

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC5086

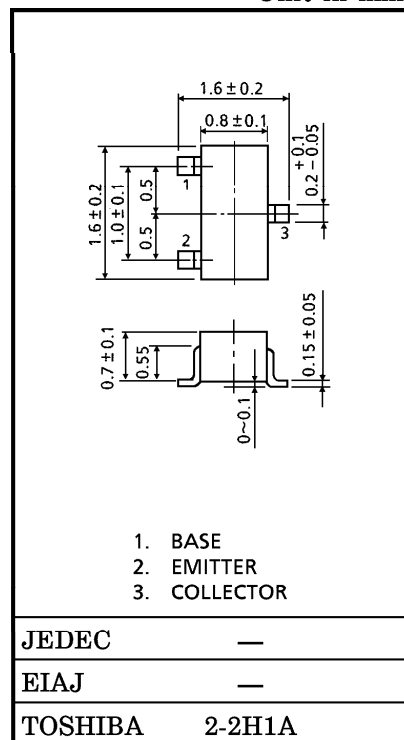
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain.
- $NF=1.1dB$ ,  $|S_{21e}|^2=11dB$  ( $f=1GHz$ )

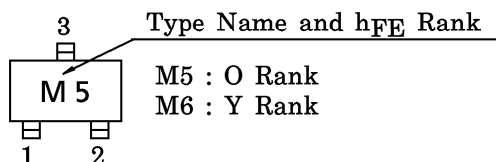
MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	$V_{CBO}$	20	V
Collector-Emitter Voltage	$V_{CEO}$	12	V
Emitter-Base Voltage	$V_{EBO}$	3	V
Base Current	$I_B$	40	mA
Collector Current	$I_C$	80	mA
Collector Power Dissipation	$P_C$	100	mW
Junction Temperature	$T_j$	125	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ C$



Weight : 2.4mg

MARKING



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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	$f_T$	$V_{CE}=10V, I_C=20mA$	5	7	—	GHz
Insertion Gain	$ S_{21e} ^2$ (1)	$V_{CE}=10V, I_C=20mA, f=500MHz$	—	16.5	—	dB
	$ S_{21e} ^2$ (2)	$V_{CE}=10V, I_C=20mA, f=1GHz$	7.5	11	—	
Noise Figure	NF (1)	$V_{CE}=10V, I_C=5mA, f=500MHz$	—	1	—	dB
	NF (2)	$V_{CE}=10V, I_C=5mA, f=1GHz$	—	1.1	2	

