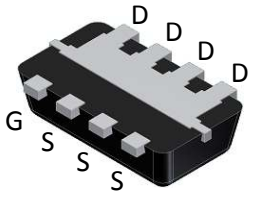
# N-Channel 60-V (D-S) MOSFET

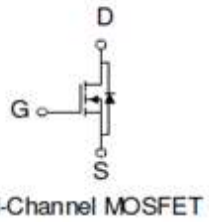
**Key Features:**
- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed
- Small Footprint DFN3x2-8L package

**Typical Applications:**
- Telecom DC/DC converters
- White LED boost converters
- Industrial DC/DC conversion
- Automotive Entertainment and GPS DC/DC conversion

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (mΩ) | $I_D$(A) |
| 60 | 82 @ $V_{GS}$ = 10V | 5 |
| | 115 @ $V_{GS}$ = 4.5V | 4.1 |

DFN3x2-8L EP



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°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°C | $I_D$ | 5 | A |
| | $T_A$=70°C | | 3.7 | |
| Pulsed Drain Current [b] | | $I_{DM}$ | 30 | |
| Continuous Source Current (Diode Conduction) [a] | | $I_S$ | 4.3 | A |
| Power Dissipation [a] | $T_A$=25°C | $P_D$ | 3.5 | W |
| | $T_A$=70°C | | 2 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to 150 | °C |

| THERMAL RESISTANCE RATINGS | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Maximum** | **Units** |
| Maximum Junction-to-Ambient [a] | t <= 10 sec | $R_{\theta JA}$ | 35 | °C/W |
| | Steady State | | 81 | |

Notes
a. Surface Mounted on 1” x 1” FR4 Board.
b. Pulse width limited by maximum junction temperature

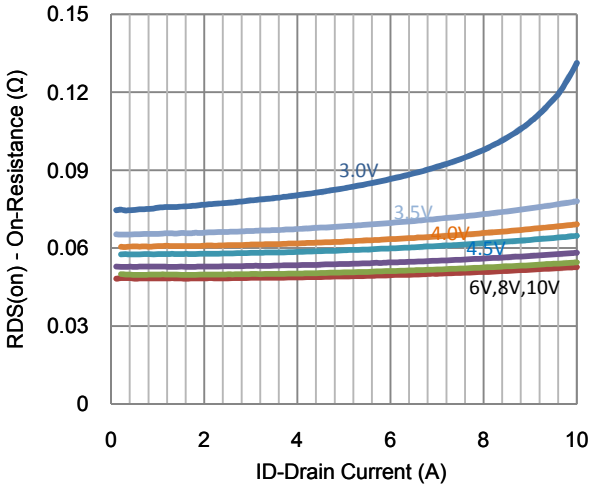
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, ID = 250 uA | 1 | 1.5 | 3 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = 20 V | | | ±100 | 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°C | | | 25 | |
| On-State Drain Current | $I_{D(on)}$ | $V_{DS}$ = 5 V, $V_{GS}$ = 10 V | 10 | | | A |
| Drain-Source On-Resistance | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 4 A | | | 82 | mΩ |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 3.3 A | | | 115 | |
| Forward Transconductance | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 4 A | | 10 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = 2.1 A, $V_{GS}$ = 0 V | | 0.77 | | V |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 30 V, $V_{GS}$ = 4.5 V, $I_D$ = 4 A | | 4.1 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.2 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.4 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 30 V, $R_L$ = 7.5 Ω , $I_D$ = 4 A, $V_{GEN}$ = 10 V, $R_{GEN}$ = 6 Ω | | 2.5 | | nS |
| Rise Time | $t_r$ | | | 4.1 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 12.1 | | |
| Fall-Time | $t_f$ | | | 4.5 | | |

