BSS138

50V N-Channel MOSFET

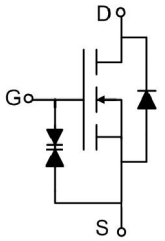
GENERAL FEATURES

- V_{DS} = 50V,I_D = 0.22A

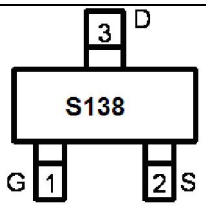
  $R_{DS(ON)}$ < 6Ω @ V_{GS}=4.5V
  $R_{DS(ON)}$ < 3.5Ω @ V_{GS}=10V

  ESD Rating：1000V HBM

- High Power and current handing capability
- Lead free product
- Surface Mount Package



Schematic Diagram



Marking and Pin Assignment

SOT-23 Top View

APPLICATIONS

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Device Package	Reel Size	Tape Width	Quantity
S138	BSS138	SOT-23	Ø180mm	8 mm	3000 units

ABSOLUTE MAXIMUM RATINGS (T_A=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous@ Current-Pulsed (Note 1)	I_D	0.22	A
	I_D(70℃)	0.18	
	I_{DM}	0.88	A
Maximum Power Dissipation	P_D	0.43	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	350	℃/W

ELECTRICAL CHARACTERISTICS (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						

Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	50			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=50V,V_{GS}=0V			1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V			10	uA
Gate-Source Breakdown Voltage	BV_{GSO}	V_{DS}=0V, I_G=±250uA	±20			V
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=1mA	0.8		1.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=0.22A V_{GS}=4.5V, I_D=0.22A			3.5 6	Ω
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=0.22A		0.1		S
DYNAMIC CHARACTERISTICS (Note4)						
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz		30		PF
Output Capacitance	C_{oss}			15		
Reverse Transfer Capacitance	C_{rss}			6		
SWITCHING CHARACTERISTICS (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,V_{GS}=10V, R_{GEN}=6Ω, I_D=0.22A		2.6		nS
Turn–On Rise Time	t_r			9		
Turn-Off Delay Time	$t_{d(off)}$			20		
Turn–Off Fall Time	t_f			6		
Total Gate Charge	Q_g	V_{DS}=25V,I_D=0.22A,V_{GS}=10V		1.7	2.4	nC
Gate–Source Charge	Q_{gs}			0.1		
Gate–Drain Charge	Q_{gd}			0.4		
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=0.44A			1.4	V

