

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC4839

VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain.
- $NF = 1.1\text{dB}$ ,  $|S_{21e}|^2 = 12\text{dB}$  ( $f = 1\text{GHz}$ )

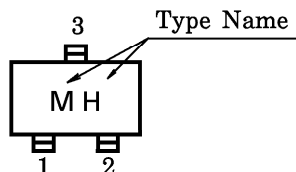
MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	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	$^\circ\text{C}$

JEDEC	—
EIAJ	—
TOSHIBA	2-2H1A

Weight : 2.4mg

Marking



MICROWAVE CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	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	

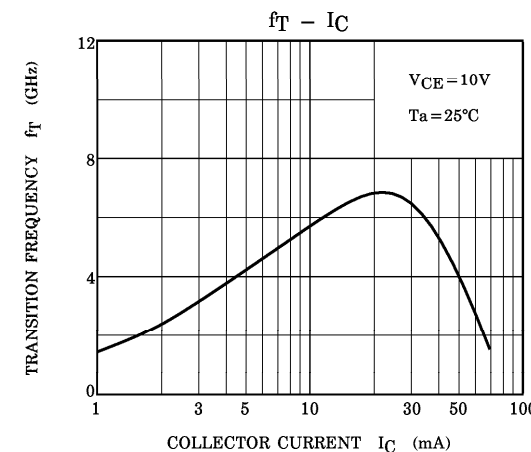
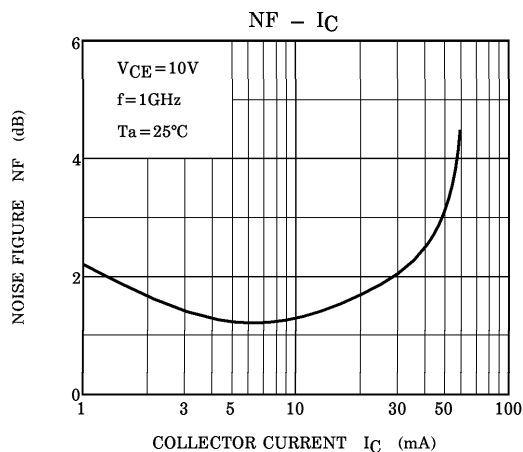
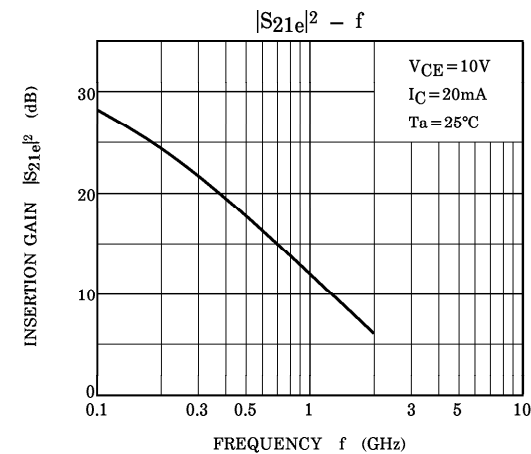
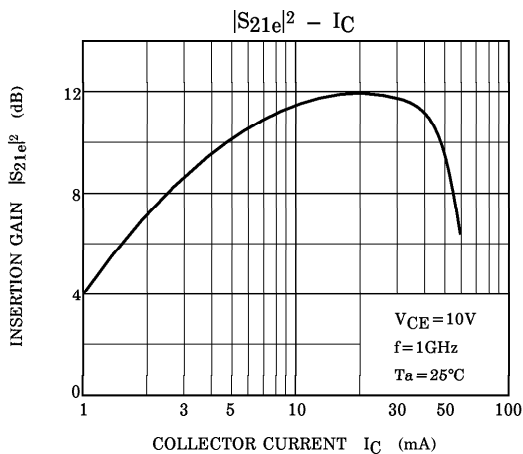
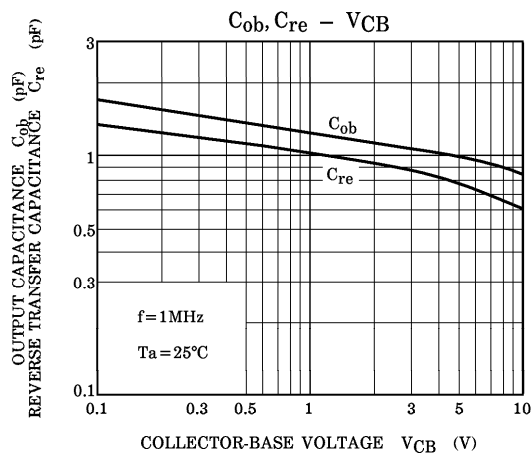
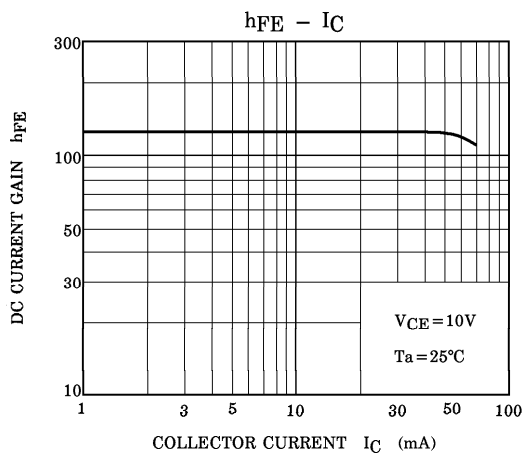
ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

