400V DUAL NPN MEDIUM POWER TRANSISTORS IN PowerDI3333-8

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)**

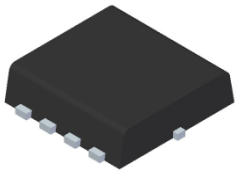
Mechanical Data

- Case: PowerDI® 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 e3
- Weight: 0.072 grams (Approximate)

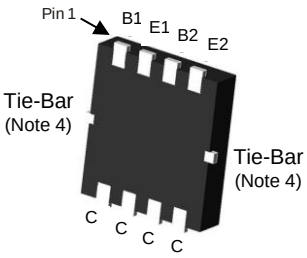
Applications

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

PowerDI3333-8 (Type UXB)

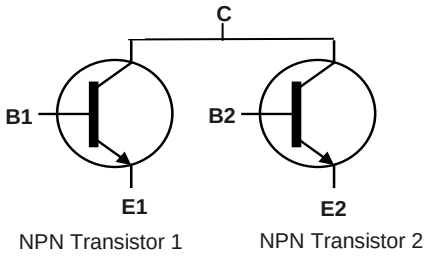


Top View



Bottom View

Dual NPN with Common-Collector



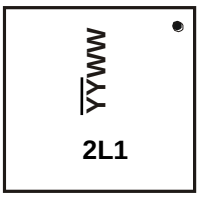
Equivalent Circuit

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_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	450	V
Collector-Emitter Voltage (Forward Blocking)	V_{CEX}	450	V
Collector-Emitter Voltage	V_{CEO}	400	V
Emitter-Collector Voltage (Reverse Blocking)	V_{ECO}	6	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	0.5	A
Peak Pulse Current	I_{CM}	1	A
Base Current	I_B	0.2	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

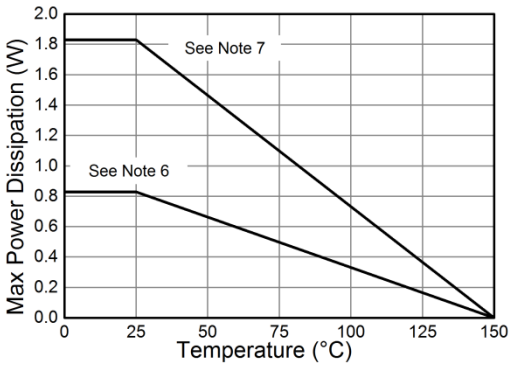
Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)		P_D	0.83	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	150	°C/W
Total Power Dissipation (Note 7)		P_D	1.83	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	68	°C/W
Thermal Resistance, Junction to Lead (Note 8)		$R_{\theta JL}$	19	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 9)

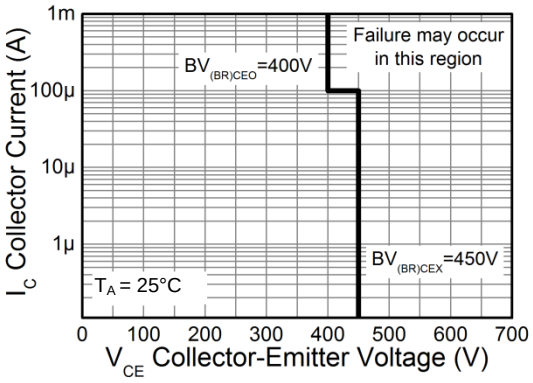
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

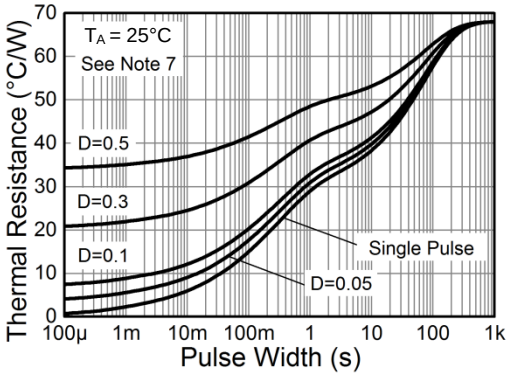
Notes: 6. Device mounted on FR-4 PCB board, with minimum recommended pad layout, single sided.
7. Device mounted on FR-4 substrate PCB board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
8. Thermal resistance from junction to soldering point (on the collector pads).
9. Refer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

