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 Max $T_C = +25°C$
40V	15mΩ @ V_{GS} = 10V	43.6A
	25mΩ @ V_{GS} = 4.5V	33A

Features and Benefits

- 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
- Low Input Capacitance
- Fast Switching Speed

Description and Applications

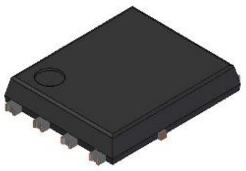
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Backlighting
- Power-management functions
- DC-DC converters

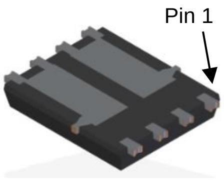
Mechanical Data

- 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
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ⓔ3
- Weight: 0.097 grams (Approximate)

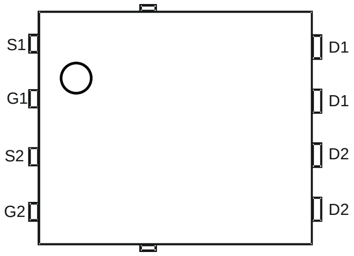
PowerDI5060-8/SWP (Type UXD)



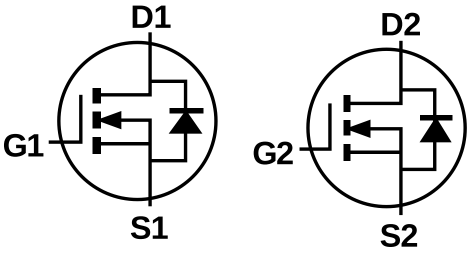
Top View



Bottom View



Pin Out
Top View



Equivalent Circuit

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	40	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 5)		T_C = +25°C T_C = +100°C	I_D	43.6 30.8	A
Continuous Drain Current (Note 6)	Steady State	T_A = +25°C T_A = +85°C T_A = +100°C	I_D	10.6 7.8 7.5	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) (Note 5)			I_{DM}	174	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	36	A
Avalanche Current, L = 0.3mH			I_{AS}	11.7	A
Avalanche Energy, L = 0.3mH			E_{AS}	20.5	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	62.6	°C/W
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	42.8	W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	3.5	°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. Device mounted on FR-4 substrate PC board, 2oz. copper, with thermal bias to bottom layer 1inch square copper plate.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	1.3	3	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	11.8	15	mΩ	V_{GS} = 10V, I_D = 20A
		—	17.9	25		V_{GS} = 4.5V, I_D = 15A
Diode Forward Voltage	V_{SD}	—	0.9	1.2	V	V_{GS} = 0V, I_S = 20A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	733	—	pF	V_{DS} = 20V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	235	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	24	—	pF	
Gate Resistance	R_g	—	1.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	5.2	—	nC	V_{DS} = 20V, I_D = 20A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	10.2	—	nC	
Gate-Source Charge	Q_{gs}	—	1.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	—	ns	V_{DD} = 20V, V_{GS} = 10V R_g = 1.6Ω, I_D = 20A
Turn-On Rise Time	t_R	—	5.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	8.7	—	ns	
Turn-Off Fall Time	t_F	—	1.8	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	11.9	—	ns	I_F = 15A, dI/dt = 400A/μs
Body Diode Reverse Recovery Charge	Q_{RR}	—	9.28	—	nC	

