

## Description

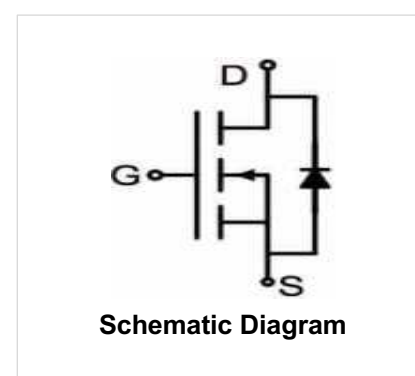
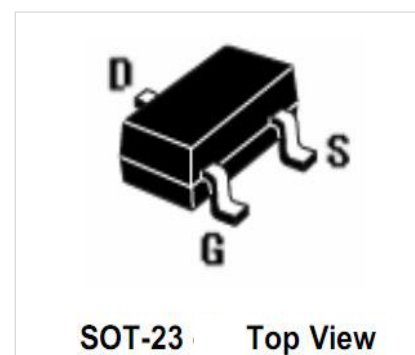
- The WTM2306 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ . This device is suitable for use as a battery protection or in other switching application.

## Features

- $V_{DS} = 30V$ ,  $I_D = 3.6A$   
 $R_{DS(ON)} < 73m\Omega @ V_{GS}=4.5V$   
 $R_{DS(ON)} < 58m\Omega @ V_{GS}=10V$
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

## Application

- Battery protection.
- Load switch
- Power management



## Package and order information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
WTM2306	A6SHB	SOT-23	Ø180mm	8 mm	3000 pcs

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous	$I_D$	3.6	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	15	A
Maximum Power Dissipation	$P_D$	1.7	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 <sup>(Note 2)</sup>	$R_{\theta JA}$	73.5	°C/W

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$B_{V_{DS}}$	$V_{GS}=0V, I_D=250\mu A$	30	33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.5	2.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=3.1A$		58	73	m $\Omega$
		$V_{GS}=10V, I_D=3.6A$	-	40	58	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=3.6A$	-	11	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, F=1.0MHz$	-	230	-	PF
Output Capacitance	$C_{oss}$		-	40	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	17	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=3.6A$ $V_{GS}=4.5V, R_{GEN}=6\Omega$	-	10	-	nS
Turn-on Rise Time	$t_r$		-	50	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	10	-	nS
Turn-Off Fall Time	$t_f$		-	20	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=3.6A, V_{GS}=10V$	-	4.0	-	nC
Gate-Source Charge	$Q_{gs}$		-	0.75	-	nC
Gate-Drain Charge	$Q_{gd}$		-	0.65	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=2.7A$	-	0.8	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	1.6	A

