

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	60	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	5.6 4.5	A
	Steady State	T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	I <sub>D</sub>	18 14.5	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	25	A
Maximum Continuous Body Diode Forward Current (Note 6)			I <sub>S</sub>	2.5	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	12	A
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	7.2	mJ

**Thermal Characteristics**

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P <sub>D</sub>	0.93	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	134	°C/W
	t < 10s		82	
Total Power Dissipation (Note 6)		P <sub>D</sub>	2.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	53	°C/W
	t < 10s		33	
Thermal Resistance, Junction to Case		R <sub>θJC</sub>	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</b> (Note 8)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current T <sub>J</sub> = +150°C (Note 9)	I <sub>DSS</sub>	—	—	100	µA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	39	50	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5A
		—	47	63		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3A
Diode Forward Voltage	V <sub>SD</sub>	—	—	1.1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 2.5A
On State Drain Current (Note 9)	I <sub>D(ON)</sub>	20	—	—	A	V <sub>DS</sub> ≥ 5V, V <sub>GS</sub> = 10V
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	C <sub>ISS</sub>	—	740	1,480	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	40	80	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	28	55	pF	
Gate Resistance	R <sub>G</sub>	—	2.2	4	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>G</sub>	—	6.4	12	nC	V <sub>DS</sub> = 30V, I <sub>D</sub> = 12A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>G</sub>	—	14	25	nC	
Gate-Source Charge	Q <sub>GS</sub>	—	2.8	5.5	nC	
Gate-Drain Charge	Q <sub>GD</sub>	—	2.3	5	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	3.6	10	ns	V <sub>DS</sub> = 30V, I <sub>D</sub> = 12A V <sub>GS</sub> = 10V, R <sub>G</sub> = 6.0Ω
Turn-On Rise Time	t <sub>R</sub>	—	5.0	10	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	12	24	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	3.3	10	ns	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	11	22	ns	I <sub>F</sub> = 4.5A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	5.1	10	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.
  - 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.

