

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_C = +25^\circ\text{C}$
-20V	9.5m Ω @ $V_{GS} = -4.5\text{V}$	-42A
	12.5m Ω @ $V_{GS} = -2.5\text{V}$	

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.

Applications

- Load Switch
- Power Management Functions

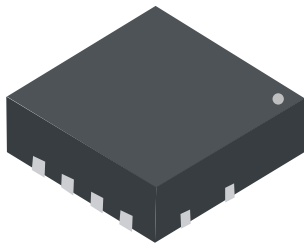
Features

- 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
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

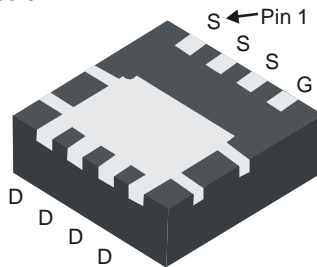
Mechanical Data

- Case: POWERDI®3333-8
- 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: 0.008 grams (Approximate)

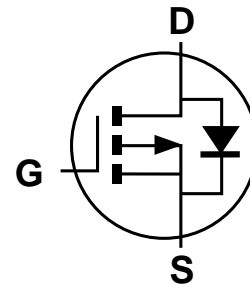
POWERDI®3333-8



Top View



Bottom View



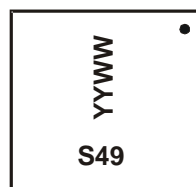
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2010UFG-7	POWERDI®3333-8	2000/Tape & Reel
DMP2010UFG-13	POWERDI®3333-8	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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 <http://www.diodes.com/products/packages.html>.

Marking Information



S49 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 15 = 2015)
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V _{DSS}	-20	V	
Gate-Source Voltage	V _{GSS}	±10	V	
Continuous Drain Current, V _{GS} = -4.5V (Note 6)	I _D	T _A = +25°C T _C = +25°C	-12.7 -42	A
Maximum Continuous Body Diode Forward Current (Note 6)		I _S	-3	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)	I _{DM}	-80	A	
Avalanche Current, L=0.1mH (Note 7)	I _{AS}	-35	A	
Avalanche Energy, L=0.1mH (Note 7)	E _{AS}	64	mJ	

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

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 5)	P _D	0.9	W	
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	Steady State	136	°C/W
Total Power Dissipation (Note 6)		P _D	2.3	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	Steady State	54	°C/W
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	4	°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 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -1mA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	µA	V _{DS} = -16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	-0.4	—	-1.2	V	V _{DS} = V _{GS} , I _D = -250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	9.5	mΩ	V _{GS} = -4.5V, I _D = -3.6A
		—	—	12.5		V _{GS} = -2.5V, I _D = -3.6A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.2	V	V _{GS} = 0V, I _S = -10A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{ISS}	—	3350	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{OSS}	—	527	—		
Reverse Transfer Capacitance	C _{RSS}	—	460	—		
Gate Resistance	R _G	—	10.7	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	50	—	nC	V _{DS} = -10V, I _D = -3.6A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	103	—		
Gate-Source Charge	Q _{GS}	—	6.0	—		
Gate-Drain Charge	Q _{GD}	—	14.4	—		
Turn-On Delay Time	t _{D(ON)}	—	9.7	—	ns	V _{DD} = -10V, V _{GS} = -4.5V, R _{GEN} = 4.7Ω, I _D = -3.6A
Turn-On Rise Time	t _R	—	30	—		
Turn-Off Delay Time	t _{D(OFF)}	—	235	—		
Turn-Off Fall Time	t _F	—	110	—		
Reverse Recovery Time	t _{RR}	—	64	—	ns	I _F = -3.6A, di/dt = 100A/µs
Reverse Recovery Charge	Q _{RR}	—	60	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

