

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC4839

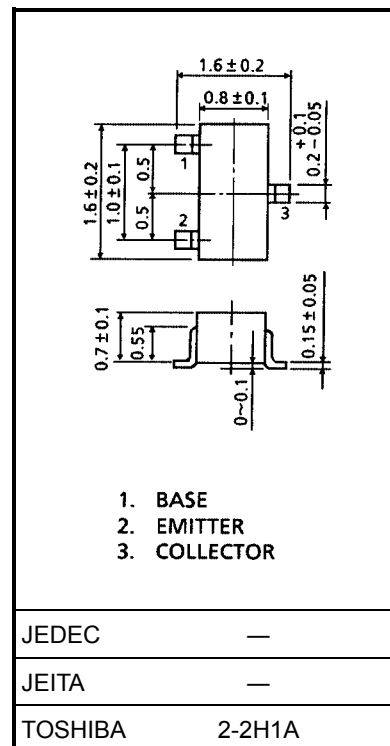
VHF~UHF Band Low Noise Amplifier Applications

Unit: mm

- Low noise figure, high gain.
- $NF = 1.1\text{dB}$, $|S_{21e}|^2 = 12\text{dB}$ ($f = 1\text{GHz}$)

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	20	V
Collector-emitter voltage	V_{CEO}	12	V
Emitter-base voltage	V_{EBO}	3	V
Collector current	I_C	80	mA
Base current	I_B	40	mA
Collector power dissipation	P_C	100	mW
Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~125	$^\circ\text{C}$

Microwave Characteristics ($T_a = 25^\circ\text{C}$)

Weight: 2.4 mg (typ.)

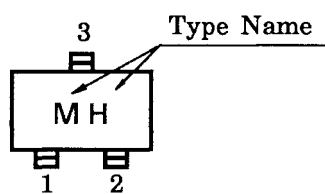
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	$V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$	5	7	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$, $f = 500\text{ MHz}$	—	18	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$, $f = 1\text{ GHz}$	7.5	12	—	
Noise figure	NF (1)	$V_{CE} = 10\text{ V}$, $I_C = 5\text{ mA}$, $f = 500\text{ MHz}$	—	1	—	dB
	NF (2)	$V_{CE} = 10\text{ V}$, $I_C = 5\text{ mA}$, $f = 1\text{ GHz}$	—	1.1	2	

