TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5098

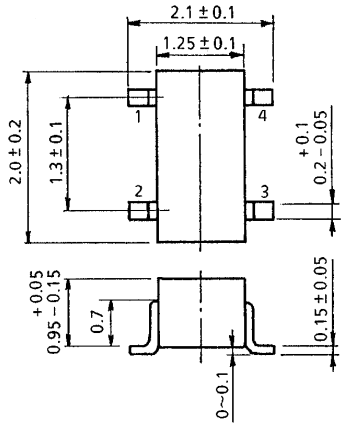
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

- Low Noise Figure, High Gain.
- NF = 1.8dB, $|S_{21e}|^2$ = 10dB (f = 2GHz)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	10	V
Emitter-Base Voltage	V_{EBO}	1.5	V
Base Current	I_B	7	mA
Collector Current	I_C	15	mA
Collector Power Dissipation	P_C	100	mW
Junction Temperature	T_j	125	°C
Storage Temperature Range	T_{stg}	−55~125	°C

Unit in mm



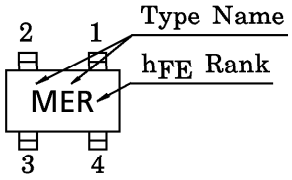
1, 3. EMITTER
2. BASE
4. COLLECTOR

USQ

JEDEC	—
EIAJ	—
TOSHIBA	2-2K1A

Weight : 0.006g

MARKING



MICROWAVE CHARACTERISTICS (Ta = 25°C)

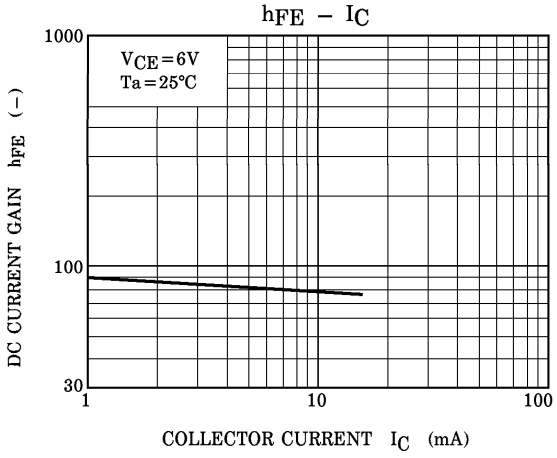
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	V_{CE} = 6V, I_C = 7mA	7	10	—	GHz
Insertion Gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 6V, I_C = 7mA, f = 1GHz	12.5	15.5	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 6V, I_C = 7mA, f = 2GHz	7	10	—	
Noise Figure	NF (1)	V_{CE} = 6V, I_C = 3mA, f = 1GHz	—	1.3	2.5	dB
	NF (2)	V_{CE} = 6V, I_C = 3mA, f = 2GHz	—	1.8	3.0	

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

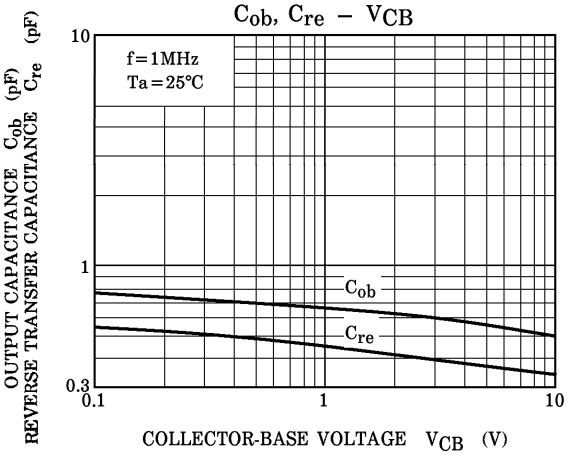
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 10V, I_E = 0	—	—	1	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1V, I_C = 0	—	—	1	μA
DC Current Gain	h_{FE} (Note 1)	V_{CE} = 6V, I_C = 7mA	50	—	160	—
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 1MHz	—	0.5	0.9	pF
Reverse Transfer Capacitance	C_{re}	(Note 2)	—	0.34	0.75	pF

(Note 1) h_{FE} Classification R : 50~100, O : 80~160
(Note 2) C_{re} is measured by 3 terminal method with capacitance bridge.

