

Product Summary

| Device | BV _{DSS} | R _{DS(ON)} Max | I _D Max T _A = +25°C |
|--------|-------------------|--------------------------------|--|
| Q1 | 30V | 25mΩ @ V _{GS} = 10V | 7.2A |
| | | 35mΩ @ V _{GS} = 4.5V | 6.1A |
| Q2 | -30V | 28mΩ @ V _{GS} = -10V | -6.8A |
| | | 38mΩ @ V _{GS} = -4.5V | -5.8A |

Description

This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

Applications

- Power Management Functions
- Analog Switch

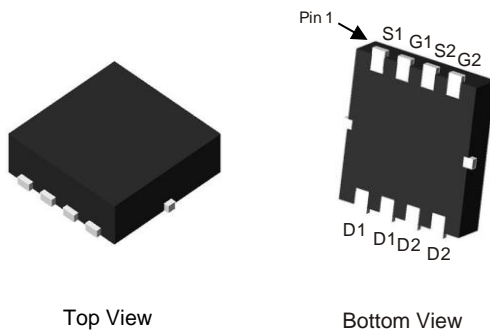
Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: POWERDI®3333-8 (Type UXB)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Below Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (Approximate)

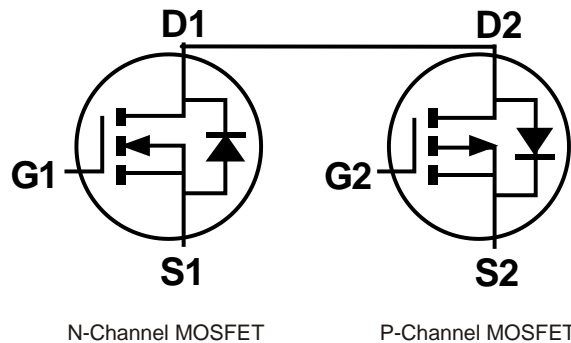
POWERDI®3333-8 (Type UXB)



Top View

Bottom View

Equivalent Circuit



N-Channel MOSFET

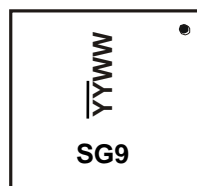
P-Channel MOSFET

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|---------------------------|-------------------|
| DMC3025LNS-7 | POWERDI®3333-8 (Type UXB) | 2,000/Tape & Reel |
| DMC3025LNS-13 | POWERDI®3333-8 (Type UXB) | 3,000/Tape & Reel |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 - See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



SG9 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 16 for 2016)
 WW = Week Code (01 to 53)

Maximum Ratings Q1 N-CHANNEL (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | 30 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 6) V _{GS} = 10V | Steady State | T _A = +25°C | I _D | 7.2 | A |
| | | T _A = +70°C | | 5.7 | |
| Maximum Body Diode Forward Current (Note 6) | | | I _S | 2 | A |
| Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%) | | | I _{DM} | 45 | A |
| Avalanche Current (L = 0.1mH) (Note 7) | | | I _{AS} | 14 | A |
| Avalanche Energy (L = 0.1mH) (Note 7) | | | E _{AS} | 9.8 | mJ |

Maximum Ratings Q2 P-CHANNEL (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|--|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | -30 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 6) V _{GS} = -10V | Steady State | T _A = +25°C | I _D | -6.8 | A |
| | | T _A = +70°C | | -5.7 | |
| Maximum Body Diode Forward Current (Note 6) | | | I _S | -2 | A |
| Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%) | | | I _{DM} | -40 | A |
| Avalanche Current (L = 0.1mH) (Note 7) | | | I _{AS} | -22 | A |
| Avalanche Energy (L = 0.1mH) (Note 7) | | | E _{AS} | 24 | 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 | 1.2 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 105 | °C/W |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 1.8 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 69 | °C/W |
| Thermal Resistance, Junction to Case (Note 6) | | R _{θJC} | 15 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

- Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.

Electrical Characteristics N-CHANNEL – Q1 (@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} | 30 | – | – | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | – | – | 1 | μA | V _{DS} = 30V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | – | – | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1.0 | – | 2.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | – | 15 | 25 | mΩ | V _{GS} = 10V, I _D = 7A |
| | | | 24 | 35 | | V _{GS} = 4.5V, I _D = 7A |
| Diode Forward Voltage | V _{SD} | – | 0.70 | 1.0 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | – | 500 | – | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | – | 72 | – | | |
| Reverse Transfer Capacitance | C _{rss} | – | 57 | – | | |
| Gate resistance | R _g | – | 1.9 | – | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | – | 4.6 | – | nC | V _{DS} = 15V, I _D = 10A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | – | 9.8 | – | | |
| Gate-Source Charge | Q _{gs} | – | 1.6 | – | | |
| Gate-Drain Charge | Q _{gd} | – | 2.0 | – | | |
| Turn-On Delay Time | t _{D(ON)} | – | 3.9 | – | ns | V _{DD} = 15V, V _{GS} = 10V, R _g = 6Ω, I _D = 1A |
| Turn-On Rise Time | t _r | – | 4.2 | – | | |
| Turn-Off Delay Time | t _{D(OFF)} | – | 16.6 | – | | |
| Turn-Off Fall Time | t _f | – | 5.8 | – | | |
| Reverse Recovery Time | t _{RR} | – | 5.6 | – | ns | I _F = 12A, di/dt = 500A/μs |
| Reverse Recovery Charge | Q _{RR} | – | 2.6 | – | nC | |

