

Description

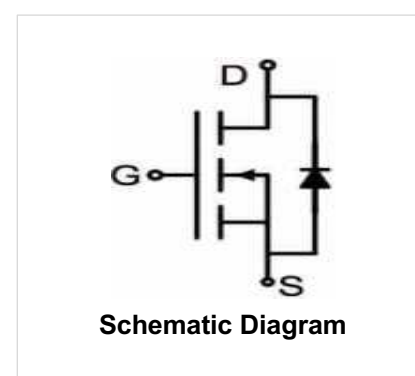
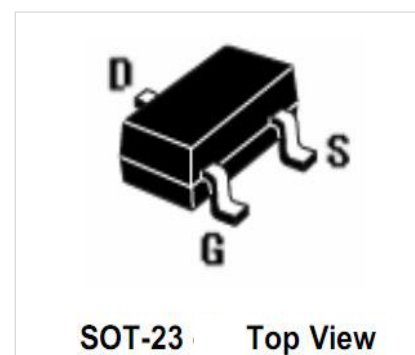
- The WTM2306 uses advanced trench technology to provide excellent $R_{DS(ON)}$. This device is suitable for use as a battery protection or in other switching application.

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 handling 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 ($T_A=25^{\circ}C$, $RH=45\%-75\%$, 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 ^(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 | $^{\circ}C$ |

Thermal Characteristic

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|---------------|
| Thermal Resistance and Junction-to-Ambient ^(Note 2) | $R_{\theta JA}$ | 73.5 | $^{\circ}C/W$ |

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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|-----|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | B _{VDS} | V _{GS} =0V, I _D =250μA | 30 | 33 | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =30V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 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 | mΩ |
| | | V _{GS} =10V, I _D =3.6A | - | 40 | 58 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =3.6A | - | 11 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| 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 |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =10V, I _D =3.6A V _{GS} =4.5V, R _{GEN} =6Ω | - | 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 |
| Drain-Source Diode Characteristics | | | | | | |
| 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 ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

