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 $T_C = +25°C$
-30V	15mΩ @ V_{GS} = -10V	-52.7 A
	25mΩ @ V_{GS} = -5V	-40.8 A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- <1.1mm Package Profile—Ideal for Thin Applications

Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

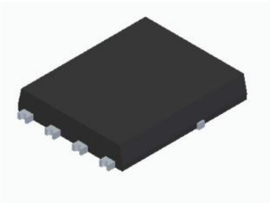
- DC-DC converters
- Power management functions
- Analog switches

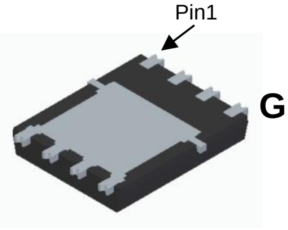
Mechanical Data

- Package: PowerDI®5060-8 (Type UX)
- 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)

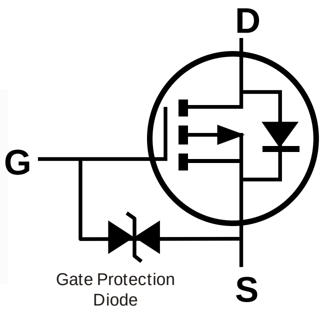
PowerDI®5060-8


ESD PROTECTED

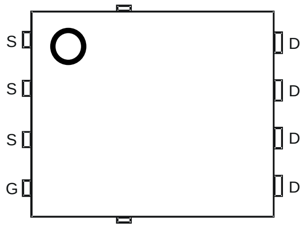

Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±25	V
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-10.6 -8.5	A
Continuous Drain Current (Note 7) V_{GS} = -10V	Steady State	T_C = +25°C T_C = +70°C	I_D	-52.7 -42.2	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-3.2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-197	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	-197	A
Avalanche Current (Note 8) L = 1mH			I_{AS}	-14.5	A
Avalanche Energy (Note 8) L = 1mH			E_{AS}	104	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.8	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	69.5	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	49.6	°C/W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	2	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	μA	V_{GS} = ±25V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	-2.5	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	9.8	15	mΩ	V_{GS} = -10V, I_D = -8A
		—	14.3	25		V_{GS} = -5V, I_D = -5A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1799	—	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	259	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	225	—	pF	
Gate Resistance	R_g	—	2.1	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -5V)	Q_g	—	17.4	—	nC	V_{DS} = -15V, I_D = -10A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	34	—	nC	
Gate-Source Charge	Q_{gs}	—	5.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	8.4	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	6.5	—	ns	V_{DD} = -15V, V_{GS} = -10V, R_G = 3Ω, I_D = -10A
Turn-On Rise Time	t_R	—	18.3	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	35.8	—	ns	
Turn-Off Fall Time	t_F	—	23.7	—	ns	
Reverse Recovery Time	t_{RR}	—	14.9	—	ns	I_S = -8A, dI/dt = 500A/μs
Reverse Recovery Charge	Q_{RR}	—	15	—	nC	

