

**Surface Mount TRANSZORB® Transient Voltage Suppressors****DO-215AB (SMCG)****PRIMARY CHARACTERISTICS**

V_{WM}	5.0 V to 188 V
P_{PPM}	1500 W
P_D	6.5 W
I_{FSM}	200 A
T_J max.	150 °C

DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional devices use C or CA suffix (e.g. SMCG188CA).

Electrical characteristics apply in both directions.

FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in uni-directional and bi-directional
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Solder dip 260 °C, 40 s
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

**RoHS**
COMPLIANT**TYPICAL APPLICATIONS**

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive and telecommunication.

MECHANICAL DATA

Case: DO-215AB (SMCG)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS compliant, commercial grade

Base P/NHE3 - RoHS compliant, high reliability/automotive grade (AEC Q101 qualified)

Terminals: Matte tin plated leads, solderable per J-STD-002 and JESD22-B102

E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

Polarity: For uni-directional types the band denotes cathode end, no marking on bi-directional types

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation with a 10/1000 μ s waveform ⁽¹⁾⁽²⁾	P_{PPM}	1500	W
Peak pulse current with a 10/1000 μ s waveform ⁽¹⁾	I_{PPM}	See next table	A
Peak forward surge current 8.3 ms single half sine-wave uni-directional only ⁽²⁾	I_{FSM}	200	A
Power dissipation on infinite heatsink, $T_A = 50$ °C	P_D	6.5	W
Operating junction and storage temperature range	T_J, T_{STG}	- 55 to + 150	°C

Notes:

(1) Non-repetitive current pulse, per Fig. 3 and derated above $T_A = 25$ °C per Fig. 2

