

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type (PCT process)

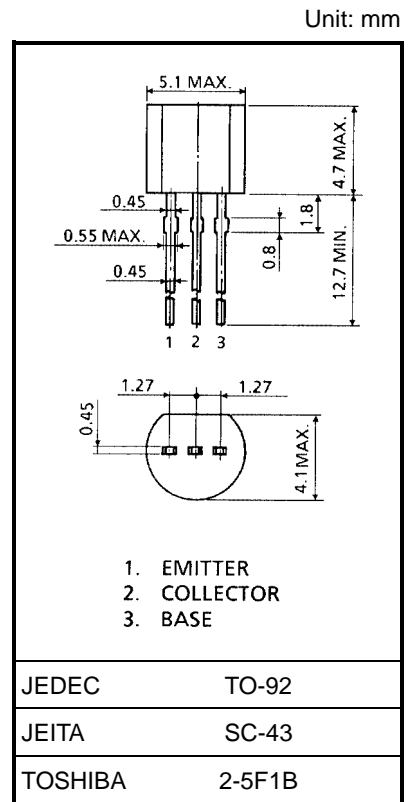
# 2SC1923

High Frequency Amplifier Applications  
 FM, RF, MIX, IF Amplifier Applications

- Small reverse transfer capacitance:  $C_{re} = 0.7 \text{ pF}$  (typ.)
- Low noise figure:  $NF = 2.5\text{dB}$  (typ.) ( $f = 100 \text{ MHz}$ )

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	40	V
Collector-emitter voltage	$V_{CEO}$	30	V
Emitter-base voltage	$V_{EBO}$	4	V
Collector current	$I_C$	20	mA
Base current	$I_B$	4	mA
Collector power dissipation	$P_C$	100	mW
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~125	$^\circ\text{C}$

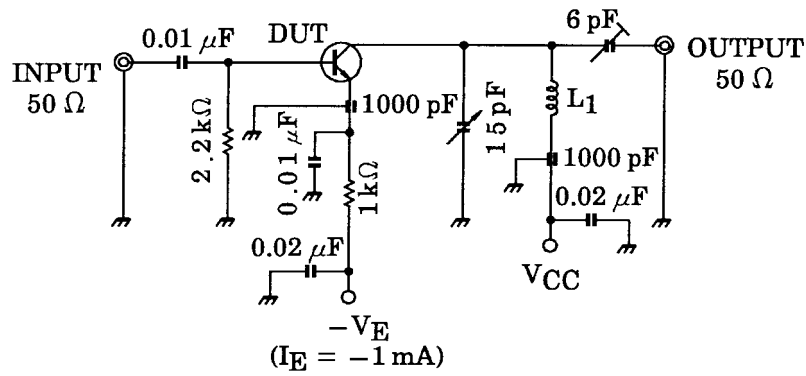


Weight: 0.21 g (typ.)

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 18 \text{ V}, I_E = 0$	—	—	0.5	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 4 \text{ V}, I_C = 0$	—	—	0.5	$\mu\text{A}$
DC current gain	$h_{FE}$ (Note)	$V_{CE} = 6 \text{ V}, I_C = 1 \text{ mA}$	40	—	200	
Reverse transfer capacitance	$C_{re}$	$V_{CE} = 6 \text{ V}, f = 1 \text{ MHz}$	—	0.70	—	pF
Transition frequency	$f_T$	$V_{CE} = 6 \text{ V}, I_C = 1 \text{ mA}$	—	550	—	MHz
Collector-base time constant	$C_c \cdot I_{bb}'$	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}, f = 30 \text{ MHz}$	—	—	30	ps
Noise figure	NF	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}, f = 100 \text{ MHz}$ , Figure 1	—	2.5	4.0*	dB
Power gain	$G_{pe}$		15	18	—	dB

Note:  $h_{FE}$  classification R: 40~80, O: 70~140, Y: 100~200 (\* NF = 5.0dB max)



L1: 0.8 mmφ silver plated copper wire, 4 T, 10ID, 8 LENGTH

Figure 1 NF,  $G_{pe}$  Test Circuit

y Parameter (typ.)

