

## Electrostatic Discharged Protection Devices (ESD) Data Sheet

### Description

Brightking's LTS08AXXL02 series transient voltage suppressor are designed to protect components which are connected to high speed data and telecommunication lines from voltage surges caused by electrostatic discharge (ESD), electrical fast transients (EFT), and lightning.

TVS diodes are ideal for use as board level protection of sensitive semiconductor components. The LTS08AxxL02 combine a TVS diode with a rectifier bridge to provide transient protection in both common and differential mode with a single device. The capacitance of the device in minimized (15pF) to ensure correct signal transmission on high speed lines. It meets the short-haul transient immunity requirements of Bellcore 1089 for telecommunications applications. Such as:

- Bellcore 1089 (intra-building) 100A (2/20 $\mu$ s)
- ITU K.20 I<sub>pp</sub>=40A (5/310 $\mu$ s)
- IEC61000-4-2 (ESD) 30KV (Air), 30KV (contact)
- IEC61000-4-4 (EFT) 40A (5/50ns)
- IEC61000-4-5 (Lightning) 100A (8/20 $\mu$ s)

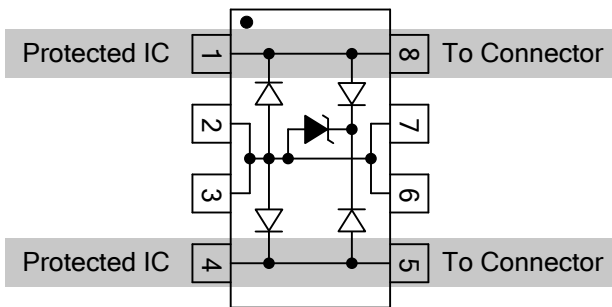
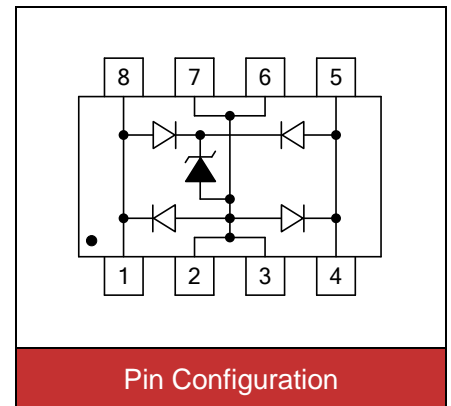


Contact :  $\pm 30\text{kV}$   
Air :  $\pm 30\text{kV}$

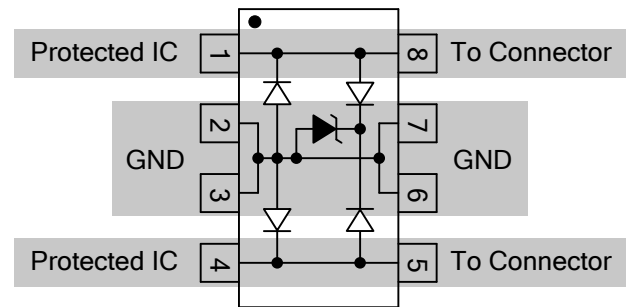


### Features

- IEC61000-4-2 ESD 30KV Air, 30KV contact compliance
- SOIC-08 surface mount package
- Protects two high-speed data lines
- Array of surge rated, low capacitance diodes
- Low clamping voltage
- Solid-state silicon avalanche technology
- Lead Free/RoHS compliant
- Solder reflow temperature: Pure Tin-Sn, 260~270 $^{\circ}\text{C}$
- Flammability rating UL 94V-0
- Meets MSL level 1, per J-STD-020



Protection --- Line to Line (Differential Mode)



Protection --- Line to GND (Common Mode)

## Maximum Ratings

Rating	Symbol	Value	Unit
Peak pulse power (tp=8/20μs waveform)	P <sub>PP</sub>	2000	W
Peak pulse current (tp=8/20μs waveform)	I <sub>PP</sub>	100	A
ESD voltage (Contact discharge)	V <sub>ESD</sub>	±30	kV
ESD voltage (Air discharge)		±30	
Storage & operating temperature range	T <sub>STG</sub> , T <sub>J</sub>	-55~+150	°C

## Electrical Characteristics (T<sub>J</sub>=25°C)

LTS08A3.3L02 (Marking: B LC33 or LC03-3.3)

