GFT7048
48 Channel Digital Pattern Generator

Features

- 48 Pattern channels
  - 1 ns sample resolution
  - 20,000 samples per channel
  - <10 ps channel to channel RMS jitter
  - 80 ps channel to channel skew
- Channel Output
  - LVDS logical level
  - 1 ns rise & fall time
- Trigger sources: External, Internal or Optical
- Analog, Digital and optical I/O
- Controlled via front panel, Ethernet or Webpage

Applications

- FPGA, ASIC emulation and simulation
- Production test
- Digital stimulus
- Control of multiple high power pulsers
- Big physics application
- Automatic Test Equipment

Description

The GFT7048 is a 48 Channel Digital Pattern Generator that operates either as a standalone device, or as a component in a timing system. In a timing system, the GFT7048 is operated in conjunction with a GFT3001 Master Transmitter that controls and synchronizes several GFT7048 DPGs via optical fibers (for more information about timing system ask to factory)

The generator provides two trigger modes: External mode from trigger input or internal mode from one frequency programmable generator
One "T0" channel is used as a time reference for all the LVDS channel Outputs.

A global delay up to 10 µs may be used to control skew between GFT7048 in a timing system configuration (optical network compensation).
A fine delay function (<50 ps resolution) on each channel pattern may be used to adjust skew between pattern channels.

Eight (8) data patterns of 48 channels can be set and saved in the generator. Each pattern channel is 20,000 samples of 1 ns resolution (20 µs total length).

Seventeen (17) Analog and Digital I/O may be used to control and monitoring some devices of your application (high voltage power supply, sensor, switch …).

GFT7048 parameters can be locally controlled over the front panel keys and LCD display, and remotely controlled via Ethernet (10/100/1000 Mb/s) or Internet (web page from internal web server).

The GFT7048 is low profile 19", 2U rack mountable instrument.

Application: This Digital Pattern Generator is well suited for FPGA or ASIC simulation or emulation, production test, digital stimulus and application where speed, resolution, channel number are critical.

