

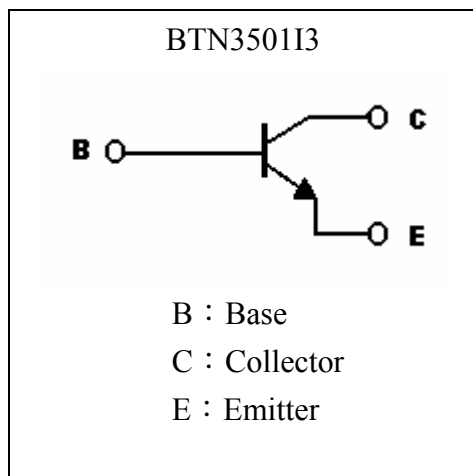
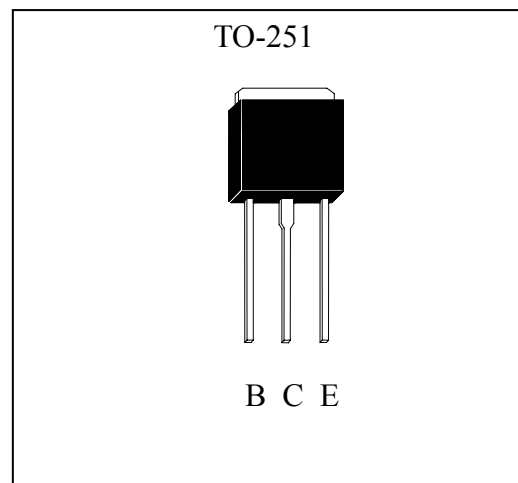
**Low Vcesat NPN Epitaxial Planar Transistor**

# BTN3501I3

|             |              |
|-------------|--------------|
| $BV_{CEO}$  | 80V          |
| $I_C$       | 8A           |
| $R_{CESAT}$ | 60m $\Omega$ |

**Features**

- Low  $V_{CE(sat)}$
- High  $BV_{CEO}$
- Excellent current gain characteristics
- RoHS compliant package

**Symbol**

**Outline**

**Absolute Maximum Ratings** ( $T_a=25^\circ\text{C}$ )

| Parameter                                  | Symbol          | Limits      | Unit               |
|--|-----------------|-------------|--------------------|
| Collector-Base Voltage                     | $V_{CBO}$       | 80          | V                  |
| Collector-Emitter Voltage                  | $V_{CEO}$       | 80          | V                  |
| Emitter-Base Voltage                       | $V_{EBO}$       | 6           | V                  |
| Collector Current (DC)                     | $I_C$           | 8           | A                  |
| Collector Current (Pulse)                  | $I_{CP}$        | 16 (Note 1) |                    |
| Base Current                               | $I_B$           | 1           | A                  |
| Power Dissipation @ $T_A=25^\circ\text{C}$ | $P_D$           | 1.5         | W                  |
| Power Dissipation @ $T_C=25^\circ\text{C}$ | $P_D$           | 20          |                    |
| Thermal Resistance, Junction to Ambient    | $R_{\theta JA}$ | 83.3        | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case       | $R_{\theta JC}$ | 6.25        | $^\circ\text{C/W}$ |
| Junction Temperature                       | $T_j$           | 150         | $^\circ\text{C}$   |
| Storage Temperature                        | $T_{stg}$       | -55~+150    | $^\circ\text{C}$   |

 Note : 1. Single Pulse ,  $P_w \leq 380\mu\text{s}$ ,  $Duty \leq 2\%$ .

