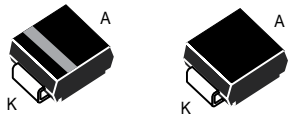
SMA6J

Datasheet

High junction temperature Transil™



Unidirectional Bidirectional
SMA
(JEDEC DO-214AA)

Product status link
SMA6J

Features

- Peak pulse power:
  - 600 W (10/1000 µs)
  - 4 kW (8/20 µs)
- Stand-off voltage range: from 5 V to 188 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
- Complies with the following standard: IEC 61000-4-2 level 4:
  - ±15 kV (air discharge)
  - ±8 kV (contact discharge)
- Complies with the following standard: MIL STD 883G, method 3015-7, class 3B:
  - ±25 kV HBM (human body model)

Description

The SMA6J Transil series has been designed to protect sensitive equipment against electro-static discharges according to IEC 61000-4-2, MIL STD 883 Method 3015, and electrical overstress such as IEC 61000-4-4 and 5. They are generally for surges below 600 W 10/1000 µs.

This 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. Their low clamping voltages provide a better safety margin to protect sensitive circuits with extended life time expectancy.

Packaged in SMA, which minimizes PCB space consumption (SMA footprint in accordance with IPC 7531 standard).

Transil™ is a trademark of STMicroelectronics.

1 Characteristics

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

Symbol	Parameter		Value	Unit
P_{PP}	Peak pulse power dissipation	T_j initial = T_{amb}	600	W
P	Power dissipation on infinite heatsink	T_{amb} = 55 °C	4	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

Table 2. Thermal resistance

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 - parameter definitions

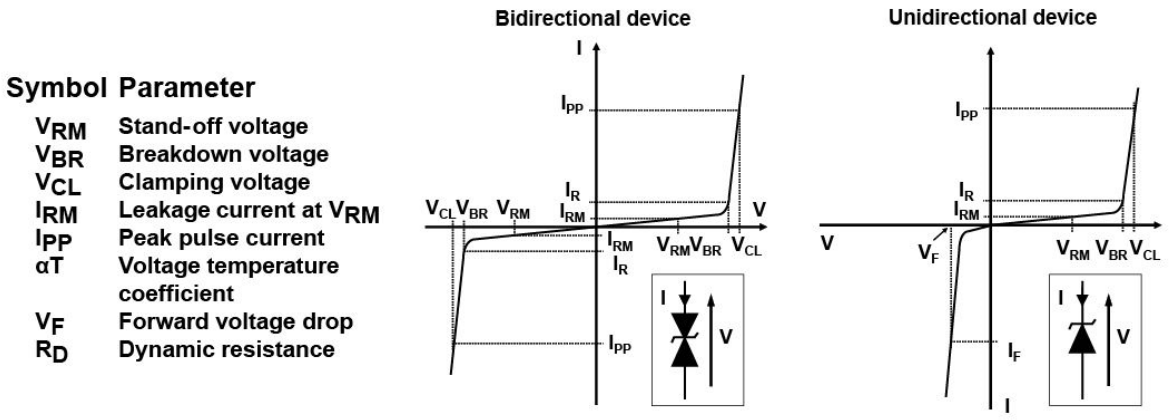


Figure 2. Pulse definition for electrical characteristics

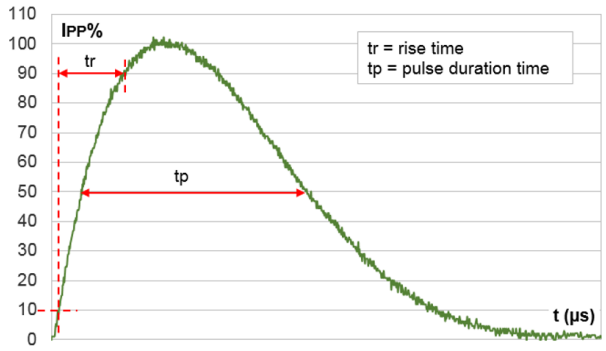


Table 3. Electrical characteristics parameter values (T_{amb} = 25 °C, unless otherwise specified)

