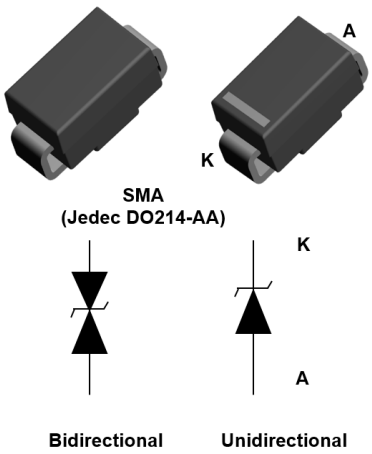
SMA6JxxA, SMA6JxxCA

Datasheet

600 W TVS in SMA



Product status link
SMA6J5.0A, SMA6J5.0CA,
SMA6J6.0A, SMA6J6.0CA,
SMA6J6.5A, SMA6J6.5CA,
SMA6J8.5A, SMA6J8.5CA,
SMA6J10A, SMA6J10CA,
SMA6J12A, SMA6J12CA,
SMA6J13A, SMA6J13CA,
SMA6J15A, SMA6J15CA,
SMA6J18A, SMA6J18CA,
SMA6J20A, SMA6J20CA,
SMA6J24A, SMA6J24CA,
SMA6J26A, SMA6J26CA,
SMA6J28A, SMA6J28CA,
SMA6J33A, SMA6J33CA,
SMA6J40A, SMA6J40CA,
SMA6J48A, SMA6J48CA,
SMA6J58A, SMA6J58CA,
SMA6J70A, SMA6J70CA,
SMA6J85A, SMA6J85CA.

Features

- Peak pulse power:
  - 600 W (10/1000 µs)
  - 4 kW (8/20 µs)
- Stand-off voltage range from 5 V to 85 V
- Unidirectional and bidirectional types
- Low leakage current:
  - 0.2 µA at 25 °C
  - 1 µA at 85 °C
- Operating T_j max: 175 °C
- JEDEC registered package outline
- Resin meets UL94, V0

Complies with the following standards

- UL94, V0
- J-STD-020 MSL level 1
- J-STD-002, JESD 22-B102 E3 and MIL-STD-750, method 2026 solderable matte tin plated leads
- JESD-201 class 2 whisker test
- IPC7531 footprint
- JEDEC registered package outline
- IEC 61000-4-4 level 4:
  - 4 kV
- IEC 61000-4-2, C = 150 pF - R = 330 Ω exceeds level 4:
  - 30 kV (air discharge)
  - 30 kV (contact discharge)

Description

The SMA6J series are designed to protect sensitive automotive circuits against surges defined in ISO 7637-2 and against electrostatic discharges according to ISO 10605.

The Planar technology makes it compatible with high-end circuits where low leakage current and high junction temperature are required to provide long term reliability and stability. SMA6J devices are packaged in SMA (SMA footprint in accordance with IPC 7531 standard).

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	IEC 61000-4-2 (C = 150 pF, R = 330 Ω) Contact discharge Air discharge	 30 30	kV
P_{PP}	Peak pulse power dissipation	T_j initial = T_{amb}	600	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature range		-55 to +175	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

