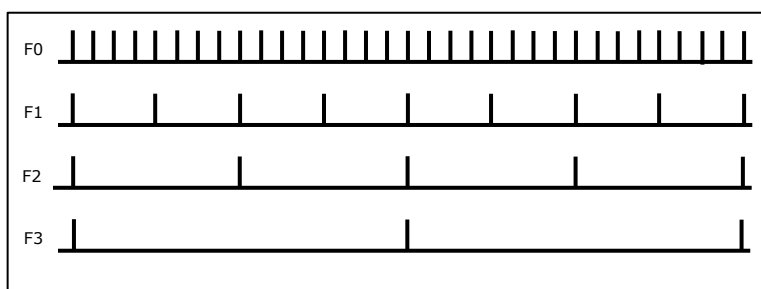
Single-shot triggers (SS1 & SS2) This pair of triggers is synchronized with the F3 repetitive trigger and started by a user command, or by external signal on the Trigger input.

In a single-shot experiment application:

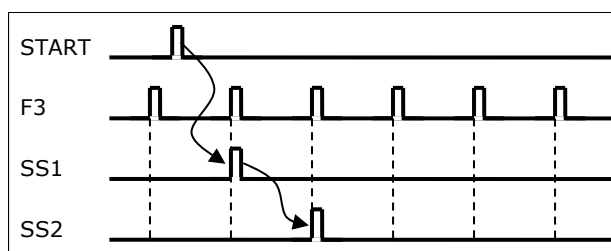
- SS1 is used to activate low frequency equipment very early in the triggered event like a high voltage power supply, for example.
- SS2 is used to activate fast equipment near or during the triggered event like a digitizer for diagnostics.



Block Diagram



Example of Repetitive Triggers:
 $F1 = 250 \text{ Hz}$, $F2 = 125 \text{ Hz}$, $F3 = 75 \text{ Hz}$



Single Shot Trigger

INH Input inhibits single-shot triggers with an external voltage level for safety management.

Data Stream Generator

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

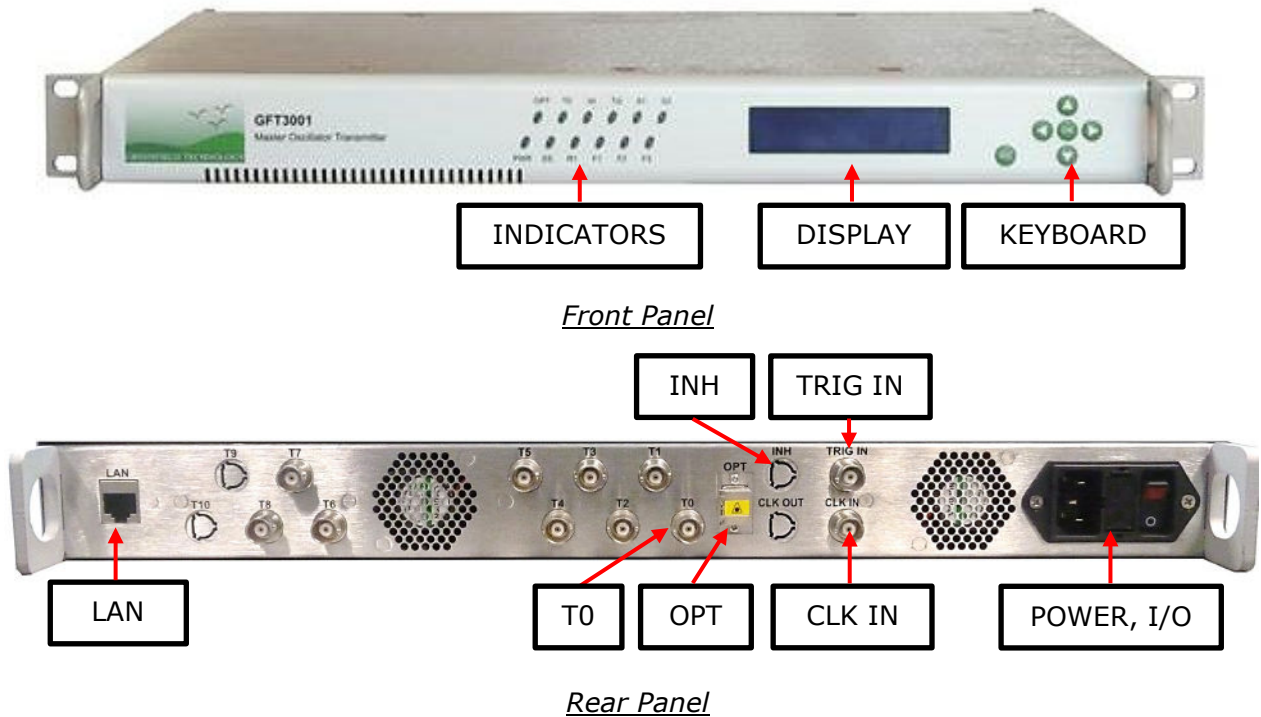
Transmitter

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.

Front and Rear Panel Interfaces



Connector, Switch, Indicators

Front panel		Rear panel	
• Indicators		LAN	LAN connection: RJ45 connector
OPT	Optical output signal ON	OPT	Optical output: SC/PC connector
T0	Blinks at T0 frequency	CLK	Clock input: BNC connector
IN	Inhibition ON	T0	T0 output: BNC connector
TG	Single-shot ARMED	TRIG IN	Trigger Input: BNC connector
S1	Blinks at Single-shot 1 frequency	INH	Inhibition input: BNC connector
S2	Blinks at Single-shot 2 frequency	POWER	AC power plug (90-240 V)
PWR	Power supply ON	• Switch	
SS	Single-shot status ON	I/O	Power ON/OFF switch
R1	N.A		
F1	Blinks at F1 frequency		
F2	Blinks at F2 frequency		
F3	Blinks at F3 frequency		
	• Display for local control		
	• Small keyboard for local control		

Ordering Information

GFT3001 Master Oscillator Transmitter part numbering

GFT3001-X-X-X-X (Where X is option number)

Ordering examples

GFT3001-1 (GFT3001 with Clock Output option)