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

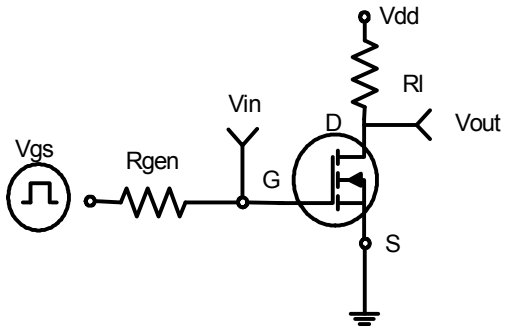


Figure 1:Switching Test Circuit

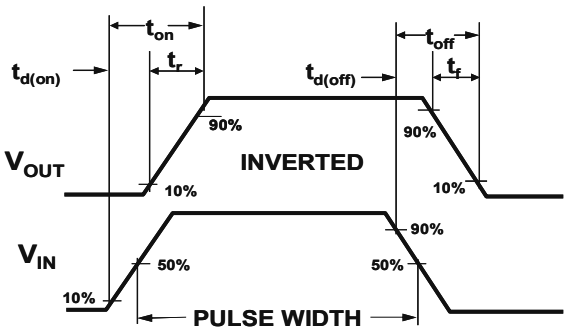


Figure 2:Switching Waveforms

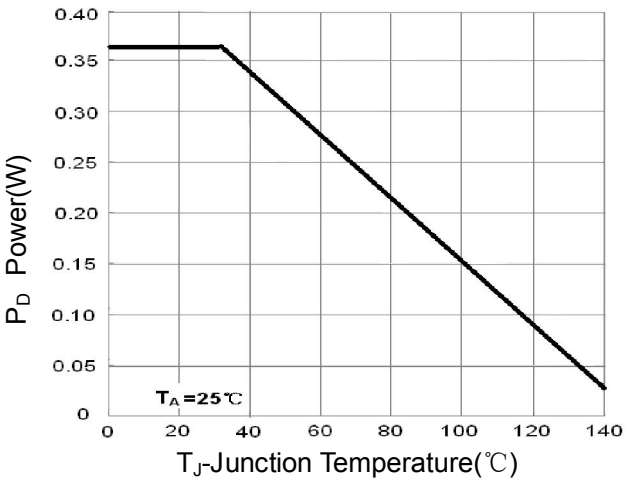


Figure 3 Power Dissipation

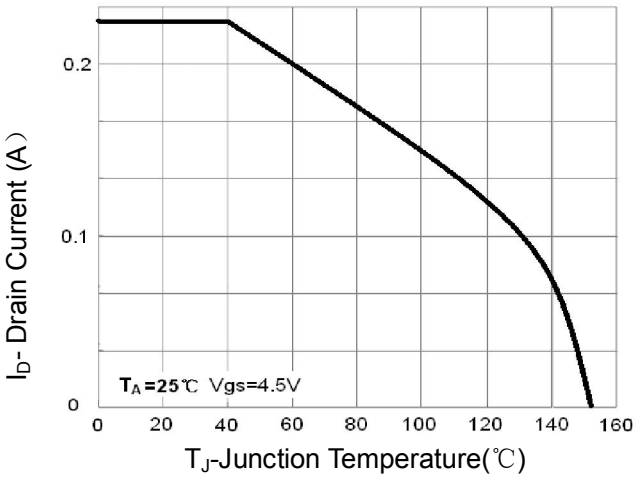


Figure 4 Drain Current

