

# DATA SHEET

## TRANSIENT VOLTAGE SUPPRESSORS

### AC/DC POWER SUPPLY

SMAJ-HP6 series

RoHS compliant & Halogen free

Product specification— March 25, 2024 V.1



## Transient Voltage Suppressors (TVS) Data Sheet

### Features

- For surface mounted applications in order to optimize board space
- Low profile package
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 600W peak pulse power capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- Fast response time
- Typical  $I_R$  less than 1 $\mu$ A above 10V
- High Temperature soldering: 260 $^{\circ}$ C/10 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020
- Safety certification: UL
- IEC61000-4-2 ESD 30KV Air, 30KV contact compliance



### Mechanical Data

- Case: JEDEC DO-214AC. Molded plastic over glass passivated junction
- Terminal: Tin plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Standard Packaging: 12mm tape (EIA STD RS-481)
- Weight: 0.07g

### Applications

- I/O interface
- AC/DC power supply
- Low frequency signal transmission line (RS232, RS485, etc.)

### Maximum Ratings and Characteristics

Ratings at 25 $^{\circ}$ C ambient temperature unless otherwise specified.

Rating	Symbol	Value	Units
Peak pulse power dissipation at 10/1000 $\mu$ s waveform (Note1, Note2, Fig.1)	$P_{PPM}$	Minimum 600	Watts
Peak pulse current of at 10/1000 $\mu$ s waveform (Note 1, Fig.3)	$I_{PPM}$	See Table	Amps
Steady state power dissipation at $T_A=50^{\circ}$ C (Fig.5)	$P_{M(AV)}$	5.0	Watts
Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note3, Fig.6)	$I_{FSM}$	100	Amps
Operating junction and Storage Temperature Range.	$T_J, T_{STG}$	-55 to +150	$^{\circ}$ C
Typical thermal resistance junction to lead	$R_{\theta JL}$	20	$^{\circ}$ C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	100	$^{\circ}$ C/W

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^{\circ}$ C per Fig.2.

2. Mounted on 5.0mm $\times$ 5.0mm (0.03mm thick) copper pads to each terminal.

3. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.

**Dimensions (SMA/DO-214AC)**

	Symbol	Millimeters		Inches	
		Min.	Max.	Min.	Max.
	L	3.99	4.50	0.157	0.177
	D	2.54	2.79	0.100	0.110
	D1	1.25	1.65	0.049	0.065
	T	4.93	5.28	0.194	0.208
	T1	0.76	1.52	0.030	0.060
	d	-	0.203	-	0.008
	H	2.00	2.50	0.079	0.098
H1	1.98	2.29	0.078	0.090	

**Electrical Characteristics (T<sub>A</sub>=25°C)**

Part Number		Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @I <sub>T</sub>	Test Current	Maximum Clamping Voltage @I <sub>PP</sub>	Peak Pulse Current	Reverse Leakage @V <sub>RWM</sub>
Unidirectional	Bidirectional	UNI	BI	V <sub>RWM</sub> (V)	V <sub>BR</sub> (V)	I <sub>T</sub> (mA)	V <sub>C</sub> (V)	I <sub>PP</sub> (A)	I <sub>R</sub> (μA)
SMAJ5.0A-HP6	SMAJ5.0CA-HP6	AE	WE	5.0	6.40~7.00	10	9.2	65.3	800
SMAJ6.0A-HP6	SMAJ6.0CA-HP6	AG	WG	6.0	6.67~7.37	10	10.3	58.3	800
SMAJ6.5A-HP6	SMAJ6.5CA-HP6	AK	WK	6.5	7.22~7.98	10	11.2	53.6	500
SMAJ7.0A-HP6	SMAJ7.0CA-HP6	AM	WM	7.0	7.78~8.60	10	12.0	50.0	200
SMAJ7.5A-HP6	SMAJ7.5CA-HP6	AP	WP	7.5	8.33~9.21	1	12.9	46.6	100
SMAJ8.0A-HP6	SMAJ8.0CA-HP6	AR	WR	8.0	8.89~9.83	1	13.6	44.2	50
SMAJ8.5A-HP6	SMAJ8.5CA-HP6	AT	WT	8.5	9.44~10.40	1	14.4	41.7	20
SMAJ9.0A-HP6	SMAJ9.0CA-HP6	AV	WV	9.0	10.00~11.10	1	15.4	39.0	10
SMAJ10A-HP6	SMAJ10CA-HP6	AX	WX	10.0	11.10~12.30	1	17.0	35.3	5
SMAJ11A-HP6	SMAJ11CA-HP6	AZ	WZ	11.0	12.20~13.50	1	18.2	33.0	1
SMAJ12A-HP6	SMAJ12CA-HP6	BE	XE	12.0	13.30~14.70	1	19.9	30.2	1
SMAJ13A-HP6	SMAJ13CA-HP6	BG	XG	13.0	14.40~15.90	1	21.5	28.0	1
SMAJ14A-HP6	SMAJ14CA-HP6	BK	XK	14.0	15.60~17.20	1	23.2	25.9	1
SMAJ15A-HP6	SMAJ15CA-HP6	BM	XM	15.0	16.70~18.50	1	24.4	24.6	1
SMAJ16A-HP6	SMAJ16CA-HP6	BP	XP	16.0	17.80~19.70	1	26.0	23.1	1
SMAJ17A-HP6	SMAJ17CA-HP6	BR	XR	17.0	18.90~20.90	1	27.6	21.8	1

