

400W Surface Mount Transient Voltage Suppressors- 5.0V- 440V

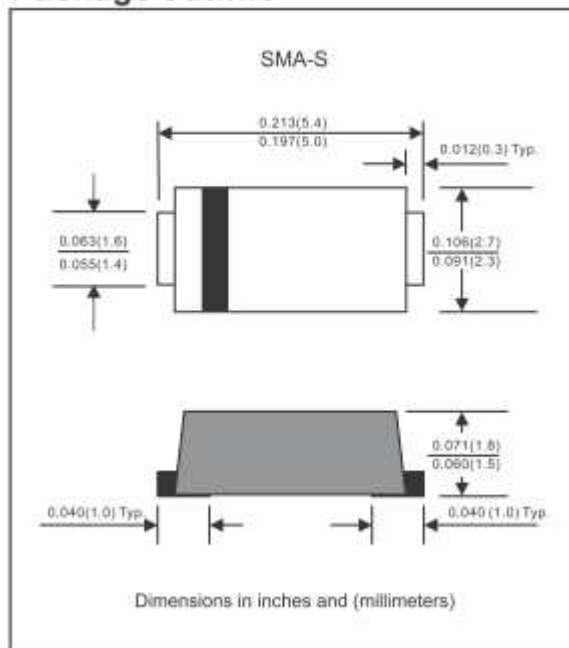
Features

- ◆400W peak pulse power capability with a 10/1000 μ s waveform, repetition rate (duty cycle): 0.01%.
- ◆Low profile surface mounted application in order to optimize board space.
- ◆Excellent clamping capability.
- ◆Low incremental surge resistance.
- ◆Fast response time from 0V to VBR, typically less than 1 ps for uni-directional & 5 ns for bi-directional types.
- ◆Glass passivated chip junction.
- ◆Lead-free parts meet RoHS requirements.
- ◆Suffix "-H" indicates Halogen-free part, ex. SMAS5.0A-H.

Mechanical Data

- ◆ Epoxy : UL94-V0 rated flame retardant
- ◆ Case : Molded plastic, DO-214AC / SMA-S
- ◆ Terminals :Plated terminals, solderable per MIL-STD-750, Method 2026
- ◆ Mounting Position : Any
- ◆ Weight : Approximated 0.05gram

Package outline



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

PARAMETER	CONDITIONS	SYMBOL	VALUE	UNIT
Peak Power Dissipation	with a 10/1000 μ s waveform, Note 1, 2 & Fig. 1	P_{PPM}	400	W
Peak Pulse current	with a 10/1000 μ s waveform	I_{PPM}	See Table 1	A
Steady State Power Dissipation	at $T_L=75^\circ\text{C}$, Note 2	$P_{M(AV)}$	1.0	W
Peak Forward Surge Current	8.3ms Single Half Sine-Wave, Note 3	I_{FSM}	40	A
Maximum Instantaneous Forward Voltage	at 25A For Uni-Directional Types Only, Note 4	V_F	3.5/6.5	V
Operating junction temperature range		T_J	-55~+150	$^\circ\text{C}$
Storage temperature range		T_{STG}	-55~+150	$^\circ\text{C}$

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

2. Mounted on copper pad area of 0.2"x0.2" (5.0x5.0 mm) per Fig 5

3. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum

4. $V_F < 3.5\text{V}$ for $V_{BR} < 200\text{V}$ and $V_F < 6.5\text{V}$ for $V_{BR} > 201\text{V}$.

