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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -20 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±10 | V |
| Continuous Drain Current (Note 5) $V_{GS}$ = -4.5V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C<br>$T_C$ = +25°C | $I_D$ | -18.0<br>-14.5<br>-40 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{DM}$ | -80 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | | | $I_S$ | -2.2 | A |
| Avalanche Current (Note 7) L=0.1mH | | | $I_{AS}$ | -23 | A |
| Avalanche Energy (Note 7) L=0.1mH | | | $E_{AS}$ | 28 | mJ |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | $T_A$ = +25°C | $P_D$ | 2.3 | W |
| | $T_C$ = +25°C | | 41 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 56 | °C/W |
| | (Note 6) | | 124 | |
| Thermal Resistance, Junction to Case | | $R_{\theta JC}$ | 6.8 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 8)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -20 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | -1 | µA | $V_{DS}$ = -16V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±8V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 8)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -0.4 | — | -1.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 4.2 | 6.7 | mΩ | $V_{GS}$ = -4.5V, $I_D$ = -15A |
| | | — | 5.4 | 9.0 | | $V_{GS}$ = -2.5V, $I_D$ = -10A |
| | | — | 7 | — | | $V_{GS}$ = -1.8V, $I_D$ = -1A |
| Diode Forward Voltage | $V_{SD}$ | — | -0.7 | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -10A |
| **DYNAMIC CHARACTERISTICS (Note 9)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 5940 | — | pF | $V_{DS}$ = -10V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 835 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 728 | — | | |
| Gate Resistance | $R_G$ | — | 3.0 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge ($V_{GS}$ = -4.5V) | $Q_g$ | — | 75 | — | nC | $V_{DD}$ = -10V, $I_D$ = -20A |
| Total Gate Charge ($V_{GS}$ = -10V) | $Q_g$ | — | 156 | — | | |
| Gate-Source Charge | $Q_{gs}$ | — | 8.8 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 22 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 10.7 | — | ns | $V_{GS}$ = -4.5V, $V_{DD}$ = -10V,<br>$R_G$ = 1Ω, $I_D$ = -10A |
| Turn-On Rise Time | $t_R$ | — | 23 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 121 | — | | |
| Turn-Off Fall Time | $t_F$ | — | 109 | — | | |
| Reverse Recovery Time | $t_{RR}$ | — | 60 | — | ns | $I_F$ = -10A, di/dt = 100A/µs |
| Reverse Recovery Charge | $Q_{RR}$ | — | 47 | — | nC | $I_F$ = -10A, di/dt = 100A/µs |

Notes:
5. $R_{\theta JA}$ is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. .UIS in production with L =0.1mH, $T_J$ = +25°C
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

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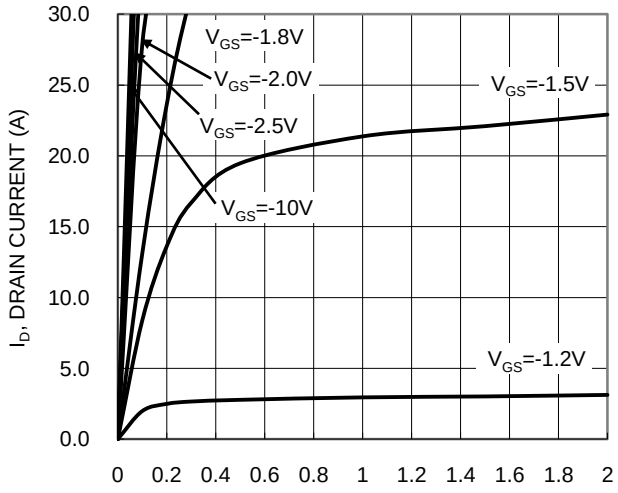


