



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



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## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>c</sub> = +25°C
60V	10mΩ @ V <sub>GS</sub> = 10V	89.5A
	12mΩ @ V <sub>GS</sub> = 4.5V	81.7A

## Features

- Rated to +175°C—Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production—Ensures More Reliable and Robust End Application
- Low R<sub>DS(ON)</sub>—Minimizes Power Losses
- Low Q<sub>G</sub>—Minimizes Switching Losses

## 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.

- High-frequency switching
- Synchronous rectifications
- DC-DC converters

## Mechanical Data

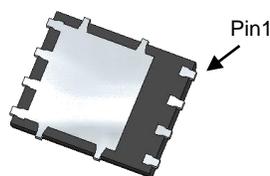
- Package: PowerDI<sup>®</sup>5060-8
- Package Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208<sup>(e3)</sup>
- Weight: 0.097 grams (Approximate)

Site 1:

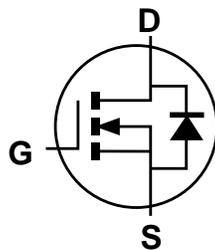
PowerDI5060-8



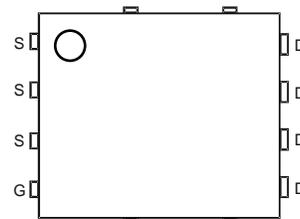
Top View



Bottom View



Internal Schematic



Top View  
Pin Configuration

Site 2:

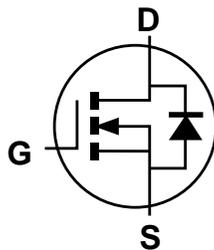
PowerDI5060-8/SWP (Type UX)



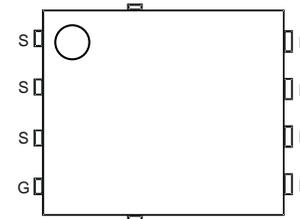
Top View



Bottom View



Internal Schematic



Top View  
Pin Configuration

**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>	±16	V
Continuous Drain Current (Note 5)	T <sub>A</sub> = +25°C	I <sub>D</sub>	11.76	A
	T <sub>A</sub> = +100°C		8.3	
Continuous Drain Current (Note 6)	T <sub>C</sub> = +25°C	I <sub>D</sub>	89.5	A
	T <sub>C</sub> = +100°C		63.3	
Maximum Continuous Body Diode Forward Current (Note 6)		I <sub>S</sub>	89	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I <sub>DM</sub>	350	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)		I <sub>SM</sub>	350	A
Avalanche Current, L = 0.1mH		I <sub>AS</sub>	20.3	A
Avalanche Energy, L = 0.1mH		E <sub>AS</sub>	20.6	mJ

**Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.8	W
Thermal Resistance, Junction to Ambient (Note 5)		R <sub>θJA</sub>	53	°C/W
Total Power Dissipation (Note 6)	T <sub>C</sub> = +25°C	P <sub>D</sub>	136	W
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	1.1	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

Notes: 5. Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1-inch 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</b> (Note 7)						
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>	—	—	±100	nA	V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.7	—	2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	7.2	10	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A
		—	8.9	12		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 15A
Diode Forward Voltage	V <sub>SD</sub>	—	0.9	—	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	C <sub>iss</sub>	—	1925	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	438	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	41	—		
Gate Resistance	R <sub>g</sub>	—	1.7	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	33.5	—	nC	V <sub>DS</sub> = 30V, I <sub>D</sub> = 13.5A
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	15.6	—		
Gate-Source Charge	Q <sub>gs</sub>	—	4.7	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	5.3	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.5	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = 13.5A
Turn-On Rise Time	t <sub>R</sub>	—	8.6	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	35.9	—		
Turn-Off Fall Time	t <sub>F</sub>	—	15.7	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	18.2	—	ns	I <sub>F</sub> = 13.5A, di/dt = 400A/μs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	33.1	—	nC	

