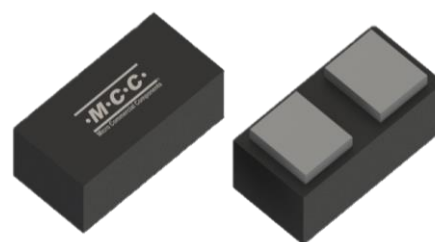


1-Line Bi-directional Ultra Low Capacitance ESD

Features

- Transient protection:
 - IEC 61000-4-2 (ESD) $\pm 15\text{kV}$ (Air), $\pm 12\text{kV}$ (Contact)
 - IEC 61000-4-5 (Lightning) 4A (8/20 μs)
- Bi-directional ESD protection of single line
- Reverse working voltage, V_{RWM} : 3.3V
- Capacitance: 0.2pF (typical)
- Clamping voltage: 3.25V (max)
- Reverse leakage current: 100nA max at $V_{\text{R}} = 3.3\text{V}$
- Solid-state silicon-avalanche



CSP0201



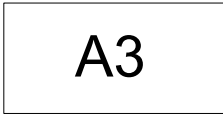
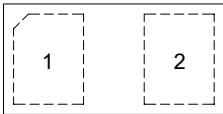
Applications

- Thunderbolt interface
- USB3.1 and USB3.0 interfaces
- USB Type-C interface
- DisplayPort interface
- Hand held portable applications
- Consumer electronics

Mechanical Data

- Package: CSP0201
- Moisture Sensitivity Level 1, per J-STD-020
- Halogen Free. "Green" Device ^(Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Body Marking and Pin Layout

Marking Code	Simplified Outline	Internal Structure
	 Transparent top view	

Ordering Information

Product Name	Reel Size	Packing Type	Qty/Reel
CSPSBULC3V3AE-TP	7"	Tape & Reel	10,000

For packaging details, visit our website at <https://www.mccsemi.com/Package/List>

1-Line Bi-directional Ultra Low Capacitance ESD

Maximum Ratings (T_A=25°C unless otherwise specified)

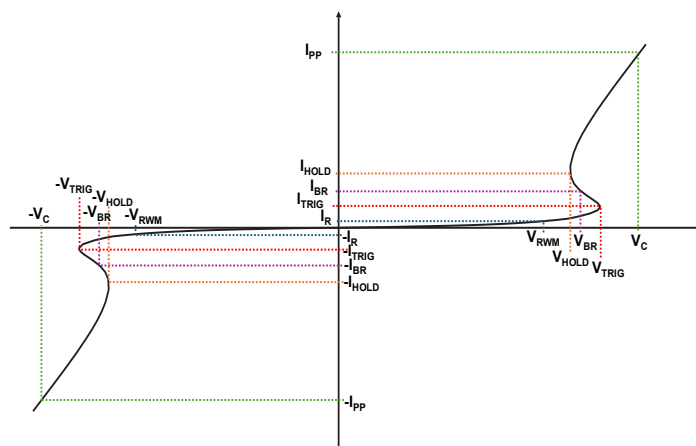
Parameter	Symbol	Rating	Unit
IEC61000-4-2(ESD)	Air	V _{ESD}	±15
	Contact	V _{ESD}	±12
Peak Pulse Current (8/20μs) (Note 2)	I _{PP}	4	A
Peak Pulse Power (8/20μs) (Note 2)	P _{PK}	13	W
Operating Temperature Range	T _J	-55 to +125	°C
Storage Temperature Range	T _{STG}	-55 to +150	°C

Note:

- Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and 1000ppm antimony compounds.
- Non-repetitive current pulse 8/20μs exponential decay waveform according to IEC61000-4-5.

