

N-Channel 40-V (D-S) MOSFET

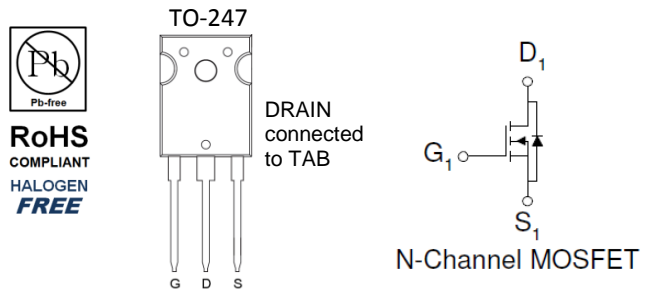
Key Features:

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

Typical Applications:

- Hot Swap Inrush Limit Circuits
- Uninterruptible Power Supplies and Inverters
- Motor Speed Controls

| PRODUCT SUMMARY | | |
|-----------------|----------------------------|------------------|
| V_{DS} (V) | $r_{DS(on)}$ (m Ω) | I_D (A) |
| 40 | 1.5 @ $V_{GS} = 10V$ | 500 ^a |
| | 2.5 @ $V_{GS} = 6V$ | |



| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ UNLESS OTHERWISE NOTED) | | | | |
|---|--------------------|----------------|------------|------------|
| Parameter | | Symbol | Limit | Units |
| Drain-Source Voltage | | V_{DS} | 40 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | |
| Continuous Drain Current | $T_C = 25^\circ C$ | I_D | 500 | A |
| Pulsed Drain Current ^a | | I_{DM} | 1250 | |
| Continuous Source Current (Diode Conduction) | $T_C = 25^\circ C$ | I_S | 500 | A |
| Power Dissipation | $T_C = 25^\circ C$ | P_D | 500 | W |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to 175 | $^\circ C$ |

| THERMAL RESISTANCE RATINGS | | | |
|-----------------------------|-----------------|---------|--------------|
| Parameter | Symbol | Maximum | Units |
| Maximum Junction-to-Ambient | $R_{\theta JA}$ | 40 | $^\circ C/W$ |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 0.29 | |

Notes

- a. Pulse width limited by maximum junction temperature

Electrical Characteristics

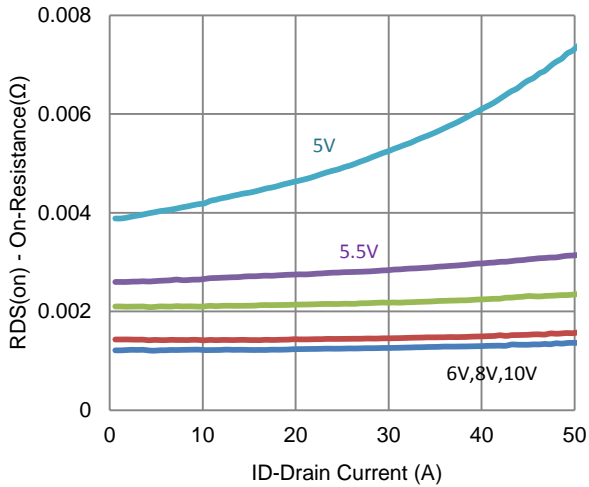
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|--------------|---|-----|-------|-----------|------|
| Static | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu A$ | 1 | | | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0 V, V_{GS} = \pm 20 V$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 32 V, V_{GS} = 0 V$ | | | 1 | uA |
| | | $V_{DS} = 32 V, V_{GS} = 0 V, T_J = 55^\circ C$ | | | 25 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} = 5 V, V_{GS} = 10 V$ | 625 | | | A |
| Drain-Source On-Resistance ^a | $r_{DS(on)}$ | $V_{GS} = 10 V, I_D = 100 A$ | | | 1.5 | mΩ |
| | | $V_{GS} = 6 V, I_D = 80 A$ | | | 2.5 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15 V, I_D = 20 A$ | | 63 | | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 50 A, V_{GS} = 0 V$ | | 1 | | V |
| Dynamic ^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 20 V, V_{GS} = 6 V,$ $I_D = 20 A$ | | 213 | | nC |
| Gate-Source Charge | Q_{gs} | | | 97 | | |
| Gate-Drain Charge | Q_{gd} | | | 81 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS} = 20 V, R_L = 1 \Omega,$ $I_D = 20 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$ | | 106 | | ns |
| Rise Time | t_r | | | 130 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 325 | | |
| Fall Time | t_f | | | 112 | | |
| Input Capacitance | C_{iss} | $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 \text{ Mhz}$ | | 27557 | | pF |
| Output Capacitance | C_{oss} | | | 2212 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 1250 | | |

Notes

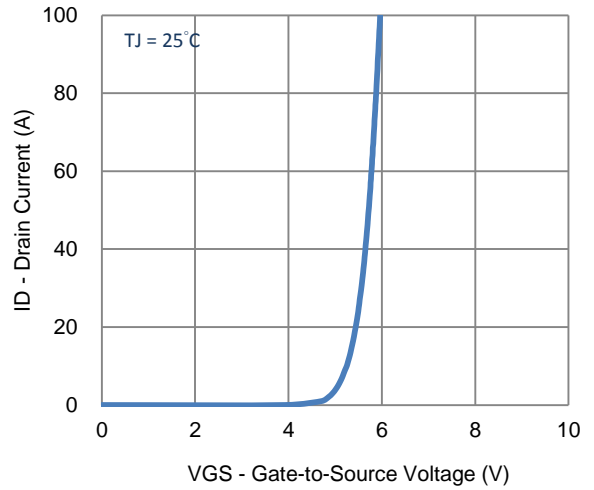
- Pulse test: $PW \leq 300 \mu s$ duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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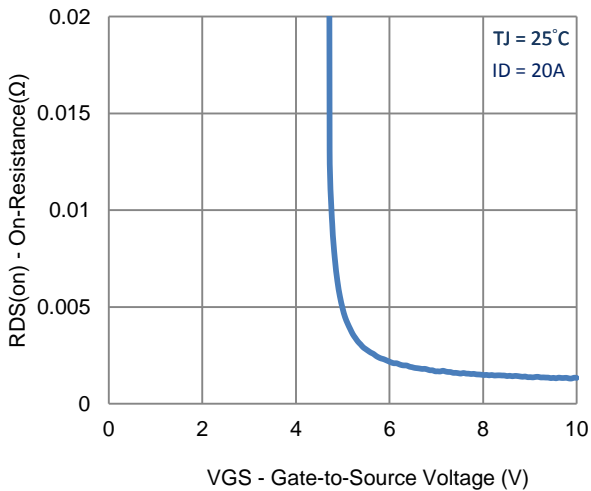
Typical Electrical Characteristics



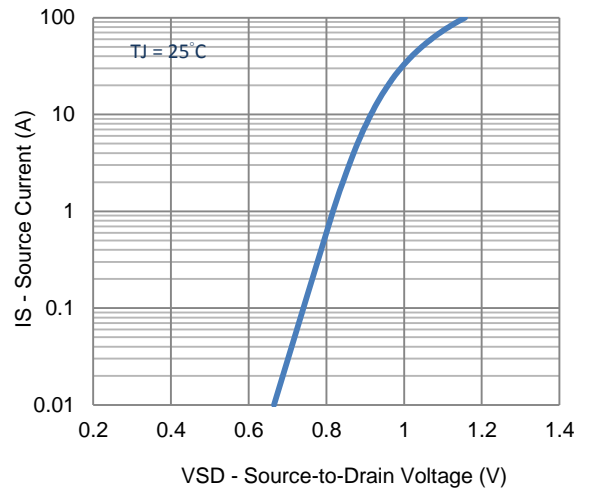
1. On-Resistance vs. Drain Current



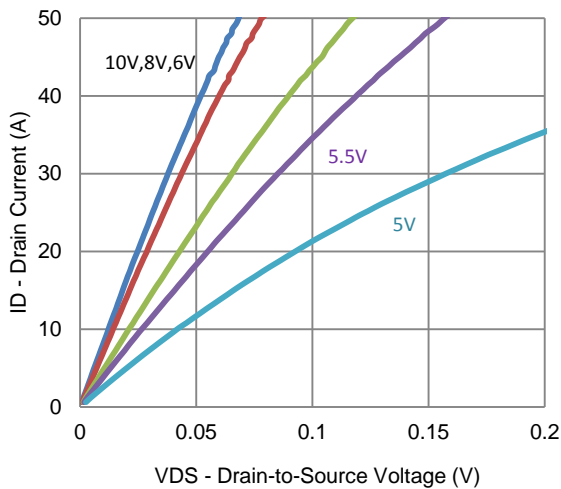
2. Transfer Characteristics



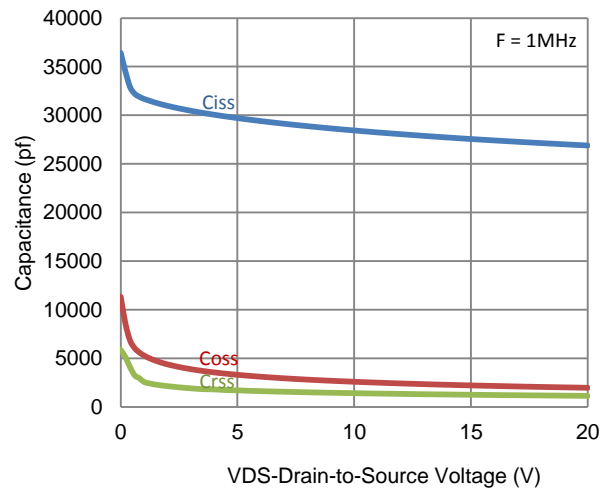
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

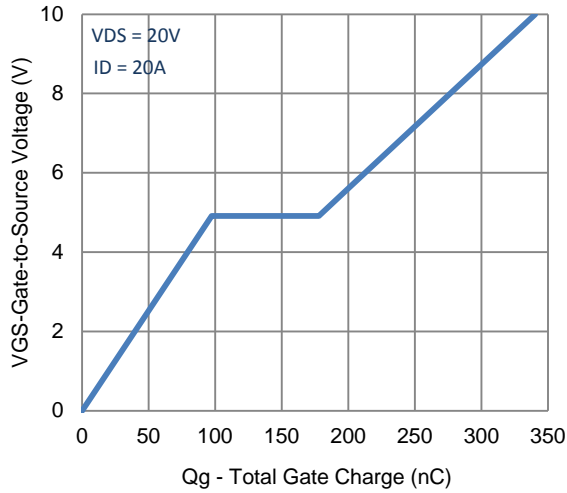


5. Output Characteristics

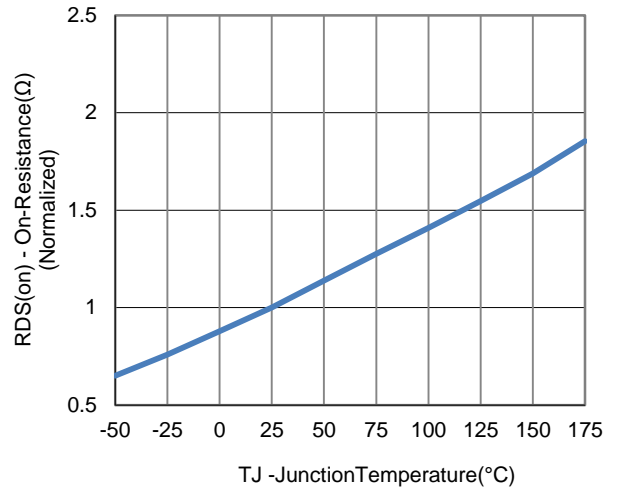


6. Capacitance

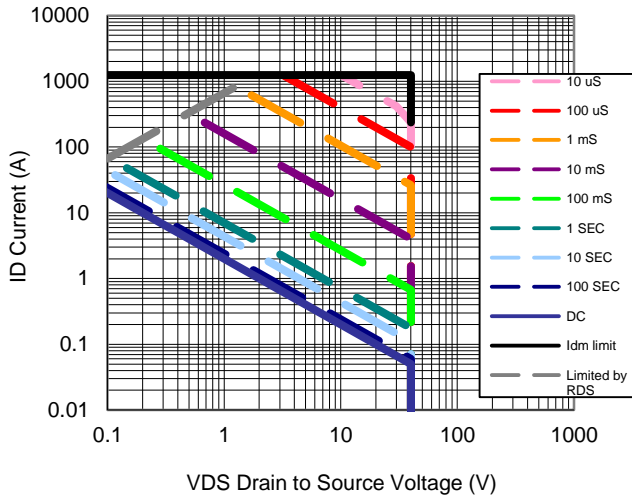
Typical Electrical Characteristics



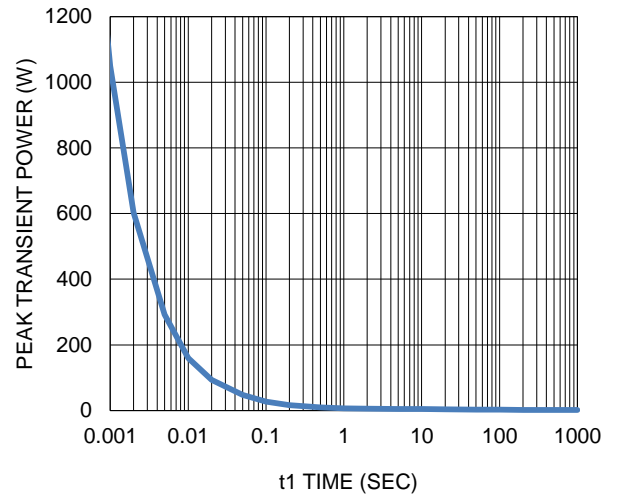
7. Gate Charge



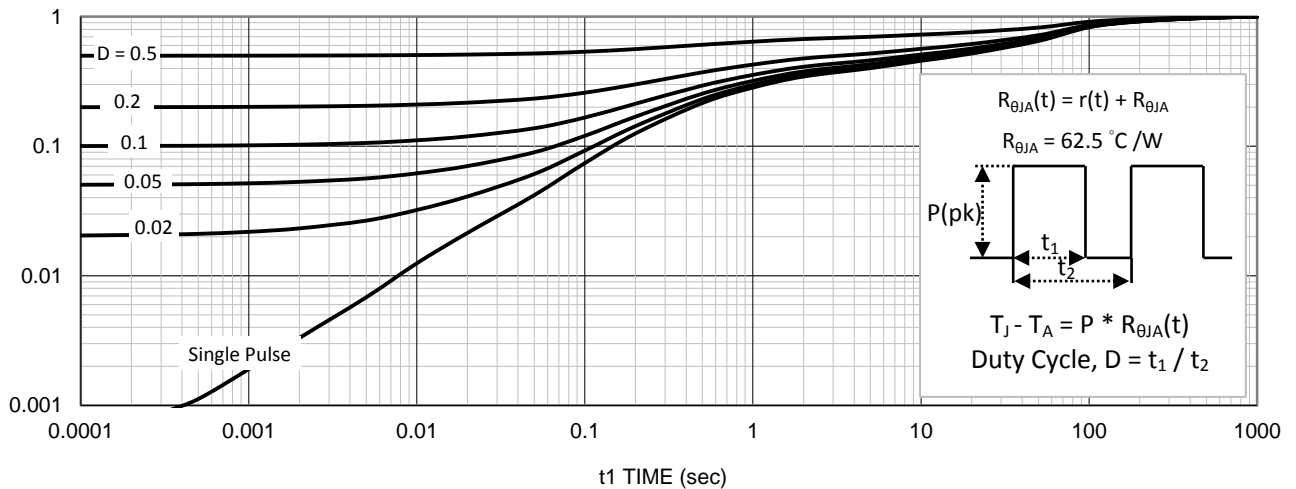
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

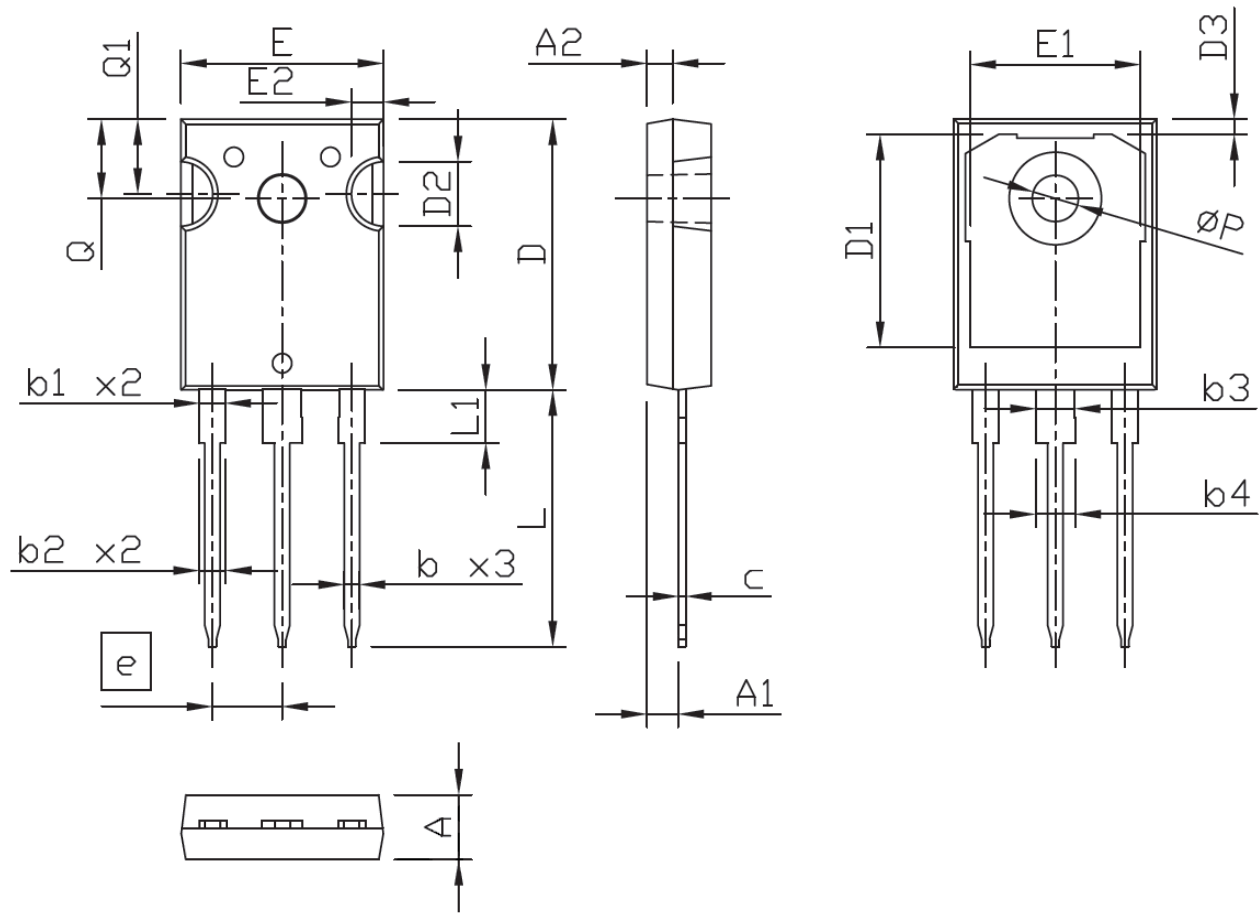


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



| SYMBOLS | DIMENSIONS IN MILLIMETERS | | |
|---------|---------------------------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.90 | 5.00 | 5.10 |
| A1 | 2.32 | 2.42 | 2.52 |
| A2 | 1.90 | 2.00 | 2.10 |
| b | 1.17 | 1.22 | 1.27 |
| b1 | 1.97 | 2.02 | 2.07 |
| b2 | 2.00 | 2.10 | 2.20 |
| b3 | 2.97 | 3.02 | 3.07 |
| b4 | 3.00 | 3.10 | 3.20 |
| c | 0.59 | 0.62 | 0.66 |
| D | 20.90 | 21.00 | 21.10 |
| D1 | 16.25 | 16.55 | 16.85 |
| D2 | 5.00 TYP | | |
| D3 | 1.05 | 1.20 | 1.35 |
| e | 5.44 BSC | | |
| E | 15.70 | 15.80 | 15.90 |
| E1 | 13.06 | 13.26 | 13.46 |
| E2 | 2.50 TYP | | |
| L | 19.72 | 19.92 | 20.12 |
| L1 | --- | --- | 4.30 |
| Q | 6.15 BSC | | |
| Q1 | 5.60 | 5.80 | 6.00 |
| ØP | 3.55 | 3.60 | 3.65 |