GaAs SPDT SWITCH IC

■ GENERAL DESCRIPTION

NJG1508F is a GaAs SPDT switch IC featuring a low loss,a high isolation and a low control current.

In the wide frequency range from 100MHz to 3GHz,The this IC operates at a low voltage from 2.5V.

A very small package is adopted.

It is suited from the switch in receiving circuit of RF frequency of PDC.

■ PACKAGE OUTLINE

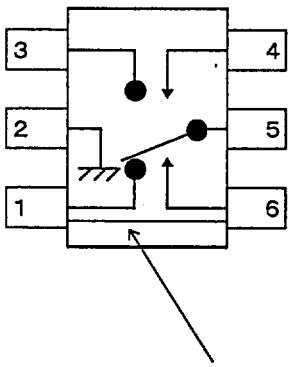
NJG1508F

■ FEATURES

●Single and low control voltage	+2.5～+5.5 V
●Low insertion loss	0.3dB Typ.@ f =1GHz、P_{in}=0dBm
●High isolation	27dB Typ.@ f =1GHz、P_{in}=0dBm
●Passing power	19dBm MAX.@ f =2GHz、V_{CTR}=3.0V
●Low control current	1 μA Typ.@ f =0.1～2.5GHz.、P_{in}=10dBm
●Small package	MTP6

■ PIN CONFIGURATION

F TYPE
(Top View)



Pin Connection

1. P1
2. GND
3. P2
4. V_{CTR2}
5. PC
6. V_{CTR1}

Package orientation mark

■ TRUTH TABLE

"H"=$V_{CTR(H)}$,"L"=$V_{CTR(L)}$

V_{CTR1}	H	L	L	H
V_{CTR2}	L	H	L	H
P1-PC	OFF	ON	LOSS=15dB P_1Return Loss=-3dB	LOSS=16dB P_1Return Loss=-2dB
P2-PC	ON	OFF	LOSS=15dB P_2Return Loss=-3dB	LOSS=16dB P_2Return Loss=-2dB

NOTE) The values of "LOSS" and "Return Loss" are typical values。

■ ABSOLUTE MAXIMUM RATINGS

(T_a=25℃)

PARAMETER	SYNBOL	RATINGS	UNIT
Input power	P_{in}	28	dBm
Control voltage	V_{CTR}	6	V
Power dissipation	P_D	300	mW
Operating Temp.	T_{opr}	-30～+85	℃
Storage Temp.	T_{stg}	-40～+150	℃

■ ELECTRICAL CHARACTERISTICS

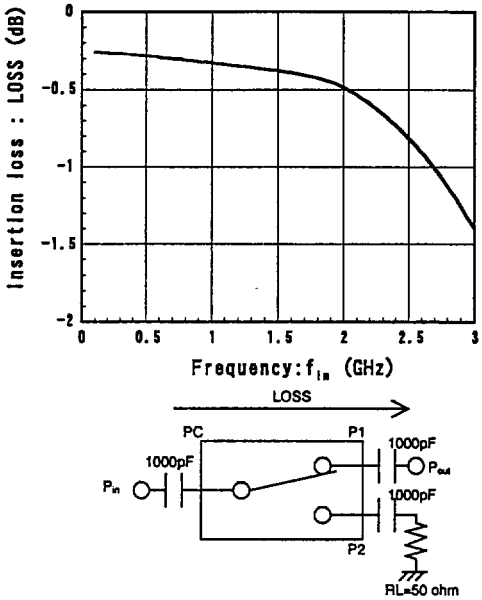
($V_{CTR(L)}$=0V、$V_{CTR(H)}$=2.7V、Z_S=Z_O=50ohm、Ta=25℃)