Specifications

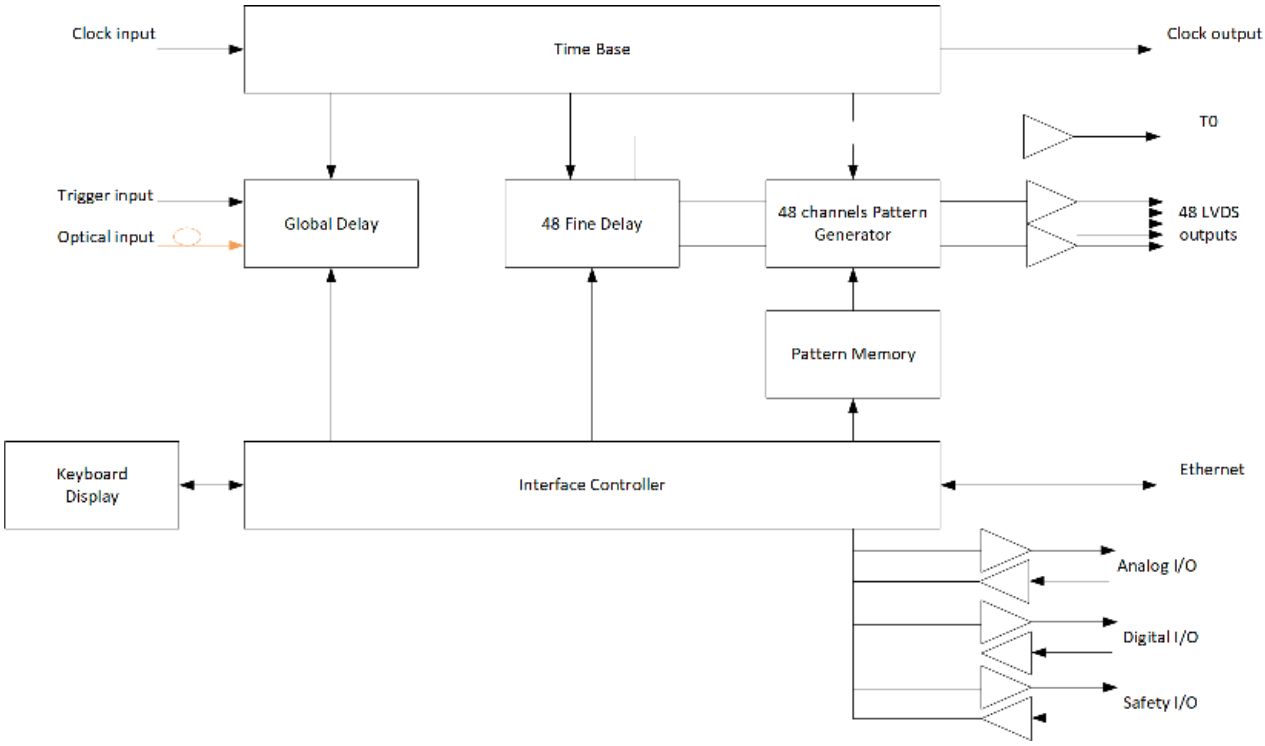
48 Pattern channels	
Sample Resolution	1 ns (1 GS/s)
Sample number per channel	20,000
Skew (Channel to channel)	< 80 ps (between first bits)
Drift (Channel to channel)	< 100 ps pk-to-pk (first bit) @ 25°C (24h) < 300 ps pk-to-pk (first bit) @20-30°C (24h)
Jitter (Channel to channel)	< 10 ps RMS
Channel LDVS Outputs (T1-T48)	
Logical level type	LVDS
Differential voltage	350 mV typ.
Required load	100 Ω
Rise/fall time	<1 ns
Connectors	3 x SAMTEC p/n ERI8-031-S-D-RA + ERC-031-01-02
Internal Time base	
Frequency	1 GHz
Stability	±0.28 ppm
Clock Input	
Required level	>0.3 V pk-to-pk, AC
Absolute maximum level	2.8 V pk-to-pk
Required frequency	10 MHz +/-0.1 kHz
Impedance	50 Ω
Connector	BNC
Clock Output	
Level	>2 V pk-to-pk AC on 50Ω load
Shape	Square
Frequency	10 MHz
Rise/fall time	<10 ns
Connector	BNC
T0 Output	
Function	Time reference
Shape	Square
Level	+10 V ± 0.5V
External load	50 Ω
Rise time	<2 ns
Width	100 ns to 10 µs (6.25 ns resolution)
T0 to DP outputs, skew	<+/- 3.125 ns (Global delay set to 0)
T0 to DP outputs, jitter	<25 ps RMS (internal or optical trigger)
Connector	BNC
External Trigger Input	
Required level	> + 1V
Maximum level	+ 10 V
Repetition rate	Up to 10 kHz
Impedance	50 Ω
Connector	BNC
Latency	<200 ns (trigger input to channel output)

Specifications (cont'd)

Internal trigger	
Programmable generator	Frequency = 1 Hz to 10 kHz
Global delay	
Function	Control skew between GFT7048
Range	0 to 10 µs
Resolution	6.25 ns
Fine delay	
Function	Control skew on each channel
Range	1.1 ns
Resolution	<50 ps (T1 to T48)
Pattern Memory	
Pattern memory size	48*20,000 samples
Pattern number	5 User Patterns (user configurable) 3 Test Patterns (fixed)
Analog I/O (3 inputs, 3 outputs)	
Type	ADC (inputs), DAC (outputs)
Resolution	12 bits
Level	0 – 10 V
Connector	25 pin D-Sub type plug
Digital I/O (4 inputs, 4 outputs)	
Level	+24V isolated
Input to output, voltage insolation	5000 V_{RMS}
Connector	25 pin D-Sub type socket
Safety optical I/O (1 input, 2 outputs)	
ARM and STATUS outputs	
Shape	Square
Level	>-9 dBm
Wavelength	850 nm
INH input	
Function	All the channel outputs may be inhibited
Threshold	>-15 dBm
Wavelength	850 nm
User Interface	
Front panel	2x20 character LCD display + keys + indicators
Ethernet 10/100/1000 Mb/s	SCPI commands and Web page RJ45 Connector
General	
Power voltage	90 to 240 VAC
Power consumption	70 W
Weight	<15 kg (< 33 lbs)
Dimension	19'', 2U, 16" depth (with front and rear handles)

