

Digital Storage Oscilloscope

SMO2000X-E Series



Advance Features

- Signal Bandwidth: 200/350 MHz
- Sampling rate: Max. 2 GSa/s
- Record length 28 Mpts (Single Channel), 14 Mpts (Two Channels)
- Newest generation of SPO (Super Phosphor Oscilloscope) technology
- Waveform capture rate up to 400,000 wfms/s
- 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 P/F function.
- Channel waveforms & its FFT display on split screen.
- 38 parameters of automatic measurements
- 256 level intensity grading display
- 7.0" TFT LCD (800 x 480)
- Independent vertical scale & position control knobs for each channel
- Standard Interface
- Support USB Host, USB Device (USB TMC), LAN (VXI-11), GPIB (Optional), Pass/Fail, Trigger Out.
- 16 Digital channels (MSO) (option)
- Bode plot
- Search and navigate
- USB AWG module(option)
- USB WIFI adapter(option)
- Web Browser based control
- Supports web control and virtual instrument control panel for both PC and mobile terminals
- Web control update rate of up-to 10 times/s provides nearly real-time update rate

Technical Specifications	SMO2202X-E	SMO2352X-E
Bandwidth	200 MHz	350 MHz
Sampling Rate	2 GSa/s (Single Channel), 1 GSa/s (Two Channels)	
Memory Depth (Max)	Max. 28 Mpts/Ch (Single Channel), 14 Mpts/Ch (Two Channels)	
Peak Detect	1 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	
Vertical System		
Bandwidth	200 MHz	350 MHz
Rise Time	1.8 ns	1.0 ns
Channels	2 + EXT	
Vertical Resolution	8 Bits	
Vertical Scale (Probe 1X)	500 μ V/div – 10 V/div (1-2-5)	
Vertical Offset Range	102 mV – 1V : \pm 20 V, 1.02 V – 10 V : \pm 200 V	
Vertical Gain Accuracy	5mV/div – 10V/div : \leq \pm 3.0% , \leq 2mV/div : \leq \pm 4.0%	
Bandwidth Limit (-3 dB)	20 MHz	
Coupling	DC, AC and GND	
Input Impedance	DC : (1 M Ω \pm 2%) (18 pF \pm 2 pF)	
Max. Input Voltage	1 M Ω : \leq 400 VPK (DC+ Peak AC \leq 10 kHz)	
Probe Attenuation Factors	0.1X, 0.2X, 0.5X, 1X, 2X, 5X, 10X,, 1000X, 2000X, 5000X, 10000X	

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Horizontal System			
Time Base Range		500 ps – 100 s/div	
Waveform Capture		Up to 110,000 wfm/s (normal mode), 400,000 wfm/s (sequence mode)	
Display Format		Y–T, X–Y, Roll	
Time Base Accuracy		± 25 ppm	
Roll Mode		50 ms/div – 100 s/div (1-2-5 step)	
Trigger System			
Trigger Level	Internal : EXT : EXT/5 :	± 4.5 div from screen center ± 0.6 V ± 3 V	
Hold of Range		80 ns to 1.5 s	
Trigger Coupling		AC, DC, LFRJ, HFRJ, Noise RJ	
Coupling Frequency Response		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 10 Hz LFRJ: Blocks the DC components and attenuates low-frequency components below 6 kHz HFRJ: Attenuates high-frequency components above 200 kHz	
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 frequency (External 50 Ω)	
	EXT/5 :	1 Vpp, DC – 10 MHz 1.5 Vpp, 10 MHz -Max BW frequency (External 50 Ω)	
Trigger Source		CH1, CH2, EXT, EXT / 5, AC Line	
Trigger Type		Edge, Slope, Pulse, Video, Window, Interval, Dropout, Runt, Pattern, Serial Trigger	
Trigger Jitter		< 100 ps	
Trigger Displacement		Pre-Trigger: 0 - 100% Memory, Delay Trigger: 0 to 10,000 div	
Edge Trigger			
Slope		Rising, Falling, Rising & Falling	
Source		CH1 / CH2 / EXT / (EXT/5) / AC Line	
Slope Trigger			
Slope		Rising, Falling	
Limit Range		<, >, <>, ><	
Source		CH1 / CH2	
Time Range		2 ns – 4.2 s	
Resolution		1 ns	
Pulse Trigger			
Polarity		+ wid, -wid	
Limit Range		<, >, <>, ><	
Source		CH1 / CH2	
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		CH1 / CH2	
Sync		ANY, Select	
Trigger Condition		Line, Field	
Window Trigger			
Window Type		Absolute, Relative	
Source		CH1 / CH2	
Interval Trigger			
Slope		Rising, Falling	
Limit Range		<, >, <>, ><	
Source		CH1 / CH2	
Time Range		2 ns – 4.2 s	
Resolution		1 ns	
Dropout Trigger			
TimeoutType		Edge, State	
Source		CH1 / CH2	
Slope		Rising, Falling	
Time Range		2 ns – 4.2 s	
Resolution		1 ns	

