



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**

0755-83047638  
ysbdt@szyoushang.cn  
www.szyoushang.cn



企业微信二维码



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## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
100V	14.5mΩ @ V <sub>GS</sub> = 10V	53A
	19.5mΩ @ V <sub>GS</sub> = 6V	47A

## Description

This new generation N-Channel Enhancement Mode MOSFET is designed to minimize R<sub>DS(ON)</sub> yet maintain superior switching performance. This device is ideal for use in notebook battery power management and load switch.

## Applications

- Motor controls
- DC-DC converters
- Power managements

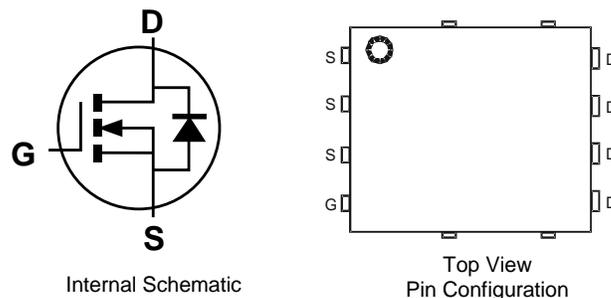
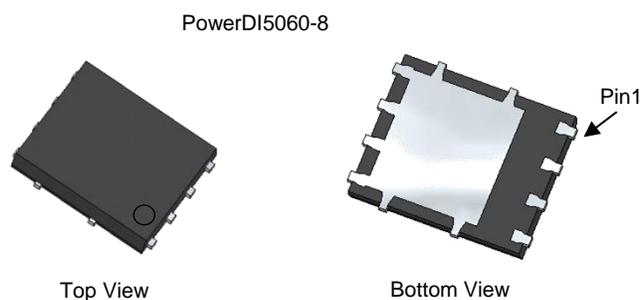
## Features

- 100% Unclamped Inductive Switching (UIS) Test in Production—Ensures More Reliable and Robust End Application
- Thermally Efficient Package—Cooler Running Applications
- High Conversion Efficiency
- Low R<sub>DS(ON)</sub>—Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed

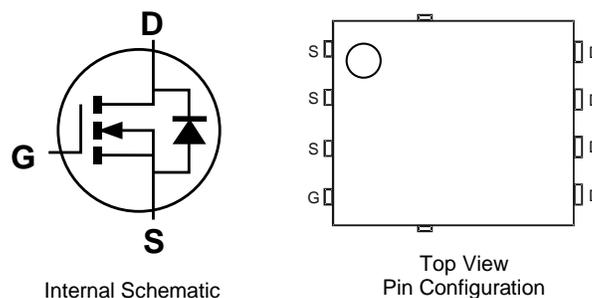
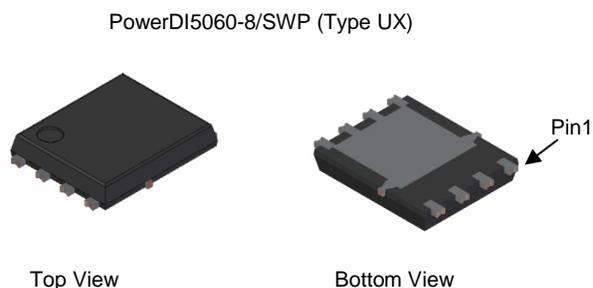
## Mechanical Data

- Package: PowerDI<sup>®</sup>5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208<sup>③</sup>
- Weight: 0.097 grams (Approximate)

Site 1:



Site 2:



### Maximum Ratings

 (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DS}$	100	V
Gate-Source Voltage			$V_{GS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$	$I_D$	53	A
		$T_C = +70^\circ\text{C}$		43	
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	120	A
Maximum Continuous Body Diode Forward Current (Note 6)			$I_S$	53	A
Avalanche Current (Note 7), $L = 3\text{mH}$			$I_{AS}$	7.5	A
Avalanche Energy (Note 7), $L = 3\text{mH}$			$E_{AS}$	85	mJ
Avalanche Current, $L = 0.1\text{mH}$			$I_{AS}$	15.8	A
Avalanche Energy, $L = 0.1\text{mH}$			$E_{AS}$	12.5	mJ

### Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	2.3	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	55	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$T_C = +25^\circ\text{C}$	$P_D$	78	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	1.6	$^\circ\text{C/W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  6. Thermal resistance from junction to soldering point (on the exposed drain pad).
  7. Guaranteed by design. Not subject to product testing.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 8)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	100	—	—	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> = 80V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	2	—	4	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	11.3	14.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A
		—	14.7	19.5		V <sub>GS</sub> = 6V, I <sub>D</sub> = 20A
Diode Forward Voltage	V <sub>SD</sub>	—	0.9	1.3	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A
<b>DYNAMIC CHARACTERISTICS</b> (Note 7)						
Input Capacitance	C <sub>iss</sub>	—	2343	—	pF	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	487	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	26	—		
Gate Resistance	R <sub>g</sub>	—	0.69	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	—	30.1	—	nC	V <sub>DD</sub> = 50V, I <sub>D</sub> = 10A, V <sub>GS</sub> = 10V
Gate-Source Charge	Q <sub>gs</sub>	—	7.5	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	6.5	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	9.8	—	ns	V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A, R <sub>g</sub> = 6Ω
Turn-On Rise Time	t <sub>r</sub>	—	7.8	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	22.5	—		
Turn-Off Fall Time	t <sub>f</sub>	—	9.6	—		
Reverse Recovery Time	t <sub>RR</sub>	—	43.1	—	ns	I <sub>F</sub> = 10A, di/dt = 100A/μs
Reverse Recovery Charge	Q <sub>RR</sub>	—	65.1	—	nC	

