优尚

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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Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_C = +25°C
80V	7.8mΩ @ V_{GS} = 10V	91A
	11mΩ @ V_{GS} = 4.5V	77A

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
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On-State Losses
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Description and Applications

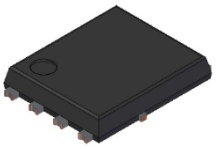
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC-DC converters
- Load switches

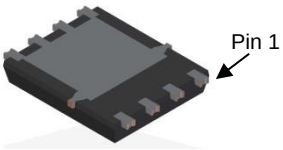
Mechanical Data

- 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 Connections: See Diagram Below
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.097 grams (Approximate)

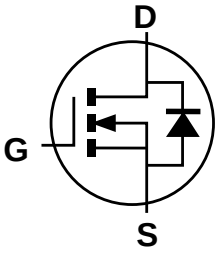
PowerDI5060-8/SWP (Type UX)



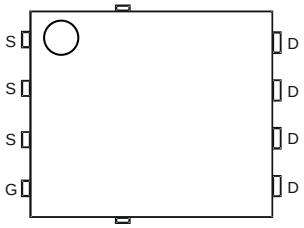
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

Maximum Ratings (@T_C = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	80	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current, V_{GS} = 10V (Note 5)	Steady State	T_C = +25°C T_C = +100°C	I_D	91 64	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	69	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I_{DM}	360	A
Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%)			I_{SM}	360	A
Avalanche Current, L = 0.1mH (Note 6)			I_{AS}	23	A
Avalanche Energy, L = 0.1mH (Note 6)			E_{AS}	26.5	mJ

Thermal Characteristics (@T_C = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 7)	T_A = +25°C	P_D	1.6	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	93	°C/W
Total Power Dissipation (Note 8)	T_A = +25°C	P_D	3.4	W
Thermal Resistance, Junction to Ambient (Note 8)	Steady State	$R_{\theta JA}$	44	°C/W
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	100	W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	1.5	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

Notes:
5. Thermal resistance from junction to soldering point (on the exposed drain pad).
6. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
7. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
8. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

Electrical Characteristics (@T_C = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	80	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 64V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.3	—	2.8	V	V_{DS} = V_{GS}, I_D = 1mA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	5	7.8	mΩ	V_{GS} = 10V, I_D = 14A
		—	8	11		V_{GS} = 4.5V, I_D = 12A
Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	V_{GS} = 0V, I_S = 14A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	2345	—	pF	V_{DS} = 40V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	842	—		
Reverse Transfer Capacitance	C_{rss}	—	51.9	—		
Gate Resistance	R_g	—	1.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	21.7	—	nC	V_{DD} = 40V, I_D = 2A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	41.2	—		
Gate-Source Charge	Q_{gs}	—	5.0	—		
Gate-Drain Charge	Q_{gd}	—	10.6	—		
Turn-On Delay Time	$t_{D(ON)}$	—	5.8	—	ns	V_{DD} = 40V, V_{GS} = 10V I_D = 2A, R_g = 1.6Ω
Turn-On Rise Time	t_R	—	5.4	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	24.5	—		
Turn-Off Fall Time	t_F	—	43.2	—		
Body Diode Reverse Recovery Time	t_{RR}	—	61	—	ns	I_F = 2A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q_{RR}	—	181	—	nC	

