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Transient Voltage Suppressors (TVS) Data Sheet

P6SMB SERIES

Breakdown Voltage
6.8 to 600 V
Peak Pulse Power
600 W

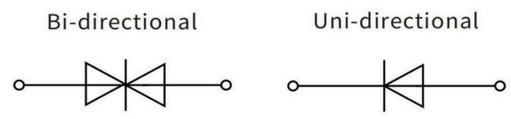
SMB

Description

The P6SMB series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events

Features

- For surface mounted applications in order to optimize board space
- Low leakage
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 600W peak pulse power capability at 10/1000μs waveform
- Fast response time
- Typical IR less than 5μA above 12.8V
- High Temperature soldering: 260°C /40 seconds at terminals
- Typical maximum temperature coefficient ΔVBR = 0.1% ×VBR@25°C ×ΔT
- Plastic package has Underwriters Laboratory Flammability 94V-0
- Matte tin lead–free Plated
- Halogen free and RoHS compliant
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC 61000-4-2 ESD 30KV(Air),30KV(contact)



Applications

TVS devices are ideal for the protection of I/O interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications

Maximum Ratings (Ta=25°C Unless otherwise specified)

PARAMETER	SYMBOL	VALUE	SYMBOL
Peak Pulse Power Dissipation with a 10/1000μs waveform (Fig.1)(Note 1), (Note 2)	P_{PPM}	600	W
Peak Pulse Current with a 10/1000μs waveform.(Note1,Fig.3)	I_{PP}	See Next Table	A
Power Dissipation on Infinite Heat Sink at T_L=75° C	$P_{M(AV)}$	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I_{FSM}	100	A
Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only(Note 4)	V_F	3.5/5.0	V
Operating junction and Storage Temperature Range	T_J , T_{STG}	-55 to +150	°C
Typical thermal resistance junction to lead	$R_{\theta J-L}$	20	°C /W
Typical thermal resistance junction to ambient	$R_{\theta J-A}$	100	°C /W

Note :
(1) Non-repetitive current pulse, per Fig. 3 and derated above Ta = 25°C per Fig. 2.
(2) Mounted on 5.0mm x 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.
(4)V_F <3.5V for V_{BR}<200V and V_F< 6.5V for V_{BR}>201V.

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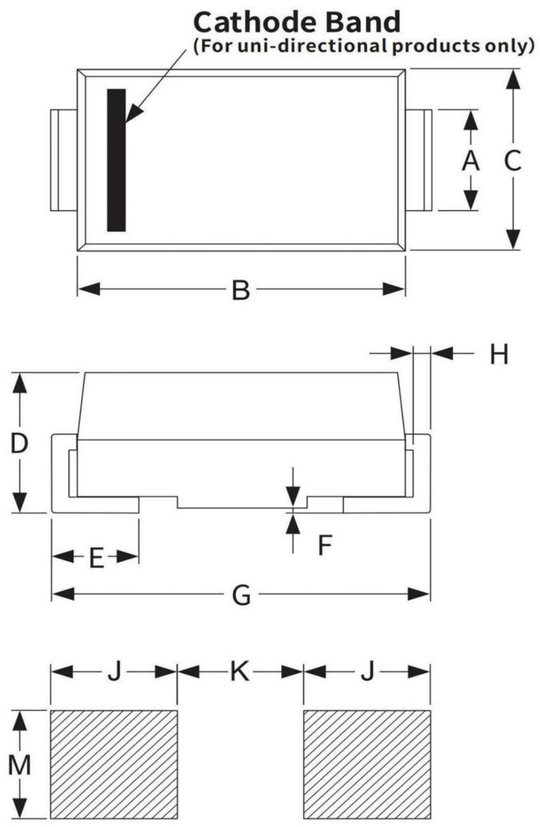
Package Outline Dimensions (SMB/DO-214AA)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.85	2.21	0.073	0.087
B	4.25	4.85	0.167	0.191
C	3.30	3.94	0.130	0.155
D	2.15	2.65	0.085	0.104
E	0.75	1.52	0.030	0.060
F	-	0.203	-	0.008
G	5.08	5.59	0.200	0.220
H	0.15	0.31	0.006	0.012
M	2.26	-	0.089	-
J	2.10	-	0.085	-
K	-	2.74	-	0.107

