Microsemi
SCOTTSDALE DIVISION

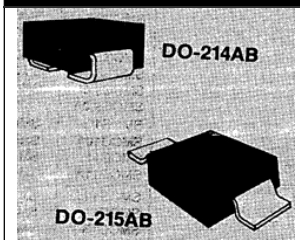
SMCGLCE6.5 thru SMCGLCE170A, e3
SMCJLCE6.5 thru SMCJLCE170A, e3

1500 WATT LOW CAPACITANCE SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSOR

DESCRIPTION

This surface mount Transient Voltage Suppressor (TVS) product family includes a rectifier diode element in series and opposite direction to achieve low capacitance below 100 pF. They are also available as RoHS Compliant with an e3 suffix. The low TVS capacitance may be used for protecting higher frequency applications in inductive switching environments or electrical systems involving secondary lightning effects per IEC61000-4-5 as well as RTCA/DO-160D or ARINC 429 for airborne avionics. They also protect from ESD and EFT per IEC61000-4-2 and IEC61000-4-4. If bipolar transient capability is required, two of these low capacitance TVS devices may be used in parallel and opposite directions (anti-parallel) for complete ac protection (Figure 6).

APPEARANCE



IMPORTANT: For the most current data, consult *MICROSEMI's* website: http://www.microsemi.com

FEATURES

- Available in standoff voltage range of 6.5 to 200 V
- Low capacitance of 100 pF or less
- Molding compound flammability rating: UL94V-O
- Two different terminations available in C-bend (modified J-Bend with DO-214AB) or Gull-wing (DO-215AB)
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, JANTXV, and JANS are available by adding MQ, MX, MV, or MSP prefixes respectively to part numbers
- Optional 100% screening for avionics grade is available by adding MA prefix to part number for 100% temperature cycle –55ºC to 125ºC (10X) as well as surge (3X) and 24 hours HTRB with post test V_{BR} & I_R
- RoHS Compliant devices available by adding an "e3" suffix

APPLICATIONS / BENEFITS

- 1500 Watts of Peak Pulse Power at 10/1000 µs
- Protection for aircraft fast data rate lines per select level waveforms in RTCA/DO-160D & ARINC 429
- Low capacitance for high speed data line interfaces
- IEC61000-4-2 ESD 15 kV (air), 8 kV (contact)
- IEC61000-4-5 (Lightning) as further detailed in LCE6.5 thru LCE170A data sheet
- T1/E1 Line Cards
- Base Stations
- WAN Interfaces
- XDSL Interfaces
- CSU/DSU Equipment

MAXIMUM RATINGS

- 1500 Watts of Peak Pulse Power dissipation at 25°C with repetition rate of 0.01% or less*
- Clamping Factor: 1.4 @ Full Rated power
  1.30 @ 50% Rated power
- $t_{clamping}$ (0 volts to $V_{(BR)}$ min): Less than $5x10^{-9}$ seconds
- Operating and Storage temperatures: -65 to +150°C
- Steady State power dissipation: 5.0W @ T_L = 50°C
- THERMAL RESISTANCE: 20°C/W (typical junction to lead (tab) at mounting plane

* When pulse testing, do not pulse in opposite direction (see "Schematic Applications" section herein and Figures 5 & 6 for further protection in both directions)

MECHANICAL AND PACKAGING

- CASE: Molded, surface mountable
- TERMINALS: Gull-wing or C-bend (modified J-bend) tin-lead or RoHS compliant annealed matte-tin plating solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band
- MARKING: Part number without prefix (e.g. LCE6.5A, LCE6.5Ae3, LCE33, LCE33Ae3, etc.
- TAPE & REEL option: Standard per EIA-481-B with 16 mm tape, 750 per 7 inch reel or 2500 per 13 inch reel (add "TR" suffix to part number)

