# Speed up your Innovation with a USB oscilloscope

This powerful USB 3.0 super speed oscilloscope combines fast sampling up to 1 GSa/s with high resolutions of 12, 14 and 16 bit and a large memory of 64 Mpoints on all four channels. The oscilloscope supports continuous streaming measurements up to 200 MSa/s and can be synchronized with other oscilloscopes using the CMI interface to form a multi channel combined instrument with synchronized time base. The CMI interface is available by default on the Handyscope HS6 DIFF. Optionally, the Handyscope HS6 DIFF can be delivered with SureConnect connection test and resistance measurement on each channel. Also, the Handyscope HS6 DIFF can be delivered with SafeGround option. With SafeGround you can switch the differential inputs of the Handyscope HS6 DIFF into single ended inputs with ground protection. It allows to make measurements using standard attenuating probes and protects the scope when a short circuit to ground is created.

Do you want to use the Handyscope HS6 DIFF (remotely) via a network connection? Transform the Handyscope HS6 DIFF to a network oscilloscope using an Instrument Sharing Server with TPISS installed.

SafeGround

SafeGround gives the possibility to use the oscilloscope inputs both as single ended and as differential. When SafeGround is active and you accidentally create a wrong connection that causes a short circuit, SafeGround will disconnect the ground of the input channel without damaging the oscilloscope or PC.
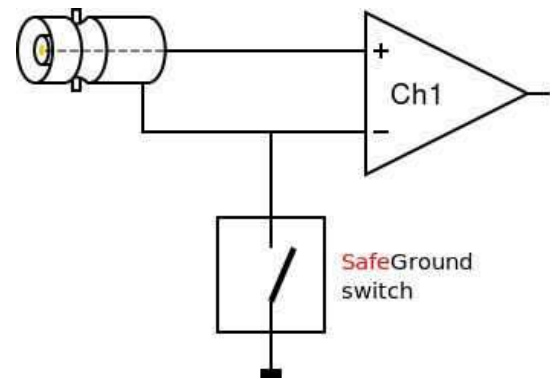
SureConnect

While measuring, the revolutionary SureConnect connection test feature of the Handyscope HS6 DIFF checks in real time whether your test probe or clip actually makes electrical contact with your test subject.

EMI pre compliance testing

The powerful capabilities of the Handyscope HS6 DIFF - 1000XMESG EMI analyzer give the user the possibility to quickly perform a good EMI compliance test. With this cost effective test, time and money are saved by avoiding extra visits to expensive EMC testing facilities. The supplied EMI probe set TP-EMI-HS6 contains three magnetic field (H field) probes and one electric field (E field) probe. The tripod ensures that the probes can be positioned properly at the object under test.

Multi oscilloscope synchronisation

The Handyscope HS6 DIFF is equipped with a sophisticated CMI synchronization bus, allowing to connect multiple Handyscope HS6 DIFFs to each other by means of TP-C50H Coupling cable CMIs, to use them as a combined oscilloscope. All Handyscopes will measure at the same sample frequency (0 ppm deviation!). Apart from a synchronization bus, the CMI also contains a trigger bus and a detection bus. The maximum number of Handyscopes is only limited by the number available USB ports.

High accuracy

The Handyscope HS6 DIFF measures with high resolutions of 14 and 16 bit. A signal measured with the Handyscope HS6 DIFF therefore has 256 times more resolution than most standalone oscilloscopes, which usually have a low resolution of 8 or 9 bit. The high resolution of the Handyscope HS6 DIFF precision oscilloscope allows for measuring signals with more accuracy, because the quantization error is much lower.
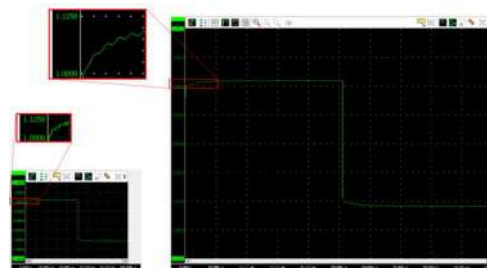
Large memory

