



High-Frequency Amplifier Applications

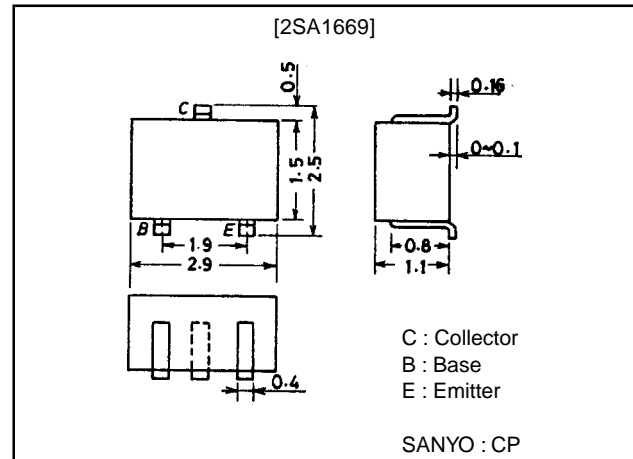
Features

- High cutoff frequency : $f_T=3.0\text{GHz}$ typ.
- High power gain : $\text{MAG}=11\text{dB}$ typ ($f=0.9\text{GHz}$)
- Small noise figure : $\text{NF}=2.0\text{dB}$ typ ($f=0.9\text{GHz}$)

Package Dimensions

unit:mm

2018A



Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		-20	V
Collector-to-Emitter Voltage	V_{CEO}		-15	V
Emitter-to-Base Voltage	V_{EBO}		-3	V
Collector Current	I_C		-50	mA
Collector Dissipation	P_C		250	mW
Junction Temperature	T_j		150	$^\circ\text{C}$
Storage Temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CB0}	$V_{CB}=-15\text{V}, I_E=0$			-0.1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=-2\text{V}, I_C=0$			-0.1	μA
DC Current Gain	h_{FE}	$V_{CE}=-10\text{V}, I_C=-5\text{mA}$	15			
Gain-Bandwidth Product	f_T	$V_{CE}=-10\text{V}, I_C=-5\text{mA}$	1.5	3.0		GHz
Collector Output Capacitance	C_{ob}	$V_{CB}=-10\text{V}, f=1\text{MHz}$		1.0	1.5	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=-10\text{V}, f=1\text{MHz}$		0.7		pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=-10\text{V}, I_C=-5\text{mA}, f=0.9\text{GHz}$	5.0			dB
Maximum Available Power Gain	MAG	$V_{CE}=-10\text{V}, I_C=-5\text{mA}, f=0.9\text{GHz}$		11		dB
Noise Figure	NF	$V_{CE}=-10\text{V}, I_C=-3\text{mA}, f=0.9\text{GHz}$		2.0		dB