Order code	I_{RM} max at V_{RM}			V_{BR} at I_R[1]				10 / 1000 µs			8 / 20 µs			αT[2]
								V_{CL}	I_{PP}	R_D	V_{CL}	I_{PP}	R_D	
	25 °C	85 °C		Min.	Typ.	Max.		Max.		Max.	Max.			Max.
	µA		V	V			mA	V[3]	A[4]	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
SMA6J100A/CA	0.2	1	100	111	117	123	1	157	3.8	9.03	212	19	4.69	10.7
SMA6J130A/CA	0.2	1	130	144	152	159	1	204	3	14.9	265	15	7.03	10.8
SMA6J154A/CA	0.2	1	154	171	180	189	1	242	2.4	22.1	317	12.6	10.2	10.8
SMA6J170A/CA	0.2	1	170	189	199	209	1	275	2.2	30.0	353	11.3	12.7	10.8
SMA6J188A/CA	0.2	1	188	209	220	231	1	328	2	48.5	388	10.3	15.2	10.8

1. *Pulse test: t_p < 50 ms*
2. *To calculate V_{BR} or V_{CL} versus junction temperature, use the following formulas:*
   - *V_{BR} at T_J = V_{BR} at 25 °C x (1 + αT x (T_J - 25))*
   - *V_{CL} at T_J = V_{CL} at 25 °C x (1 + αT x (T_J-25))*
3. *To calculate maximum clamping voltage at other surge level, use the following formula:*
   - *V_{CLmax} = $V_{BR\ max}$ + R_D x $I_{PPappli}$ where $I_{PPappli}$ is the surge current in the application*
4. *Surge capability given for both directions for unidirectional and bidirectional types.*

1.1 Characteristics (curves)

Figure 3. Peak power dissipation versus initial junction temperature

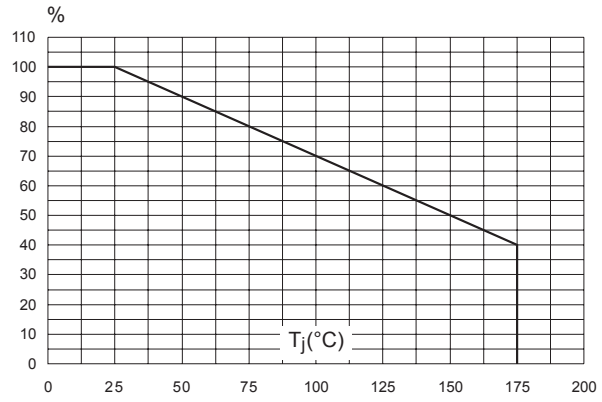


Figure 4. Peak pulse power versus exponential pulse duration (T_{amb} = 25 °C)

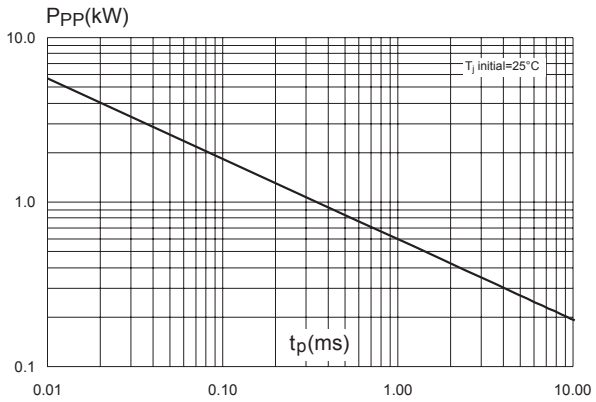


Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)

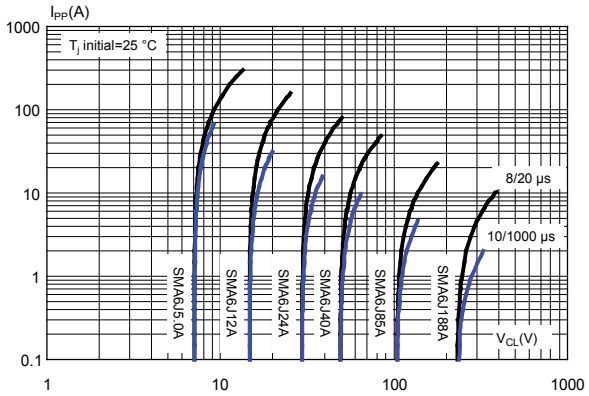


Figure 6. Junction capacitance versus reverse applied voltage (typical values) (SMA6JxxA)

