

FEATURES

240V,0.12A, $R_{DS(ON)}=7\Omega@V_{GS}=10V$

Improved dv/dt capability

Fast switching

Green Device Available

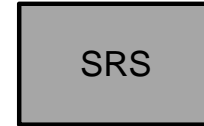
V_{DSS} 240 V
 I_D 0.12A
 $R_{DS(ON)}$ 7 Ω

APPLICATION

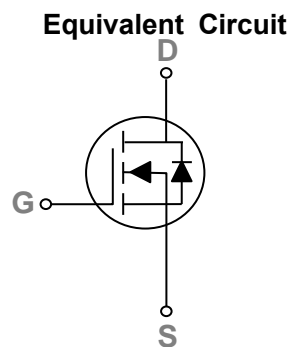
Motor Drive

Power Tools

LED Lighting



SOT23 top view



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|-----------|---|------------|---------------------|
| V_{DS} | Drain-Source Voltage | 240 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_A=25^\circ\text{C}$) | 0.12 | A |
| | Drain Current Continuous ($T = 70^\circ\text{C}$) | 0.09 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 0.4 | A |
| P_D | Power Dissipation ($T = 25^\circ\text{C}$) | 1.25 | W |
| | Power Dissipation Derate above 25°C | 0.4 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 80 | $^\circ\text{C/W}$ |

Electrical Characteristics $T_J=25^\circ\text{C}$ unless otherwise noted

Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------|--------------------------------|--|------|------|----------|---------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 240 | --- | --- | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=200V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=100V, V_{GS}=0V, T_J=75^\circ\text{C}$ | --- | --- | 10 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 10 | nA |

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|-------------------------------|-----|------|-----|----------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V, I_D=0.1A$ | --- | 7.0 | 14 | Ω |
| | | $V_{GS}=4.5V, I_D=0.1A$ | --- | 9.0 | 20 | Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 0.8 | 1.4 | 1.8 | V |
| gfs | Forward Transconductance | $V_{DS}=10V, I_D=0.08A$ | --- | 0.14 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|------------------------------------|--|-----|------|-----|----|
| Q_g | Total Gate Charge ^{2,3} | $V_{DS}=190V, V_{GS}=10V, I_D=0.1$ | --- | 0.2 | --- | nC |
| Q_{gs} | Gate-Source Charge ^{2,3} | | --- | 0.18 | --- | |
| Q_{gd} | Gate-Drain Charge ^{2,3} | | --- | 0.8 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time ^{2,3} | $V_{DD}=120V, V_{GS}=10V, R_G=6$ $I_D=0.1A$ | --- | 3.5 | --- | ns |
| T_r | Rise Time ^{2,3} | | --- | 3.2 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{2,3} | | --- | 14 | --- | |
| T_f | Fall Time ^{2,3} | | --- | 65 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$ | --- | 70 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 7.5 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 3.0 | --- | |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|---------------------------|---|------|------|------|------|
| I_S | Continuous Source Current | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | 0.12 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | 0.24 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V, I_S=0.1A, T_J=25^\circ\text{C}$ | --- | --- | 1.2 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=23A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

