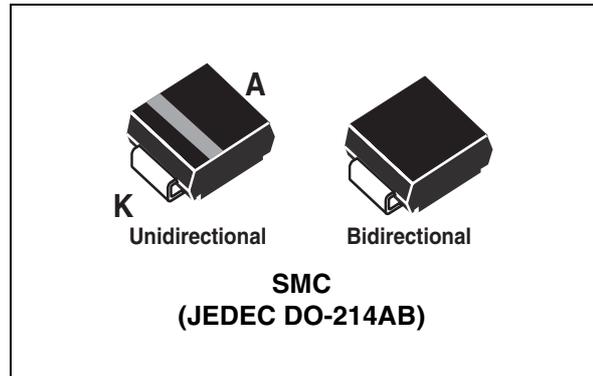


Features

- Peak pulse power: 1500 W (10/1000 μ s)
- Breakdown voltage range: from 6.8 V to 220 V
- Uni and bidirectional types
- Low clamping factor
- Fast response time
- UL recognized

Description

Transil diodes provide high overvoltage protection by clamping action. Their instantaneous response to transient overvoltages makes them particularly suited to protect voltage sensitive devices such as MOS Technology and low voltage supplied IC's.



Order code

Part number	Marking
SM15TxxxA	See Table 5 on page 7
SM15TxxxCA	See Table 5 on page 7

Table 1. Absolute maximum ratings ($T_{amb} = 25^{\circ} C$)

Symbol	Parameter	Value	Unit
P_{PP}	Peak pulse power dissipation ⁽¹⁾	$T_j \text{ initial} = T_{amb}$ 1500	W
P	Power dissipation on infinite heatsink	$T_{amb} = 50^{\circ} C$ 6.5	W
I_{FSM}	Non repetitive surge peak forward current for unidirectional types	$t_p = 10ms$ $T_j \text{ initial} = T_{amb}$ 200	A
T_{stg}	Storage temperature range	-65 to + 175	$^{\circ}C$
T_j	Maximum operating junction temperature	150	$^{\circ}C$
T_L	Maximum lead temperature for soldering during 10 s.	260	$^{\circ}C$

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

Table 2. Thermal parameter

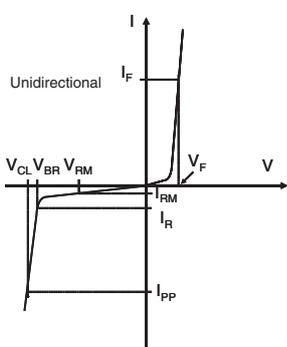
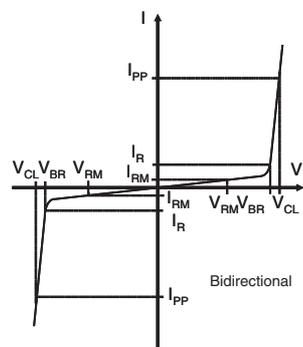
Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to leads	15	$^{\circ}C/W$
$R_{th(j-a)}$	Junction to ambient on printed circuit on recommended pad layout	75	$^{\circ}C/W$

