

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_C = +25^\circ\text{C}$
60V	10m Ω @ $V_{GS} = 10\text{V}$	34A
	11.7m Ω @ $V_{GS} = 4.5\text{V}$	31.5A

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

- Backlighting
- Power Management Functions
- DC-DC Converters

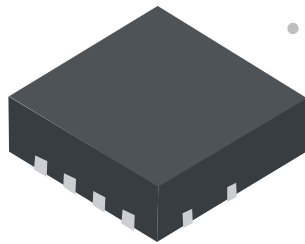
Features and Benefits

- Low $R_{DS(ON)}$ – Ensures On-State Losses Are Minimized
- Excellent $Q_{gd} \times R_{DS(ON)}$ Product (FOM)
- Advanced Technology for DC-DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% UIS (Avalanche) Rated
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

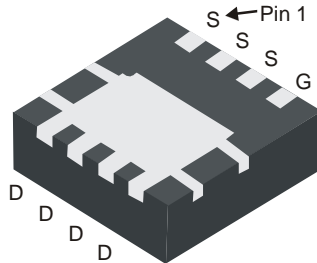
Mechanical Data

- 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)

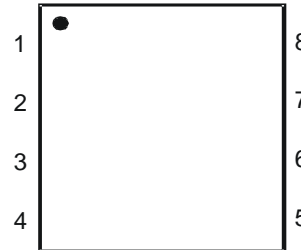
POWERDI3333-8



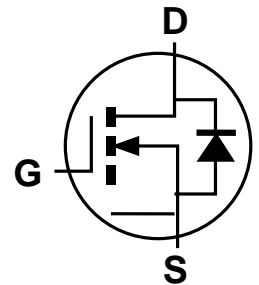
Top View



Bottom View



Top View
Internal Schematic



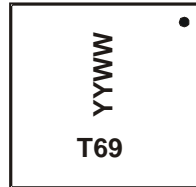
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMT6009LFG-7	POWERDI3333-8	2,000/Tape & Reel
DMT6009LFG-13	POWERDI3333-8	3,000/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



T69 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 15 = 2015)
 WW = Week Code (01 to 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V_{DSS}	60	V	
Gate-Source Voltage	V_{GSS}	± 16	V	
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	I_D	$T_C = +25^\circ\text{C}$	34	A
		$T_C = +70^\circ\text{C}$	27	A
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	I_D	$T_A = +25^\circ\text{C}$	11	A
		$T_A = +70^\circ\text{C}$	9	A
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	2.4	A	
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	90	A	
Avalanche Current, L=0.1mH	I_{AS}	28.6	A	
Avalanche Energy, L=0.1mH	E_{AS}	40.8	mJ	

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5) $T_A = +25^\circ\text{C}$	P_D	2.08	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	60	$^\circ\text{C/W}$
Total Power Dissipation (Note 5) $T_C = +25^\circ\text{C}$	P_D	19.2	W
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	6.5	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Note: 5. $R_{\theta JA}$ is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 48V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±16V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(TH)}	0.7	—	2	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	10	mΩ	V _{GS} = 10V, I _D = 13.5A
		—	—	11.7		V _{GS} = 4.5V, I _D = 11.5A
Diode Forward Voltage	V _{SD}	—	—	1.2	V	V _{GS} = 0V, I _S = 20A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iss}	—	1,925	—	pF	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	438	—		
Reverse Transfer Capacitance	C _{riss}	—	41	—		
Gate Resistance	R _g	—	1.7	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	15.6	—	nC	V _{DS} = 30V, I _D = 13.5A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	33.5	—		
Gate-Source Charge	Q _{gs}	—	4.7	—		
Gate-Drain Charge	Q _{gd}	—	5.3	—		
Turn-On Delay Time	t _{D(ON)}	—	4.5	—	ns	V _{DD} = 30V, V _{GS} = 10V, R _G = 6Ω, I _D = 13.5A
Turn-On Rise Time	t _R	—	8.6	—		
Turn-Off Delay Time	t _{D(OFF)}	—	35.9	—		
Turn-Off Fall Time	t _F	—	15.7	—		
Body Diode Reverse Recovery Time	t _{RR}	—	18.2	—	ns	I _F = 13.5A, di/dt = 400A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	33.1	—	nC	

