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	9.5mΩ @ V_{GS} = -4.5V	-40A
	12.5mΩ @ V_{GS} = -2.5V	

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.

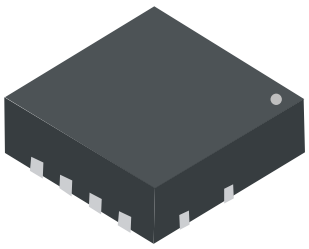
Applications

- Load switches
- Power management functions

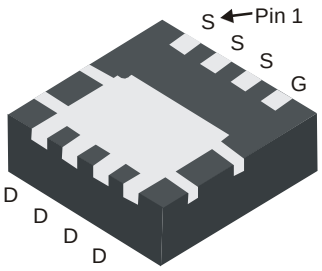
Mechanical Data

- 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
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

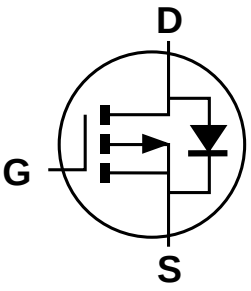
PowerDI3333-8



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}	±10	V
Continuous Drain Current, V_{GS} = -4.5V (Note 6)	T_A = +25°C T_C = +25°C (Note 10)	I_D	-12.7 -40	A
Maximum Continuous Body Diode Forward Current (Note 6)		I_S	-3	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)		I_{DM}	-80	A
Avalanche Current, L= 0.1mH (Note 7)		I_{AS}	-35	A
Avalanche Energy, L= 0.1mH (Note 7)		E_{AS}	64	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	136	°C/W
Total Power Dissipation (Note 6)		P_D	2.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	54	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	4	
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}	-20	—	—	V	V_{GS} = 0V, I_D = -1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.2	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	9.5	mΩ	V_{GS} = -4.5V, I_D = -3.6A
		—	—	12.5		V_{GS} = -2.5V, I_D = -3.6A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -10A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	3350	—	pF	V_{DS} = -10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	527	—		
Reverse Transfer Capacitance	C_{rss}	—	460	—		
Gate Resistance	R_G	—	10.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	50	—	nC	V_{DS} = -10V, I_D = -3.6A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	103	—		
Gate-Source Charge	Q_{gs}	—	6.0	—		
Gate-Drain Charge	Q_{gd}	—	14.4	—		
Turn-On Delay Time	$t_{D(ON)}$	—	9.7	—	ns	V_{DD} = -10V, V_{GS} = -4.5V, R_{GEN} = 4.7Ω, I_D = -3.6A
Turn-On Rise Time	t_R	—	30	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	235	—		
Turn-Off Fall Time	t_F	—	110	—		
Reverse Recovery Time	t_{RR}	—	64	—	ns	I_F = -3.6A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	60	—	nC	

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 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. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.
10. Package limited.

