



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}	$R_{DS(ON)}$ Max	I_D Max $T_c = +25^\circ\text{C}$
-40V	25m Ω @ $V_{GS} = -10\text{V}$	-52A
	45m Ω @ $V_{GS} = -4.5\text{V}$	-38A

Features and Benefits

- Rated to +175°C—Ideal for High Ambient Temperature Environments
- Low $R_{DS(ON)}$ —Ensures Minimal On-State Losses
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Occupies Just 33% of the Board Area Occupied by SO-8 Enabling Smaller End Products
- 100% Unclamped Inductive Switch (UIS) Test in Production

Description and Applications

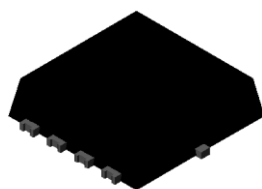
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Reverse-polarity protections
- Power-management functions
- DC-DC converters

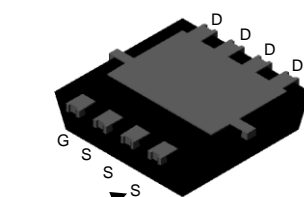
Mechanical Data

- Package: PowerDI[®]3333-8
- 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: 0.03 grams (Approximate)

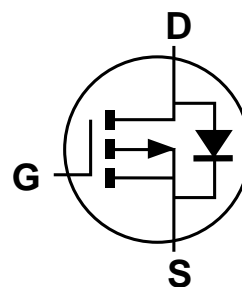
PowerDI3333-8 (SWP) (Type UX)



Top View



Pin 1
Bottom View



Equivalent Circuit

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current $V_{GS} = -10\text{V}$ (Note 5)	Steady State	$T_C = +25^\circ\text{C}$	I_D	-52	A
		$T_C = +100^\circ\text{C}$		-38	
Continuous Drain Current $V_{GS} = -10\text{V}$ (Note 6)	Steady State	$T_A = +25^\circ\text{C}$	I_D	-9.3	A
		$T_A = +100^\circ\text{C}$		-6.6	
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-208	A
Maximum Body Diode Continuous Current (Note 5)			I_S	-52	A
Pulsed Source Current (10 μs Pulse, Duty Cycle = 1%)			I_{SM}	-208	A
Avalanche Current $L = 0.3\text{mH}$			I_{AS}	-27	A
Avalanche Energy $L = 0.3\text{mH}$			E_{AS}	109	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 7)	$T_A = +25^\circ\text{C}$	P_D	2.0	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	75.2	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	3.9	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	38.4	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	1.25	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

- 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. 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 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	-40	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = -40V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	-0.8	—	-1.8	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	11.1	25	mΩ	V _{GS} = -10V, I _D = -3A
		—	14.6	45		V _{GS} = -4.5V, I _D = -3A
Diode Forward Voltage	V _{SD}	—	-0.7	-1	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	2064	—	pF	V _{DS} = -20V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	212	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	183	—	pF	
Gate Resistance	R _g	—	2.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	23.5	—	nC	V _{DS} = -20V, I _D = -3A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	45.8	—	nC	
Gate-Source Charge	Q _{gs}	—	5	—	nC	
Gate-Drain Charge	Q _{gd}	—	6.7	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	4.3	—	ns	
Turn-On Rise Time	t _r	—	4.7	—	ns	V _{DD} = -20V, V _{GS} = -10V I _D = -3A
Turn-Off Delay Time	t _{D(OFF)}	—	71.8	—	ns	
Turn-Off Fall Time	t _f	—	23.9	—	ns	
Body Diode Reverse Recovery Time	t _{RR}	—	17.3	—	ns	I _S = -3A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	8.7	—	nC	I _S = -3A, dI/dt = 100A/μs

