

Product Summary

| Device | BV _{DSS} | R _{DS(ON)} Max | I _D Max T _c = +25°C |
|--------|-------------------|--------------------------------|--|
| Q1 | 30V | 2.5mΩ @ V _{GS} = 10V | 47A |
| | | 3.2mΩ @ V _{GS} = 4.5V | 42A |
| Q2 | 30V | 2.9mΩ @ V _{GS} = 10V | 47A |
| | | 3.6mΩ @ V _{GS} = 4.5V | 42A |

Description

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

Applications

- Power management functions

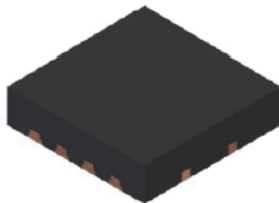
Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/contact-us) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

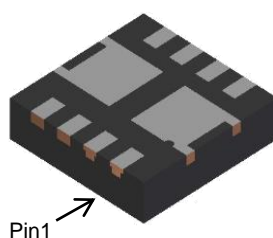
Mechanical Data

- Package: PowerDI[®]3333-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections Indicator: See Diagram
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 **(e3)**
- Weight: 0.072 grams (Approximate)

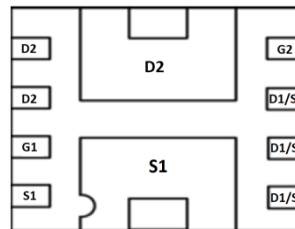
PowerDI3333-8 (Type G)



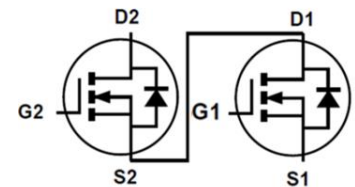
Top View



Bottom View



Bottom View



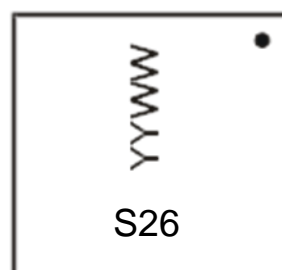
Q2 N-Channel MOSFET Q1 N-Channel MOSFET

Ordering Information (Note 4)

| Part Number | Package | Packing | |
|---------------|------------------------|---------|-------------|
| | | Qty. | Carrier |
| DMT32M6LDG-7 | PowerDI3333-8 (Type G) | 2,000 | Tape & Reel |
| DMT32M6LDG-13 | PowerDI3333-8 (Type G) | 3,000 | Tape & Reel |

- Notes:
- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 - See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



S26 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 22 = 2022)
WW = Week Code (01 to 53)

Maximum Ratings N-CHANNEL – Q1 & Q2 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Q1 N-CHANNEL | Q2 N-CHANNEL | Unit |
|---|--------------|--|------------------|-----------------|-----------------|------|
| Drain-Source Voltage | | | V _{DSS} | 30 | 30 | V |
| Gate-Source Voltage | | | V _{GSS} | 16 -12 | 16 -12 | V |
| Continuous Drain Current (Note 6) | Steady State | T _A = +25°C T _A = +70°C | I _D | 21 17 | 21 17 | A |
| Continuous Drain Current (Note 7) | Steady State | T _C = +25°C T _C = +70°C | I _D | 47 38 | 47 38 | A |
| Maximum Continuous Body Diode Forward Current (Note 7) | | | I _S | 2.7 | 2.7 | A |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | | | I _{DM} | 110 | 110 | A |
| Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%) | | | I _{SM} | 110 | 110 | A |
| Avalanche Current (Note 8) L = 0.1mH | | | I _{AS} | 21 | 21 | A |
| Avalanche Energy (Note 8) L = 0.1mH | | | E _{AS} | 22 | 22 | 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 | 1.1 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 116 | °C/W |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 1.7 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 73 | °C/W |
| Thermal Resistance, Junction to Case (Note 7) | | R _{θJC} | 14.4 | °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. Thermal resistance from junction to soldering point (on the exposed drain pad).
 8. I_{AS} and E_{AS} ratings 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 9) | | | | | | |
| 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} | — | — | 1.0 | μA | V _{DS} = 24V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | 100 | nA | V _{GS} = 16V, V _{DS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | -100 | nA | V _{GS} = -12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 9) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1 | — | 2.2 | V | V _{DS} = V _{GS} , I _D = 400μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 1.7 | 2.5 | mΩ | V _{GS} = 10V, I _D = 18A |
| | | — | 2.3 | 3.2 | | V _{GS} = 4.5V, I _D = 16A |
| Diode Forward Voltage | V _{SD} | — | 0.8 | 1.2 | V | V _{GS} = 0V, I _S = 18A |
| DYNAMIC CHARACTERISTICS (Note 10) | | | | | | |
| Input Capacitance | C _{iss} | — | 2101 | — | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 1488 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 73 | — | pF | |
| Gate Resistance | R _g | — | 0.55 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 15.6 | — | nC | V _{GS} = 4.5V, V _{DS} = 15V, I _D = 18A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 31.7 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 3.9 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 5 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 8.7 | — | ns | V _{DS} = 15V, R _G = 6Ω, I _D = 18A |
| Turn-On Rise Time | t _r | — | 32.4 | — | ns | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 36.2 | — | ns | |
| Turn-Off Fall Time | t _f | — | 15.4 | — | ns | |
| Reverse Recovery Time | t _{RR} | — | 37 | — | ns | I _F = 15A, dI/dt = 100A/μs |
| Reverse Recovery Charge | Q _{RR} | — | 29.8 | — | nC | |

