

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC4317

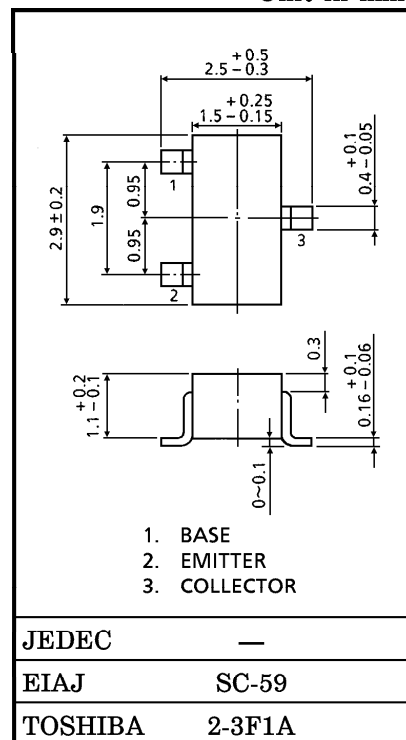
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

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

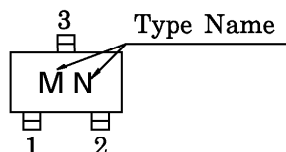
MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	$V_{CB0}$	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	$P_C$	150	mW
Junction Temperature	$T_j$	125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ\text{C}$