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Electrical characteristics (AT T =25 C unless otherwise noted)

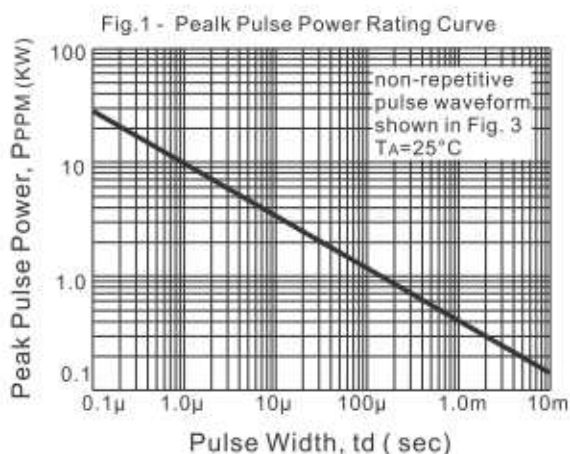
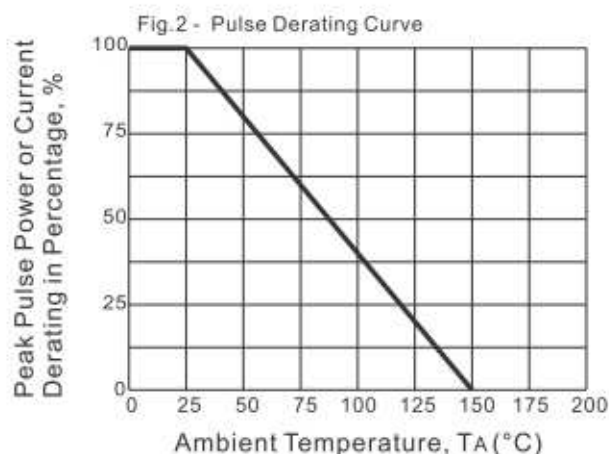
Part No.(Uni)	Part No.(Bi)	Reverse Stand-off Voltage	Breakdown Voltage @ IT		Test Current	Maximum Clamping Voltage@ IPP		Maximum Reverse Leakage Current	Marking Code	
		VRWM	VBRMIN	VBRMAX	IT	VC	IPP	IR @ VRWM		
		Volts	Volts	Volts	mA	Volts	A	uA	UNI	BI
SMAS5.0A	SMAS5.0CA	5.0	6.40	7.00	10	9.2	43.5	800	AE	WE
SMAS6.0A	SMAS6.0CA	6.0	6.67	7.37	10	10.3	38.0	800	AG	WG
SMAS6.5A	SMAS6.5CA	6.5	7.22	7.98	10	11.2	35.7	500	AK	WK
SMAS7.0A	SMAS7.0CA	7.0	7.78	8.60	10	12.0	33.3	200	AM	WM
SMAS7.5A	SMAS7.5CA	7.5	8.33	9.21	1.0	12.9	31.0	100	AP	WP
SMAS8.0A	SMAS8.0CA	8.0	8.89	9.83	1.0	13.6	29.4	50	AR	WR
SMAS8.5A	SMAS8.5CA	8.5	9.44	10.4	1.0	14.4	27.7	20	AT	WT
SMAS9.0A	SMAS9.0CA	9.0	10.0	11.1	1.0	15.4	26.0	10	AV	WV
SMAS10A	SMAS10CA	10	11.1	12.3	1.0	17.0	23.5	5	AX	WX
SMAS11A	SMAS11CA	11	12.2	13.5	1.0	18.2	22.0	5	AZ	WZ
SMAS12A	SMAS12CA	12	13.3	14.7	1.0	19.9	20.1	5	BE	XE
SMAS13A	SMAS13CA	13	14.4	15.9	1.0	21.5	18.6	5	BG	XG
SMAS14A	SMAS14CA	14	15.6	17.2	1.0	23.2	17.2	5	BK	XK
SMAS15A	SMAS15CA	15	16.7	18.5	1.0	24.4	16.4	5	BM	XM
SMAS16A	SMAS16CA	16	17.8	19.7	1.0	26.0	15.4	5	BP	XP
SMAS17A	SMAS17CA	17	18.9	20.9	1.0	27.6	14.5	5	BR	XR
SMAS18A	SMAS18CA	18	20.0	22.1	1.0	29.2	13.7	5	BT	XT
SMAS20A	SMAS20CA	20	22.2	24.5	1.0	32.4	12.3	5	BV	XV
SMAS22A	SMAS22CA	22	24.4	26.9	1.0	35.5	11.2	5	BX	XX
SMAS24A	SMAS24CA	24	26.7	29.5	1.0	38.9	10.3	5	BZ	XZ
SMAS26A	SMAS26CA	26	28.9	31.9	1.0	42.1	9.5	5	CE	YE
SMAS28A	SMAS28CA	28	31.1	34.4	1.0	45.4	8.8	5	CG	YG
SMAS30A	SMAS30CA	30	33.3	36.8	1.0	48.4	8.3	5	CK	YK
SMAS33A	SMAS33CA	33	36.7	40.6	1.0	53.3	7.5	5	CM	YM
SMAS36A	SMAS36CA	36	40.0	44.2	1.0	58.1	6.9	5	CP	YP
SMAS40A	SMAS40CA	40	44.4	49.1	1.0	64.5	6.2	5	CR	YR
SMAS43A	SMAS43CA	43	47.8	52.8	1.0	69.4	5.8	5	CT	YT
SMAS45A	SMAS45CA	45	50.0	55.3	1.0	72.7	5.5	5	CV	YV
SMAS48A	SMAS48CA	48	53.3	58.9	1.0	77.4	5.2	5	CX	YX
SMAS51A	SMAS51CA	51	56.7	62.7	1.0	82.4	4.9	5	CZ	YZ
SMAS54A	SMAS54CA	54	60.0	66.3	1.0	87.1	4.6	5	RE	ZE
SMAS58A	SMAS58CA	58	64.4	71.2	1.0	93.6	4.3	5	RG	ZG
SMAS60A	SMAS60CA	60	66.7	73.7	1.0	96.8	4.1	5	RK	ZK
SMAS64A	SMAS64CA	64	71.1	78.6	1.0	103.0	3.9	5	RM	ZM
SMAS70A	SMAS70CA	70	77.8	86.0	1.0	113.0	3.5	5	RP	ZP
SMAS75A	SMAS75CA	75	83.3	92.1	1.0	121.0	3.3	5	RR	ZR
SMAS78A	SMAS78CA	78	86.7	95.8	1.0	126.0	3.2	5	RT	ZT
SMAS85A	SMAS85CA	85	94.4	104	1.0	137.0	2.9	5	RV	ZV

