

**Features**

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



CSP1006-2

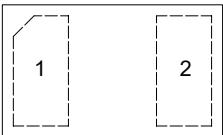
**Applications**

- 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
	 Transparent top view	

**Ordering Information**

Product Name	Packing info
CSPSBULC3V3LB-TP	10K pcs/reel

For packaging details, visit our website at [Rev.5.1-06212025](https://www.mccsemi.com/Package>List</a></p>
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**Maximum Ratings ( $T_A=25^\circ\text{C}$  unless otherwise specified)**

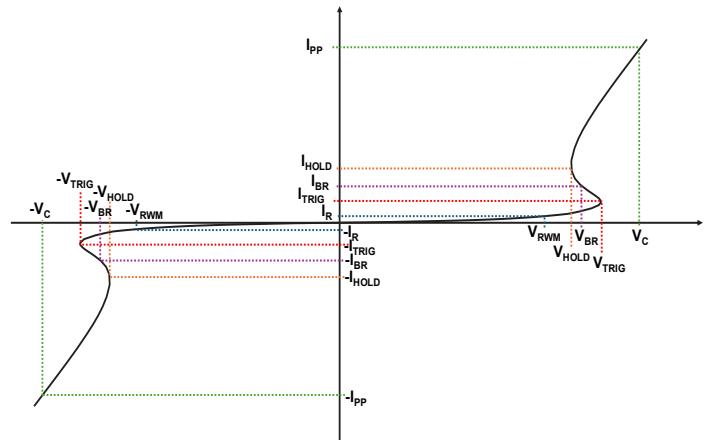
Parameter	Symbol	Rating	Unit
IEC61000-4-2(ESD)	Air	$V_{ESD}$	$\pm 15$
	Contact	$V_{ESD}$	$\pm 12$
Peak Pulse Current (8/20 $\mu\text{s}$ ) <sup>(Note 2)</sup>	$I_{PP}$	4	A
Peak Pulse Power (8/20 $\mu\text{s}$ ) <sup>(Note 2)</sup>	$P_{PK}$	13	W
Operating Temperature Range	$T_J$	-55 to +125	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ\text{C}$

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 8/20 $\mu\text{s}$  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 ( $T_A=25^\circ\text{C}$  unless otherwise specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$				3.3	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T = 1\text{mA}$	4.5	6.5	8	V
Reverse Leakage Current	$I_R$	$V_{RWM}=3.3\text{V}$			0.1	$\mu\text{A}$
Clamping Voltage <sup>(Note 3)</sup>	$V_C$	$I_{PP}=1\text{A}, t_p=8/20\mu\text{s}$		1.75	2.2	V
		$I_{PP}=4\text{A}, t_p=8/20\mu\text{s}$		2.9	3.25	
Clamping Voltage <sup>(Note 4)</sup>	$V_C$	$I_{PP}=4\text{A}(\text{TLP})$		2.5		V
		$I_{PP}=16\text{A}(\text{TLP})$		4.9		
ESD Trigger Voltage	$V_{TRIG}$	$t_p = 100\text{ns}, T_A=25^\circ\text{C}$		6.5		V
Reverse Holding Voltage	$V_{HOLD}$			1.3		V
Junction Capacitance	$C_J$	$V_R=0\text{V}, f=1\text{MHz}$		0.2	0.25	$\text{pF}$
Dynamic Resistance <sup>(Note 4)</sup>	$R_{DYN}$	$\text{TLP}, t_p = 100\text{ns}$		0.19		$\Omega$

Note:

3. Non-repetitive current pulse 8/20 $\mu\text{s}$  exponential decay waveform according to IEC61000-4-5..

4. TLP parameter:  $Z_0=50\Omega$ ,  $t_p=100\text{ns}$ ,  $t_r=2\text{ns}$ , averaging window from 60ns to 80ns.  $R_{DYN}$  is calculated from 4A to 16A.