ELECTRICAL CHARACTERISTICS @ 25ºC

MICROSEMI Part Number Gull-Wing "G" Bend Lead	MICROSEMI Part Number Modified "J" Bend Lead	Reverse Stand-Off Voltage V_{WM} Volts	Breakdown Voltage V_{BR} @ $I_{(BR)}$ Volts MIN	Breakdown Voltage V_{BR} @ $I_{(BR)}$ Volts MAX	Breakdown Voltage V_{BR} @ $I_{(BR)}$ mA	Maximum Reverse Leakage @V_{WM} I_D µA	Maximum Clamping Voltage @I_{PP} V_C Volts	Maximum Peak Pulse Current I_{PP} @10/1000 Amps	Maximum Capacitance @ 0 Volts, f = 1 MHz pF	V_{WIB} Working Inverse Blocking Voltage Volts	I_{IB} Inverse Blocking Leakage Current mA	V_{PIB} Peak Inverse Blocking Voltage Volts
SMCGLCE6.5	SMCJLCE6.5	6.5	7.22	8.82	10	1000	12.3	100	75	75	1	100
SMCGLCE6.5A	SMCJLCE6.5A	6.5	7.22	7.98	10	1000	11.2	100	75	75	1	100
SMCGLCE7.0	SMCJLCE7.0	7.0	7.78	9.51	10	500	13.3	100	75	75	1	100
SMCGLCE7.0A	SMCJLCE7.0A	7.0	7.78	8.60	10	500	12.0	100	75	75	1	100
SMCGLCE7.5	SMCJLCE7.5	7.5	8.33	10.2	10	250	14.3	100	100	75	1	100
SMCGLCE7.5A	SMCJLCE7.5A	7.5	8.33	9.21	10	250	12.9	100	100	75	1	100
SMCGLCE8.0	SMCJLCE8.0	8.0	8.89	10.9	1	100	15.0	100	100	75	1	100
SMCGLCE8.0A	SMCJLCE8.0A	8.0	8.89	9.83	1	100	13.6	100	100	75	1	100
SMCGLCE8.5	SMCJLCE8.5	8.5	9.44	11.5	1	50	15.9	94	100	75	1	100
SMCGLCE8.5A	SMCJLCE8.5A	8.5	9.44	10.4	1	50	14.4	100	100	75	1	100
SMCGLCE9.0	SMCJLCE9.0	9.0	10.0	12.2	1	10	16.9	89	100	75	1	100
SMCGLCE9.0A	SMCJLCE9.0A	9.0	10.0	11.1	1	10	15.4	97	100	75	1	100