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

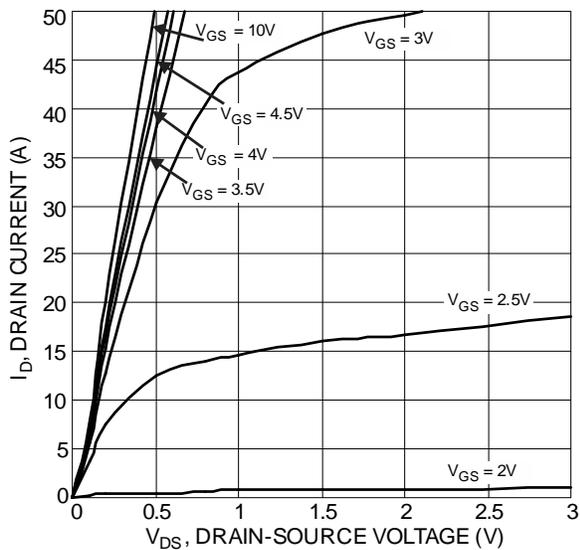


Figure 1 Typical Output Characteristic

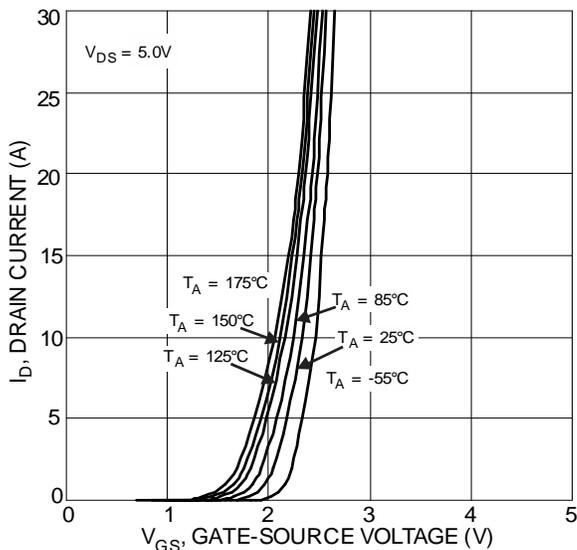


Figure 2 Typical Transfer Characteristics

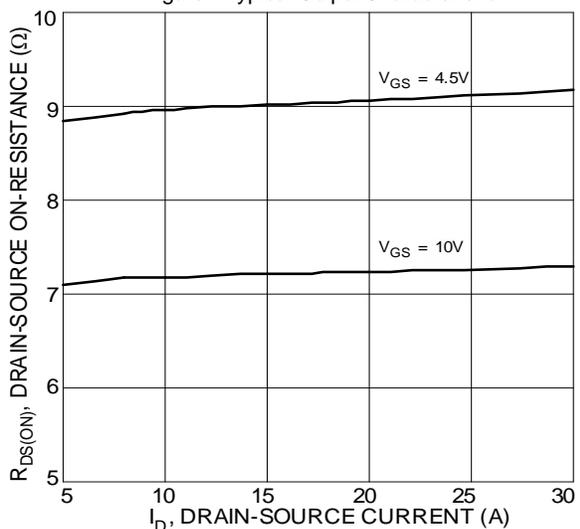