Electrical Characteristics P-CHANNEL – Q2 (@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} | -30 | – | – | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | – | – | -1 | μA | V _{DS} = -30V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | – | – | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -1.2 | – | -2.4 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | – | 22 | 28 | mΩ | V _{GS} = -10V, I _D = -7A |
| | | | 32 | 38 | | V _{GS} = -4.5V, I _D = -6.2A |
| Diode Forward Voltage | V _{SD} | – | -0.7 | -1.2 | V | V _{GS} = 0V, I _S = -2.1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | – | 1,188 | – | pF | V _{DS} = -15V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | – | 154 | – | | |
| Reverse Transfer Capacitance | C _{rss} | – | 116 | – | | |
| Gate Resistance | R _g | – | 9 | – | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | – | 9.5 | – | nC | V _{DS} = -15V, I _D = -7A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | – | 19.7 | – | | |
| Gate-Source Charge | Q _{gs} | – | 3.1 | – | | |
| Gate-Drain Charge | Q _{gd} | – | 3.2 | – | | |
| Turn-On Delay Time | t _{D(ON)} | – | 3.7 | – | ns | V _{GS} = -10V, V _{DS} = -15V, R _g = 6Ω, I _D = -7A |
| Turn-On Rise Time | t _r | – | 2.6 | – | | |
| Turn-Off Delay Time | t _{D(OFF)} | – | 36 | – | | |
| Turn-Off Fall Time | t _f | – | 22 | – | | |
| Reverse Recovery Time | t _{RR} | – | 10.4 | – | ns | I _F = -7A, di/dt = 100A/μs |
| Reverse Recovery Charge | Q _{RR} | – | 3.2 | – | nC | |

