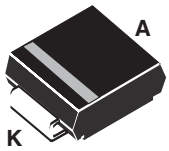
SM6T

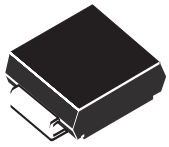
Transil™

Features

- Peak Pulse Power: 600 W (10/1000 µs)
- Breakdown voltage range:
  From 6.8 V to 220 V
- Uni and Bidirectional types
- Low clamping factor
- Fast response time
- UL recognized



Unidirectional



Bidirectional

SMB
(JEDEC DO-214AA)

Description

The SM6T Transil series has been designed to protect sensitive equipment against electrostatic discharges according to IEC 61000-4-2, MIL STD 883E Method 3015, and electrical over stress such as IEC 61000-4-4 and 5. They are, more generally, suitable for surges below 600 W, 10/1000 µs

This planar technology makes the SM6T compatible with high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time.

Automotive grade versions are available (see *Section 4: Ordering information*).

TM: Transil is a trademark of STMicroelectronics

1 Characteristics

Table 1. Absolute maximum ratings

Symbol	Parameter		Value	Unit
P_{PP}	Peak pulse power dissipation(1)	T_j initial = T_{amb}	600	W
P	Power dissipation on infinite heatsink	T_{amb} = 50 °C	5	°C
I_{FSM}	Non repetitive surge peak forward current for unidirectional types	t_p = 10 ms T_j initial = T_{amb}	100	°C
T_{stg} T_j	Storage temperature range Operating junction temperature range		-65 to 175 -55 to 150	°C
T_L	Maximum lead temperature for soldering during 10 s.		260	°C

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Table 2. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to leads	20	°C/W
$R_{th(j-a)}$	Junction to ambient on printed circuit on recommended pad layout	100	°C/W

Table 3. Electrical characteristics (T_{amb} = 25 °C)

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{BR}	Breakdown voltage
V_{CL}	Clamping voltage
I_{RM}	Leakage current
I_{PP}	Peak pulse current
αT	Voltage temperature coefficient
V_F	Forward voltage drop

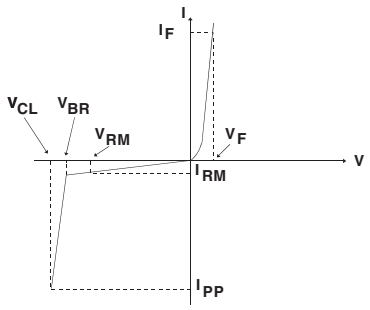


Figure 1. Pulse definition for electrical characterisitcs

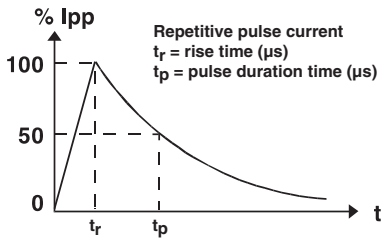


Table 4. Electrical characteristics, parameter values (T_{amb} = 25 °C)

