

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D $T_C = +25^\circ C$
-20V	2.2m Ω @ $V_{GS} = -10V$	-150A
	2.55m Ω @ $V_{GS} = -4.5V$	-120A
	4.0m Ω @ $V_{GS} = -2.5V$	-90A

Description

This new generation 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

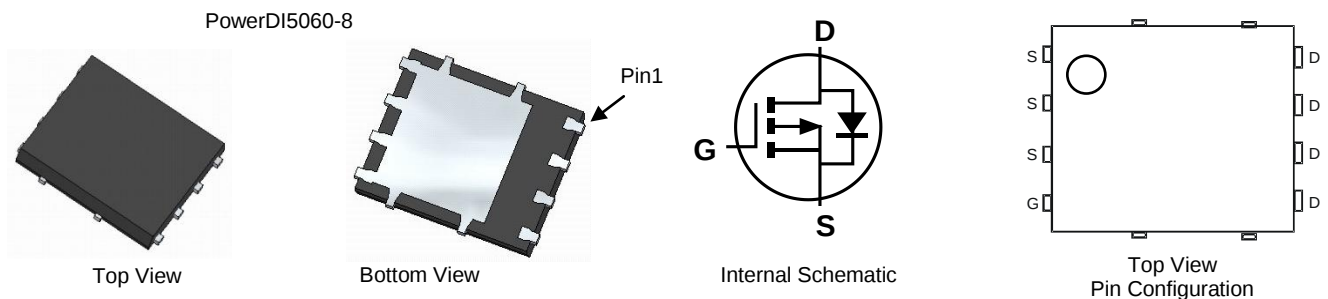
- Switch

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)**

Mechanical Data

- Case: PowerDI[®] 5060-8
- 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)

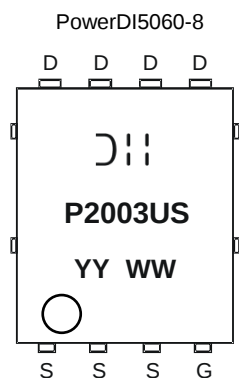


Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2003UPS-13	PowerDI5060-8	2,500 / Tape & Reel

- Notes:
- EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



 = Manufacturer's Marking
 P2003US = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 17 = 2017)
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	-20	V
Gate-Source Voltage	V _{GSS}	±12	V
Continuous Drain Current, V _{GS} = -10V (Note 7)	I _D	T _C = +25°C -150 T _C = +70°C -120	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)	I _{DM}	-350	A
Maximum Continuous Body Diode Forward Current (Note 7)	I _S	-120	A
Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%)	I _{SM}	-350	A
Avalanche Current, L = 0.1mH (Note 8)	I _{AS}	-32	A
Avalanche Energy, L = 0.1mH (Note 8)	E _{AS}	67	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	1.4	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	90	°C/W
Total Power Dissipation (Note 6)	P _D	2.7	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	46	°C/W
Total Power Dissipation (Note 7)	P _D	80	W
Thermal Resistance, Junction to Case (Note 7)	R _{θJC}	1.5	°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 9)						
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} = -16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
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)}	—	1.7	2.2	mΩ	V _{GS} = -10V, I _D = -25A
		—	1.9	2.55		V _{GS} = -4.5V, I _D = -20A
		—	2.5	4.0		V _{GS} = -2.5V, I _D = -15A
Diode Forward Voltage	V _{SD}	—	-0.6	-1.1	V	V _{GS} = 0V, I _S = -5A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{ISS}	—	8352	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{OSS}	—	1406	—	pF	
Reverse Transfer Capacitance	C _{RSS}	—	599	—	pF	
Gate Resistance	R _g	—	13.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	79	—	nC	V _{DS} = -10V, I _D = -20A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	177	—	nC	
Gate-Source Charge	Q _{gs}	—	14.3	—	nC	
Gate-Drain Charge	Q _{gd}	—	19.8	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	7.8	—	ns	V _{DD} = -10V, V _{GEN} = -4.5V, R _{GEN} = 1Ω, I _D = -10A
Turn-On Rise Time	t _r	—	4.9	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	377	—	ns	
Turn-Off Fall Time	t _f	—	189	—	ns	I _F = -10A, di/dt = 100A/μs
Reverse Recovery Time	t _{RR}	—	49	—	ns	
Reverse Recovery Charge	Q _{RR}	—	39	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