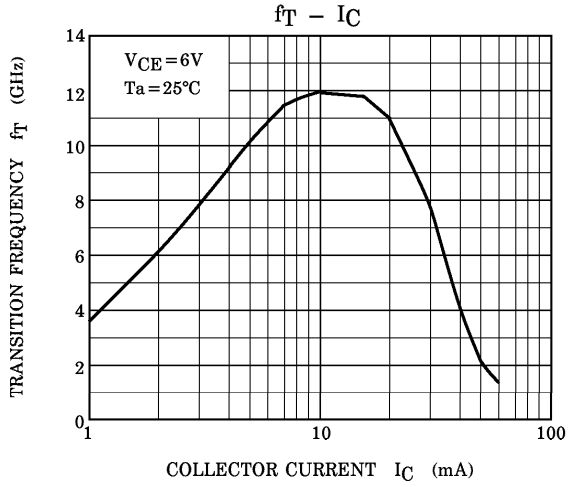
h_{FE} – I_C



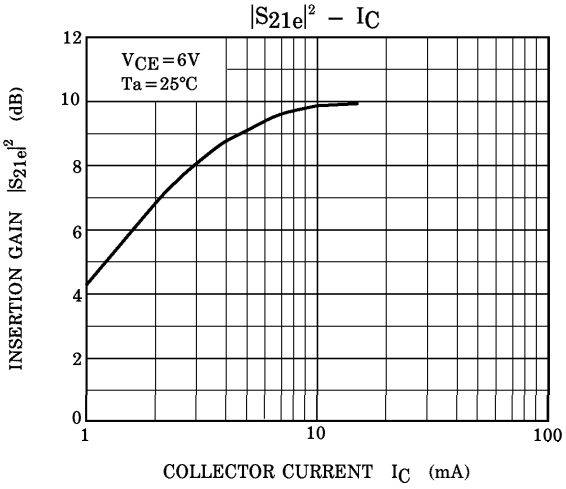
C_{ob}, C_{re} – V_{CB}



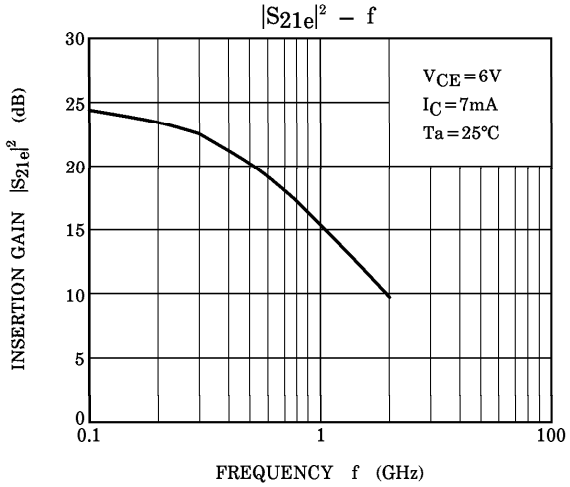
f_T – I_C



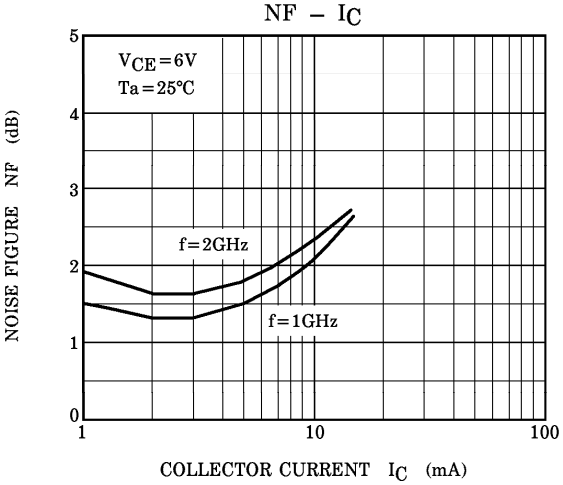
$|S_{21e}|^2$ – I_C

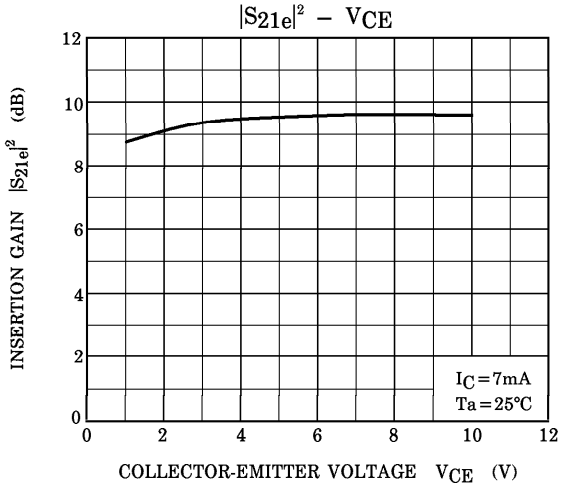


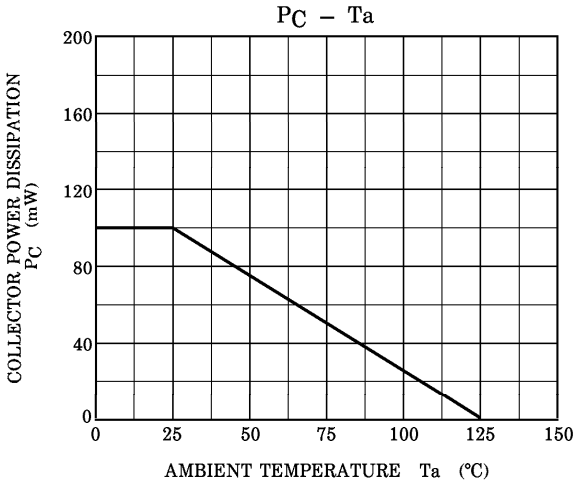
$|S_{21e}|^2$ – f



NF – I_C







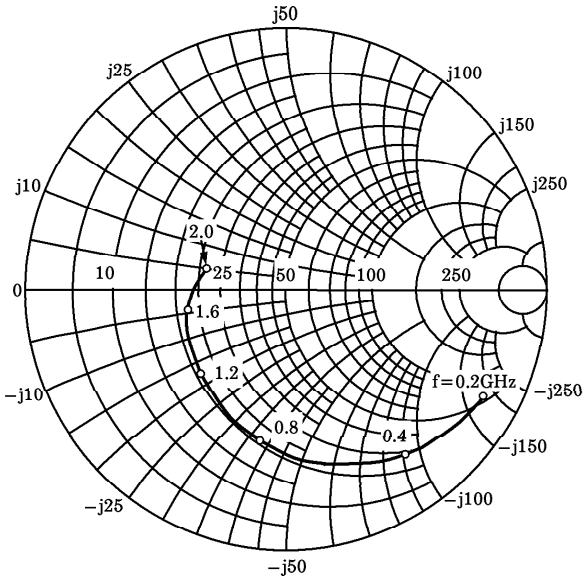
S-Parameter $Z_O = 50\Omega$, Ta = 25°C
V_{CE} = 5V, I_C = 5mA

frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.870	−27.8	8.387	159.6	0.041	76.0	0.962	−20.1
400	0.791	−54.0	7.700	141.8	0.074	63.5	0.876	−38.7
600	0.692	−77.8	6.701	125.7	0.097	54.2	0.774	−54.4
800	0.599	−99.2	5.798	112.6	0.113	47.9	0.677	−67.7
1000	0.518	−118.1	4.928	102.0	0.122	43.8	0.596	−78.6
1200	0.462	−135.9	4.239	93.5	0.129	40.7	0.524	−87.8
1400	0.406	−151.0	3.692	86.5	0.132	39.7	0.463	−95.9
1600	0.376	−166.0	3.256	80.5	0.137	39.6	0.420	−102.4
1800	0.334	179.9	2.897	75.9	0.143	39.9	0.382	−107.7
2000	0.305	166.3	2.623	71.3	0.147	40.7	0.350	−111.0

