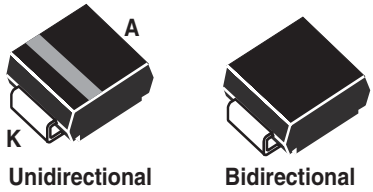
SMAJ

Transil™



SMA
(JEDEC DO-214AC)

Features

- Peak pulse power:
  - 400 W (10/1000 µs)
- Stand off voltage range: from 5 V to 188 V
- Unidirectional and bidirectional types
- Operating T_j max: 150 °C
- JEDEC registered package outline

Complies with the following standards

- IEC61000-4-2 level 4
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- IEC61000-4-5 (see *Table 3* for surge level)
- MIL STD 883G - Method 3015-7 Class 3B
  - 25 kV HBM (human body model)
- UL94V-0 approved resin
- MIL-STD-750, Method 2026 solderabilty
- EIA STD RS-481 and IEC60286-3 packing
- IPC7531 footprint

Description

The SMAJ Transil series has been designed to protect sensitive equipment against electrostatic discharges according to IEC61000-4-2, MIL STD 883 Method 3015, and electrical overstress such as IEC61000-4-4 & 5. They are generally for surges below 400 W 10/1000 µs.

The planar technology makes it compatible with high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time.

SMAJ are packaged in SMA (SMA footprint in accordance with IPC 7531 standard).

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1 Characteristics

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

Symbol	Parameter		Value	Unit
P_{PP}	Peak pulse power dissipation (1)	T_j initial = T_{amb}	400	W
P	Power dissipation on infinite heatsink	T_{amb} = 50 °C	3.3	W
I_{FSM}	Non repetitive surge peak forward current for unidirectional types	t_p = 10 ms T_j initial = T_{amb}	40	A
T_{stg}	Storage temperature range		-65 to +150	°C
T_j	Operating junction temperature range		-55 to +150	°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.

Table 2. Thermal resistances

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to leads	30	°C/W
$R_{th(j-a)}$	Junction to ambient on printed circuit on recommended pad layout	120	°C/W

Figure 1. Electrical characteristics - parameters

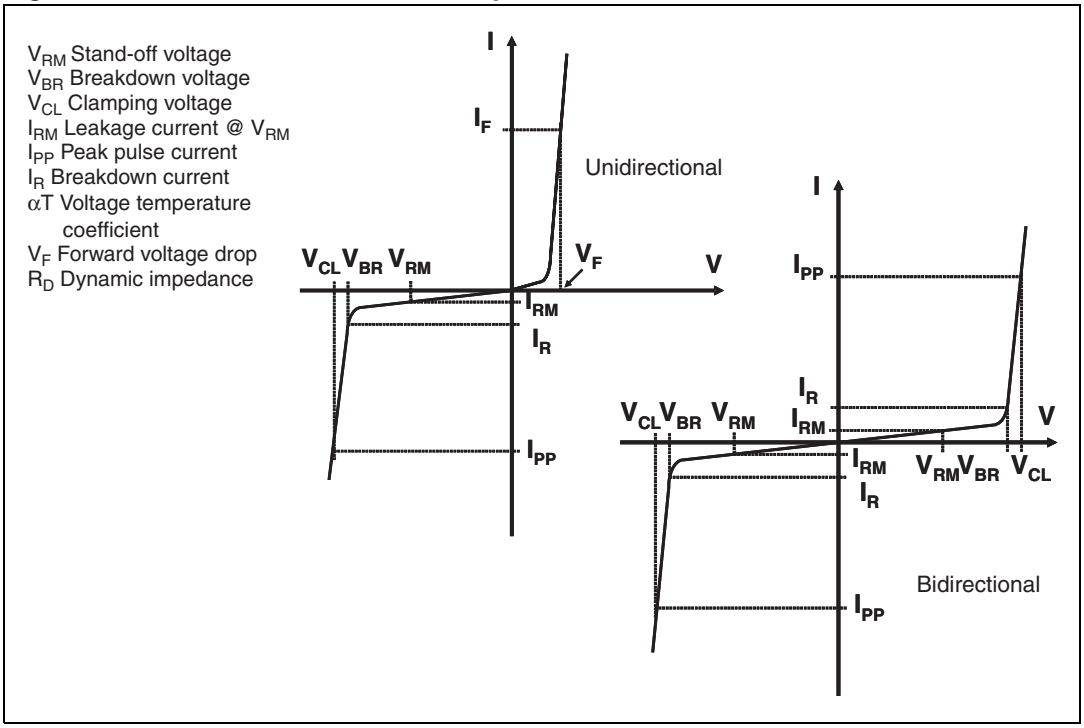


Table 3. Electrical characteristics - parameter values (T_{amb} = 25 °C)