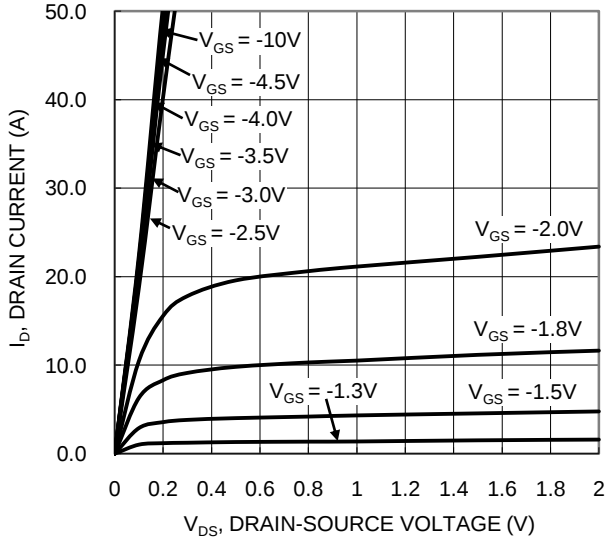


Figure 1. Typical Output Characteristic

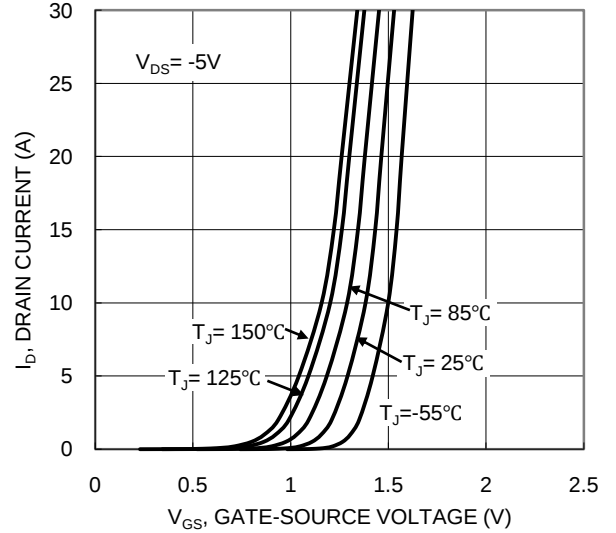


Figure 2. Typical Transfer Characteristic

