

DUAL 80V NPN & 70V PNP LOW SATURATION TRANSISTOR COMBINATION

Features

- NPN Transistor
 - $V_{CE0} = 80V$
 - $R_{SAT} = 68\ m\Omega$
 - $I_C = 3.5A$
- PNP Transistor
 - $V_{CE0} = -70V$
 - $R_{SAT} = 117\ m\Omega$
 - $I_C = -2.5A$
- $I_C = -3.5A$ Continuous Collector Current
- Low Saturation Voltage (-185mV max @ 1A -- NPN)
- h_{FE} characterized up to -5A
- **Lead, Halogen, and Antimony Free/RoHS Compliant (Note 1)**
- **"Green" Devices (Note 2)**

Mechanical Data

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

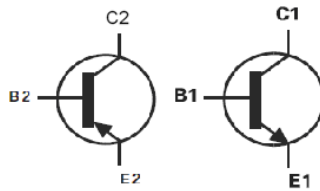
Applications

- DC – DC Converters
- Charging circuits
- Power switches
- Motor control

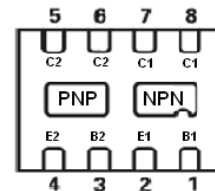
DFN3020B-8



Top View



Device Symbol



Pin Configuration

Ordering Information

Product	Status	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC6720MCTA	Active	DE4	7	8	3000

