

DUAL 50V NPN & 40V PNP LOW SATURATION TRANSISTOR COMBINATION

Features and Benefits

NPN Transistor

- $BV_{CEO} > 50V$
- $I_C = 4A$ Continuous Collector Current
- Low Saturation Voltage (100mV max @ 1A)
- $R_{SAT} = 68m\Omega$ for a low equivalent On-Resistance

PNP Transistor

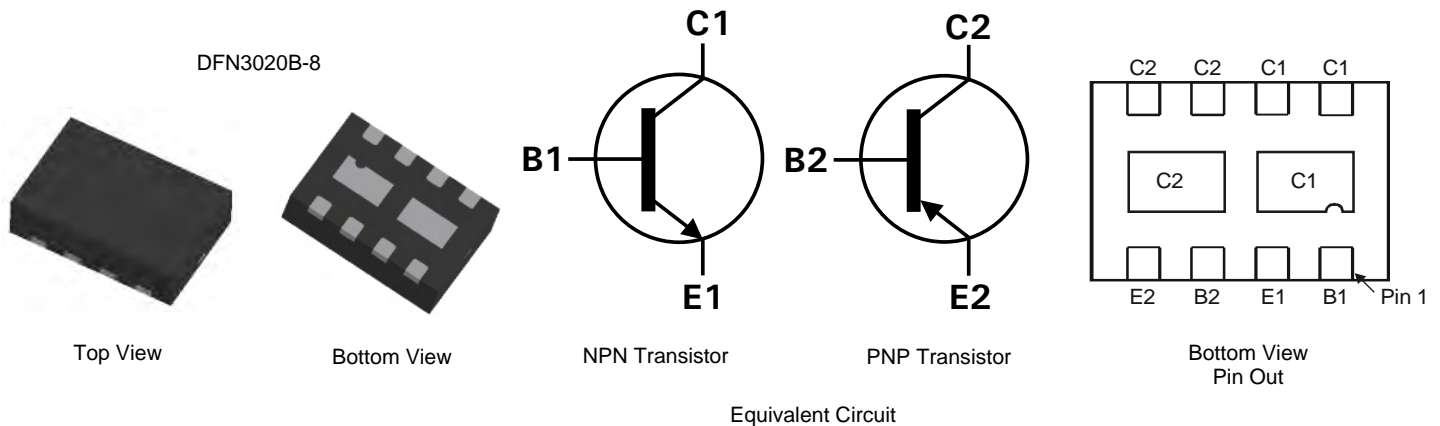
- $BV_{CEO} > -40V$
- $I_C = -3A$ Continuous Collector Current
- Low Saturation Voltage (-220mV max @ -1A)
- $R_{SAT} = 104m\Omega$ for a low equivalent On-Resistance
- h_{FE} characterized up to 6A for high current gain hold up
- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$ efficient, 40% lower than SOT26
- 6mm² 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
- CCFL Backlighting circuits
- Portable applications



Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC6719MCTA	DC3	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>
 3. For Packaging Details, go to our website at <http://www.diodes.com>.

Marking Information



DC3 = Product type Marking Code
Dot denotes Pin 1

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

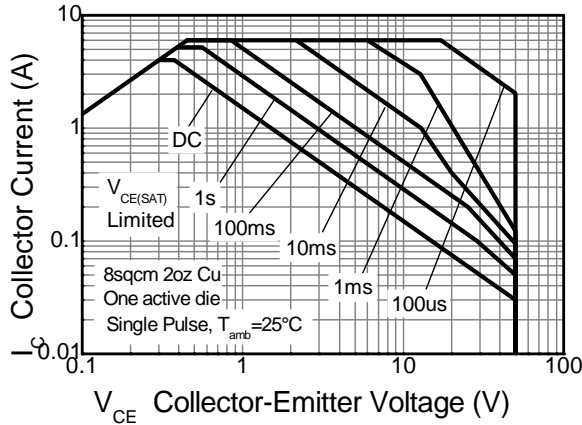
Parameter	Symbol	NPN	PNP	Unit
Collector-Base Voltage	V_{CB0}	100	-50	V
Collector-Emitter Voltage	V_{CE0}	50	-40	
Emitter-Base Voltage	V_{EB0}	7	-7	
Peak Pulse Current	I_{CM}	6	-4	A
Continuous Collector Current	(Notes 4 & 7)	4	-3	
	(Notes 5 & 7)	4.5	-3.5	
Base Current	I_B	1		

