

Transient Voltage Suppressors (TVS) Data Sheet

Description

The SMAJ 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
- 400W peak pulse power capability at 10/1000µs waveform
- Fast response time
- Typical IR less than 5µA above 12V
- High Temperature soldering: 260°C /40 seconds at terminals
- Typical maximum temperature coefficient $\Delta V_{BR} = 0.1\% \times V_{BR}@25^{\circ}C \times \Delta T$
- 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}	400	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 TL=75° C	P _{M(AV)}	1.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I _{FSM}	40	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 _{θJ-L}	30	°C /W
Typical thermal resistance junction to ambient	R _{θJ-A}	120	°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.

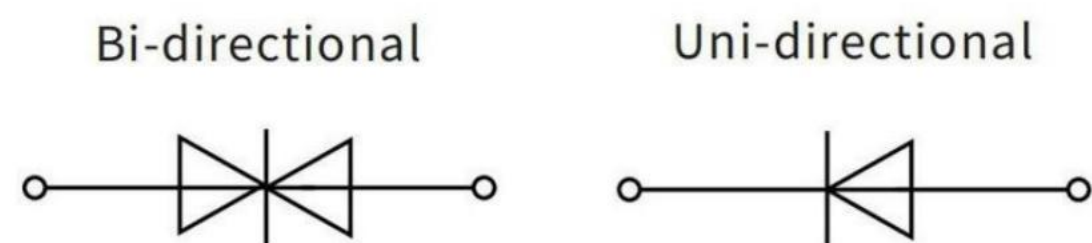
SMAJ SERIES

Breakdown Voltage

3.3 to 440 V

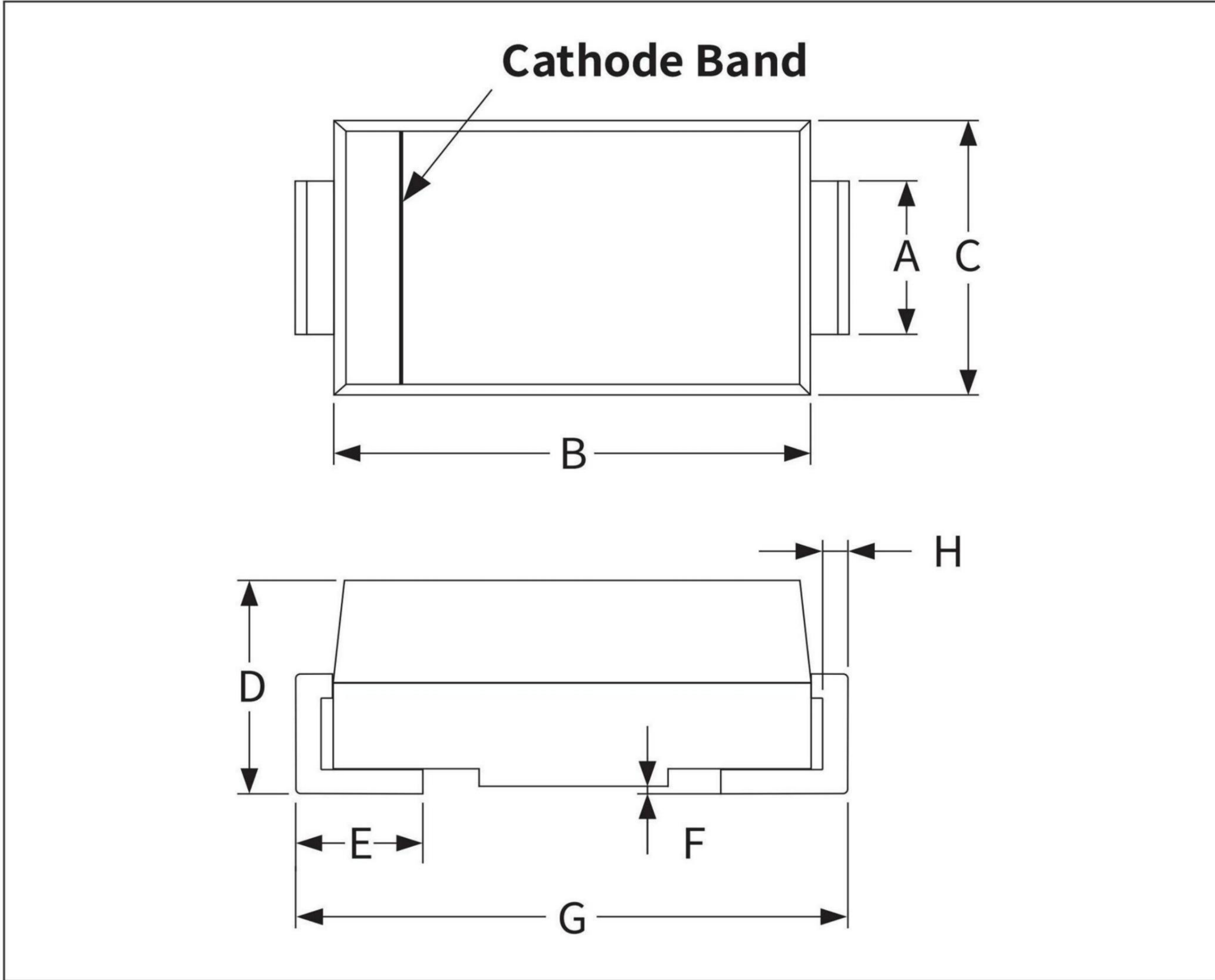
Peak Pulse Power

400 W



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Package Outline Dimensions (SMA/DO-214AC)

