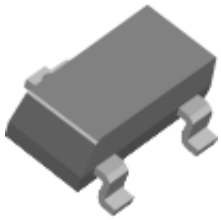
# P - Channel Logic Level MOSFET

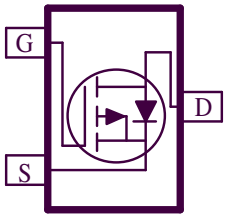
These miniature surface mount MOSFETs utilize a high cell density trench process to provide low $r_{DS(on)}$ and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA 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) | $r_{DS(on)}$ (Ω) | $I_D$ (A) |
| -30 | 0.30 @ $V_{GS}$ = -10 V | -1.0 |
| | 0.50 @ $V_{GS}$ = -4.5V | -0.9 |

Pb-free
RoHS COMPLIANT
HALOGEN FREE






| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C UNLESS OTHERWISE NOTED) | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Maximum** | **Units** |
| Drain-Source Voltage | | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current[a] | $T_A$=25°C | $I_D$ | ±0.9 | A |
| | $T_A$=70°C | | ±0.75 | |
| Pulsed Drain Current[b] | | $I_{DM}$ | ±10 | |
| Continuous Source Current (Diode Conduction)[a] | | $I_S$ | 0.4 | A |
| Power Dissipation[a] | $T_A$=25°C | $P_D$ | 0.5 | W |
| | $T_A$=70°C | | 0.42 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to 150 | °C |

| THERMAL RESISTANCE RATINGS | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Maximum** | **Units** |
| Maximum Junction-to-Ambient[a] | t <= 5 sec | $R_{THJA}$ | 250 | °C/W |
| | Steady-State | | 285 | |

Notes

a. Surface Mounted on 1" x 1" FR4 Board.

b. Pulse width limited by maximum junction temperature

## SPECIFICATIONS ($T_A$ = 25°C UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Test Conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| **Switch Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = -250 uA | -30 | | | |
| 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°C | | | -10 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | ±100 | nA |
| **Switch On Characteristics** | | | | | | |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = -250 uA | -0.80 | -1.7 | -2.6 | V |
| On-State Drain Current[A] | $I_{D(on)}$ | $V_{DS}$ = -5 V, $V_{GS}$ = -4.5 V | -2 | | | A |
| Drain-Source On-Resistance[A] | $r_{DS(on)}$ | $V_{GS}$ = -10 V, $I_D$ = -1.0 A | | 0.25 | 0.30 | Ω |
| | | $V_{GS}$ = -4.5 V, $I_D$ = -0.9 A $T_J$ = 55°C | | 0.53 | 0.66 | |
| | | $V_{GS}$ = -4.5 V, $I_D$ = -0.9 A | | 0.45 | 0.50 | |
| Forward Tranconductance[A] | $g_{fs}$ | $V_{DS}$ = -5 V, $I_D$ = -1.1 A | | 2 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = -0.4 A, $V_{GS}$ = 0 V | | -0.70 | -1.2 | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = -10 V, $V_{GS}$ = -5 V, $I_D$ = -0.9 A | | 2.0 | 3.0 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 0.5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.1 | | |
| **Switching** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$ = -10 V, $I_D$ = -0.9 A, $R_G$ = 50 Ω, $V_{GEN}$ = -10 V | | 8 | 16 | ns |
| Rise Time | $t_r$ | | | 16 | 32 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 36 | 93 | |
| Fall-Time | $t_f$ | | | 33 | 94 | |

Notes

a. Pulse test: PW <= 300us duty cycle <= 2%.

b. Guaranteed by design, not subject to production testing.

