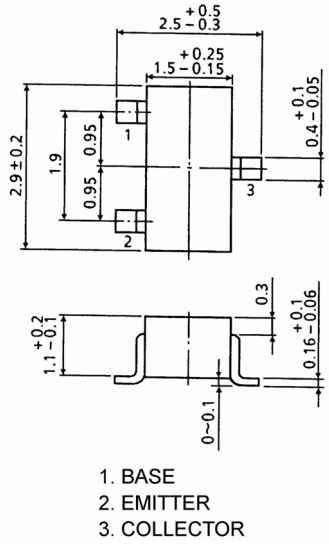
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type (PCT process)

2SC2714

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.)

Unit: mm



S-MINI	
JEDEC	TO-236
JEITA	SC-59
TOSHIBA	2-3F1A

Weight: 12 mg (typ.)

Absolute 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 to 125	°C

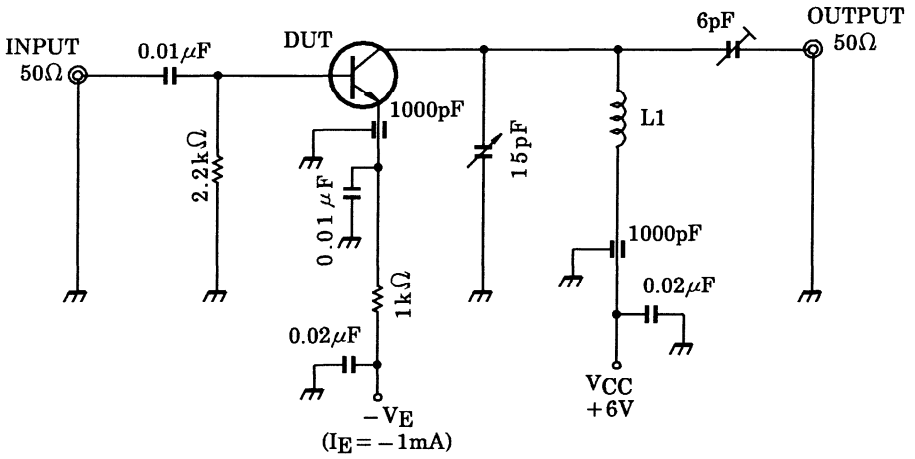
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Electrical Characteristics (Ta = 25°C)

Characteristics	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_{CB} = 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.rbb’	V_{CB} = 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, Figure 1	—	2.5	5.0	dB
Power gain	G_{pe}		17	23	—	dB

Note: h_{FE} classification R: 40 to 80, O: 70 to 140, Y: 100 to 200

Start of commercial production
1982-10



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

Figure1 NF, G_{pe} Test Circuit

y Parameter (typ.)

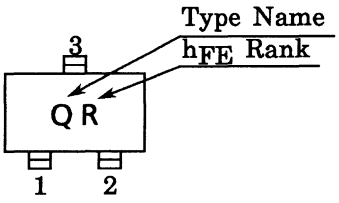
(1) Common emitter (V_{CE} = 6 V, I_E = −1 mA, f = 100 MHz, Ta = 25°C)

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	mS
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

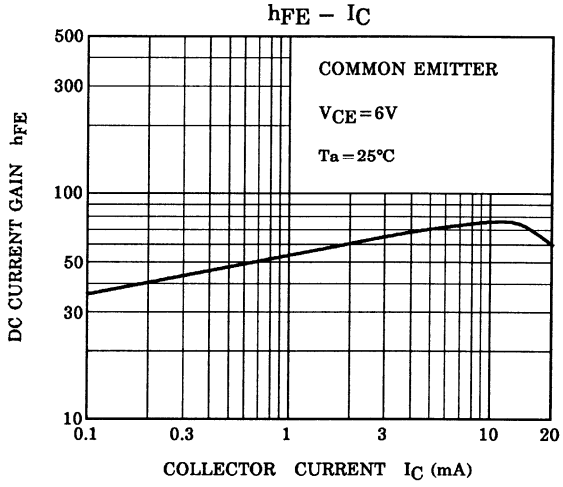
(2) Common base (V_{CE} = 6 V, I_E = −1 mA, f = 100 MHz, Ta = 25°C)

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	mS
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

