

ZMM55C(B)2V0 THRU ZMM55C(B)100**List**

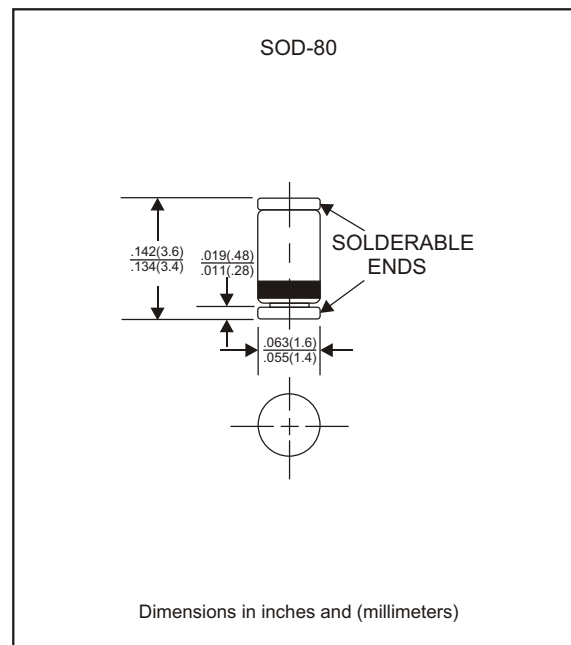
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ZMM55C(B)2V0 THRU ZMM55C(B)100**500mW Surface Mount Zener
Diodes - 2.0V-100V****Package outline****Features**

- Silicon epitaxial planar chip structure.
- Wide zener reverse voltage range 2.0V to 100V.
- Small package size for high density applications.
- Glass hermetically sealed package.
- Ideally suited for automated assembly processes.
- Lead-free parts meet environmental standards of MIL-STD-19500 / 228

Mechanical data

- Case : Glass Mini-MELF / SOD-80
- Terminals : Plated terminals, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.03 gram

**Maximum ratings** (at $T_A=25^{\circ}\text{C}$ unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 200 \text{ mADC}$	V_F			1.50	V
Power Dissipation		P_D			500	mW
Storage temperature		T_{STG}	-65		+175	$^{\circ}\text{C}$
Operating temperature		T_J	-55		+150	$^{\circ}\text{C}$

