TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE (PCT PROCESS)

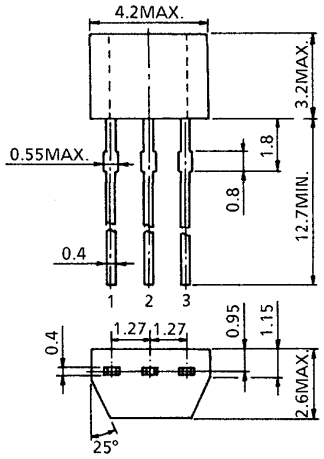
2SC2668

HIGH FREQUENCY AMPLIFIER APPLICATIONS

FM, RF, IF AMPLIFIER APLIFIER APPLICATIONS

- Small Reverse Transfer Capacitance : C_{re} = 0.70 pF (Typ.)
- Low Noise Figure : NF = 2.5dB (Typ.)

Unit in mm



1. EMITTER
2. COLLECTOR
3. BASE

JEDEC	—
EIAJ	—
TOSHIBA	2-4E1A

Weight : 0.13 g

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	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
Emitter Current	I_B	4	mA
Collector Power Dissipation	P_C	100	mW
Junction Temperature Range	T_j	125	°C
Storage Temperature Range	T_{stg}	−55~125	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 40 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
Transistion Frequency	f_T	V_{CE} = 6 V, I_C = 1 mA	—	550	—	MHz
Collector-Base Time Constant	$C_c \cdot r_{bb'}$	V_{CE} = 6 V, I_E = −1 mA, f = 30 MHz	—	—	30	ps
Noise Figure	NF	V_{CC} = 6 V, I_E = −1 mA, f = 100 MHz (Fig.1)	—	2.5	5.0	dB
Power Gain	G_{pe}		—	18	—	dB

(Note) : h_{FE} Classification R : 40~80, O : 70~140, Y : 100~200

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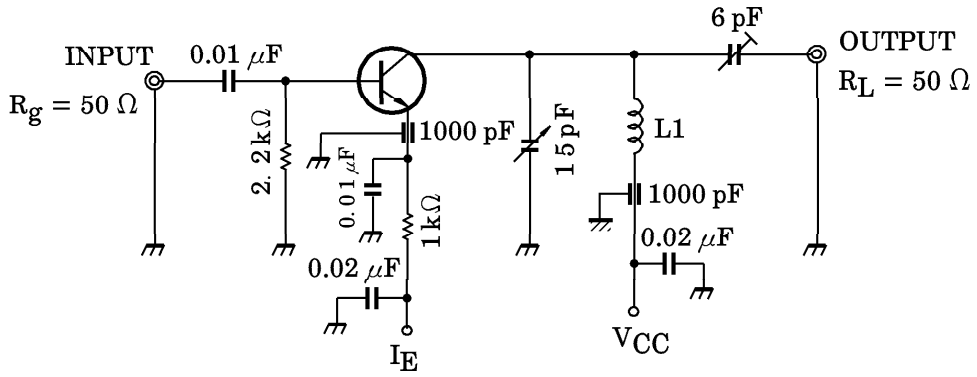
Fig.1. NF, G_{pe} TEST CIRCUIT



L1 : 0.8 mmϕ SILVER PLATED COPPER WIRE, 4Turns. 10mm ID, 8 mm Lengh.

Y PARAMETER (Typ.)

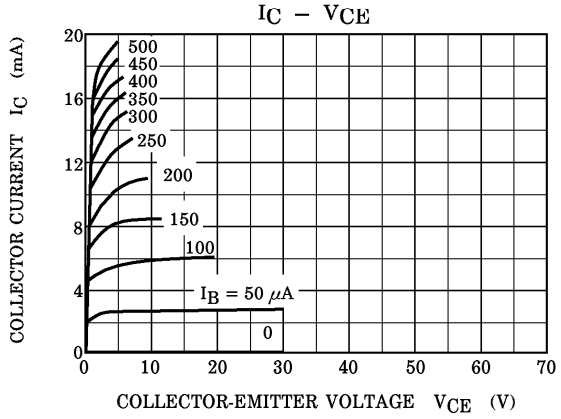
(1) COMMON EMITTER (V_{CE} = 6 V, I_E = −1 mA, f = 100 MHz)