## Transient Voltage Suppressors

SMAJ-HP6 series

Part Number		Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @ $I_T$	Test Current	Maximum Clamping Voltage @ $I_{PP}$	Peak Pulse Current	Reverse Leakage @ $V_{RWM}$
Unidirectional	Bidirectional	UNI	BI	$V_{RWM}(V)$	$V_{BR}(V)$	$I_T(mA)$	$V_C(V)$	$I_{PP}(A)$	$I_R(\mu A)$
SMAJ18A-HP6	SMAJ18CA-HP6	BT	XT	18.0	20.00~22.10	1	29.2	20.6	1
SMAJ20A-HP6	SMAJ20CA-HP6	BV	XV	20.0	22.20~24.50	1	32.4	18.6	1
SMAJ22A-HP6	SMAJ22CA-HP6	BX	XX	22.0	24.40~26.90	1	35.5	16.9	1
SMAJ24A-HP6	SMAJ24CA-HP6	BZ	XZ	24.0	26.70~29.50	1	38.9	15.5	1
SMAJ26A-HP6	SMAJ26CA-HP6	CE	YE	26.0	28.90~31.90	1	42.1	14.3	1
SMAJ28A-HP6	SMAJ28CA-HP6	CG	YG	28.0	31.10~34.40	1	45.4	13.3	1
SMAJ30A-HP6	SMAJ30CA-HP6	CK	YK	30.0	33.30~36.80	1	48.4	12.4	1
SMAJ33A-HP6	SMAJ33CA-HP6	CM	YM	33.0	36.70~40.60	1	53.3	11.3	1
SMAJ36A-HP6	SMAJ36CA-HP6	CP	YP	36.0	40.00~44.20	1	58.1	10.4	1
SMAJ40A-HP6	SMAJ40CA-HP6	CR	YR	40.0	44.40~49.10	1	64.5	9.3	1
SMAJ43A-HP6	SMAJ43CA-HP6	CT	YT	43.0	47.80~52.80	1	69.4	8.7	1
SMAJ45A-HP6	SMAJ45CA-HP6	CV	YV	45.0	50.00~55.30	1	72.7	8.3	1
SMAJ48A-HP6	SMAJ48CA-HP6	CX	YX	48.0	53.30~58.90	1	77.4	7.8	1
SMAJ51A-HP6	SMAJ51CA-HP6	CZ	YZ	51.0	56.70~62.70	1	82.4	7.3	1
SMAJ54A-HP6	SMAJ54CA-HP6	RE	ZE	54.0	60.00~66.30	1	87.1	6.9	1
SMAJ58A-HP6	SMAJ58CA-HP6	RG	ZG	58.0	64.40~71.20	1	93.6	6.5	1
SMAJ60A-HP6	SMAJ60CA-HP6	RK	ZK	60.0	66.70~73.70	1	96.8	6.2	1
SMAJ64A-HP6	SMAJ64CA-HP6	RM	ZM	64.0	71.10~78.60	1	103.0	5.9	1
SMAJ70A-HP6	SMAJ70CA-HP6	RP	ZP	70.0	77.80~86.00	1	113.0	5.3	1
SMAJ75A-HP6	SMAJ75CA-HP6	RR	ZR	75.0	83.30~92.10	1	121.0	5.0	1
SMAJ78A-HP6	SMAJ78CA-HP6	RT	ZT	78.0	86.70~95.80	1	126.0	4.8	1
SMAJ85A-HP6	SMAJ85CA-HP6	RV	ZV	85.0	94.40~104.00	1	137.0	4.4	1
SMAJ90A-HP6	SMAJ90CA-HP6	RX	ZX	90.0	100.00~111.00	1	146.0	4.1	1
SMAJ100A-HP6	SMAJ100CA-HP6	RZ	ZZ	100.0	111.00~123.00	1	162.0	3.7	1