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

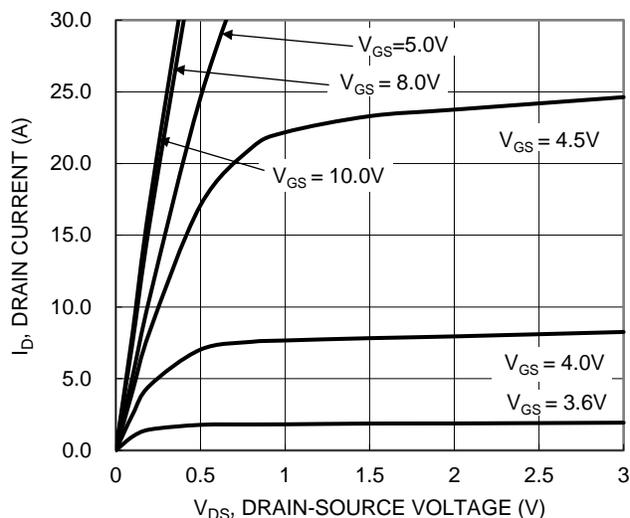


Figure 1. Typical Output Characteristic

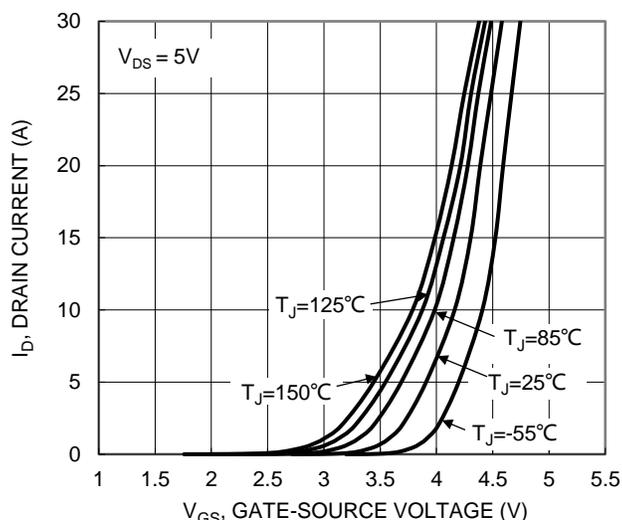


Figure 2. Typical Transfer Characteristic

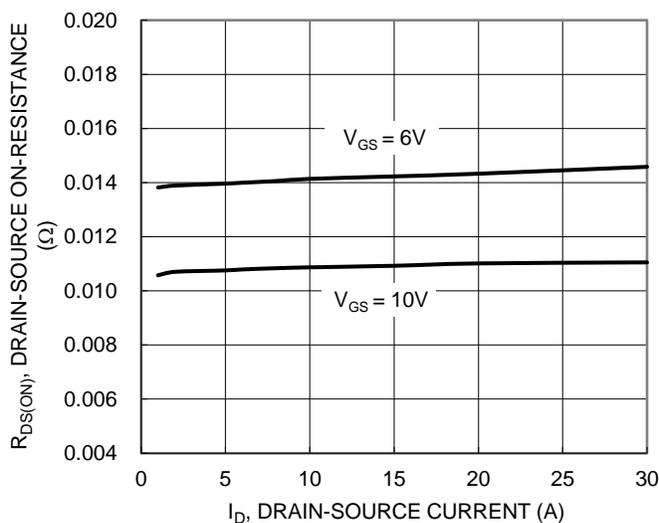


