



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 <sub>bss</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>C</sub> = +25°C
120V	8.9mΩ @ V <sub>GS</sub> = 10V	80A
	16mΩ @ V <sub>GS</sub> = 6V	65A

## Features

- 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<sub>DS(ON)</sub> – Minimizes On-State Losses
- <1.1mm Package Profile – Ideal for Thin Applications

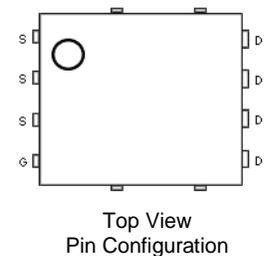
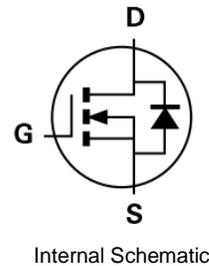
## Description and Applications

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Switching
- DC-DC converters

## Mechanical Data

- Package: PowerDI<sup>®</sup>5060-8
- Package Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.097 grams (Approximate)



### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	120	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current, V <sub>GS</sub> = 10V (Note 5)	I <sub>D</sub>	T <sub>C</sub> = +25°C	80
		T <sub>C</sub> = +70°C	64
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	320	A
Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	80	A
Pulsed Body Diode Forward Current (Note 5)	I <sub>SM</sub>	320	A
Avalanche Current, L = 3mH	I <sub>AS</sub>	15.5	A
Avalanche Energy, L = 3mH	E <sub>AS</sub>	360.4	mJ

