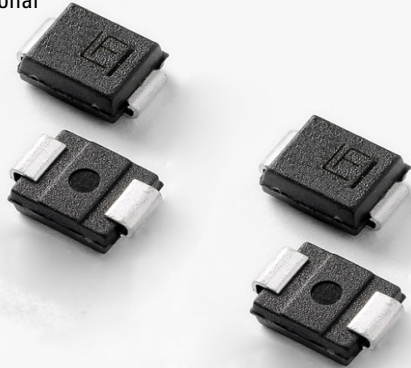



# SMBLCE-HR Series

## Surface Mount - 600W

Uni-directional



### Agency Approvals

Agency	Agency File/Certificate Number
	E230531

### Maximum Ratings & Thermal Characteristics

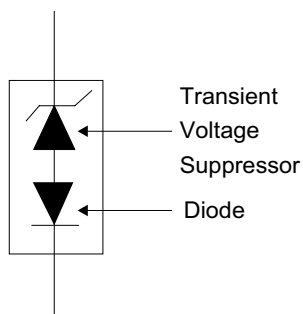
( $T_A=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation ( $I_{PP} \times V_C$ ) at $T_L=25^\circ\text{C}$ by 10/1000 $\mu\text{s}$ Waveform (fig.1)( Note 1)	$P_{PPM}$	600	W
Power Dissipation on Infinite Heat Sink at $T_L=50^\circ\text{C}$	$P_D$	3.0	W
Operating Temperature Range	$T_J$	-65 to 150	$^\circ\text{C}$
Typical Thermal Resistance Junction to Lead	$T_{STG}$	-65 to 175	$^\circ\text{C}$

#### Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_J$  (initial) =  $25^\circ\text{C}$  per Fig. 2.

### Schematic



### Description

SMBLCE-HR High Reliability series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features

- For surface mounted applications in order to optimize board space
- Low profile package
- Built-in strain relief
- 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
- ESD protection of data lines in accordance with IEC 61000-4-2 ESD 30kV (Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Glass passivated chip junction
- Low incremental surge resistance
- 600W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01 %
- Fast response and excellent clamping capability
- UL Recognized compound meeting flammability rating V-0
- Meet MSL level1, per J-STD-020, high temperature soldering guaranteed:260 $^\circ\text{C}$ /10 seconds at terminals
- Matte tin lead-free plated
- 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 Components are ideal for the protection of I/O Interfaces,  $V_{CC}$  bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.



