Ordering number:5230

PNP Epitaxial Planar Silicon Transistor

2SA1963

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

Features

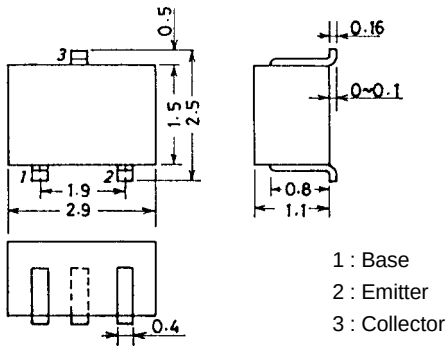
- Low noise : NF=1.5dB typ (f=1GHz).
- High gain : $|S21e|^2$=9dB typ (f=1GHz).
- High cutoff frequency : f_T=5GHz typ.

Package Dimensions

unit:mm

2018B

[2SA1963]



1 : Base
2 : Emitter
3 : Collector

SANYO : CP

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		–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	Tj		150	˚C
Storage Temperature	Tstg		–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}=–10V, I_E=0			–1.0	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=–1V, I_C=0			–1.0	μA
DC Current Gain	h_{FE}	V_{CE}=–5V, I_C=–10mA	20*		120*	
Gain-Bandwidth Product	f_T	V_{CE}=–5V, I_C=–10mA	3	5		GHz
Output Capacitance	C_{ob}	V_{CB}=–10V, f=1MHz		0.8	1.3	pF
Reverse Transfer Capacitance	C_{re}	V_{CB}=–10V, f=1MHz		0.55		pF
Forward Transfer Gain	$\|S21e\|^2$(1)	V_{CE}=–5V, I_C=–10mA, f=1GHz	7	9		dB
	$\|S21e\|^2$(2)	V_{CE}=–2V, I_C=–3mA, f=1GHz		6.5		dB
Noise Figure	NF	V_{CE}=–5V, I_C=–5mA, f=1GHz		1.5	3.0	dB

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

20 1 50	40 2 80	60 3 120

Marking : MS

h_{FE} ranks : 1, 2, 3

SANYO Electric Co.,Ltd. Semiconductor Bussiness Headquaters

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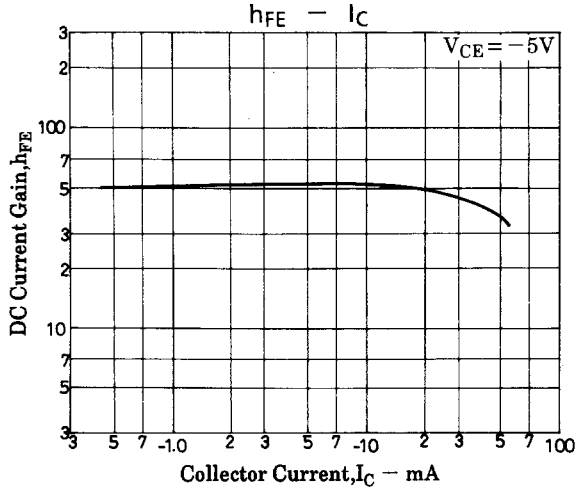
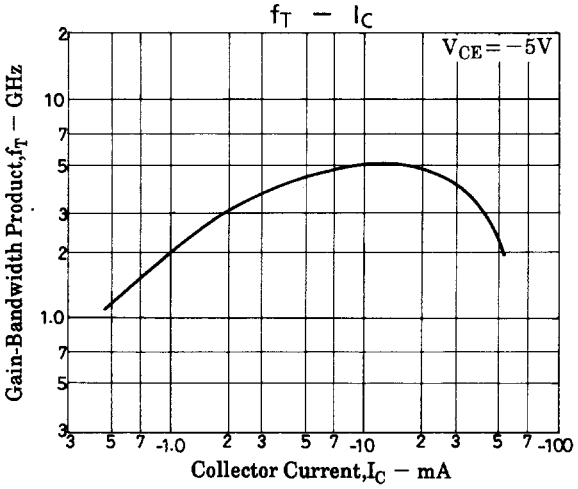
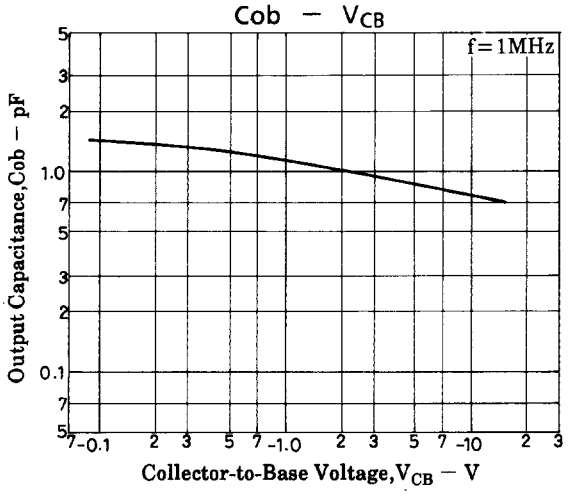
h_{FE} – I_C



