400W, 5V - 188V Surface Mount Transient Voltage Suppressor

FEATURES

- Ideal for automated placement
- Glass passivated chip junction
- Excellent clamping capability
- Fast response time: Typically less than 1.0ps from 0 V to BV min
- Typical I_R less than 1μA above 10V
- 400W peak pulse power capability with a 10/1000μs waveform (300W above 78V)
- Meets ISO 7637-2 (Pulse 1/2a/2b/3a/3b)
- Moisture sensitivity level: level 1, per J-STD-020
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

KEY PARAMETERS		
PARAMETER	**VALUE**	**UNIT**
V_{WM}	5 - 188	V
V_{BR}	6.4 - 255	V
P_{PPM} t_p = 10/1000μs waveform	400	W
$T_{J\ MAX}$	150	°C
Package	DO-214AC (SMA)	
Configuration	Single die	

Pb-Free RoHS COMPLIANT HALOGEN FREE

APPLICATIONS

- Switching mode power supply (SMPS)
- Adapters
- Lighting application
- On-board DC/DC converter



DO-214AC (SMA)

MECHANICAL DATA

- Case: DO-214AC (SMA)
- Molding compound meets UL 94V-0 flammability rating
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.060g (approximately)

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

PARAMETER	SYMBOL	VALUE	UNIT
Peak power dissipation at T_A = 25°C, tp = 1ms (Note 1)	P_{PK}	400	W
Steady state power dissipation	P_D	1	W
Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load	I_{FSM}	40	A
Maximum instantaneous forward voltage at 25A for unidirectional only	V_F	3.5	V
Operating junction temperature range	T_J	-55 to +150	°C
Storage temperature range	T_{STG}	-55 to +150	°C

Notes:

1. Non-repetitive current pulse per Fig.5 and derated above T_A = 25°C per Fig.2

Devices for Bipolar Applications

1. For bidirectional use C or CA suffix for types SMAJ5.0 - Types SMAJ188
2. Electrical characteristics apply in both directions

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)

Part number	Marking code	Breakdown voltage $V_{BR}@I_T$[1] (V)		Test current I_T (mA)	Working stand-off voltage V_{WM} (V)	Maximum reverse leakage current $I_R@V_{WM}$[1] (μA)	Maximum peak impulse current I_{PPM} (A)[2]	Maximum clamping voltage $V_C@I_{PPM}$ (V)[2]
		Min	Max					
SMAJ5.0	AD	6.4	7.30	10	5	800	41.7	9.6
SMAJ5.0A	AE	6.4	7.00	10	5	800	43.5	9.2
SMAJ6.0	AF	6.67	8.15	10	6	800	35.1	11.4
SMAJ6.0A	AG	6.67	7.37	10	6	800	38.8	10.3
SMAJ6.5	AH	7.22	8.82	10	6.5	500	32.5	12.3
SMAJ6.5A	AK	7.22	7.98	10	6.5	500	35.7	11.2
SMAJ7.0	AL	7.78	9.51	10	7	200	30.1	13.3
SMAJ7.0A	AM	7.78	8.60	10	7	200	33.3	12.0
SMAJ7.5	AN	8.33	10.30	1	7.5	100	28.0	14.3
SMAJ7.5A	AP	8.33	9.21	1	7.5	100	31.0	12.9
SMAJ8.0	AQ	8.89	10.90	1	8	50	26.7	15.0
SMAJ8.0A	AR	8.89	9.83	1	8	50	29.4	13.6
SMAJ8.5	AS	9.44	11.50	1	8.5	10	25.2	15.9
SMAJ8.5A	AT	9.44	10.40	1	8.5	10	27.8	14.4
SMAJ9.0	AU	10.0	12.20	1	9	5	23.7	16.9
SMAJ9.0A	AV	10.0	11.10	1	9	5	26.0	15.4
SMAJ10	AW	11.1	13.60	1	10	5	21.3	18.8
SMAJ10A	AX	11.1	12.30	1	10	5	23.5	17.0
SMAJ11	AY	12.2	14.90	1	11	1	19.9	20.1
SMAJ11A	AZ	12.2	13.50	1	11	1	22.0	18.2
SMAJ12	BD	13.3	16.30	1	12	1	18.2	22.0
SMAJ12A	BE	13.3	14.70	1	12	1	20.1	19.9
SMAJ13	BF	14.4	17.60	1	13	1	16.8	23.8
SMAJ13A	BG	14.4	15.90	1	13	1	18.6	21.5
SMAJ14	BH	15.6	19.10	1	14	1	15.5	25.8
SMAJ14A	BK	15.6	17.20	1	14	1	17.2	23.2
SMAJ15	BL	16.7	20.40	1	15	1	14.9	26.9
SMAJ15A	BM	16.7	18.50	1	15	1	16.4	24.4
SMAJ16	BN	17.8	21.80	1	16	1	13.9	28.8
SMAJ16A	BP	17.8	19.70	1	16	1	15.4	26.0
SMAJ17	BQ	18.9	23.10	1	17	1	13.1	30.5
SMAJ17A	BR	18.9	20.90	1	17	1	14.5	27.6
SMAJ18	BS	20.0	24.40	1	18	1	12.4	32.2
SMAJ18A	BT	20.0	22.10	1	18	1	13.7	29.2
SMAJ20	BU	22.2	27.10	1	20	1	11.2	35.8
SMAJ20A	BV	22.2	24.50	1	20	1	12.3	32.4
SMAJ22	BW	24.4	29.80	1	22	1	10.2	39.4
SMAJ22A	BX	24.4	26.90	1	22	1	11.3	35.5
SMAJ24	BY	26.7	32.60	1	24	1	9.3	43.0
SMAJ24A	BZ	26.7	29.50	1	24	1	10.3	38.9
SMAJ26	CD	28.9	35.30	1	26	1	8.6	46.6
SMAJ26A	CE	28.9	31.90	1	26	1	9.5	42.1
SMAJ28	CF	31.1	38.00	1	28	1	8.0	50.0
SMAJ28A	CG	31.1	34.40	1	28	1	8.8	45.4
SMAJ30	CH	33.3	40.7	1	30	1	7.5	53.5
SMAJ30A	CK	33.3	36.8	1	30	1	8.3	48.4
SMAJ33	CL	36.7	44.9	1	33	1	6.8	59.0
SMAJ33A	CM	36.7	40.6	1	33	1	7.5	53.3

