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 $T_C = +25°C$
65V	20mΩ @ V_{GS} = 10V	36A
	23mΩ @ V_{GS} = 4.5V	33.6A

Features and Benefits

- 100% Unclamped Inductive Switching, Test in Production – Ensures More Reliable And Robust End Application
- 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
- ESD Protected Gate

Description and Applications

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.

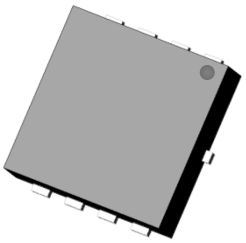
- Motor Control
- DC-DC Converters
- Power Management

Mechanical Data

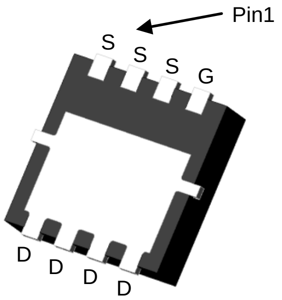
- Case: PowerDI®3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (Approximate)

ESD PROTECTED

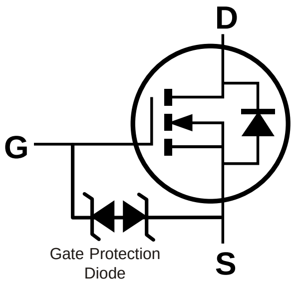
PowerDI3333-8 (Type UX)



Top View



Bottom View



Internal Schematic

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	65	V
Gate-Source Voltage		V_{GSS}	±16	V
Continuous Drain Current (Note 5) V_{GS} = 10V	T_C = +25°C	I_D	36	A
	T_C = +70°C		29	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I_{DM}	140	A
Maximum Continuous Body Diode Forward Current (Note 5)		I_S	1.7	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)		I_{SM}	140	A
Avalanche Current, L = 0.1mH		I_{AS}	19	A
Avalanche Energy, L = 0.1mH		E_{AS}	18	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	2.12	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	59	°C/W
Total Power Dissipation (Note 6)	T_C = +25°C	P_D	39.06	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	3.2	°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 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	65	—	—	V	V_{GS} = 0V, I_D = 10mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±12.8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	2.3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	13	20	mΩ	V_{GS} = 10V, I_D = 6A
		—	17.1	23		V_{GS} = 4.5V, I_D = 4A
Diode Forward Voltage	V_{SD}	—	0.7	1	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	891	—	pF	V_{DS} = 30V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	223	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	29	—	pF	
Gate Resistance	R_g	—	1.57	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	7.5	—	nC	V_{DS} = 30V, I_D = 6A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	15.3	—	nC	
Gate-Source Charge	Q_{gs}	—	1.8	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.0	—	ns	V_{GS} = 10V, V_{DS} = 30V, R_g = 3.3Ω, I_D = 6A
Turn-On Rise Time	t_R	—	5.9	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	11.7	—	ns	
Turn-Off Fall Time	t_F	—	3.3	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	21.1	—	ns	I_F = 6A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	11.9	—	nC	

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
6. Thermal resistance from junction to soldering point (on the exposed drain pad)
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

