

M6015B-VB Datasheet

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) ^a | Q_g (Typ.) |
|--------------|----------------------------|------------------------|--------------|
| - 60 | 0.019 at $V_{GS} = -10$ V | - 80 | 76 nC |
| | 0.025 at $V_{GS} = -4.5$ V | - 70 | |

FEATURES

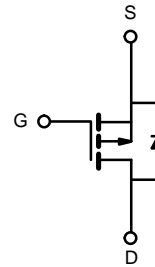
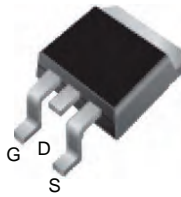
- TrenchFET[®] Power MOSFET
- 100 % UIS Tested

APPLICATIONS

- Load Switch


RoHS
 COMPLIANT

D²PAK (TO-263)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|--|---------------|----------------|--------------------|------|
| Drain-Source Voltage | | V_{DS} | - 60 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | |
| Continuous Drain Current ($T_J = 150$ °C) | $T_C = 25$ °C | I_D | - 80 ^a | A |
| | $T_C = 70$ °C | | - 70 | |
| | $T_A = 25$ °C | | 9.2 ^b | |
| | $T_A = 70$ °C | | - 8.1 ^b | |
| Pulsed Drain Current | | I_{DM} | - 150 | |
| Avalanche Current Pulse | | I_{AS} | - 45 | |
| Single Pulse Avalanche Energy | | E_{AS} | 101 | mJ |
| Continuous Source-Drain Diode Current | $T_C = 25$ °C | I_S | 69 ^a | A |
| | $T_A = 25$ °C | | 2.1 ^b | |
| Maximum Power Dissipation | $T_C = 25$ °C | P_D | 104.2 ^a | W |
| | $T_C = 70$ °C | | 66.7 ^a | |
| | $T_A = 25$ °C | | 3.1 ^b | |
| | $T_A = 70$ °C | | 2 ^b | |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | - 55 to 150 | °C |

THERMAL RESISTANCE RATINGS

| Parameter | | Symbol | Typical | Maximum | Unit |
|--|--------------|------------|---------|---------|------|
| Maximum Junction-to-Ambient ^b | Steady State | R_{thJA} | 33 | 40 | °C/W |
| Maximum Junction-to-Case | Steady State | R_{thJC} | 0.98 | 1.2 | |

Notes:

a. Based on $T_C = 25$ °C.

b. Surface mounted on 1" x 1" FR4 board.

