



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

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ $T_C = +25^\circ C$ (Note 5)
60V	5.5m $\Omega$ @ $V_{GS} = 10V$	100A

## Description and Applications

This MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- High-frequency switching
- Sync. rectification
- DC-DC converters

## Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low  $R_{DS(ON)}$  – Minimizes Power Losses
- Low  $Q_g$  – Minimizes Switching Losses

## Mechanical Data

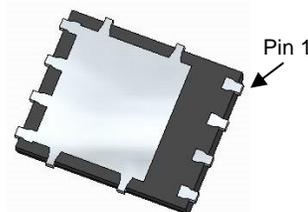
- Package: PowerDI<sup>®</sup>5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (G3)
- Weight: 0.097 grams (Approximate)

Site 1:

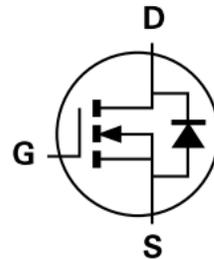
PowerDI5060-8



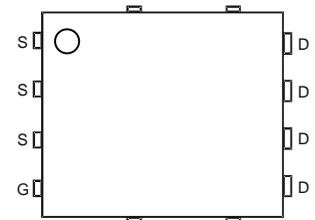
Top View



Bottom View



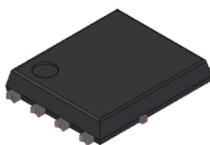
Internal Schematic



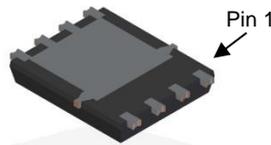
Top View  
Pin Configuration

Site 2:

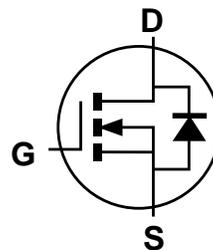
PowerDI5060-8/SWP (Type UX)



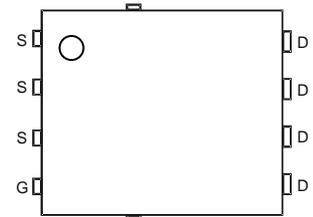
Top View



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>	±20	V
Continuous Drain Current (Note 6)	I <sub>D</sub>	T <sub>A</sub> = +25°C	20.6
		T <sub>A</sub> = +70°C	17.2
Continuous Drain Current (Note 7)	I <sub>D</sub>	T <sub>C</sub> = +25°C (Note 5)	100
		T <sub>C</sub> = +100°C	90
Maximum Continuous Body Diode Forward Current (Note 7)	I <sub>S</sub>	100	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	160	A
Avalanche Current, L = 1mH	I <sub>AS</sub>	14.8	A
Avalanche Energy, L = 1mH	E <sub>AS</sub>	98	mJ

## Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P <sub>D</sub>	3.2	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	47	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	150	W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	1	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

Notes: 5. Package limited.  
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.  
 7. 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 8)</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>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</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>	—	4.4	5.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 50A
		—	5.7	7.2		V <sub>GS</sub> = 6V, I <sub>D</sub> = 20A
		—	7.7	10		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 12.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.9	—	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 50A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	2962	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	965.2	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	59.8	—		
Gate Resistance	R <sub>g</sub>	—	0.66	—	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>	—	47.1	—	nC	V <sub>DD</sub> = 30V, I <sub>D</sub> = 50A
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	23.1	—		
Gate-Source Charge	Q <sub>gs</sub>	—	10.2	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	12.5	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V I <sub>D</sub> = 30A, R <sub>g</sub> = 3.3Ω
Turn-On Delay Time	t <sub>D(ON)</sub>	—	8.3	—		
Turn-On Rise Time	t <sub>r</sub>	—	9.4	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	22	—		
Turn-Off Fall Time	t <sub>f</sub>	—	8.9	—	ns	I <sub>F</sub> = 30A, di/dt = 100A/μs
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	40.4	—		
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	49.7	—	nC	

