

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub> T <sub>C</sub> = +25°C
60V	16mΩ @ V <sub>GS</sub> = 10V	31A
	24mΩ @ V <sub>GS</sub> = 4.5V	24A

## 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 switches.

## Applications

- Motor controls
- DC-DC converters
- Power management

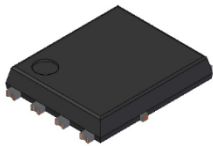
## Features

- 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
- < 1.1mm Package Profile – Ideal for Thin Applications
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

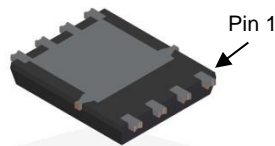
## Mechanical Data

- 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
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208
- Weight: 0.097 grams (Approximate)

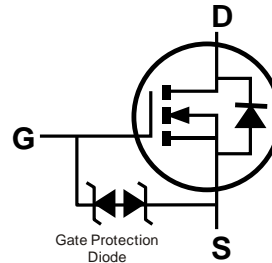
PowerDI5060-8/SWP (Type UX)



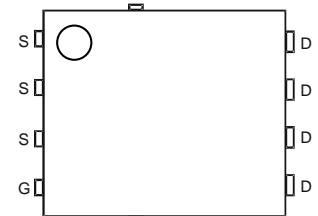
Top View



Bottom View



Internal Schematic



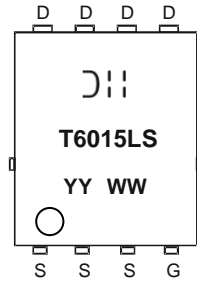
Top View  
Pin Configuration

## Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMT6015LPSW-13	PowerDI5060-8/SWP (Type UX)	2,500	Tape & Reel

- 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.
  4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



= Manufacturer's Marking  
 T6015LS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 24 = 2024)  
 WW = Week Code (01 to 53)

## 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) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>A</sub> = +25°C	10.6
		T <sub>A</sub> = +70°C	8.5
	I <sub>D</sub>	T <sub>C</sub> = +25°C	31
		T <sub>C</sub> = +70°C	25
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	60	A
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	2	A
Avalanche Current (Note 6) L = 0.1mH	I <sub>AS</sub>	10	A
Avalanche Energy (Note 6) L = 0.1mH	E <sub>AS</sub>	5	mJ
V <sub>DS</sub> Spike	V <sub>SPIKE</sub>	75	V
	t = 10µs		

## Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 7)	P <sub>D</sub>	1.16	W
Thermal Resistance, Junction to Ambient (Note 7)	R <sub>θJA</sub>	Steady State	108
		t < 10s	56
Total Power Dissipation (Note 5)	P <sub>D</sub>	2.7	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady State	46
		t < 10s	24
Thermal Resistance, Junction to Case (Note 5)	R <sub>θJC</sub>	4.4	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  - I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.

**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> = 250μA
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> = ±16V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.5	—	2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	14.2	16	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A
		—	18	24		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A
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 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1103	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	251.3	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	19.7	—		
Gate Resistance	R <sub>G</sub>	—	1.5	—	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>	—	8.9	—	nC	V <sub>DS</sub> = 30V, I <sub>D</sub> = 10A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	18.9	—		
Gate-Source Charge	Q <sub>gs</sub>	—	3.0	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	2.8	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.1	—	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 30V R <sub>G</sub> = 6Ω, I <sub>D</sub> = 10A
Turn-On Rise Time	t <sub>r</sub>	—	7.1	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	19.5	—		
Turn-Off Fall Time	t <sub>f</sub>	—	8.6	—		
Reverse-Recovery Time	t <sub>RR</sub>	—	21.2	—	ns	I <sub>F</sub> = 10A, di/dt = 100A/μs
Reverse-Recovery Charge	Q <sub>RR</sub>	—	13.2	—	nC	

