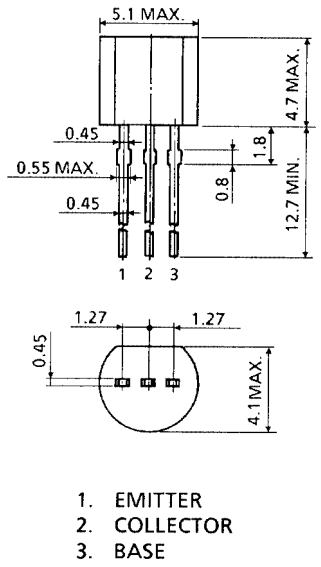
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type (PCT process)

2SC1923

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

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

Unit: mm



1. EMITTER
2. COLLECTOR
3. BASE

JEDEC	TO-92
JEITA	SC-43
TOSHIBA	2-5F1B

Weight: 0.21 g (typ.)

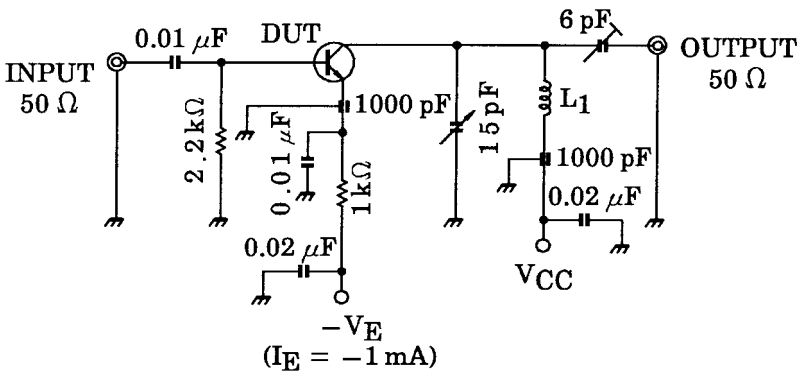
Maximum Ratings (Ta = 25°C)

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	°C
Storage temperature range	T_{stg}	−55~125	°C

Electrical Characteristics (Ta = 25°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	$C_c.r_{bb'}$	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)



L_1: 0.8 mmϕ silver plated copper wire, 4 T, 10ID, 8 LENGTH

Figure 1 NF, G_{pe} Test Circuit

y Parameter (typ.)

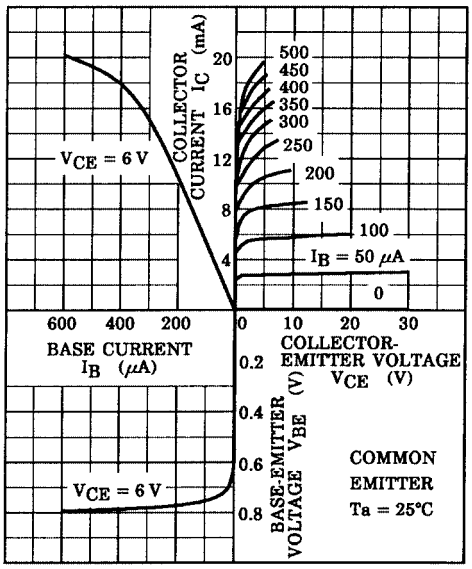
(1) Common emitter (V_{CE} = 6 V, I_E = −1 mA, f = 100 MHz)

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

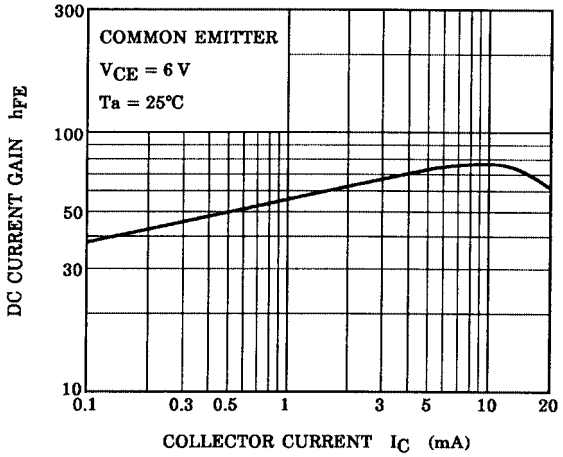
(2) Common base (V_{CE} = 6 V, I_E = −1 mA, f = 100 MHz)

