

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ\text{C}$
100V	122m $\Omega$ @ $V_{GS} = 10\text{V}$	2.9A
	133m $\Omega$ @ $V_{GS} = 4.5\text{V}$	2.7A

## Description

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.

## Applications

- Backlighting
- Power Management Functions
- DC-DC Converters

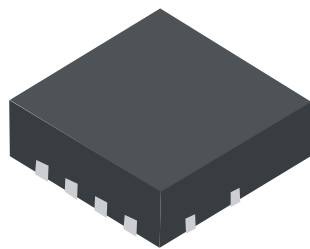
## Features

- 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**

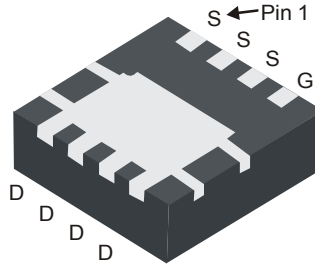
## Mechanical Data

- Case: POWERDI3333
- 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 @3
- Weight: 0.034 grams (approximate)

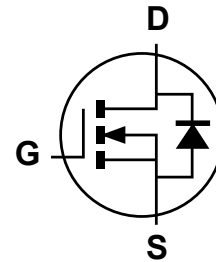
POWERDI3333



Top View



Bottom View



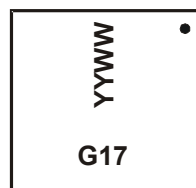
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMN10H170SFG-7	Standard	POWERDI3333	2000/Tape & Reel
DMN10H170SFG-13	Standard	POWERDI3333	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/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



- G17 = Product marking code
- YYWW = Date code marking
- YY = Last digit of year (ex: 10 for 2010)
- WW = Week code (01 – 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	100	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	2.9
		T <sub>A</sub> = +70°C	2.4
	t < 10s	T <sub>C</sub> = +25°C	8.5
		T <sub>A</sub> = +25°C	3.7
		T <sub>A</sub> = +70°C	3.0
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	3.0	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I <sub>DM</sub>	16	A
Avalanche Current (Note 7)	I <sub>AR</sub>	5.3	A
Avalanche Energy (Note 7)	E <sub>AR</sub>	20	mJ

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = +25°C	0.94
		T <sub>A</sub> = +70°C	0.6
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady State	137
		t < 10s	82
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = +25°C	2.0
		T <sub>A</sub> = +70°C	1.3
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady State	60
		t < 10s	36
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	7.0	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1.0	µA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	—	3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	99	122	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.3A
		—	104	133		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.0A
Forward Transfer Admittance	Y <sub>fs</sub>	—	4.4	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 3.3A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 3.3A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iSS</sub>	—	870.7	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	40.8	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	24.6	—	pF	
Gate resistance	R <sub>g</sub>	—	1.1	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	7.0	—	nC	V <sub>DS</sub> = 50V, I <sub>D</sub> = 3.3A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	14.9	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	3.3	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	3.0	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	4.4	—	ns	V <sub>DD</sub> = 50V, V <sub>GEN</sub> = 10V, R <sub>GEN</sub> = 6.0Ω, I <sub>D</sub> = 3.3A
Turn-On Rise Time	t <sub>r</sub>	—	2.3	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	13.9	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	3.4	—	ns	
Reverse Recovery Time	t <sub>rr</sub>	—	22.4	—	ns	I <sub>S</sub> = 3.3A, dI/dt = 100A/µs
Reverse Recovery Charge	Q <sub>rr</sub>	—	19.7	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - UIS in production with L = 1.43mH, T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