ZMM55C2V0 THRU ZMM55C100

Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Part No.	Zener voltage			Test current	Zener impedance			Leakage current		Surge current
	$V_Z @ I_{ZT}$			I_{ZT}	$Z_{ZT} @ I_{ZT}$	$Z_{ZK} @ I_{ZK}$	I_{ZK}	I_R	V_R	I_{Surge}
	Min.	Nom.	Max.	mA	OHMs	OHMs	mA	uA	Volts	mA
ZMM55C2V0	1.9	2.0	2.1	5.0	100	600	1.0	150	1.0	
ZMM55C2V2	2.1	2.2	2.3	5.0	100	600	1.0	150	1.0	
ZMM55C2V4	2.2	2.4	2.6	5.0	85	600	1.0	50	1.0	
ZMM55C2V7	2.5	2.7	2.9	5.0	85	600	1.0	10	1.0	
ZMM55C3V0	2.8	3.0	3.2	5.0	85	600	1.0	4.0	1.0	
ZMM55C3V3	3.1	3.3	3.5	5.0	85	600	1.0	2.0	1.0	
ZMM55C3V6	3.4	3.6	3.8	5.0	85	600	1.0	2.0	1.0	
ZMM55C3V9	3.7	3.9	4.1	5.0	85	600	1.0	2.0	1.0	
ZMM55C4V3	4.0	4.3	4.6	5.0	75	600	1.0	1.0	1.0	
ZMM55C4V7	4.4	4.7	5.0	5.0	60	600	1.0	0.5	1.0	
ZMM55C5V1	4.8	5.1	5.4	5.0	35	550	1.0	0.1	1.0	
ZMM55C5V6	5.2	5.6	6.0	5.0	25	450	1.0	0.1	1.0	
ZMM55C6V2	5.8	6.2	6.6	5.0	10	200	1.0	0.1	2.0	
ZMM55C6V8	6.4	6.8	7.2	5.0	8	150	1.0	0.1	3.0	
ZMM55C7V5	7.0	7.5	7.9	5.0	7	50	1.0	0.1	5.0	
ZMM55C8V2	7.7	8.2	8.7	5.0	7	50	1.0	0.1	6.2	
ZMM55C9V1	8.5	9.1	9.6	5.0	10	50	1.0	0.1	6.8	
ZMM55C10	9.4	10	10.6	5.0	15	70	1.0	0.1	7.5	
ZMM55C11	10.4	11	11.6	5.0	20	70	1.0	0.1	8.2	
ZMM55C12	11.4	12	12.7	5.0	20	90	1.0	0.1	9.1	
ZMM55C13	12.4	13	14.1	5.0	26	110	1.0	0.1	10	
ZMM55C15	13.8	15	15.6	5.0	30	110	1.0	0.1	11	
ZMM55C16	15.3	16	17.1	5.0	40	170	1.0	0.1	12	
ZMM55C18	16.8	18	19.1	5.0	50	170	1.0	0.1	13	
ZMM55C20	18.8	20	21.2	5.0	55	220	1.0	0.1	15	
ZMM55C22	20.8	22	23.3	5.0	55	220	1.0	0.1	16	
ZMM55C24	22.8	24	25.6	5.0	80	220	1.0	0.1	18	
ZMM55C27	25.1	27	28.9	5.0	80	220	1.0	0.1	20	
ZMM55C30	28	30	32	5.0	80	220	1.0	0.1	22	
ZMM55C33	31	33	35	5.0	80	220	1.0	0.1	24	
ZMM55C36	34	36	38	5.0	80	220	1.0	0.1	27	
ZMM55C39	37	39	41	2.5	90	500	1.0	0.1	30	
ZMM55C43	40	43	46	2.5	90	600	0.5	0.1	33	
ZMM55C47	44	47	50	2.5	110	700	0.5	0.1	36	
ZMM55C51	48	51	54	2.5	125	700	0.5	0.1	39	
ZMM55C56	52	56	60	2.5	135	1000	0.5	0.1	43	
ZMM55C62	58	62	66	2.5	150	1000	0.5	0.1	47	
ZMM55C68	64	68	72	2.5	200	1000	0.5	0.1	51	
ZMM55C75	70	75	79	2.5	250	1500	0.5	0.1	56	
ZMM55C82	78	82	86	2.5	300	2000	0.5	0.1	62	
ZMM55C91	86	91	96	1.0	450	5000	0.1	0.1	58	
ZMM55C100	95	100	105	1.0	450	5000	0.1	0.1	75	

Note : 5% tolerance of Zener voltage

ZMM55B2V0 THRU ZMM55B100

Electrical characteristics (at $T_A=25^{\circ}\text{C}$ unless otherwise noted)

