40V +175°C DUAL N-CHANNEL ENHANCEMENT MODE MOSFET
POWERDI®3333-8

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_C = +25°C
40V	14mΩ @ V_{GS} = 10V	27A
	22.5mΩ @ V_{GS} = 4.5V	22A

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$ – Ensures On-State Losses are Minimized
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Wettable Flank for Improved Optical Inspection
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMTH4012LDVWQ 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/

Description and Applications

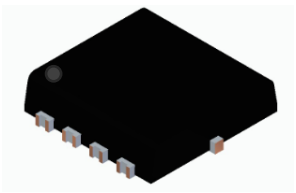
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Wireless charging
- DC-DC converters
- Power management

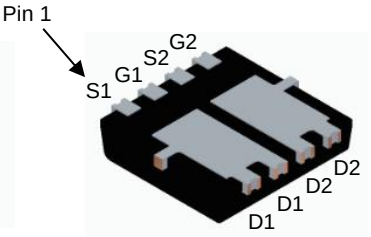
Mechanical Data

- 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 Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.023 grams (Approximate)

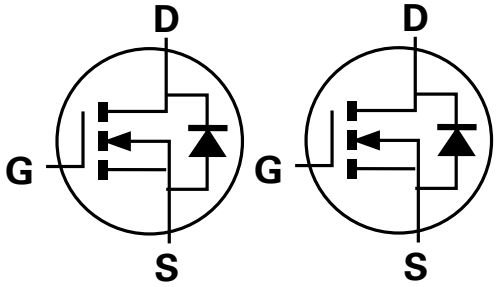
POWERDI®3333-8/SWP (Type UXD)



Top View



Bottom View



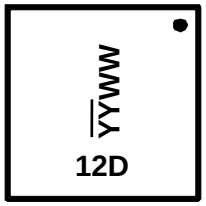
Internal Schematic

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMTH4012LDVWQ-7	POWERDI®3333-8/SWP (Type UXD)	2,000	Tape & Reel
DMTH4012LDVWQ-13	POWERDI®3333-8/SWP (Type UXD)	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



12D = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 25 = 2025)
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	I_D	27	A
		T_C = +100°C		19	
Continuous Drain Current, V_{GS} = 10V (Note 6)	Steady State	T_A = +25°C	I_D	10	A
		T_A = +100°C		7	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	108	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	27	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	108	A
Avalanche Current, L = 0.1mH			I_{AS}	19	A
Avalanche Energy, L = 0.1mH			E_{AS}	18.05	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	1.35	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	111	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.46	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	61	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	8.5	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°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} = 0, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 32V, V_{GS} = 0
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0
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	$R_{DS(ON)}$	—	—	14	mΩ	V_{GS} = 10V, I_D = 20A
		—	—	22.5		V_{GS} = 4.5V, I_D = 15A
Diode Forward Voltage	V_{SD}	—	—	1.2	V	V_{GS} = 0, I_S = 20A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	553	—	pF	V_{DS} = 20V, V_{GS} = 0, f = 1MHz
Output Capacitance	C_{oss}	—	335	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	14	—	pF	
Gate Resistance	R_g	—	0.7	—	Ω	V_{DS} = 0, V_{GS} = 0, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	1.8	—	nC	V_{DS} = 20V, I_D = 20A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	3.8	—	nC	
Gate-Source Charge	Q_{gs}	—	0.7	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.4	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	2.3	—	ns	V_{GS} = 10V, V_{DD} = 20V, R_g = 1.6Ω, I_D = 20A
Turn-On Rise Time	t_R	—	15.2	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	8.7	—	ns	
Turn-Off Fall Time	t_F	—	4.9	—	ns	
Body Diode Reverse-Recovery Time	t_{RR}	—	13.5	—	ns	I_F = 15A, di/dt = 400A/µs
Body Diode Reverse-Recovery Charge	Q_{RR}	—	12.3	—	nC	

