GPS LTD.

OSCILLOSCOPE 1000XE series

Super Phosphor Oscilloscope

Introducing the GPS-1000XE Series

with serial bus decoding

Technical Datasheet

New generation oscilloscope offering powerful functions

Key Features

- 2CH or 4CH
- 100 MHz or 200 MHz models
- Real-time sampling rate up to 1GSa/s
- Serial bus triggering + decoding
- True measurement up to 14 Mpts
- 1 Mpts FFT with a new math co-processor
- Waveform capture rate up to 100,000 wfs/s (normal mode), 400,000 wfs/s (sequence mode)
- History Waveforms (History) mode and segmented acquisition (Sequence) mode
- Supports 256-level intensity grading and colour temperature display
- Gate and Zoom Measurement
- Hardware based high-speed Pass/Fail function

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V1.2 document no. 1000XE series

Overview

OSCILLOSCOPE 1000XE series

Model	GPS-1102XE GPS-1202XE	GPS-1104XE GPS-1204XE
Bandwidth	1102XE: 100 MHz 1202XE: 200 MHz	1104XE: 100 MHz 1204XE: 200 MHz
Sampling Rate (Max.)	Two channel series have a single 1 GSa/s ADC, four channel series have two 1 GSa/s ADCs. When all channels are enabled, each channel has a maximum sample rate of 500 MSa/s. When a single channel per pair is active, that channel has sample rate of 1 GSa/s	
Channels	2+EXT	4
Memory Depth (Max.)	7 Mpts/CH (not interleave mode); 14 Mpts/CH (interleave mode)	
Waveform Capture Rate (Max.)	100,000 wfm/s (normal mode), 400,000 wfm/s (sequence mode)	
Trigger Type	Edge, Slope, Pulse Width, Window, Runt, Interval, Dropout, Pattern, Video	
Serial Trigger and decoder (Standard)	IIC, SPI, UART, CAN, LIN	
16 Digital Channels (4CH only, option)	Maximum waveform capture rate up to 1 GSa/s, Record length up to 14 Mpts/CH	
USB AWG module (4CH only, option)	One channel, 25 MHz, sample rate of 125 MHz, wave length of 16 kpts, isolated output (SAG1021I only)	
Bode plot (4CH series only)	Minimum start frequency of 10 Hz, minimum scan bandwith of 500 Hz, maximum scan bandwidth of 120 MHz (dependent on Oscilloscope and AWG bandwidth), 500 maximum scan frequency points	
USB WIFI adapter (4CH only, option)	802.11b/g/n, WPA-PSK, the adapter must be supplied by Siglent to ensure working	
I/O	USB Host, USB Device, LAN, Pass/Fail, Trigger Out, Sbus (Siglent MSO)	
Probe (Std)	4/2 pcs passive probe PP215	4 pcs passive probe PP215
Display	7-inch TFT -LCD (800x480)	
Weight	Without package 2.6 kg; With package 3.8 kg	

USB AWG Module (4 channel option only)	
Channel	1
Max. Output Frequency	25 MHz
Sampling Rate	125 MSa/s
Frequency Resolution	1 micro-Hz
Frequency Accuracy	±50 ppm
Vertical Resolution	14-bit
Amplitude Range	-1.5 ï +1.5 V (50Î© load), -3 ~ +3 V (High-Z load)
Waveform Type	Sine, Square, Ramp, Pulse, Noise, DC and 45 built-in waveforms
Output impedance	50 ±2%
Protection	Over-Voltage Protection, Current-Limiting Protection
Insulation Voltage	±42 Vpk (for SAG2021I only)

Digital Channels (4 channel option only)	
No. of Channels	16
Max. Sampling Rate	1 GSa/s
Memory Depth	14 Mpts/CH
Min. Detectable Pulse Width	4 ns
Level Group	D0~D7, D8~D15
Level Range	-8 V ~ 8 V
Logic Type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, custom
Skew	D0~D15: ±1 sampling interval, Digital to Analog: ± (1 sampling interval +1 ns)

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System

Acquire System	
Sampling Rate	1 GSa/s (Single-Channel), 500 MSa/s (Dual-Channel)
Memory Depth	Max 14 Mpts/Ch (Single-Channel), 7 Mpts/Ch (Dual- Channel)
Peak Detect	2 ns (Four channel series) 4 ns (Two channel series)
Average	Averages: 4,16,32,64,128,256,512,1024
Eres	Enhance bits: 0.5, 1, 1.5, 2, 2.5, 3 Selectable
Waveform interpolation	Sinx/x, Linear