Parameter Definition

Symbol	Parameter
V _{RWM}	Peak Reverse Working Voltage
I _R	Reverse Leakage Current @ V _{RWM}
V _{BR}	Breakdown Voltage @ I _T
I _T	Test Current
I _{PP}	Maximum Reverse Peak Pulse Current
V _C	Clamping Voltage @ I _{PP}
V _{TRIG}	Reverse Trigger Voltage
I _{TRIG}	Reverse Trigger Current
V _{HOLD}	Reverse Holding Voltage
I _{HOLD}	Reverse Holding Current
C _J	Junction Capacitance
P _{PK}	Peak Pulse Power



Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V _{RWM}				3.3	V
Reverse Breakdown Voltage	V _{BR}	I _T = 0.1mA	4.5	6.5	8	V
Reverse Leakage Current	I _R	V _{RWM} = 3.3V			0.1	μA
Clamping Voltage (Note3)	V _C	I _{PP} = 1A, t _p = 8/20μs		1.75	2.2	V
		I _{PP} = 4A, t _p = 8/20μs		2.9	3.25	
Clamping Voltage (Note4)	V _C	I _{PP} = 4A(TLP)		2.5		V
		I _{PP} = 16A(TLP)		4.9		
ESD Trigger Voltage	V _{TRIG}	t _p = 100ns, T _A = 25°C		6.5		V
Reverse Holding Voltage	V _{HOLD}			1.3		V
Junction Capacitance	C _J	V _R = 0V, f = 1MHz		0.2	0.25	pF
Dynamic Resistance (Note4)	R _{DYN}	TLP, t _p = 100ns		0.19		Ω

Note:

- Non-repetitive current pulse 8/20μs exponential decay waveform according to IEC61000-4-5.
- TLP parameter: Z₀ = 50Ω, t_p = 100ns, t_r = 2ns, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.