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

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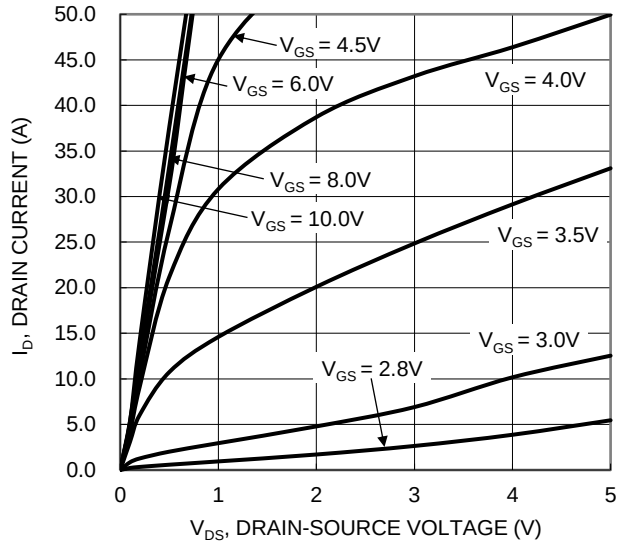


Figure 1. Typical Output Characteristic

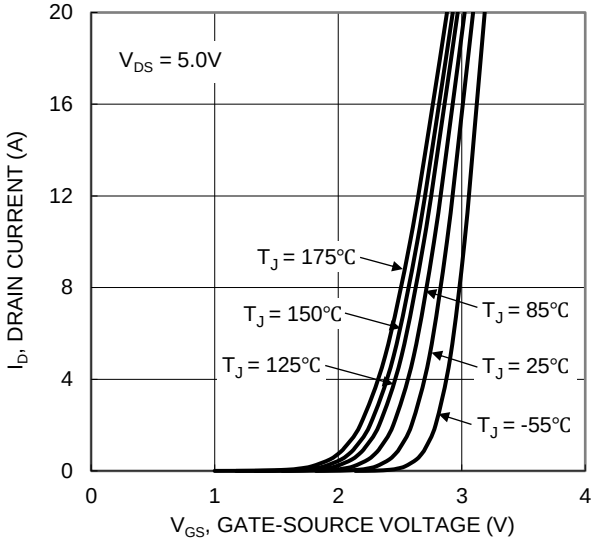


Figure 2. Typical Transfer Characteristic

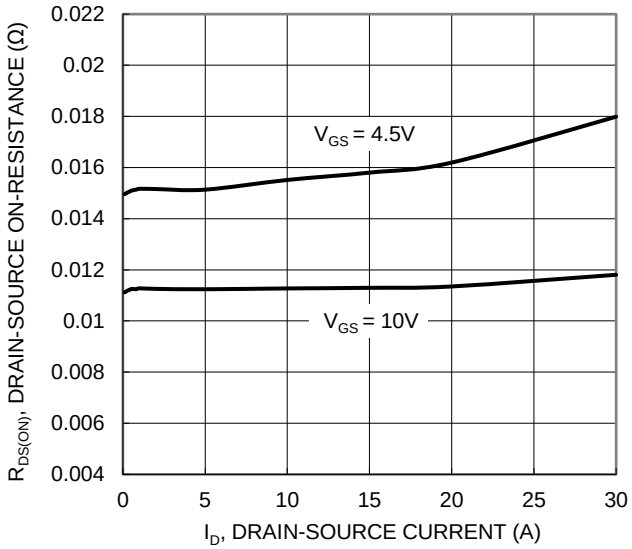


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

