

**LCE Series**



**Agency Approvals**

Agency	Agency File Number
	E230531

**Maximum Ratings and Thermal Characteristics  
(T<sub>A</sub> = 25°C unless otherwise noted)**

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000µs Test Waveform (Fig.1)(Note 1)	P <sub>PPM</sub>	1500	W
Steady State Power Dissipation on Infinite Heat Sink at T <sub>c</sub> = 75°C (Fig. 5)	P <sub>D</sub>	6.5	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to 175	°C

**Note:**  
1. Non-repetitive current pulse, per Fig. 3 and derated above T<sub>J</sub> (initial) = 25°C per Fig. 2.

**Additional Information**

 <b>Datasheet</b>	 <b>Resources</b>	 <b>Samples</b>
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**Description**

The LCE Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.


**Features**

- 1500W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01 %
- Glass passivated chip junction in DO-201 Package
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4
- Low incremental surge resistance
- High temperature to reflow soldering guaranteed: 260°C/40sec / 0.375"(9.5mm) lead length, 5 lbs., (2.3kg) tension
- Plastic package is flammability rated V-0 per Underwriters Laboratories
- Matte tin lead-free plated
- Ideal for data line applications
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

**Applications**

TVS devices are ideal for the protection of I/O interfaces, V<sub>CC</sub> bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

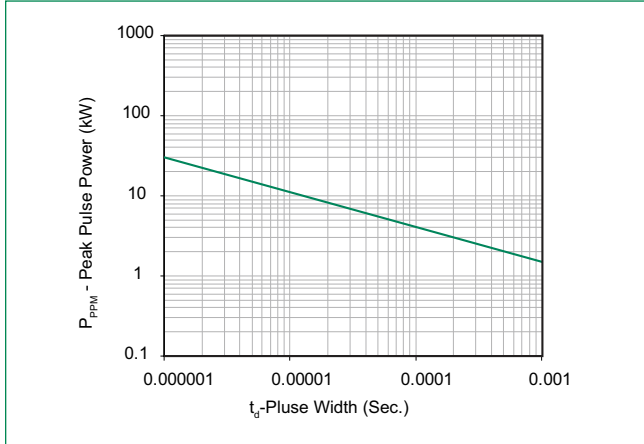
### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Part Number	Reverse Stand off Voltage V <sub>R</sub> (V)	Breakdown Voltage V <sub>BR</sub> (V)		Test Current I <sub>T</sub> (mA)	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>R</sub> (μA)	Maximum Clamping Voltage at I <sub>PP</sub> V <sub>C</sub> (V)	Maximum Peak Pulse Current (Fig.3) I <sub>PPM</sub> (A)	Maximum Junction Capacitance @ 0 Volts (pF)	Working Inverse Blocking Voltage V <sub>WIB</sub> (V)	Inverse Blocking Leakage Current at I <sub>IB</sub> @ V <sub>WIB</sub> (mA)	Peak Inverse Blocking Voltage V <sub>PIB</sub> (V)	Agency Approval 