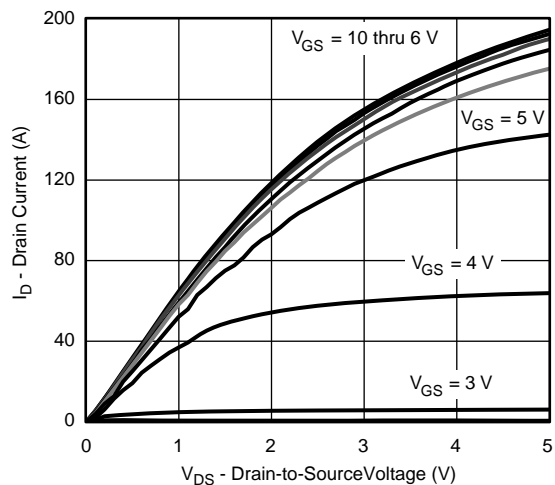
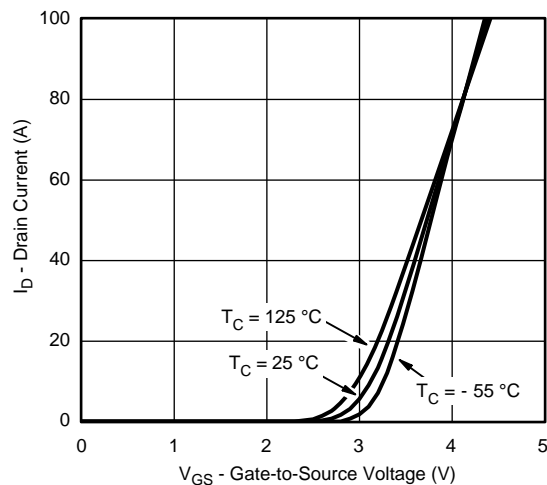
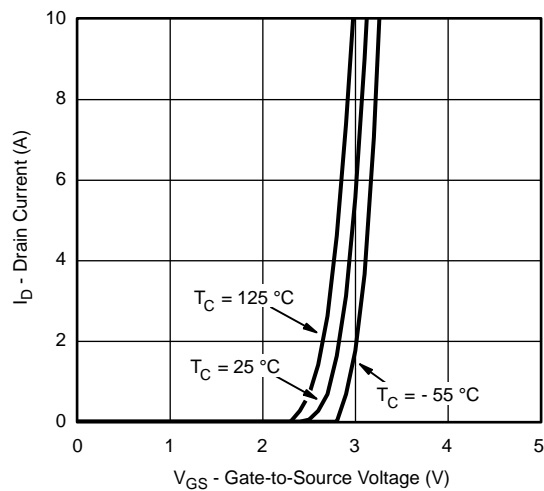
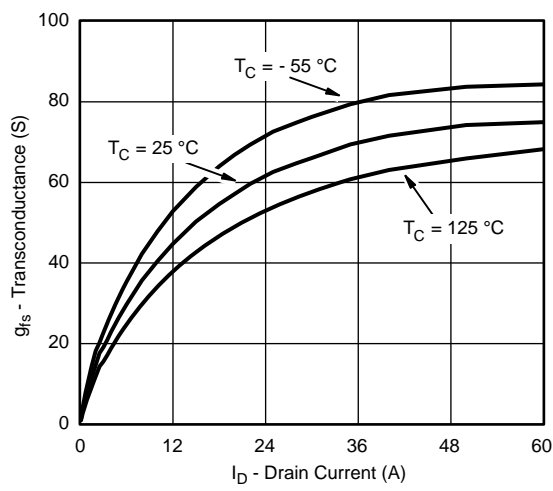
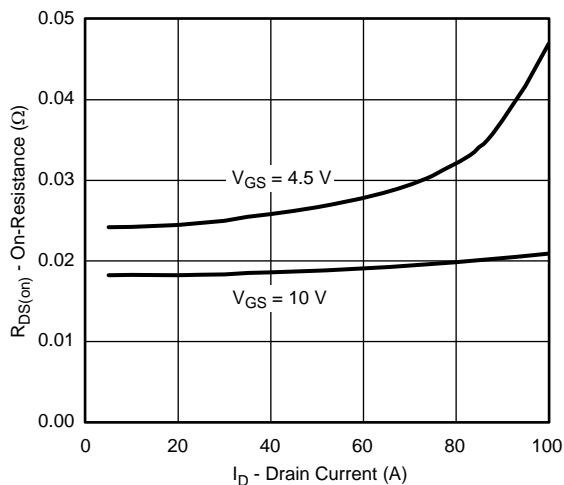
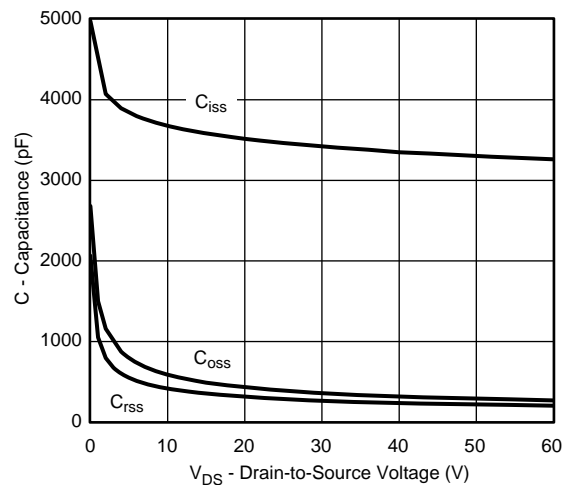
| SPECIFICATIONS (T _J = 25 °C, unless otherwise noted) | | | | | | |
|---|--------------------------------------|---|-------|-------|-------|-------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{GS} = 0 V, I _D = - 250 μA | - 60 | | | V |
| V _{DS} Temperature Coefficient | ΔV _{DS} /T _J | I _D = - 250 μA | | 68 | | mV/°C |
| V _{GS(th)} Temperature Coefficient | ΔV _{GS(th)} /T _J | | | - 5.2 | | |
| Gate-Source Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = - 250 μA | - 1 | | - 3 | V |
| Gate-Source Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 20 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = - 60 V, V _{GS} = 0 V | | | - 1 | μA |
| | | V _{DS} = - 60 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 | - 120 | | | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = - 10 V, I _D = - 30 A | | 0.019 | | Ω |
| | | V _{GS} = - 4.5 V, I _D = - 20 A | | 0.025 | | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = - 15 V, I _D = - 50 A | 20 | | | S |
| Dynamic ^b | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} = - 25 V, V _{GS} = 0 V, f = 1 MHz | | 3500 | | pF |
| Output Capacitance | C _{oss} | | | 390 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 290 | | |
| Total Gate Charge | Q _g | V _{DS} = - 30 V, V _{GS} = - 10 V, I _D = - 55 A | | 76 | | nC |
| | | | | 38 | | |
| Gate-Source Charge | Q _{gs} | V _{DS} = - 30 V, V _{GS} = - 4.5 V, I _D = - 55 A | | 16 | | |
| Gate-Drain Charge | Q _{gd} | | | 19 | | |
| Gate Resistance | R _g | f = 1 MHz | | 5.2 | | Ω |
| Turn-On Delay Time | t _{d(on)} | V _{DD} = - 2 V, R _L = 2 Ω I _D ≡ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω | | 10 | 15 | ns |
| Rise Time | t _r | | | 7 | 15 | |
| Turn-Off Delay Time | t _{d(off)} | | | 70 | 110 | |
| Fall Time | t _f | | | 40 | 60 | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Source-Drain Diode Current | I _S | T _C = 25 °C | | | - 69 | A |
| Pulse Diode Forward Current ^a | I _{SM} | | | | - 150 | |
| Body Diode Voltage | V _{SD} | I _S = - 30 A | | - 1 | - 1.5 | V |
| Body Diode Reverse Recovery Time | t _{rr} | I _F = - 50 A, di/dt = 100 A/μs, T _J = 25 °C | | 45 | 68 | ns |
| Body Diode Reverse Recovery Charge | Q _{rr} | | | 59 | 120 | nC |
| Reverse Recovery Fall Time | t _a | | | 29 | | ns |
| Reverse Recovery Rise Time | t _b | | | 16 | | |