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

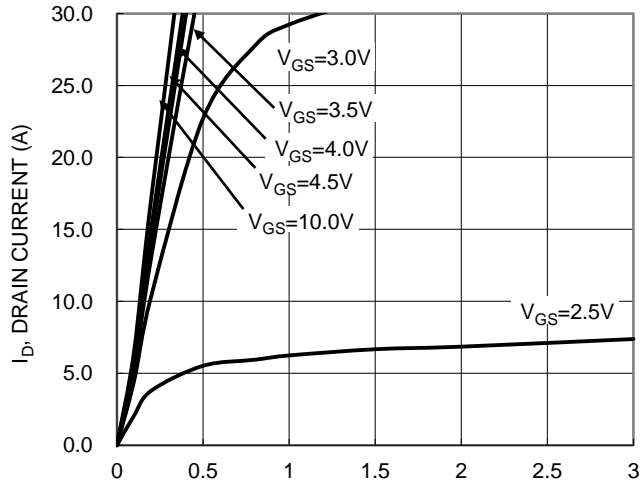


Figure 1. Typical Output Characteristic

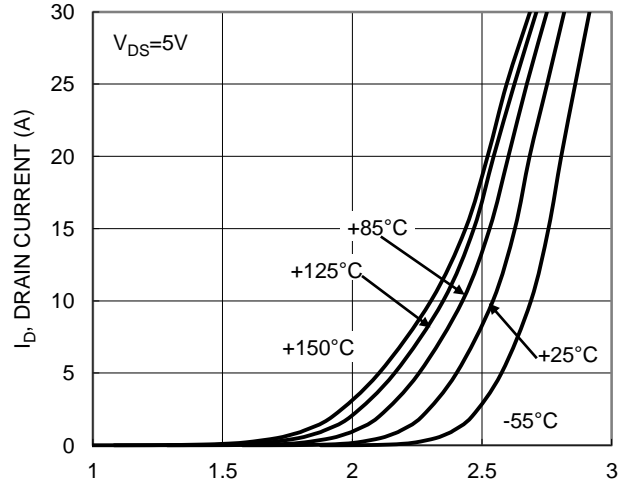


Figure 2. Typical Transfer Characteristic

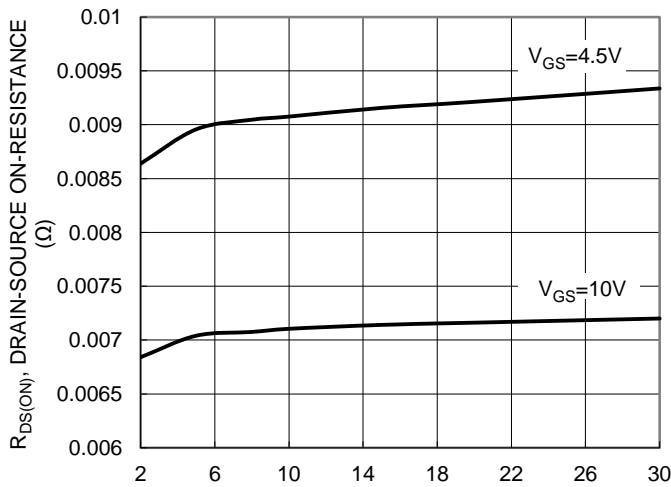


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

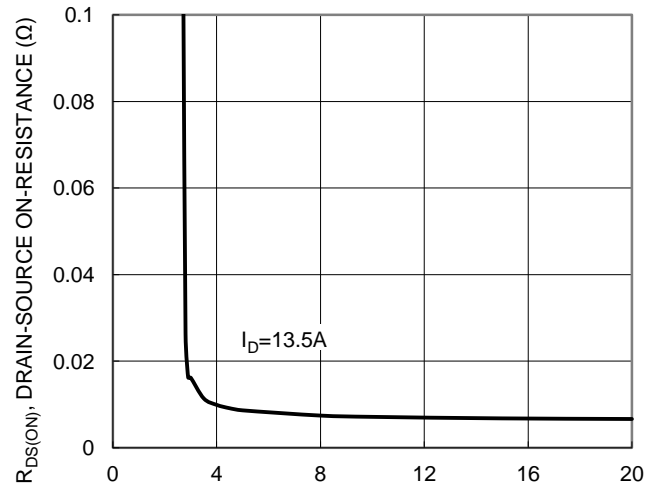


Figure 4. Typical Transfer Characteristic

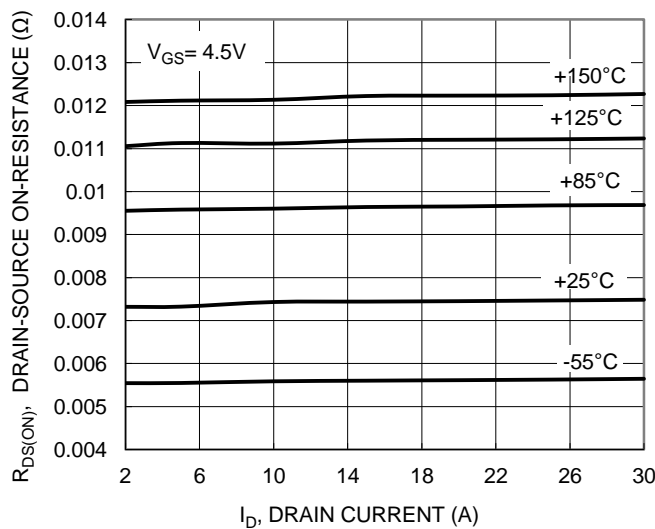


