



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	4.5mΩ @ V _{GS} = 10V	105A

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching, Test in Production – Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- Wettable Flank for Improved Optical Inspection

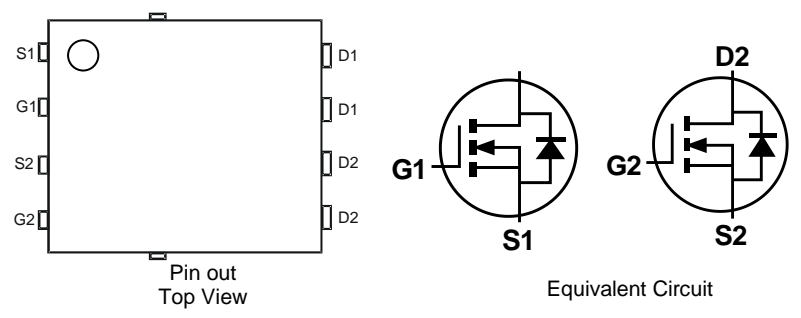
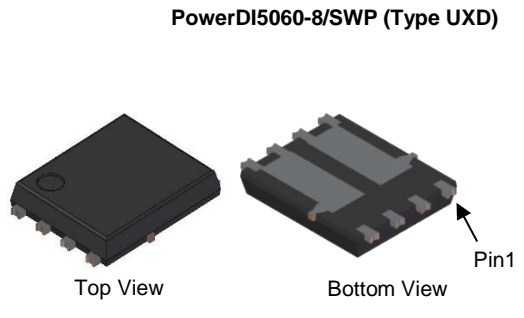
Description and Applications

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)



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, V _{GS} = 10V (Note 6)	I _D	T _C = +25°C	105
		T _C = +100°C	74
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	105	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	420	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	420	A
Avalanche Current, L = 0.1mH	I _{AS}	44	A
Avalanche Energy, L = 0.1mH	E _{AS}	97	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	3	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	50	°C/W
Total Power Dissipation (Note 6)	P _D	76	W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	2	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C

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)}	2	—	4	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	3.3	4.5	mΩ	V _{GS} = 10V, I _D = 20A
Diode Forward Voltage	V _{SD}	—	0.81	1.2	V	V _{GS} = 0V, I _S = 15A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	2958	—	pF	V _{DS} = 20V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	805	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	85	—	pF	
Gate Resistance	R _g	—	2.4	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge, V _{GS} = 4.5V	Q _g	—	17	—	nC	V _{DS} = 20V, I _D = 20A
Total Gate Charge, V _{GS} = 10V	Q _g	—	40	—	nC	
Gate-Source Charge	Q _{gs}	—	10.8	—	nC	
Gate-Drain Charge	Q _{gd}	—	2.6	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.1	—	ns	V _{DD} = 20V, V _{GS} = 10V, I _D = 20A, R _g = 3Ω
Turn-On Rise Time	t _r	—	5.1	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	32	—	ns	
Turn-Off Fall Time	t _f	—	10.8	—	ns	
Body Diode Reverse Recovery Time	t _{RR}	—	79	—	ns	I _F = 20A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q _{RR}	—	77	—	nC	

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz. copper, with thermal bias to bottom layer 1inch square copper plate.
6. Thermal resistance from junction to soldering point (on the exposed drain pad).
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

