

Data Sheet

Hantek®

Digital Storage Oscilloscope

DSO5202BMT DSO5102BMT
DSO5062BMT



► Features & Benefits

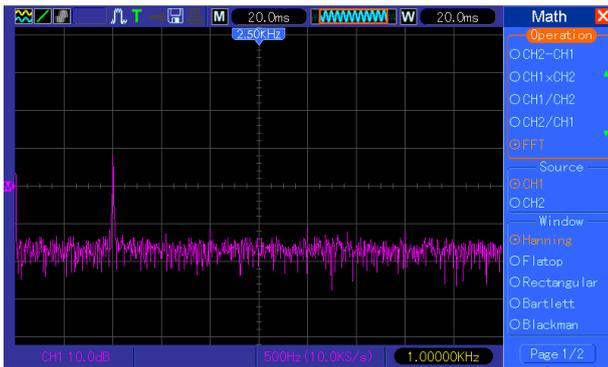
- 200/100/60MHz Bandwidths
- 1GSa/s Real Time Sample Rate
- 2M Memory Depth
- Trigger mode: Edge, Pulse Width, Video, Slop, Overtime, Alternative trigger etc.
- Provides software for PC real-time analysis

► Applications

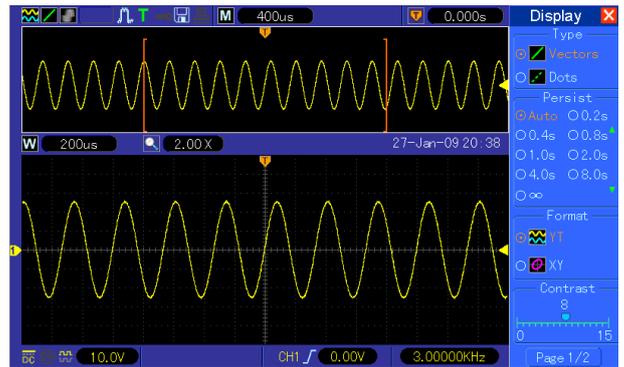
- Design and Debug
- Education and training
- Manufacturing Test and Quality Control
- Service and Repair
- Electronic Circuit Designing and Testing.

► Ease-of-Use Feature

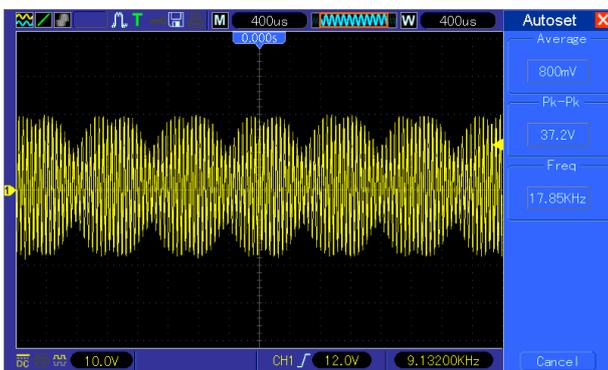
- Five math functions, +, -, *, /, and FFT functions.
- 32 automatic measurements and track measurement via cursor automatically.
- Large (7.0-inch) color display,WVGA(800x480)
- Support U disk and local files storage.
- Pass/Fail Function enables to output testing results
- Built-in Bode diagram Assistant.
- Built-in multiple language support, included Thai language.



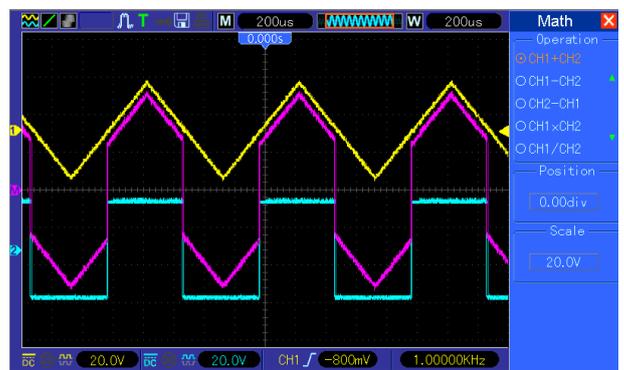
FFT



Dual-window Mode (Full Screen)



Autoset



Math: CH1+CH2

► **Troubleshooting**

If the oscilloscope is no display of waveforms on the screen when the oscilloscope is turned on, follow these steps:

- I. Check the probe to assure its proper connection to the input BNC;
- II. Check the channel switch (such as CH1, CH2 menu buttons) to make sure it has been turned on;
- III. Check the input signal to verify it has been connected to the probe correctly;
- IV. Affirm that all measured circuits have signals to output;
- V. Turn up the magnitude for DC signals with large magnitude;
- VI. In addition, you may press the Auto Measure button to perform an automatic detection of signals at first.

