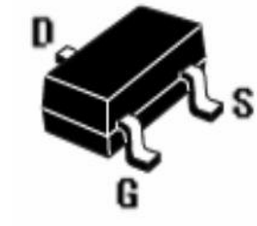
Description

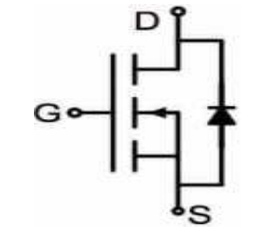
- The WTM2302 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.



SOT-23 Top View

Features

- V_{DS} = 20V, I_D = 2.6A
  $R_{DS(ON)}$ < 80mΩ @ V_{GS}=2.5V
  $R_{DS(ON)}$ < 56mΩ @ V_{GS}=4.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package



Schematic Diagram

Application

- Battery protection.
- Load switch
- Power management

Package and order information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
WTM2302	2302	SOT-23	Ø180mm	8 mm	3000 pcs

Absolute Maximum Ratings (TA=25℃, RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	2.6	A
Drain Current-Pulsed (Note 1)	I_{DM}	16	A
Maximum Power Dissipation	P_D	0.8	W
Operating Junction and Storage Temperature Range	T_J & T_{STG}	−55 to +150	°C

Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance and Junction-to-Ambient (Note 2)	$R_{\theta JA}$	139	°C/W

Electrical Characteristics（TA = 25°C unless otherwise noted）

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V I_D =250μA	20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±12V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D =250μA	0.5	0.75	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=2.5V, I_D =2A	-	62	80	mΩ
		V_{GS} =4.5V,I_D =2.6A	-	42	56	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=2.6A	-	8	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=10V,V_{GS}=0V,F=1.0MHz	-	260	-	PF
Output Capacitance	C_{oss}		-	48	-	PF
Reverse Transfer Capacitance	C_{rss}		-	27	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD} =10V, R_L=3.3Ω V_{GS} =4.5V,R_{GEN} =6Ω	-	2.5	-	nS
Turn-on Rise Time	t_r		-	3.2	-	nS
Turn-Off Delay Time	$td_{(off)}$		-	21	-	nS
Turn-Off Fall Time	t_f		-	3	-	nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=2.6A,V_{GS}=4.5V	-	2.9	5	nC
Gate-Source Charge	Q_{gs}		-	0.4	-	nC
Gate-Drain Charge	Q_{gd}		-	0.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S =2.6A	-	0.75	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	2.6	A