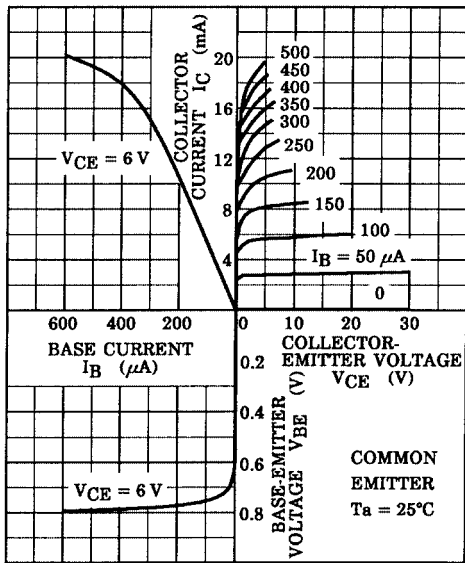
(1) Common emitter ( $V_{CE} = 6\text{ V}$ ,  $I_E = -1\text{ mA}$ ,  $f = 100\text{ MHz}$ )

Characteristics	Symbol	Typ.	Unit
Input conductance	$g_{ie}$	2.9	mS
Input capacitance	$C_{ie}$	10.2	pF
Reverse transfer admittance	$ y_{re} $	0.33	$\mu\text{S}$
Phase angle of reverse transfer admittance	$\theta_{re}$	-90	$^\circ$
Forward transfer admittance	$ y_{fe} $	40	mS
Phase angle of forward transfer admittance	$\theta_{fe}$	-20	$^\circ$
Output conductance	$g_{oe}$	45	$\mu\text{S}$
Output capacitance	$C_{oe}$	1.1	pF

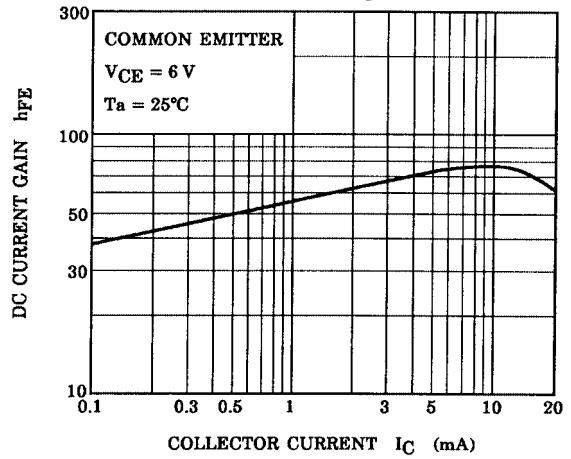
(2) Common base ( $V_{CE} = 6\text{ V}$ ,  $I_E = -1\text{ mA}$ ,  $f = 100\text{ MHz}$ )

Characteristics	Symbol	Typ.	Unit
Input conductance	$g_{ib}$	34	mS
Input capacitance	$C_{ib}$	-10	pF
Reverse transfer admittance	$ y_{rb} $	0.27	$\mu\text{S}$
Phase angle of reverse transfer admittance	$\theta_{rb}$	-105	$^\circ$
Forward transfer admittance	$ y_{fb} $	34	mS
Phase angle of forward transfer admittance	$\theta_{fb}$	165	$^\circ$
Output conductance	$g_{ob}$	45	$\mu\text{S}$
Output capacitance	$C_{ob}$	1.1	pF

