



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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企业微信二维码



企业QQ二维码

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub> T <sub>C</sub> = +25°C
60V	7.9mΩ @ V <sub>GS</sub> = 10V	69.2A
	10.8mΩ @ V <sub>GS</sub> = 4.5V	59.2A

## Features and Benefits

- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low R<sub>DS(ON)</sub>—Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- ESD Protected Gate

## Description and Applications

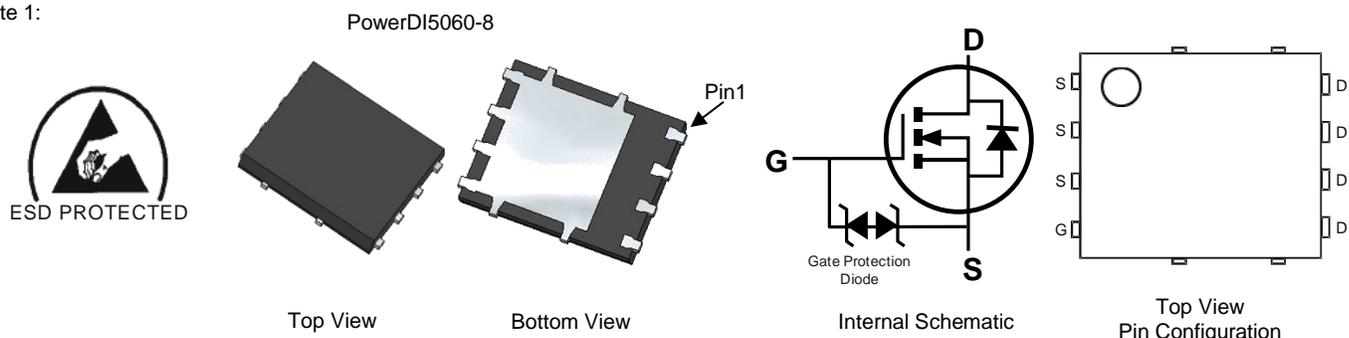
This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- Synchronous rectifiers
- DC-DC converters
- Power managements

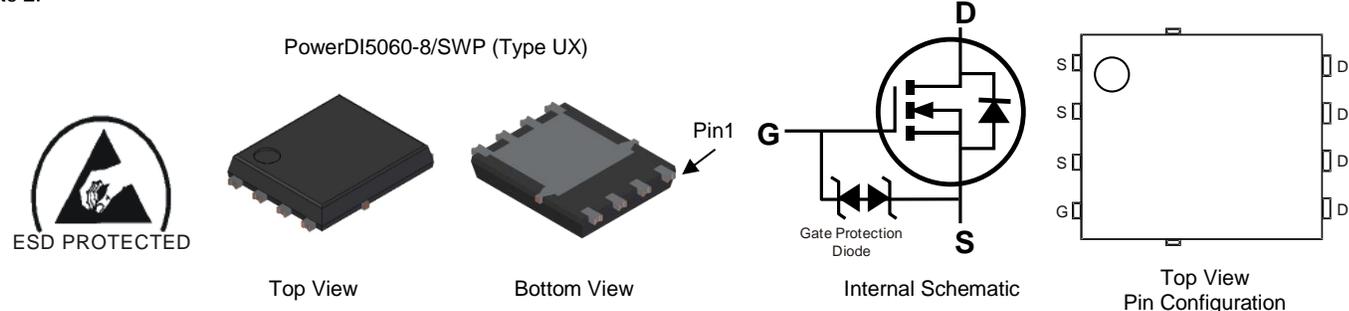
## Mechanical Data

- Package: PowerDI®5060-8
- Package 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)

Site 1:



Site 2:



- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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.

### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	60	V	
Gate-Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	14.1 11.2	A
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V		T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	69.2 55.4	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	270	A	
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	69	A	
Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	270	A	
Avalanche Current, L = 0.1mH	I <sub>AS</sub>	28.1	A	
Avalanche Energy, L = 0.1mH	E <sub>AS</sub>	39.5	mJ	

### Thermal Characteristics

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = +25°C	2.4	W
Thermal Resistance, Junction to Ambient (Note 5)		R <sub>θJA</sub>	53	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>C</sub> = +25°C	56.8	W
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	2.2	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

Notes: 5. Device mounted on FR-4 substrate PCB, 2oz copper, with 1inch square copper plate.  
 6. Thermal resistance from junction to soldering point (on the exposed drain pad).

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	5.9	7.9	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A
		—	7.8	10.8		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 20A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	2078	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	605	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	44	—		
Gate Resistance	R <sub>g</sub>	—	1.71	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	14.4	—	nC	V <sub>DS</sub> = 30V, I <sub>D</sub> = 20A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	30	—		
Gate-Source Charge	Q <sub>gs</sub>	—	4.1	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	6.7	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.2	—	ns	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A, R <sub>G</sub> = 3.3Ω
Turn-On Rise Time	t <sub>r</sub>	—	9.6	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	20.5	—		
Turn-Off Fall Time	t <sub>f</sub>	—	8.9	—		
Reverse Recovery Time	t <sub>RR</sub>	—	32.5	—	ns	I <sub>F</sub> = 20A, di/dt = 100A/μs
Reverse Recovery Charge	Q <sub>RR</sub>	—	22.8	—	nC	

