

S4MF series



TRANSIENT VOLTAGE SUPPRESSOR DIODES

Voltage: 5~220 Volts

Power: 400 W

Package: SOD-123FL

Features

- NH'S Glass Passivated Chip Technology
- Wave And Reflow Solderable
- Low Reverse Leakage
- Very Fast Response Time
- Excellent Clamping Capability
- 10/1000 μ s Waveform, Repetition Rate(Duty Cycle):0.01%
- ESD Immunity Acc. IEC 61000-4-2

Typical Applications

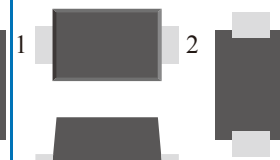
- Power Port
- Communication And Data Port
- ESD Protection And Automotive Electronics
- Industrial Control and Automation

Diagram:

UNI

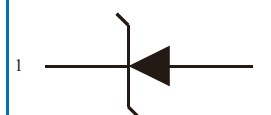


BI

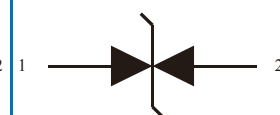


Polarity:

UNI



BI



Single Phase, Half Wave, 60Hz, Resistive Or Inductive Load. For Capacitive Load, Derate Current By 20%

Maximum Ratings (Ta=25°C Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Value	Unit
Non-Repetitive Peak Pulse Power Dissipation	10/1000 μ s Waveform	P_{PP}	400	W
Peak Pulse Current	10/1000 μ s Waveform	I_{PP}	See Table-1	A
Power Dissipation On Infinite Heatsink	$T_L = 50.0^\circ\text{C}$	P_D	1.0	W

Thermal Characteristics (Ta=25°C Unless Otherwise Specified)

Parameter	Test Conditions	Symbol	Value	Unit
Operating Junction Temperature Range		T_J	-55 ~ 150	$^\circ\text{C}$
Storage Temperature Range		T_{STG}	-55 ~ 150	
Thermal Resistance Junction To Ambient With Steady-State	Device Mounted On 1 in2 FR-4 Board With 2oz. Copper	$R_{\theta JA}$	220	$^\circ\text{C/W}$

C-V Curve Chart

Symbol Instruction

UNI	BI	Symbol	Instruction
		I_{PP}	Maximum Reverse Peak Pulse Current
		V_C	Clamping Voltage @ I_{PP}
		P_{PP}	Peak Power Dissipation
		V_{RWM}	Working Peak Reverse Voltage
		I_R	Maximum Reverse Leakage Current @ V_{RWM}
		V_{BR}	Breakdown Reverse Voltage
		I_T	Test Current @ V_{RWM}
		I_F	Maximum Average Forward Rectified Current
		V_F	Maximum Instantaneous Forward Voltage
		C_J	Junction Capacitance @ $V_R = 0$ and $f = 1.0$ MHz

