

**NPN Epitaxial Planar Transistor**

# BTC1510FP

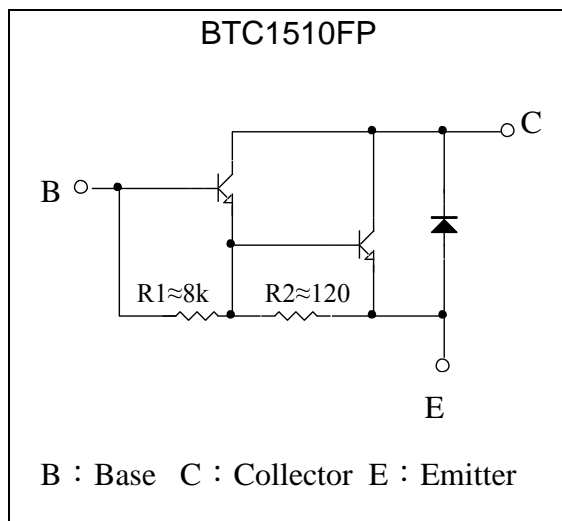
**Description**

The BTC1510FP is a NPN Darlington transistor, designed for general purpose amplifier and low speed switching application.

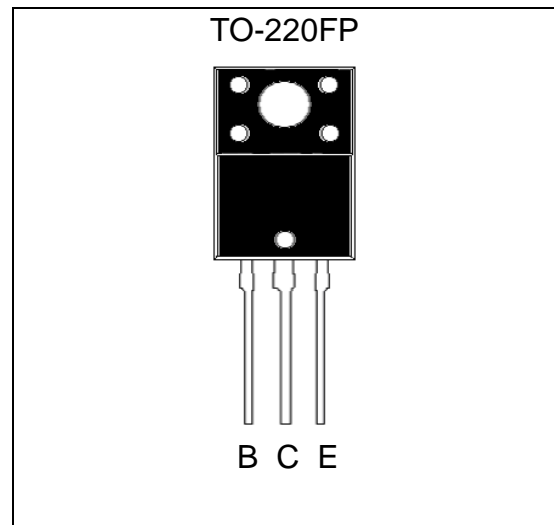
**Features:**

- High  $BV_{CEO}$
- Low  $V_{CE(SAT)}$
- High current gain
- Monolithic construction with built-in base-emitter shunt resistors
- Pb-free lead plating package

**Equivalent Circuit**

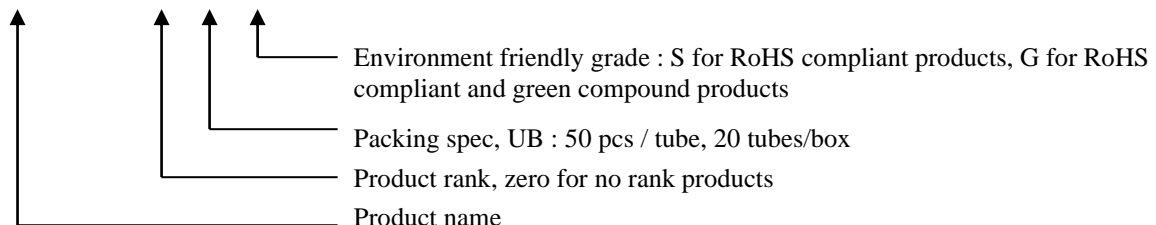


**Outline**



**Ordering Information**

Device	Package	Shipping
BTC1510FP-0-UB-S	TO-220FP (Pb-free lead plating package)	50 pcs/tube, 20 tubes/box, 5 boxes / carton





**Absolute Maximum Ratings** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V <sub>CBO</sub>	150	V
Collector-Emitter Voltage	V <sub>CEO</sub>	150	V
Emitter-Base Voltage	V <sub>EBO</sub>	5	V
Collector Current	I <sub>C(DC)</sub>	10	A
	I <sub>C(Pulse)</sub>	15 *1	
Power Dissipation	Pd(T <sub>A</sub> =25°C)	2	W
	Pd(T <sub>C</sub> =25°C)	60	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	62.5	°C/W
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	2.08	°C/W
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55~+150	°C

