

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

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

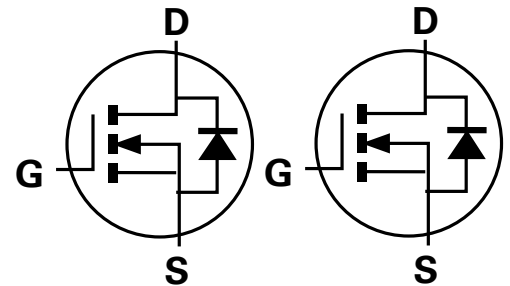
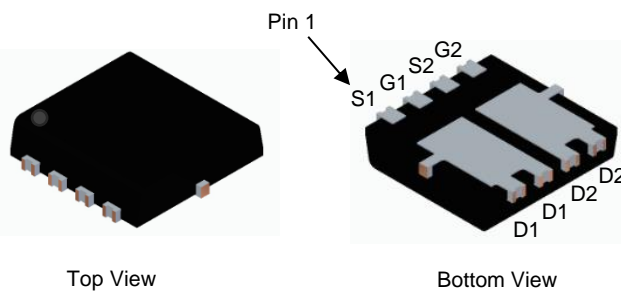
Features and Benefits

- 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/>

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 @3
- Weight: 0.023 grams (Approximate)

POWERDI®3333-8/SWP (Type UXD)



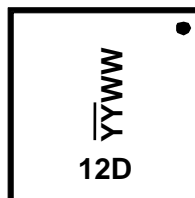
Internal Schematic

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)

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	I _D	T _A = +25°C	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 _{θJA}	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 _{θJA}	61	°C/W
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	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:
- Device mounted on FR-4 PCB, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