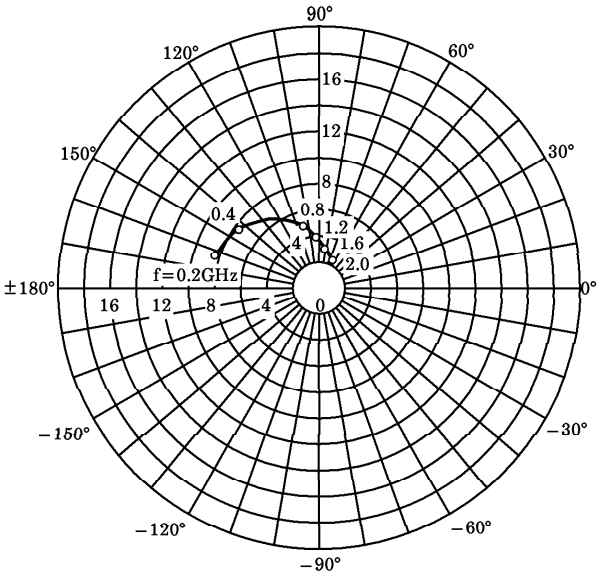
V_{CE} = 5V, I_C = 10mA

frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.737	−42.4	14.597	150.5	0.037	70.4	0.900	−28.4
400	0.625	−77.4	11.757	128.3	0.060	58.8	0.735	−50.2
600	0.521	−105.4	9.204	112.6	0.074	52.5	0.600	−65.3
800	0.455	−128.8	7.420	101.5	0.085	50.0	0.503	−77.3
1000	0.412	−147.7	6.078	92.9	0.093	49.5	0.433	−86.9
1200	0.388	−165.4	5.105	86.1	0.100	49.3	0.376	−95.4
1400	0.370	179.0	4.377	80.9	0.108	50.4	0.330	−102.8
1600	0.360	165.6	3.855	76.2	0.116	51.4	0.295	−108.7
1800	0.348	151.3	3.441	72.3	0.126	52.3	0.265	−113.4
2000	0.333	137.7	3.114	68.4	0.135	53.2	0.238	−115.5

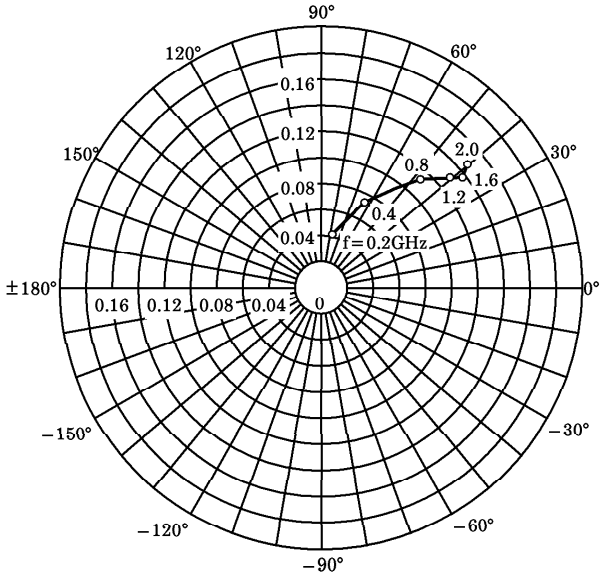
S_{11e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C
(Unit : Ω)