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

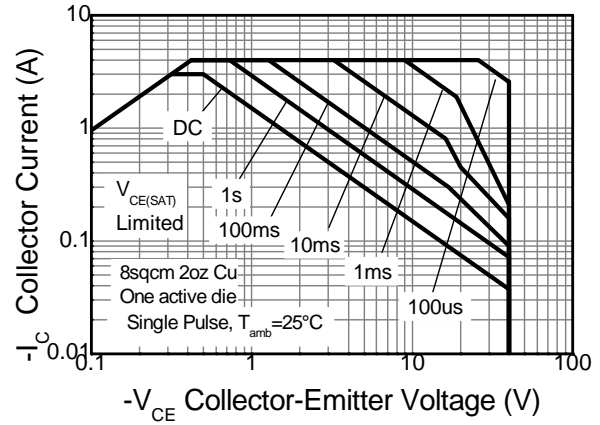
Characteristic	Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	P_D	(Notes 4 & 7)		W mW/ $^\circ\text{C}$
		(Notes 5 & 7)		
		(Notes 6 & 7)		
		(Notes 6 & 8)		
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	(Notes 4 & 7)		$^\circ\text{C/W}$
		(Notes 5 & 7)		
		(Notes 6 & 7)		
		(Notes 6 & 8)		
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	(Notes 7 & 9)		$^\circ\text{C}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150		$^\circ\text{C}$

- 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 (3), except the device is measured at $t < 5$ sec.
 6. Same as note (3), 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).

