

**40V P-CHANNEL ENHANCEMENT MODE MOSFET
 POWERDI®**
Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \max}$	$I_D \max$ $T_A = +25^\circ\text{C}$ (Notes 6)
-40V	25mΩ @ $V_{GS} = -10\text{V}$	- 7.2A
	45mΩ @ $V_{GS} = -4.5\text{V}$	- 5.4A

Description

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Motor Control
- Backlighting
- DC-DC Converters
- Printer Equipment

Features

- Low $R_{DS(on)}$ – Minimizes conduction losses
- Fast switching speed – Minimizes switching losses
- **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**

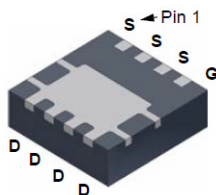
Mechanical Data

- Case: POWERDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 Ⓔ3
- Weight: 0.0172 grams (approximate)

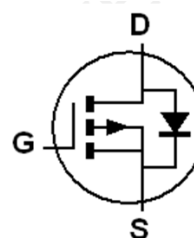
POWERDI3333-8



Top View



Bottom View

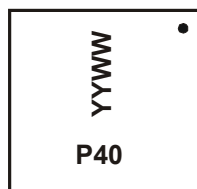


Device symbol

Ordering Information (Note 4)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DMP4025SFG-7	P40	7	8	2,000
DMP4025SFG-13	P40	13	8	3,000

- 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


P40 = Product marking code
 YYWW = Date Code Marking
 YY = Year (ex: 12 = 2012)
 WW = Week (01 - 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-40	V
Gate-Source Voltage			V _{GSS}	±20	
Continuous Drain Current	V _{GS} = 10V	(Notes 6)	I _D	-7.2	A
		T _A = +70°C (Notes 6)		-5.77	
		(Notes 5)		-4.65	
Pulsed Drain Current	V _{GS} = 10V	(Notes 7)	I _{DM}	-26	

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P _D	0.81	W
Linear Derating Factor	(Note 6)		1.95	
Thermal Resistance, Junction to Ambient	(Note 5)	R _{θJA}	155	°C/W
	(Note 6)		64	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
 6. For a device surface mounted on 25mm x 25mm FR4 PCB with 2oz copper, in still air conditions;
 7. Same as note (6), except the device is pulsed with D= 0.02 and pulse width 300μs.