PARAMETER	SYNBOL	CONDITION	MIN	TYP	MAX	UNIT
Control voltage(L)	$V_{CTR(L)}$	f=0.1～2.5GHz,P_{in}=10dBm	-0.2	0	0.2	V
Control voltage(H)	$V_{CTR(H)}$	f=0.1～2.5GHz,P_{in}=10dBm	2.5	2.7	5.5	V
Control current	I_{CTR}	f=0.1～2.5GHz,P_{in}=10dBm	-	1.0	2.0	uA
Insertion loss1	LOSS1	f=1GHz,P_{in}=0dBm	-	0.3	0.6	dB
Insertion loss2	LOSS2	f=2GHz,P_{in}=0dBm	-	0.5	0.85	dB
Isolation1 (PC-P1,PC-P2,P1-P2)	ISL1	f=1GHz,P_{in}=0dBm	23	27	-	dB
Isolation2 (PC-P1,PC-P2,P1-P2)	ISL2	f=2GHz,P_{in}=0dBm	20	23	-	dB
Input power at 1db compression	P_{-1dB}	f=2GHz	19	22	-	dBm
VSWR (PC,P1,P2)	VSWR.	f=0.1～2.5GHz,ON STATE	-	1.3	1.6	
Switching speed	T_{SW}	f=0.1～2.5GHz	-	15	-	ns

■TYPICAL CHARACTERISTICS

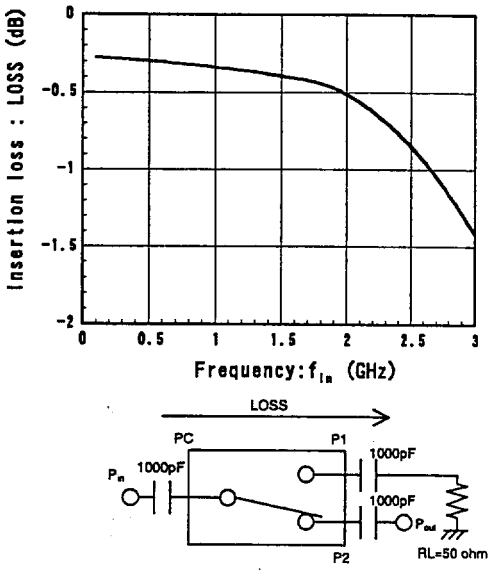
(PC-P1) Insertion loss vs. Frequency

(V_{CTR}=0V/2.7V , P_{in}=0dBm)



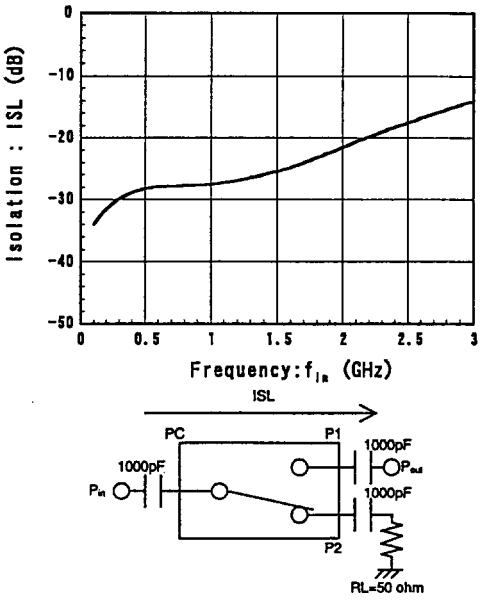
(PC-P2) Insertion loss vs. Frequency

(V_{CTR}=0V/2.7V , P_{in}=0dBm)



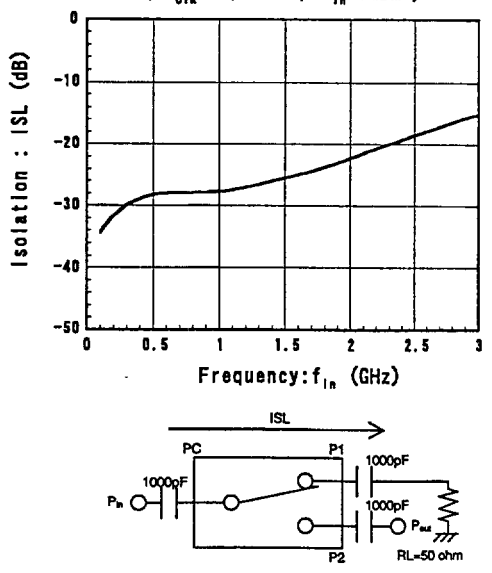
(PC-P1) Isolation vs. Frequency

(V_{CTR}=0V/2.7V , P_{in}=0dBm)



