TOTAL POWER SOLUTIONS

Automotive Oscilloscope

VATO2004

TPS Company Video on Youtube
https://youtu.be/DTcA-IU2NWA

Automotive Oscilloscope

VATO2004

Key Features

- One step to diagnose, easy to test
- Small size, light weight, perfect for outdoor test
- 7500mAh Li-ion battery for day-long use
- Deep memory depth, capture all signal details
- Multiple serial bus protocol triggering and decoding
- 31 automated measurements, one click to select
- 4 analog channels
- 200MHz bandwidth
- 1GSa/s sampling rate
- 50Mpts memory depth
- Various communication tests: Ignition, CAN...
- Camshaft sensors, cooling fans actuators and more...
- Easy to use on any Android devices (Smartphone, Tablet, PC)

Product Overview

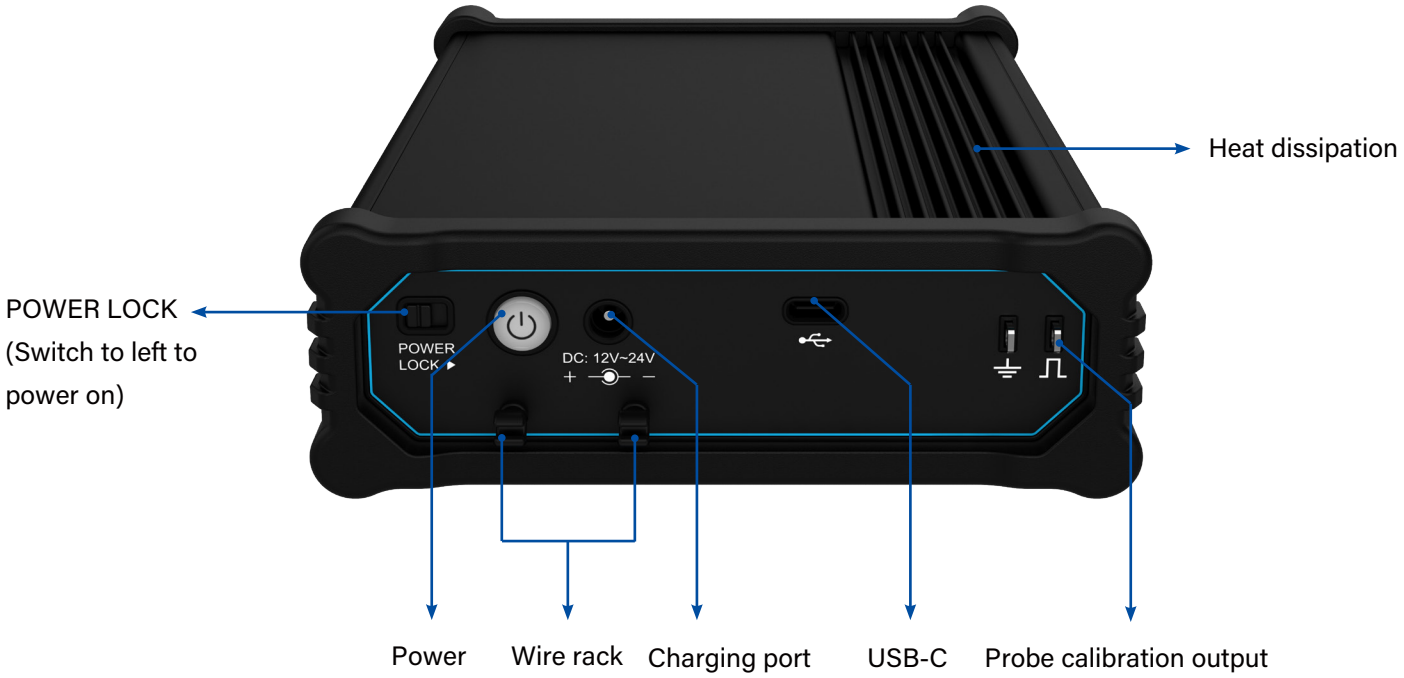
VATO2004 is a portable affordable split-type automotive diagnostic oscilloscope, most compact design with a built-in battery. It features 200MHz bandwidth, 4 channels, 1GSa/s sampling rate, up to 50Mpts memory depth.

