

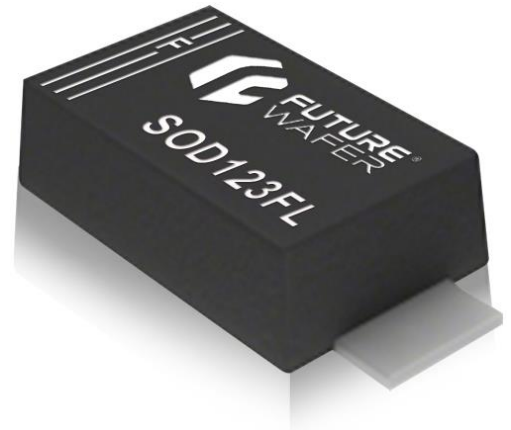
1. Synopsis

1-1. General Description

The SMF 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 Over Stress Such as IEC 61000-4-4 and 5. They Are Generally For Surges Below 300 W 10/1000 μ s.

This 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.

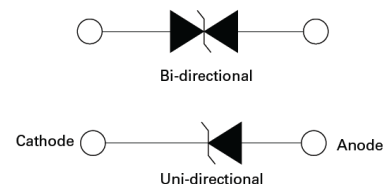
Packaged in SOD123FL, This Minimizes PCB Space Consumption.



SOD123FL

1-2. Feature List

- Bi / Uni-Directional Configurations
- Plastic Package Has Underwriters
- Glass Passivated Chip Junction in SOD123FL Package
- 300 Watts Peak Pulse Power ($t_p = 10/1000\mu$ s)
- Halogen Free and RoHS Compliant
- Fast Response Time: Typically Less Than 1.0ps From 0 Volts to $V_{(BR)}$ For Uni-Directional and 5.0ns For Bi-Directional Types
- High Temperature Soldering Guaranteed: 250°C / 10 Seconds at Terminals



1-3. Applications

- Power Supply Protection
- Industrial Application
- Power Manager

1-4. IEC Compatibility

- EN61000-4
- 61000-4-2(ESD): Contact: $>\pm 30$ KV, Air: $>\pm 30$ KV
- 61000-4-4(EFT)
- 61000-4-5(Surge): 10/1000 μ s

1-5. Mechanical Characteristics

- Molded JEDEC SOD123FL Package
- Packing: Tape and Reel
- Flammability Rating UL 94V-0
- Halogen Free
- JEDEC MSL Classification: Level 1



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3. Electrical Property

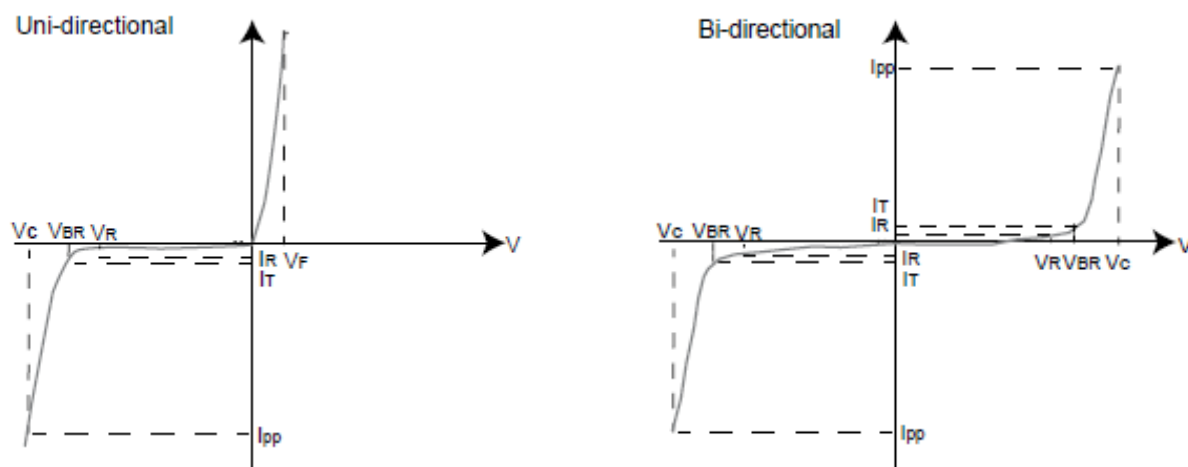
3-1. Absolute Maximum Ratings

Maximum Ratings@25°C Unless Otherwise Specified				
Parameter	Symbol		Value	Units
Peak Pulse Power	P_{PP}	(tp = 10/1000us)	300	W
		(tp = 8/20us)	1500	
Peak Forward Surge Current,8.3mS Signal Half Sine Wave Uni-Directional Only	I_{FSM}		40	A
Maximum Instantaneous Forward Voltage at 30A For Uni-Direction Only	V_F		2.6	V
Power Dissipation on Infinite Heatsink	P_D		1	W
Peak Pulse Voltage (IEC61000-4-2 Contact)	V_{PP}		± 30	KV
Operating Temperature	T_J		-65~+150	°C
Storage Temperature	T_{STG}			