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

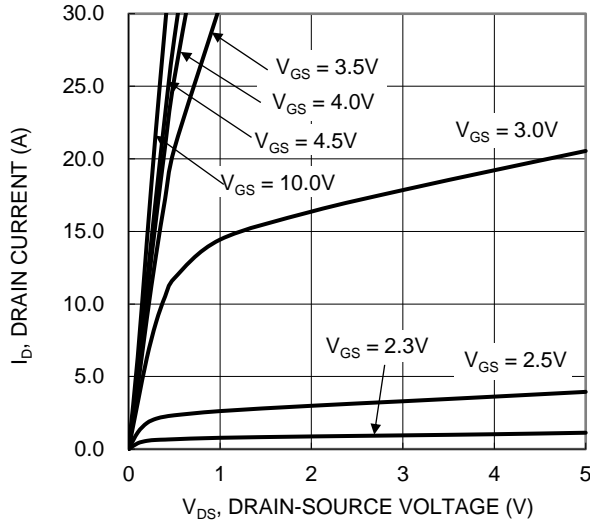


Figure 1. Typical Output Characteristic

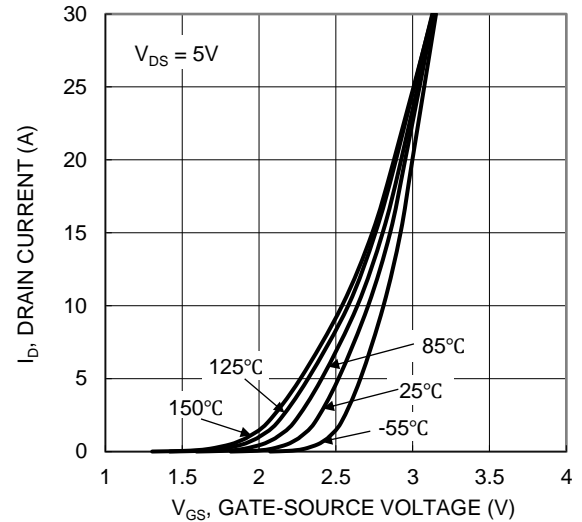


Figure 2. Typical Transfer Characteristic

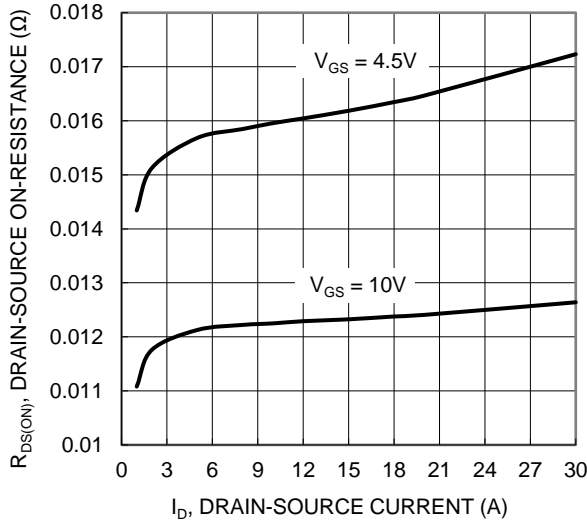


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

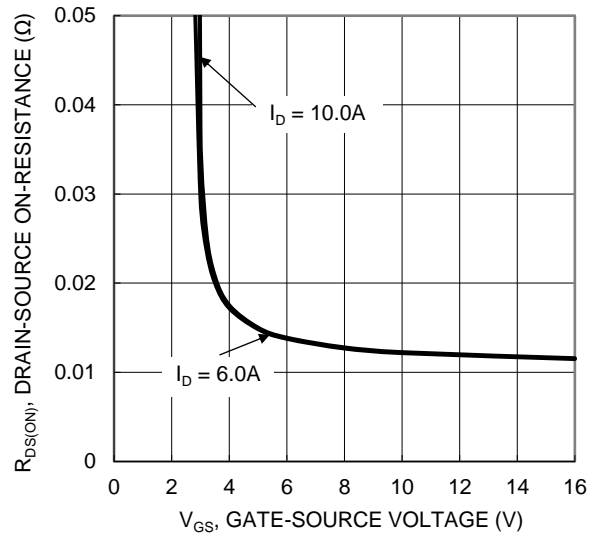


Figure 4. Typical Transfer Characteristic

