



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



企业QQ二维码

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
30V	6mΩ @ V _{GS} = 10V	65A
	9.8mΩ @ V _{GS} = 4.5V	55A

Features and Benefits

- Low R_{DS(ON)} – Minimizes On-State Losses
- Excellent Q_{gd} x R_{DS(ON)} Product (FOM)
- Advanced Technology for DC-DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% Unclamped Inductive Switching – Ensures More Reliability

Description and Applications

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

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

Mechanical Data

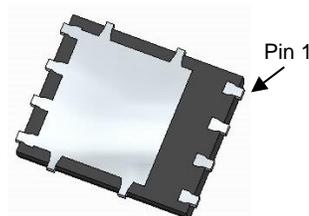
- Package: PowerDI[®]5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.097 grams (Approximate)

Site 1:

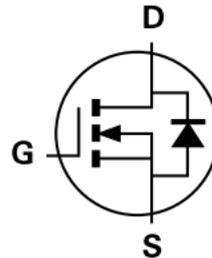
PowerDI5060-8



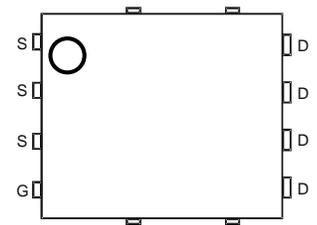
Top View



Bottom View



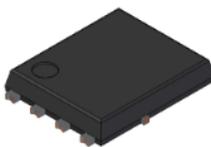
Internal Schematic



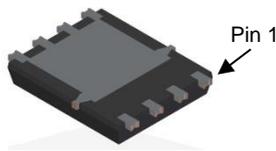
Top View
Pin Configuration

Site 2:

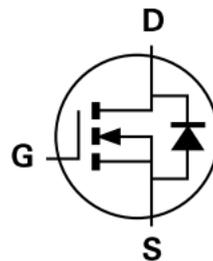
PowerDI5060-8/SWP (Type UX)



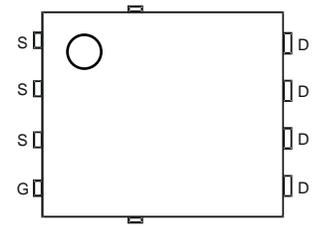
Top View



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}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 5)	I_D	$T_A = +25^\circ\text{C}$	16
		$T_A = +70^\circ\text{C}$	12
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 6)	I_D	$T_C = +25^\circ\text{C}$	65
		$T_C = +70^\circ\text{C}$	50
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	3	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	100	A
Avalanche Current, $L = 0.1\text{mH}$ (Note 7)	I_{AS}	25	A
Avalanche Energy, $L = 0.1\text{mH}$ (Note 7)	E_{AS}	31	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 8)	P_D	1.3	W
Thermal Resistance, Junction to Ambient (Note 8)	$R_{\theta JA}$	99	$^\circ\text{C/W}$
Total Power Dissipation (Note 5)	P_D	2.6	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	50	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	P_D	42	W
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	3	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- 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. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.
 8. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.

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}	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 24V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = 20V, V_{DS} = 0V$ $V_{GS} = -16V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	4.8	6	m Ω	$V_{GS} = 10V, I_D = 20A$
		—	6.8	9.8		$V_{GS} = 4.5V, I_D = 20A$
Diode Forward Voltage	V_{SD}	—	0.7	1.0	V	$V_{GS} = 0V, I_S = 2A$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1,155	—	pF	$V_{DS} = 15V, V_{GS} = 0V$ $f = 1.0MHz$
Output Capacitance	C_{oss}	—	456	—		
Reverse Transfer Capacitance	C_{rss}	—	72	—		
Gate Resistance	R_g	—	1.6	—	Ω	$V_{DS} = 0V, V_{GS} = 0V$ $f = 1.0MHz$
Total Gate Charge ($V_{GS} = 10V$)	Q_g	—	16.7	—	nC	$V_{DD} = 15V, I_D = 9A$
Total Gate Charge ($V_{GS} = 4.5V$)	Q_g	—	8.4	—		
Gate-Source Charge	Q_{gs}	—	2.2	—		
Gate-Drain Charge	Q_{gd}	—	3.5	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	—	ns	$V_{DD} = 15V, V_{GS} = 10V$ $R_g = 3\Omega, I_D = 9A$
Turn-On Rise Time	t_R	—	5.5	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	13.5	—		
Turn-Off Fall Time	t_F	—	4.6	—		
Reverse Recovery Time	t_{RR}	—	19.3	—	ns	$I_F = 1.5A, di/dt = 100A/\mu s$
Reverse Recovery Charge	Q_{RR}	—	8.6	—	nC	