Figure 1. Electrical characteristics - parameter definitions

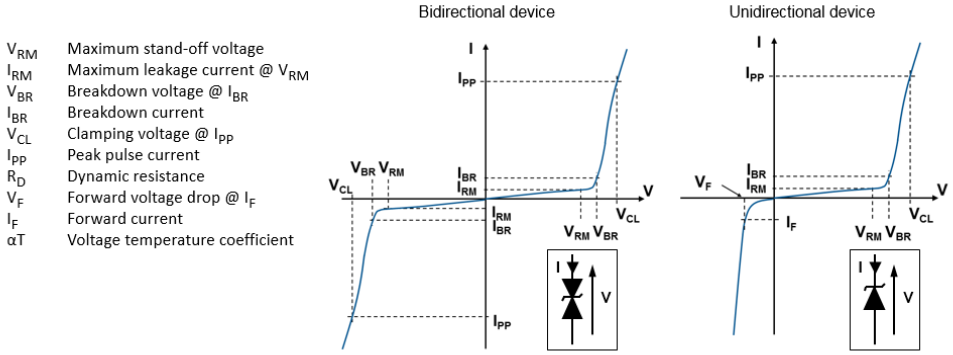


Figure 2. Pulse definition for electrical characteristics

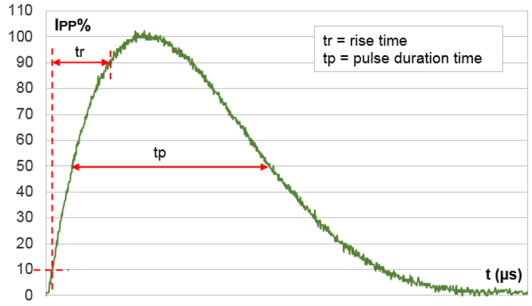


Table 2. Electrical characteristics - parameter values (T_{amb} = 25 °C, unless otherwise specified)

Type	I_{RM} max at V_{RM}			V_{BR} at I_{BR} (1)				10 / 1000 µs			8 / 20µs			αT
								V_{CL}(2)(3)	I_{PP}(4)	R_D	V_{CL}(2)(3)	I_{PP}(4)	R_D	
	25 °C	85 °C		Min.	Typ.	Max.		Max.		Max.	Max.		Max.	Max.
	µA		V	V			mA	V	A	Ω	V	A	Ω	10^{-4}/°C
SMA6J5.0A/CA	20	50	5.0	6.40	6.74	7.07	10	9.1	68	0.029	14.4	275	0.027	5.7
SMA6J6.0A/CA	20	50	6.0	6.70	7.05	7.41	10	9.5	61	0.034	14.8	270	0.027	5.9
SMA6J6.5A/CA	20	50	6.5	7.20	7.58	7.96	10	10.2	56	0.040	15.2	266	0.027	6.1
SMA6J8.5A/CA	20	50	8.5	9.4	9.9	10.4	1	13.3	41.7	0.070	19.5	205	0.044	7.3
SMA6J10A/CA	0.2	1	10	11.1	11.7	12.3	1	15.7	37	0.093	21.7	184	0.051	7.8
SMA6J12A/CA	0.2	1	12	13.3	14.0	14.7	1	18.8	31	0.133	25.3	157	0.068	8.3
SMA6J13A/CA	0.2	1	13	14.4	15.2	15.9	1	20.4	29	0.154	27.2	147	0.076	8.4
SMA6J15A/CA	0.2	1	15	16.7	17.6	18.5	1	23.6	25.1	0.206	32.5	123	0.114	8.8
SMA6J18A/CA	0.2	1	18	20.0	21.1	22.1	1	28.3	21.5	0.288	39.3	102	0.168	9.2
SMA6J20A/CA	0.2	1	20	22.2	23.4	24.5	1	31.4	19.4	0.354	42.8	93	0.196	9.4
SMA6J24A/CA	0.2	1	24	26.7	28.1	29.5	1	37.8	16	0.516	50	80	0.256	9.6
SMA6J26A/CA	0.2	1	26	28.9	30.4	31.9	1	40.9	14.9	0.600	53.5	75	0.288	9.7
SMA6J28A/CA	0.2	1	28	31.1	32.7	34.4	1	44.0	13.8	0.697	59	68	0.363	9.8
SMA6J33A/CA	0.2	1	33	36.7	38.6	40.6	1	51.9	11.8	0.963	69	57	0.512	10.0
SMA6J40A/CA	0.2	1	40	44.4	46.7	49.1	1	62.8	9.7	1.42	84	48	0.728	10.1
SMA6J48A/CA	0.2	1	48	53.3	56.1	58.9	1	75.4	8.1	2.04	100	40	1.03	10.3
SMA6J58A/CA	0.2	1	58	64.4	67.8	71.2	1	91.1	6.7	2.97	121	33	1.51	10.4
SMA6J70A/CA	0.2	1	70	77.8	81.9	86.0	1	110	5.5	4.38	146	27	2.22	10.5
SMA6J85A/CA	0.2	1	85	94	99	104	1	134	4.6	6.45	178	22.5	3.29	10.6

