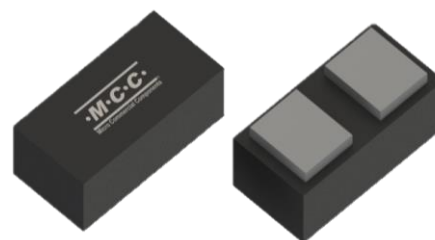


## 1-Line Bi-directional Ultra Low Capacitance ESD

### Features

- Transient protection:
  - IEC 61000-4-2 (ESD)  $\pm 15\text{kV}$  (Air),  $\pm 12\text{kV}$  (Contact)
  - IEC 61000-4-5 (Lightning) 3A (8/20 $\mu\text{s}$ )
- Bi-directional ESD protection of single line
- Reverse working voltage,  $V_{RWM}$ : 5V
- Capacitance: 0.26pF (typical)
- Clamping voltage: 3V (max)
- Reverse leakage current: 200nA max at  $V_R = 5\text{V}$
- Solid-state silicon-avalanche



CSP0201




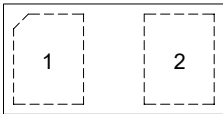

### Applications

- Thunderbolt
- USB3.1 and USB3.0
- DisplayPort Interface
- Handhelds Portable

### 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
CSPHSBULC5V0AE-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**

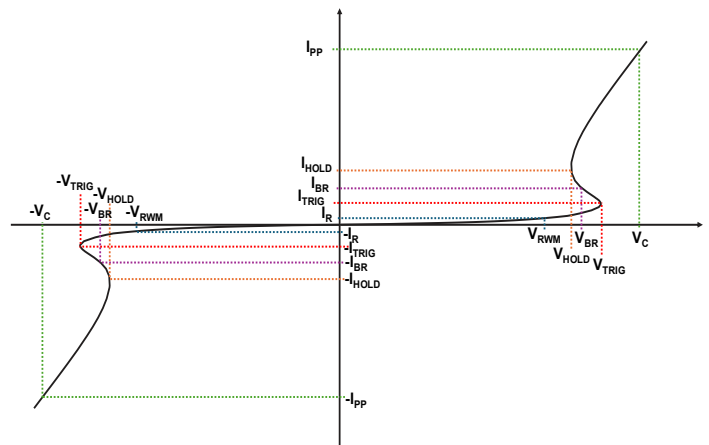
**Maximum Ratings (T<sub>A</sub>=25°C unless otherwise specified)**

Parameter	Symbol	Rating	Unit	
IEC61000-4-2(ESD)	Air	V <sub>ESD</sub>	±15	kV
	Contact	V <sub>ESD</sub>	±12	kV
Peak Pulse Current (8/20µs) (Note 2)	I <sub>PP</sub>	3	A	
Peak Pulse Power (8/20µs) (Note 2)	P <sub>PK</sub>	9	W	
Operating Temperature Range	T <sub>J</sub>	-55 to +125	°C	
Storage Temperature Range	T <sub>STG</sub>	-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 <sub>RWM</sub>	Peak Reverse Working Voltage
I <sub>R</sub>	Reverse Leakage Current @ V <sub>RWM</sub>
V <sub>BR</sub>	Breakdown Voltage @ I <sub>T</sub>
I <sub>T</sub>	Test Current
I <sub>PP</sub>	Maximum Reverse Peak Pulse Current
V <sub>C</sub>	Clamping Voltage @ I <sub>PP</sub>
V <sub>TRIG</sub>	Reverse Trigger Voltage
I <sub>TRIG</sub>	Reverse Trigger Current
V <sub>HOLD</sub>	Reverse Holding Voltage
I <sub>HOLD</sub>	Reverse Holding Current
C <sub>J</sub>	Junction Capacitance
P <sub>PK</sub>	Peak Pulse Power



**Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V <sub>RWM</sub>				5	V
Reverse Breakdown Voltage	V <sub>BR</sub>	I <sub>T</sub> = 0.1mA	5.5		10	V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 5V			0.2	µA
Clamping Voltage (Note3)	V <sub>C</sub>	I <sub>PP</sub> = 1A, t <sub>P</sub> = 8/20µs		2	2.5	V
		I <sub>PP</sub> = 3A, t <sub>P</sub> = 8/20µs		2.6	3	
Clamping Voltage (Note4)	V <sub>C</sub>	I <sub>PP</sub> = 4A(TLP)		2.6		V
		I <sub>PP</sub> = 16A(TLP)		5.8		
Reverse Trigger Voltage	V <sub>TRIG</sub>	t <sub>P</sub> = 100ns, T <sub>A</sub> = 25°C		9.8		V
Reverse Holding Voltage	V <sub>HOLD</sub>	t <sub>P</sub> = 100ns, T <sub>A</sub> = 25°C		1.4		V
Junction Capacitance	C <sub>J</sub>	V <sub>R</sub> = 0V, f = 1MHz		0.26	0.4	pF
Dynamic Resistance (Note4)	R <sub>DYN</sub>	TLP, t <sub>P</sub> = 100ns		0.26		Ω

- Note:
- Non-repetitive current pulse 8/20µs exponential decay waveform according to IEC61000-4-5.
  - TLP parameter: Z<sub>0</sub> = 50Ω, t<sub>p</sub> = 100ns, t<sub>r</sub> = 2ns, averaging window from 60ns to 80ns. R<sub>DYN</sub> is calculated from 4A to 16A.

