

## N-Channel 200-V (D-S) MOSFET

### Key Features:

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

### Typical Applications:

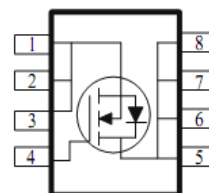
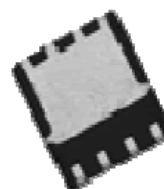
- White LED boost converters
- PoE PD Power supplies
- Industrial DC/DC Conversion Circuits

| PRODUCT SUMMARY |                            |           |
|-----------------|----------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ (m $\Omega$ ) | $I_D$ (A) |
| 200             | 87 @ $V_{GS} = 10V$        | 6.2       |
|                 | 102 @ $V_{GS} = 6.5V$      | 5.8       |



RoHS  
COMPLIANT  
HALOGEN  
FREE

DFN5X6-8L



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                          |                |            |                  |
|---|--------------------------|----------------|------------|------------------|
| Parameter   |                          | Symbol         | Limit      | Units            |
| Drain-Source Voltage  |                          | $V_{DS}$       | 200        | V                |
| Gate-Source Voltage   |                          | $V_{GS}$       | $\pm 20$   |                  |
| Continuous Drain Current <sup>a</sup>                                       | $T_A = 25^\circ\text{C}$ | $I_D$          | 6.2        | A                |
|   | $T_A = 70^\circ\text{C}$ |                | 5          |                  |
| Pulsed Drain Current <sup>b</sup>   |                          | $I_{DM}$       | 30         |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   |                          | $I_S$          | 7.1        | A                |
| Power Dissipation <sup>a</sup>  | $T_A = 25^\circ\text{C}$ | $P_D$          | 5          | W                |
|   | $T_A = 70^\circ\text{C}$ |                | 3.2        |                  |
| Operating Junction and Storage Temperature Range                            |                          | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

| THERMAL RESISTANCE RATINGS               |                 |                 |         |                    |
|--|-----------------|-----------------|---------|--------------------|
| Parameter                                |                 | Symbol          | Maximum | Units              |
| Maximum Junction-to-Ambient <sup>a</sup> | $t \leq 10$ sec | $R_{\theta JA}$ | 25      | $^\circ\text{C/W}$ |
|  | Steady State    |                 | 65      |                    |

### Notes

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

## Electrical Characteristics

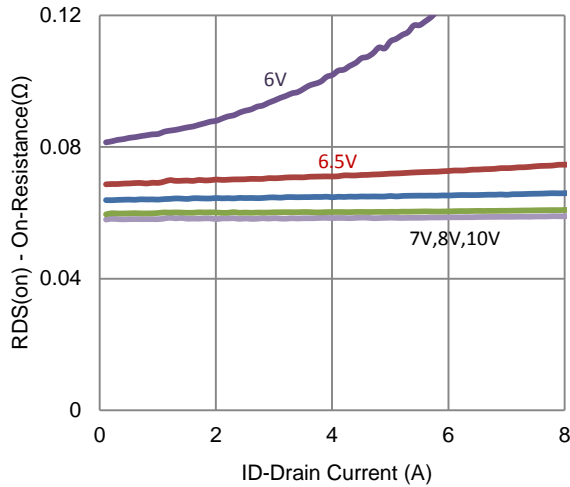
| Parameter                               | Symbol       | Test Conditions  | Min | Typ  | Max       | Unit |
|---|--------------|--|-----|------|-----------|------|
| <b>Static</b>                           |              |  |     |      |           |      |
| Gate-Source Threshold Voltage           | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu A$   | 1   |      |           | V    |
| Gate-Body Leakage                       | $I_{GSS}$    | $V_{DS} = 0 V, V_{GS} = \pm 20 V$  |     |      | $\pm 100$ | nA   |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | $V_{DS} = 160 V, V_{GS} = 0 V$   |     |      | 1         | uA   |
|   |              | $V_{DS} = 160 V, V_{GS} = 0 V, T_J = 55^\circ C$   |     |      | 25        |      |
| On-State Drain Current <sup>a</sup>     | $I_{D(on)}$  | $V_{DS} = 5 V, V_{GS} = 10 V$  | 10  |      |           | A    |
| Drain-Source On-Resistance <sup>a</sup> | $r_{DS(on)}$ | $V_{GS} = 10 V, I_D = 5.2 A$   |     |      | 87        | mΩ   |
|   |              | $V_{GS} = 6 V, I_D = 4.2 A$  |     |      | 102       |      |
| Forward Transconductance <sup>a</sup>   | $g_{fs}$     | $V_{DS} = 15 V, I_D = 5.2 A$   |     | 30   |           | S    |
| Diode Forward Voltage <sup>a</sup>      | $V_{SD}$     | $I_S = 3.6 A, V_{GS} = 0 V$  |     | 0.75 |           | V    |
| <b>Dynamic <sup>b</sup></b>             |              |  |     |      |           |      |
| Total Gate Charge                       | $Q_g$        | $V_{DS} = 100 V, V_{GS} = 6.5 V,$<br>$I_D = 5.2 A$   |     | 60   |           | nC   |
| Gate-Source Charge                      | $Q_{gs}$     |  |     | 20   |           |      |
| Gate-Drain Charge                       | $Q_{gd}$     |  |     | 34   |           |      |
| Turn-On Delay Time                      | $t_{d(on)}$  | $V_{DS} = 100 V, R_L = 19.3 \Omega,$<br>$I_D = 5.2 A,$<br>$V_{GEN} = 10 V, R_{GEN} = 6 \Omega$ |     | 26   |           | ns   |
| Rise Time                               | $t_r$        |  |     | 28   |           |      |
| Turn-Off Delay Time                     | $t_{d(off)}$ |  |     | 98   |           |      |
| Fall Time                               | $t_f$        |  |     | 26   |           |      |
| Input Capacitance                       | $C_{iss}$    | $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz$   |     | 4463 |           | pF   |
| Output Capacitance                      | $C_{oss}$    |  |     | 222  |           |      |
| Reverse Transfer Capacitance            | $C_{rss}$    |  |     | 212  |           |      |