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

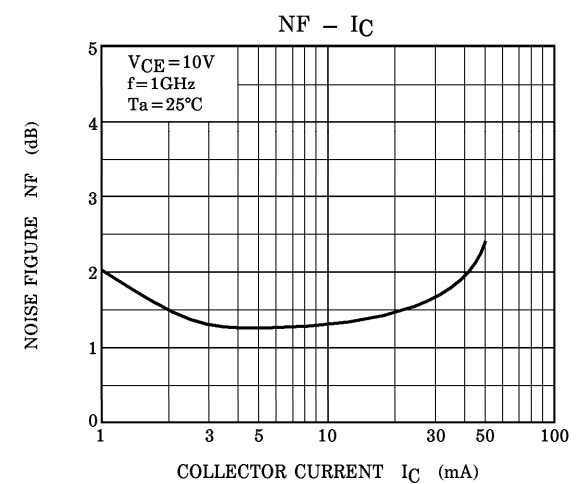
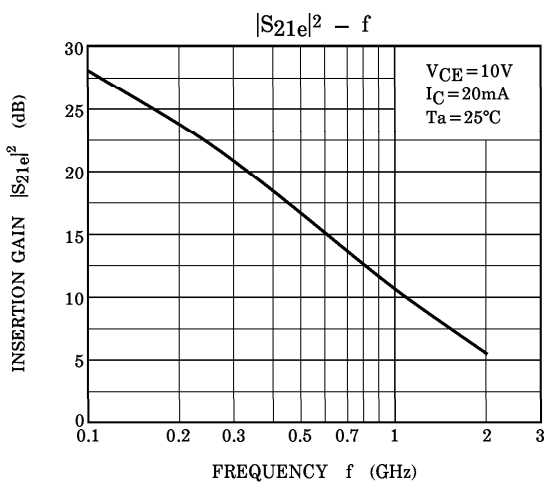
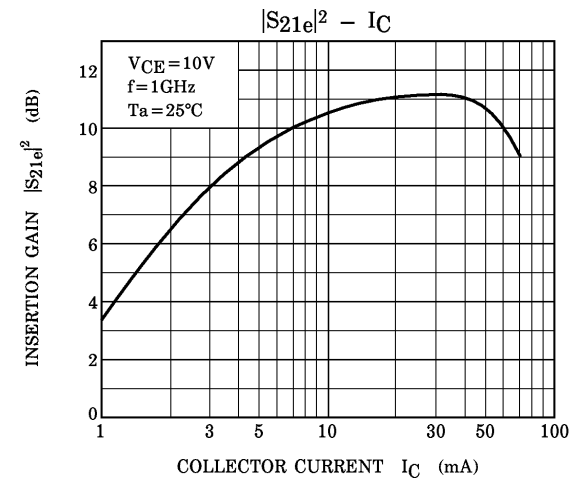
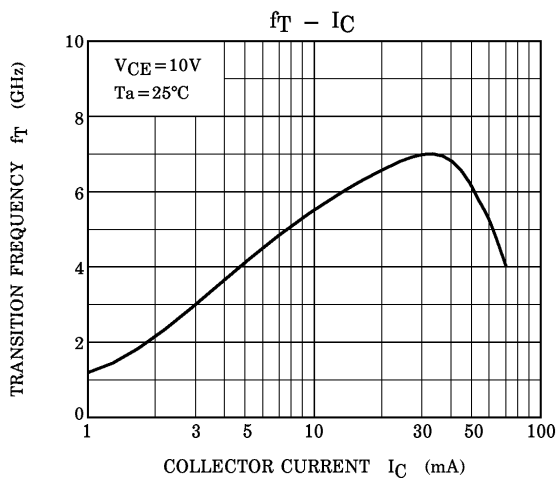
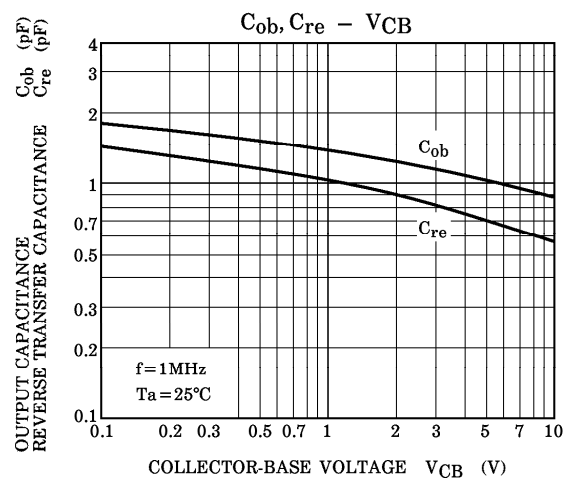
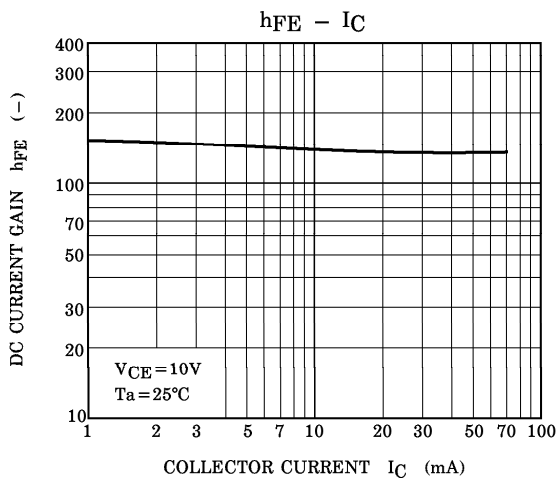
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB}=10V, I_E=0$	—	—	1	$\mu A$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=1V, I_C=0$	—	—	1	$\mu A$
DC Current Gain	$h_{FE}$ (Note 1)	$V_{CE}=10V, I_C=20mA$	80	—	240	—
Output Capacitance	$C_{ob}$	$V_{CB}=10V, I_E=0, f=1MHz$	—	1.0	—	pF
Reverse Transfer Capacitance	$C_{re}$		(Note 2)	—	0.65	1.15

