Small Signal Zener Diodes

FEATURES

- Very sharp reverse characteristic
- Low reverse current level
- Very high stability
- Low noise
- TZMC - V_Z-tolerance ± 5 %
- TZMB - V_Z-tolerance ± 2 %
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

DESIGN SUPPORT TOOLS AVAILABLE

3D Models

APPLICATIONS

- Voltage stabilization

PRIMARY CHARACTERISTICS		
PARAMETER	VALUE	UNIT
V_Z range nom.	2.4 to 75	V
Test current I_{ZT}	2.5; 5	mA
V_Z specification	Pulse current	
Circuit configuration	Single	

ORDERING INFORMATION			
DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL	MINIMUM ORDER QUANTITY
TZM-series	TZM-series-GS18	10 000 (8 mm tape on 13" reel)	10 000/box
TZM-series	TZM-series-GS08	2500 (8 mm tape on 7" reel)	12 500/box

PACKAGE				
PACKAGE NAME	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
MiniMELF (SOD-80)	31 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Power dissipation	$R_{thJA} \leq 300$ K/W	P_{tot}	500	mW
Zener current		I_Z	P_{tot}/V_Z	mA
Junction to ambient air	On PC board 50 mm x 50 mm x 1.6 mm	R_{thJA}	500	K/W
Junction temperature		T_j	175	°C
Storage temperature range		T_{stg}	-65 to +175	°C
Forward voltage (max.)	I_F = 200 mA	V_F	1.5	V

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ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PART NUMBER	ZENER VOLTAGE RANGE			TEST CURRENT		REVERSE LEAKAGE CURRENT				DYNAMIC RESISTANCE		TEMPERATURE COEFFICIENT OF ZENER VOLTAGE	
	V_Z at I_{ZT1}			I_{ZT1}	I_{ZT2}	I_R at V_R		I_R (1) at V_R		Z_Z at I_{ZT1}	Z_{ZK} at I_{ZT2}	TK_{VZ}	
	V			mA		µA	V	µA	V	Ω		%/K	
	MIN.	NOM.	MAX.							TYP.	TYP.	MIN.	MAX.
TZMC2V4	2.28	2.4	2.56	5	1	< 50	1	< 100	1	< 85	< 600	-0.09	-0.06
TZMC2V7	2.5	2.7	2.9	5	1	< 10	1	< 50	1	< 85	< 600	-0.09	-0.06
TZMC3V0	2.8	3.0	3.2	5	1	< 4	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMC3V3	3.1	3.3	3.5	5	1	< 2	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMC3V6	3.4	3.6	3.8	5	1	< 2	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMC3V9	3.7	3.9	4.1	5	1	< 2	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMC4V3	4	4.3	4.6	5	1	< 1	1	< 20	1	< 90	< 600	-0.06	-0.03
