



SainSmart® DDS Series

User Manual (Hardware)


For Oscilloscope, Signal Generator and Logic Analyzer


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1 Warnings


 Please note that the equipment should NOT be operated beyond the input voltage range.



 Please make sure that the alligator clip of the probe and the PC are both well grounded.

 Please do NOT connect the probe to the 220V/110V socket directly. It is very dangerous for the device and the operating personnel.

WARNING! Damages caused by misuse of the product will not be covered under our warranty.

Comments on  : Input voltage range of the virtual oscilloscope device is $\pm 5V$. Although the virtual oscilloscope device has an internal input overvoltage protection circuit which can protect from several times' overvoltage input, there are still very serious unpredictable risks. Be sure to choose the correct attenuator probe according to your testing voltage. The equipment includes a standard x1 / x10 probe. In the x1 position, the input voltage range is $\pm 5V$; in the x10 position, the input voltage range is $\pm 50V$; if you select an optional x100 probe, the input voltage range will be $\pm 500V$.

Comments on  : The virtual oscilloscope equipment is powered through USB port from PC. If it's connected to and get power from a PC, then the PC should be properly grounded via a three-prong plug; If the equipment is connected to a laptop running on battery power, then the ground will be floating. So generally, please make sure the equipment, PC and the alligator clip of the probe are connected to earth.

Comments on  : As briefly mentioned in  , if you have to measure high voltages like 110V/220V using this equipment, you need to have an extra x100 High Voltage Probe (isolated) and must be very careful.

2 Features

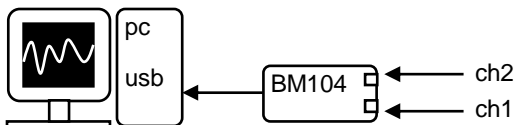
SainSmart® DDS Series

Introduction

SainSmart® DDS is more than a medium-performance handheld oscilloscope. It can be easily extended to realize the functions of signal generator and logic analyzer by plugging in different sub-modules. (DDS-140 Only)

The SainSmart® DDS series achieve the functions of traditional oscilloscope, such as digital processing, waveform drawing and displaying in computer with software. As long as you connect a SainSmart® DDS series oscilloscope with the computer via a USB cable, it will form a complete oscilloscope test system after running the software.

Unlike the traditional DSO fully relying on hardware, SainSmart® DDS leverages the self-developed software to deal with the similar work like digital processing, waveform drawing, etc.



Hardware Features

- Signal generator function: Optional module (Only for DDS-140)
- Logic analyzer function: Optional module (Only for DDS-140)
- Real-time sample rate:
 - Up to 50MHz (DDS-120)
 - Up to 200MHz (DDS-140)
- Recommended input:
 - 1 ~ 15MHz
 - 1 ~ 30MHz

- ESD protection: 10KV
- Overvoltage protection: 10 times
- Input Coupling: DC, AC
- Power supply : Directly with USB
- Built-in square wave signal output: 1KHz

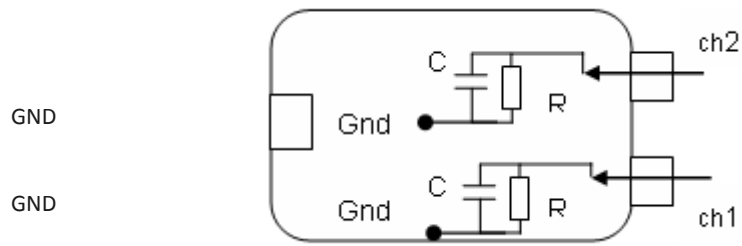
Software features

- Operating system: Support Windows XP ~ Windows 8
- Open Application Interface enabling 3rd Party software integration
- Storage and playback: Waveform storage, continuous playback as well as specified frame playback
- Arithmetic calculation and FFT analysis on input signals
- Anti-aliasing filter (LPF)
- Memory function of users' personalized settings
- Mouse-controlled trigger function setup

Application

- FAE diagnose
- Portable testing equipment for Electronics Engineering like prototype development
- Ideal development tool for hobbyist /maker
- Labs and college students

Device structure



Top View, $R=1M\ \Omega$, $C=25pF$

3 Accessories

Standard accessories(included)

