

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$ | $I_D \text{ max}$ $T_A = 25^\circ\text{C}$ |
|---------------|-------------------------------|---|
| 30V | 23mΩ @ $V_{GS} = 10\text{V}$ | 7.5A |
| | 33mΩ @ $V_{GS} = 4.5\text{V}$ | 6.3 A |

Description and Applications

This MOSFET has been 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.

- Backlighting
- Power Management Functions
- DC-DC Converters

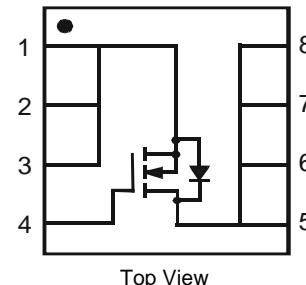
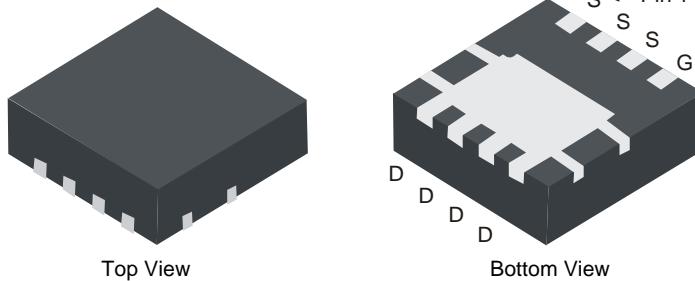
Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- Low $R_{DS(ON)}$ – ensures on state losses are minimized
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

- Case: POWERDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.008 grams (approximate)

POWERDI3333-8



Top View
Internal Schematic

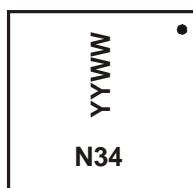
Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|---------------|------------------|
| DMN3024SFG-7 | POWERDI3333-8 | 2000/Tape & Reel |
| DMN3024SFG-13 | POWERDI3333-8 | 3000/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> 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>.

Marking Information



N34 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last digit of year (ex: 11 = 2011)
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} | 30 | V |
| Gate-Source Voltage | | | V_{GSS} | ± 25 | V |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$ | Steady State | $T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$ | I_D | 7.5 6.0 | A |
| | $t < 10\text{s}$ | $T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$ | I_D | 10.5 8.5 | A |
| Continuous Drain Current (Note 6) $V_{GS} = 4.5\text{V}$ | Steady State | $T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$ | I_D | 6.3 5.0 | A |
| | $t < 10\text{s}$ | $T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$ | I_D | 8.5 7.6 | A |
| Pulsed Drain Current (10 μs pulse, duty cycle = 1%) | | | I_{DM} | 60 | A |
| Avalanche Current (Note 7) | | | I_{AS} | 9 | A |
| Repetitive Avalanche Energy (Note 7) | | | E_{AS} | 12 | mJ |

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | | Symbol | Value | Units |
|--|--------------------------|-----------------|-------------|-------|
| Total Power Dissipation (Note 5) | $T_A = 25^\circ\text{C}$ | P_D | 0.9 | W |
| | $T_A = 70^\circ\text{C}$ | | 0.5 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state | $R_{\theta JA}$ | 145 | °C/W |
| | $t < 10\text{s}$ | | 74 | |
| Total Power Dissipation (Note 6) | $T_A = 25^\circ\text{C}$ | P_D | 2.2 | W |
| | $T_A = 70^\circ\text{C}$ | | 1.4 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state | $R_{\theta JA}$ | 58 | °C/W |
| | $t < 10\text{s}$ | | 31 | |
| Thermal Resistance, Junction to Case (Note 6) | | $R_{\theta JC}$ | 11 | |
| Operating and Storage Temperature Range | | T_J, T_{STG} | -55 to +150 | °C |

Notes:

- 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
- 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
- 7. UIS in production with $L = 0.3\text{mH}$, $T_J = 25^\circ\text{C}$