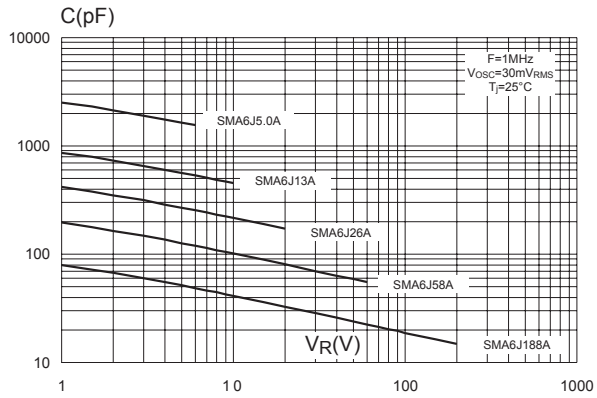


Figure 7. Junction capacitance versus reverse applied voltage (typical values) (SMA6JxxCA)

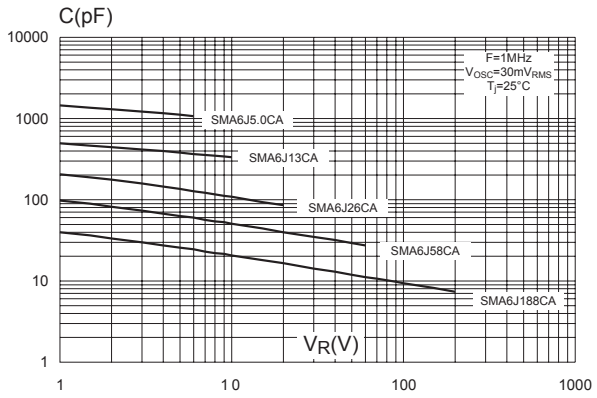


Figure 8. Peak forward voltage drop versus peak forward current (typical values)

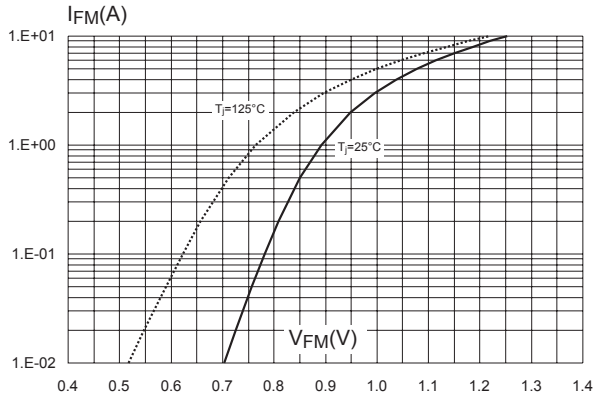


Figure 9. Relative variation of thermal impedance junction to ambient versus pulse duration (printed circuit board FR4, S_{Cu} = 1 cm2)

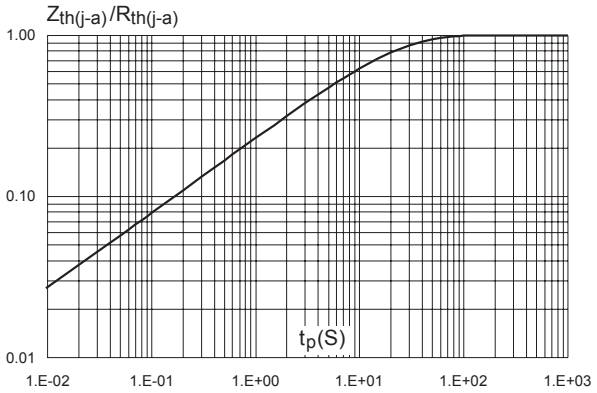


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (printed circuit board FR4, e_{Cu} = 35 µm)