Electrical Characteristics (Ta=25°C Unless otherwise specified)

Part Number		Marking		Reverse Stand-Off Voltage	Breakdown Voltage V_{BR} (V) @I_T		Test Current	Maximum Clamping Voltage@I_{PP}	Peak Pulse Current	Reverse Leakage @V_{RWM}
Uni	Bi	Uni	Bi	V_{RWM}(V)	Min.	Max.	I_T(mA)	V_C(V)	I_{PP} (A)	I_R(μA)
P6SMB6.8A	P6SMB6.8CA	6V8A	6V8C	5.8	6.46	7.14	10	10.5	57.1	1000
P6SMB7.5A	P6SMB7.5CA	7V5A	7V5C	6.4	7.13	7.88	10	11.3	53.1	500
P6SMB8.2A	P6SMB8.2CA	8V2A	8V2C	7.0	7.79	8.61	10	12.1	49.6	200
P6SMB9.1A	P6SMB9.1CA	9V1A	9V1C	7.8	8.65	9.56	1	13.4	44.7	50
P6SMB10A	P6SMB10CA	10A	10C	8.6	9.5	10.5	1	14.5	41.3	10
P6SMB11A	P6SMB11CA	11A	11C	9.4	10.45	11.55	1	15.6	38.4	5
P6SMB12A	P6SMB12CA	12A	12C	10.2	11.4	12.6	1	16.7	35.9	5
P6SMB13A	P6SMB13CA	13A	13C	11.1	12.35	13.65	1	18.2	32.9	5
P6SMB15A	P6SMB15CA	15A	15C	12.8	14.25	15.75	1	21.2	28.3	5
P6SMB16A	P6SMB16CA	16A	16C	13.6	15.2	16.8	1	22.5	26.6	5
P6SMB18A	P6SMB18CA	18A	18C	15.3	17.1	18.9	1	25.2	23.8	5
P6SMB20A	P6SMB20CA	20A	20C	17.1	19	21	1	27.7	21.6	5
P6SMB22A	P6SMB22CA	22A	22C	18.8	20.9	23.1	1	30.6	19.6	5
P6SMB24A	P6SMB24CA	24A	24C	20.5	22.8	25.2	1	33.2	18.1	5
P6SMB27A	P6SMB27CA	27A	27C	23.1	25.65	28.35	1	37.5	16	5
P6SMB30A	P6SMB30CA	30A	30C	25.6	28.5	31.5	1	41.4	14.5	5
P6SMB33A	P6SMB33CA	33A	33C	28.2	31.35	34.65	1	45.7	13.1	5
P6SMB36A	P6SMB36CA	36A	36C	30.8	34.2	37.8	1	49.9	12	5
P6SMB39A	P6SMB39CA	39A	39C	33.3	37.05	40.95	1	53.9	11.1	5
P6SMB43A	P6SMB43CA	43A	43C	36.8	40.85	45.15	1	59.3	10.1	5
P6SMB47A	P6SMB47CA	47A	47C	40.2	44.65	49.35	1	64.8	9.2	5
P6SMB51A	P6SMB51CA	51A	51C	43.6	48.45	53.55	1	70.1	8.5	5
P6SMB56A	P6SMB56CA	56A	56C	47.8	53.2	58.8	1	77	7.8	5

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Electrical Characteristics (Ta=25°C Unless otherwise specified)

