

## MINI MELF Glass-Encapsulate Diodes

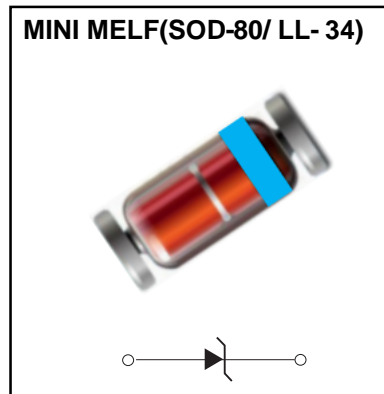
### Zener Diodes

#### Features

- $P_d$  500mW
- $V_z$  2.4V-75V

#### Applications

- Stabilizing Voltage



#### Limiting Values (Absolute Maximum Rating)

Item	Symbol	Unit	Conditions	Max
Power dissipation	$P_d$	mW	$L=4\text{mm}, T_L=25^\circ\text{C}$	500
Zener current	$I_z$	mA	$P_{tot} / V_z$	See Table
Maximum junction temperature	$T_j$	$^\circ\text{C}$		175
Storage temperature range	$T_{stg}$	$^\circ\text{C}$		-65 to +175

#### Electrical Characteristics ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

Item	Symbol	Unit	Conditions	Max
Thermal resistance	$R_{\theta JA}$	$^\circ\text{C}/\text{W}$	junction to ambient air, $L=4\text{mm}, T_L=\text{constant}$	300
Forward voltage	$V_F$	V	$I_F=200\text{mA}$	1

## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

### ZMM55C..

Part Number	Zener voltage range		Dynamic resistance		Test current	Temperature Coefficient		Test current	Reverse leakage current		
	V <sub>Z</sub> at I <sub>ZT</sub>		R <sub>ZJT</sub> at I <sub>ZT</sub>	R <sub>ZJK</sub> at I <sub>ZK</sub>	I <sub>ZT</sub>	TK <sub>VZ</sub>		I <sub>ZK</sub>	I <sub>R</sub>	I <sub>R</sub> <sup>1)</sup>	at V <sub>R</sub>
	V		Ω		mA	%/K		mA	μA		V
	Min.	Max.				Min.	Max.				
ZMM55C2V4	2.28	2.56	< 85	< 600	5	- 0.09	- 0.06	1	< 50	< 100	1
ZMM55C2V7	2.5	2.9	< 85	< 600	5	- 0.09	- 0.06	1	< 10	< 50	1
ZMM55C3V0	2.8	3.2	< 85	< 600	5	- 0.08	- 0.05	1	< 4	< 40	1
ZMM55C3V3	3.1	3.5	< 85	< 600	5	- 0.08	- 0.05	1	< 2	< 40	1
ZMM55C3V6	3.4	3.8	< 85	< 600	5	- 0.08	- 0.05	1	< 2	< 40	1
ZMM55C3V9	3.7	4.1	< 85	< 600	5	- 0.08	- 0.05	1	< 2	< 40	1
ZMM55C4V3	4	4.6	< 75	< 600	5	- 0.06	- 0.03	1	< 1	< 20	1
ZMM55C4V7	4.4	5	< 60	< 600	5	- 0.05	0.02	1	< 0.5	< 10	1