(PC-P2) Isolation vs. Frequency

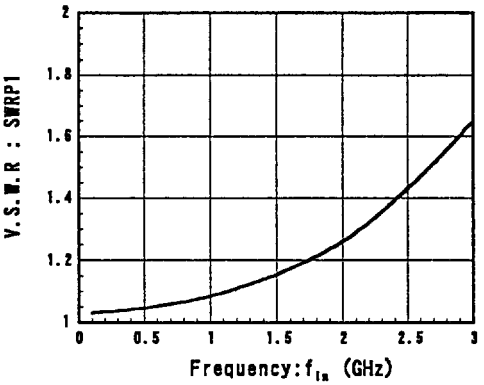
(V_{CTR}=0V/2.7V , P_{in}=0dBm)

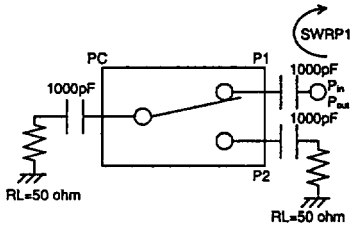


■ TYPICAL CHARACTERISTICS

P1-PC(ON) V.S.W.R vs. Frequency

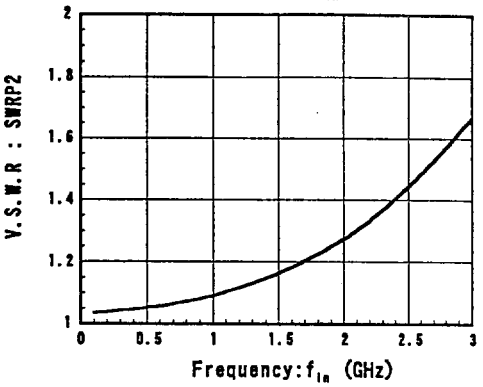
(V_{CTR}=0V/2.7V , P_{in}=0dBm)

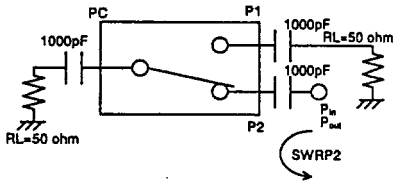




P2-PC(ON)V.S.W.R vs. Frequency

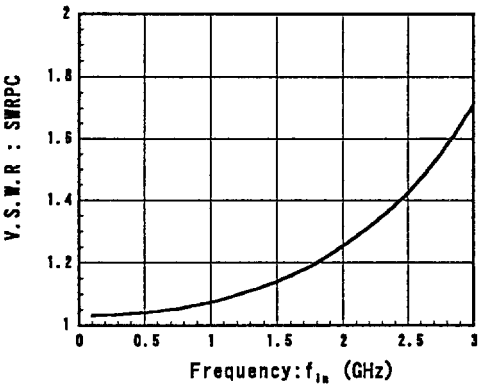
(V_{CTR}=0V/2.7V , P_{in}=0dBm)

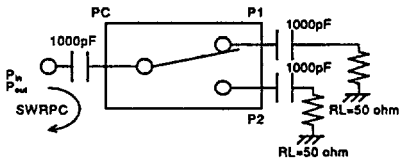




PC-P1(ON) V.S.W.R vs. Frequency

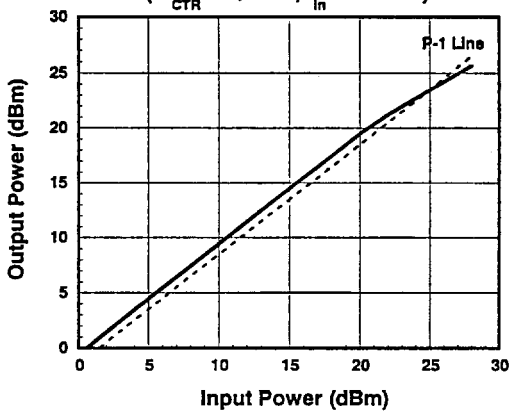
(V_{CTR}=0V/2.7V , P_{in}=0dBm)



