

**ZXTC6720MC**

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

**Features and Benefits**

**NPN Transistor**

- $BV_{CEO} > 80V$
- $I_C = 3.5A$  Continuous Collector Current
- Low Saturation Voltage (185mV max @ 1A)
- $R_{SAT} = 68m\Omega$  for a low equivalent On-Resistance

**PNP Transistor**

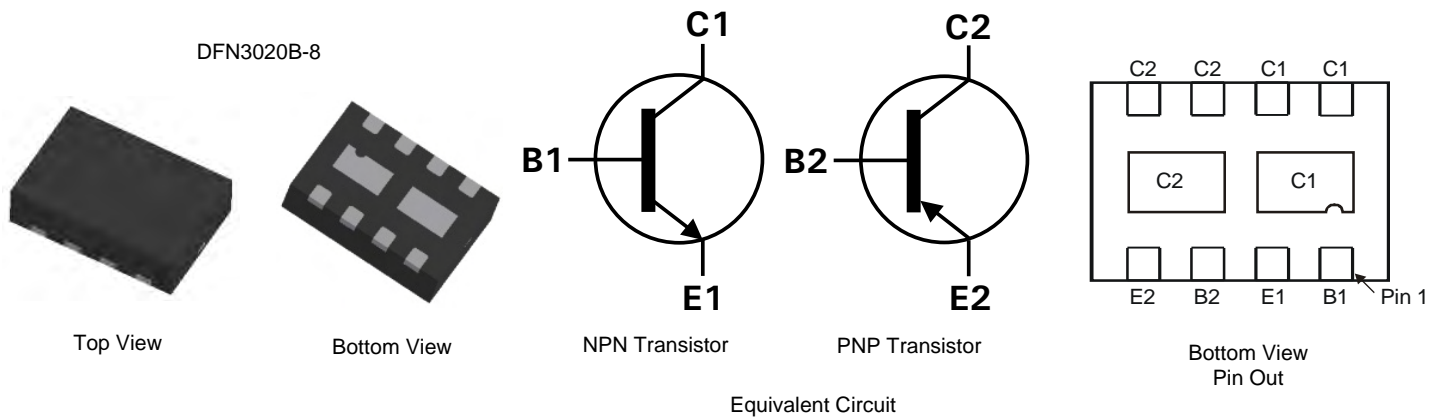
- $BV_{CEO} > -70V$
- $I_C = -2.5A$  Continuous Collector Current
- Low Saturation Voltage (-220mV max @ -1A)
- $R_{SAT} = 117m\Omega$  for a low equivalent On-Resistance
- $h_{FE}$  characterized up to -5A for high current gain hold up
- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$  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
- Portable applications



**Ordering Information** (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC6720MCTA	DE4	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**



DE4 = Product type marking code  
Top View, Dot Denotes Pin 1

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

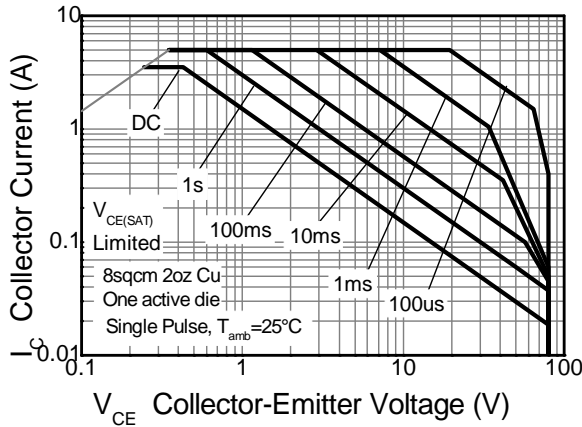
Parameter	Symbol	NPN	PNP	Unit
Collector-Base Voltage	$V_{CBO}$	100	-70	V
Collector-Emitter Voltage	$V_{CEO}$	80	-70	
Emitter-Base Voltage	$V_{EBO}$	7	-7	
Peak Pulse Current	$I_{CM}$	5	-3	A
Continuous Collector Current	(Notes 4 & 7)	3.5	-2.5	
	(Notes 5 & 7)	4	-3	
Base Current	$I_B$	1		

