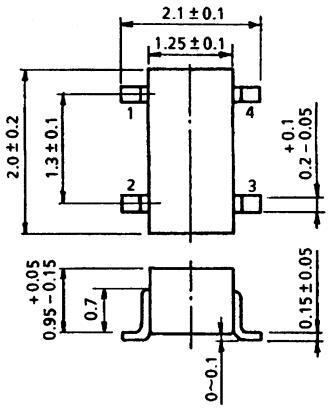
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

MT4S24U

VHF~UHF Band Low Noise Amplifier Applications

- Low Noise Figure: NF = 1.55dB(Typ.) (@f = 2GHz)
- High Gain: $|S21e|^2$ = 11.5dB(Typ.) (@f = 2 GHz)

Unit: mm



1.Emitter1(E1)
2.Collector(C)
3.Emitter2(E2)
4.Base(B)

USQ

JEDEC	—
JEITA	—
TOSHIBA	2-2K1A

Weight: 6 mg (typ.)

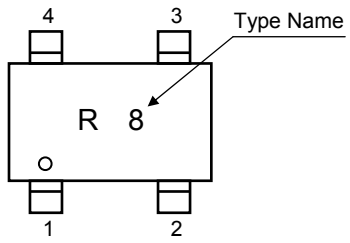
Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	10	V
Collector-emitter voltage	V_{CEO}	5	V
Emitter-base voltage	V_{EBO}	2	V
Collector current	I_C	50	mA
Base current	I_B	10	mA
Collector power dissipation	$P_{C(Note.1)}$	175	mW
Junction temperature	Tj	150	°C
Storage temperature range	Tstg	−55 to 150	°C

Note.1: The device is mounted on a FR4 board (20mm X 25mm X 1.55 mm (t))

Note.2: 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).

Marking



Microwave Characteristics (Ta = 25°C)

Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE} = 3 V, I_C = 20 mA	12.5	14.5	—	GHz
Insertion gain	$\|S21e\|^2$	V_{CE} = 3 V, I_C = 20 mA, f = 2 GHz	9.5	11.5	—	dB
Noise figure	NF	V_{CE} = 3 V, I_C = 7 mA, f = 2 GHz	—	1.55	2.35	

Electrical Characteristics (Ta = 25°C)

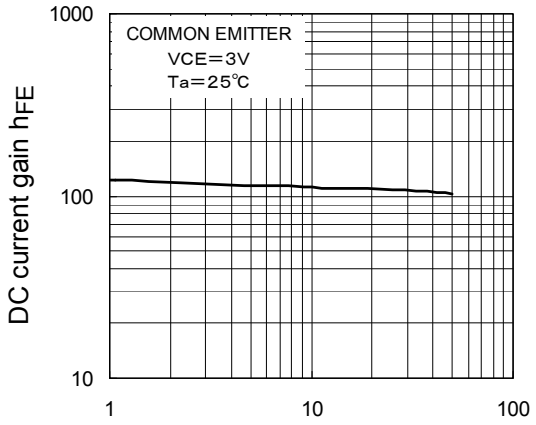
Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 6 V, I_E = 0	—	—	100	nA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	100	nA
DC current gain	h_{FE}	V_{CE} = 3 V, I_C = 20 mA	70	—	140	—
Reverse transfer capacitance	C_{re}	V_{CB} = 3 V, I_E = 0, f = 1 MHz(Note3)	—	0.34	0.8	pF

Note 3: C_{re} is measured with a three-terminal method using a capacitance bridge.