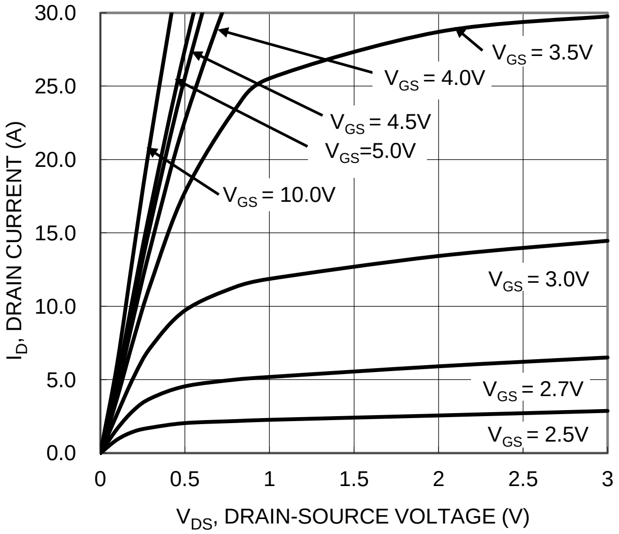


Figure 1. Typical Output Characteristic

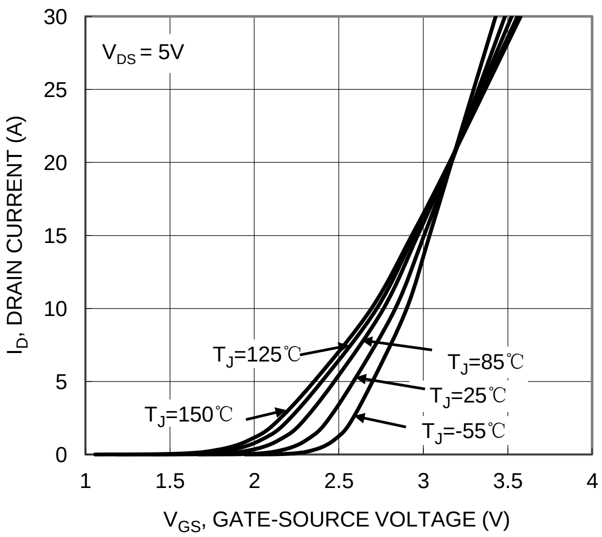


Figure 2. Typical Transfer Characteristic

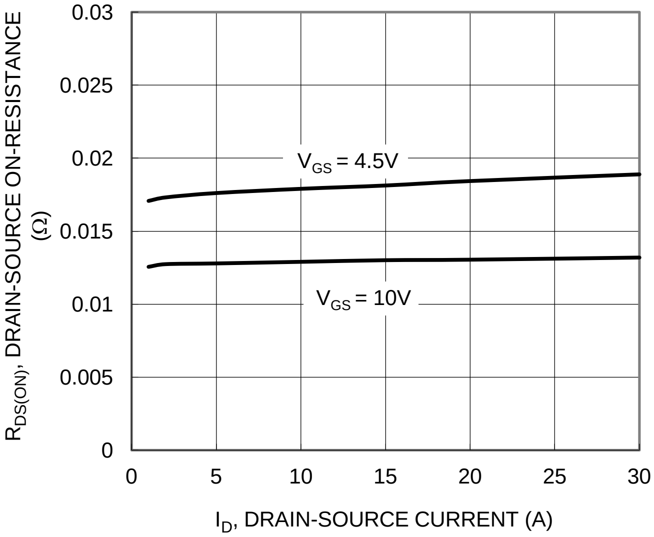


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

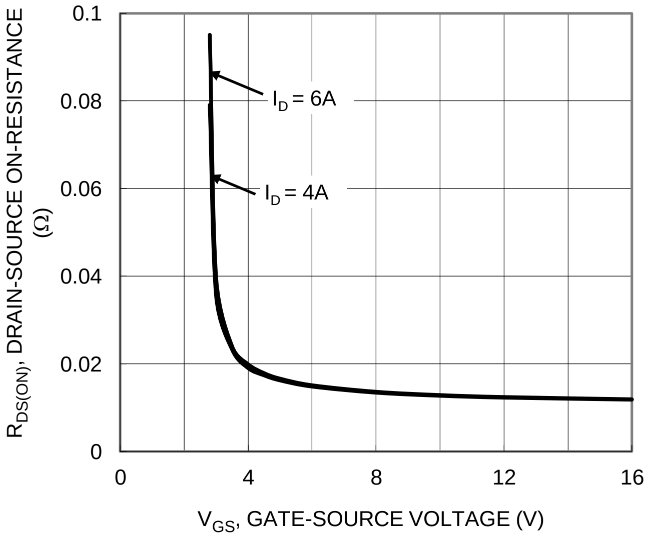


Figure 4. Typical Transfer Characteristic

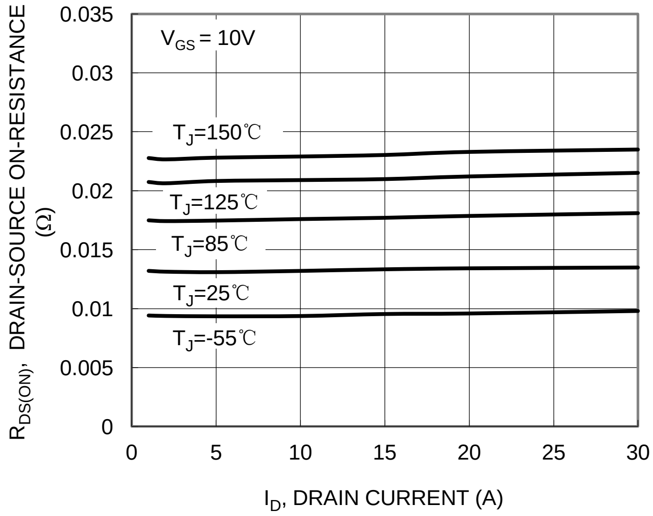