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Runt Trigger		
Slope	+wid , -wid	
Limit Range	<, >, <>, ><	
Source	CH1 / CH2	
Time Range	2 ns – 4.2 s	
Resolution	1 ns	
Pattern Trigger		
Pattern Setting	Invalid, Low, High	
Logic	AND, OR, NAND, NOR	
Source	CH1 / CH2	
Limit Range	<, >, <>, ><	
Time Range	2 ns – 4.2 s	
Resolution	1 ns	
Search		
Event	Edge, Slope, Pulse, Interval, Runt	
Event Number	Y-T: 700 ROLL: No limitation Stop After ROLL: 700	
Serial Trigger		
I2C Trigger		
Condition	Start, Stop, Restart, No Ack, EEPROM, 7 bits Address & Data, 10 bits Address & Data, Data Length	
Source (SDA/SCL)	CH1, CH2	
Data format	Hex	
Limit Range	EEPROM : =, >, <	
Data Length	EEPROM : 1 byte	
Addr & Data:	1 – 2 byte	
Data Length:	1 – 12 byte	
R/W bit	Addr & Data: Read, Write, Do not care	
SPI Trigger		
Condition	Data	
Source	(CS/CL/Data) CH1, CH2	
Data format	Binary	
Data Length	4 – 96 bit	
Bit Value	0, 1, X	
Bit Order	LSB, MSB	
UART/ RS232 Trigger		
Condition	Start, Stop, Data, Parity Error	
Source	(RX/TX) CH1, CH2	
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 Rate (Selectable)	600 / 1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600 / 115200 bit/s	
Baud Rate (Custom)	300 bit/s – 5000000 bit/s	
Can Trigger		
Condition	All, Remote, ID, ID + Data, Error	
Source	CH1, CH2	
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	CH1, CH2	
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		
I2C Decoder		
Signal	SCL, SDA	
Address	7 bits, 10 bits	
List	1 – 7 lines	
Theshold Level	- 4.5 – 4.5 div	

