Compact Digital Storage Oscilloscope & Digital Multimeter

GDS-200 & GDS-300 Series

QUICK START GUIDE

GW INSTEK PART NO. 82DS-22000MA1

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

The information in this manual was correct at the time of printing. However, Good Will continues to improve its products and therefore reserves the right to change the specifications, equipment, and maintenance procedures at any time without notice.

Good Will Instrument Co., Ltd. No. 7-1, Jhongsing Rd., Tucheng Dist., New Taipei City 236, Taiwan.

SAFETY INSTRUCTIONS

This section contains the basic safety symbols that may appear on the accompanying User Manual CD or on the instrument. For detailed safety instructions and precautions, please see the Safety Instructions chapter in the user manual CD.

Safety Symbols

These safety symbols may appear in the user manual or on the instrument.

 Warning	Warning: Identifies conditions or practices that could result in injury or loss of life.
 Caution	Caution: Identifies conditions or practices that could result in damage to the instrument or to other properties.
	DANGER High Voltage
	Attention Refer to the Manual
	Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.
 Battery Caution	The internal battery is not user-replaceable. Please return the unit back to your local dealer for assistance. For battery details, see the user manual.

Power Cord for the United Kingdom

When using the instrument in the United Kingdom, make sure the power cord meets the following safety instructions.

NOTE: This lead/appliance must only be wired by competent persons.

WARNING: THIS APPLIANCE MUST BE EARTHED
IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow:	Earth
Blue:	Neutral
Brown:	Live (Phase)

As the colours of the wires in main leads may not correspond with the coloured marking identified in your plug/appliance, proceed as follows:
The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with either the letter E, the earth symbol or coloured Green/Green & Yellow.
The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black.
The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.
If in doubt, consult the instructions provided with the equipment or contact the supplier.
This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, a cable of 0.75mm^2 should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.
Any exposed wiring from a cable, plug or connection that is engaged in a live socket is extremely hazardous. If a cable or plug is deemed hazardous, turn off the mains power and remove the cable, any fuses and fuse assemblies. All hazardous wiring must be immediately destroyed and replaced in accordance to the above standard.

GETTING STARTED

The Getting started chapter introduces the series lineup, main features, appearance, and set up procedure.

Series Lineup

There are 6 models in the series, divided by DSO bandwidth, DSO memory depth and DMM digit resolution.

Model Name	Bandwidth	Memory Depth	DMM Resolution	Temp. Meas.
GDS-207	70MHz	1M points per channel	3½	No
GDS-210	100MHz			
GDS-220	200MHz			
GDS-307	70MHz	5M points per channel	4½	Yes
GDS-310	100MHz			
GDS-320	200MHz			

Performance

- 1 G Sa/s sampling rate max
- 70/100/200MHz bandwidth
- Acquisition memory: 1Mpts (GDS-200), 5Mpts (GDS-300)
- Max 300Vrms(CAT II, DSO); 600V(CAT II) or 300V(CAT III) for DMM
- 30,000 waveforms can be replayed

Features	• Simultaneous DMM and DSO operation • Portrait and landscape modes • Large 800 x 480 TFT panel and capacitive touch panel • 7.4V/6100mAH battery for up to 4 hours operation • Support for differential probes • Handy APPs - EE calculator, chip resistance calculator, attenuation calculator • Shielded BNC terminals • DSO Features • X-Y mode • Go/No Go • 36 automatic measurement functions • Trend plot • Edge, Alt, Video and Pulse trigger functions • FFT, FFTrms, +, -, /, * math functions • Replay function • DMM Features • 50,000 counts • DCV, DCA, ACV, ACA, R, Diode, Continuity, Temperature • Fuse protection for the current ports
Interface	• Mini-B USB device port

Package Contents and Accessories

Standard Accessories

Item	Part Number
User Manual CD	82DS-2200E01
Quick Start Guide (this document)	82DS-22000M01
100MHz passive probe; for GDS-207 /307, GDS-210 /310	GTP-100A-4
200MHz passive probe; for GDS-220 /320	GTP-200A-4
Multimeter test lead x2	GTL-207
Soft carrying case (large)	GSC-010
Protection bag (small)	GSC-011
Wrist strap	GWS-001