When measuring at high sample rates, a long record length/large memory is necessary to be able to record a complete signal in the acquisition buffer. Where most oscilloscopes have 2.5 kpoints or 100 kpoints memory, the Handyscope HS6 DIFF has up to 256 Mpoints memory per channel, depending on the selected resolution and the number of active channels. When measuring at 14 bit resolution and all four channels, the available memory is 32 Mpoints per channel. This gives the user 300 to 100000 times more memory. An advantage of a large memory is that once-only fast phenomena can be captured accurately or complete serial communication signal blocks can be measured all at once. For example complete serial communications, like CAN bus signals, can be measured all in one record to be reviewed and analyzed afterwards.
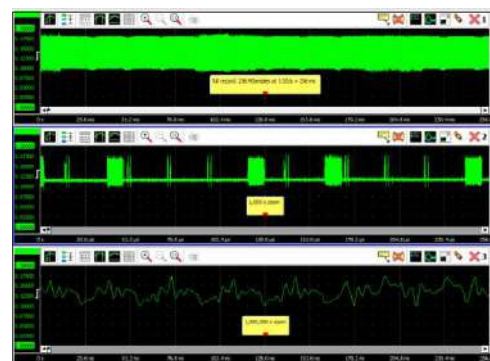
Bandwidth limit

It seems reasonable to assume that more bandwidth is better, but a wider bandwidth gives more noise. To reduce your noise you can switch on a bandwidth limiter for each channel of the Handyscope HS6 DIFF.

Scientech
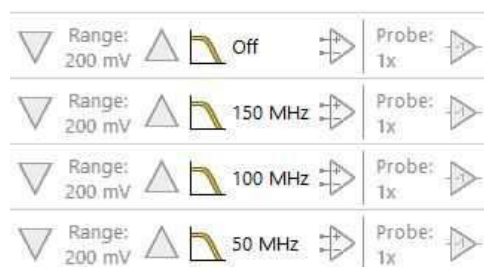
Software features

Versatile multi channel oscilloscope software

The Handyscope HS6 DIFF is delivered with the versatile multi channel oscilloscope software, which transforms the Handyscope HS6 DIFF into an oscilloscope, spectrum analyzer, data logger, multimeter and protocol analyzer.

Some of the powerful features of the multi channel oscilloscope software are indicated below, for a full description of the multi channel oscilloscope software, refer to the multi channel oscilloscope software pages.

Quick Setup

To simplify setting up the measurements, the multi channel oscilloscope software contains a large number of Quick Setups, for almost any application. A Quick Setup contains the basic settings for a specific measurement as well as additional information regarding the selected Quick Setup, like e.g. how your Handyscope and/or accessories need to be connected. Quick Setups can also contain reference signals. After loading the Quick Setup, that specific measurement can be performed and if needed, small adjustments to the setup can be made.

The Quick Setups are carefully organized in a tree structure, ordered by application. Just a few mouse clicks allow to perform a complex measurement.

Flexible signal displays

The multi channel oscilloscope software scope, spectrum analyzer and datalogger offer an ultimately flexible way to display all aspects of the measured signals. They can have one or more graphs, each displaying one or more signals, where each graph can display different parts of a signal. Graphs can display the signal(s) of your Handyscope in Yt mode, in XY mode or as frequency spectrum, with or without interpolation. Colors of all items in a graph can be set to any required value. Graph dimensions can be adjusted to any required size, graphs can be located in one single window or in separate windows, which can be located anywhere on the desktop.

