

**2SA1963**

High-Frequency Low-Noise Amplifier, Ultrahigh-Speed Switching Applications

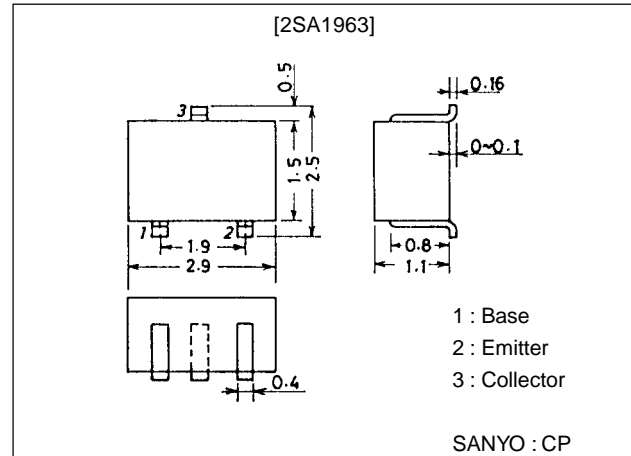
Features

- Low noise : $NF=1.5\text{dB}$ typ ($f=1\text{GHz}$).
- High gain : $|S_{21e}|^2=9\text{dB}$ typ ($f=1\text{GHz}$).
- High cutoff frequency : $f_T=5\text{GHz}$ typ.

Package Dimensions

unit:mm

2018B



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		-12	V
Collector-to-Emitter Voltage	V_{CEO}		-8	V
Emitter-to-Base Voltage	V_{EBO}		-2	V
Collector Current	I_C		-50	mA
Collector Dissipation	P_C		200	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_{CBO}	$V_{CB}=-10\text{V}, I_E=0$			-1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=-1\text{V}, I_C=0$			-1.0	μA
DC Current Gain	h_{FE}	$V_{CE}=-5\text{V}, I_C=-10\text{mA}$	20*		120*	
Gain-Bandwidth Product	f_T	$V_{CE}=-5\text{V}, I_C=-10\text{mA}$	3	5		GHz
Output Capacitance	C_{ob}	$V_{CB}=-10\text{V}, f=1\text{MHz}$		0.8	1.3	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=-10\text{V}, f=1\text{MHz}$		0.55		pF
Forward Transfer Gain	$ S_{21e} ^2(1)$	$V_{CE}=-5\text{V}, I_C=-10\text{mA}, f=1\text{GHz}$	7	9		dB
	$ S_{21e} ^2(2)$	$V_{CE}=-2\text{V}, I_C=-3\text{mA}, f=1\text{GHz}$		6.5		dB
Noise Figure	NF	$V_{CE}=-5\text{V}, I_C=-5\text{mA}, f=1\text{GHz}$		1.5	3.0	dB

* : The 2SA1963 is classified by 10mA h_{FE} as follows :

20	1	50	40	2	80	60	3	120
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Marking : MS