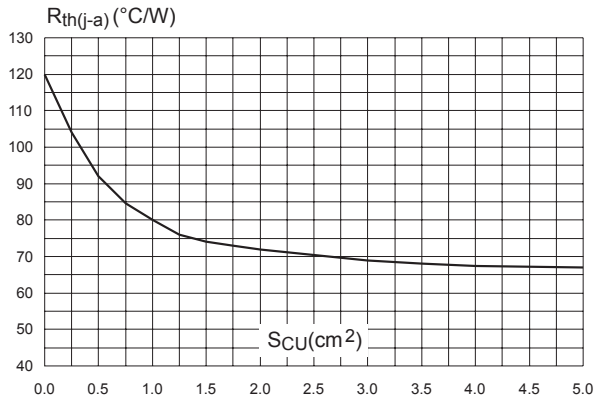
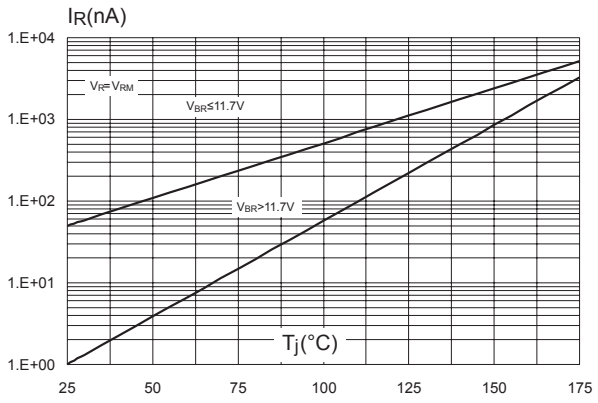


Figure 11. Leakage current versus junction temperature (typical values)



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

- Case: JEDEC DO214-AA 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

Figure 12. SMA package outline

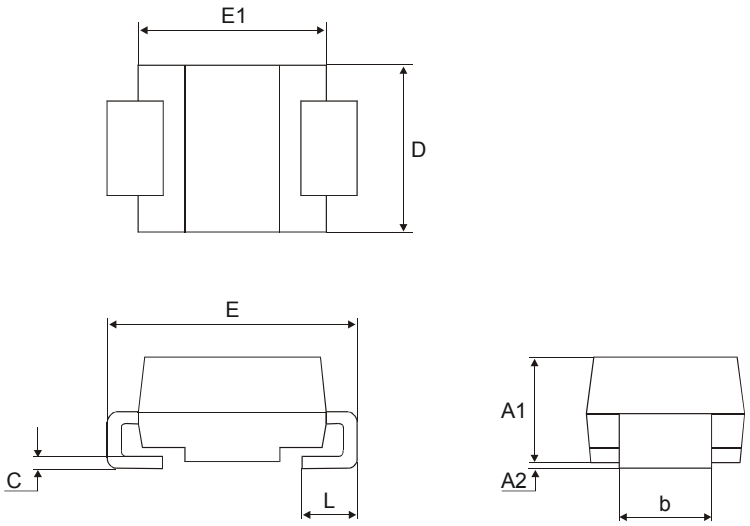


Table 4. SMA package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.0748	0.0964
A2	0.05	0.20	0.0020	0.0079
b	1.25	1.65	0.0492	0.0649
c	0.15	0.40	0.0059	0.0157
D	2.25	2.90	0.0885	0.1141
E	4.80	5.35	0.1889	0.2106
E1	3.95	4.60	0.1555	0.1811
L	0.75	1.50	0.0295	0.0591

Figure 13. SMA recommended footprint

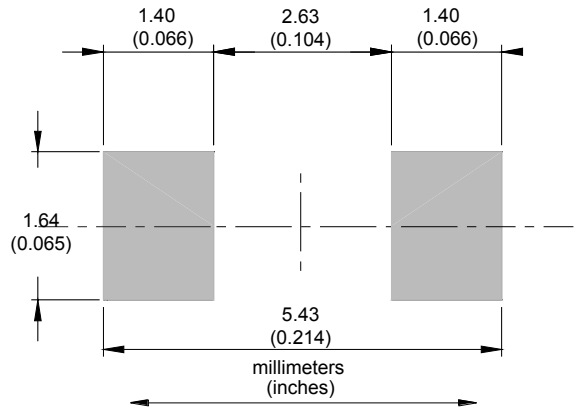
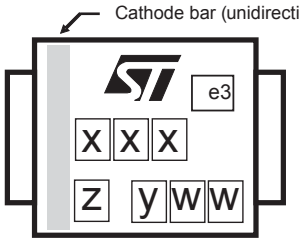


Figure 14. Marking layout



e3: ECOPACK compliance
XXX: Marking
Z: Manufacturing location
Y: Year
WW: Week

Note: Marking layout can vary according to assembly location.