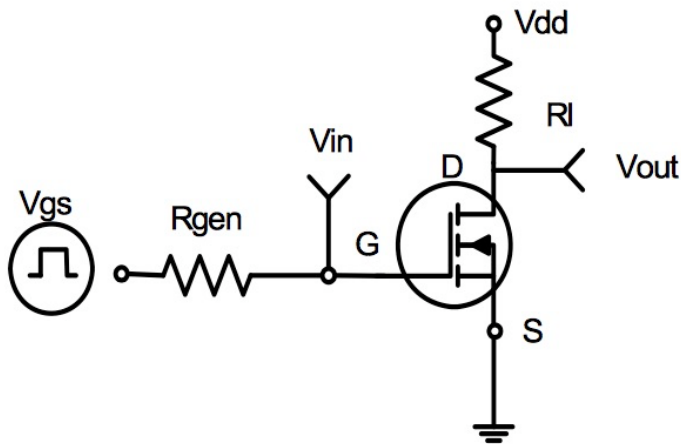


Figure 1 - Switching Test Circuit

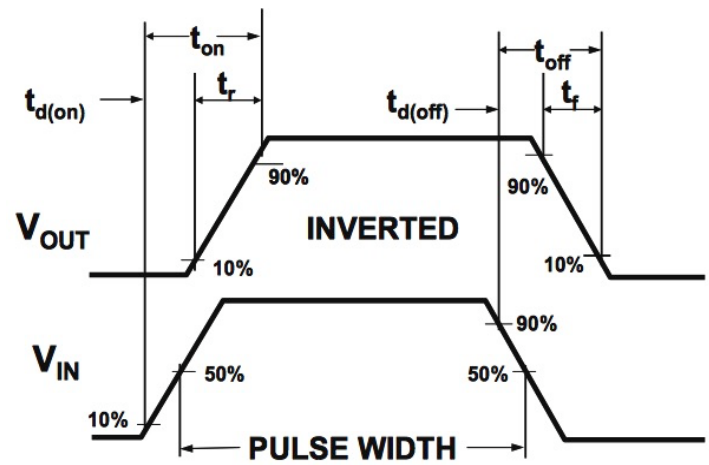


Figure 2 - Switching Waveforms

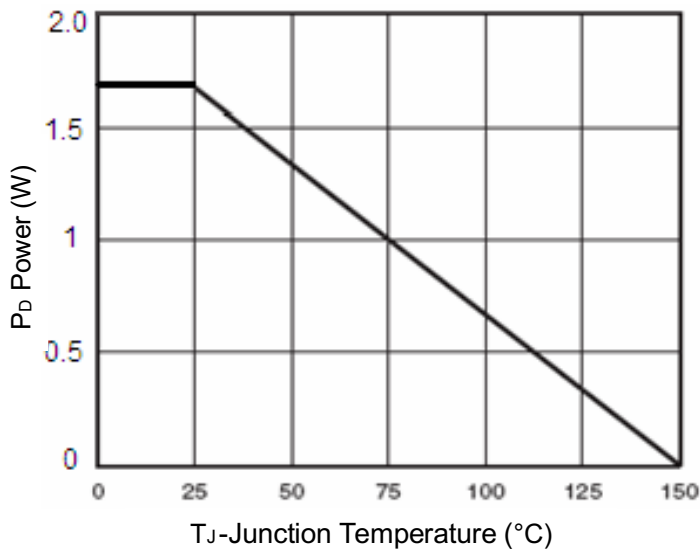


Figure 3 - Power Dissipation

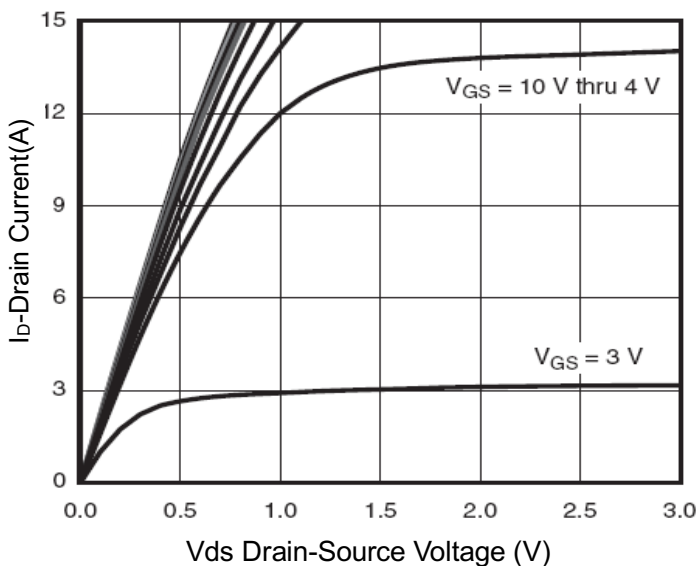
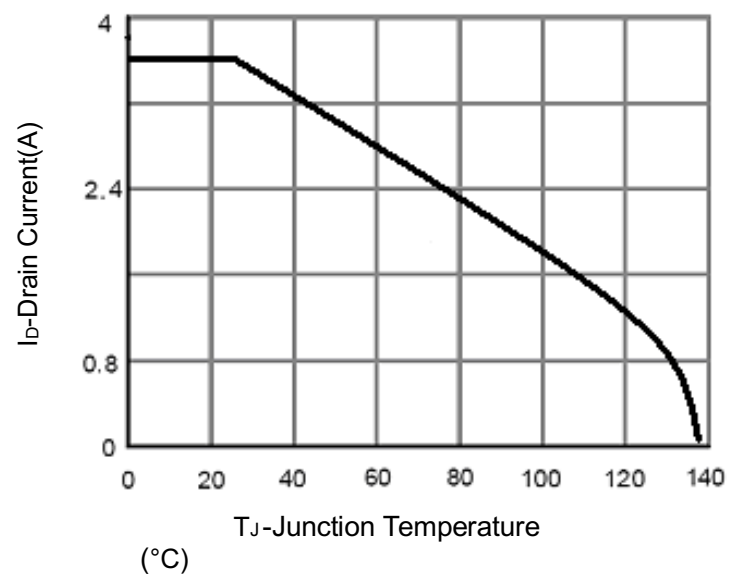


