

<b>SANYO</b>	No.5036A	<b>2SC5231</b>
		NPN Epitaxial Planar Silicon Transistor VHF to UHF Wide-Band Low-Noise Amp Applications

**Features**

- Low noise :  $NF = 1.0\text{dB typ (} f = 1\text{GHz)}$ .
- High gain :  $|S_{21e}|^2 = 12\text{dB typ (} f = 1\text{GHz)}$ .
- High cutoff frequency :  $f_T = 7\text{GHz typ}$ .
- Very small-sized package permitting 2SC5231-applied sets to be made small and slim.

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

			unit
Collector-to-Base Voltage	$V_{CB0}$	20	V
Collector-to-Emitter Voltage	$V_{CE0}$	10	V
Emitter-to-Base Voltage	$V_{EB0}$	2	V
Collector Current	$I_C$	70	mA
Collector Dissipation	$P_C$	100	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	- 55 to + 150	$^\circ\text{C}$

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

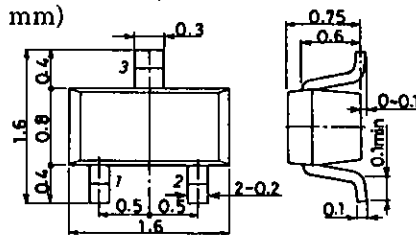
			min	typ	max	unit
Collector Cutoff Current	$I_{CB0}$	$V_{CB} = 10\text{V}, I_E = 0$			1.0	$\mu\text{A}$
Emitter Cutoff Current	$I_{EB0}$	$V_{EB} = 1\text{V}, I_C = 0$			10	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE} = 5\text{V}, I_C = 20\text{mA}$	60*		270*	
Gain-Bandwidth Product	$f_T$	$V_{CE} = 5\text{V}, I_C = 20\text{mA}$	5	7		GHz
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, f = 1\text{MHz}$		0.7	1.2	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB} = 10\text{V}, f = 1\text{MHz}$		0.45		pF
Forward Transfer Gain	$ S_{21e} ^2(1)$	$V_{CE} = 5\text{V}, I_C = 20\text{mA}, f = 1\text{GHz}$	9	12		dB
	$ S_{21e} ^2(2)$	$V_{CE} = 2\text{V}, I_C = 3\text{mA}, f = 1\text{GHz}$		8.5		dB
Noise Figure	NF	$V_{CE} = 5\text{V}, I_C = 7\text{mA}, f = 1\text{GHz}$	1.0		1.8	dB

\* : Pulse Test Pulse Width  $\leq 2\text{ms}$

※ : The 2SC5231 is classified by 20mA  $h_{FE}$  as follows :