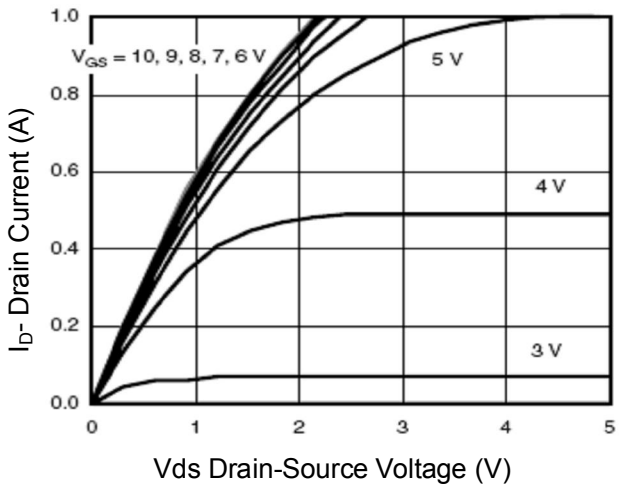


Figure 5 Output CHARACTERISTICS

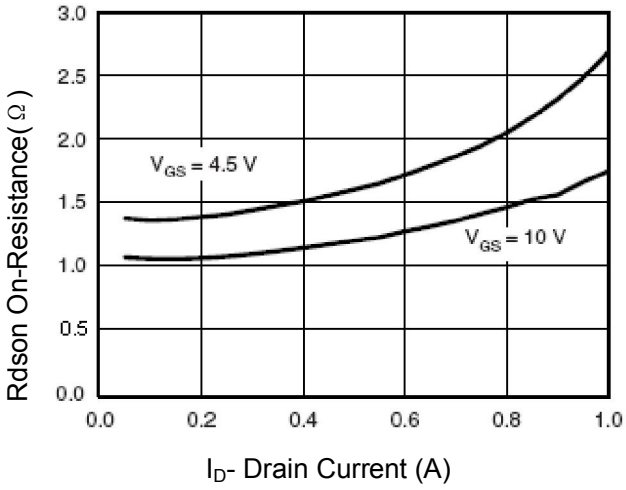


Figure 6 Drain-Source On-Resistance

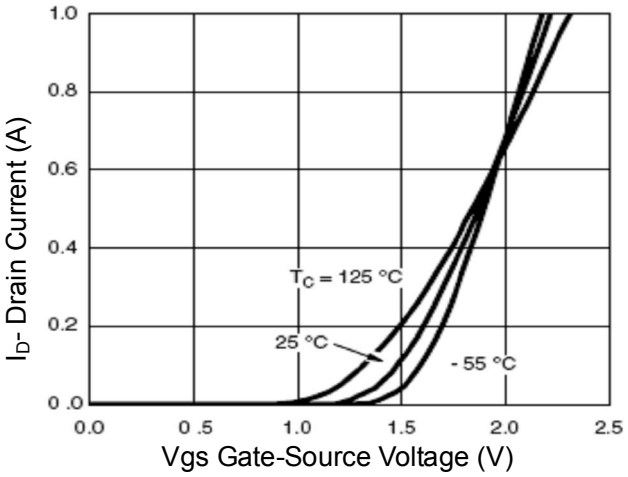


Figure 7 Transfer Characteristics

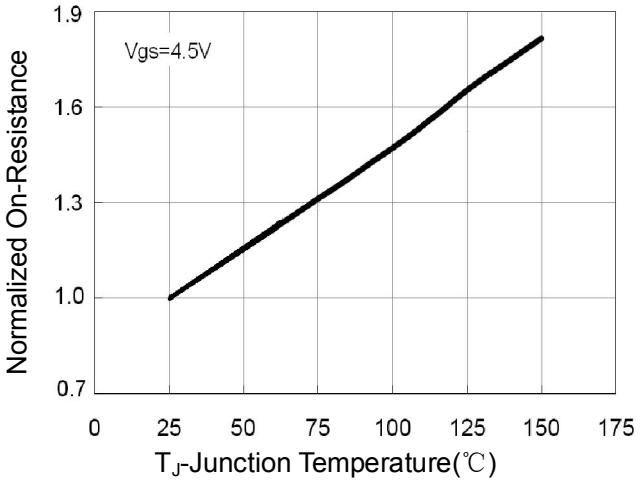


Figure 8 Drain-Source On-Resistance

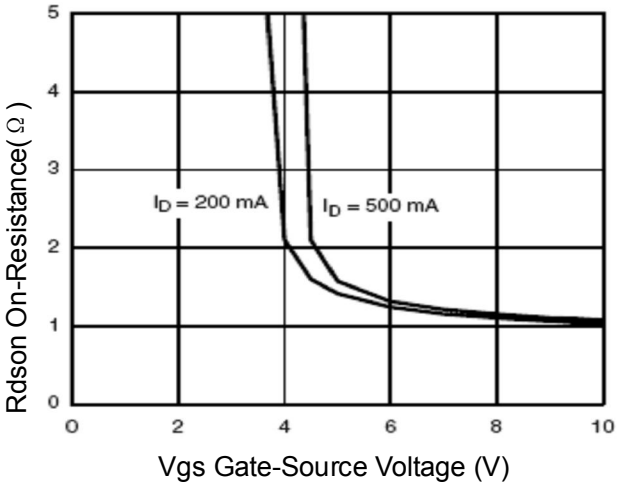


