

**DUAL 15V NPN & 12V PNP LOW SATURATION TRANSISTOR COMBINATION**

**Features**

NPN Transistor

- $BV_{CEO} > 15V$
- $I_C = 4.5A$  Continuous Collector Current
- Low Saturation Voltage (100mV max @ 1A)
- $R_{SAT} = 45m\Omega$  for a low equivalent On-Resistance

PNP Transistor

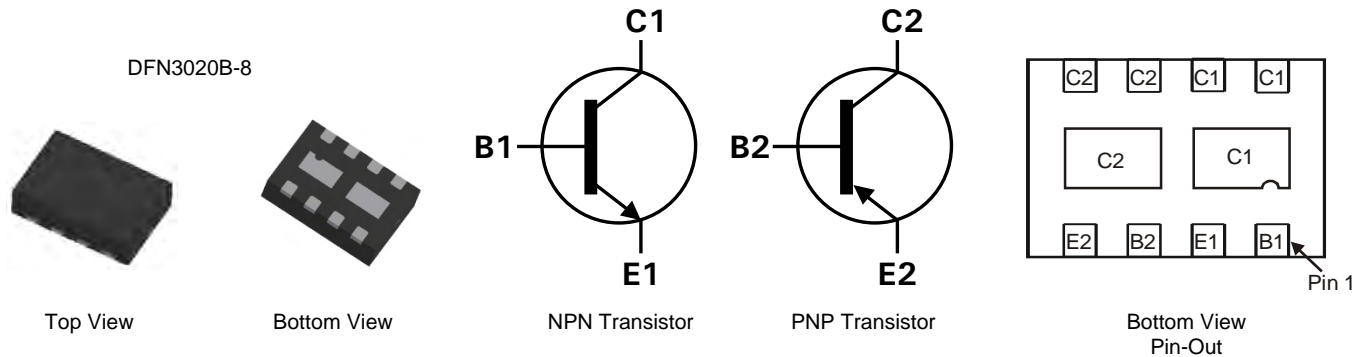
- $BV_{CEO} > -12V$
- $I_C = -4A$  Continuous Collector Current
- Low Saturation Voltage (-140mV max @ -1A)
- $R_{SAT} = 60m\Omega$  for a low equivalent On-Resistance
- $h_{FE}$  characterized up to 12A for high current gain hold up
- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$  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.
- Terminals: Pre-Plated NiPdAu leadframe.
- Nominal package height: 0.8mm
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight: 0.013 grams (approximate)

**Applications**

- DC – DC Converters
- Charging circuits
- Power switches
- Motor control
- LED Backlighting circuits
- Portable applications



**Ordering Information**

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC6717MCTA	DA1	7	8	3000

- Notes:
1. No purposefully added lead.
  2. Diodes Inc's "Green" Policy can be found on our website at <http://www.diodes.com>.

**Marking Information**



DA1 = Product type Marking Code  
Dot denotes Pin 1

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

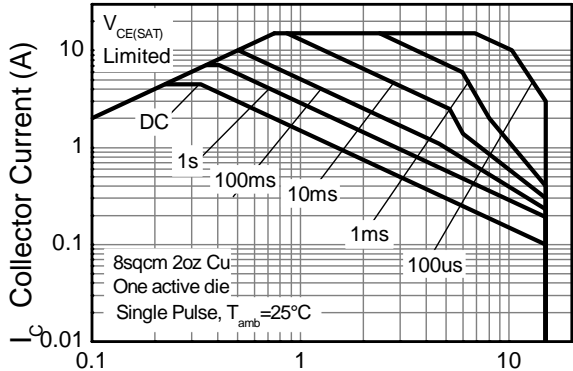
Characteristic	Symbol	NPN	PNP	Unit
Collector-Base Voltage	$V_{CBO}$	40	-20	V
Collector-Emitter Voltage	$V_{CEO}$	15	-12	V
Emitter-Base Voltage	$V_{EBO}$	7	-7	V
Peak Pulse Current	$I_{CM}$	15	-12	A
Continuous Collector Current	(Notes 3 & 6)	4.5	-4	A
	(Notes 4 & 6)			
Base Current	$I_B$	1		A