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

Electrical Characteristics N-CHANNEL – Q2 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-----|------|------|------|--|
| OFF CHARACTERISTICS (Note 9) | | | | | | |
| 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} | — | — | 1.0 | μA | V _{DS} = 24V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | 100 | nA | V _{GS} = 16V, V _{DS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | -100 | nA | V _{GS} = -12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 9) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1 | — | 2.2 | V | V _{DS} = V _{GS} , I _D = 400μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 2.1 | 2.9 | mΩ | V _{GS} = 10V, I _D = 18A |
| | | | 2.7 | 3.6 | | V _{GS} = 4.5V, I _D = 16A |
| Diode Forward Voltage | V _{SD} | — | 0.8 | 1.2 | V | V _{GS} = 0V, I _S = 18A |
| DYNAMIC CHARACTERISTICS (Note 10) | | | | | | |
| Input Capacitance | C _{iss} | — | 2106 | — | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 1491 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 73 | — | pF | |
| Gate Resistance | R _g | — | 0.55 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 15.1 | — | nC | V _{GS} = 4.5V, V _{DS} = 15V, I _D = 18A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 32 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 3.7 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 4.4 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 9.3 | — | ns | V _{DS} = 15V, R _G = 6Ω, I _D = 18A |
| Turn-On Rise Time | t _R | — | 30.6 | — | ns | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 35 | — | ns | |
| Turn-Off Fall Time | t _F | — | 15.1 | — | ns | |
| Reverse Recovery Time | t _{RR} | — | 35.8 | — | ns | I _F = 15A, dI/dt = 100A/μs |
| Reverse Recovery Charge | Q _{RR} | — | 28.7 | — | nC | |

