# TRANSISTOR (NPN)

**SOT-323**


1. BASE
2. EMITTER
3. COLLECTOR

## FEATURES

- Small reverse transfer capacitance: Cre= 0.55pF(typ.)
- Low noise figure: NF=2dB (typ.) (f=100 MHz)

## MAXIMUM RATINGS ($T_A$=25℃ unless otherwise noted)

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | 40 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 30 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 4 | V |
| $I_C$ | Collector Current -Continuous | 20 | mA |
| $P_C$ | Collector Power Dissipation | 100 | mW |
| $T_J$ | Junction Temperature | 150 | ℃ |
| $T_{stg}$ | Storage Temperature | -55-150 | ℃ |

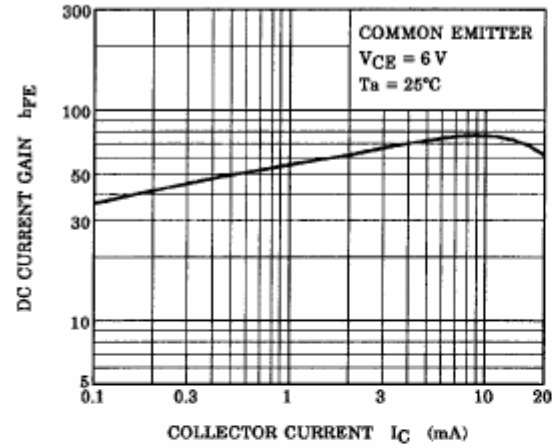
## ELECTRICAL CHARACTERISTICS (Tamb=25℃ unless otherwise specified)

| Parameter | Symbol | Test conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **Collector-base breakdown voltage** | $V_{(BR)CBO}$ | $I_C$=100μA,$I_E$=0 | 40 | | | V |
| **Collector-emitter breakdown voltage** | $V_{(BR)CEO}$ | $I_C$=1mA,$I_B$=0 | 30 | | | V |
| **Emitter-base breakdown voltage** | $V_{(BR)EBO}$ | $I_E$=100μA,$I_C$=0 | 4 | | | V |
| **Collector cut-off current** | $I_{CBO}$ | $V_{CB}$=40V,$I_E$=0 | | | 0.1 | μA |
| **Emitter cut-off current** | $I_{EBO}$ | $V_{EB}$=4V,$I_C$=0 | | | 0.5 | μA |
| **DC current gain** | $h_{FE}$ | $V_{CE}$=6V,$I_C$=1mA | 40 | | 200 | |
| **Collector-base time constant** | $Cc.r_{bb}'$ | $V_{CE}$=6V,$I_C$=1mA, f=30MHz | | | 25 | ps |
| **Transition frequency** | $f_T$ | $V_{CE}$=6V,$I_C$=1mA, | 260 | 550 | | MHz |
| **Reverse transfer capacitance** | $C_{re}$ | $V_{CB}$=10V,f=1MHz | | 0.55 | | pF |
| **Noise figure** | NF | $V_{CC}$=6V,$I_c$=1mA,f=100MHz | | 2 | 5 | dB |
| **Power gain** | Gpe | | 17 | 23 | | dB |

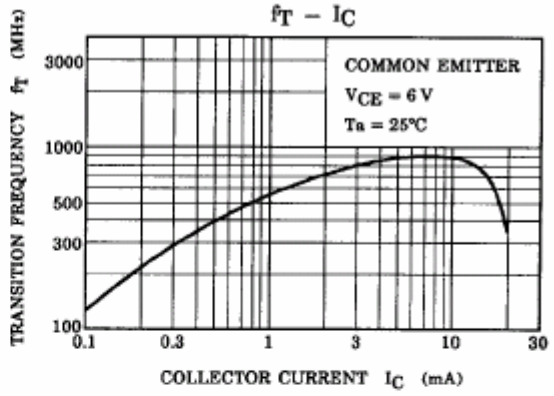
## CLASSIFICATION OF $h_{FE}$

| **Rank** | R | O | Y |
|---|---|---|---|
| **Range** | 40-80 | 70-140 | 100-200 |
| **Marking** | QR | QO | QY |