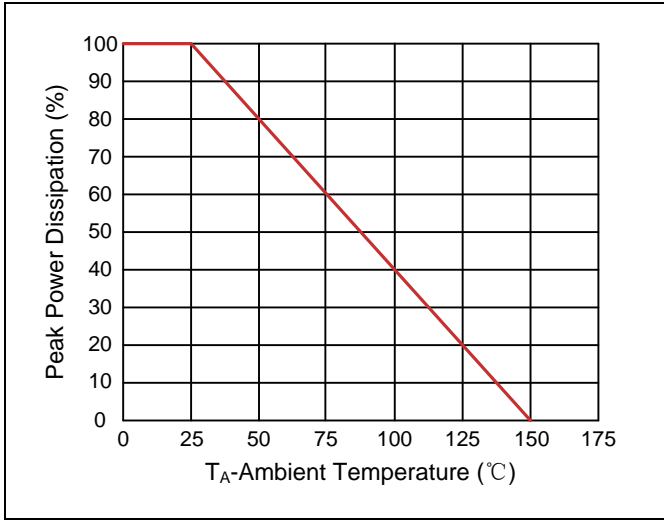
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V <sub>RWM</sub>				3.3	V
Punch-Through voltage	V <sub>PT</sub>	I <sub>PT</sub> =1mA	3.5			V
Snap-Back voltage	V <sub>SB</sub>	I <sub>SB</sub> =50mA	2.8			V
Reverse leakage current	I <sub>R</sub>	V <sub>R</sub> =3.3V			15	μA
Clamping voltage (tp=8/20μs)	V <sub>C</sub>	I <sub>PP</sub> =50A Line to Ground			15	V
Clamping voltage (tp=8/20μs)	V <sub>C</sub>	I <sub>PP</sub> =50A Line to Line			20	V
Clamping voltage (tp=8/20μs)	V <sub>C</sub>	I <sub>PP</sub> =100A Line to Ground			20	V
Clamping voltage (tp=8/20μs)	V <sub>C</sub>	I <sub>PP</sub> =100A Line to Line			25	V
Off state junction capacitance (V <sub>R</sub> =0V, f=1MHz)	C <sub>J</sub>	Between I/O pins and GND		15	30	pF
		Between I/O pins		12	30	pF

LTS08A06L02 (Marking: B LC06 or LC03-6)

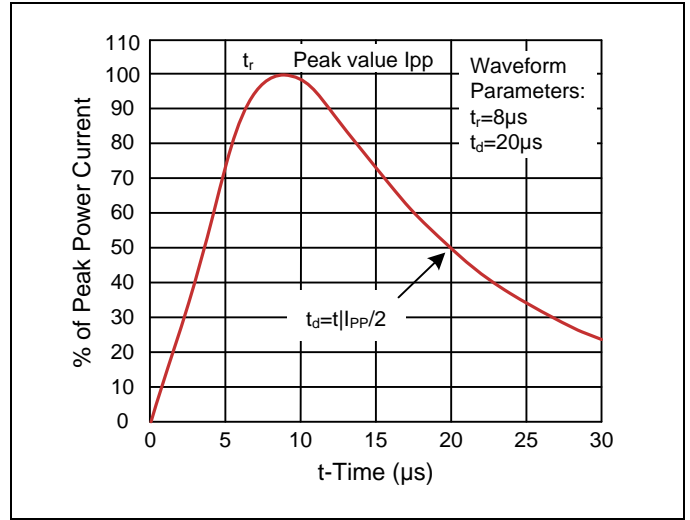
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	$V_{RWM}$				6	V
Punch-Through voltage	$V_{PT}$	$I_{PT}=1mA$	6.8			V
Reverse leakage current	$I_R$	$V_R=6V$			20	$\mu A$
Clamping voltage (tp=8/20 $\mu s$ )	$V_C$	$I_{PP}=50A$ Line to Ground			15	V
Clamping voltage (tp=8/20 $\mu s$ )	$V_C$	$I_{PP}=50A$ Line to Line			18	V
Clamping voltage (tp=8/20 $\mu s$ )	$V_C$	$I_{PP}=100A$ Line to Ground			20	V
Clamping voltage (tp=8/20 $\mu s$ )	$V_C$	$I_{PP}=100A$ Line to Line			24	V
Off state junction capacitance ( $V_R=0V$ , $f=1MHz$ )	$C_J$	Between I/O pins and GND		15	30	pF
		Between I/O pins		12	30	pF

