

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5064

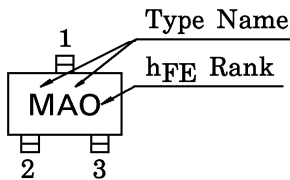
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

- Low Noise Figure, High Gain.
- $NF=1.1dB$, $|S_{21e}|^2=12dB$ ($f=1GHz$)

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	15	mA
Collector Current	I_C	30	mA
Collector Power Dissipation	P_C	150	mW
Junction Temperature	T_j	125	$^\circ C$
Storage Temperature Range	T_{stg}	-55~125	$^\circ C$

MARKING



Unit in mm

1. BASE
2. EMITTER
3. COLLECTOR

S-MINI

JEDEC	—
EIAJ	SC-59
TOSHIBA	2-3F1A

Weight : 0.012g

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

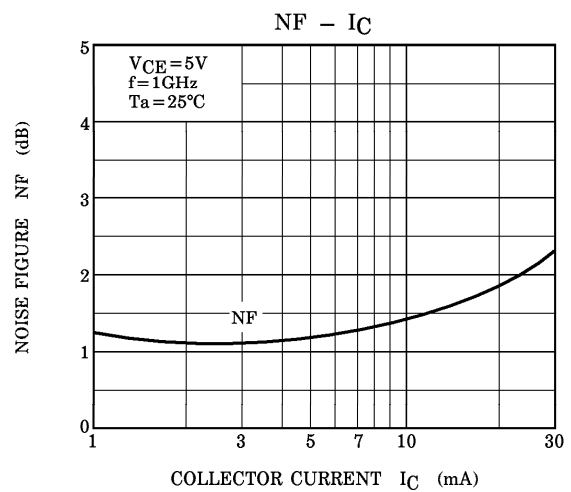
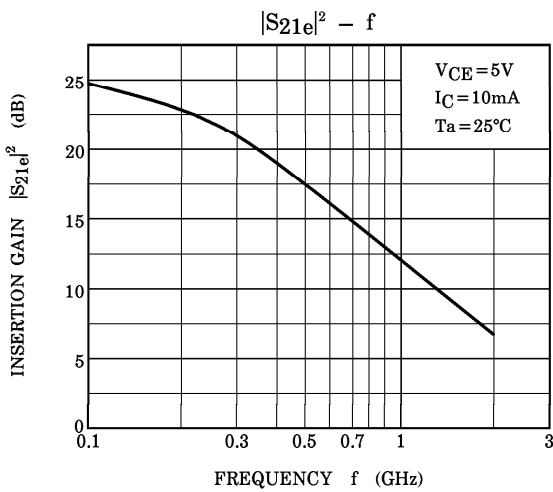
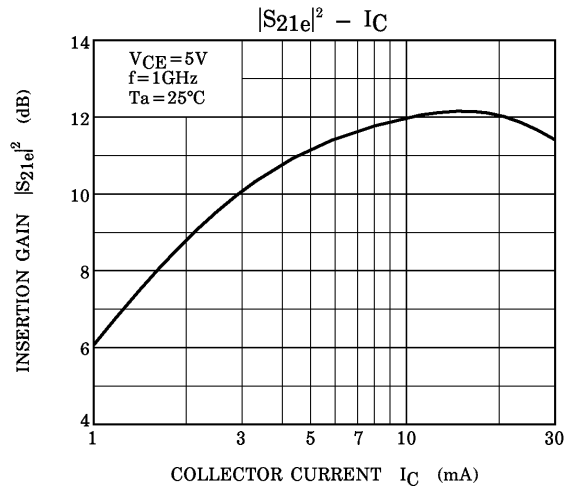
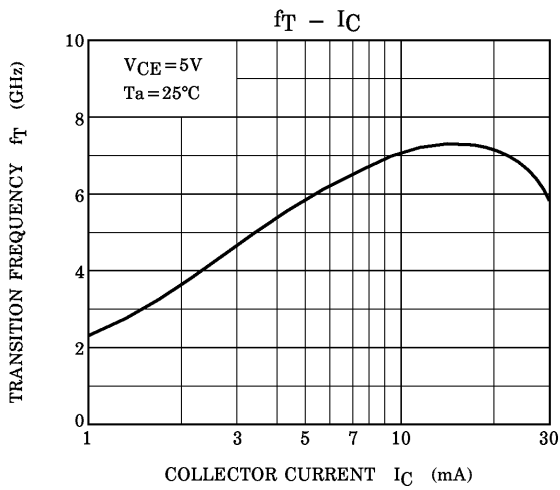
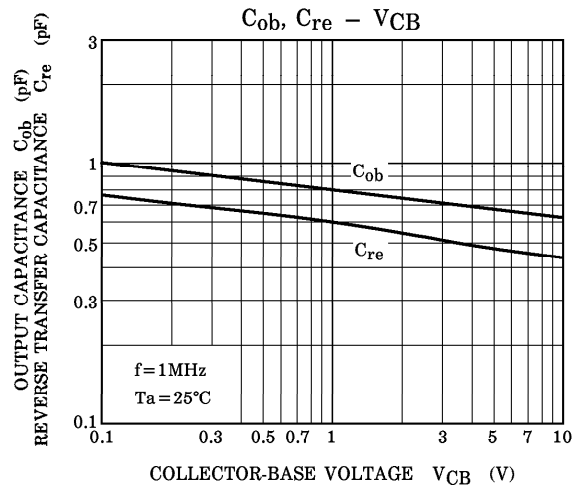
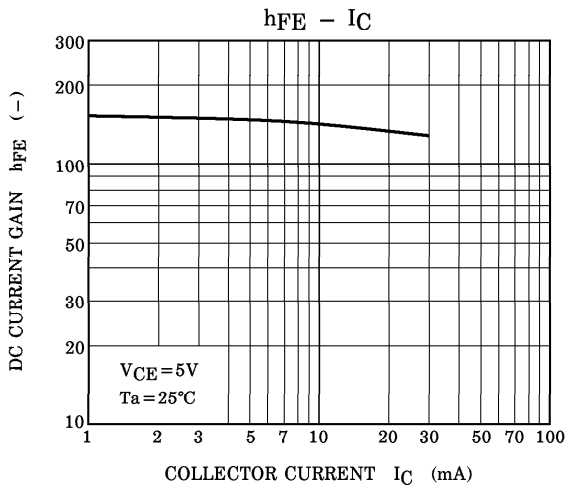
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	$V_{CE}=5V, I_C=10mA$	5	7	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE}=5V, I_C=10mA, f=500MHz$	—	17	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE}=5V, I_C=10mA, f=1GHz$	8.5	12	—	
Noise Figure	NF (1)	$V_{CE}=5V, I_C=3mA, f=500MHz$	—	1	—	dB
	NF (2)	$V_{CE}=5V, I_C=3mA, f=1GHz$	—	1.1	2.0	

