30V P-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI3333-8 (Type UX)

Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	I_D max T_C = +25°C
-30V	9.5mΩ @ V_{GS} = -10V	-35A
	17mΩ @ V_{GS} = -4.5V	-25A

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 33% of the Board Area Occupied by SO-8 Enabling Smaller End Product
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Description

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

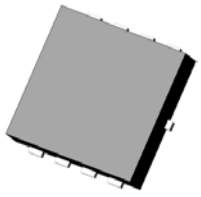
Mechanical Data

- 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 e3
- Weight: 0.03 grams (Approximate)

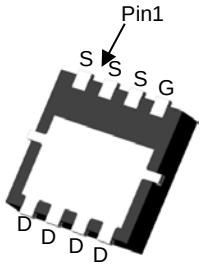
Applications

- Backlighting
- Power Management Functions
- DC-DC Converters

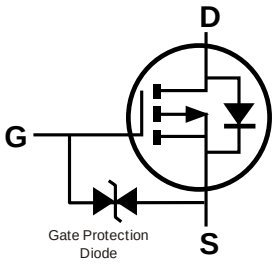




Top View



Bottom View



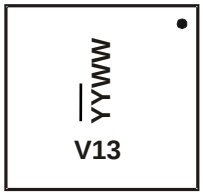
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP3013SFV-7	PowerDI3333-8 (Type UX)	2000/Tape & Reel
DMP3013SFV-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, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



V13 = 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}	-30	V
Gate-Source Voltage			V_{GSS}	±25	V
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-12 -10	A
Continuous Drain Current (Note 7) V_{GS} = -10V	Steady State	T_C = +25°C T_C = +70°C	I_D	-35 -25	A
Maximum Continuous Body Diode Forward Current (Note 7)			I_S	-35	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I_{DM}	-80	A
Pulsed Body Diode Forward Current (380µs Pulse, Duty Cycle = 1%)			I_{SM}	-80	A
Avalanche Current (Note 8) L = 1mH			I_{AS}	-14	A
Avalanche Energy (Note 8) L = 1mH			E_{AS}	100	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	0.94	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\Theta JA}$	134	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.94	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\Theta JA}$	65	°C/W
Total Power Dissipation (Note 7)		P_D	31	W
Thermal Resistance, Junction to Case (Note 7)		$R_{\Theta JC}$	4.0	°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 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.0	—	-3.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	8	9.5	mΩ	V_{GS} = -10V, I_D = -11.5A
		—	11	17		V_{GS} = -4.5V, I_D = -8.5A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1674	—	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	302	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	230	—	pF	
Gate Resistance	R_g	—	15.2	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -5V)	Q_g	—	16.2	—	nC	V_{DS} = -15V, I_D = -11.5A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	33.7	—	nC	
Gate-Source Charge	Q_{gs}	—	3.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	6.7	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.0	—	ns	V_{DD} = -15V, V_{GS} = -10V, R_G = 6Ω, I_D = -11.5A
Turn-On Rise Time	t_R	—	4.5	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	96	—	ns	
Turn-Off Fall Time	t_F	—	106.5	—	ns	
Reverse Recovery Time	t_{RR}	—	46	—	ns	I_S = -11.5A, dI/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	25.5	—	nC	

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 1-inch 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.

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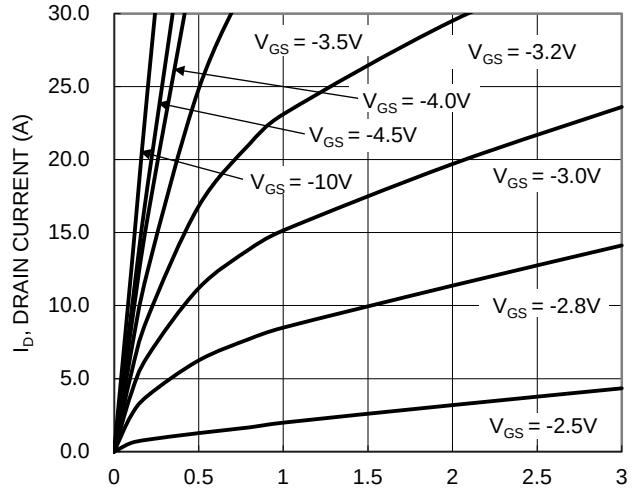


