Automotive Oscilloscope SATO Series

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PRODUCT OVERVIEW

Equipped with highly sensitive digital trigger system and comprehensive Automotive Diagnostic software preset, the SATO able to help mechanics quickly and easily find out all kinds of problem on all types of vehicles, including circuits on Charging/ Start up, various Sensors and Actuators, Ignition system, and Networks (CAN, CAN FD, LIN, Flexray, K line) etc. Combined with Micsig's unique touch algorithm patented technology, the SATO brings unparalleled operating experience to automotive users.

- Professional automotive diagnostic tests
- Compact portable design, best for field work
- 7500mAh large battery support 5-hour use
- Android-based OS, 32GB internal storage
- Deep memory to display all signal details
- Comprehensive serial bus protocol decodings
- Support Wi-Fi, USB, PC and SCPI control
- Hardware-based filter to eliminates interferences

Key Specifications

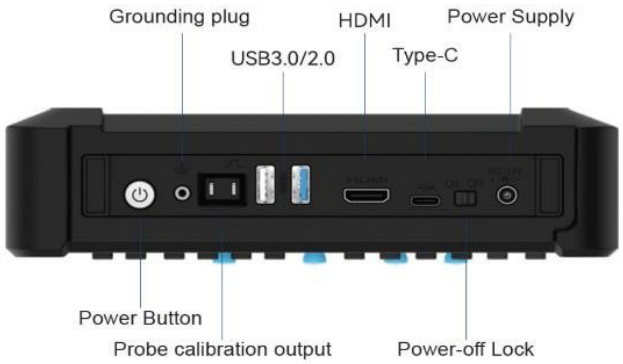
Model	SATO1004	SATO2002
Bandwidth	100MHz	200MHz
Analog Channels	4	2
Rise Time	≤ 3.5ns	≤ 1.75ns
Sampling Rate (Max.)	1GSa/s	
Memory Depth	70Mpts	
Waveform Capture Rate (Max.)	130,000 wfms/s	
Interfaces	Wi-Fi, USB 3.0/2.0 Host, USB Type-C, Grounding, HDMI, Trigger out	
Display	Industrial 8" TFT-LCD (800*600)	
Dimension / Net Weight	265*192*50mm / 1.9kg (with battery)	
Battery	7.4V, 7500mAh, Li-ion battery	

CHARACTERISTICS & FEATURES

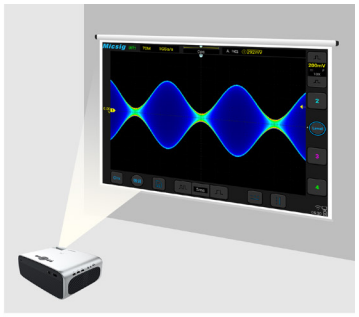
Auto-diagnostic Presets:

Charging/Start Circuit: 12V&24V charging, Alternator AC Ripple, Ford smart Alternator, 12V&24V Start, Cranking Current
Sensor: ABS, Accelerator Pedal, Air Flow Meter, Camshaft, Coolant Temperature, Crankshaft, Distributor, Fuel pressure, Knock, Lamda, MAP, Road Speed, Throttle Position
Actuators: Carbon Canister Solenoid Valve, Diesel Glow Plugs, EGR Solenoid Valve, Fuel Pump, Idle Speed Control Valve (IAC), Injector (Petrol), Injector (Diesel), Pressure Regulator, Quantity Control Valve, Throttle Servomotor, Variable-speed cooling fan, Variable Valve Timing
Ignition: Primary, Secondary, Primary + Secondary
Networks: CAN High & CAN Low, CAN FD, FlexRay, K line
Combination Tests: Crankshaft + Camshaft, Camshaft + Primary Ignition, Primary ignition + Injector Vol, Crankshaft + Camshaft + Injector Vol.+ Secondary Ignition
Pressure Tests: Intake Manifold, Exhaust Tailpipe, In-Cylinder, In-Crankcase

- Built-in 7500mAh Li-ion battery support 5-hour outdoor use

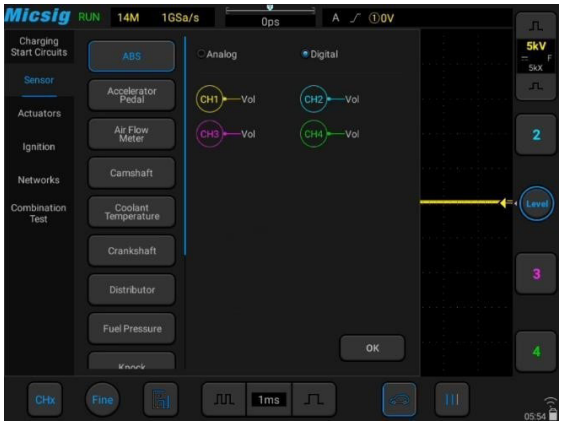


- Complete connectivity (* switch Power-off lock to ON for first-time use)