Figure 5 - Output Characteristics

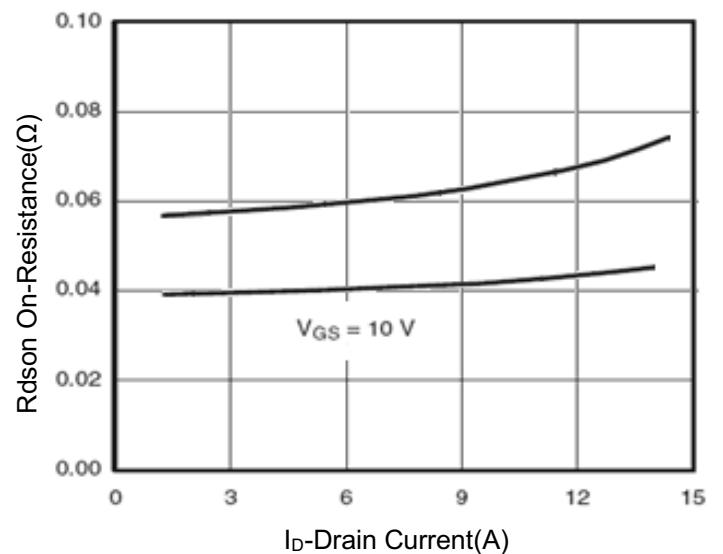


Figure 6 - Drain-Source On-Resistance

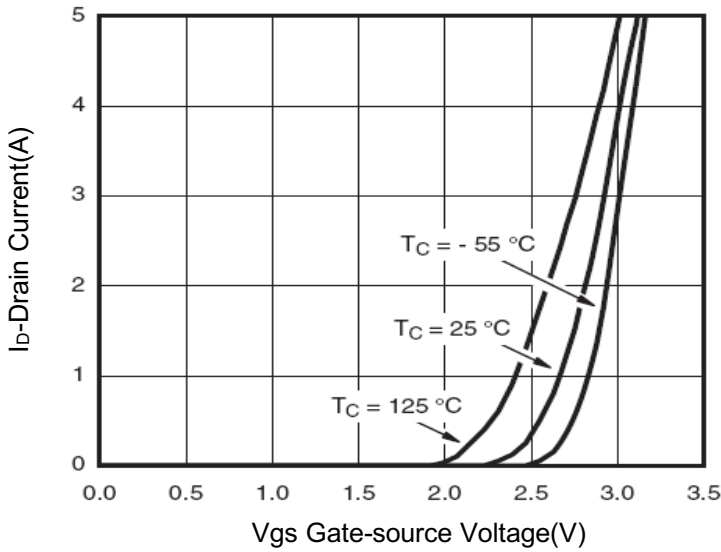


Figure 7 – Transfer Characteristics

