



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°C
-40V	25mΩ @ V _{GS} = -10V	-49A
	45mΩ @ V _{GS} = -4.5V	-37A

Features and Benefits

- 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

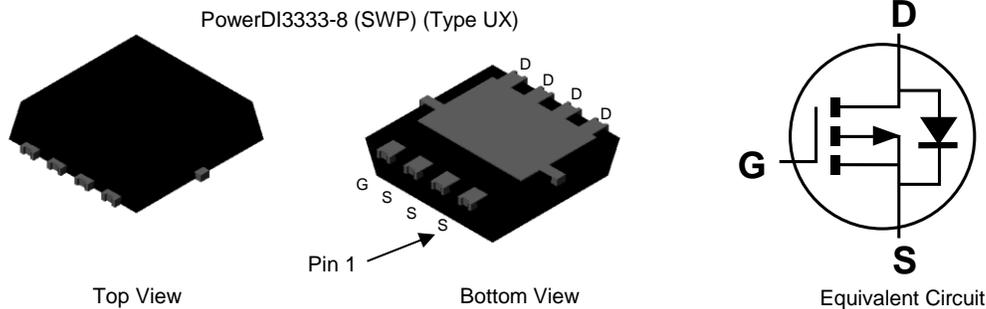
Description and Applications

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)



Maximum Ratings (@T_A = +25°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} = -10V (Note 5)	Steady State	T _C = +25°C T _C = +70°C	I _D	-49 -39	A
Continuous Drain Current V _{GS} = -10V (Note 6)	Steady State	T _A = +25°C T _A = +70°C	I _D	-8.9 -7	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	-198	A
Maximum Body Diode Continuous Current (Note 5)			I _S	-49	A
Pulsed Source Current (10μs Pulse, Duty Cycle = 1%)			I _{SM}	-198	A
Avalanche Current L = 0.3mH			I _{AS}	-27	A
Avalanche Energy L = 0.3mH			E _{AS}	109	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 7)	T _A = +25°C	P _D	1.6	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R _{θJA}	75.2	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	3.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	38.4	°C/W
Thermal Resistance, Junction to Case (Note 5)		R _{θJC}	1.25	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

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}	—	182	—	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	V _{DD} = -20V, V _{GS} = -10V I _D = -3A
Turn-On Rise Time	t _r	—	4.7	—	ns	
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:
- Thermal resistance from junction to soldering point (on the exposed drain pad).
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

