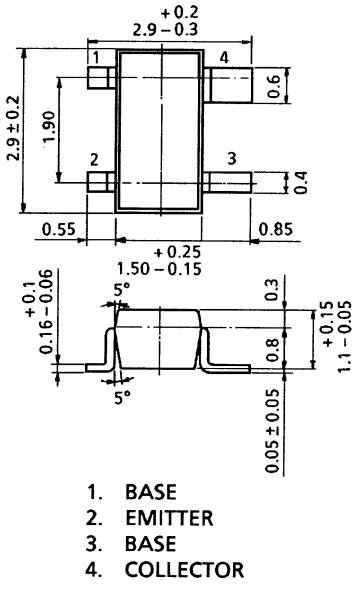
TOSHIBA Transistor Silicon NPN Planar Type

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

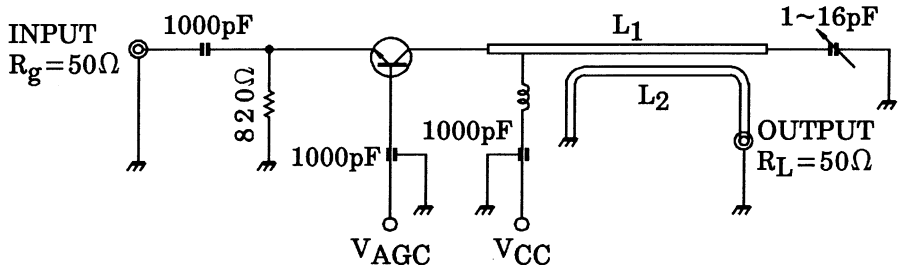
Weight: 0.013 g (typ.)

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

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

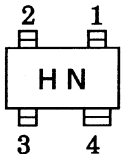


L_1, L_2: ϕ1.0 mm silver plated copper wire

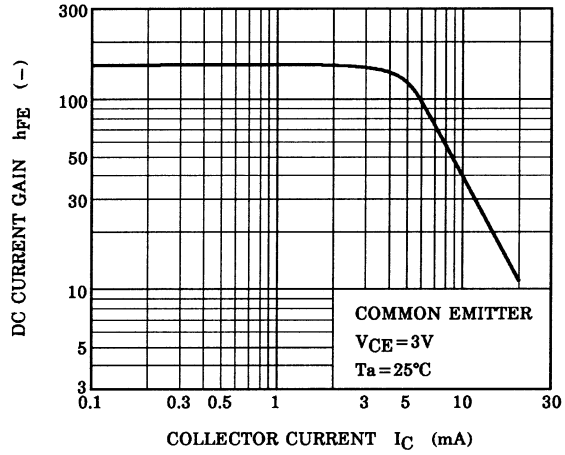
Note: V_{AGC} measured by the test circuit shown in Figure 1, when the power gain is reduced to 20dB compared with G_{pb} shown above table.