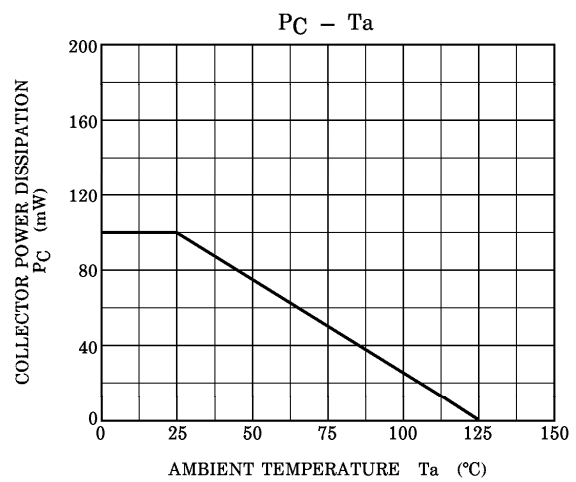
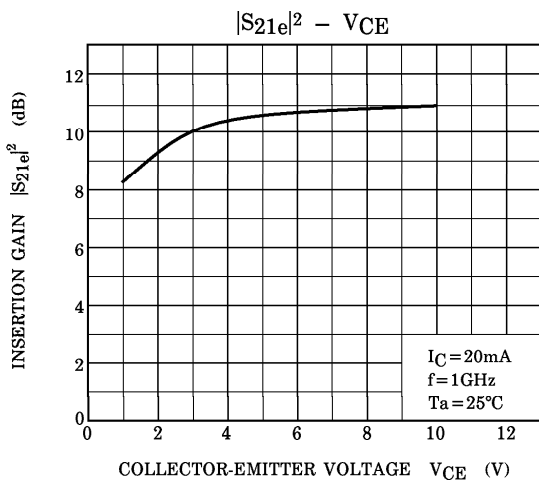
(Note 1)  $h_{FE}$  Classification O : 80~160, Y : 120~240

(Note 2)  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

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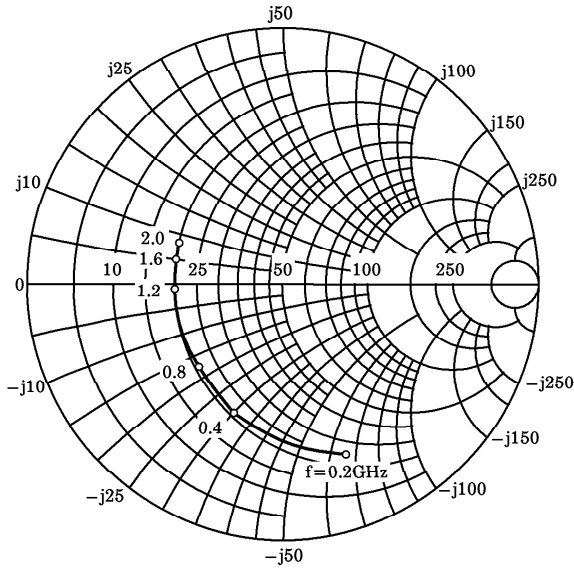
S-Parameter  $Z_0 = 50\Omega$ ,  $T_a = 25^\circ\text{C}$   
 $V_{CE} = 10\text{V}$ ,  $I_C = 5\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.715	-69.3	9.495	132.1	0.051	55.2	0.747	-29.0
400	0.542	-112.4	6.482	108.5	0.068	46.8	0.555	-35.1
600	0.476	-137.7	4.717	95.8	0.077	47.9	0.478	-36.2
800	0.447	-154.4	3.691	87.1	0.086	51.6	0.442	-37.1
1000	0.435	-166.8	3.049	79.9	0.096	55.9	0.424	-38.9
1200	0.433	-176.6	2.611	73.9	0.108	60.4	0.418	-41.8
1400	0.435	174.8	2.294	68.3	0.123	64.2	0.411	-45.0
1600	0.439	167.3	2.050	63.2	0.140	66.9	0.407	-49.0
1800	0.444	160.6	1.860	58.7	0.159	68.7	0.406	-53.6
2000	0.454	154.2	1.713	53.9	0.180	70.5	0.404	-57.8