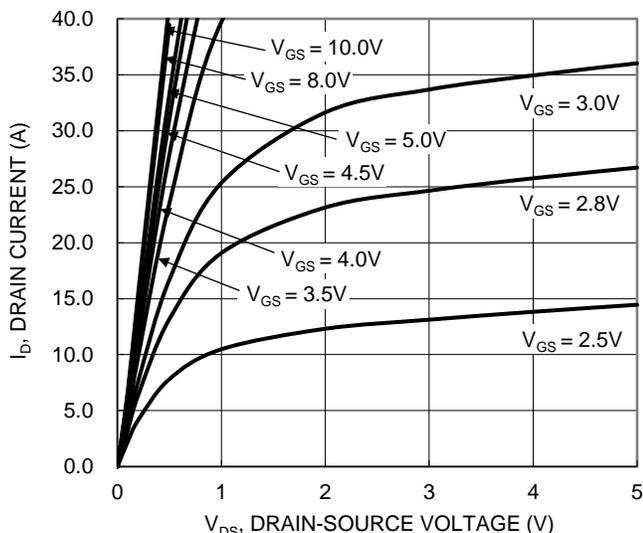


Figure 1. Typical Output Characteristic

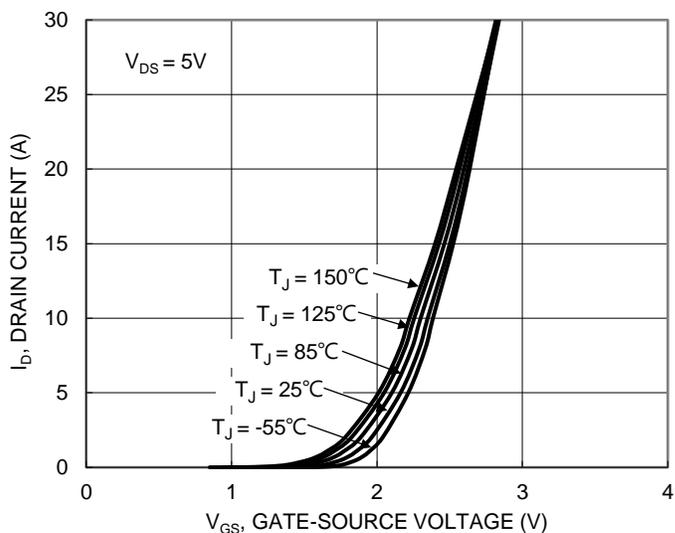


Figure 2. Typical Transfer Characteristic

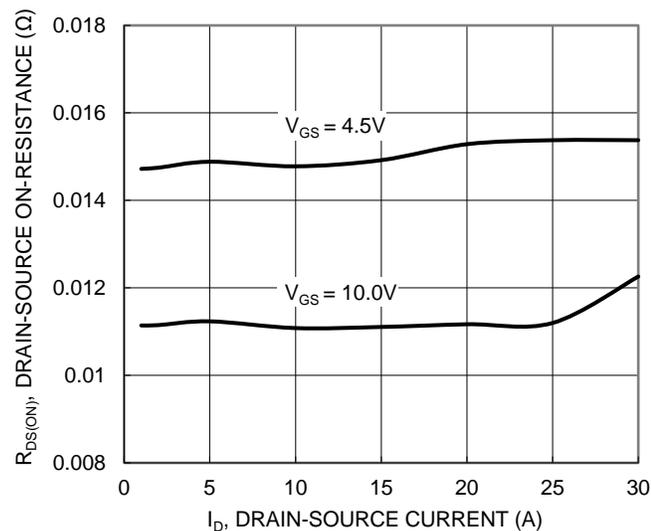


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