Notes

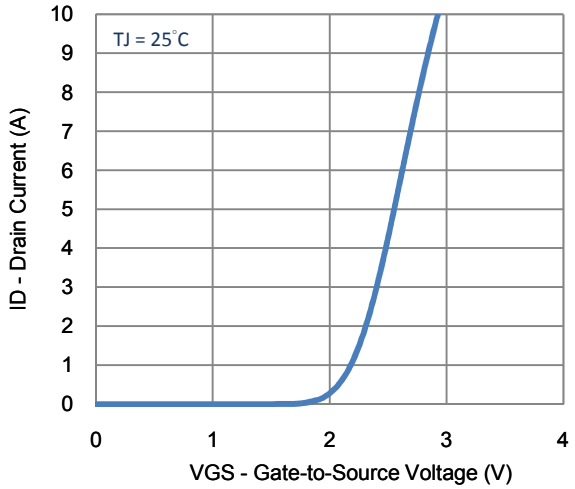
a. Pulse test: PW <= 300us duty cycle <= 2%.

b. Guaranteed by design, not subject to production testing.

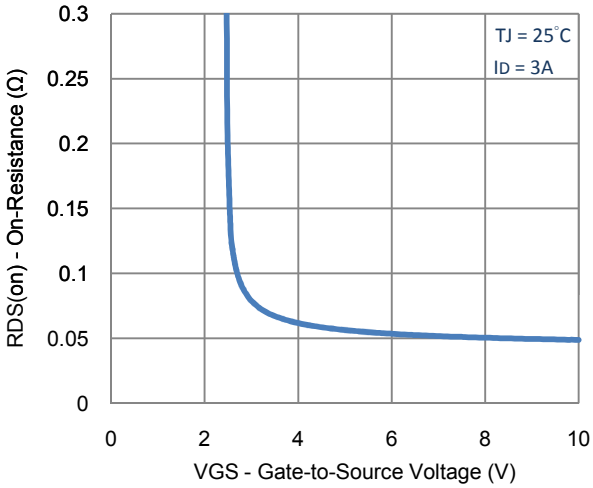
## Typical Electrical Characteristics



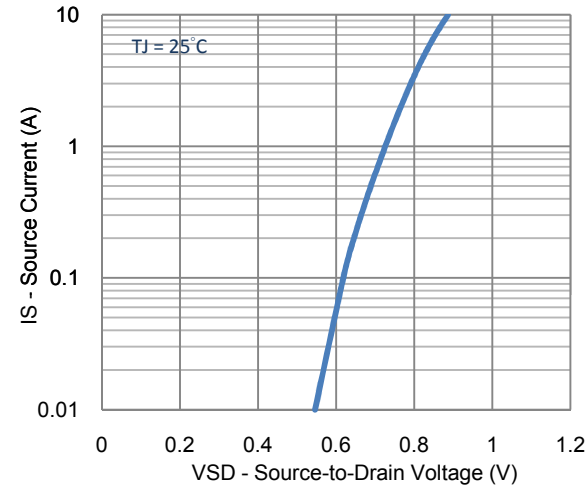

**1. On-Resistance vs. Drain Current**



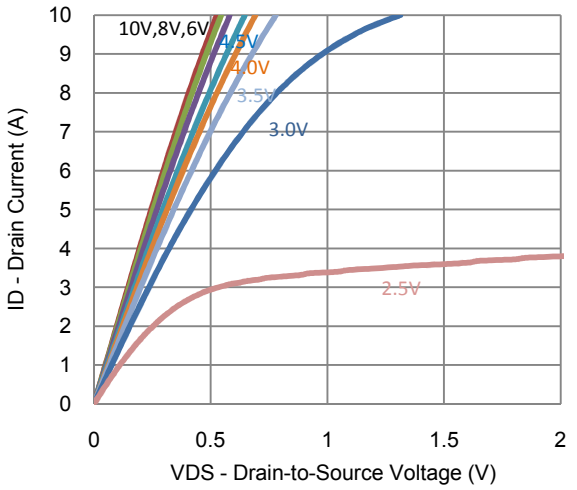

**2. Transfer Characteristics**



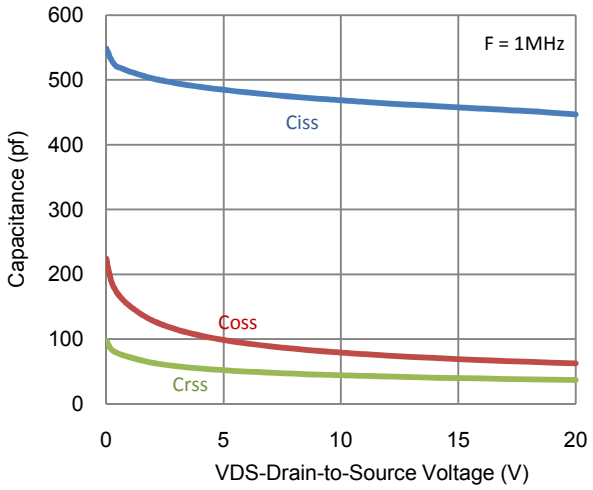