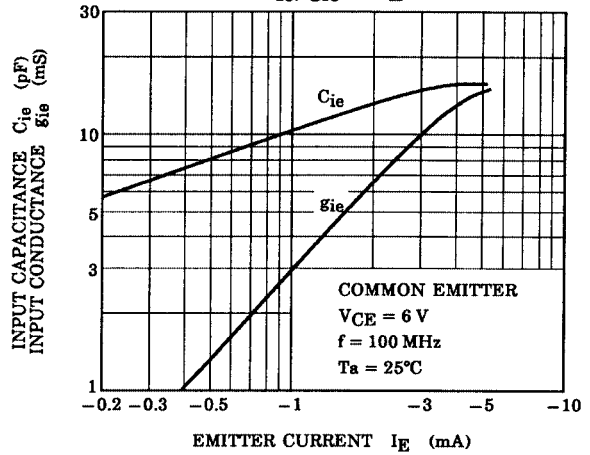
STATIC CHARACTERISTICS



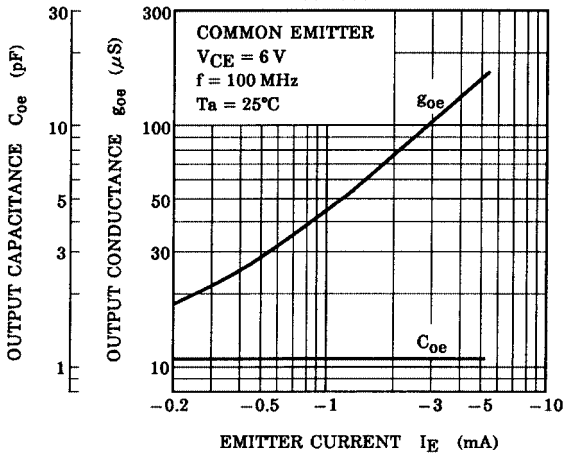
$h_{FE} - I_C$



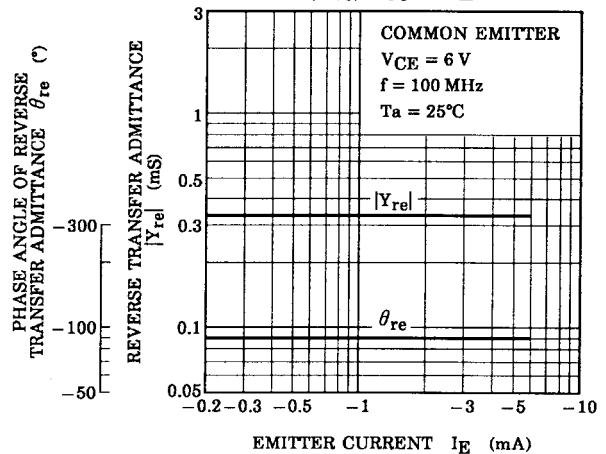
$C_{ie}, g_{ie} - I_E$

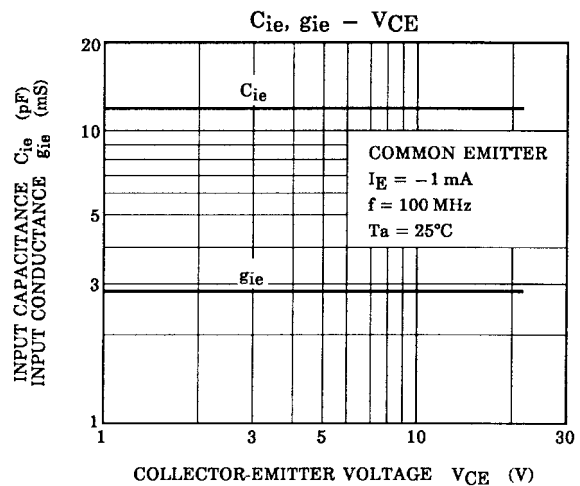