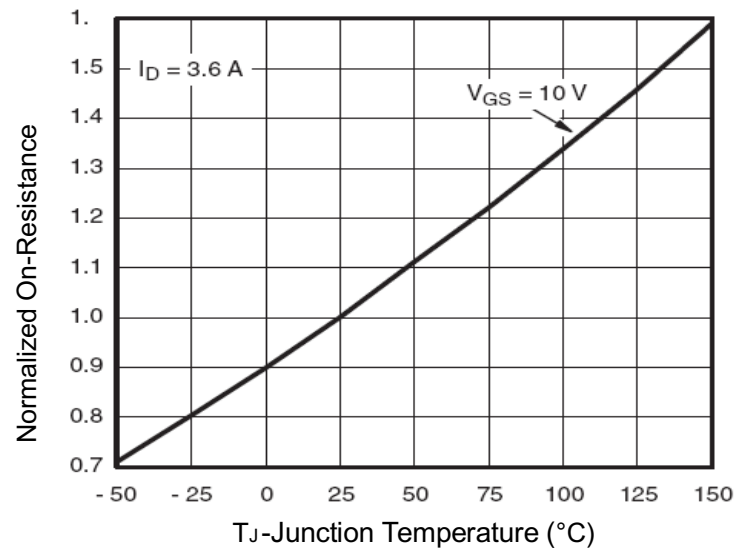


Figure 8 – Drain-Source On-Resistance

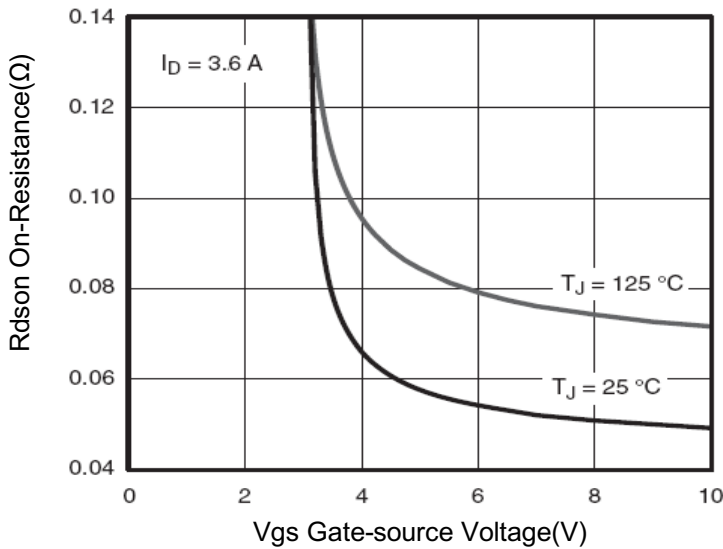


Figure 9 – Rdson vs Vgs

