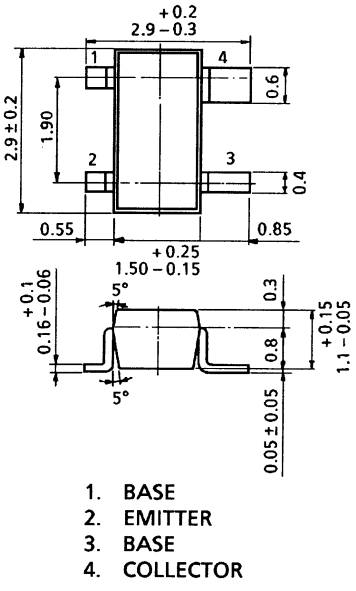
TOSHIBA Transistor Silicon NPN Planar Type

2SC4214

UHF TV Tuner RF Amplifier Applications

- Low noise figure: NF = 2.8dB (typ.)
- High power gain V_{CC} = 4.5 V: G_{pb} = 15dB (typ.)
- Excellent forward AGC characteristics

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-3J1B

Weight: 0.013 g (typ.)

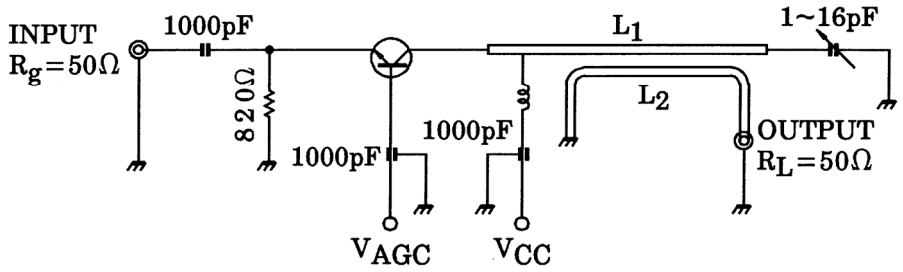
Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	25	V
Collector-emitter voltage	V_{CEO}	20	V
Emitter-base voltage	V_{EBO}	2	V
Base current	I_B	4	mA
Collector current	I_C	20	mA
Collector power dissipation	P_C	150	mW
Junction temperature	T_j	125	°C
Storage temperature range	T_{stg}	−55~125	°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} = 10 V, I_E = 0	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 2 V, I_C = 0	—	—	1	μA
Collector-emitter breakdown voltage	$V_{(BR)\ CEO}$	I_C = 1 mA, I_B = 0	20	—	—	V
DC current gain	h_{FE}	V_{CE} = 3.0 V, I_C = 1 mA	40	100	—	
Transition frequency	f_T	V_{CE} = 3.0 V, I_C = 1 mA	500	850	—	MHz
Reverse transfer capacitance	C_{rb}	V_{CE} = 2.0 V, I_B = 0, f = 1 MHz	—	0.3	0.5	pF
Power gain	G_{pb}	V_{CC} = 4.5 V, V_{AGC} = 2.0 V	10	15	—	dB
Noise figure	NF	f = 800 MHz (Figure 1)	—	2.8	4.5	dB
AGC voltage	V_{AGC}	V_{CC} = 4.5 V, G.R. = −20dB f = 800 MHz (Note)	2.5	3.2	4.0	V

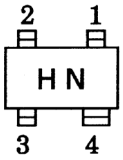


L_1, L_2: ϕ1.0 mm silver plated copper wire

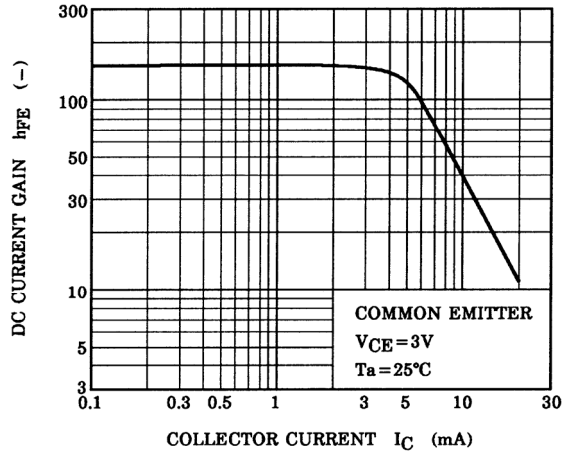
Note: V_{AGC} measured by the test circuit shown in Figure 1, when the power gain is reduced to 20dB compared with G_{pb} shown above table.

