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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_c = +25^\circ C$
30V	21m Ω @ $V_{GS} = 10V$	30A
	35m Ω @ $V_{GS} = 4.5V$	24A

Description

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.

Applications

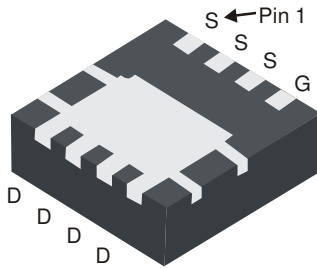
- Backlighting
- Power Management Functions
- DC-DC Converters

Features and Benefits

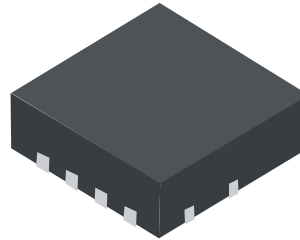
- Low $R_{DS(ON)}$ – Ensures On-State Losses are Minimized
- Small form factor thermally efficient package enables higher density end products (PowerDI[®])
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **Qualified to AEC-Q101 standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMN3018SFGQ](#))**

Mechanical Data

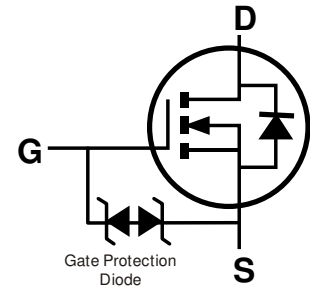
- Case: PowerDI3333-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (Approximate)



Bottom View



Top View



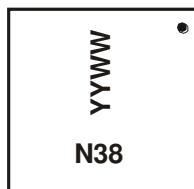
Top View
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN3018SFG-7	PowerDI3333-8	2000/Tape & Reel
DMN3018SFG-13	PowerDI3333-8	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, “Green” and Lead-free.
 3. Halogen- and Antimony-free “Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



N38 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 16 = 2016)
 WW = Week Code (01 – 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	± 25	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	I_D	30 25	A
	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	8.5 6.8	A
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$		$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	11.3 9.1
	Continuous Drain Current (Note 6) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	6.6 5.3
$t < 10\text{s}$		$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	8.7 7.0	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	2.5	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	60	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			I_{AS}	18	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			E_{AS}	16	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	1.0	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	126	$^\circ\text{C/W}$
	$t < 10\text{s}$		71	
Total Power Dissipation (Note 6)		P_D	2.2	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	56	$^\circ\text{C/W}$
	$t < 10\text{s}$		31	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	7.0	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	1.7	2.1	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	16	21	m Ω	$V_{GS} = 10\text{V}, I_D = 10\text{A}$
		—	21	35		$V_{GS} = 4.5\text{V}, I_D = 8.5\text{A}$
Diode Forward Voltage	V_{SD}	0.5	—	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{ISS}	—	697	—	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$
Output Capacitance	C_{OSS}	—	97	—	pF	
Reverse Transfer Capacitance	C_{RSS}	—	67	—	pF	
Gate resistance	R_G	—	1.47	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_G	—	6.0	—	nC	$V_{GS} = 10\text{V}, V_{DS} = 15\text{V},$ $I_D = 9\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_G	—	13.2	—	nC	
Gate-Source Charge	Q_{GS}	—	2.2	—	nC	
Gate-Drain Charge	Q_{GD}	—	1.8	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.3	—	ns	$V_{DD} = 15\text{V}, V_{GS} = 10\text{V},$ $R_L = 15\Omega, I_D = 1\text{A}, R_G = 6\Omega$
Turn-On Rise Time	t_R	—	4.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	20.1	—	ns	
Turn-Off Fall Time	t_F	—	4.1	—	ns	
Reverse Recovery Time	T_{RR}	—	7.3	—	ns	$I_F = 9\text{A}, di/dt = 500\text{A}/\mu\text{s}$
Reverse Recovery Charge	Q_{RR}	—	7.9	—	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_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.
 - Short duration pulse test used to minimize self-heating effect.

