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Hantek DSO8202E

Hantek DSO8000E Series 6-in-1 Handheld Oscilloscope User Manual

Models: DSO8072E, DSO8102E, DSO8152E, DSO8202E

1. Introduction

This manual provides comprehensive instructions for the safe and effective operation of the Hantek DSO8000E Series 6-in-1 Handheld Oscilloscope. This versatile device integrates an oscilloscope, recorder, digital multimeter (DMM), spectrum analyzer, frequency counter, and arbitrary waveform generator (AWG) into a single portable unit. Please read this manual thoroughly before using the instrument to ensure proper functionality and to prevent damage.



Figure 1: Hantek DSO8000E Series Handheld Oscilloscope (Front View). This image displays the front panel of the oscilloscope, showing the screen, control buttons, input ports, and overall ergonomic design.

2. Safety Information

Always observe the following safety precautions to prevent injury and avoid damage to the instrument or connected devices:

- **Power Source:** Use only the specified power adapter and battery type. Ensure the power supply voltage matches the instrument's requirements.
- **Grounding:** Ensure proper grounding when connecting to external power sources or circuits.
- **Environmental Conditions:** Operate the device within the specified temperature and humidity ranges (Operating: 32°F to 122°F (0°C to 50°C); Nonoperating: -40°F to 159.8°F (-40°C to +71°C)). Avoid exposure to direct sunlight, high humidity, dust, or corrosive gases.
- **Probe Usage:** Use only probes rated for the voltage and current being measured. Do not touch exposed connections or components when power is applied.

- **Maintenance:** Refer all servicing to qualified personnel. Do not attempt to open or repair the instrument yourself.
- **Cleaning:** Disconnect power before cleaning. Use a soft, dry cloth. Do not use abrasive cleaners or solvents.

The device is IP-51 rated for dust, drip, and shake proofing, designed to withstand harsh environments. It features a large fuse conforming to European Safety Standards.

3. Product Overview

3.1 Key Features

- Six-in-one functionality: Oscilloscope, Recorder, DMM, Spectrum Analyzer, Frequency Counter, Arbitrary Waveform Generator.
- High bandwidth (70MHz-200MHz) Oscilloscope with 1GSa/s sample rate and 2M Memory depth.
- 25MHz Arbitrary Waveform Generator with 200MSa/s DDS and 12-bit vertical resolution.
- 6000 Counts Digital Multimeter (DMM) for AC/DC voltage, current, resistance, capacitance, and diode/continuity tests.
- FFT spectral analysis, waveform math functions (add, subtract, multiply, divide), X-Y mode, and over 20 automatic measurements.
- PASS/FAIL Check function for engineering applications.
- Abundant trigger functions and double timebase sampling.
- Record and replay of more than 1000 waveforms.
- Large 5.6-inch TFT Color LCD Display with 640x480 resolution.
- USB Host/Device 2.0 full-speed interface; supports removable disk.
- WIFI/LAN Option for PC control (optional).
- Waveform data output in WORD, EXCEL, BMP, JPG formats.
- Battery indicator with easy-changed connect points and selectable 18650 battery box.
- Anti-theft lock hole, tripod fixed hole, hang rope, and built-in flashlight.
- Replaceable BNC safety joints.

3.2 Included Components

The Hantek DSO8000E Series oscilloscope typically includes the following items:

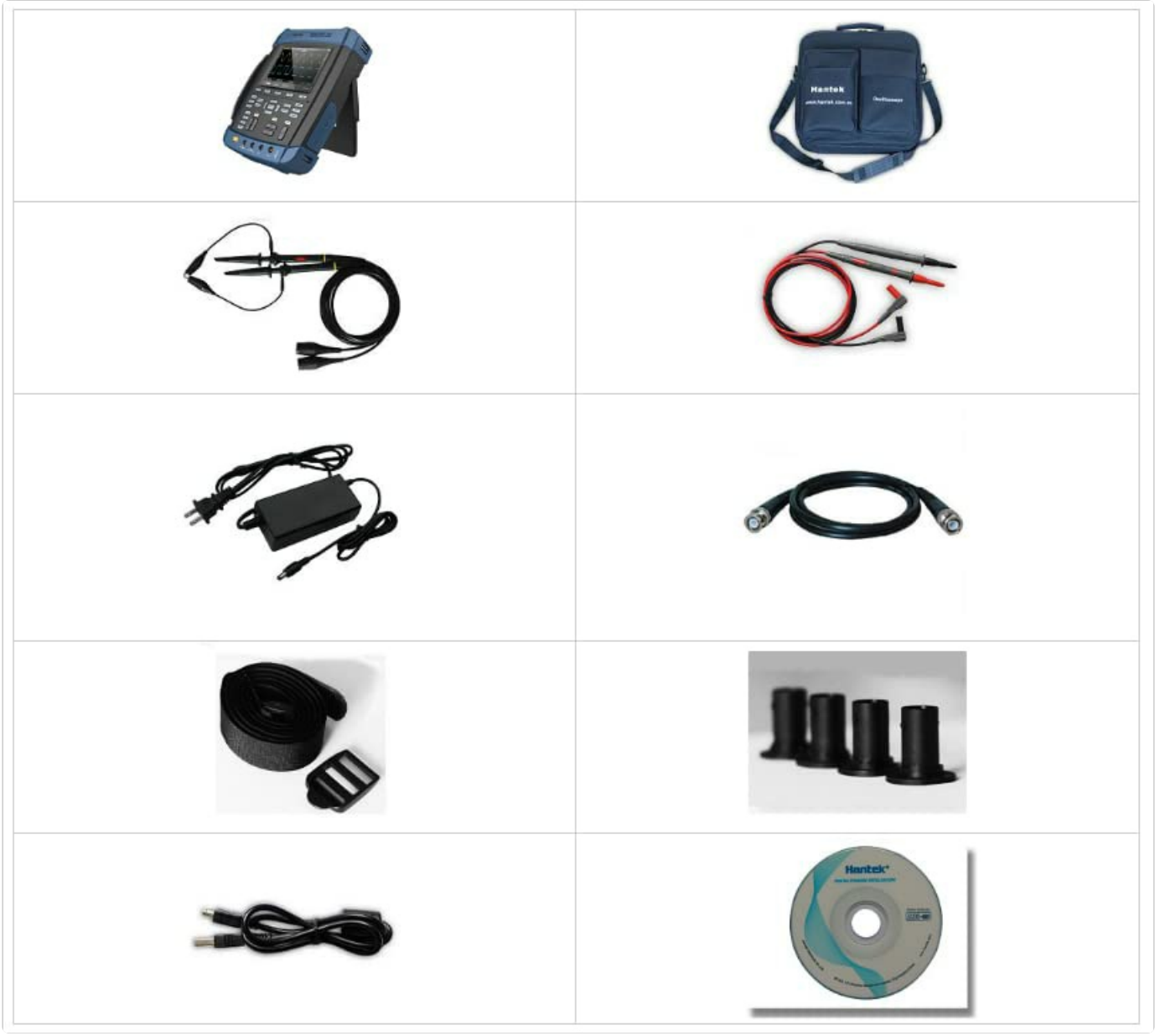


Figure 2: Included Components. This image shows the main unit, carrying bag, oscilloscope probes, multimeter leads, power adapter, BNC cable, shoulder strap, BNC safety joints, USB cable, and software CD.

- Hantek DSO8000E Series Main Unit
- Carrying Bag
- Oscilloscope Probes (x2)
- Multimeter Test Leads
- Power Adapter
- BNC to BNC Cable
- Shoulder Strap
- BNC Safety Joints (additional set)
- USB Cable
- Software CD
- Lithium Ion Battery (pre-installed or included separately)

4. Setup

4.1 Initial Power-Up and Charging

1. **Battery Installation:** If the 18650 Lithium Ion battery is not pre-installed, open the battery compartment and insert the battery, ensuring correct polarity.
2. **Charging:** Connect the power adapter to the instrument's DC input and plug it into a suitable AC outlet. The battery indicator will show charging status. It is recommended to fully charge the battery before first use.
3. **Power On/Off:** Press and hold the power button (usually located on the front panel) to turn the instrument on or off.

4.2 Probe Connection

1. **Oscilloscope Probes:** Connect the BNC connector of the oscilloscope probe to the CH1 or CH2 input on the front panel. Ensure a secure connection.
2. **Multimeter Leads:** For DMM functions, connect the red test lead to the VΩmA input and the black test lead to the COM input. For high current measurements, use the 10A input.
3. **Probe Compensation:** Before making critical measurements, perform probe compensation to ensure accurate readings. Refer to the on-screen menu for the compensation procedure, typically involving connecting the probe to a dedicated compensation signal output.

