

N-Channel 30-V (D-S) MOSFET

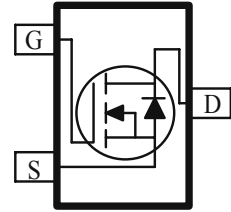
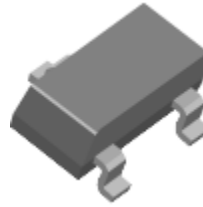
These miniature surface mount MOSFETs utilize a high cell density trench process to provide low $r_{DS(on)}$ and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low $r_{DS(on)}$ provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SOT-23 saves board space
- Fast switching speed
- High performance trench technology

| PRODUCT SUMMARY | | |
|-----------------|----------------------------|-----------|
| V_{DS} (V) | $r_{DS(on)}$ m(Ω) | I_D (A) |
| 30 | 32 @ $V_{GS} = 10V$ | 5.2 |
| | 44 @ $V_{GS} = 4.5V$ | 4.5 |



ESD Protected
2000V



| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ UNLESS OTHERWISE NOTED) | | | | |
|---|--------------------|----------------|------------|------------|
| Parameter | | Symbol | Limit | Units |
| Drain-Source Voltage | | V_{DS} | 30 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | |
| Continuous Drain Current ^a | $T_A = 25^\circ C$ | I_D | 5.2 | A |
| | $T_A = 70^\circ C$ | | 4.1 | |
| Pulsed Drain Current ^b | | I_{DM} | 30 | |
| Continuous Source Current (Diode Conduction) ^a | | I_S | 1.6 | A |
| Power Dissipation ^a | $T_A = 25^\circ C$ | P_D | 1.3 | W |
| | $T_A = 70^\circ C$ | | 0.8 | |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to 150 | $^\circ C$ |

| THERMAL RESISTANCE RATINGS | | | | |
|--|--------------|-----------------|---------|--------------|
| Parameter | | Symbol | Maximum | Units |
| Maximum Junction-to-Ambient ^a | t <= 5 sec | $R_{\theta JA}$ | 100 | $^\circ C/W$ |
| | Steady-State | | 166 | $^\circ C/W$ |

Notes

- a. Surface Mounted on 1" x 1" FR4 Board.
- b. Pulse width limited by maximum junction temperature

| Parameter | Symbol | Test Conditions | Limits | | | Unit |
|---|--------------|--|--------|-----|------|------|
| | | | Min | Typ | Max | |
| Static | | | | | | |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu A$ | 1 | | | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0 V, V_{GS} = 8 V$ | | | ±100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 24 V, V_{GS} = 0 V$ | | | 1 | μA |
| | | $V_{DS} = 24 V, V_{GS} = 0 V, T_J = 55^\circ C$ | | | 25 | |
| On-State Drain Current ^A | $I_{D(on)}$ | $V_{DS} = 5 V, V_{GS} = 10 V$ | 20 | | | A |
| Drain-Source On-Resistance ^A | $r_{DS(on)}$ | $V_{GS} = 10 V, I_D = 5.2 A$ | | | 32 | mΩ |
| | | $V_{GS} = 4.5 V, I_D = 4.5 A$ | | | 44 | |
| Forward Transconductance ^A | g_{fs} | $V_{DS} = 15 V, I_D = 5.2 A$ | | 40 | | S |
| Diode Forward Voltage | V_{SD} | $I_S = 2.3 A, V_{GS} = 0 V$ | | 0.7 | | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 15 V, V_{GS} = 4.5 V,$ $I_D = 5.2 A$ | | 4.0 | | nC |
| Gate-Source Charge | Q_{gs} | | | 1.1 | | |
| Gate-Drain Charge | Q_{gd} | | | 1.4 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 25 V, R_L = 25 \Omega, I_D = 1 A,$ $V_{GEN} = 10 V$ | | 16 | | nS |
| Rise Time | t_r | | | 5 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 23 | | |
| Fall-Time | t_f | | | 3 | | |

Notes

- Pulse test: $PW \leq 300 \mu s$ duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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Typical Electrical Characteristics (N-Channel)

