

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_C = +25^\circ\text{C}$
60V	7.5m $\Omega$ @ $V_{GS} = 10\text{V}$	30A
	11.5m $\Omega$ @ $V_{GS} = 4.5\text{V}$	25A

## 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

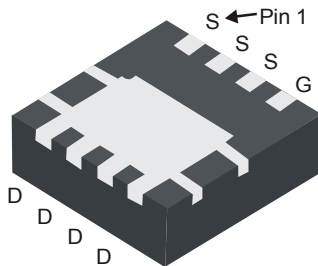
- Synchronous Rectifier
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

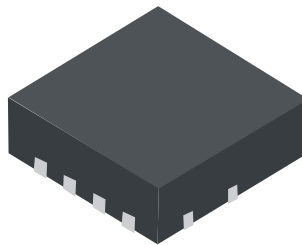
- Low  $R_{DS(ON)}$  – ensures on state losses are minimized
- Excellent  $Q_{gd} \times R_{DS(ON)}$  Product (FOM)
- Advanced Technology for DC/DC converts
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- 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

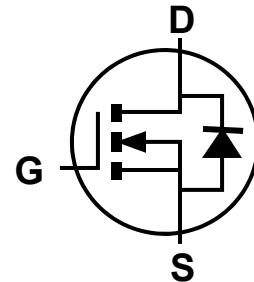
- Case: POWERDI<sup>®</sup>3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)



Bottom View



Top View



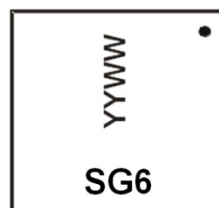
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMT6010LFG-7	POWERDI <sup>®</sup> 3333-8	2000/Tape & Reel
DMT6010LFG-13	POWERDI <sup>®</sup> 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



SG6 = 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 5) $V_{GS} = 10\text{V}$	$I_D$	$T_A = +25^\circ\text{C}$	13
		$T_A = +70^\circ\text{C}$	11
	$I_D$	$T_C = +25^\circ\text{C}$	30
		$T_C = +70^\circ\text{C}$	24
Maximum Continuous Body Diode Forward Current (Note 5)	$I_S$	3	A
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)	$I_{DM}$	80	A
Avalanche Current (Note 6)	$I_{AS}$	20	A
Avalanche Energy (Note 6)	$E_{AS}$	64	mJ

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	$P_D$	$T_A = +25^\circ\text{C}$	2.2
		$T_C = +25^\circ\text{C}$	41
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	Steady State	55
		$t < 10\text{s}$	35
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	3	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**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	$I_{DSS}$	—	—	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	$V_{GS(th)}$	0.8	—	2	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	6	7.5	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	7.8	11.5		$V_{GS} = 4.5\text{V}, I_D = 20\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.9	1.2	V	$V_{GS} = 0\text{V}, I_S = 20\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	2090	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	746	—		
Reverse Transfer Capacitance	$C_{rss}$	—	38.5	—		
Gate resistance	$R_g$	—	0.59	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	19.3	—	nC	$V_{DS} = 30\text{V}, I_D = 20\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	41.3	—		
Gate-Source Charge	$Q_{gs}$	—	6.0	—		
Gate-Drain Charge	$Q_{gd}$	—	8.8	—		
Turn-On Delay Time	$t_{D(on)}$	—	5.7	—	nS	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, I_D = 20\text{A}, R_G = 3\Omega,$
Turn-On Rise Time	$t_r$	—	4.3	—		
Turn-Off Delay Time	$t_{D(off)}$	—	23.4	—		
Turn-Off Fall Time	$t_f$	—	9.7	—		

- Notes:
- $R_{\theta JA}$  is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta JA}$  is determined by the user's board design.
  - .UIS in production with  $L = 0.3\text{mH}, T_J = +25^\circ\text{C}$
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