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

Typical Characteristics - N-CHANNEL

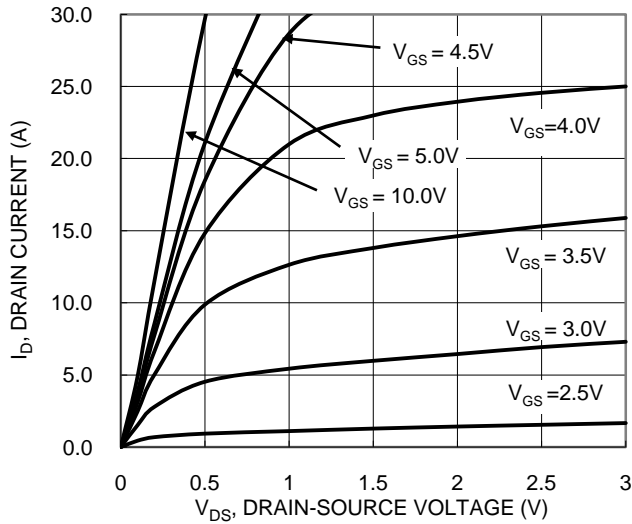


Figure 1. Typical Output Characteristic

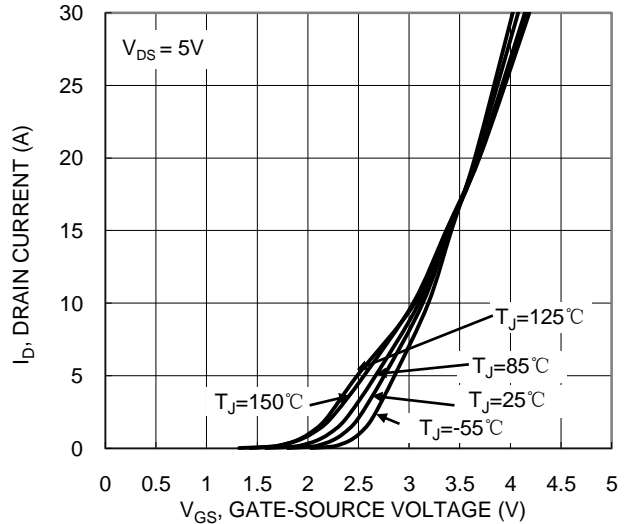


Figure 2. Typical Transfer Characteristic

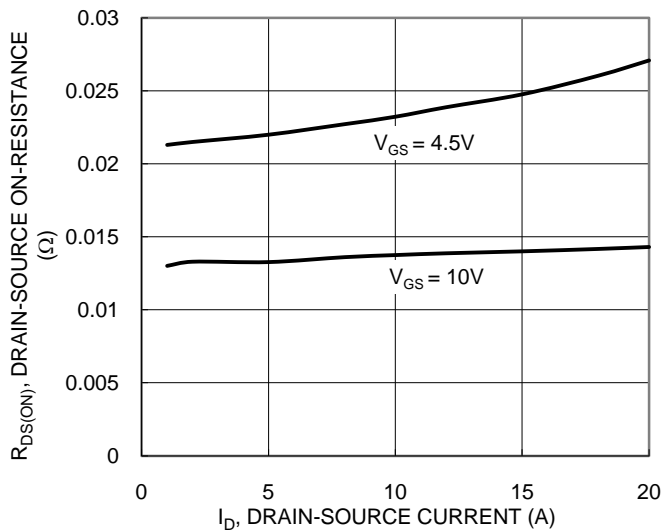