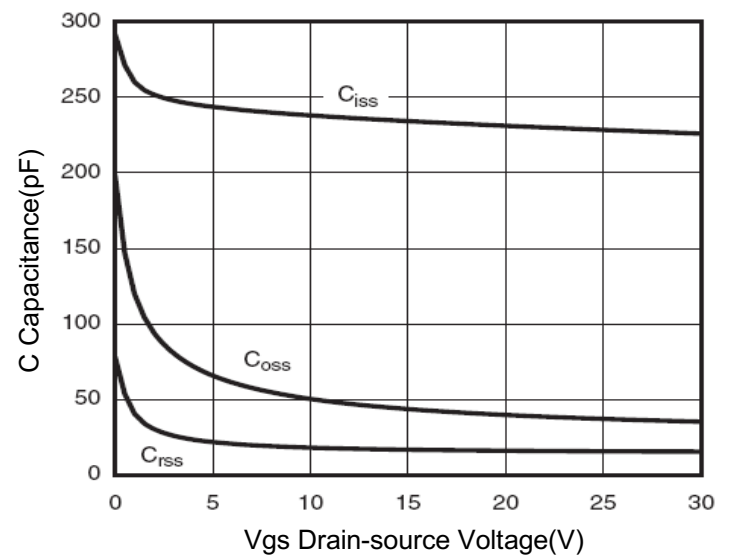


Figure 10 – Capacitance vs Vds

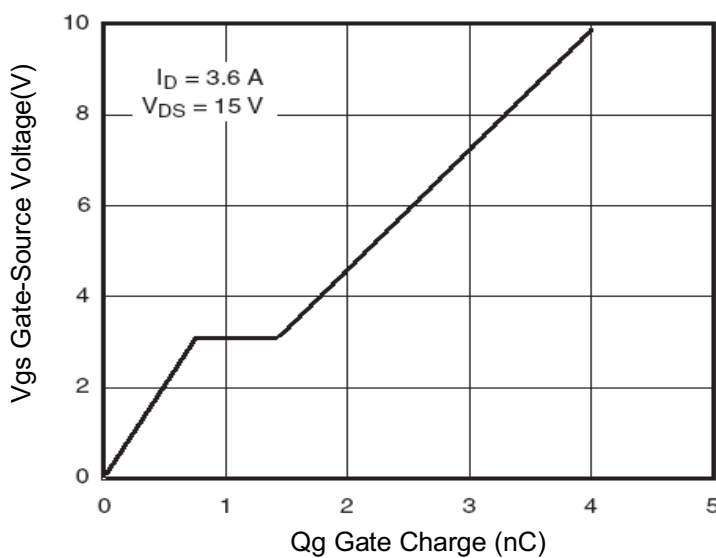


Figure 11 – Gate Charge

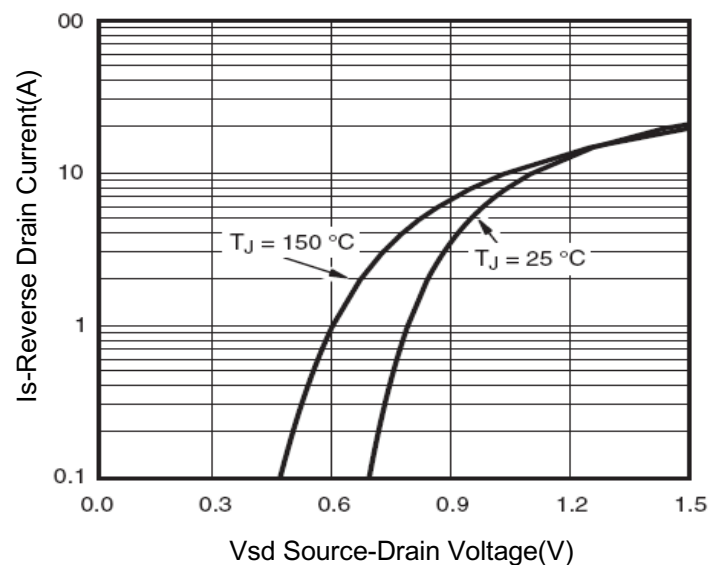