Characteristics	Symbol	Typ.	Unit
Input conductance	g_{ib}	34	mS
Input capacitance	C_{ib}	−10	pF
Reverse transfer admittance	$\lvert y_{rb} \rvert$	0.27	μS
Phase angle of reverse transfer admittance	θ_{rb}	−105	°
Forward transfer admittance	$\lvert y_{fb} \rvert$	34	mS
Phase angle of forward transfer admittance	θ_{fb}	165	°
Output conductance	g_{ob}	45	μS
Output capacitance	C_{ob}	1.1	pF

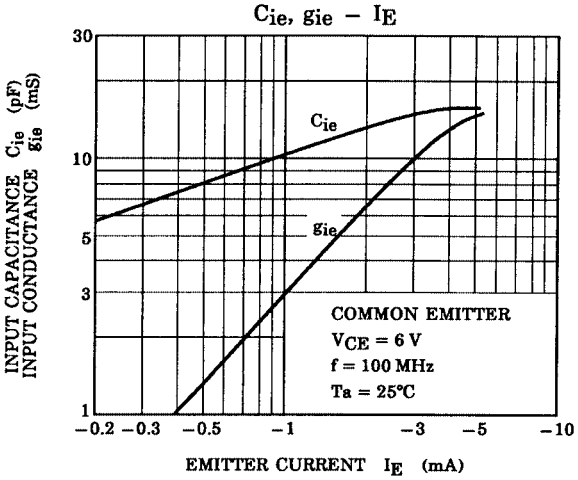
STATIC CHARACTERISTICS



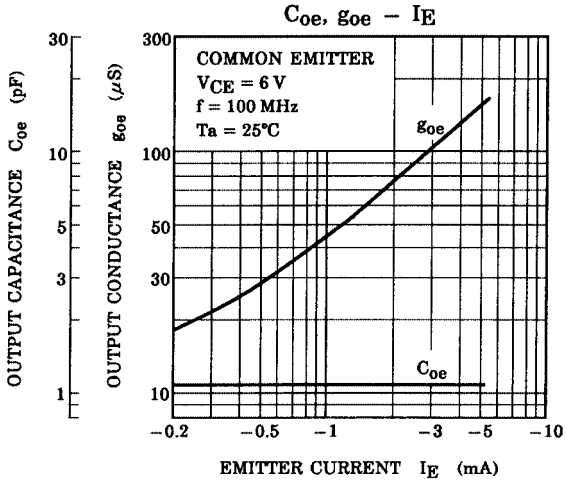
h_{FE} – I_C