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SPI Decoder		
Signal	SCL, MISO, MOSI, CS (2 channel scopes can only use 2 signal identifiers))	
Edge Select	Rising, Falling	
Idle Level	Low, High	
Bit Order	MSB, LSB	
Threshold Level	-4.5 – 4.5 div	
List	1 – 7 lines	
UART 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 – 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 Specific Package Revision	Ver 1.3, Ver 2.0	
Threshold	-4.5 – 4.5 div	
List	1 – 7 lines	
Signal Measurement		
Source	CH1, CH2, Math, Ref, History	
Number of Measurements	Display 4 measurements at the same time, 5 measurements displayed in statistics table	
Measurement Range	Screen region, Gate region	
Auto Measurement		
Measurement Parameters	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	
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 Digit counter (channels are selectable)	
Math Functions		
Operations	Add, Subtract, Multiply, Divide, FFT, d/dt, Integration, Square Root	
FFT Window	Hanning, Hamming, Blackman, Rectangular, Flattop	
FFT Display	Full Screen, Split, Exclusive	
USB AWG Option : SMO2000X-E-FG		
Channel	1	
Max. Output Frequency	25 MHz	
Sampling Rate	125 MSa/s	
Frequency Resolution	1 μHz	
Frequency Accuracy	± 50 ppm	
Vertical Resolution	14-bit	
Amplitude Range	-1.5 to +1.5 V (50 Ω load), -3 to + 3 V (High-Z load)	
Waveform Type	Sine, Square, Ramp, Pulse, Noise, DC and 45 built-in waveforms	
Output impedance	50 Ω ± 2%	
Protection	Over-Voltage Protection, Current-Limiting Protection	
Insulation Voltage	±42 Vpk (for SUG1012I only)	
Sine		
Frequency	1 μHz to 25 MHz	
Offset Accuracy (10 kHz)	± (1% x Offset Setting Value +3 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 10 MHz	
Duty Cycle	1% to 99%	
Rise/Fall Time	< 24 ns (10% to 90%)	
Overshoot	(1 kHz, 1 Vpp, Typical) < 3% (typical 1 kHz, 1 Vpp)	

Technical Specifications	SMO2202X-E	SMO2352X-E
Pulse Width	> 50 ns	
Jitter	< 500 ps + 10 ppm	
Ramp		
Frequency	1 μ Hz to 300 kHz	
Linearity (Typical)	< 0.1% of Pk-Pk (Typical, 1 kHz, 1 Vpp, 50% Symmetry)	
Symmetry	0% to 100%	
DC		
Offset Range	\pm 1.5 V (50 Ω load) \pm 3 V (High-Z load)	
Accuracy	\pm (offset * 1% + 3 mV)	
Noise		
Bandwidth	> 25 MHz (-3 dB)	
Arbitrary Wave		
Frequency	1 μ Hz to 5 MHz	
Wave Length	16 kpts	
Sampling Rate	125 MSa/s	
Lead In	EasyWave and U-Disk	
Digital Channels option : SMO2000X-E-16LA		
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	-8 V to 8 V	
Logic Type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, custom	
Skew	D0 to D15 : \pm 1 sampling interval Digital to Analog : \pm (1 sampling interval +1 ns)	
I/O		
Standard Ports	USB Host, USB Device , LAN, Pass/ Fail, Trigger Out	
Pass/Fail	3.3 V TTL Output	
Display (Waveform)		
Display Mode	Dot, Vector	
Persist	Off, 1 sec, 5 sec, 10 sec, 30 sec, Infinite	
Screen Saver	1min, 5min, 10min, 30min, 1hour, Off	
General Information		
Display Type & Resolution	7.0 inches TFT LCD, 800 x 480 pixels	
Range	8 x 14 divisions	
Power	100 – 240 V AC, CAT II, 50 / 60 Hz	
Power Consumption	50 W Max	
Operating Condition	10°C to 40°C, \leq 85% RH	
Storage Condition	-20°C to +60°C, 85%RH @ 65°C, 24 Hours	
Compliance	LVD IEC 61010-1:2010 EMC EN6 1326-1 : 2013	
Dimension	W : 312 mm, D : 132.6 mm, H : 151 mm	
Weight	N.W : 2.6 Kg ; G.W : 3.8 Kg	
Standard Accessories	1:1 / 1:10 Probes, Power cord, USB cable, CD	
Available Options	16 channel MSO Function : SMO2000X-E-16LA (inclusive of MSO Function Software + 16 channel Logic Analyzer Probe SLA1016)	
	USB AWG Option : SMO2000X-E-FG (inclusive of USB AWG Software + USB Isolated AWG Module Hardware SAG1021I)	
	Wireless Communication Function : SMO2000X-E-WIFI (inclusive of WIFI software + USB WIFI Adapter TL-WN725N)	
	Isolated front end : ISFE	

Subject to change

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