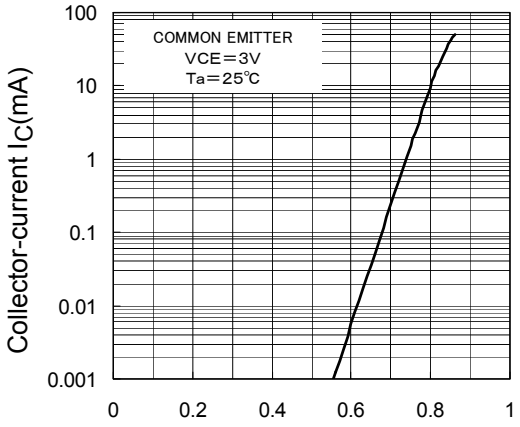
Caution

This device is sensitive to electrostatic discharge. Ensure that tools and equipment are sufficiently grounded before handling. When handling individual devices (which are not yet mounted on a circuit board), ensure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

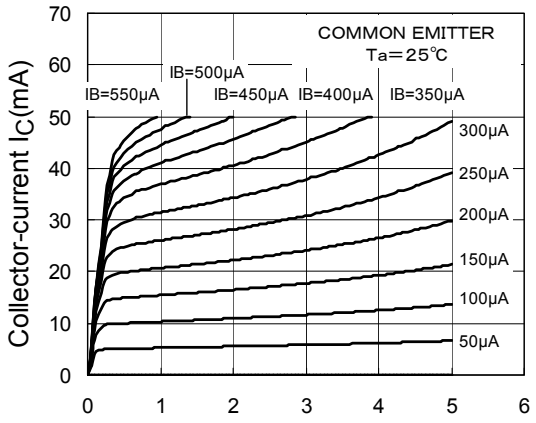
h_{FE}-I_C



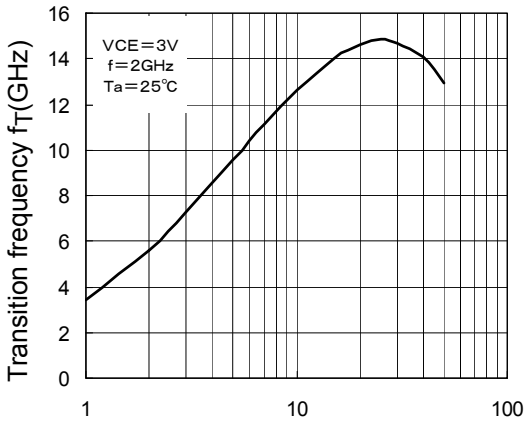
I_C-V_{BE}



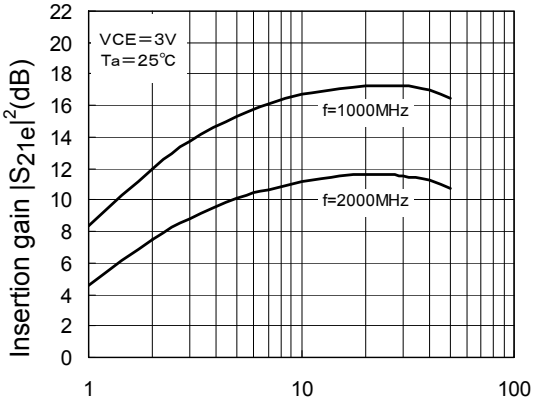
