



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



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## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$ $T_C = +25^\circ C$
30V	1.6m $\Omega$ @ $V_{GS} = 10V$	240A

## Description

This new generation N-Channel Enhancement Mode MOSFET is designed to minimize  $R_{DS(ON)}$ , yet maintain superior switching performance. This device is ideal for use in power management and load switch.

## Applications

- DC-DC Converters
- Load Switch

## Features

- Thermally Efficient Package – Cooler Running Applications
- <1.1mm Package Profile – Ideal for Thin Applications
- High Conversion Efficiency
- Low  $R_{DS(ON)}$  – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed

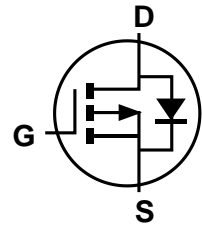
## Mechanical Data

- Case: PowerDI5060-8 (Type K)
- Case 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 208③
- Weight: 0.097 grams (Approximate)

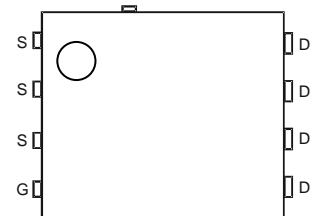
PowerDI5060-8 (Type K)



Top View


 Bottom View  
 Pin1


Internal Schematic


 Top View  
 Pin Configuration

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	30	V
Gate-Source Voltage	V <sub>GSS</sub>	±16	V
Continuous Drain Current, V <sub>GS</sub> = 10V (Note 7)	I <sub>D</sub>	240	A
		240	
Maximum Continuous Body Diode Forward Current (Note 7)	I <sub>S</sub>	100	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	400	A
Pulsed Continuous Body Diode Forward Current (380µs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	400	A
Avalanche Current, L=3mH (Note 8)	I <sub>AS</sub>	15	A
Avalanche Energy, L=3mH (Note 8)	E <sub>AS</sub>	700	mJ

**Thermal Characteristics** (@T<sub>C</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	103	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	51	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	136	W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	1.1	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 9)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 9)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1mA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	1.25	1.6	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 25A
		—	2	2.5		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 25A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 25A
<b>DYNAMIC CHARACTERISTICS</b> (Note 10)						
Input Capacitance	C <sub>ISS</sub>	—	5,000	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>OSS</sub>	—	2,660	—		
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	300	—		
Gate Resistance	R <sub>G</sub>	—	0.75	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>G</sub>	—	37	—	nC	V <sub>DS</sub> = 15V, I <sub>D</sub> = 25A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>G</sub>	—	77	—		
Gate-Source Charge	Q <sub>GS</sub>	—	10	—		
Gate-Drain Charge	Q <sub>GD</sub>	—	14	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	21	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 25A, R <sub>G</sub> = 4.7Ω
Turn-On Rise Time	t <sub>R</sub>	—	45	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	32	—		
Turn-Off Fall Time	t <sub>F</sub>	—	26	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	44	—	ns	I <sub>S</sub> = 15A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	52	—		

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
  - Thermal resistance from junction to soldering point (on the exposed drain pad).
  - I<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

