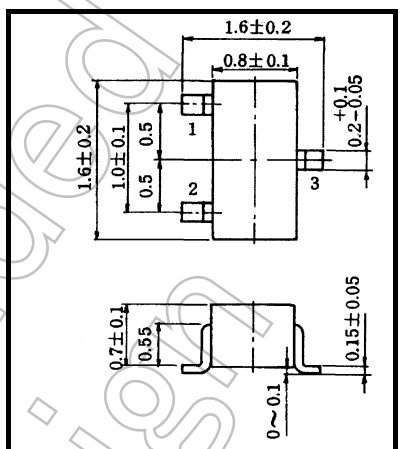
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC5108

For VCO Application

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-2H1A

Weight: 2.4 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	20	V
Collector-emitter voltage	V_{CEO}	10	V
Emitter-base voltage	V_{EBO}	3	V
Base current	I_B	15	mA
Collector current	I_C	30	mA
Collector power dissipation	P_C	100	mW
Junction temperature	T_j	125	°C
Storage temperature range	T_{stg}	−55 to 125	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Start of commercial production
1993-10

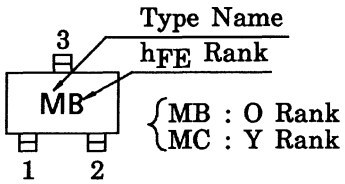
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 10 V, I_E = 0	—	—	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE} (Note 1)	V_{CE} = 5 V, I_C = 5 mA	80	—	240	
Transition frequency	f_T	V_{CE} = 5 V, I_C = 5 mA	4	6	—	GHz
Insertion gain	$\|S_{21e}\|^2$	V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz	7	11	—	dB
Output capacitance	C_{ob}	V_{CB} = 5 V, I_E = 0, f = 1 MHz (Note 2)	—	0.7	—	pF
Reverse transfer capacitance	C_{re}		—	0.5	0.9	pF
Collector-base time constant	C_c.rbb'	V_{CB} = 5 V, I_C = 3 mA, f = 30 MHz	—	5.5	15	ps

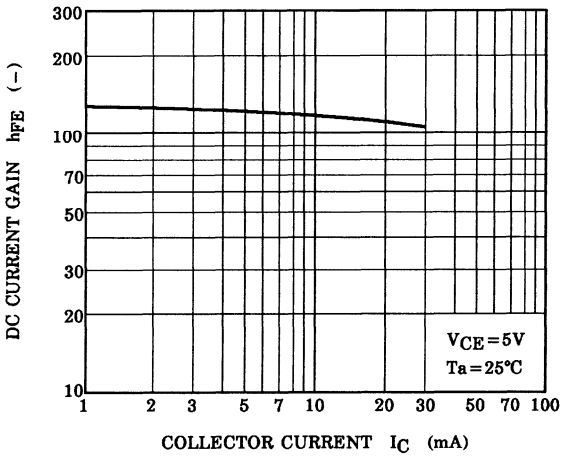
Note 1: h_{FE} classification O: 80 to 160, Y: 120 to 240