**Characteristics (Ta=25°C)**

| Symbol                  | Min. | Typ. | Max. | Unit | Test Conditions   |
|-------------------------|------|------|------|------|---|
| BV <sub>CEO(SUS)</sub>  | 80   | -    | -    | V    | I <sub>C</sub> =30mA, I <sub>B</sub> =0   |
| I <sub>CES</sub>        | -    | -    | 10   | μA   | V <sub>CE</sub> =80V, V <sub>BE</sub> =0  |
| I <sub>EBO</sub>        | -    | -    | 50   | μA   | V <sub>EB</sub> =5V, I <sub>C</sub> =0  |
| *V <sub>CE(sat)</sub> 1 | -    | 0.1  | 0.3  | V    | I <sub>C</sub> =2A, I <sub>B</sub> =200mA   |
| *V <sub>CE(sat)</sub> 2 | -    | -    | 0.6  | V    | I <sub>C</sub> =8A, I <sub>B</sub> =400mA   |
| *V <sub>CE(sat)</sub> 3 | -    | -    | 1.5  | V    | I <sub>C</sub> =5A, I <sub>B</sub> =50mA  |
| *V <sub>BE(sat)</sub> 1 | -    | -    | 1.2  | V    | I <sub>C</sub> =2A, I <sub>B</sub> =200mA   |
| *V <sub>BE(sat)</sub> 2 | -    | -    | 1.5  | V    | I <sub>C</sub> =8A, I <sub>B</sub> =800mA   |
| *h <sub>FE</sub> 1      | 200  | -    | -    | -    | V <sub>CE</sub> =1V, I <sub>C</sub> =100mA  |
| *h <sub>FE</sub> 2      | 200  | -    | 400  | -    | V <sub>CE</sub> =1V, I <sub>C</sub> =2A   |
| *h <sub>FE</sub> 3      | 100  | -    | -    | -    | V <sub>CE</sub> =1V, I <sub>C</sub> =4A   |
| f <sub>T</sub>          | -    | 50   | -    | MHz  | V <sub>CE</sub> =6V, I <sub>C</sub> =500mA, f=20MHz   |
| C <sub>ob</sub>         | -    | 130  | -    | pF   | V <sub>CB</sub> =10V, f=1MHz  |
| t <sub>on</sub>         | -    | -    | 100  | ns   | V <sub>CC</sub> =25V, I <sub>C</sub> =10I <sub>B1</sub> =-10I <sub>B2</sub> =4A,<br>R <sub>L</sub> =6.25Ω |
| t <sub>stg</sub>        | -    | 500  | -    | ns   |   |
| t <sub>f</sub>          | -    | 20   | -    | ns   |   |

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

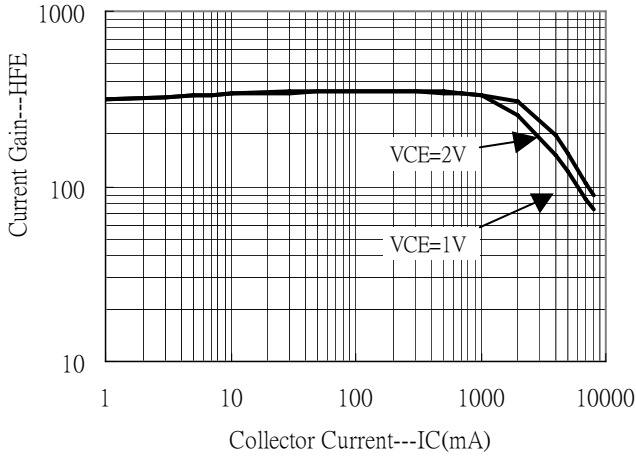
**Ordering Information**

| Device    | Package                    | Shipping                      | Marking |
|-----------|----------------------------|-------------------------------|---------|
| BTN3501I3 | TO-251<br>(RoHS compliant) | 80 pcs / tube, 50 tubes / box | N3501   |

