

1 Characteristics

Table 1. Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter V					
V_PP		ISO10605 (C = 330 pF, R = 330 Ω):				
	Peak pulse voltage	Contact discharge	30			
		Air discharge	30	137		
		ISO10605 / IEC 61000-4-2 (C = 150 pF, R = 330 Ω)		kV		
		Contact discharge	30			
		Air discharge	30			
P _{PP}	Peak pulse power dissipation T_j initial = T_{amb}		3000	W		
T _{stg}	Storage temperature range	-65 to +175	°C			
Tj	Operating junction temperature ra	-55 to +175	°C			
TL	Maximum lead temperature for soldering during 10 s			°C		

Figure 1. Electrical characteristics - parameter definitions

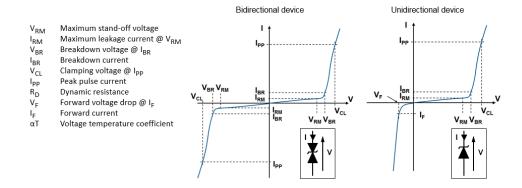
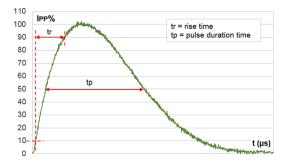


Figure 2. Pulse definition for electrical characteristics



DS8599 - Rev 9 page 2/16



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

			V (1)			10 / 1000 μs			8 / 20µs			_	
_	I _{RM} max at V _{RM}		V _{BR} at I _R ⁽¹⁾			V _{CL} ⁽²⁾⁽³⁾	I _{PP} ⁽⁴⁾		V _{CL} ⁽²⁾⁽³⁾	I _{PP} ⁽⁴⁾		αΤ	
Туре			Min.	Тур.	Max.		Max.		R _D	Max.		R _D	Max.
	μΑ	V		٧		mA	٧	Α	Ω	٧	Α	Ω	10 ⁻⁴ /°C
SM30T6.8AY/CAY	500	5	6.45	6.80	7.10	10	9.20	327	0.007	14.4	1610	0.004	5.7
SM30T7.5AY/CAY	250	6.5	7.13	7.50	7.90	10	11.2	268	0.014	15.2	1530	0.004	6.1
SM30T10AY/CAY	10	8.5	9.50	10.0	10.5	1	14.4	208	0.021	18.6	1280	0.007	7.3
SM30T12AY/CAY	0.2	10	11.4	12	12.6	1	17.0	176	0.028	21.7	1170	0.008	7.8
SM30T15AY/CAY	0.2	13	14.3	15	15.8	1	21.5	140	0.046	27.2	993	0.012	8.4
SM30T18AY/CAY	0.2	15	16.7	17.6	18.5	1	24.4	123	0.055	32.5	926	0.016	8.8
SM30T19AY/CAY	0.2	16	17.8	18.7	19.6	1	26.6	115.4	0.063	34.4	868	0.018	8.8
SM30T21AY/CAY	0.2	18	20	21.1	22.2	1	29.2	102.7	0.079	39.3	800	0.023	9.2
SM30T23AY/CAY	0.2	20	22.2	23.4	24.6	1	32.4	92.6	0.097	42.8	747	0.026	9.4
SM30T26AY/CAY	0.2	22	24.4	25.7	27.0	1	35.5	84.5	0.116	48.3	701	0.032	9.6
SM30T28AY/CAY	0.2	24	26.7	28.1	29.5	1	38.9	77.1	0.140	50.0	660	0.033	9.6
SM30T30AY/CAY	0.2	26	28.9	30.4	31.9	1	42.1	71.3	0.164	53.5	626	0.037	9.7
SM30T33AY/CAY	0.2	28	31.1	32.7	34.3	1	45.4	66.1	0.192	59.0	596	0.044	9.8
SM30T35AY/CAY	0.2	30	33.3	35.1	36.9	1	48.4	62.0	0.215	64.3	569	0.051	9.9
SM30T39AY/CAY	0.2	33	36.7	38.6	40.5	1	53.3	56.3	0.261	69.7	526	0.059	10.0
SM30T42AY/CAY	0.2	36	40.0	42.1	44.2	1	58.1	48.4	0.331	76.0	503	0.067	10.0
SM30T47AY/CAY	0.2	40	44.4	46.7	49	1	64.5	43.5	0.409	84.0	469	0.079	10.1
SM30T56AY/CAY	0.2	48	53.2	56.0	58.8	1	76.6	38.0	0.542	100	409	0.108	10.3