3-2. Electrical Characteristics (Tamb=25°C)

Part Number		Reverse Stand-off Voltage	Breakdown Voltage		Test Current	Reverse Leakage	Max. Clamp Voltage	Peak Pulse Current	Marking	
		V_{RWM}	$V_{BR} @ I_T$		I_T	$I_R @ V_{RWM}$	$V_C @ I_{PP}$	$I_{PP} (10/100\mu s)$		
Uni	Bi	V	Min	Max	mA	μA	V	A	Uni	Bi
300W Surface Mount Transient Voltage Suppressors SMF Series										
SMF5.0A	SMF5.0CA	5.0	6.40	7.07	10.0	200.0	9.2	32.6	FE	KE
SMF6.0A	SMF6.0CA	6.0	6.67	7.37	10.0	200.0	10.3	29.1	FG	KG
SMF6.5A	SMF6.5CA	6.5	7.22	7.98	10.0	100.0	11.2	26.8	FK	KK
SMF7.0A	SMF7.0CA	7.0	7.78	8.60	10.0	100.0	12.0	25.0	FM	KM
SMF7.5A	SMF7.5CA	7.5	8.33	9.21	1.0	100.0	12.9	23.3	FP	KP
SMF8.0A	SMF8.0CA	8.0	8.89	9.83	1.0	100.0	13.6	22.1	FR	KR
SMF8.5A	SMF8.5CA	8.5	9.44	10.40	1.0	20.0	14.4	20.8	FT	KT
SMF9.0A	SMF9.0CA	9.0	10.00	11.10	1.0	10.0	15.4	19.5	FV	KV
SMF10A	SMF10CA	10.0	11.10	12.30	1.0	10.0	17.0	17.6	FX	KX
SMF11A	SMF11CA	11.0	12.20	13.50	1.0	1.0	18.2	16.5	FZ	KZ
SMF12A	SMF12CA	12.0	13.30	14.70	1.0	1.0	19.9	15.1	HE	LE
SMF13A	SMF13CA	13.0	14.40	15.90	1.0	1.0	21.5	14.0	HG	LG
SMF14A	SMF14CA	14.0	15.60	17.20	1.0	1.0	23.2	12.9	HK	LK
SMF15A	SMF15CA	15.0	16.70	18.50	1.0	1.0	24.4	12.3	HM	LM
SMF16A	SMF16CA	16.0	17.80	19.70	1.0	1.0	26.0	11.5	HP	LP
SMF17A	SMF17CA	17.0	18.90	20.90	1.0	1.0	27.6	10.9	HR	LR
SMF18A	SMF18CA	18.0	20.00	22.10	1.0	1.0	29.2	10.3	HT	LT
SMF19A	SMF19CA	19.0	21.10	23.30	1.0	1.0	30.6	9.8	HU	LU
SMF20A	SMF20CA	20.0	22.20	24.50	1.0	1.0	32.4	9.3	HV	LV
SMF22A	SMF22CA	22.0	24.40	26.90	1.0	1.0	35.5	8.5	HX	LL
SMF24A	SMF24CA	24.0	26.70	29.50	1.0	1.0	38.9	7.7	HZ	LZ
SMF26A	SMF26CA	26.0	28.90	31.90	1.0	1.0	42.1	7.1	JJ	ME
SMF28A	SMF28CA	28.0	31.10	34.40	1.0	1.0	45.4	6.6	JG	MG
SMF30A	SMF30CA	30.0	33.30	36.80	1.0	1.0	48.4	6.2	JK	MK
SMF33A	SMF33CA	33.0	36.70	40.60	1.0	1.0	53.3	5.6	JM	MM
SMF36A	SMF36CA	36.0	40.00	44.20	1.0	1.0	58.1	5.2	JP	MP
SMF40A	SMF40CA	40.0	44.40	49.10	1.0	1.0	64.5	4.7	JR	MR
SMF43A	SMF43CA	43.0	47.80	52.80	1.0	1.0	69.4	4.3	JT	MT
SMF45A	SMF45CA	45.0	50.00	55.30	1.0	1.0	72.7	4.1	JV	MV
SMF48A	SMF48CA	48.0	53.30	58.90	1.0	1.0	77.4	3.9	JX	MX
SMF51A	SMF51CA	51.0	56.70	62.70	1.0	1.0	82.4	3.6	JZ	MZ
SMF54A	SMF54CA	54.0	60.00	66.30	1.0	1.0	87.1	3.4	XE	NE
SMF58A	SMF58CA	58.0	64.40	71.20	1.0	1.0	93.6	3.2	XG	NG
SMF60A	SMF60CA	60.0	66.70	73.70	1.0	1.0	96.8	3.1	XK	NK
SMF64A	SMF64CA	64.0	71.10	78.60	1.0	1.0	103.0	2.9	XM	NM
SMF70A	SMF70CA	70.0	77.80	86.00	1.0	1.0	113.0	2.7	XP	NP
SMF75A	SMF75CA	75.0	83.30	92.10	1.0	1.0	121.0	2.5	XR	NR
SMF78A	SMF78CA	78.0	86.70	95.80	1.0	1.0	126.0	2.4	XT	NT
SMF80A	SMF80CA	80.0	88.80	97.60	1.0	1.0	129.0	2.3	XU	NU
SMF85A	SMF85CA	85.0	94.40	104.00	1.0	1.0	137.0	2.2	XV	NV
SMF90A	SMF90CA	90.0	100.00	111.00	1.0	1.0	146.0	2.1	XX	NX
SMF100A	SMF100CA	100.0	111.00	123.00	1.0	1.0	162.0	1.9	XZ	NZ
SMF110A	SMF110CA	110.0	122.00	135.00	1.0	1.0	177.0	1.7	TE	PE
SMF120A	SMF120CA	120.0	133.00	147.00	1.0	1.0	193.0	1.6	TG	PG
SMF130A	SMF130CA	130.0	144.00	159.00	1.0	1.0	209.0	1.4	TK	PK
SMF140A	SMF140CA	140.0	155.00	171.00	1.0	1.0	224.0	1.3	TU	PU
SMF150A	SMF150CA	150.0	167.00	185.00	1.0	1.0	243.0	1.2	TM	PM
SMF160A	SMF160CA	160.0	178.00	197.00	1.0	1.0	259.0	1.2	TP	PP
SMF170A	SMF170CA	170.0	189.00	209.00	1.0	1.0	275.0	1.1	TR	PR
SMF180A	SMF180CA	180.0	201.00	222.00	1.0	1.0	292.0	1.0	TT	PT
SMF190A	SMF190CA	190.0	211.00	232.00	1.0	1.0	324.0	0.9	TV	PV