ZMM55C5V1	4.8	5.4	< 35	< 550	5	- 0.02	0.02	1	< 0.1	< 2	1
ZMM55C5V6	5.2	6	< 25	< 450	5	- 0.05	0.05	1	< 0.1	< 2	1
ZMM55C6V2	5.8	6.6	< 10	< 200	5	0.03	0.06	1	< 0.1	< 2	2
ZMM55C6V8	6.4	7.2	< 8	< 150	5	0.03	0.07	1	< 0.1	< 2	3
ZMM55C7V5	7	7.9	< 7	< 50	5	0.03	0.07	1	< 0.1	< 2	5
ZMM55C8V2	7.7	8.7	< 7	< 50	5	0.03	0.08	1	< 0.1	< 2	6.2
ZMM55C9V1	8.5	9.6	< 10	< 50	5	0.03	0.09	1	< 0.1	< 2	6.8
ZMM55C10	9.4	10.6	< 15	< 70	5	0.03	0.1	1	< 0.1	< 2	7.5
ZMM55C11	10.4	11.6	< 20	< 70	5	0.03	0.11	1	< 0.1	< 2	8.2
ZMM55C12	11.4	12.7	< 20	< 90	5	0.03	0.11	1	< 0.1	< 2	9.1
ZMM55C13	12.4	14.1	< 26	< 110	5	0.03	0.11	1	< 0.1	< 2	10
ZMM55C15	13.8	15.6	< 30	< 110	5	0.03	0.11	1	< 0.1	< 2	11
ZMM55C16	15.3	17.1	< 40	< 170	5	0.03	0.11	1	< 0.1	< 2	12
ZMM55C18	16.8	19.1	< 50	< 170	5	0.03	0.11	1	< 0.1	< 2	13
ZMM55C20	18.8	21.2	< 55	< 220	5	0.03	0.11	1	< 0.1	< 2	15
ZMM55C22	20.8	23.3	< 55	< 220	5	0.04	0.12	1	< 0.1	< 2	16
ZMM55C24	22.8	25.6	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	18
ZMM55C27	25.1	28.9	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	20
ZMM55C30	28	32	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	22
ZMM55C33	31	35	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	24
ZMM55C36	34	38	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	27
ZMM55C39	37	41	< 90	< 500	2.5	0.04	0.12	0.5	< 0.1	< 5	30
ZMM55C43	40	46	< 90	< 600	2.5	0.04	0.12	0.5	< 0.1	< 5	33
ZMM55C47	44	50	< 110	< 700	2.5	0.04	0.12	0.5	< 0.1	< 5	36
ZMM55C51	48	54	< 125	< 700	2.5	0.04	0.12	0.5	< 0.1	< 10	39
ZMM55C56	52	60	< 135	< 1000	2.5	0.04	0.12	0.5	< 0.1	< 10	43
ZMM55C62	58	66	< 150	< 1000	2.5	0.04	0.12	0.5	< 0.1	< 10	47
ZMM55C68	64	72	< 200	< 1000	2.5	0.04	0.12	0.5	< 0.1	< 10	51
ZMM55C75	70	79	< 250	< 1500	2.5	0.04	0.12	0.5	< 0.1	< 10	56