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

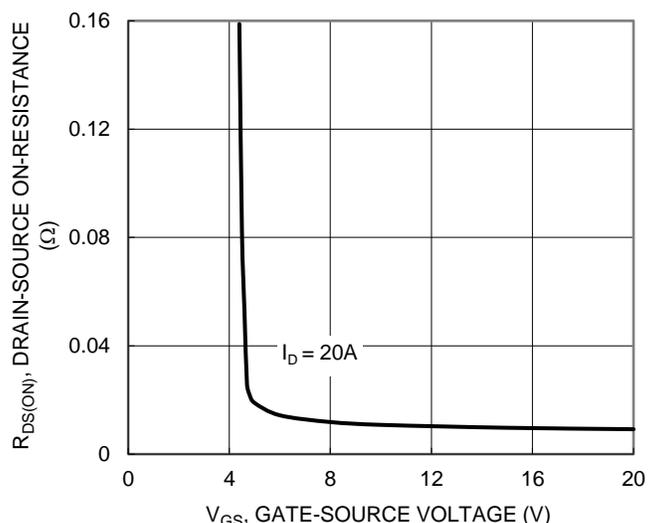


Figure 4. Typical Transfer Characteristic

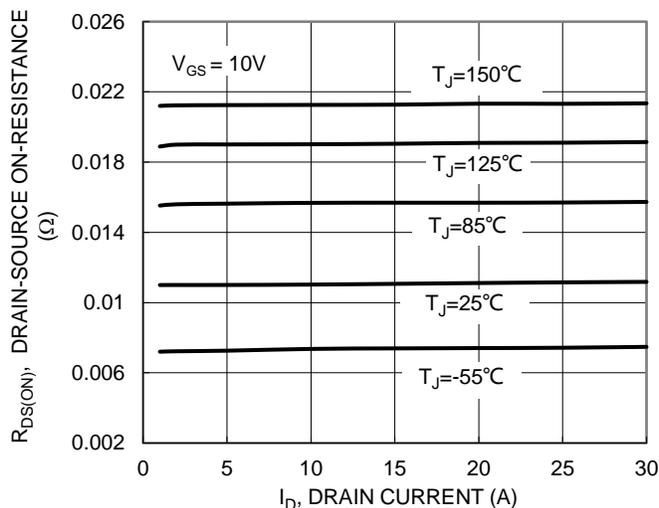


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

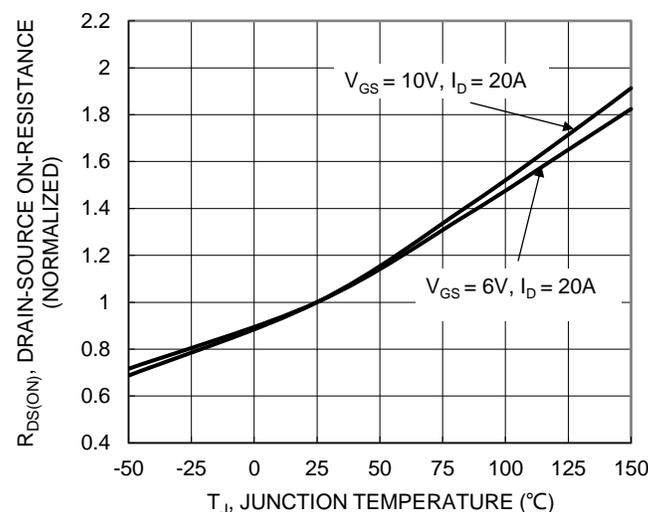
