

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type (PCT process)

## 2SC2715

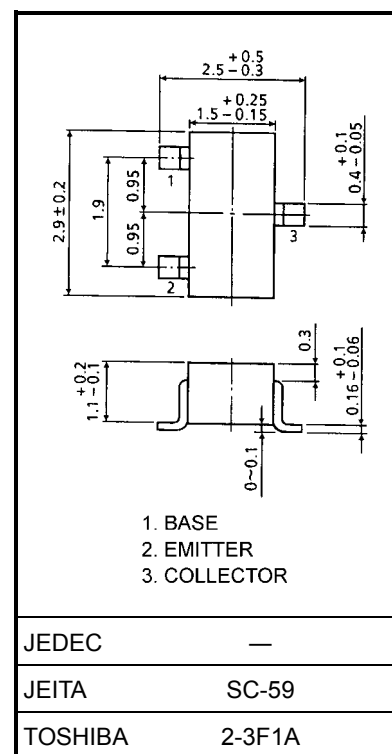
### High Frequency Amplifier Applications

Unit: mm

- High power gain:  $G_{pe} = 2\text{dB}$  (typ.) ( $f = 10.7\text{ MHz}$ )
- Recommended for FM IF, OSC stage and AM CONV. IF stage.

### Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

| Characteristics             | Symbol    | Rating        | Unit             |
|-----------------------------|-----------|---------------|------------------|
| Collector-base voltage      | $V_{CBO}$ | 35            | V                |
| Collector-emitter voltage   | $V_{CEO}$ | 30            | V                |
| Emitter-base voltage        | $V_{EBO}$ | 4             | V                |
| Collector current           | $I_C$     | 50            | mA               |
| Base current                | $I_B$     | 10            | mA               |
| Collector power dissipation | $P_C$     | 150           | mW               |
| Junction temperature        | $T_j$     | 125           | $^\circ\text{C}$ |
| Storage temperature range   | $T_{stg}$ | $-55\sim 125$ | $^\circ\text{C}$ |



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

Weight: 0.012 g (typ.)

| Characteristics                      | Symbol               | Test Condition                                                               | Min | Typ. | Max | Unit          |
|--------------------------------------|----------------------|------------------------------------------------------------------------------|-----|------|-----|---------------|
| Collector cut-off current            | $I_{CBO}$            | $V_{CB} = 35\text{ V}, I_E = 0$                                              | —   | —    | 0.1 | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$            | $V_{EB} = 4\text{ V}, I_C = 0$                                               | —   | —    | 0.1 | $\mu\text{A}$ |
| DC current gain                      | $h_{FE}$<br>(Note)   | $V_{CE} = 12\text{ V}, I_C = 2\text{ mA}$                                    | 40  | —    | 240 |               |
| Collector-emitter saturation voltage | $V_{CE}(\text{sat})$ | $I_C = 10\text{ mA}, I_B = 1\text{ mA}$                                      | —   | —    | 0.4 | V             |
| Base-emitter voltage                 | $V_{BE}$             | $I_C = 10\text{ mA}, I_B = 1\text{ mA}$                                      | —   | —    | 1.0 | V             |
| Transition frequency                 | $f_T$                | $V_{CE} = 10\text{ V}, I_C = 1\text{ mA}$                                    | 100 | —    | 400 | MHz           |
| Collector output capacitance         | $C_{ob}$             | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$                            | —   | 2.0  | 3.2 | pF            |
| Collector-base time constant         | $C_c.rbb'$           | $V_{CE} = 10\text{ V}, I_E = -1\text{ mA}, f = 30\text{ MHz}$                | —   | —    | 50  | ps            |
| Power gain                           | $G_{pe}$             | $V_{CC} = 6\text{ V}, I_E = -1\text{ mA}, f = 10.7\text{ MHz}$<br>(Figure 1) | 27  | 30   | 33  | dB            |

Note:  $h_{FE}$  classification R: 40~80, O: 70~140, Y: 120~240

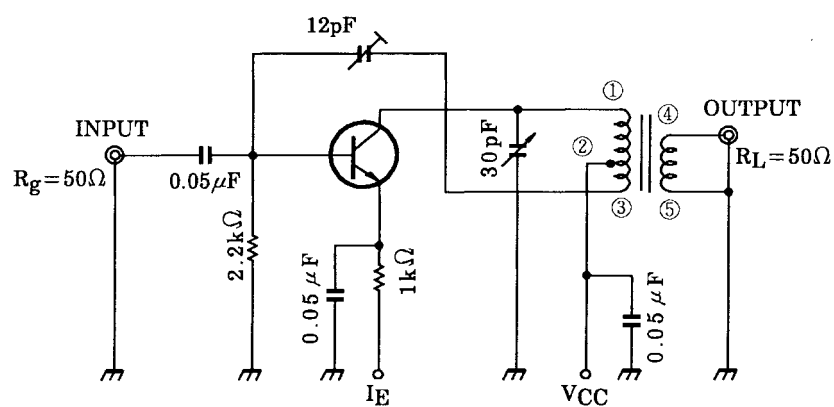
## y Parameter (typ.)