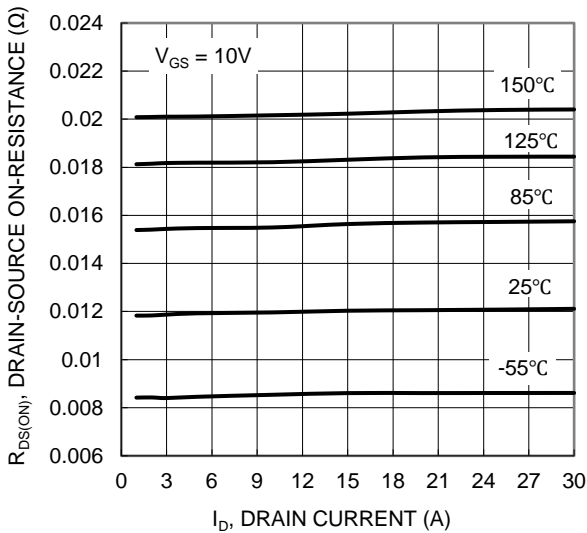


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

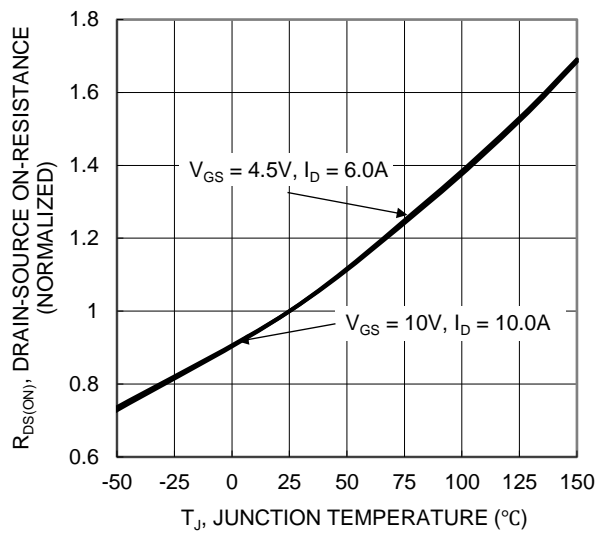


Figure 6. On-Resistance Variation with Temperature

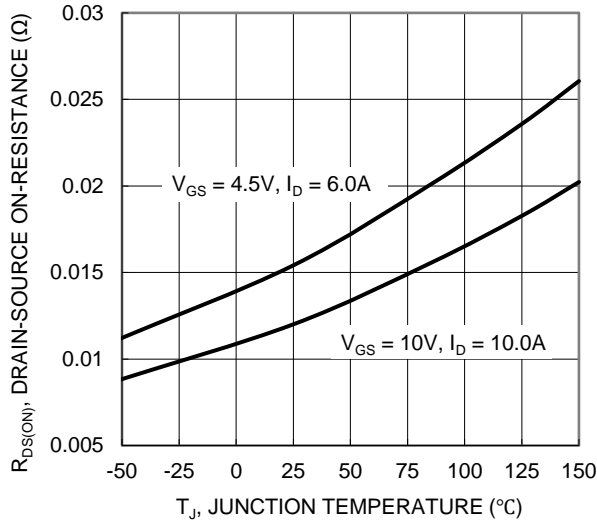


Figure 7. On-Resistance Variation with Temperature

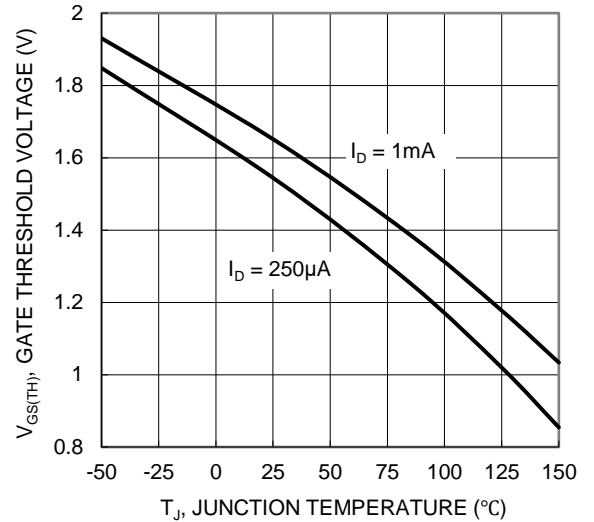


Figure 8. Gate Threshold Variation vs. Temperature