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

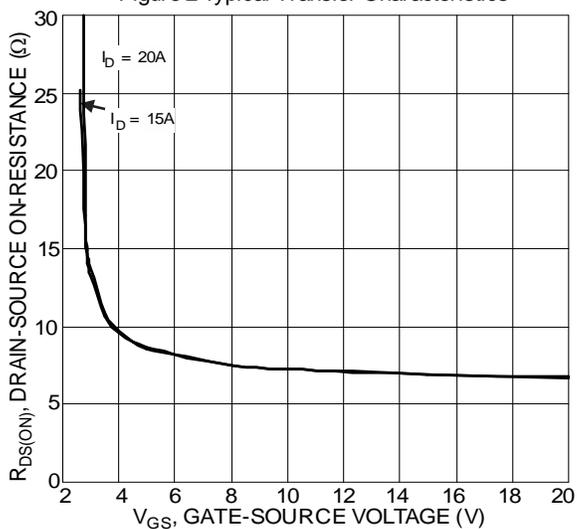


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

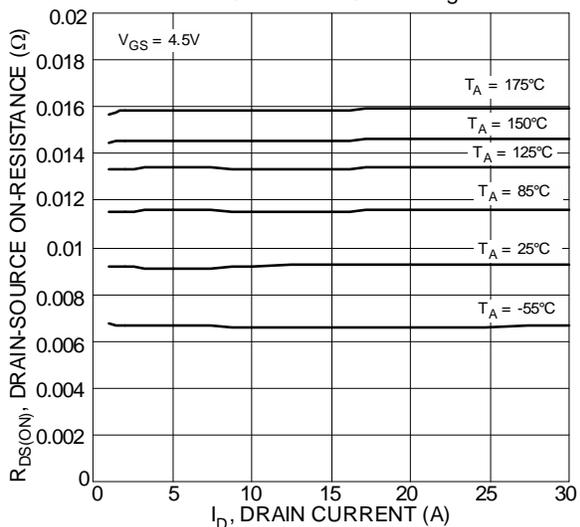


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

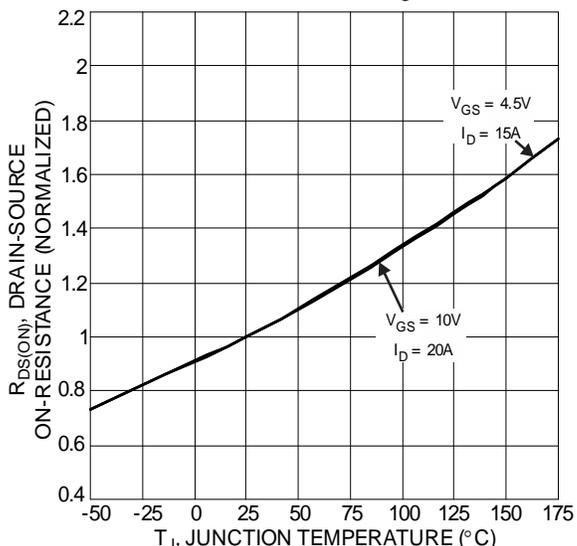