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

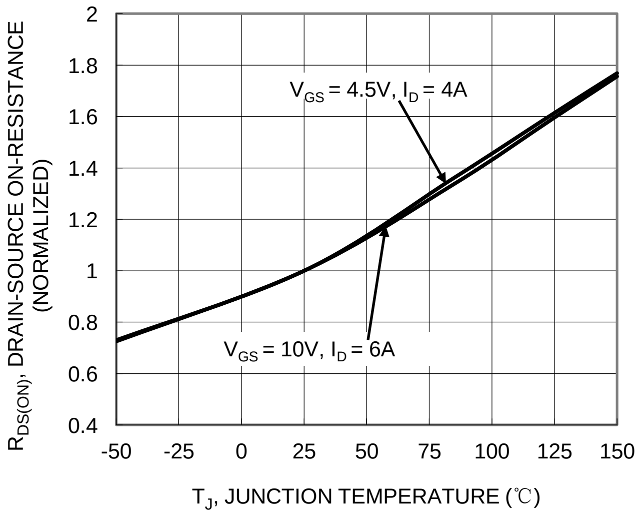


Figure 6. On-Resistance Variation with Junction Temperature

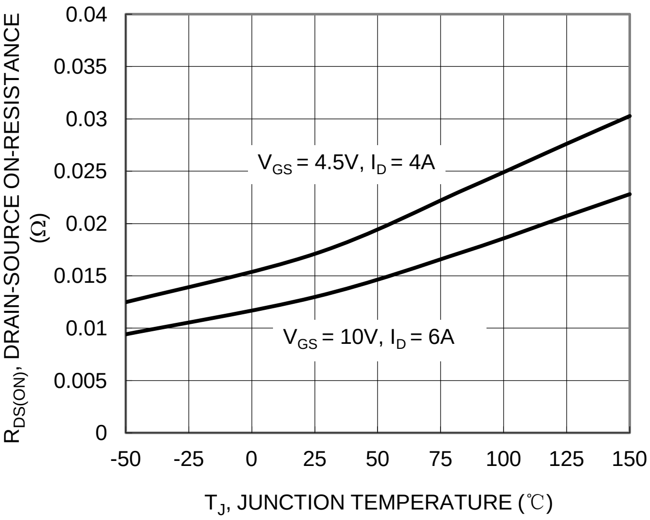


Figure 7. On-Resistance Variation with Junction Temperature

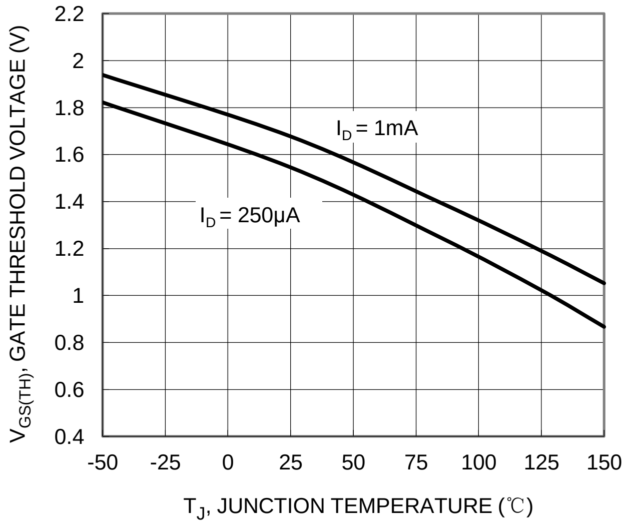


Figure 8. Gate Threshold Variation vs. Junction Temperature

