

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_C = +25^\circ\text{C}$
-20V	1.9mΩ @ $V_{GS} = -10\text{V}$	-60A
	2.4mΩ @ $V_{GS} = -4.5\text{V}$	-60A
	3.8mΩ @ $V_{GS} = -2.5\text{V}$	-60A

Description

This new generation P-Channel Enhancement Mode MOSFET is designed to minimize $R_{DS(ON)}$ and yet maintain superior switching performance. This device is ideal for use in notebook battery power management and load switch.

Applications

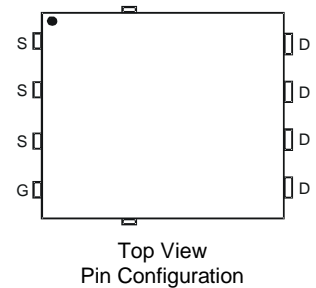
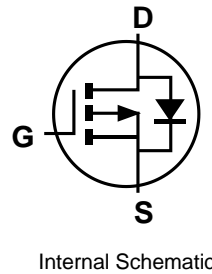
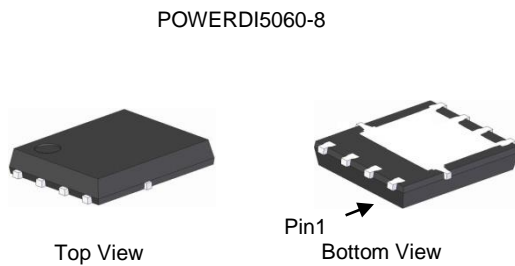
- Switch

Features

- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On State Losses
- <1.1mm Package Profile – Ideal for Thin Applications
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: POWERDI5060-8
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208(3)
- Weight: 0.097 grams (Approximate)

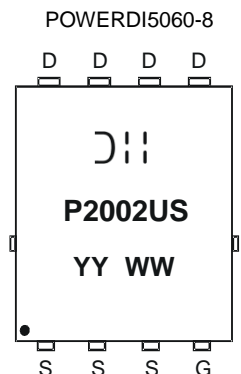


Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2002UPS-13	POWERDI5060-8	2,500 / Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 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



- Diodes Incorporated Logo = Manufacturer's Marking
- P2002US = 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_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage			V _{GSS}	±12	V
Continuous Drain Current, V _{GS} = 10V (Note 5)	Steady State (Note 8)	T _C = +25°C T _C = +70°C	I _D	-60 -60	A
	t < 10s	T _A = +25°C T _A = +70°C		-42 -33.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I _{DM}	-100	A
Continuous Body Diode Forward Current (Note 5)	Steady State (Note 8)	T _C = +25°C	I _S	-60	A
	t < 10s	T _A = +25°C		-5.6	A
Avalanche Current, L = 0.1mH			I _{AS}	-37	A
Avalanche Energy, L = 0.1mH			E _{AS}	69.8	mJ

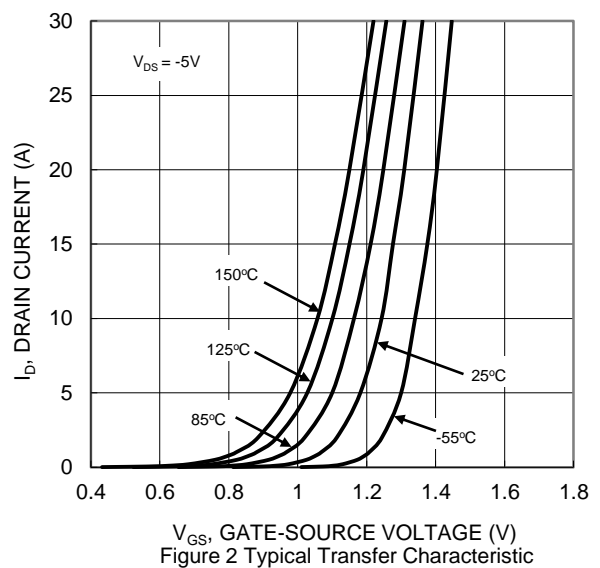
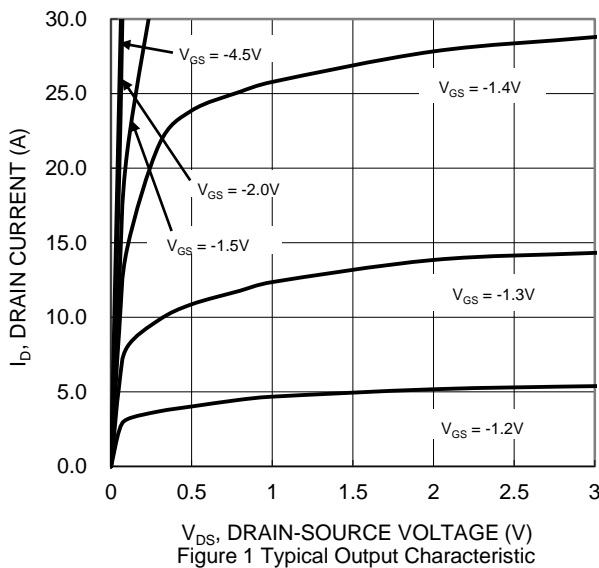
Thermal Characteristics

