



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 Max T _c = +25°C
150V	17.5mΩ @ V _{GS} = 10V	50A
	25.5mΩ @ V _{GS} = 4.5V	43A

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
- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low R_{DS(ON)} – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- <1.1mm Package Profile – Ideal for Thin Applications (PowerDI®)

Description and Applications

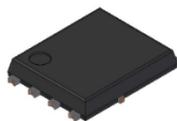
This new generation N-Channel Enhancement Mode MOSFET is designed to minimize R_{DS(ON)} yet maintain superior switching performance. This device is ideal for use in notebook battery power management and load switch.

- Synchronous rectification
- Power switching
- Class D audio amplifiers

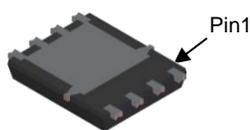
Mechanical Data

- Package: PowerDI5060-8
- 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
- Terminal Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (63)
- Weight: 0.097 grams (Approximate)

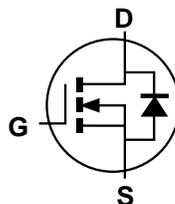
PowerDI5060-8 (SWP) (Type UX)



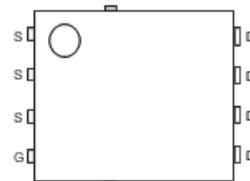
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DS}	150	V
Gate-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current $V_{GS} = 10\text{V}$ (Note 5)	Steady State	$T_A = +25^\circ\text{C}$	I_D	8	A
		$T_A = +100^\circ\text{C}$		5.7	
Continuous Drain Current $V_{GS} = 10\text{V}$ (Note 6)	Steady State	$T_C = +25^\circ\text{C}$	I_D	50	A
		$T_C = +100^\circ\text{C}$		35	
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	200	A
Maximum Continuous Body Diode Forward Current			I_S	50	A
Pulsed Body Diode Current (10 μs Pulse, Duty Cycle = 1%)			I_{SM}	200	A
Avalanche Current (Note 7), $L = 3\text{mH}$			I_{AS}	14.5	A
Avalanche Energy (Note 7), $L = 3\text{mH}$			E_{AS}	315.4	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 8)	$T_A = +25^\circ\text{C}$	P_D	1.5	W
Thermal Resistance, Junction to Ambient (Note 8)	Steady State	$R_{\theta JA}$	99	$^\circ\text{C/W}$
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	2.8	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	53	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$T_C = +25^\circ\text{C}$	P_D	107	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	1.4	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	150	—	—	V	$V_{GS} = 0\text{V}, I_D = 10\text{mA}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 120\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.3	—	2.6	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	13	17.5	m Ω	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	17	25.5		$V_{GS} = 4.5\text{V}, I_D = 20\text{A}$
Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	$V_{GS} = 0\text{V}, I_S = 20\text{A}$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	3369	—	pF	$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	211	—		
Reverse Transfer Capacitance	C_{rss}	—	6.7	—		
Gate Resistance	R_g	—	1.9	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge	Q_g	—	50	—	nC	$V_{DD} = 75\text{V}, I_D = 20\text{A}$ $V_{GS} = 10\text{V}$
Gate-Source Charge	Q_{gs}	—	12.8	—		
Gate-Drain Charge	Q_{gd}	—	9.4	—		
Turn-On Delay Time	$t_{D(ON)}$	—	10.5	—	ns	$V_{DD} = 75\text{V}, V_{GS} = 10\text{V}$ $I_D = 20\text{A}, R_g = 6\Omega$
Turn-On Rise Time	t_R	—	16.3	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	44.6	—		
Turn-Off Fall Time	t_F	—	17.7	—		
Reverse Recovery Time	t_{RR}	—	72	—	ns	$I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	Q_{RR}	—	215	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.
 - Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