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

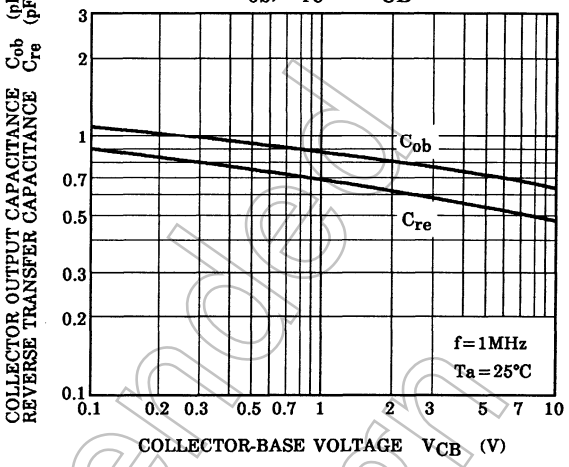
Marking



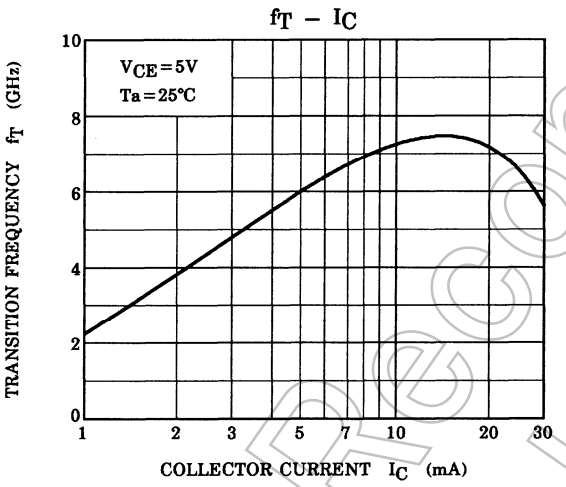
h_{FE} – I_C



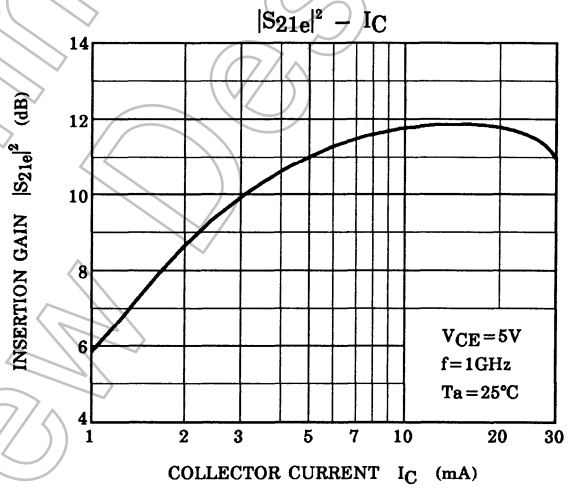
C_{ob}, C_{re} – V_{CB}



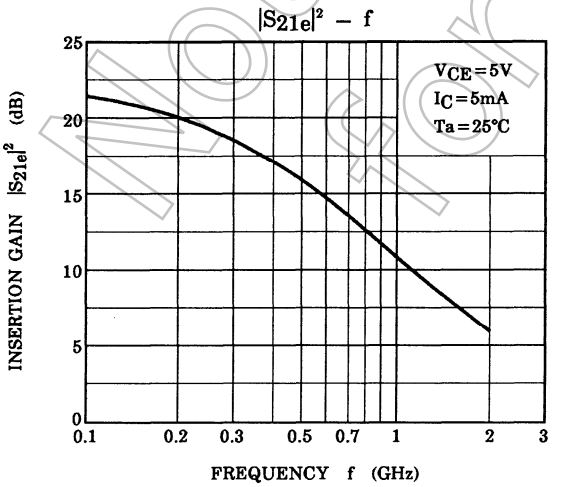
f_T – I_C



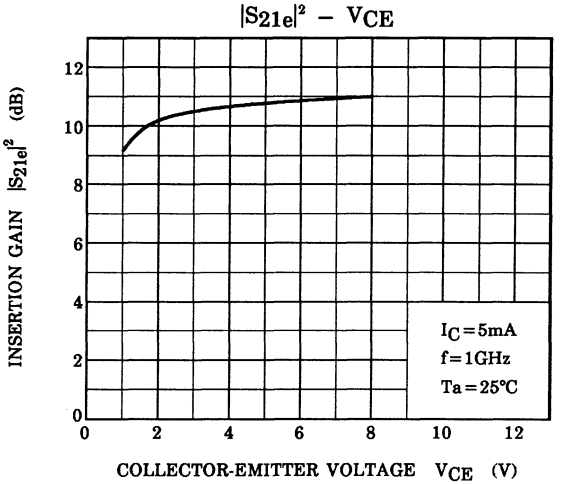
$|S_{21e}|^2$ – I_C

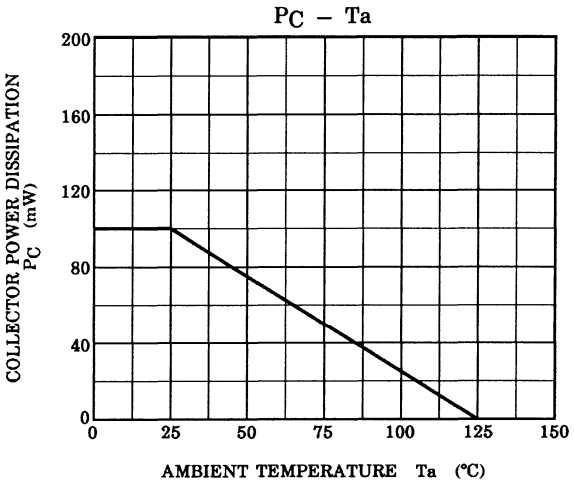


$|S_{21e}|^2$ – f



$|S_{21e}|^2$ – V_{CE}



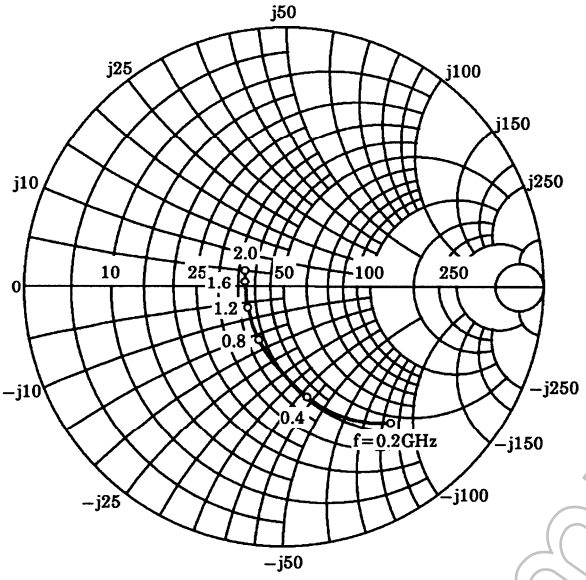


S-Parameter $Z_O = 50\ \Omega$, Ta = 25°C

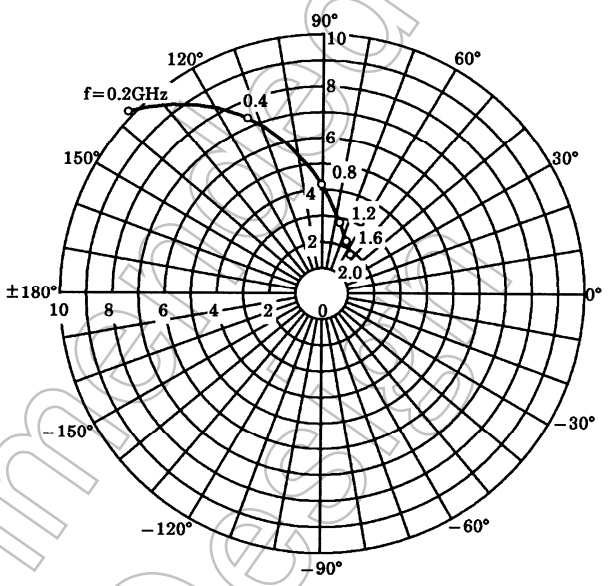
$V_{CE} = 5$ V, $I_C = 5$ mA

Frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.684	–47.0	10.116	136.8	0.049	63.1	0.765	–29.5
400	0.438	–79.2	7.260	112.9	0.072	56.5	0.553	–37.8