Figure 9 Rdson vs Vgs

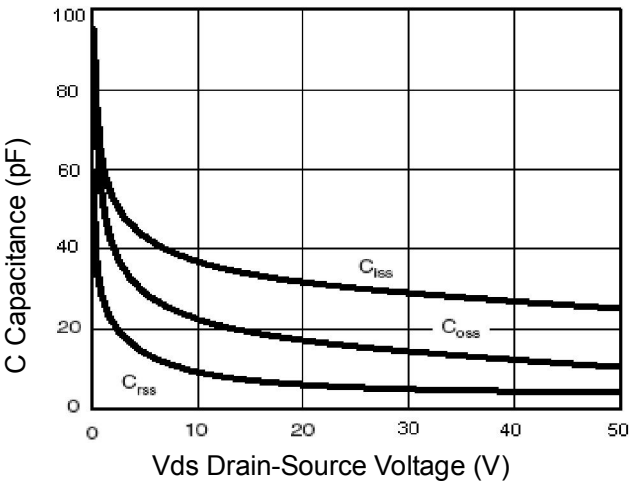


Figure 10 Capacitance vs Vds

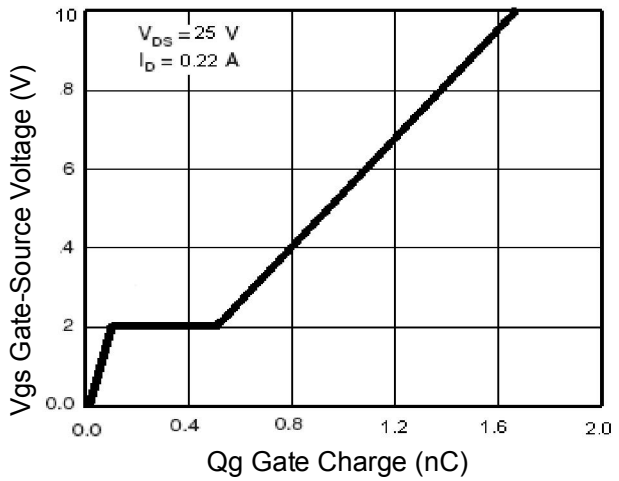


Figure 11 Gate Charge

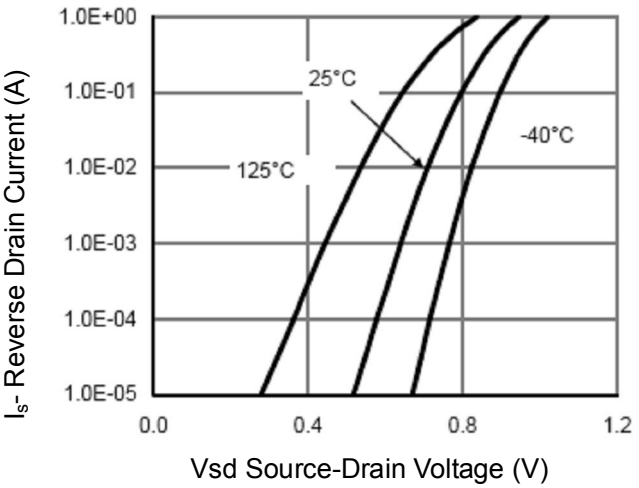


Figure 12 Source- Drain Diode Forward

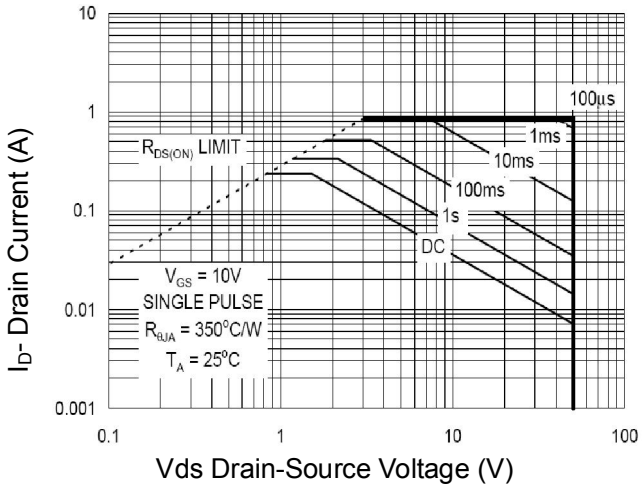


Figure 13 Safe Operation Area

