

#### **DUAL 40V PNP LOW SATURATION SWITCHING TRANSISTOR**

### **Features and Benefits**

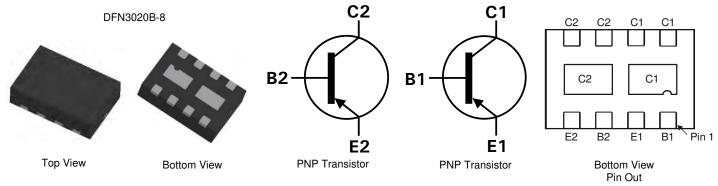
- BV<sub>CEO</sub> > -40V
- I<sub>C</sub> = -3A Continuous Collector Current
- Low Saturation Voltage (-220mV @ -1A)
- $R_{SAT} = 104 \text{ m}\Omega$  for Low Equivalent On Resistance
- hFE specified up to -3A for high gain holds up
- Dual NPN saving footprint and component count
- Low profile 0.8mm high package for thin applications
- R<sub>0JA</sub> efficient, 40% lower than SOT26
- 6mm<sup>2</sup> footprint, 50% smaller than TSOP6 and SOT26
- Lead-Free, RoHS Compliant (Note 1)
- Halogen and Antimony Free. "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

### **Mechanical Data**

- Case: DFN3020B-8
- Case material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Terminals: Pre-Plated NiPdAu leadframe.
- Nominal package height: 0.8mm
- Moisture Sensitivity: Level 1 per J-STD-020
- Solderable per MIL-STD-202, Method 208
- Weight: 0.013 grams (approximate)

## **Applications**

- DC-DC Converters
- · Charging circuits
- Power switches
- Motor control
- CCFL Backlighting
- Portable applications



**Equivalent Circuit** 

## Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTD720MCTA	D33	7	8	3,000

Notes:

- 1. No purposefully added lead.
- 2. Diodes Inc's "Green" Policy can be found on our website at http://www.diodes.com
- 3. For Packaging Details, go to our website at http://www.diodes.com.

# **Marking Information**

D33

D33 = Product type Marking Code Top View, Dot Denotes Pin 1





## Maximum Ratings @ T<sub>A</sub> = 25°C unless otherwise specified

Parameter	Symbol	Limit	Unit
Collector-Base Voltage	$V_{CBO}$	-50	
Collector-Emitter Voltage	V <sub>CEO</sub>	-40	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	
Peak Pulse Current	I <sub>CM</sub>	-4	
Continuous Collector Current (Notes 4 and 7)	Ic	-3	Α
Base Current	lΒ	-1	

# Thermal Characteristics @ TA = 25°C unless otherwise specified

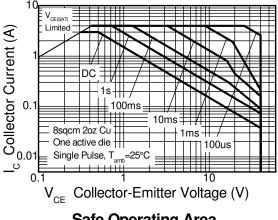
Characteristic		Symbol	Value	Unit	
	(Notes 4 & 7)		1.5 12		
Power Dissipation	(Notes 5 & 7)		2.45 19.6	w	
Linear Derating Factor	(Notes 6 & 7)	P <sub>D</sub>	1.13 8	mW/°C	
	(Notes 6 & 8)		1.7 13.6		
	(Notes 4 & 7)		83.3		
Thermal Decistores, Junction to Ambient	(Notes 5 & 7)		51.0		
Thermal Resistance, Junction to Ambient	(Notes 6 & 7)	$R_{\theta JA}$	111	°C/W	
	(Notes 6 & 8)		73.5		
Thermal Resistance, Junction to Lead	(Notes 7 & 9)	$R_{\theta JL}$	17.1		
Operating and Storage Temperature Range	•	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

Notes:

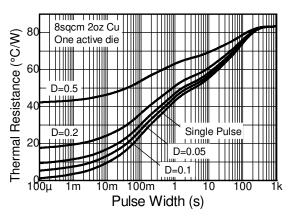
- 4. For a dual device surface mounted on 28mm x 28mm (8cm²) FR4 PCB with high coverage of single sided 2 oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The heatsink is split in half with the exposed collector pads connected to each half.
- 5. Same as note (4), except the device is measured at t <5 sec.
- 6. Same as note (4), except the device is surface mounted on 31mm x 31mm (10cm²) FR4 PCB with high coverage of single sided 1oz copper.
- 7. For a dual device with one active die.
- 8. For dual device with 2 active die running at equal power.
- 9. Thermal resistance from junction to solder-point (at the end of the collector lead).