1-Line Bi-directional Ultra Low Capacitance ESD

Curve Characteristics

Fig. 1 - 8 X 20µs Pulse Waveform

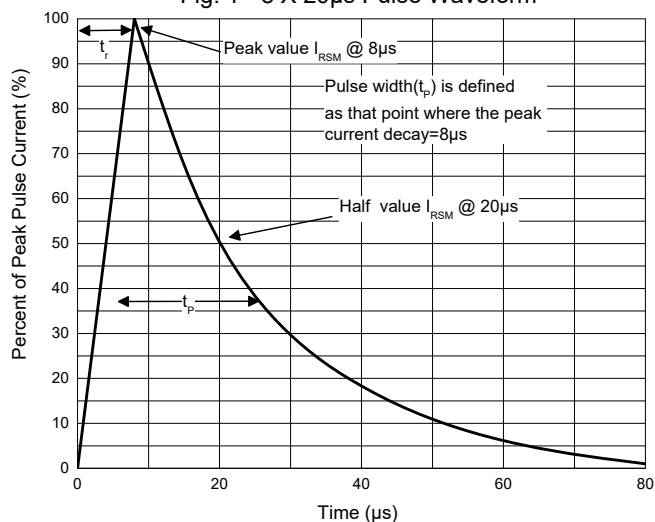


Fig. 2 - Pulse Derating Curve

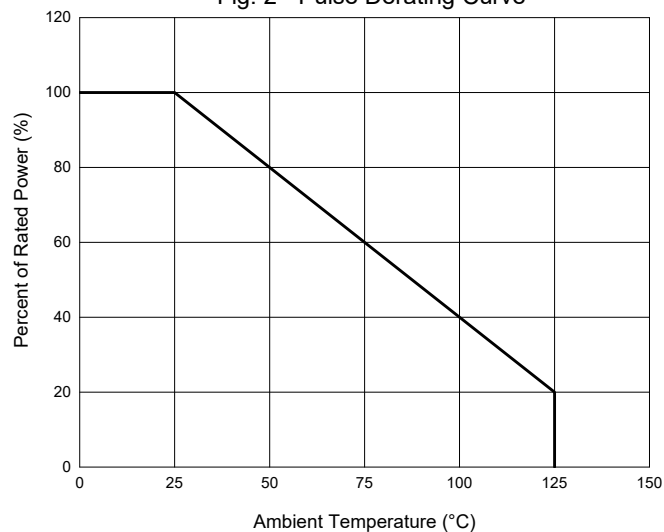


Fig. 3 - Capacitance Characteristics

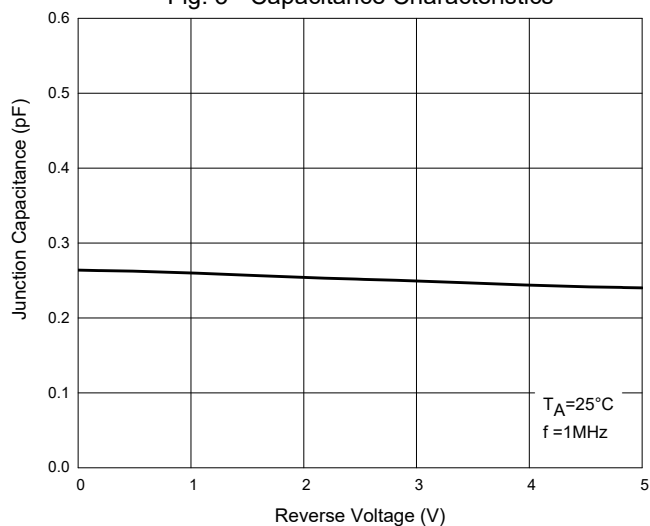


Fig. 4 - Clamping Voltage Characteristics

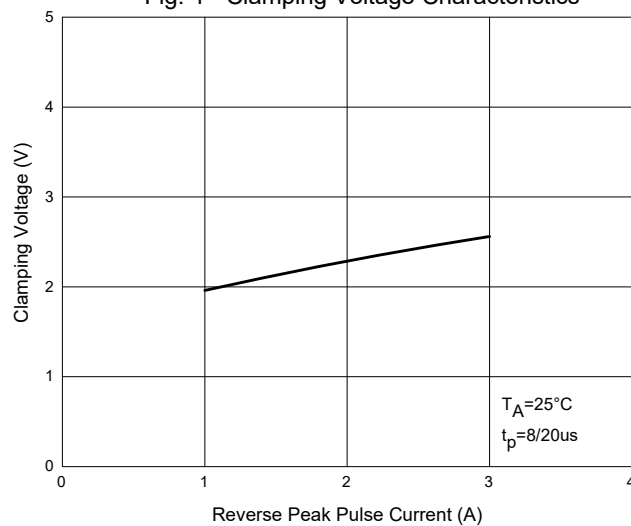
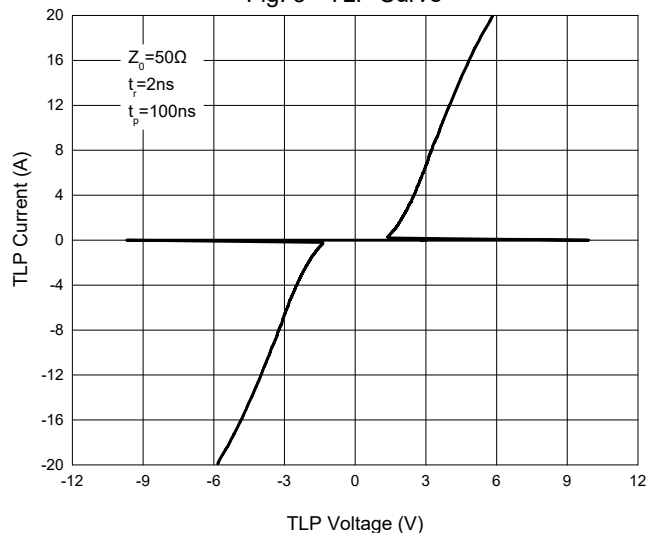
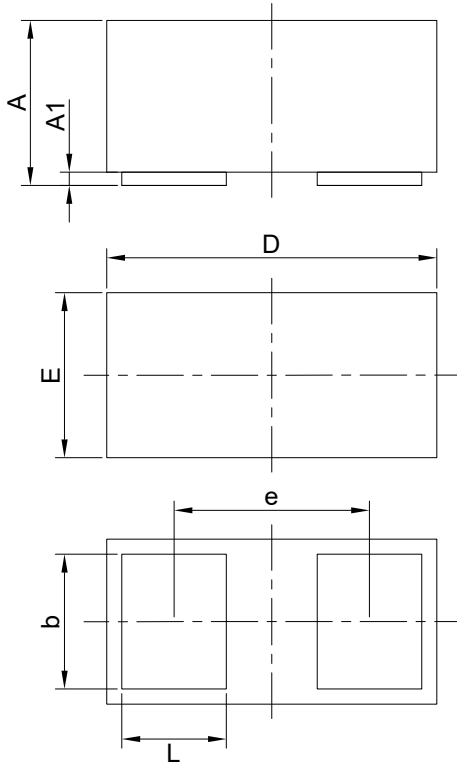


Fig. 5 - TLP Curve

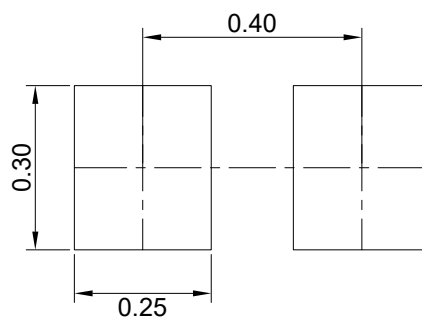


**Package Outline**



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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