TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process)

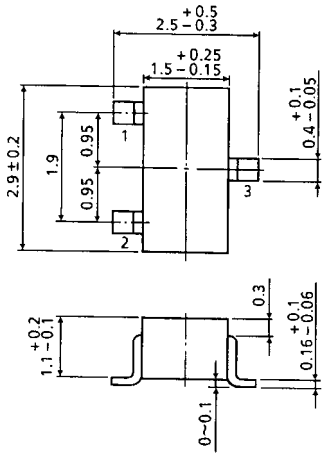
2SC2996

FM/AM RF, MIX, Local, IF

High Frequency Amplifier Applications

- High stability oscillation voltage on FM local oscillator
- Recommend FM/AM RF, MIX, local and IF

Unit: mm



JEDEC	TO-236
JEITA	—
TOSHIBA	2-3F1A

Weight: 0.012 g (typ.)

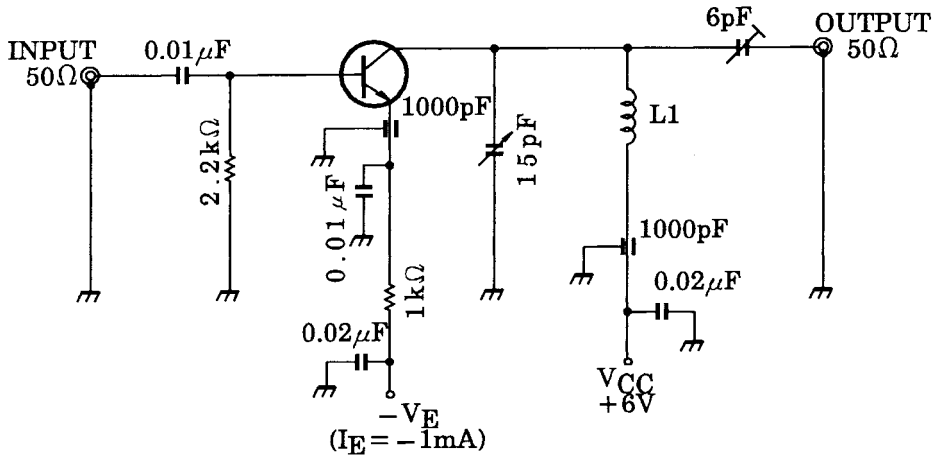
Maximum Ratings (Ta = 25°C)

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	50	mA
Emitter current	I_E	−50	mA
Collector power dissipation	P_C	150	wW
Junction temperature	T_j	125	°C
Storage temperature range	T_{stg}	−55~125	°C

Electrical Characteristics (Ta = 25°C)

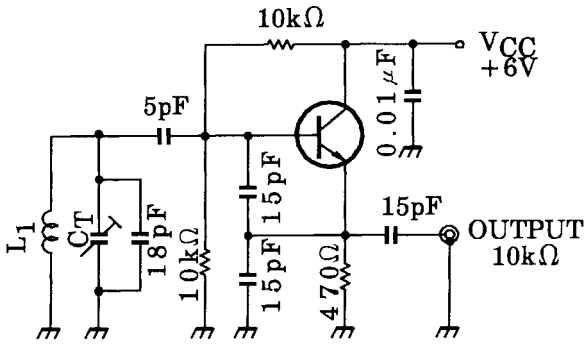
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 40 V, I_E = 0	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 4 V, I_C = 0	—	—	0.5	μA
DC current gain	h_{FE} (Note)	V_{CE} = 6 V, I_C = 1 mA	40	—	240	
Reverse transfer capacitance	C_{re}	V_{CB} = 6 V, f = 1 MHz	—	0.9	1.3	pF
Transition frequency	f_T	V_{CE} = 6 V, I_C = −1 mA	150	350	—	MHz
Collector-base time constant	C_c.rbb'	V_{CE} = 6 V, I_E = −1 mA, f = 30 MHz	—	15	30	ps
Noise figure	NF	V_{CE} = 6 V, I_E = −1 mA, f = 100 MHz (Figure 1)	—	4.0	—	dB
Power gain	G_{pe}		—	15	—	dB
Oscillation output voltage	V_{OSC}	V_{CE} = 6 V, f = 100 MHz (Figure 2)	—	150	—	mV

