

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

## 2SC5088

VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

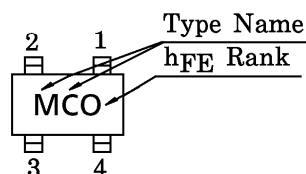
Unit in mm

- 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	$V_{CEO}$	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	$^\circ C$

MARKING



USQ	
JEDEC	—
EIAJ	—
TOSHIBA	2-2K1A

Weight : 0.006g

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)$	$V_{CE}=10V, I_C=20mA, f=500MHz$	—	18	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE}=10V, I_C=20mA, f=1GHz$	9.5	13	—	
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 ( $T_a = 25^\circ C$ )

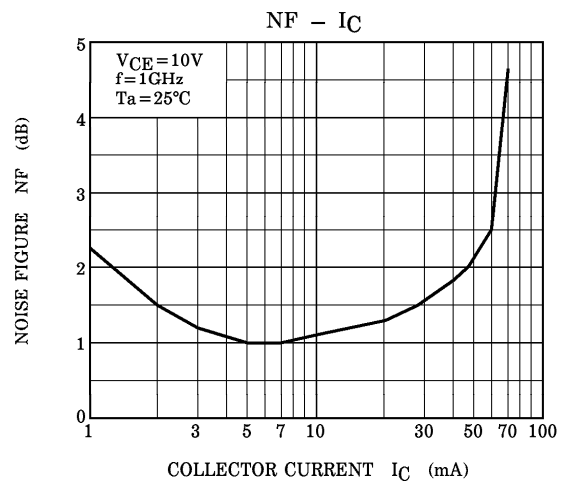
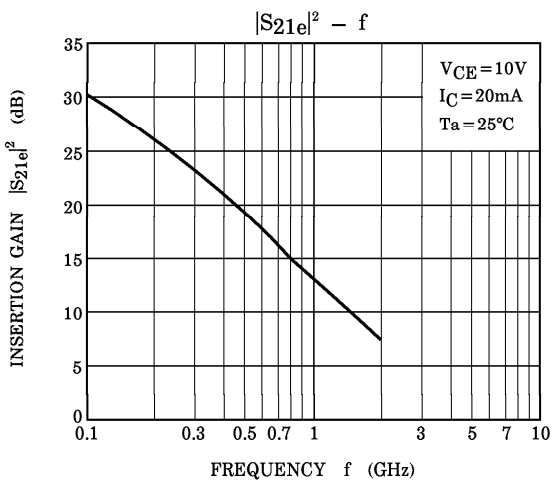
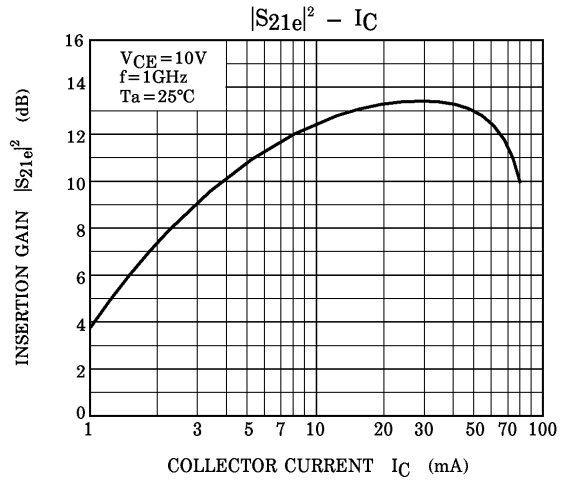
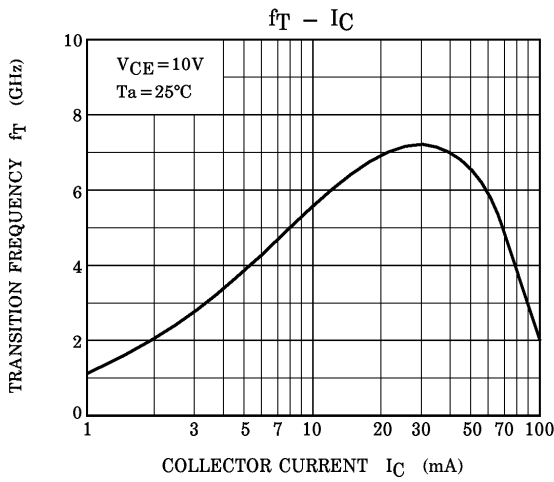
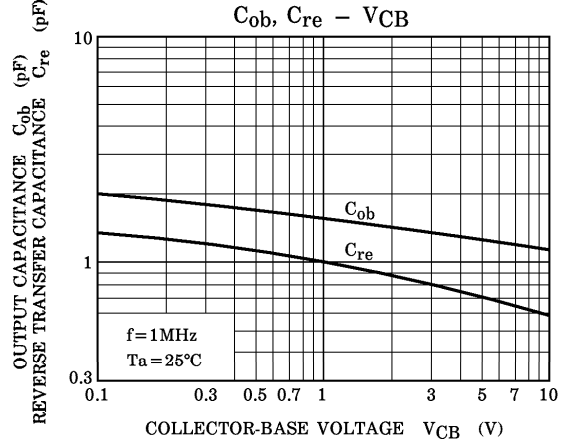
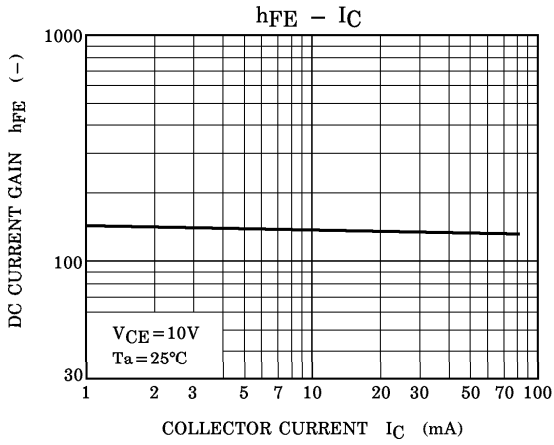
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB}=10V, I_E=0$	—	—	1	$\mu A$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=1V, I_C=0$	—	—	1	$\mu A$
DC Current Gain	$h_{FE}$ (Note 1)	$V_{CE}=10V, I_C=20mA$	80	—	240	—
Output Capacitance	$C_{ob}$	$V_{CB}=10V, I_E=0, f=1MHz$	—	1.1	1.6	pF
Reverse Transfer Capacitance	$C_{re}$		(Note 2)	—	0.65	1.05

