



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

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C	
40V	5.5mΩ @ V _{GS} = 10V	71A	

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:

- Backlighting
- Power-management functions
- DC-DC converters

Features and Benefits

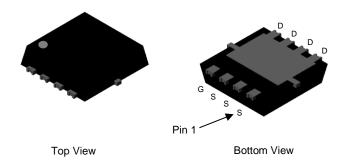
- Rated to +175°C Ideal for High Ambient Temperature Environments
- Low Rds(ON) Ensures On-State Losses are Minimized
- Excellent Qgd x RDS(ON) Product (FOM)
- Wettable Flank for Improved Optical Inspection
- 100% Unclamped Inductive Switching (UIS) Test in Production –
 Ensures More Reliable and Robust End Application
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- The DMTH45M5SFVWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.

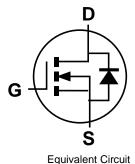
https://www.diodes.com/quality/product-definitions/

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: 0.029 grams (Approximate)

PowerDI3333-8 (SWP) (Type UX)





Ordering Information (Note 4)

Part Number	Package	Packing		
Fait Number	Fackage	Qty.	Carrier	
DMTH45M5SFVWQ-7	PowerDI3333-8 (SWP) (Type UX)	2,000	Tape & Reel	
DMTH45M5SFVWQ-13	PowerDI3333-8 (SWP) (Type UX)	3,000	Tape & Reel	

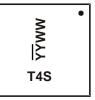
Notes:

- 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

PowerDI3333-8 (SWP) (Type UX)



 $\frac{\text{T4S}}{\text{YY}} = \text{Product Type Marking Code}$ $\frac{\text{YY}}{\text{YY}} = \text{Date Code Marking}$ $\frac{\text{YY}}{\text{YY}} = \text{Last Two Digits of Year (ex: 23 = 2023)}$ 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		Vgss	±20	V
Continuous Drain Current (Note 5), VGS = 10V	T _C = +25°C T _C = +100°C	lο	71 50	А
Continuous Drain Current (Note 6), V _{GS} = 10V	ID	18 13	А	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	Ірм	284	Α	
Maximum Continuous Body Diode Forward Current (Note 5	Is	71	Α	
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cyc	I _{SM}	284	Α	
Avalanche Current, L = 0.1mH	las	20.5	А	
Avalanche Energy, L = 0.1mH	Eas	21	mJ	

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	P _D	3.5	W	
Thermal Resistance, Junction to Ambient (Note 6)	Reja	42	°C/W	
Total Power Dissipation (Note 5)	PD	51	W	
Thermal Resistance, Junction to Case (Note 5)	Rejc	2.9	°C/W	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C	

Notes:

- 5. Thermal resistance from junction to soldering point (on the exposed drain pad).6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.



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	μΑ	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)	2.0	_	3.5	٧	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	
Static Drain-Source On-Resistance	R _{DS(ON)}		4.2	5.5	mΩ	$V_{GS} = 10V, I_D = 25A$	
Diode Forward Voltage	V_{SD}		0.85	1.2	V	$V_{GS} = 0V, I_{S} = 25A$	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	Ciss		1083			V _{DS} = 20V, V _{GS} = 0V f = 1MHz	
Output Capacitance	Coss		621		pF		
Reverse Transfer Capacitance	Crss		21				
Gate Resistance	Rg		1.5	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge	Qg		13.2				
Gate-Source Charge	Qgs		4.2	_	nC	$V_{DS} = 20V$, $I_D = 25A$, $V_{GS} = 10V$	
Gate-Drain Charge	Qgd		0.9	_			
Turn-On Delay Time	t _D (ON)		5.4	_			
Turn-On Rise Time	t _R		2.5		ns	$\begin{split} V_{DD} &= 20 \text{V}, V_{GS} = 10 \text{V} \\ R_g &= 3.5 \Omega, I_D = 25 \text{A} \end{split}$	
Turn-Off Delay Time	tD(OFF)		16.1				
Turn-Off Fall Time	tF	_	4.5	_			
Body Diode Reverse Recovery Time	trr		61.3	_	ns I OFA HIGH 100A (co		
Body Diode Reverse Recovery Charge	Q _{RR}		52.1	_	nC	I _F = 25A, dl/dt = 100A/μs	

Notes:

^{7.} Short duration pulse test used to minimize self-heating effect. 8. Guaranteed by design. Not subject to production testing.



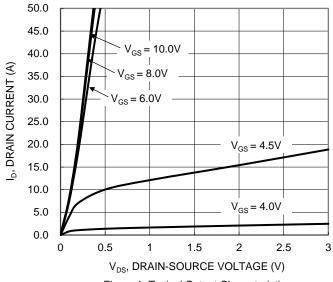
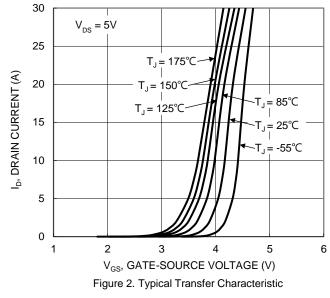