# SMBLCE-HR Series

## Surface Mount - 600W

### Electrical Characteristics

Part Number	Marking Code	Stand-Off Voltage $V_R$ (V)	Minimum Breakdown Voltage $V_{BR}(V)$ @ $I_T$		Test Current $I_T$ (mA)	Maximum Reverse Leakage at $I_R$ @ $V_R$ ( $\mu A$ )	Maximum Clamping Voltage @ $I_{PP}$ $V_C$ (V)	Maximum Peak Pulse Current per (Fig.3) $I_{PP}$ (A)	Maximum Junction Capacitance at 0 Volts $f=1MHz$ (pF)	Working Inverse Blocking Voltage $V_{WIB}$ (V)	Inverse Blocking Leakage Current at $I_{IB}$ @ $V_{WIB}$ (mA)	Peak Inverse Blocking Voltage $V_{PIB}$ (V)	Agency Approval 
			MIN	MAX									
SMBLCE6.5-HR	SKK	6.5	7.22	7.98	10	1000	11.2	53.58	50	75	1.0	100	X
SMBLCE7.0-HR	SKM	7.0	7.78	8.60	10	500	12.0	50.00	50	75	1.0	100	X
SMBLCE7.5-HR	SKP	7.5	8.33	9.21	10	250	12.9	46.52	50	75	1.0	100	X
SMBLCE8.0-HR	SKR	8.0	8.89	9.83	1	100	13.6	44.12	50	75	1.0	100	X
SMBLCE8.5-HR	SKT	8.5	9.44	10.40	1	50	14.4	41.67	50	75	1.0	100	X
SMBLCE9.0-HR	SKV	9.0	10.00	11.10	1	10	15.4	38.97	50	75	1.0	100	X
SMBLCE10-HR	SKX	10.0	11.10	12.30	1	5	17.0	35.30	50	75	1.0	100	X
SMBLCE11-HR	SKZ	11.0	12.20	13.50	1	0.96	18.2	32.97	50	75	1.0	100	X
SMBLCE12-HR	SLE	12.0	13.30	14.70	1	0.96	19.9	30.16	50	75	1.0	100	X
SMBLCE13-HR	SLG	13.0	14.40	15.90	1	0.96	21.5	27.91	50	75	1.0	100	X
SMBLCE14-HR	SLK	14.0	15.60	17.20	1	0.96	23.2	25.87	50	75	1.0	100	X
SMBLCE15-HR	SLM	15.0	16.70	18.50	1	0.96	24.4	24.59	50	75	1.0	100	X
SMBLCE16-HR	SLP	16.0	17.80	19.70	1	0.96	26.0	23.10	50	75	1.0	100	X
SMBLCE17-HR	SLR	17.0	18.90	20.90	1	0.96	27.6	21.74	50	75	1.0	100	X
SMBLCE18-HR	SLT	18.0	20.00	22.10	1	0.96	29.2	20.55	50	75	1.0	100	X
SMBLCE20-HR	SLV	20.0	22.20	24.50	1	0.96	32.4	18.52	50	75	1.0	100	X
SMBLCE22-HR	SLX	22.0	24.40	26.90	1	0.96	35.5	16.91	50	75	1.0	100	X
SMBLCE24-HR	SLZ	24.0	26.70	29.50	1	0.96	38.9	15.43	50	75	1.0	100	X
SMBLCE26-HR	SME	26.0	28.90	31.90	1	0.96	42.1	14.26	50	75	1.0	100	X
SMBLCE28-HR	SMG	28.0	31.10	34.40	1	0.96	45.5	13.19	50	75	1.0	100	X
SMBLCE30-HR	SMK	30.0	33.30	36.80	1	0.96	48.4	12.40	50	75	1.0	100	X
SMBLCE33-HR	SMM	33.0	36.70	40.60	1	0.96	53.3	11.26	50	75	1.0	100	X
SMBLCE36-HR	SMP	36.0	40.00	44.20	1	0.96	58.1	10.33	50	75	1.0	100	X
SMBLCE40-HR	SMR	40.0	44.40	49.10	1	0.96	64.5	9.31	50	75	1.0	100	X
SMBLCE43-HR	SMT	43.0	47.80	52.80	1	0.96	69.4	8.65	50	75	1.0	100	X
SMBLCE45-HR	SMV	45.0	50.00	55.30	1	0.96	72.7	8.26	50	75	1.0	100	X
SMBLCE48-HR	SMX	48.0	53.30	58.90	1	0.96	77.4	7.76	50	75	1.0	100	X
SMBLCE51-HR	SMZ	51.0	56.70	62.70	1	0.96	82.4	7.29	50	75	1.0	100	X
SMBLCE54-HR	SNE	54.0	60.00	66.30	1	0.96	87.1	6.90	50	100	1.0	125	X
SMBLCE58-HR	SNG	58.0	64.40	71.20	1	0.96	93.6	6.42	50	100	1.0	125	X
SMBLCE60-HR	SNK	60.0	66.70	73.70	1	0.96	96.8	6.20	50	100	1.0	125	X
SMBLCE64-HR	SNM	64.0	71.10	78.60	1	0.96	103.0	5.83	50	100	1.0	125	X
SMBLCE70-HR	SNP	70.0	77.80	86.00	1	0.96	113.0	5.31	50	125	1.0	150	X

Note: Each lot of parts will pass group B test requirement.

### Screen Process

<b>100% Vision Inspection</b>	MIL-STD-750 method 2074
<b>100% X-RAY inspection</b>	MIL-STD-750 method 2076
<b>100% Temperature Cycle Test (-55 to 150°C, 20 cycles, dwell time 15 min)</b>	MIL-STD-750 method 1051
<b>100% Reflow (2x)</b>	JEDEC J-STD-020
<b>100% Surge Test (2x)</b>	MIL-STD-750 method 4066
<b>100% HTRB 150°C Bias=<math>V_R</math> (80% breakdown voltage, 96hrs)</b>	MIL-STD-750 method 1038
<b>Final Electrical Test( 100% 3 sigma limit, 100% dynamic test and PAT limit)</b>	MIL-STD-750 method 4016.4021.4011

Note: Up-screen program can be specified by customer's request by contacting Littelfuse customer service

# SMBLCE-HR Series

## Surface Mount - 600W

### Group B Test Requirement

Screen	Method	Condition	Requirement
Surge test	10/1000 $\mu$ s Peak Pulse Waveform	Maximum clamping Voltage ( $V_C$ ) @ Peak Pulse Current ( $I_{PP}$ )	Sample Size 45 perform 10x Accept 0 failures
Burn - In (HTRB)	MIL -STD-750, Method 1038.5	Applied voltage 100% $V_R$ @ 150°C	Sample size 45 340 hours Accept 0 failures
Electrical test	-	$I_R$ @ $V_R$ , $V_{BR}$ @ $I_T$	Sample size 45 Accept 0 failures

