



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	3.8mΩ @ V _{GS} = 10V	140A
	6mΩ @ V _{GS} = 4.5V	110A

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.

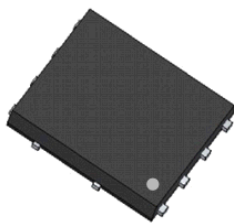
- Backlighting
- Power management functions
- DC-DC converters

Mechanical Data

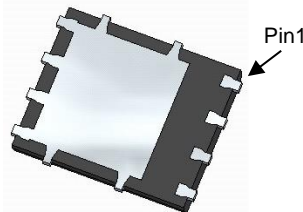
- Package: PowerDI[®]5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.097 grams (Approximate)

Site1:

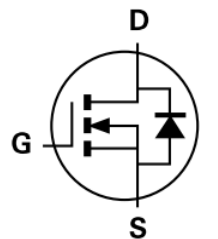
PowerDI5060-8



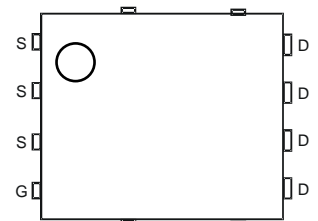
Top View



Bottom View



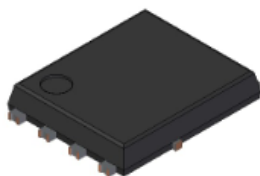
Internal Schematic



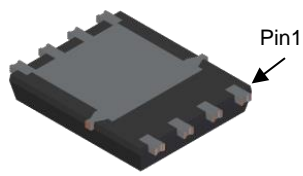
Top View
Pin Configuration

Site2:

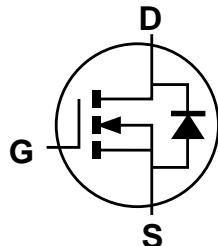
PowerDI5060-8 (SWP) (Type UX)



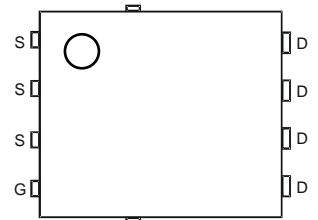
Top View



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_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	+20 -16	V
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 5)	$T_A = +25^\circ\text{C}$	I_D	21	A
	$T_A = +70^\circ\text{C}$		17	
Continuous Drain Current, $V_{GS} = 10\text{V}$	$T_C = +25^\circ\text{C}$	I_D	140	A
	$T_C = +70^\circ\text{C}$		110	
Maximum Continuous Body Diode Forward Current (Note 5)	$T_A = +25^\circ\text{C}$	I_S	3	A
Maximum Continuous Body Diode Forward Current	$T_C = +25^\circ\text{C}$	I_S	48	A
Maximum Body Diode Forward Pulse Current	$T_C = +25^\circ\text{C}$	I_{SM}	180	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)		I_{DM}	180	A
Avalanche Current, $L=0.3\text{mH}$		I_{AS}	27	A
Avalanche Energy, $L=0.3\text{mH}$		E_{AS}	110	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation	$T_A = +25^\circ\text{C}$ (Note 5)	P_D	2.7	W
	$T_C = +25^\circ\text{C}$		113	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	47	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case		$R_{\theta JC}$	1.1	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Note: 5. $R_{\theta JA}$ is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1in. square copper plate. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
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 6)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	3.8	m Ω	$V_{GS} = 10V, I_D = 20A$
		—	—	6		$V_{GS} = 4.5V, I_D = 7A$
Diode Forward Voltage	V_{SD}	—	0.70	1	V	$V_{GS} = 0V, I_S = 1A$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	2,370	—	pF	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1MHz$
Output Capacitance	C_{oss}	—	1,360	—		
Reverse Transfer Capacitance	C_{rss}	—	240	—		
Gate Resistance	R_g	—	0.7	—	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge ($V_{GS} = 10V$)	Q_g	—	43.7	—	nC	$V_{DS} = 15V, I_D = 20A$
Gate-Source Charge	Q_{gs}	—	6.9	—		
Gate-Drain Charge	Q_{gd}	—	8	—		
Turn-On Delay Time	$t_{D(ON)}$	—	6.2	—	ns	$V_{DD} = 15V, V_{GS} = 10V,$ $R_G = 3\Omega, R_L = 0.75\Omega$
Turn-On Rise Time	t_r	—	4.2	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	21	—		
Turn-Off Fall Time	t_f	—	8	—		
Body Diode Reverse Recovery Time	t_{RR}	—	25	—	ns	$I_F = 15A, di/dt = 500A/\mu s$
Body Diode Reverse Recovery Charge	Q_{RR}	—	37	—	nC	