Order code	I_{RM} @ V_{RM}(1) max			V_{BR} @ I_R(2) min	nom	max		V_{CL} @ I_{PP} 10/1000 µs(3) max		V_{CL} @ I_{PP} 8/20 µs(3) max		αT(4) max	C(5) typ
	µA (T_j=25°C)	µA (T_j=85°C)	V	V	V	V	mA	V	A	V	A	10^{-4}/°C	pF
SM6T6V8A/CA	10	50	5.8	6.45	6.8	7.14	10	10.5	57	13.4	298	5.7	4000
SM6T7V5A/CA	10	50	6.4	7.13	7.5	7.88	10	11.3	53	14.5	276	6.1	3700
SM6T10A/CA	1	10	8.55	9.5	10	10.5	1	14.5	41	18.6	215	7.3	2800
SM6T12A/CA	0.5	1	10.2	11.4	12	12.6	1	16.7	36	21.7	184	7.8	2300
SM6T15A/CA	0.5	1	12.8	14.3	15	15.8	1	21.2	28	27.2	147	8.4	1900
SM6T18A/CA	0.5	1	15.3	17.1	18	18.9	1	25.2	24	32.5	123	8.8	1600
SM6T22A/CA	0.5	1	18.8	20.9	22	23.1	1	30.6	20	39.3	102	9.2	1350
SM6T24A/CA	0.5	1	20.5	22.8	24	25.2	1	33.2	18	42.8	93	9.4	1250
SM6T27A/CA	0.5	1	23.1	25.7	27	28.4	1	37.5	16	48.3	83	9.6	1150
SM6T27AY(6)	0.5	1	23.1	25.7	27	28.4	1	37.5	16	48.3	83	9.6	1150
SM6T30A/CA	0.5	1	25.6	28.5	30	31.5	1	41.5	14.5	53.5	75	9.7	1075
SM6T33A/CA	0.5	1	28.2	31.4	33	34.7	1	45.7	13.1	59.0	68	9.8	1000
SM6T36A/CA	0.5	1	30.8	34.2	36	37.8	1	49.9	12	64.3	62	9.9	950
SM6T36AY(6)	0.5	1	30.8	34.2	36	37.8	1	49.9	12	64.3	62	9.9	950
SM6T39A/CA	0.5	1	33.3	37.1	39	41.0	1	53.9	11.1	69.7	57	10.0	900
SM6T39AY(6)	0.5	1	33.3	37.1	39	41.0	1	53.9	11.1	69.7	57	10.0	900
SM6T68A/CA	0.5	1	58.1	64.6	68	71.4	1	92	6.5	121	33	10.4	625
SM6T75A/CA	0.5	1	64.1	71.3	75	78.8	1	103	5.8	134	30	10.5	575
SM6T100A/CA	0.5	1	85.5	95.0	100	105	1	137	4.4	178	22.5	10.6	500
SM6T150A/CA	0.5	1	128	143	150	158	1	207	2.9	265	15	10.8	400
SM6T200A/CA	0.5	1	171	190	200	210	1	274	2.2	353	11.3	10.8	350
SM6T220A/CA	0.5	1	188	209	220	231	1	328	2	388	10.3	10.8	330

1. For bidirectional types having $V_{RM} \leq 10$ V, I_{RM} shown should be multiplied by 2.
2. Pulse test: $t_p < 50$ ms
3. For pulse definition see *Figure 1*.
4. $\Delta V_{BR} = \alpha T * (T_{amb} - 25) * V_{BR}(25\ °C)$
5. $V_R = 0$ V, F = 1 MHz. For bidirectional types, capacitance value shown should be divided by 2.
6. Automotive grade version (qualified according to AEC Q101)

Figure 2. Peak power dissipation versus initial junction temperature (printed circuit board)