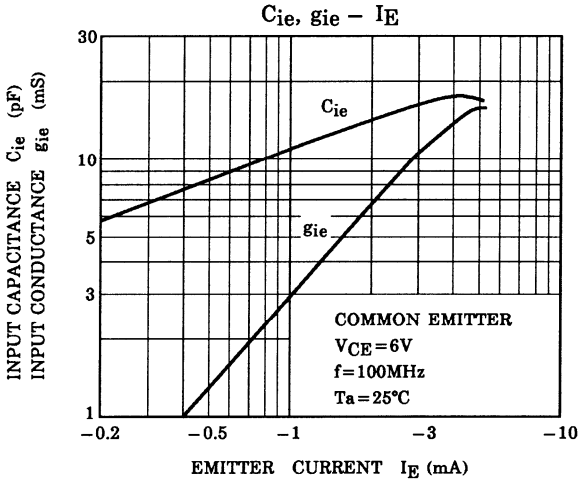
Marking



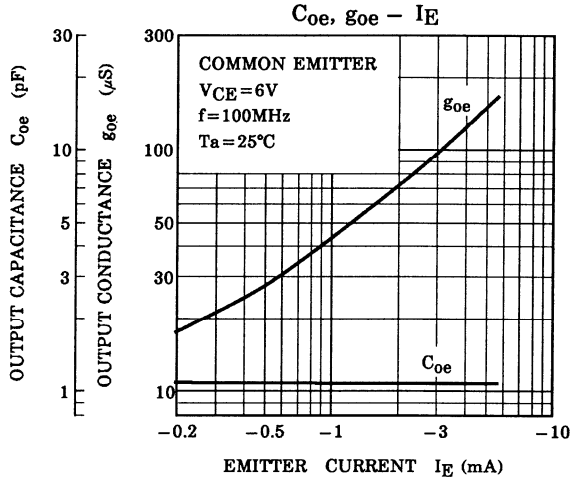
h_{FE} – I_C



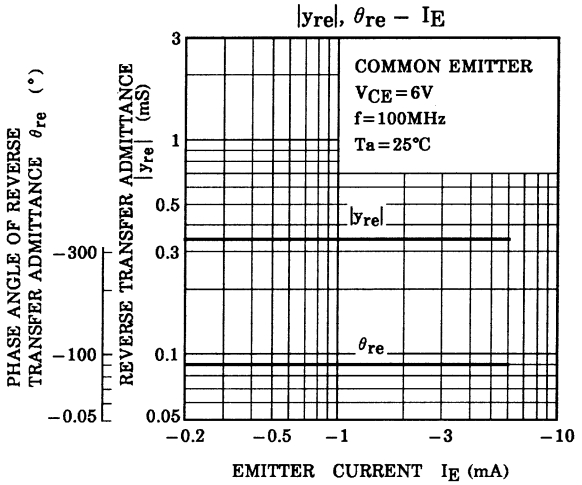
C_{ie}, g_{ie} – I_E



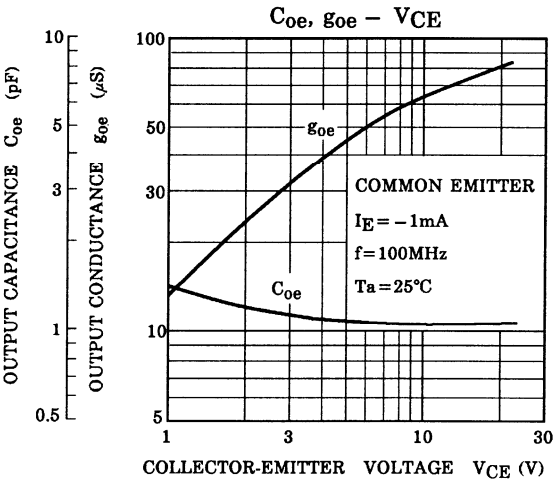
C_{oe}, g_{oe} – I_E



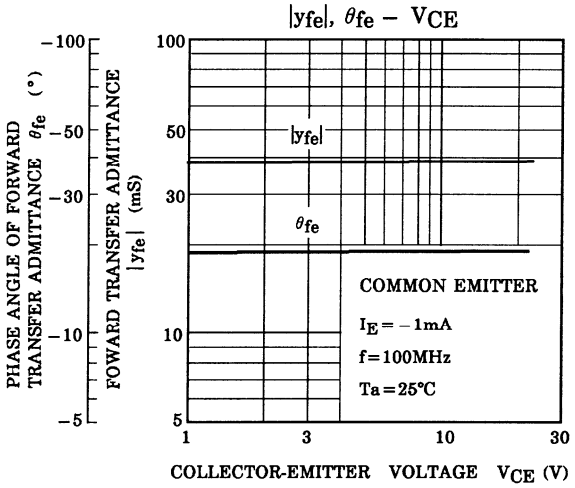
$|y_{re}|$, θ_{re} – I_E

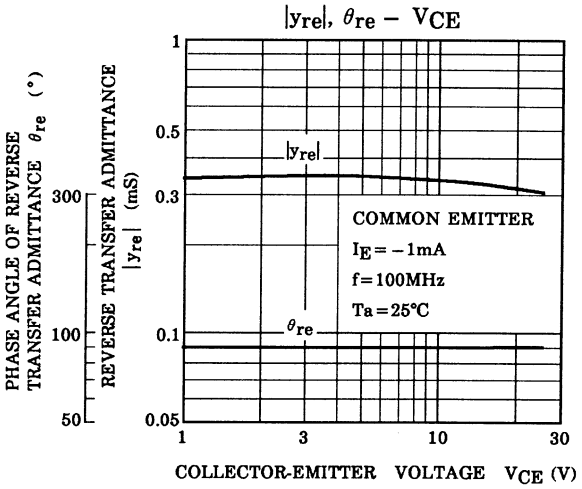


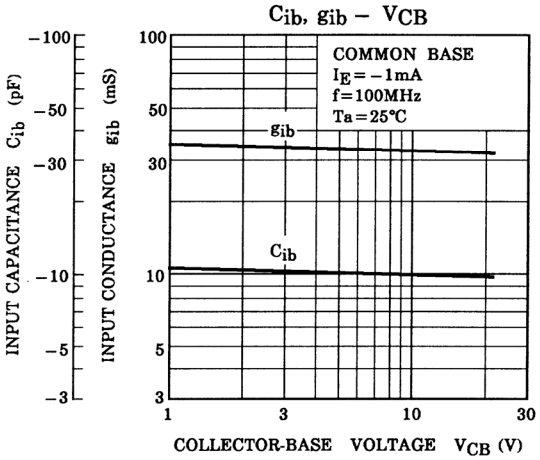
C_{oe}, g_{oe} – V_{CE}

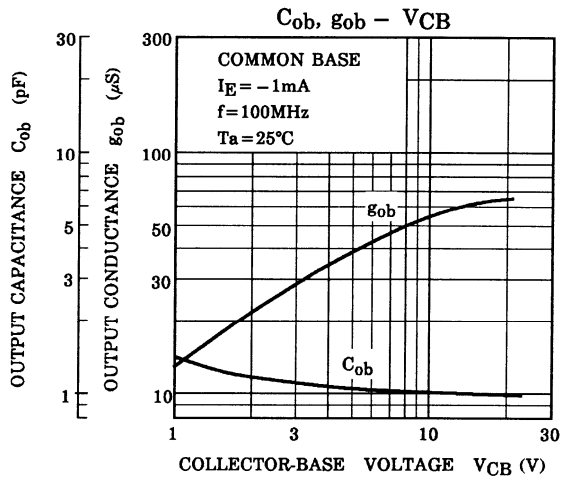