TM: TRANSIL is a trademark of STMicroelectronics

1 Characteristics

Table 3. Electrical characteristics

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

Type	$I_{RM} @ V_{RM}$ max		$V_{BR} @ I_R^{(1)}$				$V_{CL} @ I_{PP}$ 10/1000 μs		$V_{CL} @ I_{PP}$ 8/20 μs		αT max ⁽²⁾	C typ ⁽³⁾
			min	nom	max		max		max			
	μA	V	V	V	V	mA	V	A	V	A	$10^{-4}/^{\circ}C$	pF
SM15T6V8A/CA	1000	5.8	6.45	6.8	7.14	10	10.5	143	13.4	746	5.7	9500
SM15T7V5A/CA	500	6.4	7.13	7.5	7.88	10	11.3	132	14.5	690	6.1	8500
SM15T10A/CA	10	8.55	9.5	10	10.5	1	14.5	103	18.6	538	7.3	7000
SM15T12A/CA	5	10.2	11.4	12	12.6	1	16.7	90	21.7	461	7.8	6000
SM15T15A/CA	1	12.8	14.3	15	15.8	1	21.2	71	27.2	368	8.4	5000
SM15T18A/CA	1	15.3	17.1	18	18.9	1	25.2	59.5	32.5	308	8.8	4300
SM15T22A/CA	1	18.8	20.9	22	23.1	1	30.6	49	39.3	254	9.2	3700
SM15T24A/CA	1	20.5	22.8	24	25.2	1	33.2	45	42.8	234	9.4	3500
SM15T27A/CA	1	23.1	25.7	27	28.4	1	37.5	40	48.3	207	9.6	3200
SM15T30A/CA	1	25.6	28.5	30	31.5	1	41.5	36	53.5	187	9.7	2900
SM15T33A/CA	1	28.2	31.4	33	34.7	1	45.7	33	59.0	169	9.8	2700
SM15T36A/CA	1	30.8	34.2	36	37.8	1	49.9	30	64.3	156	9.9	2500
SM15T39A/CA	1	33.3	37.1	39	41.0	1	53.9	28	69.7	143	10.0	2400
SM15T68A/CA	1	58.1	64.6	68	71.4	1	92	16.3	121	83	10.4	1550
SM15T75A/CA	1	64.1	71.3	---	78.8	1	103	14.6	134	75	10.5	1450
SM15T100A/CA	1	85.5	95.0	100	105	1	137	11	178	56	10.6	1150
SM15T150A/CA	1	128	143	150	158	1	207	7.2	265	38	10.8	850
SM15T200A/CA	1	171	190	200	210	1	274	5.5	353	28	10.8	675
SM15T220A/CA	1	188	209	220	231	1	328	4.6	388	26	10.8	625

1. Pulse test: $t_p < 50$ ms.
2. $\Delta V_{BR} = \alpha T * (T_{amb} - 25) * V_{BR}(25^{\circ}C)$
3. $V_R = 0$ V, $F = 1$ MHz. For bidirectional types capacitance value is divided by 2.

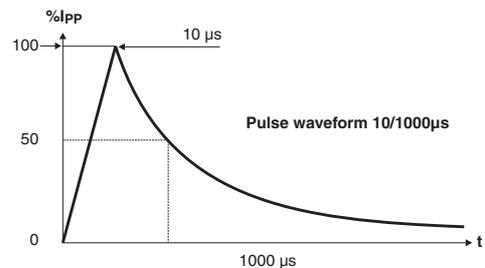


Figure 1. Peak pulse power dissipation versus initial junction temperature (printed circuit board)