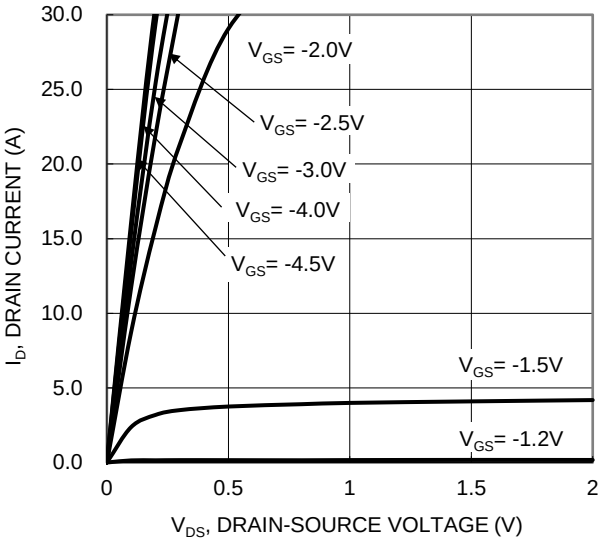


Figure 1. Typical Output Characteristic

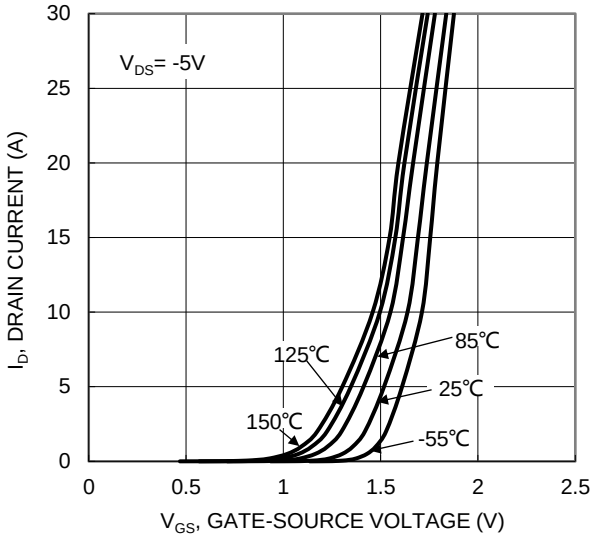


Figure 2. Typical Transfer Characteristic

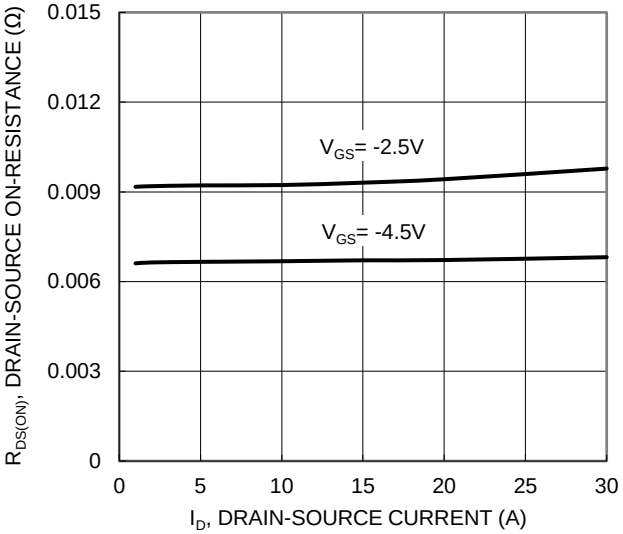


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

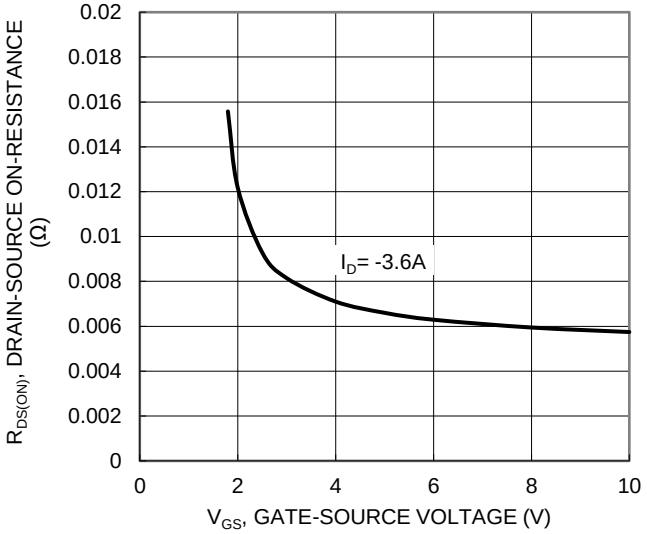


Figure 4. Typical Transfer Characteristic