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|-----------------------------------|-----|------|-----------|------------------|--|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 30 | - | - | V | $\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = 250\text{ }\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | - | - | 1 | μA | $\text{V}_{\text{DS}} = 30\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | - | - | ± 100 | nA | $\text{V}_{\text{GS}} = \pm 25\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | $\text{V}_{\text{GS(th)}}$ | 1.0 | 1.3 | 2.4 | V | $\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $\text{R}_{\text{DS}}(\text{ON})$ | - | 15 | 23 | $\text{m}\Omega$ | $\text{V}_{\text{GS}} = 10\text{V}$, $\text{I}_D = 10\text{A}$ |
| Forward Transfer Admittance | $ \text{Y}_{\text{fs}} $ | - | 11 | - | S | $\text{V}_{\text{DS}} = 5\text{V}$, $\text{I}_D = 10.0\text{A}$ |
| Diode Forward Voltage | V_{SD} | - | 0.69 | 1 | V | $\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 1\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C_{iss} | - | 479 | - | pF | $\text{V}_{\text{DS}} = 15\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | - | 97 | - | pF | |
| Reverse Transfer Capacitance | C_{rss} | - | 61 | - | pF | |
| Gate Resistance | R_g | 0.4 | 1.1 | 1.6 | Ω | $\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$ |
| Total Gate Charge $\text{V}_{\text{GS}} = 4.5\text{V}$ | Q_g | - | 5.0 | - | nC | $\text{V}_{\text{DS}} = 15\text{V}$, $\text{I}_D = 10\text{A}$ |
| Total Gate Charge $\text{V}_{\text{GS}} = 10\text{V}$ | Q_g | - | 10.5 | - | nC | |
| Gate-Source Charge | Q_{gs} | - | 1.8 | - | nC | |
| Gate-Drain Charge | Q_{gd} | - | 1.6 | - | nC | |
| Turn-On Delay Time | $\text{t}_{\text{D(on)}}$ | - | 2.9 | - | ns | |
| Turn-On Rise Time | t_r | - | 7.9 | - | ns | $\text{V}_{\text{GS}} = 10\text{V}$, $\text{V}_{\text{DS}} = 15\text{V}$, $\text{R}_g = 3\Omega$, $\text{R}_L = 1.5\Omega$, |
| Turn-Off Delay Time | $\text{t}_{\text{D(off)}}$ | - | 14.6 | - | ns | |
| Turn-Off Fall Time | t_f | - | 3.1 | - | ns | |