#### Notes:

Additional measurement of voltage group ZMM55C9V1 to ZMM55C75, I<sub>R</sub> at 95% V<sub>Zmin</sub> ≤ 35nA at T<sub>j</sub>=25°C

<sup>1)</sup> T<sub>j</sub>=150°C

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

### ZMM55B..

Part Number	Zener voltage range		Dynamic resistance		Test current	Temperature Coefficient		Test current	Reverse leakage current		
	$V_Z$ at $I_{ZT}$		$R_{ZJT}$ at $I_{ZT}$	$R_{ZJK}$ at $I_{ZT}$	$I_{ZT}$	$TK_{VZ}$		$I_{ZK}$	$I_R$	$I_R^{(1)}$	at $V_R$
	V		$\Omega$		mA	%K		mA	$\mu\text{A}$		V
	Min.	Max.				Min.	Max.				
ZMM55B2V4	2.35	2.45	< 85	< 600	5	- 0.09	- 0.06	1	< 50	< 100	1
ZMM55B2V7	2.64	2.76	< 85	< 600	5	- 0.09	- 0.06	1	< 10	< 50	1
ZMM55B3V0	2.94	3.06	< 90	< 600	5	- 0.08	- 0.05	1	< 4	< 40	1
ZMM55B3V3	3.24	3.36	< 90	< 600	5	- 0.08	- 0.05	1	< 2	< 40	1
ZMM55B3V6	3.52	3.68	< 90	< 600	5	- 0.08	- 0.05	1	< 2	< 40	1
ZMM55B3V9	3.82	3.98	< 90	< 600	5	- 0.08	- 0.05	1	< 2	< 40	1
ZMM55B4V3	4.22	4.38	< 90	< 600	5	- 0.06	- 0.03	1	< 1	< 20	1
ZMM55B4V7	4.6	4.8	< 80	< 600	5	- 0.05	0.02	1	< 0.5	< 10	1
ZMM55B5V1	5	5.2	< 60	< 550	5	- 0.02	0.02	1	< 0.1	< 2	1
ZMM55B5V6	5.48	5.72	< 40	< 450	5	- 0.05	0.05	1	< 0.1	< 2	1
ZMM55B6V2	6.08	6.32	< 10	< 200	5	0.03	0.06	1	< 0.1	< 2	2
ZMM55B6V8	6.66	6.94	< 8	< 150	5	0.03	0.07	1	< 0.1	< 2	3
ZMM55B7V5	7.35	7.65	< 7	< 50	5	0.03	0.07	1	< 0.1	< 2	5
ZMM55B8V2	8.04	8.36	< 7	< 50	5	0.03	0.08	1	< 0.1	< 2	6.2
ZMM55B9V1	8.92	9.28	< 10	< 50	5	0.03	0.09	1	< 0.1	< 2	6.8
ZMM55B10	9.8	10.2	< 15	< 70	5	0.03	0.1	1	< 0.1	< 2	7.5
ZMM55B11	10.78	11.22	< 20	< 70	5	0.03	0.11	1	< 0.1	< 2	8.2
ZMM55B12	11.76	12.24	< 20	< 90	5	0.03	0.11	1	< 0.1	< 2	9.1
ZMM55B13	12.74	13.26	< 26	< 110	5	0.03	0.11	1	< 0.1	< 2	10
ZMM55B15	14.7	15.3	< 30	< 110	5	0.03	0.11	1	< 0.1	< 2	11
ZMM55B16	15.7	16.3	< 40	< 170	5	0.03	0.11	1	< 0.1	< 2	12
ZMM55B18	17.64	18.36	< 50	< 170	5	0.03	0.11	1	< 0.1	< 2	13
ZMM55B20	19.6	20.4	< 55	< 220	5	0.03	0.11	1	< 0.1	< 2	15
ZMM55B22	21.55	22.45	< 55	< 220	5	0.04	0.12	1	< 0.1	< 2	16
ZMM55B24	23.5	24.5	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	18
ZMM55B27	26.4	27.6	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	20
ZMM55B30	29.4	30.6	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	22
ZMM55B33	32.4	33.6	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	24
ZMM55B36	35.3	36.7	< 80	< 220	5	0.04	0.12	1	< 0.1	< 2	27
ZMM55B39	38.2	39.8	< 90	< 500	2.5	0.04	0.12	0.5	< 0.1	< 5	30
ZMM55B43	42.1	43.9	< 90	< 600	2.5	0.04	0.12	0.5	< 0.1	< 5	33
ZMM55B47	46.1	47.9	< 110	< 700	2.5	0.04	0.12	0.5	< 0.1	< 5	36
ZMM55B51	50	52	< 125	< 700	2.5	0.04	0.12	0.5	< 0.1	< 10	39
ZMM55B56	54.9	57.1	< 135	< 1000	2.5	0.04	0.12	0.5	< 0.1	< 10	43
ZMM55B62	60.8	63.2	< 150	< 1000	2.5	0.04	0.12	0.5	< 0.1	< 10	47
ZMM55B68	66.6	69.4	< 200	< 1000	2.5	0.04	0.12	0.5	< 0.1	< 10	51
ZMM55B75	73.5	76.5	< 250	< 1500	2.5	0.04	0.12	0.5	< 0.1	< 10	56

#### Notes:

Additional measurement of voltage group ZMM55B9V1 to ZMM55B75,  $I_R$  at 95%  $V_{Zmin} \leq 35\text{nA}$  at  $T_J=25^\circ\text{C}$