**Notes:**

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

Typical Electrical and Thermal Characteristics

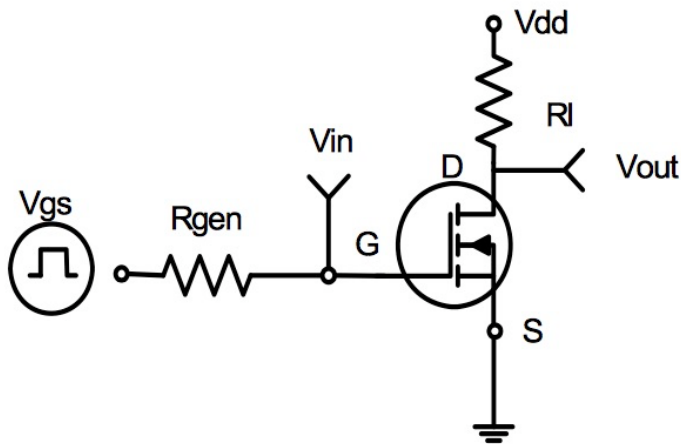


Figure 1 - Switching Test Circuit

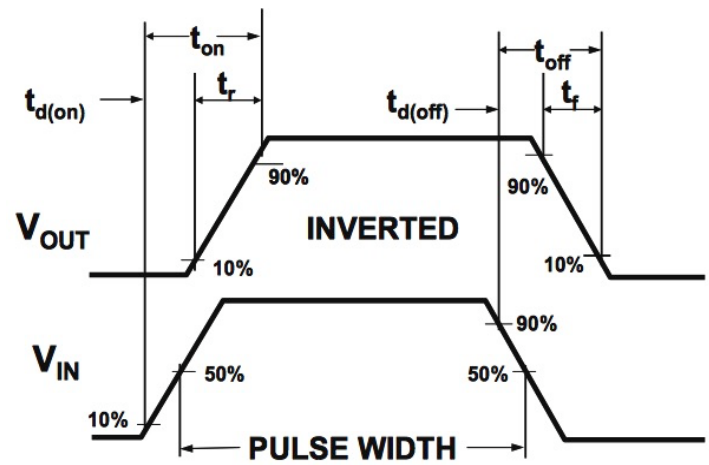