Weight : 0.012g

Marking



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

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

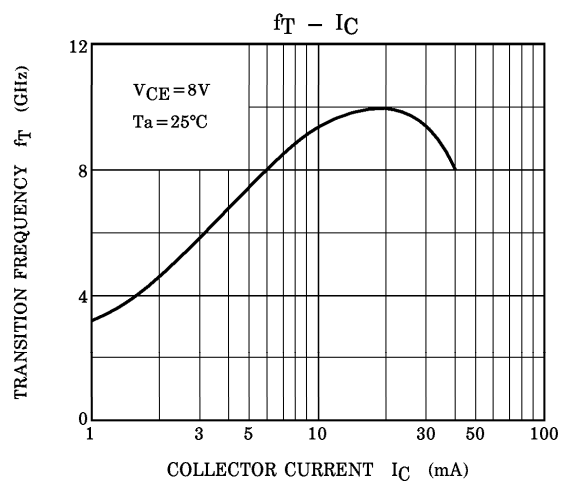
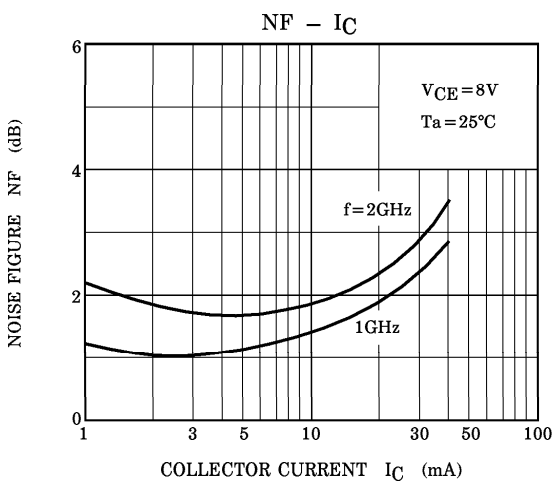
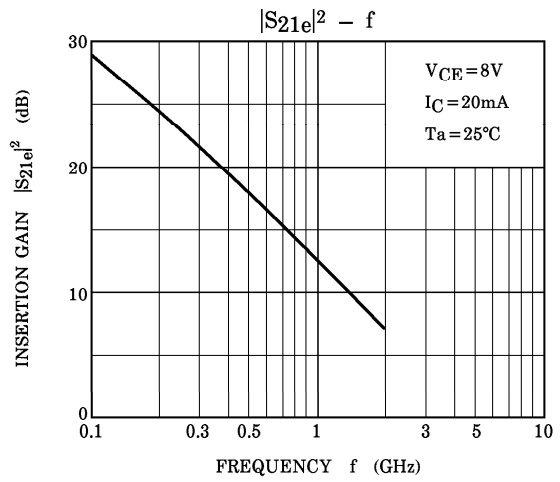
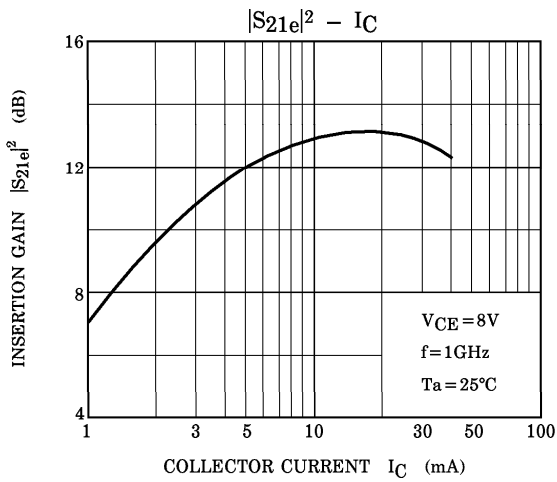
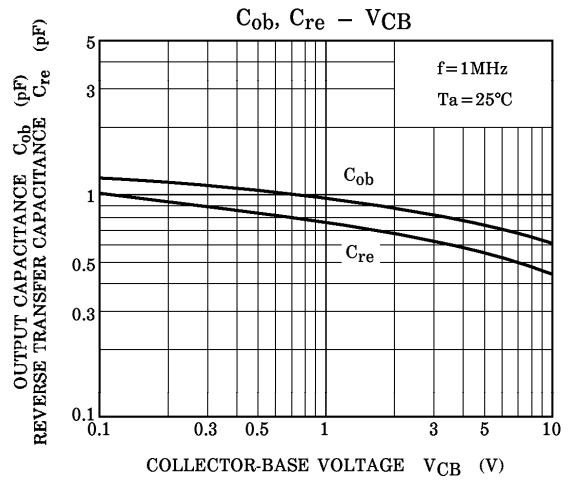
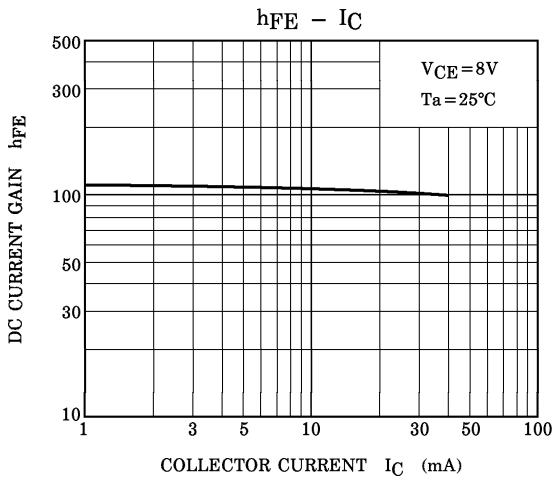
ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

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	$h_{FE}$	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$	50	—	250	—
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$	—	0.65	—	pF
Reverse Transfer Capacitance	$C_{re}$	(Note)	—	0.45	0.9	pF