CHARACTERISTIC	SYMBOL	TYP.	UNIT
Input Conductance	g_{ie}	2.9	ms
Input Capacitance	C_{ie}	10.2	pF
Reverse Transfer Admittance	$\|Y_{re}\|$	0.33	ms
Phase Angle of Reverse Transfer Admittance	θ_{re}	−90	°
Forward transfer Admittance	$\|Y_{fe}\|$	40	ms
Phase Angle of Forward Transfer Admittance	θ_{fe}	−20	°
Output Conductance	g_{oe}	45	μs
Output Capacitance	C_{oe}	1.1	pF

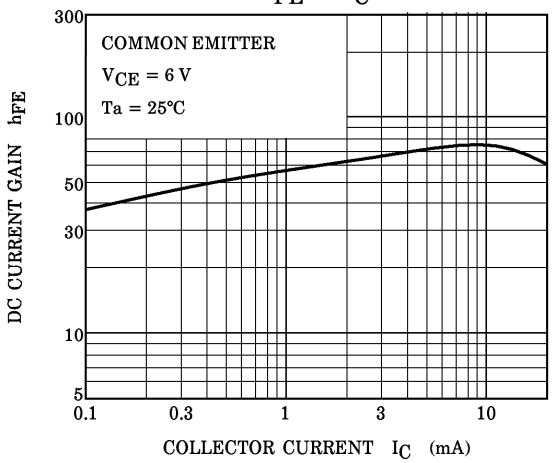
(2) COMMON BASE (V_{CB} = 6 V, I_E = −1 mA, f = 100 MHz)

CHARACTERISTIC	SYMBOL	TYP.	UNIT
Input Conductance	g_{ib}	34	ms
Input Capacitance	C_{ib}	−10	pF
Reverse Transfer Admittance	$\|Y_{rb}\|$	0.27	ms
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	μs
Output Capacitance	C_{ob}	1.1	pF

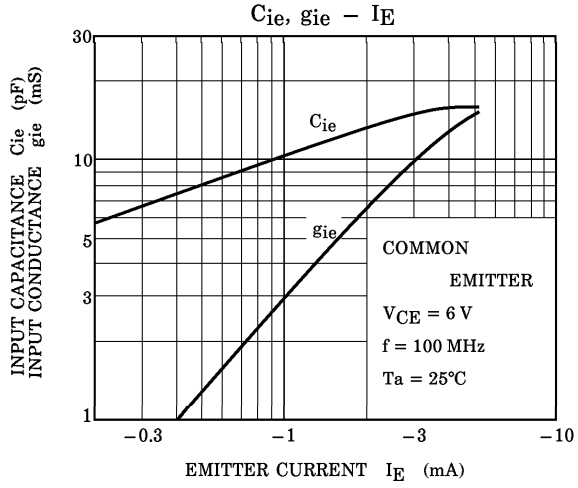
I_C – V_{CE}



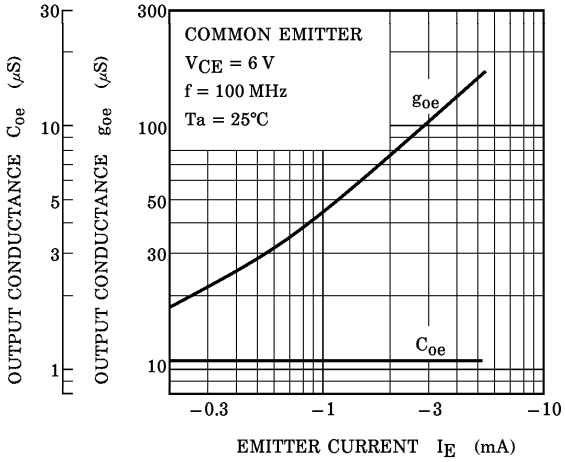
h_{FE} – I_C



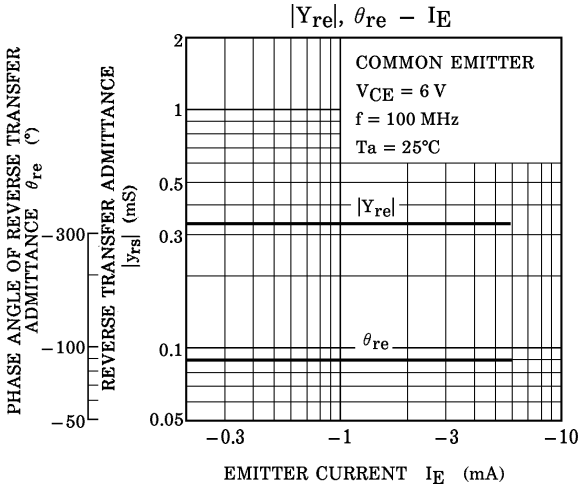
C_{ie}, g_{ie} – I_E



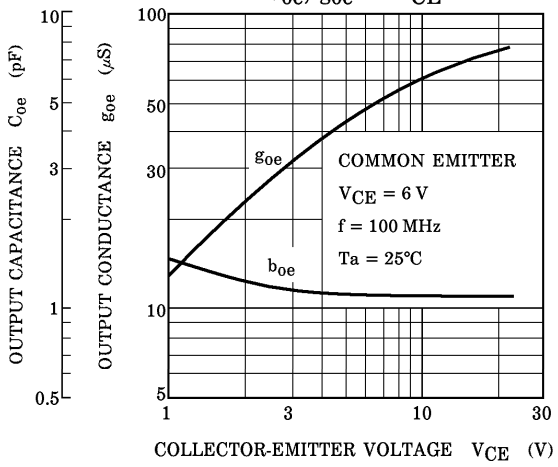
C_{oe}, g_{oe} – I_E



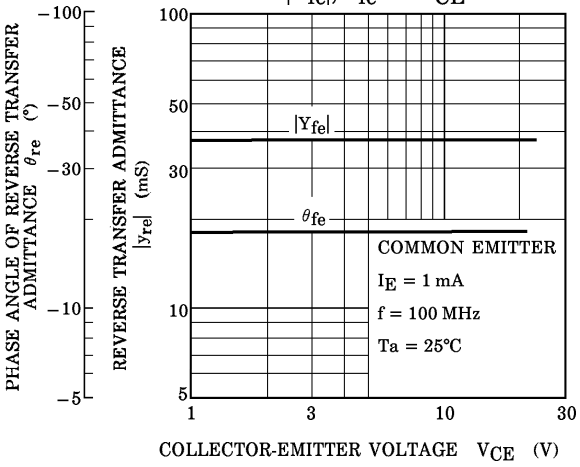
$|Y_{re}|$, θ_{re} – I_E



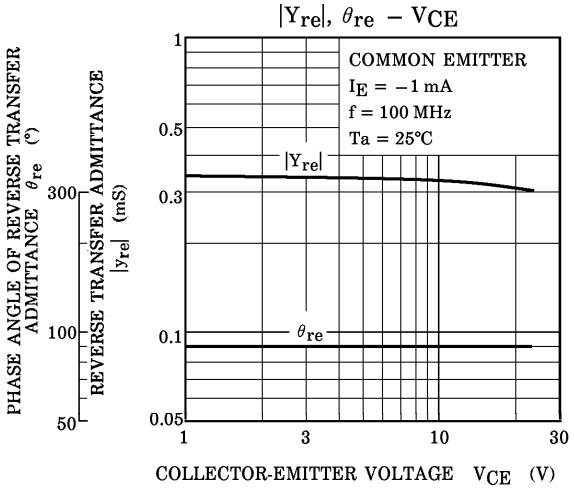
C_{oe}, g_{oe} – V_{CE}



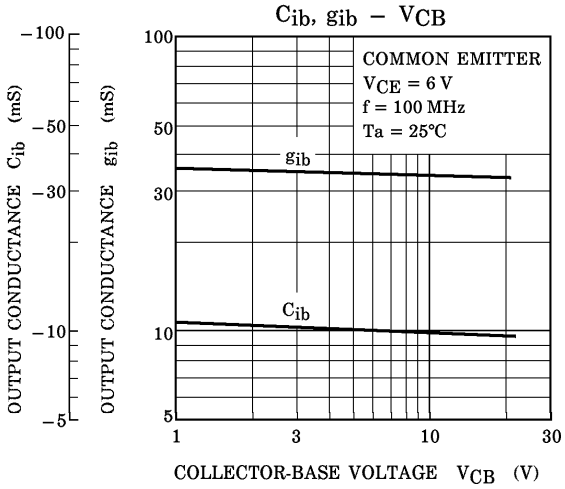
$|Y_{fe}|$, θ_{fe} – V_{CE}