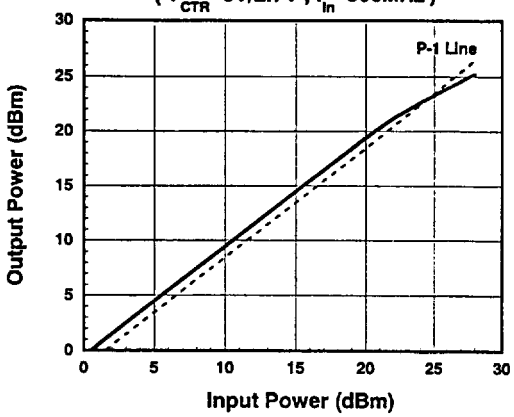


■ TYPICAL CHARACTERRISTICS

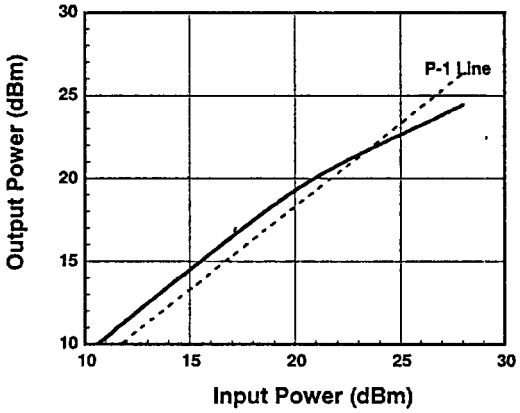
Output Power vs. Input Power
(V_{CTR}=0V/2.7V , f_{in}=300MHz)



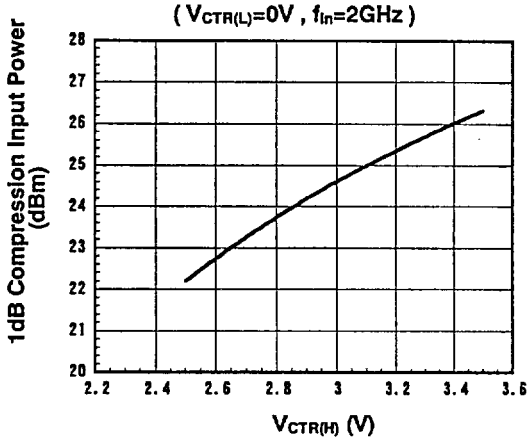
Output Power vs. Input Power
(V_{CTR}=0V/2.7V , f_{in}=900MHz)



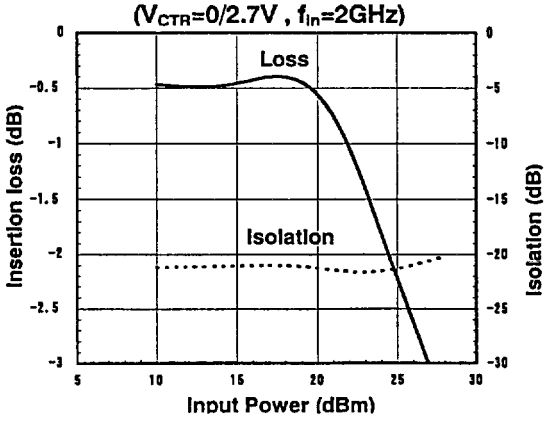
Output Power vs. Input Power
(V_{CTR}=0V/2.7V , f_{in}=2GHz)



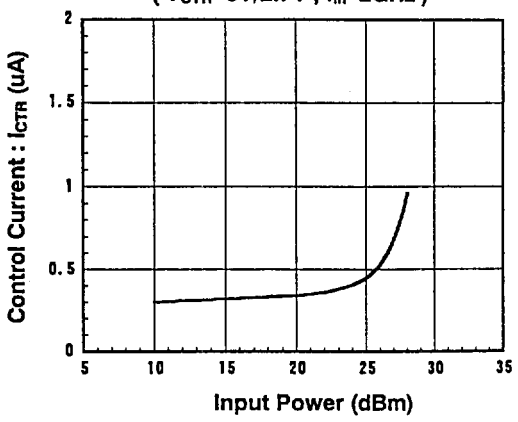
P-1dB vs. Control Voltage
($V_{CTR(L)}$=0V , f_{in}=2GHz)



Insertion loss,Isolation vs. Input Power
(V_{CTR}=0/2.7V , f_{in}=2GHz)