1-Line Bi-directional Ultra Low Capacitance ESD

Curve Characteristics

Fig. 1 - 8 X 20 μ s Pulse Waveform

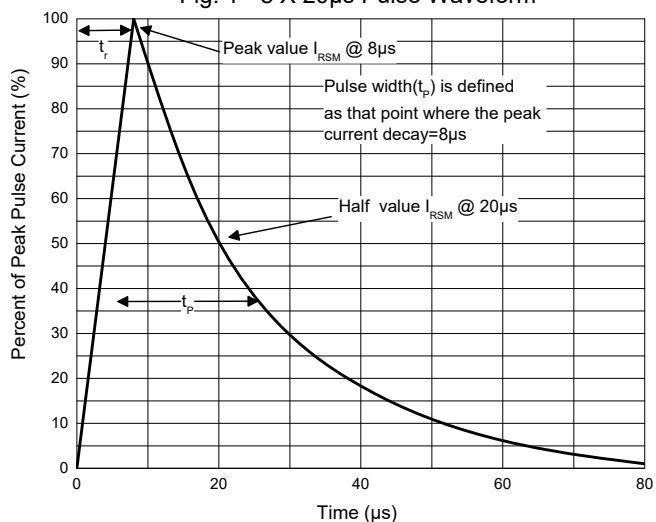


Fig. 2 - Pulse Derating Curve

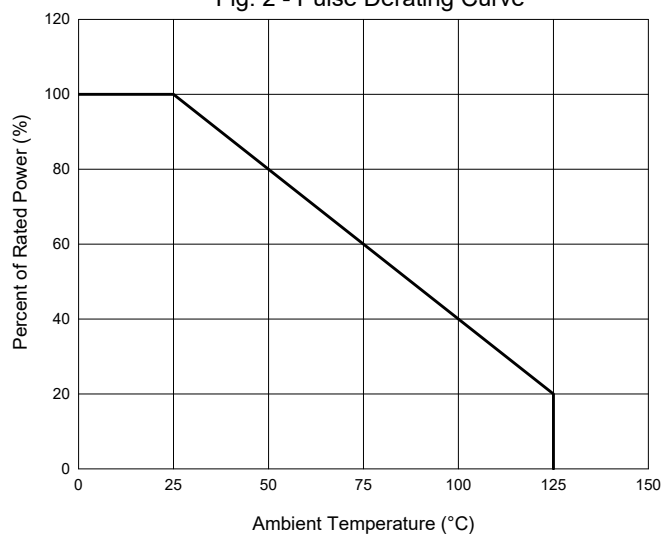


Fig. 3 - Capacitance Characteristics