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

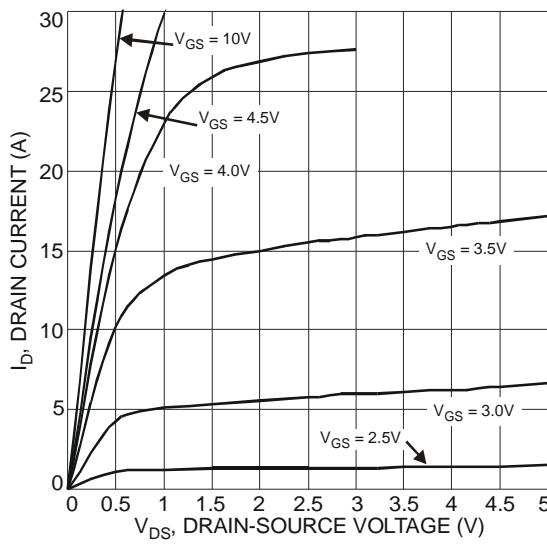


Fig. 1 Typical Output Characteristic

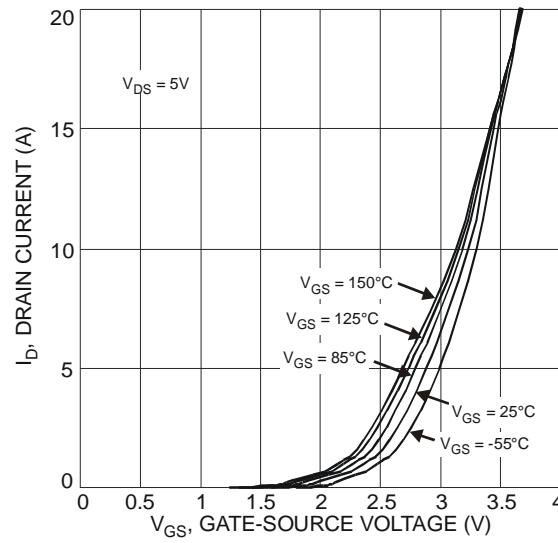


Fig. 2 Typical Transfer Characteristic

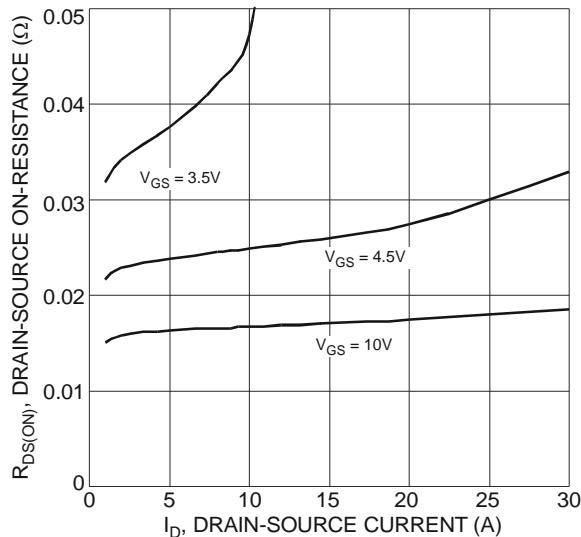


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

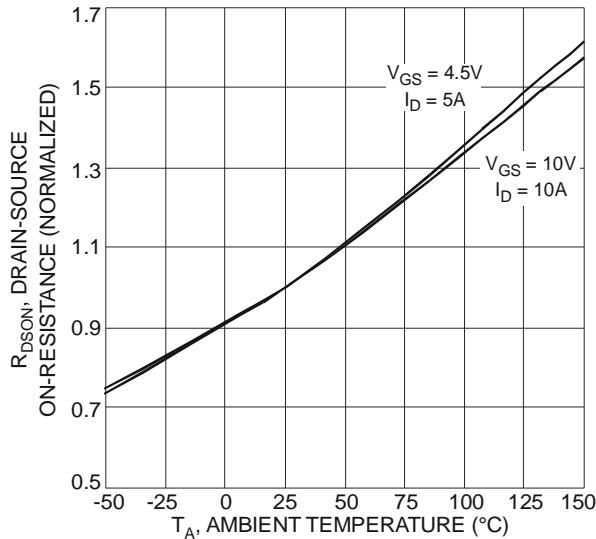


Fig. 5 On-Resistance Variation with Temperature

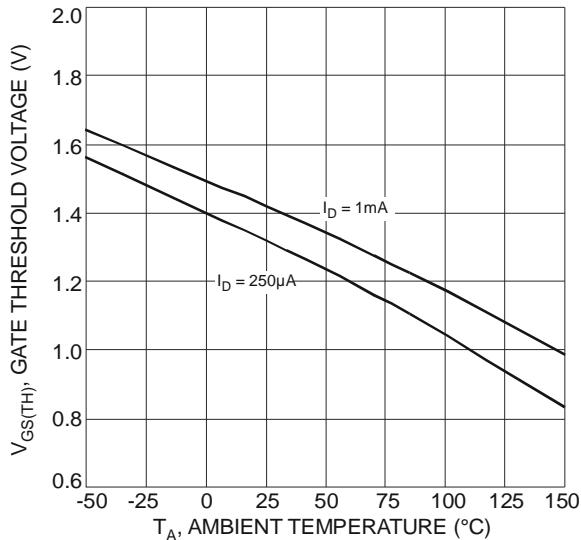


