



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**

0755-83047638

ysbdt@szyoushang.cn

www.szyoushang.cn



企业微信二维码



企业QQ二维码

## Product Summary

$BV_{DSS}$	$R_{DS(ON) Max}$	$I_D$ $T_c = +25^\circ C$
-60V	48mΩ @ $V_{GS} = -10V$	-26A
	60mΩ @ $V_{GS} = -4.5V$	-23A

## Description and Applications

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:

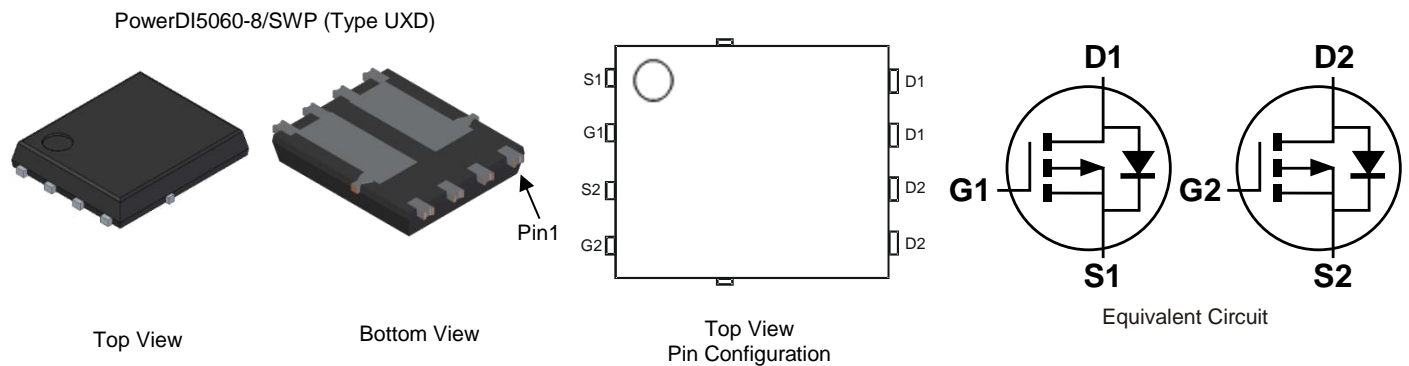
- Engine management systems
- Body control electronics
- DC-DC converters

## Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable And Robust End Application
- Low  $R_{DS(ON)}$  – Minimizes Power Losses
- Low  $Q_g$  – Minimizes Switching Losses
- Wettable Flank for Improved Optical Inspections

## 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 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)



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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	-60	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-6.3	A
		T <sub>A</sub> = +100°C		-4.4	
Continuous Drain Current (Note 7) V <sub>GS</sub> = -10V	Steady State	T <sub>C</sub> = +25°C	I <sub>D</sub>	-26	A
		T <sub>C</sub> = +100°C		-18	
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	-40	A
Maximum Continuous Body Diode Forward Current (Note 6)			I <sub>S</sub>	-2.0	A
Avalanche Current (Note 8) L = 0.1mH			I <sub>AS</sub>	-21	A
Avalanche Energy (Note 8) L = 0.1mH			E <sub>AS</sub>	30	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.5	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	100	°C/W
	t < 10s		53	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	52	°C/W
	t < 10s		27	
Thermal Resistance, Junction to Case (Note 7)		R <sub>θJC</sub>	2.9	°C
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

- Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  7. Thermal resistance from junction to soldering point (on the exposed drain pad).
  8. I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	-1	μA	V <sub>DS</sub> = -60V, 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 (Note 9)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.0	—	-3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	36	48	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A
			44	60		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iss</sub>	—	1525	—	pF	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	90	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	70	—	pF	
Gate Resistance	R <sub>g</sub>	—	16	—	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>	—	14.5	—	nC	V <sub>DS</sub> = -30V, I <sub>D</sub> = -5A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	30.6	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	4.9	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	5.2	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.3	—	ns	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -30V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = -5A
Turn-On Rise Time	t <sub>r</sub>	—	15.4	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	79.2	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	45.3	—	ns	
Body Diode Reverse-Recovery Time	t <sub>RR</sub>	—	15.2	—	ns	I <sub>F</sub> = -5A, di/dt = -100A/μs
Body Diode Reverse-Recovery Charge	Q <sub>RR</sub>	—	9.3	—	nC	I <sub>F</sub> = -5A, di/dt = -100A/μs