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

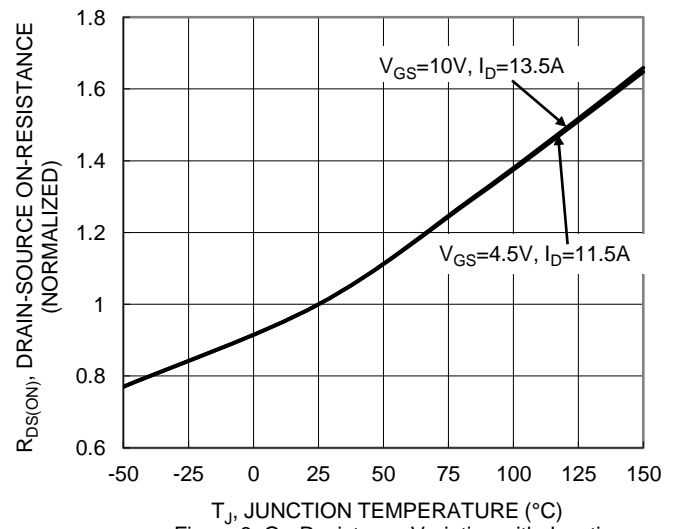


Figure 6. On-Resistance Variation with Junction Temperature

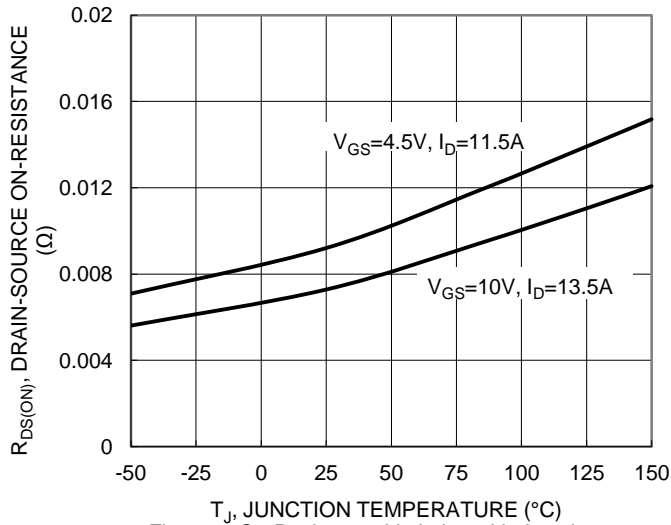


Figure 7. On-Resistance Variation with Junction Temperature

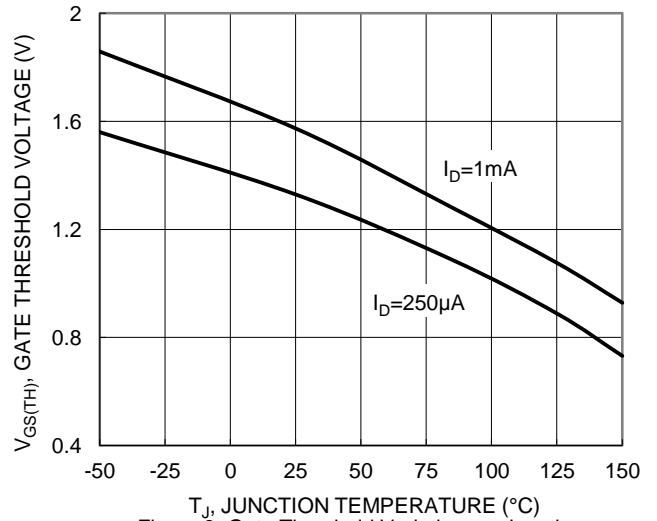


Figure 8. Gate Threshold Variation vs. Junction Temperature

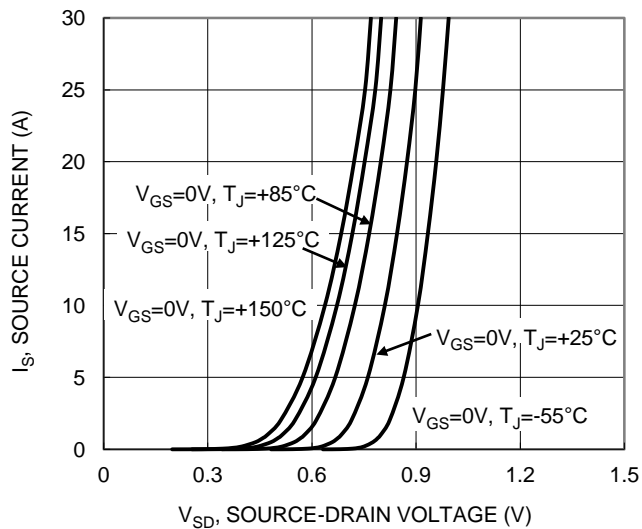


Figure 9. Diode Forward Voltage vs. Current

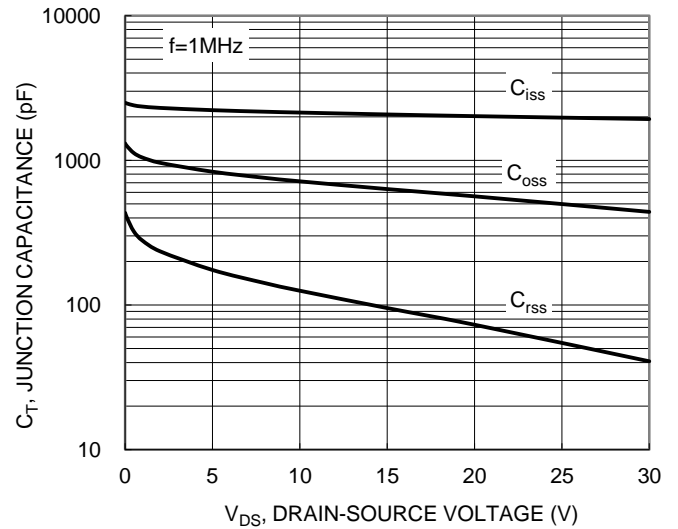


