



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
-20V	5.5mΩ @V _{GS} = -4.5V	-71A
	7.5mΩ @V _{GS} = -2.5V	-60A

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

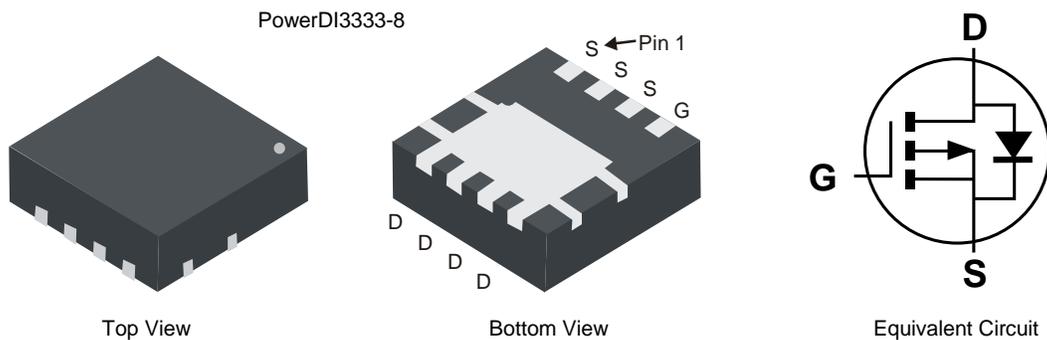
This MOSFET is designed to minimize on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

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 Lead-Frame; Solderable per MIL-STD-202, Method 208 
- Weight: 0.030 grams (Approximate)



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 (Note 7) V _{GS} = -4.5V	Steady State	T _C = +25°C T _C = +70°C	I _D	-71 -56	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	-110	A
Maximum Continuous Body Diode Forward Current (Note 5)			I _S	-2	A
Avalanche Current L = 0.1mH (Note 8)			I _{AS}	-37	A
Avalanche Energy L = 0.1mH (Note 8)			E _{AS}	-71	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	1.67	W
Thermal Resistance, Junction to Ambient (Note 5)		R _{θJA}	75	°C/W
Total Power Dissipation (Note 6)	T _C = +25°C	P _D	3.0	W
Thermal Resistance, Junction to Ambient (Note 6)		R _{θJA}	41	°C/W
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	3.0	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -16V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 8V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	4.7	5.5	m Ω	$V_{GS} = -4.5V, I_D = -15A$
		—	5.8	7.5		$V_{GS} = -2.5V, I_D = -10A$
		—	7.8	12		$V_{GS} = -1.8V, I_D = -1A$
		—	11	17		$V_{GS} = -1.5V, I_D = -1A$
		—	—	—		—
Diode Forward Voltage	V_{SD}	—	-0.7	-1.1	V	$V_{GS} = 0V, I_S = -10A$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	5392	—	pF	$V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz$
Output Capacitance	C_{oss}	—	608	—		
Reverse Transfer Capacitance	C_{rss}	—	564	—		
Gate Resistance	R_G	—	2.05	—	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$
Total Gate Charge ($V_{GS} = -4.5V$)	Q_g	—	75	—	nC	$V_{DD} = -10V, I_D = -20A$
Total Gate Charge ($V_{GS} = -10V$)	Q_g	—	164	—		
Gate-Source Charge	Q_{gs}	—	6.9	—		
Gate-Drain Charge	Q_{gd}	—	19.8	—		
Turn-On Delay Time	$t_{D(on)}$	—	9	—	ns	$V_{DD} = -10V, V_{GEN} = -4.5V, R_{GEN} = 1\Omega, I_D = -10A$
Turn-On Rise Time	t_R	—	24	—		
Turn-Off Delay Time	$t_{D(off)}$	—	69	—		
Turn-Off Fall Time	t_F	—	107	—		
Reverse Recovery Time	t_{RR}	—	54	—	ns	$I_F = -10A, di/dt = 100A/\mu s$
Reverse Recovery Charge	Q_{RR}	—	55	—	nC	