Functional Overview

Block diagram



The GFT7048 includes the following functions:

Time Base:

GFT7048 can run three modes for the clock reference:

- Internal: Time base and internal clocks are synthetized from an onboard 10 MHz VCTCXO.
- External: the internal clocks and time base are synthetized from an external 10 MHz input (Clock input).
- Optical: the internal clocks and time base are synthetized from the reference clock decoded from the optical serial data stream reception (160 MHz).

Global Delay

A global delay up to 10 µs may be used to control skew between GFT7048 in a timing system configuration (optical network compensation).

48 Fine Delay

A fine delay (<50 ps resolution) may be used to adjust skew between pattern channels.

48 channel pattern generator

They are 48 independent channels pattern generator. Content of the pattern is stored in pattern memory. "T0 output" channel is used as a time reference (delay = 0) for all 48 LVDS outputs.

Pattern Memory

GFT7048 can memorize up to 8 different data pattern of 48 channels. Five are user configurable and three are test patterns.

Channel LVDS outputs

The outputs are specially designed to provide LVDS level via high speed SAMTEC connectors.

Analog, digital and safety I/O

This I/O lines under software command allow to control and monitoring other external devices.

Interface Controller: It manages internal functions and user interfaces. The parameters can be locally controlled over the front panel keys, and remotely displayed and controlled via Ethernet (10/100/1000 Mb/s) or Internet (web page from internal web server)

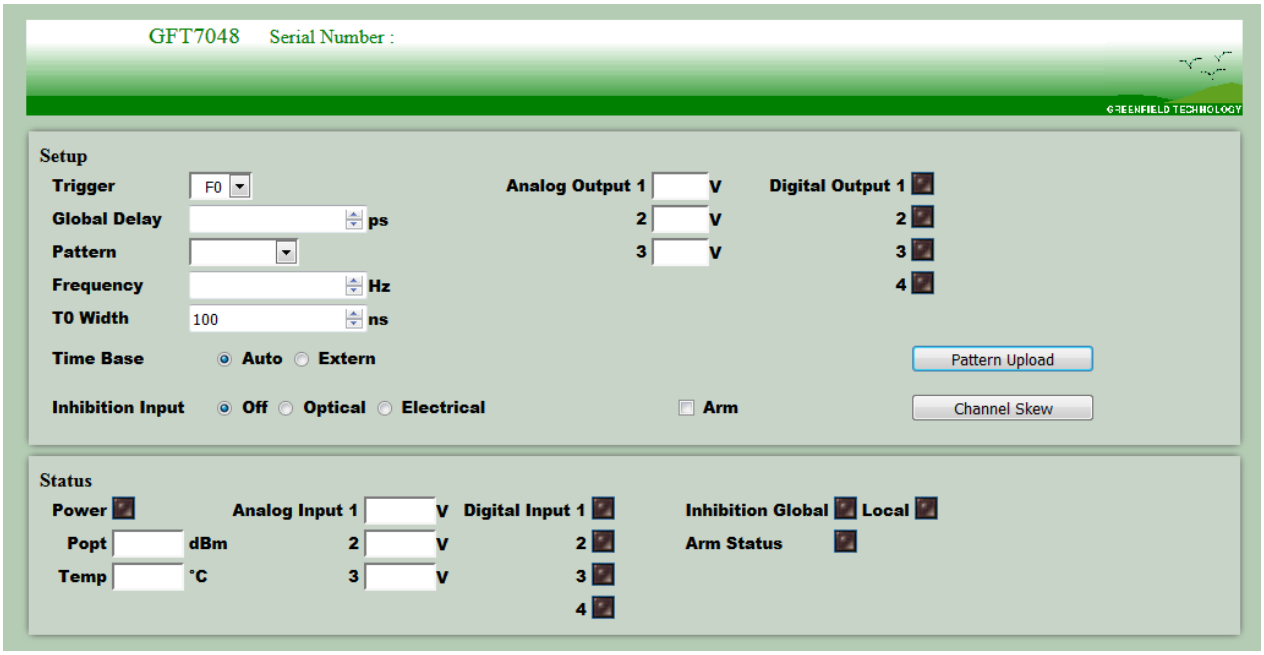
Control and Software Tools

They are three ways to control the generator:

- **"local way"** via the front Panel Display an Keyboard. This way allows to locally configure the settings (delay, trigger source, time base reference…), control operation and display status of the generator.