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

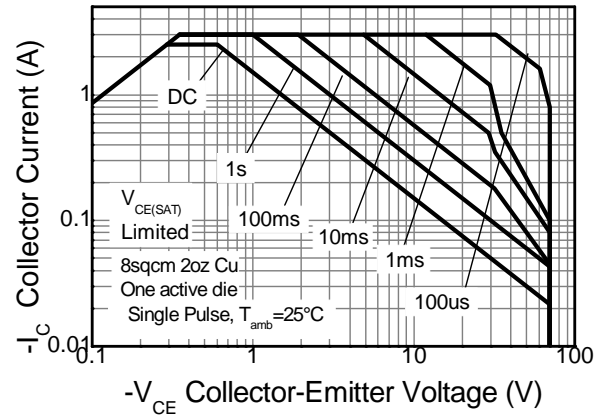
Characteristic	Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	$P_D$	(Notes 4 & 7)		W mW/°C
		(Notes 5 & 7)		
		(Notes 6 & 7)		
		(Notes 6 & 8)		
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	(Notes 4 & 7)		°C/W
		(Notes 5 & 7)		
		(Notes 6 & 7)		
		(Notes 6 & 8)		
Thermal Resistance,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

- Notes:
4. 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.
  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 (10cm<sup>2</sup>) 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).