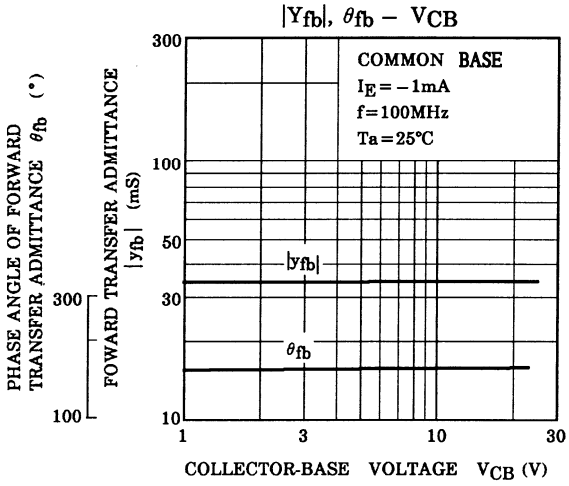
$|y_{fe}|$, θ_{fe} – V_{CE}

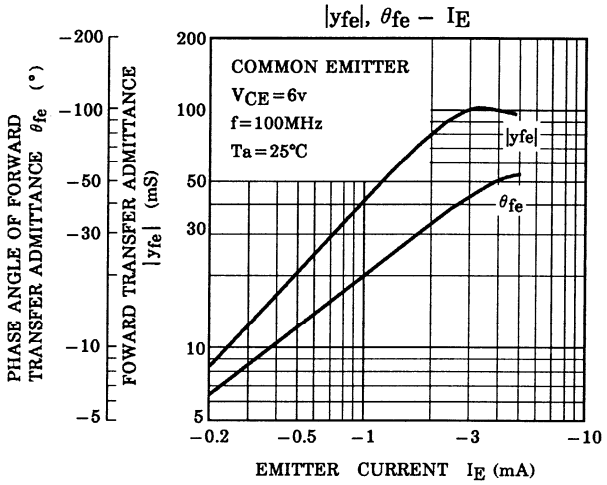


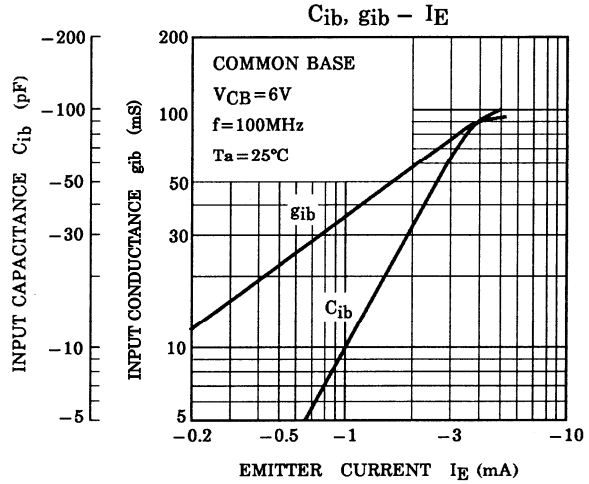

|yre|, θre – VCE
COMMON EMITTER
IE = −1mA
f = 100MHz
Ta = 25°C
|yre|
θre
REVERSE TRANSFER ADMITTANCE |yre| (mS)
PHASE ANGLE OF REVERSE TRANSFER ADMITTANCE θre (°)
COLLECTOR-EMITTER VOLTAGE VCE (V)


Cib, gib – VCB
COMMON BASE
IE = −1mA
f = 100MHz
Ta = 25°C
gib
Cib
INPUT CONDUCTANCE gib (mS)