## Notes

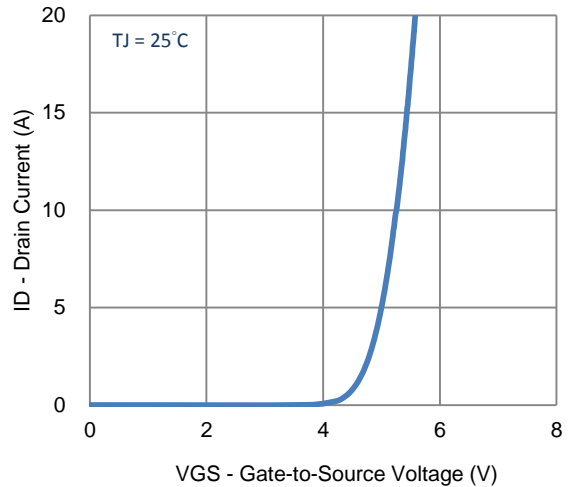
- Pulse test:  $PW \leq 300 \mu s$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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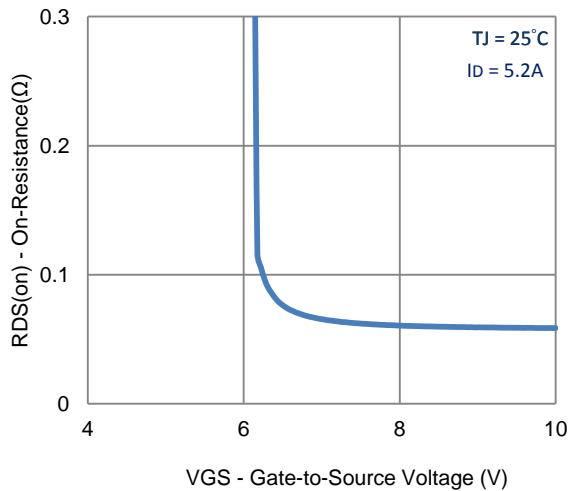
Typical Electrical Characteristics