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

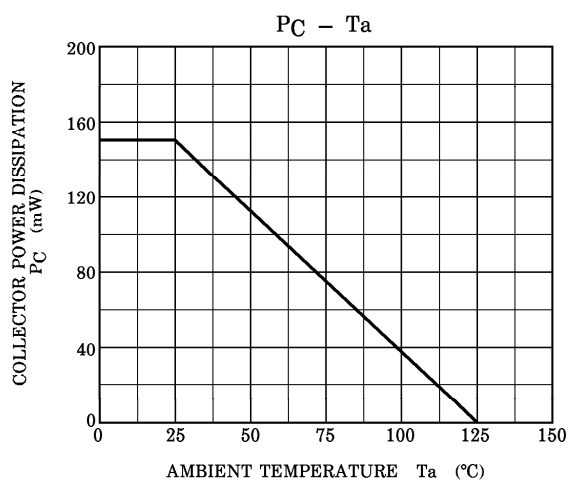
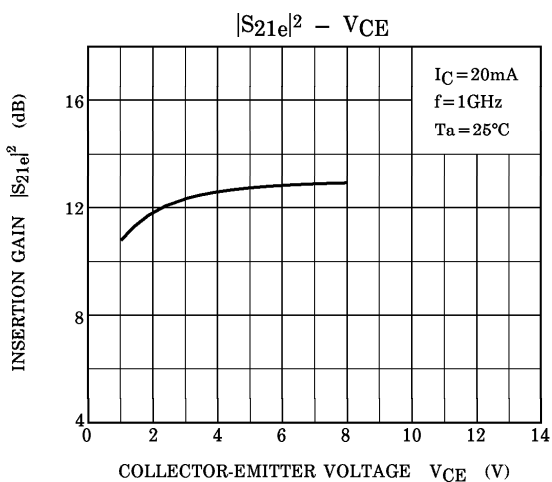
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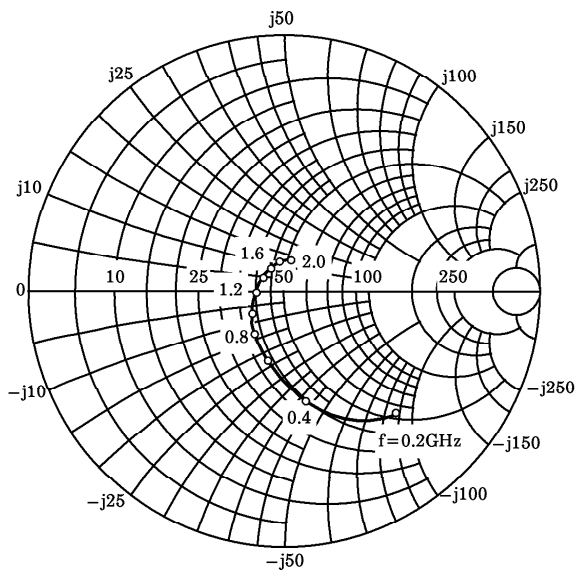
S-PARAMETER  $Z_O = 50\Omega$ ,  $T_a = 25^\circ\text{C}$   
 $V_{CE} = 8\text{V}$ ,  $I_C = 5\text{mA}$

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.649	-46.9	11.454	139.7	0.044	67.8	0.823	-26.1
400	0.426	-78.5	8.028	116.2	0.068	61.0	0.623	-36.4
600	0.282	-100.9	5.965	102.6	0.085	60.4	0.513	-39.5
800	0.192	-122.5	4.688	92.7	0.103	61.5	0.452	-40.3
1000	0.131	-147.7	3.856	85.4	0.121	62.6	0.422	-41.1
1200	0.099	-175.5	3.308	78.9	0.140	63.2	0.406	-42.0
1400	0.096	145.6	2.871	72.7	0.159	63.2	0.404	-43.5
1600	0.091	116.0	2.562	68.0	0.179	63.0	0.402	-45.9
1800	0.111	93.4	2.341	62.9	0.199	62.5	0.406	-49.1
2000	0.115	78.3	2.106	59.5	0.218	62.0	0.409	-53.1