RATING AND CHARACTERISTIC CURVES

Figure 1. Output Characteristics

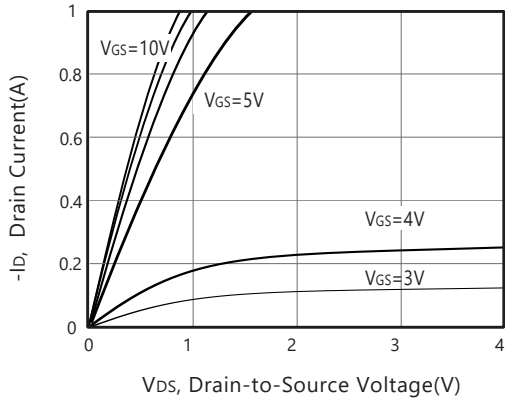


Figure 2. Body Diode Forward Voltage Variation with Source Current

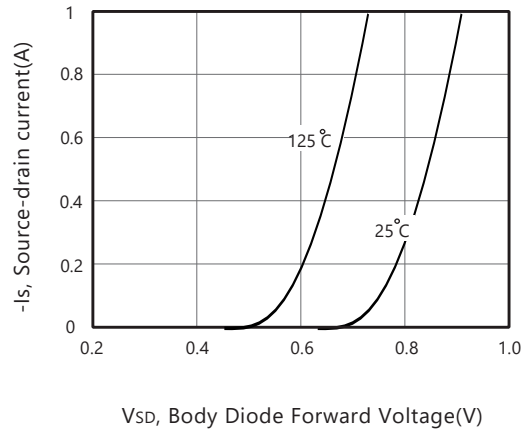


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

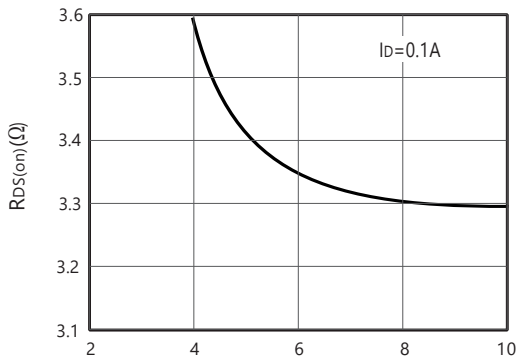


Figure 4. On-Resistance Variation with Drain Current and Temperature

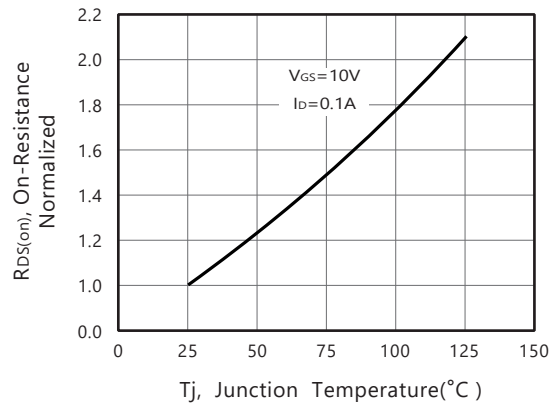


Figure 5. Gate Threshold Variation with Temperature

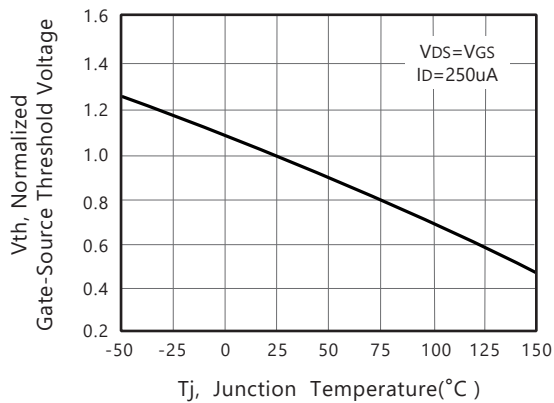
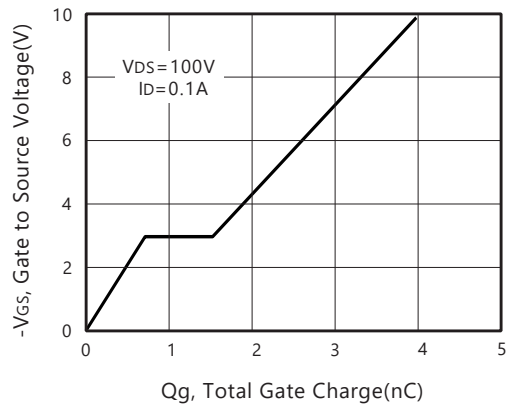