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

N-CHANNEL – Q1

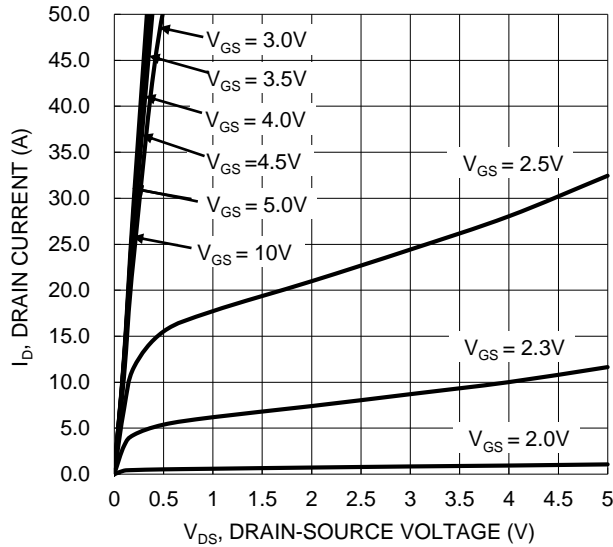


Figure 1. Typical Output Characteristic

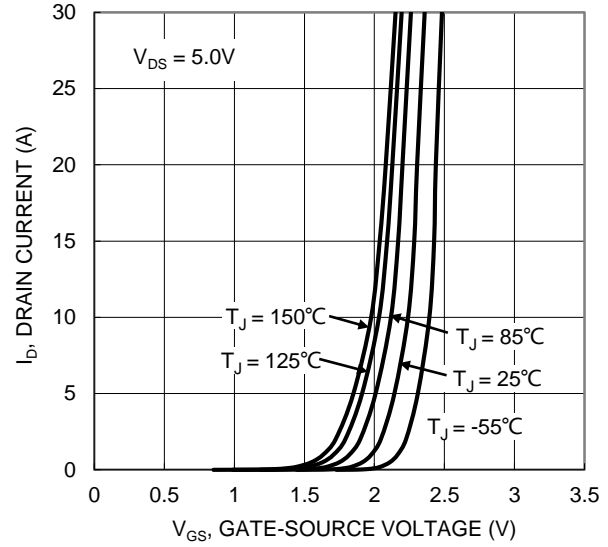


Figure 2. Typical Transfer Characteristic

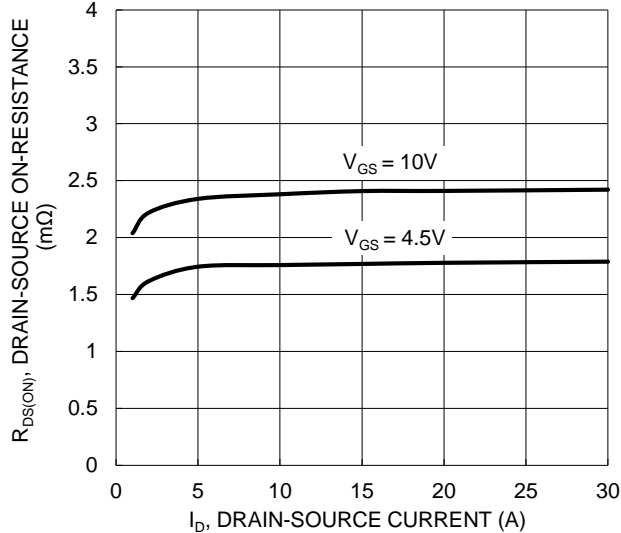


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

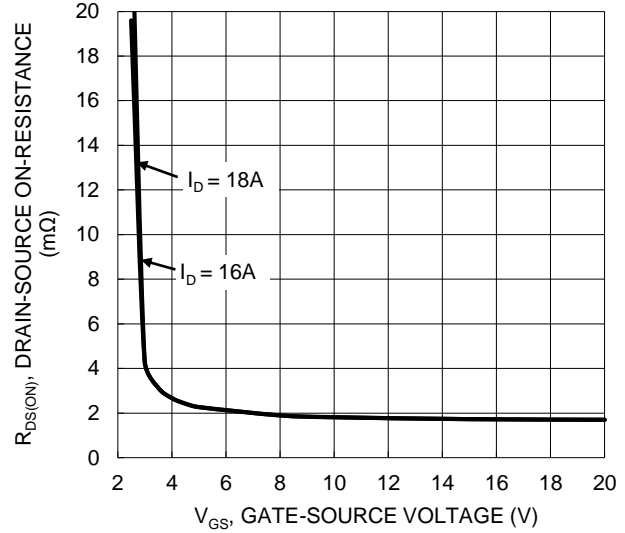


Figure 4. Typical Transfer Characteristic