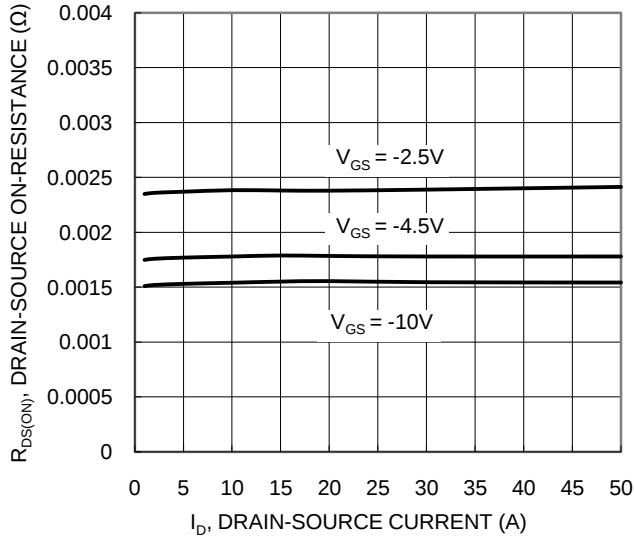


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

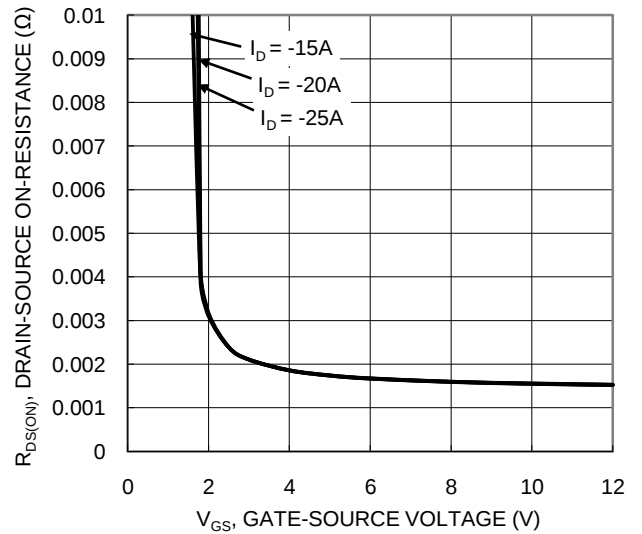


Figure 4. Typical Transfer Characteristic