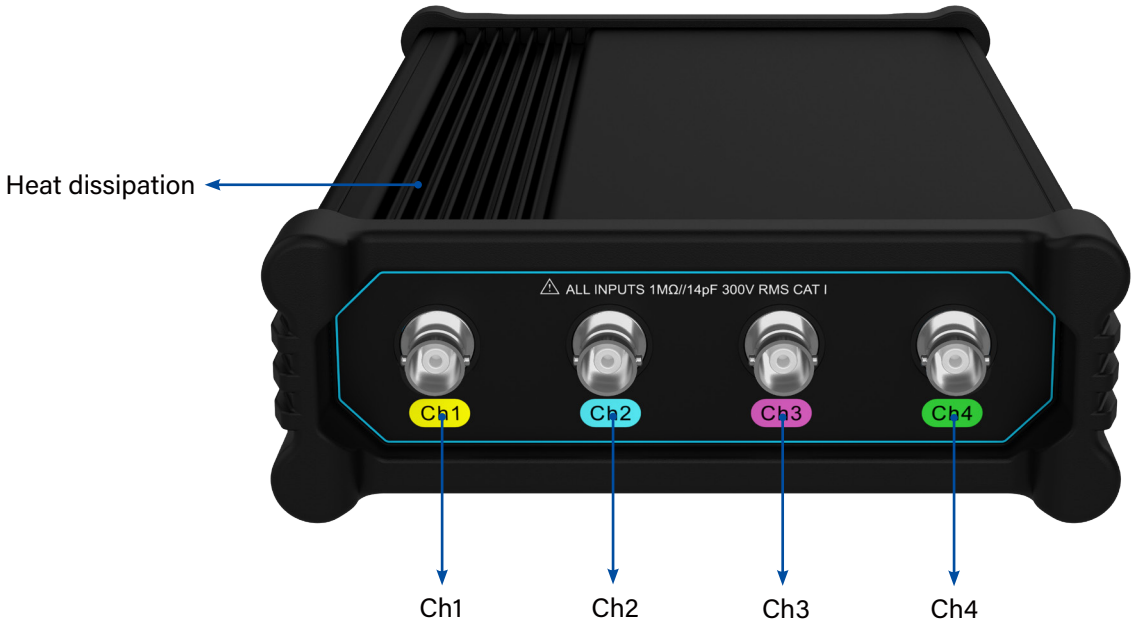
It can be connected to any Android device, such as tablets, smartphones, and PC computers. With a user-friendly UI design, a wide range of measurement options, and built-in professional automotive software packages, it allows for one-click test configuration and provides a new automotive diagnostic operation experience.

Key Specifications

Model	VATO2004
Max bandwidth	200MHZ
Analog channels	4
Rise time	⩽ 1.8ns
Max. sampling rate	1GSa/s
Memory depth	50Mpts
DC gain accuracy	⩽ 2%
Input impedance	1MΩ±1% II 14pF
Interfaces	USB Type-C, DC power
Battery (optional)	7.4V, 7500mAh Li-ion battery
Dimension	140*215*52mm
Net weight	640g

Appearance & Interfaces





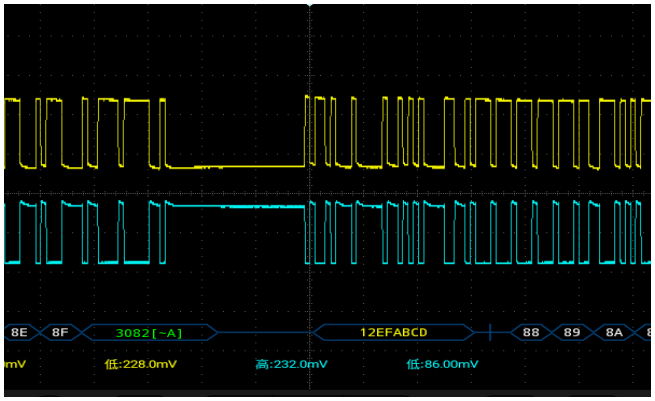
- **Automotive Diagnostic Presets:**
- Charging/Start Circuit: 12V&24V charging, Alternator AC Ripple, Ford smart Alternator, 12V&24V Start, Cranking Current
- Sensor: ABS, Accelerator Pedal, Air Flow Meter, Camshaft, Coolant Temperature, Crankshaft, Distributor, Fuel pressure, Knock, Lamda, MAP, Road 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, FlexRay, K line
- Combination Tests: Crankshaft + Camshaft, Camshaft + Primary Ignition, Primary ignition + Injector Vol, Crankshaft + Camshaft + Injector Vol.+ Secondary Ignition