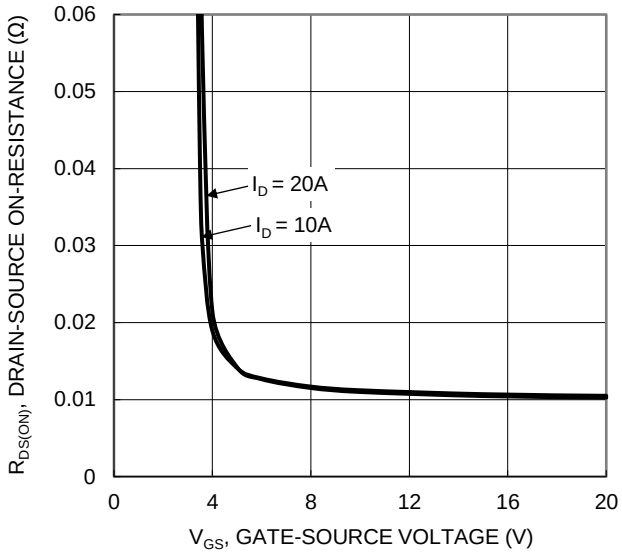


Figure 4. Typical Transfer Characteristic

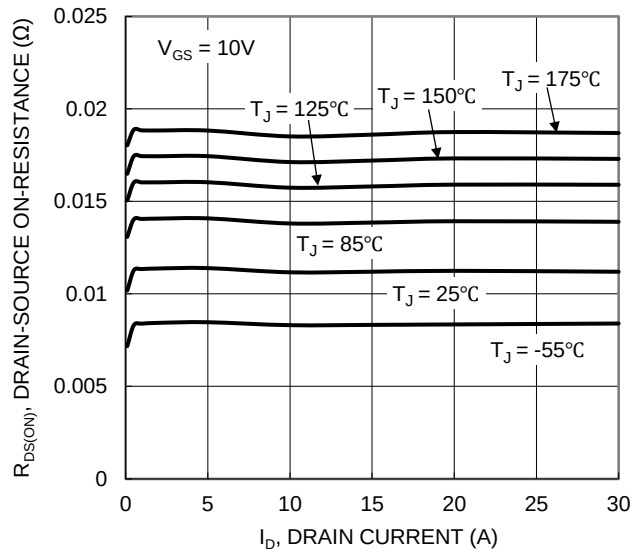


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

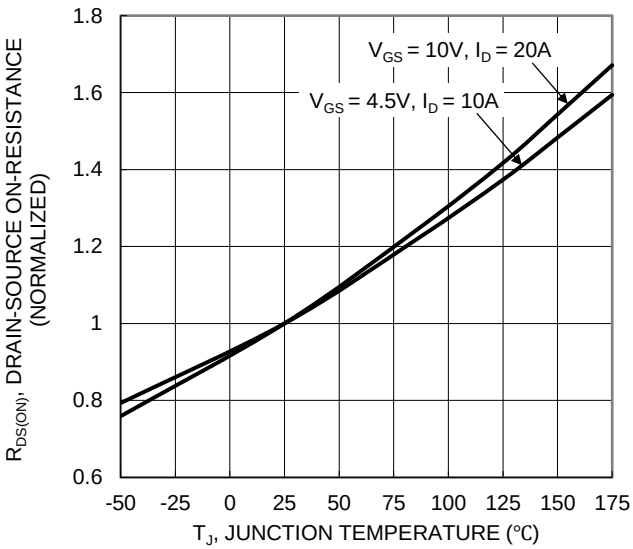


Figure 6. On-Resistance Variation with Junction Temperature

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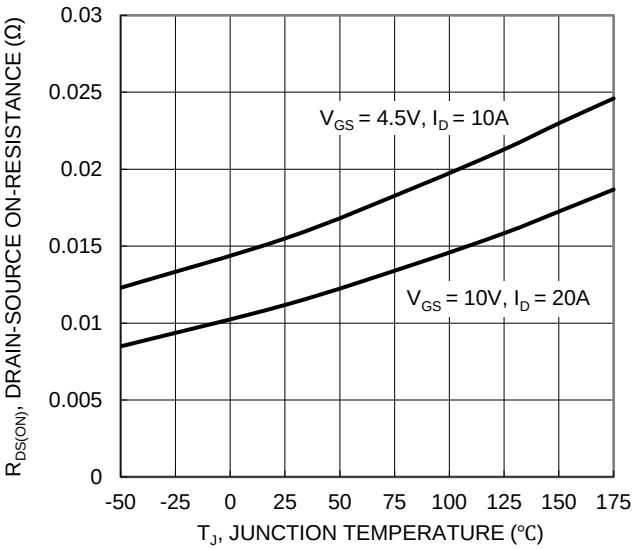