**Typical Characteristics Curves**

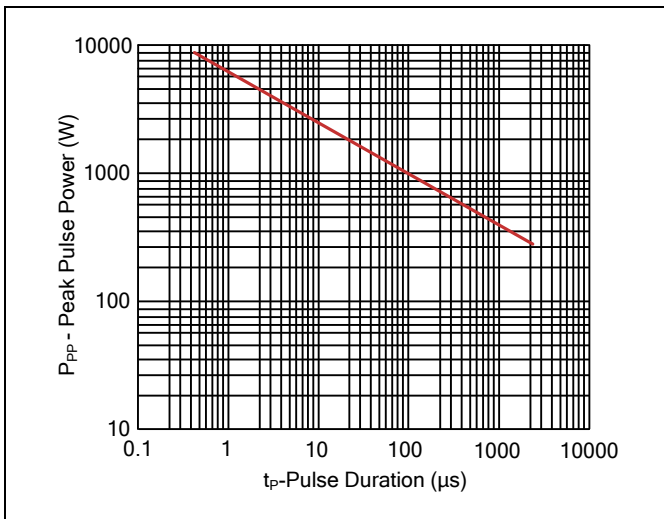
**Figure 1. Power Derating Curve**



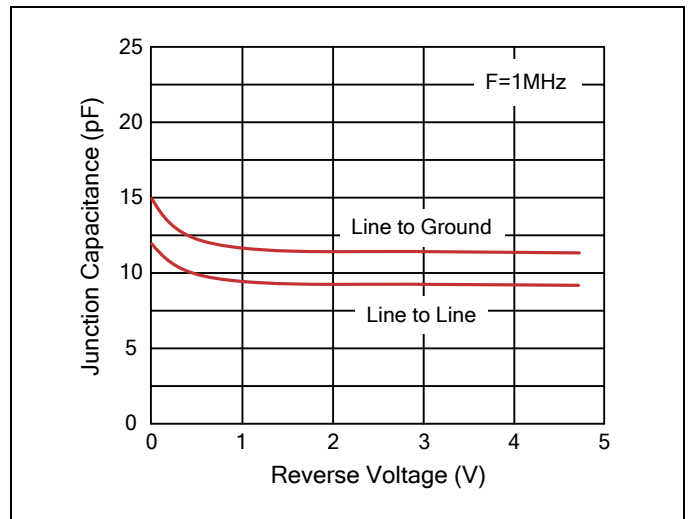
**Figure 2. Pulse Waveforms**



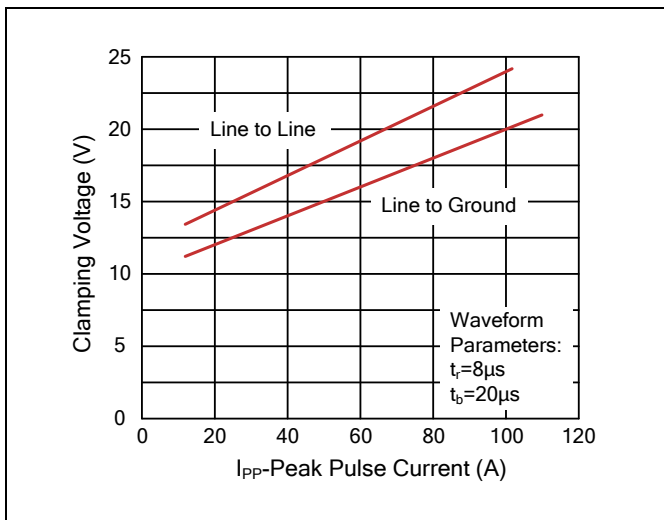
**Figure 3. Non-Repetitive Peak Pulse vs. Pulse Time**