**3. On-Resistance vs. Gate-to-Source Voltage**




**4. Drain-to-Source Forward Voltage**

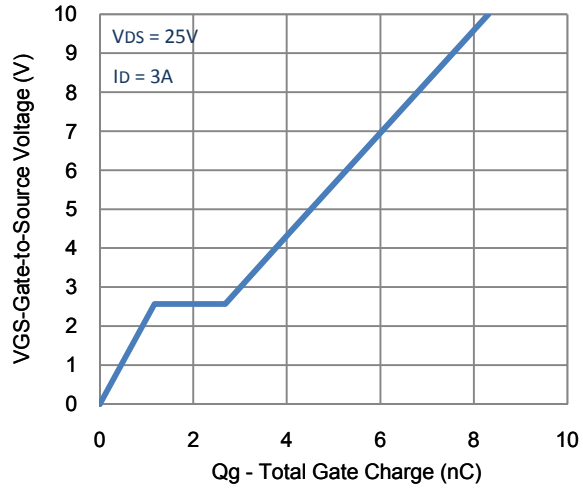



**5. Output Characteristics**

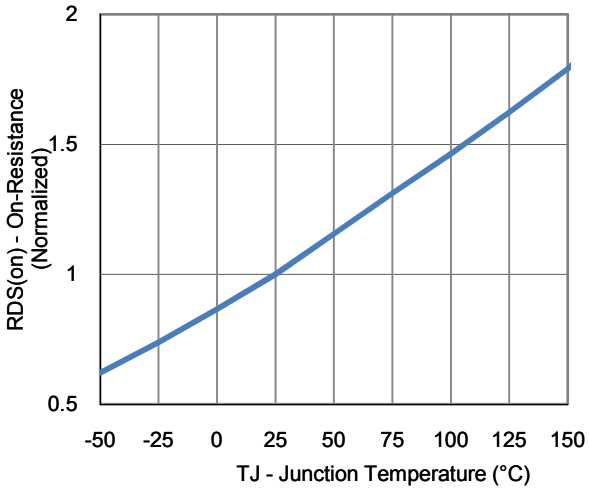



**6. Capacitance**

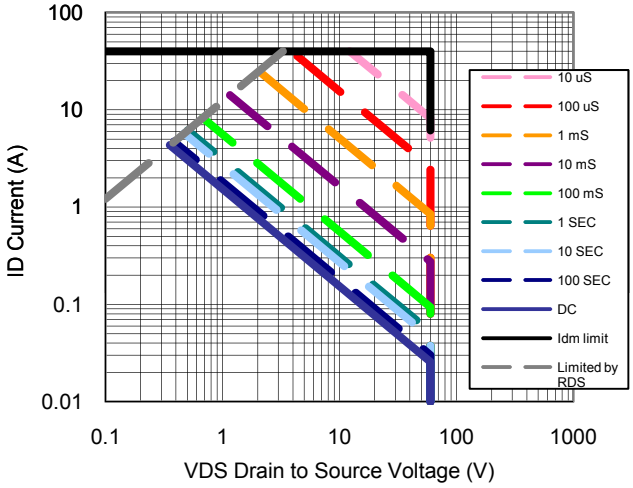
## Typical Electrical Characteristics



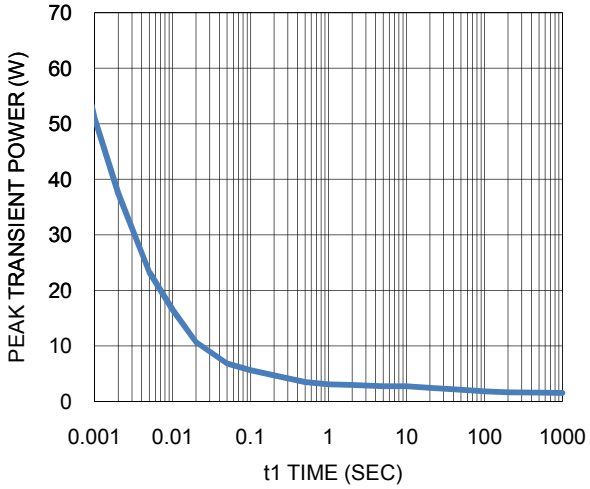

**7. Gate Charge**



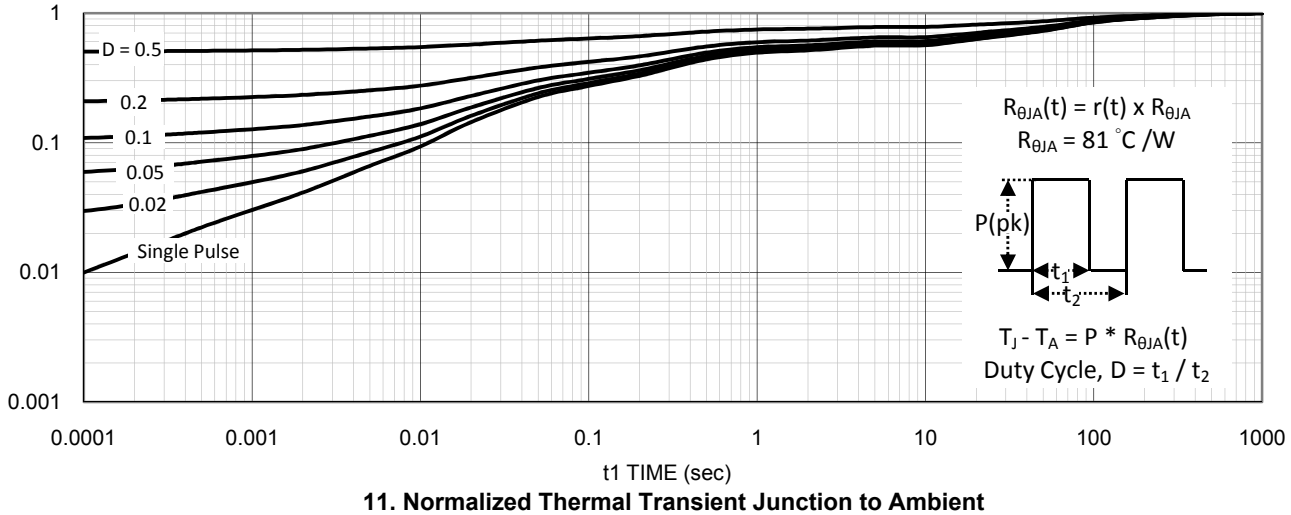

**8. Normalized On-Resistance Vs Junction Temperature**




**9. Safe Operating Area**

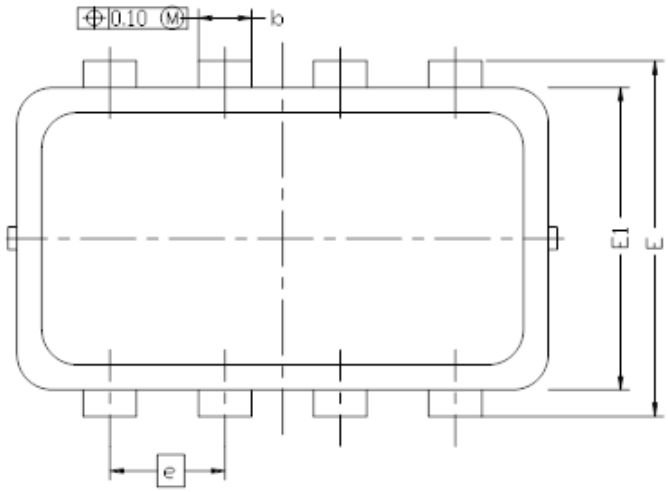


