

Ordering number:EN3927

NPN Epitaxial Planar Silicon Transistor



# 2SC4673

## UHF Low-Noise Amplifier, Wide-Band Amplifier Applications

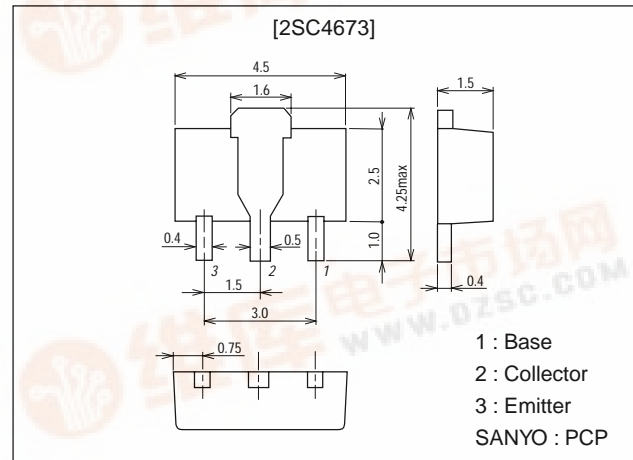
### Features

- Low noise figure : NF=1.5dB typ (f=0.9GHz).
- High power gain :  $|S_{21e}|^2=8.0\text{dB typ (f=0.9GHz)}$ .
- High cutoff frequency :  $f_T=4.5\text{GHz typ}$ .

### Package Dimensions

unit:mm

2038A



### Specifications

#### Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V <sub>CBO</sub>		20	V
Collector-to-Emitter Voltage	V <sub>CEO</sub>		12	V
Emitter-to-Base Voltage	V <sub>EBO</sub>		3	V
Collector Current	I <sub>C</sub>		100	mA
Base Current	I <sub>B</sub>		30	mA
Collector Dissipation	P <sub>C</sub>		400	mW
		Mounted on ceramic board (250mm <sup>2</sup> ×0.8mm)	800	mW
Junction Temperature	T <sub>j</sub>		150	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

#### Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I <sub>CBO</sub>	V <sub>CB</sub> =12V, I <sub>E</sub> =0			1.0	μA
Emitter Cutoff Current	I <sub>EBO</sub>	V <sub>EB</sub> =2V, I <sub>C</sub> =0			10	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =20mA	40*		200*	
Gain-Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =20mA		4.5		GHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> =10V, f=1MHz		1.1		pF
Reverse Transfer Capacitance	C <sub>re</sub>	V <sub>CB</sub> =10V, f=1MHz		0.75		pF

\* : The 2SC3778 is classified by 20mA h<sub>FE</sub> as follows :