Thermal Characteristics

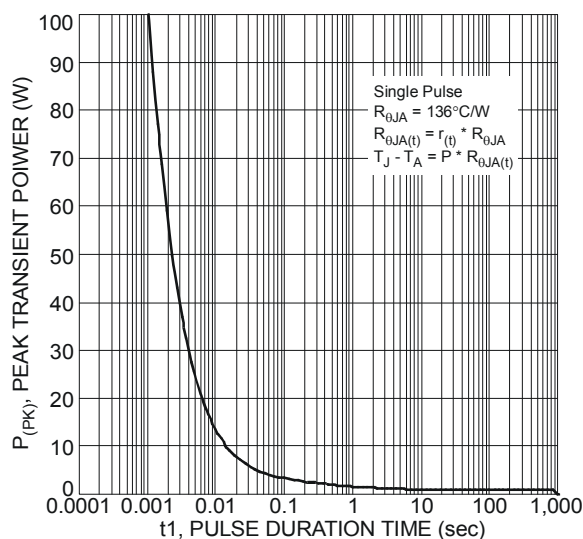


Figure 1 Single Pulse Maximum Power Dissipation

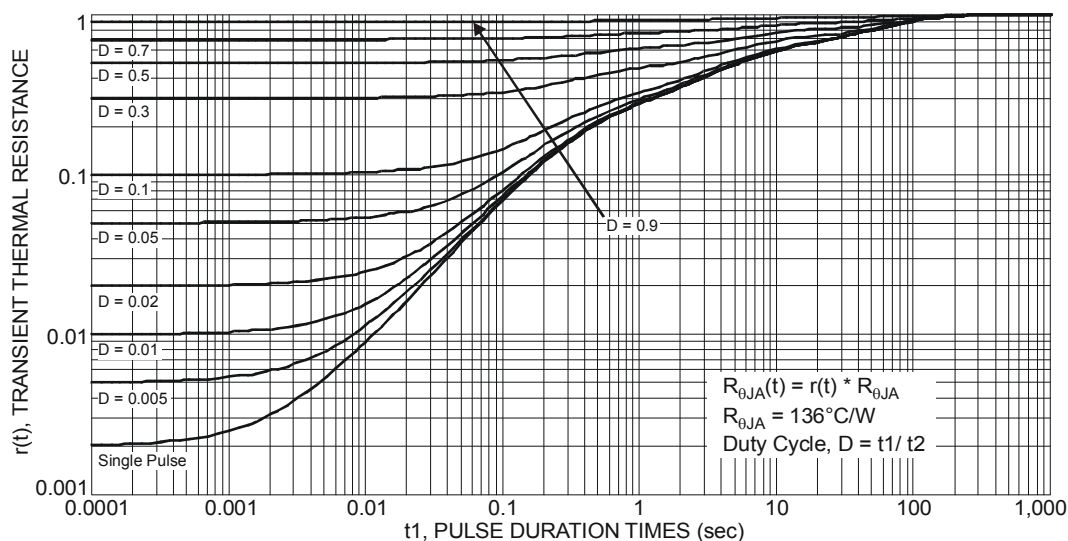


Figure 2 Transient Thermal Resistance

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	-40	—	—	V	I _D = -250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1.0	μA	V _{DS} = -40V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	-0.8	-1.3	-1.8	V	I _D = -250μA, V _{DS} = V _{GS}
Static Drain-Source On-Resistance (Note 8)	R _{DS(on)}	—	18	25	mΩ	V _{GS} = -10V, I _D = -3A
			30	45		V _{GS} = -4.5V, I _D = -3A
Forward Transconductance (Notes 8 & 9)	g _{fs}	—	16.6	—	S	V _{DS} = -5V, I _D = -3A
Diode Forward Voltage (Note 8)	V _{SD}	—	-0.7	-1.0	V	I _S = -1A, V _{GS} = 0V
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	1643	—	pF	V _{DS} = -20V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	179	—		
Reverse Transfer Capacitance	C _{rss}	—	128	—		
Gate Resistance	R _g	—	6.43	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (Note 10)	Q _g	—	14.0	—	nC	V _{DS} = -20V I _D = -3A
Total Gate Charge (Note 10)	Q _g	—	33.7	—		
Gate-Source Charge (Note 10)	Q _{gs}	—	5.5	—		
Gate-Drain Charge (Note 10)	Q _{gd}	—	7.3	—		
Turn-On Delay Time (Note 10)	t _{D(on)}	—	6.9	—	ns	V _{DD} = -20V, V _{GS} = -10V I _D = -3A
Turn-On Rise Time (Note 10)	t _r	—	14.7	—		
Turn-Off Delay Time (Note 10)	t _{D(off)}	—	53.7	—		
Turn-Off Fall Time (Note 10)	t _f	—	30.9	—		

- Notes:
8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
 9. For design aid only, not subject to production testing.
 10. Switching characteristics are independent of operating junction temperatures.