Notes: 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

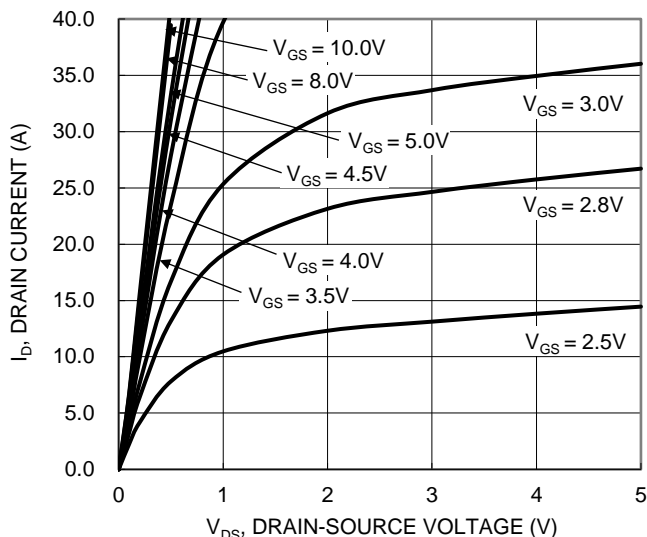


Figure 1. Typical Output Characteristic

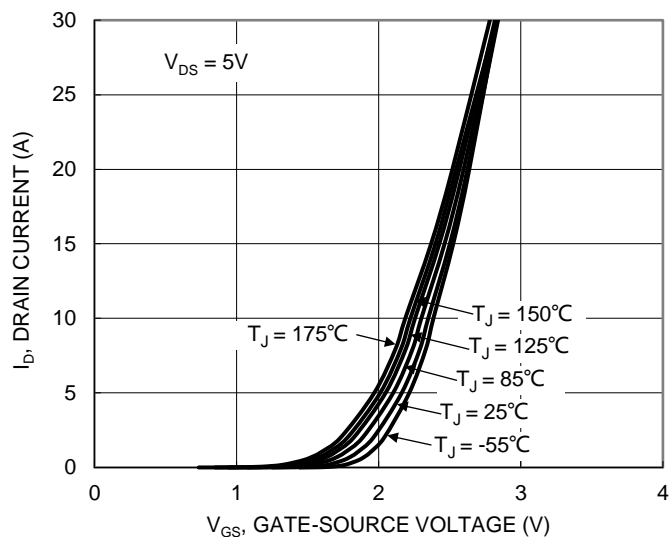


Figure 2. Typical Transfer Characteristic

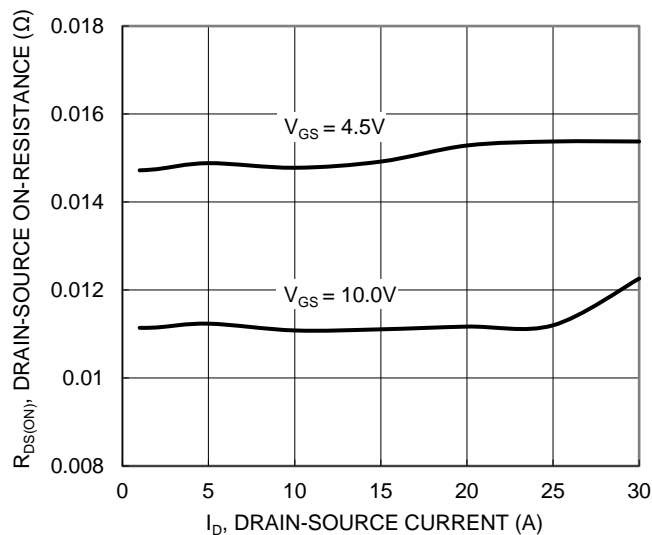


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