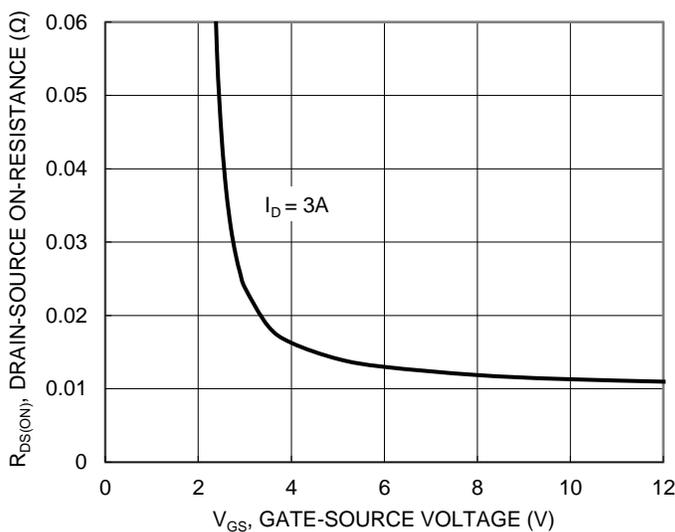


Figure 4. Typical Transfer Characteristic

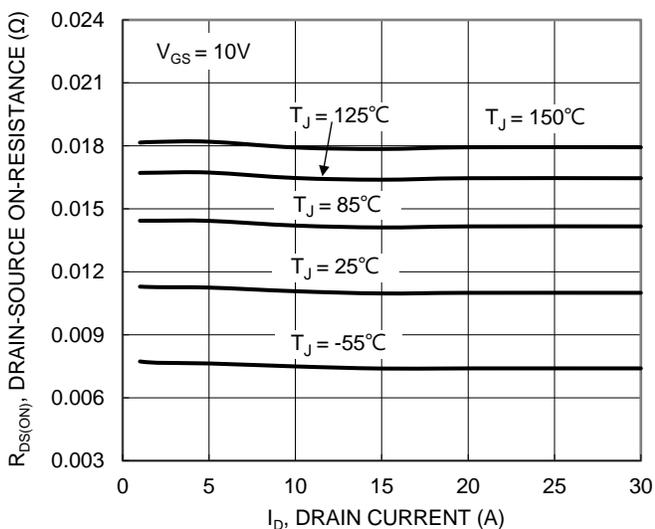


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

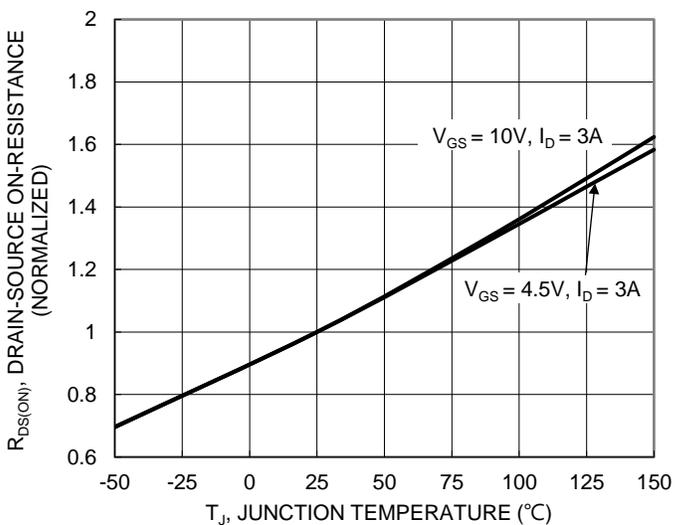
