TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

MT3S07T

VHF~UHF Band Low Noise Amplifier Applications

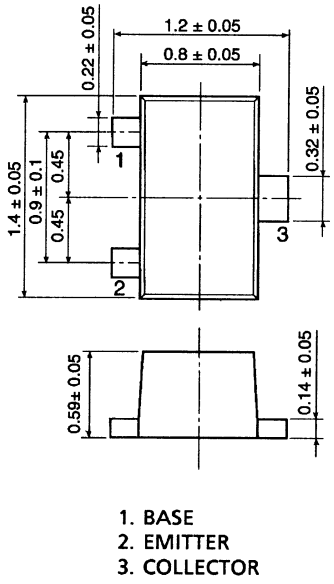
- Low noise figure: NF = 1.5dB (V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz)
- High gain: $|S_{21e}|^2$ = 9.5dB (V_{CE} = 3 V, I_C = 15 mA, f = 2 GHz)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	10	V
Collector-emitter voltage	V_{CEO}	5	V
Emitter-base voltage	V_{EBO}	1.5	V
Collector current	I_C	25	mA
Base current	I_B	10	mA
Collector power dissipation	P_C	100	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).

Unit: mm

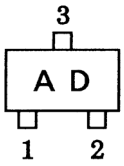


1. BASE
2. EMITTER
3. COLLECTOR

JEDEC	—
JEITA	—
TOSHIBA	2-1B1A

Weight: 0.0022 g (typ.)

Marking



Microwave Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE} = 3 V, I_C = 10 mA	10	12	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	—	7.5	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 3 V, I_C = 15 mA, f = 2 GHz	6.5	9.5	—	
Noise figure	NF (1)	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	—	1.6	3	dB
	NF (2)	V_{CE} = 3 V, I_C = 5 mA, f = 2 GHz	—	1.5	3	

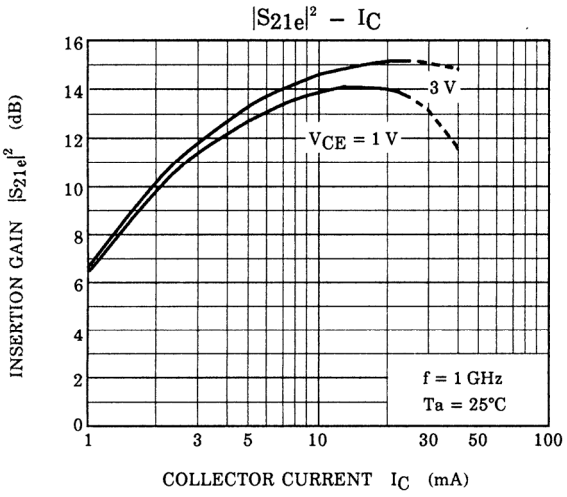
Electrical Characteristics (Ta = 25°C)

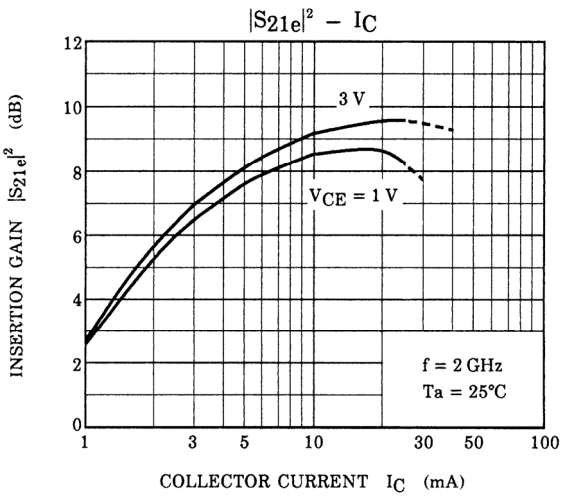
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 5 V, I_E = 0	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 1 V, I_C = 5 mA	70	—	140	
Reverse transfer capacitance	C_{re}	V_{CB} = 1 V, I_E = 0, f = 1 MHz (Note)	—	0.4	0.85	pF