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

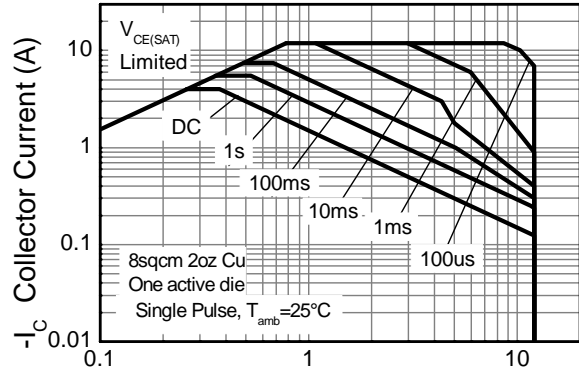
Characteristic	Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	(Notes 3 & 6)	1.5		W mW/°C
	(Notes 4 & 6)	12		
	(Notes 5 & 6)	2.45		
	(Notes 5 & 7)	19.6		
	(Notes 5 & 7)	1.13		
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	8		°C/W
		1.7		
		13.6		
		83.3		
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	51.0		°C/W
		111		
		73.5		
		17.1		
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150		°C

- Notes:
3. For a dual device surface mounted on 28mm x 28mm (8cm<sup>2</sup>) 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.
  4. Same as note (3), except the device is measured at  $t < 5$  sec.
  5. Same as note (3), except the device is surface mounted on 31mm x 31mm (10cm<sup>2</sup>) FR4 PCB with high coverage of single sided 1oz copper.
  6. For a dual device with one active die.
  7. For dual device with 2 active die running at equal power.
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).

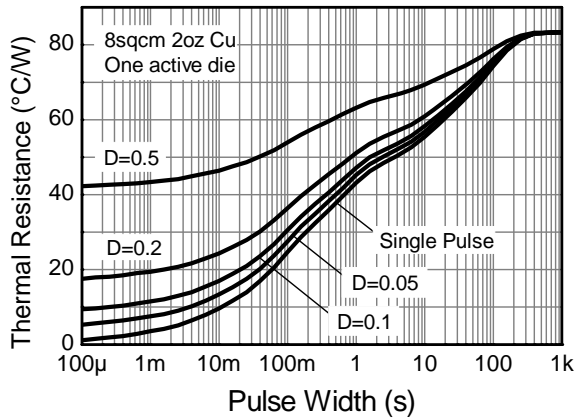
**Thermal Characteristics**



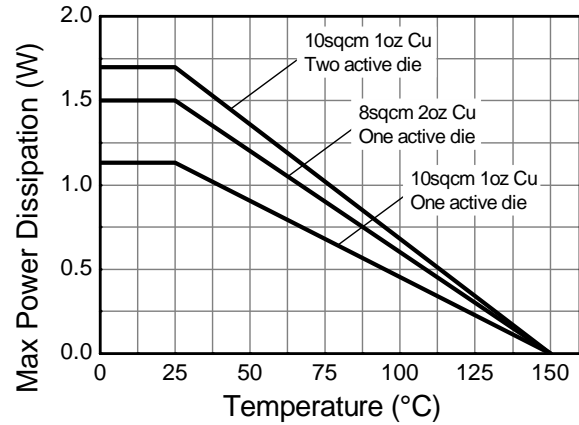
$V_{CE}$  Collector-Emitter Voltage (V)  
**NPN Safe Operating Area**



