



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
-30V	42mΩ @ V _{GS} = -10V	-19.9A
	65mΩ @ V _{GS} = -4.5V	-16A

Features and Benefits

- 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 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:

- Backlighting
- Power management functions
- DC-DC converters

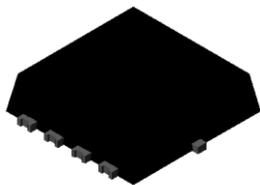
Mechanical Data

- 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: 0.072 grams (Approximate)

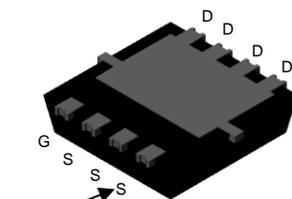


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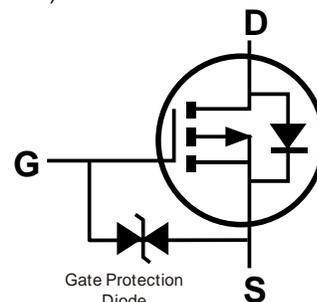
PowerDI3333-8 (SWP) (Type UX)



Top View



Bottom View



Equivalent Circuit

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-30	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 6) V _{GS} = -10V	Steady State	T _A = +25°C	I _D	-5.7	A
		T _A = +70°C		-4.6	
Continuous Drain Current (Note 7) V _{GS} = -10V	Steady State	T _C = +25°C	I _D	-19.9	A
		T _C = +70°C		-15.9	
Maximum Continuous Body Diode Forward Current (Note 7)			I _S	-1.3	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	-76	A
Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%)			I _{SM}	-76	A
Avalanche Current (Note 8) L = 1mH			I _{AS}	-7.8	A
Avalanche Energy (Note 8) L = 1mH			E _{AS}	30.8	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	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	135	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	2.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	61	°C/W
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	5	°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 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	-30	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = -24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	-1.0	—	-2.1	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	25	42	mΩ	V _{GS} = -10V, I _D = -4.9A
		—	43	65		V _{GS} = -4.5V, I _D = -3.7A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.2	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	782	—	pF	V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	110	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	74	—	pF	
Gate Resistance	R _g	—	10.4	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	6.6	—	nC	V _{DS} = -15V, I _D = -4.9A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	13.6	—	nC	
Gate-Source Charge	Q _{gs}	—	2.1	—	nC	
Gate-Drain Charge	Q _{gd}	—	2.7	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	4.1	—	ns	V _{DD} = -15V, V _{GS} = -10V, I _D = -4.9A, R _G = 6Ω
Turn-On Rise Time	t _R	—	6.1	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	24.6	—	ns	
Turn-Off Fall Time	t _F	—	13.1	—	ns	
Reverse Recovery Time	t _{RR}	—	12.7	—	ns	I _S = -11.5A, dI/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	4.8	—	nC	

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch 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.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