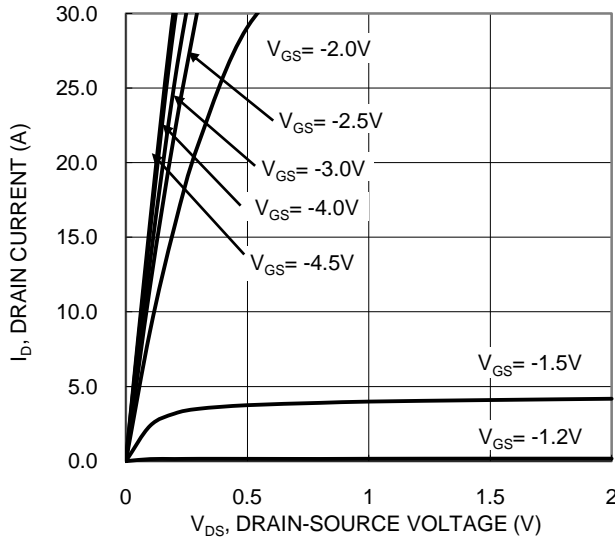


Figure 1. Typical Output Characteristic

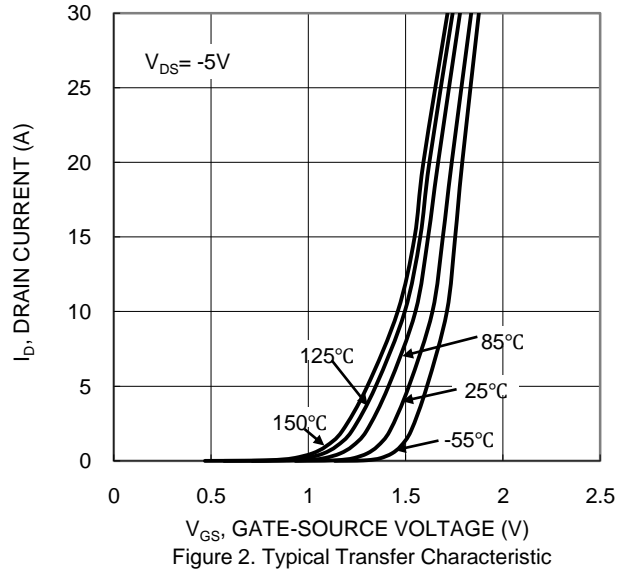


Figure 2. Typical Transfer Characteristic

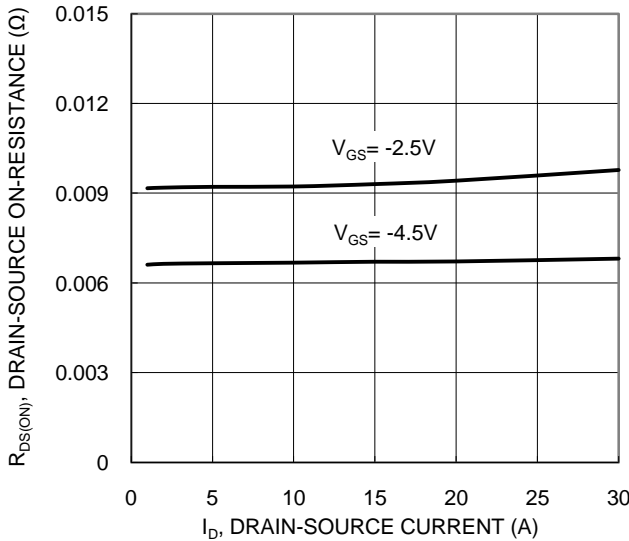


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

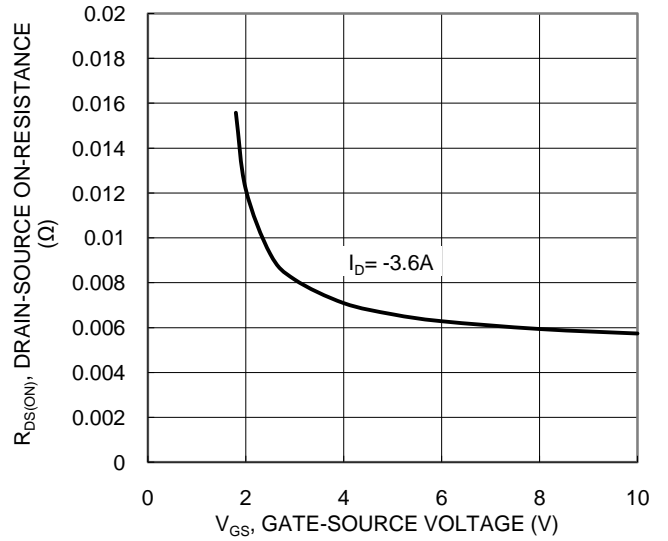


Figure 4. Typical Transfer Characteristic

