Innovative Service Around the Globe YAGEO

DATA SHEET

TRANSIENT VOLTAGE SUPPRESSORS
AC/DC POWER SUPPLY

SMAJ-HP6AT 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 10/1000μs waveform, repetition rate (duty cycle): 0.01%
- Fast response time
- Typical I_R less than 1μA above 10V
- High Temperature soldering: 260℃/10 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020
- Safety certification: UL
- AEC-Q101 qualified
- 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.)

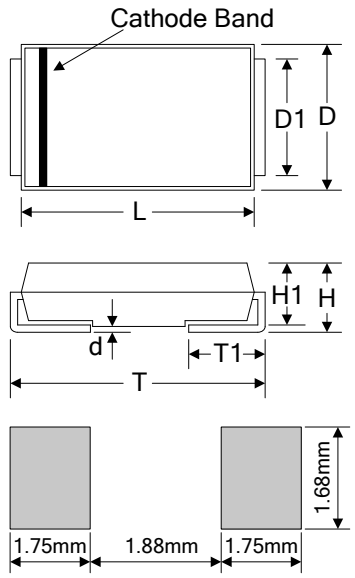
Maximum Ratings and Characteristics

Ratings at 25℃ ambient temperature unless otherwise specified.

Rating	Symbol	Value	Units
Peak pulse power dissipation at 10/1000μs waveform (Note1, Note2, Fig.1)	P_{PPM}	Minimum 600	Watts
Peak pulse current of at 10/1000μs waveform (Note 1, Fig.3)	I_{PPM}	See Table	Amps
Steady state power dissipation at T_A=50℃ (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	℃
Typical thermal resistance junction to lead	$R_{\theta JL}$	20	℃/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	100	℃/W

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above T_A=25℃ per Fig.2.
2. Mounted on 5.0mm×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_A=25℃)

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(μA)
SMAJ5.0A-HP6AT	SMAJ5.0CA-HP6AT	AE	WE	5.0	6.40~7.00	10	9.2	65.3	800
SMAJ6.0A-HP6AT	SMAJ6.0CA-HP6AT	AG	WG	6.0	6.67~7.37	10	10.3	58.3	800
SMAJ6.5A-HP6AT	SMAJ6.5CA-HP6AT	AK	WK	6.5	7.22~7.98	10	11.2	53.6	500
SMAJ7.0A-HP6AT	SMAJ7.0CA-HP6AT	AM	WM	7.0	7.78~8.60	10	12.0	50.0	200
SMAJ7.5A-HP6AT	SMAJ7.5CA-HP6AT	AP	WP	7.5	8.33~9.21	1	12.9	46.6	100
SMAJ8.0A-HP6AT	SMAJ8.0CA-HP6AT	AR	WR	8.0	8.89~9.83	1	13.6	44.2	50
SMAJ8.5A-HP6AT	SMAJ8.5CA-HP6AT	AT	WT	8.5	9.44~10.40	1	14.4	41.7	20
SMAJ9.0A-HP6AT	SMAJ9.0CA-HP6AT	AV	WV	9.0	10.00~11.10	1	15.4	39.0	10
SMAJ10A-HP6AT	SMAJ10CA-HP6AT	AX	WX	10.0	11.10~12.30	1	17.0	35.3	5
SMAJ11A-HP6AT	SMAJ11CA-HP6AT	AZ	WZ	11.0	12.20~13.50	1	18.2	33.0	1
SMAJ12A-HP6AT	SMAJ12CA-HP6AT	BE	XE	12.0	13.30~14.70	1	19.9	30.2	1
SMAJ13A-HP6AT	SMAJ13CA-HP6AT	BG	XG	13.0	14.40~15.90	1	21.5	28.0	1
SMAJ14A-HP6AT	SMAJ14CA-HP6AT	BK	XK	14.0	15.60~17.20	1	23.2	25.9	1
SMAJ15A-HP6AT	SMAJ15CA-HP6AT	BM	XM	15.0	16.70~18.50	1	24.4	24.6	1
SMAJ16A-HP6AT	SMAJ16CA-HP6AT	BP	XP	16.0	17.80~19.70	1	26.0	23.1	1
SMAJ17A-HP6AT	SMAJ17CA-HP6AT	BR	XR	17.0	18.90~20.90	1	27.6	21.8	1

