

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ max}$	$I_D \text{ max}$ $T_A = +25^\circ\text{C}$
60V	13mΩ @ $V_{GS} = 10\text{V}$	10.3A
	18mΩ @ $V_{GS} = 4.5\text{V}$	8.8A

## Description

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.

## Applications

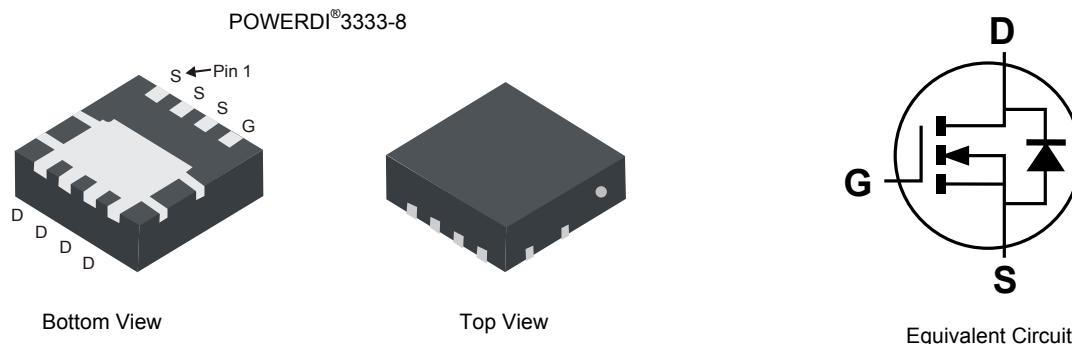
- Backlighting
- Power Management Functions
- DC-DC Converters

## 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)**
- **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: 0.072 grams (approximate)



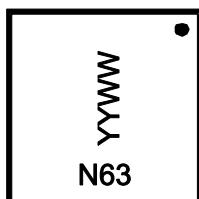
## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN6013LFG-7	POWERDI®3333-8	2,000/Tape & Reel
DMN6013LFG-13	POWERDI®3333-8	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](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



N63= Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last digit of year (ex: 13 = 2013)  
 WW = Week code (01 ~ 53)

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

Characteristic	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	$T_A = +25^\circ\text{C}$	10.3	A
	$T_A = +70^\circ\text{C}$	8.3	A
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)	$T_C = +25^\circ\text{C}$	45	A
	$T_C = +100^\circ\text{C}$	28	A
Maximum Continuous Body Diode Forward Current (Note 6)	$I_S$	3	A
Avalanche Current, $L = 0.1\text{mH}$	$I_{AS}$	33.3	A
Avalanche Energy, $L = 0.1\text{mH}$	$E_{AS}$	56.8	mJ

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	$P_D$	1	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	123	°C/W
	$t < 10\text{s}$	69	
Total Power Dissipation (Note 6)	$P_D$	2.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	60	°C/W
	$t < 10\text{s}$	34	
Total Power Dissipation (Note 6)	$P_D$	40	W
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	6.7	°C/W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current, $T_J = +25^\circ\text{C}$	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(\text{th})}$	1	1.8	3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	—	9.3	13	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 10\text{A}$
		—	12.3	18		$V_{GS} = 4.5\text{V}, I_D = 8\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1.7\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	2577	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	162	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	132	—	pF	
Gate Resistance	$R_g$	—	0.9	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	26.6	—	nC	$V_{DS} = 30\text{V}, I_D = 10\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	55.4	—	nC	
Gate-Source Charge	$Q_{gs}$	—	9.3	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	12.6	—	nC	
Turn-On Delay Time	$t_{D(\text{on})}$	—	6.2	—	ns	$V_{GS} = 10\text{V}, V_{DS} = 30\text{V}, R_G = 3\Omega, I_D = 10\text{A}$
Turn-On Rise Time	$t_r$	—	9.9	—	ns	
Turn-Off Delay Time	$t_{D(\text{off})}$	—	27.6	—	ns	
Turn-Off Fall Time	$t_f$	—	11.7	—	ns	
Body Diode Reverse Recovery Time	$t_{rr}$	—	9.4	—	nS	$I_F = 10\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{rr}$	—	18.6	—	nC	