Ratings and Characteristic Curves ( $T_A=25^\circ\text{C}$  unless otherwise noted)

Figure 1. Peak Pulse Power Rating Curve

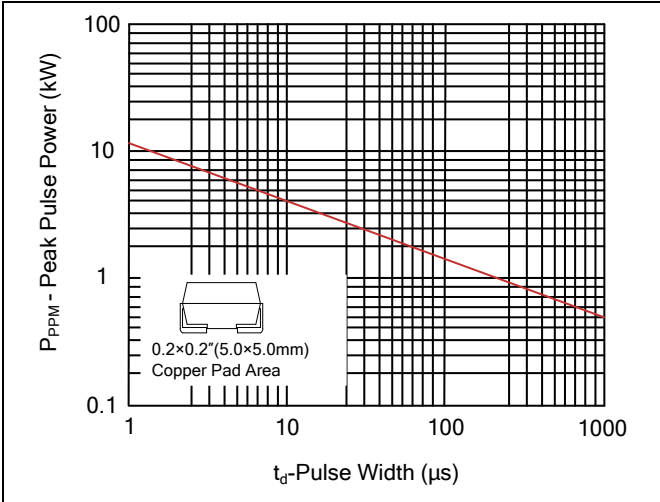


Figure 2. Pulse Derating Curve

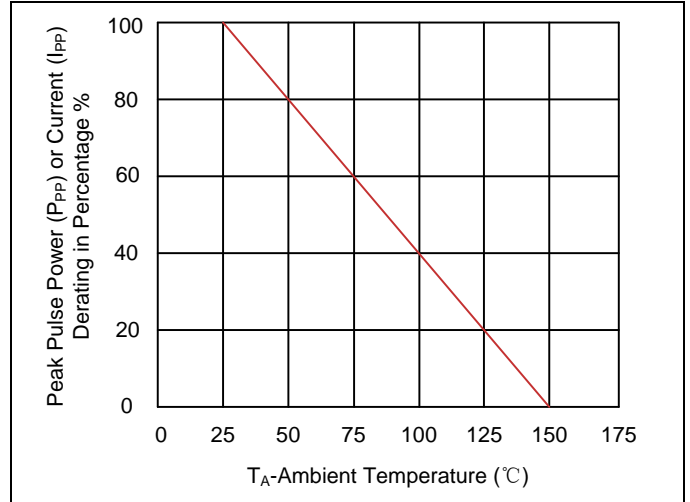


Figure 3. Pulse Waveform