Note: h_{FE} classification R: 40~80, O: 70~140, Y: 120~240



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

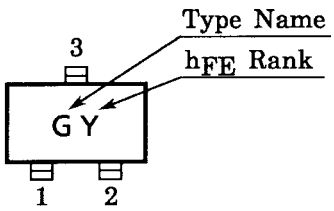
Figure 1 NF, G_{pe} Test Circuit



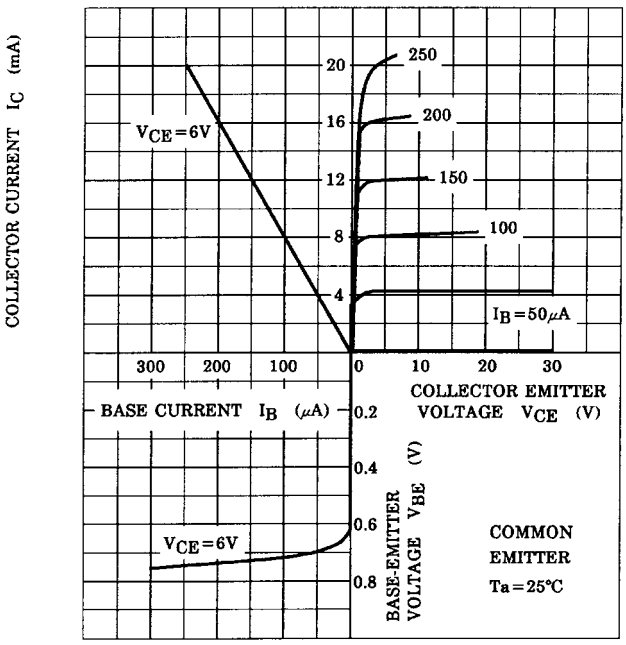
L_1: 0.8 mmϕ silver plated copper wire, 4 T, 10ID, 8 length

