

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

Key Features:

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

Typical Applications:

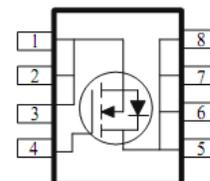
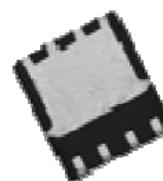
- DC/DC Conversion Circuits
- Motor Drives

| PRODUCT SUMMARY | | |
|-----------------|----------------------------|-----------|
| V_{DS} (V) | $r_{DS(on)}$ (m Ω) | I_D (A) |
| 60 | 13 @ $V_{GS} = 10V$ | 14 |
| | 16 @ $V_{GS} = 4.5V$ | 12 |

DFN3x3-8L



RoHS
COMPLIANT
HALOGEN
FREE



| 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} | ± 20 | |
| Continuous Drain Current ^a | $T_A = 25^\circ\text{C}$ | I_D | 14 | A |
| | $T_A = 70^\circ\text{C}$ | | 10 | |
| Pulsed Drain Current ^b | | I_{DM} | 60 | |
| Continuous Source Current (Diode Conduction) ^a | | I_S | 4.6 | A |
| Power Dissipation ^a | $T_A = 25^\circ\text{C}$ | P_D | 3.5 | W |
| | $T_A = 70^\circ\text{C}$ | | 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 ^a | $t \leq 10$ sec | $R_{\theta JA}$ | 35 | $^\circ\text{C/W}$ |
| | Steady State | | 81 | |

Notes

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

Electrical Characteristics

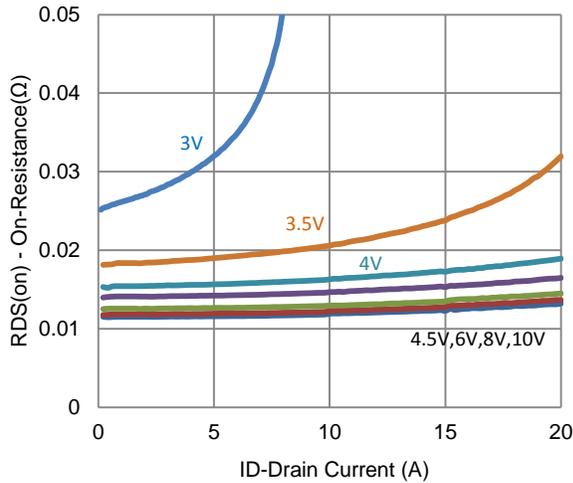
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|-----------------------------------------|--------------|-----------------------------------------------------------------------------------------------|-----|------|-----------|------|
| Static | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu A$ | 1 | | | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0 V, V_{GS} = \pm 20 V$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 48 V, V_{GS} = 0 V$ | | | 1 | uA |
| | | $V_{DS} = 48 V, V_{GS} = 0 V, T_J = 55^\circ C$ | | | 10 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} = 5 V, V_{GS} = 10 V$ | 20 | | | A |
| Drain-Source On-Resistance ^a | $r_{DS(on)}$ | $V_{GS} = 10 V, I_D = 10.7 A$ | | | 13 | mΩ |
| | | $V_{GS} = 4.5 V, I_D = 8.6 A$ | | | 16 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15 V, I_D = 10.7 A$ | | 12 | | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 2.3 A, V_{GS} = 0 V$ | | 0.78 | | V |
| Dynamic ^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 30 V, V_{GS} = 4.5 V,$ $I_D = 10.7 A$ | | 16 | | nC |
| Gate-Source Charge | Q_{gs} | | | 5.6 | | |
| Gate-Drain Charge | Q_{gd} | | | 6.5 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS} = 30 V, R_L = 2.9 \Omega,$ $I_D = 10.7 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$ | | 11 | | ns |
| Rise Time | t_r | | | 12 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 63 | | |
| Fall Time | t_f | | | 18 | | |
| Input Capacitance | C_{iss} | $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 \text{ Mhz}$ | | 2775 | | pF |
| Output Capacitance | C_{oss} | | | 165 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 129 | | |