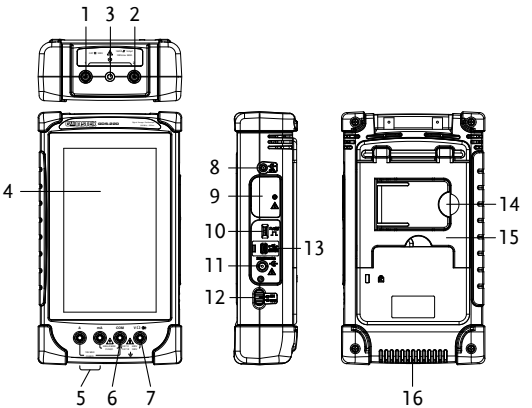
Optional Accessories

Item	Part Number
Dual-channel differential probe, Only for GDS-200/300	GDP-040D
Type A - Mini-B USB cable	GTL-253
Vertical calibration cable	GCL-001

Download

Item	Part Number
USB driver	dso_vpo.inf

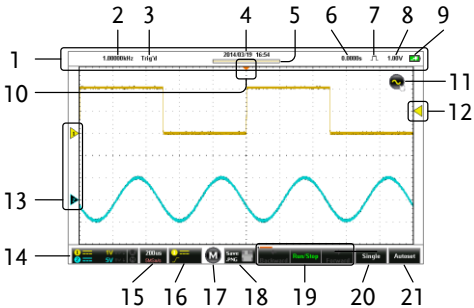
Panel Overview



Description

1.	Channel 1 BNC input	2.	Channel 2 BNC input
3.	Tapped hole for options	4.	800 x 480 TFT screen, cap. touch panel
5.	A and mA range DMM ports	6.	Com port
7.	Voltage, resistance and diode port	8.	External power port for optional extras
9.	Internal Use Port. Restricted use	10.	Calibration port: 2Vpp, 1kHz, square wave
11.	12V DC input	12.	Power switch
13.	Mini-B USB device port	14.	Horizontal stand
15.	Vertical stand		

Display Overview



Note: Background color has been inverted for clarity.

Description			
1.	Drop down menu	2.	Trigger frequency
3.	Trigger status	4.	Date and Time
5.	Memory bar	6.	Horizontal position
7.	Acquisition mode	8.	Trigger level
9.	Battery Indicator	10.	Horizontal position indicator
11.	Gesture control icon	12.	Trigger level indicator
13.	Channel indicators	14.	Vertical scale
15.	Horizontal scale	16.	Trigger mode
17.	Measurement/DMM key	18.	Hardcopy key
19.	Run Mode keys	20.	Single trigger
21.	Autoset		

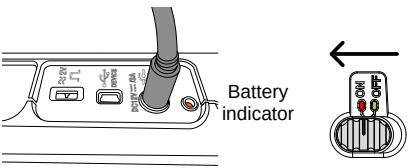
Setting up the Oscilloscope

This section describes how to set up the oscilloscope properly including setting the stand, power up and basic touch gestures.

Power Up

Before the unit is powered up for the first time, it is recommended that the unit is first fully charged.

1. Plug the AC-DC power pack into the mains outlet.
2. Connect the 12V plug into the 12V socket on the interface panel. The unit will begin charging. An orange battery indicator light indicates charging, while green indicates charged.
3. Slide the power switch to the ON position, located on the interface panel.
4. The unit will turn on in a short while.

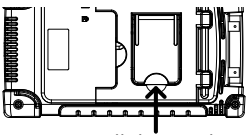


5. The battery indicator is shown on the top right-hand corner of the main display.

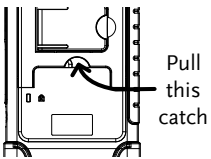
Tilting the Stand

The GDS-200/300 has two adjustable tabs on the rear panel that can be used to position the instrument into two preset orientations.

Horizontal



Vertical

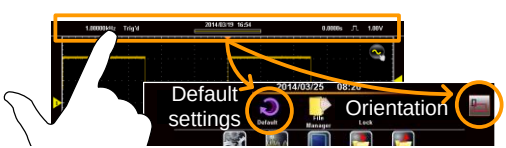


Portrait and Landscape Mode

1. Tap the top of the screen to access the Menu tray.
2. Press the  icon to toggle between horizontal and vertical view.

Default Settings

1. Tap the top of the screen to access the Menu tray.
2. Press the  icon to load the default settings.



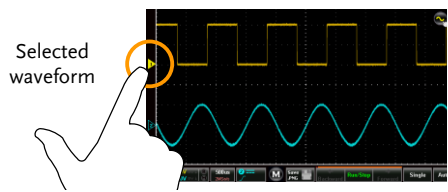
Basic Operation

This section will go over all of the basic touch gestures that are available using the default settings. Please see the user manual for comprehensive explanations.

Channel/Ref/Math Waveform Selection

To select the active waveform, tap the desired channel, math or reference indicator.