► **Designed to Make Your Work Easy**

The DSO Series oscilloscopes are designed with the ease of use and familiar operation you have come to expect from Hantek

► **Help When You Need It, Where You Need It**

The built-in Help menu provides you with important information on your oscilloscope's features and functions. Help is provided in the same languages as the user interface.

► **Performance You Need at a Price You Can Afford**

The DSO5000BMT Series Digital Storage Oscilloscope provides you with affordable performance in a compact design. Packed with standard features-including USB connectivity, 32 automated measurements, limit testing, data loading, and context-sensitive make the instruments help you get more done in less time. Digital Precision for Accurate Measurements With up to 200MHz bandwidth and 1GS/s maximum sample rate, no other digital storage oscilloscope offers as much bandwidth and sample rate for the price. Hantek provides real-time sampling with a minimum of 10X oversampling on all channels, all the time to accurately capture your signals.

► **Easy PC Connectivity**

Easily capture, save, and analyze measurements results by connecting to your PC with the rear-panel USB device port. Simply pull screen images and waveform data into the stand-alone desktop application.

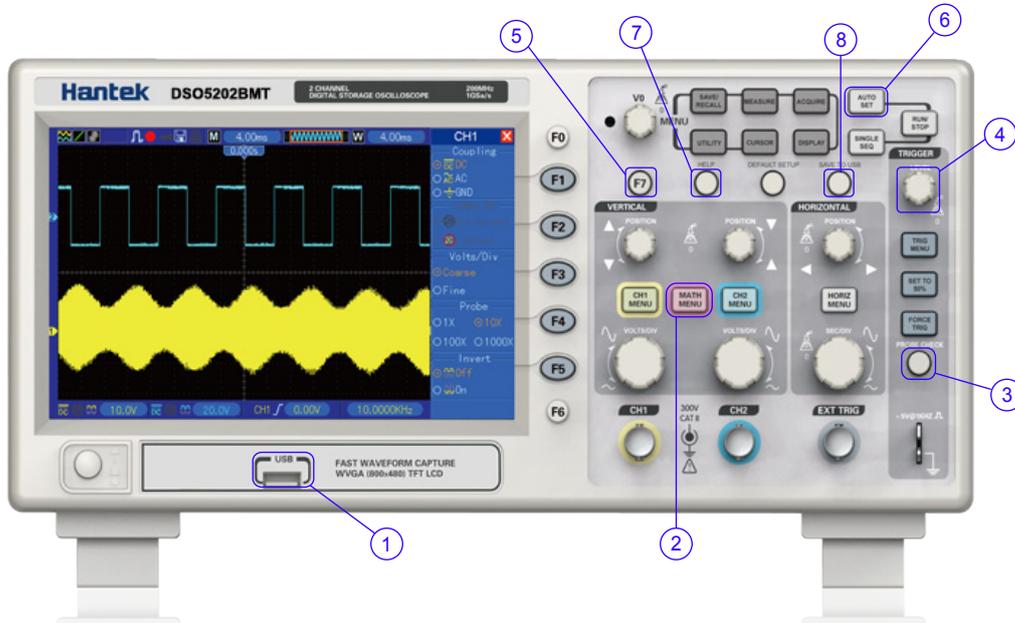
► Characteristics

| Acquisition | |
|---|---|
| Sample Rate | Real-Time Sample: 1GS/s; Equivalent Sample: 25GS/s |
| Acquisition Modes | |
| Normal | Normal data only |
| Peak Detect | High-frequency and random glitch capture |
| Average | Waveform Average, selectable 4,8,16,32,64,128 |
| Inputs | |
| Input Coupling | AC, DC, GND |
| Input Impedance | 1MΩ±2% 20pF±3pF |
| Probe Attenuation | 1X, 10X |
| Supported Probe Attenuation Factor | 1X, 10X, 100X, 1000X |
| Max. Input Voltage | CAT I and CAT II: 300VRMS (10×); Installation Category III: 150VRMS (1×); Installation Category II: derate at 20dB/decade above 100kHz to 13V peak AC at 3MHz and above. For non-sinusoidal waveforms, peak value must be less than 450V. Excursion above 300V should be of less than 100ms duration. RMS signal level including all DC components removed through AC coupling must be limited to 300V. If these values are exceeded, damage to the oscilloscope may occur. |
| Horizontal | |
| Sample Rate Range | 500MS/s--1GS/s |
| Waveform Interpolation | (sin x)/x |
| Record Length | 2M |
| SEC/DIV Range | DSO5202BMT : 2ns/div to 40s/div, in a 2, 4, 8 sequence DSO5102BMT/DSO5062BMT : 4ns/div to 40s/div, in a 2, 4, 8 sequence |
| Sample Rate and Delay Time Accuracy | ±50ppm (at over any ≥1ms time interval) |
| Position Range | DSO5202BMT: 2ns/div to 10ns/div; (-4div x s/div) to 20ms; DSO5102BMT/DSO5062BMT: 20ns/div to 80us/div; (-8div x s/div) to 40ms; 200us/div to 40s/div; (-8div x s/div) to 400s; |
| 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 | |
| Vertical Resolution | 8-bit resolution, all channel sampled simultaneously |
| Volts/Div Range | 2mV/div~5V/div (1x), 20mV/div~50V/div (10x) |
| Position Range | 2mV/div to 200mV/div; ±2V; 200mV/div to 5V/div; ±50V |
| Bandwidth | DSO5202BMT: 200MHz; DSO5102BMT: 100MHz; DSO5062BMT: 60MHz; |
| Rise time at BNC(typical) | DSO5202BMT: 1.8ns; DSO5102BMT: 3.5ns; DSO5062BMT: 5.8ns; |
| Analog Bandwidth in Normal and Average Modes at BNC or with probe, DC Coupled | 2mV/div to 20mV/div, ±400mV; 50mV/div to 200mV/div, ±2V; 500mV/div to 2V/div, ±40V; 5V/div, ±50V |
| Math | +, -, *, /, FFT |
| FFT | Windows: Hanning, Flatop, Rectangular, Bartlett, Blackman 1024 sample point; |
| Bandwidth Limit | 20MHz |

