

Description

The SM8S Series use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting, especially for automotive load dump protection application.



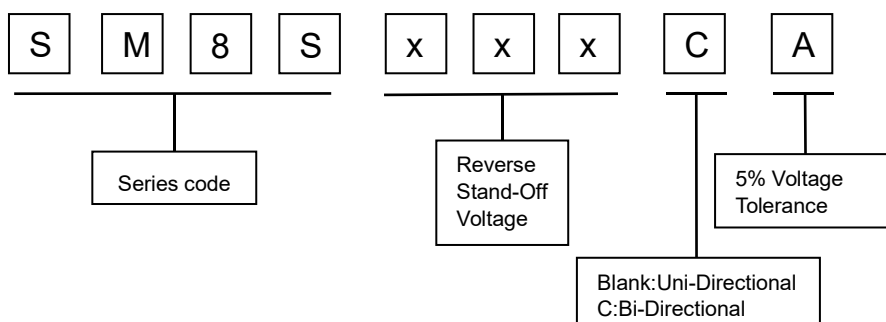
Features

- Chip produced by chemical method
- Junction passivated by high temperature resistant insulating adhesive
- $T_J = 175\text{ }^{\circ}\text{C}$ capability suitable for high reliability and automotive requirement
- SM8SXXA Available in Uni-directional polarity only
- SM8SXXCA Available in Bi-directional polarity only
- Low leakage current
- Low forward voltage drop for uni-directional production
- High surge capability
- Meets ISO16750-2 surge specification (varied by test condition)
- LF maximum peak of $245\text{ }^{\circ}\text{C}$
- AEC-Q101 qualified

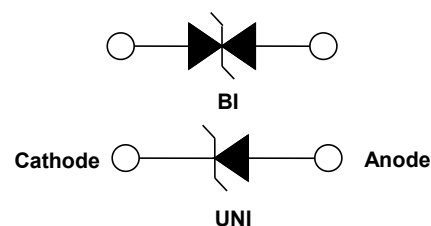
Mechanical Data

- Case: DO-218AB
Molding compound meets UL 94 V-0 flammability rating
Base P/NHE3_X - RoHS-compliant and AEC-Q101 qualified ("X" denotes revision code e.g. A, B, ...)
- Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
- Polarity: For uni-directional production heatsink is anode

Part Number Code



Electrical symbol



Mechanical Characteristics (TA=25°C unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation	P_{PPM}	6600	W
with 10/1000 μs waveform		5200	
Power dissipation on infinite heatsink at $T_C = 25\text{ }^{\circ}\text{C}$ (fig. 2)	P_D	8.0	W
Peak pulse current with 10/1000 μs waveform	$I_{PPM}^{(1)}$	See next table	A
Peak forward surge current 8.3 ms single half sine-wave	$I_{FSM}^{(2)}$	700	A
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +175	$^{\circ}\text{C}$

Note

- (1) Non-repetitive current pulse derated above $T_A = 25\text{ }^{\circ}\text{C}$
 (2) I_{FSM} only for uni-directional production

Electrical Characteristics (TA=25°C unless otherwise specified)