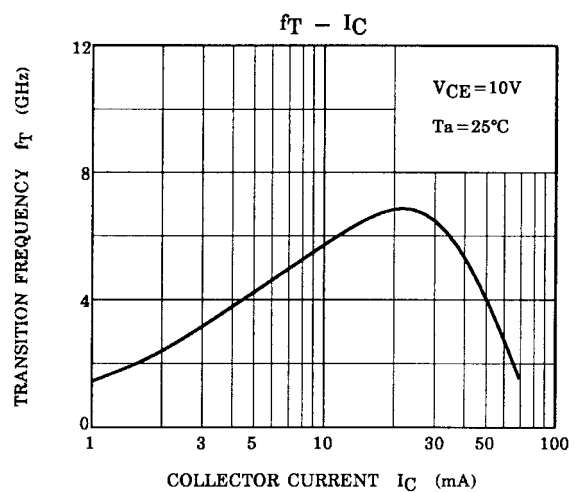
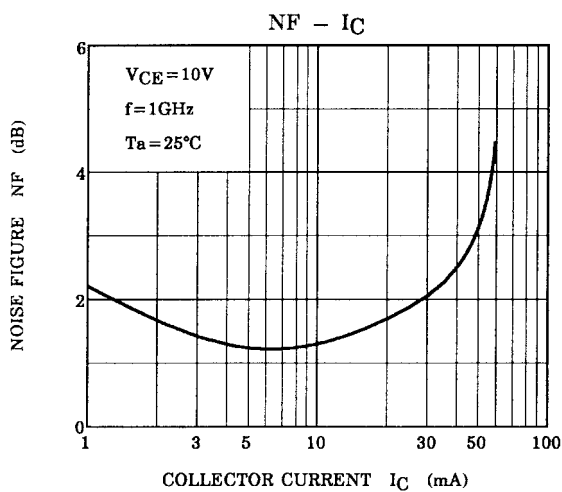
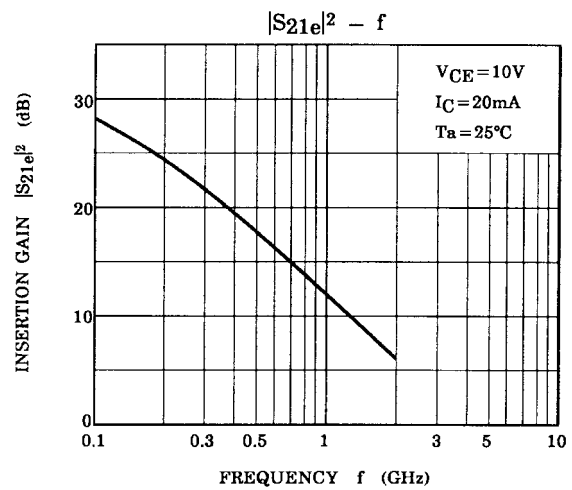
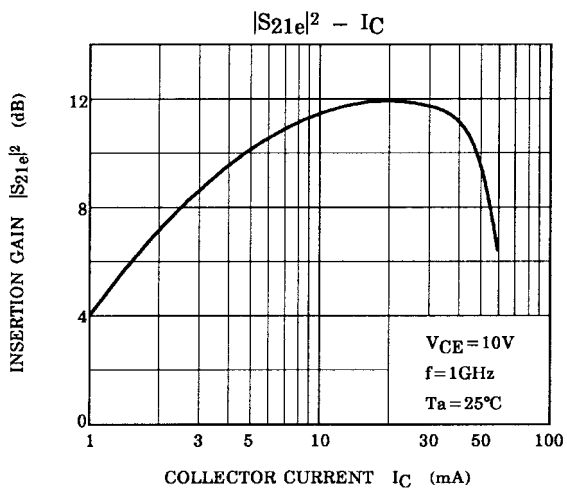
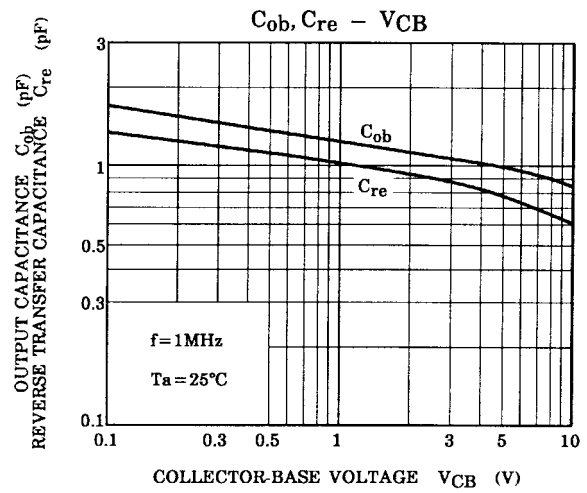
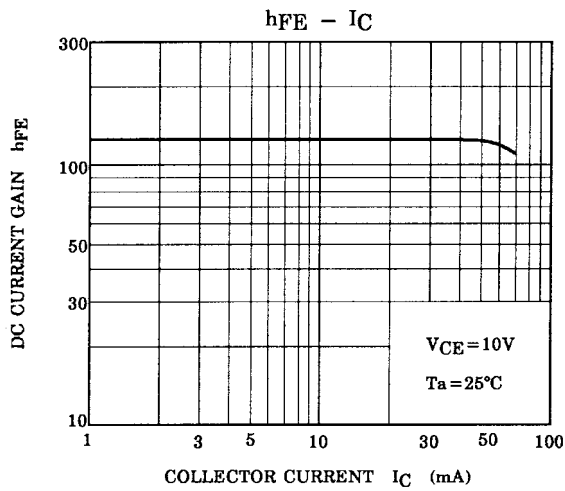
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