(1) (common emitter  $f = 455 \text{ MHz}$ ,  $T_a = 25^\circ\text{C}$ )

| Characteristics                            | Symbol        | 2SC2715-R | 2SC2715-O | 2SC2715-Y | Unit          |
|--------------------------------------------|---------------|-----------|-----------|-----------|---------------|
| Collector-emitter voltage                  | $V_{CE}$      | 6         | 6         | 6         | V             |
| Emitter current                            | $I_E$         | -1        | -1        | -1        | mA            |
| Input conductance                          | $g_{ie}$      | 0.58      | 0.41      | 0.26      | mS            |
| Input capacitance                          | $C_{ie}$      | 53        | 46        | 38        | pF            |
| Output conductance                         | $g_{oe}$      | 1.9       | 2.7       | 4.8       | $\mu\text{S}$ |
| Output capacitance                         | $C_{oe}$      | 2.6       | 2.8       | 3.6       | pF            |
| Forward transfer admittance                | $ y_{fe} $    | 38        | 38        | 38        | mS            |
| Phase angle of forward transfer admittance | $\theta_{fe}$ | -0.79     | -0.83     | -0.92     | °             |
| Reverse transfer admittance                | $ y_{re} $    | 5.7       | 5.7       | 6.2       | $\mu\text{S}$ |
| Phase angle of reverse transfer admittance | $\theta_{re}$ | -90       | -90       | -90       | °             |

(2) (common emitter  $f = 10.7 \text{ MHz}$ ,  $T_a = 25^\circ\text{C}$ )

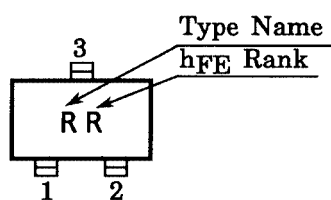
| Characteristics                            | Symbol        | 2SC2715-R | 2SC2715-O | 2SC2715-Y | Unit          |
|--------------------------------------------|---------------|-----------|-----------|-----------|---------------|
| Collector-emitter voltage                  | $V_{CE}$      | 6         | 6         | 6         | V             |
| Emitter current                            | $I_E$         | -1        | -1        | -1        | mA            |
| Input conductance                          | $g_{ie}$      | 1.04      | 0.85      | 0.65      | mS            |
| Input capacitance                          | $C_{ie}$      | 49        | 43        | 36        | pF            |
| Output conductance                         | $g_{oe}$      | 10        | 15        | 28        | $\mu\text{S}$ |
| Output capacitance                         | $C_{oe}$      | 2.7       | 2.9       | 3.6       | pF            |
| Forward transfer admittance                | $ y_{fe} $    | 37        | 37        | 37        | mS            |
| Phase angle of forward transfer admittance | $\theta_{fe}$ | -9.6      | -10.4     | -11.5     | °             |
| Reverse transfer admittance                | $ y_{re} $    | 120       | 120       | 140       | $\mu\text{S}$ |
| Phase angle of reverse transfer admittance | $\theta_{re}$ | -90       | -90       | -90       | °             |

