Microsemi
SCOTTSDALE DIVISION

SMAJ5.0 thru SMAJ170CA, e3

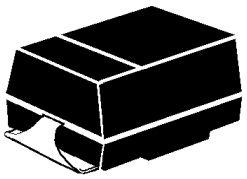
SURFACE MOUNT 500 Watt Transient Voltage Suppressor

DESCRIPTION

This SMAJ5.0-170A series of surface mount 500 W Transient Voltage Suppressors (TVSs) protects a variety of voltage-sensitive components from destruction or degradation. The package outline is similar to the DO-214AB or DO-214AC. It is also available in a unidirectional configuration or as bidirectional with a C or CA suffix part number as well as RoHS Compliant with an "e3"suffix. Their response time is virtually instantaneous. As a result, they can be used for protection from ESD or EFT per IEC61000-4-2 and IEC61000-4-4, or for inductive switching environments and induced RF protection. They can also protect from secondary lightning effects per IEC61000-4-5 and class levels defined herein. Microsemi also offers numerous other TVS products to meet higher and lower power demands and special applications.

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

PACKAGE



DO-214AB or AC (SMAJ)

FEATURES

- Selections for 5.0 to 170 volts standoff voltages (V_{WM})
- Suppresses transients up to 500 watts @ 10/1000 µs (see Figure 1) with fast response
- Optional 100% **screening for avionics grade** is available by adding MA prefix to part number for added 100% temperature cycle -55°C to +125°C (10X) as well as surge (3X) and 24 hours HTRB with post test V_Z & I_R (in the operating direction for unidirectional or both directions for bidirectional)
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, and JANTXV are available by adding MQ, MX, or MV prefixes respectively to part numbers.
- Axial-lead equivalent packages for thru-hole mounting available as P5KE6.8 to P5KE170CA (consult factory for other surface mount options)
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS Compliant devices available by adding an "e3" suffix

APPLICATIONS / BENEFITS

- Economical surface mount
- Available in Unidirectional or as Bidirectional construction with a C or CA suffix
- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T^2L, etc.
- Protection from switching transients & induced RF
- Compliant to IEC61000-4-2 and IEC61000-4-4 for ESD and EFT protection respectively
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:
  - Class 1: SMAJ5.0 to SMAJ100A or CA
  - Class 2: SMAJ5.0 to SMAJ51A or CA
  - Class 3: SMAJ5.0 to SMAJ24A or CA
  - Class 4: SMAJ5.0 to SMAJ12A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
  - Class 1: SMAJ5.0 to SMAJ30A or CA
  - Class 2: SMAJ5.0 to SMAJ16A or CA

MAXIMUM RATINGS

- Peak Pulse Power dissipation at 25°C: 500 watts at 10/1000 µs (also see Fig 1,2, and 3)
- Impulse repetition rate (duty factor): 0.01%
- $t_{clamping}$ (0 volts to $V_{(BR)}$ min.): < 100 ps theoretical for unidirectional and < 5 ns for bidirectional
- Operating and Storage temperature: -65°C to +150°C
- Thermal resistance: 15°C/W junction to lead or 80°C/W junction to ambient when mounted on FR4 PC board (1oz Cu) with recommended footprint (see last page)
- Steady-State Power dissipation: 5 watts at T_L = 75°C, or 1.56 watts at T_A = 25°C when mounted on FR4 PC board with recommended footprint
- Forward Surge Current at 25ºC: 40 amps peak, 8.3 ms half-sine wave. Maximum voltage of 3.50 V (unidirectional only)
- Solder temperatures: 260°C for 10 s (maximum)

MECHANICAL AND PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- TERMINALS: Gull-wing or C-bend (modified J-bend) leads Tin-Lead or RoHS compliant annealed matte-Tin plating solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band. No marking on bi-directional devices
- MARKING: Part number without SMA prefix (e.g. 5.0, 5.0A, 5.0Ae3, 5.0CA, 36A, 36CA, 36CAe3, etc.)
- TAPE & REEL option: Standard per EIA-481-1-A with 12 mm tape, 750 per 7 inch reel or 2500 per 13 inch reel (add "TR" suffix to part number)
- WEIGHT: 0.064 grams
- See package dimension on last page

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ELECTRICAL CHARACTERISTICS @ 5°C