3-3. I-V Curve Characteristics



P_{PPM}	Peak Pulse Power Dissipation -Max Power Dissipation
V_R	Stand-off Voltage -Maximum Voltage That Can be Applied to The TVS Without Operation
I_R	Reverse Leakage Current -Current Measured at V_R
V_F	Forward Voltage Drop for Uni-directional
V_{BR}	Breakdown Voltage -Maximum Voltage that Flows Though the TVS at a Specified Test Current (I_T)
V_C	Clamping Voltage -Peak Voltage Measured Across the Suppressor at a Specified I_{ppm} (Peak Impulse Current)

3-4. Ratings and Characteristics Curve (TA=25°C unless otherwise noted)

Fig 1. Peak Pulse Power Rating Curve

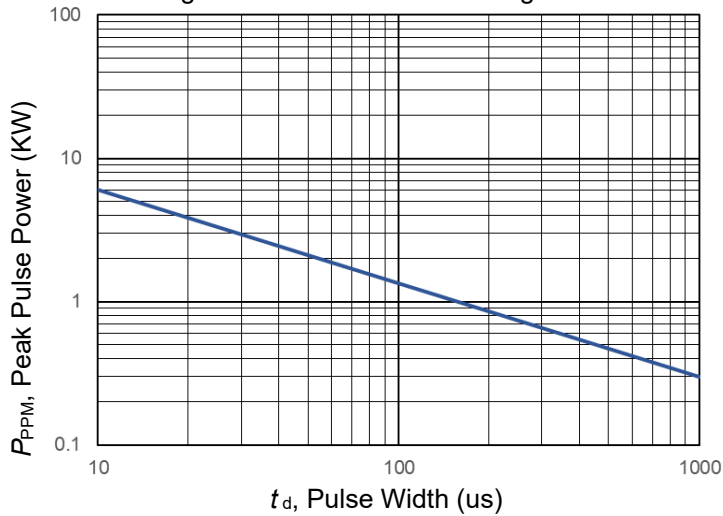


Fig 2. Pulse Waveform (10/1000us)