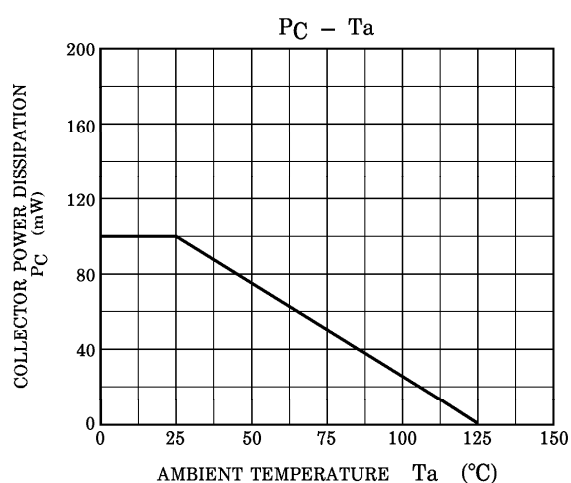
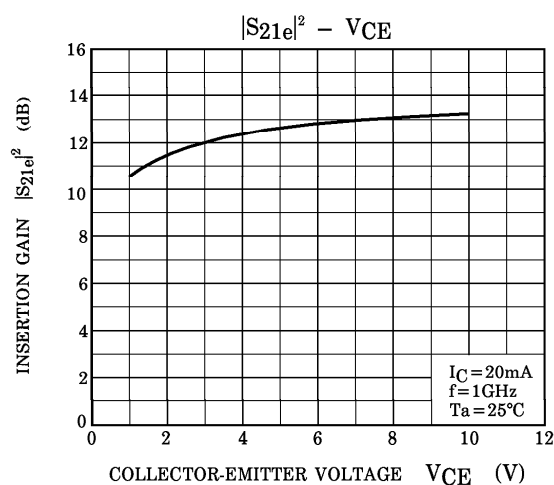
(Note 1)  $h_{FE}$  Classification O : 80~160, Y : 120~240(Note 2)  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