Features

- One Click to Test

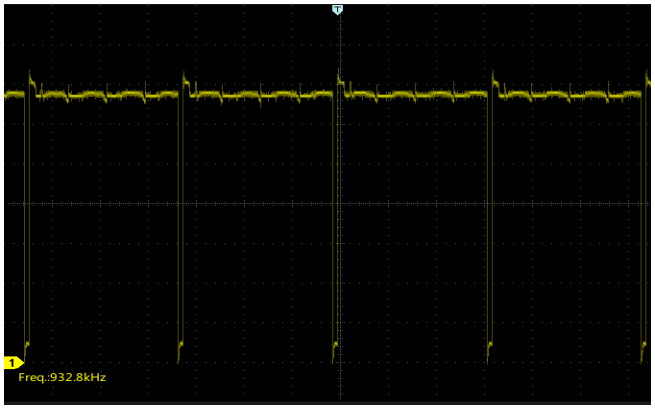
Select the respective test item, follow the description to connect wires, click OK and the oscilloscope will automatically configure the corresponding tests, easily solving most common issues encountered by automotive engineers.

- CAN Bus



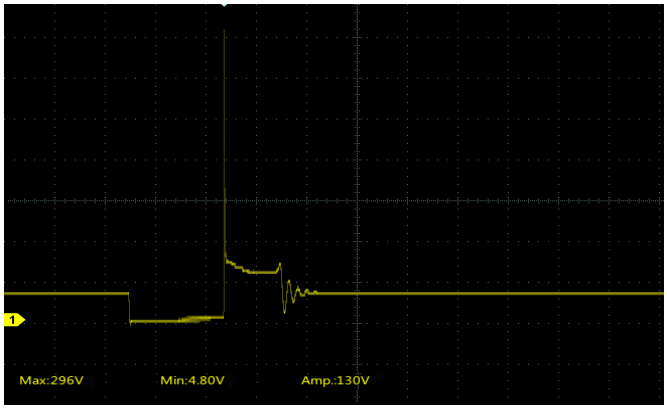
The application of Controller Area Network (CAN) in automotive simplifies wiring, reduces costs, and enables simpler and faster communication between electronic control units. It also reduces the number of sensors required and facilitates the sharing of information resources.

- Carbon Canister Solenoid Valve



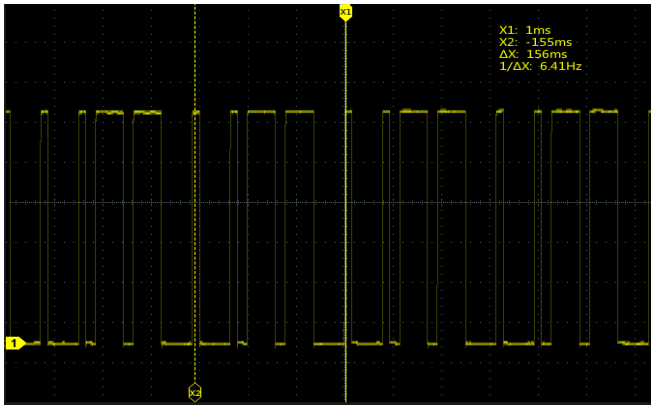
The carbon canister is typically installed in the engine compartment and connected to the fuel tank via a pipeline. Its purpose is to collect the evaporated fuel vapors from the fuel tank to prevent emission into the air, thus reducing pollution.

- Primary Ignition Voltage



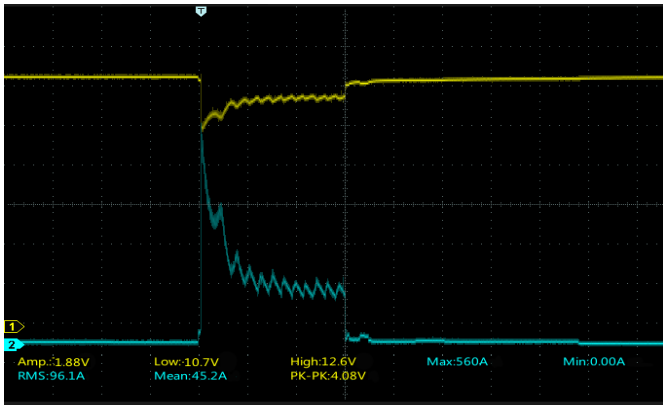
The ignition system of a gasoline car typically consists of primary coils, secondary coils, and spark plugs. There are traditional ignition systems and electronic ignition systems. Currently, most car models use electronic ignition systems. The primary circuit has evolved from basic contact-point and capacitor types to the commonly used distributor-less and one-coil-per-cylinder systems today.