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

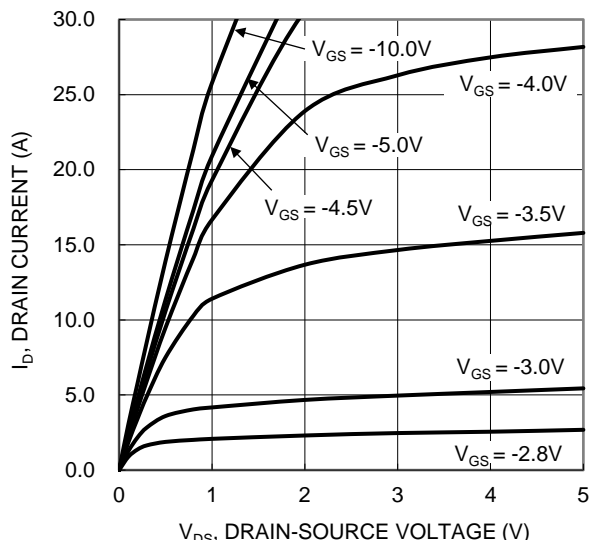


Figure 1. Typical Output Characteristic

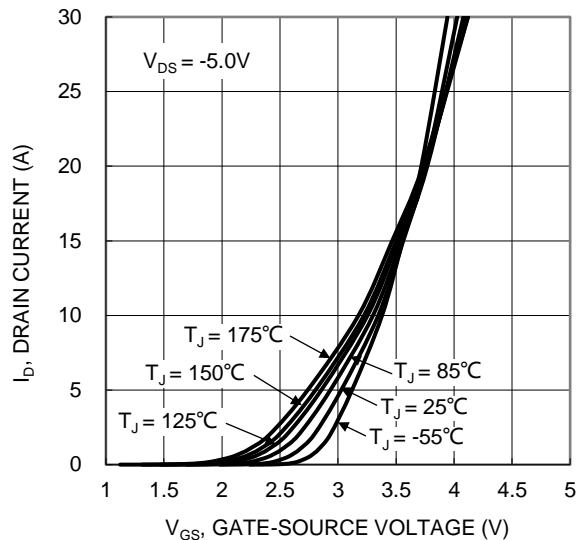


Figure 2. Typical Transfer Characteristic

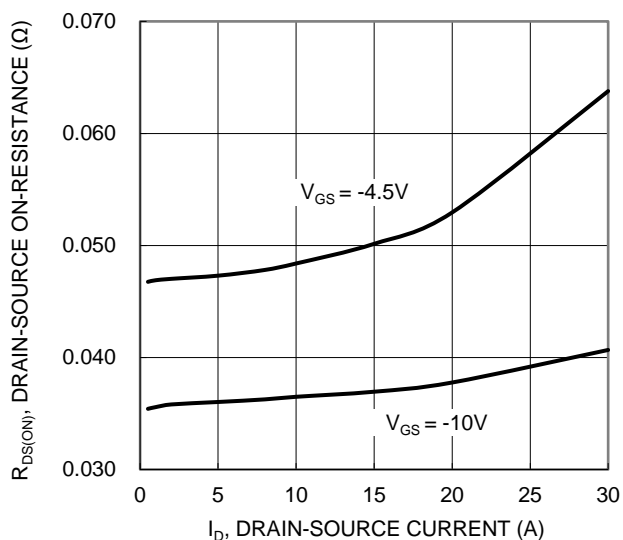


