

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

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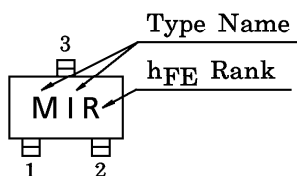
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

- Low Noise Figure : NF=1.7dB (f=2GHz)
- High Gain : Gain=8.5dB (f=2GHz)

MAXIMUM RATINGS (T_a = 25°C)

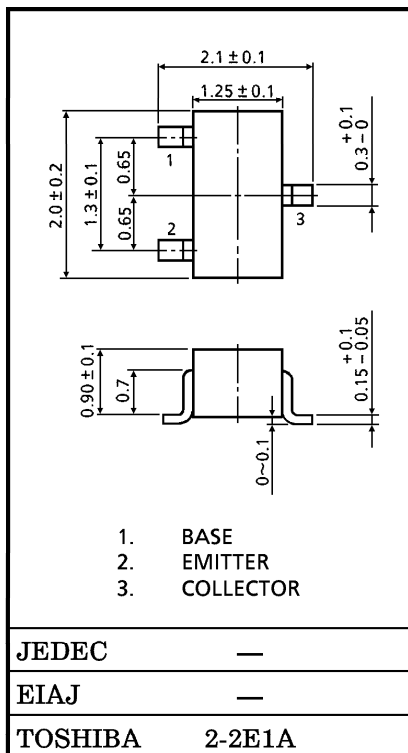
CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CB0}	15	V
Collector-Emitter Voltage	V_{CEO}	7	V
Emitter-Base Voltage	V_{EB0}	1.5	V
Collector Current	I_C	15	mA
Base Current	I_B	7	mA
Collector Power Dissipation	P_C	100	mW
Junction Temperature	T_j	125	°C
Storage Temperature Range	T_{stg}	-55~125	°C

MARKING



MICROWAVE CHARACTERISTICS (Ta = 25°C)

