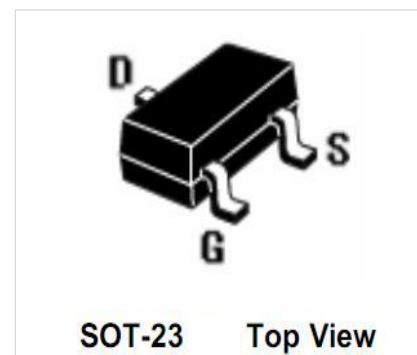


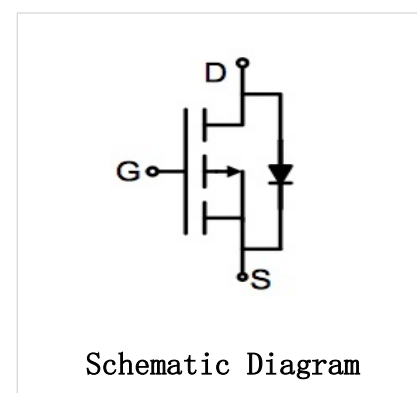
**Description**

- The WTM2305 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.



**Features**

- $V_{DS} = -20V, I_D = -4.1A$   
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -2.5V$   
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$
- High power and current handing capability
- Lead free product is acquired
- Surface mount package



**Application**

- PWM applications
- Load switch
- Power management

**Package and order information**

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
WTM2305	A5SHB	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	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	±12	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ C$	-4.1
		$T_C = 70^\circ C$	-3.2
		$T_A = 25^\circ C$	-3
		$T_A = 70^\circ C$	-2.3
Drain Current-Pulsed (Note 1)	$I_{DM}$	-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 <sub>θJA</sub>	74	°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 <sub>VDSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA	-20	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	-1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA	-0.45	-0.7	-1.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> = -4.1A	-	39	52	mΩ
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3A	-	58	75	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2A	6	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-4V, V <sub>GS</sub> =0V, F=1.0MHz	-	740	-	PF
Output Capacitance	C <sub>OSS</sub>		-	290	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	190	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -4V, I <sub>D</sub> = -3.3A, R <sub>L</sub> = 1Ω V <sub>GS</sub> = -4.5V, R <sub>GEN</sub> = 1Ω	-	12	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	35	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	30	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	10	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-4V, I <sub>D</sub> =-4.1A, V <sub>GS</sub> =-4.5V	-	7.8	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1.2	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	1.6	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> = 1.6A	-	-	-1.2	V
Diode Forward Current <sup>(Note 2)</sup>	I <sub>S</sub>		-	-	1.6	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