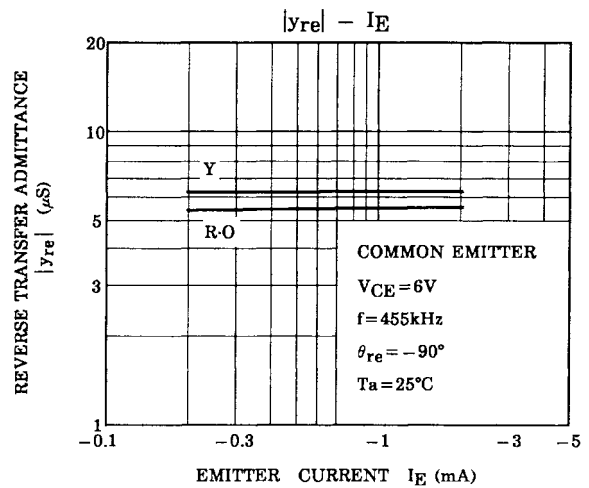
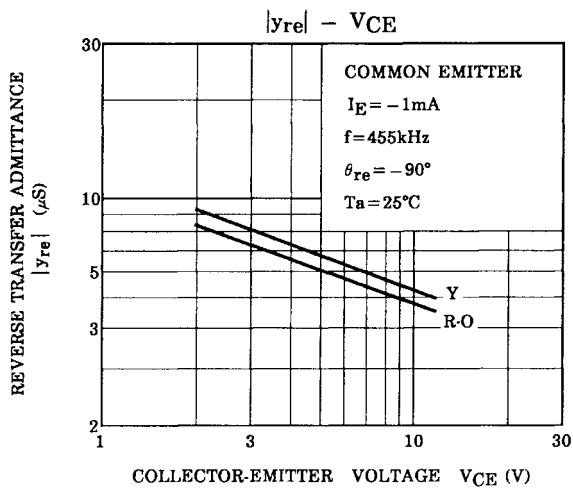
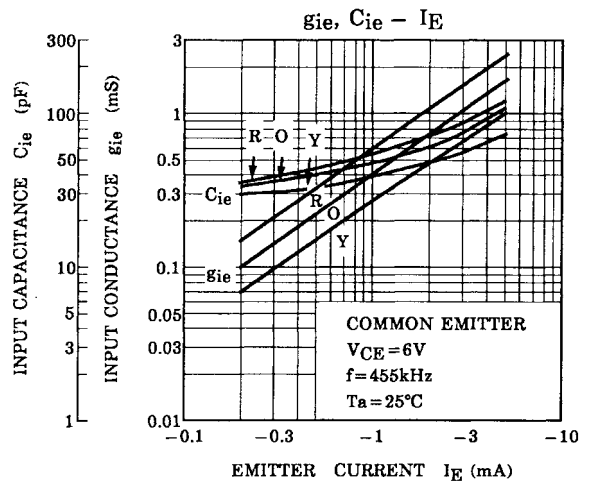
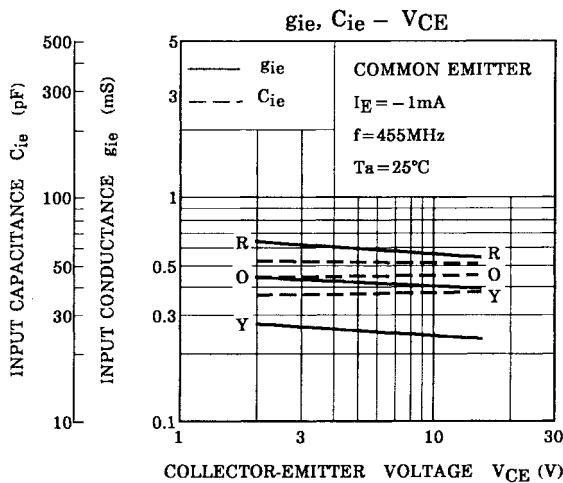
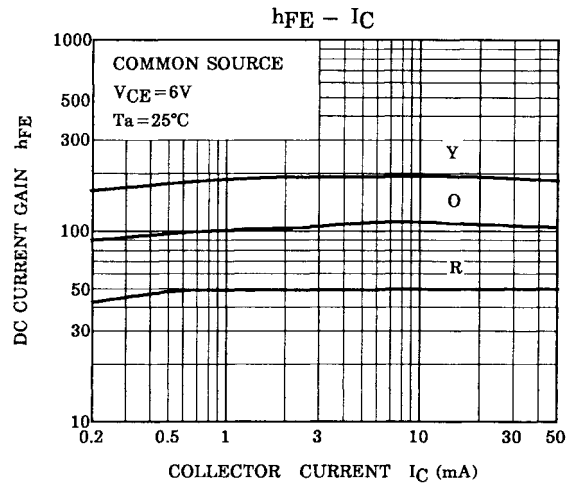
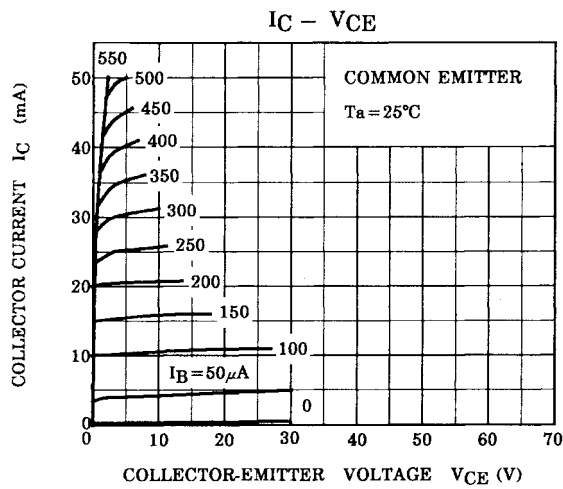