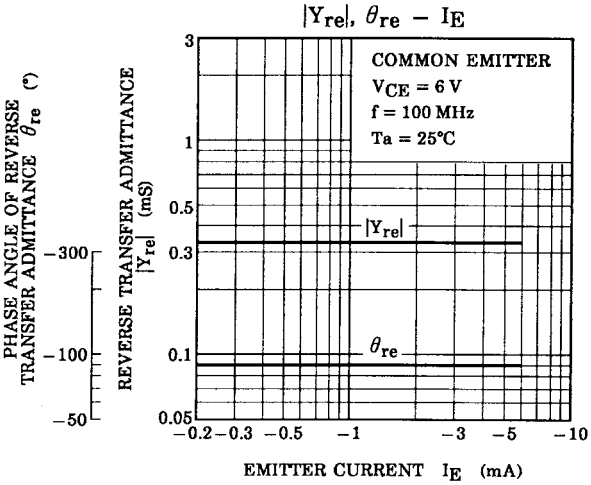
C_{ie}, g_{ie} – I_E

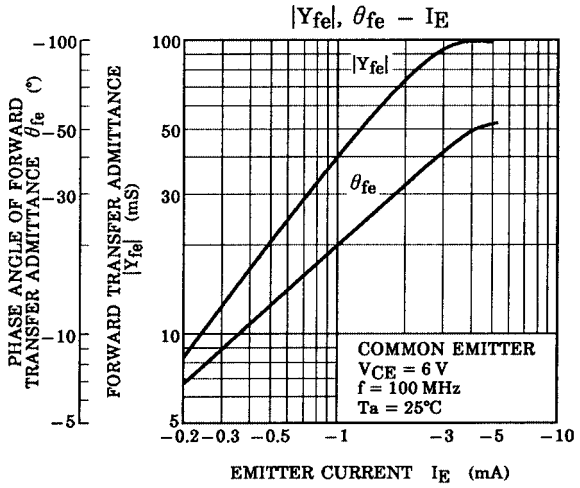


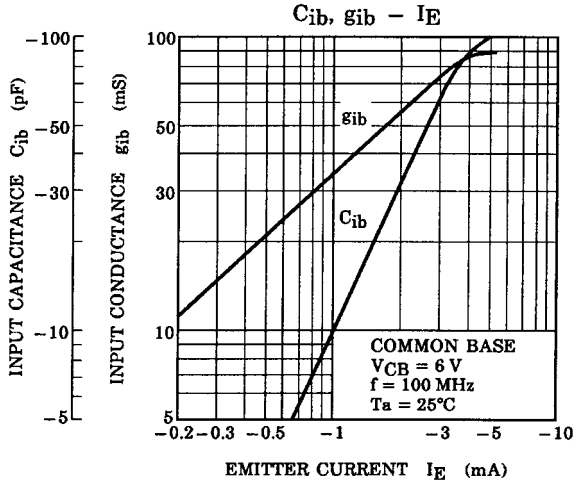
C_{oe}, g_{oe} – I_E

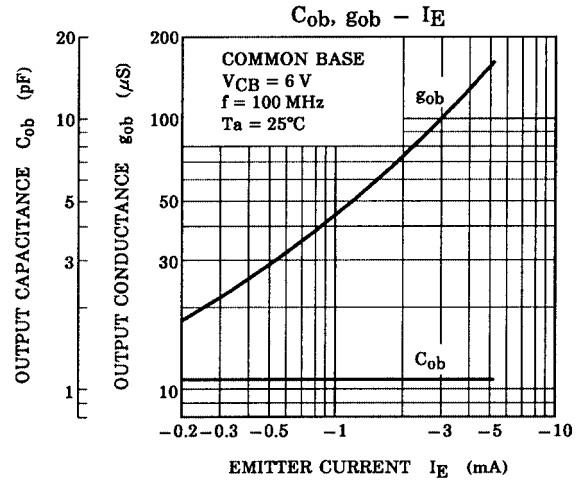


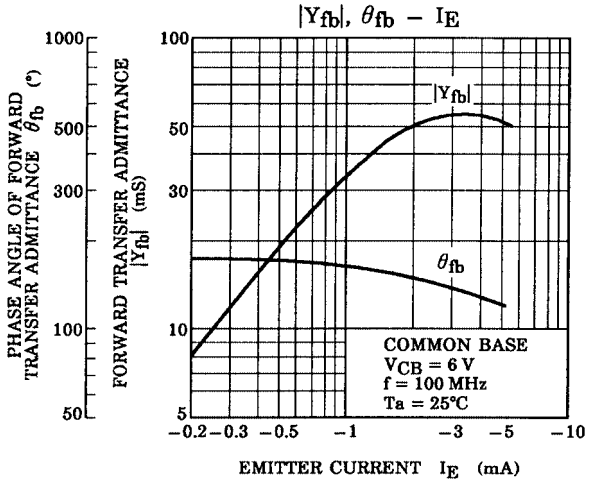
$|Y_{re}|$, θ_{re} – I_E

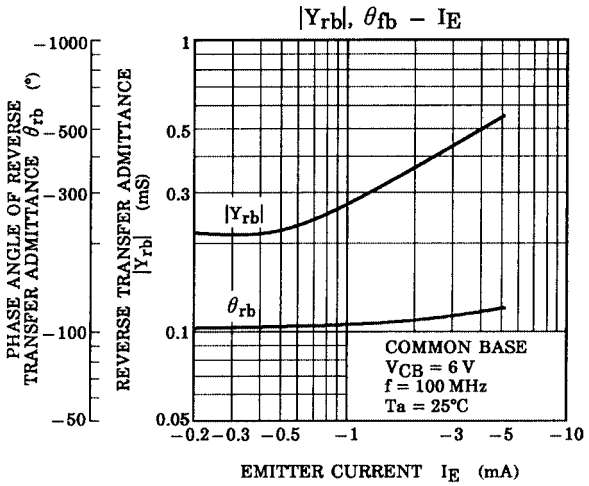


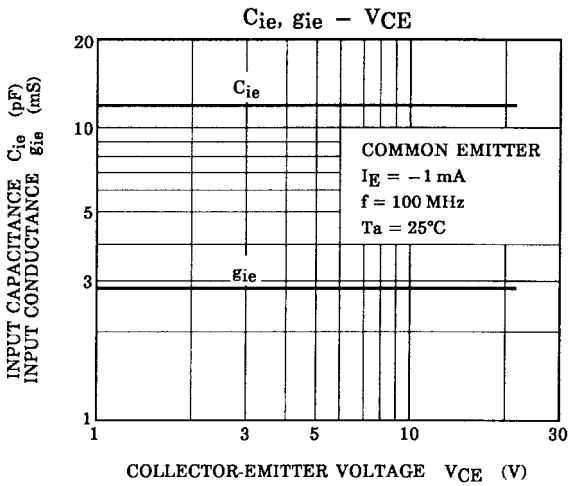

|Yfe|, θfe – IE
PHASE ANGLE OF FORWARD TRANSFER ADMITTANCE θfe (°)
FORWARD TRANSFER ADMITTANCE |Yfe| (mS)
|Yfe|
θfe
COMMON EMITTER
VCE = 6 V
f = 100 MHz
Ta = 25°C
EMITTER CURRENT IE (mA)