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

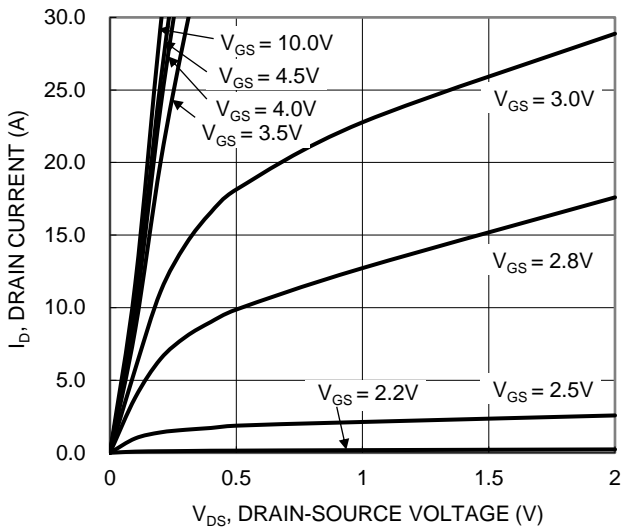


Figure 1. Typical Output Characteristic

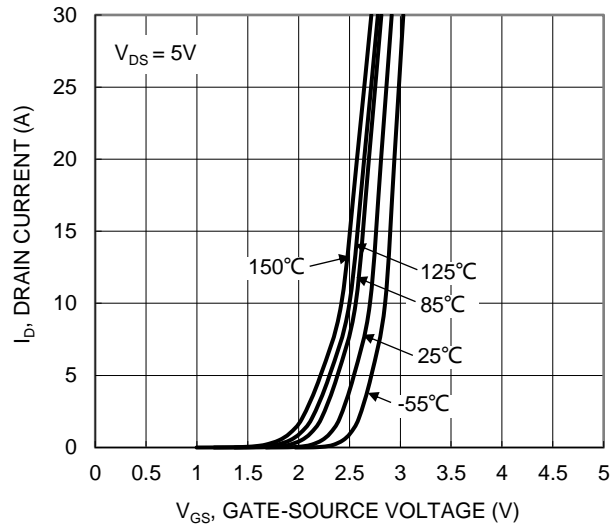


Figure 2. Typical Transfer Characteristic

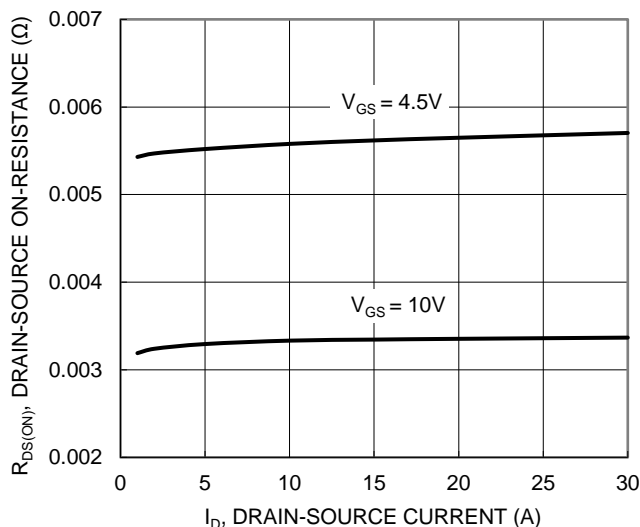


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