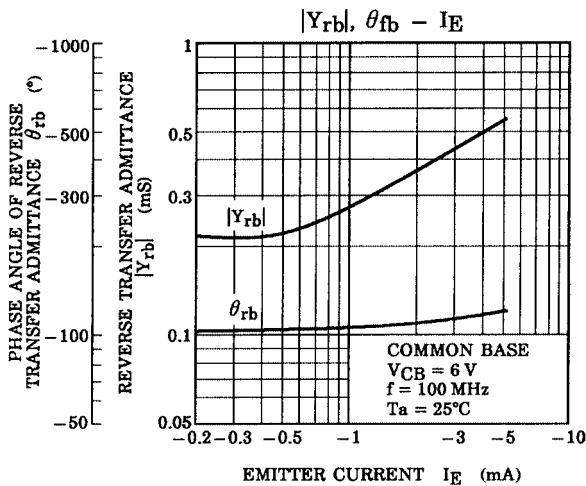
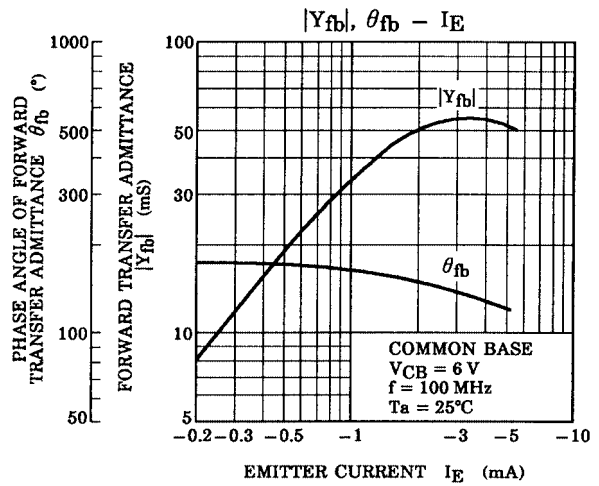
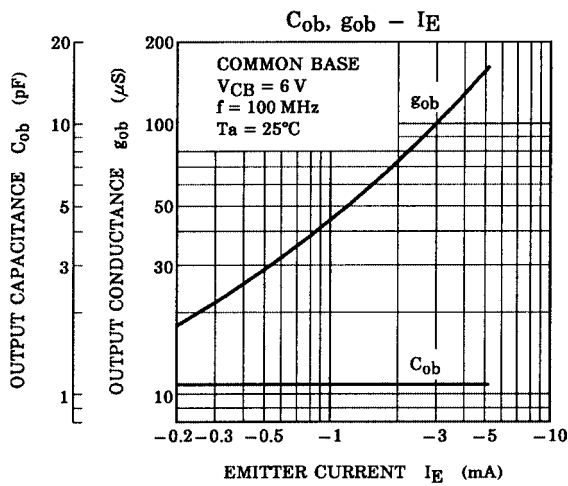
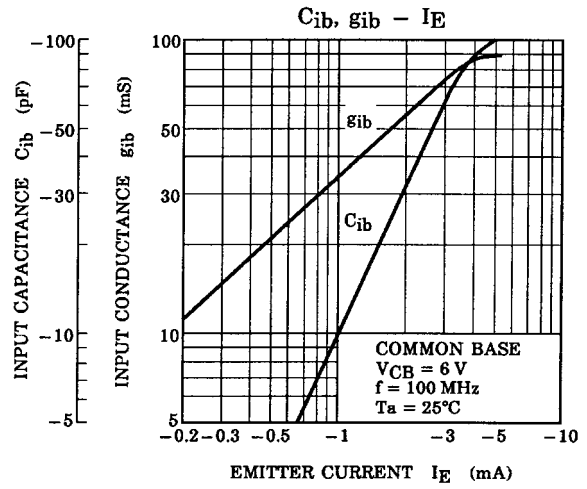
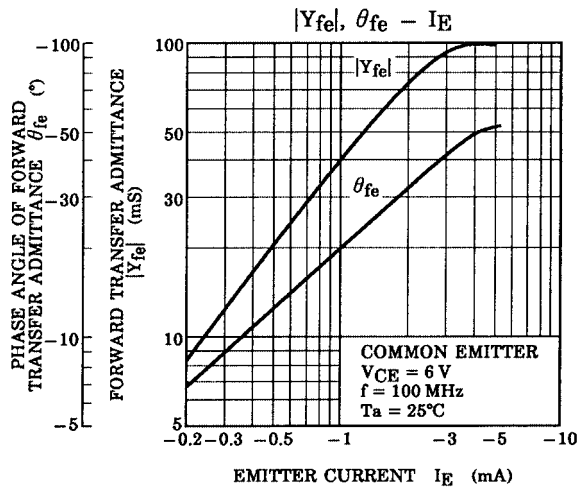