(2) Mounted on 0.31 x 0.31" (8.0 x 8.0 mm) copper pads to each terminal

ELECTRICAL CHARACTERISTICS (T _A = 25 °C unless otherwise noted)									
DEVICE TYPE MODIFIED GULL WING	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V _{BR} AT I _T ⁽¹⁾ (V)		TEST CURRENT I _T (mA)	STAND-OFF VOLTAGE V _{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V _{WM} I _D (μA) ⁽³⁾	MAXIMUM PEAK PULSE SURGE CURRENT I _{PPM} (A) ⁽²⁾	MAXIMUM CLAMPING VOLTAGE AT I _{PPM} V _C (V)
	UNI	BI	MIN.	MAX.					
(+)SMCG5.0	GDD	GDD	6.40	7.82	10.0	5.0	1000	156.3	9.6
(+)SMCG5.0A ⁽⁵⁾	GDE	GDE	6.40	7.07	10.0	5.0	1000	163.0	9.2
(+)SMCG6.0	GDF	GDF	6.67	8.15	10.0	6.0	1000	131.6	11.4
(+)SMCG6.0A	GDG	GDG	6.67	7.37	10.0	6.0	1000	145.6	10.3
(+)SMCG6.5	GDH	BDH	7.22	8.82	10.0	6.5	500	122.0	12.3
(+)SMCG6.5A	GDK	BDK	7.22	7.98	10.0	6.5	500	133.9	11.2
(+)SMCG7.0	GDL	GDL	7.78	9.51	10.0	7.0	200	112.8	13.3
(+)SMCG7.0A	GDM	GDM	7.78	8.60	10.0	7.0	200	125.0	12.0
(+)SMCG7.5	GDN	BDN	8.33	10.2	1.0	7.5	100	104.9	14.3
(+)SMCG7.5A	GDP	BDP	8.33	9.21	1.0	7.5	100	116.3	12.9
(+)SMCG8.0	GDQ	BDG	8.89	10.9	1.0	8.0	50	100.0	15.0
(+)SMCG8.0A	GDR	BDR	8.89	9.83	1.0	8.0	50	110.3	13.6
(+)SMCG8.5	GDS	BDS	9.44	11.5	1.0	8.5	20	94.3	15.9
(+)SMCG8.5A	GDT	BDT	9.44	10.4	1.0	8.5	20	104.2	14.4
(+)SMCG9.0	GDU	BDU	10.0	12.2	1.0	9.0	10	88.8	16.9
(+)SMCG9.0A	GDV	BDV	10.0	11.1	1.0	9.0	10	97.4	15.4
(+)SMCG10	GDW	BDW	11.1	13.6	1.0	10	5.0	79.8	18.8
(+)SMCG10A	GDX	BDX	11.1	12.3	1.0	10	5.0	88.2	17.0
(+)SMCG11	GDY	GDY	12.2	14.9	1.0	11	5.0	74.6	20.1
(+)SMCG11A	GDZ	GDZ	12.2	13.5	1.0	11	5.0	82.4	18.2
(+)SMCG12	GED	BED	13.3	16.3	1.0	12	5.0	68.2	22.0
(+)SMCG12A	GEE	BEE	13.3	14.7	1.0	12	5.0	75.4	19.9
(+)SMCG13	GEF	GEF	14.4	17.6	1.0	13	1.0	63.0	23.8
(+)SMCG13A	GEG	GEG	14.4	15.9	1.0	13	1.0	69.8	21.5
(+)SMCG14	GEH	BEH	15.6	19.1	1.0	14	1.0	58.1	25.8
(+)SMCG14A	GEK	BEK	15.6	17.2	1.0	14	1.0	64.7	23.2
(+)SMCG15	GEL	BEL	16.7	20.4	1.0	15	1.0	55.8	26.9
(+)SMCG15A	GEM	BEM	16.7	18.5	1.0	15	1.0	61.5	24.4
(+)SMCG16	GEN	GEN	17.8	21.8	1.0	16	1.0	52.1	28.8
(+)SMCG16A	GEP	GEP	17.8	19.7	1.0	16	1.0	57.7	26.0
(+)SMCG17	GEQ	GEQ	18.9	23.1	1.0	17	1.0	49.2	30.5
(+)SMCG17A	GER	GER	18.9	20.9	1.0	17	1.0	54.3	27.6
(+)SMCG18	GES	BES	20.0	24.4	1.0	18	1.0	46.6	32.2
(+)SMCG18A	GET	BET	20.0	22.1	1.0	18	1.0	51.4	29.2
(+)SMCG20	GEU	BEU	22.2	27.1	1.0	20	1.0	41.9	35.8
(+)SMCG20A	GEV	BEV	22.2	24.5	1.0	20	1.0	46.3	32.4
(+)SMCG22	GEW	BEW	24.4	29.8	1.0	22	1.0	38.1	39.4
(+)SMCG22A	GEX	BEX	24.4	26.9	1.0	22	1.0	42.3	35.5
(+)SMCG24	GEY	BEY	26.7	32.6	1.0	24	1.0	34.9	43.0
(+)SMCG24A	GEZ	BEZ	26.7	29.5	1.0	24	1.0	38.6	38.9
(+)SMCG26	GFD	BFD	28.9	35.3	1.0	26	1.0	32.2	46.6
(+)SMCG26A	GFE	BFE	28.9	31.9	1.0	26	1.0	35.6	42.1
(+)SMCG28	GFF	BFF	31.1	38.0	1.0	28	1.0	30.0	50.0
(+)SMCG28A	GFG	BFG	31.1	34.4	1.0	28	1.0	33.0	45.4
(+)SMCG30	GFH	BFH	33.3	40.7	1.0	30	1.0	28.0	53.5
(+)SMCG30A	GFK	BFK	33.3	36.8	1.0	30	1.0	31.0	48.4
(+)SMCG33	GFL	BFL	36.7	44.9	1.0	33	1.0	25.4	59.0
(+)SMCG33A	GFM	BFM	36.7	40.6	1.0	33	1.0	28.1	53.3
(+)SMCG36	GFN	BFN	40.0	48.9	1.0	36	1.0	23.3	64.3
(+)SMCG36A	GFP	BFP	40.0	44.2	1.0	36	1.0	25.8	58.1
(+)SMCG40	GFQ	BFQ	44.4	54.3	1.0	40	1.0	21.0	71.4
(+)SMCG40A	GFR	BFR	44.4	49.1	1.0	40	1.0	23.3	64.5