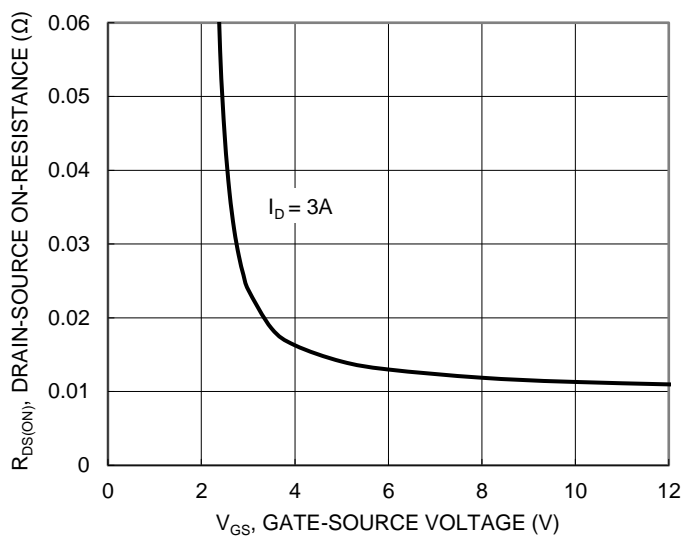


Figure 4. Typical Transfer Characteristic

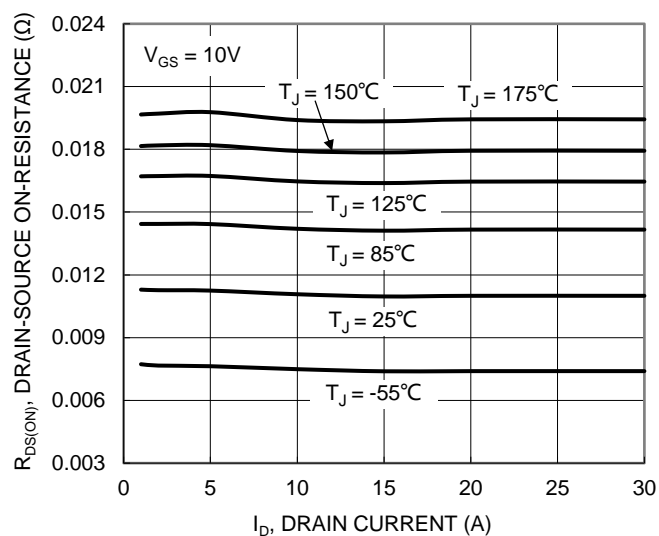


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

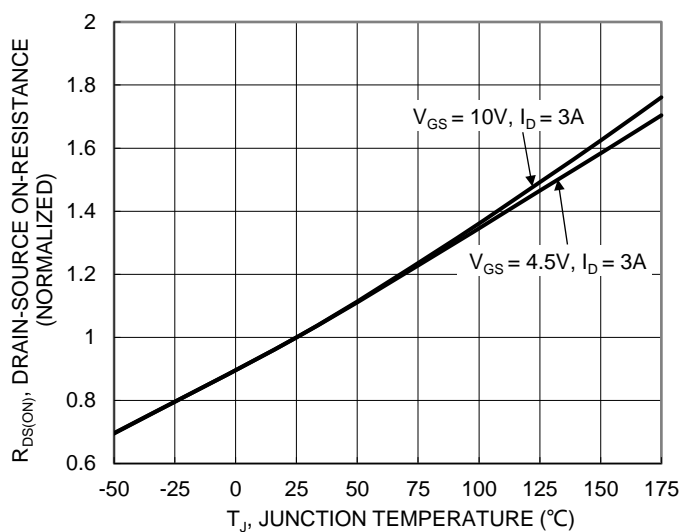


Figure 6. On-Resistance Variation with Junction Temperature

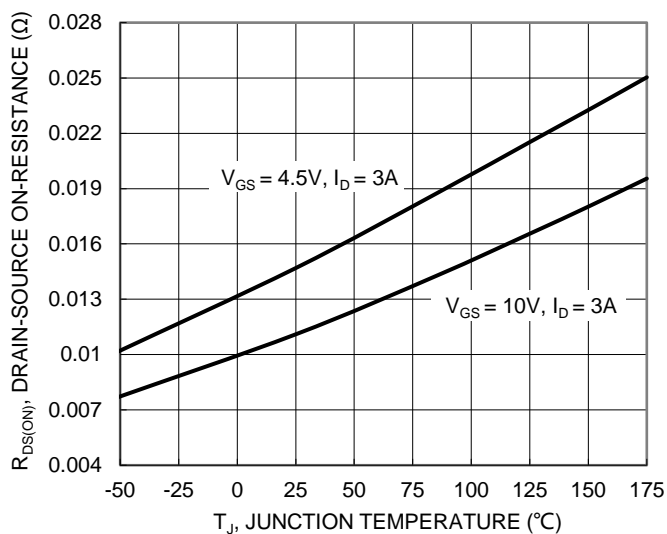


