

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type (PCT process)

2SC1923

High Frequency Amplifier Applications

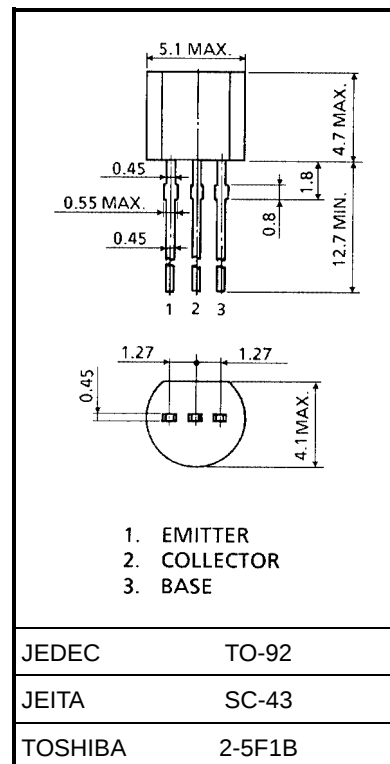
FM, RF, MIX, IF Amplifier Applications

Unit: mm

- Small reverse transfer capacitance: $C_{re} = 0.7$ pF (typ.)
- Low noise figure: $NF = 2.5$ dB (typ.) ($f = 100$ 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}	$V_{CB} = 18$ V, $I_E = 0$	—	—	0.5	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 4$ V, $I_C = 0$	—	—	0.5	μA
DC current gain	h_{FE} (Note)	$V_{CE} = 6$ V, $I_C = 1$ mA	40	—	200	
Reverse transfer capacitance	C_{re}	$V_{CE} = 6$ V, $f = 1$ MHz	—	0.70	—	pF
Transition frequency	f_T	$V_{CE} = 6$ V, $I_C = 1$ mA	—	550	—	MHz
Collector-base time constant	$C_c \cdot f_{bb'}$	$V_{CE} = 6$ V, $I_E = -1$ mA, $f = 30$ MHz	—	—	30	ps
Noise figure	NF	$V_{CE} = 6$ V, $I_E = -1$ mA, $f = 100$ 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)