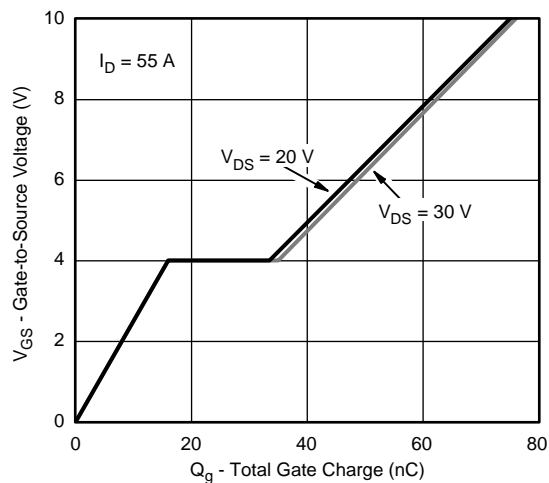
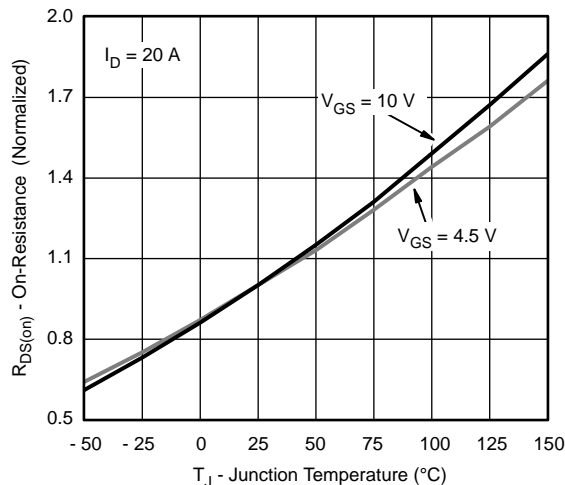
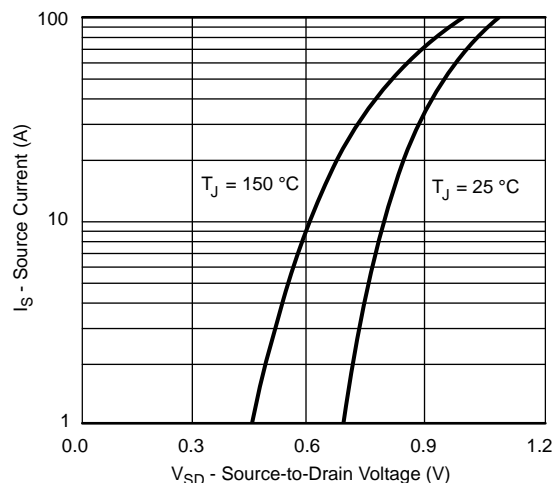
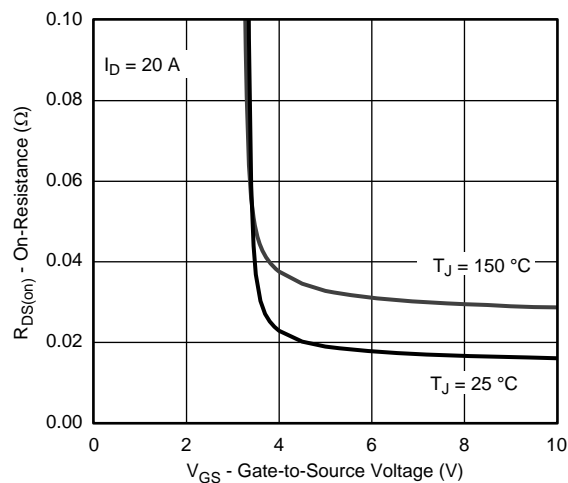
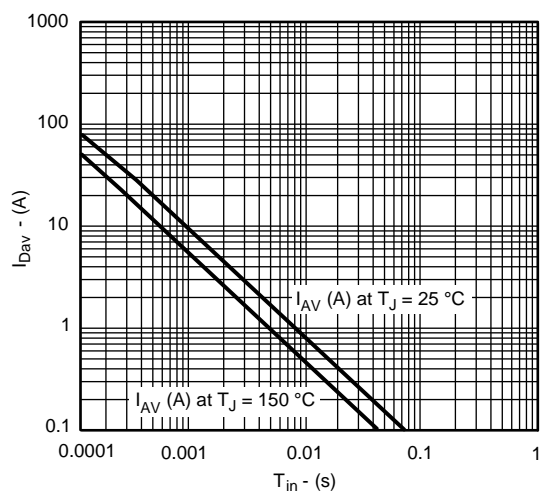
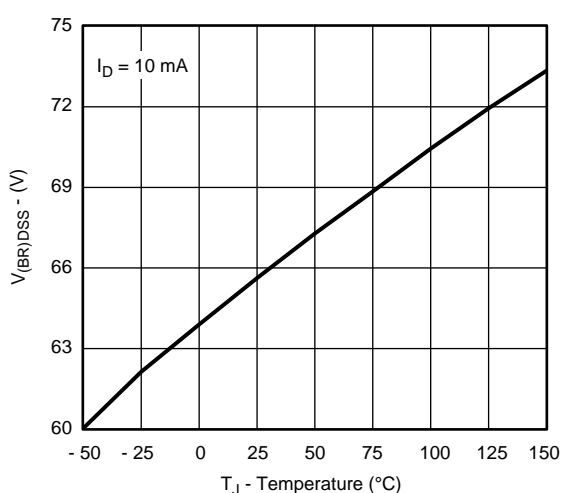
Notes:

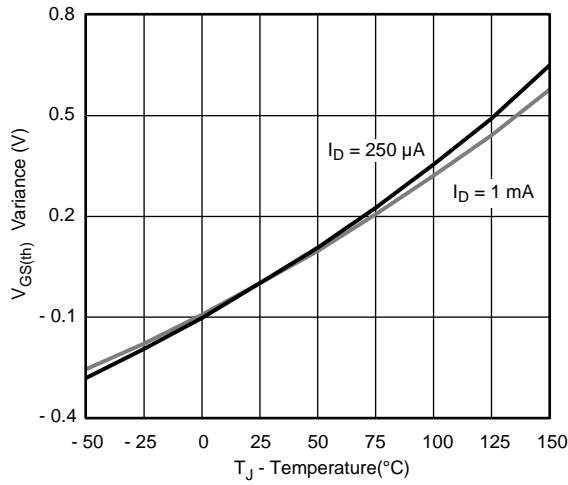
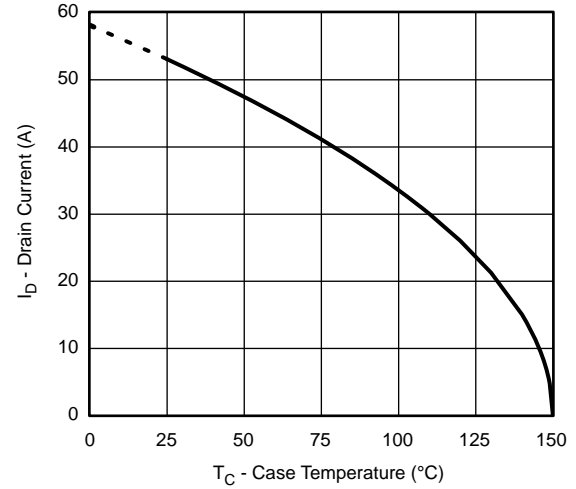
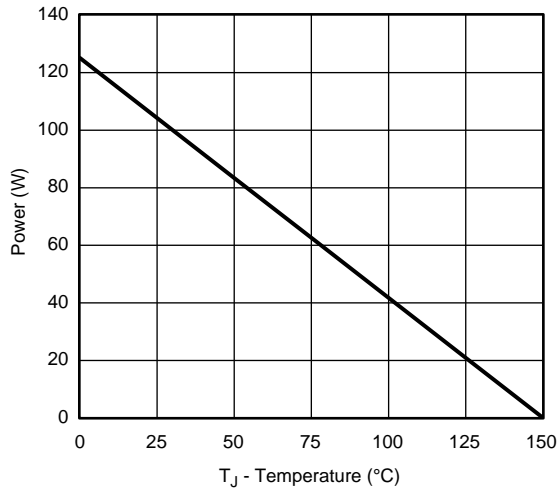
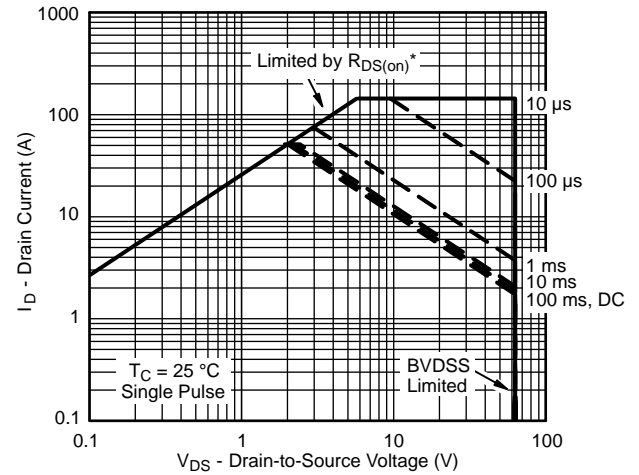
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