 h_{FE} ranks : 1, 2, 3

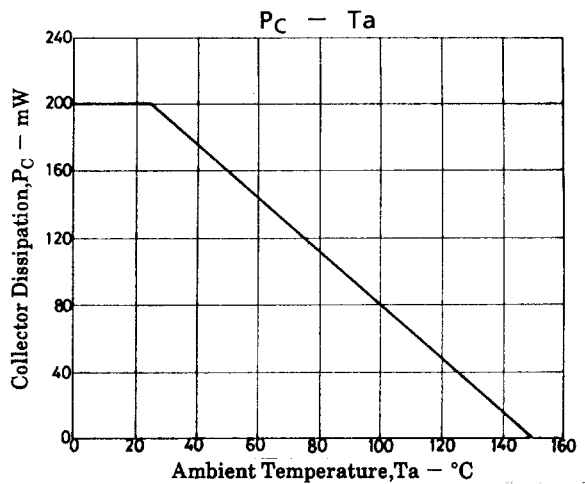
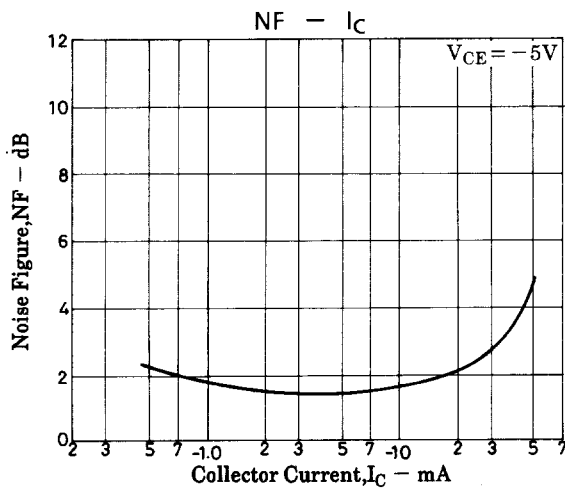
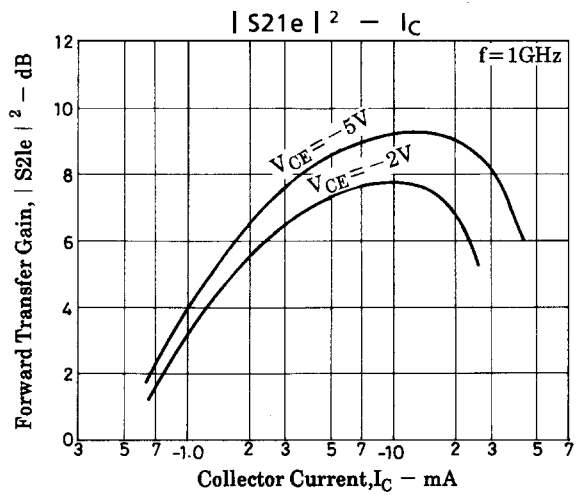
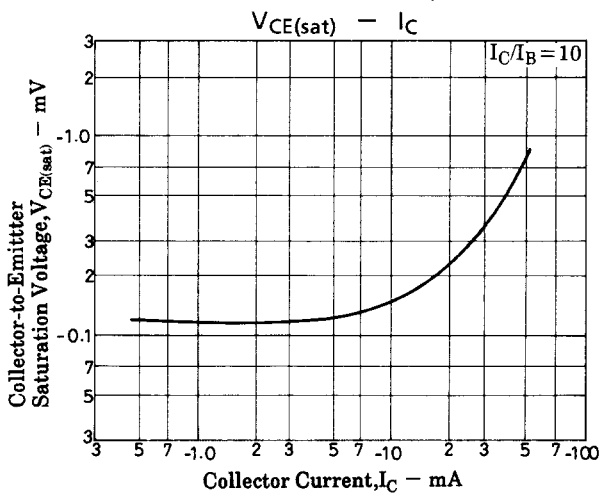
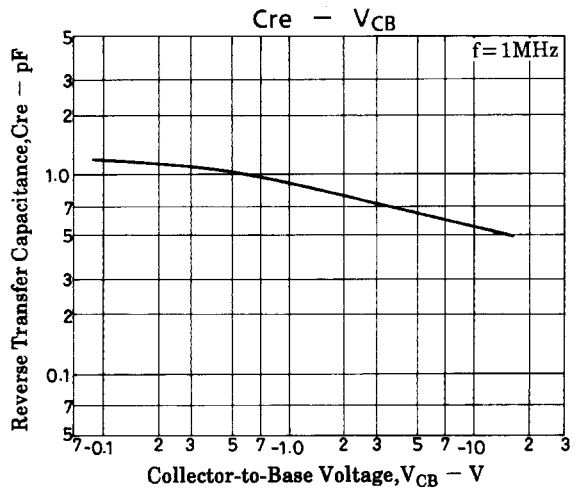
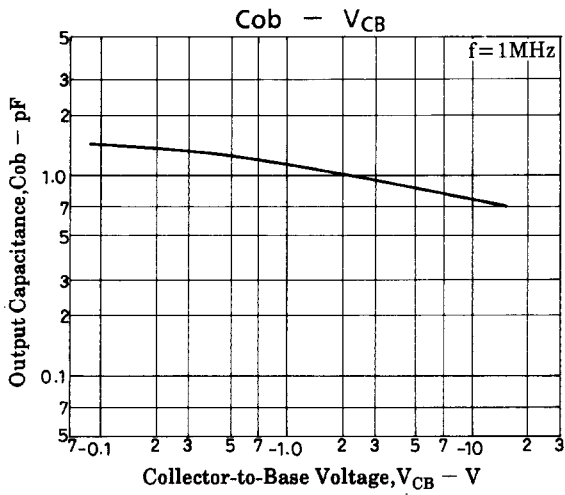