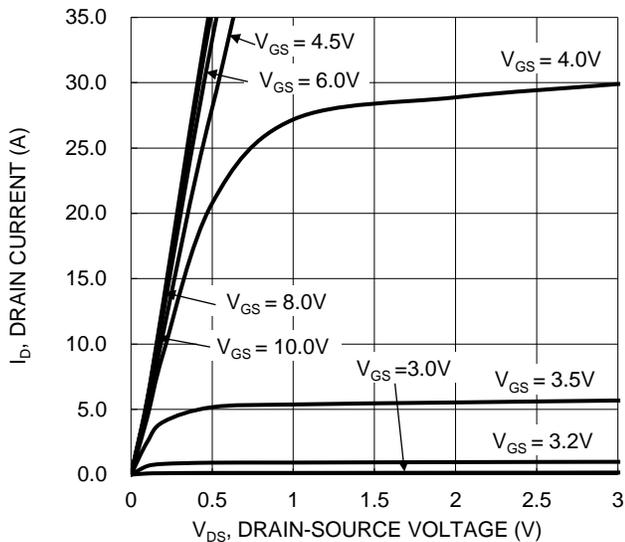


Figure 1. Typical Output Characteristic

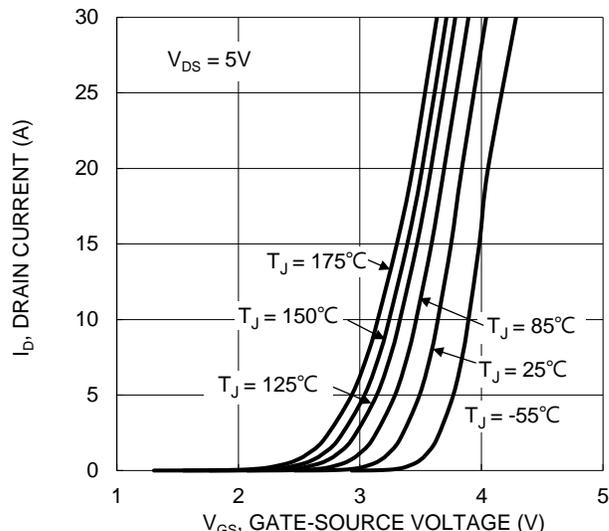


Figure 2. Typical Transfer Characteristic

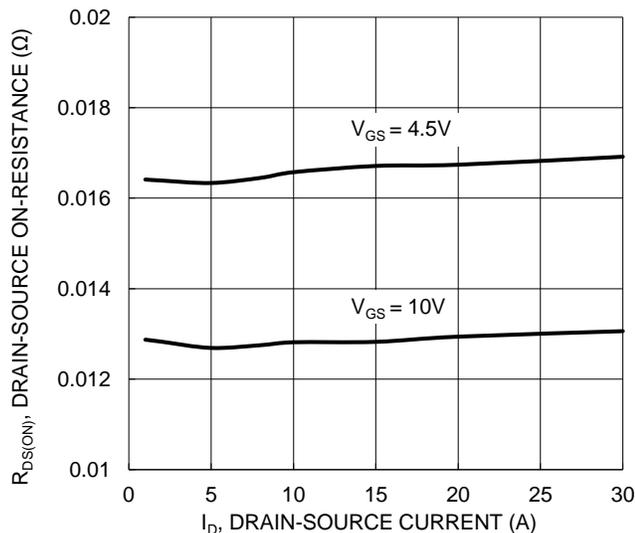


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

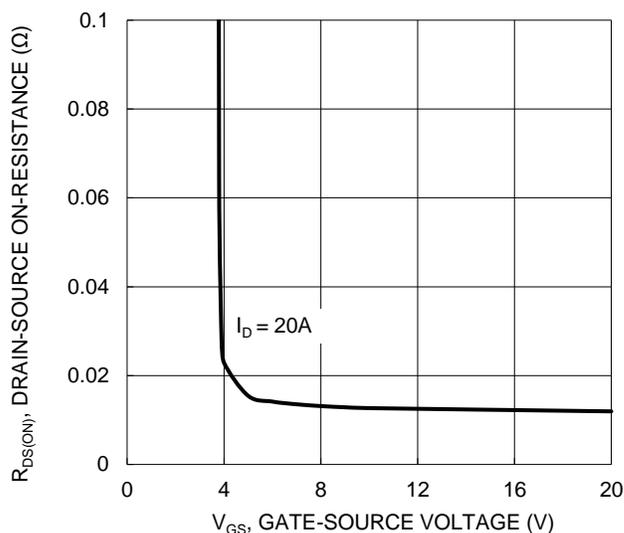


