

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC4840

VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

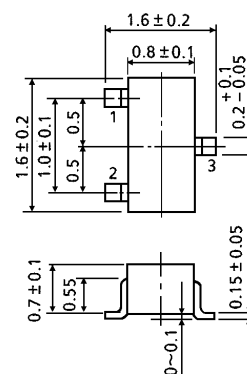
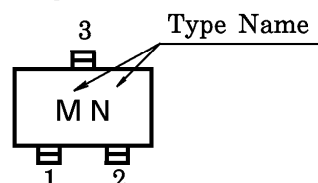
Unit in mm

- Low Noise Figure, High Gain.
- $NF = 1.1\text{dB}$, $|S_{21e}|^2 = 13\text{dB}$ ($f = 1\text{GHz}$)

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	10	V
Emitter-Base Voltage	V_{EBO}	1.5	V
Base Current	I_B	20	mA
Collector Current	I_C	40	mA
Collector Power Dissipation	P_C	100	mW
Junction Temperature	T_j	125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	$-55 \sim 125$	$^\circ\text{C}$

Marking



1. BASE
2. EMITTER
3. COLLECTOR

JEDEC

—

EIAJ

—

TOSHIBA 2-2H1A

Weight : 2.4mg

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$, $f = 1\text{GHz}$	10	13	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$, $f = 2\text{GHz}$	—	7	—	
Noise Figure	NF (1)	$V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$, $f = 1\text{GHz}$	—	1.1	2.5	dB
	NF (2)	$V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$, $f = 2\text{GHz}$	—	1.7	—	