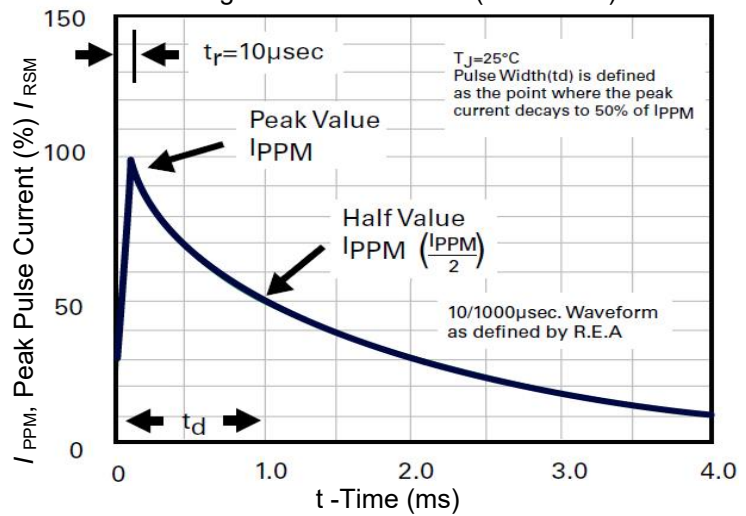


Fig 3. Maximum Non-repetitive Forward Surge Current Uni-direction Only

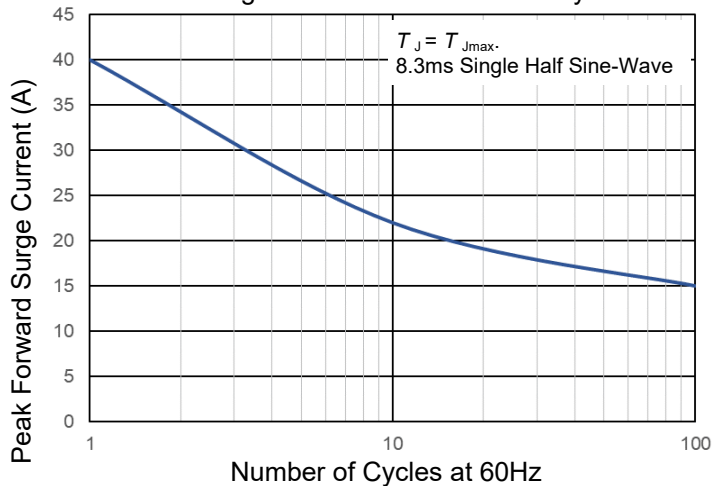


Fig 4. Typical Junction Capacitance