Figure 4. Typical Transfer Characteristic

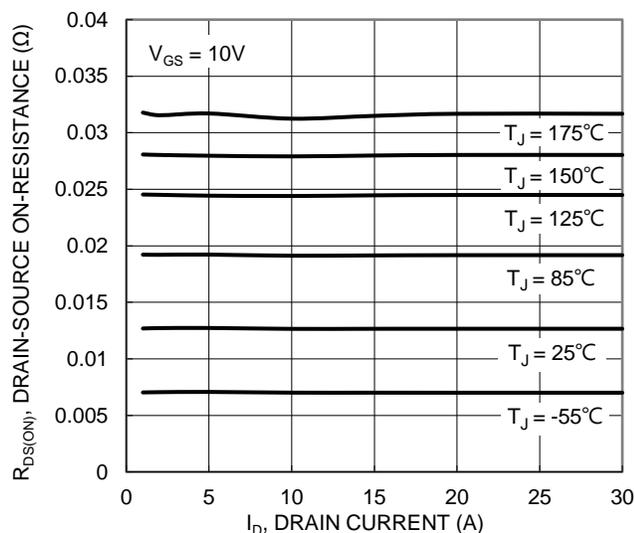


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

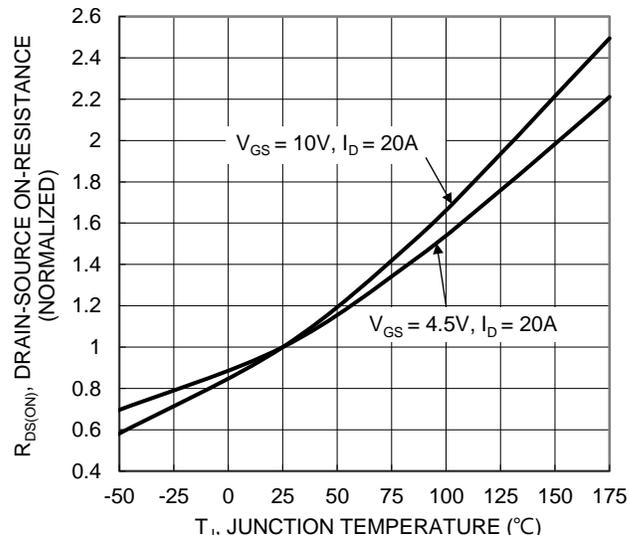


Figure 6. On-Resistance Variation with Junction Temperature

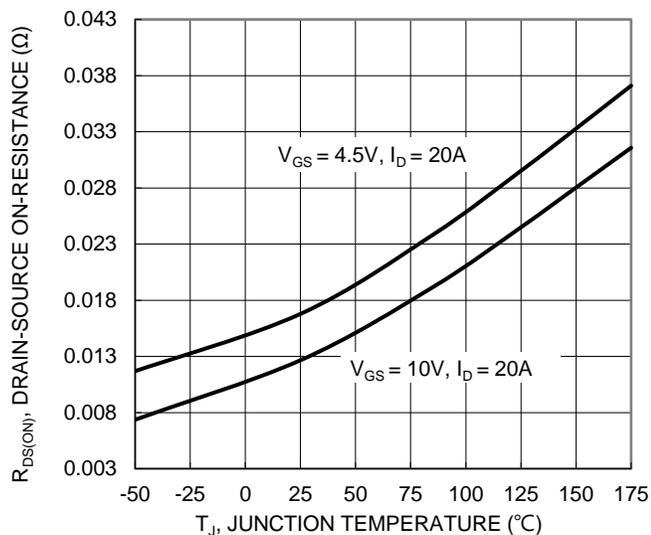