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

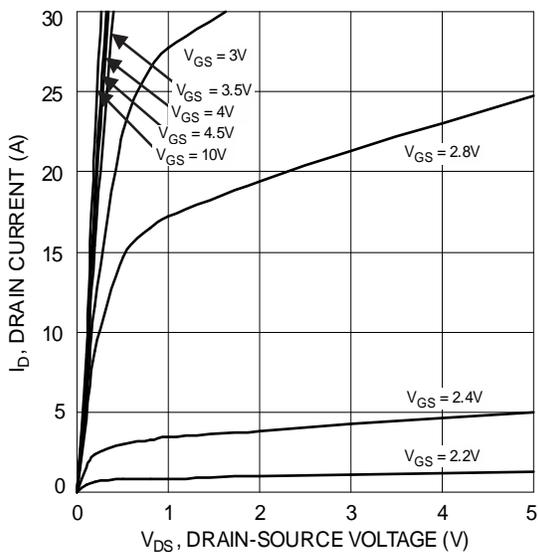


Figure 1 Typical Output Characteristic

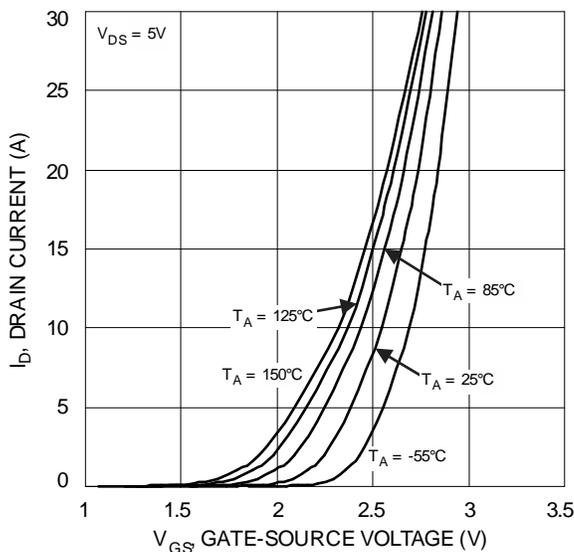


Figure 2 Typical Transfer Characteristics

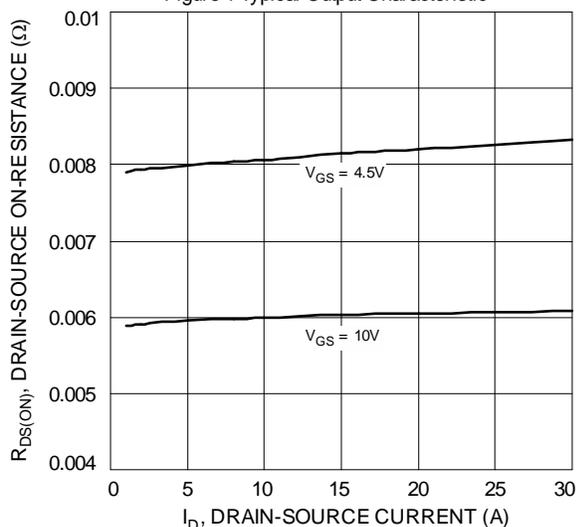