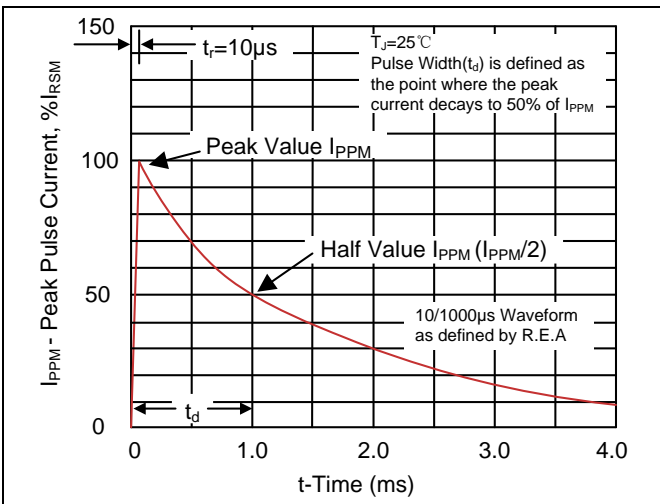


Figure 4. Typical Junction Capacitance

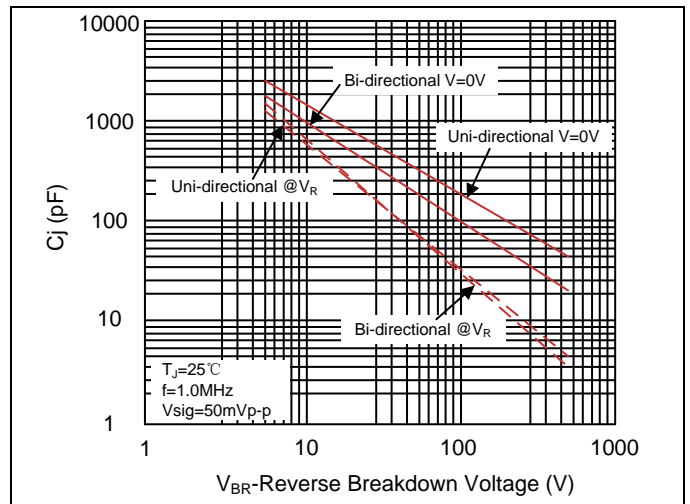


Figure 5. Steady State Power Dissipation Derating Curve

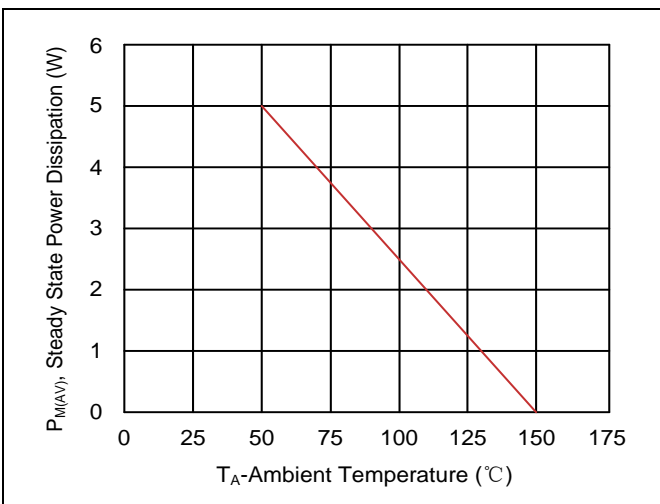
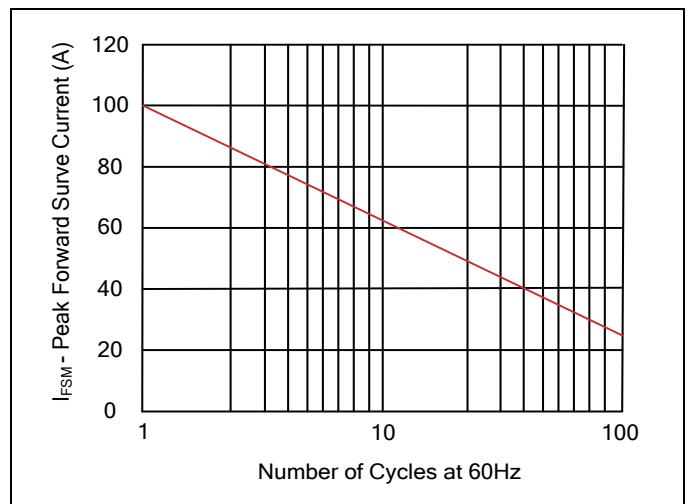
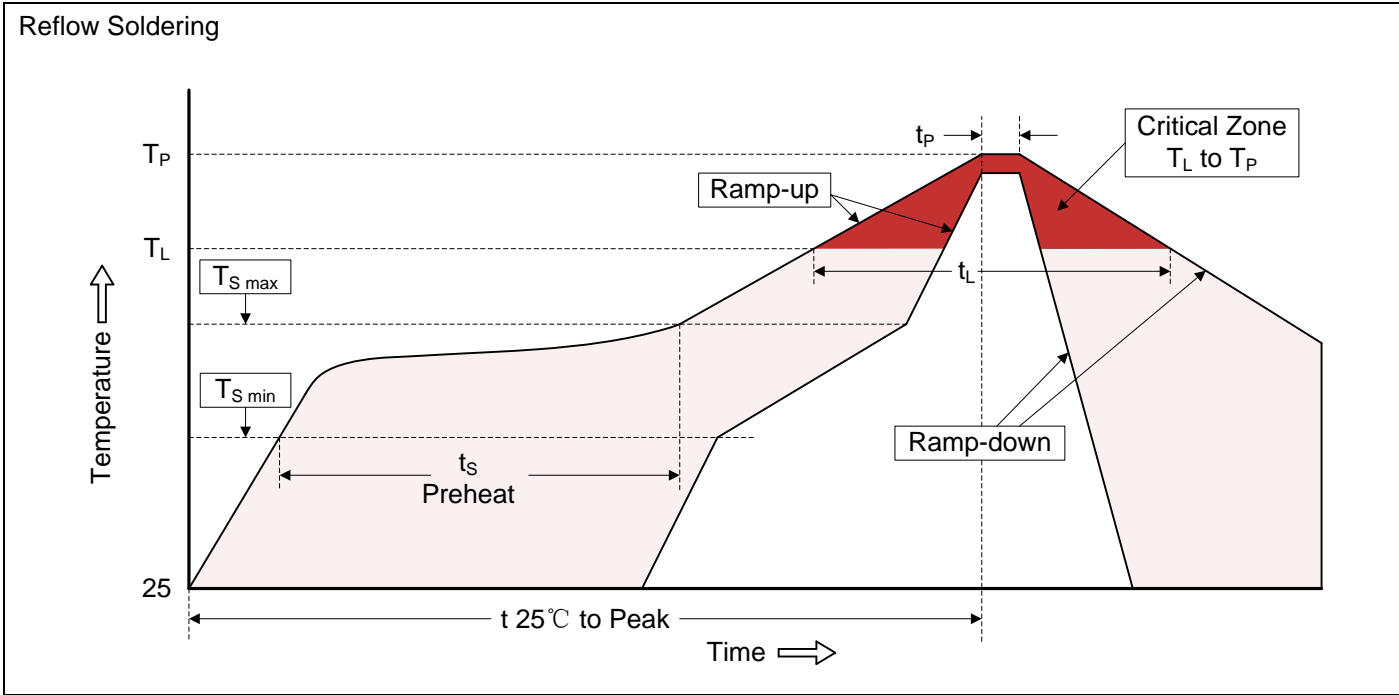


Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



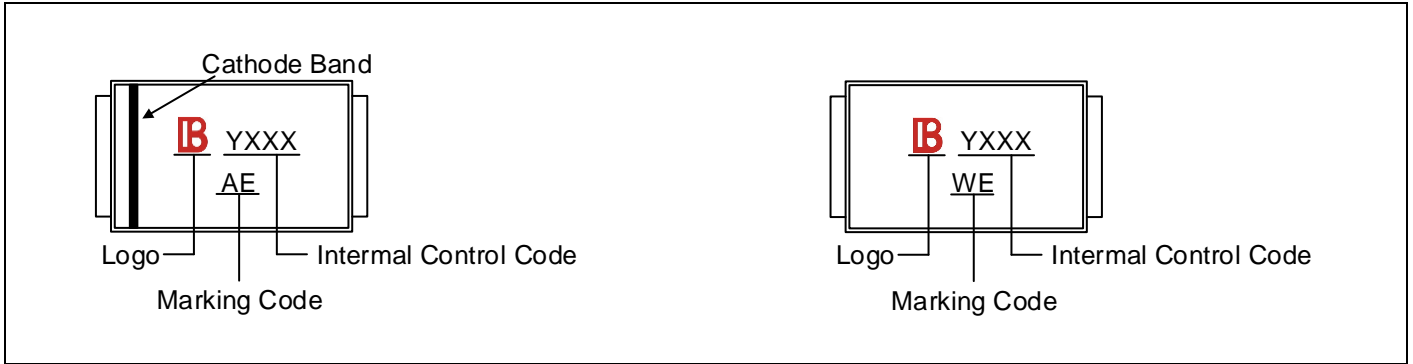
**Recommended Soldering Conditions**



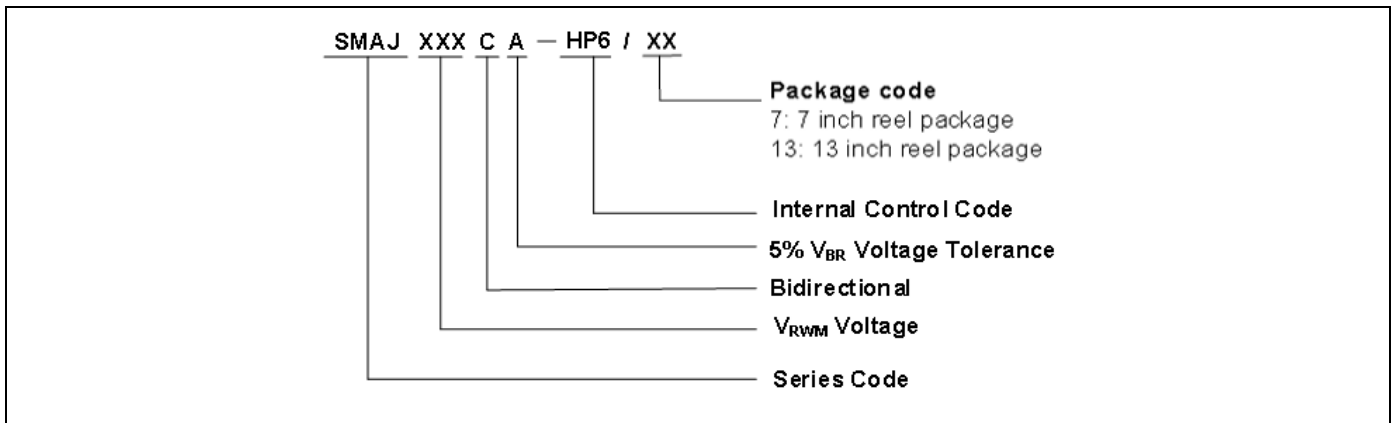
Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	3°C/second max.
Preheat	
-Temperature Min ( $T_{S\ min}$ )	150°C
-Temperature Max ( $T_{S\ max}$ )	200°C
-Time (min to max) ( $t_s$ )	60-180 seconds
$T_{S\ max}$ to $T_L$	
-Ramp-up Rate	3°C/second max.
Time maintained above:	
-Temperature ( $T_L$ )	217°C
-Time ( $t_L$ )	60-150 seconds
Peak Temperature ( $T_P$ )	260°C
Time within 5 °C of actual Peak	20-40 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

**Marking Code**



**Part Number Code**

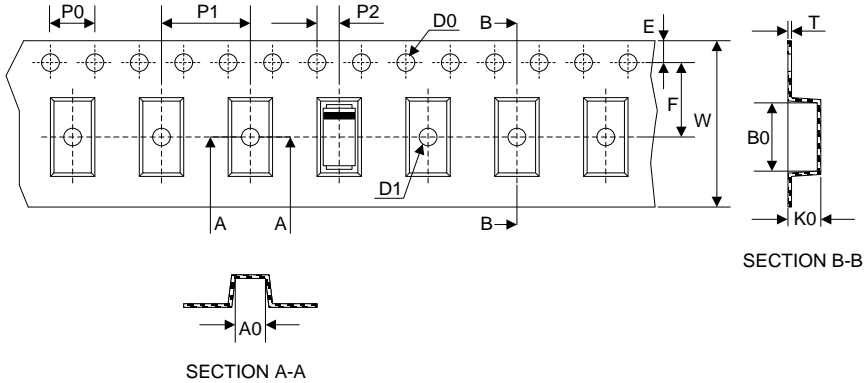