	Symbol	Dimensions			
		Millimeters		Inches	
		Min.	Max.	Min.	Max.
A		1.25	1.65	0.049	0.065
B		3.95	4.65	0.156	0.183
C		2.35	2.85	0.093	0.112
D		1.98	2.41	0.078	0.095
E		0.76	1.52	0.030	0.060
F		-	0.203	-	0.008
G		4.70	5.30	0.185	0.209
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 (μ A)
SMAJ3.3A	SMAJ3.3CA	AD	WD	3.3	5.2	6	10	8	43.8	800
SMAJ5.0A	SMAJ5.0CA	AE	WE	5	6.4	7	10	9.2	43.5	800
SMAJ6.0A	SMAJ6.0CA	AG	WG	6	6.67	7.37	10	10.3	38.8	800
SMAJ6.5A	SMAJ6.5CA	AK	WK	6.5	7.22	7.98	10	11.2	35.7	500
SMAJ7.0A	SMAJ7.0CA	AM	WM	7	7.78	8.6	10	12.0	33.3	200
SMAJ7.5A	SMAJ7.5CA	AP	WP	7.5	8.33	9.21	1	12.9	31.0	100
SMAJ8.0A	SMAJ8.0CA	AR	WR	8	8.89	9.83	1	13.6	29.4	50
SMAJ8.5A	SMAJ8.5CA	AT	WT	8.5	9.44	10.4	1	14.4	27.8	20
SMAJ9.0A	SMAJ9.0CA	AV	WV	9	10	11.1	1	15.4	26.0	10
SMAJ10A	SMAJ10CA	AX	WX	10	11.1	12.3	1	17.0	23.5	5
SMAJ11A	SMAJ11CA	AZ	WZ	11	12.2	13.5	1	18.2	22.0	1
SMAJ12A	SMAJ12CA	BE	XE	12	13.3	14.7	1	19.9	20.1	1
SMAJ13A	SMAJ13CA	BG	XG	13	14.4	15.9	1	21.5	18.6	1
SMAJ14A	SMAJ14CA	BK	XK	14	15.6	17.2	1	23.2	17.2	1
SMAJ15A	SMAJ15CA	BM	XM	15	16.7	18.5	1	24.4	16.4	1
SMAJ16A	SMAJ16CA	BP	XP	16	17.8	19.7	1	26.0	15.4	1
SMAJ17A	SMAJ17CA	BR	XR	17	18.9	20.9	1	27.6	14.5	1
SMAJ18A	SMAJ18CA	BT	XT	18	20	22.1	1	29.2	13.7	1
SMAJ20A	SMAJ20CA	BV	XV	20	22.2	24.5	1	32.4	12.3	1
SMAJ22A	SMAJ22CA	BX	XX	22	24.4	26.9	1	35.5	11.3	1
SMAJ24A	SMAJ24CA	BZ	XZ	24	26.7	29.5	1	38.9	10.3	1
SMAJ26A	SMAJ26CA	CE	YE	26	28.9	31.9	1	42.1	9.5	1
SMAJ28A	SMAJ28CA	CG	YG	28	31.1	34.4	1	45.4	8.8	1

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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 (μ A)
SMAJ30A	SMAJ30CA	CK	YK	30	33.3	36.8	1	48.4	8.3	1
SMAJ33A	SMAJ33CA	CM	YM	33	36.7	40.6	1	53.3	7.5	1
SMAJ36A	SMAJ36CA	CP	YP	36	40	44.2	1	58.1	6.9	1
SMAJ40A	SMAJ40CA	CR	YR	40	44.4	49.1	1	64.5	6.2	1
SMAJ43A	SMAJ43CA	CT	YT	43	47.8	52.8	1	69.4	5.8	1
SMAJ45A	SMAJ45CA	CV	YV	45	50	55.3	1	72.7	5.5	1
SMAJ48A	SMAJ48CA	CX	YX	48	53.3	58.9	1	77.4	5.2	1
SMAJ51A	SMAJ51CA	CZ	YZ	51	56.7	62.7	1	82.4	4.9	1
SMAJ54A	SMAJ54CA	RE	ZE	54	60	66.3	1	87.1	4.6	1
SMAJ58A	SMAJ58CA	RG	ZG	58	64.4	71.2	1	93.6	4.3	1
SMAJ60A	SMAJ60CA	RK	ZK	60	66.7	73.7	1	96.8	4.1	1
SMAJ64A	SMAJ64CA	RM	ZM	64	71.1	78.6	1	103	3.9	1
SMAJ70A	SMAJ70CA	RP	ZP	70	77.8	86	1	113	3.5	1
SMAJ75A	SMAJ75CA	RR	ZR	75	83.3	92.1	1	121	3.3	1
SMAJ78A	SMAJ78CA	RT	ZT	78	86.7	95.8	1	126	3.2	1
SMAJ80A	SMAJ80CA	RB	ZB	80	88.8	97.6	1	129.6	3.09	1
SMAJ85A	SMAJ85CA	RV	ZV	85	94.4	104	1	137	2.9	1
SMAJ90A	SMAJ90CA	RX	ZX	90	100	111	1	146	2.7	1
SMAJ100A	SMAJ100CA	RZ	ZZ	100	111	123	1	162	2.5	1
SMAJ110A	SMAJ110CA	SE	VE	110	122	135	1	177	2.3	1
SMAJ120A	SMAJ120CA	SG	VG	120	133	147	1	193	2.1	1
SMAJ130A	SMAJ130CA	SK	VK	130	144	159	1	209	1.9	1
SMAJ150A	SMAJ150CA	SM	VM	150	167	185	1	243	1.6	1
SMAJ160A	SMAJ160CA	SP	VP	160	178	197	1	259	1.5	1
SMAJ170A	SMAJ170CA	SR	VR	170	189	209	1	275	1.5	1
SMAJ180A	SMAJ180CA	ST	VT	180	201	222	1	292	1.4	1
SMAJ190A	SMAJ190CA	SU	YU	190	211	232	1	307.8	1.3	1
SMAJ200A	SMAJ200CA	SV	VV	200	224	247	1	324	1.2	1
SMAJ220A	SMAJ220CA	SX	VX	220	246	272	1	356	1.1	1
SMAJ250A	SMAJ250CA	SZ	VZ	250	279	309	1	405	1.0	1
SMAJ300A	SMAJ300CA	TE	UE	300	335	371	1	486	0.8	1
SMAJ350A	SMAJ350CA	TG	UG	350	391	432	1	567	0.7	1
SMAJ400A	SMAJ400CA	TK	UK	400	447	494	1	648	0.6	1
SMAJ440A	SMAJ440CA	TM	UM	440	492	543	1	713	0.56	1

