优尚

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 Max T_C = +25°C
-20V	3.0mΩ @ V_{GS} = -10V	-115A
	4.0mΩ @ V_{GS} = -4.5V	-105A
	7.0mΩ @ V_{GS} = -2.5V	-75A

Features

- Low $R_{DS(ON)}$ – Ensures On-State Losses Are Minimized
- 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 Product

Description

This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

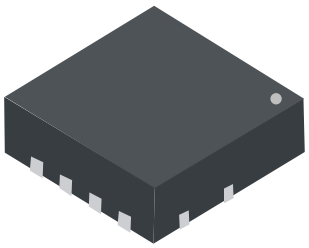
Applications

- Load switches
- Power management functions

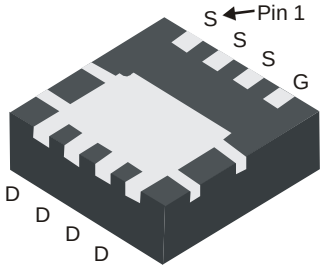
Mechanical Data

- 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
- Terminal Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072 grams (Approximate)

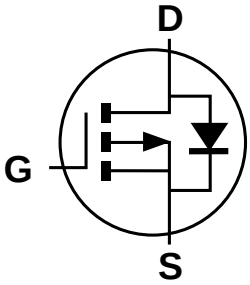
PowerDI3333-8



Top View



Bottom View



Equivalent Circuit

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 5) V_{GS} = -10V	Steady State	T_C = +25°C T_C = +70°C	I_D	-115 -95	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-2.7	A
Pulsed Drain Current (380μs Pulse, Duty Cycle = 1%)			I_{DM}	-180	A
Pulsed Body Diode Forward Current (380μs Pulse, Duty Cycle = 1%)			I_{SM}	-180	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	-28	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	40.5	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 8)	T_A = +25°C	P_D	1.0	W
Thermal Resistance, Junction to Ambient (Note 8)	Steady State	$R_{\theta JA}$	124	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	52	°C/W
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	52	W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	2.4	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°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 1inch square copper plate.
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}	-20	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.5	—	-1.1	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	2.2	3.0	mΩ	V_{GS} = -10V, I_D = -15A
		—	3.0	4.0		V_{GS} = -4.5V, I_D = -15A
		—	4.8	7.0		V_{GS} = -2.5V, I_D = -10A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -10A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	3840	—	pF	V_{DS} = -10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	772	—		
Reverse Transfer Capacitance	C_{rss}	—	589	—		
Gate Resistance	R_G	—	4.6	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	40	—	nC	V_{DD} = -10V, I_D = -20A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	83	—		
Gate-Source Charge	Q_{gs}	—	4.5	—		
Gate-Drain Charge	Q_{gd}	—	14	—		
Turn-On Delay Time	$t_{D(ON)}$	—	8.2	—	ns	V_{GS} = -4.5V, V_{DD} = -10V R_G = 1Ω, I_D = -10A
Turn-On Rise Time	t_R	—	7.3	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	75	—		
Turn-Off Fall Time	t_F	—	75.2	—		
Reverse Recovery Time	t_{RR}	—	25	—	ns	I_F = -10A, dI/dt = 100A/μs
Reverse Recovery Charge	Q_{RR}	—	14	—	nC	I_F = -10A, 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.