Figure 2 - Switching Waveforms

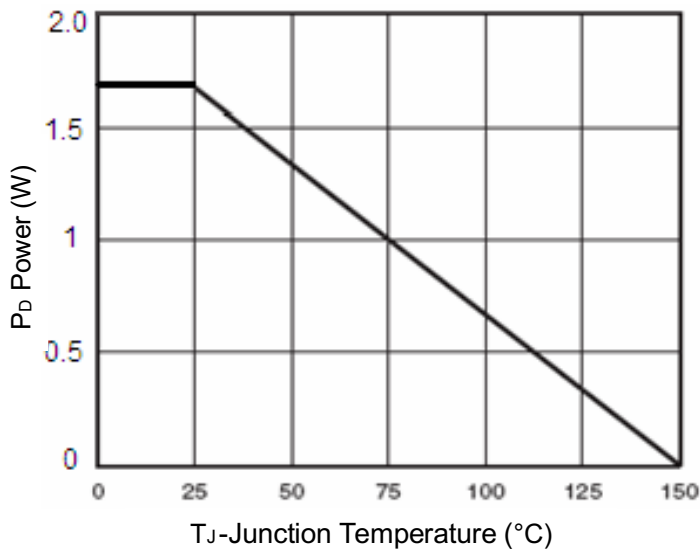


Figure 3 - Power Dissipation

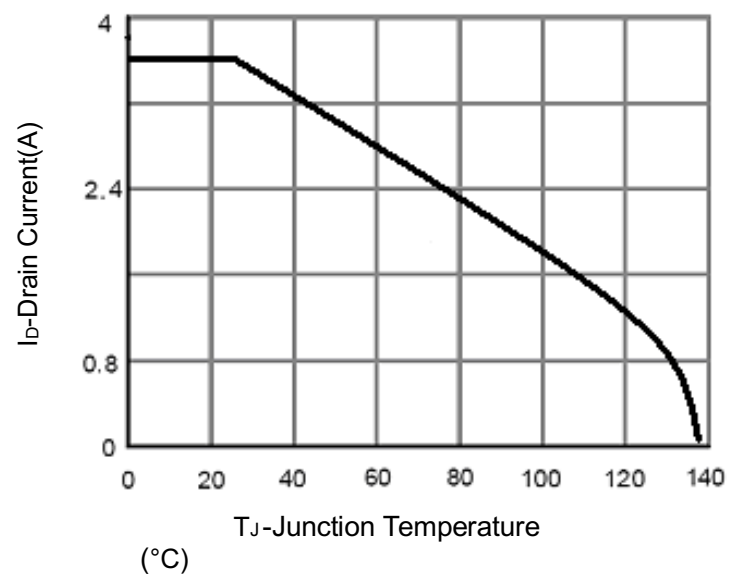


Figure 4 - Id-Drain Current vs Tj-Junction Temperature

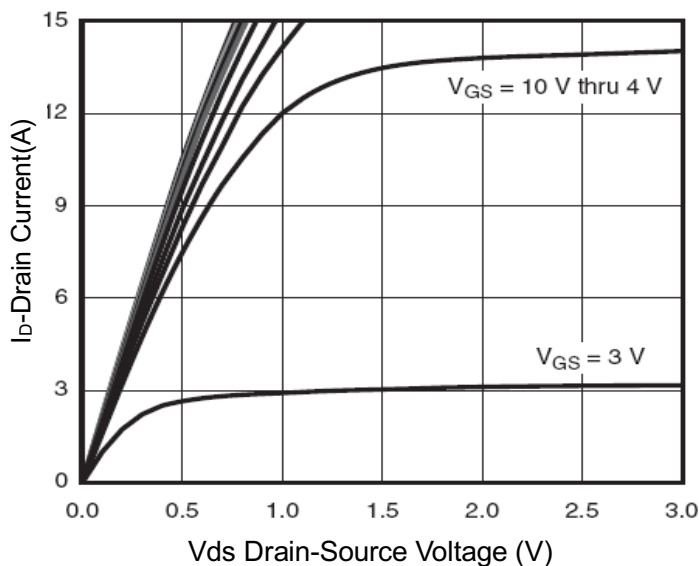