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

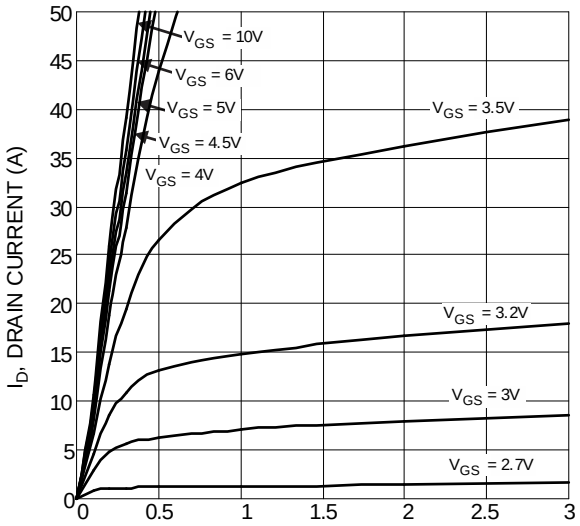


Figure 1 Typical Output Characteristic

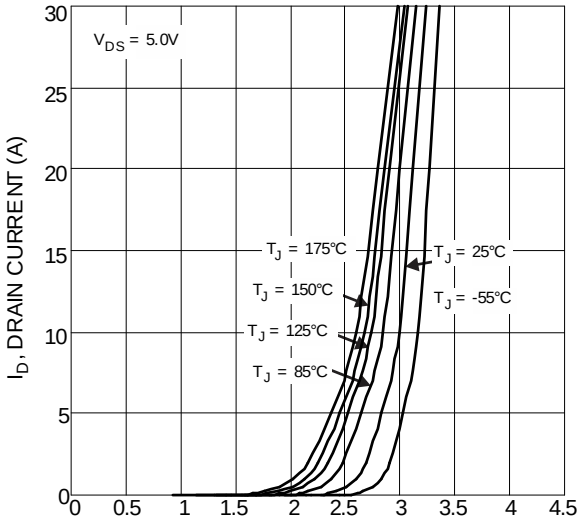


Figure 2 Typical Transfer Characteristics

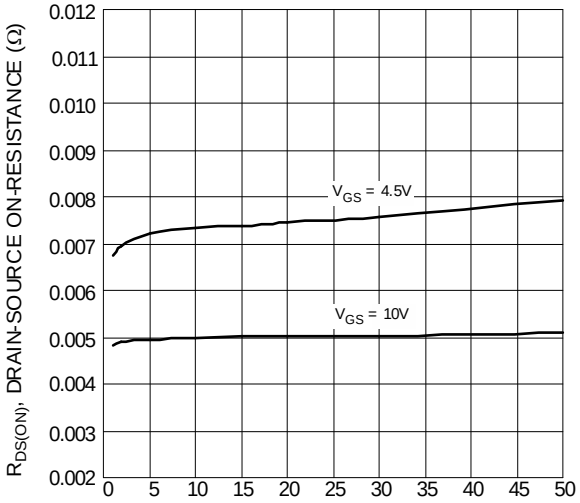


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

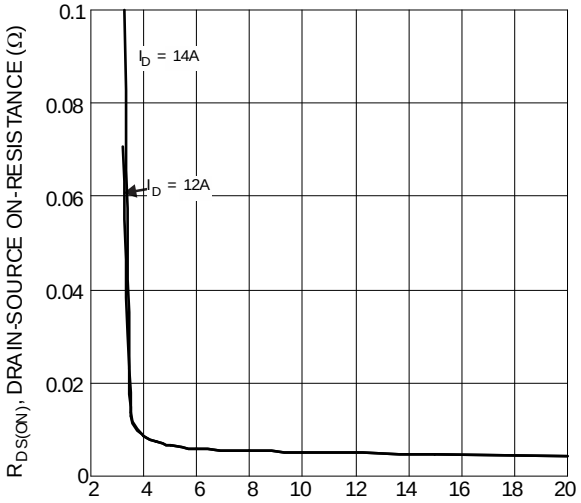