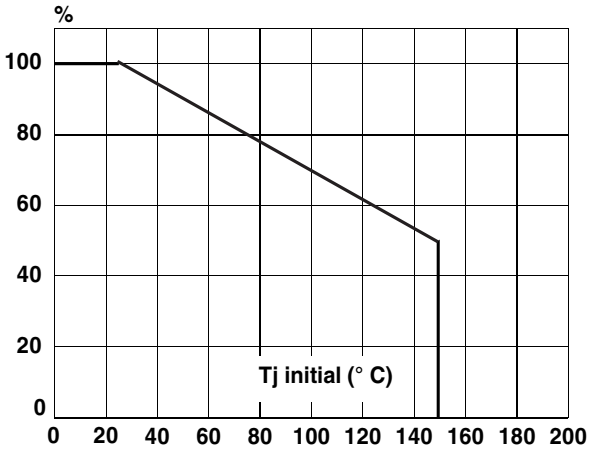


Figure 3. Peak pulse power versus exponential pulse duration

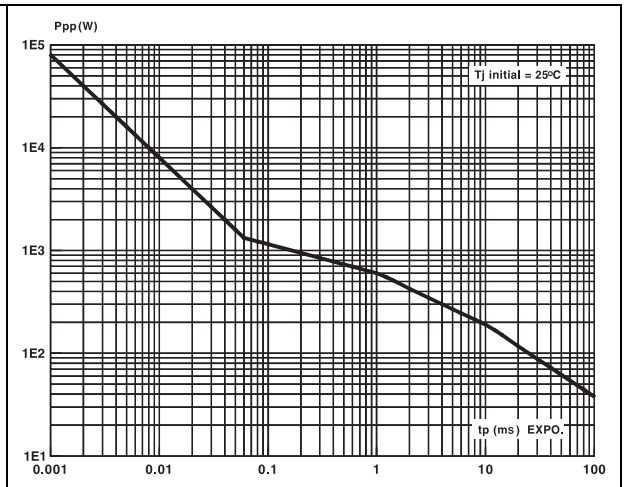
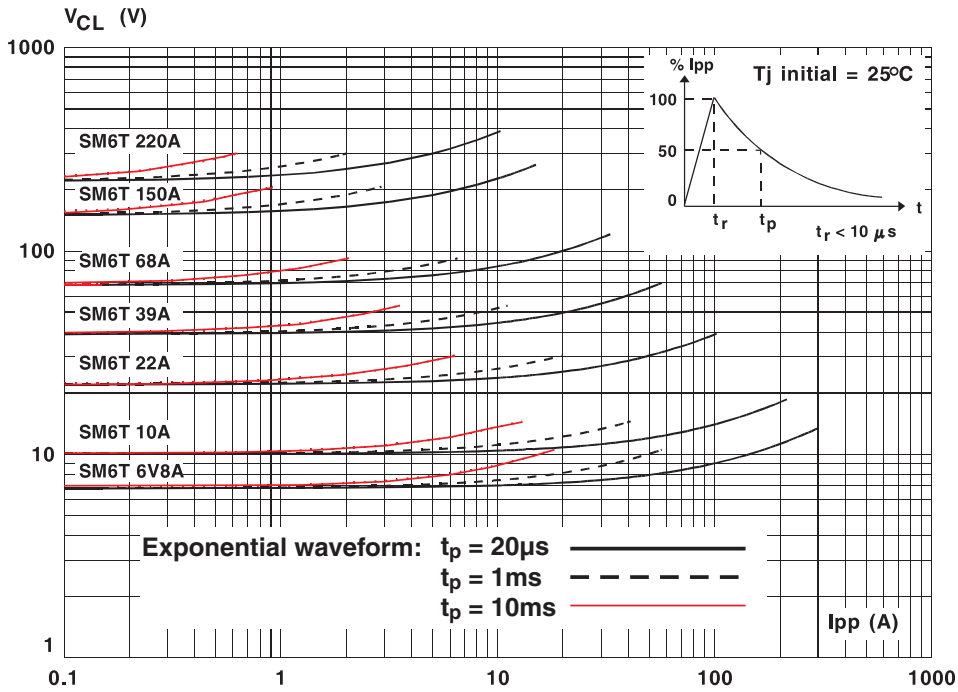


Figure 4. Clamping voltage versus peak pulse current[a]



a. The curves of Figure 4 are specified for a junction temperature of 25 °C before surge. The given results may be extrapolated for other junction temperatures by using the formula: $\Delta V_{BR} = \alpha T * [T_{amb} -25] * V_{BR}(25\ °C)$. For intermediate voltages, extrapolate the given results.

Figure 5. Capacitance versus reverse applied voltage for unidirectional types (typical values)

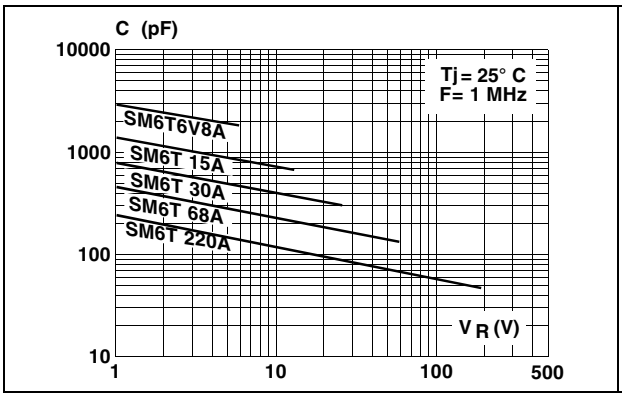


Figure 6. Capacitance versus reverse applied voltage for bidirectional types (typical values)

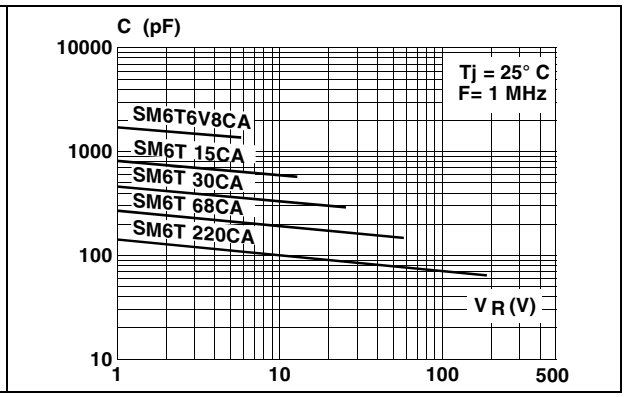


Figure 7. Peak forward voltage drop versus peak forward current for unidirectional types (typical values)

