GFT1004

4 channel Digital Delay Generator

Features

- 4 independent delay channels
  - 1 ps time resolution
  - < 10 ps jitter for internal triggered delays
  - < 25 ps jitter for external triggered delays
- Adjustable output pulse up to 10V, 1 ns rise time
- External or internal trigger sources to every channel
- Internal or External clocking up to 90 MHz
- Independent control of delay, width and amplitude
- Controlled via Ethernet, Web page and front panel
- Compact packaging 1U, 19”
- Options:
  - Extension to 8 or 10 channels
  - Output pulse: TTL level or 20 V or 32 V or optical

Applications

- Components test
- ATE application
- System Laser timing control
- Control flash lamps and Q-Switches
- Synch with selectable clock frequency (Mode locked laser)
- Precision pulse Application
- Gate high Speed Cameras
- Instrument triggering

Description

The GTF1004 Digital Delay Generator provides four independent delayed pulses on the rear panel and in option eight or ten channels. Delays up to 10 seconds can be programmed with 1ps resolution and channel to channel jitter is less than 10 ps RMS. BNC outputs deliver up to 10V, 1 ns under 50Ω. Pulse amplitude and width are adjustable on each output channel.

One input channel, or two internal synchronized timers is used to trigger all output channels. One T0 channel is used to time reference the all output delayed pulse.

The GFT1004 is a Digital Delay Generator that operates either as a standalone or as a component in a timing system (in option 2). In timing system mode is operated in conjunction with a GFT3001 Master Transmitter that controls and synchronize a number of GFT1004’ over optical fibers.

GFT 1004 parameters can be local controlled over the front panel keys and LCD display and remote controlled via Ethernet (10/100 Mb/s) or Internet (Web page from Internal Web server).

Control panel Web page:

This ”web page”, from embedded Web server, provides a simple method to configure settings for each channel (delay, output amplitude, output width), trigger source, trigger mode, and to control operation and status of the instrument.
The configuration information of the instrument is stored and saved in the GFT1004.
The user can open a “web page” to control the GFT1004 device via Internet Explorer, Mozilla Firefox or Chrome.
To control GFT1004 to the PC you will need to enter the unit’s IP address into the browser after connecting a cable from Ethernet port to your computer network. The browser automatically will open the control panel web page on PC.

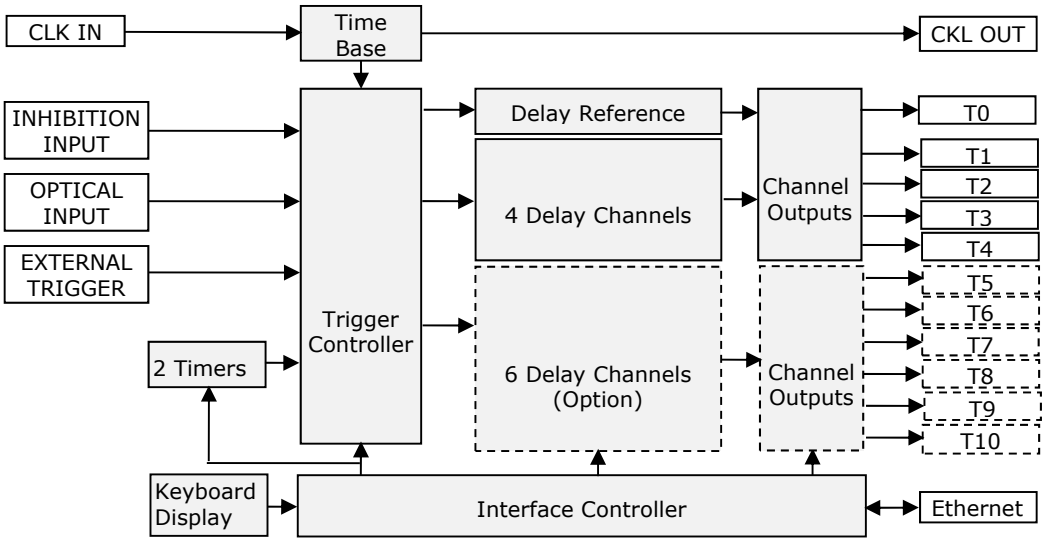
GFT1004
4 channel Digital Delay Generator