Cib, gib – IE
INPUT CAPACITANCE Cib (pF)
INPUT CONDUCTANCE gib (mS)
gib
Cib
COMMON BASE
VCB = 6 V
f = 100 MHz
Ta = 25°C
EMITTER CURRENT IE (mA)

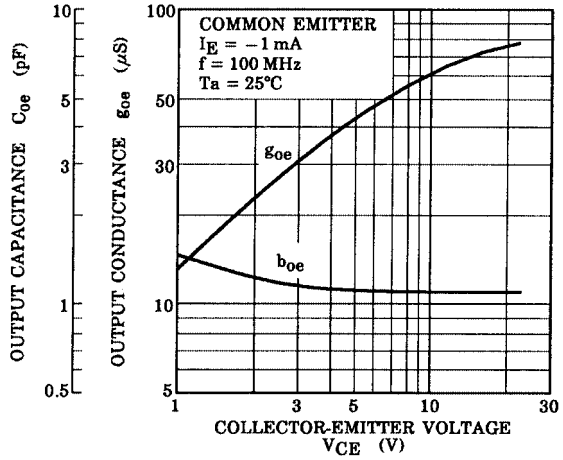

Cob, gob – IE
OUTPUT CAPACITANCE Cob (pF)
OUTPUT CONDUCTANCE gob (μS)
COMMON BASE
VCB = 6 V
f = 100 MHz
Ta = 25°C
gob
Cob
EMITTER CURRENT IE (mA)


|Yfb|, θfb – IE
PHASE ANGLE OF FORWARD TRANSFER ADMITTANCE θfb (°)
FORWARD TRANSFER ADMITTANCE |Yfb| (mS)
|Yfb|
θfb
COMMON BASE
VCB = 6 V
f = 100 MHz
Ta = 25°C
EMITTER CURRENT IE (mA)