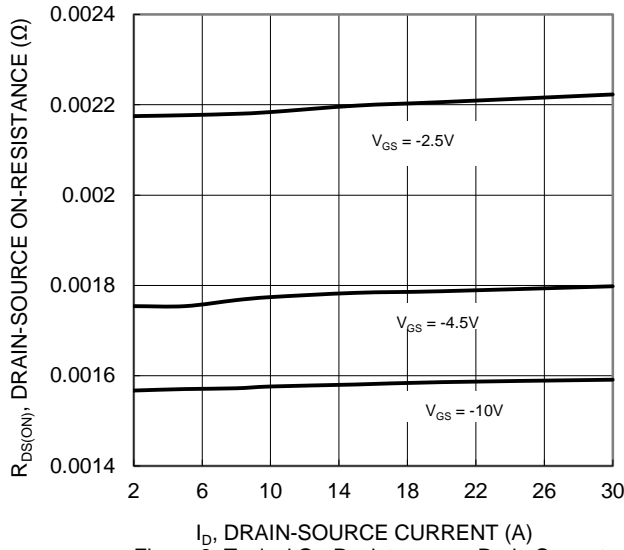
Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady State	P _D	2.3	W
	t < 10s		6.25	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	55	°C/W
	t < 10s		20	
Total Power Dissipation (Note 5)	Steady State	P _D	104	W
Thermal Resistance, Junction to Case (Note 5)		R _{θJC}	0.9	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

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

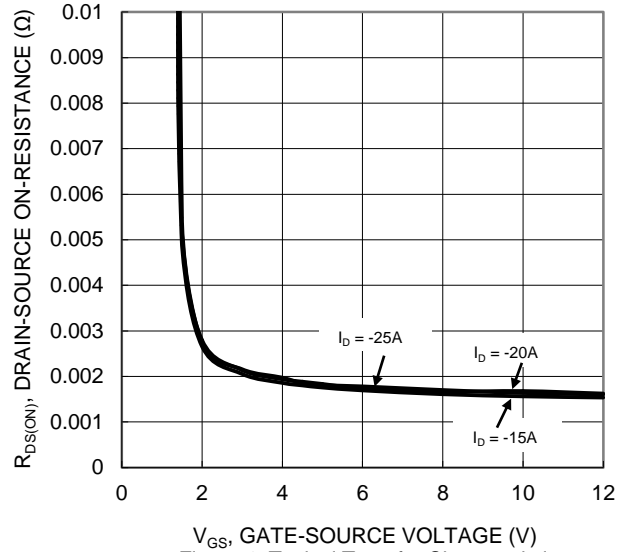
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(TH)}	-0.5	—	-1.4	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	1.3	1.9	mΩ	V _{GS} = -10V, I _D = -25A
		—	1.5	2.4		V _{GS} = -4.5V, I _D = -20A
		—	2	3.8		V _{GS} = -2.5V, I _D = -15A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iSS}	—	12826	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oSS}	—	2547	—		
Reverse Transfer Capacitance	C _{rSS}	—	1924	—		
Gate Resistance	R _G	0.9	4.2	6.6	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -10V)	Q _g	—	476	585	nC	V _{DS} = -10V, I _D = -20A
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	228	282		
Gate-Source Charge	Q _{gs}	—	24.8	—		
Gate-Drain Charge	Q _{gd}	—	61.9	—		
Turn-On Delay Time	t _{D(ON)}	—	14.2	28	ns	V _{DD} = -10V, V _{GEN} = -4.5V, R _{GEN} = 1Ω, I _D = -10A
Turn-On Rise Time	t _R	—	35.4	70		
Turn-Off Delay Time	t _{D(OFF)}	—	361	578		
Turn-Off Fall Time	t _F	—	224	358		
BODY DIODE CHARACTERISTICS						
Continuous Body Diode Forward Current (Note 5 & 8)	I _S	—	—	-60	A	T _C = +25°C
Pulse Diode Forward Current	I _{SM}	—	—	-100		
Diode Forward Voltage	V _{SD}	—	-0.58	-1.1	V	V _{GS} = 0V, I _S = -5A
Reverse Recovery Time (Note 7)	t _{RR}	—	137	219	ns	I _F = -10A, di/dt = 100A/μs
Reverse Recovery Charge (Note 7)	Q _{rr}	—	221	332	nC	
Reverse Recovery Fall Time (Note 7)	t _a	—	39	—	ns	
Reverse Recovery Raise Time (Note 7)	t _b	—	98	—		