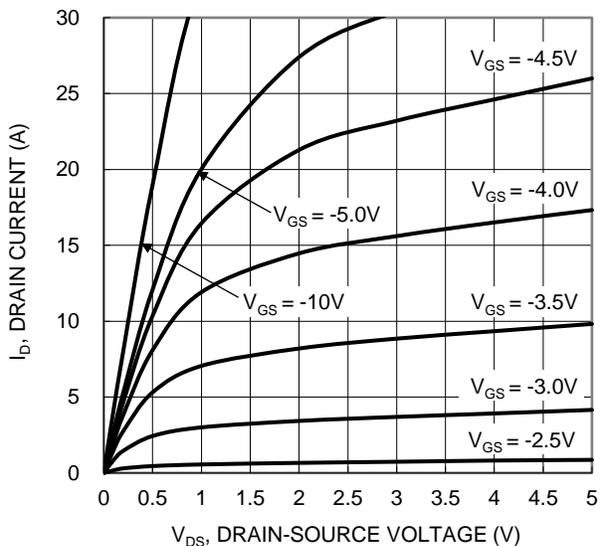


Figure 1. Typical Output Characteristic

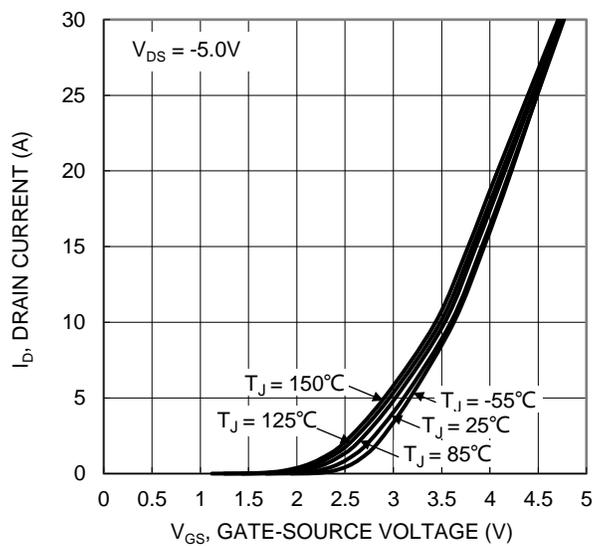


Figure 2. Typical Transfer Characteristic

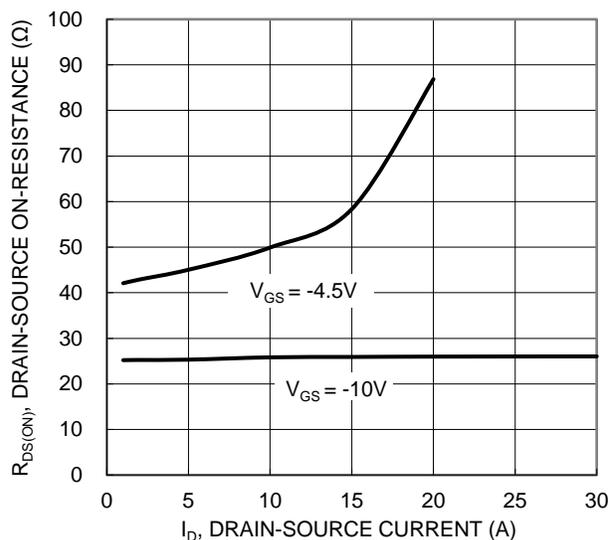


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