Part Number		Marking		Reverse Stand-Off Voltage	Breakdown Voltage V_{BR} (V) @I_T		Test Current	Maximum Clamping Voltage@I_{PP}	Peak Pulse Current	Reverse Leakage @V_{RWM}
Uni	Bi	Uni	Bi	V_{RWM}(V)	Min.	Max.	I_T(mA)	V_C(V)	I_{PP} (A)	I_R(μA)
P6SMB62A	P6SMB62CA	62A	62C	53	58.9	65.1	1	85	7.0	5
P6SMB68A	P6SMB68CA	68A	68C	58.1	64.6	71.4	1	92	6.5	5
P6SMB75A	P6SMB75CA	75A	75C	64.1	71.25	78.75	1	103	5.8	5
P6SMB82A	P6SMB82CA	82A	82C	70.1	77.9	86.1	1	113	5.3	5
P6SMB91A	P6SMB91CA	91A	91C	77.8	86.45	95.35	1	125	4.8	5
P6SMB100A	P6SMB100CA	100A	100C	85.5	95	105	1	137	4.3	5
P6SMB110A	P6SMB110CA	110A	110C	94	104.5	115.5	1	152	3.9	5
P6SMB120A	P6SMB120CA	120A	120C	102	114	126	1	165	3.6	5
P6SMB130A	P6SMB130CA	130A	130C	111	123.5	136.5	1	179	3.3	5
P6SMB150A	P6SMB150CA	150A	150C	128	142.5	157.5	1	207	2.9	5
P6SMB160A	P6SMB160CA	160A	160C	136	152	168	1	219	2.7	5
P6SMB170A	P6SMB170CA	170A	170C	145	161.5	178.5	1	234	2.5	5
P6SMB180A	P6SMB180CA	180A	180C	154	171	189	1	246	2.4	5
P6SMB200A	P6SMB200CA	200A	200C	171	190	210	1	274	2.2	5
P6SMB220A	P6SMB220CA	220A	220C	185	209	231	1	328	1.8	5
P6SMB250A	P6SMB250CA	250A	250C	214	237.5	262.5	1	344	1.7	5
P6SMB300A	P6SMB300CA	300A	300C	256	285	315	1	414	1.4	5
P6SMB350A	P6SMB350CA	350A	350C	299.3	332.5	367.5	1	482	1.2	5
P6SMB380A	P6SMB380CA	380A	380C	324.9	361	399	1	524.4	1.1	5
P6SMB400A	P6SMB400CA	400A	400C	342	380	420	1	548	1.1	5
P6SMB440A	P6SMB440CA	440A	440C	376.2	418	462	1	607.2	1.0	5
P6SMB500A	P6SMB500CA	500A	500C	427.5	475	525	1	690	0.8	5
P6SMB520A	P6SMB520CA	520A	520C	444.6	494	546	1	717.6	0.8	5
P6SMB550A	P6SMB550CA	550A	550C	470.3	522.5	577.5	1	759	0.8	5
P6SMB600A	P6SMB600CA	600A	600C	513	570	630	1	828	0.7	5

Note :
(1)Suffix 'A ' denotes 5% tolerance device.
(2)Add suffix ' CA ' after part number to specify Bi-directional devices.
(3)For Bi-Directional devices having VR of 10 volts and under, the IR limit is double.

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Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)