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

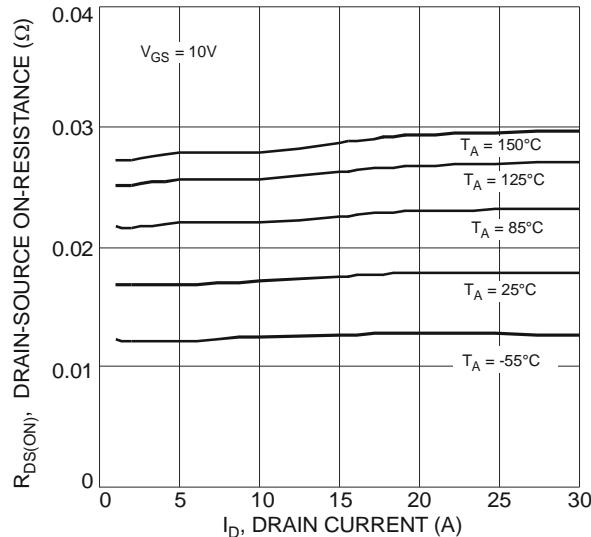


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

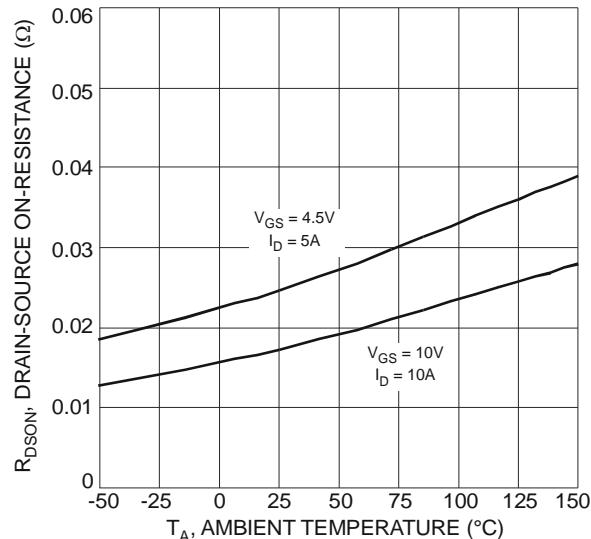


Fig. 6 On-Resistance Variation with Temperature

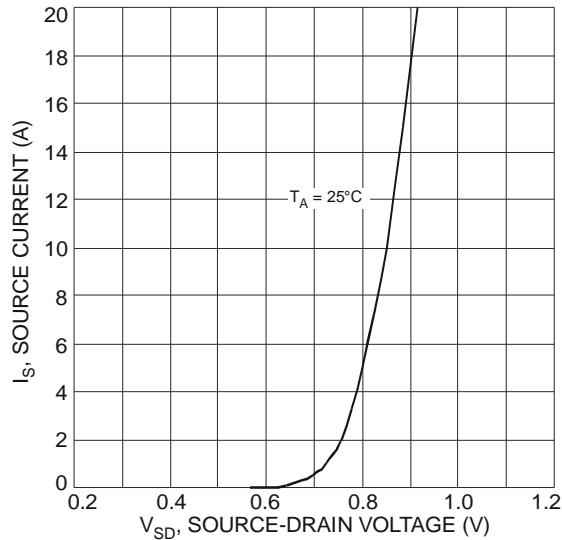


Fig. 8 Diode Forward Voltage vs. Current

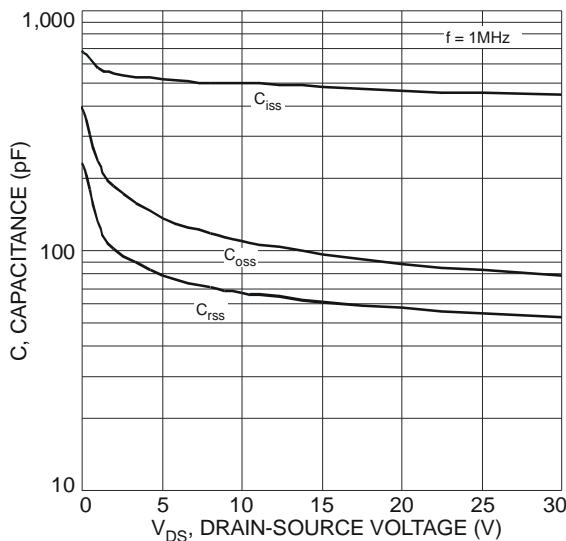


Fig. 9 Typical Total Capacitance

