

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5109

FOR VCO APPLICATION

Unit in mm

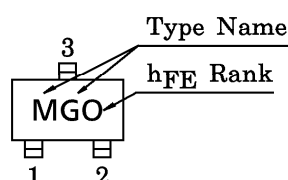
MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CB0}	20	V
Collector-Emitter Voltage	V_{CEO}	10	V
Emitter-Base Voltage	V_{EBO}	3	V
Base Current	I_B	30	mA
Collector Current	I_C	60	mA
Collector Power Dissipation	P_C	150	mW
Junction Temperature	T_j	125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	$-55 \sim 125$	$^\circ\text{C}$

		1. BASE 2. EMITTER 3. COLLECTOR
JEDEC	—	
EIAJ	SC-59	
TOSHIBA	2-3F1A	

Weight : 0.012g

MARKING

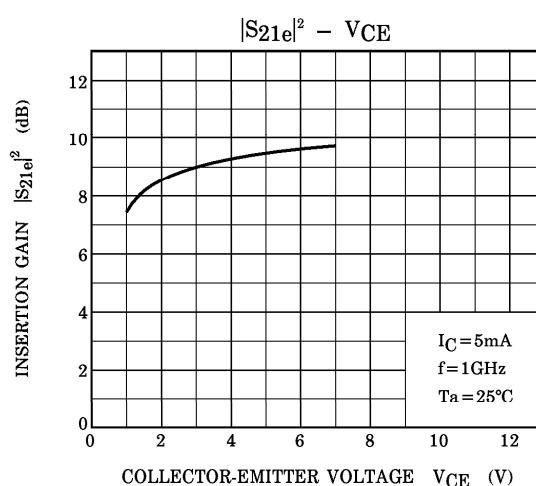
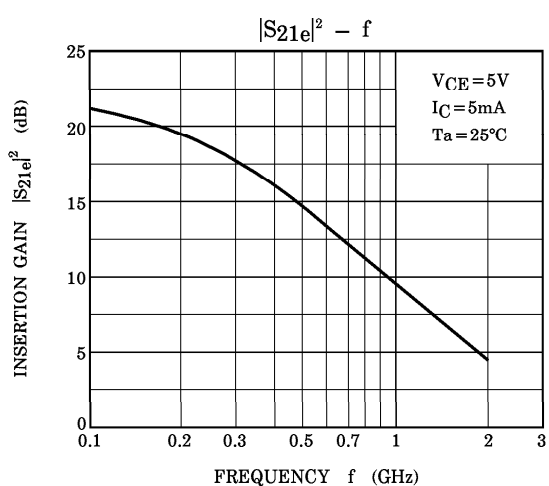
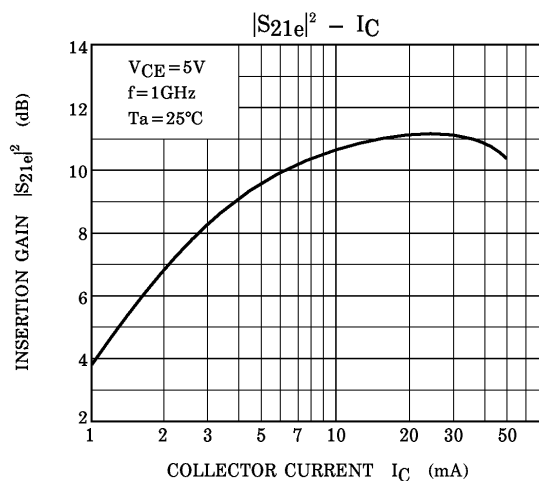
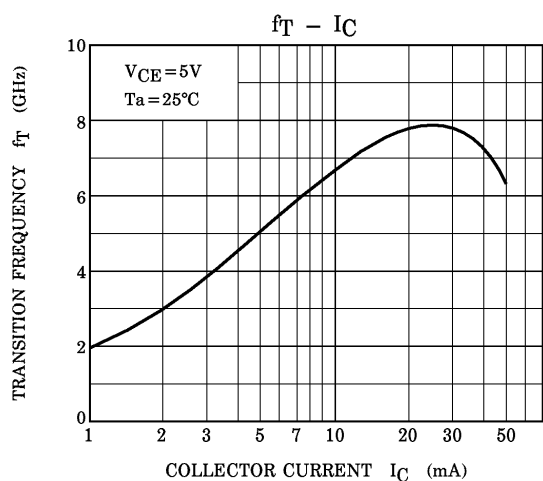
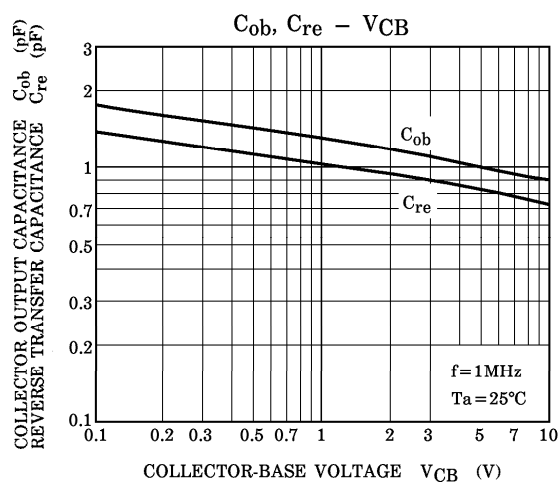
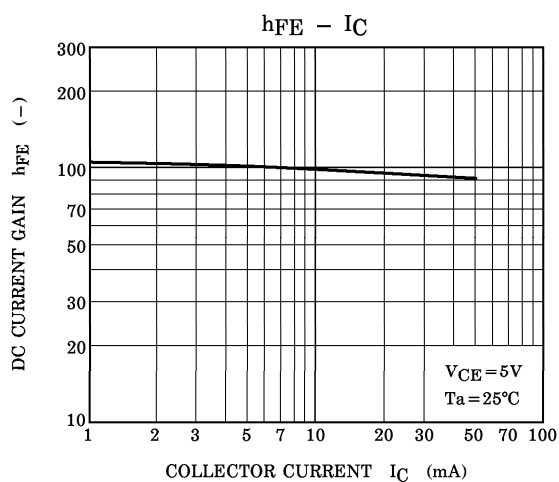
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	$V_{CB} = 10\text{V}, I_E = 0$	—	—	0.1	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{V}, I_C = 0$	—	—	0.1	μA
DC Current Gain	h_{FE} (Note 1)	$V_{CE} = 5\text{V}, I_C = 5\text{mA}$	80	—	240	—
Transition Frequency	f_T	$V_{CE} = 5\text{V}, I_C = 5\text{mA}$	4	6	—	GHz
Insertion Gain	$ S_{21e} ^2$	$V_{CE} = 5\text{V}, I_C = 5\text{mA}, f = 1\text{GHz}$	7	11	—	dB
Output Capacitance	C_{ob}	$V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$ (Note 2)	—	0.7	—	pF
Reverse Transfer Capacitance	C_{re}		—	0.5	0.9	pF
Collector-Base Time Constant	$C_c \cdot r_{bb'}$	$V_{CB} = 5\text{V}, I_C = 3\text{mA}, f = 30\text{MHz}$	—	5.5	10	ps