Figure 1. Typical Output Characteristic



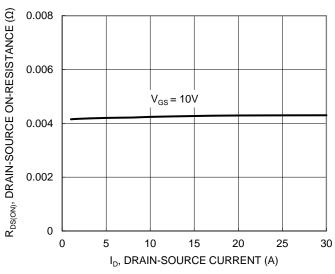


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

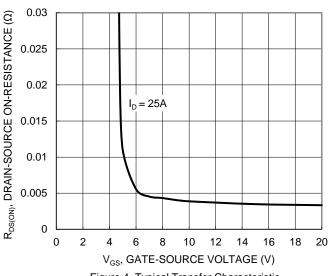


Figure 4. Typical Transfer Characteristic

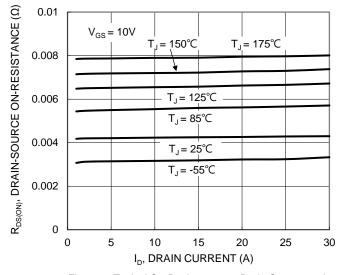


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

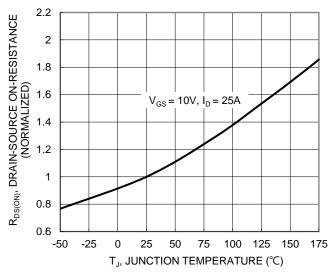


Figure 6. On-Resistance Variation with Junction Temperature





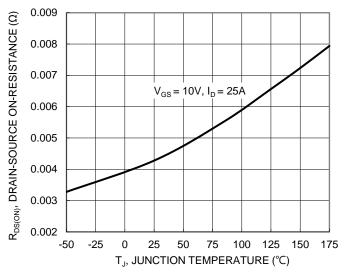


Figure 7. On-Resistance Variation with Junction Temperature

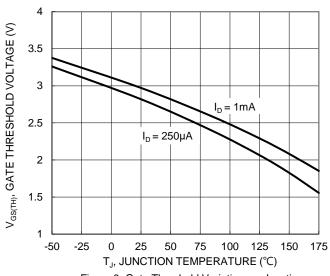


Figure 8. Gate Threshold Variation vs. Junction Temperature

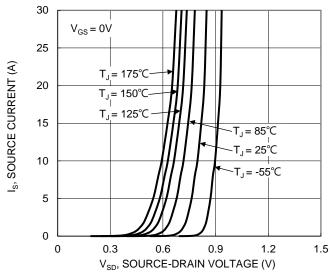


Figure 9. Diode Forward Voltage vs. Current

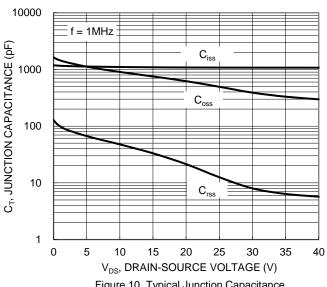


Figure 10. Typical Junction Capacitance

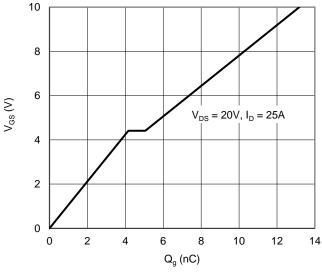


Figure 11. Gate Charge

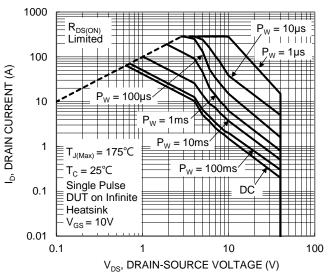


Figure 12. SOA, Safe Operation Area



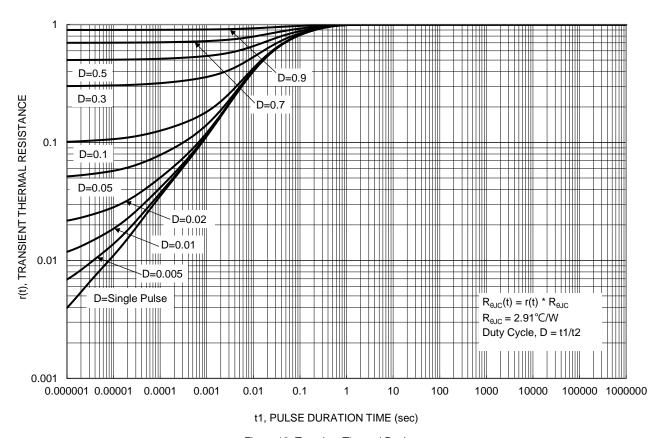


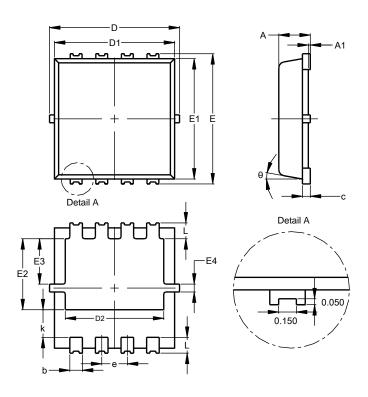
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

PowerDI3333-8 (SWP) (Type UX)

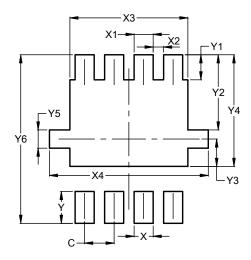


PowerDI3333-8 (SWP)						
(Type UX)						
Dim	Min	Max	Тур			
Α	0.75	0.85	0.80			
A1	0.00	0.05				
b	0.25	0.40	0.32			
С	0.10	0.25	0.15			
D	3.20	3.40	3.30			
D1	2.95	3.15	3.05			
D2	2.30	2.70	2.50			
Е	3.20	3.40	3.30			
E1	2.95	3.15	3.05			
E2	1.60	2.00	1.80			
E3	0.95	1.35	1.15			
E4	0.10	0.30	0.20			
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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