

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC4841

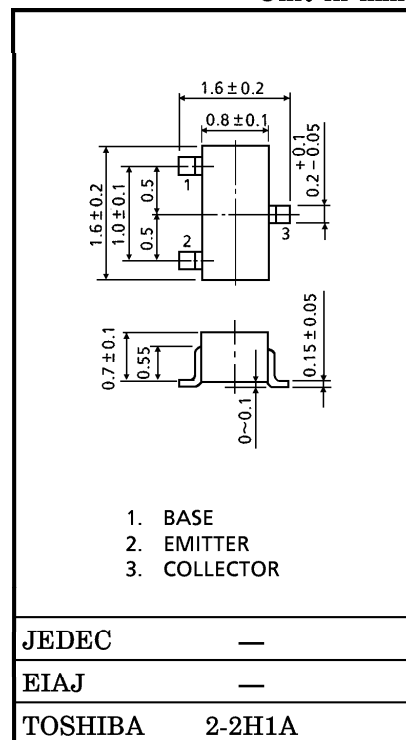
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

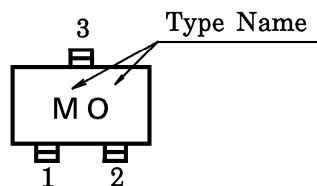
- Low Noise Figure, High Gain.
- $NF = 1.8\text{dB}$ ,  $|S_{21e}|^2 = 8.5\text{dB}$  ( $f = 2\text{GHz}$ )

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	$I_B$	7	mA
Collector Current	$I_C$	15	mA
Collector Power Dissipation	$P_C$	100	mW
Junction Temperature	$T_j$	125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ\text{C}$



Marking



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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	$f_T$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$ , $f = 1\text{GHz}$	—	13.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$ , $f = 2\text{GHz}$	4.5	8.5	—	
Noise Figure	NF (1)	$V_{CE} = 6\text{V}$ , $I_C = 3\text{mA}$ , $f = 1\text{GHz}$	—	1.4	—	dB
	NF (2)	$V_{CE} = 6\text{V}$ , $I_C = 3\text{mA}$ , $f = 2\text{GHz}$	—	1.8	3.0	

