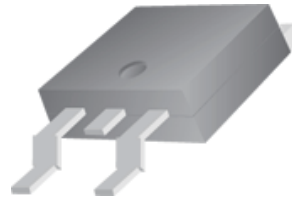


## N-Channel 30-V (D-S) MOSFET

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 DPAK saves board space
- Fast switching speed
- High performance trench technology



### PRODUCT SUMMARY

| $V_{DS}$ (V) | $r_{DS(on)}$ m( $\Omega$ ) | $I_D$ (A) |
|--------------|----------------------------|-----------|
| 30           | 26 @ $V_{GS} = 10V$        | 34        |
|              | 35 @ $V_{GS} = 4.5V$       | 22        |

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

| Parameter                                                 | Symbol                         | Limit      | Units            |
|-----------------------------------------------------------|--------------------------------|------------|------------------|
| Drain-Source Voltage                                      | $V_{DS}$                       | 30         | V                |
| Gate-Source Voltage                                       | $V_{GS}$                       | $\pm 20$   |                  |
| Continuous Drain Current <sup>a</sup>                     | $T_C = 25^\circ\text{C}$ $I_D$ | 34         | A                |
| Pulsed Drain Current <sup>b</sup>                         | $I_{DM}$                       | 72         |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup> | $I_S$                          | 30         | A                |
| Power Dissipation <sup>a</sup>                            | $T_C = 25^\circ\text{C}$ $P_D$ | 50.0       | W                |
| Operating Junction and Storage Temperature Range          | $T_J, T_{stg}$                 | -55 to 175 | $^\circ\text{C}$ |

### THERMAL RESISTANCE RATINGS

| Parameter                                | Symbol          | Maximum | Units              |
|------------------------------------------|-----------------|---------|--------------------|
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{\theta JA}$ | 50      | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                 | $R_{\theta JC}$ | 3.0     | $^\circ\text{C/W}$ |

#### Notes

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

| SPECIFICATIONS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED) |                     |                                                                                                   |        |     |      |      |
|---------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------|--------|-----|------|------|
| Parameter                                                     | Symbol              | Test Conditions                                                                                   | Limits |     |      | Unit |
|                                                               |                     |                                                                                                   | Min    | Typ | Max  |      |
| Static                                                        |                     |                                                                                                   |        |     |      |      |
| Gate-Threshold Voltage                                        | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 uA                                       | 1.0    |     |      | V    |
| Gate-Body Leakage                                             | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V                                                     |        |     | ±100 | nA   |
| Zero Gate Voltage Drain Current                               | I <sub>DSS</sub>    | V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V                                                     |        |     | 1    | uA   |
|                                                               |                     | V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C                              |        |     | 25   |      |
| On-State Drain Current <sup>A</sup>                           | I <sub>D(on)</sub>  | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V                                                     | 34     |     |      | A    |
| Drain-Source On-Resistance <sup>A</sup>                       | r <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 17 A                                                     |        |     | 26   | mΩ   |
|                                                               |                     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 11 A                                                    |        |     | 35   |      |
| Forward Tranconductance <sup>A</sup>                          | g <sub>fs</sub>     | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 17 A                                                     |        | 22  |      | S    |
| Diode Forward Voltage                                         | V <sub>SD</sub>     | I <sub>S</sub> = 34 A, V <sub>GS</sub> = 0 V                                                      |        | 1.1 |      | V    |
| Dynamic <sup>b</sup>                                          |                     |                                                                                                   |        |     |      |      |
| Total Gate Charge                                             | Q <sub>g</sub>      | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V,<br>I <sub>D</sub> = 11 A                         |        | 4.0 |      | nC   |
| Gate-Source Charge                                            | Q <sub>gs</sub>     |                                                                                                   |        | 1.1 |      |      |
| Gate-Drain Charge                                             | Q <sub>gd</sub>     |                                                                                                   |        | 1.4 |      |      |
| Input Capacitance                                             | C <sub>iss</sub>    | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V,<br>f = 1MHz                                        |        | 720 |      | pF   |
| Output Capacitance                                            | C <sub>oss</sub>    |                                                                                                   |        | 165 |      |      |
| Reverse Transfer Capacitance                                  | C <sub>rss</sub>    |                                                                                                   |        | 60  |      |      |
| Turn-On Delay Time                                            | t <sub>d(on)</sub>  | V <sub>DD</sub> = 25 V, R <sub>L</sub> = 25 Ω , I <sub>D</sub> = 34 A,<br>V <sub>GEN</sub> = 10 V |        | 16  |      | nS   |
| Rise Time                                                     | t <sub>r</sub>      |                                                                                                   |        | 5   |      |      |
| Turn-Off Delay Time                                           | t <sub>d(off)</sub> |                                                                                                   |        | 23  |      |      |
| Fall-Time                                                     | t <sub>f</sub>      |                                                                                                   |        | 3   |      |      |