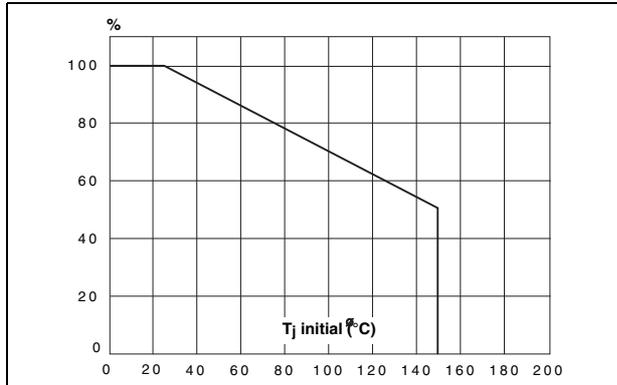


Figure 2. Peak pulse power versus exponential pulse duration

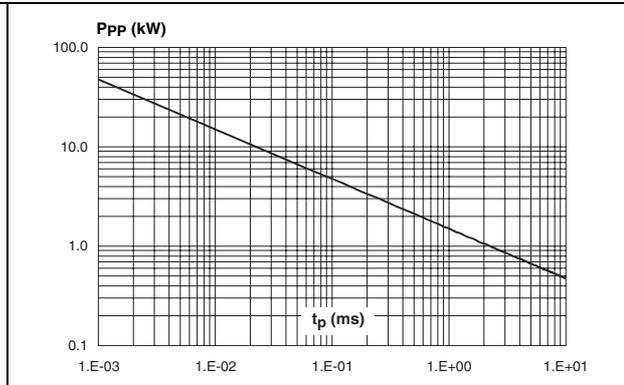
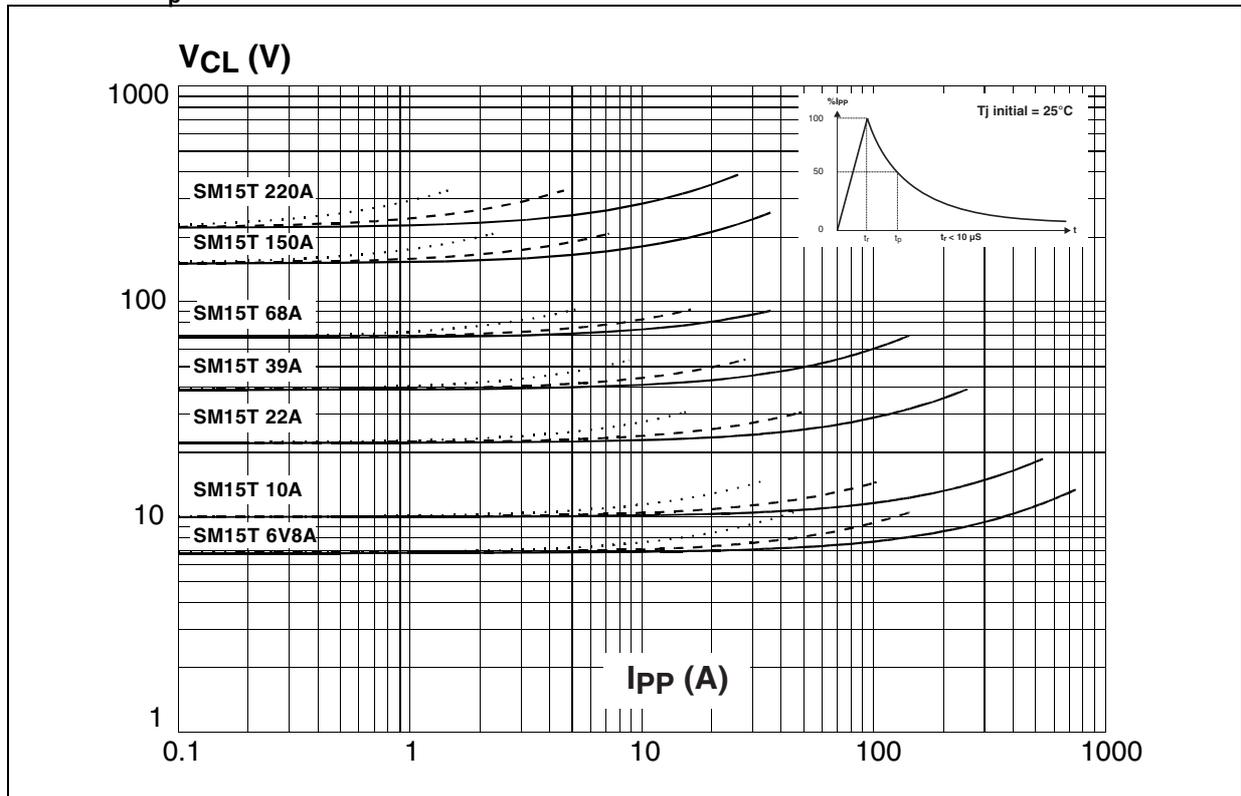


Figure 3. Clamping voltage versus peak pulse current
 Exponential waveform $t_p = 20 \text{ ms}$
 $t_p = 1 \text{ ms}$ —————
 $t_p = 10 \text{ ms}$



Note: The curves of figure 3 are specified for a junction temperature of 25° C before surge. The given results may be extrapolated for other junction temperatures by using the following formula:

$$\Delta V_{BR} = \alpha T * [T_{amb} - 25] * V_{BR} (25^\circ C)$$
For intermediate voltages, extrapolate the given results.