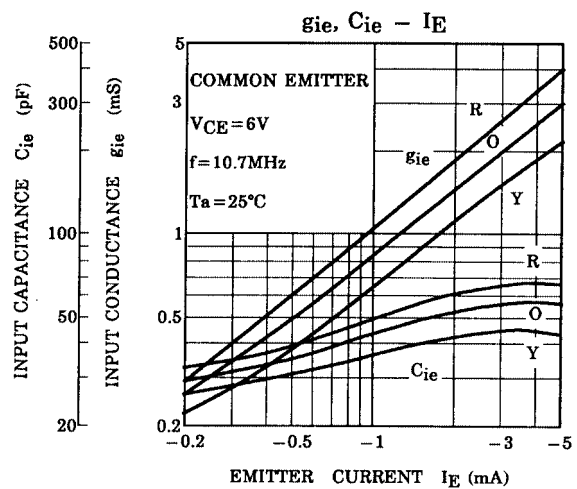
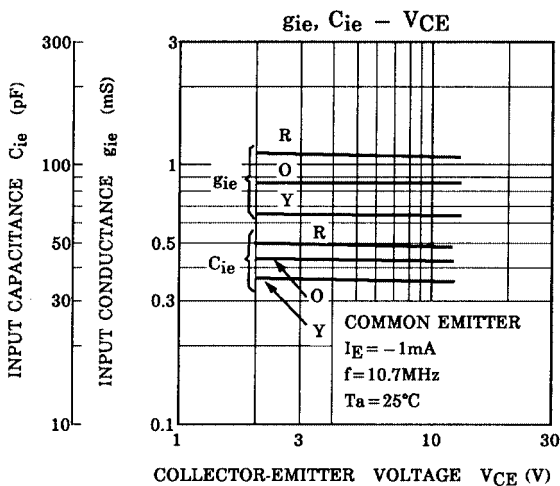
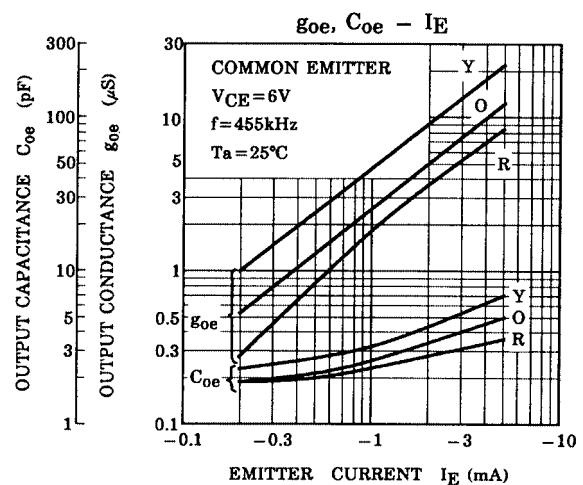
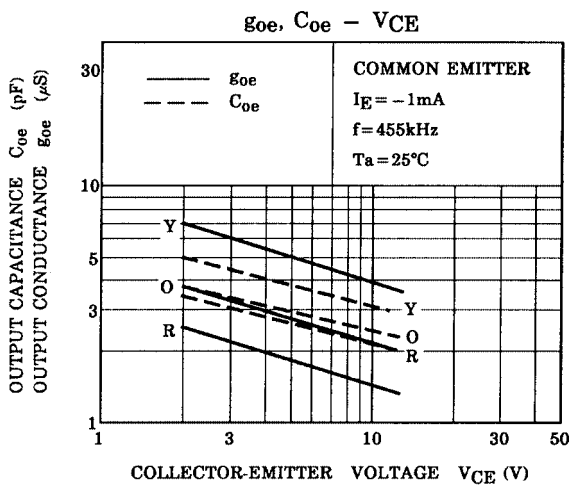
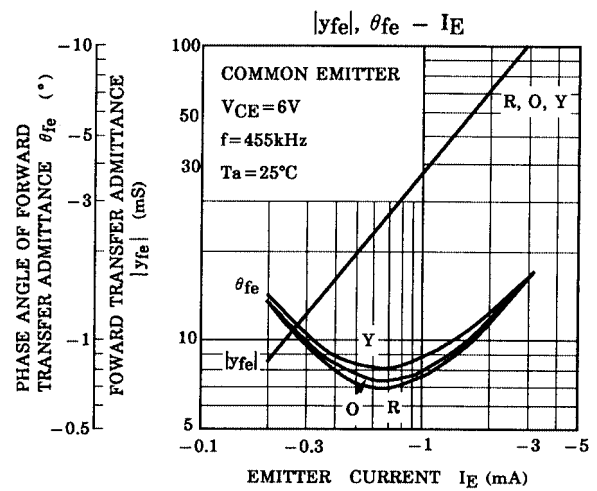
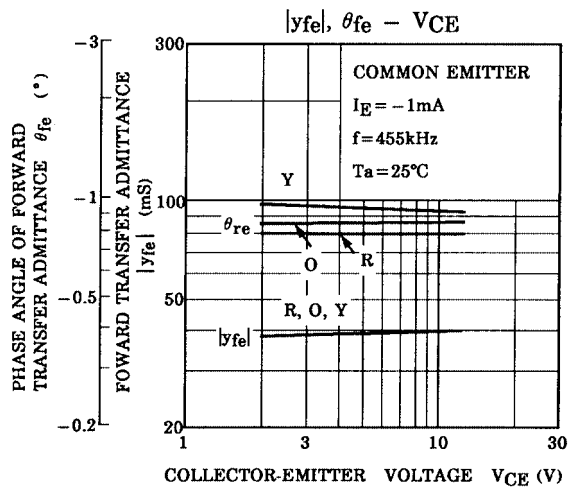
T : ①-② 0.1mm $\phi$  UEW 20T  
 ②-③ 0.1mm $\phi$  UEW 8T  
 ④-⑤ 0.1mm $\phi$  UEW 2T