Many automatic measurements

The multi channel oscilloscope software features many automatic measurements, that can be performed on the measured signals of your Handyscope or on a selection of the measured signals. Using the automatic measurements in the oscilloscope, any detail of your signal is revealed. Two sets of cursors, both horizontal and vertical, can be used to indicate a part of the signal that needs to be examined thoroughly. The automatic measurements include e.g.: Mininum, Maximum, Top-Bottom, RMS, Mean, Variance, Standard deviation, Frequency.
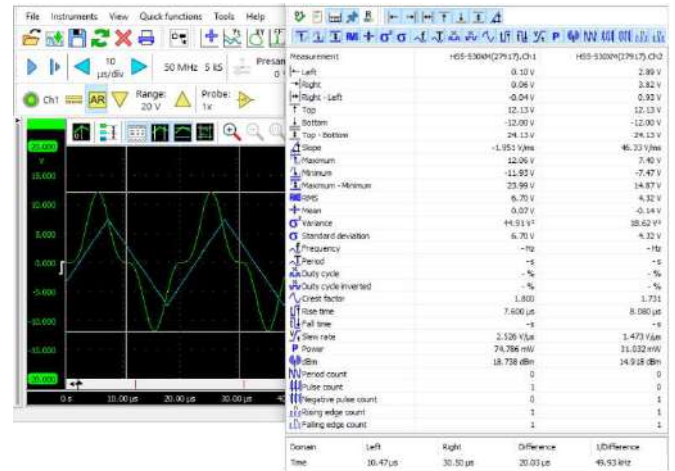
The measurement results are shown in a special value window that can be positioned anywhere on your computer screen. A convenient toolbar allows you to enable or disable a measurement with a single click. The measurement results can be copied to the clipboard e.g. to use them in reports. When printing the graphs, the cursors and measurements results are also included.

High detail spectrum analyzer

The high detail multi channel oscilloscope software spectrum analyzer takes full benefit of the deep memory of the high resolution USB Handyscopes. Not only gives the deep memory an incredible low resolution bandwidth of just 7.45 Hz at a frequency span of 500 MHz, it also gives a vertical dynamic range of 140 dB. The fast and powerful FFT routines with many user selectable window functions allow you to see the smallest frequency components in your signals.
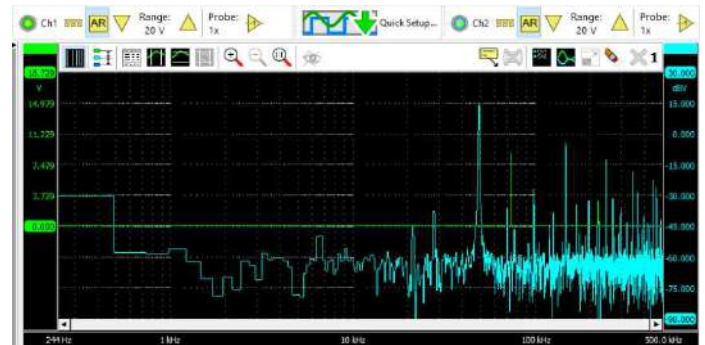
The multi display option of the multi channel oscilloscope software spectrum analyzer allows viewing multiple parts of the spectrum at the same time, giving a better understanding of the signals that are analyzed.

Advanced triggers

To control the advanced trigger capabilities of your Handyscope, the multi channel oscilloscope software provides for a convenient trigger properties dialog. It allows to view and set all properties of the trigger, like e.g. trigger source, trigger type, all levels and hystereses and optional time conditions. Additionally, it gives an explanation on the selected trigger type and examples that do cause a trigger (left column) and do not cause a trigger (right column).
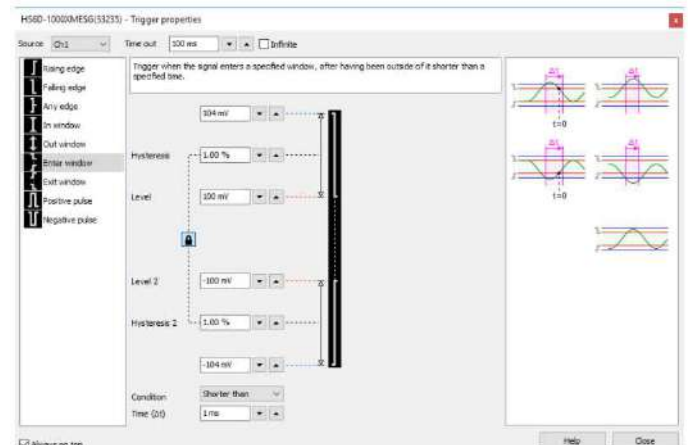
Unlimited zoom

When measuring at high sample rates, a long record length is a must, otherwise the acquisition buffer is full before the signal is measured. Therefore, our Handyscopes can have up to 256 MSamples record length per channel.