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

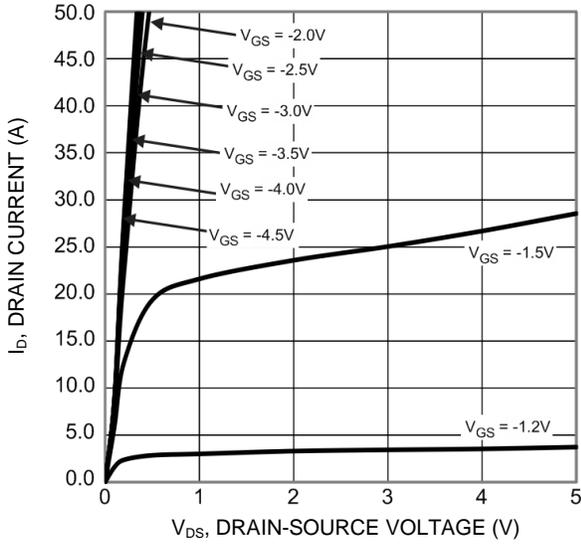


Figure 1. Typical Output Characteristic

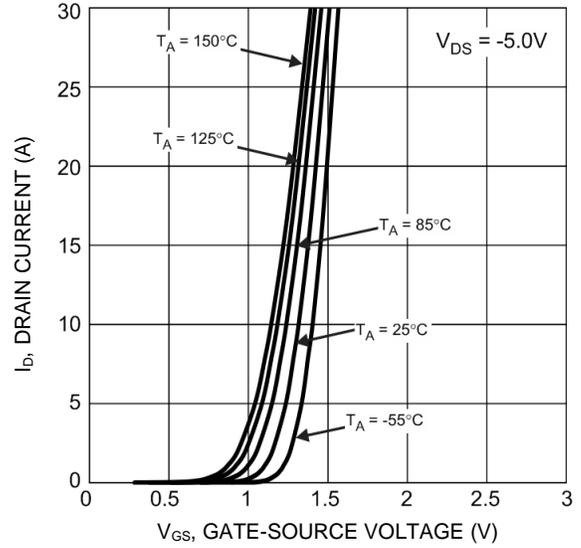


Figure 2. Typical Transfer Characteristic

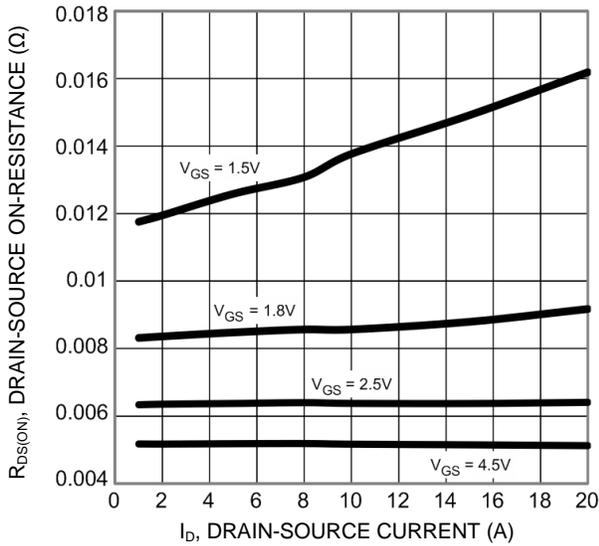


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

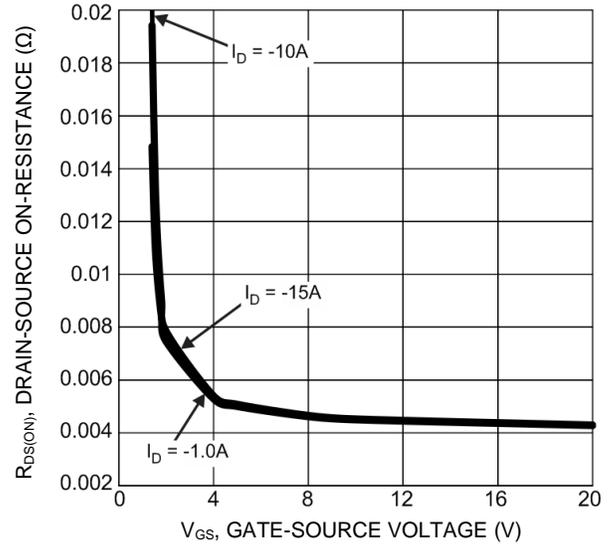


Figure 4. Typical Transfer Characteristic