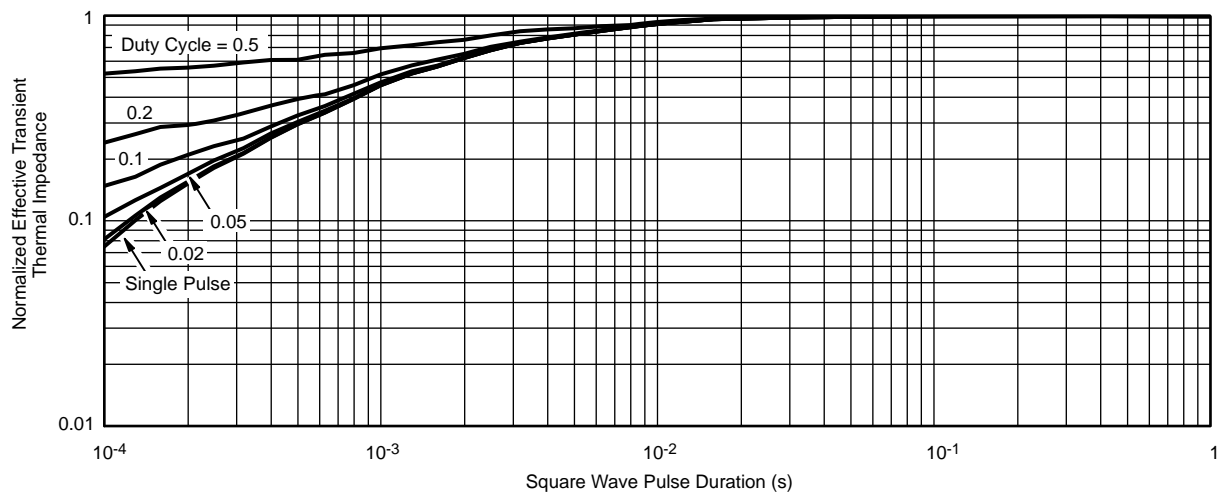
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

