

## Product Summary

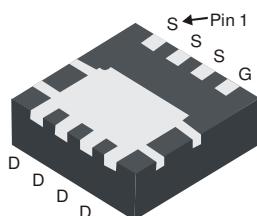
| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$      | $I_D \text{ max}$<br>$T_A = +25^\circ\text{C}$ |
|---------------|-------------------------------|--|
| 40V           | 12mΩ @ $V_{GS} = 10\text{V}$  | 11.5A  |
|               | 15mΩ @ $V_{GS} = 4.5\text{V}$ | 10.3A  |

## Description and Applications

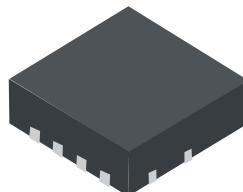
This MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications such as:

- Backlighting
- Power Management Functions
- DC-DC Converters

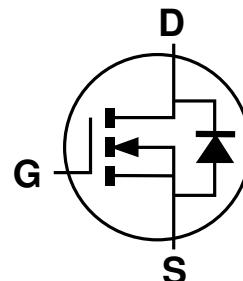
POWERDI 3333-8



Bottom View



Top View



Equivalent Circuit

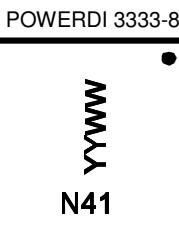
## Ordering Information (Note 4)

| Part Number   | Case           | Packaging         |
|---------------|----------------|-------------------|
| DMN4010LFG-7  | POWERDI 3333-8 | 2,000/Tape & Reel |
| DMN4010LFG-13 | POWERDI 3333-8 | 3,000/Tape & Reel |

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See [http://www.diodes.com/quality/lead\\_free.html](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.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



N41 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 13 = 2013)  
 WW = Week Code (01 ~ 53)

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic   |                  |  | Symbol    | Value        | Units |
|--|------------------|--|-----------|--------------|-------|
| Drain-Source Voltage   |                  |  | $V_{DSS}$ | 40           | V     |
| Gate-Source Voltage  |                  |  | $V_{GSS}$ | $\pm 20$     | V     |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$        | Steady State     | $T_A = +25^\circ\text{C}$<br>$T_A = +70^\circ\text{C}$ | $I_D$     | 11.5<br>9.2  | A     |
|  | $t < 10\text{s}$ | $T_A = +25^\circ\text{C}$<br>$T_A = +70^\circ\text{C}$ | $I_D$     | 14.2<br>11.4 | A     |
| Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%) |                  |  | $I_{DM}$  | 80           | A     |
| Maximum Continuous Body Diode Forward Current (Note 6)         |                  |  | $I_S$     | 2            | A     |
| Avalanche Current (Note 7) $L = 0.1\text{mH}$                  |                  |  | $I_{AS}$  | 27           | A     |
| Avalanche Energy (Note 7) $L = 0.1\text{mH}$                   |                  |  | $E_{AS}$  | 37           | mJ    |

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                   | Symbol           | Value       | Units              |
|--|------------------|-------------|--------------------|
| Total Power Dissipation (Note 5)                 | $P_D$            | 0.93        | W                  |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state     | 137         | $^\circ\text{C/W}$ |
|  | $t < 10\text{s}$ | 89          |                    |
| Total Power Dissipation (Note 6)                 | $P_D$            | 2.45        | W                  |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state     | 52          | $^\circ\text{C/W}$ |
|  | $t < 10\text{s}$ | 34          |                    |
| Thermal Resistance, Junction to Case (Note 6)    | $R_{\theta JC}$  | 3           |                    |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$   | -55 to +150 | $^\circ\text{C}$   |

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  $T_J = +25^\circ\text{C}$ .