To view all that data conveniently and yet being able to see all details of the signals, the multi channel oscilloscope software scope, spectrum analyzer and data logger support sophisticated signal drawing routines with unlimited zooming capabilities. The full signal can be shown on any display size, without loss of information. Yet, you can zoom in to any required level, to see the finest details in the signals. Zooming factors of 1 million of even more are no problem, you can zoom in far beyond sample level.

Analyze fast serial communication protocols

To analyze or debug your serial communications, simply measure the signal(s) transferring the protocol with your Handyscope and have them analyzed and decoded by one of the multi channel oscilloscope software protocol analyzers. The decoded information from the serial communications can be shown in tables, in graphs and in the multimeter.
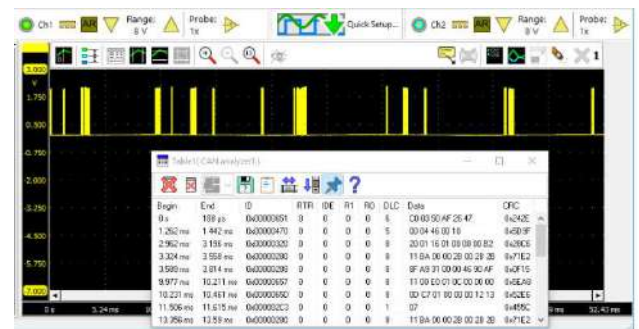
A protocol analyzer is a useful tool when developing a hardware and/or software implementation of a communication bus. It can also be used when debugging device or bus failures.

24/7 Data logging

Measuring long term signal changes with your Handyscope is done with the multi channel oscilloscope software Data logger. The data logger logs your signal, continuously uninterrupted at high speed, 24 hour a day, 7 days a week. Results are immediately shown on the screen and all data can be stored to disk. A convenient toolbar lets you navigate through the stored files to find the important moments in the measurement.

Technical Specification

Acquisition system

Number of input channels	:	4 analog
CH1, CH2, Ch3, CH4	:	Isolated Female BNC
Type	:	Differential input
Resolution	:	8, 12, 14, 16 bit user selectable
DC Accuracy	:	0.25 % (0.1 % typical) of full scale ± 1 LSB at 20°C to 25°C

Ranges (Full scale)	:	±200mV	±2V	±20V
		±400mV	±4V	±40V
		±800mV	±8V	±80V

Coupling	:	AC/DC
Impedance	:	2 MOhm / 12 pF ± 1 %
		1 MOhm / 20 pF ± 1 % when SafeGround enabled
Maximum voltage	:	200 V (DC + AC peak < 10 kHz)
Maximum Common Mode voltage	:	200 mV to 800 mV ranges : 2 V
2 V to 8 V ranges	:	20 V
20 V to 80 V ranges	:	200 V
Common Mode Rejection Ratio	:	-47 dB

Bandwidth	:	HS6D-1000	HS6D-500	HS6D-200	HS6D-100	HS6D-50
-3dB at 75 % of full scale input	:	250 MHz	250 MHz	250 MHz	100 MHz	100 MHz
Limit, selectable per channel (MHz)	:	Off 250	Off 250	Off 250	Off 100	Off 100
		150 MHz	150 MHz	150MHz	75 MHz	75 MHz
		100 MHz	100 MHz	100 MHz	50 MHz	50 MHz
		50 MHz	50 MHz	50 MHz	25 MHZ	25 MHZ

AC coupling cut off frequency (-3dB)	:	±1.5 Hz
SureConnect	:	Optionally available (option S)
Maximum voltage on connection	:	200 V (DC + AC peak < 10 kHz)
Resistance measurement	:	Optionally available (option S)

Ranges (Full scale)	:	100 kΩ	1 kΩ	10 kΩ	100 kΩ	1 MΩ
		200 kΩ	2 kΩ	20 kΩ	200 kΩ	2 MΩ
		500 kΩ	5 kΩ	50 kΩ	500 kΩ	

Accuracy	:	1 % of full scale
Response time (to 95%)	:	< 10 µs
SafeGround	:	Optionally available (option G)
Maximum voltage on connection	:	200 V (DC + AC peak < 10 kHz)
Maximum switch off current	:	500 mA
Response time	:	< 100 ns