# Typical Electrical Characteristics

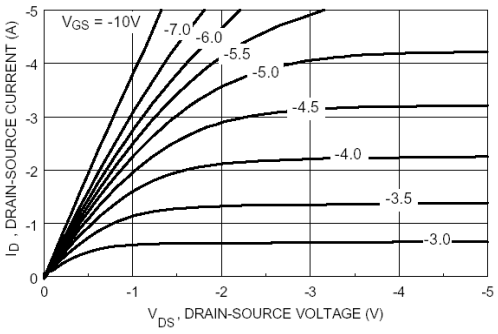



**Figure 1. On-Region Characteristics**

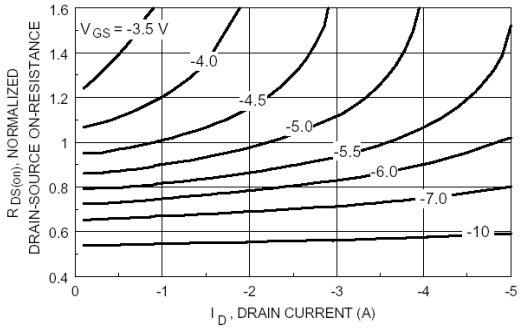



**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage**

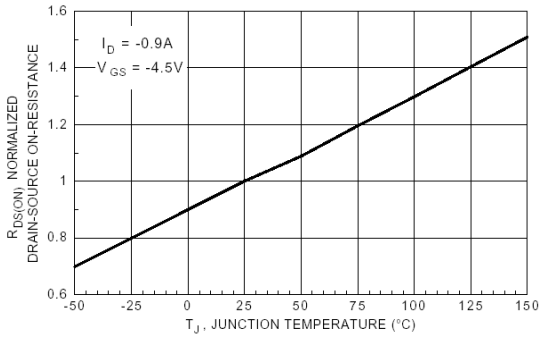



**Figure 3. On-Resistance Variation with Temperature**

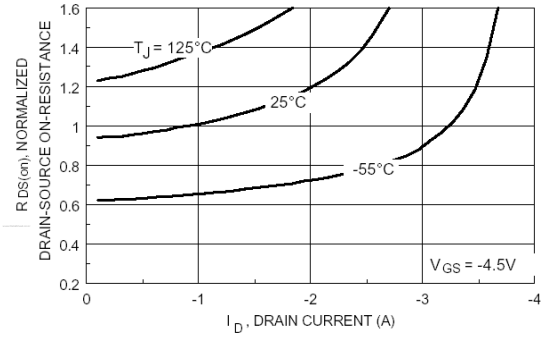



**Figure 4. On-Resistance Variation with Gate to Source Voltage**

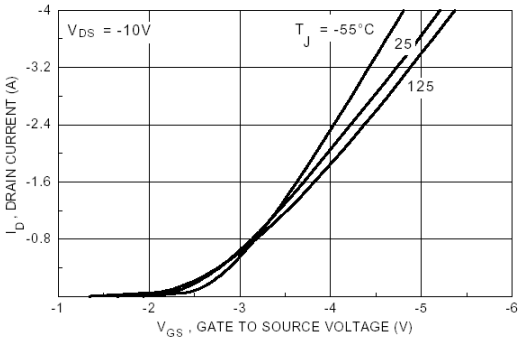



**Figure 5. Transfer Characteristics**

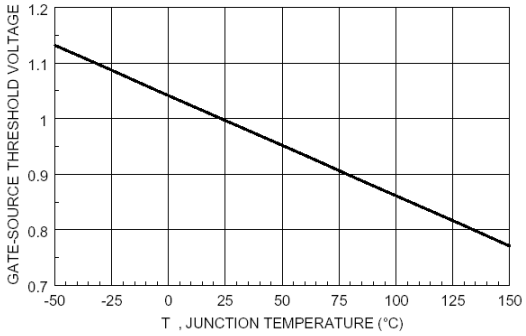



**Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature**

# Typical Electrical Characteristics

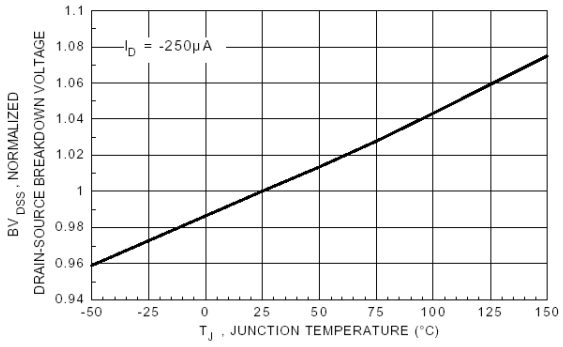