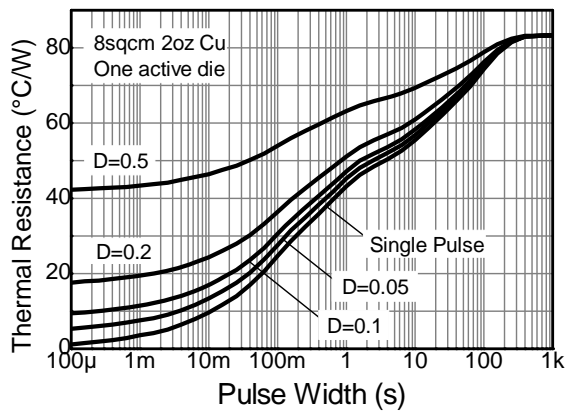
Thermal Characteristics



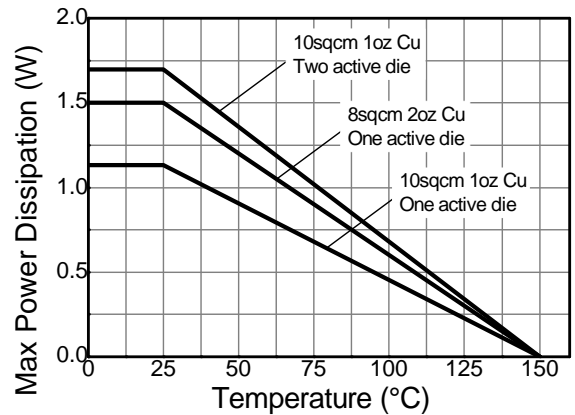
NPN Safe Operating Area



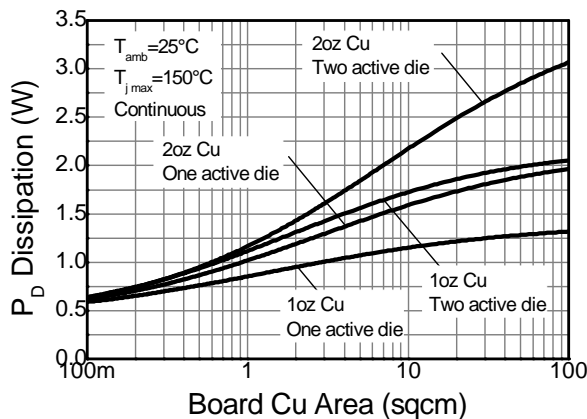
PNP Safe Operating Area



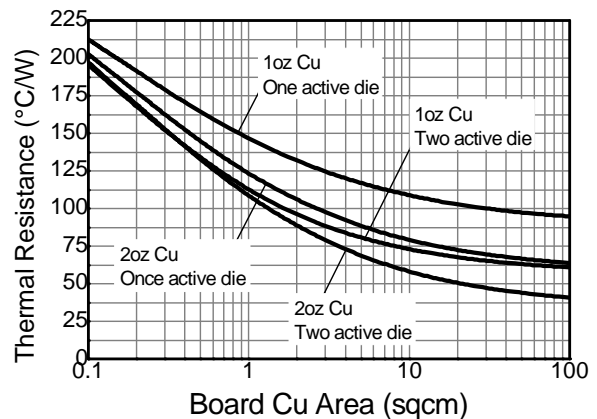
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



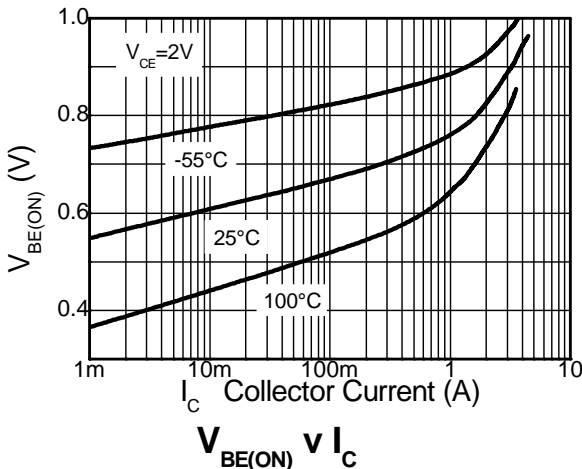
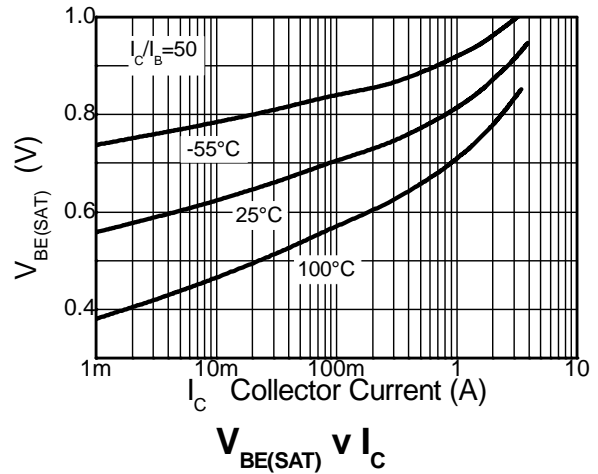
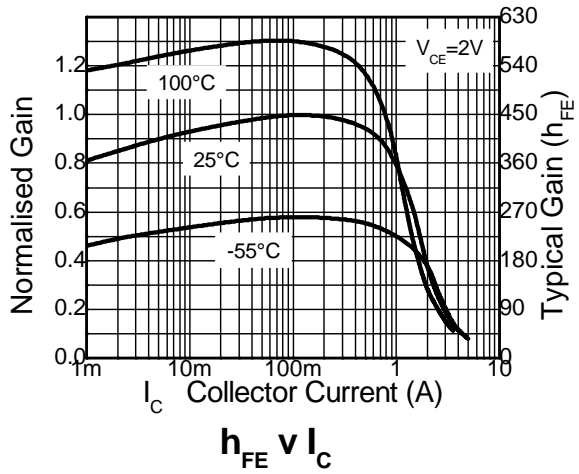
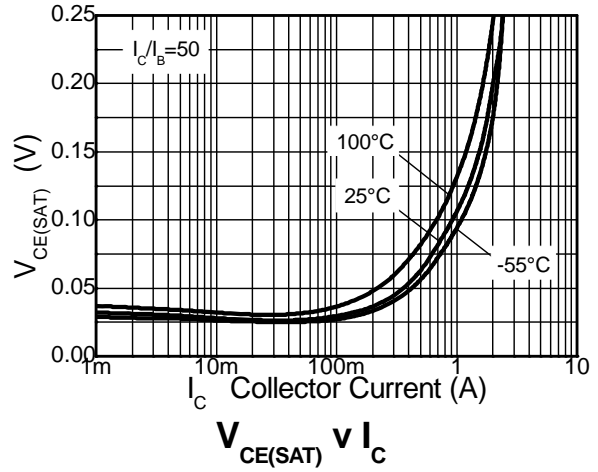
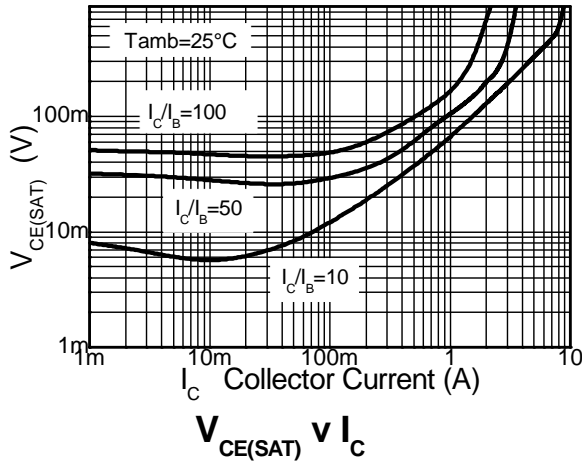
Thermal Resistance v Board Area