40	C	80	60	D	120	100	E	200
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Marking : CD

h<sub>FE</sub> rank : C, D, E

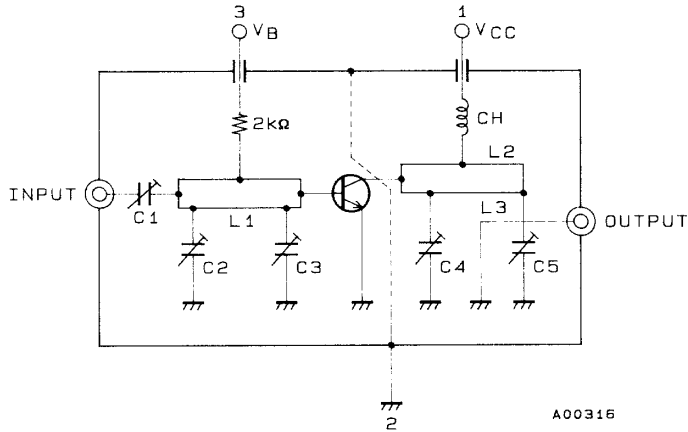
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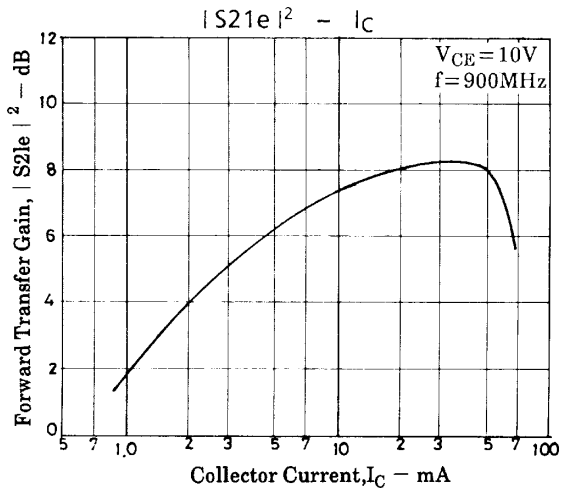
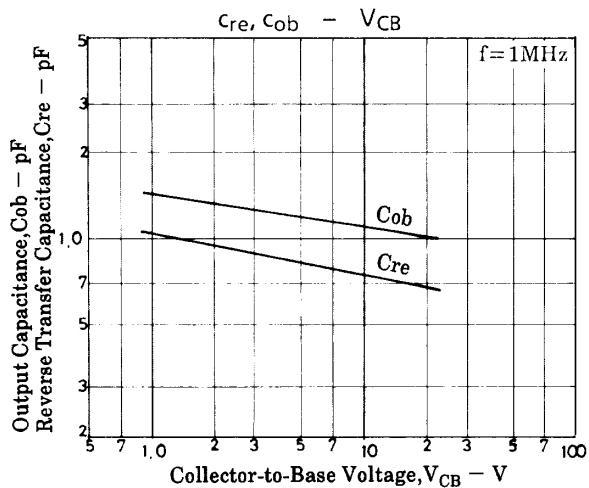
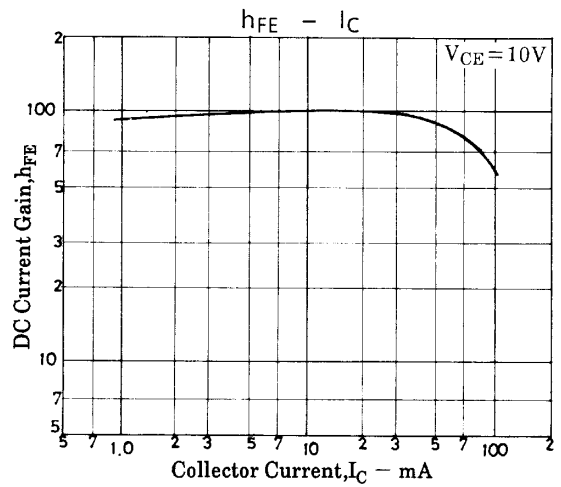
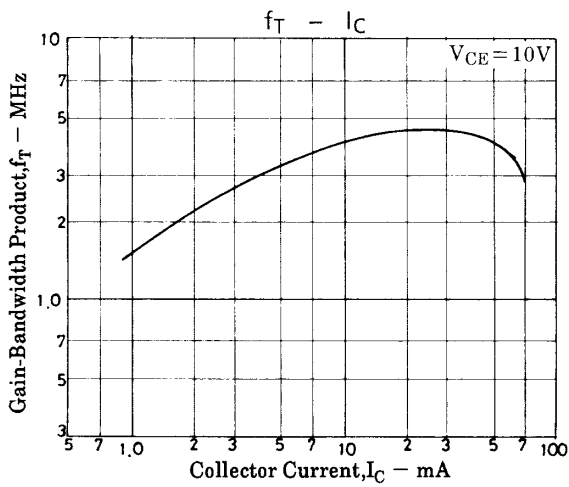
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=10V, I_C=20mA, f=0.9GHz$		8.0		dB
Noise Figure	NF	$V_{CE}=10V, I_C=5mA, f=0.9GHz$		1.5	3.0	dB

