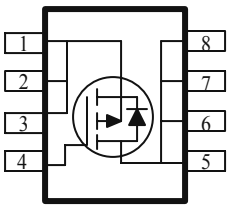
# P-Channel 30-V (D-S) MOSFET

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.

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ m(Ω) | $I_D$ (A) |
| -30 | 13 @ $V_{GS}$ = -10V | -11.5 |
| | 19 @ $V_{GS}$ = -4.5V | -9.3 |

- Low $r_{DS(on)}$ provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SOIC-8 saves board space
- Fast switching speed
- High performance trench technology




| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C UNLESS OTHERWISE NOTED) | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Maximum** | **Units** |
| Drain-Source Voltage | | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±25 | |
| Continuous Drain Current[a] | $T_A$=25°C | $I_D$ | -11.5 | A |
| | $T_A$=70°C | | -9.3 | |
| Pulsed Drain Current[b] | | $I_{DM}$ | ±50 | |
| Continuous Source Current (Diode Conduction)[a] | | $I_S$ | -2.1 | A |
| Power Dissipation[a] | $T_A$=25°C | $P_D$ | 3.1 | W |
| | $T_A$=70°C | | 2.3 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to 150 | °C |

| THERMAL RESISTANCE RATINGS | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Maximum** | **Units** |
| Maximum Junction-to-Case[a] | t <= 5 sec | $R_{\theta JC}$ | 25 | °C/W |
| Maximum Junction-to-Ambient[a] | t <= 5 sec | $R_{\theta JA}$ | 50 | °C/W |

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** | |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = -250 uA | -30 | | | V |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = -250 uA | -1 | | | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±25 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = -24 V, $V_{GS}$ = 0 V | | | -1 | uA |
| | | $V_{DS}$ = -24 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | -5 | |
| On-State Drain Current[A] | $I_{D(on)}$ | $V_{DS}$ = -5 V, $V_{GS}$ = -10 V | -50 | | | A |
| Drain-Source On-Resistance[A] | $r_{DS(on)}$ | $V_{GS}$ = -10 V, $I_D$ = -11.5 A | | | 13 | mΩ |
| | | $V_{GS}$ = -4.5 V, $I_D$ = -9.3 A | | | 19.0 | |
| Forward Tranconductance[A] | $g_{fs}$ | $V_{DS}$ = -15 V, $I_D$ = -11.5 A | | 29 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = 2.5 A, $V_{GS}$ = 0 V | | -0.8 | | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = -15 V, $V_{GS}$ = -5 V, $I_D$ = -11.5 A | | 25 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 11 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 17 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-15V, $V_{GS}$=0V, f=1MHz | | 2300 | | pF |
| Output Capacitance | $C_{oss}$ | | | 600 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 300 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = -15 V, $R_L$ = 6 Ω , $I_D$ = -1 A, VGEN = -10 V | | 15 | | nS |
| Rise Time | $t_r$ | | | 13 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 100 | | |
| Fall-Time | $t_f$ | | | 54 | | |