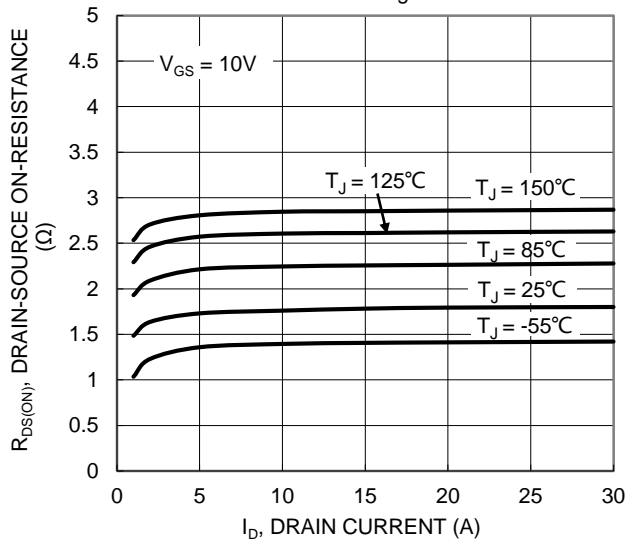


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

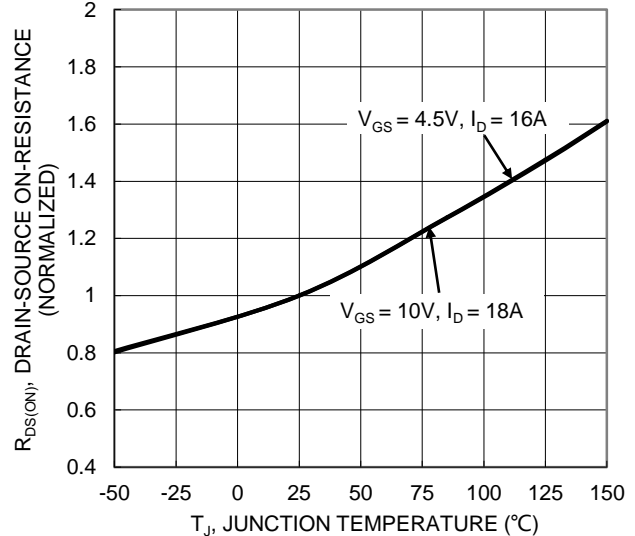


Figure 6. On-Resistance Variation with Temperature

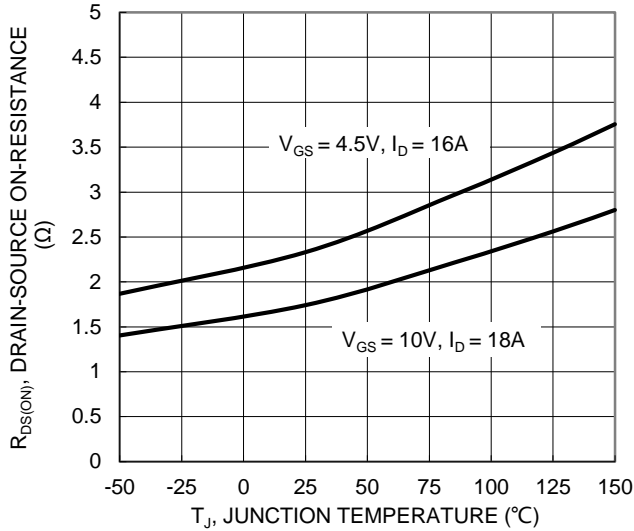


Figure 7. On-Resistance Variation with Temperature

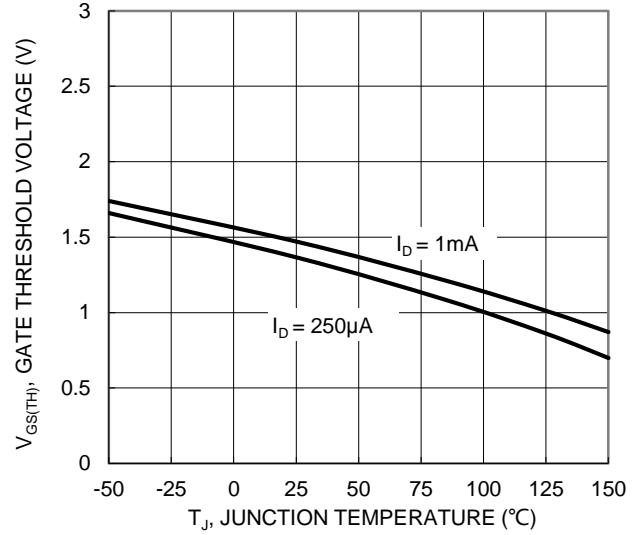


Figure 8. Gate Threshold Variation vs. Junction Temperature

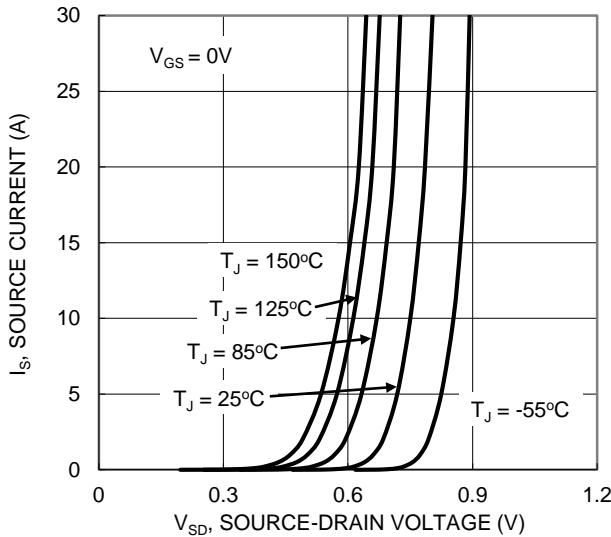


Figure 9. Diode Forward Voltage vs. Current

