

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# MT6L52AE

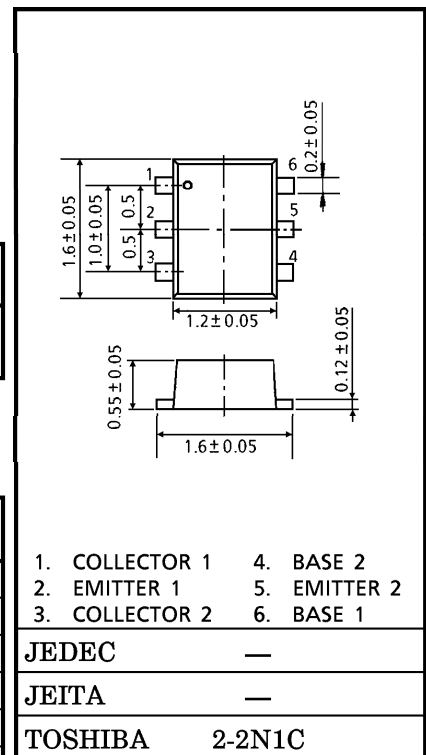
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Two devices are built in to the super-thin and extreme super mini (6 pins) package : ES6

**MOUNTED DEVICES**

|  |                        |                        |
|--|------------------------|------------------------|
|  | Q1 : SSM (TESM)        | Q2 : SSM (TESM)        |
| Three-pins (SSM/ TESM) mold products are corresponded. | MT3S03AS<br>(MT3S03AT) | MT3S04AS<br>(MT3S04AT) |



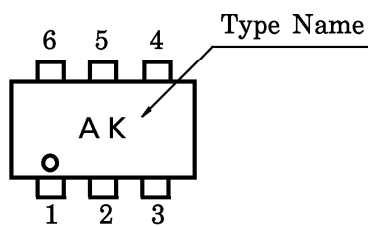
Weight : 0.003 g

**MAXIMUM RATINGS (Ta = 25°C)**

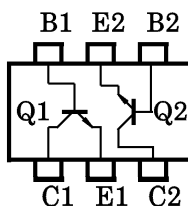
| CHARACTERISTIC              | SYMBOL                     | Q1      | Q2 | UNIT |
|-----------------------------|----------------------------|---------|----|------|
| Collector-Base Voltage      | V <sub>CB0</sub>           | 10      | 10 | V    |
| Collector-Emitter Voltage   | V <sub>CEO</sub>           | 5       | 5  | V    |
| Emitter-Base Voltage        | V <sub>EBO</sub>           | 2       | 2  | V    |
| Collector Current           | I <sub>C</sub>             | 40      | 40 | mA   |
| Base Current                | I <sub>B</sub>             | 10      | 10 | mA   |
| Collector Power Dissipation | P <sub>C</sub><br>(Note 1) | 100     |    | mW   |
| Junction Temperature        | T <sub>j</sub>             | 125     |    | °C   |
| Storage Temperature Range   | T <sub>stg</sub>           | -55~125 |    | °C   |

(Note 1) : Total power dissipation of Q1 and Q2.

**MARKING**



**PIN ASSIGNMENT (TOP VIEW)**



## ELECTRICAL CHARACTERISTICS Q1 (Ta = 25°C)

| CHARACTERISTIC               | SYMBOL            | TEST CONDITION   | MIN. | TYP. | MAX. | UNIT          |
|------------------------------|-------------------|--|------|------|------|---------------|
| Collector Cut-off Current    | $I_{CBO}$         | $V_{CB} = 5\text{ V}, I_E = 0$                                 | —    | —    | 0.1  | $\mu\text{A}$ |
| Emitter Cut-off Current      | $I_{EBO}$         | $V_{EB} = 1\text{ V}, I_C = 0$                                 | —    | —    | 1    | $\mu\text{A}$ |
| DC Current Gain              | $h_{FE}$          | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$                       | 80   | —    | 160  | —             |
| Transition Frequency         | $f_T$ (1)         | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$                       | 5    | 7    | —    | GHz           |
|                              | $f_T$ (2)         | $V_{CE} = 3\text{ V}, I_C = 10\text{ mA}$                      | 7    | 10   | —    | GHz           |
| Insertion Gain               | $ S_{21e} ^2$ (1) | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$     | —    | 5    | —    | dB            |
|                              | $ S_{21e} ^2$ (2) | $V_{CE} = 3\text{ V}, I_C = 20\text{ mA}, f = 2\text{ GHz}$    | 3    | 6.5  | —    | dB            |
| Noise Figure                 | NF (1)            | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$     | —    | 1.7  | 3    | dB            |
|                              | NF (2)            | $V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 2\text{ GHz}$     | —    | 1.4  | 2.2  | dB            |
| Reverse Transfer Capacitance | $C_{re}$          | $V_{CB} = 1\text{ V}, I_E = 0,$<br>$f = 1\text{ MHz}$ (Note 2) | —    | 0.8  | 1.15 | pF            |

## ELECTRICAL CHARACTERISTICS Q2 (Ta = 25°C)

| CHARACTERISTIC               | SYMBOL            | TEST CONDITION   | MIN. | TYP. | MAX. | UNIT          |
|------------------------------|-------------------|--|------|------|------|---------------|
| Collector Cut-off Current    | $I_{CBO}$         | $V_{CB} = 5\text{ V}, I_E = 0$                                 | —    | —    | 0.1  | $\mu\text{A}$ |
| Emitter Cut-off Current      | $I_{EBO}$         | $V_{EB} = 1\text{ V}, I_C = 0$                                 | —    | —    | 1    | $\mu\text{A}$ |
| DC Current Gain              | $h_{FE}$          | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$                       | 80   | —    | 160  | —             |
| Transition Frequency         | $f_T$ (1)         | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$                       | 2    | 4.5  | —    | GHz           |
|                              | $f_T$ (2)         | $V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$                       | 5    | 7    | —    | GHz           |
| Insertion Gain               | $ S_{21e} ^2$ (1) | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$     | —    | 8.5  | —    | dB            |
|                              | $ S_{21e} ^2$ (2) | $V_{CE} = 3\text{ V}, I_C = 20\text{ mA}, f = 1\text{ GHz}$    | 7.5  | 11   | —    | dB            |
| Noise Figure                 | NF (1)            | $V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$     | —    | 1.3  | 2.2  | dB            |
|                              | NF (2)            | $V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$     | —    | 1.2  | 2    | dB            |
| Reverse Transfer Capacitance | $C_{re}$          | $V_{CB} = 1\text{ V}, I_E = 0,$<br>$f = 1\text{ MHz}$ (Note 2) | —    | 0.9  | 1.25 | pF            |

(Note 2) :  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

## HANDLING PRECAUTION

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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