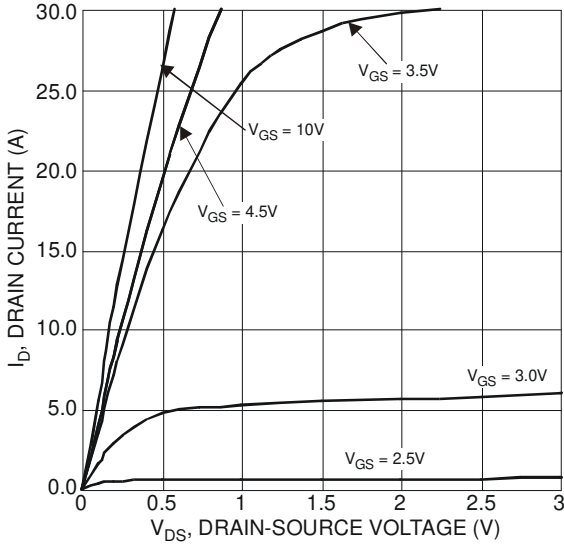


Figure 1 Typical Output Characteristics

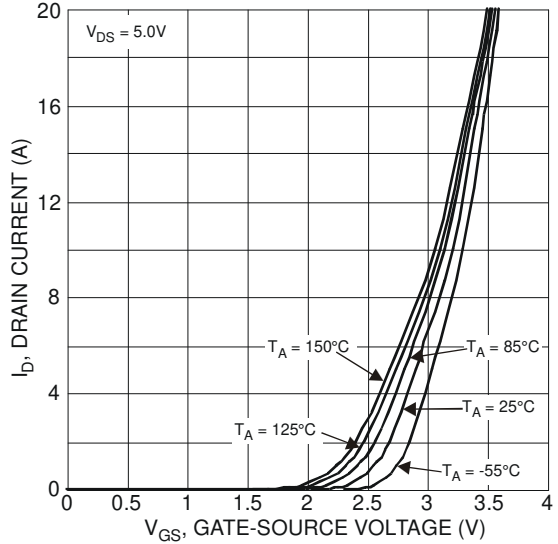


Figure 2 Typical Transfer Characteristics

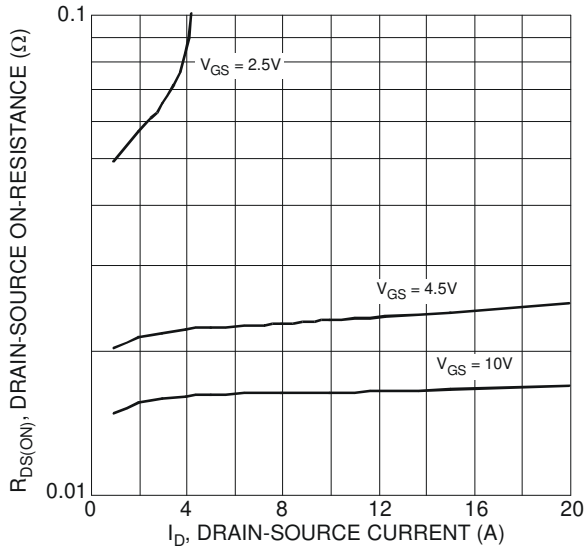


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

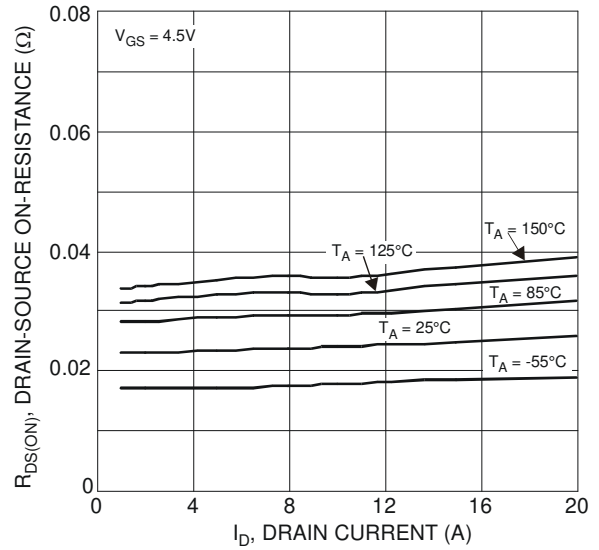


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