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

Typical Electrical and Thermal Characteristics

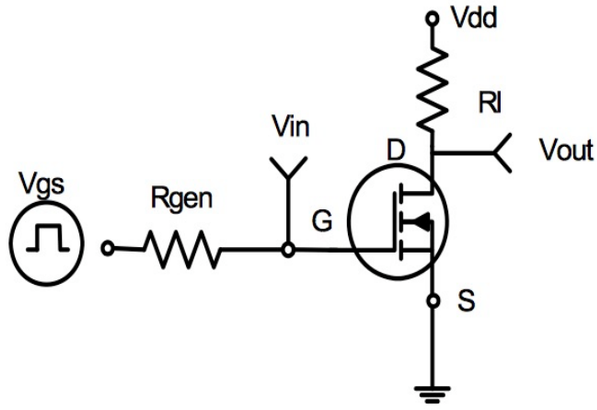


Figure 1 - Switching Test Circuit

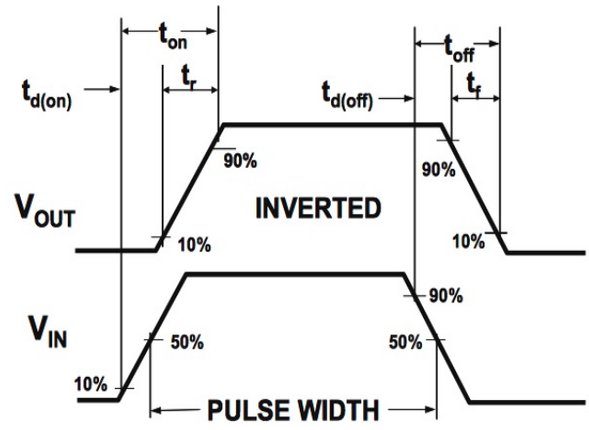
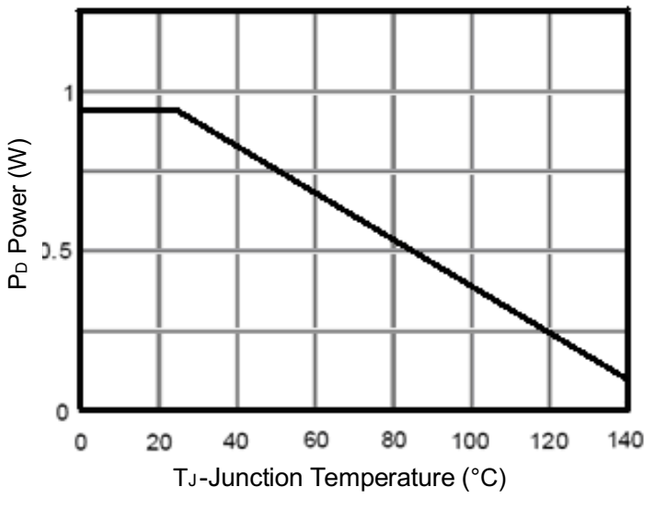


