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

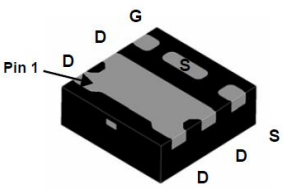
**Key Features:**
- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

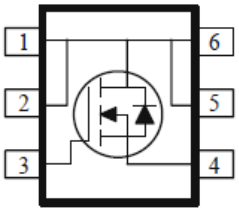
**Typical Applications:**
- Power Routing
- Li Ion Battery Packs
- Level Shifting and Driver Circuits

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (mΩ) | $I_D$ (A) |
| 20 | 30 @ $V_{GS}$ = 4.5V | 6.9 |
| | 36 @ $V_{GS}$ = 2.5V | 6.3 |

Pb-free
RoHS COMPLIANT
HALOGEN FREE

DFN1.6x1.6-6L




| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°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°C | $I_D$ | 6.9 | A |
| | $T_A$=70°C | | 4 | |
| Pulsed Drain Current [b] | | $I_{DM}$ | 25 | |
| Continuous Source Current (Diode Conduction) [a] | | $I_S$ | 3 | A |
| Power Dissipation [a] | $T_A$=25°C | $P_D$ | 2.1 | W |
| | $T_A$=70°C | | 0.7 | |
| 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 | $R_{\theta JA}$ | 70 | °C/W |
| | Steady State | | 110 | |

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

## Electrical Characteristics

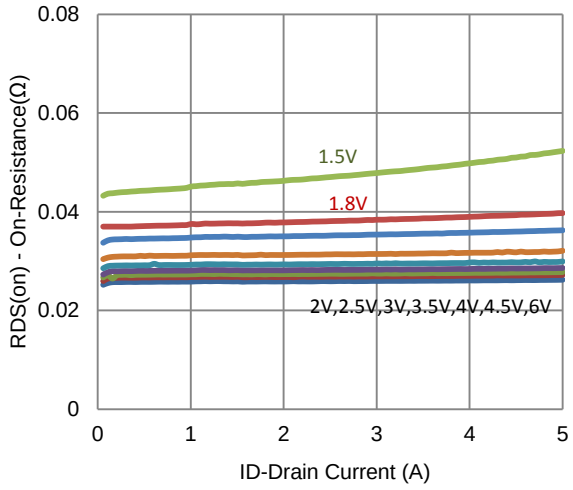
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 uA | 0.4 | | | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±8 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 16 V, $V_{GS}$ = 0 V | | | 1 | uA |
| | | $V_{DS}$ = 16 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | 10 | |
| On-State Drain Current [a] | $I_{D(on)}$ | $V_{DS}$ = 5 V, $V_{GS}$ = 4.5 V | 10 | | | A |
| Drain-Source On-Resistance [a] | $r_{DS(on)}$ | $V_{GS}$ = 4.5 V, $I_D$ = 2 A | | | 30 | mΩ |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 1.6 A | | | 36 | |
| Forward Transconductance [a] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 2 A | | 5 | | S |
| Diode Forward Voltage [a] | $V_{SD}$ | $I_S$ = 1.5 A, $V_{GS}$ = 0 V | | 0.67 | | V |
| **Dynamic [b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 10 V, $V_{GS}$ = 4.5 V, $I_D$ = 2 A | | 12 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 2.1 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 2.8 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$ = 10 V, $R_L$ = 5 Ω, $I_D$ = 2 A, $V_{GEN}$ = 4.5 V, $R_{GEN}$ = 6 Ω | | 8 | | ns |
| Rise Time | $t_r$ | | | 18 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 60 | | |
| Fall Time | $t_f$ | | | 17 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 Mhz | | 726 | | pF |
| Output Capacitance | $C_{oss}$ | | | 74 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 69 | | |

Notes

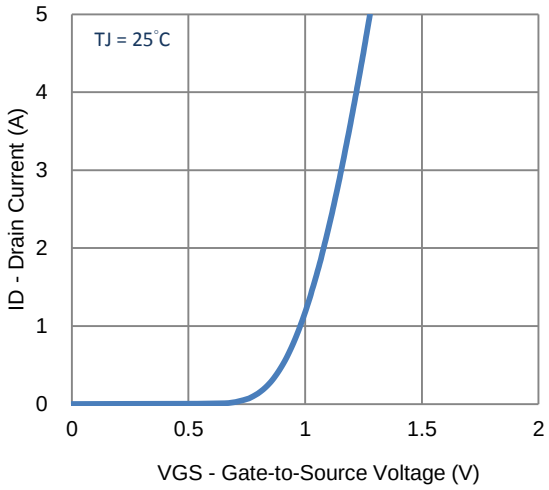
a. Pulse test: PW <= 300us duty cycle <= 2%.