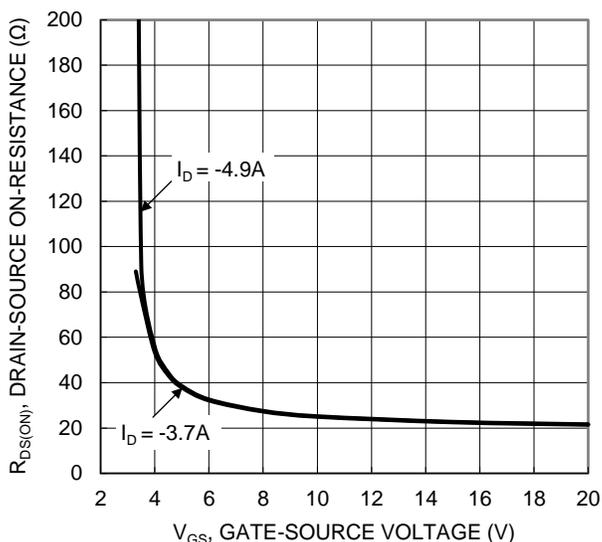


Figure 4. Typical Transfer Characteristic

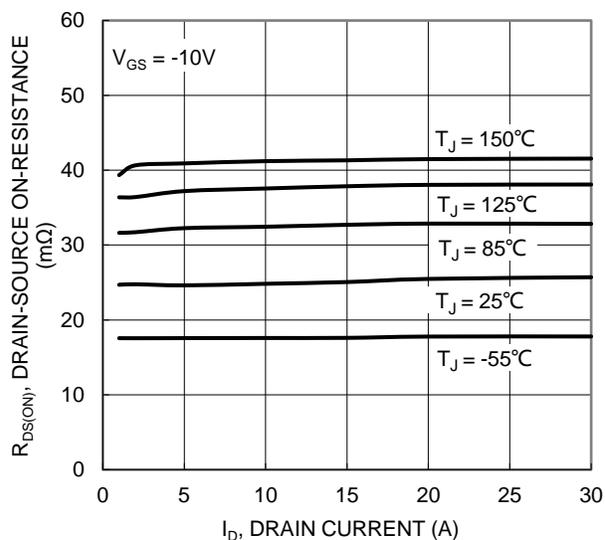


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

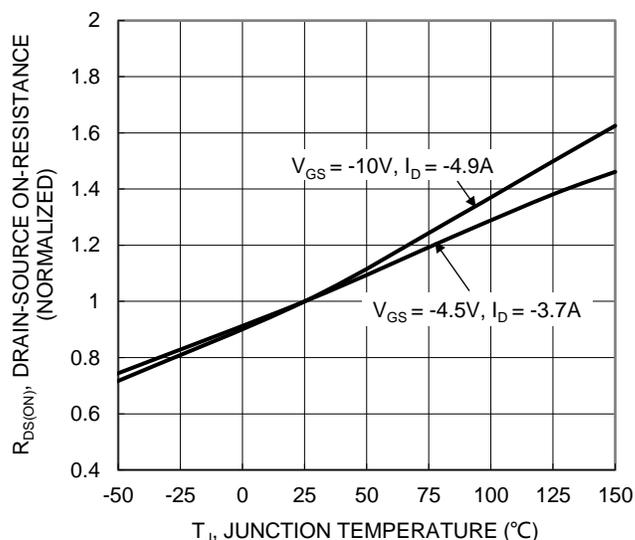