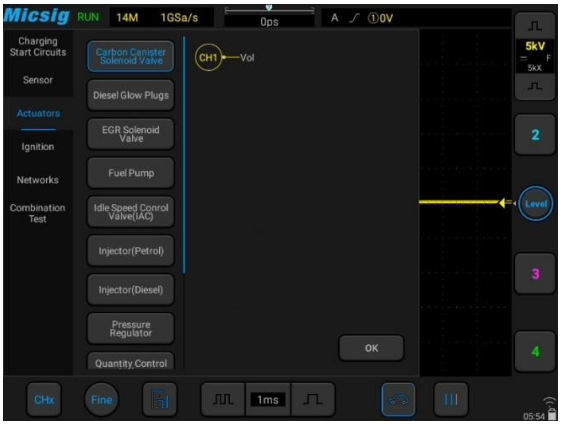


The SATO series supports PC software + Mobile App (Android / iOS) remote control via Wi-Fi, USB to access internet for online upgrade, it also can be projected through HDMI port for demonstrations for training and education purpose.

▲ Support 12/24V Charging & Start circuit, AC Ripple, Cranking Current tests



▲ Directly measure the waveform of various Sensors,by comparing with standard waveform, helps user easily find out possible problem.

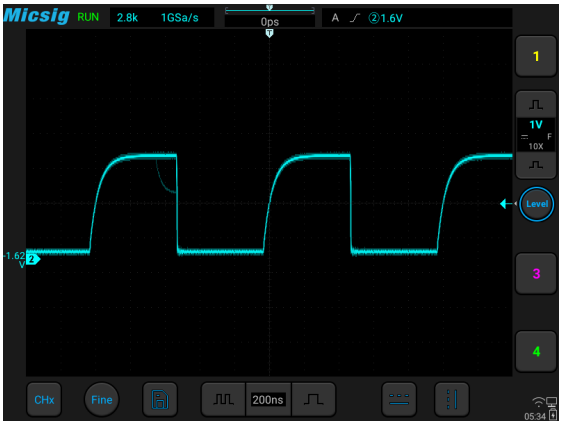


▲ Support multiple Actuator tests, including Carbon Canister & EGR solenoid valve, Fuel PumpInjectors, Cooling fan, Pressure Regulator, etc.

▲ The ignition system of a car is usually composed of primary and secondary coils and spark plugs. Can test both Primary and Secondary ignition signals, to find out possible malfunction.

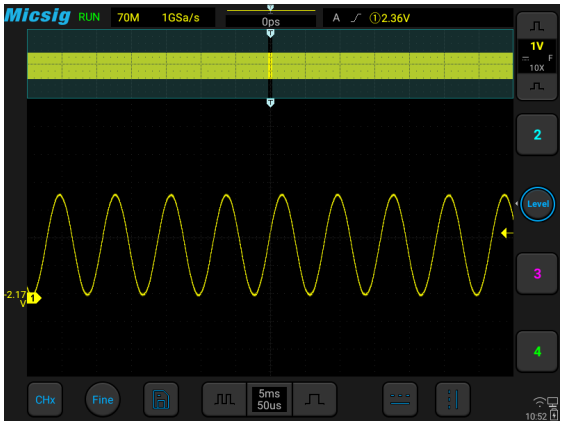
▲ SATO is capable of acquiring and decoding CAN High /CAN Low, CAN FD, LIN, FlexRay, and K line signals,delivers professional Network communication tests on vehicles.

▲ The electronic faults can be complicated, by comparing the collected various waveforms, users judgefaults by analyzing the timing and quantitative relationships between waveforms.



High Waveform Update Rate

With a waveform update rate of up to 130,000 wfm/s, the SATO can easily capture unusual or low probability events.

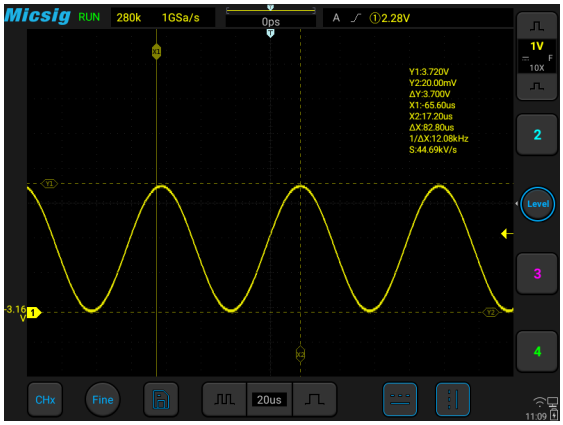


Ultra-deep Memory

Using hardware-based Zoom technique and memorydepth of up to 70Mpts, users to move and browse waveforms much easier and quickly zoom in to focuson the area of interest.

