

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC4840

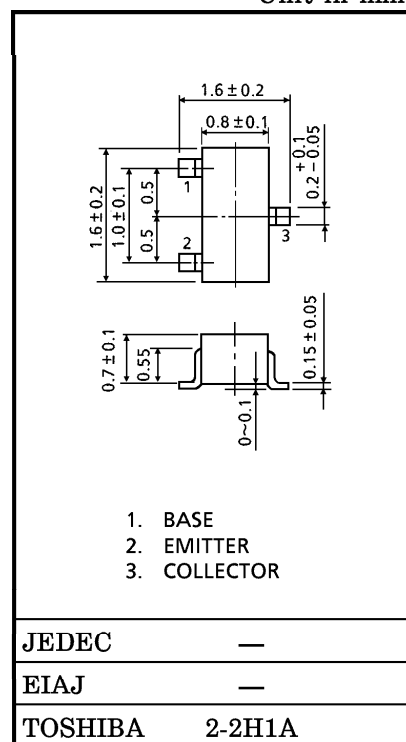
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

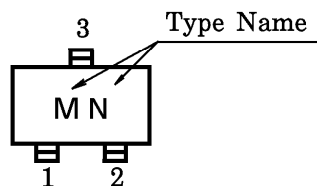
- Low Noise Figure, High Gain.
- $NF = 1.1dB$ ,  $|S_{21e}|^2 = 13dB$  ( $f = 1GHz$ )

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

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	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ C$



Marking



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

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

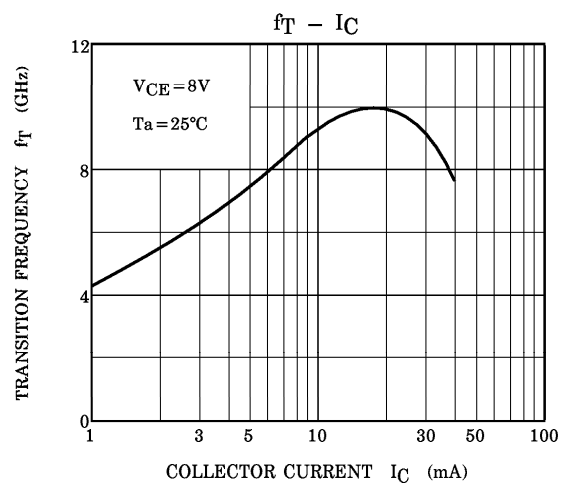
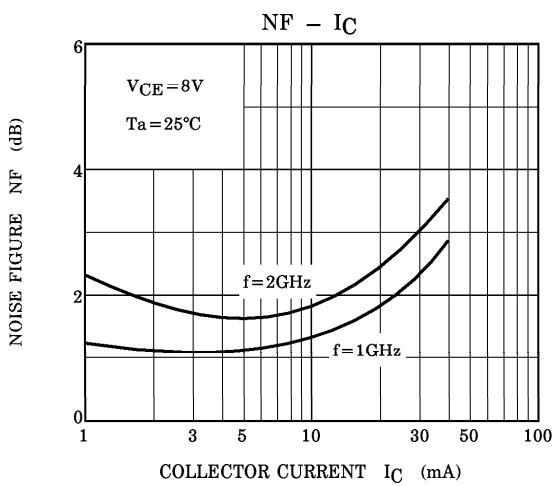
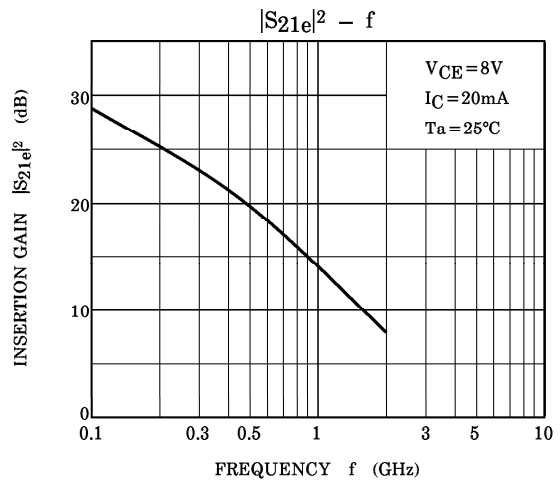
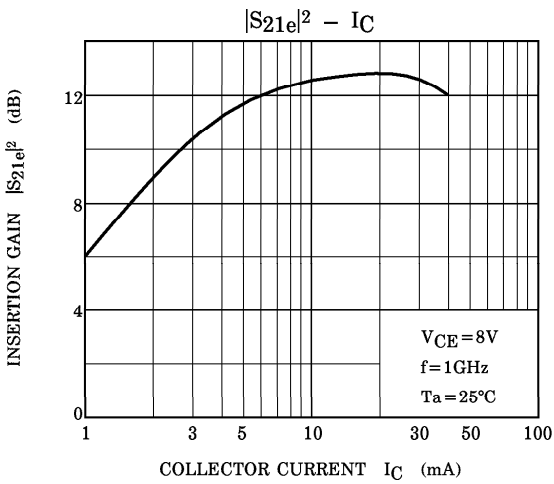
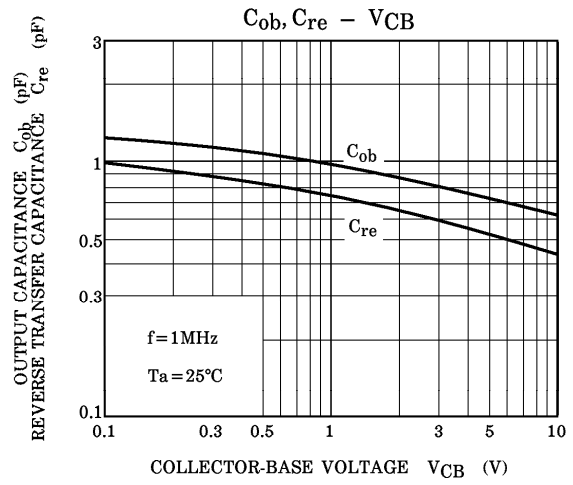
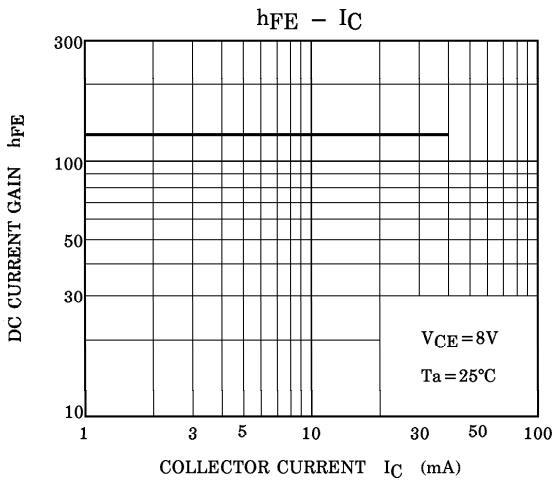
ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ C$ )