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MICROSEMI Part Number Gull-Wing "G" Bend Lead	MICROSEMI Part Number Modified "J" Bend Lead	Reverse Stand-Off Voltage V_{WM} Volts	Breakdown Voltage V_{BR} @ $I_{(BR)}$ Volts MIN	Volts MAX	mA	Maximum Reverse Leakage @V_{WM} I_D µA	Maximum Clamping Voltage @I_{PP} V_C Volts	Maximum Peak Pulse Current I_{PP} @10/1000 Amps	Maximum Capacitance @ 0 Volts pF	V_{WIB} Working Inverse Blocking Voltage Volts	I_{IB} Inverse Blocking Leakage Current mA	V_{PIB} Peak Inverse Blocking Voltage Volts
SMCGLCE10	SMCJLCE10	10	11.1	13.6	1	5	18.8	80	100	75	1	100
SMCGLCE10A	SMCJLCE10A	10	11.1	12.3	1	5	17.0	88	100	75	1	100
SMCGLCE11	SMCJLCE11	11	12.2	14.9	1	5	20.1	74	100	75	1	100
SMCGLCE11A	SMCJLCE11A	11	12.2	13.5	1	5	18.2	82	100	75	1	100
SMCGLCE12	SMCJLCE12	12	13.3	16.3	1	5	22.0	68	100	75	1	100
SMCGLCE12A	SMCJLCE12A	12	13.3	14.7	1	5	19.9	75	100	75	1	100
SMCGLCE13	SMCJLCE13	13	14.4	17.6	1	5	23.8	63	100	75	1	100
SMCGLCE13A	SMCJLCE13A	13	14.4	15.9	1	5	21.5	70	100	75	1	100
SMCGLCE14	SMCJLCE14	14	15.6	19.1	1	5	25.8	58	100	75	1	100
SMCGLCE14A	SMCJLCE14A	14	15.6	17.2	1	5	23.2	65	100	75	1	100
SMCGLCE15	SMCJLCE15	15	16.7	20.4	1	5	26.9	56	100	75	1	100
SMCGLCE15A	SMCJLCE15A	15	16.7	18.5	1	5	24.4	61	100	75	1	100
SMCGLCE16	SMCJLCE16	16	17.8	21.8	1	5	28.8	52	100	75	1	100
SMCGLCE16A	SMCJLCE16A	16	17.8	19.7	1	5	26.0	57	100	75	1	100
SMCGLCE17	SMCJLCE17	17	18.9	23.1	1	5	30.5	49	100	75	1	100
SMCGLCE17A	SMCJLCE17A	17	18.9	20.9	1	5	27.6	54	100	75	1	100
SMCGLCE18	SMCJLCE18	18	20.0	24.4	1	5	32.2	45	100	75	1	100
SMCGLCE18A	SMCJLCE18A	18	20.0	22.1	1	5	29.2	51	100	75	1	100
SMCGLCE20	SMCJLCE20	20	22.2	27.1	1	5	35.8	42	100	75	1	100
SMCGLCE20A	SMCJLCE20A	20	22.2	24.5	1	5	32.4	46	100	75	1	100
SMCGLCE22	SMCJLCE22	22	24.4	29.8	1	5	39.4	38	100	75	1	100
SMCGLCE22A	SMCJLCE22A	22	24.4	26.9	1	5	35.5	42	100	75	1	100
SMCGLCE24	SMCJLCE24	24	26.7	32.6	1	5	43.0	35	100	75	1	100
SMCGLCE24A	SMCJLCE24A	24	26.7	29.5	1	5	38.9	39	100	75	1	100
SMCGLCE26	SMCJLCE26	26	28.9	353	1	5	46.6	32	100	75	1	100
SMCGLCE26A	SMCJLCE26A	26	28.9	31.9	1	5	42.1	36	100	75	1	100
SMCGLCE28	SMCJLCE28	28	31.1	38.0	1	5	50.1	30	100	75	1	100
SMCGLCE28A	SMCJLCE28A	28	31.1	34.4	1	5	45.5	33	100	75	1	100
SMCGLCE30	SMCJLCE30	30	33.3	40.7	1	5	53.5	28	100	75	1	100
SMCGLCE30A	SMCJLCE30A	30	33.3	36.8	1	5	48.4	31	100	75	1	100
SMCGLCE33	SMCJLCE33	33	36.7	44.9	1	5	59.0	25.4	100	75	1	100
SMCGLCE33A	SMCJLCE33A	33	36.7	40.6	1	5	53.3	28.1	100	75	1	100
SMCGLCE36	SMCJLCE36	36	40.0	48.9	1	5	64.3	23.3	100	75	1	100