Figure 5 - Output Characteristics

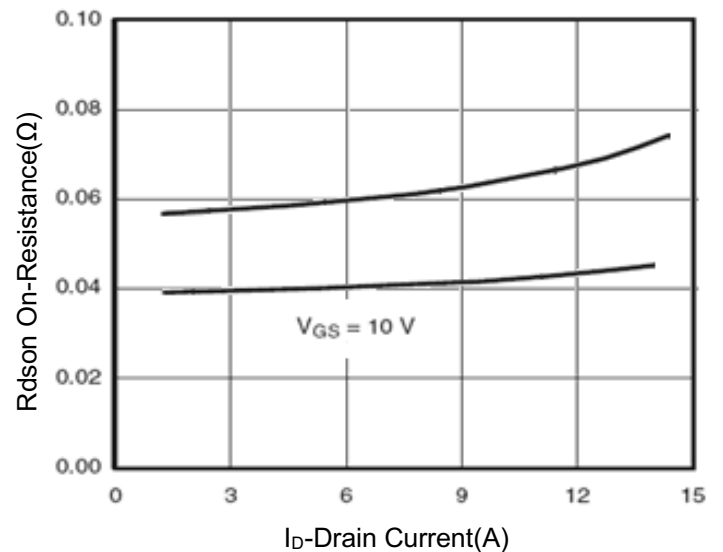


Figure 6 - Drain-Source On-Resistance

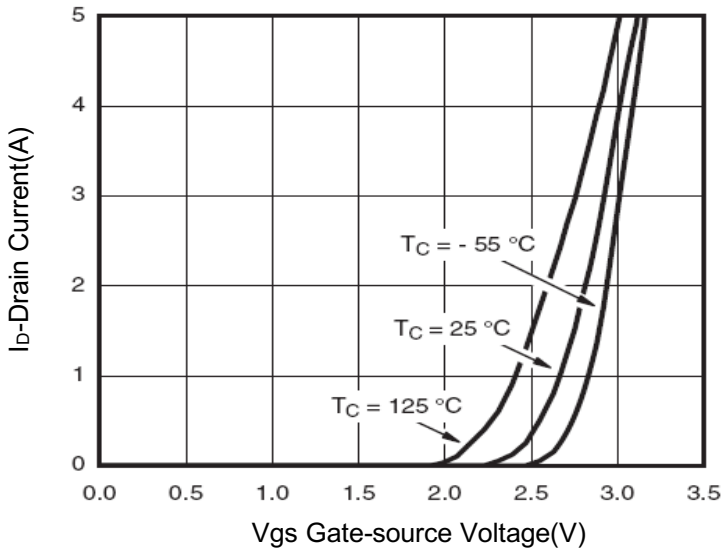


Figure 7 – Transfer Characteristics

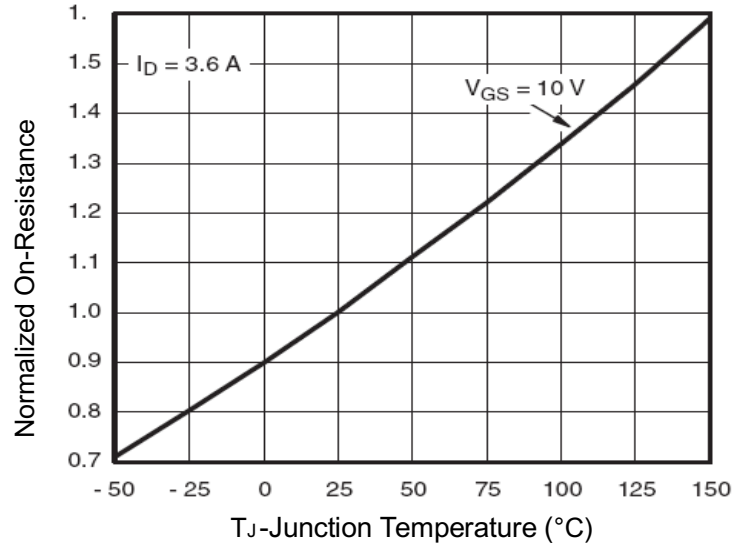