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

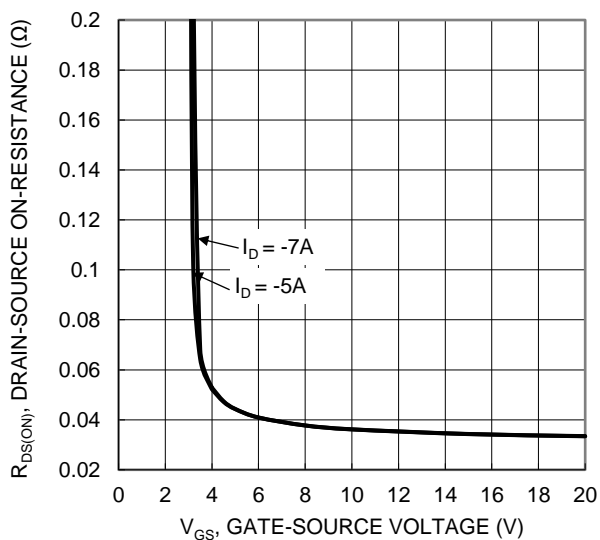


Figure 4. Typical Transfer Characteristic

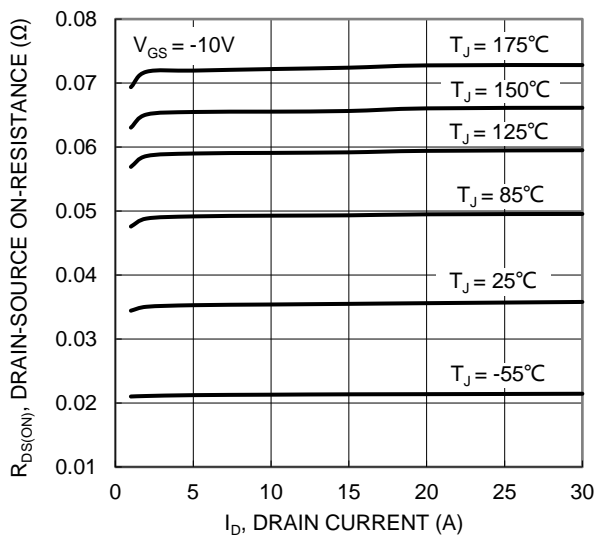


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

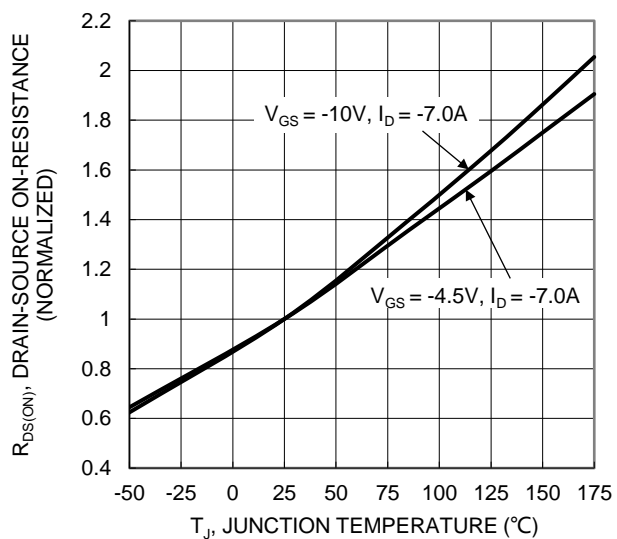