Thermal Characteristics and Derating Information

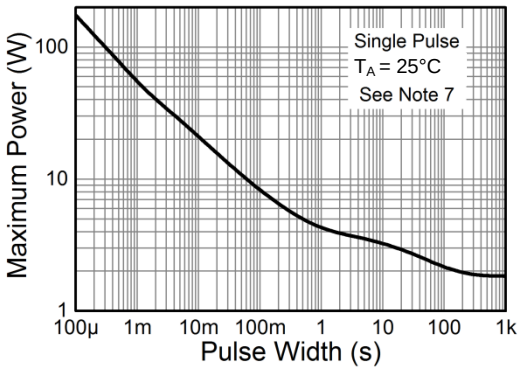


Derating Curve





Transient Thermal Impedance



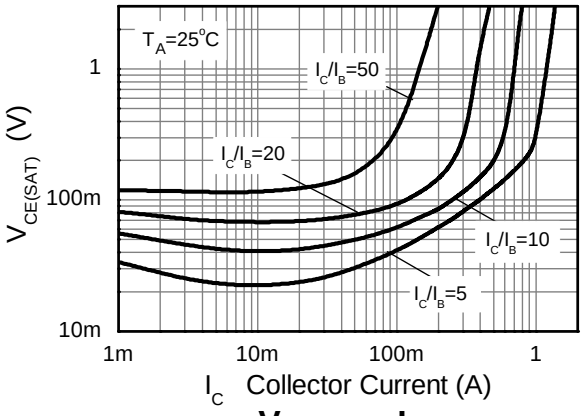
Pulse Power Dissipation

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

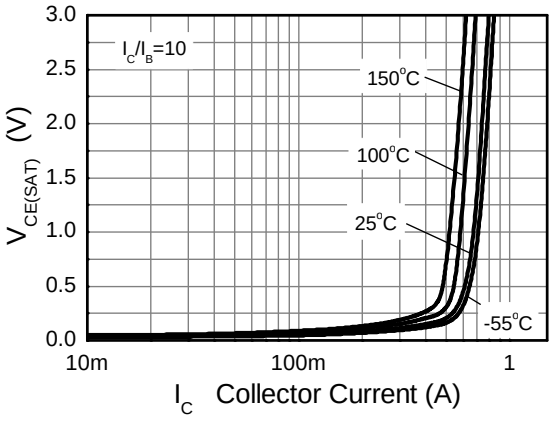
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	450	550	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Forward Blocking)	BV_{CEX}	450	550	—	V	I_C = 100µA, R_{BE}≤1kΩ or -1V < V_{BE} < 0.25V
Collector-Emitter Breakdown Voltage (Base Open) (Note 10)	BV_{CEO}	400	500	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.1	—	V	I_E = 100µA
Emitter-Collector Breakdown Voltage (Reverse Blocking)	BV_{ECX}	6	8	—	V	I_E = 100µA, R_{BC}≤1kΩ or -0.25V < V_{BC} < 0.25V
Emitter-Collector Breakdown Voltage (Base Open)	BV_{ECO}	6	8.5	—	V	I_E = 100µA
Collector-Base Cutoff Current	I_{CBO}	—	<1	50	nA	V_{CB} = 360V
			—	20	µA	V_{CB} = 360V, T_A = +100°C
Collector-Emitter Cutoff Current	I_{CEX}	—	<1	100	nA	V_{CE} = 360V, R_{BE}≤1kΩ -1V < V_{BE} < 0.25V
Emitter-Base Cutoff Current	I_{EBO}	—	<1	50	nA	V_{EB} = 5.6V
ON CHARACTERISTICS (Note 10)						
Static Forward Current Transfer Ratio	h_{FE}	90	165	300	—	I_C = 1mA, V_{CE} = 5V
		100	180			I_C = 50mA, V_{CE} = 5V
		10	20			I_C = 500mA, V_{CE} = 5V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	70	85	mV	I_C = 20mA, I_B = 1mA
			50	70		I_C = 50mA, I_B = 5mA
			120	170		I_C = 300mA, I_B = 30mA
			125	175		I_C = 500mA, I_B = 100mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	865	950	mV	I_C = 500mA, I_B = 100mA
Base-Emitter On Voltage	$V_{BE(ON)}$	—	800	900	mV	I_C = 500mA, V_{CE} = 10V
SMALL SIGNAL CHARACTERISTICS (Note 10)						
Transition Frequency	f_T	—	40	—	MHz	I_C = 10mA, V_{CE} = 20V, f = 20MHz
Output Capacitance	C_{OBO}	—	8	10	pF	V_{CB} = 20V, f = 1MHz
Delay Time	t_D	—	100	—	ns	V_{CC} = 100V, I_C = 100mA, I_{B1} = 10mA I_{B2} = -20mA
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 ≤ 300µs. Duty cycle ≤ 2%.

