

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

### Key Features:

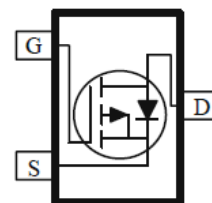
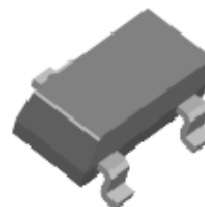
- Low  $r_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed

### Typical Applications:

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



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



| PRODUCT SUMMARY |                            |           |
|-----------------|----------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ (m $\Omega$ ) | $I_D$ (A) |
| -30             | 112 @ $V_{GS} = -4.5V$     | -2.8      |
|                 | 172 @ $V_{GS} = -2.5V$     | -2.3      |

| 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   |                          | $V_{GS}$       | $\pm 8$    |                  |
| Continuous Drain Current <sup>a</sup>                                       | $T_A = 25^\circ\text{C}$ | $I_D$          | -2.8       | A                |
|   | $T_A = 70^\circ\text{C}$ |                | -2.2       |                  |
| Pulsed Drain Current <sup>b</sup>   |                          | $I_{DM}$       | -10        |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   |                          | $I_S$          | -1.7       | A                |
| Power Dissipation <sup>a</sup>  | $T_A = 25^\circ\text{C}$ | $P_D$          | 1.3        | W                |
|   | $T_A = 70^\circ\text{C}$ |                | 0.8        |                  |
| 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 | $R_{\theta JA}$ | 100     | $^\circ\text{C/W}$ |
|  | Steady State    |                 | 166     |                    |

### Notes

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

## Electrical Characteristics

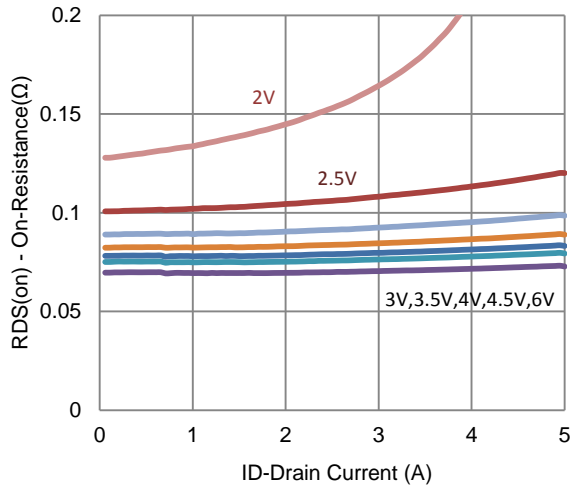
| Parameter                               | Symbol       | Test Conditions   | Min  | Typ  | Max       | Unit       |
|---|--------------|---|------|------|-----------|------------|
| <b>Static</b>                           |              |   |      |      |           |            |
| Gate-Source Threshold Voltage           | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250 \mu A$   | -0.4 |      |           | V          |
| Gate-Body Leakage                       | $I_{GSS}$    | $V_{DS} = 0 V, V_{GS} = \pm 8 V$  |      |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | $V_{DS} = -24 V, V_{GS} = 0 V$  |      |      | -1        | uA         |
|   |              | $V_{DS} = -24 V, V_{GS} = 0 V, T_J = 55^\circ C$  |      |      | -25       |            |
| On-State Drain Current <sup>a</sup>     | $I_{D(on)}$  | $V_{DS} = -5 V, V_{GS} = -4.5 V$  | -4   |      |           | A          |
| Drain-Source On-Resistance <sup>a</sup> | $r_{DS(on)}$ | $V_{GS} = -4.5 V, I_D = -2 A$   |      |      | 112       | m $\Omega$ |
|   |              | $V_{GS} = -2.5 V, I_D = -1.6 A$   |      |      | 172       |            |
| Forward Transconductance <sup>a</sup>   | $g_{fs}$     | $V_{DS} = -15 V, I_D = -2.5 A$  |      | 11   |           | S          |
| Diode Forward Voltage <sup>a</sup>      | $V_{SD}$     | $I_S = -0.9 A, V_{GS} = 0 V$  |      | -0.8 |           | V          |
| <b>Dynamic <sup>b</sup></b>             |              |   |      |      |           |            |
| Total Gate Charge                       | $Q_g$        | $V_{DS} = -15 V, V_{GS} = -4.5 V,$<br>$I_D = -2 A$  |      | 8.4  |           | nC         |
| Gate-Source Charge                      | $Q_{gs}$     |   |      | 1.3  |           |            |
| Gate-Drain Charge                       | $Q_{gd}$     |   |      | 2.5  |           |            |
| Turn-On Delay Time                      | $t_{d(on)}$  | $V_{DS} = -15 V, R_L = 7.5 \Omega, I_D = -2 A,$<br>$V_{GEN} = -4.5 V, R_{GEN} = 6 \Omega$ |      | 8    |           | ns         |
| Rise Time                               | $t_r$        |   |      | 6    |           |            |
| Turn-Off Delay Time                     | $t_{d(off)}$ |   |      | 29   |           |            |
| Fall Time                               | $t_f$        |   |      | 11   |           |            |
| Input Capacitance                       | $C_{iss}$    | $V_{DS} = -15 V, V_{GS} = 0 V, f = 1 MHz$   |      | 474  |           | pF         |
| Output Capacitance                      | $C_{oss}$    |   |      | 52   |           |            |
| Reverse Transfer Capacitance            | $C_{rss}$    |   |      | 48   |           |            |