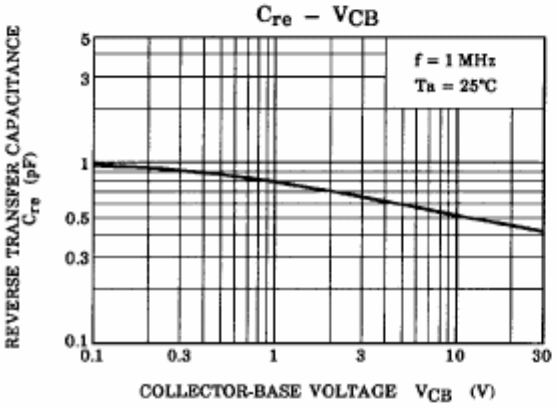
$h_{FE}$ – $I_C$



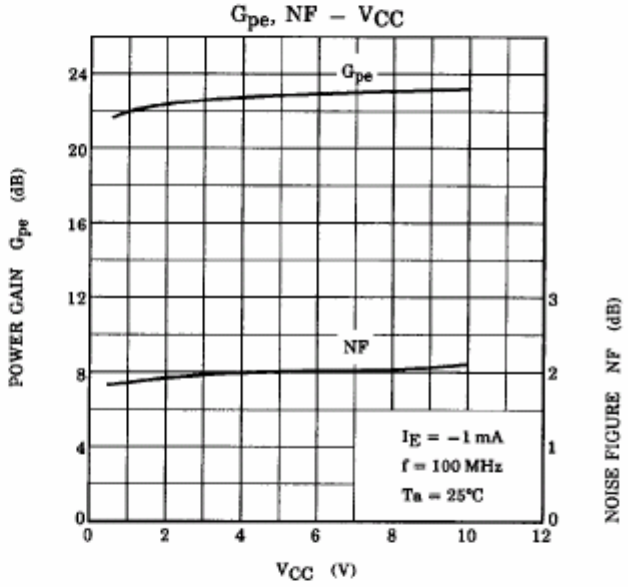

$f_T$ – $I_C$



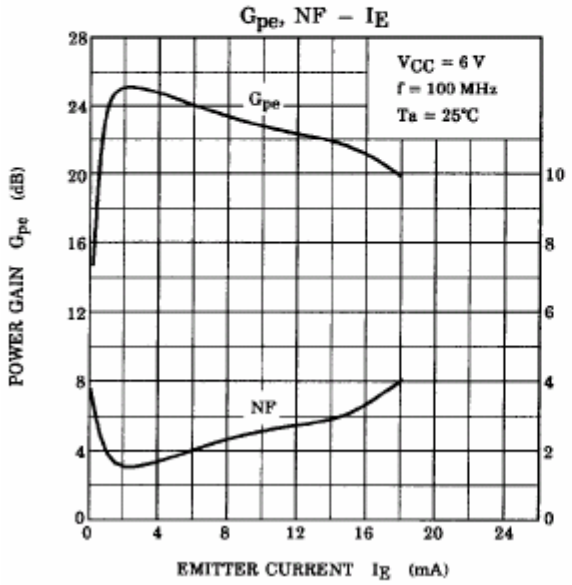

$C_{re}$ – $V_{CB}$



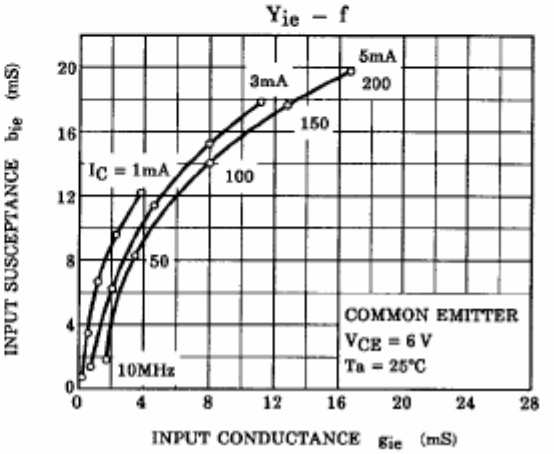

$G_{pe}$, NF – $V_{CC}$

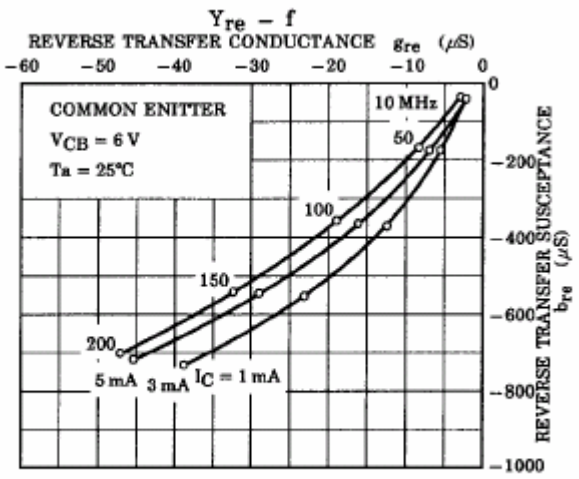


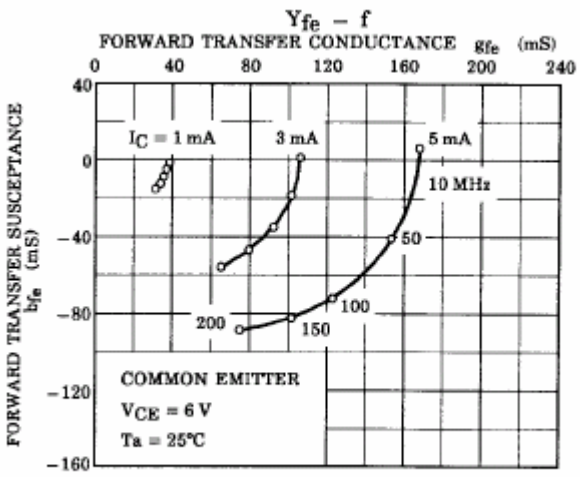

$G_{pe}$, NF – $I_E$

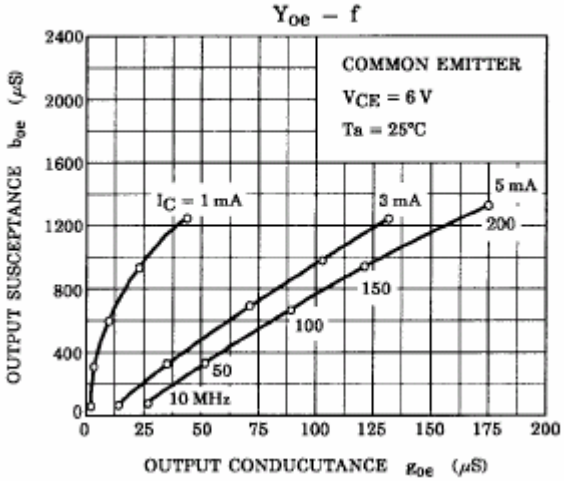



$Y_{ie}$ – f




$Y_{re}$ – f
REVERSE TRANSFER CONDUCTANCE $g_{re}$ (μS)
−60 −50 −40 −30 −20 −10 0
COMMON ENITTER
$V_{CB}$ = 6 V
Ta = 25°C
10 MHz
50
100
150
200
5 mA
3 mA
$I_C$ = 1 mA
0 −200 −400 −600 −800 −1000
REVERSE TRANSFER SUSCEPTANCE $b_{re}$ (μS)


$Y_{fe}$ – f
FORWARD TRANSFER CONDUCTANCE $g_{fe}$ (mS)
0 40 80 120 160 200 240
40 0 −40 −80 −120 −160
FORWARD TRANSFER SUSCEPTANCE $b_{fe}$ (mS)
$I_C$ = 1 mA
3 mA
5 mA
10 MHz
50
100
150
200
COMMON EMITTER
$V_{CE}$ = 6 V
Ta = 25°C


$Y_{oe}$ – f
COMMON EMITTER
$V_{CE}$ = 6 V
Ta = 25°C
$I_C$ = 1 mA
3 mA
5 mA
200
150
100
50
10 MHz
2400 2000 1600 1200 800 400 0
OUTPUT SUSCEPTANCE $b_{oe}$ (μS)
0 25 50 75 100 125 150 175 200
OUTPUT CONDUCUTANCE $g_{oe}$ (μS)