Part No.	Zener voltage			Test current	Zener impedance			Leakage current		Surge current
	$V_Z @ I_{ZT}$			I_{ZT}	$Z_{ZT} @ I_{ZT}$	$Z_{ZK} @ I_{ZK}$	I_{ZK}	I_R	V_R	I_{Surge}
	Min.	Nom.	Max.	mA	OHMs	OHMs	mA	uA	Volts	mA
ZMM55B2V0	1.96	2.0	2.04	5.0	100	600	1.0	150	1.0	
ZMM55B2V2	2.12	2.2	2.24	5.0	100	600	1.0	150	1.0	
ZMM55B2V4	2.35	2.4	2.45	5.0	85	600	1.0	50	1.0	
ZMM55B2V7	2.65	2.7	2.75	5.0	85	600	1.0	10	1.0	
ZMM55B3V0	2.94	3.0	3.06	5.0	85	600	1.0	4.0	1.0	
ZMM55B3V3	3.23	3.3	3.37	5.0	85	600	1.0	2.0	1.0	
ZMM55B3V6	3.53	3.6	3.67	5.0	85	600	1.0	2.0	1.0	
ZMM55B3V9	3.82	3.9	3.98	5.0	85	600	1.0	2.0	1.0	
ZMM55B4V3	4.21	4.3	4.39	5.0	75	600	1.0	1.0	1.0	
ZMM55B4V7	4.61	4.7	4.79	5.0	60	600	1.0	0.5	1.0	
ZMM55B5V1	5.00	5.1	5.20	5.0	35	550	1.0	0.1	1.0	
ZMM55B5V6	5.49	5.6	5.71	5.0	25	450	1.0	0.1	1.0	
ZMM55B6V2	6.08	6.2	6.32	5.0	10	200	1.0	0.1	2.0	
ZMM55B6V8	6.66	6.8	6.94	5.0	8	150	1.0	0.1	3.0	
ZMM55B7V5	7.35	7.5	7.65	5.0	7	50	1.0	0.1	5.0	
ZMM55B8V2	8.04	8.2	8.36	5.0	7	50	1.0	0.1	6.2	
ZMM55B9V1	8.92	9.1	9.28	5.0	10	50	1.0	0.1	6.8	
ZMM55B10	9.8	10	10.2	5.0	15	70	1.0	0.1	7.5	
ZMM55B11	10.8	11	11.2	5.0	20	70	1.0	0.1	8.2	
ZMM55B12	11.8	12	12.2	5.0	20	90	1.0	0.1	9.1	
ZMM55B13	12.7	13	13.3	5.0	26	110	1.0	0.1	10	
ZMM55B15	14.7	15	15.3	5.0	30	110	1.0	0.1	11	
ZMM55B16	15.7	16	16.3	5.0	40	170	1.0	0.1	12	
ZMM55B18	17.6	18	18.4	5.0	50	170	1.0	0.1	13	
ZMM55B20	19.6	20	20.4	5.0	55	220	1.0	0.1	15	
ZMM55B22	21.6	22	22.4	5.0	55	220	1.0	0.1	16	
ZMM55B24	23.5	24	24.5	5.0	80	220	1.0	0.1	18	
ZMM55B27	26.5	27	27.5	5.0	80	220	1.0	0.1	20	
ZMM55B30	29.4	30	30.6	5.0	80	220	1.0	0.1	22	
ZMM55B33	32.3	33	33.7	5.0	80	220	1.0	0.1	24	
ZMM55B36	35.3	36	36.7	5.0	80	220	1.0	0.1	27	
ZMM55B39	38.2	39	39.8	2.5	90	500	1.0	0.1	30	
ZMM55B43	42.1	43	43.9	2.5	90	600	0.5	0.1	33	
ZMM55B47	46.1	47	47.9	2.5	110	700	0.5	0.1	36	
ZMM55B51	50.0	51	52.0	2.5	125	700	0.5	0.1	39	
ZMM55B56	54.9	56	57.1	2.5	135	1000	0.5	0.1	43	
ZMM55B62	60.8	62	63.2	2.5	150	1000	0.5	0.1	47	
ZMM55B68	66.6	68	69.4	2.5	200	1000	0.5	0.1	51	
ZMM55B75	73.5	75	76.5	2.5	250	1500	0.5	0.1	56	
ZMM55B82	80.4	82	83.6	2.5	300	2000	0.5	0.1	62	
ZMM55B91	89.2	91	92.8	1.0	450	5000	0.1	0.1	58	
ZMM55B100	98	100	102	1.0	450	5000	0.1	0.1	75	

Note : 2% tolerance of Zener voltage

Rating and characteristic curves (ZMM55C(B)2V0 THRU ZMM55C(B)100)