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

Marking Information



DE4 = Product type Marking Code
Dot denotes Pin 1

Maximum Ratings

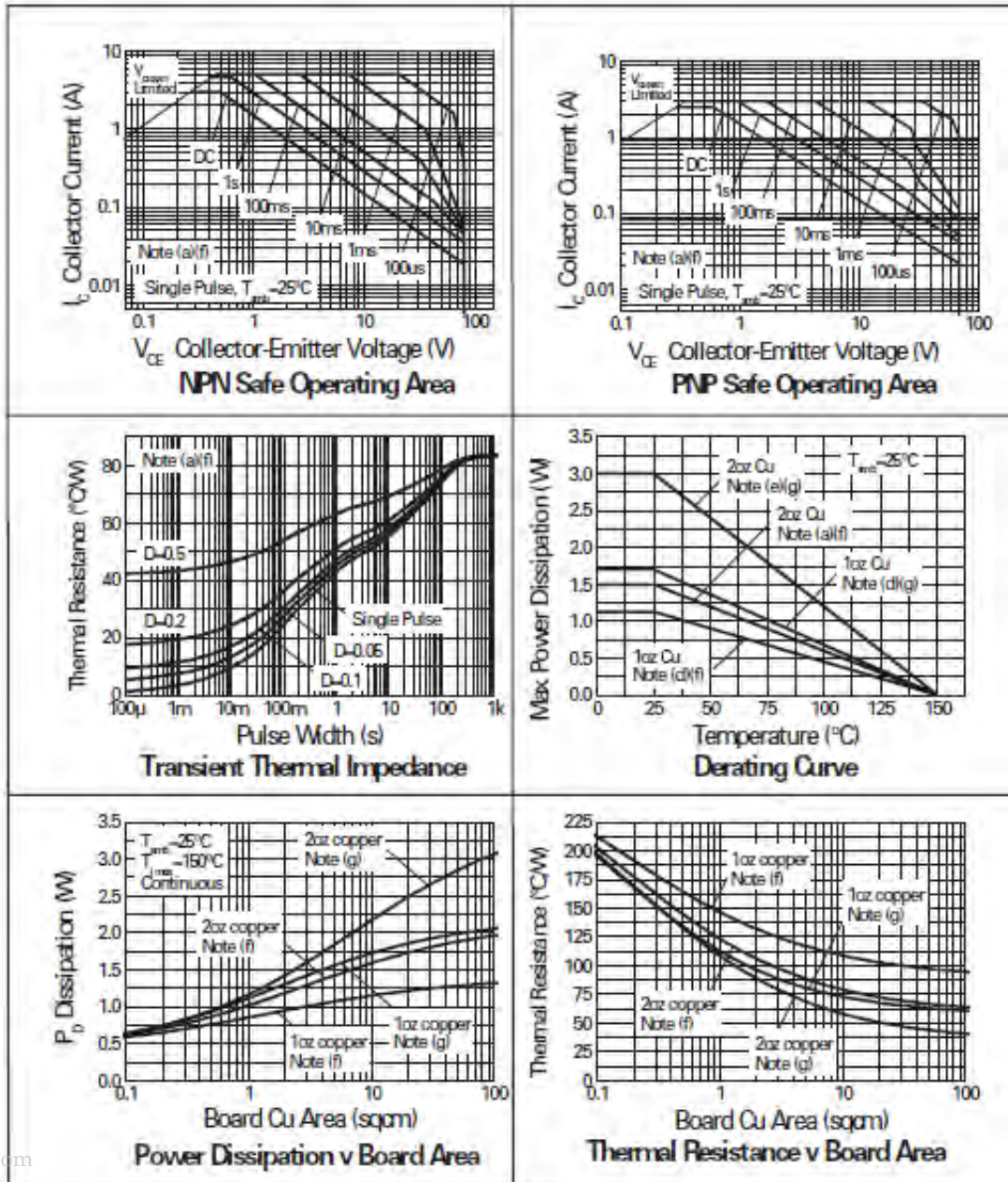
Parameter	Symbol	NPN	PNP	Unit
Collector-Base Voltage	V_{CBO}	100	-70	V
Collector-Emitter Voltage	V_{CEO}	80	-70	V
Emitter-Base Voltage	V_{EBO}	7.5	-7.5	V
Peak Pulse Current	I_{CM}	5	-3	A
Continuous Collector Current (a) (f)	I_C	3.5	-2.5	A
Base Current	I_B		1	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation at $T_A = 25^\circ\text{C}$ (a) (f) Linear Derating Factor	P_D	1.5 12	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (b) (f) Linear Derating Factor	P_D	2.45 19.6	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (c) (f) Linear Derating Factor	P_D	1 8	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (d) (f) Linear Derating Factor	P_D	1.13 9	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (d) (g) Linear Derating Factor	P_D	1.7 13.6	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (e) (g) Linear Derating Factor	P_D	3 24	W mW/ $^\circ\text{C}$
Junction to Ambient (a) (f)	$R_{\theta JA}$	83.3	$^\circ\text{C}/\text{W}$
Junction to Ambient (b) (f)	$R_{\theta JA}$	51	$^\circ\text{C}/\text{W}$
Junction to Ambient (c) (f)	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Junction to Ambient (d) (f)	$R_{\theta JA}$	111	$^\circ\text{C}/\text{W}$
Junction to Ambient (d) (g)	$R_{\theta JA}$	73.5	$^\circ\text{C}/\text{W}$
Junction to Ambient (e) (g)	$R_{\theta JA}$	41.7	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Operating and Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
- For a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - Measured at $t < 5$ secs for a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with minimal lead connections only**.
 - For a dual device surface mounted on 10 sq cm single sided 1 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device surface mounted on 85 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device with one active die.
 - For dual device with 2 active die running at equal power.