Note : \*1. Single Pulse Pw=100ms

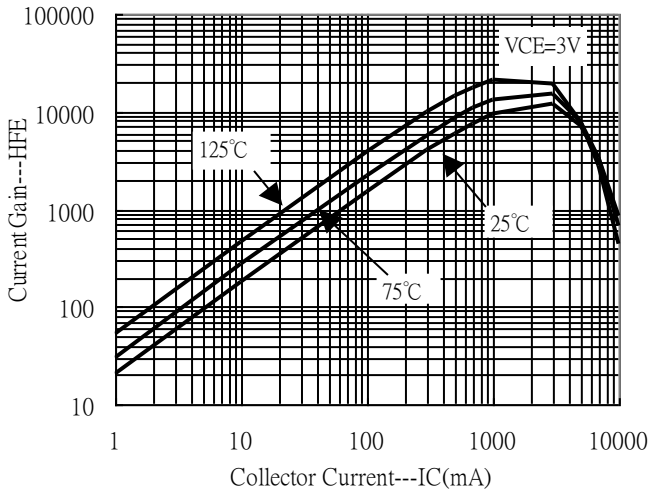
**Characteristics** (Ta=25°C)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CBO</sub>	150	-	-	V	I <sub>C</sub> =100μA, I <sub>E</sub> =0
BV <sub>CEO</sub>	150	-	-	V	I <sub>C</sub> =1mA, I <sub>B</sub> =0
I <sub>CEO</sub>	-	-	200	μA	V <sub>CE</sub> =150V, I <sub>E</sub> =0
I <sub>CBO</sub>	-	-	200	μA	V <sub>CB</sub> =150V, I <sub>E</sub> =0
I <sub>EBO</sub>	-	-	2	mA	V <sub>EB</sub> =5V, I <sub>C</sub> =0
*V <sub>CE(sat)</sub> 1	-	-	1.5	V	I <sub>C</sub> =5A, I <sub>B</sub> =10mA
*V <sub>CE(sat)</sub> 2	-	-	3	V	I <sub>C</sub> =10A, I <sub>B</sub> =100mA
*V <sub>CE(sat)</sub> 3	-	-	2	V	I <sub>C</sub> =5A, I <sub>B</sub> =2.5mA
*V <sub>BE(sat)</sub>	-	-	2	V	I <sub>C</sub> =5A, I <sub>B</sub> =5mA
*V <sub>BE(on)</sub> 1	-	-	2.8	V	V <sub>CE</sub> =3V, I <sub>C</sub> =5A
*V <sub>BE(on)</sub> 2	-	-	4.5	V	V <sub>CE</sub> =3V, I <sub>C</sub> =10A
*V <sub>FEC</sub>	-	-	4	V	I <sub>C</sub> =5A
*h <sub>FE</sub> 1	2	-	20	K	V <sub>CE</sub> =3V, I <sub>C</sub> =5A
*h <sub>FE</sub> 2	100	-	-	-	V <sub>CE</sub> =3V, I <sub>C</sub> =10A

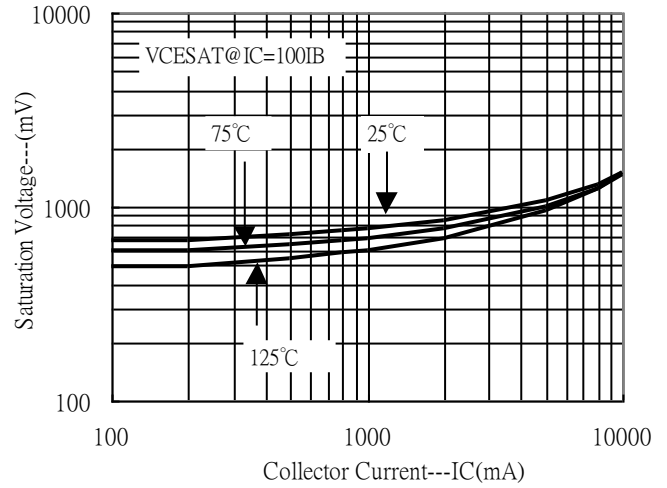
\*Pulse Test : Pulse Width ≤380μs, Duty Cycle≤2%