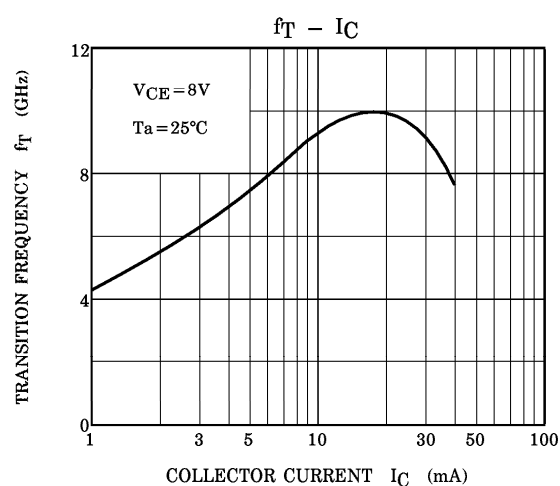
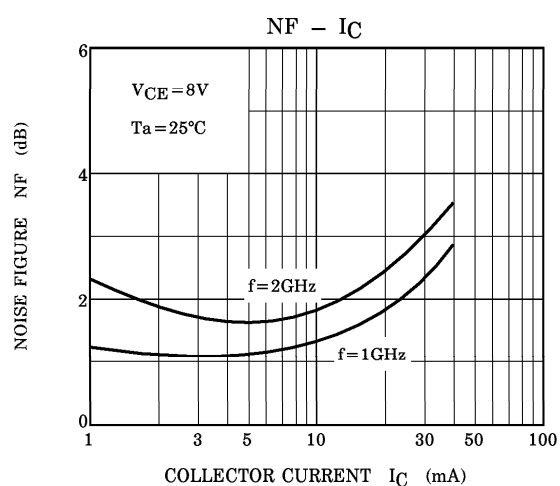
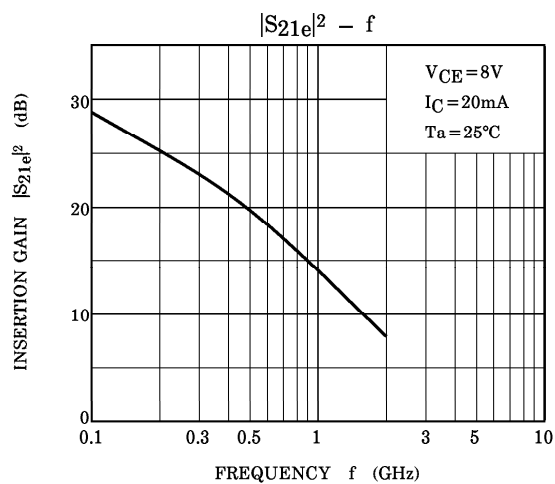
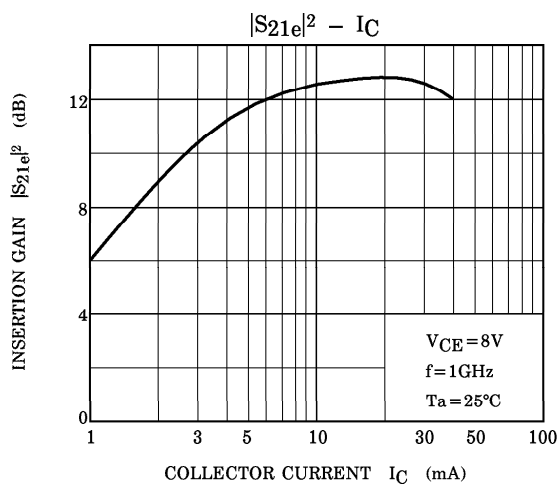
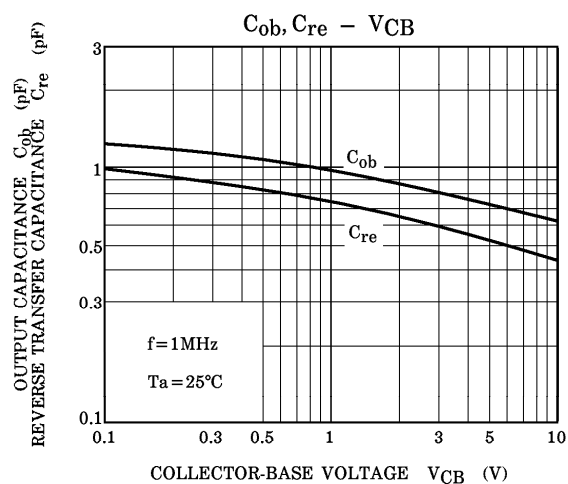
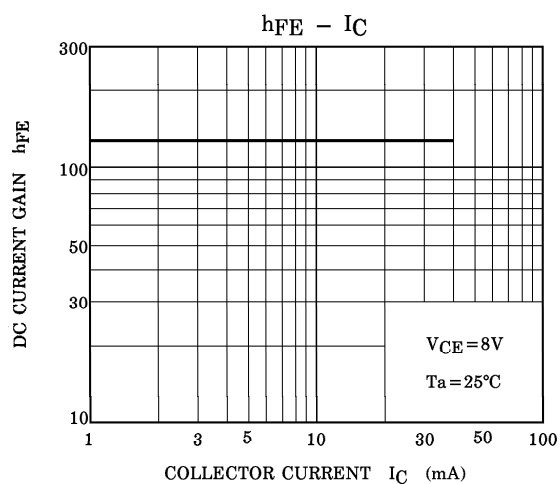
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