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	100	190	-	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	$V_{(BR)CEO}$	50	65	-	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7	8.2	-	V	$I_E = 100\mu\text{A}$
Collector Cutoff Current	I_{CBO}	-	-	100	nA	$V_{CB} = 80\text{V}$
Emitter Cutoff Current	I_{EBO}	-	-	100	nA	$V_{EB} = 6\text{V}$
Collector Emitter Cutoff Current	I_{CES}	-	-	100	nA	$V_{CES} = 40\text{V}$
Static Forward Current Transfer Ratio (Note 10)	h_{FE}	200	400	-	-	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$
		300	450	-		$I_C = 200\text{mA}, V_{CE} = 2\text{V}$
		200	400	-		$I_C = 1\text{A}, V_{CE} = 2\text{V}$
		100	225	-		$I_C = 2\text{A}, V_{CE} = 2\text{V}$
		-	40	-		$I_C = 6\text{A}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	-	10	20	mV	$I_C = 0.1\text{A}, I_B = 10\text{mA}$
		-	145	200		$I_C = 1\text{A}, I_B = 10\text{mA}$
		-	70	100		$I_C = 1\text{A}, I_B = 50\text{mA}$
		-	115	220		$I_C = 2\text{A}, I_B = 50\text{mA}$
		-	225	300		$I_C = 3\text{A}, I_B = 100\text{mA}$
		-	270	320		$I_C = 4\text{A}, I_B = 200\text{mA}$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	-	0.94	1.00	V	$I_C = 4\text{A}, V_{CE} = 2\text{V}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	-	1.00	1.07	V	$I_C = 4\text{A}, I_B = 200\text{mA}$
Output Capacitance	C_{obo}	-	12	20	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Transition Frequency	f_T	100	165	-	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Turn-on Time	t_{on}	-	170	-	ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$
Turn-off Time	t_{off}	-	750	-	ns	$I_{B1} = I_{B2} = 10\text{mA}$

