

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

### Key Features:

- Low  $r_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed

### Typical Applications:

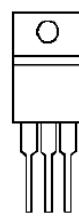
- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

| PRODUCT SUMMARY |                            |                 |
|-----------------|----------------------------|-----------------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ (m $\Omega$ ) | $I_D$ (A)       |
| 60              | 9.9 @ $V_{GS} = 10V$       | 64 <sup>a</sup> |
|                 | 13.5 @ $V_{GS} = 5.5V$     |                 |



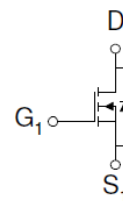
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

TO-220CFM



G D S

Top View



N-Channel MOSFET

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

| Parameter   | Symbol   | Limit          | Units |
|---|----------|----------------|-------|
| Drain-Source Voltage                                      | $V_{DS}$ | 60             | V     |
| Gate-Source Voltage                                       | $V_{GS}$ | $\pm 20$       |       |
| Continuous Drain Current <sup>a</sup>                     | $I_D$    | 64             | A     |
| Pulsed Drain Current <sup>b</sup>                         |          | $I_{DM}$       |       |
| Continuous Source Current (Diode Conduction) <sup>a</sup> | $I_S$    | 64             | A     |
| Power Dissipation <sup>a</sup>                            | $P_D$    | 60             | W     |
| Operating Junction and Storage Temperature Range          |          | $T_J, T_{stg}$ |       |

### THERMAL RESISTANCE RATINGS

| Parameter                                | Symbol          | Maximum | Units              |
|--|-----------------|---------|--------------------|
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{\theta JA}$ | 62.5    | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                 | $R_{\theta JC}$ | 1       |                    |

### Notes

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

## Electrical Characteristics

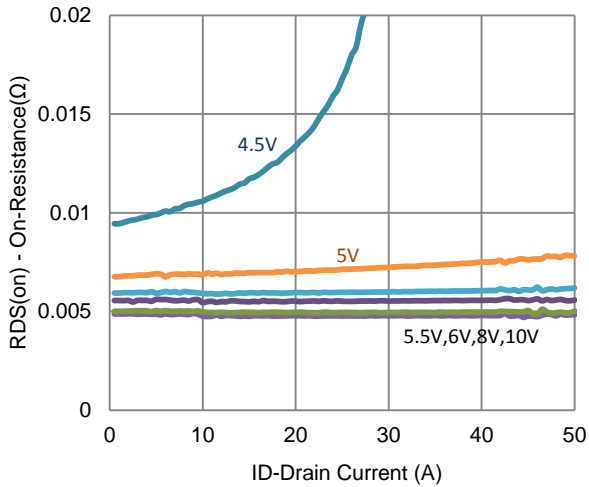
| Parameter                               | Symbol       | Test Conditions   | Min | Typ   | Max       | Unit |
|---|--------------|---|-----|-------|-----------|------|
| <b>Static</b>                           |              |   |     |       |           |      |
| Gate-Source Threshold Voltage           | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu A$  | 1   |       |           | V    |
| Gate-Body Leakage                       | $I_{GSS}$    | $V_{DS} = 0 V, V_{GS} = \pm 20 V$   |     |       | $\pm 100$ | nA   |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | $V_{DS} = 48 V, V_{GS} = 0 V$   |     |       | 1         | uA   |
|   |              | $V_{DS} = 48 V, V_{GS} = 0 V, T_J = 55^\circ C$   |     |       | 25        |      |
| On-State Drain Current <sup>a</sup>     | $I_{D(on)}$  | $V_{DS} = 5 V, V_{GS} = 10 V$   | 120 |       |           | A    |
| Drain-Source On-Resistance <sup>a</sup> | $r_{DS(on)}$ | $V_{GS} = 10 V, I_D = 45 A$   |     |       | 9.9       | mΩ   |
|   |              | $V_{GS} = 5.5 V, I_D = 44 A$  |     |       | 13.5      |      |
| Forward Transconductance <sup>a</sup>   | $g_{fs}$     | $V_{DS} = 15 V, I_D = 20 A$   |     | 30    |           | S    |
| Diode Forward Voltage <sup>a</sup>      | $V_{SD}$     | $I_S = 32 A, V_{GS} = 0 V$  |     | 0.85  |           | V    |
| <b>Dynamic <sup>b</sup></b>             |              |   |     |       |           |      |
| Total Gate Charge                       | $Q_g$        | $V_{DS} = 30 V, V_{GS} = 5.5 V,$<br>$I_D = 20 A$  |     | 79    |           | nC   |
| Gate-Source Charge                      | $Q_{gs}$     |   |     | 29    |           |      |
| Gate-Drain Charge                       | $Q_{gd}$     |   |     | 40    |           |      |
| Turn-On Delay Time                      | $t_{d(on)}$  | $V_{DS} = 30 V, R_L = 1.5 \Omega,$<br>$I_D = 20 A,$<br>$V_{GEN} = 10 V, R_{GEN} = 6 \Omega$ |     | 39    |           | ns   |
| Rise Time                               | $t_r$        |   |     | 32    |           |      |
| Turn-Off Delay Time                     | $t_{d(off)}$ |   |     | 168   |           |      |
| Fall Time                               | $t_f$        |   |     | 34    |           |      |
| Input Capacitance                       | $C_{iss}$    | $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz$  |     | 10331 |           | pF   |
| Output Capacitance                      | $C_{oss}$    |   |     | 565   |           |      |
| Reverse Transfer Capacitance            | $C_{rss}$    |   |     | 491   |           |      |

