

EPCOS Sample Kit 2012

# CeraDiodes for ESD Protection



# What are CeraDiodes?

- CeraDiodes are multilayer semiconductor ceramic components for the ESD protection of data, audio and video lines, ICs and I/O ports in electronic devices.
- CeraDiodes are cost effective alternatives to semiconductor protection devices such as Zener and TVS diodes.
- In many cases, CeraDiodes are 1:1 replacements for these semiconductor diodes (Fit, Form, Function) and offer additional packages for specific application requirements.

## Benefits for customer applications

- Bidirectional protection in a single component
- High ESD stability to IEC 61000-4-2, Level 4 up to  $\pm 1000$  pulses
- No change of ESD protection performance at temperatures up to 85 °C (temperature derating)
- Use of parasitic capacitance for RFI suppression and RF filtering (replacement of additional MLCC)
- Small packages down to EIA case size 0201
- Capacitance values 0.6 pF up to 470 pF
- Combined ESD/EMI protection with EIA case size 0405 audio filter array
- EIA case size 0201 series with low clamping voltage (CDS1C05GTA1, CDS1C05GTH1, CDS1C05GTH2)
- Surge current capability
- Low parasitic inductance
- Low leakage current
- Fast response time  $< 0.5$  ns



**Important information:** Some parts of this publication contain statements about the suitability of our products for certain areas of application. These statements are based on our knowledge of typical requirements that are often placed on our products. We expressly point out that these statements cannot be regarded as binding statements about the suitability of our products for a particular customer application. It is incumbent on the customer to check and decide whether a product is suitable for use in a particular application. This publication is only a brief product survey which may be changed from time to time. Our products are described in detail in our data sheets. The *Important notes* ([www.epcos.com/ImportantNotes](http://www.epcos.com/ImportantNotes)) and the product-specific *Cautions and warnings* must be observed. All relevant information is available through our sales offices.








# Components

B72440 D0050A060	B72440 C0050A160	B72590 D0050A060	B72590 D0150A060	B72500 D0050A060	B72500 D0150A060	B72500 D0200A060	B72570 D0120A060	
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B72724 D0200A062		B72440 D0050H060	B72440 C0050H160	B72440 C0050H260	B72590 D0050H260	B72590 D0120H060	B72590 D0160H060	B72590 D0200H060
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B72500 D0050H160	B72500 D0160H060	B72500 D0300H060	B72570 D0160H060	B72714 D0160H060	B72724 D0160H062	B72735 D0050H062		B72862 F1050S160
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## Electrical specifications and ordering codes

EIA case size	Ordering code	EPCOS type	Device schematic	V <sub>DC</sub> [V]	V <sub>BR, min</sub> @ 1 mA [V]	V <sub>clamp, max</sub> @ 1 A, 8/20 μs [V]	I <sub>pp, max</sub> @ 8/20 μs [A]	C <sub>typ</sub> [pF]
<b>Single standard<sup>1)</sup></b>								
0201	B72440D0050A060	CDS1C05GTA		5.6	12	35	–	22
0201	B72440C0050A160	CDS1C05GTA1		5.5	11	22	–	15
0402	B72590D0050A060	CDS2C05GTA		5.6	6.4	24	10	180
0402	B72590D0150A060	CDS2C15GTA		15	20	46	10	47
0603	B72500D0050A060	CDS3C05GTA		5.6	6.4	19	30	470
0603	B72500D0150A060	CDS3C15GTA		15	22	42	30	160
0603	B72500D0200A060	CDS3C20GTA		22	25	50	30	56
1003	B72570D0120A060	CDS4C12GTA		12	16	46	20	82
<b>Array standard<sup>2)</sup></b>								
0612	B72724D0200A062	CDA5C20GTA		22	25	50	30	56
<b>Single high-speed<sup>1)</sup></b>								
0201	B72440D0050H060	CDS1C05GTH		5.6	21	70	–	6
0201	B72440C0050H160	CDS1C05GTH1		5.5	17	33	–	7
0201	B72440C0050H260	CDS1C05GTH2		5.5	20	66	–	3
0402	B72590D0050H260	CDS2C05HDMI2		5.6	90	–	–	0.6
0402	B72590D0120H060	CDS2C12GTH		12	20	66	–	4.5
0402	B72590D0160H060	CDS2C16GTH		16	65	290	–	2
0402	B72590D0200H060	CDS2C20GTH		20	30	80	–	10
0603	B72500D0050H160	CDS3C05HDMI1		5.6	150	–	–	0.6
0603	B72500D0160H060	CDS3C16GTH		16	65	290	–	3
0603	B72500D0300H060	CDS3C30GTH		30	50	120	–	10
1003	B72570D0160H060	CDS4C16GTH	16	38	146	–	3	
<b>Array high-speed</b>								
0508	B72714D0160H060 <sup>2)</sup>	CDA4C16GTH		16	22	66	–	10
0612	B72724D0160H062 <sup>2)</sup>	CDA5C16GTH		16	80	350	–	3
1012	B72735D0050H062 <sup>3)</sup>	CDA6C05GTH		5.6	52	195	–	7
<b>ESD/EMI audio filter array<sup>4)</sup></b>								
0405	B72862F1050S160	CA04F2FT5 AUD010G		5.6	8	30	–	270

