1-Line Bi-directional Ultra Low Capacitance ESD

Features

- Transient protection:
  - IEC 61000-4-2 (ESD) ±15kV (Air), ±12kV (Contact)
  - IEC 61000-4-5 (Lightning) 4A (8/20μs)
- Bi-directional ESD protection of single line
- Reverse working voltage, V_{RWM}: 1.5V
- Low capacitance: 0.2pF
- Low clamping voltage: 3.25V
- Low reverse leakage current: 100nA max at V_R = 1.5V
- Solid-state silicon-avalanche

CSP1006-2

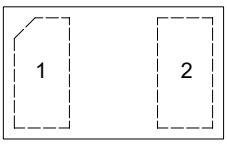
Applications

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

Mechanical Data

- Package: CSP1006-2
- 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
L1	 Transparent top view	

Ordering Information

Product Name	Packing info
CSPSBULC1V5LB-TP	10K pcs/reel

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

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

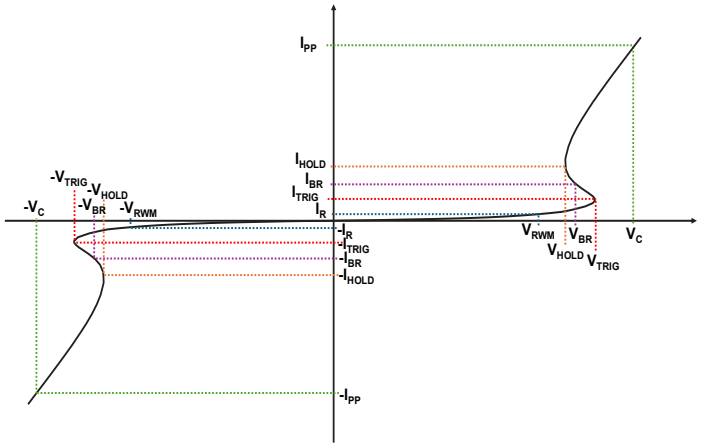
Parameter		Symbol	Rating	Unit
IEC61000-4-2(ESD)	Air	V_{ESD}	±15	kV
	Contact	V_{ESD}	±12	kV
Peak Pulse Current (8/20μs) (Note 2)		I_{PP}	4	A
Peak Pulse Power (8/20μs) (Note 2)		P_{PK}	13	W
Operating Temperature Range		T_J	-55 to +125	°C
Storage Temperature Range		T_{STG}	-55 to +150	°C

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and 1000ppm antimony compounds.
2. 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}				1.5	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	4.5	6.5	8	V
Reverse Leakage Current	I_R	V_{RWM}=1.5V			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:

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

Curve Characteristics

Fig. 1 - 8 X 20μs Pulse Waveform

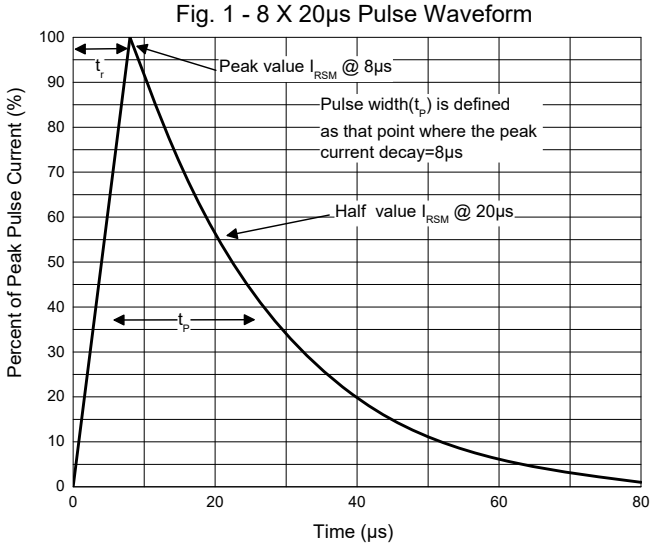


Fig. 2 - Pulse Derating Curve

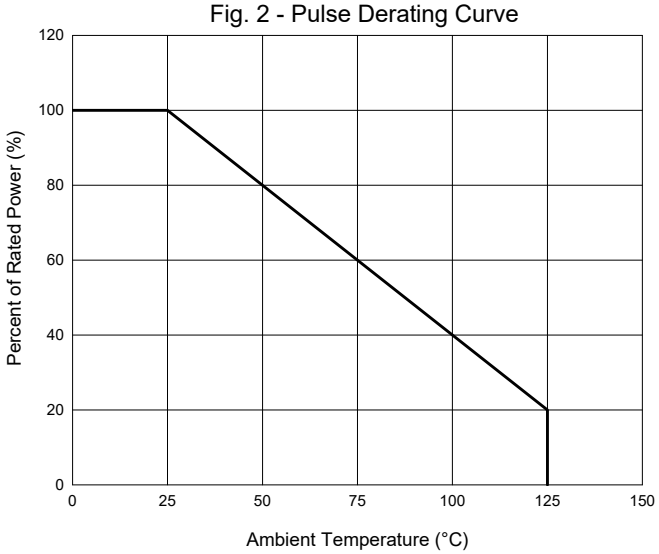


Fig. 3 - Capacitance Characteristics

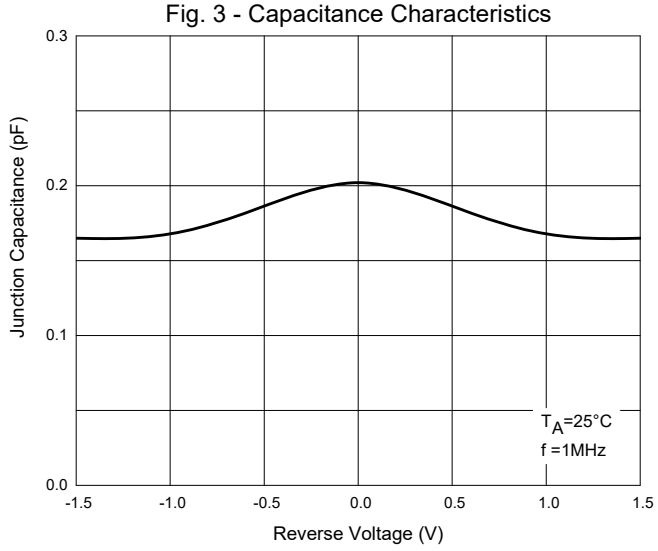


Fig. 4 - Clamping Voltage Characteristics

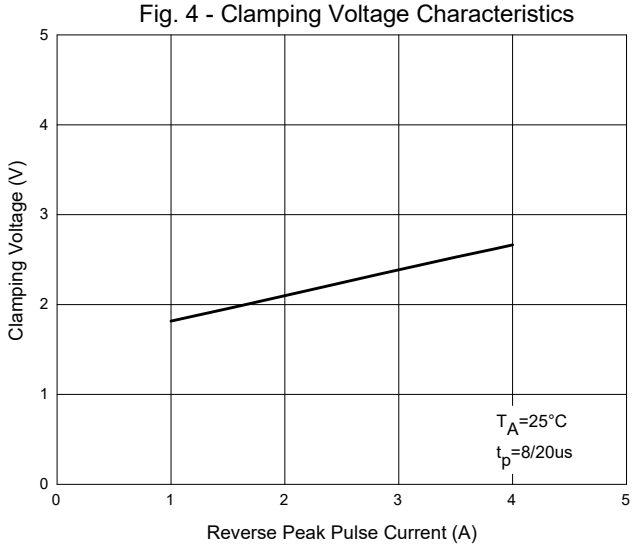