Figure 1 NF, G_{pe} Test Circuit

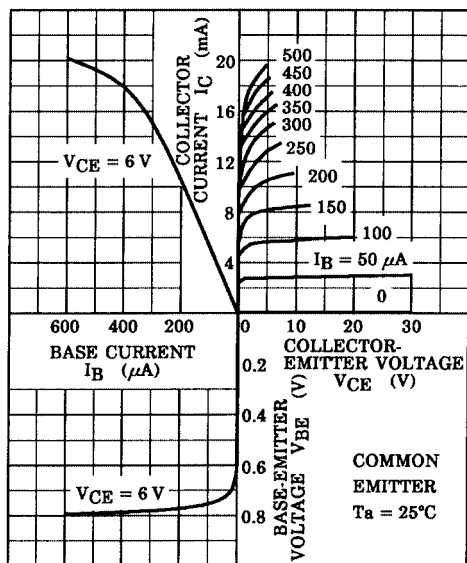
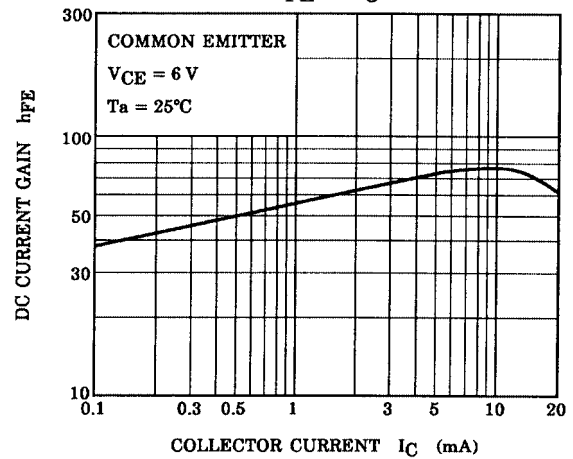
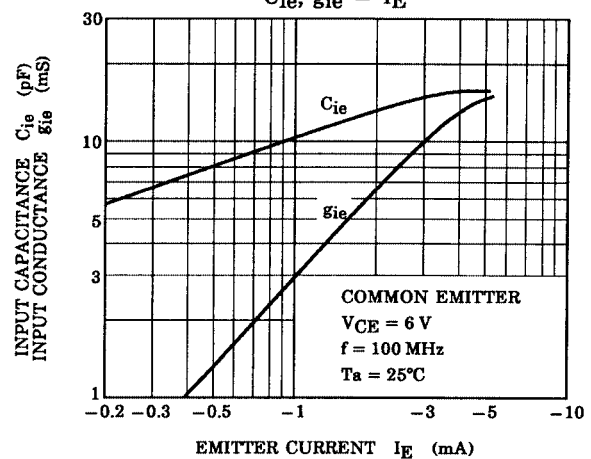
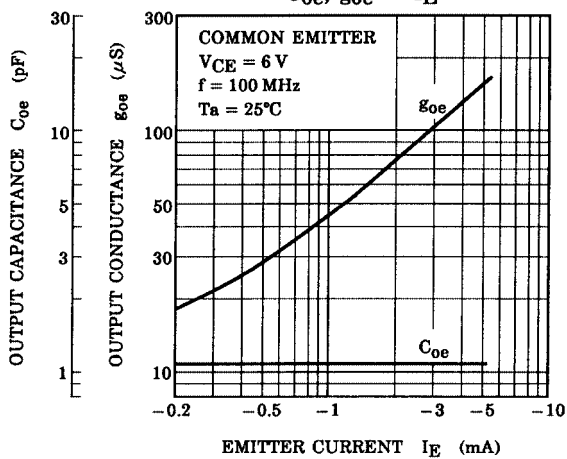
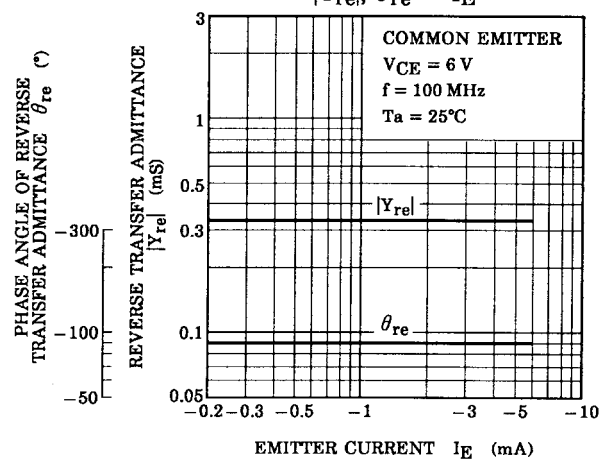
(1) Common emitter ($V_{CE} = 6 \text{ V}$, $I_E = -1 \text{ mA}$, $f = 100 \text{ MHz}$)

