



N-CHANNEL ENHANCEMENT MODE MOSFET PowerDI3333-8 (Type UX)

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
	5.0mΩ @ V _{GS} = 10V	70A
24V	6.5mΩ @ V _{GS} = 4.5V	60A
	10.0mΩ @ V _{GS} = 2.5V	45A

Description and Applications

This MOSFET is 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.

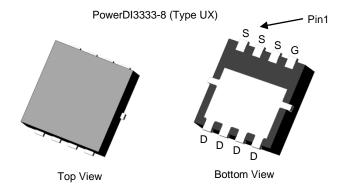
- Backlighting
- Power Management Functions
- DC-DC Converters

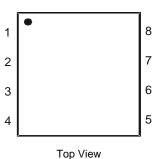
Features and Benefits

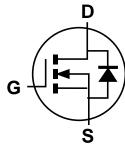
- Low R_{DS(ON)} ensures on state losses are minimized
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- 100% Unclamped Inductive Switch (UIS) Test in Production
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

Mechanical Data

- Case: PowerDI[®]3333-8 (Type UX)
- 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: 0.072 grams (Approximate)







Equivalent Circuit

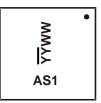
Ordering Information (Note 4)

Part Number	Case	Packaging		
DMT2004UFV-7	PowerDI3333-8 (Type UX)	2,000/Tape & Reel		
DMT2004UFV-13	PowerDI3333-8 (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



AS1 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 18 = 2018)
WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit		
Drain-Source Voltage	V_{DSS}	24	V		
Gate-Source Voltage	V_{GSS}	±12	V		
Continuous Drain Current (Note 7) $V_{GS} = 10V$ Steady $T_C = +25^{\circ}C$ State $T_C = +70^{\circ}C$			I _D	70 55	А
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	90	A		
Continuous Source-Drain Diode Current (Note 6)			Is	2.5	А
Avalanche Current (Note 8) L = 0.1mH			I _{AS}	26	Α
Avalanche Energy (Note 8) L = 0.1mH			Eas	36	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^{\circ}C$	P_{D}	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{ hetaJA}$	106	°C/W
Total Power Dissipation (Note 6)	$T_A = +25^{\circ}C$	P_{D}	2.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{ hetaJA}$	54	°C/W
Thermal Resistance, Junction to Case (Note 7)	$R_{ heta JC}$	3.5	°C/W	
Operating and Storage Temperature Range		T _{J,} T _{STG}	-55 to +150	°C

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

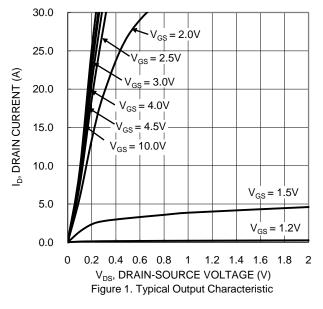
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 9)							
Drain-Source Breakdown Voltage	BV _{DSS}	24	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current (T _J = +25°C)	I _{DSS}	_	_	1	μΑ	V _{DS} = 20V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 10V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 9)							
Gate Threshold Voltage	V _{GS(TH)}	0.55	_	1.45	V	$V_{DS} = V_{GS}, I_D = 250 \mu A$	
		_	3.8	5.0	mΩ	$V_{GS} = 10V, I_D = 12A$	
Static Drain-Source On-Resistance	RDS(ON)	_	4.6	6.5		$V_{GS} = 4.5V, I_D = 12A$	
		_	6.8	10.0		$V_{GS} = 2.5V, I_D = 12A$	
Diode Forward Voltage	V _{SD}	_	0.65	1.0	V	V _{GS} = 0V, I _S = 2A	
DYNAMIC CHARACTERISTICS (Note 10)							
Input Capacitance	C _{iss}	_	1683	_		$V_{DS} = 15V, V_{GS} = 0V,$ f = 1.0MHz	
Output Capacitance	Coss	_	581	_	pF		
Reverse Transfer Capacitance	C _{rss}	_	559	_			
Gate Resistance	R _G	_	1.6	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge (V _{GS} = 4.5V)	Qg	_	29.6	_			
Total Gate Charge (V _{GS} = 10V)	Qq	_	53.7	_	nC	V 45V 1 0A	
Gate-Source Charge	Q_{gs}	_	4.2	_	IIC	$V_{DD} = 15V$, $I_D = 9A$	
Gate-Drain Charge	Q _{qd}	_	13.4	_			
Turn-On Delay Time	t _{D(ON)}	_	3.9	_			
Turn-On Rise Time	t _R	_	9.6	_		$V_{DD} = 15V, V_{GS} = 10V,$	
Turn-Off Delay Time	t _{D(OFF)}	_	30.8	_	ns	$R_G = 3\Omega$, $I_D = 9A$	
Turn-Off Fall Time	t _F	_	38.6	_			
Reverse Recovery Time	t _{RR}	_	11.2	_	ns		
Reverse Recovery Charge	Q _{RR}	_	22.9	_	nC	$I_F = 1.5A$, di/dt = 100A/ μ s	

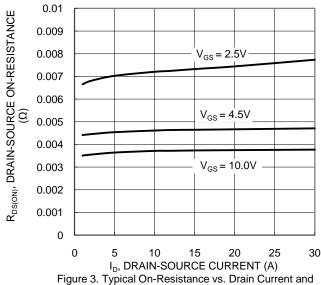
Notes:

- 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 7. Thermal resistance from junction to soldering point (on the exposed drain pad).
 8. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 9. Short duration pulse test used to minimize self-heating effect.
 10. Guaranteed by design. Not subject to product testing.