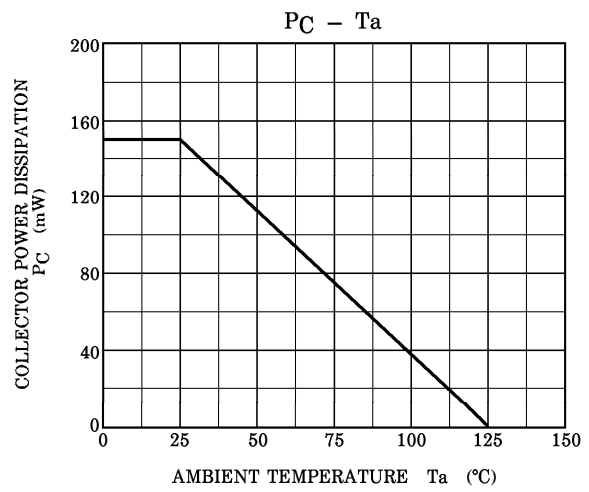
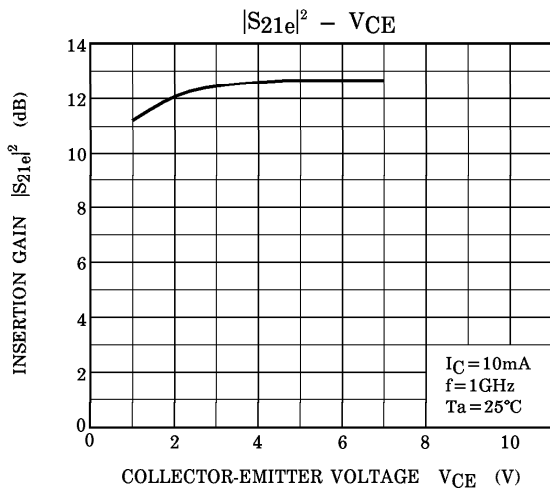
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	$V_{CB}=10V, I_E=0$	—	—	1	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB}=1V, I_C=0$	—	—	1	μA
DC Current Gain	h_{FE} (Note 1)	$V_{CE}=5V, I_C=10mA$	80	—	240	—
Output Capacitance	C_{ob}	$V_{CB}=5V, I_E=0, f=1MHz$	—	0.7	—	pF
Reverse Transfer Capacitance	C_{re}		(Note 2)	—	0.45	0.9