**Typical Characteristics**

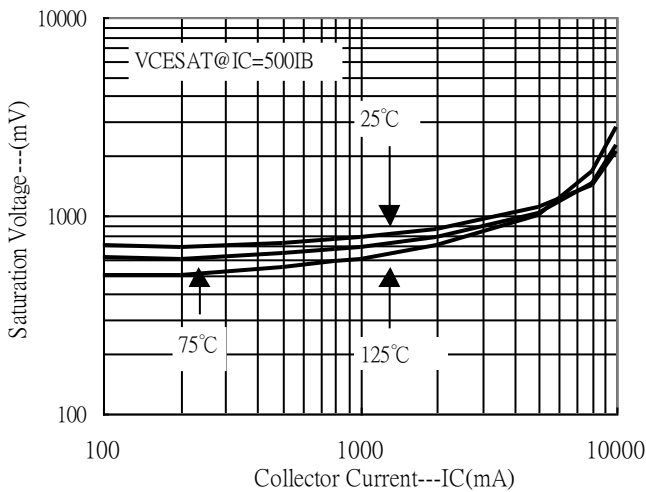
Current Gain vs Collector Current



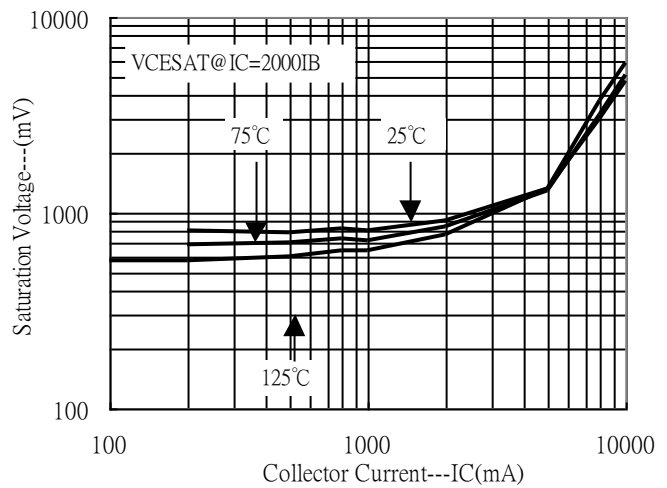
Saturation Voltage vs Collector Current



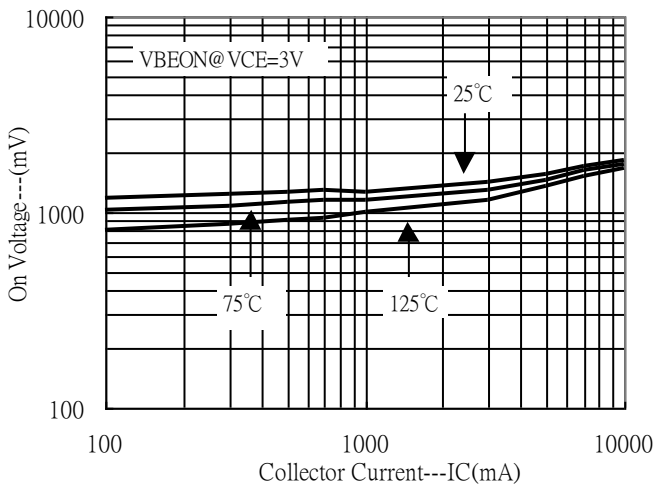
Saturation Voltage vs Collector Current



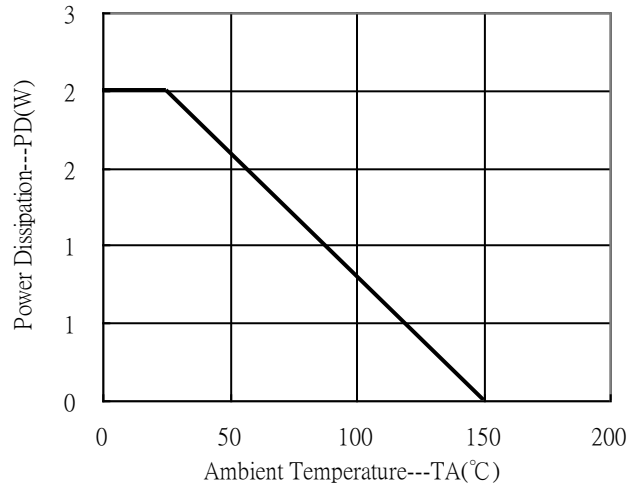
Saturation Voltage vs Collector Current



On Voltage vs Collector Current

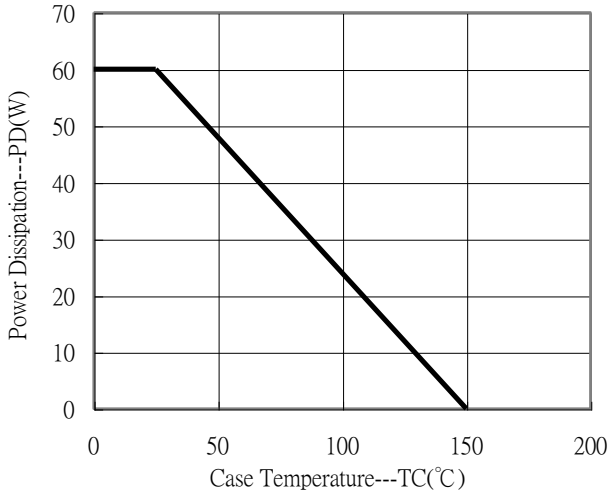


Power Derating Curve

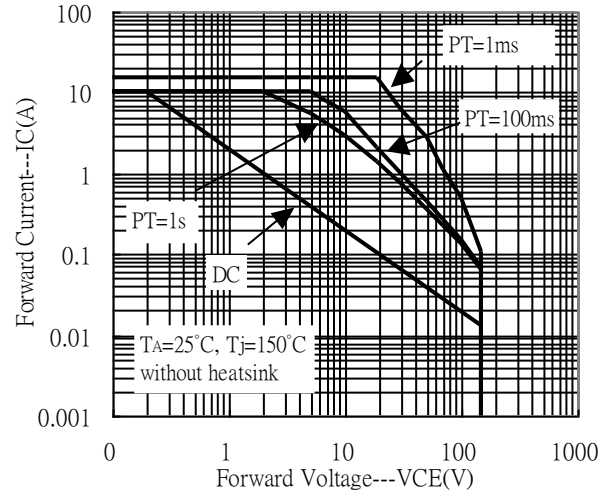


**Typical Characteristics(Cont.)**

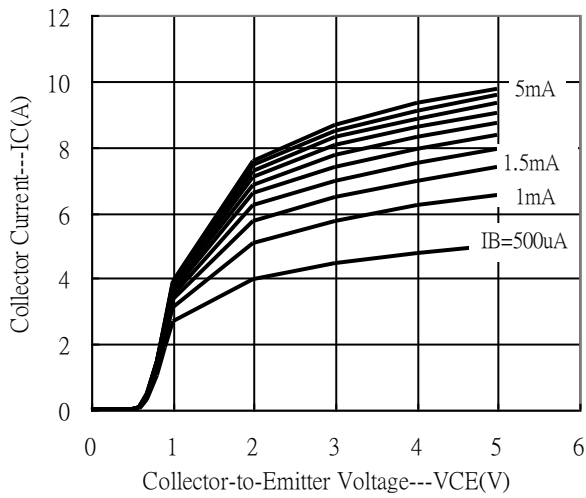
Power Derating Curve



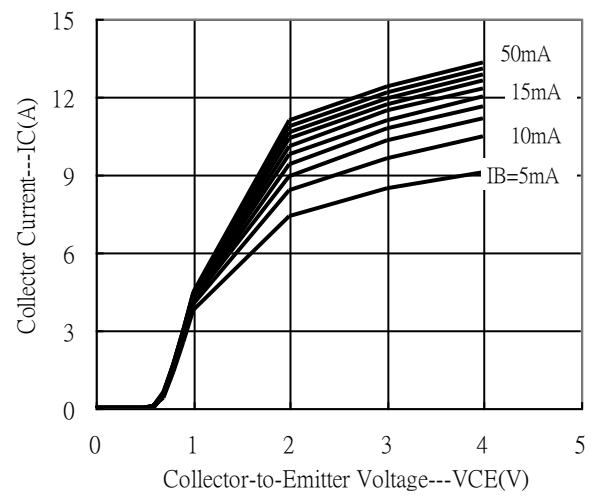
Safe Operating Area



Emitter Grounded Output Characteristics



