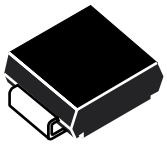
SM6T250CAY

Automotive 600 W Transil™

Datasheet - production data



Bidirectional
SMB
(JEDEC DO-214AA)

Features

- Peak pulse power:
  - 600 W (10/1000 µs)
  - 4 kW (8/20 µs)
- Stand-off voltage 213 V
- Bidirectional type
- Low leakage current:
  - 200 nA at 25 °C
  - 1 µA at 85 °C
- Operating $T_{j\ max}$: 175 °C
- High power capability at $T_{j\ max}$
- JEDEC registered package outline
- Resin meets UL 94, V0
- AEC-Q101 qualified

Complies with the following standards

- IEC 61000-4-2 exceeds level 4:
  - 30 kV (air discharge)
  - 30 kV (contact discharge)
- ISO 10605, C = 330 pF, R = 330 Ω exceeds level 4:
  - 30 kV (air discharge)
  - 30 kV (contact discharge)
- ISO 7637-2

Description

The SM6T250CAY Transil series has been designed to protect sensitive automotive circuits against surges defined in ISO 7637-2 and against electrostatic discharges according to IEC 61000-4-2 and ISO 10605.

The planar technology makes this device compatible with high-end circuits where low leakage current and high junction temperature are required to provide reliability and stability over time. SM6T250CAY is 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 (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	ISO 10605 (C = 330 pF, R = 330 Ω): Contact discharge Air discharge IEC61000-4-2: Contact discharge Air discharge	 30 30 30 30	kV
P_{PP}	Peak pulse power dissipation(1)	T_j initial = T_{amb}	600	W
T_j	Operating junction temperature range		-55 to 175	°C
T_{stg}	Storage temperature range		-65 to 175	°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.

Figure 1. Electrical characteristics - definitions

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{BR}	Breakdown voltage
V_{CL}	Clamping voltage
I_{RM}	Leakage current @ V_{RM}
I_{PP}	Peak pulse current
αT	Voltage temperature coefficient
R_D	Dynamic resistance

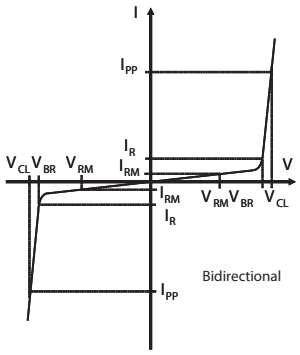


Figure 2. Pulse definition for electrical characteristics

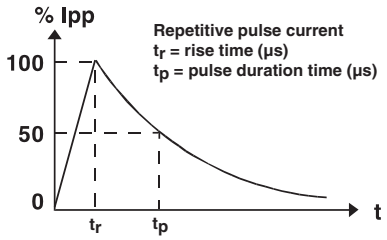


Table 2. Electrical characteristics, parameter values (T_{amb} = 25 °C)

Order code	I_{RM} max at V_{RM}			V_{BR} at I_R (1)				V_{CL} at I_{PP} 10/1000 µs		R_D (2) 10/100 µs	V_{CL} at I_{PP} 8/20 µs		R_D (2) 8/20 µs	αT
	25 °C	85 °C		min.	typ.	max.		max.			max.			max.
	nA	µA	V	V			mA	V(3)	A	Ω	V(3)	A	Ω	10-4/°C
SM6T250CAY	200	1	213	237	250	263	1	344	1.75	53.7	400	10	15	11

1. Pulse test: t_p < 50 ms
2. To calculate maximum clamping voltage at another surge level, use the following formula:
   $V_{CLmax} = V_{CL} - R_D \times (I_{PP} - I_{PPappli})$ where $I_{PPappli}$ is the surge current in the application.
3. To calculate V_{BR} or V_{CL} versus junction temperature, use the following formulas:
   V_{BR} @ T_J = V_{BR} @ 25°C x (1 + αT x (T_J - 25))
   V_{CL} @ T_J = V_{CL} @ 25°C x (1 + αT x (T_J - 25))