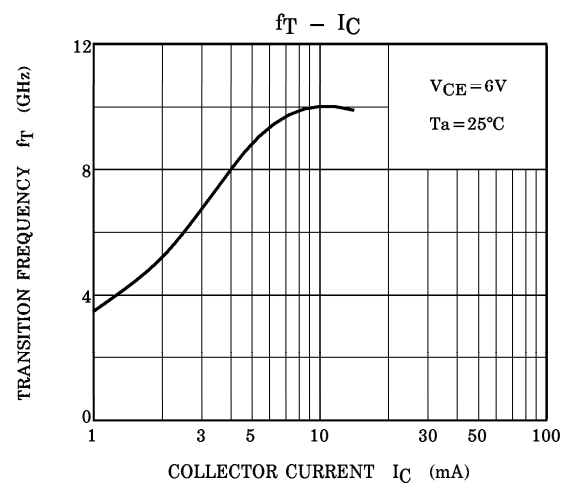
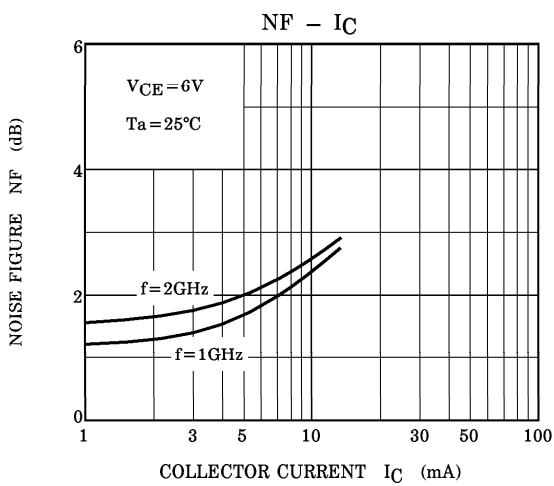
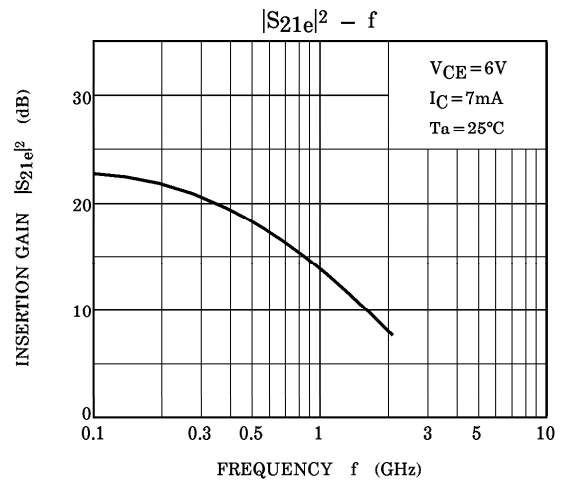
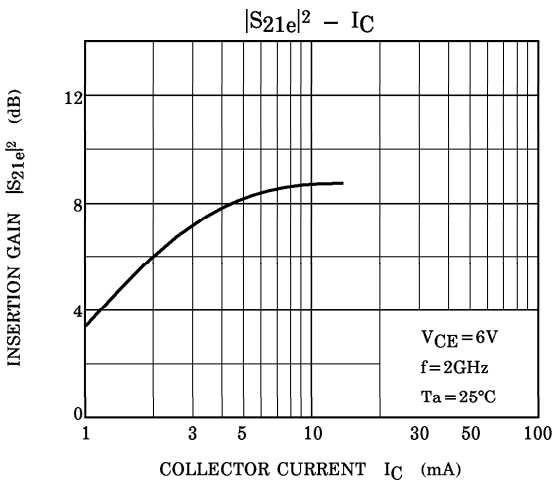
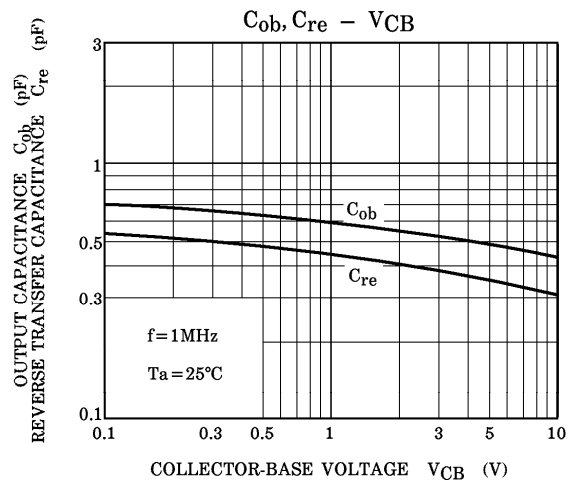
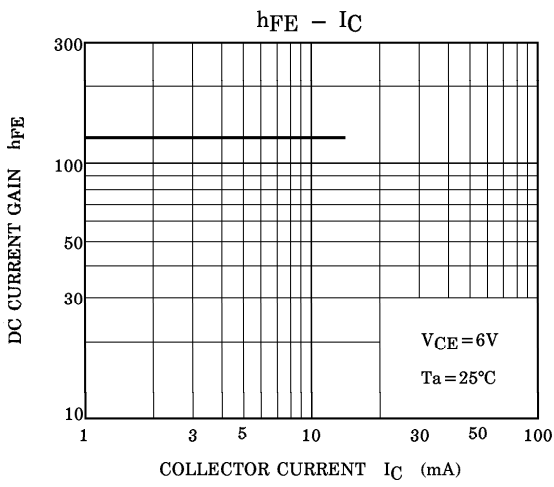
ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