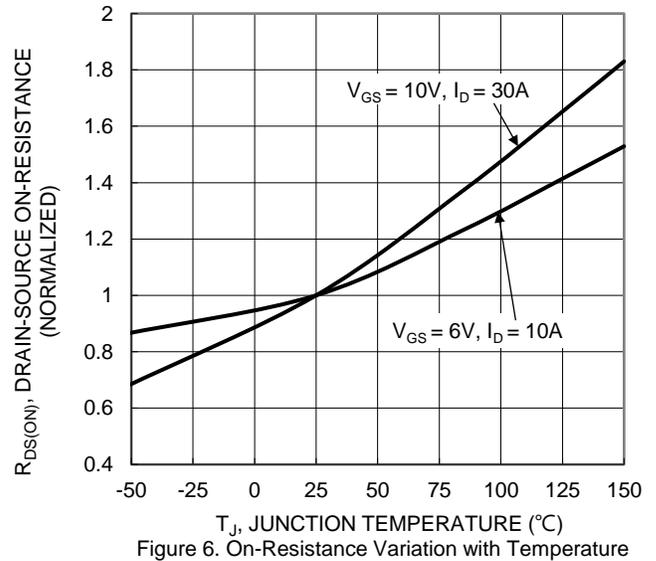
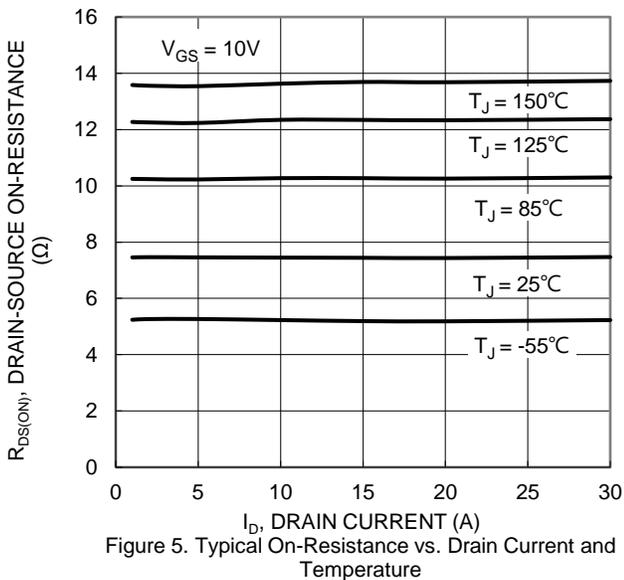
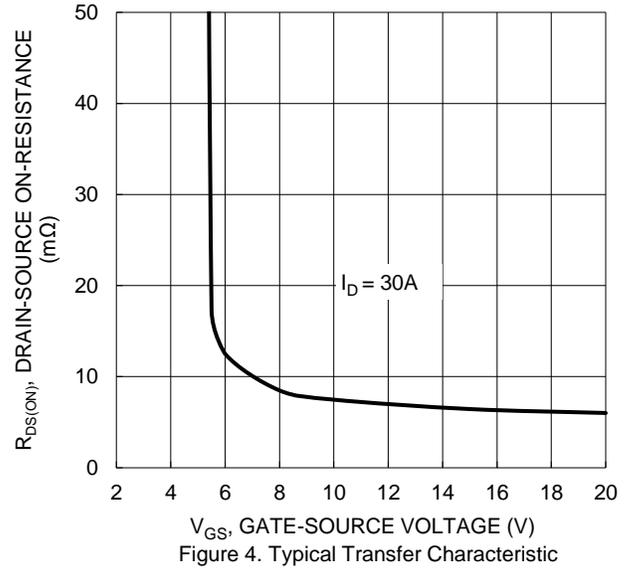
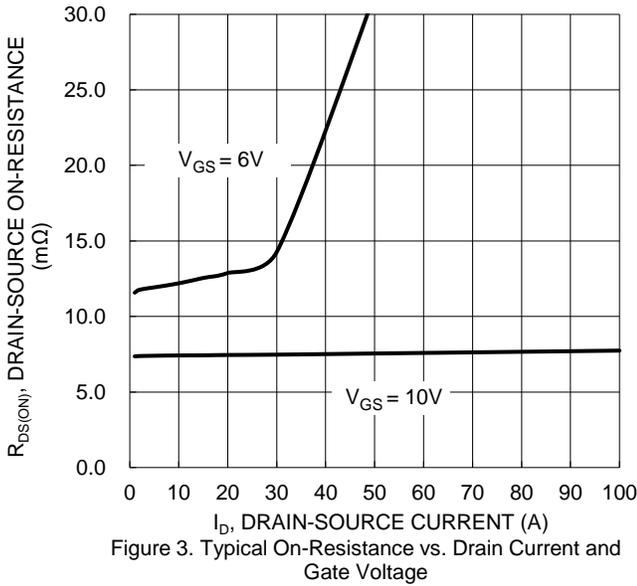
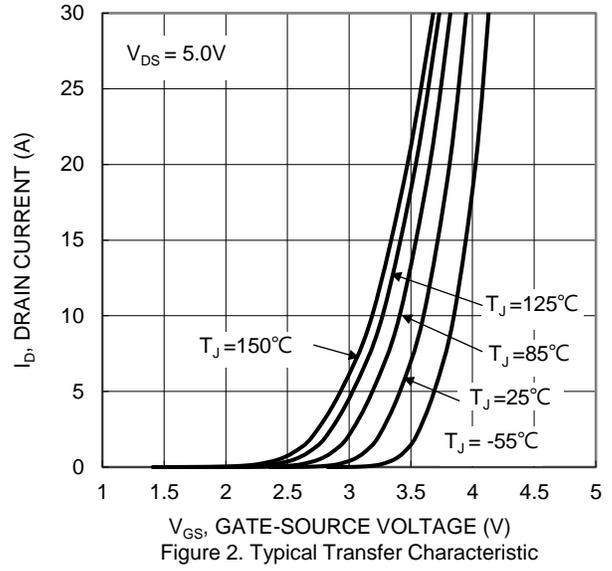
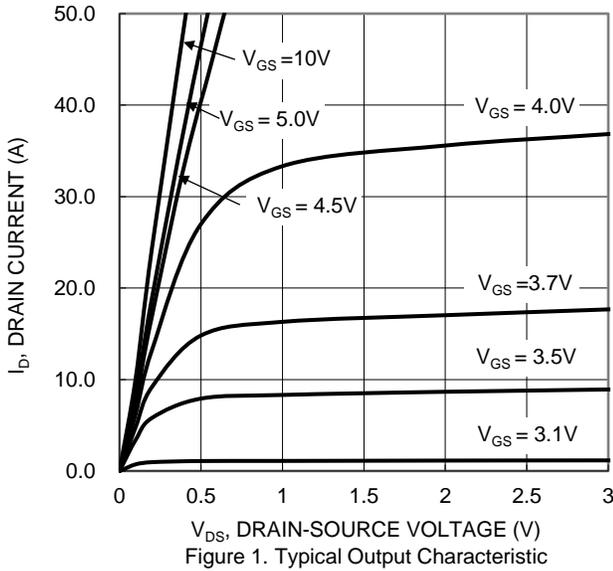
### Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P <sub>D</sub>	2.9	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	43	°C/W
Total Power Dissipation (Note 5)	P <sub>D</sub>	104	W
Thermal Resistance, Junction to Case (Note 5)	R <sub>θJC</sub>	1.2	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 7)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	120	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 10mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 96V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	2	—	4	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	7.5	8.9	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 30A
		—	12	16		V <sub>GS</sub> = 6V, I <sub>D</sub> = 10A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 30A
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	C <sub>iss</sub>	—	3142	—	pF	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	665	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	29	—		
Gate Resistance	R <sub>G</sub>	—	1.9	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 6V)	Q <sub>g</sub>	—	27	—	nC	V <sub>DS</sub> = 60V, I <sub>D</sub> = 25A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	44	—		
Gate-Source Charge	Q <sub>gs</sub>	—	15	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	9	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	12.5	—	ns	V <sub>DD</sub> = 60V, V <sub>GS</sub> = 10V I <sub>D</sub> = 25A, R <sub>G</sub> = 2.7Ω
Turn-On Rise Time	t <sub>R</sub>	—	13.7	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	24.4	—		
Turn-Off Fall Time	t <sub>F</sub>	—	10.9	—		
Reverse Recovery Time	t <sub>RR</sub>	—	55	—	ns	I <sub>F</sub> = 25A, dI/dt = 100A/μs
Reverse Recovery Charge	Q <sub>RR</sub>	—	105	—	nC	