Type	I_{RM} @V_{RM}		V_{BR} @I_R min(1)		V_{CL} @I_{PP} 10/1000 µs		V_{CL} @I_{PP} 8/20 µs		αT (2)
	max		min		max		max		max
	µA	V	V	mA	V	A	V	A	10-4/°C
SMAJ5.0A/CA	800	5	6.4	10	9.2	43.5	13.4	174	5.7
SMAJ6.0A/CA	800	6	6.7	10	10.3	38.8	13.7	170	5.9
SMAJ6.5A/CA	500	6.5	7.2	10	11.2	35.7	14.5	160	6.1
SMAJ8.5A/CA	10	8.5	9.4	1	14.4	27.7	19.5	124	7.3
SMAJ10A/CA	5	10	11.1	1	17	23.5	21.7	106	7.8
SMAJ12A/CA	5	12	13.3	1	19.9	20.1	25.3	91	8.3
SMAJ13A/CA	1	13	14.4	1	21.5	18.6	27.2	85	8.4
SMAJ15A/CA	1	15	16.7	1	24.4	16.4	32.5	71	8.8
SMAJ18A/CA	1	18	20	1	29.2	13.7	39.3	59	9.2
SMAJ20A/CA	1	20	22.2	1	32.4	12.3	42.8	54	9.4
SMAJ22A/CA	1	22	24.4	1	35.5	11.2	48.3	48	9.6
SMAJ24A/CA	1	24	26.7	1	38.9	10.3	50	46	9.6
SMAJ26A/CA	1	26	28.9	1	42.1	9.5	53.5	43	9.7
SMAJ28A/CA	1	28	31.1	1	45.4	8.8	59	39	9.8
SMAJ30A/CA	1	30	33.3	1	48.4	8.3	64.3	36	9.9
SMAJ33A/CA	1	33	36.7	1	53.3	7.5	69.7	33	10
SMAJ40A/CA	1	40	44.4	1	64.5	6.2	84	27	10.1
SMAJ43A/CA	1	43	47.8	1	69.4	5.7	91	25	10.2
SMAJ48A/CA	1	48	53.3	1	77.4	5.2	100	23	10.3
SMAJ58A/CA	1	58	64.4	1	93.6	4.3	121	19	10.4
SMAJ70A/CA	1	70	77.8	1	113	3.5	146	16	10.5
SMAJ85A/CA	1	85	94	1	137	2.9	178	13	10.6
SMAJ100A/CA	1	100	111	1	162	2.5	212	11	10.7
SMAJ130A/CA	1	130	144	1	209	1.9	265	9	10.8
SMAJ154A/CA	1	154	171	1	246	1.6	317	7	10.8
SMAJ170A/CA	1	170	189	1	275	1.4	353	6.5	10.8
SMAJ188A/CA	1	188	209	1	328	1.4	388	6	10.8

1. Pulse test : t_p < 50 ms
2. To calculate V_{BR} versus junction temperature, use the following formula :
   V_{BR} @ T_J = V_{BR} @ 25°C x (1 + αT x (T_J – 25))

