

## WBFBP-03B Plastic-Encapsulate Transistors

### TK3906NND03 TRANSISTOR

#### DESCRIPTION

PNP Epitaxial Silicon Transistor

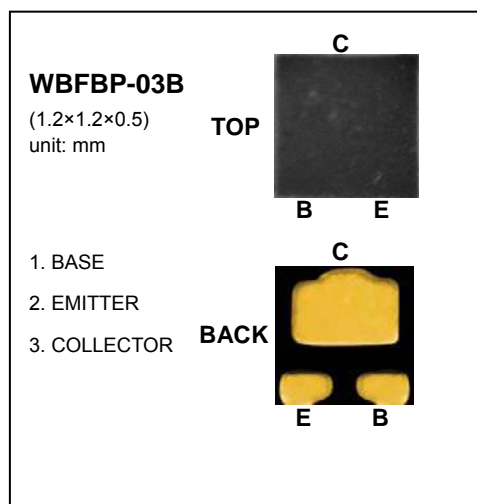
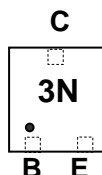
#### FEATURES

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	Unit
V <sub>CB0</sub>	Collector-Base Voltage	-40	V
V <sub>CE0</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

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

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector output capacitance	C <sub>ob</sub>	V <sub>CB</sub> =-5V, I <sub>E</sub> =0, f=1MHz			4.5	pF
Input capacitance	C <sub>ib</sub>	V <sub>EB</sub> =-0.5V, I <sub>C</sub> =0, f=1MHz			10	pF
Noise figure	NF	V <sub>CE</sub> =-5V, I <sub>c</sub> =0.1mA, f=1KHz, R <sub>S</sub> =1KΩ			4	dB
Delay time	t <sub>d</sub>	V <sub>CC</sub> =-3V, V <sub>BE(OFF)</sub> =0.5V, I <sub>C</sub> =-10mA, I <sub>B1</sub> =-1mA			35	ns
Rise time	t <sub>r</sub>				35	ns
Storage time	t <sub>s</sub>	V <sub>CC</sub> =-3V, I <sub>C</sub> =-10mA, I <sub>B1</sub> = I <sub>B2</sub> =- 1mA			225	ns
Fall time	t <sub>f</sub>				75	ns