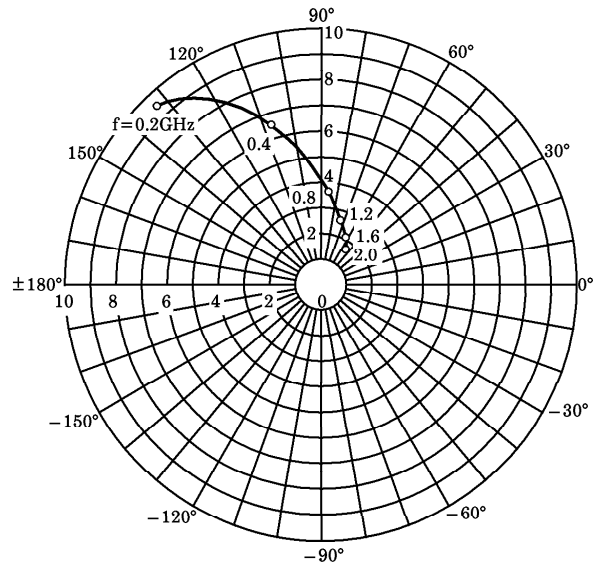
$V_{CE} = 10\text{V}$ ,  $I_C = 20\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.465	-107.8	16.512	113.2	0.035	56.7	0.484	-40.9
400	0.375	-145.6	9.090	96.5	0.052	62.2	0.331	-37.8
600	0.351	-164.4	6.252	88.1	0.070	66.5	0.291	-34.1
800	0.343	-176.7	4.762	81.9	0.089	68.9	0.277	-33.3
1000	0.338	174.8	3.875	76.6	0.109	70.2	0.273	-34.0
1200	0.337	167.9	3.285	71.8	0.130	70.8	0.274	-36.2
1400	0.343	161.6	2.874	67.2	0.152	70.6	0.274	-39.3
1600	0.343	156.2	2.553	62.9	0.173	69.8	0.274	-43.4
1800	0.348	151.2	2.317	58.8	0.195	68.9	0.273	-47.8
2000	0.354	146.2	2.113	55.0	0.218	68.2	0.272	-52.1

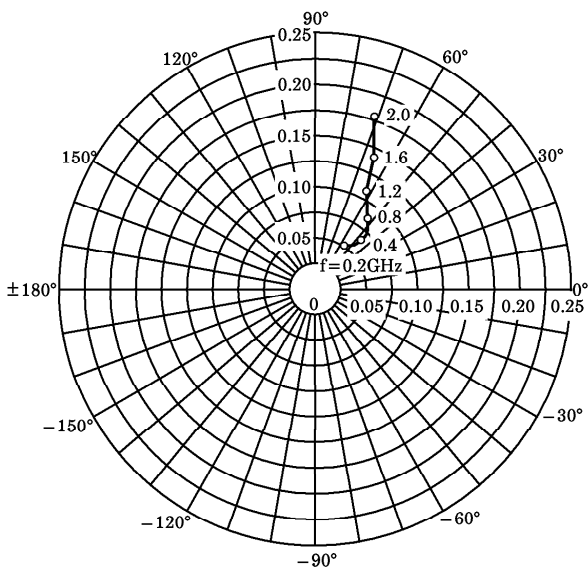
**S<sub>11e</sub>**  
 V<sub>CE</sub>=10V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C  
 (UNIT : Ω)



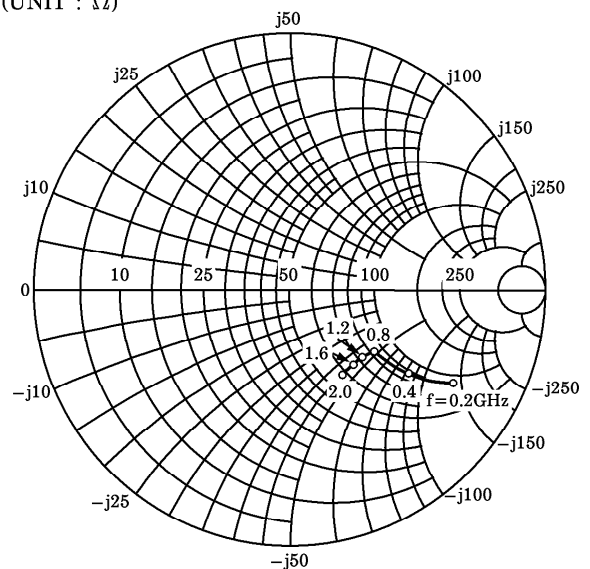
**S<sub>21e</sub>**  
 V<sub>CE</sub>=10V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C