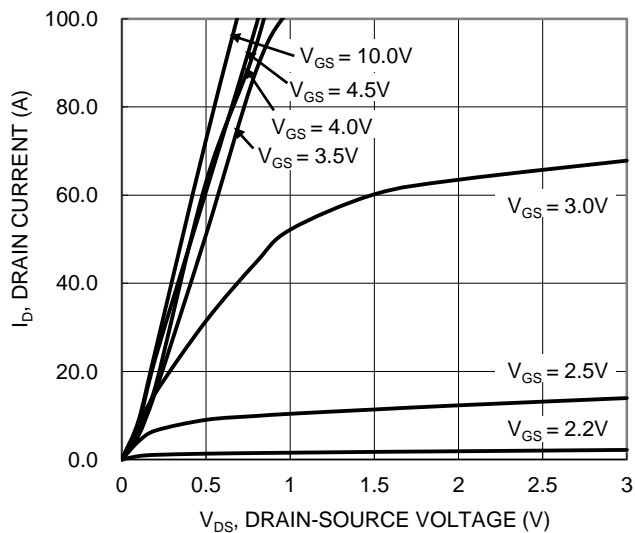


Figure 1. Typical Output Characteristic

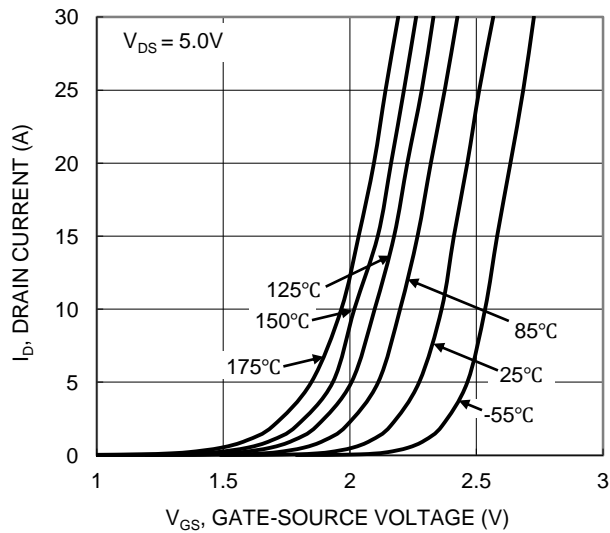


Figure 2. Typical Transfer Characteristic

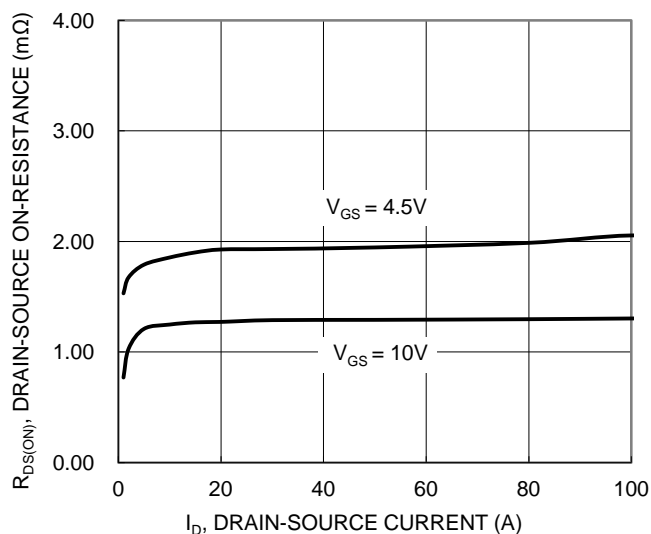


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

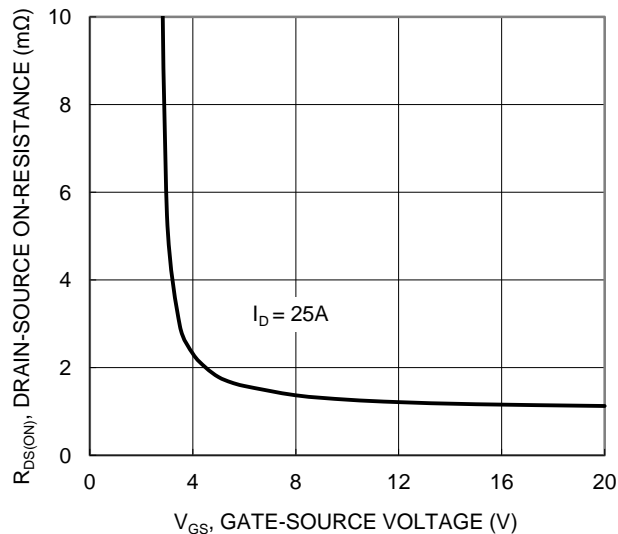


Figure 4. Typical Transfer Characteristic

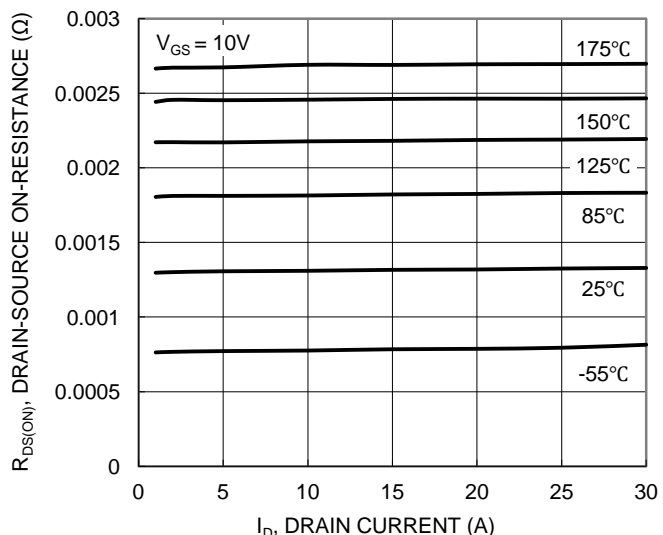


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