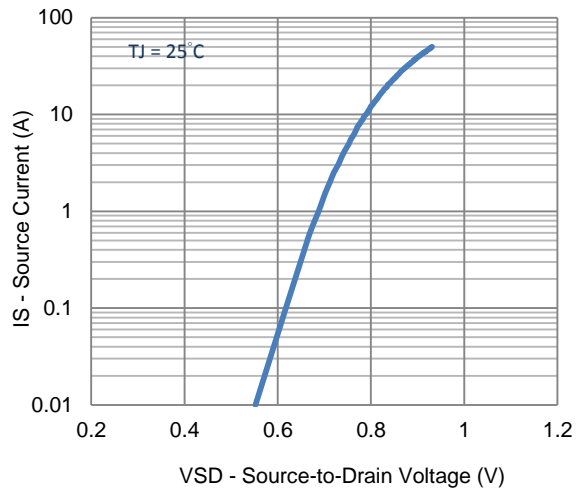
1. On-Resistance vs. Drain Current



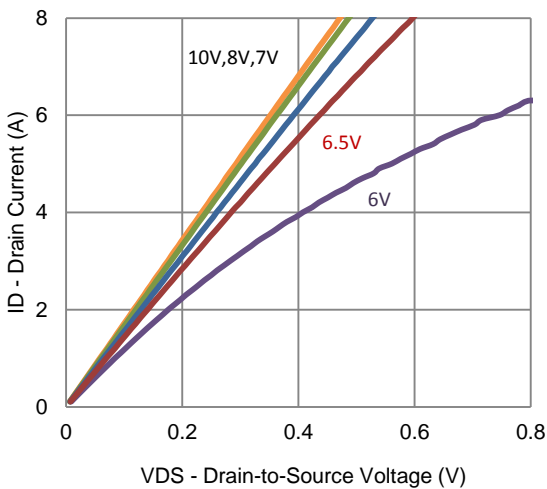
2. Transfer Characteristics



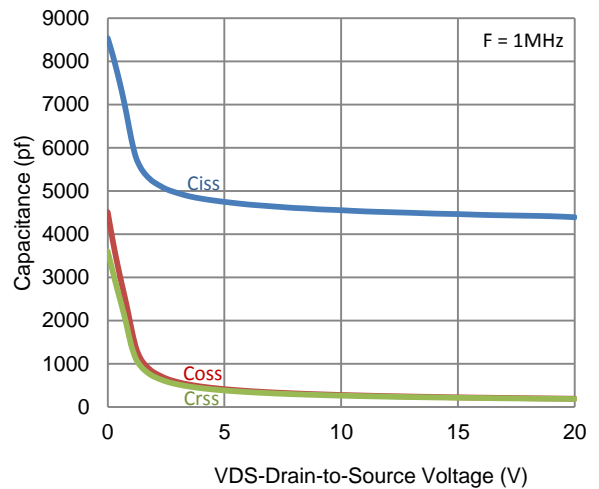
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