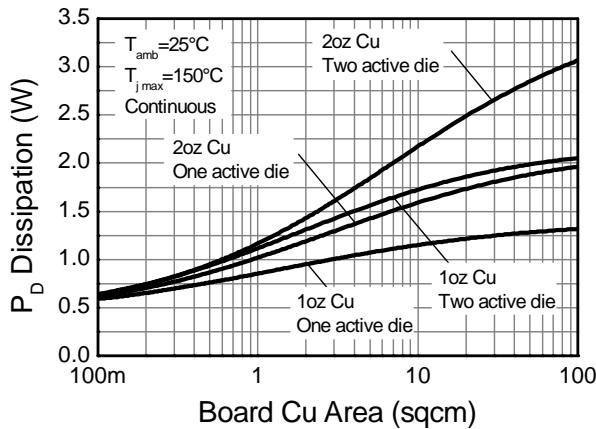
$-V_{CE}$  Collector-Emitter Voltage (V)  
**PNP Safe Operating Area**



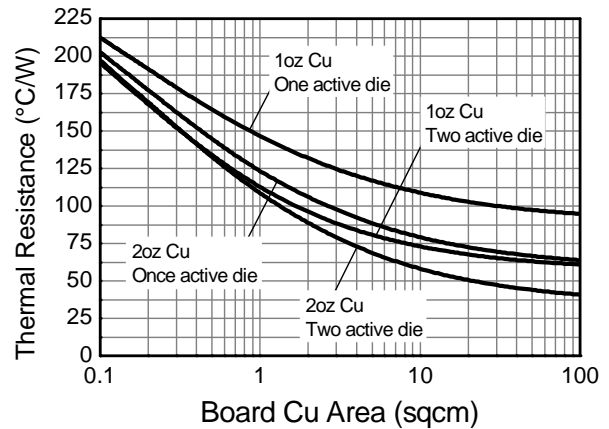
**Transient Thermal Impedance**



**Derating Curve**



**Power Dissipation v Board Area**



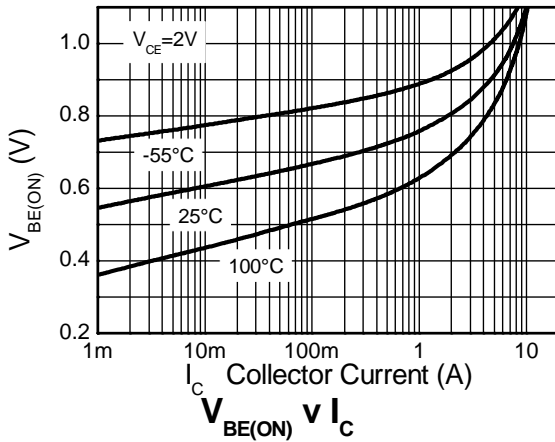
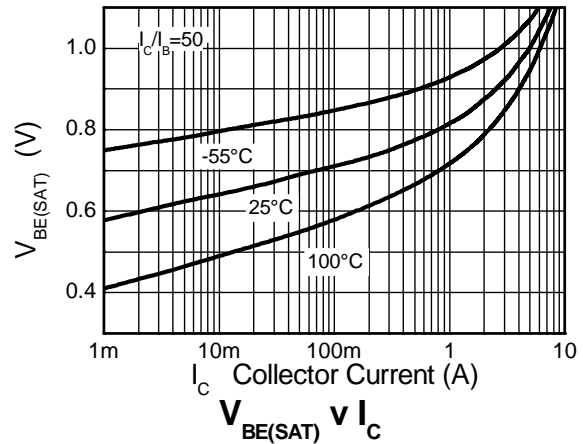
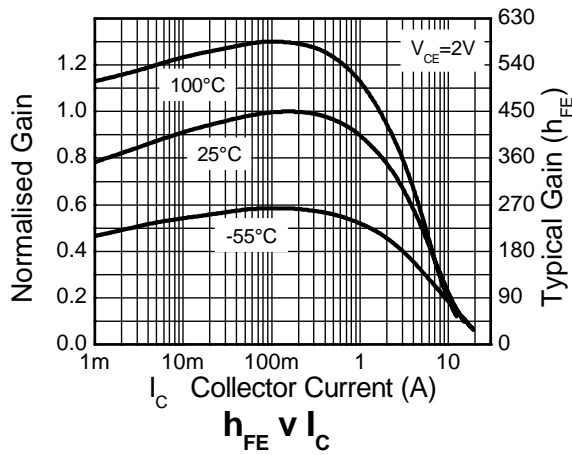
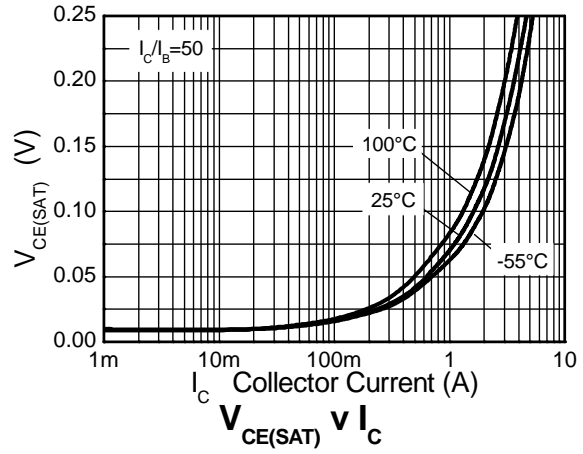
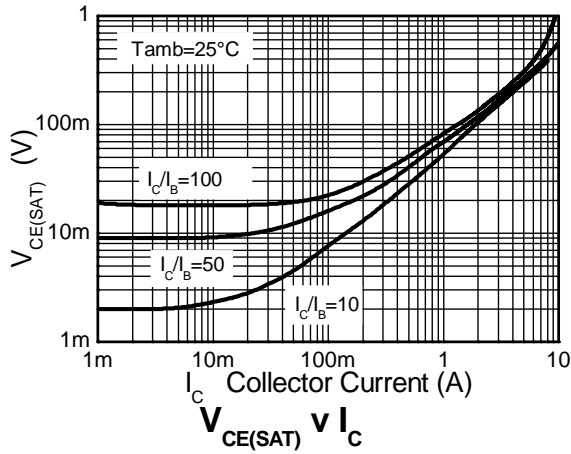
**Thermal Resistance v Board Area**