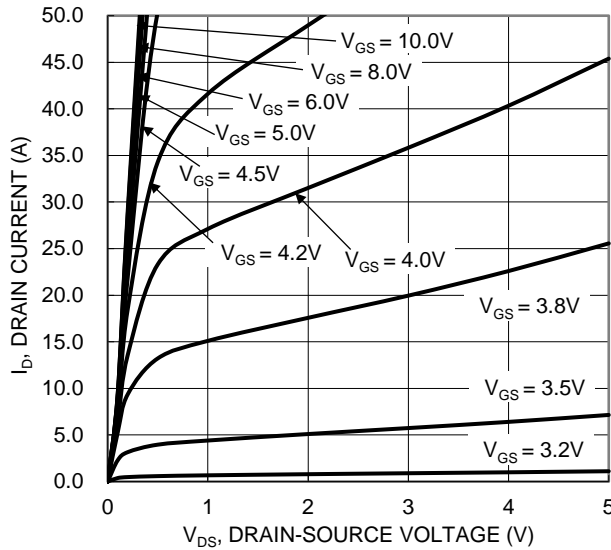


Figure 1. Typical Output Characteristic

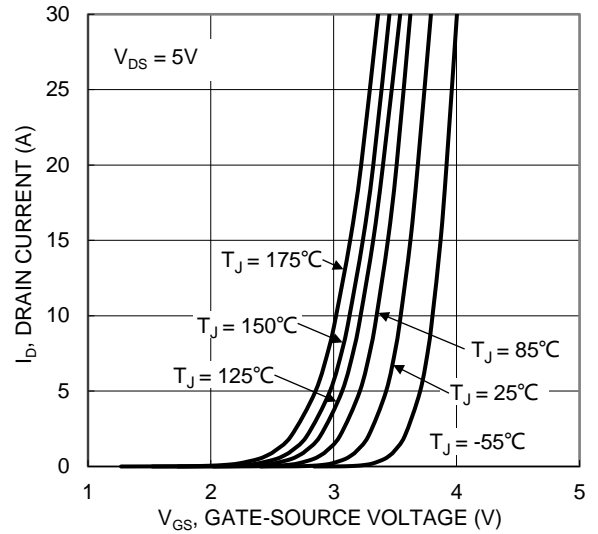


Figure 2. Typical Transfer Characteristic

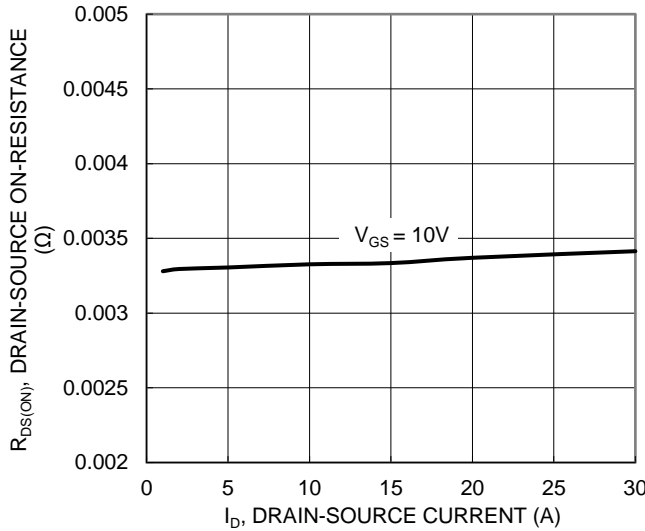


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