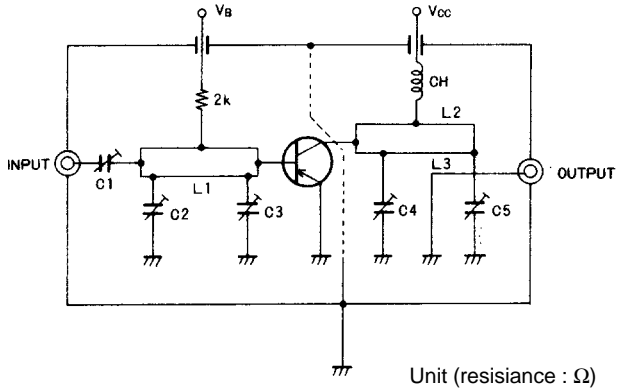
Note) Marking : DB

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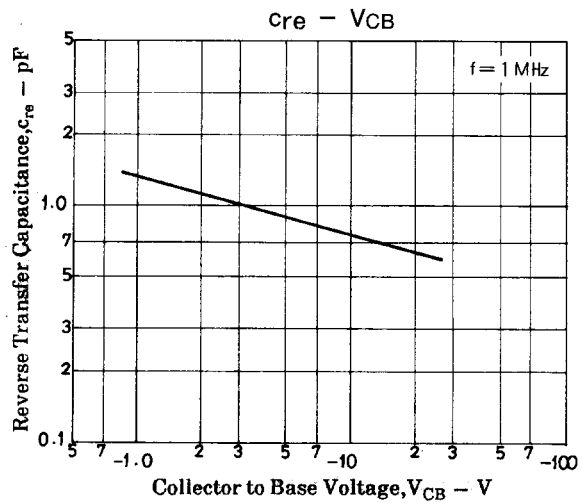
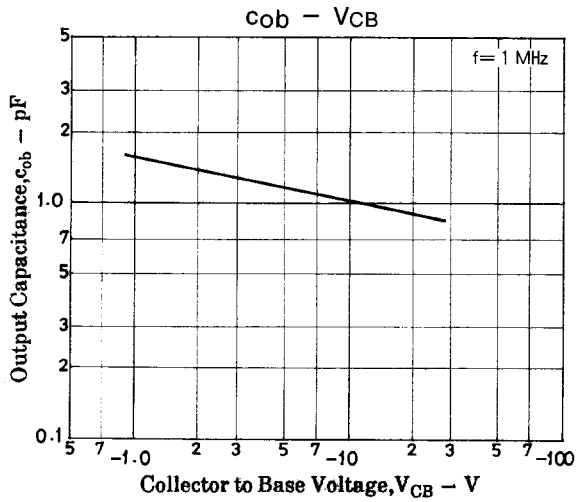
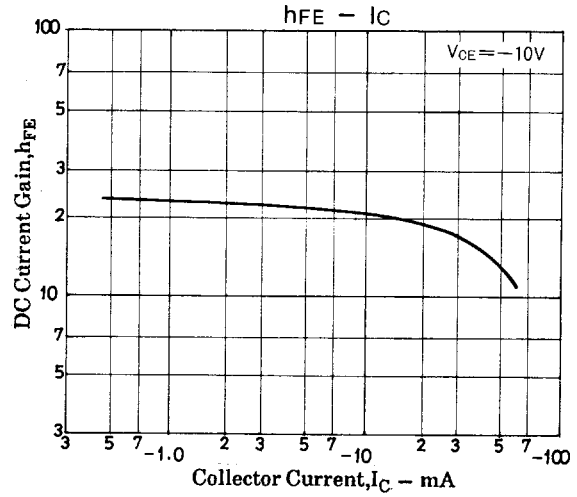
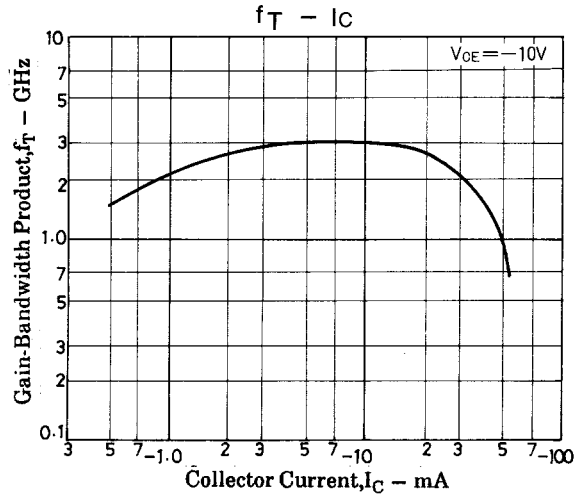
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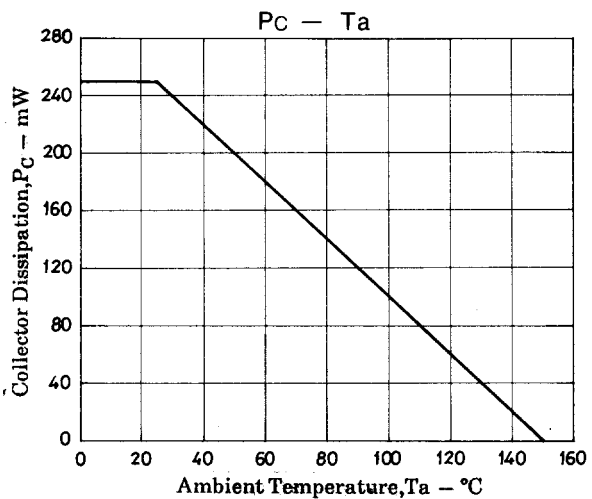
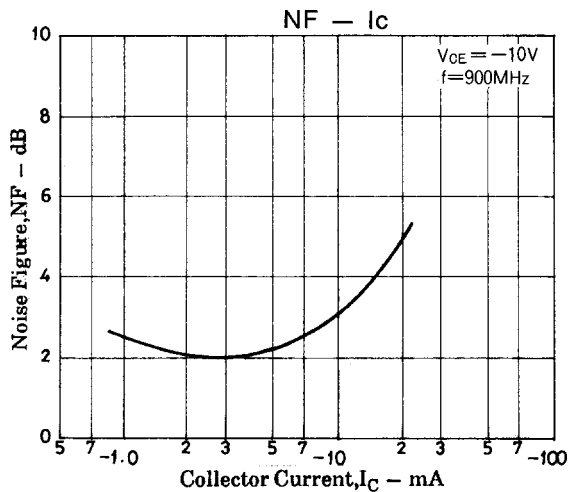
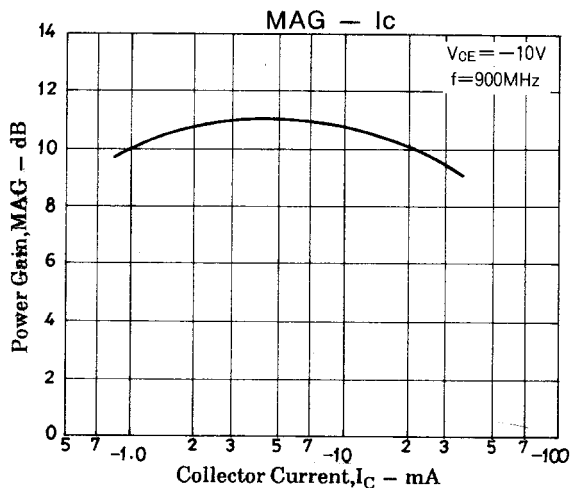
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NF Test Circuit



