Hantek

Data Manual

202507

Warranties and Declarations

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Product certification

Hantek certified DSO2D20 series oscilloscope to meet China's national industry standards and has passed the CE certification.

Contact us

If you have any questions when using the products of Qingdao Hantek Electronic Co., LTD., you can obtain service and support through the following ways:
Email: service@hantek.com, support@hantek.com
Website: http://www.hantek.com

1 Product Overview

Product features

- Support 1MΩ/50Ω impedance switching to ensure signal integrity;
- The sampling rate of the entire system is 2GSa/s, with a maximum bandwidth of 500MHz;
- Built in arbitrary waveform generator, capable of outputting 5 standard waveforms, supports custom arbitrary waveform output, and supports burst output;
- Protocol Trigger: Comes with five standard serial protocol triggers and decoding, supporting protocols including UART, LIN, CAN, SPI, IIC, making it easy to analyze serial bus data;
- 32 automatic measurement and threshold measurement functions, with test results supporting statistical analysis;
- Two sets of digital voltmeter functions and hardware frequency meter functions;Standard SCPI remote control instructions, convenient for users to build testing systems;
- Save and export function, which can save settings CSV, Information such as images, reference waveforms, and waveforms;
- Four sampling methods: normal, average, peak, and high-precision;
- 14 operating languages, supporting over 90% of countries and regions worldwide;
- There are two cursor measurement modes: manual and tracking, and the Math function also supports cursor measurement;
- 500uV-10V vertical measurement gear, 300VCAT Ⅱ withstand voltage input;
- FFT scale display, convenient for reading results;
- Manual, single time, one click AUTO measurement, simple and fast waveform measurement;
- XY mode supports dual window display, making it easy to understand waveform phase changes;

The DSO2D20 series digital oscilloscope has comprehensive functions and outstanding performance, with a sampling rate of 2GSa/s and a maximum bandwidth of 500MHz across the entire range. Support 1MΩ/50 Ω impedance switching to ensure signal integrity; Built in arbitrary waveform generator, capable of outputting 5 standard waveforms and supporting custom arbitrary waveform output; Standard configuration includes 9 triggering modes including edge, pulse, video, slope, timeout, window, code

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pattern, interval, and under amplitude, as well as 5 bus analysis and protocol decoding functions including UART, LIN, CAN, SPI, and IIC; 32 automatic measurement and threshold measurement functions, with test results supporting statistical analysis; Two sets of digital voltmeter functions and hardware frequency meter functions; Standard SCPI remote control instructions, convenient for users to build testing systems.

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2 Specifications

All technical specifications are applicable to the DSO2D20 series oscilloscope, as detailed in the last part of this chapter. To verify whether the oscilloscope meets technical specifications, the oscilloscope must first meet the following conditions:

- Within the specified operating temperature, the oscilloscope must have been operating continuously for more than twenty minutes.
- If the operating temperature changes by more than 5 degrees Celsius, a self calibration operation must be performed, which can be done through the **[Utility]** menu.
- The oscilloscope must be within the factory calibration period.

Model

Model	channels	real-time sample rate	Bandwidth	Signal Generator
DSO2C20	2	2GSa/s	200MHz	-
DSO2C35	2	2GSa/s	350MHz	-
DSO2C50	2	2GSa/s	500MHz	-
DSO2D20	2	2GSa/s	200MHz	1
DSO2D35	2	2GSa/s	350MHz	1
DSO2D50	2	2GSa/s	500MHz	1

Specifications

No. of Input Channels	2 analog channel input 1 EXT channel input 1 GEN OUT channel
Sampling Mode	Real-time sampling
Max. Sample Rate of Analog Channel	2GSa/s(single-channel) 1GSa/s(all channels)
Max. Memory Depth	80Kpts(single-channel), 40Kpts(all-channel)
Max. Waveform Capture Rate	2,000wfms/s
Peak Detection	Under all the time base settings, capture 1ns glitches

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LCD Size and Type	7-inch capacitive multi-touch screen
Display Resolution	800*480

