



#### **N-CHANNEL ENHANCEMENT MODE MOSFET**

### **Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>C</sub> = +25°C (Note 9)
30V	$4.5 \text{m}\Omega$ @ $V_{GS} = 10V$	25A
	$7.0 \text{m}\Omega$ @ $V_{GS} = 4.5 \text{V}$	25A

## **Description and Applications**

This MOSFET has been designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

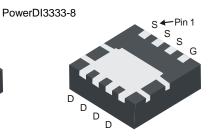
## **Features and Benefits**

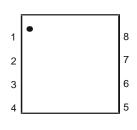
- Low R<sub>DS(ON)</sub> Ensures on State Losses Are Minimized
- Excellent Q<sub>gd x</sub> R<sub>DS(ON)</sub> Product (FOM)
- Advanced Technology for DC/DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Occupies Just 33% of The Board Area Occupied by SO-8 Enabling Smaller End Product
- 100% UIS (Avalanche) Rated
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

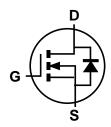
### **Mechanical Data**

- Case: PowerDI<sup>®</sup>3333-8
- 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
- Weight: 0.072 grams (Approximate)









Top View

**Bottom View** 

Top View

**Equivalent Circuit** 

#### Ordering Information (Note 4)

Part Number	Case	Packaging
DMT3004LFG-7	PowerDI3333-8	2,000/Tape & Reel
DMT3004LFG-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) & 2015/863/EU (RoHS 3) compliant.
- 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.
- 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 https://www.diodes.com/design/support/packaging/diodes-packaging/

## **Marking Information**



SG3 = Product Type Marking Code YYWW = Date Code Marking YY = Last Two Digits of Year (ex: 18 = 2018) WW = Week Code (01 to 53)



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

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	30	V	
Gate-Source Voltage		V <sub>GSS</sub>	+20 -16	V
Continuous Drain Current (Notes 6 & 9) V <sub>GS</sub> = 10V	$T_{C} = +25^{\circ}C$ $T_{C} = +70^{\circ}C$	I <sub>D</sub>	25 25	А
Continuous Drain Current (Note 5) $V_{GS} = 10V$ $T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$		I <sub>D</sub>	10.4 8.3	А
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	3	Α	
Pulsed Drain Current (10µs pulse, Duty Cycle = 1%)	I <sub>DM</sub>	95	А	
Avalanche Current, L=0.3mH	I <sub>AS</sub>	27	Α	
Avalanche Energy, L=0.3mH	E <sub>AS</sub>	110	mJ	

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T <sub>C</sub> = +25°C	$P_{D}$	42	W
Thermal Resistance, Junction to Case (Note 6)		$R_{ heta JC}$	3	°C/W
Total Power Dissipation (Note 5) $T_A = +25^{\circ}C$		P <sub>D</sub>	2.1	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{ heta JA}$	60	°C/W
Operating and Storage Temperature Range		$T_{J_1}T_{STG}$	-55 to +150	°C

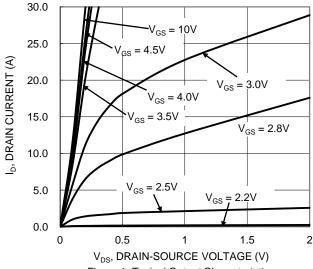
# **Electrical Characteristics** (@ $T_A = +25$ °C, unless otherwise specified.)

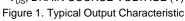
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage		30	-	-	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	1	μΑ	$V_{DS} = 24V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	-	-	100 -100	nA	$V_{GS} = +20V, V_{DS} = 0V$ $V_{GS} = -16V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)			,				
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		-	3.5	4.5	mΩ	$V_{GS} = 10V, I_D = 20A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	5	7.0		$V_{GS} = 4.5V, I_D = 7A$	
Diode Forward Voltage	V <sub>SD</sub>	-	0.7	1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	C <sub>iss</sub>	-	2370	-		V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1MHz	
Output Capacitance	Coss	-	1360	-	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	240	-			
Gate Resistance	Rg	-	0.6	-	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Qq	-	20	-			
Total Gate Charge (V <sub>GS</sub> = 10V)	Qq	-	44	-	nC	151/ 1 004	
Gate-Source Charge	Q <sub>gs</sub>	-	7	-	nc	$V_{DS} = 15V, I_{D} = 20A$	
Gate-Drain Charge	Q <sub>qd</sub>	-	8	-			
Turn-On Delay Time	t <sub>D(ON)</sub>	-	6.2	-		$V_{DD} = 15V, V_{GS} = 10V,$ $R_L = 0.75\Omega, R_G = 3\Omega, I_D = 20A$	
Turn-On Rise Time	t <sub>R</sub>	-	4.3	-			
Turn-Off Delay Time	t <sub>D(OFF)</sub>	-	21	-	ns		
Turn-Off Fall Time	t <sub>F</sub>	-	8	-			
Body Diode Reverse Recovery Time	t <sub>RR</sub>	-	25	-	ns	1. 154 1/1/ 5004/	
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	-	37	-	nC	$I_F = 15A$ , di/dt = 500A/ $\mu$ s	

Notes:

- 5.  $R_{\theta JA}$  is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.  $R_{\theta JC}$  is guaranteed by design O. NouA is determined with the device mounted on FR-4 substrate PC board, 2oz of while RouA is determined by the user's board design.
  6. Thermal resistance from junction to soldering point (on the exposed drain pad).
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to product testing.
  9. Package limited.