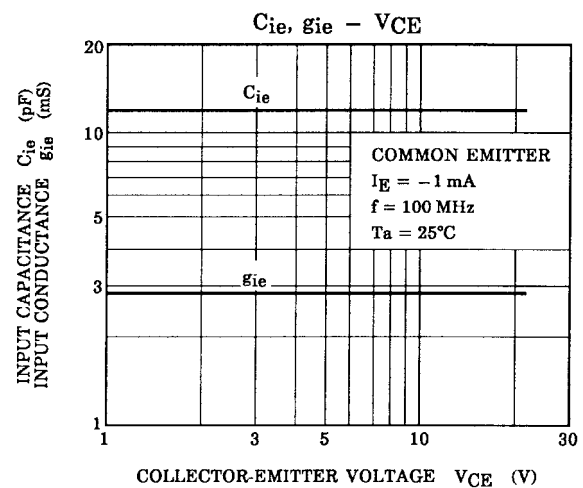
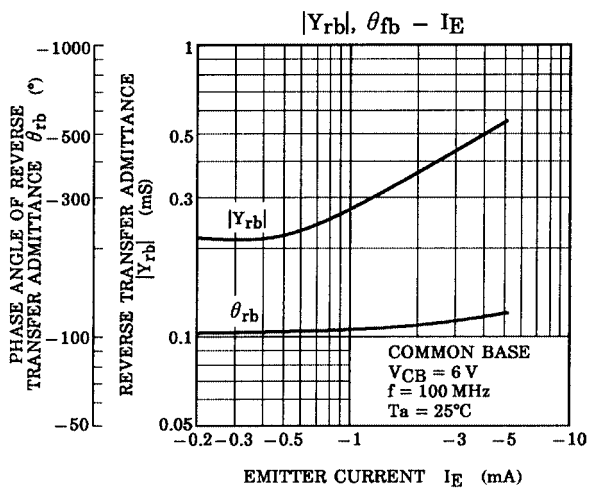
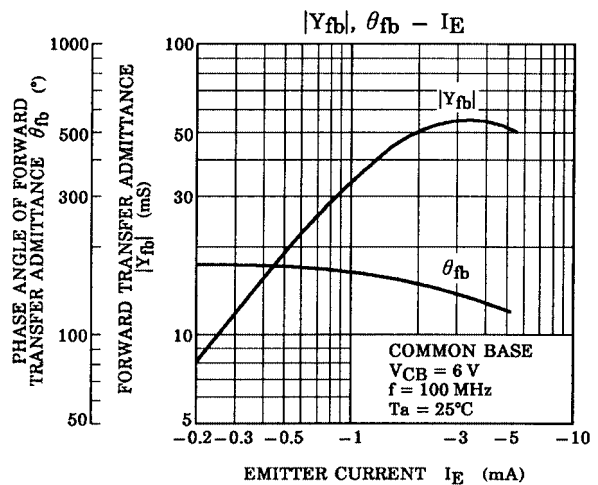
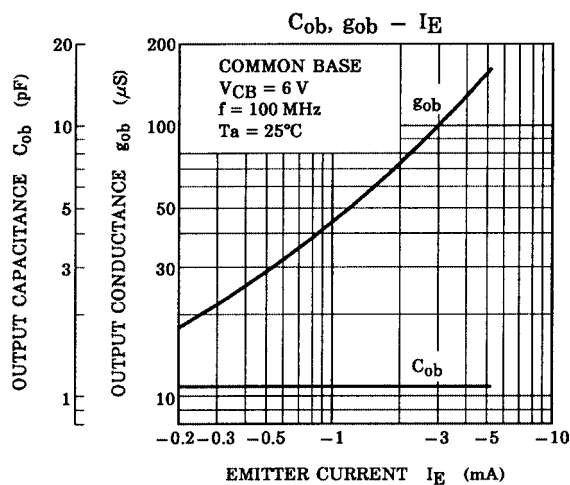
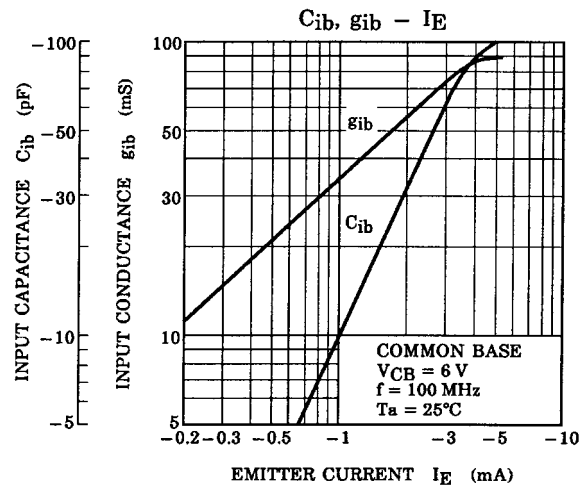
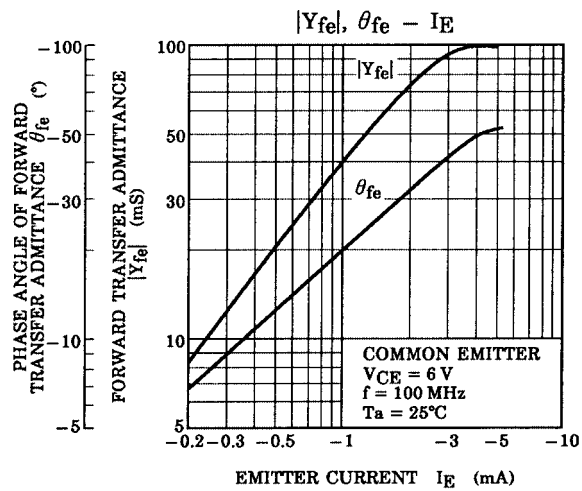
Characteristics	Symbol	Typ.	Unit
Input conductance	g_{ie}	2.9	mS
Input capacitance	C_{ie}	10.2	pF
Reverse transfer admittance	$ y_{re} $	0.33	μ S
Phase angle of reverse transfer admittance	θ_{re}	-90	$^{\circ}$
Forward transfer admittance	$ y_{fe} $	40	mS
Phase angle of forward transfer admittance	θ_{fe}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