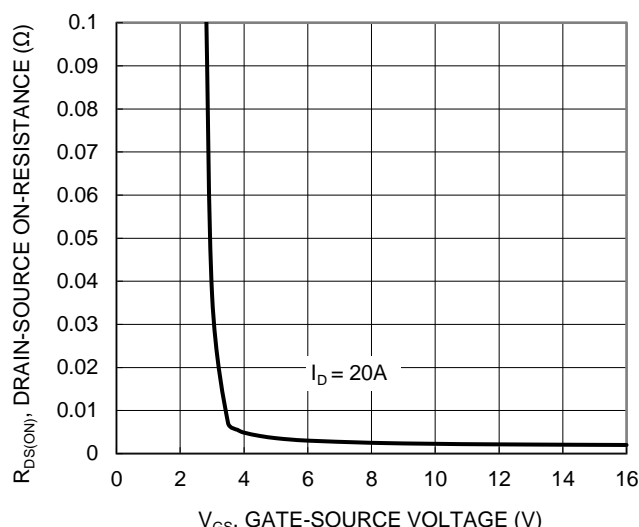


Figure 4. Typical Transfer Characteristic

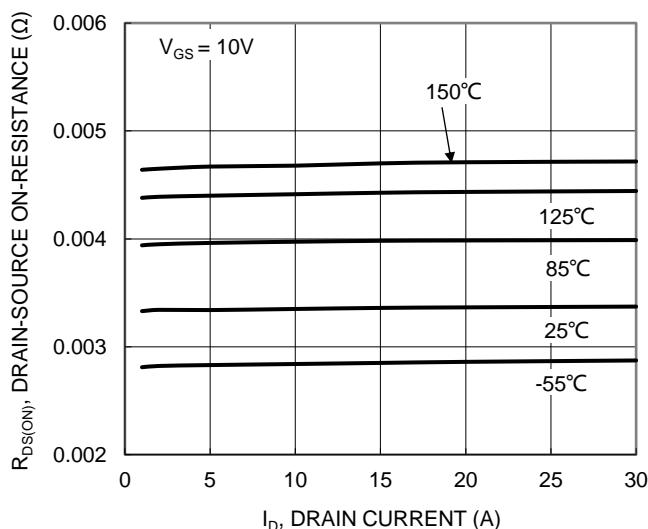


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

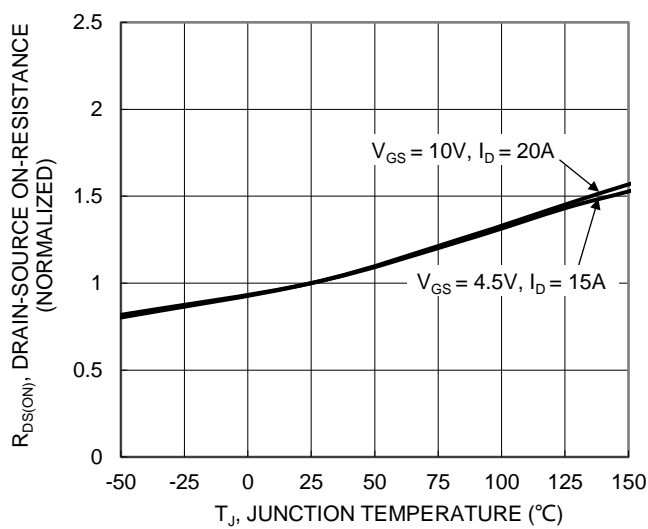


Figure 6. On-Resistance Variation with Junction Temperature