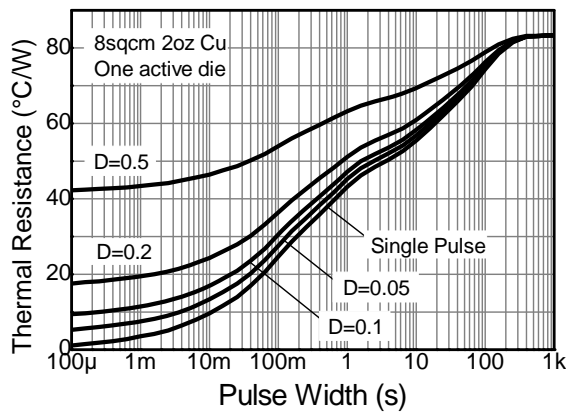
**Thermal Characteristics**



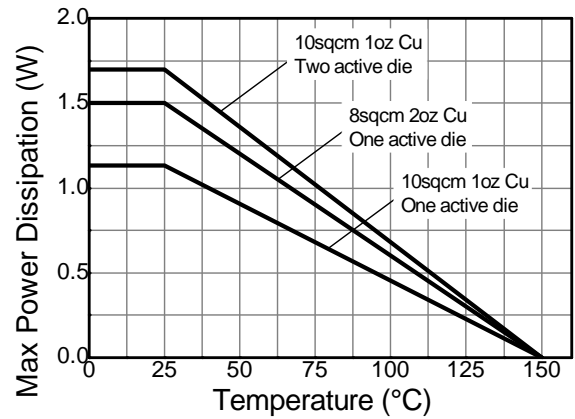
**NPN Safe Operating Area**



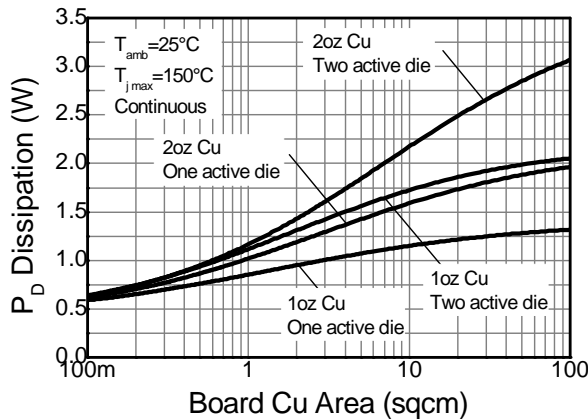
**PNP Safe Operating Area**



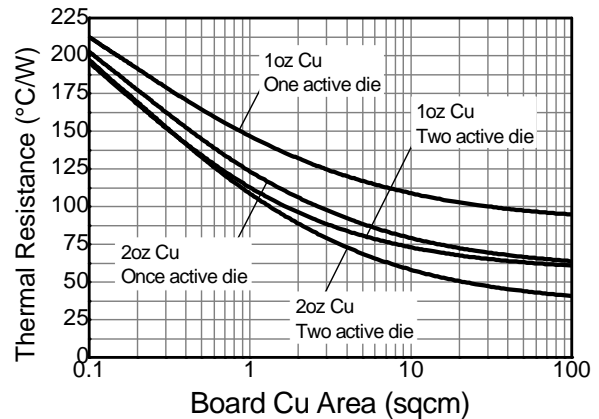
**Transient Thermal Impedance**



**Derating Curve**



**Power Dissipation v Board Area**



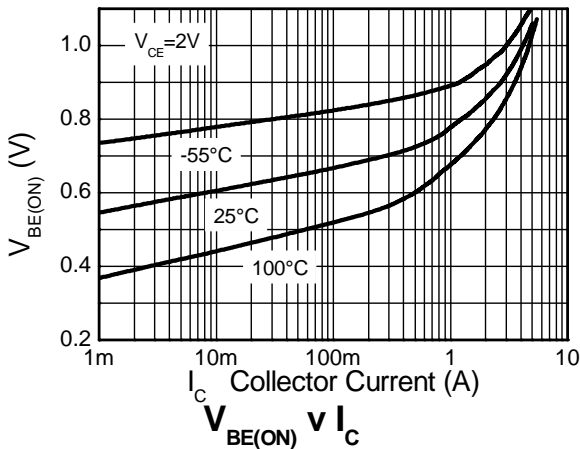
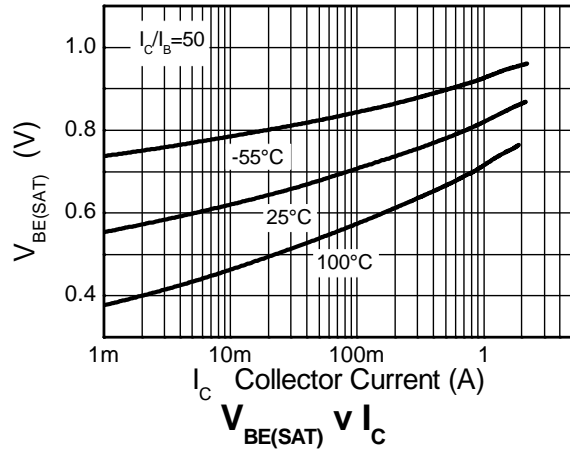
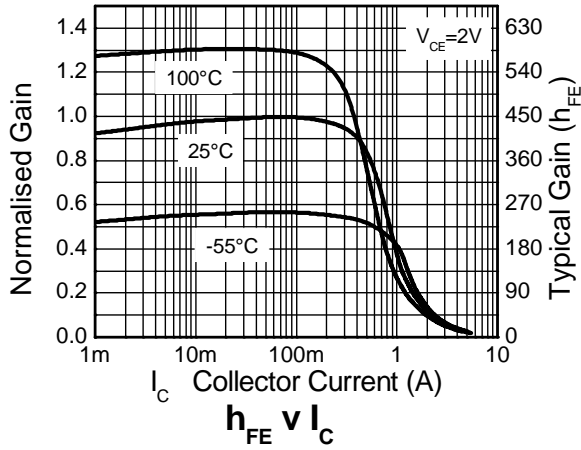
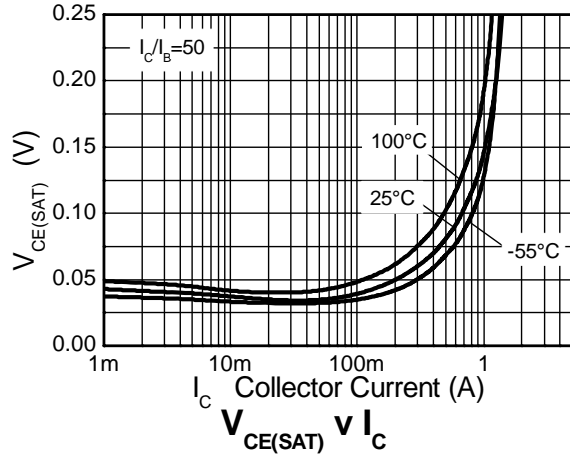
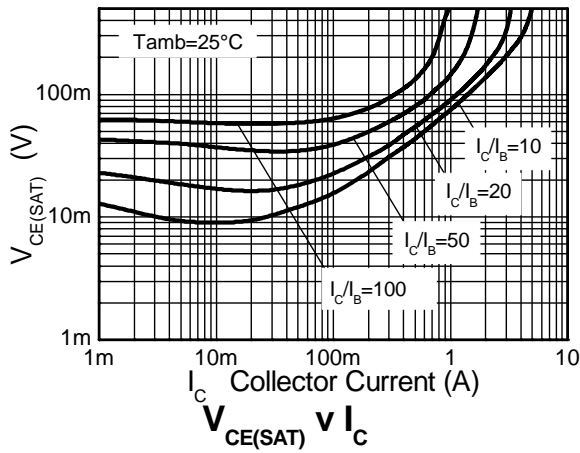
**Thermal Resistance v Board Area**