FIG. 1-TOTAL POWER DISSIPATION VS. AMBIENT TEMPERATURE

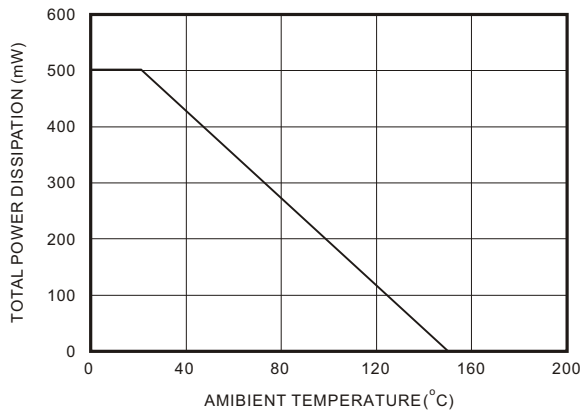


FIG. 2-TYPICAL CHANGE OF WORKING VOLTAGE UNDER OPERATING CONDITIONS AT $T_A = 25^\circ\text{C}$

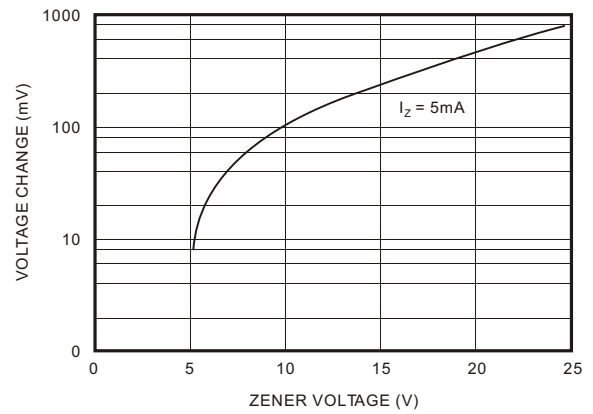


FIG. 3-TYPICAL CHANGE OF WORKING VOLTAGE VS. JUNCTION TEMPERATURE

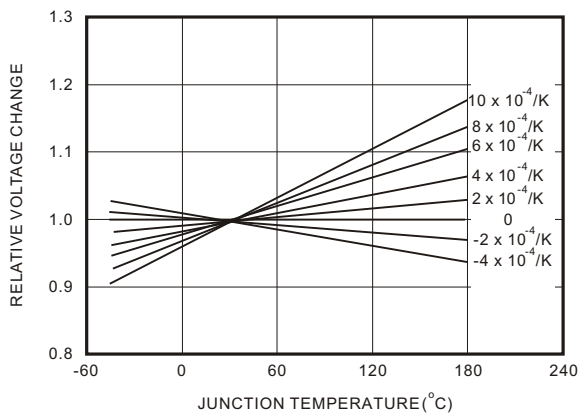


FIG. 4-TEMPERATURE COEFFICIENT OF V_Z VS. Z-VOLTAGE

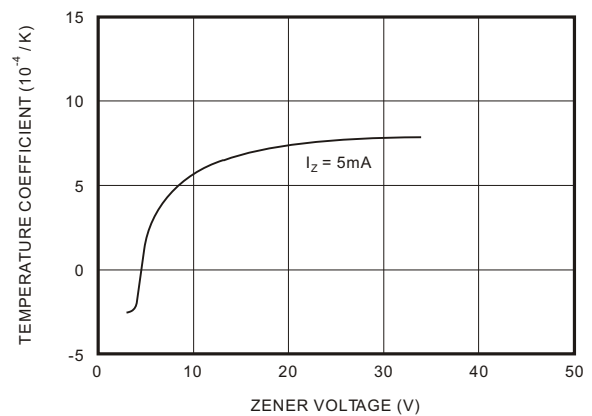
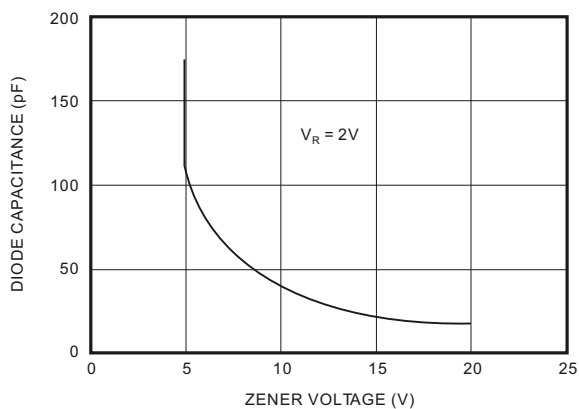


FIG. 5-DIODE CAPACITANCE VS. Z-VOLTAGE



Rating and characteristic curves (ZMM55C(B)2V0 THRU ZMM55C(B)100)