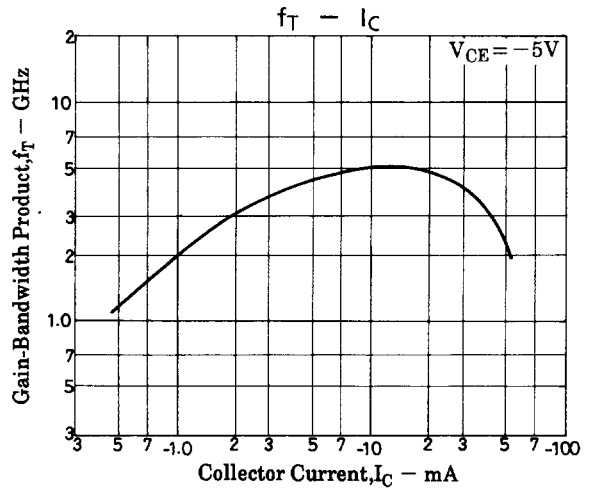
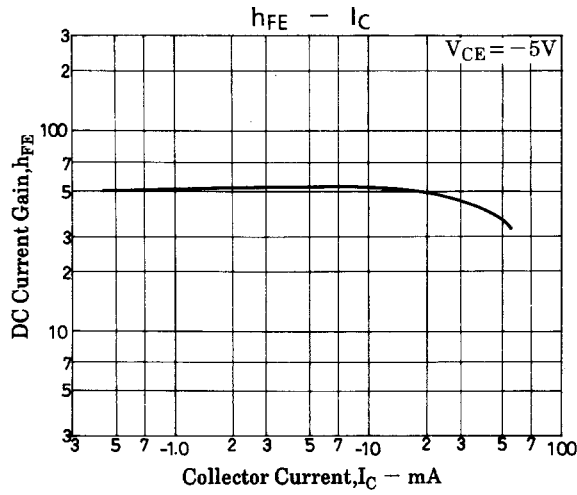
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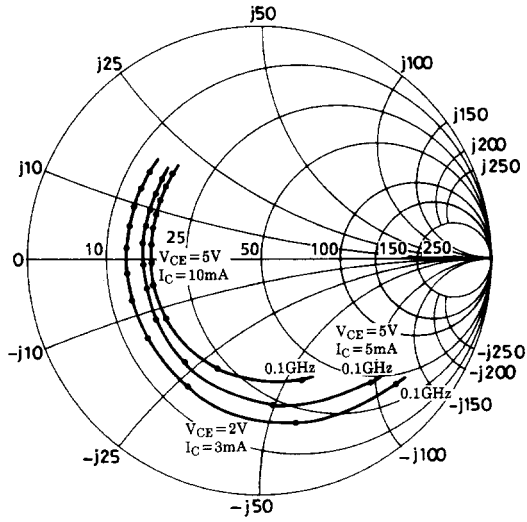
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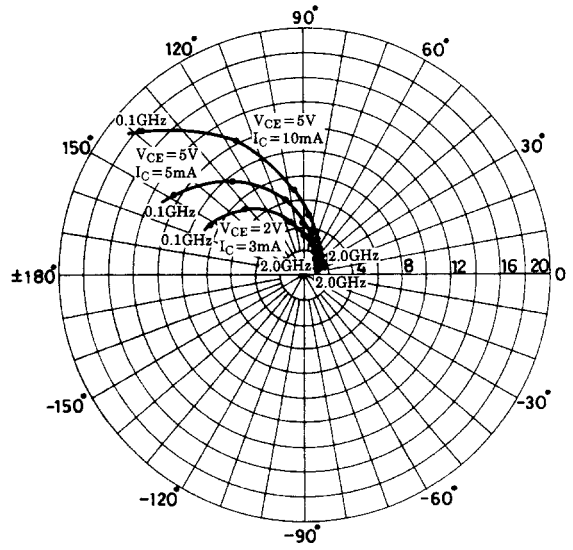