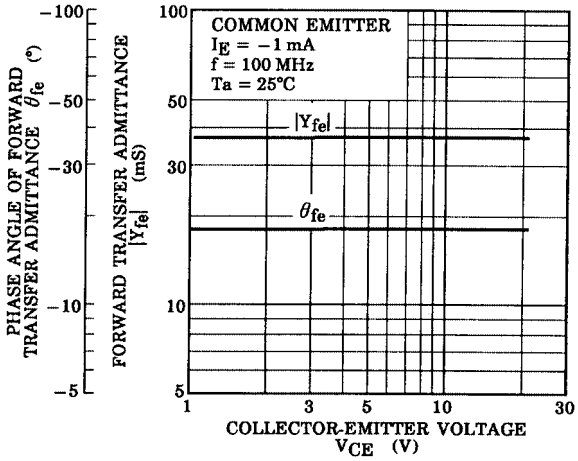

|Yrb|, θfb – IE
PHASE ANGLE OF REVERSE TRANSFER ADMITTANCE θrb (°)
REVERSE TRANSFER ADMITTANCE |Yrb| (mS)
|Yrb|
θrb
COMMON BASE
VCB = 6 V
f = 100 MHz
Ta = 25°C
EMITTER CURRENT IE (mA)


Cie, gie – VCE
INPUT CAPACITANCE Cie (pF)
INPUT CONDUCTANCE gie (mS)
Cie
gie
COMMON EMITTER
IE = –1 mA
f = 100 MHz
Ta = 25°C
COLLECTOR-EMITTER VOLTAGE VCE (V)