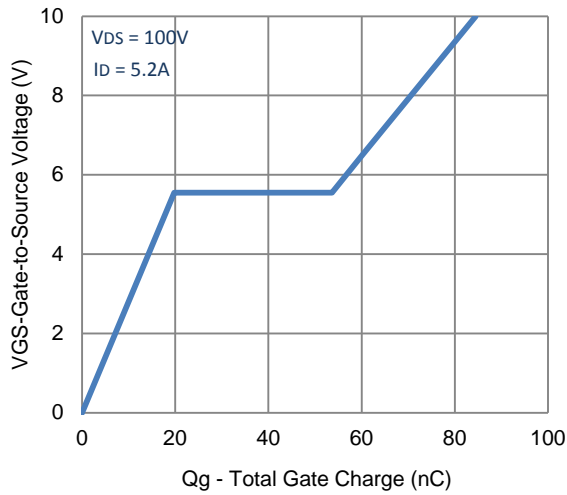


5. Output Characteristics

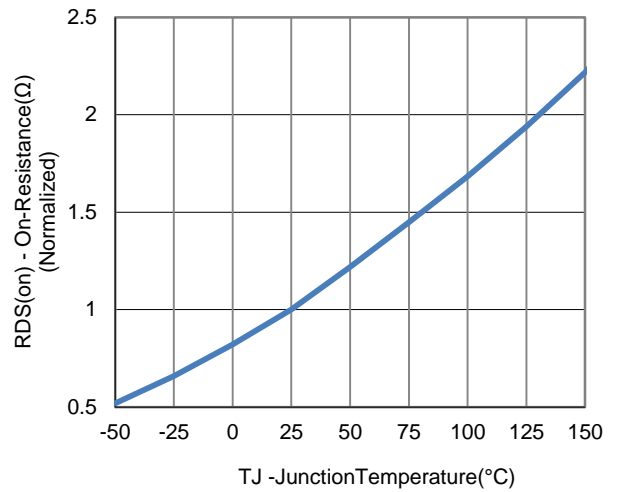


6. Capacitance

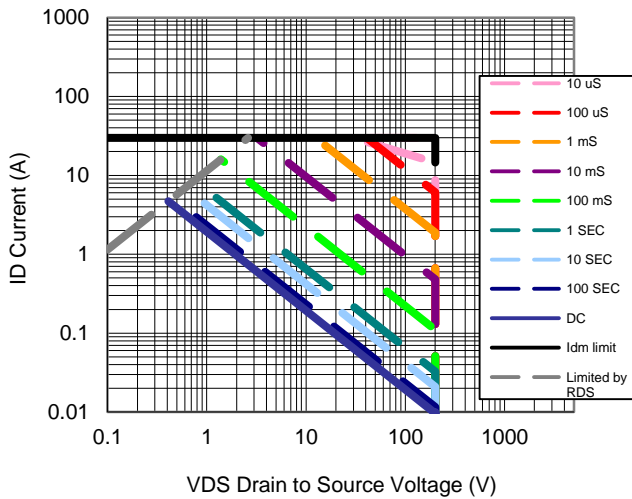
Typical Electrical Characteristics



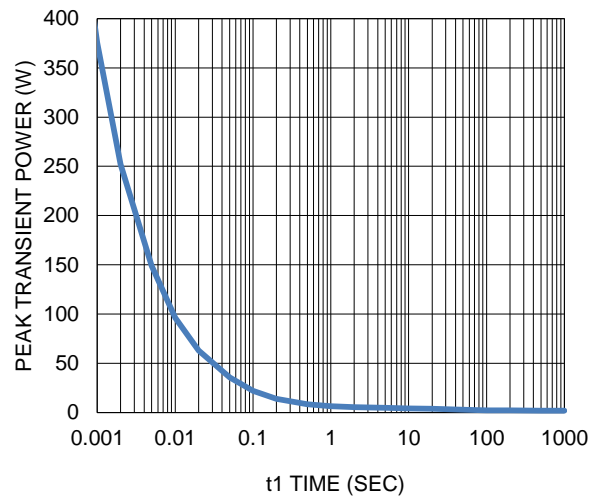
7. Gate Charge



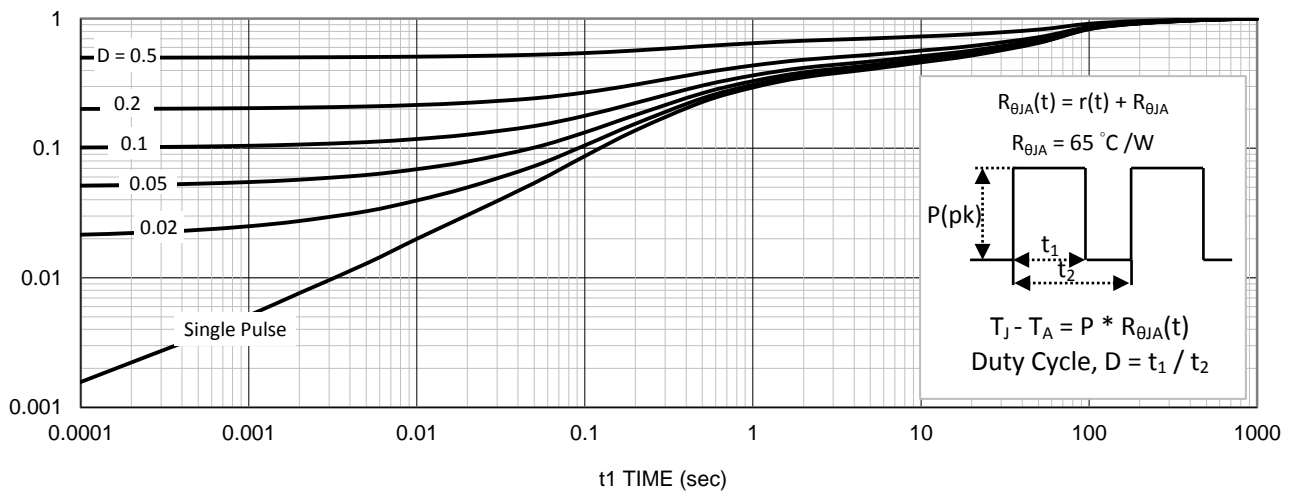
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