Figure 2 - Switching Waveforms



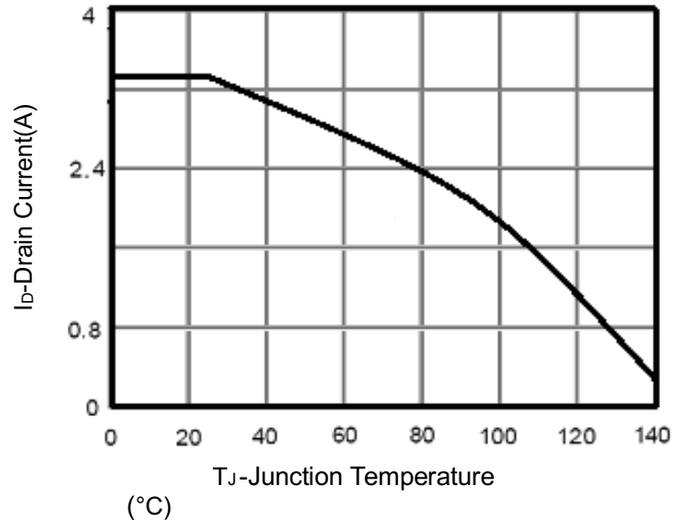


Figure 3 - Power Dissipation

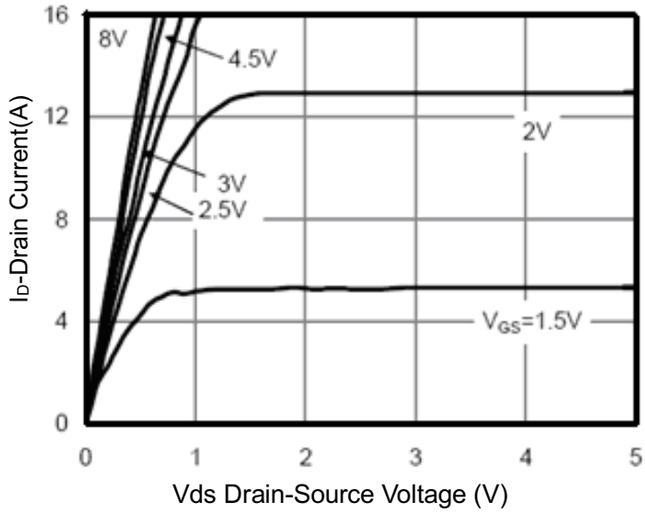


Figure 5 - Output Characteristics

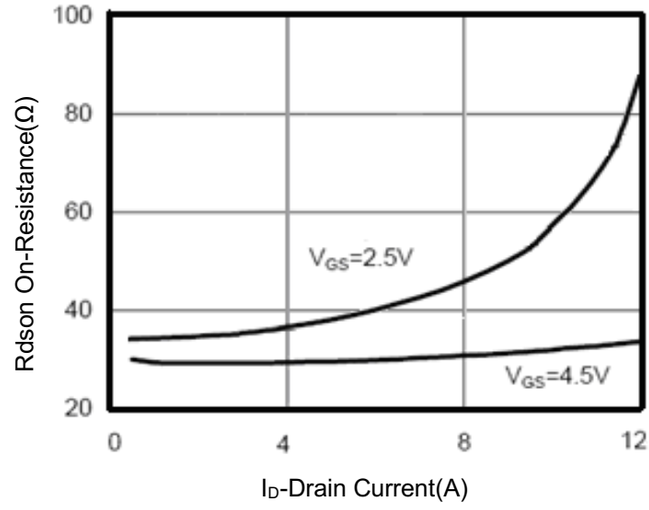


Figure 6 -Drain-Source On-Resistance

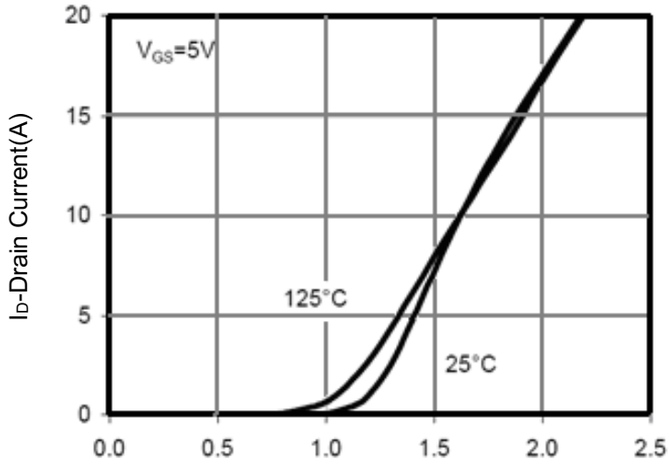