**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	$BV_{CBO}$	100	180	-	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	80	110	-	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	$V_{CB} = 80\text{V}$
Emitter Cutoff Current	$I_{EBO}$	-	-	100	nA	$V_{EB} = 6\text{V}$
Collector Emitter Cutoff Current	$I_{CES}$	-	-	100	nA	$V_{CE} = 65\text{V}$
Static Forward Current Transfer Ratio (Note 10)	$h_{FE}$	200	450	-	-	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$
		300	450	900		$I_C = 200\text{mA}, V_{CE} = 2\text{V}$
		110	170	-		$I_C = 1\text{A}, V_{CE} = 2\text{V}$
		60	90	-		$I_C = 1.5\text{A}, V_{CE} = 2\text{V}$
		20	30	-		$I_C = 3\text{A}, V_{CE} = 2\text{V}$
-	10	-	$I_C = 5\text{A}, V_{CE} = 2\text{V}$			
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	-	15	20	mV	$I_C = 0.1\text{A}, I_B = 10\text{mA}$
		-	45	60		$I_C = 0.5\text{A}, I_B = 50\text{mA}$
		-	145	185		$I_C = 1\text{A}, I_B = 20\text{mA}$
		-	160	200		$I_C = 1.5\text{A}, I_B = 50\text{mA}$
		-	240	340		$I_C = 3.5\text{A}, I_B = 300\text{mA}$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	-	0.96	1.05	V	$I_C = 3.5\text{A}, V_{CE} = 2\text{V}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	-	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: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**NPN - Typical Electrical Characteristics**