I_C-V_{CE}



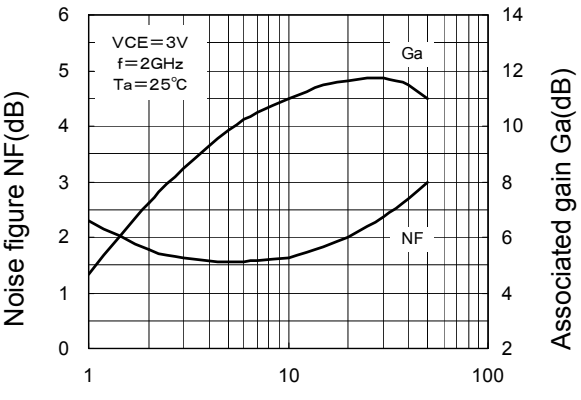
f_T-I_C



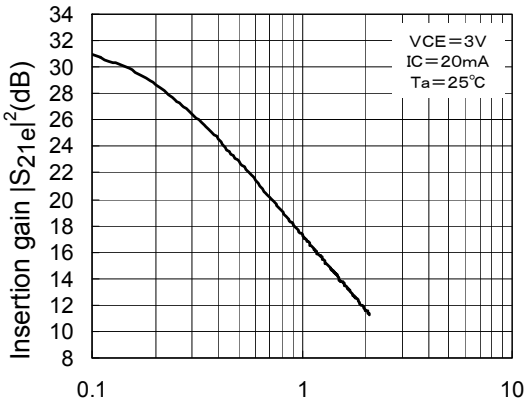
$|S_{21e}|^2$-I_C



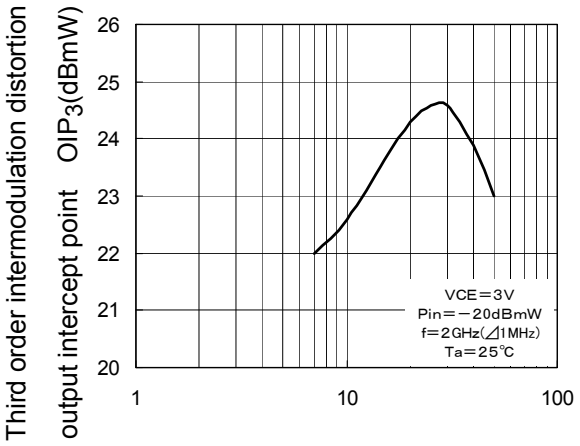
NF, Ga -I_C



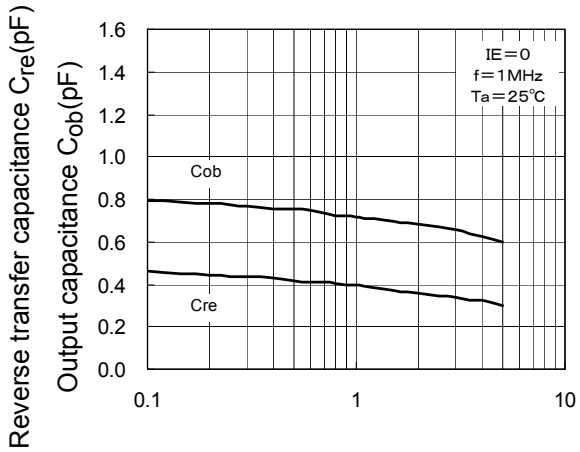
$|S_{21e}|^2$-Freq.



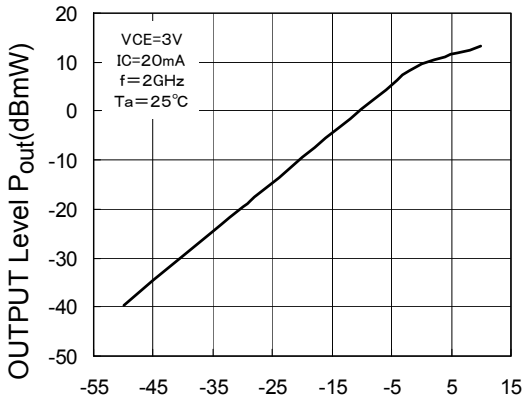
OIP_3-I_C



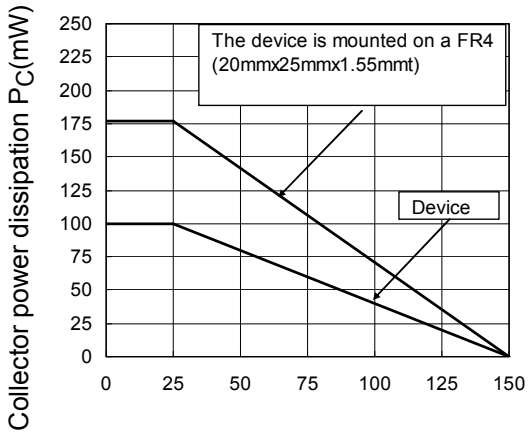
C_{re},C_{ob}-V_{CB}



P_{out} - P_{in}



P_C-T_a



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