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

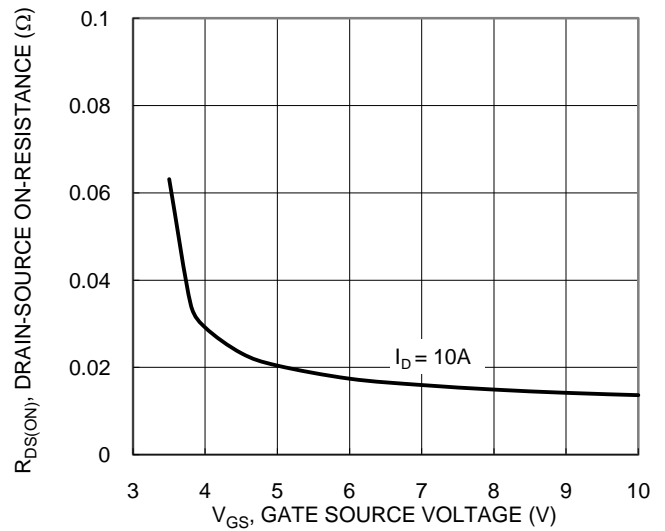


Figure 4. Typical On-Resistance vs. Drain Current and Gate Voltage

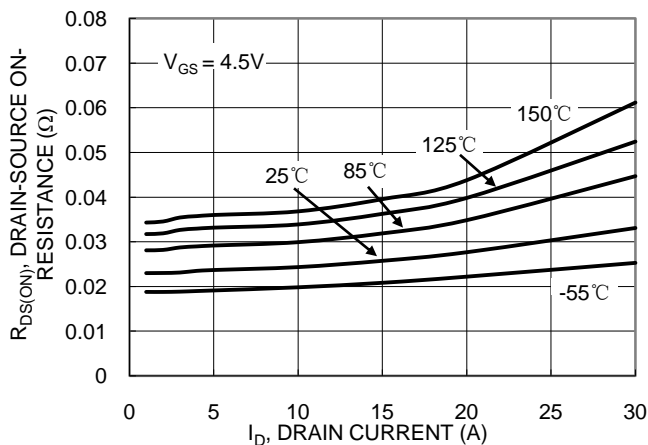


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