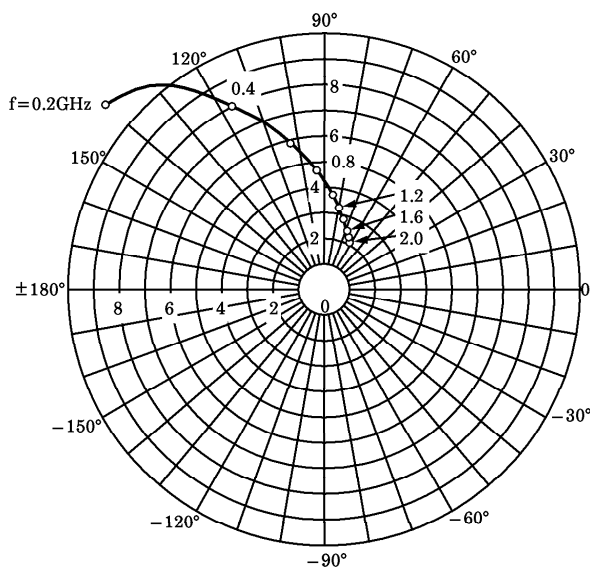
$V_{CE} = 8\text{V}$ ,  $I_C = 20\text{mA}$

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.278	-78.9	18.400	118.0	0.031	71.1	0.586	-33.3
400	0.138	-120.1	10.350	99.6	0.053	73.5	0.426	-32.4
600	0.088	-159.6	7.137	90.4	0.076	74.1	0.379	-30.1
800	0.084	157.2	5.433	83.4	0.100	73.9	0.361	-29.1
1000	0.096	122.5	4.401	78.0	0.123	73.1	0.356	-29.7
1200	0.117	99.7	3.719	73.0	0.147	71.5	0.357	-31.3
1400	0.141	84.9	3.216	67.9	0.170	69.9	0.364	-33.6
1600	0.152	69.0	2.849	63.9	0.192	68.3	0.372	-37.0
1800	0.167	59.2	2.577	59.6	0.215	66.3	0.381	-41.3
2000	0.169	49.4	2.304	56.3	0.235	64.7	0.386	-46.3

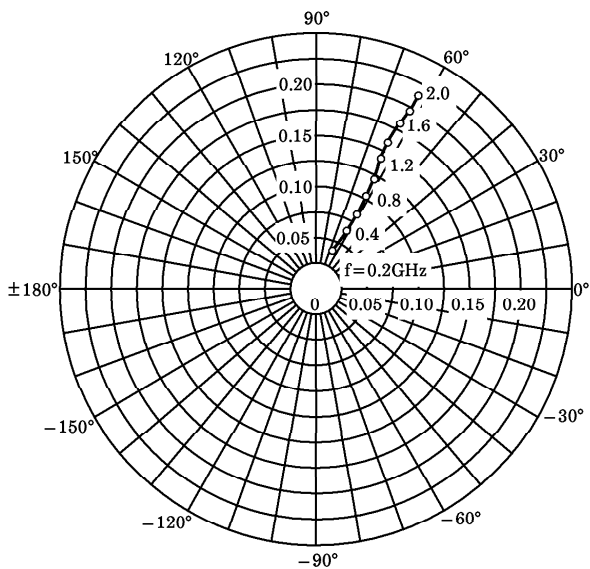
**S<sub>11e</sub>**  
 V<sub>CE</sub>=8V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C  
 (UNIT : Ω)



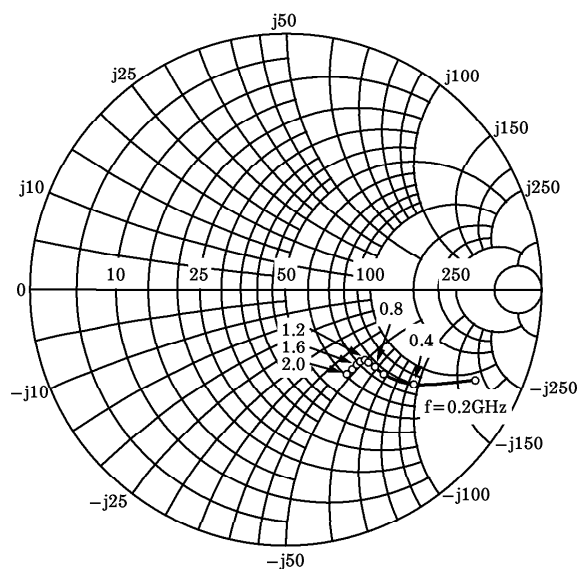
**S<sub>21e</sub>**  
 V<sub>CE</sub>=8V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C



