



40V 175°C N-CHANNEL ENHANCEMENT MODE MOSFET PowerDI3333-8

Product Summary

BVDSS	R _{DS(ON)} Max	I _D Max T _C = +25°C	
40V	7.4mΩ @ V _{GS} = 10V	67.2A	

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:

- Motor controls
- Power management functions
- DC-DC converters

Features and Benefits

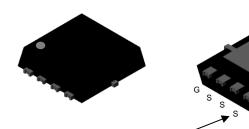
- Rated to +175°C Ideal for High Ambient Temperature Environments
- Excellent Q_{GD} × R_{DS(ON)} Product (FOM)
- Low RDS(ON) Ensures On-State Losses are Minimized
- 100% Unclamped Inductive Switching (UIS) Test in Production Ensures More Reliable and Robust End Application
- Wettable Flank for Improved Optical Inspection
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- The DIODES[™] DMTH46M7SFVWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.

https://www.diodes.com/quality/product-definitions/

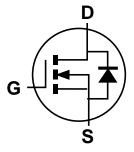
Mechanical Data

- Package: PowerDI[®]3333-8
- Package 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: 0.072 grams (Approximate)

PowerDI3333-8 (SWP) (Type UX)







Equivalent Circuit

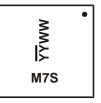
Ordering Information (Note 4)

Part Number	Package	Packing		
Fait Number	Package	Qty.	Carrier	
DMTH46M7SFVWQ-7	PowerDI3333-8 (SWP) (Type UX)	2,000	Tape & Reel	
DMTH46M7SFVWQ-13	PowerDI3333-8 (SWP) (Type UX)	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.
- 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. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



M7S = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 22 = 2022)
WW = Week Code (01 to 53)



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

Characteristic	Symbol	Value	Unit		
Drain-Source Voltage	VDSS	40	V		
Gate-Source Voltage	V_{GSS}	±20	V		
Continuous Drain Current (Note C) Vac. 40V	T _C = +25°C	_	67.2	А	
Continuous Drain Current (Note 6), Vos = 10V	T _C = +100°C	lo	47.5		
Continuous Drain Current (Note 5), Vgs = 10V	T _A = +25°C	lD	16.3	А	
Continuous Diam Current (Note 5), VGS = 10V	T _A = +100°C		11.5		
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	l _{DM}	260	Α		
Maximum Continuous Body Diode Forward Current (Note 6)	Is	65	Α		
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1	Ism	260	А		
Avalanche Current, L = 0.1mH	las	26.6	Α		
Avalanche Energy, L = 0.1mH	Eas	35.3	mJ		

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25$ °C	PD	3.2	W
Thermal Resistance, Junction to Ambient (Note 5)	RθJA	46.8	°C/W	
Total Power Dissipation (Note 6) $T_C = +25^{\circ}C$		PD	54.5	W
Thermal Resistance, Junction to Case (Note 6)		R _θ JC	2.75	°C/W
Operating and Storage Temperature Range	TJ, TSTG	-55 to +175	°C	

