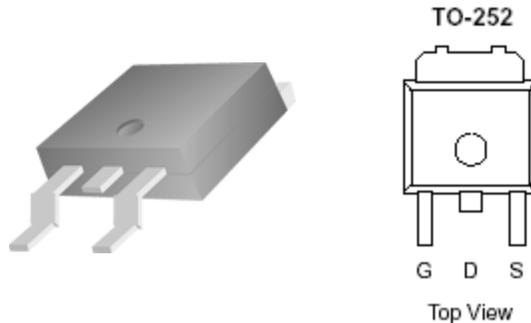


### N-Channel 60-V (D-S) MOSFET

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 <sub>DS</sub> (V) | r <sub>DS(on)</sub> m(Ω)    | I <sub>D</sub> (A) |
| 60                  | 38 @ V <sub>GS</sub> = 10V  | 30                 |
|                     | 50 @ V <sub>GS</sub> = 4.5V | 26                 |

| ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED) |                      |                                   |            |       |
|--|----------------------|-----------------------------------|------------|-------|
| Parameter  |                      | Symbol                            | Limit      | Units |
| Drain-Source Voltage   |                      | V <sub>DS</sub>                   | 60         | V     |
| Gate-Source Voltage  |                      | V <sub>GS</sub>                   | ±20        |       |
| Continuous Drain Current <sup>a</sup>                                    | T <sub>C</sub> =25°C | I <sub>D</sub>                    | 19         | A     |
| Pulsed Drain Current <sup>b</sup>  |                      | I <sub>DM</sub>                   | 40         |       |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                |                      | I <sub>S</sub>                    | 30         | A     |
| Power Dissipation <sup>a</sup>   | T <sub>C</sub> =25°C | P <sub>D</sub>                    | 50         | W     |
| Operating Junction and Storage Temperature Range                         |                      | T <sub>J</sub> , T <sub>stg</sub> | -55 to 175 | °C    |

| THERMAL RESISTANCE RATINGS               |                  |         |       |
|--|------------------|---------|-------|
| Parameter                                | Symbol           | Maximum | Units |
| Maximum Junction-to-Ambient <sup>a</sup> | R <sub>θJA</sub> | 50      | °C/W  |
| Maximum Junction-to-Case                 | R <sub>θJC</sub> | 3.0     | °C/W  |

Notes

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

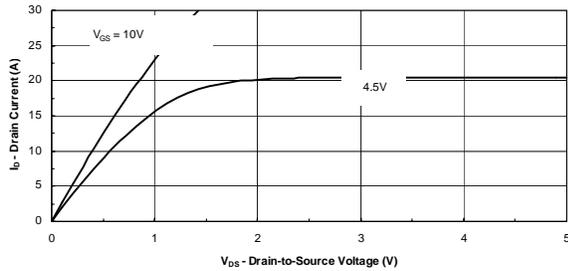
| SPECIFICATIONS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED) |                     |  |        |      |      |      |
|---|---------------------|--|--------|------|------|------|
| Parameter   | Symbol              | Test Conditions  | Limits |      |      | Unit |
|   |                     |  | Min    | Typ  | Max  |      |
| <b>Static</b>   |                     |  |        |      |      |      |
| 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> = 48 V, V <sub>GS</sub> = 0 V  |        |      | 1    | uA   |
|   |                     | V <sub>DS</sub> = 48 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> = 30 A  |        |      | 38   | mΩ   |
|   |                     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 26 A   |        |      | 50   |      |
| Forward Transconductance <sup>A</sup>                         | g <sub>s</sub>      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A  |        | 22   |      | S    |
| Diode Forward Voltage   | V <sub>SD</sub>     | I <sub>S</sub> = 24 A, V <sub>GS</sub> = 0 V   |        | 1.1  |      | V    |
| <b>Dynamic<sup>b</sup></b>                                    |                     |  |        |      |      |      |
| 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> = 30 A                        |        | 12.5 |      | nC   |
| Gate-Source Charge  | Q <sub>gs</sub>     |  |        | 2.4  |      |      |
| Gate-Drain Charge   | Q <sub>gd</sub>     |  |        | 2.6  |      |      |
| 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> = 30 A,<br>V <sub>GEN</sub> = 10 V |        | 11   |      | nS   |
| Rise Time   | t <sub>r</sub>      |  |        | 8    |      |      |
| Turn-Off Delay Time   | t <sub>d(off)</sub> |  |        | 19   |      |      |
| Fall-Time   | t <sub>f</sub>      |  |        | 6    |      |      |

Notes

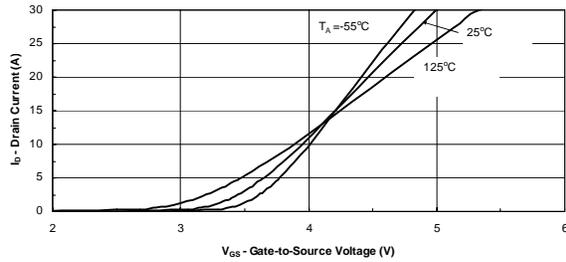
- a. Pulse test: PW ≤ 300us duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.