<sup>1)</sup>  $T_J=150^\circ\text{C}$

# Typical Characteristics

FIG1: Total Power Dissipation vs. Ambient Temperature

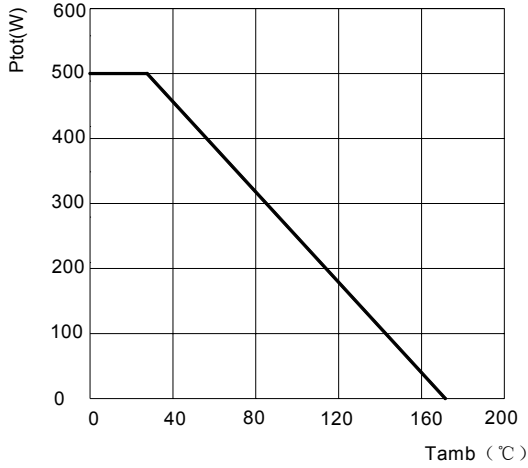


FIG2: Typical Change of Working Voltage under Operating Conditions at Tamb=25°C

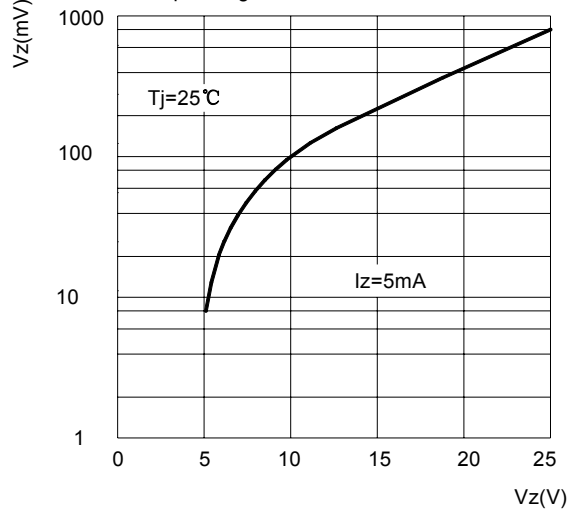


FIG3: Typical Change of Working Voltage vs. Junction Temperature

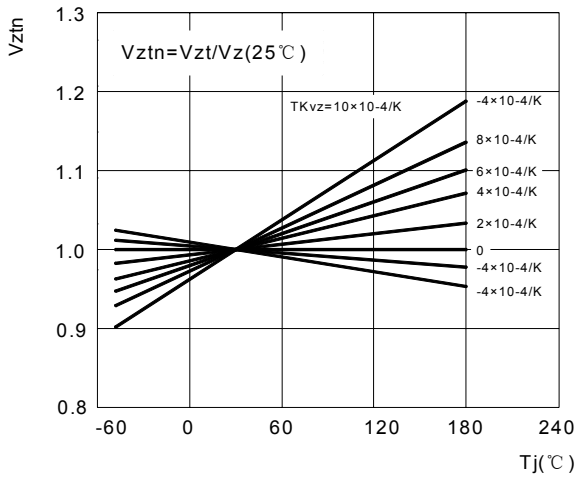


FIG4: Temperature Coefficient of Vz vs. Z-voltage

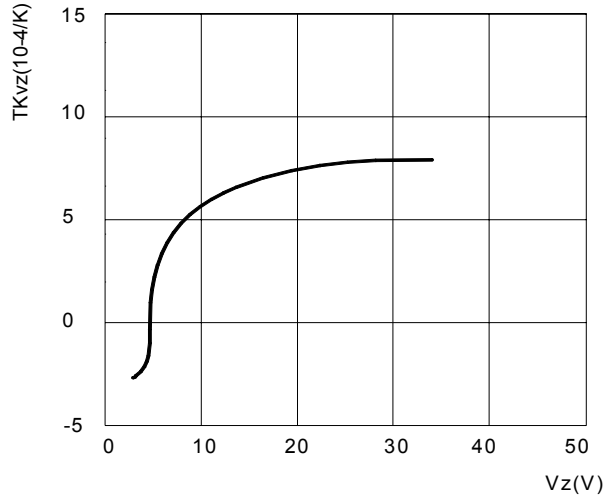