Figure 2. Pulse form

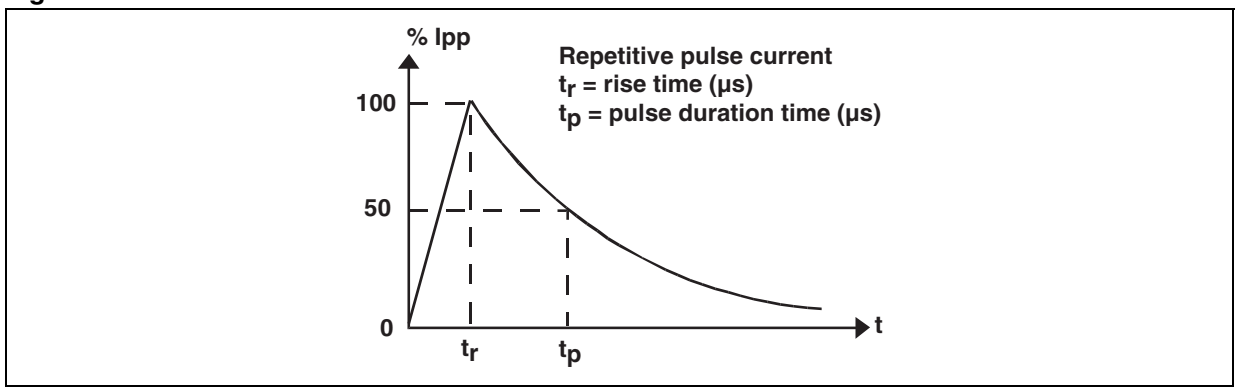


Figure 3. Peak pulse power dissipation versus initial junction temperature

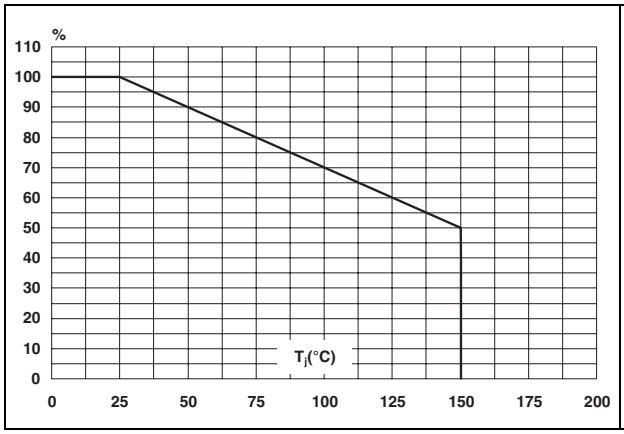


Figure 4. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

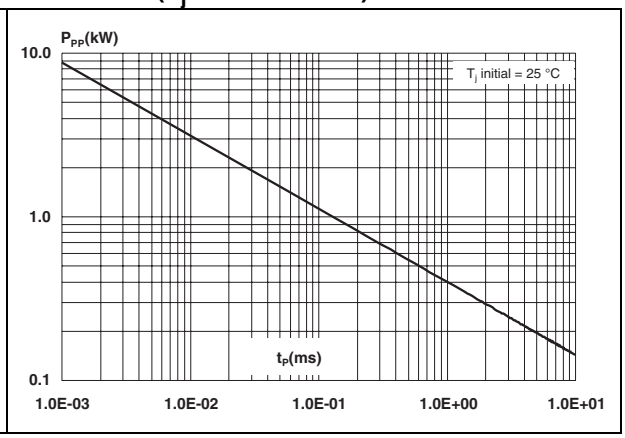


Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)

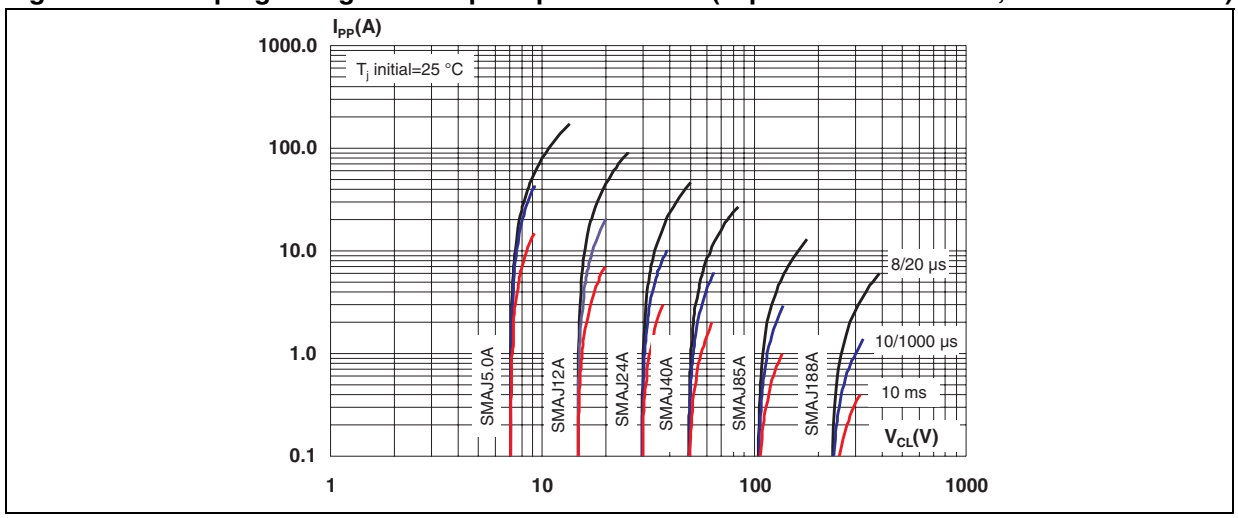


Figure 6. Junction capacitance versus reverse applied voltage for unidirectional types (typical values)