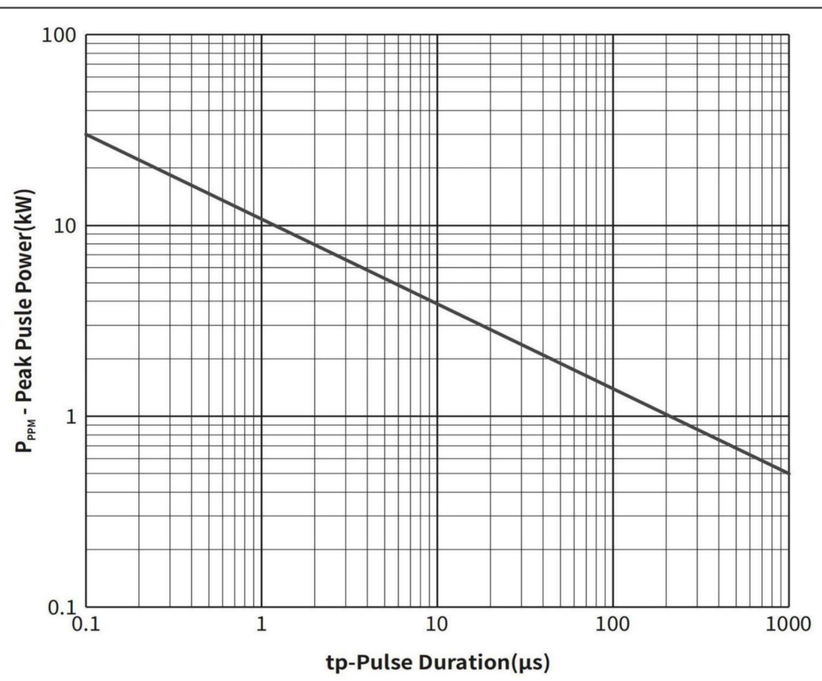

Fig. 1 Peak Pulse Power Rating Curve

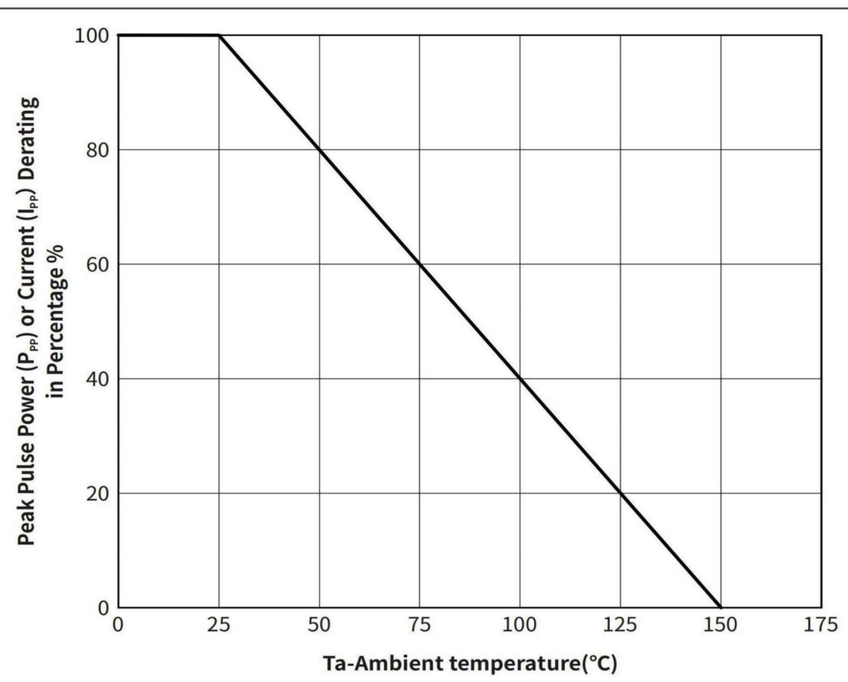

Fig.2 Pulse Derating Curve

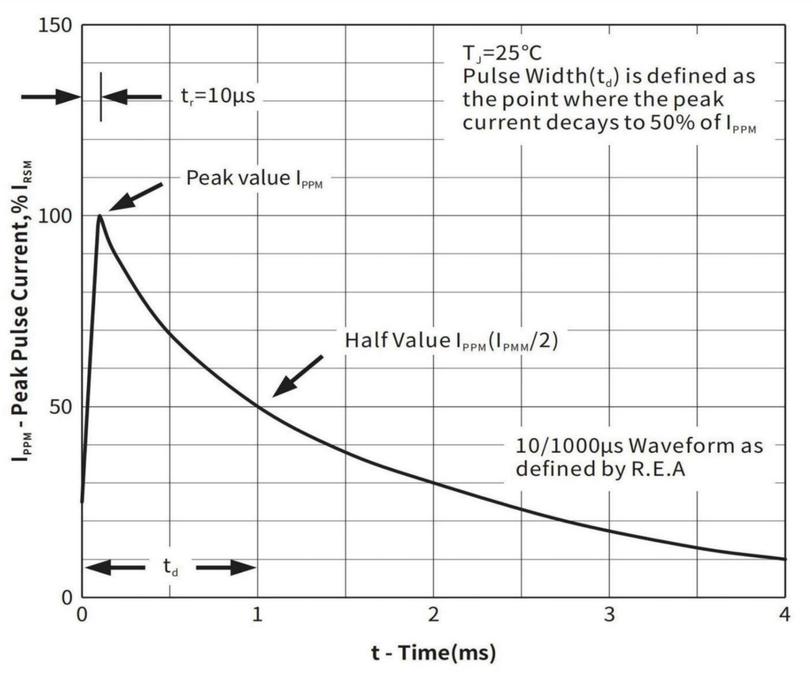

