

NPN Epitaxial Planar Silicon Transistor



2SC4931

VHF to UHF Wide-Band Low-Noise Amplifier Applications

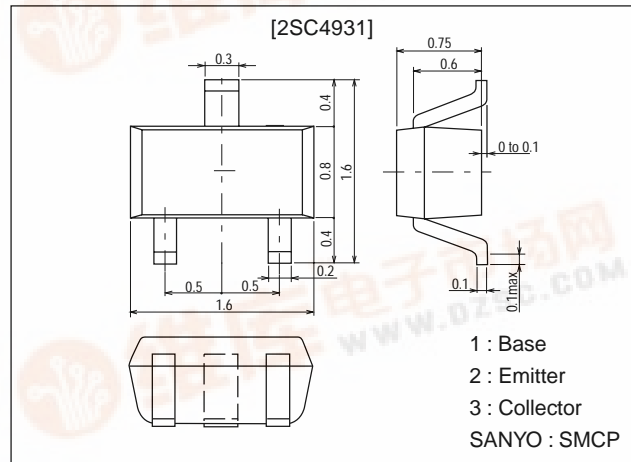
Features

- Low noise : NF=1.2dB typ (f=1GHz).
- High gain : $|S_{21e}|^2=13\text{dB typ (f=1GHz)}$.
- High cutoff frequency : $f_T=9.0\text{GHz typ}$.
- Very small-sized package permitting 2SC4931-applied sets to be made small and slim.

Package Dimensions

unit:mm

2106A



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		16	V
Collector-to-Emitter Voltage	V_{CEO}		8	V
Emitter-to-Base Voltage	V_{EBO}		1.5	V
Collector Current	I_C		50	mA
Collector Dissipation	P_C		100	mW
Junction Temperature	T_j		150	°C
Storage Temperature	T_{stg}		-55 to +150	°C

