



JIANGSU CHANGJIANG ELECTRONICS TECHNOLOGY CO., LTD

## WBFBP-03B Plastic-Encapsulate Transistors

### TK3906NND03 TRANSISTOR

#### DESCRIPTION

PNP Epitaxial Silicon Transistor

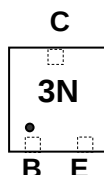
#### FEATURES

Epitaxial Planar Die Construction  
Complementary NPN Type Available (TK3904NND03)  
Ultra-Small Surface Mount Package  
Also Available in Lead Free Version

#### APPLICATION

General Purpose Amplifier, switching  
For portable equipment:(i.e. Mobile phone,MP3, MD,CD-ROM,  
DVD-ROM, Note book PC, etc.)

#### MARKING:3N



#### MAXIMUM RATINGS\* T<sub>A</sub>=25°C unless otherwise noted

| Symbol           | Parameter                               | Value   | Units |
|------------------|-----------------------------------------|---------|-------|
| V <sub>CBO</sub> | Collector-Base Voltage                  | -40     | V     |
| V <sub>CEO</sub> | Collector-Emitter Voltage               | -40     | V     |
| V <sub>EB0</sub> | Emitter-Base Voltage                    | -5      | V     |
| I <sub>C</sub>   | Collector Current -Continuous           | -200    | mA    |
| P <sub>D</sub>   | Power Dissipation                       | 150     | mW    |
| R <sub>θJA</sub> | Thermal Resistance, Junction to Ambient | 833     | °C/W  |
| T <sub>J</sub>   | Operating Temperature                   | 150     | °C    |
| T <sub>stg</sub> | Storage and Temperature                 | -55-150 | °C    |

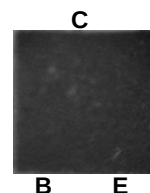
#### ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise specified)

| Parameter                            | Symbol                | Test conditions                                        | MIN   | TYP | MAX   | UNIT |
|--------------------------------------|-----------------------|--------------------------------------------------------|-------|-----|-------|------|
| Collector-base breakdown voltage     | V <sub>(BR)CBO</sub>  | I <sub>C</sub> =-10μA, I <sub>E</sub> =0               | -40   |     |       | V    |
| Collector-emitter breakdown voltage  | V <sub>(BR)CEO</sub>  | I <sub>C</sub> =-1mA, I <sub>B</sub> =0                | -40   |     |       | V    |
| Emitter-base breakdown voltage       | V <sub>(BR)EBO</sub>  | I <sub>E</sub> =-10μA, I <sub>C</sub> =0               | -5    |     |       | V    |
| Collector cut-off current            | I <sub>CEX</sub>      | V <sub>CE</sub> =-30V, V <sub>EB(off)</sub> =-3V       |       |     | -0.05 | μA   |
| Emitter cut-off current              | I <sub>EBO</sub>      | V <sub>EB</sub> =-5V, I <sub>C</sub> =0                |       |     | -0.1  | μA   |
| DC current gain                      | h <sub>FE(1)</sub>    | V <sub>CE</sub> =-1V, I <sub>C</sub> =-0.1mA           | 60    |     |       |      |
|                                      | h <sub>FE(2)</sub>    | V <sub>CE</sub> =-1V, I <sub>C</sub> =-1mA             | 80    |     |       |      |
|                                      | h <sub>FE(3)</sub>    | V <sub>CE</sub> =-1V, I <sub>C</sub> =-10mA            | 100   |     | 300   |      |
|                                      | h <sub>FE(4)</sub>    | V <sub>CE</sub> =-1V, I <sub>C</sub> =-50mA            | 60    |     |       |      |
|                                      | h <sub>FE(5)</sub>    | V <sub>CE</sub> =-1V, I <sub>C</sub> =-100mA           | 30    |     |       |      |
| Collector-emitter saturation voltage | V <sub>CE(sat)1</sub> | I <sub>C</sub> =-10mA, I <sub>B</sub> =-1mA            |       |     | -0.25 | V    |
|                                      | V <sub>CE(sat)2</sub> | I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA            |       |     | -0.4  | V    |
| Base-emitter saturation voltage      | V <sub>BE(sat)1</sub> | I <sub>C</sub> =-10mA, I <sub>B</sub> =-1mA            | -0.65 |     | -0.85 | V    |
|                                      | V <sub>BE(sat)2</sub> | I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA            |       |     | -0.95 | V    |
| Transition frequency                 | f <sub>T</sub>        | V <sub>CE</sub> =-20V, I <sub>C</sub> =-10mA, f=100MHz | 250   |     |       | MHz  |

#### WBFBP-03B

(1.2×1.2×0.5)  
unit: mm

TOP

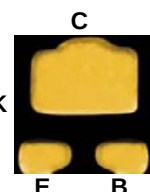


1. BASE

2. EMITTER

3. COLLECTOR

BACK



## ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)

| Parameter                    | Symbol    | Test conditions                                        | MIN | TYP | MAX | UNIT |
|------------------------------|-----------|--------------------------------------------------------|-----|-----|-----|------|
| Collector output capacitance | $C_{obo}$ | $V_{CB}=-5V, I_E=0, f=1MHz$                            |     |     | 4.5 | pF   |
| Input capacitance            | $C_{iob}$ | $V_{EB}=-0.5V, I_C=0, f=1MHz$                          |     |     | 10  | pF   |
| Noise figure                 | NF        | $V_{CE}=-5V, I_C=0.1mA, f=1KHz, R_S=1K\Omega$          |     |     | 4   | dB   |
| Delay time                   | $t_d$     | $V_{CC}=-3V, V_{BE(OFF)}=0.5V, I_C=-10mA, I_{B1}=-1mA$ |     |     | 35  | nS   |
| Rise time                    | $t_r$     |                                                        |     |     | 35  | nS   |
| Storage time                 | $t_s$     | $V_{CC}=-3V, I_C=-10mA, I_{B1}=I_{B2}=-1mA$            |     |     | 225 | nS   |
| Fall time                    | $t_f$     |                                                        |     |     | 75  | nS   |

## Typical Characteristics

## TK3906NND03