## Notes

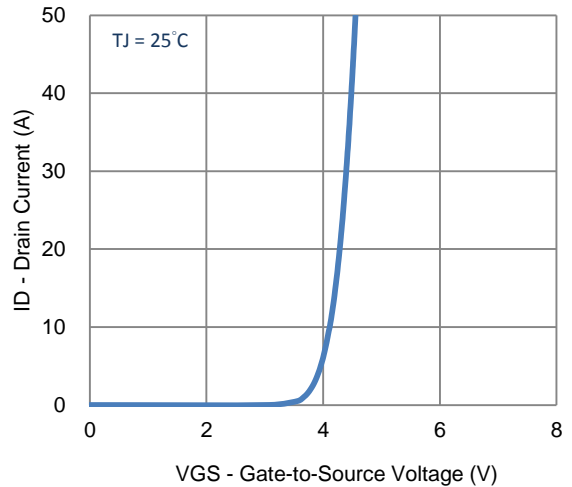
- Pulse test:  $PW \leq 300 \mu s$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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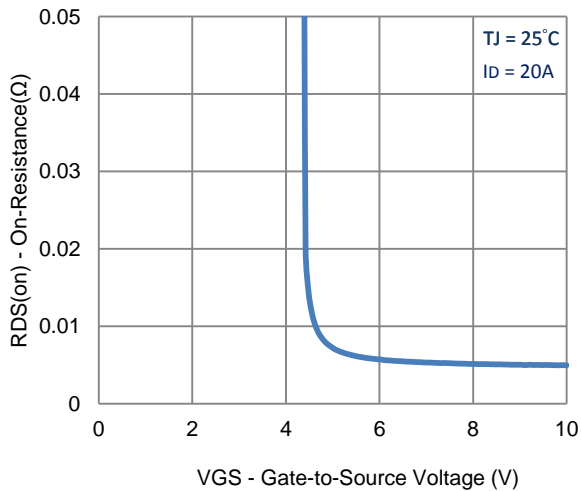
Typical Electrical Characteristics