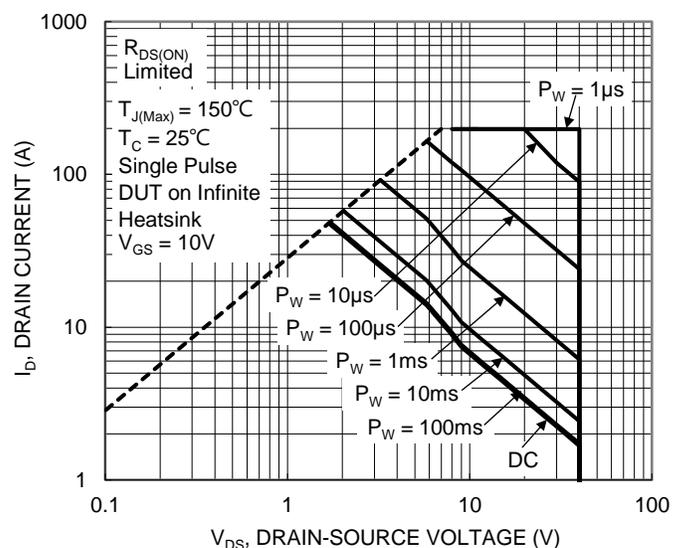
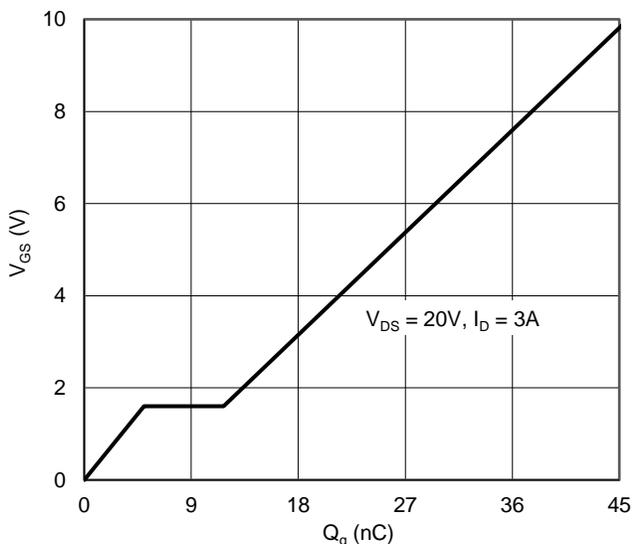
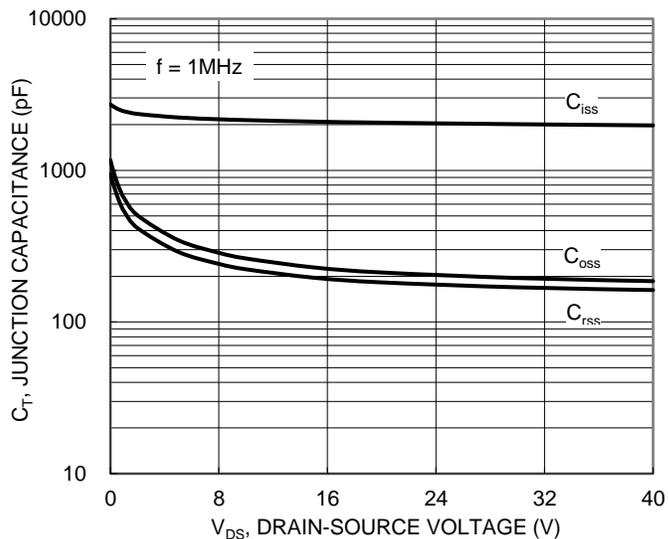
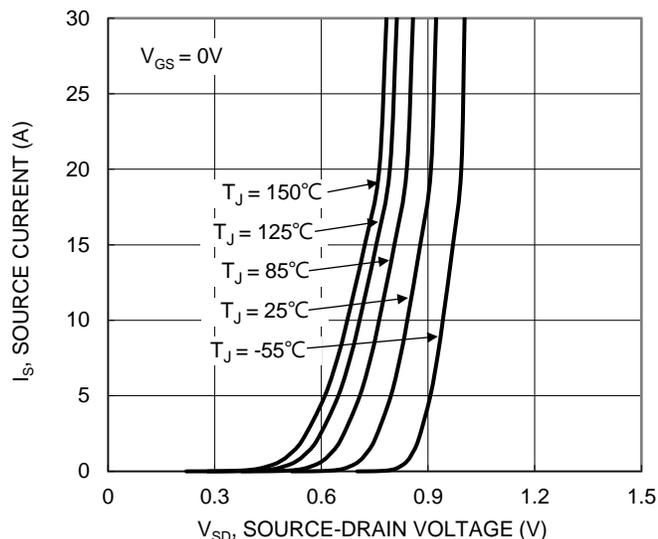
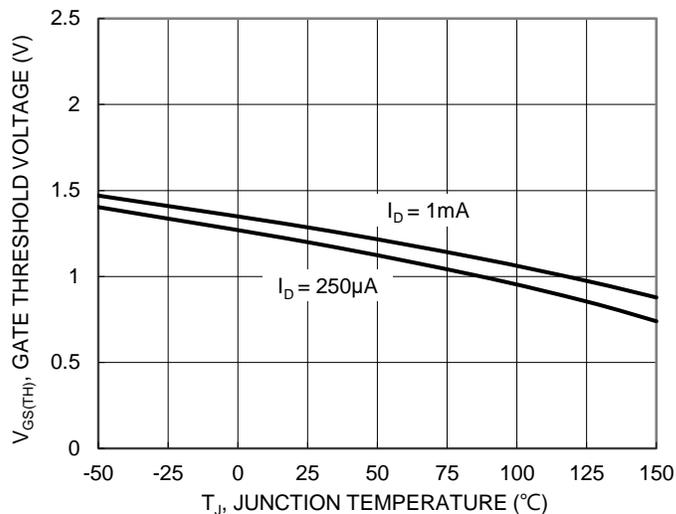
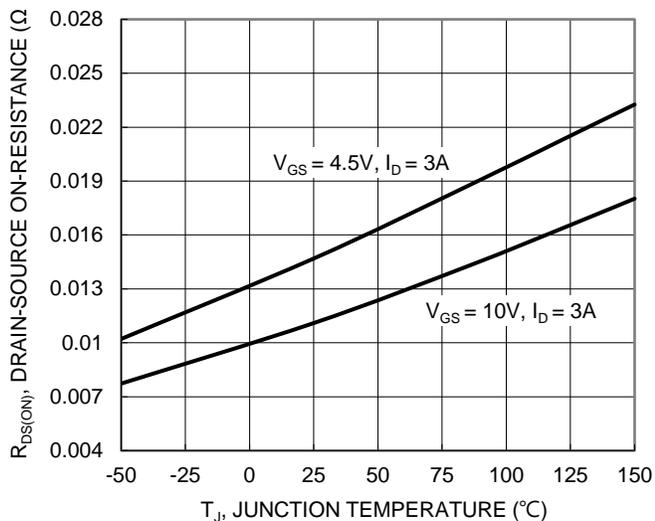