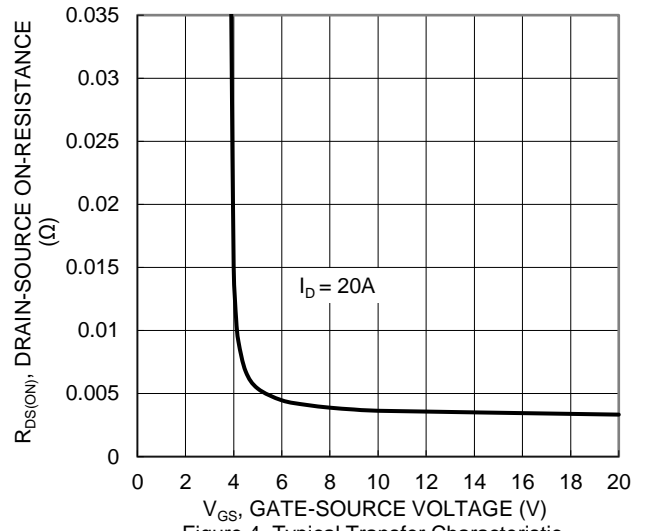


Figure 4. Typical Transfer Characteristic

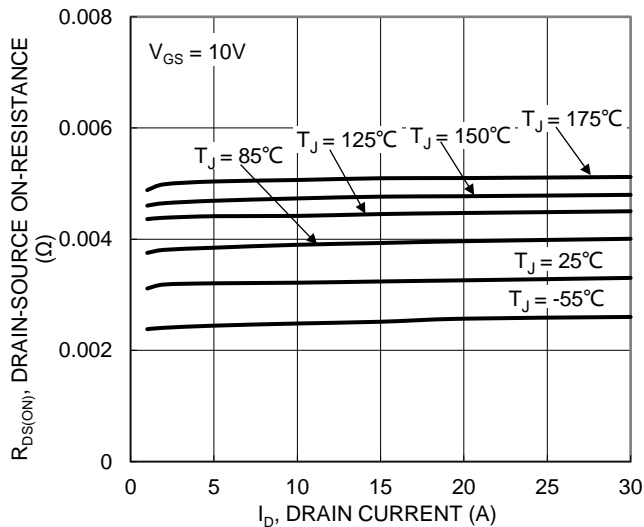


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

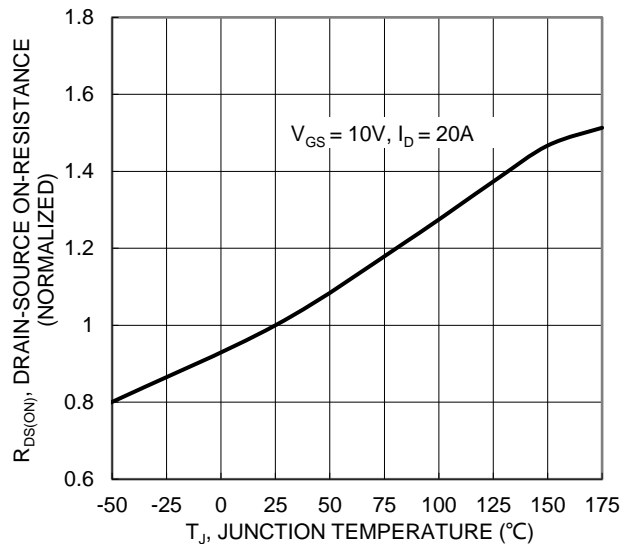


Figure 6. On-Resistance Variation with Temperature