Notes

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

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

# Typical Electrical Characteristics (P-Channel)

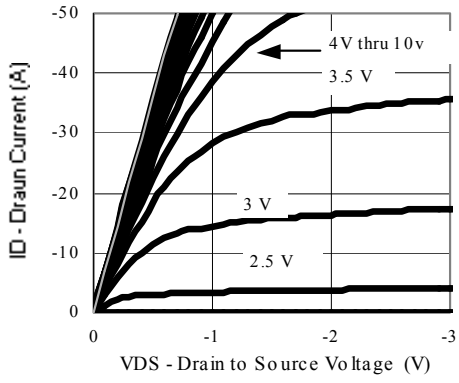



**Figure 1. On-Region Characteristics**

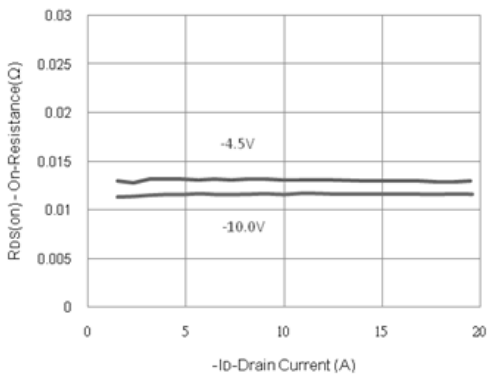



**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage**

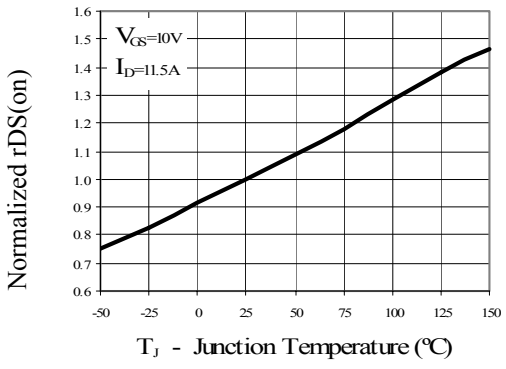



**Figure 3. On-Resistance Variation with Temperature**

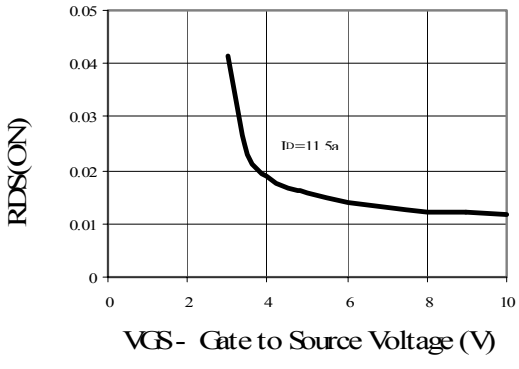



**Figure 4. On-Resistance with Gate to Source Voltage**

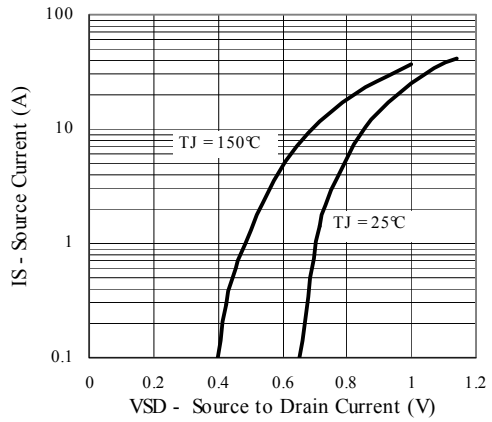



**Figure 5. Transfer Characteristics**

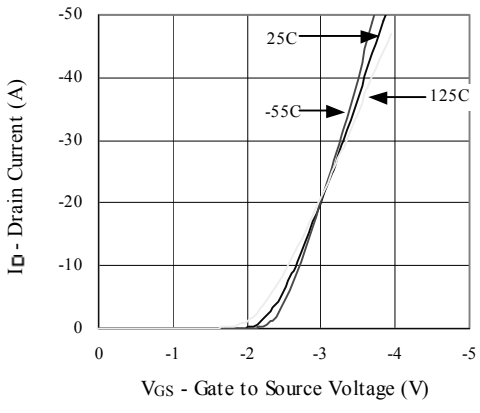



**Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature**

# Typical Electrical Characteristics (P-Channel)

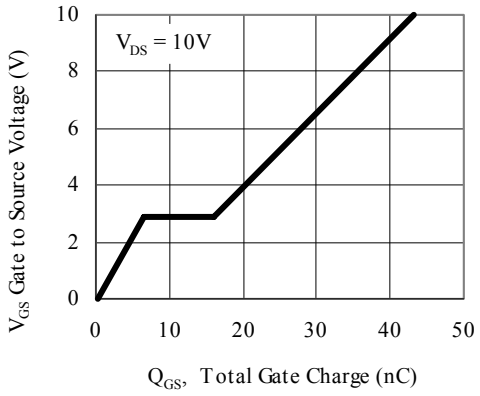



**Figure 7. Gate Charge Characteristics**

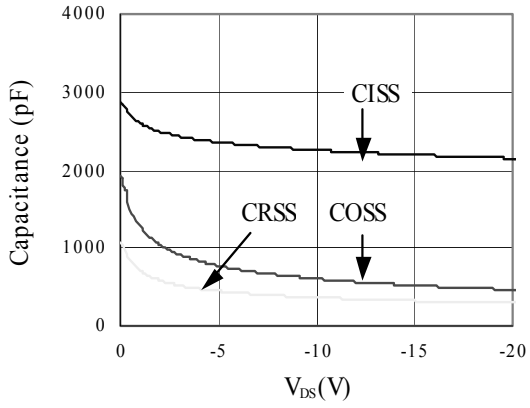