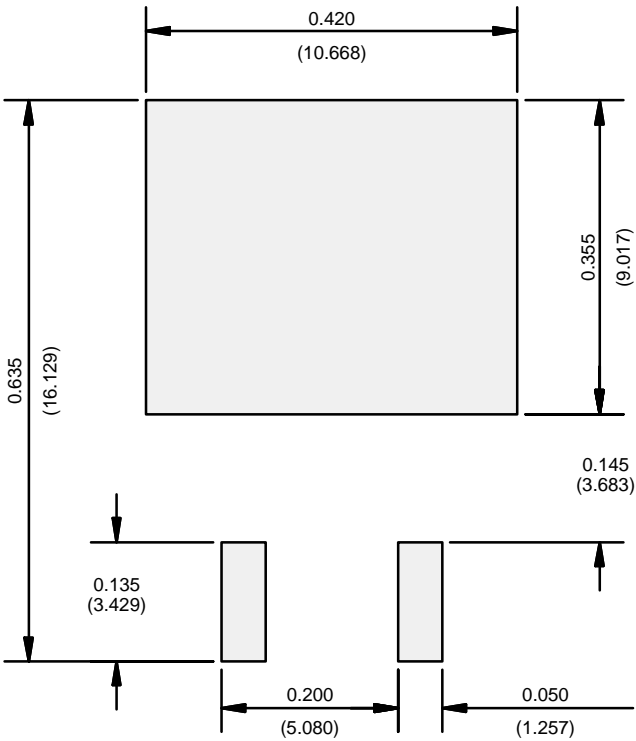
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Gate Charge

On-Resistance vs. Gate-to-Source Voltage

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Single Pulse Avalanche Current Capability vs. Time

Drain-Source Breakdown Voltage vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Threshold Voltage

Max. Drain Current vs. Case Temperature

Power Derating, Junction-to-Case


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case

Normalized Thermal Transient Impedance, Junction-to-Case

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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