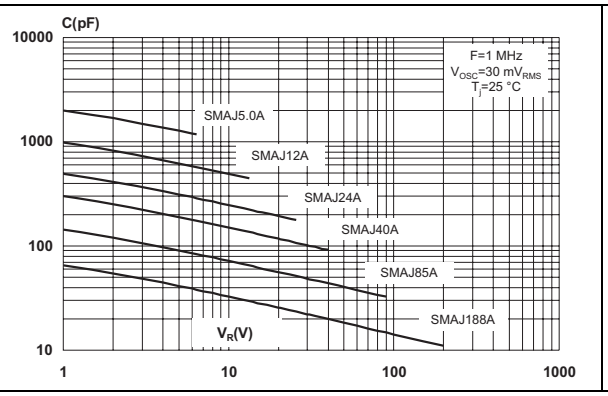


Figure 7. Junction capacitance versus reverse applied voltage for bidirectional types (typical values)

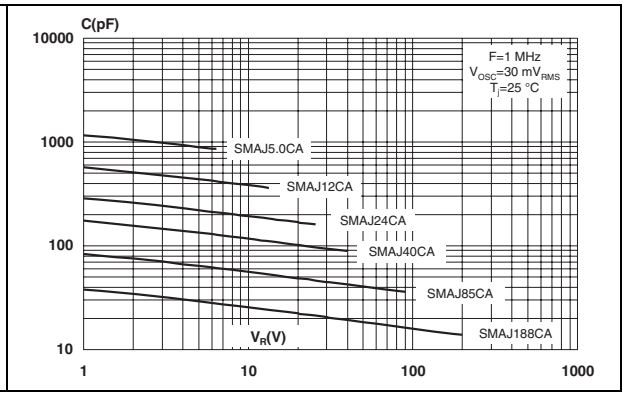


Figure 8. Peak forward voltage drop versus peak forward current (typical values)

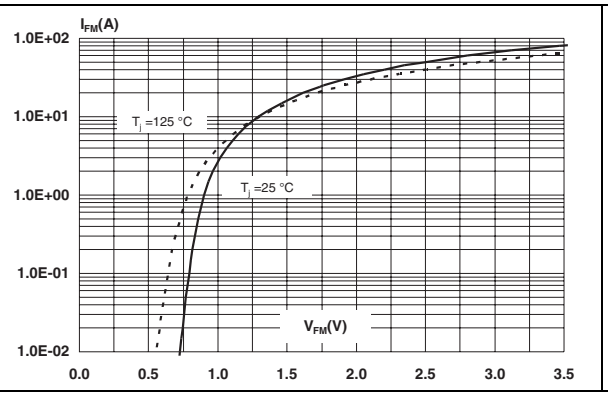


Figure 9. Relative variation of thermal impedance, junction to ambient, versus pulse duration

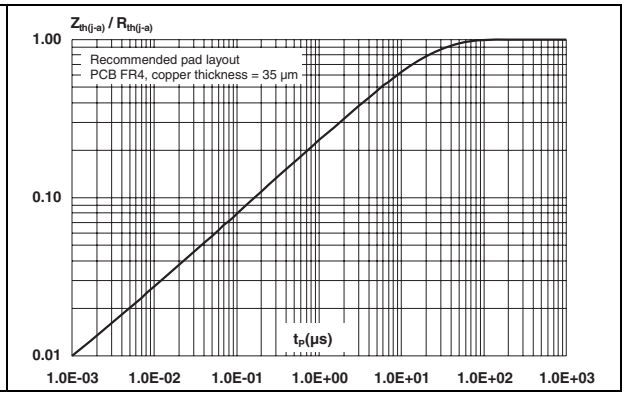


Figure 10. Thermal resistance, junction to ambient, versus copper surface under each lead

