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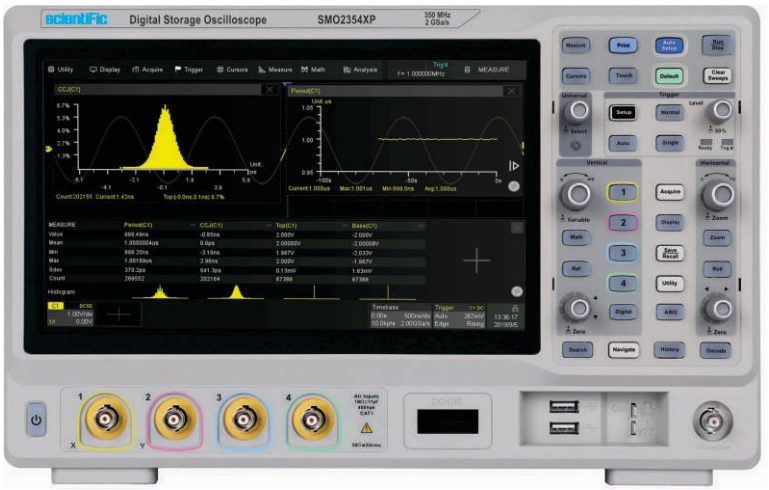
Since 1963

Digital Oscilloscope
SMO2000XP Series



Advance Features

- 350 MHz, 200 MHz, 100 MHz models with real time sample rate up to 2 GSa/s, 500 MHz bandwidth upgrade option is available for 350 MHz models.
- Waveform capture rates up to 120,000 wfm/s (normal mode) and 50000 wfm/s (sequence mode)
- Supports 256 level intensity grading and color temperature display modes.
- Record length up to 200 Mpts/ch, 400 Mpts in total for all 4 channels
- Digital trigger system
- Intelligent trigger : Edge, Slope, Pulse, Window, Runt, Interval, Dropout, Pattern and Video (HDTV supported.) Trigger zone helps to simplify advanced triggering.
- Serial bus triggering and decoder, supports I2C, SPI, UART, CAN, LIN (Standard) and CAN FD, Flex Ray, I2S and MIL-STD-1553B (optional) protocols.
- Low background noise, features 0.5 mv / div to 10 V / div voltage scales.
- 10 bit mode provides higher resolution and lower noise.
- Segmented acquisition (Sequence) mode, dividing the maximum record length into multiple segments (up to 90000), according to trigger conditions set by the user, with a very small dead time between segments to capture the qualifying event.
- History waveform record (History) function for up to 90000 triggered waveforms (frames)
- Automatic measurement function on 50+ parameters supports statistics with histogram and trend
- Two Math traces, support 2 Mpts FFT, +, -, x, ÷, d/dt, ∫dt, √‾, average, ERES, and formula editor
- Abundant data processing and analysis functions such as search, Navigate, Mask Test, Bode plot, Power Analysis (optional) and counter
- 16 digit channels (optional)
- Built in 50 MHz waveform generator (optional)
- Large 10.1" TFT – LCD display with 1024 x 600 resolution ; Capacitive touch screen supports multi-touch gestures
- Multiple interfaces : USB Host, USB Device (USBTMC), LAN (VXI-11/Telnet / Socket), Pass / Fail, Trigger out.
- Built in web server supports remote control by the LAN port using a web browser; Supports SCPI remote control commands

Technical Specification	SMO2102XP	SMO2104XP	SMO2204XP	SMO2354XP
Bandwidth	100 MHz	100 MHz	200 MHz	350 MHz (upgradable to 500 MHz)
Sample Rate (Max.)	2 GSa/s (interleaving mode), 1 GSa/s (non-interleaving mode)			
Memory Depth (Max)	200 Mpts/ch (interleaving mode), 100 Mpts/ch (non-interleaving mode)			
Waveform Capture Rate	Normal Mode : 120,000 wfm/s max., Sequence Mode : 500,000 wfm/s max.			
Trace intesity	256 Grades			
Peak detect	1 ns minimum detectable pulse			
Seqeuence	90,000 frames max ; interval between tirgger = 2 µs min.			
History	90,000 frames max			
Interpolation	Sin(x)/x, x			