## Curve Characteristics

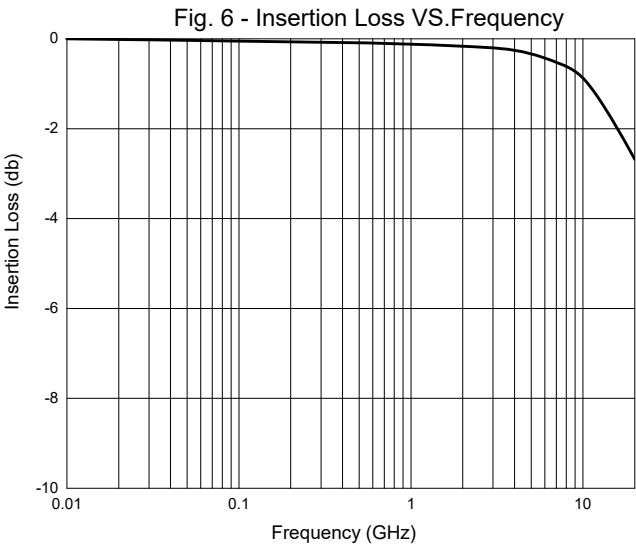
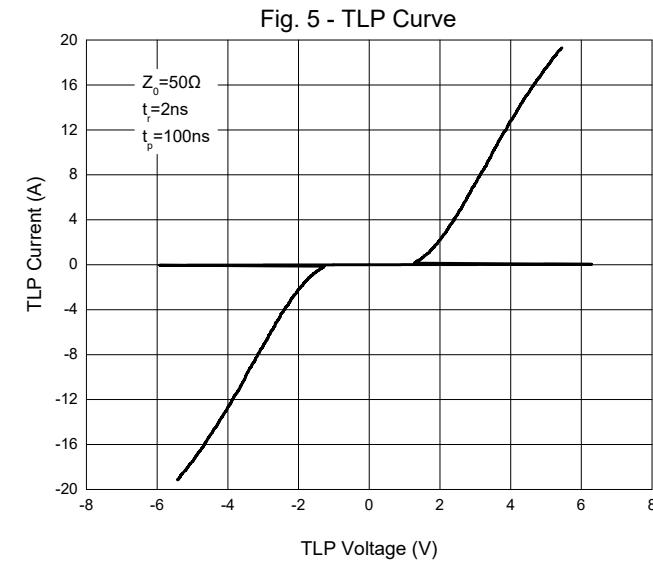
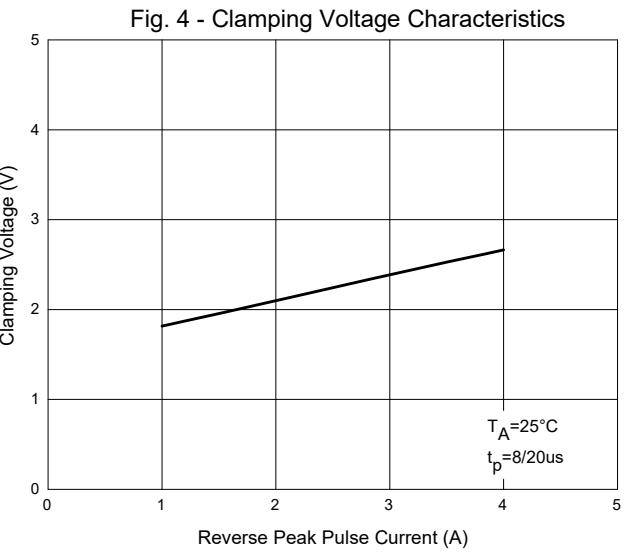