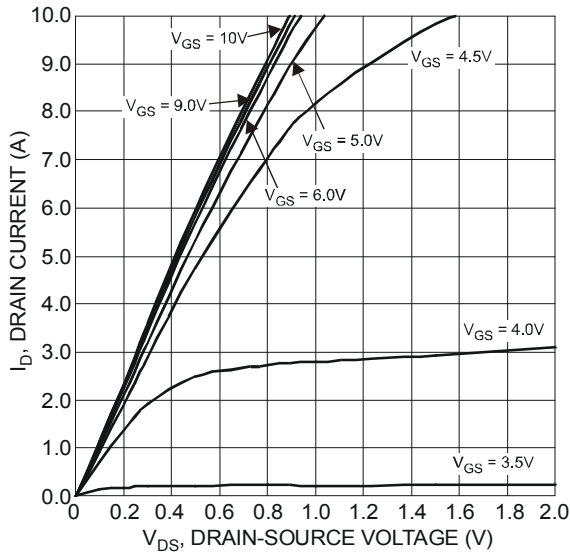


Figure 1 Typical Output Characteristic

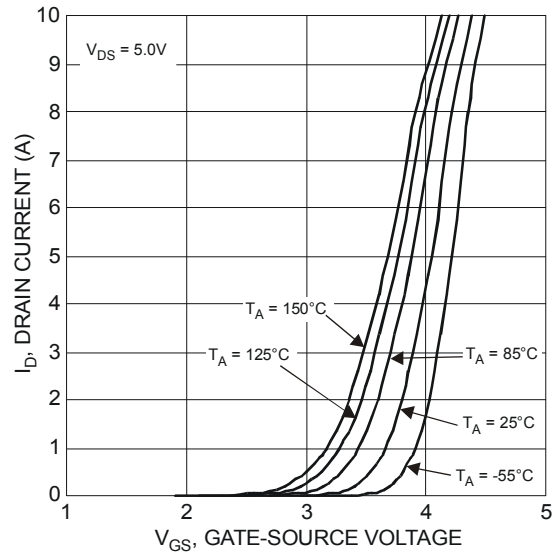


Figure 2 Typical Transfer Characteristics

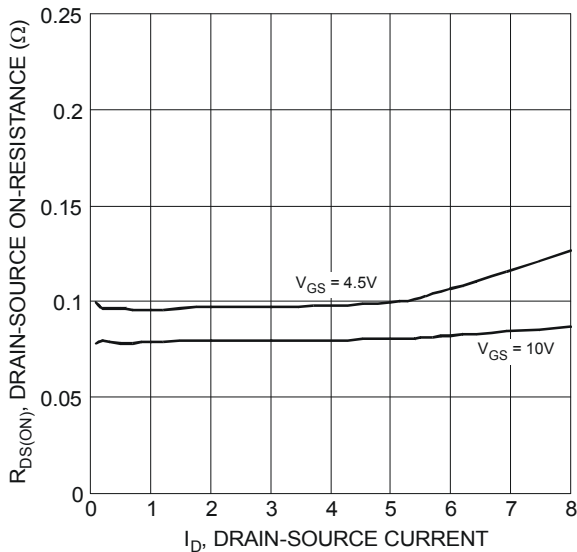


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

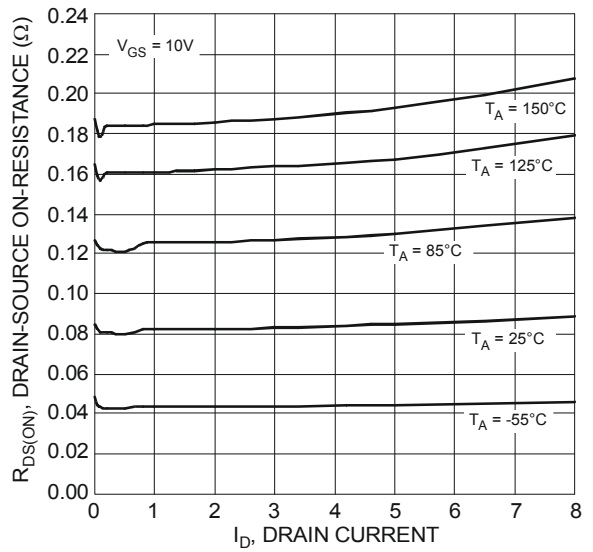


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

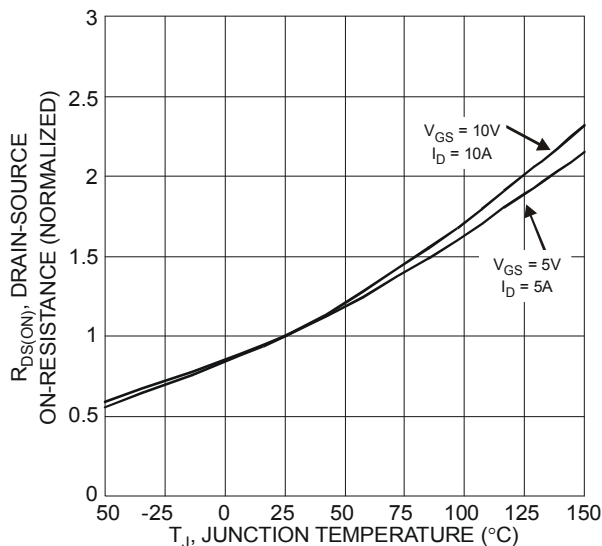


Figure 5 On-Resistance Variation with Temperature

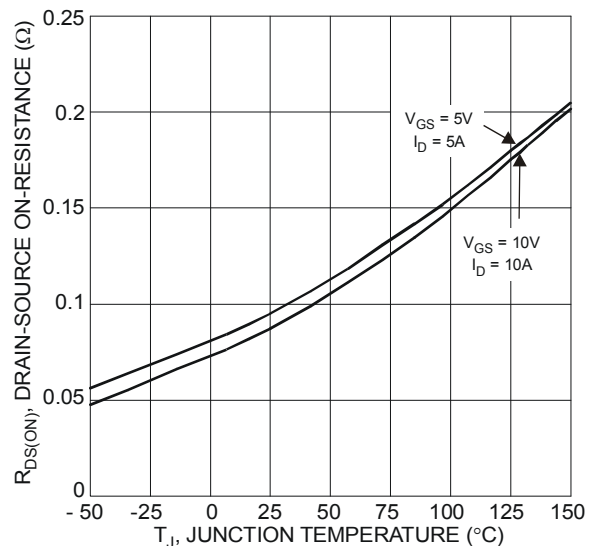