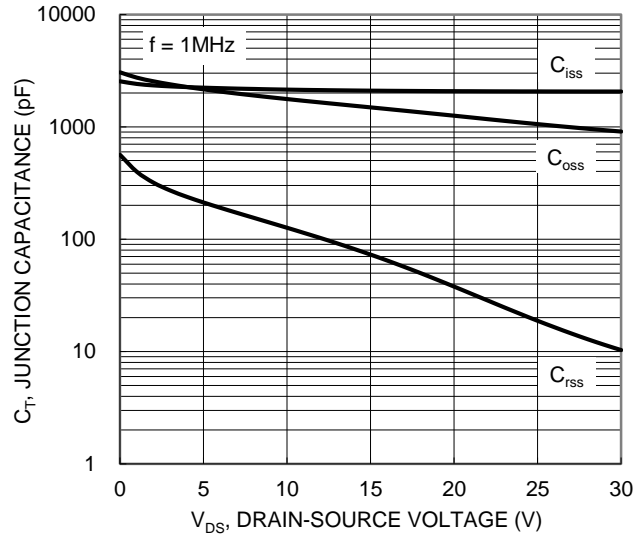


Figure 10. Typical Junction Capacitance

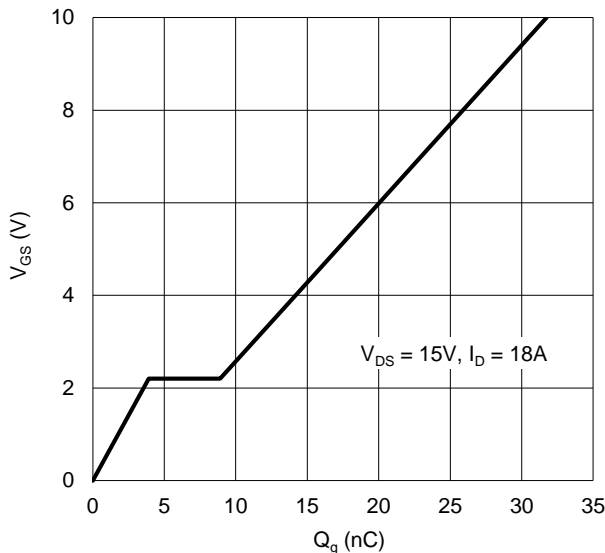


Figure 11. Gate Charge

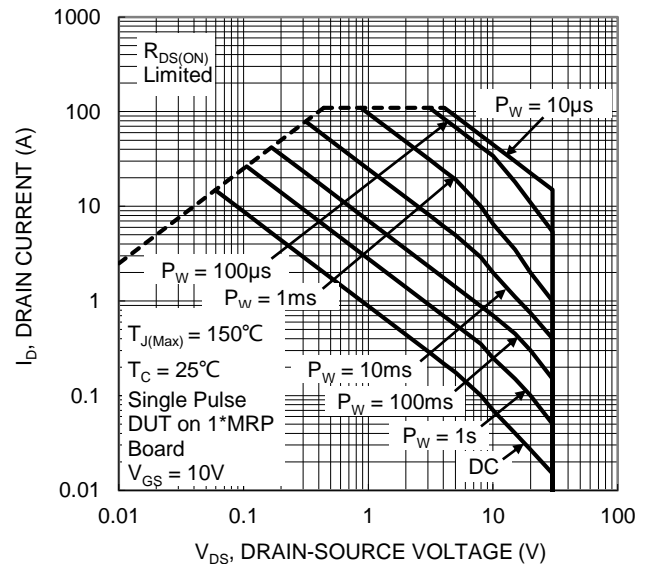


Figure 12. SOA, Safe Operation Area

N-CHANNEL – Q2

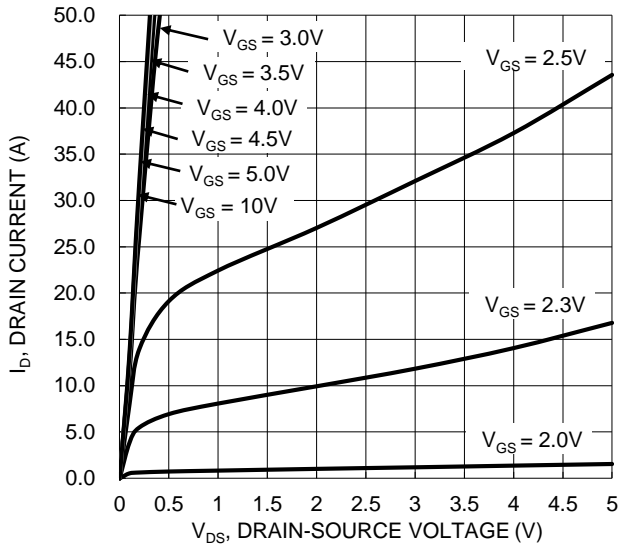


Figure 13. Typical Output Characteristic

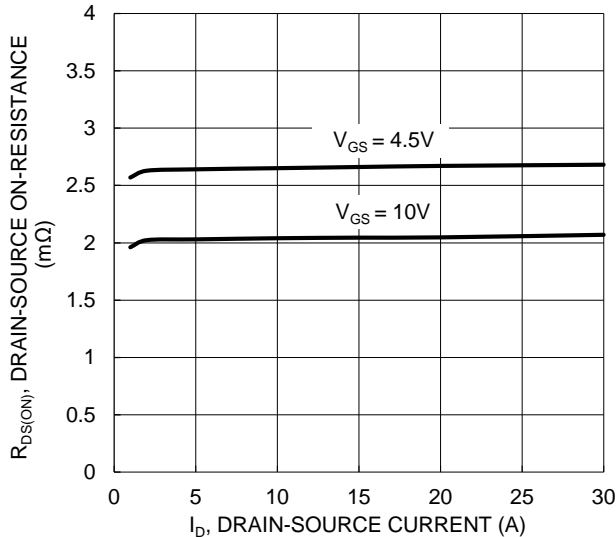


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