FIG. 6-FORWARD CURRENT VS. FORWARD VOLTAGE

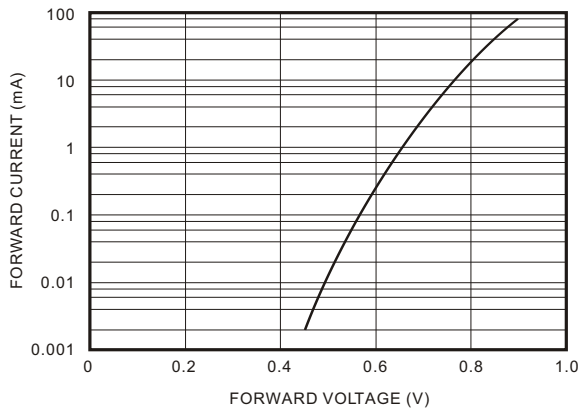


FIG. 7-Z-CURRENT VS. Z-VOLTAGE

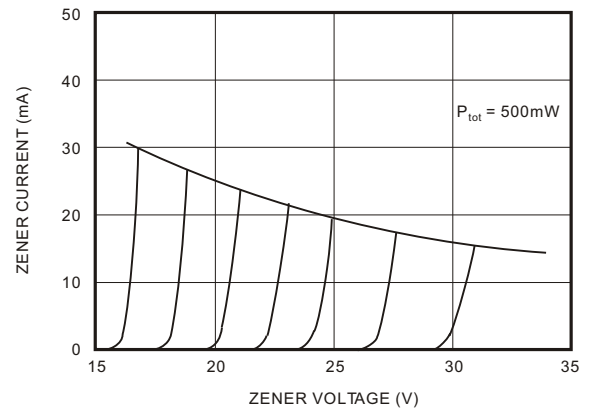


FIG. 8-Z-CURRENT VS. Z-VOLTAGE

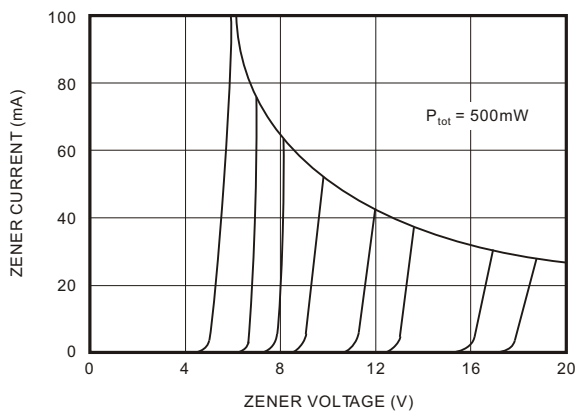


FIG. 9-DIFFERENTIAL Z-RESISTANCE VS. Z-VOLTAGE

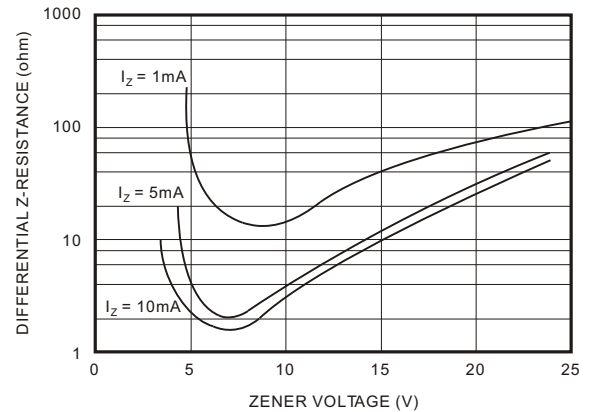
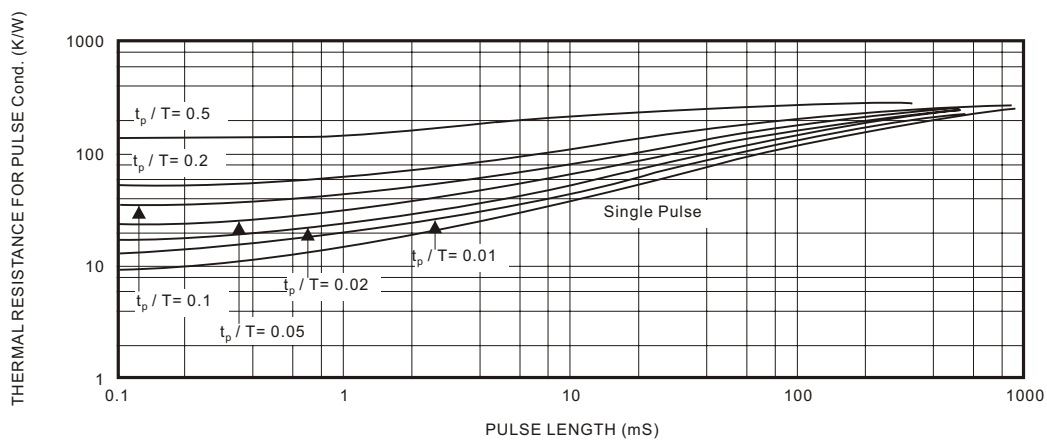