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TRANSIENT VOLTAGE SUPPRESSOR DIODES
Table-1.ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Part Number		Device Marking Code		Reverse Stand-off Voltage	Breakdown Voltage V_{BR} @ I_T		Test Current	Max. Clamping Voltage @ I_{PP}	Max. Peak Pulse Current	Max. Reverse Leakage @ V_{RWM}
UNI-POLAR	BI-POLAR	UNI	BI	$V_{RWM}(V)$	Min.(V)	Max.(V)	$I_T(mA)$	$V_{C\ Max.}(V)$	IPP(A)	$I_R(\mu A)$
S4MF5.0A	S4MF5.0CA	KE	AE	5	6.4	7	10	9.2	43.47	800
S4MF6.0A	S4MF6.0CA	KG	AG	6	6.67	7.37	10	10.3	38.83	800
S4MF6.5A	S4MF6.5CA	KK	AK	6.5	7.22	7.98	10	11.2	35.71	500
S4MF7.0A	S4MF7.0CA	KM	AM	7	7.78	8.6	10	12	33.33	200
S4MF7.5A	S4MF7.5CA	KP	AP	7.5	8.33	9.21	1	12.9	31	100
S4MF8.0A	S4MF8.0CA	KR	AR	8	8.89	9.83	1	13.6	29.41	50
S4MF8.5A	S4MF8.5CA	KT	AT	8.5	9.44	10.4	1	14.4	27.77	20
S4MF9.0A	S4MF9.0CA	KV	AV	9	10	11.1	1	15.4	25.97	5
S4MF10A	S4MF10CA	LX	AX	10	11.1	12.3	1	17	23.52	5
S4MF11A	S4MF11CA	KZ	AZ	11	12.2	13.5	1	18.2	21.97	1
S4MF12A	S4MF12CA	LE	BE	12	13.3	14.7	1	19.9	20.1	1
S4MF13A	S4MF13CA	LG	BG	13	14.4	15.9	1	21.5	18.6	1
S4MF14A	S4MF14CA	LK	BK	14	15.6	17.2	1	23.2	17.24	1
S4MF15A	S4MF15CA	LM	BM	15	16.7	18.5	1	24.4	16.39	1
S4MF16A	S4MF16CA	LP	BP	16	17.8	19.7	1	26	15.38	1
S4MF17A	S4MF17CA	LR	BR	17	18.9	20.9	1	27.6	14.49	1
S4MF18A	S4MF18CA	LT	BT	18	20	22.1	1	29.2	13.69	1
S4MF20A	S4MF20CA	LV	BV	20	22.2	24.5	1	32.4	12.34	1
S4MF22A	S4MF22CA	LX	BX	22	24.4	26.9	1	35.5	11.26	1
S4MF24A	S4MF24CA	LZ	BZ	24	26.7	29.5	1	38.9	10.28	1
S4MF26A	S4MF26CA	ME	CE	26	28.9	31.9	1	42.1	9.5	1
S4MF28A	S4MF28CA	MG	CG	28	31.1	34.4	1	45.4	8.81	1
S4MF30A	S4MF30CA	MK	CK	30	33.3	36.8	1	48.4	8.26	1
S4MF33A	S4MF33CA	33A	CM	33	36.7	40.6	1	53.3	7.5	1
S4MF36A	S4MF36CA	MP	CP	36	40	44.2	1	58.1	6.88	1
S4MF40A	S4MF40CA	MR	CR	40	44.4	49.1	1	64.5	6.2	1
S4MF43A	S4MF43CA	MT	CT	43	47.8	52.8	1	69.4	5.76	1
S4MF45A	S4MF45CA	MV	CV	45	50	55.3	1	72.7	5.5	1
S4MF48A	S4MF48CA	MX	CX	48	53.3	58.9	1	77.4	5.16	1
S4MF51A	S4MF51CA	MZ	CZ	51	56.7	62.7	1	82.4	4.85	1
S4MF54A	S4MF54CA	NE	DE	54	60	66.3	1	87.1	4.59	1
S4MF58A	S4MF58CA	NG	DG	58	64.4	71.2	1	93.6	4.27	1
S4MF60A	S4MF60CA	NK	DK	60	66.7	73.7	1	96.8	4.13	1
S4MF64A	S4MF64CA	NM	DM	64	71.1	78.6	1	103	3.88	1
S4MF70A	S4MF70CA	NP	DP	70	77.8	86	1	113	3.53	1
S4MF75A	S4MF75CA	NR	DR	75	83.3	92.1	1	121	3.3	1
S4MF78A	S4MF78CA	NT	DT	78	86.7	95.8	1	126	3.17	1
S4MF85A	S4MF85CA	NV	DV	85	94.4	104	1	137	2.91	1
S4MF90A	S4MF90CA	NX	DZ	90	100	111	1	146	2.73	1
S4MF100A	S4MF100CA	NZ	DN	100	111	123	1	162	2.46	1
S4MF110A	S4MF110CA	OE	EE	110	122	135	1	177	2.25	1