Vertical System Analog Channel

	DSO2C20	DSO2C35	DSO2C50	DSO2D20	DSO2D35	DSO2D50
Input Coupling	DC, AC, GND					
InputImpedance	1 MΩ ± 1%, 50 Ω ± 1%					
Input Capacitance	17pF±3pF					
Maximum Input Voltage	1MΩ：CAT I 300 VRMS，400Vpk					
	50Ω：5 VRMS					
Vertical Resolution	8bit					
Vertical Sensitivity Range	1MΩ:500uV/div ~ 10 V/div					
	50Ω：500uV/div~1V/div					
Offset Range	1MΩ: ±1V (500uV/div ~ 50 mV/div) ±10V(100mV/div ~ 500 mV/div) ±100 V (1V/div ~ 10 V/div)					
	50Ω: ±1V(500uV/div ~ 50 mV/div) ±10V(100mV/div ~ 500 mV/div) ±100V(1 V/div)					
Dynamic Range	±5div (8bit)					
Bandwidth Limit	20MHz, 100M, 200M, 350M； selectable for each channel					
DC Gain Accuracy	± 3% FullScale					
DC Offset Accuracy	<200mV/div (±0.1 div±2 mV±1.5%of offset value)					
	>200mV/div (±0.1 div±2 mV±1.0%of offset value)					

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Channel-to-Channel Isolation	40dB, from DC to maximum rated bandwidth of each model

Horizontal System--Analog Channel

	DSO2C20	DSO2D20	DSO2C35	DSO2D35	DSO2C50	DSO2D50
Range of Time Base	200MHz		350MHz		500MHz	
	2ns/div-1ks/div		1ns/div-1ks/div		500ps/div-1ks/div	
Time Base Accuracy	±50ppm					
Time Base Delay Range	before triggering: ≥1/2 screen width					
	after triggering:1s or100 div(whichever is greater)					
Time Interval (△T)	Measurement±(1 sample interval)±(50ppm×readout)±50ps					
Horizontal Mode	YT:Default					
	XY:1=CH1,2=CH2					
	SCAN:Time base≥100ms/div,available to enter or exit the SCAN mode by rotating the Horizontal SCALE.					
	ROLL:Time base≥100ms/div,available to enter or exit ROLL mode through HORIZ MENU menu.					

Acquisition System

Max. Sample Rate of Analog Channel	2GSa/s(single-channel),1GSa/s(all channels)	
Max. Memory Depth	80Kpts(single-channel),40Kpts(all-channel)	
Acquisition Mode	Normal	Default
	Peak Detection	Capture 1ns glitches
	Average Mode	2, 4, 8, 16…128 are available for you to choose, averaging point by point
	High Resolution	12 bits (max.)

Trigger System

Trigger Source	Analog channel(CH1-CH2), EXT, Line	
Trigger Mode	Auto, Normal, Single	
Holdoff Range	16ns-10s	
Trigger Bandwidth	CH1-CH2	Analog bandwidth

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	EXT	200MHz
Trigger Sensitivity	CH1-CH2	1 div or 5 mVpp, whichever is larger, <10mV/div 0.5 div, ≥10mV/div
	EXT	3.3Vpp
Trigger Level Range	CH1-CH2	± 4 div from the center of the screen
	EXT	0-3.3V