^{1.} To calculate V_{BR} versus T_j : V_{BR} at $T_j = V_{BR}$ at 25 °C x (1 + αT x (T_j - 25))

DS8599 - Rev 9 page 3/16

^{2.} To calculate V_{CL} versus T_j : V_{CL} at T_j = V_{CL} at 25 °C x (1 + αT x (T_j - 25))

^{3.} To calculate V_{CL} max versus $I_{PPappli}$: $V_{CLmax} = V_{BR}$ max + RD x $I_{PPappli}$

^{4.} Surge capability given for both directions for unidirectional and bidirectional devices



1.1 **Characteristics (curves)**

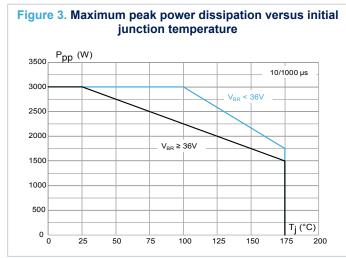
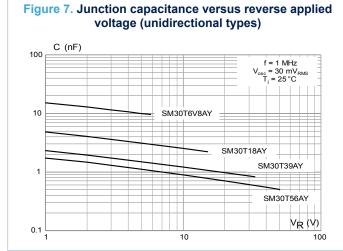
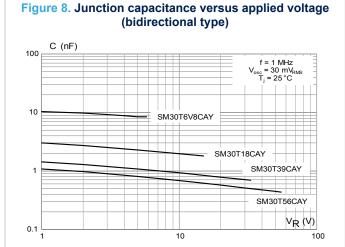


Figure 4. Maximum peak pulse power versus exponential pulse duration P_PP (kW) T_i initial = 25 °C 100 10 t_p (ms) 0.1 ___ 0.1

Figure 5. Maximum peak pulse current versus clamping voltage I_{pp} (A) 10000_E 8/20 µs 10/1000 µs 1000 100 10 SM30T56A/CAY SM30T6V8A/CAY SM30T26A/CAY SM30T39A/CAY SM30T18A/CAY

Figure 6. Dynamic resistance versus pulse duration R_D (Ω) SM30T56AY/CAY SM30T39AY/CAY 0.01 SM30T18AY/CAY SM30T6V8AY/CAY t_p (ms) 0.001





DS8599 - Rev 9 page 4/16

V_{CL} (V)

0.1



Figure 9. Leakage current versus junction temperature $\begin{array}{c} I_{R} \text{ (nA)} \\ \hline 100000 \\ \hline 10000 \\ \hline 10000$

Figure 10. Peak forward voltage drop versus peak forward current $I_F(A)$ 100 single pulse T_i = 175 °C 10 T_i = 25 °C T_j = 150 °C $V_{F_{i}}(V)$ 0.1 0.2 0.4 0.6 0.8 1.2 1.4 1.6 1.8

Figure 11. Thermal impedance junction to ambient versus pulse duration

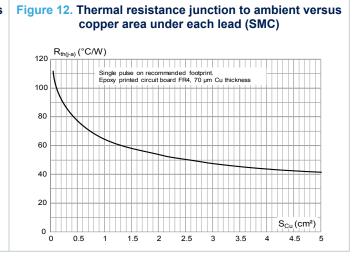
Z_{th(j-a)} (°C/W)

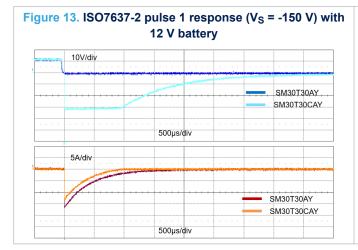
Single pulse on recommended footprint.
Epoxy printed circuit board FR4, 70 µm Cu thickness

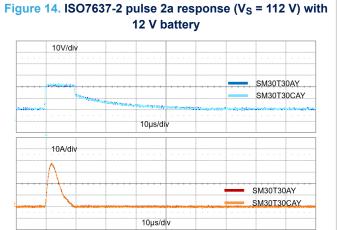
100

100

t_p(s)







DS8599 - Rev 9 page 5/16



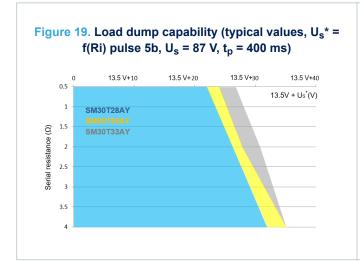
Figure 15. ISO7637-2 pulse 3a response (V_S = -220 V) with Figure 16. ISO7637-2 pulse 3b response (V_S = 150 V) with 12 V battery 10V/div SM30T30AY 200ns/div 1A/div SM30T30AY SM30T30CAY

