

Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	I_D $T_C = +25^\circ C$
-20V	2.5mΩ @ $V_{GS} = -10V$	-60A
	3.5mΩ @ $V_{GS} = -4.5V$	-60A

Description

This new generation P-Channel Enhancement Mode MOSFET is designed to minimize $R_{DS(ON)}$ and yet maintain superior switching performance.

Applications

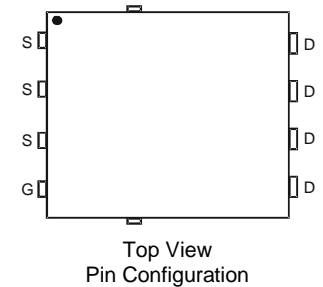
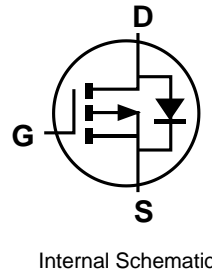
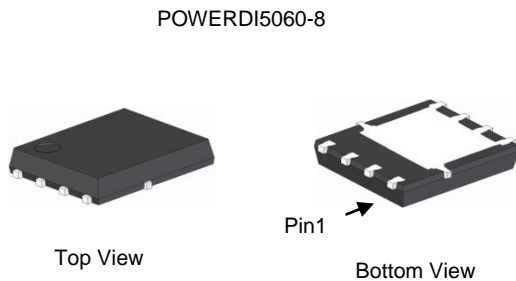
- Load Switch
- Notebook Battery Power Management

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)**

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(Ⓔ)
- Weight: 0.097 grams (Approximate)

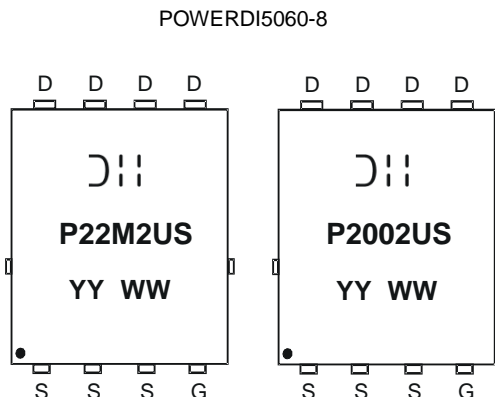


Ordering Information (Note 4)

Part Number	Case	Packaging
DMP22M2UPS-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



= Manufacturer's Marking
 P22M2US or 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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	± 12	V
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 5)	Steady State (Note 6)	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	I_D	-60 -60	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$		-42 -33.5	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-100	A
Continuous Body Diode Forward Current (Note 5)	Steady State (Note 6)	$T_C = +25^\circ\text{C}$	I_S	-60	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$		-5.6	A
Avalanche Current, $L = 0.1\text{mH}$			I_{AS}	-37	A
Avalanche Energy, $L = 0.1\text{mH}$			E_{AS}	69.8	mJ