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic   | Symbol                      | Min | Typ   | Max       | Unit             | Test Condition  |
|--|-----------------------------|-----|-------|-----------|------------------|---|
| <b>OFF CHARACTERISTICS (Note 8)</b>                        |                             |     |       |           |                  |   |
| Drain-Source Breakdown Voltage                             | $\text{BV}_{\text{DSS}}$    | 40  | —     | —         | V                | $\text{V}_{\text{GS}} = 0\text{V}$ , $\text{I}_D = 250\mu\text{A}$  |
| Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$  | $\text{I}_{\text{DSS}}$     | —   | —     | 1         | $\mu\text{A}$    | $\text{V}_{\text{DS}} = 32\text{V}$ , $\text{V}_{\text{GS}} = 0\text{V}$  |
| Gate-Source Leakage  | $\text{I}_{\text{GSS}}$     | —   | —     | $\pm 100$ | nA               | $\text{V}_{\text{GS}} = \pm 20\text{V}$ , $\text{V}_{\text{DS}} = 0\text{V}$  |
| <b>ON CHARACTERISTICS (Note 8)</b>                         |                             |     |       |           |                  |   |
| Gate Threshold Voltage                                     | $\text{V}_{\text{GS(th)}}$  | 1.0 | —     | 3.0       | V                | $\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$ , $\text{I}_D = 250\mu\text{A}$   |
| Static Drain-Source On-Resistance                          | $\text{R}_{\text{DS (ON)}}$ | —   | —     | 12        | $\text{m}\Omega$ | $\text{V}_{\text{GS}} = 10\text{V}$ , $\text{I}_D = 14\text{A}$   |
|  |                             | —   | —     | 15        |                  | $\text{V}_{\text{GS}} = 4.5\text{V}$ , $\text{I}_D = 11\text{A}$  |
| Diode Forward Voltage                                      | $\text{V}_{\text{SD}}$      | —   | 0.72  | —         | V                | $\text{V}_{\text{GS}} = 0\text{V}$ , $\text{I}_S = 14\text{A}$  |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                    |                             |     |       |           |                  |   |
| Input Capacitance  | $\text{C}_{\text{iss}}$     | —   | 1,810 | —         | pF               | $\text{V}_{\text{DS}} = 20\text{V}$ , $\text{V}_{\text{GS}} = 0\text{V}$ , $f = 1.0\text{MHz}$  |
| Output Capacitance   | $\text{C}_{\text{oss}}$     | —   | 135   | —         | pF               |   |
| Reverse Transfer Capacitance                               | $\text{C}_{\text{rss}}$     | —   | 112   | —         | pF               | $\text{V}_{\text{DS}} = 0\text{V}$ , $\text{V}_{\text{GS}} = 0\text{V}$ , $f = 1\text{MHz}$   |
| Gate Resistance  | $\text{R}_{\text{g}}$       | —   | 1.7   | —         | $\Omega$         |   |
| Total Gate Charge ( $\text{V}_{\text{GS}} = 4.5\text{V}$ ) | $\text{Q}_{\text{g}}$       | —   | 17    | —         | nC               | $\text{V}_{\text{DS}} = 20\text{V}$ , $\text{I}_D = 14\text{A}$   |
| Total Gate Charge ( $\text{V}_{\text{GS}} = 10\text{V}$ )  | $\text{Q}_{\text{g}}$       | —   | 37    | —         | nC               |   |
| Gate-Source Charge   | $\text{Q}_{\text{gs}}$      | —   | 5.6   | —         | nC               | $\text{V}_{\text{DS}} = 20\text{V}$ , $\text{I}_D = 14\text{A}$   |
| Gate-Drain Charge  | $\text{Q}_{\text{gd}}$      | —   | 7.1   | —         | nC               |   |
| Turn-On Delay Time   | $\text{t}_{\text{D(on)}}$   | —   | 5.1   | —         | ns               | $\text{V}_{\text{GS}} = 10\text{V}$ , $\text{V}_{\text{DS}} = 20\text{V}$ , $\text{R}_{\text{G}} = 6\Omega$ , $\text{I}_D = 14\text{A}$ |
| Turn-On Rise Time  | $\text{t}_{\text{r}}$       | —   | 13    | —         | ns               |   |
| Turn-Off Delay Time  | $\text{t}_{\text{D(off)}}$  | —   | 36    | —         | ns               |   |
| Turn-Off Fall Time   | $\text{t}_{\text{f}}$       | —   | 13    | —         | ns               |   |
| Body Diode Reverse Recovery Time                           | $\text{t}_{\text{rr}}$      | —   | 12.2  | —         | nS               | $\text{I}_{\text{F}} = 3\text{A}$ , $\text{di}/\text{dt} = 100\text{A}/\mu\text{s}$   |
| Body Diode Reverse Recovery Charge                         | $\text{Q}_{\text{rr}}$      | —   | 5.4   | —         | nC               | $\text{I}_{\text{F}} = 3\text{A}$ , $\text{di}/\text{dt} = 100\text{A}/\mu\text{s}$   |

Notes: 8. Short duration pulse test used to minimize self-heating effect.

