40V N-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI3333-8 (Type UX)

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_C = +25°C
40V	7.9mΩ @ V_{GS} = 10V	54.8A
	12mΩ @ V_{GS} = 4.5V	44.5A

Features

- 100% Unclamped Inductive Switching—Ensures More Reliable and Robust End Application
- Low On-Resistance
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Description and Applications

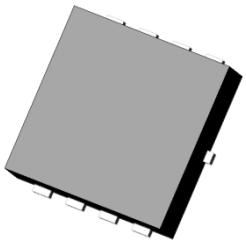
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, which makes it ideal for high-efficiency power management applications.

- Power Management Functions
- DC-DC Converters

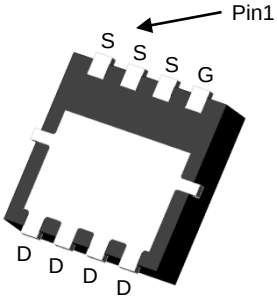
Mechanical Data

- 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
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072 grams (Approximate)

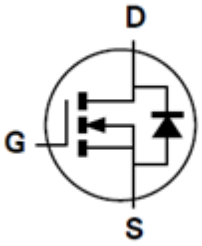
PowerDI3333-8 (Type UX)



Top View



Bottom View



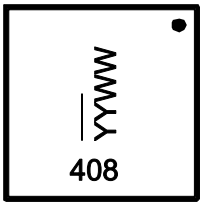
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMT4008LFV-7	PowerDI3333-8 (Type UX)	2000/Tape & Reel
DMT4008LFV-13	PowerDI3333-8 (Type UX)	3000/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, see https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



408 = 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}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, V_{GS} = 10V (Note 6)	T_C = +25°C T_C = +70°C	I_D	54.8 43.9	A
Continuous Drain Current, V_{GS} = 10V (Note 5)	T_A = +25°C T_A = +70°C	I_D	12.1 9.7	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I_{DM}	70	A
Maximum Continuous Body Diode Forward Current (Note 6)		I_S	29.8	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)		I_{SM}	70	A
Avalanche Current, L = 0.3mH		I_{AS}	11.3	A
Avalanche Energy, L = 0.3mH		E_{AS}	19.2	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.9	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\Theta JA}$	64	°C/W
Total Power Dissipation (Note 6)	T_C = +25°C	P_D	35.7	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\Theta JC}$	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	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	6.5	7.9	mΩ	V_{GS} = 10V, I_D = 12A
		—	9.4	12		V_{GS} = 4.5V, I_D = 10A
Diode Forward Voltage	V_{SD}	—	—	1.2	V	V_{GS} = 0V, I_S = 10A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	1179	—	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	384	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	42	—	pF	
Gate Resistance	R_g	—	1.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	—	17.1	—	nC	V_{DS} = 20V, I_D = 10A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	8.3	—	nC	
Gate-Source Charge	Q_{gs}	—	2.4	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.4	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	—	ns	V_{DD} = 20V, V_{GS} = 10V, R_G = 6Ω, I_D = 10A
Turn-On Rise Time	t_R	—	3.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	17.1	—	ns	
Turn-Off Fall Time	t_F	—	6.4	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	19.8	—	ns	I_F = 10A, di/dt = 400A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	8.8	—	nC	

Notes:
5. Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer and 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 product testing.

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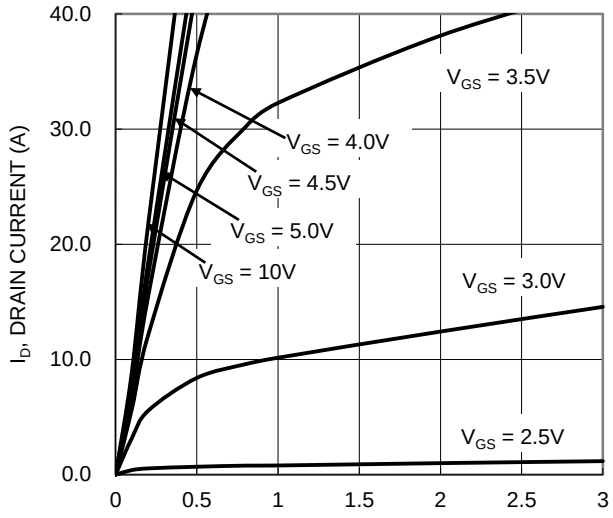