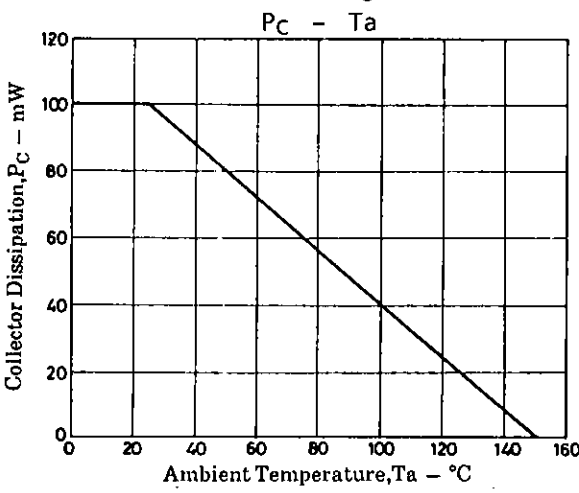
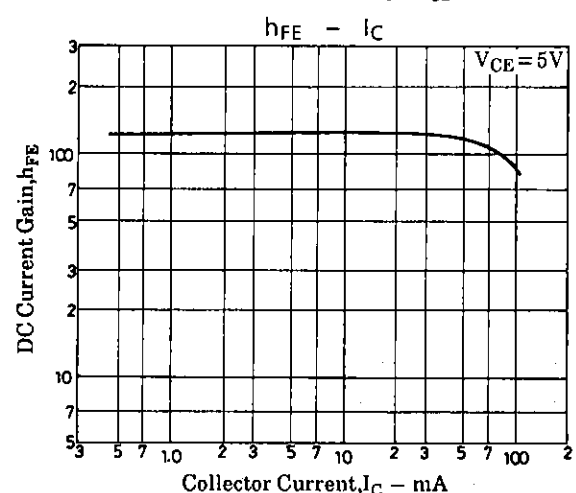
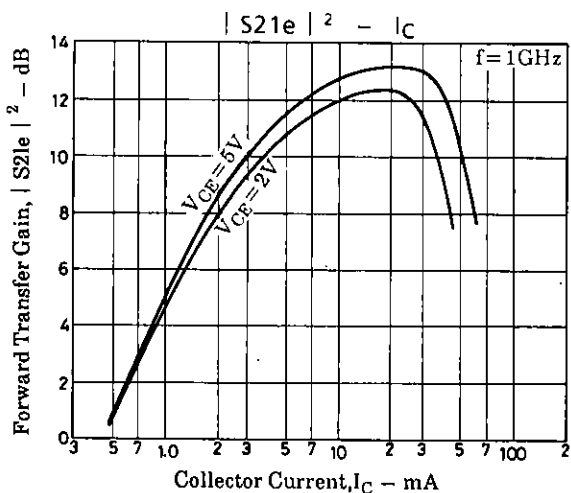
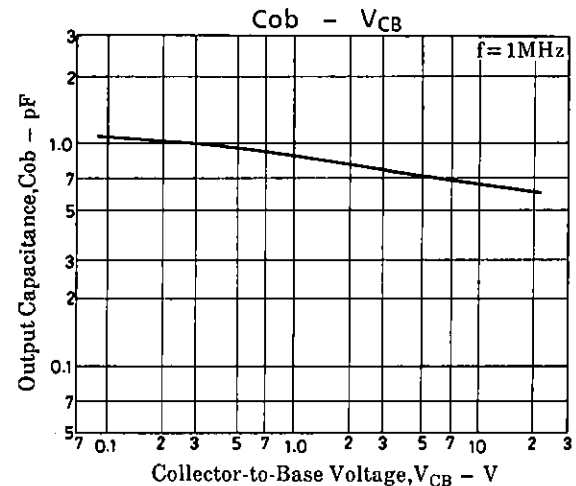
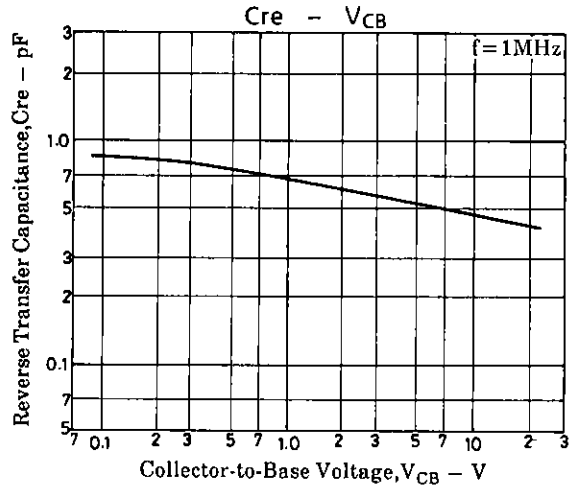
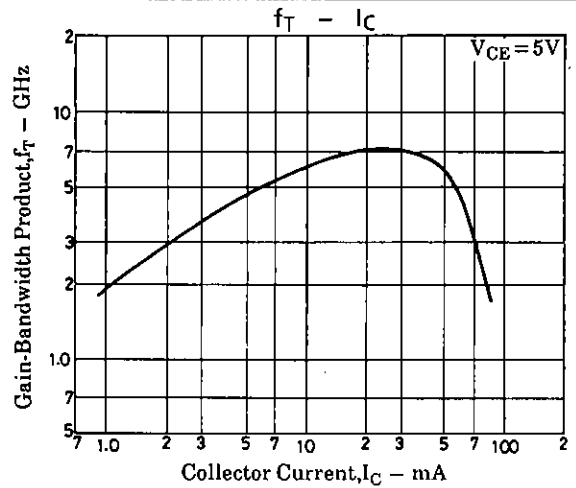
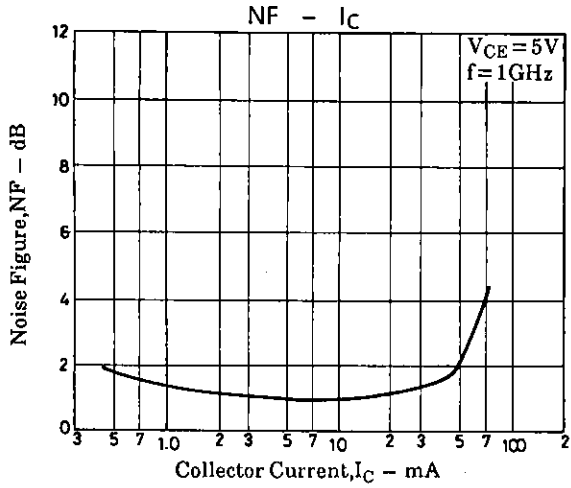
Marking	C7	C8	C9
$h_{FE}$	60 to 120	90 to 180	135 to 270

