

CAN Newsletter Online

CLASSICAL CAN AND CAN FD

Digital storage oscilloscope with 12-bit resolution

The SDS2000X HD series of oscilloscopes from Siglent is available in bandwidths of 100 MHz, 200 MHz, and 350 MHz. They feature serial bus triggering and decoding and support CAN, CAN FD, LIN, and others. Additionally, the company also recently introduced a series of handheld oscilloscopes.



The oscilloscope series uses a 12-bit ADC and low noise front-end, which has 16 times the signal resolution capability of a traditional 8-bit oscilloscope, explained the company (Source: Siglent)

The oscilloscopes are based on a 12-bit analog-to-digital converters (ADC) with sample rate up to 2 giga samples per second and front end that features a low noise floor which provides more signal details. This enables engineers to get more accurate waveform measurements, explained the company. The vertical resolution of an oscilloscope refers to the ratio of the highest input signal the oscilloscope can handle to the smallest signal amplitude it can detect. With higher resolution measurements, waveform details become more visible, quantization noise is reduced, and measurement accuracy improve.



An 8-bit resolution acquisition shows a blurred saturation voltage trace with details buried in quantization noise but the 12-bit oscilloscope clearly shows details of the saturation voltage (Source: Siglent)

The oscilloscope displays signal details in finer detail, make more precise measurements, have higher voltage offsets, and better accuracy than traditional 8-bit oscilloscopes, stated the company. The series also includes deep memory with a maximum record length of 200 Mbit/s per channel and displays four analog channels and an optional 16 digital channels for mixed signal analysis. They employ Siglent's SPO technology with a maximum waveform capture rate of up to 100 000 wfm/s (waveforms per second) (up to 500 000 wfm/s in Sequence mode), 256-level intensity grading display function plus a color temperature display mode.

SDS2000X HD also employs a digital trigger system with high sensitivity and low jitter, said the company. The trigger system supports multiple powerful triggering modes including serial bus triggering. An array of measurement and math capabilities, options for a 25 MHz arbitrary waveform generator, as well as serial decoding are also features of the SDS2000X HD. Serial bus triggering and decoding are available for CAN, CAN FD, [LIN](#), I²C, SPI, UART, Flexray, I²S, MIL-STD-1553B, Sent, and Manchester serial-coded links.

Another release of the company: Handheld oscilloscopes

The company recently also released handheld oscilloscopes. The series of portable instruments have been developed specifically for field work and industrial applications. The SHS800X and SHS1000X series integrate a dual-channel oscilloscope, multimeter, serial triggering and decoding, spectrum analysis, data logging into one battery-powered portable device. Both series weigh 1,7 kg, have a battery life of up to 5,5 h, and come with an IP51 waterproof and dustproof rated design for harsh environments.

Both series are available in 200 MHz and 100 MHz analog bandwidths, a single ADC with 1 giga samples per second maximum sample rate, and a single memory module with 12 Mbit/s of memory depth. The most commonly used functions can be accessed with its front panel design.

The digital trigger system delivers sensitivity and low jitter, and a waveform capture rate of up to 400 000 frames per second, explained the company. The SHS also employs a 256-level intensity grading display function and a color temperature display mode for clarity and fast fault identification. After the waveform is acquired, the result can be stored as a file or image with one click for subsequent analysis.



The SHS800X/1000X series of handheld oscilloscopes both integrate an oscilloscope, recorder, and multimeter functions into one device (Source: Siglent)

The SHS1000X series features isolation between the two oscilloscope channels, one multimeter channel, power adapter, and the USB host/device port. Each channel on a SHS1000X oscilloscope is isolated from the chassis ground and from each other. The isolation makes it suitable for both laboratory and floating signal measurement because it reduces the risk of accidental short circuits, the company continued. The maximum voltage input to the analog scope inputs is CATIII 600 V_{rms}, CATII 1000 V_{rms}.

Serial protocols often need to be observed while working in automotive and embedded industries, said the company. The

SHSX products have multiple triggering modes including serial bus triggering as well as free serial decoding for CAN, LIN, I²C, SPI, and UART, which makes them more able to meet the test requirements of on-site decoding in automotive and embedded industries. Another addition is the FFT math function. The SHSX's feature a 1-million-point FFT function. The built-in analysis function allows direct marking of data such as frequency and corresponding amplitude.

The series integrates a 6000 count hardware-based true RMS multimeter, which can measure DC/AC voltage, DC/AC current, resistance, capacitance, diodes, and continuity. This function enhances the efficiency of field testing in conventional measurement environments, explained the company. The measured values of the oscilloscope functions and multimeter can be recorded at the same time. Up to four sets of measured values can be recorded simultaneously and played back later. The waveform recorder function can also continuously record waveforms for up to 22 h at a sampling rate of 25 kilo samples per second.

Full Scale	Smallest Voltage Step	
	8-bit	12-bit
80 V	312.5 mV	19.5 mV
40 V	156.2 mV	9.76 mV
20 V	78.1 mV	4.88 mV
8 V	31.3 mV	1.95 mV
4 V	15.6 mV	976 μV
1.6 V	6.3 mV	390 μV
800 mV	3.1 mV	195 μV
400 mV	1.56 mV	97.6 μV
160 mV	625 μV	39 μV
80 mV	313 μV	19.5 μV
40 mV	156 μV	9.76 μV
16 mV	62.5 μV	3.9 μV
8 mV	31.2 μV	1.95 μV

When measuring an 8-V signal, the smallest detectable voltage variation is 1,95 mV, compared with 31,3 mV on an 8-bit ADC (Source: Siglent)

[CW](#)