Figure 7 – Transfer Characteristics

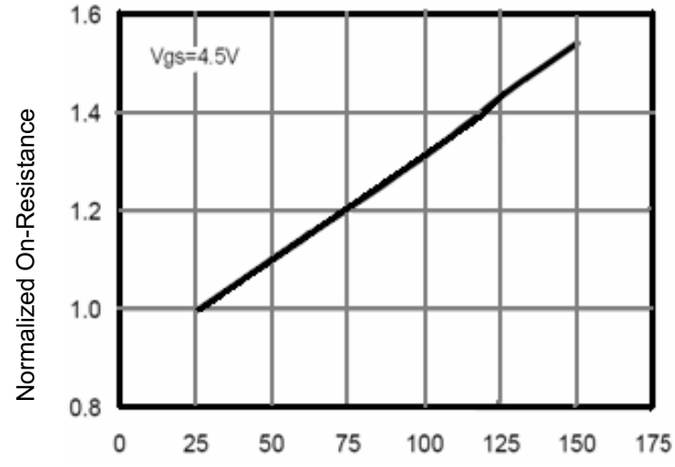


Figure 8 – Drain-Source On-Resistance

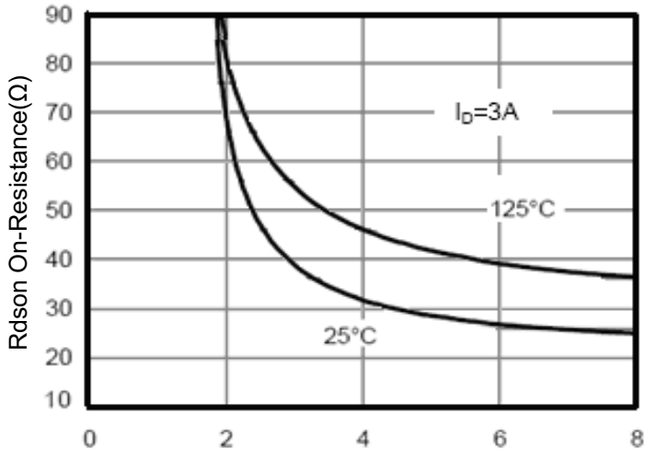


Figure 9 – Rdson vs Vgs

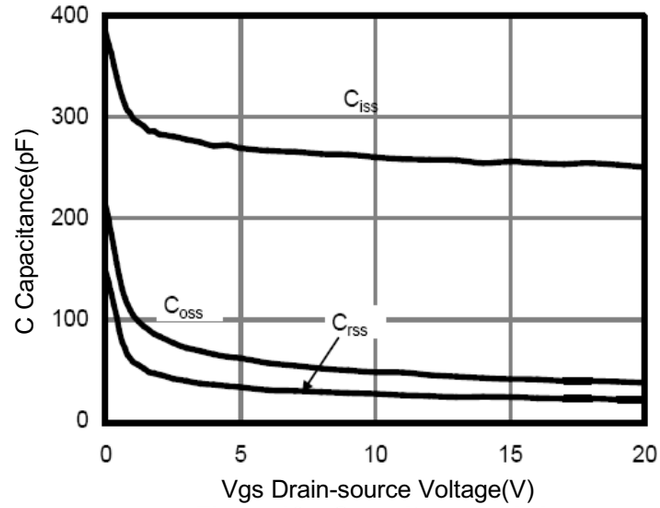


Figure 10 – Capacitance vs Vds

