![EPCOS logo]

CeraDiodes

for ESD Protection in Flat Screen TVs and Monitors

The increasing demand for thin designs as well as for high-definition digital content are making flat screen TVs and monitors more complex and thus more vulnerable to electrostatic discharge (ESD).

These high quality electronic products however must offer high ESD robustness.

The system user interfaces, and the input/output (I/O) ports in particular, are the most critical areas. Because these interfaces are entry points for surge current into the system, it is essential to protect the systems from undesirable damage by using ESD protection devices.

EPCOS offers a broad CeraDiode® portfolio for bidirectional ESD protection (acc. to IEC61000-4-2, level 4 standard).

Applications

- Audio port
- VGA
- S-Video
- Serial port
- SCART
- Ethernet
- IEEE 1394
- USB 2.0
- USB 3.0
- HDMI 1.3
- HDMI 1.4
- DVI

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CeraDiodes

Features and benefits

- Ultra-low capacitance values for high signal data rates
- High transmission bandwidth for high quality audio signals (0 dB up to 1 MHz)
- Bidirectional operation
- Low clamping voltage
- Fast response time: < 0.5 ns

Characteristics

- Types: single and array devices
- DC voltage: 5.6 up to 30 V
- Typical capacitance: 0.6 up to 470 pF
- ESD robustness to IEC 61000-4-2, level 4
- Operating temperature range: -40 °C … 85 °C
- Lead-free soldering: nickel barrier termination
- RoHS-compatible

Type designation system

Example:

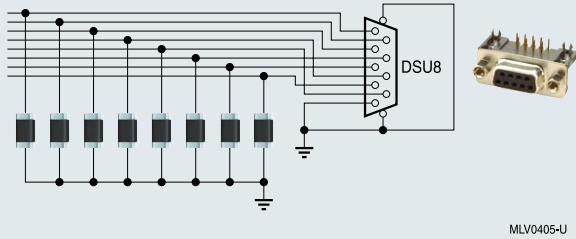| CD	S	2		C	05	GTA
	Construction:	Case size:			V_{DC}:	Type:
	S: Single	**1:** 0201			**05:** 5.6 V	**GTA:** Standard
		2: 0402			**09:** 9 V	**GTH:** High-speed
		3: 0603			**12:** 12 V	**GTAB:** Standard
		4: 1003			**15:** 15 V	**HDMI:** Capacitance
	A: Array	**3:** 0506			**16:** 16 V	value <1 pF
		4: 0508			**20:** 22 V	
		6: 1012			**30:** 30 V	

Application matrix

Type	Case size	Audio analog	Serial port	Parallel port	Analog modem	Push button	PS/2	Video analog	Ethernet	SATA	IEEE 1394	RF, Bluetooth	USB 2.0	Display port	HDMI, DVI	USB 3.0
Low-speed interfaces																
CDS2C05GTA	0402	X	X		X	X	X									
CDS2C15GTA	0402	X	X	X	X	X	X									
CDS3C05GTA	0603	X	X		X	X	X									
CDS3C09GTA	0603	X	X		X	X	X									
CDS3C15GTA	0603	X	X		X	X	X									
CDS3C20GTA	0603	X	X	X	X	X	X									
CDS4C12GTA	1003	X	X	X	X	X	X									
CDA4C20GTA	0508	X	X	X	X	X	X									
High-speed interfaces																
CDS1C05GTH	0201	X	X	X	X	X	X	X	X		X		X	X		
CDS2C05HDMI2	0402								X	X	X	X	X	X	X	X
CDS2C12GTH	0402	X	X	X	X	X	X	X								
CDS2C15GTH	0402	X	X	X	X	X	X	X								
CDS2C16GTH	0402			X				X	X	X	X		X			
CDS2C20GTH	0402	X	X	X	X	X	X	X								
CDS3C05HDMI1	0603							X	X	X	X	X	X	X	X	X
CDS3C16GTH	0603		X			X	X	X	X				X			
CDS3C30GTH	0603	X	X	X	X	X	X	X								
CDA3C05GTH	0506			X				X	X	X	X		X			
CDA4C16GTH	0508			X				X	X	X	X		X			
CDA6C05GTH	1012	X	X	X	X	X	X	X	X	X	X		X			

For further information please contact your EPCOS sales office.