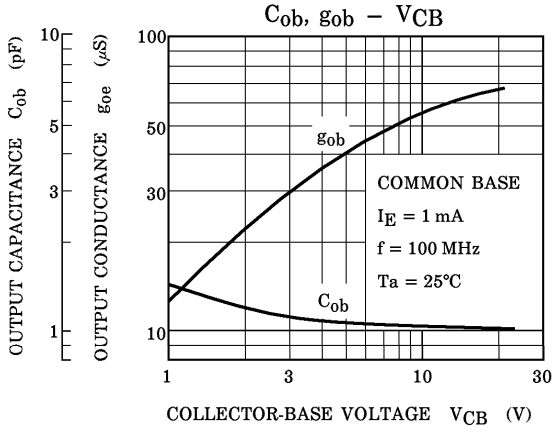
$|Y_{re}|$, θ_{re} – V_{CE}



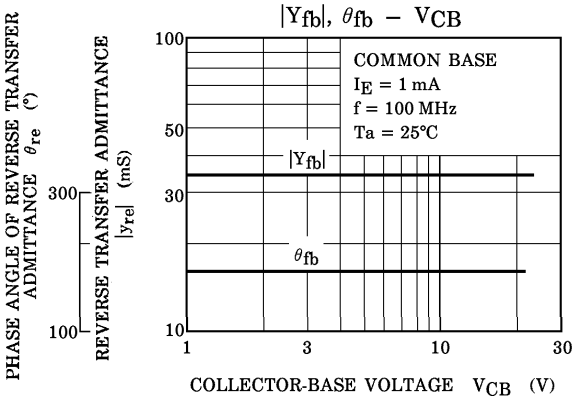
C_{ib}, g_{ib} – V_{CB}

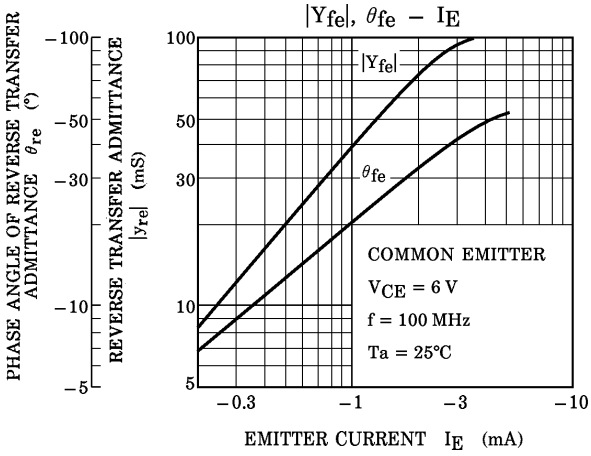


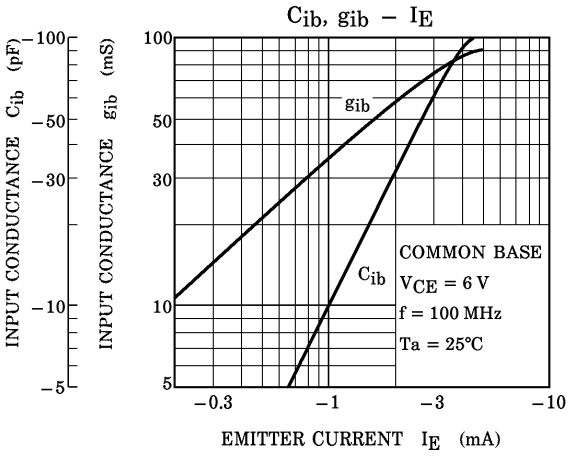
C_{ob}, g_{ob} – V_{CB}

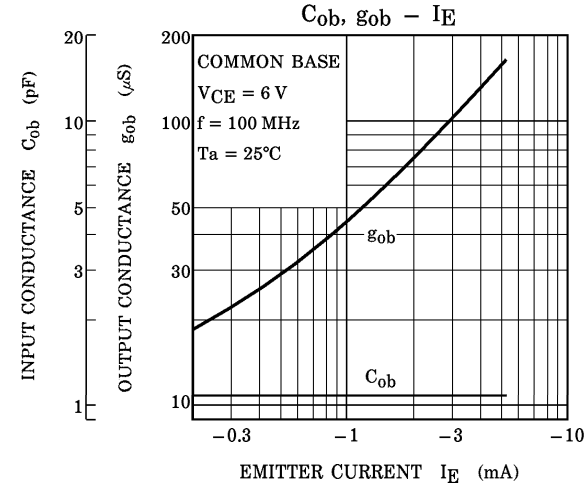


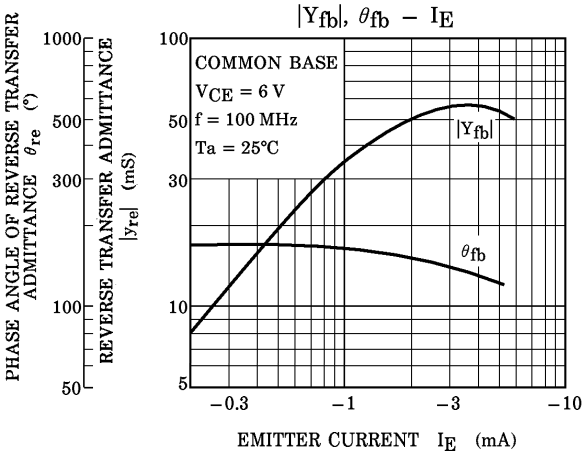
$|Y_{fb}|$, θ_{fb} – V_{CB}

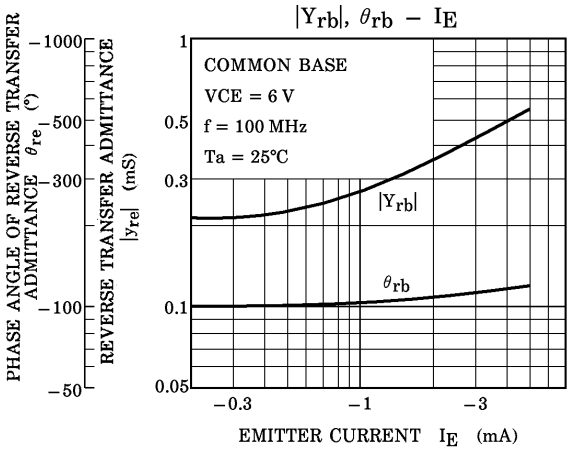


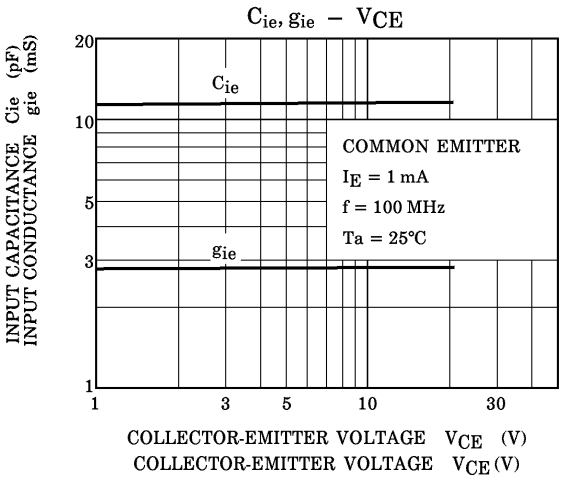