## Notes

- Pulse test: PW ≤ 300us duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.

## Typical Electrical Characteristics (N-Channel)

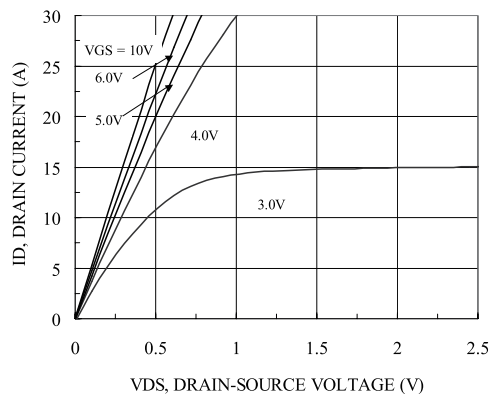


Figure 1. On-Region Characteristics

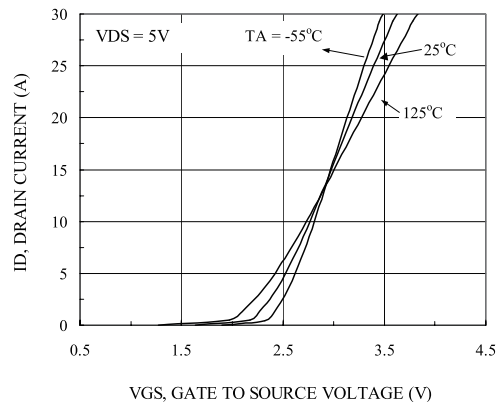


Figure 2. Body Diode Forward Voltage Variation with Source Current and Temperature