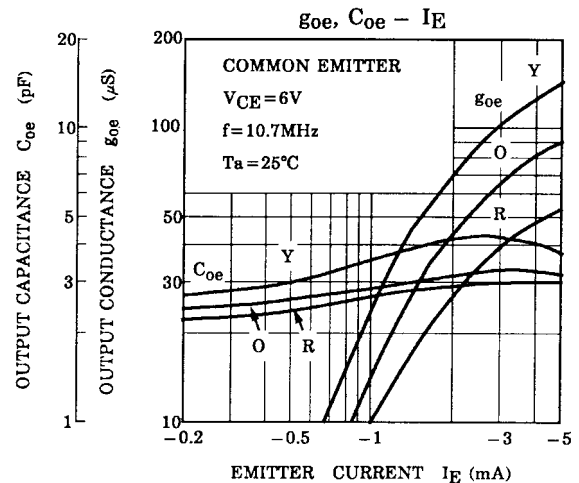
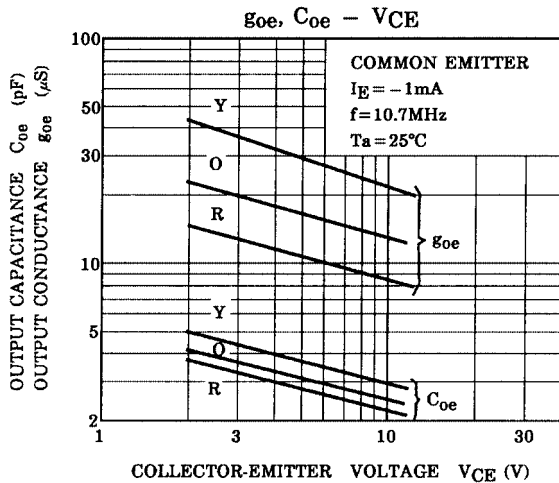
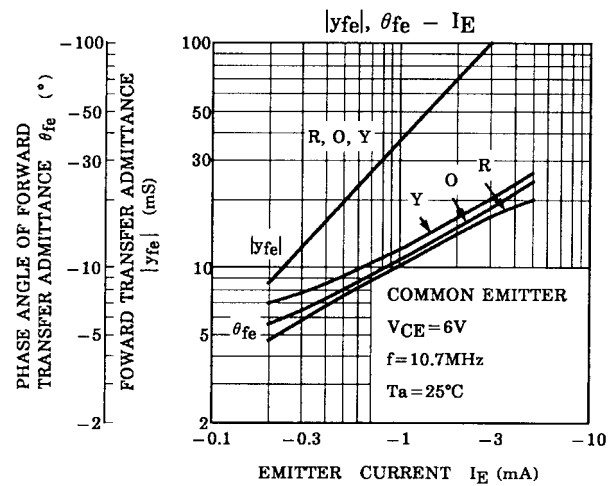
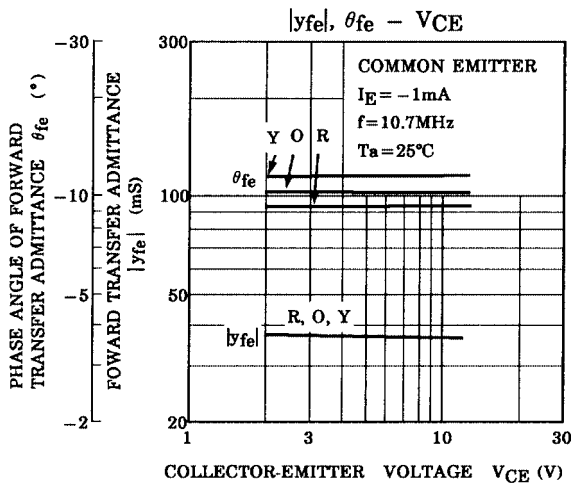
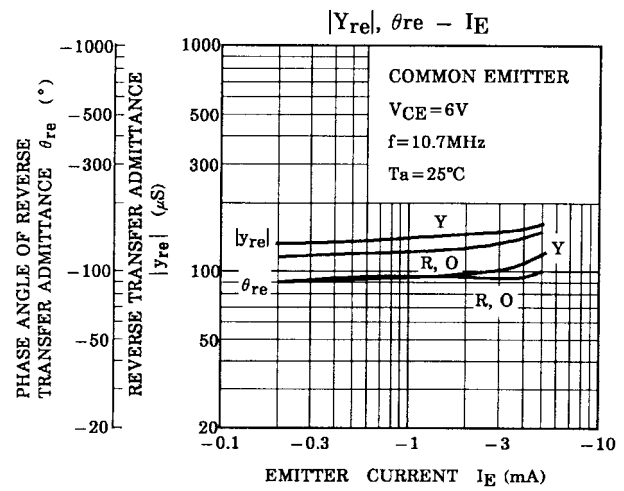
