



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 <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>c</sub> = +25°C
-30V	20mΩ @ V <sub>GS</sub> = -10V	-30A
	29mΩ @ V <sub>GS</sub> = -5V	

## Features

- Low R<sub>DS(ON)</sub> – 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

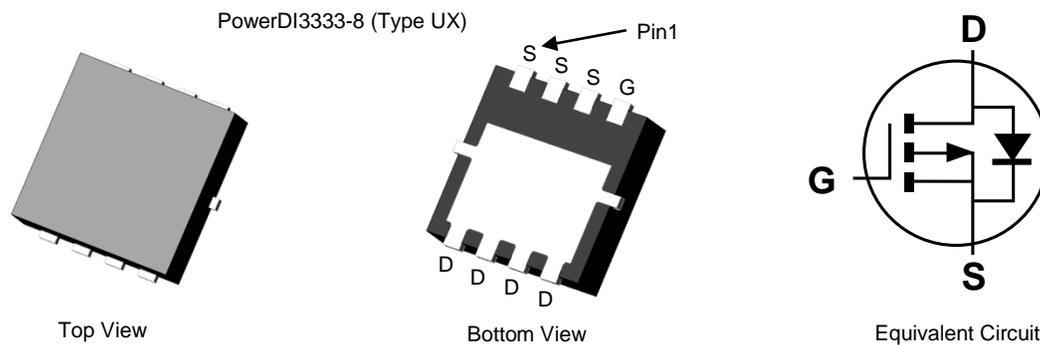
## Description and Applications

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:

- General-purpose interfacing switches
- Power management functions

## Mechanical Data

- Package: PowerDI<sup>®</sup>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 
- Weight: 0.03 grams (Approximate)



**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	-30	V	
Gate-Source Voltage	V <sub>GSS</sub>	±25	V	
Continuous Drain Current, V <sub>GS</sub> = -10V (Note 6)	I <sub>D</sub>	T <sub>A</sub> = +25°C	-8.7	A
		T <sub>A</sub> = +70°C	-7.0	
Continuous Drain Current, V <sub>GS</sub> = -10V (Note 7)	I <sub>D</sub>	T <sub>C</sub> = +25°C	-30	A
		T <sub>C</sub> = +70°C	-25	
Maximum Continuous Body Diode Forward Current (Note 7)	I <sub>S</sub>	-3.6	A	
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	-80	A	
Avalanche Current, L = 0.3mH (Note 8)	I <sub>AS</sub>	-17.5	A	
Avalanche Energy, L = 0.3mH (Note 8)	E <sub>AS</sub>	64	mJ	

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.9	W	
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady State	137	°C/W
Total Power Dissipation (Note 6)		P <sub>D</sub>	2.3	
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady State	55	°C/W
Thermal Resistance, Junction to Case (Note 7)		R <sub>θJC</sub>	3.5	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1	µA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±25V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 9)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.0	—	-2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	—	20	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -8A
		—	—	29		V <sub>GS</sub> = -5V, I <sub>D</sub> = -5A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iss</sub>	—	1931	—	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	226	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	168	—		
Gate Resistance	R <sub>G</sub>	—	11	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = -5V)	Q <sub>g</sub>	—	8.8	—	nC	V <sub>DS</sub> = -15V, I <sub>D</sub> = -10A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	16.5	—		
Gate-Source Charge	Q <sub>gs</sub>	—	2.6	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	3.6	—		
Turn-On Delay Time	t <sub>D(on)</sub>	—	8.2	—	ns	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V, R <sub>GEN</sub> = 3Ω, I <sub>D</sub> = -10A
Turn-On Rise Time	t <sub>R</sub>	—	14	—		
Turn-Off Delay Time	t <sub>D(off)</sub>	—	65	—		
Turn-Off Fall Time	t <sub>F</sub>	—	31.6	—		
Reverse Recovery Time	t <sub>RR</sub>	—	9.3	—	ns	I <sub>F</sub> = -8A, di/dt = 500A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	12.2	—	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<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

