

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

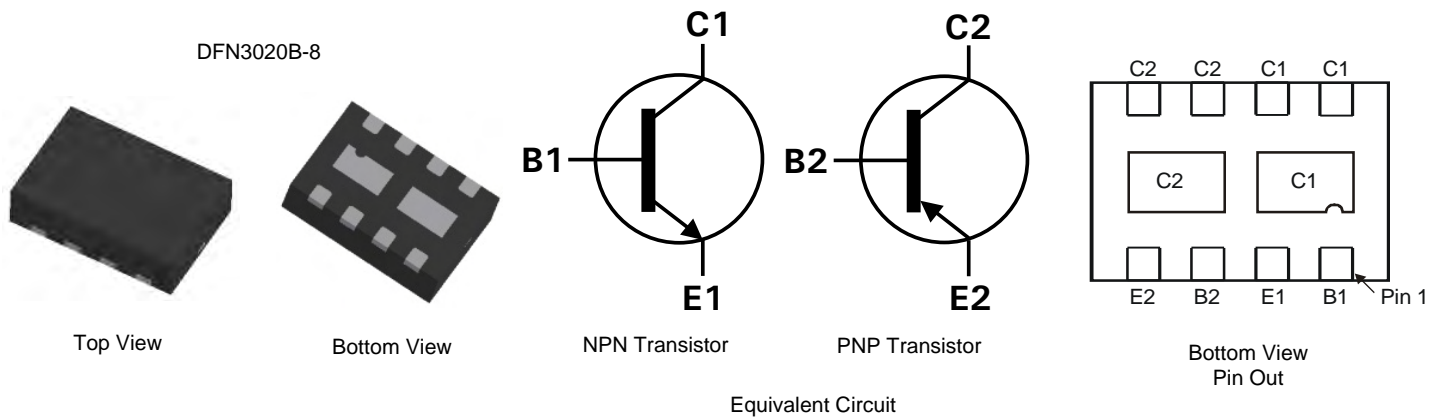
- $BV_{CEO} > -70V$
- $I_C = -2.5A$ Continuous Collector Current
- Low Saturation Voltage (-220mV max @ -1A)
- $R_{SAT} = 117m\Omega$ for a low equivalent On-Resistance
- h_{FE} characterized up to -5A for high current gain hold up
- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$ efficient, 40% lower than SOT26
- 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
- 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

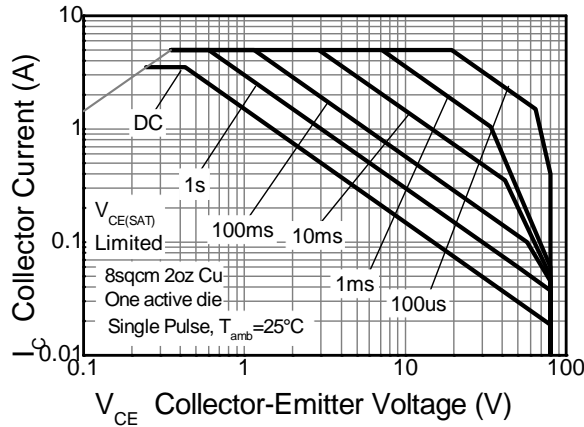
Parameter		Symbol	NPN	PNP	Unit
Collector-Base Voltage		V_{CBO}	100	-70	V
Collector-Emitter Voltage		V_{CEO}	80	-70	
Emitter-Base Voltage		V_{EBO}	7	-7	
Peak Pulse Current		I_{CM}	5	-3	A
Continuous Collector Current	(Notes 4 & 7)	I_C	3.5	-2.5	
	(Notes 5 & 7)		4	-3	
Base Current		I_B	1		