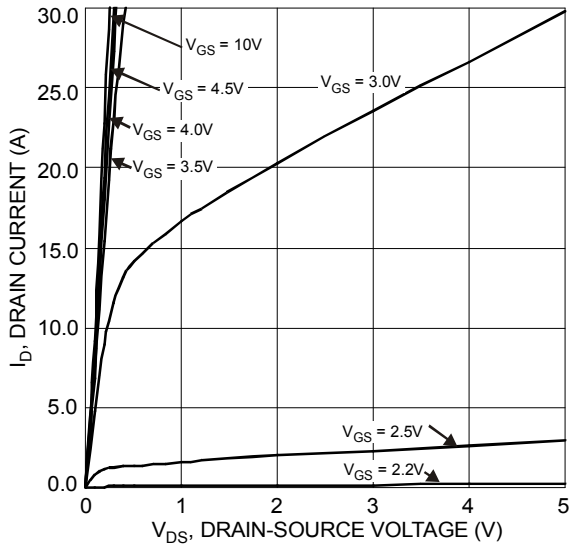


Figure 1 Typical Output Characteristic

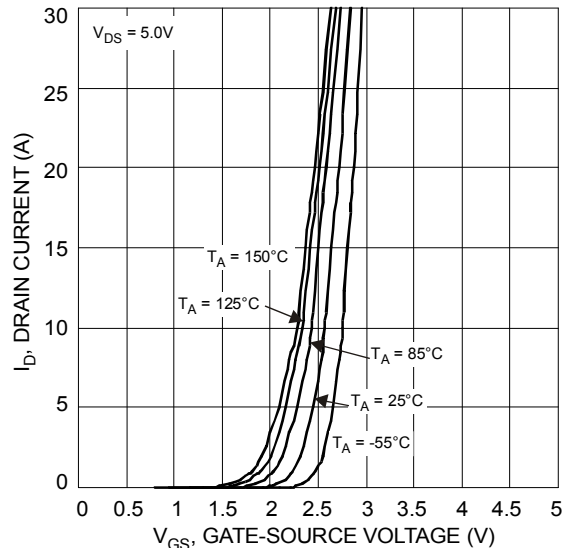


Figure 2 Typical Transfer Characteristics

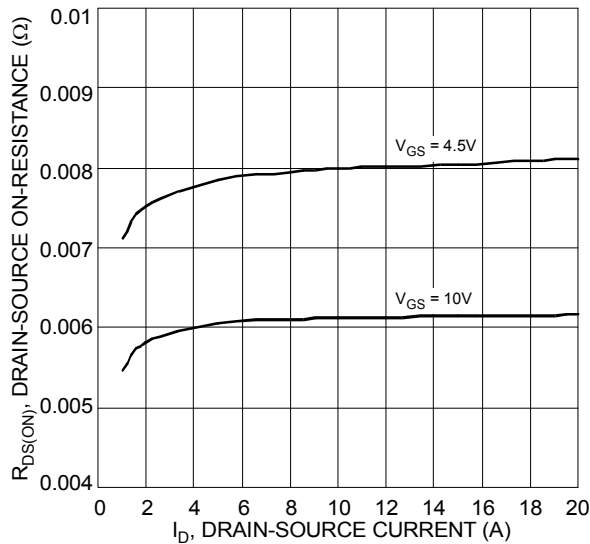


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

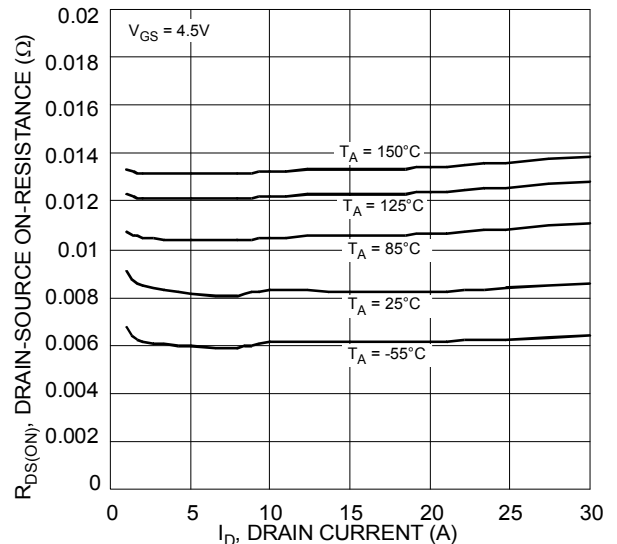


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

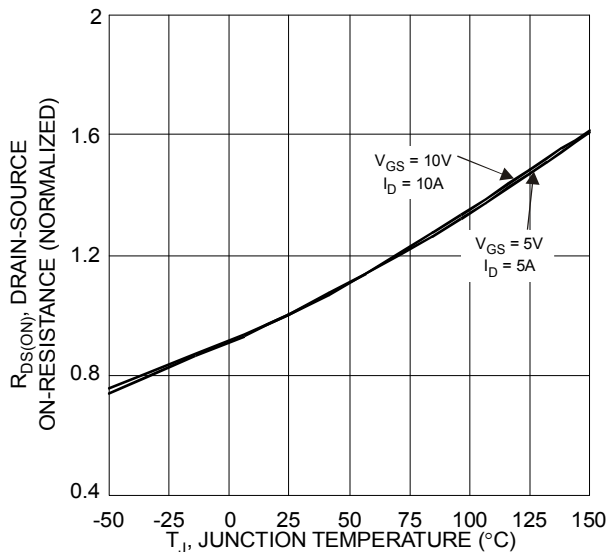


Figure 5 On-Resistance Variation with Temperature

