

SM6T

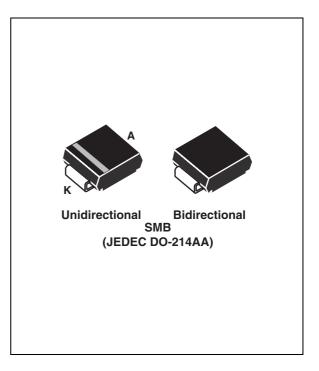
Transil™

Features

- Peak pulse power:
 - 600 W (10/1000 μs)
 - 4 kW (8/20 μs)
- Breakdown voltage range: from 6.8 V to 220 V
- Unidirectional and bidirectional types
- Low leakage current:
 - 0.2 µA at 25 °C
 - 1 μA at 85 $^{\circ}C$
- Operating T_{j max}: 150 °C
- High power capability at T_{jmax}:
 - 515 W (10/1000 μs)
- JEDEC registered package outline

Complies with the following standards

- IEC 61000-4-2 level 4:
 - 15 kV (air discharge)
 - 8 kV (contact discharge)
- IEC 61000-4-5
- MIL STD 883G, method 3015-7: class 3B:
 25 kV HBM (human body model)
- UL 497B, file number: QVGQ2.E136224
- Resin meets UL 94, V0
- MIL-STD-750, method 2026 soldererability
- EIA STD RS-481 and IEC 60286-3 packing
- IPC 7531 footprint



Description

The SM6T Transil series has been designed to protect sensitive equipment against electrostatic discharges according to IEC 61000-4-2 and MIL STD 883, method 3015, and electrical overstress according to IEC 61000-4-4 and 5. These devices are more generally used against surges below 600 W (10/1000 μ s).

Planar technology makes these devices suitable for high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time.

SM6T are packaged in SMB (SMB footprint in accordance with IPC 7531 standard).

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⁾	600	W
T _{stg}	Storage temperature range	-65 to 150	
Тj	Operating junction temperature range	-55 to 150	°C
TL	Maximum lead temperature for soldering during	260	