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Table-1.ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Part Number		Device Marking Code		Reverse Stand-off Voltage	Breakdown Voltage V_{BR} @ I_T		Test Current	Max. Clamping Voltage @ I_{PP}	Max. Peak Pulse Current	Max. Reverse Leakage @ V_{RWM}
UNI-POLAR	BI-POLAR	UNI	BI	$V_{RWM}(V)$	Min.(V)	Max.(V)	$I_T(mA)$	$V_{C\ Max.}(V)$	IPP(A)	$I_R(uA)$
S4MF120A	S4MF120CA	OG	EG	120	133	147	1	193	2.07	1
S4MF130A	S4MF130CA	OK	EK	130	144	159	1	209	1.91	1
S4MF150A	S4MF150CA	OM	EM	150	167	185	1	243	1.64	1
S4MF160A	S4MF160CA	OP	EP	160	178	197	1	259	1.54	1
S4MF170A	S4MF170CA	OR	ER	170	189	209	1	275	1.45	1
S4MF180A	S4MF180CA	OT	ET	180	201	222	1	292	1.36	1
S4MF188A	S4MF188CA	OV	EV	188	209	231	1	304	1.31	1
S4MF200A	S4MF200CA	OX	EX	200	224	247	1	324	1.23	1
S4MF220A	S4MF220CA	OZ	EZ	220	246	272	1	356	1.12	1

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TRANSIENT VOLTAGE SUPPRESSOR DIODES