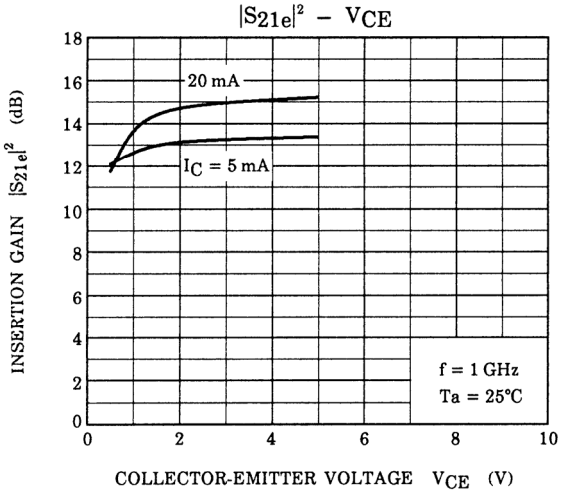
Note: C_{re} is measured by 3 terminal method with capacitance bridge.

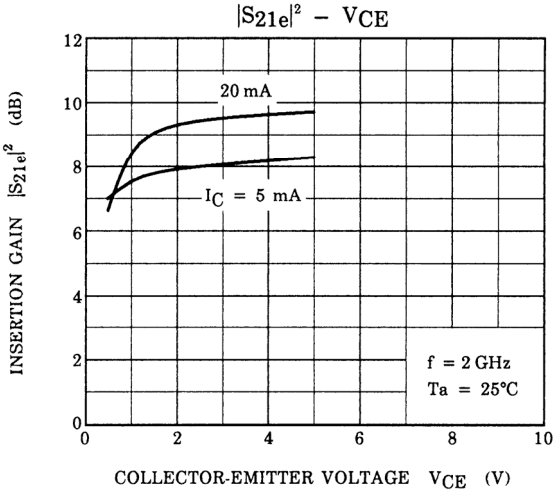
Caution

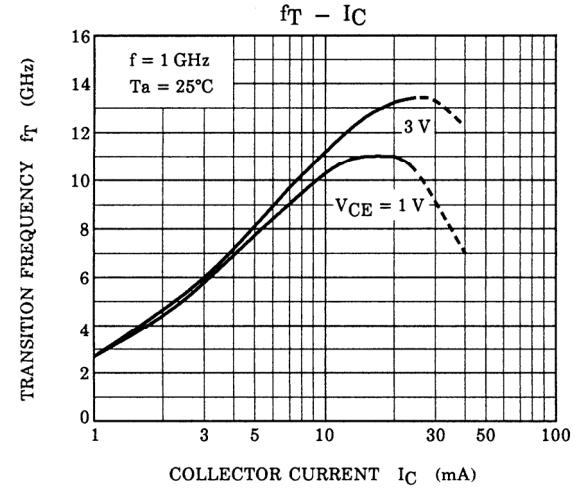
This device is sensitive to electrostatic discharge. Please handle with caution.

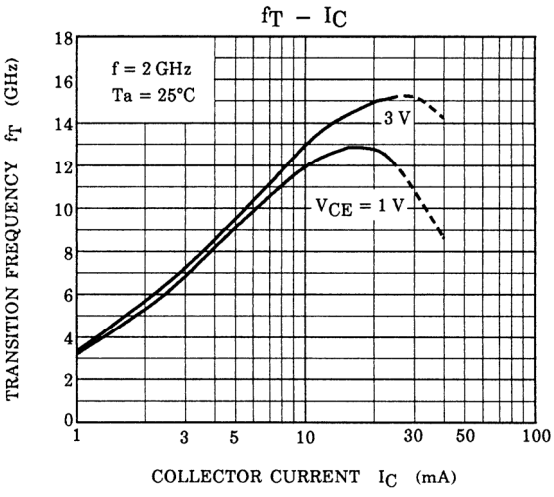

$|S_{21e}|^2$ – I_C
INSERTION GAIN $|S_{21e}|^2$ (dB)
3 V
V_{CE} = 1 V
f = 1 GHz
Ta = 25°C
COLLECTOR CURRENT I_C (mA)