INPUT CAPACITANCE Cib (pF)
COLLECTOR-BASE VOLTAGE VCB (V)

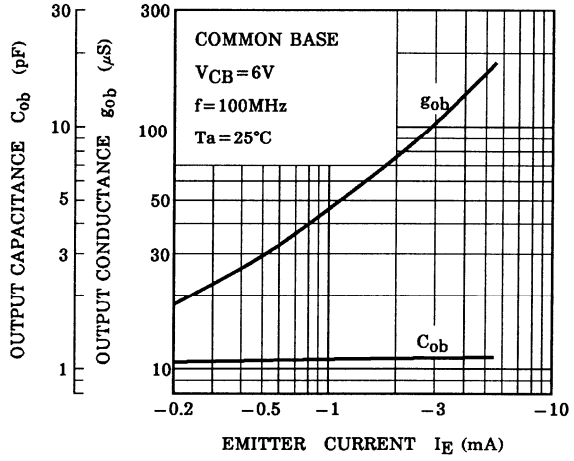

Cob, gob – VCB
COMMON BASE
IE = −1mA
f = 100MHz
Ta = 25°C
gob
Cob
OUTPUT CONDUCTANCE gob (μS)
OUTPUT CAPACITANCE Cob (pF)
COLLECTOR-BASE VOLTAGE VCB (V)


|Yfb|, θfb – VCB
COMMON BASE
IE = −1mA
f = 100MHz
Ta = 25°C
|yfb|
θfb
FOWARD TRANSFER ADMITTANCE |yfb| (mS)
PHASE ANGLE OF FORWARD TRANSFER ADMITTANCE θfb (°)
COLLECTOR-BASE VOLTAGE VCB (V)