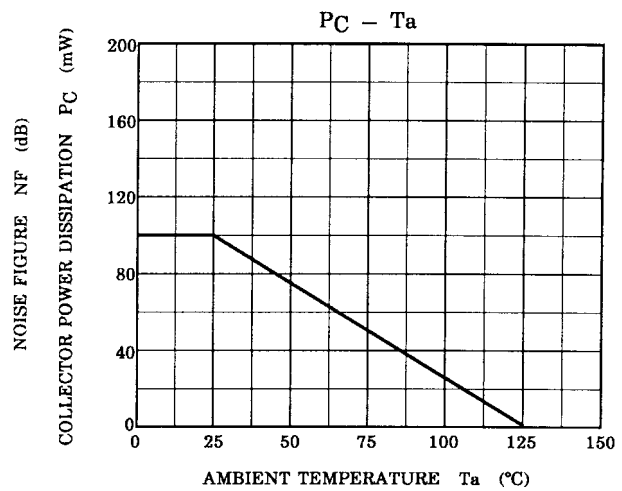
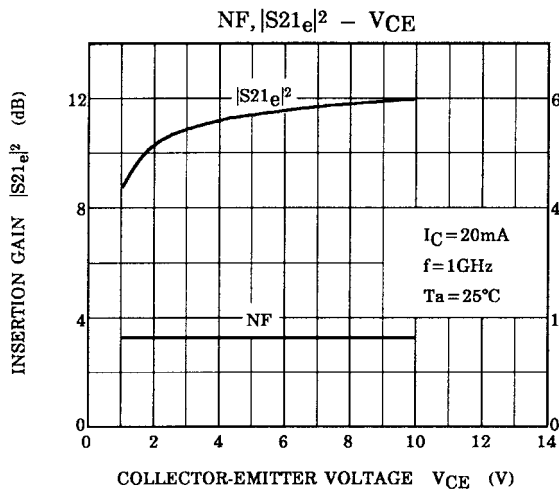
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 10\text{ V}$, $I_E = 0$	—	—	1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 1\text{ V}$, $I_C = 0$	—	—	1	μA
DC current gain	h_{FE}	$V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$	30	—	250	
Output capacitance	C_{ob}	$V_{CB} = 10\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$ (Note)	—	0.85	—	pF
Reverse transfer capacitance	C_{re}		—	0.6	1.15	pF

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

Marking







S-Parameter $Z_O = 50\ \Omega$, $T_a = 25^\circ\text{C}$

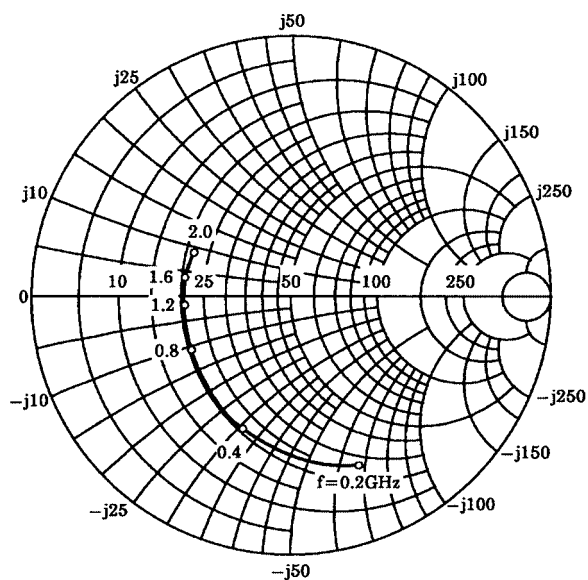
$V_{CE} = 10\text{ V}$, $I_C = 5\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.705	-67.0	9.702	132.700	0.048	57.9	0.769	-27.9
400	0.536	-109.6	6.665	109.300	0.066	50.8	0.591	-34.7
600	0.467	-135.0	4.880	96.100	0.077	52.3	0.518	-36.9
800	0.440	-151.6	3.799	87.500	0.088	56.2	0.486	-39.0
1000	0.426	-164.9	3.136	80.600	0.100	60.3	0.475	-41.5
1200	0.417	-175.0	2.668	75.000	0.113	64.2	0.469	-44.5
1400	0.412	176.5	2.349	69.800	0.129	67.6	0.469	-47.8
1600	0.405	169.0	2.099	65.100	0.147	70.4	0.470	-51.2
1800	0.399	162.8	1.916	61.100	0.168	72.2	0.474	-54.1
2000	0.393	157.9	1.777	56.900	0.190	73.5	0.474	-57.8