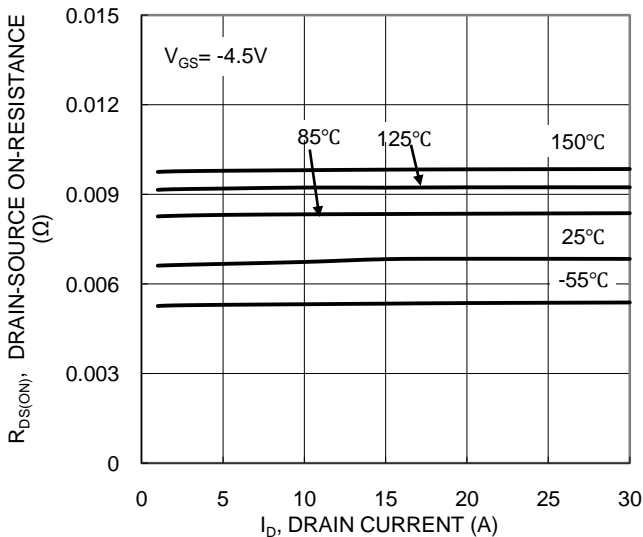


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

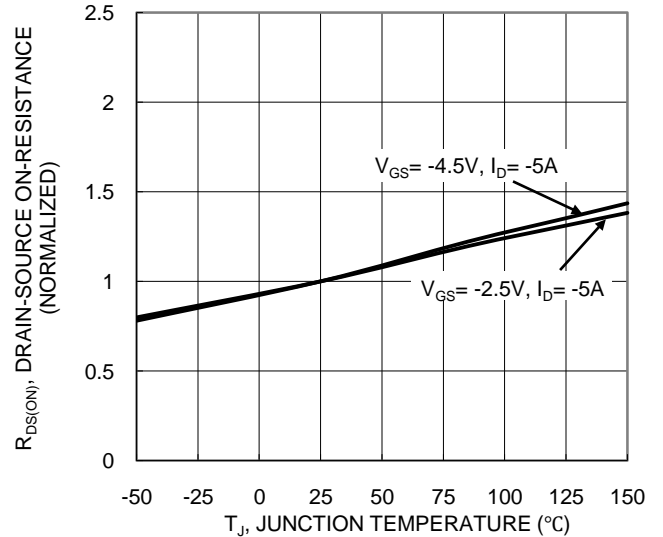


Figure 6. On-Resistance Variation with Junction Temperature

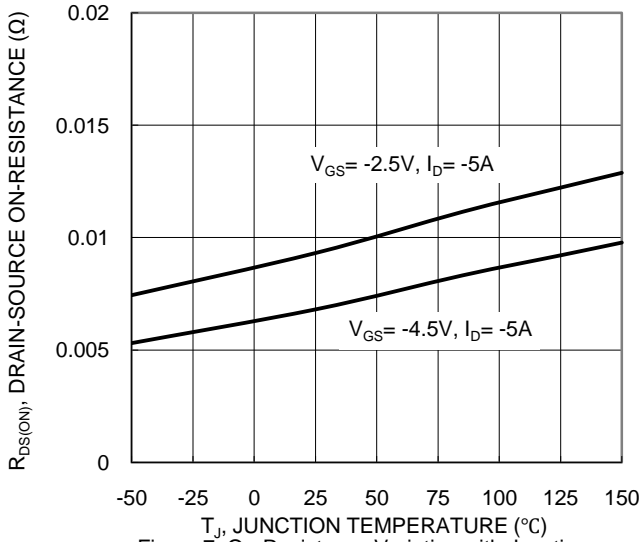


Figure 7. On-Resistance Variation with Junction Temperature

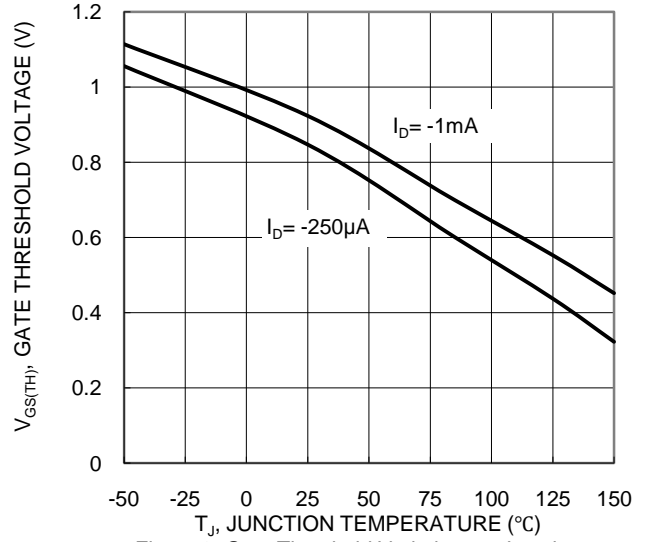