- Camshaft



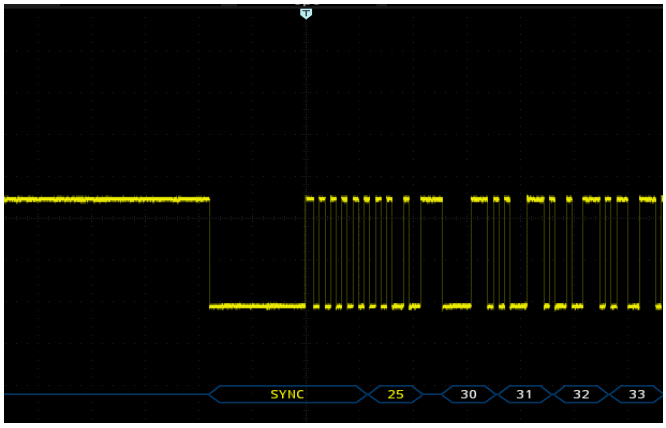
The camshaft position sensor is generally used for timing and is often tested in conjunction with the crankshaft sensor to determine the vehicle's timing. Common vehicle models have one or two camshaft position sensors, while it is less common to have four. Common types of camshaft position sensors include Hall-effect, inductive, and AC reluctance sensors.

- Startup Current



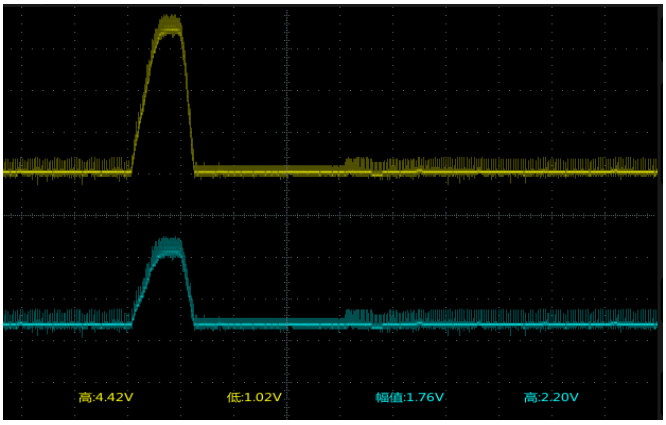
Use VATO with a current probe to conduct current testing during the starting process of a vehicle (both gasoline and diesel vehicles), able to observe whether the current waveform is normal or not.

- LIN Bus



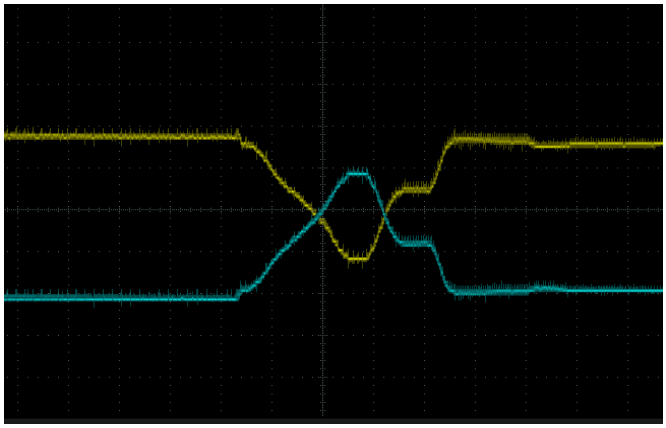
The LIN bus communication is widely used in automobiles, with low speed and the ability to connect multiple control devices on a single network. It can control non-safety-critical components of the vehicle at low speeds, such as wipers, windows, mirrors, air conditioning, and electronic seats.