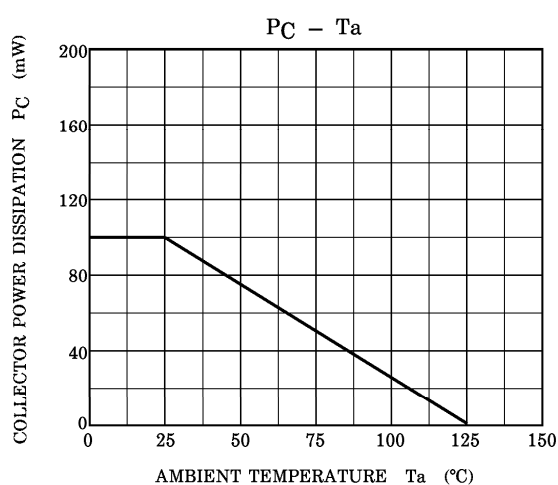
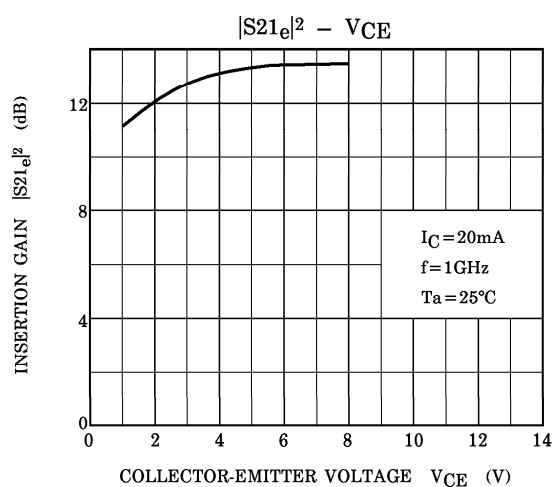
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	$V_{CB} = 10\text{V}$, $I_E = 0$	—	—	1	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{V}$, $I_C = 0$	—	—	1	μA
DC Current Gain	h_{FE}	$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$	50	—	250	—
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}$, $I_E = 0$, $f = 1\text{MHz}$	—	0.6	—	pF
Reverse Transfer Capacitance	C_{re}	(Note)	—	0.45	0.9	pF

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

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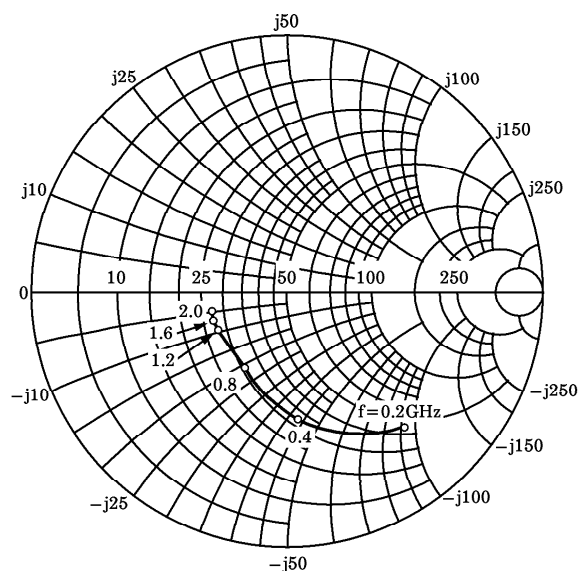
S-PARAMETER $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200	0.710	−49.8	10.366	140.1	0.043	63.4	0.805	−24.9	
400	0.513	−85.6	7.744	118.2	0.063	55.6	0.609	−32.5	
600	0.400	−109.8	5.844	105.6	0.076	55.0	0.507	−33.3	
800	0.347	−126.2	4.634	97.8	0.087	57.4	0.456	−32.4	
1000	0.319	−138.6	3.851	91.9	0.099	60.2	0.427	−31.8	
1200	0.303	−148.0	3.310	87.4	0.112	62.9	0.411	−31.5	
1400	0.299	−155.5	2.914	83.3	0.126	64.4	0.401	−32.6	
1600	0.294	−160.5	2.610	80.0	0.139	65.9	0.389	−33.8	
1800	0.296	−160.3	2.367	77.4	0.153	68.7	0.380	−34.8	
2000	0.300	−163.9	2.184	75.0	0.171	69.3	0.376	−36.4	