Figure 1. Typical Output Characteristic

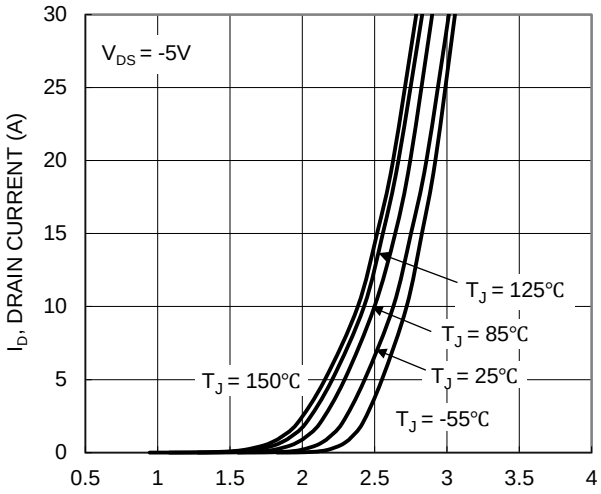


Figure 2. Typical Transfer Characteristic

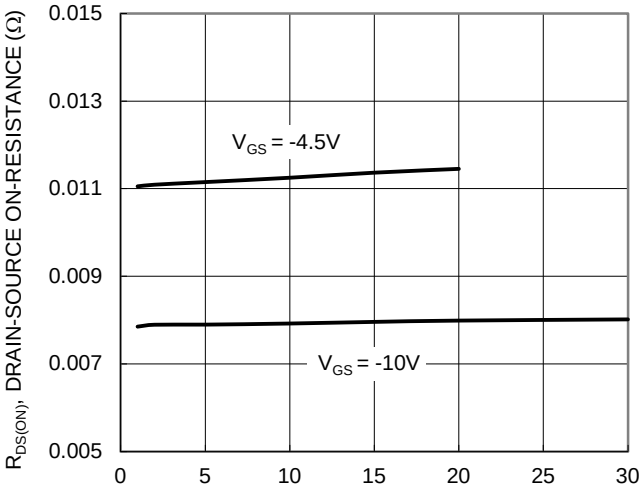


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

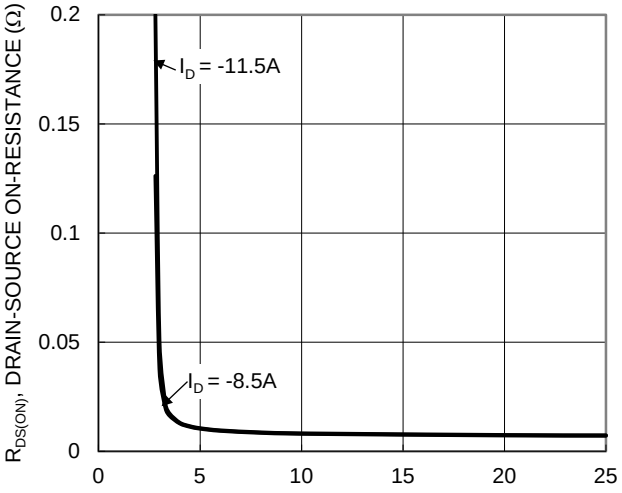


Figure 4. Typical Transfer Characteristic