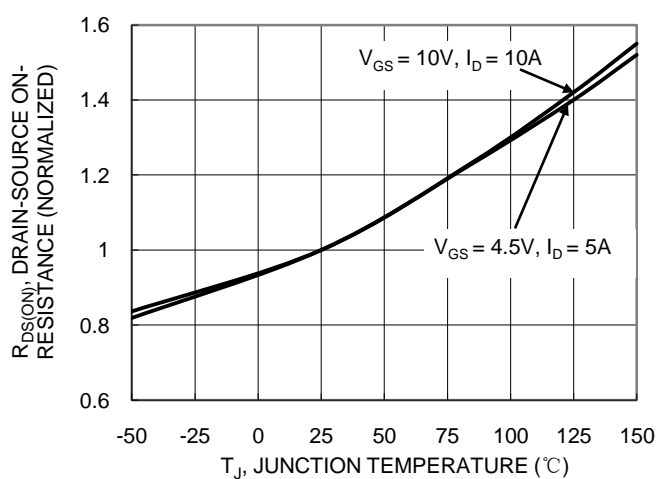
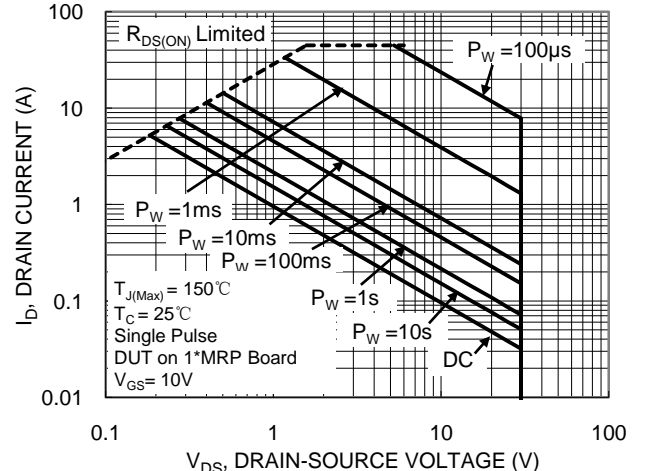
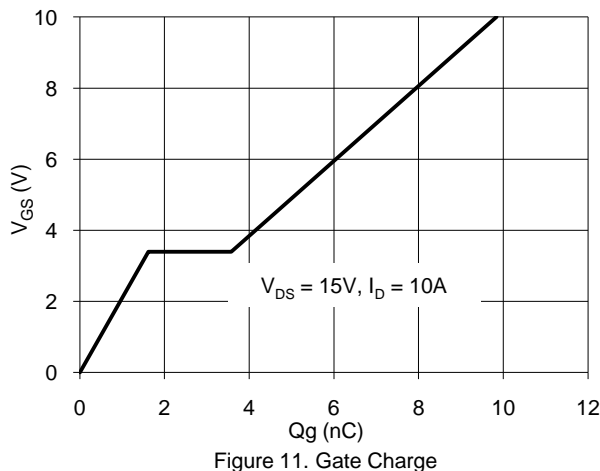
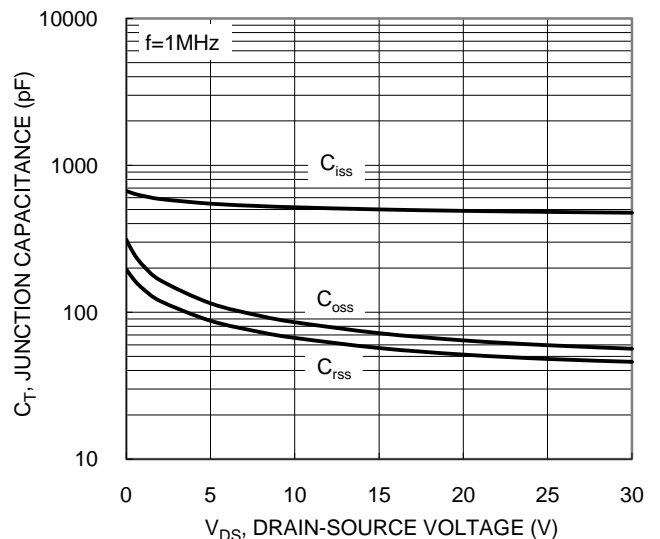
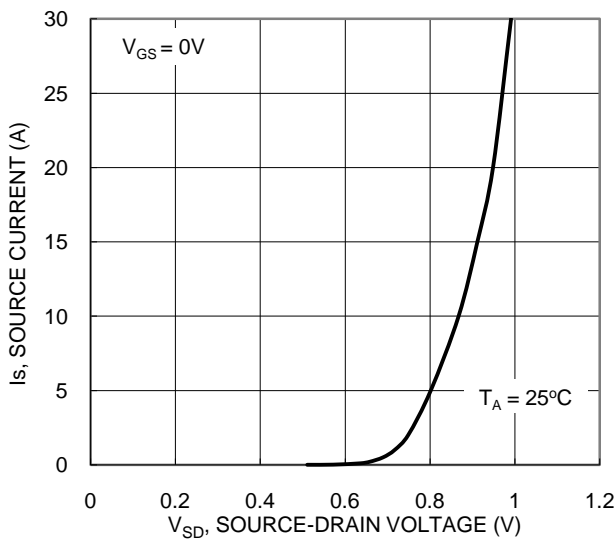
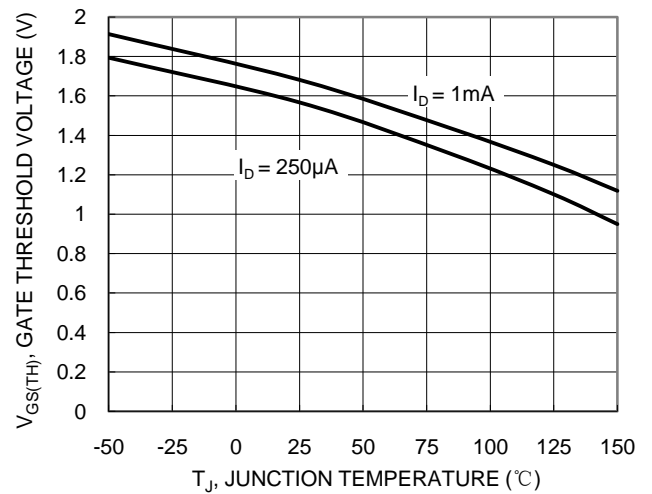
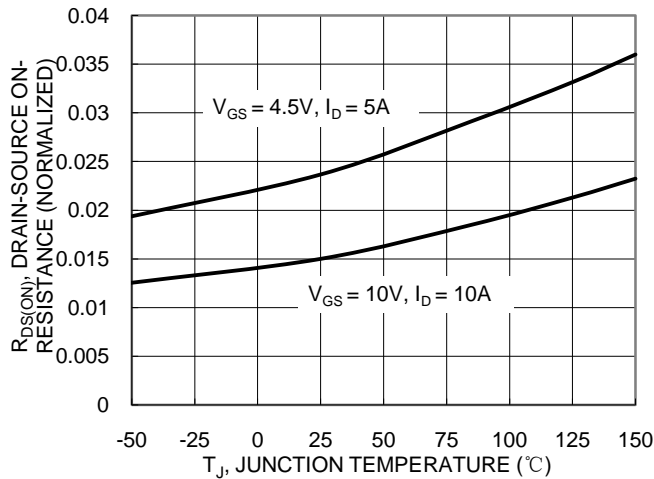