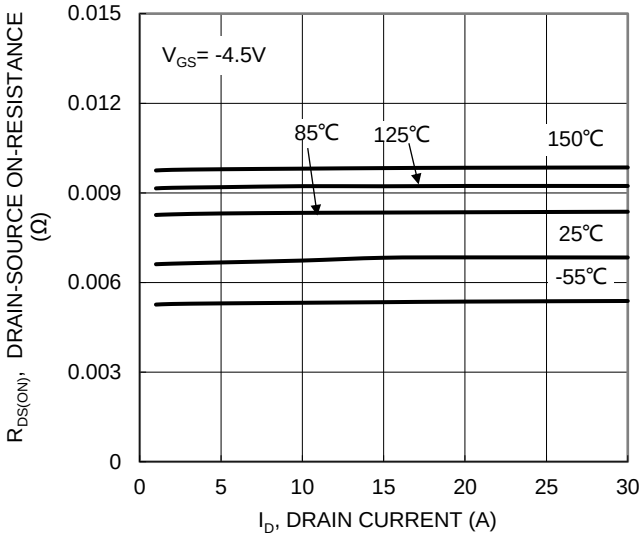


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

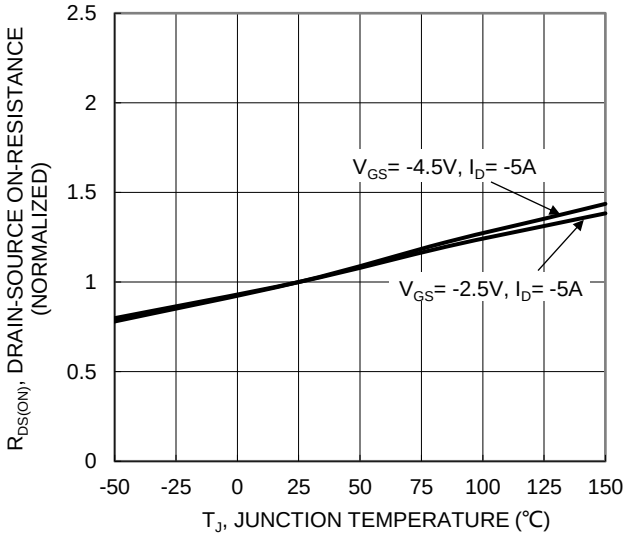


Figure 6. On-Resistance Variation with Junction Temperature

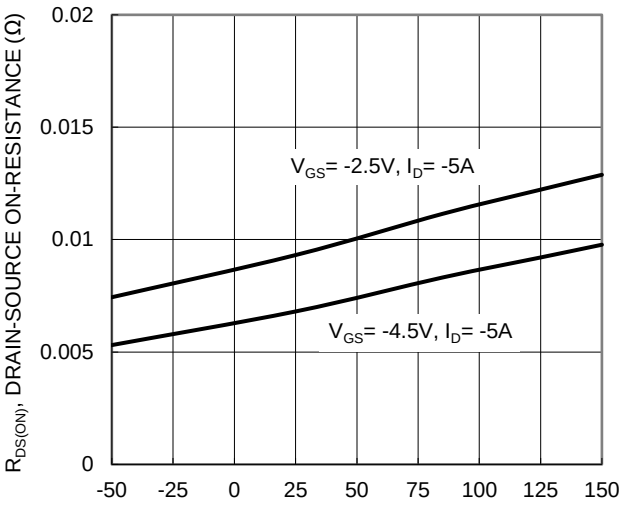


Figure 7. On-Resistance Variation with Junction Temperature

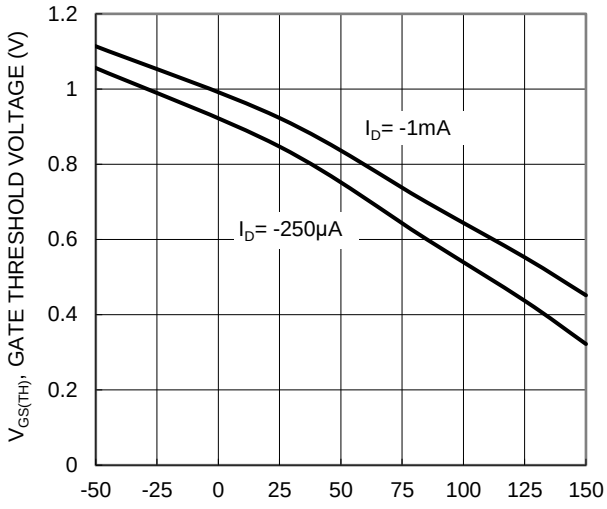