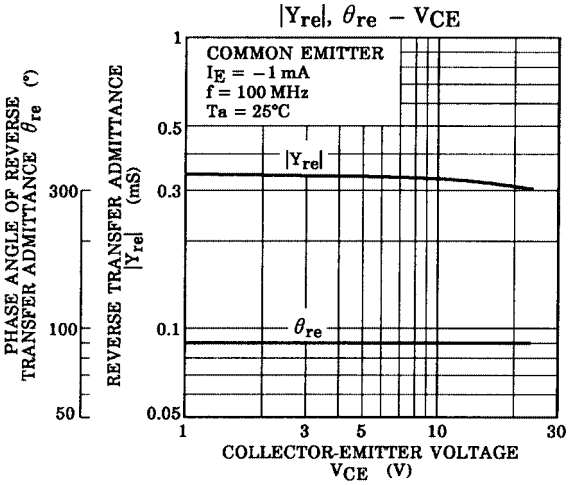
C_{oe}, g_{oe} – V_{CE}



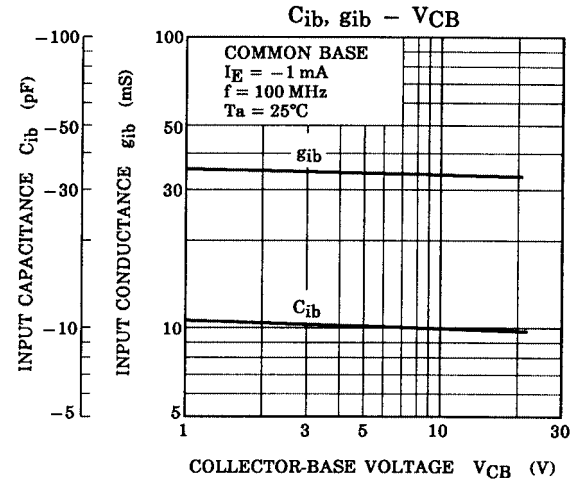
$|Y_{fe}|$, θ_{fe} – V_{CE}



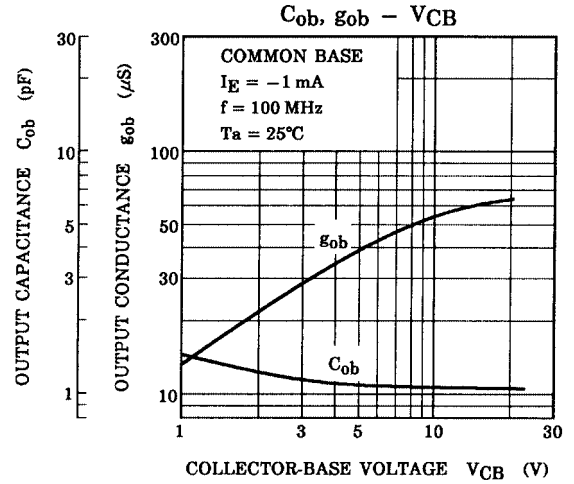
$|Y_{re}|$, θ_{re} – V_{CE}



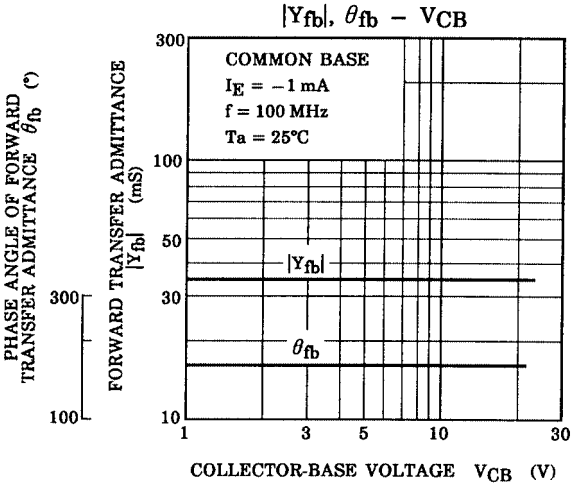
C_{ib}, g_{ib} – V_{CB}



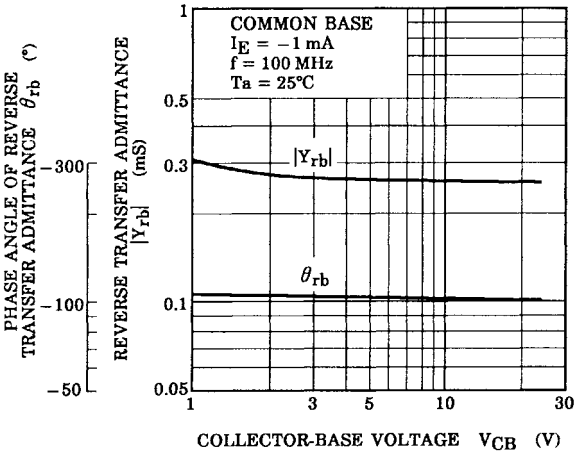
C_{ob}, g_{ob} – V_{CB}



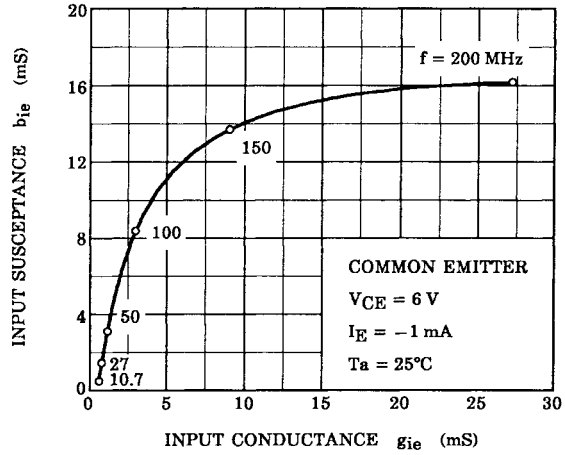