Figure 8. Gate Threshold Variation vs. Junction Temperature

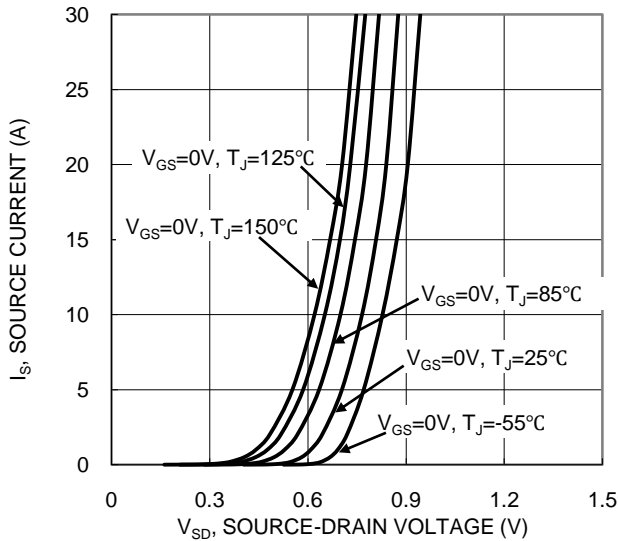


Figure 9. Diode Forward Voltage vs. Current

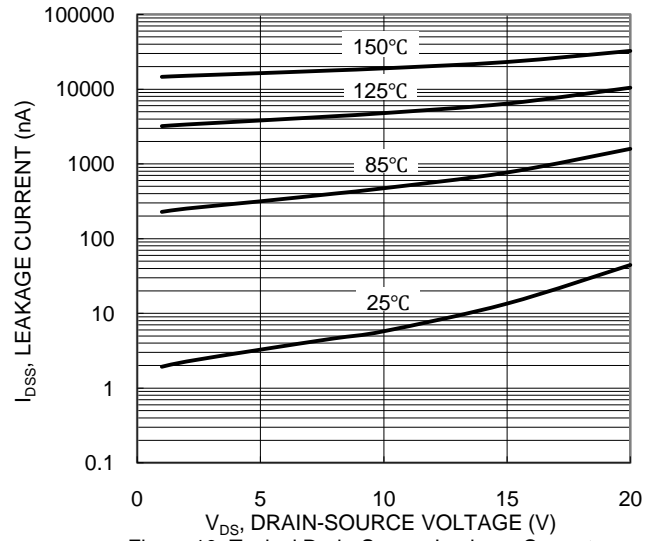


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

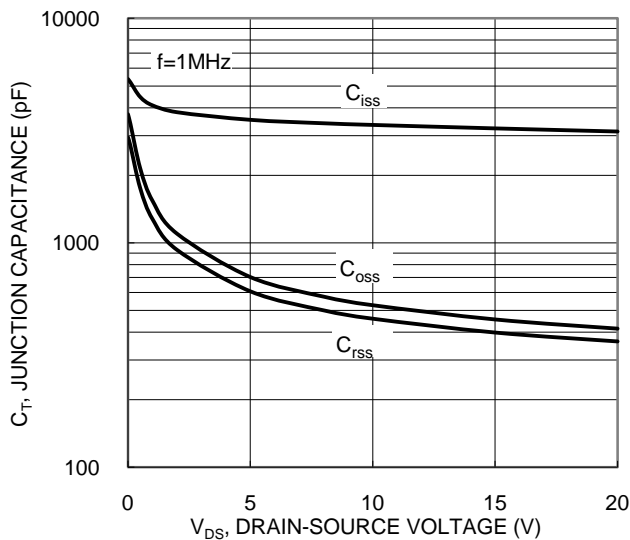


Figure 11. Typical Junction Capacitance

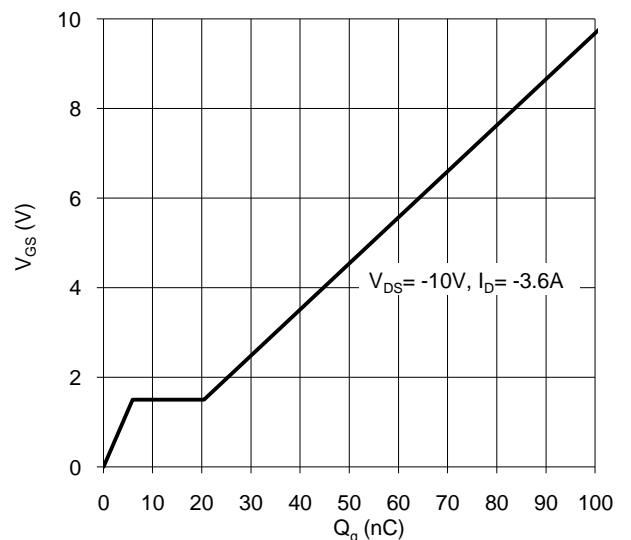