SMCGLCE36A	SMCJLCE36A	36	40.0	44.2	1	5	58.1	25.8	100	75	1	100
SMCGLCE40	SMCJLCE40	40	44.4	54.3	1	5	71.4	21.0	100	75	1	100
SMCGLCE40A	SMCJLCE40A	40	44.4	49.1	1	5	64.5	23.3	100	75	1	100
SMCGLCE43	SMCJLCE43	43	47.8	58.4	1	5	76.7	19.5	100	150	1	200
SMCGLCE43A	SMCJLCE43A	43	47.8	52.8	1	5	69.4	21.6	100	150	1	200
SMCGLCE45	SMCJLCE45	45	50.0	61.1	1	5	80.3	18.7	100	150	1	200
SMCGLCE45A	SMCJLCE45A	45	50.0	55.3	1	5	72.7	20.6	100	150	1	200
SMCGLCE48	SMCJLCE48	48	53.3	65.1	1	5	85.5	17.5	100	150	1	200
SMCGLCE48A	SMCJLCE48A	48	53.3	58.9	1	5	77.4	19.4	100	150	1	200
SMCGLCE51	SMCJLCE51	51	56.7	69.3	1	5	91.1	16.5	100	150	1	200
SMCGLCE51A	SMCJLCE51A	51	56.7	62.7	1	5	82.4	18.2	100	150	1	200
SMCGLCE54	SMCJLCE54	54	60.0	73.3	1	5	96.3	15.6	100	150	1	200
SMCGLCE54A	SMCJLCE54A	54	60.0	66.3	1	5	87.1	17.2	100	150	1	200
SMCGLCE58	SMCJLCE58	58	64.4	78.7	1	5	103	14.6	100	150	1	200
SMCGLCE58A	SMCJLCE58A	58	64.4	71.2	1	5	93.6	16.0	100	150	1	200
SMCGLCE60	SMCJLCE60	60	66.7	81.5	1	5	107	14.0	90	150	1	200
SMCGLCE60A	SMCJLCE60A	60	66.7	73.7	1	5	96.8	15.5	90	150	1	200
SMCGLCE64	SMCJLCE64	64	71.1	86.9	1	5	114	13.2	90	150	1	200
SMCGLCE64A	SMCJLCE64A	64	71.1	78.6	1	5	103	14.6	90	150	1	200
SMCGLCE70	SMCJLCE70	70	77.8	95.1	1	5	125	12.0	90	150	1	200
SMCGLCE70A	SMCJLCE70A	70	77.8	85.0	1	5	113	13.3	90	150	1	200
SMCGLCE75	SMCJLCE75	75	83.3	102	1	5	134	11.2	90	150	1	200
SMCGLCE75A	SMCJLCE75A	75	83.3	92.1	1	5	121	12.4	90	150	1	200
SMCGLCE80	SMCJLCE80	80	88.7	108	1	5	142	10.6	90	150	1	200
SMCGLCE80A	SMCJLCE80A	80	88.7	98.0	1	5	129	11.6	90	150	1	200
SMCGLCE90	SMCJLCE90	90	100	122	1	5	160	9.4	90	300	1	200
SMCGLCE90A	SMCJLCE90A	90	100	111	1	5	146	10.3	90	300	1	200
SMCGLCE100	SMCJLCE100	100	111	136	1	5	179	8.4	90	300	1	200
SMCGLCE100A	SMCJLCE100A	100	111	123	1	5	162	9.3	90	300	1	200
SMCGLCE110	SMCJLCE110	110	122	149	1	5	196	7.7	90	300	1	400
SMCGLCE110A	SMCJLCE110A	110	122	135	1	5	178	8.4	90	300	1	400
SMCGLCE120	SMCJLCE120	120	133	163	1	5	214	7.0	90	300	1	400
SMCGLCE120A	SMCJLCE120A	120	133	147	1	5	193	7.8	90	300	1	400
SMCGLCE130	SMCJLCE130	130	144	176	1	5	231	6.5	90	300	1	400
SMCGLCE130A	SMCJLCE130A	130	144	159	1	5	209	7.2	90	300	1	400
SMCGLCE150	SMCJLCE150	150	167	204	1	5	268	5.6	90	300	1	400
SMCGLCE150A	SMCJLCE150A	150	167	185	1	5	243	6.2	90	300	1	400
SMCGLCE160	SMCJLCE160	160	178	218	1	5	287	5.2	90	300	1	400
SMCGLCE160A	SMCJLCE160A	160	178	197	1	5	259	5.8	90	300	1	400
SMCGLCE170	SMCJLCE170	170	189	231	1	5	304	4.9	90	300	1	400
SMCGLCE170A	SMCJLCE170A	170	189	209	1	5	275	5.4	90	300	1	400

