



#### 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
001/	6mΩ @ V <sub>GS</sub> = 10V	80A
60V	8.5mΩ @ V <sub>GS</sub> = 4.5V	70A

## **Description and Applications**

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

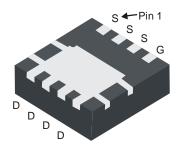
- Brushless DC Motor Control
- DC-DC Converters
- Load Switch

### **Features and Benefits**

- Low R<sub>DS(ON)</sub> Ensures On-State Losses are Minimized
- Excellent Q<sub>gd</sub> x R<sub>DS(ON)</sub> Product (FOM)
- Small form factor thermally efficient package enables higher density end products
- 100% Unclamped Inductive Switching, Test in Production Ensures More Reliable And Robust End Application
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

#### **Mechanical Data**

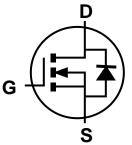
- Case: PowerDI<sup>®</sup>3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminal Finish Matte Tin Annealed over Copper Leadframe.
   Solderable per MIL-STD-202, Method 208(3)
- Weight: 0.008 grams (Approximate)







Top View



**Equivalent Circuit** 

#### **Ordering Information (Note 5)**

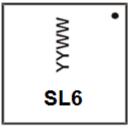
Part Number	Case	Packaging	
DMT6007LFGQ-7	PowerDI3333-8	2,000/Tape & Reel	
DMT6007LFGQ-13	PowerDI3333-8	3,000/Tape & Reel	

Notes:

- 1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
- 2. 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to https://www.diodes.com/quality/.
- 5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/

## **Marking Information**

PowerDI3333-8



SL6 = 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** (@ $T_A = +25^{\circ}C$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	60	V	
Gate-Source Voltage	V <sub>GSS</sub>	±20	V	
$T_{A} = T_{A} = T_{A$		I <sub>D</sub>	15 12	А
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	$T_C = +25$ °C $T_C = +70$ °C	I <sub>D</sub>	80 65	А
Maximum Continuous Body Diode Forward Current (Note 7)	I <sub>S</sub>	80	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	80	Α	
Avalanche Current, L = 0.1mH	I <sub>AS</sub>	20	Α	
Avalanche Energy, L = 0.1mH	Eas	20	mJ	

# **Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	$T_A = +25^{\circ}C$	$P_{D}$	2.2	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	55	°C/W	
Total Power Dissipation (Note 7)	P <sub>D</sub>	62.5	W	
Thermal Resistance, Junction to Case (Note 7)		R <sub>0JC</sub>	2	°C/W
Operating and Storage Temperature Range		T <sub>J,</sub> T <sub>STG</sub>	-55 to +150	°C

Notes:

<sup>6.</sup> R<sub>BJA</sub> is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate. R<sub>BJC</sub> is guaranteed by design while  $R_{\theta JA}$  is determined by the user's board design. 7. Short duration pulse test used to minimize self-heating effect.



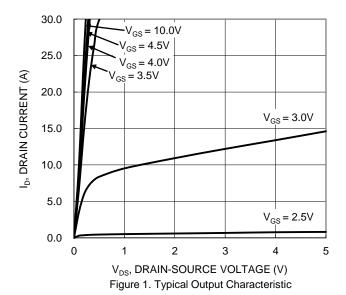
# Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	_	1	μΑ	$V_{DS} = 48V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.8		2	V	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$	
Static Drain-Source On-Resistance			4.5	6	mΩ	$V_{GS} = 10V, I_D = 20A$	
Static Dialii-Source Off-Resistance	R <sub>DS(ON)</sub>	_	6.5	8.5	11122	$V_{GS} = 4.5V, I_D = 15A$	
Forward Transconductance	$G_{FS}$	_	100	_	S	$V_{DS} = 5V, I_{D} = 20A$	
Diode Forward Voltage	V <sub>SD</sub>	_	0.9	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	C <sub>iss</sub>	_	2090	_		V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1MHz	
Output Capacitance	Coss	_	746	_	pF		
Reverse Transfer Capacitance	Crss	_	38.5	_			
Gate Resistance	Ra	_	0.59	_	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Qg	_	19.3	_			
Total Gate Charge (V <sub>GS</sub> = 10V)	Qq	_	41.3	_		N/ 00V/ 1 00A	
Gate-Source Charge	Qgs	_	6.0	_	nC	$V_{DS} = 30V, I_{D} = 20A$	
Gate-Drain Charge	$Q_{gd}$	_	8.8	_			
Turn-On Delay Time	t <sub>D(ON)</sub>	_	5.7	_		$V_{DD} = 30V, V_{GS} = 10V,$ $I_{D} = 20A, R_{G} = 3\Omega$	
Turn-On Rise Time	t <sub>R</sub>	_	4.3	_			
Turn-Off Delay Time	t <sub>D(OFF)</sub>	_	23.4	_	ns		
Turn-Off Fall Time	t <sub>F</sub>	_	9.7	-			
Body Diode Reverse Recovery Time	t <sub>RR</sub>	_	35.4	-	ns	1 00A 11/14 400A/1	
Body Diode Reverse Recovery Charge	$Q_{RR}$	_	38.2	_	nC	I <sub>F</sub> = 20A, di/dt = 100A/µs	

Notes:

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





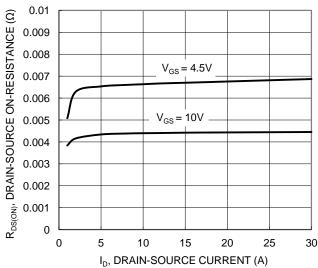


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

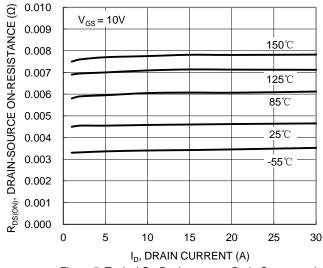


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

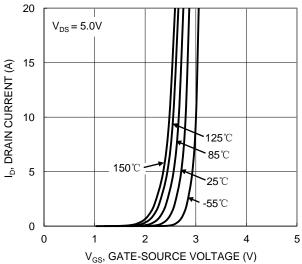
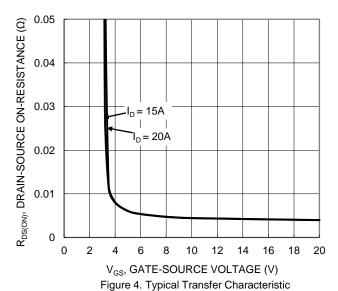


Figure 2. Typical Transfer Characteristic



2 R<sub>DS(ON)</sub>, DRAIN-SOURCE ON-RESISTANCE (NORMALIZED) 1.8  $V_{GS} = 10V, I_{D} = 10A$ 1.6 1.4 1.2  $V_{GS} = 4.5V, I_{D} = 15A$ 8.0 0.6 0.4 0.2 0 -25 0 25 50 75 100 125 -50 150



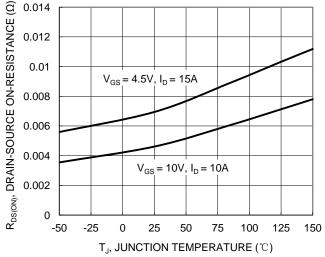


Figure 7. On-Resistance Variation with Temperature

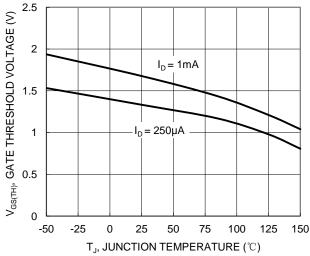
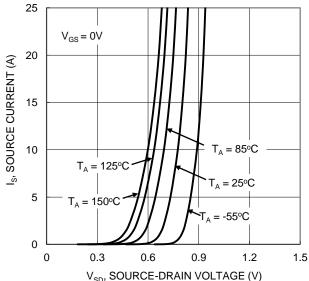
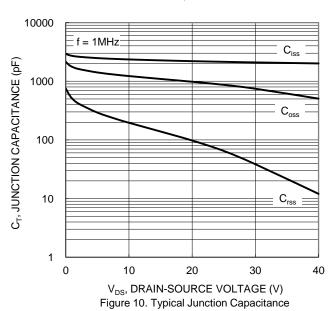


Figure 8. Gate Threshold Variation vs. Junction Temperature



 $\rm V_{SD},$  SOURCE-DRAIN VOLTAGE (V) Figure 9. Diode Forward Voltage vs. Current



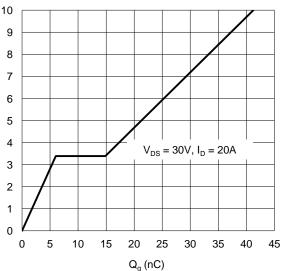


Figure 11. Gate Charge

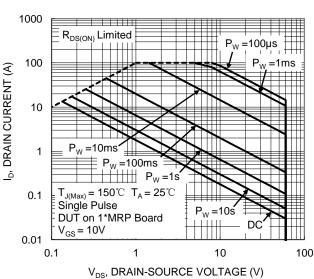


Figure 12. SOA, Safe Operation Area



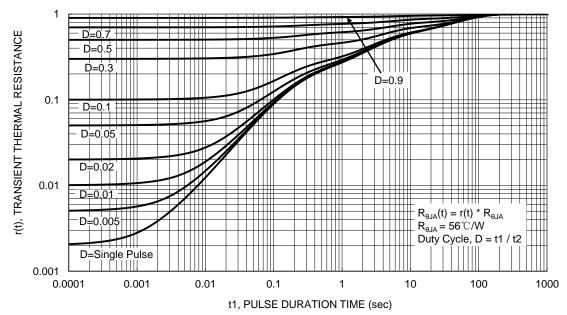


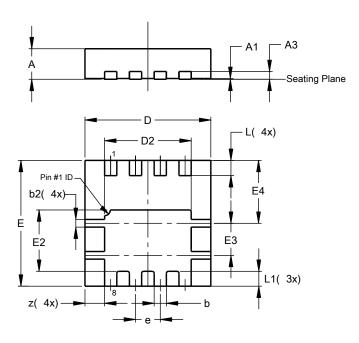
Figure 13. Transient Thermal Resistance



## **Package Outline Dimensions**

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

#### PowerDI3333-8

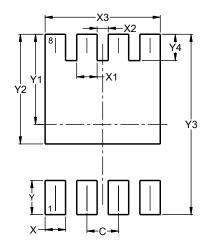


PowerDI3333-8					
Dim	Min	Max	Тур		
Α	0.75	0.85	0.80		
A1	0.00	0.05	0.02		
A3	-	-	0.203		
b	0.27	0.37	0.32		
b2	0.15	0.25	0.20		
D	3.25	3.35	3.30		
D2	2.22	2.32	2.27		
Е	3.25	3.35	3.30		
E2	1.56	1.66	1.61		
E3	0.79	0.89	0.84		
E4	1.60	1.70	1.65		
е	-	_	0.65		
L	0.35	0.45	0.40		
L1	_	_	0.39		
Z	_	_	0.515		
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		
Х	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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