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

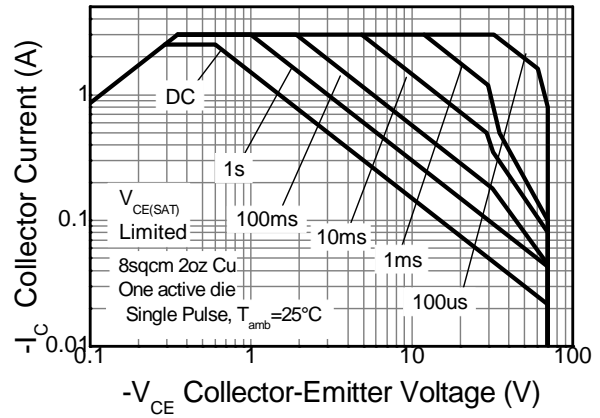
Characteristic		Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	(Notes 4 & 7)	P_D	1.5		W mW/°C
	(Notes 5 & 7)		12		
	(Notes 6 & 7)		2.45		
	(Notes 6 & 8)		19.6		
Thermal Resistance, Junction to Ambient	(Notes 4 & 7)	$R_{\theta JA}$	1.13		°C/W
	(Notes 5 & 7)		8		
	(Notes 6 & 7)		1.7		
	(Notes 6 & 8)		13.6		
Thermal Resistance, Junction to Lead	(Notes 7 & 9)	$R_{\theta JL}$	83.3		°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150		°C	

- Notes:
- 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.
 - Same as note (4), except the device is measured at $t < 5$ sec.
 - 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.
 - For a dual device with one active die.
 - For dual device with 2 active die running at equal power.
 - Thermal resistance from junction to solder-point (at the end of the collector lead).

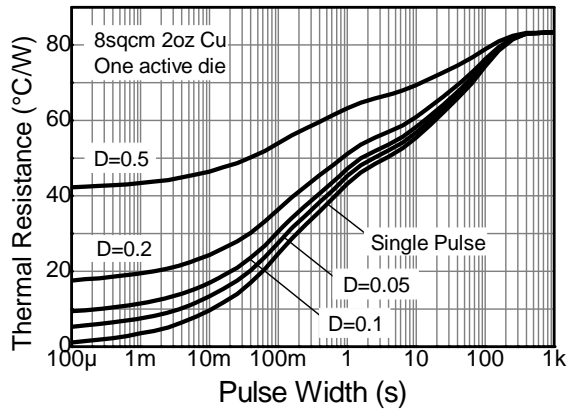
Thermal Characteristics



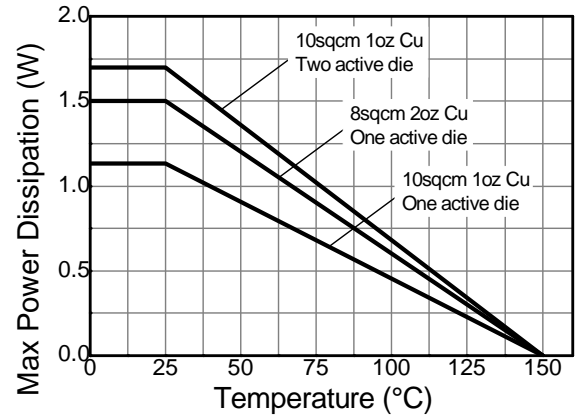
NPN Safe Operating Area



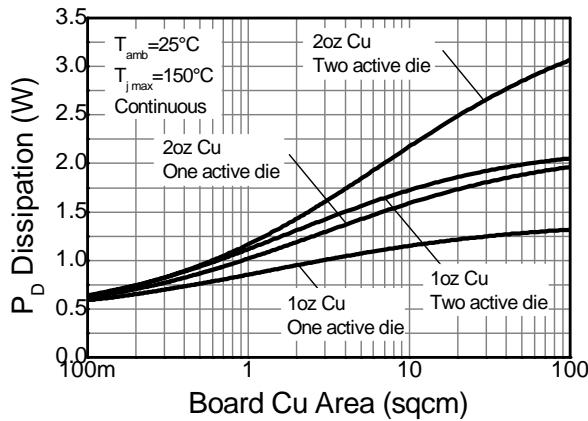
PNP Safe Operating Area



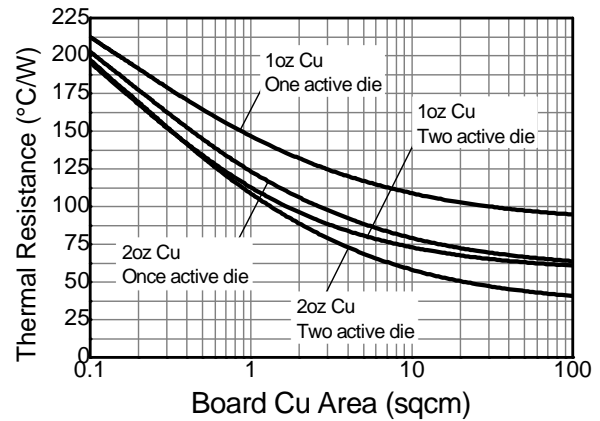
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