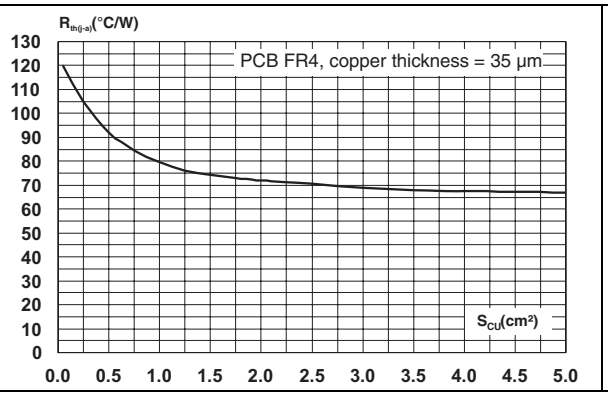
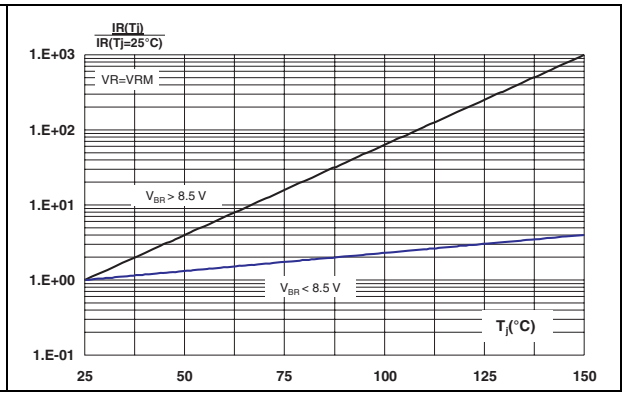
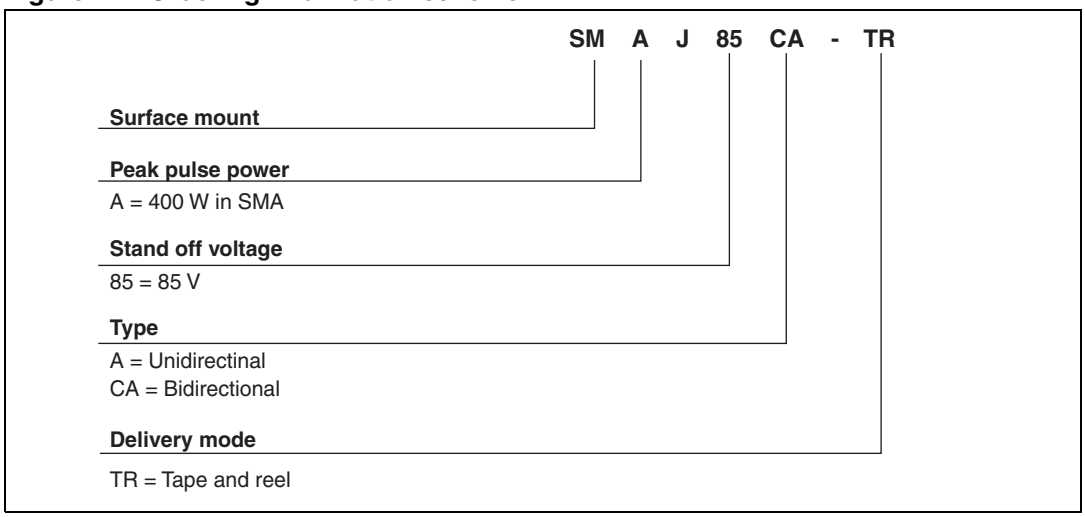


Figure 11. Relative leakage current versus junction temperature (typical values)



2 Ordering information scheme

Figure 12. Ordering information scheme



3 Package information

- Case: JEDEC DO-214AA 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

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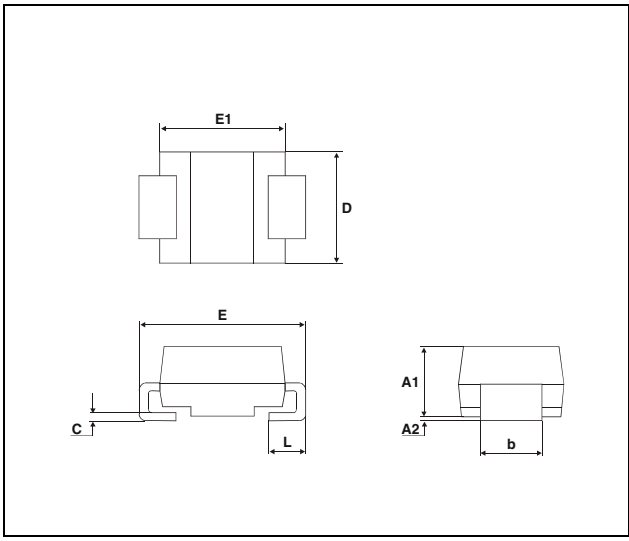
Table 4. SMA dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