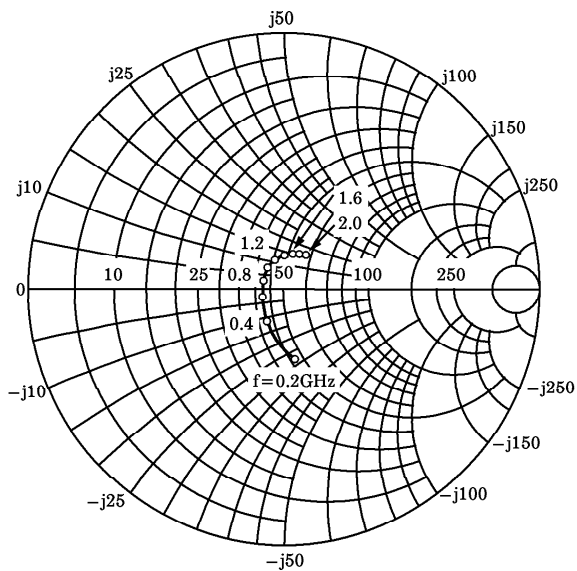
**S<sub>12e</sub>**  
 V<sub>CE</sub>=8V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C



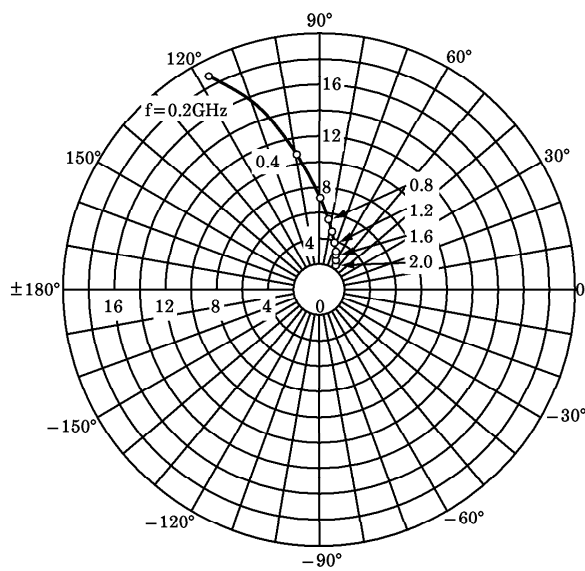
**S<sub>22e</sub>**  
 V<sub>CE</sub>=8V  
 I<sub>C</sub>=5mA  
 T<sub>a</sub>=25°C  
 (UNIT : Ω)



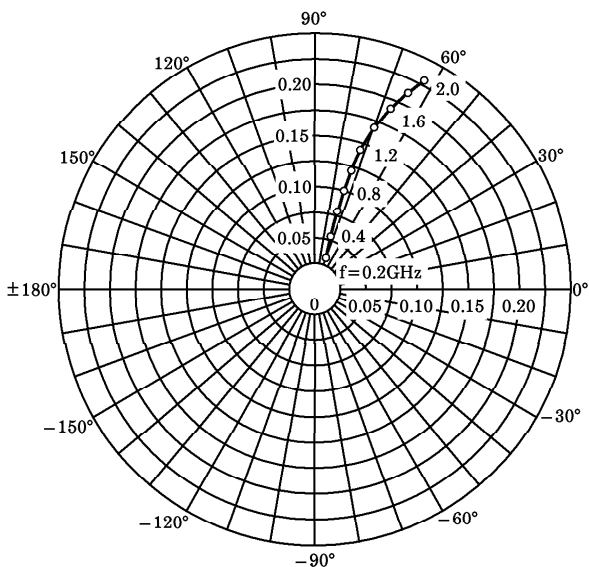
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



**S<sub>21e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C



**S<sub>12e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C



**S<sub>22e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)