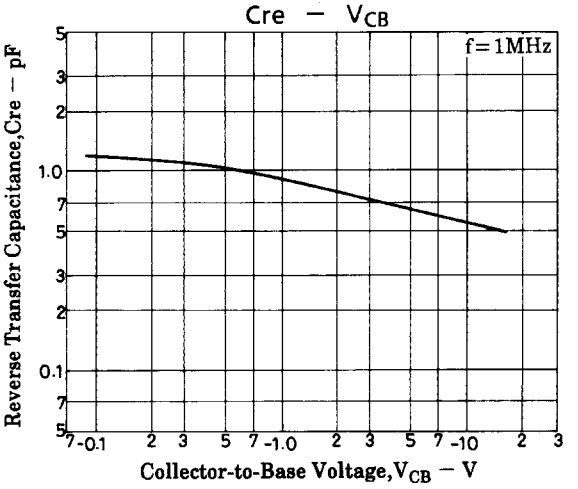
f_T – I_C



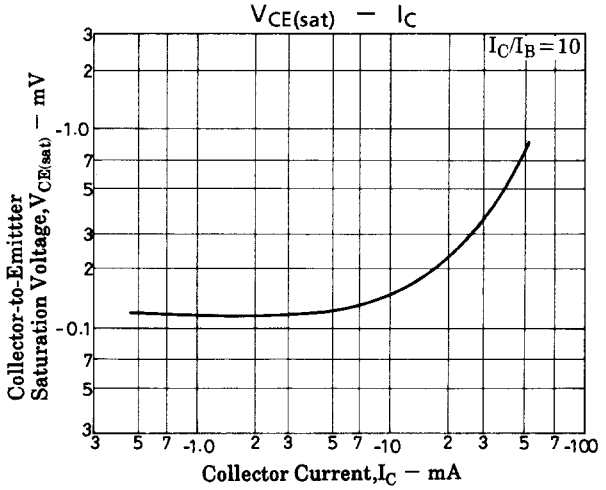
Cob – V_{CB}



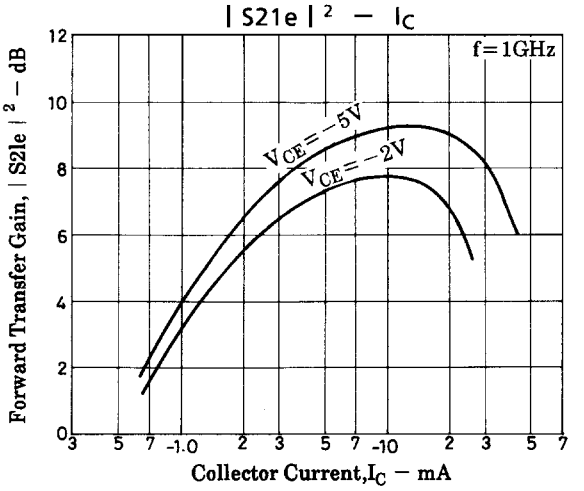
Cre – V_{CB}



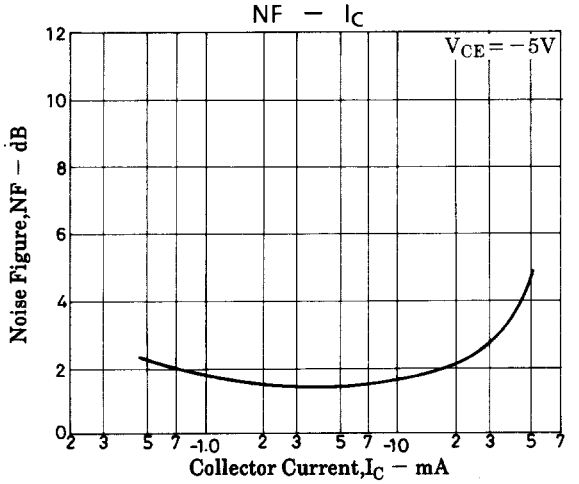
$V_{CE(sat)}$ – I_C



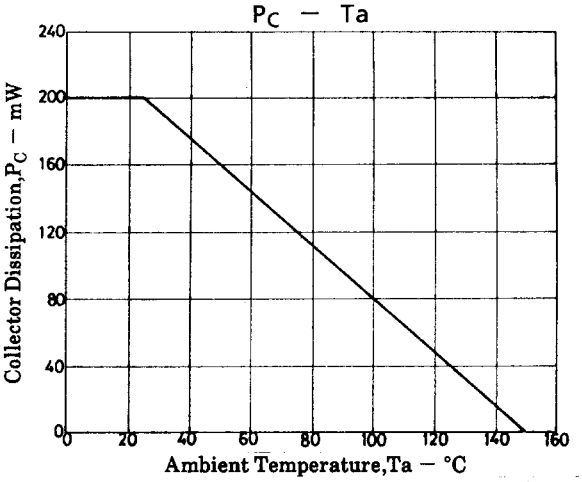
$|S21e|^2$ – I_C



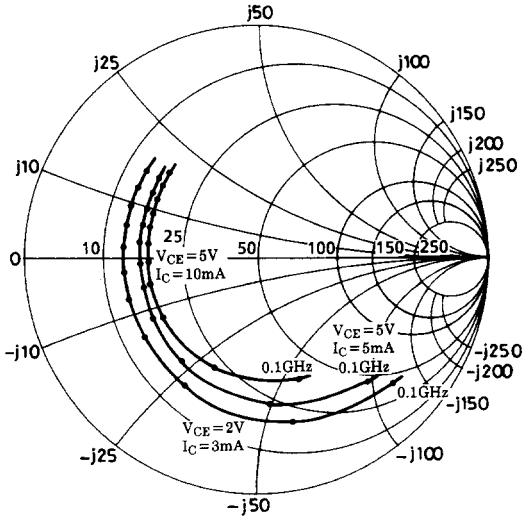
NF – I_C



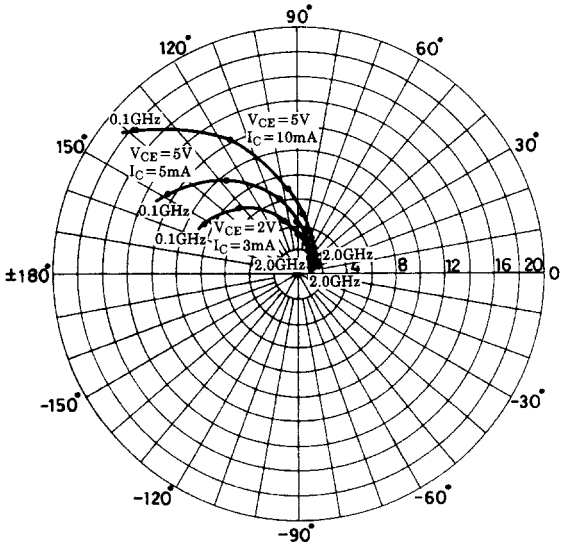
P_C – Ta



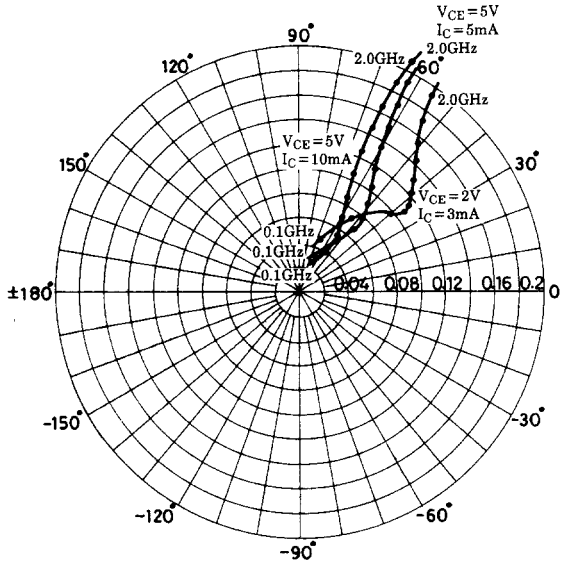
S11e : f=100MHz, 200 to 2000MHz (200MHz step)



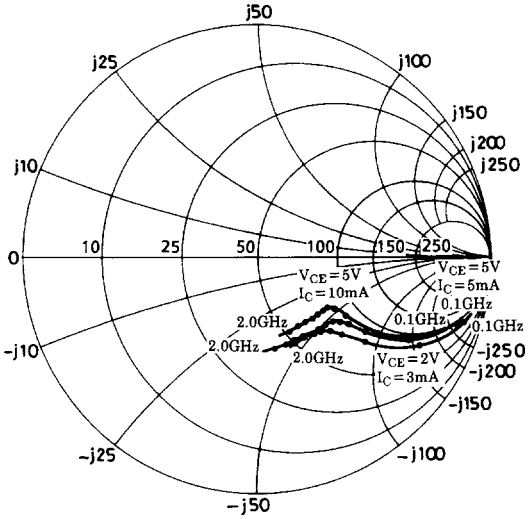
S21e : f=100MHz, 200 to 2000MHz (200MHz step)



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



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



S Parameters (Common Emitter)

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

Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
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

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

Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
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

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

Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
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