

Compact SIDACtor® Protection Thyristor for CVBS and RS-485 Ports

The first television broadcast signals were “monochrome” and contained just sync and luminance (brightness) information. This was superseded by the “composite color” signal in the 1950s, a combination of luminance and color signals, which is still used today as the dominant mode of video transmission. The composite signal, also known as Composite Video Blanking and Sync (CVBS), is the conventional analog signal delivered through an analog BNC connector, which basically means a pair of wires can transmit video and power from a camera to a video recorder, for video surveillance. This was the earliest video technology used in the security industry and it is still widely used today. The CVBS connector is often used in current STBs (Set Top Boxes) and other surveillance systems.

Outdoor security systems often require the use of long coaxial cables with CVBS connectors, requiring protection against induced lightning surges. The YD/T 1082-2000 standard establishes the technical specifications on overvoltage and overcurrent protection of access network equipment for Mainland China. Lightning surge test conditions for outdoor cables with CVBS connectors are normally 4kV 10/700µs (100A 5/310µs).

Normally, peak to peak signal voltage is within 1.1V and driver IC Vcc voltage is less than 5V, so a protection component with a voltage higher than 6V is suggested. The P0080S4BLRP SIDACtor® Protection Thyristor has a minimum operating voltage of 6V and 100A 5/310µs surge peak current capability. Its junction capacitance of less than 30pF is well-suited for 4.43 MHz CVBS signals.

Figure 1.
Typical CVBS Port



Figure 2.
Typical CVBS Driver Circuit & Connection

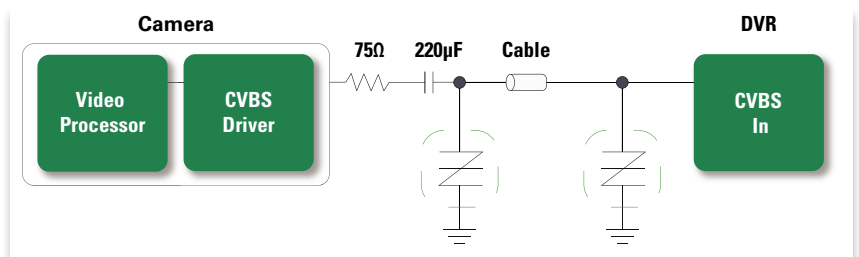
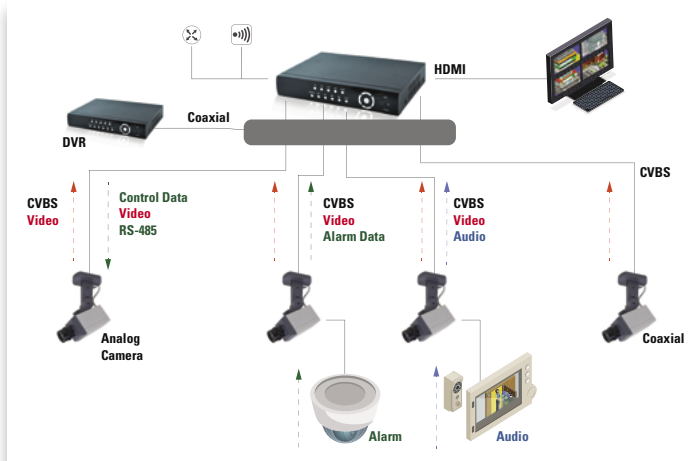


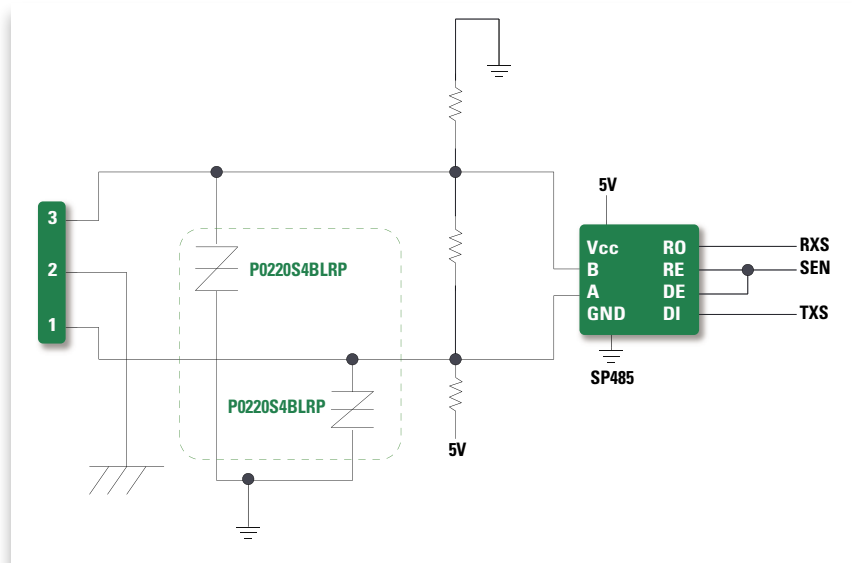
Figure 3.
Typical Surveillance System Topology



The P0080S4BLRP thyristor can also be used for surge protection of R/G/B cables.

In surveillance systems, RS-485 connections are also very popular for data communication or control applications. Like CVBS cables, RS-485 data lines need to be protected from induced lightning surges. **Figure 4 (Pg2)** illustrates how two **P0220S4BLRP** can be used for both differential mode and common mode surge protection.

Figure 4.
Typical RS-485 Topology



The **P0080S4BLRP**'s minimum operating voltage of 6V and low capacitance is well-suited for low voltage signal line protection.

Littelfuse has released a 15V operating voltage component in the same family, **P0220S4BLRP**. It offers a higher voltage operating of 15V which brings in protection of signal line with 15V or below. It is ideal for high speed signal line protection in harsh environment. It also meets 4kV @ 10/700 surge test level. It will be an alternative to **P0080S4BLRP** if electronic designers are looking for a higher voltage protection option.

Table 1.
PxxxxS4xLRP Series Electrical Characteristics

Part Number	Marking	$V_{DRM} @ I_{DRM}=5\mu A$	$V_s @ 100V/\mu s$	I_H	I_s	I_T	$V_T @ I_T=2.2Amps$	Capacitance @ 1MHz, 2V bias	
		V_{min}	V_{max}	mA_{min}	mA_{max}	A_{max}	V_{max}	pF min	pF max
P0080S4BLRP	P-8B	6	25	50	800	2.2	4	15	25
P0220S4BLRP	P02B	15	32	50	800	2.2	4	15	30

This **PxxxxS4xLRP** SIDACTor® Series has high surge current capability with various surge waveforms and a compact package that simplifies designing it into a PCB layout.

Table 2.
PxxxxS4xLRP Series Component Surge Ratings

Series	I_{pp}										$I_{TSM} 50/60 Hz$	di/dt Amps/ μs max
	0.2/310 0.5/700	2/10 2/10	8/20 1.2/50	10/160 10/160	10/560 10/560	5/320 9/720	10/360 10/360	10/1000 10/1000	5/310 10/700			
	A min	A min	A min	A min	A min	A min	A min	A min	A min	A min		
B	20	150	150	90	50	75	75	50	100	20		500