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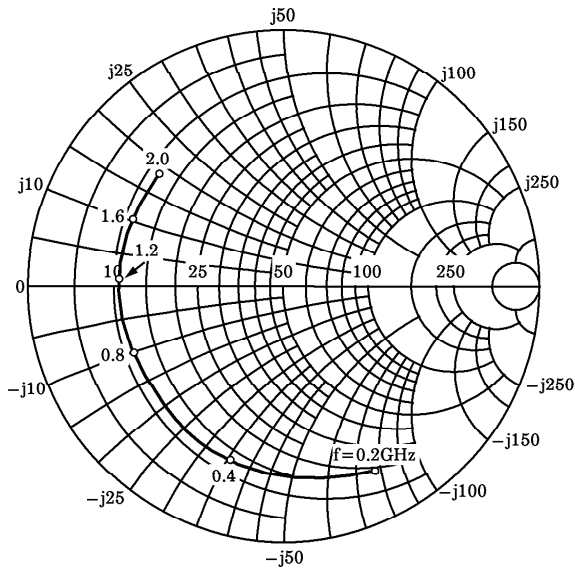
S-Parameter  $Z_0 = 50\Omega$ ,  $T_a = 25^\circ\text{C}$   
 $V_{CE} = 10\text{V}$ ,  $I_C = 5\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.826	-64.3	9.839	139.2	0.056	59.2	0.844	-31.7
400	0.735	-106.8	7.058	115.2	0.083	43.8	0.663	-50.1
600	0.692	-134.4	5.233	99.5	0.094	36.8	0.558	-62.3
800	0.666	-154.3	4.106	88.1	0.100	33.3	0.496	-72.6
1000	0.656	-170.0	3.315	78.9	0.102	32.7	0.458	-81.8
1200	0.653	178.0	2.768	71.3	0.103	33.4	0.429	-90.6
1400	0.649	167.7	2.353	65.4	0.104	36.0	0.407	-99.4
1600	0.655	158.2	2.061	59.6	0.107	39.1	0.393	-107.8
1800	0.653	149.0	1.818	55.3	0.111	42.6	0.378	-115.3
2000	0.654	139.9	1.650	50.7	0.116	46.7	0.367	-121.9

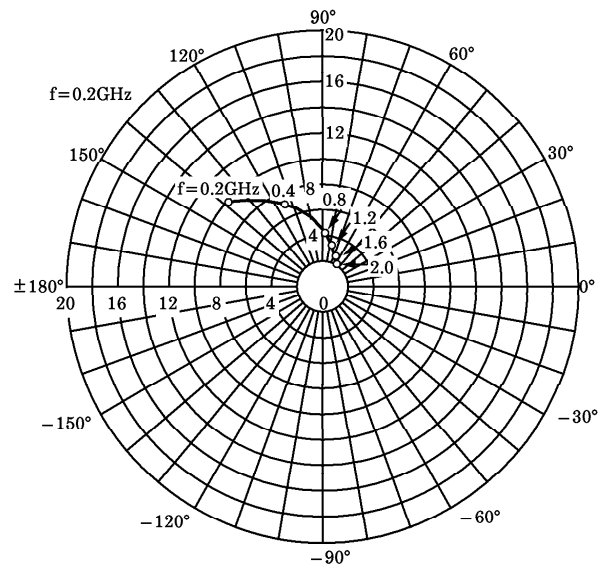
$V_{CE} = 10\text{V}$ ,  $I_C = 20\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.747	-87.0	16.492	129.8	0.048	52.1	0.717	-47.1
400	0.675	-130.5	10.431	106.5	0.063	41.8	0.486	-69.1
600	0.648	-154.8	7.298	93.5	0.070	40.8	0.379	-82.0
800	0.636	-170.9	5.547	84.4	0.076	42.0	0.324	-93.0
1000	0.630	176.7	4.423	77.5	0.083	44.7	0.291	-102.7
1200	0.634	166.4	3.660	71.7	0.089	47.7	0.266	-112.1
1400	0.634	157.1	3.125	67.0	0.097	50.8	0.249	-120.8
1600	0.639	148.8	2.741	62.4	0.105	53.2	0.233	-128.9
1800	0.645	139.9	2.451	58.8	0.115	55.6	0.220	-135.8
2000	0.642	131.4	2.233	54.9	0.126	58.1	0.205	-141.2

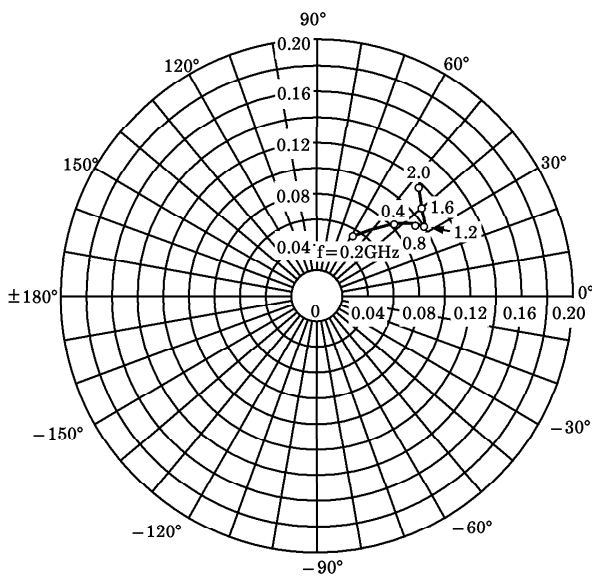
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (Unit : Ω)