Electrical Characteristics at Ta = 25°C

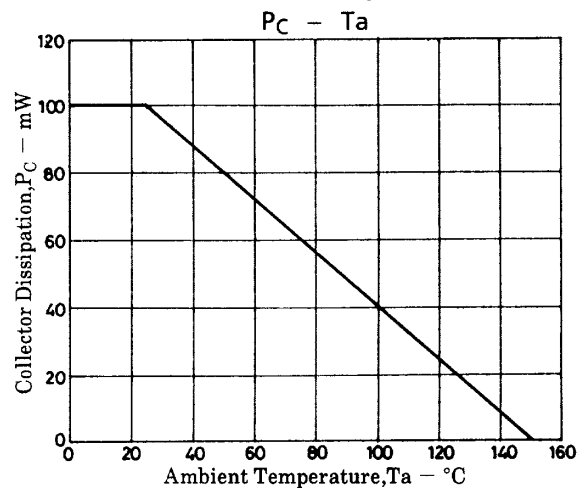
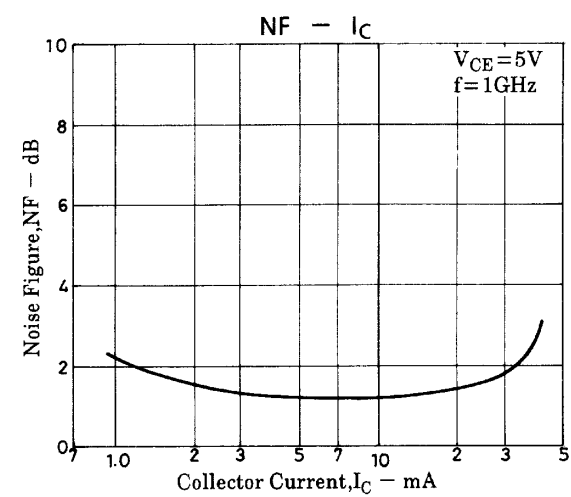
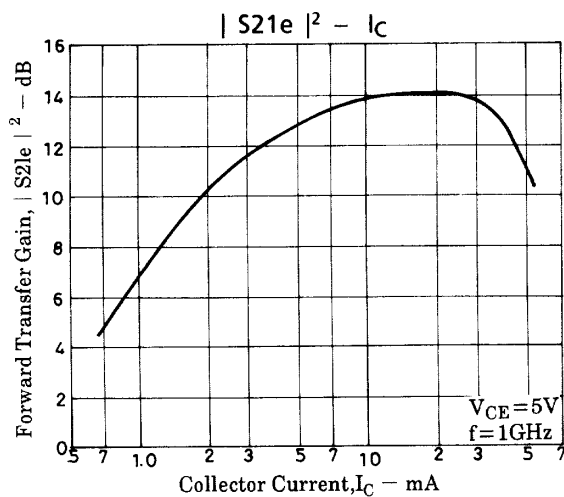
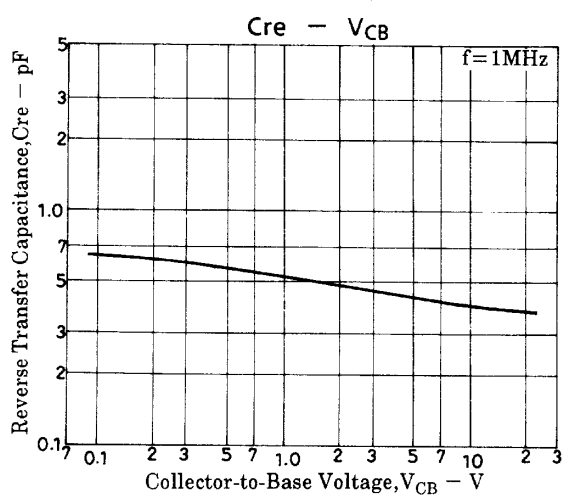
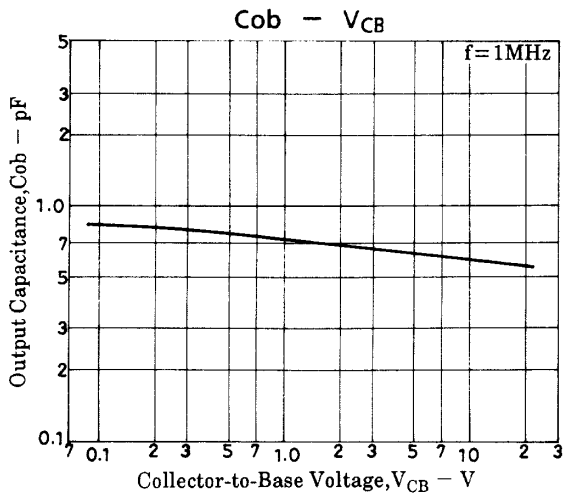
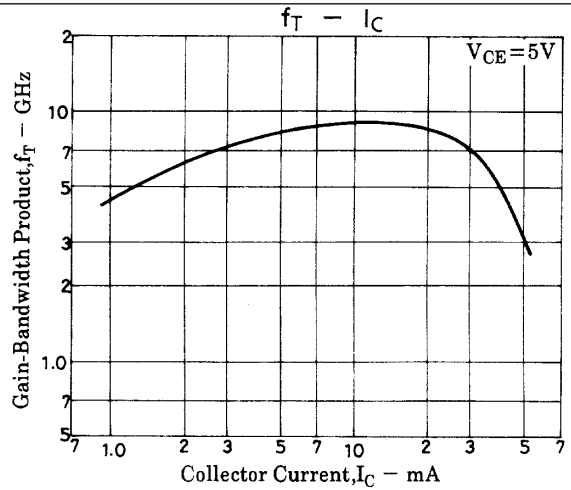
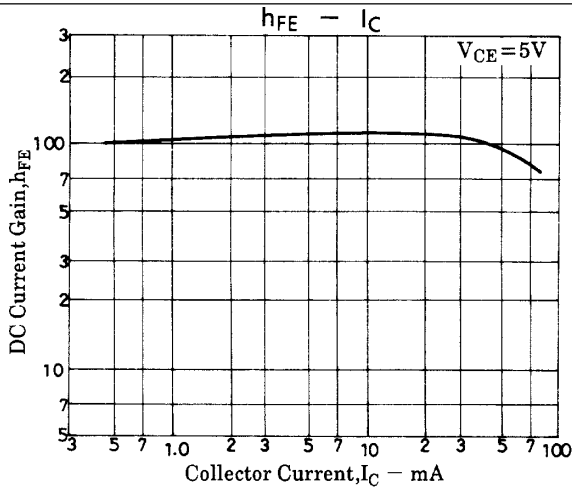
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	$V_{CB}=10\text{V}, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=1\text{V}, I_C=0$			10	μA
DC Current Gain	h_{FE}	$V_{CE}=5\text{V}, I_C=15\text{mA}$	60*		270*	
Gain-Bandwidth Product	f_T	$V_{CE}=5\text{V}, I_C=15\text{mA}$		9.0		GHz
Output Capacitance	C_{ob}	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.55	1.2	pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5\text{V}, I_C=15\text{mA}, f=1\text{GHz}$	10	13		dB
Noise Figure	NF	$V_{CE}=5\text{V}, I_C=5\text{mA}, f=1\text{GHz}$		1.2	2.5	dB