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

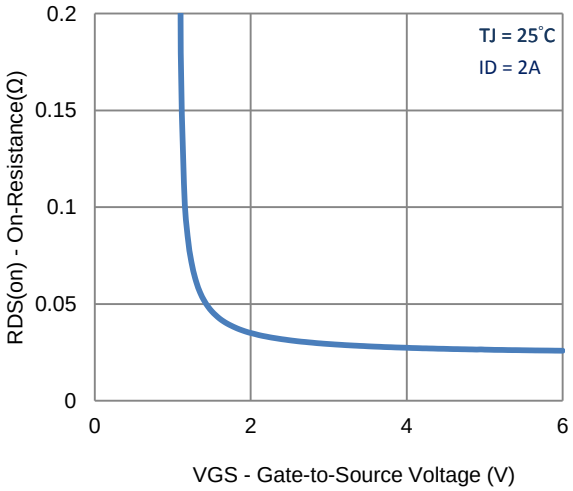
## Typical Electrical Characteristics



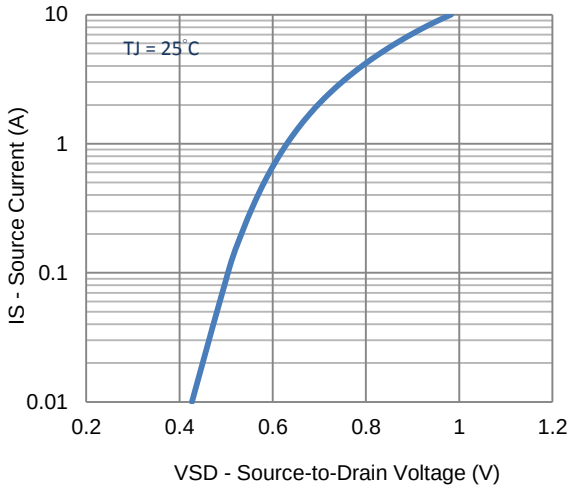

**1. On-Resistance vs. Drain Current**



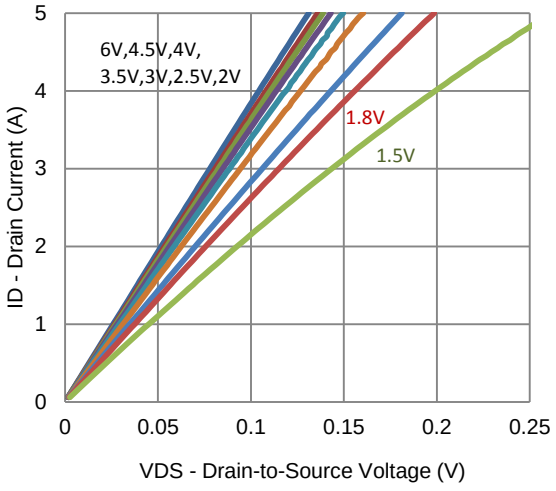

**2. Transfer Characteristics**



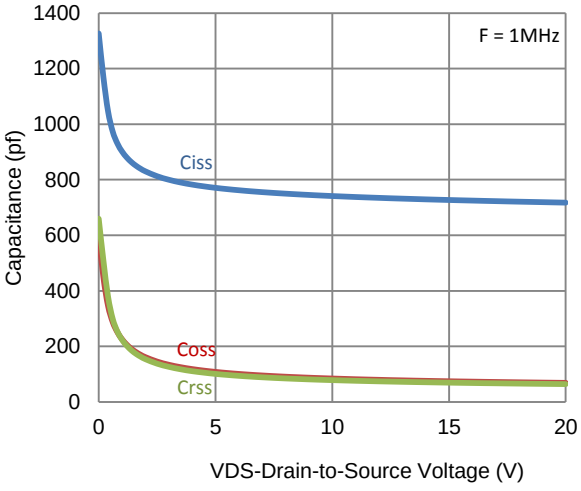

**3. On-Resistance vs. Gate-to-Source Voltage**




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

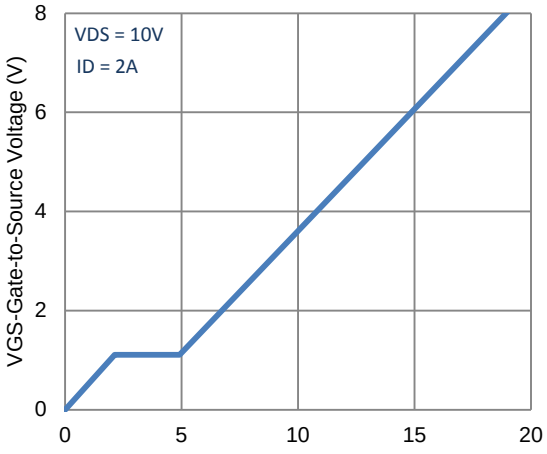



**5. Output Characteristics**

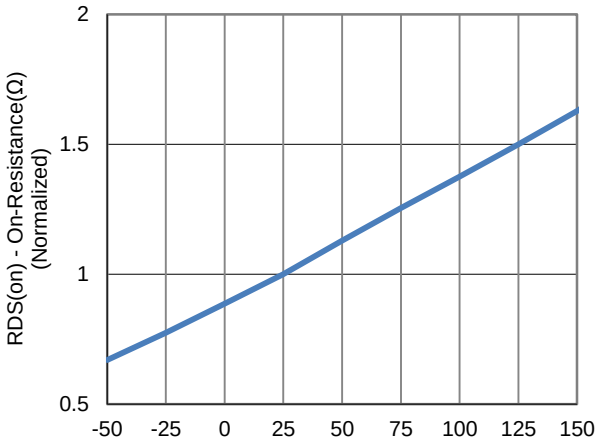