TZMC4V7	4.4	4.7	5	5	1	< 0.5	1	< 10	1	< 80	< 600	-0.05	0.02
TZMC5V1	4.8	5.1	5.4	5	1	< 0.1	1	< 2	1	< 60	< 550	-0.02	0.02
TZMC5V6	5.2	5.6	6	5	1	< 0.1	1	< 2	1	< 40	< 450	-0.05	0.05
TZMC6V2	5.8	6.2	6.6	5	1	< 0.1	2	< 2	2	< 10	< 200	0.03	0.06
TZMC6V8	6.4	6.8	7.2	5	1	< 0.1	3	< 2	3	< 8	< 150	0.03	0.07
TZMC7V5	7	7.5	7.9	5	1	< 0.1	5	< 2	5	< 7	< 50	0.03	0.07
TZMC8V2	7.7	8.2	8.7	5	1	< 0.1	6.2	< 2	6.2	< 7	< 50	0.03	0.08
TZMC9V1	8.5	9.1	9.6	5	1	< 0.1	6.8	< 2	6.8	< 10	< 50	0.03	0.09
TZMC10	9.4	10	10.6	5	1	< 0.1	7.5	< 2	7.5	< 15	< 70	0.03	0.1
TZMC11	10.4	11	11.6	5	1	< 0.1	8.2	< 2	8.2	< 20	< 70	0.03	0.11
TZMC12	11.4	12	12.7	5	1	< 0.1	9.1	< 2	9.1	< 20	< 90	0.03	0.11
TZMC13	12.4	13	14.1	5	1	< 0.1	10	< 2	10	< 26	< 110	0.03	0.11
TZMC15	13.8	15	15.6	5	1	< 0.1	11	< 2	11	< 30	< 110	0.03	0.11
TZMC16	15.3	16	17.1	5	1	< 0.1	12	< 2	12	< 40	< 170	0.03	0.11
TZMC18	16.8	18	19.1	5	1	< 0.1	13	< 2	13	< 50	< 170	0.03	0.11
TZMC20	18.8	20	21.2	5	1	< 0.1	15	< 2	15	< 55	< 220	0.03	0.11
TZMC22	20.8	22	23.3	5	1	< 0.1	16	< 2	16	< 55	< 220	0.04	0.12
TZMC24	22.8	24	25.6	5	1	< 0.1	18	< 2	18	< 80	< 220	0.04	0,12
TZMC27	25.1	27	28.9	5	1	< 0.1	20	< 2	20	< 80	< 220	0.04	0.12
TZMC30	28	30	32	5	1	< 0.1	22	< 2	22	< 80	< 220	0.04	0.12
TZMC33	31	33	35	5	1	< 0.1	24	< 2	24	< 80	< 220	0.04	0.12
TZMC36	34	36	38	5	1	< 0.1	27	< 2	27	< 80	< 220	0.04	0.12
TZMC39	37	39	41	2.5	0.5	< 0.1	30	< 5	30	< 90	< 500	0.04	0.12
TZMC43	40	43	46	2.5	0.5	< 0.1	33	< 5	33	< 90	< 600	0.04	0.12
TZMC47	44	47	50	2.5	0.5	< 0.1	36	< 5	36	< 110	< 700	0.04	0.12
TZMC51	48	51	54	2.5	0.5	< 0.1	39	< 10	39	< 125	< 700	0.04	0.12
TZMC56	52	56	60	2.5	0.5	< 0.1	43	< 10	43	< 135	< 1000	0.04	0.12
TZMC62	58	62	66	2.5	0.5	< 0.1	47	< 10	47	< 150	< 1000	0.04	0.12
TZMC68	64	68	72	2.5	0.5	< 0.1	51	< 10	51	< 200	< 1000	0.04	0.12
TZMC75	70	75	79	2.5	0.5	< 0.1	56	< 10	56	< 250	< 1500	0.04	0.12