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| Low Frequency Response (-3db) | ≤10Hz at BNC |
| DC Gain Accuracy | ±3% for Normal or Average acquisition mode, 5V/div to 10mV/div; ±4% for Normal or Average acquisition mode, 5mV/div to 2mV/div. |
| DC Measurement Accuracy, Average Acquisition Mode | When vertical displacement is zero, and $N \geq 16: \pm (3\% \times \text{reading} + 0.1\text{div} + 1\text{mV})$ only 10mV/div or greater is selected; When vertical displacement is not zero, and $N \geq 16: \pm [3\% \times (\text{reading} + \text{vertical position}) + 1\%$ of vertical position + 0.2div]; Add 2mV for settings from 2mV/div to 200mV/div; add 50mV for settings from 200mV/div to 5V/div |
| Volts Measurement Repeatability, Average Acquisition Mode | Delta volts between any two averages of ≥16 waveforms acquired under same setup and ambient conditions |
| Trigger | |
| Trigger Types | Edge, Video, Pulse, Slope, Over time, Alternative |
| Trigger Source | CH1, CH2, EXT, EXT/5, AC Line |
| Trigger Modes | Auto, Normal |
| Coupling Type | DC, AC, Noise Reject, HF Reject, LF Reject |
| Trigger Sensitivity (Edge Trigger Type) | DC(CH1,CH2): DSO5202BMT: 1.5div from 10MHz to 100MHz; 2div from 100MHz to Full; DSO5102BMT/DSO5062BMT: 1div from DC to 10MHz; 1.5div from 10MHz to Full; DC(EXT): DSO5202BMT: 200mV from DC to 100MHz; 350mV from 100MHz to 200MHz; DSO5102BMT/DSO5062BMT: 200mV from DC to Full; DC(EXT/5): DSO5202BMT: 1V from DC to 100MHz; 1.75V from 100MHz to 200MHz; DSO5102BMT/DSO5062BMT: 1V from DC to Full; AC: Attenuates signals below 10Hz HF Reject: Attenuates signals above 80kHz LF Reject: Same as the DC-coupled limits for frequencies above 150kHz; attenuates signals below 150kHz |
| Trigger Level Range | CH1/CH2: ±8 divisions from center of screen; EXT: ±1.2V; EXT/5: ±6V |
| Trigger Level Accuracy (typical) Accuracy is for signals having rise and fall times ≥20ns | CH1/CH2: 0.2div × volts/div within ±4 divisions from center of screen; EXT: ± (6% of setting + 40mV); EXT/5: ± (6% of setting + 200mV); |
| Set Level to 50% (typical) | Operates with input signals ≥50Hz |
| Trigger Holdoff range | 100ns-10s |
| Video Trigger | |
| Video Trigger Type | CH1, CH2: Peak-to-peak amplitude of 2 divisions; EXT: 400mV; EXT/5: 2V |
| Signal Formats and Field Rates | Supports NTSC, PAL and SECAM broadcast systems for any field or any line Line range: 1-525(NTSC), 1-625(PAL/SECAM) |
| Holdoff Range | 100ns ~ 10s |
| Pulse Width Trigger | |
| Pulse Width Trigger Mode | Trigger when (< , > , = , or ≠); Positive pulse or Negative pulse |
| Pulse Width Trigger Point | Equal: The oscilloscope triggers when the trailing edge of the pulse crosses the trigger level. Not Equal: If the pulse is narrower than the specified width, the trigger point is the trailing edge. Otherwise, the oscilloscope triggers when a pulse continues longer than the time specified as the Pulse Width. Less than: The trigger point is the trailing edge. Greater than (also called overtime trigger): The oscilloscope triggers when a pulse continues longer than the time specified as the Pulse Width |
| Pulse Width Range | 20ns ~ 10s |
| Overtime Trigger | |
| Over Time Mode | Rising edge or Falling edge |