Input	
Channels	4 (Four channel series) 2+EXT (Two channel series)
Coupling	DC, AC, GND
Impedance	DC: (1 M ±2%) || (15 pF ±2 pF) (4CH) DC: (1 M ±2%) || (18 pF ±2 pF) (2CH)
Max Input voltage	1 M ≤400 Vpk (DC + Peak AC <=10 kHz),
CH to CH Isolation	DC~Max BW >40 dB
Probe attenuator	0.1X, 0.2X, 0.5X, 1X, 2X 10X....1000X, 2000X, 5000X, 10000X

Vertical System	
Bandwidth (-3 dB)	200 MHz (GPS-1204XE/GPS-1202XE) 100 MHz (GPS-1104XE/GPS-1102XE)
Vertical Resolution	8-bit
Vertical Scale (Probe 1X)	500 V/div - 10 V/div (1-2-5)
Offset Range (Probe 1X)	500 V ~ 150 mV: ± 1 V 152 mV ~ 1.5 V: ± 20 V 1.52 V ~ 10 V: ± 200 V
Bandwidth Limit	20 MHz ±40%
Bandwidth Flatness	DC ~ 10%(BW): ± 1 dB 10% ~ 50%(BW): ± 2 dB 50% ~ 100%(BW): + 2 dB / -3 dB
Low Frequency Response (AC-3 dB)	≤2 Hz (at input BNC)
Noise	ST-DEV ≤0.5 division (<1 mV/div) ST-DEV ≤0.2 division (<2 mV/div) ST-DEV ≤0.1 division (≥2 mV/div)
SFDR including harmonics	≥35 dB
DC Gain Accuracy	≤±3.0%: 5 mV/div ~10 V/div ≤±4.0%: ≤2 mV/div
Offset Accuracy	± (1%* Offset+1.5%*8*div+2 mV): ≥2 mV/div ± (1%* Offset+1.5%*8*div+500 uV): ≤1 mv/div
Rise time	Typical 1.8 ns (GPS-1204X-E) Typical 3.5 ns (GPS-1104X-E)
Overshoot (500 ps Pulse)	<10%

Horizontal System	
Time base Scale	1.0 ns/div ~ 100 s/div
Channel Skew	<100 ps
Waveform Capture Rate	Up to 100,000 wfms/s (normal mode), 400,000 wfms/s (sequence mode)
Intensity grading	256 Levels
Display Format	Y-T, X-Y, Roll
Time base Accuracy	±25 ppm
Roll Mode	50 ms/div ~ 100 s/div (1-2-5 step)

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Trigger

Trigger System	
Trigger Mode	Auto, Normal, Single
Trigger Level	Internal: ±4.5 div from the centre of the screen EXT: ±0.6 V (2CH series) EXT/5: ±3 V (2CH series)
Hold-off Range	80 ns ~ 1.5 s
Trigger Coupling	AC, DC, LFRJ, HFRJ, Noise RJ
Coupling Frequency Response (CH1~CH2)	DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 8 Hz LFRJ: Blocks the DC component and attenuates the low-frequency components below 2 MHz HFRJ: Attenuates the high-frequency components above 1.2 MHz
Coupling Frequency Response (EXT)	DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 20 Hz LFRJ: Blocks the DC component and attenuates the low-frequency components below 7 kHz HFRJ: Attenuates the high-frequency components above 160 kHz
Trigger Accuracy (Typical)	Internal: ±0.2 div EXT: ±0.4 div (2CH series)
Trigger Sensitivity	CH1~CH2: DC~ Max BW 0.6 div EXT: 200 mVpp DC ~ 10 MHz (2CH series) 300 mVpp 10 MHz ~ BW frequency EXT/5: 1 Vpp DC ~ 10 MHz (2CH series) 1.5 Vpp 10 MHz ~ BW frequency
Trigger Jitter	<100 ps (CH1~CH2)
Trigger Displacement	Pre-Trigger: 0~100% Memory Delay Trigger: 0 to 10,000 div

Slope Trigger	
Slope	Rising, Falling
Limit Range	<, >, <>, ><
Source	All channels
Time Range	2 ns ~ 4.2 s
Resolution	1 ns
Edge Trigger	
Slope	Rising, Falling, Rising & Falling
Source	All channels/ EXT/ (EXT/5)/ AC Line (Two channel series) All channels/ AC Line (Four channel series)
Pulse Trigger	
Polarity	+wid, -wid
Limit Range	<, >, <>, ><
Source	All channels
Pulse Range	2 ns ~ 4.2 s
Resolution	1 ns
Video Trigger	
Signal Standard	NTSC, PAL, 720p/50, 720p/60, 1080p/50, 1080p/60, 1080i/50, 1080i/60, Custom
Source	All channels
Sync	Any, Select
Trigger condition	Line, Field

Trigger (cont.)