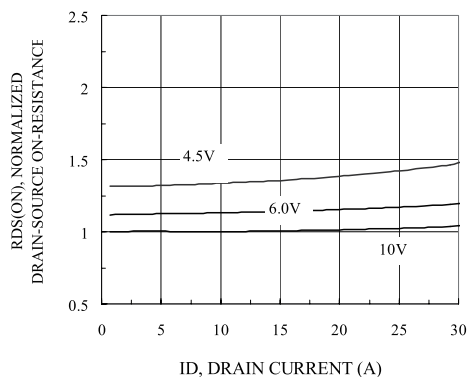


Figure 3. On Resistance Vs Vgs Voltage

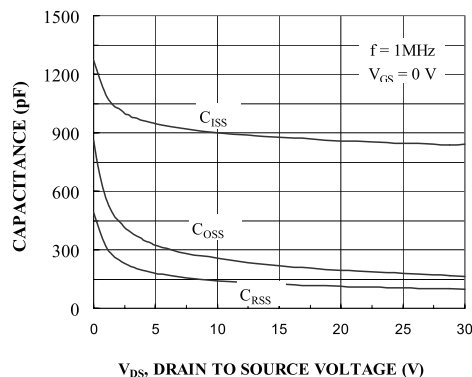


Figure 4. Capacitance Characteristics

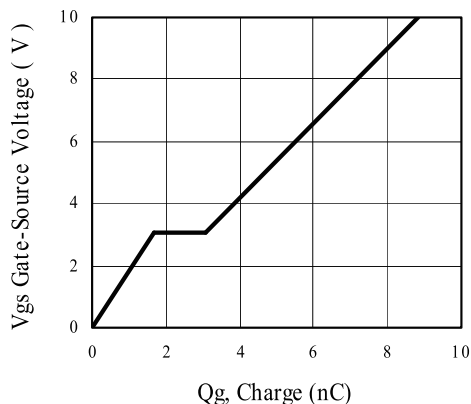


Figure 5. Gate Charge Characteristics

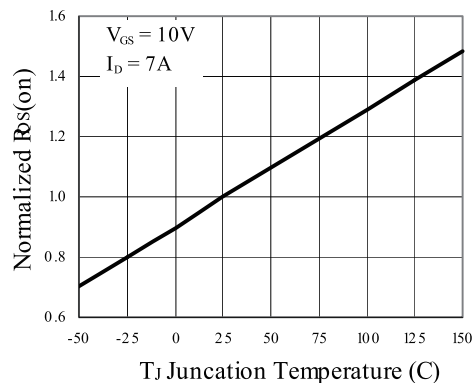


Figure 6. On-Resistance Variation with Temperature

## Typical Electrical Characteristics (N-Channel)

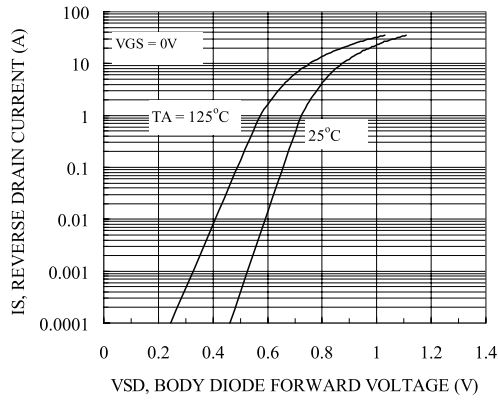


Figure 7. Transfer Characteristics

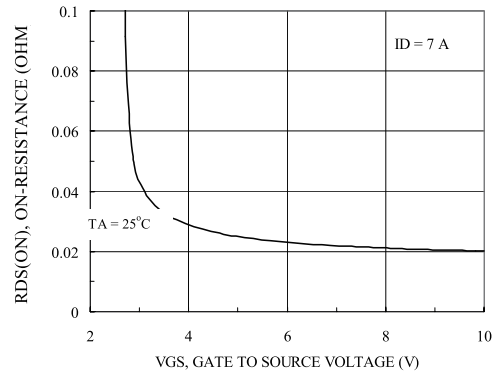


Figure 8. On-Resistance with Gate to Source Voltage

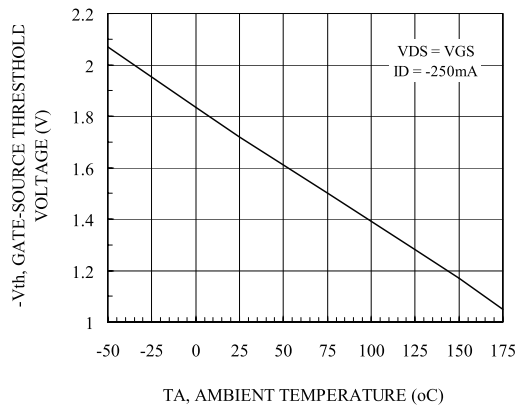


Figure 9. Vth Gate to Source Voltage Vs Temperature

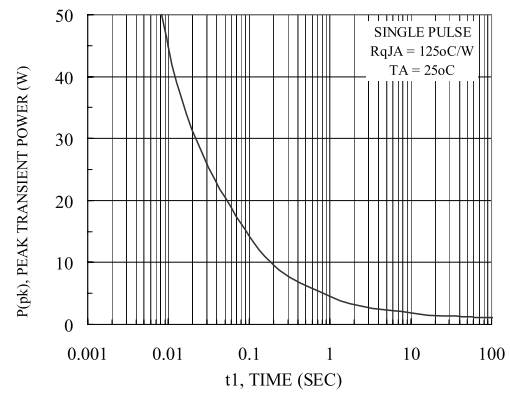


Figure 10. Single Pulse Maximum Power Dissipation

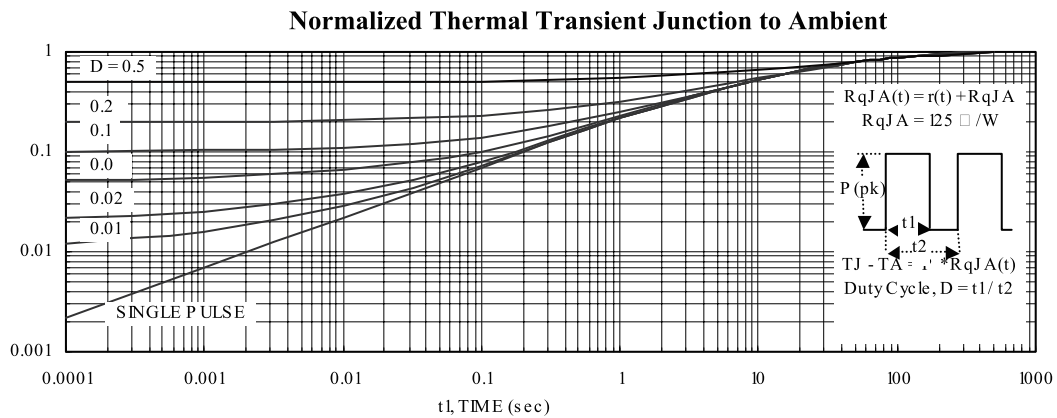
