



BCT0502

Low Capacitance ESD & CDE Protection

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GENERAL DESCRIPTION

This TVS diodes are specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from overvoltage caused by ESD (electrostatic discharge), CDE (cable discharge events), and EFT (electrical fast transients).

The BCT0502 has a typical capacitance of only 0.50pF (pin1 to 2). This means it can be used on circuits operating in excess of 3GHz with minimal signal attenuation. They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ($\pm 18\text{kV}$ air, $\pm 12\text{kV}$ contact discharge). Each device can be configured to protect 1 bidirectional line or two unidirectional lines.

These devices are in a small SOT-523 package and feature a lead-free. They are designed for use in applications where board space is at a premium. The combination of small size, low capacitance, and high level of ESD protection makes them a flexible solution for applications such as HDMI, MDDI, antenna circuits, Automatic Test Equipment, USB 2.0/3.0, and Infiniband circuits.

FEATURES

- Transient protection for high-speed data lines to IEC 61000-4-2 (ESD) $\pm 18\text{kV}$ (air), $\pm 12\text{kV}$ (contact)
IEC 61000-4-4 (EFT) 40A (5/50ns)
IEC 61000-4-5 (Surge) 5A (8/20 μs)
- Protects up to two I/O lines
- Low capacitance (<1pF)
- No insertion loss to > 3.0 GHz
- Low profile (<1mm)
- Low leakage current and clamping voltage
- Low operating voltage: 5.0V
- Solid-state silicon-avalanche technology
- SOT-523 package
- Packaging: Tape and Reel

APPLICATIONS

- Mobile Display Digital Interface (MDDI)
- USB 2.0/USB 3.0
- GaAs Photodetector Protection
- HBT Power Amp Protection
- Infiniband Transceiver Protection

ORDERING INFORMATION

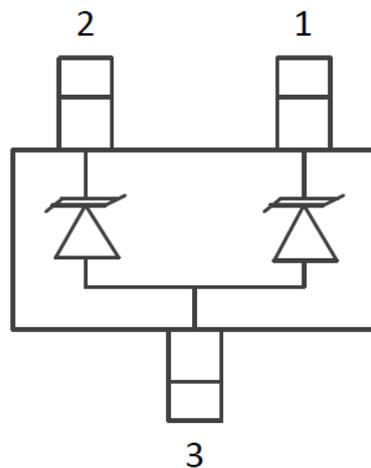
Order Number	Package Type	Temperature Range	Marking	QTY/Reel
BCT0502EUR-TR	SOT-523	-40°C to +85°C	XBA	3000

Note 1: X : Unfixed and it will be appeared as week No.
BA: in Marking is product short code.

Week No. table.

Week	Week No.										
1	A	11	K	21	U	31	e	41	o	51	y
2	B	12	L	22	V	32	f	42	p	52	z
3	C	13	M	23	W	33	g	43	q	53	1
4	D	14	N	24	X	34	h	44	r	54	2
5	E	15	O	25	Y	35	i	45	s		
6	F	16	P	26	Z	36	j	46	t		
7	G	17	Q	27	a	37	k	47	u		
8	H	18	R	28	b	38	l	48	v		
9	I	19	S	29	c	39	m	49	w		
10	J	20	T	30	d	40	n	50	x		

PIN CONFIGURATION (Top View)





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ABSOLUTE MAXIMUM RATINGS

Peak Pulse Power ($t_p = 8/20\mu s$).....	125W
Peak Pulse Current ($t_p = 8/20\mu s$).....	5A
Operating Temperature Range.....	-55°C to +125°C
Storage Temperature Range.....	-55°C to 150°C
Lead Temperature (Soldering, 10 sec).....	260°C
ESD Susceptibility	
IEC 61000-4-2 (Air).....	18KV
IEC 61000-4-2 (Contact).....	12KV

NOTE:

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. Broadchip recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Broadchip reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact Broadchip sales office to get the latest datasheet.

ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$, unless otherwise specified.)