		Min.	Max.									
LCE6.5A	6.5	7.22	7.98	10	1000	11.2	100.0	100	75	1.0	100	X
LCE7.0A	7.0	7.78	8.60	10	500	12.0	100.0	100	75	1.0	100	X
LCE7.5A	7.5	8.33	9.21	10	250	12.9	100.0	100	75	1.0	100	X
LCE8.0A	8.0	8.89	9.83	1	100	13.6	100.0	100	75	1.0	100	X
LCE8.5A	8.5	9.44	10.40	1	50	14.4	100.0	100	75	1.0	100	X
LCE9.0A	9.0	10.00	11.10	1	10	15.4	97.0	100	75	1.0	100	X
LCE10A	10.0	11.10	12.30	1	5	17.0	88.0	100	75	1.0	100	X
LCE11A	11.0	12.20	13.50	1	1	18.2	82.0	100	75	1.0	100	X
LCE12A	12.0	13.30	14.70	1	1	19.9	75.0	100	75	1.0	100	X
LCE13A	13.0	14.40	15.90	1	1	21.5	70.0	100	75	1.0	100	X
LCE14A	14.0	15.60	17.20	1	1	23.2	65.0	100	75	1.0	100	X
LCE15A	15.0	16.70	18.50	1	1	24.4	61.0	100	75	1.0	100	X
LCE16A	16.0	17.80	19.70	1	1	26.0	57.0	100	75	1.0	100	X
LCE17A	17.0	18.90	20.90	1	1	27.6	54.0	100	75	1.0	100	X
LCE18A	18.0	20.00	22.10	1	1	29.2	51.0	100	75	1.0	100	X
LCE20A	20.0	22.20	24.50	1	1	32.4	46.0	100	75	1.0	100	X
LCE22A	22.0	24.40	26.90	1	1	35.5	42.0	100	75	1.0	100	X
LCE24A	24.0	26.70	29.50	1	1	38.9	39.0	100	75	1.0	100	X
LCE26A	26.0	28.90	31.90	1	1	42.1	36.0	100	75	1.0	100	X
LCE28A	28.0	31.10	34.40	1	1	45.5	33.0	100	75	1.0	100	X
LCE30A	30.0	33.30	36.80	1	1	48.4	31.0	100	75	1.0	100	X
LCE33A	33.0	36.70	40.60	1	1	53.3	28.1	100	75	1.0	100	X
LCE36A	36.0	40.00	44.20	1	1	58.1	25.8	100	75	1.0	100	X
LCE40A	40.0	44.40	49.10	1	1	64.5	23.3	100	75	1.0	100	X
LCE43A	43.0	47.80	52.80	1	1	69.4	21.6	100	75	1.0	100	X
LCE45A	45.0	50.00	55.30	1	1	72.7	20.6	100	75	1.0	100	X
LCE48A	48.0	53.30	58.90	1	1	77.4	19.4	100	75	1.0	100	X
LCE51A	51.0	56.70	62.70	1	1	82.4	18.2	100	75	1.0	100	X
LCE54A	54.0	60.00	66.30	1	1	87.1	17.2	100	100	1.0	125	X
LCE58A	58.0	64.40	71.20	1	1	93.6	16.0	100	100	1.0	125	X
LCE60A	60.0	66.70	73.70	1	1	96.8	15.5	100	100	1.0	125	X
LCE64A	64.0	71.10	78.60	1	1	103.0	14.6	100	100	1.0	125	X
LCE70A	70.0	77.80	86.00	1	1	113.0	13.3	100	125	1.0	150	X
LCE75A	75.0	83.30	92.10	1	1	121.0	12.4	100	125	1.0	150	X
LCE85A	85.0	94.40	104.00	1	1	129.0	11.6	100	125	1.0	150	X
LCE90A	90.0	100.00	111.00	1	1	146.0	10.3	100	125	1.0	150	X