TYPE NUMBER	BREAKDOWN VOLTAGE V _{BR} (V)			TEST CURRENT I _T (mA)	STAND-OFF VOLTAGE V _{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V _{WM} I _D (μA)	MAXIMUM REVERSE LEAKAGE AT V _{WM} T _J = 175 °C I _D (μA)	MAX. PEAK PULSE CURRENT AT 10/1000 μs WAVEFORM (A)	MAXIMUM CLAMPING VOLTAGE AT 1PPM V _C (V)	TYPICAL TEMP. COEFFICIENT OF V _{BR} ⁽¹⁾ α _T (%/°C)
	MIN.	NOM.	MAX.							
SM8S10A/CA	11.1	11.7	12.3	5.0	10.0	10	150	388	17.0	0.069
SM8S11A/CA	12.2	12.9	13.5	5.0	11.0	10	150	363	18.2	0.072
SM8S12A/CA	13.3	14.0	14.7	5.0	12.0	10	150	332	19.9	0.074
SM8S13A/CA	14.4	15.2	15.9	5.0	13.0	10	150	307	21.5	0.076
SM8S14A/CA	15.6	16.4	17.2	5.0	14.0	10	150	284	23.2	0.078
SM8S15A/CA	16.7	17.6	18.5	5.0	15.0	10	150	270	24.4	0.080
SM8S16A/CA	17.8	18.8	19.7	5.0	16.0	10	150	254	26.0	0.081
SM8S17A/CA	18.9	19.9	20.9	5.0	17.0	10	150	239	27.6	0.082
SM8S18A/CA	20.0	21.1	22.1	5.0	18.0	10	150	226	29.2	0.083
SM8S20A/CA	22.2	23.4	24.5	5.0	20.0	10	150	204	32.4	0.085
SM8S22A/CA	24.4	25.7	26.9	5.0	22.0	10	150	186	35.5	0.086
SM8S24A/CA	26.7	28.1	29.5	5.0	24.0	10	150	170	38.9	0.087
SM8S26A/CA	28.9	30.4	31.9	5.0	26.0	10	150	157	42.1	0.088
SM8S28A/CA	31.1	32.8	34.4	5.0	28.0	10	150	145	45.4	0.089
SM8S30A/CA	33.3	35.1	36.8	5.0	30.0	10	150	136	48.4	0.090
SM8S33A/CA	36.7	38.7	40.6	5.0	33.0	10	150	124	53.3	0.091
SM8S36A/CA	40.0	42.1	44.2	5.0	36.0	10	150	114	58.1	0.091
SM8S40A/CA	44.4	46.8	49.1	5.0	40.0	10	150	102	64.5	0.092
SM8S43A/CA	47.8	50.3	52.8	5.0	43.0	10	150	95.1	69.4	0.093
SM8S45A/CA	50.0	52.7	55.3	5.0	45.0	10	150	90.8	72.7	0.094
SM8S48A/CA	53.3	56.1	58.9	5.0	48.0	10	150	85.3	77.4	0.095
SM8S51A/CA	56.7	59.7	62.7	5.0	51.0	10	150	80.1	82.4	0.096
SM8S54A/CA	60.0	63.1	66.3	5.0	54.0	10	150	75.8	87.1	0.097
SM8S58A/CA	64.4	67.8	71.2	5.0	58.0	10	150	70.5	93.6	0.098
SM8S60A/CA	66.7	70.2	73.7	5.0	60.0	10	150	68.2	96.8	0.099
SM8S64A/CA	71.1	74.9	78.6	5.0	64.0	10	150	64.1	103	0.100
SM8S70A/CA	77.8	81.9	86.0	5.0	70.0	10	150	58.4	113	0.101
SM8S75A/CA	83.3	87.7	92.1	5.0	75.0	10	150	54.5	121	0.102
SM8S78A/CA	86.7	91.3	95.8	5.0	78.0	10	150	52.4	126	0.103
SM8S85A/CA	94.4	99.2	104.0	5.0	85.0	10	150	48.2	137	0.104

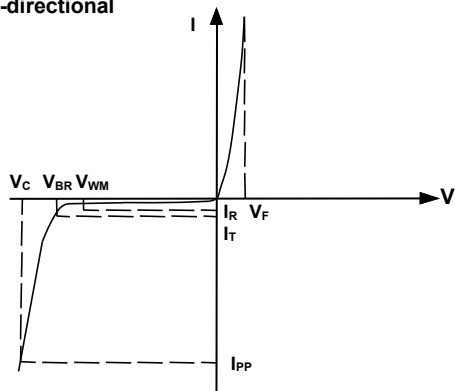
Notes

- For all uni-directional types maximum V_F = 1.8 V at I_F = 100 A measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

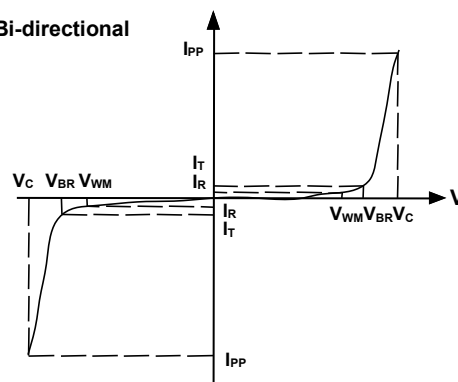
⁽¹⁾ To calculate V_{BR} vs. junction temperature, use the following formula: V_{BR} at T_J = V_{BR} at 25 °C x (1 + α_T x (T_J - 25))

I-V Curve Characteristics

Uni-directional



Bi-directional



P_{PPM} Peak Pulse Power Dissipation -- Max power dissipation

V_{WM} Stand-off Voltage -- Maximum voltage that can be applied to the TVS without operation

V_{BR} Breakdown Voltage -- Maximum voltage that flows through the TVS at a specified test current (I_T)

V_C Clamping Voltage -- Peak voltage measured across the TVS at a specified I_{ppm} (peak impulse current)