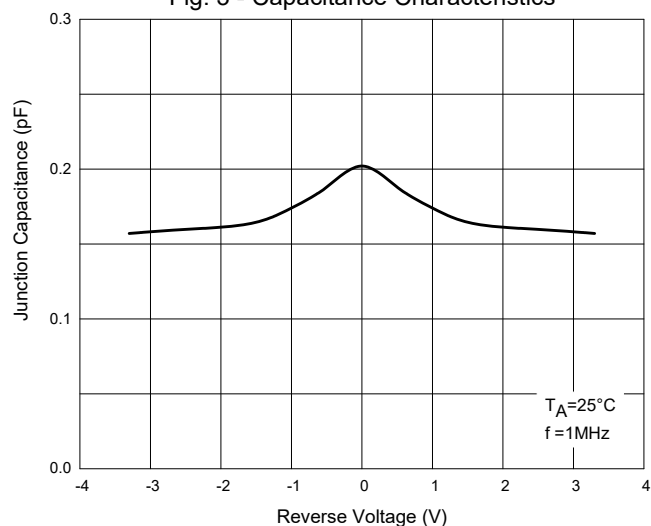


Fig. 4 - Clamping Voltage Characteristics

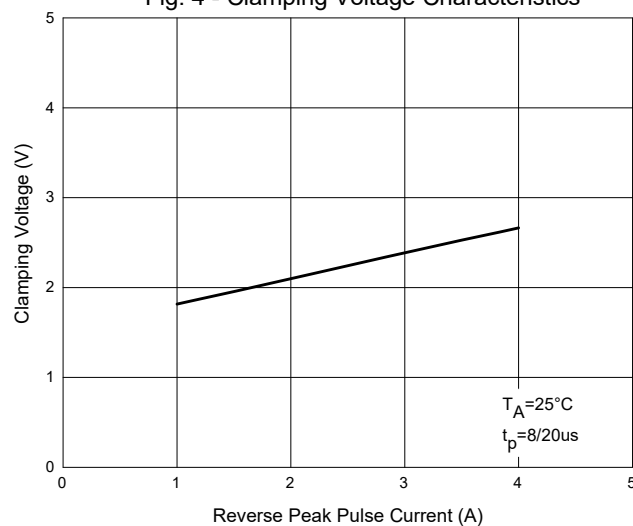


Fig. 5 - TLP Curve

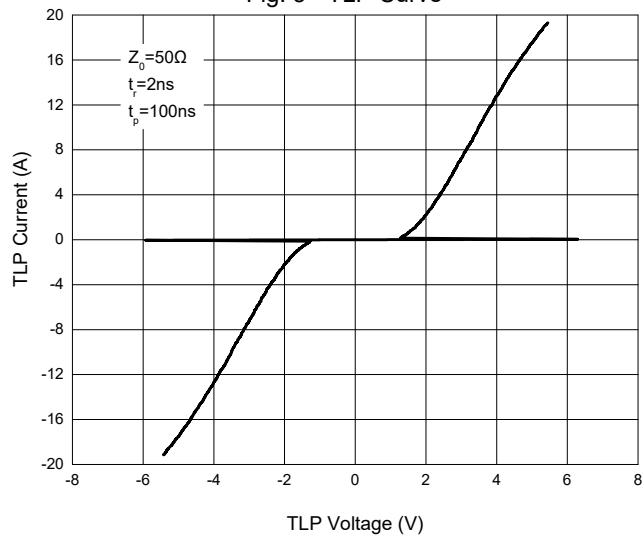
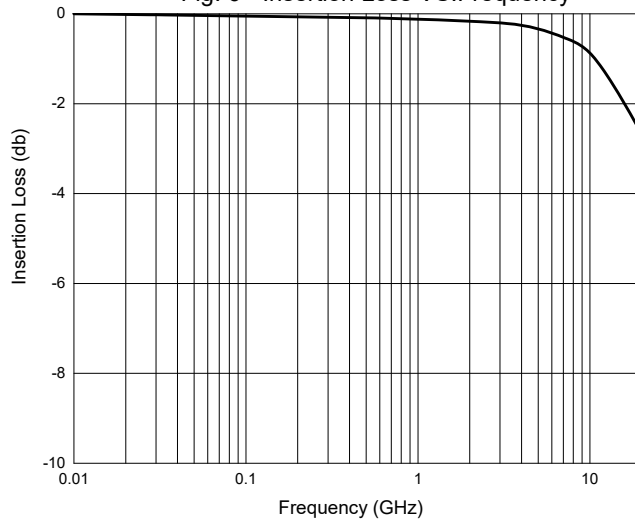


