

**2SC3776**

## UHF Oscillator, Mixer, Low-Noise Amplifier, Wide-Band Amplifier Applications

### Applications

- UHF frequency converters, local oscillators, low-noise amplifiers, wide-band amplifiers.

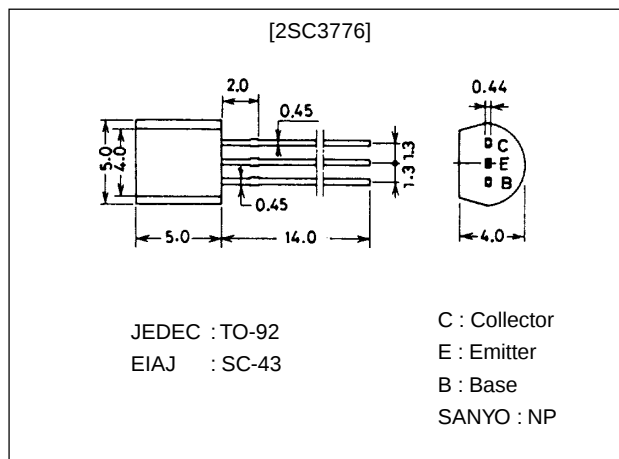
### Features

- Small noise figure : NF=2.5dB typ (f=0.9GHz).
- High power gain : MAG=12dB typ (f=0.9GHz).
- High cutoff frequency :  $f_T$ =3.0GHz typ.

### Package Dimensions

unit:mm

2004A



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

| Parameter                    | Symbol    | Conditions | Ratings     | Unit             |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |            | 25          | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |            | 16          | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |            | 3           | V                |
| Collector Current            | $I_C$     |            | 70          | mA               |
| Base Current                 | $I_B$     |            | 20          | mA               |
| Collector Dissipation        | $P_C$     |            | 400         | mW               |
| Junction Temperature         | $T_J$     |            | 150         | $^\circ\text{C}$ |
| Storage Temperature          | $T_{stg}$ |            | -55 to +150 | $^\circ\text{C}$ |

#### Electrical Characteristics at $T_a = 25^\circ\text{C}$

| Parameter                    | Symbol    | Conditions                           | Ratings |      |      | Unit          |
|------------------------------|-----------|--------------------------------------|---------|------|------|---------------|
|                              |           |                                      | min     | typ  | max  |               |
| Collector Cutoff Current     | $I_{CBO}$ | $V_{CB}=16\text{V}, I_E=0$           |         |      | 1.0  | $\mu\text{A}$ |
| Emitter Cutoff Current       | $I_{EBO}$ | $V_{EB}=2\text{V}, I_C=0$            |         |      | 10   | $\mu\text{A}$ |
| DC Current Gain              | $h_{FE}$  | $V_{CE}=10\text{V}, I_C=10\text{mA}$ | 40*     |      | 200* |               |
| Gain-Bandwidth Product       | $f_T$     | $V_{CE}=10\text{V}, I_C=10\text{mA}$ | 1.5     | 3.0  |      | GHz           |
| Output Capacitance           | $C_{ob}$  | $V_{CB}=10\text{V}, f=1\text{MHz}$   |         | 0.7  | 1.0  | pF            |
| Reverse Transfer Capacitance | $C_{re}$  | $V_{CB}=10\text{V}, f=1\text{MHz}$   |         | 0.45 |      | pF            |

\* : The 2SC3776 is classified by 10mA  $h_{FE}$  as follows :

|    |   |    |    |   |     |     |   |     |
|----|---|----|----|---|-----|-----|---|-----|
| 40 | C | 80 | 60 | D | 120 | 100 | E | 200 |
|----|---|----|----|---|-----|-----|---|-----|