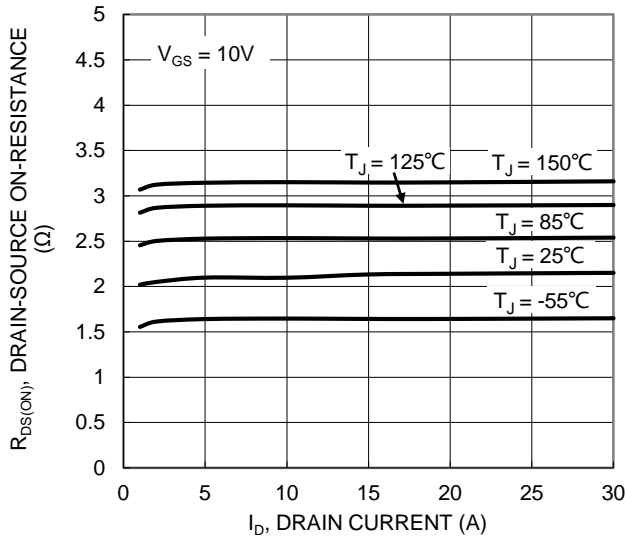


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

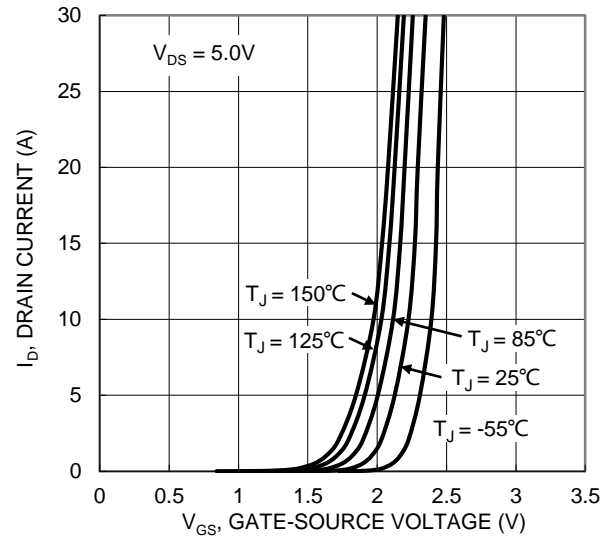


Figure 14. Typical Transfer Characteristic

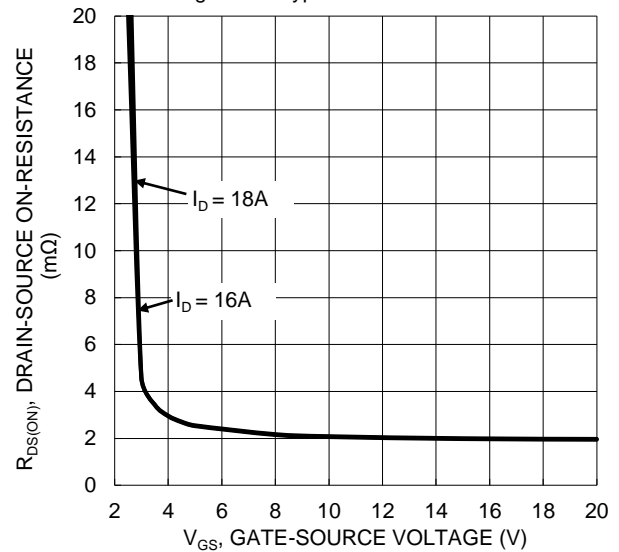


Figure 16. Typical Transfer Characteristic

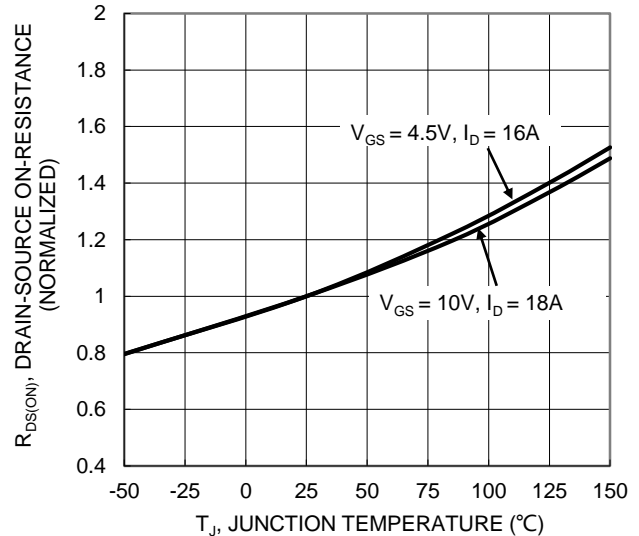


Figure 18. On-Resistance Variation with Temperature

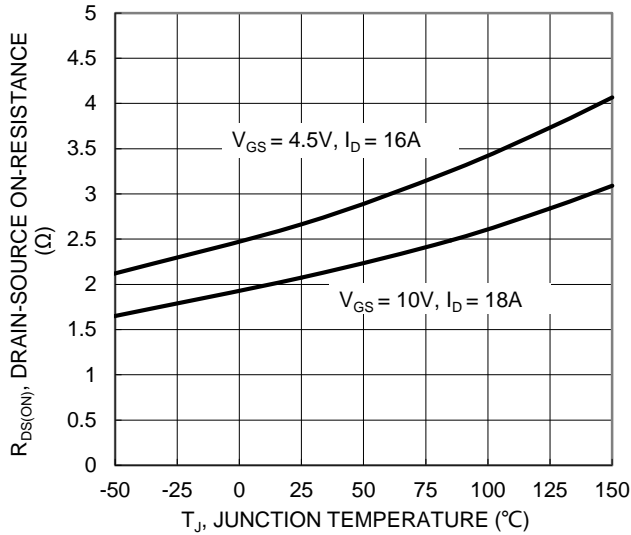


Figure 19. On-Resistance Variation with Temperature