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

NPN – Typical Electrical Characteristics

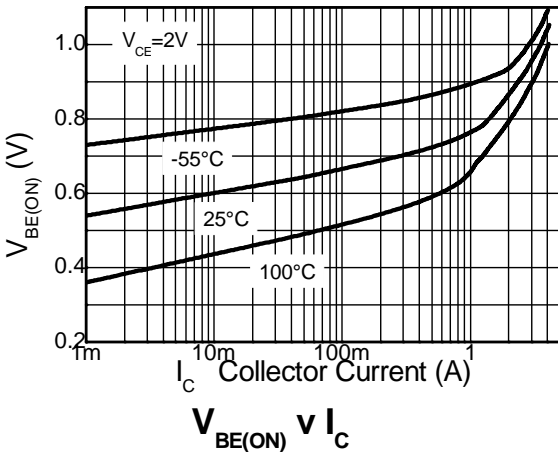
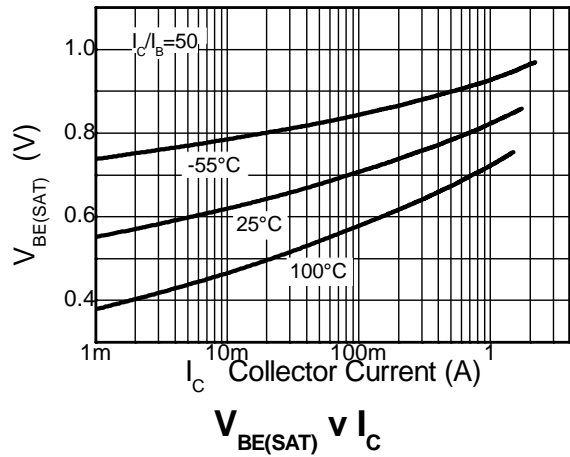
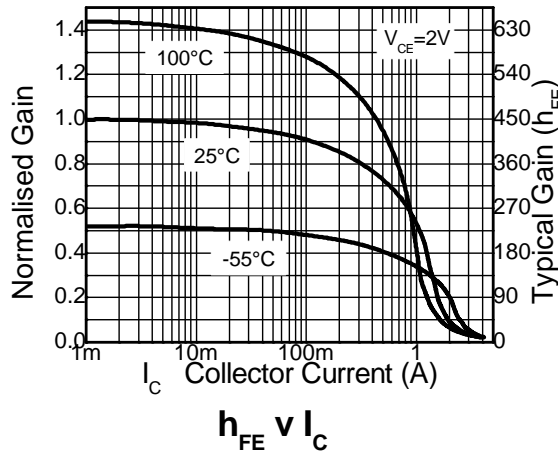
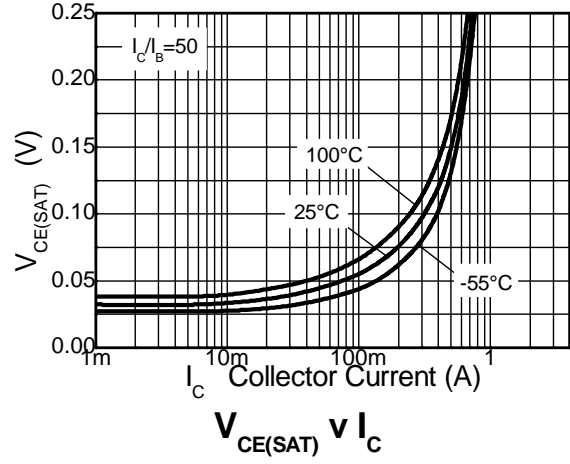
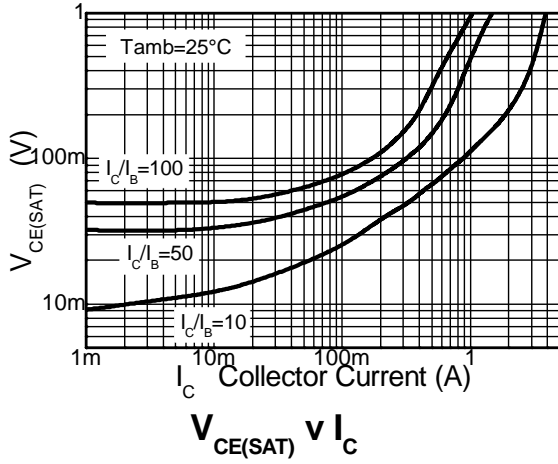


PNP - Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

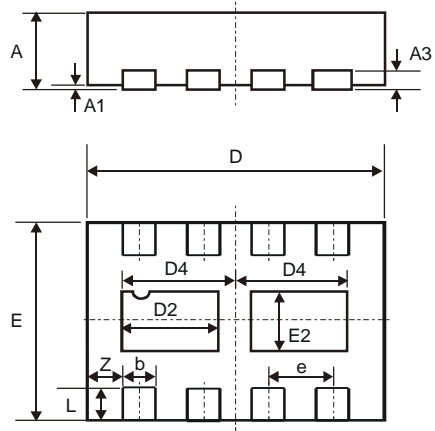
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-50	-80	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 11)	$V_{(BR)CEO}$	-40	-70	-	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-7	-8.5	-	V	$I_E = -100\mu\text{A}$
Collector Cutoff Current	I_{CBO}	-	-	-100	nA	$V_{CB} = -40\text{V}$
Emitter Cutoff Current	I_{EBO}	-	-	-100	nA	$V_{EB} = -6\text{V}$
Collector Emitter Cutoff Current	I_{CES}	-	-	-100	nA	$V_{CES} = -32\text{V}$
Static Forward Current Transfer Ratio (Note 11)	h_{FE}	300	480	-	-	$I_C = -10\text{mA}, V_{CE} = -2\text{V}$
		300	450	-		$I_C = -100\text{mA}, V_{CE} = -2\text{V}$
		180	290	-		$I_C = -1\text{A}, V_{CE} = -2\text{V}$
		60	130	-		$I_C = -1.5\text{A}, V_{CE} = -2\text{V}$
		12	22	-		$I_C = -3\text{A}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	-	-25	-40	mV	$I_C = -0.1\text{A}, I_B = -10\text{mA}$
		-	-150	-220		$I_C = -1\text{A}, I_B = -50\text{mA}$
		-	-195	-300		$I_C = -1.5\text{A}, I_B = -100\text{mA}$
		-	-210	-300		$I_C = -2\text{A}, I_B = -200\text{mA}$
		-	-260	-370		$I_C = -2.5\text{A}, I_B = -250\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	-	-0.89	-0.95	V	$I_C = -2.5\text{A}, V_{CE} = -2\text{V}$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	-	-0.97	-1.05	V	$I_C = -2.5\text{A}, I_B = -250\text{mA}$
Output Capacitance	C_{obo}	-	19	25	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$
Transition Frequency	f_T	150	190	-	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
Turn-on Time	t_{on}	-	40	-	ns	$V_{CC} = -15\text{V}, I_C = -0.75\text{A}$
Turn-off Time	t_{off}	-	435	-	ns	$I_{B1} = I_{B2} = -10\text{mA}$

Notes: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

PNP – Typical Electrical Characteristics

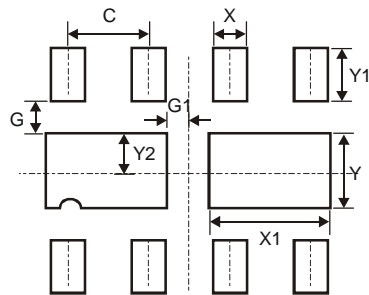


Package Outline Dimensions



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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