FIG5: Forward Current vs. Forward Voltage

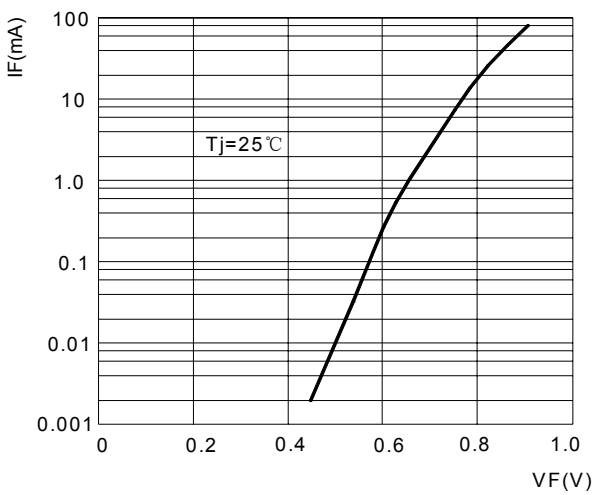
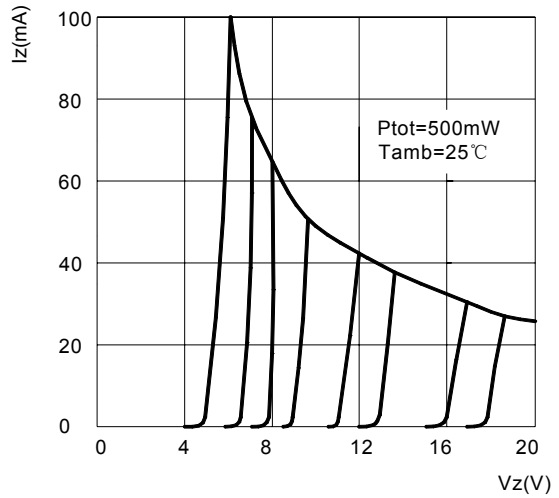
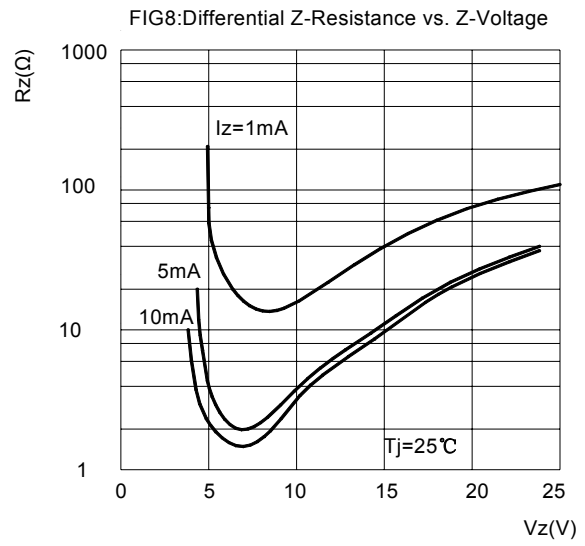
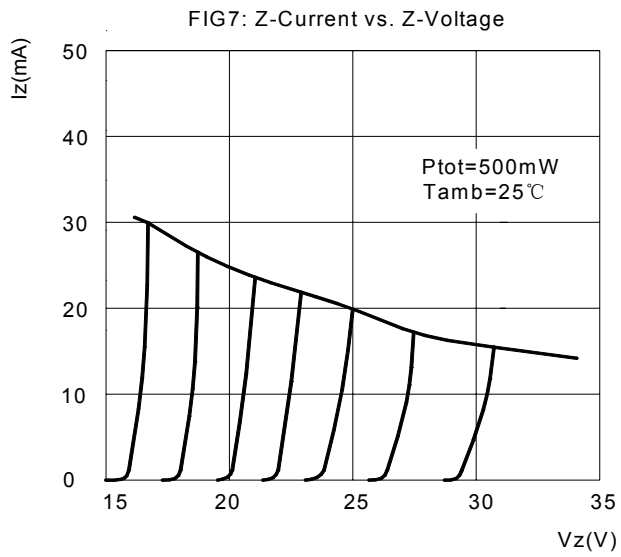


FIG6: Z-Current vs. Z-Voltage



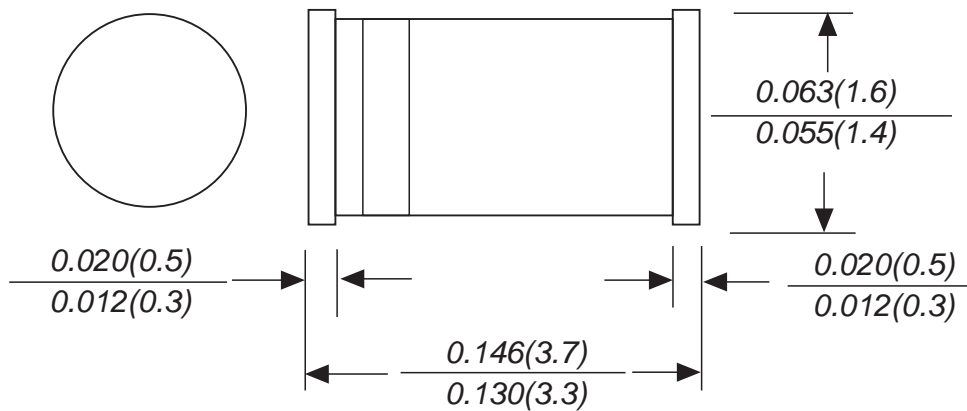
## Typical Characteristics



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## MINI MELF Package Outline Dimensions

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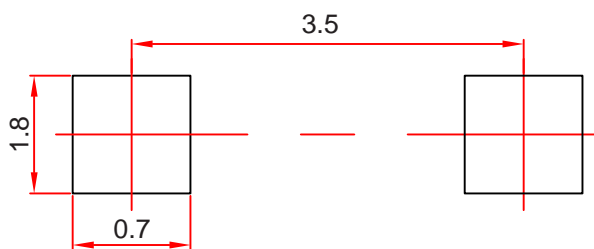