Technical Specification		SMO2102XP	SMO2104XP	SMO2204XP	SMO2354XP
Vertical System					
Analog Channels		2 + EXT	4 + EXT	4 + EXT	4 + EXT
Bandwidth (- 3dB) @ 50 Ω		100 MHz	100 MHz*2	200 MHz	350 MHz (Standard)*2 500 MHz (Optional)*1.2
Rise Time (Typical) @ 50 Ω		3.5 ns*2	3.5 ns*2	1.7 ns*2	1 ns (standard) *2 800 ps (optional) *1.2
*1: in interleaving mode bandwidth is 500 MHz, rise time is 0.8 ns; in non-interleaving mode bandwidth is 350 MHz, rise time is 1 ns *2: in10-bit mode bandwidth is 100 MHz (typical), risetime is 3.3 ns (typical)					
Resolution		8 bit, 10 bit mode (with typical 100 MHz bandwidth)			
Vertical Range		8 Division			
Vertical Scale (Probe 1X)		1 MΩ : 500 µV/div to 10 V/div, 50 Ω : 500 µV/div to1 V/div			
DC Gain Accurancy		≤ 3.0%			
Offset Accuracy		± (1.5% x offset + 1.5% x full scale + 1 mV)			
Offset Range (Probe IX)		500 µV/div to 100 mV/div : ± 2 V 102 mV/div to 1 V/div. ± 20 V 1.02 V/div to 10 V/div ± 200 V			
Bandwidth flatness @ 50 Ω		10 kHz to BW/10 : ± 0.5 dB BW/10 to BW/ 3 : ± 0.8 dB BW/3 to BW2/3 : + 1.0 dB, -1.2 dB BW2/3 to BW + 2.0 dB, - 2.5 dB			
Bandwidth Limit		20 MHz (-0, + 20%), 200 MHz (-0, + 20 %)			
Low frequency response (AC coupling -3dB)		5 Hz (Typical)			
Coupling		DC, AC, GND			
Impedance		(1 MΩ ± 2%) || (17 pF ± 2 pF) 50 Ω : 50 Ω ± 1%			
Max. Input voltage		1 MΩ ≤ 400 Vpk (DC + AC), DC – 10 kHz, 50 Ω ≤ 5 Vrms, ± 10 V Peak			
Probe Attenuation		1X, 10X, 100X, Custom			
Horizontal System					
Time Scale		1 ns/div to 1000 s/div 0.5 ns/div to 1000 s/div when 500 MHz bandwidth option is installed			
Horizontal Rage		10 Divisions			
Display Format		Y–T, X–Y, Roll (≥ 50 ms / div)			
Skew (CH1 to CH4)		< 100 ps			
Time base Accuracy		± 1 ppm initial; ± 1 ppm 1st year aging; ± 3.5 ppm 10 year aging			
Trigger System					
Trigger Mode		Auto, Normal, Single			
Trigger Level Range		Internal : ± 4.1 div from screen center; EXT : ± 0.61 V; EXT/5 : ± 3.05 V			
Hold off Ranges		By time : 8 ns to 30 s (8 ns step) By event : 1 to 10^8			
Trigger Coupling	(CH1 to CH4)	DC : Passes all components of the signal AC : Blocks DC components and attenuates signals below 20 Hz LFRJ : Attenuates the frequency component below 1.2 MHZ HFRJ : Attenuates the frequency component above 600 kHz Noise RJ : increase the trigger hystersis			
	(EXT)	DC : Passes all components of the signal AC : Blocks DC components and attenuates signals below 8 Hz LFRJ : Attenuates the frequency components below 33 kHz HFRJ : Attenuates the frequency components above 967 kHz			
Accuracy (Typical)		CH1 to CH4 ± 0.2 div, EXT : ± 0.3 div			
Sensitivity	(CH1 to CH4)	>10 mv/div : ± 0.13 div (Noise RJ = OFF), ± 0.33 div (Noise RJ = ON)			
		5 mV/div to 10 mV/div : ± 0.26 div (Noise RJ = OFF), ± 0.33 div (Noise RJ = ON)			
		≤ 2 mv/div : ± 0.5 div (Noise RJ = OFF), ± 0.5 div (Noise RJ = ON)			
	EXT :	200 mVpp (DC - 10 MHz) 300 mVpp (10 MHz to 300 MHz)			
	EXT/5 :	1Vpp (DC - 10 MHz) 1.5 Vpp (10 MHz to 300 MHz)			
Jitter		CH1 to CH4: < 10 ps rms, 6 divisions pk -pk, 2 ns edge Ext : < 200 ps rms			
Displacement		Pre-Trigger : 0 to 100% memory Delay-Trigger : 0 to 5000 div			
Zone		Up to 2 zones ; Source : CH1 to CH4; Property : intersect, Not intersect			
Edge Trigger					
Source		CH1 to CH4 / EXT / (EXT/5) / AC Line / D0 to D15			
Slope		Rising, Falling, Rising & Falling			