Fig.3 Pulse Waveform

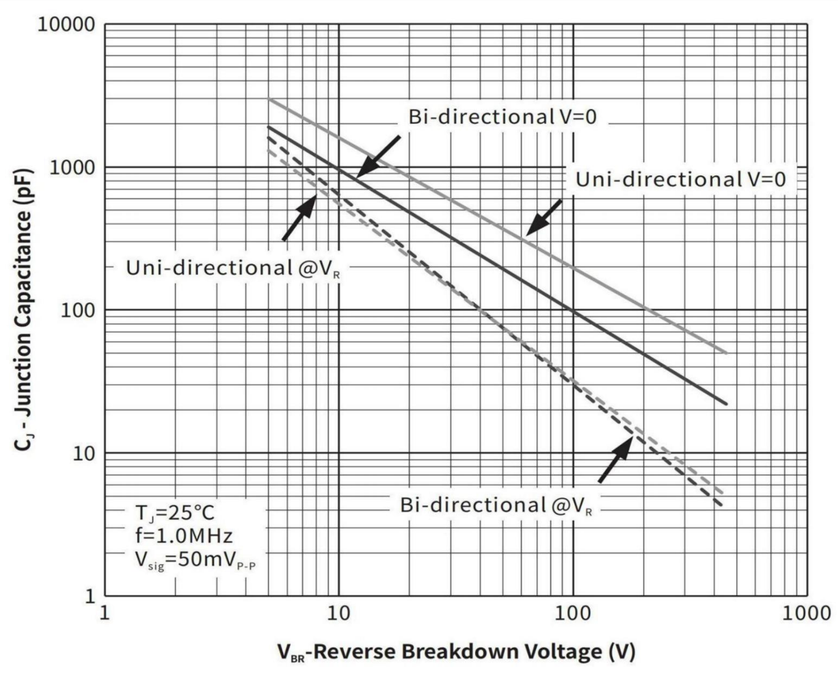

Fig.4 Typical Junction Capacitance

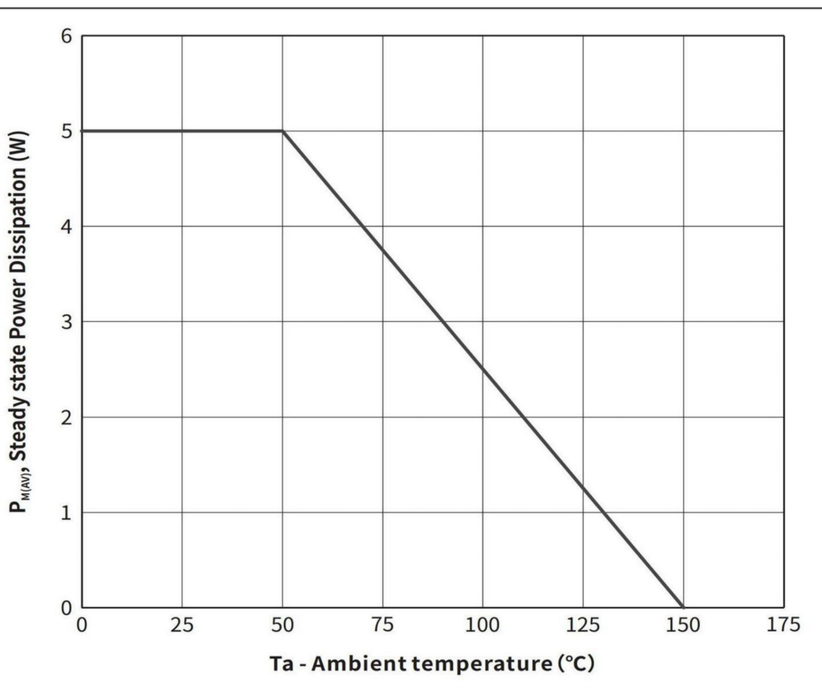

Fig.5 Steady State Power Dissipation Derating Curve

