

N-Channel 20-V (D-S) MOSFET

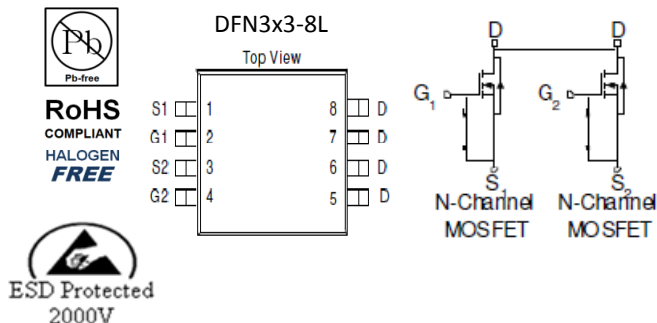
Key Features:

- 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 Ω) | I_D (A) |
| 20 | 21 @ $V_{GS} = 4.5V$ | 8.2 |
| | 24 @ $V_{GS} = 2.5V$ | 7.5 |



| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ UNLESS OTHERWISE NOTED) | | | | |
|---|--------------------|----------------|------------|------------|
| Parameter | | Symbol | Limit | Units |
| Drain-Source Voltage | | V_{DS} | 20 | V |
| Gate-Source Voltage | | V_{GS} | ± 8 | |
| Continuous Drain Current ^a | $T_A = 25^\circ C$ | I_D | 8.2 | A |
| | $T_A = 70^\circ C$ | | 6 | |
| Pulsed Drain Current ^b | | I_{DM} | 40 | |
| Continuous Source Current (Diode Conduction) ^a | | I_S | 2.1 | A |
| Power Dissipation ^a | $T_A = 25^\circ C$ | P_D | 1.5 | W |
| | $T_A = 70^\circ C$ | | 0.8 | |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to 150 | $^\circ C$ |

| THERMAL RESISTANCE RATINGS | | | | |
|--|-----------------|-----------------|---------|--------------|
| Parameter | | Symbol | Maximum | Units |
| Maximum Junction-to-Ambient ^a | $t \leq 10$ sec | $R_{\theta JA}$ | 83 | $^\circ C/W$ |
| | Steady State | | 120 | |

Notes

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

Electrical Characteristics

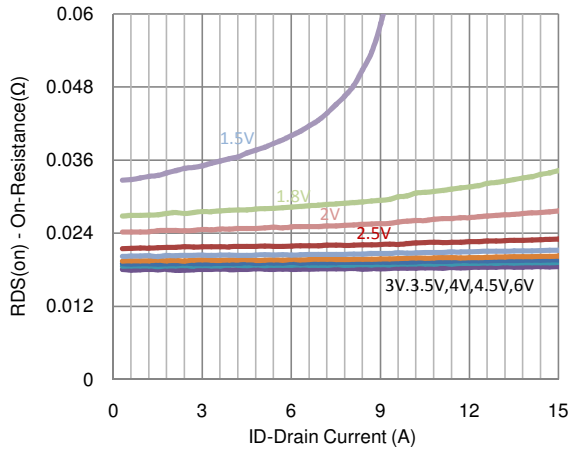
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---------------------------------|--------------|---|-----|------|-----------|-----------|
| Static | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu A$ | 0.4 | | | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0 V, V_{GS} = \pm 8 V$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 16 V, V_{GS} = 0 V$ | | | 1 | μA |
| | | $V_{DS} = 16 V, V_{GS} = 0 V, T_J = 55^\circ C$ | | | 25 | |
| On-State Drain Current | $I_{D(on)}$ | $V_{DS} = 5 V, V_{GS} = 4.5 V$ | 15 | | | A |
| Drain-Source On-Resistance | $r_{DS(on)}$ | $V_{GS} = 4.5 V, I_D = 6.6 A$ | | 16 | 21 | $m\Omega$ |
| | | $V_{GS} = 2.5 V, I_D = 6 A$ | | 20 | 24 | |
| Forward Transconductance | g_{fs} | $V_{DS} = 10 V, I_D = 6.6 A$ | | 25 | | S |
| Diode Forward Voltage | V_{SD} | $I_S = 1.1 A, V_{GS} = 0 V$ | | 0.68 | | V |
| Dynamic | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 10 V, V_{GS} = 4.5 V,$ $I_D = 6.6 A$ | | 11 | | nC |
| Gate-Source Charge | Q_{gs} | | | 2.7 | | |
| Gate-Drain Charge | Q_{gd} | | | 2.1 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS} = 10 V, R_L = 1.6 \Omega,$ $I_D = 6.6 A,$ $V_{GEN} = 4.5 V, R_{GEN} = 6 \Omega$ | | 57 | | ns |
| Rise Time | t_r | | | 87 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 604 | | |
| Fall Time | t_f | | | 198 | | |
| Input Capacitance | C_{iss} | $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz$ | | 877 | | pF |
| Output Capacitance | C_{oss} | | | 88 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 254 | | |