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)

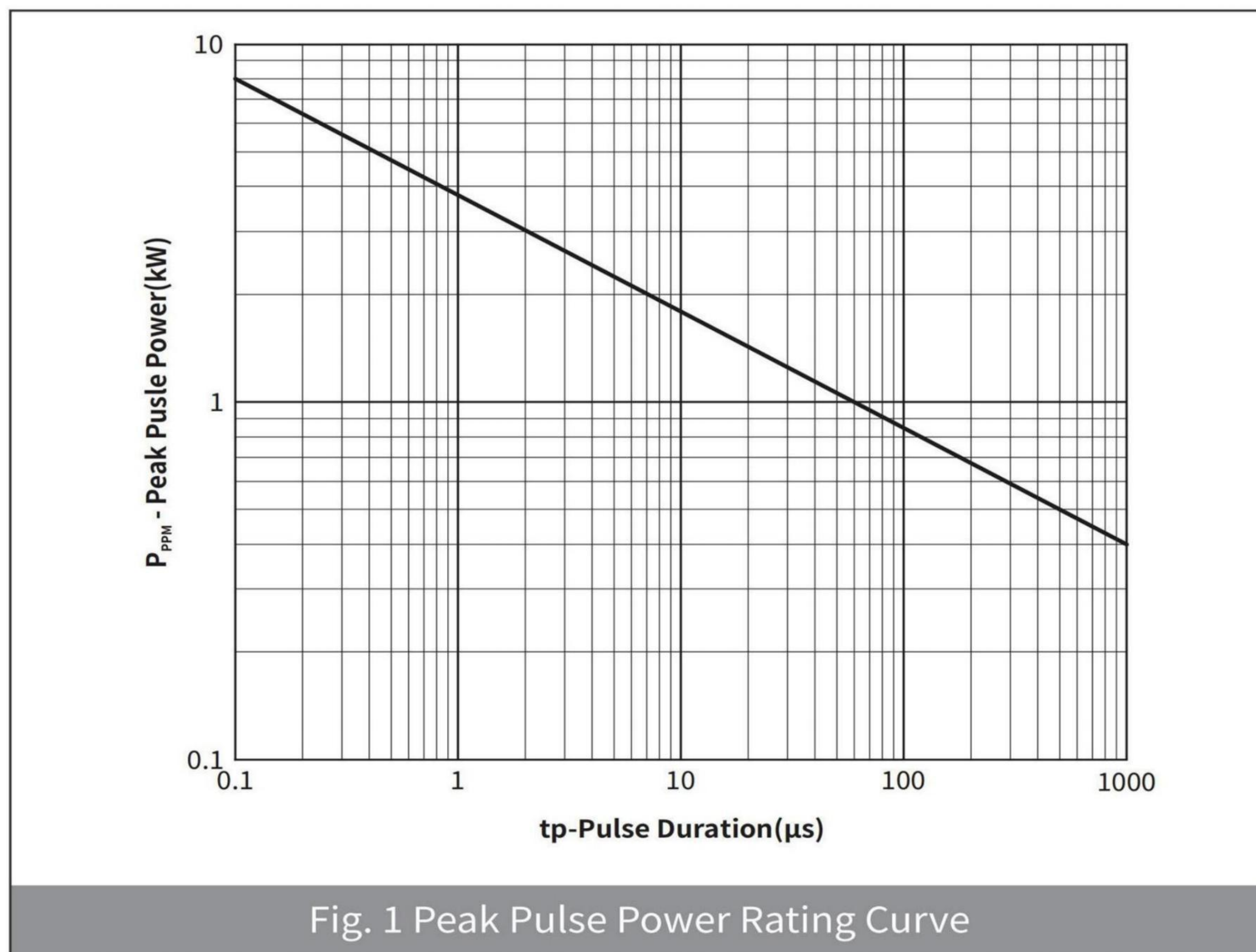


Fig. 1 Peak Pulse