**Package Dimensions 2106A**  
(unit: mm)



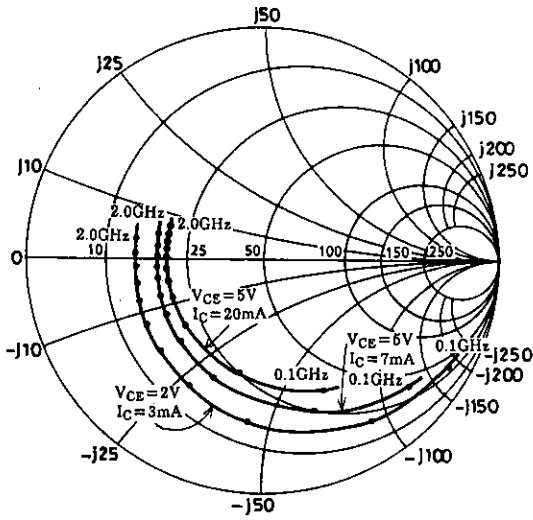
1 : Base  
2 : Emitter  
3 : Collector

SANYO : SMCP

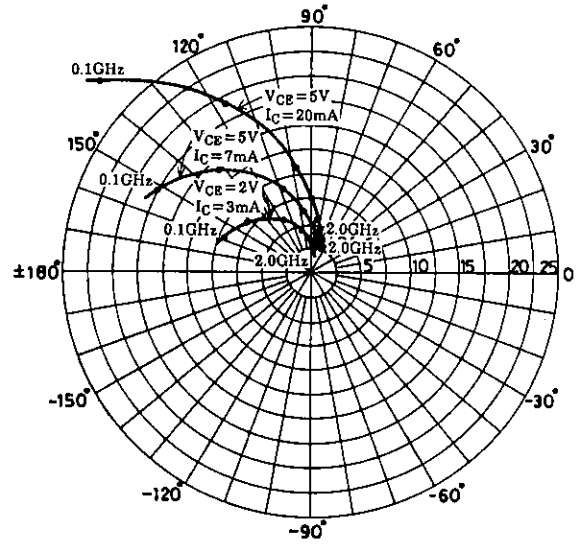


S Parameter

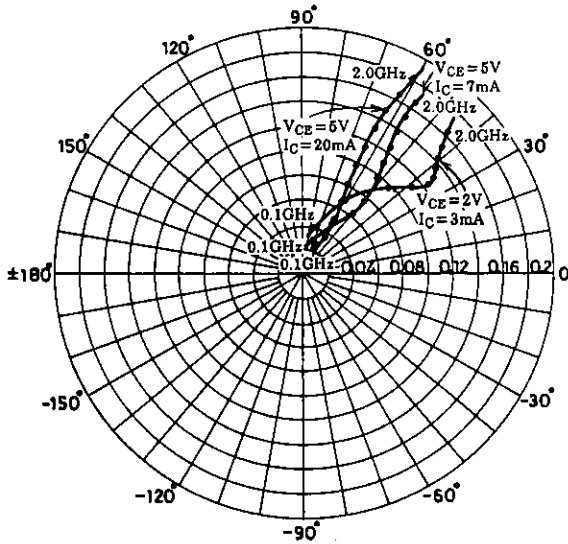
S11e : f=100MHz, 200~2000MHz (200MHz step)