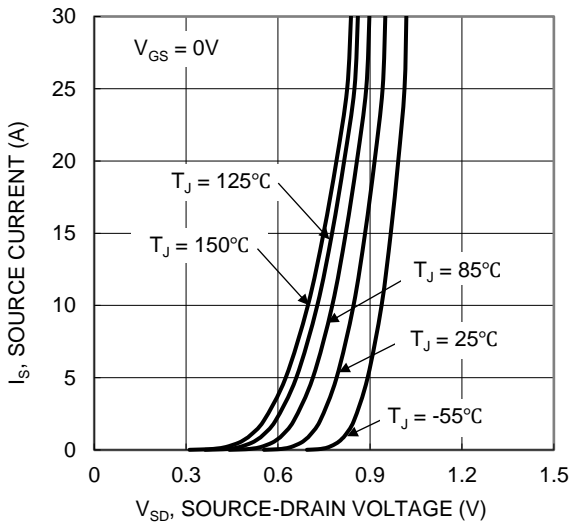


Figure 9. Diode Forward Voltage vs. Current

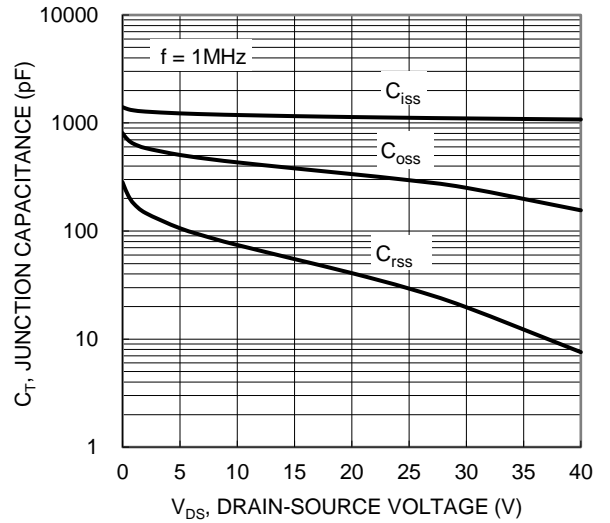


Figure 10. Typical Junction Capacitance

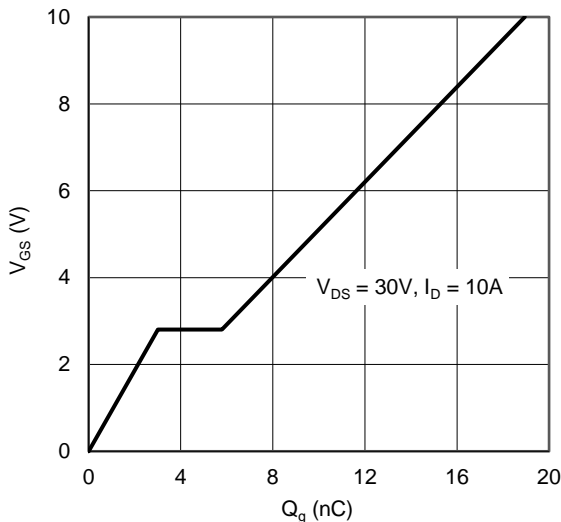


Figure 11. Gate Charge

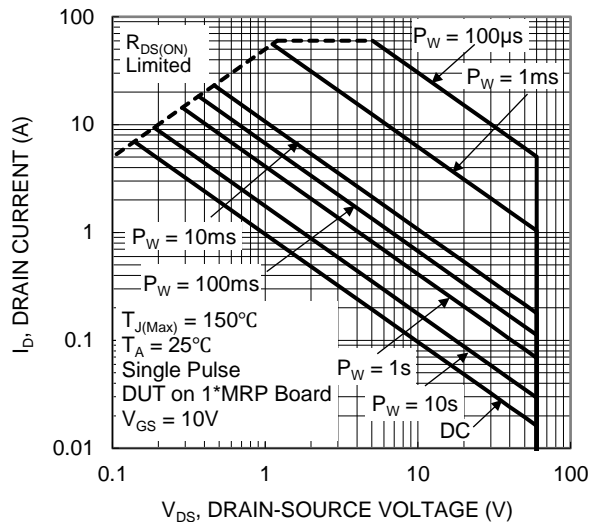


Figure 12. SOA, Safe Operation Area

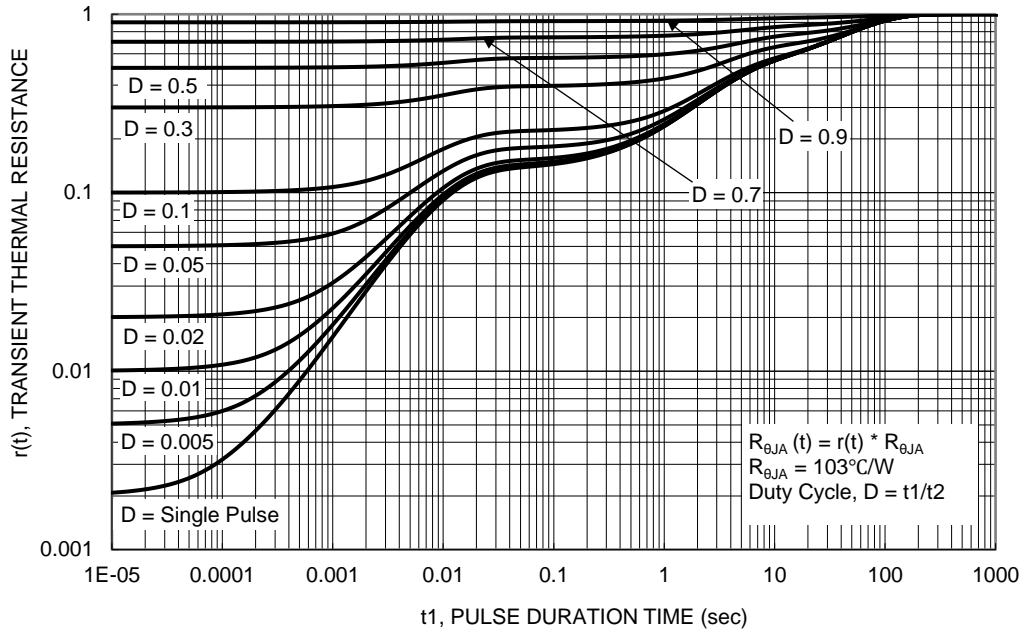


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

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

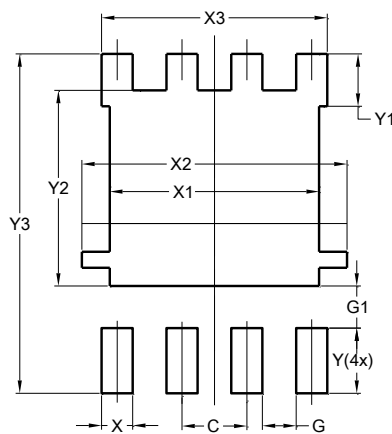


PowerDI5060-8/SWP (Type UX)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
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**

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

**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

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