9. Guaranteed by design. Not subject to product testing.

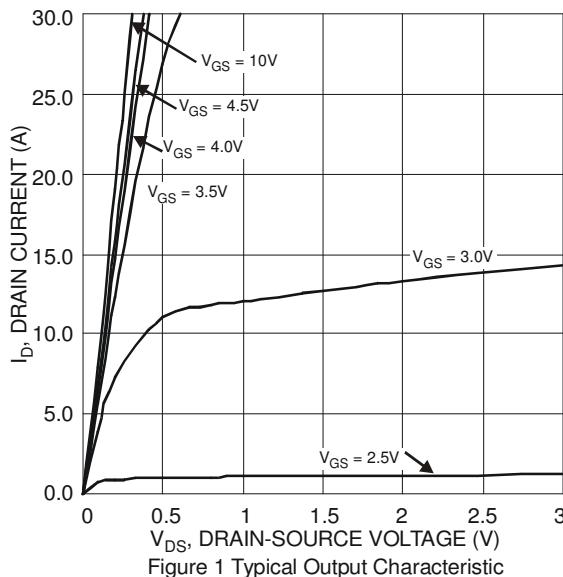


Figure 1 Typical Output Characteristic

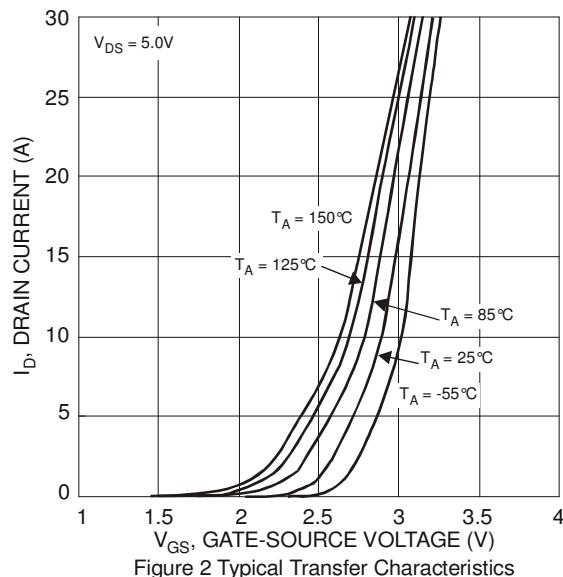
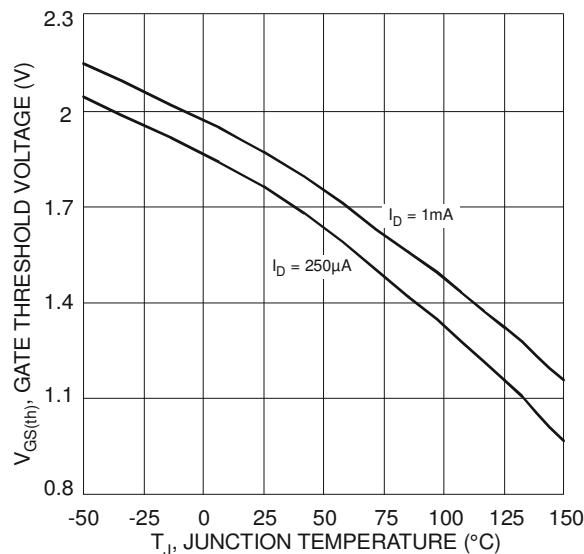