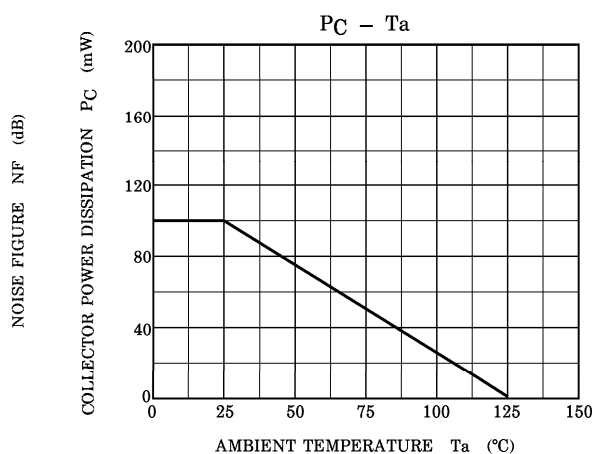
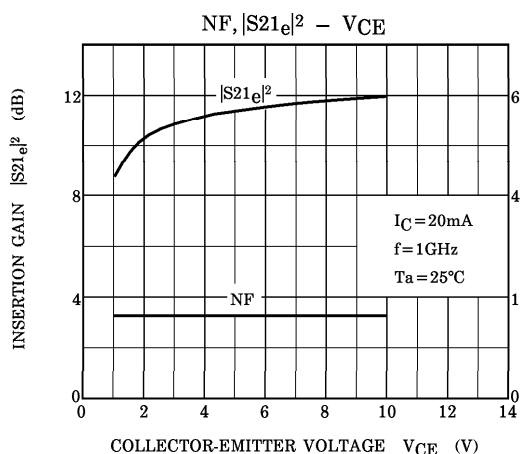
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 10\text{V}$ , $I_E = 0$	—	—	1	$\mu\text{A}$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB} = 1\text{V}$ , $I_C = 0$	—	—	1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE} = 10\text{V}$ , $I_C = 20\text{mA}$	30	—	250	—
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$	—	0.85	—	pF
Reverse Transfer Capacitance	$C_{re}$		(Note)	—	0.6	1.15

(Note)  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

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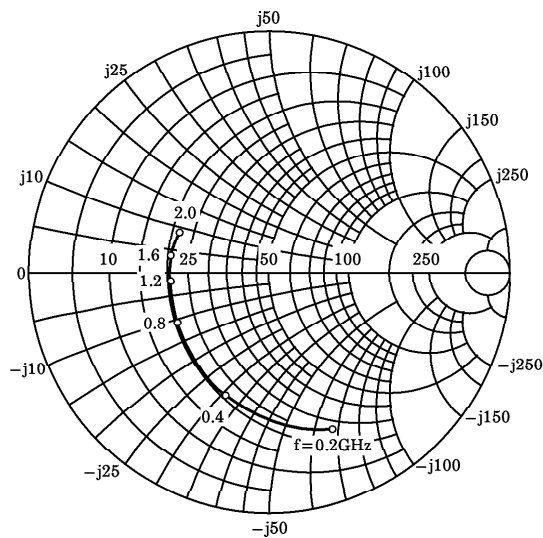
S-PARAMETER Z<sub>O</sub> = 50Ω, T<sub>a</sub> = 25°C  
 V<sub>CE</sub> = 10V, I<sub>C</sub> = 5mA

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

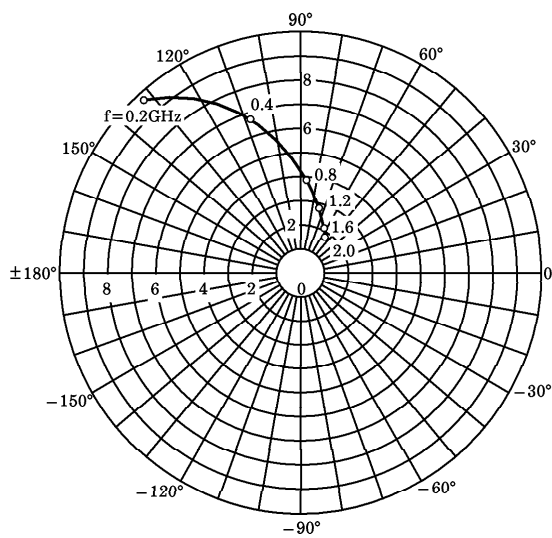
V<sub>CE</sub> = 10V, I<sub>C</sub> = 20mA