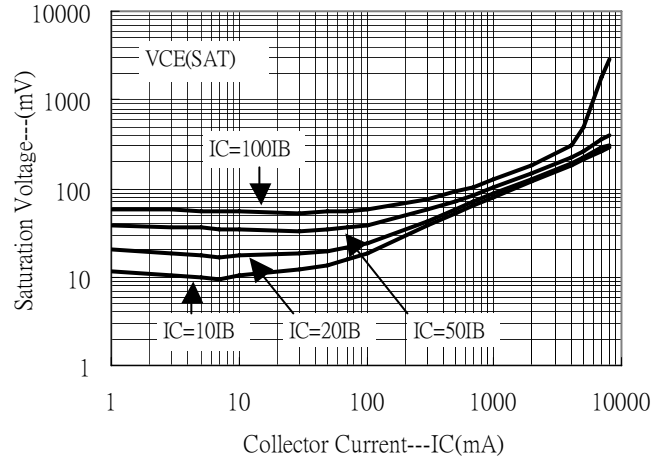


### Characteristic Curves

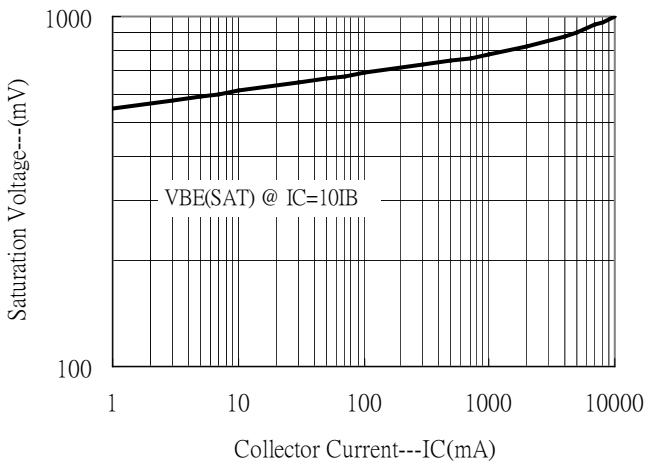
Current Gain vs Collector Current



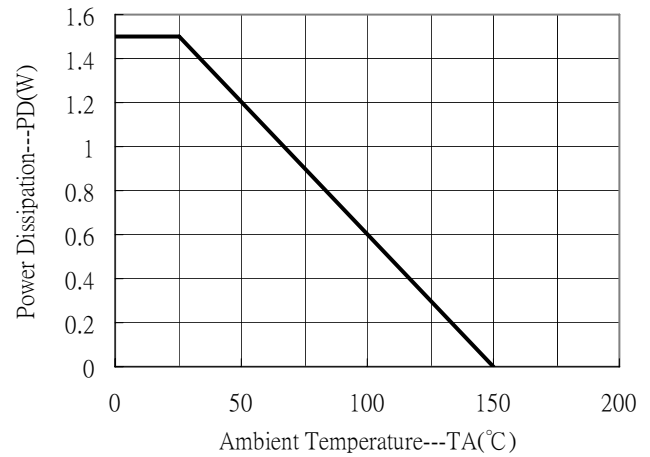
Saturation Voltage vs Collector Current



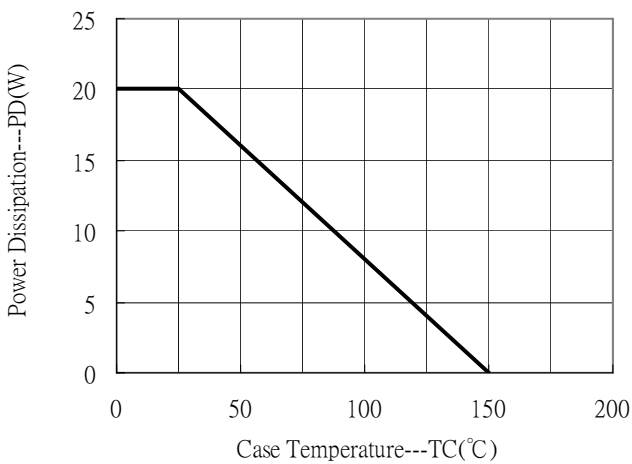
Saturation Voltage vs Collector Current



Power Derating Curve



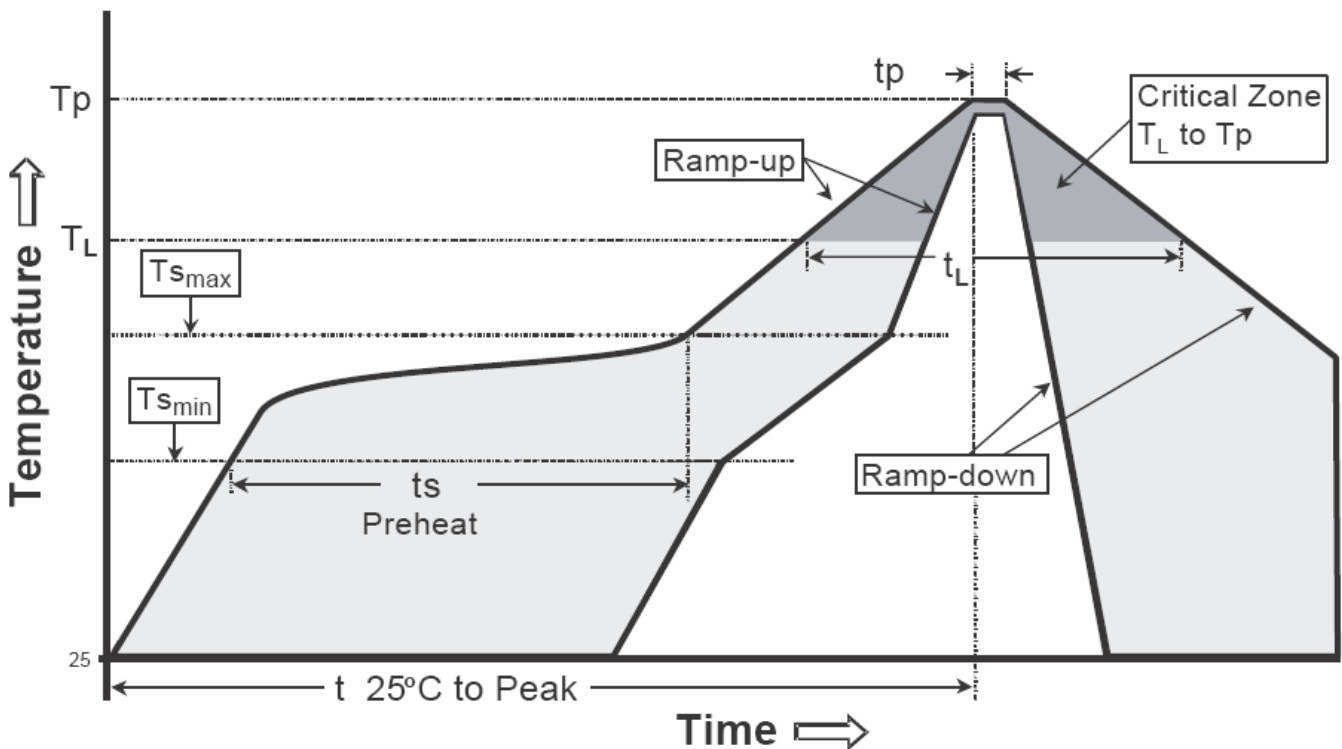
Power Derating Curve



**Recommended wave soldering condition**

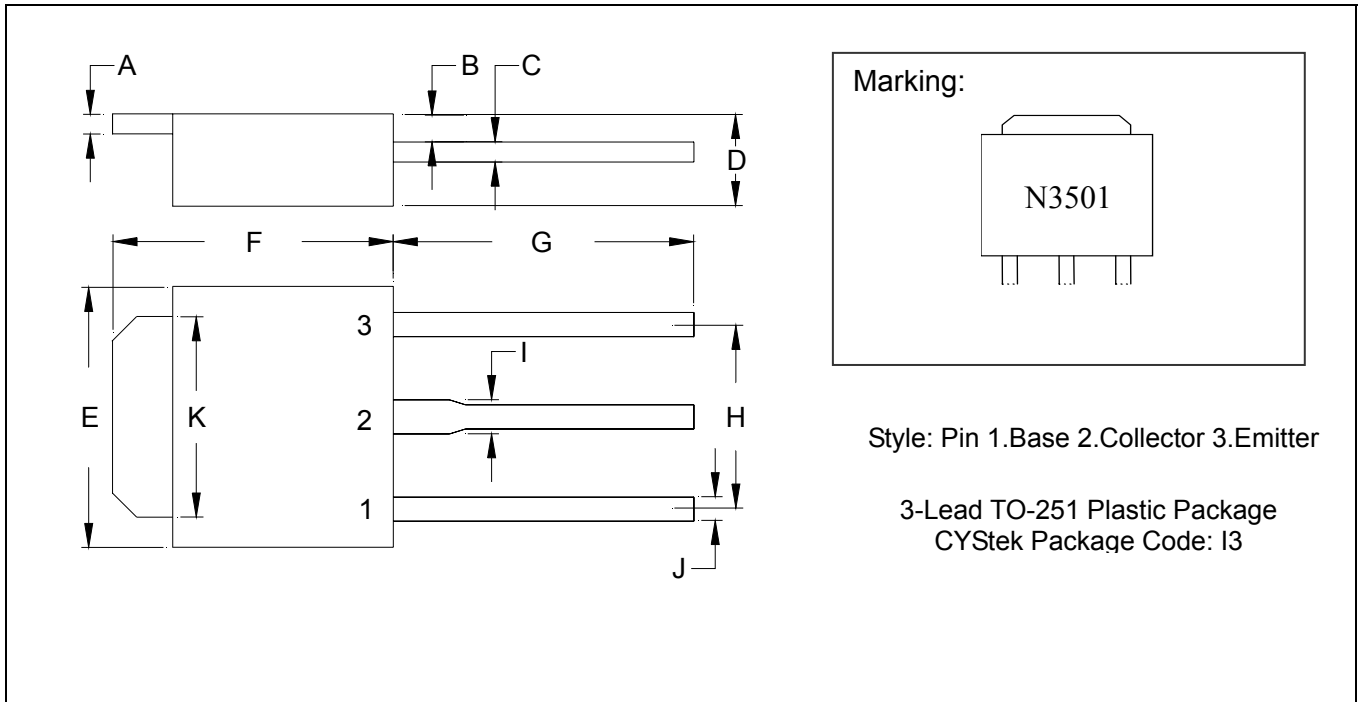
|                 |                  |                 |
|-----------------|------------------|-----------------|
| Product         | Peak Temperature | Soldering Time  |