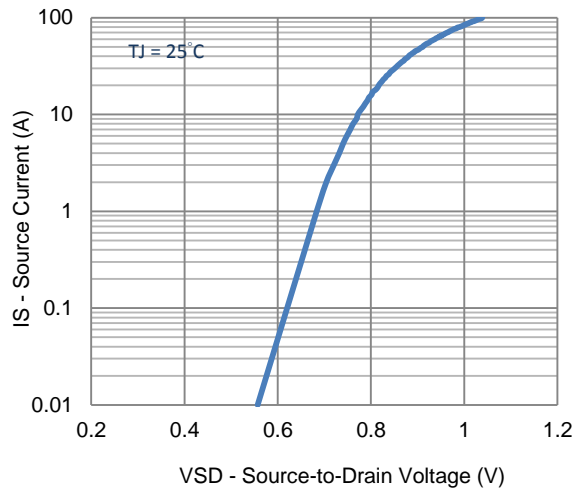
1. On-Resistance vs. Drain Current



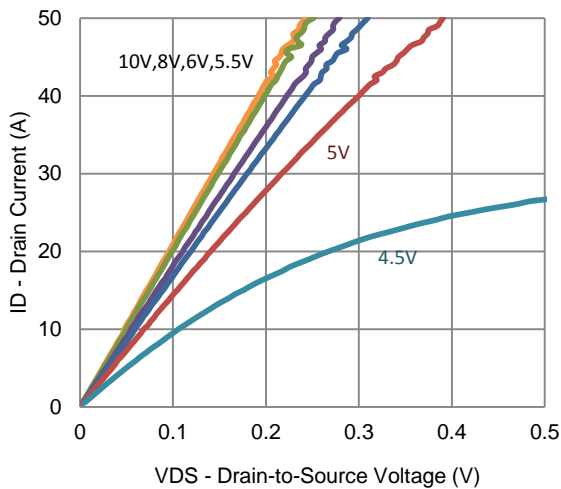
2. Transfer Characteristics



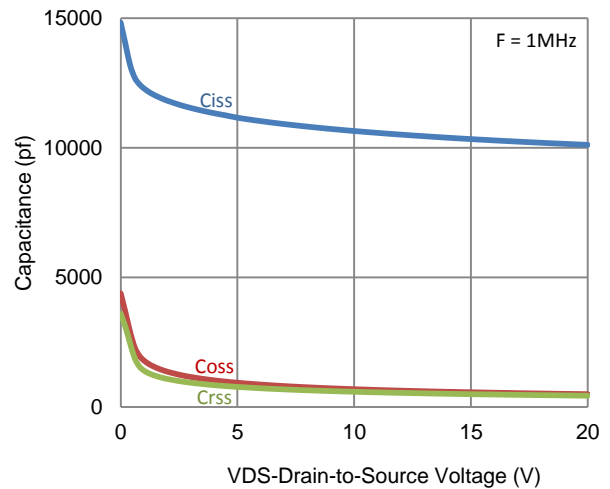
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