## Notes

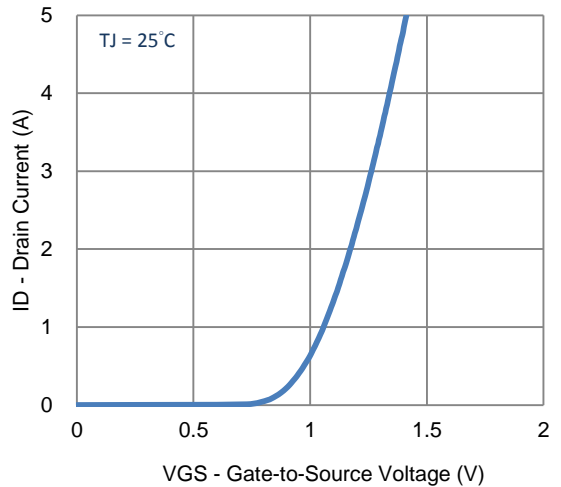
- Pulse test: PW  $\leq$  300us duty cycle  $\leq$  2%.
- Guaranteed by design, not subject to production testing.

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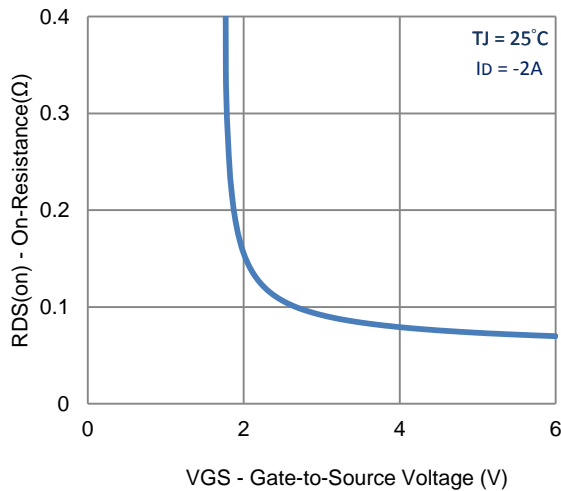
Typical Electrical Characteristics