Unit in mm



Weight : 6mg

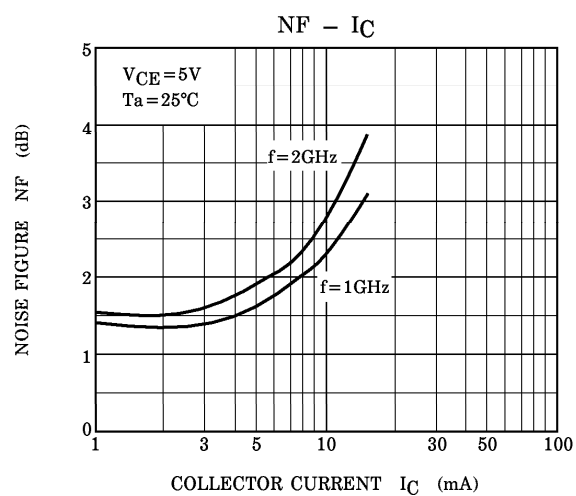
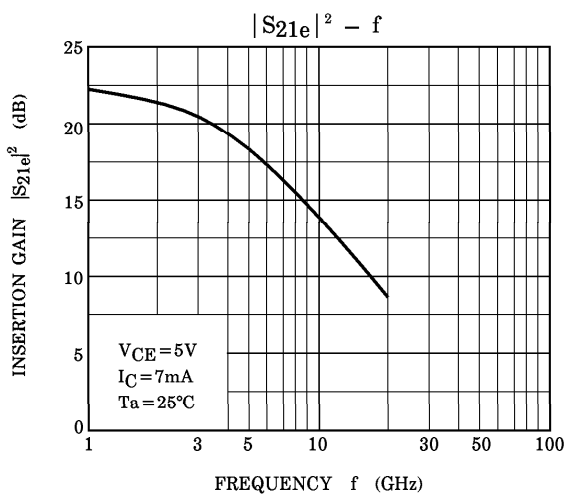
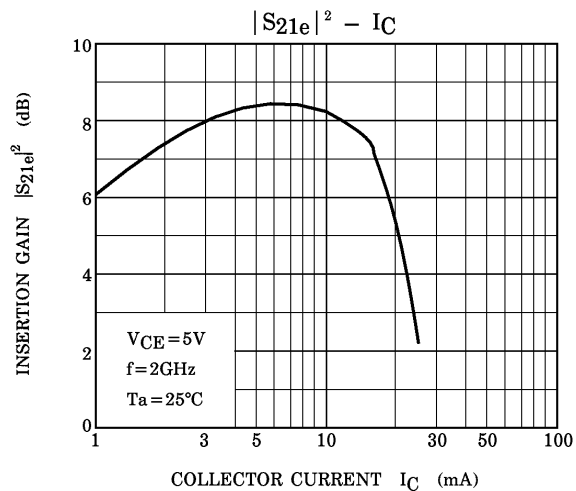
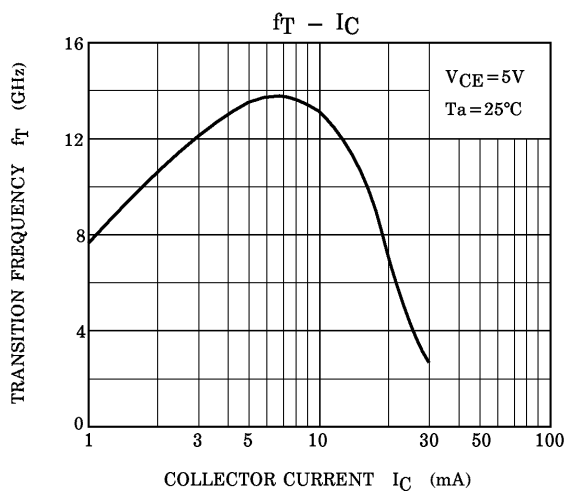
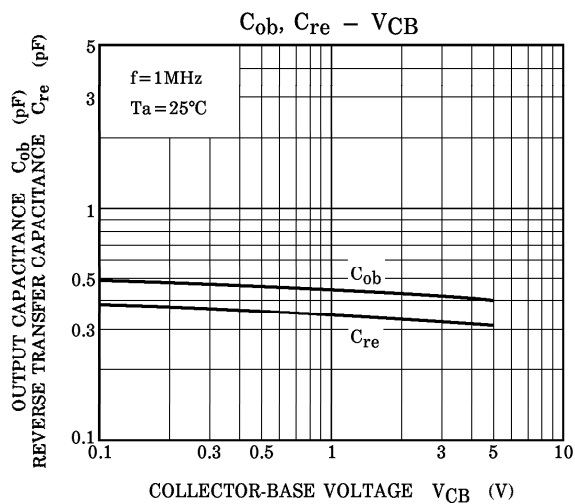
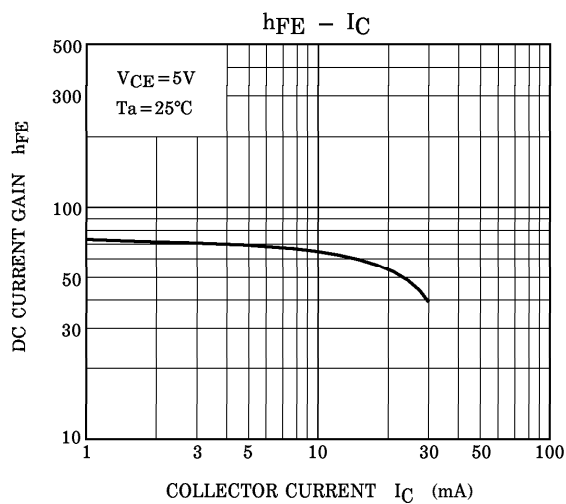
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	$V_{CE}=5V, I_C=7mA$	9	12	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE}=5V, I_C=7mA, f=1GHz$	11.5	14.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE}=5V, I_C=7mA, f=2GHz$	5.5	8.5	—	
Noise Figure	NF (1)	$V_{CE}=5V, I_C=3mA, f=1GHz$	—	1.3	—	dB
	NF (2)	$V_{CE}=5V, I_C=3mA, f=2GHz$	—	1.7	3	