Figure 6. On-Resistance Variation with Junction Temperature



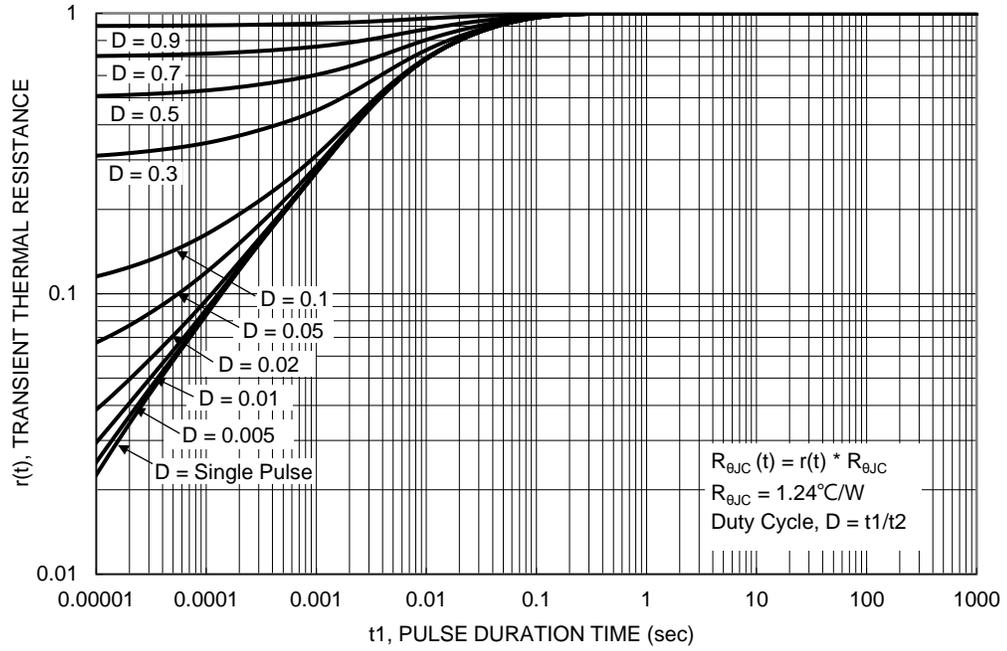
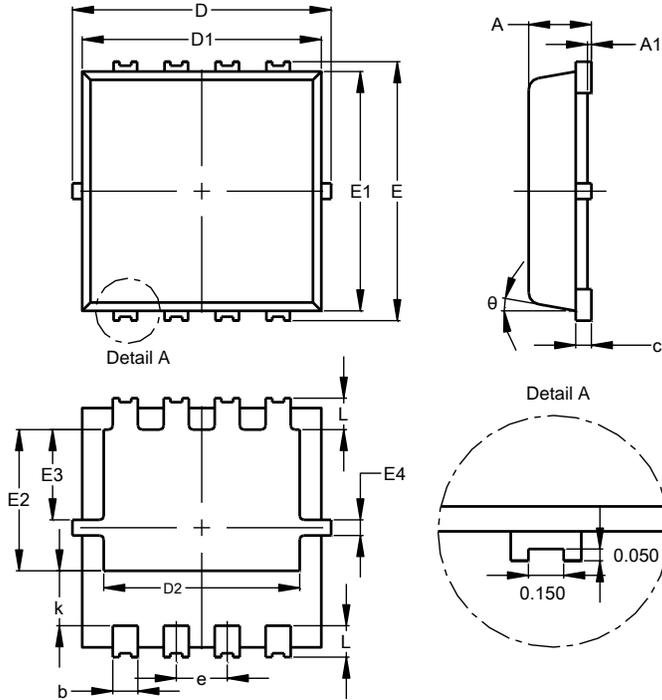


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

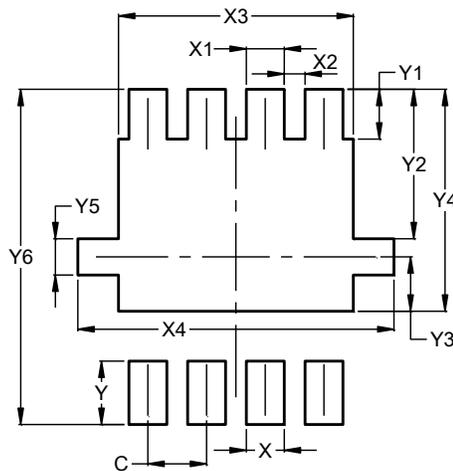
PowerDI3333-8 (SWP) (Type UX)



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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