**Figure 7. Breakdown Voltage With Temperature**

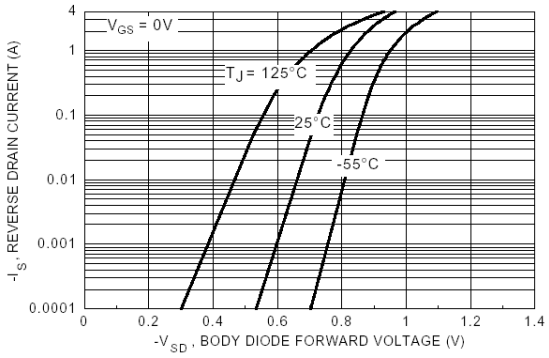



**Figure 8. Body Diode Forward Voltage With Source Current & Temperature**

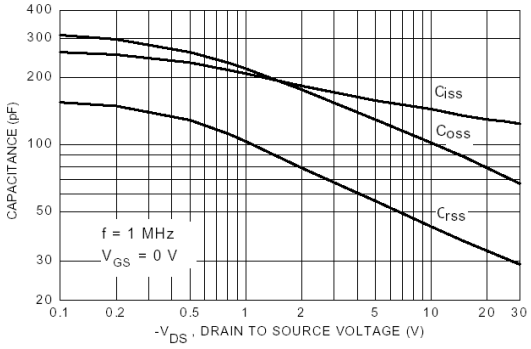



**Figure 9. Capacitance Characteristic**

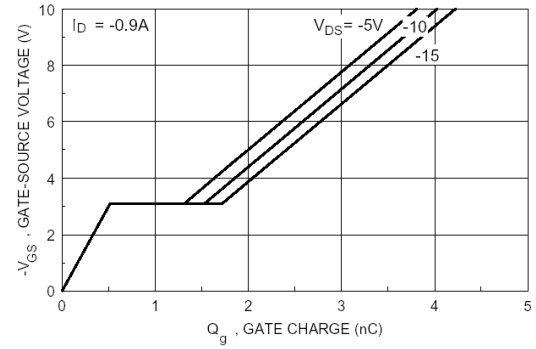



**Figure 10. Gate Charge Characteristic**

**Normalized Thermal Transient Impedance, Junction to Ambient**

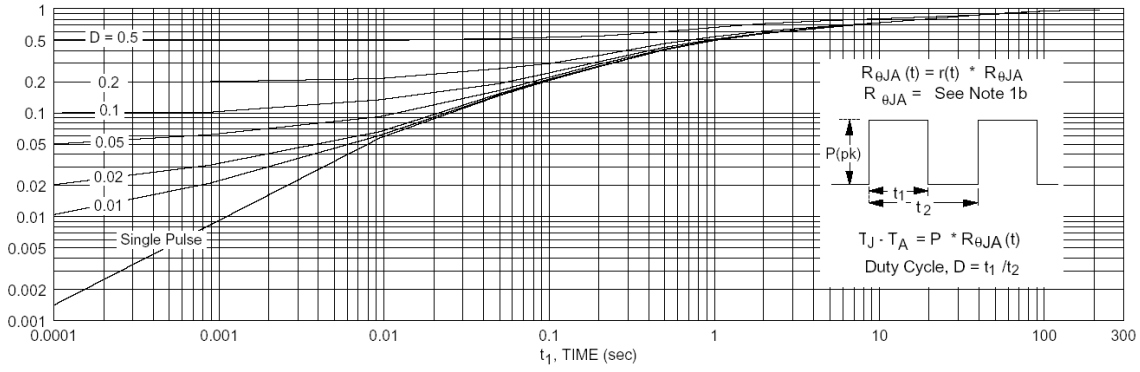



**Figure 11. Transient Thermal Response Curve**

# Typical Electrical Characteristics

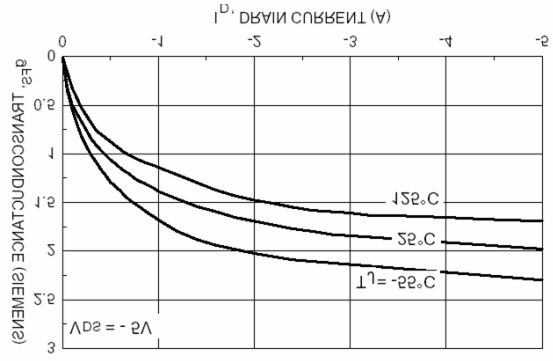


**Figure 13. Transconductance Variation With Current & Temperature**

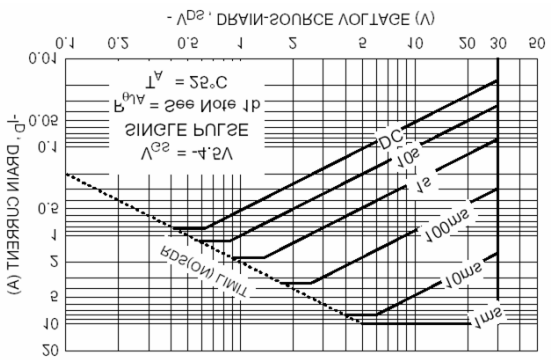


**Figure 14. Maximum Safe Operation Area**

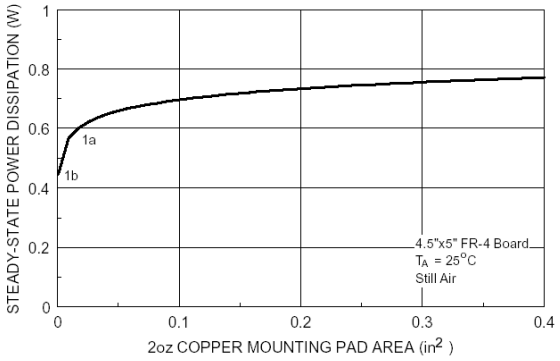