Figure 12 – Gate Charge

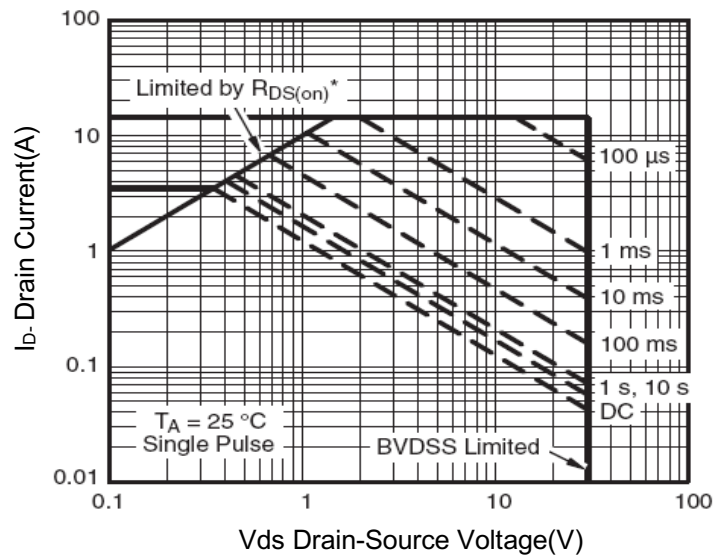


Figure 13 – Safe Operation Area

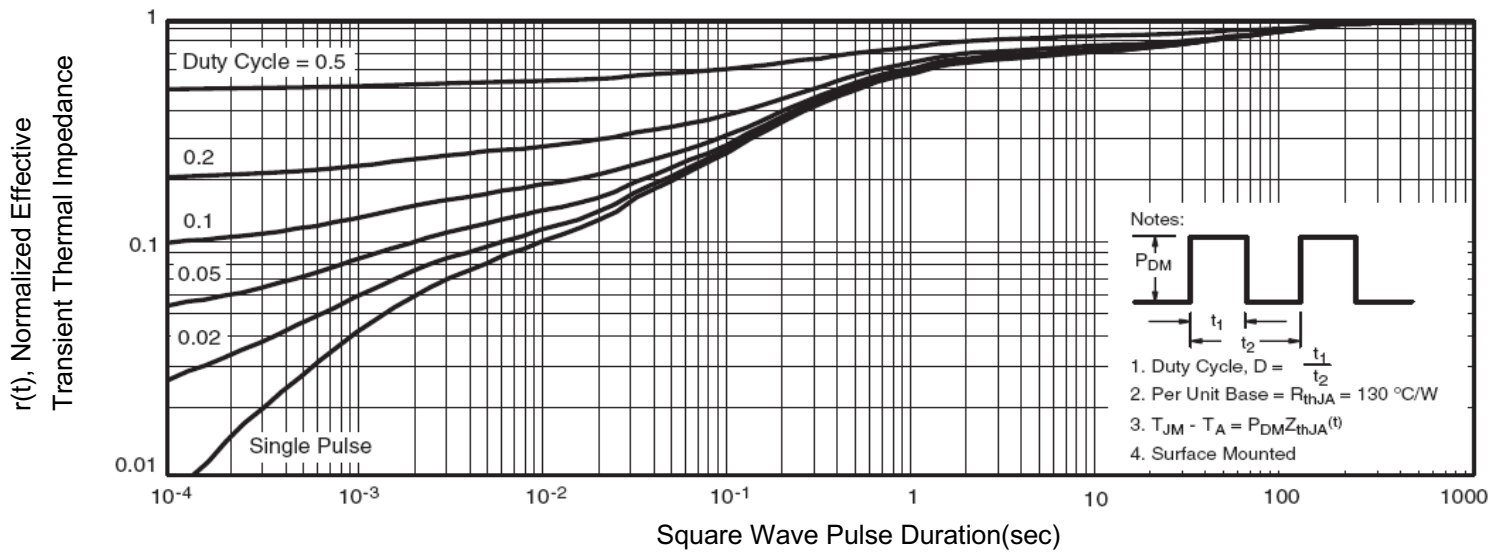
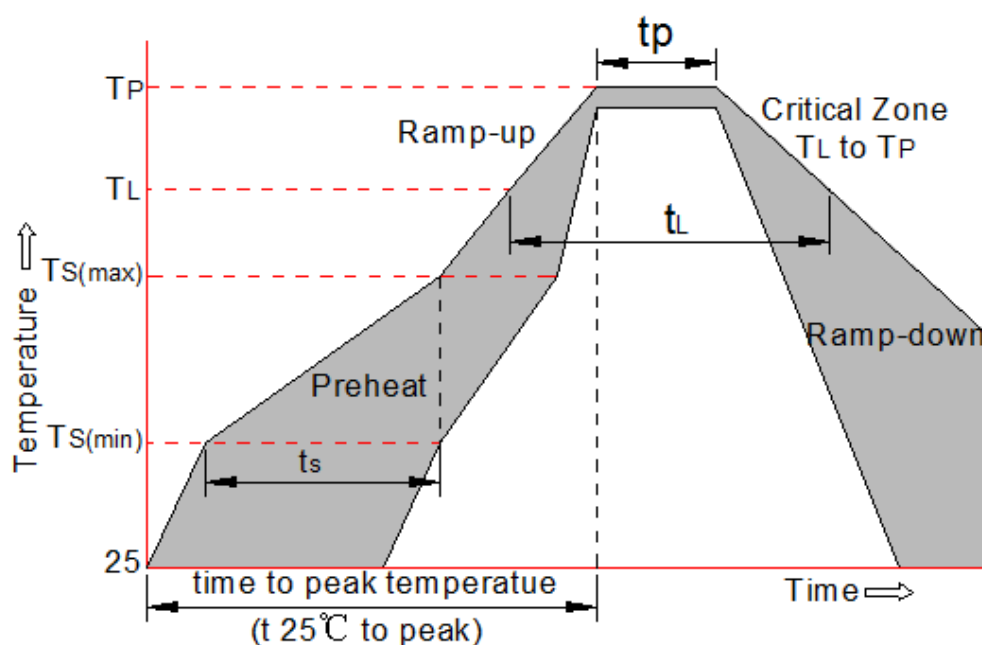