Figure 7. On-Resistance Variation with Junction Temperature

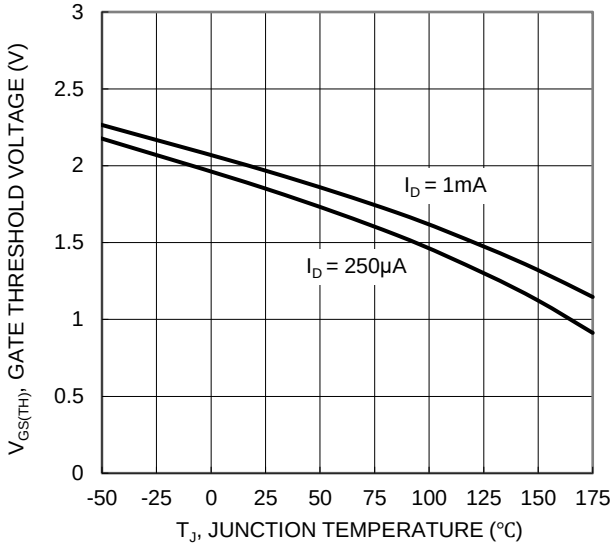


Figure 8. Gate Threshold Variation vs. Junction Temperature

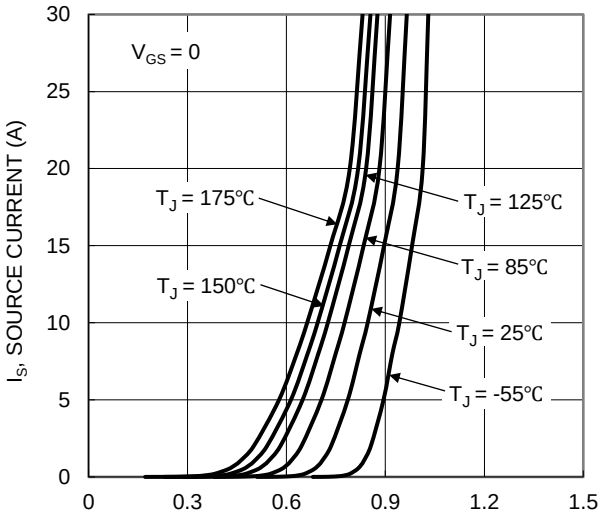


Figure 9. Diode Forward Voltage vs. Current

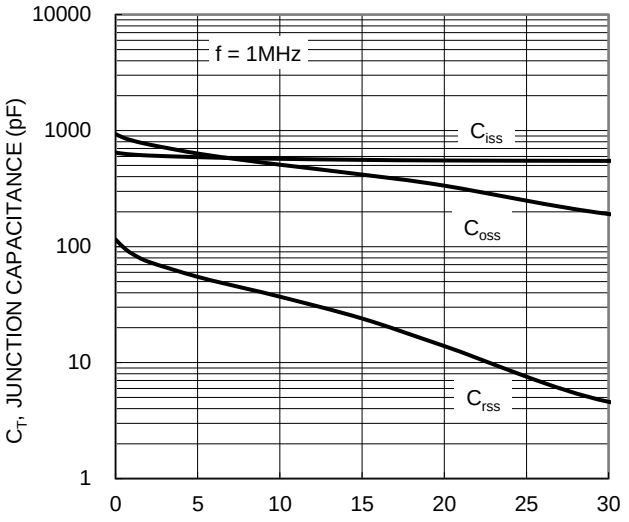