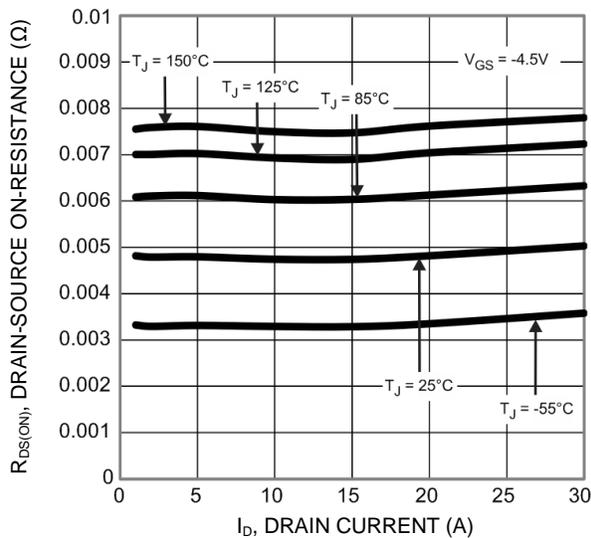


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

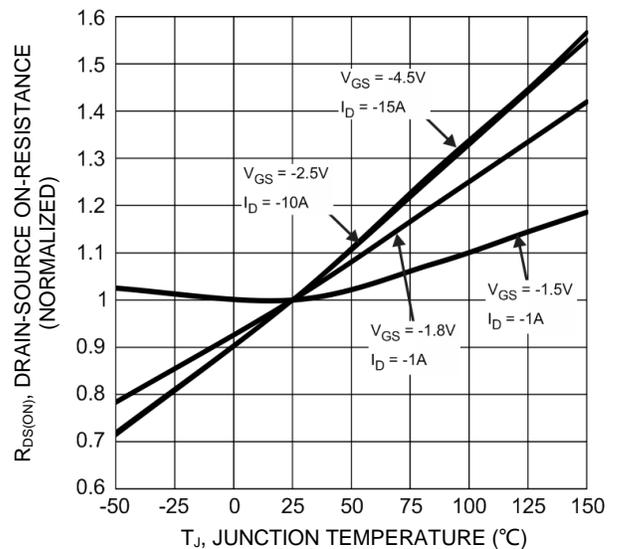


Figure 6. On-Resistance Variation with Junction Temperature

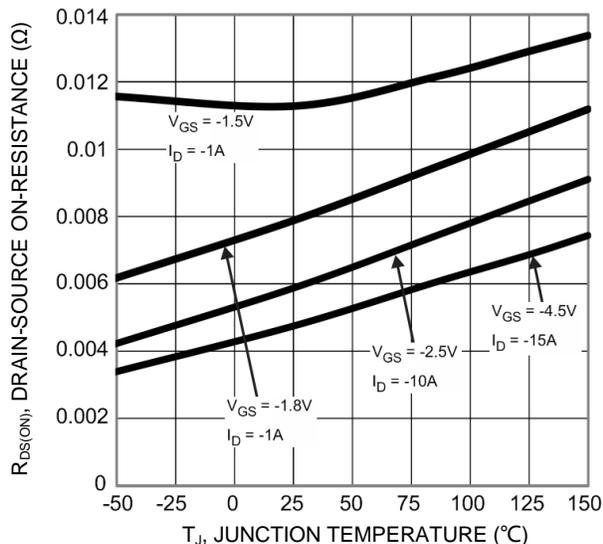


Figure 7. On-Resistance Variation with Junction Temperature

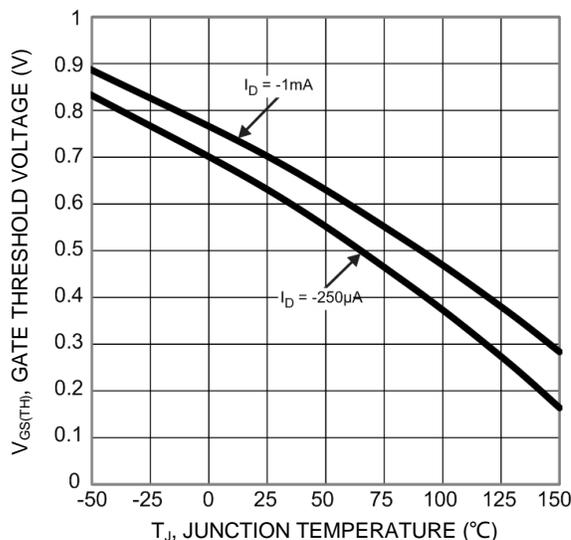


