

## Features

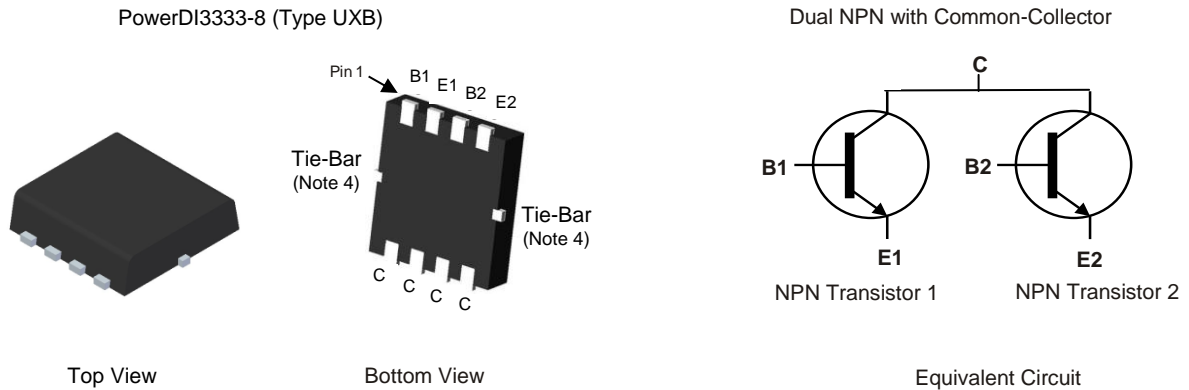
- Dual NPN with Common-Collector
- $BV_{CEO} > 400V$
- $I_C = 0.5A$  Continuous Collector Current
- Configurable as NPN Darlington Pair
- Low Saturation Voltage  $V_{CE(SAT)} < 175mV @ 500mA$
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: PowerDI<sup>®</sup> 3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.072 grams (Approximate)

## Applications

- Power Management
- High Voltage Start-Up Switch
- DC-DC Converters

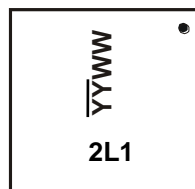


## Ordering Information (Note 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXTN08400BNS-7	Standard	2L1	7	12	2,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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. Tie-bars are internally connected to the Common-Collector. They do not need to be externally connected.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



2L1 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 19 for 2019)  
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	450	V
Collector-Emitter Voltage (Forward Blocking)	V <sub>CEX</sub>	450	V
Collector-Emitter Voltage	V <sub>CEO</sub>	400	V
Emitter-Collector Voltage (Reverse Blocking)	V <sub>ECO</sub>	6	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	0.5	A
Peak Pulse Current	I <sub>CM</sub>	1	A
Base Current	I <sub>B</sub>	0.2	A

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

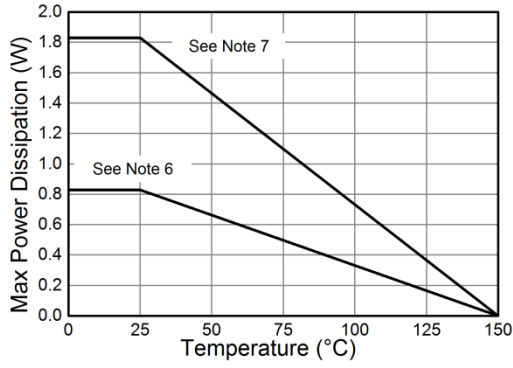
Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 6)	P <sub>D</sub>	0.83	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	150	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	1.83	W
Thermal Resistance, Junction to Ambient (Note 7)	R <sub>θJA</sub>	68	°C/W
Thermal Resistance, Junction to Lead (Note 8)	R <sub>θJL</sub>	19	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 9)