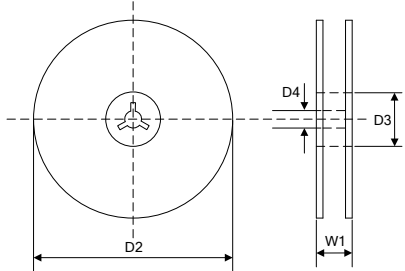
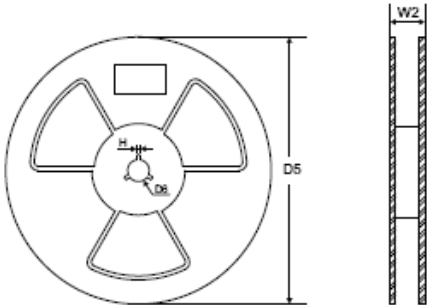


**Ordering Code for Different Package**

7 inch reel package: Add suffix “ /7 ” at the end of the part number, such as SMAJXXXCA-HP6/7

13 inch reel package: Add suffix “ /13 ” at the end of the part number, such as SMAJXXXCA-HP6/13

**Packaging**

Tape	Symbol	Dimension (mm)
	W	12.00±0.20
	P0	4.00±0.10
	P1	4.00±0.10
	P2	2.00±0.10
	D0	Φ1.5±0.10
	D1	Φ1.5±0.10
	E	1.75±0.10
	F	5.50±0.05
	A0	2.79±0.10
	B0	5.33±0.10
	K0	2.55±0.15
	T	0.25±0.05
	<p>7" Reel</p> 	D2
D3		Φ50.0Min.
D4		Φ13.0±0.5
W1		16.0±2.0
Quantity: 1000PCS		
<p>13" Reel</p> 	D5	Φ330.0±2.0
	D6	Φ13.5±0.5
	H	2.5±1.0
	W2	16.0±2.0
	Quantity: 5000PCS	



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