Figure 8. Gate Threshold Variation vs. Junction Temperature

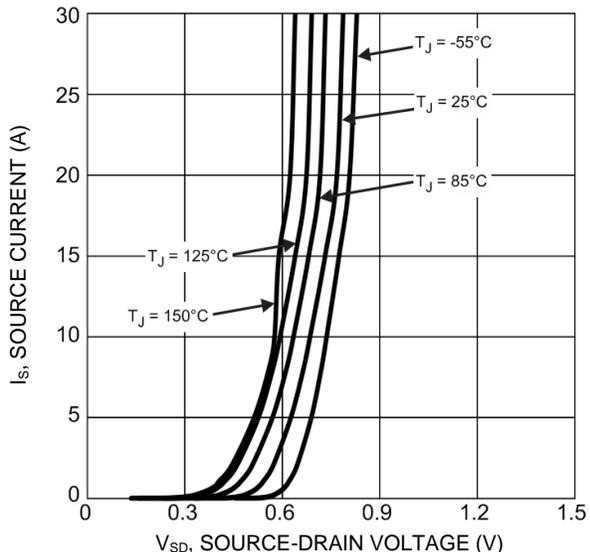


Figure 9. Diode Forward Voltage vs. Current

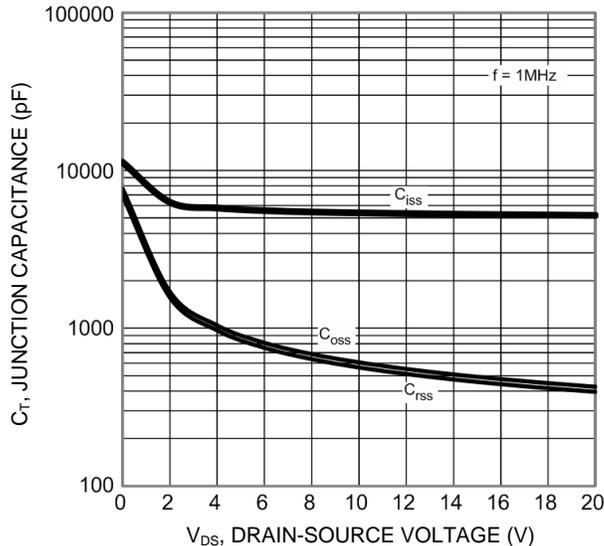


Figure 10. Typical Junction Capacitance

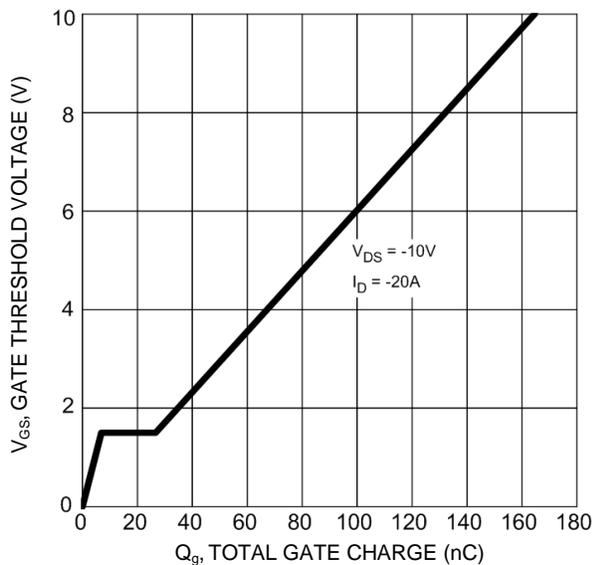


Figure 11. Gate Charge

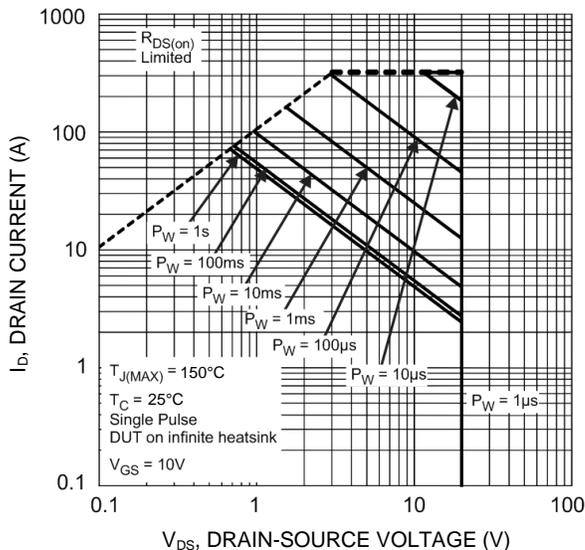


Figure 12. SOA, Safe Operation Area

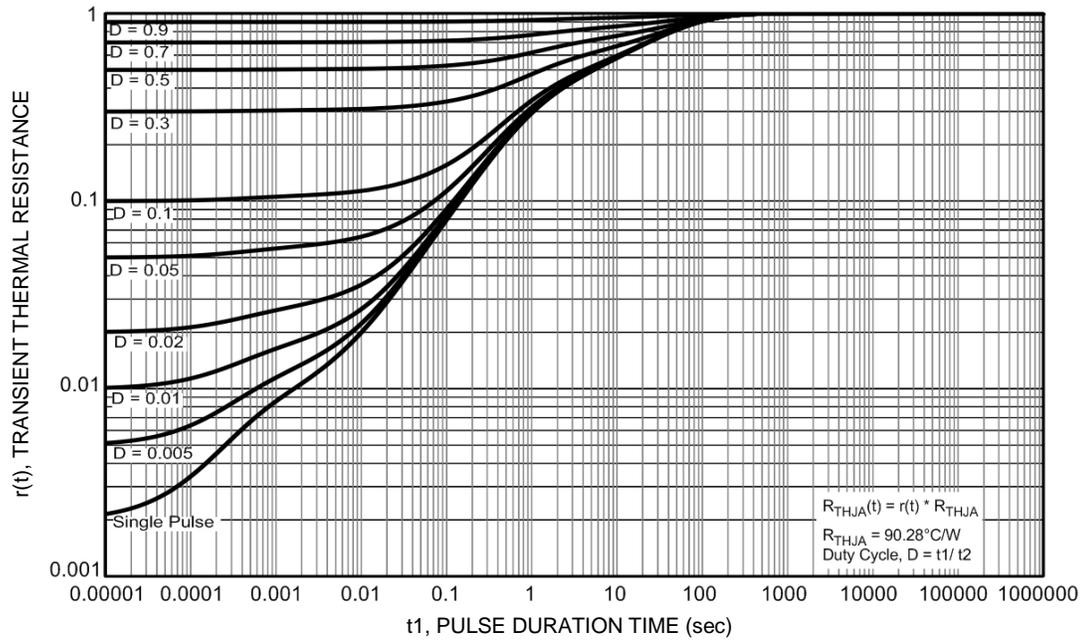