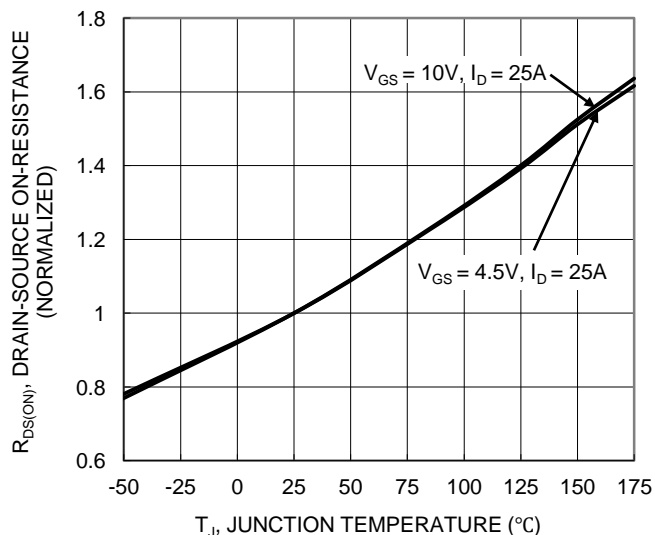


Figure 6. On-Resistance Variation with Temperature

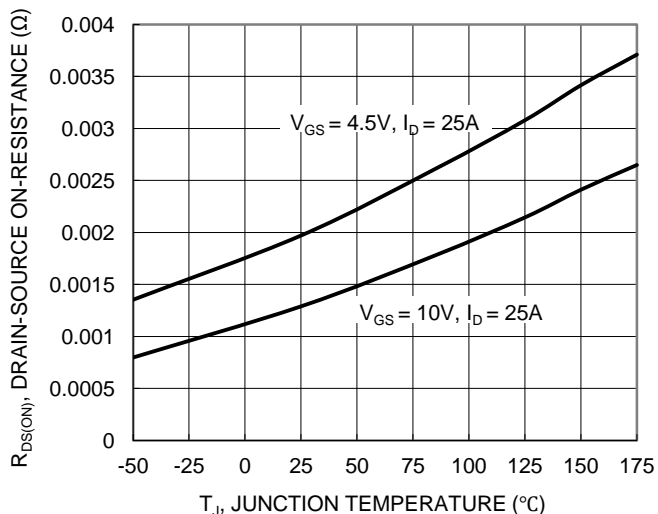


Figure 7. On-Resistance Variation with Temperature

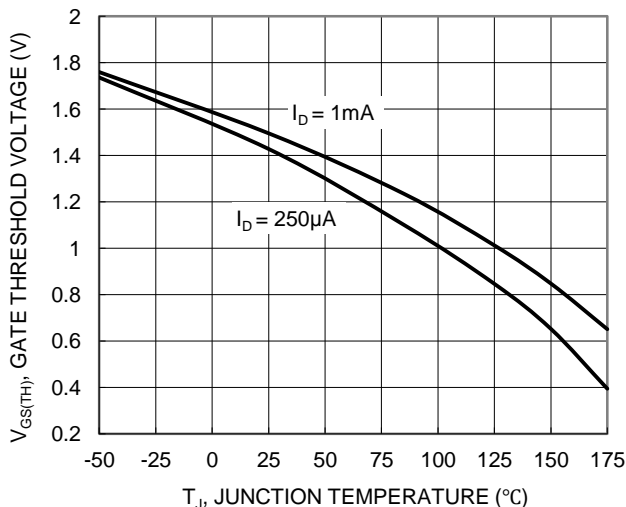


Figure 8. Gate Threshold Variation vs. Junction Temperature

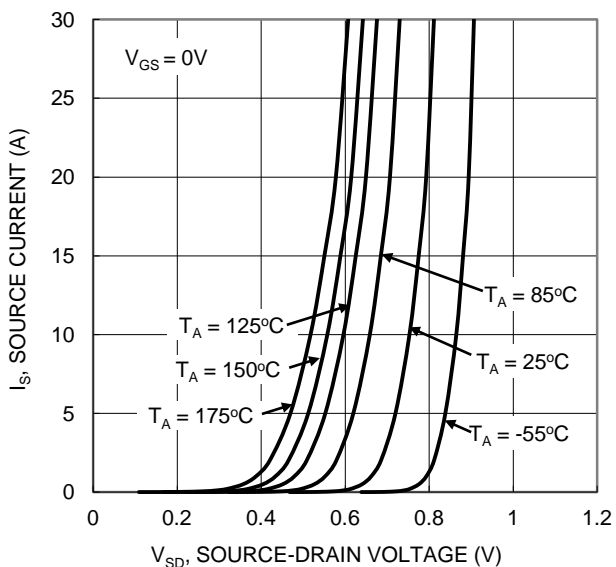


Figure 9. Diode Forward Voltage vs. Current

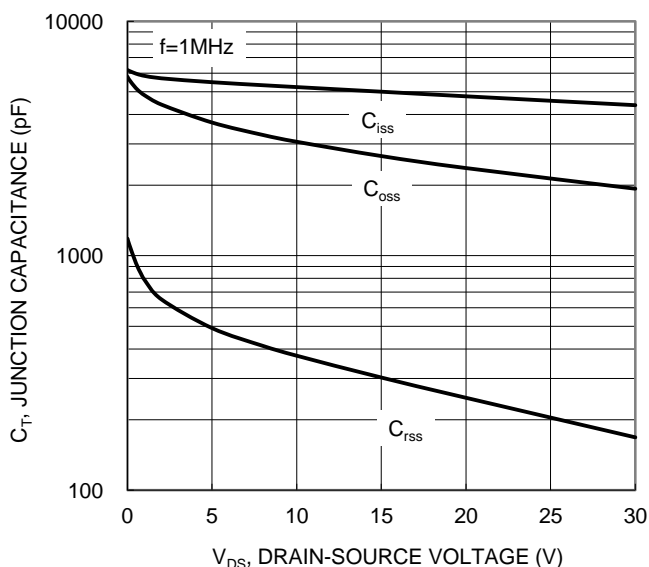