Specifications

Delay channel	
Number	4 independents
Range	0 to 10 seconds
Resolution	1 ps
RMS jitter	< 10 ps + delay x 10^{-7} (channel to channel in internal trigger)
	< 25 ps + delay x 10^{-7} (External trigger to any channel)
	< 10 ps + delay x 10^{-7} (External time reference to any channel)
Accuracy	< 150 ps + delay x 10^{-7}
Time base	155.52 MHz Frequency, 0.5 ppm stability
External Trigger input	
Repetition rate	Up to 100KHz or single
Trigger level	+1 V /50Ω
Slope	Positive
Minimum Trigger delay	< 100 ns (insertion delay)
Connector	BNC
Internal Trigger	
Two synchronized generators	Frequency= 1 Hz to 1 MHz in step of 1Hz
Output pulse T0	
Amplitude / width	2.5 to 10 V / 100ns to 10 ms under 50 Ω
Output pulse T1 to T4	
Amplitude	2.5 V to 10 V in step of 10 mV
Load	50 Ω
Rise/Fall time	< 1 ns / 3 ns
Width	100 ns to 10 ms in step of 6.43 ns
Connector	BNC
External time reference	
Threshold	0 V, internal 50 Ω
level	Min -3 dBm, typical 0 dBm
Frequency	10 MHz (other frequency are available up to 90 MHz)
Inhibition input	Active high, Threshold = 1 V, repetition rate < 1kHz
General	
Software	Free Drivers for Seven, VI labview driver
User Interface	Front panel, Ethernet 10/100 Mb/s, Internet (Web page)
Power consumption	90 To 240 V / 50 – 60 Hz/ 0.25 A
Weight / Size	< 5 kg / 19” W X 363 mm D X 1U H
Options	
Option 1:	Extension to 8 channels
Option 2:	Optical input for timing system mode
Option 3:	Clock output (Sinewave, 3dBm, -40dBm Spectral purity, 77.76 MHz Frequency, 5 ps RMS jitter to any channel)
Option 4:	32 V channel output (Width=1µs, rise/fall time = 3/15 ns under 50 Ω)
Option 5:	Extension to 10 channels
Option 6:	5 V to 20 V channel output (Width=0.1 to 10 µs, rise/fall time = 3/15 ns under 50 Ω)
Option 7:	TTL level (2.5 to 6 V) channel output (Width=100 ns to 10 s, rise/fall time = 5 ns /5 ns under 50 Ω, positive or negative pulse)
Option 8:	Optical channel output (250 µW, 850 nm, ST connector)

Functional overview

Block diagram: The GFT1004 includes the five following functions: Time base, Trigger Controller, Digital Delay channel, Channel Output and Interface controller.



Block diagram of the delay generator

Time base: This functions provides a 155.52 MHz time base from an internal reference or an external 10MHz reference. In option the external reference can be up to 90 MHz (ask to the factory)

Clock controller:
This function provides 4 triggers sources to each delay channel

- External trigger source: When the external trigger source is selected a rising edge on a "TRIG IN" starts a delay sequence. After the delay sequence a pulse appears on every Output
- Two internal trigger sources from two synchronous Timers. The frequency of timers is programmable 1 Hz to 100 KHz
- Optical trigger source (in option) is operated in conjunction with a GFT3001 Master Transmitter that controls a number of GFT1004. GFT3001 provides via a serial data stream and over optical fiber, time base synchronization, single shot, repetitive triggers and inhibition information to the various GFT1004 at distance greater than 1 Km from The GFT3001 Master Transmitter.

