

# XN04604 (XN4604)

Silicon NPN epitaxial planer transistor (Tr1)  
 Silicon PNP epitaxial planer transistor (Tr2)

For amplification of low frequency output

**Features**

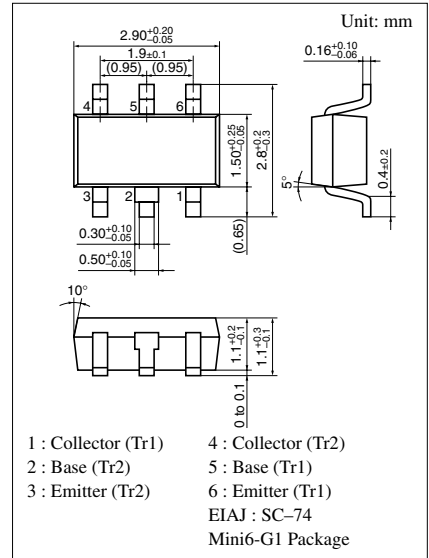
- Two elements incorporated into one package.
- Reduction of the mounting area and assembly cost by one half.

**Basic Part Number of Element**

- 2SD1328 + 2SB0970(2SB970)

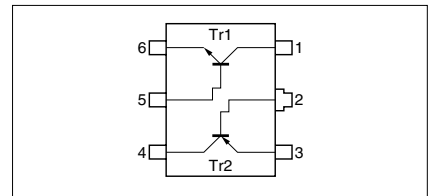
**Absolute Maximum Ratings (Ta=25°C)**

|         | Parameter                    | Symbol    | Ratings     | Unit |
|---------|------------------------------|-----------|-------------|------|
| Tr1     | Collector to base voltage    | $V_{CBO}$ | 25          | V    |
|         | Collector to emitter voltage | $V_{CEO}$ | 20          | V    |
|         | Emitter to base voltage      | $V_{EBO}$ | 12          | V    |
|         | Collector current            | $I_C$     | 0.5         | A    |
|         | Peak collector current       | $I_{CP}$  | 1           | A    |
| Tr2     | Collector to base voltage    | $V_{CBO}$ | -15         | V    |
|         | Collector to emitter voltage | $V_{CEO}$ | -10         | V    |
|         | Emitter to base voltage      | $V_{EBO}$ | -7          | V    |
|         | Collector current            | $I_C$     | -0.5        | A    |
|         | Peak collector current       | $I_{CP}$  | -1          | A    |
| Overall | Total power dissipation      | $P_T$     | 300         | mW   |
|         | Junction temperature         | $T_j$     | 150         | °C   |
|         | Storage temperature          | $T_{stg}$ | -55 to +150 | °C   |



Marking Symbol: 5I

Internal Connection



Note) The Part number in the Parenthesis shows conventional part number.

■ Electrical Characteristics (Ta=25°C)

● Tr1

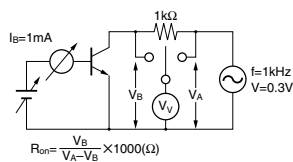
| Parameter                               | Symbol                        | Conditions  | min | typ  | max | Unit |
|---|-------------------------------|---|-----|------|-----|------|
| Collector to base voltage               | V <sub>CBO</sub>              | I <sub>C</sub> = 10μA, I <sub>E</sub> = 0                 | 25  |      |     | V    |
| Collector to emitter voltage            | V <sub>CEO</sub>              | I <sub>C</sub> = 1mA, I <sub>B</sub> = 0                  | 20  |      |     | V    |
| Emitter to base voltage                 | V <sub>EBO</sub>              | I <sub>E</sub> = 10μA, I <sub>C</sub> = 0                 | 12  |      |     | V    |
| Collector cutoff current                | I <sub>CBO</sub>              | V <sub>CB</sub> = 25V, I <sub>E</sub> = 0                 |     |      | 0.1 | μA   |
| Forward current transfer ratio          | h <sub>FE1</sub>              | V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.5A <sup>*1</sup> | 200 |      | 800 |      |
|   | h <sub>FE2</sub>              | V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A <sup>*1</sup>   | 60  |      |     |      |
| Collector to emitter saturation voltage | V <sub>CE(sat)</sub>          | I <sub>C</sub> = 0.5A, I <sub>B</sub> = 20mA              |     | 0.13 | 0.4 | V    |
| Base to emitter saturation voltage      | V <sub>BE(sat)</sub>          | I <sub>C</sub> = 0.5A, I <sub>B</sub> = 20mA              |     |      | 1.2 | V    |
| Transition frequency                    | f <sub>T</sub>                | V <sub>CB</sub> = 10V, I <sub>E</sub> = -50mA, f = 200MHz |     | 200  |     | MHz  |
| Collector output capacitance            | C <sub>ob</sub>               | V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f = 1MHz       |     | 10   |     | pF   |
| ON Resistance                           | R <sub>on</sub> <sup>*2</sup> |   |     | 1.0  |     | Ω    |