**NPN - Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	40	70	-	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	$BV_{CEO}$	15	18	-	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.2	-	V	$I_E = 100\mu\text{A}$
Collector Cutoff Current	$I_{CBO}$	-	-	100	nA	$V_{CB} = 30\text{V}$
Emitter Cutoff Current	$I_{EBO}$	-	-	100	nA	$V_{EB} = 6\text{V}$
Collector Emitter Cutoff Current	$I_{CES}$	-	-	100	nA	$V_{CE} = 12\text{V}$
Static Forward Current Transfer Ratio (Note 9)	$h_{FE}$	200 300 200 150 -	415 450 320 240 80	- - - - -	-	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$ $I_C = 200\text{mA}, V_{CE} = 2\text{V}$ $I_C = 3\text{A}, V_{CE} = 2\text{V}$ $I_C = 5\text{A}, V_{CE} = 2\text{V}$ $I_C = 12\text{A}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(sat)}$	-	8 70 165 240 200	14 100 200 310 -	mV	$I_C = 0.1\text{A}, I_B = 10\text{mA}$ $I_C = 1\text{A}, I_B = 10\text{mA}$ $I_C = 3\text{A}, I_B = 50\text{mA}$ $I_C = 4.5\text{A}, I_B = 50\text{mA}$ $I_C = 4.5\text{A}, I_B = 100\text{mA}$
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(on)}$	-	0.88	0.96	V	$I_C = 4.5\text{A}, V_{CE} = 2\text{V}$
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(sat)}$	-	0.94	1.05	V	$I_C = 4.5\text{A}, I_B = 50\text{mA}$
Output Capacitance	$C_{obo}$	-	30	40	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Transition Frequency	$f_T$	80	120	-	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Turn-on Time	$t_{on}$	-	120	-	ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$
Turn-off Time	$t_{off}$	-	160	-	ns	$I_{B1} = I_{B2} = 10\text{mA}$

Notes: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**NPN – Typical Electrical Characteristics**