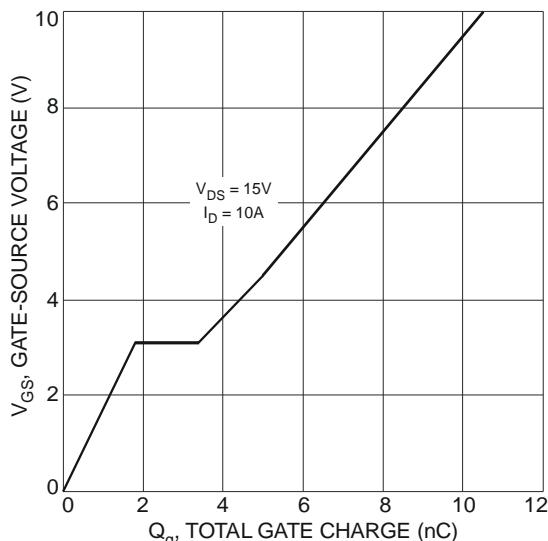


Fig. 10 Gate-Charge Characteristics

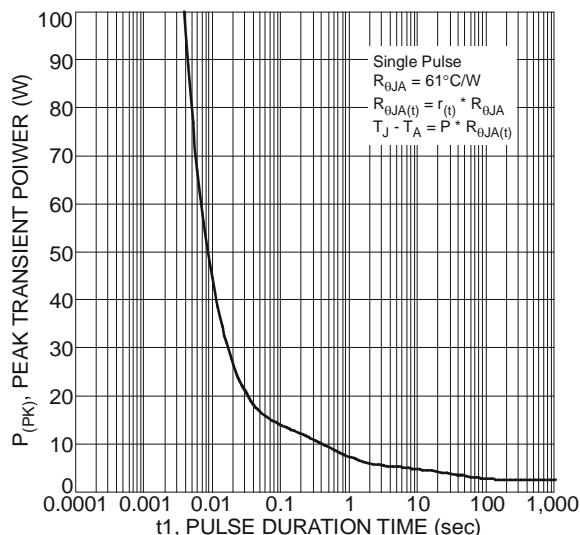


Fig. 11 Single Pulse Maximum Power Dissipation

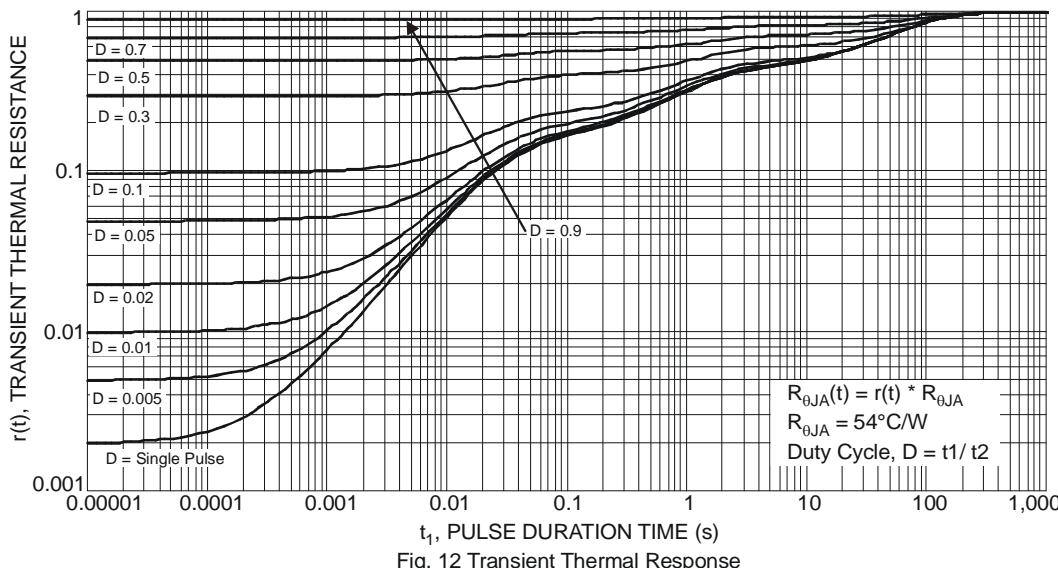
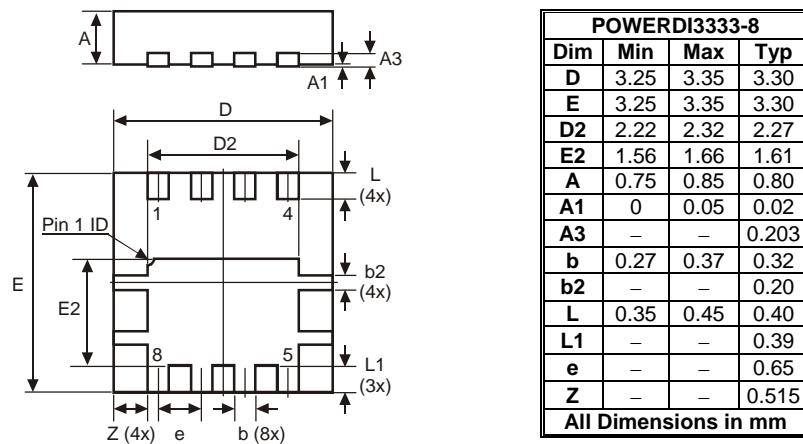
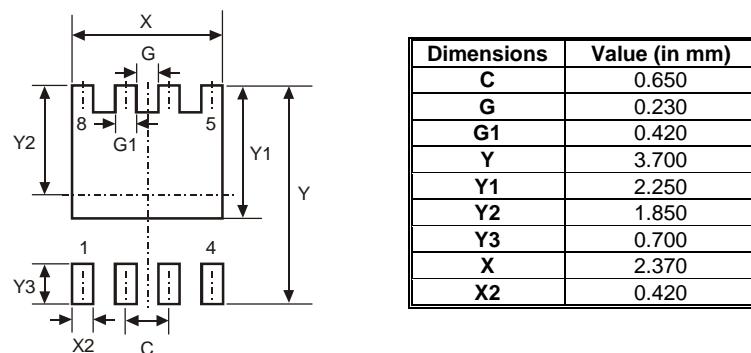


Fig. 12 Transient Thermal Response

Package Outline Dimensions



Suggested Pad Layout



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