Thermal Characteristics

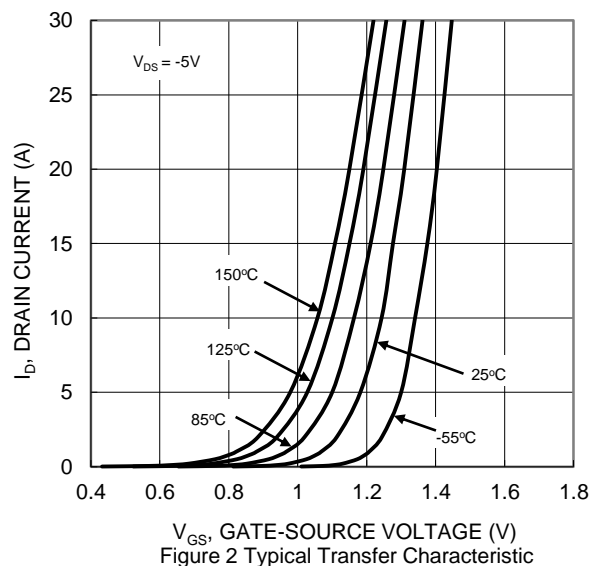
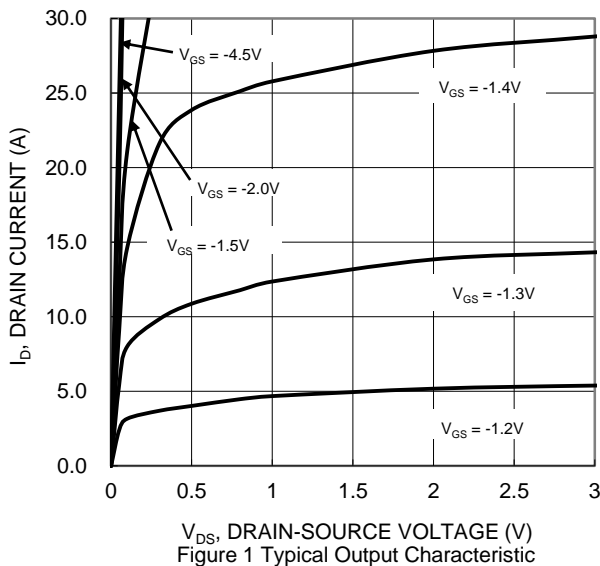
Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady State	P_D	2.3	W
	$t < 10\text{s}$		6.25	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	55	$^\circ\text{C/W}$
	$t < 10\text{s}$		20	
Total Power Dissipation (Note 5)	Steady State	P_D	104	W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	0.9	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

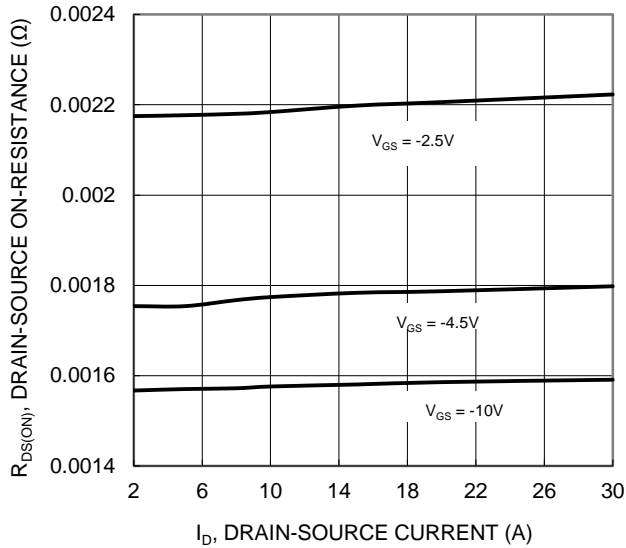
Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
6. Package limited.

