



JIANGSU CHANGJIANG ELECTRONICS TECHNOLOGY CO.,LTD

## WBFBP-03B Plastic-Encapsulate Transistors

### S9013M TRANSISTOR

#### DESCRIPTION

NPN Epitaxial Silicon Transistor

#### FEATURES

- High Collector Current. ( $I_C=500\text{mA}$ )
- Complementary to S9012M
- Excellent  $h_{FE}$  linearity.

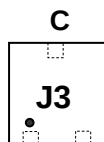
#### APPLICATION

150mW Output Amplifier of Potable Radios in Class

B Push-pull Operation.

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

#### MARKING: J3



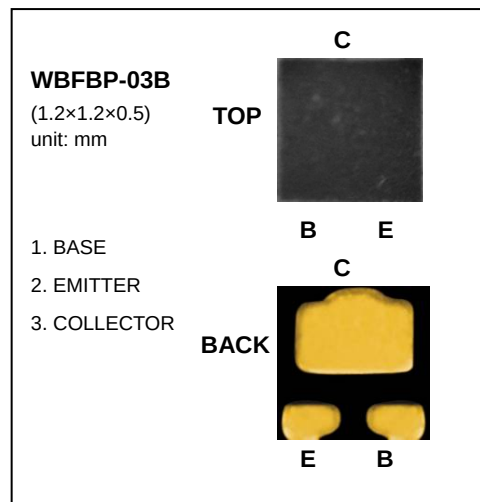
B E

#### MAXIMUM RATINGS $T_A=25^\circ\text{C}$ unless otherwise noted

| Symbol    | Parameter                     | Value   | Units            |
|-----------|-------------------------------|---------|------------------|
| $V_{CBO}$ | Collector-Base Voltage        | 40      | V                |
| $V_{CEO}$ | Collector-Emitter Voltage     | 25      | V                |
| $V_{EBO}$ | Emitter-Base Voltage          | 5       | V                |
| $I_C$     | Collector Current -Continuous | 500     | mA               |
| $P_C$     | Collector Dissipation         | 150     | mW               |
| $T_J$     | Junction Temperature          | 150     | $^\circ\text{C}$ |
| $T_{stg}$ | Storage Temperature           | -55-150 | $^\circ\text{C}$ |

#### ELECTRICAL CHARACTERISTICS( $T_{amb}=25^\circ\text{C}$ unless otherwise specified)

| Parameter                            | Symbol        | Test conditions                                            | MIN | TYP | MAX | UNIT          |
|--------------------------------------|---------------|------------------------------------------------------------|-----|-----|-----|---------------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_C=100\mu\text{A}$ , $I_E=0$                             | 40  |     |     | V             |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_C=1\text{mA}$ , $I_B=0$                                 | 25  |     |     | V             |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E=100\mu\text{A}$ , $I_C=0$                             | 5   |     |     | V             |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB}=40\text{V}$ , $I_E=0$                              |     |     | 0.1 | $\mu\text{A}$ |
| Collector cut-off current            | $I_{CEO}$     | $V_{CE}=20\text{V}$ , $I_B=0$                              |     |     | 0.1 | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB}=5\text{V}$ , $I_C=0$                               |     |     | 0.1 | $\mu\text{A}$ |
| DC current gain                      | $h_{FE1}$     | $V_{CE}=1\text{V}$ , $I_C=50\text{mA}$                     | 120 |     | 400 |               |
|                                      | $h_{FE2}$     | $V_{CE}=1\text{V}$ , $I_C=500\text{mA}$                    | 40  |     |     |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C=500\text{mA}$ , $I_B=50\text{mA}$                     |     |     | 0.6 | V             |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C=500\text{mA}$ , $I_B=50\text{mA}$                     |     |     | 1.2 | V             |
| Transition frequency                 | $f_T$         | $V_{CE}=6\text{V}$ , $I_C=20\text{mA}$<br>$f=30\text{MHz}$ | 150 |     |     | MHz           |
| Collector output capacitance         | $C_{ob}$      | $V_{CB}=6\text{V}$ , $I_E=0$ , $f=1\text{MHz}$             |     |     | 8   | pF            |



# CLASSIFICATION OF $h_{FE1}$

| Rank  | L       | H       | J       |
|-------|---------|---------|---------|
| Range | 120-200 | 200-350 | 300-400 |