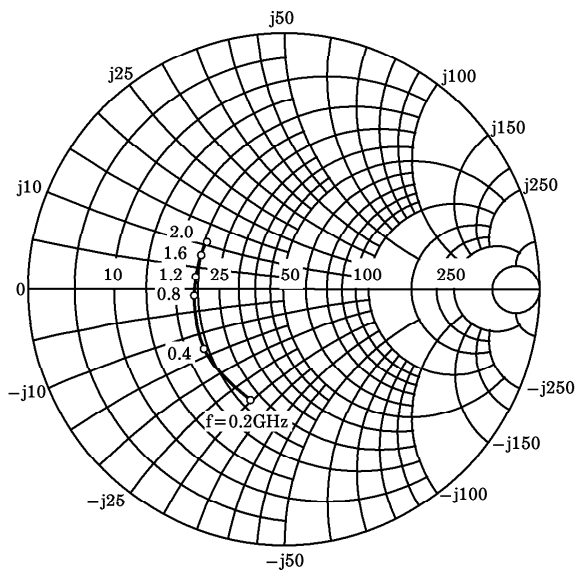
**S<sub>12e</sub>**  
 V<sub>CE</sub>=10V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C



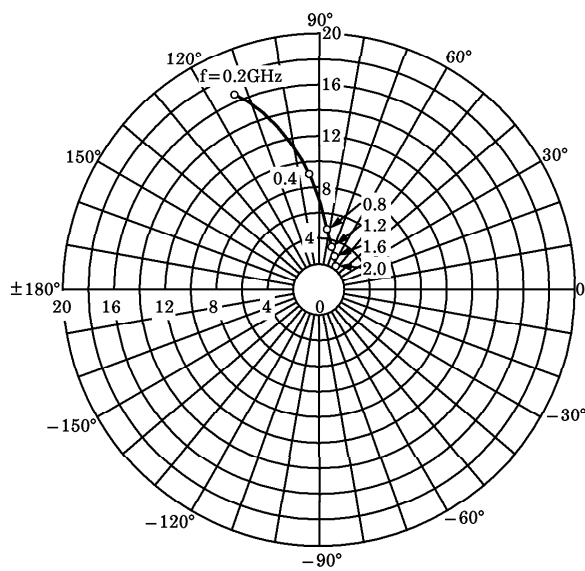
**S<sub>22e</sub>**  
 V<sub>CE</sub>=10V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C  
 (UNIT : Ω)



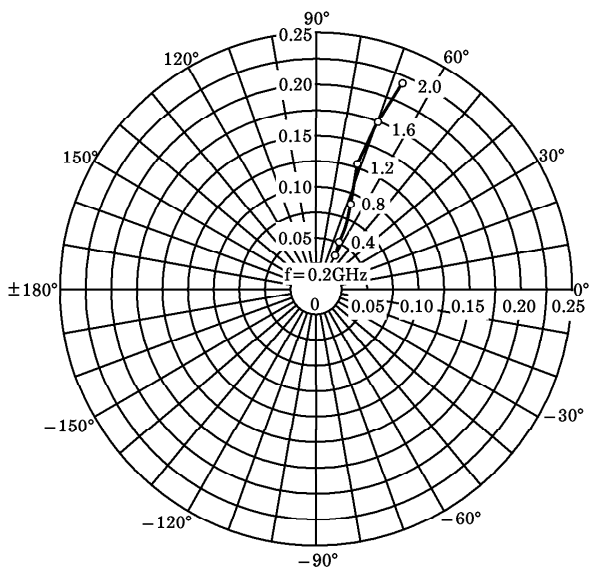
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



**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  
 (UNIT : Ω)