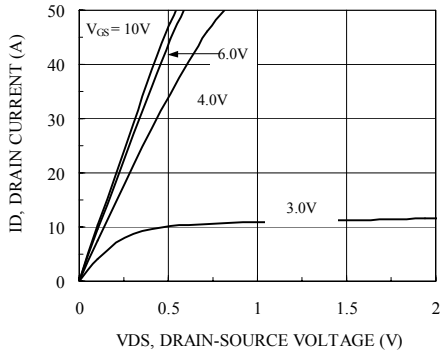


Figure 1. On-Region Characteristics

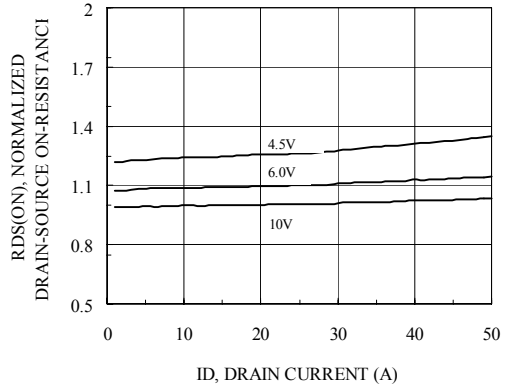


Figure 2. On-Resistance with Drain Current

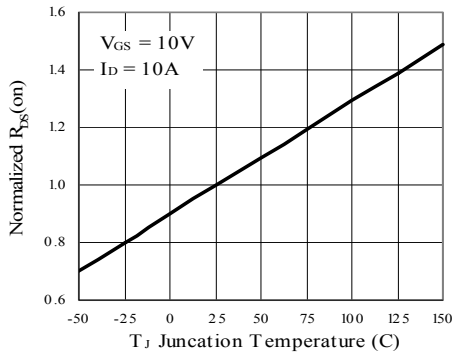


Figure 3. On-Resistance Variation with Temperature

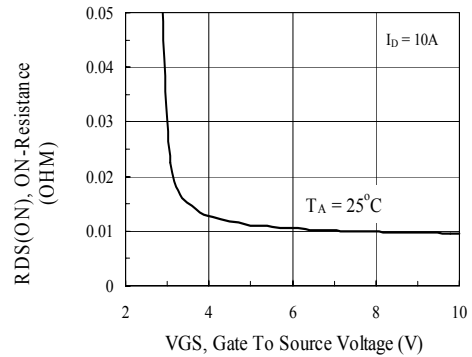


Figure 4. On-Resistance Variation with Gate to Source Voltage

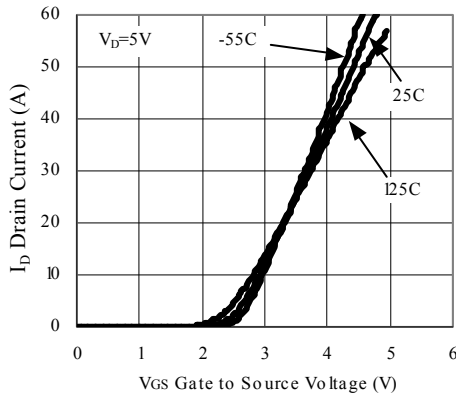


Figure 5. Transfer Characteristics

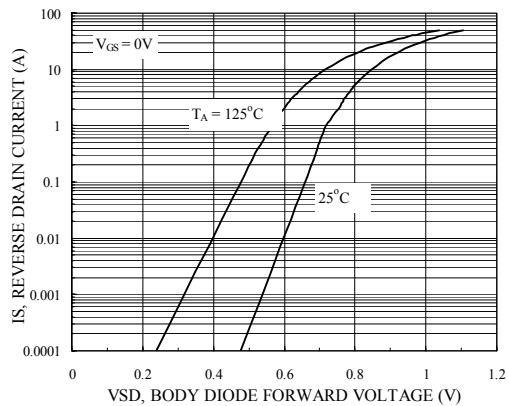


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Electrical Characteristics (N-Channel)