Figure 8 – Drain-Source On-Resistance

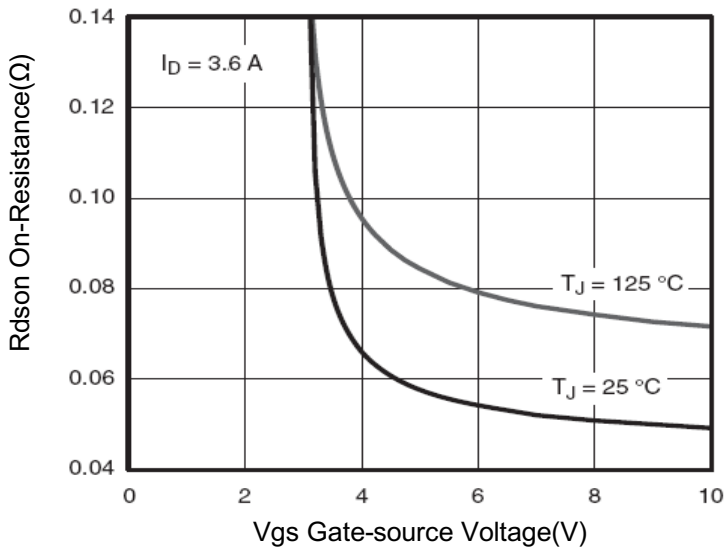


Figure 9 – Rdson vs Vgs

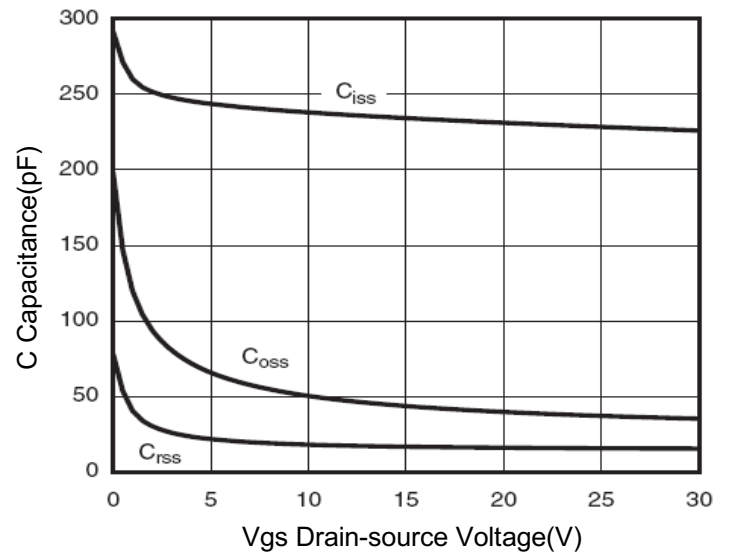


Figure 10 – Capacitance vs Vds

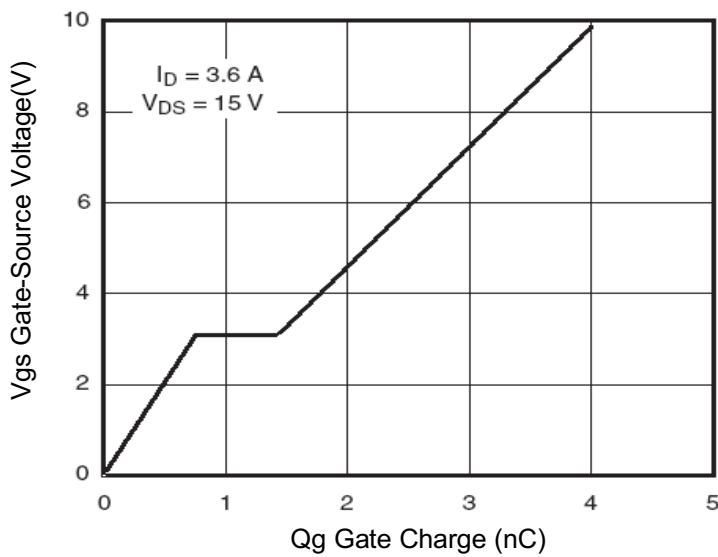


Figure 11 – Gate Charge