(Note 1) h_{FE} Classification O : 80~160, Y : 120~240(Note 2) C_{re} is measured by 3 terminal method with capacitance bridge.

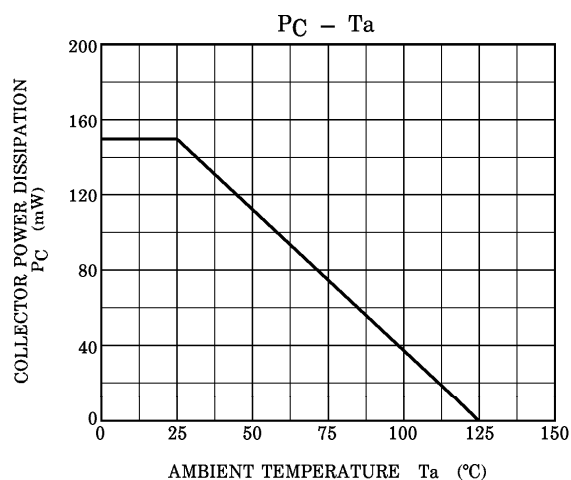
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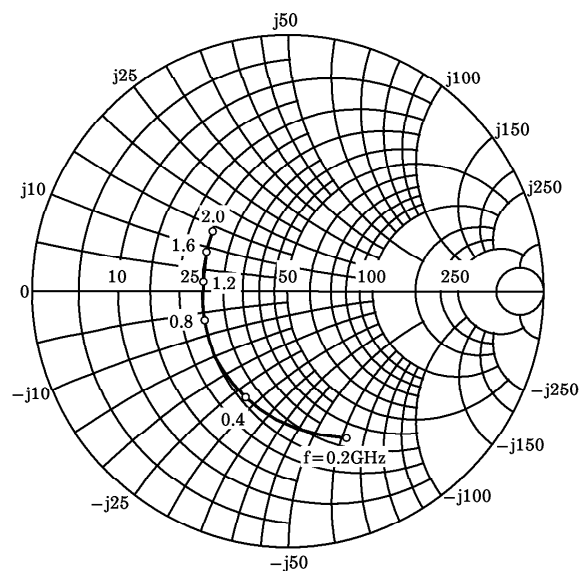