TYPE NUMBER	REVERSE STANDOFF VOLTAGE V_{WM} Volts	MINIMUM BREAKDOWN VOLTAGE V_{BR} MIN @ $I_{(BR)}$ Volts	BREAKDOWN CURRENT $I_{(BR)}$ mA	MAXIMUM CLAMPING VOLTAGE @ I_{PP} V_C Volts	PEAK PULSE CURRENT (See Fig. 2) I_{PP} Amps	MAXIMUM STANDBY CURRENT @ V_{WM} I_D µA
SMAJ5.0	5.0	6.40	10	9.6	52	800
SMAJ5.0A	5.0	6.40	10	9.2	54.3	800
SMAJ6.0	6.0	6.67	10	11.4	43.9	800
SMAJ6.0A	6.0	6.67	10	10.3	48.5	800
SMAJ6.5	6.5	7.22	10	12.3	40.7	500
SMAJ6.5A	6.5	7.22	10	11.2	44.7	500
SMAJ7.0	7.0	7.78	10	13.3	37.8	200
SMAJ7.0A	7.0	7.78	10	12.0	41.7	200
SMAJ7.5	7.5	8.33	1	14.3	35.0	100
SMAJ7.5A	7.5	8.33	1	12.9	38.8	100
SMAJ8.0	8.0	8.89	1	15.0	33.3	50
SMAJ8.0A	8.0	8.89	1	13.6	36.7	50
SMAJ8.5	8.5	9.44	1	15.9	31.4	10
SMAJ8.5A	8.5	9.44	1	14.4	34.7	10
SMAJ9.0	9.0	10.0	1	16.9	29.5	5
SMAJ9.0A	9.0	10.0	1	15.4	32.6	5
SMAJ10	10	11.1	1	18.8	26.6	1
SMAJ10A	10	11.1	1	17.0	29.4	1
SMAJ11	11	12.2	1	20.1	24.9	1
SMAJ11A	11	12.2	1	18.2	27.4	1
SMAJ12	12	13.3	1	22.0	22.7	1
SMAJ12A	12	13.3	1	19.9	25.1	1
SMAJ13	13	14.4	1	23.8	21.0	1
SMAJ13A	13	14.4	1	21.5	23.2	1
SMAJ14	14	15.6	1	25.8	19.4	1
SMAJ14A	14	15.6	1	23.2	21.5	1
SMAJ15	15	16.7	1	26.9	18.8	1
SMAJ15A	15	16.7	1	24.4	20.6	1
SMAJ16	16	17.8	1	28.8	17.6	1
SMAJ16A	16	17.8	1	26.0	19.2	1
SMAJ17	17	18.9	1	30.5	16.4	1
SMAJ17A	17	18.9	1	27.6	18.1	1
SMAJ18	18	20.0	1	32.2	15.5	1
SMAJ18A	18	20.0	1	29.2	17.2	1
SMAJ20	20	22.2	1	35.8	13.9	1
SMAJ20A	20	22.2	1	32.4	15.4	1
SMAJ22	22	24.4	1	39.4	12.7	1
SMAJ22A	22	24.4	1	35.5	14.1	1
SMAJ24	24	26.7	1	43.0	11.6	1
SMAJ24A	24	26.7	1	38.9	12.8	1
SMAJ26	26	28.9	1	46.6	10.7	1
SMAJ26A	26	28.9	1	42.1	11.9	1
SMAJ28	28	31.1	1	50.0	9.9	1
SMAJ28A	28	31.1	1	45.4	11.0	1
SMAJ30	30	33.3	1	53.5	9.3	1
SMAJ30A	30	33.3	1	48.4	10.3	1
SMAJ33	33	36.7	1	59.0	8.5	1
SMAJ33A	33	36.7	1	53.3	9.4	1
SMAJ36	36	40.0	1	64.3	9.8	1
SMAJ36A	36	40.0	1	58.1	8.6	1
SMAJ40	40	44.4	1	71.4	7.0	1
SMAJ40A	40	44.4	1	64.5	7.8	1