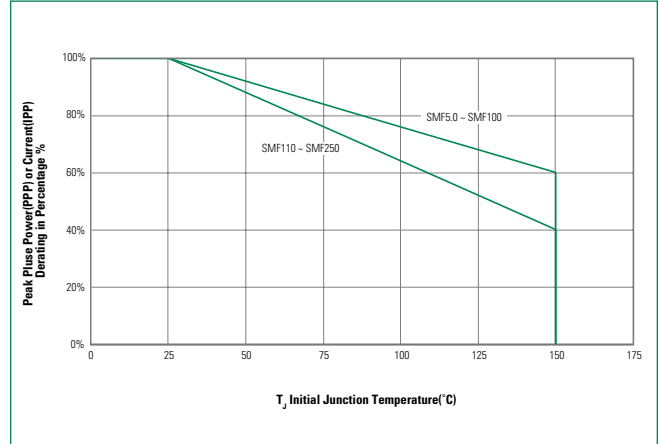
**Note:** For parts without A, the V<sub>BR</sub> is ±10% and V<sub>C</sub> is 5% higher than with A parts, the parts without A are currently available, but not recommended for new designs. The parts with A are preferred.

**Ratings and Characteristic Curves** ( $T_A=25^\circ\text{C}$  unless otherwise noted)

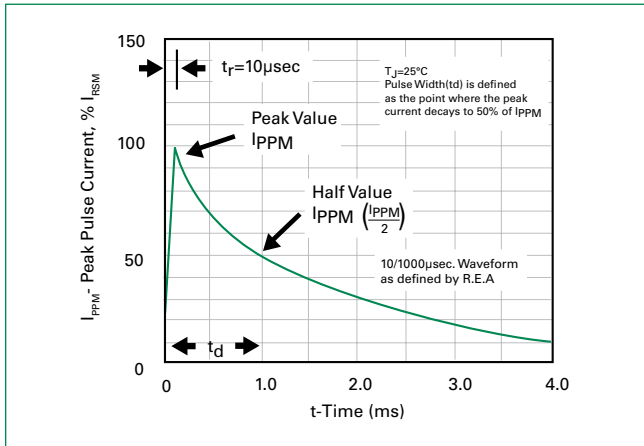
**Figure 1 - Peak Pulse Power Rating**



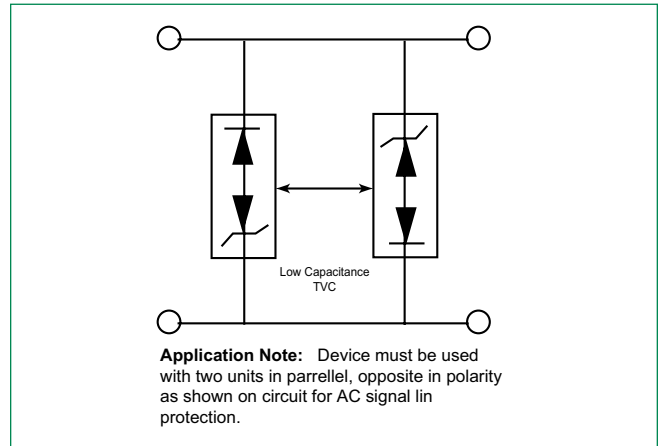
**Figure 2 - Peak Pulse Power Derating Curve**



**Figure 3 - Pulse Waveform**

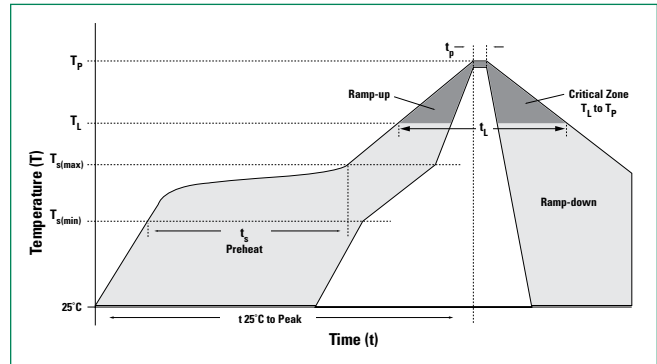


**Figure 4 - AC Line Protection Application**



### Soldering Parameters

<b>Reflow Condition</b>		Lead-free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_A</math>) to peak)</b>		3°C/second max
<b><math>T_{S(max)}</math> to <math>T_A</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_A$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_s$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		6°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		210°C



### Flow/Wave Soldering (Solder Dipping)

<b>Peak Temperature :</b>	265°C
<b>Dipping Time :</b>	10 seconds
<b>Soldering :</b>	1 time

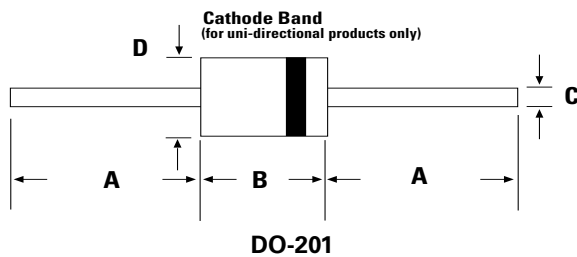
### Physical Specifications

<b>Weight</b>	0.045oz., 1.2g
<b>Case</b>	JEDEC DO-201 molded plastic body over passivated junction.
<b>Polarity</b>	Color band denotes the cathode except Bipolar.
<b>Terminal</b>	Matte Tin axial leads, solderable per JESD22-B102.