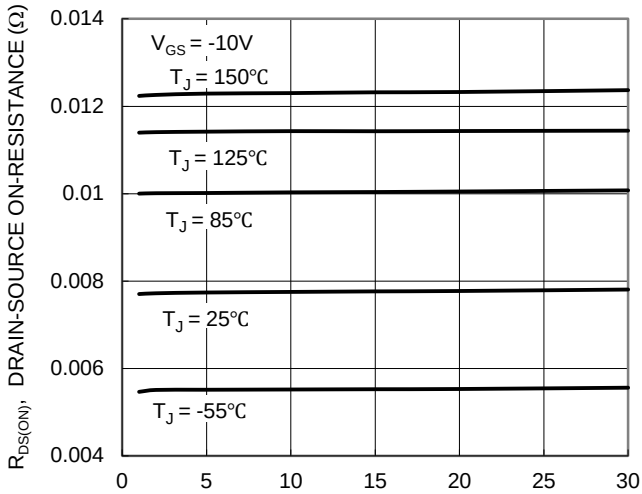


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

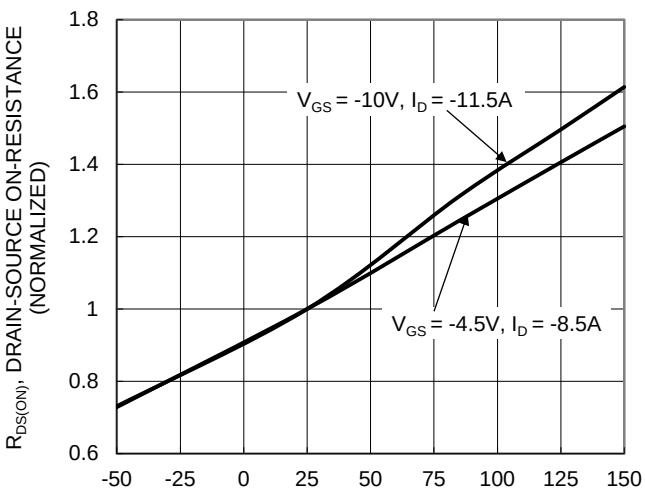


Figure 6. On-Resistance Variation with Junction Temperature

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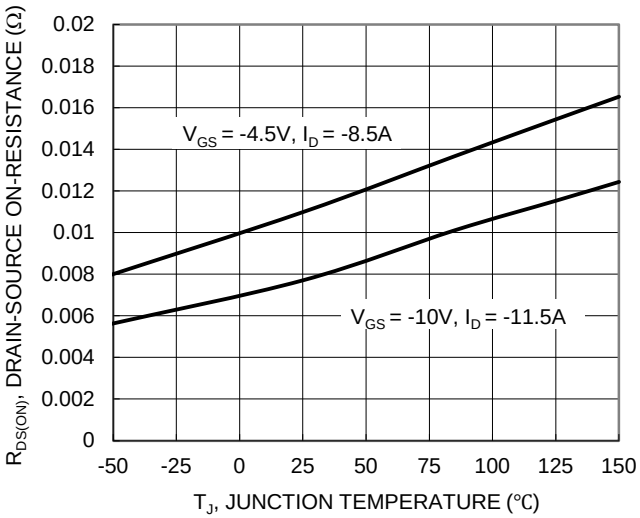