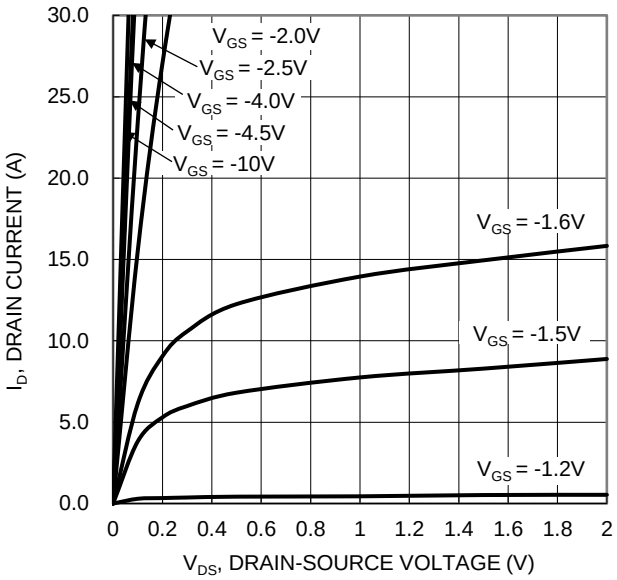


Figure 1. Typical Output Characteristic

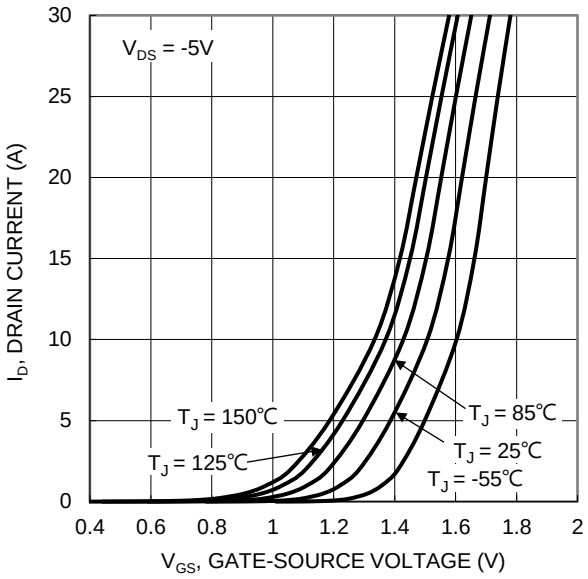


Figure 2. Typical Transfer Characteristic

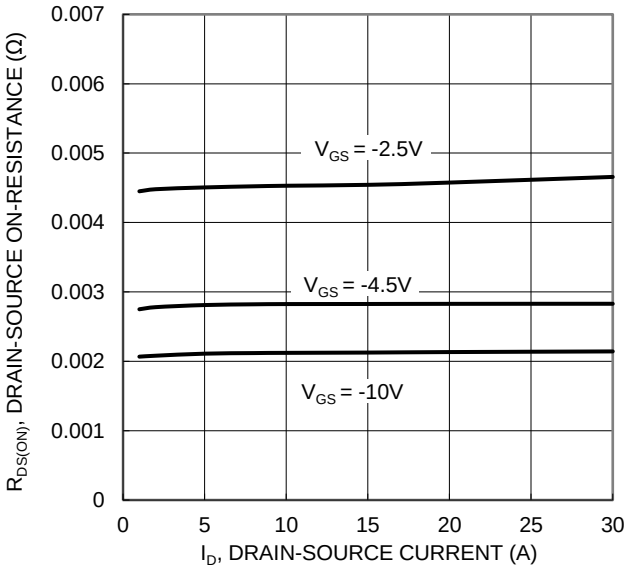


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

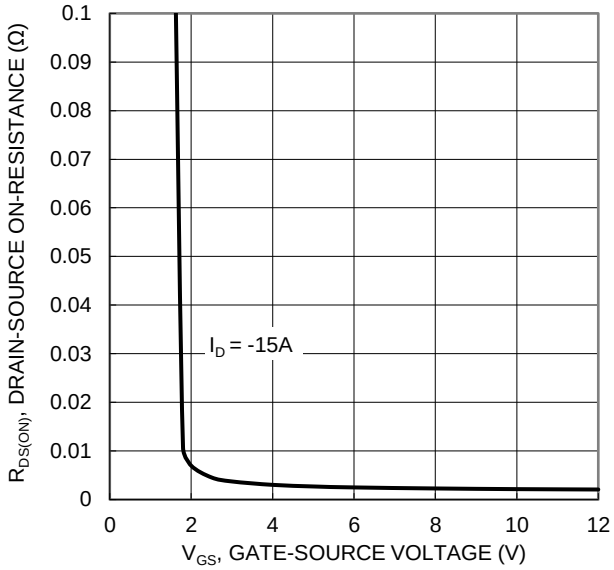


Figure 4. Typical Transfer Characteristic

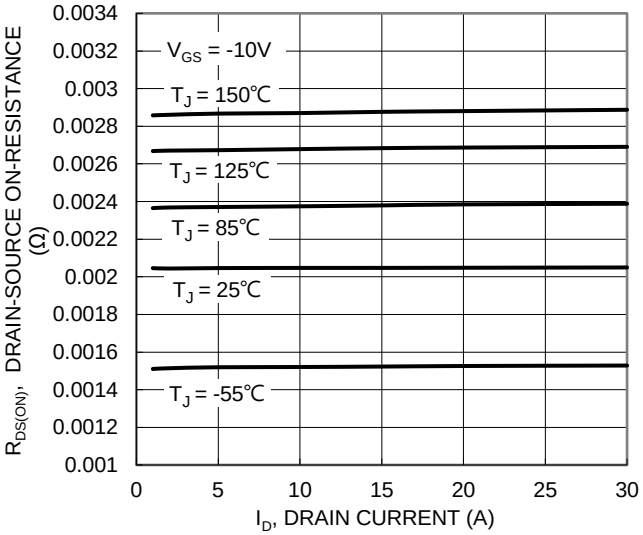