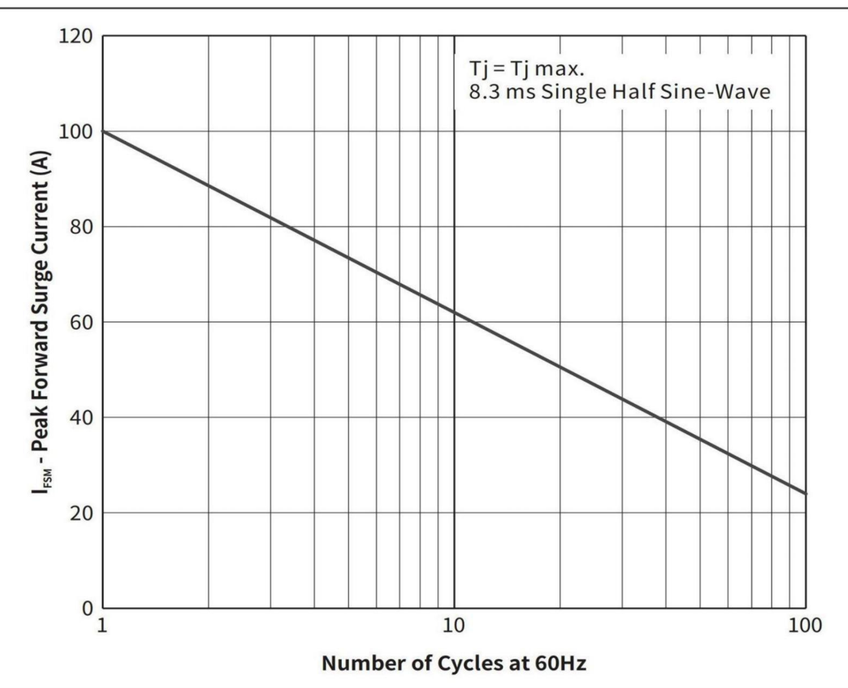

Fig.6 Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

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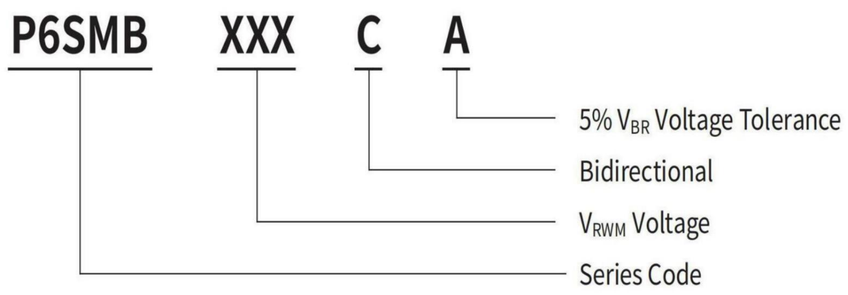
Ordering Information