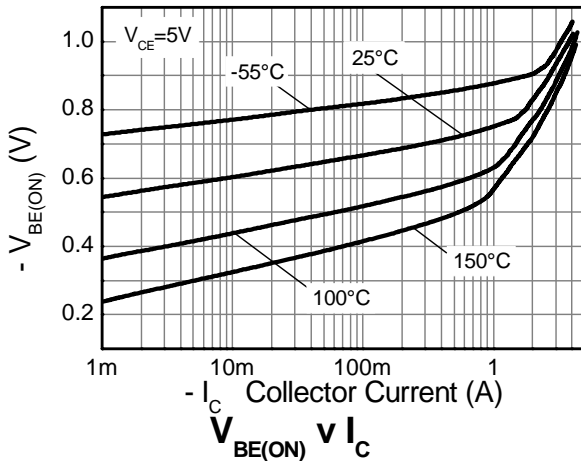
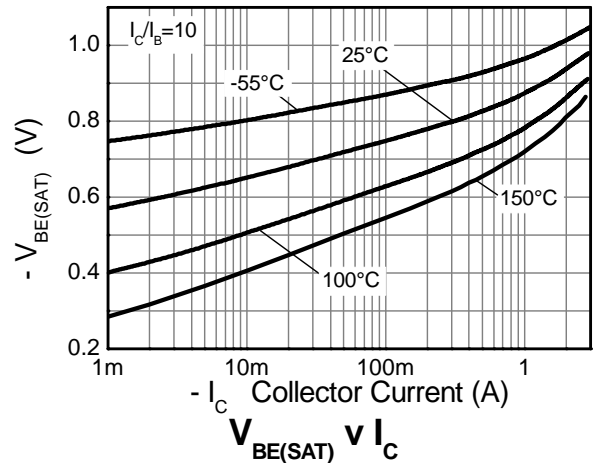
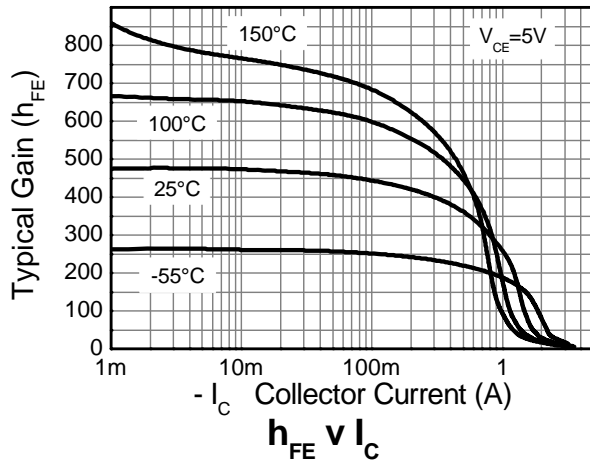
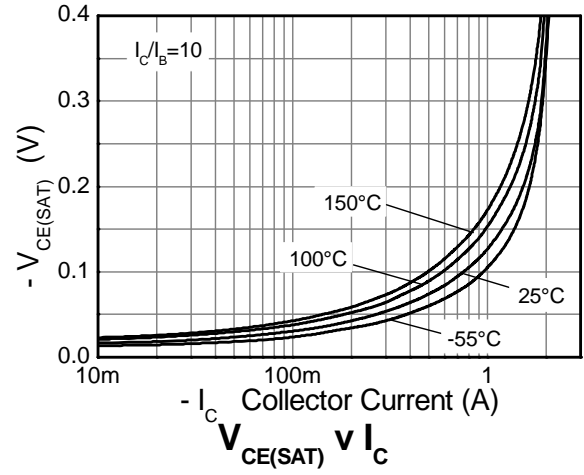
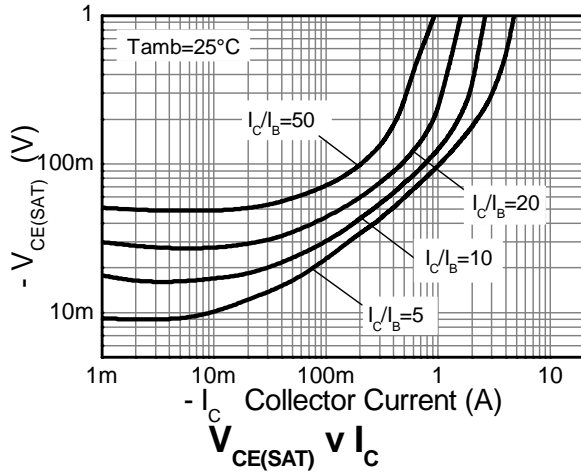