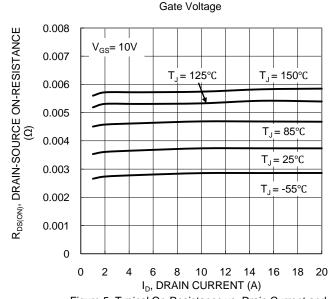
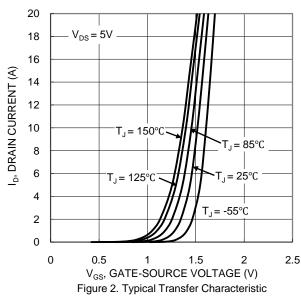
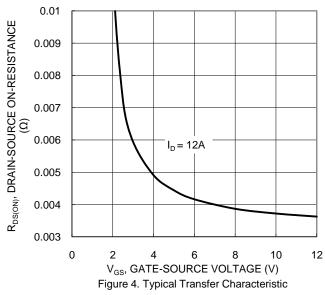


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





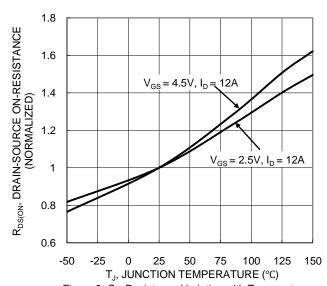


Figure 6. On-Resistance Variation with Temperature





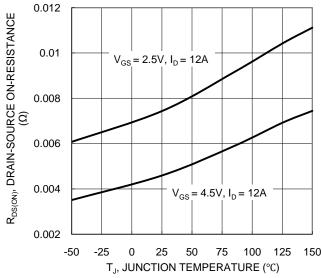
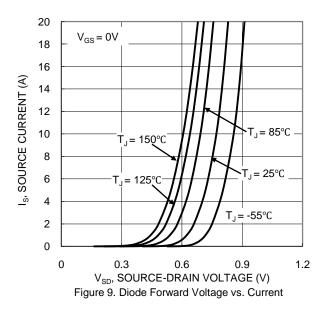
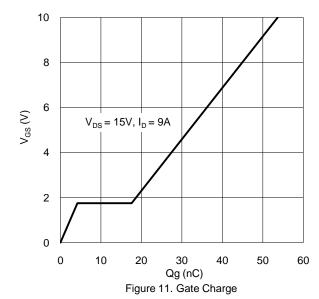


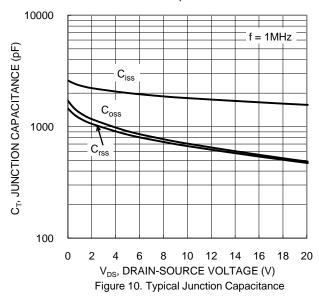
Figure 7. On-Resistance Variation with Temperature

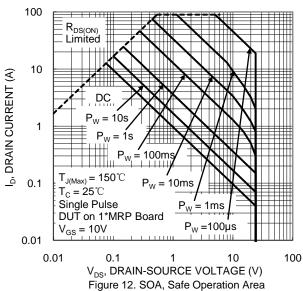




1.2 $V_{GS(TH)}$, GATE THRESHOLD VOLTAGE (V) 1 $I_D = 1 \text{mA}$ 0.8 0.6 $I_{D} = 250 \mu A$ 0.4 0.2 0 -50 -25 0 25 50 75 100 125 150 T_J, JUNCTION TEMPERATURE (°C)

Figure 8. Gate Threshold Variation vs. Junction Temperature







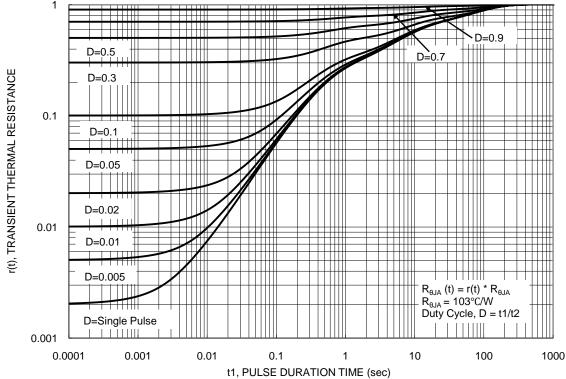


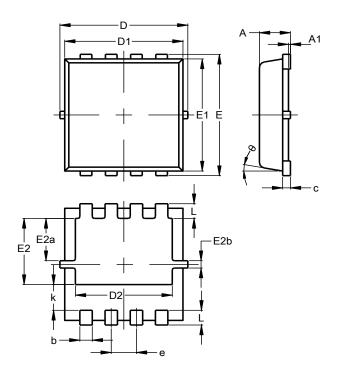
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

PowerDI3333-8 (Type UX)

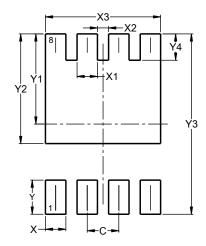


PowerDI3333-8						
(Type UX)						
Dim	Min	Max	Тур			
Α	0.75	0.85	0.80			
A1	0.00	0.05				
b	0.25	0.40	0.32			
С	0.10	0.25	0.15			
D	3.20	3.40	3.30			
D1	2.95	3.15	3.05			
D2	2.30	2.70	2.50			
Е	3.20	3.40	3.30			
E1	2.95	3.15	3.05			
E2	1.60	2.00	1.80			
E2a	0.95	1.35	1.15			
E2b	0.10	0.30	0.20			
е	0.65 BSC					
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 (Type UX)



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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