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

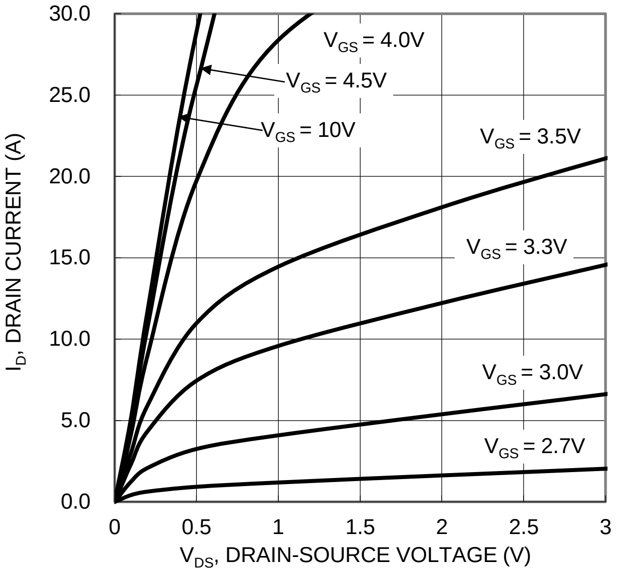


Figure 1. Typical Output Characteristic

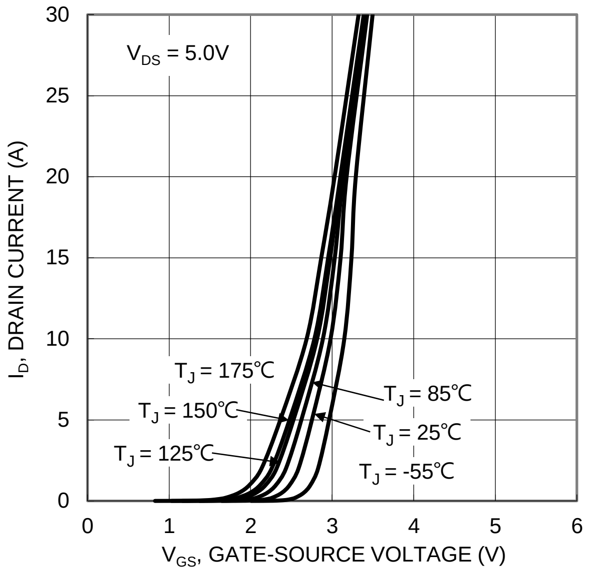


Figure 2. Typical Transfer Characteristic

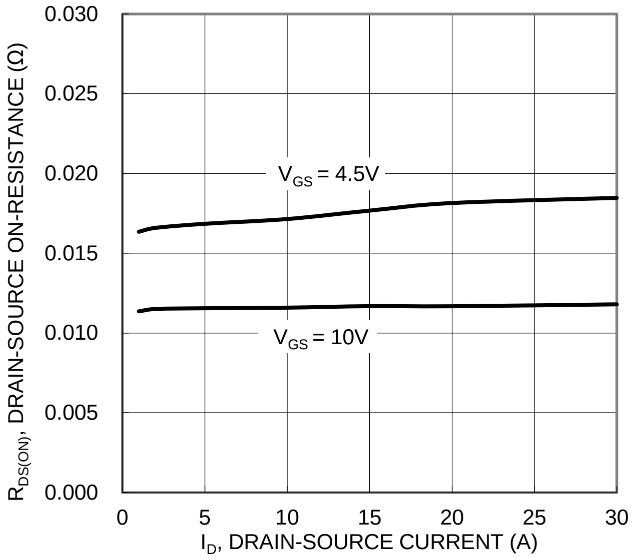


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

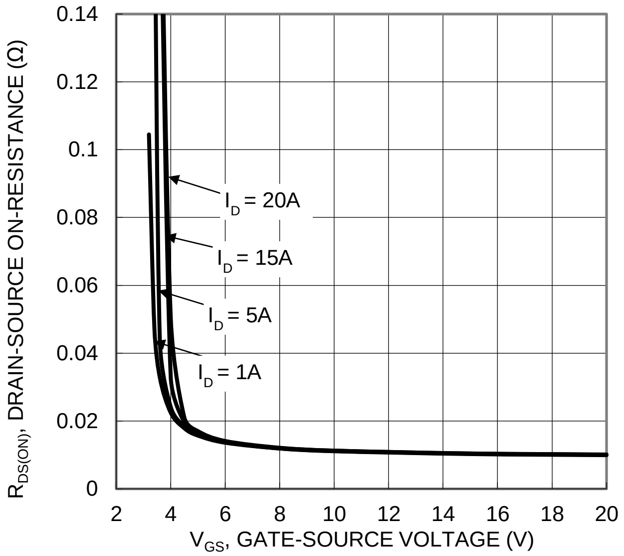