Typical Characteristics Curves

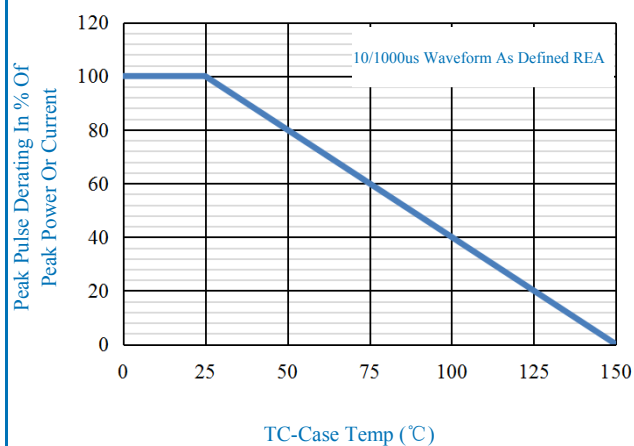


Fig.1-Peak Power Or Current Vs.Tc

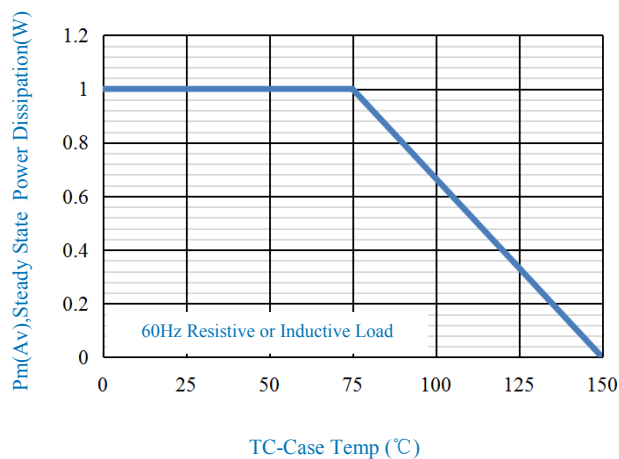


Fig.2-Steady State Power Derating Curve

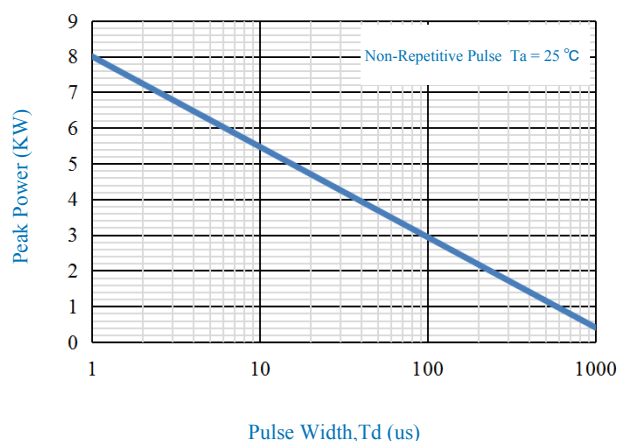


Fig.3-Peak Pulse Power Rating Curve

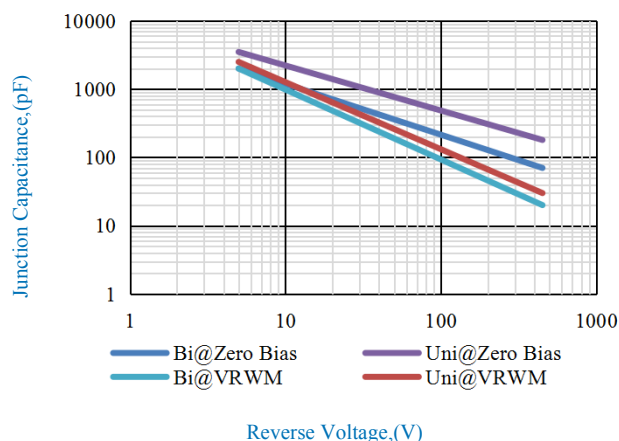


Fig.4-Typical Junction Capacitance

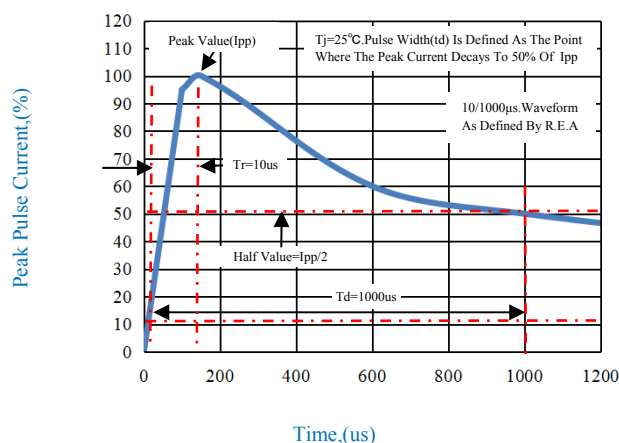


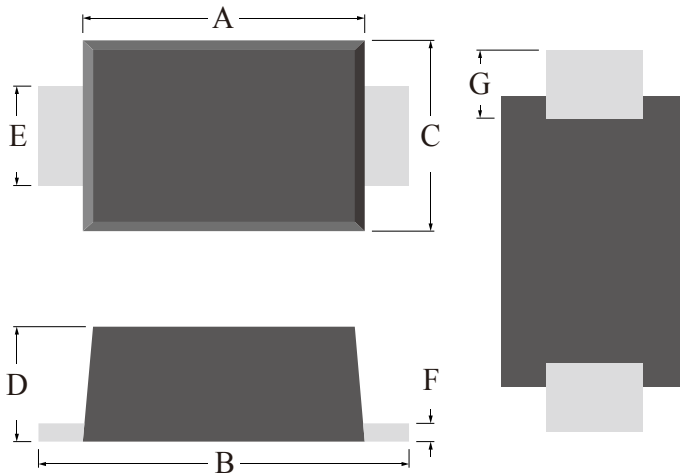
Fig.5-Pulse Waveform

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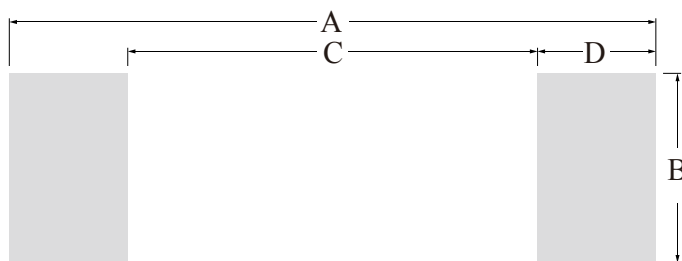
OUTLINE DRAWINGS



SOD-123FL

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.65	-	2.90	0.1043	-	0.1142
B	3.50	-	3.80	0.1378	-	0.1496
C	1.70	-	1.95	0.0669	-	0.0768
D	0.90	-	1.30	0.0354	-	0.0512
E	0.80	-	1.10	0.0315	-	0.0433
F	0.10	-	0.25	0.0039	-	0.0098
G	0.45	-	0.85	0.0177	-	0.0335