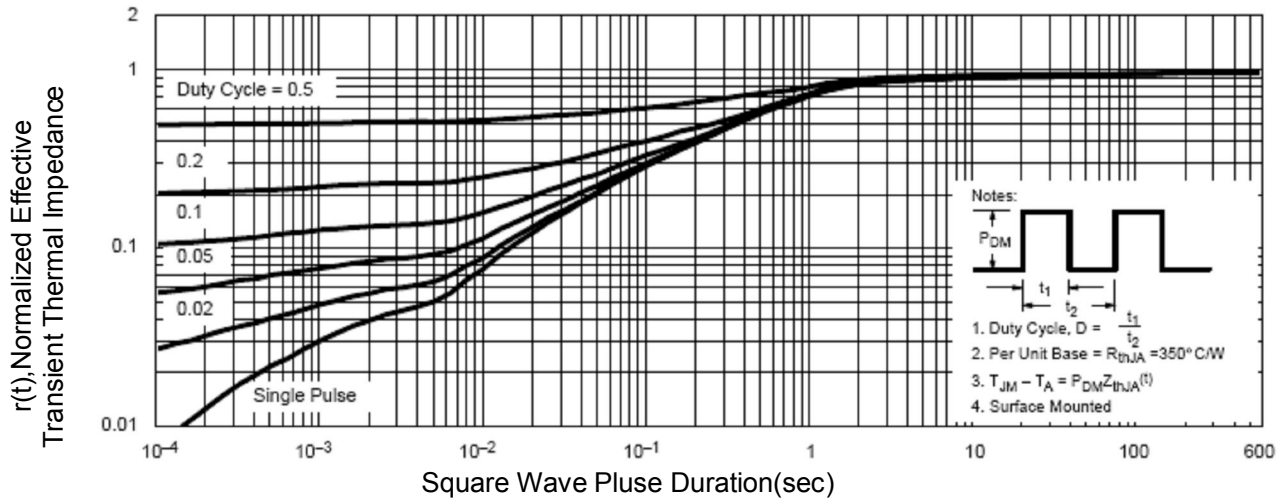
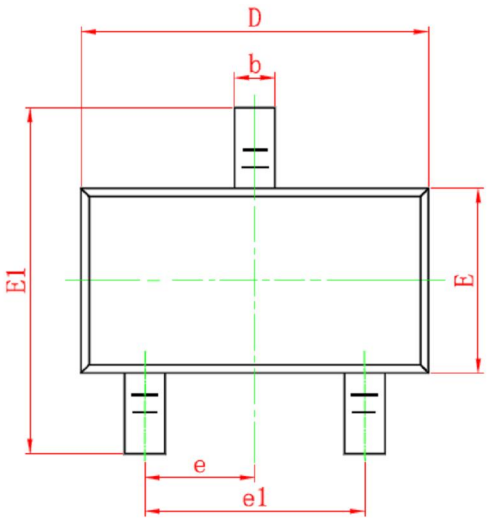
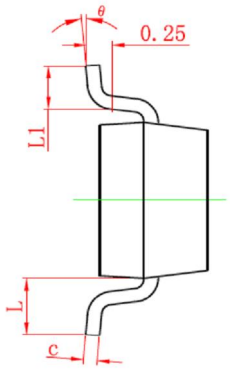


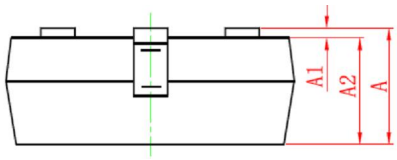
Figure 14 Normalized Maximum Transient Thermal Impedance

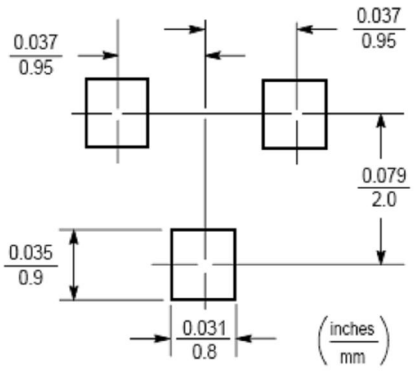
SOT-23 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT: mm)