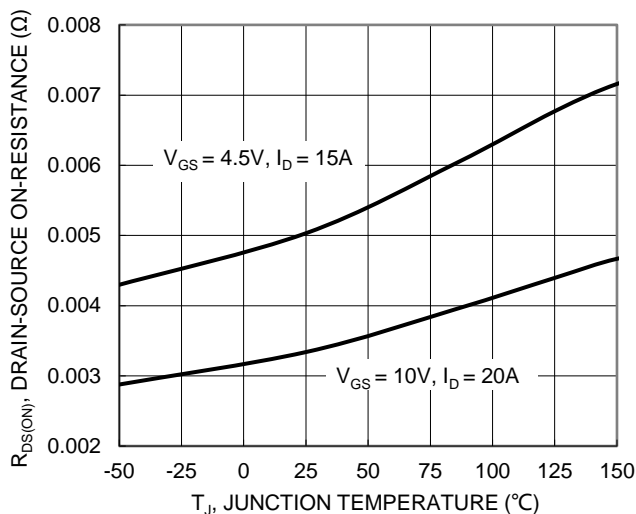


Figure 7. On-Resistance Variation with Junction Temperature

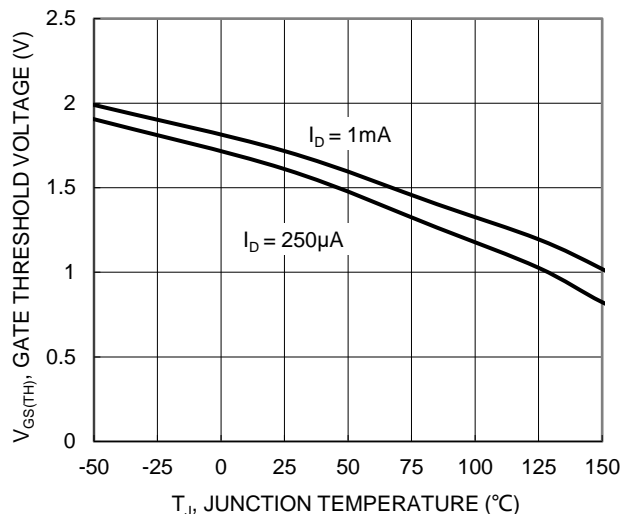


Figure 8. Gate Threshold Variation vs. Junction Temperature

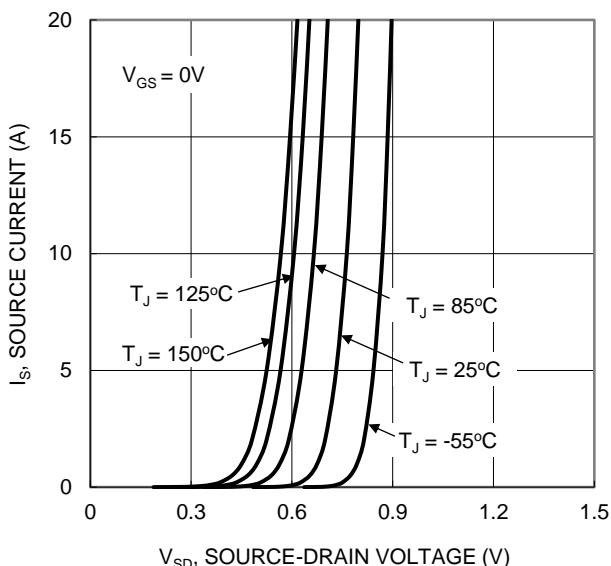


Figure 9. Diode Forward Voltage vs. Current

