

# Digital Oscilloscope

## SMO1104U



### Advance Features

- 100 MHz BW, 4 Channels
- 1 GSa/s Sampling rate
- 14 Mpts Memory Depth
- 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, 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
- 256 Level Intensity Grading Display
- 7.0" TFT LCD (800 x 480)

Technical Specifications	SMO1104U
<b>Vertical System</b>	
Bandwidth	100 MHz
Input Channels	4
Rise Time	< 3.5 ns
Coupling	DC, AC and GND
Input Impedance	DC : (1 MΩ ± 2%)    (11 pF ± 2 pF)
CH to CH Isolation	DC to Max BW > 40 dB
Max. Input Voltage	1 MΩ : ≤400 VPK (DC+ Peak AC ≤ 10 kHz)
Probe Attenuation Factors	0.000001 to 100000X
Bandwidth Limit (-3 dB)	20 MHz
Vertical Resolution	8 Bits
Vertical Scale	1 mV/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 %
<b>Acquisition System</b>	
Sampling Rate	1 GSa/s (Single Channel), 500 MSa/s (Two Channels), 250 MSa/s (Four Channels)
Memory Depth	14 Mpoints
Peak Detect	2 ns
Average	4, 16, 32, 64, 128, 256, 512, 1024
Eres	Enhance bits : 0.5, 1, 1.5, 2, 2.5, 3; Selectable
Waveform Interpolation	Sin (x)/x, Linear
<b>Horizontal System</b>	
Time Base Range	2 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)
<b>Trigger System</b>	
Trigger Mode	Auto, Normal, Single
Trigger Sensitivity	0.6 div (DC to Max. BW)
Accuracy	± 0.2 div
Level	± 4.5 div from the center of the screen
Trigger Coupling	DC, AC, LF reject, HF reject, Noise reject
Sensitivity	DC to Max BW 0.6 div

<b>Technical Specifications</b>		<b>SMO1104U</b>
Jitter	< 100 ps	
Displacement	Pre-Trigger : 0 to 100% Memory Delay Trigger : 0 to 10,000 div	
Trigger Type	Edge, Slope, Pulse, Video, Window, Interval, Dropout, Runt, Pattern, Serial Trigger	
Holdoff Range	80 ns to 1.5 s	
<b>Edge Trigger</b>		
Slope	Rising, Falling, Rising & Falling	
Source	All Channels, AC line	
<b>Slope Trigger</b>		
Slope	Rising, Falling	
Limit Range	<, >, <>, ><	
Source	All Channels	
Time Range	2 ns to 4.2 s	
Resolution	1 ns	
<b>Pulse Trigger</b>		
Polarity	+ wid , -wid	
Limit Range	<, >, <>, ><	
Source	All Channels	
Pulse Range	2 ns to 4.2 s	
Resolution	1 ns	
<b>Video Trigger</b>		
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	
<b>Window Trigger</b>		
Window Type	Absolute, Relative	
Source	All Channels	
<b>Interval Trigger</b>		
Slope	Rising, Falling	
Limit Range	<, >, <>, ><	
Source	All Channels	
Time Range	2 ns to 4.2 s	
Resolution	1 ns	
<b>Dropout Trigger</b>		
Timeout Type	Edge, State	
Source	All Channels	
Slope	Rising, Falling	
Time Range	2 ns to 4.2 s	
Resolution	1 ns	
<b>Runt Trigger</b>		
Polarity	+wid , -wid	
Limit Range	<, >, <>, ><	
Source	All Channels	
Time Range	2 ns to 4.2 s	
Resolution	1 ns	
<b>Pattern Trigger</b>		
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	
<b>Serial Trigger</b>		
<b>I2C Trigger</b>		
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	
<b>SPI Trigger</b>		
Condition	Data	
Source (CS/CL/Data)	All Channels	
Data Format	Binary	

<b>Technical Specifications</b>	<b>SMO1104U</b>
Data Length	4 to 96 bit
Bit Value	0, 1, X
Bit Order	LSB, MSB
<b>UART Trigger</b>	
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 5000000 bit/s
<b>CAN Trigger</b>	
Condition	Start, 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
<b>LIN Trigger</b>	
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
<b>Search</b>	
Event	Edge, Slope, Pulse, Interval, Runt
Event Number	Y-T : 700 ROLL : No limitation Stop after ROLL : 700
<b>Serial Decoder</b>	
Decoders	2
<b>I2C Decoder</b>	
Signal	SCL, SDA
Address	7 bits, 10 bits
List	1 to 7 lines
Threshold Level	- 4.5 to 4.5 div
<b>SPI Decoder</b>	
Signal	SCL, MISO, MOSI
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
<b>UART Decoder</b>	
Signal	RX, TX
Data Width	5 bit, 6 bit, 7 bit, 8 bit
Parity Check	None, Odd, Even, Space, Mark
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
<b>CAN Decoder</b>	
Signal	CAN_H, CAN_L
Source	CAN_H, CAN_L
Threshold	- 4.5 to 4.5 div
List	1 to 7 lines

Technical Specifications		SMO1104U
<b>LIN Decoder</b>		
LIN Specification Package Revision	Ver 1.3, Ver 2.0	
Threshold	-4.5 to 4.5 div	
List	1 to 7 lines	
<b>Measurement</b>		
Source	All Channels , All Channels in Zoom, Math, All References, History	
Number of Measurements	Display 4 measurements at the same time. 5 measurement displayed in statistics table	
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, Stdev, Count	
Counter	Hardware 6 bits counter (channels are selectable)	
<b>Math Functions</b>		
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, Exclusive	
<b>Waveform Display</b>		
Display Mode	Dot, Vector	
Persist	Off, 1 sec, 5 sec, 10 sec, 30 sec, Infinite	
Color Display	Normal, Color	
Screen Saver	1min, 5min, 10min, 30min, 1h, Off	
<b>Standards</b>		
Electromagnetic	Meets EMC directive (2014/30/EU), meets or exceeds IEC 61326-1:2012/EN61326-1:2013 (Basic)	
Compatibility	Conducted disturbance	CISPR 11/EN/ 55011
	Radiated disturbance	CISPR 11/EN 55011
	Electrostatic discharge (ESD)	IEC 61000-4-2/EN 61000-4-2
	Radio frequency electromagnetic field immunity	IEC 61000-4-3/EN 61000-4-3
	Electrical fast transients (EFT)	IEC 61000-4-4/EN 61000-4-4
	Surges	IEC 61000-4-5/EN 61000-4-5
	Radio frequency continuous conducted immunity	IEC 61000-4-6/EN61000-4-6
Safety	UL 61010-1:2012/R: 2018-11;	
	UL 61010-2:030/R: 2018	
<b>General Informations</b>		
<b>I/O</b>		
Standard	USB Host, USB Device, LAN, Pass/Fail, Trigger Out	
Pass / Fail	3.3 V TTL Output	
<b>Screen Display</b>		
Display Type	7.0 inches TFT LCD	
Resolution	800 (Horizontal) x 480 (Vertical) pixel	
Range	8 x 14 divisions	
Input Supply	100 to 240V AC, CAT II, 50 / 60 / 400 Hz	
Power Consumption	50 W Max	
Operating Condition	10°C to 50°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 132.6 mm x 151 mm	
Weight	N.W. : 2.6 kg : G.W. : 3.8 kg	
Standard Accessories	1:1 / 1:10 Switchable Probes, Power cord, USB cable, CD	

Subject to Change

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