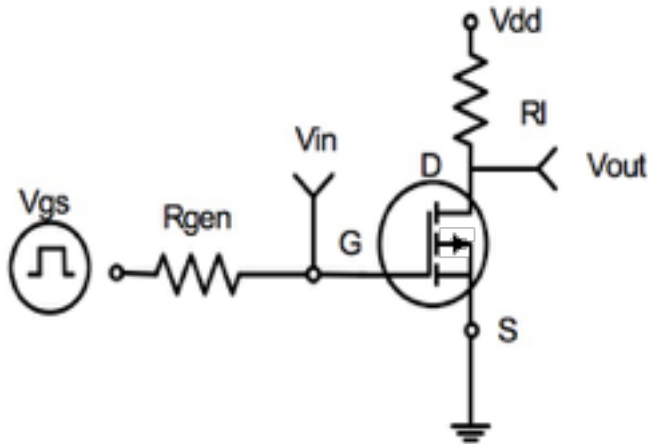


Figure 1 - Switching Test Circuit

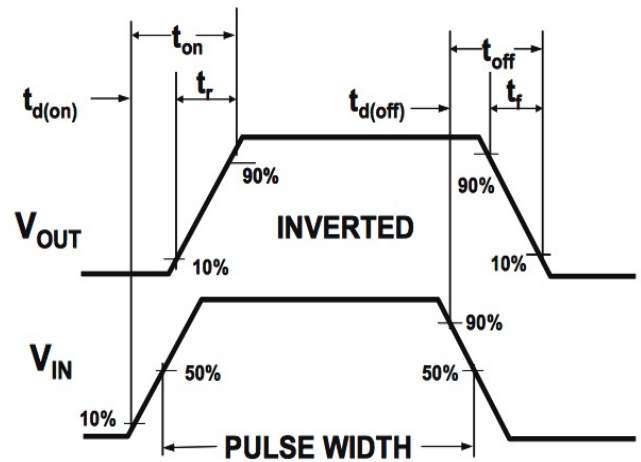


Figure 2 - Switching Waveforms

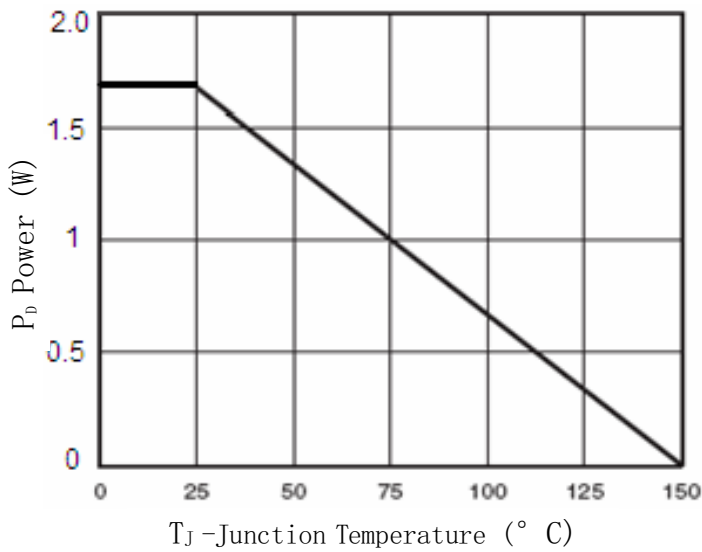