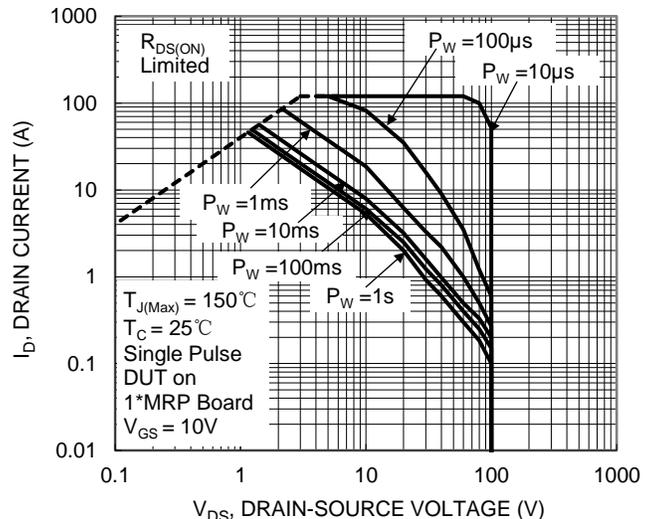
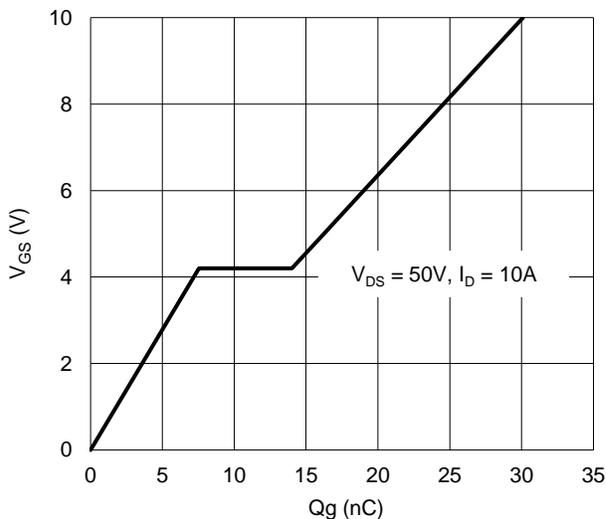
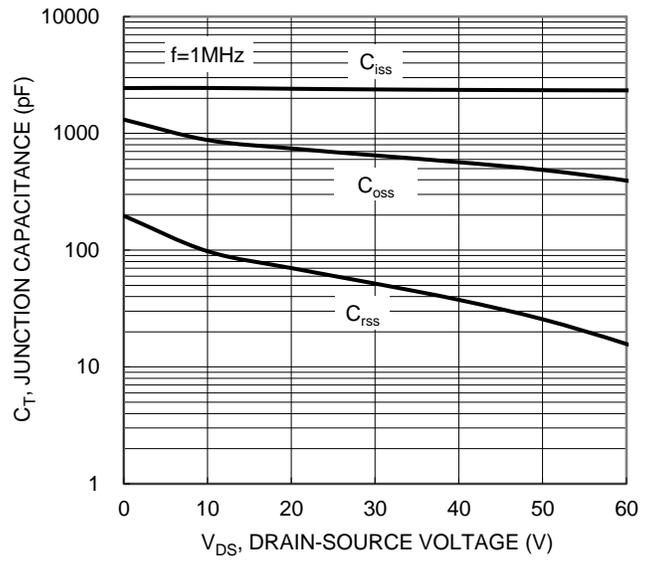
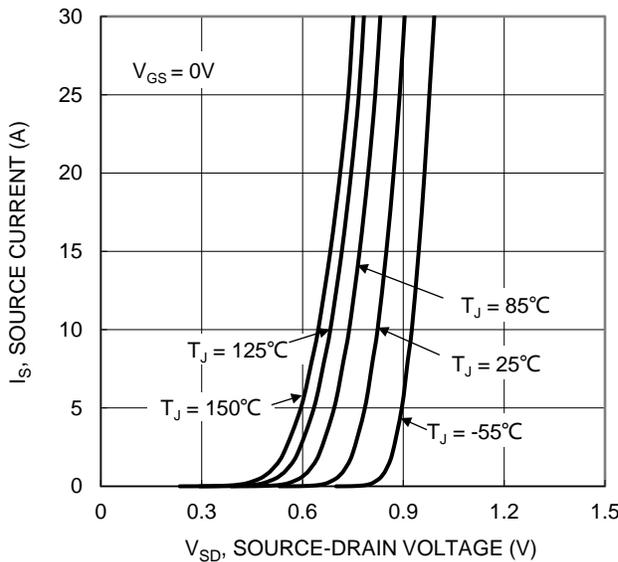
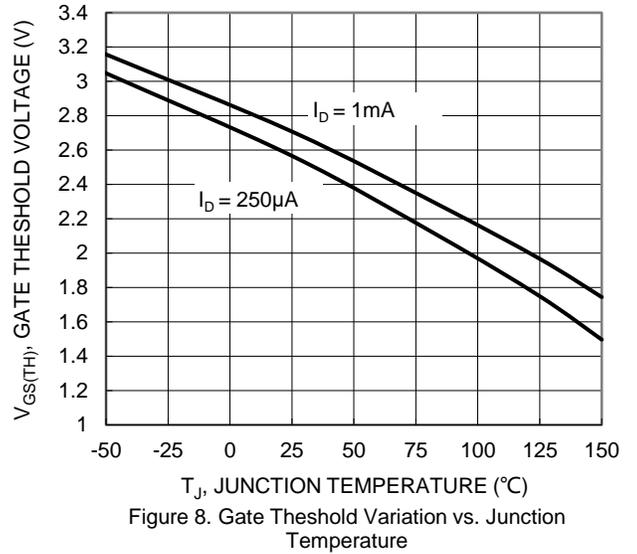
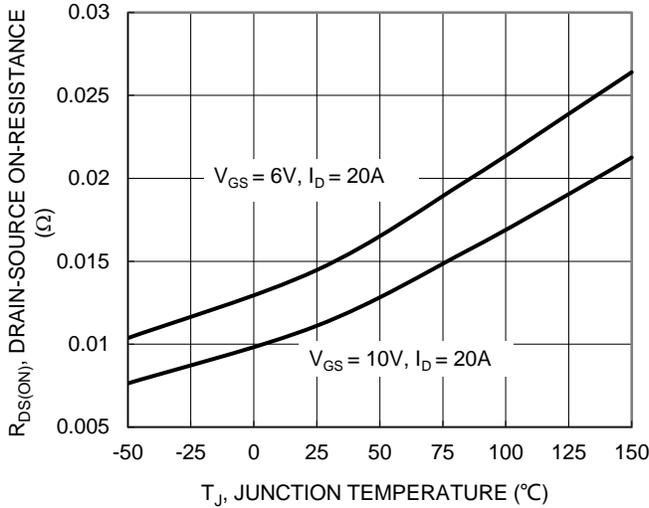