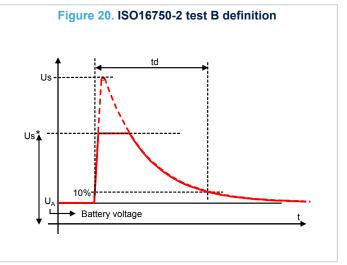
200ns/div

12 V battery 10V/div SM30T30AY SM30T30CAY 200ns/div 1A/div SM30T30AY SM30T30CAY 200ns/div

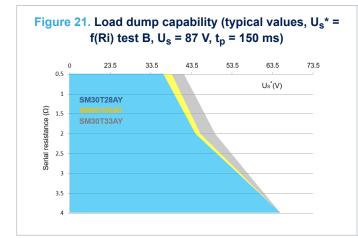
Figure 17. ISO7637-2 pulse 5b definition 10% 13.5 \ Battery voltage

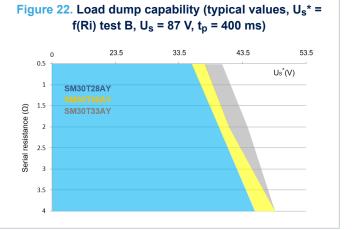
Figure 18. Load dump capability (typical values, U_s^* = f(Ri) pulse 5b, $U_s = 87 \text{ V}$, $t_p = 150 \text{ ms}$) 13.5 V+10 13.5 V+20 13.5 V+30 13.5 V+40 13.5 V+50 13.5 V+60 0.5 13.5V + Us*(V) SM30T28AY Serial resistance (Ω) 1.5











DS8599 - Rev 9 page 7/16



2 Package information

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.

2.1 SMC package information

Figure 23. SMC package outline

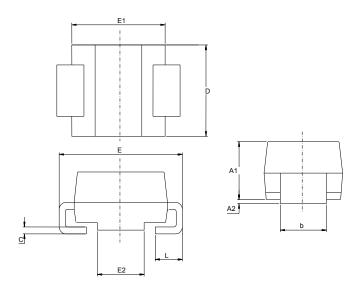


Table 3. SMC package mechanical data

	Dimensions						
Ref.	Millin	neters	Inches (for reference only)				
	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	3.20	0.114	0.126			
С	0.15	0.40	0.006	0.016			
D	5.55	6.25	0.218	0.246			
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			
L	0.75	1.50	0.030	0.060			

DS8599 - Rev 9 page 8/16



1.54 5.11 (0.061) (0.201) (0.061) (0.061) (0.124) (0.323) millimeters (inches)

Cathode bar (unidirectional devices only)

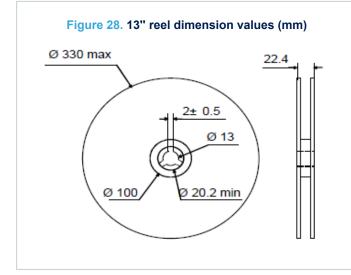
E: ECOPACK grade
XXXX: Marking
Z: Manufacturing location
Y: Year
WW: week

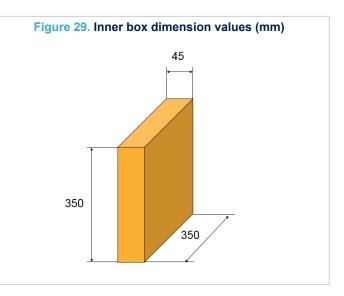
Figure 26. Package orientation in reel

Bidirectional

Taped according to EIA-481
Pocket dimensions are not on scale.
Pocket shape may vary depending on package
On bidirectional devices, marking and logo may not be always in the same direction.



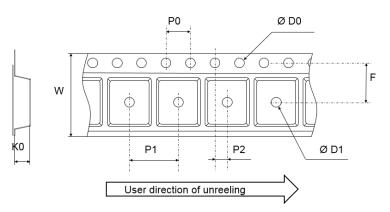




DS8599 - Rev 9 page 9/16



Figure 30. Tape outline



Note: Pocket dimensions are not on scale Pocket shape may vary depending on package