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))*
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 3. Maximum peak power dissipation versus initial junction temperature

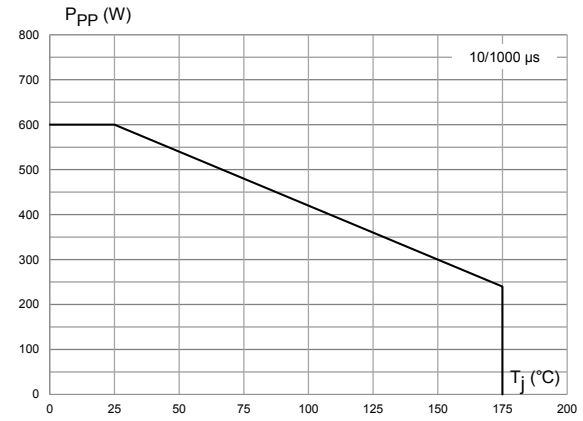


Figure 4. Maximum peak pulse power versus exponential pulse duration

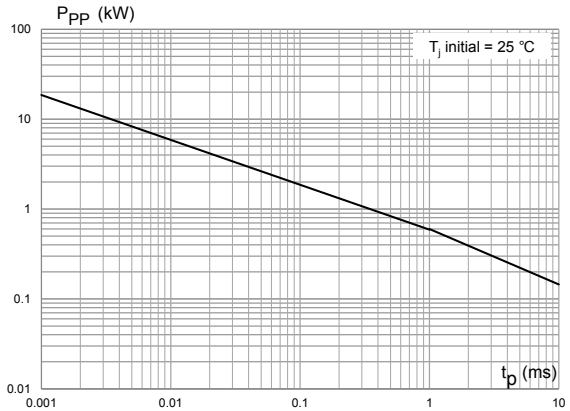


Figure 5. Maximum peak pulse current versus clamping voltage

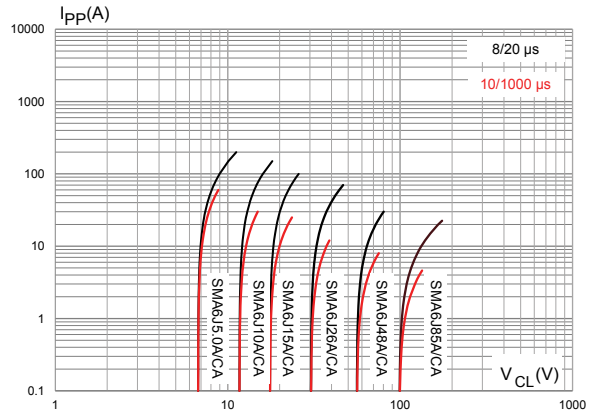


Figure 6. Dynamic resistance versus pulse duration

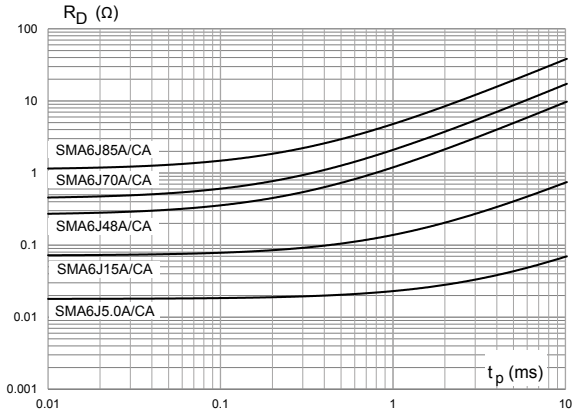


Figure 7. Junction capacitance versus reverse applied voltage (unidirectional type)