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

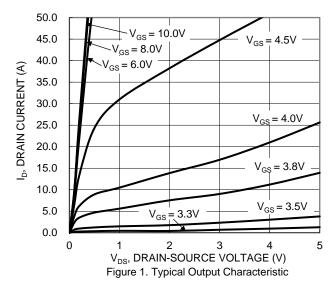
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BVDSS	40	_	_	V	$V_{GS} = 0V, I_{D} = 250\mu A$	
Zero Gate Voltage Drain Current	IDSS			1	μA	V _{DS} = 32V, V _{GS} = 0V	
Gate-Source Leakage	Igss	_	_	±100	nA	$V_{GS} = \pm 20V$, $V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)							
Gate Threshold Voltage	Vgs(TH)	2	_	4	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	
Static Drain-Source On-Resistance	RDS(ON)	_	5.7	7.4	mΩ	$V_{GS} = 10V, I_{D} = 20A$	
Diode Forward Voltage	V_{SD}	_	0.9	1.2	V	$V_{GS} = 0V, I_{S} = 20A$	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	Ciss	_	1315	_		V _{DS} = 20V, V _{GS} = 0V, f = 1MHz	
Output Capacitance	Coss	_	517	_	pF		
Reverse Transfer Capacitance	Crss	_	30.9	_			
Gate Resistance	R_g	_	1.13	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge	Qg	_	14.8	_			
Gate-Source Charge	Q_{gs}	_	1.9	_	nC	$V_{DS} = 20V$, $I_D = 20A$, $V_{GS} = 10V$	
Gate-Drain Charge	Q_{gd}	_	5.2	_			
Turn-On Delay Time	tD(ON)	_	8.67	_		$V_{DD} = 20V, V_{GS} = 10V,$ $R_g = 3\Omega, I_D = 20A$	
Turn-On Rise Time	tR		16.1	_	no		
Turn-Off Delay Time	tD(OFF)		15.9	_	ns		
Turn-Off Fall Time	tF	_	9.07	_			
Body Diode Reverse Recovery Time	trr	_	105	_	ns	I- 200 di/dt 2000///	
Body Diode Reverse Recovery Charge	Qrr	_	229	_	nC	I _F = 20A, di/dt = 300A/μs	

Notes:

- 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
- 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 production testing.







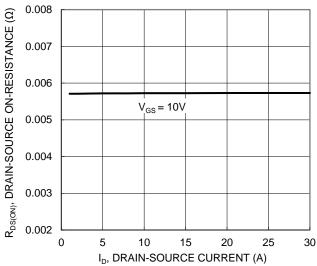
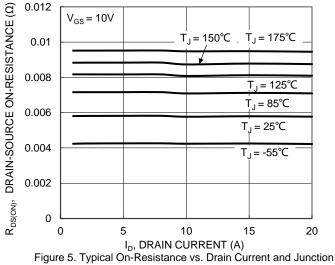


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage



Temperature

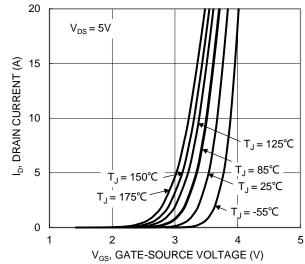


Figure 2. Typical Transfer Characteristic

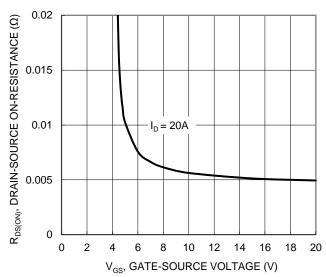
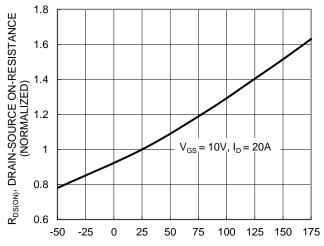


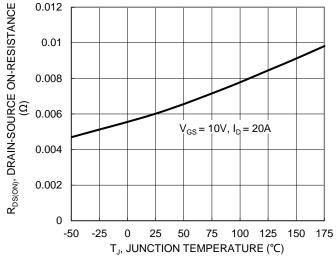
Figure 4. Typical Transfer Characteristic

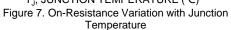


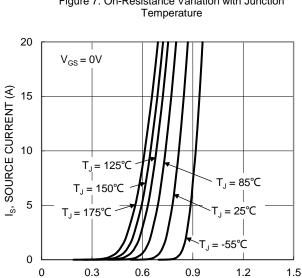
T_J, JUNCTION TEMPERATURE (°C) Figure 6. On-Resistance Variation with Junction Temperature