## Typical Characteristics

S9013M

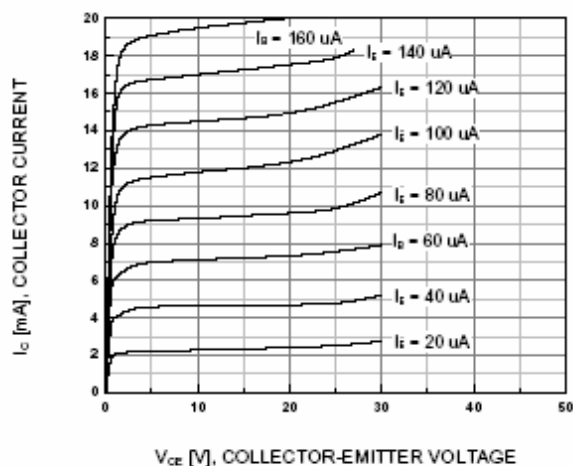


Figure 1. Static Characteristic

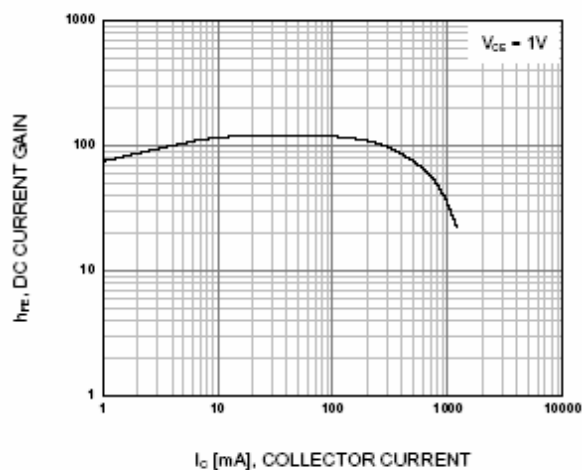


Figure 2. DC current Gain

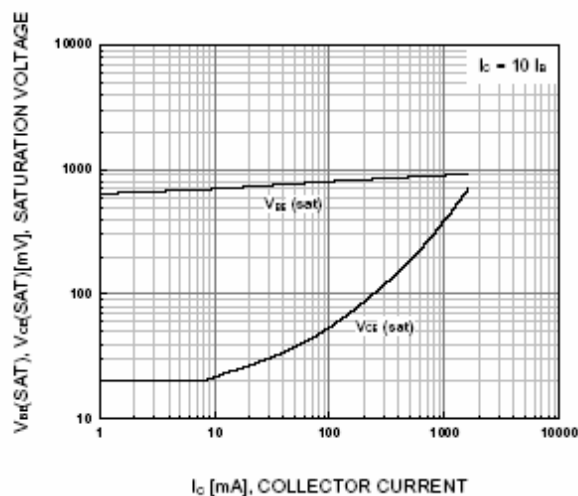


Figure 3. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

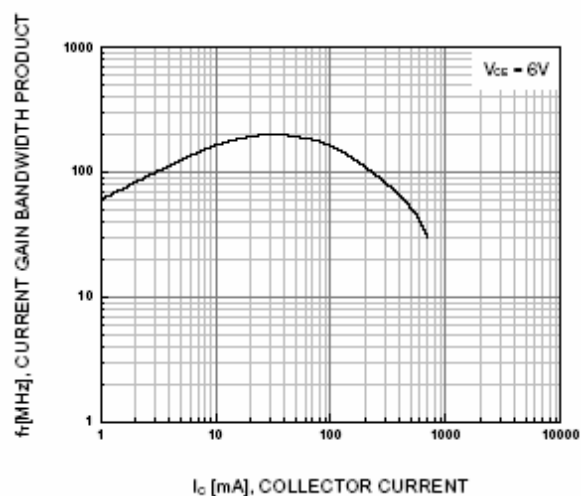
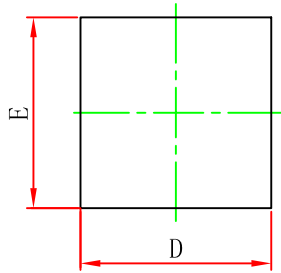
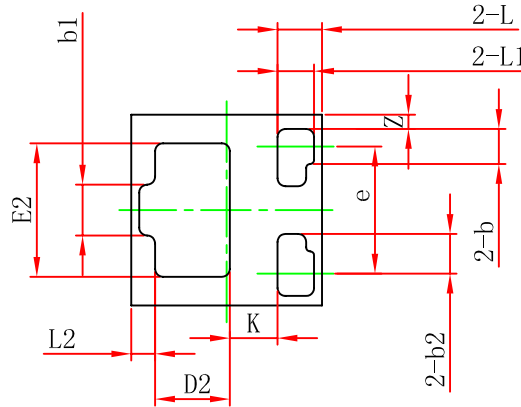


Figure 4. Current Gain Bandwidth Product

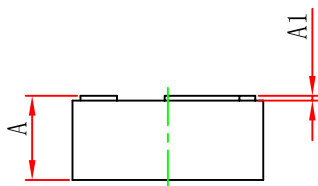
# **WBFBP-03B(1.2×1.2×0.5) PACKAGE OUTLINE DIMENSIONS**



TOP VIEW

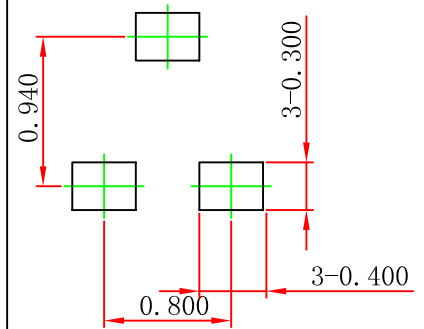


BOTTOM VIEW



SIDE VIEW

## **(LAND PATTERN RECOMMENDATION)**



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.450                     | 0.550 | 0.018                | 0.022 |
| A1     | 0.010                     | 0.090 | 0.000                | 0.004 |
| b      | 0.170                     | 0.270 | 0.007                | 0.011 |
| b1     | 0.270                     | 0.370 | 0.011                | 0.015 |
| b2     | 0.250 REF.                |       | 0.010 REF.           |       |
| D      | 1.150                     | 1.250 | 0.045                | 0.049 |
| E      | 1.150                     | 1.250 | 0.045                | 0.049 |
| D2     | 0.470 REF.                |       | 0.002 REF.           |       |
| E2     | 0.810 REF.                |       | 0.032 REF.           |       |
| e      | 0.800 TYP.                |       | 0.032 TYP.           |       |
| L      | 0.280 REF.                |       | 0.011 REF.           |       |
| L1     | 0.230 REF.                |       | 0.009 REF.           |       |
| L2     | 0.150 REF.                |       | 0.006 REF.           |       |
| k      | 0.300 REF.                |       | 0.012 REF.           |       |
| z      | 0.090 REF.                |       | 0.004 REF.           |       |