Figure 1. Typical Output Characteristic

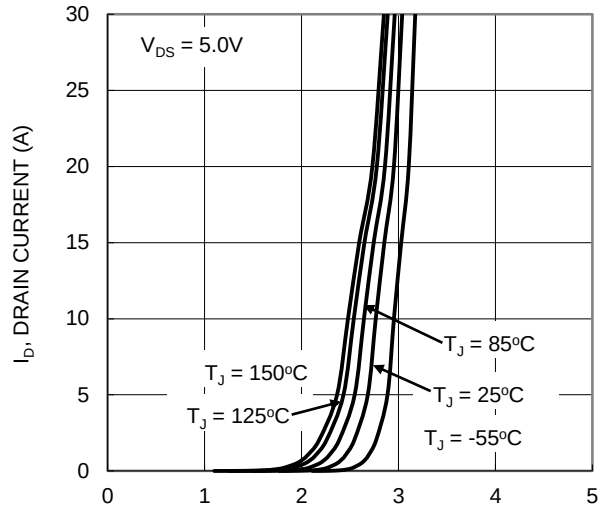

Figure 2. Typical Transfer Characteristic

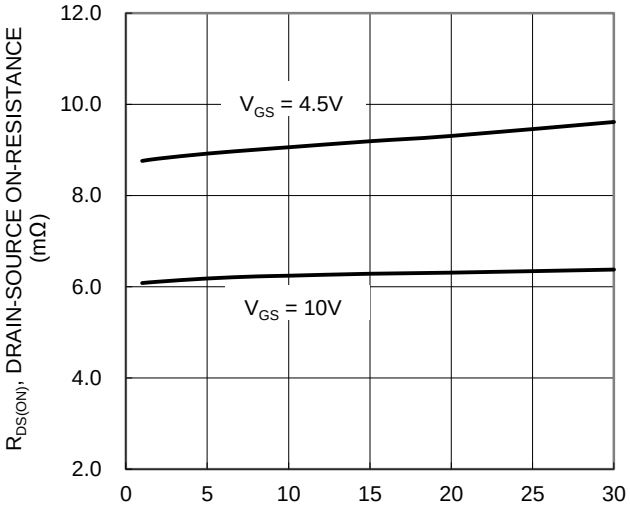

Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

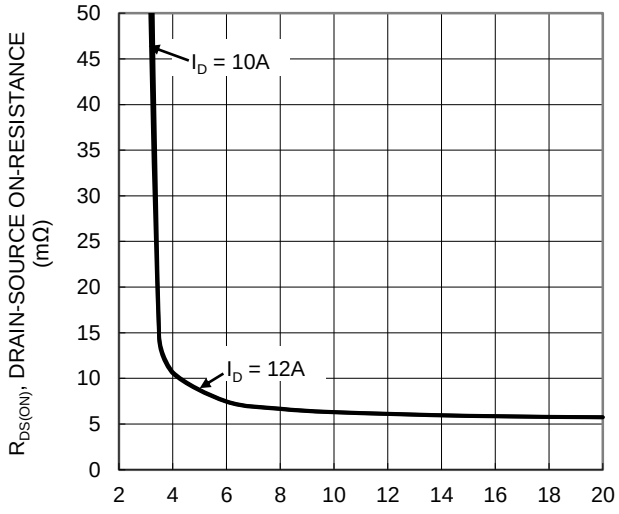

Figure 4. Typical Transfer Characteristic