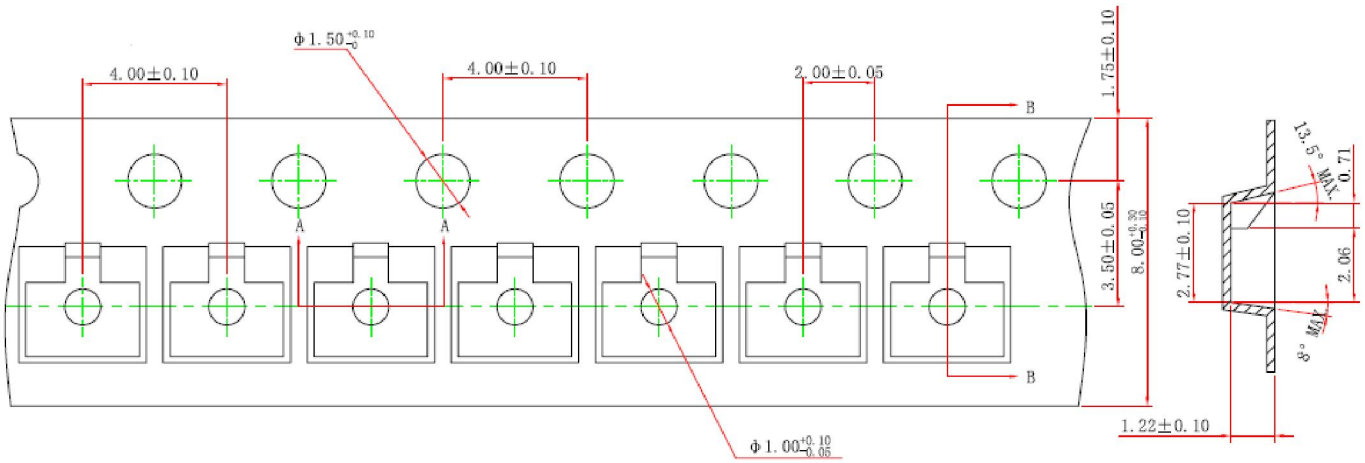
Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

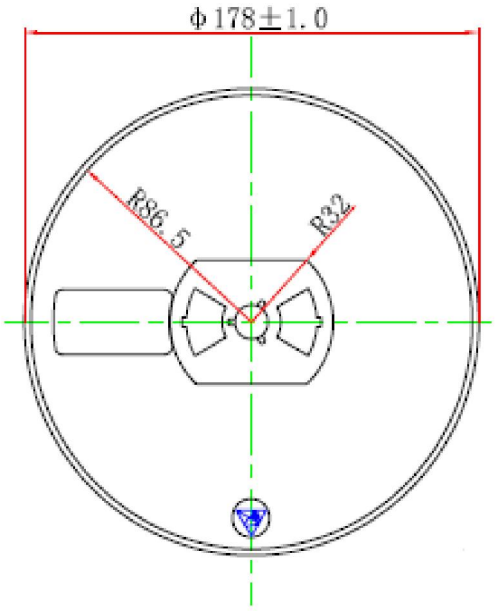
NOTES

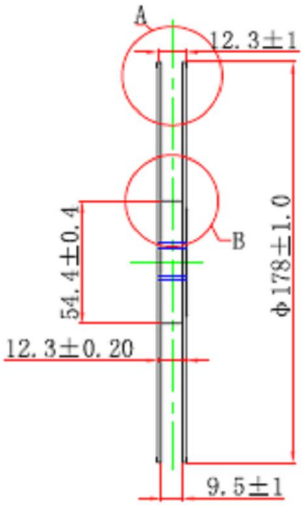
1. All dimensions are in millimeters.
2. Tolerance ±0.10mm (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

SOT 23 Tape and Reel Information

Dimensions in Millimeters (UNIT: mm)







NOTES:

1. All dimensions are in millimeters.
2. 10 Sprocket hole pitch cumulative tolerance ±0.20MAX
3. General tolerance ±0.25