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

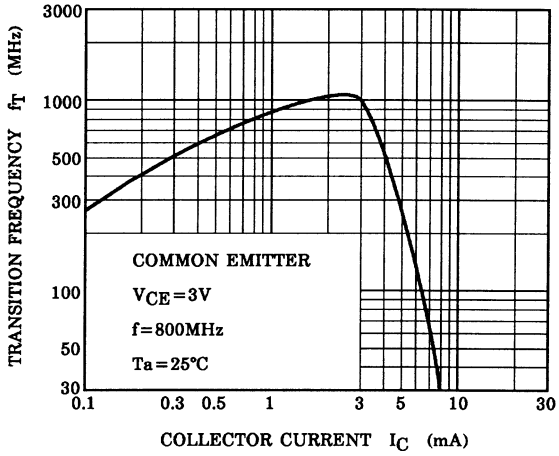
Marking



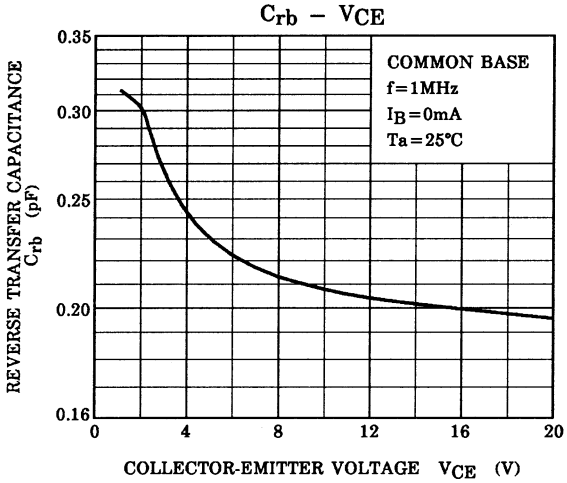
h_{FE} – I_C



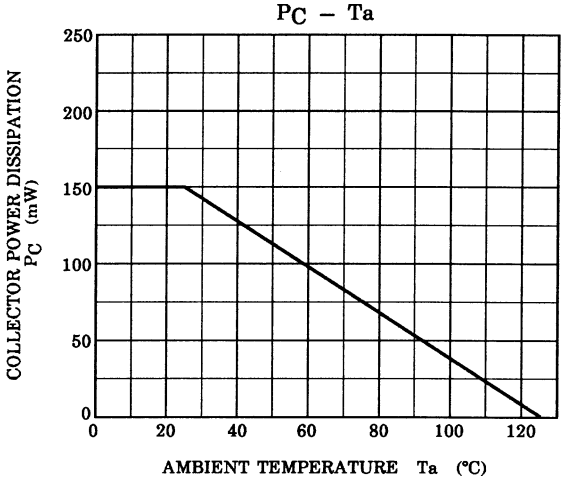
f_T – I_C



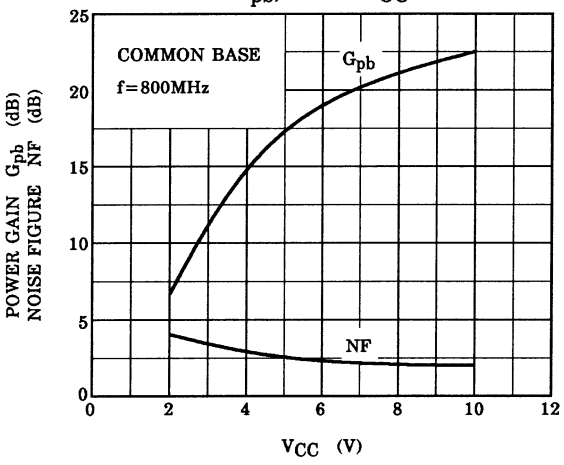
C_{rb} – V_{CE}



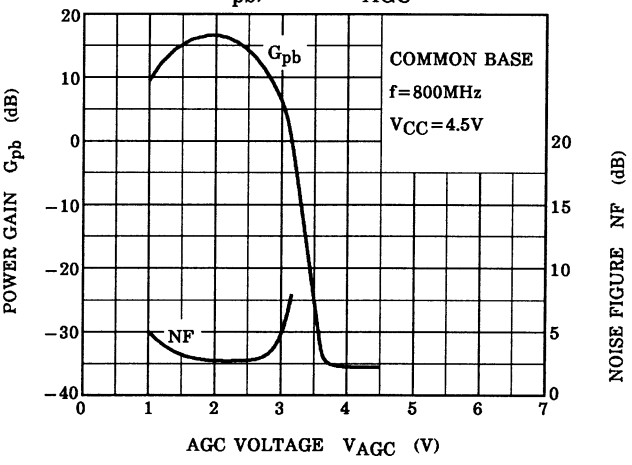
P_C – Ta

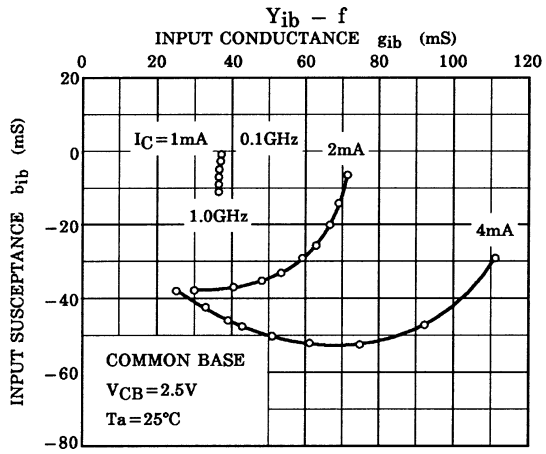


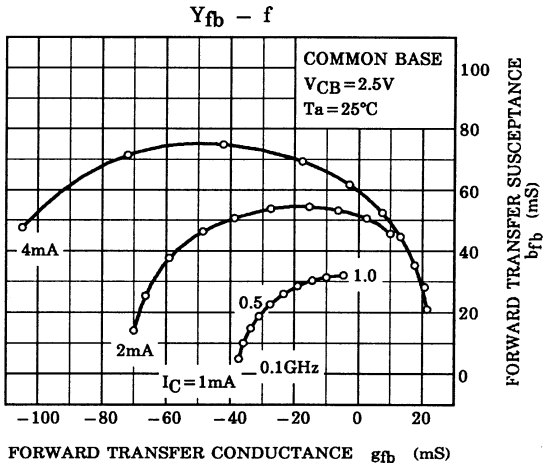
G_{pb}, NF – V_{CC}

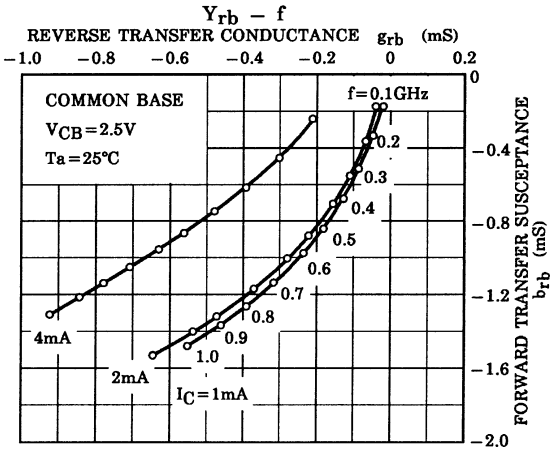


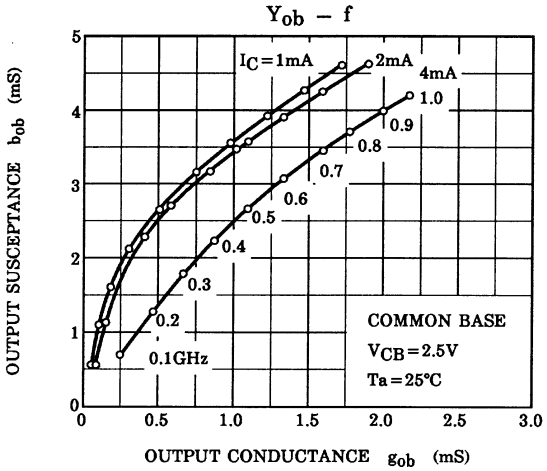
G_{pb}, NF – V_{AGC}




Y_{ib} – f
INPUT CONDUCTANCE g_{ib} (mS)
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
4mA
2mA
I_C=1mA
0.1GHz
0.5
1.0
FORWARD TRANSFER CONDUCTANCE g_{fb} (mS)
FORWARD TRANSFER SUSCEPTANCE b_{fb} (mS)


Y_{rb} – f
REVERSE TRANSFER CONDUCTANCE g_{rb} (mS)
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
FORWARD TRANSFER SUSCEPTANCE b_{rb} (mS)


Y_{ob} – f
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
OUTPUT SUSCEPTANCE b_{ob} (mS)
OUTPUT CONDUCTANCE g_{ob} (mS)

RESTRICTIONS ON PRODUCT USE

000707EAA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer’s own risk.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.