| Time Range | 20ns ~ 10s |

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| Slope Trigger | |
| Slope Trigger Mode | Trigger when (< , > , = , or ≠); Positive slope or Negative slope |
| Slope Trigger Point | Equal: The oscilloscope triggers when the waveform slope is equal to the set slope. Not Equal: The oscilloscope triggers when the waveform slope is not equal to the set slope. Less than: The oscilloscope triggers when the waveform slope is less than the set slope. Greater than: The oscilloscope triggers when the waveform slope is greater than the set slope. |
| Time Range | 20ns ~ 10s |
| Alternative Trigger | |
| Trigger on CH1 | Internal Trigger: Edge, Pulse Width, Video, Slope |
| Trigger on CH2 | Internal Trigger: Edge, Pulse Width, Video, Slope |
| Trigger Frequency Counter | |
| Readout Resolution | 6 digits |
| Accuracy (typical) | ±30ppm (including all frequency reference errors and ±1 count errors) |
| Frequency Range | AC coupled, from 4Hz minimum to rated bandwidth |
| Signal Source | Pulse Width or Edge Trigger modes: all available trigger sources; The Frequency Counter measures trigger source at all times, including when the oscilloscope acquisition pauses due to changes in the run status, or acquisition of a single shot event has completed. Pulse Width Trigger mode: The oscilloscope counts pulses of significant magnitude inside the 1s measurement window that qualify as triggerable events, such as narrow pulses in a PWM pulse train if set to < mode and the width is set to a relatively small time. Edge Trigger mode: The oscilloscope counts all edges of sufficient magnitude and correct polarity. Video Trigger mode: The Frequency Counter does not work. |
| Measurement | |
| Cursor Measurement | Manual: Voltage difference between cursors: ΔV ; Time difference between cursors: ΔT ; Reciprocal of ΔT in Hertz ($1/\Delta T$); Tracing: The voltage and time at a waveform point |
| Auto Measurement | Frequency, Period, Mean, Pk-Pk, Cycli RMS, Minimum, Maximum, Rise time, Fall Time, +Pulse Width, -Pulse Width, Delay1-2Rise, Delay1-2Fall, +Duty, -Duty, Vbase, Vtop, Vmid, Vamp, Overshoot, Preshoot, Preiod Mean, Preiod RMS, FOVShoot, RPRESshoot, BWIDTH, FRF, FFR, LRR, LRF, LFR, LFF |
| Display | |
| Display Type | 7 inch 64K color TFT (diagonal liquid crystal) |
| Display Resolution | 800 horizontal by 480 vertical pixels |
| Display Contrast | Adjustable (16 gears) with the progress bar |
| Probe Compensator Output | |
| Output Voltage (typical) | About 5Vpp into $\geq 1M\Omega$ load |
| Frequency (typical) | 1KHz |
| Power Supply | |
| Supply Voltage | 100-120VACRMS($\pm 10\%$), 45Hz to 440Hz, CAT II 120-240VACRMS($\pm 10\%$), 45Hz to 66Hz, CAT II |
| Power Consumption | <30W |
| Fuse | 2A, T rating, 250V |
| 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): $\leq 90\%$ relative humidity; 106 °F to 122 °F (+41 °C to 50 °C): $\leq 60\%$ relative humidity |
| Altitude | Operating: Below 3,000m (10,000 feet); Notoperaring: Below 15,000m(50,000 feet) |
| Mechanical | |
| Size | Packing: Length 385mm; Width 200mm; Height 245mm Without Packing: Length 313mm; Width 108mm; Height 142mm |
| Weight | 2.08KG(without Packing); 3.5KG(with Packing) |