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

DEVICE TYPE MODIFIED GULL WING	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V_{BR} AT I_T ⁽¹⁾ (V)		TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (μA) ⁽³⁾	MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (A) ⁽²⁾	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)
	UNI	BI	MIN.	MAX.					
(+)SMCG43	GFS	BFS	47.8	58.4	1.0	43	1.0	19.6	76.7
(+)SMCG43A	GFT	BFT	47.8	52.8	1.0	43	1.0	21.6	69.4
(+)SMCG45	GFU	GFU	50.0	61.1	1.0	45	1.0	18.7	80.3
(+)SMCG45A	GFV	GFV	50.0	55.3	1.0	45	1.0	20.6	72.7
(+)SMCG48	GFW	GFW	53.3	65.1	1.0	48	1.0	17.5	85.5
(+)SMCG48A	GFX	GFX	53.3	58.9	1.0	48	1.0	19.4	77.4
(+)SMCG51	GFY	GFY	56.7	69.3	1.0	51	1.0	16.5	91.1
(+)SMCG51A	GFZ	GFZ	56.7	62.7	1.0	51	1.0	18.2	82.4
(+)SMCG54	GGD	GGD	60.0	73.3	1.0	54	1.0	15.6	96.3
(+)SMCG54A	GGE	GGE	60.0	66.3	1.0	54	1.0	17.2	87.1
(+)SMCG58	GGF	GGF	64.4	78.7	1.0	58	1.0	14.6	103
(+)SMCG58A	GGG	GGG	64.4	71.2	1.0	58	1.0	16.0	93
(+)SMCG60	GGH	GGH	66.7	81.5	1.0	60	1.0	14.0	107
(+)SMCG60A	GGK	GGK	66.7	73.7	1.0	60	1.0	15.5	96
(+)SMCG64	GGL	GGL	71.1	86.9	1.0	64	1.0	13.2	114
(+)SMCG64A	GGM	GGM	71.1	78.6	1.0	64	1.0	14.6	103
(+)SMCG70	GGN	GGN	77.8	95.1	1.0	70	1.0	12.0	125
(+)SMCG70A	GGP	GGP	77.8	86.0	1.0	70	1.0	13.3	113
(+)SMCG75	GGQ	GGQ	83.3	102	1.0	75	1.0	11.2	134
(+)SMCG75A	GGR	GGR	83.3	92.1	1.0	75	1.0	12.4	121
(+)SMCG78	GGs	GGs	86.7	106	1.0	78	1.0	10.8	139
(+)SMCG78A	GGT	GGT	86.7	95.8	1.0	78	1.0	11.9	126
(+)SMCG85	GGU	GGU	94.4	115	1.0	85	1.0	9.9	151
(+)SMCG85A	GGV	GGV	94.4	104	1.0	85	1.0	10.9	137
(+)SMCG90	GGW	GGW	100	122	1.0	90	1.0	9.4	160
(+)SMCG90A	GGX	GGX	100	111	1.0	90	1.0	10.3	146
(+)SMCG100	GGY	GGY	111	136	1.0	100	1.0	8.4	179
(+)SMCG100A	GGZ	GGZ	111	123	1.0	100	1.0	9.3	162
(+)SMCG110	GHD	GHD	122	149	1.0	110	1.0	7.7	196
(+)SMCG110A	GHE	GHE	122	135	1.0	110	1.0	8.5	177
(+)SMCG120	GHF	GHF	133	163	1.0	120	1.0	7.0	214
(+)SMCG120A	GHG	GHG	133	147	1.0	120	1.0	7.8	193
(+)SMCG130	GHH	GHH	144	176	1.0	130	1.0	6.5	231
(+)SMCG130A	GHK	GHK	144	159	1.0	130	1.0	7.2	209
(+)SMCG150	GHL	GHL	167	204	1.0	150	1.0	5.6	268
(+)SMCG150A	GHM	GHM	167	185	1.0	150	1.0	6.2	243
(+)SMCG160	GHN	GHN	178	218	1.0	160	1.0	5.2	287
(+)SMCG160A	GHP	GHP	178	197	1.0	160	1.0	5.8	259
(+)SMCG170	GHQ	GHQ	189	231	1.0	170	1.0	4.9	304
(+)SMCG170A	GHR	GHR	189	209	1.0	170	1.0	5.5	275
SMCG188	GHT	GHT	209	255	1.0	188	1.0	4.4	344
SMCG188A	GHS	GHS	209	231	1.0	188	1.0	4.6	328