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 1inch square copper plate

7. Short duration pulse test used to minimize self-heating effect.

8. Guaranteed by design. Not subject to product testing.

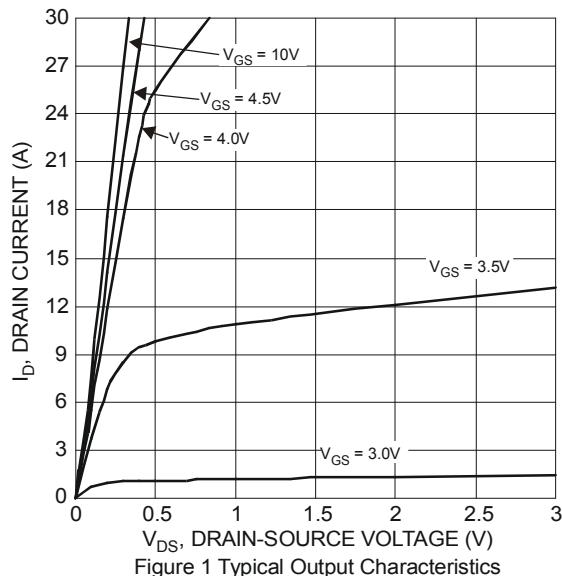


Figure 1 Typical Output Characteristics

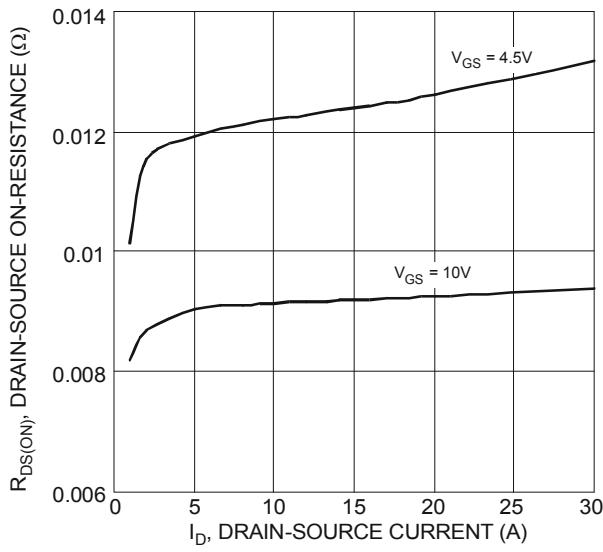