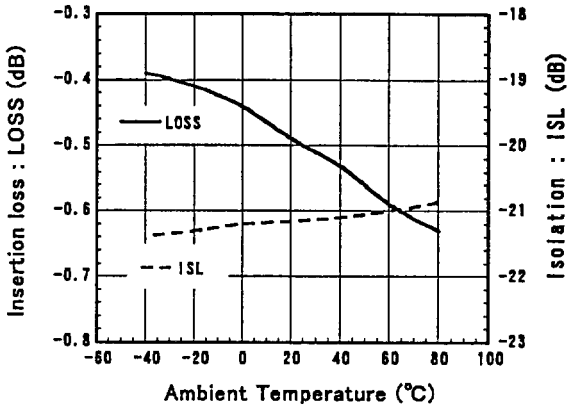
Control Current vs. Input Power
(V_{CTR}=0V/2.7V , f_{in}=2GHz)



■ TYPICAL CHARACTERRISTICS

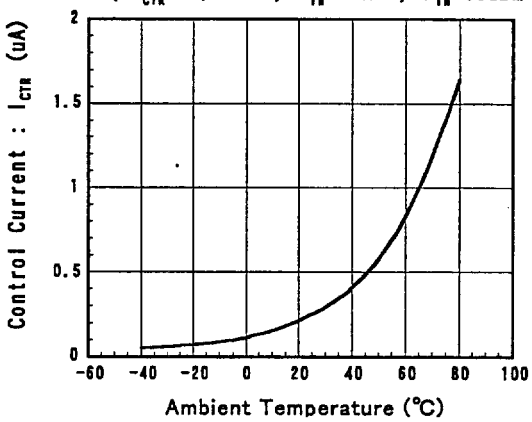
Loss/Isolation vs. Temperature

(V_{CTR}=0V/2.7V , f_{in}=2GHz)



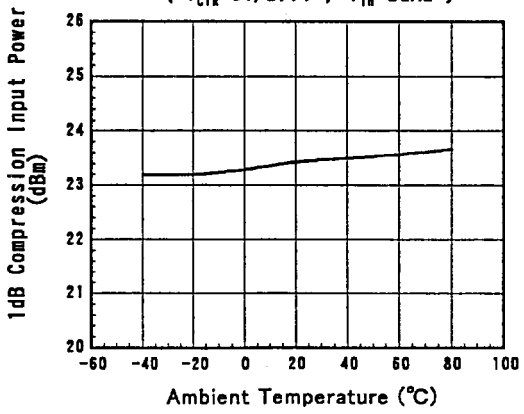
Control Current vs. Temperature

(V_{CTR}=0V/2.7V , f_{in}=2GHz , P_{in}=10dBm)



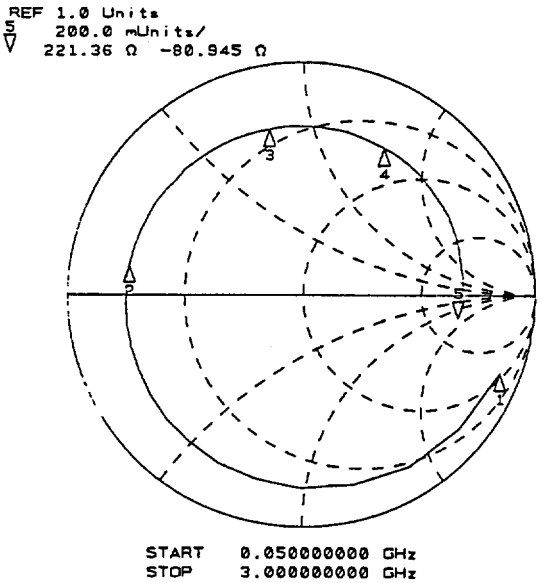
P-1dB vs. Temperature

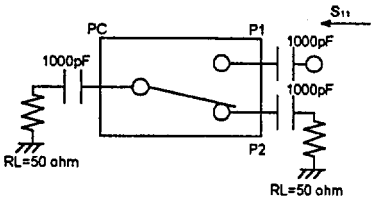
(V_{CTR}=0V/2.7V , f_{in}=2GHz)