Figure 2 V_{OSC} Test Circuit

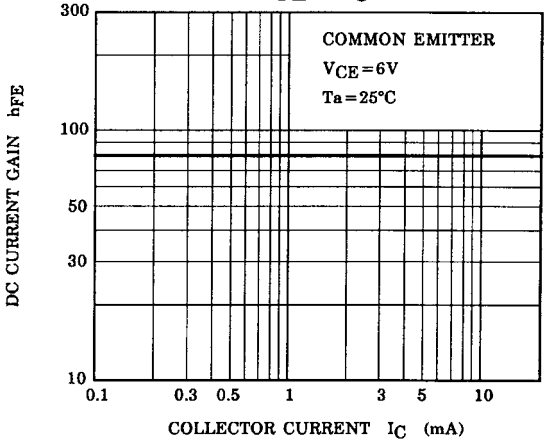
Marking



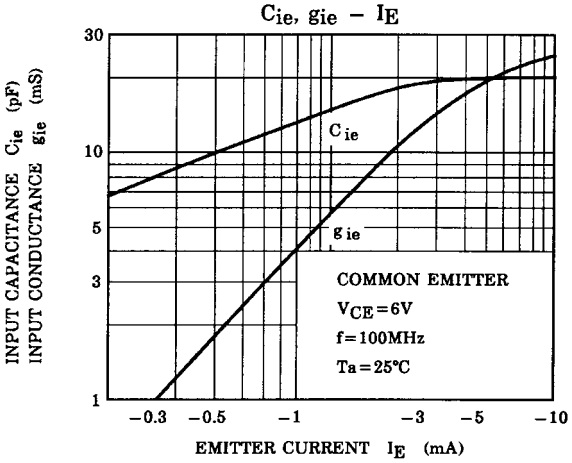
STATIC CHARACTERISTICS



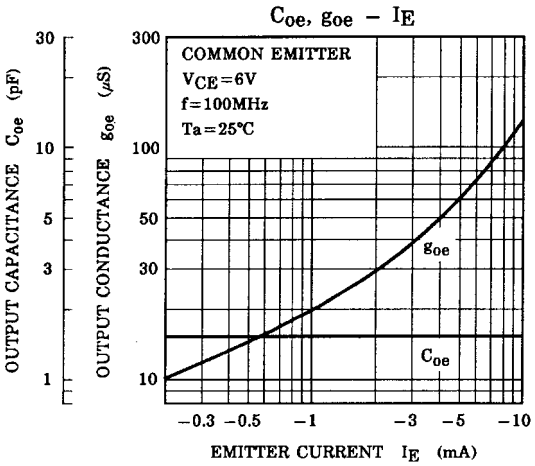
h_{FE} – I_C



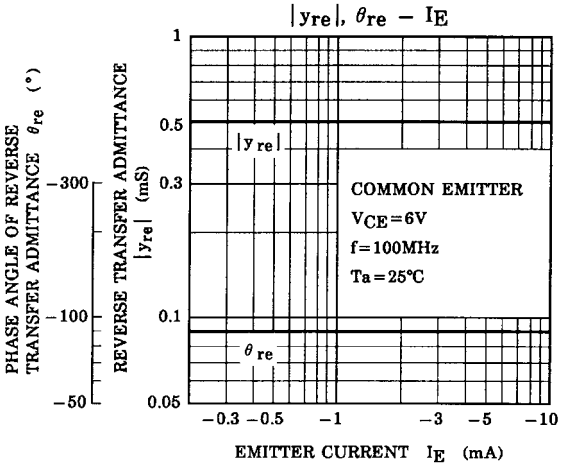
C_{ie}, g_{ie} – I_E

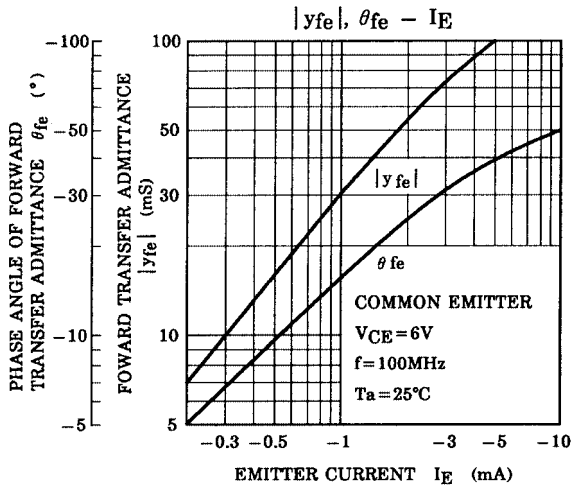


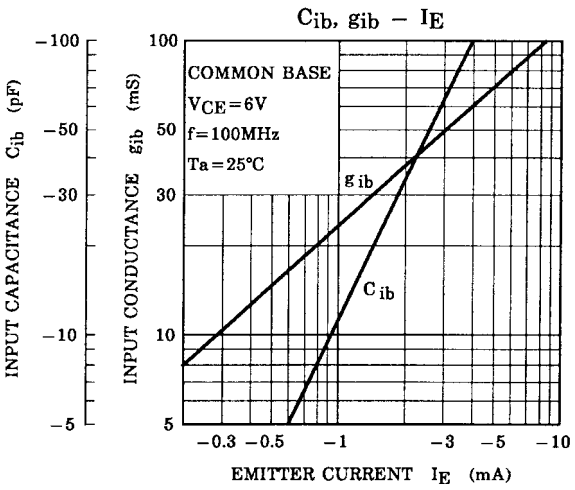
C_{oe}, g_{oe} – I_E

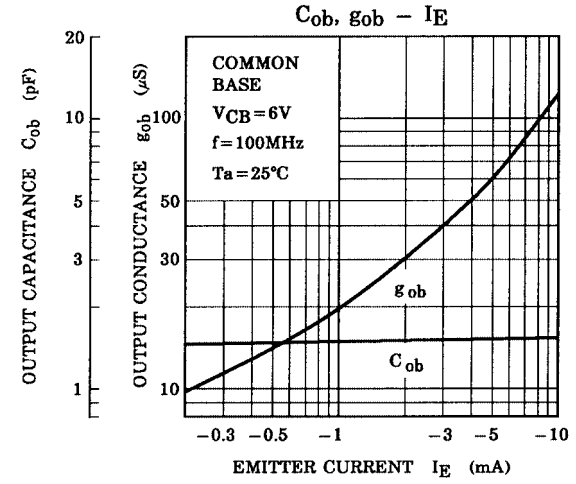


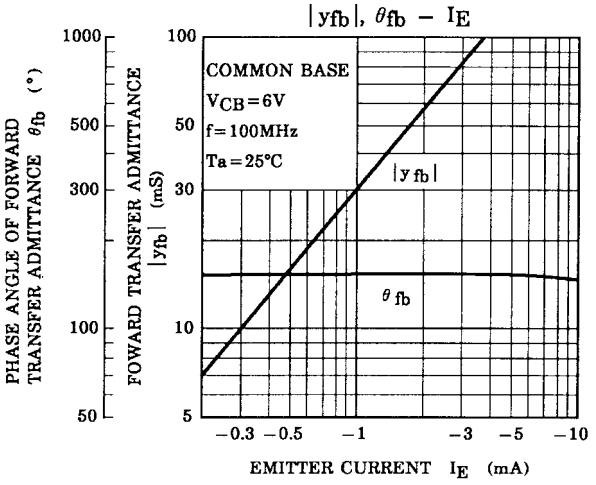
$|y_{re}|$, θ_{re} – I_E