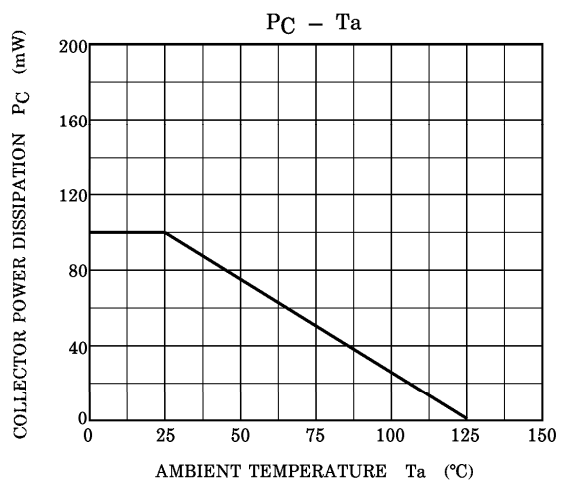
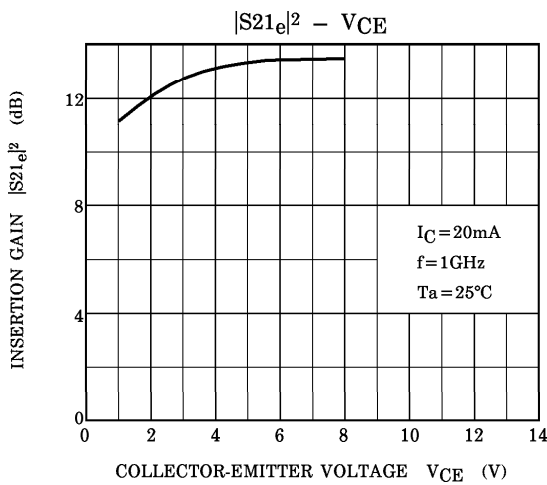
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 10V, I_E = 0$	—	—	1	$\mu A$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB} = 1V, I_C = 0$	—	—	1	$\mu A$
DC Current Gain	$h_{FE}$	$V_{CE} = 8V, I_C = 20mA$	50	—	250	—
Output Capacitance	$C_{ob}$	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	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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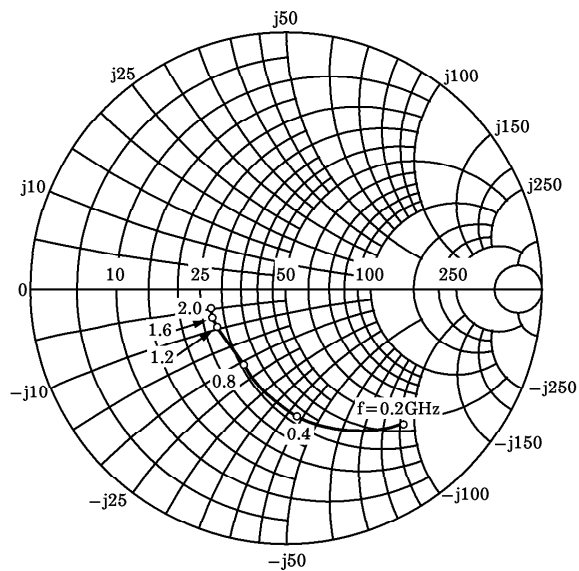
S-PARAMETER  $Z_0 = 50\Omega$ ,  $T_a = 25^\circ\text{C}$   
 $V_{CE} = 8\text{V}$ ,  $I_C = 5\text{mA}$