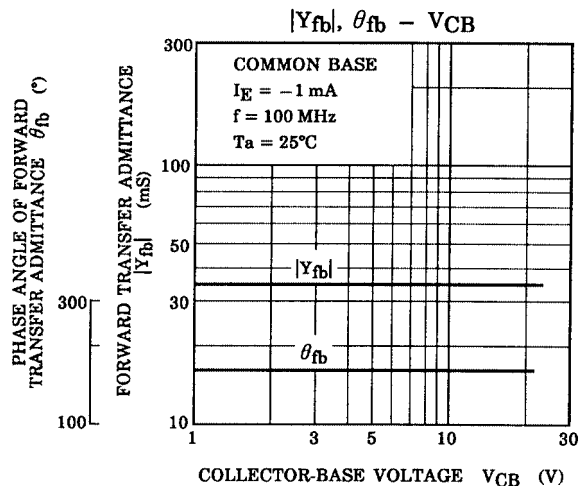
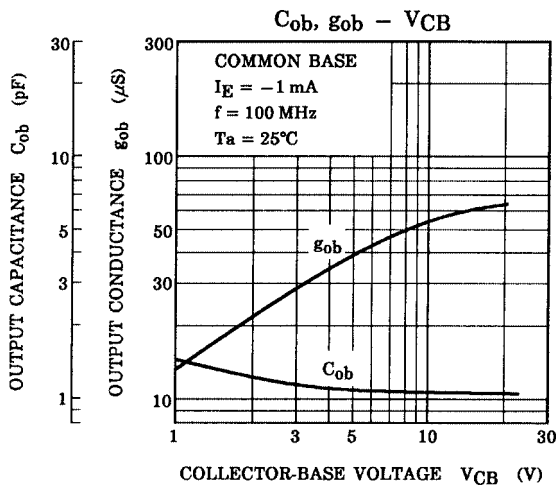
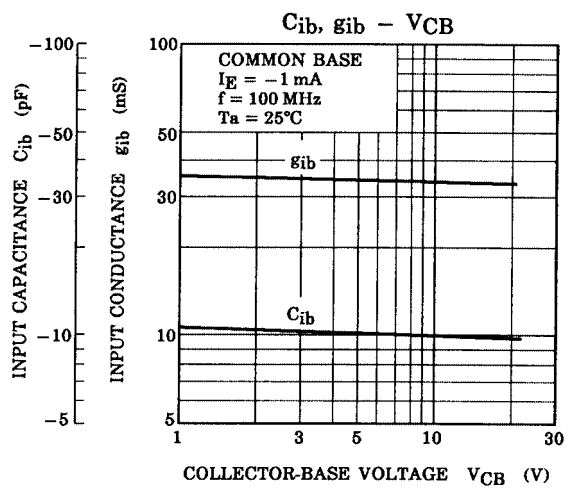