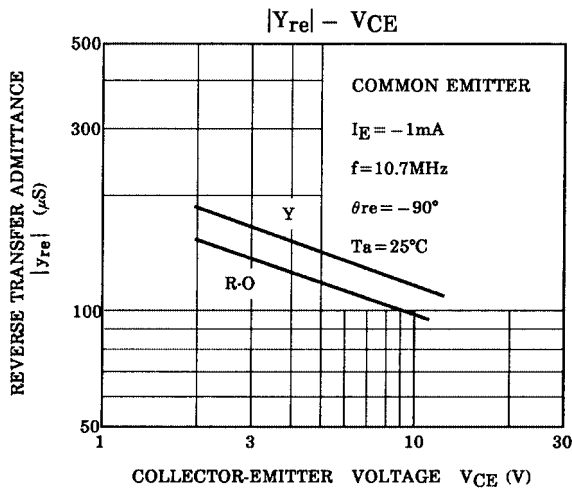
**Figure 1 NF, Gpe Test Circuit**

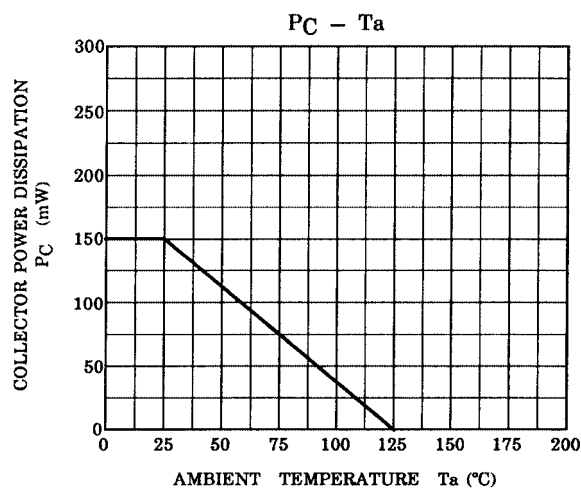
**Marking**











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