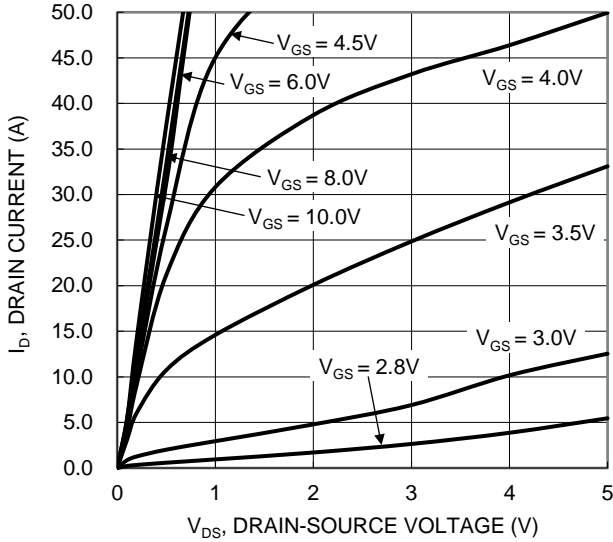


Figure 1. Typical Output Characteristic

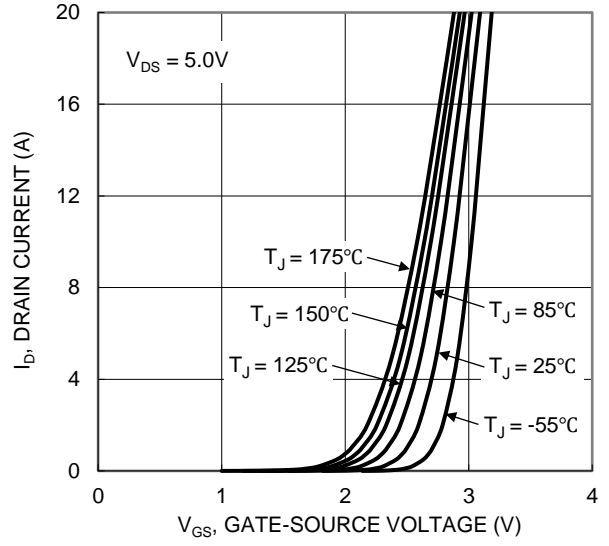


Figure 2. Typical Transfer Characteristic

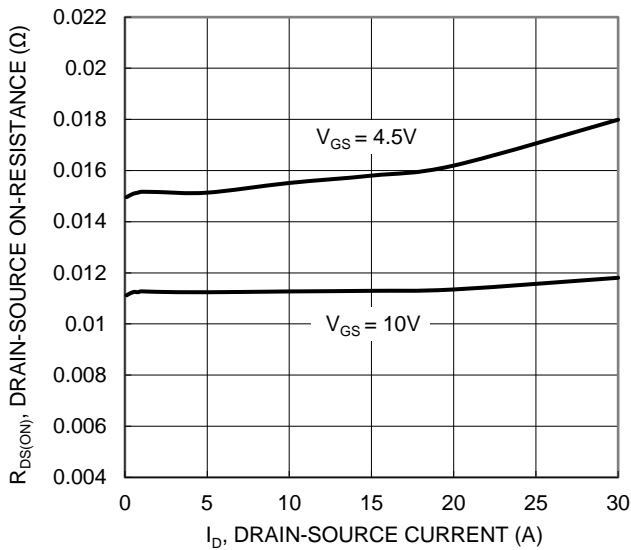


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

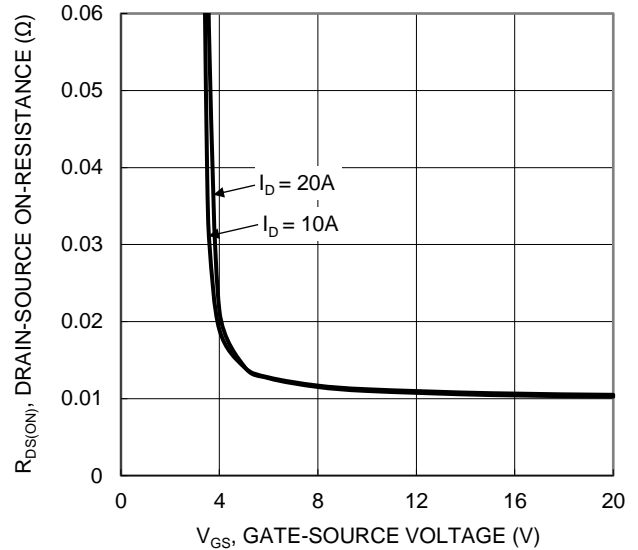


Figure 4. Typical Transfer Characteristic

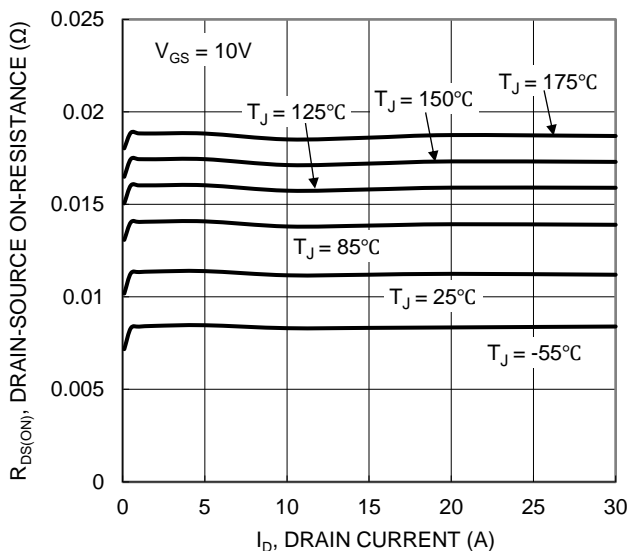


