

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

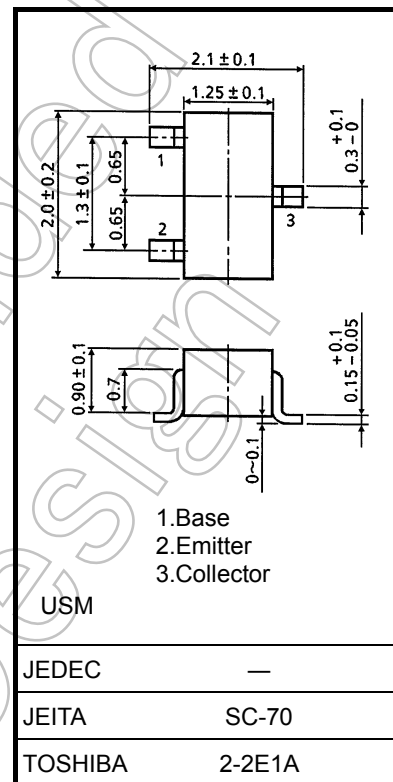
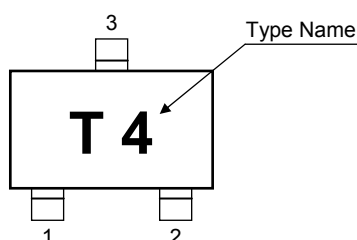
MT3S16U

Unit: mm

○ UHF Band Oscillator and Amplifier Applications

- f_T is high and current dependability is excellent.
- The characteristic of Reverse transfer capacitance (C_{re}) is flat.
 : $NF = 2.4\text{dB}$ (typ.) (@ 2V, 5mA, 1 GHz)
 : $|S_{21e}|^2 = 4.5\text{dB}$ (typ.) (@ 2V, 10mA, 1 GHz)

Marking



Weight : 6 mg (Typ.)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	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	60	mA
Base current	I_B	10	mA
Collector power dissipation	P_C	100	mW
	P_C (Note.1)	180	mW
Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 125	$^\circ\text{C}$

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).

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

Start of commercial production
2002-09

Microwave Characteristics (Ta = 25°C)

Characteristics	Symbol	Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	$V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$	2	4	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 2\text{ V}$, $I_C = 10\text{ mA}$, $f = 1\text{ GHz}$	—	4.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 3\text{ V}$, $I_C = 30\text{ mA}$, $f = 1\text{ GHz}$	3	5.5	—	
Noise figure	NF	$V_{CE} = 2\text{ V}$, $I_C = 5\text{ mA}$, $f = 1\text{ GHz}$	—	2.4	3.2	dB

Electrical Characteristics (Ta = 25°C)

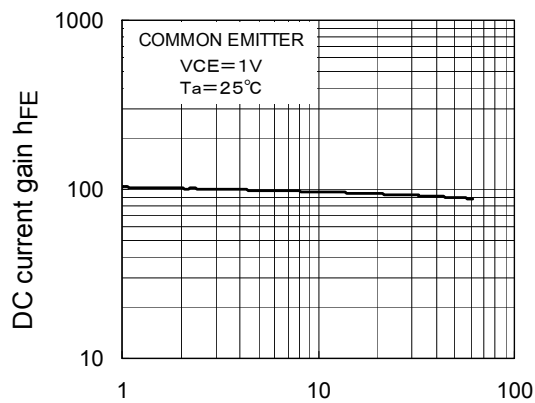
Characteristics	Symbol	Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 5\text{ V}$, $I_E = 0$	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 1\text{ V}$, $I_C = 0$	—	—	1	μA
DC current gain	h_{FE}	$V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$	80	—	140	—
Reverse transfer capacitance	C_{re}	$V_{CB} = 1\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$ (Note.2)	—	2.4	3	pF

Note.2: C_{re} is measured with a three-terminal method using a capacitance bridge.

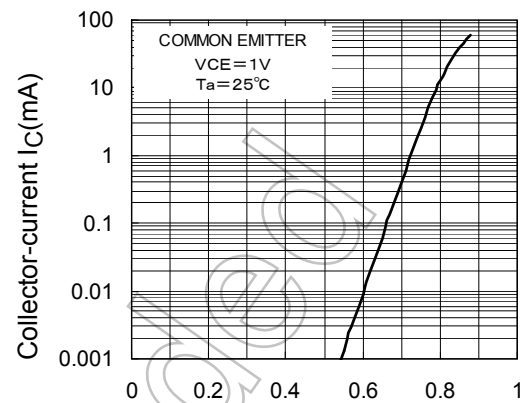
Caution

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.

$h_{FE}-I_C$



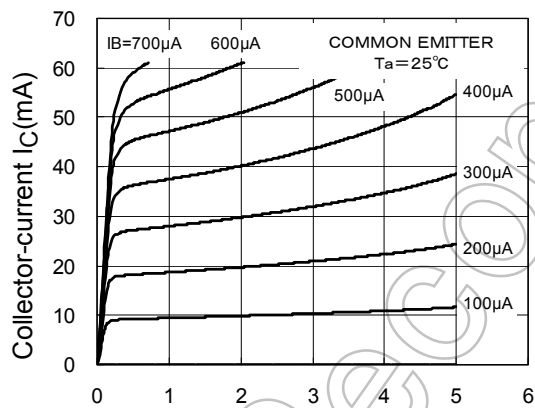
I_C-V_{BE}



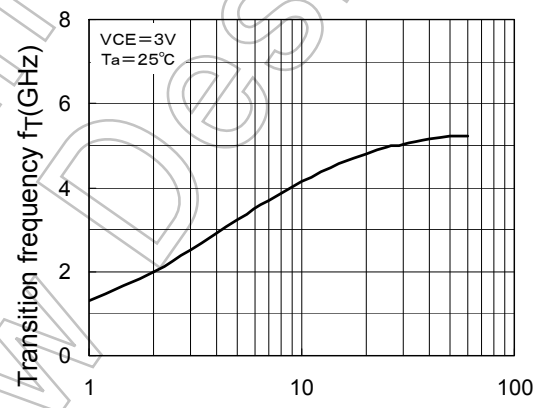
Collector-current I_C (mA)