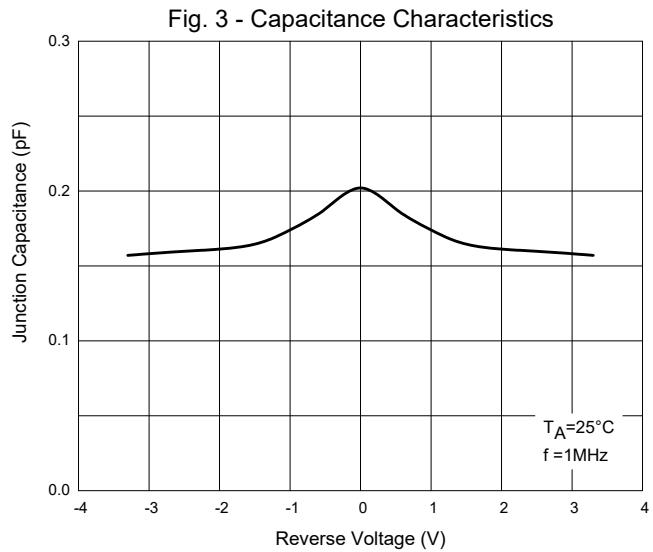
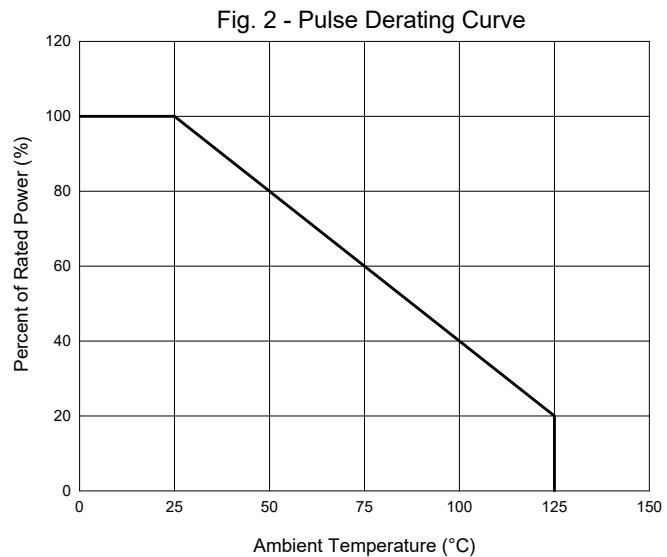
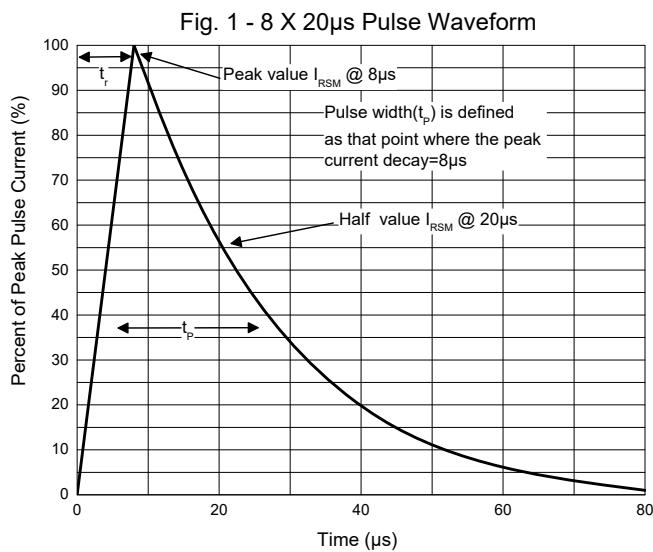