Figure 1. Typical Output Characteristic

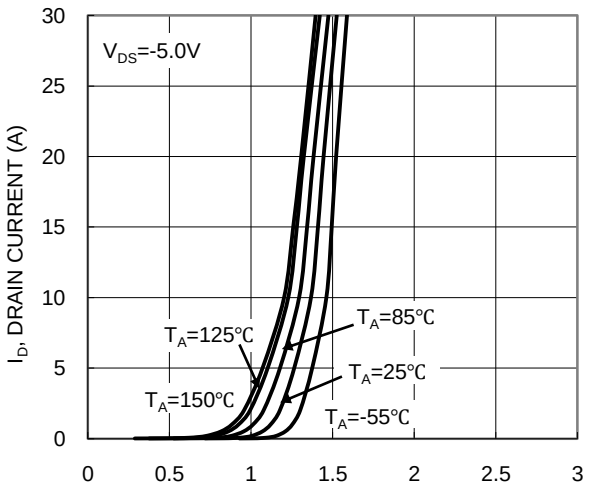


Figure 2. Typical Transfer Characteristic

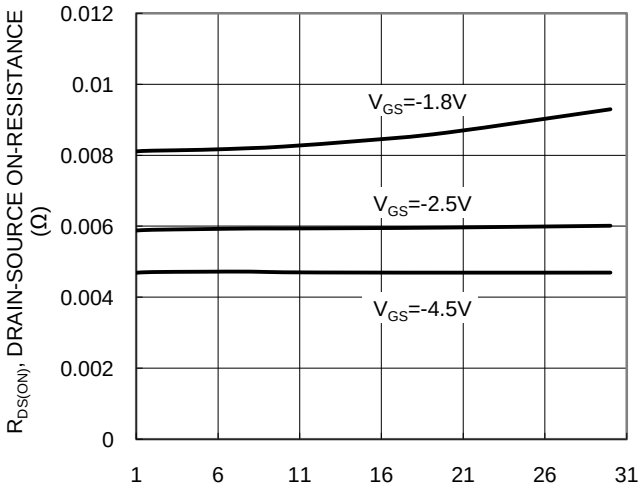


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

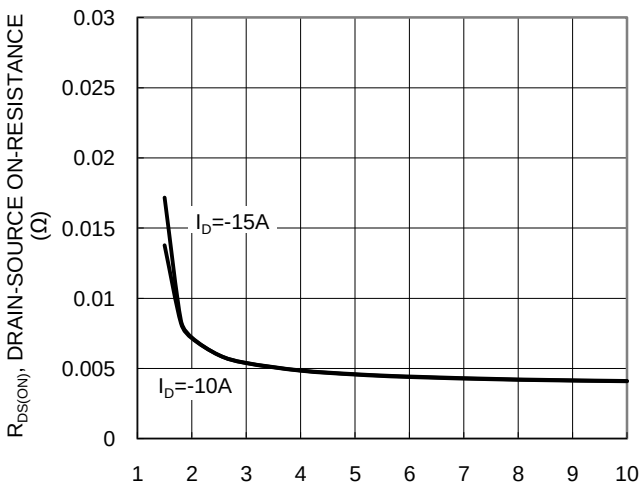


Figure 4. Typical Transfer Characteristic