Notes

- Additional measurement of voltage group TZMC9V1 to TZMC75, I_R at 95 % $V_{Zmin.}$ ≤ 35 nA at T_j = 25 °C

(1) at T_j = 150 °C

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PART NUMBER	ZENER VOLTAGE RANGE			TEST CURRENT		REVERSE LEAKAGE CURRENT				DYNAMIC RESISTANCE		TEMPERATURE COEFFICIENT OF ZENER VOLTAGE	
	V_Z at I_{ZT1}			I_{ZT1}	I_{ZT2}	I_R at V_R		I_R (1) at V_R		Z_Z at I_{ZT1}	Z_{ZK} at I_{ZT2}	TK_{VZ}	
	V			mA		µA	V	µA	V	Ω		%/K	
	MIN.	NOM.	MAX.							TYP.	TYP.	MIN.	MAX.
TZMB2V4	2.35	2.4	2.45	5	1	< 50	1	< 100	1	< 85	< 600	-0.09	-0.06
TZMB2V7	2.64	2.7	2.76	5	1	< 10	1	< 50	1	< 85	< 600	-0.09	-0.06
TZMB3V0	2.94	3.0	3.06	5	1	< 4	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMB3V3	3.24	3.3	3.36	5	1	< 2	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMB3V6	3.52	3.6	3.68	5	1	< 2	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMB3V9	3.82	3.9	3.98	5	1	< 2	1	< 40	1	< 90	< 600	-0.08	-0.05
TZMB4V3	4.22	4.3	4.38	5	1	< 1	1	< 20	1	< 90	< 600	-0.06	-0.03
TZMB4V7	4.6	4.7	4.8	5	1	< 0.5	1	< 10	1	< 80	< 600	-0.05	0.02
TZMB5V1	5	5.1	5.2	5	1	< 0.1	1	< 2	1	< 60	< 550	-0.02	0.02
TZMB5V6	5.48	5.6	5.72	5	1	< 0.1	1	< 2	1	< 40	< 450	-0.05	0.05
TZMB6V2	6.08	6.2	6.32	5	1	< 0.1	2	< 2	2	< 10	< 200	0.03	0.06
TZMB6V8	6.66	6.8	6.94	5	1	< 0.1	3	< 2	3	< 8	< 150	0.03	0.07
TZMB7V5	7.35	7.5	7.65	5	1	< 0.1	5	< 2	5	< 7	< 50	0.03	0.07
TZMB8V2	8.04	8.2	8.36	5	1	< 0.1	6.2	< 2	6.2	< 7	< 50	0.03	0.08
TZMB9V1	8.92	9.1	9.28	5	1	< 0.1	6.8	< 2	6.8	< 10	< 50	0.03	0.09
TZMB10	9.8	10	10.2	5	1	< 0.1	7.5	< 2	7.5	< 15	< 70	0.03	0.1
TZMB11	10.78	11	11.22	5	1	< 0.1	8.2	< 2	8.2	< 20	< 70	0.03	0.11
TZMB12	11.76	12	12.24	5	1	< 0.1	9.1	< 2	9.1	< 20	< 90	0.03	0.11
TZMB13	12.74	13	13.26	5	1	< 0.1	10	< 2	10	< 26	< 110	0.03	0.11
TZMB15	14.7	15	15.3	5	1	< 0.1	11	< 2	11	< 30	< 110	0.03	0.11
TZMB16	15.7	16	16.3	5	1	< 0.1	12	< 2	12	< 40	< 170	0.03	0.11
TZMB18	17.64	18	18.36	5	1	< 0.1	13	< 2	13	< 50	< 170	0.03	0.11
TZMB20	19.6	20	20.4	5	1	< 0.1	15	< 2	15	< 55	< 220	0.03	0.11
TZMB22	21.55	22	22.45	5	1	< 0.1	16	< 2	16	< 55	< 220	0.04	0.12
TZMB24	23.5	24	24.5	5	1	< 0.1	18	< 2	18	< 80	< 220	0.04	0,12
TZMB27	26.4	27	27.6	5	1	< 0.1	20	< 2	20	< 80	< 220	0.04	0.12
TZMB30	29.4	30	30.6	5	1	< 0.1	22	< 2	22	< 80	< 220	0.04	0.12
TZMB33	32.4	33	33.6	5	1	< 0.1	24	< 2	24	< 80	< 220	0.04	0.12
TZMB36	35.3	36	36.7	5	1	< 0.1	27	< 2	27	< 80	< 220	0.04	0.12
TZMB39	38.2	39	39.8	2.5	0.5	< 0.1	30	< 5	30	< 90	< 500	0.04	0.12
TZMB43	42.1	43	43.9	2.5	0.5	< 0.1	33	< 5	33	< 90	< 600	0.04	0.12
TZMB47	46.1	47	47.9	2.5	0.5	< 0.1	36	< 5	36	< 110	< 700	0.04	0.12
TZMB51	50	51	52	2.5	0.5	< 0.1	39	< 10	39	< 125	< 700	0.04	0.12
TZMB56	54.9	56	57.1	2.5	0.5	< 0.1	43	< 10	43	< 135	< 1000	0.04	0.12
TZMB62	60.8	62	63.2	2.5	0.5	< 0.1	47	< 10	47	< 150	< 1000	0.04	0.12
TZMB68	66.6	68	69.4	2.5	0.5	< 0.1	51	< 10	51	< 200	< 1000	0.04	0.12
TZMB75	73.5	75	76.5	2.5	0.5	< 0.1	56	< 10	56	< 250	< 1500	0.04	0.12

Notes

- Additional measurement of voltage group TZMB9V1 to TZMB75, I_R at 95 % $V_{Zmin.}$ ≤ 35 nA at T_j = 25 °C

(1) at T_j = 150 °C

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BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