Fig. 5 - TLP Curve

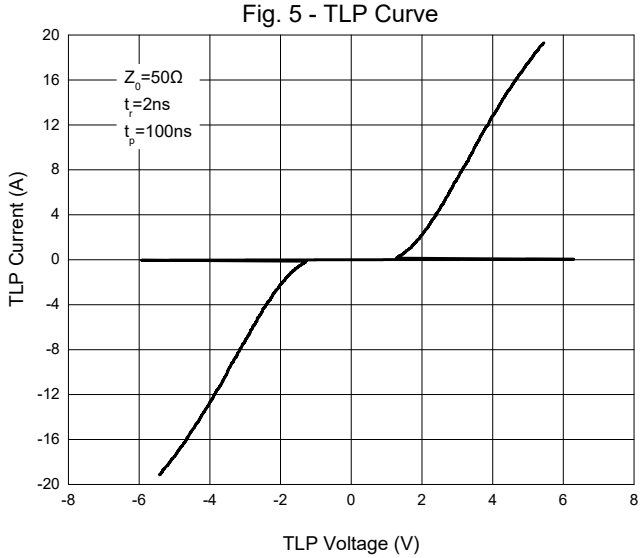


Fig. 6 - Insertion Loss VS.Frequency

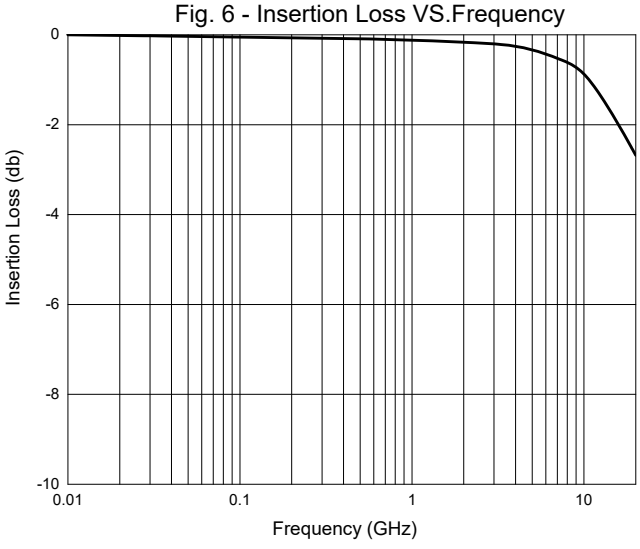


Fig. 7 - Return Loss VS.Frequency

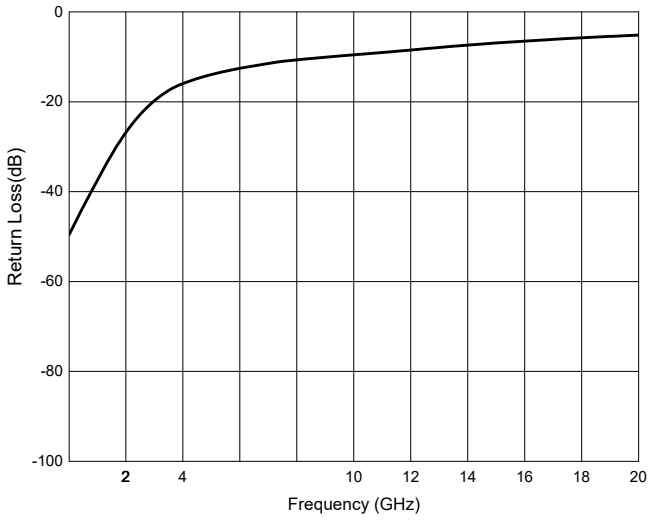
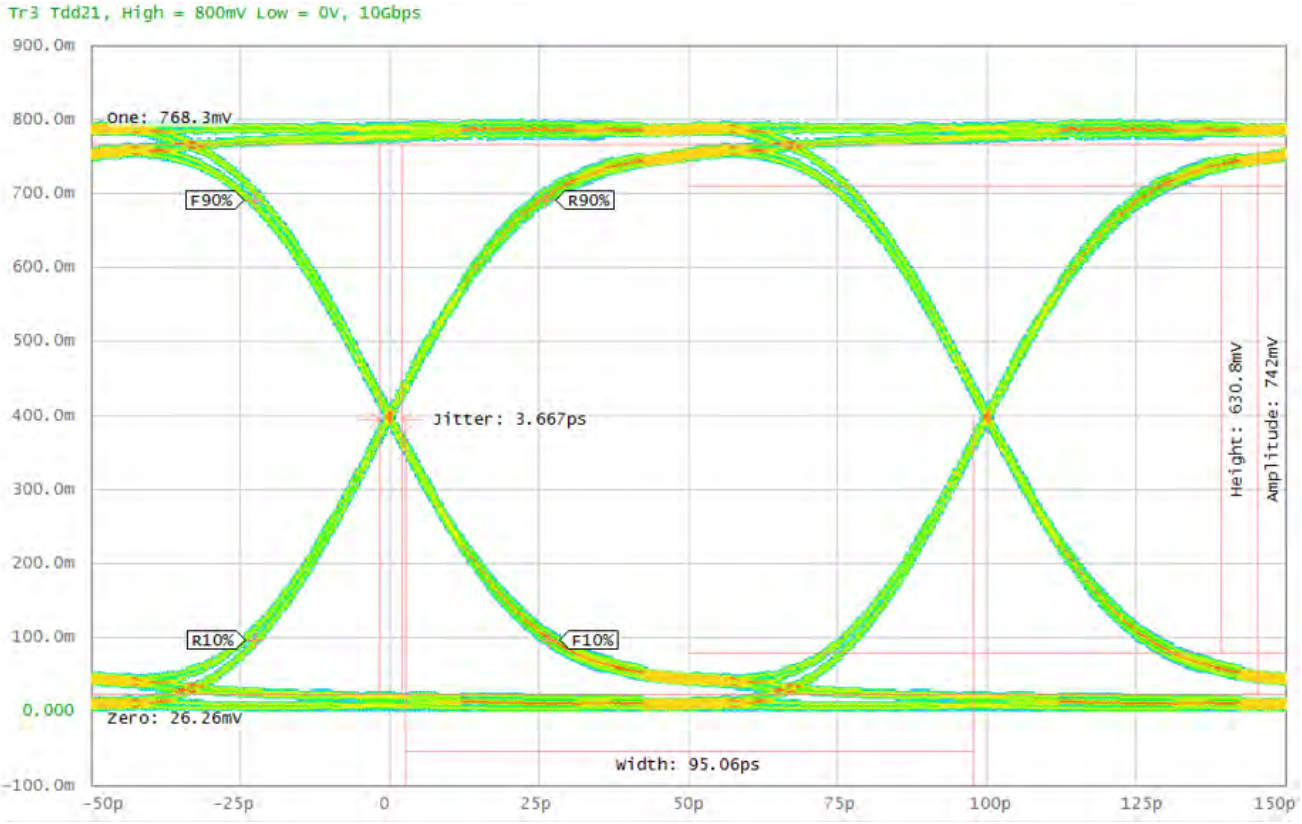
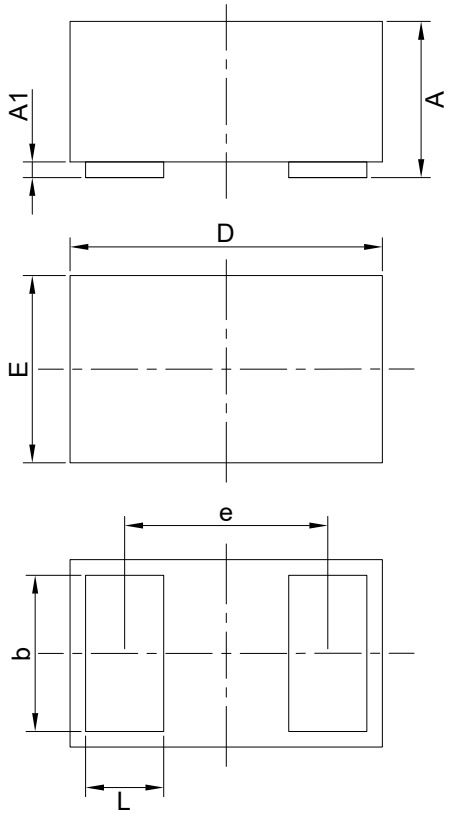


Fig. 8 - Eye Diagram (10 Gbps)

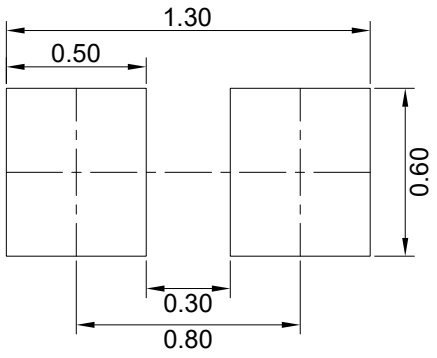


Package Outline



DIM	INCH		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.016	0.022	0.40	0.55	
A1	0.000	0.002	0.00	0.05	
b	0.018	0.022	0.45	0.55	
D	0.037	0.041	0.95	1.05	
E	0.022	0.026	0.55	0.65	
e	0.026		0.65		TYP
L	0.008	0.012	0.20	0.30	

Suggested Pad Layout (Unit:mm)



Notes:

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

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