Notes

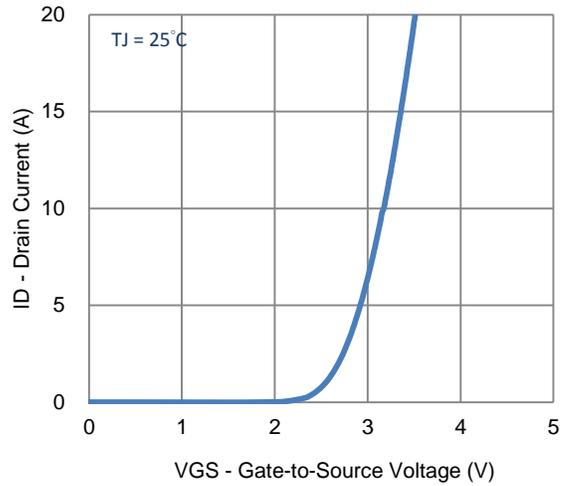
- Pulse test: $PW \leq 300 \mu s$ duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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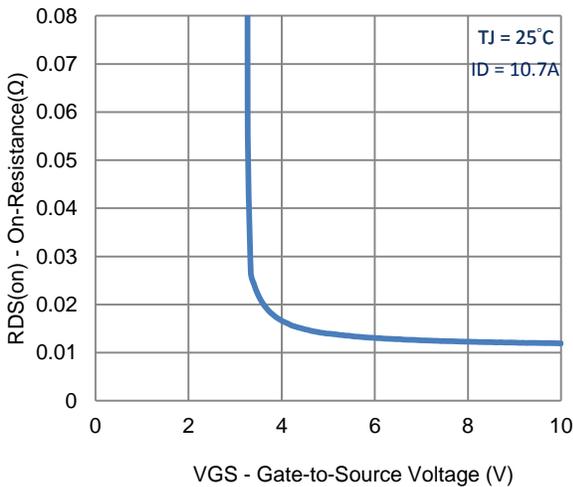
Typical Electrical Characteristics



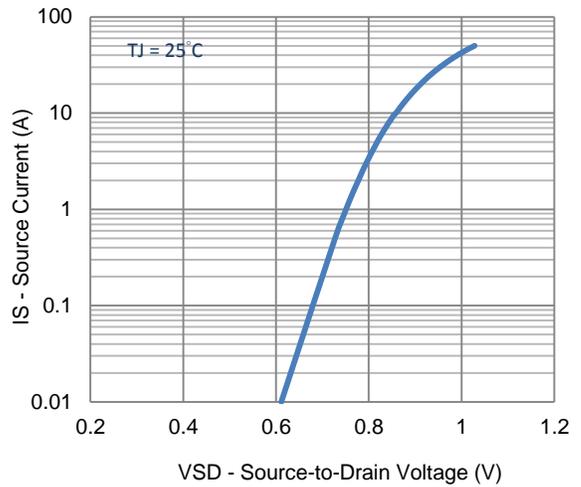
1. On-Resistance vs. Drain Current



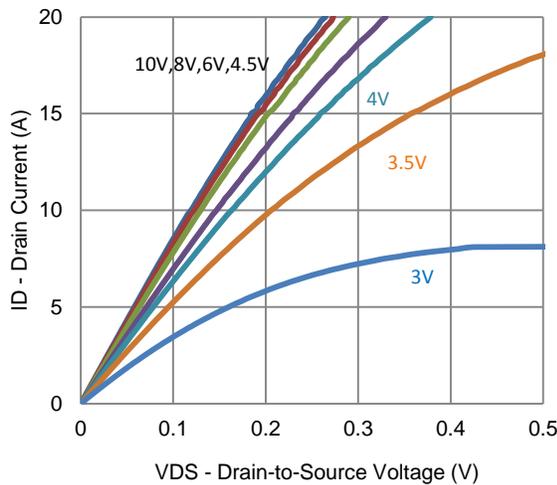
2. Transfer Characteristics



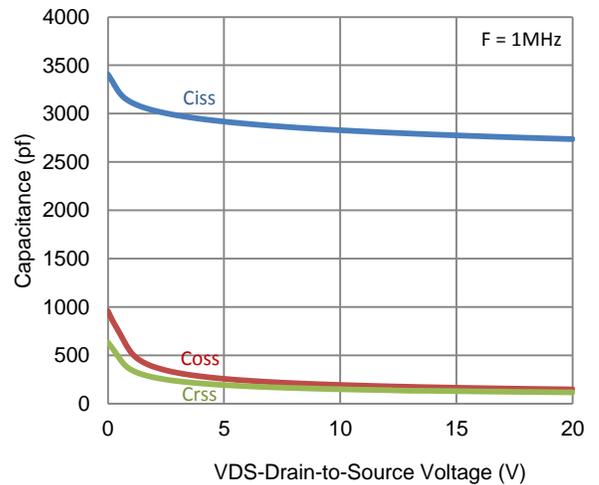
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