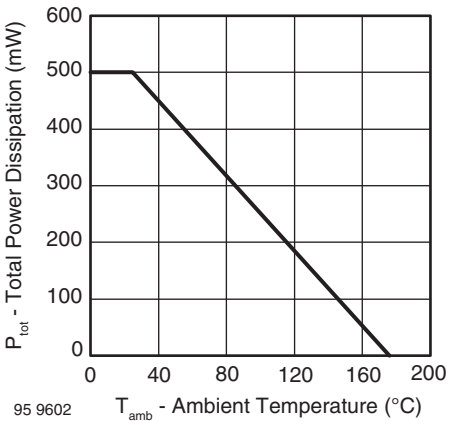

Fig. 1 - Total Power Dissipation vs. Ambient Temperature

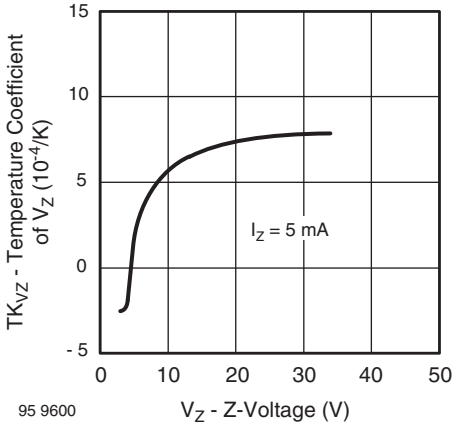

Fig. 4 - Temperature Coefficient of V_Z vs. Z-Voltage

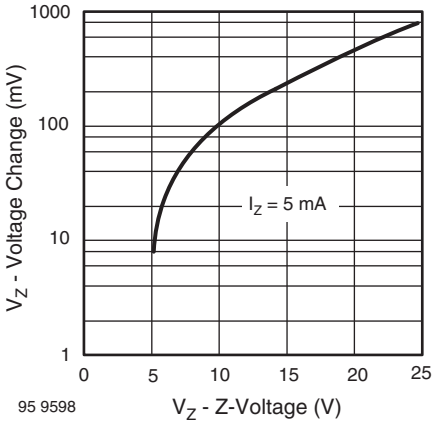

Fig. 2 - Typical Change of Working Voltage under Operating Conditions at T_{amb} = 25 °C

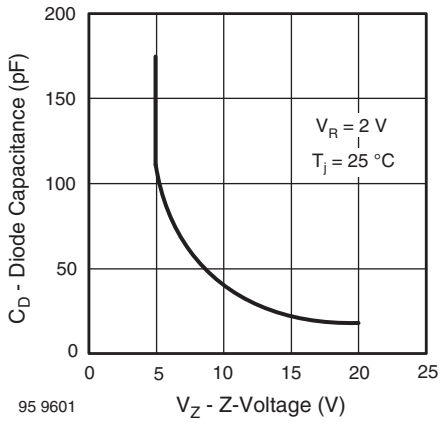

Fig. 5 - Diode Capacitance vs. Z-Voltage

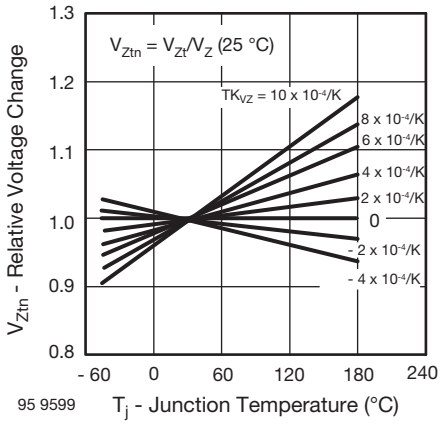

Fig. 3 - Typical Change of Working Voltage vs. Junction Temperature

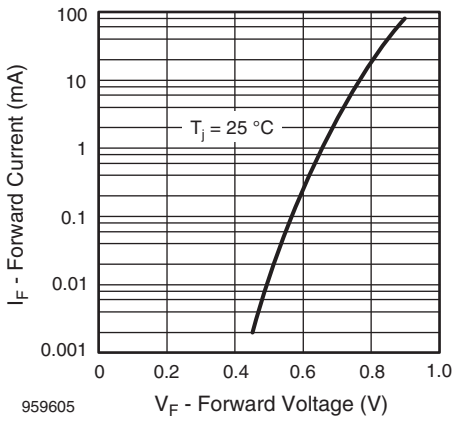

Fig. 6 - Forward Current vs. Forward Voltage

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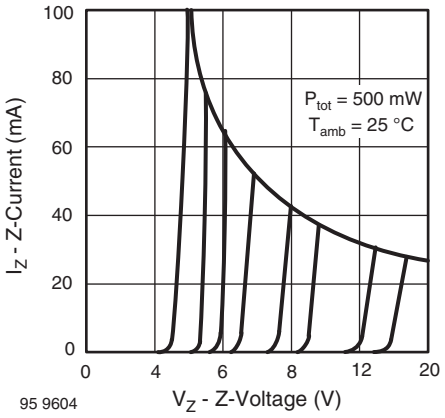