Figure 6. Gate Charge



RATING AND CHARACTERISTIC CURVES

Figure 7. Capacitance

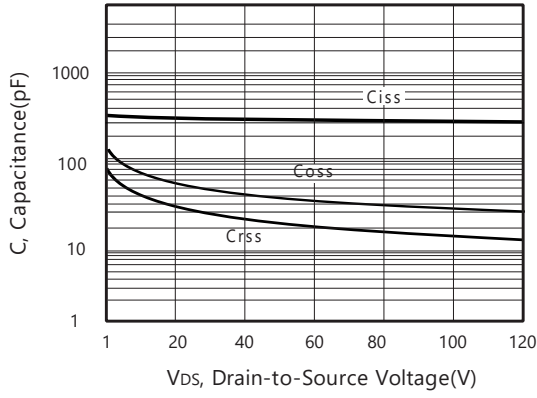


Figure 8. Maximum Safe Operating Area

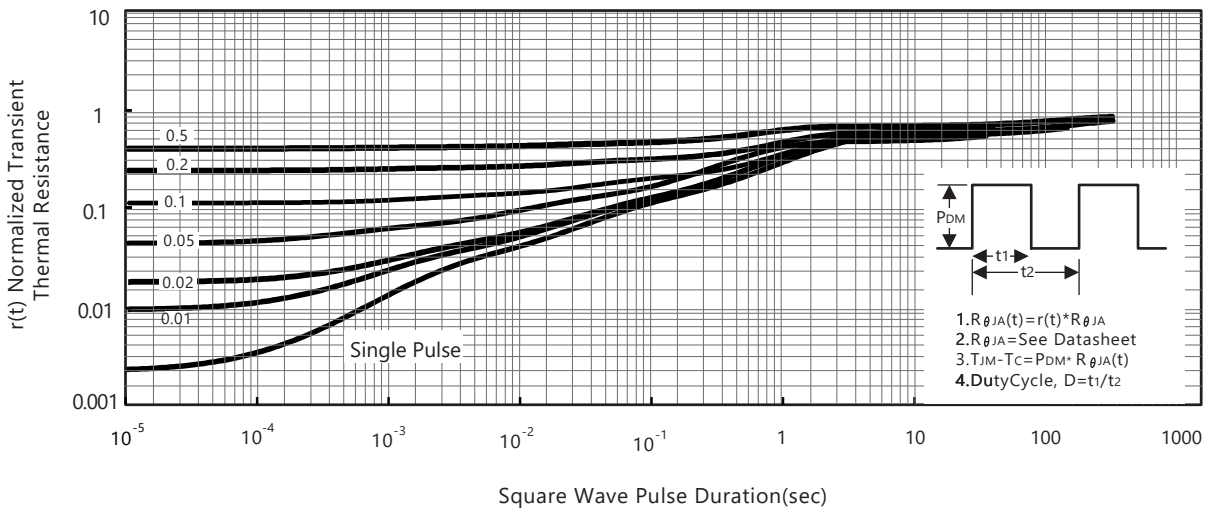
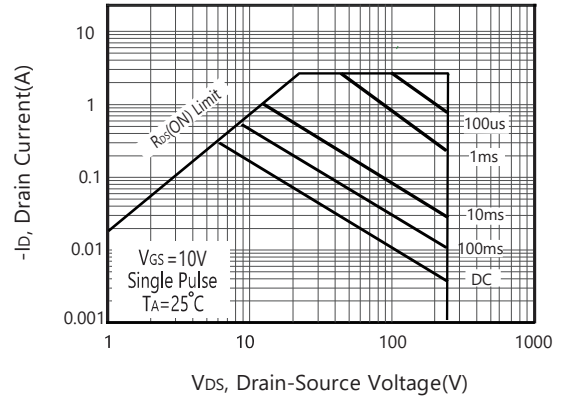


Figure 9. Normalized Thermal Transient Impedance Curve

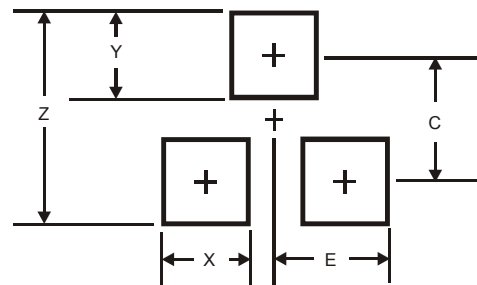
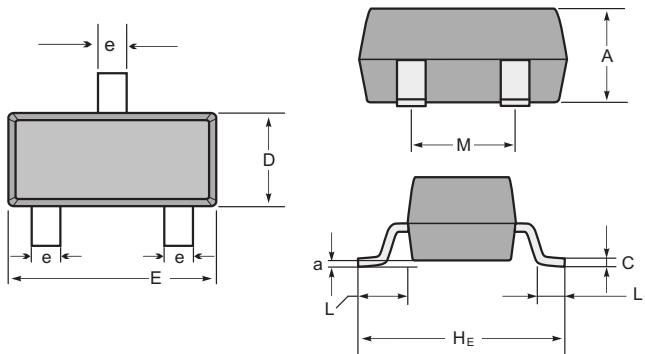
Soldering parameters

| Reflow Condition | | Pb-Free assembly (see as below) |
|---|------------------------------------|------------------------------------|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150 °C |
| | -Temperature Max ($T_{s(max)}$) | +200 °C |
| | -Time (Min to Max) (ts) | 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 Dimensions & Suggested Pad Layout

SOT23



SOT-23 mechanical data

| UNIT | A | C | D | E | H_E | e | M | L | L_1 | a | |
|------|-----|-----|------|-----|-------|-----|-----|------|------------|------------|------|
| mm | max | 1.1 | 0.15 | 1.4 | 3.0 | 2.6 | 0.5 | 1.95 | 0.55 (ref) | 0.36 (ref) | 0.0 |
| | min | 0.9 | 0.08 | 1.2 | 2.8 | 2.2 | 0.3 | 1.7 | | | 0.15 |
| mil | max | 43 | 6 | 55 | 118 | 102 | 20 | 77 | 22 (ref) | 14 (ref) | 0.0 |
| | min | 35 | 3 | 47 | 110 | 87 | 12 | 67 | | | 6 |

| Dimensions | SOT23 |
|------------|-------|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

Tape & reel specification

| Tape | | Symbol | Dimension (mm) |
|-------------------|-----------|--------|----------------|
| | | P0 | 4.00±0.10 |
| | | P1 | 4.00±0.10 |
| | | P2 | 2.00±0.10 |
| | | D0 | 1.55±0.10 |
| | | D1 | 1.05±0.10 |
| | | E | 1.55±0.10 |
| | | F | 3.60±0.10 |
| | | W | 8.00±0.10 |
| | | A0 | 3.80±0.20 |
| | | B0 | 3.25±0.20 |
| | | K0 | 1.45±0.10 |
| | | T | 0.25±0.05 |
| | | D2 | 178.0±3.0 |
| | | D3 | 55Min. |
| | | D4 | R24.0±3.0 |
| G | R82.0±3.0 | | |
| I | 13.0±2.0 | | |
| W1 | 11.0±3.0 | | |
| Quantity: 3000PCS | | | |

7" Reel