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

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





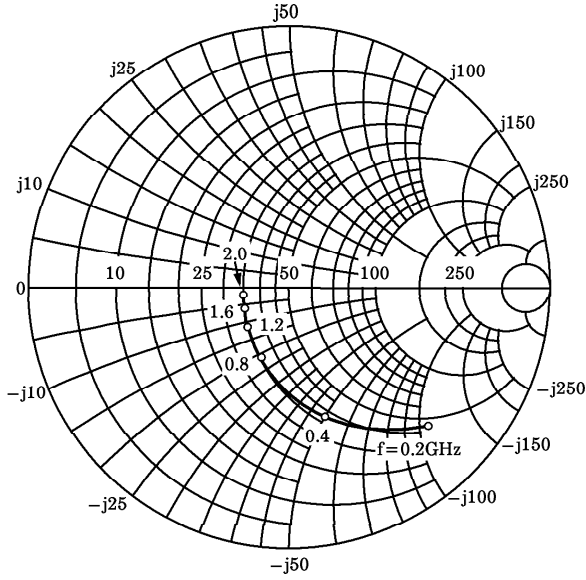
S-Parameter Z_O = 50Ω, T_a = 25°C
V_{CE} = 5V, I_C = 5mA

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.753	-43.7	10.247	140.6	0.040	65.6	0.827	-22.6
400	0.531	-75.1	7.684	117.1	0.060	57.1	0.648	-30.3
600	0.384	-96.4	5.815	103.0	0.074	56.1	0.551	-32.0
800	0.305	-112.6	4.523	93.6	0.086	57.0	0.500	-32.3
1000	0.255	-126.5	3.788	86.3	0.099	58.9	0.472	-32.4
1200	0.224	-138.4	3.244	80.7	0.112	60.2	0.455	-32.2
1400	0.203	-150.1	2.833	75.4	0.127	60.3	0.442	-32.6
1600	0.187	-159.4	2.529	70.6	0.139	60.0	0.434	-33.0
1800	0.174	-166.5	2.283	66.7	0.150	60.3	0.429	-32.6
2000	0.176	-171.2	2.107	63.0	0.164	59.2	0.428	-32.8