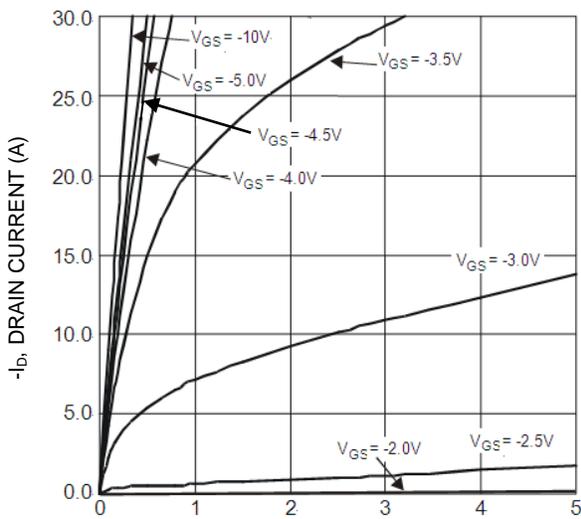


Figure 1 Typical Output Characteristics

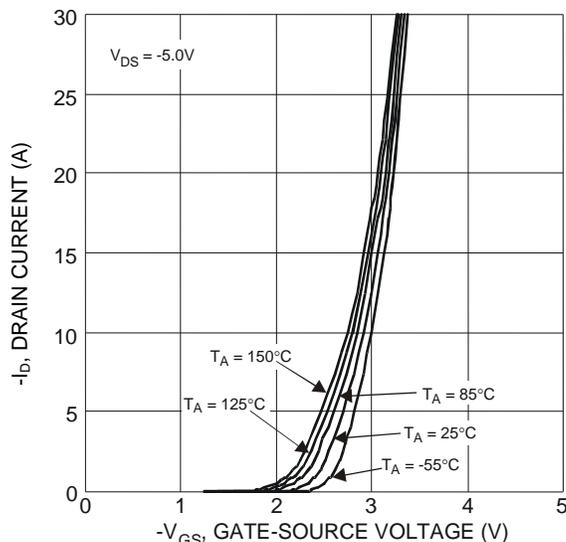


Figure 2 Typical Transfer Characteristics

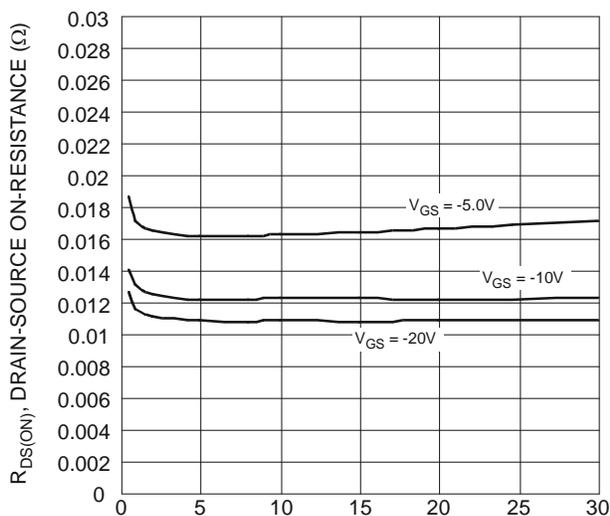


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

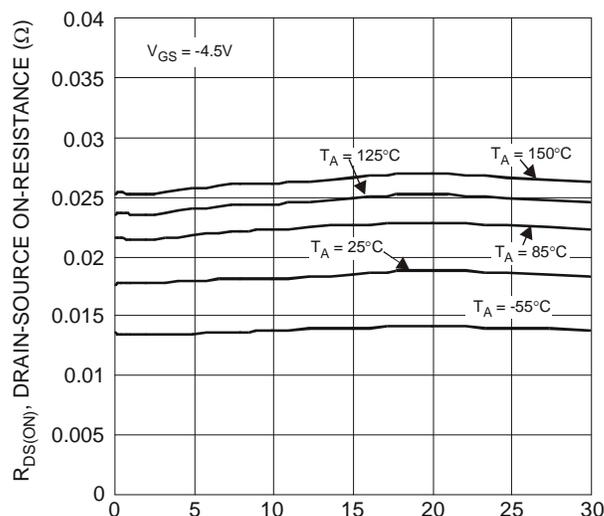