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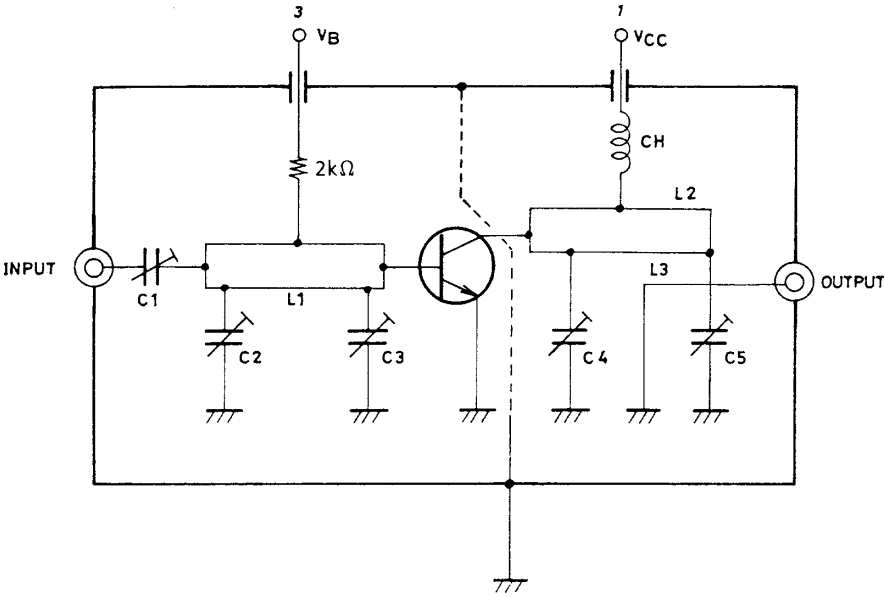
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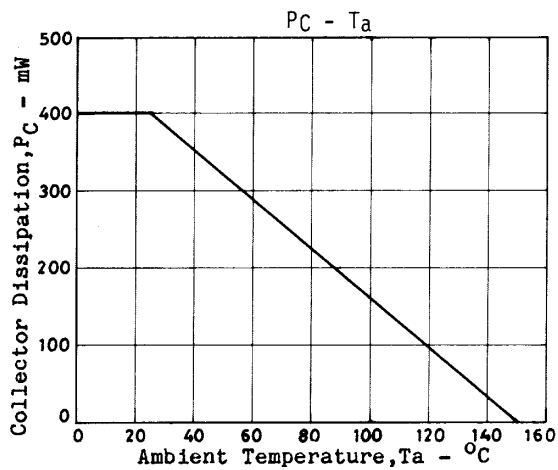
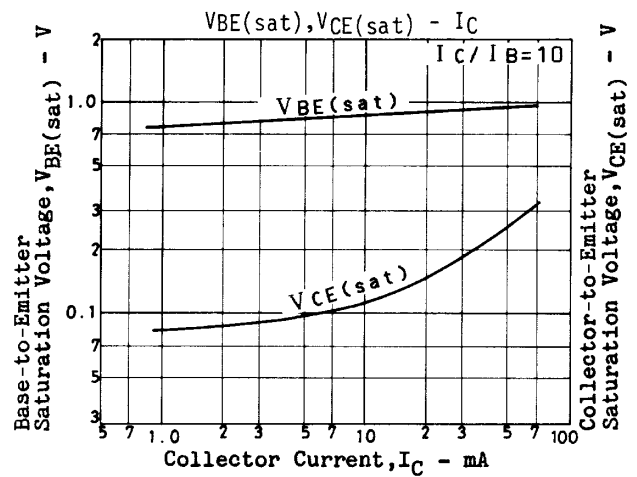