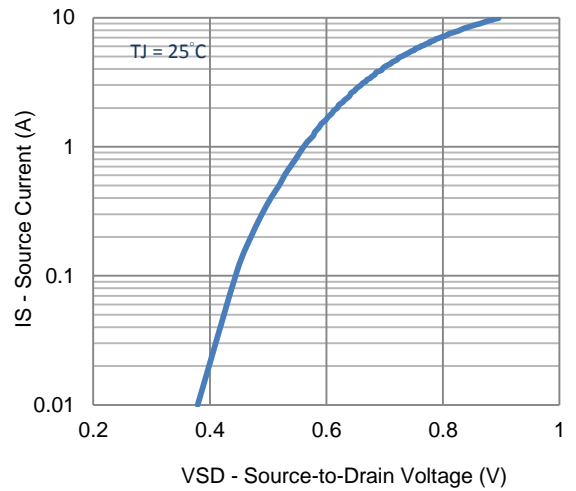
1. On-Resistance vs. Drain Current



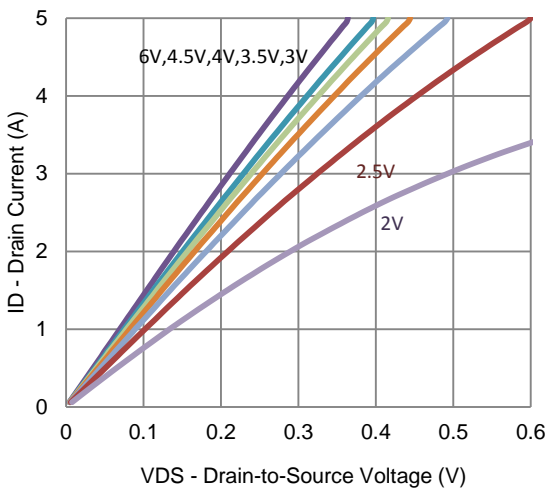
2. Transfer Characteristics



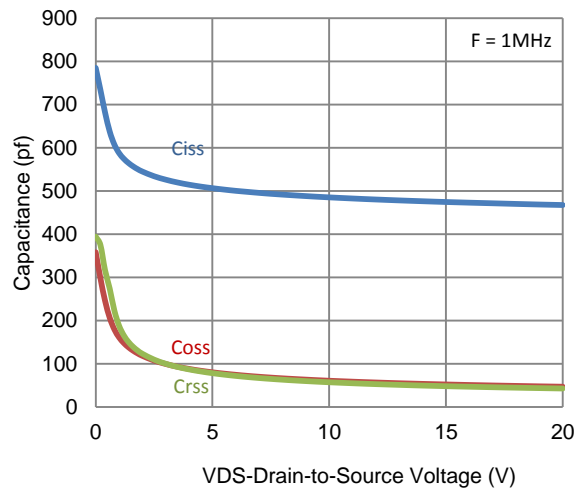
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