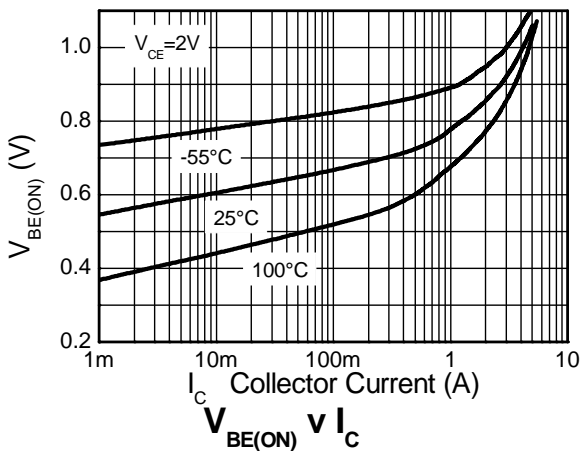
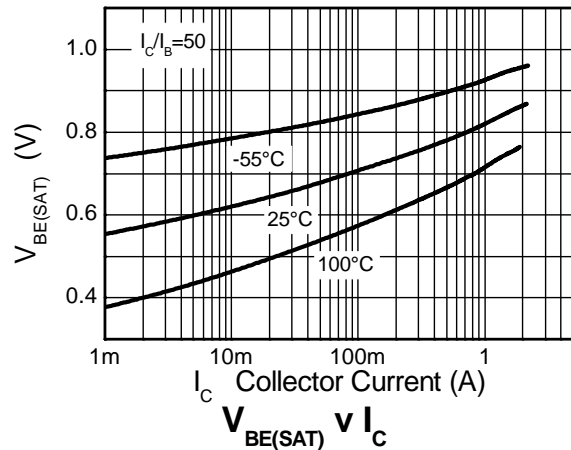
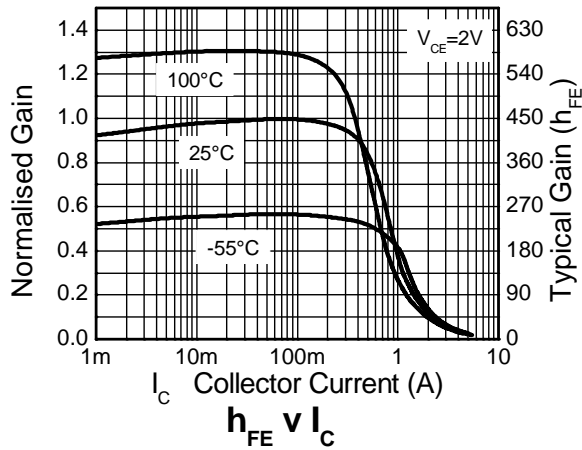
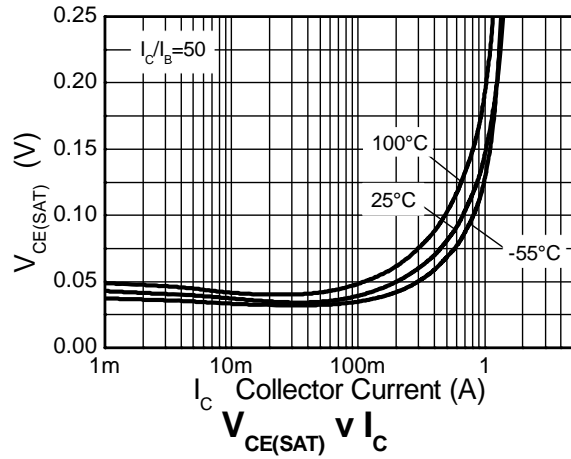
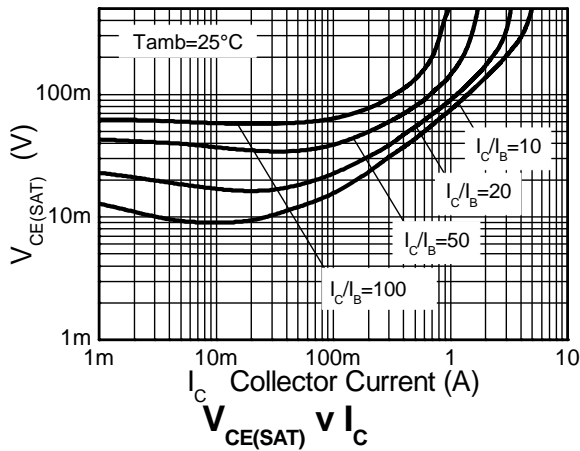
Thermal Resistance v Board Area