Fig. 6 - Insertion Loss VS. Frequency



1-Line Bi-directional Ultra Low Capacitance ESD

Fig. 7 - Return Loss VS.Frequency

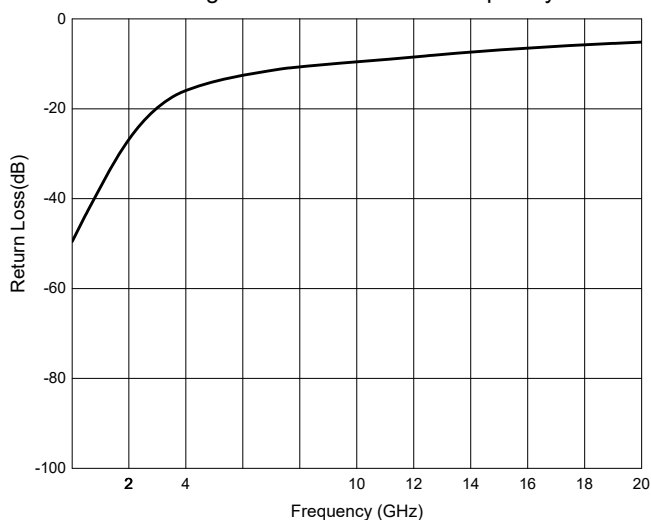
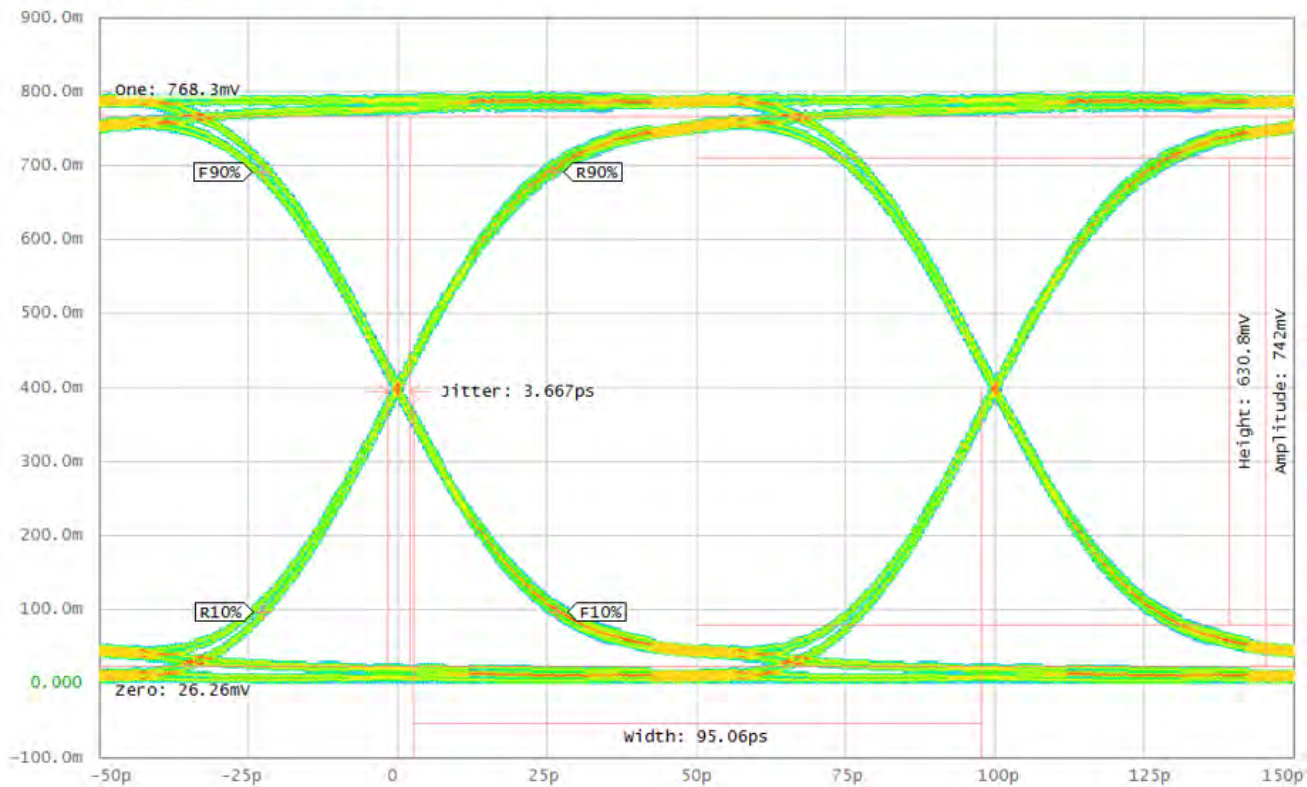
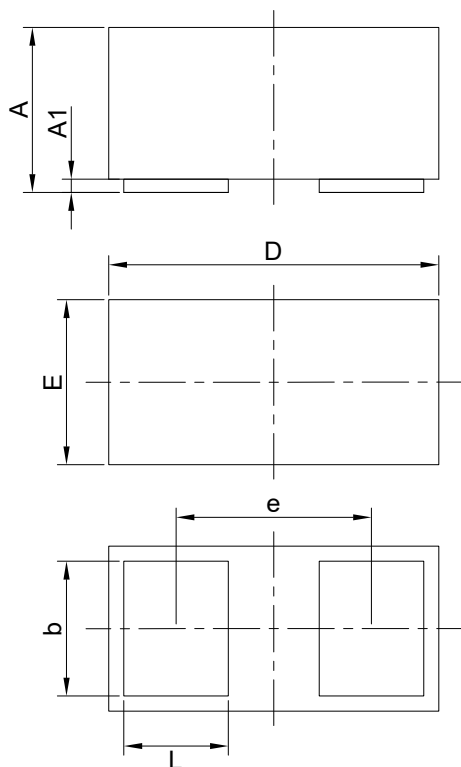


Fig. 8 - Eye Diagram (10 Gbps)

Tr3 Tdd21, High = 800mV Low = 0V, 10Gbps

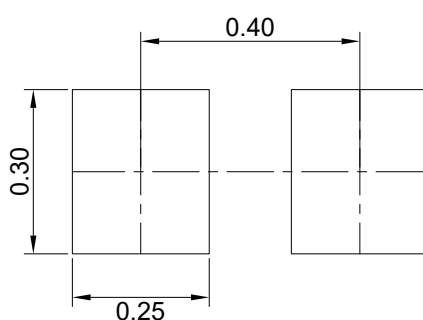


Package Outline



DIM	INCH		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.009	0.013	0.23	0.34	
A1	0.000	0.002	0.00	0.05	
b	0.008	0.011	0.21	0.28	
D	0.022	0.026	0.55	0.65	
E	0.010	0.014	0.25	0.35	
e	0.014		0.36		TYP
L	0.006	0.009	0.16	0.22	

Suggested Pad Layout (Unit:mm)



Notes:

1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please refer to document IPC-7351A.

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