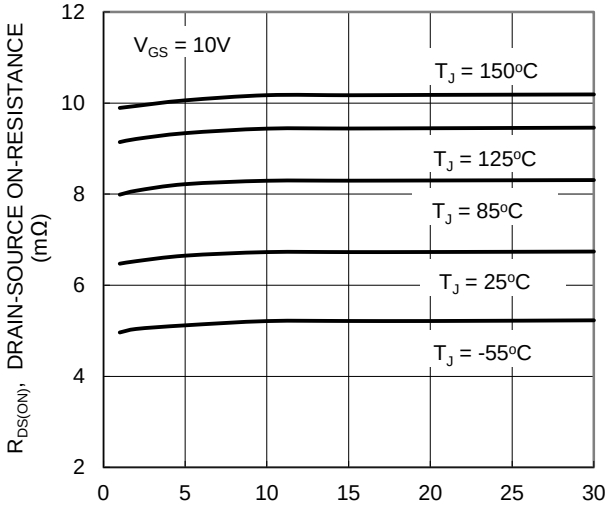

Figure 5. Typical On-Resistance vs. Drain Current and Temperature

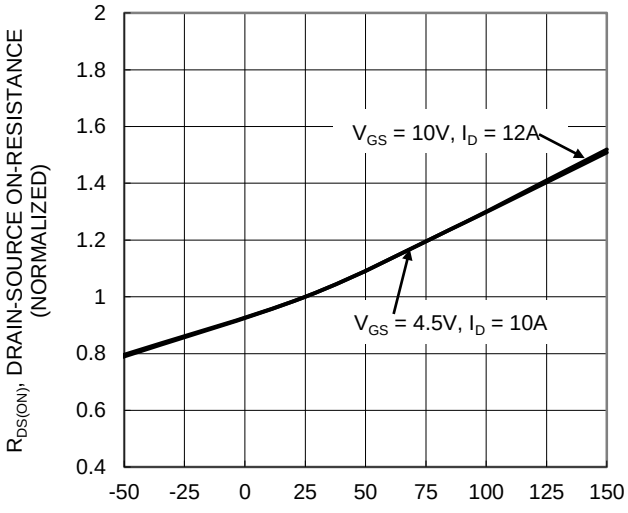

Figure 6. On-Resistance Variation with Temperature

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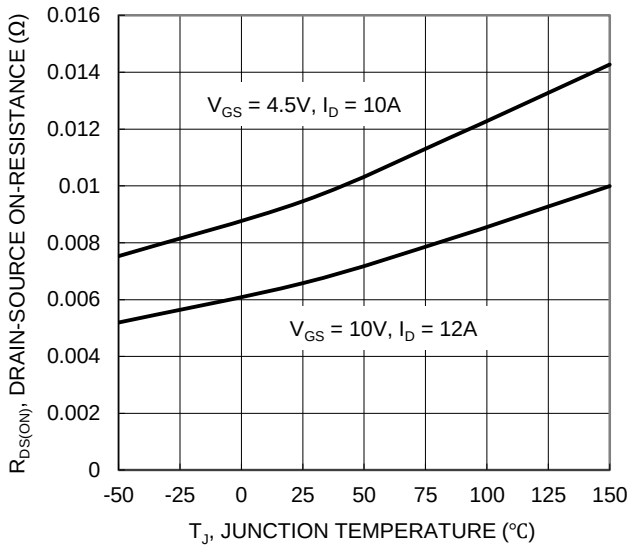