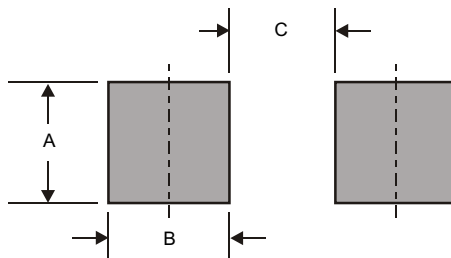


FIG. 10-THERMAL RESPONSE



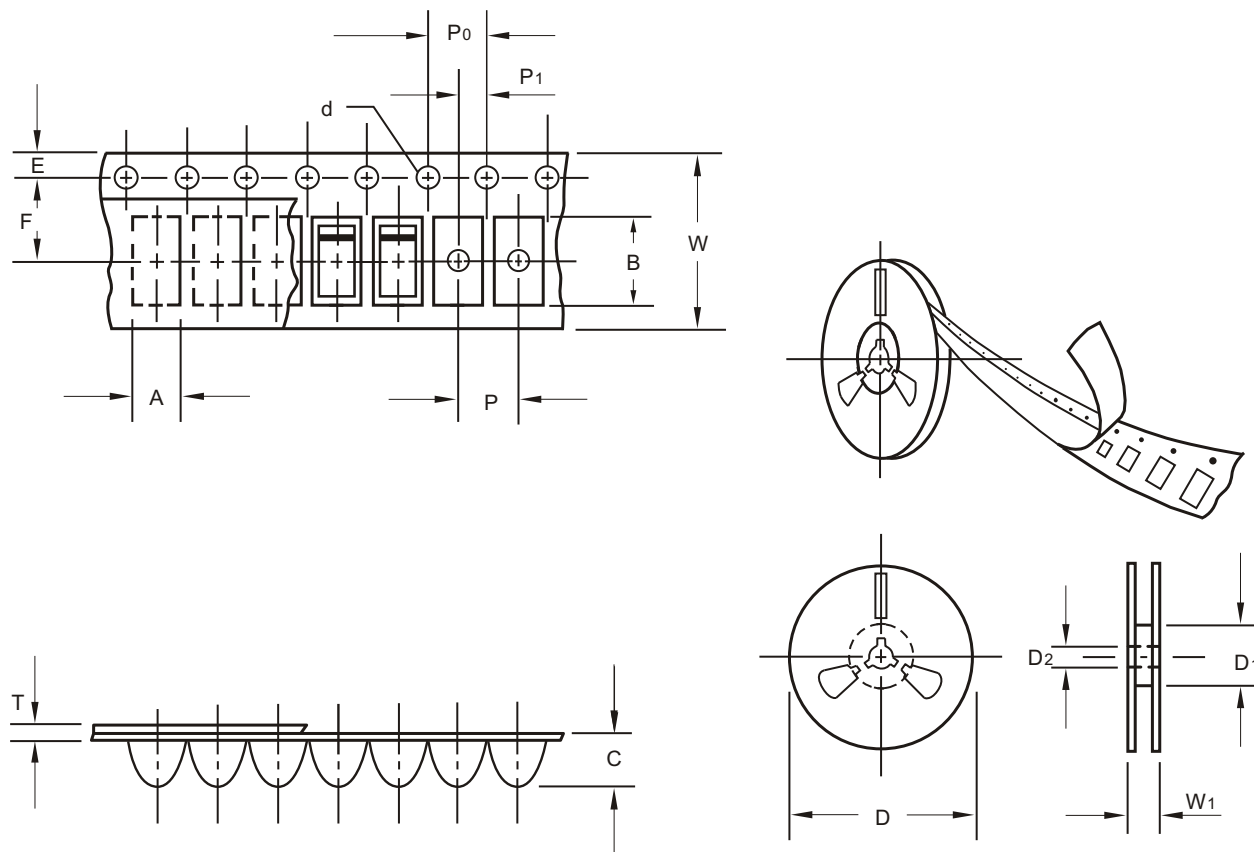
ZMM55C(B)2V0 THRU ZMM55C(B)100**Pinning information**

Pin	Simplified outline	Symbol
Pin1 cathode Pin2 anode	1  2	1  2

Suggested solder pad layout

Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-80	0.071 (1.80)	0.035 (0.90)	0.102 (2.60)

ZMM55C(B)2V0 THRU ZMM55C(B)100**Packing information**

unit:mm

Item	Symbol	Tolerance	SOD-80
Carrier width	A	0.1	2.00
Carrier length	B	0.1	3.70
Carrier depth	C	0.1	1.80
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	50.00
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	62.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	5.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	12.00
Reel width	W1	1.0	18.00

