



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 T _c = +25°C
100V	8.9mΩ @ V _{GS} = 10V	86A

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®)

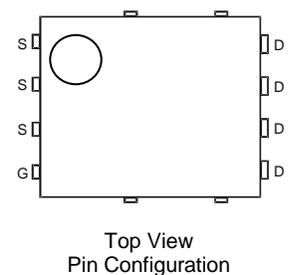
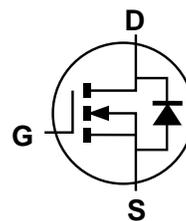
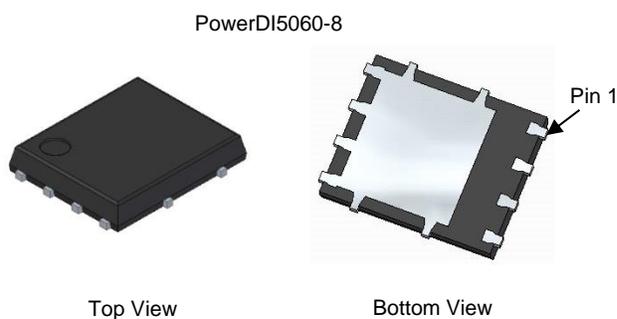
Description

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Motor controls
- DC-DC converters
- Power management

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
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.097 grams (Approximate)



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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	100	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current V _{GS} = 10V (Note 5)	Steady State	T _A = +25°C T _A = +100°C	I _D	14 10	A
Continuous Drain Current V _{GS} = 10V (Note 6)	Steady State	T _C = +25°C T _C = +100°C	I _D	86 61	A
Pulsed Drain Current (10μs Pulse, T _C = +25°C, Package Limited)			I _{DM}	340	A
Maximum Continuous Body Diode Forward Current (Note 6)			I _S	83	A
Pulsed Body Diode Current (10μs Pulse, T _C = +25°C, Package Limited)			I _{SM}	340	A
Avalanche Current (Note 7), L = 3mH			I _{AS}	11	A
Avalanche Energy (Note 7), L = 3mH			E _{AS}	181.5	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 8)	T _A = +25°C	P _D	1.6	W
Thermal Resistance, Junction to Ambient (Note 8)	Steady State	R _{θJA}	94	°C/W
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	2.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	51	°C/W
Total Power Dissipation (Note 6)	T _C = +25°C	P _D	100	W
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	1.5	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +175	°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°C.
 8. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.

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}	100	—	—	V	V _{GS} = 0V, I _D = 1mA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 80V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	2	—	4	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	6.7	8.9	mΩ	V _{GS} = 10V, I _D = 20A
Diode Forward Voltage	V _{SD}	—	0.8	1.2	V	V _{GS} = 0V, I _S = 13A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	2085	—	pF	V _{DS} = 50V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	609	—		
Reverse Transfer Capacitance	C _{rss}	—	13	—		
Gate Resistance	R _g	—	1.7	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	30	—	nC	V _{DD} = 50V, I _D = 13A V _{GS} = 10V
Gate-Source Charge	Q _{gs}	—	9.5	—		
Gate-Drain Charge	Q _{gd}	—	7.3	—		
Turn-On Delay Time	t _{D(ON)}	—	9.7	—	ns	V _{DD} = 50V, V _{GS} = 10V I _D = 13A, R _g = 6Ω
Turn-On Rise Time	t _r	—	13.7	—		
Turn-Off Delay Time	t _{D(OFF)}	—	25.1	—		
Turn-Off Fall Time	t _f	—	17.3	—		
Reverse Recovery Time	t _{RR}	—	45	—	ns	I _F = 13A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	68	—	nC	