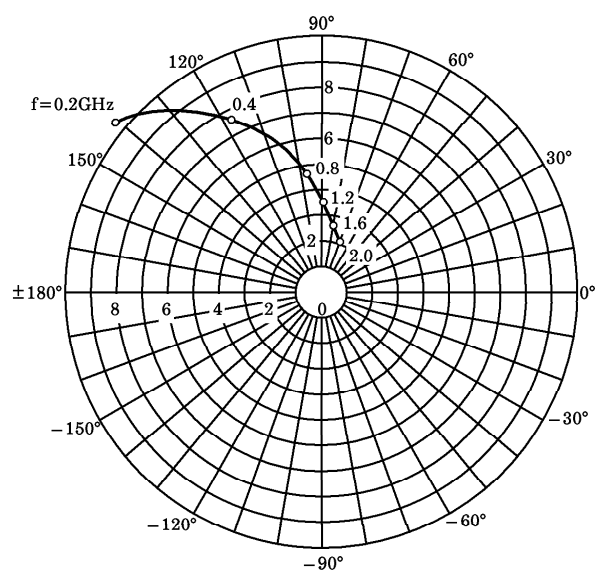
$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200	0.383	−98.8	19.474	117.1	0.043	63.5	0.538	−34.2	
400	0.292	−134.7	10.899	100.9	0.063	55.5	0.384	−30.2	
600	0.270	−154.3	7.496	93.5	0.076	55.0	0.341	−25.5	
800	0.262	−165.3	5.727	88.7	0.087	57.3	0.327	−22.9	
1000	0.256	−173.1	4.663	84.6	0.099	60.1	0.321	−21.8	
1200	0.254	−178.3	3.972	81.4	0.112	62.7	0.322	−22.3	
1400	0.257	178.1	3.462	78.3	0.126	64.4	0.320	−23.7	
1600	0.258	176.3	3.088	75.7	0.138	66.0	0.315	−25.3	
1800	0.258	176.5	2.786	73.7	0.153	68.5	0.314	−26.2	
2000	0.265	177.7	2.569	71.6	0.171	69.4	0.308	−28.3	

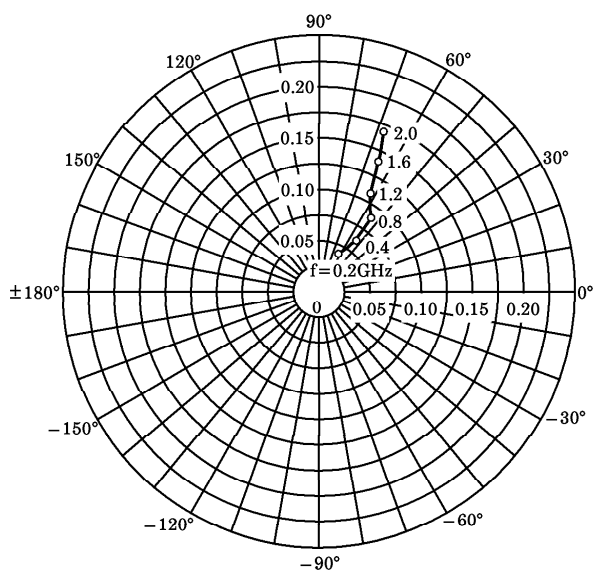
S_{11e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



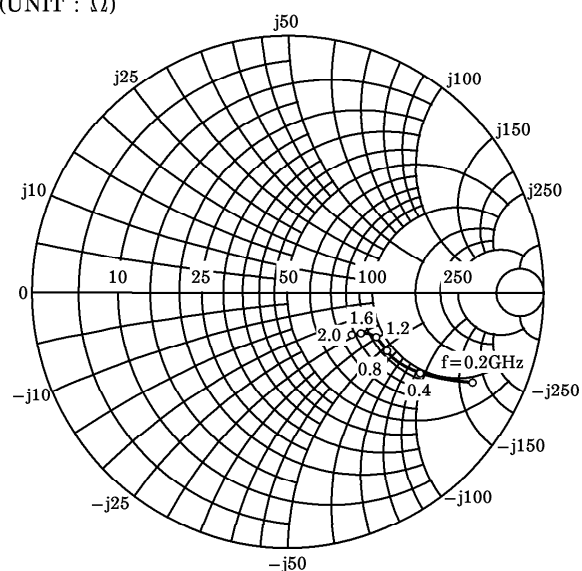
S_{21e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$