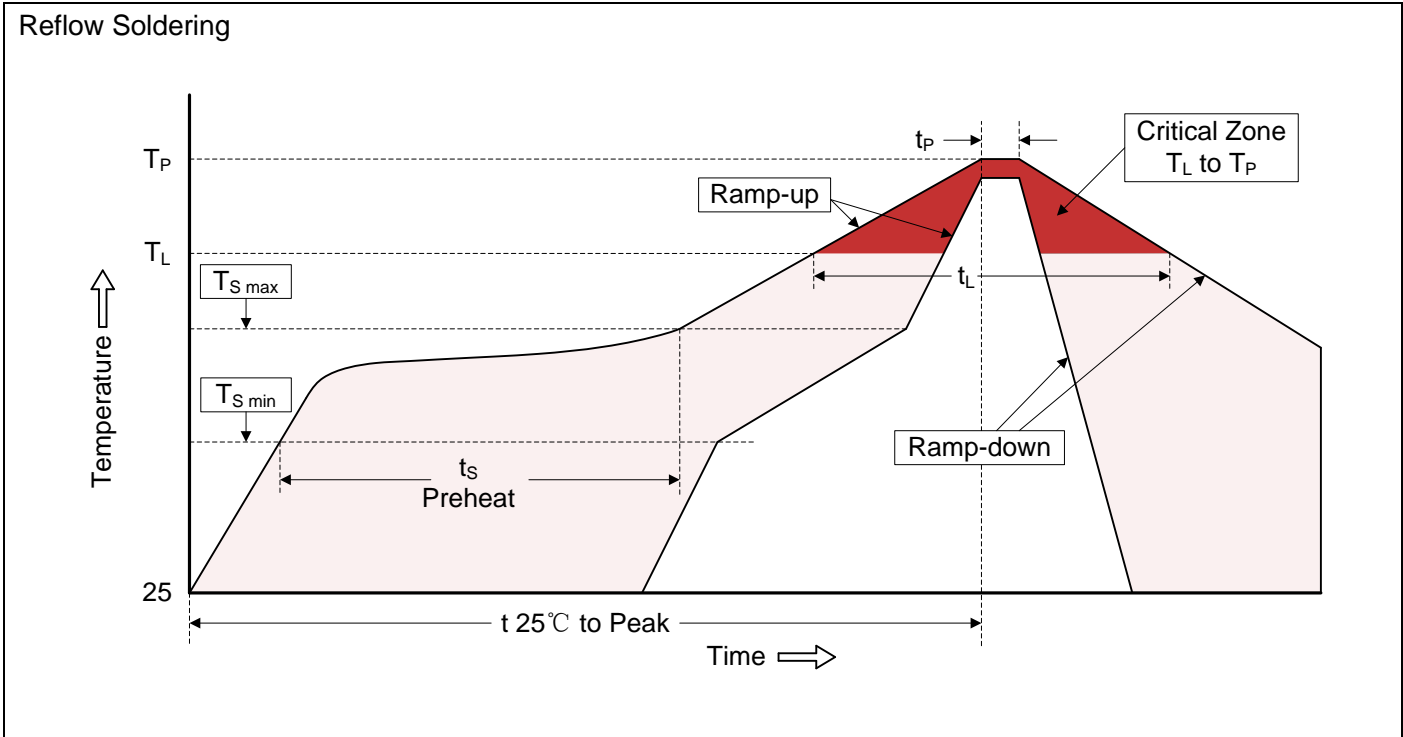
**Figure 4. Capacitance vs. Reverse Voltage**



**Figure 5. Clamping Voltage vs. Peak Pulse Current**



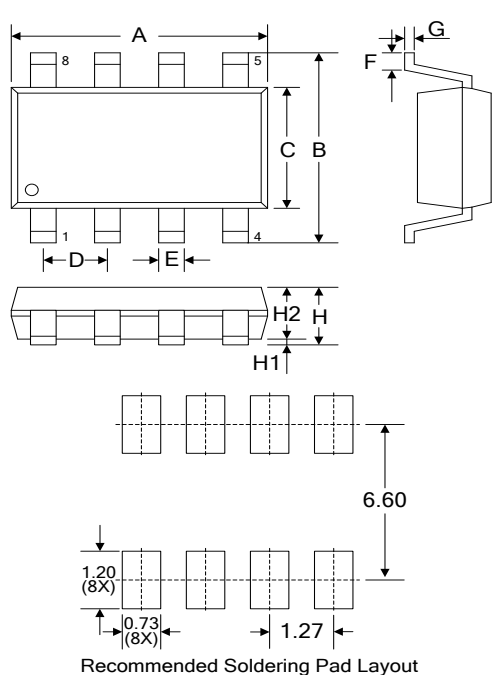
**Recommended Soldering Conditions**



**Recommended Conditions**

Profile Feature	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	3°C/second max.
Preheat -Temperature Min ( $T_{S\ min}$ ) -Temperature Max ( $T_{S\ max}$ ) -Time (min to max) ( $t_s$ )	150°C 200°C 60-180 seconds
$T_{S\ max}$ to $T_L$ -Ramp-up Rate	3°C/second max.
Time maintained above: -Temperature ( $T_L$ ) -Time ( $t_L$ )	217°C 60-150 seconds
Peak Temperature ( $T_P$ )	260°C
Time within 5°C of actual Peak Temperature ( $t_P$ )	20-40 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

**Dimensions (SOIC-08)**



Symbol	Dimension			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.80	5.00	0.189	0.197
B	5.80	6.20	0.228	0.244
C	3.80	4.00	0.150	0.157
D	1.27		0.050	
E	0.33	0.51	0.013	0.020
F	0.40	1.27	0.016	0.050
G	0.19	0.25	0.007	0.010
H	1.35	1.75	0.053	0.069
H1	0.10	0.25	0.004	0.010
H2	1.45		0.057	

Recommended Soldering Pad Layout

**Packaging**

Tape	Symbol	Dimension (mm)
	W	12.00±0.30
P0	4.00±0.10	
P1	8.00±0.10	
P2	2.00±0.10	
D0	Φ1.55±0.10	
D1	Φ1.55±0.05	
E	1.75±0.10	
F	5.50±0.10	
A	6.50±0.10	
B	5.40±0.10	
K	2.00±0.10	
t	0.30±0.05	

Reel	Symbol	Dimension (mm)
	D	Φ330.0±3.0
	D2	Φ13.0
	W1	13.5
		Quantity: 2500PCS

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