Figure 3 Typical On-Resistance vs.  
Drain Current and Gate Voltage

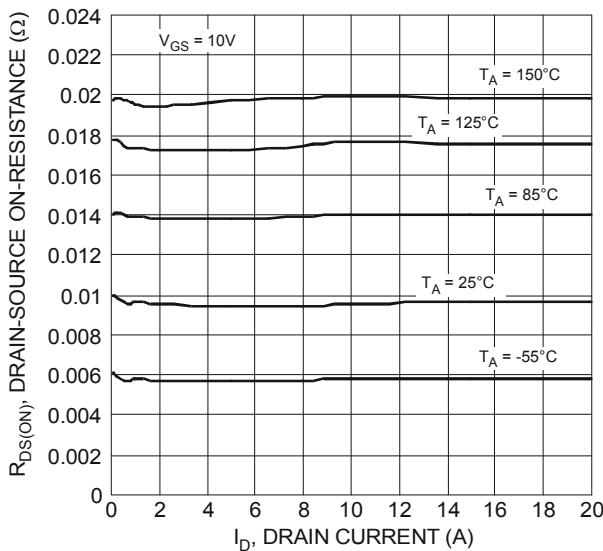


Figure 5 Typical On-Resistance vs.  
Drain Current and Temperature

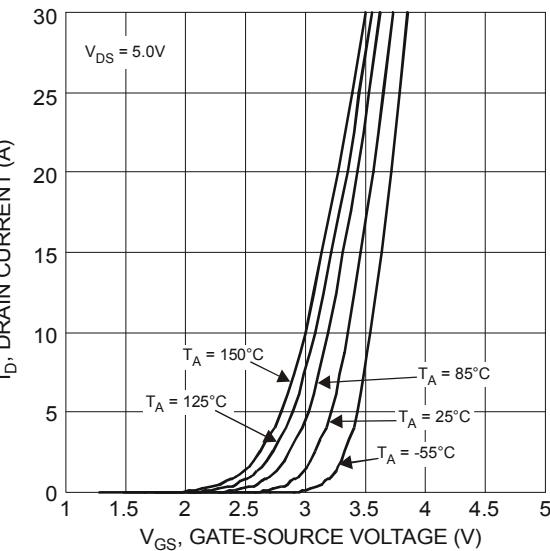


Figure 2 Typical Transfer Characteristics

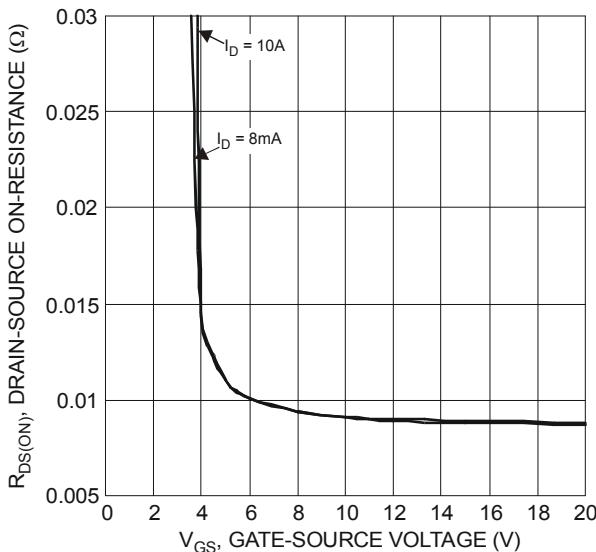


Figure 4 Typical Drain-Source On-Resistance  