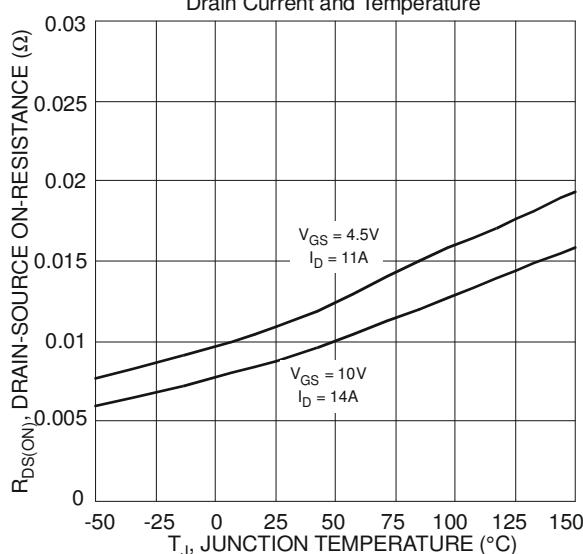
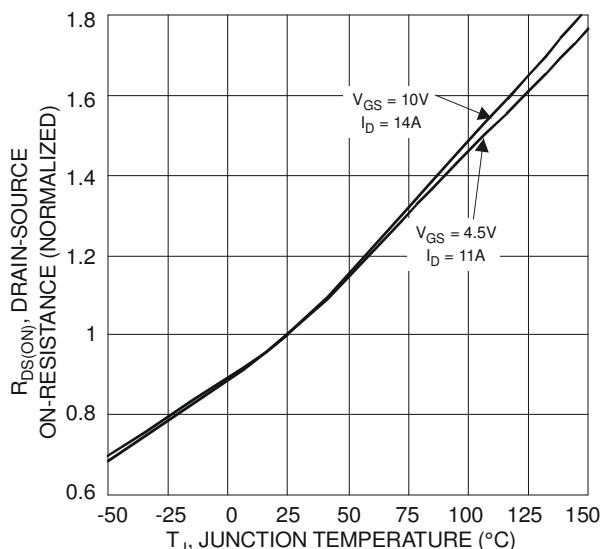
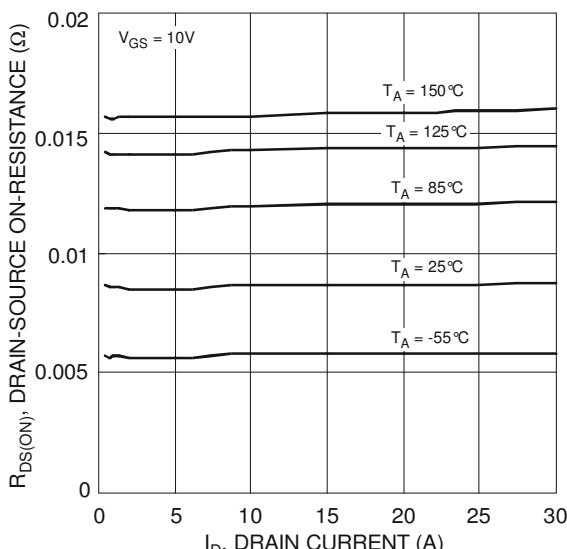
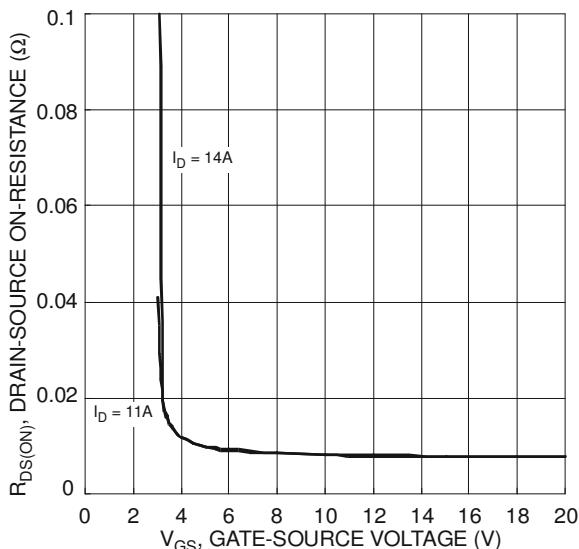
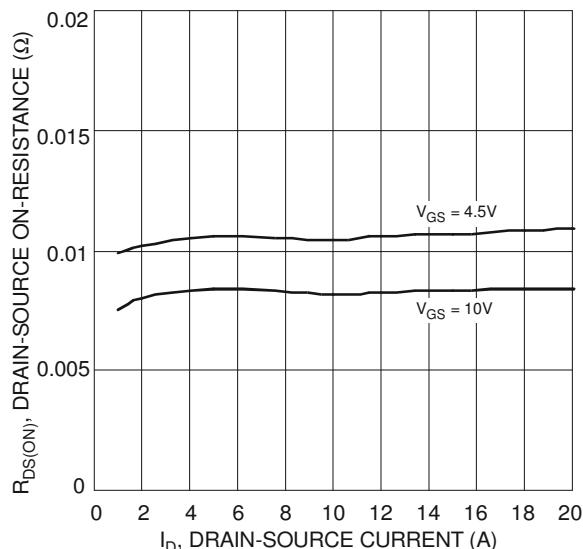
