

**PNP Epitaxial Planar Transistor**

# BTA1210FP

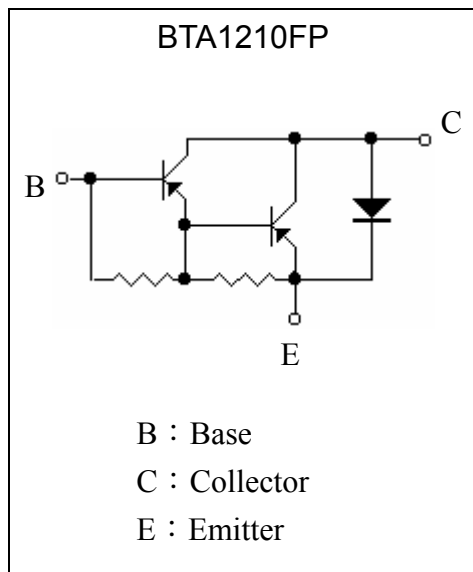
**Description**

The BTA1210FP is a PNP Darlington transistor, designed for use in general purpose amplifier and low speed switching application.

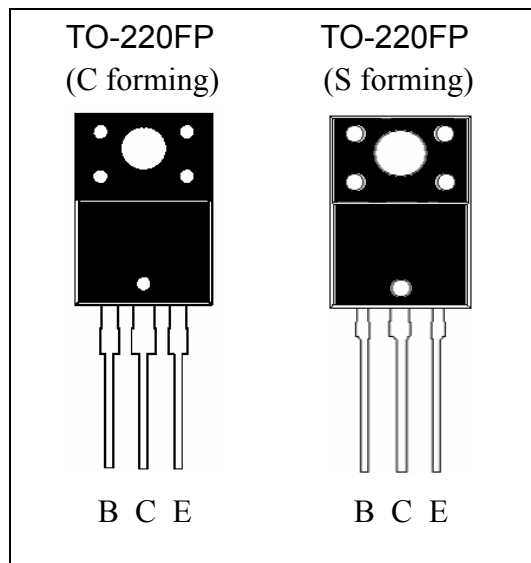
**Features**

- High  $BV_{CEO}$
- High DC current gain
- High current capability
- Monolithic construction with built-in base-emitter shunt resistors
- RoHS compliant package

**Equivalent Circuit**

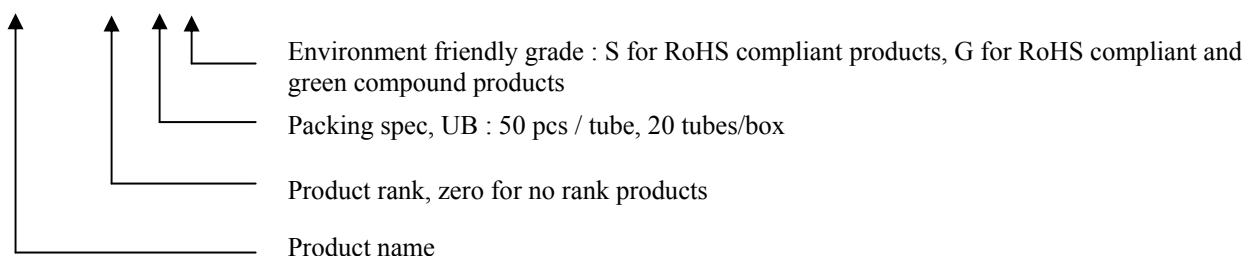


**Outline**



**Ordering Information**

| Device           | Package                              | Shipping                                    |
|------------------|--------------------------------------|---|
| BTA1210FP-0-UB-S | TO-220FP<br>(RoHS compliant package) | 50 pcs/tube, 20 tubes/box, 4 boxes / carton |