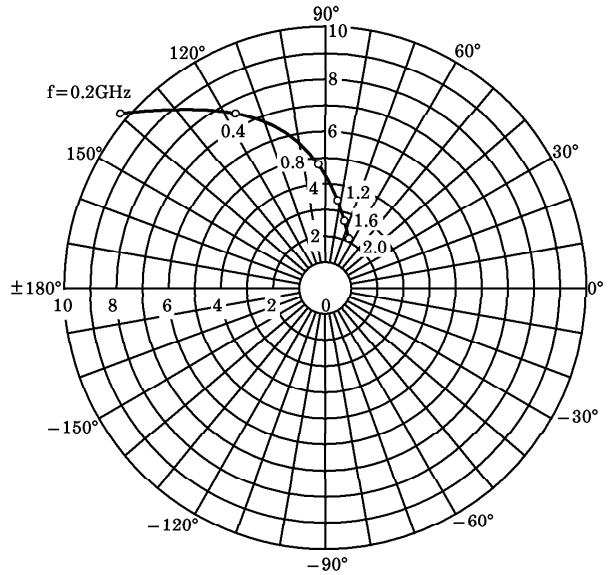
V_{CE} = 5V, I_C = 10mA

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.591	-58.0	14.955	129.6	0.034	64.3	0.714	-27.5
400	0.367	-90.3	9.581	107.5	0.052	61.9	0.534	-30.8
600	0.260	-110.7	6.781	96.1	0.067	63.9	0.462	-30.1
800	0.209	-126.9	5.207	88.6	0.083	65.2	0.428	-29.2
1000	0.178	-141.8	4.269	82.5	0.100	66.4	0.412	-28.6
1200	0.160	-153.7	3.618	77.7	0.117	66.7	0.403	-28.3
1400	0.150	-166.3	3.152	72.7	0.135	65.4	0.398	-28.8
1600	0.141	-175.2	2.801	68.7	0.149	64.0	0.393	-29.4
1800	0.130	178.2	2.521	65.0	0.163	63.4	0.392	-29.0
2000	0.133	174.0	2.314	61.7	0.179	61.3	0.395	-28.6

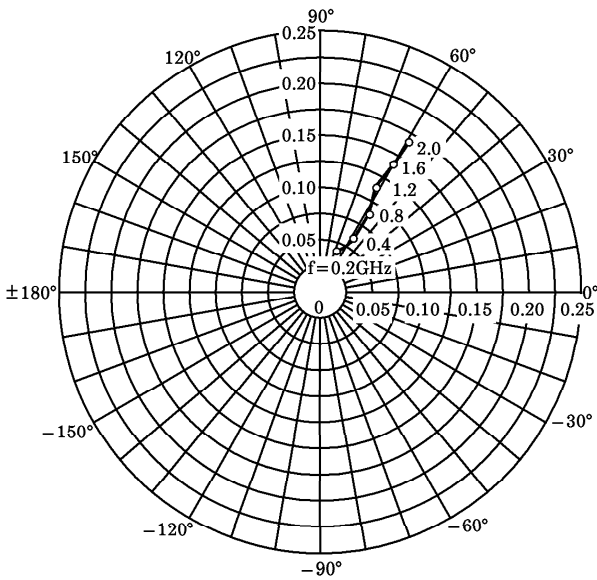
S_{11e}
 V_{CE} = 5V
 I_C = 5mA
 T_a = 25°C
 (UNIT : Ω)



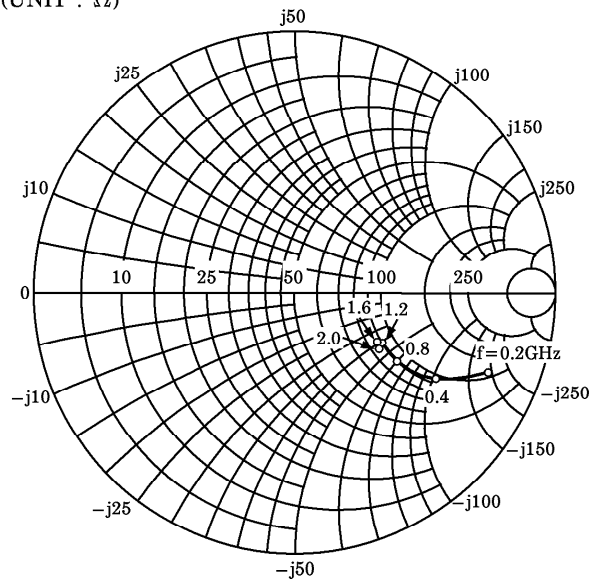
S_{21e}
 V_{CE} = 5V
 I_C = 5mA
 T_a = 25°C



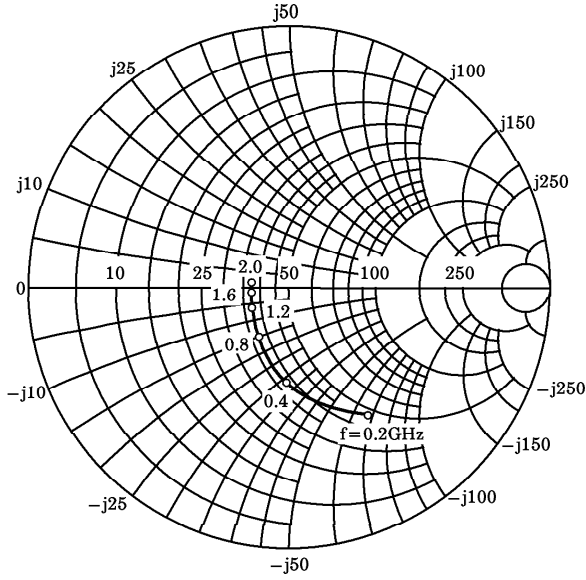
S_{12e}
 V_{CE} = 5V
 I_C = 5mA
 T_a = 25°C