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

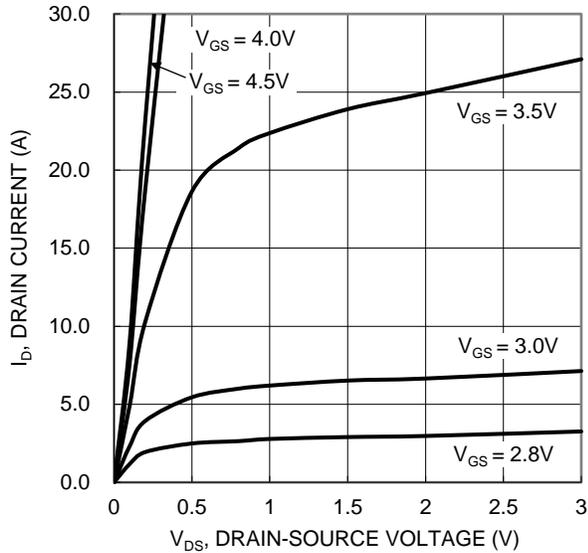


Figure 1. Typical Output Characteristic

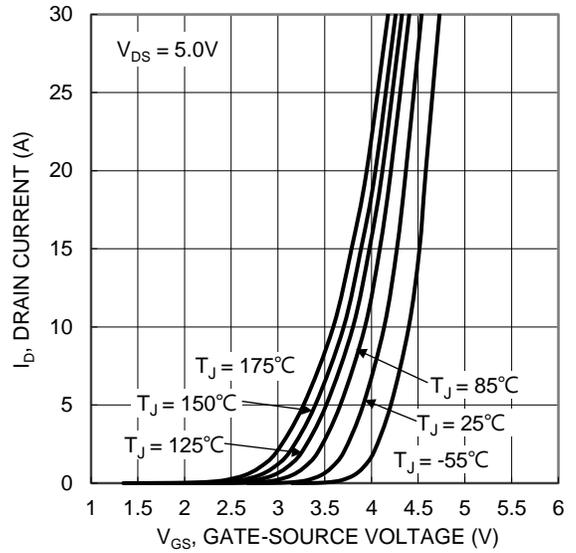


Figure 2. Typical Transfer Characteristic

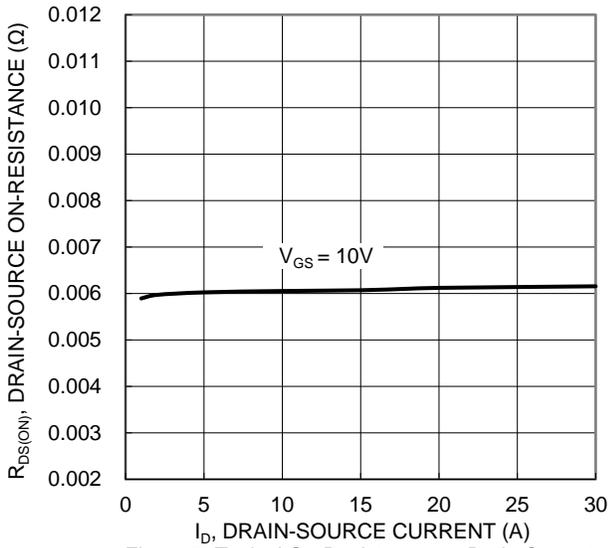


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

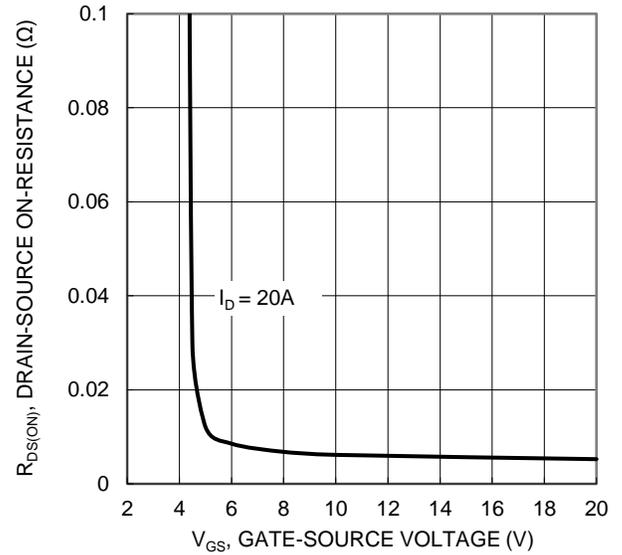