Notes:(1) Pulse test: $t_p \leq 50\text{ ms}$

(2) Surge current waveform per Fig. 3 and derated per Fig. 2

(3) For bi-directional types having V_{WM} of 10 V and less, the I_D limit is doubled

(4) All terms and symbols are consistent with ANSI/IEEE C62.35

(5) For the bi-directional SMCG5.0CA, the maximum V_{BR} is 7.25 V(6) $V_F = 3.5\text{ V}$ at $I_F = 100\text{ A}$ (uni-directional only)

(+) Underwriters laboratory recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both uni-directional and bi-directional devices

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

PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to ambient ⁽¹⁾	$R_{\theta JA}$	75	$^{\circ}\text{C/W}$
Typical thermal resistance, junction to lead	$R_{\theta JL}$	15	$^{\circ}\text{C/W}$

Note:

(1) Measured on minimum recommended pad layout

ORDERING INFORMATION (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SMCG5.0A-E3/57T	0.211	57T	850	7" diameter plastic tape and reel
SMCG5.0A-E3/9AT	0.211	9AT	3500	13" diameter plastic tape and reel
SMCG5.0AHE3/57T ⁽¹⁾	0.211	57T	850	7" diameter plastic tape and reel
SMCG5.0AHE3/9AT ⁽¹⁾	0.211	9AT	3500	13" diameter plastic tape and reel

Note:

(1) Automotive grade AEC Q101 qualified

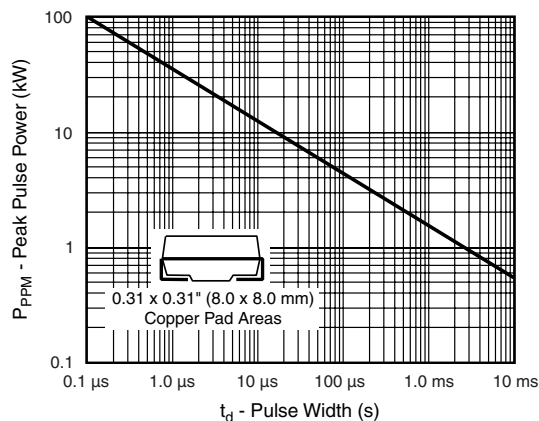
RATINGS AND CHARACTERISTICS CURVES($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

