

### Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ C$
-60V	50mΩ @ $V_{GS} = -10V$	-4.8A
	70mΩ @ $V_{GS} = -4.5V$	-4.1A

### 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 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)**

### Description and Applications

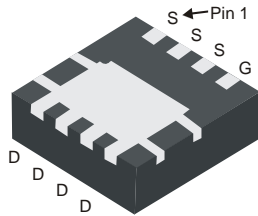
This MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

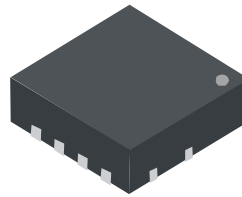
### Mechanical Data

- 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 @3
- Weight: 0.072 grams (Approximate)

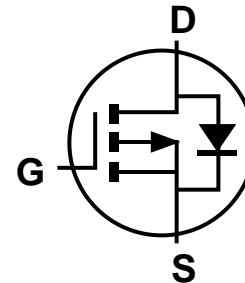
POWERDI®3333-8



Bottom View



Top View



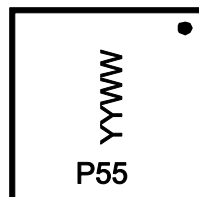
Equivalent Circuit

### Ordering Information (Note 4)

Part Number	Case	Packaging
DMP6050SFG-7	POWERDI®3333-8	2000/Tape & Reel
DMP6050SFG-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](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



P55= Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 14 = 2014)  
 WW = Week Code (01 to 53)

**Maximum Ratings** @T<sub>A</sub> = +25°C, unless otherwise specified.

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-60	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V	I <sub>D</sub>	T <sub>A</sub> = +25°C	-4.8
		T <sub>A</sub> = +70°C	-3.9
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I <sub>D</sub>	T <sub>A</sub> = +25°C	-6.0
		T <sub>A</sub> = +70°C	-4.8
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	-2.8	A
Avalanche Current (Note 7) L = 0.1mH	I <sub>AS</sub>	-24.8	A
Repetitive Avalanche Energy (Note 7) L = 0.1mH	E <sub>AS</sub>	30.8	mJ

**Thermal Characteristics** @T<sub>A</sub> = +25°C, unless otherwise specified.

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.1	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady state	118
		t < 10s	78
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.8	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady state	71
		t < 10s	46
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	6.7	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** @T<sub>A</sub> = +25°C, unless otherwise specified.

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	-1	µA	V <sub>DS</sub> = -60V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.0	—	-3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	36	50	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A
		—	47	70		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1293	—	pF	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	86.3	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	64.7	—	pF	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Gate Resistance	R <sub>g</sub>	—	12	—	Ω	
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	—	11.9	—	nC	V <sub>DS</sub> = -30V, I <sub>D</sub> = -5A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	24	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	3.6	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	5.7	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.3	—	ns	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -30V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = -5A
Turn-On Rise Time	t <sub>R</sub>	—	6.3	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	46.7	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	25.3	—	ns	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	13.6	—	ns	I <sub>F</sub> = -5A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	7.4	—	nC	I <sub>F</sub> = -5A, di/dt = 100A/µs

- 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. I<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.  
8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.