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



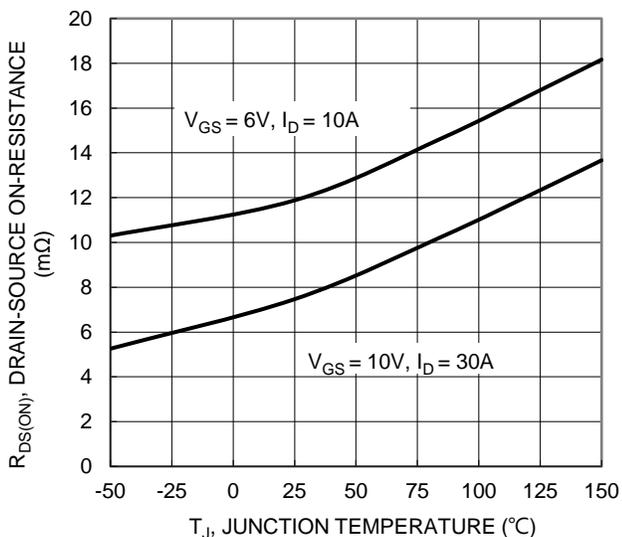


Figure 7. On-Resistance Variation with Temperature

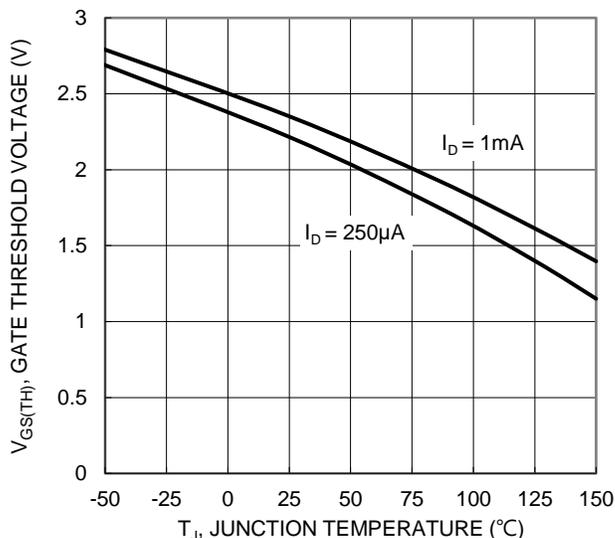


Figure 8. Gate Threshold Variation vs. Junction Temperature

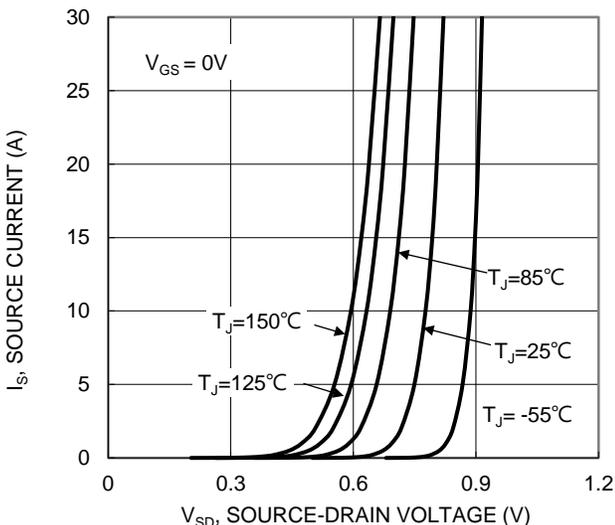


Figure 9. Diode Forward Voltage vs. Current

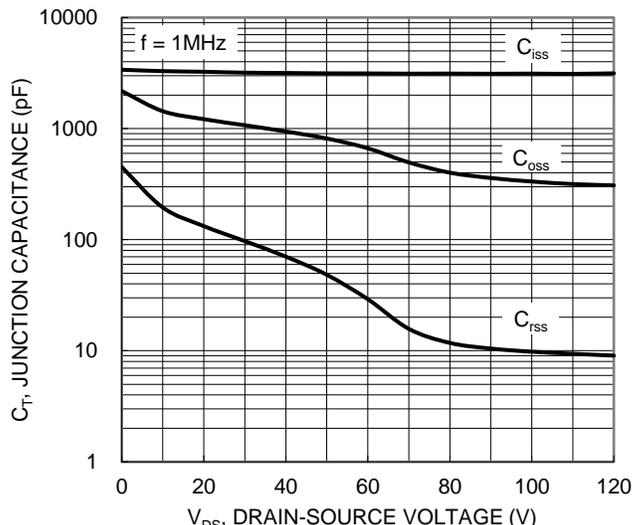


Figure 10. Typical Junction Capacitance

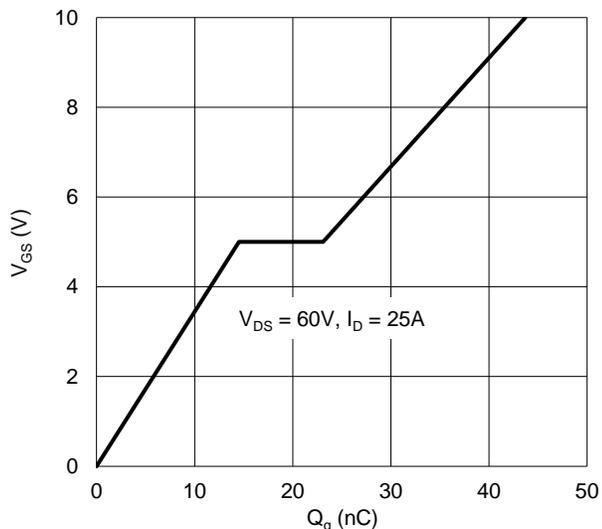