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS	
Reverse Stand-Off Voltage	V_{RWM}	Pin 1 or Pin 2 to Pin 3, and between Pin 1 & 2			5.0	V	
Reverse Breakdown Voltage	V_{BR}	$I_{BR}=1\text{mA}$, Pin 1 or Pin 2 to Pin 3	6			V	
Reverse Leakage Current	I_R	$V_{RWM} = 5\text{V}$, Pin 1 or Pin 2 to Pin 3 and between Pin 1 & 2			1	μA	
Clamping Voltage	V_C	$t_p = 8/20\mu\text{s}$ Pin 1 or Pin 2 to Pin 3			15	V	
			$I_{PP} = 1\text{A}$				
			$I_{PP} = 5\text{A}$		22	V	
		$t_p = 8/20\mu\text{s}$ between Pin 1 & 2			25	V	
Junction Capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$	Pin 1 to Pin 2		0.5	0.9	pF
			Pin 1 or Pin 2 to Pin 3			1.2	pF

NOTES:

- ESD gun return path connected to ESD ground plane.



APPLICATION NOTE

Device Connection Options

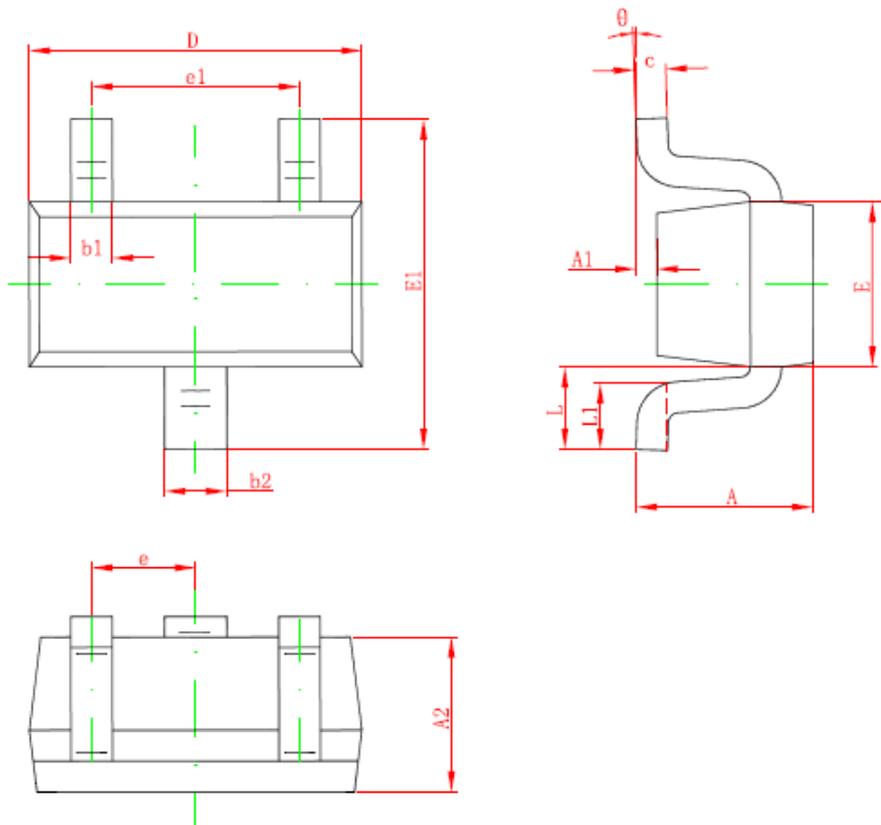
This device is optimized for protection of 1 line operating in excess of 3GHz. It may also be used to protect two lines operating in excess of 2.0GHz. The device is connected as follows:

Protection for one line with $<1\text{pF}$ capacitance can be achieved by connecting one data line to either pin 1 or pin 2 with the other pin connected to ground. Pin 3 is not connected. The connection to ground should be made directly to a ground plane. The path length should also be kept as short as possible to minimize parasitic inductance.

Protection of two lines is achieved by connecting data lines at pins 1 & 2. Pin 3 is connected to ground. The connection to ground should be made directly to a ground plane. The path length should also be kept as short as possible to minimize parasitic inductance.