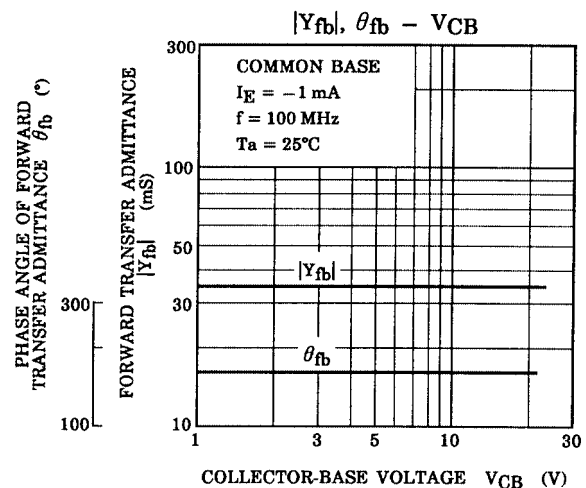
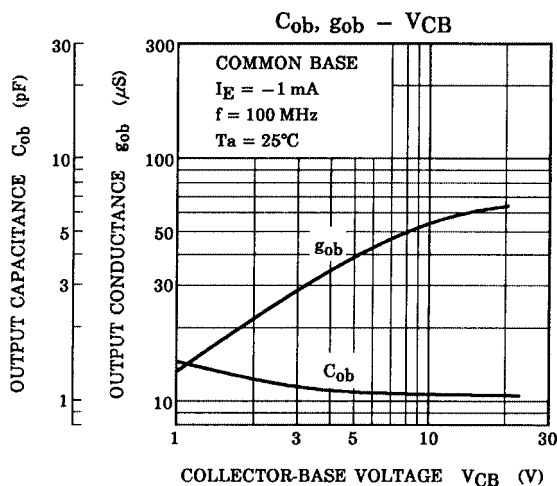
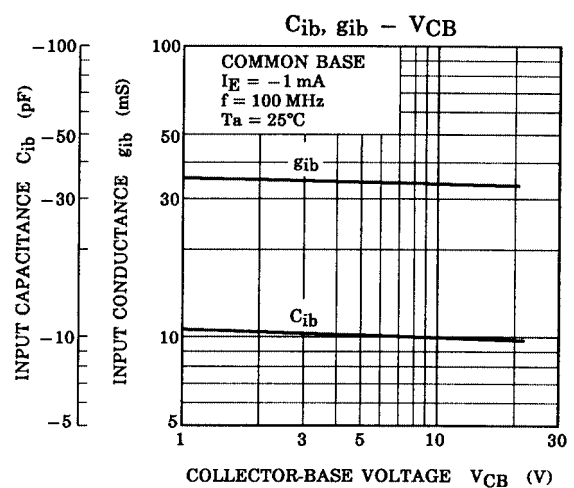
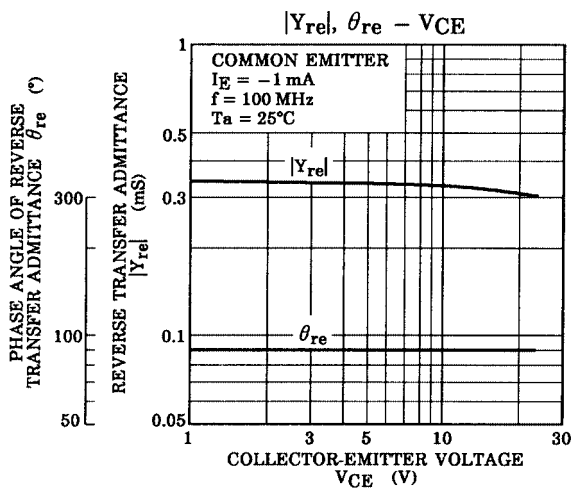
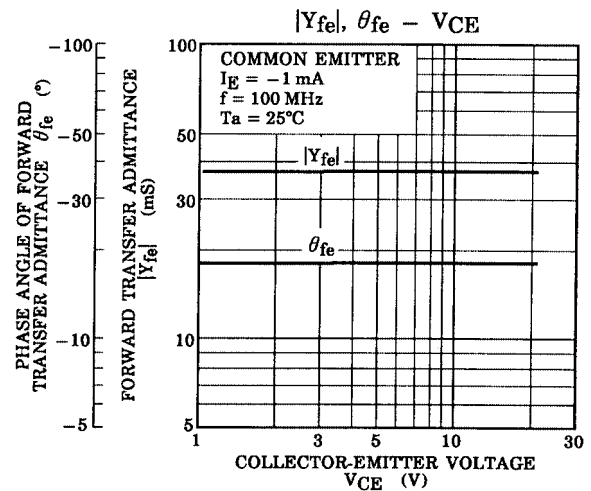
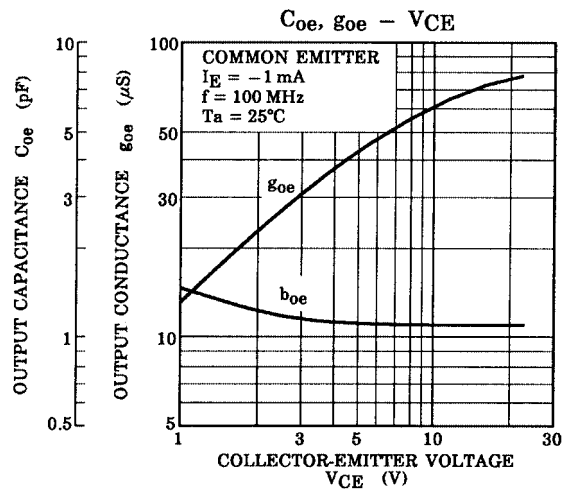
(2) Common base ($V_{CE} = 6 \text{ V}$, $I_E = -1 \text{ mA}$, $f = 100 \text{ MHz}$)