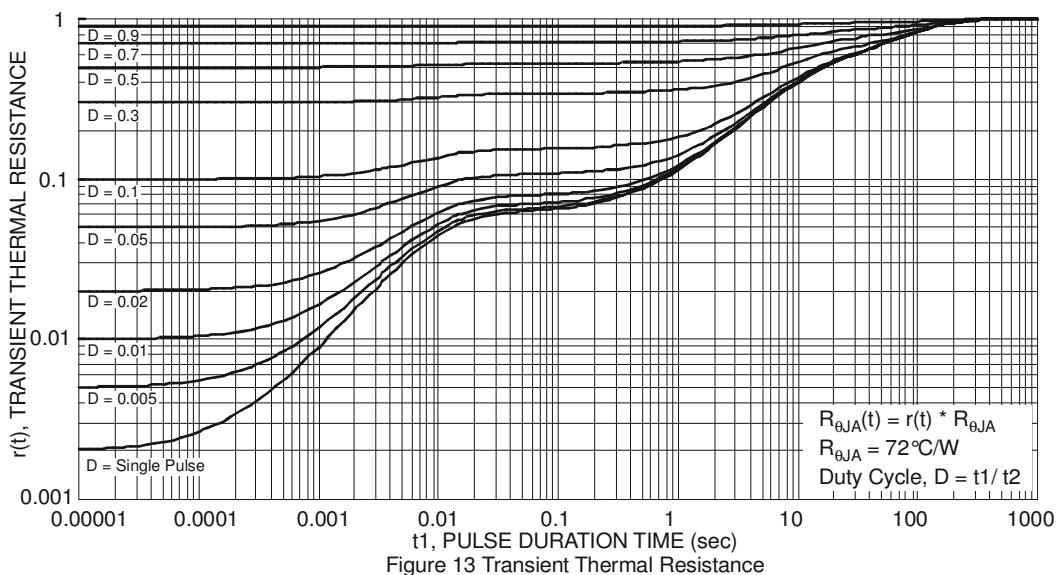
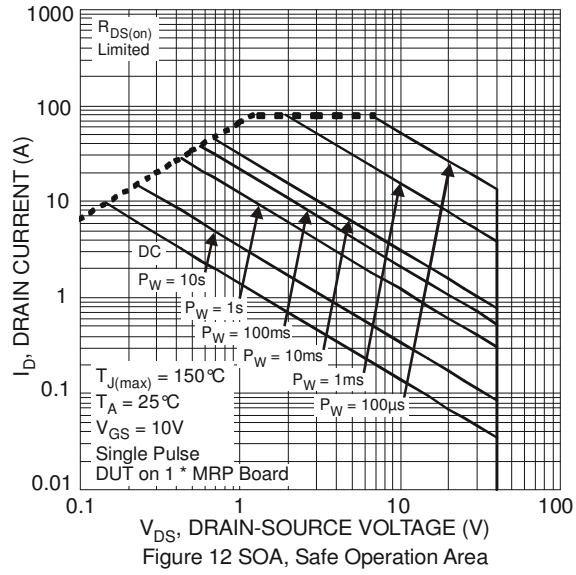
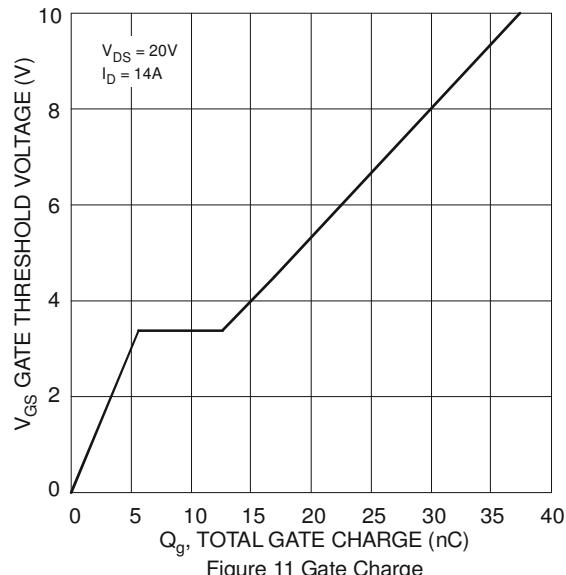
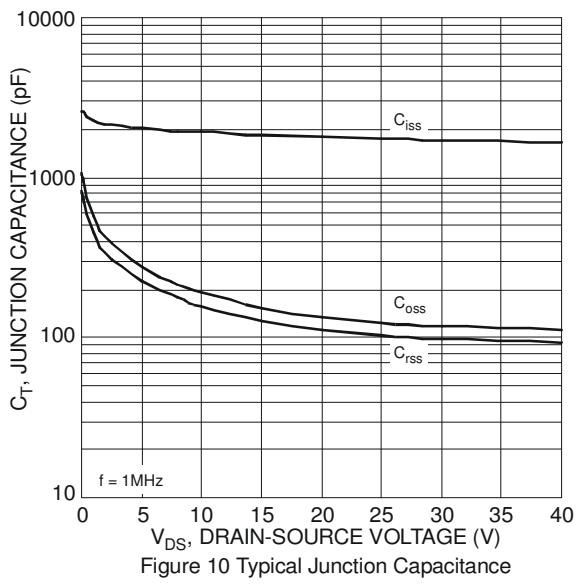
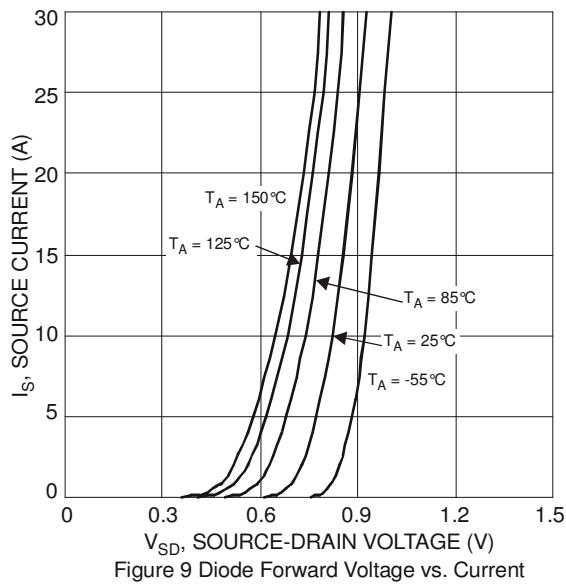