Figure 8. Gate Threshold Variation vs. Junction Temperature

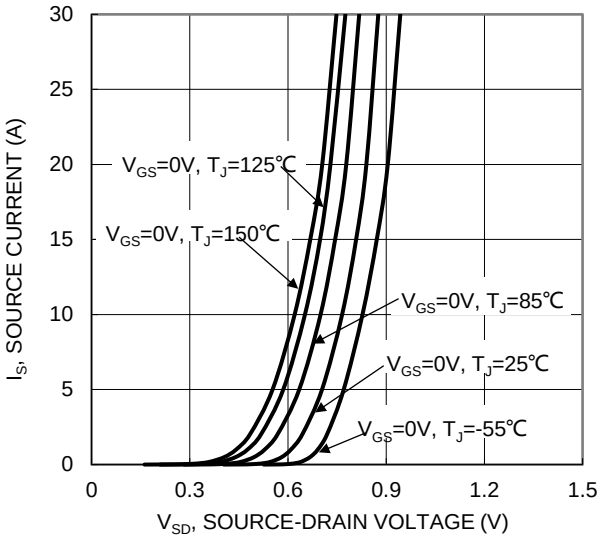


Figure 9. Diode Forward Voltage vs. Current

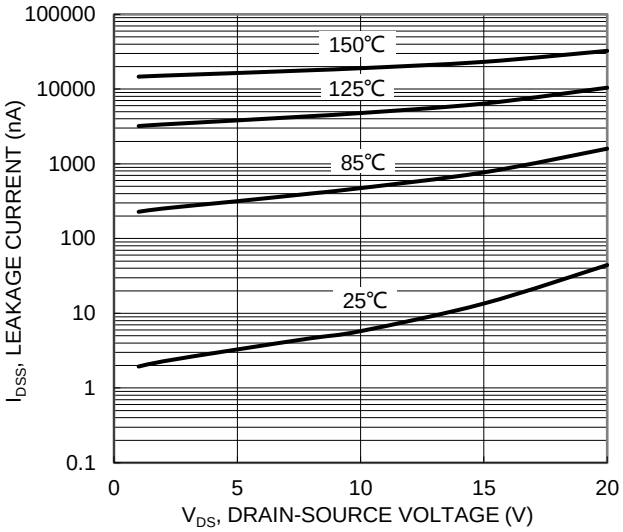


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

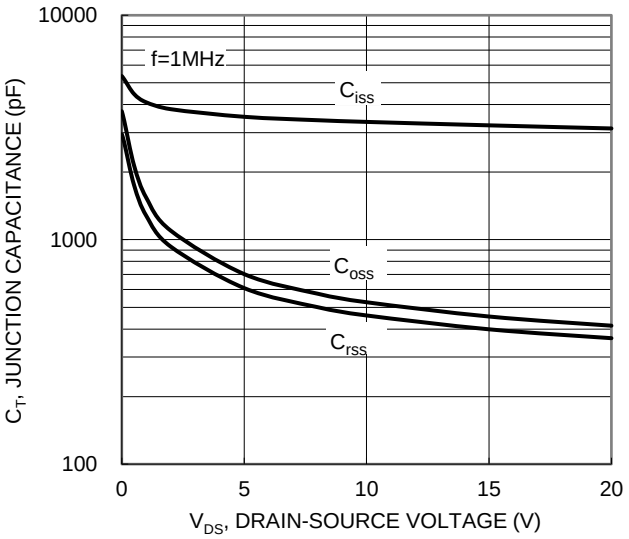


Figure 11. Typical Junction Capacitance

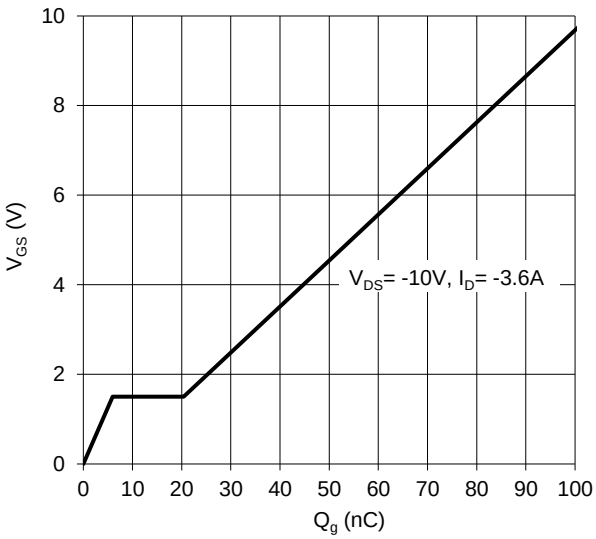