Figure 6 On-Resistance Variation with Temperature

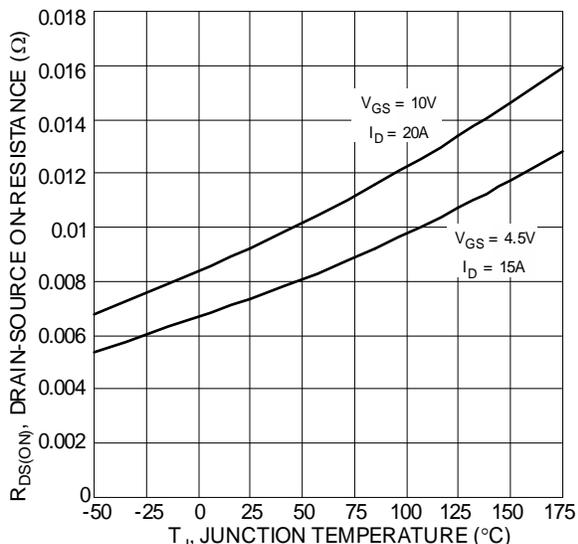


Figure 7 On-Resistance Variation with Temperature

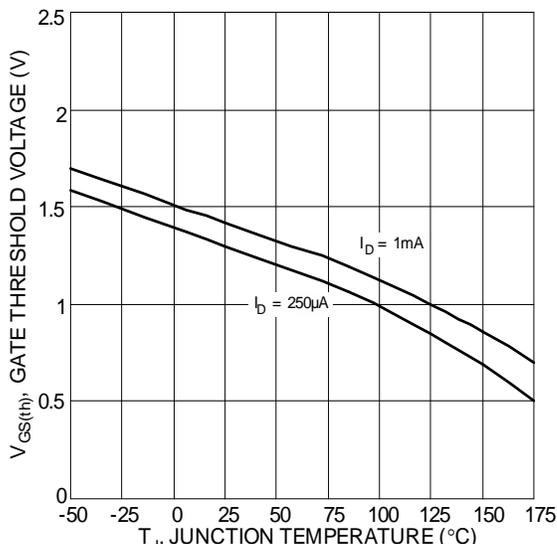


Figure 8 Gate Threshold Variation vs. Ambient Temperature

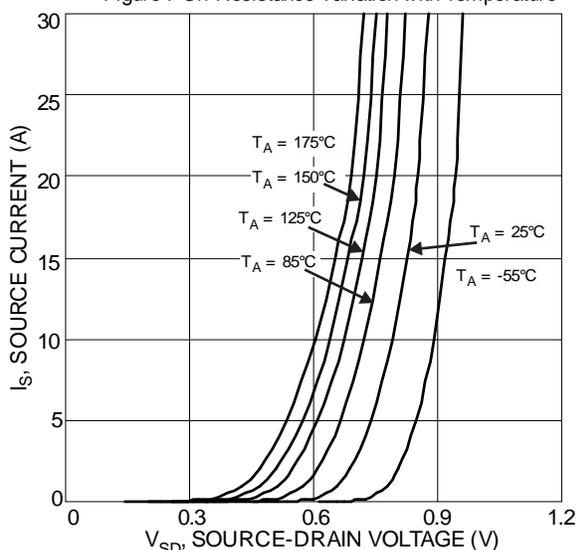


Figure 9 Diode Forward Voltage vs. Current