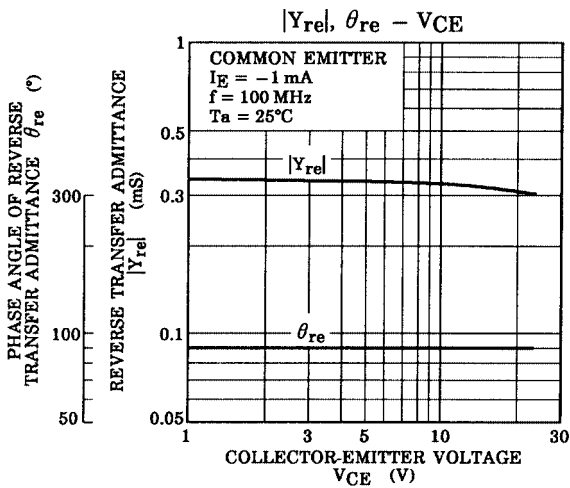
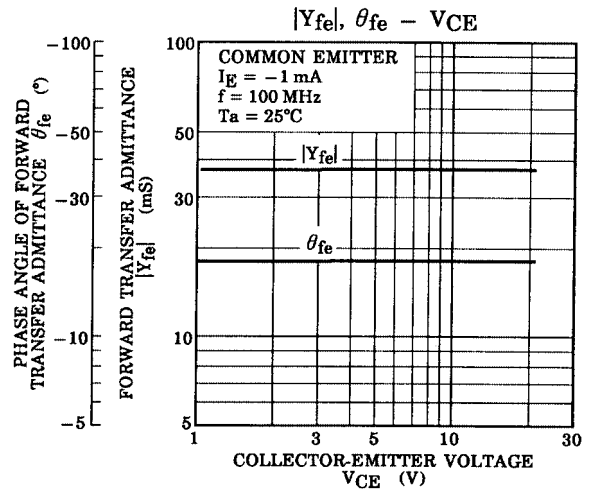
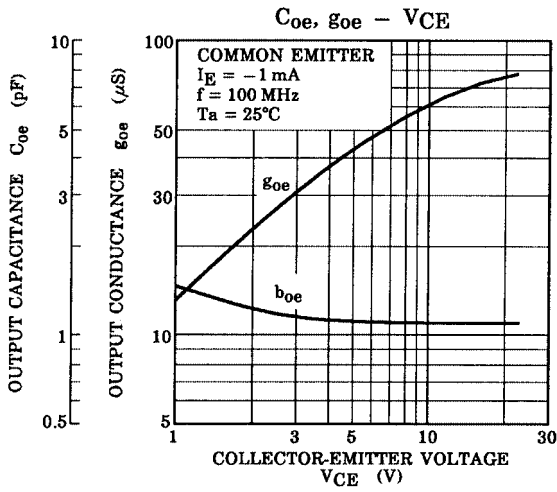
$C_{oe}, g_{oe} - I_E$