Figure 3. Peak power dissipation versus initial junction temperature

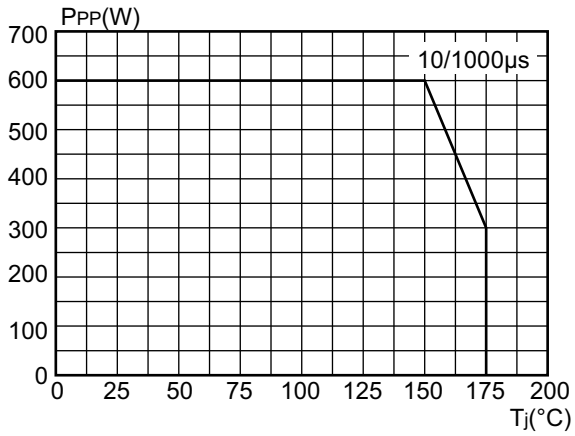


Figure 4. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

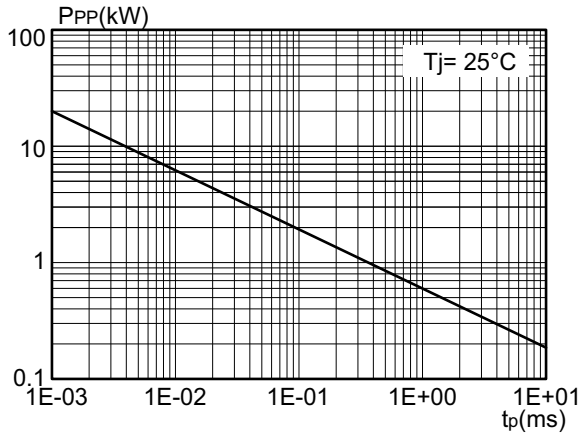


Figure 5. Clamping voltage versus peak pulse current exponential waveform (maximum values)

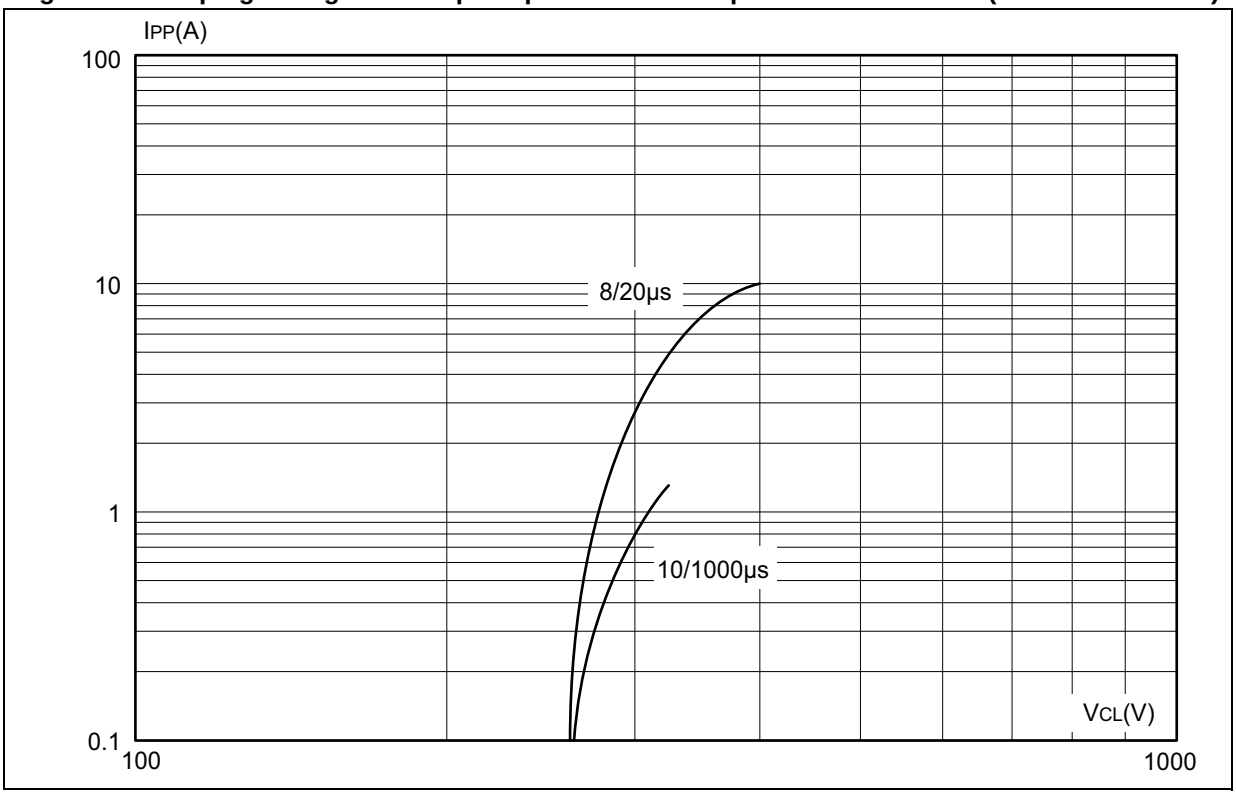


Figure 6. Junction capacitance versus reverse applied (typical values)