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

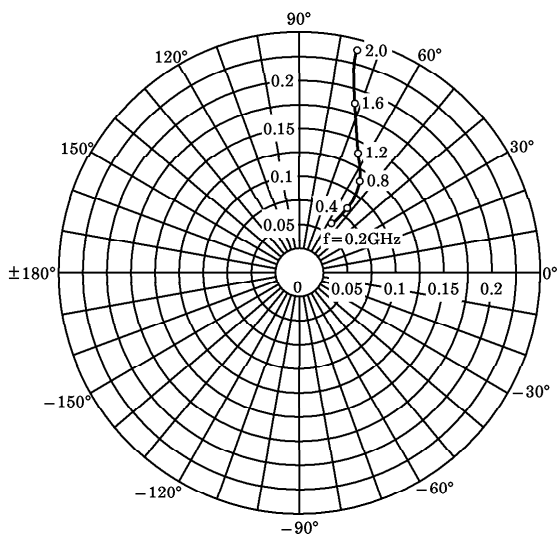
S<sub>11e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



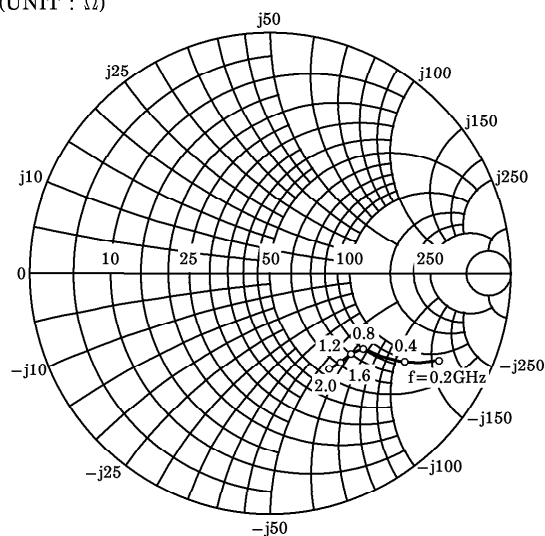
S<sub>21e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



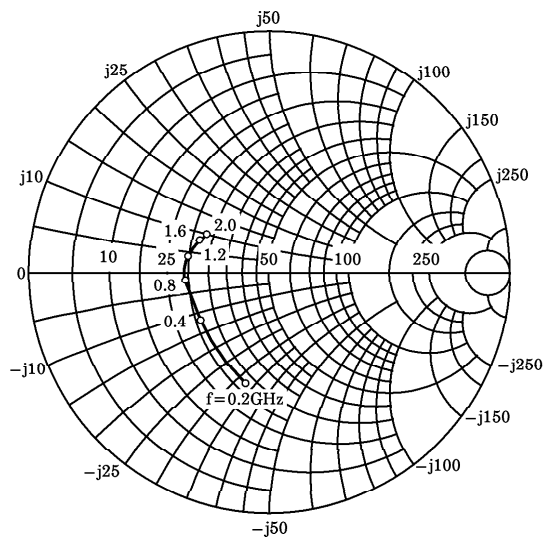
S<sub>12e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



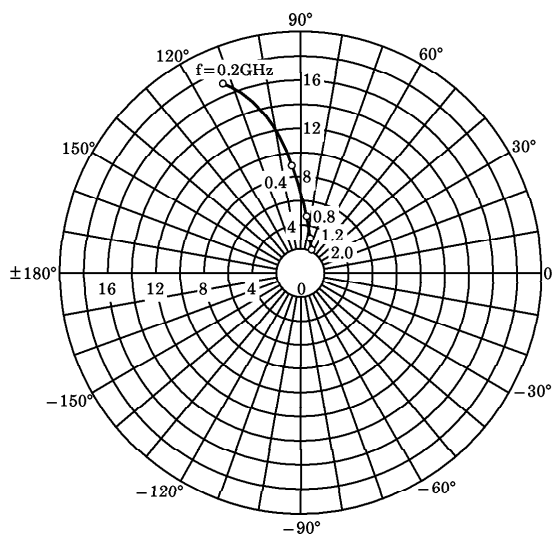
S<sub>22e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



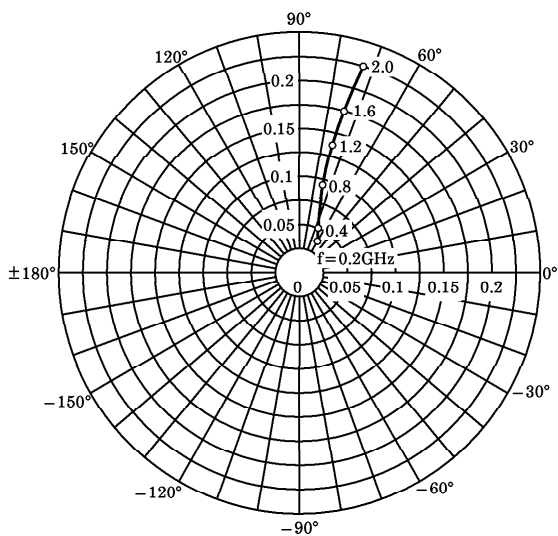
S<sub>11e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



S<sub>21e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C



S<sub>12e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C



S<sub>22e</sub>  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C  
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