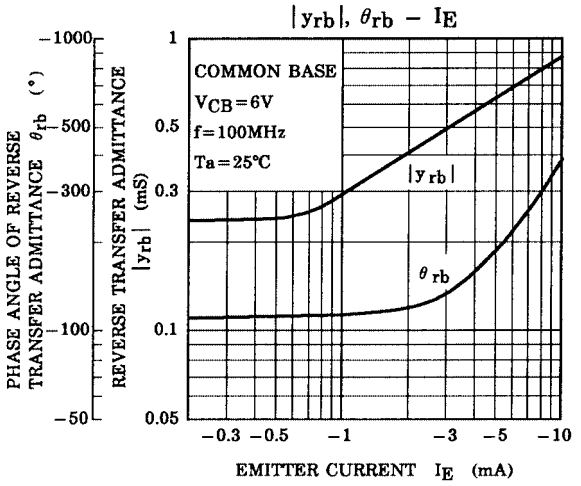


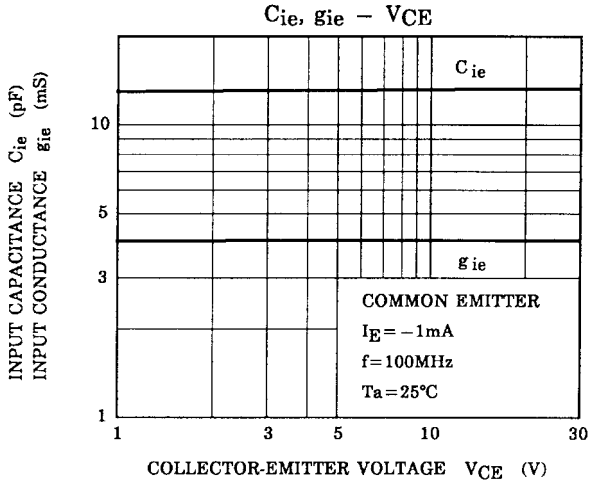

|yfe|, θfe – IE
PHASE ANGLE OF FORWARD TRANSFER ADMITTANCE θfe (°)
FOWARD TRANSFER ADMITTANCE |yfe| (mS)
|yfe|
θfe
COMMON EMITTER
VCE=6V
f=100MHz
Ta=25°C
EMITTER CURRENT IE (mA)


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

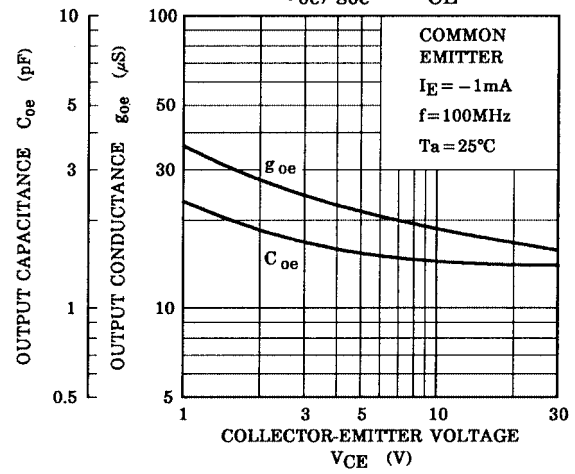

Cob, gob – IE
OUTPUT CAPACITANCE Cob (pF)
OUTPUT CONDUCTANCE gob (μS)
COMMON BASE
VCB=6V
f=100MHz
Ta=25°C
gob
Cob
EMITTER CURRENT IE (mA)