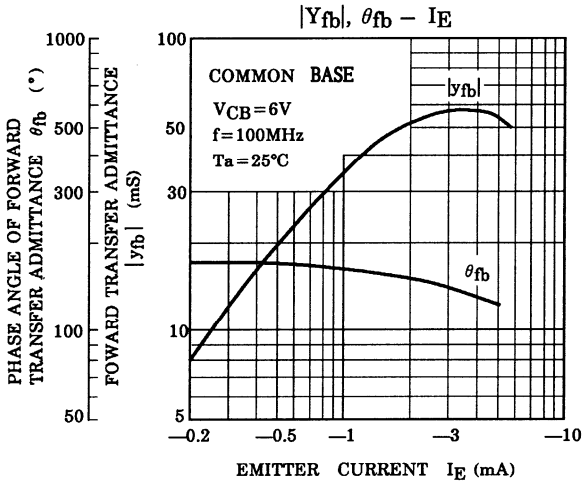

|yfe|, θfe – IE
COMMON EMITTER
VCE = 6v
f = 100MHz
Ta = 25°C
|yfe|
θfe
FOWARD TRANSFER ADMITTANCE |yfe| (mS)
PHASE ANGLE OF FORWARD TRANSFER ADMITTANCE θfe (°)
EMITTER CURRENT IE (mA)