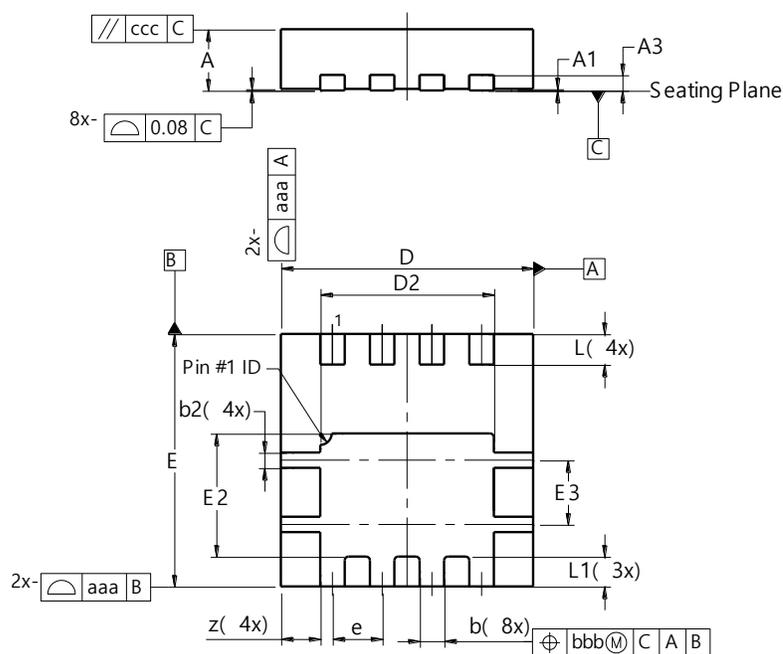


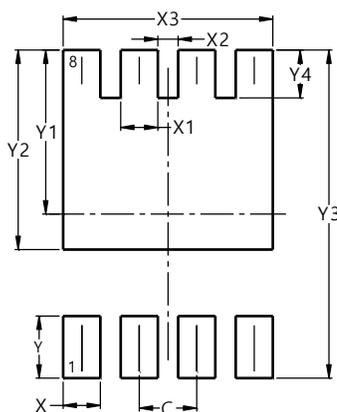
Figure 13. Transient Thermal Resistance

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	–	–	0.20
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
e	–	–	0.65
L	0.35	0.45	0.40
L1	–	–	0.39
z	–	–	0.515
aaa	0.25		
bbb	0.10		
ccc	0.10		
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