Figure 3 - Power Dissipation

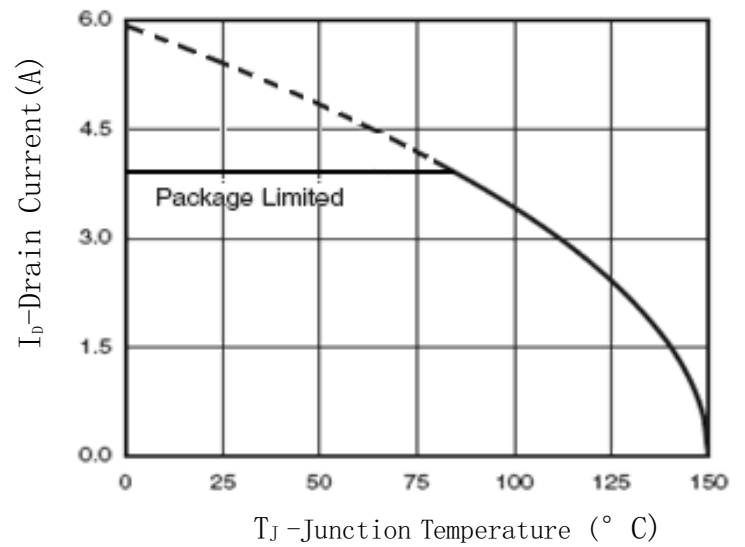


Figure 4 - Drain Current

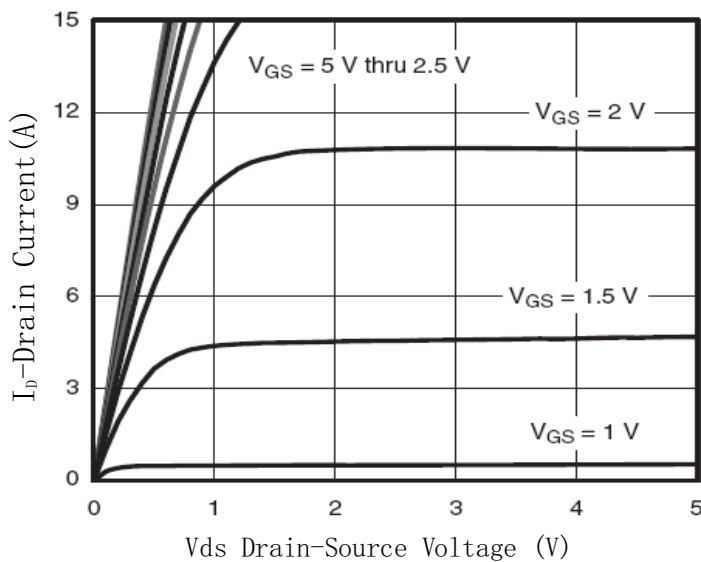


Figure 5 - Output

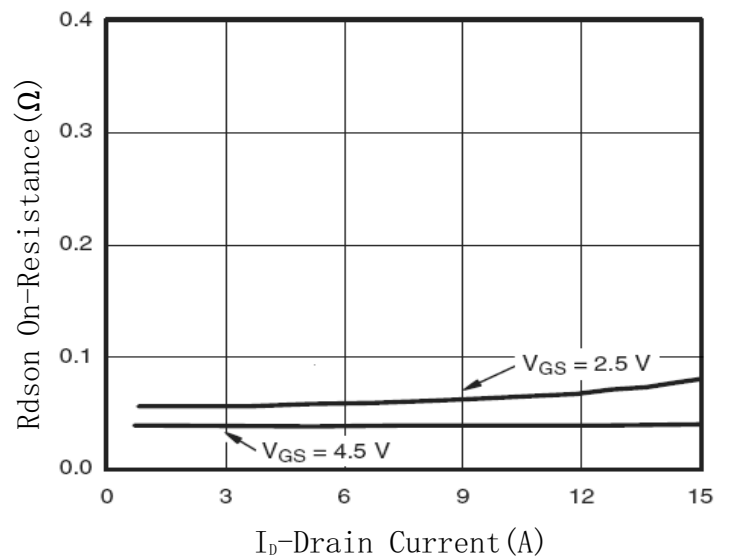


Figure 6 - Drain-Source