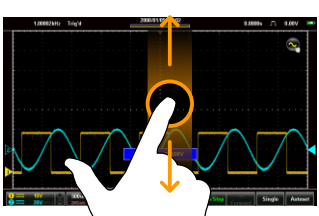
When selected, the icon will become a solid triangle.



Vertical Position of Selected Waveform

Swipe the screen vertically to set the vertical position of the selected waveform.

Tapping the upper or lower part of the screen will also increase/decrease the vertical position.



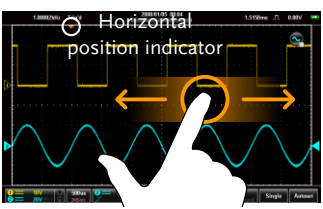
Vertical Scale

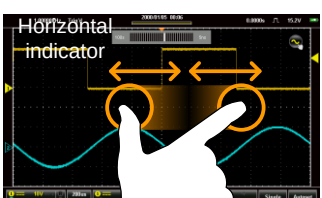
Pinch in/out vertically to set the vertical scale of the selected waveform.

Horizontal Position and Scale

Swipe the screen horizontally to set the horizontal position of the displayed waveforms.

Pinch in/out horizontally to set the horizontal scale of the display.

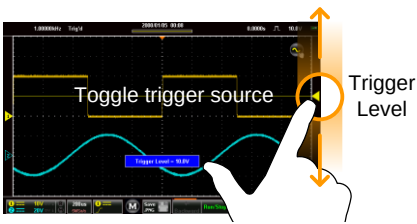




Trigger Source and Trigger Level

Tap on the trigger level indicator to toggle between trigger sources.

Swipe the screen to the right of the grid to set the trigger level with the currently selected source.



Drop Down Menu

The Drop Down menu contains the Menu tray and the App tray. The Menu tray includes the Horizontal/Vertical orientation key, Default settings, Utility menu, Display and Acquisition, Automatic measurement menu, Go-NoGo, Save, Recall, Panel Lock and File utilities.

Tap Drop Down menu area to access the Menu or App tray

SPECIFICATIONS

The specifications apply when the oscilloscope is powered on for at least 30 minutes under +20°C-+30°C.

Scope Specifications

Vertical	
Channel	2 (BNC-Shield)
Input Impedance	1MΩ
Maximum Input	CATII 300VRMs
Input Coupling	AC, DC, GND
Bandwidth	DC-70/100/200MHz (-3dB)
Rise Time	<5ns / 3.5ns / 1.75ns approx.
Sensitivity	2mV/div-10V/div (1-2-5 increments)
Accuracy	±(3% x Readout + 0.1 div + 1mV)
Bandwidth Limit	20MHz(-3dB)
Polarity	Normal, Invert
Offset Position Range	2mV/div-50mV/div : ±0.4V 100mV/div-500mV/div : ±4V 1V/div-5V/div : ±40V 10V/div : ±300V

Signal Acquisition	
Realtime Sample Rate	1GSa/s
Memory Depth	5M points per channel (GDS-307/310/320) 1M points per channel (GDS-207/210/220)
Acquisition Mode	Average: 2-256 waveforms Peak detect: 10ns sin(x)/x or ET
Replay wfms.	30,000 wfms

Trigger

Source	Ch1 or Ch2
Trigger Mode	Auto, Normal, Single, Force
Trigger Type	Edge, Pulse width, Video, Alternative
Trigger Holdoff	10ns - 10s
Coupling	AC, DC, LFR, HFR, NR
Sensitivity	DC - 25MHz: approx. 0.5div or 5mV 25MHz - 70/100/200MHz: approx. 1.5div or 15mV

Horizontal

Range	5ns-100s/Div (1-2-5 increments)
Roll	100ms/div - 100s/div
Pre-Trigger	10 div max.
Post-Trigger	1,000 div max (depend on time base)
Accuracy	±20ppm over any > 1ms time interval

X-Y Mode

Phase Shift	±3° at 100kHz

Cursors and Measurement

Cursors	Voltage difference between cursors(Δ V), time difference between cursors(Δ T), frequency measure(1/Δ T)
Auto-measurement	36 sets
Auto-counter	6 digits. Range: 2Hz to rated bandwidth
Autoset	Available

Probe Compensation

	2V, 1kHz, 50% Duty cycle

Miscellaneous

Multi-language Menu	Available
On-line Help	Available
Time and Clock	Available

Battery

Battery Power	Li-polymer 6100mA/hr, 7.4V (Built-in)
Charge Time	2.0 hour (75%)
Operation Time	4.1 hours, depending on the operating conditions.

