

Digital Storage Oscilloscope SMO1000E Series



Advance Features

- 100/200 MHz BW, 2/4 Channels
- 1 GSa/s Sampling rate
- 14 Mpts Record length
- Newest generation of SPO (Super Phosphor Oscilloscope) technology
- Waveform capture rate up to 100,000 wfm/s (normal mode) and 400,000 wfm/s (sequence mode)
- Standard Serial decode & trigger functions (I2C, SPI, UART, RS232, CAN, LIN)
- Smart Trigger functions: Window, Runt, Interval, DropOut, Pattern
- Advanced math operations (FFT, +, -, *, /, d/dt, integrate, square root)
- 1 Mpoints FFT
- High Speed Hardware based P/F Function.
- Automatic Measurement of 38 Parameters
- Standard Functions in 4 Channel Model : Bode Plot, Search & Navigate & Web Browser based control
- Other options in 4 channel model : MSO Function (16 digital channels), USB AWG module, USB WIFI adapter
- 256 Level Intensity Grading Display
- 7.0" TFT LCD (800 x 480)
- Independent vertical scale & position control knobs for each channel
- Support USB Host, USB Device (USB TMC), LAN (VXI-11), GPIB (Optional), Pass/Fail, Trigger Out.

Technical Specifications	SMO1102E	SMO1202E	SMO1104E	SMO1204E
Vertical System				
Input Channels	2 + Ext		4	
Bandwidth	100 MHz	200 MHz	100 MHz	200 MHz
Rise Time	< 3.5 ns	< 1.8 ns	< 3.5 ns	< 1.8 ns
Coupling	DC, AC and GND			
Input Impedance	DC : (1 MΩ ± 2%) (18 pF ± 2 pF)		DC : (1 MΩ ± 2%) (15 pF ± 2 pF)	
Max. Input Voltage	1 MΩ : ≤400 VPK (DC+ Peak AC ≤ 10 kHz)			
Probe Attenuation Factors	0.1X, 0.2X, 0.5X, 1X, 2X, 5X, 10X,, 1000X, 2000X, 5000X, 10000X			
Bandwidth Limit (-3 dB)	20 MHz			
Vertical Resolution	8 Bits			
Vertical Scale	500 μV/div to 10 V/div (1-2-5 Sequence)			
Vertical Gain Accuracy	5 mV/div to 10 V/div : ≤ ± 3.0% , ≤ 2 mV/div : ≤ ± 4.0 %			
Sampling System				
Sampling Rate	1 GSa/s (Single Channel / Channel Pair), 500 MSa/s (Dual Channel / Channel Pair)			
Memory Depth	14 Mpoints (Single Channel / Channel Pair), 7 Mpoints (Dual Channel / Channel Pair)			
Peak Detect	4 ns	4 ns	2 ns	2 ns
Average	4, 16, 32, 64, 128, 256, 512, 1024			
Eres	Enhance bits : 0.5, 1.5, 2, 2.5, 3; Selectable			
Waveform Interpolation	Sin (x)/x, Linear			
Horizontal System				
Time Base Range	1 ns to 100 s/div			
Time Base Accuracy	± 25 ppm			
Waveform Capture Rate	Up to 100,000 wfm/s (normal mode), 400,000 wfm/s (sequence mode)			
Display Format	Y-T, X-Y, Roll			
Roll Mode	50 ms/div to 100 s/div (1-2-5 sequence)			