Figure 4 Typical Drain-Source On-Resistance
vs. Gate-Source Voltage

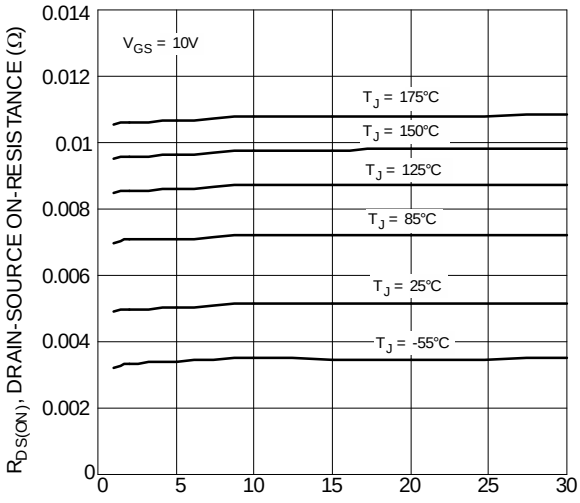


Figure 5 Typical On-Resistance vs.
Drain Current and Temperature

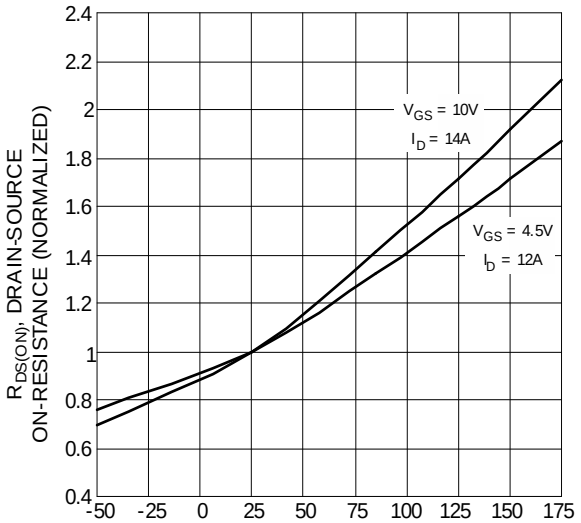


Figure 6 On-Resistance Variation with Temperature

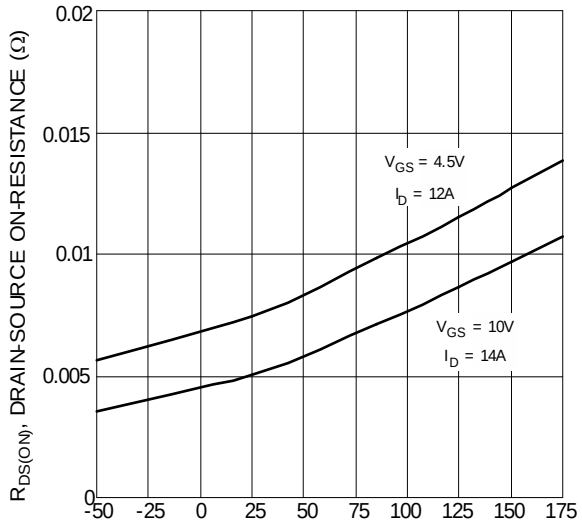


Figure 7 On-Resistance Variation with Temperature