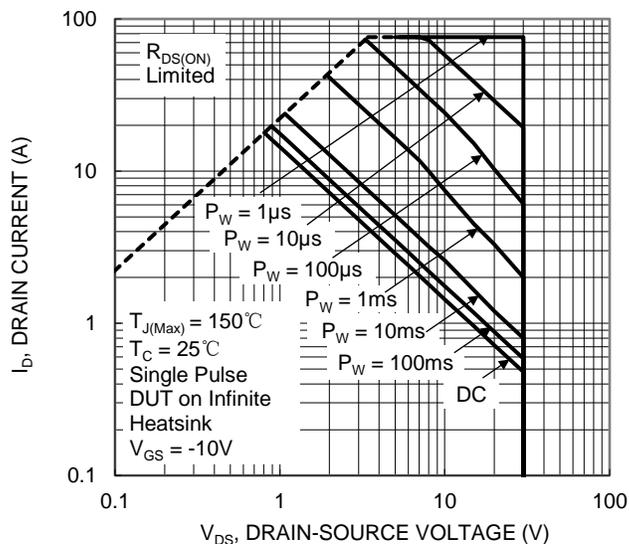
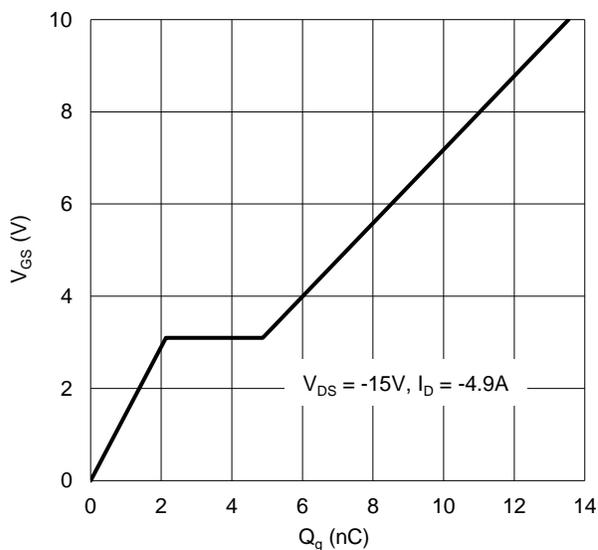
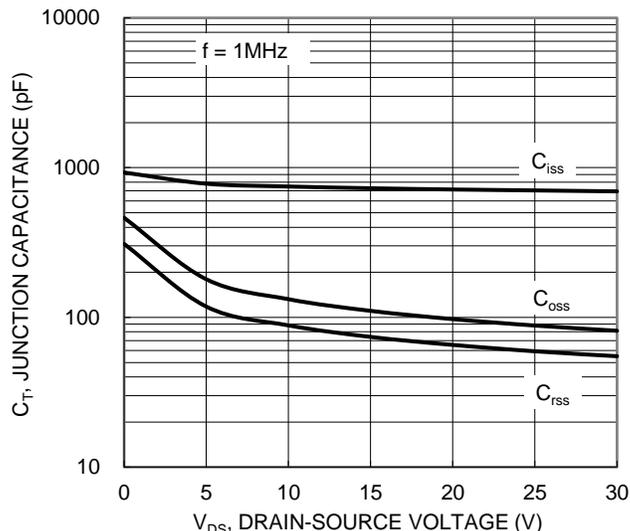
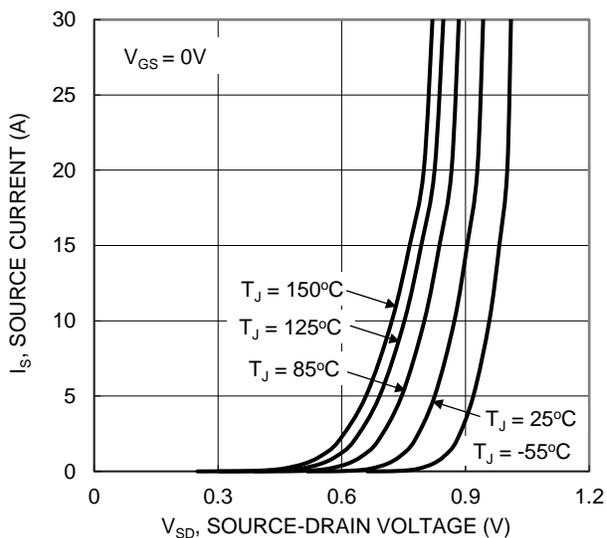
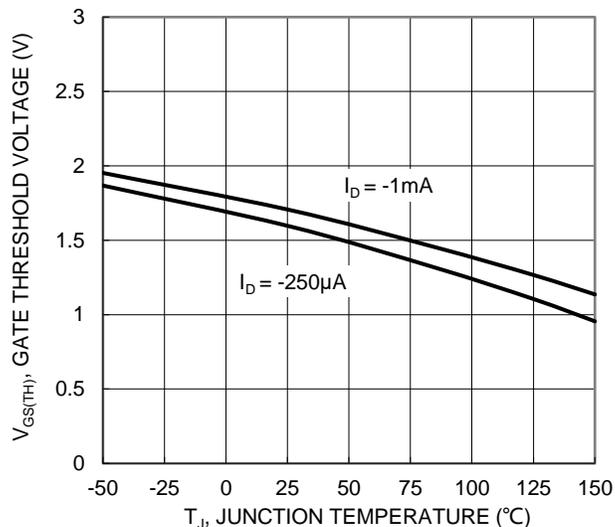
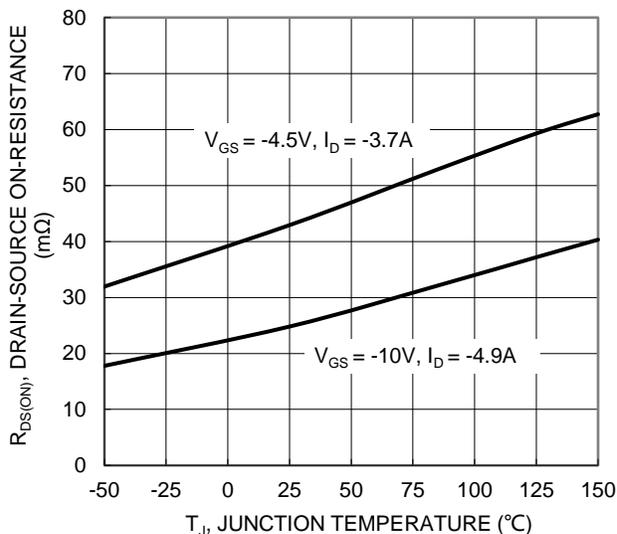