Figure 4. Typical Transfer Characteristic

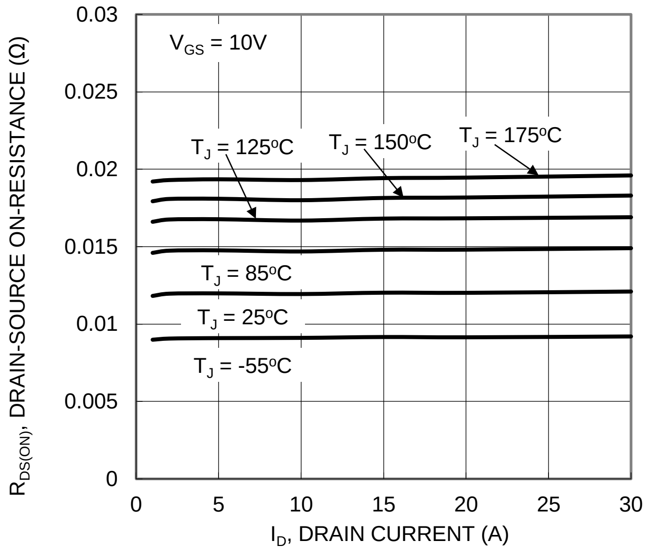


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

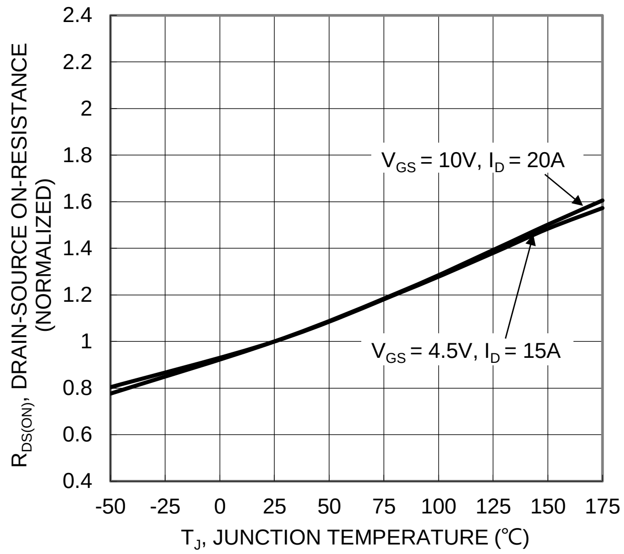


Figure 6. On-Resistance Variation with Temperature

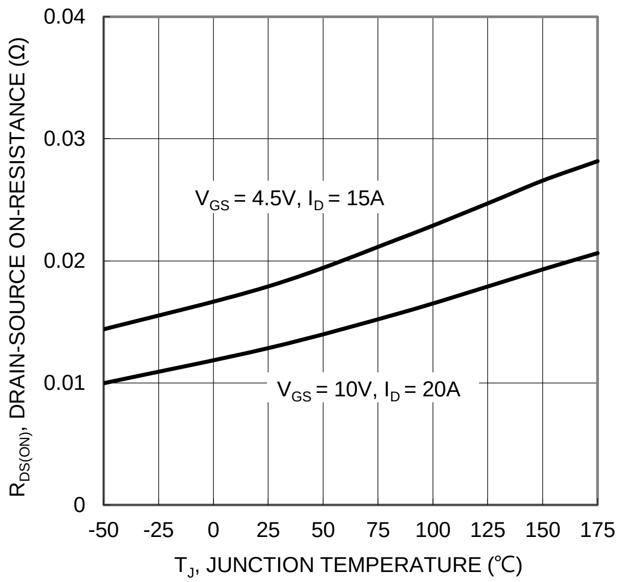


Figure 7. On-Resistance Variation with Temperature

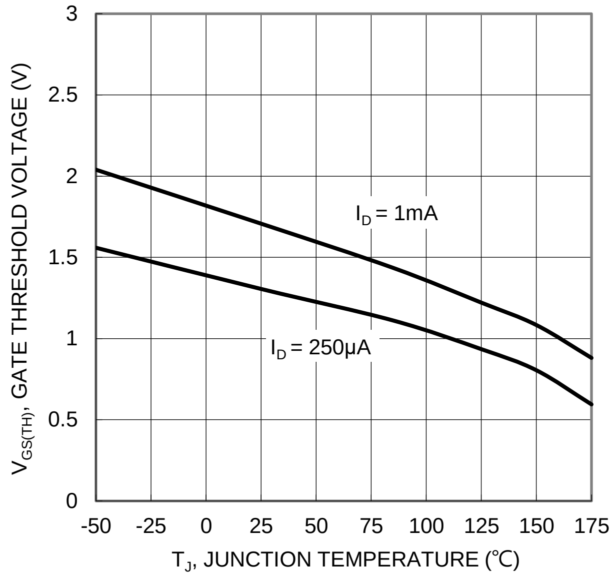