Power Rating Curve

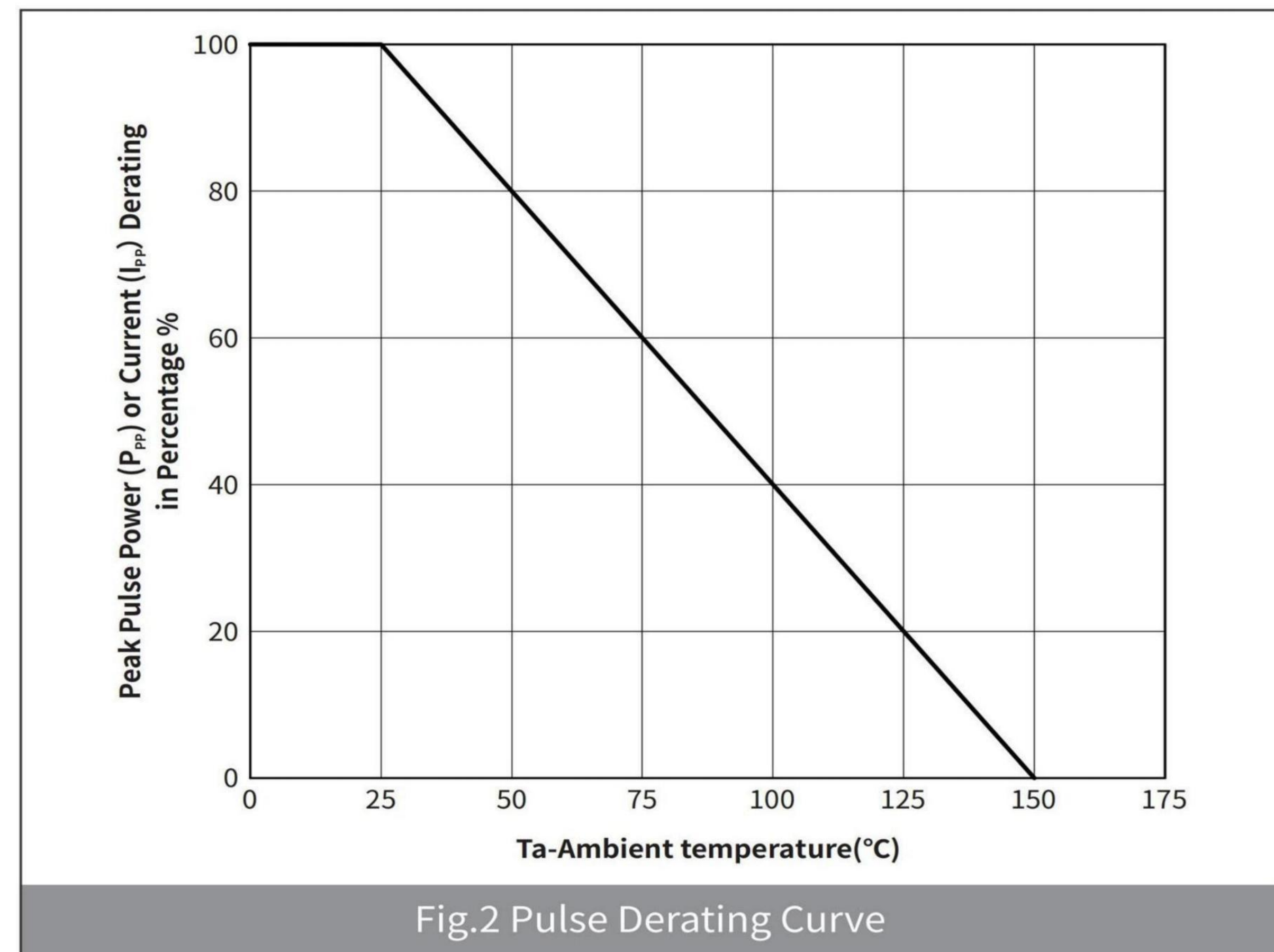


Fig.2 Pulse Derating Curve

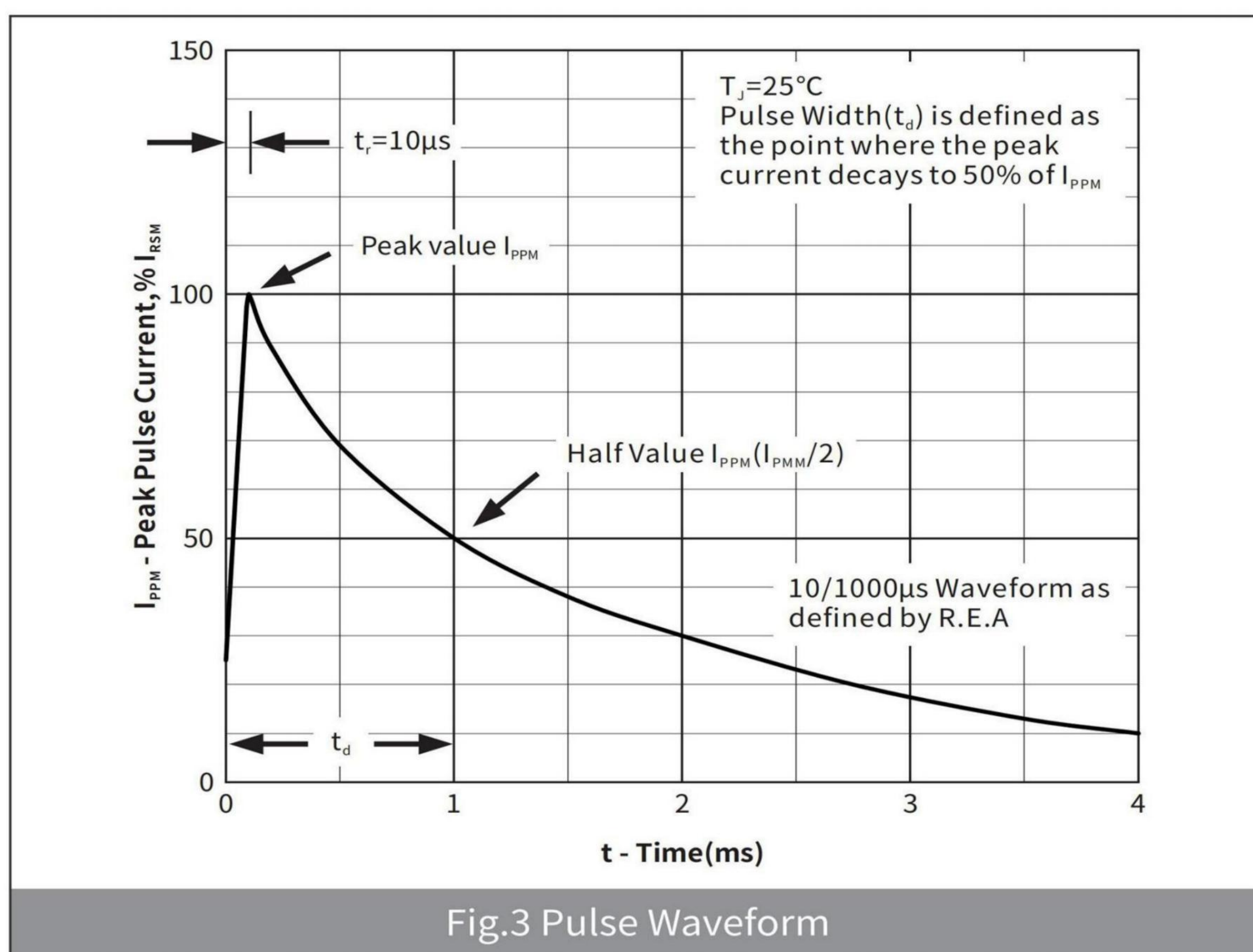