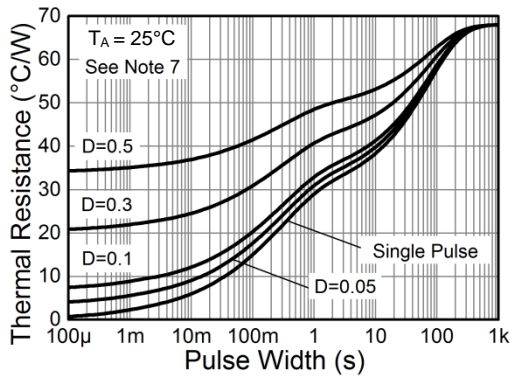
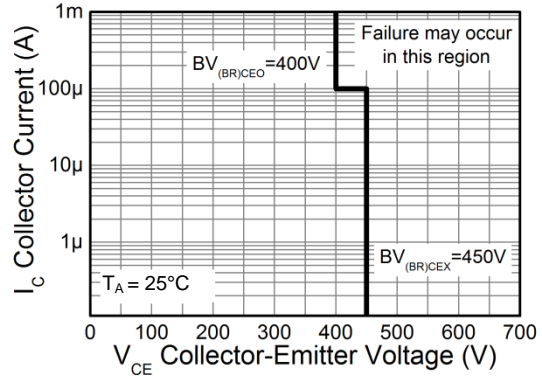
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. Device mounted on FR-4 PCB board, with minimum recommended pad layout, single sided.
  7. Device mounted on FR-4 substrate PCB board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
  8. Thermal resistance from junction to soldering point (on the collector pads).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

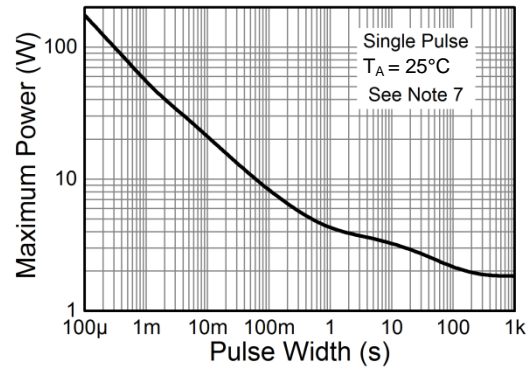
**Thermal Characteristics and Derating Information**