Figure 12. Gate Charge

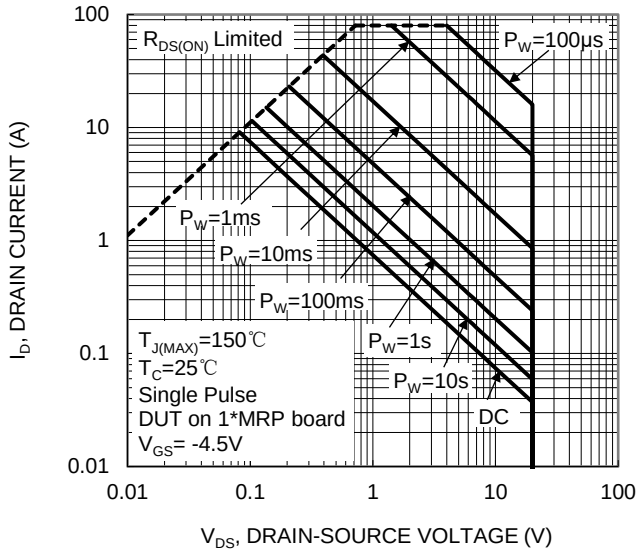


Figure 13. SOA, Safe Operation Area

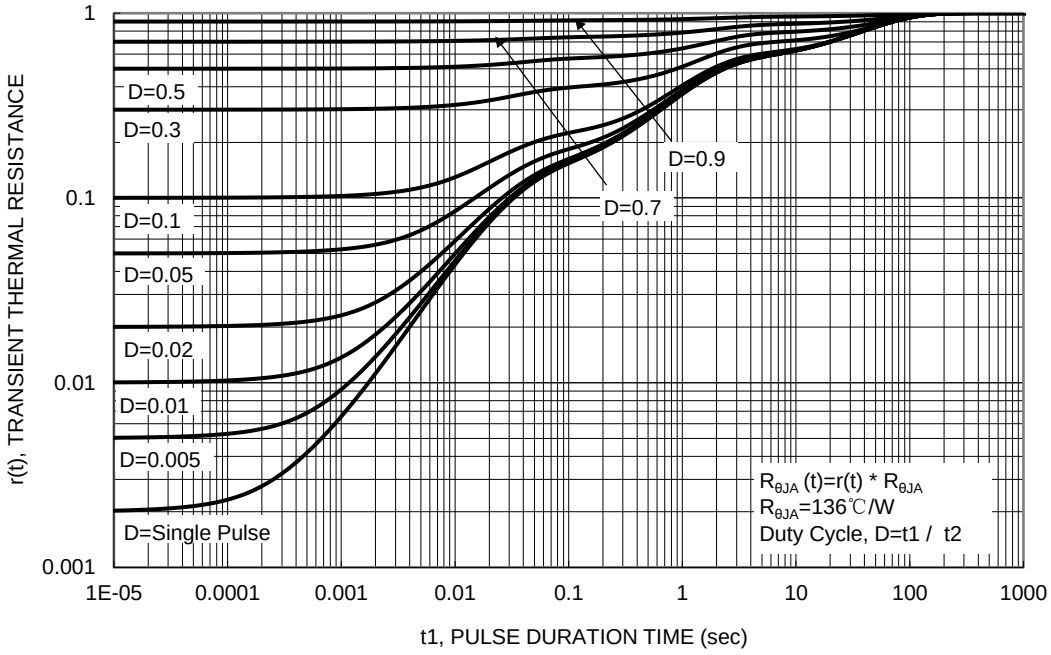
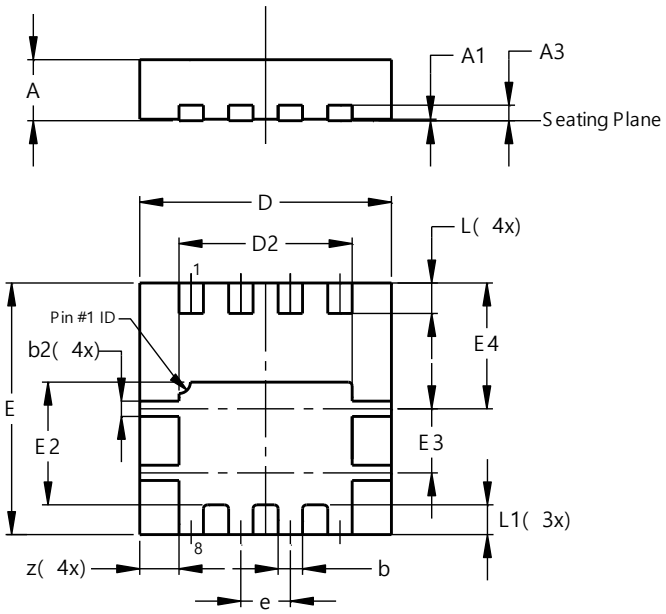


Figure 14. Transient Thermal Resistance

Package Outline Dimensions

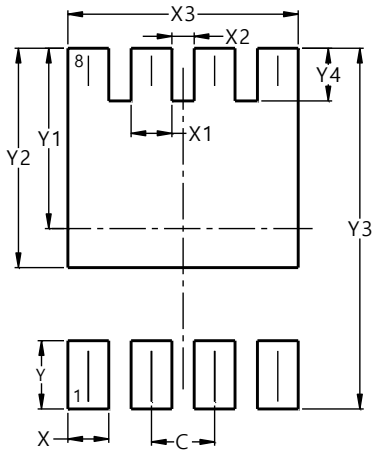
PowerDI3333-8



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