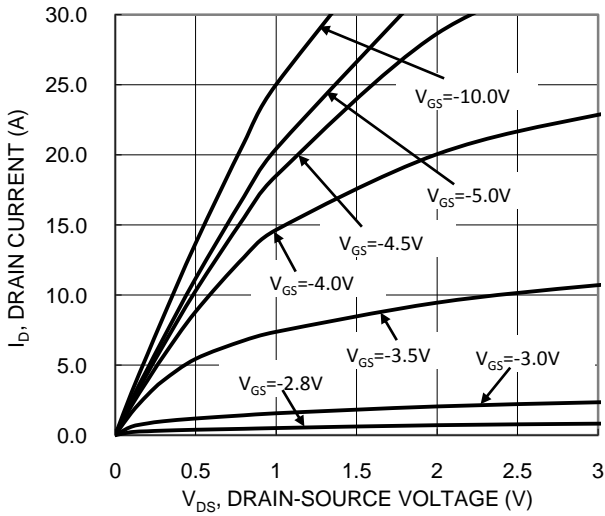


Figure 1 Typical Output Characteristic

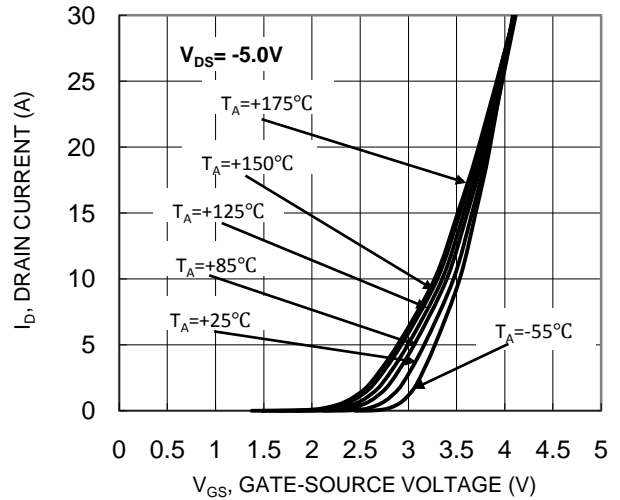


Figure 2 Typical Transfer Characteristic

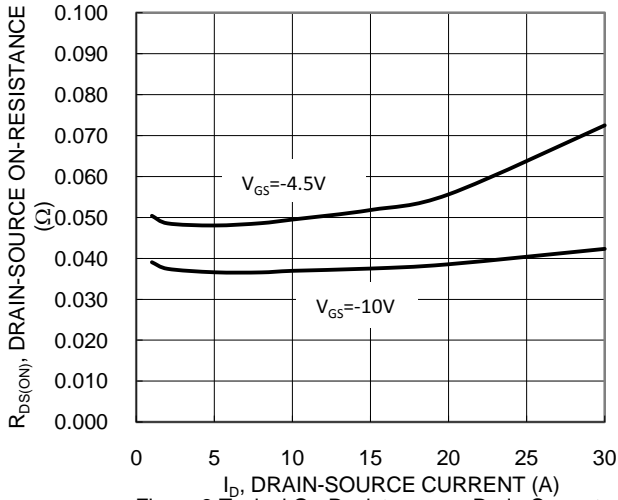


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

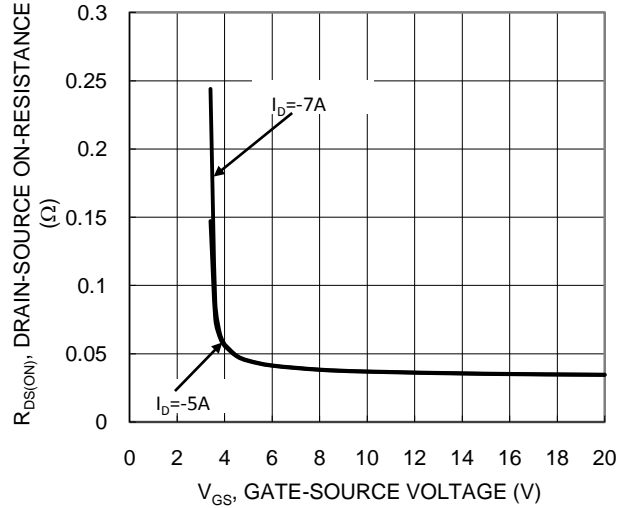


Figure 4 Typical Transfer Characteristic

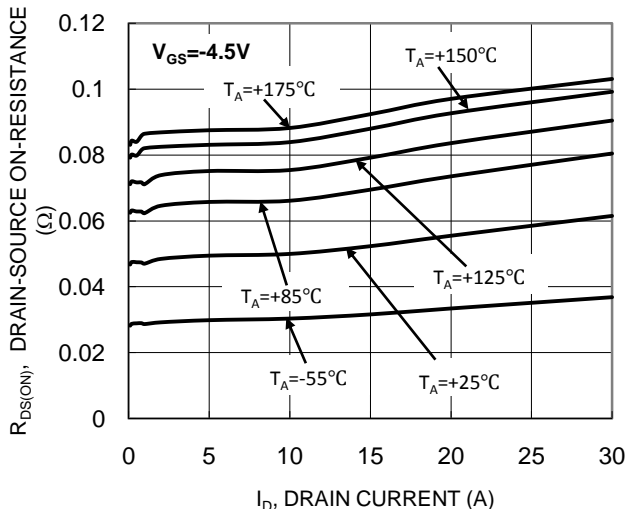


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