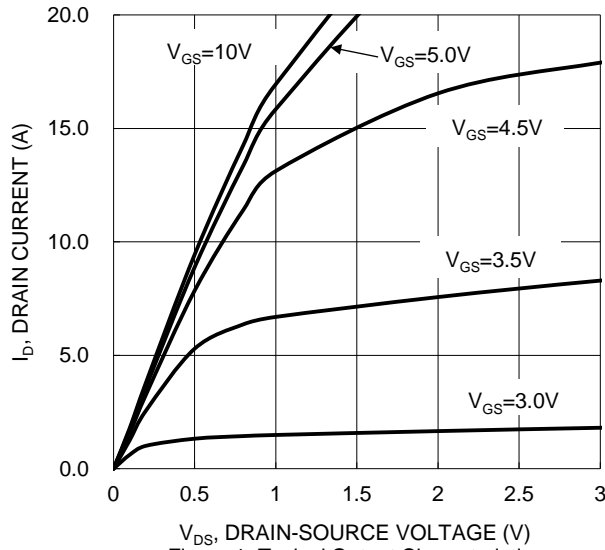


Figure 1. Typical Output Characteristic

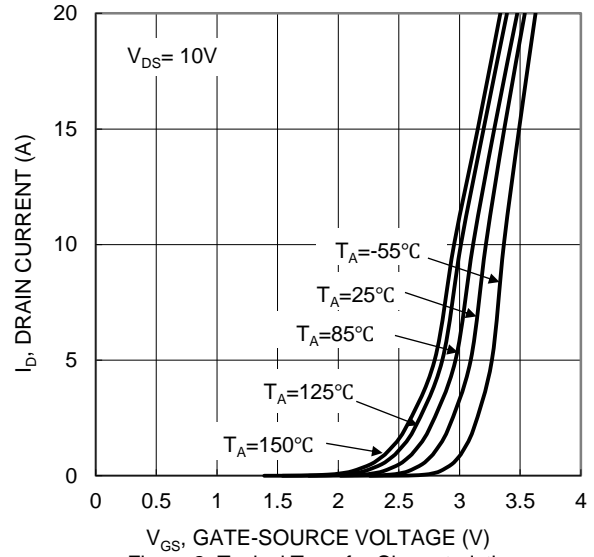


Figure 2. Typical Transfer Characteristic

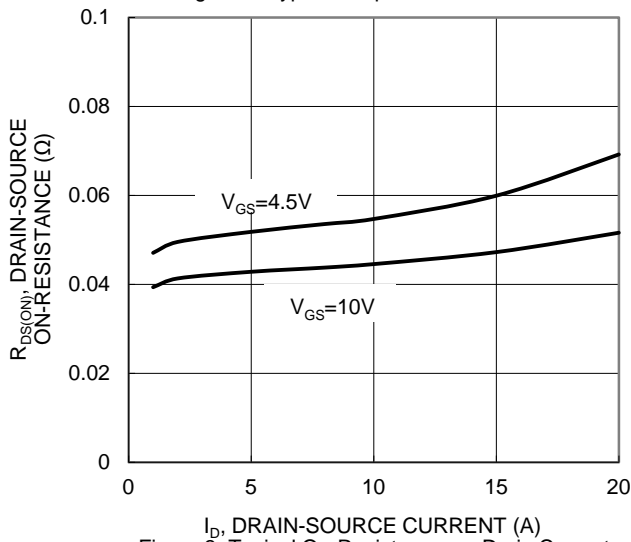


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

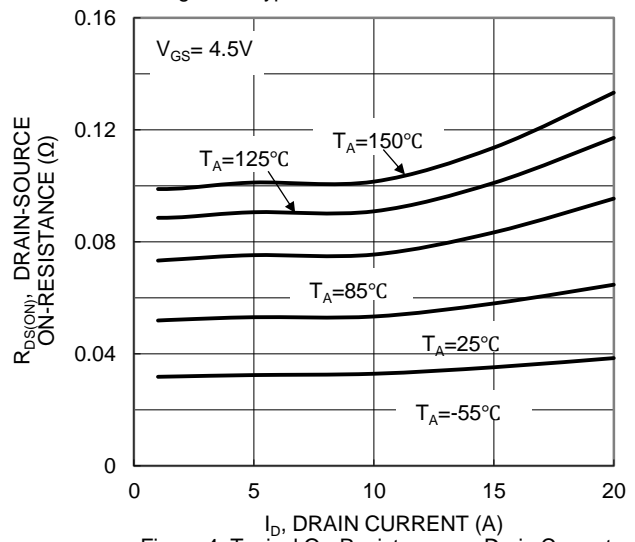


Figure 4. Typical On-Resistance vs. Drain Current and Temperature

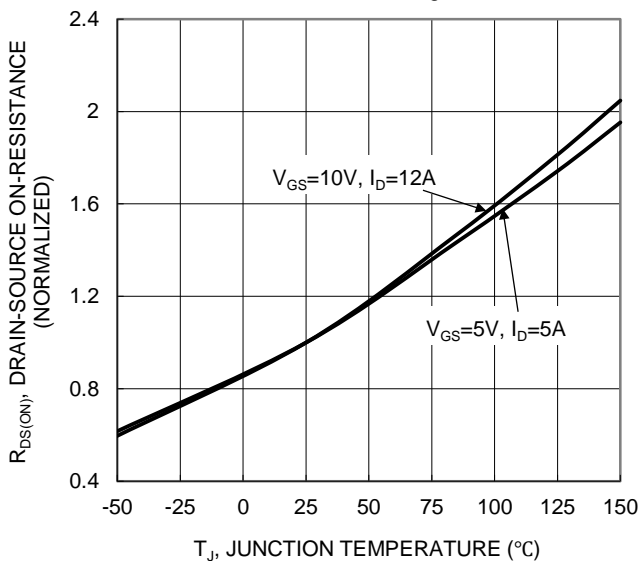


