TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

MT4S34U

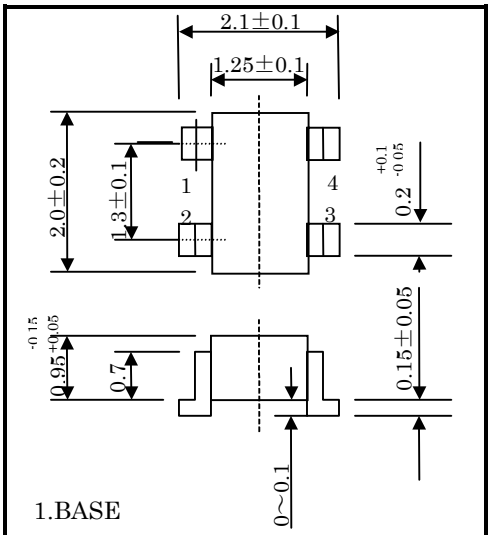
Tentative

VHF-UHF BAND LOW NOISE AMPLIFIER APLICATIONS.

- Low Noise : Figure : NF=1.2dB(at f=2GHz)
- High Gain : $|S21e|^2$=14dB(at f=2GHz)

MAXIMUM RATINGS (Ta=25deg.)

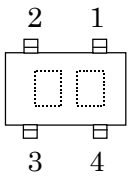
CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CBO}	6	V
Collector-Emitter Voltage	V_{CEO}	3	V
Emitter-Base Voltage	V_{EBO}	1.5	V
Collector-Current	I_C	36	mA
Base Current	I_B	12	mA
Collector Power Dissipation	P_C	100	mW
Junction Temperature	T_j	125	deg
Storage Temperature Range	T_{stg}	-55-125	deg.



1.BASE
2.EMITTER
3.COLLECTOR
4.EMITTER

JEDEC	-
EIAJ	-
TOSHIBA	

MARKING



MICROWAVE CHARACTERISTICS(Ta=25deg.)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	V_{CE}=2V, I_C=20mA	15	19	-	GHz
Insertion Gain	$\|S_{21e}\|^2$	V_{CE}=2V, I_C=20mA, f=2GHz	12	14	17	dB
Noise Figure	NF	V_{CE}=2V, I_C=5mA, f=2GHz	-	1.2	TBD	dB

ELECTRICAL CHARACTERISTICS(Ta=25deg.)

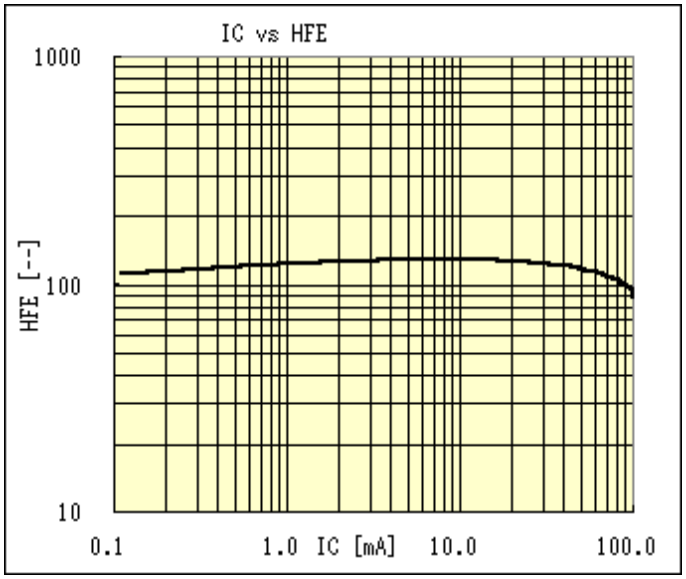
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB}=6V, I_E=0	-	-	1	uA
Emitter Cut-off Current	I_{EBO}	V_{EB}=1V, I_C=0	-	-	1	uA
DC Current Gain	h_{FE}	V_{CE}=2V, I_C=20mA	TBD	TBD	TBD	-
Output Capacitance	Cob	V_{CB}=2V, I_E=0, f=1MHz (Note)	-	0.4	-	pF
Reverse Transistor Capacitance	Cre		-	0.2	-	pF