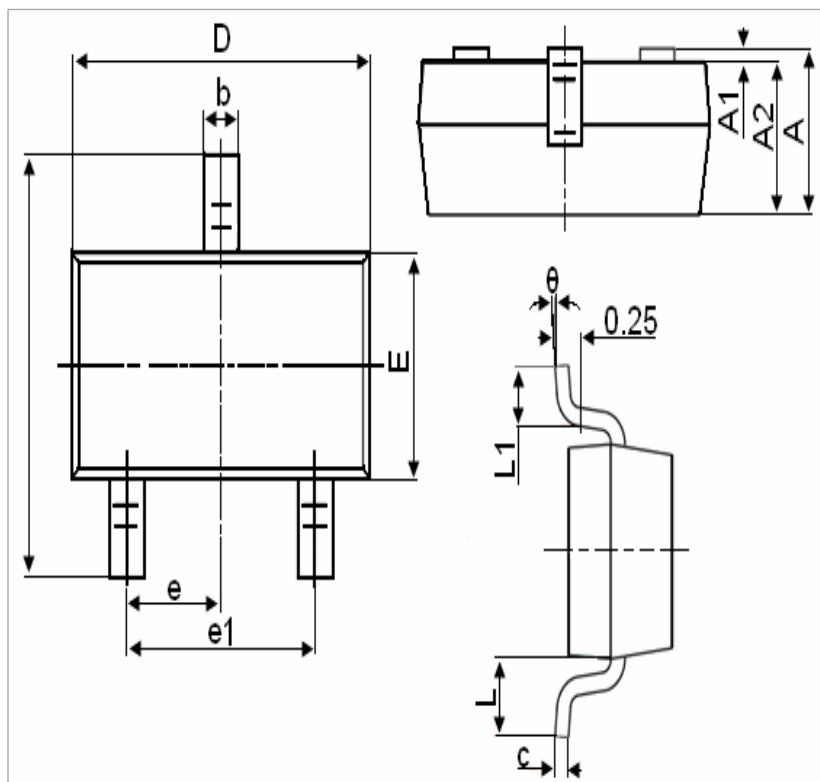
Figure 14 – Normalized Maximum Transient Thermal Impedance

Soldering parameters



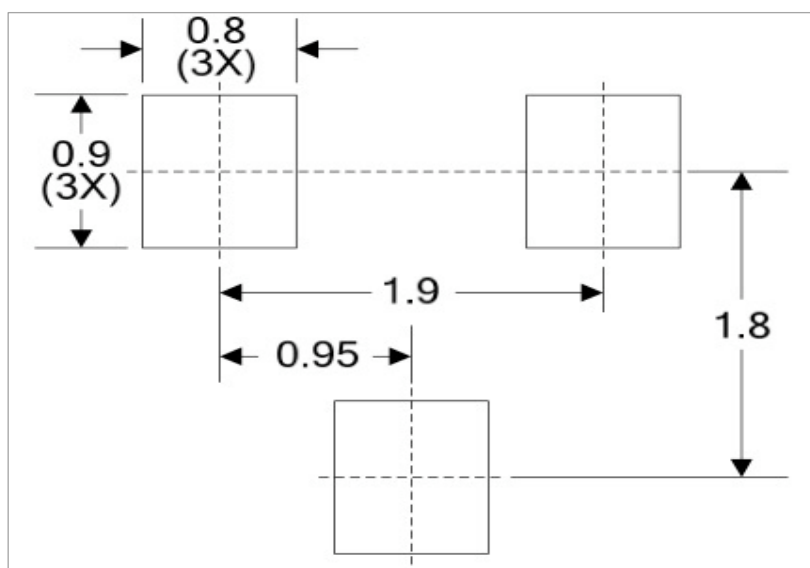
| Reflow Condition | | Pb-Free assembly |
|---|-----------------------------------|------------------|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150°C |
| | -Temperature Max($T_{s(max)}$) | +200°C |
| | -Time (Min to Max) (t_s) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp (T_L) to peak)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

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