Figure 10. Typical Junction Capacitance

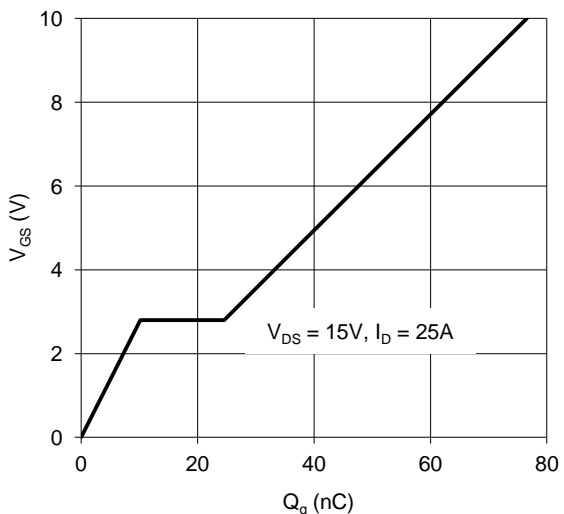


Figure 11. Gate Charge

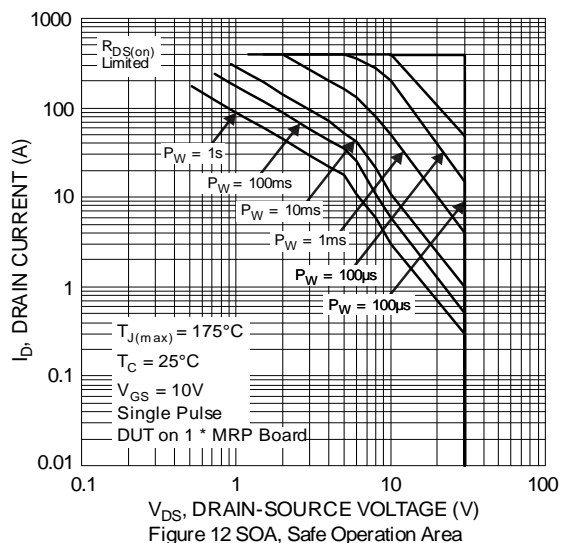


Figure 12 SOA, Safe Operation Area

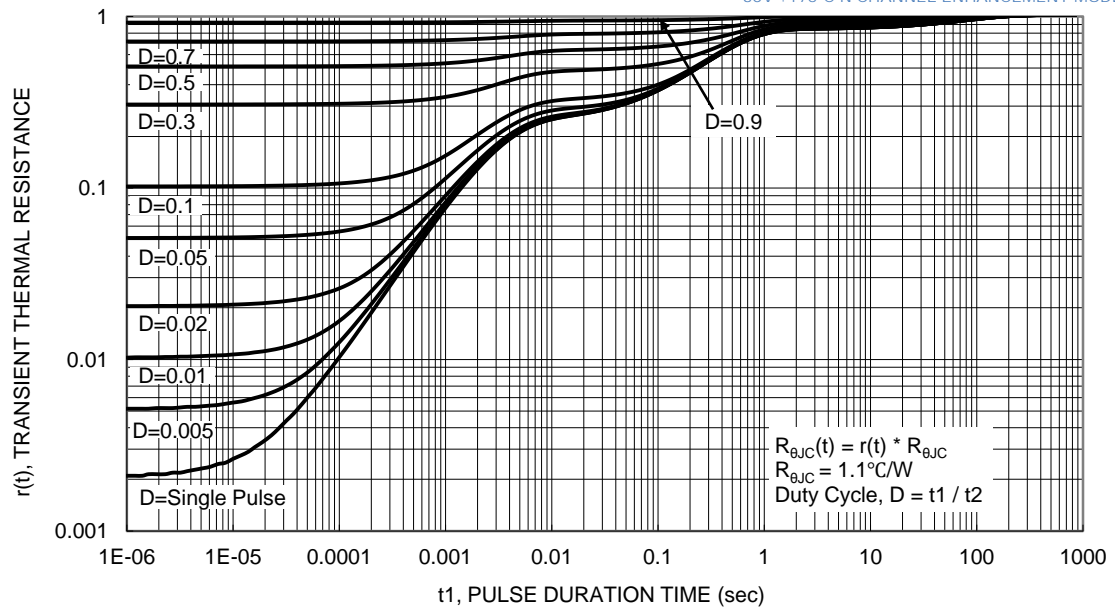
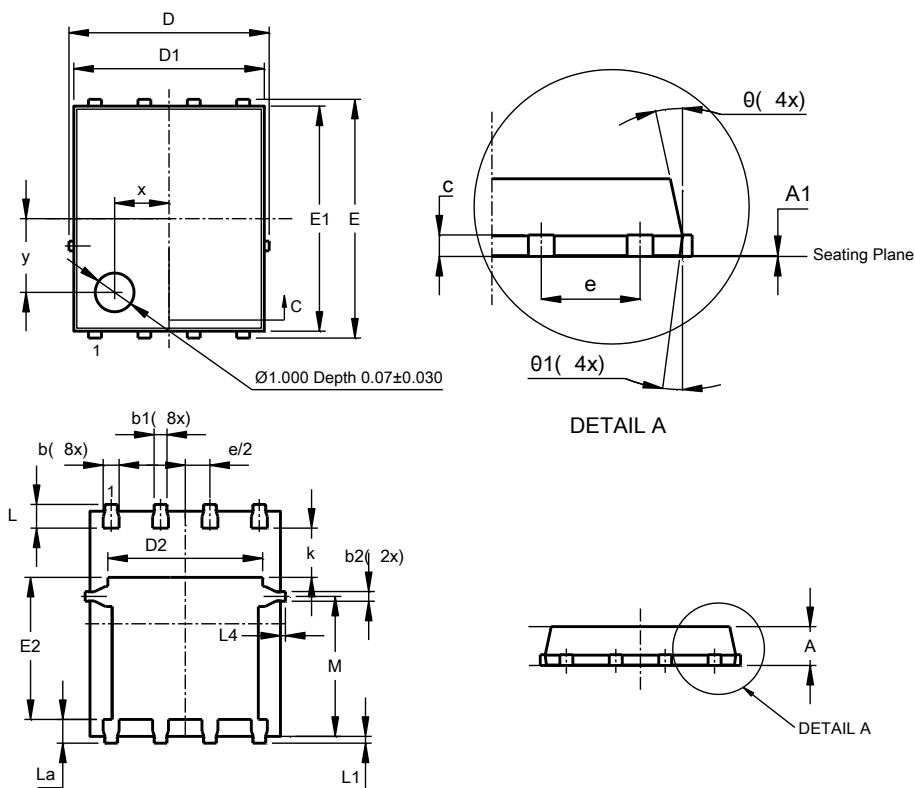


Figure 13. Transient Thermal Resistance

### Package Outline Dimensions

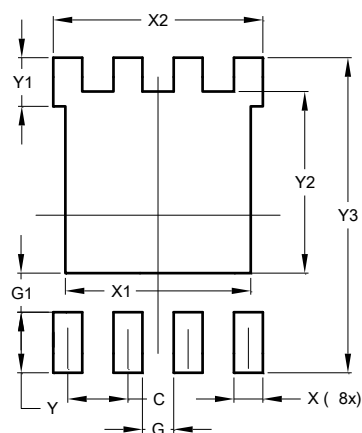
PowerDI5060-8 (Type K)



PowerDI5060-8 (Type K)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	-	-	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.725	3.66
E	1.27BSC		
k	-	-	1.27
L	0.51	0.71	0.61
La	0.51	0.675	0.61
L1	0.05	0.20	0.175
L4	-	-	0.125
M	3.50	3.71	3.605
x	-	-	1.400
y	-	-	1.900
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

### Suggested Pad Layout

PowerDI5060-8 (Type K)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	3.910
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610