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(μA)
SMAJ18A-HP6AT	SMAJ18CA-HP6AT	BT	XT	18.0	20.00~22.10	1	29.2	20.6	1
SMAJ20A-HP6AT	SMAJ20CA-HP6AT	BV	XV	20.0	22.20~24.50	1	32.4	18.6	1
SMAJ22A-HP6AT	SMAJ22CA-HP6AT	BX	XX	22.0	24.40~26.90	1	35.5	16.9	1
SMAJ24A-HP6AT	SMAJ24CA-HP6AT	BZ	XZ	24.0	26.70~29.50	1	38.9	15.5	1
SMAJ26A-HP6AT	SMAJ26CA-HP6AT	CE	YE	26.0	28.90~31.90	1	42.1	14.3	1
SMAJ28A-HP6AT	SMAJ28CA-HP6AT	CG	YG	28.0	31.10~34.40	1	45.4	13.3	1
SMAJ30A-HP6AT	SMAJ30CA-HP6AT	CK	YK	30.0	33.30~36.80	1	48.4	12.4	1
SMAJ33A-HP6AT	SMAJ33CA-HP6AT	CM	YM	33.0	36.70~40.60	1	53.3	11.3	1
SMAJ36A-HP6AT	SMAJ36CA-HP6AT	CP	YP	36.0	40.00~44.20	1	58.1	10.4	1
SMAJ40A-HP6AT	SMAJ40CA-HP6AT	CR	YR	40.0	44.40~49.10	1	64.5	9.3	1
SMAJ43A-HP6AT	SMAJ43CA-HP6AT	CT	YT	43.0	47.80~52.80	1	69.4	8.7	1
SMAJ45A-HP6AT	SMAJ45CA-HP6AT	CV	YV	45.0	50.00~55.30	1	72.7	8.3	1
SMAJ48A-HP6AT	SMAJ48CA-HP6AT	CX	YX	48.0	53.30~58.90	1	77.4	7.8	1
SMAJ51A-HP6AT	SMAJ51CA-HP6AT	CZ	YZ	51.0	56.70~62.70	1	82.4	7.3	1
SMAJ54A-HP6AT	SMAJ54CA-HP6AT	RE	ZE	54.0	60.00~66.30	1	87.1	6.9	1
SMAJ58A-HP6AT	SMAJ58CA-HP6AT	RG	ZG	58.0	64.40~71.20	1	93.6	6.5	1
SMAJ60A-HP6AT	SMAJ60CA-HP6AT	RK	ZK	60.0	66.70~73.70	1	96.8	6.2	1
SMAJ64A-HP6AT	SMAJ64CA-HP6AT	RM	ZM	64.0	71.10~78.60	1	103.0	5.9	1
SMAJ70A-HP6AT	SMAJ70CA-HP6AT	RP	ZP	70.0	77.80~86.00	1	113.0	5.3	1
SMAJ75A-HP6AT	SMAJ75CA-HP6AT	RR	ZR	75.0	83.30~92.10	1	121.0	5.0	1
SMAJ78A-HP6AT	SMAJ78CA-HP6AT	RT	ZT	78.0	86.70~95.80	1	126.0	4.8	1
SMAJ85A-HP6AT	SMAJ85CA-HP6AT	RV	ZV	85.0	94.40~104.00	1	137.0	4.4	1
SMAJ90A-HP6AT	SMAJ90CA-HP6AT	RX	ZX	90.0	100.00~111.00	1	146.0	4.1	1
SMAJ100A-HP6AT	SMAJ100CA-HP6AT	RZ	ZZ	100.0	111.00~123.00	1	162.0	3.7	1

Ratings and Characteristic Curves (T_A=25℃ unless otherwise noted)