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Slope Trigger				
Source	CH1 to CH4			
Slope	Rising, Falling			
Limit Range	≤, ≥ , in range, out of orange			
Time Range	2 ns to 20 s			
Resolution	1 ns			
Pulse Width Trigger				
Source	CH1 to CH4/ D0 to D15			
Polarity	+ wid , -wid			
Limit Range	≤, ≥ , in range, out of orange			
Time Range	2 ns to 20 s			
Resolution	1 ns			
Video Trigger				
Source	CH1 to CH4			
Signal Standard	NTSC, PAL, 720p/50, 720p/60,1080p/50, 1080p/60,1080i/50,1080i/60, Custom			
Sync	ANY, Select			
Trigger Condition	Line, Field			
Window Trigger				
Source	CH1 to CH4			
Window Type	Absolute, Relative			
Inrerval Trigger				
Source	CH1 to CH4/ D0 to D15			
Slope	Rising, Falling			
Limit Range	≤, ≥ , in range, out of orange			
Time Range	2 ns to 20 s			
Resolution	1 ns			
Dropout Trigger				
Source	CH1 to CH4/ D0 to D15			
Timeout Type	Edge, State			
Slope	Rising, Falling			
Time Range	2 ns to 20 s			
Resolution	1 ns			
Runt Trigger				
Source	CH1 to CH4			
Limit Range	≤, ≥ , in range, out of orange			
Time Range	2 ns to 20 s			
Resolution	1 ns			
Pattern Trigger				
Source	CH1 to CH4/ D0 to D15			
Pattern Setting	Don't Care, Low, High			
Logic	AND, OR, NAND, NOR			
Limit Range	≤, ≥ , in range, out of orange			
Time Range	2 ns to 20 s			
Resolution	1 ns			
Serial Trigger				
Source	CH1 to CH4/ D0 to D15			
Protocol	Standard : I^2C, SPI, UART, CAN, LIN Optional : CAN FD, FlexRay, I^2S, MIL-STD-1553B			
I^2C Trigger	Type : Start, Stop, Restart, No Ack, EEPROM, Address & Data, Data Length			
SPI Trigger	Type : Data			
UART Trigger	Type : Start, Stop, Data, Parity Error			
CAN Trigger	Type : All, Remote, ID, ID+Data, Error			
LIN Trigger	Type : Break, Frame ID, ID+Data, Error			
CAN FD Trigger (Optional)	Type : Start, Remote, ID, ID+Data, Error			
Flex Ray Trigger (Optional)	Type : TSS, Frame, Symbol, Errors			
I^2S Trigger (Optional)	Type : Data, Mute, Clip, Glitch, Rising Edge, Falling Edge			
MIL-STD-1553B Trigger (Optional)	Type : Transfer, Word, Error, Timing			
Serial Decoder				
Decoders	2			
Decoder Type	Full duplex			
Threshold	- 4.1 to 4.1 div			
List	1 to 7 lines			
I^2C				
Signal	SCL, SDA			
Address	7 bit, 10 bit			
Decoded frames (Max.)	2000			