Fig.3 Pulse Waveform

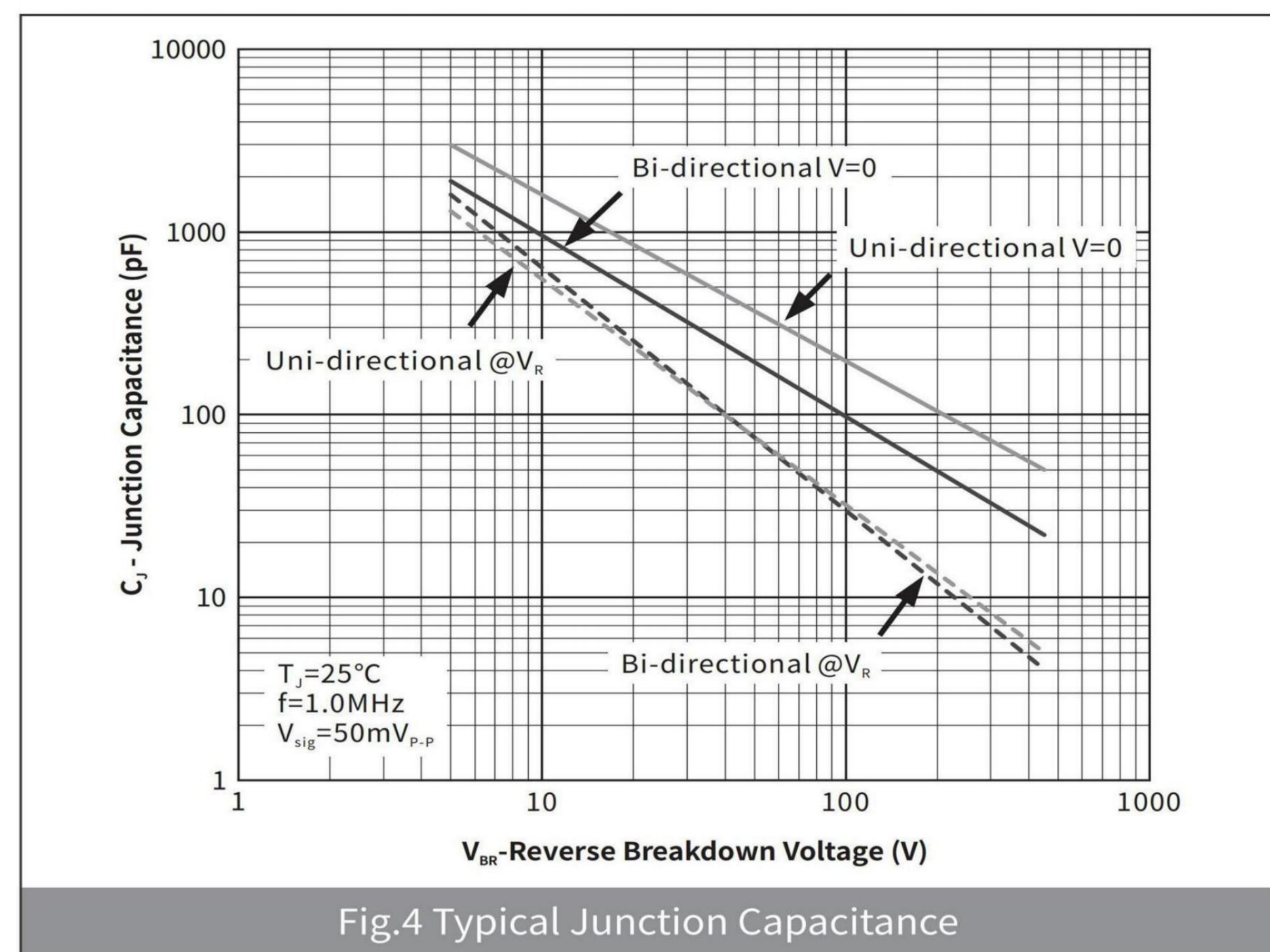


Fig.4 Typical Junction Capacitance