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

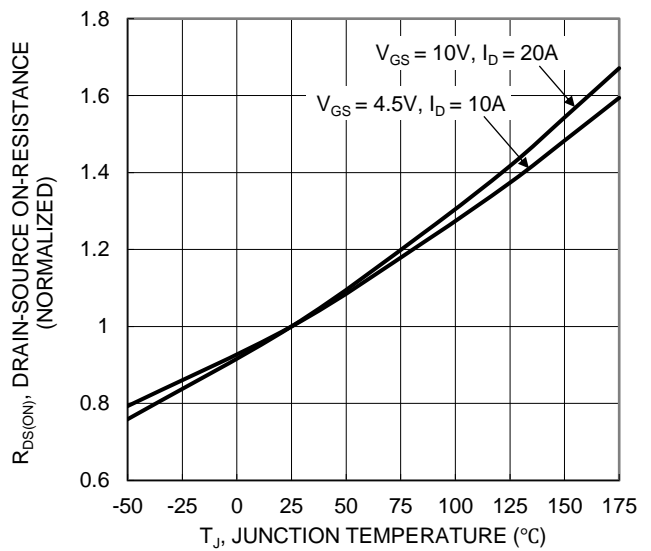


Figure 6. On-Resistance Variation with Junction Temperature

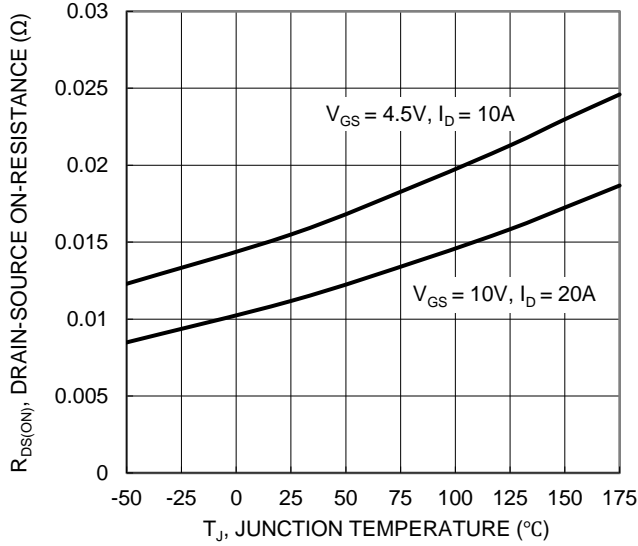


Figure 7. On-Resistance Variation with Junction Temperature

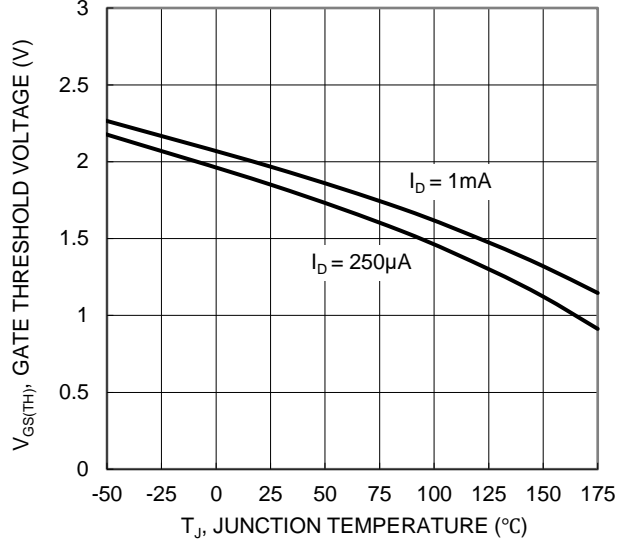


Figure 8. Gate Threshold Variation vs. Junction Temperature