Figure 7. On-Resistance Variation with Junction Temperature

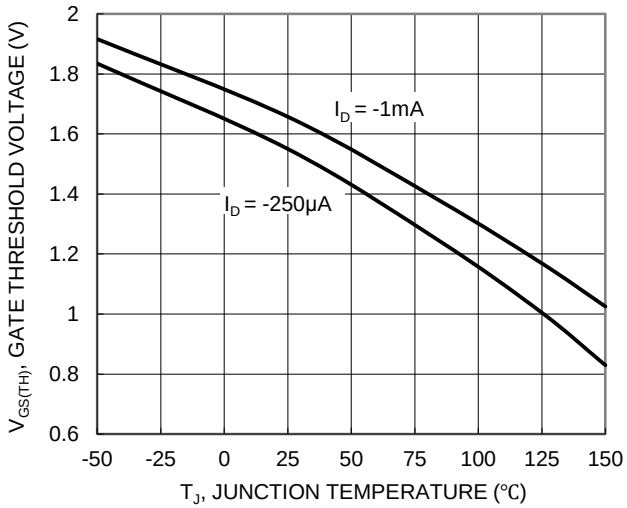


Figure 8. Gate Threshold Variation vs. Junction Temperature

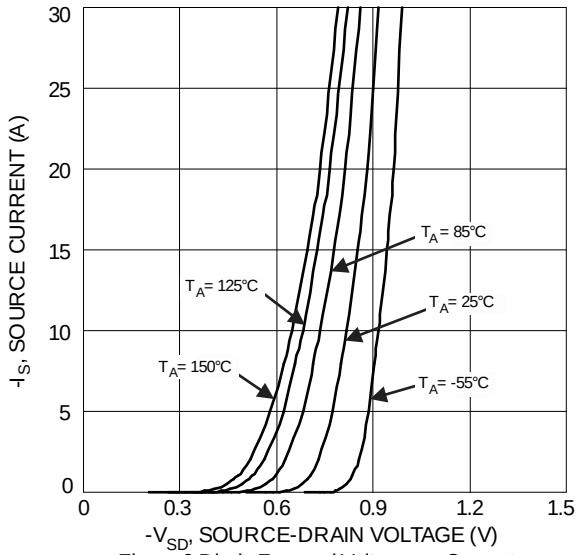


Figure 9 Diode Forward Voltage vs. Current

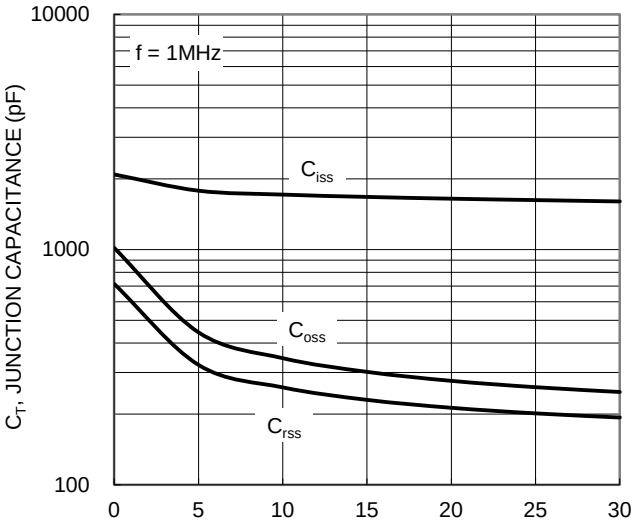


Figure 10. Typical Junction Capacitance

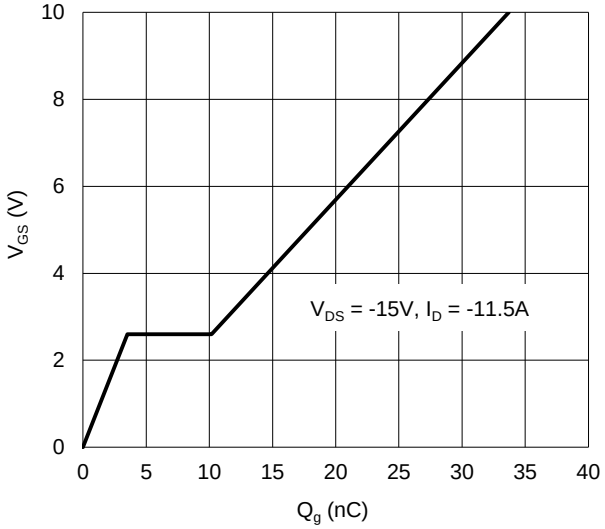


Figure 11. Gate Charge

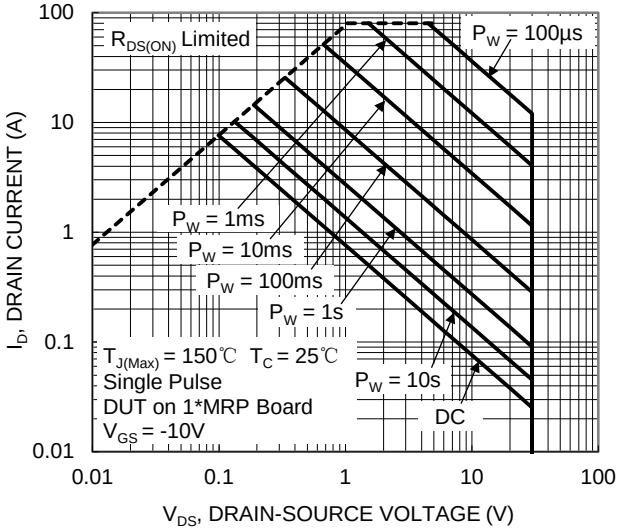


Figure 12. SOA, Safe Operation Area

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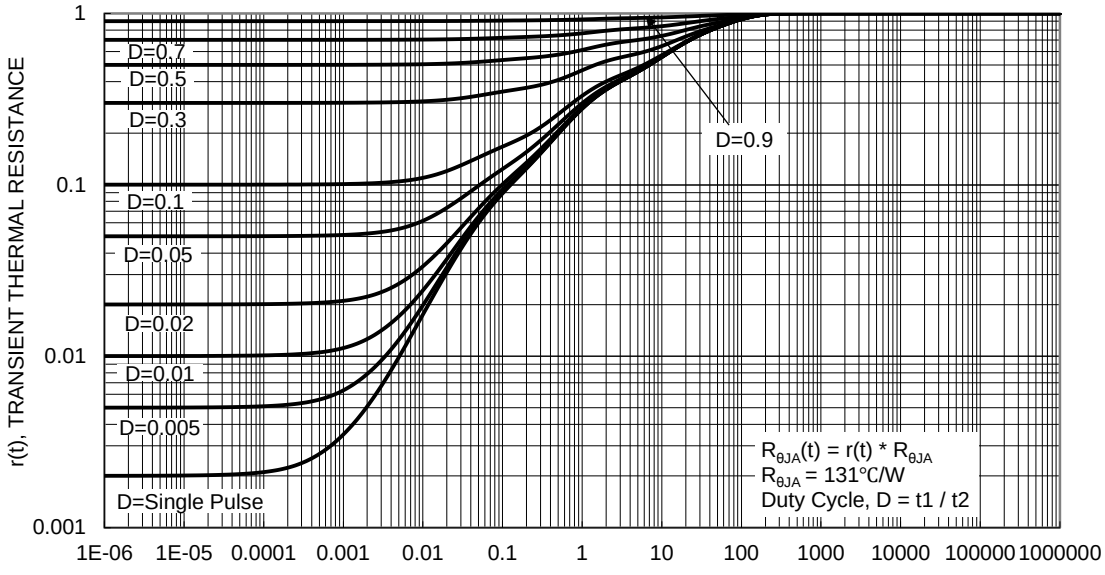