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

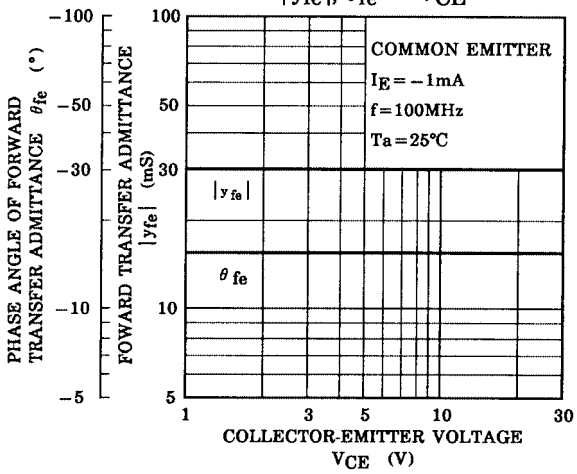

|yrb|, θrb – IE
PHASE ANGLE OF REVERSE TRANSFER ADMITTANCE θrb (°)
REVERSE TRANSFER ADMITTANCE |yrb| (mS)
COMMON BASE
VCB=6V
f=100MHz
Ta=25°C
|yrb|
θrb
EMITTER CURRENT IE (mA)


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

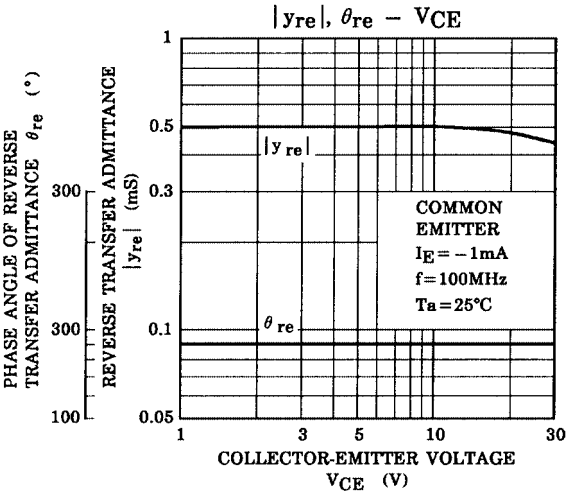
C_{oe}, g_{oe} – V_{CE}



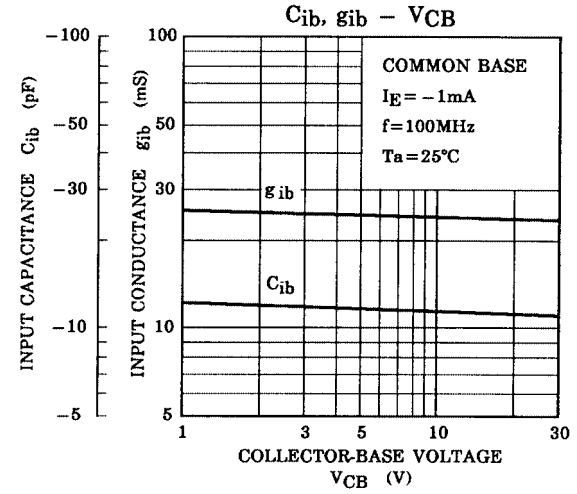
$|y_{fe}|$, θ_{fe} – V_{CE}



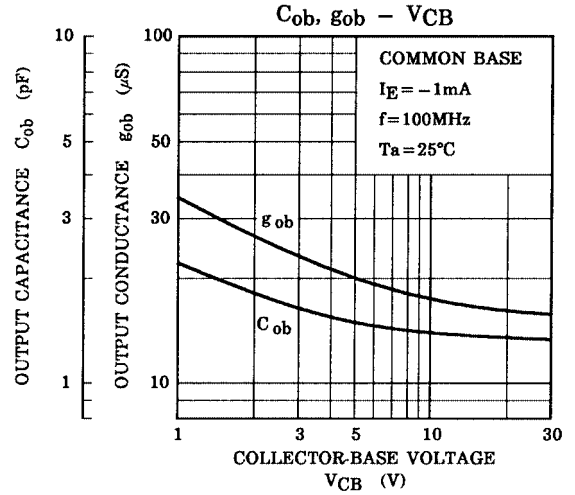
$|y_{re}|$, θ_{re} – V_{CE}



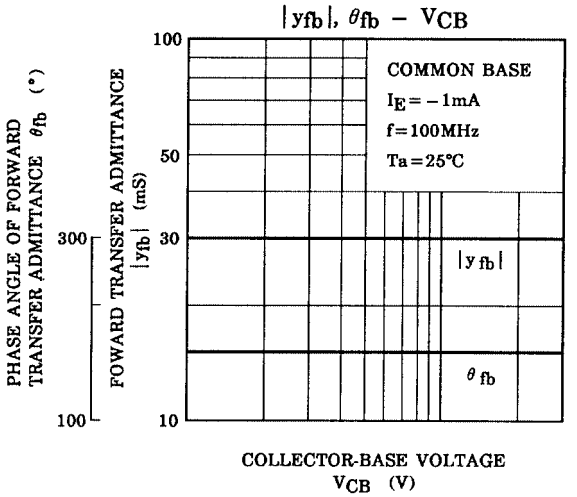
C_{ib}, g_{ib} – V_{CB}

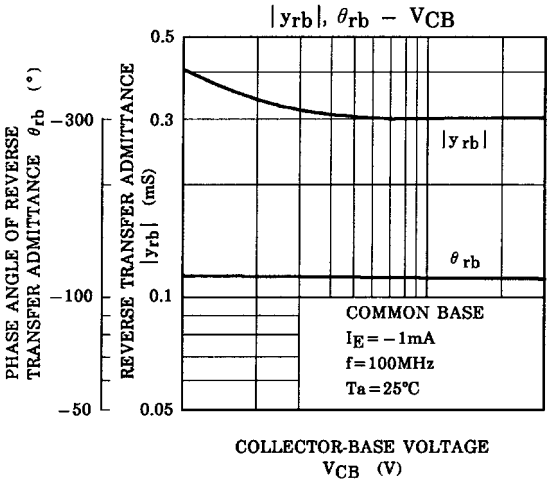


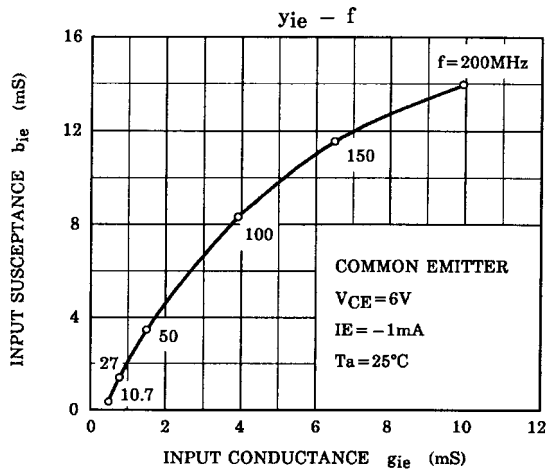