Fig. 7 - Return Loss VS.Frequency

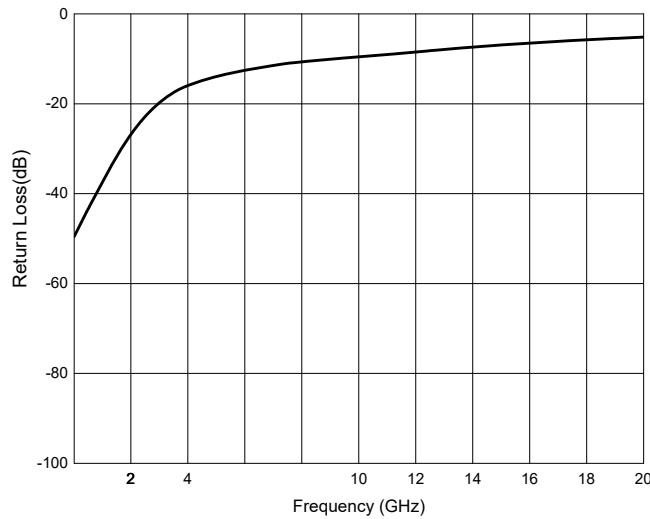
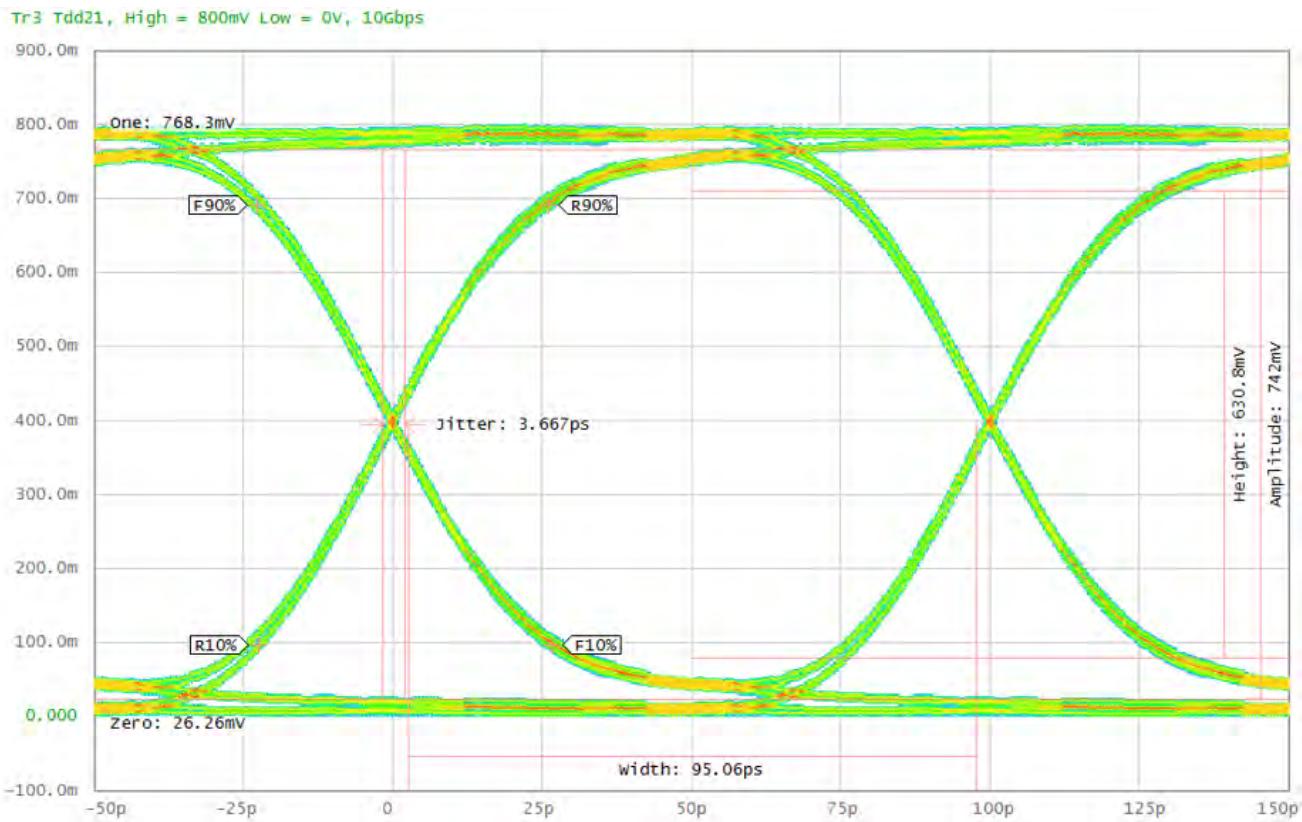
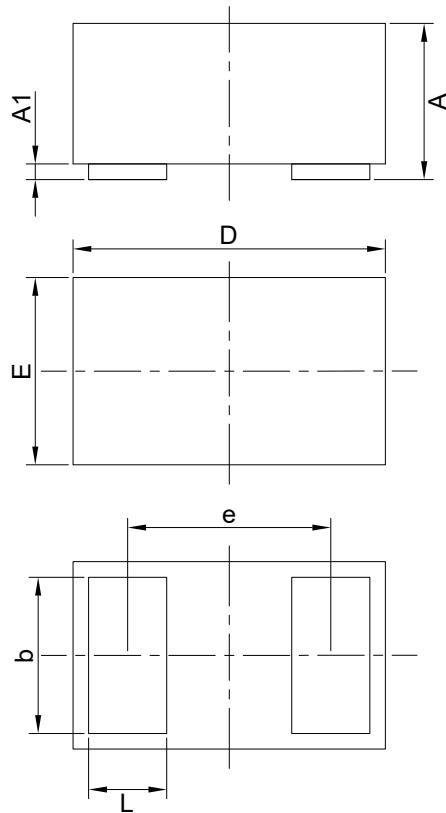


Fig. 8 - Eye Diagram (10 Gbps)

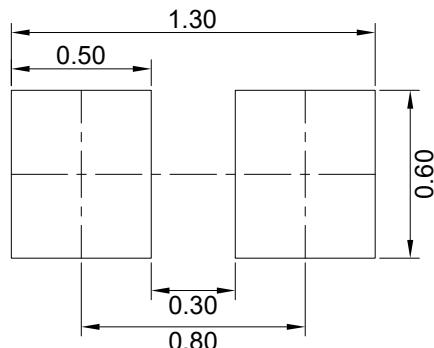


## Package Outline



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 refer to document IPC-7351A.

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