5. Operating Instructions

The DSO8000E series offers multiple operating modes, accessible via the function buttons on the front panel. The main modes are Oscilloscope, DMM, and Arbitrary Waveform Generator.

5.1 Oscilloscope Mode

This is the primary function for visualizing electrical signals. Use the dedicated 'SCOPE/REC' button to enter this mode.

- **Vertical Controls:** Use the CH1/CH2 buttons to select channels. Adjust vertical sensitivity (Volts/Div) and position using the corresponding knobs or menu options.
- **Horizontal Controls:** Adjust the time base (Sec/Div) and horizontal position to view the desired portion of the waveform.
- **Trigger System:** Configure the trigger type (Edge, Pulse, Video, etc.), source, and level to stabilize the waveform display. The 'AUTOSET' button can automatically adjust settings for a stable display.
- **Measurements:** Access automatic measurements (e.g., Vpp, Vrms, Frequency, Period) via the 'MEAS' button.
- **Waveform Math & FFT:** Perform mathematical operations on waveforms (Add, Subtract, Multiply, Divide) or analyze frequency components using the Fast Fourier Transform (FFT) function.
- **PASS/FAIL:** Set up criteria for waveform comparison to automatically identify signals that fall outside defined limits.

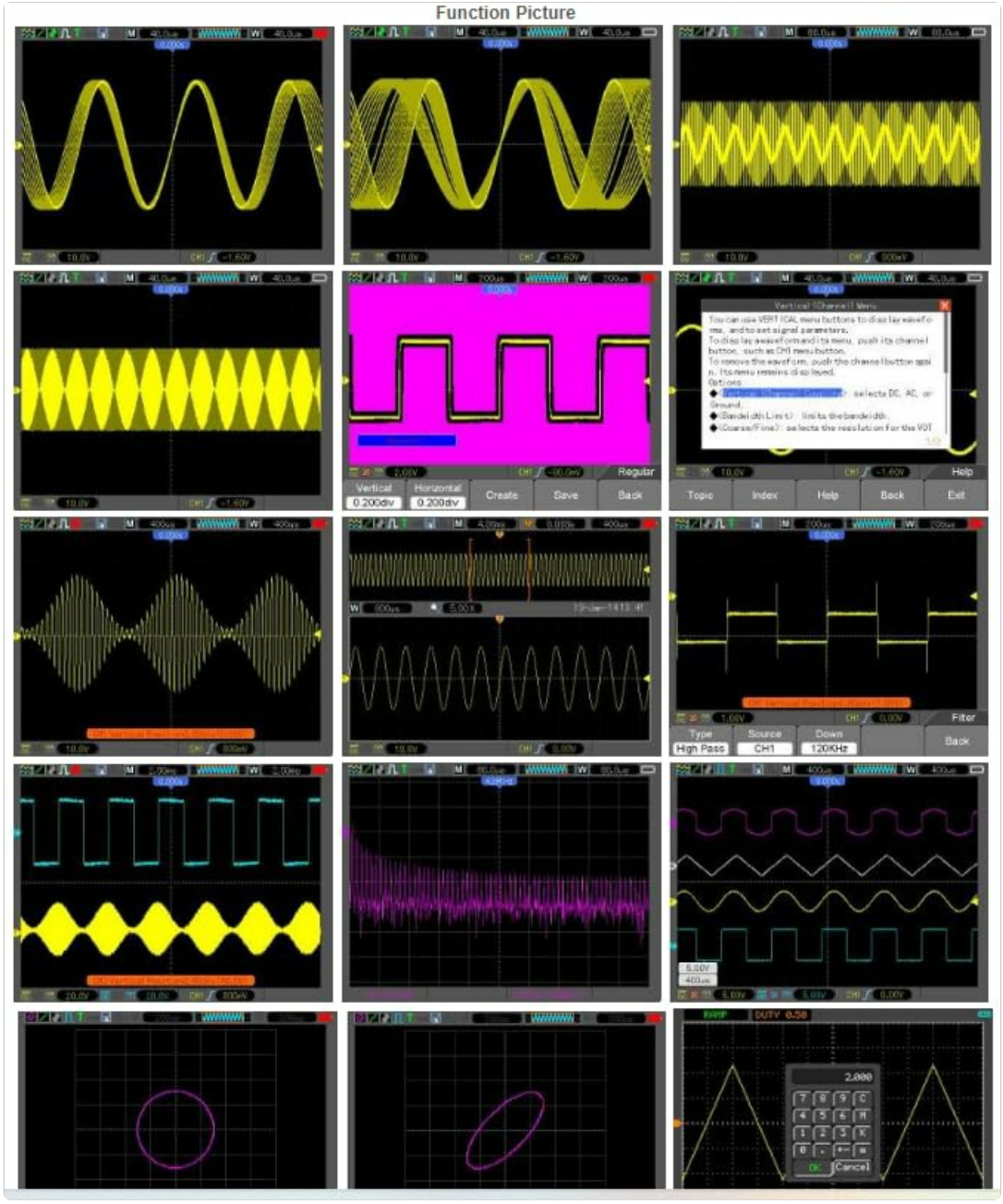


Figure 3: Oscilloscope Function Examples. This image displays various waveform captures and interface elements, demonstrating the device's capability to display sine waves, square waves, modulated signals, and FFT analysis.

5.2 Digital Multimeter (DMM) Mode

The integrated DMM provides precise measurements for various electrical parameters. Use the 'DMM' button to switch to this mode.

- **Voltage Measurement:** Select AC or DC voltage and connect test leads appropriately.
- **Current Measurement:** Select AC or DC current. For current measurements, the test leads must be connected in series with the circuit. Use the 10A input for higher currents.
- **Resistance, Capacitance, Diode, Continuity:** Select the desired function and connect the test leads to the component under test.

5.3 Arbitrary Waveform Generator (AWG) Mode

The AWG allows you to generate various standard and custom waveforms. Use the 'AWG' button to access this mode.