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

Figure 1. Electrical characteristics - definitions

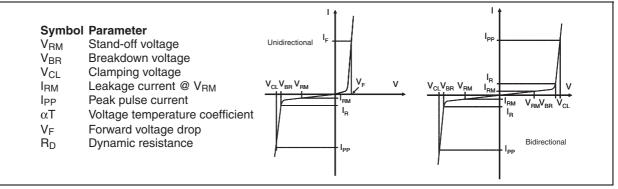


Figure 2. Pulse definition for electrical characteristics

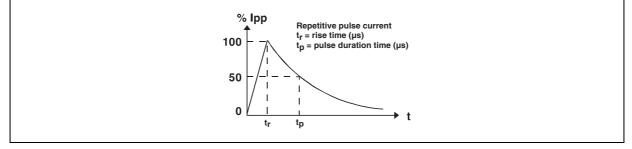




Table 3. Electrical characteristics, parameter values (T _{amb} = 25 °C)														
	I _{RM} max@V _{RM}		V _{BR} @I _R ⁽¹⁾			V _{CL} @I _{PP} 10/1000 µs		R _D 10/1000 µs	V _{CL} @I _{PP} 8/20 μs		R _D 8/20 μs	α Τ ⁽²⁾		
Order code	25 °C	85 °C		min	typ	max		max			max			max
	μ	Α	v		v	1	mA	V ⁽³⁾	A ⁽⁴⁾	Ω	V ⁽³⁾	A ⁽⁴⁾	Ω	10-4/ °C
SM6T6V8A/CA	20	50	5.8	6.45	6.8	7.14	10	10.5	57	0.059	13.4	298	0.021	5.7
SM6T7V5A/CA	20	50	6.4	7.13	7.5	7.88	10	11.3	53	0.065	14.5	276	0.024	6.1
SM6T10A/CA	20	50	8.55	9.5	10	10.5	1	14.5	41	0.098	18.6	215	0.038	7.3
SM6T12A/CA	0.2	1	10.2	11.4	12	12.6	1	16.7	36	0.114	21.7	184	0.049	7.8
SM6T15A/CA	0.2	1	12.8	14.3	15	15.8	1	21.2	28	0.193	27.2	147	0.078	8.4
SM6T18A/CA	0.2	1	15.3	17.1	18	18.9	1	25.2	24	0.263	32.5	123	0.111	8.8
SM6T22A/CA	0.2	1	18.8	20.9	22	23.1	1	30.6	20	0.375	39.3	102	0.159	9.2
SM6T24A/CA	0.2	1	<mark>20.5</mark>	<mark>22.8</mark>	<mark>24</mark>	<mark>25.2</mark>	1	<mark>33.2</mark>	<mark>18</mark>	0.444	<mark>42.8</mark>	<mark>93</mark>	<mark>0.189</mark>	<mark>9.4</mark>
SM6T27A/CA	0.2	1	23.1	25.7	27	28.4	1	37.5	16	0.569	48.3	83	0.240	9.6
SM6T30A/CA	0.2	1	25.6	28.5	30	31.5	1	41.5	14.5	0.690	53.5	75	0.293	9.7
SM6T33A/CA	0.2	1	28.2	31.4	33	34.7	1	45.7	13.1	0.840	59.0	68	0.357	9.8
SM6T36A/CA	0.2	1	30.8	34.2	36	37.8	1	49.9	12	1.01	64.3	62	0.427	9.9
SM6T39A/CA	0.2	1	33.3	37.1	39	41.0	1	53.9	11.1	1.16	69.7	57	0.504	10.0
SM6T56A/CA	0.2	1	47.6	53.2	56	58.8	1	76.6	7.8	2.28	100	40	1.030	10.0
SM6T68A/CA	0.2	1	58.1	64.6	68	71.4	1	92	6.5	3.17	121	33	1.503	10.4
SM6T75A/CA	0.2	1	64.1	71.3	75	78.8	1	103	5.8	4.17	134	30	1.84	10.5
SM6T100A/CA	0.2	1	85.5	95.0	100	105	1	137	4.4	7.27	178	22.5	3.24	10.6
SM6T150A/CA	0.2	1	128	143	150	158	1	207	2.9	16.9	265	15	7.13	10.8
SM6T200A/CA	0.2	1	171	190	200	210	1	274	2.2	29.1	353	11.3	12.7	10.8
SM6T220A/CA	0.2	1	188	209	220	231	1	328	2	48.5	388	10.3	15.2	10.8

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

1. Pulse test : $t_p < 50 \text{ ms}$

SM6T

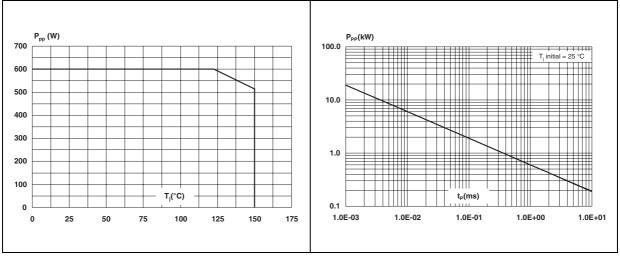
2. To calculate V_{BR} versus junction temperature, use the following formula: $V_{BR} @ T_J = V_{BR} @ 25^{\circ}C x (1 + \alpha T x (T_J - 25))$.

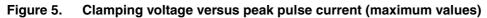
3. To calculate maximum clamping voltage at other surge level, use the following formula: $V_{CL} = R_D x I_{PP} + V_{BRmax}$.

4. Surge capability given for both directions for unidirectional and bidirectional types.



Figure 3. Peak power dissipation versus initial junction temperature





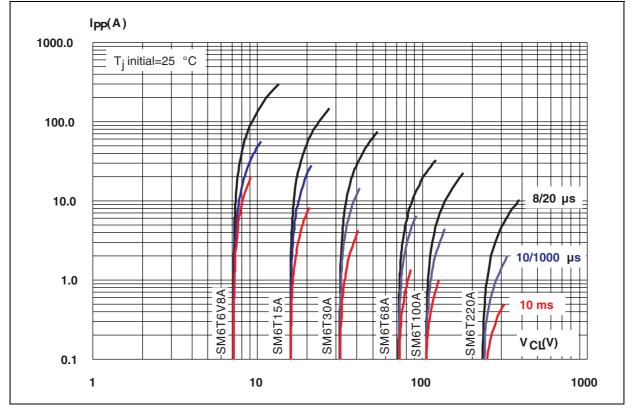
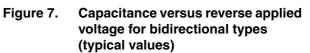


Figure 4. Peak pulse power versus exponential pulse duration



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



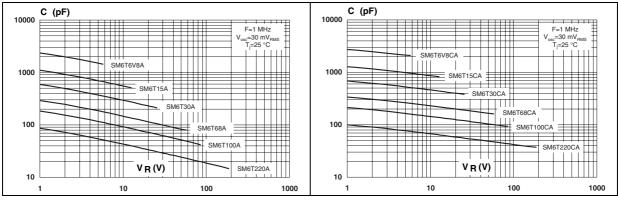


Figure 8. Peak forward voltage drop versus peak forward current (typical values)