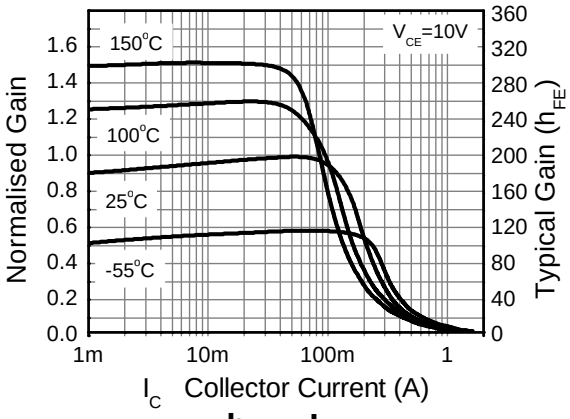
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



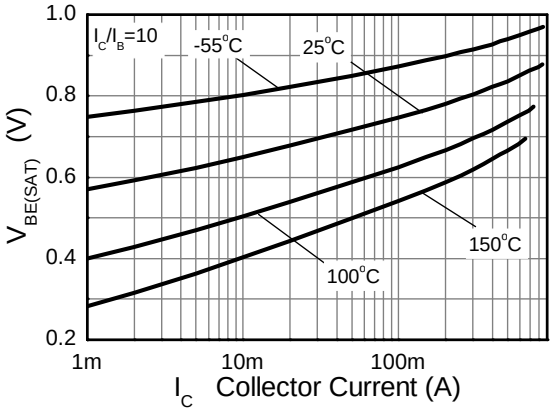
$V_{CE(SAT)}$ v I_C



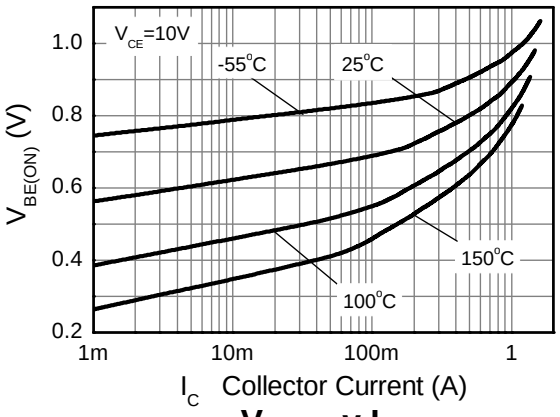
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C

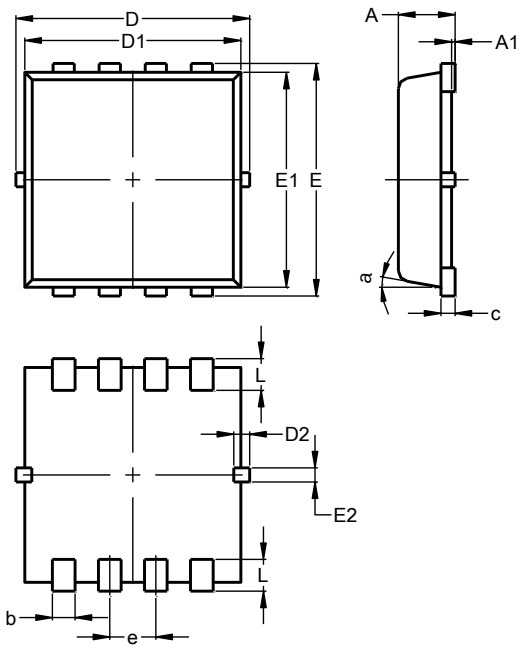


$V_{BE(ON)}$ v I_C

Package Outline Dimensions

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

PowerDI3333-8 (Type UXB)

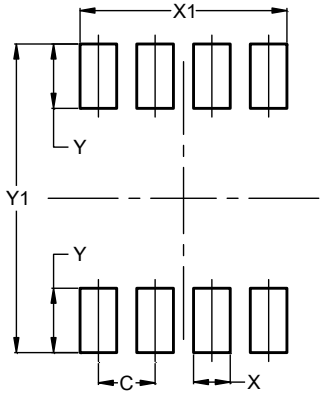


PowerDI3333-8 (Type UXB)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.10	0.35	0.23
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	0.10	0.30	0.20
e	—	—	0.65
L	0.35	0.55	0.45
a	0°	12°	10°
All Dimensions in mm			

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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