### Environmental Specifications

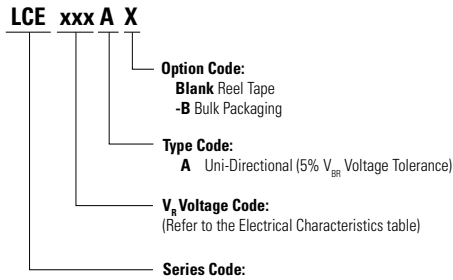
<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Temperature Cycling</b>	JESD22-A104
<b>H3TRB</b>	JESD22-A101
<b>RSH</b>	JESD22-B106

### Dimensions

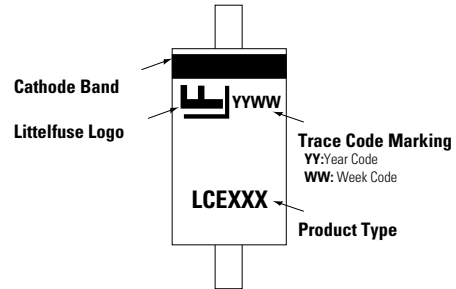


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	1.000	-	25.40	-
<b>B</b>	0.285	0.375	7.20	9.50
<b>C</b>	0.038	0.042	0.96	1.07
<b>D</b>	0.190	0.210	4.80	5.30

### Part Numbering System



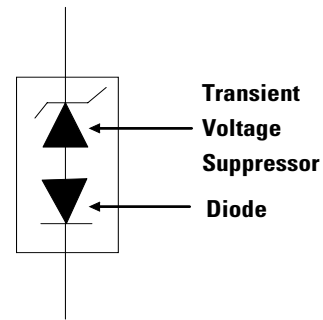
### Part Marking System



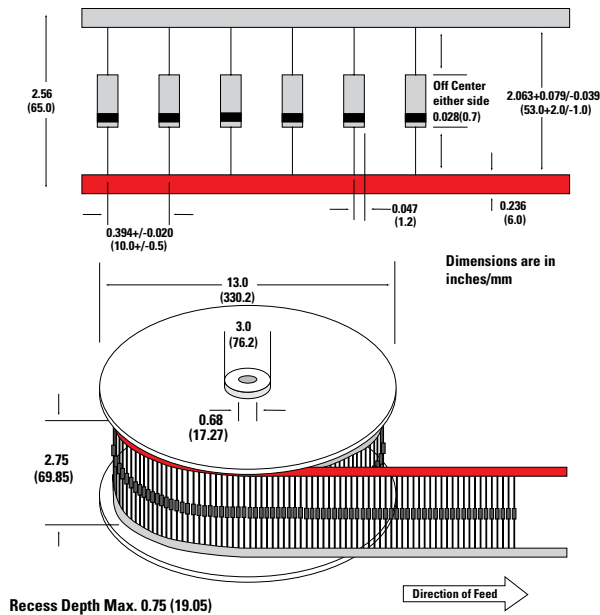
### Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
LCExxxXX	DO-201	1200	Tape & Reel	EIA STD RS-296
LCExxxXX-B	DO-201	500	BULK	Littelfuse Spec.

### Schematic



### Tape and Reel Specification



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[LCE7.0](#) [LCE8.0A](#) [LCE11A](#) [LCE12](#) [LCE8.0](#) [LCE16A](#) [LCE8.5](#) [LCE18A](#) [LCE13](#) [LCE7.0A](#) [LCE9.0](#) [LCE16](#) [LCE10A](#)  
[LCE7.5](#) [LCE28](#) [LCE13A](#) [LCE22A](#) [LCE15](#) [LCE28A](#) [LCE9.0A](#) [LCE20A](#) [LCE8.5A](#) [LCE17](#) [LCE12A](#) [LCE14](#) [LCE20](#)  
[LCE6.5A](#) [LCE18](#) [LCE24A](#) [LCE17A](#) [LCE58](#) [LCE60A](#) [LCE75A-C](#) [LCE70](#) [LCE45](#) [LCE48](#) [LCE51A](#) [LCE36](#) [LCE54](#)  
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