Figure 7. On-Resistance Variation with Junction Temperature

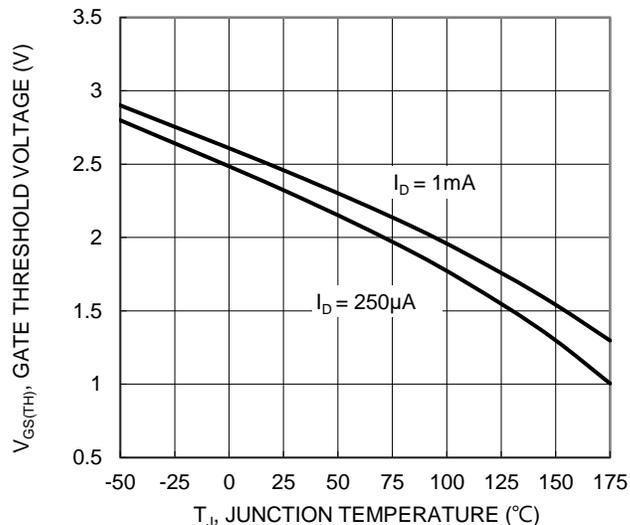


Figure 8. Gate Threshold Variation vs. Junction Temperature

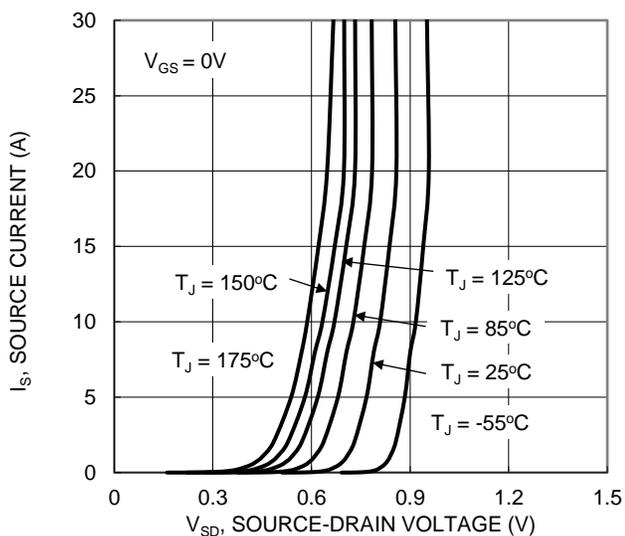


Figure 9. Diode Forward Voltage vs. Current

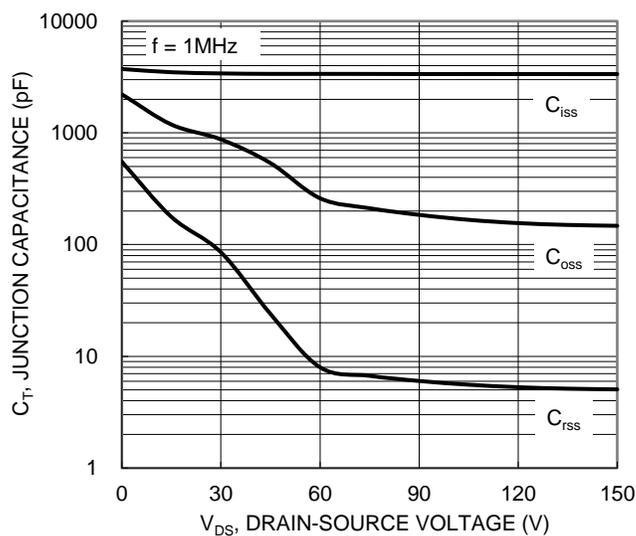