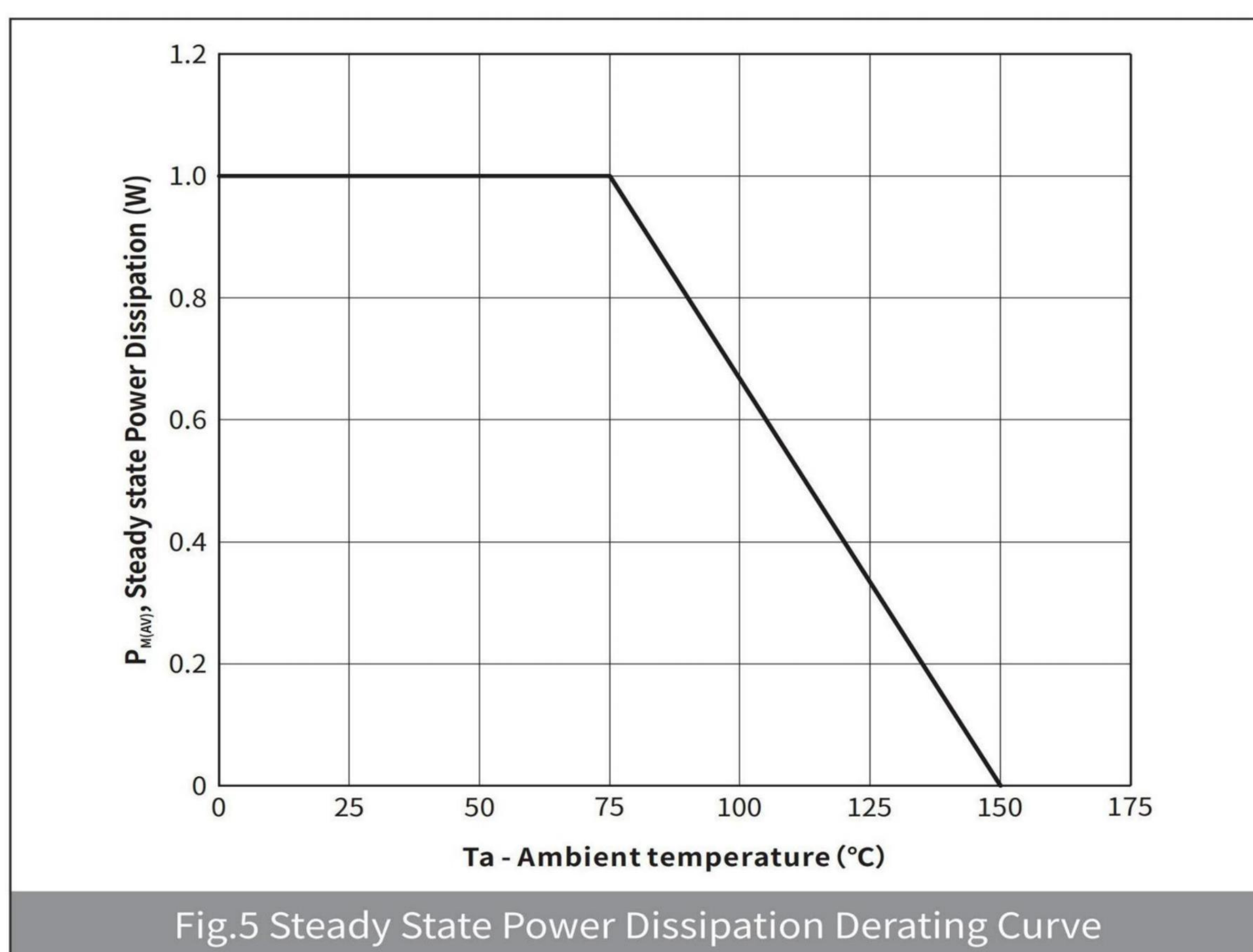


Fig.5 Steady State Power Dissipation Derating Curve

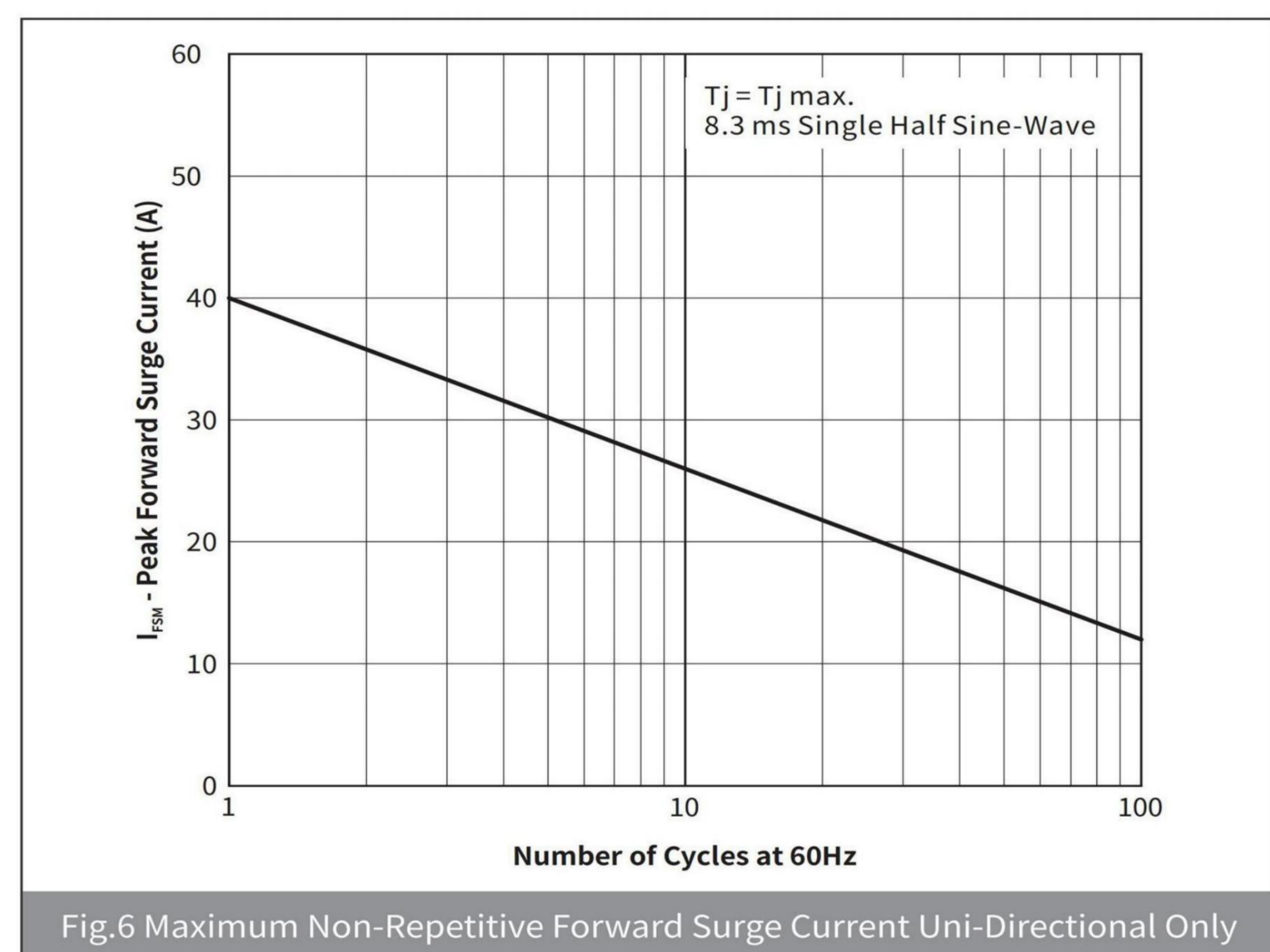