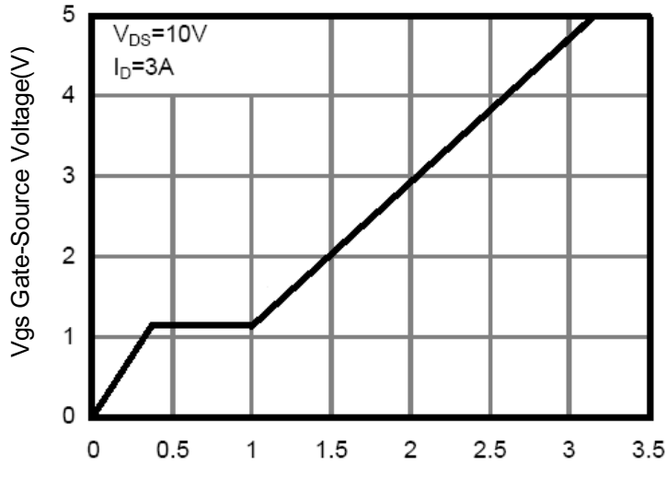


Figure 11 –Gate Charge

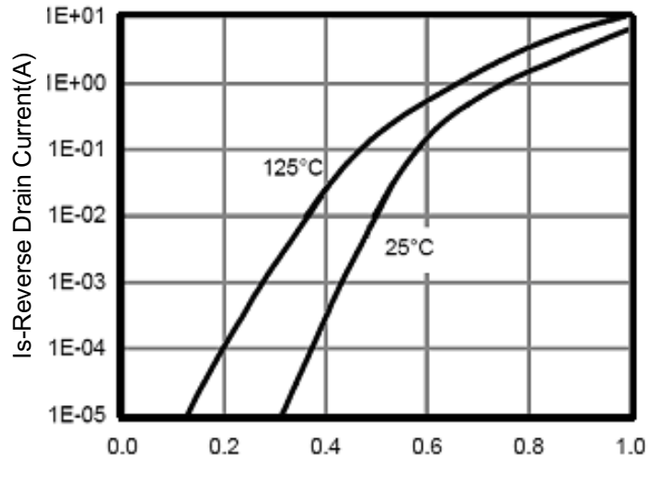


Figure 12 –Source-Drain Diode Forward

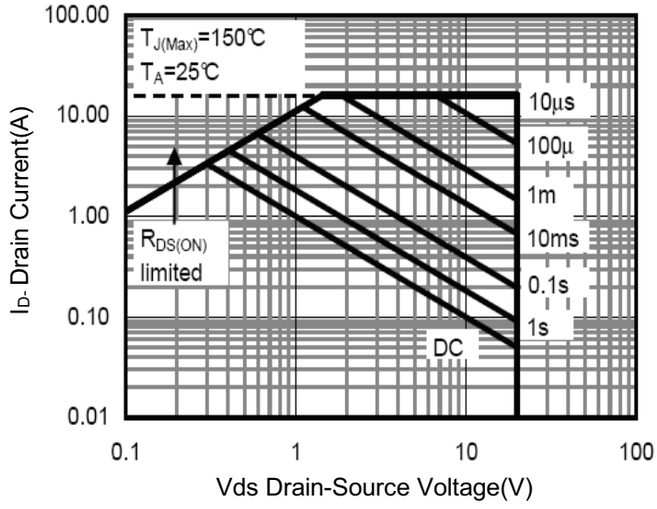


Figure 13 – Safe Operation Area

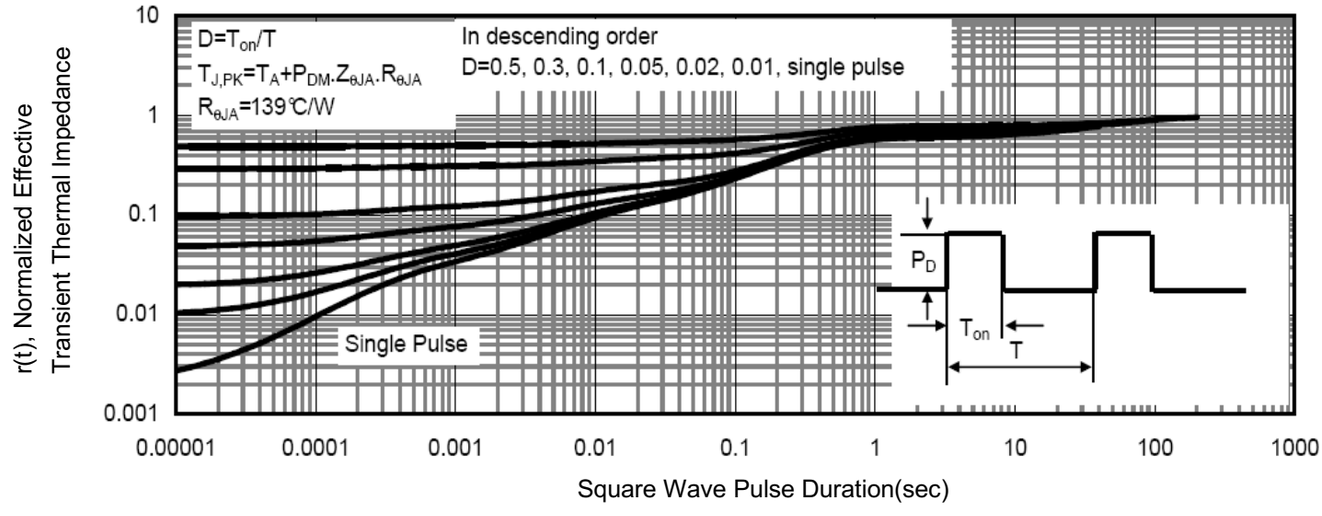
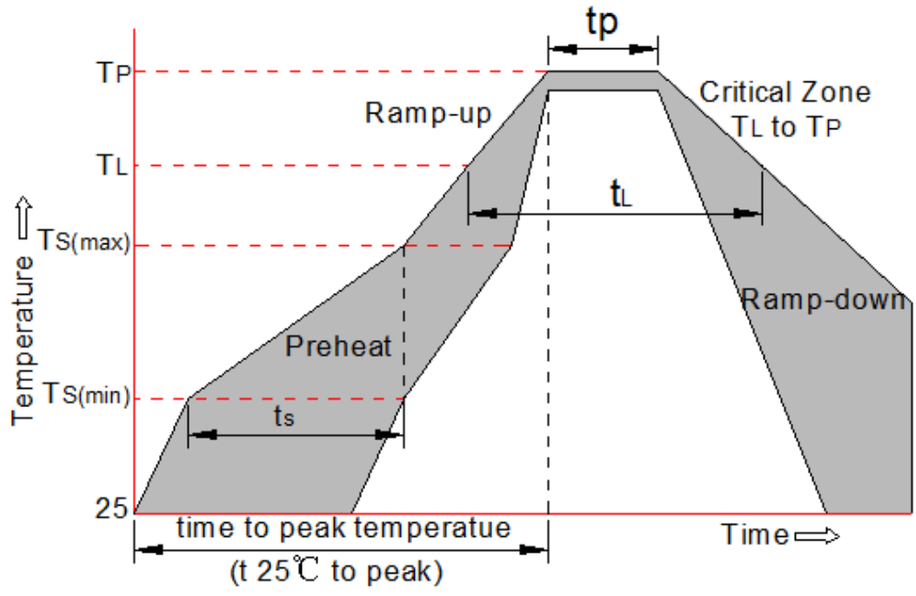