- Accelerator Pedal



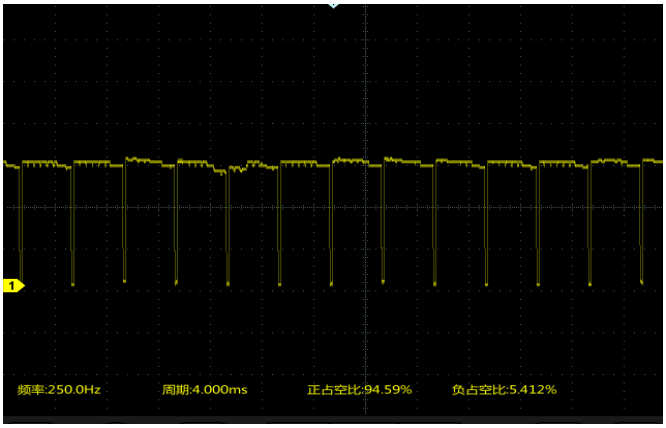
The accelerator pedal is the signal from accelerator. Generally, there are two sets, each with 3 wires: power, signal, and ground. They can be classified as analog/analog or analog/digital signals. Analog/analog signals consist of 2 analog signals, typically in two modes: a divergent signal and a convergent signal.

- Throttle Position



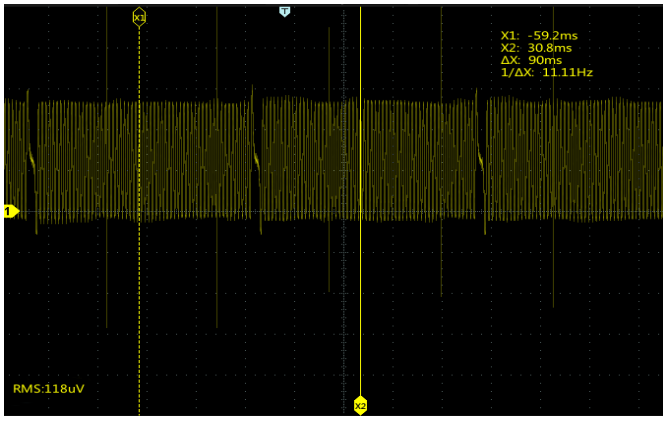
The throttle position sensor is installed on the throttle body drive shaft to sense the opening of the throttle. It provides the ECM with information for intake judgment. There are two types of outputs: analog output and throttle position switch output.

- Variable Valve Timing



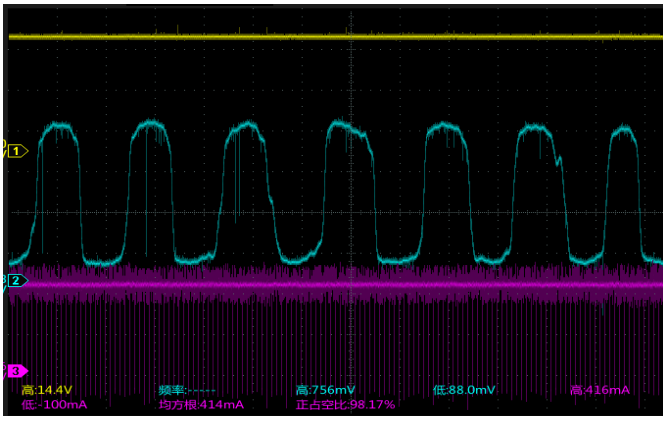
Variable valve timing is achieved by adjusting the camshaft phase of the engine, allowing the intake air volume to change with the engine speed. This helps achieve optimal combustion efficiency and improve fuel economy.

- Crankshaft Sensor



The crankshaft position sensor can be installed in various locations, such as near the front crank pulley or on the rear flywheel. The ECM uses its output signal to determine the precise position of the engine's crankshaft. Typically, there are two types: inductive and Hall-effect sensors.

- Oxygen Sensor



The oxygen sensor is typically installed on the exhaust pipe, in front of the catalytic converter. It is used to sense the oxygen content in the exhaust gases. This allows the ECM to determine the combustion conditions in the combustion chamber and adjust the fuel delivery accordingly.