Maximum sampling rate	:	HS6D-1000	HS6D-500	HS6D-200	HS6D-100	HS6D-50
8 bit						
measuring one channel	:	1 GSa/s	500 MSa/s	200 MSa/s	100 MSa/s	50 MSa/s
measuring two channels	:	500 MSa/s	200 MSa/s	100 MSa/s	50 MSa/s	20 MSa/s
measuring three or four channels	:	200 MSa/s	100 MSa/s	50 MSa/s	20 MSa/s	10 MSa/s
12 bit						
measuring one channel	:	500 MSa/s	200 MSa/s	100 MSa/s	50 MSa/s	20 MSa/s
measuring two channels	:	200 MSa/s	100 MSa/s	50 MSa/s	20 MSa/s	10 MSa/s
measuring three or four channels	:	100 MSa/s	50 MSa/s	20 MSa/s	10 MSa/s	5 MSa/s
14 bit	:	100 MSa/s	50 MSa/s	20 MSa/s	10 MSa/s	5 MSa/s
16 bit	:	6.25 MSa/s	3.125 MSa/s	1.25 MSa/s	625 kSa/s	312.5 kSa/s

Maximum streaming rate 1	:	HS6D-1000	HS6D-500	HS6D-200	HS6D-100	HS6D-50
8 bit						
measuring one channel	:	200 MSa/s2	100 MSa/s2	40 MSa/s	20 MSa/s	10 MSa/s
measuring two channels	:	100 MSa/s3	50 MSa/s3	20 MSa/s	10 MSa/s	5 MSa/s
measuring three or four channels	:	50 MSa/s4	25 MSa/s4	10 MSa/s	5 MSa/s	2.5 MSa/s
12 bit						
measuring one channel	:	100 MSa/s3	50 MSa/s3	20 MSa/s	10 MSa/s	5 MSa/s
measuring two channels	:	50 MSa/s4	25 MSa/s4	10 MSa/s	5 MSa/s	2.5 MSa/s
measuring three or four channels	:	25 MSa/s5	12.5 MSa/s5	5 MSa/s	2.5 MSa/s	1.25 MSa/s
14 bit						
measuring one channel	:	100 MSa/s3	50 MSa/s3	20 MSa/s	10 MSa/s	5 MSa/s
measuring two channels	:	50 MSa/s4	25 MSa/s4	10 MSa/s	5 MSa/s	2.5 MSa/s
measuring three or four channels	:	25 MSa/s5	12.5 MSa/s5	5 MSa/s	2.5 MSa/s	1.25 MSa/s
16 bit	:	6.25 MSa/s6	3.125 MSa/s	1.25 MSa/s	625 kSa/s	312.5 kSa/s

Sampling clock source		
Internal	:	TCXO
Accuracy	:	± 0.0001 %
Stability	:	± 1 ppm over 0°C to 55°C
Time base aging	:	±1 ppm/year
External	:	LVDS, on CMI connectors
Input frequency	:	10 MHz ± 1 %
		16.369 MHz ± 1 %

Memory	:	Standard model	XM option

8 bit resolution

Measuring one channel	:	1 Mpts per channel	256 Mpts per channel
Measuring two channels	:	512 Kpts per channel	128 Mpts per channel
Measuring three or four channels:		256 Kpts per channel	64 Mpts per channel

12, 14, 16 bit resolution

Measuring one channel	:	512 Kpts per channel	128 Mpts per channel
Measuring two channels	:	256 Kpts per channel	64 Mpts per channel
Measuring three or four channels	:	128 Kpts per channel	32 Mpts per channel

Trigger

System	:	Digital, 2 levels
Source	:	CH1, CH2, CH3, CH4, OR, digital external
Trigger modes	:	Rising edge, falling edge, any edge, inside window, outside window, enter window, exit window, pulse width
Level adjustment	:	0 to 100 % of full scale
Hysteresis adjustment	:	0 to 100 % of full scale
Resolution	:	0.006 % (14, 16 bits) / 0.025% (12 bits)
Pre trigger	:	0 to selected record length, 1 sample resolution
Post trigger	:	0 to selected record length, 1 sample resolution
Trigger hold-off	:	0 to 63 MSamples, 1 sample resolution
Trigger delay	:	0 to 8 GSamples, 1 sample resolution