- Probe ×2
- A USB Cable
- A Resource CD

4 Device Interface

Module Interface



4.1 USB Connection

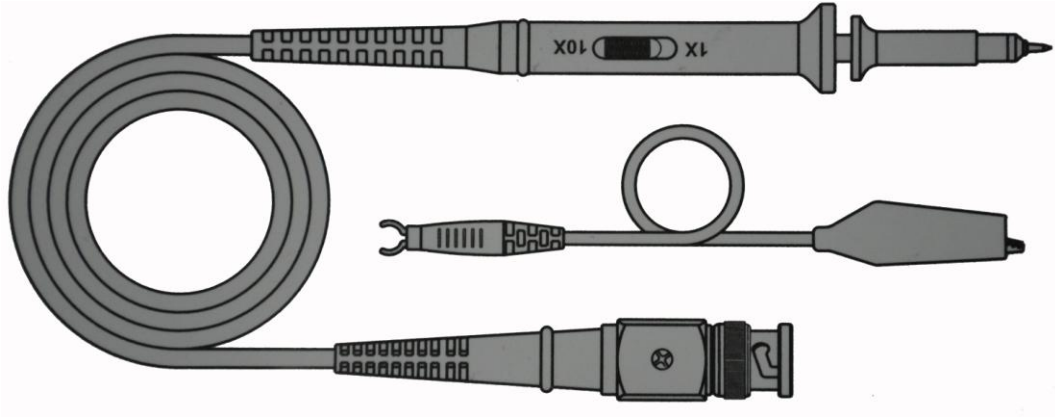
Please use the USB 2.0 cable included in the package. Poor quality USB cable or using the front USB interface may cause shortage of power supply which may further result in problems like software crashes, slowdown or devices not being recognized.

4.2 Built-in Standard Square Wave Signal

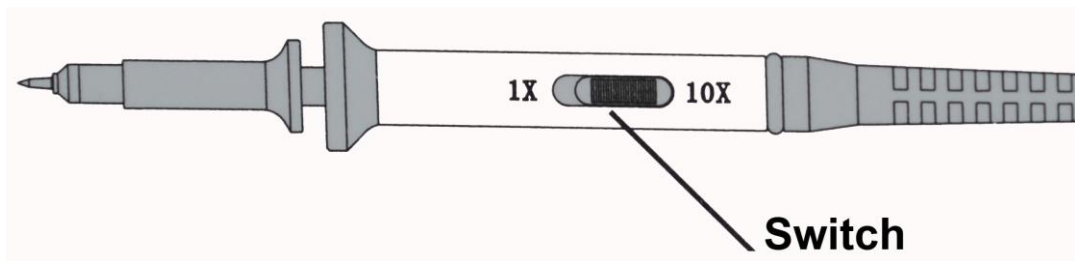
The small metal tip between the two BNC ports will output a square wave signal of 1KHz with an maximum of about 1.5V. You can use it to test, calibrate and set up the device. This standard square wave may be automatically disabled when the signal generator module is plugged in. It will be enabled when the signal generator is unplugged.

4.3 Probe Connection

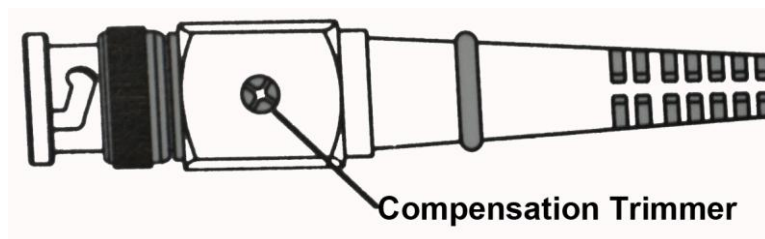
Two standard x1/x10 switchable 60MHz probes included:



4.3.1 Attenuation Switch



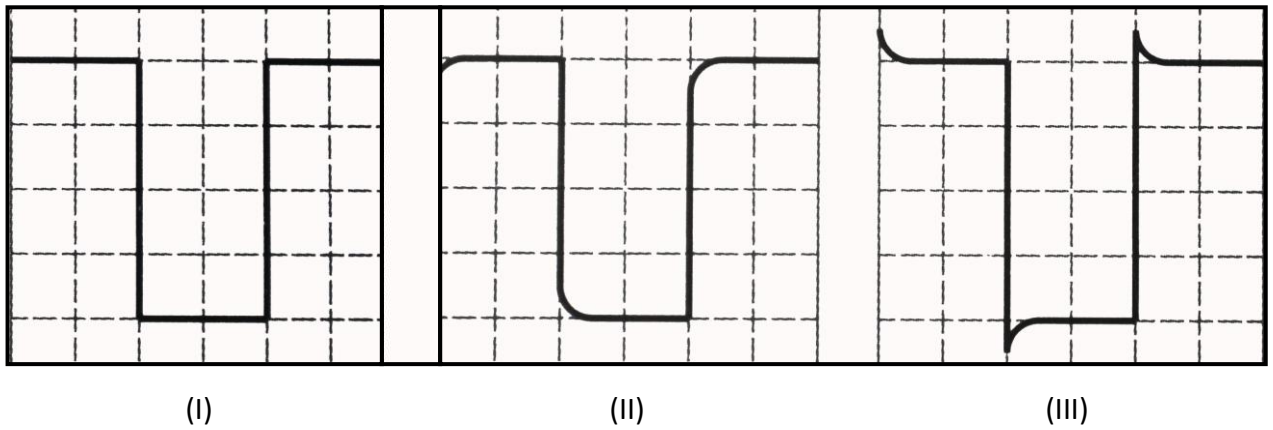
4.3.2 Probe Tuning (Compensation Capacitor)