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

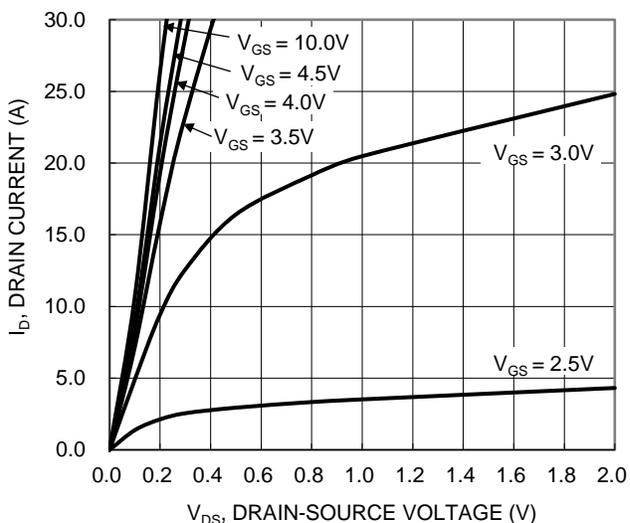


Figure 1. Typical Output Characteristic

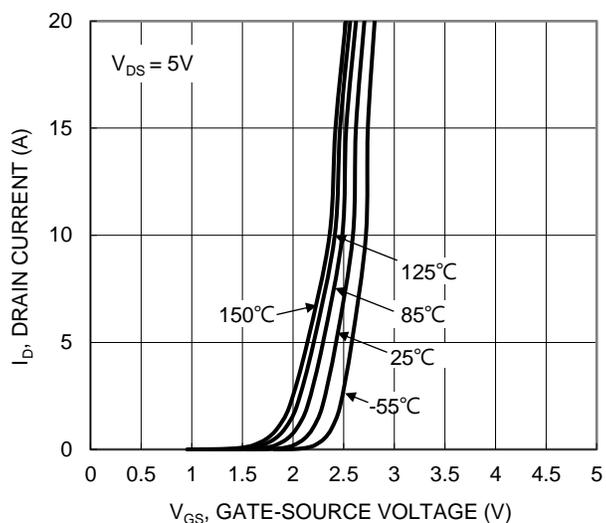


Figure 2. Typical Transfer Characteristic