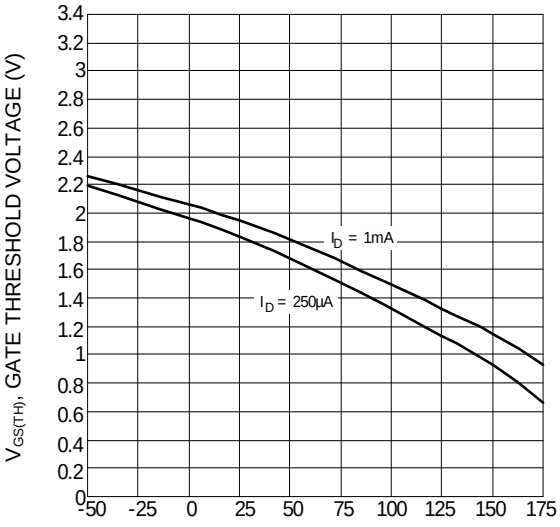


Figure 8 Gate Threshold Variation vs. Junction Temperature

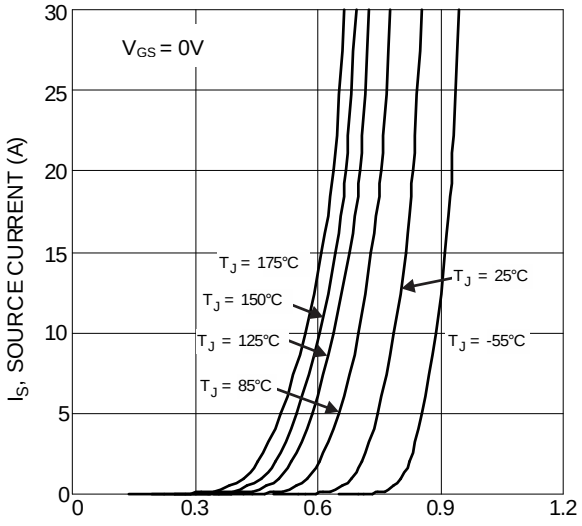


Figure 9 Diode Forward Voltage vs. Current

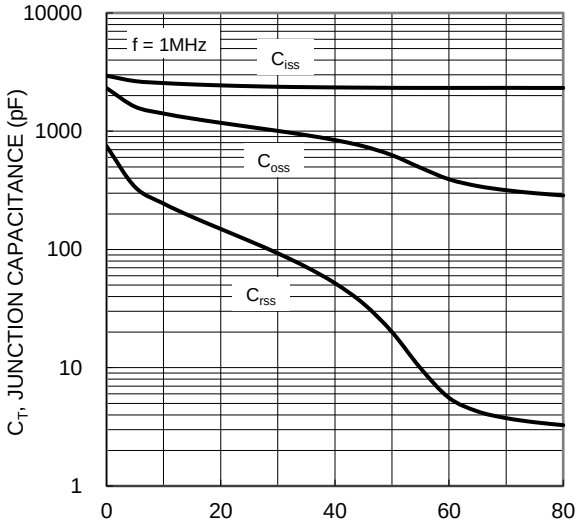


Figure 10 Typical Junction Capacitance

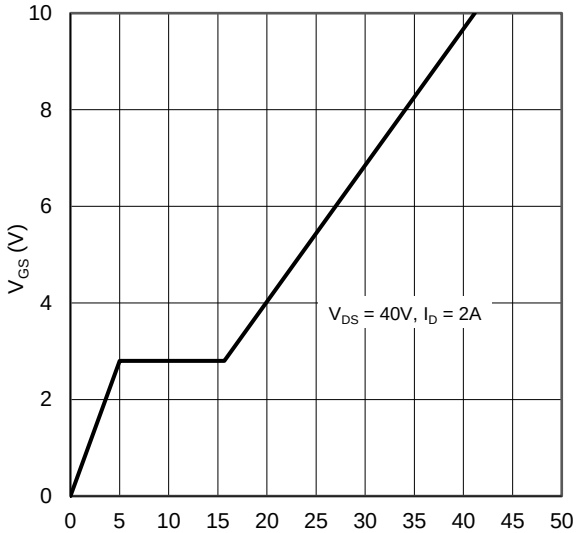


Figure 11 Gate Charge

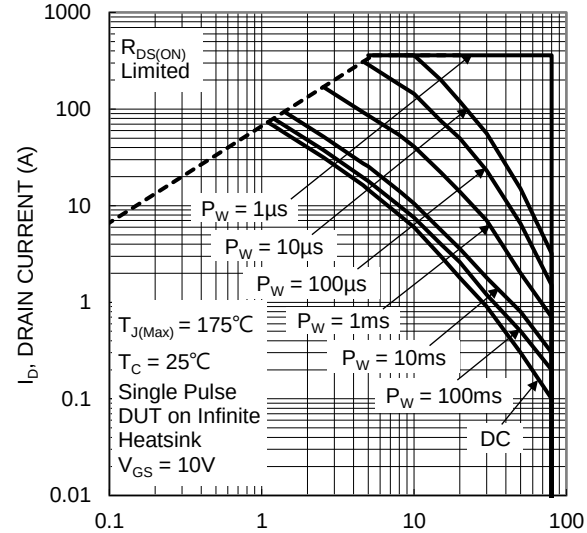