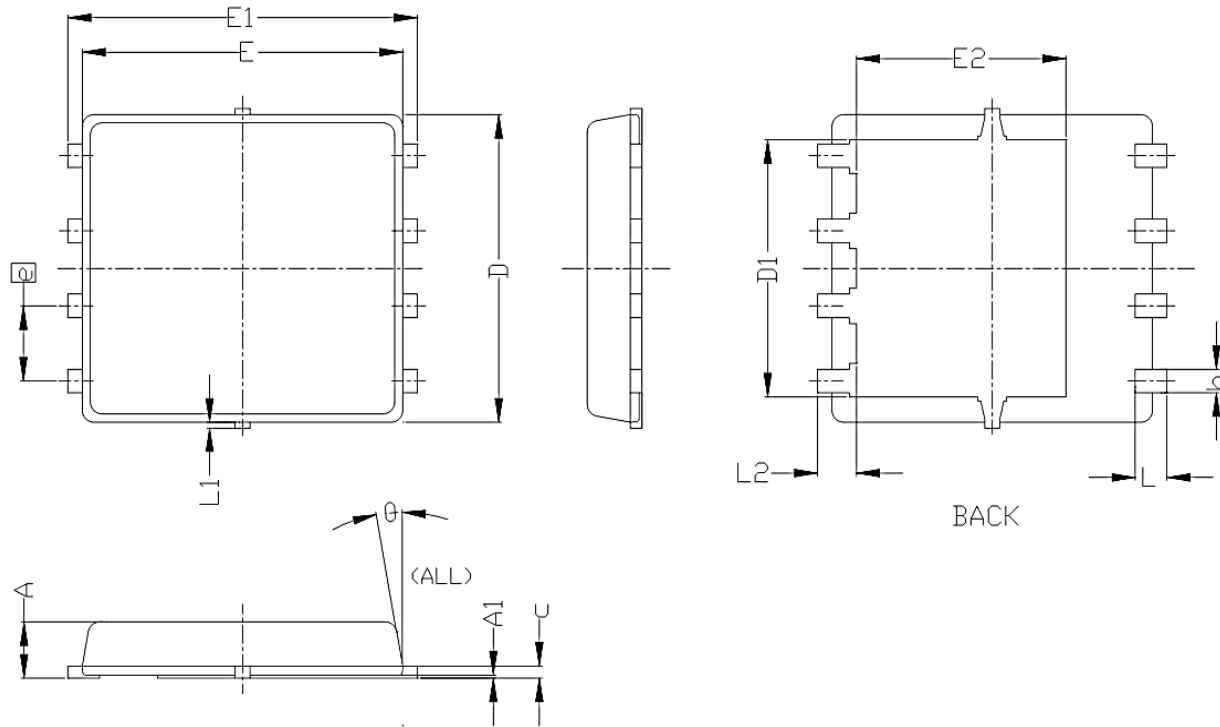


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



| SYMBOLS | DIMENSIONS IN MILLIMETERS |      |      | DIMENSIONS IN INCHES |       |       |
|---------|---------------------------|------|------|----------------------|-------|-------|
|         | MIN                       | NOM  | MAX  | MIN                  | NOM   | MAX   |
| A       | 0.85                      | 0.95 | 1.00 | 0.033                | 0.037 | 0.039 |
| A1      | 0.00                      | ---  | 0.05 | 0.000                | ---   | 0.002 |
| b       | 0.30                      | 0.40 | 0.50 | 0.012                | 0.016 | 0.020 |
| c       | 0.15                      | 0.20 | 0.25 | 0.006                | 0.008 | 0.010 |
| D       | 5.20 BSC                  |      |      | 0.205 BSC            |       |       |
| D1      | 4.35 BSC                  |      |      | 0.171 BSC            |       |       |
| E       | 5.55 BSC                  |      |      | 0.219 BSC            |       |       |
| E1      | 6.05 BSC                  |      |      | 0.238 BSC            |       |       |
| E2      | 3.62 BSC                  |      |      | 0.143 BSC            |       |       |
| e       | 1.27 BSC                  |      |      | 0.050 BSC            |       |       |
| L       | 0.45                      | 0.55 | 0.65 | 0.018                | 0.022 | 0.026 |
| L1      | 0                         | ---  | 0.15 | 0                    | ---   | 0.006 |
| L2      | 0.68 REF                  |      |      | 0.027 REF            |       |       |
| θ       | 0°                        | ---  | 10°  | 0°                   | ---   | 10°   |