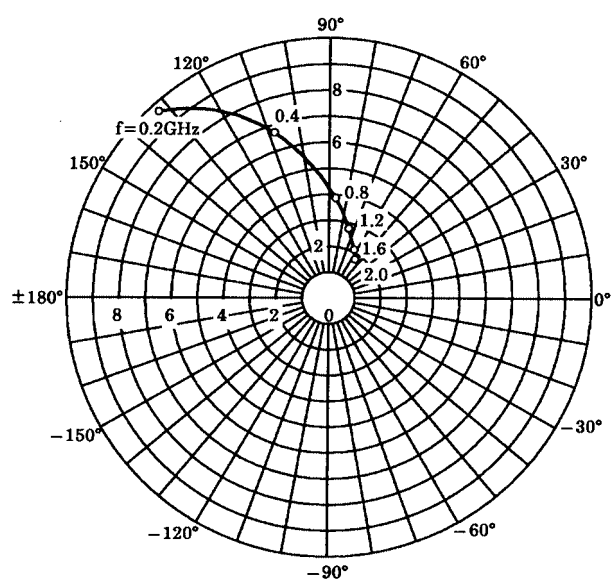
$V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.416	-111.00	16.818	111.100	0.032	61.30	0.504	-36.4
400	0.352	-145.90	9.121	95.900	0.051	67.10	0.382	-34.9
600	0.343	-163.20	6.289	87.800	0.070	70.90	0.352	-34.7
800	0.341	-174.70	4.772	81.800	0.090	72.80	0.342	-36.3
1000	0.341	-175.50	3.903	76.400	0.111	73.70	0.341	-39.2
1200	0.338	167.80	3.294	72.300	0.132	73.90	0.346	-41.9
1400	0.333	160.90	2.898	67.800	0.154	73.90	0.349	-45.8
1600	0.325	154.60	2.563	63.800	0.176	73.60	0.355	-49.0
1800	0.314	150.30	2.322	60.300	0.200	72.90	0.361	-51.9
2000	0.301	147.30	2.132	56.600	0.223	72.10	0.363	-55.0

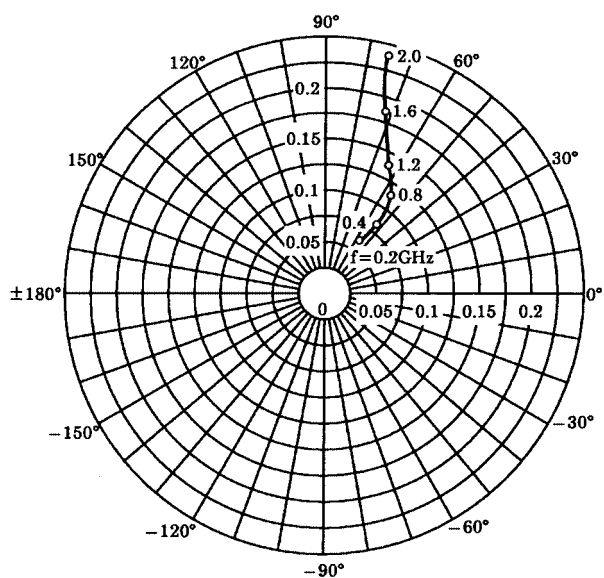
S_{11e}
 $V_{CE} = 10V$
 $I_C = 5mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



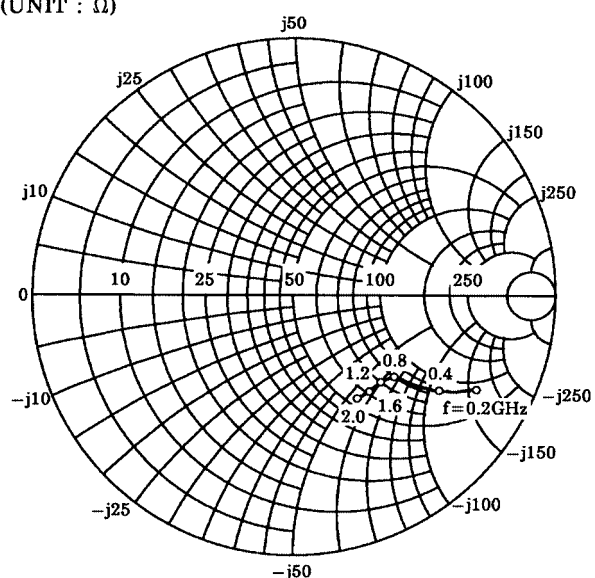
S_{21e}
 $V_{CE} = 10V$
 $I_C = 5mA$
 $T_a = 25^\circ C$



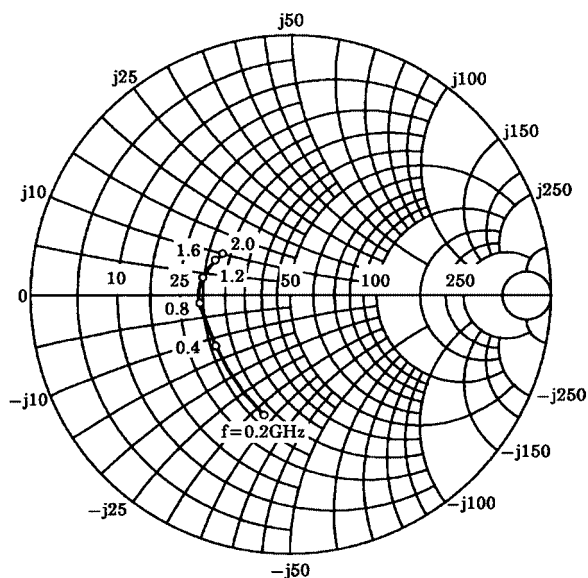
S_{12e}
 $V_{CE} = 10V$
 $I_C = 5mA$
 $T_a = 25^\circ C$



