

HD-SDI Repeaters for Long-Distance Digital HD-CCTV

Extend HD-CCTV Links up to 1.0 km with Power Over Cable and Camera Control Link Over Single Coax Cable



Summary

Microchip's EQCO-SDI30-7501 is an extender solution for HD-SDI links, operating over a standard 75Ω coax cable. Each unit receives an attenuated HD-CCTV signal and extends it up to 220m over the coax cable.

The repeater contains three critical components to correct and then retransmit the signal:

- Adaptive Equalizer to return the signal to its original amplitude and modulation
- Reclocker to resynchronize the signal—bringing it back to its original condition
- Cable Driver to retransmit the signal with its original characteristics restored

The repeater design offers these unique benefits:

- Power can be transmitted from the recorder (DVR) side to the camera over the coax cable
- Up to five repeaters may be powered from the first repeater at the DVR side over the cable; if only one or two repeaters are used, the remaining power may also be adequate to power the SDI camera at the remote end
- A control signal (RS485) can be transmitted from the recorder (DVR) side to the camera over the coax cable

The repeater enables simultaneous signal transmission camera control, and power, over a single cable.

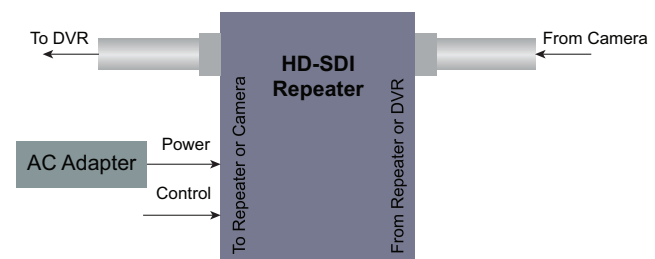
Implementation

Each repeater supports a data rate of 2.97 Gbit/s (3G-SDI). A link of up to 220m can be achieved with a data rate of 1.485 Gbit/s, depending on cable quality*.

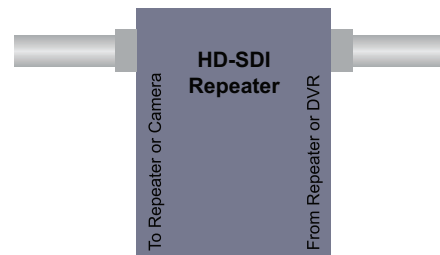
For longer cable lengths, lower speed camera are supported. For example, a cable length of 720m supports SDI cameras. Up to five repeater units can be daisy chained together, all powered over the coax cable by the first repeater.

The repeater nearest the recorder can be provided with the system power and the camera control signals. Similarly, the control signals and power (if needed) can be fed to a camera by the nearest repeater to it. Camera control is accomplished via RS485, the most commonly used communications protocol. It supports a control signal bandwidth of up to 38.4 kbps.

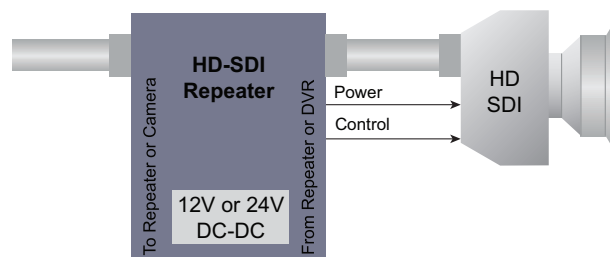
DVR Side Repeater Including Link Power and Control Channel



In-Line HD-SDI Repeater



Camera Side HD-SDI Repeater with Power and Control



*Subject to maximum cable attenuation, see back for details.



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Technical Specifications

HD-SDI Interface	
Connectors	BNC True 75Ω
Cable Impedance	75Ω ± 3Ω
Data Throughput	270 Mbps, 1.485 Gbps, 2.97 Gbps
Aux Interface	
Connector (Head End)	Plug connector
Cable Type	Category 3 or above
Signaling	RS485 in (Pair 1) RS485 out (Pair 2), Gnd (Pair 3), +24V (Pair 4)
Power Supply Input (Head End Input)	
Aux Power in via Plug Connector	24V @ 720 mWatts, plus any concatenated repeaters
DC Feed via Coax	Min. 9V–24V DC, rated current 0.5–2A
Power Supply Output (Camera Side Output)	
Aux Power out via Plug Connector	V _{IN} @ Head End –1V-Coax DC drop (varies with cable type/length)
DC Feed via Coax	V _{IN} @ Head End –1V-Coax DC drop per hop (varies with cable type/length)
Environmental	
Operating Temperature	0°C to +50°C
Relative Humidity	Up to 85% non-condensing
Storage Temperature	–20°C to +70°C

Performance Specifications

Performance by Coax Type	Max. Coax Length for Error-Free Operation @ 1.5 Gbps	Max. Coax Length for Error-Free Operation @ 3.0 Gbps	Cable/Power Budget	
			Max # Repeaters (Total Length)	DC Power After Two Repeaters
RG6 Sample 1 (16 dB/100m) (Belden 1694A)	200 meters/ 720 feet	120 meters/ 390 feet	5 (1 km)	6W
RG6 Sample 2 (16 dB/100m) (Carol Brand)	200 meters/ 720 feet	120 meters/ 390 feet	3 (600m)	1.8W
5C-HFBS Sample (16dB/100m) (Amphenol)	200 meters/ 720 feet	120 meters/ 390 feet	5 (1 km)	6W
RG59 Sample (23 dB/100m)	153 meters/ 502 feet	83 meters/ 272 feet	5 (700m)	6.5W
3C-2V Sample 1 (41 dB/100m) (Hangzhou Linan Tongda Cable Co., Ltd.)	85 meters/ 280 feet	47 meters/ 154 feet	5 (390m)	6.5W
RG11 Sample (10 dB/100m) (CommCope F1160BVV)	350 meters/ 1150 feet	192 meters/ 630 feet	4 (1.3 km)	4W



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