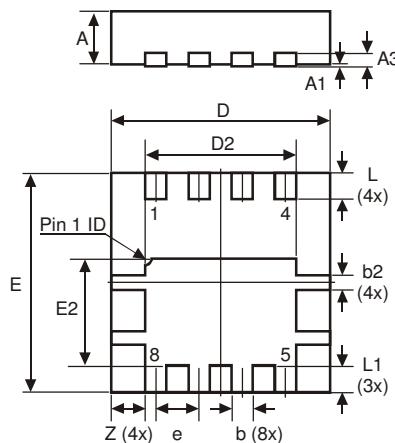
Figure 2 Typical Transfer Characteristics





## Package Outline Dimensions

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

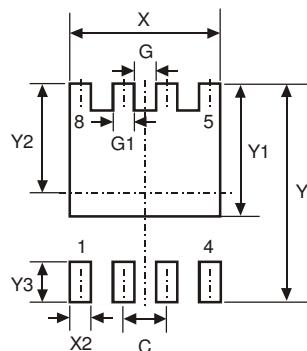


| POWERDI®3333-8 |      |      |       |
|----------------|------|------|-------|
| Dim            | Min  | Max  | Typ   |
| D              | 3.25 | 3.35 | 3.30  |
| E              | 3.25 | 3.35 | 3.30  |
| D2             | 2.22 | 2.32 | 2.27  |
| E2             | 1.56 | 1.66 | 1.61  |
| A              | 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

## 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         |

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