# N-Channel 120-V (D-S) MOSFET

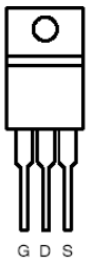
**Key Features:**
- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

**Typical Applications:**
- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (mΩ) | $I_D$ (A) |
| 120 | 3.8 @ $V_{GS}$ = 10V | 90[a] |
| | 4.8 @ $V_{GS}$ = 6.5V | |

Pb-free
RoHS COMPLIANT
HALOGEN FREE

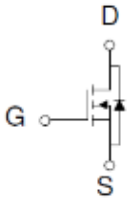
TO-220AB



DRAIN connected to TAB

G D S

Top View




N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C UNLESS OTHERWISE NOTED) | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Limit** | **Units** |
| Drain-Source Voltage | | $V_{DS}$ | 120 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current [a] | $T_C$=25°C | $I_D$ | 90 | A |
| Pulsed Drain Current [b] | | $I_{DM}$ | 360 | |
| Continuous Source Current (Diode Conduction) [a] | $T_C$=25°C | $I_S$ | 90 | A |
| Power Dissipation [a] | $T_C$=25°C | $P_D$ | 300 | W |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to 175 | °C |

| THERMAL RESISTANCE RATINGS | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Maximum** | **Units** |
| Maximum Junction-to-Ambient [c] | $R_{\theta JA}$ | 62.5 | °C/W |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 0.5 | |

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

## Electrical Characteristics

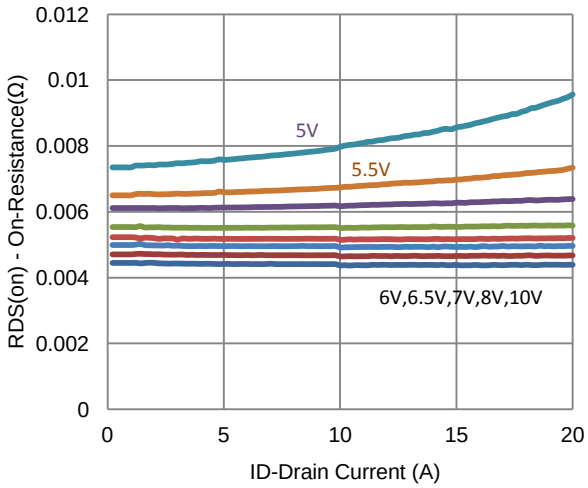
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 uA | 1 | | | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 96 V, $V_{GS}$ = 0 V | | | 1 | uA |
| | | $V_{DS}$ = 96 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | 10 | |
| On-State Drain Current [a] | $I_{D(on)}$ | $V_{DS}$ = 5 V, $V_{GS}$ = 10 V | 112.5 | | | A |
| Drain-Source On-Resistance [a] | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 20 A | | | 3.8 | mΩ |
| | | $V_{GS}$ = 6.5 V, $I_D$ = 18 A | | | 4.8 | |
| Forward Transconductance [a] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 20 A | | 54 | | S |
| Diode Forward Voltage [a] | $V_{SD}$ | $I_S$ = 45 A, $V_{GS}$ = 0 V | | 0.93 | | V |
| **Dynamic [b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 60 V, $V_{GS}$ = 6.5 V, $I_D$ = 2 A | | 59 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 19.8 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 25 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$ = 60 V, $R_L$ = 30 Ω, $I_D$ = 2 A, $V_{GEN}$ = 10 V, $R_{GEN}$ = 6 Ω | | 35 | | ns |
| Rise Time | $t_r$ | | | 33 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 94 | | |
| Fall Time | $t_f$ | | | 136 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 50 V, $V_{GS}$ = 0 V, f = 1 Mhz | | 4636 | | pF |
| Output Capacitance | $C_{oss}$ | | | 1170 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 48 | | |

Notes

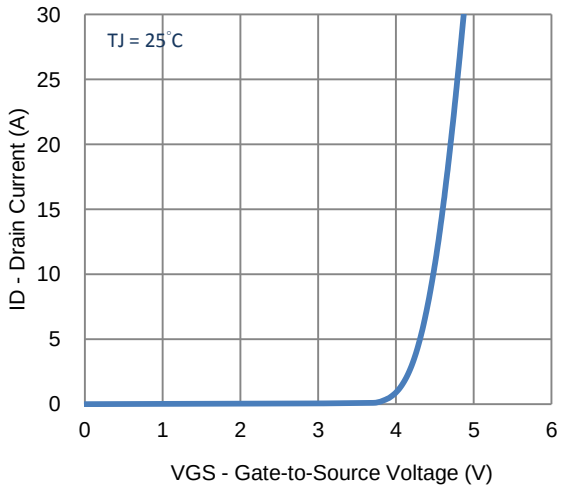
a. Pulse test: PW <= 300us duty cycle <= 2%.

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

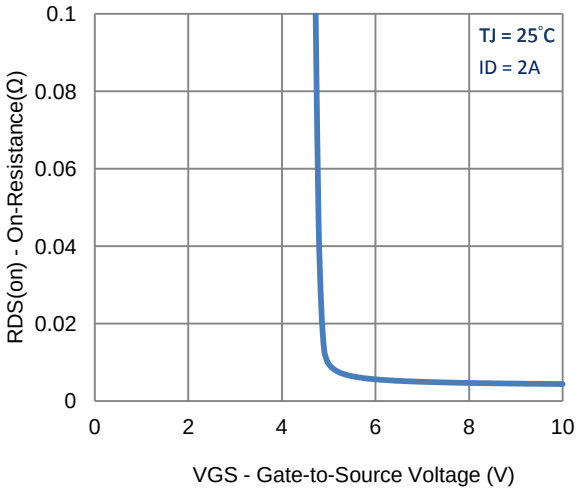
## Typical Electrical Characteristics



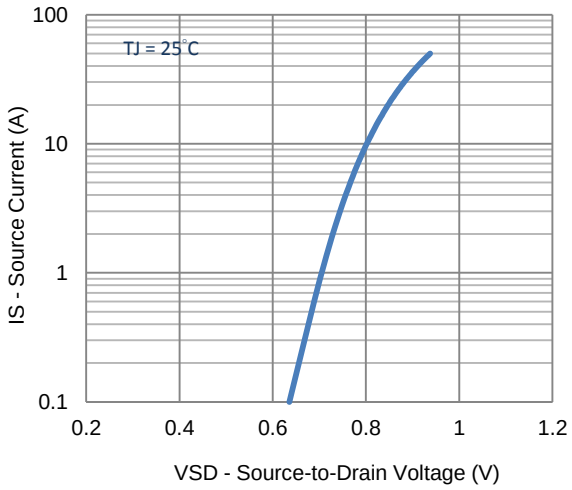

**1. On-Resistance vs. Drain Current**



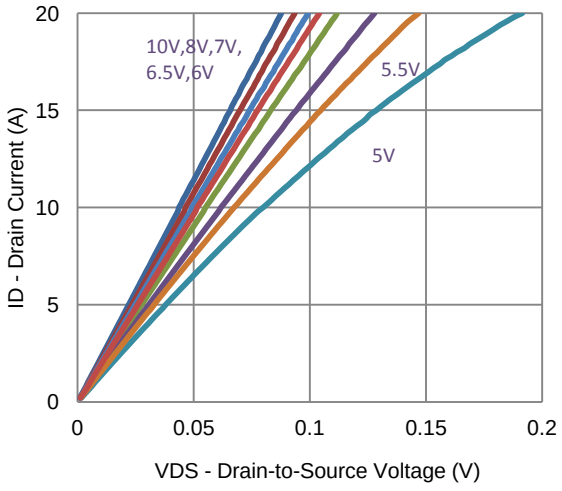

**2. Transfer Characteristics**



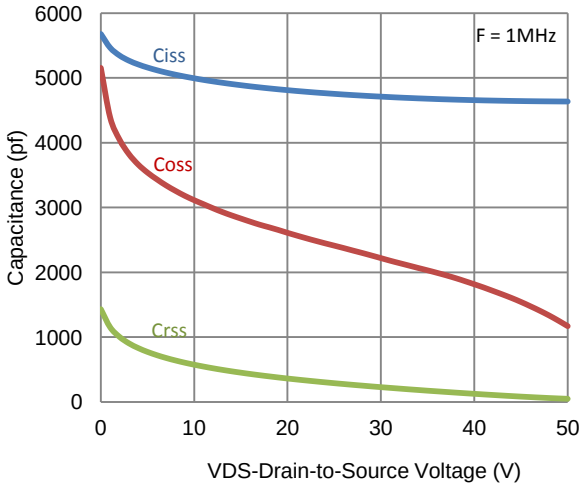

**3. On-Resistance vs. Gate-to-Source Voltage**




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

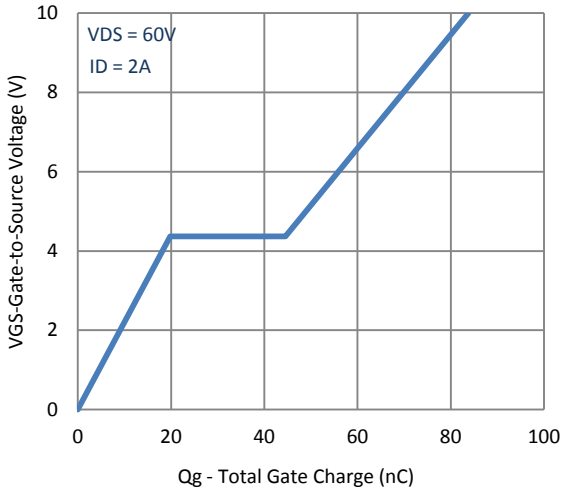



**5. Output Characteristics**

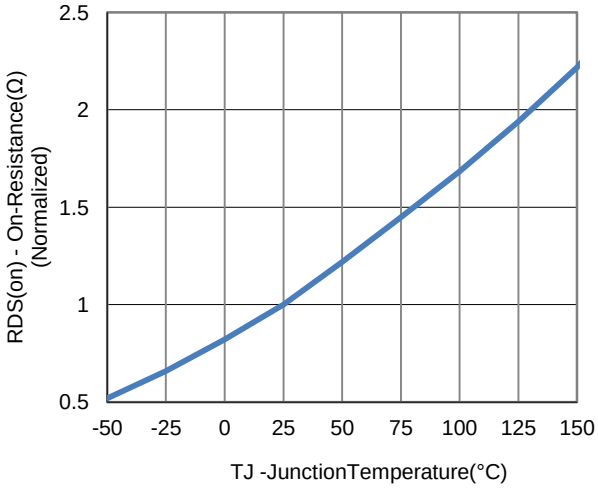



**6. Capacitance**

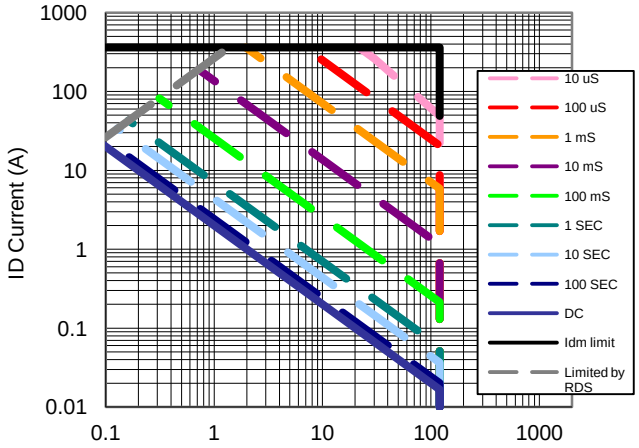
## Typical Electrical Characteristics



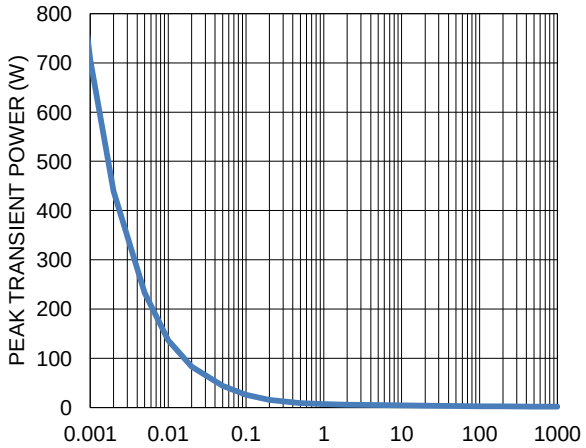

**7. Gate Charge**



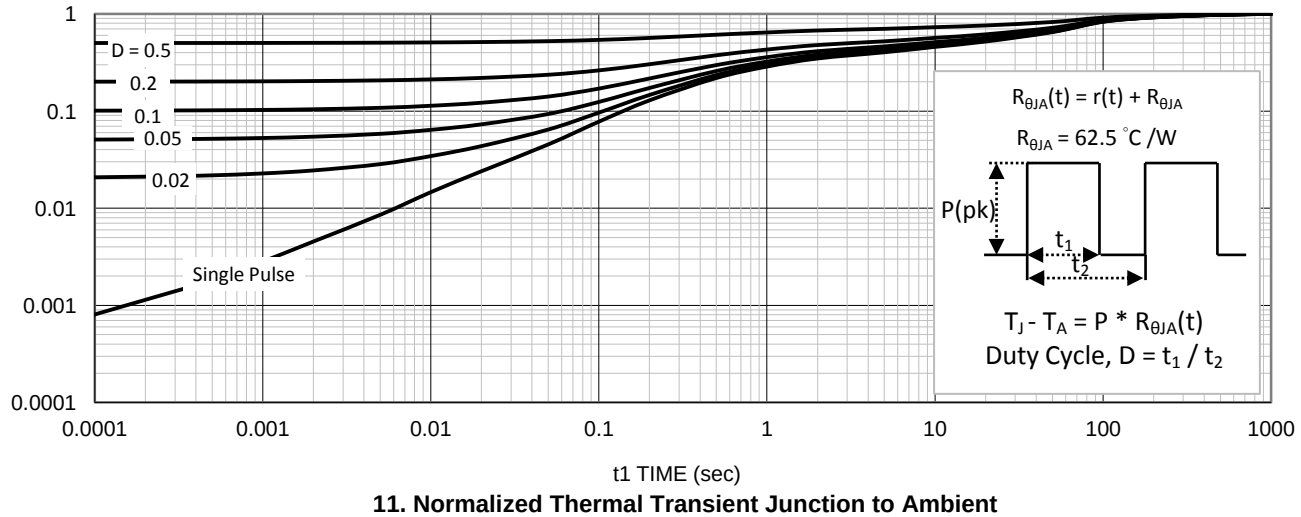

**8. Normalized On-Resistance Vs Junction Temperature**




**9. Safe Operating Area**

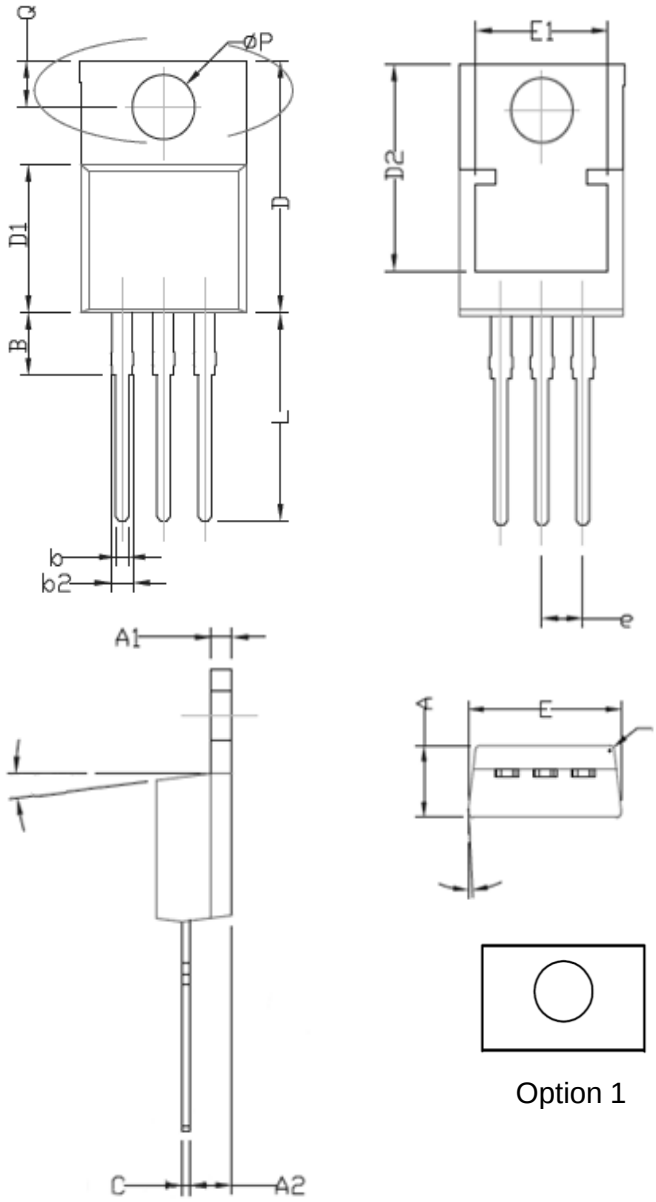



**10. Single Pulse Maximum Power Dissipation**

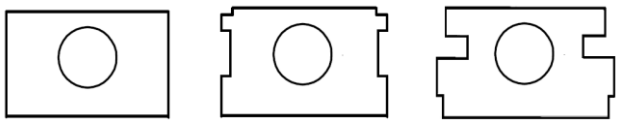



**11. Normalized Thermal Transient Junction to Ambient**

## Package Information




| DIM. | MILLIMETERS | |
|---|---|---|
| | MIN | MAX |
| A | 4.24 | 4.72 |
| A1 | 1.11 | 1.41 |
| A2 | 2.22 | 2.7 |
| B | 2.6 | 3.9 |
| b | 0.66 | 0.94 |
| b2 | 1.17 | 1.45 |
| c | 0.4 | 0.6 |
| D | 14.5 | 15.74 |
| D1 | 8.4 | 9.65 |
| D2 | 12.08 | 12.48 |
| E | 9.7 | 10.54 |
| E1 | 8 | 8.4 |
| e | 2.49 | 2.59 |
| L | 12.27 | 14.5 |
| ØP | 3.55 | 3.89 |
| Q | 2.58 | 2.98 |



Option 1 Option 2 Option 3