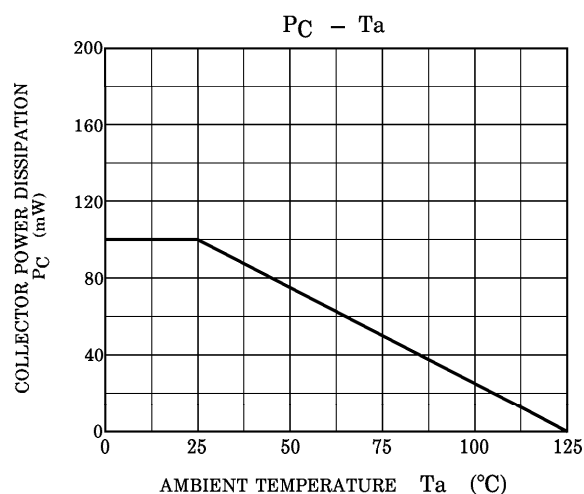
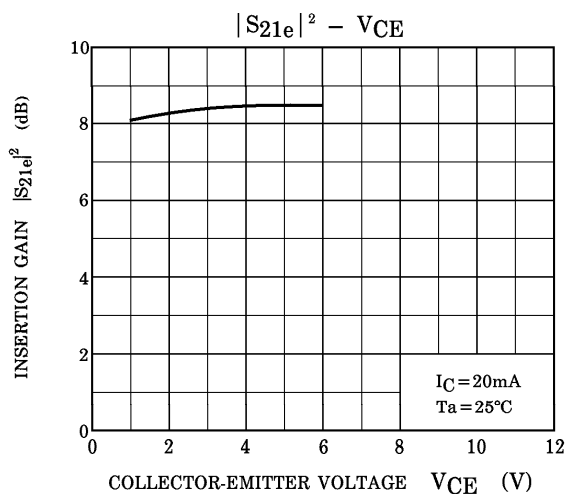
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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)	$V_{CE}=5V, I_C=7mA$	50	—	160	—
Output Capacitance	C_{ob}	$V_{CB}=5V, I_E=0, f=1MHz$ (Note 2)	—	0.4	—	pF
Reverse Transfer Capacitance	C_{re}		—	0.3	0.7	pF

(Note 1) : hFF Classification R : 50~100, O : 80~160

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





S-PARAMETER $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 5\text{V}$, $I_C = 3\text{mA}$

FREQUENCY (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.845	-20.2	7.567	159.8	0.037	80.6	0.942	-16.8
400	0.76	-39.4	6.813	142.4	0.069	74	0.861	-31.3
600	0.656	-55.7	5.892	127.9	0.094	69.5	0.767	-42.6
800	0.562	-70.4	5.164	115.9	0.116	67	0.684	-51.7
1000	0.479	-82.5	4.471	106.3	0.134	65.6	0.61	-59.6
1200	0.405	-92.7	3.928	97.8	0.151	64.6	0.553	-65.9
1400	0.349	-104	3.47	90.9	0.167	64.3	0.502	-71.4
1600	0.297	-111.7	3.11	85.3	0.184	64.4	0.462	-76.1
1800	0.251	-118.6	2.792	80.2	0.201	64.5	0.428	-79.8
2000	0.214	-125	2.545	75.5	0.218	64.7	0.398	-82.4

$V_{CE} = 5\text{V}$, $I_C = 7\text{mA}$

FREQUENCY (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.69	-29.5	11.905	149.2	0.033	78.1	0.884	-21.7
400	0.547	-52.5	9.332	127.8	0.058	73.2	0.74	-35.6
600	0.434	-68	7.272	113.7	0.079	72.1	0.634	-43.8
800	0.353	-81.7	5.932	103.6	0.1	71.9	0.563	-49.8
1000	0.295	-92.3	4.926	96	0.118	72.2	0.509	-55.5
1200	0.246	-102.3	4.229	89	0.138	72.1	0.469	-60.2
1400	0.209	-114.4	3.687	83.6	0.158	71.9	0.436	-64.5
1600	0.169	-123.5	3.280	78.9	0.178	71.7	0.41	-68.3
1800	0.136	-129.5	2.931	74.8	0.198	71.4	0.388	-71.4
2000	0.112	-138.1	2.657	70.7	0.218	71.1	0.371	-73.7

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