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

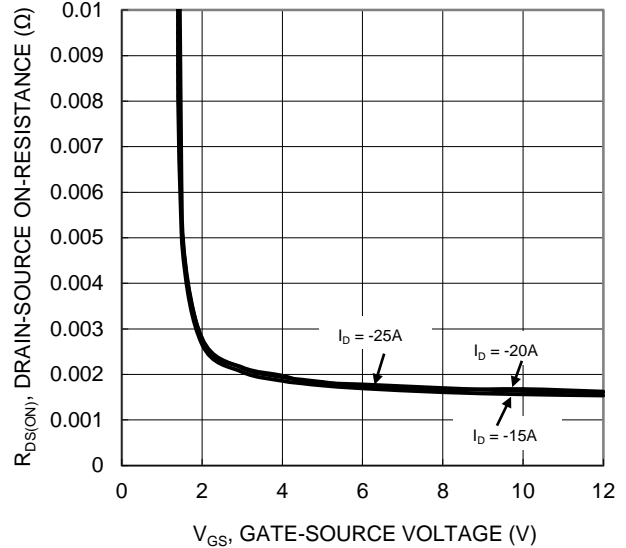
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-10	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
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)}	—	—	2.5	mΩ	V _{GS} = -10V, I _D = -25A
		—	—	3.5		V _{GS} = -4.5V, I _D = -20A
		—	—	5.0		V _{GS} = -2.5V, I _D = -15A
DYNAMIC CHARACTERISTICS (Note 8)						
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	—	4.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -10V)	Q _g	—	476	—	nC	V _{DS} = -10V, I _D = -20A
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	228	—		
Gate-Source Charge	Q _{gs}	—	24.8	—		
Gate-Drain Charge	Q _{gd}	—	61.9	—		
Turn-On Delay Time	t _{D(ON)}	—	14.2	—	ns	V _{DD} = -10V, V _{GEN} = -4.5V, R _{GEN} = 1Ω, I _D = -10A
Turn-On Rise Time	t _r	—	35.4	—		
Turn-Off Delay Time	t _{D(OFF)}	—	361	—		
Turn-Off Fall Time	t _f	—	224	—		
BODY DIODE CHARACTERISTICS						
Diode Forward Voltage	V _{SD}	—	-0.58	—	V	V _{GS} = 0V, I _S = -5A
Reverse Recovery Time (Note 8)	t _{RR}	—	137	—	ns	I _F = -10A, di/dt = 100A/μs
Reverse Recovery Charge (Note 8)	Q _{rr}	—	221	—	nC	
Reverse Recovery Fall Time (Note 8)	t _a	—	39	—	ns	
Reverse Recovery Raise Time (Note 8)	t _b	—	98	—		

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

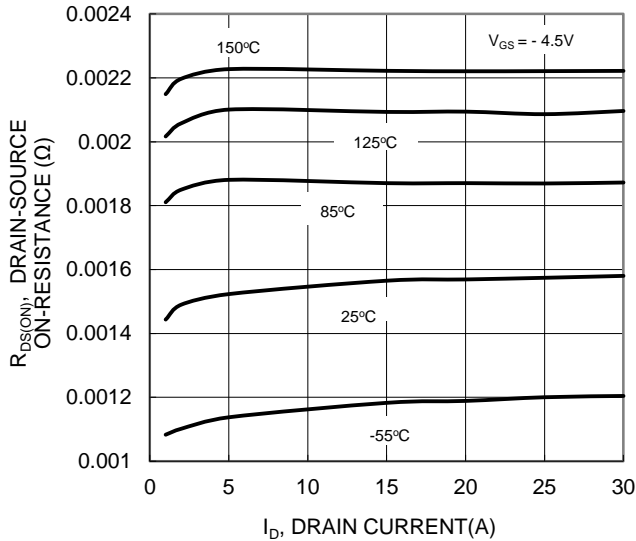




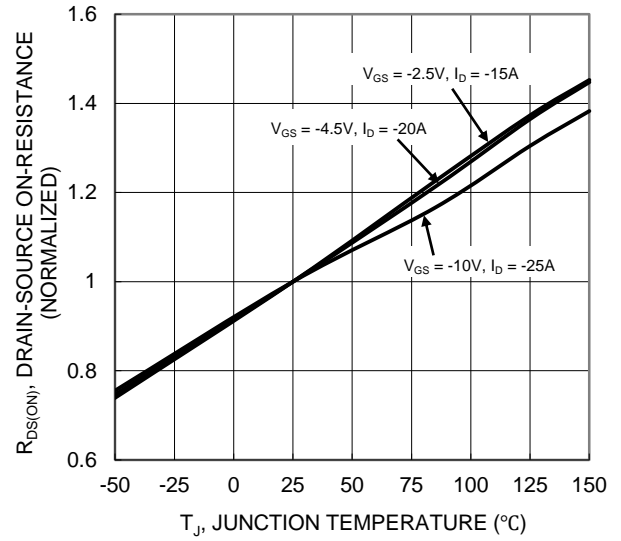
I_D , DRAIN-CURRENT (A)
Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage



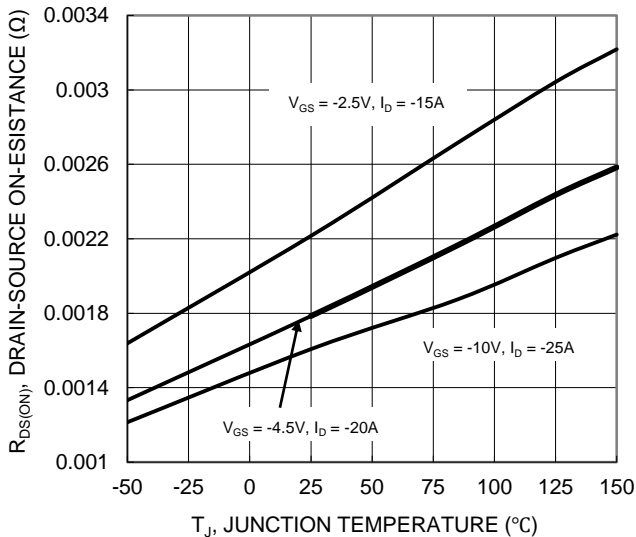
V_{GS} , GATE-SOURCE VOLTAGE (V)
Figure 4 Typical Transfer Characteristic



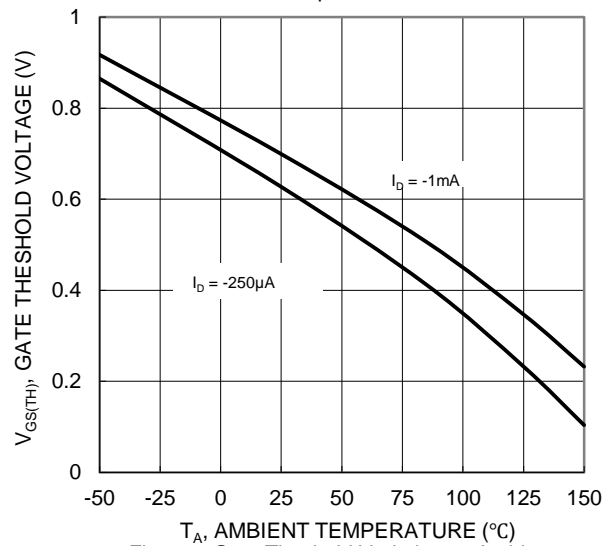
I_D , DRAIN CURRENT (A)
Figure 5 Typical On-Resistance vs. Drain Current and Temperature