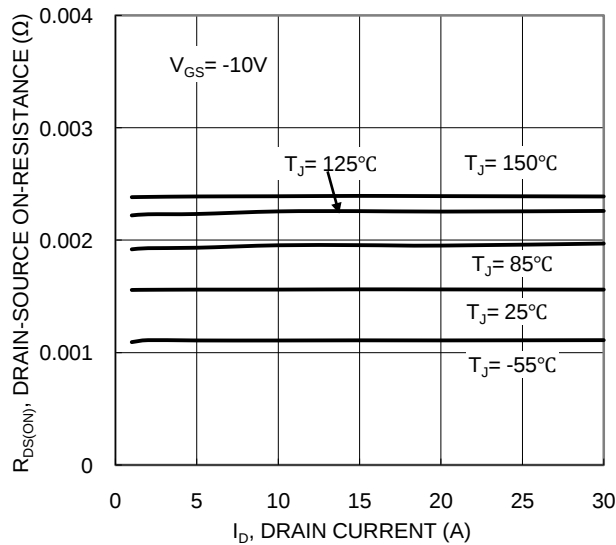


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

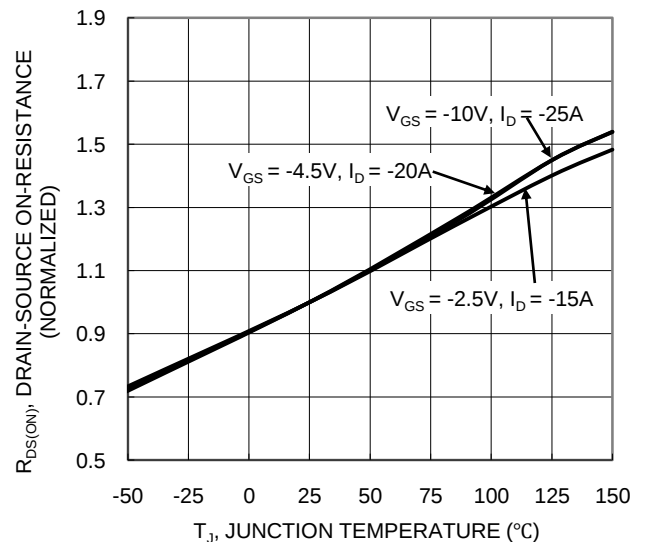
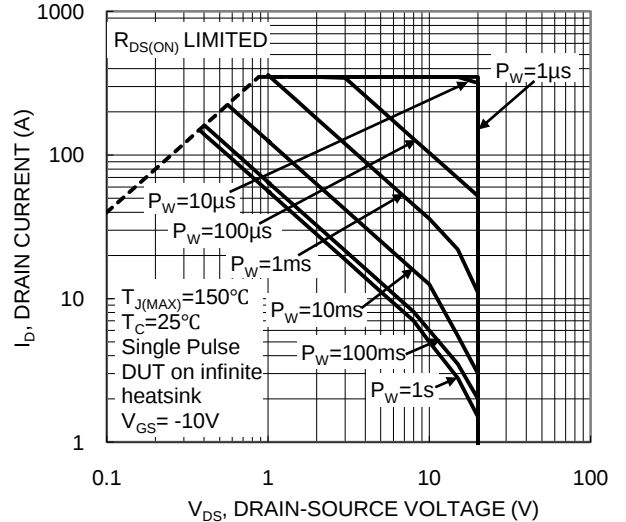
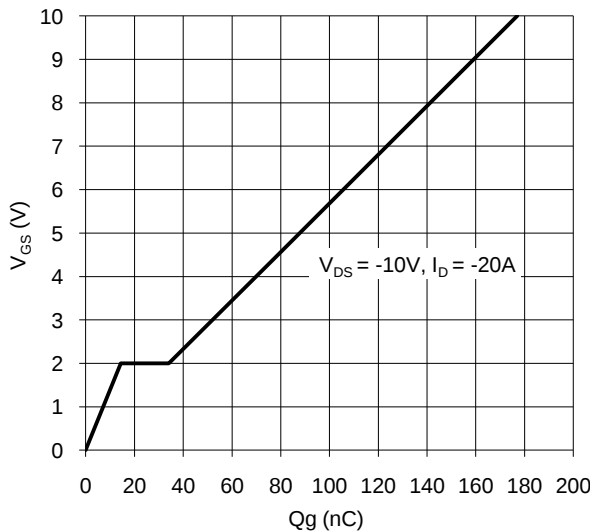