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

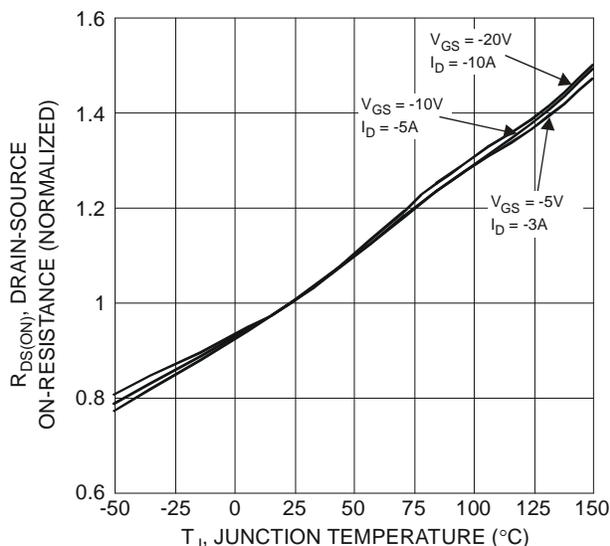


Figure 5 On-Resistance Variation with Temperature

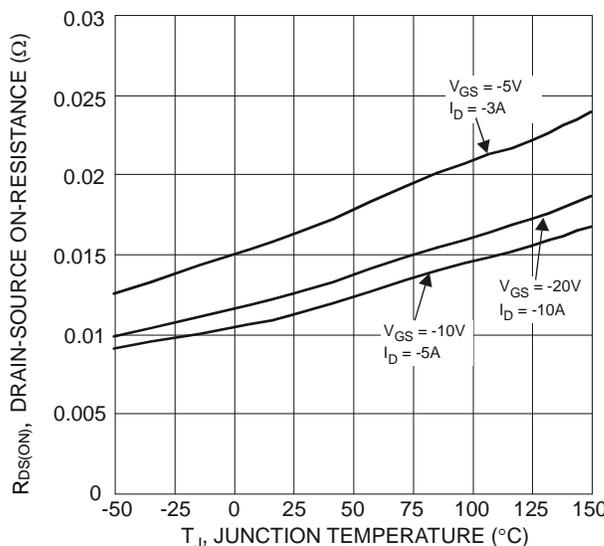


Figure 6 On-Resistance Variation with Temperature

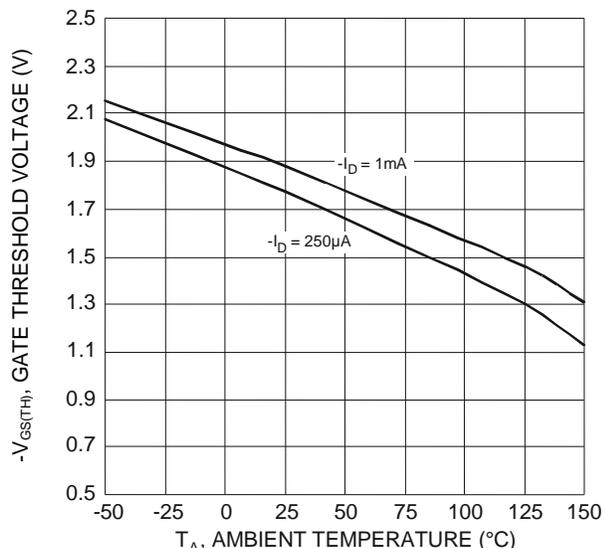


Figure 7 Gate Threshold Variation vs. Ambient Temperature