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Part No.(Uni)	Part No.(Bi)	Reverse Stand-off Voltage	Breakdown Voltage @ I_T		Test Current	Maximum Clamping Voltage@ I_{PP}		Maximum Reverse Leakage Current	Marking Code	
		V_{RWM}	V_{BRMIN}	V_{BRMAX}	I_T	V_C	I_{PP}	I_R @ V_{RWM}		
		Volts	Volts	Volts	mA	Volts	A	μA	UNI	BI
SMAS90A	SMAS90CA	90	100	111	1.0	146.0	2.7	5	RX	ZX
SMAS100A	SMAS100CA	100	111	123	1.0	162.0	2.5	5	RZ	ZZ
SMAS110A	SMAS110CA	110	122	135	1.0	177.0	2.3	5	SE	VE
SMAS120A	SMAS120CA	120	133	147	1.0	193.0	2.1	5	SG	VG
SMAS130A	SMAS130CA	130	144	159	1.0	209.0	1.9	5	SK	VK
SMAS150A	SMAS150CA	150	167	185	1.0	243.0	1.6	5	SM	VM
SMAS160A	SMAS160CA	160	178	197	1.0	259.0	1.5	5	SP	VP
SMAS170A	SMAS170CA	170	189	209	1.0	275.0	1.5	5	SR	VR
SMAS180A	SMAS180CA	180	201	222	1.0	292.0	1.4	5	ST	VT
SMAS200A	SMAS200CA	200	224	247	1.0	324.0	1.2	5	SV	VV
SMAS220A	SMAS220CA	220	246	272	1.0	356.0	1.1	5	SX	VX
SMAS250A	SMAS250CA	250	279	309	1.0	405.0	1.0	5	SZ	VZ
SMAS300A	SMAS300CA	300	335	371	1.0	486.0	0.8	5	TE	UE
SMAS350A	SMAS350CA	350	391	432	1.0	567.0	0.7	5	TG	UG
SMAS400A	SMAS400CA	400	447	494	1.0	648.0	0.6	5	TK	UK
SMAS440A	SMAS440CA	440	492	543	1.0	713.0	0.6	5	TM	UM