Notes

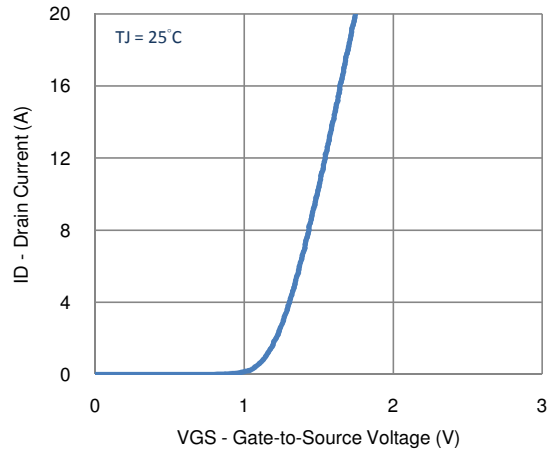
- Pulse test: PW \leq 300us duty cycle \leq 2%.
- Guaranteed by design, not subject to production testing.

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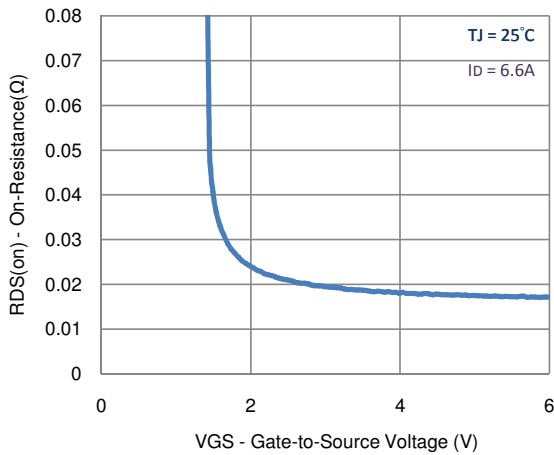
Typical Electrical Characteristics



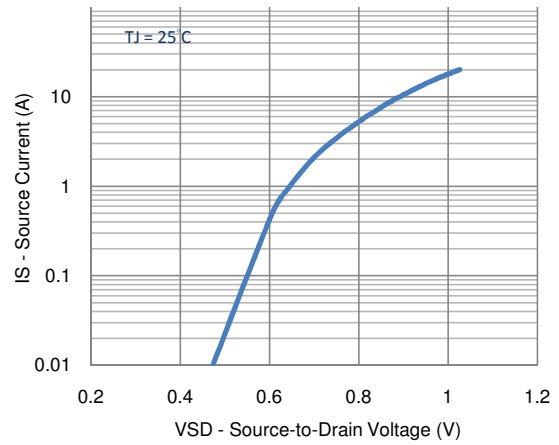
1. On-Resistance vs. Drain Current



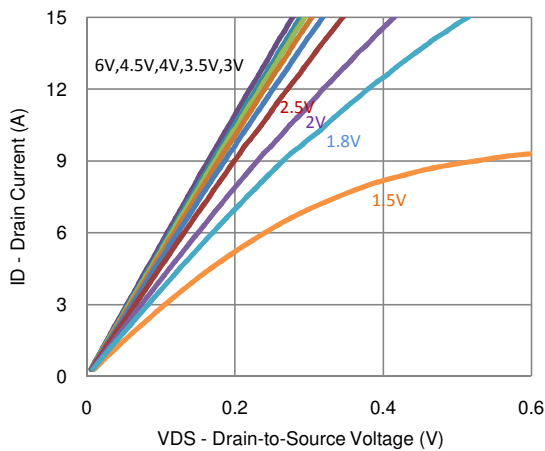
2. Transfer Characteristics



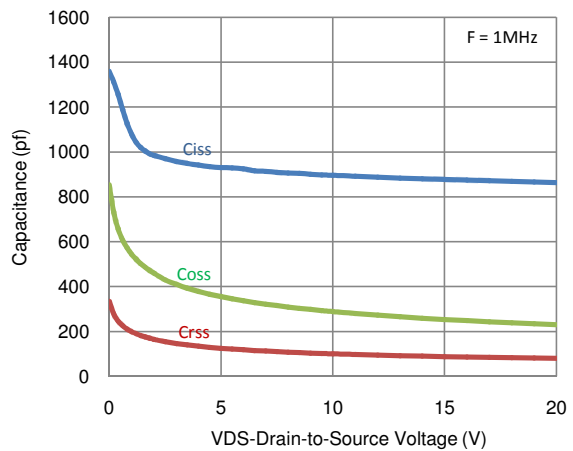
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