Figure 12. Gate Charge

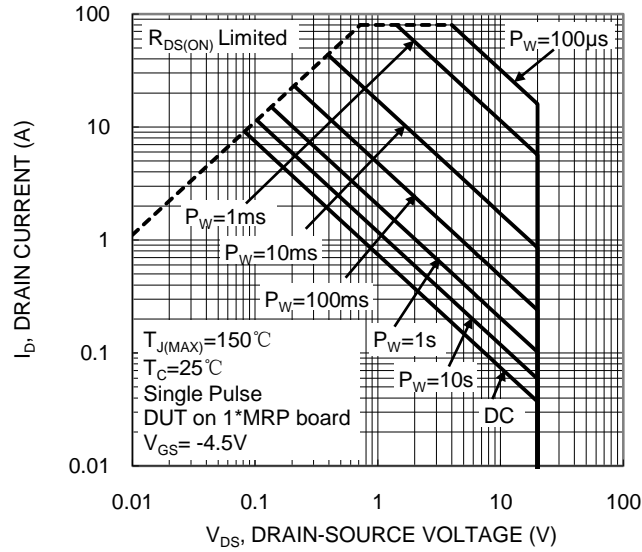


Figure 13. SOA, Safe Operation Area

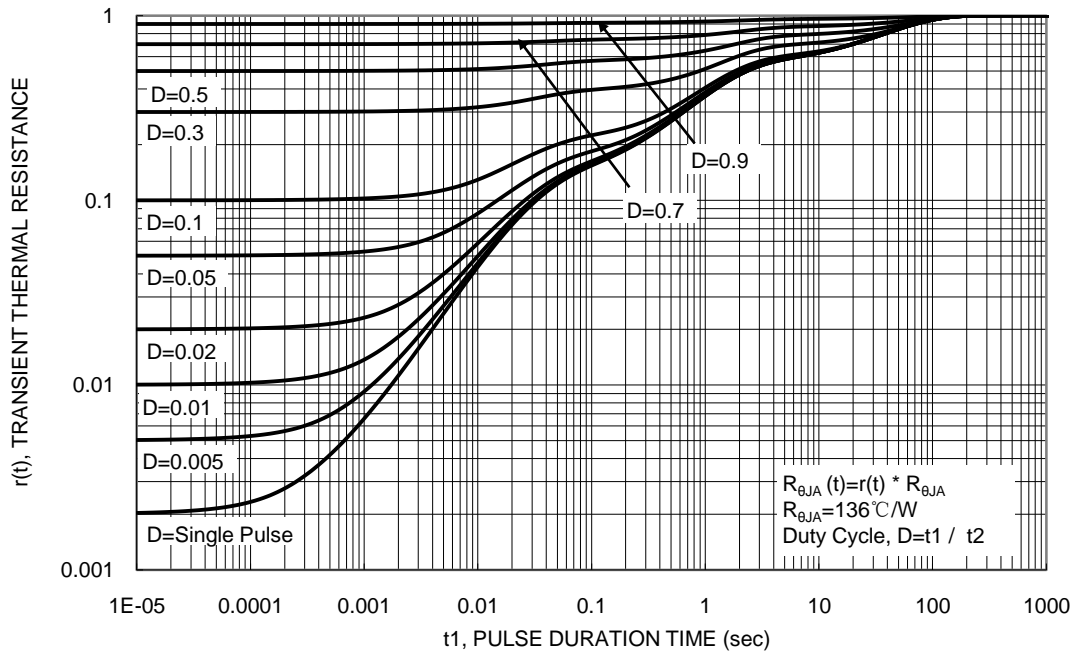
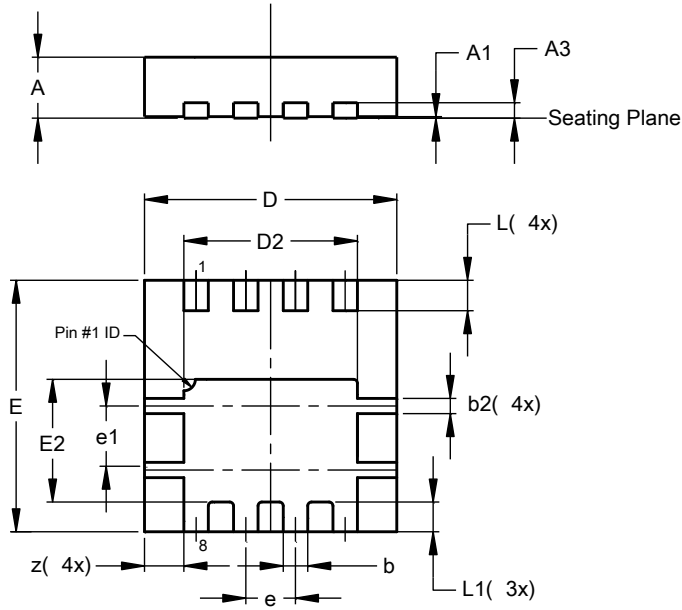


Figure 14. Transient Thermal Resistance

Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

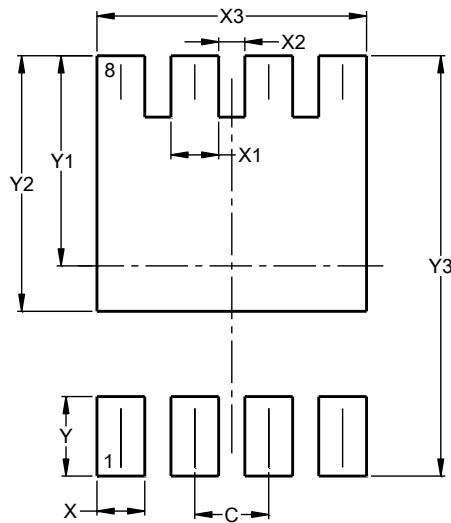


POWERDI [®] 3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	-	-	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
e	-	-	0.65
e1	0.79	0.89	0.84
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

NEW PRODUCT

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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

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