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

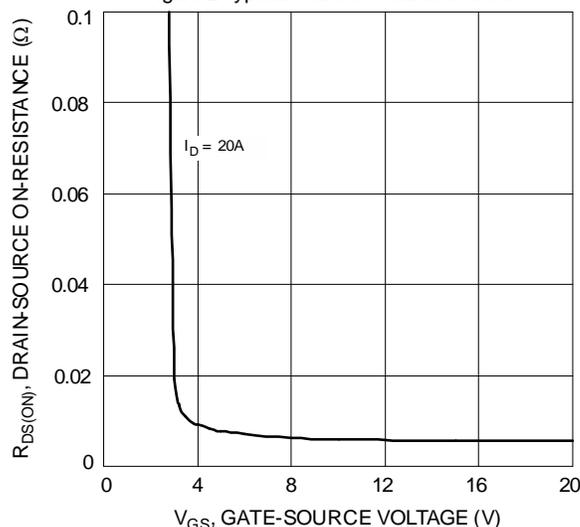


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

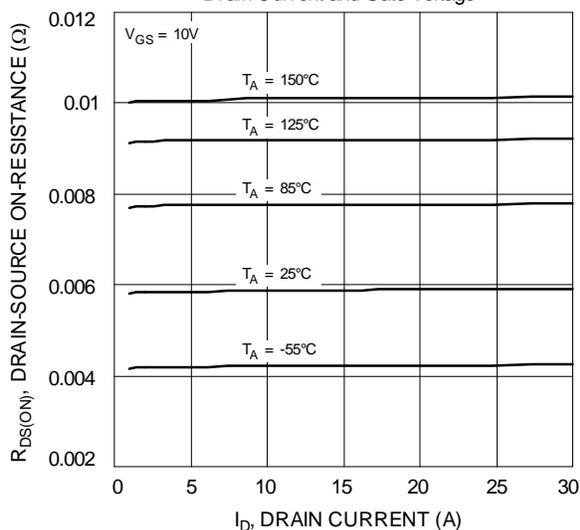


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

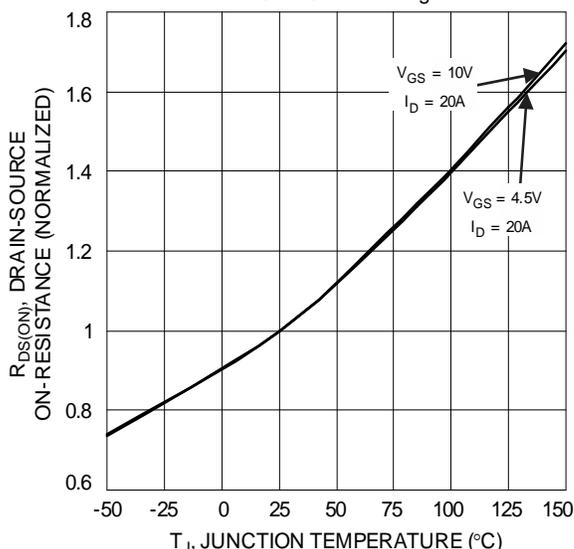