● Tr2

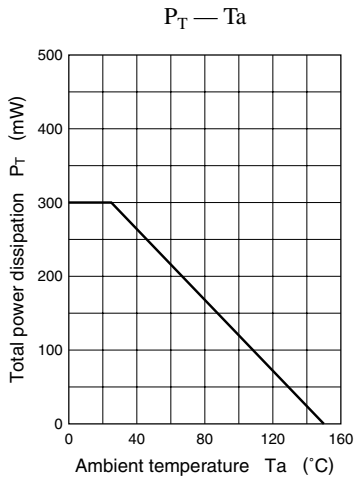
| Parameter                               | Symbol               | Conditions  | min | typ   | max  | Unit |
|---|----------------------|---|-----|-------|------|------|
| Collector to base voltage               | V <sub>CBO</sub>     | I <sub>C</sub> = -10μA, I <sub>E</sub> = 0                  | -15 |       |      | V    |
| Collector to emitter voltage            | V <sub>CEO</sub>     | I <sub>C</sub> = -1mA, I <sub>B</sub> = 0                   | -10 |       |      | V    |
| Emitter to base voltage                 | V <sub>EBO</sub>     | I <sub>E</sub> = -10μA, I <sub>C</sub> = 0                  | -7  |       |      | V    |
| Collector cutoff current                | I <sub>CBO</sub>     | V <sub>CB</sub> = -10V, I <sub>E</sub> = 0                  |     |       | -0.1 | μA   |
| Forward current transfer ratio          | h <sub>FE1</sub>     | V <sub>CE</sub> = -2V, I <sub>C</sub> = -0.5A <sup>*1</sup> | 100 |       | 350  |      |
|   | h <sub>FE2</sub>     | V <sub>CE</sub> = -2V, I <sub>C</sub> = -1A <sup>*1</sup>   | 60  |       |      |      |
| Collector to emitter saturation voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> = -0.4A, I <sub>B</sub> = -8mA               |     | -0.16 | -0.3 | V    |
| Base to emitter saturation voltage      | V <sub>BE(sat)</sub> | I <sub>C</sub> = -0.4A, I <sub>B</sub> = -8mA               |     | -0.8  | -1.2 | V    |
| Transition frequency                    | f <sub>T</sub>       | V <sub>CB</sub> = -10V, I <sub>E</sub> = 50mA, f = 200MHz   |     | 130   |      | MHz  |
| Collector output capacitance            | C <sub>ob</sub>      | V <sub>CB</sub> = -10V, I <sub>E</sub> = 0, f = 1MHz        |     | 22    |      | pF   |

\*1 Pulse measurement

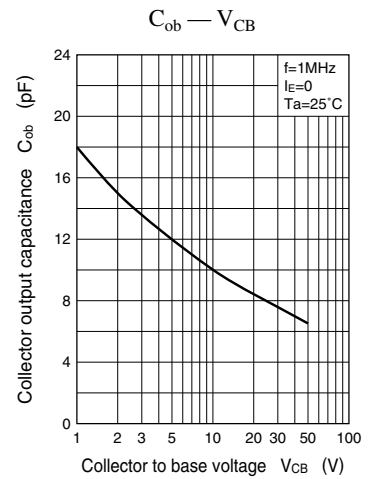
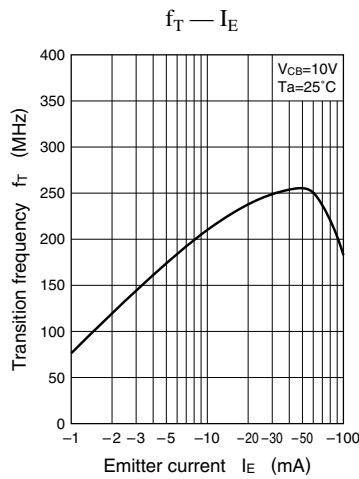
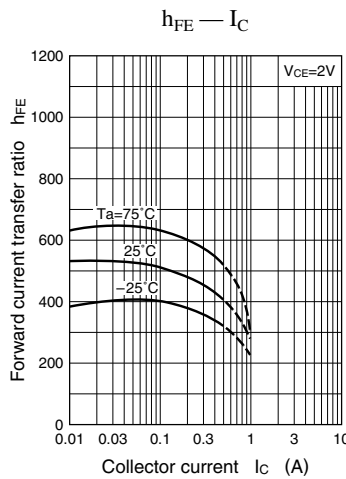
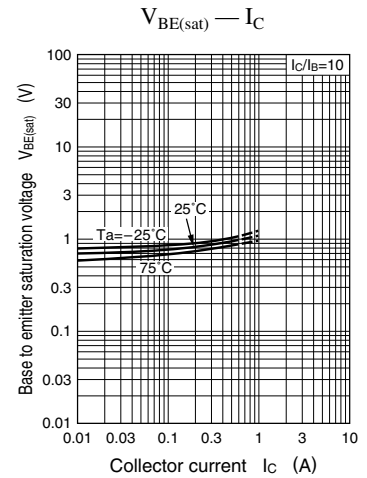
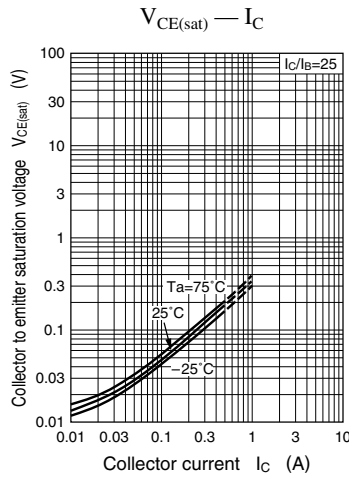
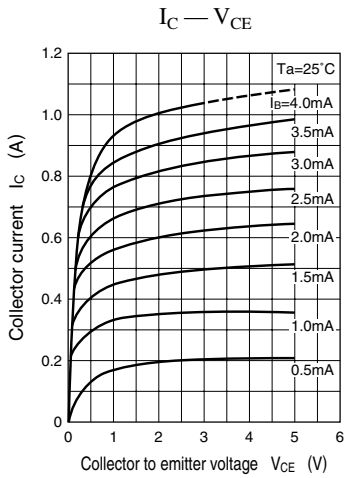
\*2 R<sub>on</sub> test circuit