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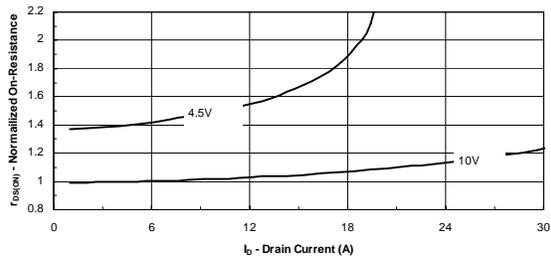
## Typical Electrical Characteristics



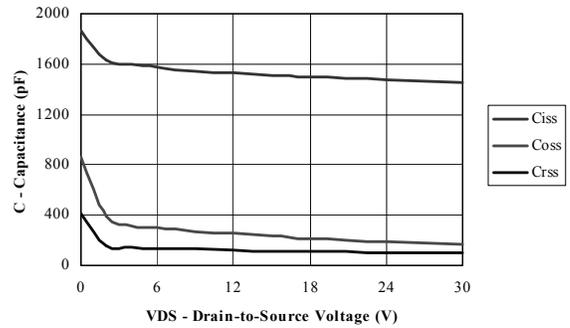
Output Characteristics



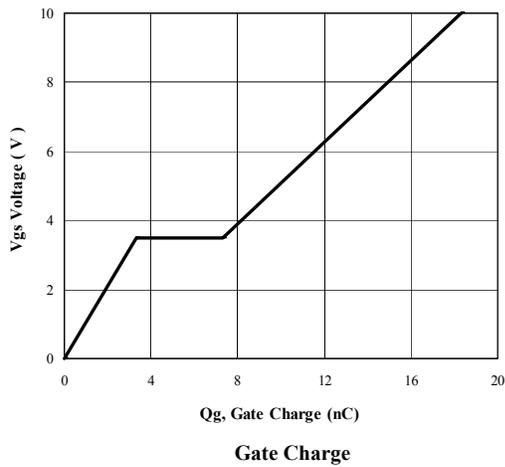
Transfer Characteristics



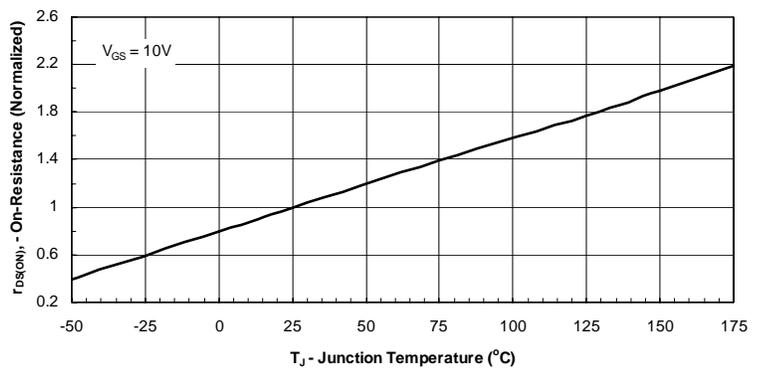
On-Resistance vs. Drain Current



Capacitance

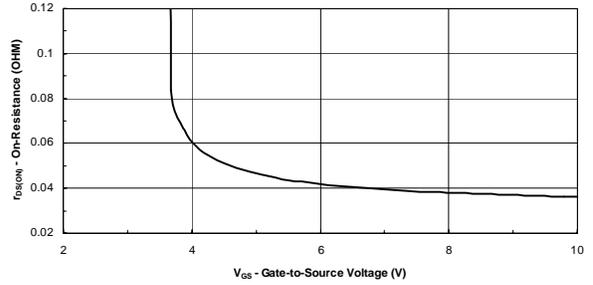
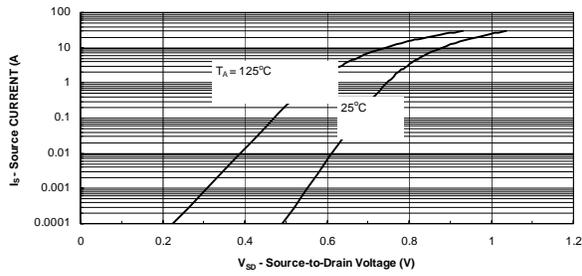