**Figure 8. Capacitance Characteristics**

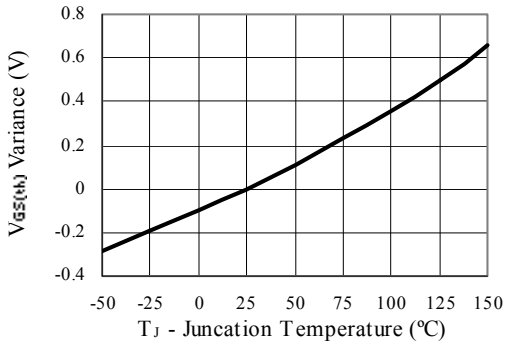



**Figure 9. Maximum Safe Operating Area**

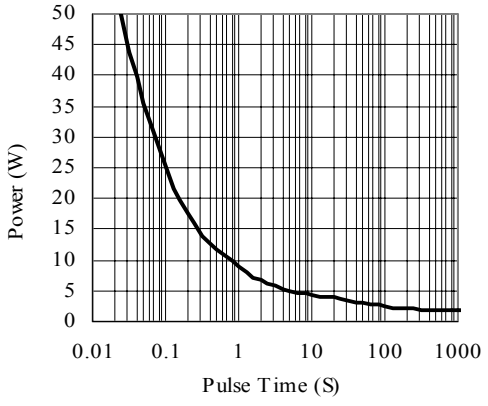



**Figure 10. Single Pulse Maximum Power Dissipation**

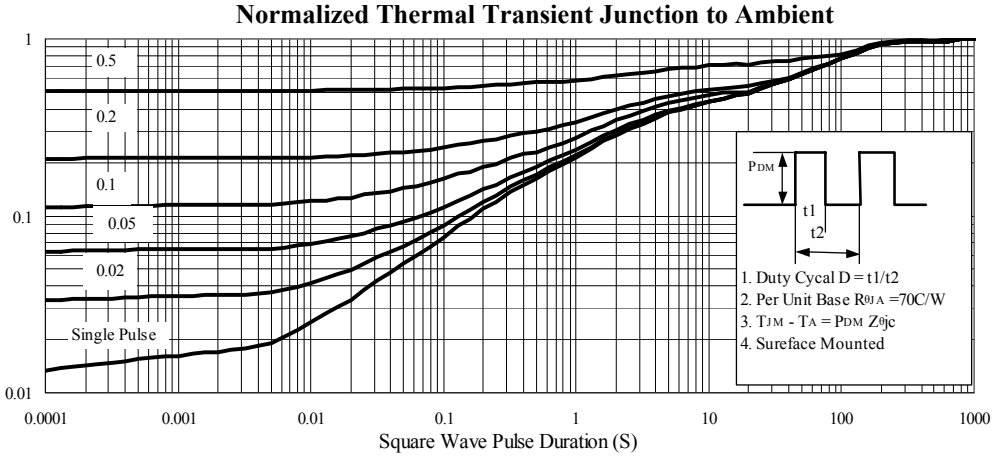
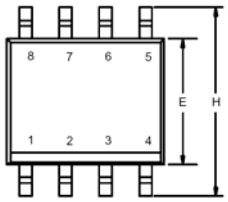
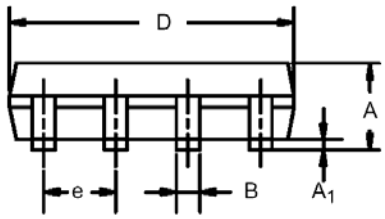



**Figure 11. Transient Thermal Response Curve**

# Package Information

## SO-8: 8LEAD




| Dim | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| $A_1$ | 0.10 | 0.20 | 0.004 | 0.008 |
| B | 0.35 | 0.51 | 0.014 | 0.020 |
| C | 0.19 | 0.25 | 0.0075 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.196 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 BSC | | 0.050 BSC | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| h | 0.25 | 0.50 | 0.010 | 0.020 |
| L | 0.50 | 0.93 | 0.020 | 0.037 |
| q | 0° | 8° | 0° | 8° |