**Figure 15. SOT-3 Maximum Steady-State Variation Power Dissipation versus Copper Pad Area**

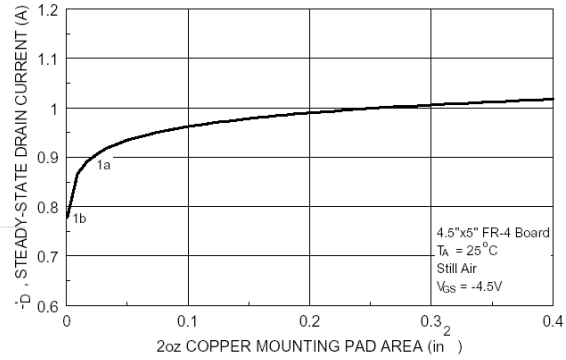
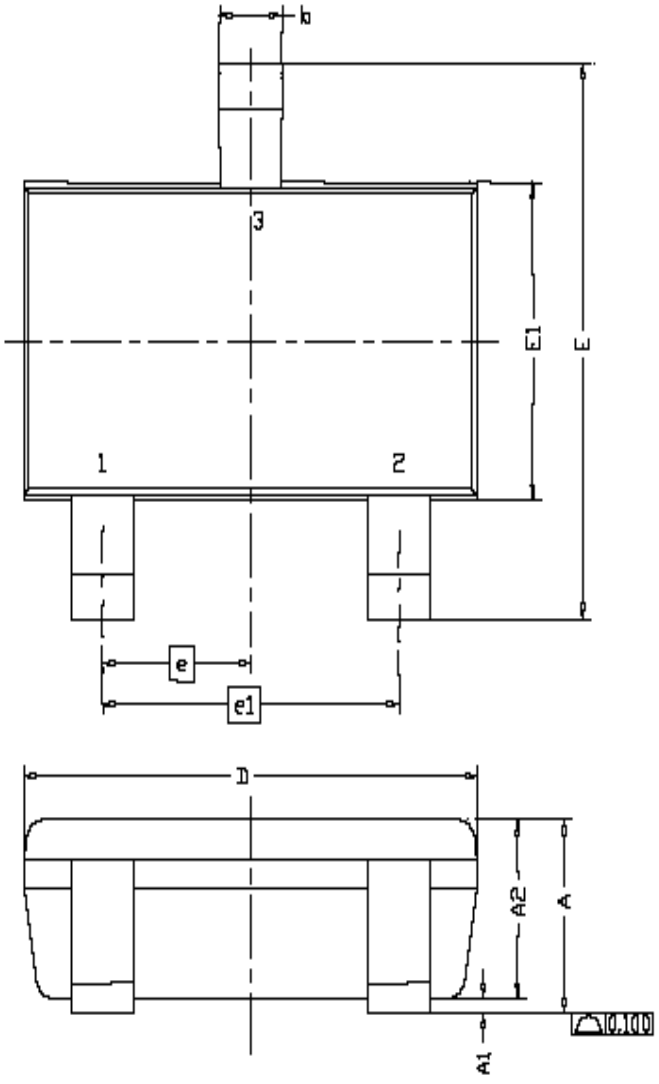



**Figure 16. Maximum State-State Drain Current Versus Copper Pad Area**

# Package Information




| DIM. | MILLIMETERS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 0.935 | 0.95 | 1.10 |
| A1 | 0.01 | --- | 0.10 |
| A2 | 0.85 | 0.90 | 0.925 |
| b | 0.30 | 0.40 | 0.50 |
| c | 0.10 | 0.15 | 0.25 |
| D | 2.70 | 2.90 | 3.10 |
| E | 2.60 | 2.80 | 3.00 |
| E1 | 1.40 | 1.60 | 1.80 |
| e | 0.95 BSC | | |
| e1 | 1.90 BSC | | |
| L | 0.30 | 0.40 | 0.60 |
| L1 | 0.60REF | | |
| L2 | 0.25BSC | | |
| R | 0.10 | --- | --- |
| θ | 0° | 4° | 8° |
| θ1 | 7°NOM | | |