I_R Reverse Leakage Current -- Current measured at V_R

V_F Forward Voltage Drop for Uni-directional

Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

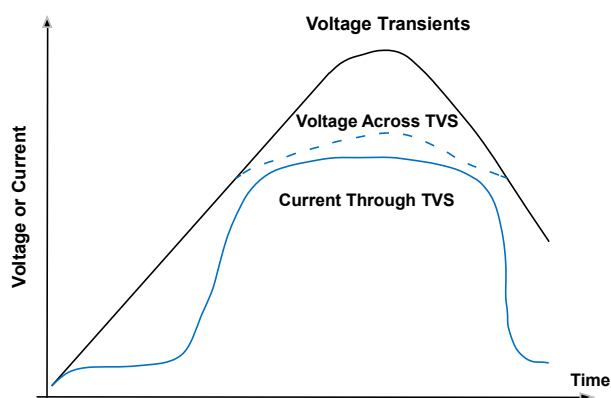
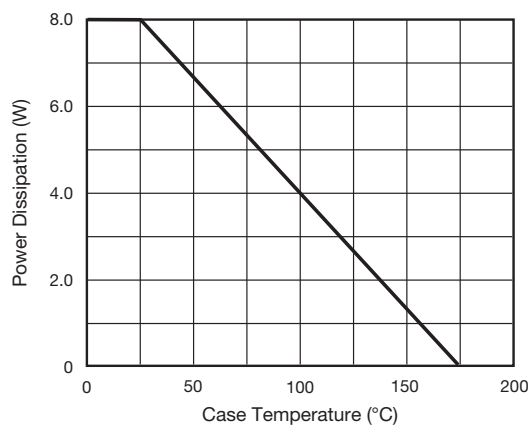


Figure 2 - Pulse Derating Curve



Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 3 - Load Dump Power Characteristics