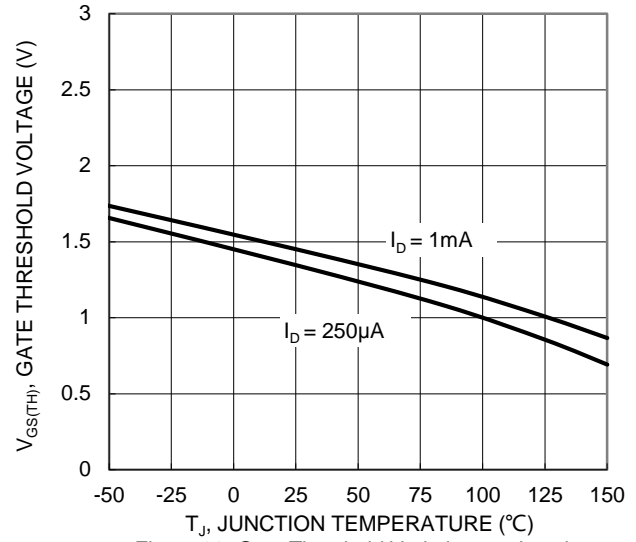


Figure 20. Gate Threshold Variation vs. Junction Temperature

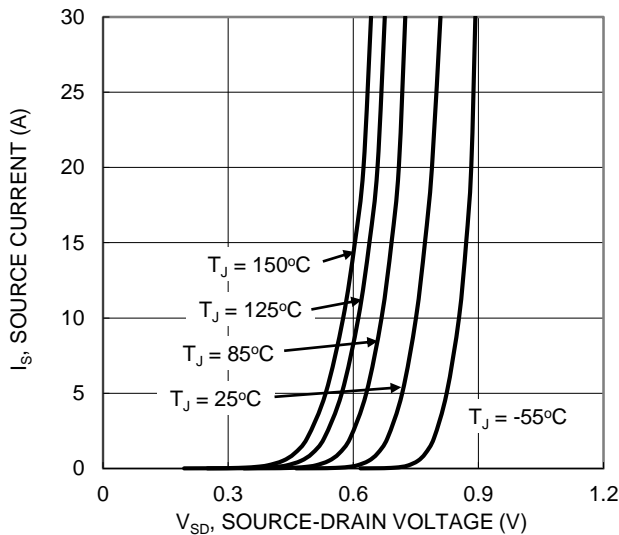


Figure 21. Diode Forward Voltage vs. Current

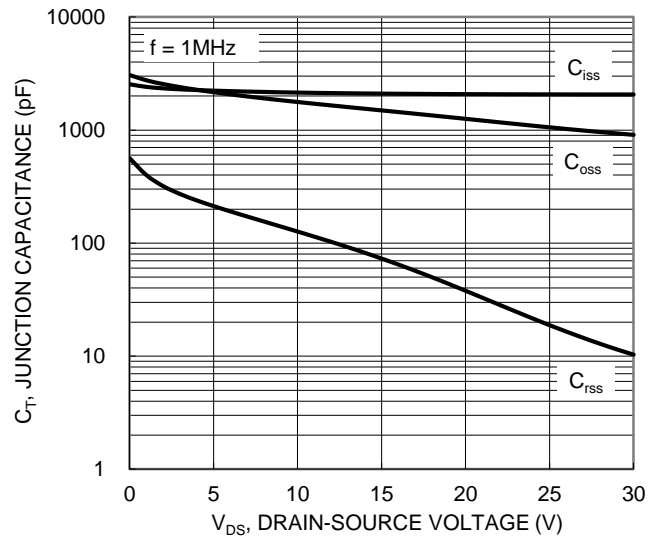


Figure 22. Typical Junction Capacitance

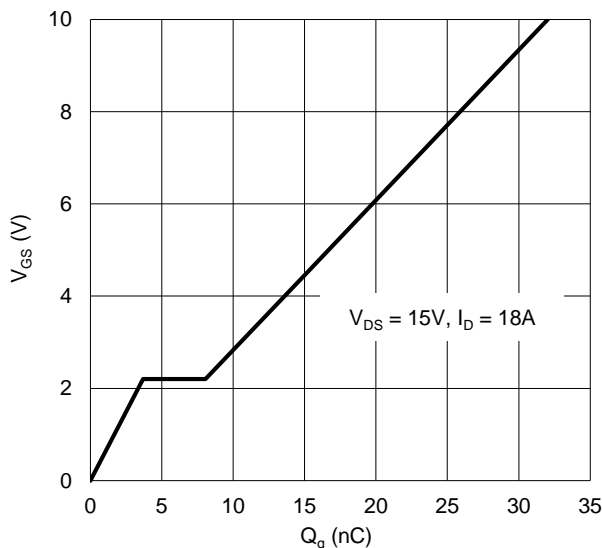


Figure 23. Gate Charge

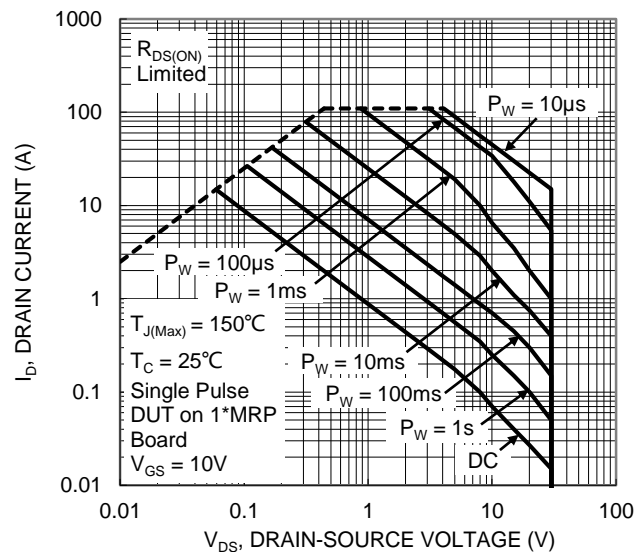
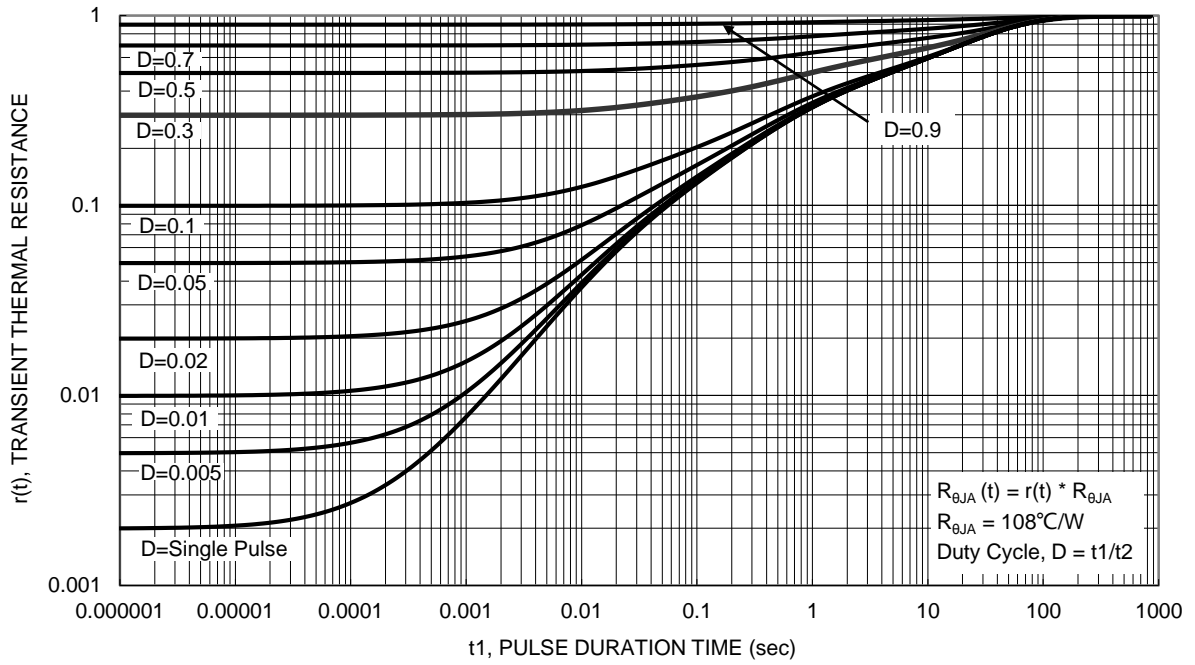