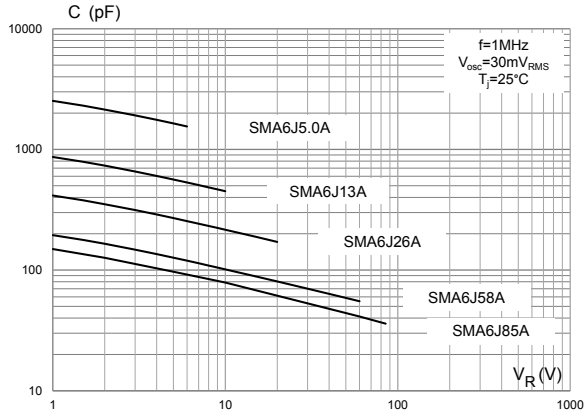


Figure 8. Junction capacitance versus applied voltage (bidirectional type)

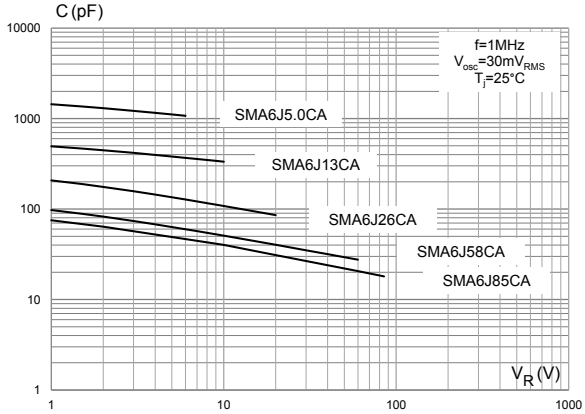


Figure 9. Leakage current versus junction temperature

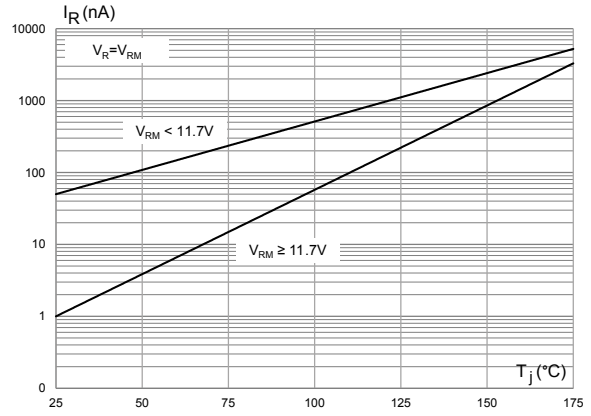


Figure 10. Peak forward voltage drop versus peak forward current

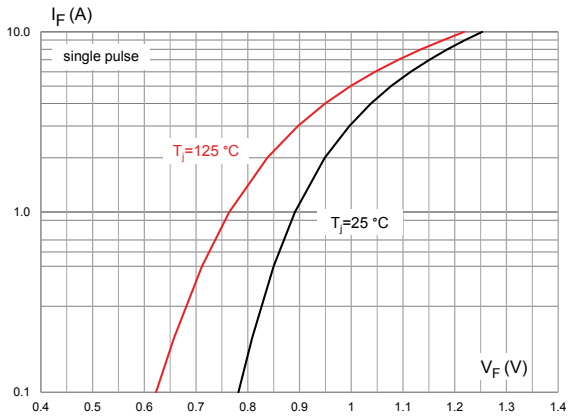


Figure 11. Thermal impedance junction to ambient versus pulse duration

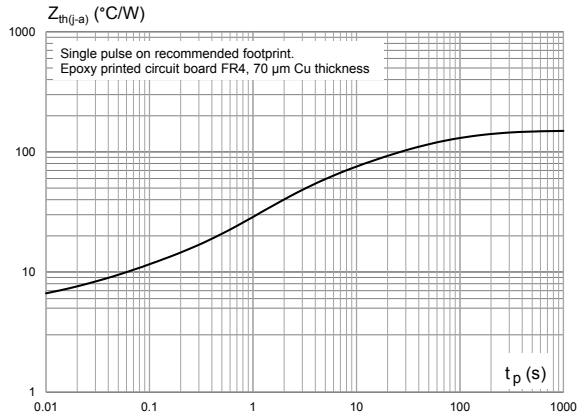
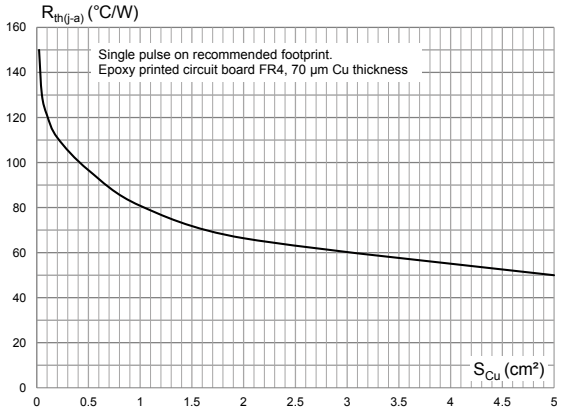