<sup>1)</sup> Lines to protect: 1

<sup>2)</sup> Lines to protect: 4

<sup>3)</sup> Lines to protect: 2 or 4 data + 1 supply

<sup>4)</sup> Lines to protect: 2

# Application matrix



EIA case size	EPCOS type	Semi diode package	Interface																
			Video analog	DVI	HDMI, DisplayPort	Audio analog	Audio digital	USB, IEEE 1394	Ethernet	Serial port	Parallel port	LCD data line	SATA	Memory card, SIM card	Bluetooth	Analog modem / ISDN	xDSL modem	WLAN	Keyboard, Push buttons, PS/2
<b>Single standard</b>																			
0201	CDS1C05GTA	SOD-923				x				x								x	
0201	CDS1C05GTA1	SOD-923				x				x								x	
0402	CDS2C05GTA	SOD-723				x				x								x	
0402	CDS2C15GTA	SOD-723				x		x <sup>1)</sup>		x								x	
0603	CDS3C05GTA	SOD-523				x				x								x	
0603	CDS3C15GTA	SOD-523				x		x <sup>1)</sup>		x								x	
0603	CDS3C20GTA	SOD-523				x				x								x	
1003	CDS4C12GTA	SOD-323				x		x <sup>1)</sup>		x								x	
<b>Array standard</b>																			
0612	CDA5C20GTA	-				x	x			x								x	
<b>Single high-speed</b>																			
0201	CDS1C05GTH	SOD-923	x					x	x	x				x	x			x	x
0201	CDS1C05GTH1	SOD-923	x					x	x	x				x	x			x	x
0201	CDS1C05GTH2	SOD-923	x					x	x	x				x	x			x	x
0402	CDS2C05HDMI2	SOD-723		x	x			x	x				x						x
0402	CDS2C12GTH	SOD-723		x	x			x	x				x						x
0402	CDS2C16GTH	SOD-723	x	x				x	x	x			x	x	x			x	x
0402	CDS2C20GTH	SOD-723		x	x			x	x				x						x
0603	CDS3C05HDMI1	SOD-523		x	x			x	x				x						x
0603	CDS3C16GTH	SOD-523	x	x				x	x	x			x	x	x			x	x
0603	CDS3C30GTH	SOD-523	x					x	x				x	x				x	x
1003	CDS4C16GTH	SOD-323	x	x				x	x	x			x	x	x			x	x
<b>Array high-speed</b>																			
0508	CDA4C16GTH	-	x					x	x	x			x	x				x	x
0612	CDA5C16GTH	-	x	x				x	x	x			x	x	x			x	x
1012	CDA6C05GTH	SOT-23 6L	x					x	x	x			x		x	x		x	x
<b>ESD/EMI audio filter array</b>																			
0405	CA04F2FT5 AUD010G	-						x	x										

<sup>1)</sup> Supply line

For examples how to use CeraDiodes to protect the mentioned interfaces, see enclosed CD-ROM, "Presentations and application examples". Customer must test and approve parts for the application. *The Important notes* ([www.epcos.com/ImportantNotes](http://www.epcos.com/ImportantNotes)) and the product-specific *Cautions and warnings* must be observed.