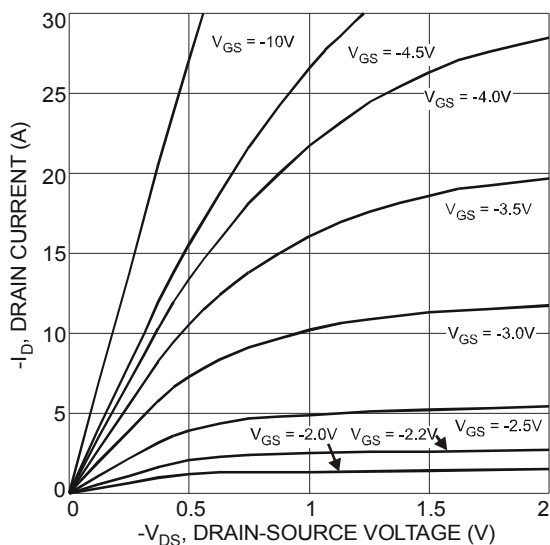
Typical Characteristics


Figure 3 Typical Output Characteristic

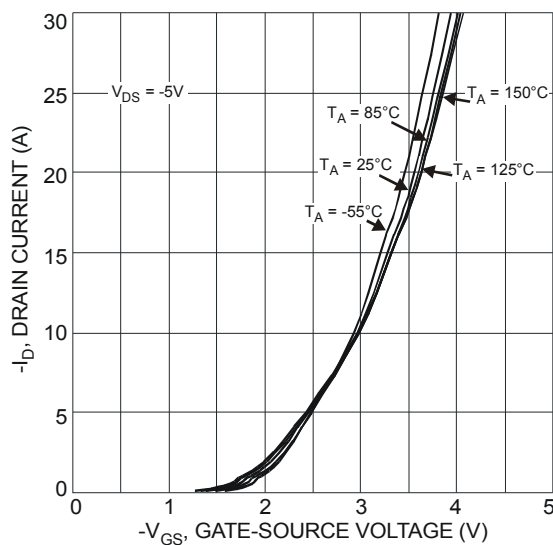


Figure 4 Typical Transfer Characteristic

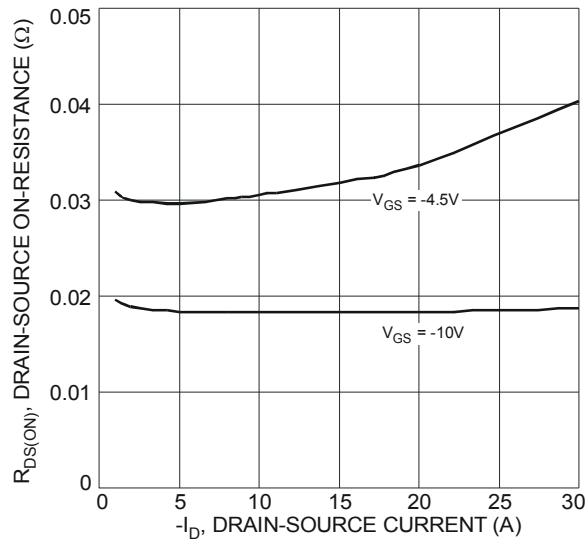


Figure 5 Typical On-Resistance
vs. Drain Current and Gate Voltage

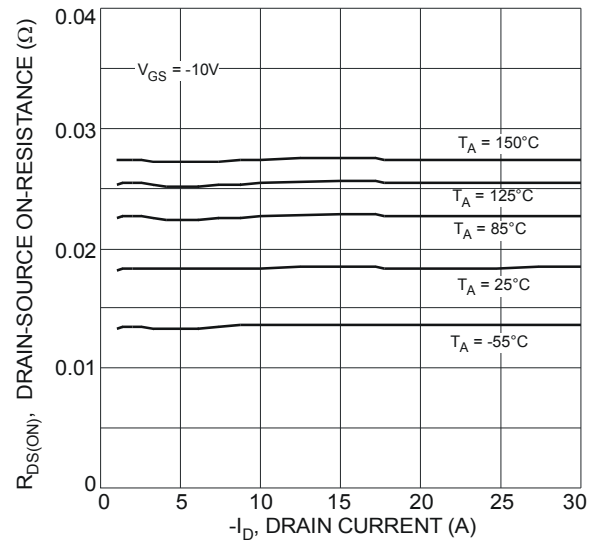


Figure 6 Typical On-Resistance
vs. Drain Current and Temperature