Figure 4. Capacitance versus reverse applied voltage for unidirectional types (typical values)

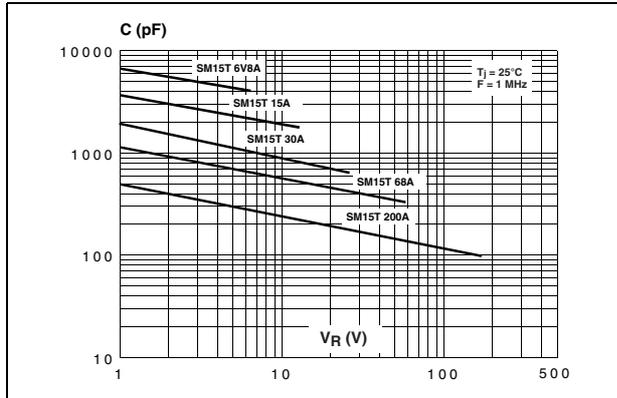


Figure 5. Capacitance versus reverse applied voltage for bidirectional types (typical values)

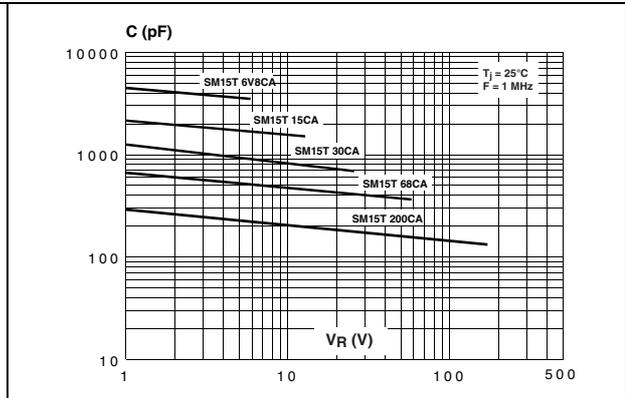


Figure 6. Peak forward voltage drop versus peak forward current (typical values for unidirectional types)

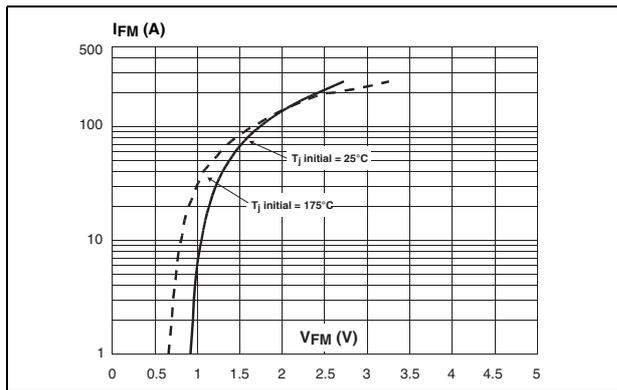


Figure 7. Transient thermal impedance junction-ambient versus pulse duration - mounting on FR4 PC board with recommended pad layout