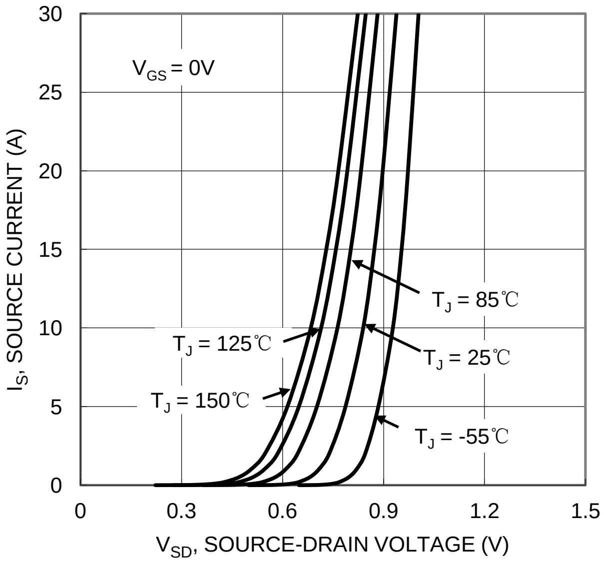


Figure 9. Diode Forward Voltage vs. Current

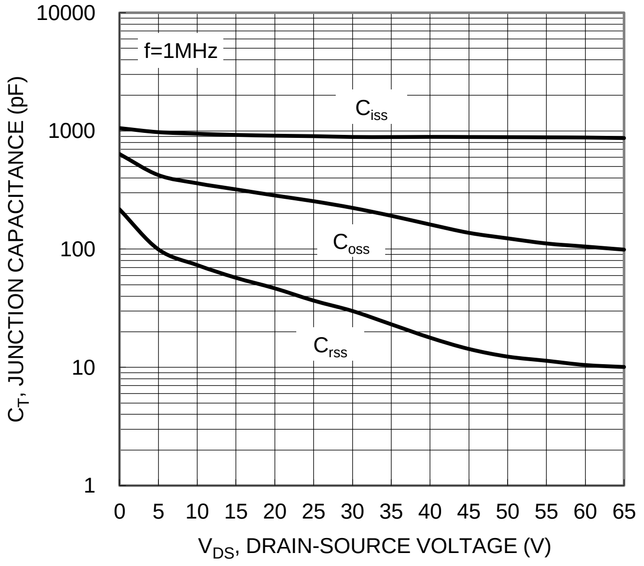


Figure 10. Typical Junction Capacitance

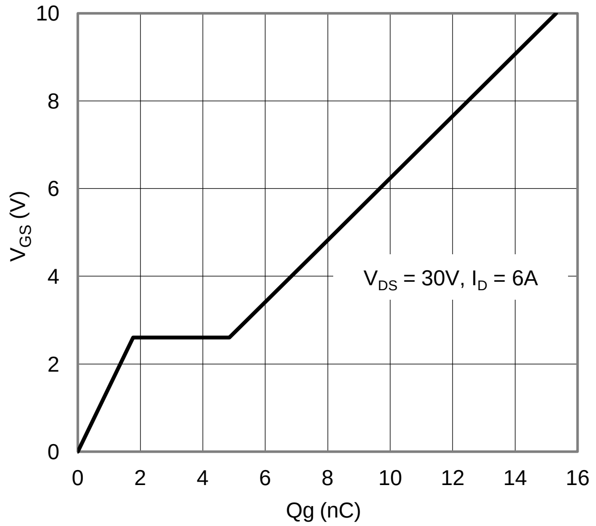


Figure 11. Gate Charge

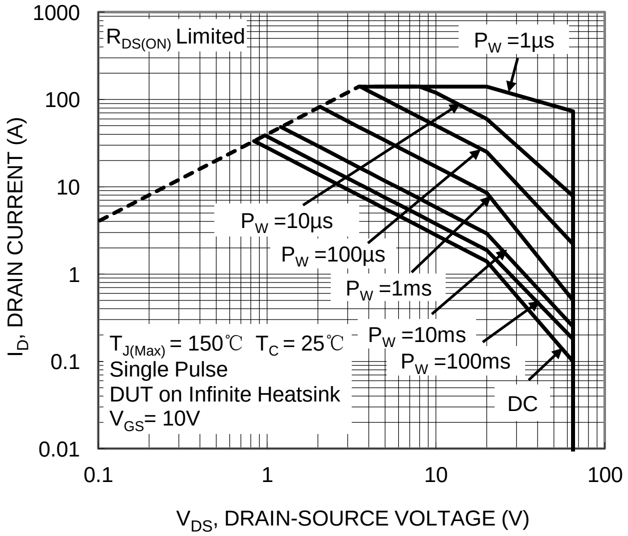


Figure 12. SOA, Safe Operation Area

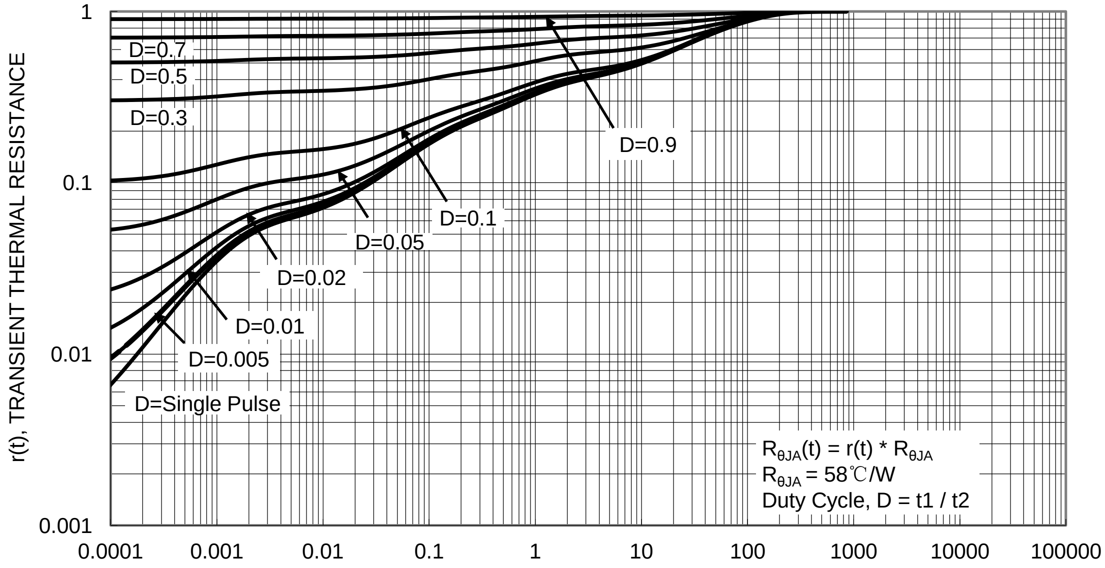
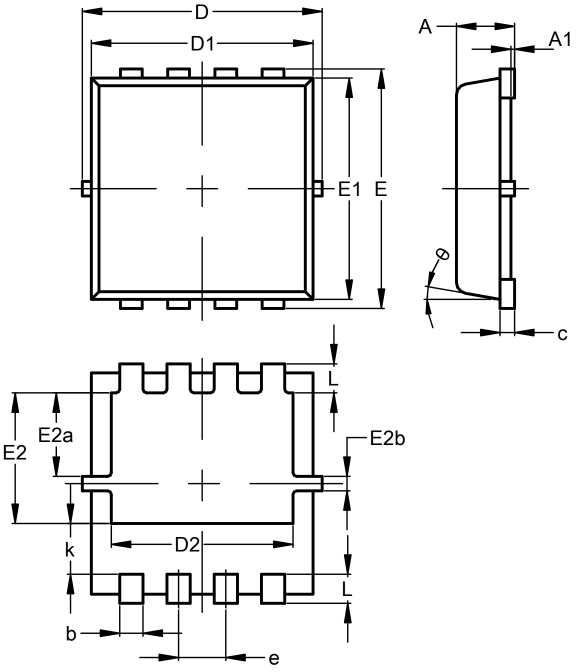


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

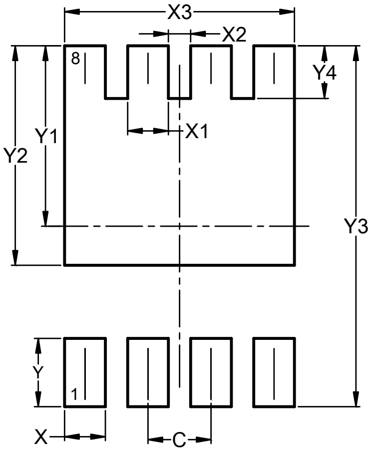
PowerDI3333-8 (Type UX)



PowerDI3333-8 (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
E2a	0.95	1.35	1.15
E2b	0.10	0.30	0.20
e	0.65 BSC		
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 (Type UX)



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