

Testing SDI/HDSDI Video Display Inputs with the VideoPro

True or False? The Sencore VideoPro multi-media generator provides all the interface signal types needed to test all the inputs of a video display? Just when you think you've got it covered, another video display input appears. So, you need another input test signal. The Sencore "VideoPro" multi-media video generator has you covered. This article introduces you to the SDI/HDSDI interface and the new "SH" VideoPro Generator which provides the test signals to test SDI or HDSDI inputs.

What is SDI & HDSDI?

Serial Digital Interface (SDI) and High Definition Serial Digital Interface (HDSDI) are serial digital interface signals. These signals originated as a means to interface uncompressed, unencrypted digitized video between devices in the television production and broadcast environments. In recent years, SDI and HDSDI are beginning to branch out into other applications and more and more displays are being designed with SDI and HDSDI inputs.

You'll find SDI and HDSDI inputs on displays and equipment used in the following applications:

- Broadcast Stations
- Rental & Staging
- Digital Signage
- Digital Cinema
- Training & Meeting Facilities
- High End Video Projectors
- Amusement/Entertainment



Figure 1. Serial Digital Interface video signals are found in TV production & broadcast, signage, cinema, rental & staging, and increasingly more and more applications.

Creating Serial Digital Interface Signal – Tech Talk

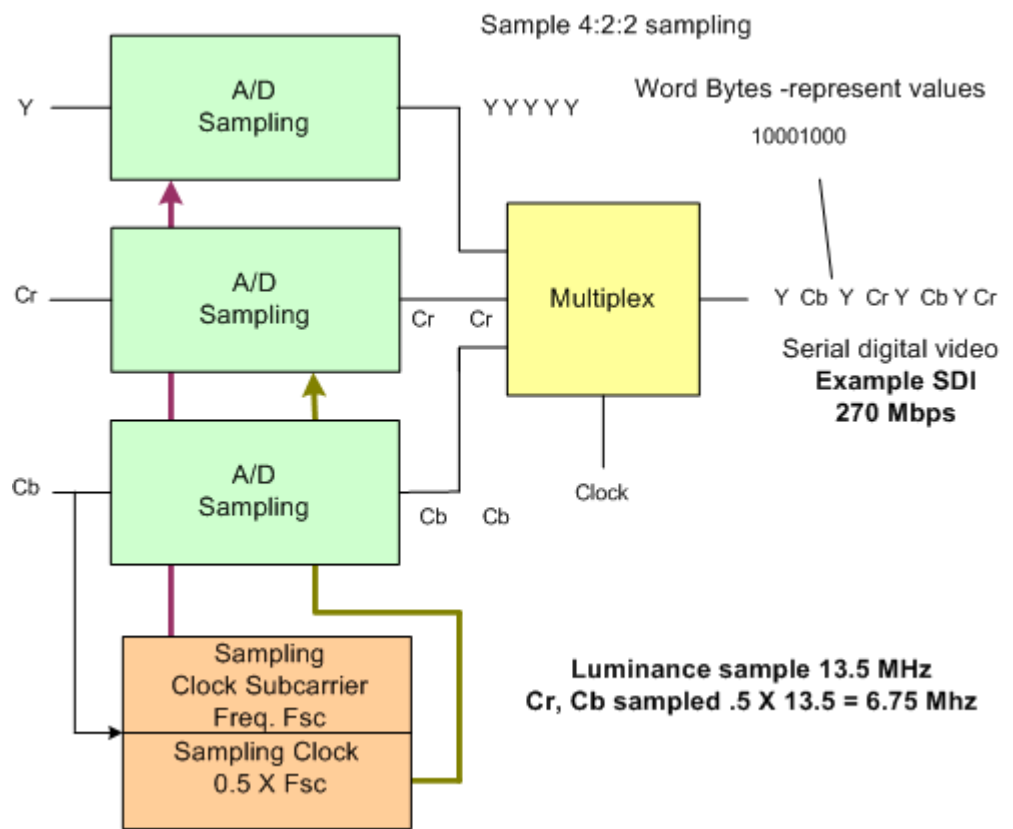
A serial digital video signal is produced using the video's Y, Cr and Cb component voltages representing the luminance and color picture information. These individual component voltages are input to ADC (analog-to-digital converters). The converters take samples, snapshots in time, of the voltage levels occurring on the Y, Cr and Cb inputs. The snapshot voltages are quantified into 10 bit digital values representing levels from black to white (luminance) and color levels (Cr, Cb).

The clock sampling rates for the conversion is chosen to be multiples of the color sub-carrier frequency. For example, the SDI 525i system samples the luminance at 13.5 MHz and the Cb and Cr at 1/2 this rate or 6.75 MHz. Therefore, for every four luminance samples there are two Cb and Cr samples. This is stated as a 4:2:2 digital sampling ratio.

Imagine a picture frame sequentially feeding the Analog to Digital Converter (ADC) video line by line. The resulting output of each ADC is sequential 10 bit digital words (digital samples) representing Y, Cr and Cb for the entire picture frame. These digital values are multiplexed together so they can exist on a single cable and then be separated by the receiver. The output of the time division multiplexer is multiplexed data words Y, Cr, Y, Cb, etc.

Synchronizing bits are added to the digital multiplexed signal and encoding is applied. Synchronizing bits and encoding enables the serial digital receiver to properly detect the beginning of the picture frame and horizontal blanking times to recover the Y, Cr and Cb components.