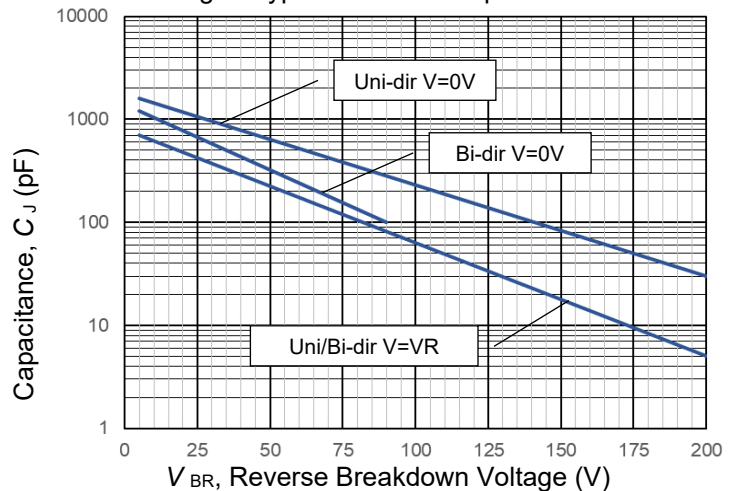


Fig 5. Maximum Forward Voltage

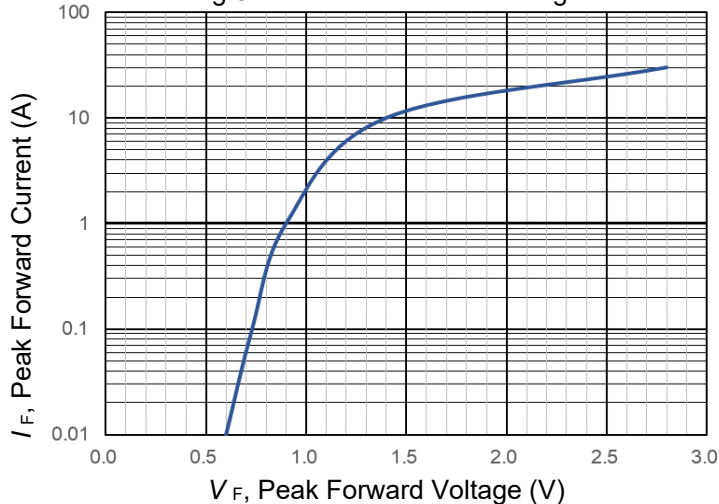
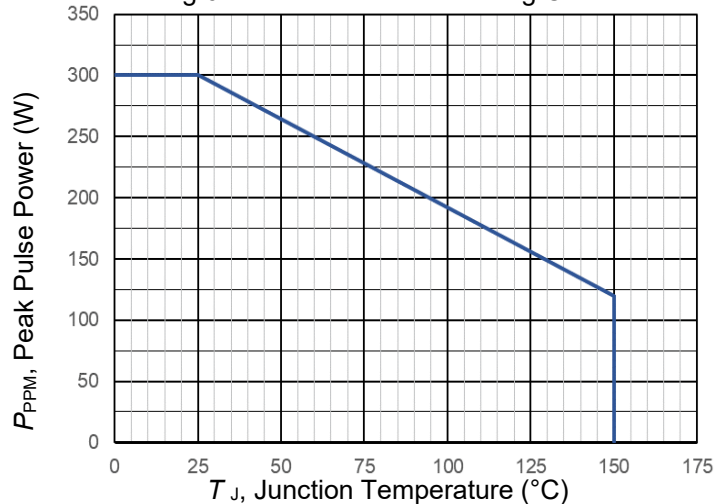
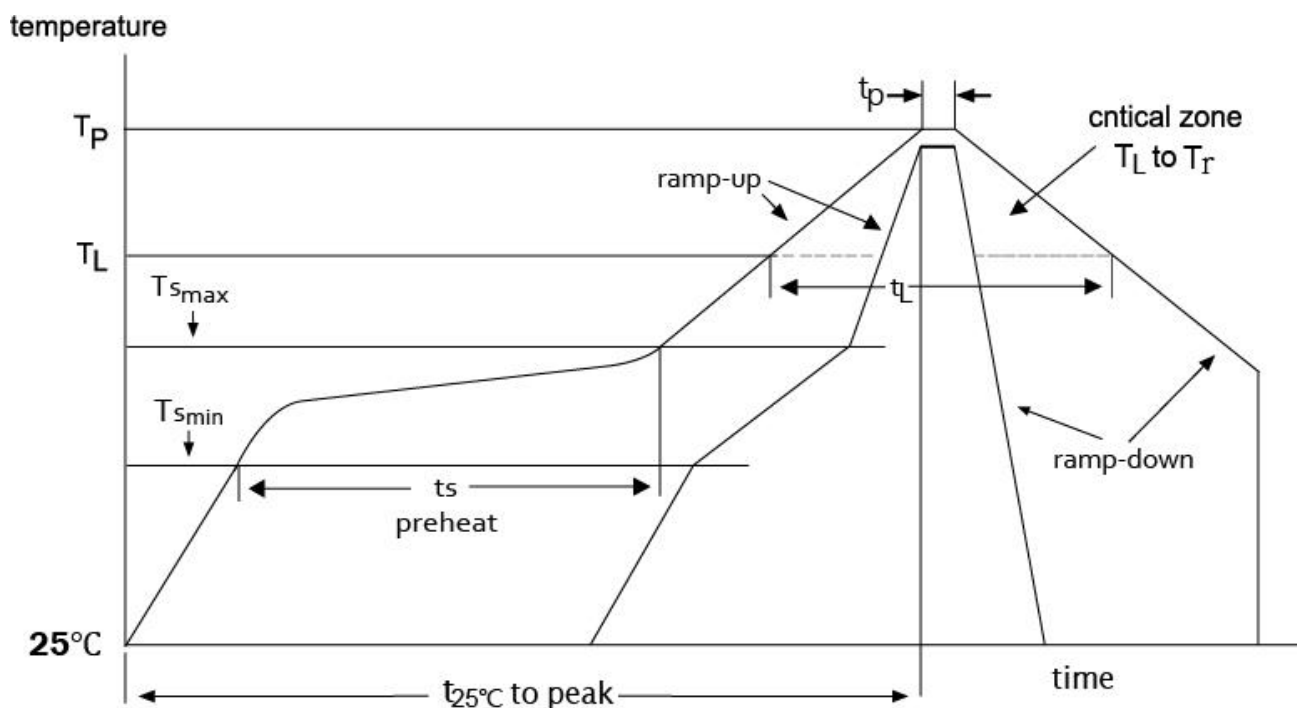