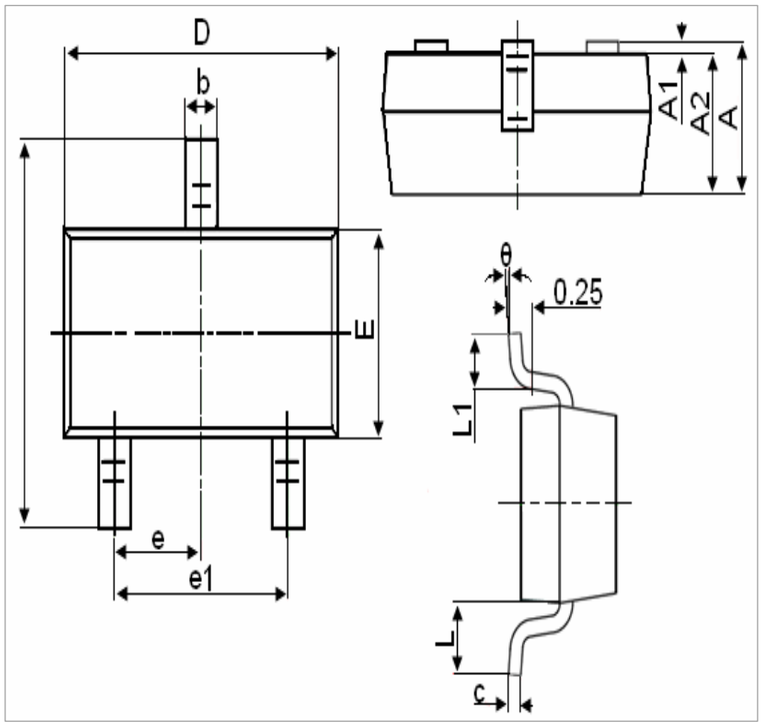
Figure 14 – Normalized Maximum Transient Thermal Impedance

Soldering parameters



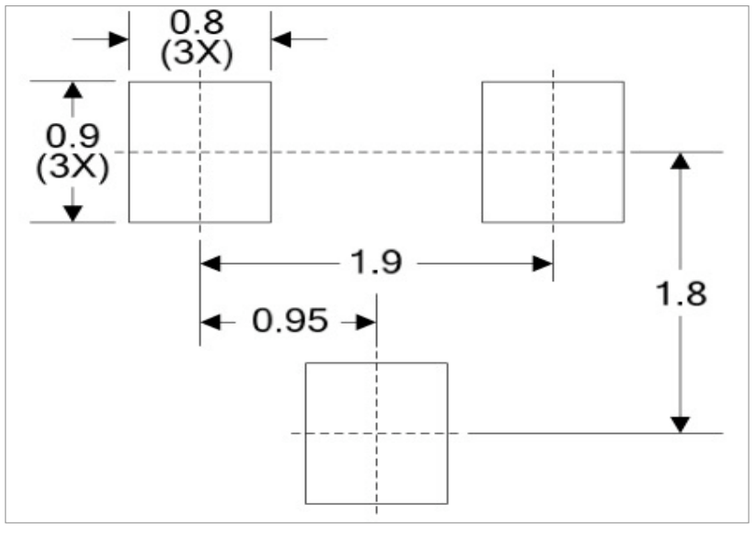
Reflow Condition		Pb-Free assembly
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L) (Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

Package Outline Dimensions (SOT-23)



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	0.950 TYP	
e1	1.800	2.000
L	0.55 REF	
L1	0.300	0.500
θ	0°	8°

Recommend PAD Layout



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.