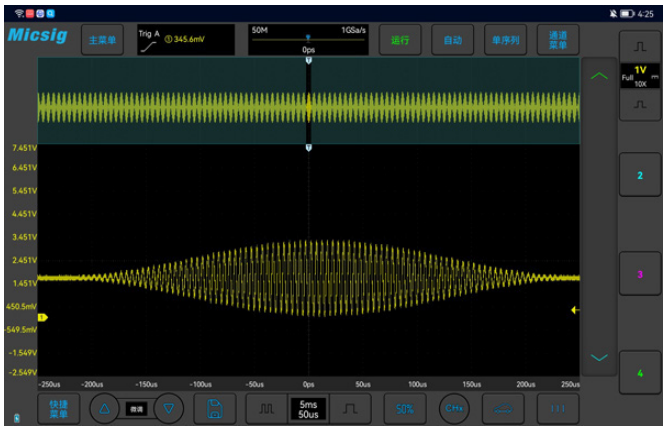
• Super Convenient

With the USB type-c interface, it can be used with any Android platform or device. Such as smartphones, tablet devices or Android-based computers.

• Large Capacity Battery

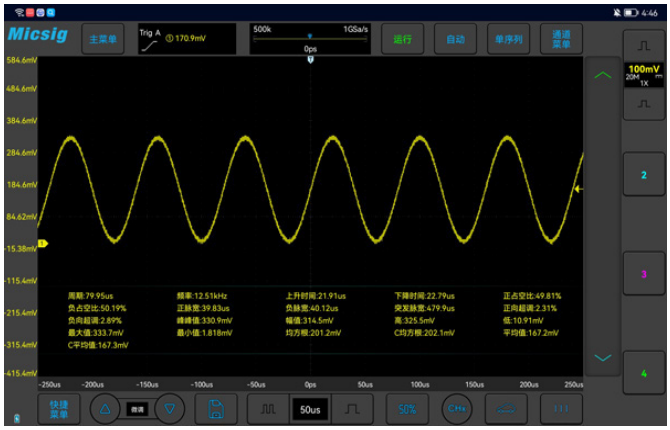
An optional 7500mAh lithium battery, support 24 hours field work. Power lock makes it safer to carry and transport.

• Ultra Memory Depth



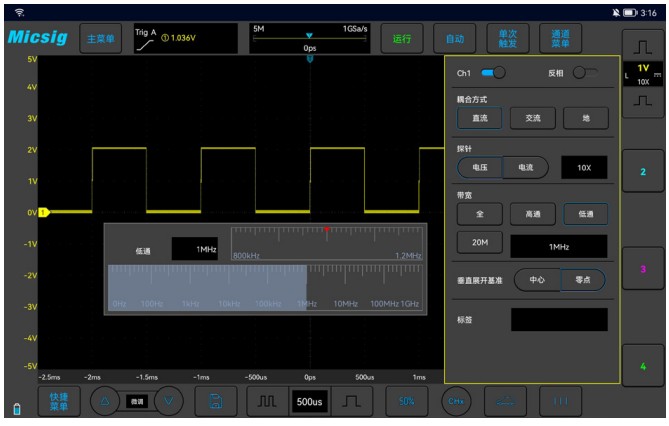
Memory depth up to 50Mpts, with Zoom technology, both the overall picture and details can be perfectly displayed.

• Convenient Auto Measurements



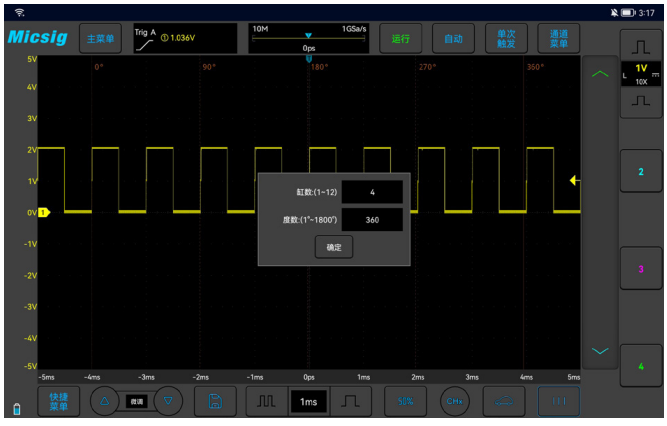
31 types of automated measurements, all can be selected and cleared with one click.

• Hardware Digital Filter



Support hardware digital filtering to filter out interference and noise.

• Phase Scale



Helps measure the timing of the cyclic waveform. Set the cylinders number and angle, with the phase start and end points indicated by solid lines. Two phase scales can be dragged to appropriate positions to mark the start and end points of the cycle.