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SPI				
Signal	CLK, MISO, MOSI, CS			
Edge Select	Rising, Failing			
Chip Select	Active high, Active low, Clock timeout			
Bit Order	LSB, MSB			
Decoded frames (Max.)	15000			
UART				
Signal	RX, TX			
Data Width	5bit, 6bit, 7bit, 8bit			
Parity Check	None, Odd, Even, Mark, Space			
Stop Bit	1bit,1.5bit, 2bit			
Idle Level	Low, High			
Bit Order	LSB, MSB			
Decoded Frames (Max.)	15000			
CAN				
Source	CH1 to CH4/ D0 to D15			
Decoded Frame (Max.)	2000			
LIN				
LIN Specification Package Revision	Ver1.3, Ver2.0			
Baud Rate	600bps,1200bps, 2400bps, 4800bps, 9600bps,19200bps, custom			
Decoded frames (Max.)	3000			
CAN FD (Optional)				
Source	CH1 to CH4 / D0 to D15			
Nominal Baud Rate	10kbps, 25kbps, 50kbps, 100kbps, 250kbps, 1Mbps, Custom			
Data Baud Rate	500kbps, 1Mbps, 2Mbps, 5Mbps, 8Mbps, 10Mbps, Custom			
Decoded frames (Max.)	1000			
Flex Ray (Optional)				
Source	CH1 to CH4			
Data Baud Rate	2.5Mbps, 5Mbps, 10Mbps, Custom			
Decoded Frames (Max.)	1000			
I^2S (Optional)				
Signal	BCLK, WS, DATA			
Audio Variant	Audio-I2S, Audio L-J, Audio RJ			
Start Bits	0 to 31			
Baud Rate	1 to 32			
Decoded frames (Max.)	10000			
MIL-STD-1553B (Optional)				
Source	CH1 to CH4			
Decoded frames (Max.)	10000			
Measurement				
Auto Measurement				
Source	CH1 to CH4 / D0 to D15, F1 to F2, Ref, History, Z1 to Z4			
Mode	Simple, Advanced			
Range	Screen, Gate			
Vertical	Max, Min, Pk-Pk, Top, Base, Amplitude, Mean, Cycle Mean, Stdev, Cycle Stdev,, RMS, Cycle RMS, Median, Cycle Median, FOV, FPRE, ROV, RPRE, Level@Trigger			
Horizontal	Period, freq, Time@Max, Time@min, +Width, -Width, 10-90% Rise, 90-10%Fall, 20-80% Rise, 80-20% Fall, + BWidth, + Duty, - Duty, Delay, T@M, CCJ			
Miscellaneous	+ Area, - Area, Area, AbsArea, Cycles, Rising Edges, Falling Edges, Edges, Ppulses, Npulses			
Delay	Phase, FRFR, FRFF, FFFR, FFFF, FRLR, FRLF, FFLR, FFLF, Skew			
Statistics	Current, Mean, Min, Max, Sdev, Count, Histogram, Trend			
Cursors				
Source	CH1 to CH4, D0 to D15, Math, Ref			
Type	Manual : Time X1, X2, (X1-X2), (1/ΔT) Voltage/Current : Y1, Y2, (Y1-Y2) Track Time X1, X2, (X1-X2)			
Math				
Traces	F1, F2			
Sources	CH1 to CH4, Z1 to Z4, F1 to F2			
Operation	+, -, *, ÷, FFT, d/dt, ∫dt, ,√‾, Formula Editor			
FFT	Length : 2Mpts, 1Mpts, 512kpts, 256kpts, 128kpts, 64kpts, 32kpts, 16kpts, 8kpts, 4kpts, 2kpts Window : Rectangular , Blackman, Hanning, Hamming, Flattop Display : Full Screen, Split, Exclusive Model : Normal, Max hold Average Tools : Peaks, Markers			