| Pb-free devices | 260 +0/-5 °C     | 5 +1/-1 seconds |

**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(t <sub>s min</sub> to t <sub>s 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-251 Dimension**



\*: Typical

| DIM | Inches |        | Millimeters |      | DIM | Inches |         | Millimeters |       |
|-----|--------|--------|-------------|------|-----|--------|---------|-------------|-------|
|     | Min.   | Max.   | Min.        | Max. |     | Min.   | Max.    | Min.        | Max.  |
| A   | 0.0177 | 0.0217 | 0.45        | 0.55 | G   | 0.2559 | -       | 6.50        | -     |
| B   | 0.0354 | 0.0591 | 0.90        | 1.50 | H   | -      | *0.1811 | -           | *4.60 |
| C   | 0.0177 | 0.0236 | 0.45        | 0.60 | I   | -      | 0.0449  | -           | 1.14  |
| D   | 0.0866 | 0.0945 | 2.20        | 2.40 | J   | -      | 0.0346  | -           | 0.88  |
| E   | 0.2441 | 0.2677 | 6.20        | 6.80 | K   | 0.2047 | 0.2165  | 5.20        | 5.50  |
| F   | 0.2677 | 0.2835 | 6.80        | 7.20 |     |        |         |             |       |

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: KFC; pure tin plated
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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