Thermal Characteristics and Derating information



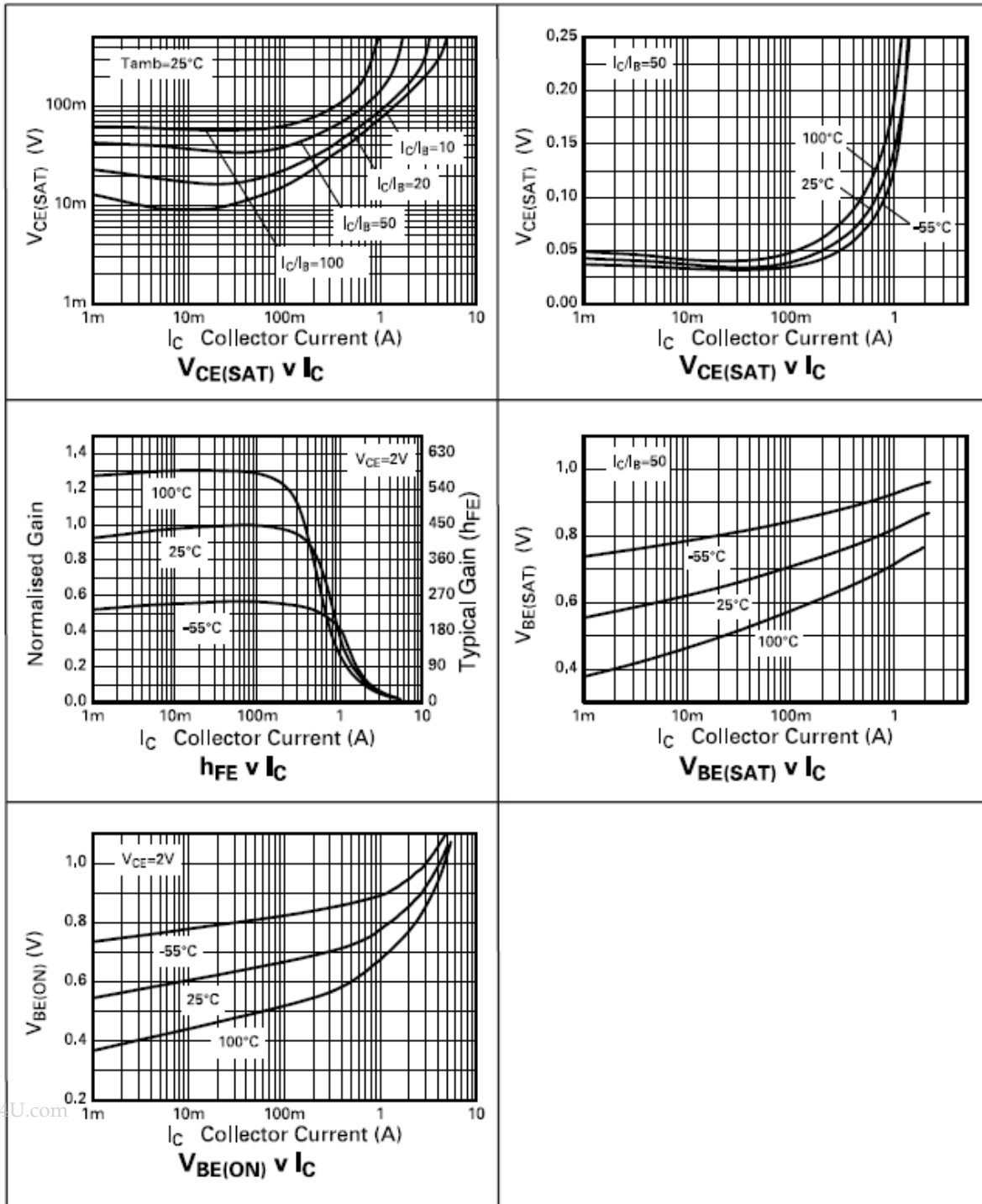
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Electrical Characteristics, NPN Transistor (at $T_A = 25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	100	180	-	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 3)	$V_{(BR)CEO}$	80	110	-	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7.5	8.2	-	V	$I_E = 100\mu\text{A}$
Collector Cutoff Current	I_{CBO}	-	-	25	nA	$V_{CB} = 80\text{V}$
Emitter Cutoff Current	I_{EBO}	-	-	25	nA	$V_{EB} = 6\text{V}$
Collector Emitter Cutoff Current	I_{CES}	-	-	25	nA	$V_{CE} = 65\text{V}$
Static Forward Current Transfer Ratio (Note 3)	h_{FE}	200 300 110 60 20 -	450 450 170 90 30 10	- 900 - - - -	-	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$ $I_C = 200\text{mA}, V_{CE} = 2\text{V}$ $I_C = 1\text{A}, V_{CE} = 2\text{V}$ $I_C = 1.5\text{A}, V_{CE} = 2\text{V}$ $I_C = 3\text{A}, V_{CE} = 2\text{V}$ $I_C = 5\text{A}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 3)	$V_{CE(sat)}$	- - - - -	15 45 145 160 240	20 60 185 200 325	mV	$I_C = 0.1\text{A}, I_B = 10\text{mA}$ $I_C = 0.5\text{A}, I_B = 50\text{mA}$ $I_C = 1\text{A}, I_B = 20\text{mA}$ $I_C = 1.5\text{A}, I_B = 50\text{mA}$ $I_C = 3.5\text{A}, I_B = 300\text{mA}$
Base-Emitter Turn-On Voltage (Note 3)	$V_{BE(on)}$	-	0.96	1.05	V	$I_C = 3.5\text{A}, V_{CE} = 2\text{V}$
Base-Emitter Saturation Voltage (Note 3)	$V_{BE(sat)}$	-	1.09	1.175	V	$I_C = 3.5\text{A}, I_B = 300\text{mA}$
Output Capacitance	C_{obo}	-	11.5	18	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Transition Frequency	f_T	100	160	-	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Turn-on Time	t_{on}	-	86	-	ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$
Turn-off Time	t_{off}	-	1128	-	ns	$I_{B1} = I_{B2} = 25\text{mA}$

Notes: 3. Measured under pulsed conditions.

NPN Characteristics



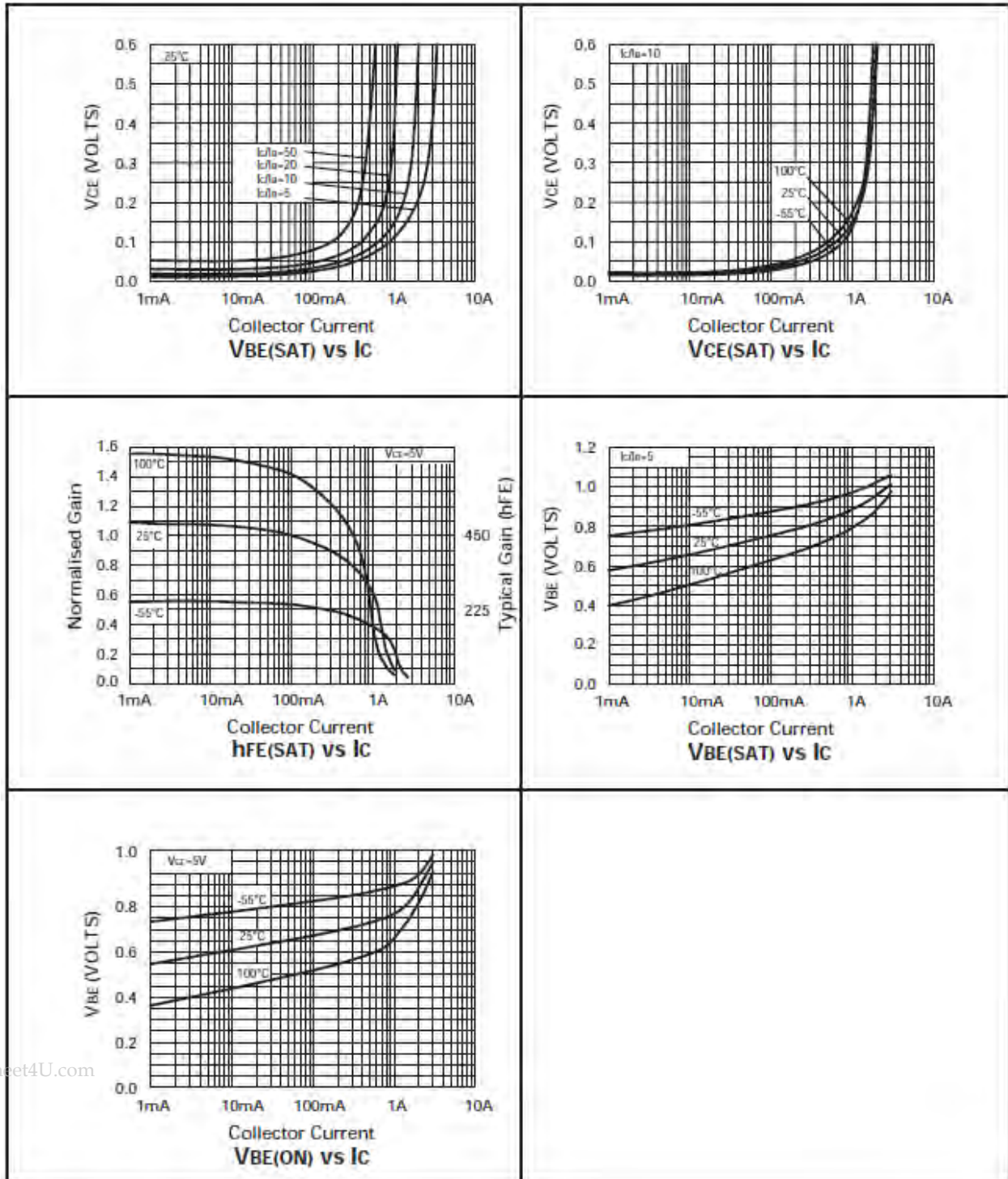
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Electrical Characteristics, PNP Transistor @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-70	-150	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 4)	$V_{(BR)CEO}$	-70	-125	-	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-7.5	-8.5	-	V	$I_E = -100\mu\text{A}$
Collector Cutoff Current	I_{CBO}	-	-	-25	nA	$V_{CB} = -55\text{V}$
Emitter Cutoff Current	I_{EBO}	-	-	-25	nA	$V_{EB} = -6\text{V}$
Collector Emitter Cutoff Current	I_{CES}	-	-	-25	nA	$V_{CE} = -55\text{V}$
Static Forward Current Transfer Ratio (Note 4)	h_{FE}	300 300 175 40 -	470 450 275 60 10	- - - - -	-	$I_C = -10\text{mA}, V_{CE} = -5\text{V}$ $I_C = -100\text{mA}, V_{CE} = -5\text{V}$ $I_C = -1\text{A}, V_{CE} = -5\text{V}$ $I_C = -1.5\text{A}, V_{CE} = -5\text{V}$ $I_C = -3\text{A}, V_{CE} = -5\text{V}$
Collector-Emitter Saturation Voltage (Note 4)	$V_{CE(sat)}$	- - - -	-35 -135 -140 -175	-50 -200 -220 -260	mV	$I_C = -0.1\text{A}, I_B = -10\text{mA}$ $I_C = -0.5\text{A}, I_B = -20\text{mA}$ $I_C = -1.0\text{A}, I_B = -100\text{mA}$ $I_C = -1.5\text{A}, I_B = -200\text{mA}$
Base-Emitter Turn-On Voltage (Note 4)	$V_{BE(on)}$	-	0.78	1.00	V	$I_C = -1.5\text{A}, V_{CE} = -5\text{V}$
Base-Emitter Saturation Voltage (Note 4)	$V_{BE(sat)}$	-	0.94	1.05	V	$I_C = -1.5\text{A}, I_B = -200\text{mA}$
Output Capacitance	C_{obo}	-	14	20	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$
Transition Frequency	f_T	150	180	-	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
Turn-on Time	t_{on}	-	40	-	ns	$V_{CC} = -50\text{V}, I_C = -1\text{A}$
Turn-off Time	t_{off}	-	700	-	ns	$I_{B1} = I_{B2} = -50\text{mA}$

Notes: 4. Measured under pulsed conditions.

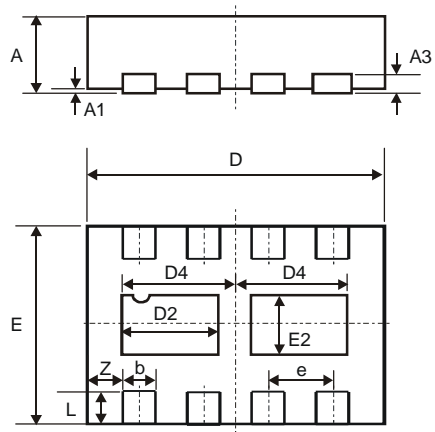
PNP Characteristics



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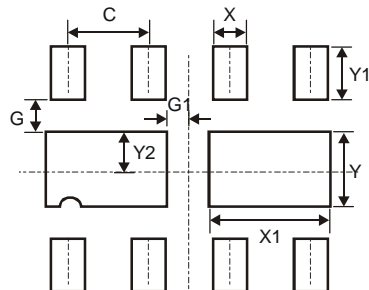
ZXTC6720MC

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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