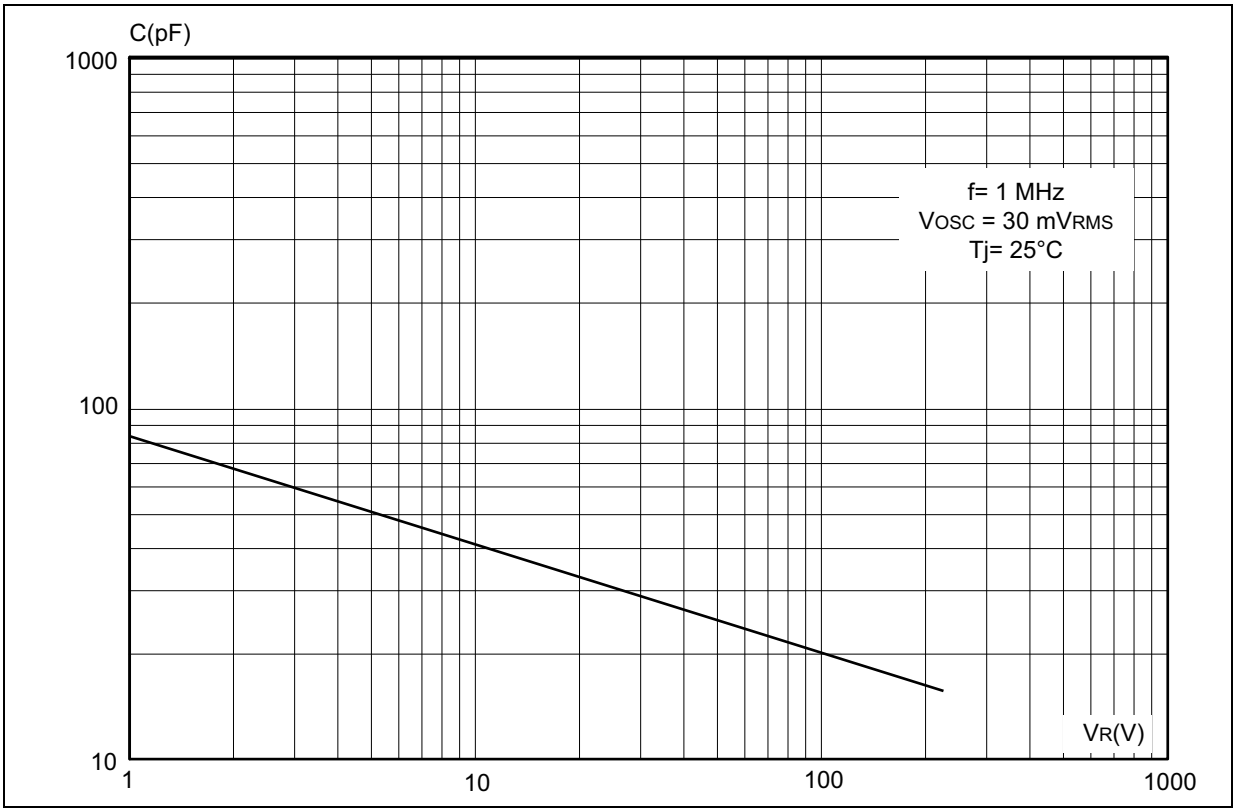


Figure 7. Relative variation of thermal impedance, junction to ambient, versus pulse duration

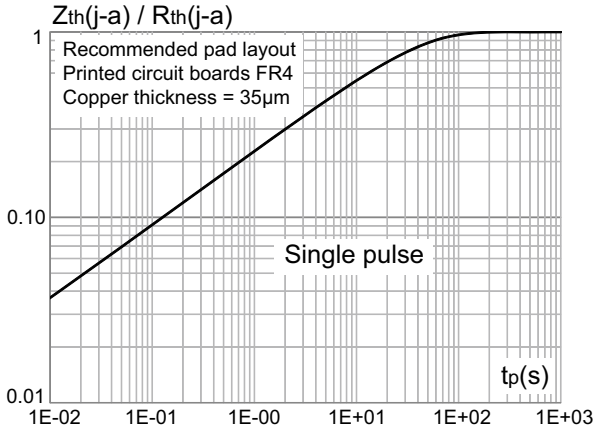


Figure 8. Thermal resistance junction to ambient versus copper surface under each lead