* : The 2SC4931 is classified by 15mA h_{FE} as follows :

Marking	B1	B2	B3
h_{FE}	60 to 120	90 to 180	135 to 270

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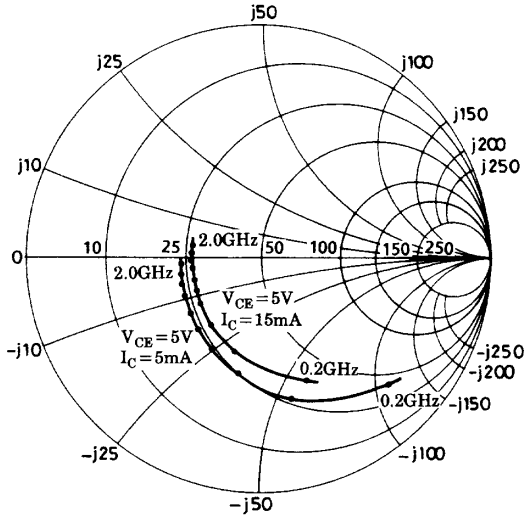
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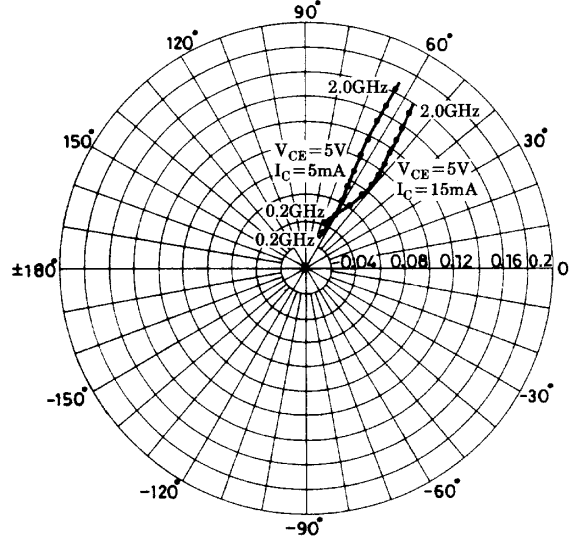
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S parameter