$|Y_{fb}|$, θ_{fb} – V_{CB}



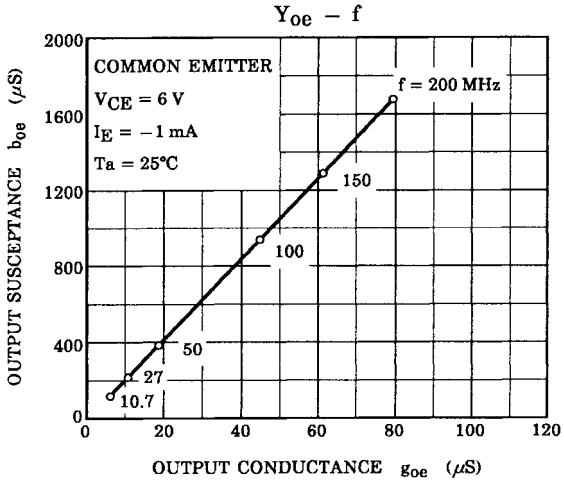
$|Y_{rb}|, \theta_{rb} - V_{CB}$



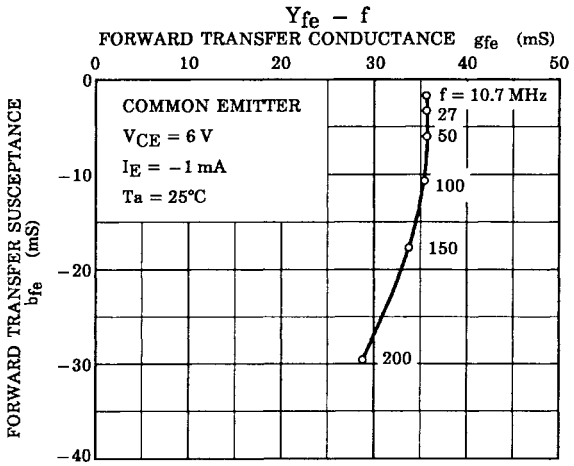
$Y_{ie} - f$



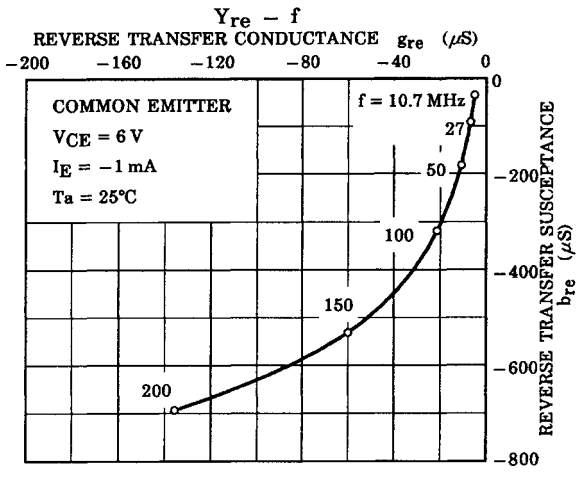
$Y_{oe} - f$



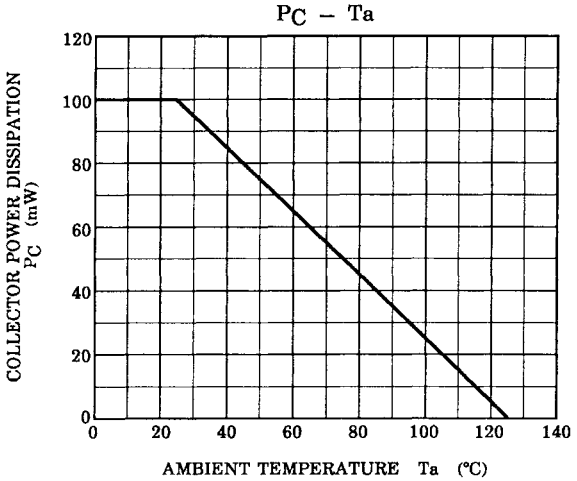
$Y_{fe} - f$



$Y_{re} - f$



$P_C - Ta$



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