Figure 12 SOA, Safe Operation Area

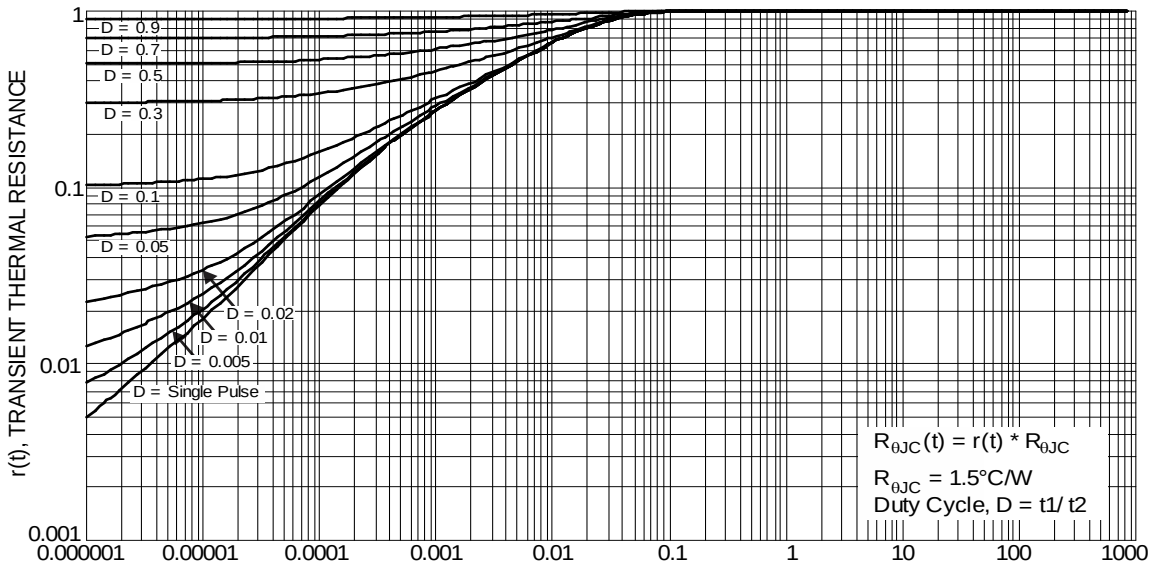
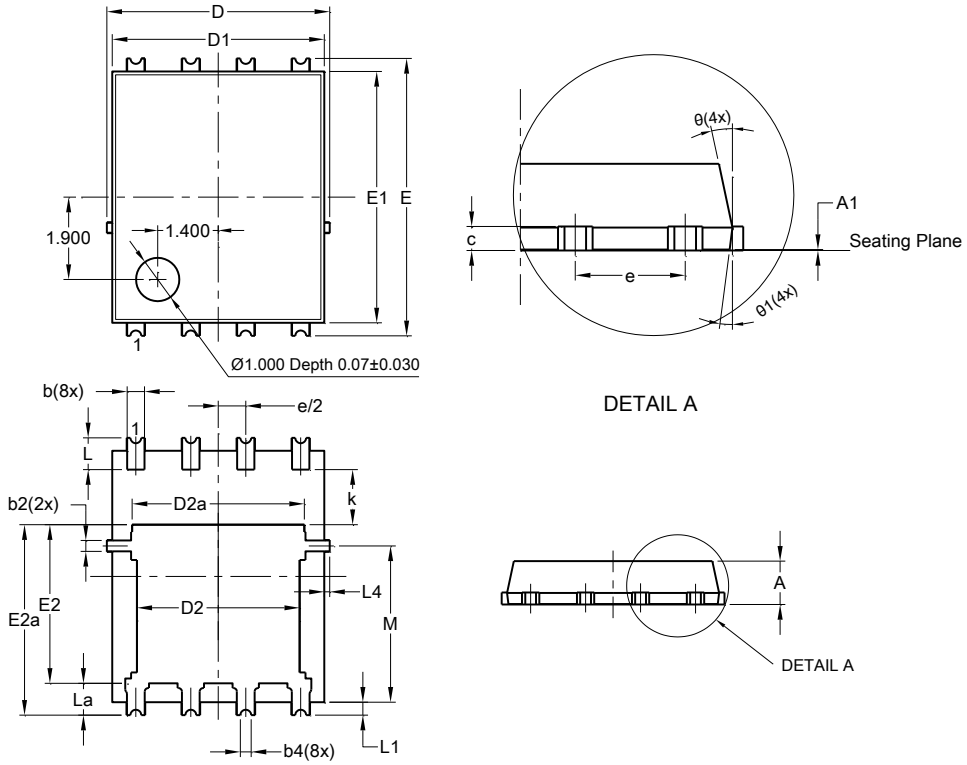


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

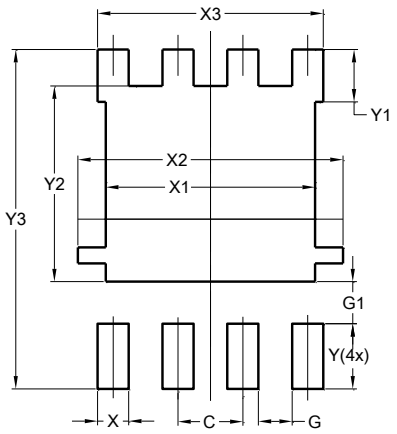
PowerDI5060-8/SWP (Type UX)



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

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