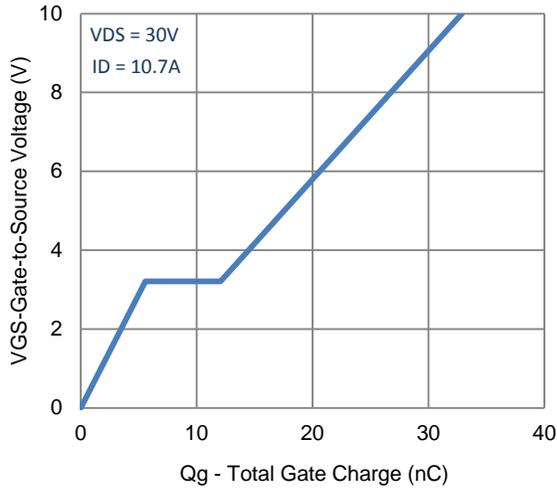


5. Output Characteristics

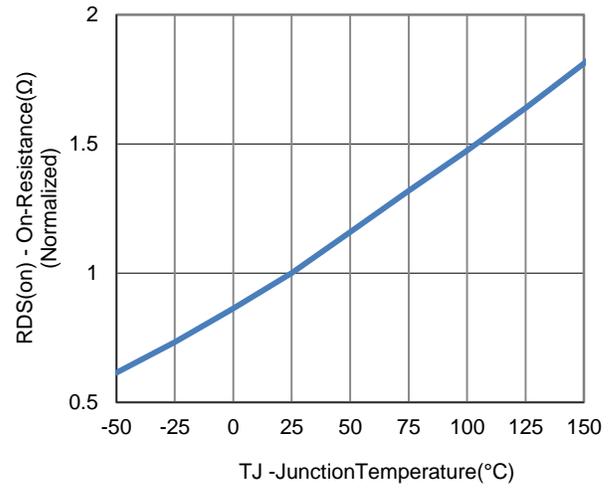


6. Capacitance

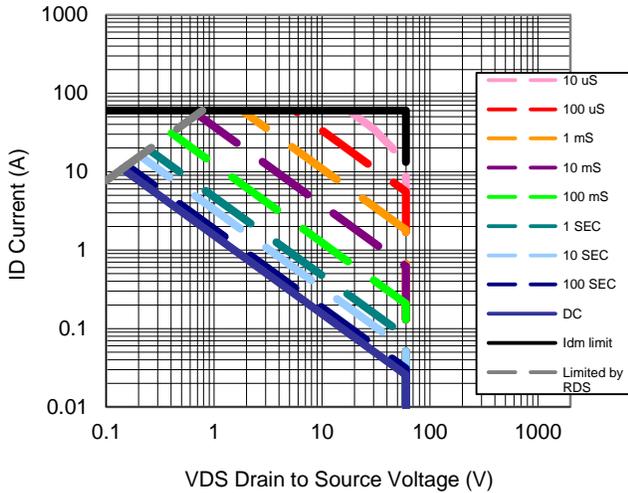
Typical Electrical Characteristics



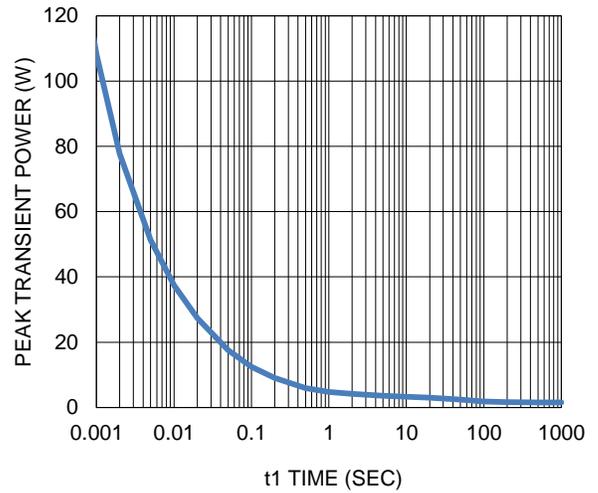
7. Gate Charge



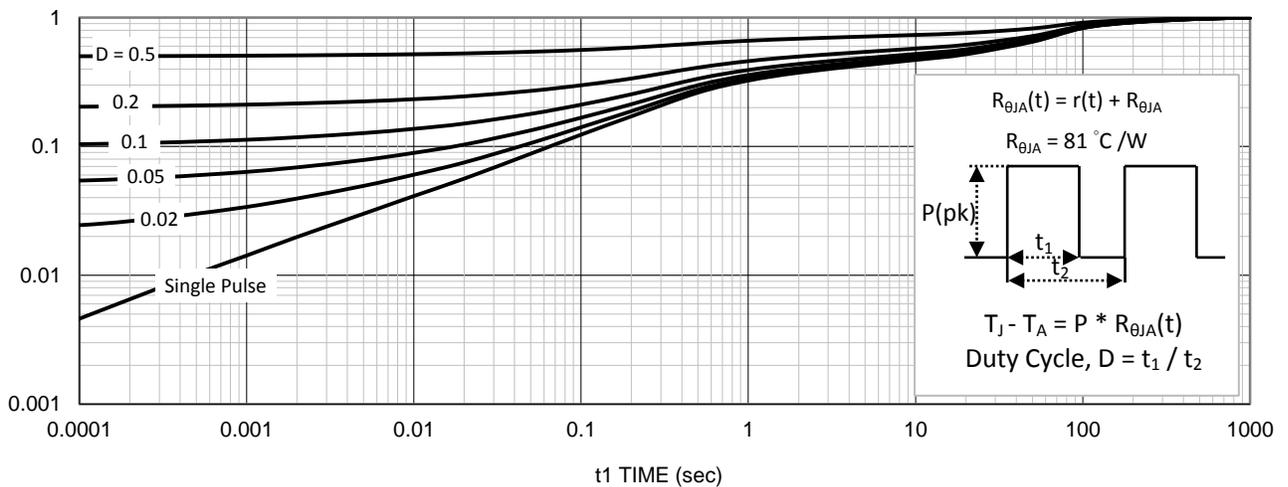
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

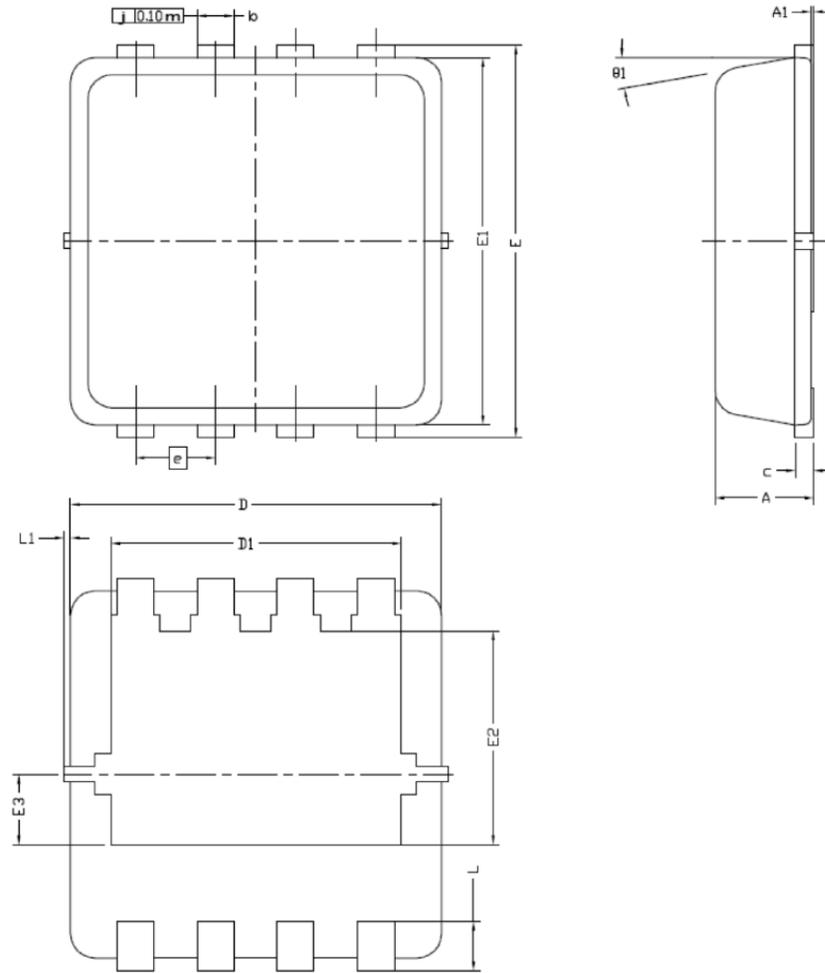


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



| 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 | 0,10 | 0,152 | 0,25 | 0,004 | 0,006 | 0,010 |
| D | 3,00 BSC | | | 0,118 BSC | | |
| D1 | 2,35 BSC | | | 0,093 BSC | | |
| E | 3,20 BSC | | | 0,126 BSC | | |
| E1 | 3,00 BSC | | | 0,118 BSC | | |
| E2 | 1,75 BSC | | | 0,069 BSC | | |
| E3 | 0,575 BSC | | | 0,023 BSC | | |
| e | 0,65 BSC | | | 0,026 BSC | | |
| L | 0,30 | 0,40 | 0,50 | 0,0118 | 0,0157 | 0,0197 |
| L1 | 0 | --- | 0,100 | 0 | --- | 0,004 |
| θ_1 | 0° | 10° | 12° | 0° | 10° | 12° |