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

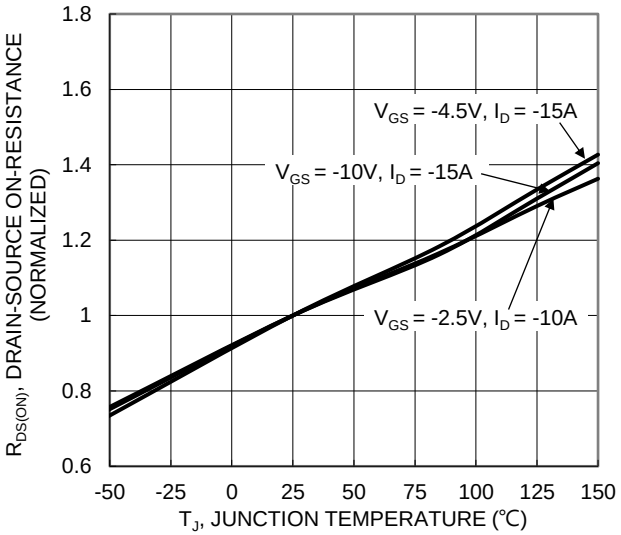


Figure 6. On-Resistance Variation with Junction Temperature

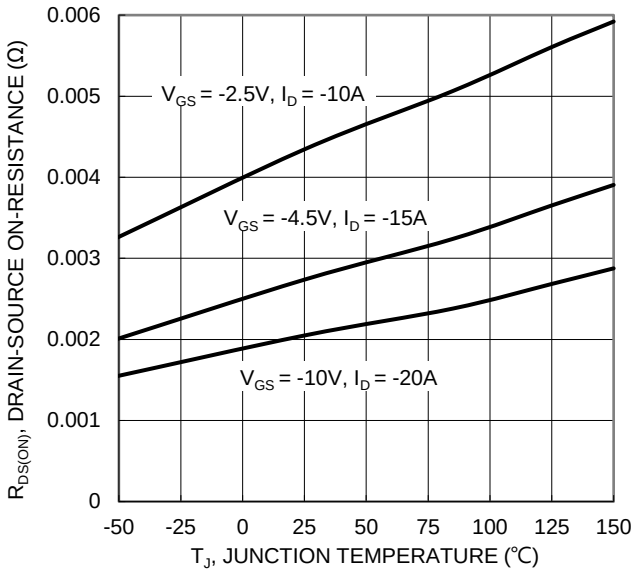


Figure 7. On-Resistance Variation with Junction Temperature

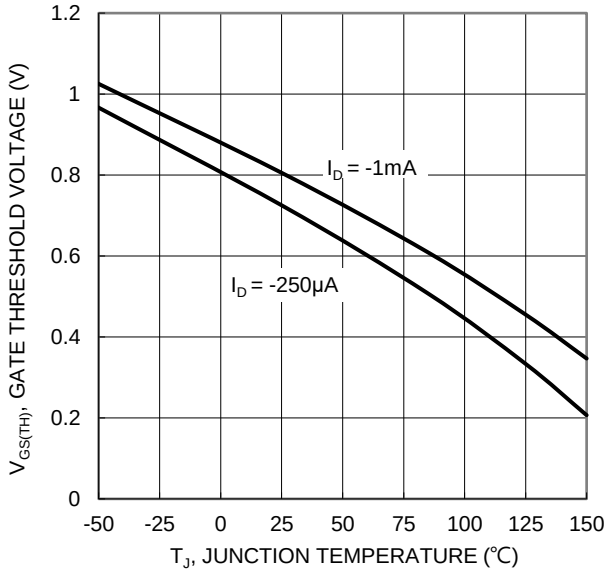


Figure 8. Gate Threshold Variation vs. Junction Temperature

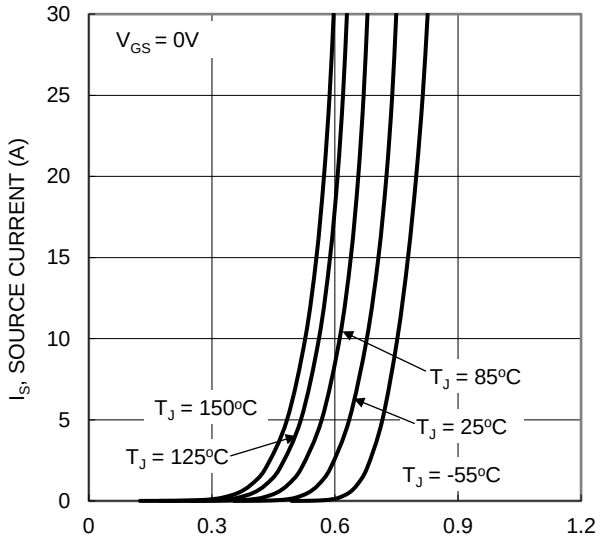