Figure 1 800 MHz G_{pb}, NF Test Circuit

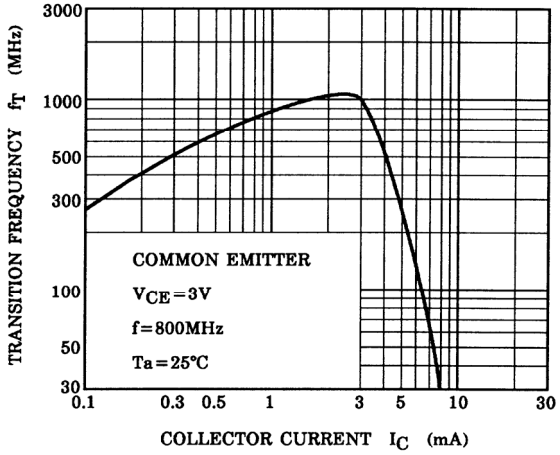
Marking



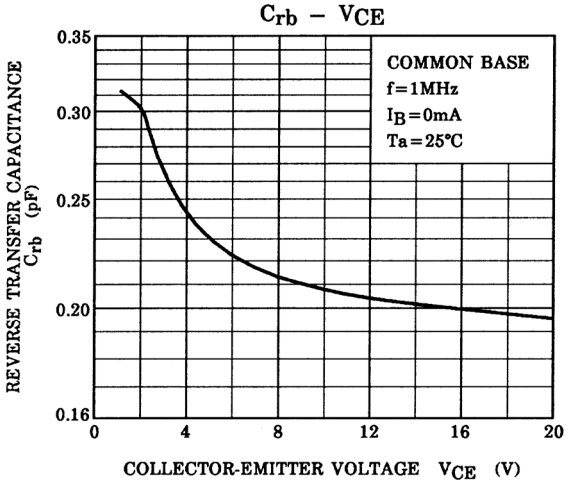
h_{FE} – I_C



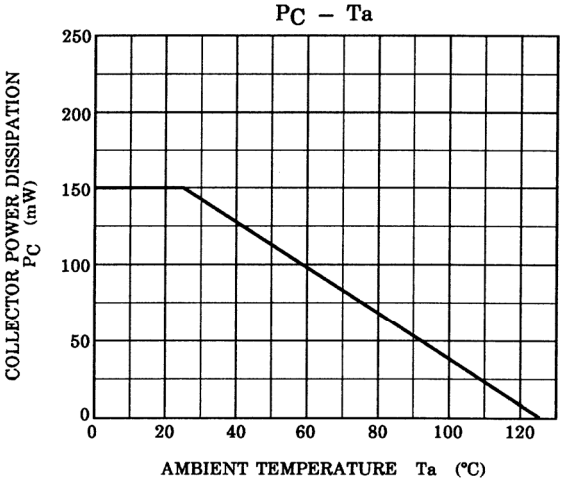
f_T – I_C



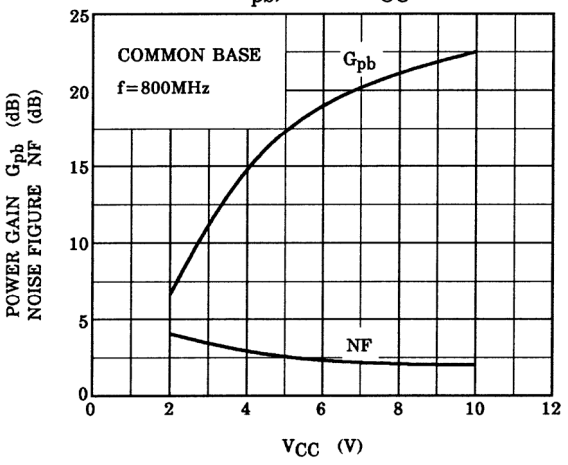
C_{rb} – V_{CE}



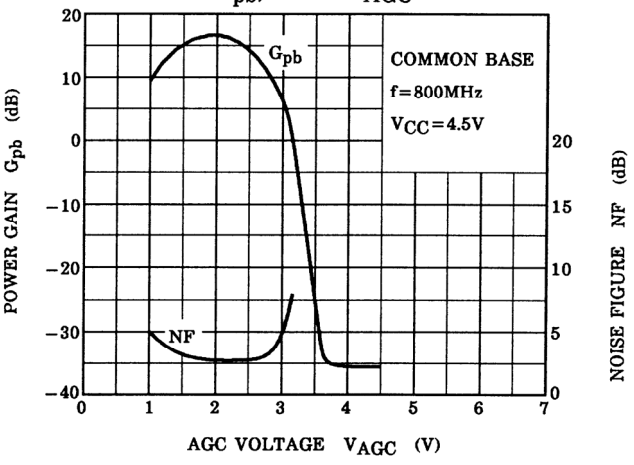
P_C – Ta

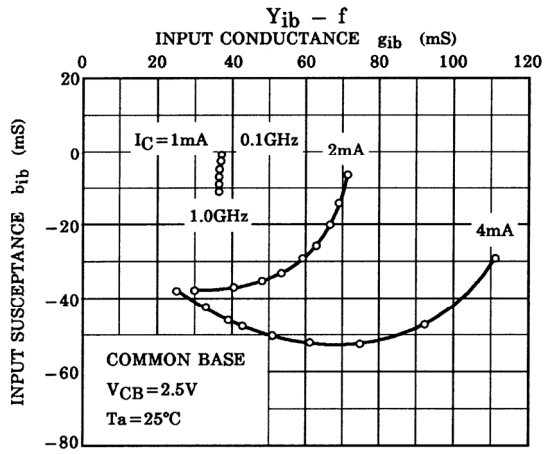


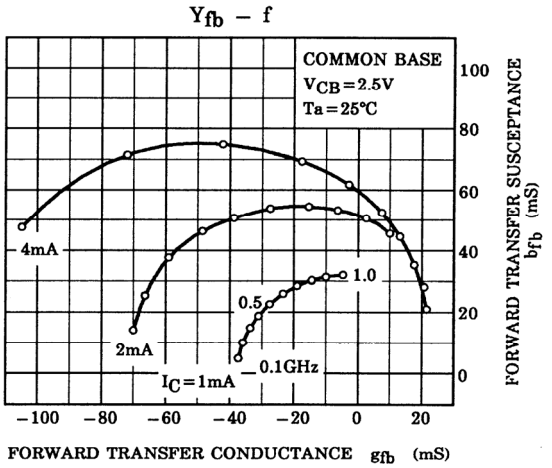
G_{pb}, NF – V_{CC}

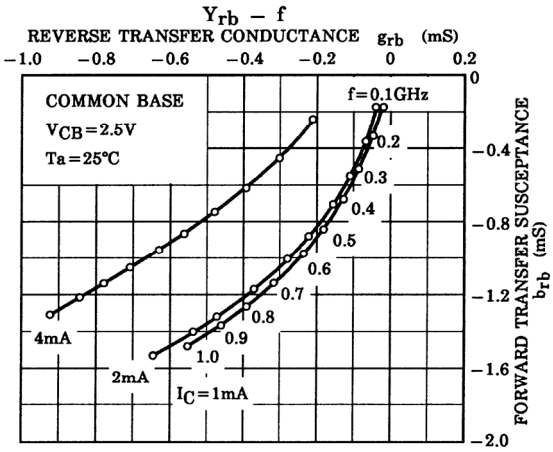


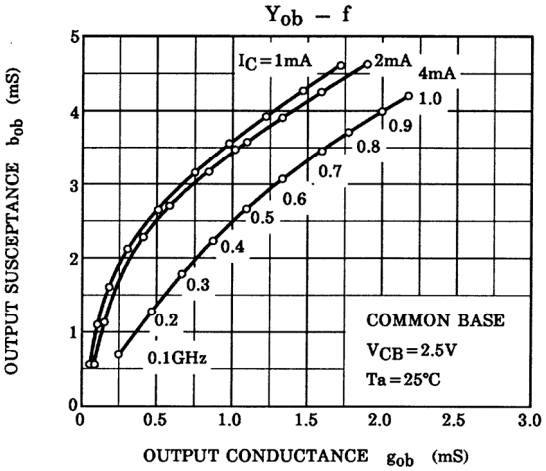
G_{pb}, NF – V_{AGC}




Y_{ib} – f
INPUT CONDUCTANCE g_{ib} (mS)
0 20 40 60 80 100 120
20 0 −20 −40 −60 −80
INPUT SUSCEPTANCE b_{ib} (mS)
I_C = 1mA
0.1GHz
2mA
1.0GHz
4mA
COMMON BASE
V_{CB} = 2.5V
Ta = 25°C


Y_{fb} – f
COMMON BASE
V_{CB} = 2.5V
Ta = 25°C
100 80 60 40 20 0
FORWARD TRANSFER SUSCEPTANCE b_{fb} (mS)
4mA
2mA
0.5
1.0
0.1GHz
I_C = 1mA
−100 −80 −60 −40 −20 0 20
FORWARD TRANSFER CONDUCTANCE g_{fb} (mS)


Y_{rb} – f
REVERSE TRANSFER CONDUCTANCE g_{rb} (mS)
−1.0 −0.8 −0.6 −0.4 −0.2 0 0.2
COMMON BASE
V_{CB} = 2.5V
Ta = 25°C
f = 0.1GHz
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
4mA
2mA
I_C = 1mA
0 −0.4 −0.8 −1.2 −1.6 −2.0
FORWARD TRANSFER SUSCEPTANCE b_{rb} (mS)


Y_{ob} – f
5 4 3 2 1 0
OUTPUT SUSCEPTANCE b_{ob} (mS)
I_C = 1mA
2mA
4mA
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1GHz
COMMON BASE
V_{CB} = 2.5V
Ta = 25°C
0 0.5 1.0 1.5 2.0 2.5 3.0
OUTPUT CONDUCTANCE g_{ob} (mS)

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20070701-EN GENERAL

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