Interval Trigger	
Slope	Rising, Falling
Limit Range	<, >, <>, ><
Source	All channels
Time Range	2 ns ~ 4.2 s
Resolution	1 ns
Dropout Trigger	
Time out Type	Edge, State
Source	All channels
Slope	Rising, Falling
Time Range	2 ns ~ 4.2 s
Runt Trigger	
Polarity	+wid, -wid
Limit Range	<, >, <>, ><
Source	All channels
Time Range	2 ns ~ 4.2 s
Resolution	1 ns
Pattern Trigger	
Pattern Setting	Invalid, Low, High
Logic	AND, OR, NAND, NOR
Source	All channels
Limit Range	<, >, <>, ><
Time Range	2 ns ~ 4.2 s
Resolution	1 ns
Window Trigger	
Window Type	Absolute, Relative
Source	All channels

Serial Trigger	
I^2C Trigger	
Condition	Start, Stop, Restart, No Ack, EEPROM, 7 bits Address & Data, 10 bits Address & Data, Data Length
Source (SDA/SCL)	All channels
Data format	Hex
Limit Range	EEPROM: =, >, <
Data Length	EEPROM: 1 byte Address & Data: 1~2-byte, Data Length: 1~12 byte
R/W bit	Address & Data: Read, Write, DNC
SPI Trigger	
Condition	Data
Source (CS/CL/Data)	All channels
Data format	Binary
Data Length	4 ~ 96 bit
Bit Value	0, 1, X
Bit Order	LSB, MSB

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Trigger (cont.)

UART/ RS232 Trigger	
Condition	Start, Stop, Data, Parity Error
Source (RX/TX)	All channels
Data format	Hex
Limit Range	=, >, <
Data Length	1 byte
Data Width	5-bit, 6-bit, 7-bit, 8-bit
Parity Check	None, Odd, Even
Stop Bit	1 bit, 1.5 bit, 2-bit
Idle Level	High, Low
Baud (Selectable)	600/1200/2400/4800/9600/19200/38400/57600/115200 bit/s
(Custom)	300 bit/s ~ 334000 bit/s
CAN Trigger	
Condition	All, Remote, ID, ID + Data, Error
Source	All channels
ID	STD (11 bit), EXT (29 bit)
Data Format	Hex
Data Length	1~2 byte
Baud Rate (Selectable)	5k/10k/20k/50k/100k/125k/250k/500k/800k/1M bit/s
Baud Rate (Custom)	5 Kbit/s~1 Mbit/s
LIN Trigger	
Condition	Break, Frame ID, ID + Data, Error
Source	All channels
ID	1 byte
Data Format	Hex
Data Length	1~2 byte
Baud Rate (Selectable)	600/1200/2400/4800/9600/19200 bit/s
Baud Rate (Custom)	300 bit/s~20 Kbit/s

Serial Decoder	
Number of Decoders	2
I^2C Decoder	
Signal	SCL, SDA
Address	7-bit, 10-bit
Threshold	-4.5~4.5 div
List	1~7 lines
SPI Decoder	
Signal	SCL, MISO, MOSI, CS
Edge Select	Rising, Falling
Idle	Low, High
Bit Order	MSB, LSB
Threshold	-4.5~4.5 div
List	1~7 lines
UART/RS232 Decoder	
Signal	RX, TX
Data Width	5-bit, 6-bit, 7-bit, 8-bit
Parity Check	None, Odd, Even
Stop Bit	1-bit, 1.5-bit, 2-bit
Idle Level	Low, High
Threshold	-4.5~4.5 div
List	1~7 lines
CAN Decoder	
Signal	CAN_H, CAN_L
Source	CAN_H, CAN_L, CAN_H-CAN_L
Threshold	-4.5~4.5 div
List	1 ~ 7 lines
LIN Decoder	
LIN Specification Package Revision	Ver1.3, Ver2.0
Threshold	-4.5 ~ 4.5 div
List	1 ~ 7 lines