vs. Gate-Source Voltage

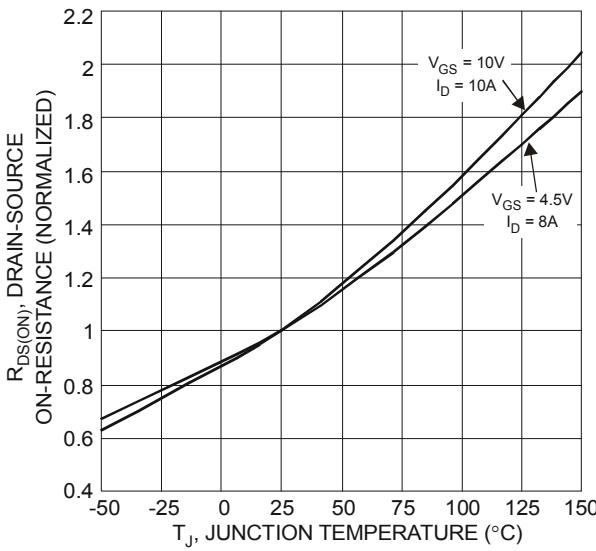
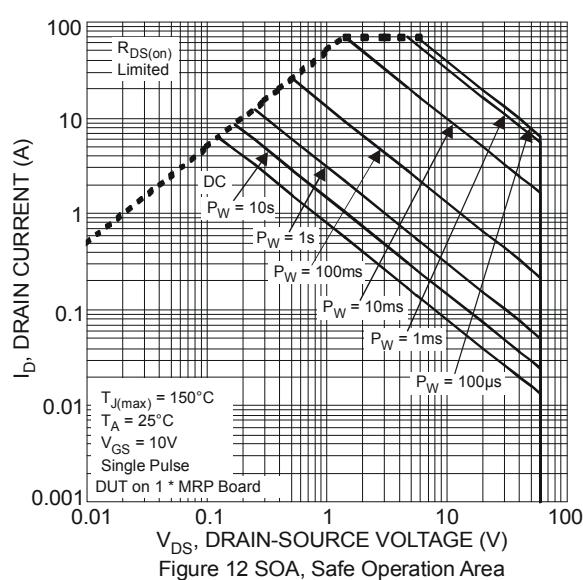
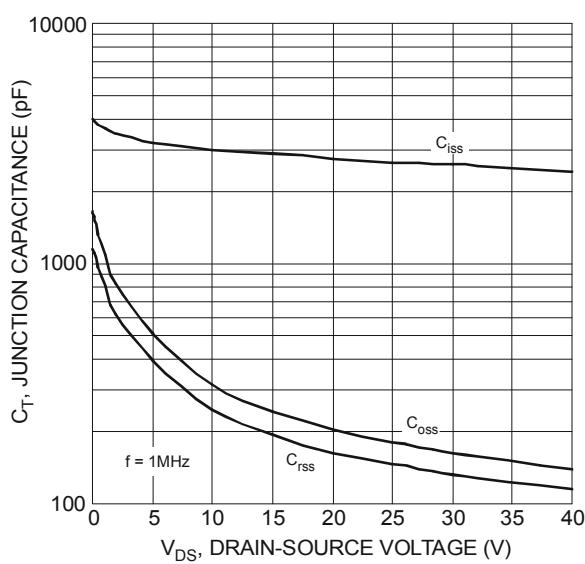
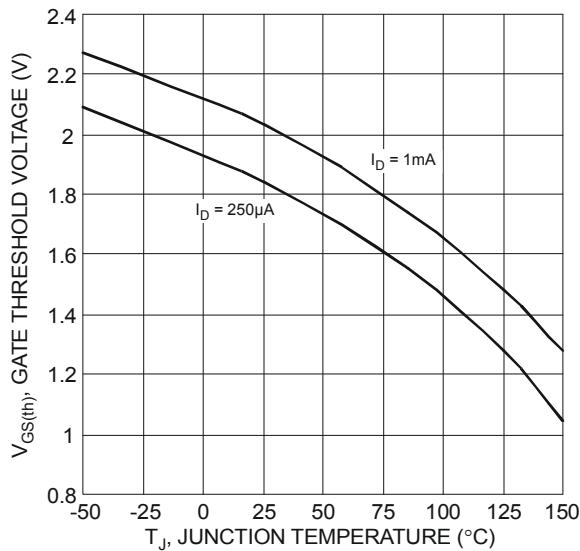
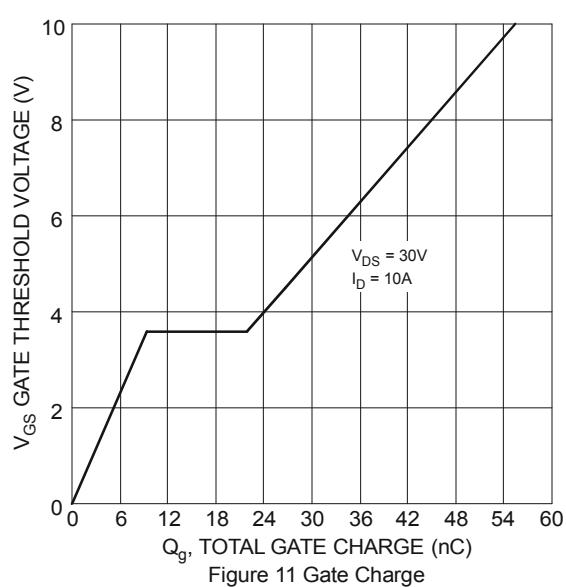
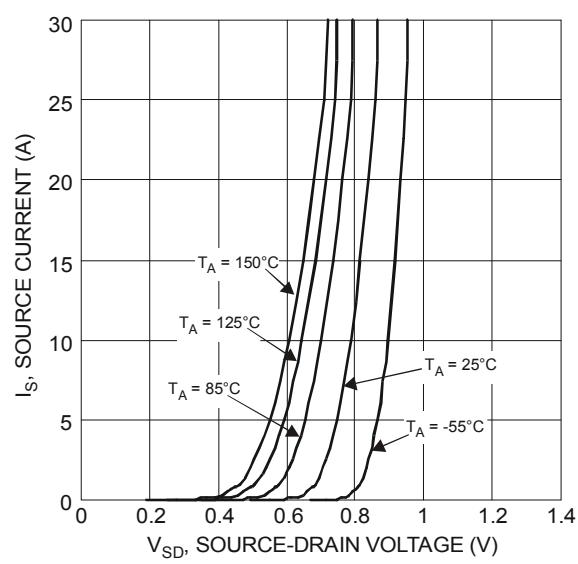
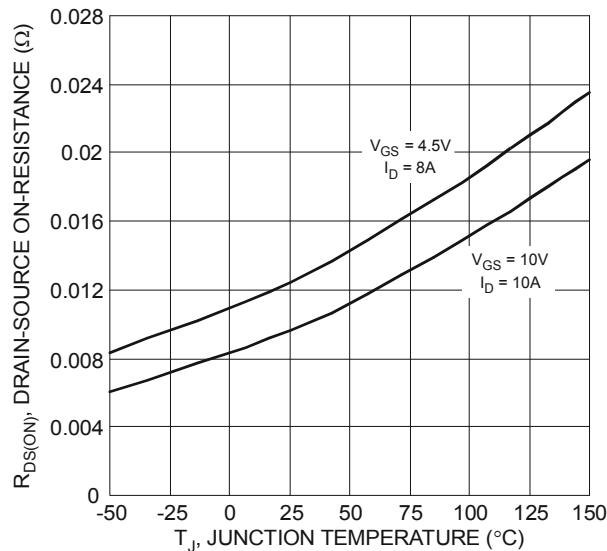
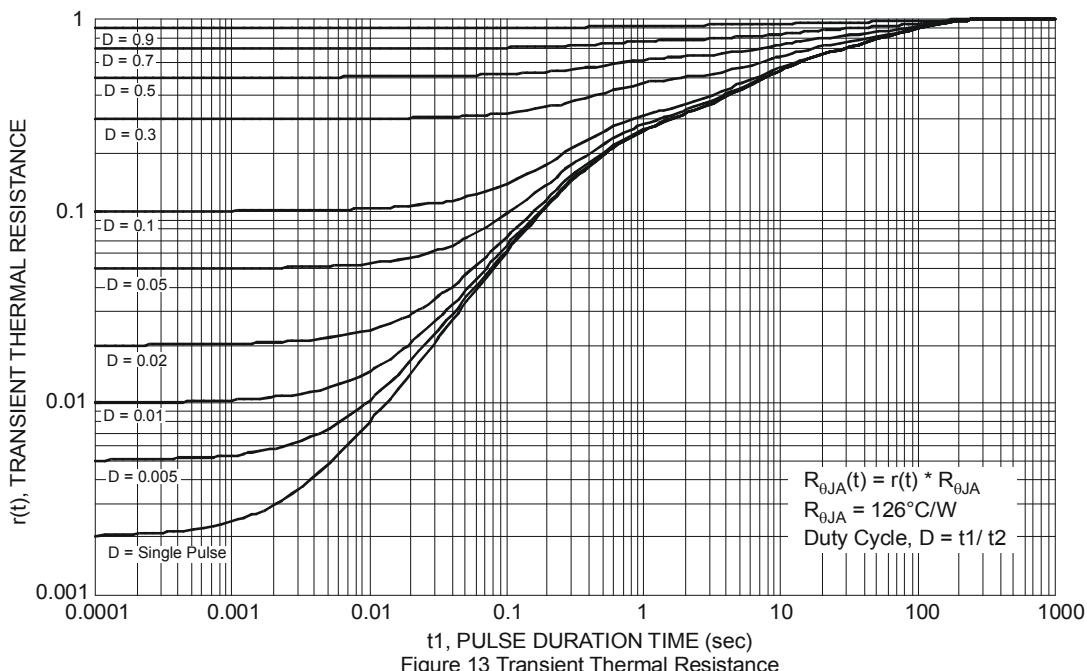