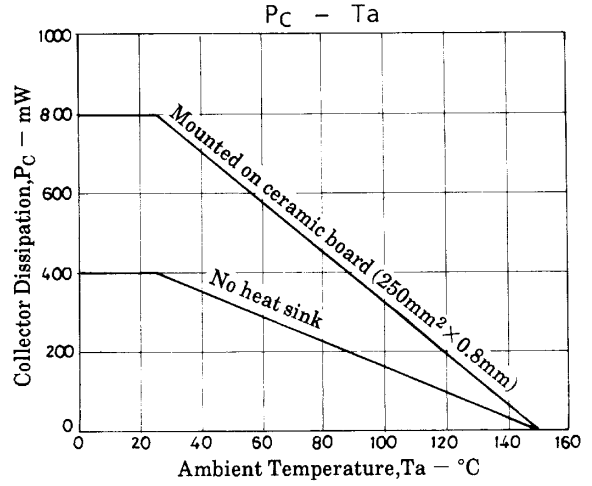
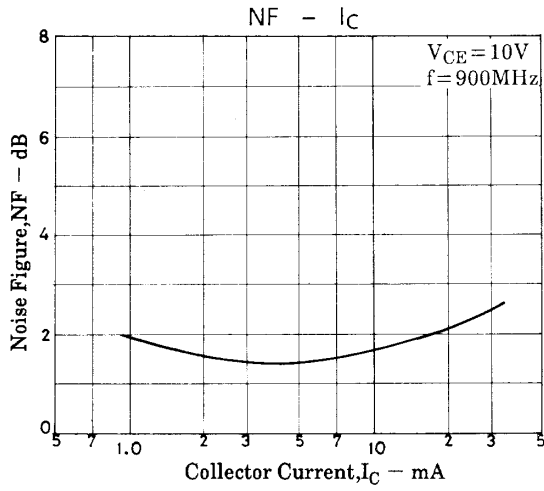
## NF Test Circuit



900MHz	
C1	up to 5pF
C2	up to 10pF
C3	up to 10pF
C4	up to 10pF
C5	up to 10pF
L1	W ≈ 1.5mm, l ≈ 25mm Strip line
L2	W ≈ 4mm, l ≈ 25mm Strip line
L3	0.5φ, l ≈ 4mm
CH	2t+bead core

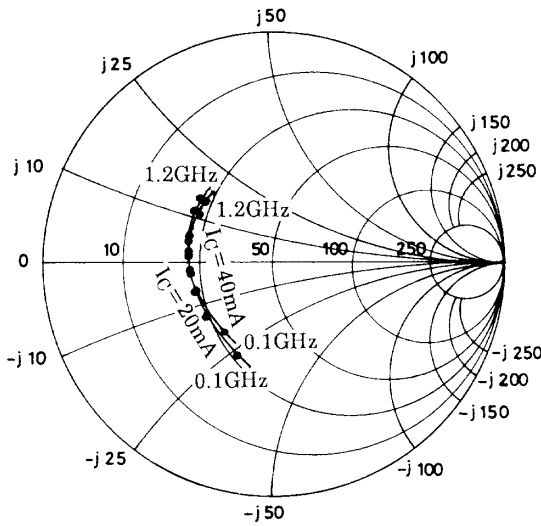


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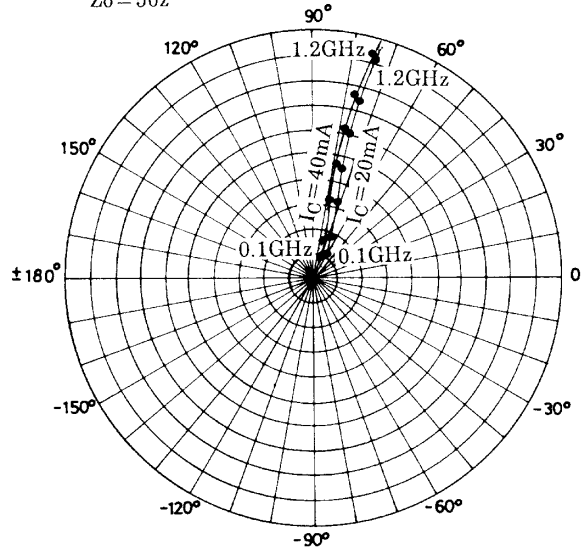