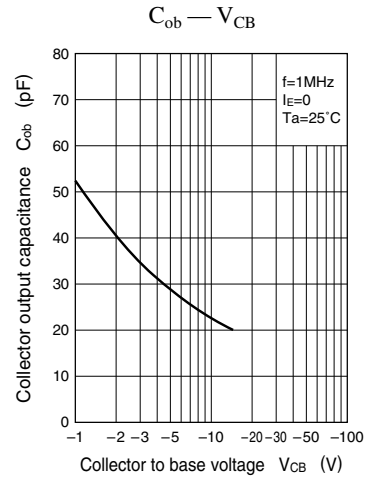
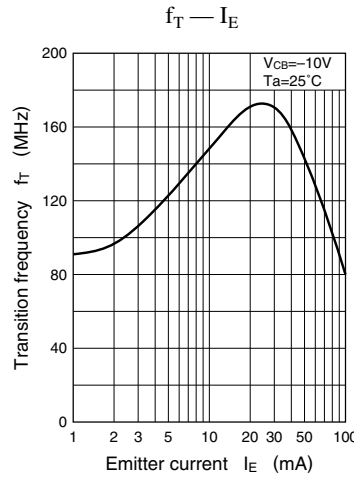
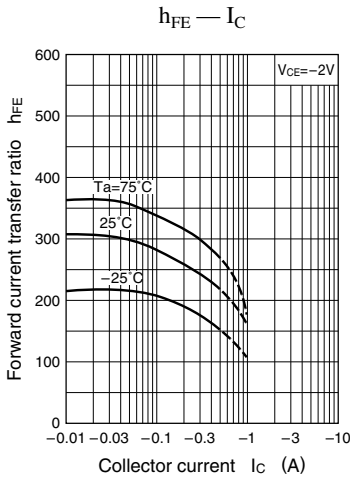
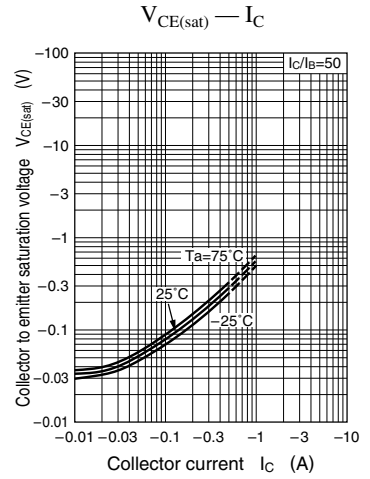
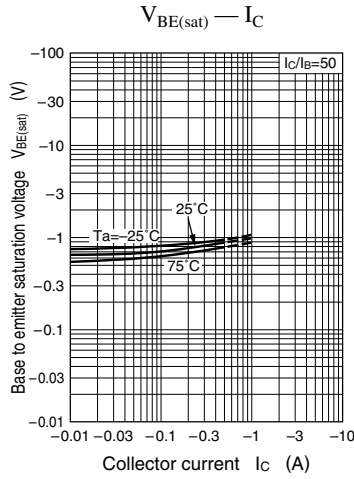
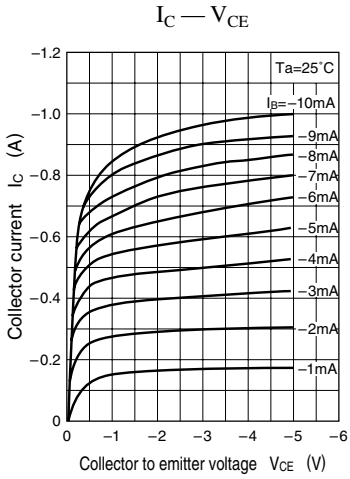
Common characteristics chart



Characteristics charts of Tr1



Characteristics charts of Tr2



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