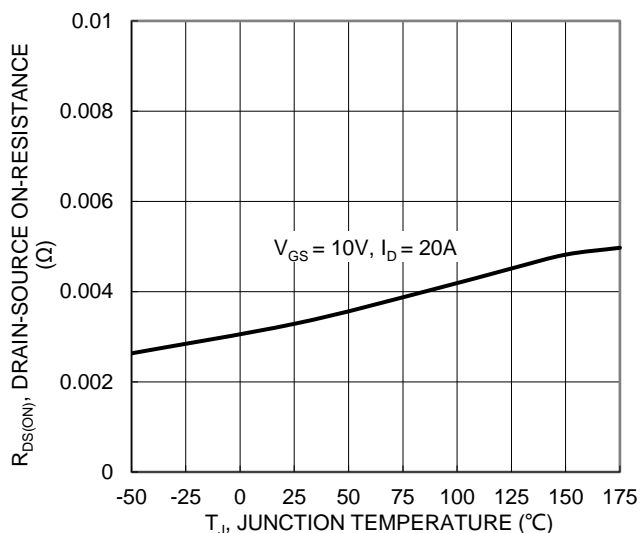


Figure 7. On-Resistance Variation with Temperature

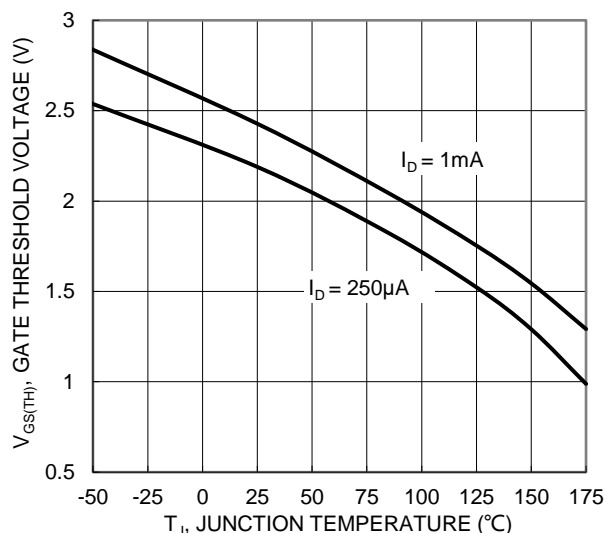


Figure 8. Gate Threshold Variation vs. Junction Temperature

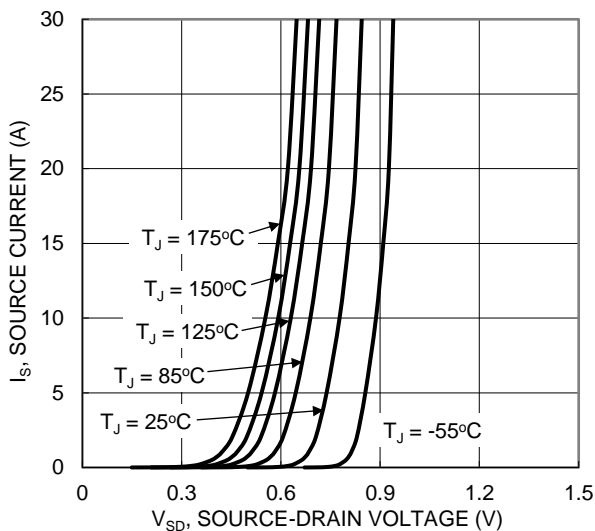