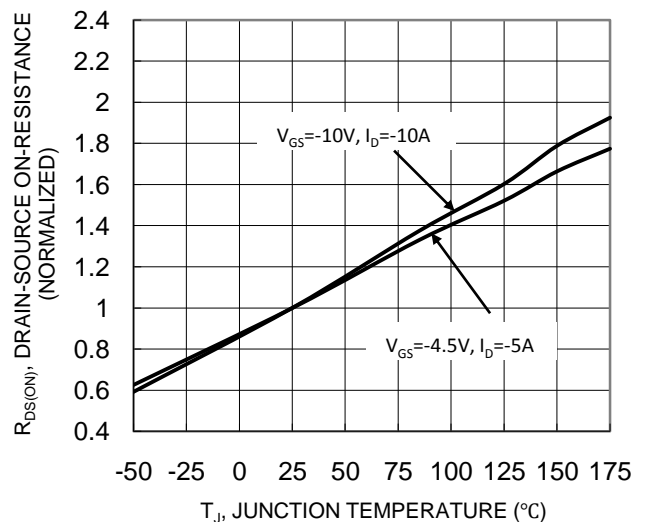


Figure 6 On-Resistance Variation with Temperature

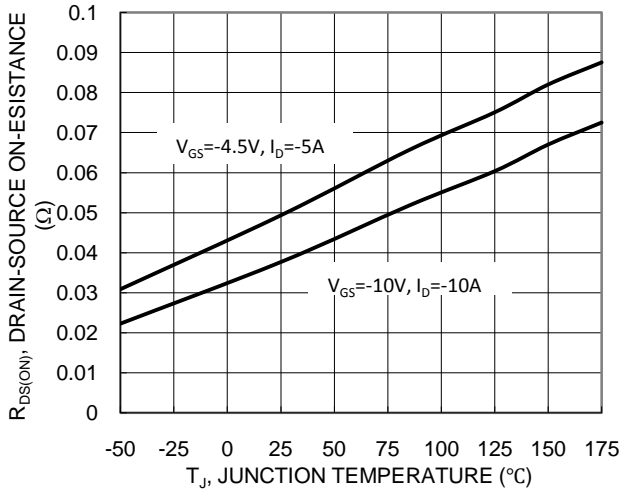


Figure 7 On-Resistance Variation with Temperature

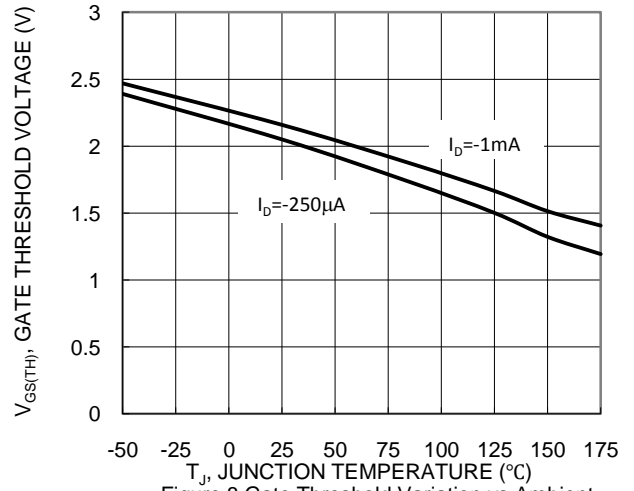


Figure 8 Gate Threshold Variation vs Ambient Temperature

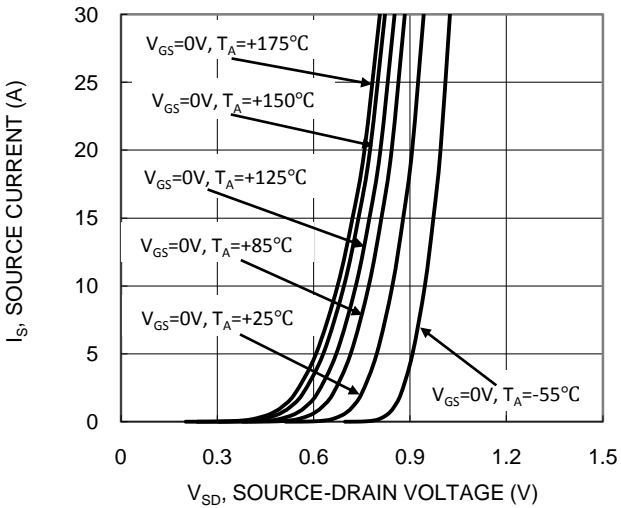


Figure 9 Diode Forward Voltage vs. Current

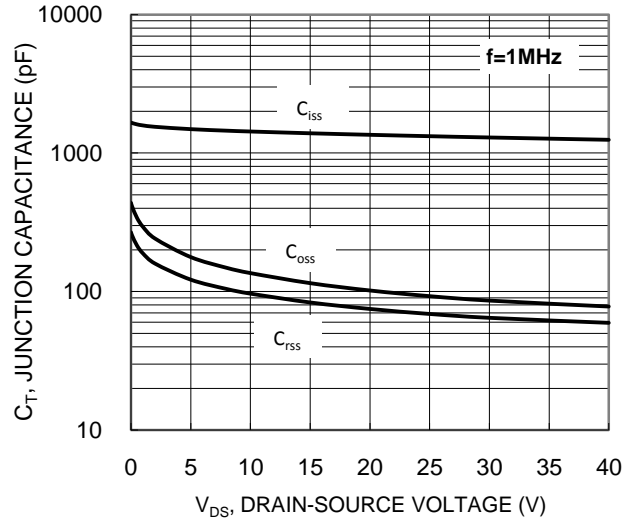