Trigger Type

Trigger Type	Edge trigger, Pulse trigger, Video trigger, Slope trigger, Overtime trigger, Window trigger, Pattern trigger, Internal trigger, Under Amp trigger, UART trigger, LIN trigger, CAN trigger, SPI trigger, IIC trigger
Edge trigger	Identify triggers by searching for specified edges (rising edge, falling edge, double edge) and voltage levels on the waveform. Source channel: CH1~CH2, EXT, Line.
Pulse trigger	Set the oscilloscope to trigger on positive or negative pulses of a specified width. You can set the trigger source, polarity (positive, negative), trigger conditions, and pulse width in this menu. Source channel: CH1~CH2.
Video trigger	Triggered by scanning lines, number of lines, odd fields, even fields, and all fields that meet video standards. The supported video standards are PAL and NTSC. Source channel: CH1~CH2.
Slope trigger	Set the oscilloscope to trigger a positive or negative slope from one level to another within a specified time. Source channel: CH1~CH2.
Overtime trigger	Triggered when the time interval (△ T) from the rising edge (or falling edge) of the input signal through the trigger level to the adjacent falling edge (or rising edge) through the trigger level is greater than the set timeout. Source channel: CH1~CH2.
Window trigger	Window triggering provides high and low triggering levels. When the input signal passes through a high or low trigger level, the oscilloscope triggers. Source channel: CH1~CH2.
Pattern trigger	Identify triggering conditions by searching for specific code patterns. Source channel: CH1~CH2.
Internal trigger	Triggered when the interval between two consecutive rising (or falling) edges satisfies the set time condition (<,>,!=,=). Source channel: CH1~CH2.

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Under Amp trigger	Used to trigger a pulse that crosses one trigger level but does not cross another trigger level. Source channel: CH1~CH2.
UART trigger	Triggering of frame start, frame end, data, checksum errors, and acceptance errors when UART signals are detected. Source channel: CH1~CH2.
LIN trigger	Triggered on the synchronization field of LIN signal, or on specified identifiers, data, or frames. Source channel: CH1~CH2.
CAN trigger	Triggered at the beginning of a CAN signal frame, on a specified type of frame (such as remote frame, data frame, etc.), or on a specified type of error frame. Source channel: CH1~CH2.
SPI trigger	When the timeout condition is met, the oscilloscope triggers when it searches for the specified data.. Source channel: CH1~CH2.
I2C trigger	Triggered on the start bit, stop bit, no response, address, restart, address, and data of the I2C bus. Source channel: CH1~CH2.

Waveform Measurement

Cursor	Number of Cursors	2 pairs of XY cursors
	Manual Mode	Voltage deviation between cursors Time deviation between cursors Reciprocal of dX (1/dX)
	Track Mode	Fix Y-axis to track X-axis waveform point's voltage and time values Fix X-axis to track Y-axis waveform point's voltage and time values
	XY Mode	Measure the voltage parameters of the corresponding channel waveforms in XY time base mode. X = Channel 1, Y = Channel 2
Auto Measurement	Number of Measurements	Up to 4 measurements can be displayed at a time.
	Measurement Source	CH1-CH2
	All Measurement	Display 32 measurement items for the current measurement channel, with continuously updated measurement results and switchable measurement channels.

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	Type	PKPK, Freq, Average, Vmax, Vmin, Period, Vtop, Vmid, Vbase, Vamp, RMS, OverShoot, PreShoot, PrdRms, PrdAvg, RiseTime, FallTime, +Width, -Width, +Duty, -Duty, FRR, FFF, FOV, FPRE, BWidth, FRF, FFR, LRR, LRF, LFR, LFF
	Statistics	Cur, Avg, Max, Min, Rmse, Count
	Analyze	Frequency Counter, DVM

Waveform Calculation

Operation	A+B, A-B, A*B, A/B, FFT,	
Source	CH1-CH2	
FFT	Window Type	Rectangle, Hanning, Hamming, Blackman, Bartlett, Flattop

Waveform Analysis

Pass/Fail Test	Compare the signal under test with the user-defined mask to provide the test results: the number of successful tests, failed tests, and the total number of tests. The pass/fail event can enable immediate beeper, and the screenshot.	
	Source	Any analog channel

Serial Decoding

Decoding Type	UART, IIC, SPI, LIN, CAN
UART	Decode the data of 20 Mb/s UART bus TX/RX signals (5-9 bits), supporting check bit (no parity, odd parity, and even parity) and stop bit (1bit, 1.5bit, 2bit) settings.
IIC	Decode the address (with or without read/write bits), data, and ACK of the I2C bus.
SPI	Decoding SPI bus data.
LIN	Decode 2. X LIN bus, with a maximum speed of 20Mb/s.
CAN	Decode remote frames, overloaded frames, and data frames from a 5 Mb/s CAN bus.