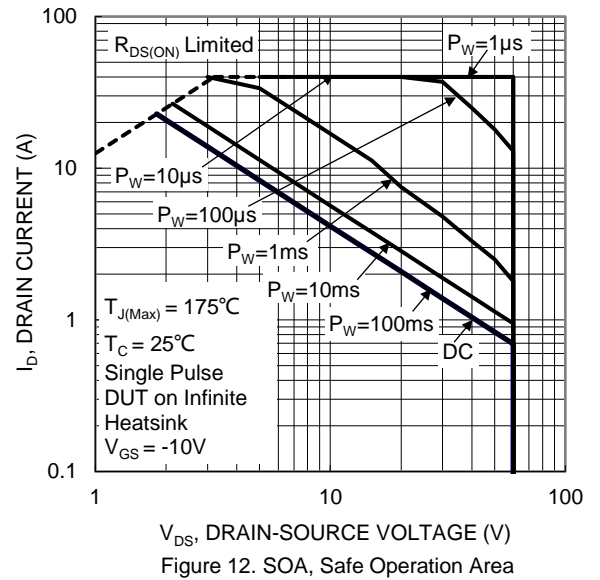
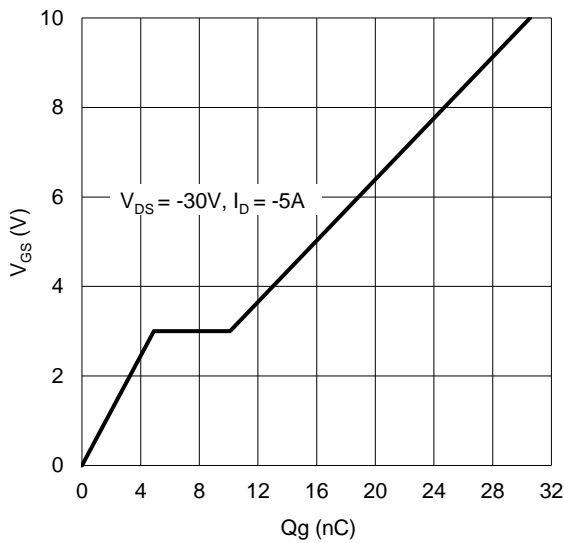
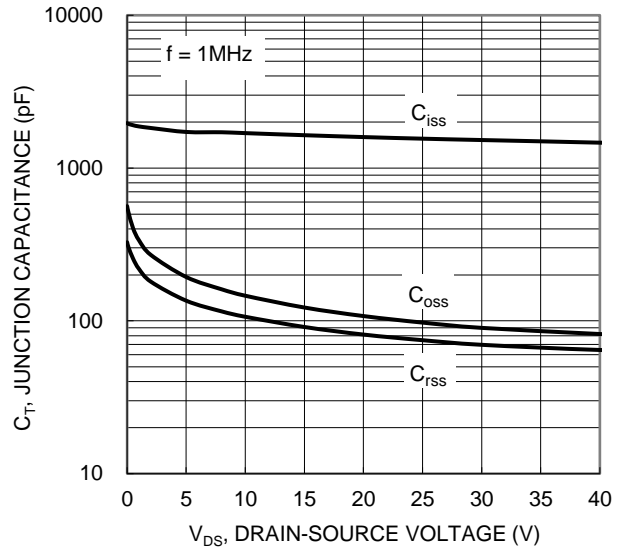
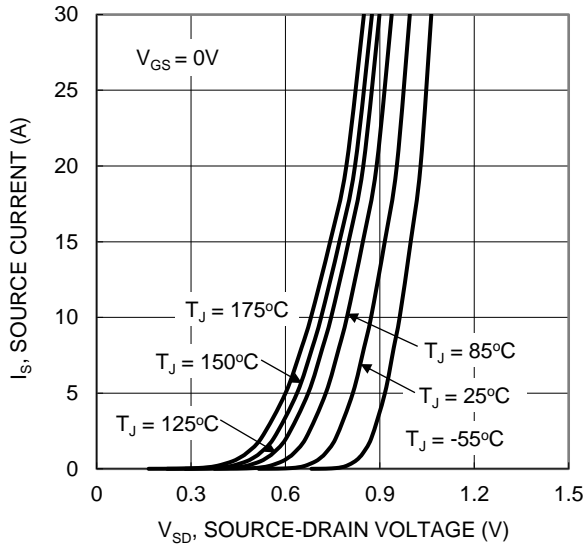
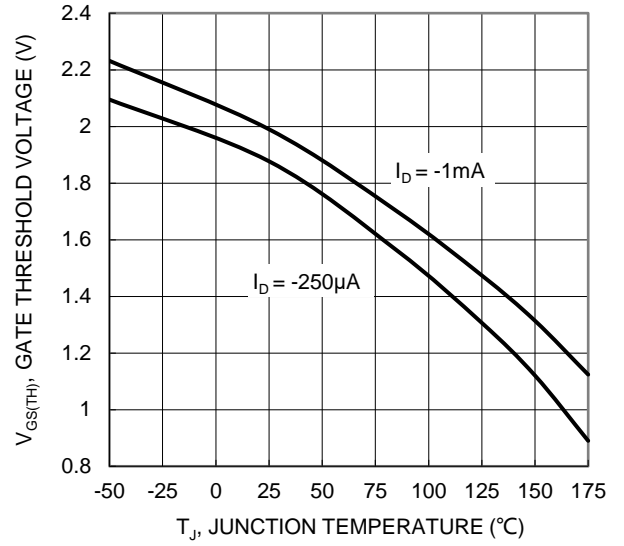
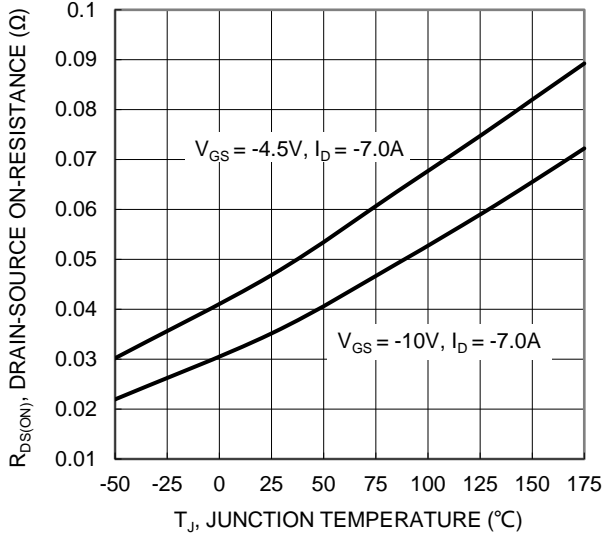