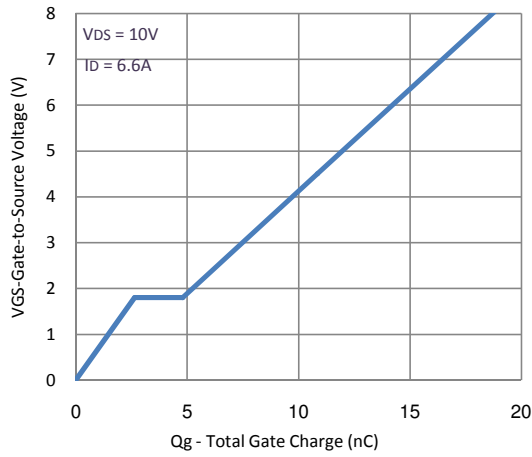


5. Output Characteristics

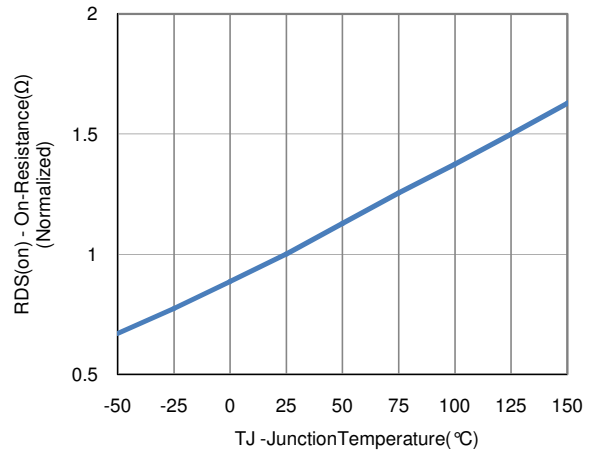


6. Capacitance

Typical Electrical Characteristics

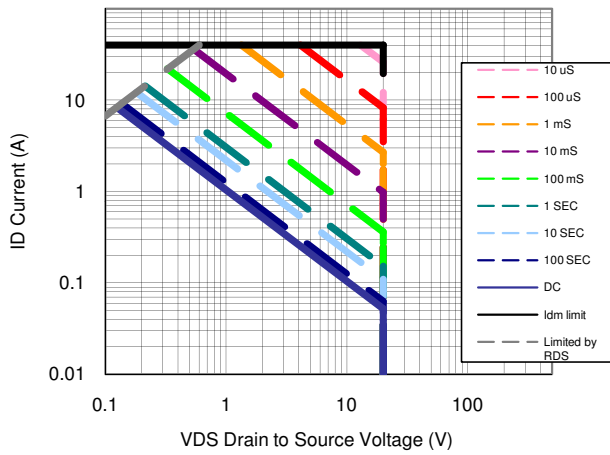


7. Gate Charge

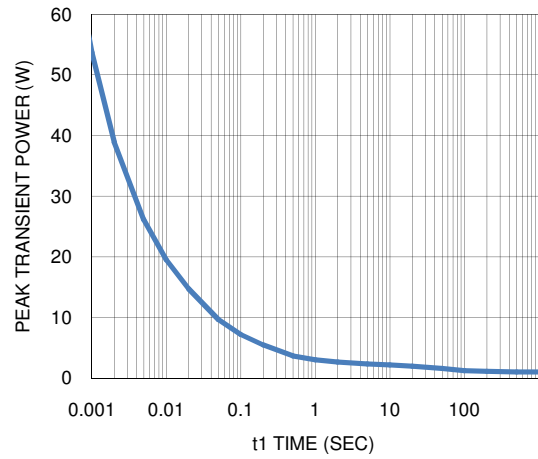


8. Normalized On-Resistance Vs Junction Temperature

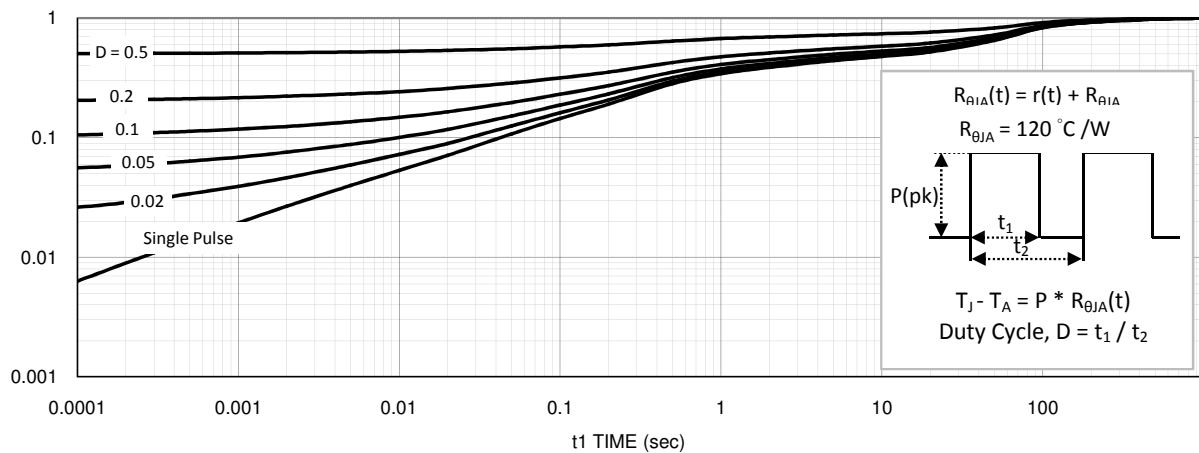
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9. Safe Operating Area

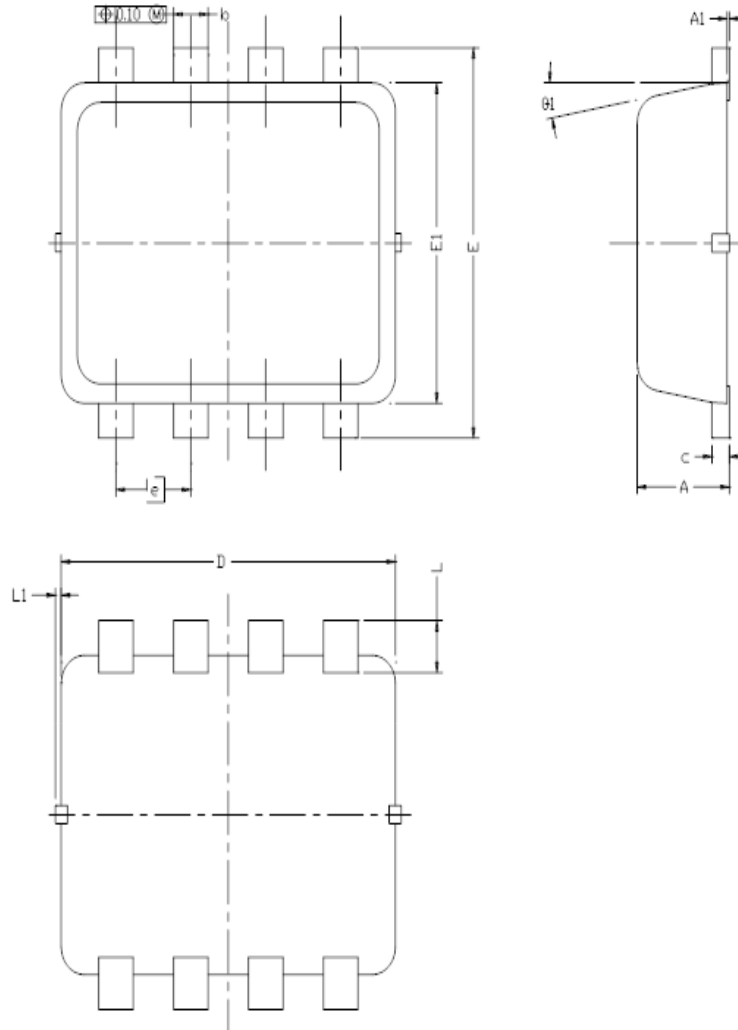


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



| DIM. | MILLIMETERS | | | INCHES | | |
|------|-------------|-------|-------|-----------|--------|--------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.700 | 0.80 | 0.900 | 0.0276 | 0.0315 | 0.0354 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.24 | 0.30 | 0.35 | 0.009 | 0.012 | 0.014 |
| c | 0.08 | 0.152 | 0.25 | 0.003 | 0.006 | 0.010 |
| D | 2.90 BSC | | | 0.114 BSC | | |
| E | 2.80 BSC | | | 0.110 BSC | | |
| E1 | 2.30 BSC | | | 0.091 BSC | | |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.20 | 0.375 | 0.450 | 0.008 | 0.0148 | 0.0177 |
| L1 | 0 | --- | 0.100 | 0 | --- | 0.004 |
| θ1 | 0 | 10 | 12 | 0 | 10 | 12 |