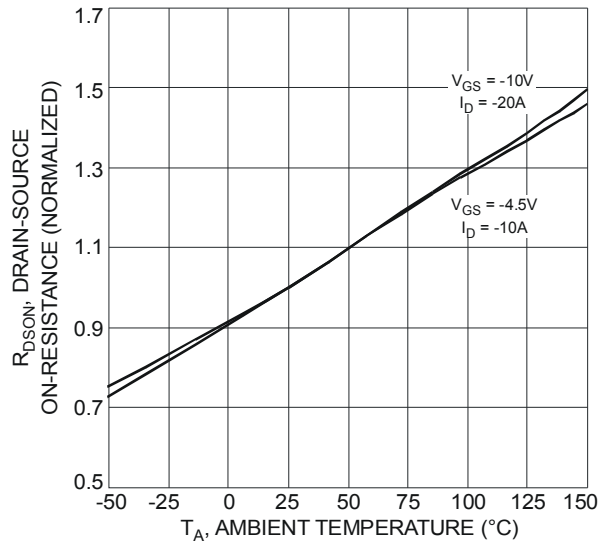


Figure 7 On-Resistance Variation with Temperature

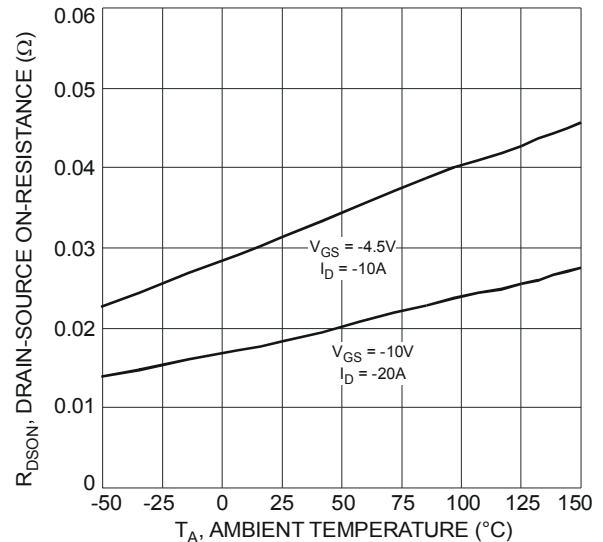


Figure 8 On-Resistance Variation with Temperature

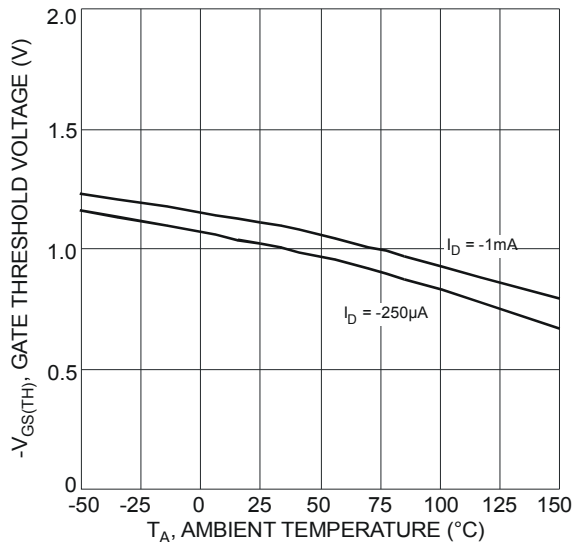


Figure 9 Gate Threshold Variation vs. Ambient Temperature

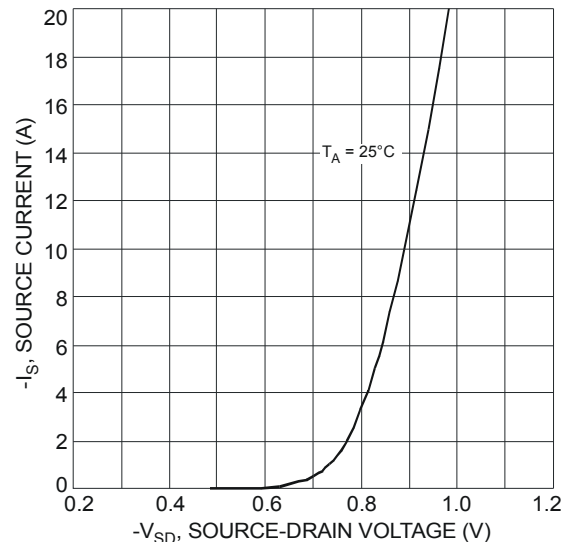
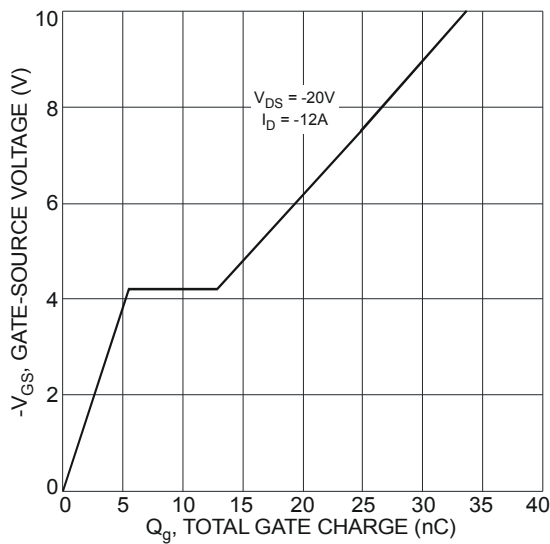