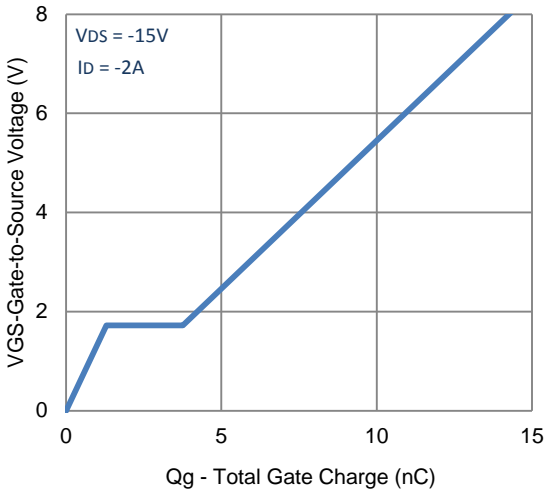


5. Output Characteristics

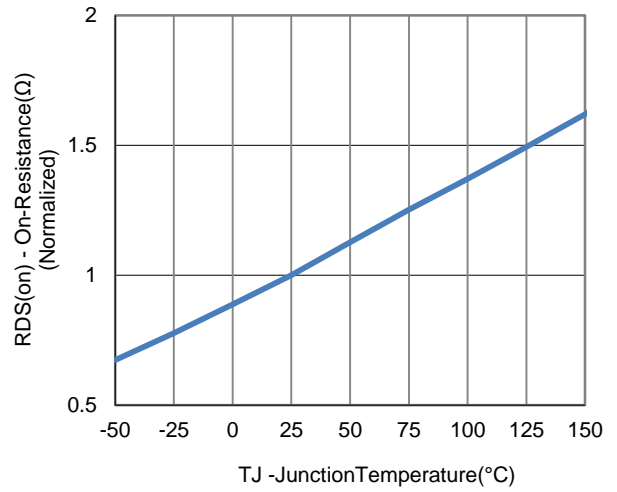


6. Capacitance

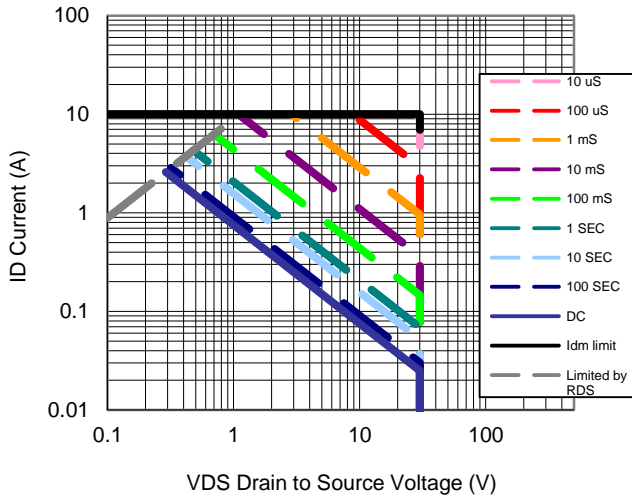
Typical Electrical Characteristics



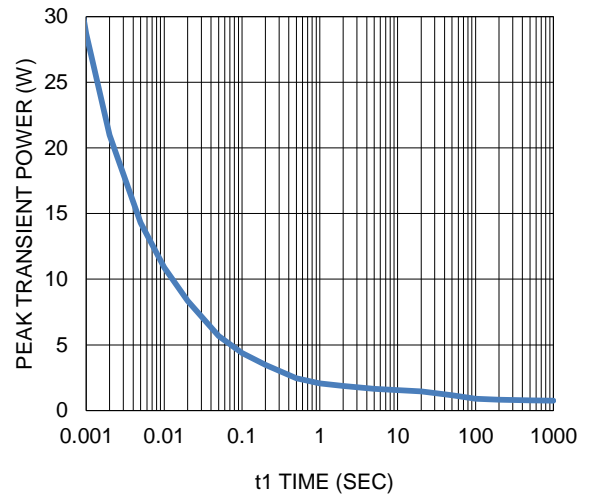
7. Gate Charge



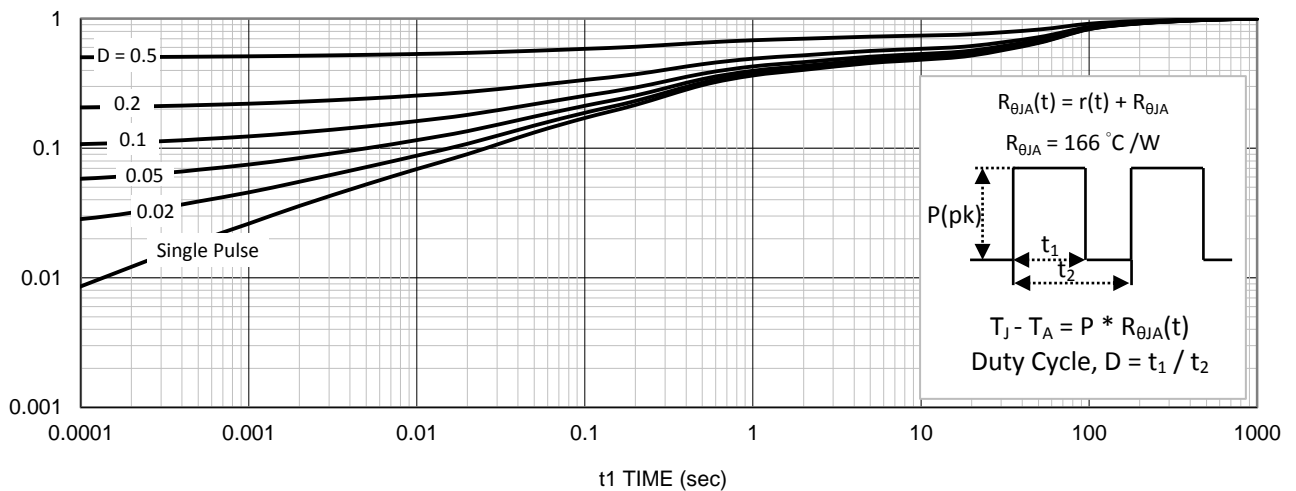
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