- **Waveform Selection:** Choose from standard waveforms (sine, square, triangle, pulse) or load custom arbitrary waveforms.
- **Parameter Adjustment:** Set frequency, amplitude, offset, and duty cycle as required.

- **Output:** Connect the AWG output to the circuit or device requiring a signal input.

5.4 Recorder, Spectrum Analyzer, and Frequency Counter

These additional functions enhance the utility of the DSO8000E series:

- **Recorder:** Capture and store long-duration waveform data for later analysis.
- **Spectrum Analyzer:** Analyze the frequency content of signals using FFT.
- **Frequency Counter:** Precisely measure the frequency of input signals.

6. Maintenance

6.1 General Care

- Keep the instrument clean and dry. Avoid exposing it to dust, dirt, or liquids.
- Store the device in its carrying bag when not in use to protect it from physical damage.
- Regularly check probes and test leads for damage or wear. Replace them if necessary.

6.2 Battery Maintenance

- Recharge the battery when the low battery indicator appears.
- If the instrument will not be used for an extended period, charge the battery to approximately 50% and store it in a cool, dry place.
- The 18650 battery is user-replaceable. Ensure to use a compatible battery type.

7. Troubleshooting

If you encounter issues with your Hantek DSO8000E Series oscilloscope, refer to the following common troubleshooting steps:

- **No Power:** Ensure the battery is charged or the power adapter is properly connected. Check the power button.
- **No Waveform Display:** Verify probes are correctly connected to the input channels and the circuit under test. Check trigger settings (level, source, type). Use 'AUTOSET' to attempt automatic configuration.
- **Inaccurate Measurements:** Perform probe compensation. Ensure correct probe attenuation settings (1X, 10X, 100X, 1000X) are selected on both the probe and the oscilloscope.
- **DMM Readings Incorrect:** Check test lead connections and ensure the correct measurement function is selected. Verify the battery charge.
- **Device Unresponsive:** Try restarting the device. If unresponsive, disconnect power and battery, wait a few minutes, then reconnect and power on.

For persistent issues, contact Hantek customer support.