Figure 2. Serial digital video consists of a series of multiplexed bits (bit stream) consisting of Y, Cr and Cb digitized values representing the video.



The VideoPro SDI/HDSDI Connection (Electrical Interface)

Serial digital interface standards specify the use of coaxial cables with BNC connectors. The nominal transmission line impedance is 75 ohm. The specified signal amplitude at the source is 800 mV (±10%) peak-to-peak although far lower voltages may be measured at the receiver, due to attenuation. The interface signal carries a synchronizing signal sequence within the digital signal and is self clocking which permits a receiver to lock and recover the video

It is possible to send 270 Mbit/s SDI over 300 meters without use of repeaters, but shorter lengths are preferred. The HD bit rates have a shorter maximum run length, typically 100 meters.

The VideoPro VP403SH provides SDI or HDSDI through a rear panel BNC connector. The SDI/HDSDI

output is enabled when the signal type is chosen within the menu selections. A short BNC cable is provided for connection to SDI/HDSDI inputs.



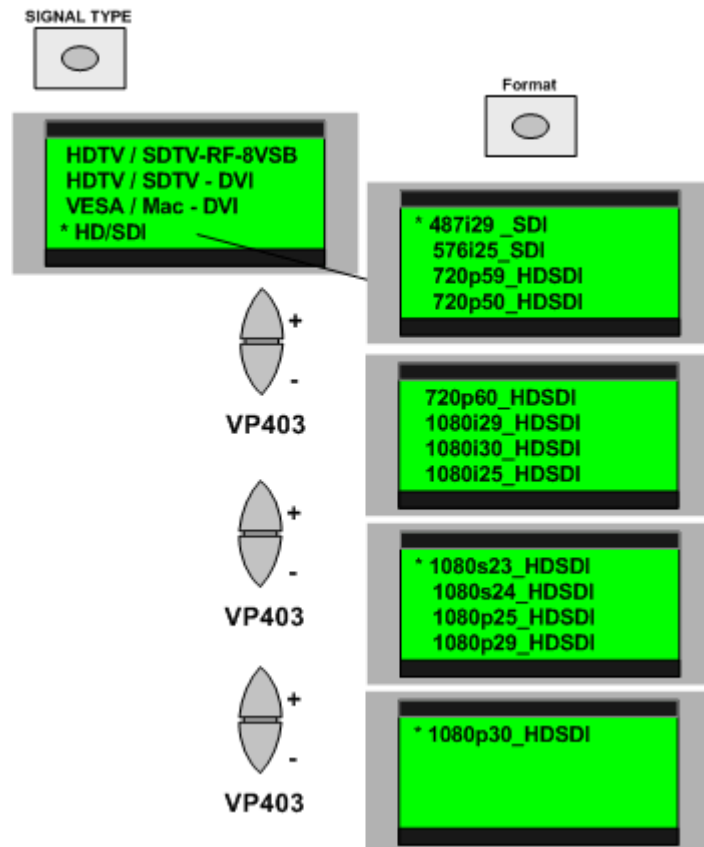
Figure 3. The SDI/HDSDI output of the Sencore VideoPro provides standard SDI or HDSDI signals through a standard BNC interface connection.

SDI/HDSDI Video Resolution Formats

An SDI/HDSDI signal can be one of several different resolutions. The SDI format may be divided into either a 525 (720x486) @ 59.94i or a 625 (720x576) @ 50i signal resolution. These are commonly called NTSC and PAL serial digital signals. Both resolutions employ 10 bit data and a data clock rate of 270 Mb/s.

The HDSDI signal offers multiple resolutions in 720 or 1080 formats. The 720p signal format is available at frame rates of 60, 59.94 or 50 Hz. The 1080 signal format is available in interlaced, segmented or progressive scan formats at applicable frame rates of 30, 29.97, 25, 24, or 23.98 Hz. HDSDI employs 10 bit data and a data rate of 1.485 Gb/s.

Figure 4. The SDI/HDSDI output of the VideoPro offers two SDI output signal formats and multiple HDSDI 720 or 1080i formats.



The VideoPro “SH” Product Family

The “SH” family of VideoPro Multi-media generators provides just the signals you need to fit your testing and application needs. There are four models including the VP400SH, VP401SH, VP403SH and VP403CSH. The test signals provided by each model are summarized in figure 5.

VP400-SH Product Family

Outputs	Multimedia Video Generators			
	400-SH	401-SH	403-SH	403C-SH
Composite	X	X	X	X
S-Video	X	X	X	X
VESA/MAC RGB	X	X	X	X
Component SDTV/HDTV	X	X	X	X
DVI		X	X	X
NTSC-RF			X	X
ATSC-RF			X	X
SDI/HDSDI	X	X	X	X
ATSC-RF Video Clips & Photo Images				X

Figure 5. Summary of VP400-SH models and the output signals provided.

True! The Sencore VideoPro Multimedia Generator provides all interface signal types needed to test video display inputs. There is a Sencore “VideoPro” that is right for you and your applications. Call 1-800-Sencore (736-2673) or visit the web at <http://www.sencore.com>.

To learn more about the VP40x-SH VideoPro family, visit <http://www.sencore.com/products/vp40xsh.htm>.

<http://www.sencore.com>

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1.800.736.2673 or 1.605.339.0100