Figure 10. Typical Junction Capacitance

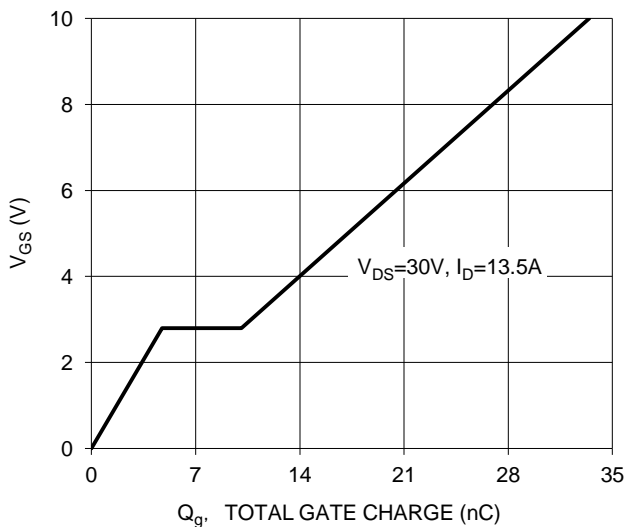


Figure 11. Gate Charge

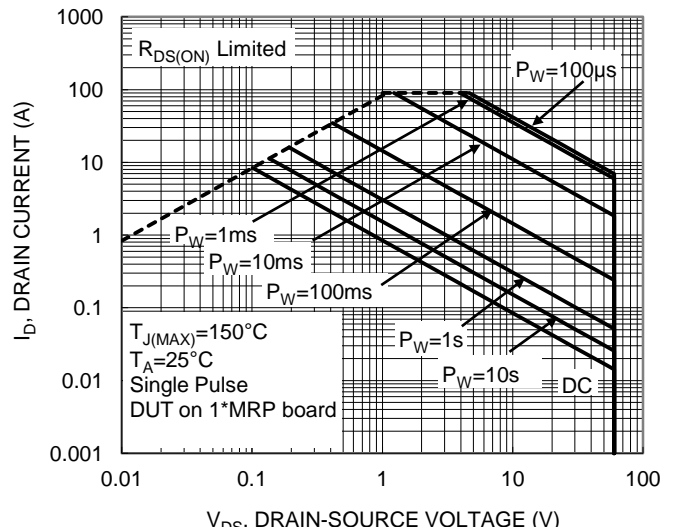


Figure 12. SOA, Safe Operation Area

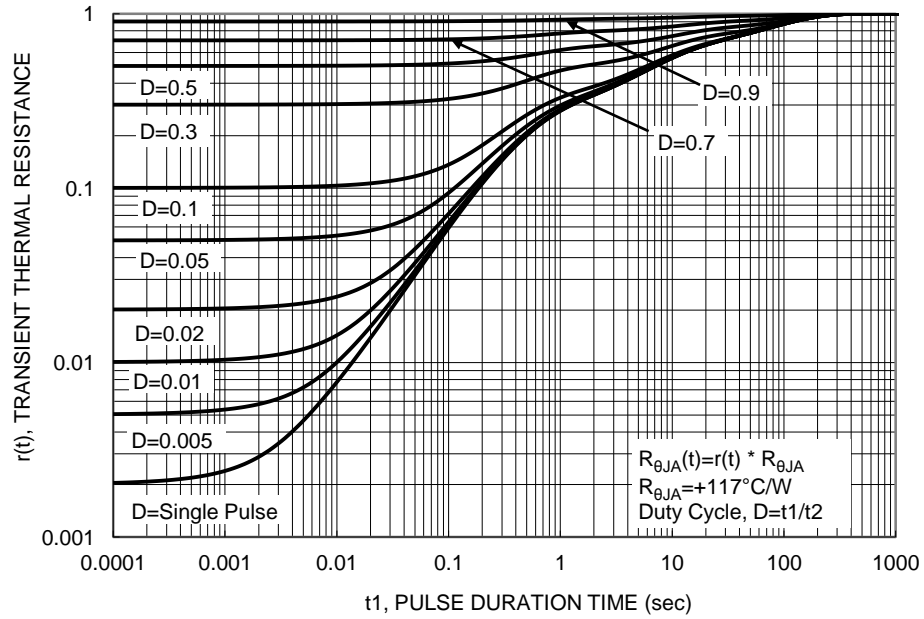
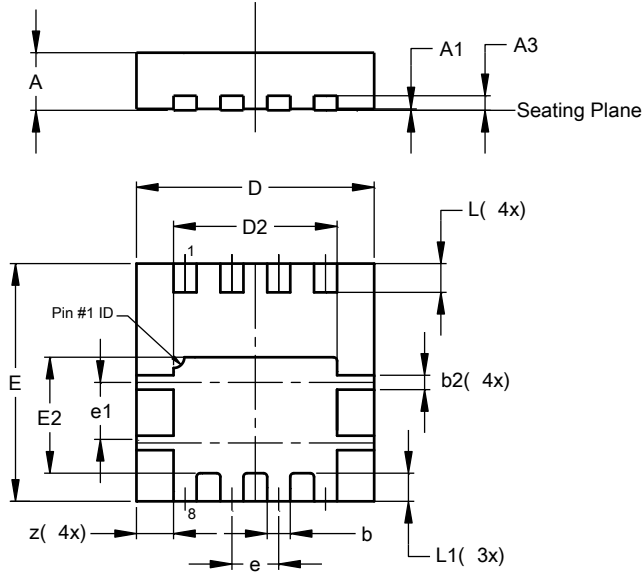


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

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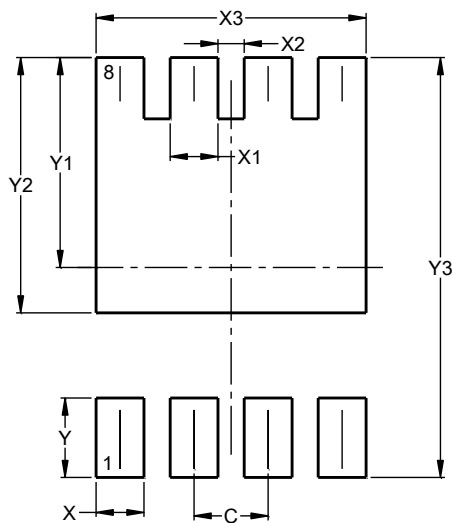


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Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	-	-	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
e	-	-	0.65
e1	0.79	0.89	0.84
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions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

Suggested Pad Layout

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

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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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