Using a x10 attenuator, user can adjust the compensate capacitor to improve the frequency response.

The easiest way to compensate the LFC part of the probe is to input a square wave with a relatively slow edge but, importantly, no overshoot.

The diagram (I) below show how the waveform should look when LFC is correct. Too little LFC, the HF gain will be lower than the LF gain (II). With too much and the High Frequency (HF) gain of the probe will be higher than its Low Frequency (LF) gain (III).



4.3.3 Probe Ground Clip



4.4 External Module Interface (Only For DDS-140)

External function modules like Signal Generator, Logic Analyzer can be easily plugged into the interface on the DDS oscilloscope equipment. In most cases, the external modules are Plug-N-Play supported, but we'd suggest the user to plug/unplug the modules in power-off status for its safety and stability.

5 Specification

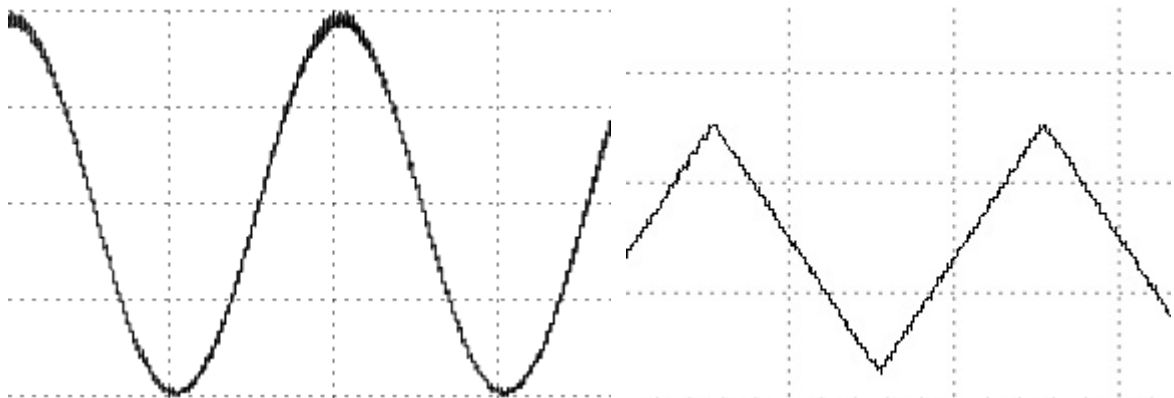
Category	Index	
Interface	USB 2.0	
Channels#	2	
Built-in Signal	1Hz, 3.25V level, standard square wave	
Max Sampling Rate	DDS-120: 50Msps DDS-140: 200Msps (single), 100Msps (dual)	
Vertical Resolution	8 bit	
Voltage range	Default $\pm 5V$, can be extended to $\pm 50v$ through x10 probe, extended to $\pm 500v$ through x100 probe	
Noise range	$\pm 50mV$	1V/div
	$\pm 25mV$	500mV/div
	$\pm 10mV$	200mV/div
	$\pm 8mV$	100mV/div
	$\pm 4mV$	50mV/div
Trigger Coupling	AC/DC	
Triggering Conditions	Trigger level + rising / falling-edge trigger	
Trigger	Auto, Normal, Single, None, (Scan)	
Input Impedance	1M / 25pf	
Memory Depth	64KB	
Power	<2W	
Weight	<400g	
Functionalities	Automatic measurement: max, min, frequency, rise time, cycle, duty, Vpp, Vram, Vavg and DC voltage Precise vertical measurement with markers Precise horizontal measurement with markers Trig level adjustable via software Trig sensitivity adjustable via software	
Size	DDS-120: 10cm X 7.5cm X 2.5cm DDS-140: 12cm X 7.5cm X 2.5cm	

6 Signal Generator Module (Optional, Only For DDS-140)



Signal output from BNC port::