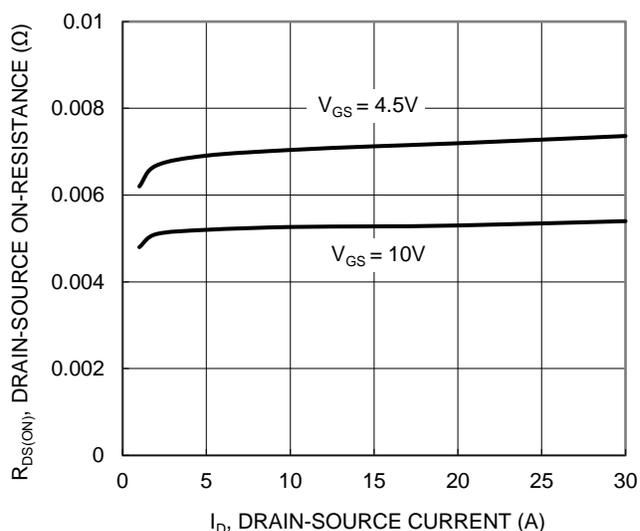


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

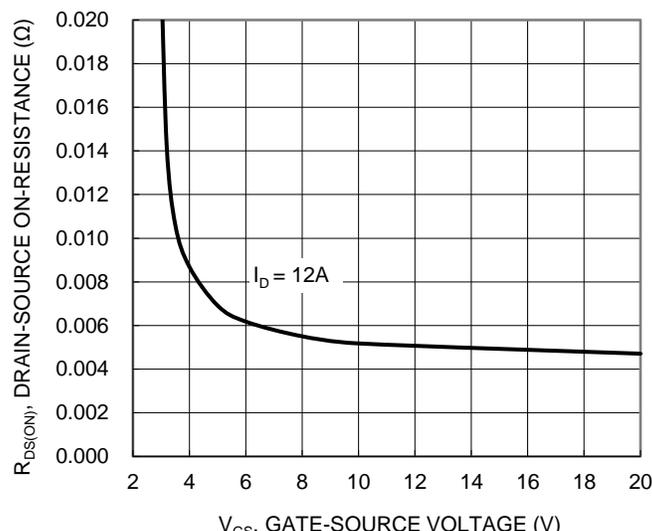


Figure 4. Typical Transfer Characteristic

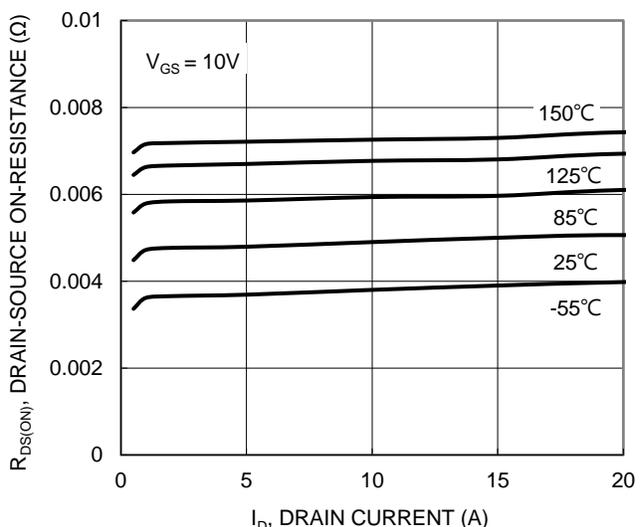


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