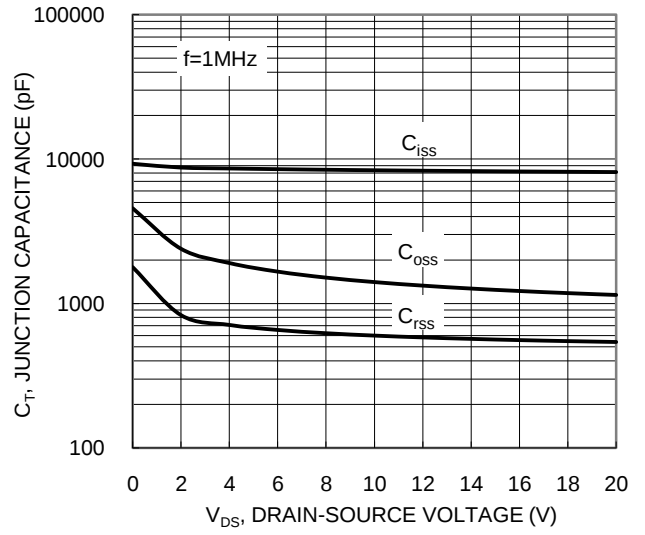
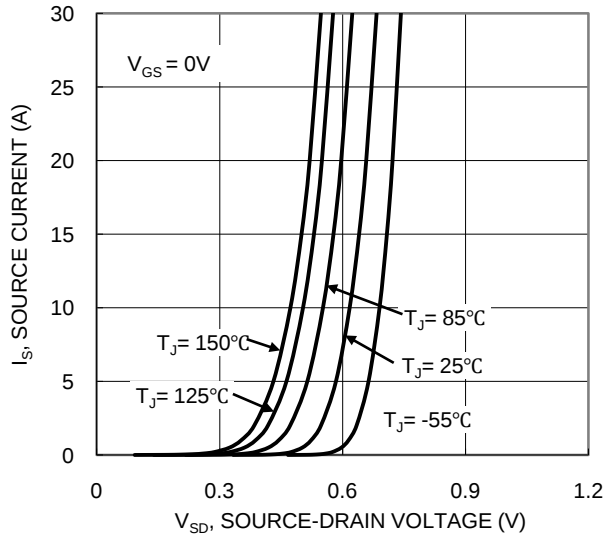
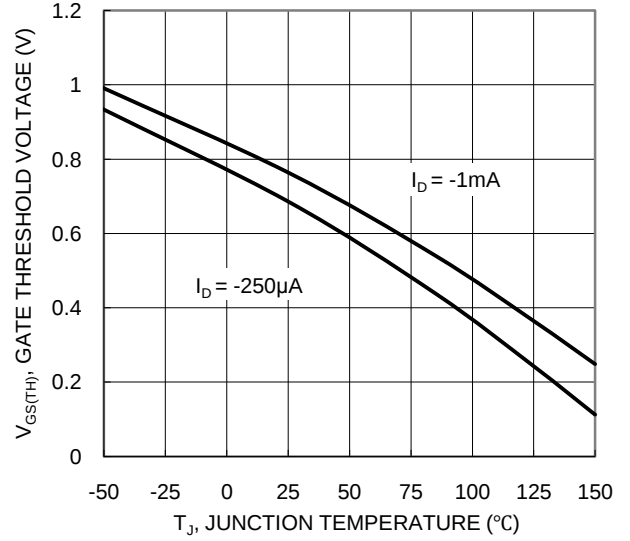
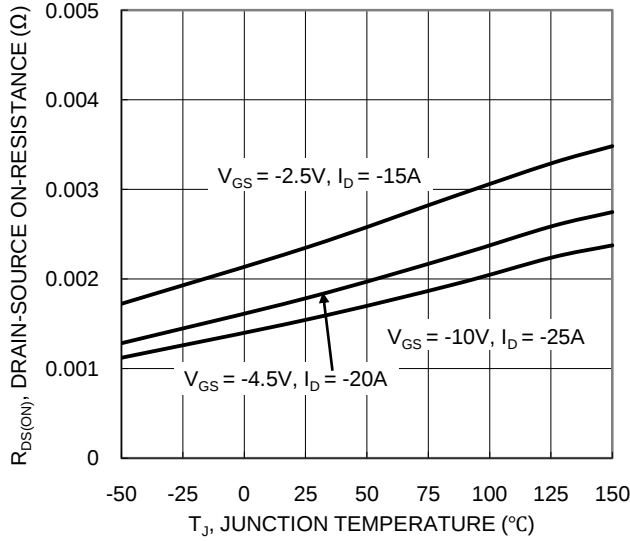