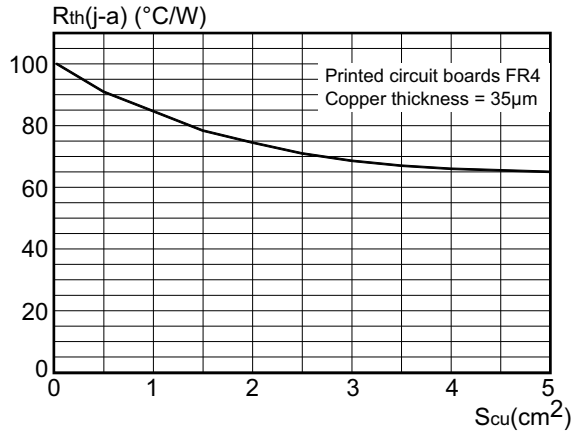
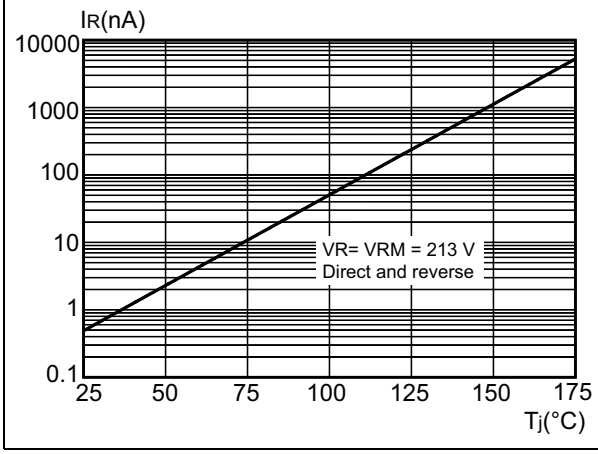


Figure 9. Leakage current versus junction temperature (typical values)



2 Application and design guidelines

More information is available in the ST Application note AN2689 “Protection of automotive electronics from electrical hazards, guidelines for design and component selection”.

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
- Epoxy meets UL94, V0
- Lead-free 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: *www.st.com*. ECOPACK® is an ST trademark.

Figure 10. SMB outline (definitions)

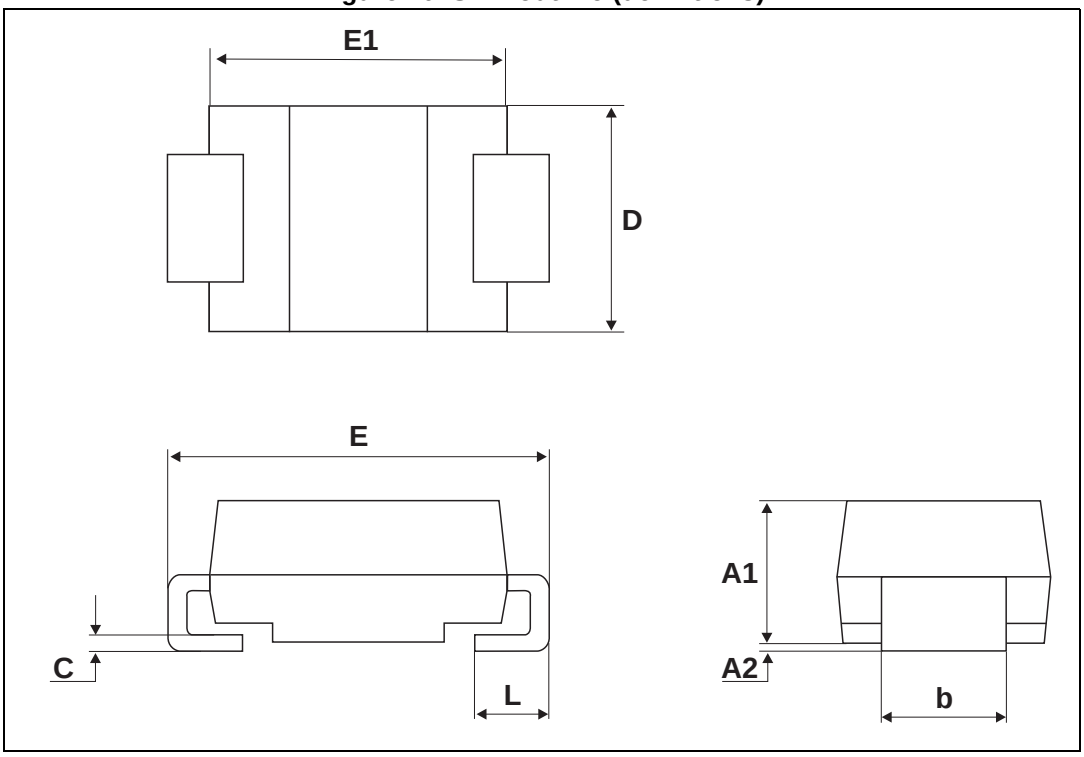


Table 3. SMB dimensions (values)