Figure 4. Typical Transfer Characteristic

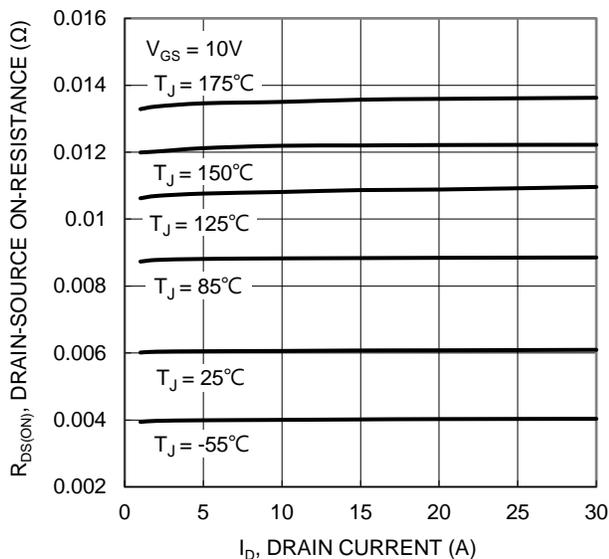


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

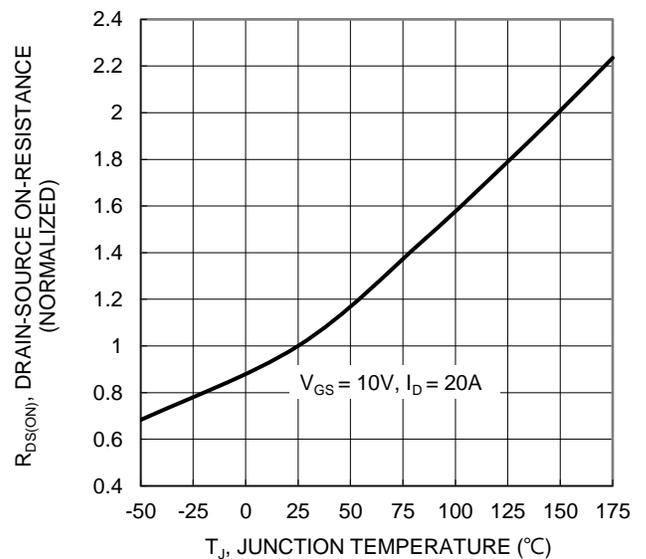


Figure 6. On-Resistance Variation with Temperature

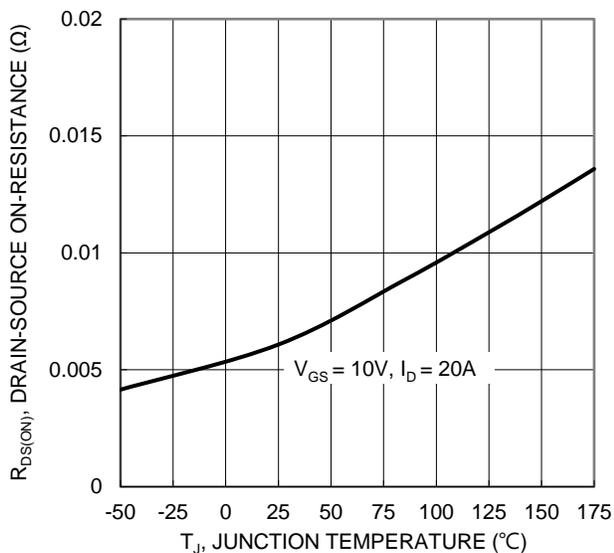


Figure 7. On-Resistance Variation with Temperature