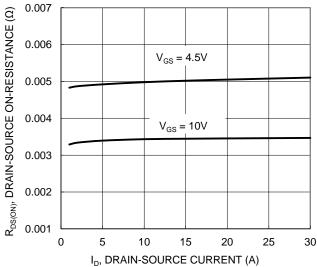


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

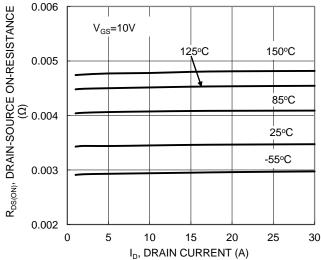


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

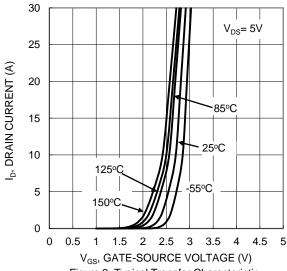


Figure 2. Typical Transfer Characteristic

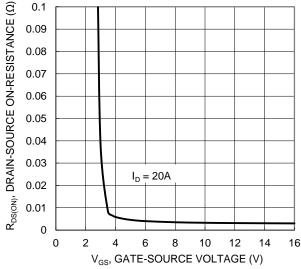
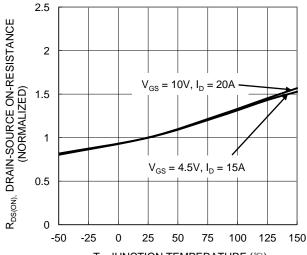


Figure 4. Typical Transfer Characteristic



T<sub>J</sub>, JUNCTION TEMPERATURE (°C) Figure 6. On-Resistance Variation with Junction Temperature



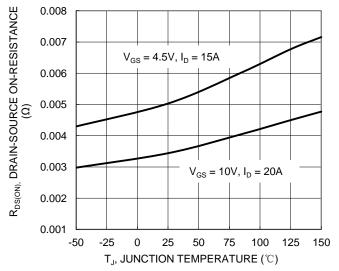
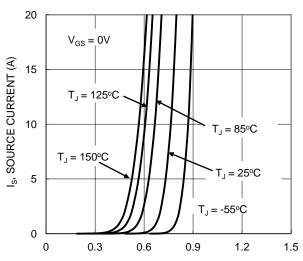


Figure 7. On-Resistance Variation with Junction Temperature



V<sub>SD</sub>, SOURCE-DRAIN VOLTAGE (V) Figure 9. Diode Forward Voltage vs. Current

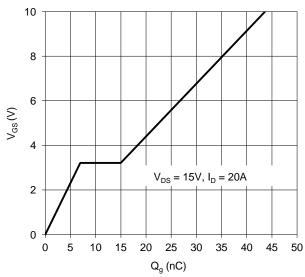


Figure 11. Gate Charge

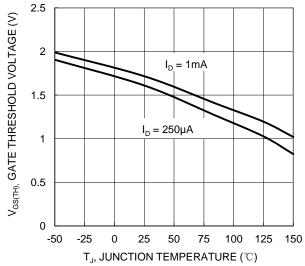
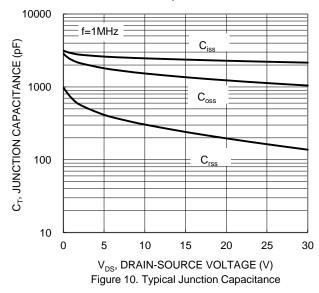


Figure 8. Gate Threshold Variation vs. Junction Temperature



1000  $R_{DS(ON)}$  Limited 100 ID, DRAIN CURRENT (A) 10 =10ms P<sub>W</sub> =100ms 1 T<sub>J(Max)</sub>=150℃ T<sub>4</sub>=25°C 0.1 =10s Single Pulse DC DUT on 1\*MRP board V<sub>GS</sub>=10V 0.01 0.01 100 V<sub>DS</sub>, DRAIN-SOURCE VOLTAGE (V) Figure 12. SOA, Safe Operation Area



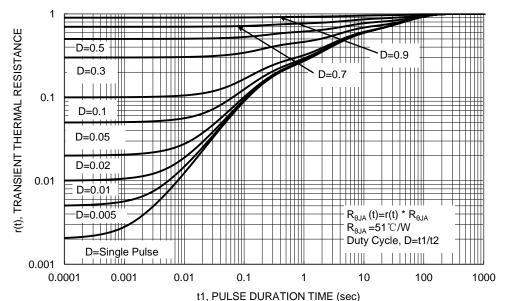


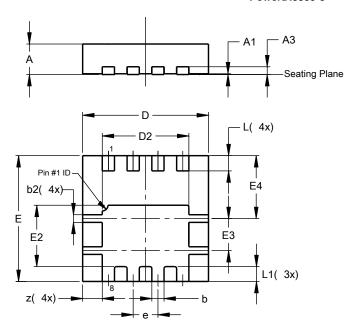
Figure 13. Transient Thermal Resistance



## **Package Outline Dimensions**

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

#### PowerDI3333-8

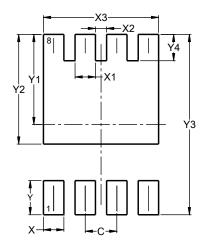


PowerDI3333-8					
Dim	Min	Max	Тур		
Α	0.75	0.85	0.80		
A1	0.00	0.05	0.02		
<b>A</b> 3	1	1	0.203		
b	0.27	0.37	0.32		
b2	0.15	0.25	0.20		
D	3.25	3.35	3.30		
D2	2.22	2.32	2.27		
E	3.25	3.35	3.30		
E2	1.56	1.66	1.61		
E3	0.79	0.89	0.84		
E4	1.60	1.70	1.65		
е	-	-	0.65		
L	0.35	0.45	0.40		
L1	_	_	0.39		
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		
X	0.420		
X1	0.420		
X2	0.230		
Х3	2.370		
Υ	0.700		
Y1	1.850		
Y2	2.250		
Y3	3.700		
Y4	0.540		



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