Dimensions in millimeters

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## MINI MELF Suggested Pad Layout

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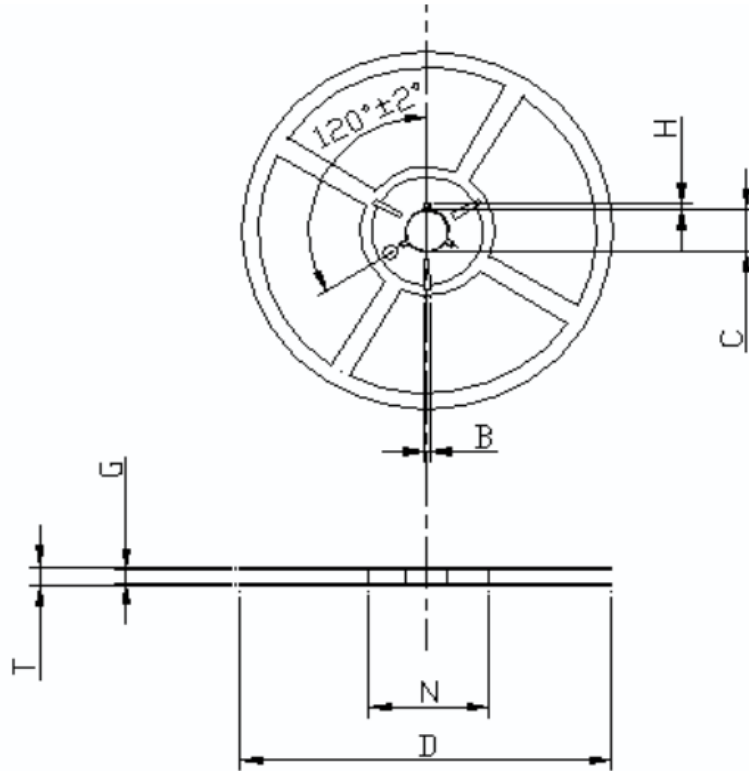


**Note:**

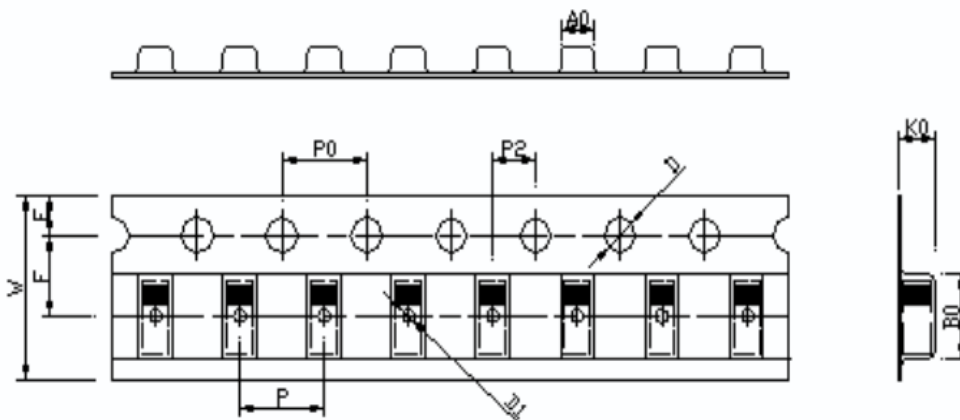
1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05$  mm.
3. The pad layout is for reference purposes only.

**NOTICE**

JSHD reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. JSHD does not assume any liability arising out of the application or use of any product described herein.



SYMBOL	B	C	D	G	H	N	T
SIZE(mm)	$2 \pm 0.5$	$13 \pm 0.5$	$178 \pm 2$	$8.4 \pm 1.5$	$4 \pm 0.5$	60	$< 14.9$



SYMBOL	W	P	E	F	D	D1	P0	P2	A0	B0	K0
SIZE(mm)	$8.0 \pm 0.1$	$4.0 \pm 0.1$	$1.75 \pm 0.1$	$3.5 \pm 0.05$	$1.5 \pm 0.1$	$1.0 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.05$	$1.70 \pm 0.1$	$3.80 \pm 0.1$	$1.85 \pm 0.1$