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

| Parameter                               | Symbol                   | Limits     | Unit |
|---|--------------------------|------------|------|
| Collector-Base Voltage                  | V <sub>CB0</sub>         | -120       | V    |
| Collector-Emitter Voltage               | V <sub>CE0</sub>         | -120       | V    |
| Emitter-Base Voltage                    | V <sub>EBO</sub>         | -5         | V    |
| Collector Current (DC)                  | I <sub>C</sub>           | -10        | A    |
| Collector Current (Pulse)               | I <sub>CP</sub>          | -15 (Note) | A    |
| Power Dissipation                       | Pd(T <sub>A</sub> =25°C) | 2          | W    |
|   | Pd(T <sub>C</sub> =25°C) | 60         | W    |
| 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 : Single Pulse Pw ≤ 350μs, Duty ≤ 2%.

**Characteristics** (Ta=25°C)

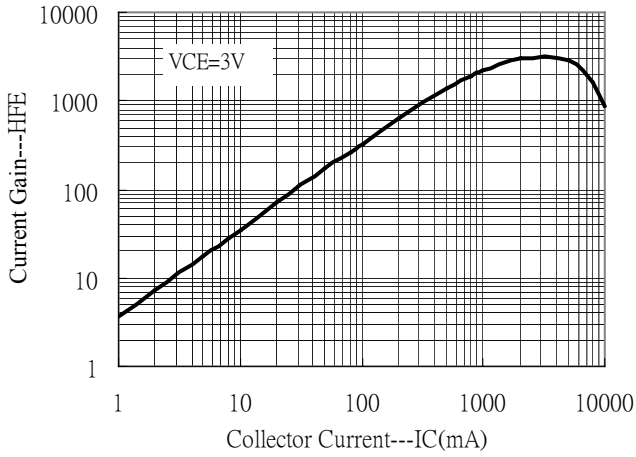
| Symbol                  | Min. | Typ. | Max. | Unit | Test Conditions                                   |
|-------------------------|------|------|------|------|---|
| BV <sub>CE0</sub>       | -120 | -    | -    | V    | I <sub>C</sub> =-1mA, I <sub>B</sub> =0           |
| BV <sub>CB0</sub>       | -120 | -    | -    | V    | I <sub>C</sub> =-100μA, I <sub>E</sub> =0         |
| I <sub>CB0</sub>        | -    | -    | -200 | μA   | V <sub>CB</sub> =-120V, I <sub>E</sub> =0         |
| I <sub>CE0</sub>        | -    | -    | -200 | μA   | V <sub>CE</sub> =-120V, I <sub>B</sub> =0         |
| I <sub>EBO</sub>        | -    | -    | -2   | mA   | V <sub>EB</sub> =-5V, I <sub>C</sub> =0           |
| *V <sub>CE(sat) 1</sub> | -    | -    | -2   | V    | I <sub>C</sub> =-4A, I <sub>B</sub> =-16mA        |
| *V <sub>CE(sat) 2</sub> | -    | -    | -4   | V    | I <sub>C</sub> =-8A, I <sub>B</sub> =-80mA        |
| *V <sub>BE(sat)</sub>   | -    | -    | -4.5 | V    | I <sub>C</sub> =-8A, I <sub>B</sub> =-80mA        |
| *V <sub>BE(on)</sub>    |      |      | -2.8 | V    | V <sub>CE</sub> =-4V, I <sub>C</sub> =-4A         |
| *h <sub>FE1</sub>       | 1    | -    | 12   | K    | V <sub>CE</sub> =-4V, I <sub>C</sub> =-4A         |
| *h <sub>FE2</sub>       | 100  | -    | -    | -    | V <sub>CE</sub> =-4V, I <sub>C</sub> =-8A         |
| Cob                     | -    |      | 300  | pF   | V <sub>CB</sub> =-10V, I <sub>E</sub> =0A, f=1MHz |