Figure 1. Peak Pulse Power Rating Curve

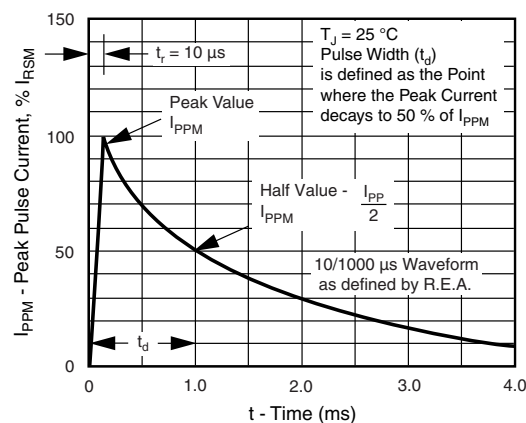


Figure 3. Pulse Waveform

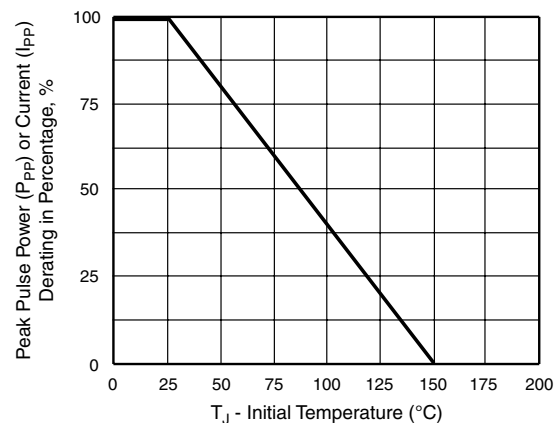


Figure 2. Pulse Power or Current vs. Initial Junction Temperature

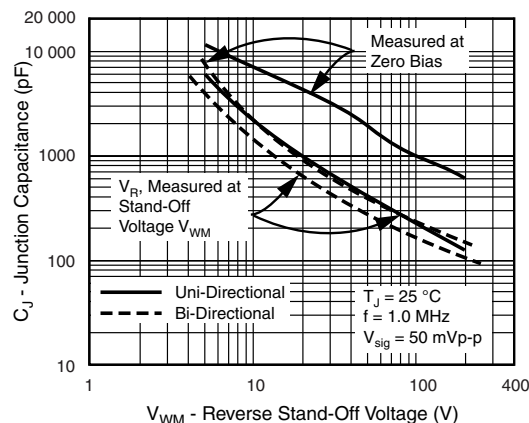


Figure 4. Typical Junction Capacitance Uni-Directional

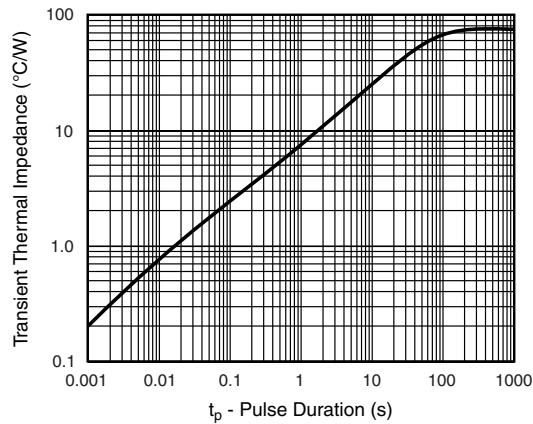


Figure 5. Typical Transient Thermal Impedance

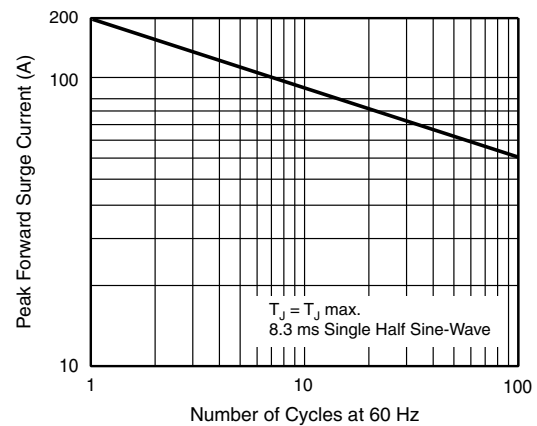
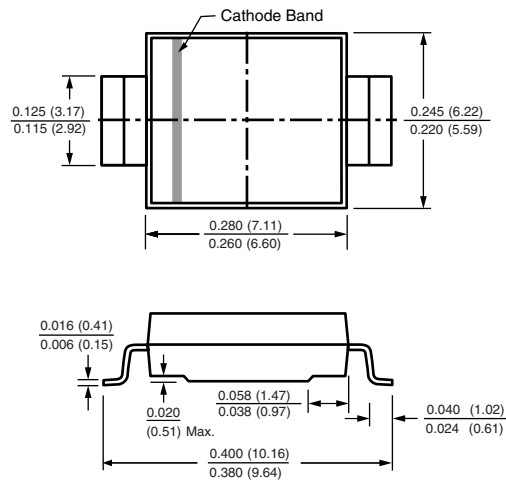


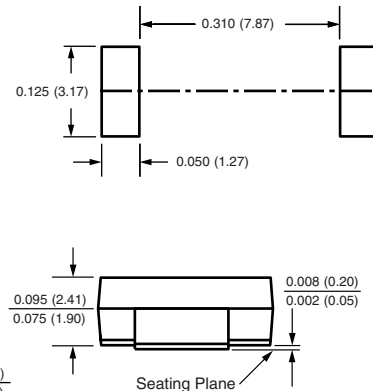
Figure 6. Maximum Non-Repetitive Forward Surge Current
Uni-Directional Use Only

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-215AB (SMCG)



Mounting Pad Layout





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