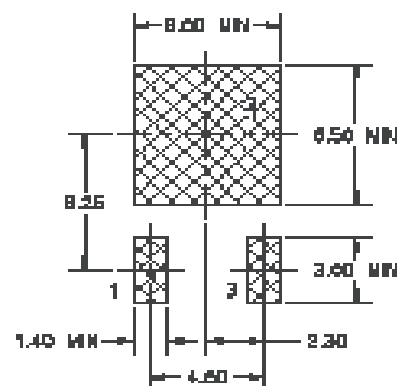
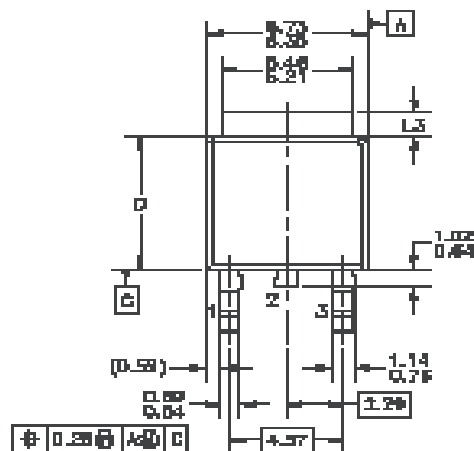
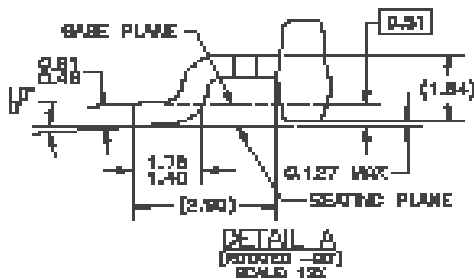
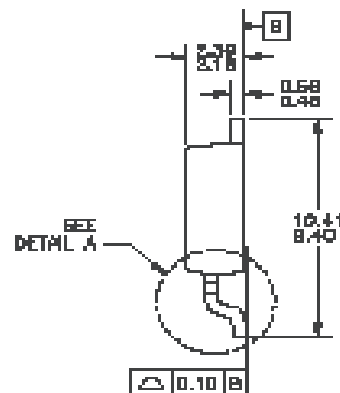
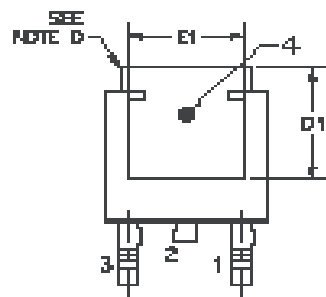


Figure 11. Transient Thermal Response Curve

# Package Information



LAND PATTERN RECOMMENDATION



- NOTES: UNLESS OTHERWISE SPECIFIED
- ALL DIMENSIONS ARE IN MILLIMETERS.
  - THIS PACKAGE CONFORMS TO JEDEC, TO-263, ISSUE C, VARIATION AA, 30 DEC, DATED NOV. 1989.
  - DIMENSIONING AND TOLERANCING PER ASME Y14.00M-1994.
  - HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.
  - DIMENSIONS L3, L4, E1 AND D1 TABLE:

|    | OPTIONAL A1 | OPTIONAL A2 |
|----|-------------|-------------|
| L3 | 0.08-1.27   | 1.02-2.54   |
| D  | 0.97-0.99   | 0.93-0.99   |
| E1 | 4.32 MIN    | 3.81 MIN    |
| D1 | 3.81 MIN    | 4.37 MIN    |