Figure 6. On-Resistance Variation with Temperature



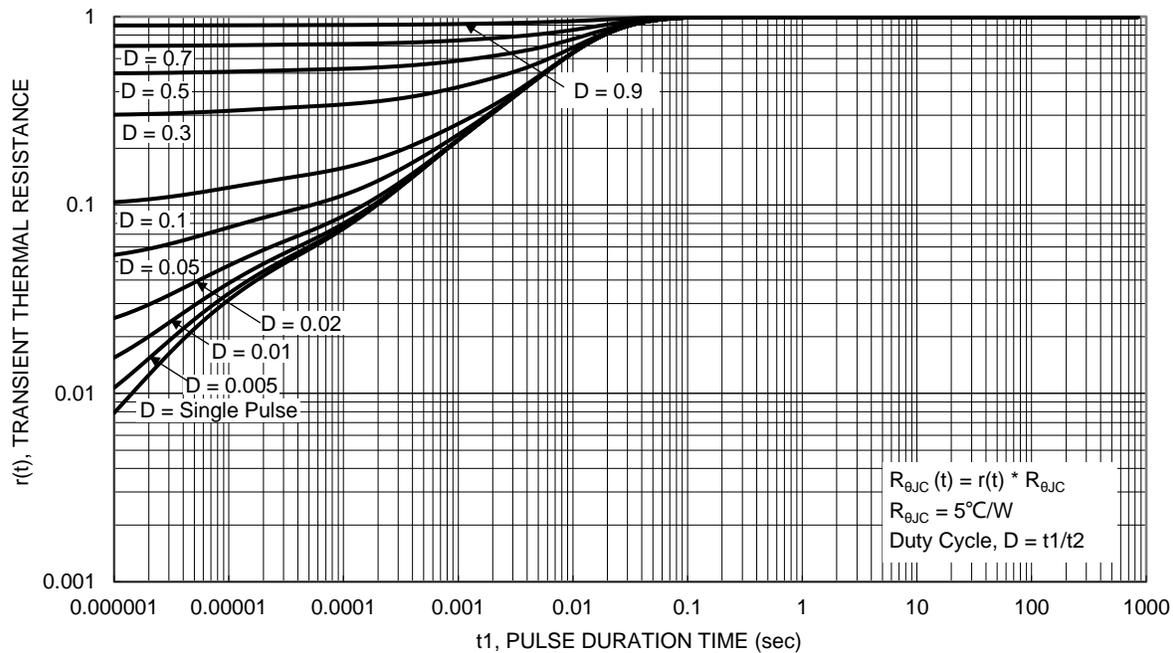
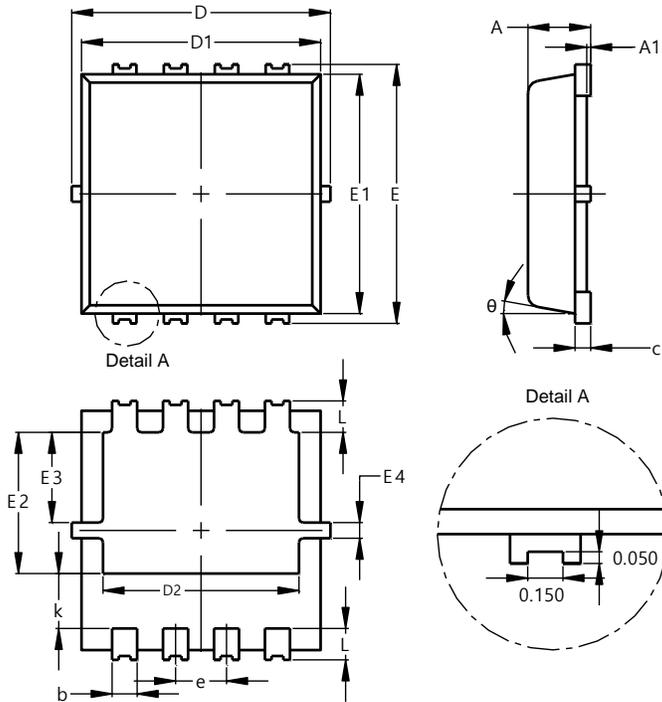


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

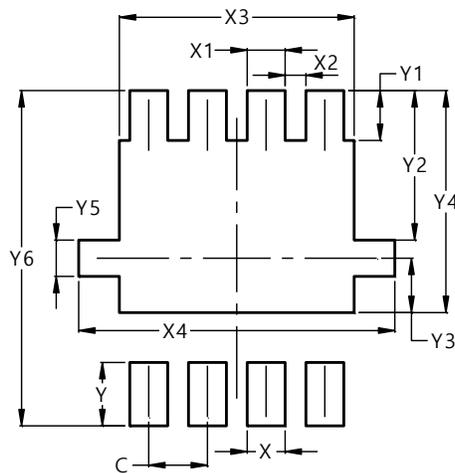
PowerDI3333-8 (SWP) (Type UX)



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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