- Note 1. V_{BR} measured after I_T applied for 300 μs , I_T =square wave pulse or equivalent
2. Surge current waveform per Fig. 3 and derated per Fig. 2
3. For bi-directional types having V_{RWM} of 10 volts and less, the I_R limit is doubled
4. Suffix 'C' denotes bi-directional devices. Suffix 'A' denotes 5% tolerance devices, no suffix denotes 10% tolerance devices.
5. All terms and symbols are consistent with ANS/IEEE C62.35
6. Transient Voltage Suppressors (TVS) are devices used to protect vulnerable circuits from electrical overstress such as that caused by electrostatic discharge, inductive load switching and induced lightning. Within the TVS, damaging voltage spikes are limited by clamping or avalanche action of a rugged silicon pn junction which reduces the amplitude of the transient to a nondestructive level. See Fig. 7 & Fig. 8

Rating and characteristic curves (SMAS SERIES)



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Fig.3 - Pulse Waveform

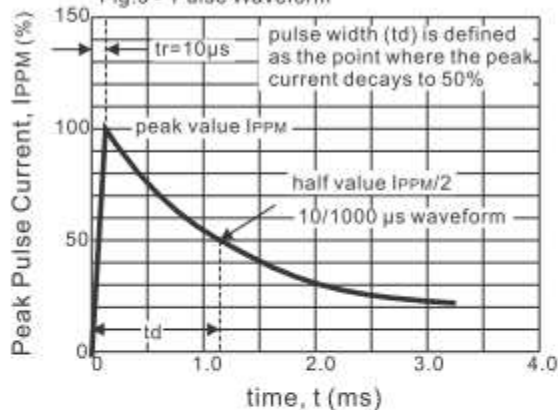


Fig.4 - Typical Junction Capacitance

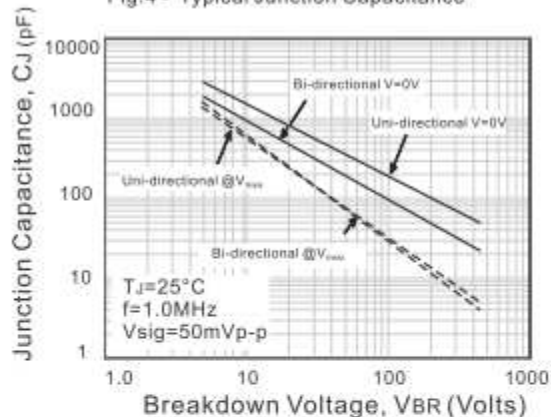


Fig.5 - Steady State Power Derating Curve

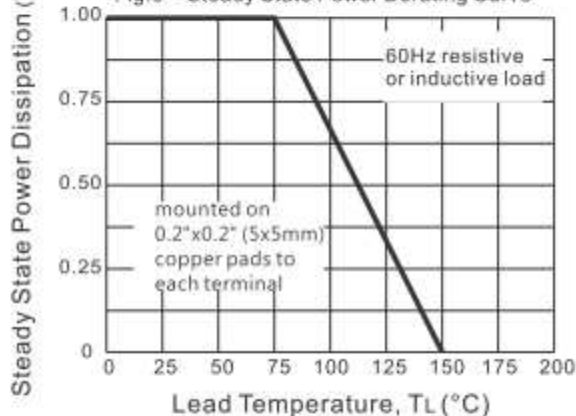


Fig.6 - Maximum Non-Repetitive Forward Surge Current

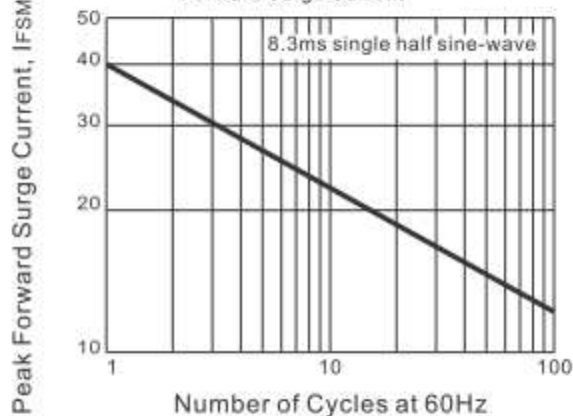


Fig. 7 - Transients of several thousand volts can be clamped to a safe level by the TVS