Specifications

Vertical System	
Bandwidth Filter	Full bandwidth, High pass & Low pass (30kHz~Max bandwidth)
Input Coupling	DC, AC, GND
Input Impedance	1MΩ±1% II 14pF±3pF
Vertical Resolution	8 bit
DC Gain Accuracy (Amplitude accuracy)	<±2% (1MΩ input)
Input Sensitivity Range	5mV/div~10V/div (1MΩ input)
Noise	⩽ 1.3mVpp (5mV/div,1MΩ)
Ch-to-Ch Isolation	⩾ 40dB (100: 1)(DC to Max bandwidth)
Maximum Input Voltage	CAT I 300Vrms(1MΩ)

Horizontal System	
Time Base	5ns/div-1ks/div
Time Base Delay Time Range	10 div~10ks
Clock Drift	⩽±5ppm/ year
Time Base Accuracy	±20ppm

Trigger System	
Trigger Mode	Auto, Nomal, Single
Trigger Coupling	DC, noise suppression
Trigger Holdoff Range	200ns-10s
Trigger Types	
Edge	Positive slope, negative slope, or any slope on any channel. Coupling includes DC and noise suppression
Pulse Width	Trigger on positive pulse width, negative pulse width >, <, =, ≠ or within the time range of 8ns-10s
Bus Decoding	LIN, CAN

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
Waveform Math	
Dual Waveform	+, -, *, /, analog channel
FFT	Points: max. 100K; Source: Analog channel; Window: Rectangular, Hamming, Blackman, Hanning

Storage	
Storage Format	WAV、CSV
Store Waveform Quantity	Unlimited
Stored Waveform Rename	Support
Reference Waveform Display	4
Quick Screenshot	Support
User Setting Storage	8
User Settings Rename	Support

System	
Self-calibration	Support
Languages	English, Chinese
System	Android 7 or above
Warranty	The main unit has one-year warranty. Probes and accessories are not covered. Please refer to the data sheet of each probe and accessory for the respective warranty terms (contact us for extended warranty)

Interface	
USB Type-C	One, read and edit
DC power port	1
Probe calibration signal	1kHz, 2Vpk-pk

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

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

Physical Characteristics	
Dimensions	140*215*52mm
Net Weight	640g

Standard Accessories

Model	Accessories
VATO2004	Passive BNC probes *2
	BNC to banana cable *4
	Alligator clips *4
	Pin needle *4
	Power cable *1
	Power adapter *1
	Battery *1(Built-in)
	Type-c cable *1
	Calibration certificate *1
	Quick Operation Guide *1
	Manual *1
	Packing list *1

Recommend Instruments

Suitcase & handbag

Handbag	Black nylon , suitable for all Micsig oscilloscopes
Suitcase	Anti-fall, anti-seismic, anti-pressure, dust-proof, moisture-proof, customized for Micsig oscilloscope

Current Probes

High Frequency AC/DC Current Probe CP253B	Bandwidth: 25MHz, Range: 6A/30A Accuracy: ±1%, BNC
High Frequency AC/DC Current Probe CP503B	Bandwidth: 50MHz,Range: 6A/30A, Accuracy: ±1%, BNC
High Frequency AC/DC Current Probe CP1003B	Bandwidth: 100MHz, Range: 6A/30A, Accuracy: ±1%, BNC
Low Frequency AC/DC Current Probe CP2100X	Bandwidth: DC~300kHz, Range: 10A/100A, BNC
Low Frequency AC/DC Current Probe CP2100A	Bandwidth: DC~800kHz, Range: 10A/100A, BNC
Low Frequency AC/DC Current Probe CP2100B	Bandwidth: DC~2.5MHz, Range: 10A/100A, BNC
Rogowski AC Current Probe	Bandwidth: 15~30MHz, Current range:200mApk-600Apk, Accuracy: 1%
AC Current Probe ACP1000	Bandwidth: 10Hz~100kHz, Currentrange: 0.1Apk~1000Apk

SigOFIT Optical-fiber Isolated Probe

MOIP Series	Bandwidth: 100MHz ~ 1GHz DC Gain Accuracy: 1% Common Mode Voltage Range: 85kVpk CMRR: Up to 180dB

High Voltage Differential Probe

MDP Series	Bandwidth: 100MHz ~ 500MHz Differential Voltage(DC+AC PK): 700V - 3000V Accuracy: ±2% BNC interface