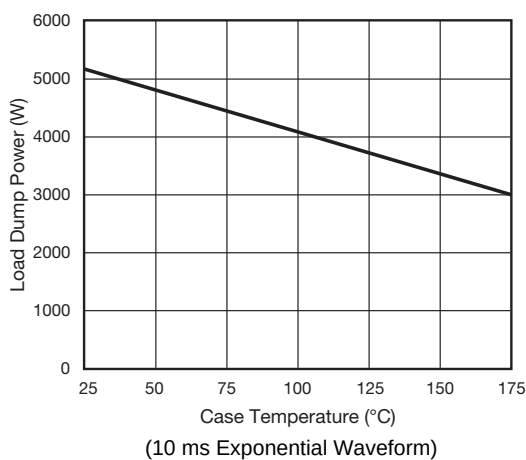


Figure 4 - Pulse Waveform

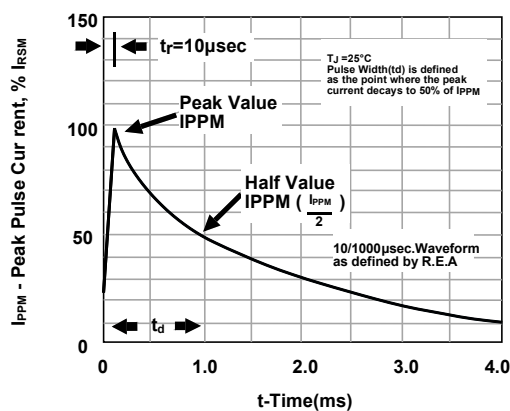


Figure 5 - Typical Junction Capacitance

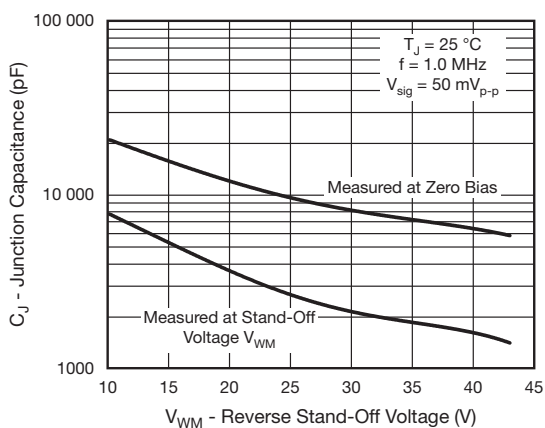


Figure 6 - Typical Transient Thermal Impedance

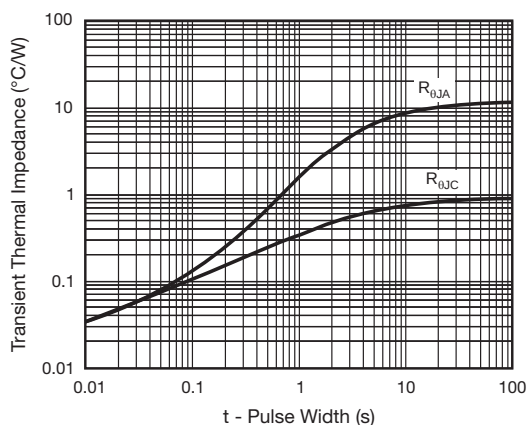
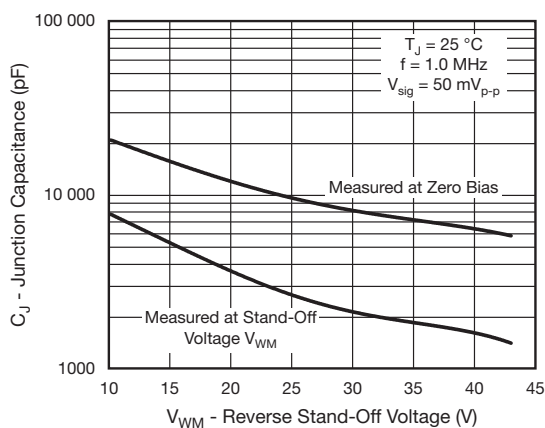
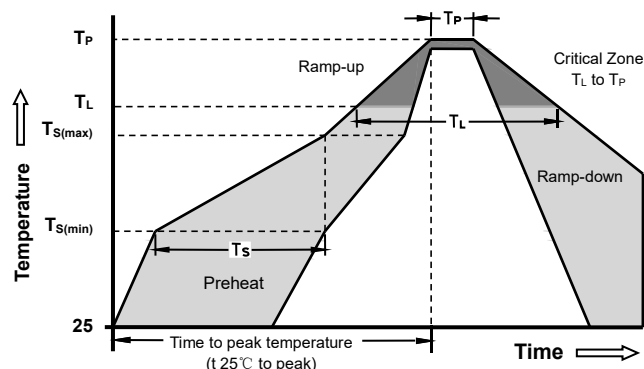


Figure 7 - Typical Junction Capacitance

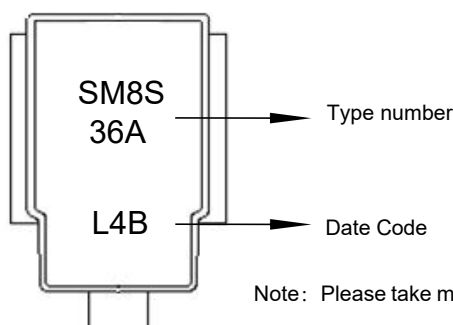


Soldering Parameters - Reflow Soldering (Surface Mount Devices)



Reflow Condition		Pb - Free assembly
Pre Heat	-Temperature Min ($T_{s(min)}$)	150°C
	-Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 -180 Seconds
Average ramp up rate (Liquids Temp T_L to peak		3°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquids)	217°C
	- Time (min to max) (t_s)	60 -150 Seconds
Peak Temperature (T_P)		260 +0/-5°C
Time within 5°C of actual peak Temperature (t_p)		20 - 40 Seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max
Do not exceed		260°C

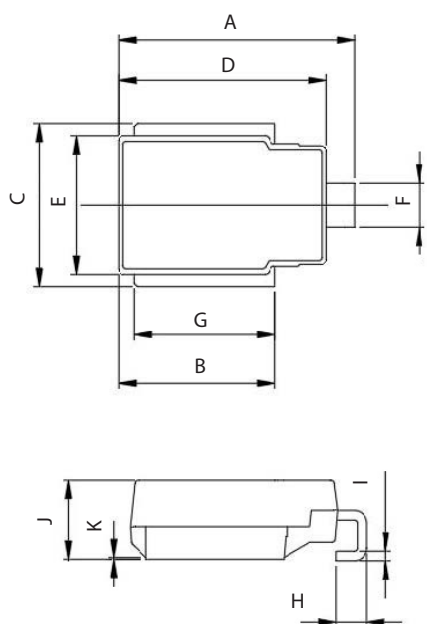
Part Marking System



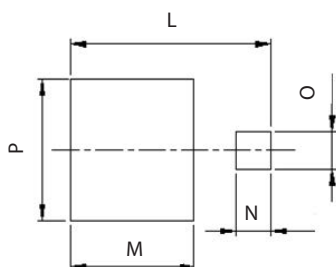
Note: Please take material release date as the production date.

Thermal Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to case	$R_{\theta JC}$	0.90	$^\circ\text{C/W}$

Dimensions(DO-218AB)


Mounting Pad Layout



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	15.0	16.0	0.591	0.630
B	9.9	9.5	0.390	0.374
C	9.5	10.5	0.374	0.413
D	13.3	13.7	0.524	0.539
E	8.3	8.7	0.327	0.343
F	2.4	3.0	0.094	0.118
G	8.9	9.5	0.350	0.374
H	2.0	2.6	0.079	0.102
I	0.5	0.7	0.020	0.028
J	4.7	5.0	0.185	0.197
K	0.1	-	0.004	-
L	14.7	15.3	0.579	0.602
M	9.0	9.6	0.354	0.378
N	2.3	2.9	0.091	0.114
O	2.4	3.0	0.094	0.118
P	9.5	10.5	0.374	0.413

Ordering Information

TYPE NUMBER	UNIT WEIGHT (g)	PACKAGE	BASE QUANTITY
SM8SXXA/CA	2.90	DO-218AB	750/reel