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

Figure 1 - Peak Pulse Power Rating Curve

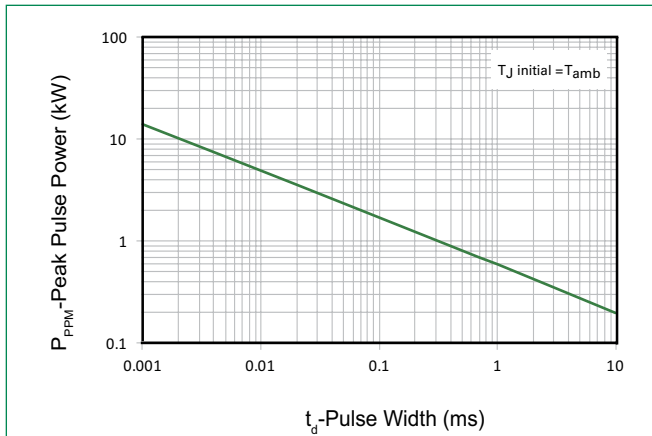


Figure 2 - Peak Pulse Power Derating Curve

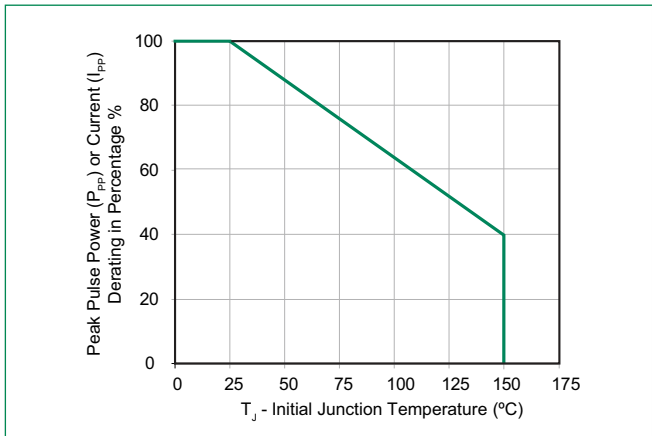


Figure 3 - Pulse Waveform

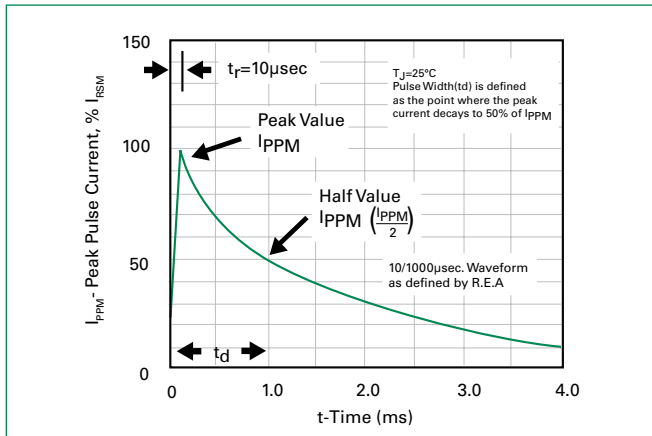
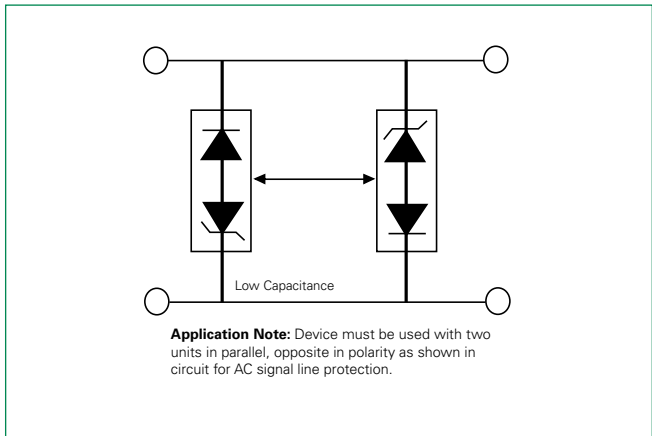


Figure 4 - AC Line Protection Application

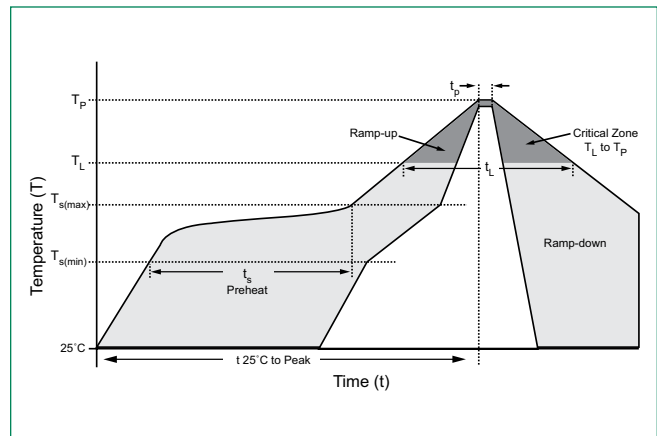


# SMBLCE-HR Series

## Surface Mount - 600W

### 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_L</math>) to peak)</b>		3°C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (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>		260°C