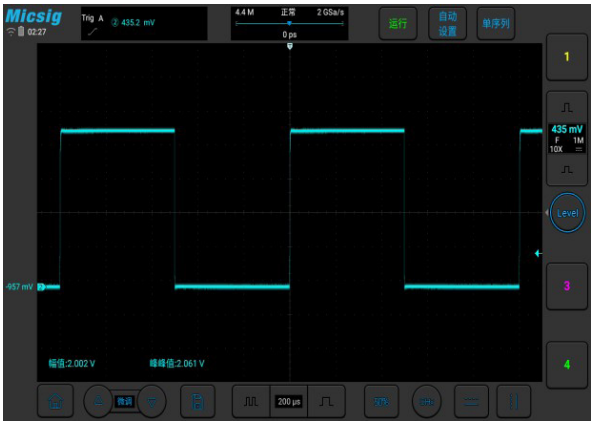
Powerful Trigger Functions

Support Edge, Pulse, Logic, N Edge, Runt, Slope, Timeout, Video and Serial trigger, most intuitive trigger settings.



Convenient Cursor Measurement

One touch to open horizontal and vertical cursors, eachcursor can be moved separately or simultaneously.



Vertical scale fining

By pinching two fingers apart on the screen, you can adjust the vertical scale as you like, no longer limited by the 1/2/5 step limit.

Serial Bus Decoding and Analysis

Support RS-232/422/485/UART, LIN, CAN, CAN FD, I²C, SPI serial bus decoding and triggering options, display waveform and data at the same time.

Specifications

Vertical System	
Bandwidth Filter	Full bandwidth, Low pass (30kHz~max bandwidth)
Input Coupling	DC, AC, GND
Input Impedance	1MΩ±1%‖14.5pF±3pF
Vertical Resolution	8 bits
DC Gain Accuracy (Amplitude Accuracy)	<±2% (1MΩ Input)
Input Sensitivity Range	1mV/div~10V/div (1MΩ Input)
Noise	≤ 1.2mVpp (1mV/div,1MΩ)
Ch-to-Ch Isolation DC to Maximum Bandwidth	≥ 40dB (100:1)
Offset Range	±2.5V (Probe attenuation X1, <500mV/div), ±120V (Probe attenuation X1, ≥ 500mV/div)
Maximum Input Voltage	CAT I 300Vrms (1MΩ Input)

Horizontal System	
Time Base	2ns/div~1ks/div
Time Base Delay Time Range	14 divisions ~ 14ks
Clock Drift	≤ ±5ppm / year
Time Base Accuracy	±20ppm

Sampling System	
Sampling Method	Real-Time
Peak Detect	Capture narrow glitches at all sweep speeds: CH – 1ns, dual CH – 2ns, four CH – 4ns
Maximum duration at highest sampling rate	70ms
Average	Selectable from 2, 4, 8, 16, 32, 64, 128, 256
Envelope	Selectable from 2, 4, 8, 16, 32, 64, 128, 256, ∞

Trigger System	
Trigger Mode	Auto, Normal, Single
Trigger Coupling	DC, AC, high frequency reject, low frequency reject, noise reject
Trigger Holdoff Range	200ns~10s
Trigger Types	
Edge	Positive or negative slope on any channel. Coupling includes DC, HF reject, LF reject, and noise reject.
Pulse Width	Trigger on width of positive or negative pulses that are >, <, =, ≠ or within a period of time of 8ns ~ 10s.

Logic	Trigger on any logic pattern of the channel changes to >, <, =, ≠ , true value, false value within the set time range. Any input can be used as a clock to find patterns on clock edges. Defines the assigned mode (AND, OR, NAND, NOR) of all input channels as high, low or irrelevant
Video	Trigger on video signals varies according to different video formats, generally PAL/625, SECAM, NTSC/525, 720P, 1080I, 1080P, etc.
Time Out	Starting from the intersection of the signal and the trigger level, the trigger is generated when the duration above (or below) the trigger level reaches the set time
Slope	Trigger on the time of the waveform from one level to another level meets the set time condition
Runt Pulse (Runt)	Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again.
N Edge	Trigger on the Nth rising/falling edge of the waveform
Serial Bus	RS-232/422/485/UART、CAN、CAN FD、LIN、SPI、I2C