**Derating Curve**



**Transient Thermal Impedance**



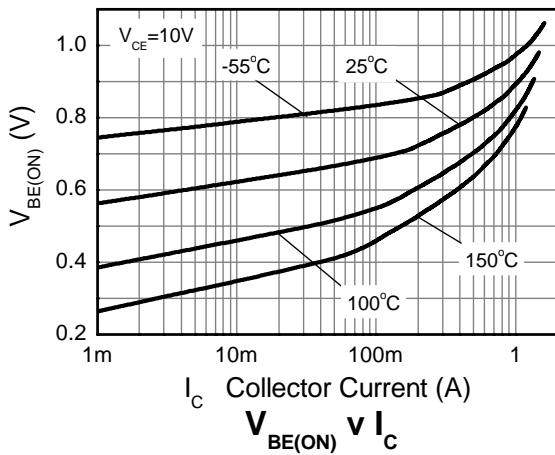
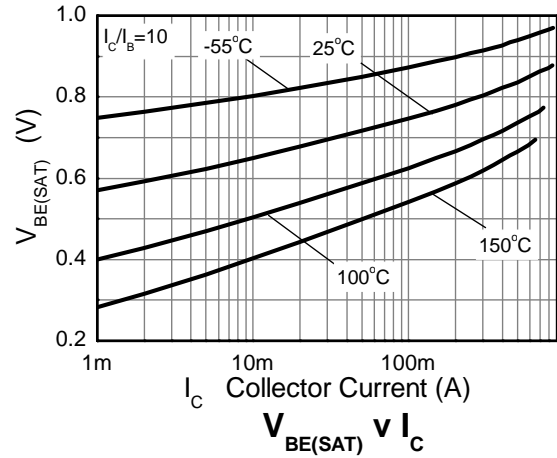
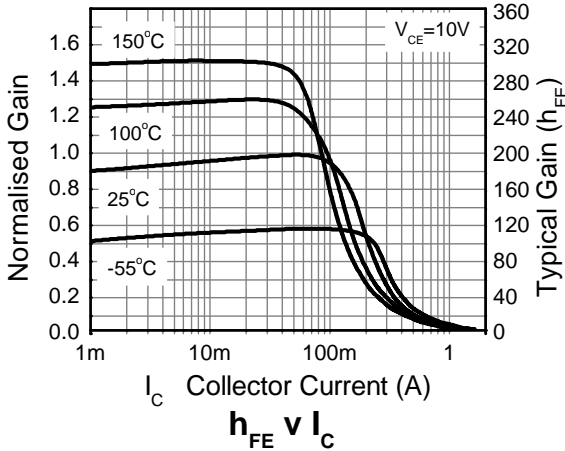
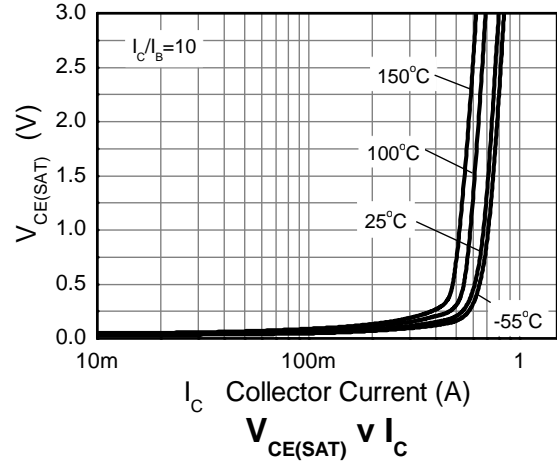
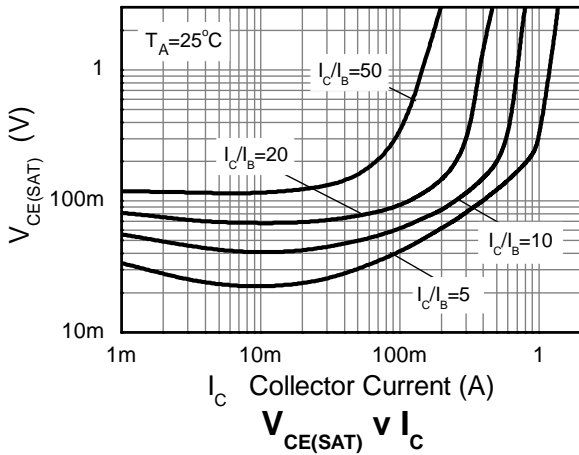
**Pulse Power Dissipation**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	450	550	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Forward Blocking)	$BV_{CEX}$	450	550	—	V	$I_C = 100\mu\text{A}$ , $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Collector-Emitter Breakdown Voltage (Base Open) (Note 10)	$BV_{CEO}$	400	500	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.1	—	V	$I_E = 100\mu\text{A}$
Emitter-Collector Breakdown Voltage (Reverse Blocking)	$BV_{ECX}$	6	8	—	V	$I_E = 100\mu\text{A}$ , $R_{BC} \leq 1\text{k}\Omega$ or $-0.25\text{V} < V_{BC} < 0.25\text{V}$
Emitter-Collector Breakdown Voltage (Base Open)	$BV_{ECO}$	6	8.5	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	$I_{CBO}$	—	<1	50	nA	$V_{CB} = 360\text{V}$
			—	20	$\mu\text{A}$	$V_{CB} = 360\text{V}$ , $T_A = +100^\circ\text{C}$
Collector-Emitter Cutoff Current	$I_{CEX}$	—	<1	100	nA	$V_{CE} = 360\text{V}$ , $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Emitter-Base Cutoff Current	$I_{EBO}$	—	<1	50	nA	$V_{EB} = 5.6\text{V}$
<b>ON CHARACTERISTICS</b> (Note 10)						
Static Forward Current Transfer Ratio	$h_{FE}$	90	165	300	—	$I_C = 1\text{mA}$ , $V_{CE} = 5\text{V}$
			100			$I_C = 50\text{mA}$ , $V_{CE} = 5\text{V}$
			10			$I_C = 500\text{mA}$ , $V_{CE} = 5\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	70	85	mV	$I_C = 20\text{mA}$ , $I_B = 1\text{mA}$
			50	70		$I_C = 50\text{mA}$ , $I_B = 5\text{mA}$
			120	170		$I_C = 300\text{mA}$ , $I_B = 30\text{mA}$
			125	175		$I_C = 500\text{mA}$ , $I_B = 100\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	865	950	mV	$I_C = 500\text{mA}$ , $I_B = 100\text{mA}$
Base-Emitter On Voltage	$V_{BE(ON)}$	—	800	900	mV	$I_C = 500\text{mA}$ , $V_{CE} = 10\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b> (Note 10)						
Transition Frequency	$f_T$	—	40	—	MHz	$I_C = 10\text{mA}$ , $V_{CE} = 20\text{V}$ , $f = 20\text{MHz}$
Output Capacitance	$C_{OBO}$	—	8	10	pF	$V_{CB} = 20\text{V}$ , $f = 1\text{MHz}$
Delay Time	$t_D$	—	100	—	ns	$V_{CC} = 100\text{V}$ , $I_C = 100\text{mA}$ , $I_{B1} = 10\text{mA}$ , $I_{B2} = -20\text{mA}$
Rise Time	$t_R$	—	52	—	ns	
Storage Time	$t_S$	—	3122	—	ns	
Fall Time	$t_F$	—	240	—	ns	

Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

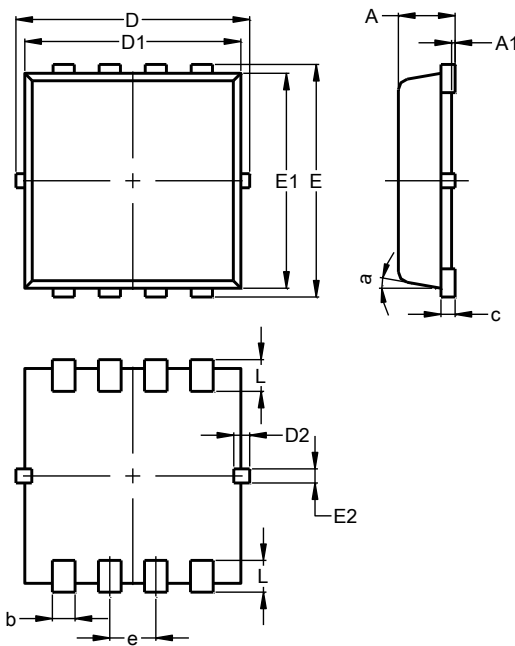
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



**Package Outline Dimensions**

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

**PowerDI3333-8 (Type UXB)**

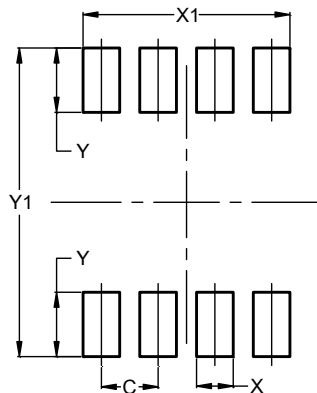


PowerDI3333-8 (Type UXB)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.10	0.35	0.23
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	0.10	0.30	0.20
e	—	—	0.65
L	0.35	0.55	0.45
a	0°	12°	10°
All Dimensions in mm			

**Suggested Pad Layout**

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

**PowerDI3333-8 (Type UXB)**



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	2.370
Y	0.730
Y1	3.500

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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