Base-emitter voltage V_{BE} (V)

I_C-V_{CE}



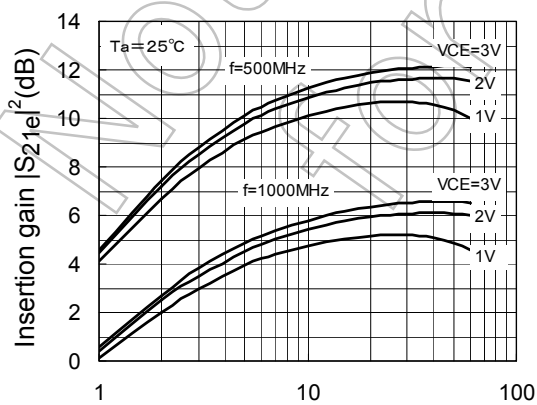
f_T-I_C



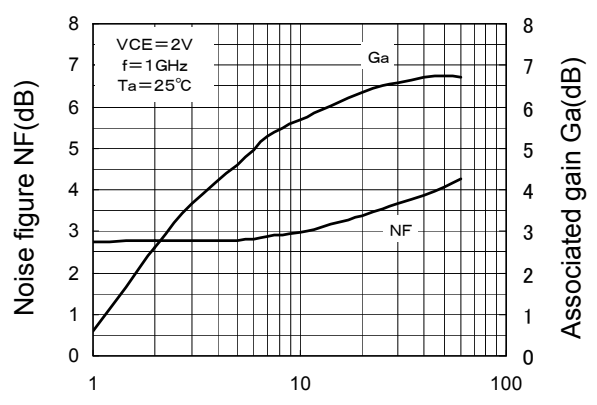
Collector-emitter voltage V_{CE} (V)

Collector-current I_C (mA)

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

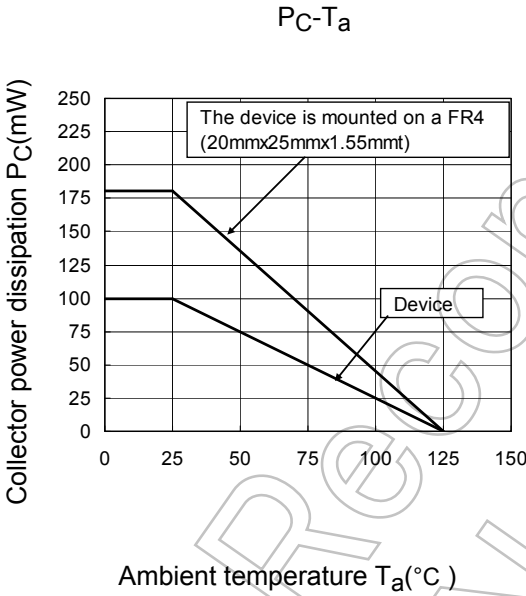
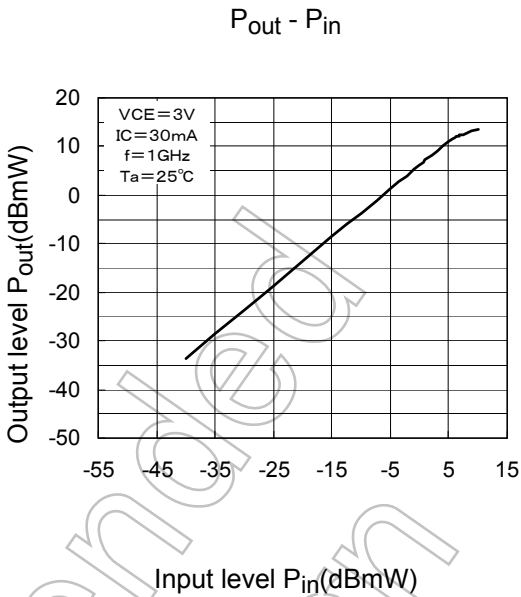
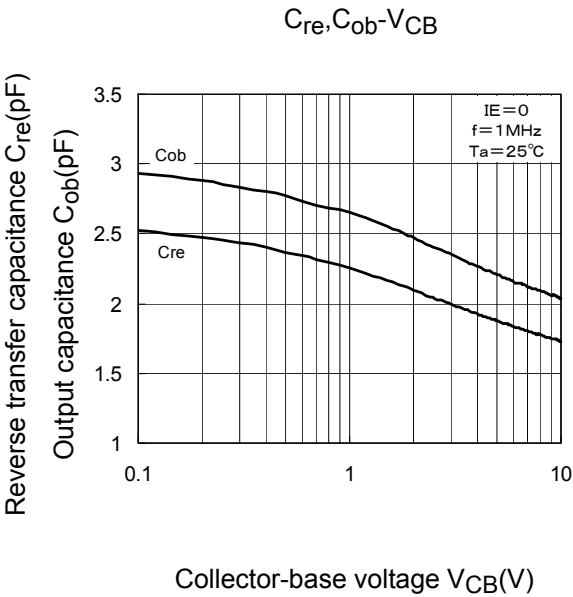


NF, Ga - I_C



Collector-current I_C (mA)

Collector-current I_C (mA)



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