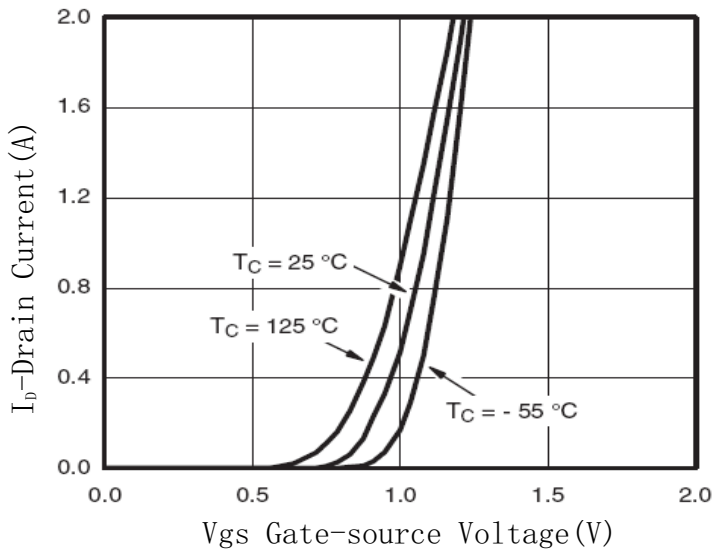


Figure 7 - Transfer Characteristics

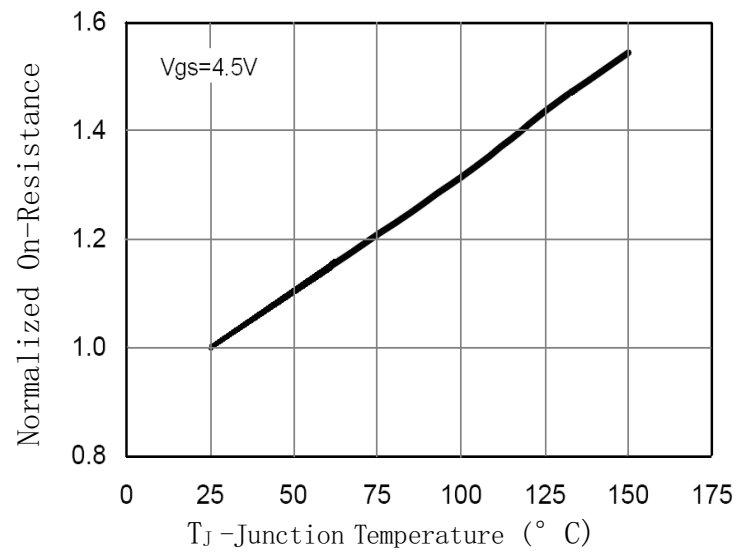


Figure 8 - Drain-Source On-Resistance

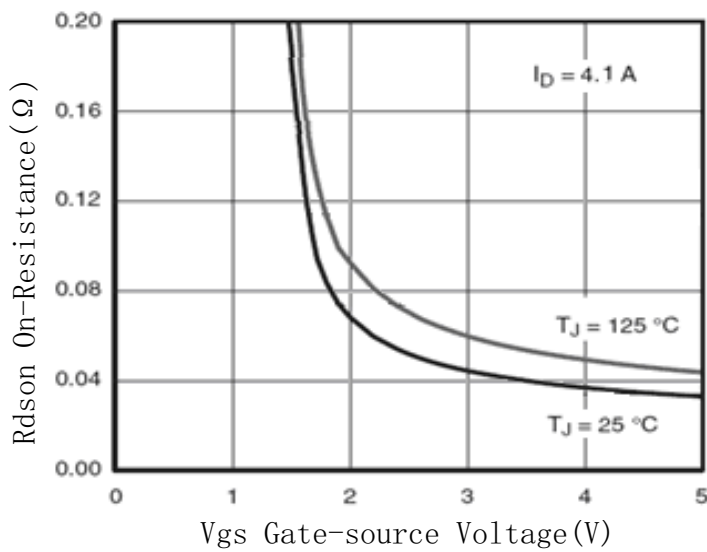