|Yfe|, θfe – IE
PHASE ANGLE OF REVERSE TRANSFER ADMITTANCE θre (°)
REVERSE TRANSFER ADMITTANCE |Yre| (mS)
|Yfe|
θfe
COMMON EMITTER
VCE = 6 V
f = 100 MHz
Ta = 25°C
EMITTER CURRENT IE (mA)


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

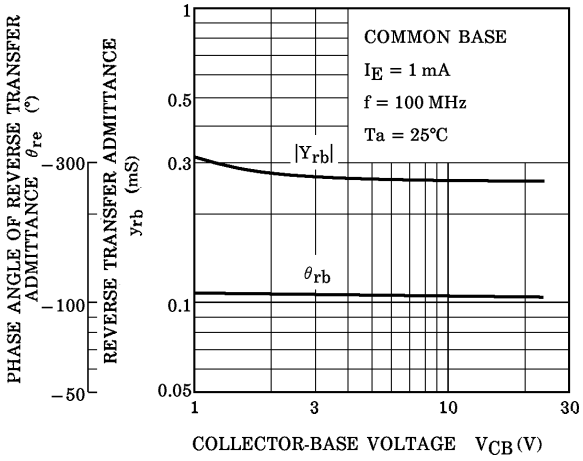

Cob, gob – IE
INPUT CONDUCTANCE Cob (pF)
OUTPUT CONDUCTANCE gob (μS)
COMMON BASE
VCE = 6 V
f = 100 MHz
Ta = 25°C
gob
Cob
EMITTER CURRENT IE (mA)