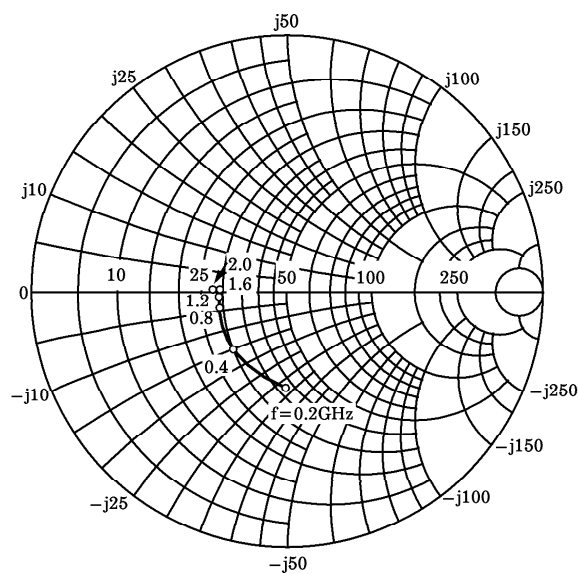
S_{12e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$



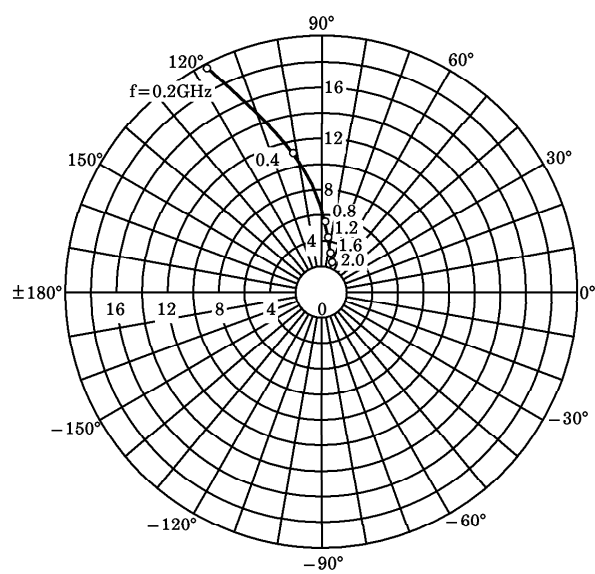
S_{22e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



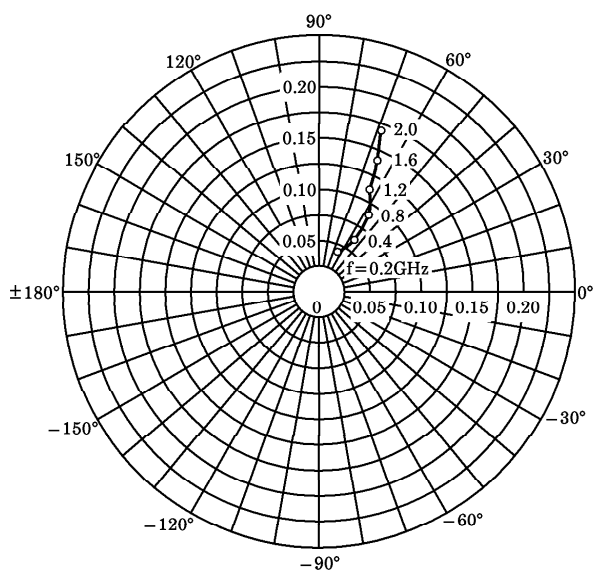
S_{11e}
 $V_{CE}=8V$
 $I_C=20mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



S_{21e}
 $V_{CE}=8V$
 $I_C=20mA$
 $T_a=25^\circ C$



S_{12e}
 $V_{CE}=8V$
 $I_C=20mA$
 $T_a=25^\circ C$



S_{22e}
 $V_{CE}=8V$
 $I_C=20mA$
 $T_a=25^\circ C$
 (UNIT : Ω)