### Physical Specifications

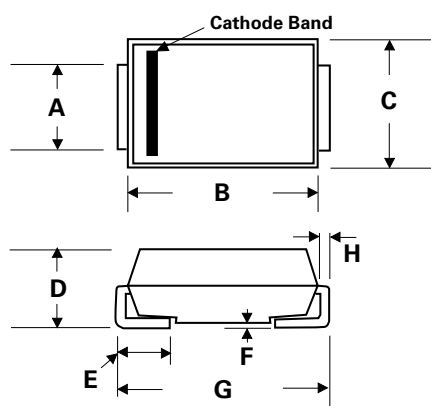
<b>Weight</b>	0.003oz., 0.093g
<b>Case</b>	JEDEC DO-214AA molded plastic body over glass passivated junction.
<b>Polarity</b>	Color band denotes cathode except Bidirectional
<b>Terminal</b>	Matte Tin-plated leads. Solderable per JESD22-B102

### Environmental Specifications

<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Temperature Cycling</b>	JESD22-A104
<b>MSL</b>	JEDEC-J-STD-020, Level 1
<b>H3TRB</b>	JESD22-A101
<b>RSH</b>	JESD22-A111

### Dimensions

DO-214AA (SMB J-Bend)

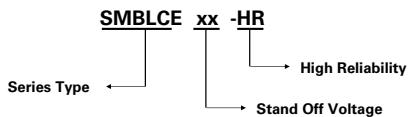


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.077	0.086	1.950	2.200
B	0.160	0.180	4.060	4.570
C	0.130	0.155	3.300	3.940
D	0.084	0.096	2.130	2.440
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305

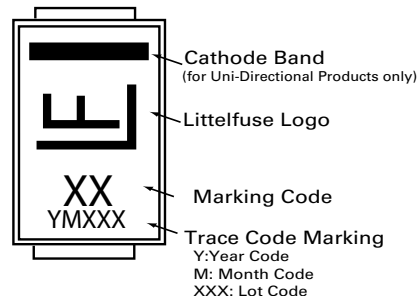
# SMBLCE-HR Series

## Surface Mount - 600W

### Part Numbering System



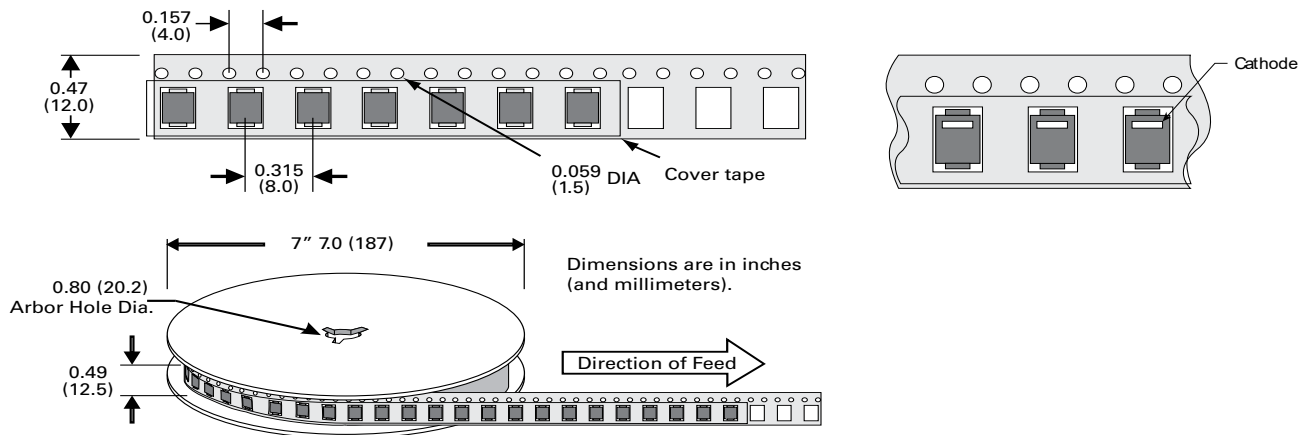
### Part Marking System



### Packaging

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMBLCE-HR	DO-214AA	500	Tape & Reel - 12mm tape/7" reel	EIA STD RS-481

### Tape and Reel Specification



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