Fig 6. Peak Pulse Power Rating Curve



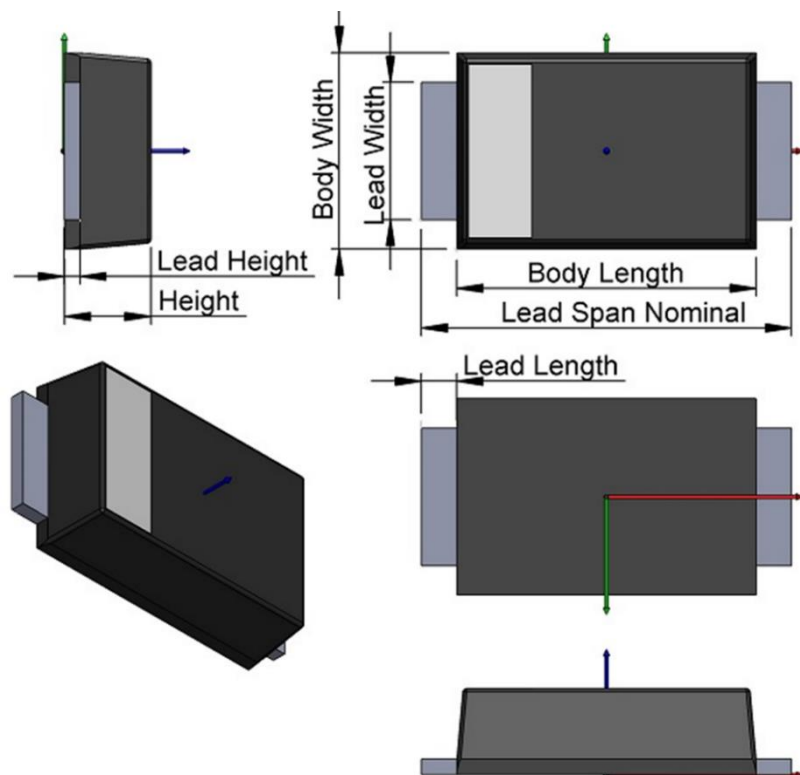
4. Soldering Parameters

Profile Feature	SnPb eutectic assembly	Pb-free assembly
Average ramp-up rate (T _{smax} to T _p)	3 °C/s maximum	3 °C/s maximum
Preheat		
Temperature minimum (T _{smin})	100 °C	150 °C
Temperature maximum (T _{smax})	150 °C	200 °C
Time (t _{smin} to t _{smax})	60 s to 120 s	60 s to 180 s
Time maintained above		
Temperature (T _L)	183 °C	217 °C
Time (t _L)	60 s to 150 s	60 s to 150 s
Peak/classification temperature (T)	235 °C	260 °C
Number of allowed reflow cycles	3	3
Time within 5 °C of actual peak temperature (t _p)	10 s to 30 s	20 s to 40 s
Ramp-down rate	6 °C/s maximum	6 °C/s maximum
Time 25 °C to peak temperature	6 minutes maximum	8 minutes maximum



5. Package Information

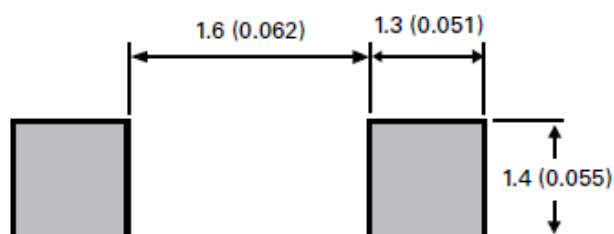
5-1. Dimension


SOD-123FL

Dim	Min	Max
Body Length	2.60	3.00
Lead Span Nominal	3.50	3.90
Lead Width	0.70	1.20
Body Width	1.65	1.95
Height	0.80	1.25
Lead Height	0.195	0.205
Lead Length	0.35	0.60