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

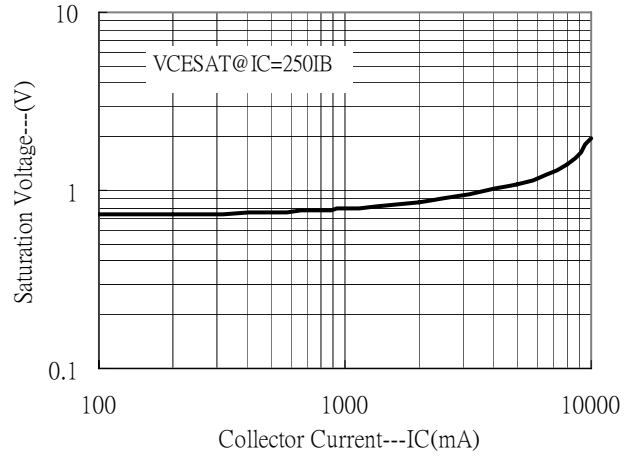


### Characteristic Curves

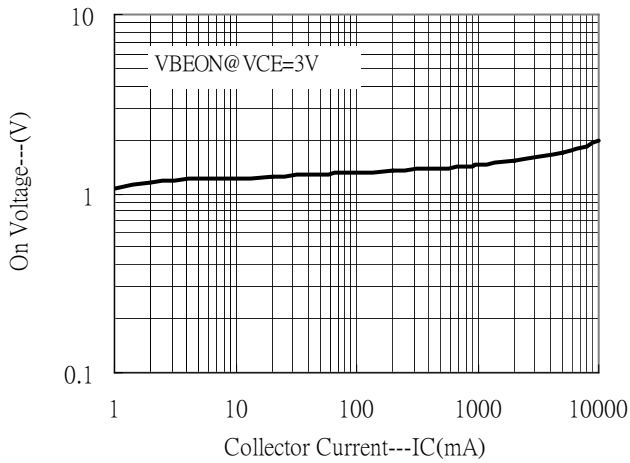
Current Gain vs Collector Current



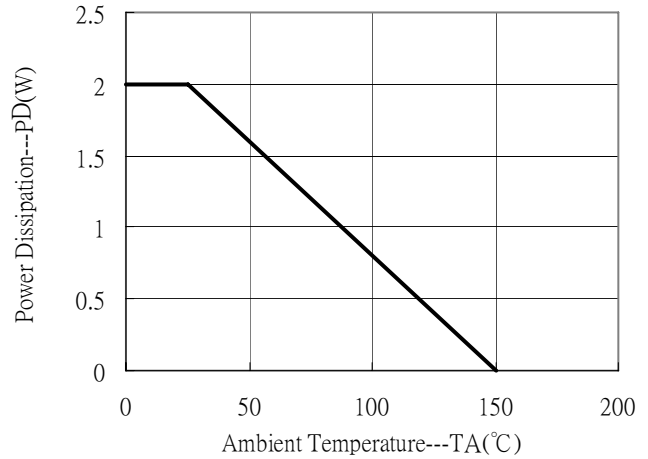
Saturation Voltage vs Collector Current



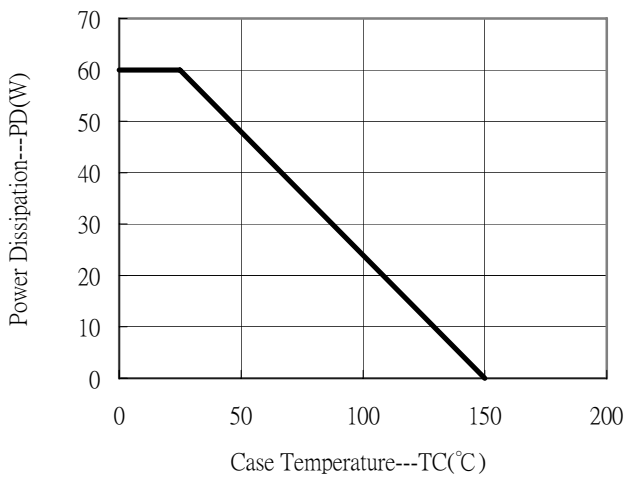
On voltage vs Collector Current



Power Derating Curve

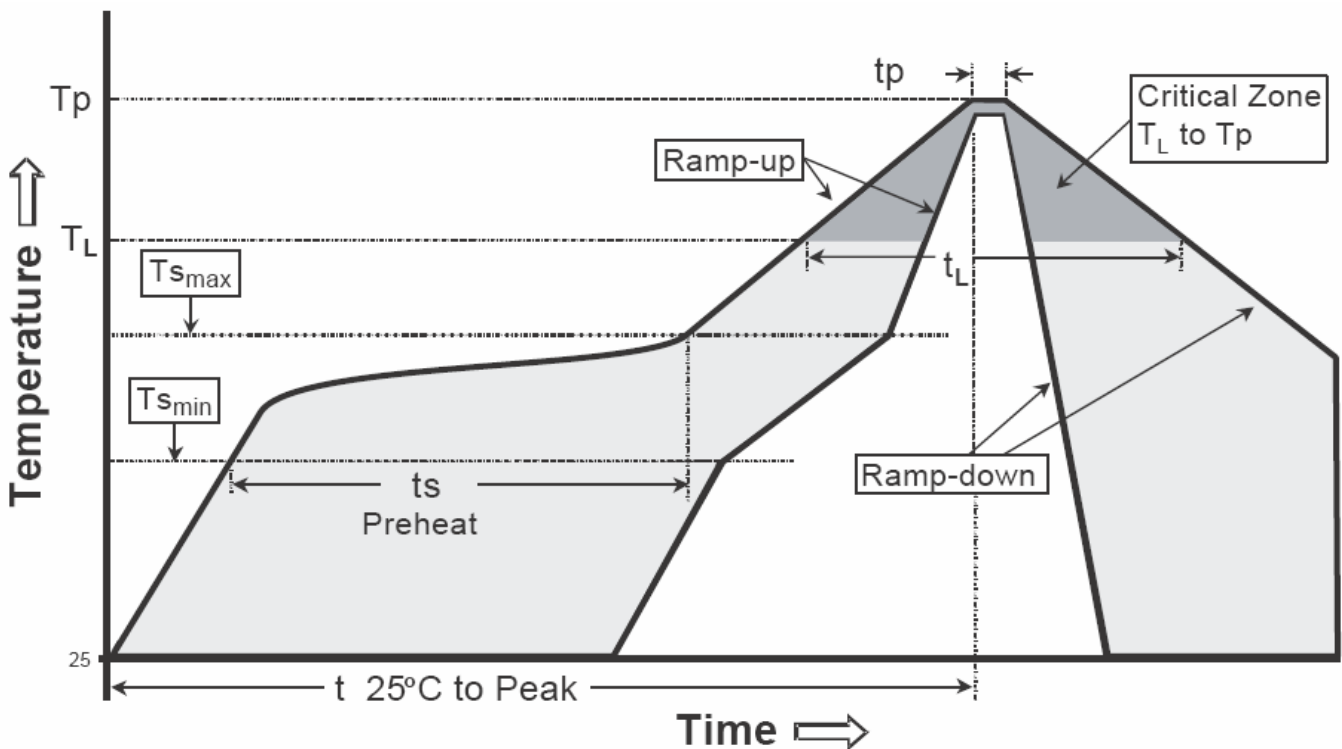


Power Derating Curve



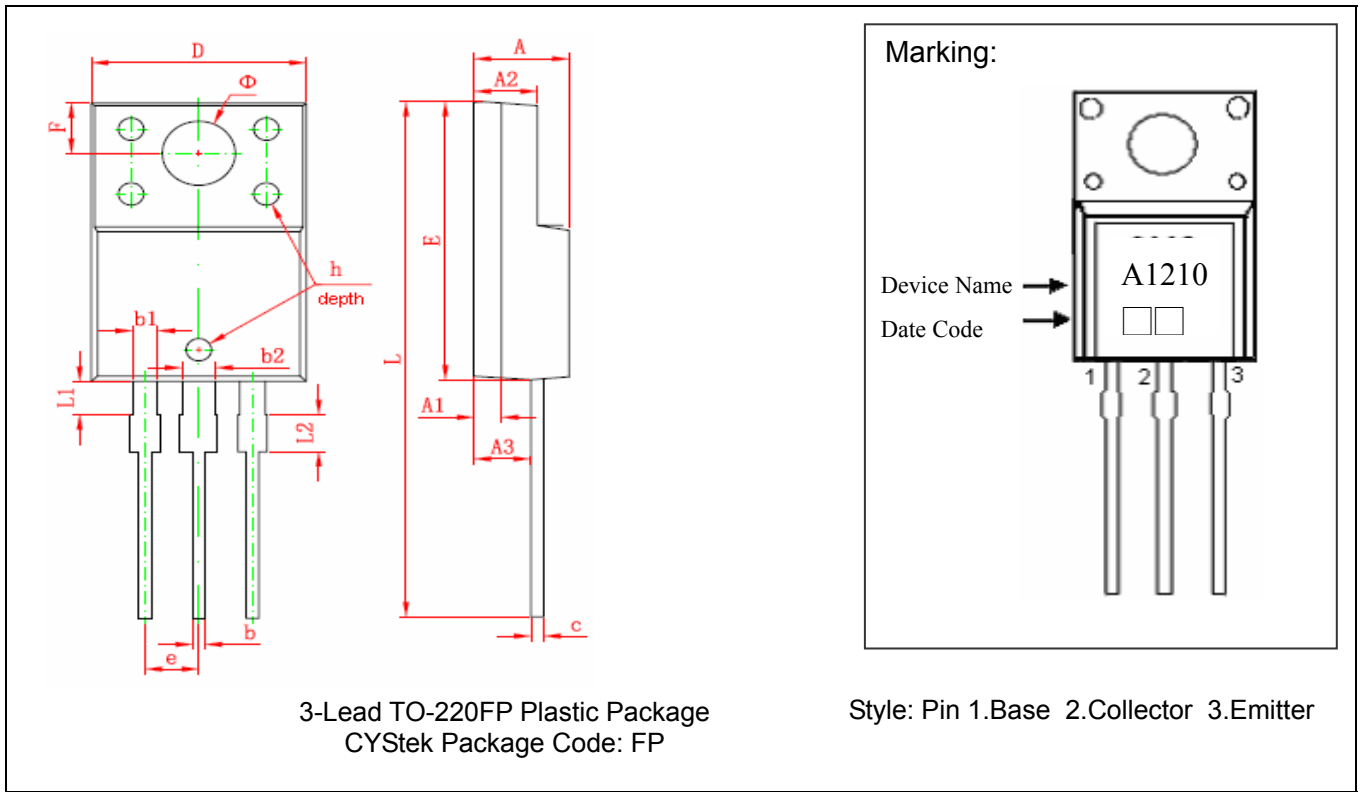
**Recommended wave soldering condition**

|                 |                  |                 |
|-----------------|------------------|-----------------|
| 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 (T <sub>smax</sub> to T <sub>p</sub> ) | 3°C/second max.         | 3°C/second max.  |
| Preheat   |                         |                  |
| -Temperature Min(T <sub>s min</sub> )                       | 100°C                   | 150°C            |
| -Temperature Max(T <sub>s max</sub> )                       | 150°C                   | 200°C            |
| -Time(ts <sub>min</sub> to ts <sub>max</sub> )              | 60-120 seconds          | 60-180 seconds   |
| Time maintained above:                                      |                         |                  |
| -Temperature (T <sub>L</sub> )                              | 183°C                   | 217°C            |
| - Time (t <sub>L</sub> )                                    | 60-150 seconds          | 60-150 seconds   |
| Peak Temperature(T <sub>p</sub> )                           | 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.   |

**TO-220FP (C Forming) Dimension**



The drawing shows a 3-lead TO-220FP plastic package with dimensions labeled A through L2. The marking area shows the device name 'A1210' and a date code. The pin configuration is: Pin 1: Base, Pin 2: Collector, Pin 3: Emitter.