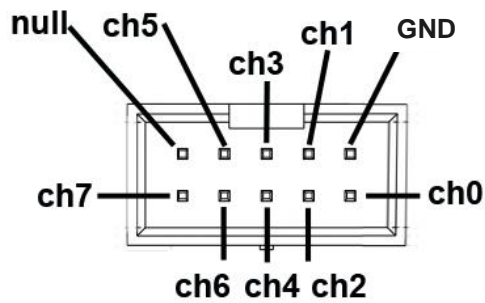
Entry	Detail
Waveform Type	Square, Sine, Triangle, PWM
Max Output	Adjustable via software, output range -4V ~ +4 V
Output Frequency	1 ~ 20MHz (sine wave) continuously adjustable; PWM output frequency limit: 20KHz
Output Bandwidth	5MHz (sine wave)
Output Offset	Adjustable via software
Mark-Space Ratio	PWM's Mark-Space Ratio is adjustable via software, stepping at 10%
Size	10cm X 4cm X 2.5cm



7 Logic Analyzer Module (Optional, Only For DDS-140)

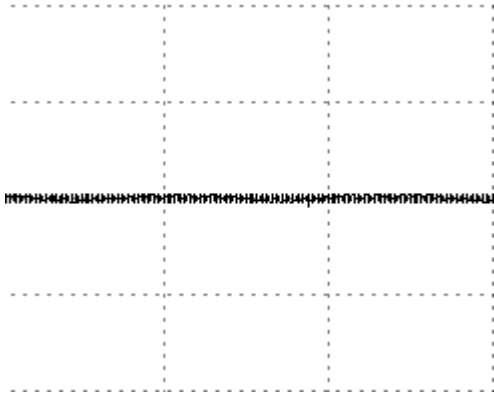


Entry	Detail
Channels#	8
Input Level	Compatible with 3.3V/5V TTL/CMOS
Max Sampling Rate	100MHz
Memory Depth	32K per channel
Output Offset	Adjustable via software
Size	10cm X 4cm X 2.5cm

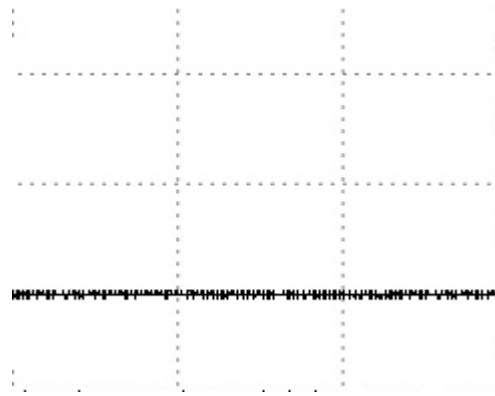


Interface front view

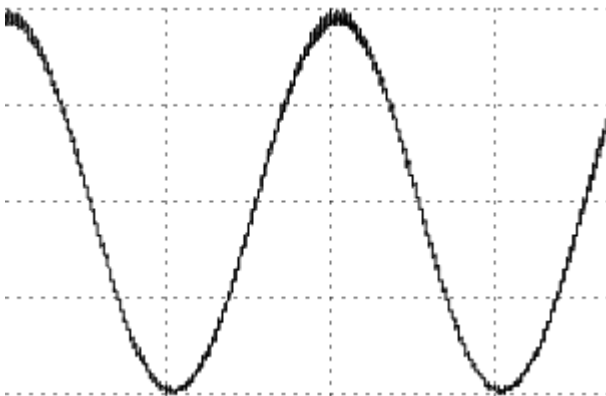
8 Typical Characteristics



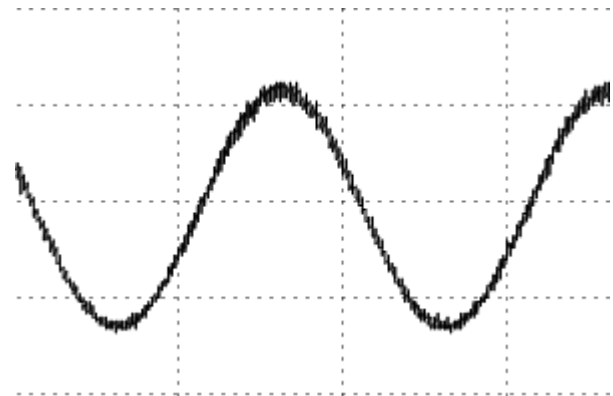
Noise range $\lt; \pm 50\text{mV}$ (1V / vertical)