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)

Part number	Marking code	Breakdown voltage $V_{BR}@I_T$[1] (V)		Test current I_T (mA)	Working stand-off voltage V_{WM} (V)	Maximum reverse leakage current $I_R@V_{WM}$[1] (μA)	Maximum peak impulse current I_{PPM} (A)[2]	Maximum clamping voltage $V_C@I_{PPM}$ (V)[2]
		Min	Max					
SMAJ36	CN	40.0	48.9	1	36	1	6.2	64.3
SMAJ36A	CP	40.0	44.2	1	36	1	6.9	58.1
SMAJ40	CQ	44.4	54.3	1	40	1	5.6	71.4
SMAJ40A	CR	44.4	49.1	1	40	1	6.2	64.5
SMAJ43	CS	47.8	58.4	1	43	1	5.2	76.7
SMAJ43A	CT	47.8	52.8	1	43	1	5.8	69.4
SMAJ45	CU	50.0	61.1	1	45	1	5.0	80.3
SMAJ45A	CV	50.0	55.3	1	45	1	5.5	72.7
SMAJ48	CW	53.3	65.1	1	48	1	4.7	85.5
SMAJ48A	CX	53.3	58.9	1	48	1	5.2	77.4
SMAJ51	CY	56.7	69.3	1	51	1	4.4	91.1
SMAJ51A	CZ	56.7	62.7	1	51	1	4.9	82.4
SMAJ54	RD	60.0	73.3	1	54	1	4.2	96.3
SMAJ54A	RE	60.0	66.3	1	54	1	4.6	87.1
SMAJ58	RF	64.4	78.7	1	58	1	3.9	103
SMAJ58A	RG	64.4	71.2	1	58	1	4.3	93.6
SMAJ60	RH	66.7	81.5	1	60	1	3.7	107
SMAJ60A	RK	66.7	73.7	1	60	1	4.1	96.8
SMAJ64	RL	71.1	86.9	1	64	1	3.5	114
SMAJ64A	RM	71.1	78.6	1	64	1	3.9	103
SMAJ70	RN	77.8	95.1	1	70	1	3.2	125
SMAJ70A	RP	77.8	86	1	70	1	3.5	113
SMAJ75	RQ	83.3	102	1	75	1	3.0	134
SMAJ75A	RR	83.3	92.1	1	75	1	3.3	121
SMAJ78	RS	86.7	106	1	78	1	2.9	139
SMAJ78A	RT	86.7	95.8	1	78	1	3.2	126
SMAJ85	RU	94.4	115	1	85	1	2.0	151
SMAJ85A	RV	94.4	104	1	85	1	2.2	137
SMAJ90	RW	100	122	1	90	1	1.9	160
SMAJ90A	RX	100	111	1	90	1	2.1	146
SMAJ100	RY	111	136	1	100	1	1.7	179
SMAJ100A	RZ	111	123	1	100	1	1.9	162
SMAJ110	SD	122	149	1	110	1	1.6	196
SMAJ110A	SE	122	135	1	110	1	1.7	177
SMAJ120	SF	133	163	1	120	1	1.4	214
SMAJ120A	SG	133	147	1	120	1	1.6	193
SMAJ130	SH	144	176	1	130	1	1.3	231
SMAJ130A	SK	144	159	1	130	1	1.5	209
SMAJ150	SL	167	204	1	150	1	1.1	266
SMAJ150A	SM	167	185	1	150	1	1.3	243
SMAJ160	SN	178	218	1	160	1	1.0	287
SMAJ160A	SP	178	197	1	160	1	1.2	259
SMAJ170	SQ	189	231	1	170	1	1.0	304
SMAJ170A	SR	189	209	1	170	1	1.1	275
SMAJ188	ST	209	255	1	188	1	0.9	344
SMAJ188A	SS	209	231	1	188	1	0.9	328