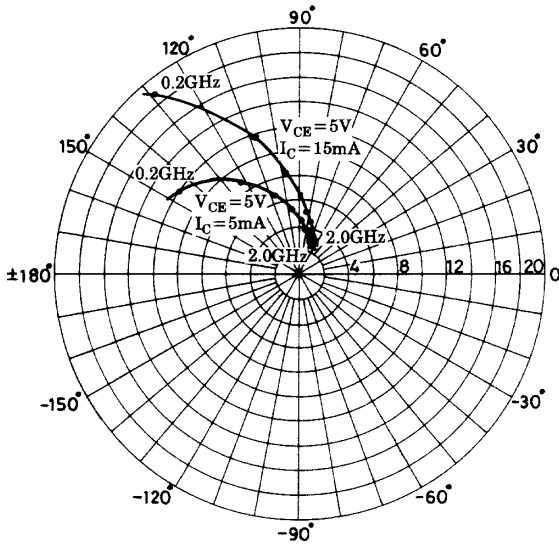
S11e
f=200 to 2000MHz (200MHz Step)



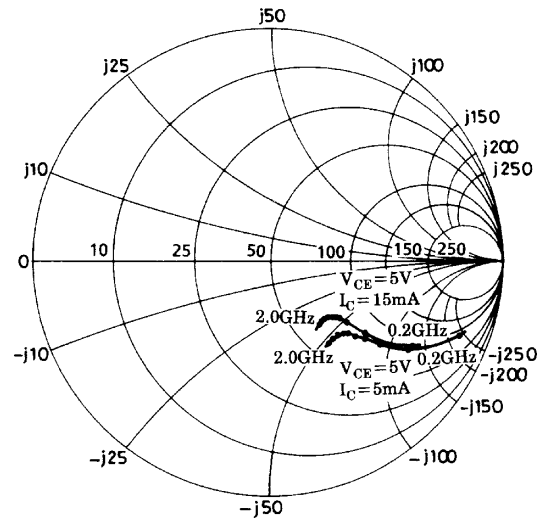
S12e
f=200 to 2000MHz (200MHz Step)



S21e
f=200 to 2000MHz (200MHz Step)



S22e
f=200 to 2000MHz (200MHz Step)



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S parameter (Common emitter)

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.775	-45.2	11.958	144.8	0.040	67.3	0.872	-21.4
400	0.620	-78.1	8.989	122.3	0.063	56.2	0.704	-32.1
600	0.517	-100.9	6.908	107.9	0.076	52.2	0.594	-36.7
800	0.451	-117.9	5.487	97.6	0.087	51.3	0.529	-39.2
1000	0.411	-131.5	4.553	89.8	0.097	51.9	0.491	-40.9
1200	0.385	-142.0	3.899	83.4	0.107	52.7	0.467	-42.5
1400	0.372	-152.5	3.411	77.3	0.117	53.7	0.451	-44.1
1600	0.364	-161.7	3.052	71.3	0.129	54.7	0.438	-46.2
1800	0.353	-168.5	2.740	66.7	0.139	55.4	0.435	-48.8
2000	0.349	-176.6	2.507	62.7	0.152	56.2	0.435	-51.2

$V_{CE}=5V, I_C=15mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.560	-70.0	19.044	129.1	0.032	63.2	0.710	-31.1
400	0.422	-106.3	11.887	108.4	0.048	59.7	0.515	-37.2
600	0.364	-127.3	8.449	97.5	0.061	61.3	0.430	-37.9
800	0.330	-143.0	6.510	89.6	0.075	62.5	0.391	-38.8
1000	0.315	-153.4	5.285	83.6	0.089	63.5	0.371	-39.7
1200	0.306	-161.8	4.484	78.4	0.103	64.1	0.360	-41.0
1400	0.302	-170.7	3.898	73.4	0.118	64.2	0.352	-42.7
1600	0.309	-178.5	3.464	68.5	0.133	64.0	0.346	-45.1
1800	0.302	176.0	3.094	64.7	0.147	63.6	0.344	-48.0
2000	0.299	170.6	2.828	61.2	0.163	63.1	0.348	-50.8

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