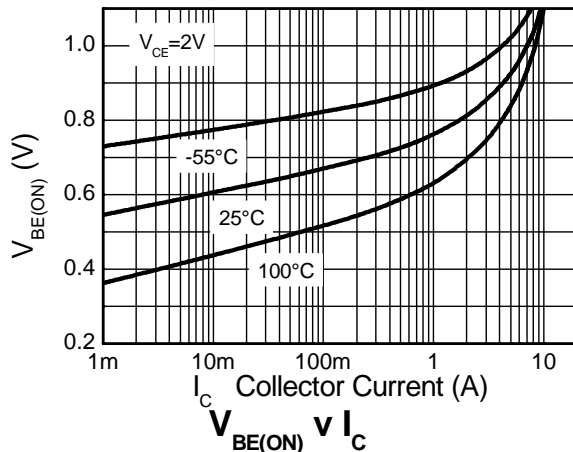
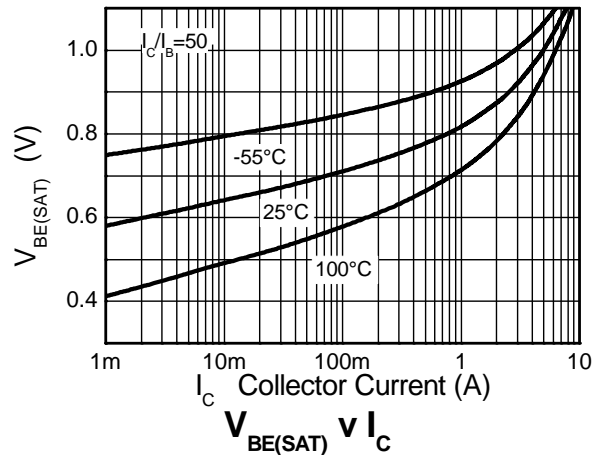
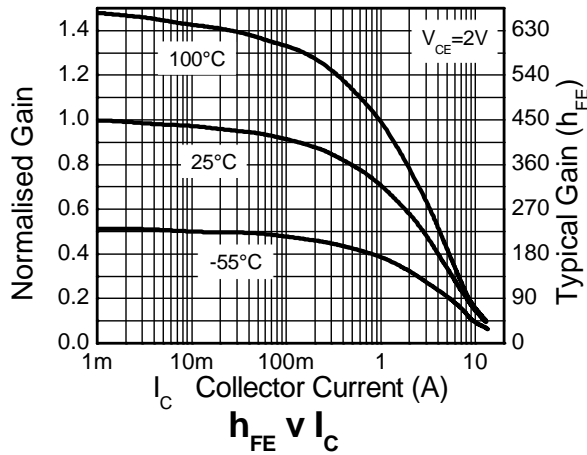
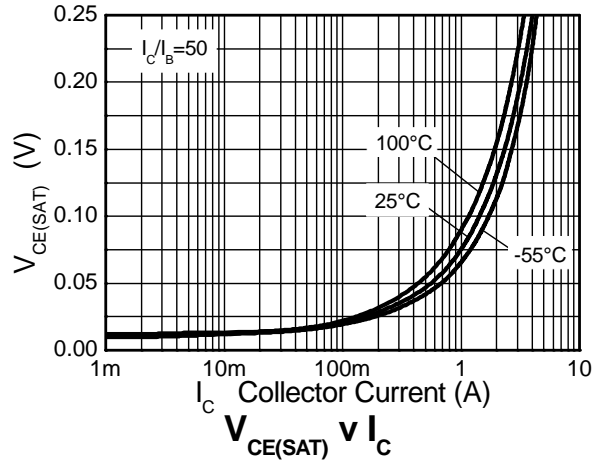
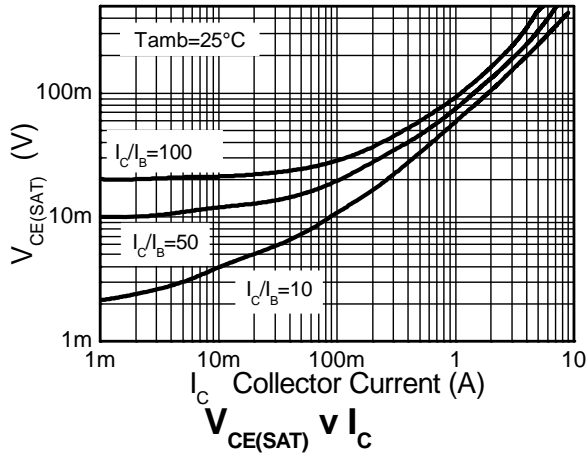