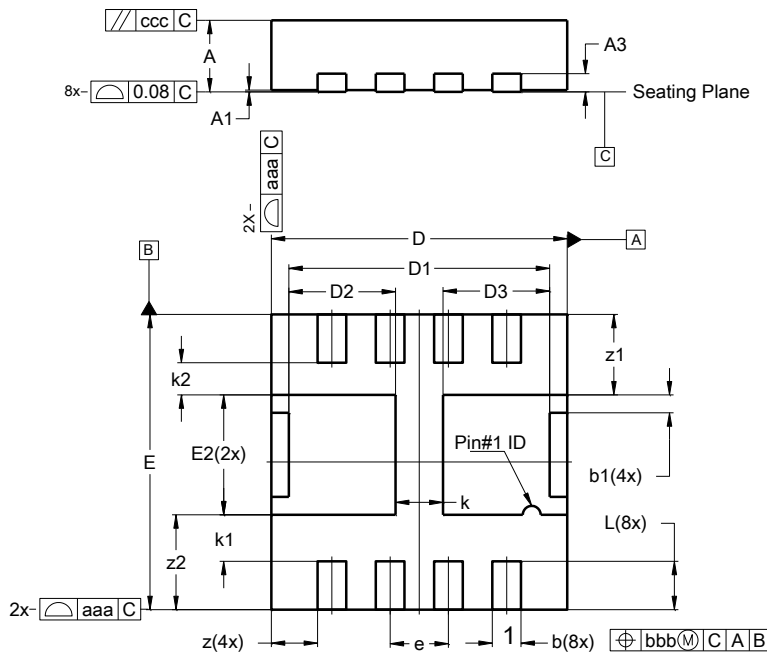
Figure 24. SOA, Safe Operation Area



Package Outline Dimensions

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

PowerDI3333-8 (Type G)

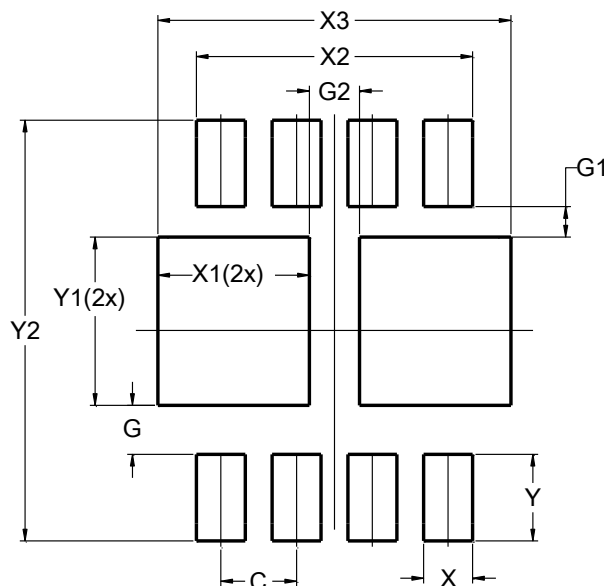


| PowerDI3333-8 (Type G) | | | |
|------------------------|---------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | -- | -- | 0.203 |
| b | 0.27 | 0.37 | 0.32 |
| b1 | 0.15 | 0.25 | 0.20 |
| D | 3.25 | 3.35 | 3.30 |
| D1 | 2.81 | 3.01 | 2.91 |
| D2 | 1.09 | 1.29 | 1.19 |
| D3 | 1.09 | 1.29 | 1.19 |
| E | 3.25 | 3.35 | 3.30 |
| E2 | 1.24 | 1.44 | 1.34 |
| e | 0.65BSC | | |
| L | 0.49 | 0.59 | 0.54 |
| k | -- | -- | 0.53 |
| k1 | -- | -- | 0.52 |
| k2 | -- | -- | 0.36 |
| z | -- | -- | 0.515 |
| z1 | -- | -- | 0.90 |
| z2 | -- | -- | 1.06 |
| aaa | 0.25 | | |
| bbb | 0.10 | | |
| ccc | 0.10 | | |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

PowerDI3333-8 (Type G)



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 0.420 |
| G1 | 0.260 |
| G2 | 0.430 |
| X | 0.420 |
| X1 | 1.300 |
| X2 | 2.370 |
| X3 | 3.030 |
| Y | 0.740 |
| Y1 | 1.440 |
| Y2 | 3.600 |

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