8. Specifications

8.1 Oscilloscope Mode Specifications

Model	DSO8072E	DSO8102E	DSO8152E	DSO8202E
Acquisition				
Sample Modes	Real-Time Sample			
Acquisition Modes				
Normal	Normal data only			
Peak Detect	High-frequency and randon glith capture			
Average	Wavefom Average, selectable 4,8,16,32,64,128			
Inputs				
Inputs Coupling	AC, DC, GND			
Inputs Impendance	1MΩ±2% ll20pF±3pF			
Probe Attenuation	1X, 10X			
Supported Probe Attenuation Factor	1X, 10X, 100X, 1000X			
Maximum Input Voltage	CAT I and CAT II: 300VRMS (10×), Installation Category; CAT III: 150VRMS (1×)			
Horizontal System				
Sample Rate Range	1GS/s			
Waveform Interpolation	(sin x)/x			
Record Length	2M			
SEC/DIV Range	4ns/div~2000s/div, in a 2, 4, 8 sequence		2ns/div~2000s/div, in a 2, 4, 8 sequence	
Sample Rate and Delay Time Accuracy	±50ppm over any ≥1ms time interval			
Scanning Speed Range	4ns/div to 8ns/div; (-8div x s/div) to 40ms; 20ns/div to 80μs/div;(-8div×s/div) to 40ms; 200μs/div to 40s/div;(-8div×s/div) to 400s;		2ns/div to10ns/div;(-4div×s/div) to 20ms;	
Delta Time Measurement Accuracy (Full Bandwidth)	Single-shot, Normal mode:± (1 sample interval +100ppm × reading + 0.6ns); >16 averages:± (1 sample interval + 100ppm × reading + 0.4ns); Sample interval = s/div ÷ 200			
Vertical System				
Vertical Resolution	8-bit resolution, all channel sampled simultaneously			
Volts Range	2mV/div to 100V/div at input BNC			
Bandwidth	70MHz	100MHz	150MHz	200MHz
Rise Time at BNC(typical)	5ns	3.5ns	2.3ns	1.8ns
Analog Bandwidth in Normal and Average modes at BNC or with probe, DC Coupled	±400V(100V/div-20V/div); ±50V(10V/div-5V/div); ±40V(2V/div-500mV/div); ±2V(200mV/div-50mV/div); ±400mV(20mV/div-2mV/div);			
Math	+, -, *, /, FFT			
FFT	Windows: Hanning, Flatop, Rectamgular, Bartlett, Blackman; 1024 sample point			
Bandwidth Limit	20MHz			
Low Frequency Response (-3db)	≤10Hz at BNC			
DC Gain Accuracy	±3% for Normal or Average acquisition mode, 100V/div to 10mV/div. ±4% for Normal or Average acquisition mode, 5mV/div to 2mV/div.			
DC Measurement Accuracy, Average Acquisition Mode	Measurement Type: Average of ≥16 waveforms with vertical position at zero Accuracy: ± (3% × reading + 0.1div + 1mV) when 10mV/div or greater is selected. Measurement Type: Average of ≥16 waveforms with vertical position not at zero Accuracy: ± [3% × (reading + vertical position) + 1% of vertical position + 0.2div].			
Volts Measurement Repeatability, Average Acquisition Mode	Delta volts between any two averages of ≥16 waveforms acquired under same setup and ambient conditions			

Figure 4: Detailed specifications for the Oscilloscope Mode, including acquisition modes, inputs, impedance, probe attenuation, bandwidth, sample rate, memory depth, vertical resolution, and measurement accuracy for models DSO8072E, DSO8102E, DSO8152E, and DSO8202E.

8.2 DMM Mode Specifications

DMM Mode			
Max. Resolution	6000 Counts		
DMM Testing Modes	Voltage, Current, Resistance, Capacitance, Diode & Continuity		
Max. Input Voltage	AC:600V, DC: 800V		
Max. Input Current	AC: 10A, DC:10A		
Input Impedance	10MΩ		
DMM TrendPlot	1.2M Point		
Range	Resolution	Accuracy	Resolution
DC Voltage	60.00mV	±1%±3 digit	10uV
	600.0mV		100uV
	6.000V		1mV
	60.00V		10mV
	600.0V		100mV
	800V		1V
AC Voltage	60.00mV	±1%±3 digit	10uV
	600.0mV		100uV
	6.000V		1mV
	60.00V		10mV
	600.0V		100mV
DC Current	60.00mA	±1%±5 digit	10uA
	600.0mA	±1.5%±5 digit	100uA
	6.000A		1mA
	10.00A		10mA
AC Current	60.00mA	±1%±5 digit	10uA
	600.0mA	±1.5%±5 digit	100uA
	6.000A		1mA
	10.00A		10mA
Resistance	600Ω	±1%±3 digit	0.1Ω
	6.000KΩ		1Ω
	60.00KΩ		10Ω
	600.0KΩ		1KΩ
	6.000MΩ		10KΩ
	60.00MΩ	±1%±5 digit	100KΩ
Capacitance	40.00nF	±2%±5 digit	10pF
	400.0nF		100pF
	4.000uF		1nF
	40.00uF		10nF
	400.0uF		100nF
	Attention: the smallest capacitance value that can be measured in 5nF		
Diode	0V~2.0V		
ON-OFF test	<10Ω		

Figure 5: Detailed specifications for the Digital Multimeter (DMM) Mode, outlining maximum resolution, testing modes, input voltage/current, resistance, capacitance, and diode/continuity test parameters.