Figure 8. Gate Threshold Variation vs. Junction Temperature

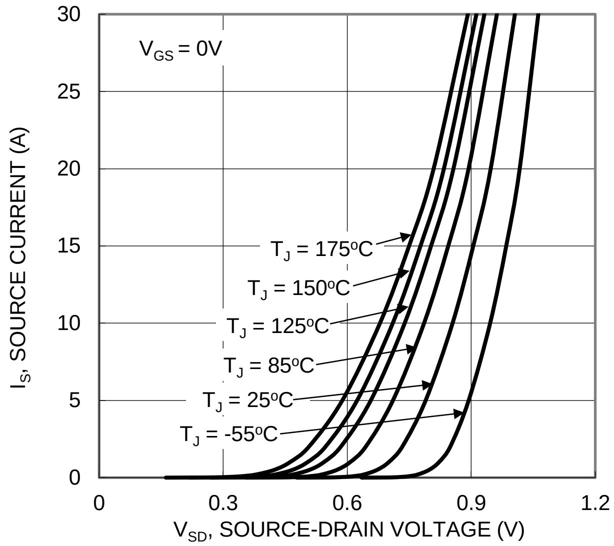


Figure 9. Diode Forward Voltage vs. Current

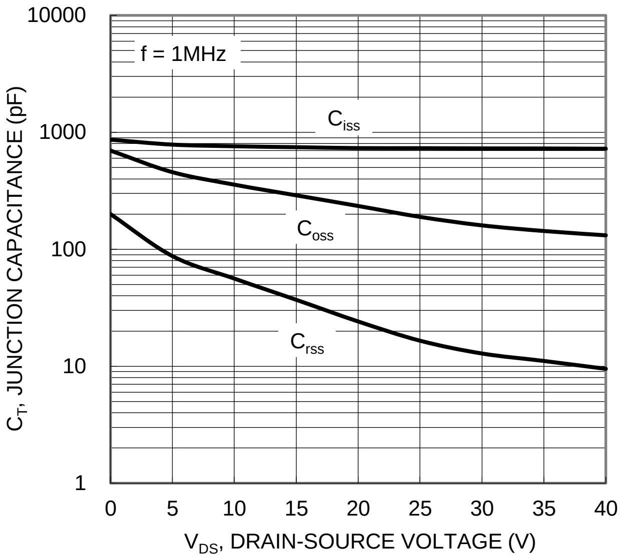


Figure 10. Typical Junction Capacitance

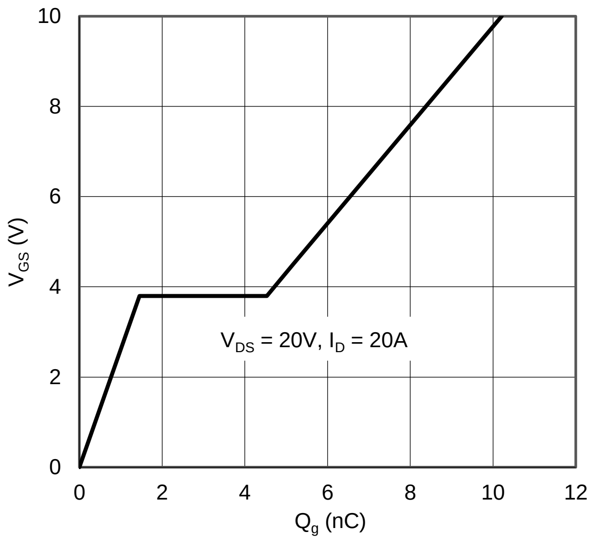


Figure 11. Gate Charge

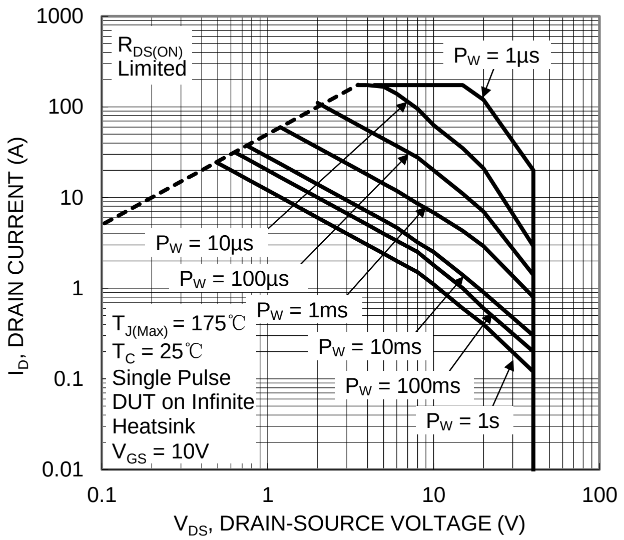