Figure 9. Diode Forward Voltage vs. Current

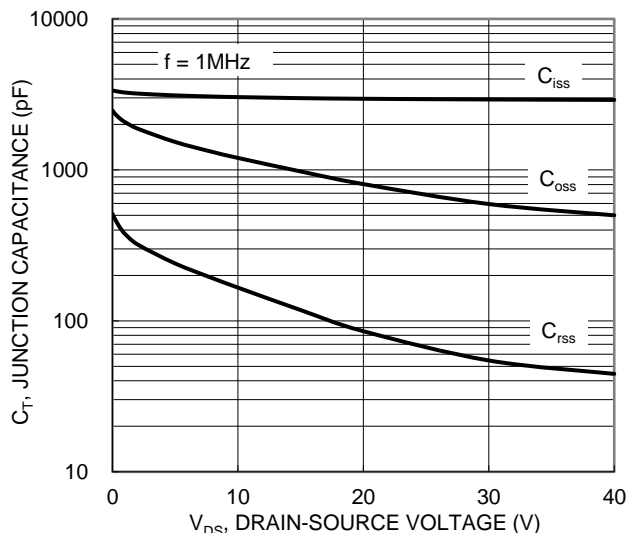


Figure 10. Typical Junction Capacitance

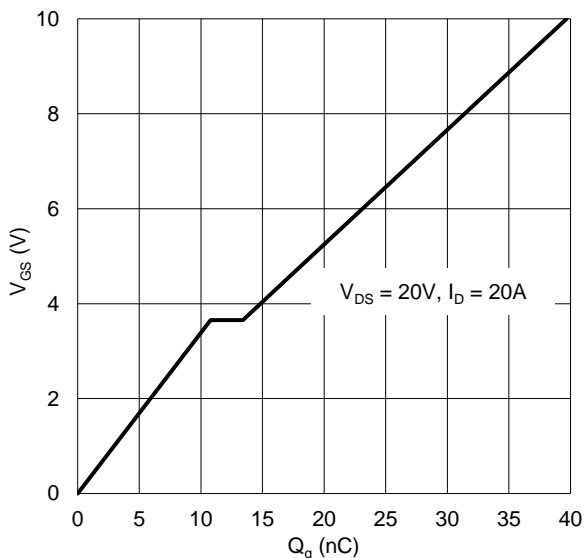


Figure 11. Gate Charge

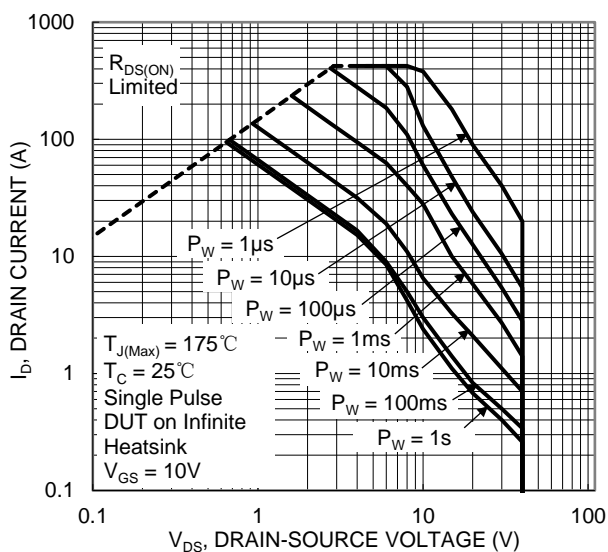


Figure 12. SOA, Safe Operation Area

