



20V P-CHANNEL ENHANCEMENT MODE MOSFET POWERDI®

Product Summary

V _{(BR)DSS}	R _{DS(ON)} max	I _D max T _C = +25°C
	5.5 m Ω @ $V_{GS} = -10$ V	-40A
-20V	$7.0 \text{m}\Omega$ @ $V_{GS} = -4.5 \text{V}$	-40A
	$9.0 \text{m}\Omega$ @ $V_{GS} = -2.5 \text{V}$	-40A

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

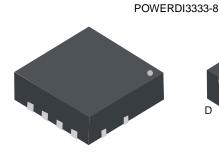
- Load Switch
- Power Management Functions

Features

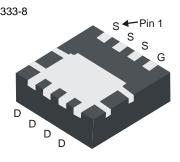
- Low R_{DS(ON)} ensures on state losses are minimized
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

Mechanical Data

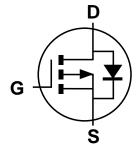
- Case: POWERDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound.
 UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.008 grams (Approximate)







Bottom View



Equivalent Circuit

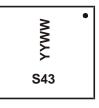
Ordering Information (Note 4)

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Part Number	Case	Packaging
DMP2007UFG-7	POWERDI3333-8	2000/Tape & Reel
DMP2007UFG-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.
- 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



S43 = Product Type Marking Code YYWW = Date Code Marking YY = Last Digit of Year (ex: 14 = 2014) WW = Week Code (01 ~ 53)



Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V_{DSS}	-20	V
Gate-Source Voltage	V_{GSS}	±12	V
Continuous Drain Current (Note 5) V _{GS} = -4.5V	I _D	-18.0 -14.5 -40	А
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	-80	Α
Maximum Continuous Body Diode Forward Current (Is	-2.2	Α
Avalanche Current L=0.1mH	I _{AS}	-30	Α
Avalanche Energy L=0.1mH	E _{AS}	50	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 5)	$T_A = +25$ °C	C	2.3	W
Total Power Dissipation (Note 5)	$T_C = +25$ °C	P_{D}	41	
Thermal Resistance, Junction to Ambient	(Note 5)	D	58	°C/W
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	143	
Thermal Resistance, Junction to Case	R ₀ JC	3.0		
Operating and Storage Temperature Range	T_J , T_STG	-55 to +150	°C	

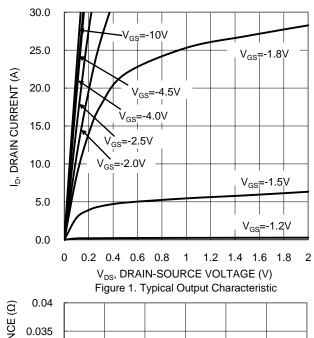
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

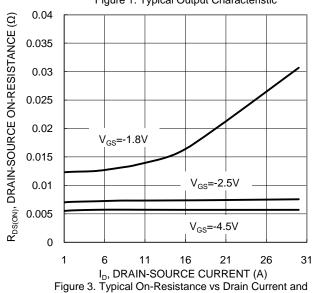
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV _{DSS}	-20	-	-	V	$V_{GS} = 0V, I_{D} = -250\mu A$	
Zero Gate Voltage Drain Current	I _{DSS}	_		-1	μΑ	$V_{DS} = -16V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 12V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)							
Gate Threshold Voltage	V _{GS(TH)}	-0.4	1	-1.3	V	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	
		_	4.4	5.5		$V_{GS} = -10V, I_D = -15A$	
Static Drain-Source On-Resistance	R _{DS(ON)}	_	4.9	7.0	mΩ	$V_{GS} = -4.5V$, $I_D = -15A$	
		_	6.5	9.0		$V_{GS} = -2.5V$, $I_{D} = -10A$	
Diode Forward Voltage	V_{SD}	_	-0.7	-1.2	V	V _{GS} = 0V, I _S = -10A	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	Ciss	_	4621	_		V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz	
Output Capacitance	Coss	_	652	-	pF		
Reverse Transfer Capacitance	Crss	_	403	_			
Gate Resistance	R _G	_	3.2	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge (V _{GS} = -4.5V)	Q_g	_	39	_			
Total Gate Charge (V _{GS} = -10V)	Qg	_	85	_	nC	V _{DD} = -10V. I _D = -20A	
Gate-Source Charge	Q_{gs}	_	8.3	_	IIC	$V_{DD} = -10V, I_{D} = -20A$	
Gate-Drain Charge	Q_{gd}	_	9.6	_			
Turn-On Delay Time	t _{D(ON)}	_	10.1	_			
Turn-On Rise Time	t _R	_	9.8	_		$V_{GS} = -4.5V, V_{DD} = -10V,$	
Turn-Off Delay Time	t _{D(OFF)}	_	61	_	ns	$R_G = 1\Omega$, $I_D = -10A$	
Turn-Off Fall Time	t _F	_	51	_			
Reverse Recovery Time	t _{RR}	_	20.1	_	ns	I _F = -10A, di/dt = 100A/μs	
Reverse Recovery Charge	Q _{rr}		10.1		nC	I _F = -10A, di/dt = 100A/µs	

Notes:

- 5. R_{BJA} is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. R_{BJC} is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.
- 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
- 7. Short duration pulse test used to minimize self-heating effect.
- 8. Guaranteed by design. Not subject to product testing.