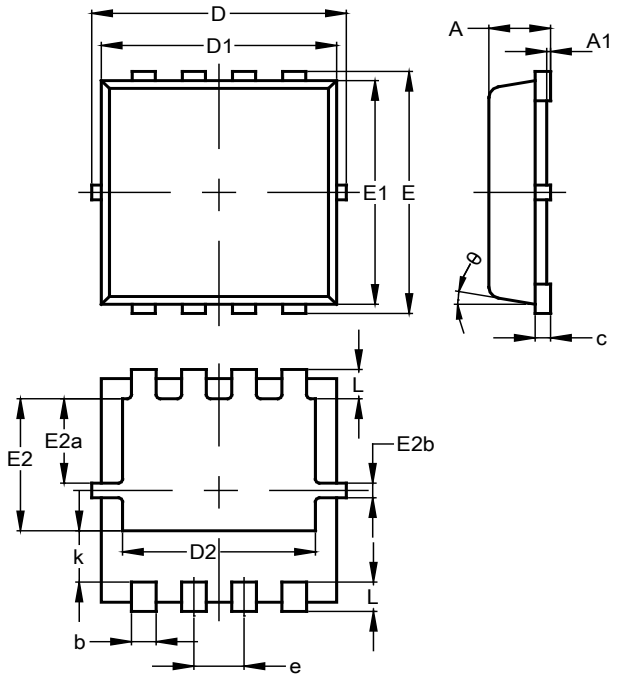
Figure 13. Transient Thermal Resistance

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Package Outline Dimensions

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

PowerDI3333-8 (Type UX)

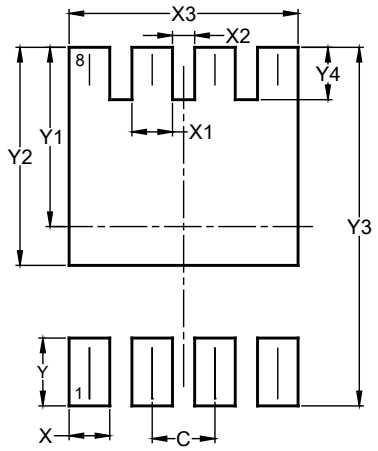


PowerDI3333-8 (Type UX)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E2a	0.95	1.35	1.15
E2b	0.10	0.30	0.20
e	0.65 BSC		
k	0.50	0.90	0.70
L	0.30	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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