Figure 10. Typical Junction Capacitance

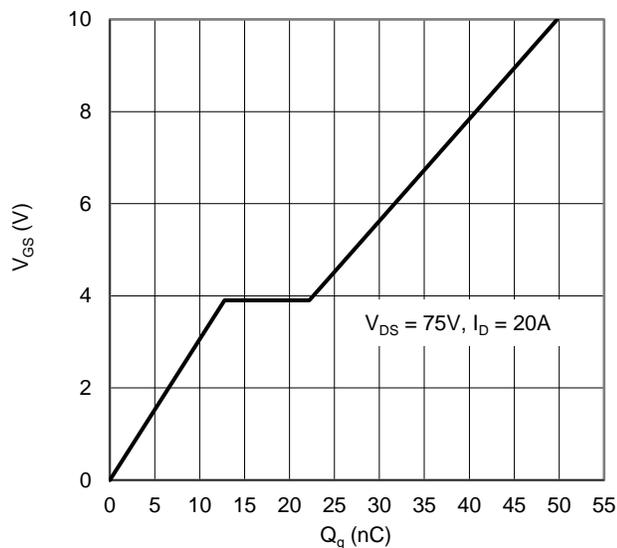


Figure 11. Gate Charge

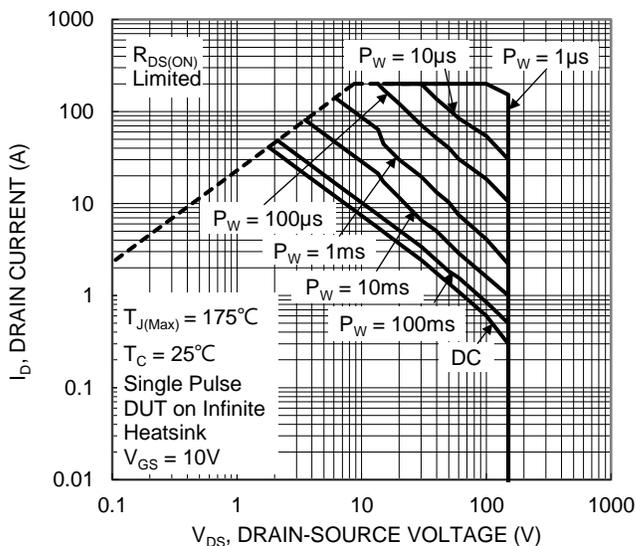


Figure 12. SOA, Safe Operation Area

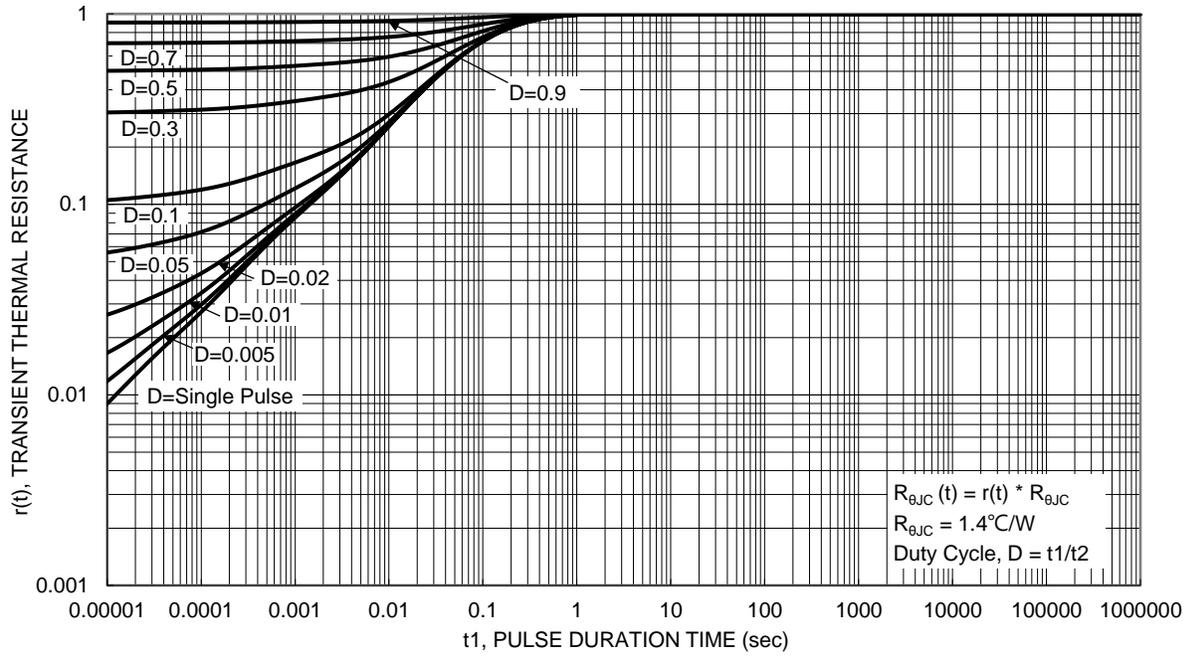
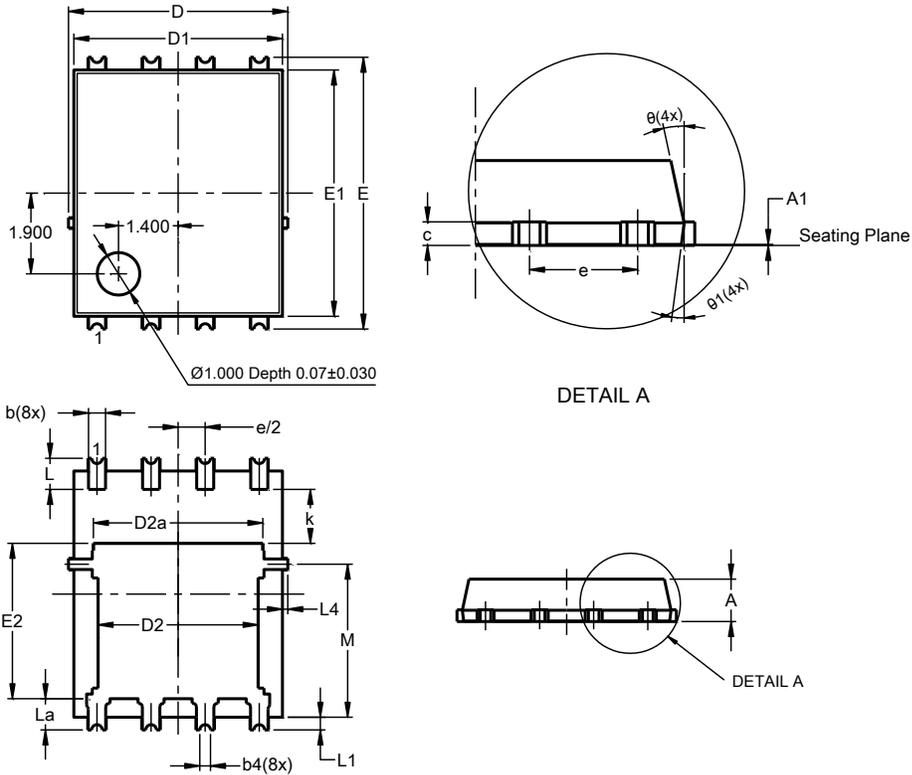


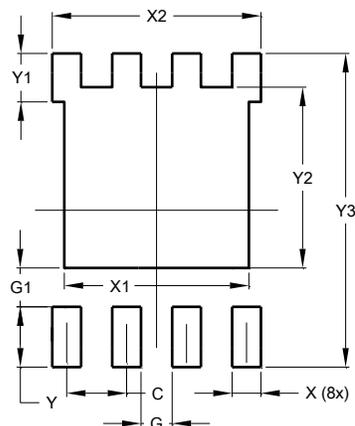
Figure 13. Transient Thermal Resistance

Package Outline Dimensions

PowerDI5060-8 (SWP) (Type UX)


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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	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610