Figure 12. SOA, Safe Operation Area

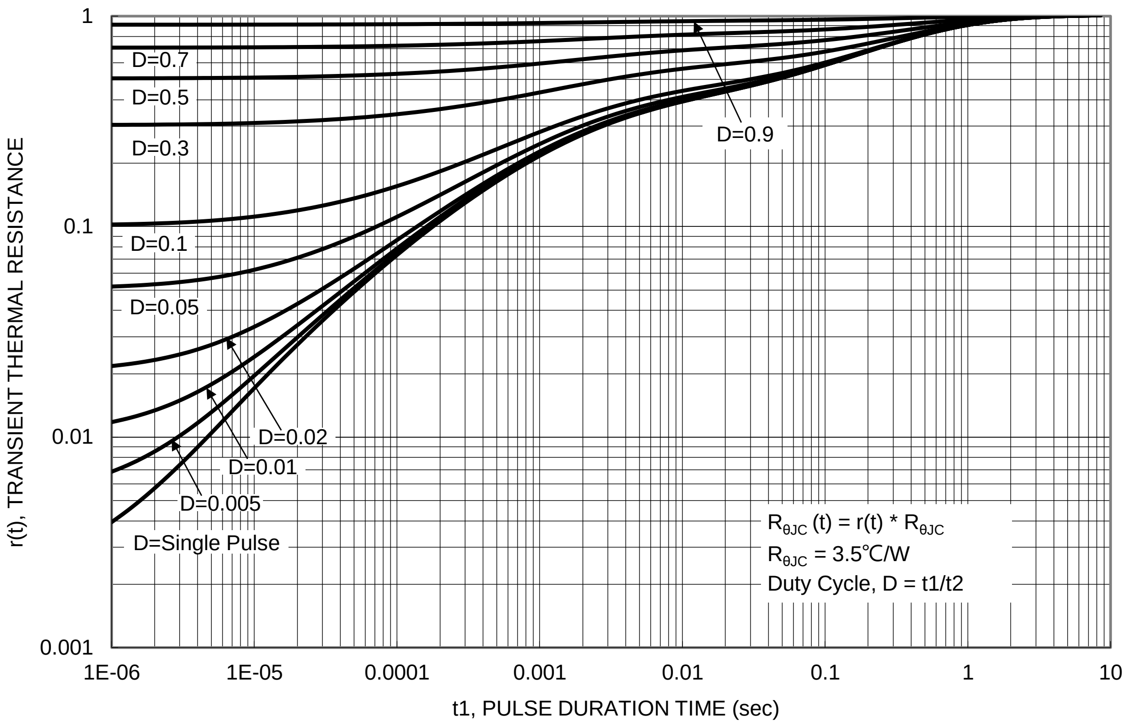
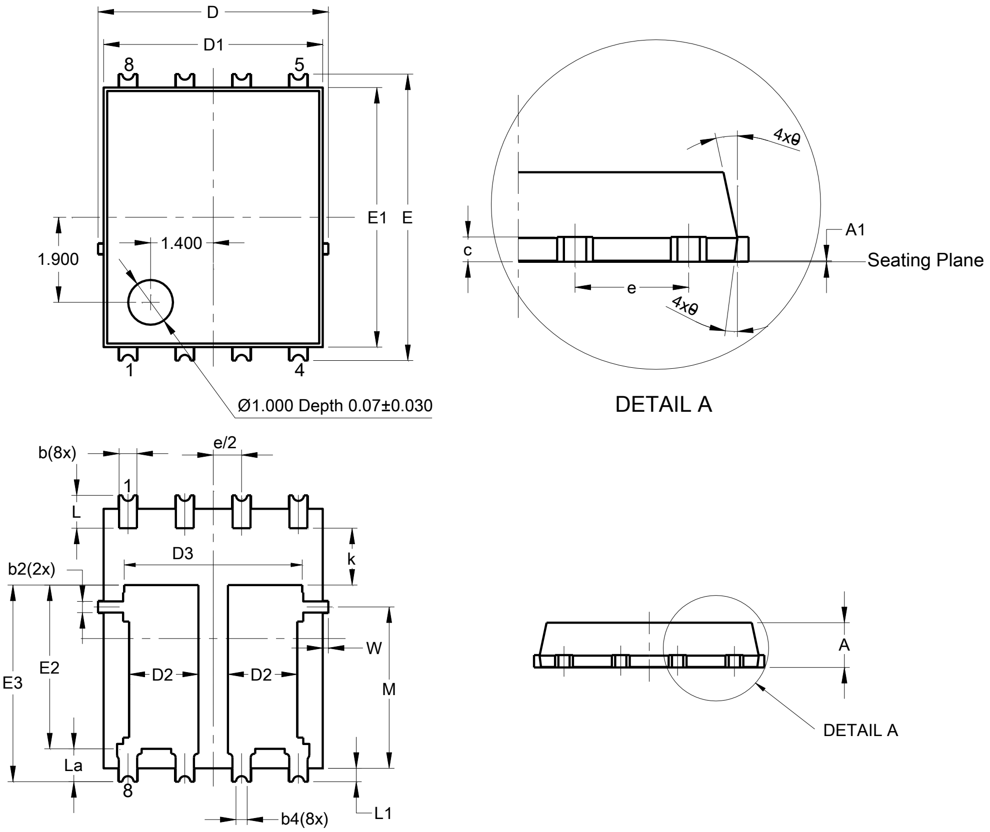


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

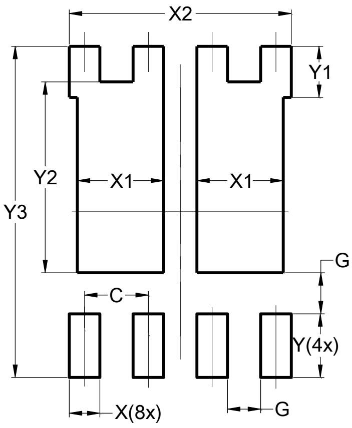
PowerDI5060-8/SWP (Type UXD)



PowerDI5060-8/SWP (Type UXD)			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.10	1.00
A1	0.00	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	1.46	1.66	1.55
D3	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
M	3.205	4.005	3.605
W	0.025	0.225	0.125
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

PowerDI5060-8/SWP (Type UXD)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	1.720
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610