Figure 10 Typical Junction Capacitance

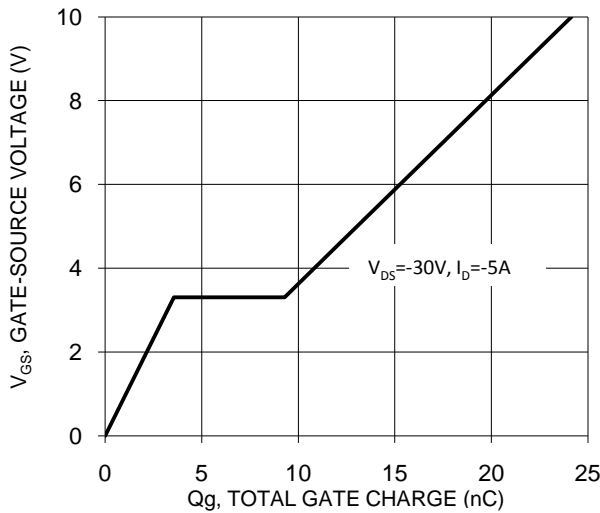


Figure 11 Gate Charge

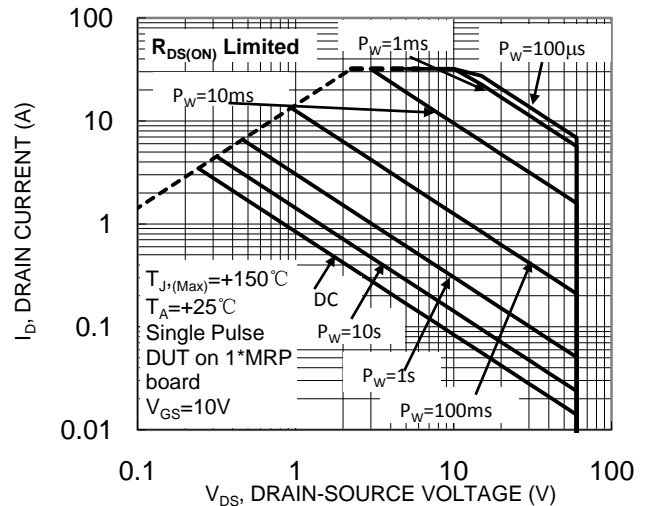


Figure 12 SOA, Safe Operation Area

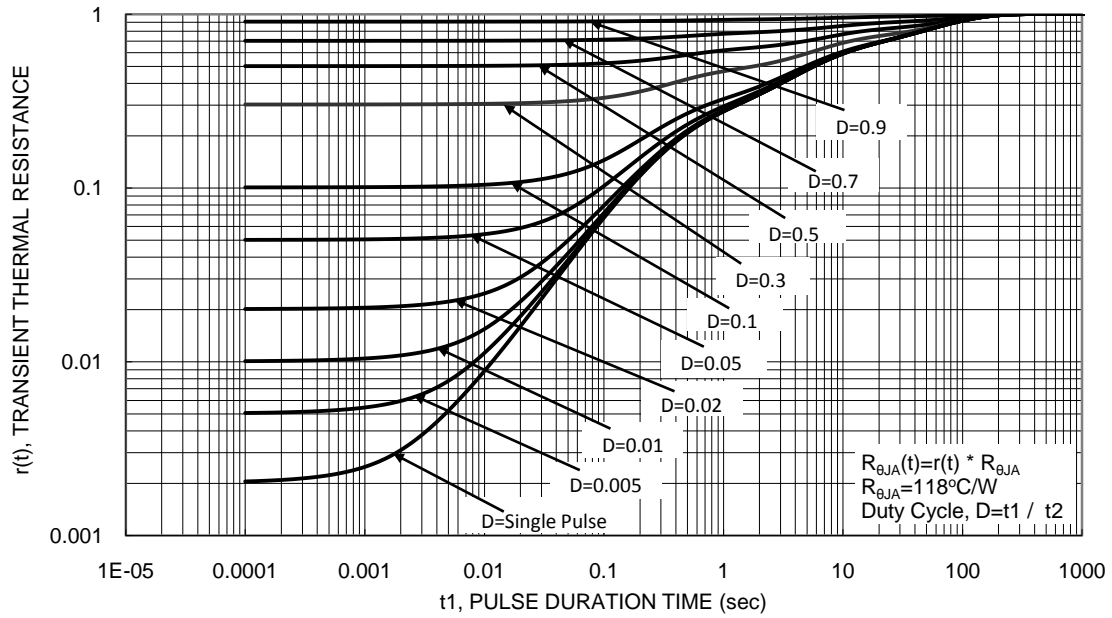
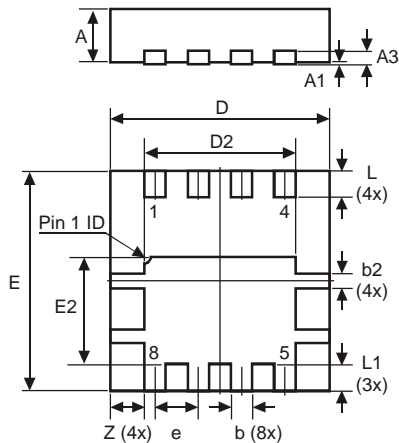


Figure 13 Transient Thermal Resistance

**Package Outline Dimensions**

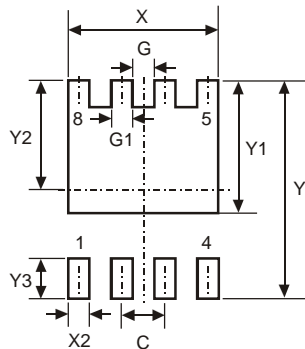
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



POWERDI <sup>®</sup> 3333-8			
Dim	Min	Max	Typ
D	3.25	3.35	3.30
E	3.25	3.35	3.30
D2	2.22	2.32	2.27
E2	1.56	1.66	1.61
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	-	-	0.20
L	0.35	0.45	0.40
L1	-	-	0.39
e	-	-	0.65
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.



Dimensions	Value (in mm)
C	0.650
G	0.230
G1	0.420
Y	3.700
Y1	2.250
Y2	1.850
Y3	0.700
X	2.370
X2	0.420

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