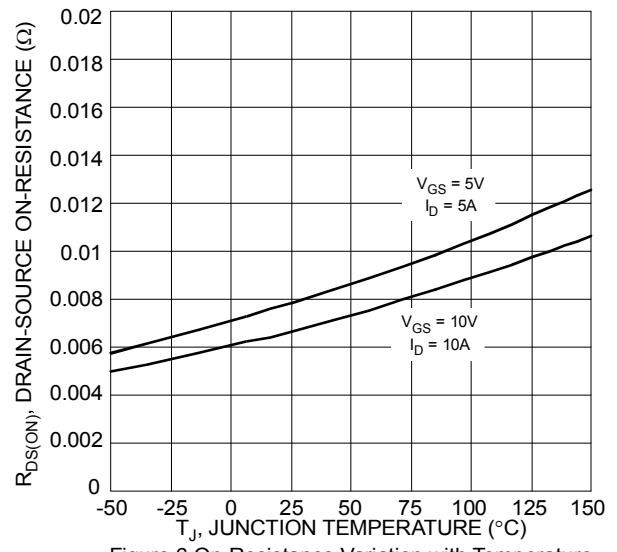


Figure 6 On-Resistance Variation with Temperature

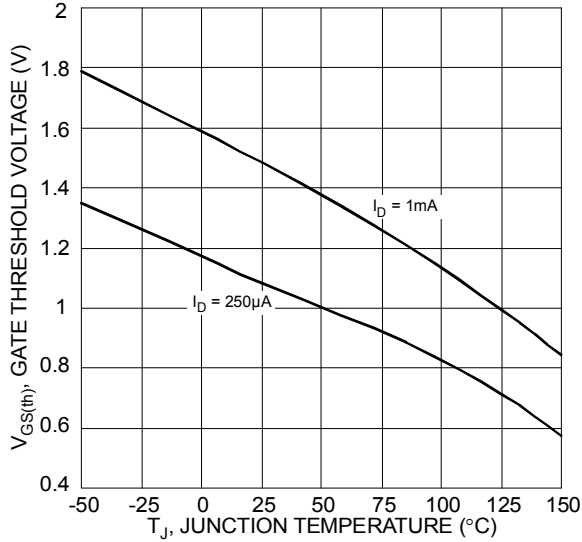


Figure 7 Gate Threshold Variation vs. Ambient Temperature

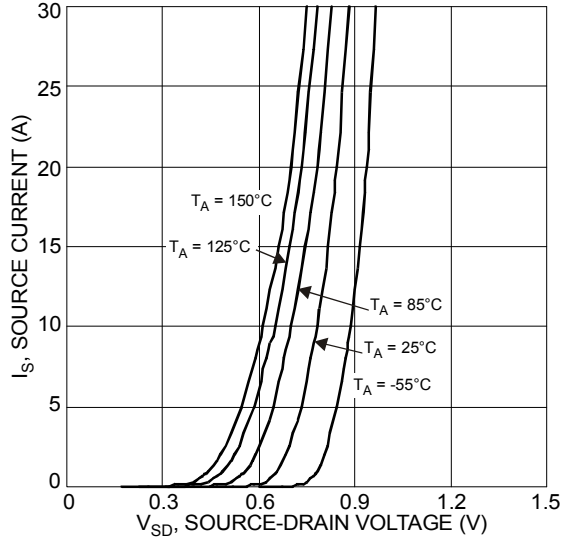


Figure 8 Diode Forward Voltage vs. Current

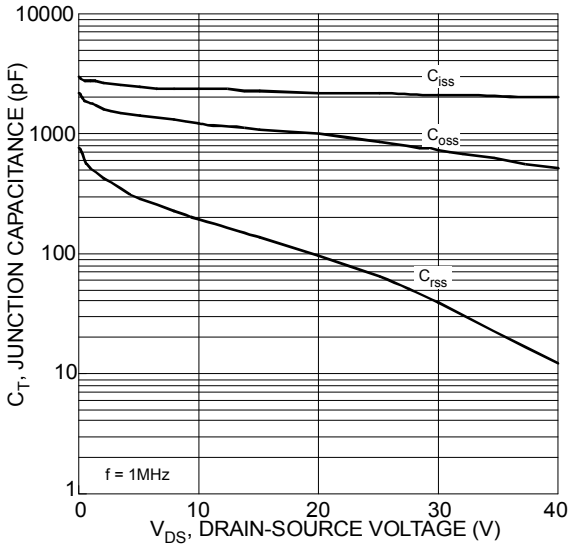


Figure 9 Typical Junction Capacitance

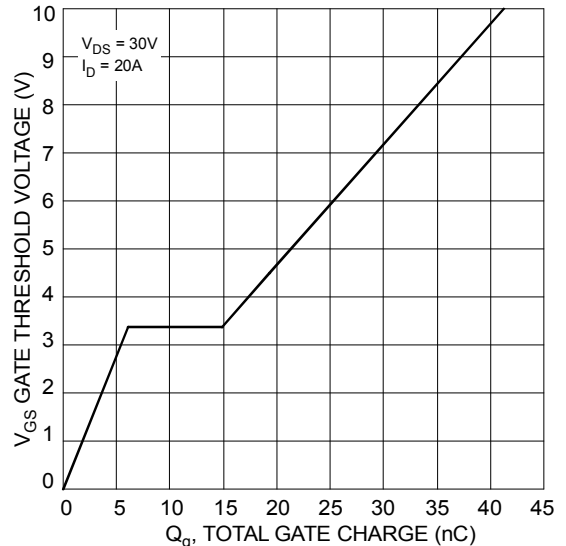


Figure 10 Gate Charge