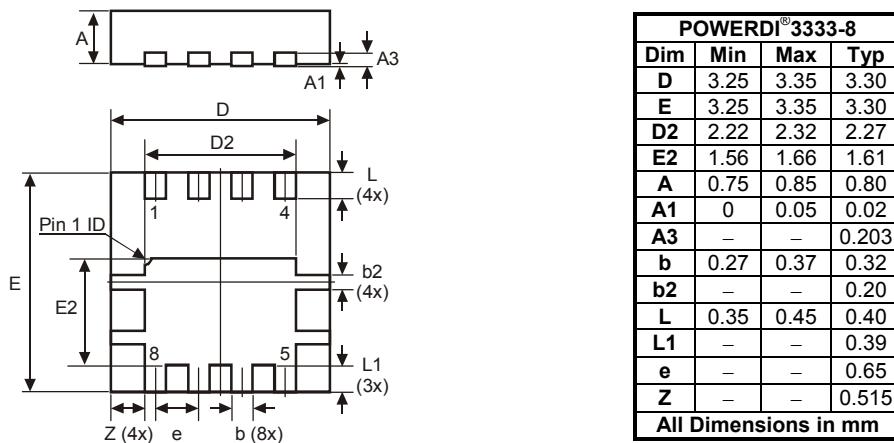
Figure 6 On-Resistance Variation with Temperature





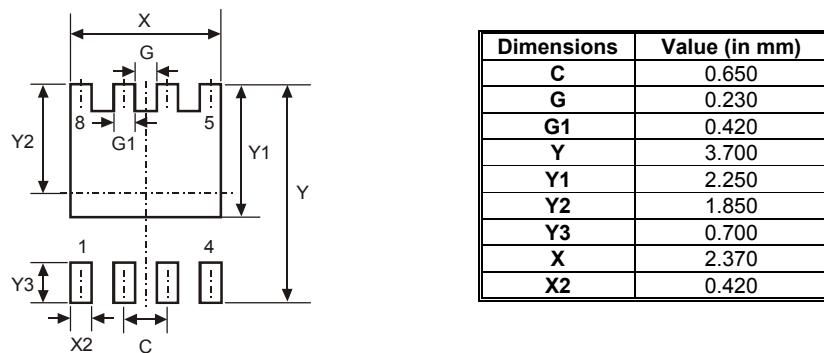
## Package Outline Dimensions

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



## Suggested Pad Layout

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



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