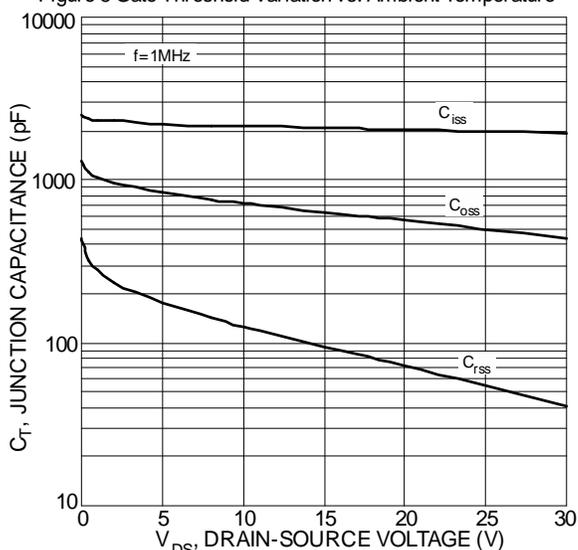


Figure 10 Typical Junction Capacitance

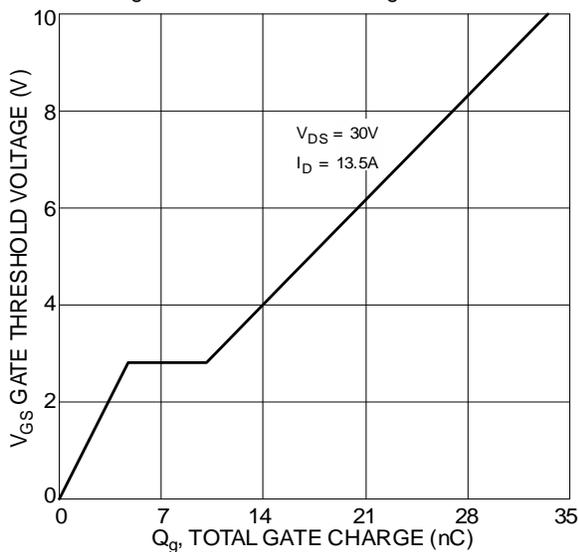


Figure 11 Gate Charge

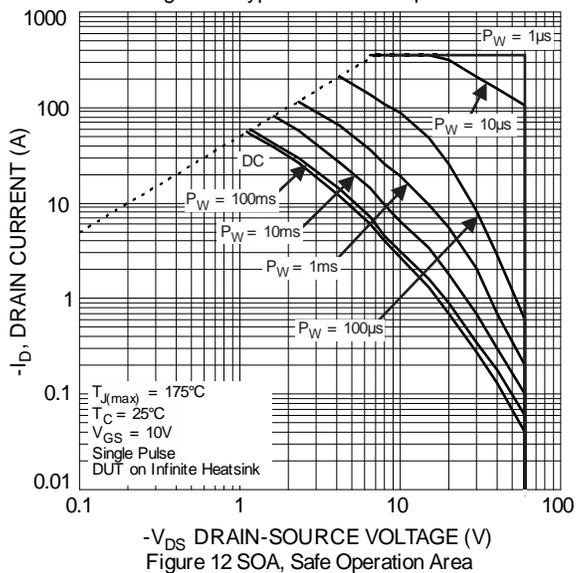
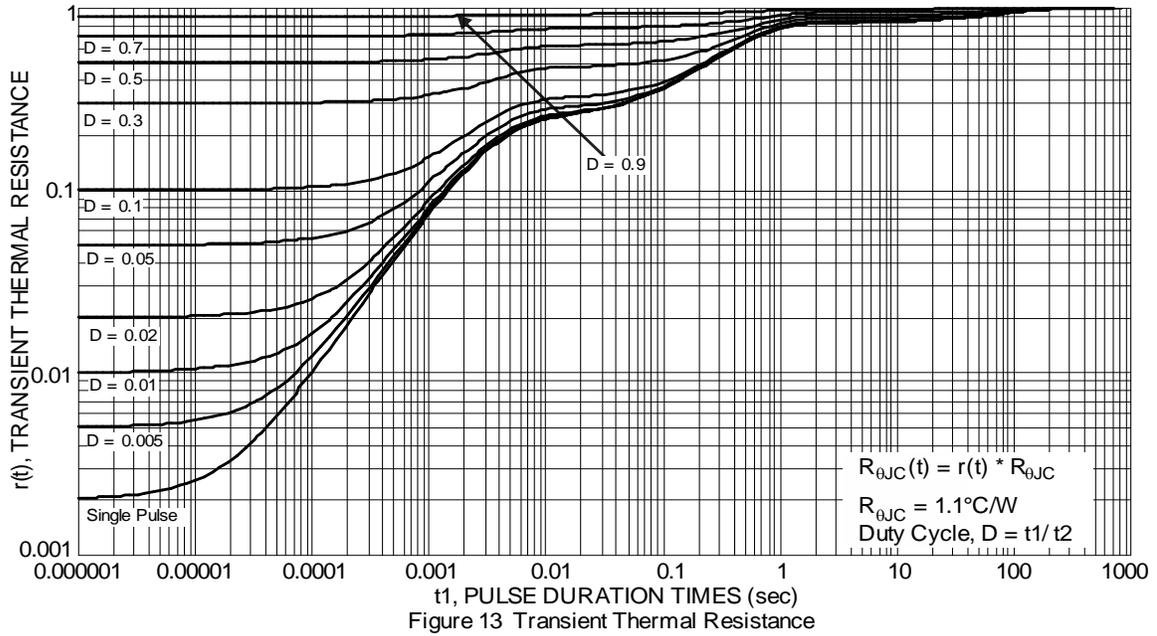
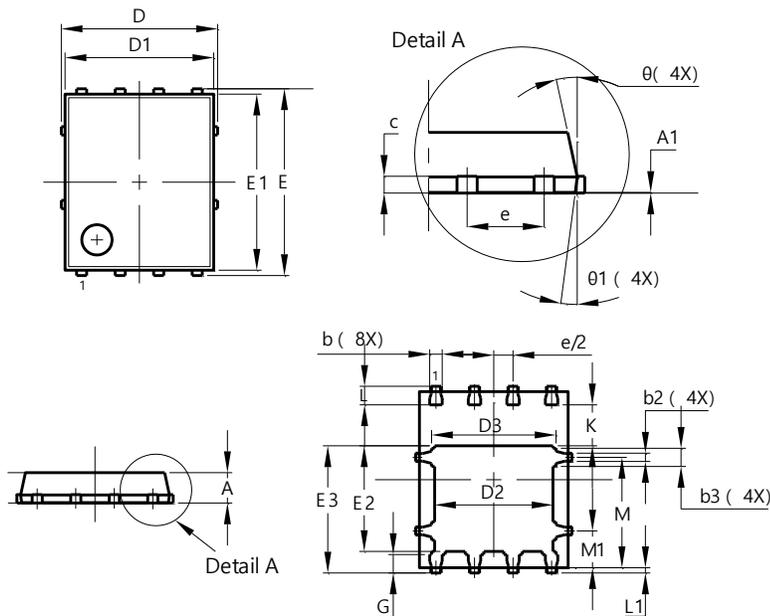