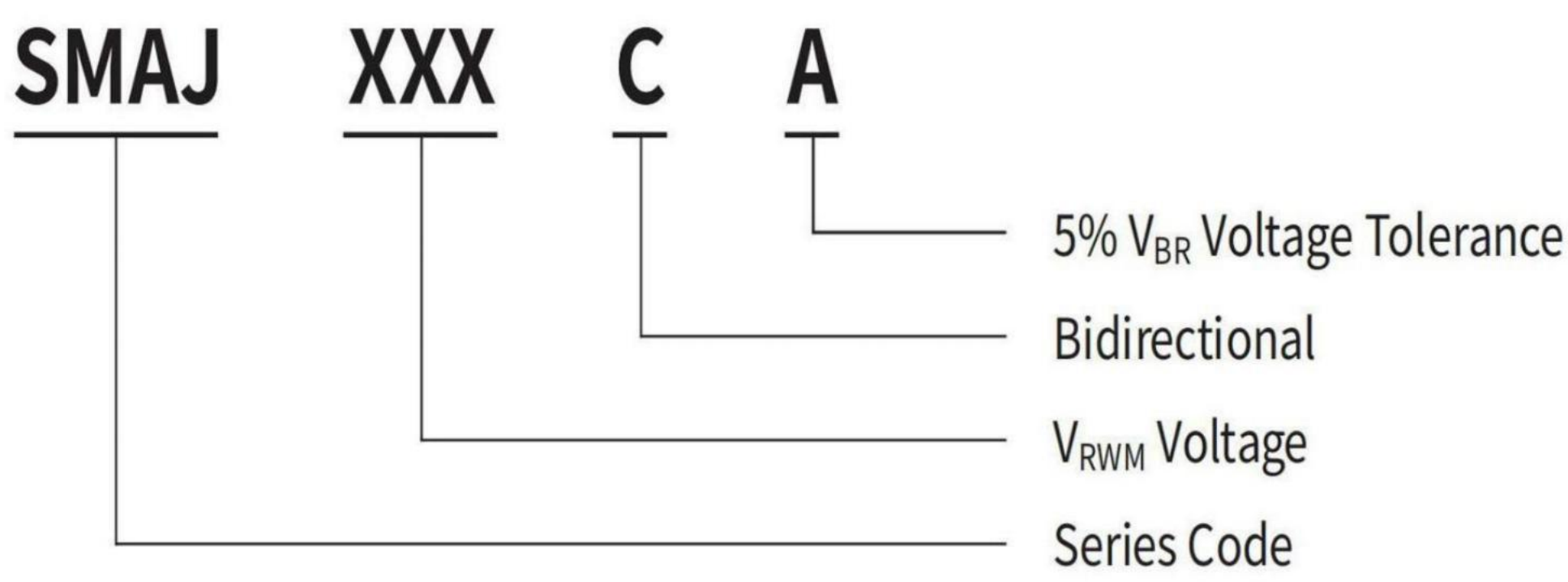
Fig.6 Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