■ TYPICAL CHARACTERISTICS

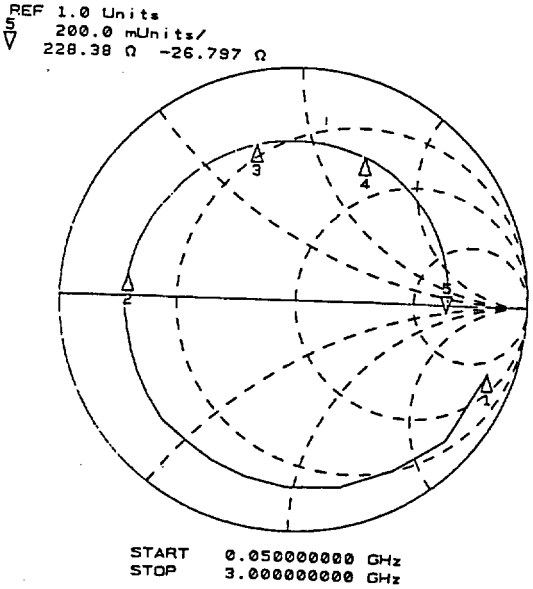
P1 PORT IMPEDANCE (OFF STATE)

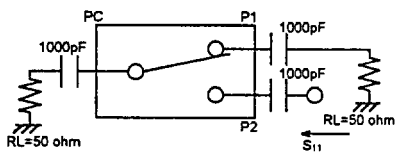




MARKER	f (MHz)	Mag.	Ang. (∠°)
1	50	0.912	-21.7
2	800	0.748	170.1
3	1500	0.728	101.3
4	2000	0.718	61.7
5	3000	0.671	-8.7

P2 PORT IMPEDANCE (OFF STATE)





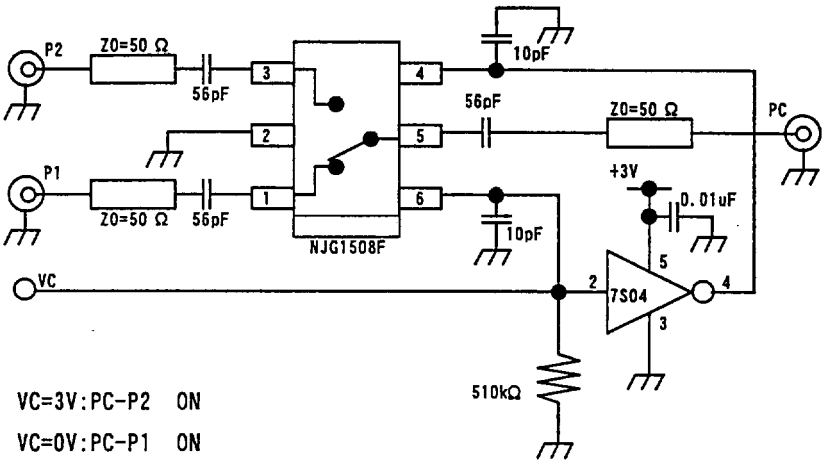
MARKER	f (MHz)	Mag.	Ang. (∠°)
1	50	0.881	-19.2
2	800	0.713	172.3
3	1500	0.690	104.9
4	2000	0.681	66.1
5	3000	0.643	-3.2

Scattering Parameters : S11(OFF STATE)

(VCTR=0/2.7V , 50Ω System)