**PNP - Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	-70	-150	-	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 11)	V <sub>(BR)CEO</sub>	-70	-125	-	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	-7	-8.5	-	V	I <sub>E</sub> = -100μA
Collector Cutoff Current	I <sub>CBO</sub>	-	-	-100	nA	V <sub>CB</sub> = -55V
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>CE</sub> = -55V
Static Forward Current Transfer Ratio (Note 11)	h <sub>FE</sub>	200	470	-	-	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -5V
		300	450	-		I <sub>C</sub> = -100mA, V <sub>CE</sub> = -5V
		175	275	-		I <sub>C</sub> = -1A, V <sub>CE</sub> = -5V
		40	60	-		I <sub>C</sub> = -1.5A, V <sub>CE</sub> = -5V
		-	10	-		I <sub>C</sub> = -3A, V <sub>CE</sub> = -5V
Collector-Emitter Saturation Voltage (Note 11)	V <sub>CE(sat)</sub>	-	-35	-50	mV	I <sub>C</sub> = -0.1A, I <sub>B</sub> = -10mA
		-	-135	-200		I <sub>C</sub> = -0.5A, I <sub>B</sub> = -20mA
		-	-140	-220		I <sub>C</sub> = -1.0A, I <sub>B</sub> = -100mA
		-	-175	-270		I <sub>C</sub> = -1.5A, I <sub>B</sub> = -200mA
Base-Emitter Turn-On Voltage (Note 11)	V <sub>BE(on)</sub>	-	0.78	1.00	V	I <sub>C</sub> = -1.5A, V <sub>CE</sub> = -5V
Base-Emitter Saturation Voltage (Note 11)	V <sub>BE(sat)</sub>	-	0.94	1.05	V	I <sub>C</sub> = -1.5A, I <sub>B</sub> = -200mA
Output Capacitance	C <sub>obo</sub>	-	14	20	pF	V <sub>CB</sub> = -10V, f = 1MHz
Transition Frequency	f <sub>T</sub>	150	180	-	MHz	V <sub>CE</sub> = -10V, I <sub>C</sub> = -50mA, f = 100MHz
Turn-on Time	t <sub>on</sub>	-	40	-	ns	V <sub>CC</sub> = -50V, I <sub>C</sub> = -1A
Turn-off Time	t <sub>off</sub>	-	700	-	ns	I <sub>B1</sub> = I <sub>B2</sub> = -50mA

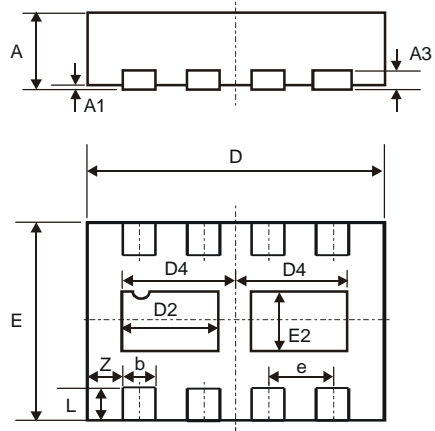
Notes: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**PNP - Typical Electrical Characteristics**



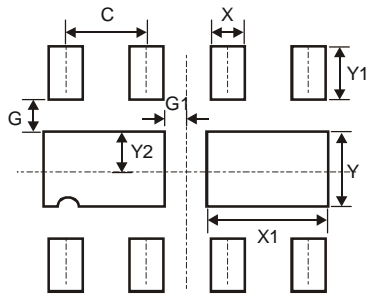
**ZXTC6720MC**

**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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Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А