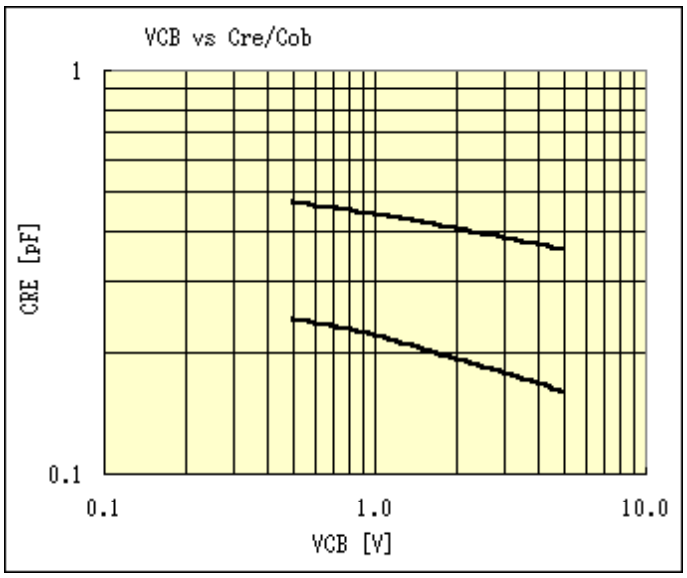
NOTE : C_{re} is measured by 3 terminal method with capacitance bridge

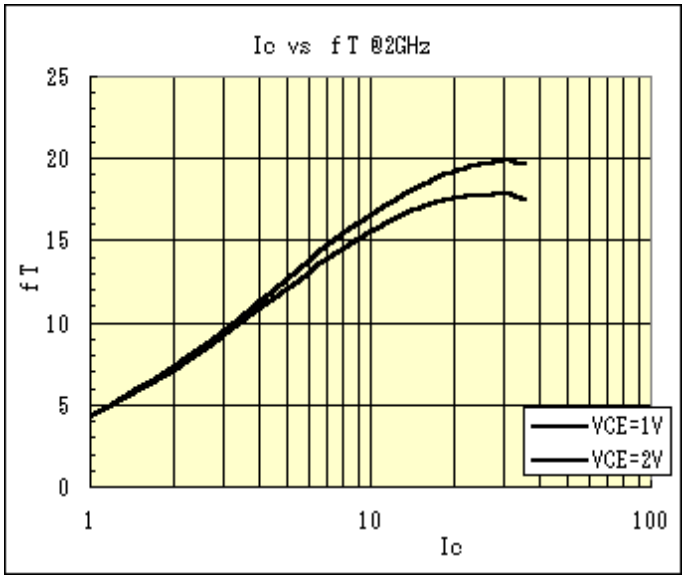
CAUTION

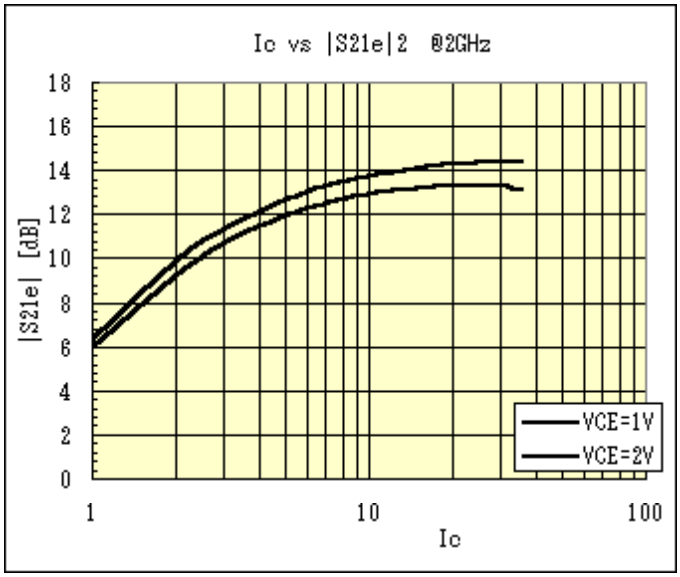
This device is sensitive to electrostatic discharge. Please make each tool and equipment earthed when you handle.