RECOMMEDNED LAYOUT DRAWINGS



SOD-123FL

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	4.26	-	-	0.1677	-
B	-	1.22	-	-	0.0480	-
C	-	2.70	-	-	0.1063	-
D	-	0.78	-	-	0.0307	-

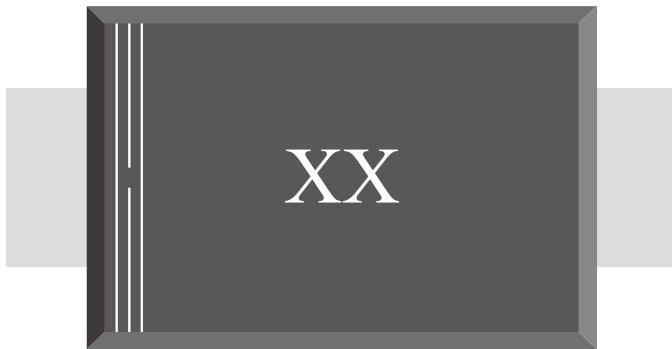
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MARKING

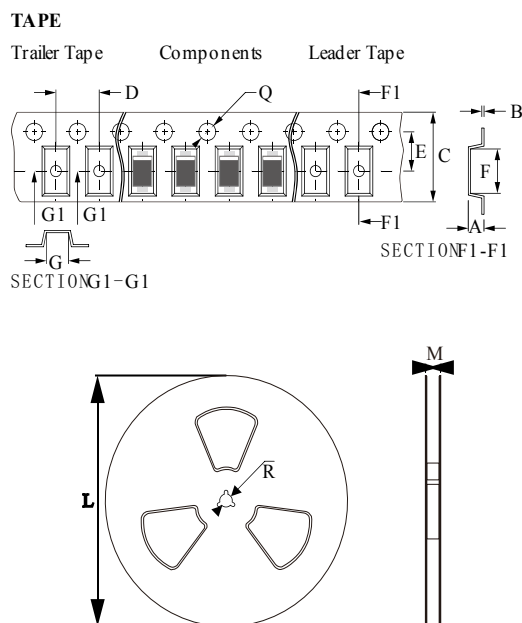
MARKING INSTRUCTION



XX=mark,XX=See Table-1
White band denotes cathode

PACKAGING

SOD-123FL



OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
TAPE						
A	1.35	-	1.55	0.0531	-	0.0610
B	0.11	-	0.31	0.0043	-	0.0122
C	7.70	-	8.30	0.3031	-	0.3268
D	3.90	-	4.10	0.1535	-	0.1614
E	3.40	-	3.60	0.1339	-	0.1417
F	3.85	-	4.05	0.1516	-	0.1594
G	1.95	-	2.15	0.0768	-	0.0846
Q Φ	1.50	-	1.60	0.0591	-	0.0630
REEL						
L Φ	176.00	-	180.00	6.929	-	7.087
R	12.00	-	14.00	0.4724	-	0.5512
M	8.00	-	12.00	0.3150	-	0.4724

PACKING INFORMATION

Package Type	Package Code	Product Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
SOD-123FL	P1	0.0161	7" Reel	3000	15000	120000
SOD-123FL	P2	0.0161	7" Reel	3000	21000	252000

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TRANSIENT VOLTAGE SUPPRESSOR DIODES

Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow

	Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
	Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
	Preheat-Temperature Min (T _S min) -Temperature Max (T _S max) -Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
	Time maintained above: -Temperature (T _L) - Time (t _L)	183°C 60-150 seconds	217°C 60-150 seconds
	Peak Temperature(T _P)	240 +0/-5 °C	260 +0/-5 °C
	Time within 5°C of actual peak temperature (t _p)	10-30 seconds	20-40 seconds
	Ramp down rate	6°C/second max.	6°C/second max.
	Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

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Specification Revision History

Rev.	Date	Changed Items	Pre-Changed Content	Changed Content
A/1	2014-10-20	First Issue		
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