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.
8. Package limited.

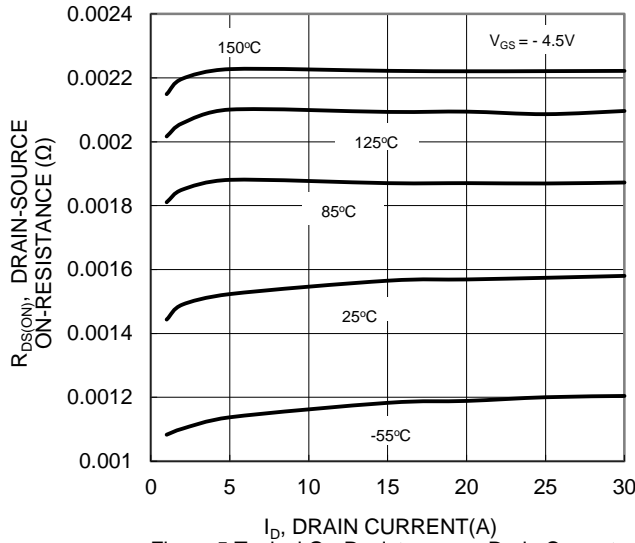




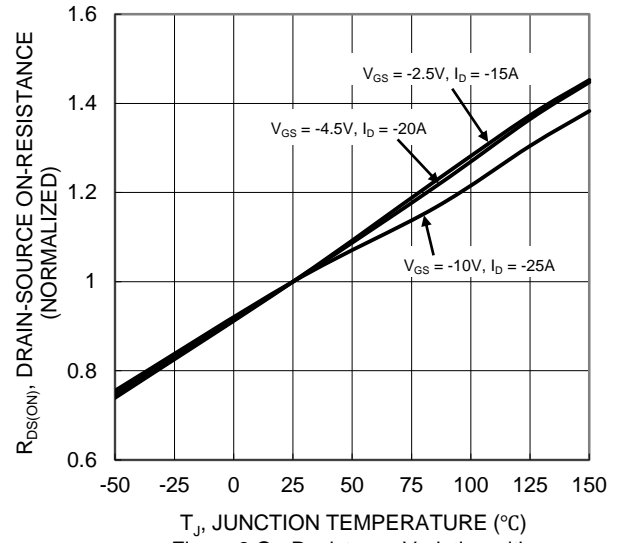
I_D , DRAIN-CURRENT (A)
Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage



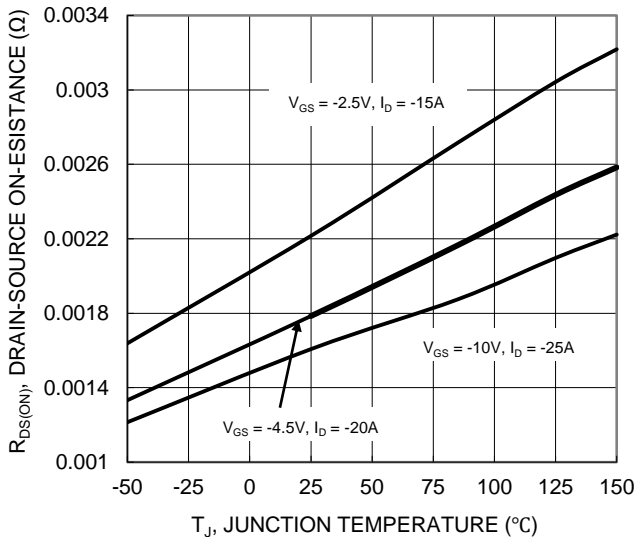
V_{GS} , GATE-SOURCE VOLTAGE (V)
Figure 4 Typical Transfer Characteristic



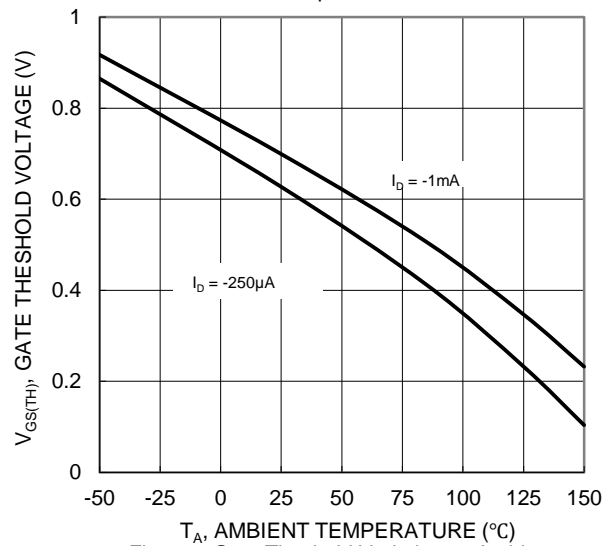
I_D , DRAIN CURRENT (A)
Figure 5 Typical On-Resistance vs. Drain Current and Temperature