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

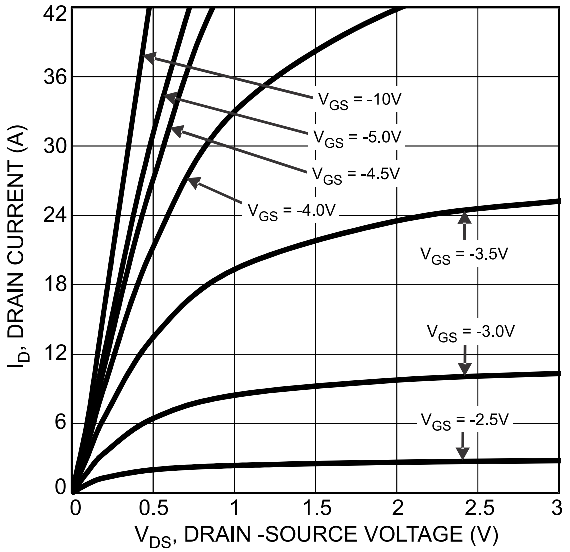


Fig. 1 Typical Output Characteristics

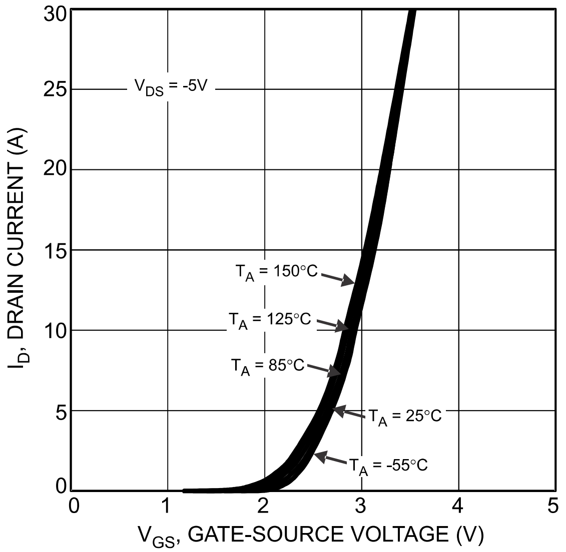


Fig. 2 Typical Transfer Characteristics

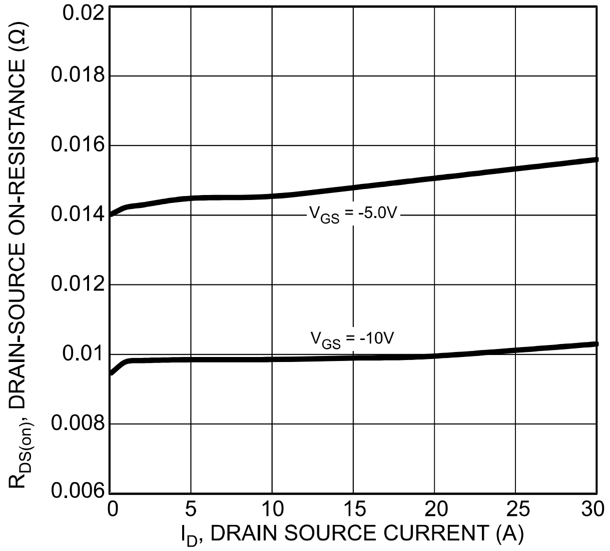


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

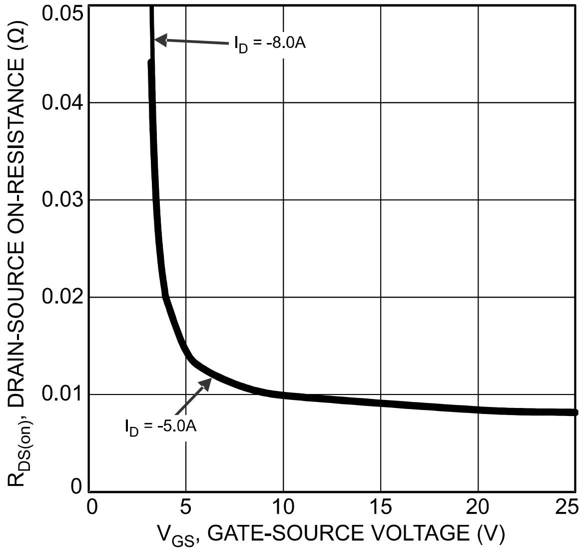