Unit:mm

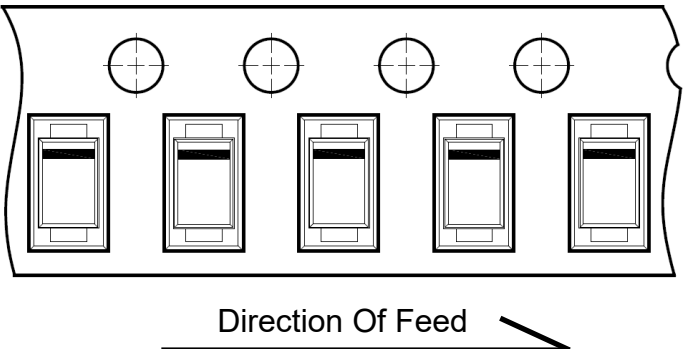
5-2. PCB Pad Layout Recommendation



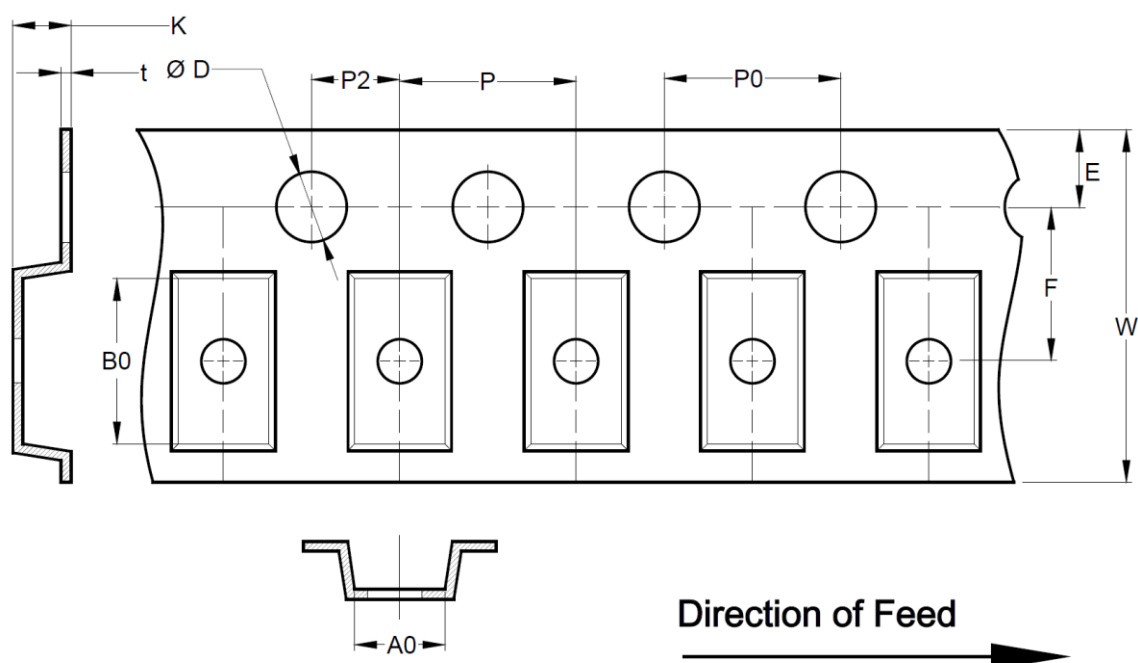
Unit:mm

6. Packing

6-1. Taping and Reel Specification

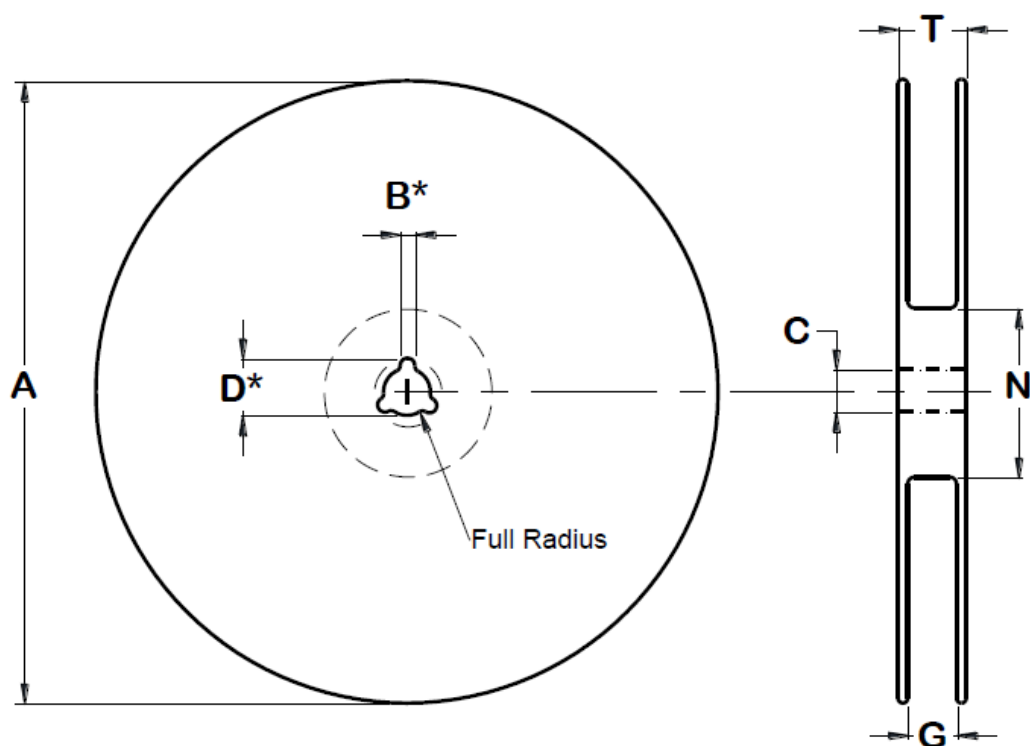
Taping Width	Tape Orientation
8mm	

6-2. Embossed Carrier Tape Specification



Unit:mm												
Dimension	W	A0	B0	D	E	F	K	P	P0	P2	t	W
Value	8 mm	2.05 ±0.10	3.75 ±0.20	1.50 +0.10	1.75 ±0.10	3.5 ±0.05	1.32 ±0.10	4.0 ±0.10	4.0 ±0.10	2.0 ±0.05	0.23 ±0.02	8 +0.3/ -0.1
A0 / B0 / K0	Determined by Component Size. The Clearance Between The Component And The Cavity Must Comply to The Rotational and Lateral Movement Requirement Provided in Figures in The "Maximum Component Movement in Tape Pocket" Section.											

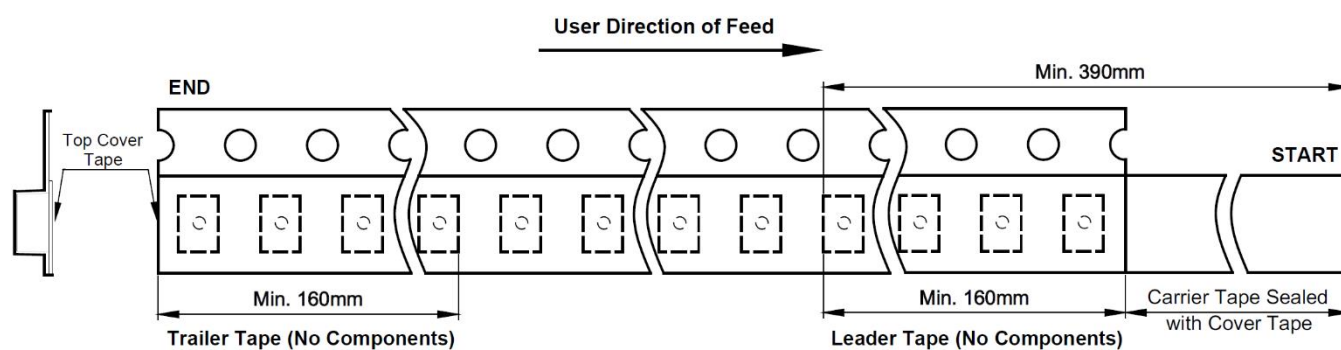
6-3. Surface Mount Reel Specification



Unit:mm

Dimension	Tape Width	Reel Size	A	B	C	D	N	G	T
Value	8 mm	7"	178 ±2	2.0 +0.5-0	13 +0.5-0.2	20.5 ±0.2	55 ±5	8.4 +1.5/-0.0	14.4

6-4. Tape Leader and Trailer Specification