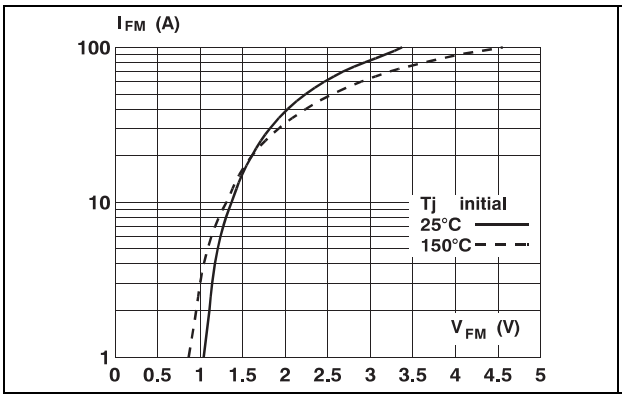


Figure 8. Transient thermal resistance junction to ambient versus pulse duration (printed circuit board FR4 $e_{(Cu)}$ = 35 µm)

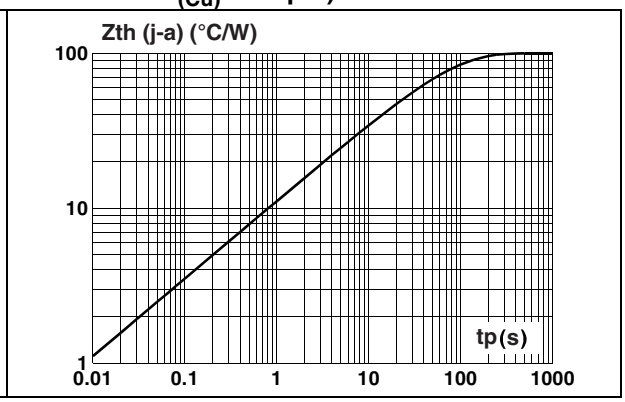
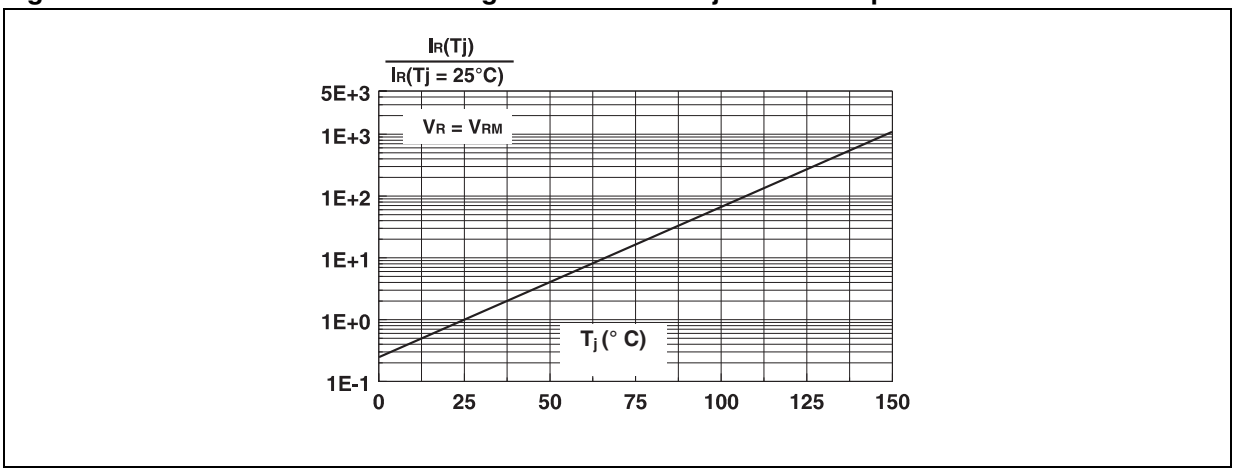
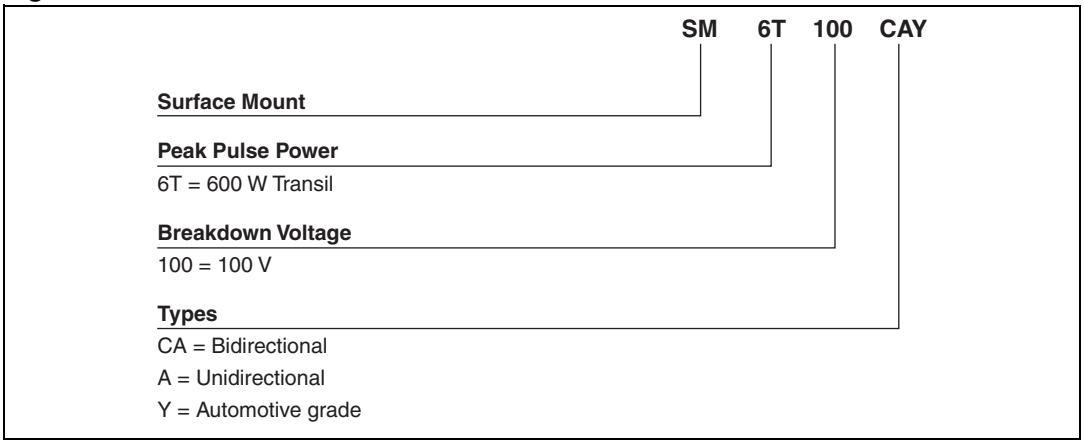