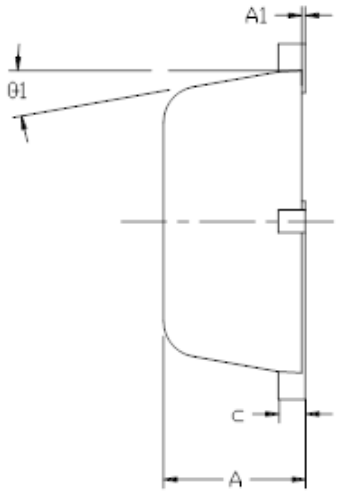

**10. Single Pulse Maximum Power Dissipation**

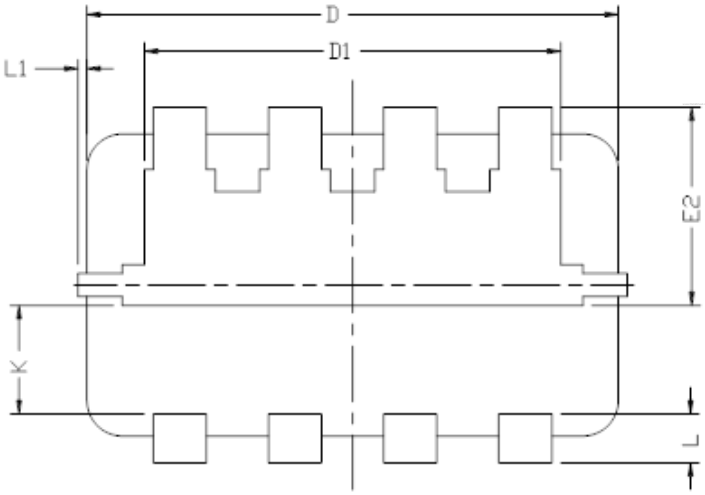



**11. Normalized Thermal Transient Junction to Ambient**

## 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 | 0.08 | 0.152 | 0.25 | 0.003 | 0.006 | 0.010 |
| D | 3.00 BSC | | | 0.118 BSC | | |
| D1 | 2.30 | 2.35 | 2.40 | 0.091 | 0.093 | 0.095 |
| E | 2.00 BSC | | | 0.079 BSC | | |
| E1 | 1.70 BSC | | | 0.067 BSC | | |
| E2 | 1.065 | 1.115 | 1.165 | 0.042 | 0.044 | 0.046 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.20 | 0.275 | 0.400 | 0.008 | 0.011 | 0.0157 |
| K | 0.56 | 0.61 | 0.66 | 0.022 | 0.024 | 0.026 |
| L1 | 0 | --- | 0.100 | 0 | --- | 0.004 |
| θ1 | 0? | 10? | 12? | 0? | 10? | 12? |

Note:
1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs. Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
4. The Package Top May Be Smaller Than The Package Bottom.