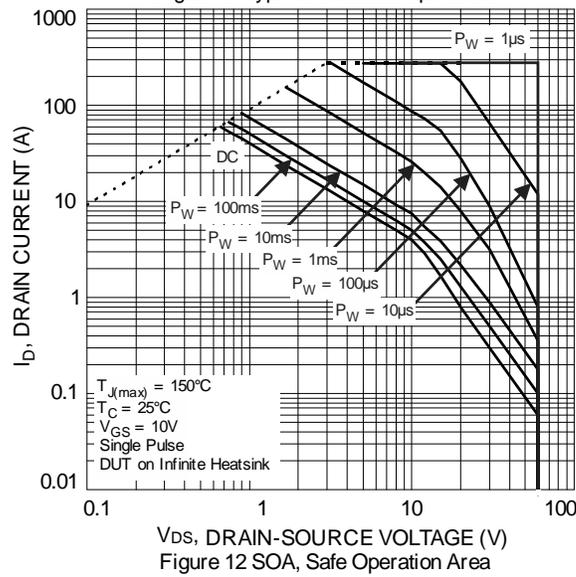
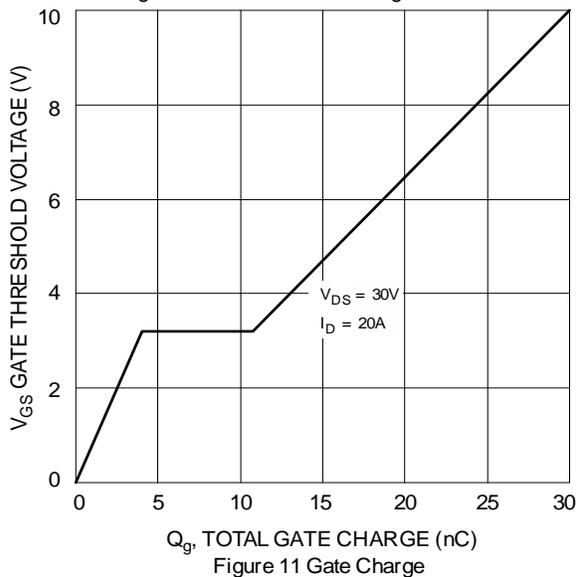
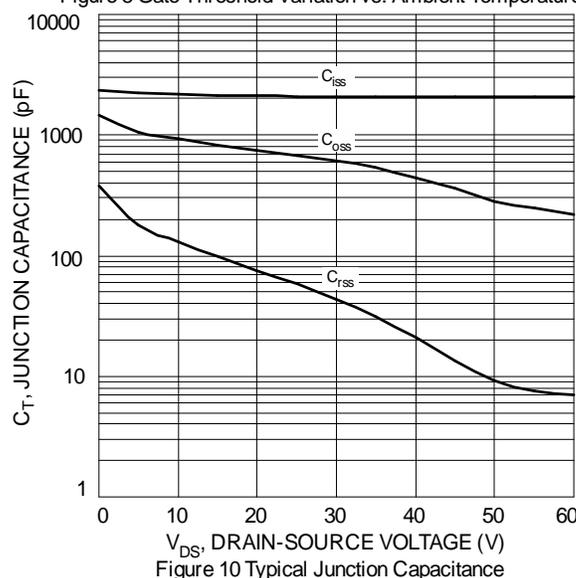
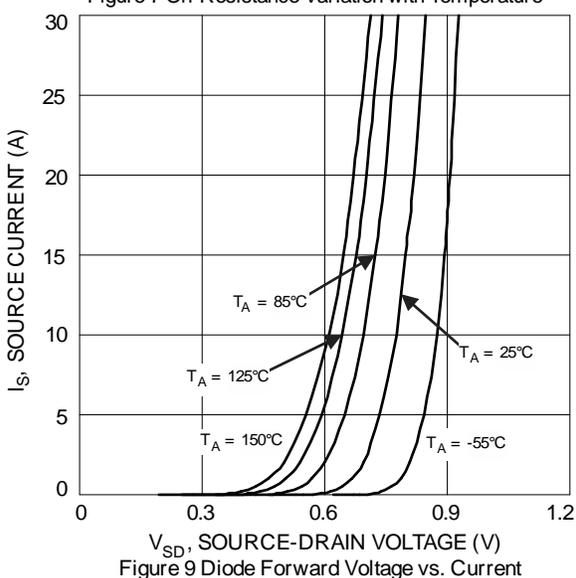
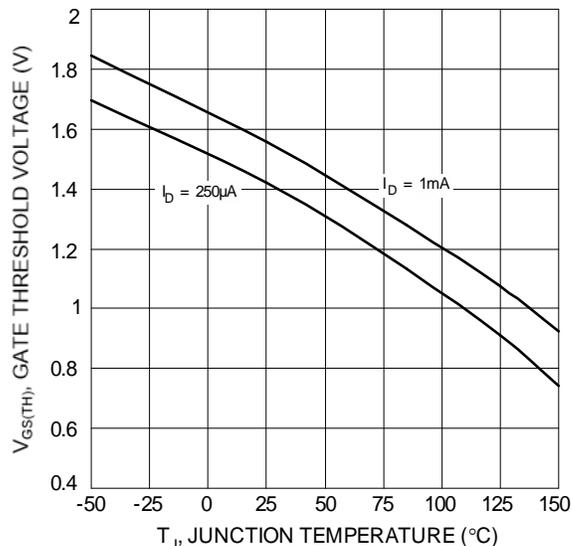
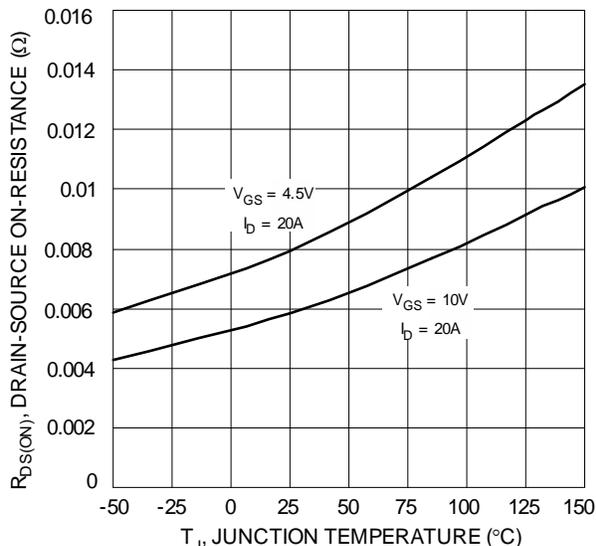
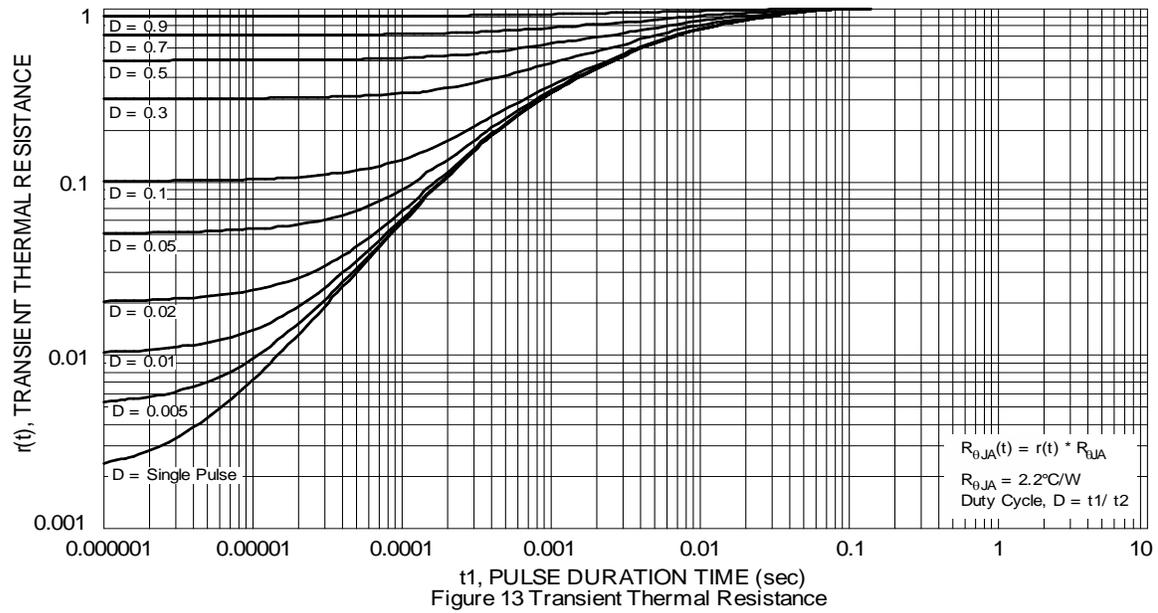