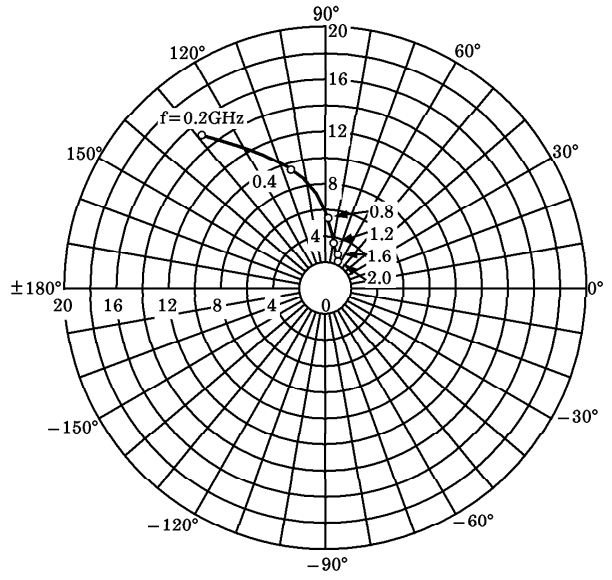
S_{22e}
 V_{CE} = 5V
 I_C = 5mA
 T_a = 25°C
 (UNIT : Ω)



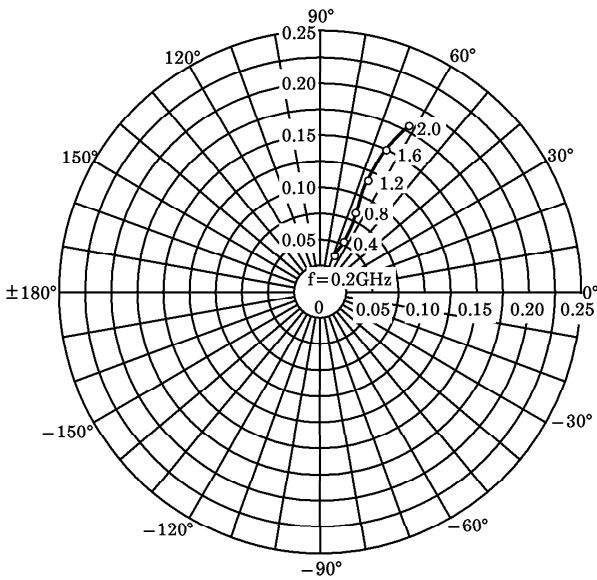
S_{11e}
 V_{CE} = 5V
 I_C = 10mA
 T_a = 25°C
 (UNIT : Ω)



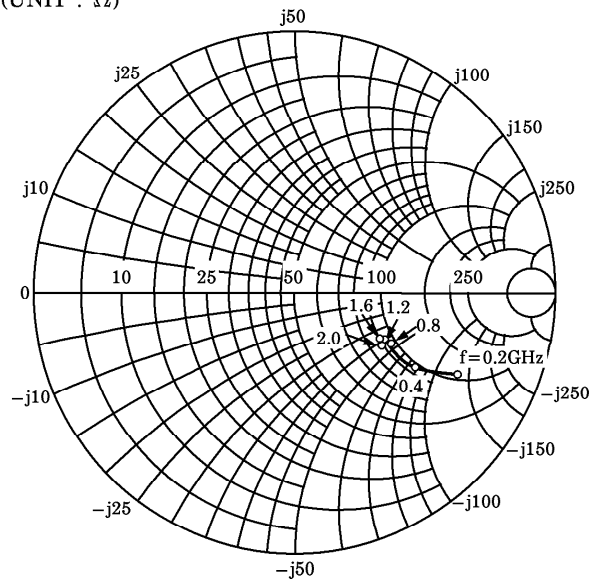
S_{21e}
 V_{CE} = 5V
 I_C = 10mA
 T_a = 25°C



S_{12e}
 V_{CE} = 5V
 I_C = 10mA
 T_a = 25°C



S_{22e}
 V_{CE} = 5V
 I_C = 10mA
 T_a = 25°C
 (UNIT : Ω)



RESTRICTIONS ON PRODUCT USE

000707EAA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.