8.3 Waveform Generator Mode Specifications

Waveform Generator Mode	
Frenquency Range	1Hz(DC)~25MHz
DAC Clock	2K~200MHz adjustable
Memory Depth	4KSa
Vertical Resolution	12 Bits
Stability	<30ppm
Amplitude	±3.5V Max.
Output Impedance	50 Ω
Output Current	50mA Ipeak=50mA
System Bandwidth	25M
Harmonic Wave Distortion	-50dBc(1KHz), -40dBc(10KHz)
General Specifications	
Display Resolution	640 horizontal by 480 vertical pixels
Display Contrast	Adjustable (16 gears) with the progress bar
Probe Compensator Output	
Output Voltage(typical)	About 2Vpp into ≥1MΩ load
Frequency(typical)	1kHz
Power Supply	
Supply Voltage	AC Input:100-240VACRMS,0.6A MAX,50Hz~60Hz; DC Output:9V,2A
Power Consumption	<30W
Environmental	
Temperature	Operating: 32℉ to 122℉ (0℃ to 50℃); Nonoperating: -40℉ to 159.8℉ (-40℃ to +71℃)
Cooling Method	Convection
Humidity	+104℉ or below (+40℃ or below): ≤90% relative humidity; 106℉ to 122℉ (+41℃ to 50℃): ≤60% relative humidity
Altitude	Operating: Below 3,000m (10,000 feet); Nonoperaring: Below 15,000m(50,000 feet)
Mechanical	
Size	260mmmm; 220mm; 75mm
Weight	2.5KG(without Packing)

Figure 6: Detailed specifications for the Waveform Generator Mode, including frequency range, DAC clock, memory depth, vertical resolution, stability, amplitude, output impedance, and system bandwidth.

8.4 General Specifications

Waveform Generator Mode	
Frenquency Range	1Hz(DC)~25MHz
DAC Clock	2K~200MHz adjustable
Memory Depth	4KSa
Vertical Resolution	12 Bits
Stability	<30ppm
Amplitude	±3.5V Max.
Output Impedance	50 Ω
Output Current	50mA Ipeak=50mA
System Bandwidth	25M
Harmonic Wave Distortion	-50dBc(1KHz), -40dBc(10KHz)
General Specifications	
Display Resolution	640 horizontal by 480 vertical pixels
Display Contrast	Adjustable (16 gears) with the progress bar
Probe Compensator Output	
Output Voltage(typical)	About 2Vpp into ≥1MΩ load
Frequency(typical)	1kHz
Power Supply	
Supply Voltage	AC Input:100-240VACRMS,0.6A MAX,50Hz~60Hz; DC Output:9V,2A
Power Consumption	<30W
Environmental	
Temperature	Operating: 32°F to 122°F (0°C to 50°C); Nonoperating: -40°F to 159.8°F (-40°C to +71°C)
Cooling Method	Convection
Humidity	+104°F or below (+40°C or below): ≤90% relative humidity; 106°F to 122°F (+41°C to 50°C): ≤60% relative humidity
Altitude	Operating: Below 3,000m (10,000 feet); Nonoperaring: Below 15,000m(50,000 feet)
Mechanical	
Size	260mmmm; 220mm; 75mm
Weight	2.5KG(without Packing)

Figure 7: General specifications for the device, including display resolution, contrast, probe compensator output, power supply, power consumption, environmental conditions (temperature, humidity, altitude), and mechanical dimensions (size, weight).

- **Manufacturer:** Hantek
- **Model Number:** GL-DSO8202E (for DSO8202E variant)
- **Product Dimensions:** 22 x 15 x 12 cm
- **Item Weight:** 500 g
- **Power Source:** Battery Powered (1 Lithium Ion battery included)

- **Wattage:** 5 watts
- **Material:** Acrylonitrile Butadiene Styrene (ABS)
- **Certifications:** CE, EMC, ISO 9001, RoHS
- **Country of Origin:** China

9. Warranty and Support

Hantek products are designed for reliability and performance. For specific warranty details, please refer to the warranty card included with your product or visit the official Hantek website. For technical support, service, or inquiries, please contact Hantek customer service through their official channels.
Manufacturer: Hantek
Website: www.hantek.com (Please verify the official website for your region)

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