Figure 7. On-Resistance Variation with Temperature

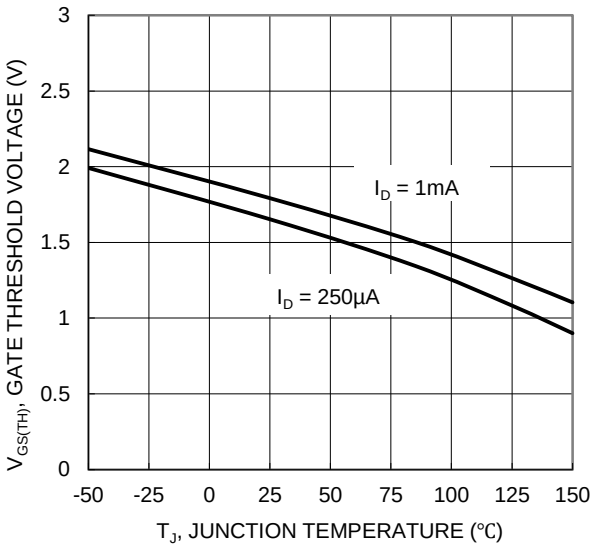

Figure 8. Gate Threshold Variation vs. Junction Temperature

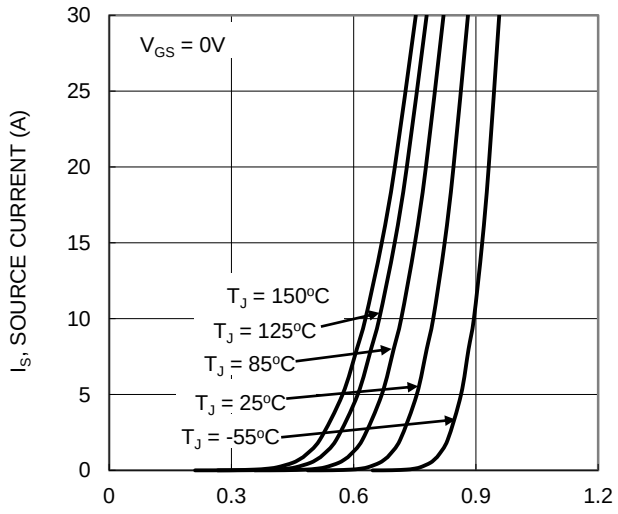

Figure 9. Diode Forward Voltage vs. Current

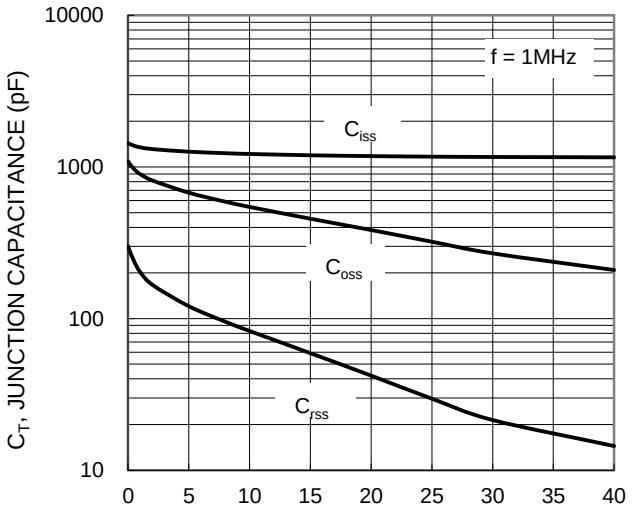

Figure 10. Typical Junction Capacitance

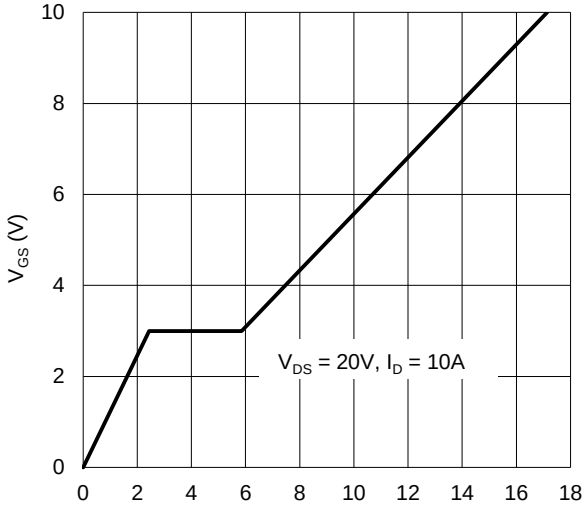

Figure 11. Gate Charge

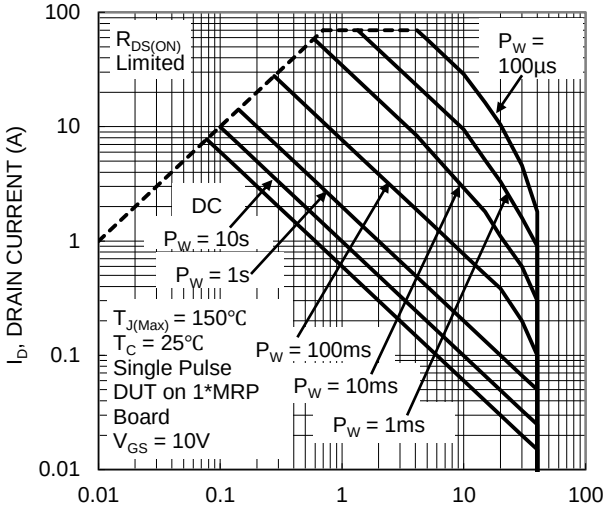

Figure 12. SOA, Safe Operation Area

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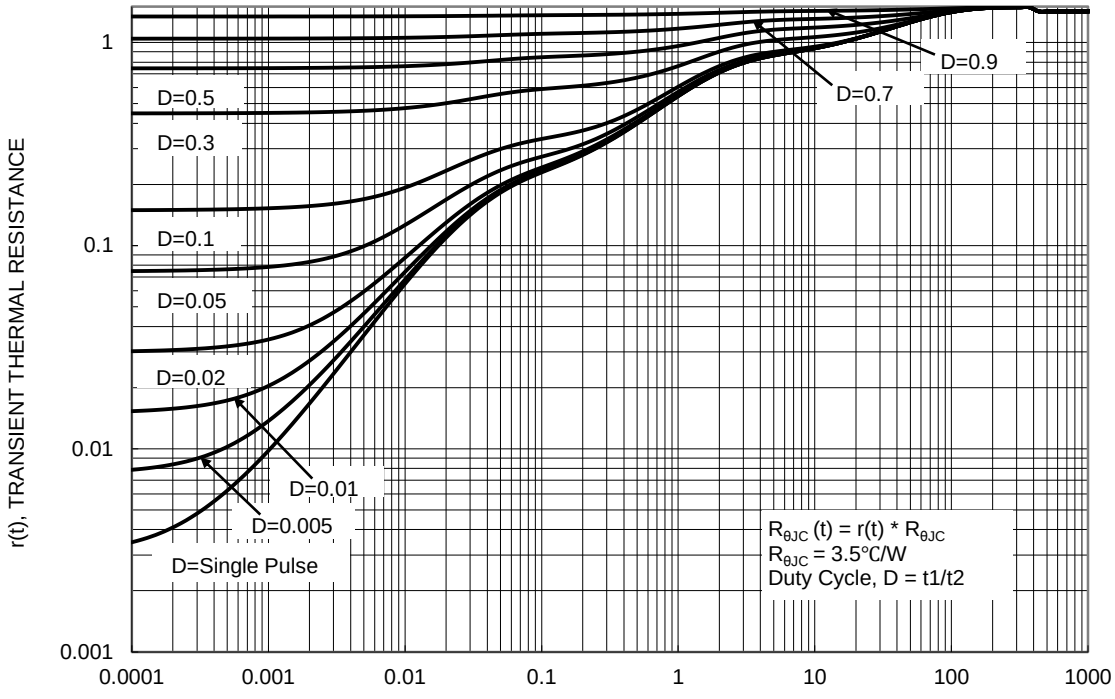

Figure 13. Transient Thermal Resistance