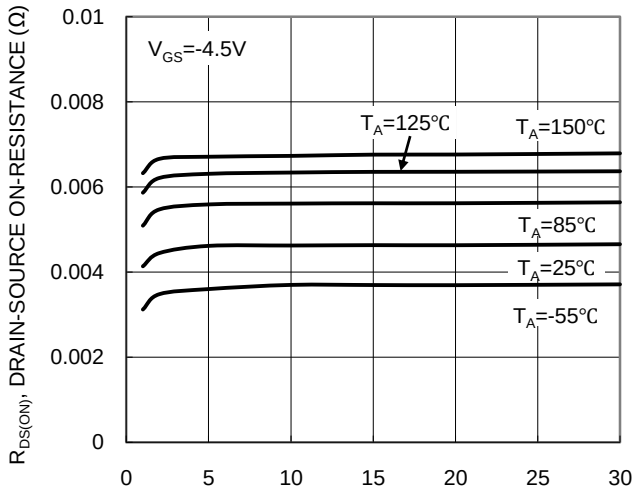


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

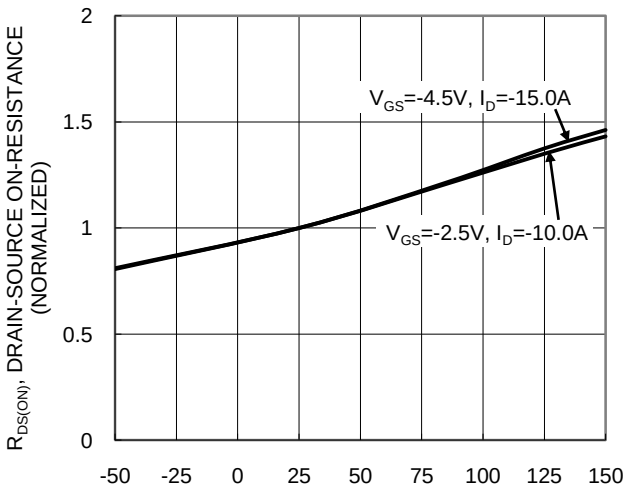


Figure 6. On-Resistance Variation with Temperature

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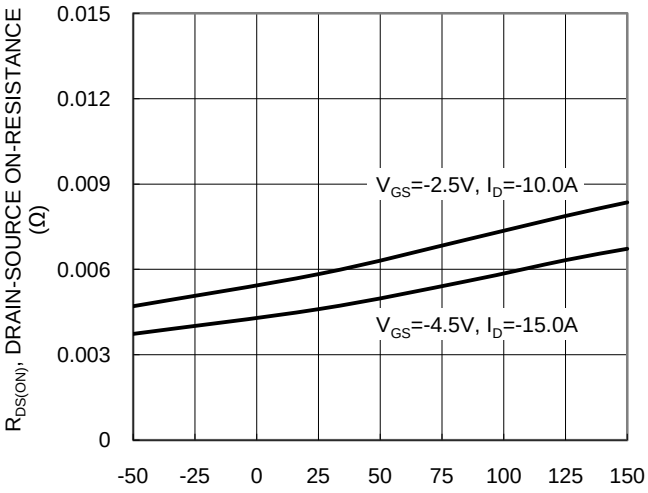