Figure 5. On-Resistance Variation with Temperature

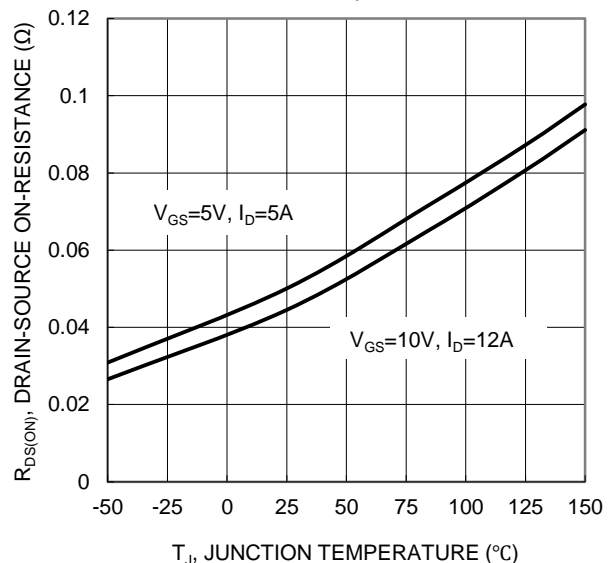


Figure 6. On-Resistance Variation with Temperature

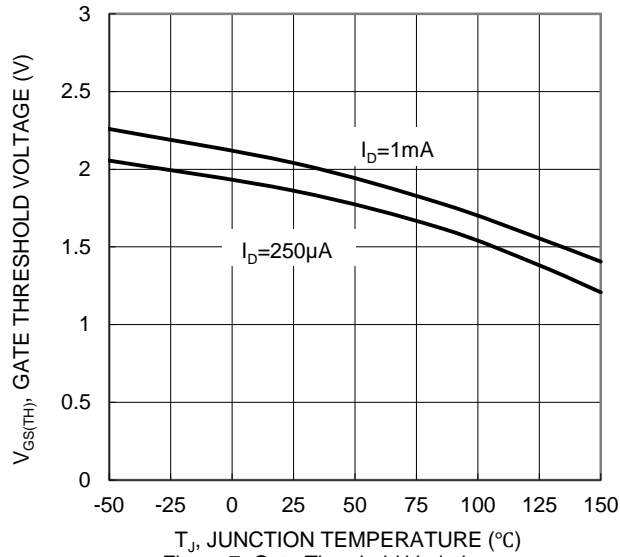


Figure 7. Gate Threshold Variation vs. Junction Temperature

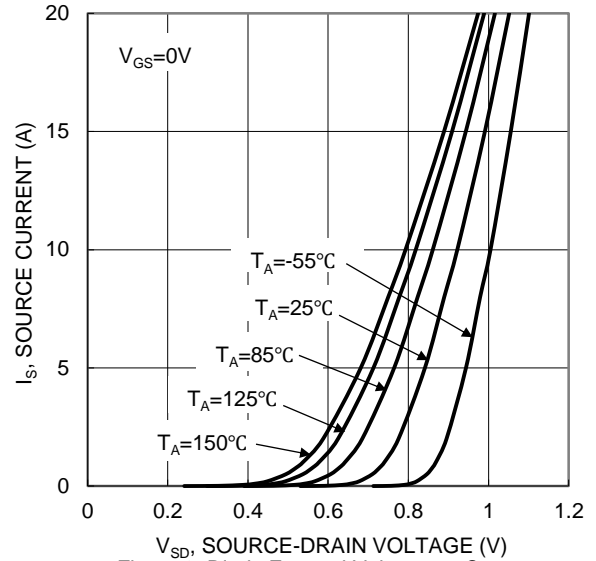


Figure 8. Diode Forward Voltage vs. Current

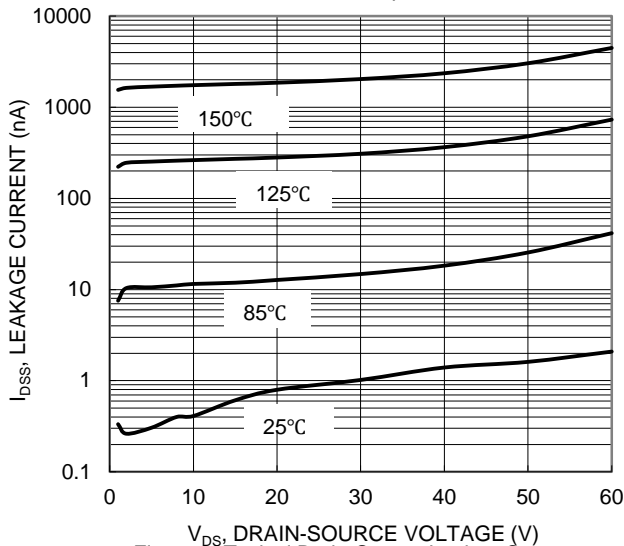