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Package Outline Dimensions

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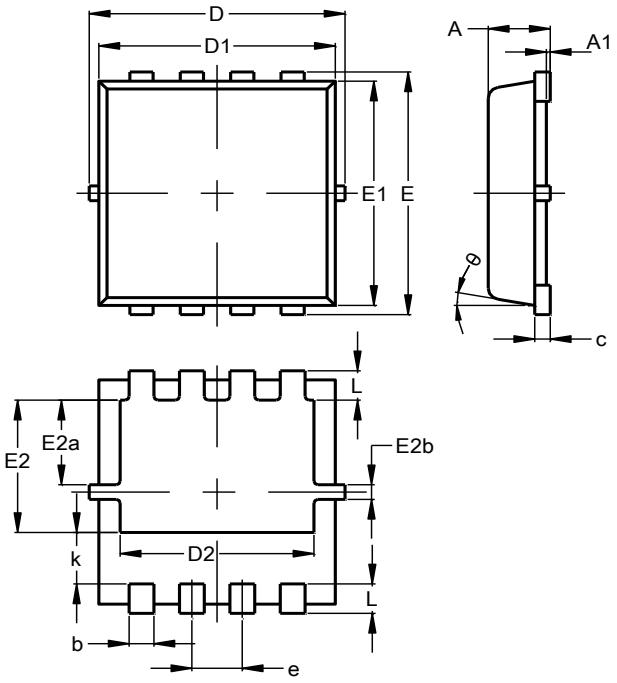
PowerDI3333-8 (Type UX)

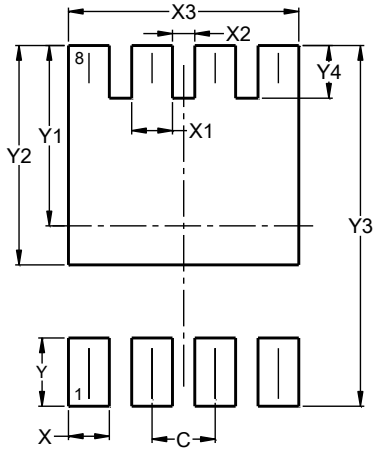


PowerDI3333-8 (Type UX)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	—
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E2a	0.95	1.35	1.15
E2b	0.10	0.30	0.20
e	0.65 BSC		
k	0.50	0.90	0.70
L	0.30	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)
C	0.650
X	0.420
X1	0.420
X2	0.230
X3	2.370
Y	0.700
Y1	1.850
Y2	2.250
Y3	3.700
Y4	0.540

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