Figure 7. On-Resistance Variation with Temperature

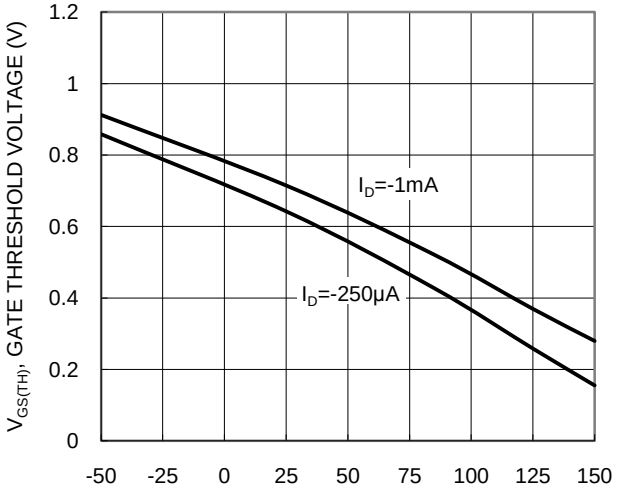


Figure 8. Gate Threshold Variation vs. Junction Temperature

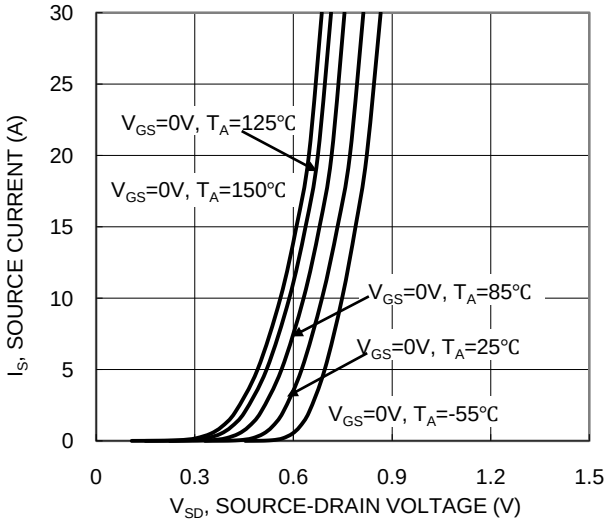


Figure 9. Diode Forward Voltage vs. Current

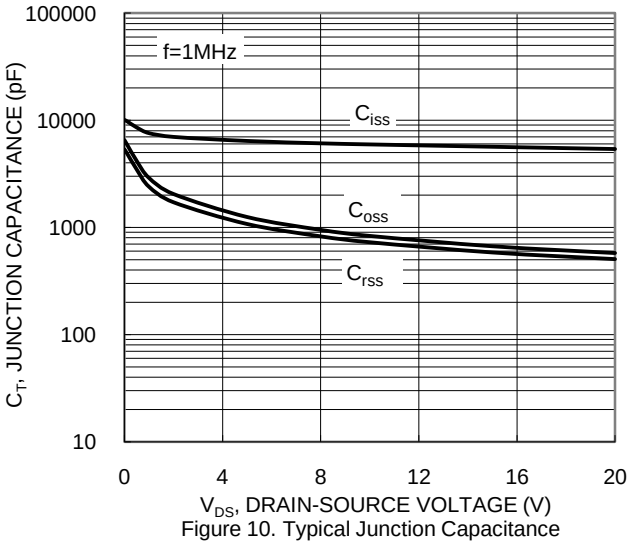


Figure 10. Typical Junction Capacitance

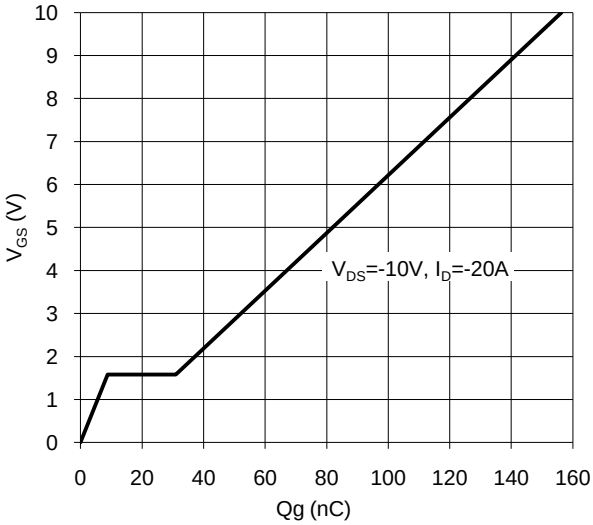


Figure 11. Gate Charge

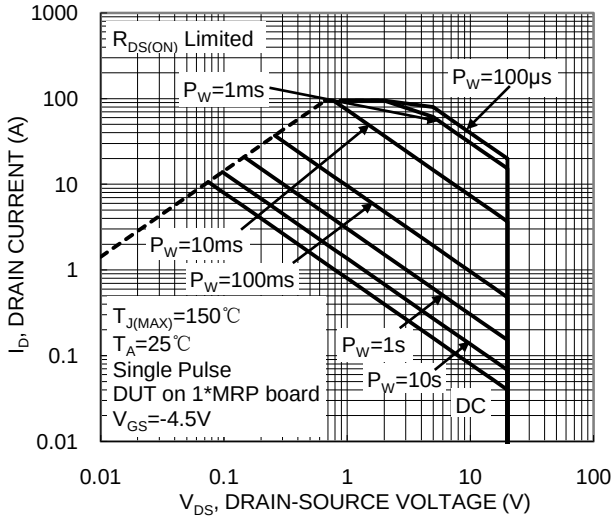


Figure 12. SOA, Safe Operation Area

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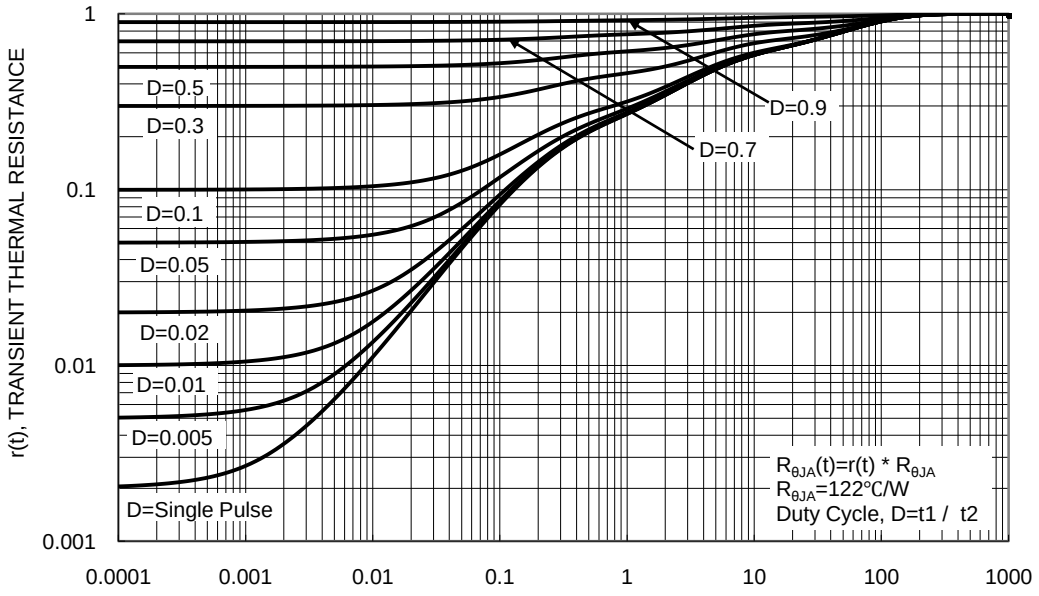
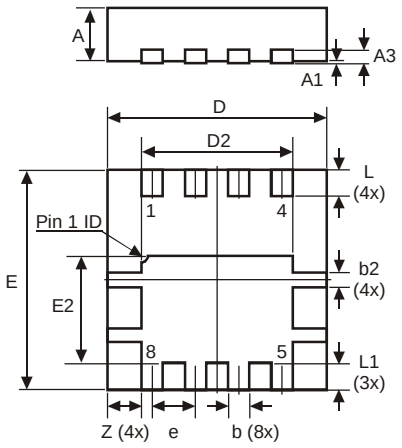



Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.




| POWERDI3333-8 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **D** | 3.25 | 3.35 | 3.30 |