Notes:

1. Pulse test with PW = 30ms
2. Non-repetitive current pulse, per Fig.5 and derated above T_A = 25°C per Fig.2
3. Peak pulse power waveform is 10/1000μs
4. For bi-directional devices having V_R of 10V and under, the I_R limit is double.

ORDERING INFORMATION

ORDERING CODE[1]	PACKAGE	PACKING
SMAJx	DO-214AC (SMA)	7,500 / Tape & Reel

Notes:

1. "x" defines voltage from 5.0V(SMAJ5.0) to 188V(SMAJ188)

CHARACTERISTICS CURVES

(T_A = 25°C unless otherwise noted)

Fig.1 Peak Pulse Power Rating Curve

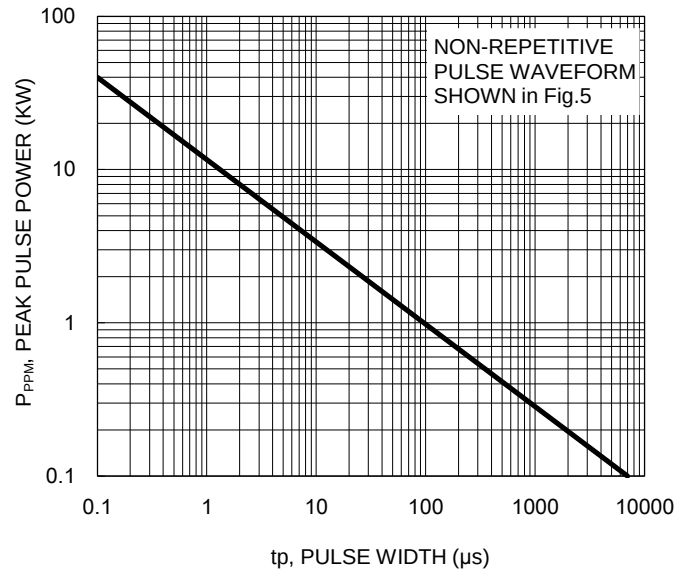


Fig.2 Pulse Derating Curve

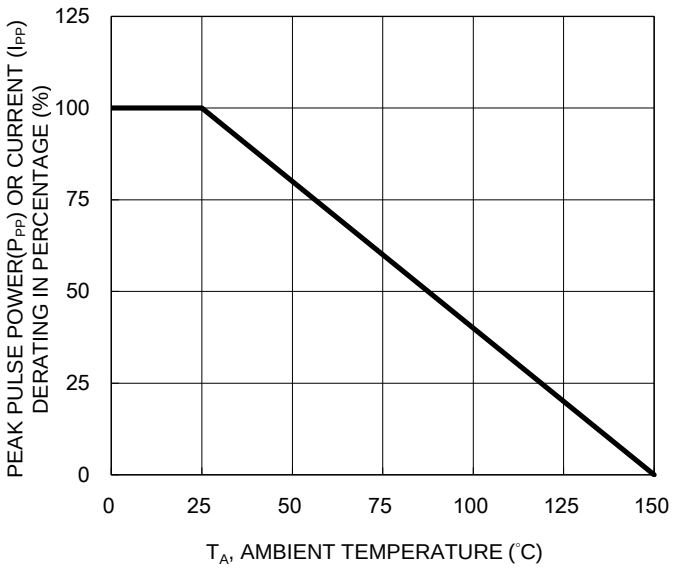


Fig.3 Typical Junction Capacitance

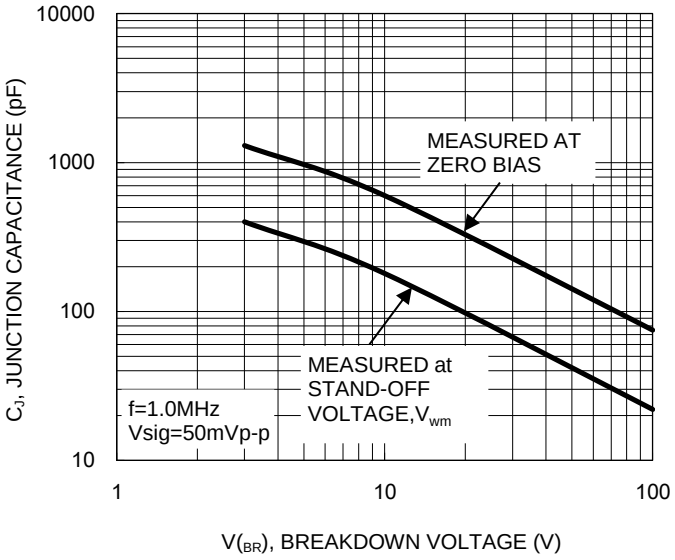
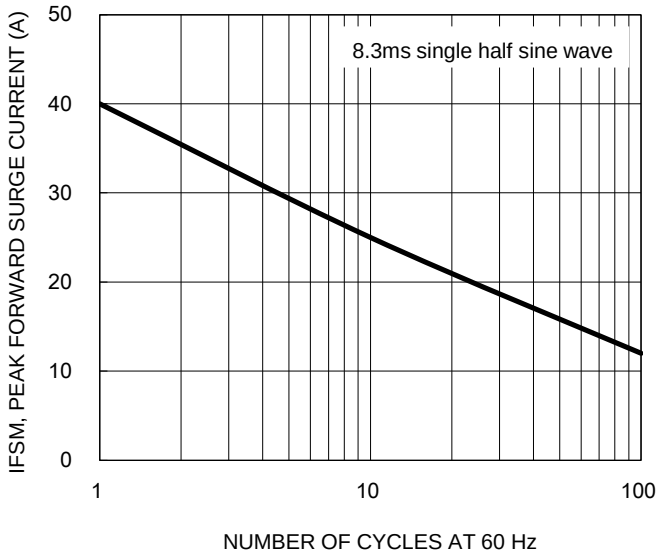


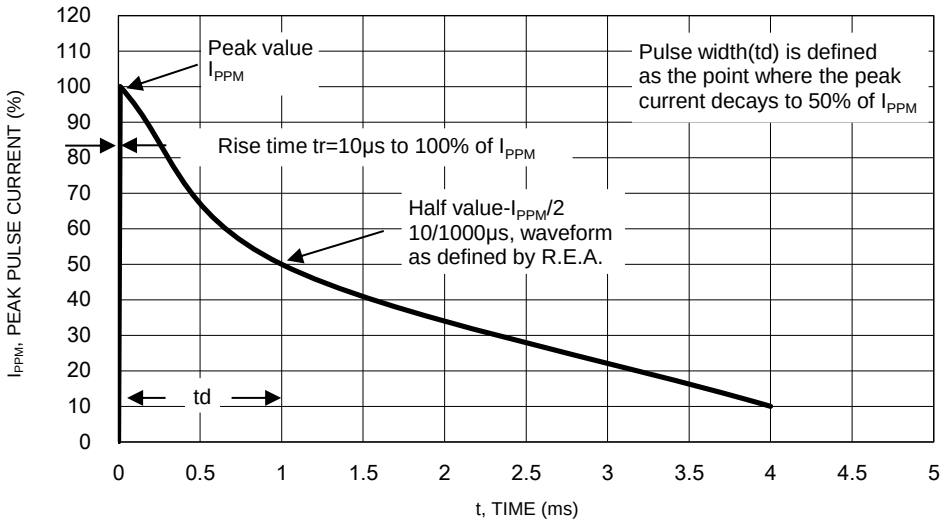
Fig.4 Maximum Non-repetitive Forward Surge Current