Tentative

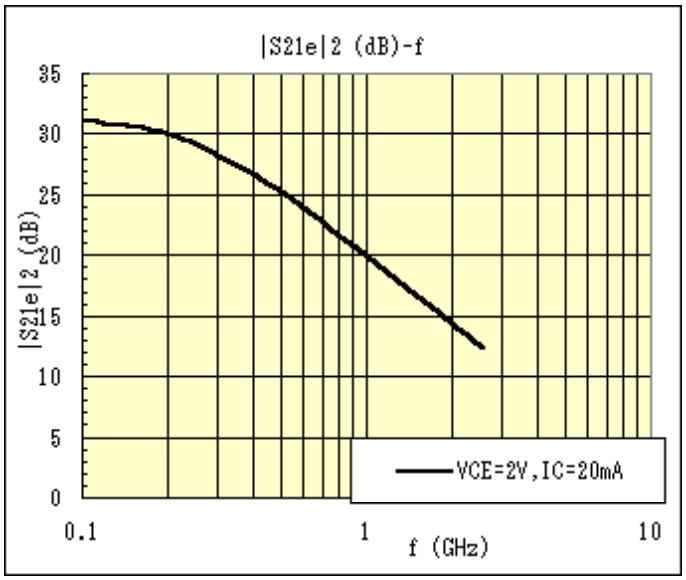

IC vs HFE
1000
100
10
HFE [--]
0.1
1.0
IC [mA]
10.0
100.0

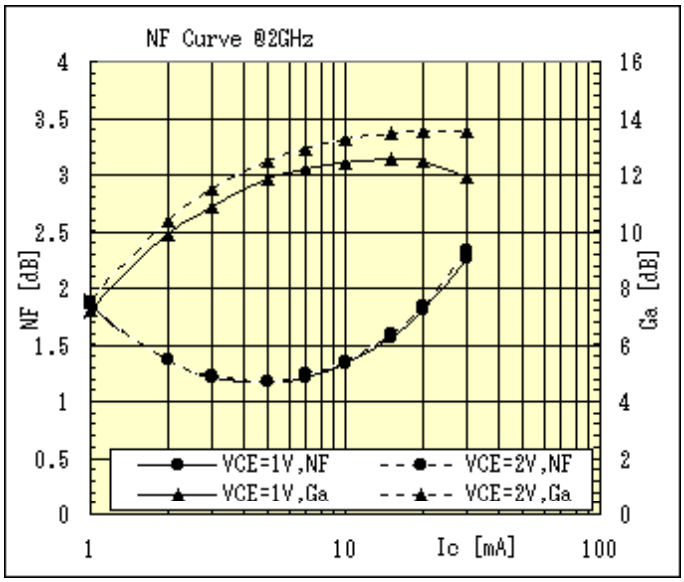

VCB vs Cre/Cob
1
0.1
CRE [pF]
0.1
1.0
10.0
VCB [V]

