Micsig

Automotive Tablet Oscilloscope
ATO Series
DATASHEET

- 2 or 4 analog channels
- Max. 300MHz bandwidth
- Max. 2GSa/s sampling rate
- Up to 220Mpts memory depth
- 7500mAh large Li-ion battery
- Support electronic measurements for all vehicles

PRODUCT OVERVIEW

ATO series oscilloscope is an oscilloscope dedicated to automotive maintenance and diagnostics. Equipped with professional automotive diagnostic functions, it comes with 2 and 4 channels, max. 300MHz bandwidth, up to 2GSa/s sampling rate and 220Mpts memory depth, delivers most powerful signal capture and analysis capability.

With 10.1-inch high-resolution full touch screen, large built-in battery, and Micsig's dedicated SigtestUI™ multi-tasking system, the ATO automotive oscilloscope making modern automotive diagnostics much easier than ever before.

- ◆ Professional automotive diagnostic tests
- ◆ Compact portable design, best for field work
- ◆ Large battery support continual field work
- ◆ Android-based OS, 32GB internal storage
- ◆ Switchable 1MΩ/50Ω input impedance

- ◆ Deep memory to display all signal details
- ◆ Comprehensive serial bus trigger & decoding
- ◆ Support USB, PC and SCPI control
- ◆ Hardware-based filter to eliminates interferences
- ◆ Support segmented storage acquisition

Key Specifications

Model	ATO3004	ATO3002	ATO2004	ATO2002	ATO1004
Bandwidth	300MHz	300MHz	200MHz	200MHz	100MHz
Analog Channels	4	2	4	2	4
Rise Time	≤1.16ns	≤1.16ns	≤1.75ns	≤1.75ns	≤3.5ns
Sampling Rate (Max.)	2GSa/S	2GSa/S	2GSa/S	1GSa/S	1GSa/S
Memory Depth	220Mpts	220Mpts	220Mpts	110Mpts	110Mpts
Input Impedance	1MΩ / 50Ω			1MΩ	
Support Tests	Charging/Start Circuits, Sensors, Actuators, Ignition, Networks (CAN, CAN FD, LIN, Flexray, K line), Combination Tests				
Bandwidth Filter	Full bandwidth, Low pass				
Interfaces	USB 3.0/2.0 Host, USB Type-C, Grounding, HDMI, Trigger out				
Display	Industrial 10.1" TFT-LCD (1280*800)				
Dimension / Net Weight	265*192*50mm / 1.9kg (with battery)				
Battery	7.4V, 7500mAh, Li-ion battery				

CHARACTERISTICS & FEATURES

Protocol Decoding

Standard RS-232/422/485/UART, CAN, CAN FD, LIN, SPI, I²C

Portable Design

ABS+TPU protector, pre-installed handstrap, only 1.9kg, one hand to hold.

Smooth Touch

10.1" integrated seamless touch screen, ultra-high 1280*800 resolution.

Robust Hardware

Upgraded core hardware, fast CPU, 32G internal storage, support video recording.

Friendly UI

Fast Android OS experience, updated UI design, easy to use

Auto-diagnostic Presets

Dedicated software for auto repair engineers, covering most of the auto repair tests.

Tablet Oscilloscope

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

7500 mAh

Grounding plug   HDMI   Power Supply

USB3.0/2.0   Type-C

Power Button

Probe calibration output   Power-off Lock

▶ Built-in large Li-ion battery, work where you work
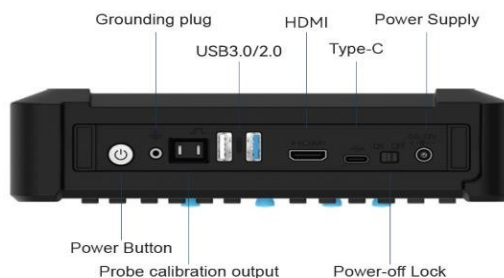
▶ Complete connectivity (*switch Power-off lock to ON for first-time use)
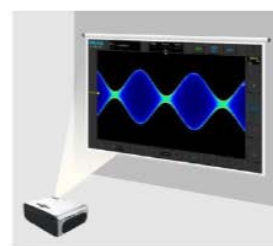
▶ The ATO series supports PC software + Mobile App (Android / iOS) remote control via USB to access internet for online upgrade, it also can be projected through HDMI port for demonstrations for training and education purpose.

AUTOMOTIVE DIAGNOSTIC PRESETS

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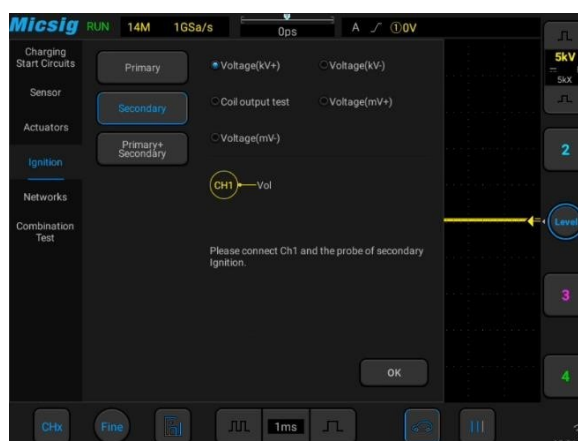
▲ The ignition system of a car is usually composed of primary and secondary coils and spark plugs. Can test both Primary and Secondary ignition signals, to find out possible malfunction.

▲ 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 judge faults by analyzing the timing and quantitative relationships between waveforms.
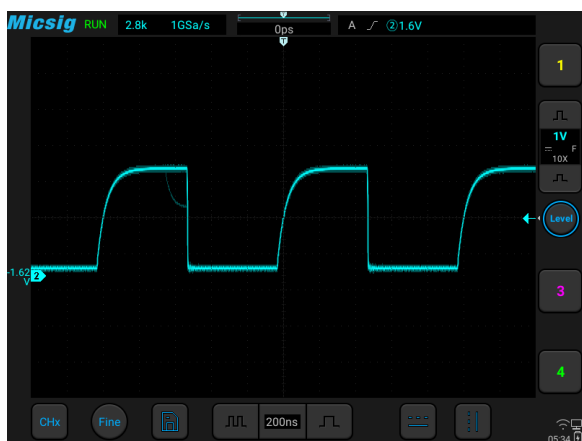
▲ **High Waveform Update Rate**

With a waveform update rate of up to 300,000 wfm/s,the ATO can easily capture unusual or low probability events.
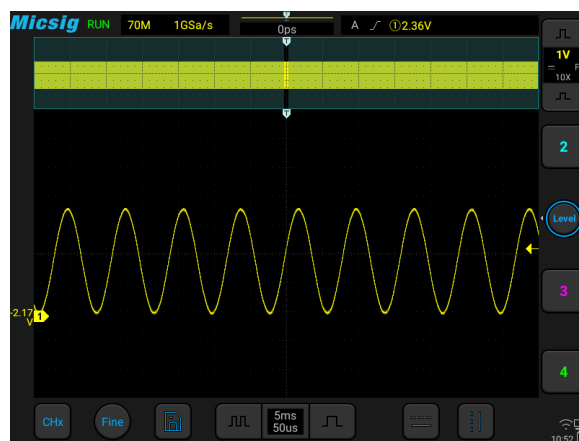
▲ **Ultra-deep Memory**

Using hardware-based Zoom technique and memorydepth of up to 220Mpts, 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.
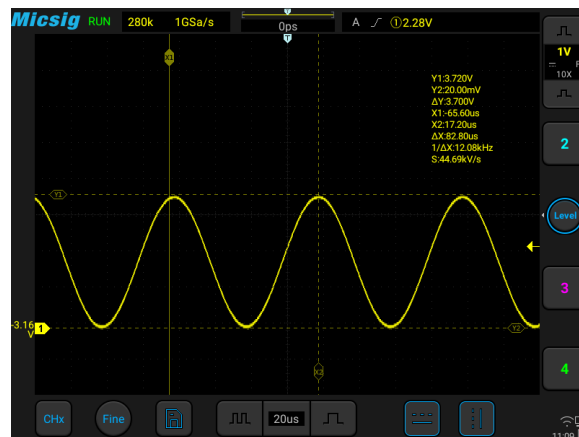
▲ **Convenient Cursor Measurement**

One touch to open horizontal and vertical cursors, eachcursor can be moved separately or simultaneously.
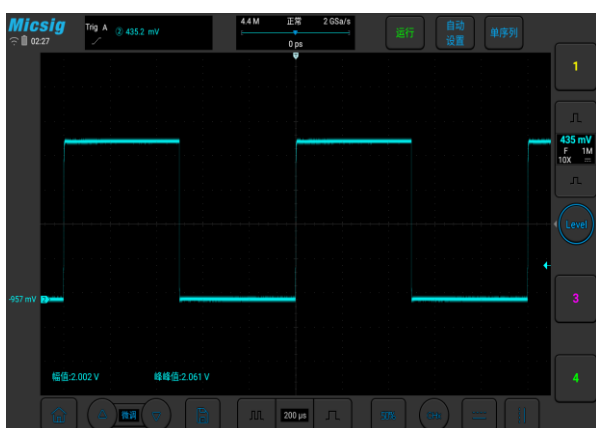
▲ **Vertical scale fining**

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.
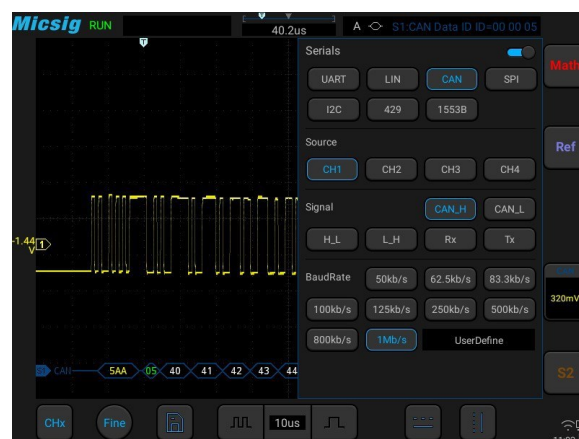
▲ **Serial Bus Decoding and Analysis**

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	
Input Coupling	DC, AC, GND
Bandwidth Filter	ATO3004 / ATO3002 / ATO2004: Full bandwidth, Low pass (to 30Hz) ATO2002 / ATO1004: Full bandwidth, Low pass (to 30KHz)
Input Impedance	ATO3004 / ATO3002 / TO2004：1MΩ±1% ‖ 50Ω±1% ATO2002 / ATO1004：1MΩ±1%
Vertical Resolution	8 bits
Vertical Divisions	10 divisions
Input Sensitivity Range	ATO3004 / ATO3002 / ATO2004：1mV/div~10V/div（1MΩ）1mV/div~1V/div（50Ω） ATO2002 / ATO1004：1mV/div~10V/div（1MΩ）
DC Gain Accuracy	5mV/div ~10V/div：≤ ±2.0%； ≤ 2mV/div：≤ ±3.0%
Ch-to-Ch Isolation DC to Max. Bandwidth	＞40dB（≤100MHz），＞35dB（＞100MHz）
Offset Range（1MΩ，50Ω）	±2.5V (Probe @ X1, <500mV/div), ±120V (Probe @ X1, ≥500mV/div)
Maximum Input Voltage	CAT I 300Vrms 400Vpk（1MΩ），5Vrms（50Ω）

Horizontal System	
Time Base	1ns/div~1ks/div（ATO2002 / ATO1004：2ns/div-1ks/div）
Vertical Divisions	11 divisions
Clock Drift	≤±5ppm / year
Time Base Accuracy	±20ppm

Sampling System	ATO3004 / ATO2004 / ATO3002	ATO2002 / ATO1004
Real-Time Sampling Rate	2G Sa/s (One CH), 1G Sa/s (All CH)	1G Sa/s (One CH), 250M Sa/s (All CH)
Max. Memory depth	220Mpts	110Mpts
Segmented Storage	Support	Not Support
Average	Selectable within 2, 4, 8, 16, 32, 64, 128, 256	
Envelope	Selectable within 2, 4, 8, 16, 32, 64, 128, 256, ∞	

Trigger System	
Trigger Mode	Auto, Normal, Single
Trigger Coupling (frequency)	DC, AC (70Hz), high frequency (40KHz), low frequency (40KHz), noise (10MHz)
Trigger Holdoff Range	200ns~10s
Trigger Types	Edge, Pulse Width, Logic, N Edge, Runt Pulse (Runt), Slope, Time Out, Video
Bus decoding	RS-232/422/485/UART,CAN,CAN FD,LIN,SPI,I2C

Waveform Measurements

Cursors	Horizontal, Vertical, Cross
Automated Measurements	31 types. 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 & Resolution	6 digits, 2Hz~Max bandwidth，PK-PK＞0.8div
Waveform Math	
Dual Waveform	+, -, *, /, analog channel
FFT	Points: max. 275KdBVrms; Source: Analog channel; Resolution: Max 100Kpts Window: 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	10.1-inch TFT LCD capacitive, 11*10 divisions
Display Resolution	1280*800 pixels
Persistence Duration	Auto, 10ms~10s, ∞
Time Base Mode	YT, XY, Zoom, Roll (scroll waveforms right to left across the screen at sweep speeds slower than or equal to 200 ms/div)
Expand Benchmark	Center, Trigger position
Waveform Display	Vectors, Line, brightness adjustable
Waveform Update Rate	ATO3004/2004/3002 is 300,000 wfms/s， ATO2002 / ATO1004 is 78,000 wfms/s
Clock	Real time, user adjustable
Language	English, Chinese, German, French, Czech, Korean, Spanish, Italian, Russia, etc.

Storage

Storage Medium	Local, USB drive
Internal Storage	32G
Waveform Storage Format	csv, wav, 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

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
Other supported	HDMI 1.4; Android / IOS App, PC Remote Control

Power Source

Power Voltage Range	100~240VAC, 50/60Hz
Power Consumption	< 60W
Adapter Output	12V DC, 5A (ATO2002 / ATO1004 is 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 Accessories

Accessories	✧ Passive BNC probes * 2 or 4 pcs (channel dependent) ✧ Power adaptor * 1 pc ✧ Power plug (Local) * 1 pc ✧ Battery (Built-in) * 1 pc ✧ 8" Screen protector * 1 pc ✧ Alligator clips * 2 pairs ✧ BNC to banana cable * 2 or 4 pcs ✧ Flexible needle * 2 pairs ✧ Hard case * 1 pc (Master Kit) ✧ Multimeter probe * 1 / pair (Master kit) ✧ Secondary ignition pickup *1 pc (Master kit)
Warranty	Three years for Base Unit; 180 days for accessories.

Options

Bus Decoding	**Standard**: UART, LIN, CAN, SPI, I²C; **Optional**: ARINC-429, MIL-STD-1553B
Recommended accessory (Optional)	Customized handbag, hard shell suitcase; High-frequency AC/DC current probe: 50MHz-100MHz, 6A/30A; Low-frequency AC/DC current probe: 800KHz-2.5MHz, 10A/100A ; High-voltage differential probe: 100MHz, 700Vpk-5600Vpk; SigOFIT optical-fiber isolated probe: 100MHz - 1GHz, 60kVpk, CMRR: DC -160dB.