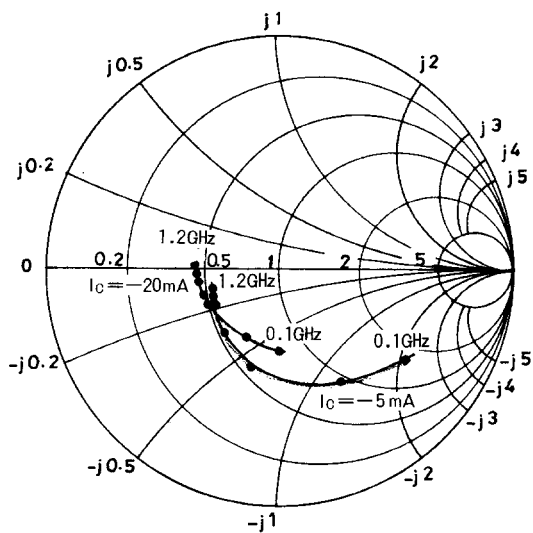
900MHz	
C1	~ 5 pF
C2	~ 10 pF
C3	~ 10 pF
C4	~ 10 pF
C5	~ 10 pF
L1	W ≐ 1.5mm, 1 ≐ 25mm strip line
L2	W ≐ 4 mm, 1 ≐ 25mm strip line
L3	0.5 φ, 1 ≐ 40mm
CH	2t + bead core



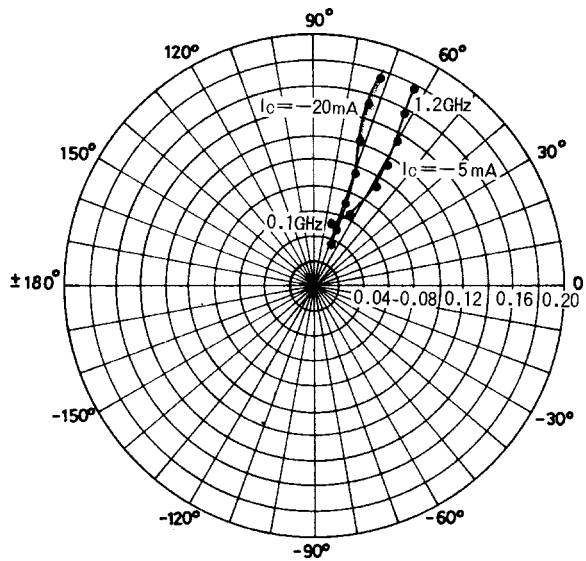


S parameter

S11w : $V_{CE} = -10V$
 $f = 100MHz, 200$ to $120MHz$ (200MHz step)