FREQUENCY	S11		S21		S12		S22	
	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

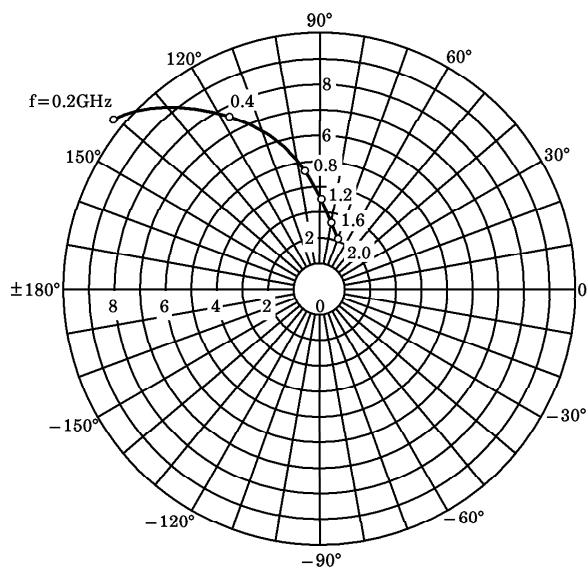
$V_{CE} = 8\text{V}$ ,  $I_C = 20\text{mA}$

FREQUENCY	S11		S21		S12		S22	
	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

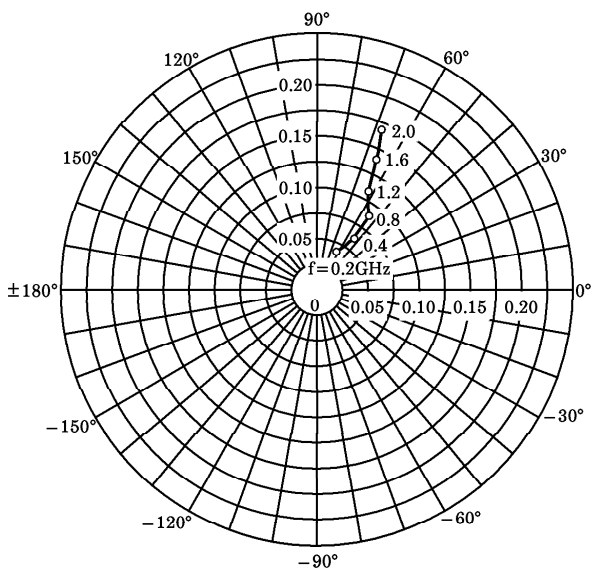
$S_{11e}$   
 $V_{CE} = 8V$   
 $I_C = 5mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