Figure 13. Footprint dimensions in mm (inches)

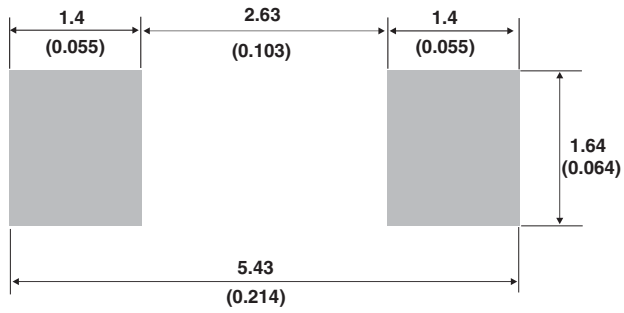


Figure 14. Marking layout

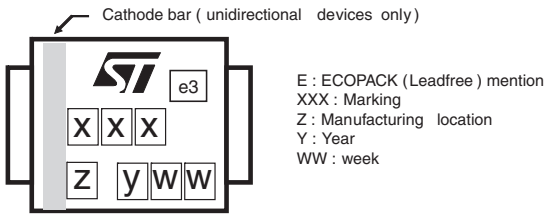


Table 5. Marking

Type	Marking	Type	Marking
SMAJ5.0A-TR	AE	SMAJ5.0CA-TR	AA
SMAJ6.0A-TR	DUB	SMAJ6.0CA-TR	DBB
SMAJ6.5A-TR	DUC	SMAJ6.5CA-TR	DBC
SMAJ8.5A-TR	DUH	SMAJ8.5CA-TR	DBH
SMAJ10A-TR	AX	SMAJ10CA-TR	AC
SMAJ12A-TR	DUK	SMAJ12CA-TR	DBK
SMAJ13A-TR	BG	SMAJ13CA-TR	BH
SMAJ15A-TR	BM	SMAJ15CA-TR	AJ
SMAJ18A-TR	DUQ	SMAJ18CA-TR	DBQ
SMAJ20A-TR	DUR	SMAJ20CA-TR	DBR
SMAJ22A-TR	DUS	SMAJ22CA-TR	DBS
SMAJ24A-TR	DUT	SMAJ24CA-TR	DBT
SMAJ26A-TR	DUU	SMAJ26CA-TR	DBU
SMAJ28A-TR	CG	SMAJ28CA-TR	CH
SMAJ30A-TR	CK	SMAJ30CA-TR	CL
SMAJ33A-TR	CM	SMAJ33CA-TR	CN
SMAJ40A-TR	DUZ	SMAJ40CA-TR	DBZ
SMAJ43A-TR	EUA	SMAJ43CA-TR	EBA
SMAJ48A-TR	CX	SMAJ48CA-TR	CY
SMAJ58A-TR	EUF	SMAJ58CA-TR	EBF
SMAJ70A-TR	EUI	SMAJ70CA-TR	EBI
SMAJ85A-TR	EUL	SMAJ85CA-TR	EBL
SMAJ100A-TR	EUN	SMAJ100CA-TR	EBN
SMAJ130A-TR	EUQ	SMAJ130CA-TR	EBQ
SMAJ154A-TR	EUT	SMAJ154CA-TR	EBT
SMAJ170A-TR	SR	SMAJ170CA-TR	SS
SMAJ188A-TR	EUV	SMAJ188CA-TR	EBV

4 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
SMAJxxxA-TR	See *Table 5*	SMA	0.068 g	5000	Tape and reel
SMAJxxxCA-TR	See *Table 5*	SMA	0.068 g	5000	Tape and reel

5 Revision history

Table 7. Document revision history

Date	Revision	Changes
September-1998	5B	Previous update.
02-Aug-2004	6	SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106inc.) to 2.03mm (0.080).
10-Dec-2004	7	Template layout update. No content change.
10-Feb-2006	8	Added unidirectional marking on cover page and Figure 14. Changed Figure 13. Footprint.
14-May-2009	9	Updated ECOPACK statement. Reformatted to current standards.

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