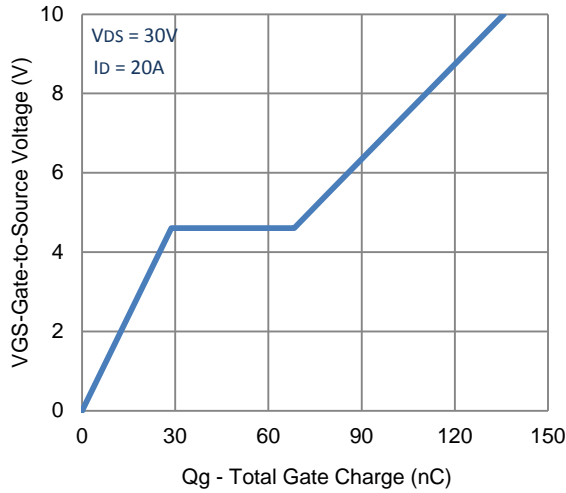


5. Output Characteristics

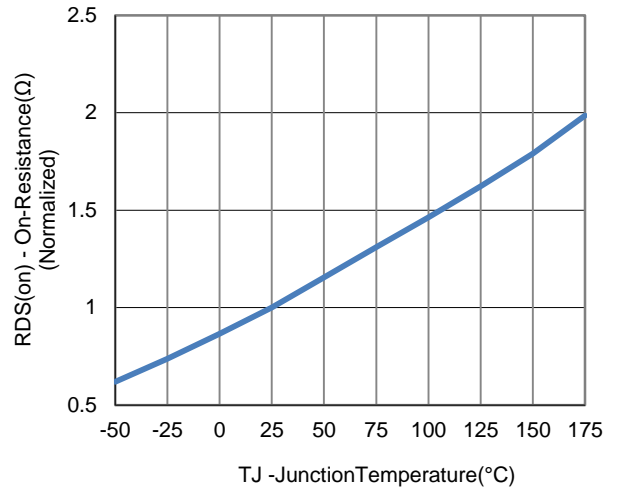


6. Capacitance

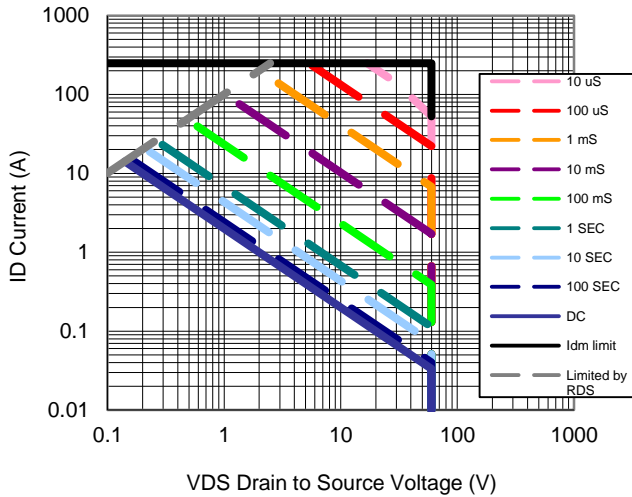
Typical Electrical Characteristics



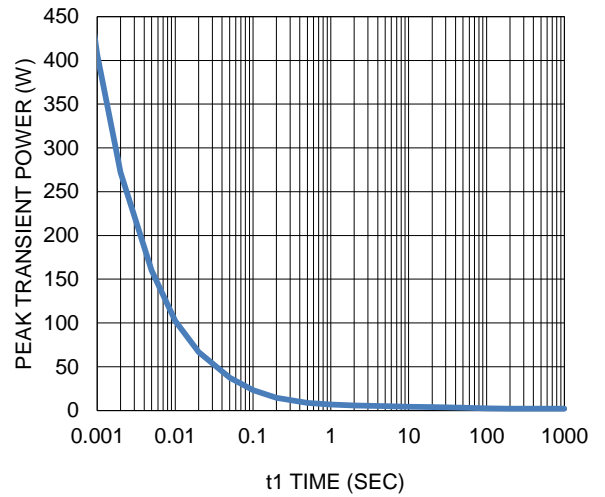
7. Gate Charge



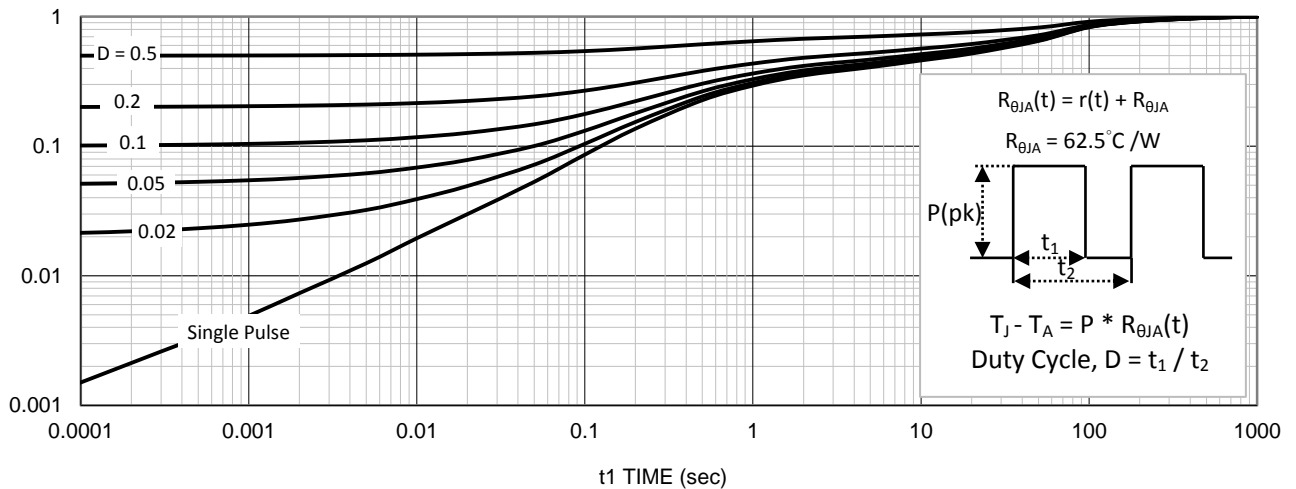
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area



10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information