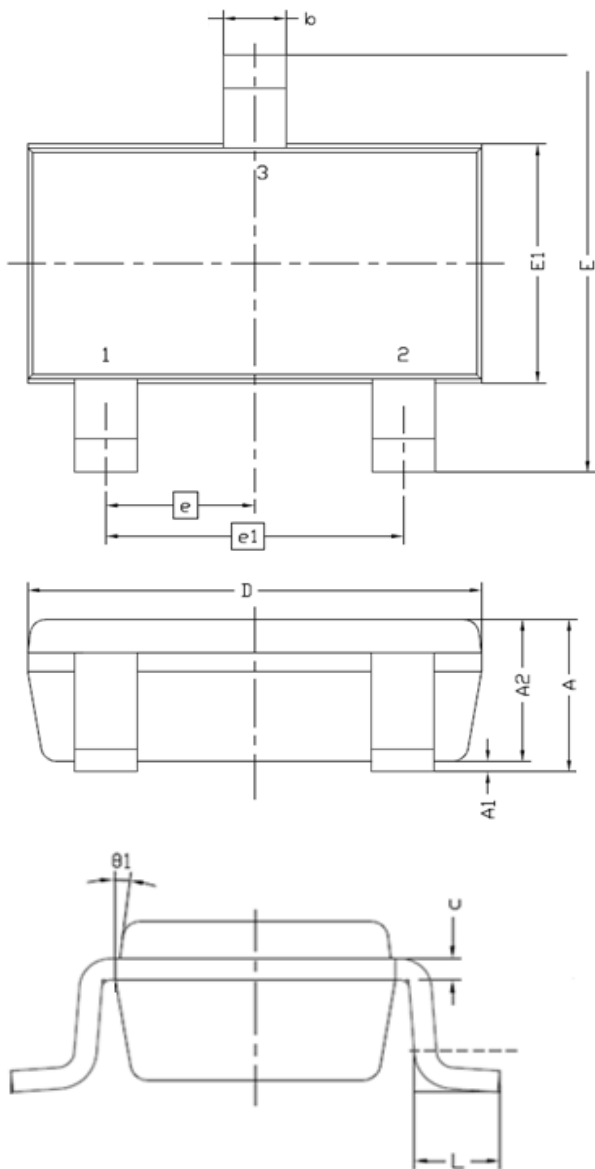


10. Single Pulse Maximum Power Dissipation



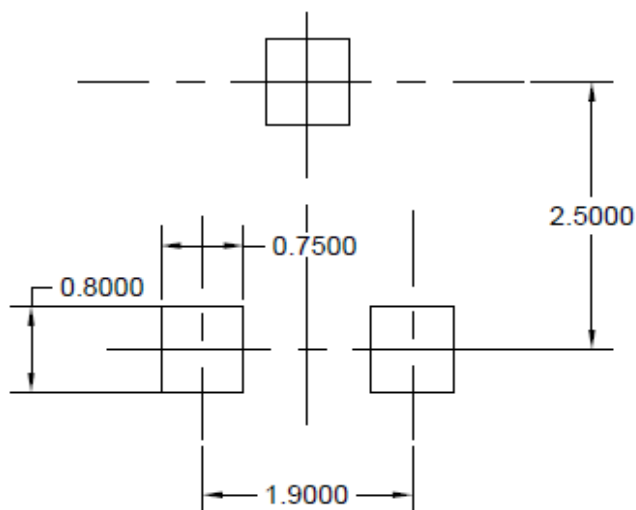
11. Normalized Thermal Transient Junction to Ambient

## Package Information



| Symbol     | MILLIMETERS |     |
|------------|-------------|-----|
|            | MIN         | MAX |
| A          | 0.8         | 1.2 |
| A1         | 0           | 0.1 |
| A2         | 0.7         | 1.1 |
| b          | 0.3         | 0.5 |
| c          | 0.1         | 0.2 |
| D          | 2.7         | 3.1 |
| E          | 2.6         | 3   |
| E1         | 1.4         | 1.8 |
| e          | 0.95 BSC    |     |
| e1         | 1.9 BSC     |     |
| L          | 0.3         | 0.6 |
| $\theta 1$ | 7° NOM      |     |

## Recommended Pad Layout



Note: Drain opening is recommended to be solder mask defined in a copper fill for improved thermal performance

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