Figure 6. On-Resistance Variation with Temperature



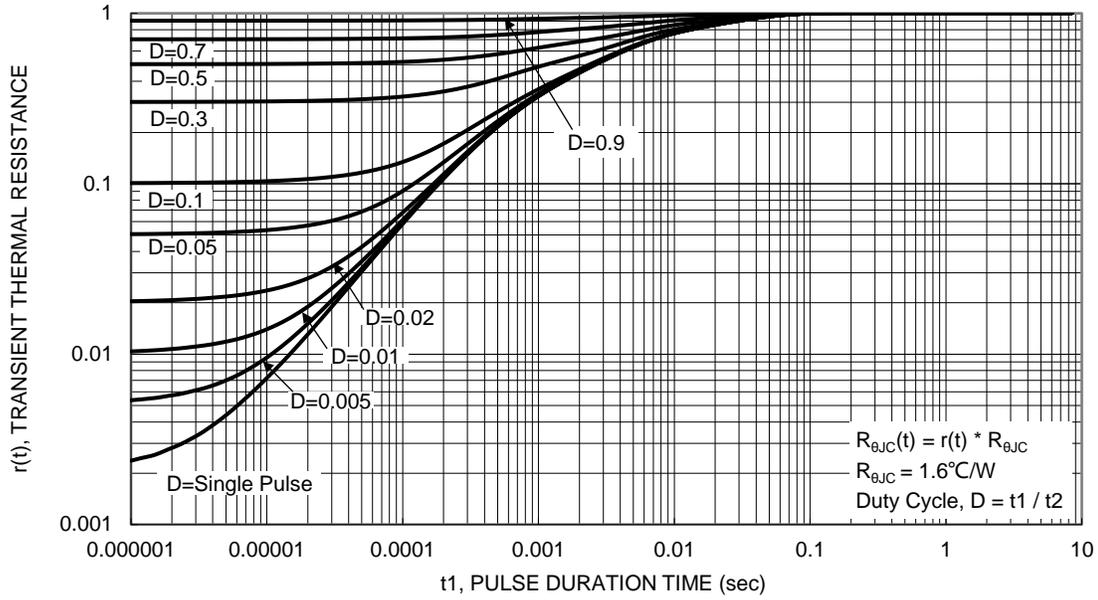
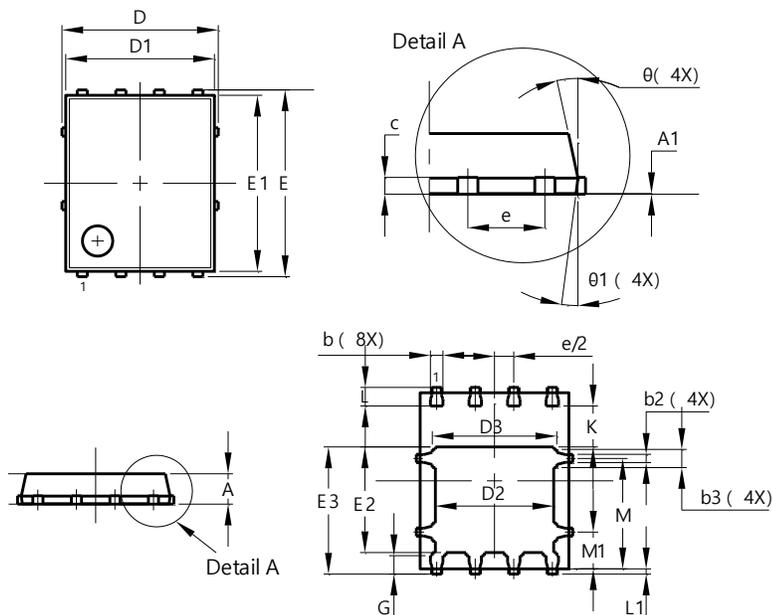