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

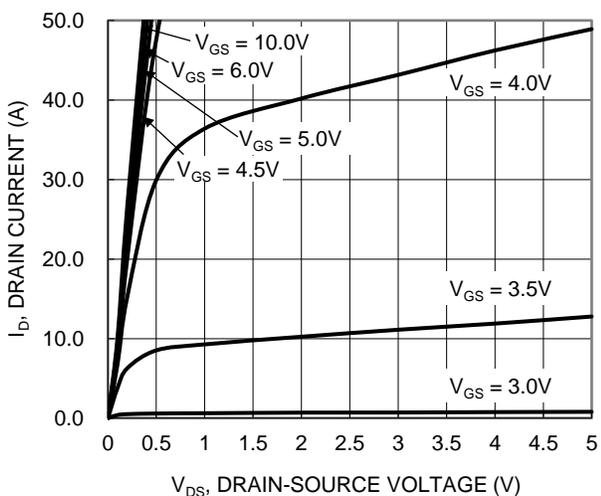


Figure 1. Typical Output Characteristic

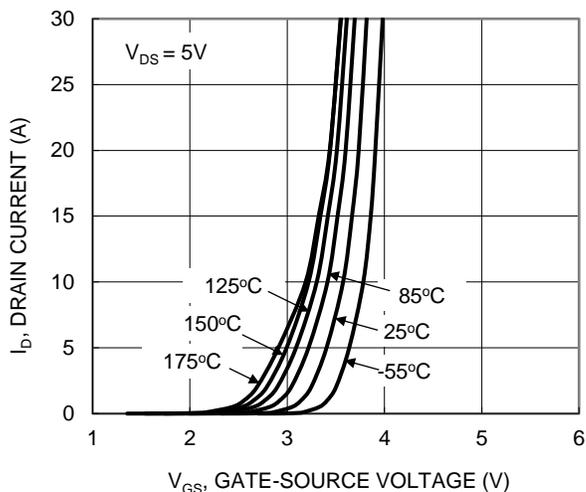


Figure 2. Typical Transfer Characteristic

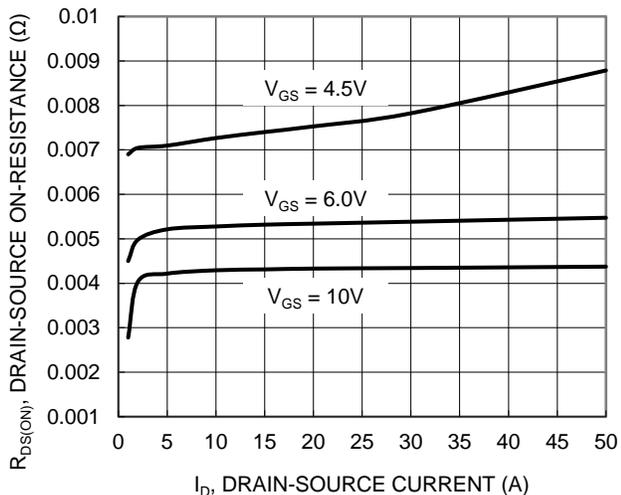


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