7. Family Members

Part Number	Component Package	Watts	Working Voltage $V_{RWM}(V)$
SMF Series	SOD-123FL	300W	5.0V ~ 190V
NVS4M Series		400W	5.0V ~ 58V
NVS4D Series	DFN2020-3L	400W	3.3V ~ 58V
SMAJ Series	SMAJ	400W	5.0V ~ 190V
SMA6J Series		600W	12V ~ 58V
NVS6A Series	SMAF	600W	12V ~ 58V
SMBJ Series	SMBJ	600W	5.0V ~ 190V
SMB10J Series		1000W	
NVS15B Series	SMBF	1500W	5.0V ~ 58V
SMPJ Series	TO-277	1500W	5.0V ~ 200V
SMCJ Series	SMCJ	1500W	5.0V ~ 190V
2.0SMCJ Series		2000W	
3.0SMCJ Series		3000W	
4.0SMCJ Series		4000W	12V ~ 58V
5.0SMCJ Series		5000W	12V ~ 170V
6KA Series		6600W	21V ~ 58V
5KP Series	P600	5000W	5.0V ~ 180V
10KP Series		10000W	17V ~ 180V
15KP Series		15000W	
20KP Series		20000W	20V ~ 180V

8. Ordering Information

Part Number	Marking Code	Quantity	Component Package	Packaging Option
SMFxxA	Series	3,000PCS	SOD-123FL	Tape & Reel - 8mm tape / 7"reel
SMFxxCA				

9. Version

9-1. History

Version	Date	File No.	Recording	Basic
2.0	15-May-2021	F12122A	New Create	Market
2.1	19-Jul-2021		Update Version	System