C_{ob}, g_{ob} – V_{CB}

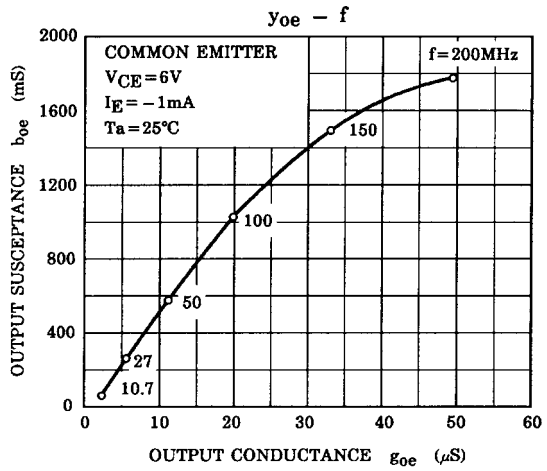


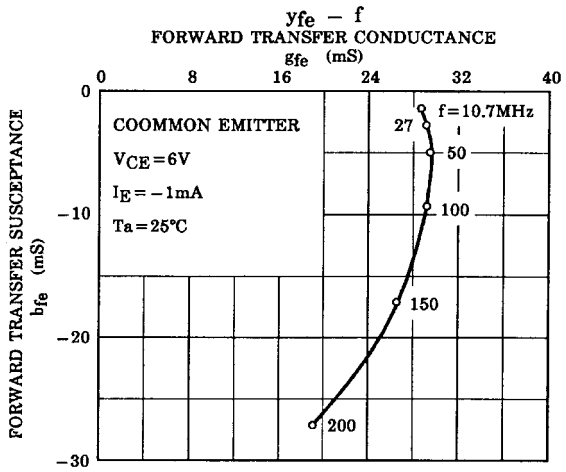
$|y_{fb}|$, θ_{fb} – V_{CB}

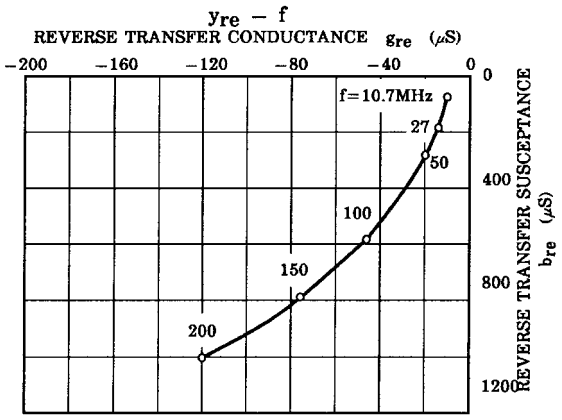


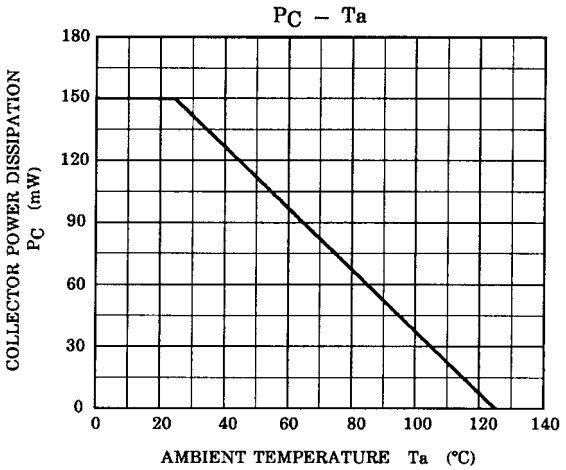

|yrb|, θrb – VCB
PHASE ANGLE OF REVERSE TRANSFER ADMITTANCE θrb (°)
REVERSE TRANSFER ADMITTANCE |yrb| (mS)
0.5
0.3
0.1
0.05
−300
−100
−50
|yrb|
θrb
COMMON BASE
IE = −1mA
f=100MHz
Ta=25°C
COLLECTOR-BASE VOLTAGE
VCB (V)


yie – f
INPUT SUSCEPTANCE bie (mS)
16
12
8
4
0
f=200MHz
150
100
50
27
10.7
COMMON EMITTER
VCE=6V
IE=−1mA
Ta=25°C
0
2
4
6
8
10
12
INPUT CONDUCTANCE gie (mS)


yoe – f
OUTPUT SUSCEPTANCE boe (mS)
2000
1600
1200
800
400
0
COMMON EMITTER
VCE=6V
IE=−1mA
Ta=25°C
f=200MHz
150
100
50
27
10.7
0
10
20
30
40
50
60
OUTPUT CONDUCTANCE goe (μS)


yfe – f
FORWARD TRANSFER CONDUCTANCE
gfe (mS)
0
8
16
24
32
40
FORWARD TRANSFER SUSCEPTANCE bfe (mS)
0
−10
−20
−30
COOMMON EMITTER
VCE=6V
IE=−1mA
Ta=25°C
f=10.7MHz
27
50
100
150
200


yre – f
REVERSE TRANSFER CONDUCTANCE gre (μS)
−200
−160
−120
−80
−40
0
f=10.7MHz
27
50
100
150
200
0
400
800
1200
REVERSE TRANSFER SUSCEPTANCE bre (μS)


PC – Ta
COLLECTOR POWER DISSIPATION PC (mW)
180
150
120
90
60
30
0
0
20
40
60
80
100
120
140
AMBIENT TEMPERATURE Ta (°C)

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000707EAA

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