Figure 9. Diode Forward Voltage vs. Current

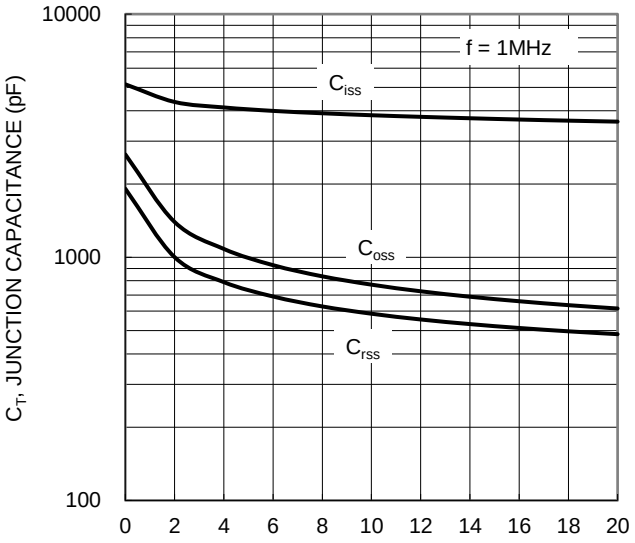


Figure 10. Typical Junction Capacitance

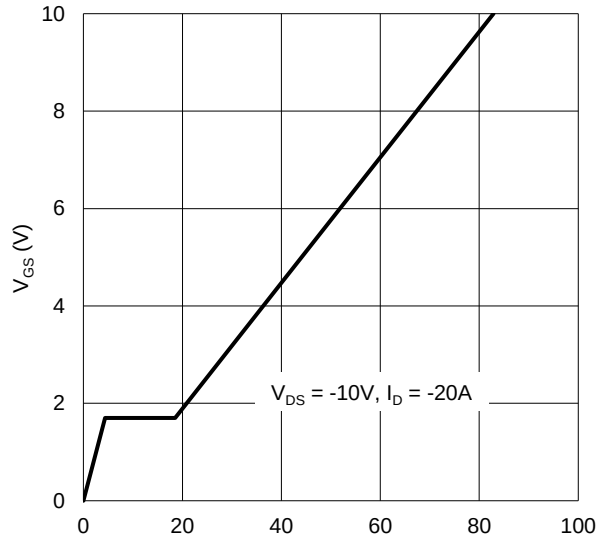


Figure 11. Gate Charge

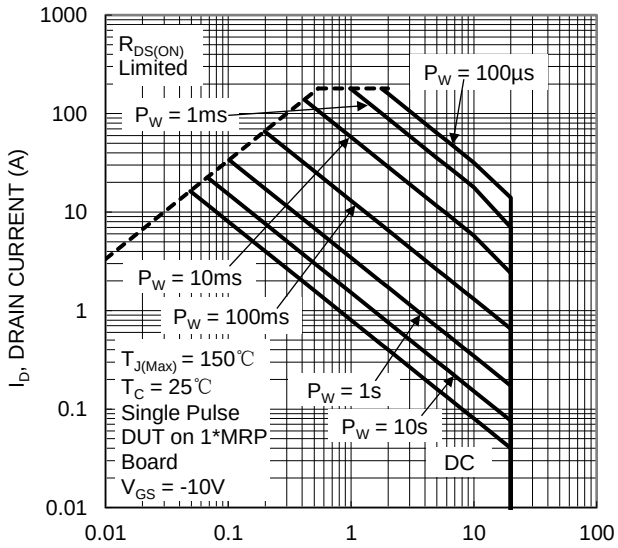


Figure 12. SOA, Safe Operation Area

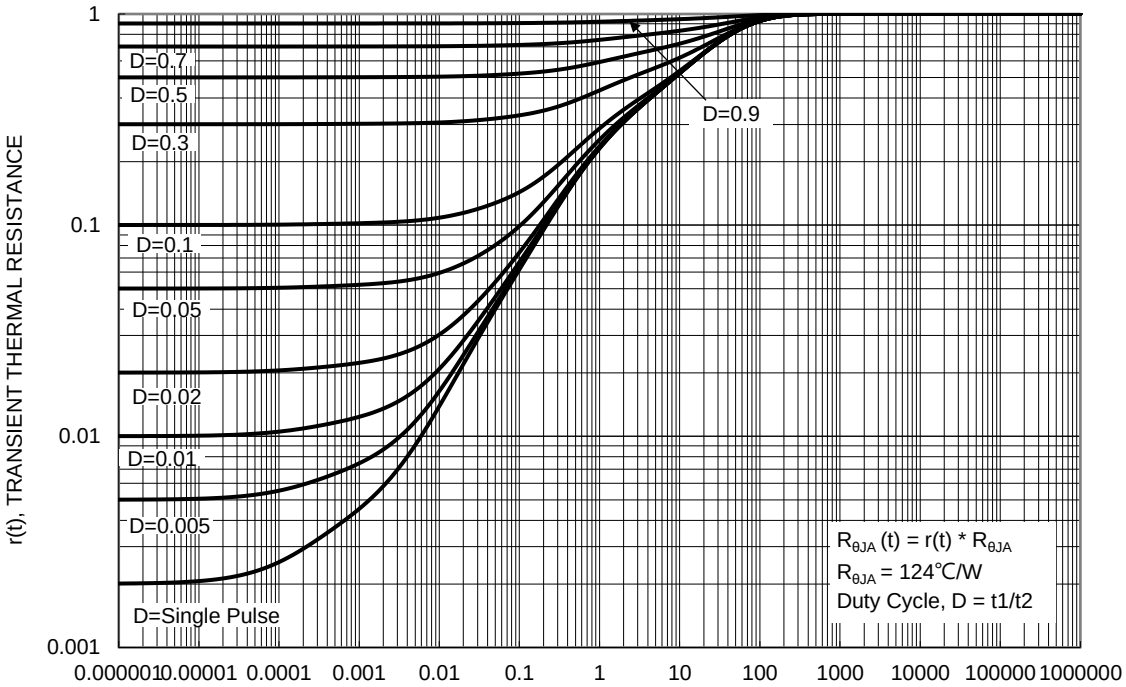
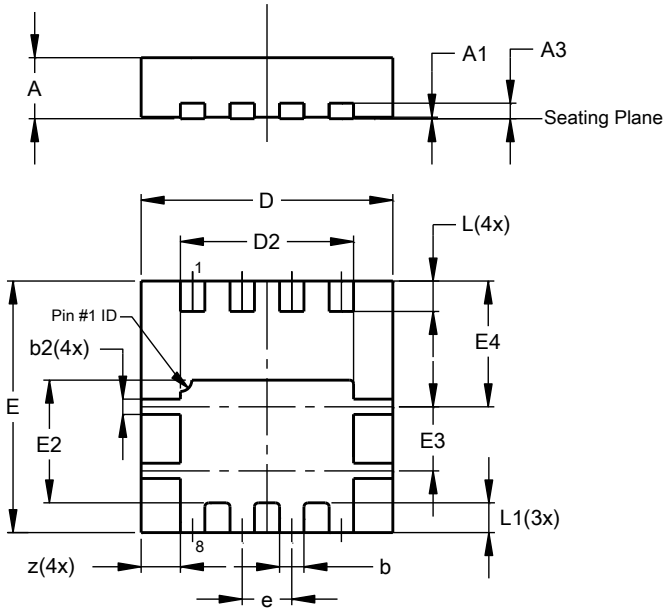


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

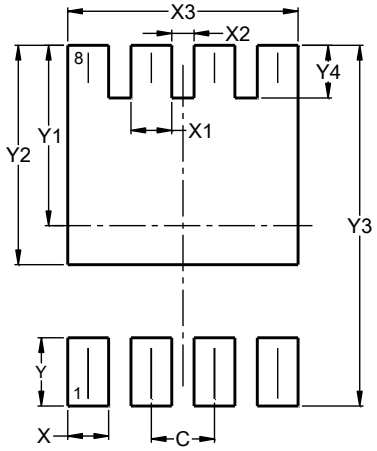
PowerDI3333-8



PowerDI3333-8			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	–	–	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	–	–	0.65
L	0.35	0.45	0.40
L1	–	–	0.39
z	–	–	0.515
All Dimensions in mm			

Suggested Pad Layout

PowerDI3333-8



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	0.420
X2	0.230
X3	2.370
Y	0.700
Y1	1.850
Y2	2.250
Y3	3.700
Y4	0.540