NOTE 1: TVS are normally selected according to the reverse "Stand Off Voltage" (V_{WM}) which should be equal to or greater than the dc or continuous peak operating voltage level.

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GRAPHS

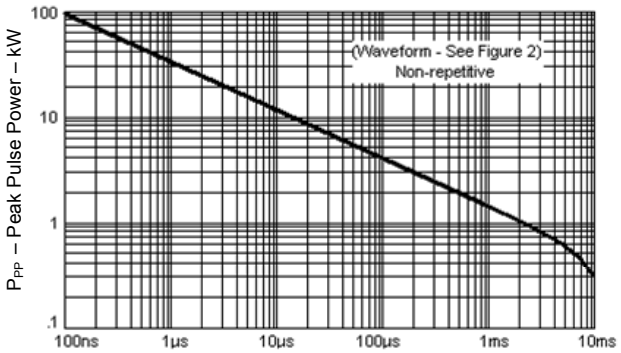

FIGURE 1 PEAK PULSE POWER vs. PULSE TIME

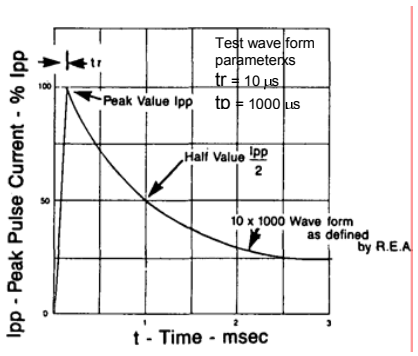

FIGURE 2 PULSE WAVEFORM

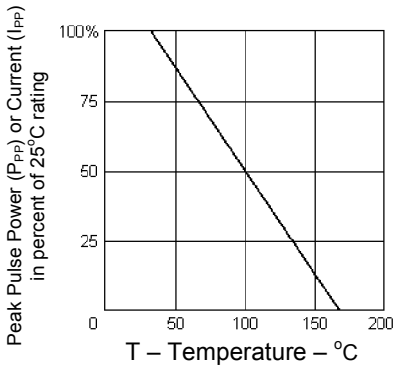

FIGURE 3 DERATING CURVE

SCHEMATIC APPLICATIONS

The TVS low capacitance device configuration is shown in Figure 4. As a further option for unidirectional applications, an additional low capacitance rectifier diode may be used in parallel in the same polarity direction as the TVS as shown in Figure 5. In applications where random high voltage transients occur, this will prevent reverse transients from damaging the internal low capacitance rectifier diode and also provide a low voltage conducting direction. The added rectifier diode should be of similar low capacitance and also have a higher reverse voltage rating than the TVS clamping voltage V_C. The Microsemi recommended rectifier part number for the application in Figure 5 is the "SMBJLCR80" or "SMBGLCR80" depending on the terminal configuration desired. If using two (2) low capacitance TVS devices in anti-parallel for bidirectional applications, this added protective feature for both directions (including the reverse of each rectifier diode) is inherently provided in Figure 6. The unidirectional and bidirectional configurations in Figure 5 and 6 will both result in twice the capacitance of Figure 4.

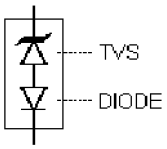

FIGURE 4
TVS with internal low capacitance rectifier diode

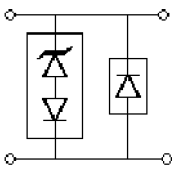

FIGURE 5
Optional Unidirectional configuration (TVS and separate rectifier diode) in parallel)

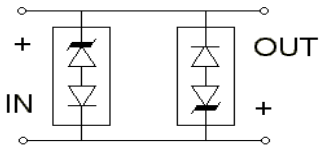

FIGURE 6
Optional Bidirectional configuration (two TVS devices in anti-parallel)

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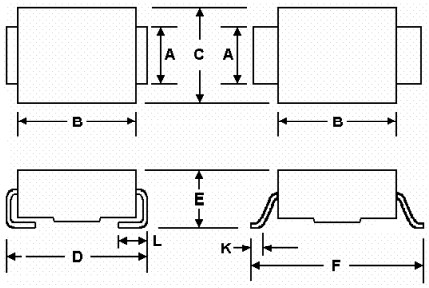
PACKAGE DIMENSIONS



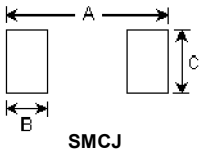
DO-214AB **(SMCJ)**

DO-215AB **(SMCG)**

DIMENSIONS IN INCHES

	A	B	C	D	E	F	K	L
MIN	.115	.260	.220	.305	.077	.380	.025	.30
MAX	.121	.280	.245	.320	.104	.400	.040	.060
DIMENSIONS IN MILLIMETERS								
MIN	2.92	6.60	5.59	7.75	1.95	9.65	0.635	0.760
MAX	3.07	7.11	6.22	8.13	2.65	10.16	1.016	1.520

PAD LAYOUT



SMCJ

	INCHES	mm
A	.390	9.90
B	.110	2.79
C	.150	3.81

SMCG

	INCHES	mm
A	0.510	12.95
B	0.110	2.79
C	0.150	3.81

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