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)

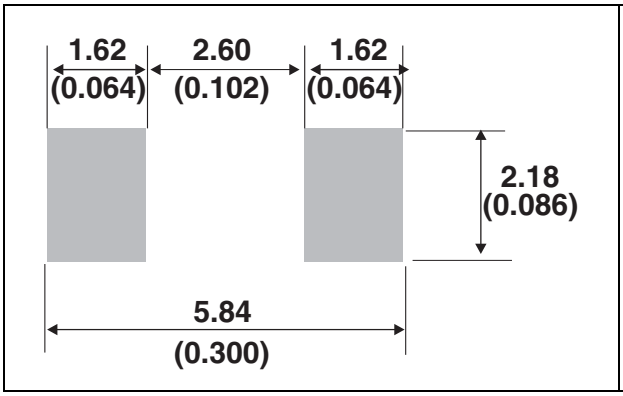
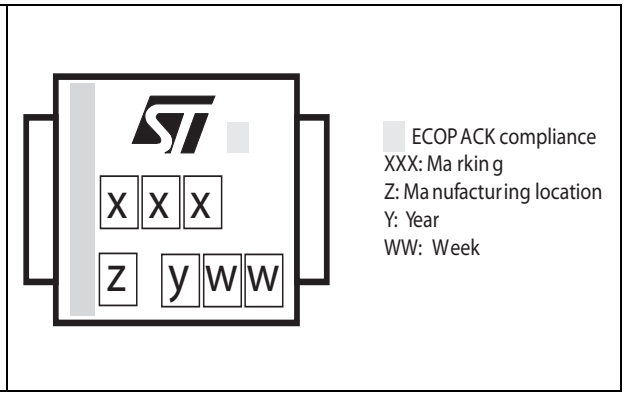


Figure 12. Marking layout(1)



1. Marking layout can vary according to assembly location.

4 Ordering information

Figure 13. Ordering information scheme

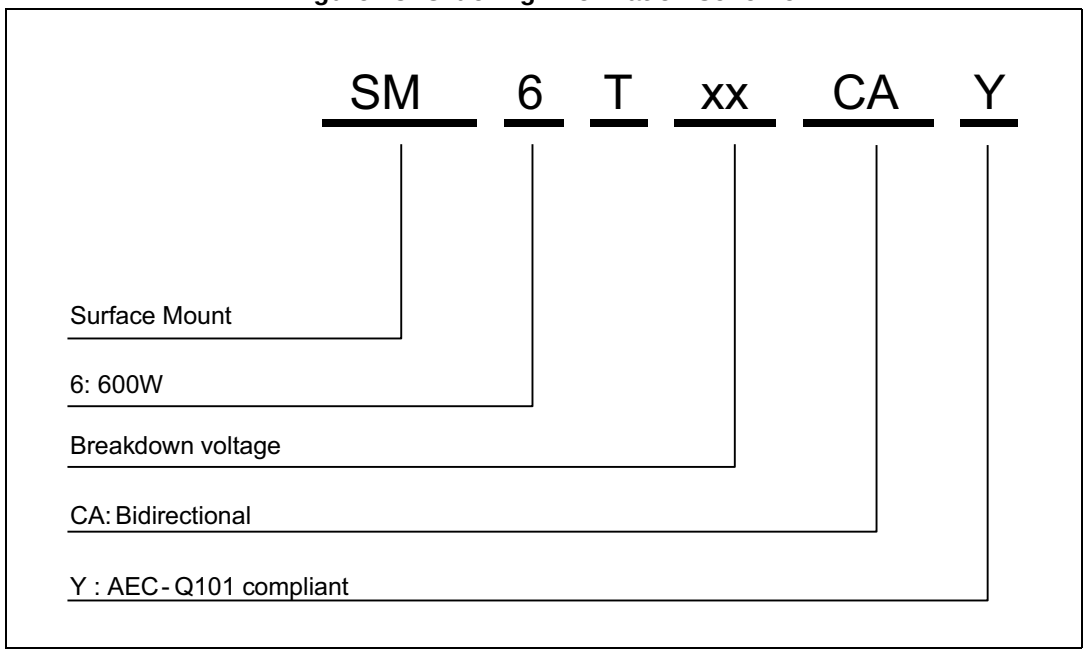


Table 4. Ordering information

Order code	Marking	Weight	Base qty.	Delivery mode
SM6T250CAY	PRY	0.11 g	2500	Tape and reel

5 Revision history

Table 5. Document revision history

Date	Revision	Changes
19-Mar-2015	1	Initial release.
09-Apr-2015	2	Updated *Figure 7*.

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