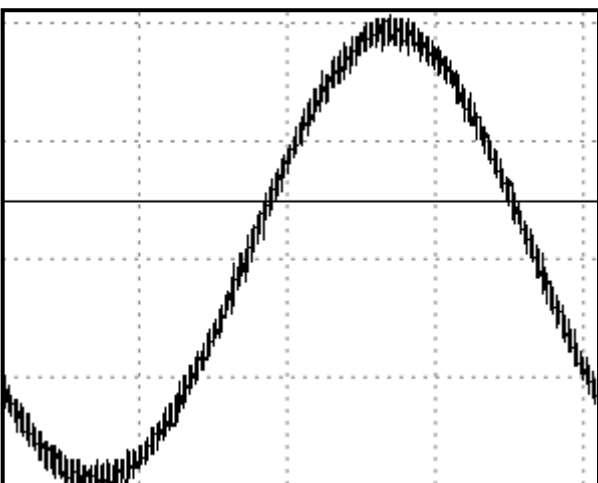
Noise range $\lt; \pm 4\text{mV}$ (50mV / vertical)



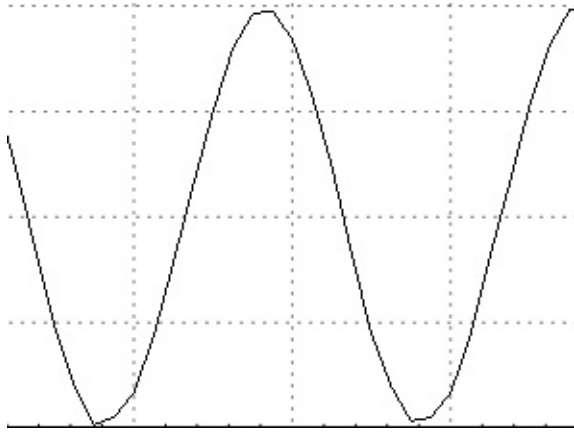
4V, 1kHz sine wave diagram (1V / vertical)



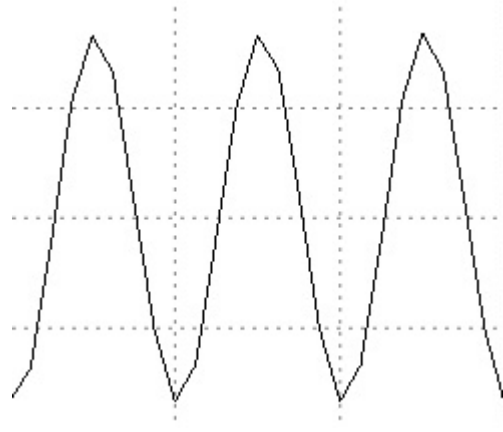
0.5V, 1kHz sine wave diagram (200mV / vertical)



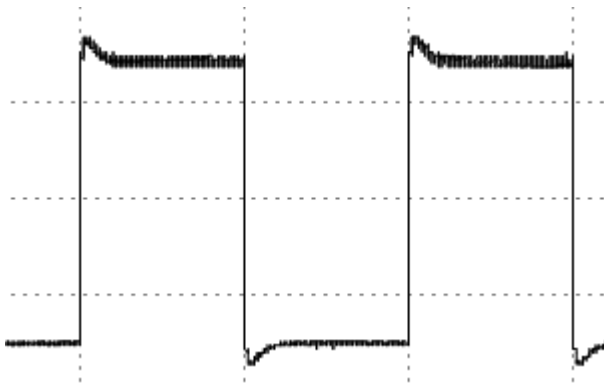
200mV, 1kHz sine wave diagram (50mV / vertical)



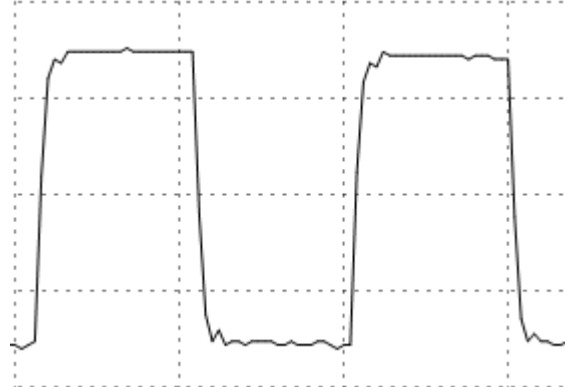
4V, 10MHz sine wave diagram (1V / 50ns)



4V, 20MHz sine wave diagram (1V / 50ns)



3V, 1KHz sine wave diagram (1V / vertical)



3V, 1MHz sine wave diagram (1V / vertic)

END