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Analysis				
Search				
Source	CH1 to CH4, History			
Mode	Edge, Slope, Pulse, Interval, Runt			
Copy Setting	Copy from trigger, Copy to trigger			
Navigate				
Type	Search event, Time, History frame			
Mask test				
Source	CH1 to CH4, Z1 to Z4			
Mask creating	Auto (Create mask), Custom (Mask Editor, Optional)			
Mask test speed	Up to 80,000 frames/s			
Store failled frames	To history, To screen shot			
Bode Plot				
Source	CH1 to Ch4			
Supportedsignal Sources	Built in waveform generator			
	SMG Series waveform generators, Connection : USB, LAN			
Sweep Type	Simple, Vari-Level			
Frequency	Mode : Linear, Logarithmic, Range : 10 Hz to 120 MHz			
Masure	Upper cutoff frequency, Lower cutoff frequency, Bandwidth, Gain margin, Phase margin			
Power Analysis (Optional)				
Measure	Power quality, Current Harmonics, Inrush current, Switching loss, Slew rate, Modulation, Output ripple, Turn on/Turn off, Transient response, PSRR, Efficiency			
Counter				
Source	CH1 to CH4			
Frequency Resolution	7 digits			
Totalizer	Counter on edges, Support Gate and Trigger			
500 MHz Bandwidth Extension (Optional)				
Channels	2 (CH1 & CH3, CH1 & CH4, CH2 & CH3 or CH2 & CH4)			
Bandwidth (-3dB) @ 50 Ω	500 MHz			
Rise Time (typical) @ 50 Ω	800 ps			
Sample Rate	2 GSa/s			
Resolution	8 bit,10 bit mode (with typical 100 MHz bandwidth)			
Memory Depth	200 Mpts/ch			
Digital Channels (Optional)				
Channels	16 divided to 2 groups : D0 to D7, D8 to D15			
Max. Sampling Rate	500 MSa/s			
Memory Depth	50 Mpts/ch			
Min. Detectable Pulse	3.3 ns			
Level Range	-10 V to10 V			
Logic Type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, Custom			
Skew	D0 to D15: ± sampling interval Digital to Analog: ± (1 sampling interval + 1 ns)			
Waveform Generator (Optional)				
Channels	1			
Max. Output Frequency	50 MHz			
Sampling Rate	125 MSa/s			
Frequency Resolution	1 µHz			
Frequency Accuracy	± 50 ppm			
Vertical Resolution	14 bit			
Amplitude Range	-1.5 V to +1.5 V (into 50 Ω), -3 V to + 3 V (into High-Z)			
Waveforms	Sine, Square, Ramp, Pulse, DC, Noise, 45 Arbitrary			
Output Impedance	50 Ω ± 2%			
Protection	Over Voltage protection, Current limit			
Sine				
Frequency	1 µHz to 50 MHz			
Offset Accuracy	± (1% x offset setting value + 3mVpp)			
Amplitude Flatness @ 10 kHz, 5 Vpp	± 0.3 dB, ≤ 25 MHz ± 0.5 dB, > 25 MHz			
SFDR	DC - 1 MHz : -60 dBc 1 MHz to 5 MHz : -55 dBc 5 MHz to 25 MHz : -50 dBc 25 MHz to 50 MHz : -40 dBc			
Harmonic distortion	DC - 5 MHz : -50 dBc 5 MHz to 25 MHz : -45 dBc 25 MHz to 50 MHz : -40 dBc			
Square /Pulse				
Frequency	1 µHz to 10 MHz			
Duty Cycle	1% to 99%			

Technical Specification	SMO2102XP	SMO2104XP	SMO2204XP	SMO2354XP
Edge	< 24 ns (10% to 90%)			
Overshoot	< 3% (typical, 1 kHz, 1 Vpp)			
Pulse width	> 50 ns			
Jitter (cycle - cycle)	< 500 ps + 10 ppm			
Ramp				
Frequency	1 µHz to 300 kHz			
Linearity	< 0.1% of pk-pk (typical,1 kHz, 1 Vpp, 50% symmetry)			
Channels	0% to 100%			
DC				
Offset Range	± 1.5 V (into 50 Ω) ± 3 V (into Hi-z)			
Accuracy	± (|setting value|*1%+3 mV)			
Noise				
Bandwidth	> 25 MHz			
Arb				
Frequency	1 µHz to 5 MHz			
Waveform memory	16kpts			
Sampling Rate	125 MSa/s			
Wave import	From Easy Wave, from U-disk directly from waveform data of analog channels			
I/O				
Front Panel	USB 2.0 Host x 2 Probe compensation : 1 kHz, 3 V_{pp} Square wave			
Rear Panel	USB 2.0 Device, LAN : 100 M EXT Trigger : EXT ≤ 1.5 Vrms , EXT/5 ≤ 7.5 Vrms Auxiliary output : TRIG OUT :- 3.3 V LVCMOS : PASS/FAIL OUT :- 3.3 V TTL			
Display				
Display Type	10.1" TFT LCD with capacitive touch screen			
Resolution	1024 x 600			
Range	8 x 10 grid			
Display Type	Dot, Vector			
Persistence Time	OFF, 1s, 5s,10s, 30s, Infinite			
Color Display	Normal, Color			
Environmental				
Temperature	Operating : 0˚C to 40˚C			
	Storage : -20˚C to 60˚C			
Humidity	Operating : 85% RH, 40˚C			
	Storage : 85% RH, 65˚C			
Electromagnetic Compatibility	EN 61326-1:2013			
Safety	EN 61010-1:2010			
Power Supply				
Input Voltage & Frequency	100 to 240 Vrms, 50/60 Hz			
	100 to 120 Vrms, 400 Hz			
Power consumption	80 W max, 50 W typical, 4 W typical in stand by mode			
Mechanical				
Dimension	W : 352 mm, D : 224 mm, H : 111 mm			
Weight	N.W : 3.3 Kg ; G.W : 4.8 Kg			

Subject to change

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