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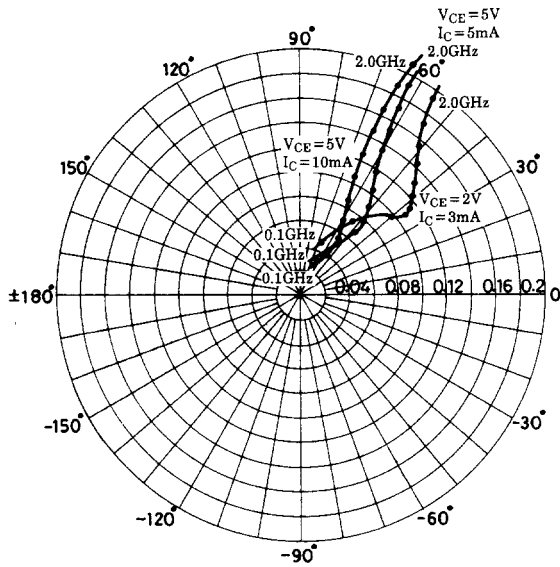
S11e : $f = 100\text{MHz}$, 200 to 2000MHz (200MHz step)



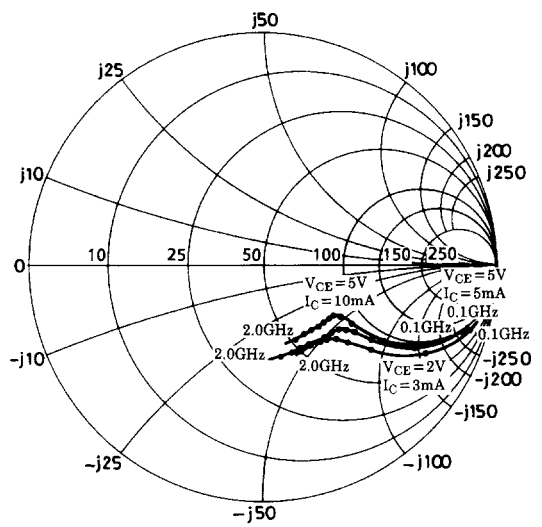
S21e : $f = 100\text{MHz}$, 200 to 2000MHz (200MHz step)



S12e : $f = 100\text{MHz}$, 200 to 2000MHz (200MHz step)



S22e : $f = 100\text{MHz}$, 200 to 2000MHz (200MHz step)



2SA1963

S Parameters (Common Emitter)

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.711	-47.7	12.330	149.2	0.033	68.0	0.893	-18.2
200	0.628	-83.9	9.680	127.8	0.052	55.1	0.740	-28.5
400	0.542	-126.7	6.113	104.1	0.069	47.5	0.559	-34.7
600	0.513	-150.7	4.337	90.6	0.080	48.5	0.479	-36.5
800	0.502	-166.1	3.375	80.7	0.091	52.0	0.442	-38.4
1000	0.504	-177.9	2.772	72.7	0.104	55.0	0.424	-41.5
1200	0.506	172.3	2.378	65.5	0.119	57.6	0.416	-45.2
1400	0.509	163.8	2.069	58.5	0.136	59.6	0.409	-49.6
1600	0.516	155.3	1.825	52.1	0.153	61.1	0.403	-55.0
1800	0.527	147.7	1.645	46.4	0.173	61.9	0.403	-60.5
2000	0.541	140.6	1.515	41.3	0.193	62.2	0.406	-66.5

$V_{CE}=5V, I_C=10mA, Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.547	-70.6	17.652	139.1	0.027	64.1	0.801	-24.4
200	0.501	-112.1	12.156	117.0	0.040	55.5	0.610	-32.8
400	0.479	-148.5	6.937	97.2	0.056	55.7	0.457	-34.5
600	0.473	-166.7	4.783	85.8	0.071	60.0	0.398	-34.6
800	0.473	-178.8	3.677	77.6	0.088	63.2	0.374	-36.5
1000	0.478	172.1	3.005	70.5	0.107	65.0	0.366	-39.7
1200	0.486	163.7	2.570	63.7	0.126	65.6	0.358	-43.8
1400	0.492	156.4	2.228	57.3	0.147	65.8	0.353	-48.5
1600	0.502	149.2	1.967	51.4	0.166	65.5	0.349	-54.0
1800	0.514	142.4	1.765	45.9	0.188	64.6	0.348	-59.9
2000	0.526	135.6	1.626	42.1	0.209	63.6	0.351	-66.1

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.788	-42.7	8.469	152.2	0.045	68.4	0.913	-17.6
200	0.714	-77.5	6.984	131.1	0.074	53.9	0.780	-29.2
400	0.626	-120.3	4.613	106.0	0.099	40.2	0.586	-38.9
600	0.587	-145.9	3.338	90.6	0.108	36.9	0.491	-42.9
800	0.577	-162.3	2.612	79.5	0.114	38.0	0.443	-46.0
1000	0.574	-174.9	2.173	70.6	0.122	40.9	0.422	-50.2
1200	0.577	174.5	1.872	62.2	0.131	44.2	0.410	-54.7
1400	0.578	165.4	1.637	54.5	0.142	47.9	0.400	-59.8
1600	0.587	157.0	1.447	47.5	0.155	51.1	0.398	-65.9
1800	0.598	149.0	1.303	41.6	0.173	53.7	0.398	-72.0
2000	0.608	141.3	1.203	36.3	0.194	55.6	0.403	-78.8

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