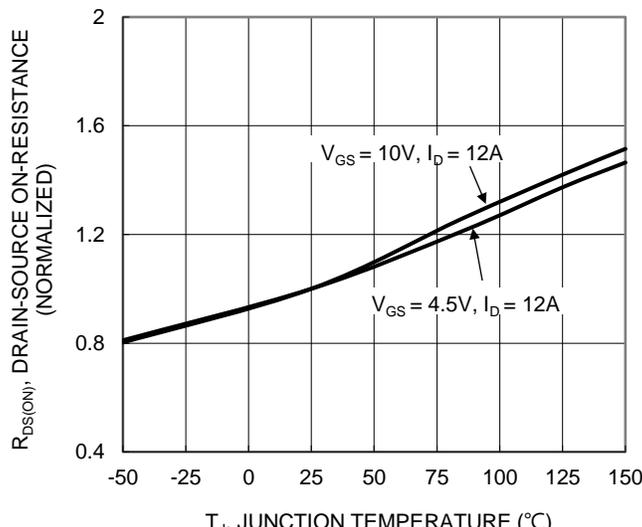


Figure 6. On-Resistance Variation with Temperature

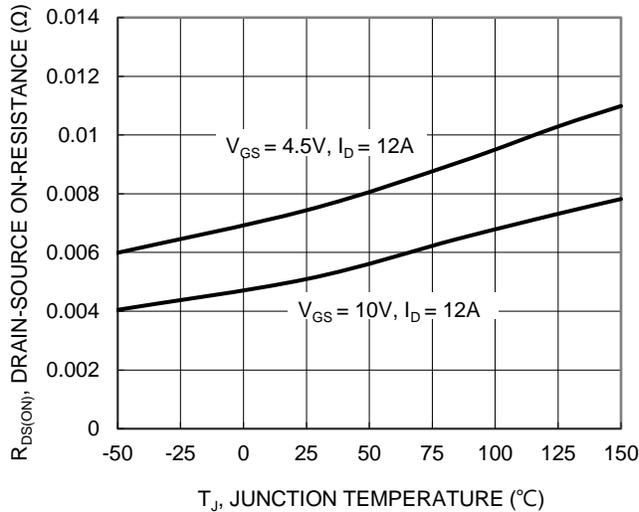


Figure 7. On-Resistance Variation with Temperature

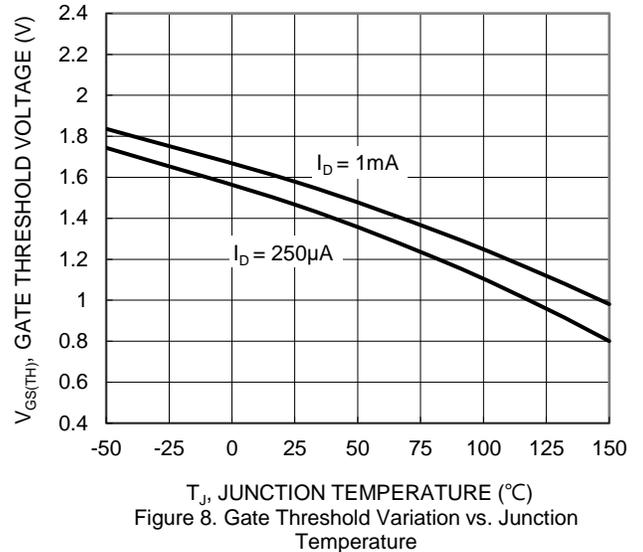