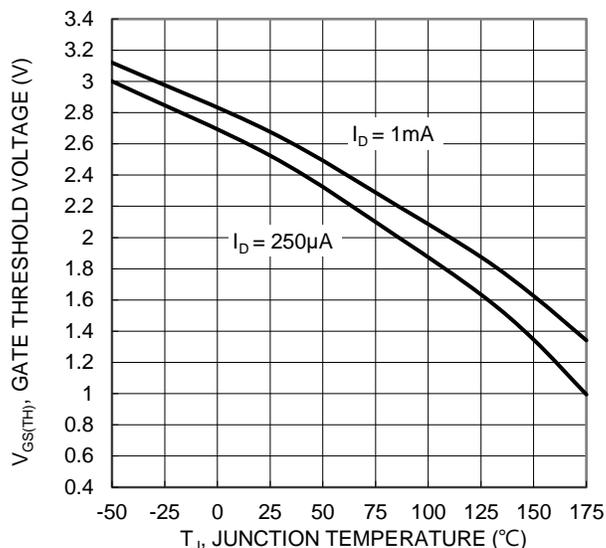


Figure 8. Gate Threshold Variation vs. Junction Temperature

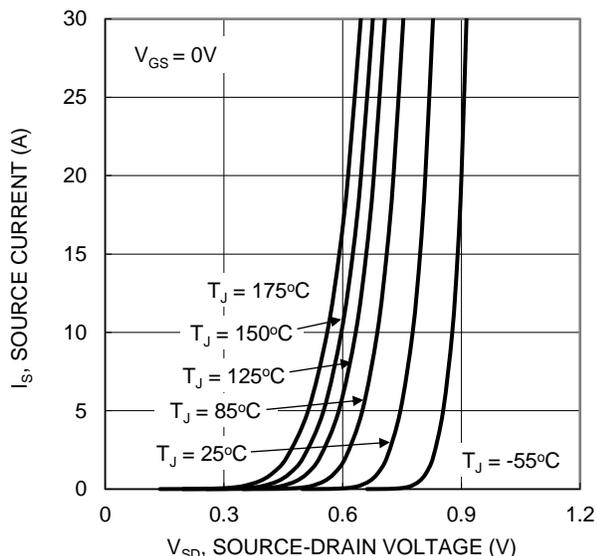


Figure 9. Diode Forward Voltage vs. Current

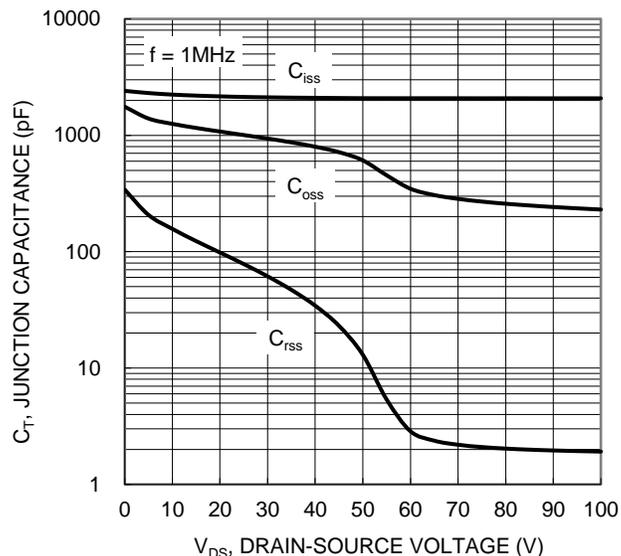


Figure 10. Typical Junction Capacitance

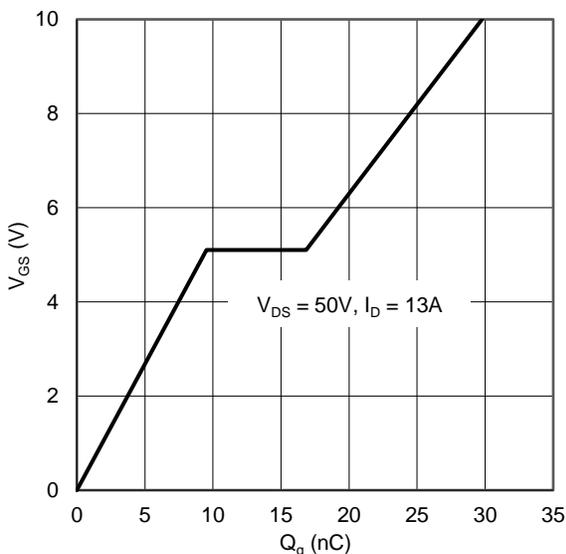


Figure 11. Gate Charge

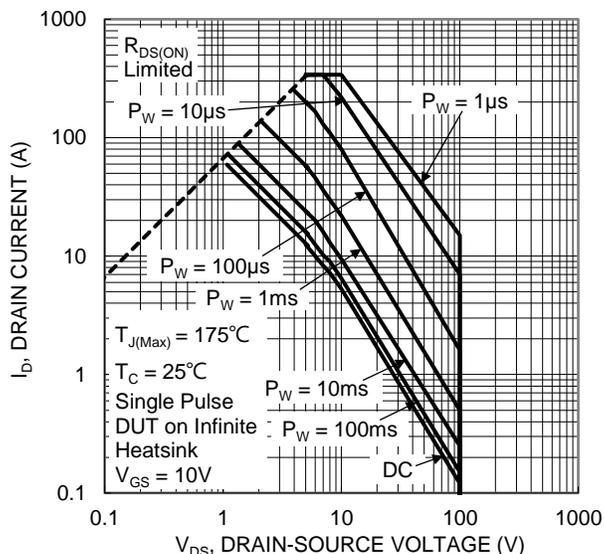