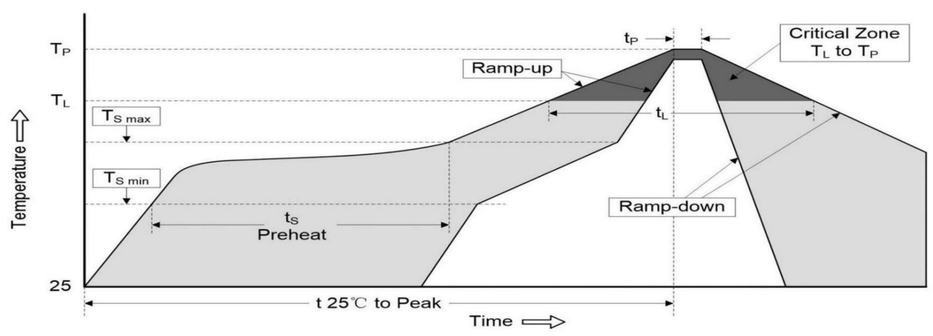
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SMB	R1	0.098	500	2000	16000	7''
SMB	R3	0.098	3000	6000	30000	13''

Part Numbering



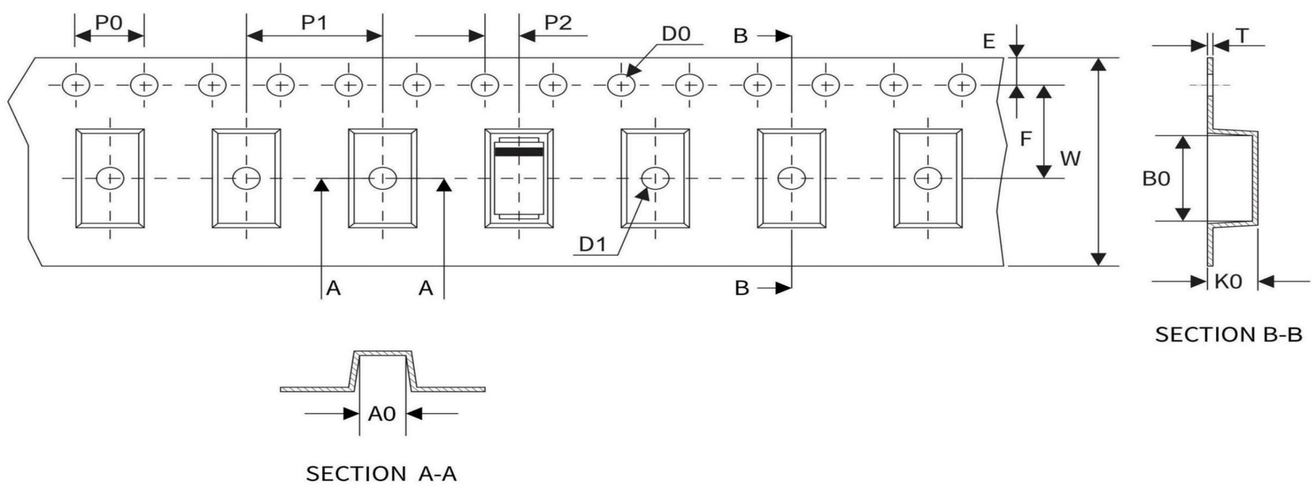
Soldering Parameters

Reflow Soldering



Profile Feature		Pb-Free Assembly
Pre-heat	Temperature Min ($T_{s(min)}$)	+150°C
	Temperature Max($T_{s(max)}$)	+200°C
	Time (Min to Max) (t_s)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3°C /sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C /sec. Max
Reflow	Temperature(T_L)(Liquid us)	+217°C
	Temperature(t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_P)		30 secs. Max
Ramp-down Rate		6°C /sec. Max
Time 25°C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260°C

Packaging (SMB/DO-214AA)



Symbol	Dimension (mm)
W	12.00±0.20
P0	4.00±0.10
P1	8.00±0.10
P2	2.00±0.10
D0	Φ1.55±0.10
D1	Φ1.5±0.10
E	1.75±0.10
F	5.50±0.05
A0	3.86±0.10
B0	5.65±0.10
K0	2.75±0.15
T	0.25±0.05