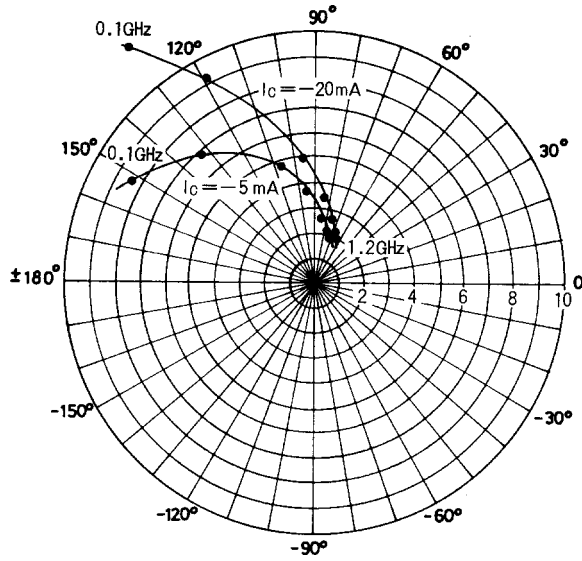
S12e : $V_{CE} = -10V$
 $f = 100MHz, 200$ to $1200MHz$ (200MHz step)



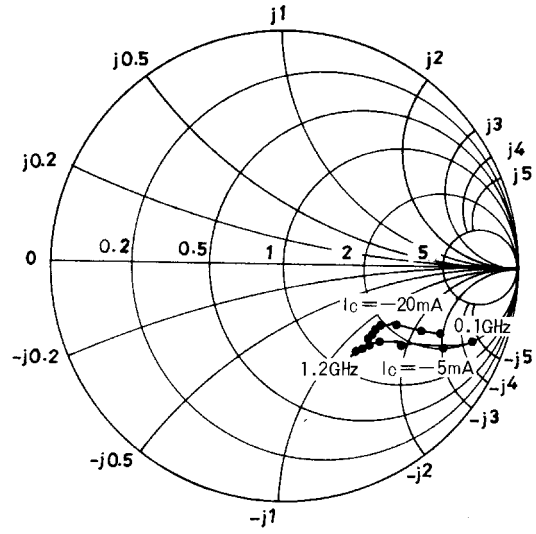
2SA1669

S parameter

S21e : $V_{CE} = -10V$
 $f = 100MHz, 200 \text{ to } 1200MHz$ (200MHz step)



S22e : $V_{CE} = -10V$
 $f = 100MHz, 200 \text{ to } 1200MHz$ (200MHz step)



S parameter (Common emitter)

$V_{CE} = -10V, I_C = -5mA, Z_O = 50\Omega$

Freq (MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.707	-33.1	8.215	151.1	0.043	68.6	0.856	-19.8
200	0.589	-60.3	6.763	132.2	0.059	62.0	0.761	-25.4
400	0.435	-104.7	4.810	106.5	0.089	56.4	0.584	-34.2
600	0.373	-128.1	3.503	93.2	0.110	57.3	0.508	-36.6
800	0.349	-144.4	2.728	83.4	0.130	59.5	0.474	-39.0
900	0.346	-150.1	2.492	80.0	0.142	60.9	0.464	-40.3
1000	0.344	-155.4	2.266	76.8	0.154	61.4	0.459	-41.7
1200	0.340	-163.6	1.971	70.6	0.176	62.1	0.452	-45.2

$V_{CE} = -10V, I_C = -20mA, Z_O = 50\Omega$

Freq (MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.348	-92.8	12.039	129.4	0.031	67.3	0.727	-22.9
200	0.330	-116.7	9.073	118.2	0.041	66.0	0.634	-24.8
400	0.350	-151.2	4.962	95.1	0.068	67.7	0.510	-26.5
600	0.353	-164.5	3.408	84.4	0.093	69.9	0.481	-28.1
800	0.360	-172.9	2.591	76.4	0.118	71.6	0.470	-31.1
900	0.366	-176.2	2.346	73.3	0.131	72.0	0.467	-32.9
1000	0.371	-178.4	2.142	70.8	0.146	71.8	0.467	-34.8
1200	0.379	176.2	1.851	65.2	0.171	71.1	0.466	-39.1

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