Figure 9. Typical Drain-Source Leakage Current vs. Voltage

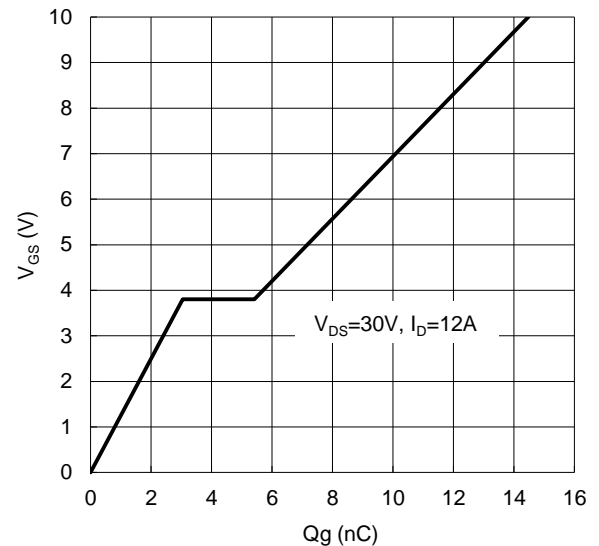


Figure 10. Gate Charge

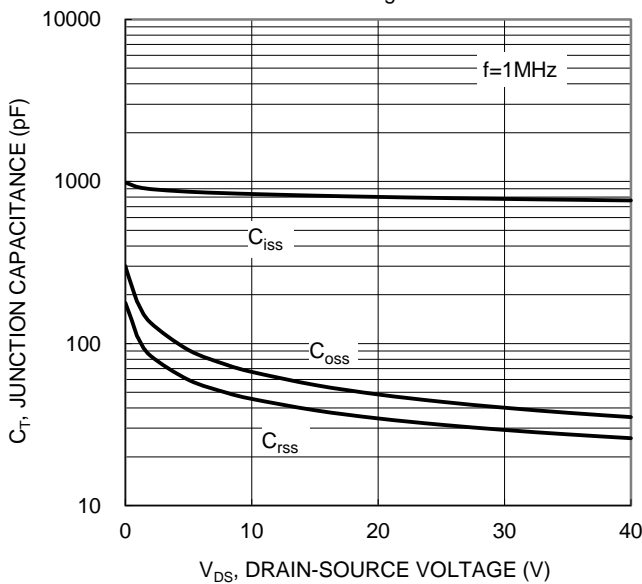


Figure 11. Typical Junction Capacitance

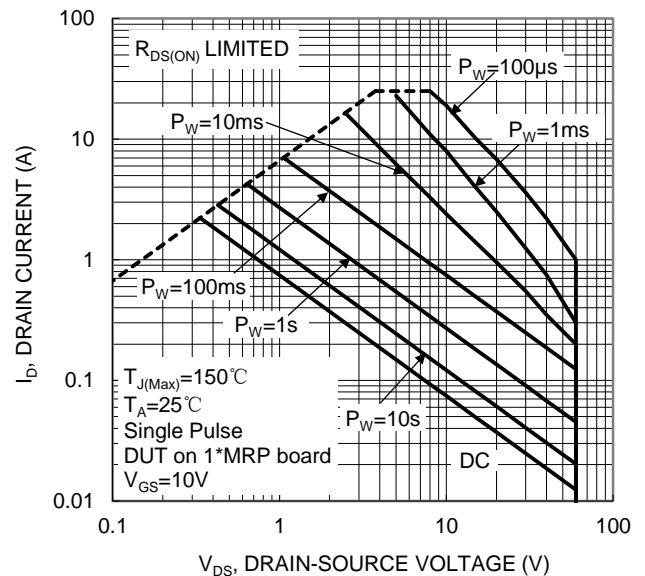


Figure 12. SOA, Safe Operation Area

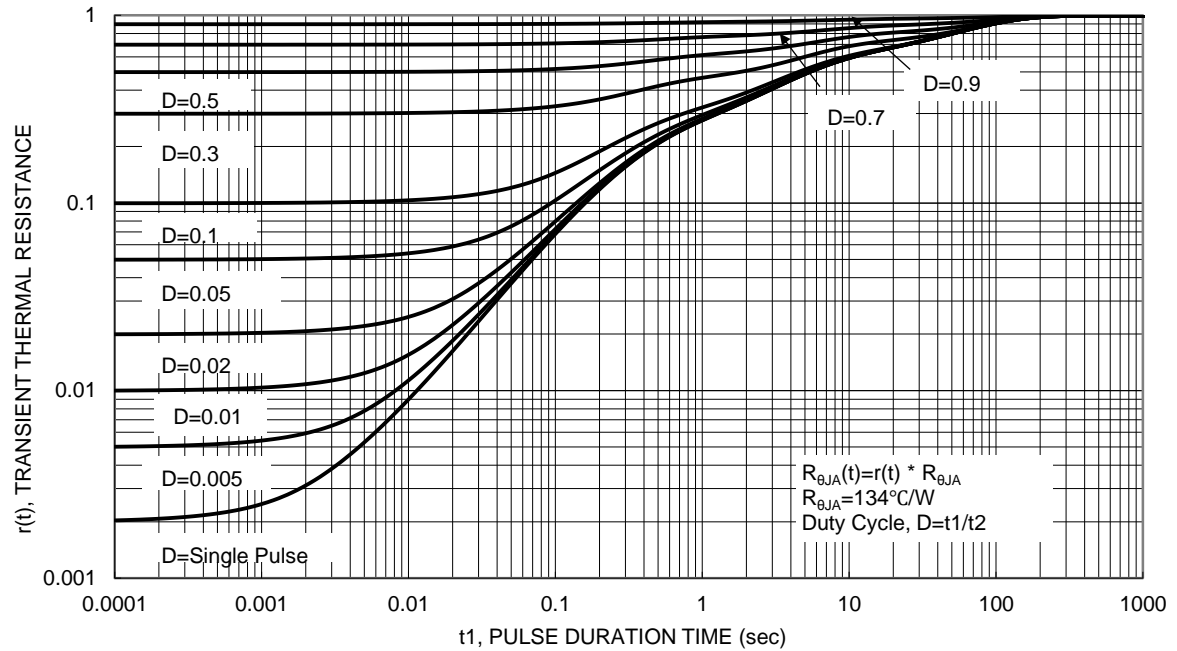
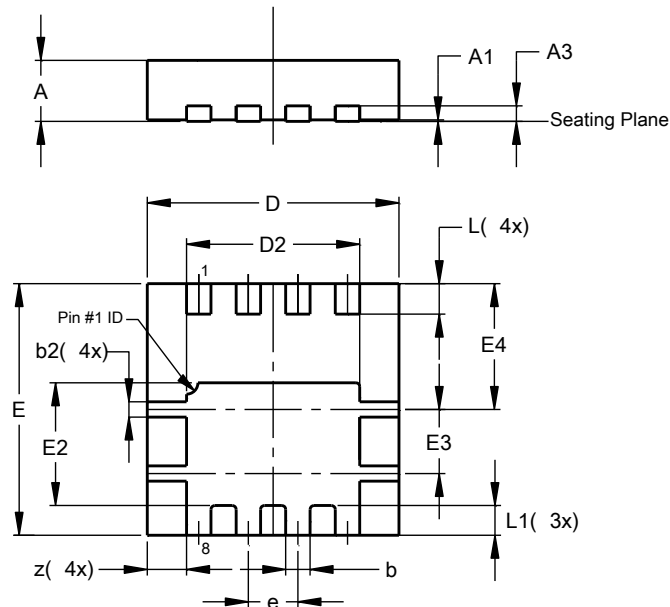


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**PowerDI3333-8**

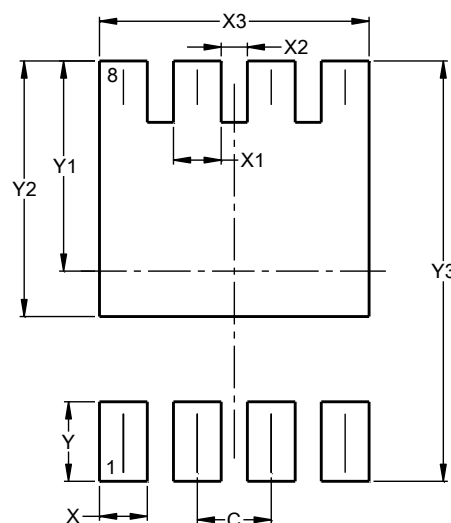


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	—	—	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	—	—	0.65
L	0.35	0.45	0.40
L1	—	—	0.39
z	—	—	0.515
All Dimensions in mm			

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**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

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