Figure 12. Thermal resistance junction to ambient versus copper area under each lead



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 SMA package information

Figure 13. SMA package outline

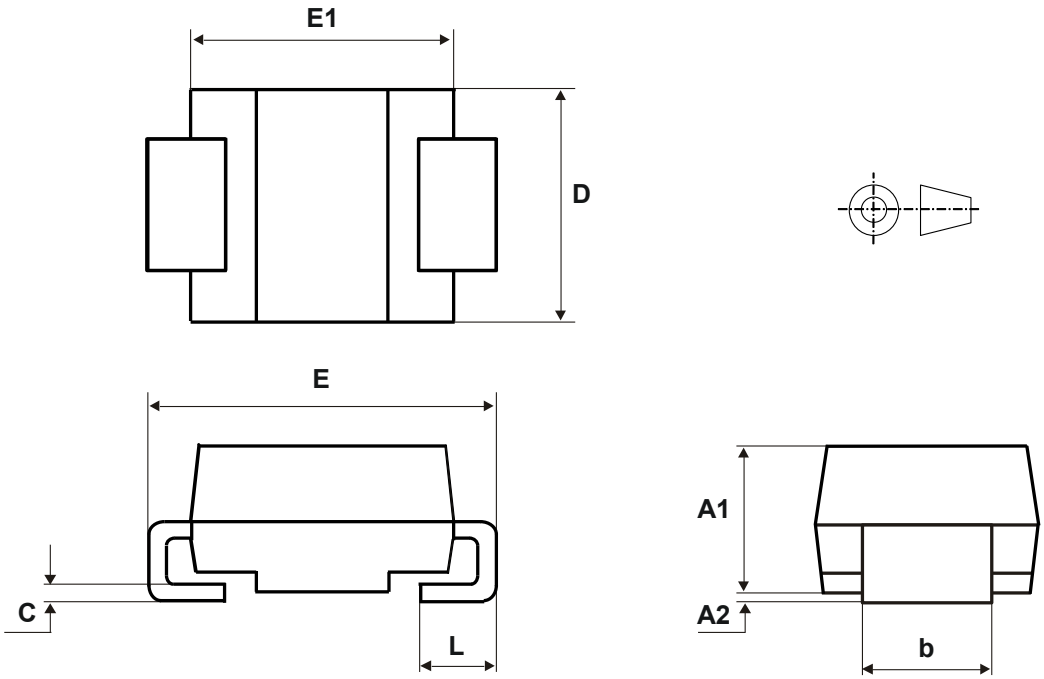


Table 3. SMA package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.074	0.097
A2	0.05	0.20	0.001	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.005	0.016
D	2.25	2.90	0.088	0.115
E	4.80	5.35	0.188	0.211
E1	3.95	4.60	0.155	0.182
L	0.75	1.50	0.029	0.060

Figure 14. SMA recommended footprint in mm (inches)