Figure 10. Typical Junction Capacitance

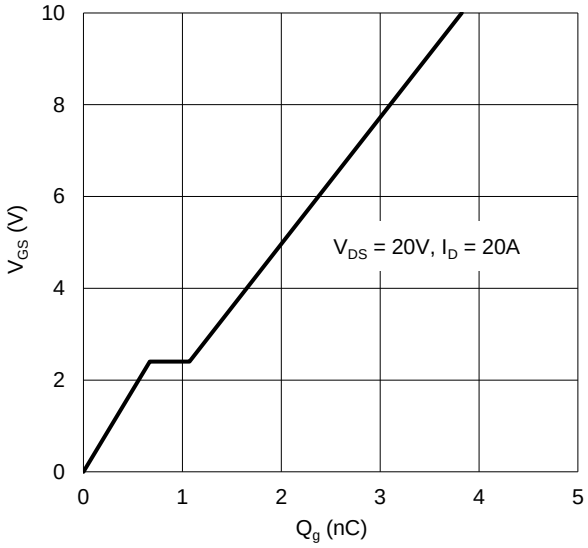


Figure 11. Gate Charge

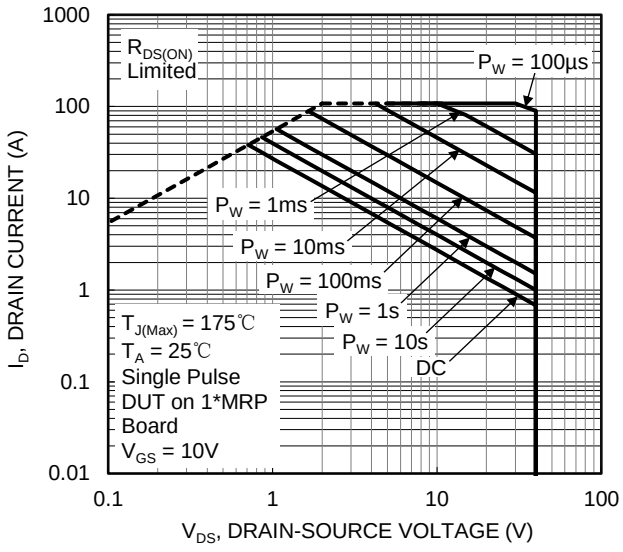


Figure 12. SOA, Safe Operation Area

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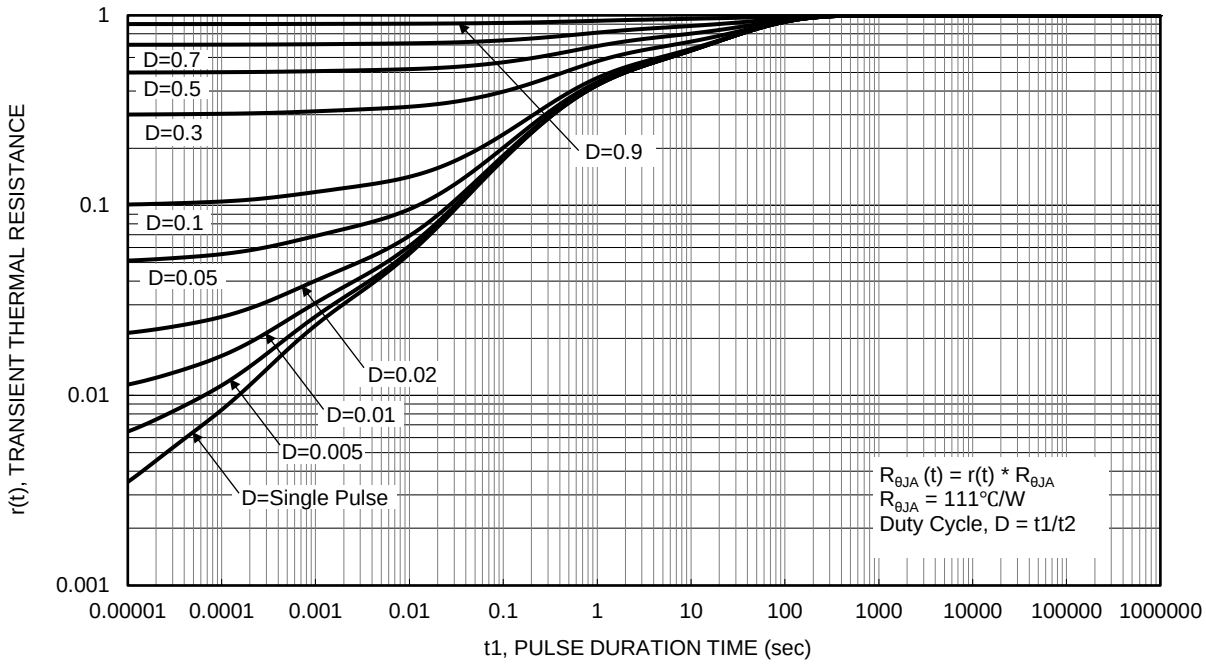