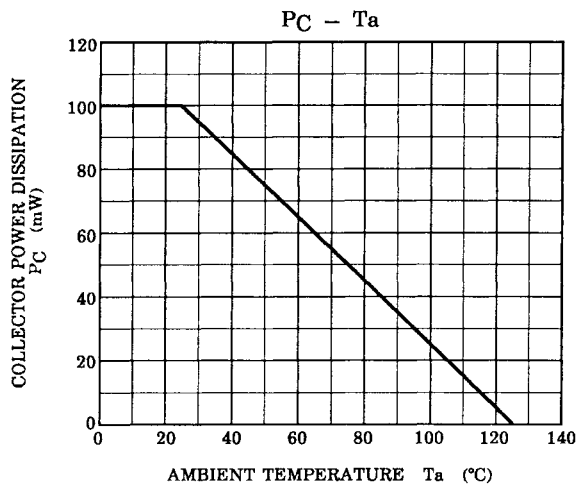
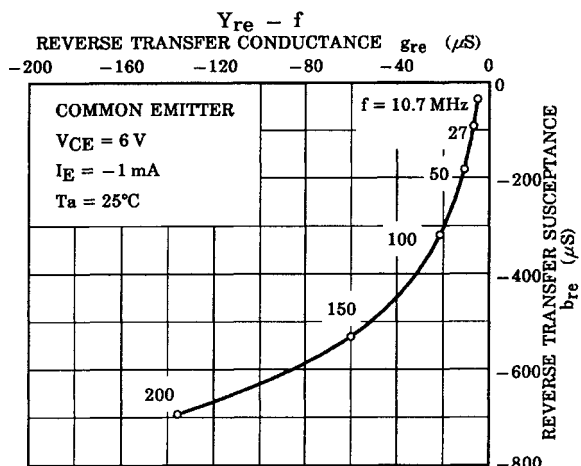
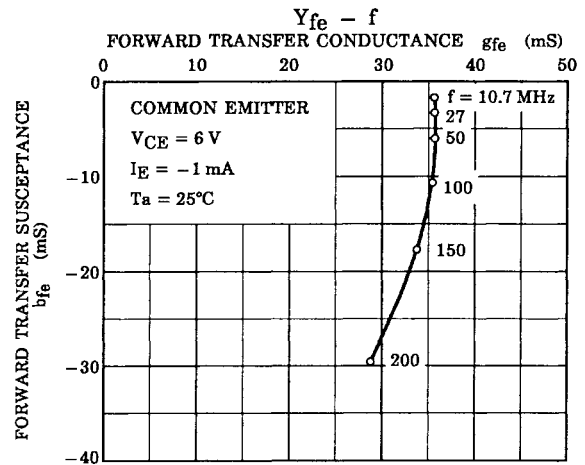
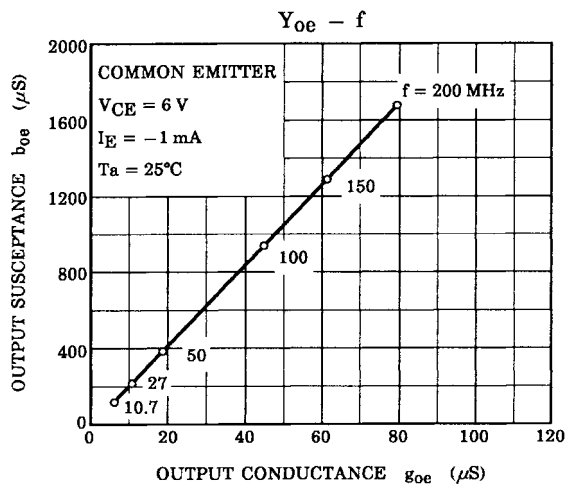
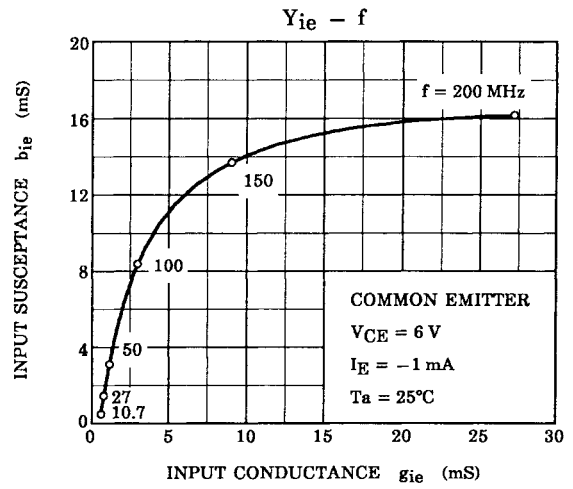
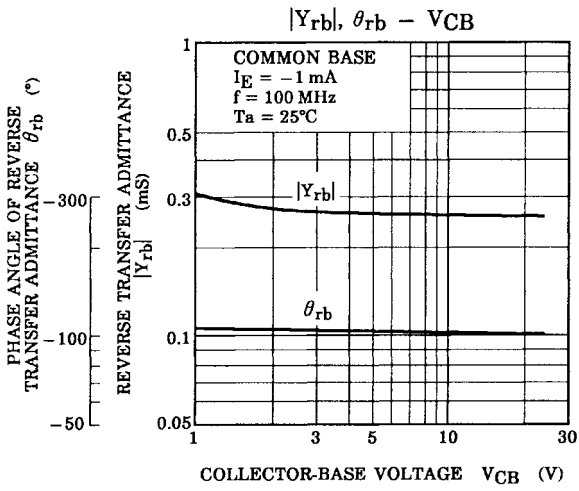


$|Y_{re}|, \theta_{re} - I_E$









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