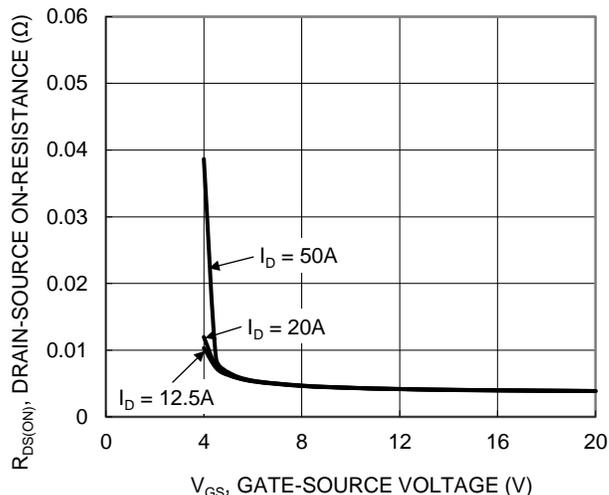


Figure 4. Typical Transfer Characteristic

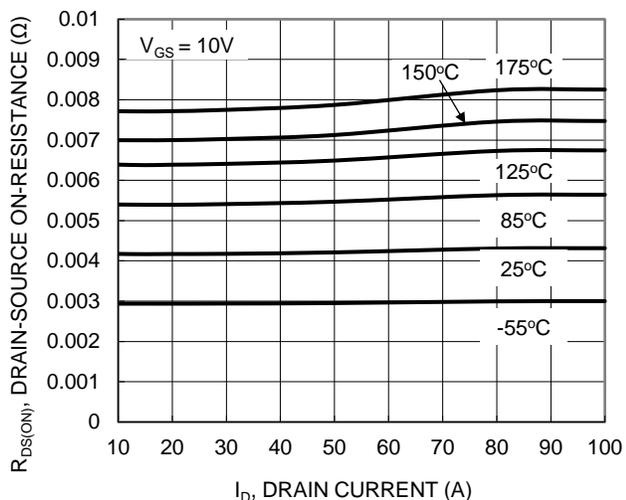


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

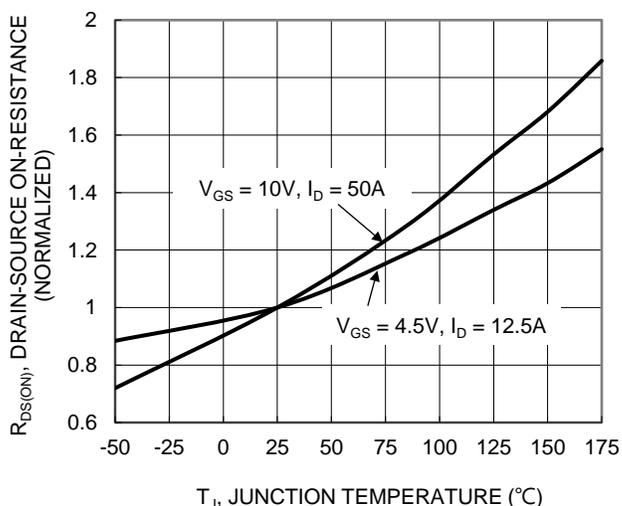
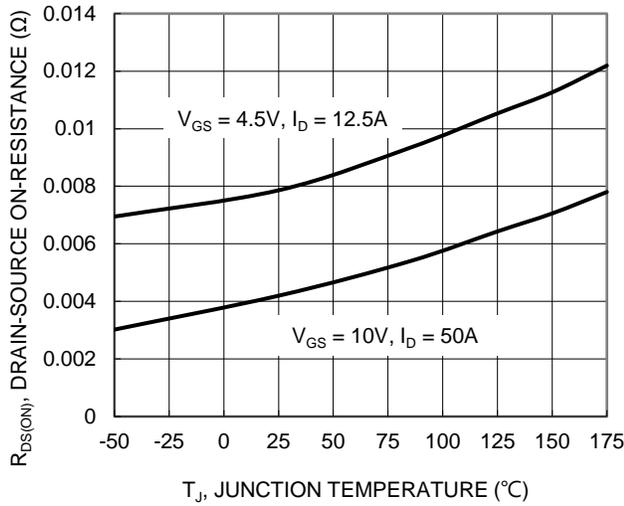
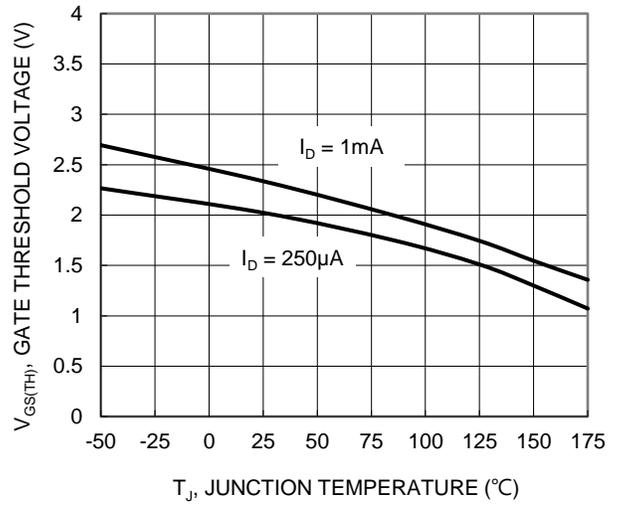