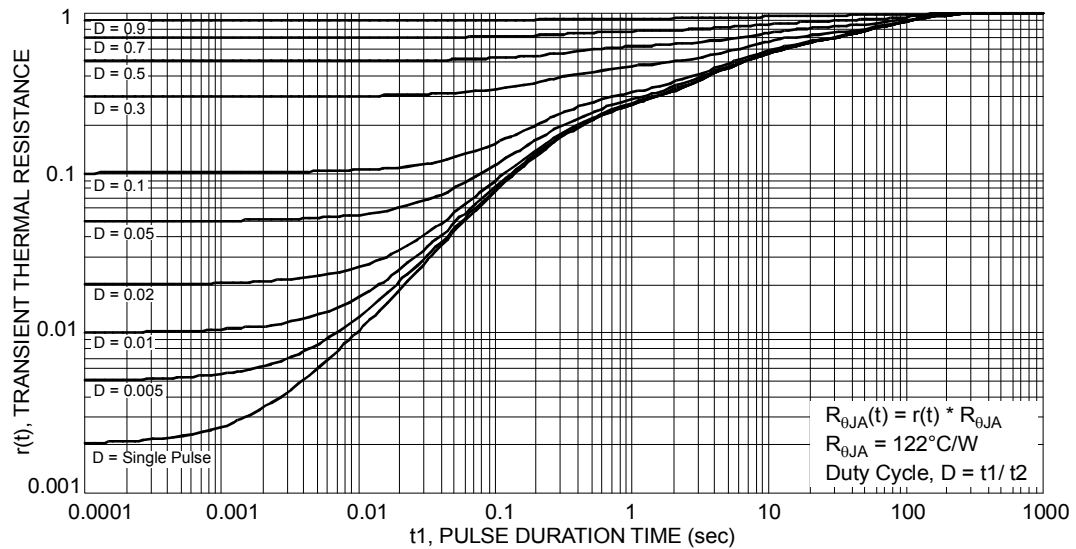


Figure 11 Transient Thermal Resistance

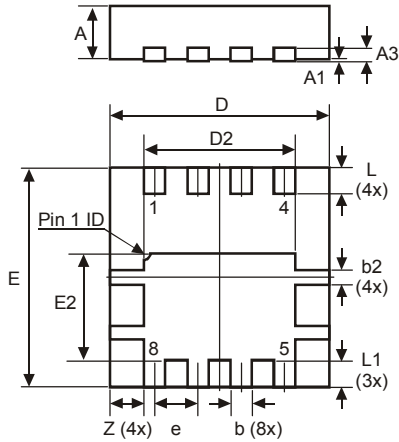
$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

$$R_{\theta JA} = 122^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t1/t2$$

**Package Outline Dimensions**

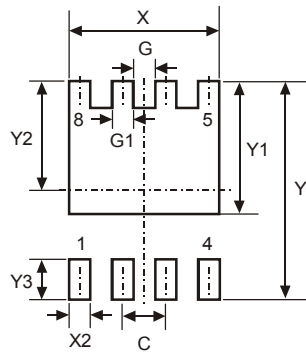
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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