Figure 1. Peak Pulse Power Rating Curve

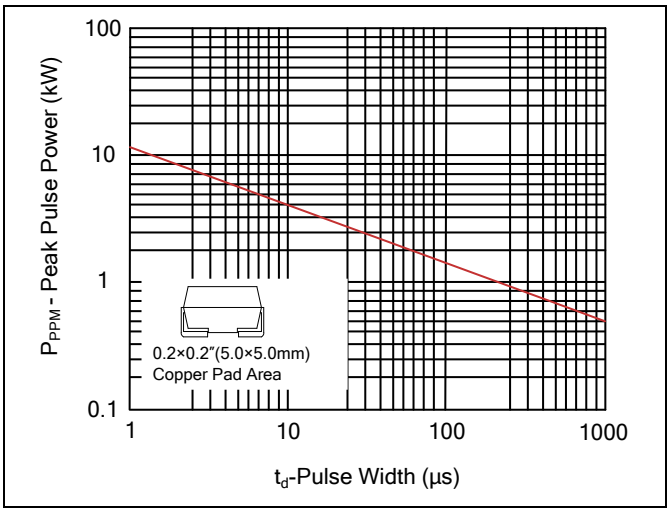


Figure 2. Pulse Derating Curve

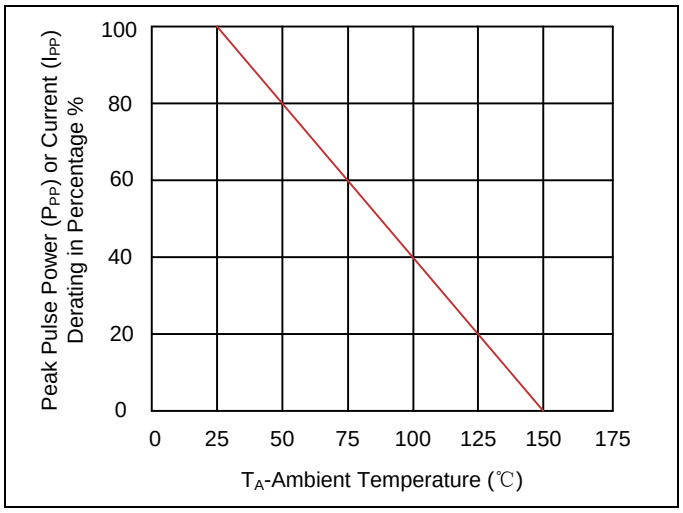


Figure 3. Pulse Waveform

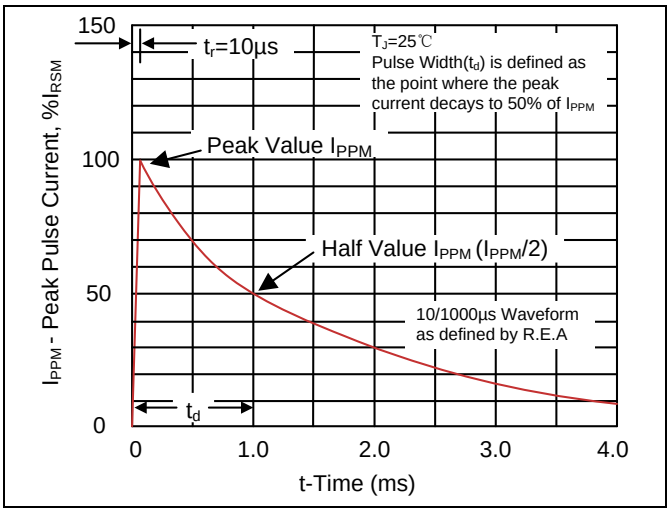