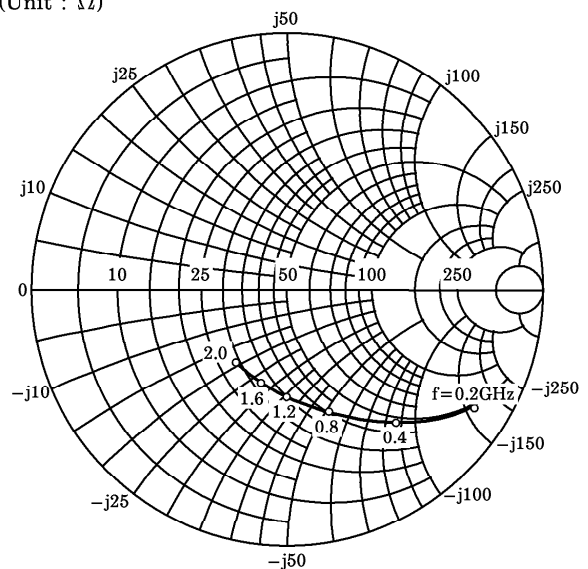
**S<sub>21e</sub>**  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



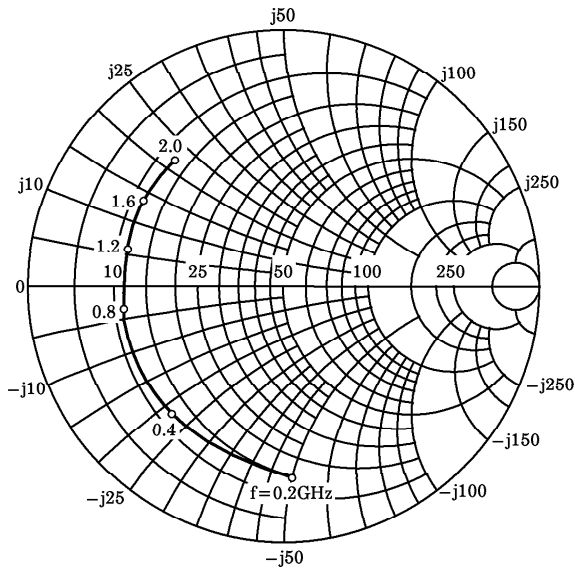
**S<sub>12e</sub>**  
 V<sub>CE</sub> = 10V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



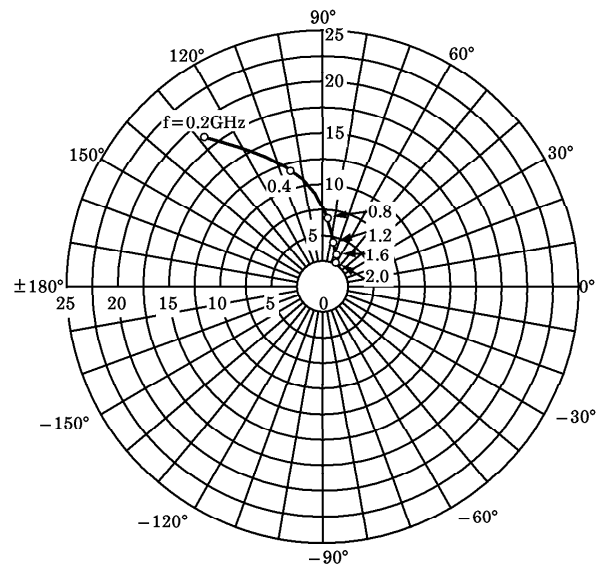
**S<sub>22e</sub>**  
 V<sub>CE</sub> = 10V  
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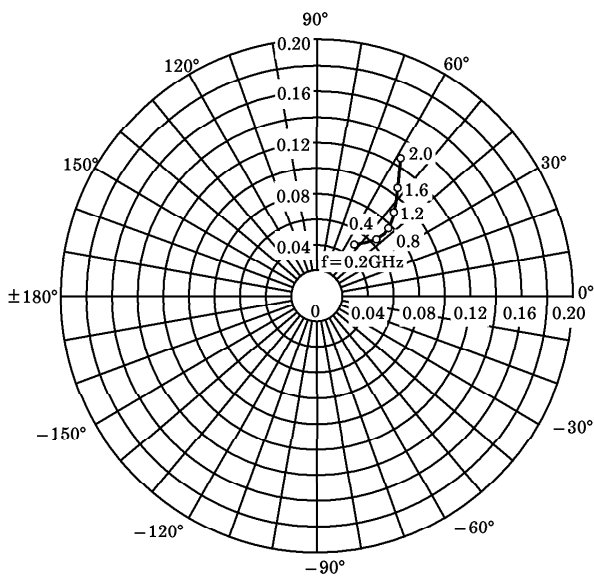
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 10V  
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 (Unit : Ω)



**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)