3 Ordering information

Figure 15. **Ordering information scheme**

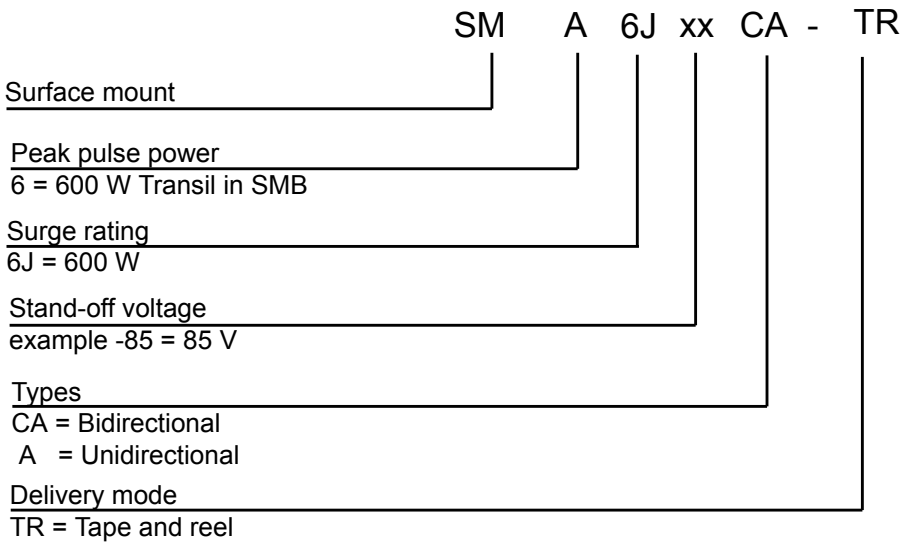


Table 5. **Ordering information**

Order code[1]	Marking	Package	Weight	Base qty.	Delivery mode
SMA6JxxA-TR	See Table 6. Marking .	SMA	0.072 g	5000	Tape and reel
SMA6JxxCA-TR					

1. *xx indicates stand-off voltage*

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

Type	Marking	Type	Marking
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
SMA6J100A-TR	6UW	SMA6J100CA-TR	6BW
SMA6J130A-TR	6UX	SMA6J130CA-TR	6BX
SMA6J154A-TR	6UY	SMA6J154CA-TR	6BY
SMA6J170A-TR	6UZ	SMA6J170CA-TR	6BZ
SMA6J188A-TR	6UAA	SMA6J188CA-TR	6BAA

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.

Mouser Electronics

Authorized Distributor

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SMA6J10A-TR SMA6J10CA-TR SMA6J12A-TR SMA6J12CA-TR SMA6J13A-TR SMA6J13CA-TR SMA6J15A-TR SMA6J15CA-TR SMA6J18A-TR SMA6J18CA-TR SMA6J20A-TR SMA6J20CA-TR SMA6J24A-TR SMA6J24CA-TR SMA6J26A-TR SMA6J26CA-TR SMA6J28A-TR SMA6J33A-TR SMA6J33CA-TR SMA6J40A-TR SMA6J40CA-TR SMA6J48A-TR SMA6J48CA-TR SMA6J5.0A-TR SMA6J5.0CA-TR SMA6J58A-TR SMA6J58CA-TR SMA6J6.0A-TR SMA6J6.0CA-TR SMA6J6.5A-TR SMA6J6.5CA-TR SMA6J70A-TR SMA6J70CA-TR SMA6J8.5A-TR SMA6J8.5CA-TR SMA6J100A-TR SMA6J100CA-TR SMA6J130A-TR SMA6J130CA-TR SMA6J154A-TR SMA6J154CA-TR SMA6J170A-TR SMA6J170CA-TR SMA6J188A-TR SMA6J188CA-TR SMA6J85A-TR SMA6J85CA-TR SMA6J28CA-TR