TYPE NUMBER	REVERSE STANDOFF VOLTAGE V_{WM} Volts	MINIMUM BREAKDOWN VOLTAGE V_{BR} MIN @ $I_{(BR)}$ Volts	BREAKDOWN CURRENT $I_{(BR)}$ mA	MAXIMUM CLAMPING VOLTAGE @ I_{PP} V_C Volts	PEAK PULSE CURRENT (See Fig. 2) I_{PP} Amps	MAXIMUM STANDBY CURRENT @ V_{WM} I_D µA
SMAJ43	43	47.8	1	76.7	6.5	1
SMAJ43A	43	47.8	1	69.4	7.2	1
SMAJ45	45	50.0	1	80.3	6.2	1
SMAJ45A	45	50.0	1	72.7	6.9	1
SMAJ48	48	53.3	1	85.5	5.8	1
SMAJ48A	48	53.3	1	77.4	6.5	1
SMAJ51	51	56.7	1	91.1	5.5	1
SMAJ51A	51	56.7	1	82.4	6.1	1
SMAJ54	54	60.0	1	96.3	5.2	1
SMAJ54A	54	60.0	1	87.1	5.7	1
SMAJ58	58	64.4	1	103.0	4.9	1
SMAJ58A	58	64.4	1	93.6	5.3	1
SMAJ60	60	66.7	1	107.0	4.7	1
SMAJ60A	60	66.7	1	96.8	5.2	1
SMAJ64	64	71.1	1	114.0	4.4	1
SMAJ64A	64	71.1	1	103.0	4.9	1
SMAJ70	70	77.8	1	125	4.0	1
SMAJ70A	70	77.8	1	113	4.4	1
SMAJ75	75	83.3	1	134	3.7	1
SMAJ75A	75	83.3	1	121	4.1	1
SMAJ78	78	86.7	1	139	3.6	1
SMAJ78A	78	86.7	1	126	4.0	1
SMAJ85	85	94.4	1	151	3.3	1
SMAJ85A	85	94.4	1	137	3.6	1
SMAJ90	90	100	1	160	3.1	1
SMAJ90A	90	100	1	146	3.4	1
SMAJ100	100	111	1	179	2.8	1
SMAJ100A	100	111	1	162	3.1	1
SMAJ110	110	122	1	196	2.6	1
SMAJ110A	110	122	1	177	2.8	1
SMAJ120	120	133	1	214	2.3	1
SMAJ120A	120	133	1	193	2.6	1
SMAJ130	130	144	1	231	2.2	1
SMAJ130A	130	144	1	209	2.4	1
SMAJ150	150	167	1	268	1.9	1
SMAJ150A	150	167	1	243	2.1	1
SMAJ160	160	178	1	287	1.7	1
SMAJ160A	160	178	1	259	1.9	1
SMAJ170	170	189	1	304	1.6	1
SMAJ170A	170	189	1	275	1.8	1

- For Bidirectional device types indicate a C or CA suffix after the part number. (i.e.: SMAJ170CA or SMAJ170C). Bidirectional capacitance is half that shown in figure 4 at zero volts.
- Microsemi Corp's SMA series (500 W) surface mountable packages are designed specifically for transient voltage suppression. The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground. These high speed transient voltage suppressors can be used to effectively protect sensitive components such as integrated circuits and MOS devices.

SYMBOLS & DEFINITIONS

Symbol	Definition	Symbol	Definition
V_{WM}	Working Peak (Standoff) Voltage	I_{PP}	Peak Pulse Current
P_{PP}	Peak Pulse Power	V_C	Clamping Voltage
$V_{(BR)}$	Breakdown Voltage	$I_{(BR)}$	Breakdown Current for $V_{(BR)}$
I_D	Standby Current		