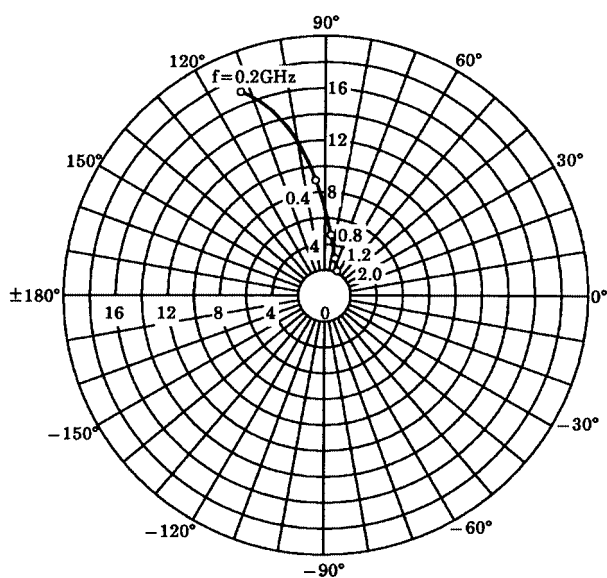
S_{22e}
 $V_{CE} = 10V$
 $I_C = 5mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



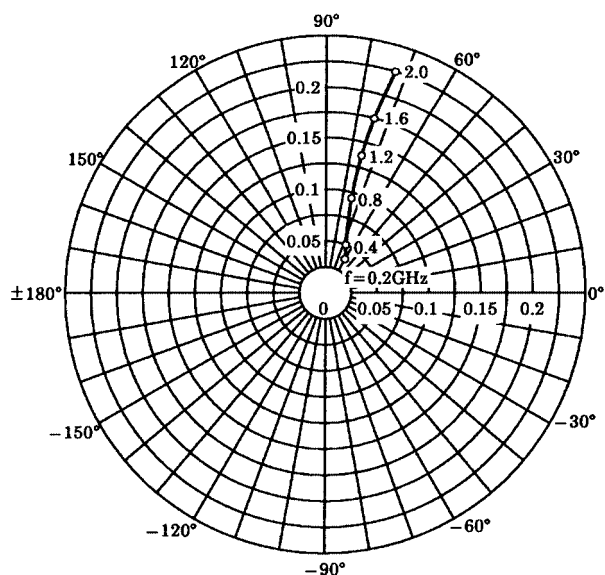
S_{11e}
 $V_{CE} = 10V$
 $I_C = 20mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



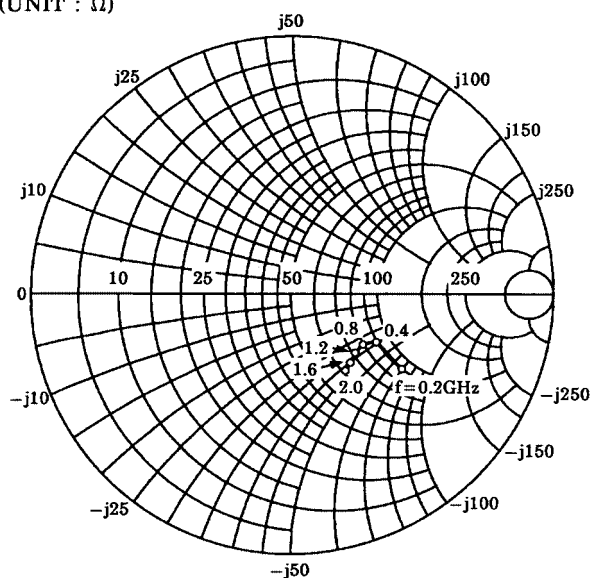
S_{21e}
 $V_{CE} = 10V$
 $I_C = 20mA$
 $T_a = 25^\circ C$



S_{12e}
 $V_{CE} = 10V$
 $I_C = 20mA$
 $T_a = 25^\circ C$



S_{22e}
 $V_{CE} = 10V$
 $I_C = 20mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



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