Figure 7. On-Resistance Variation with Junction Temperature

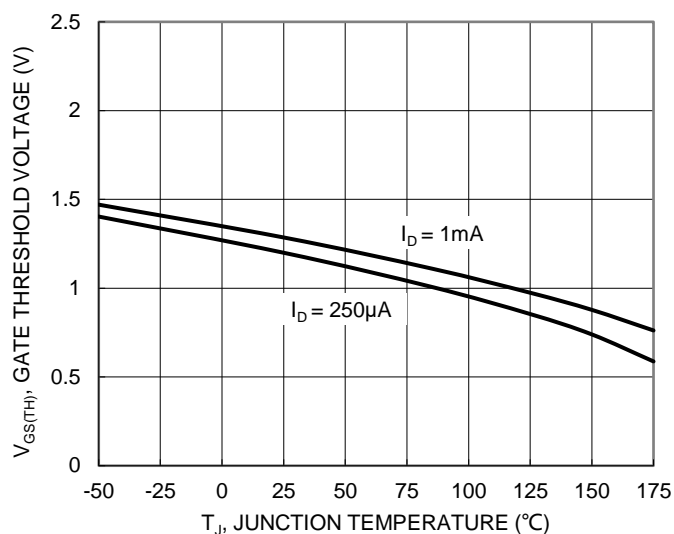


Figure 8. Gate Threshold Variation vs. Junction Temperature

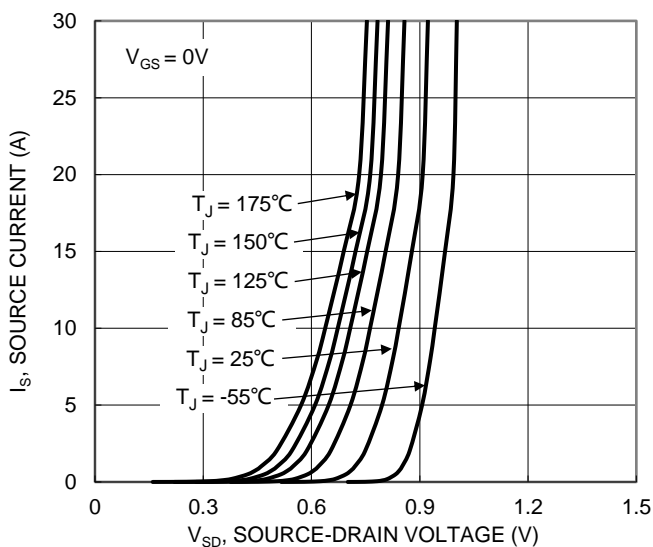


Figure 9. Diode Forward Voltage vs. Current

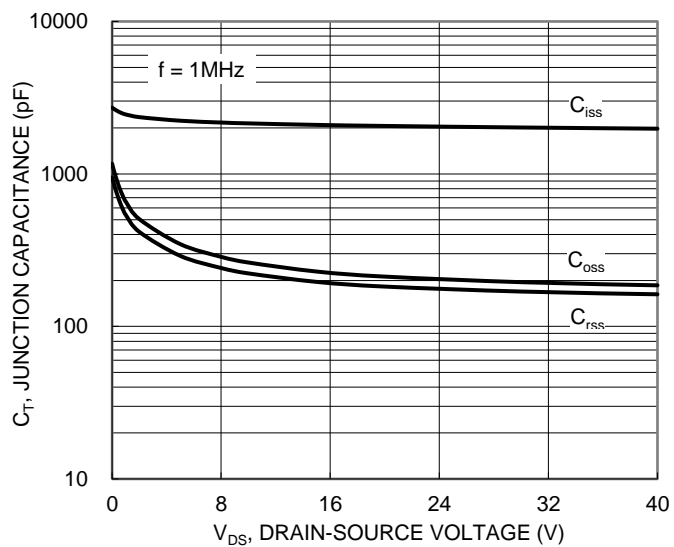


Figure 10. Typical Junction Capacitance

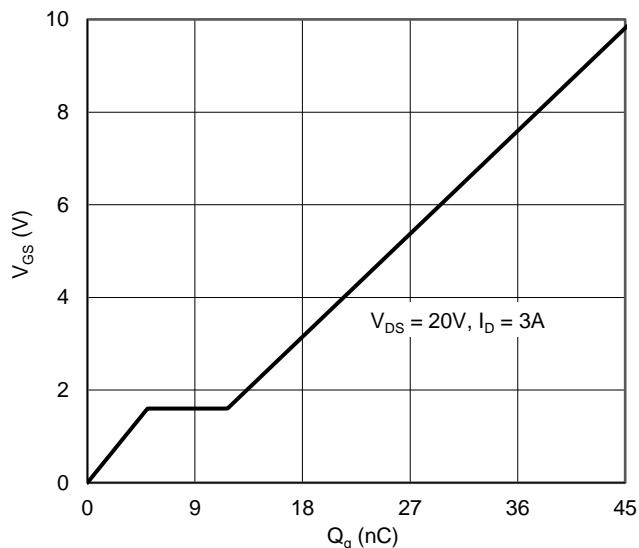