PACKAGE OUTLINE DIMENSIONS

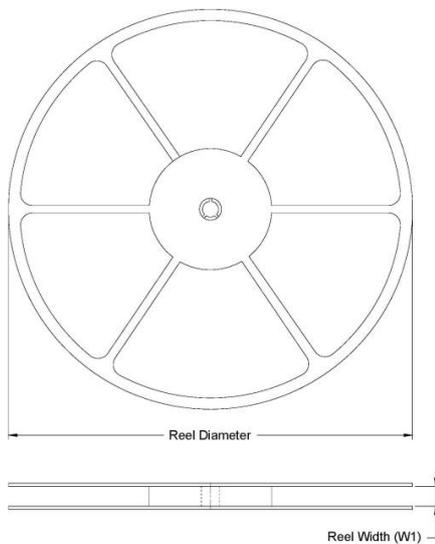
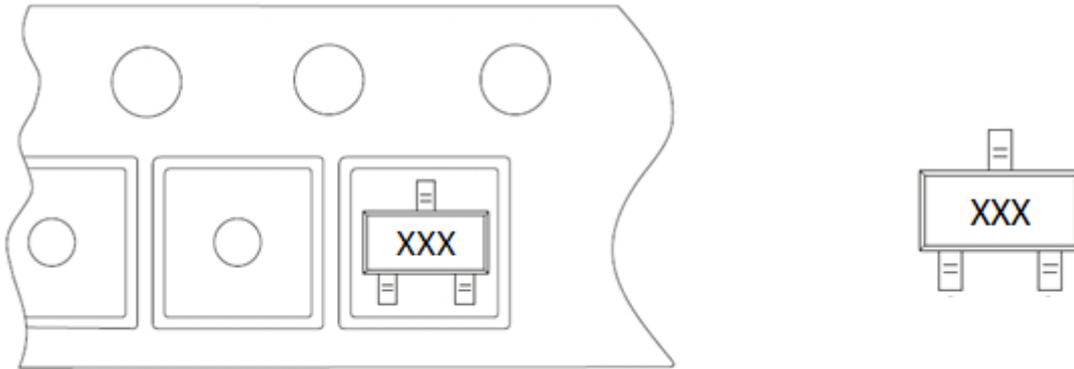
SOT-523



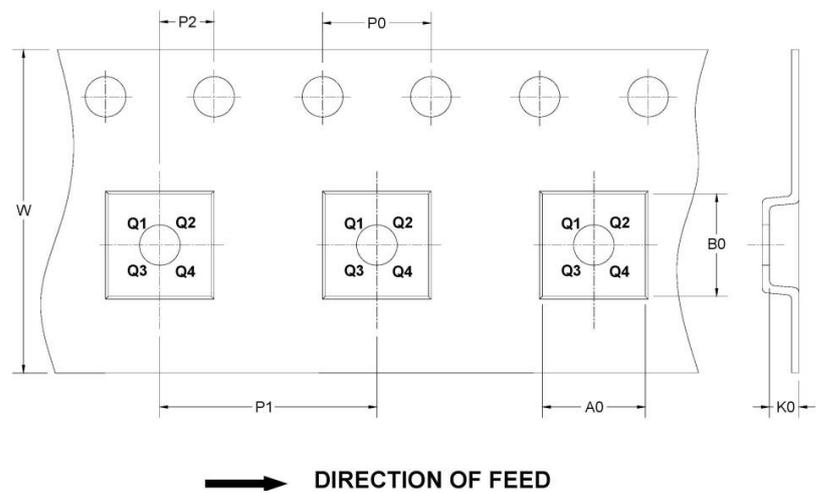
Symbol	Dimensions In Millimeters	
	Min	Max
A	0.700	0.900
A1	0.000	0.100
A2	0.700	0.800
b1	0.150	0.250
b2	0.250	0.350
c	0.100	0.200
D	1.500	1.700
E	0.700	0.900
E1	1.450	1.750
e	0.500(TYP)	
e1	0.900	1.100
L	0.400(REF)	
L1	0.260	0.460
θ	0	8°

SOT-523 Surface Mount Package

TAPING DESCRIPTION



TAPE DIMENSIONS



KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT-523	$\phi 178 \pm 1.0$	9.5 ± 1	1.85 ± 0.05	1.85 ± 0.05	0.875 ± 0.05	4.0 ± 0.1	4.0 ± 0.1	2.00 ± 0.05	$8.00^{+0.2}_{-0.1}$	Q3

RECOMMEND PCB LAYOUT PATTERN