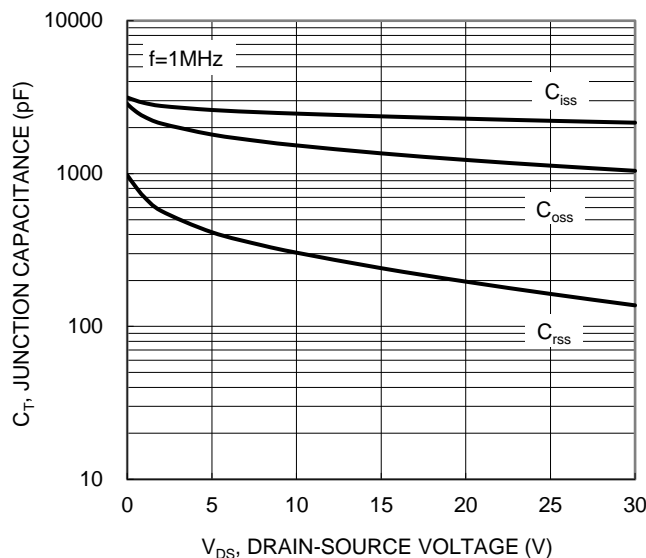


Figure 10. Typical Junction Capacitance

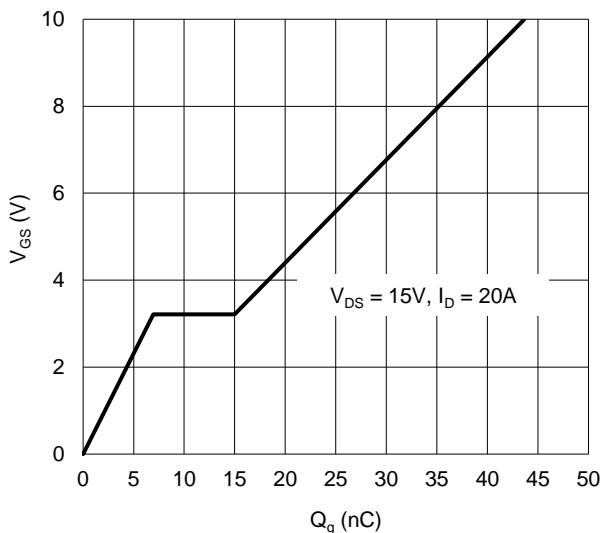


Figure 11. Gate Charge

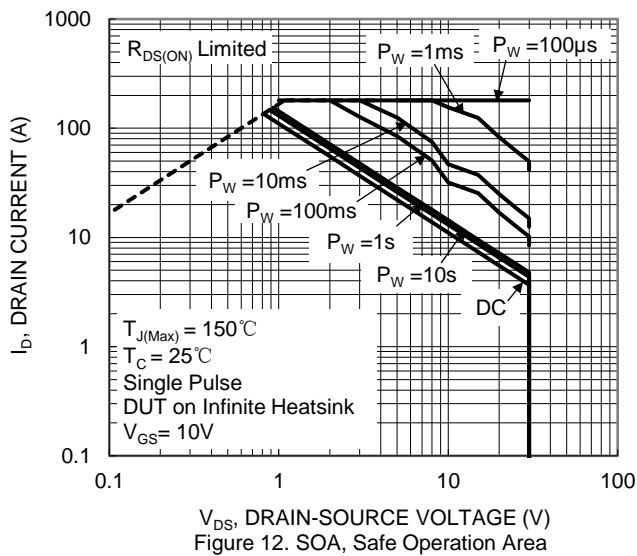
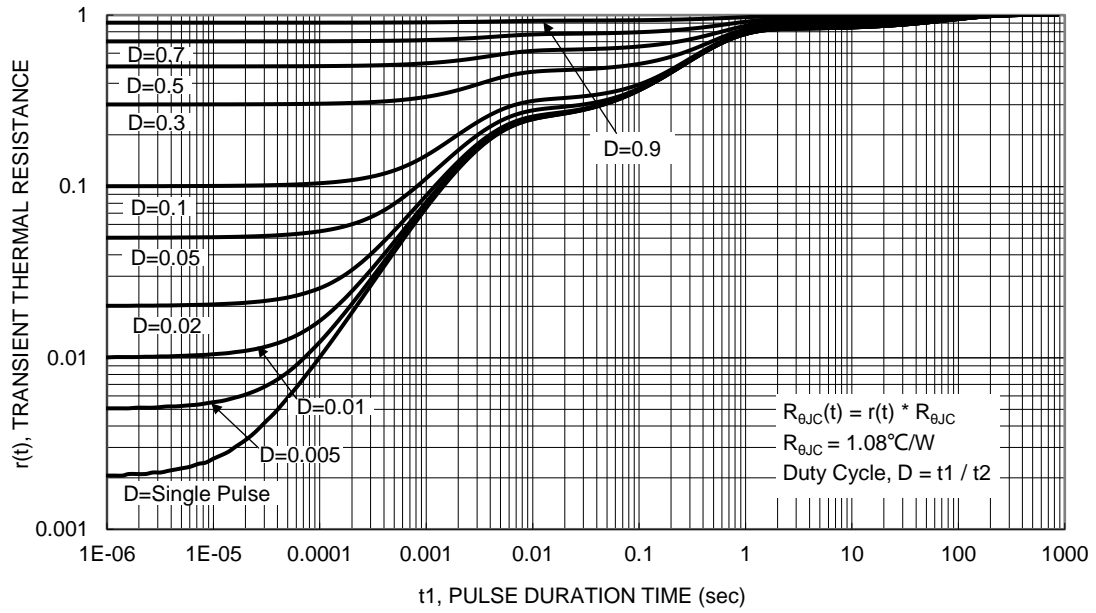
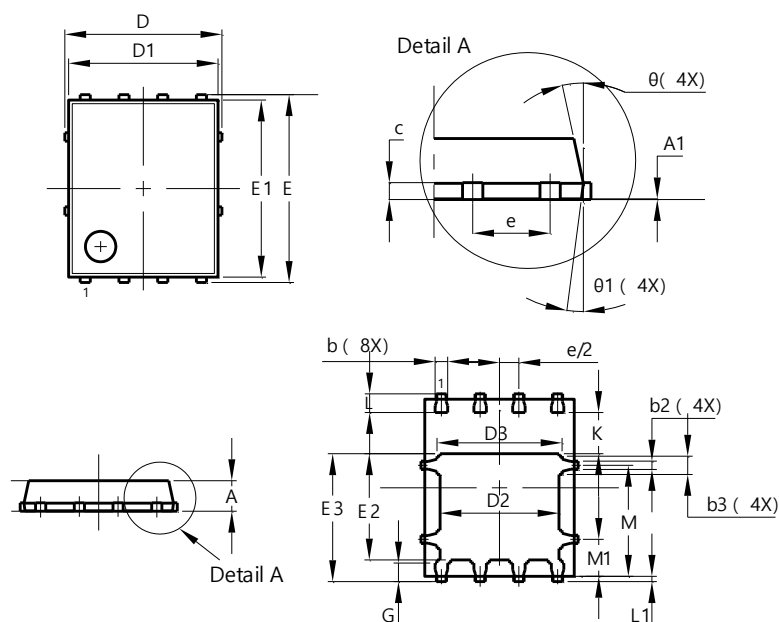