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Application examples

Serial port

MLV0405•U

Recommended types

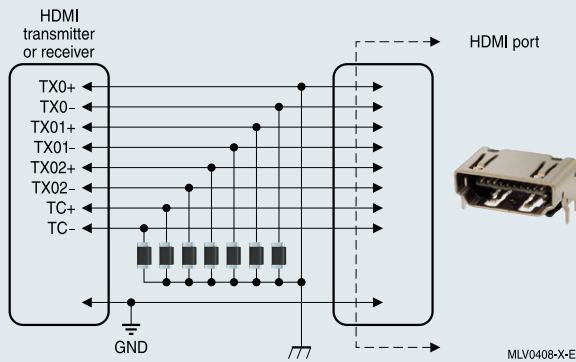| Type	Case size		Lines to protect	V_{DC} V	C_{typ} pF
CDS1C05GTA	0201	SOD-923		5.6	100
CDS2C05GTA	0402	SOD-723		5.6	180
CDS2C15GTA			1	15	47
CDS3C20GTA	0603	SOD-523		22	56
CDS4C12GTA	1003	SOD-323		12	82

S-Video

MLV0406-V
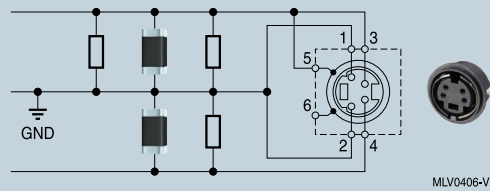
Type	Case size		Lines to protect	V_{DC} V	C_{typ} pF
CDS1C05GTH	0201	SOD-923		5.6	6
CDS2C12GTH	0402	SOD-723		12	3
CDS2C20GTH			1	20	10
CDS3C16GTH	0603	SOD-523		16	2
CDS3C30GTH				30	10
CDS4C16GTH	1003	SOD-323		15	3

HDMI

MLV0408-X-E

Type	Case size		Lines to protect	V_{DC} V	C_{typ} pF
CDS2C05HDMI1	0402	SOD-923			
CDS2C05HDMI2			1	5.6	0.6
CDS3C05HDMI	0603	SOD-723			

USB 2.0

MLV0407-W
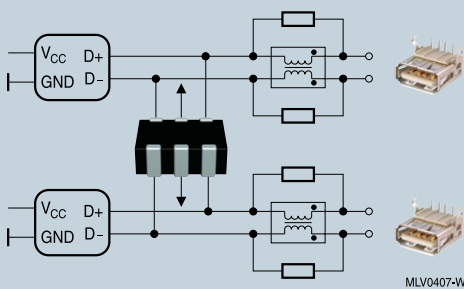
Type	Case size		Lines to protect	V_{DC} V	C_{typ} pF
CDS2C12GTH	0402	SOD-723		12	3
CDS3C16GTH	0603	SOD-523	1	16	2
CDS4C16GTH	1003	SOD-323			3
CDA3C05GTH	0506	SOT-666	2/4 data + 1 supply	5.6	2.2
					7

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Product range								
Case size		**Type**	**Ordering code**	**Lines to protect**	**V$_{DC}$**	**V$_{BR, min}$ @ 1 mA**	**V$_{clamp, max}$ @ 1 A**	**C**
MLV	**TVS**				**V**	**V**	**V**	**pF**
Low-speed interfaces								
0402	SOD-723	CDS2C05GTA	B72590D0050A060	1	5.6	6.4	24	180
		CDS2C15GTA	B72590D0150A060	1	15	20	46	47
0603	SOD-523	CDS3C05GTA	B72500D0050A060	1	5.6	6.4	19	470
		CDS3C09GTA	B72500D0090A060	1	9	10	30	220
		CDS3C15GTA	B72500D0150A060	1	15	22	42	160
		CDS3C20GTA	B72500D0200A060	1	22	25	50	56
1003	SOD-323	CDS4C12GTA	B72570D0120A060	1	12	16	46	82
0508	-	CDA4C20GTA	B72714D0200A060	4	22	24	60	33
High-speed interfaces								
0201	SOD-923	CDS1C05GTH	B72440D0050H060	1	5.6	21	70	6
0402	SOD-723	CDS2C05HDMI1	B72590D0050H160	1	5.6	90		0.6
		CDS2C05HDMI2	B72590D0050H260	1	5.6	90		0.6
		CDS2C15GTH	B72590D0150H060	1	15	23	66	10
		CDS2C16GTH	B72590D0160H060	1	16	65	290	2
		CDS2C20GTH	B72590D0200H060	1	20	30	80	10
0603	SOD-523	CDS3C05HDMI	B72500D0050H160	1	5.6	150		0.6
		CDS3C16GTH	B72500D0160H060	1	16	65	290	2
		CDS3C30GTH	B72500D0300H060	1	30	50	120	10
1003	SOD-323	CDS4C16GTH	B72570D0160H060	1	16	38	146	3
0506	SOT-666	CDA3C05GTH	B72755D0050H062	2/4 data +1 supply	5.6	106	395	2.2
0508	-	CDA4C16GTH	B72714D0160H060	4	16	22	66	10
1012	SOT-23 6L	CDA6C05GTH	B72735D0050H062	2/4 data +1 supply	5.6	52	195	7