Fig. 7 - Z-Current vs. Z-Voltage

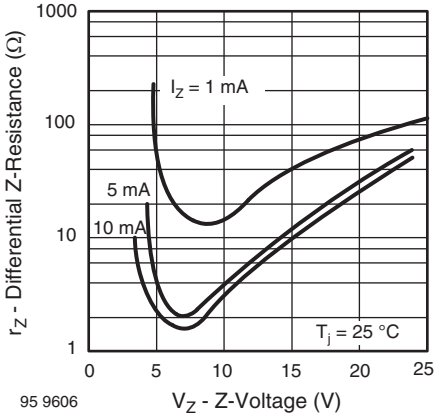

Fig. 9 - Differential Z-Resistance vs. Z-Voltage

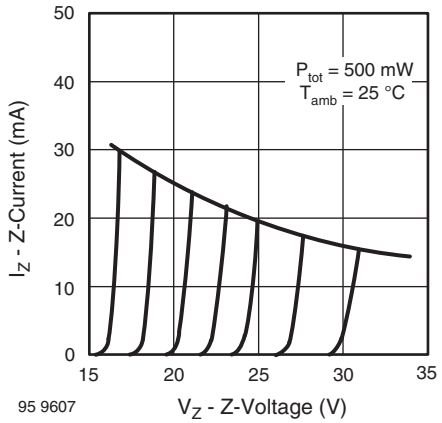

Fig. 8 - Z-Current vs. Z-Voltage

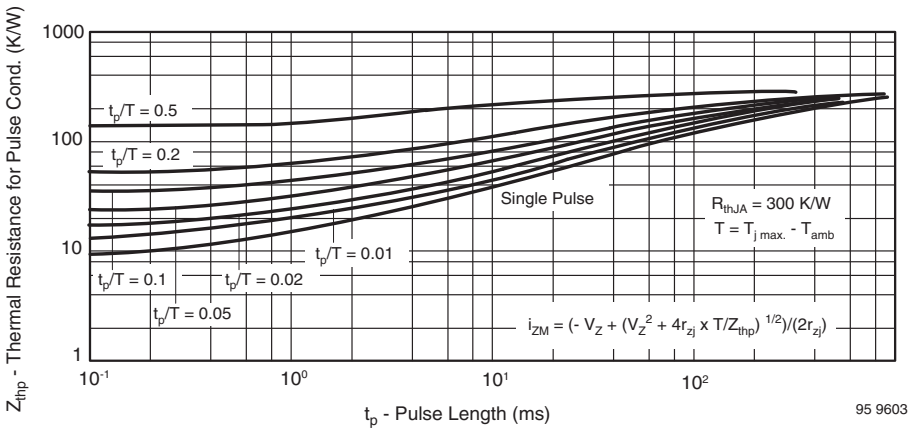

Fig. 10 - Thermal Response

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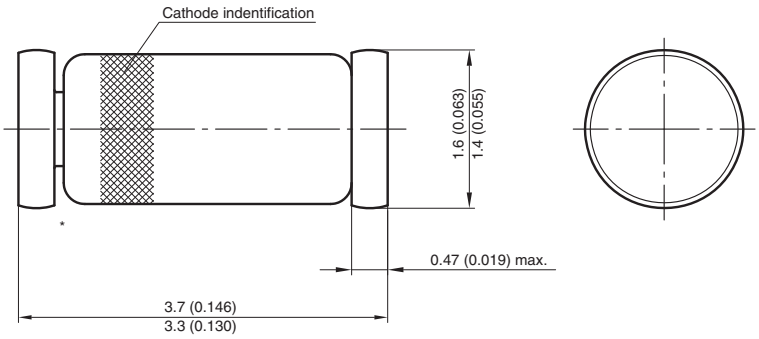
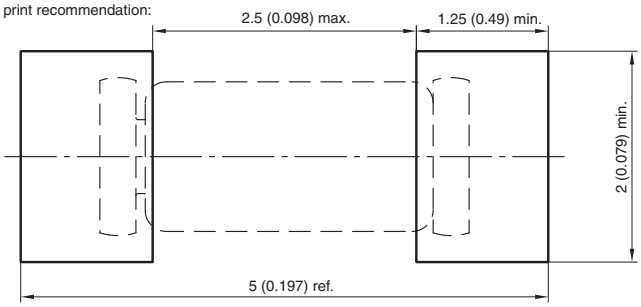
PACKAGE DIMENSIONS in millimeters (inches): **MiniMELF (SOD-80)**



* The gap between plug and glass can be either on cathode or anode side

Foot print recommendation:



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