- **"Easy remote way"** via Internet and control panel web pages on your PC.
  Web page, from embedded Web server, provides a simple method to configure settings (delay, trigger mode, trigger source, time base reference...) to control operation, to upload user pattern and to display the status of the instrument.
  The configuration information of the instrument is stored and saved in the GFT7048.

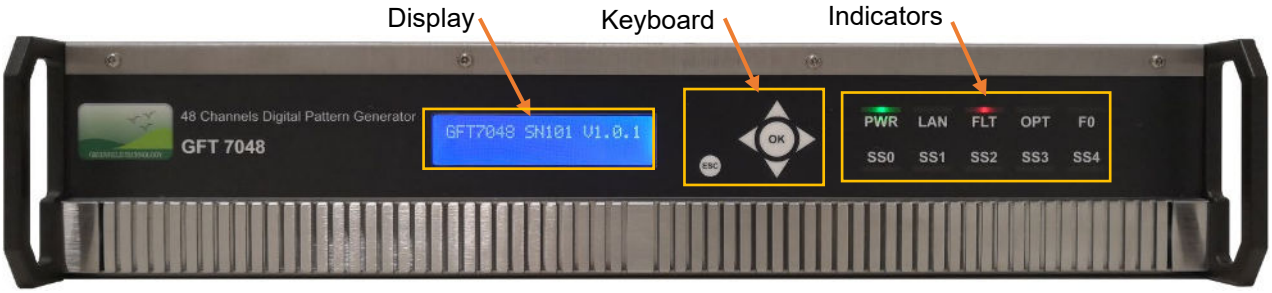
  The web page can be opened via Internet Explorer, Mozilla Firefox or Chrome.
  After connecting a cable from the GFT7048's Ethernet port to your computer Network, enter the GFT7048's IP address into your PC's browser (the IP address can be identified or assigned via the front panel). The browser will automatically open the control panel web page on your PC.



Setup Web page

- **"General remote way"** via LabVIEW software application or other PC software application.

Front and Rear Panel



Front Panel

Rear Panel

Connector, Switch, Indicators

Front Panel		**Rear Panel**	
•	Indicators	LAN	LAN connection: RJ45 connector
PWR	Power supply ON (green)	OPT	Optical input: SC/APC connector
LAN	LAN connected / unconnected (yellow)	ARM	ARM output: ST connector
OPT	Timing system sync. / unsync. (blue)	STATUS	STATUS output: ST connector
F0	Blinks at the trigger event F0 if selected (blue)	CLK IN	Clock input: BNC connector
SS0	Blinks at the trigger event SS0 if selected (blue)	CLK OUT	Clock output: BNC connector
SS1	Blinks at the trigger event SS1 if selected (blue)	T0	T0 output: BNC connector
SS2	Blinks at the trigger event SS2 if selected (blue)	T1 to T16 T17 to T32 T33 to T48	Digital pattern outputs: SAMTEC connector
SS3	Blinks at the trigger event SS3 if selected (blue)		
SS4	Blinks at the trigger event SS4 if selected (blue)		
•	Small keyboard for local control	TRIG IN	External Trigger Input: BNC connector
•	Display for local control	INH	Inhibition input: BNC connector or ST connector
		Digital I/O	Digital I/O: D-SUB 25 pin socket
		Analog I/O	Analog I/O: D-SUB 25 pin plug
		LINE IN	AC power plug (90-240 VAC) and power ON/OFF switch

Ordering Information

Digital Pattern Generator part number is: GFT7048