Waveform Measurements	
Cursors	Horizontal, Vertical, Cross
Automated Measurements	31 types, of which up to 10 types can be displayed on-screen at any time. Including: Period, Frequency, Rise Time, Fall Time, Delay, Positive Duty Cycle, Negative Duty Cycle, Positive Pulse Width, Negative Pulse Width, Burst Width, Positive Overshoot, Negative Overshoot, Phase, Peak-to-Peak, Amplitude, High, Low, Maximum, Minimum, RMS, Cycle RMS, Mean, Cycle Mean
Hardware Frequency Meter	6 digits
Waveform Math	
Dual Waveform	Add, Subtract, Multiply, Divide
FFT	Points: max. 100kpts Rectangular, Hamming, Blackman, Hanning
AX+B	A: ±1k, Min. Resolution 1p or 4it B: ±1k, Resolution 1p or 5bit X: Analog channel
Advance math	Advanced input, including +、-、*、/、<、>、≤、≥、==、!=、&&、‖、（、）、!(、sqrt、abs、deg、rad、exp、diff、ln、sin、cos、tan、intg、lg、asin、acos、atan

Display System	
Display Type	8-inch TFT LCD capacitive, 800*600 pixels, 14*10 divisions
Operation Method	Touch, Button, Touch + Button
Persistence Duration	Auto, 10ms~10s, ∞
Time Base Mode	YT、XY、Roll、Zoom
Expand Benchmark	Center, Trigger position
Waveform Display	Vectors, Line, brightness adjustable
Waveform Update Rate	130,000 wfms/s
Clock	Real time, user adjustable

Storage	
Storage Medium	Local, USB drive
Internal Storage	32G
Waveform Storage Format	WAV、CSV、BIN
Store Waveform Quantity	Unlimited
Stored Waveform Rename	Support
Reference Waveform Display	4 internal waveforms
Quick Screenshot	Support
User Setting Storage	10 internal setups
User Settings Rename	Support
USB Flash Drive	Support industry standard flash drives
Screenshot & Video record	Support

Input / Output Ports	
USB3.0 Port	Support one USB mass storage device, read and edit
USB2.0 Port	One, read and edit
USB Type-C	One, read and edit
DC Port	One
Probe Compensator	1kHz、2Vpk-pk
HDMI	HDMI 1.4
Wi-Fi	Support
Android/iOS remote application	Support
SCPI	Support

Power Source	
Power Voltage Range	100~240V AC, 50/60Hz
Power Consumption	< 60W
Adapter Output	12V DC, 4A
Battery	7.4V, 7500mAh Li-ion battery

Environment	
Temperature	
Operating	0℃ ~ 45℃
Non-operating	-40℃ ~ 60℃
Humidity	
Operating	5% ~ 85%, 25℃
Non-operating	5% ~ 90%, 25℃
Altitude	
Operating	< 3000m
Non-operating	< 12000m

Physical Characteristics	
Dimensions (W x H x D)	265*192*50mm
Weight	Net: 1.9kg (with battery), Volume Weight: 4.5kg

Standard Kit


2 x passive probe


2/4 BNC-Banana cable


power cord


1/2 x Alligator clips/pair

1/2 x soft pin probe/pair


power adapter


Battery (built-in)


screen protector

* SATO2002 are 2CH oscilloscopes, and SATO1004 are 4CH oscilloscopes.
The standard configuration of the 2CH oscilloscope includes 2 BNC banana cables, 1 pair of alligator clips, and 1 pair of soft pin probe.
The standard configuration of the 4CH oscilloscope includes 4 BNC banana cables, 2 pairs of alligator clips, and 2 pairs of soft pin probe.

Master Kit


2 x passive probe


2/4 BNC-Banana cable


secondary ignition probe


1/2 x Alligator clips/pair

1/2 x soft pin probe/pair


Multimeter probe


power cord


power adapter


Suitcase


Battery (built-in)


screen protector

Optional instruments

Optical-fiber Isolated Probe	
SigOFIT series	Bandwidth: up to 1GHz, Common mode voltage: 85kVpk, DC gain accuracy: 1%, CMRR: up to 180dB

High Voltage Differential Probe	
DP series	Bandwidth: up to 500MHz; Differential voltage (DC+AC PK) Max.7000V; Accuracy：±2%

Current Probes	
HF AC/DC current probe CP series	Bandwidth: up to 100MHz, Range: 5A/30A, Accuracy: ±1%
LF AC/DC current probe CP2100 series	Bandwidth: up to 2.5MHz, Range: 10A/100A
Rogowski AC current probe RCP series	Bandwidth: 2Hz - 30MHz, Range: 6000Apk, Accuracy: 2%
AC Current Probe ACP1000	Bandwidth: 10Hz -100KHz, Range: 0.1Apk-1000Apk

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Official Website