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - N-CHANNEL (Cont.)



Typical Characteristics - P-CHANNEL

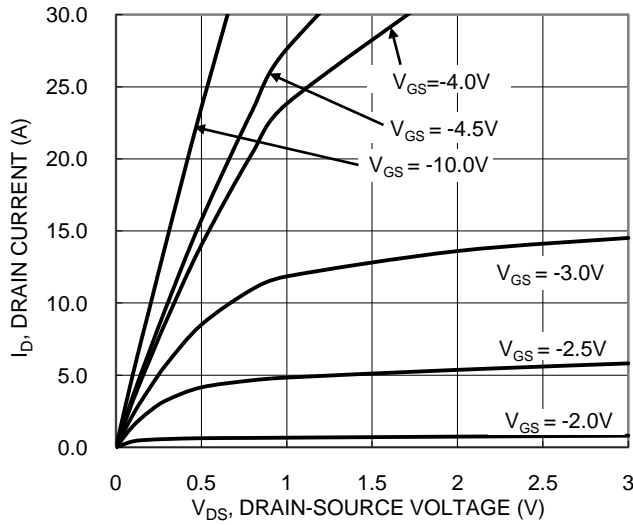


Figure 13. Typical Output Characteristic

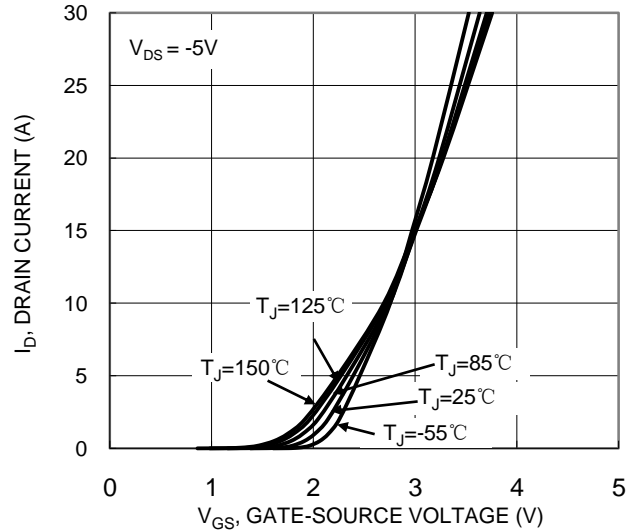


Figure 14. Typical Transfer Characteristic

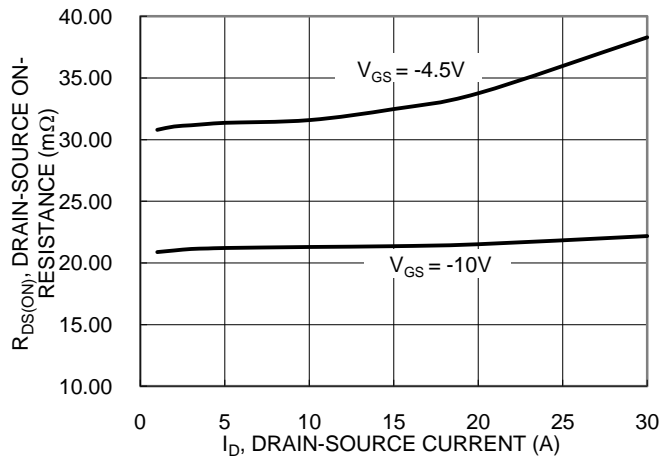


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

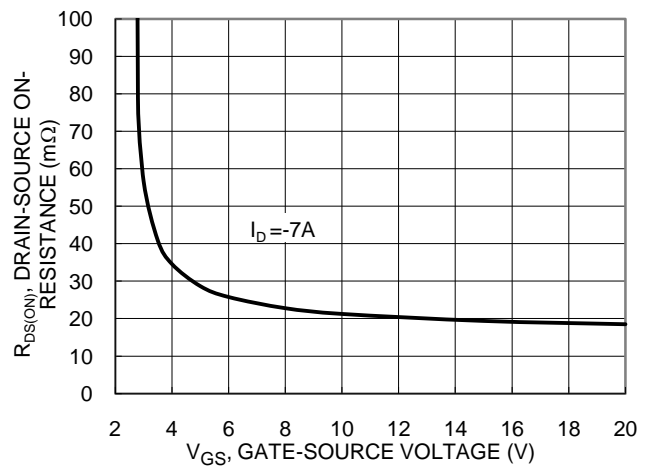


Figure 16. Typical Transfer Characteristic

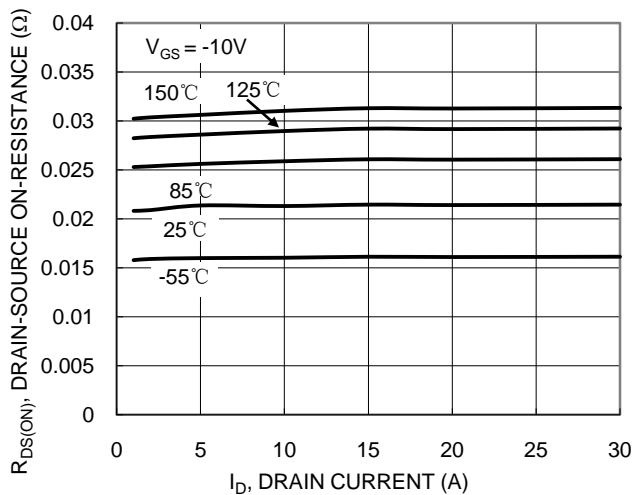


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

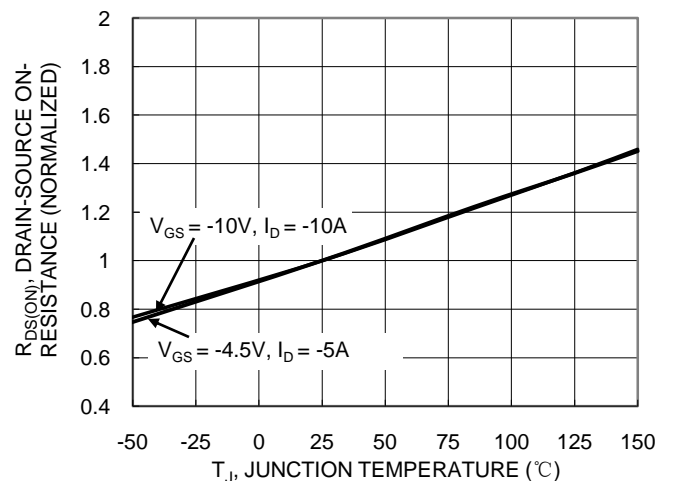


Figure 18. On-Resistance Variation with Temperature

Typical Characteristics - P-CHANNEL (Cont.)