CHARACTERISTICS CURVES

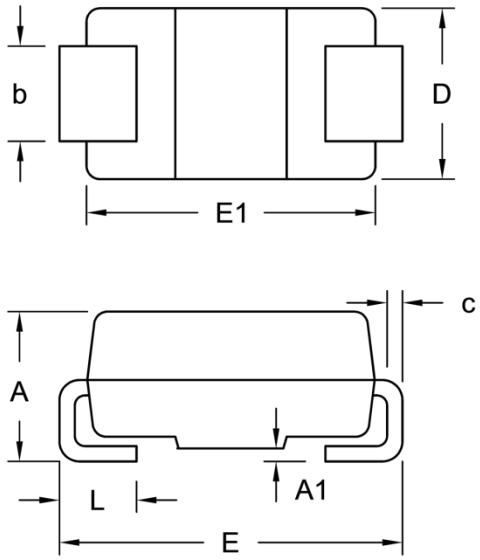
(T_A = 25°C unless otherwise noted)

Fig.5 Clamping Power Pulse Waveform



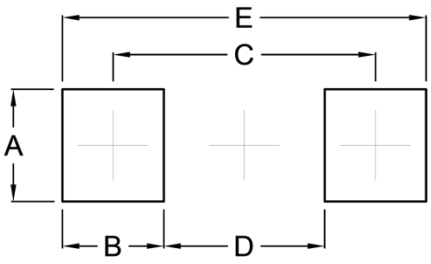
PACKAGE OUTLINE DIMENSIONS

DO-214AC (SMA)



DIM.	Unit (mm)		Unit (inch)	
	Min.	Max.	Min.	Max.
A	1.99	2.50	0.078	0.098
A1	0.10	0.20	0.004	0.008
b	1.27	1.58	0.050	0.062
c	0.15	0.31	0.006	0.012
D	2.29	2.83	0.090	0.111
E	4.95	5.33	0.195	0.210
E1	4.06	4.60	0.160	0.181
L	0.90	1.41	0.035	0.056

SUGGESTED PAD LAYOUT



Symbol	Unit (mm)	Unit (inch)
A	1.68	0.066
B	1.52	0.060
C	3.93	0.155
D	2.41	0.095
E	5.45	0.215

MARKING DIAGRAM



Cathode band for uni-directional products only

P/N = Marking Code
G = Green Compound
YW = Date Code
F = Factory Code

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SMAJ5.0CA SMAJ530 SMAJ550 SMAJ6.5A SMAJ6.5CA SMAJ7.0A SMAJ7.0CA SMAJ7.5A SMAJ8.0A SMAJ8.0CA SMAJ8.5CA SMAJ9.0A SMAJ9.0CA SMAJ8.5A R2 SMAJ7.5A R2 SMAJ110CA R2 SMAJ24A R2 SMAJ5.0A R2 SMAJ90A R2 SMAJ51CA R2 SMAJ20CA R2 SMAJ70CA R2 SMAJ26CA R2 SMAJ6.5CA R2 SMAJ110A R2 SMAJ7.0CA R2 SMAJ78A R2 SMAJ64A R2 SMAJ8.0CA R2 SMAJ30A R2 SMAJ13A R2 SMAJ54CA R2 SMAJ6.5A R2 SMAJ33CA R2 SMAJ60CA R2 SMAJ70A R2 SMAJ40A R2 SMAJ18CA R2 SMAJ54A R2 SMAJ75CA R2 SMAJ100A R2 SMAJ26A R2 SMAJ9.0CA R2 SMAJ8.5CA R2 SMAJ11A R2 SMAJ48A R2 SMAJ51A R2 SMAJ8.0A R2 SMAJ120CA R2 SMAJ64CA R2 SMAJ6.0CA R2 SMAJ75A R2 SMAJ60A R2 SMAJ10A R2 SMAJ7.0A R2 SMAJ22A R2 SMAJ90CA R2 SMAJ5.0CA R2 SMAJ160A R2 SMAJ78CA R2 SMAJ43A R2 SMAJ85A R2 SMAJ18A R2 SMAJ7.5CA R2 SMAJ9.0A R2 SMAJ45CA R2 SMAJ8.5A R2G SMAJ24CA R2G SMAJ17A R2G SMAJ12A R2G SMAJ64CA R2G SMAJ18A R3 SMAJ12A R3 SMAJ110CA R2G SMAJ60A R2G SMAJ36CA R3 SMAJ45A R2G SMAJ6.5CA R2G SMAJ33A R2G SMAJ36A R2G SMAJ7.5A R2G SMAJ100A R2G SMAJ188CA R2G SMAJ45CA R2G SMAJ70CA R2G SMAJ120CA R2G SMAJ90A R2G SMAJ51A R2G SMAJ20CA R2G SMAJ75A R3 SMAJ18CA R2G SMAJ15CA R2G SMAJ75AHR3G SMAJ75AHR3 SMAJ54A R2G SMAJ18A R2G SMAJ70A R2G SMAJ9.0A R2G SMAJ58A R2G SMAJ75CA R2G