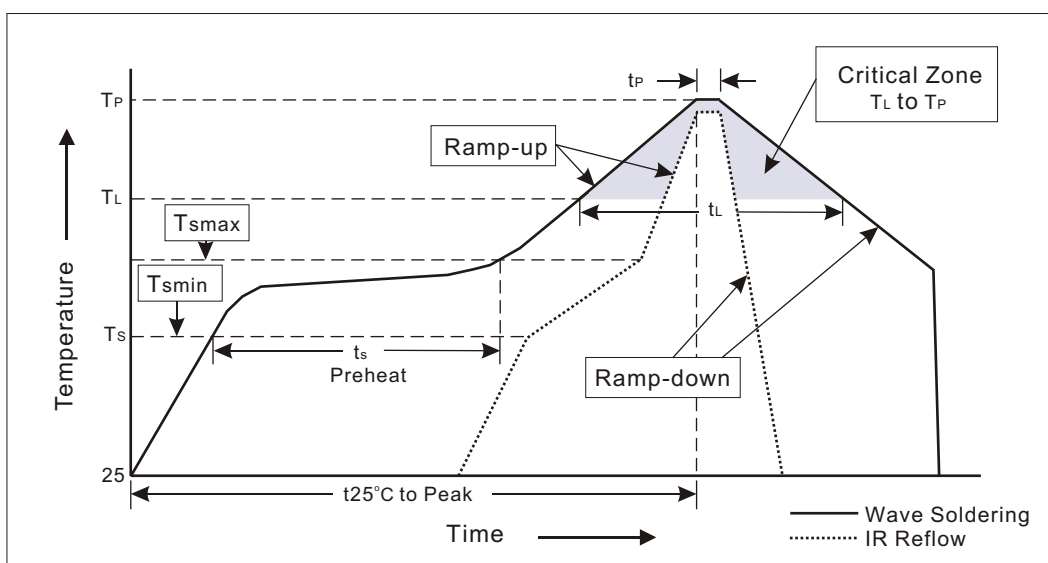
Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

ZMM55C(B)2V0 THRU ZMM55C(B)100**Reel packing**

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOD-80	7"	2500	4.0	25,000	185*120*180	178	400*250*200	100,000	7.0

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=10°C~35°C Humidity=65%±15%
- 2.Reflow soldering of surface-mount devices

**3.Flow (wave)soldering (solder dipping)**

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(T_{Smin}) -Temperature Max(T_{Smax}) -Time(min to max)(t_s)	100°C 150°C 60~120sec
T_{Smax} to T_L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	183°C 60~150sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

ZMM55C(B)2V0 THRU ZMM55C(B)100**High reliability test capabilities**

Item Test	Conditions	Reference
1. Solder Resistance	at $260 \pm 5^\circ\text{C}$ for $10 \pm 2\text{sec.}$ immerse body into solder $1/16" \pm 1/32"$	MIL-STD-750D METHOD-2031
2. Solderability	at $245 \pm 5^\circ\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_R = V_Z$ rate at $T_A = 150^\circ\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1026
4. Forward Operation Life	Rated zener current at $T = 25^\circ\text{C}$ for 500 hrs.	MIL-STD-750D METHOD-1027
5. Intermittent Operation Life	$T_A = 25^\circ\text{C}$, $I_F = 200\text{mA}$ On state: power on for 5 min. off state: power off for 5 min. on and off for 500 cycles.	MIL-STD-750D METHOD-1036
6. Pressure Cooker	$15P_{SIG}$ at $T_A = 121^\circ\text{C}$ for 4 hrs.	
7. Temperature Cycling	-55°C to $+125^\circ\text{C}$ dwelled for 30 min. and transferred for 5 min. total 10 cycles.	MIL-STD-750D METHOD-1051
8. Thermal Shock	0°C for 5 min. rise to 100°C for 5 min. total 10 cycles.	MIL-STD-750D METHOD-1056
9. Forward Surge	8.3ms single half sine-wave superimposed on rated load, one surge.	MIL-STD-750D METHOD-4066-2
10. Humidity	at $T_A = 65^\circ\text{C}$, RH=98% for 1000 hrs.	MIL-STD-750D METHOD-1038
11. High Temperature Storage Life	at 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031
12. Solvent Resistance	Dip into Freon at 25°C for 1 min.	MIL-STD-202F METHOD-215