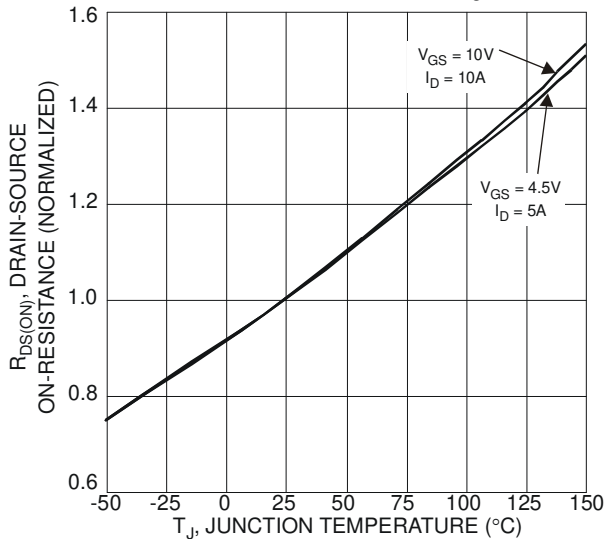


Figure 5 On-Resistance Variation with Temperature

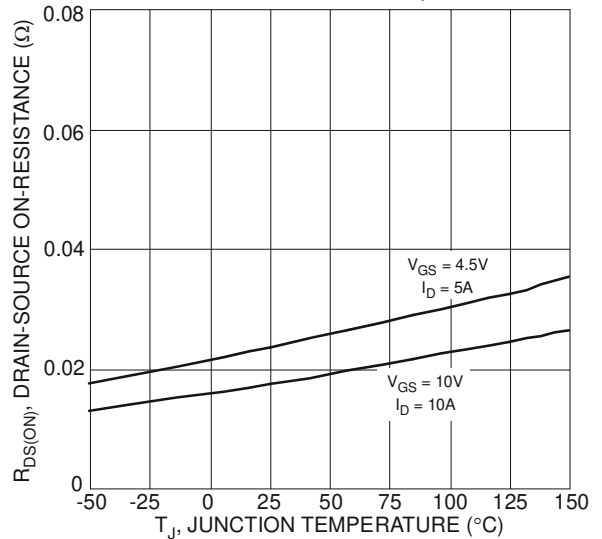


Figure 6 On-Resistance Variation with Temperature

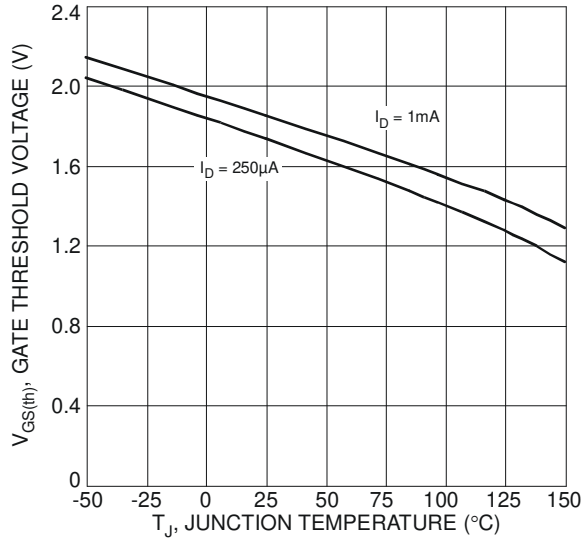


Figure 7 Gate Threshold Variation vs. Ambient Temperature

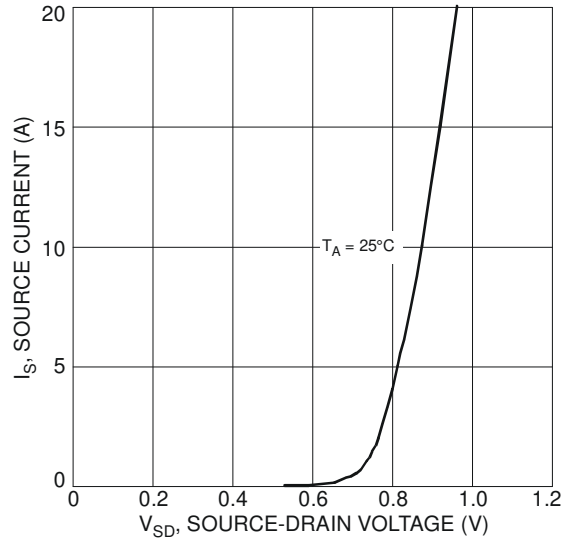


Figure 8 Diode Forward Voltage vs. Current