Figure 4. Typical Junction Capacitance

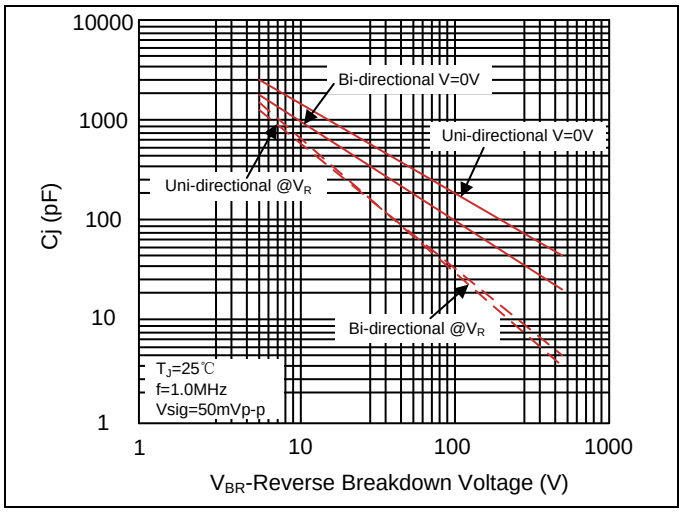


Figure 5. Steady State Power Dissipation Derating Curve

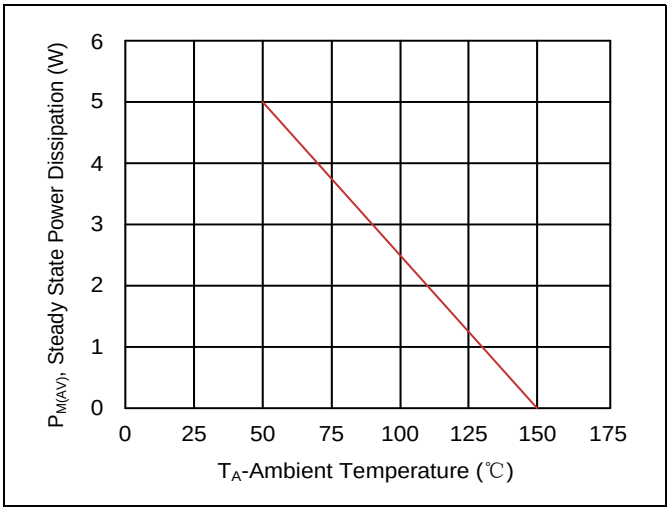
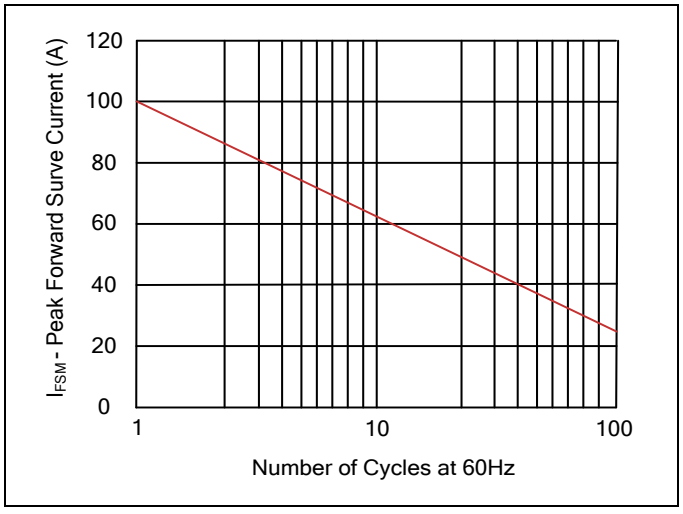
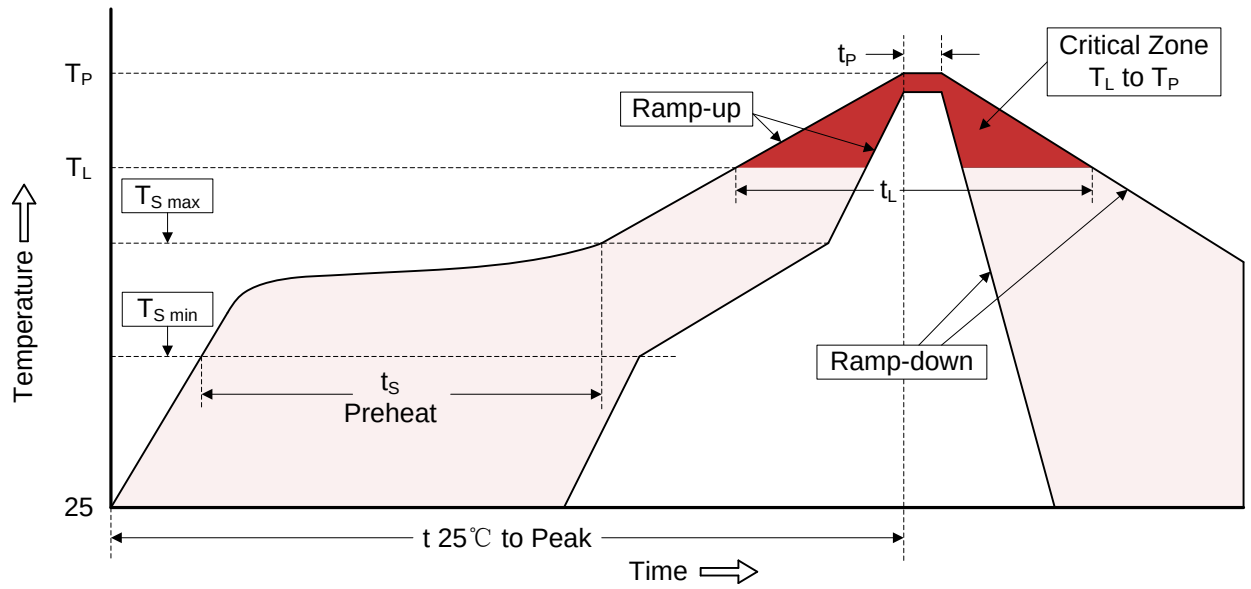


Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



Recommended Soldering Conditions

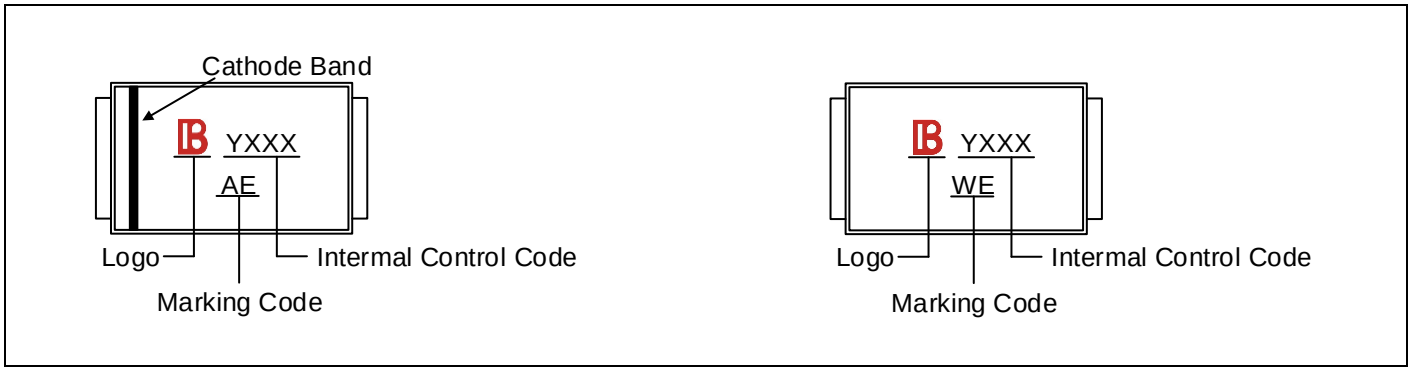
Reflow Soldering



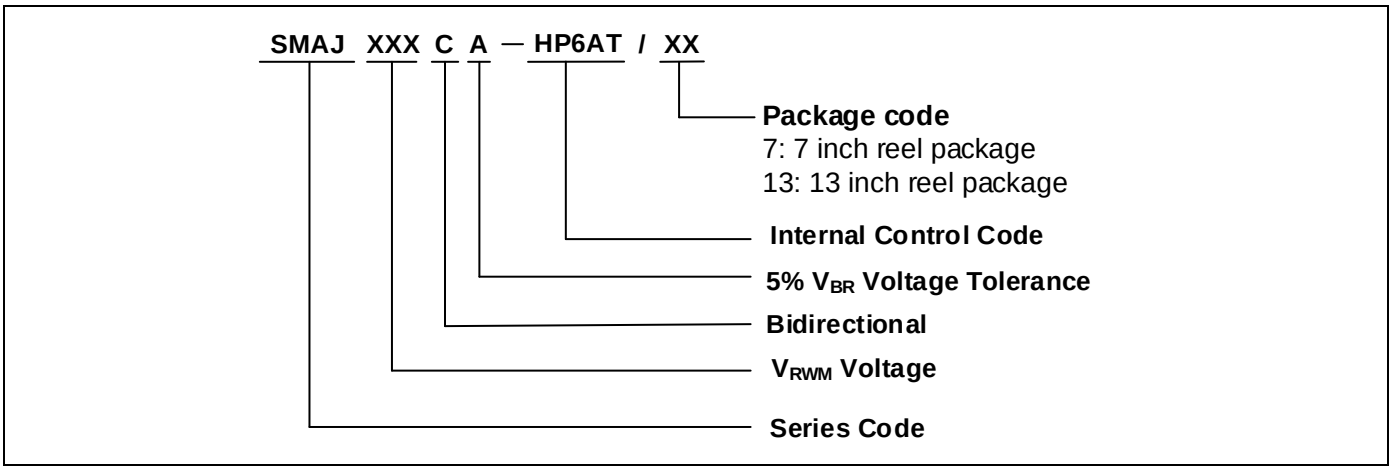
Recommended Conditions

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

Marking Code



Part Number Code

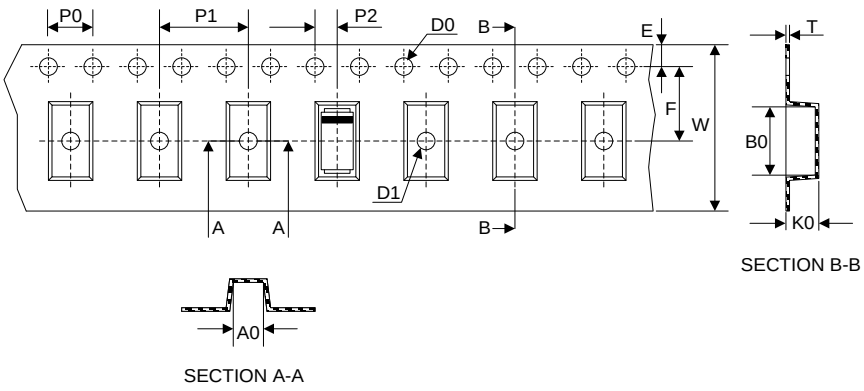


Ordering Code for Different Package

7 inch reel package: Add suffix " /7 " at the end of the part number, such as SMAJXXXCA-HP6AT/7