## S parameter

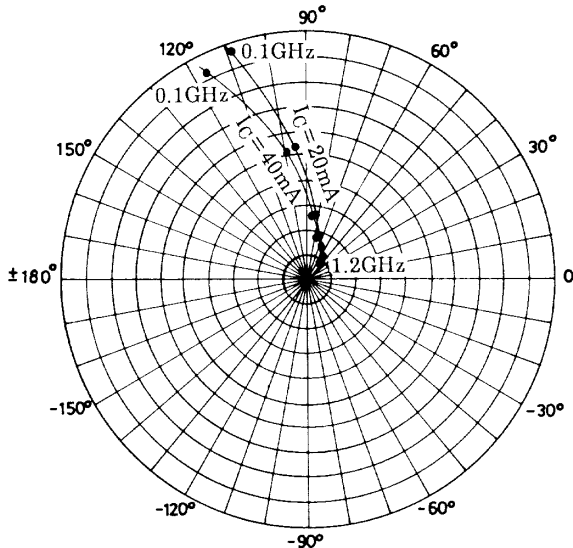
S11e:  $V_{CE} = 10V$   
 $f = 100MHz, 200$  to  $1200MHz$  (200MHz step)



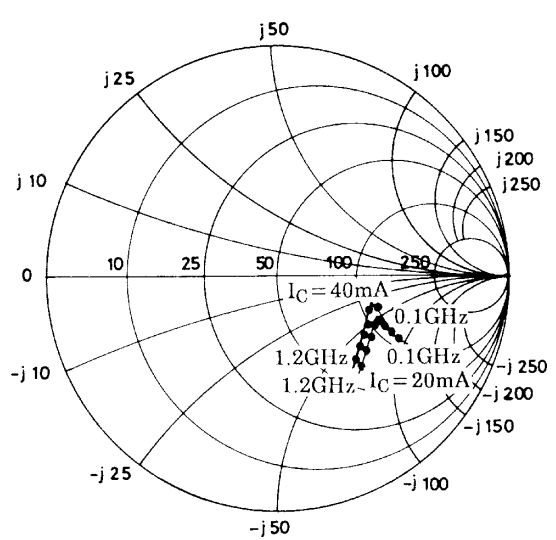
S12e:  $V_{CE} = 10V$   
 $f = 100MHz, 200$  to  $1200MHz$  (200MHz step)  
 $Z_o = 50\Omega$



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



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



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### S parameters (Common emitter)

$V_{CE}=10V, I_C=20mA, Z_0=50\Omega$

Freq (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.414	-112.1	18.300	115.9	0.024	61.1	0.605	-26.4
200	0.372	-147.5	10.148	99.2	0.037	66.4	0.492	-23.5
400	0.364	-175.7	5.274	84.8	0.064	72.9	0.458	-23.0
600	0.369	170.1	3.619	75.6	0.093	75.3	0.460	-27.3
800	0.379	158.7	2.764	67.8	0.123	76.6	0.468	-32.6
900	0.366	153.6	2.504	66.4	0.139	75.4	0.475	-35.7
1000	0.388	148.5	2.279	60.8	0.152	75.1	0.478	-38.5
1200	0.399	140.5	1.914	54.2	0.184	74.0	0.487	-44.4

$V_{CE}=10V, I_C=40mA, Z_0=50\Omega$

Freq (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.730	-133.7	19.714	109.3	0.021	66.4	0.535	-25.3
200	0.363	-161.5	10.534	95.3	0.035	72.5	0.452	-20.6
400	0.366	177.6	5.411	82.8	0.064	77.3	0.438	-21.1
600	0.371	166.7	3.690	74.3	0.094	77.9	0.444	-25.9
800	0.380	156.9	2.823	66.8	0.125	77.3	0.454	-31.7
900	0.389	153.1	2.562	63.5	0.142	76.8	0.462	-35.1
1000	0.391	148.3	2.329	59.9	0.155	76.1	0.465	-37.7
1200	0.404	141.3	1.982	53.6	0.186	74.7	0.474	-43.8

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