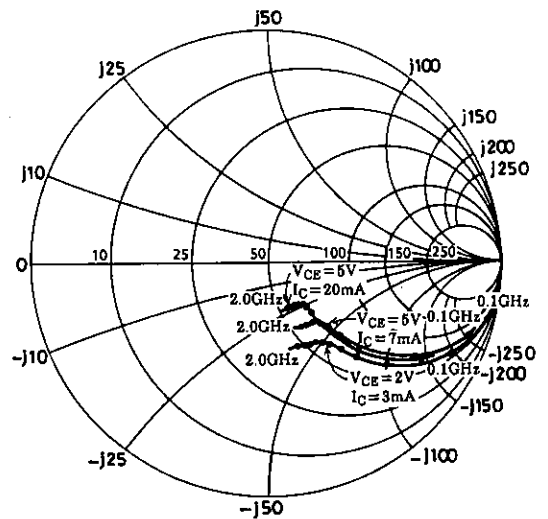
S21e : f=100MHz, 200~2000MHz (200MHz step)



S12e : f=100MHz, 200~2000MHz (200MHz step)



S22e : f=100MHz, 200~2000MHz (200MHz step)



## S Parameter (Common emitter)

 $V_{CE}=5V, I_C=7mA, Z_0=50\Omega$ 

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.786	-40.7	17.507	151.3	0.028	70.1	0.898	-20.4
200	0.677	-72.4	13.998	131.4	0.046	58.0	0.739	-33.4
400	0.546	-112.7	9.061	108.6	0.064	49.6	0.525	-43.7
600	0.492	-135.2	6.442	96.1	0.076	49.3	0.423	-46.7
800	0.473	-150.0	5.005	87.3	0.087	50.8	0.374	-44.4
1000	0.465	-160.0	4.073	80.4	0.099	52.6	0.346	-49.7
1200	0.457	-169.5	3.449	74.0	0.111	54.0	0.332	-51.6
1400	0.451	-176.2	2.989	68.6	0.124	55.2	0.321	-54.1
1600	0.449	177.8	2.658	63.8	0.138	56.6	0.319	-56.2
1800	0.454	172.5	2.378	58.4	0.151	56.7	0.313	-60.0
2000	0.460	167.1	2.154	54.0	0.166	56.7	0.311	-63.2

 $V_{CE}=5V, I_C=20mA, Z_0=50\Omega$ 

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.601	-65.8	28.967	137.1	0.023	64.1	0.757	-32.9
200	0.497	-103.7	19.309	116.6	0.035	57.0	0.534	-50.3
400	0.435	-139.6	10.891	98.6	0.050	58.7	0.345	-50.3
600	0.419	-156.6	7.461	89.3	0.065	61.3	0.280	-50.7
800	0.414	-166.6	5.695	82.5	0.081	63.1	0.251	-51.3
1000	0.413	-174.0	4.613	77.0	0.098	63.8	0.235	-52.9
1200	0.413	178.6	3.870	71.8	0.114	63.9	0.226	-55.1
1400	0.411	173.8	3.345	66.9	0.131	63.6	0.221	-57.7
1600	0.413	169.6	2.960	62.7	0.148	63.2	0.220	-60.2
1800	0.416	165.1	2.655	58.0	0.165	61.8	0.219	-64.8
2000	0.422	160.3	2.406	54.0	0.182	60.6	0.218	-68.3

 $V_{CE}=2V, I_C=3mA, Z_0=50\Omega$ 

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.888	-30.2	9.280	158.6	0.038	73.6	0.949	-15.1
200	0.815	-56.4	8.218	141.3	0.067	60.5	0.849	-26.9
400	0.690	-96.0	6.074	116.7	0.098	45.1	0.657	-41.1
600	0.616	-120.7	4.517	101.4	0.112	38.4	0.539	-47.6
800	0.584	-138.0	3.610	90.4	0.120	35.8	0.475	-51.2
1000	0.566	-150.7	2.995	81.9	0.125	35.7	0.434	-54.5
1200	0.555	-161.2	2.540	74.2	0.131	36.5	0.410	-57.5
1400	0.546	-169.3	2.213	67.5	0.137	38.4	0.393	-60.7
1600	0.541	-176.4	1.982	62.0	0.143	40.7	0.391	-64.0
1800	0.545	177.1	1.774	55.9	0.152	42.5	0.382	-67.8
2000	0.547	170.9	1.614	50.9	0.163	44.7	0.381	-72.1

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