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

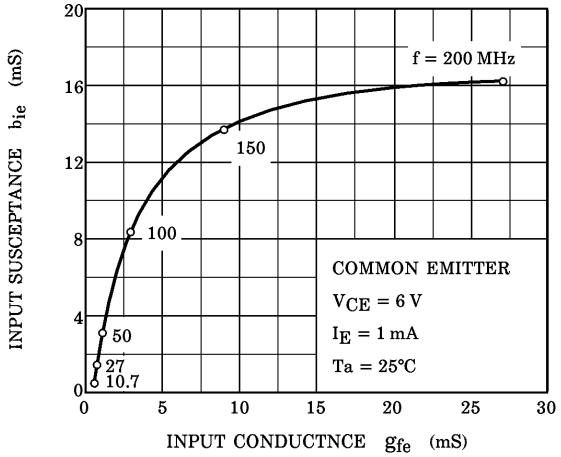

|Yrb|, θrb – IE
PHASE ANGLE OF REVERSE TRANSFER ADMITTANCE θre (°)
REVERSE TRANSFER ADMITTANCE |Yre| (mS)
COMMON BASE
VCE = 6 V
f = 100 MHz
Ta = 25°C
|Yrb|
θrb
EMITTER CURRENT IE (mA)


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)
COLLECTOR-EMITTER VOLTAGE VCE (V)

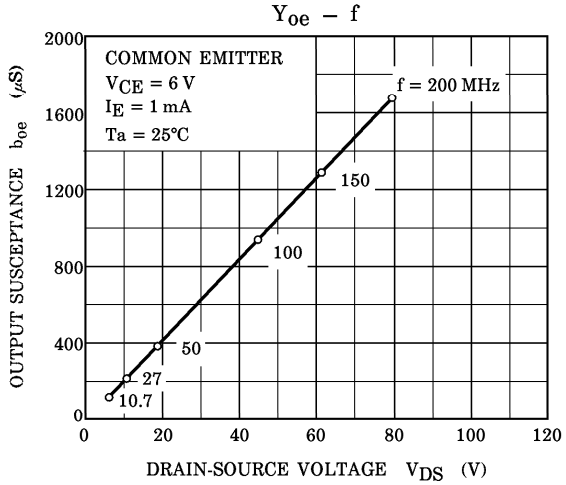
$|Y_{rb}|, \theta_{rb}$ – V_{CB}



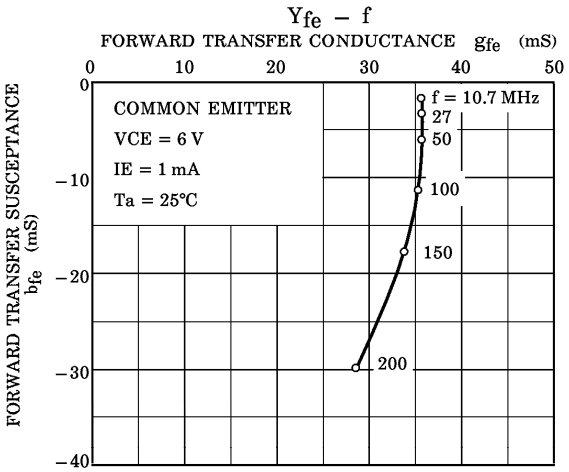
Y_{ie} – f



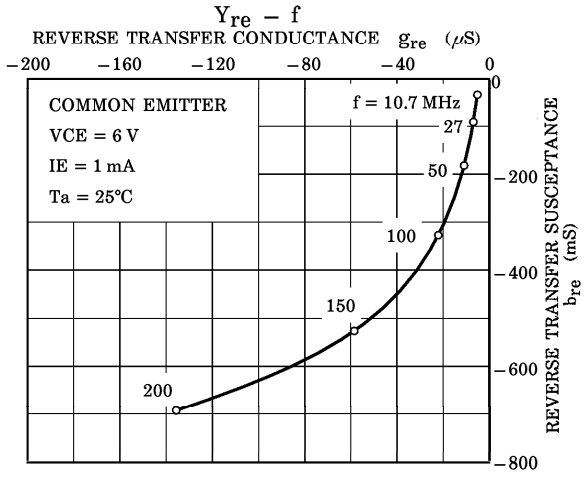
Y_{oe} – f



Y_{fe} – f



Y_{re} – f



P_C – Ta