Figure 6 On-Resistance Variation with Temperature

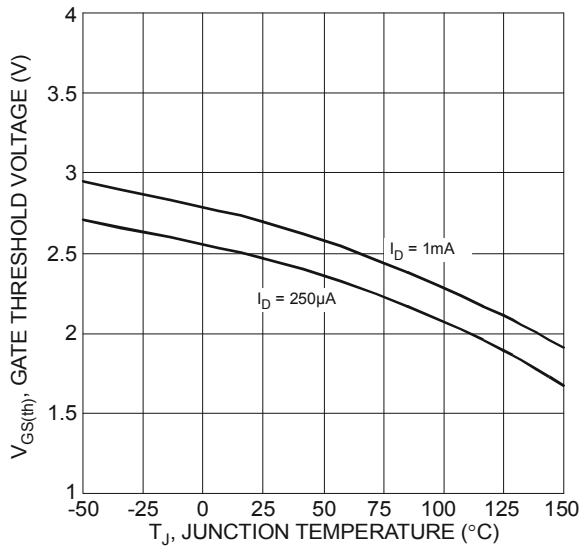


Figure 7 Gate Threshold Variation vs. Ambient Temperature

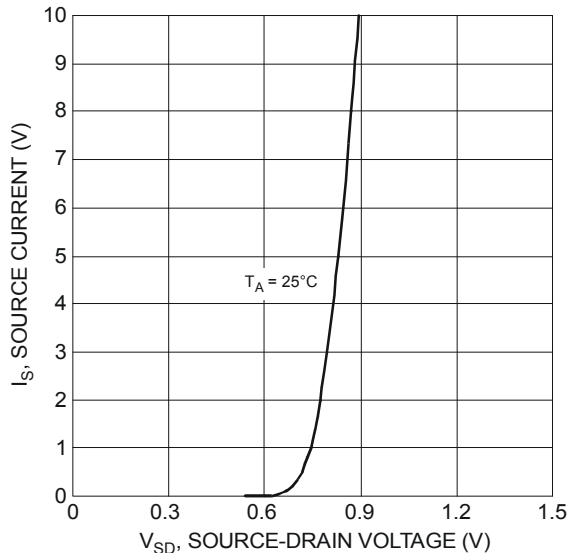


Figure 8 Diode Forward Voltage vs. Current

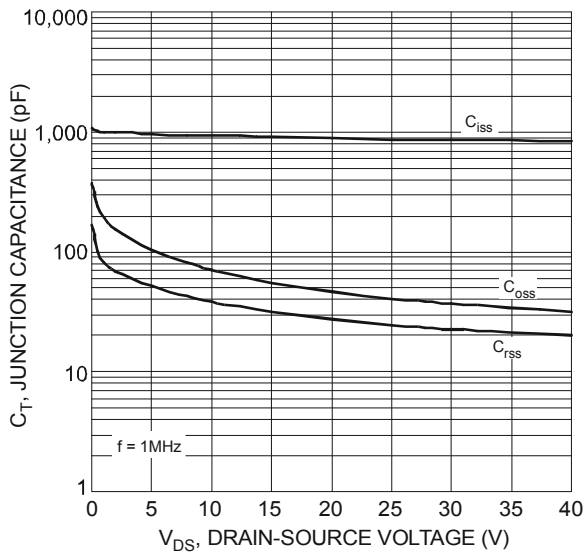


Figure 9 Typical Junction Capacitance

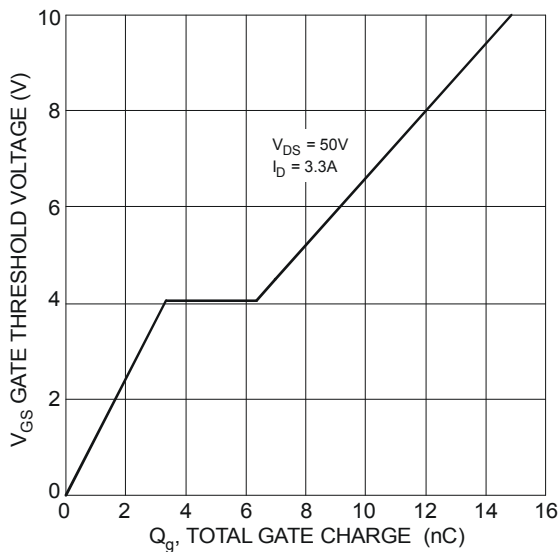


Figure 10 Gate Charge

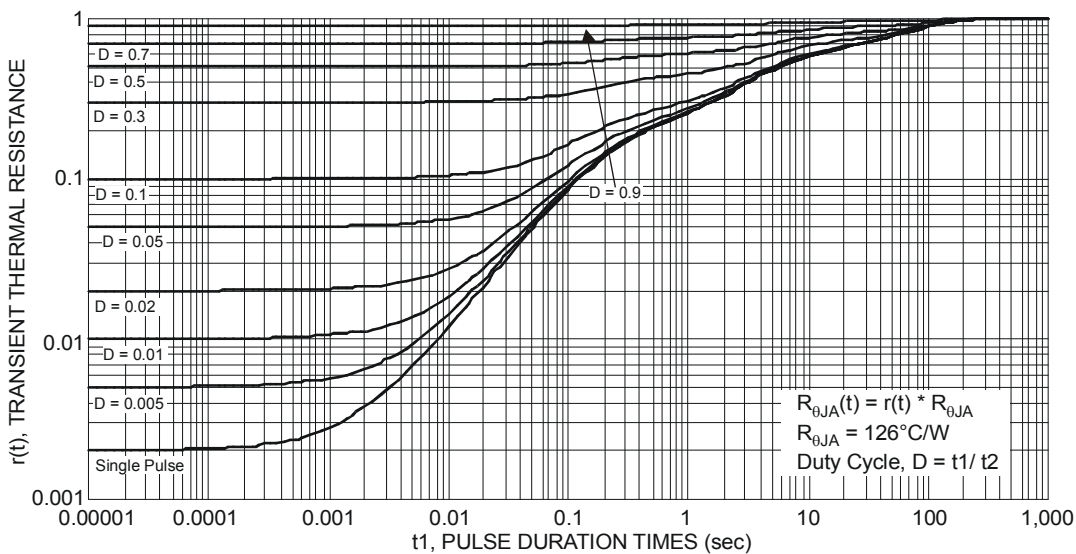


Figure 11 Transient Thermal Resistance

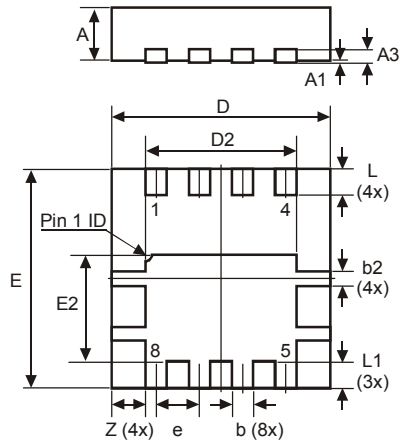
$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

$$R_{\theta JA} = 126^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t_1 / t_2$$

**Package Outline Dimensions**

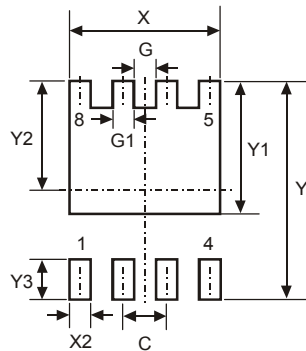
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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			

**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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