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

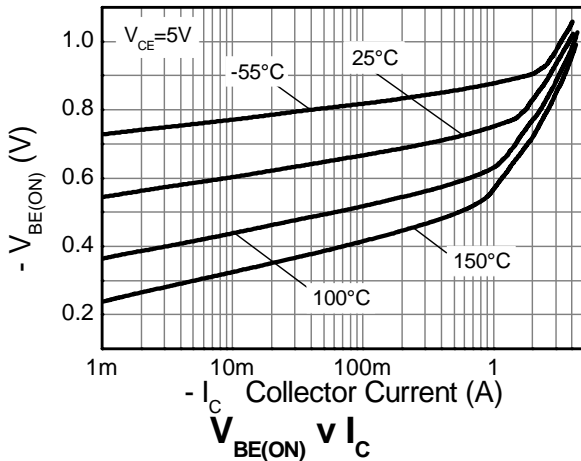
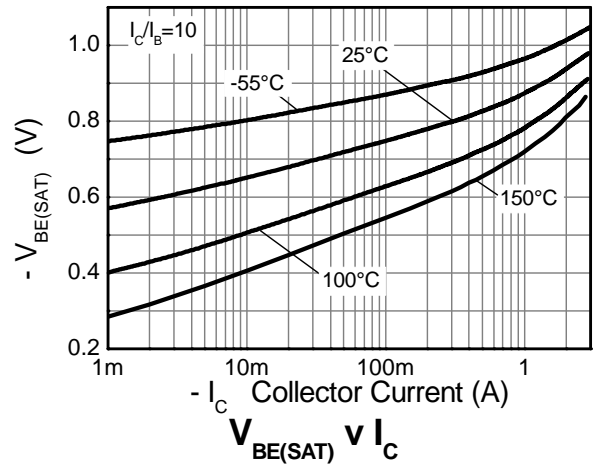
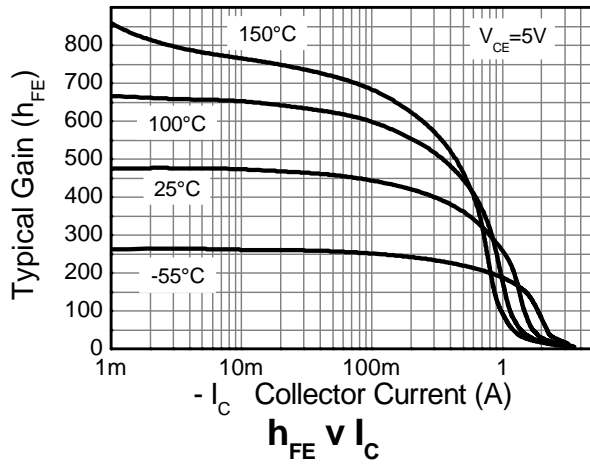
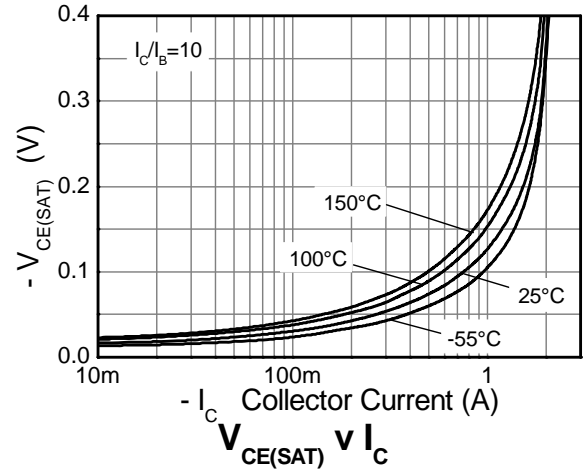
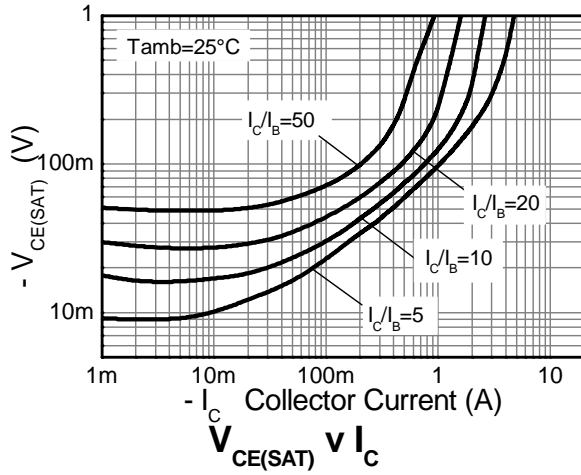


PNP - Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	V _{(BR)CBO}	-70	-150	-	V	I _C = -100μA
Collector-Emitter Breakdown Voltage (Note 11)	V _{(BR)CEO}	-70	-125	-	V	I _C = -10mA
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	-7	-8.5	-	V	I _E = -100μA
Collector Cutoff Current	I _{CBO}	-	-	-100	nA	V _{CB} = -55V
Emitter Cutoff Current	I _{EBO}	-	-	-100	nA	V _{EB} = -6V
Collector Emitter Cutoff Current	I _{CEs}	-	-	-100	nA	V _{CE} = -55V
Static Forward Current Transfer Ratio (Note 11)	h _{FE}	200	470	-	-	I _C = -10mA, V _{CE} = -5V
		300	450	-		I _C = -100mA, V _{CE} = -5V
		175	275	-		I _C = -1A, V _{CE} = -5V
		40	60	-		I _C = -1.5A, V _{CE} = -5V
		-	10	-		I _C = -3A, V _{CE} = -5V
Collector-Emitter Saturation Voltage (Note 11)	V _{CE(sat)}	-	-35	-50	mV	I _C = -0.1A, I _B = -10mA
		-	-135	-200		I _C = -0.5A, I _B = -20mA
		-	-140	-220		I _C = -1.0A, I _B = -100mA
		-	-175	-270		I _C = -1.5A, I _B = -200mA
Base-Emitter Turn-On Voltage (Note 11)	V _{BE(on)}	-	0.78	1.00	V	I _C = -1.5A, V _{CE} = -5V
Base-Emitter Saturation Voltage (Note 11)	V _{BE(sat)}	-	0.94	1.05	V	I _C = -1.5A, I _B = -200mA
Output Capacitance	C _{obo}	-	14	20	pF	V _{CB} = -10V, f = 1MHz
Transition Frequency	f _T	150	180	-	MHz	V _{CE} = -10V, I _C = -50mA, f = 100MHz
Turn-on Time	t _{on}	-	40	-	ns	V _{CC} = -50V, I _C = -1A
Turn-off Time	t _{off}	-	700	-	ns	I _{B1} = I _{B2} = -50mA

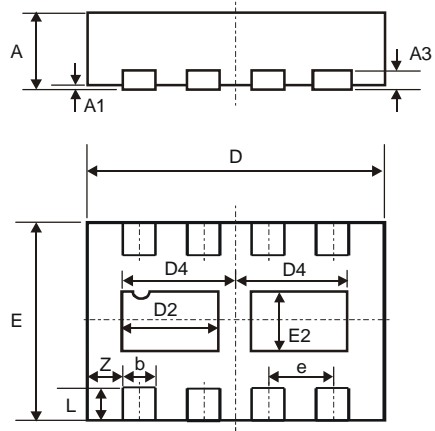
Notes: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

PNP - Typical Electrical Characteristics



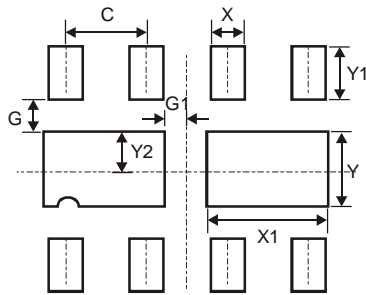
ZXTC6720MC

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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