



# N-CHANNEL ENHANCEMENT MODE MOSFET POWERDI

#### **Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>C</sub> = +25°C
	11.5mΩ @ V <sub>GS</sub> = 10V	30A
40V	17.8mΩ @ V <sub>GS</sub> = 4.5V	24A

#### **Features and Benefits**

- Low R<sub>DS(ON)</sub> Ensures On State Losses Are Minimized
- Excellent Q<sub>gd x</sub> R<sub>DS(ON)</sub> Product (FOM)
- Advanced Technology for DC-DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% UIS (Avalanche) Rated
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

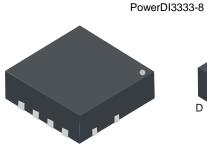
#### **Description and Applications**

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.

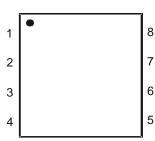
- Backlighting
- Power Management Functions
- DC-DC Converters

#### **Mechanical Data**

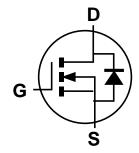
- Case: PowerDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish Matte Tin Annealed over Copper Leadframe.
   Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.008 grams (Approximate)











**Equivalent Circuit** 

#### **Ordering Information** (Note 4)

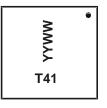
Part Number	Case	Packaging
DMT4011LFG-7	PowerDI3333-8	2,000/Tape & Reel
DMT4011LFG-13	PowerDI3333-8	3,000/Tape & Reel

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 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

PowerDI3333-8



T41 = Product Type Marking Code YYWW = Date Code Marking YY = Last Two Digits of Year (ex: 16 = 2016) WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.



# 

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	$V_{DSS}$	40	V	
Gate-Source Voltage	$V_{GSS}$	+20 -16	٧	
Continuous Drain Current (Note 5) $V_{GS} = 10V$ $T_C = +25^{\circ}C$ $T_C = +70^{\circ}C$		Ι <sub>D</sub>	30 24	А
Continuous Drain Current (Note 5) $V_{GS} = 10V$ $ T_A = +25^{\circ}C $ $ T_A = +70^{\circ}C $		Ι <sub>D</sub>	10.8 8.6	А
Maximum Continuous Body Diode Forward Current (Note 5)	Is	2.1	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	65	Α	
Avalanche Current, L=0.3mH	I <sub>AS</sub>	11.9	Α	
Avalanche Energy, L=0.3mH	E <sub>AS</sub>	21.4	mJ	

#### **Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^{\circ}C$	$P_{D}$	2	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	62	°C/W	
Total Power Dissipation (Note 5) $T_C = +25^{\circ}C$		P <sub>D</sub>	15.6	W
Thermal Resistance, Junction to Case (Note 5)		$R_{ heta JC}$	8	°C/W
Operating and Storage Temperature Range		$T_{J_1}T_{STG}$	-55 to +150	°C

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

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 6)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	-	-	V	$V_{GS} = 0V$ , $I_D = 1mA$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	1	μΑ	$V_{DS} = 32V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	-	-	100 -100	nA	$V_{GS} = +20V, V_{DS} = 0V$ $V_{GS} = -16V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 6)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	-	3	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
Static Drain-Source On-Resistance		-	9.2	11.5	mΩ	$V_{GS} = 10V, I_D = 20A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	13.4	17.8		$V_{GS} = 4.5V, I_D = 20A$	
Diode Forward Voltage	$V_{SD}$	-	-	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A	
DYNAMIC CHARACTERISTICS (Note 7)							
Input Capacitance	C <sub>iss</sub>	-	767	-		V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1MHz	
Output Capacitance	Coss	-	238	-	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	30.6	-			
Gate Resistance	$R_g$	-	1	-	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Qg	-	7	-			
Total Gate Charge (V <sub>GS</sub> = 10V)	Qq	-	15.1	-	nC	V 00V I 00A	
Gate-Source Charge	Qgs	-	2.1	-	nC	$V_{DS} = 20V, I_{D} = 20A$	
Gate-Drain Charge	Q <sub>qd</sub>	-	3.2	-			
Turn-On Delay Time	t <sub>D(ON)</sub>	-	3.5	-		$V_{DD} = 20V, V_{GS} = 10V,$ $R_G = 1.6\Omega, I_D = 20A$	
Turn-On Rise Time	t <sub>R</sub>	-	5.8	-			
Turn-Off Delay Time	t <sub>D(OFF)</sub>	-	9.6	-	ns		
Turn-Off Fall Time	t <sub>F</sub>	-	2	-			
Body Diode Reverse Recovery Time	t <sub>RR</sub>	-	9.8	-	ns		
Body Diode Reverse Recovery Charge	$Q_{RR}$	-	5.1	-	nC	I <sub>F</sub> = 15A, di/dt = 400A/μs	