Figure 8. Gate Threshold Variation vs. Junction Temperature

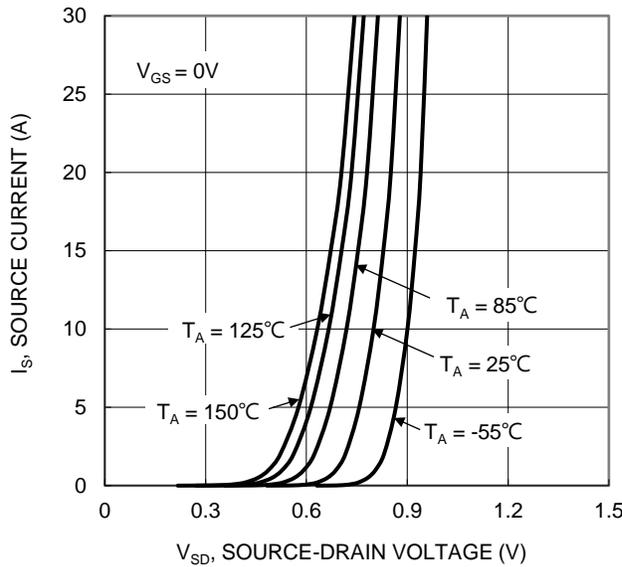


Figure 9. Diode Forward Voltage vs. Current

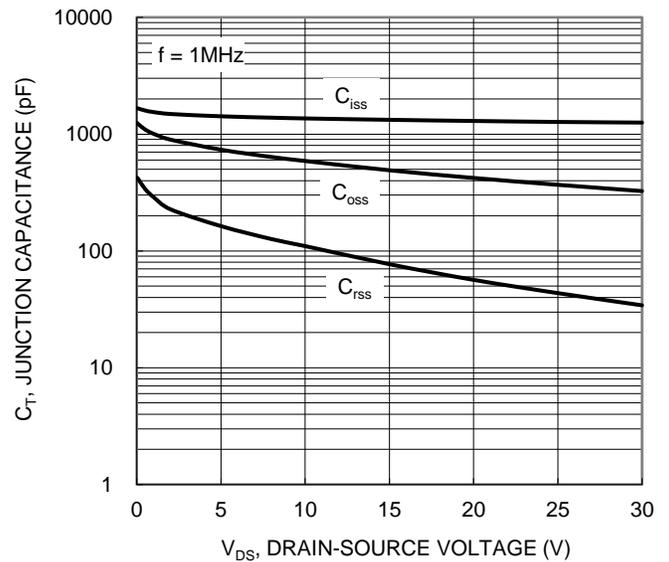


Figure 10. Typical Junction Capacitance