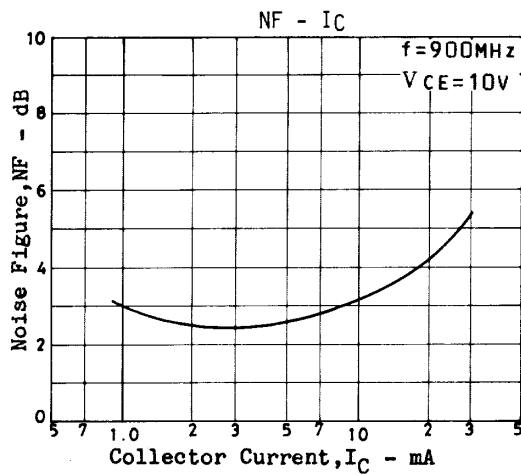
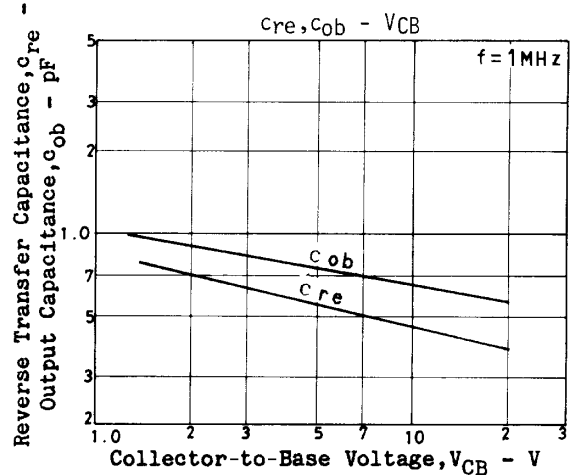
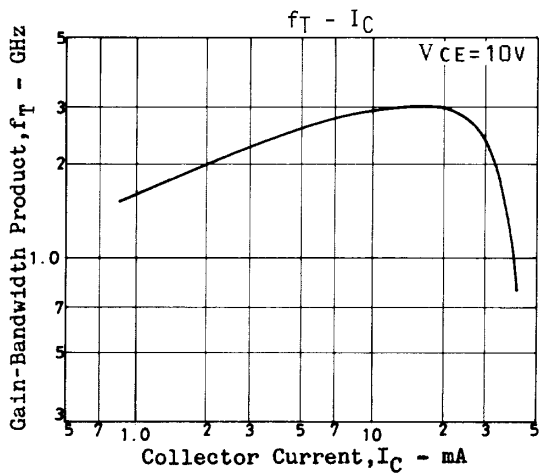
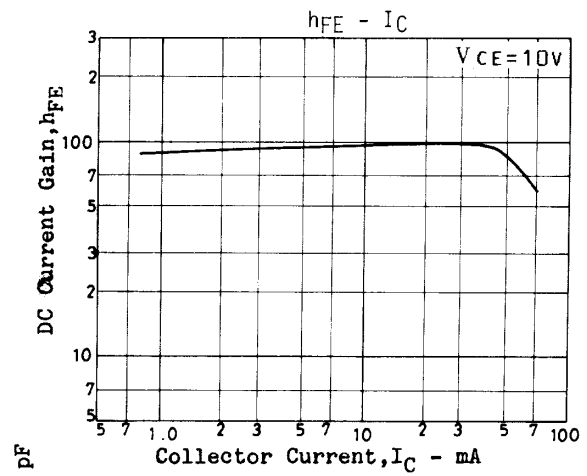
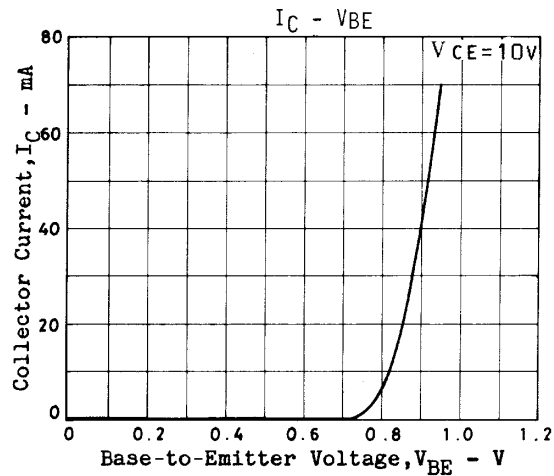
2SC3776