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

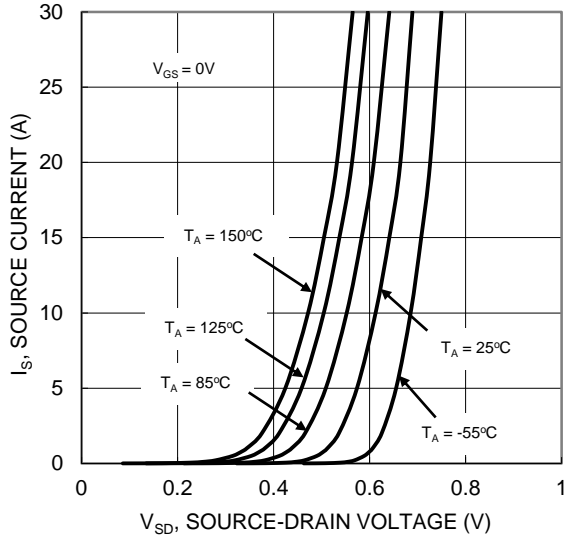


Figure 9 Diode Forward Voltage vs. Current

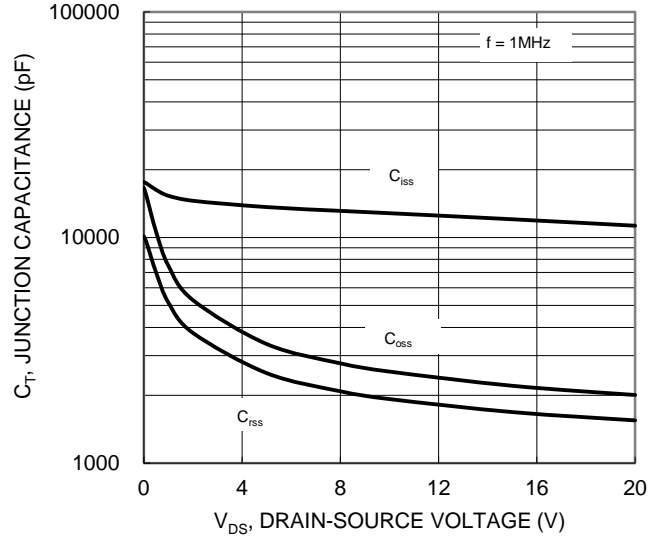


Figure 10 Typical Junction Capacitance

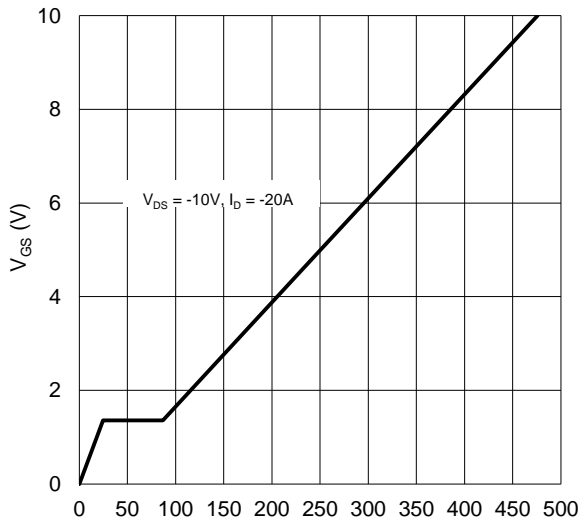


Figure 11 Gate Charge

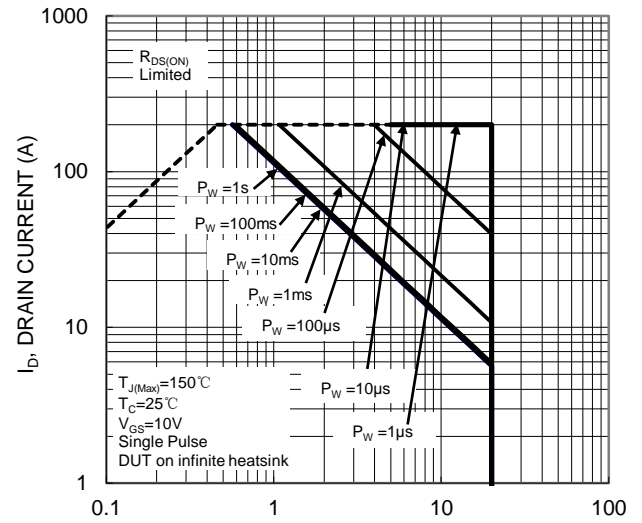