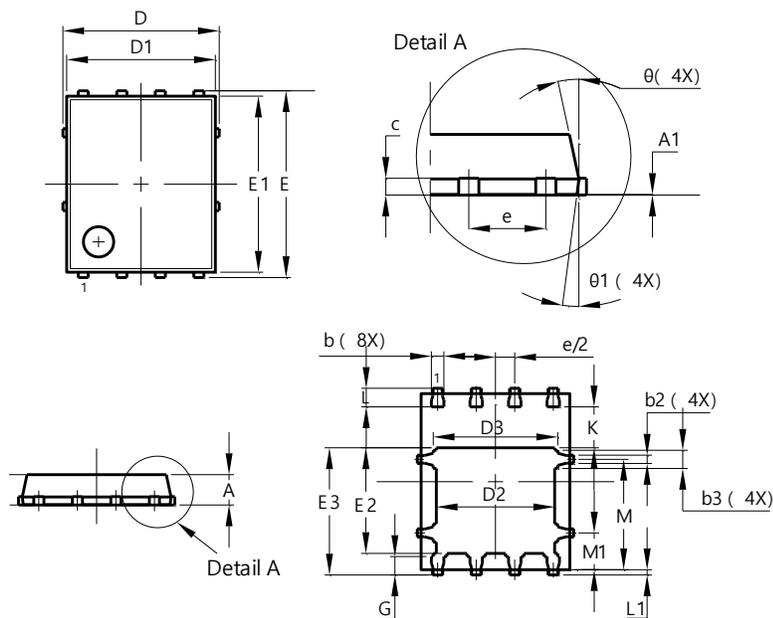
Figure 6 On-Resistance Variation with Temperature