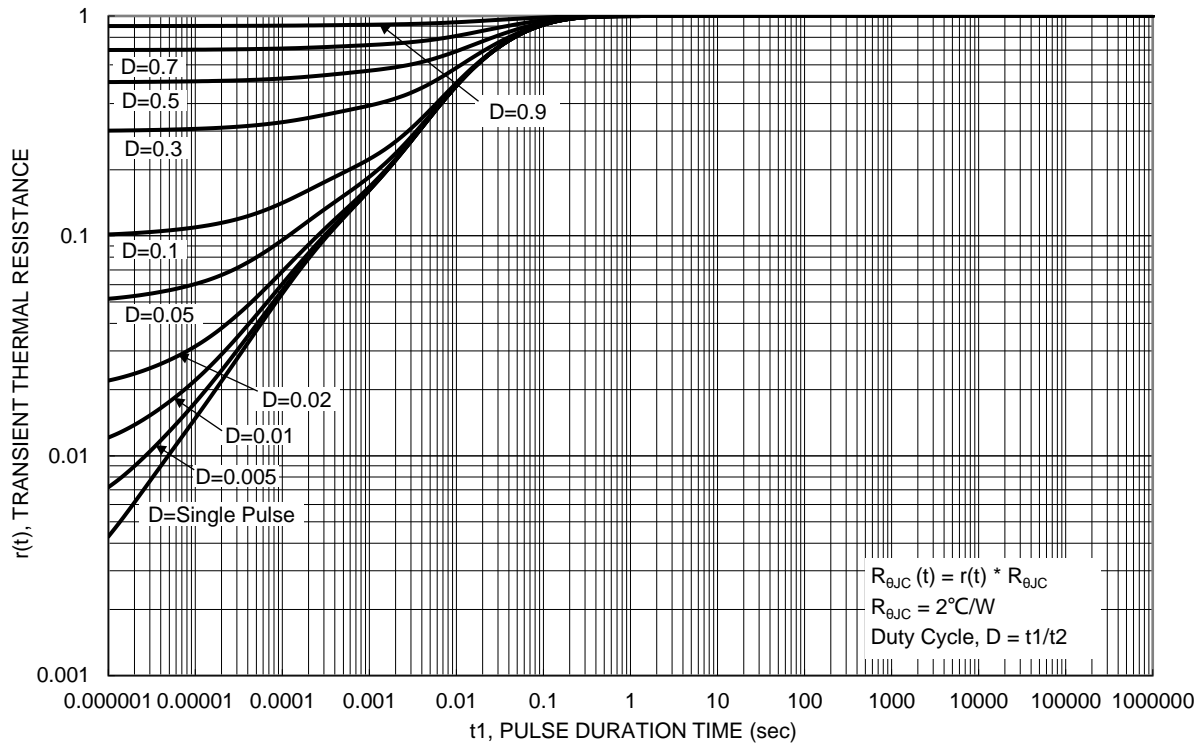
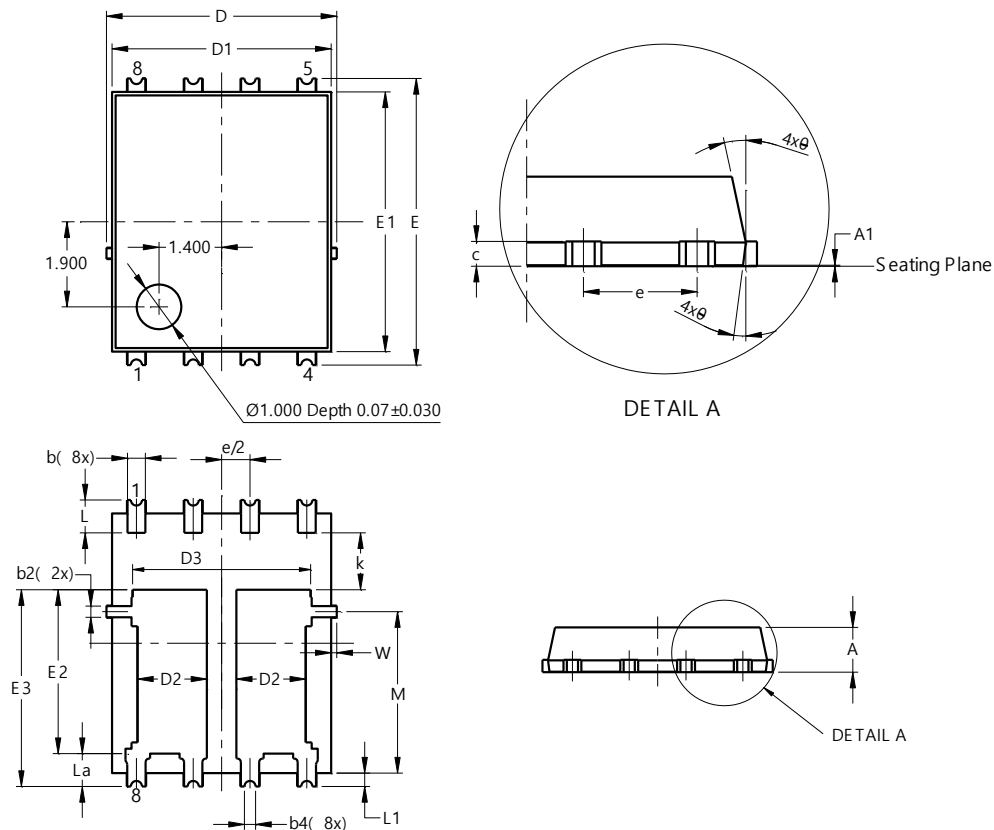


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

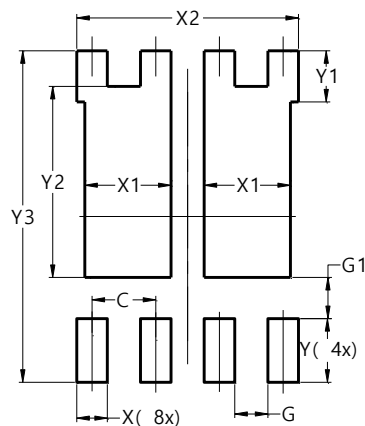
PowerDI5060-8/SWP (Type UXD)



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