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

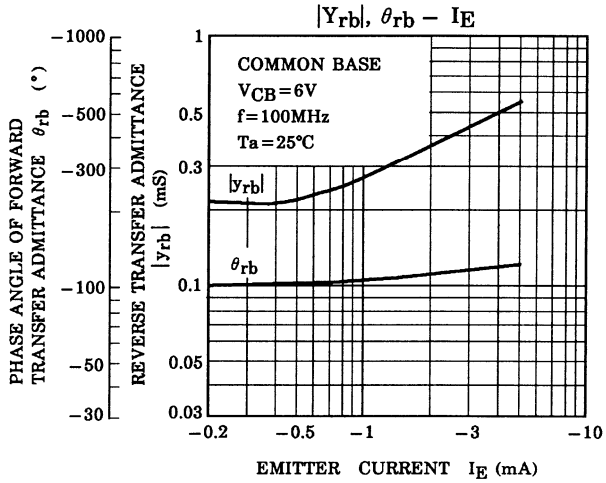
C_{ob}, g_{ob} – I_E



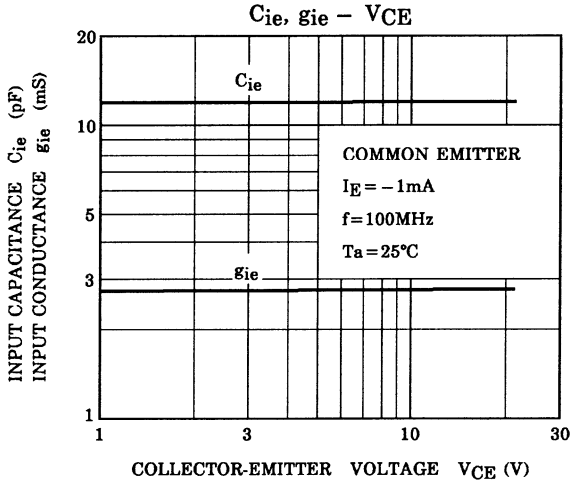
$|Y_{fb}|$, θ_{fb} – I_E



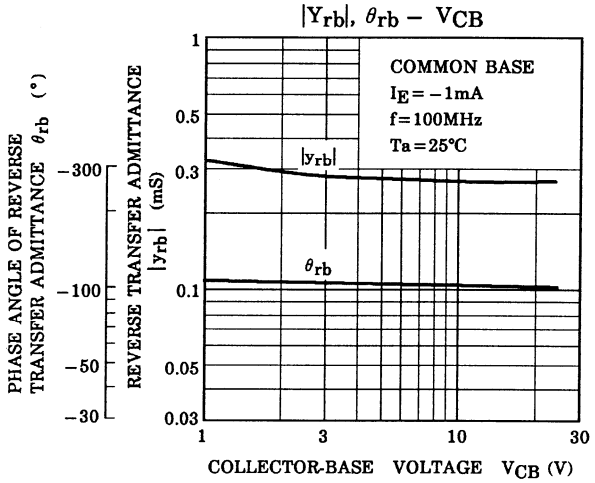
$|Y_{rb}|$, θ_{rb} – I_E



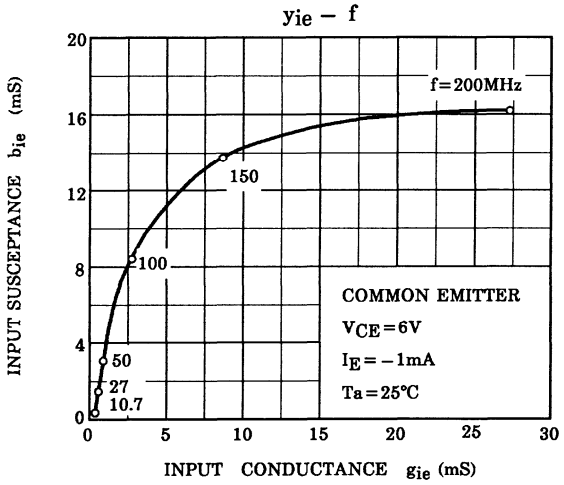
C_{ie}, g_{ie} – V_{CE}



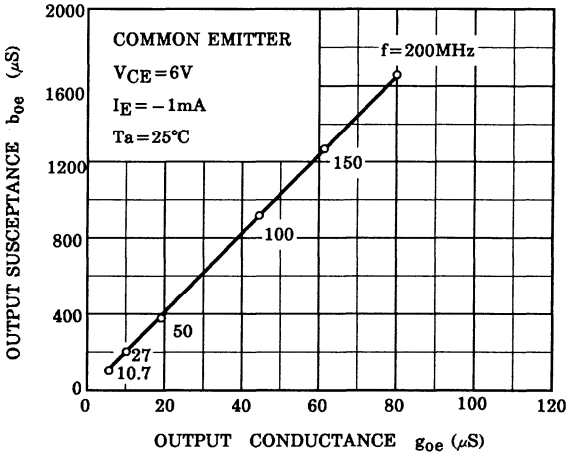
$|Y_{rb}|$, θ_{rb} – V_{CB}



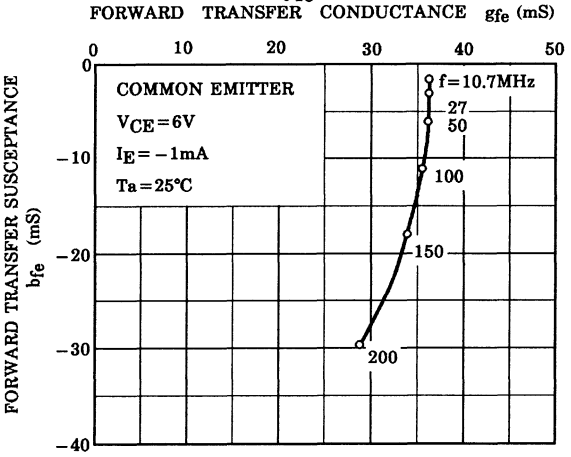
y_{ie} – f



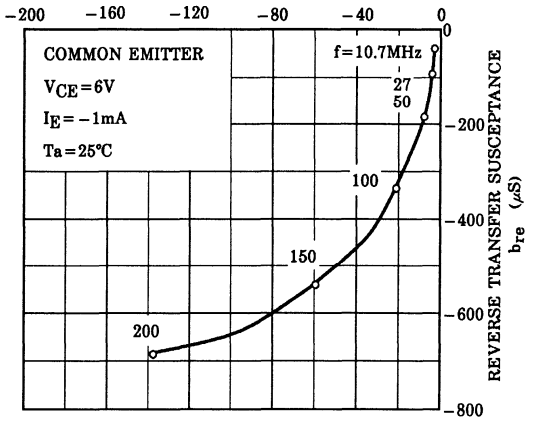
y_{oe} – f



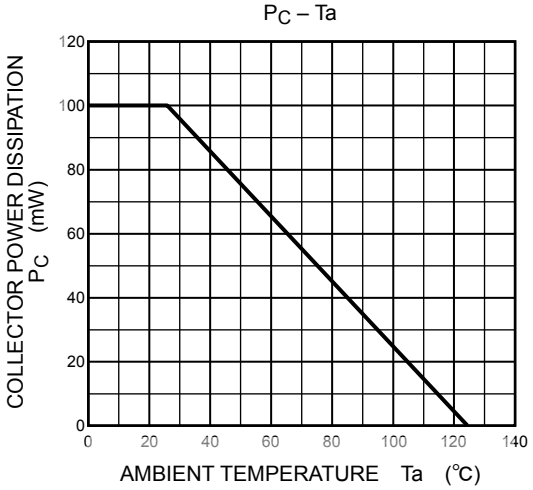
y_{fe} – f



y_{re}–f



P_C – Ta



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