GRAPHS

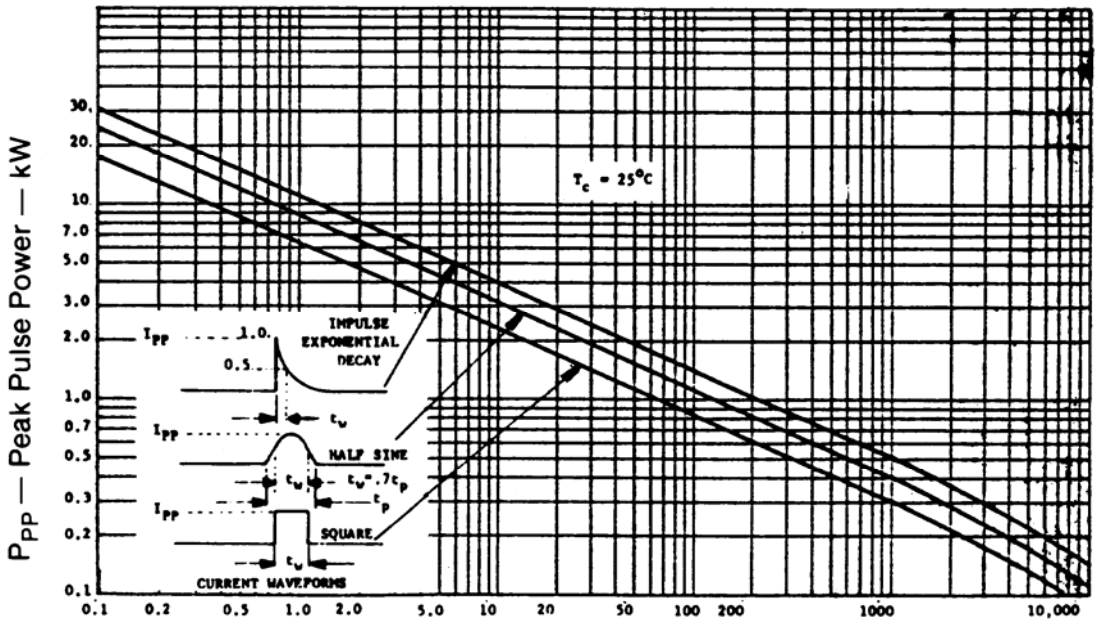


FIGURE 1

Peak Pulse Power (P_{PP}) – Kilowatts *versus*
Pulse Width (tw) - Microseconds

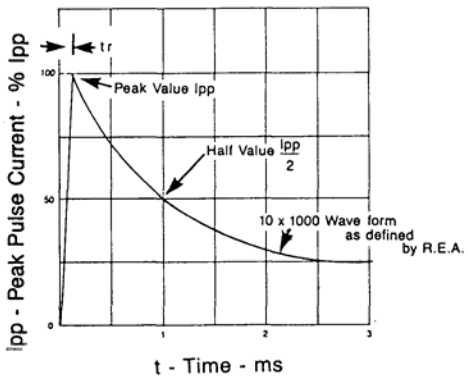


FIGURE 2

Pulse Waveform for Exponential Surge

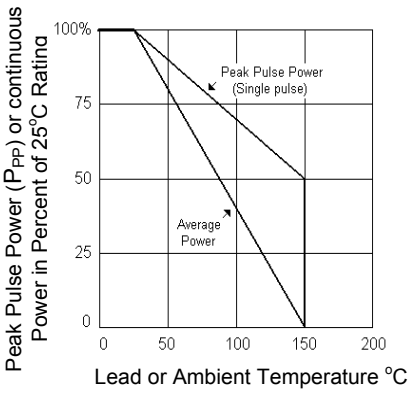


FIGURE 3

Derating Curve

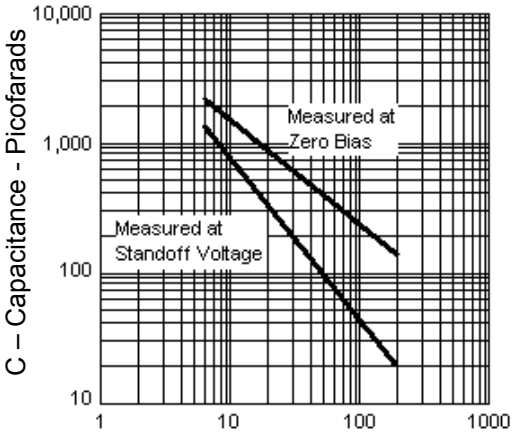
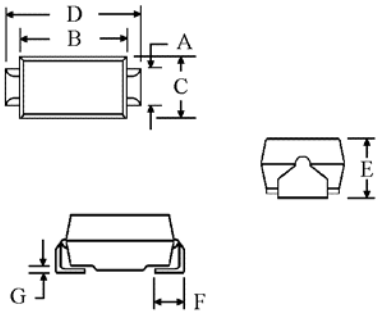


FIGURE 4

Typical Capacitance vs. Breakdown Voltage

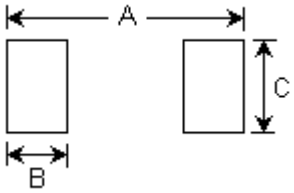
PACKAGE DIMENSIONS & PAD LAYOUT



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.067	. 089	1.70	2.26	
B	.160	.180	3.99	4.50	
C	.100	.110	2.57	2.79	
D	.194	.216	4.93	5.48	
E	.078	.120	1.98	3.05	1
F	.030	.060	.76	1.52	
G	-	.02	-	.51	

NOTE 1: THIS MAXIMUM DIMENSION IS LARGER THAN THE STANDARD JEDEC CALL OUT. STANDARD JEDEC IS .105 INCHES OR 2.66 MM.

PAD LAYOUT



	INCHES	mm
A	.245	6.22
B	.075	1.90
C	.094	2.39