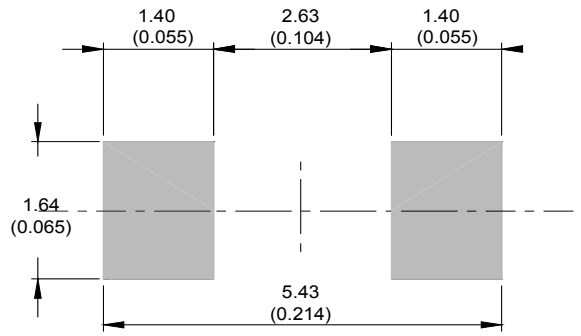
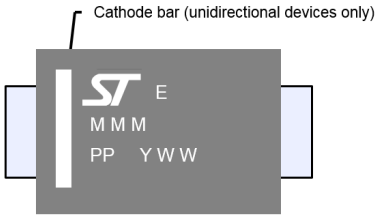
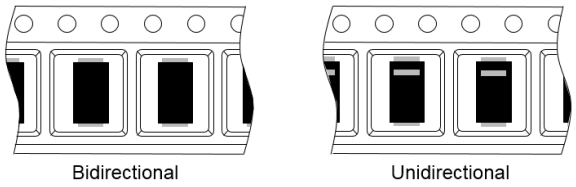


Figure 15. SMA marking



E : ECOPACK grade
MMM : Marking
PP : Assembly location
Y : Year
WW : week

Figure 16. Package orientation in reel



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.

Figure 17. Tape and reel orientation

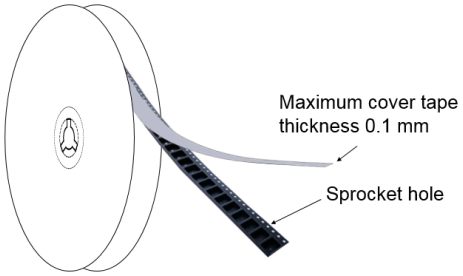


Figure 18. 13" reel dimension values

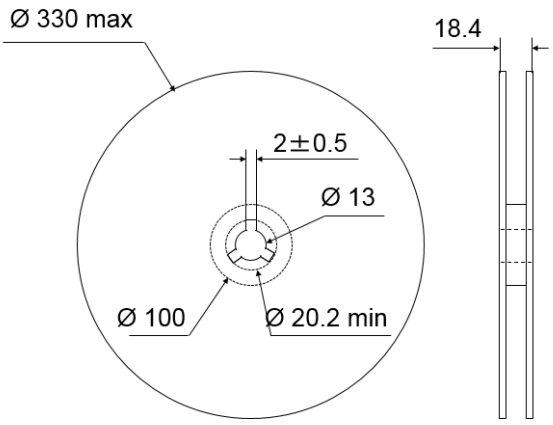


Figure 19. Inner box dimension values

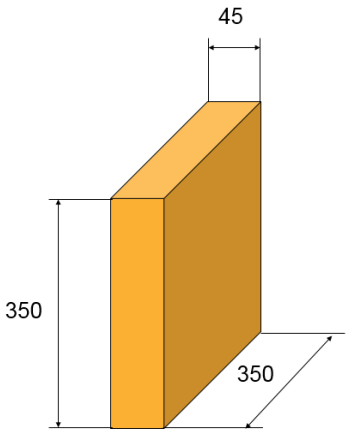
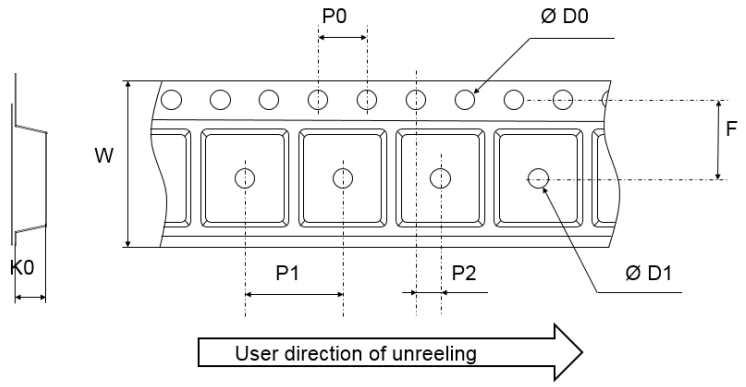