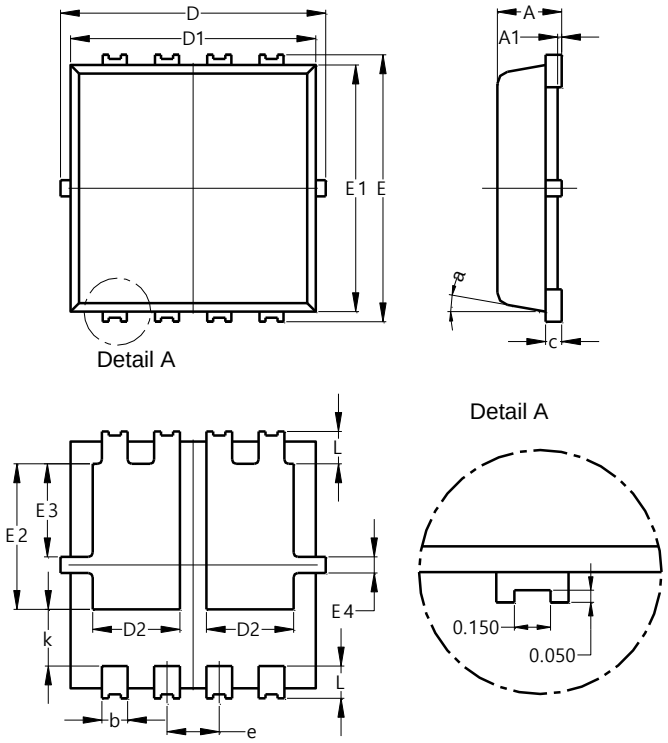
Figure 13. Transient Thermal Resistance

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Package Outline Dimensions

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

POWERDI®3333-8/SWP (Type UXD)

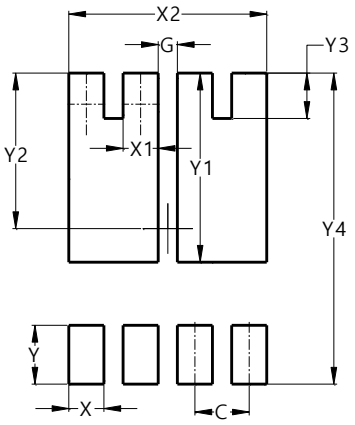


POWERDI®3333-8/SWP (Type UXD)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	1.00	1.20	1.10
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	–	–	0.65
L	0.30	0.50	0.40
k	0.50	0.90	0.70
a	0°	12°	10°
All Dimensions in mm			

Suggested Pad Layout

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

POWERDI®3333-8/SWP (Type UXD)



Dimensions	Value (in mm)
C	0.650
G	0.230
X	0.420
X1	0.420
X2	2.370
Y	0.700
Y1	2.250
Y2	1.850
Y3	0.540
Y4	3.700

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