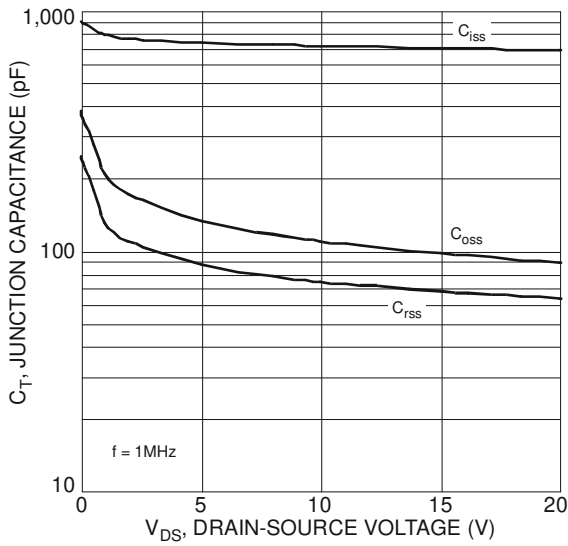


Figure 9 Typical Junction Capacitance

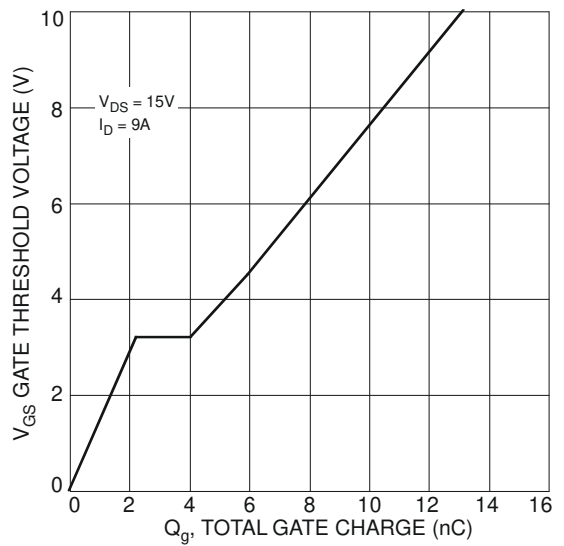


Figure 10 Gate Charge

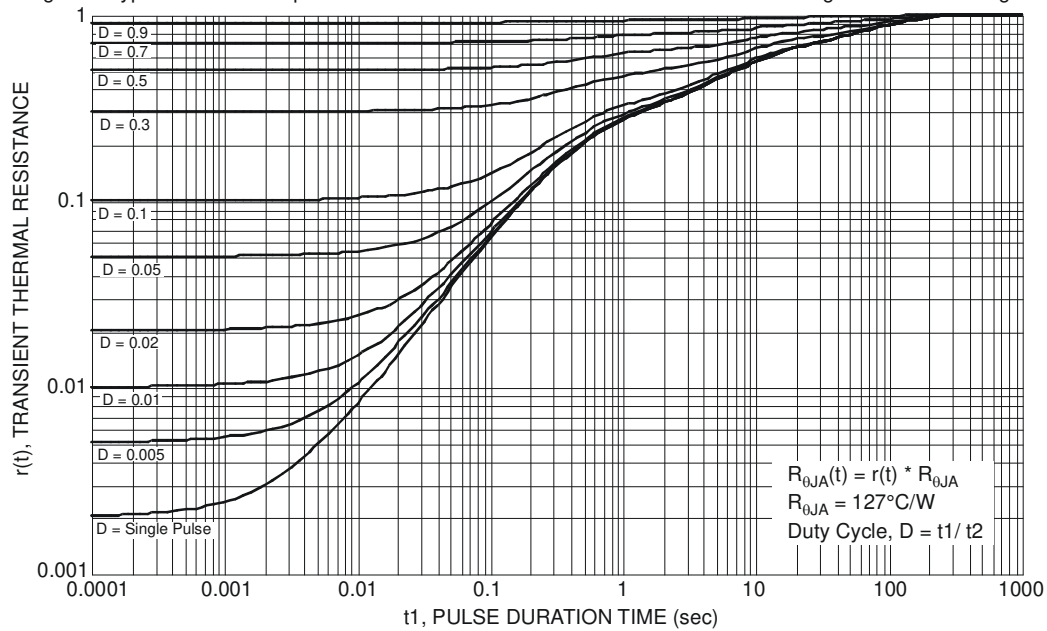


Figure 11 Transient Thermal Resistance

$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

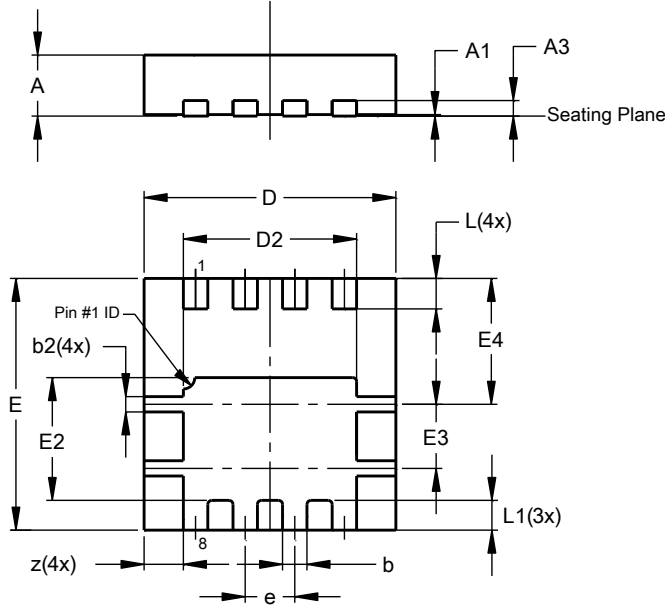
$$R_{\theta JA} = 127^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t_1 / t_2$$

Package Outline Dimensions

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

PowerDI3333-8

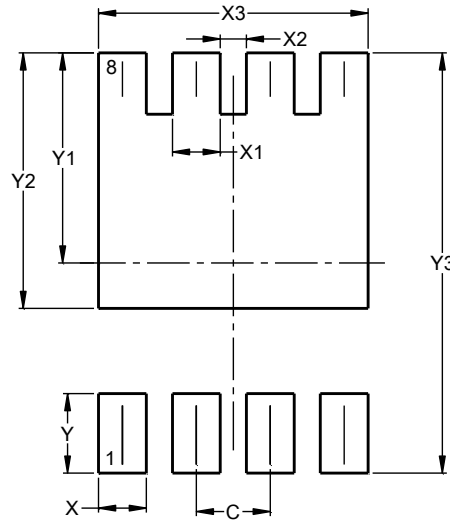


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

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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