Figure 13. Transient Thermal Resistance

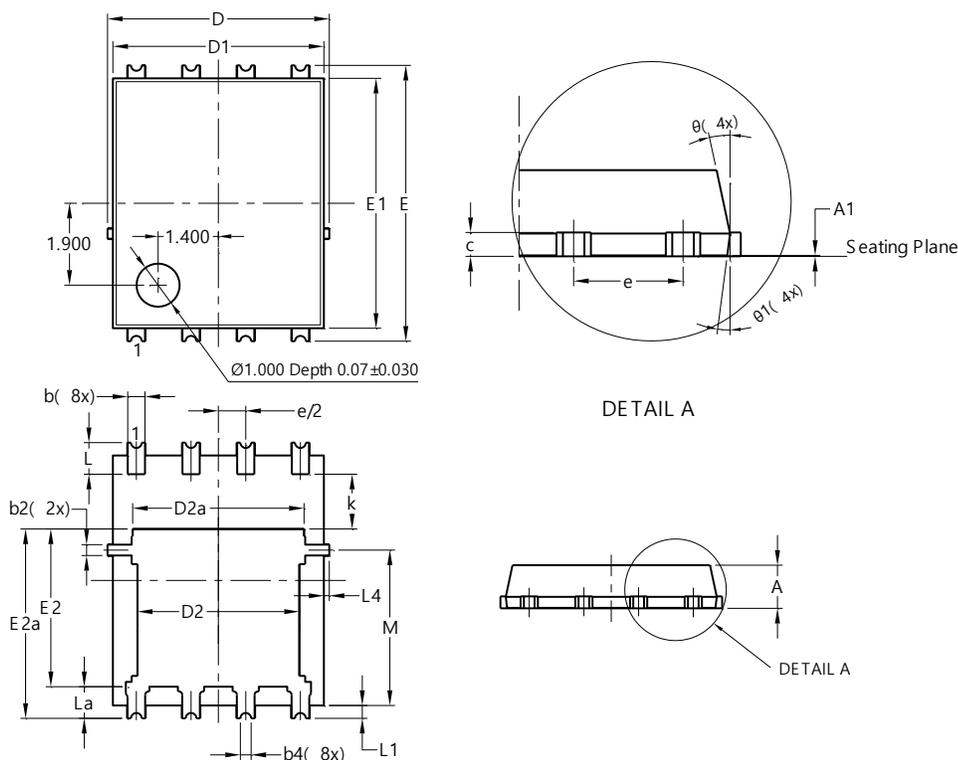
**Package Outline Dimensions**

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
theta	10°	12°	11°
theta1	6°	8°	7°
All Dimensions in mm			

Site 2:

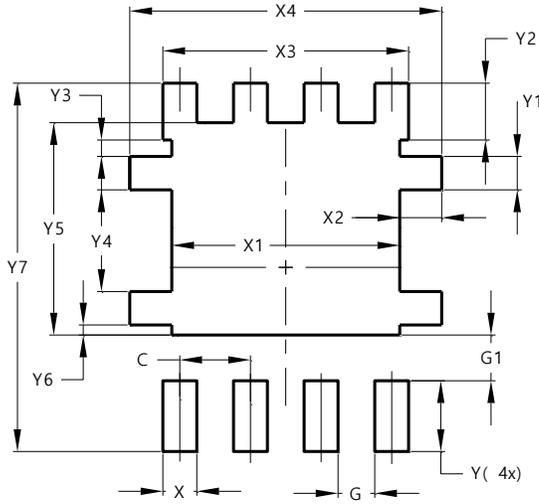
**PowerDI5060-8/SWP (Type UX)**


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
theta	10°	12°	11°
theta1	6°	8°	7°
All Dimensions in mm			

**Suggested Pad Layout**

Site 1:

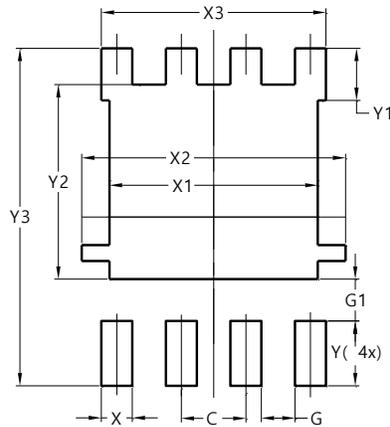
**PowerDI5060-8**



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