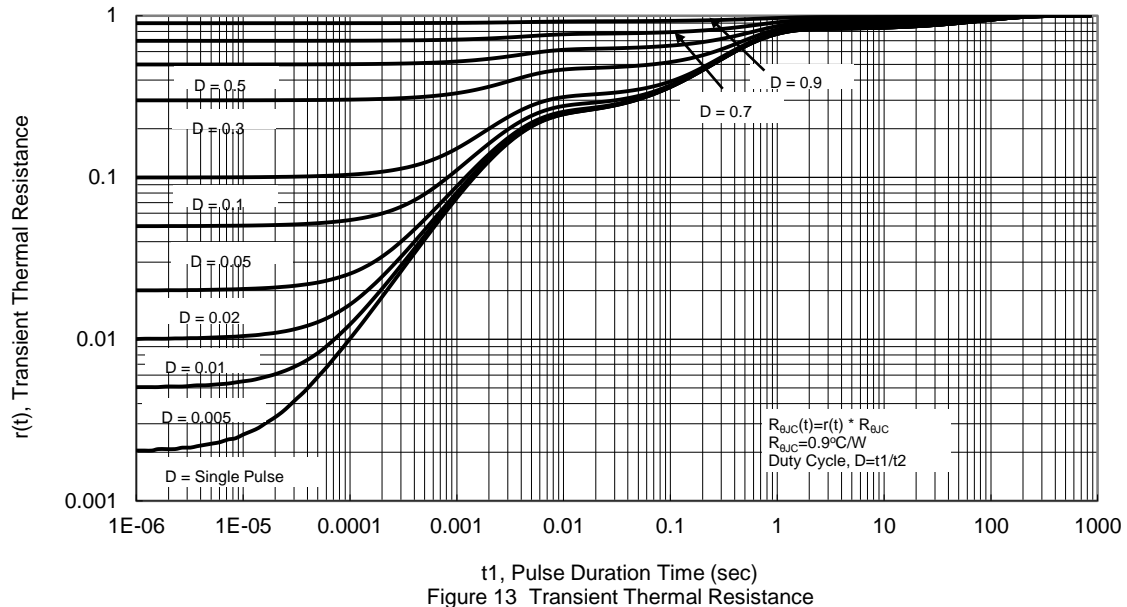
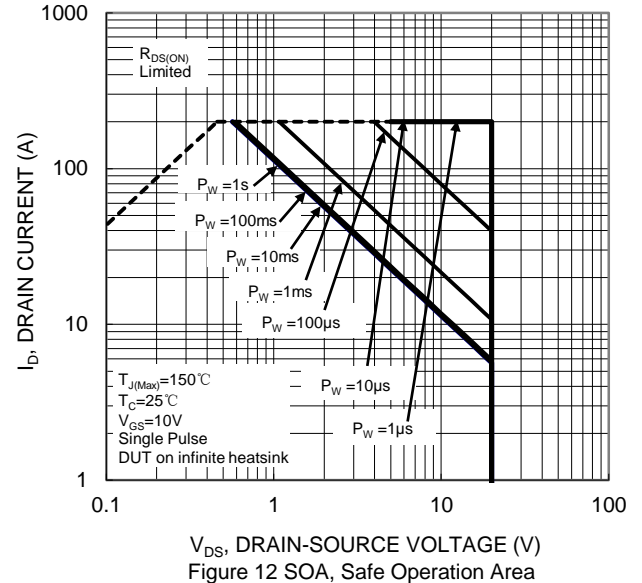
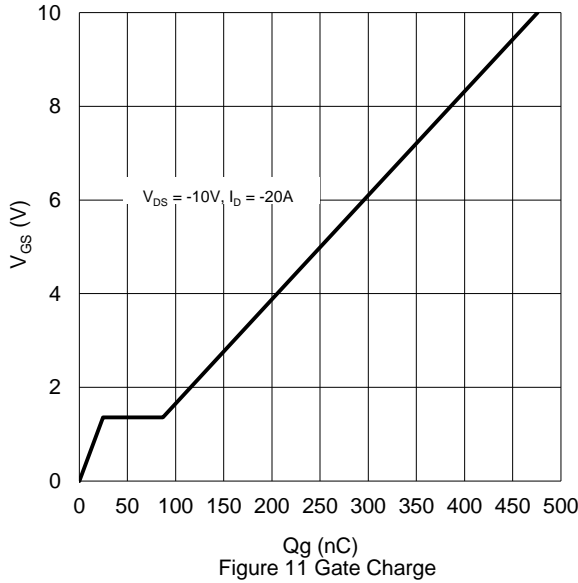
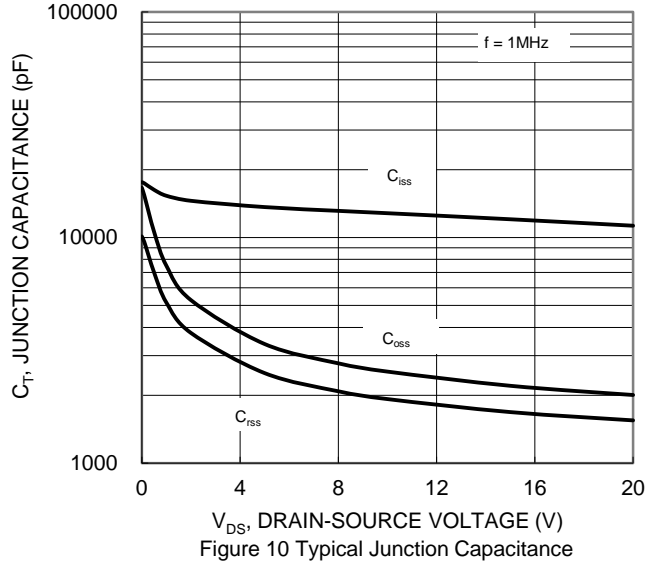
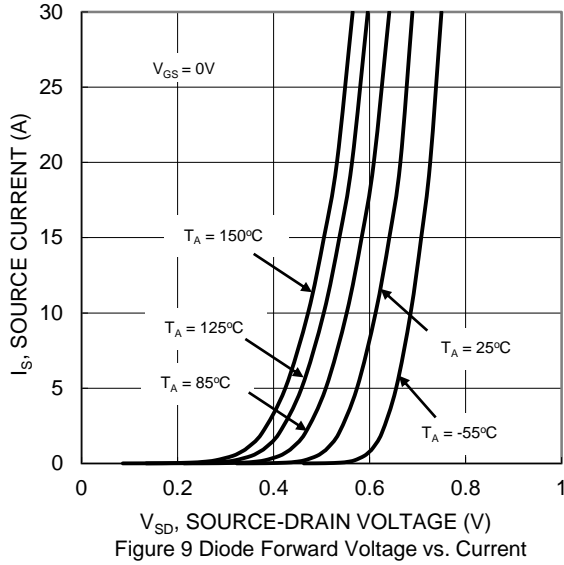
T_J , JUNCTION TEMPERATURE (°C)
Figure 6 On-Resistance Variation with Temperature