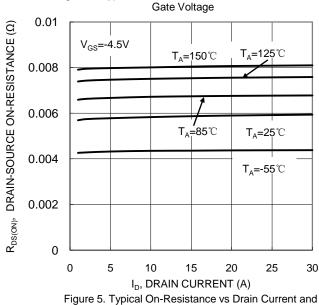
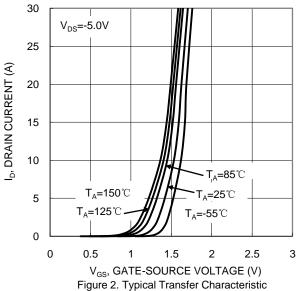
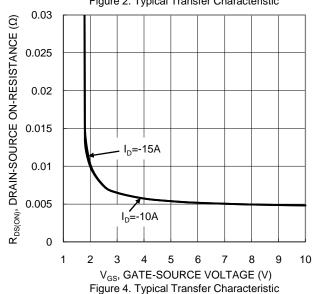


Figure 5. Typical On-Resistance vs Drain Current and Temperature





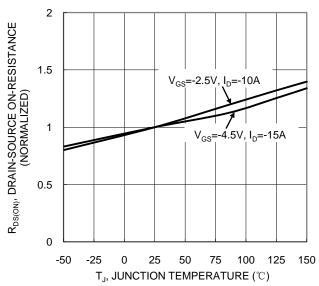


Figure 6. On-Resistance Variation with Temperature

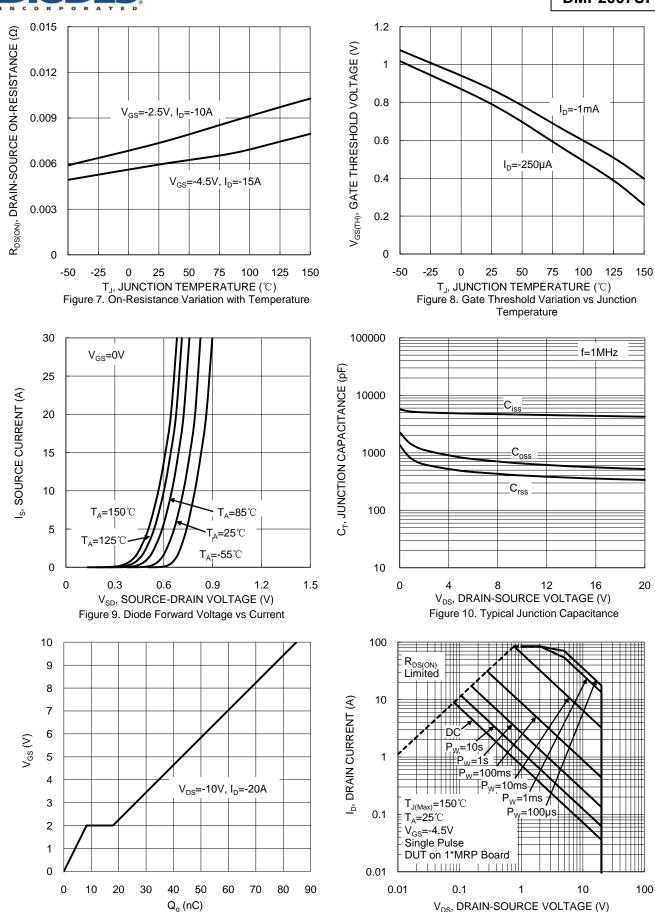


Figure 11. Gate Charge

Figure 12. SOA, Safe Operation Area



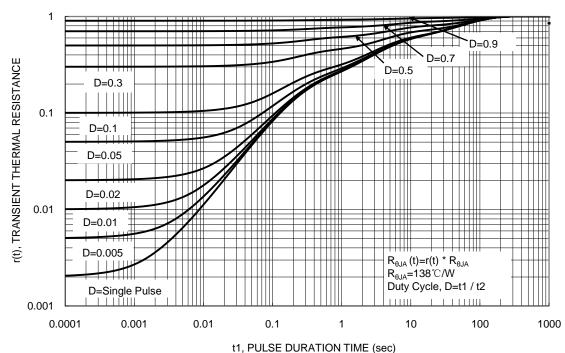
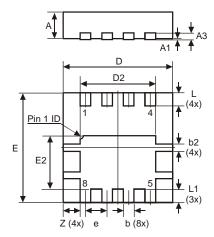


Figure 13. Transient Thermal Resistance



Package Outline Dimensions

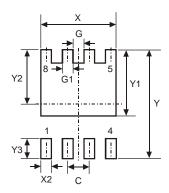
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



POWERDI3333-8					
Dim	Min	Max	Тур		
D	3.25	3.35	3.30		
Е	3.25	3.35	3.30		
D2	2.22	2.32	2.27		
E2	1.56	1.66	1.61		
Α	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		
е	_	_	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)		
С	0.650		
G	0.230		
G1	0.420		
Y	3.700		
Y1	2.250		
Y2	1.850		
Y3	0.700		
Х	2.370		
X2	0.420		



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