Figure 12 SOA, Safe Operation Area



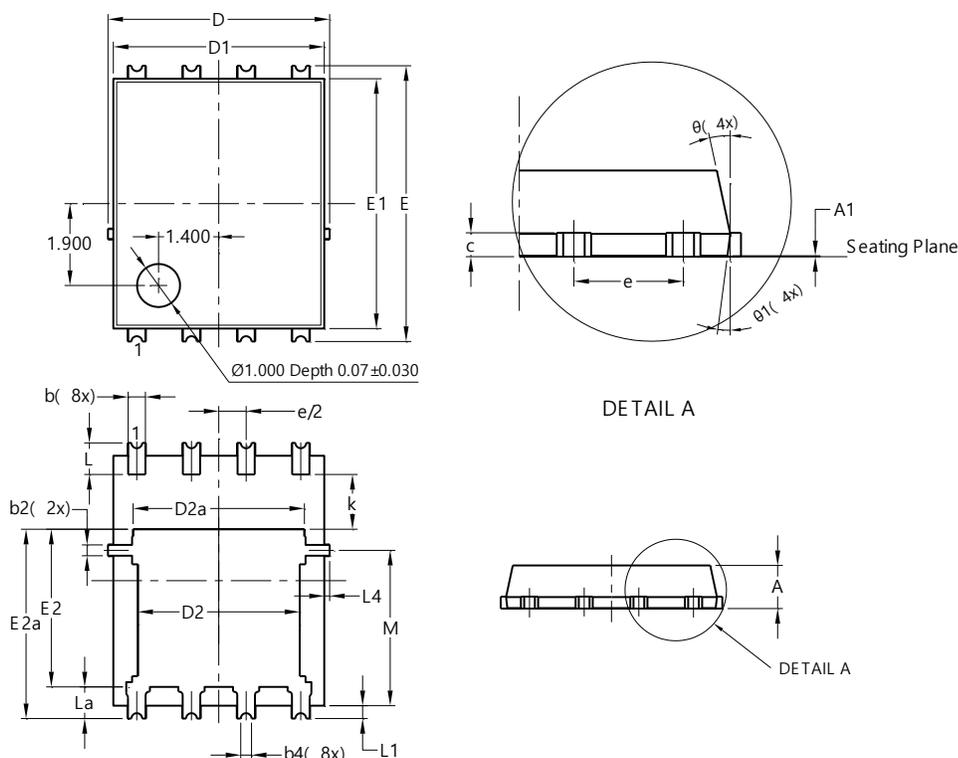
## Package Outline Dimensions

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°
$\theta 1$	6°	8°	7°
All Dimensions in mm			

Site 2:

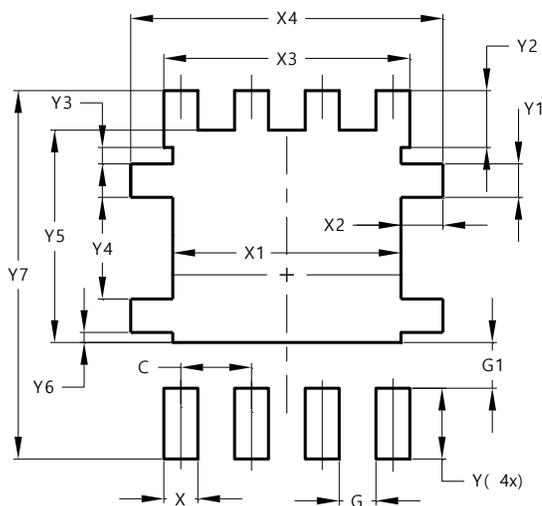
**PowerDI5060-8/SWP (Type UX)**


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°
$\theta 1$	6°	8°	7°
All Dimensions in mm			

### Suggested Pad Layout

Site 1:

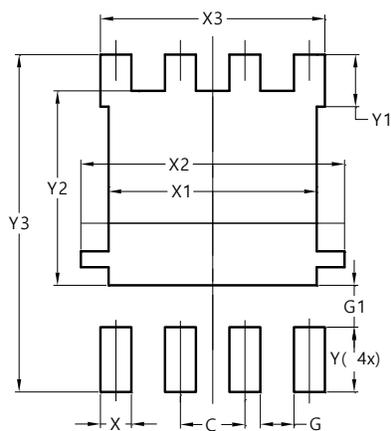
PowerDI5060-8



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

Site 2:

PowerDI5060-8/SWP (Type UX)



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