Figure 12. SOA, Safe Operation Area

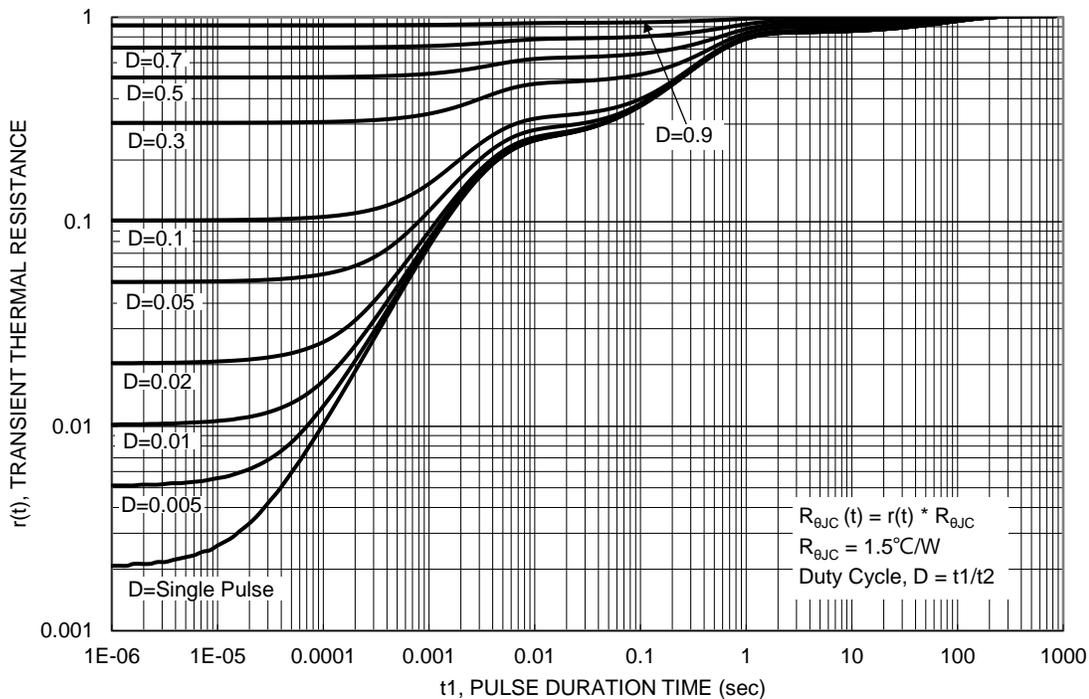
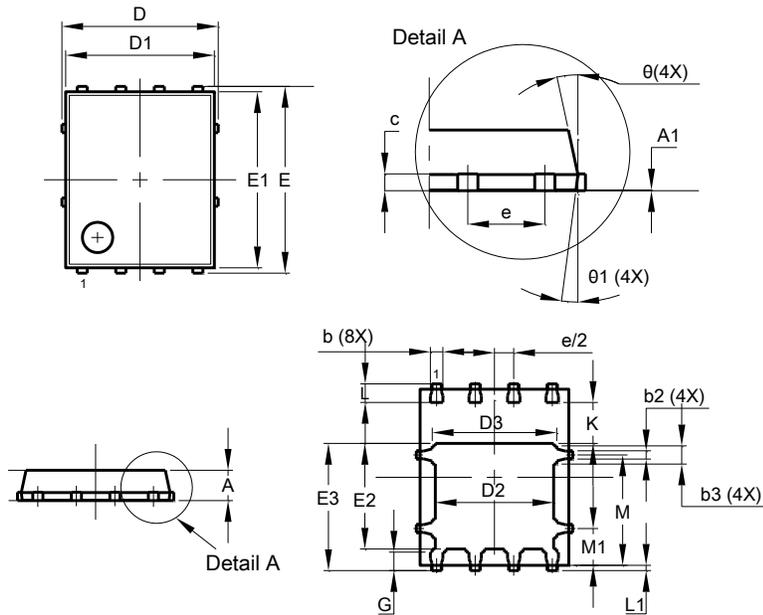
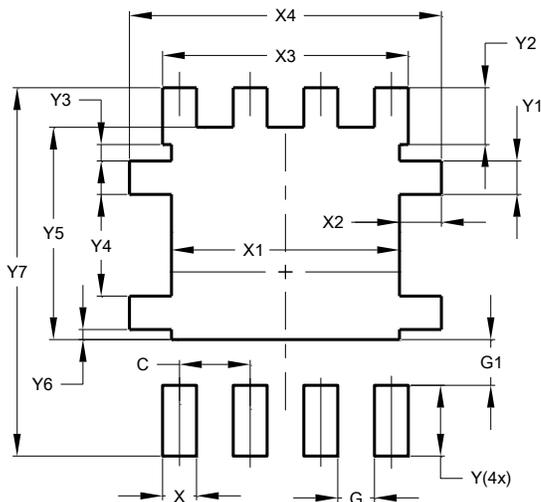


Figure 13. Transient Thermal Resistance

Package Outline Dimensions
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°
θ_1	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