Frequency Counter

Source	CH1-CH2
Measure	frequency

DVM

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Source	CH1-CH2
Mode	DC, AC+DC RMS, and AC RMS

Arbitrary Waveform Generator(Opiton)

Sample Rate	200MSa/s	
Vertical Resolution	12bit	
Max. Frequency	25MHz	
Standard Waveform	Sine, Square, Ramp, Exp, Noise, DC	
Arb Waveform	Arb1-Arb4	
Sine	Frequency Range	0.1Hz-25MHz
Square	Frequency Range	0.1Hz-10MHz
Ramp	Frequency Range	0.1Hz-1MHz
Exp	Frequency Range	0.1Hz-5MHz
Arb	Frequency Range	0.1Hz-25MHz
Waveform Length	4K	
Frequency	Accuracy	100 ppm (<10 kHz), 50 ppm (>10 kHz)
	Resolution	100 mHz or 4 bits (whichever is greater)
Amplitude	Output Range	10mVpp-7Vpp(HighZ)
		5mVpp-3.5Vpp(50Ω)
DC Offset	Range	±3.5V, HighZ
		±1.75V, 50Ω
	Resolution	100 uV or 3 bits (whichever is greater)
	Accuracy	2%(1KHz)
Output Impedance	50Ω±1%	
Modulation	AM, FM	
	AM	Modulating Waveforms: Sine, Square, Triangle
		Modulation Frequency: 1Hz-50KHz
		Modulation Depth: 0%-120%

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	FM	Modulating Waveforms: Sine, Square, Triangle
		Modulation Frequency:1Hz-50KHz
		Modulation Offset:0.1Hz-1KHz
Burst	N Cycle, Infinite	
	Cycle Count	1-1024
	Trigger Source	Internal, Manual
	Burst Period	2us-500s

Display

LCD	7-inch capacitive multi-touch screen
Resolution	800*480
Persistence	Off, adjustable time afterglow (1s, 5s, 10s, 30s), infinite afterglow
Display Type	vector or point
Waveform Intensity	adjustable
Screen Grid	Dot, Line, and Close
Grid Brightness	adjustable
Screen Brightness	adjustable

I/O

USB HOST	1 on the front panel
USB DEVICE	1 on the rear panel

Power

Power Voltage	100-120V, 50/60/400Hz; 100-240V, 50/60Hz
Power	Max.50W
Fuse	4 A, T degree, 250 V

Environment

Temperature Range	Operating	0℃~+50℃
	Non-operating	-30℃~+70℃
Humidity Range	Operating	Below +30℃, ≤90%RH (without condensation) +30 ℃ ~+40 ℃ , ≤75%RH (without

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		condensation) +40 ℃ ~+50 ℃ , ≤45%RH (without condensation)
	Non-operating	Below 65℃, ≤90%RH (without condensation)
Altitude	Operating	Below 3,000
	Non-operating	Below 15,000

Mechanical Characteristics

Dimensions	320mm(L)*125mm(W)*152mm(H)	
Weight	Package Excluded	~2kg

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3 Order Information and warranty period

3.1 Order Information

Order Information	Order No.
Model	
2GSa/S, 200MHz 2-channel oscilloscope	DSO2C20
2GSa/S, 350MHz 2-channel oscilloscope	DSO2C35
2GSa/S, 500MHz 2-channel oscilloscope	DSO2C50
2GSa/S, 200MHz 2-channel oscilloscope + AWG	DSO2D20
2GSa/S, 350MHz 2-channel oscilloscope + AWG	DSO2D35
2GSa/S, 500MHz 2-channel oscilloscope + AWG	DSO2D50
Order Information	**Order No.**
Standard Accessories	
Oscilloscope probe	200MHz machine PP200B * 1 350MHz machine PP300B * 1 500MHz machine PP500B * 1
USB cable	--
Crocodile Clip Line	DSO2C20 series * 1 DSO2D20 series * 2
power Line	--

3.2 Warranty Period

Mainframe warranty for 3 years, excluding probes and accessories.

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