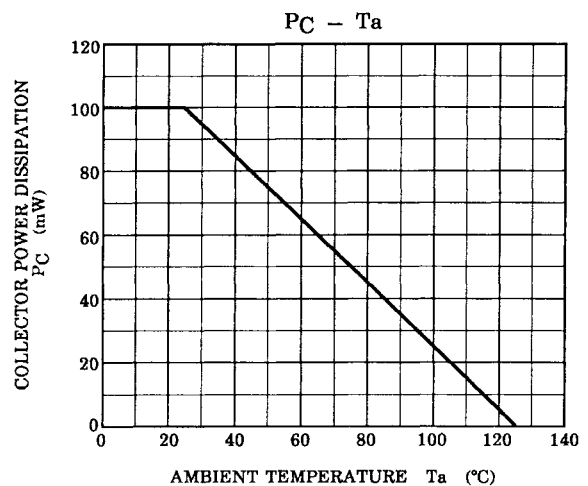
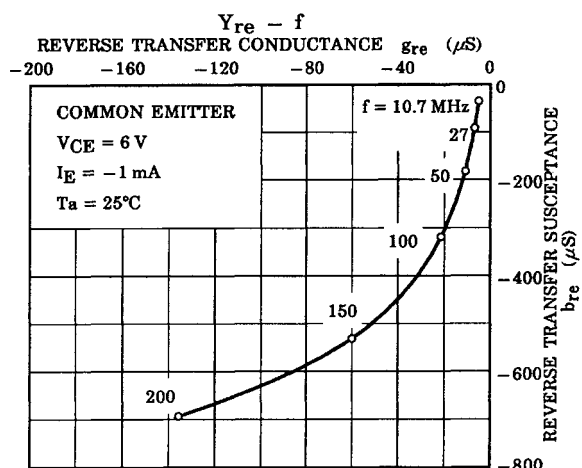
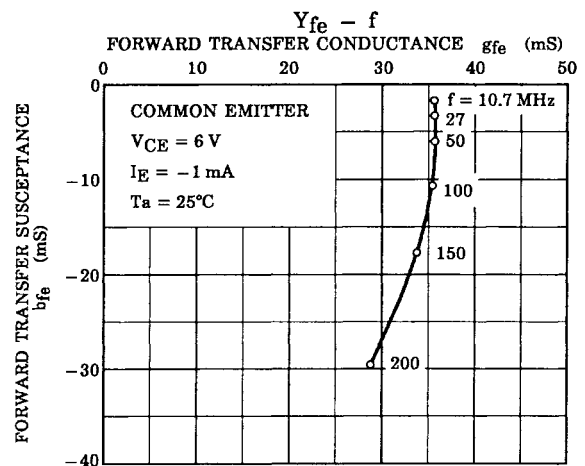
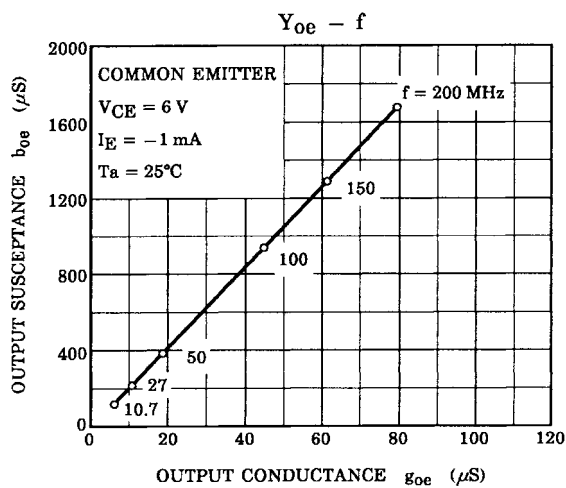
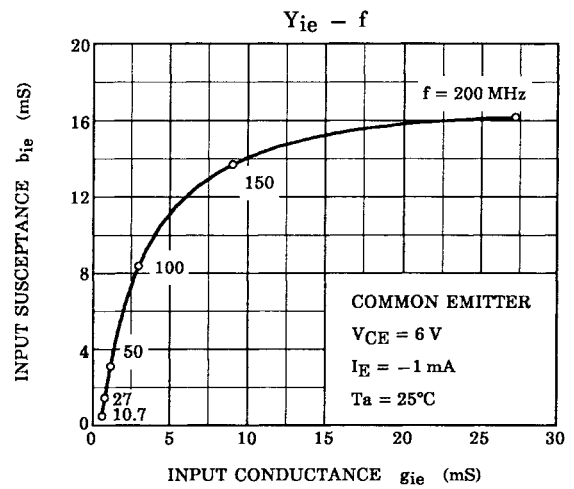
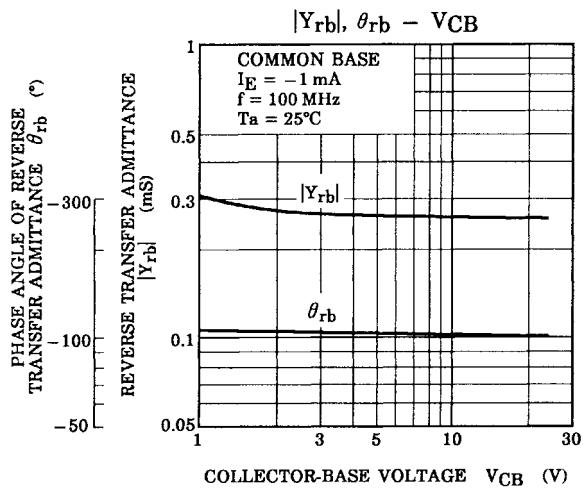
Characteristics	Symbol	Typ.	Unit
Input conductance	g_{ib}	34	mS
Input capacitance	C_{ib}	-10	pF
Reverse transfer admittance	$ y_{rb} $	0.27	μ S
Phase angle of reverse transfer admittance	θ_{rb}	-105	°
Forward transfer admittance	$ y_{fb} $	34	mS
Phase angle of forward transfer admittance	θ_{fb}	165	°
Output conductance	g_{ob}	45	μ 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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