S-Parameter $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$

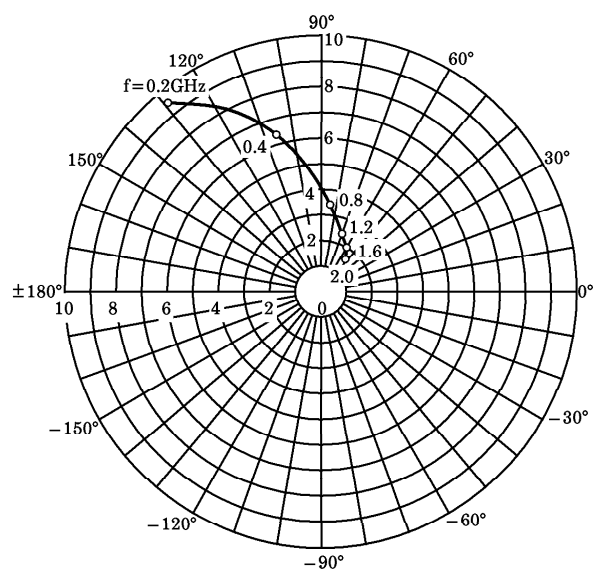
$V_{CE} = 5\text{V}$, $I_C = 5\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.631	-67.7	9.526	129.8	0.062	55.9	0.687	-38.7
400	0.441	-111.7	6.393	106.3	0.084	49.5	0.459	-48.5
600	0.363	-139.8	4.611	93.6	0.100	50.6	0.360	-50.6
800	0.338	-159.8	3.599	84.6	0.117	52.9	0.312	-51.1
1000	0.331	-175.0	2.990	77.5	0.134	55.1	0.286	-51.6
1200	0.337	171.9	2.556	71.2	0.152	57.2	0.271	-53.0
1400	0.344	161.7	2.252	65.3	0.174	58.6	0.265	-55.7
1600	0.359	152.1	2.011	60.3	0.196	58.5	0.259	-59.5
1800	0.373	144.6	1.845	55.4	0.217	57.9	0.254	-63.6
2000	0.391	138.5	1.691	50.8	0.238	58.3	0.249	-68.8

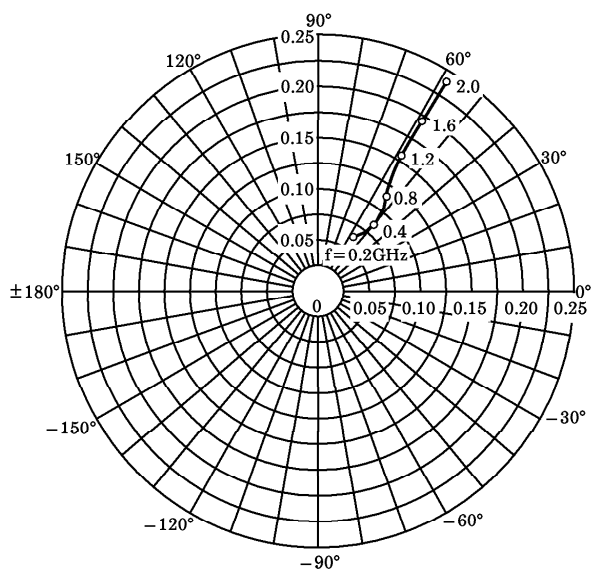
S_{11e}
 $V_{CE}=5V$
 $I_C=5mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



S_{21e}
 $V_{CE}=5V$
 $I_C=5mA$
 $T_a=25^\circ C$



S_{12e}
 $V_{CE}=5V$
 $I_C=5mA$
 $T_a=25^\circ C$



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