Figure 9 - Rdson vs Vgs

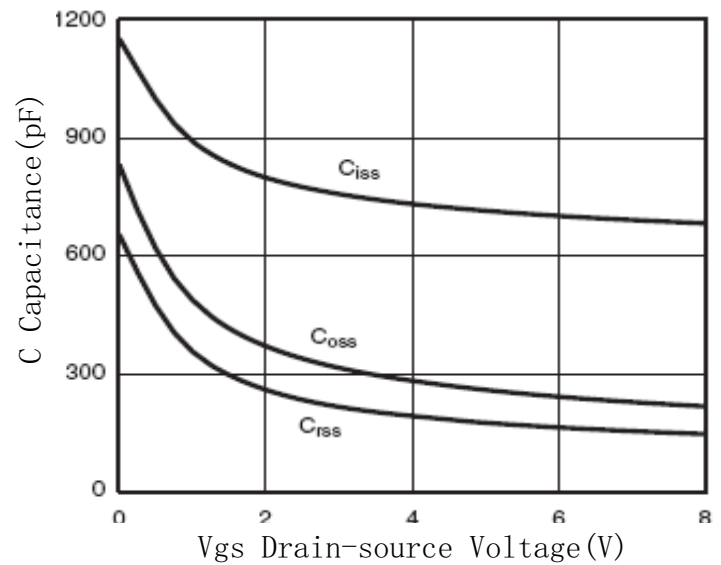


Figure 10 - Capacitance vs Vds

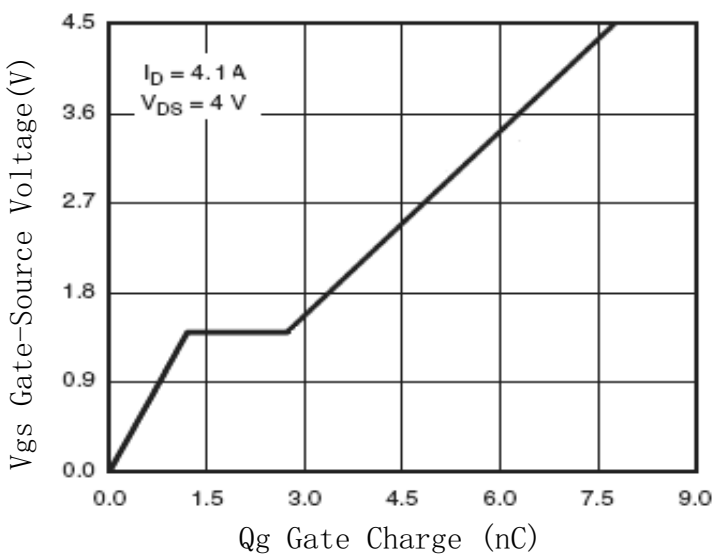


Figure 11 - Gate Charge

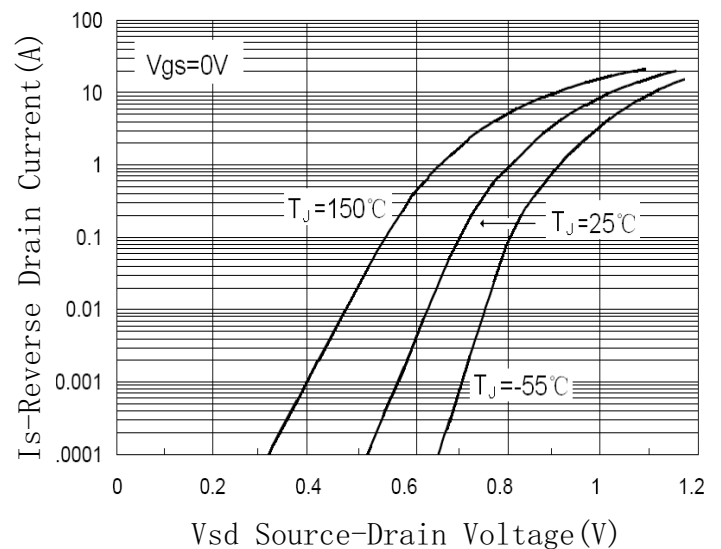