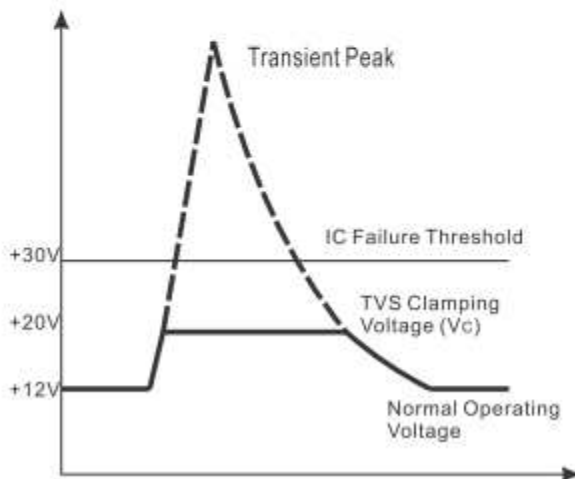
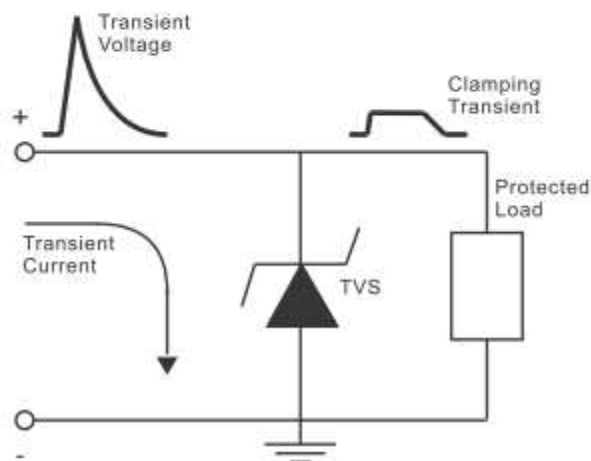
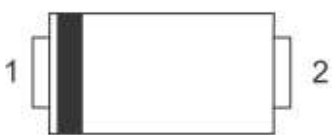


Fig. 8 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level

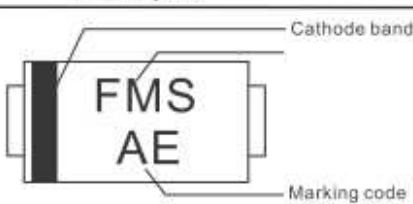
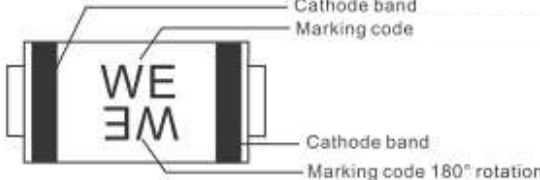


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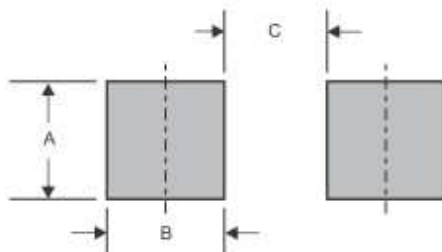
Pinning information

Pin	Simplified outline	Symbol
Uni-Directional Pin1 cathode Pin2 anode		
Bi-Directional		

Marking

Type number	Example
Uni-Directional	
Bi-Directional	

Suggested solder pad layout



Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMA-S	0.063 (1.60)	0.059 (1.50)	0.110 (2.80)