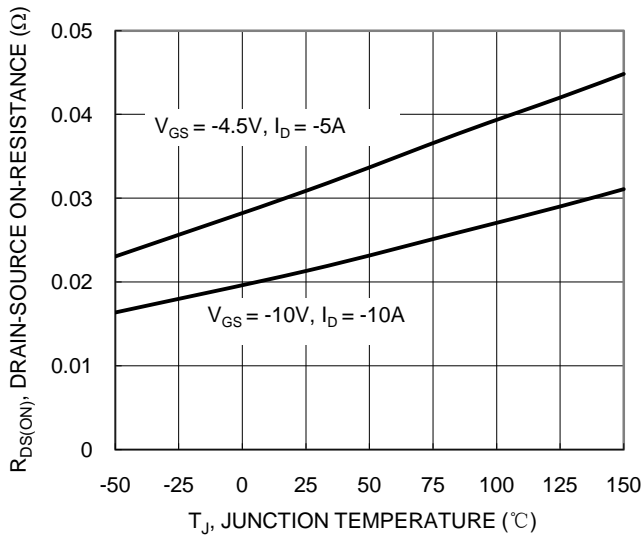


Figure 19. On-Resistance Variation with Temperature

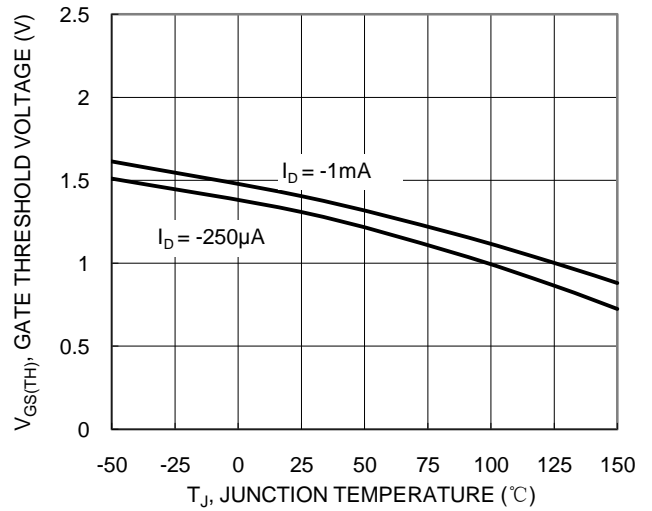


Figure 20. Gate Threshold Variation vs. Junction Temperature

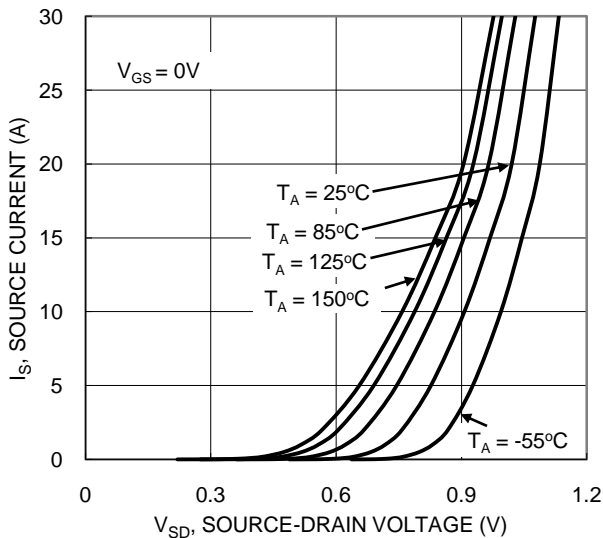


Figure 21. Diode Forward Voltage vs. Current

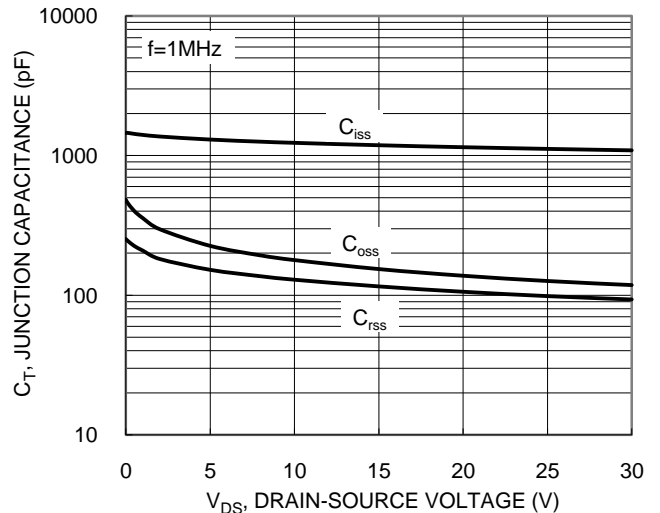


Figure 22. Typical Junction Capacitance

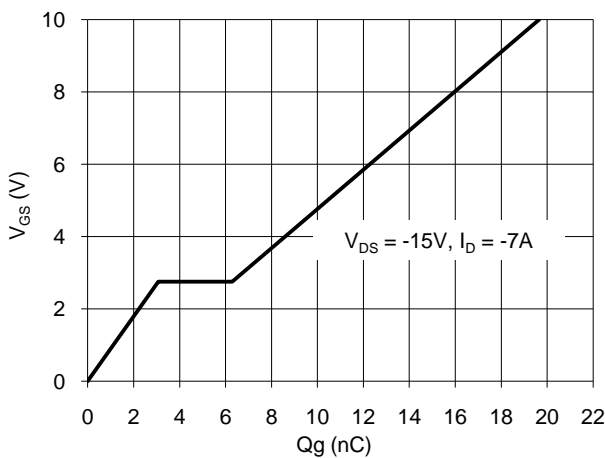


Figure 23. Gate Charge

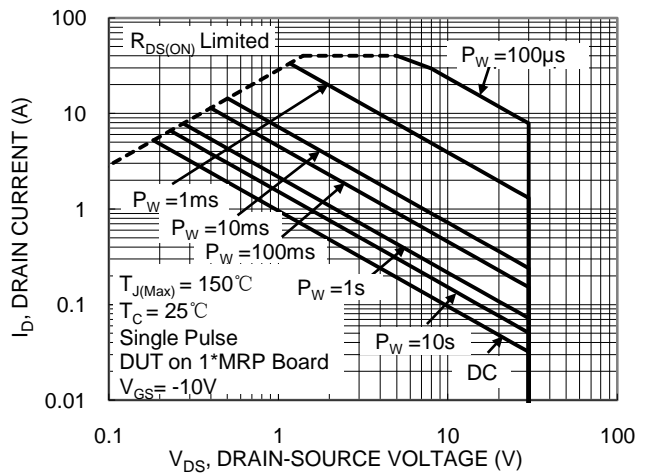


Figure 24. SOA, Safe Operation Area

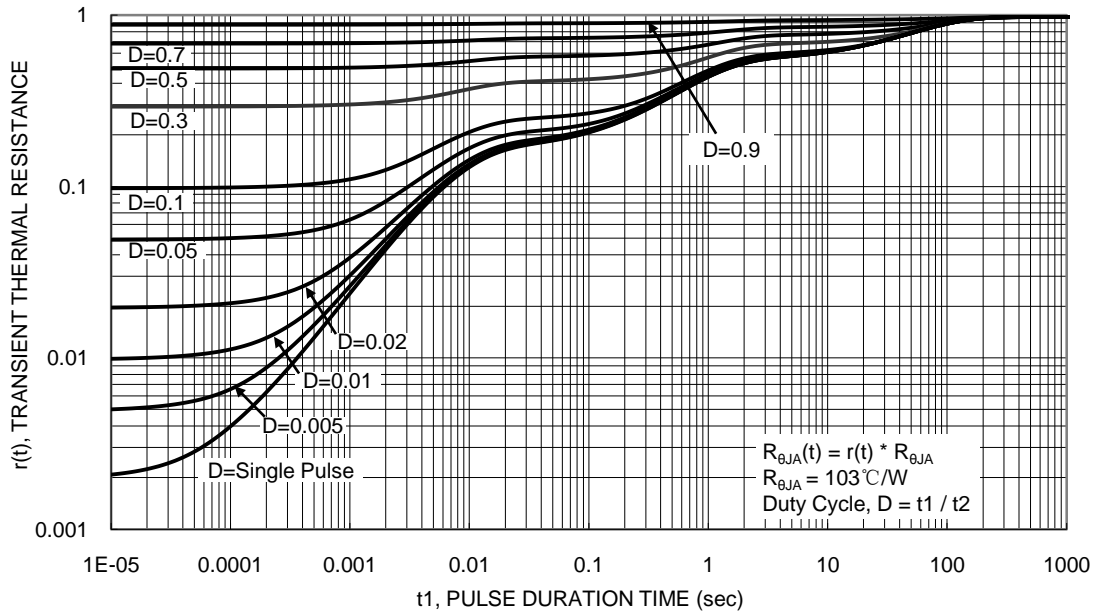
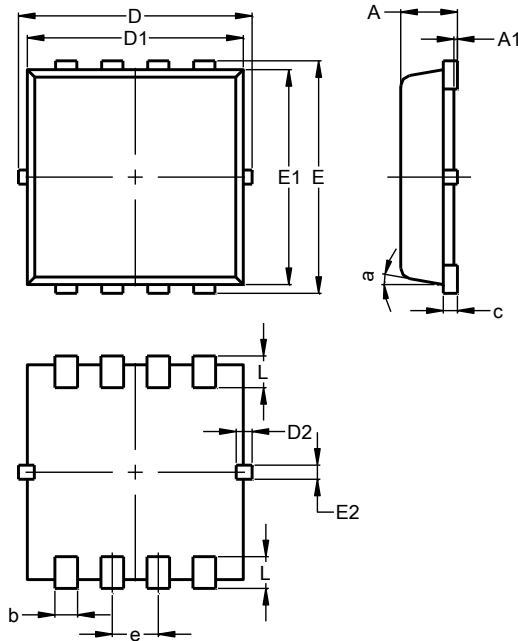


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

POWERDI®3333-8 (Type UXB)