Figure 12 - Source-Drain Diode Forward

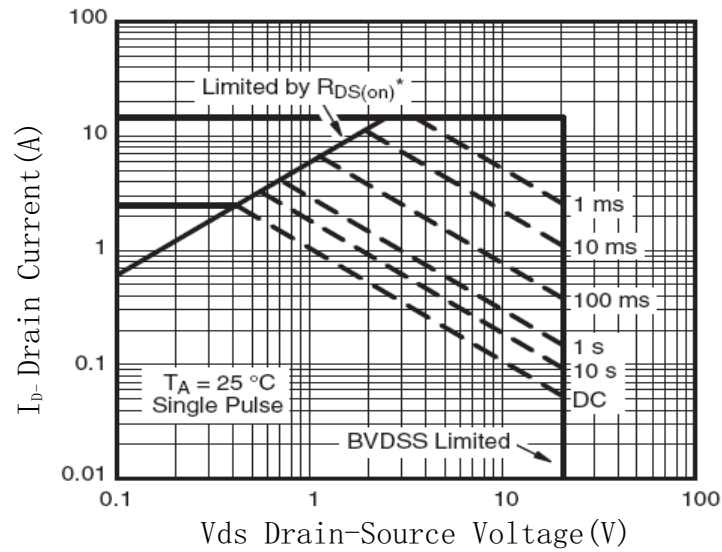


Figure 13 - Safe Operation Area

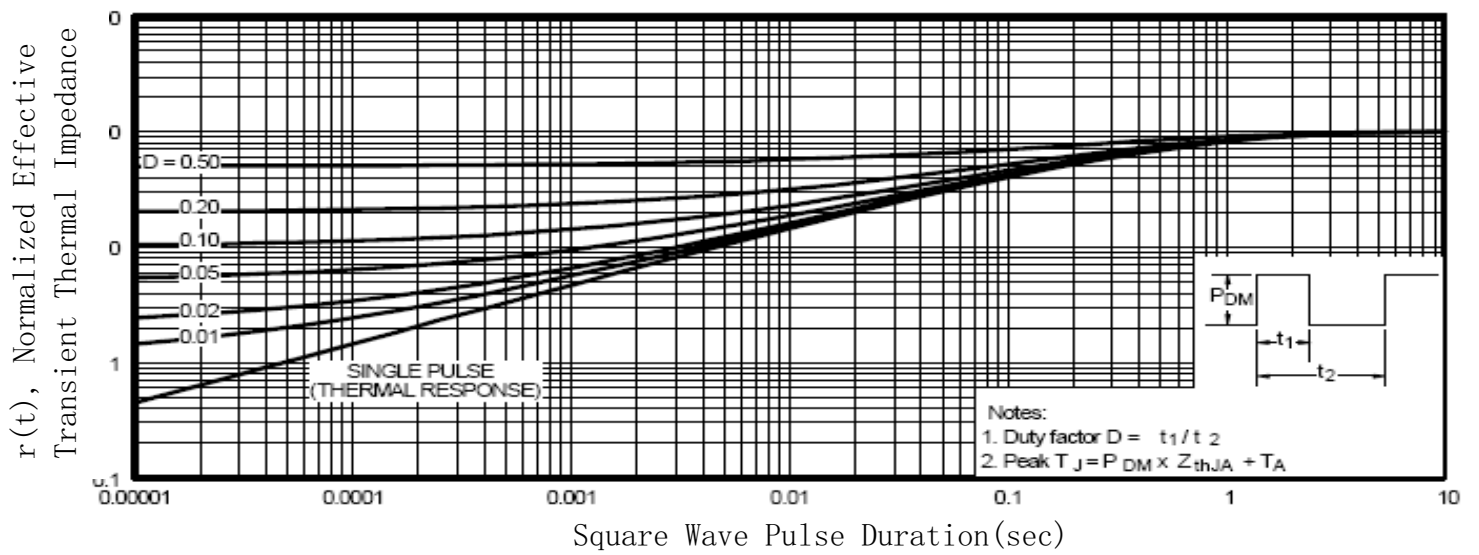
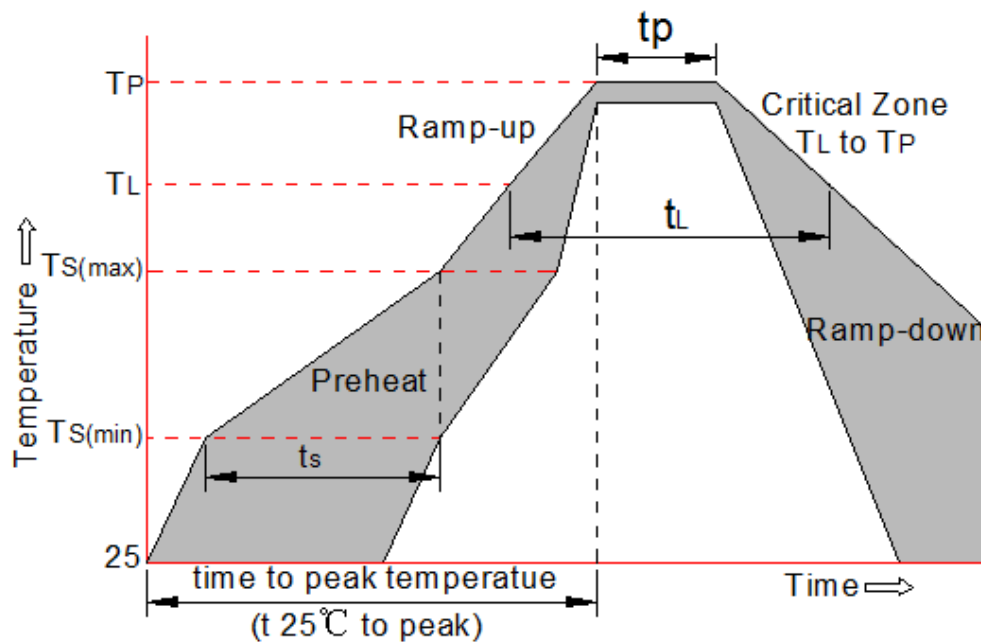