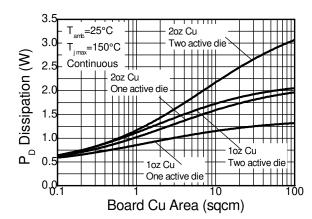
# **Thermal Characteristics**



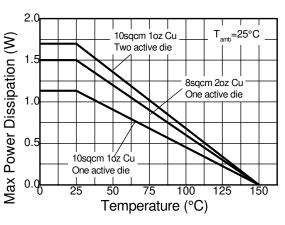
# Safe Operating Area



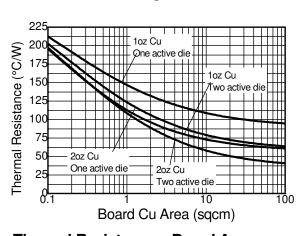
# **Transient Thermal Impedance**



**Power Dissipation v Board Area** 



# **Derating Curve**



Thermal Resistance v Board Area





# Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

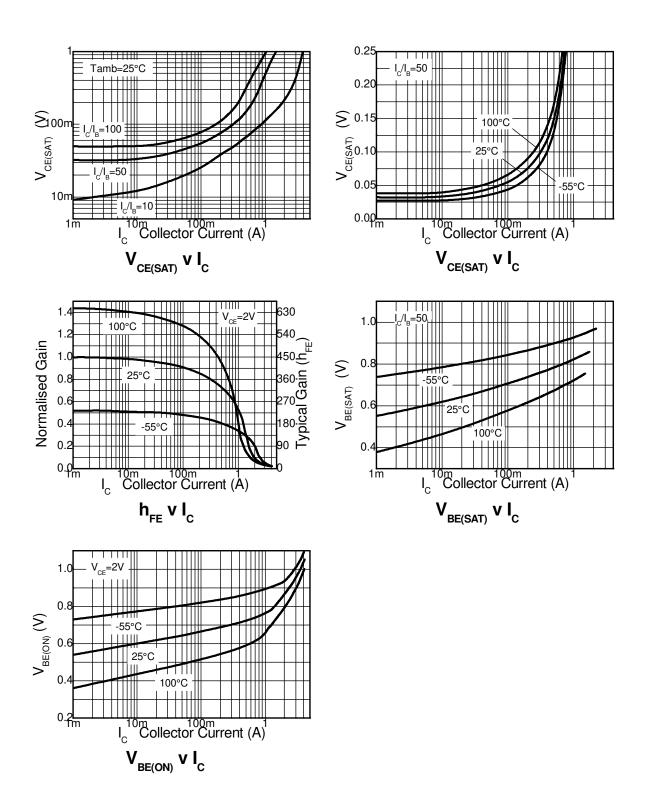
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	-50	-80	-	V	$I_C = -100 \mu A$
Collector-Emitter Breakdown Voltage (Note 10)	$V_{(BR)CEO}$	-40	-70	-	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-7	-8.5	-	V	$I_E = -100 \mu A$
Collector Cutoff Current	I <sub>CBO</sub>	-	-	-100	nA	$V_{CB} = -40V$
Emitter Cutoff Current	I <sub>EBO</sub>	-	-	-100	nA	V <sub>EB</sub> = -6V
Collector Emitter Cutoff Current	I <sub>CES</sub>	-	-	-100	nA	V <sub>CES</sub> = -32V
		300	480	-	-	$I_C = -10 \text{mA}, V_{CE} = -2 \text{V}$
		300	450	-	-	$I_C = -100 \text{mA}, V_{CE} = -2 \text{V}$
Static Forward Current Transfer Ratio (Note 10)	h <sub>FE</sub>	180	290	-	-	$I_{C} = -1A, V_{CE} = -2V$
	,	60	130	-	-	$I_C = -1.5A$ , $V_{CE} = -2V$
		12	22	-	-	$I_C = -3A$ , $V_{CE} = -2V$
	V <sub>CE(sat)</sub>	-	-25	-40	mV	I <sub>C</sub> =- 0.1A, I <sub>B</sub> = -10mA
		-	-150	-220		$I_C = -1A$ , $I_B = -50mA$
Collector-Emitter Saturation Voltage (Note 10)		-	-195	-300		$I_C = -1.5A$ , $I_B = -100mA$
		-	-210	-300		$I_C = -2A$ , $I_B = -200mA$
		-	-260	-370		$I_C = -2.5A$ , $I_B = -250mA$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	-	-0.89	-0.95	V	I <sub>C</sub> = -2.5A, V <sub>CE</sub> = -2V
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(sat)</sub>	-	-0.97	-1.05	V	I <sub>C</sub> = -2.5A, I <sub>B</sub> = -250mA
Output Capacitance	C <sub>obo</sub>	-	19	25	pF	V <sub>CB</sub> = -10V. f = 1MHz
Transition Frequency	f <sub>T</sub>	150	190	-	MHz	$V_{CE} = -10V, I_{C} = -50mA,$ f = 100MHz
Turn-on Time	t <sub>on</sub>	-	40	-	ns	$V_{CC} = -15V, I_{C} = -0.75A$
Turn-off Time	t <sub>off</sub>	-	435	-	ns	$I_{B1} = I_{B2} = -15\text{mA}$

Notes: 10. Measured under pulsed conditions. Pulse width  $\leq$  300  $\mu$ s. Duty cycle  $\leq$  2%





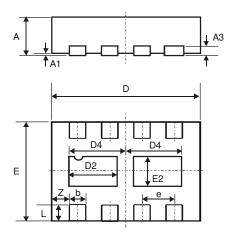
# **Typical Electrical Characteristics**





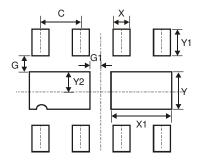


# **Package Outline Dimensions**



DFN3020B-8					
Dim	Min	Max	Тур		
Α	0.77	0.83	0.80		
A1	0	0.05	0.02		
А3	-	-	0.15		
b	0.25	0.35	0.30		
D	2.95	3.075	3.00		
D2	0.82	1.02	0.92		
D4	1.01	1.21	1.11		
е	1	-	0.65		
Е	1.95	2.075	2.00		
E2	0.43	0.63	0.53		
L	0.25	0.35	0.30		
Z	-	-	0.375		
All Dimensions in mm					

# **Suggested Pad Layout**



Dimensions	Value (in mm)
С	0.650
G	0.285
G1	0.090
Х	0.400
X1	1.120
Υ	0.730
Y1	0.500
V2	0.365





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