Gate Charge

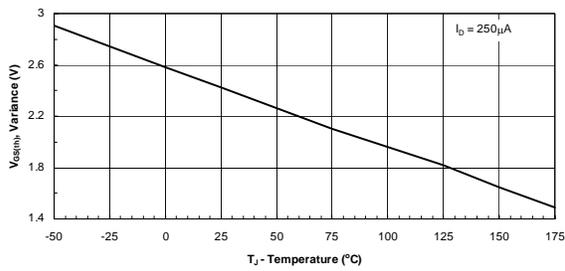


On-Resistance vs. Junction Temperature

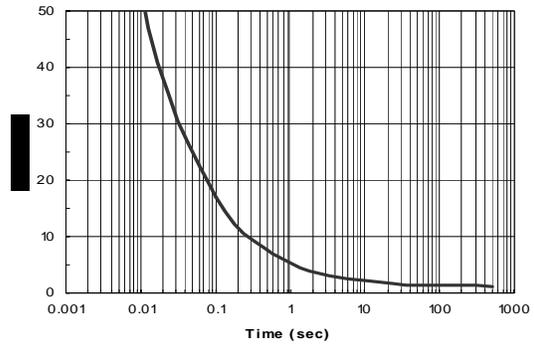
## Typical Electrical Characteristics (N-Channel)



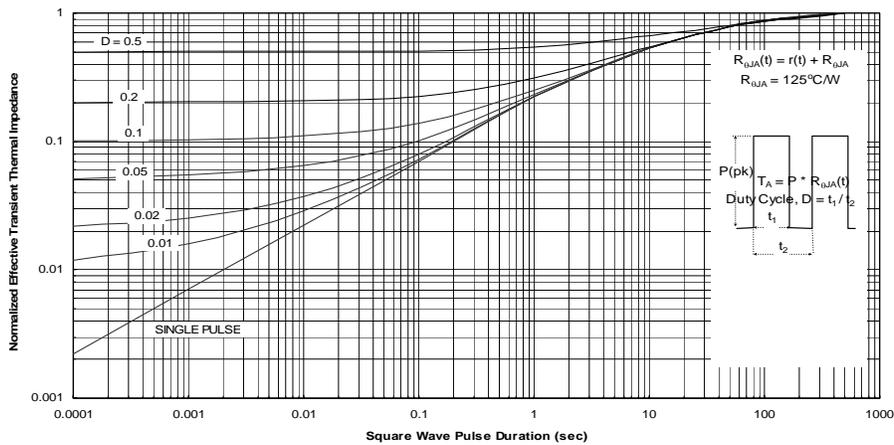
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to Source Voltage



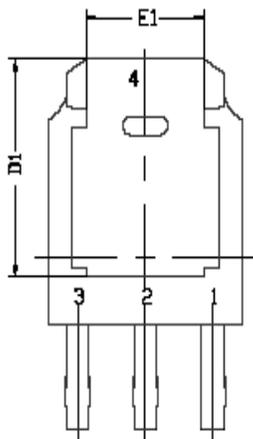
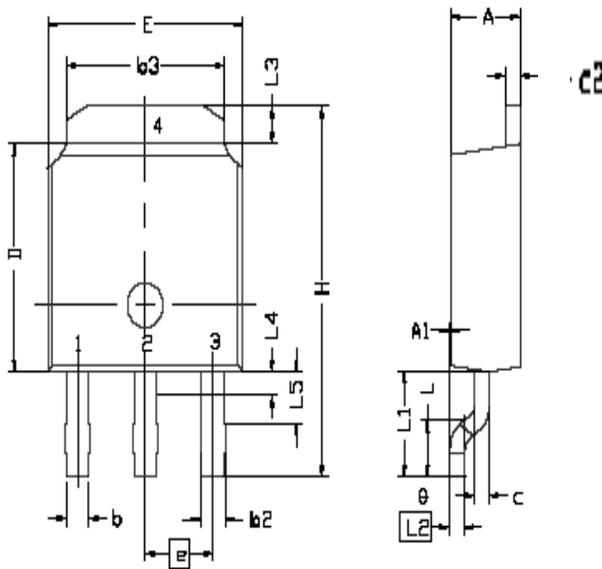
Threshold Voltage



Single Pulse Power

Normalized Thermal Transient Impedance, Junction-to-Ambient

# Package Information



| SYMBOL | DIMENSIONAL REQMTS |       |       |
|--------|--------------------|-------|-------|
|        | MIN                | NOM   | MAX   |
| E      | 6.40               | 6.60  | 6.731 |
| L      | 1.40               | 1.52  | 1.77  |
| L1     | 2.743 REF          |       |       |
| L2     | 0.508 BSC          |       |       |
| L3     | 0.89               | --    | 1.27  |
| L4     | 0.64               | --    | 1.01  |
| L5     | --                 | --    | --    |
| D      | 6.00               | 6.10  | 6.223 |
| H      | 9.40               | 10.00 | 10.40 |
| b      | 0.64               | 0.76  | 0.88  |
| b2     | 0.77               | 0.84  | 1.14  |
| b3     | 5.21               | 5.34  | 5.46  |
| e      | 2.286 BSC          |       |       |
| A      | 2.20               | 2.30  | 2.38  |
| A1     | 0.00               | --    | 0.127 |
| c      | 0.45               | 0.50  | 0.60  |
| c2     | 0.45               | 0.50  | 0.58  |
| D1     | 5.30               | --    | --    |
| E1     | 4.40               | --    | --    |
| theta  | 0°                 | --    | 10°   |