Figure 20. **Tape outline**



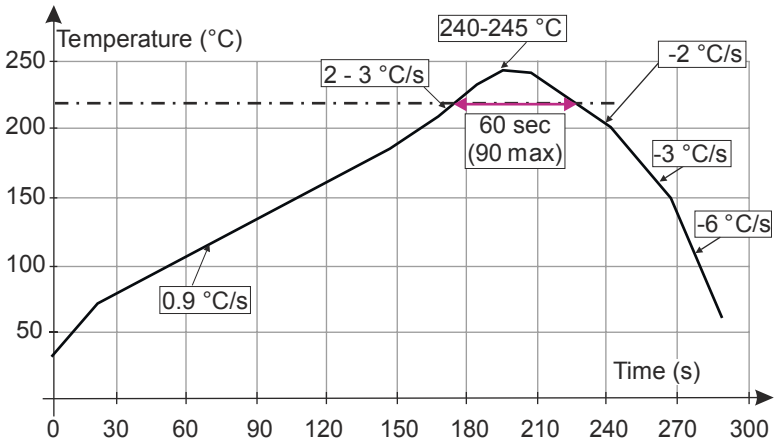
Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 4. **Tape dimension values**

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.40	1.50	1.60
D1	1.50		
F	5.40	5.50	5.60
K0	2.26	2.36	2.46
P0	3.90	4.00	4.10
P1	3.90	4.00	4.10
P2	1.95	2.00	2.05
W	11.70	12.00	12.30

2.2 Reflow profile

Figure 21. 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.

3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
SMA6JxxA/CA[1]	See Table 6. Marking.	SMA	72 mg	5000	Tape and reel

1. *Where xx is V_{RM} and A or CA indicates unidirectional or bidirectional version.*

Table 6. Marking

Type	Marking	Type	Marking
SMA6J5.0A-TR	6UA	SMA6J5.0CA-TR	6BA
SMA6J6.0A-TR	6UB	SMA6J6.0CA-TR	6BB
SMA6J6.5A-TR	6UC	SMA6J6.5CA-TR	6BC
SMA6J8.5A-TR	6UD	SMA6J8.5CA-TR	6BD
SMA6J10A-TR	6UE	SMA6J10CA-TR	6BE
SMA6J12A-TR	6UF	SMA6J12CA-TR	6BF
SMA6J13A-TR	6UG	SMA6J13CA-TR	6BG
SMA6J15A-TR	6UH	SMA6J15CA-TR	6BH
SMA6J18A-TR	6UJ	SMA6J18CA-TR	6BJ
SMA6J20A-TR	6UK	SMA6J20CA-TR	6BK
SMA6J24A-TR	6UM	SMA6J24CA-TR	6BM
SMA6J26A-TR	6UN	SMA6J26CA-TR	6BN
SMA6J28A-TR	6UO	SMA6J28CA-TR	6BO
SMA6J33A-TR	6UQ	SMA6J33CA-TR	6BQ
SMA6J40A-TR	6UR	SMA6J40CA-TR	6BR
SMA6J48A-TR	6US	SMA6J48CA-TR	6BS
SMA6J58A-TR	6UT	SMA6J58CA-TR	6BT
SMA6J70A-TR	6UU	SMA6J70CA-TR	6BU
SMA6J85A-TR	6UV	SMA6J85CA-TR	6BV

Revision history

Table 7. **Document revision history**

Date	Revision	Changes
21-Feb-2007	1	First issue.
7-Nov-2007	2	Updated Description. Improved readability of Ordering information scheme. Reformatted to current standards.
04-Aug-2014	3	Updated weight in Table 7.
28-Oct-2015	4	Updated Table 4 and Figure 3.
04-Jul-2017	5	Updated Table 4.
22-Jan-2018	6	Updated Table3.
30-Aug-2018	7	Updated Table 6. Marking.
30-Mar-2022	8	Update after termination of V_{RM} > 90 V. Minor text changes.