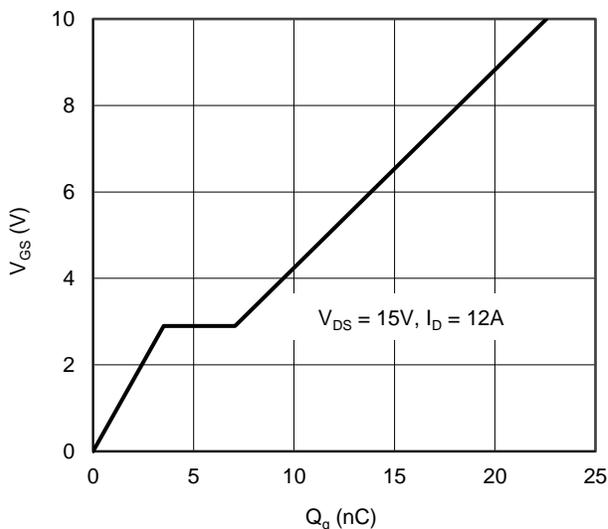


Figure 11. Gate Charge

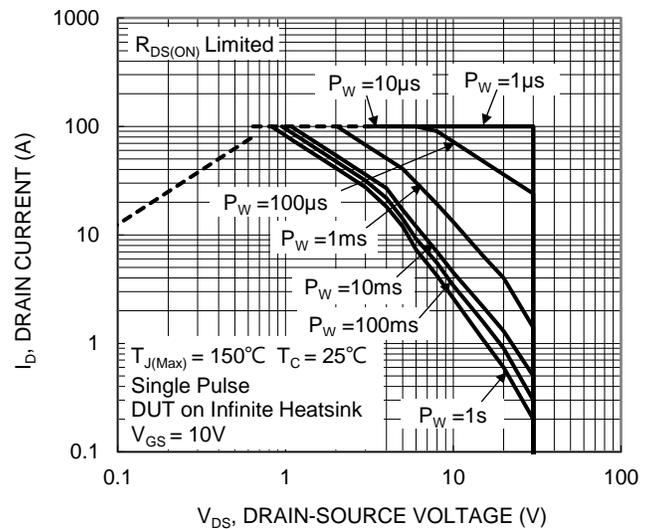


Figure 12. SOA, Safe Operation Area

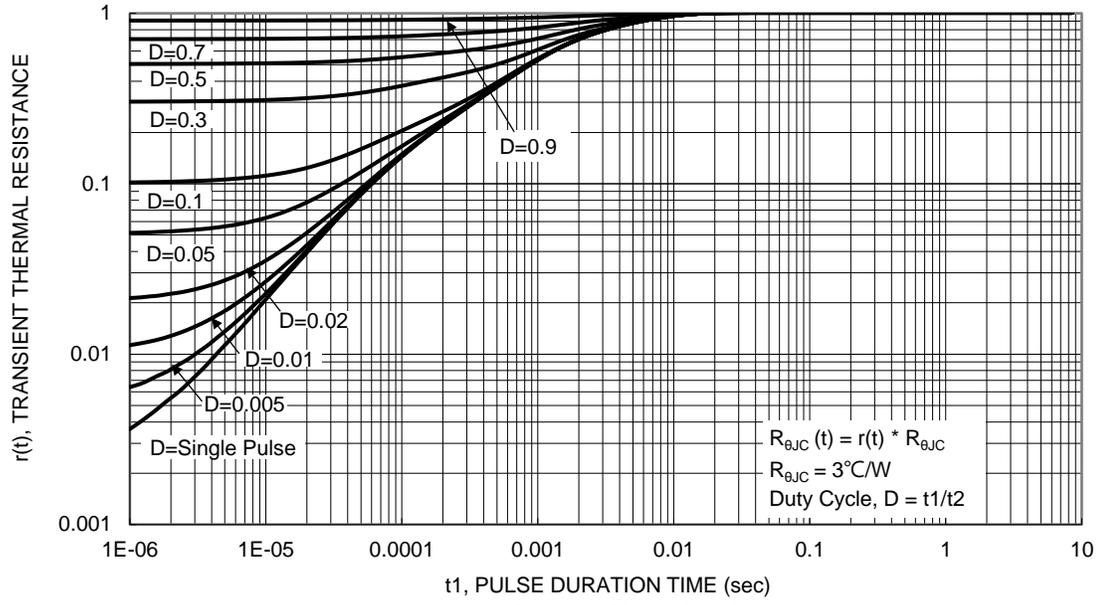
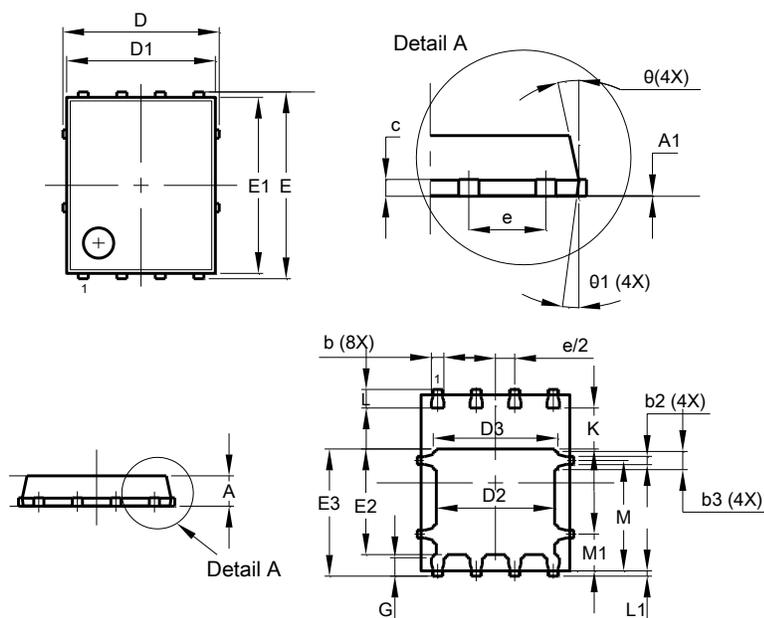