Figure 9. Relative variation of leakage current versus junction temperature



2 Order information scheme

Figure 10. Order information scheme

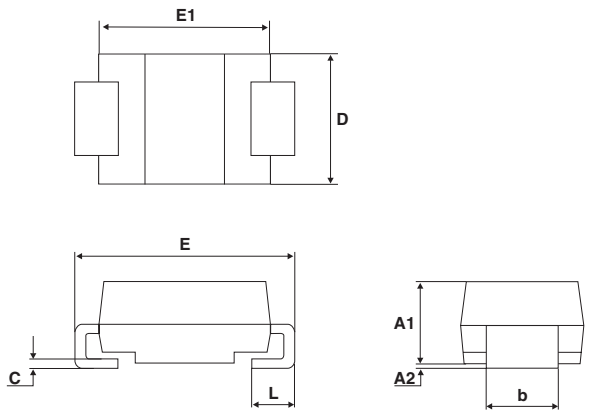


3 Packaging information

- Epoxy meets UL94, V0

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at *www.st.com*.

Table 5. SMB package dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 11. SMB footprint dimensions in mm (inches)

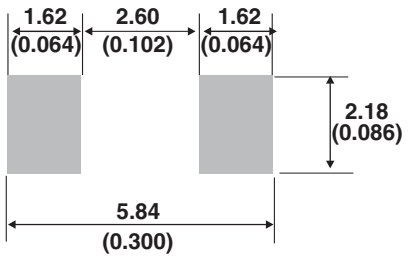


Figure 12. Marking layout

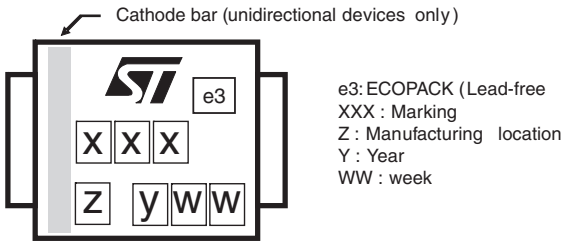


Table 6. Marking

Order code	Mark	Order code	Mark
SM6T6V8A	DE	SM6T6V8CA	LE
SM6T7V5A	DG	SM6T7V5CA	LG
SM6T10A	DP	SM6T10CA	LP
SM6T12A	DT	SM6T12CA	LT
SM6T15A	DX	SM6T15CA	LX
SM6T18A	EE	SM6T18CA	ME
SM6T22A	EK	SM6T22CA	MK
SM6T24A	EM	SM6T24CA	MM
SM6T27A	EP	SM6T27CA	MP
SM6T27AY(1)	EPY		
SM6T30A	ER	SM6T30CA	MR
SM6T33A	ET	SM6T33CA	MT
SM6T36A	EV	SM6T36CA	MV
SM6T36AY(1)	EVY		
SM6T39A	EX	SM6T39CA	MX
SM6T39AY(1)	EXY		
SM6T68A	FQ	SM6T68CA	NQ
SM6T75A	FS	SM6T75CA	NS
SM6T100A	FY	SM6T100CA	NY
SM6T150A	GL	SM6T150CA	OL
SM6T200A	GU	SM6T200CA	OU
SM6T220A	GW	SM6T220CA	OW

1. Automotive grade version (qualified according to AEC Q101)

4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
SM6T	See *Table 6 on page 7*	SMB	0.12 g	5000	Tape and reel

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
August-2001	4A	Previous update.
15-Sep-2004	5	1. Types table parameters on page 2: I_{RM} @ T_j = 85 °C condition added 2. I_{RM} max values changed
26-Mar-2008	6	Reformatted to current standard. SMB dimensions and footprint updated. Maximum junction temperature replaced with operating junction temperature range in *Table 1*. Automotive grade versions indicated in *Description* section, in *Table 4* and *Table 6*.

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