| Parameter                    | Symbol        | Conditions                                                       | Ratings |     |     | Unit |
|------------------------------|---------------|------------------------------------------------------------------|---------|-----|-----|------|
|                              |               |                                                                  | min     | typ | max |      |
| Forward Transfer Gain        | $ S_{21e} ^2$ | $V_{CE}=10V, I_C=10mA, f=0.9GHz$                                 | 7       | 9   |     | dB   |
| Maximum Available Power Gain | MAG           | $V_{CE}=10V, I_C=10mA, f=0.9GHz$                                 |         | 12  |     | dB   |
| Noise Figure                 | NF            | $V_{CE}=10V, I_C=3mA, f=0.9GHz$ ,<br>See specified Test Circuit. |         | 2.5 |     | dB   |

NF Test Circuit



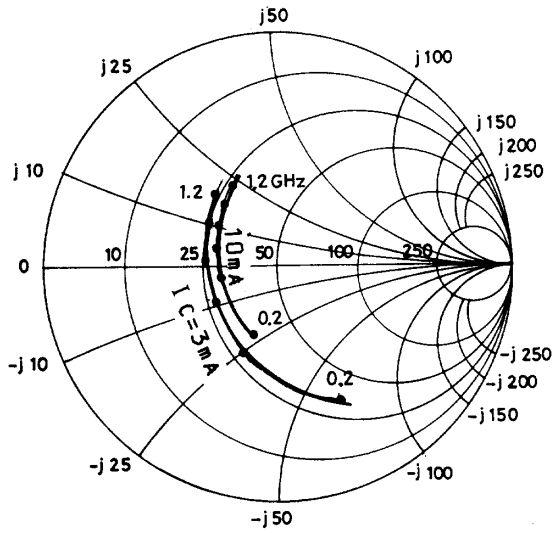
|    | 900MHz                            |
|----|-----------------------------------|
| C1 | ~5pF                              |
| C2 | ~10pF                             |
| C3 | ~10pF                             |
| C4 | ~10pF                             |
| C5 | ~10pF                             |
| L1 | W ≈ 1.5mm, l ≈ 25mm<br>Strip line |
| L2 | W ≈ 4mm, l ≈ 25mm<br>Strip line   |
| L3 | 0.5φ, l ≈ 40mm                    |
| CH | 2t+bead core                      |



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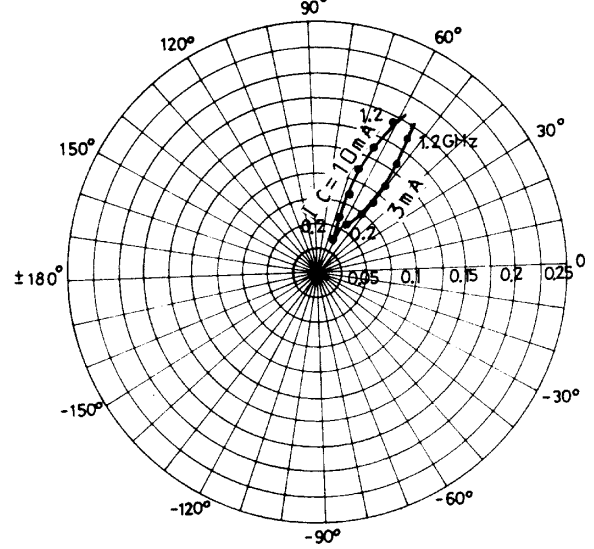
S11e :  $V_{CE}=10V$

$f=200MHz$  step



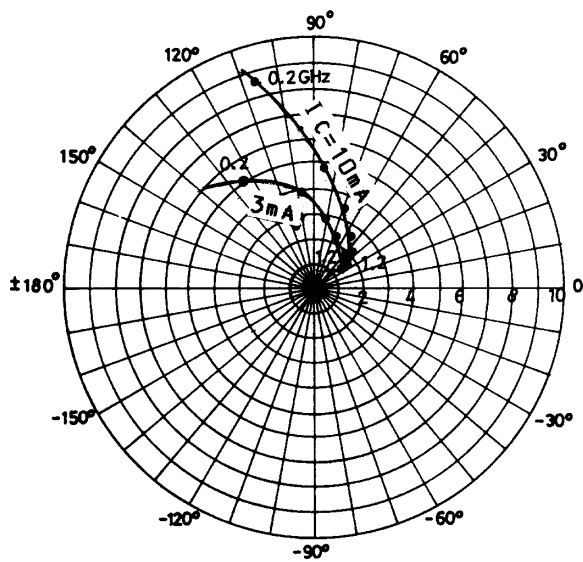
S12e :  $V_{CE}=10V$

$f=200MHz$  step



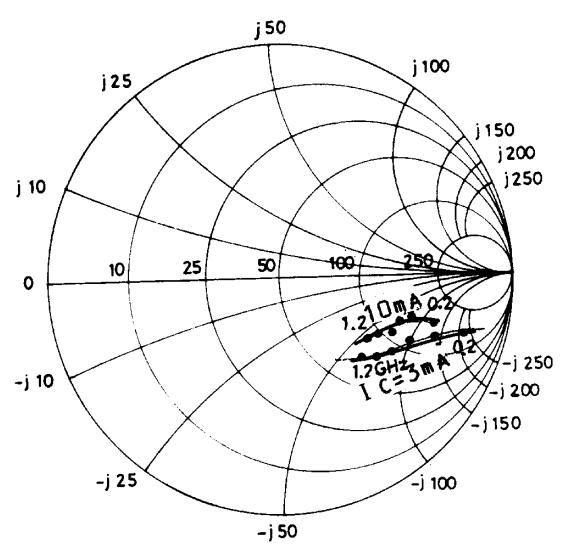
S21e :  $V_{CE}=10V$

$f=200MHz$  step



S22e :  $V_{CE}=10V$

$f=200MHz$  step



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