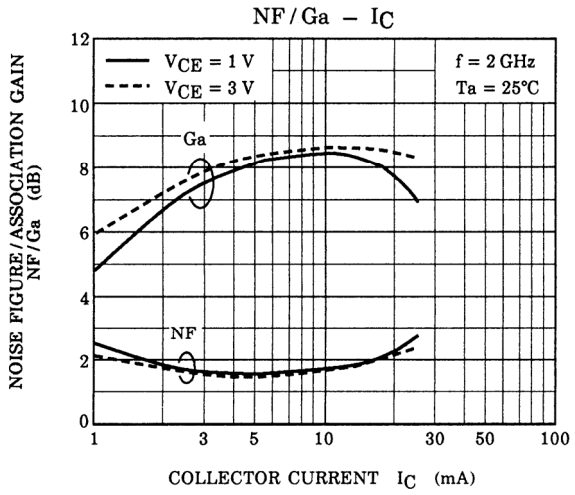

$|S_{21e}|^2$ – I_C
INSERTION GAIN $|S_{21e}|^2$ (dB)
3 V
V_{CE} = 1 V
f = 2 GHz
Ta = 25°C
COLLECTOR CURRENT I_C (mA)

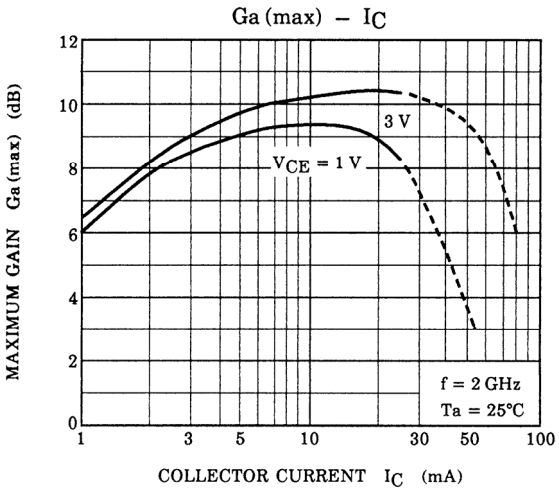

$|S_{21e}|^2$ – V_{CE}
INSERTION GAIN $|S_{21e}|^2$ (dB)
20 mA
I_C = 5 mA
f = 1 GHz
Ta = 25°C
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)

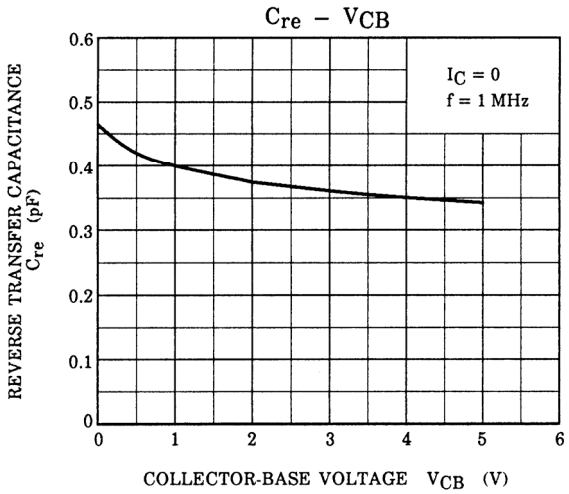

$|S_{21e}|^2$ – V_{CE}
INSERTION GAIN $|S_{21e}|^2$ (dB)
20 mA
I_C = 5 mA
f = 2 GHz
Ta = 25°C
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)


f_T – I_C
TRANSITION FREQUENCY f_T (GHz)
f = 1 GHz
Ta = 25°C
3 V
V_{CE} = 1 V
COLLECTOR CURRENT I_C (mA)


f_T – I_C
TRANSITION FREQUENCY f_T (GHz)
f = 2 GHz
Ta = 25°C
3 V
V_{CE} = 1 V
COLLECTOR CURRENT I_C (mA)


NF / Ga – IC
VCE = 1 V
VCE = 3 V
f = 2 GHz
Ta = 25°C
Ga
NF
NOISE FIGURE / ASSOCIATION GAIN NF / Ga (dB)
COLLECTOR CURRENT IC (mA)


Ga (max) – IC
3 V
VCE = 1 V
f = 2 GHz
Ta = 25°C
MAXIMUM GAIN Ga (max) (dB)
COLLECTOR CURRENT IC (mA)


Cre – VCB
IC = 0
f = 1 MHz
REVERSE TRANSFER CAPACITANCE Cre (pF)
COLLECTOR-BASE VOLTAGE VCB (V)

RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

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