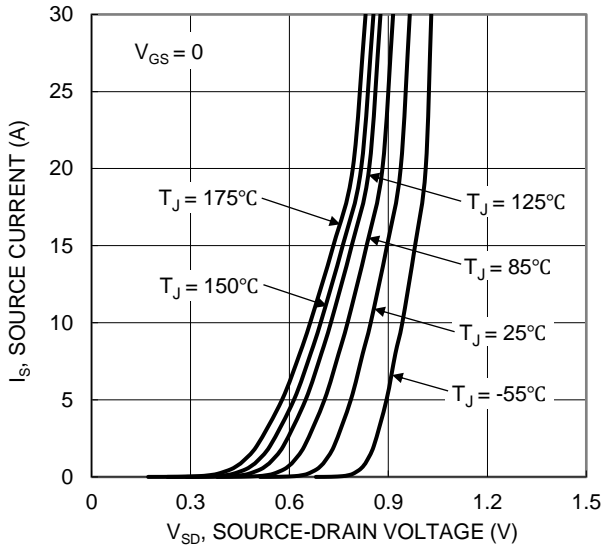


Figure 9. Diode Forward Voltage vs. Current

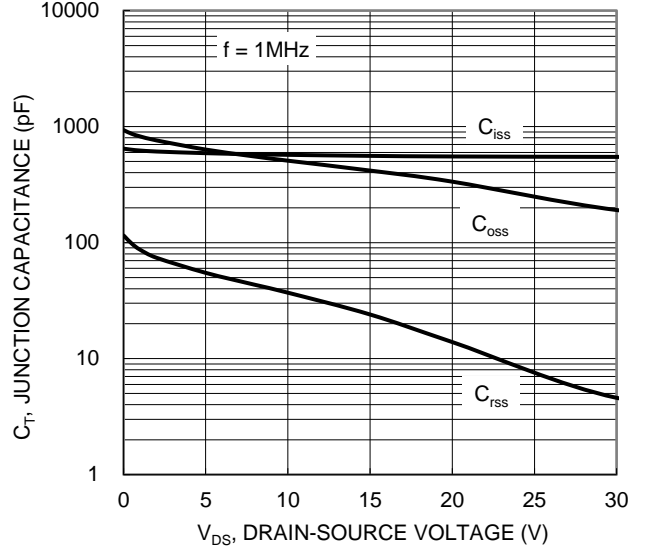


Figure 10. Typical Junction Capacitance

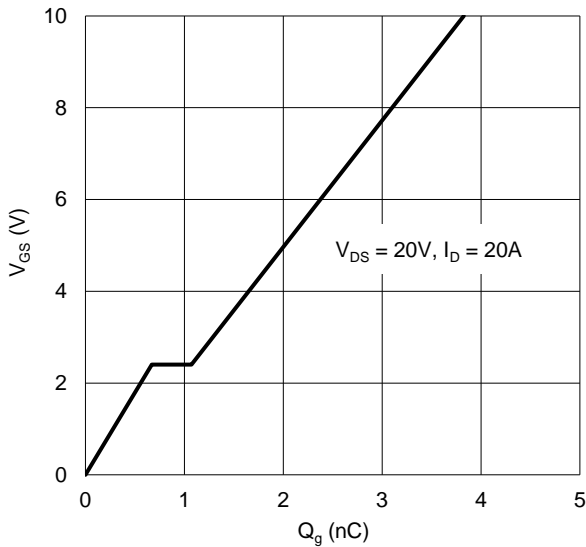


Figure 11. Gate Charge

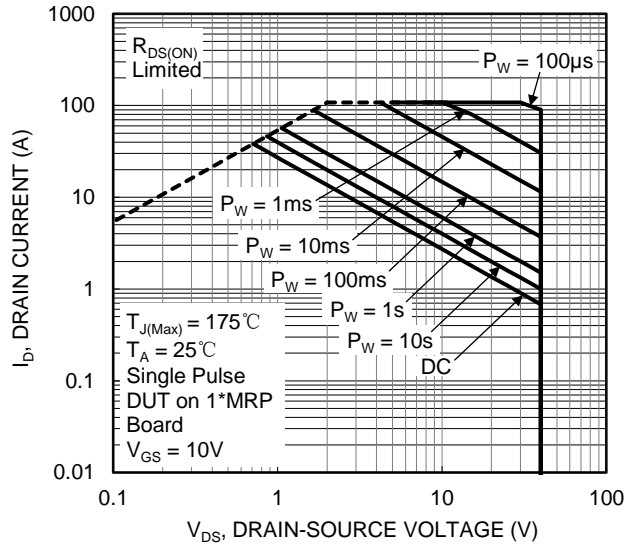


Figure 12. SOA, Safe Operation Area

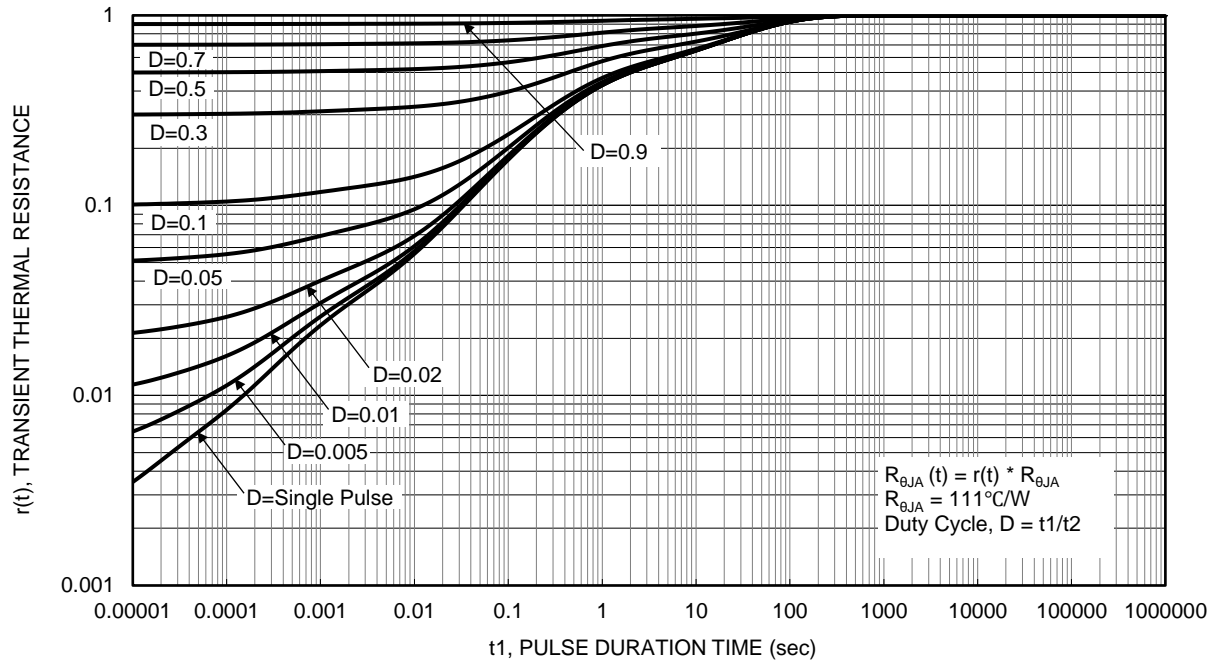
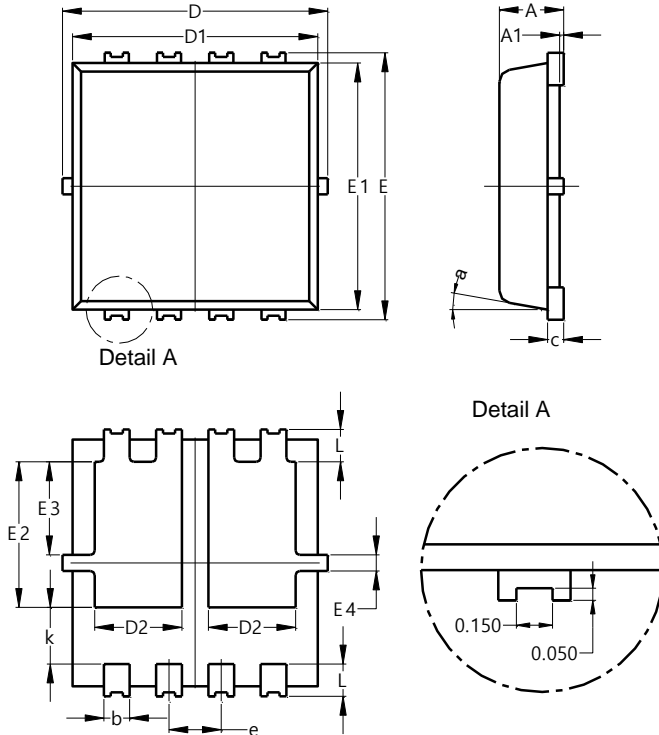


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

POWERDI®3333-8/SWP (Type UXD)

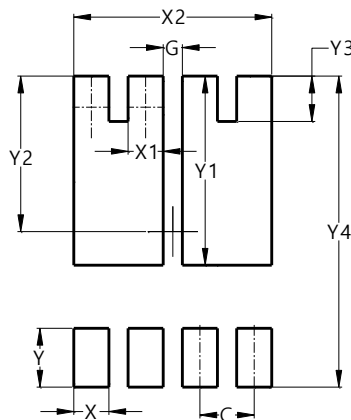


POWERDI®3333-8/SWP (Type UXD)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	1.00	1.20	1.10
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	--	--	0.65
L	0.30	0.50	0.40
k	0.50	0.90	0.70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