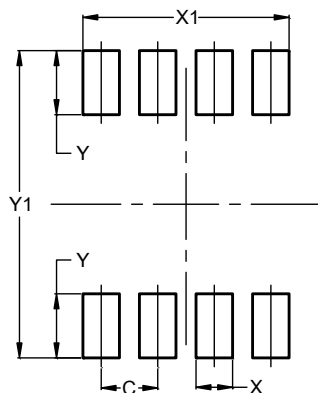


| POWERDI®3333-8 (Type UXB) | | | |
|------------------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | – |
| b | 0.25 | 0.40 | 0.32 |
| c | 0.10 | 0.25 | 0.15 |
| D | 3.20 | 3.40 | 3.30 |
| D1 | 2.95 | 3.15 | 3.05 |
| D2 | 0.10 | 0.35 | 0.23 |
| E | 3.20 | 3.40 | 3.30 |
| E1 | 2.95 | 3.15 | 3.05 |
| E2 | 0.10 | 0.30 | 0.20 |
| e | – | – | 0.65 |
| L | 0.35 | 0.55 | 0.45 |
| a | 0° | 12° | 10° |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

POWERDI®3333-8 (Type UXB)



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| X | 0.420 |
| X1 | 2.370 |
| Y | 0.730 |
| Y1 | 3.500 |

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