600	0.301	–101.2	5.388	99.1	0.090	56.5	0.452	–39.1
800	0.226	–119.2	4.227	90.0	0.107	57.6	0.402	–39.0
1000	0.182	–136.2	3.494	82.7	0.124	58.8	0.374	–38.9
1200	0.159	–153.3	2.988	76.9	0.142	59.6	0.359	–39.4
1400	0.147	–170.3	2.632	71.2	0.163	59.9	0.348	–40.7
1600	0.145	174.4	2.345	66.0	0.182	59.2	0.339	–43.2
1800	0.149	162.6	2.128	61.4	0.200	58.4	0.329	–46.3
2000	0.161	150.9	1.967	57.1	0.219	58.1	0.318	–49.5

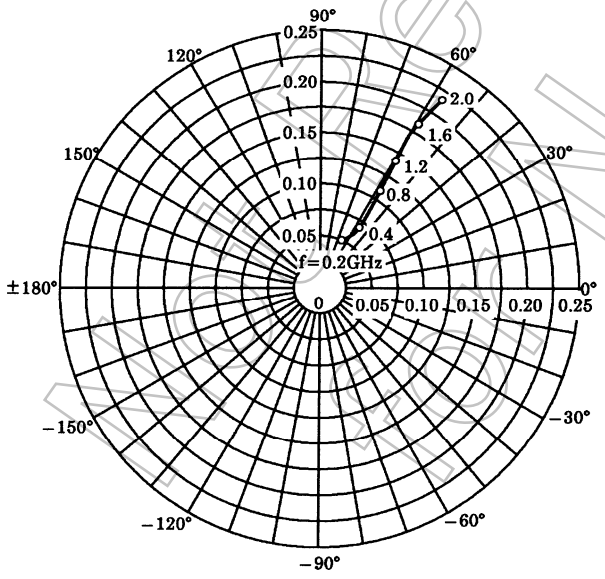
S_{11e}
V_{CE} = 5V
I_C = 5mA
Ta = 25°C
(UNIT : Ω)



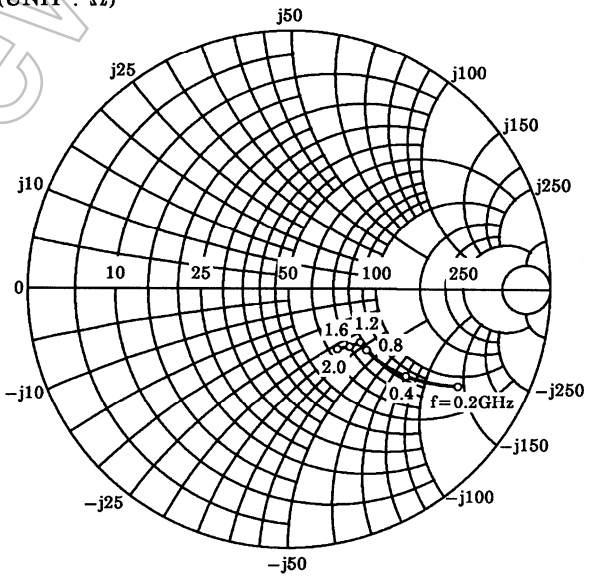
S_{21e}
V_{CE} = 5V
I_C = 5mA
Ta = 25°C



S_{12e}
V_{CE} = 5V
I_C = 5mA
Ta = 25°C



S_{22e}
V_{CE} = 5V
I_C = 5mA
Ta = 25°C
(UNIT : Ω)



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