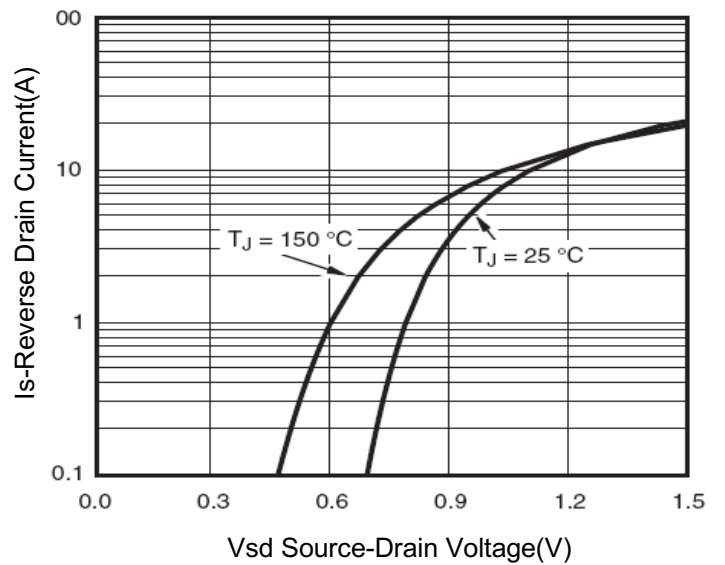


Figure 12 – Gate Charge

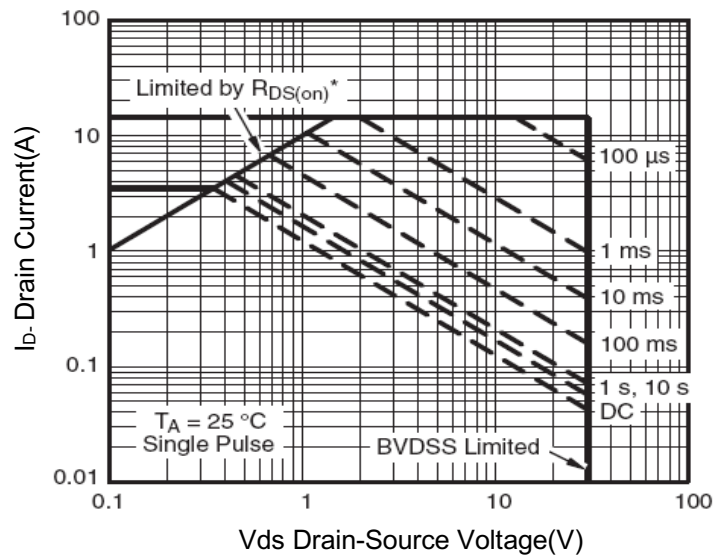


Figure 13 – Safe Operation Area

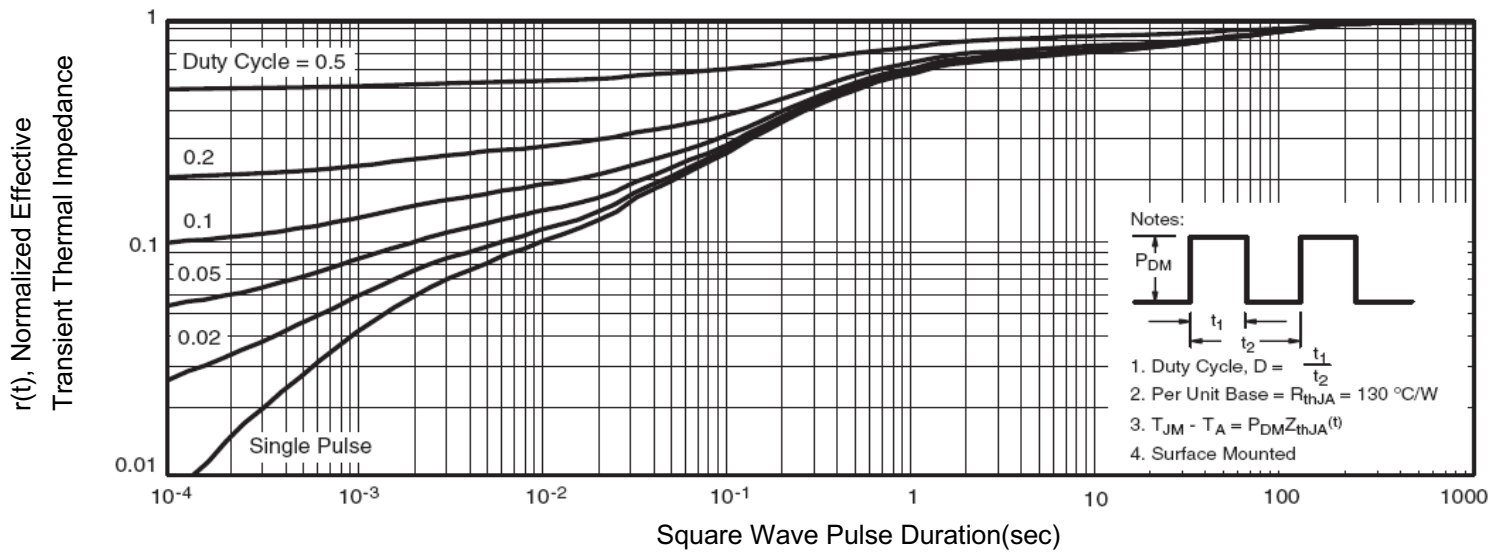
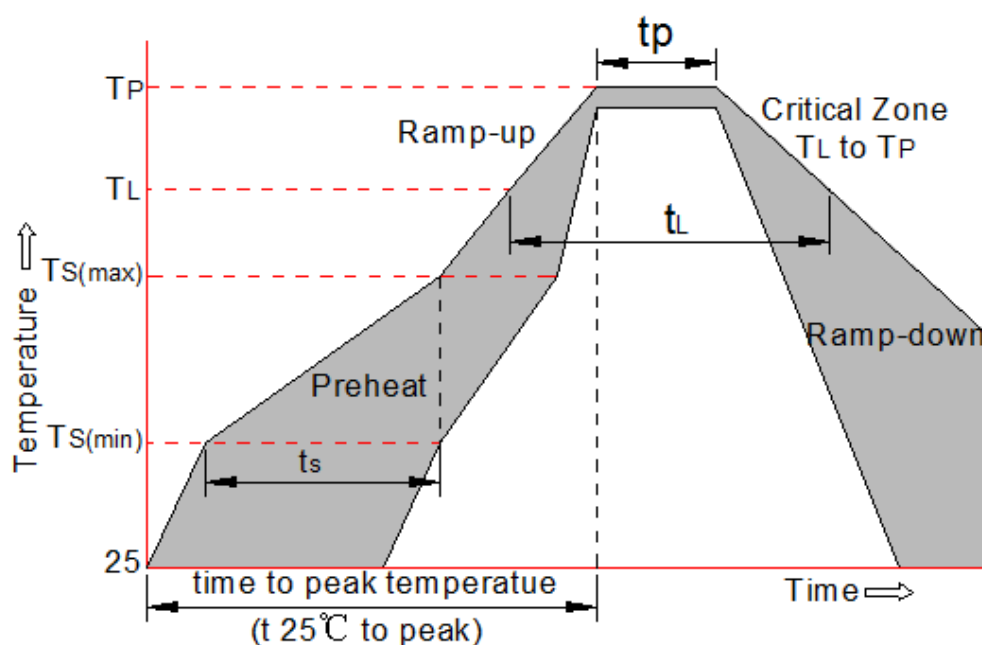