Fig. 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

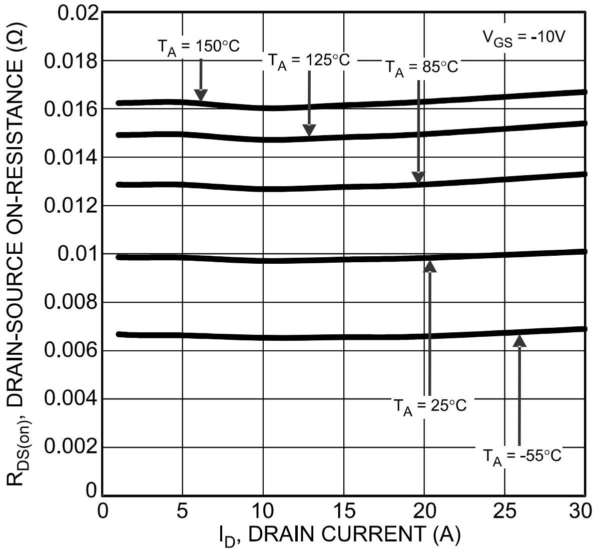


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

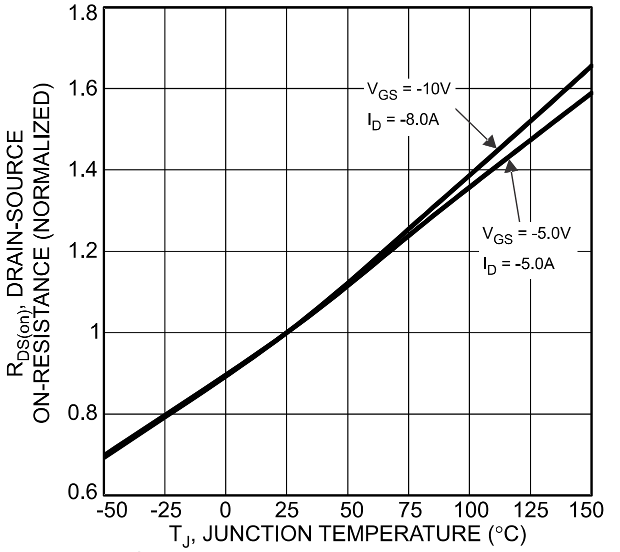


Fig. 6 On-Resistance Variation with Junction Temperature

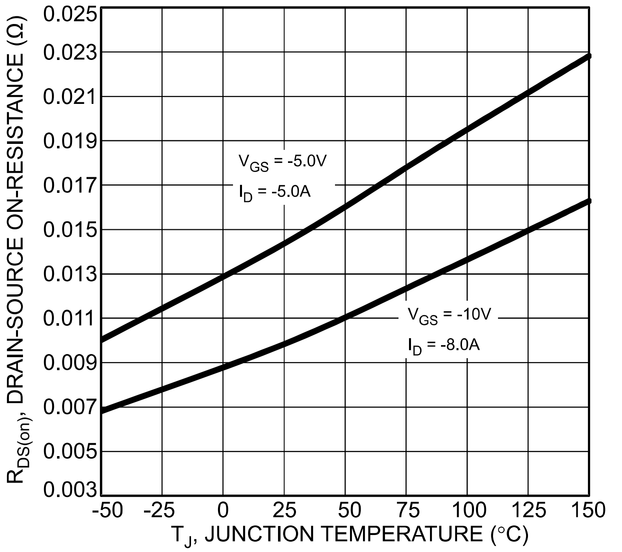


Fig. 7 On-Resistance Variation with Junction Temperature