Measure System		
Source	All channels, All channels in Zoom, Math, All References, History	
Number of Measurements	Display 4 measurements at the same time. 5 measurements displayed in statistics table.	
Measurement Range	Screen region, Gate region	
Measurement Parameters (38 Types)		
Vertical (Voltage)	Max	Highest value in input waveform
	Min	Lowest value in input waveform
	Pk-Pk	Difference between maximum and minimum data values
	Ampl	Difference between top and base in a bimodal signal, or between max and min in a unimodal signal
	Top	Value of most probable higher state in a bimodal waveform
	Base	Value of most probable lower state in a bimodal waveform
	Mean	Average of all data values
	Cmean	Average of data values in the first cycle
	Stdev	Standard deviation of all data values
	Cstd	Standard deviation of all data values in the first cycle
	VRMS	Root mean square of all data values
	Crms	Root mean square of all data values in the first cycle
	FOV	Overshoot after a falling edge;(base-min)/Amplitude
	FPRE	Overshoot before a falling edge;(max-top)/Amplitude
	ROV	Overshoot after a rising edge;(max-top)/Amplitude
	RPRE	Overshoot before a rising edge;(base-min)/Amplitude
	Level@X	the voltage value of the trigger point
Horizontal (Time)	Period	Period for every cycle in waveform at the 50% level, and positive slope
	Freq	Frequency for every cycle in waveform at the 50% level, and positive slope
	+Wid	Width measured at 50% level and positive slope
	-Wid	Width measured at 50% level and negative slope
	Rise Time	Duration of rising edge from 10-90%
	Fall Time	Duration of falling edge from 90-10%
	Bwid	Time from the first rising edge to the last falling edge, or the first falling edge to the last rising edge at the 50% crossing
	+Dut	Ratio of positive width to period
	-Dut	Ratio of negative width to period
	Delay	Time from the trigger to the first transition at the 50% crossing
Delay	Phase	Calculate the phase difference between two edges
	FRR	Time between the first rising edges of the two channels
	FRF	Time from the first rising edge of channel A to the first falling edge of channel B
	FFR	Time from the first falling edge of channel A to the first rising edge of channel B
	FFF	Time from the first falling edge of channel A to the first falling edge of channel B
	LRR	Time from the first rising edge of channel A, to the last rising edge of channel B
	LRF	Time from the first rising edge of channel A to the last falling edge of channel B
	LFF	Time from the first falling edge of channel A to the last rising edge of channel B
	Skew	Time of source A edge minus time of nearest source B edge
Cursors	Manual: Time X1, X2, (X1-X2), (1/ T) Voltage Y1, Y2, (Y1-Y2), Track: Time X1, X2, (X1-X2)	
Statistics	Current, Mean, Min, Max, Std-Dev, Count	
Counter	Hardware 6 bits counter (channels are selectable)	

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General

MATH Function

Operation	+, -, *, /, FFT, d/dt, ∫dt, square root
FFT Window	Rectangular, Blackman, Hanning, Hamming, Flattop
FFT Display	Full Screen, Split, Exclusive
Number of Decoders	2

I/O

Standard	2x USB Host, USB Device, LAN, Pass/Fail, Trigger Out
Pass/Fail	3.3 V TTL Output

Screen Display

Display Type	7-inch TFT-LCD
Display Resolution	800 480
Display Colour	24-bit
Contrast (Typical)	500:1
Backlight	300-nit
Range	8 x 14 divisions

Waveform Display

Display Mode	Dot, Vector
Persist Time	Off, 1 Sec, 5 Sec, 10 Sec, 30 Sec, Infinite
Colour Display	Normal, Colour
Screen Saver	1 min, 5 min, 10 min, 30 min, 1 hour, Off
Language	English, French, Japanese, Korean, German, Russian, Italian, Portuguese

Environmental & Safety

Temperature	Operating: 10°C ~ +40°C Non-operating: -20°C ~ +60°C
Humidity	Operating: 85%RH, 40°C, 24 hours Non-operating: 85%RH, 65°C, 24 hours
Height	Operating: ≤3000 m Non-operating: ≤15,266 m
Electromagnetic Compatibility	2004/108/EC Execution Standard EN 61326-1:2006 EN 61000-3-2:2006 + A2:2009, EN 61000-3-3:2008
Safety	2006/95/EC Execution Standard EN 61010-1:2010/EN 61010-2- 030:2010

Mechanical Data

Dimensions	Length 312 mm Width 134 mm Height 150 mm
Weight	N.W: 2.50 Kg G.W: 3.50 Kg

Power Supply

Input Voltage	100 ~ 240 VAC, CAT II, Auto selection
Frequency	50/ 60/ 400 Hz
Power	50 W Max

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