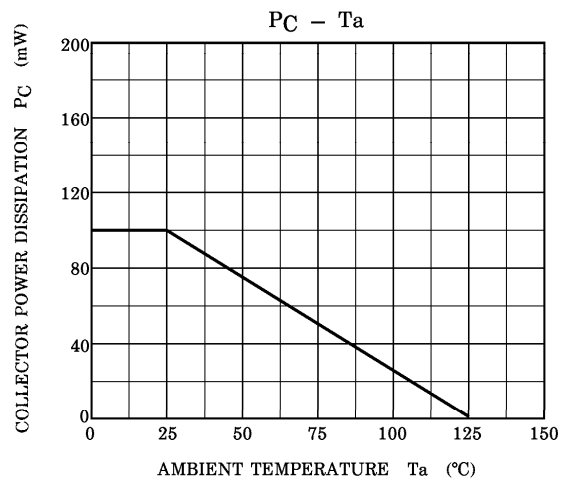
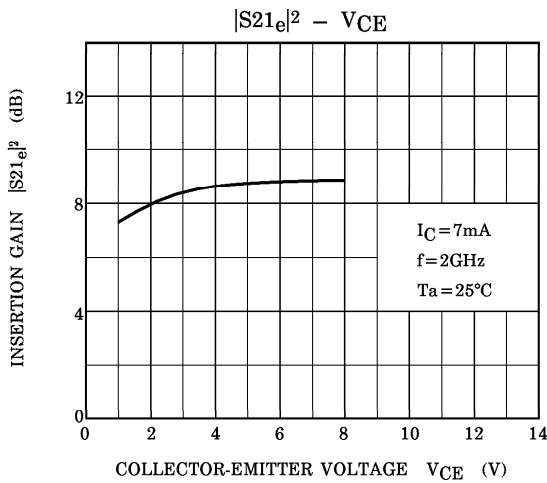
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 10\text{V}$ , $I_E = 0$	—	—	1	$\mu\text{A}$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB} = 1\text{V}$ , $I_C = 0$	—	—	1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$	50	—	250	—
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$	—	0.45	—	pF
Reverse Transfer Capacitance	$C_{re}$	(Note)	—	0.35	0.8	pF

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

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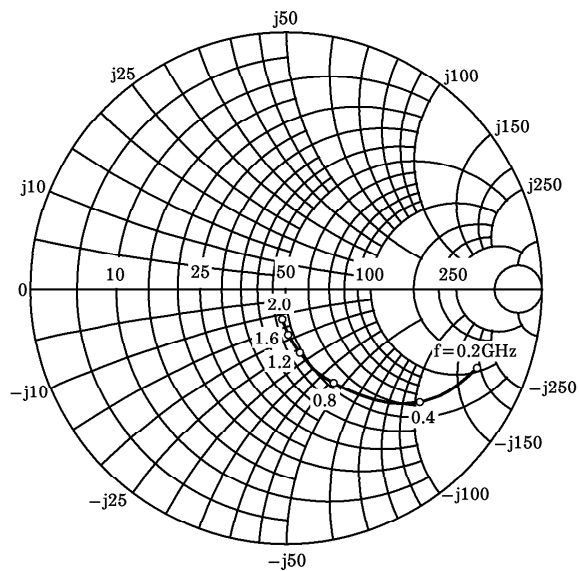
S-PARAMETER  $Z_0 = 50\Omega$ ,  $T_a = 25^\circ\text{C}$   
 $V_{CE} = 6\text{V}$ ,  $I_C = 3\text{mA}$

FREQUENCY	S11		S21		S12		S22	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
200	0.823	-22.5	7.186	154.4	0.036	74.8	0.928	-14.5
400	0.685	-40.5	6.252	136.4	0.063	65.5	0.805	-23.6
600	0.537	-54.5	5.378	122.5	0.080	60.8	0.700	-28.1
800	0.428	-64.4	4.567	112.6	0.094	59.3	0.627	-30.0
1000	0.343	-71.9	3.961	104.8	0.107	59.3	0.578	-30.7
1200	0.267	-77.4	3.486	98.6	0.119	59.7	0.544	-31.1
1400	0.227	-83.4	3.104	93.3	0.131	60.2	0.518	-31.8
1600	0.187	-86.9	2.793	88.9	0.141	60.6	0.497	-32.2
1800	0.157	-90.6	2.534	85.1	0.153	62.3	0.481	-32.7
2000	0.130	-94.1	2.336	81.2	0.167	62.7	0.466	-33.2