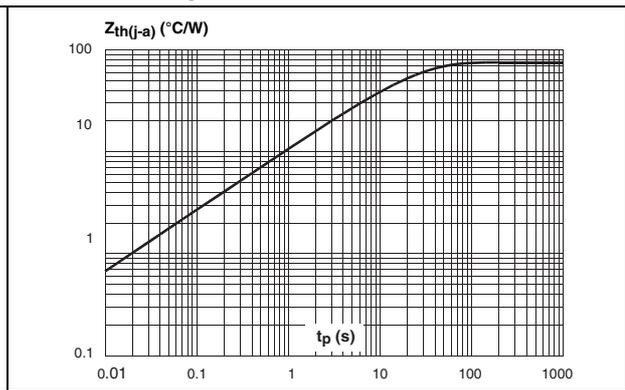
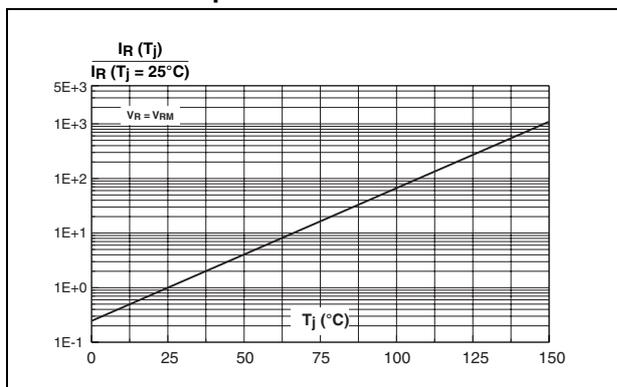
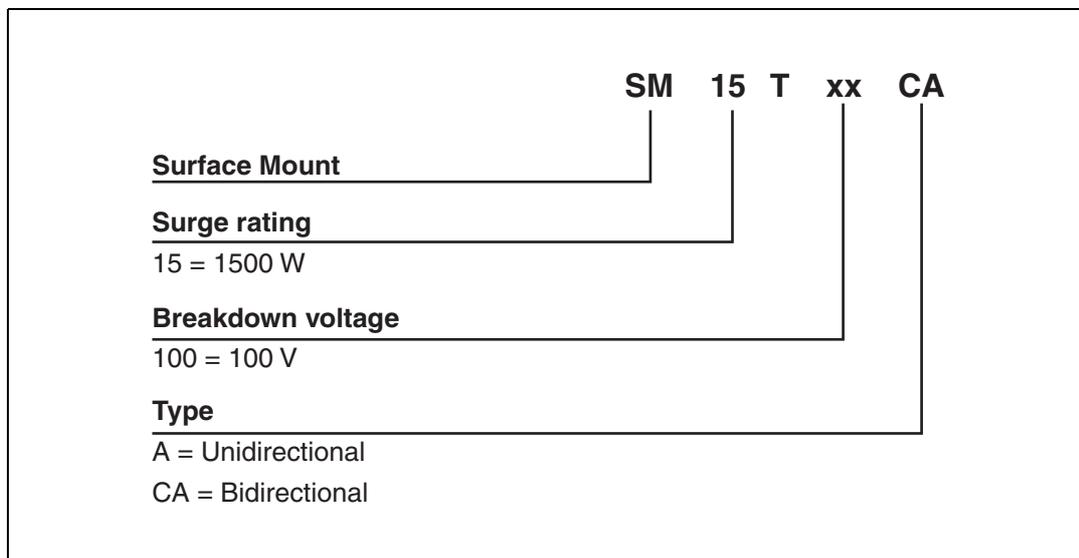


Figure 8. Relative variation of leakage current versus junction temperature



2 Ordering information scheme



3 Package mechanical data

- Case: JEDEC DO-214AB molded plastic over Planar junction
- Terminals: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: For unidirectional types the band indicates cathode
- Flammability: Epoxy is rated UL94V-0
- RoHS package

Table 4. SMC 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	2.90	3.2	0.114	0.126
c	0.15	0.41	0.006	0.016
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
D	5.55	6.25	0.218	0.246
L	0.75	1.60	0.030	0.063