Digital external trigger

Input	:	Extension connector pins 1 and 2
Range	:	0 to 2.5 V (TTL)
Coupling	:	DC
Jitter	:	≤ 1 sample

Multi-instrument synchronization

Maximum number of instruments	:	Limited by number of available USB ports
Synchronization accuracy	:	0 ppm
CMI interface	:	2x, CMI 1, CMI 2
Required coupling cable	:	TP-C50H Coupling cable CMI
Maximum coupling cable length	:	50 cm

Probe calibration

Output Extension connector	:	pins 3 (signal) and 6 (ground)
Signal	:	Square wave
Level	:	-1 V to 1 V
Frequency	:	1 kHz

Interface

Interface	:	USB 3.0 SuperSpeed (5 Gbit/s); (USB 2.0 HighSpeed compatible)
Network support	:	Yes, via TPISS Instrument Sharing Server

Power Requirements

Power	:	From USB port or external input
Consumption	:	5 VDC 1200 mA max
External power	:	From second USB port or power adapter

Physical

Instrument

Height	:	25 mm (1 inch)
Length	:	170 mm (6.7 inch)
Width	:	140 mm (5.2 inch)
Weight	:	500 g (17.6 ounce)
USB cord length	:	1.8 m (70 inch)

I/O connectors

Channel 1, 2, 3, 4	:	Isolated BNC
USB	:	Fixed cable with USB 3.0 type A connector, 1.8 m
Extension connector	:	D-sub 9 pins female
Power	:	3.5 mm power socket
CMI I/O connectors	:	2 x HDMI type C socket

System requirements

PC I/O connection	:	USB 2.0, USB 3.0 or USB 3.1
Operating system	:	Windows 10, 32 and 64 bits Linux (via LibTiePie SDK)

Environment conditions

Operating

Ambient temperature	:	20°C to 25°C (10°C to 40°C without specifications)
Relative humidity	:	10 % to 90 %, non condensing

Storage

Ambient temperature	:	-20°C to 70°C
Relative humidity	:	5 % to 95 %, non condensing

Certification and Compliances

CE mark compliance	:	Yes
RoHS	:	Yes

Package contents

The Handyscope HS6 DIFF is delivered with:

Carry case	:	Carry case BB391
Instrument	:	Handyscope HS6 DIFF
Measure leads	:	4 x Measure lead TP-C812B, Differential BNC -> 4 mm banana plug
Differential attenuator	:	4 x Differential attenuator TP-DA10
Alligator clips, large	:	Alligator Clip TP-AC80I - Set, 8 large alligator clips
Alligator clips, medium	:	Alligator Clip TP-AC10I - Set, 8 medium alligator clips
Alligator clips, small	:	Alligator Clip TP-AC5 - Set, 8 small alligator clips
Accessories	:	Handyscope / WiFiScope power supply, external power cable for USB port, Probe compensation cable TP-DB9-BNC-30 (only with option SafeGround)
Software	:	for Windows 10, via website
Drivers	:	for Windows 10, via website
Software Development Kit	:	for Windows 10 and Linux, via website
Manuals	:	instrument manual and software user's manuals color printed and digital, via website

Related Products

Differential Probe
SI-9002

Current clamp
TP-CC80

Current clamp
TP-CC600

Current clamp
TP-CC400

Measure Lead
TP-C812B

Measure Lead
TP-C1812B

Back Probe
TP-BP85

Alligator Clip
TP-AC80I

Test Probe
TP-TP90 Set

Alligator Clip
TP-AC50B Set

Accelerometer
TP-ACC20

Differential attenuator
TP-DA10

Scientech

TP-C50H
Coupling cable CMI

Rubber Protector
TP-RP-HS

Differential attenuator
TP-DA25

Alligator Clip
TP-AC101

Alligator Clip
TP-AC5

Oscilloscope Probe
1:1-1:10-HP-3250I

Measure lead
TP-BNCI-100

Carry case
Bb391

Probe compensation cable
TP-DB9-BNC-30

Milliohm Meter
TP-MM3000

Handyscope/WiFiScope
Power supply

Subject to Change