Technical Specifications	SMO1102E	SMO1202E	SMO1104E	SMO1204E
Trigger System				
Trigger Mode	Auto, Normal, Single			
Trigger Sensitivity	Internal	0.6 div (DC to Max. BW)		
	EXT	200 mVpp (DC to 10 MHz) 300 mVpp (10 MHz to Max. BW)	-	
	EXT/5	1Vpp (DC to 10 MHz) 1.5 Vpp (10 MHz to Max. BW)	-	
Trigger Coupling	DC, AC, LF reject, HF reject, Noise reject			
Trigger Type	Edge, Slope, Pulse, Video, Window, Interval, Dropout, Runt, Pattern, Serial Trigger			
Holdoff Range	80 ns to 1.5 s			
Edge Trigger				
Slope	Rising, Falling, Rising & Falling			
Source	All Channels, AC line, EXT / (EXT/5) for 2 Channels Model		All Channels, AC line	
Slope Trigger				
Slope	Rising, Falling			
Limit Range	<, >, <>, ><			
Source	All Channels			
Time Range	2 ns to 4.2 s			
Resolution	1 ns			
Pulse Trigger				
Polarity	+ wid, -wid			
Limit Range	<, >, <>, ><			
Source	All Channels			
Pulse Range	2 ns to 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			
Window Trigger				
Window Type	Absolute, Relative			
Source	All Channels			
Interval Trigger				
Slope	Rising, Falling			
Limit Range	<, >, <>, ><			
Source	All Channels			
Time Range	2 ns to 4.2 s			
Resolution	1 ns			
Dropout Trigger				
Timeout Type	Edge, State			
Source	All Channels			
Slope	Rising, Falling			
Time Range	2 ns to 4.2 s			
Resolution	1 ns			
Runt Trigger				
Polarity	+wid, -wid			
Limit Range	<, >, <>, ><			
Source	All Channels			
Time Range	2 ns to 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 to 4.2 s			
Resolution	1 ns			
Serial Trigger				
I2C 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			
	Addr & Data : 1 to 2 byte			
	Data Length: 1 to 12 byte			
R/W bit	Addr & Data: Read, Write, Do not care			

Technical Specifications	SMO1102E	SMO1202E	SMO1104E	SMO1204E
SPI Trigger				
Condition	Data			
Source (CS/CL/Data)	All Channels			
Data Format	Binary			
Data Length	4 to 96 bit			
Bit Value	0, 1, X			
Bit Order	LSB, MSB			
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 to 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 to 2 byte			
Baud Rate (Selectable)	5k / 10k / 20k / 50k / 100k / 125k / 250k / 500k / 800k / 1M bit/s			
Baud Rate (Custom)	5 kbit/s to 1 Mbit/s			
LIN Trigger				
Condition	Break, Frame ID, ID + Data, Error			
Source	All Channels			
ID	1 byte			
Data Format	Hex			
Data Length	1 to 2 byte			
Baud Rate (Selectable)	600 / 1200 / 2400 / 4800 / 9600 / 19200 bit/s			
Baud Rate (Custom)	300 bit/s to 20 kbit/s			
Serial Decoder				
I2C Decoder				
Signal	SCL, SDA			
Address	7 bits, 10 bits			
List	1 to 7 lines			
Theshold Level	- 4.5 to 4.5 div			
SPI Decoder				
Signal	SCL, MISO, MOSI, CS (Note : SMO2102E can only use 2 signal identifiers)			
Edge Select	Rising, Falling			
Idle Level	Low, High			
Bit Order	MSB, LSB			
Threshold Level	-4.5 to 4.5 div			
List	1 to 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 Level	-4.5 to 4.5 div			
List	1 to 7 lines			
CAN Decoder				
Signal	CAN_H, CAN_L			
Source	CAN_H, CAN_L, CAN_H-CAN_L			
Threshold	-4.5 to 4.5 div			
List	1 to 7 lines			