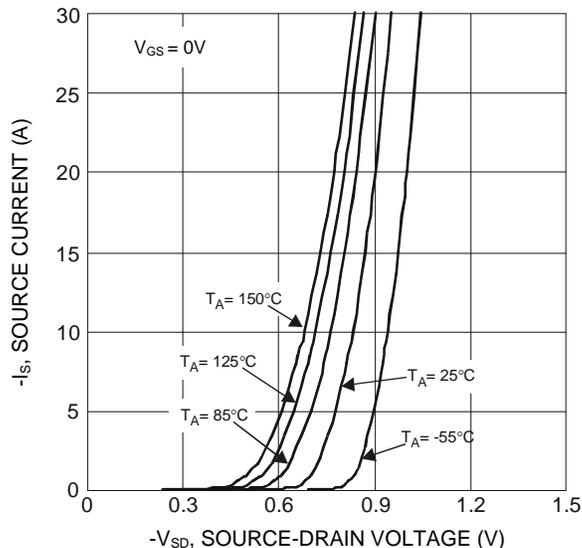


Figure 8 Diode Forward Voltage vs. Current

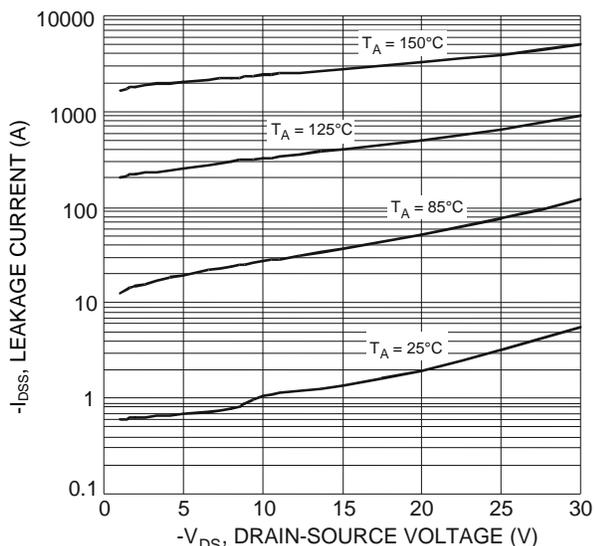


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

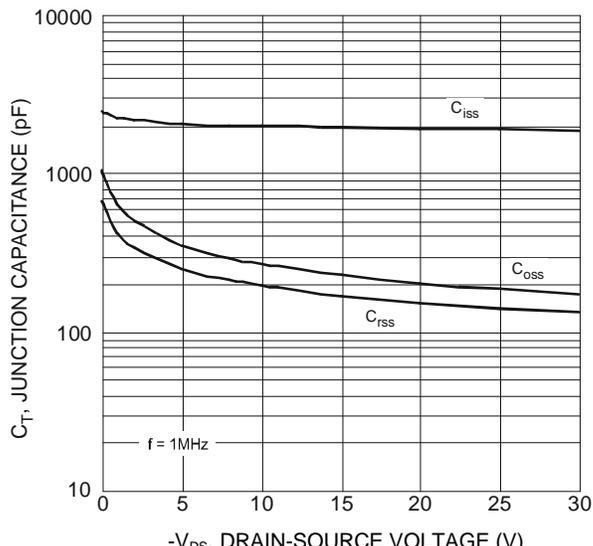


Figure 10 Typical Junction Capacitance

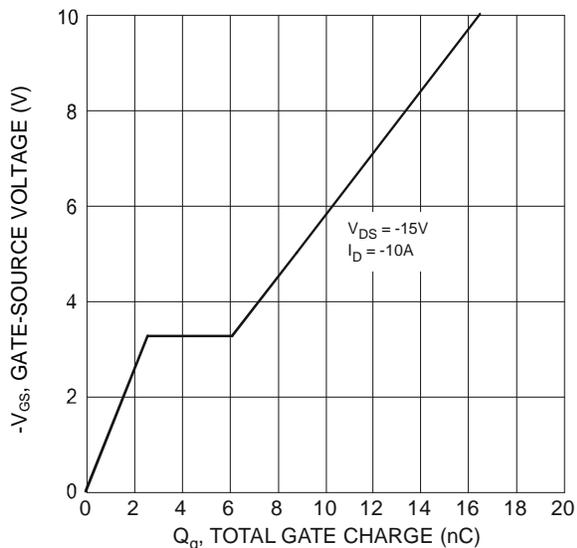


Figure 11 Gate-Charge Characteristics