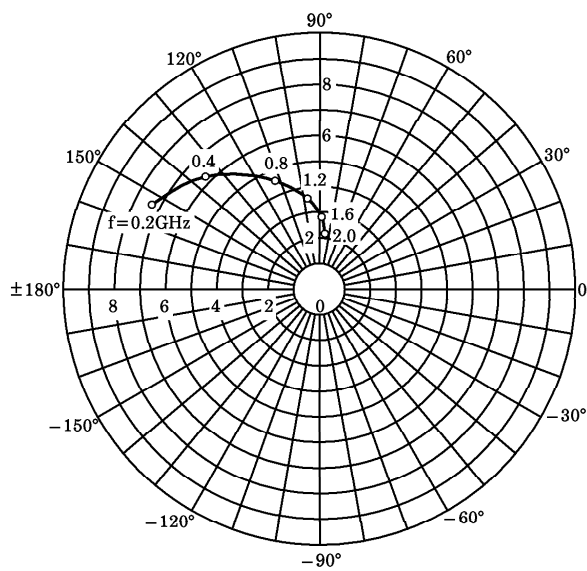
$V_{CE} = 6\text{V}$ ,  $I_C = 7\text{mA}$

FREQUENCY	S11		S21		S12		S22	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
200	0.653	-34.3	12.924	144.3	0.032	71.8	0.840	-20.9
400	0.447	-57.1	9.858	122.7	0.051	66.3	0.657	-28.3
600	0.304	-70.0	7.513	109.8	0.066	66.0	0.552	-28.9
800	0.220	-77.9	5.971	101.8	0.081	67.2	0.500	-27.9
1000	0.164	-83.4	4.955	95.6	0.096	68.5	0.470	-26.9
1200	0.123	-87.1	4.225	91.0	0.112	69.1	0.454	-26.3
1400	0.094	-93.7	3.721	86.8	0.127	69.2	0.441	-26.4
1600	0.070	-97.1	3.302	83.3	0.142	69.1	0.430	-26.8
1800	0.054	-102.8	2.974	80.2	0.156	70.1	0.423	-27.0
2000	0.039	-115.8	2.732	76.9	0.174	69.5	0.414	-27.7

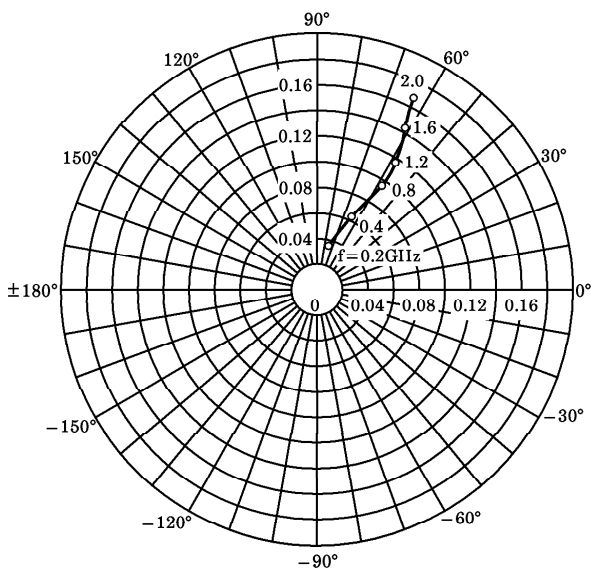
$S_{11e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



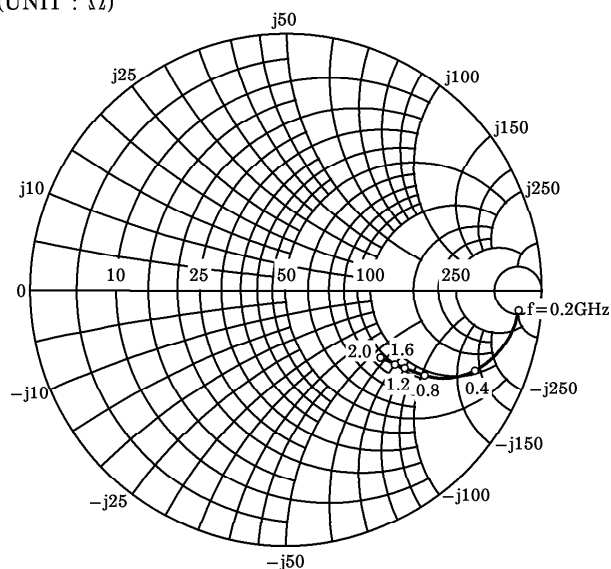
$S_{21e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$