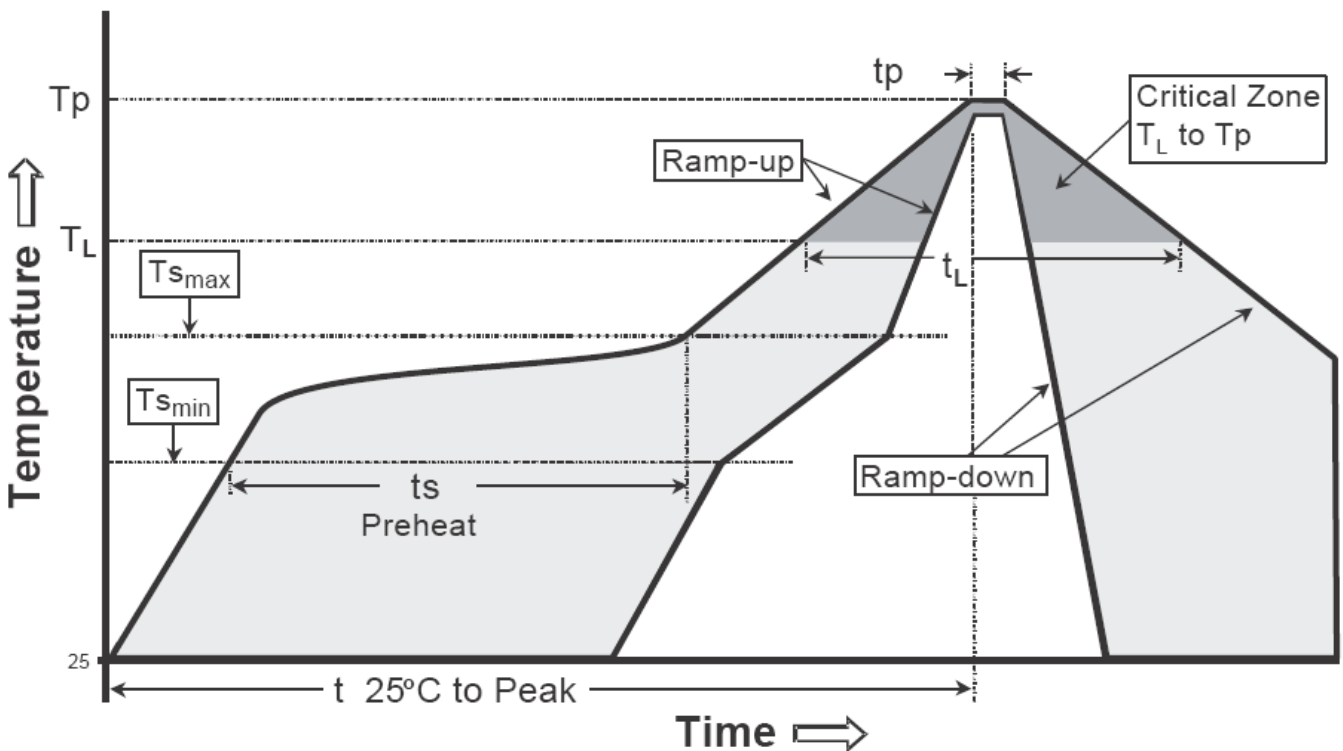
Emitter Grounded Output Characteristics



**Recommended wave soldering condition**

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (Tl)	183°C	217°C
- Time (tl)	60-150 seconds	60-150 seconds
Peak Temperature(Tp)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

**TO-220FP Dimension**

**Marking:**

Device Code → **C1510**  
 Date Code → [ ] [ ] [ ] [ ]

Style: Pin 1.Base 2.Collector 3.Emitter

Date Code: Year+Month  
 Year: 3→2003, 4→2004  
 Month: 1→1, 2→2, . . .  
 9→9, A→10, B→11, C→12

3-Lead TO-220FP Plastic Package  
 CYStek Package Code: FP

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.169	0.185	4.35	4.65	e	0.100 TYP.		2.54 TYP.	
A1	0.051 REF.		1.300 REF.		F	0.106 REF.		2.70 REF.	
A2	0.112	0.124	2.85	3.15	Φ	0.138 REF.		3.50 REF.	
A3	0.102	0.110	2.60	2.80	h	0.000	0.012	0.00	0.30
b	0.020	0.030	0.50	0.75	h1	0.031 REF.		0.80 REF.	
b1	0.031	0.041	0.80	1.05	h2	0.020 REF.		0.50 REF.	
b2	0.043	0.053	1.10	1.35	L	1.102	1.118	28.00	28.40
c	0.020	0.030	0.50	0.75	L1	0.043	0.051	1.10	1.30
D	0.392	0.408	9.96	10.36	L2	0.036	0.043	0.92	1.08
E	0.583	0.598	14.80	15.20					

**Notes:** 1.Controlling dimension: millimeters.  
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.  
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

**Material:**

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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