Table 4. Tape dimension values

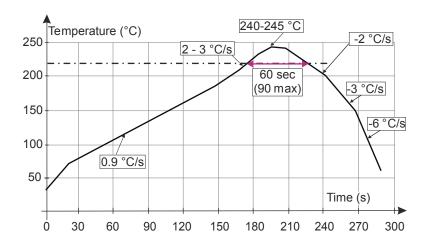
	Dimensions								
Ref.	Millimeters								
	Min.	Тур.	Max.						
D0	1.4	1.5	1.6						
D1	1.5								
F	7.4	7.5	7.6						
K0	2.39	2.49	2.59						
P0	3.9	4.0	4.1						
P1	7.9	8.0	8.1						
P2	1.9	2.0	2.1						
W	15.7	16	16.3						

DS8599 - Rev 9 page 10/16



2.2 Reflow profile

Figure 31. ST ECOPACK recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

DS8599 - Rev 9 page 11/16



Application and design guidelines

3 Application and design guidelines

More information is available in the application note AN2689 "Protection of automotive electronics from electrical hazards, guidelines for design and component selection".

DS8599 - Rev 9 page 12/16



4 Ordering information

Figure 32. Ordering information scheme

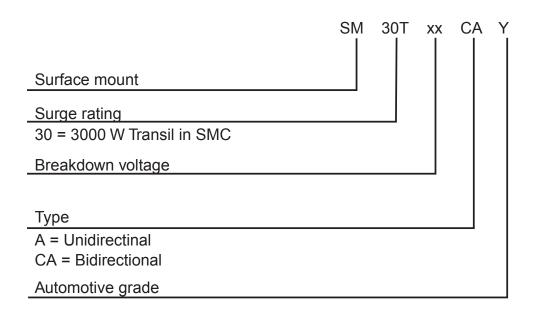


Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
SM30TxxAY/CAY ⁽¹⁾	See Table 6. Marking.	SMC	0.25 g	2500	Tape and reel

^{1.} Where xx is nominal value of V_{BR} and A or CA indicates unidirectional or bidirectional type.

DS8599 - Rev 9 page 13/16



4.1 Marking

Table 6. Marking

Order code	Marking	Order code	Marking
SM30T6.8AY	3AAAY	SM30T6.8CAY	3BAAY
SM30T7.5AY	3AACY	SM30T7.5CAY	3BACY
SM30T10AY	3AADY	SM30T10CAY	3BADY
SM30T12AY	3AAWY	SM30T12CAY	3BAWY
SM30T15AY	3AAGY	SM30T15CAY	3BAGY
SM30T18AY	3AAHY	SM30T18CAY	3BAHY
SM30T19AY	3AAIY	SM30T19CAY	3BAIY
SM30T21AY	3AAJY	SM30T21CAY	3BAJY
SM30T23AY	3AAKY	SM30T23CAY	3BAKY
SM30T26AY	3AALY	SM30T26CAY	3BALY
SM30T28AY	3AAEY	SM30T28CAY	3BAEY
SM30T30AY	3AAMY	SM30T30CAY	3BAMY
SM30T33AY	3AANY	SM30T33CAY	3BANY
SM30T35AY	3AAOY	SM30T35CAY	3BAOY
SM30T39AY	3AAPY	SM30T39CAY	3BAPY
SM30T42AY	3AAQY	SM30T42CAY	3BAQY
SM30T47AY	3AARY	SM30T47CAY	3BARY
SM30T56AY	3AASY	SM30T56CAY	3BASY

DS8599 - Rev 9 page 14/16



Revision history

Table 7. Document revision history

Date	Version	Changes
28-Jul-2011	1	Initial release.
27-Mar-2012	2	Updated footnote on page 1. Removed Table 2. Thermal parameter.
02-Jun-2014	3	Updated : Features, Table 2, Table 4 and reformatted to current standard.
09-Jan-2015	4	Updated Features, Table 2, Table 4, Figure 5 to Figure 8 and Figure 11 to Figure 21.
13-Jul-2015	5	Updated features in cover page, Table 1, Table 2 and Table 4. Updated Figure 3, Figure 5, Figure 6, Figure 7, Figure 8, Figure 9, Figure 11, Figure 12, Figure 13, Figure 14, Figure 15, Figure 17, Figure 18, Figure 20 and Figure 21.
27-Jul-2015	6	Updated Figure 10 and Figure 15.
02-Sep-2019	7	Updated Table 2. Electrical characteristics - parameter values (T _{amb} = 25 °C, unless otherwise specified) and Section 1.1 Characteristics (curves).
17-Oct-2019	8	Updated Section 2.1 SMC package information.
03-Nov-2021	9	Updated Figure 11.

DS8599 - Rev 9 page 15/16



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DS8599 - Rev 9 page 16/16