S_{21e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



S_{12e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



S_{22e}
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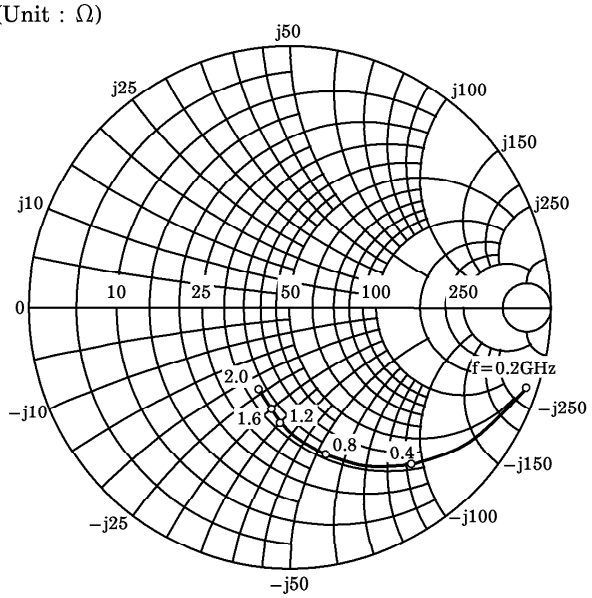
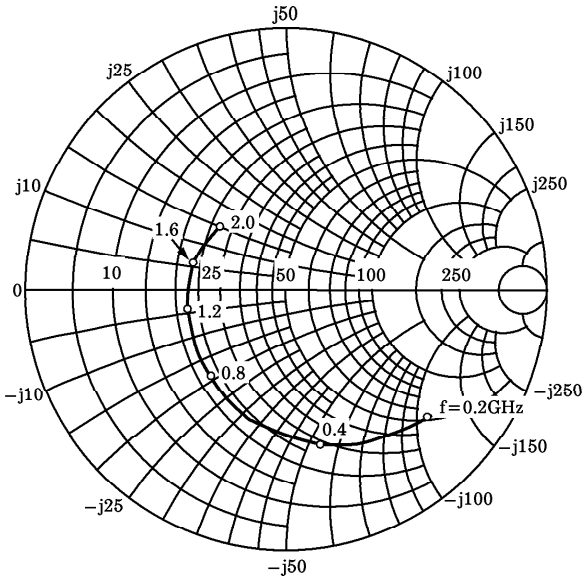
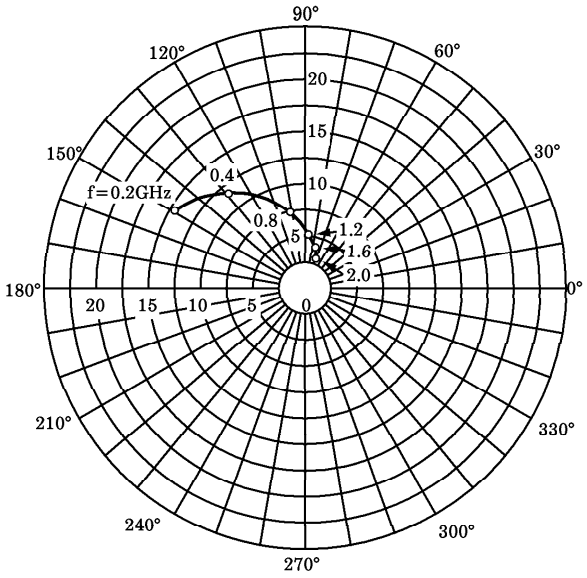
I_C = 3mA
Ta = 25°C
(Unit : Ω)



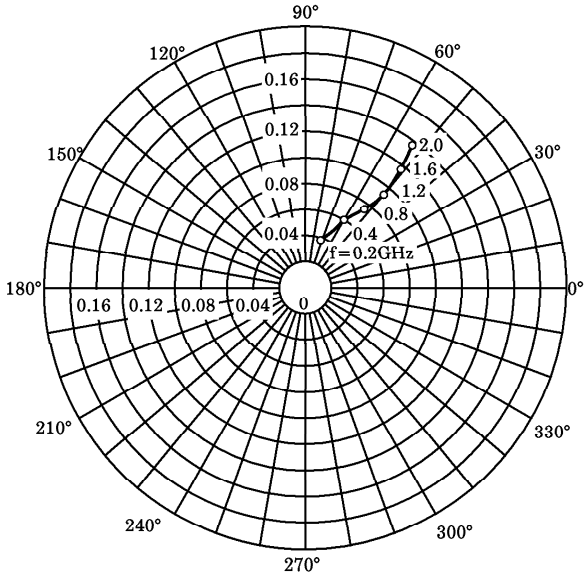
S_{11e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C
(Unit : Ω)



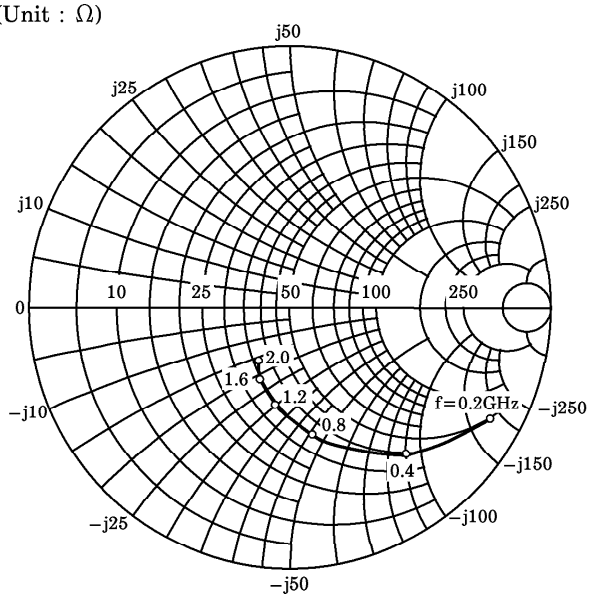
S_{21e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C



S_{12e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C



S_{22e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C
(Unit : Ω)



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