**6. Capacitance**

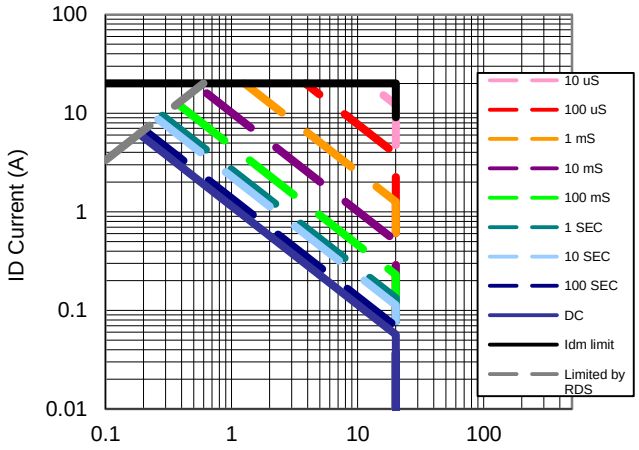
## Typical Electrical Characteristics



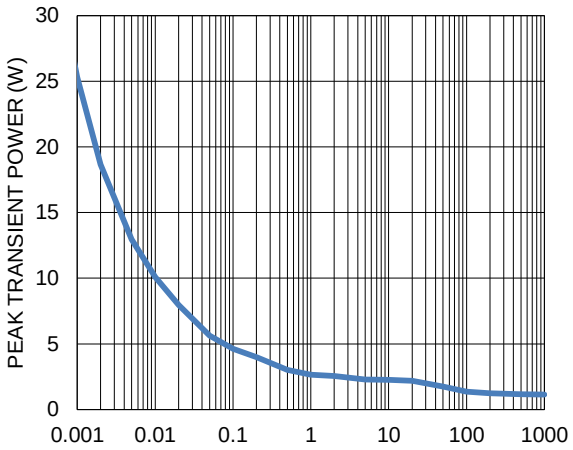

**7. Gate Charge**



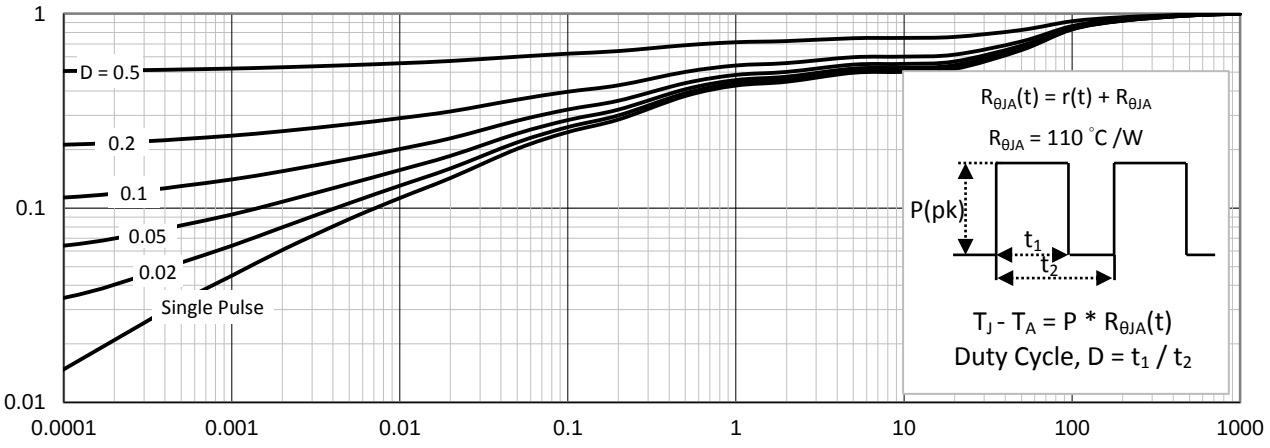

**8. Normalized On-Resistance Vs Junction Temperature**




**9. Safe Operating Area**

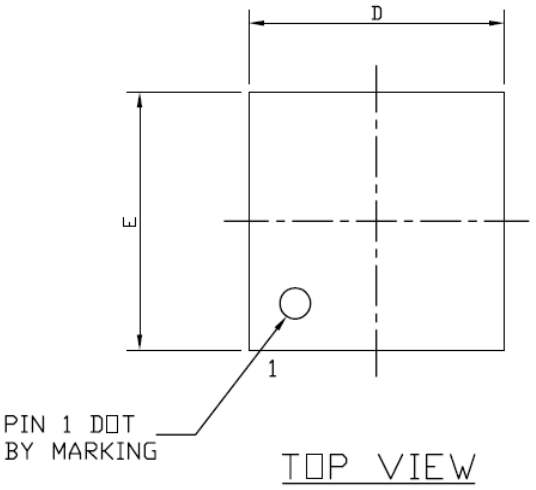



**10. Single Pulse Maximum Power Dissipation**

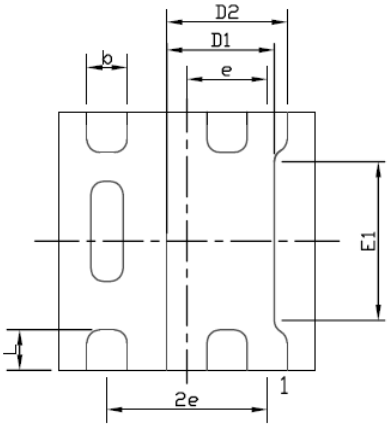



**11. Normalized Thermal Transient Junction to Ambient**

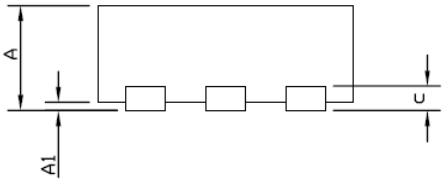
## Package Information




TOP VIEW




BOTTOM VIEW




SIDE VIEW

| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.50 | 0.55 | 0.60 | 0.020 | 0.022 | 0.024 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.22 | 0.25 | 0.28 | 0.009 | 0.010 | 0.011 |
| c | 0.152 Ref. | | | 0.006 Ref. | | |
| D | 1.55 | 1.60 | 1.65 | 0.061 | 0.063 | 0.065 |
| D1 | 0.67 TYP | | | 0.026 TYP | | |
| D2 | 0.75 TYP | | | 0.030 TYP | | |
| E | 1.55 | 1.60 | 1.65 | 0.061 | 0.063 | 0.065 |
| E1 | 0.98 TYP | | | 0.039 TYP | | |
| e | 0.50 BSC | | | 0.020 BSC | | |
| L | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |