

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

Key Features:

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

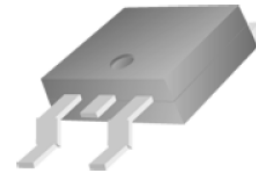
Typical Applications:

- Battery Operated Power Tools
- Automotive Systems
- Industrial DC/DC Conversion Circuits

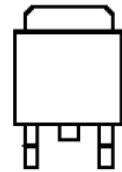
| PRODUCT SUMMARY | | |
|-----------------|----------------------------|------------------|
| V_{DS} (V) | $r_{DS(on)}$ (m Ω) | I_D (A) |
| 40 | 2.3 @ $V_{GS} = 10V$ | 120 ^a |
| | 3 @ $V_{GS} = 5.5V$ | |



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TO-263



Top View

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Limit | Units |
|---|----------------|------------|------------------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current ^a | I_D | 120 | A |
| Pulsed Drain Current ^b | I_{DM} | 360 | |
| Continuous Source Current (Diode Conduction) ^a | I_S | 90 | A |
| Power Dissipation | P_D | 234 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to 175 | $^\circ\text{C}$ |

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Maximum | Units |
|--|-----------------|---------|---------------------------|
| Maximum Junction-to-Ambient ^c | $R_{\theta JA}$ | 43 | $^\circ\text{C}/\text{W}$ |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 0.64 | |

Notes

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

Electrical Characteristics

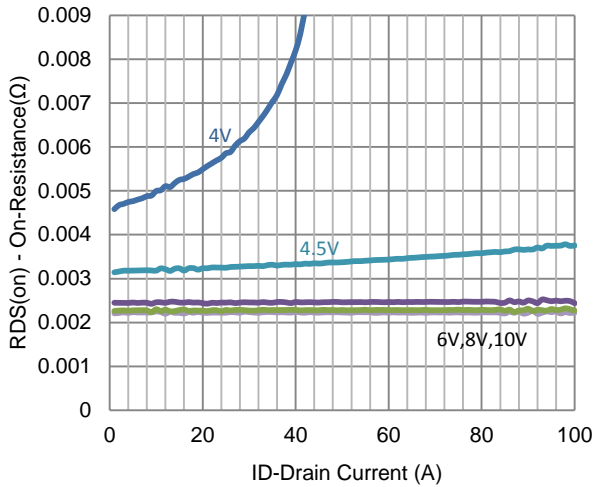
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|--------------|---|-----|-------|-----------|------------|
| Static | | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu A$ | 1 | | | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0 V, V_{GS} = \pm 20 V$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 32 V, V_{GS} = 0 V$ | | | 1 | μA |
| | | $V_{DS} = 32 V, V_{GS} = 0 V, T_J = 55^\circ C$ | | | 25 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} = 5 V, V_{GS} = 10 V$ | 120 | | | A |
| Drain-Source On-Resistance ^a | $r_{DS(on)}$ | $V_{GS} = 10 V, I_D = 45 A$ | | | 2.3 | m Ω |
| | | $V_{GS} = 5.5 V, I_D = 44 A$ | | | 3 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15 V, I_D = 20 A$ | | 35 | | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 45 A, V_{GS} = 0 V$ | | 0.82 | | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 20 V, V_{GS} = 5.5 V,$ $I_D = 20 A$ | | 138 | | nC |
| Gate-Source Charge | Q_{gs} | | | 52 | | |
| Gate-Drain Charge | Q_{gd} | | | 57 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS} = 20 V, R_L = 1 \Omega,$ $I_D = 20 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$ | | 54 | | ns |
| Rise Time | t_r | | | 85 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 254 | | |
| Fall Time | t_f | | | 86 | | |
| Input Capacitance | C_{iss} | $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz$ | | 24600 | | pF |
| Output Capacitance | C_{oss} | | | 1560 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 1470 | | |

Notes

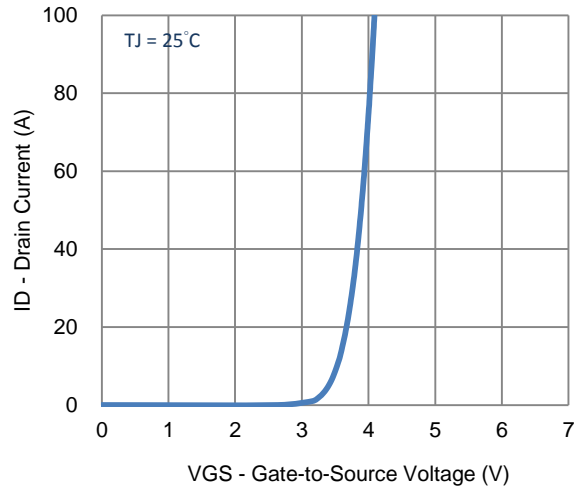
- Pulse test: PW \leq 300us duty cycle \leq 2%.
- Guaranteed by design, not subject to production testing.

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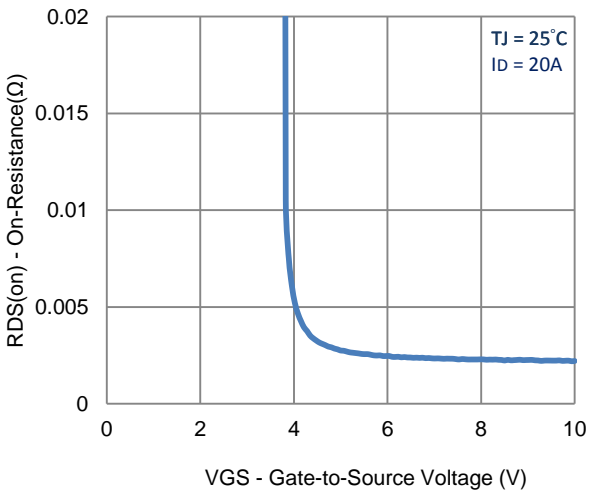
Typical Electrical Characteristics



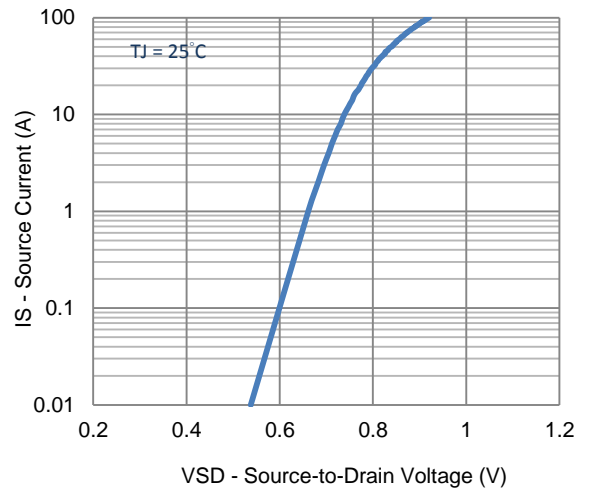
1. On-Resistance vs. Drain Current



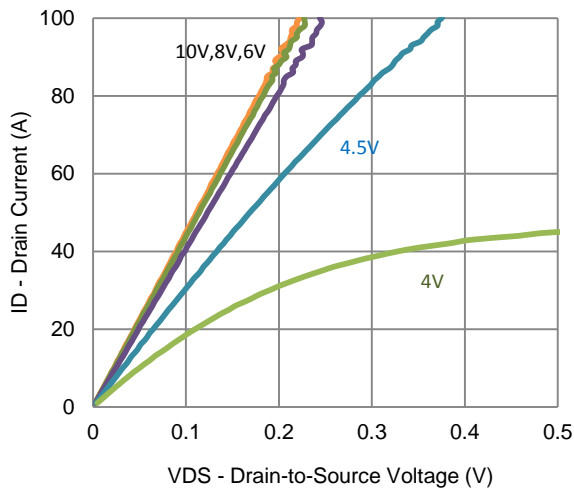
2. Transfer Characteristics



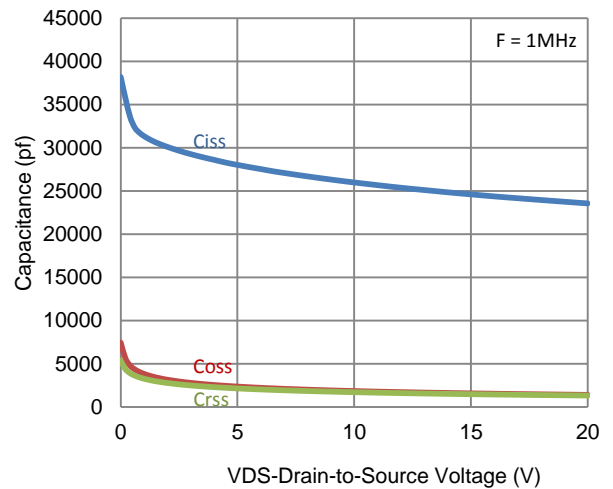
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

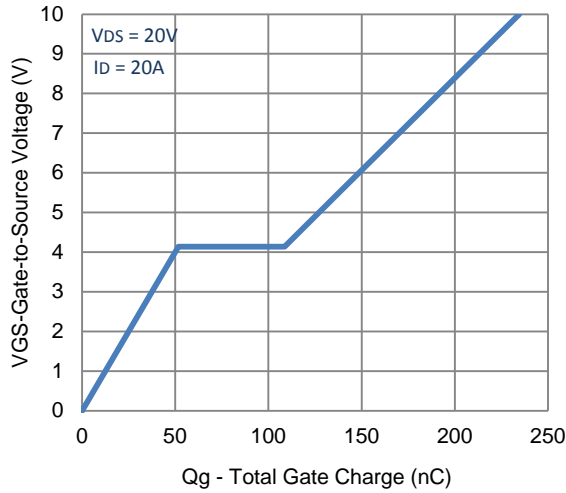


5. Output Characteristics

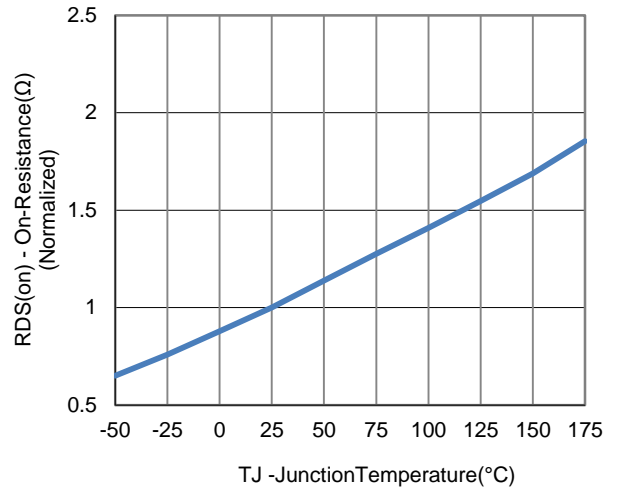


6. Capacitance

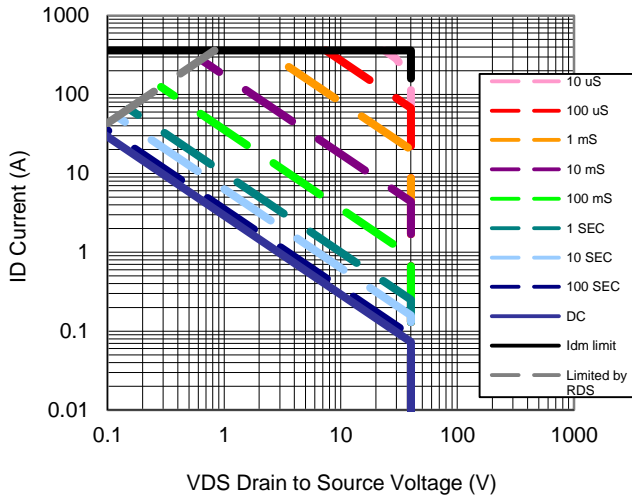
Typical Electrical Characteristics



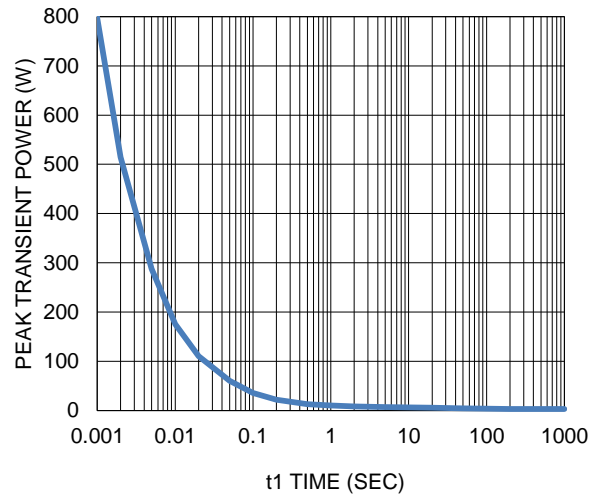
7. Gate Charge



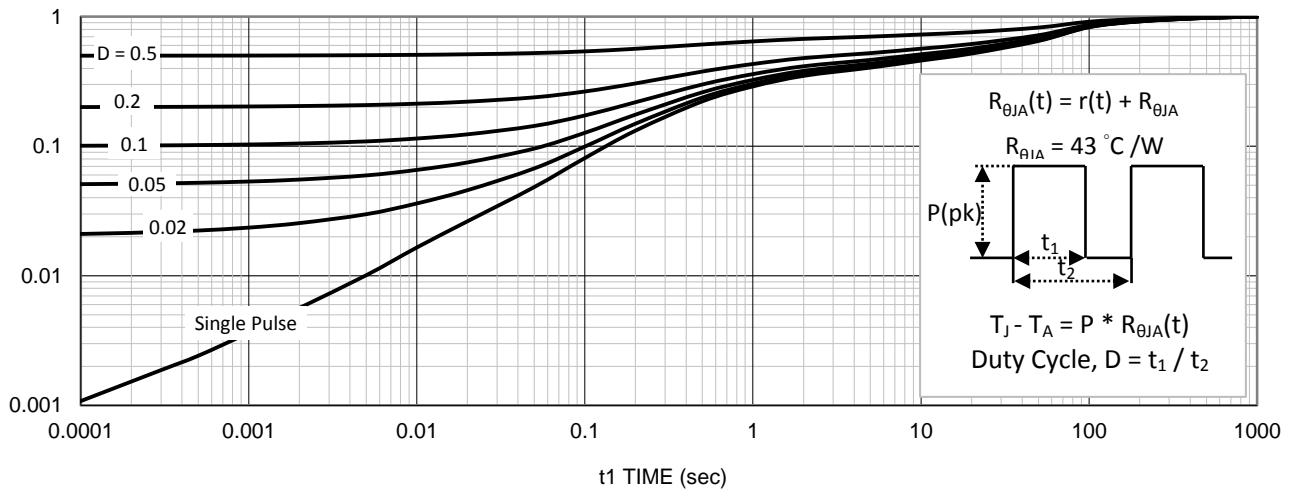
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

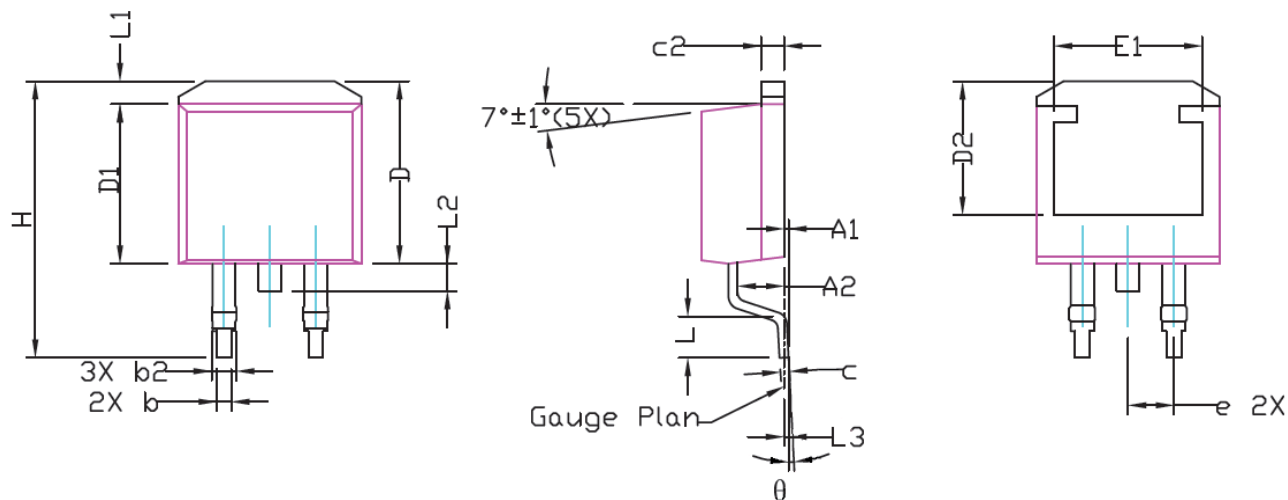


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



| SYMBOL | DIMENSIONAL REQMTS | | | INCHES REQMTS | | |
|----------|--------------------|-------|-------|---------------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.30 | 4.57 | 4.72 | 0.169 | 0.180 | 0.186 |
| A1 | 0 | --- | 0.25 | 0 | --- | 0.010 |
| A2 | 2.47 | 2.57 | 2.67 | 0.097 | 0.101 | 0.105 |
| b | 0.69 | 0.813 | 0.94 | 0.027 | 0.032 | 0.037 |
| b2 | 1.17 | 1.27 | 1.45 | 0.046 | 0.050 | 0.057 |
| c | 0.48 | 0.50 | 0.60 | 0.019 | 0.020 | 0.024 |
| c2 | 1.17 | 1.27 | 1.37 | 0.046 | 0.050 | 0.054 |
| D | 9.80 | 10.05 | 10.30 | 0.386 | 0.396 | 0.406 |
| D1 | 8.64 | 8.78 | 9.65 | 0.340 | 0.346 | 0.380 |
| D2 | 7.12 | 7.37 | 7.62 | 0.280 | 0.290 | 0.300 |
| E | 9.70 | 10.15 | 10.54 | 0.382 | 0.400 | 0.415 |
| E1 | 8.00 | 8.20 | 8.40 | 0.315 | 0.323 | 0.331 |
| e | 2.54 BSC | | | 0.100 BSC | | |
| H | 14.99 | 15.24 | 15.49 | 0.590 | 0.600 | 0.610 |
| L | 1.78 | 2.29 | 2.79 | 0.070 | 0.090 | 0.110 |
| L1 | 1.02 | 1.27 | 1.52 | 0.040 | 0.050 | 0.060 |
| L2 | --- | --- | 1.75 | --- | --- | 0.069 |
| L3 | --- | 0.254 | --- | --- | 0.010 | --- |
| θ | 0° | --- | 8° | 0° | --- | 8° |