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

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

\*Typical

| DIM | Inches    |       | Millimeters |        | DIM | Inches    |       | Millimeters |        |
|-----|-----------|-------|-------------|--------|-----|-----------|-------|-------------|--------|
|     | Min.      | Max.  | Min.        | Max.   |     | Min.      | Max.  | Min.        | Max.   |
| A   | 0.169     | 0.185 | 4.300       | 4.700  | E   | 0.583     | 0.598 | 14.800      | 15.200 |
| A1  | 0.051 REF |       | 1.300 REF   |        | e   | 0.100*    |       | 2.540*      |        |
| A2  | 0.110     | 0.126 | 2.800       | 3.200  | F   | 0.106 REF |       | 2.700 REF   |        |
| A3  | 0.098     | 0.114 | 2.500       | 2.900  | Φ   | 0.138 REF |       | 3.500 REF   |        |
| b   | 0.020     | 0.030 | 0.500       | 0.750  | h   | 0.000     | 0.012 | 0.000       | 0.300  |
| b1  | 0.043     | 0.053 | 1.100       | 1.350  | L   | 1.102     | 1.118 | 28.000      | 28.400 |
| b2  | 0.059     | 0.069 | 1.500       | 1.750  | L1  | 0.067     | 0.075 | 1.700       | 1.900  |
| c   | 0.020     | 0.030 | 0.500       | 0.750  | L2  | 0.075     | 0.083 | 1.900       | 2.100  |
| D   | 0.392     | 0.408 | 9.960       | 10.360 |     |           |       |             |        |

**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.

**TO-220FP (S Forming) Dimension**

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

**Marking:**

Device Name → A1210  
 Date Code → [ ] [ ] [ ] [ ]

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

\*Typical

| DIM | Inches    |       | Millimeters |       | DIM | Inches    |       | Millimeters |       |
|-----|-----------|-------|-------------|-------|-----|-----------|-------|-------------|-------|
|     | Min.      | Max.  | Min.        | Max.  |     | Min.      | Max.  | Min.        | Max.  |
| A   | 0.171     | 0.183 | 4.35        | 4.65  | G   | 0.246     | 0.258 | 6.25        | 6.55  |
| A1  | 0.051 REF |       | 1.300 REF   |       | H   | 0.138 REF |       | 3.50 REF    |       |
| A2  | 0.112     | 0.124 | 2.85        | 3.15  | H1  | 0.055 REF |       | 1.40 REF    |       |
| A3  | 0.102     | 0.110 | 2.60        | 2.80  | H2  | 0.256     | 0.272 | 6.50        | 6.90  |
| b   | 0.020     | 0.030 | 0.50        | 0.75  | J   | 0.031 REF |       | 0.80 REF    |       |
| b1  | 0.031     | 0.041 | 0.80        | 1.05  | K   | 0.020     |       | 0.50 REF    |       |
| b2  | 0.047 REF |       | 1.20 REF    |       | L   | 1.102     | 1.118 | 28.00       | 28.40 |
| c   | 0.020     | 0.030 | 0.500       | 0.750 | L1  | 0.043     | 0.051 | 1.10        | 1.30  |
| D   | 0.396     | 0.404 | 10.06       | 10.26 | L2  | 0.036     | 0.043 | 0.92        | 1.08  |
| E   | 0.583     | 0.598 | 14.80       | 15.20 | M   | 0.067 REF |       | 1.70 REF    |       |
| e   | 0.100 *   |       | 2.54*       |       | N   | 0.012 REF |       | 0.30 REF    |       |
| F   | 0.106 REF |       | 2.70 REF    |       |     |           |       |             |       |

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**Material:**

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

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