Figure 6. On-Resistance Variation with Junction Temperature



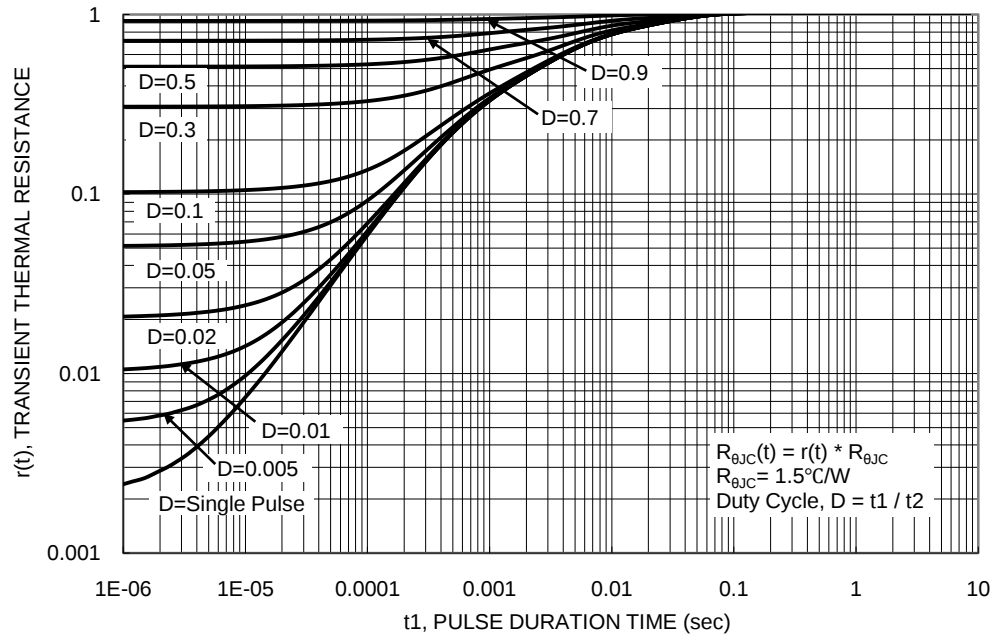
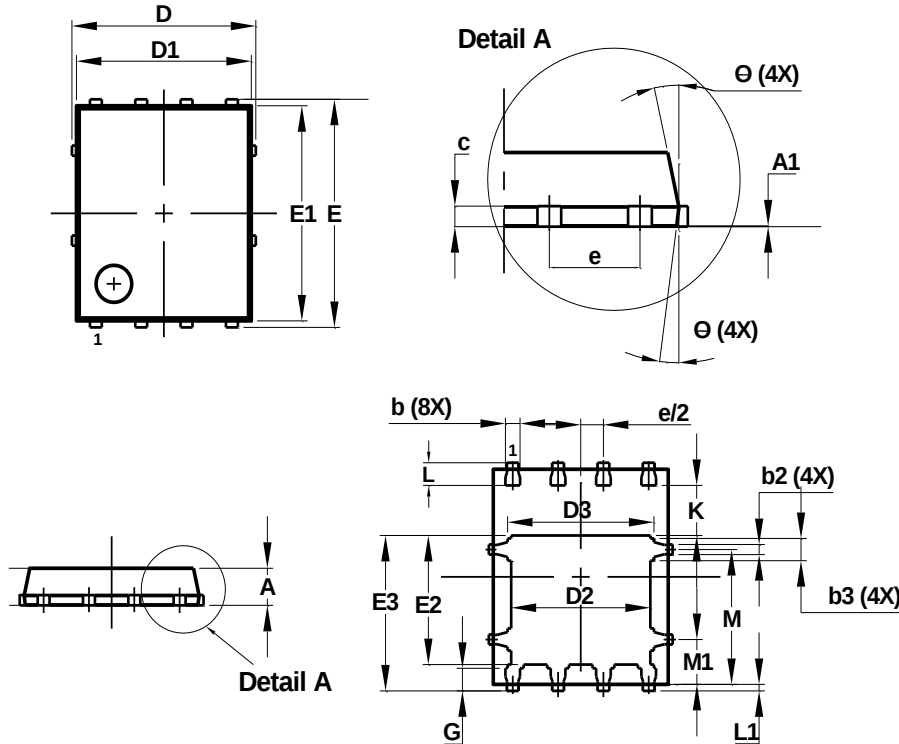


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8

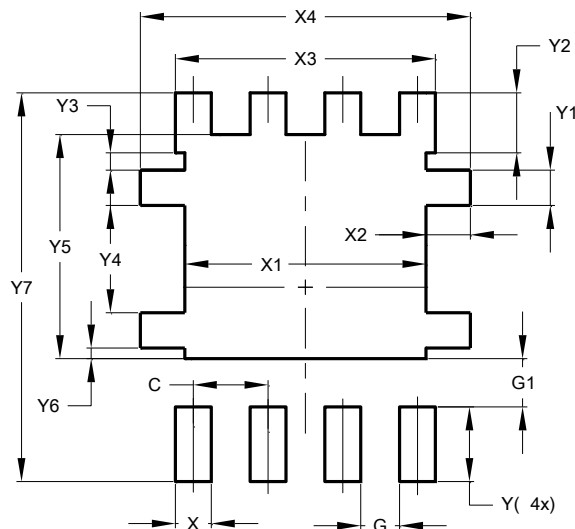


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	—
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
K	0.51	—	—
L	0.51	0.71	0.61
L1	0.100	0.200	0.175
M	3.235	4.035	3.635
M1	1.00	1.40	1.21
θ	10°	12°	11°
θ 1	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610

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