Figure 11. Gate Charge

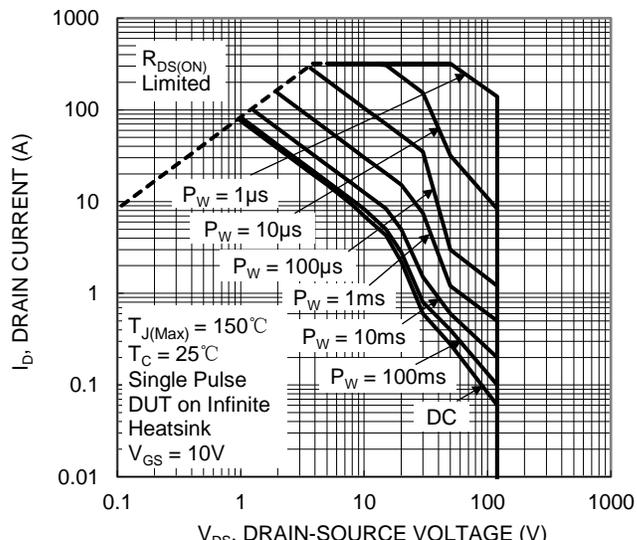


Figure 12. SOA, Safe Operation Area

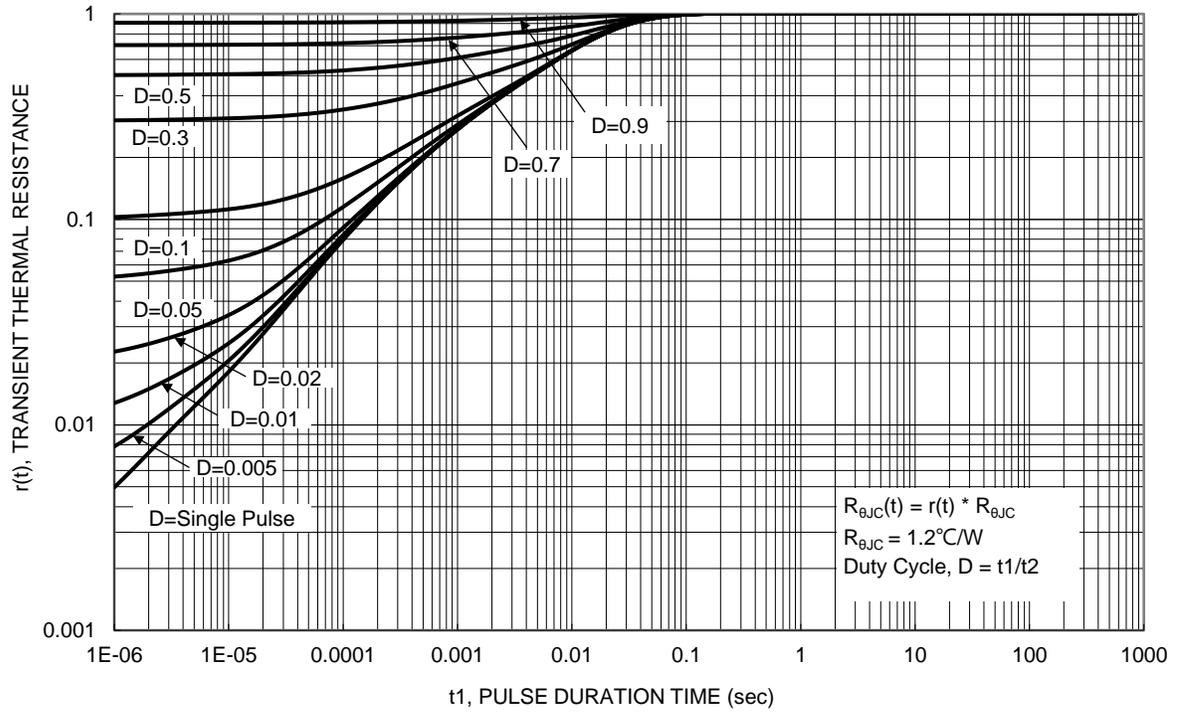
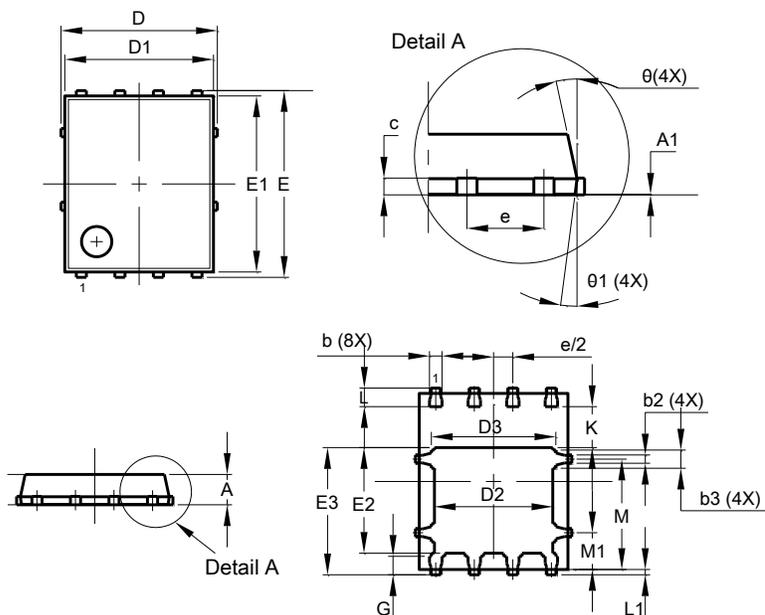


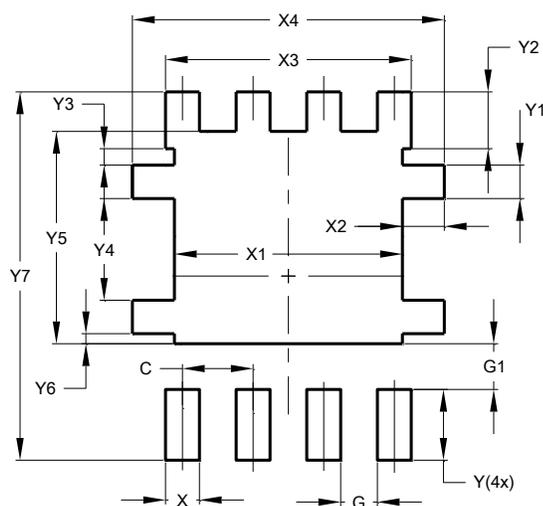
Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

**PowerDI5060-8**


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			

## Suggested Pad Layout

**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