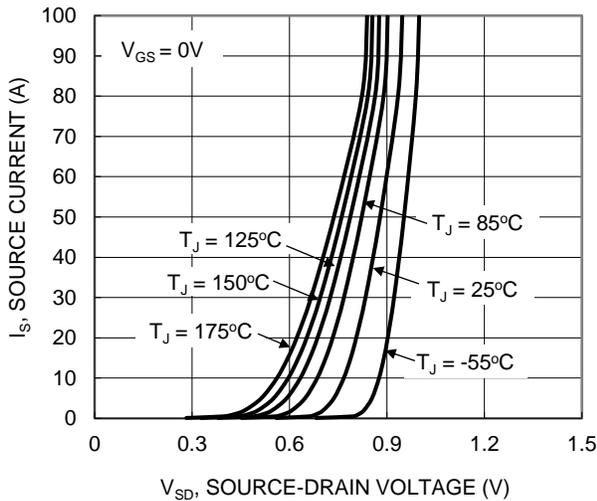
Figure 6. On-Resistance Variation with Junction Temperature



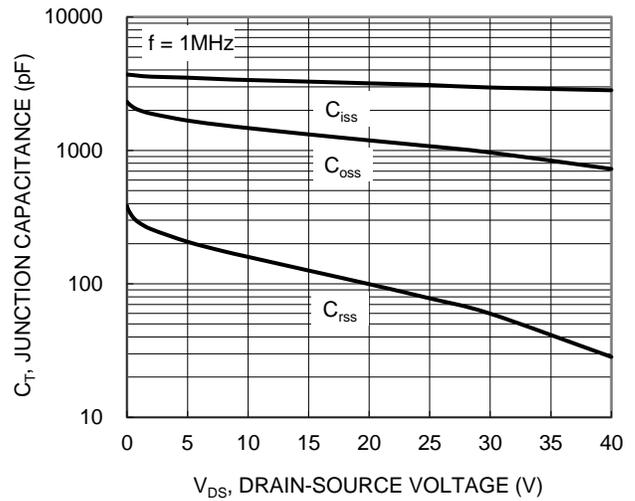
T<sub>J</sub>, JUNCTION TEMPERATURE (°C)  
Figure 7. On-Resistance Variation with Junction Temperature



T<sub>J</sub>, JUNCTION TEMPERATURE (°C)  
Figure 8. Gate Threshold Variation vs. Junction Temperature



V<sub>SD</sub>, SOURCE-DRAIN VOLTAGE (V)  
Figure 9. Diode Forward Voltage vs. Current



V<sub>DS</sub>, DRAIN-SOURCE VOLTAGE (V)  
Figure 10. Typical Junction Capacitance