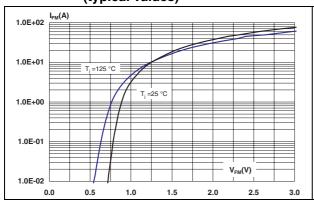
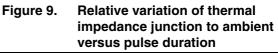


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead



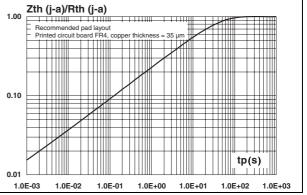
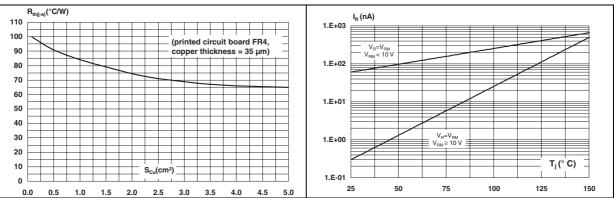
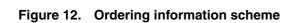
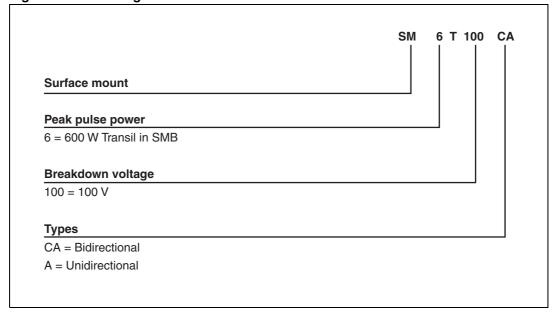


Figure 11. Leakage current versus junction temperature (typical values)



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3 Packaging information

- Case: JEDEC DO-214AA molded plastic over planar junction
- Terminals: solder plated, solderable as per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy meets UL 94, V0
- RoHS package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: <u>www.st.com</u>. ECOPACK[®] is an ST trademark.

Table 4. SMB dimensions

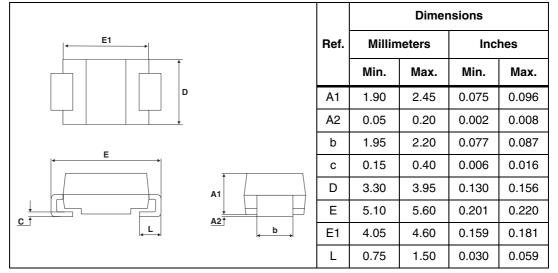
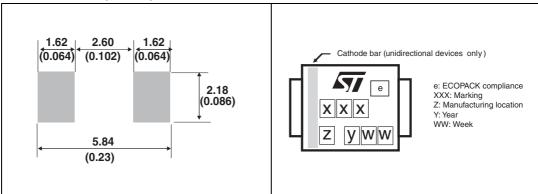


Figure 13. SMB footprint dimensions in Figure 14. Marking layout⁽¹⁾ mm (inches)



1. Marking layout can vary according to assembly location.



Table 5. Marking							
Order code	Marking	Order code	Marking				
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				
SM6T30A	ER	SM6T30CA	MR				
SM6T33A	ET	SM6T33CA	MT				
SM6T36A	EV	SM6T36CA	MV				
SM6T39A	EX	SM6T39CA	MX				
SM6T56A	FL	SM6T56CA	NL				
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				

Table 5. Marking



4 Ordering information

Table 6. Ordering information

Order code	Marking	Package	ackage Weight		Delivery mode
SM6TxxxA/CA ⁽¹⁾	See Table 5 on page 8	SMB	0.11 g	2500	Tape and reel

1. Where xxx is nominal value of V_{BR} and A or CA indicates unidirectional or bidirectional version. See *Table 3* for list of available devices and their order codes

5 Revision history

Table 7.	Document revision	historv
14.0.0		

Date	Revision	Changes
August-2001	4A	Previous update.
15-Sep-2004	5	1. Types table parameters on page 2: I_{RM} @ T_{j} = 85 $^{\circ}C$ 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 <i>Table 1</i> .
25-May-2009	7	Reformatted to current standard. Added standards compliance information on page 1. Added device SM6T56 to <i>Table 3</i> . Updated all characteristic curves.
17-Sep-2009	8	Document updated for low leakage current.
20-Oct-2010	9	Updated Figure 13.

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