| **E** | 3.25 | 3.35 | 3.30 |
| **D2** | 2.22 | 2.32 | 2.27 |
| **E2** | 1.56 | 1.66 | 1.61 |
| **A** | 0.75 | 0.85 | 0.80 |
| **A1** | 0 | 0.05 | 0.02 |
| **A3** | – | – | 0.203 |
| **b** | 0.27 | 0.37 | 0.32 |
| **b2** | – | – | 0.20 |
| **L** | 0.35 | 0.45 | 0.40 |
| **L1** | – | – | 0.39 |
| **e** | – | – | 0.65 |
| **Z** | – | – | 0.515 |
| **All Dimensions in mm** | | | |

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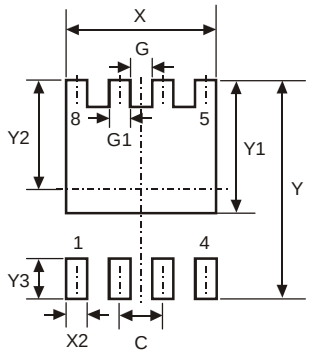
## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| Dimensions | Value (in mm) |
|---|---|
| C | 0.650 |
| G | 0.230 |
| G1 | 0.420 |
| Y | 3.700 |
| Y1 | 2.250 |
| Y2 | 1.850 |
| Y3 | 0.700 |
| X | 2.370 |
| X2 | 0.420 |