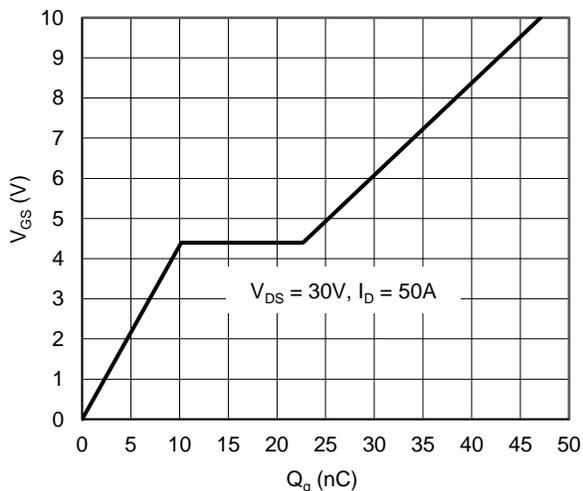


Figure 11. Gate Charge

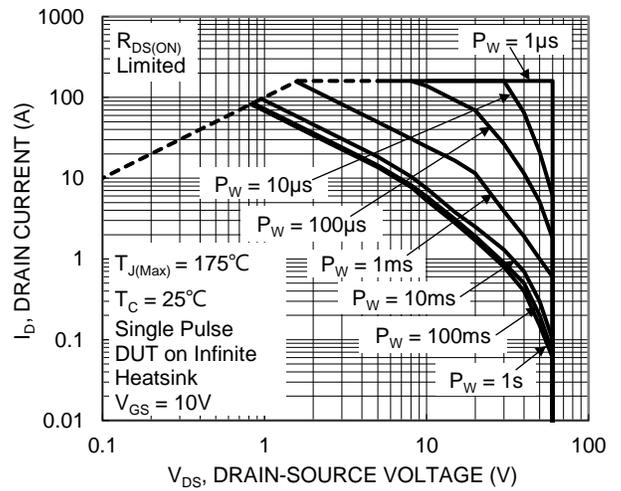


Figure 12. SOA, Safe Operation Area

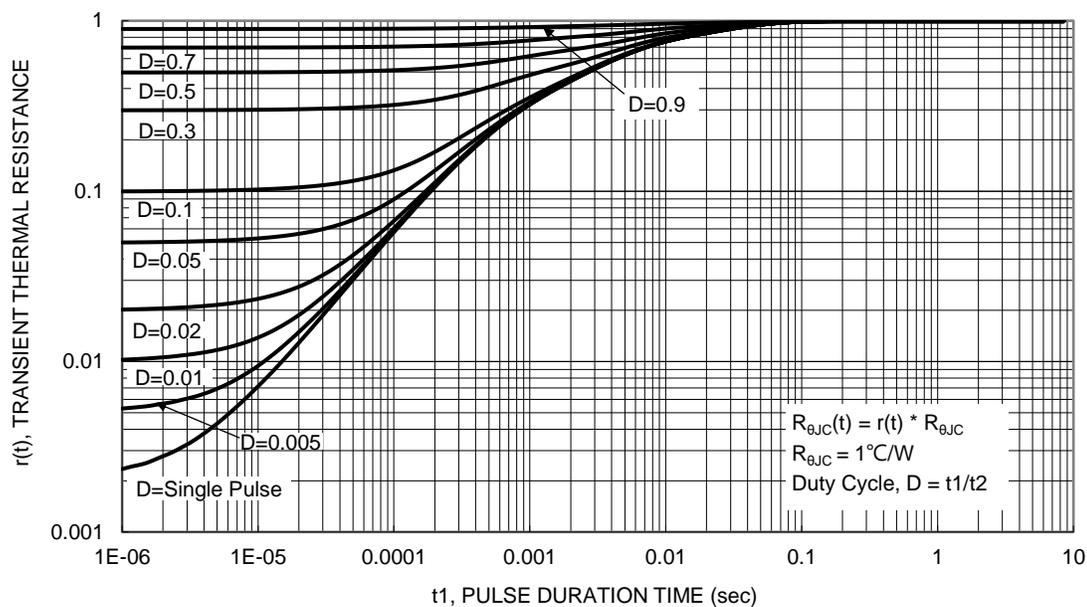


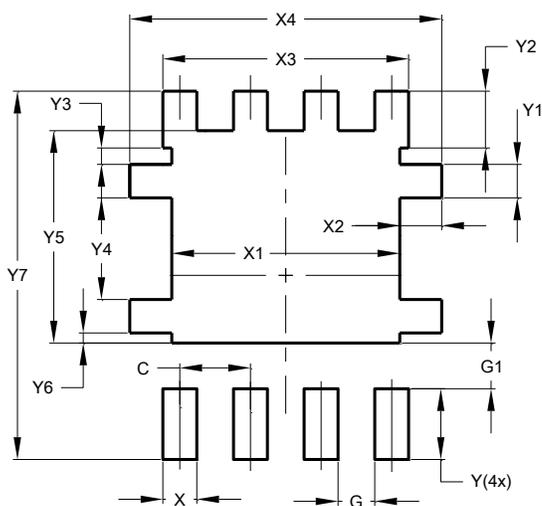
Figure 13. Transient Thermal Resistance



### Suggested Pad Layout

Site 1:

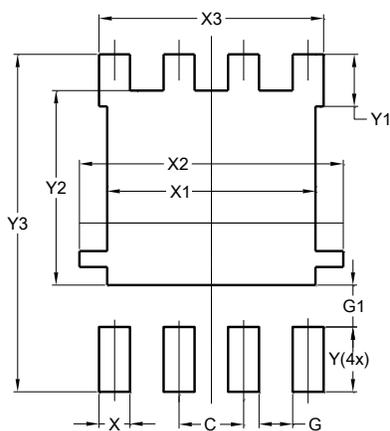
PowerDI5060-8



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