Figure 13. Transient Thermal Resistance

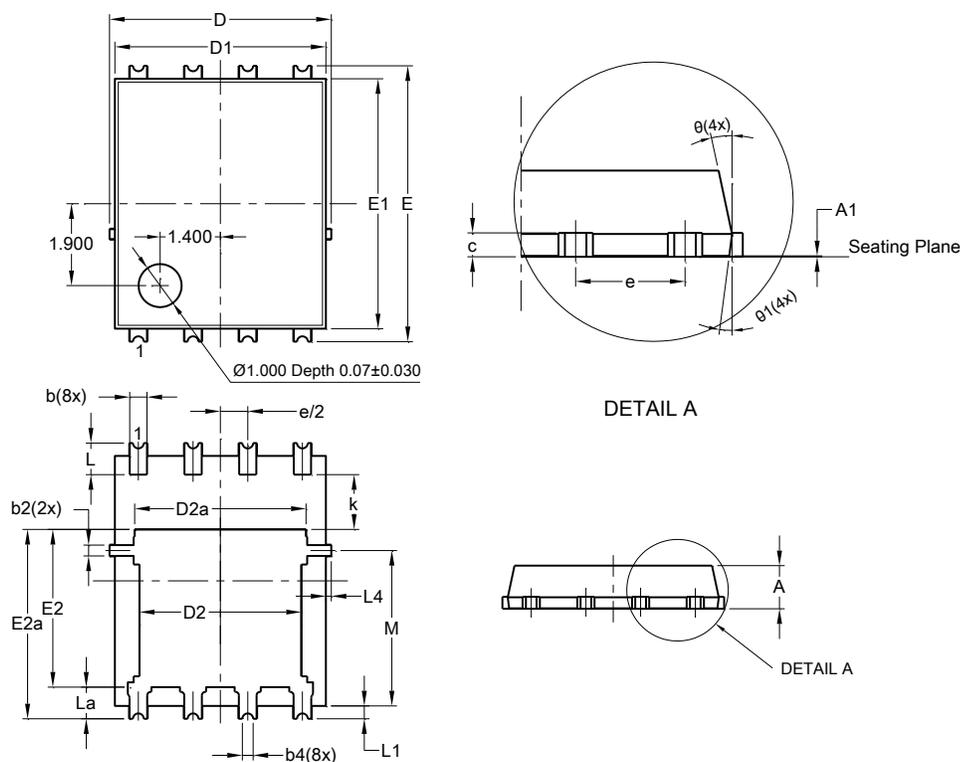
Package Outline Dimensions

Site 1:

PowerDI5060-8


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	—
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
K	0.51	—	—
L	0.51	0.71	0.61
L1	0.100	0.200	0.175
M	3.235	4.035	3.635
M1	1.00	1.40	1.21
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

Site 2:

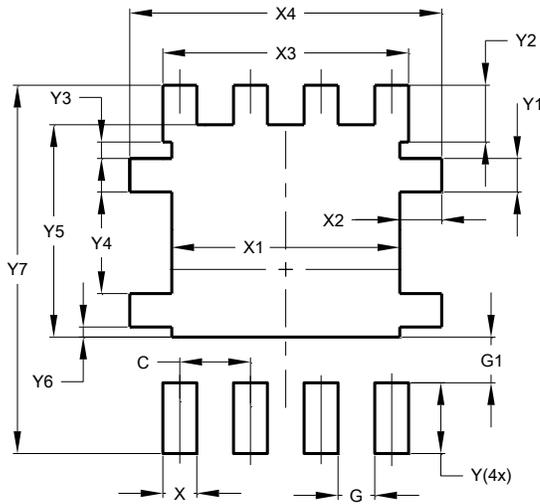
PowerDI5060-8/SWP (Type UX)


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

Site 1:

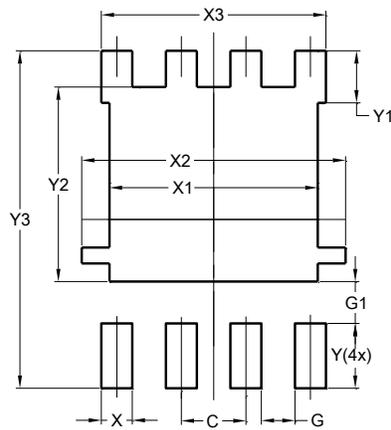
PowerDI5060-8



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610

Site 2:

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