T_J , JUNCTION TEMPERATURE (°C)
Figure 7 On-Resistance Variation with Temperature

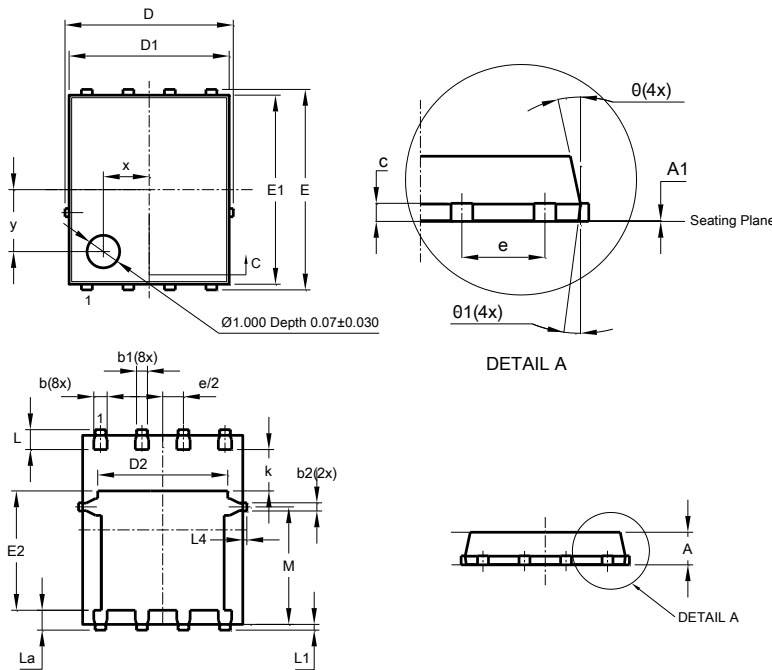


T_A , AMBIENT TEMPERATURE (°C)
Figure 8 Gate Threshold Variation vs Ambient Temperature



Package Outline Dimensions

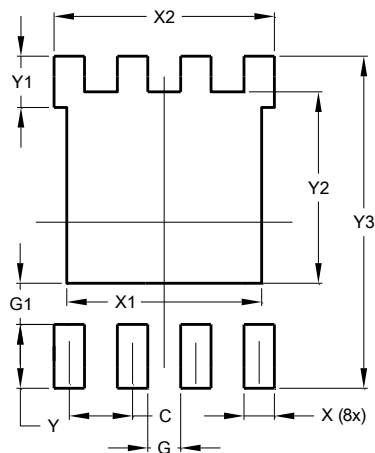
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



PowerDI5060-8 (Type K)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	-	-	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.76	3.66
E	1.27BSC		
k	-	-	1.27
L	0.51	0.71	0.61
La	0.51	0.71	0.61
L1	0.05	0.20	0.175
L4	-	-	0.125
M	3.50	3.71	3.605
x	-	-	1.400
y	-	-	1.900
θ	10°	12°	11°
θ1	6°	8°	7°
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	1.270
G	0.660
G1	0.820
X	0.610
X1	3.910
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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