Interface

USB	USB Device (Isolated)
Internal Flash Disk	120MB

Display

Type	7 Inch
Display Resolution	480 x 800
Display Orientation	Landscape and Portrait
Backlight Control	Manual adjustable & ECO mode
Touch Panel	Capacitive

Power Adapter

Line Voltage	AC 100V-240V, 47-63Hz, Power Consumption 40W
DC Output	12V/3A, double shielded wire cable

Dimensions and Weight

Weight	1.5kg
Dimensions	HxWxD(mm) 240.2mm x 136.0mm x 59.7 mm

DMM Specifications

Basic

Reading	50,000 counts, 4½ digits (GDS-307/310/320) 3½ digits (GDS-207/210/220)
Voltage Input	CAT II 600VRMS, CAT III 300VRMS

DC Voltage

Range	50mV, 500mV, 5V, 50V, 500V, 1000V, 6 ranges
Accuracy	GDS-307/310/320: 50mV, 500mV, 5V, 50V, 500V ±(0.05% + 5 digits), 1000V ±(0.1% + 5 digits) GDS-207/210/220: 50mV, 500mV, 5V, 50V, 500V, 1000V ±(0.1% + 5 digits)
Input Impedance	10MΩ

DC Current

Range	50mA, 500mA, 10A, 3 ranges
Accuracy	GDS-307/310/320: 50mA - 500mA, 2 Ranges, ±(0.1% + 5 digits), 10A ±(0.5% + 1 digits) GDS-207/210/220: 50mA - 500mA, 10A 3 Ranges, ±(0.5% + 1 digits)

AC Voltage

Range	50mV, 500mV, 5V, 50V, 700V 5 ranges
Accuracy	50mV, 500mV, 5V, 50V, 700V ±(1.5% + 15 digits) at 50Hz-1kHz

AC Current*

Range	50mA, 500mA, 10A 3 ranges
Accuracy	50mA, 500mA, ±(1.5% + 15 digits) at 50Hz-1kHz; 10A ±(3% + 15 digits) at 50Hz - 1kHz

* Measure range: >10mA

Resistance*

Range	500Ω, 5kΩ, 50kΩ, 500kΩ, 5MΩ, 5 range
Accuracy	500Ω, 5kΩ, 50kΩ, 500kΩ ±(0.3% + 3 digits); 5MΩ ± (0.5% + 5 digits)

* Measure range: 50Ω to 5MΩ

Diode Test

	Maximum forward voltage 1.5V, Open voltage 2.8V

Temperature (Thermocouple)*

Range	-50°C - + 1000°C
Resolution	0.1°C
Thermocouple	B, E, J, K, N, R, S, T

* Specifications do not include probe accuracy. Temperature specifications only apply to the GDS-307/310/320.

Continuity Beeper

	< 15 Ω

Diode Test

Functions	Auto Range, Max, Min, Hold, Trend plot

EC Declaration of Conformity

We
GOOD WILL INSTRUMENT CO., LTD.
No.7-1, Jhongsing Rd., Tucheng Dist., New Taipei City 236, Taiwan
GOOD WILL INSTRUMENT (SUZHOU) CO., LTD.
No. 69, Lushan Road, Suzhou New District Jiangsu, China
declares that the below mentioned product
GDS-207, GDS-210, GDS-220, GDS-307, GDS-310, GDS-320
Are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (2004/108/EC) and Low Voltage Equipment Directive (2006/95/EC). For the evaluation regarding the Electromagnetic Compatibility and Low Voltage Equipment Directive, the following standards were applied:

◎ EMC

EN 61326-1 : EN 61326-2-1: EN 61326-2-2:	Electrical equipment for measurement, control and laboratory use — EMC requirements (2013)
Conducted & Radiated Emission EN 55011: 2009+A1: 2010	Electrostatic Discharge EN 61000-4-2: 2009
Current Harmonics EN 61000-3-2: 2006+A1: 2009+A2: 2009	Radiated Immunity EN 61000-4-3: 2006+A1: 2008 +A2: 2010
Voltage Fluctuations EN 61000-3-3: 2008	Electrical Fast Transients EN 61000-4-4: 2012
----------	Surge Immunity EN 61000-4-5: 2006
----------	Conducted Susceptibility EN 61000-4-6: 2009
----------	Power Frequency Magnetic Field EN 61000-4-8: 2010
----------	Voltage Dip/ Interruption EN 61000-4-11: 2004

◎ Safety

Low Voltage Equipment Directive 2006/95/EEC
Safety Requirements: EN 61010-1: 2010 (Third Edition); EN 61010-0-030: 2010 (First Edition); EN 61010-2-033: 2012 (First Edition)