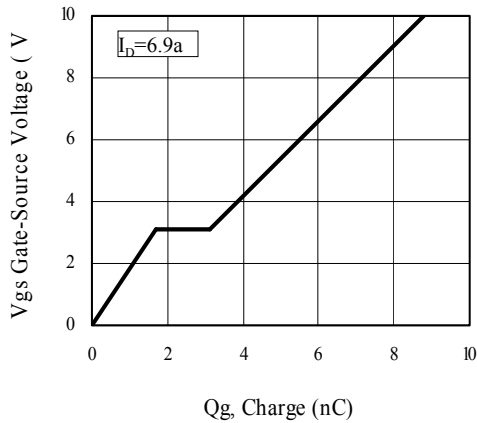


Figure 7. Gate Charge Characteristics

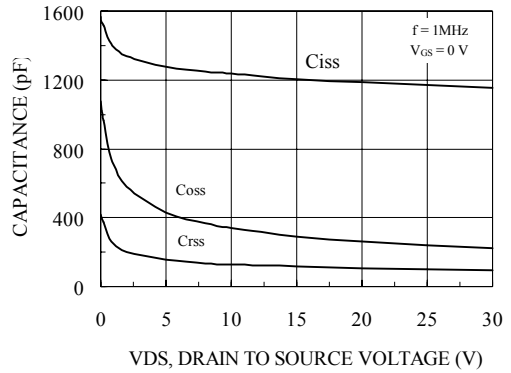


Figure 8. Capacitance Characteristics

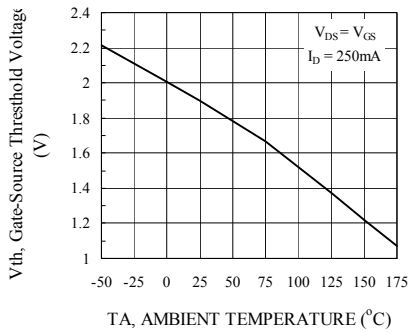


Figure 9. Threshold Vs Ambient Temperature

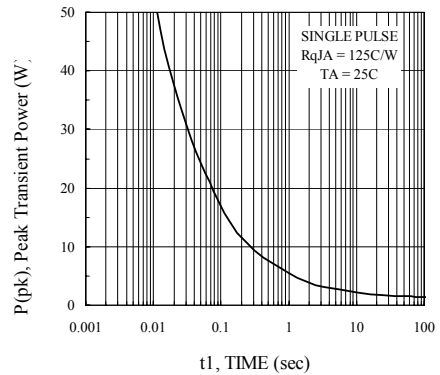


Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

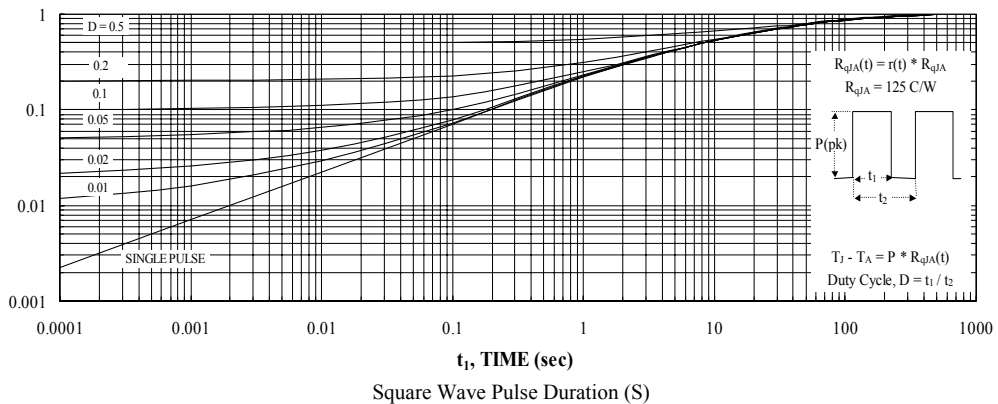
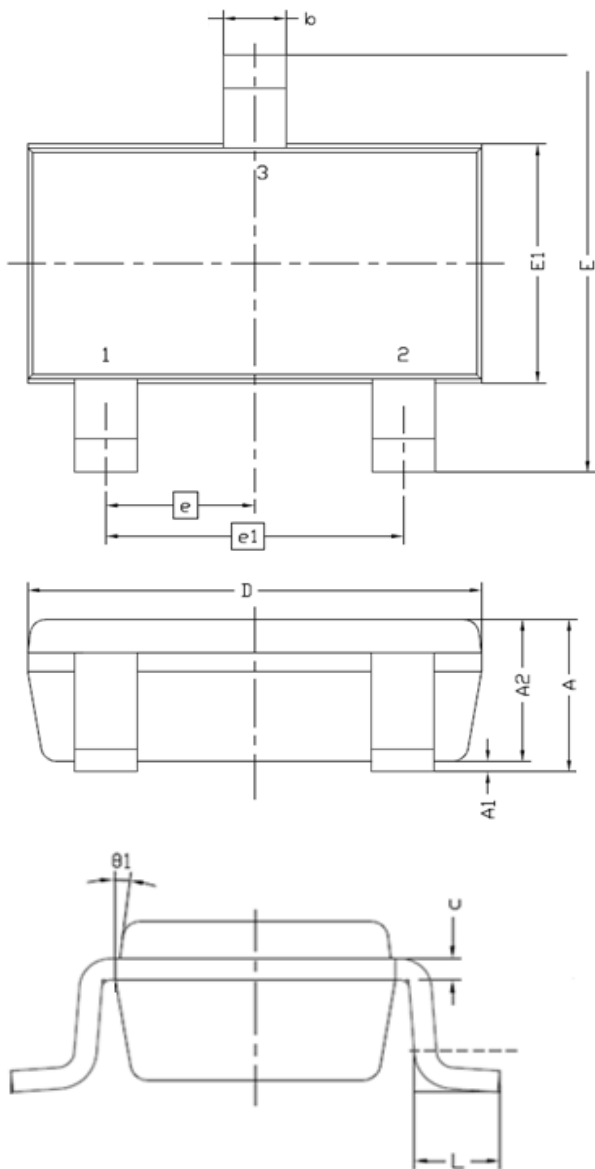


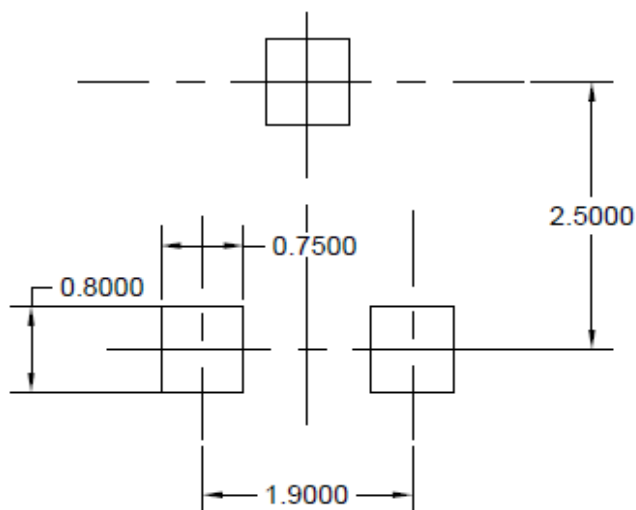
Figure 11. Transient Thermal Response Curve

Package Information



| Symbol | MILLIMETERS | |
|-----------|-------------|-----|
| | MIN | MAX |
| A | 0.8 | 1.2 |
| A1 | 0 | 0.1 |
| A2 | 0.7 | 1.1 |
| b | 0.3 | 0.5 |
| c | 0.1 | 0.2 |
| D | 2.7 | 3.1 |
| E | 2.6 | 3 |
| E1 | 1.4 | 1.8 |
| e | 0.95 BSC | |
| e1 | 1.9 BSC | |
| L | 0.3 | 0.6 |
| $\theta1$ | 7° NOM | |

Recommended Pad Layout



Note: Drain opening is recommended to be solder mask defined in a copper fill for improved thermal performance

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