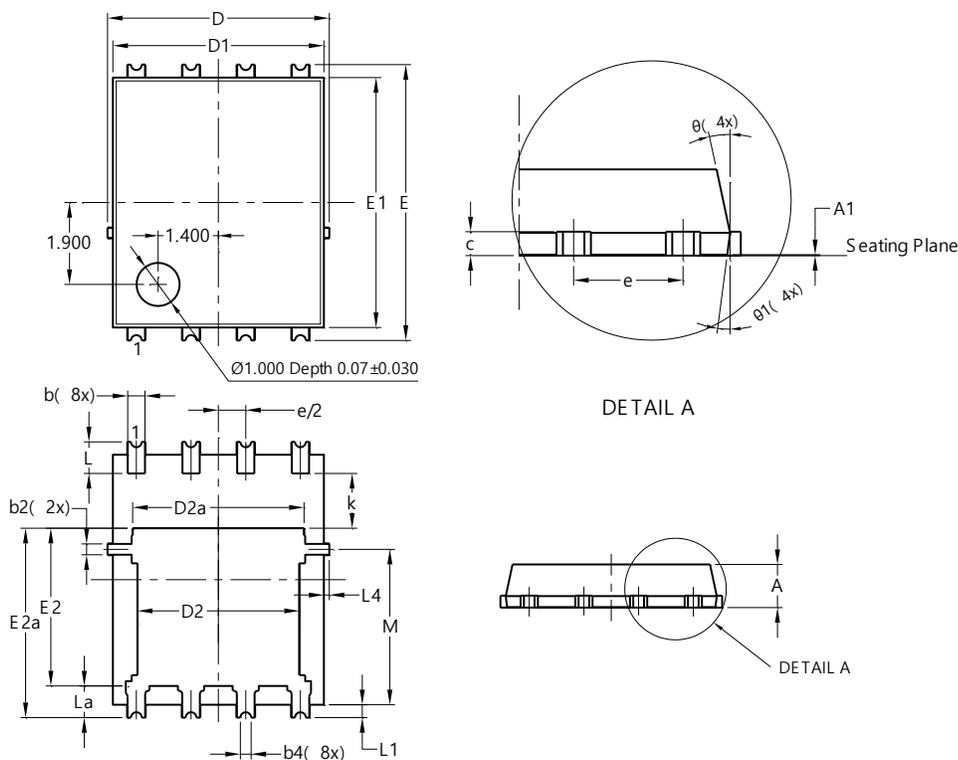
**Package Outline Dimensions**

Site 1:

**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°
θ1	6°	8°	7°
All Dimensions in mm			

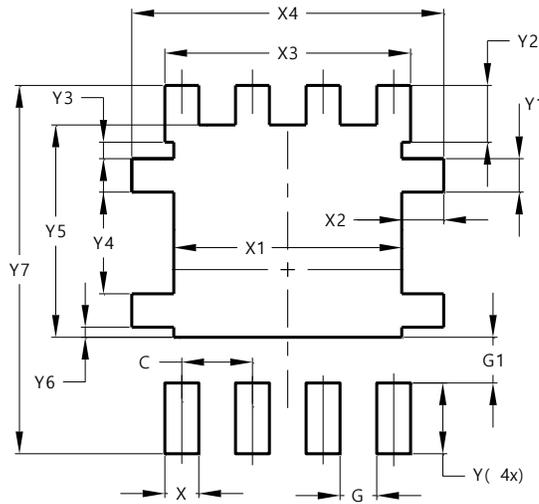
Site 2:

**PowerDI5060-8/SWP (Type UX)**


PowerDI5060-8/SWP (Type UX)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
L1a	0.050REF		
L4	0.025	0.225	0.125
M	3.205	4.005	3.605
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

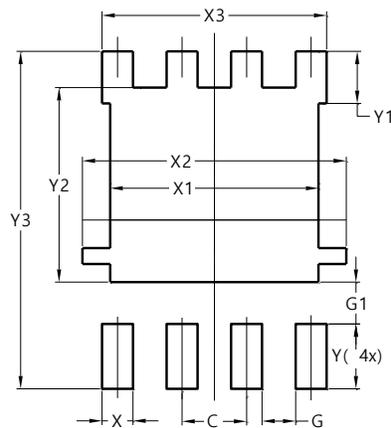
## Suggested Pad Layout

Site 1:

**PowerDI5060-8**


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

Site 2:

**PowerDI5060-8/SWP (Type UX)**


Dimensions	Value (in mm)
<b>C</b>	1.270
<b>G</b>	0.660
<b>G1</b>	0.820
<b>X</b>	0.610
<b>X1</b>	4.100
<b>X2</b>	5.190
<b>X3</b>	4.420
<b>Y</b>	1.270
<b>Y1</b>	1.020
<b>Y2</b>	3.810
<b>Y3</b>	6.610