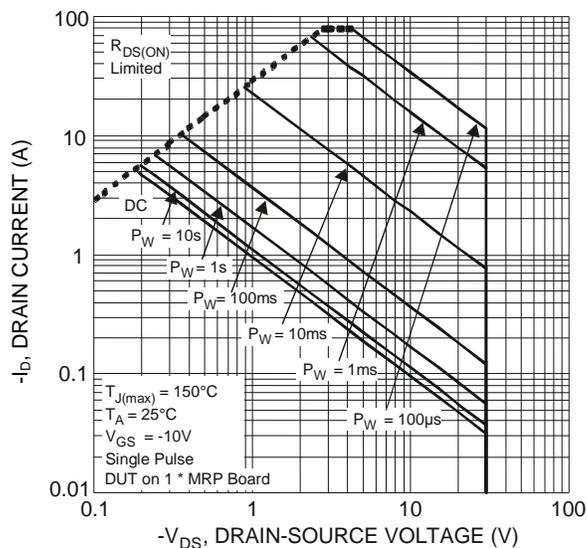
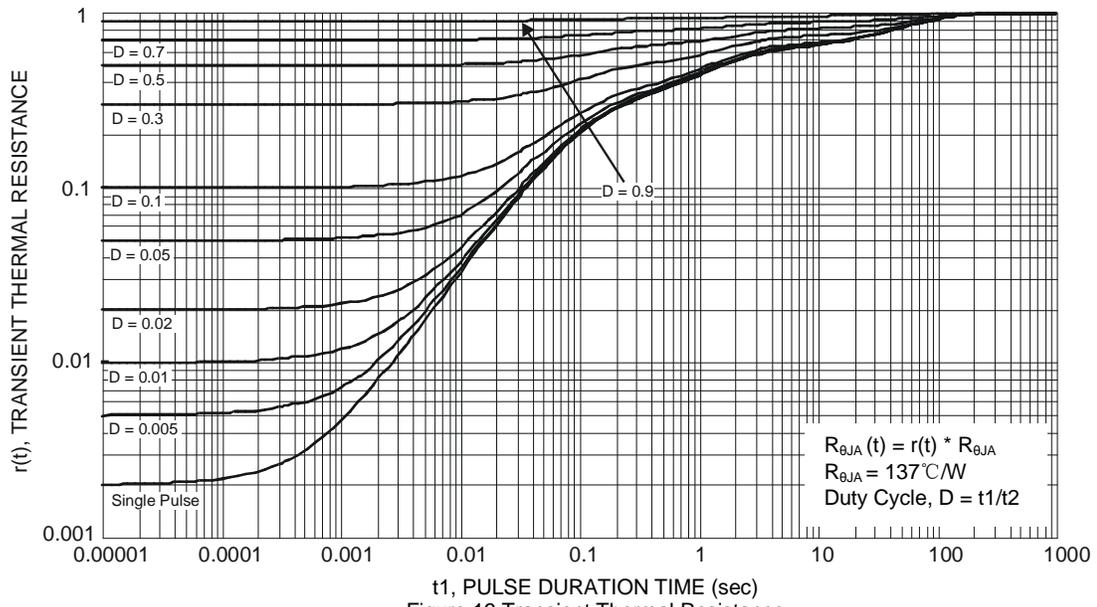
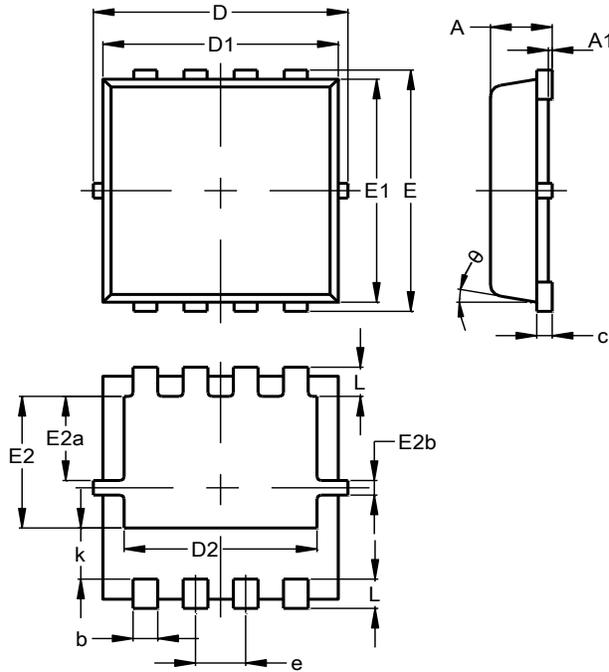


Figure 12 SOA, Safe Operation Area



## Package Outline Dimensions

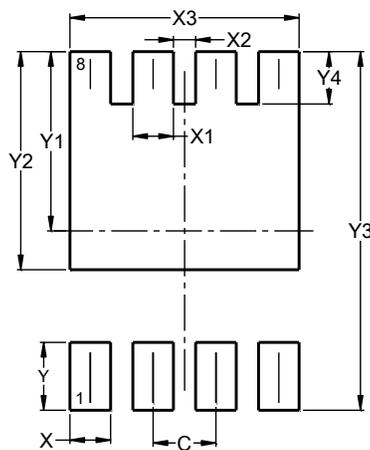
PowerDI3333-8 (Type UX)



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