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Ordering Information

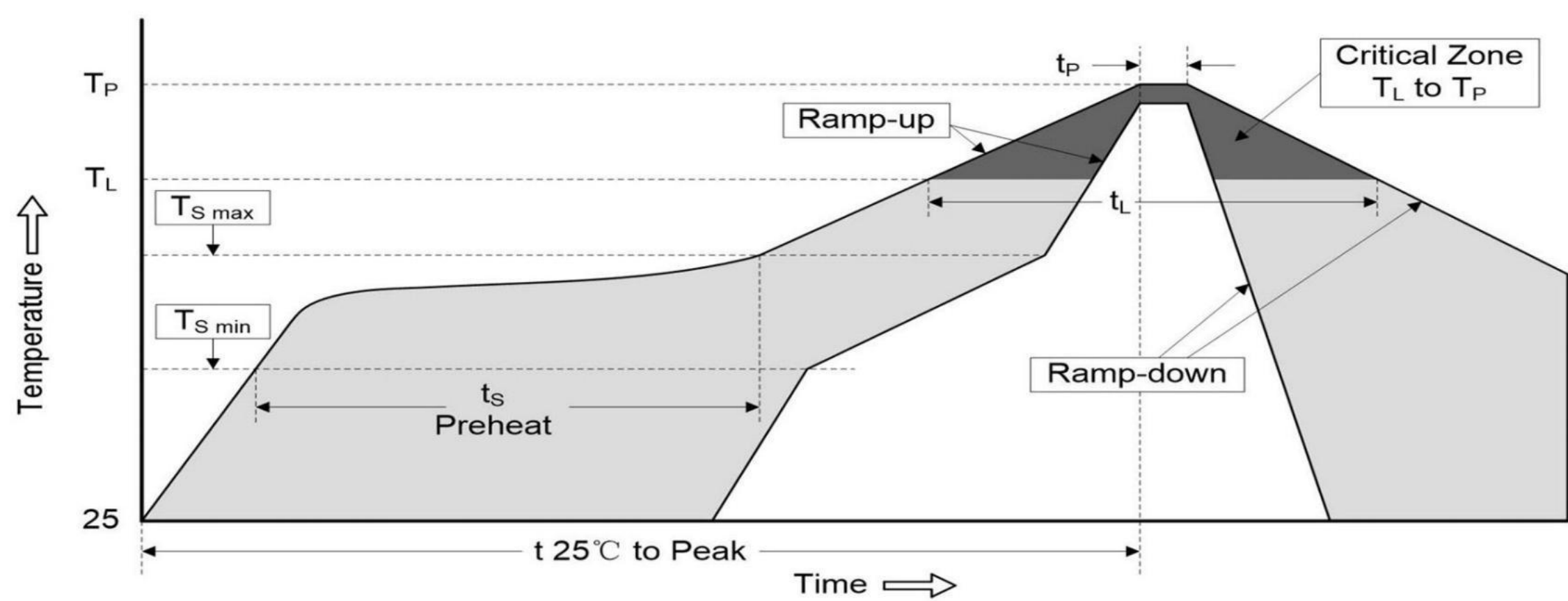
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SMA	R2	0.07	5000	10000	50000	11"
SMA	R3	0.07	7500	15000	75000	13"

Part Numbering



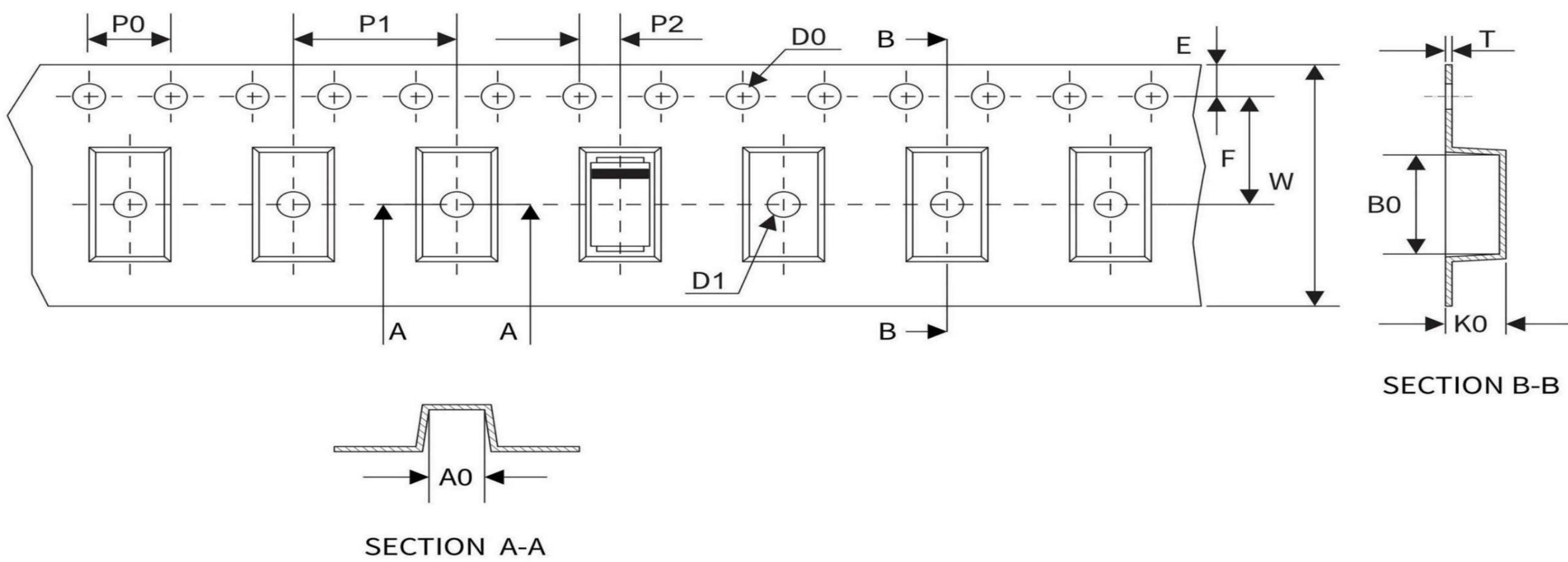
Soldering Parameters

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 (SMA/DO-214AC)



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