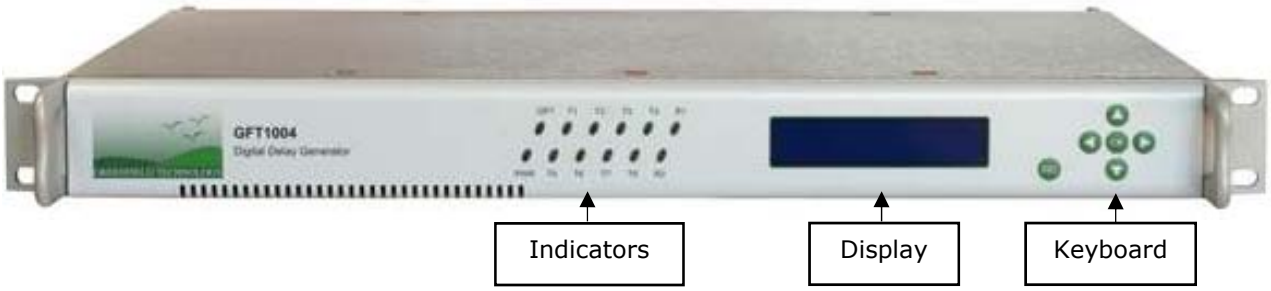
"Inhibition input" allows to inhibit quickly the selected Outputs.

Delay Channel: They are 4 independent delay channels (8 or 10 in option). The delay from selected trigger source is programmable up to 10 seconds in 1 ps increments.
"T0 Output" channel is used to time reference (delay = 0) the all output delayed pulse.

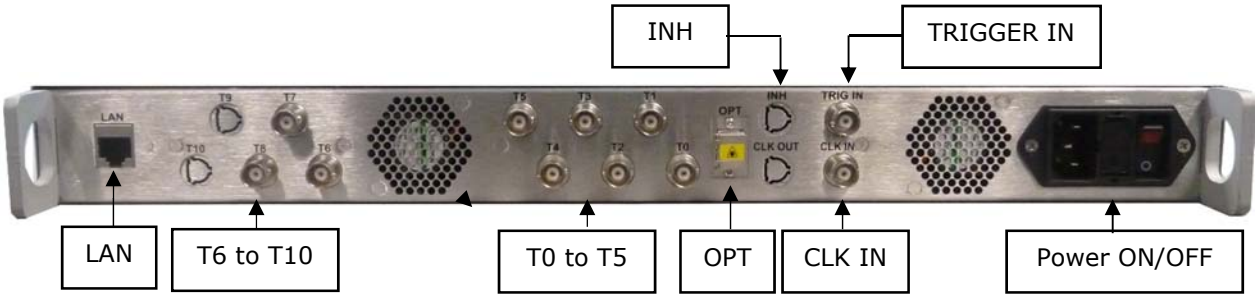
Channel output
Each delayed output pulse (T1 to T10) can be independently adjustable in level and width. The outputs are designed to drive 50 Ω load.
In option channel output level can be 2.5 to 6 V or 5 to 20 V or fixed 32 V or optical pulse.

Interface Controller: It manages internal functions and user interfaces. The parameters can be local controlled over the front panel keys and Display and remote controlled via Ethernet (10/100 Mb/s) or Internet (Web page from internal Web server)
All parameter values (delay, level, width) are automatically saved.

Front and Rear panel



Front panel



Rear panel

Connector, Switch, Indicators

Front panel		Rear panel	
• Indicators		LAN	Lan connection: RJ45 connector
OPT	Synchronized by optical network	OPT	Optical input: SC/PC connector
T1	Flick at the trigger frequency of channel 1	CLK IN	Clock input: BNC connector
T2	Flick at the trigger frequency of channel 2	T0	T0 output: BNC connector
T3	Flick at the trigger frequency of channel 3	T1 to T10	T1 to T10 output pulses: BNC connector
T4	Flick at the trigger frequency of channel 4	TRIG IN	External Trigger Input: BNC connector
T5	Flick at the trigger frequency of channel 5	PLUG	AC power plug (90-240 V)
PWR	Power supply ON	INH	Inhibition input: BNC connector
T6	Flick at the trigger frequency of channel 6	I/O	Power ON/OFF switch
T7	Flick at the trigger frequency of channel 7		
T8	Flick at the trigger frequency of channel 8		
T9	Flick at the trigger frequency of channel 9		
T10	Flick at the trigger frequency of channel 10		
• Small keyboard to local control			
• Display to local control			

Ordering information

GFT1004 Delay generator part numbering

GFT1004-X-X-X-X (Where "X" is option number)

Ordering examples

GFT1004-1-2 (GFT1004 with extension to 8 channels and Optical input for timing system mode)
GFT1004-5-7-3 (GFT1004 with extension to 10 channels, TTL level channel output and Clock output)