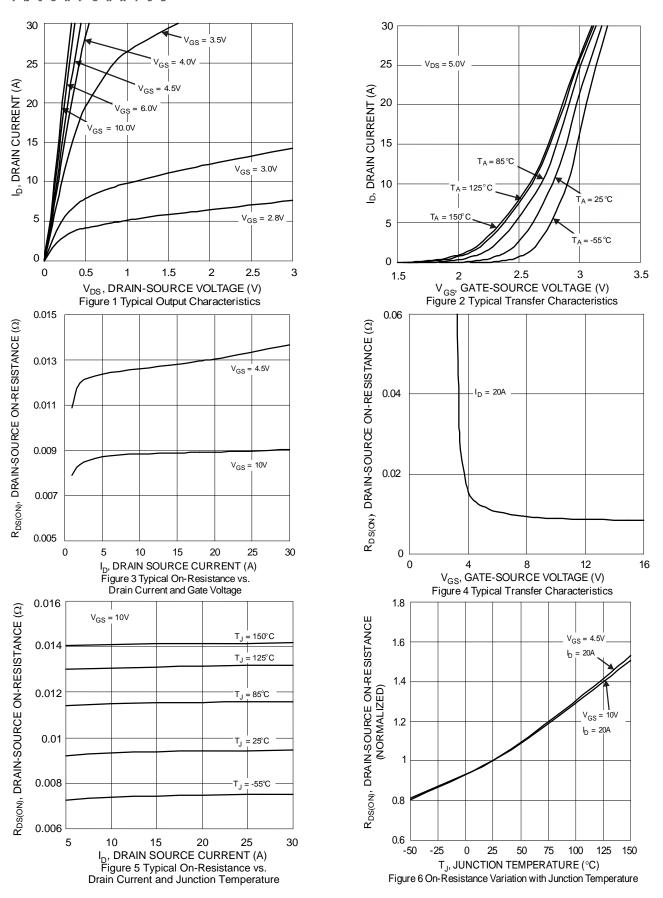
Notes:

<sup>5.</sup> R<sub>0JA</sub> is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout. R<sub>0JC</sub> is guaranteed by design while R<sub>0JA</sub> is determined by the user's board design.

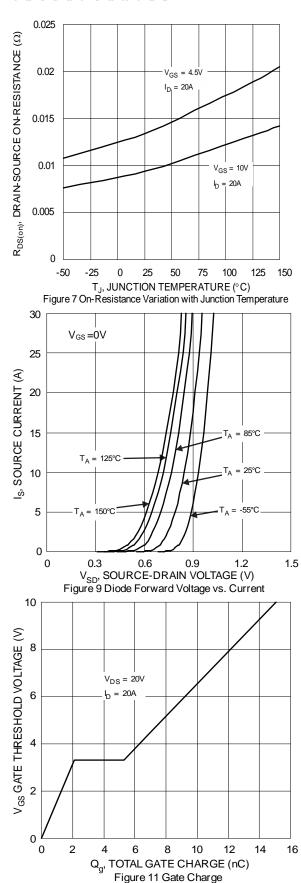
<sup>6.</sup> Short duration pulse test used to minimize self-heating effect.

<sup>7.</sup> Guaranteed by design. Not subject to product testing.









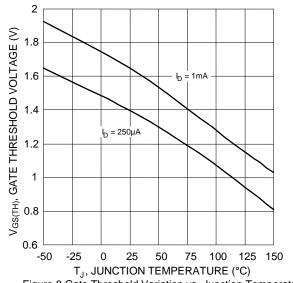
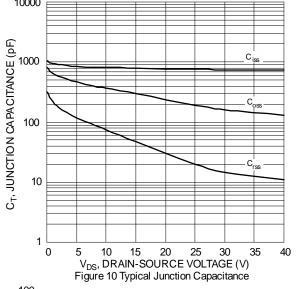
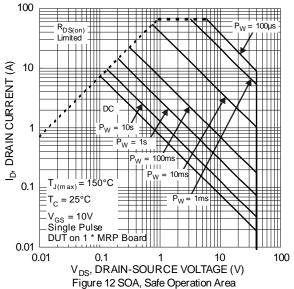


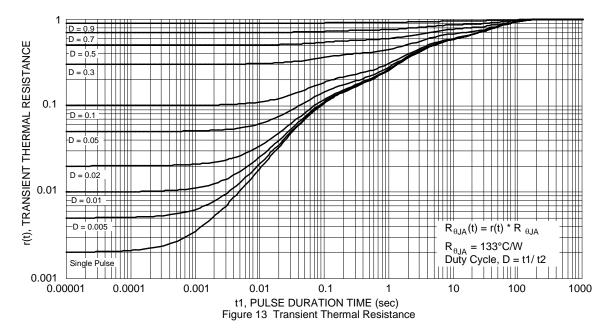
Figure 8 Gate Threshold Variation vs. Junction Temperature





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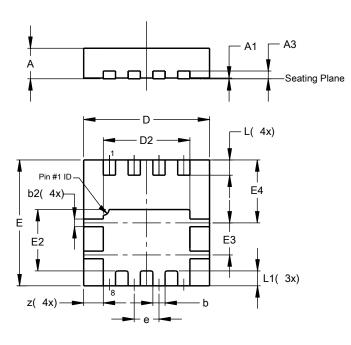




#### **Package Outline Dimensions**

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

#### PowerDI3333-8

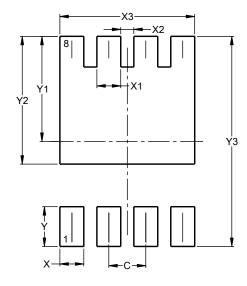


PowerDI3333-8					
Dim	Min	Max	Тур		
Α	0.75	0.85	0.80		
<b>A</b> 1	0.00	0.05	0.02		
A3	-	_	0.203		
b	0.27	0.37	0.32		
b2	0.15	0.25	0.20		
D	3.25	3.35	3.30		
D2	2.22	2.32	2.27		
Е	3.25	3.35	3.30		
E2	1.56	1.66	1.61		
E3	0.79	0.89	0.84		
E4	1.60	1.70	1.65		
e	1	-	0.65		
L	0.35	0.45	0.40		
L1	_	_	0.39		
Z	_	_	0.515		
All Dimensions in mm					

# **Suggested Pad Layout**

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

#### PowerDI3333-8



Dimensions	Value (in mm)
С	0.650
Х	0.420
X1	0.420
X2	0.230
Х3	2.370
Y	0.700
Y1	1.850
Y2	2.250
V٦	3 700



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