**PNP - Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

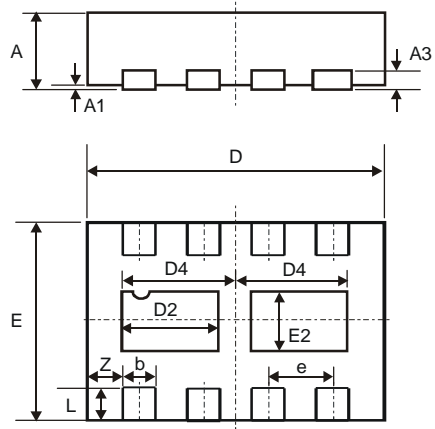
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-20	-35	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	-12	-25	-	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-8.5	-	V	$I_E = -100\mu\text{A}$
Collector Cutoff Current	$I_{CBO}$	-	-	-100	nA	$V_{CB} = -16\text{V}$
Emitter Cutoff Current	$I_{EBO}$	-	-	-100	nA	$V_{EB} = -6\text{V}$
Collector Emitter Cutoff Current	$I_{CES}$	-	-	-100	nA	$V_{CES} = -10\text{V}$
Static Forward Current Transfer Ratio (Note 10)	$h_{FE}$	300 300 180 60 45	475 450 275 100 70	- - - - -	-	$I_C = -10\text{mA}, V_{CE} = -2\text{V}$ $I_C = -100\text{mA}, V_{CE} = -2\text{V}$ $I_C = -2.5\text{A}, V_{CE} = -2\text{V}$ $I_C = -8\text{A}, V_{CE} = -2\text{V}$ $I_C = -10\text{A}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	- - - - -	-10 -100 -100 -195 -240	-17 -140 -150 -300 -310	mV	$I_C = -0.1\text{A}, I_B = -10\text{mA}$ $I_C = -1\text{A}, I_B = -10\text{mA}$ $I_C = -1.5\text{A}, I_B = -50\text{mA}$ $I_C = -3\text{A}, I_B = -50\text{mA}$ $I_C = -4\text{A}, I_B = -150\text{mA}$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	-	-0.87	-0.96	V	$I_C = -4\text{A}, V_{CE} = -2\text{V}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	-	-0.97	-1.07	V	$I_C = -4\text{A}, I_B = -150\text{mA}$
Output Capacitance	$C_{obo}$	-	21	30	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$
Transition Frequency	$f_T$	100	110	-	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
Turn-on Time	$t_{on}$	-	70	-	ns	$V_{CC} = -6\text{V}, I_C = -2\text{A}$
Turn-off Time	$t_{off}$	-	130	-	ns	$I_{B1} = I_{B2} = -50\text{mA}$

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

**PNP – Typical Electrical Characteristics**

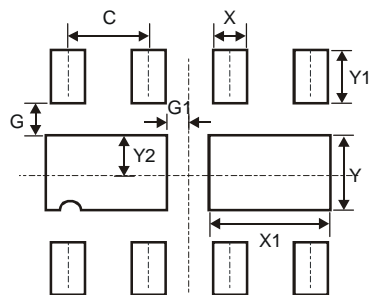


**Package Outline Dimensions**



DFN3020B-8			
Dim	Min	Max	Typ
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	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
e	-	-	0.65
E	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)
C	0.650
G	0.285
G1	0.090
X	0.400
X1	1.120
Y	0.730
Y1	0.500
Y2	0.365



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