13 inch reel package: Add suffix " /13 " at the end of the part number, such as SMAJXXXCA-HP6AT/13

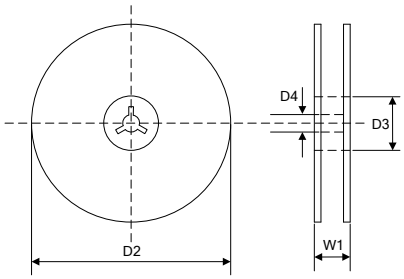
Packaging

Tape



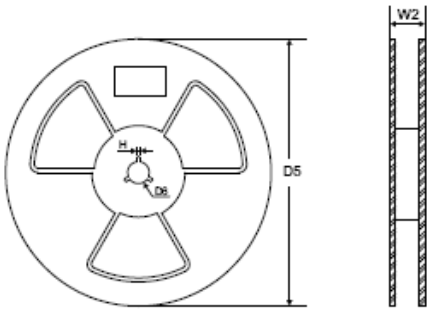
Symbol	Dimension (mm)
W	12.00±0.20
P0	4.00±0.10
P1	4.00±0.10
P2	2.00±0.10
D0	Φ1.5±0.10
D1	Φ1.5±0.10
E	1.75±0.10
F	5.50±0.05
A0	2.79±0.10
B0	5.33±0.10
K0	2.55±0.15
T	0.25±0.05

7” Reel



D2	Φ178.0±2.0
D3	Φ50.0Min.
D4	Φ13.0±0.5
W1	16.0±2.0
Quantity: 1000PCS	

13” Reel



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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