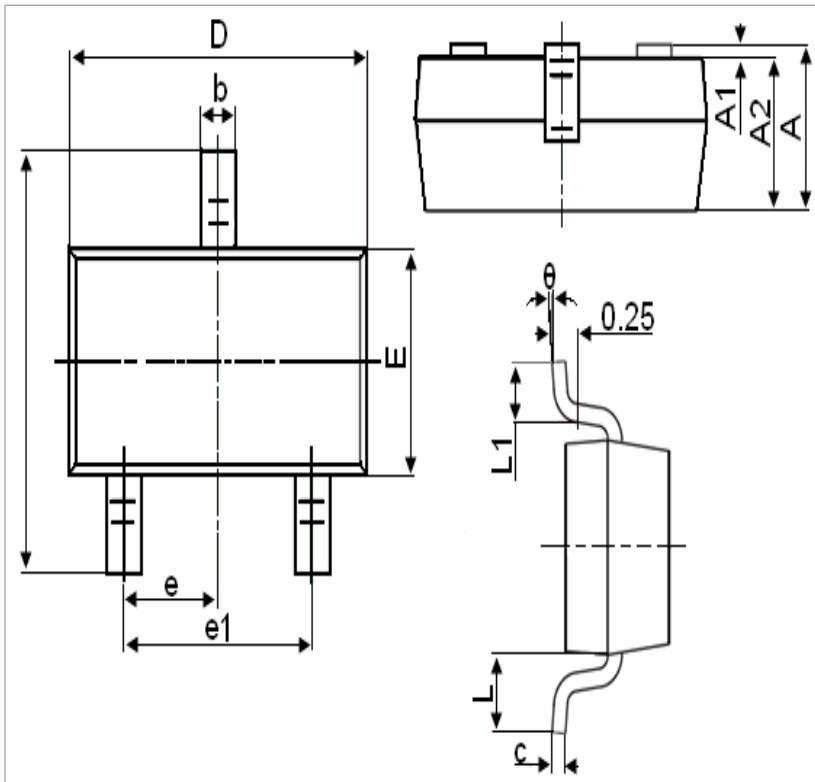
Figure 14 - Normalized Maximum Transient Thermal Impedance

**Soldering parameters**



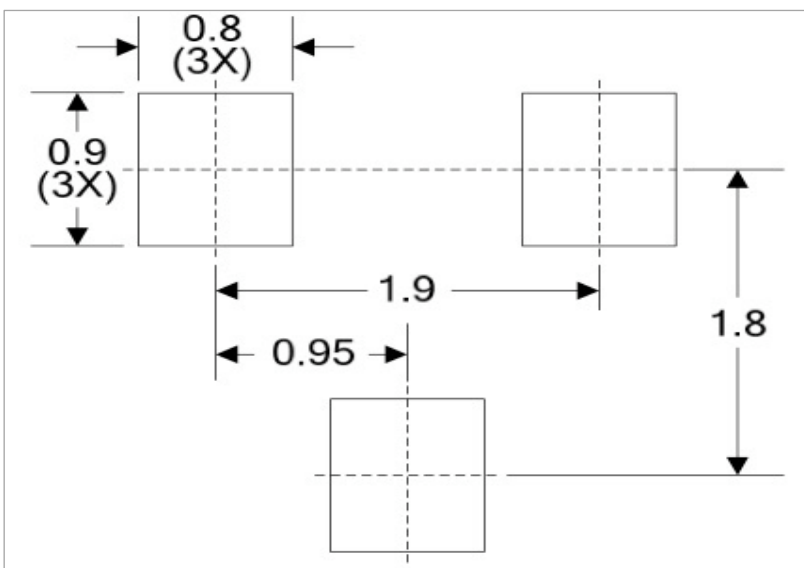
Reflow Condition		Pb-Free assembly
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature ( $T_L$ ) (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  $\pm 0.10\text{mm}$  (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.