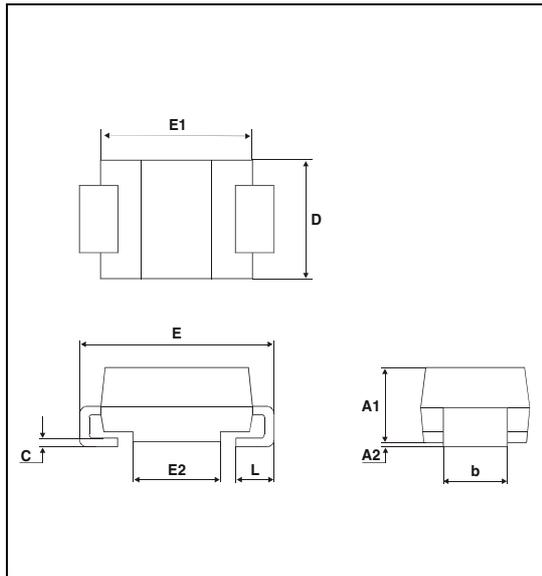


Figure 9. Footprint dimensions (millimeter)

Figure 10. Marking layout

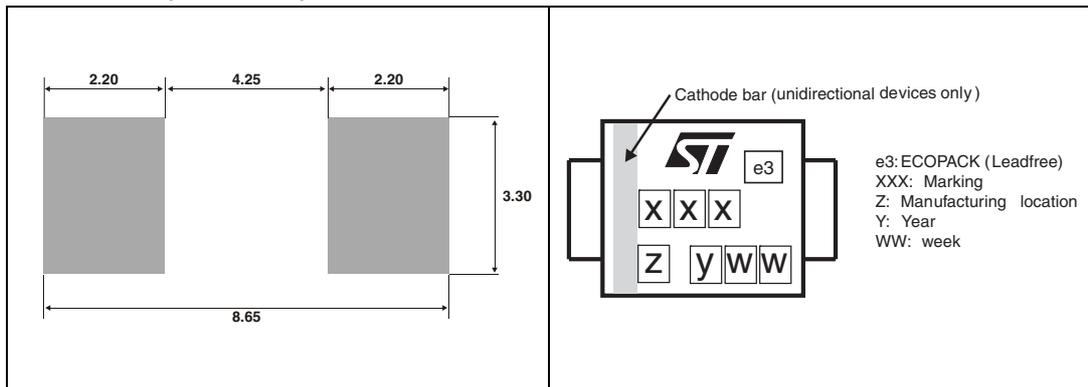


Table 5. Marking

Unidirectional	Marking	Bidirectional	Marking
SM15T6V8A	MDE	SM15T6V8CA	BDE
SM15T7V5A	MDG	SM15T7V5CA	BDG
SM15T10A	MDP	SM15T10CA	BDP
SM15T12A	MDT	SM15T12CA	BDT
SM15T15A	MDX	SM15T15CA	BDX
SM15T18A	MEE	SM15T18CA	BEE
SM15T22A	MEK	SM15T22CA	BEK
SM15T24A	MEM	SM15T24CA	BEM
SM15T27A	MEP	SM15T27CA	BEP
SM15T30A	MER	SM15T30CA	BER
SM15T33A	MET	SM15T33CA	BET
SM15T36A	MEV	SM15T36CA	BEV
SM15T39A	MEX	SM15T39CA	BEX
SM15T68A	MFP	SM15T68CA	BFP
SM15T75A	MFO	SM15T75CA	BFO
SM15T100A	MFX	SM15T100CA	BFX
SM15T150A	MGK	SM15T150CA	BGK
SM15T200A	MGV	SM15T200CA	BGV
SM15T220A	MGX	SM15T220CA	BGX

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.

4 Ordering information

Part number	Marking	Package	Weight	Base qty	Delivery mode
SM15TxxxA	See Table 5 on page 7	SMC	0.25 g	5000	Tape and reel
SM15TxxCA	See Table 5 on page 7				

5 Revision history

Date	Revision	Description of Changes
September-2001	3B	Last issue
19-Feb-2007	4	Reformatted to current standards. Peak pulse power Figure 2 on page 3 updated.

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