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

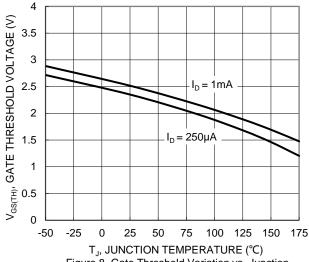


Figure 8. Gate Threshold Variation vs. Junction Temperature

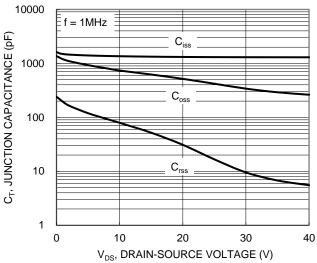
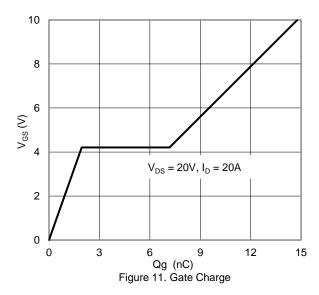


Figure 10. Typical Junction Capacitance



1000 R_{DS(ON)} 100 ID, DRAIN CURRENT (A) 10 1 $T_{J(Max)} = 175$ °C T_C = 25°C Single Pulse DUT on Infinite Heatsink V_{GS}= 10V 0.01 0.1 10 100 $V_{\rm DS}$, DRAIN-SOURCE VOLTAGE (V) Figure 12. SOA, Safe Operation Area



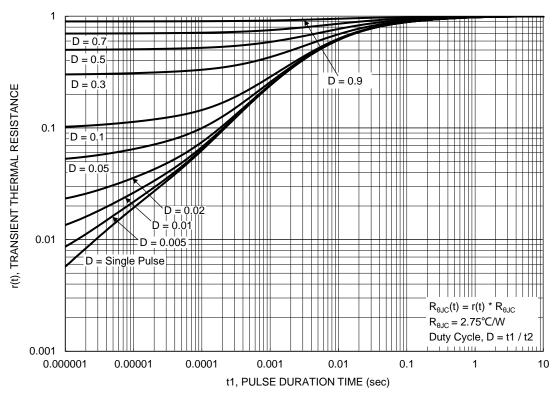


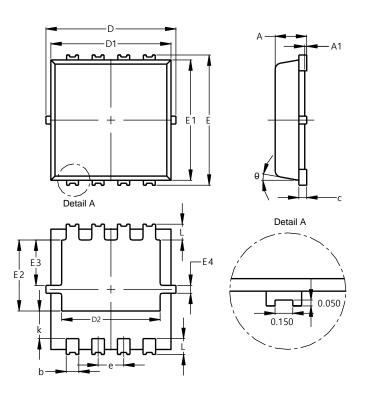
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

PowerDI3333-8 (SWP) (Type UX)

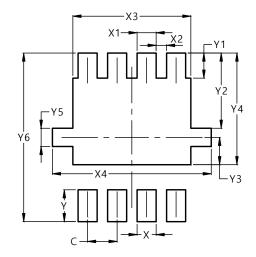


PowerDI3333-8 (SWP)					
(Type UX)					
Dim	Min	Max	Тур		
Α	0.75	0.85	0.80		
A1	0.00	0.05			
b	0.25	0.40	0.32		
С	0.10	0.25	0.15		
D	3.20	3.40	3.30		
D1	2.95	3.15	3.05		
D2	2.30	2.70	2.50		
Е	3.20	3.40	3.30		
E1	2.95	3.15	3.05		
E2	1.60	2.00	1.80		
E3	0.95	1.35	1.15		
E4	0.10	0.30	0.20		
е			0.65		
k	0.50	0.90	0.70		
L	0.30	0.50	0.40		
θ	0°	12°	10°		
All Dimensions in mm					

Suggested Pad Layout

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

PowerDI3333-8 (SWP) (Type UX)



Dimensions	Value (in mm)			
С	0.650			
Х	0.420			
X1	0.420			
X2	0.230			
Х3	2.600			
X4	3.500			
Υ	0.700			
Y1	0.550			
Y2	1.650			
Y3	0.600			
Y4	2.450			
Y5	0.400			
Y6	3.700			



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