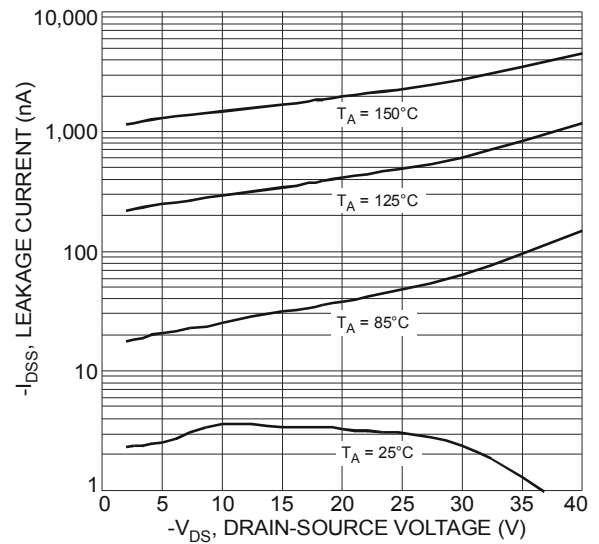
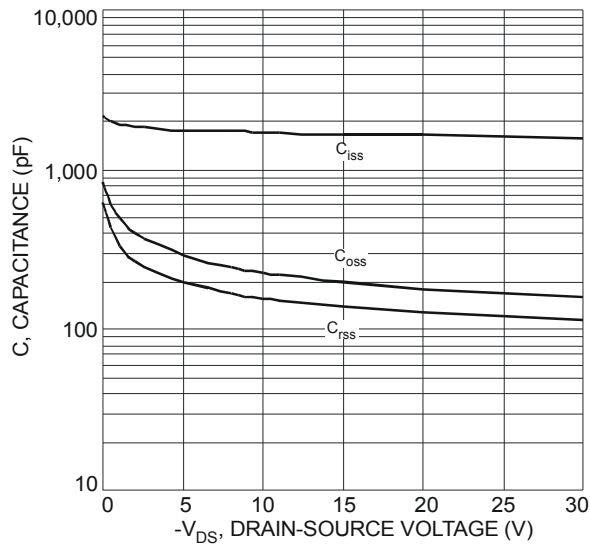
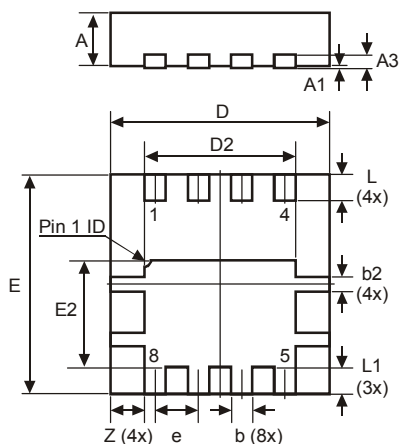


Figure 10 Diode Forward Voltage vs. Current



Package Outline Dimensions

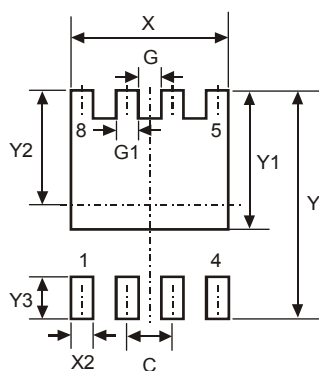
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



POWERDI®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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