Figure 12 SOA, Safe Operation Area

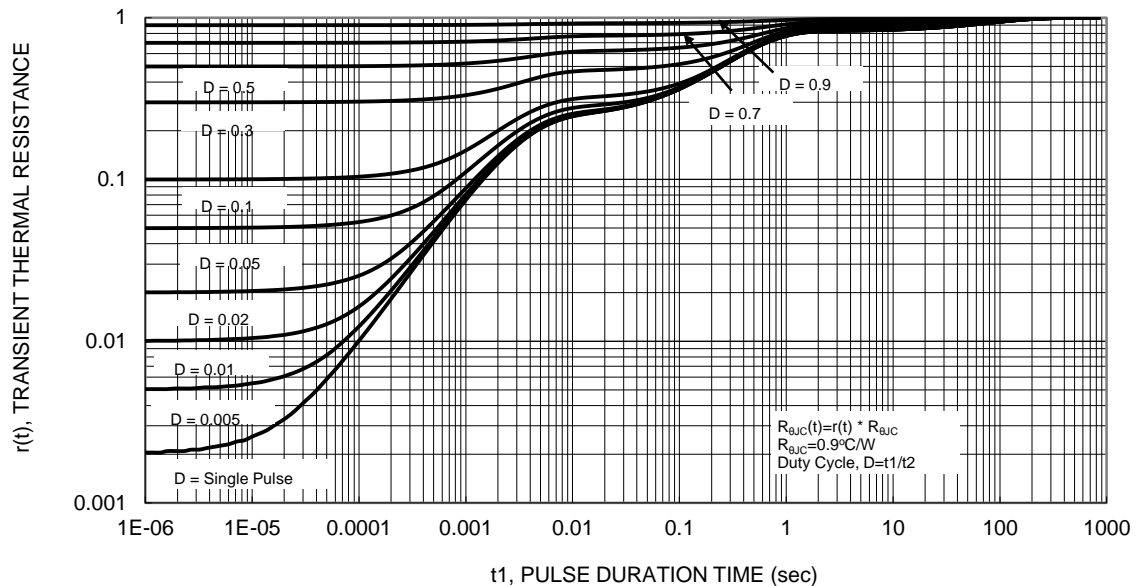
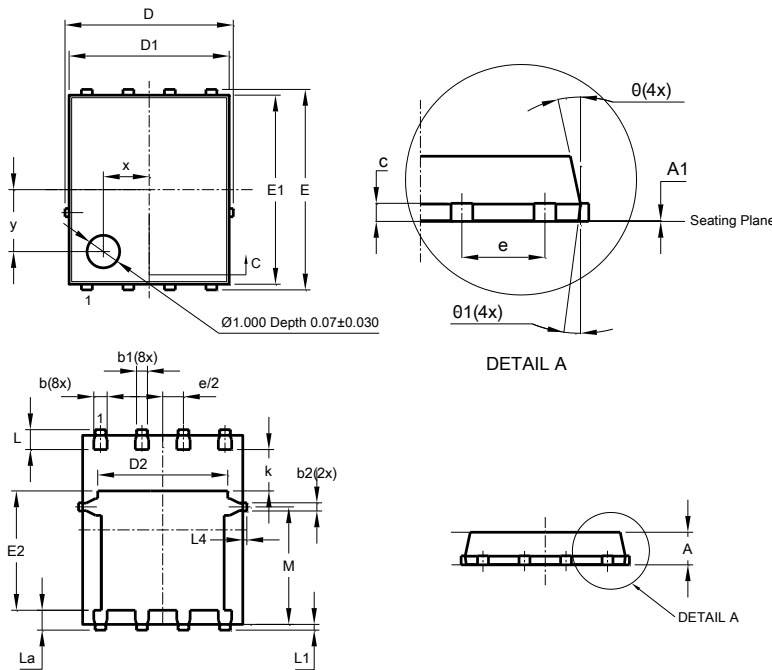


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

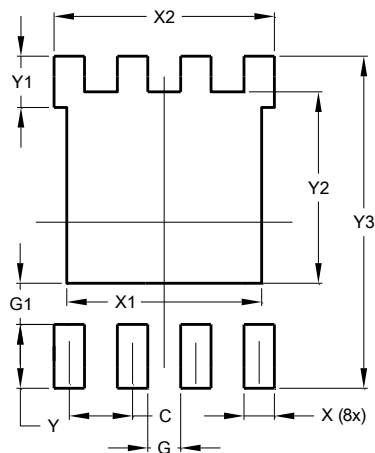
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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