Figure 12. SOA, Safe Operation Area



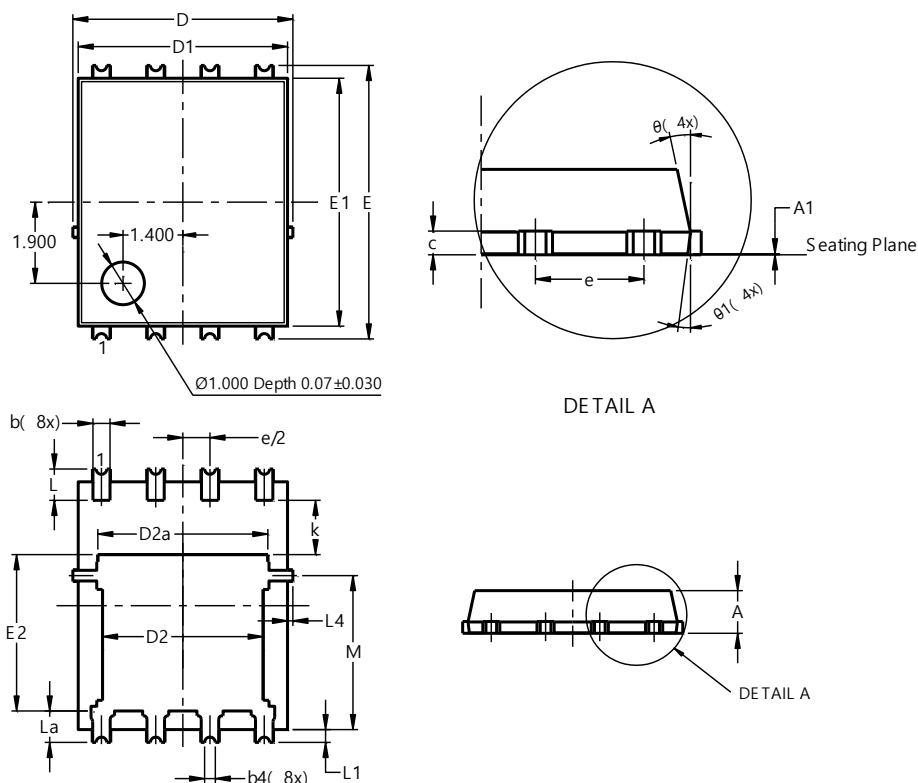
Package Outline Dimensions

Site1:

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			

Site2:

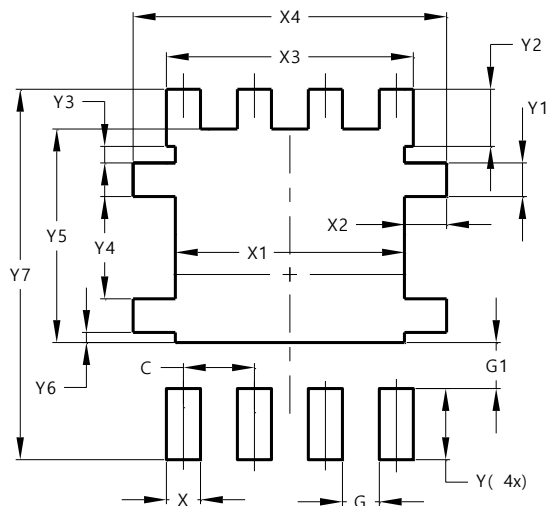
PowerDI5060-8 (SWP) (Type UX)


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

Site1:

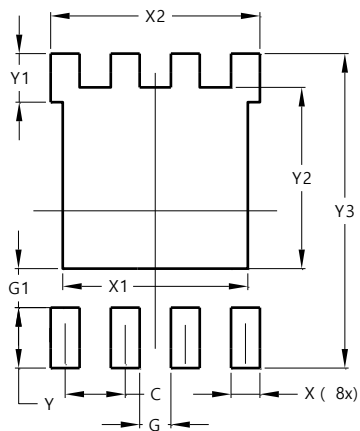
PowerDI5060-8



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

Site2:

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