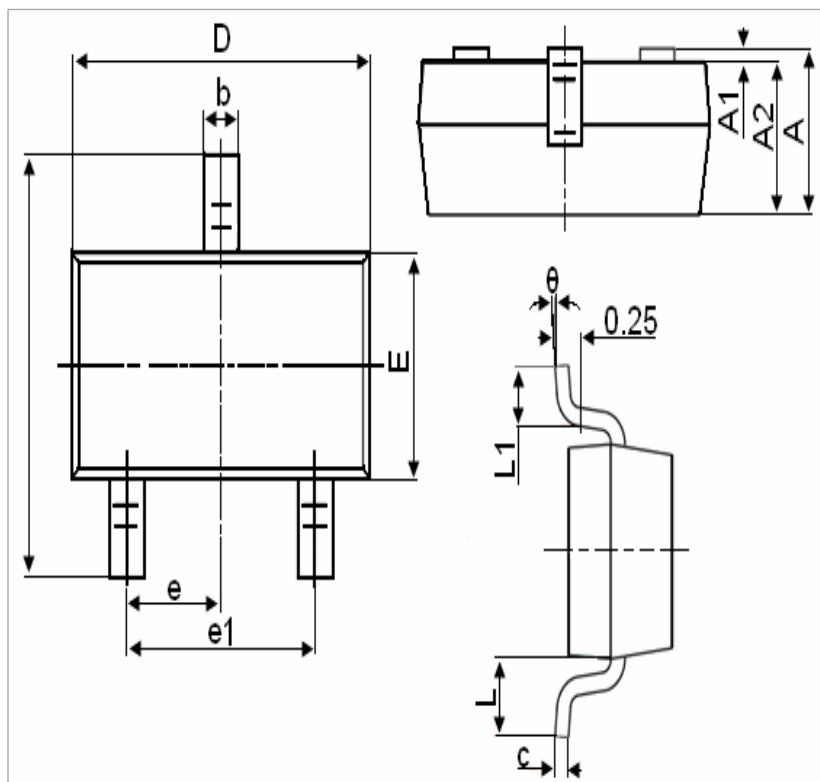
Figure 14 – Normalized Maximum Transient Thermal Impedance

**Soldering parameters**



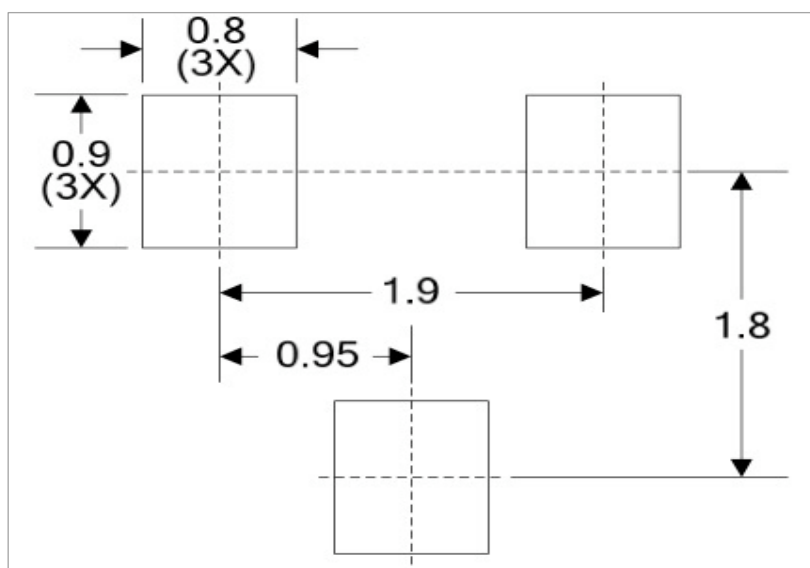
Reflow Condition		Pb-Free assembly
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(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

**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
$\theta$	0°	8°

**Recommend PAD Layout**



**Notes:**

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10$ mm (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.