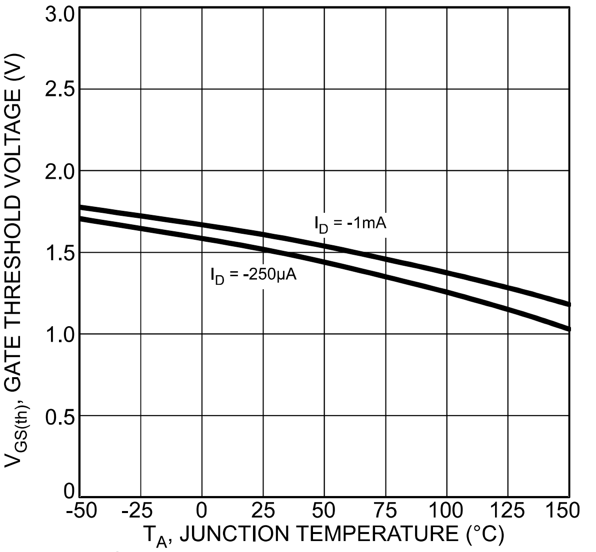


Fig. 8 Gate Threshold Variation vs. Junction Temperature

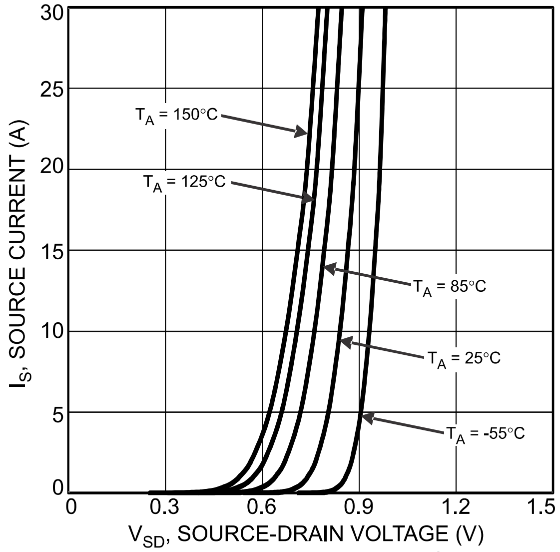


Fig. 9 Diode Forward Voltage vs. Current

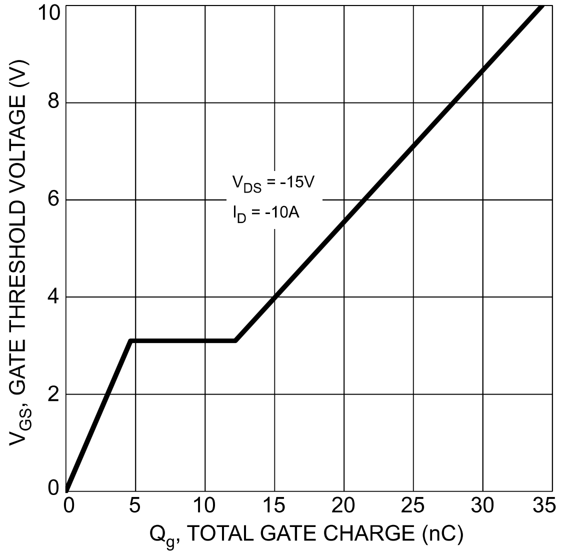


Fig. 10 Gate Charge

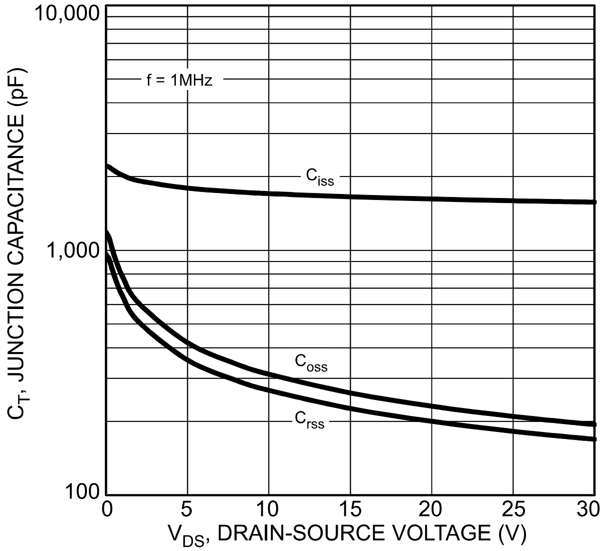


Fig. 11 Typical Junction Capacitance

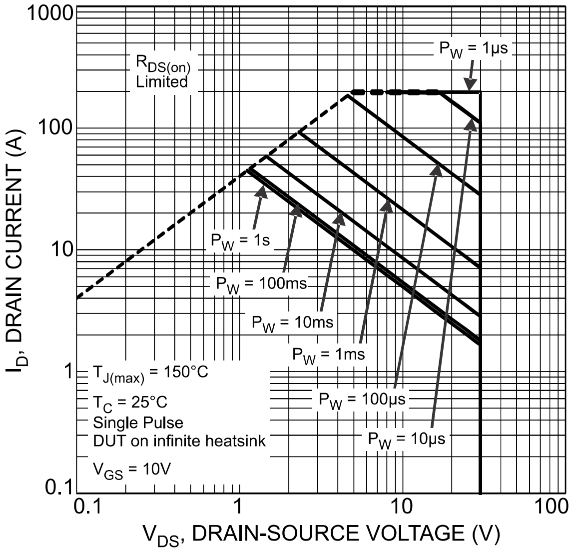