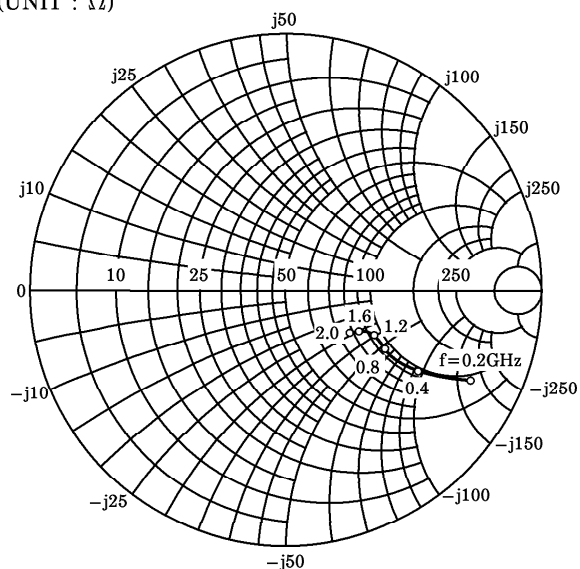
$S_{21e}$   
 $V_{CE} = 8V$   
 $I_C = 5mA$   
 $T_a = 25^\circ C$



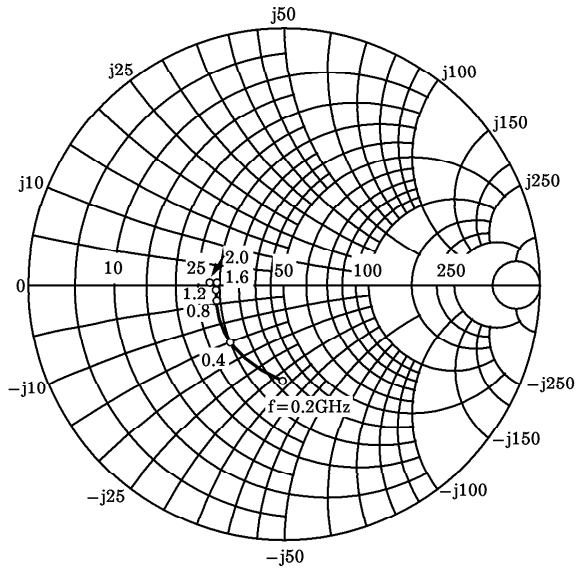
$S_{12e}$   
 $V_{CE} = 8V$   
 $I_C = 5mA$   
 $T_a = 25^\circ C$



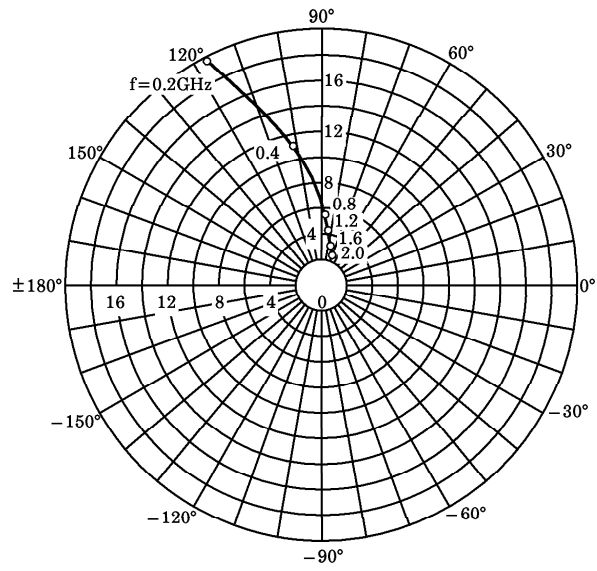
$S_{22e}$   
 $V_{CE} = 8V$   
 $I_C = 5mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



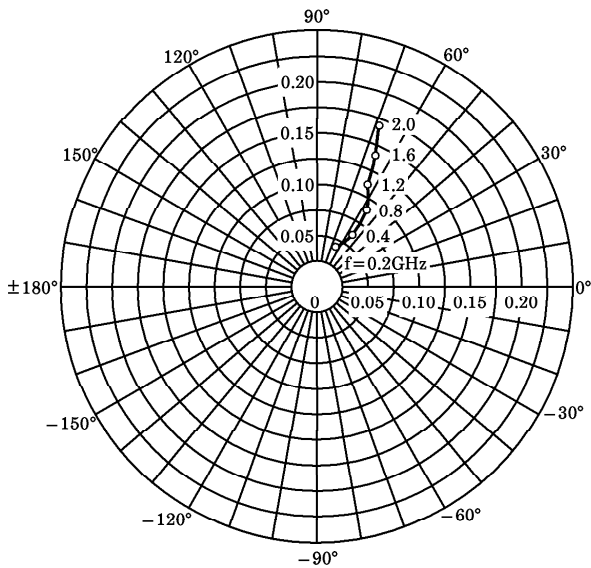
$S_{11e}$   
 $V_{CE} = 8V$   
 $I_C = 20mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



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



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



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