Figure 11. Gate Charge

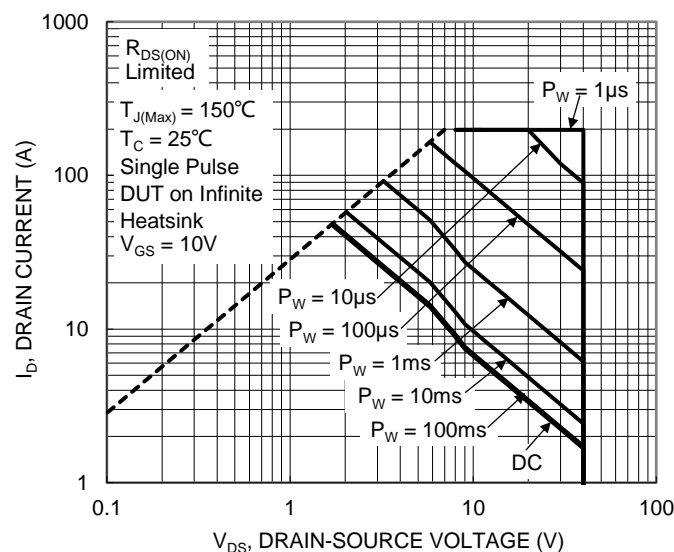


Figure 12. SOA, Safe Operation Area

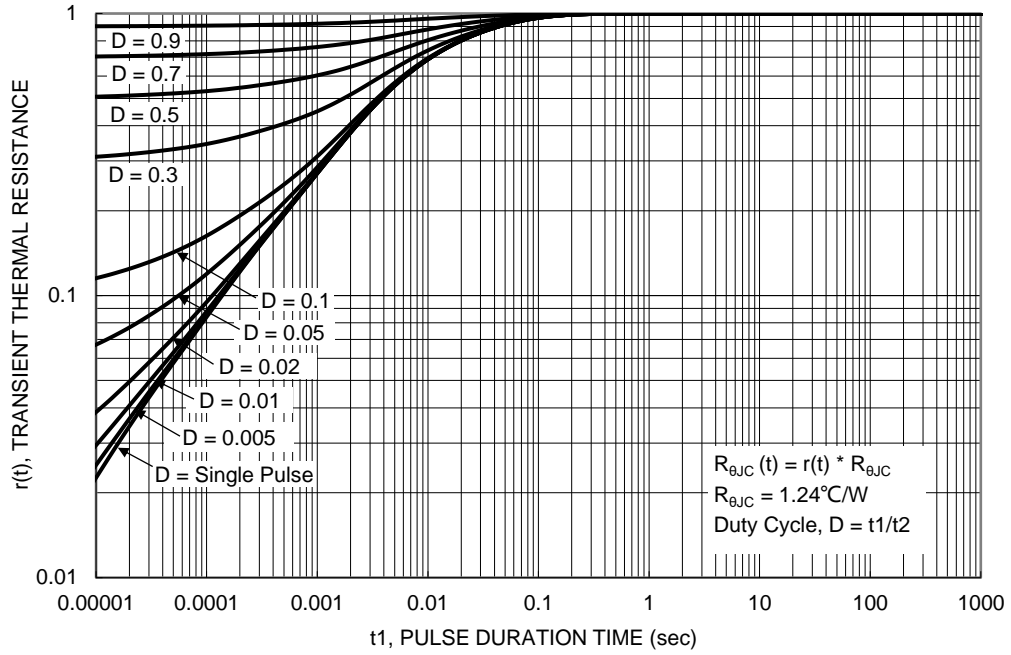
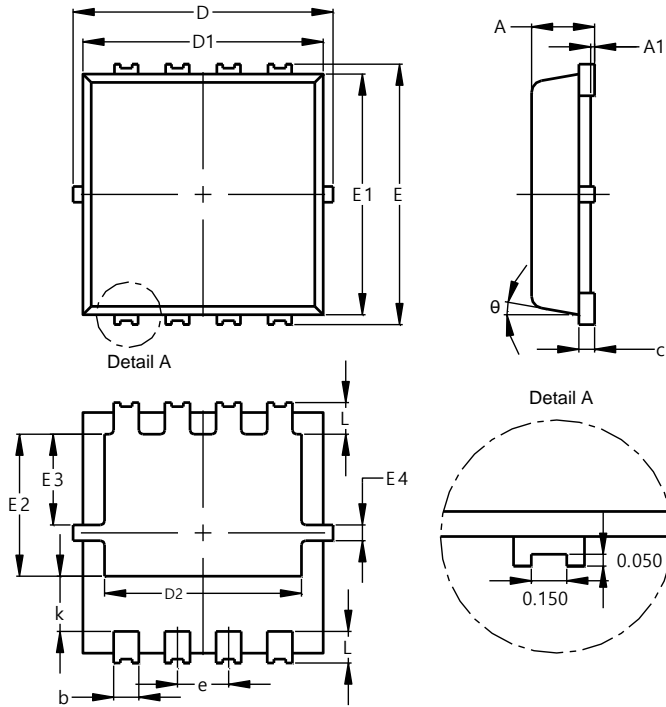


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

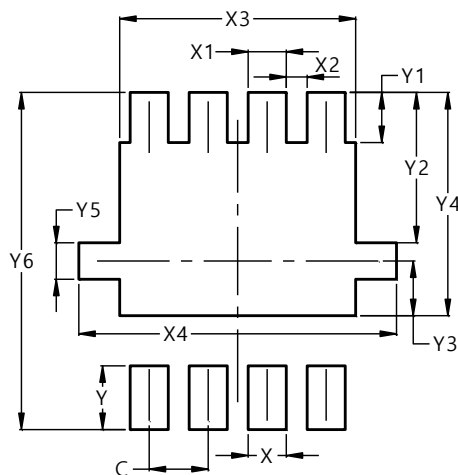
PowerDI3333-8 (SWP) (Type UX)



PowerDI3333-8 (SWP) (Type UX)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	--	--	0.65
k	0.50	0.90	0.70
L	0.30	0.50	0.40
θ	0°	12°	10°
All Dimensions in mm			

Suggested Pad Layout

PowerDI3333-8 (SWP) (Type UX)



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	0.420
X2	0.230
X3	2.600
X4	3.500
Y	0.700
Y1	0.550
Y2	1.650
Y3	0.600
Y4	2.450
Y5	0.400
Y6	3.700