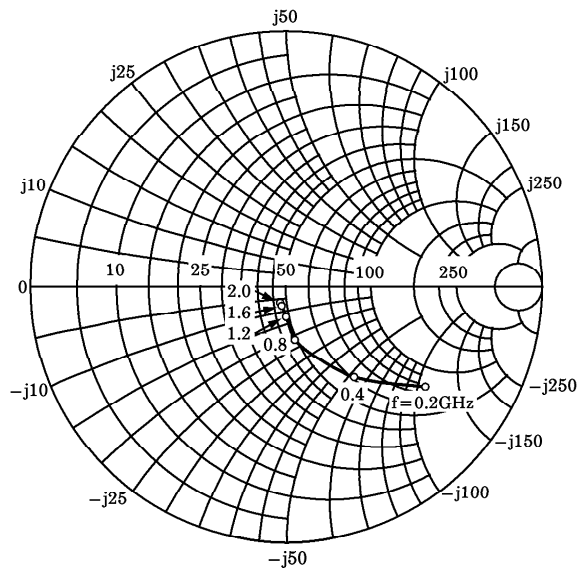
$S_{12e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$



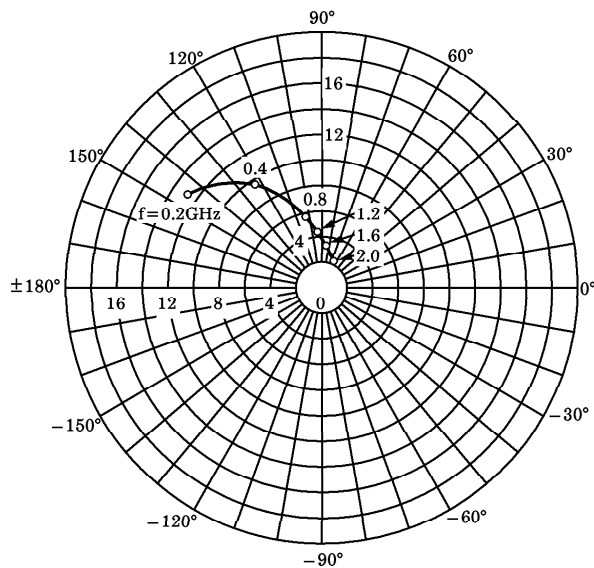
$S_{22e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



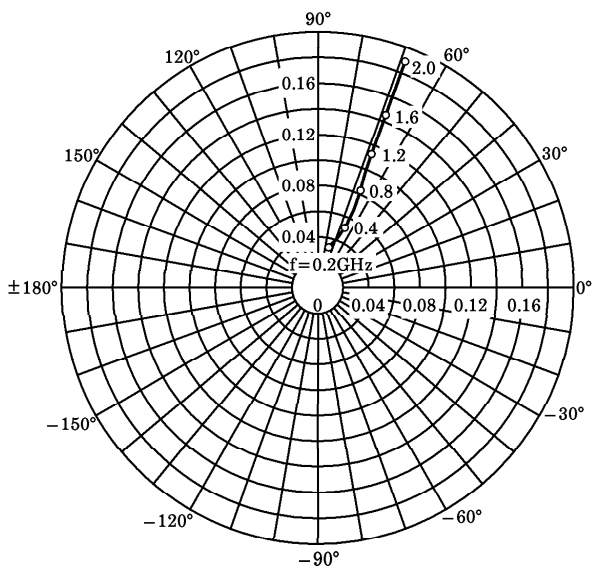
$S_{11e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



$S_{21e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$



$S_{12e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$



$S_{22e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )