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LIN Decoder				
LIN Specific Package Revision	Ver 1.3, Ver 2.0			
Threshold	-4.5 to 4.5 div			
List	1 to 7 lines			
Signal Measurement				
Source	All Channels , Math, Ref, History			
Number of Measurements	Display 5 measurements simultaneously			
Measurement Range	Screen region, Gate region			
Auto Measurement	38 (Types)			
Vertical (Voltage)	Vmax, Vmin, Vpp, Vamp, Vtop, Vbase, Mean, Cmean, Stdev, Cstd, Vrms, Crms, FOV, FPRE, ROV, RPRE, Level@X			
Horizontal (Time)	Period, Freq, +Wid , -Wid, Rise Time, Fall Time, Bwid, +Dut, -Dut, Delay, Time@Level			
Delay	Phase, FRR, FRF, FFR, FFF, LRR, LRF, LFF , Skew			
Cursor Measurement	Manual, Auto, Track			
Cursors	Manual : Time X1, X2, (X1-X2), (1/ΔT), 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)			
Math Functions				
Operations	Add, Subtract, Multiply, Divide, FFT(1 Mpoints), d/dt, Integration, Square Root			
FFT Window	Rectangular, Blackman, Hanning, Hamming, Flat top			
FFT Display	Full Screen, Split			
Number of Decoders	2			
USB AWG Module option : SMO1004E-FG (Four Channel Model only)				
Channel	-	1		
Max. Output Frequency	-	25 MHz		
Sampling Rate	-	125 MSa/s		
Frequency Resolution	-	1 μHz		
Frequency Accuracy	-	± 50ppm		
Vertical Resolution	-	14 bits		
Amplitude Range	-	-1.5 to +1.5 V (50Ω), -3 to 3 V (High-Z)		
Waveform Type	-	Sine, Square, Ramp, Pulse, Noise, DC & 45 built in waveforms		
Output Impedance	-	50 Ω ± 2%		
Protection	-	Over-Voltage Protection, Current-Limiting Protection		
Sine				
Frequency	-	1 μHz to 25 MHz		
Offset Accuracy (10 kHz)	-	± (1% *Offset Setting Value + 1 mVpp)		
Amplitude flatness (10 kHz, 5 Vpp)	-	± 0.3 dB		
SFDR	-	DC to 1 MHz : -60 dBc, 1 MHz to 5 MHz : -55 dBc, 5 MHz to 25 MHz : -50 dBc		
HD	-	DC to 5 MHz : -50 dBc, 5 MHz to 25 MHz : -45 dBc		
Square/Pulse				
Frequency	-	1 μHz to 10MHz		
Duty Cycle	-	1% to 99%		
Rise / Fall time	-	< 24 ns (10% to 90%)		
Overshoot	-	< 3% (1 kHz, 1 Vpp, typical)		
Pulse Width	-	> 50 ns		
Jitter	-	< 500 ps + 10ppm		
Ramp				
Frequency	-	1 μHz to 300 kHz		
Linearity	-	< 0.1% of Pk-Pk (Typical 1 kHz, 1 Vpp, 100% Symmetry)		
Symmetry	-	0% to 100% (Adjustable)		
DC				
Offset Range	-	± 1.5 V (50 Ω), ± 3 V (High-z)		
Accuracy	-	± (offset* 1% + 3 mV)		
Noise				
Bandwidth	-	> 25 MHz (-3 dB)		
Arbitrary Wave				
Frequency	-	1 μHz to 5 MHz		
Wave Length	-	16 kpts		
Sampling Rate	-	125 MSa/s		
Digital Channels MSO Option : SMO1004E-16LA (Four Channel Model 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 to D7, D8 to D15		
Level Range	-	- 3 V to 3 V		
Logic Type	-	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, custom		

Technical Specifications	SMO1102E	SMO1202E	SMO1104E	SMO1204E
General Informations				
I/O				
Standard	USB Host, USB Device, LAN, Pass/Fail, Trigger Out			
Pass / Fail	3.3 V TTL Output			
Waveform Display				
Display Mode	Dot, Vector			
Persist	Off, 1 sec, 5 sec, 10 sec, 30 sec, Infinite			
Screen Saver	1min, 5min, 10min, 30min, 1h, Off			
Screen Display				
Display Type	7.0 inches TFT LCD			
Resolution	800 (Horizontal) x 480 (Vertical) pixel			
Range	8 x 14 divisions			
Electromagnetic Compatibility	2004/108/EC Execution standard EN61326-1:2006, EN 61000-3-2:2006+A2:2009, EN61000-3-3:2008			
Safety	2006/95/EC, Execution standard EN 61010-1:2010/EN 61010-2-030:2010			
Input Supply	100 to 240V AC, CAT II, 50 / 60 / 400 Hz			
Power Consumption	25 W Max			
Operating Condition	10°C to 40°C, 85% RH at 40°C			
Storage Condition	-20°C to 60°C, 85% RH at 65°C			
Dimension (W X D X H)	312mm x 134mm x 150mm		312mm x 132.6mm x 151mm	
Weight	N.W. : 2.5 kg : G.W. : 3.5 kg		N.W. : 2.6 kg : G.W. : 3.8 kg	
Standard Accessories	1:1 / 1:10 Switchable Probes, Power cord, USB cable, CD			
Available Options	-		16 channel MSO Function : SMO1004E-16LA (inclusive of MSO Function Software + 16 channel Logic Analyzer Probe SLA1016)	
	-		USB AWG Option : SMO1004E-FG (inclusive of USB AWG Software + USB Isolated AWG Module Hardware SAG1021I)	
	-		Wireless Communication Function : SMO1004E-WIFI (inclusive of WIFI software + USB WIFI Adapter TL-WN725N)	
	Isolated front end : ISFE			

Subject to Change

scientific

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