Figure 6. On-Resistance Variation with Temperature



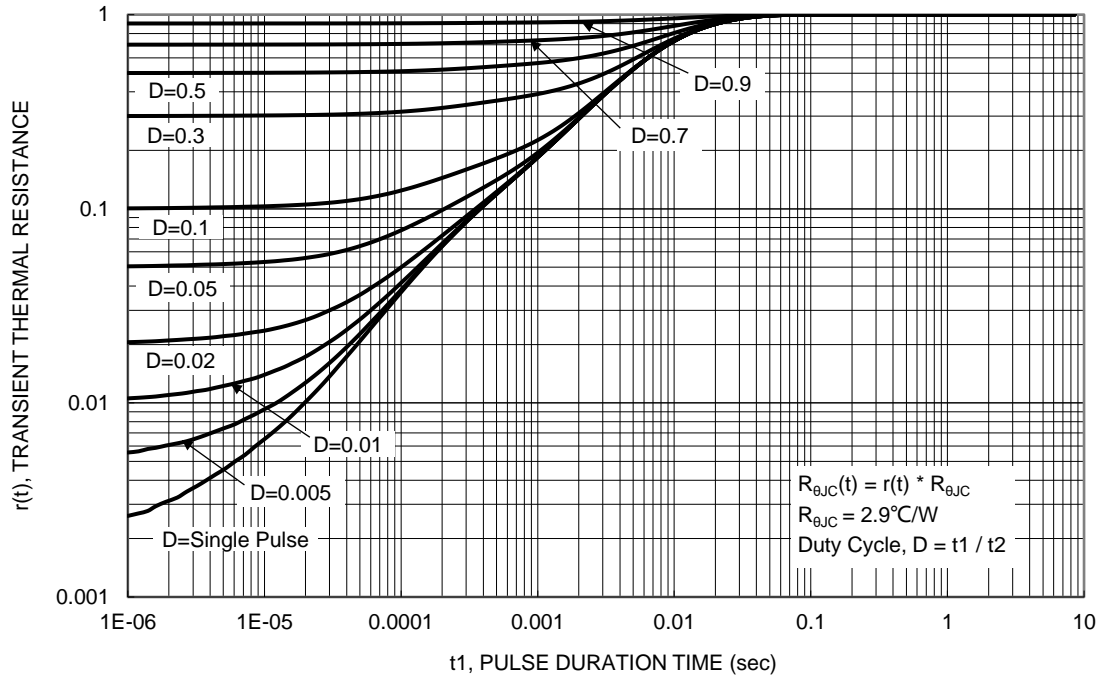
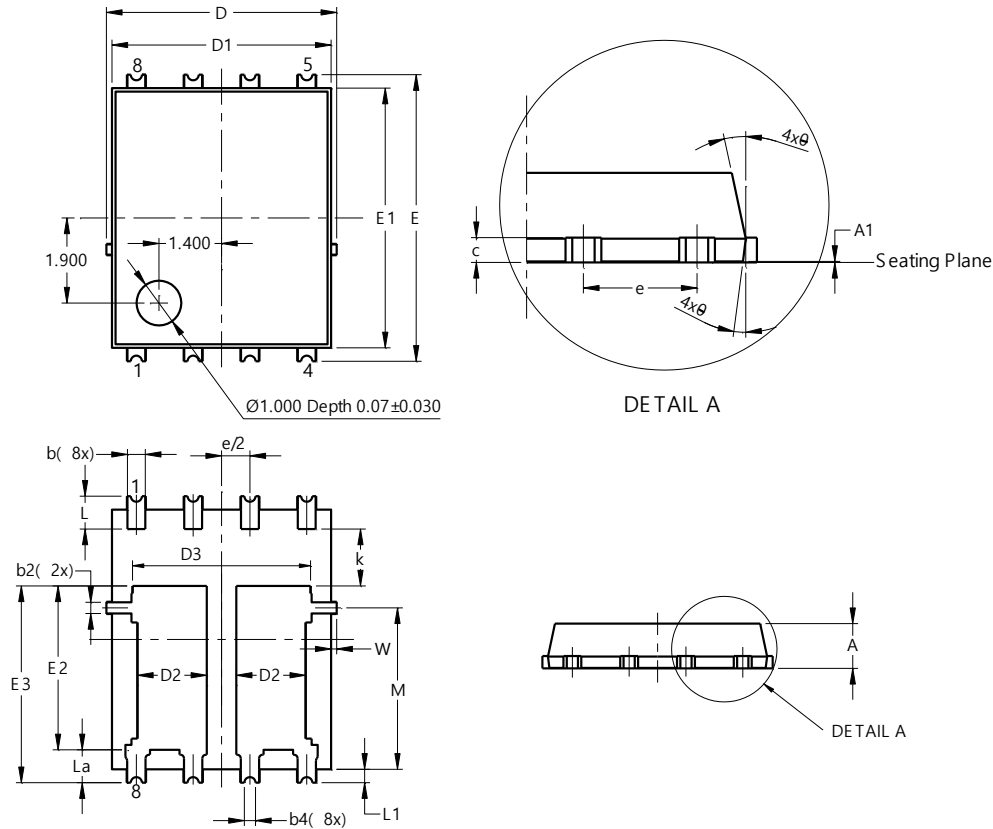


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

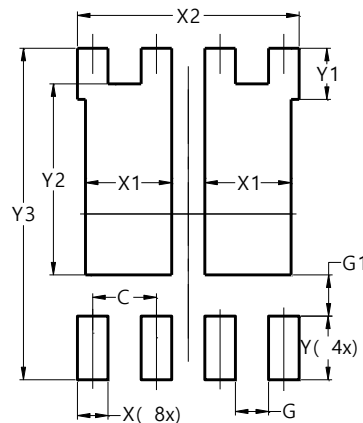
PowerDI5060-8/SWP (Type UXD)



PowerDI5060-8/SWP (Type UXD)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	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	1.46	1.66	1.55
D3	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
M	3.205	4.005	3.605
W	0.025	0.225	0.125
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

## Suggested Pad Layout

PowerDI5060-8/SWP (Type UXD)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	1.720
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610