Fig. 12 SOA, Safe Operation Area

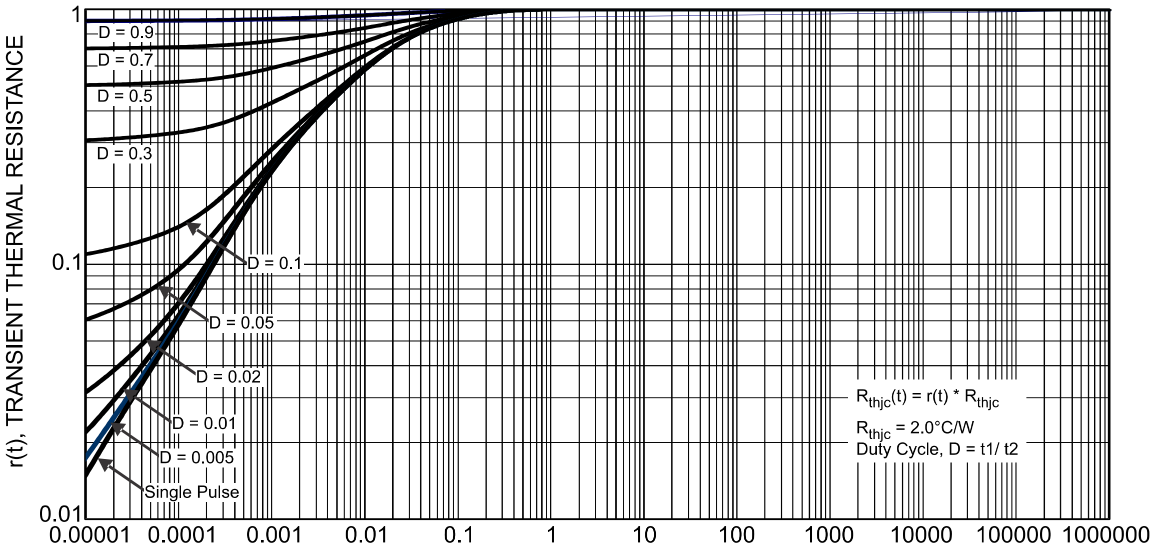
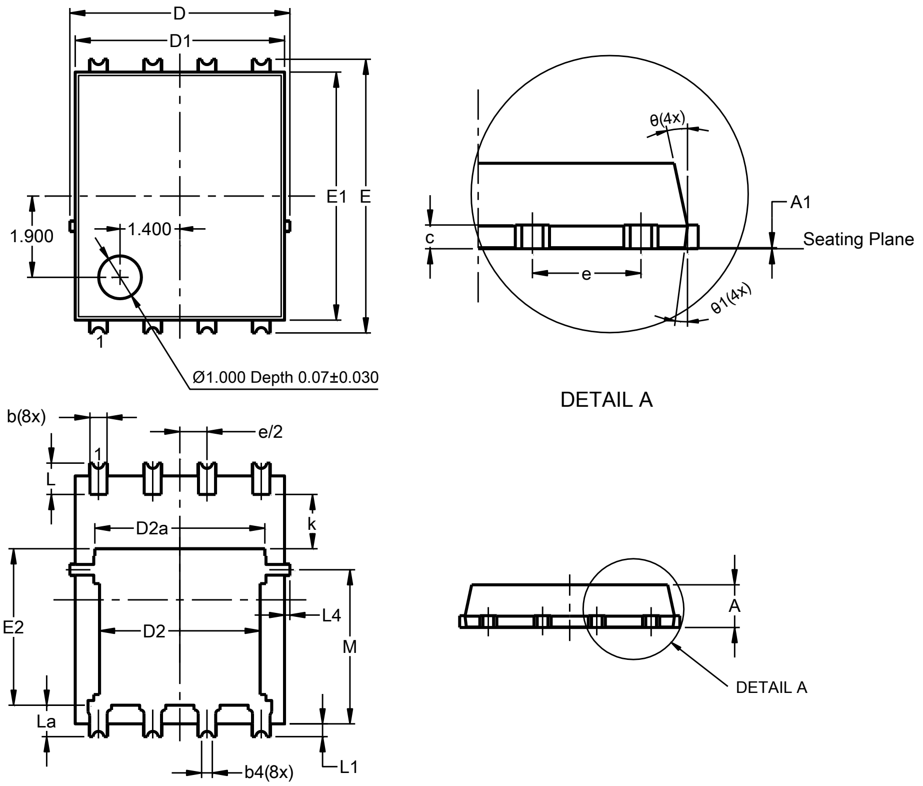


Fig. 13 Transient Thermal Resistance

Package Outline Dimensions

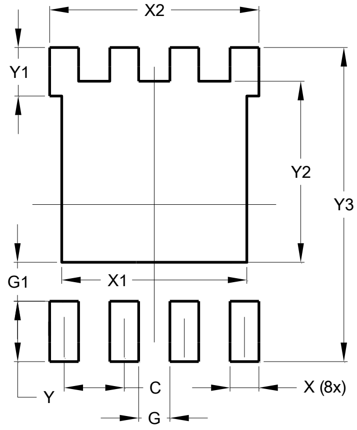
PowerDI5060-8 (SWP) (Type UX)



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			

Suggest 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