► Font Panel Features



- ① **USB Host Port** -- Conveniently use your USB flash drive to store your personal oscilloscope setups, screen shots, and waveform data of later use. Also uses the USB host port to easily update your instrument firmware.
- ② **Math Menu** -- Easy and precise On-board Analysis, FFT and waveform add, subtract, and multiply math functions come standard on all models. FFT function displays frequency domain spectrums for fast harmonic distortion analysis or other frequency based analysis.
- ③ **Probe Check** -- Quickly verify that your probe is calibrated and operating properly
- ④ **Triggers** -- Quickly capture your event of interest with advanced triggers including Pulse Width, Edge, slope, Overtime and line selectable video triggers.
- ⑤ **F7 Button** -- Push this button in single-window mode to switch between dotted line display and cross display. Push it in dual-window mode to perform auto cruise.
- ⑥ **Autoset** -- Simplify setup with smart Autoset function which identifies the type of waveform, adjusts controls to produce a usable display of input signal, and allows you to select how the waveform should be presented. This function can be used to adjust the horizontal and vertical scales of the oscilloscope automatically and set the trigger coupling, type, position, slope, level and mode, etc., to acquire a stable waveform display. Automatically set the oscilloscope controls to generate a usable display of the input signals.
- ⑦ **Help** -- Help system with topics covering all of its features. Built in context-sensitive help further eases the operation by providing indexed and linked topics that allow you to selectively learn about the operation of various oscilloscope features and functions.
- ⑧ **Save to USB** -- Save all displays on the screen to a USB device, just like the screen capturing function of a computer.

► Rear Panel Features



9 USB Device Port Combined with PC -- Easily communicate with other instruments, peripherals or system via usb. The USB port allows you full programmable controls for automated measurements and remote display and archiving.

10 Integrated Handle -- Easily carry your light instruments from a place to another.

► Standard Accessories

| | |
|---------------|---|
| Probe | X1, X10 two passive probes. The passive probes have a 6MHz bandwidth (rated 100Vrms CAT III) when the switch is in the X1 position, and a maximum bandwidth (rated 300Vrms CAT II) when the switch is in the X10 position. Each probe consists of all necessary fittings. |
| Power Cord | A power cord special for this product. In addition to the power cord shipped with your instrument, you may purchase another one certified for the country of use. |
| Warranty Card | A warranty card. When there appears something wrong with the product, it can be returned for repair under warranty. |
| USB Line | A USB A-B line, used to connect external devices with USB-B interface like a printer or to establish communications between PC and the oscilloscope. |
| CD | A software installation CD. It contains the user manual of DSO5000B(MV), giving particular descriptions on the DSO5000B(MV) series oscilloscopes. |

Hantek

Qingdao Hantek Electronic Co., Ltd