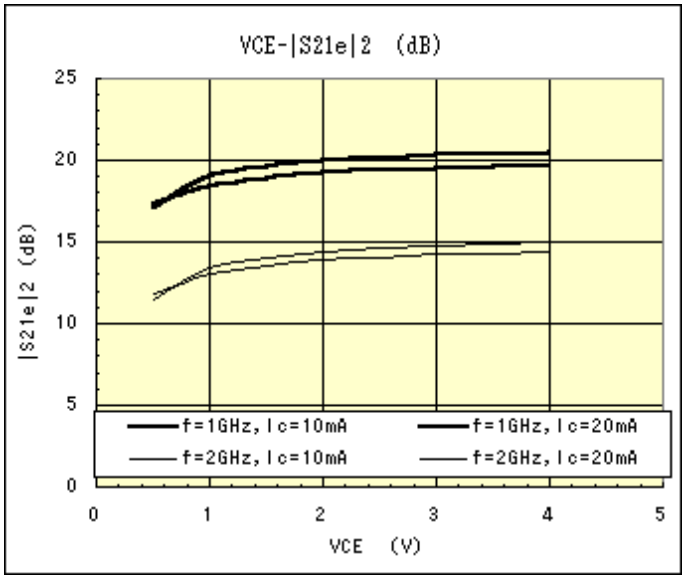

Ic vs fT @2GHz
25
20
15
10
5
0
fT
1
10
100
Ic
VCE=1V
VCE=2V


Ic vs |S21e|2 @2GHz
18
16
14
12
10
8
6
4
2
0
|S21e| [dB]
1
10
100
Ic
VCE=1V
VCE=2V

Tentative


|S21e|2 (dB)-f
|S21e|2 (dB)
35
30
25
20
15
10
5
0
0.1
1
10
f (GHz)
VCE=2V,IC=20mA


NF Curve @2GHz
NF [dB]
Ga [dB]
4
3.5
3
2.5
2
1.5
1
0.5
0
16
14
12
10
8
6
4
2
0
1
10
Ic [mA]
100
VCE=1V,NF
VCE=2V,NF
VCE=1V,Ga
VCE=2V,Ga


VCE-|S21e|2 (dB)
|S21e|2 (dB)
25
20
15
10
5
0
0
1
2
3
4
5
VCE (V)
f=1GHz,Ic=10mA
f=1GHz,Ic=20mA
f=2GHz,Ic=10mA
f=2GHz,Ic=20mA

Tentative

S-Parameter Zo=50ohm, Ta=25deg.

VCE=2V, IC=20mA

Freq.	S11		S21		S12		S22	
GHz	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
0.1	0.639	-29.12	36.68	157.01	0.011	95.39	0.916	-18.45
0.2	0.579	-56.22	31.65	139.46	0.021	70.61	0.795	-34.89
0.3	0.506	-77.39	26.08	126.17	0.027	63.65	0.661	-46.48
0.4	0.454	-93.98	21.72	116.85	0.033	60.81	0.549	-54.16
0.5	0.416	-106.97	18.32	109.78	0.038	58.49	0.469	-59.51
0.6	0.389	-117.92	15.78	104.56	0.041	57.58	0.407	-63.17
0.7	0.367	-126.75	13.81	100.18	0.045	57.97	0.357	-65.95
0.8	0.355	-134.39	12.25	96.36	0.049	57.66	0.317	-68.12
0.9	0.344	-140.83	11.03	93.16	0.053	59.20	0.285	-70.08
1.0	0.341	-146.41	10.03	90.31	0.058	58.58	0.261	-71.67
1.1	0.334	-151.78	9.16	87.64	0.062	58.69	0.241	-73.42
1.2	0.332	-156.22	8.45	85.16	0.066	58.67	0.224	-73.93
1.3	0.327	-160.43	7.85	82.76	0.070	58.84	0.208	-75.41
1.4	0.325	-164.29	7.32	80.62	0.075	57.34	0.195	-76.83
1.5	0.325	-167.62	6.88	78.44	0.079	57.90	0.183	-78.53
1.6	0.324	-170.88	6.48	76.61	0.083	56.77	0.176	-79.25
1.7	0.323	-173.87	6.11	74.41	0.088	56.61	0.167	-80.61
1.8	0.320	-176.61	5.78	72.44	0.092	55.69	0.162	-82.12
1.9	0.319	-179.41	5.48	70.58	0.096	54.14	0.153	-84.19
2.0	0.323	177.97	5.26	68.87	0.100	54.44	0.147	-85.06
2.1	0.325	174.90	5.04	67.44	0.105	53.90	0.141	-85.63
2.2	0.324	172.58	4.81	65.82	0.109	53.31	0.136	-87.47
2.3	0.323	170.03	4.60	63.83	0.113	52.79	0.131	-87.93
2.4	0.324	167.43	4.44	61.75	0.117	52.14	0.129	-88.79
2.5	0.325	164.48	4.33	60.29	0.121	51.13	0.125	-90.28
2.6	0.328	162.66	4.16	59.14	0.125	50.22	0.121	-91.13