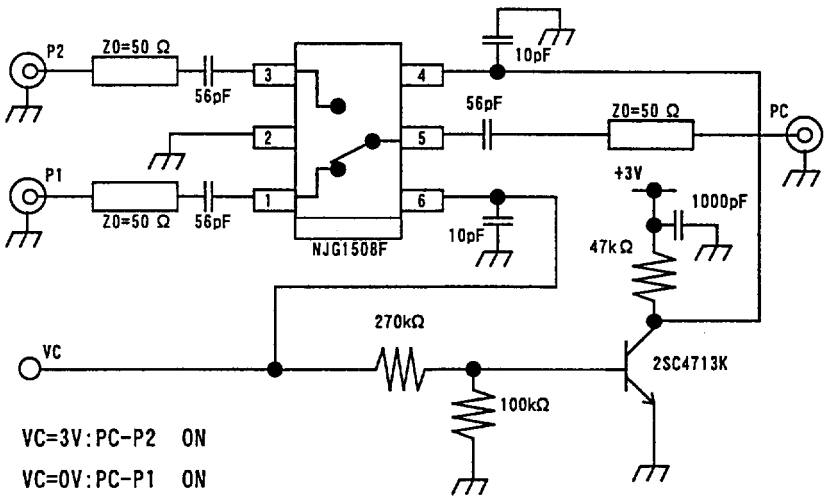
	P1 PORT		P2 PORT	
f(MHz)	Mag.	Ang.(∠°)	Mag.	Ang.(∠°)
50	0.912	-21.7	0.881	-19.2
100	0.886	-40.6	0.883	-41.9
200	0.849	-75.2	0.832	-75.1
300	0.818	-103.8	0.787	-103.6
400	0.792	-127.1	0.757	-126.1
500	0.776	-146.5	0.743	-145.5
600	0.762	-163.0	0.726	-161.4
700	0.754	-177.1	0.721	-175.0
800	0.748	170.1	0.713	172.3
900	0.743	158.5	0.709	160.9
1000	0.740	147.7	0.704	150.4
1100	0.728	137.1	0.694	139.9
1200	0.731	128.0	0.696	131.0
1300	0.732	118.7	0.695	122.1
1400	0.730	110.0	0.694	113.3
1500	0.728	101.3	0.690	104.9
1600	0.726	93.0	0.689	96.9
1700	0.724	85.1	0.686	89.1
1800	0.724	77.1	0.684	81.3
1900	0.721	69.1	0.682	73.6
2000	0.718	61.7	0.681	66.1
2100	0.717	54.5	0.679	59.1
2200	0.714	46.9	0.677	51.7
2300	0.710	39.3	0.672	44.4
2400	0.706	32.4	0.670	37.3
2500	0.703	25.1	0.666	30.2
2600	0.696	18.2	0.664	23.4
2700	0.689	11.8	0.658	16.9
2800	0.684	5.0	0.655	10.0
2900	0.679	-2.1	0.648	3.3
3000	0.671	-8.7	0.643	-3.2

■ **APPLICATION CIRCUIT 1**:Single signal control circuit using C-MOS invertor

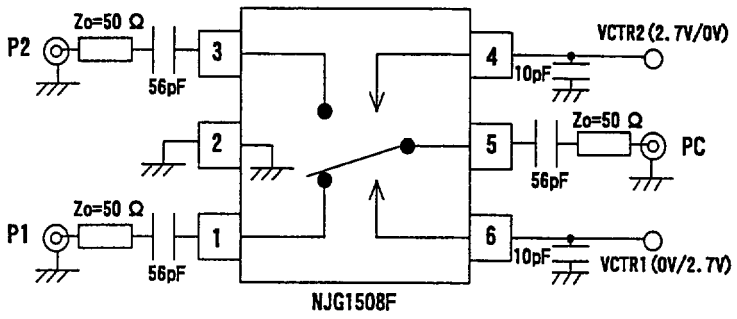


[1] Please connect the bypass capacitor to C-MOS invertor supply terminal.
[2] In order to the state of input impedence of invertor, Please pull-down with 510k Ω of resister for C-MOS invertor input terminal.

■ **APPLICATION CIRCUIT 2**:Single signal control circuit using transistor.

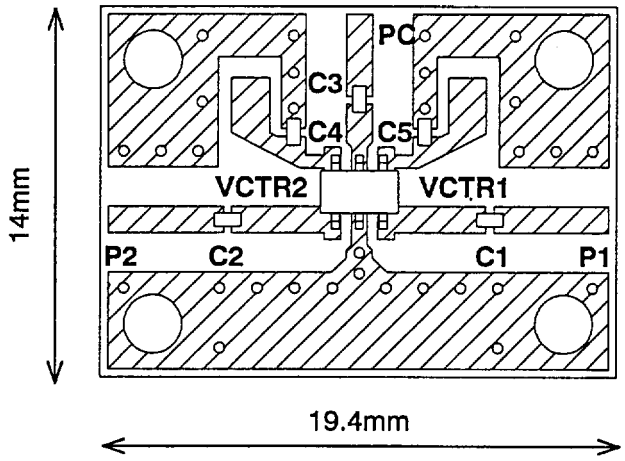


■ TEST CIRCUIT



■ RECOMMENDED PCB

(TOP VIEW)



PCB:FR-4 t=0.5mm
CAPACITOR:size 1005
STRIP LINE WIDTH=1mm
C1～C3:56pF
C4,C5:10pF

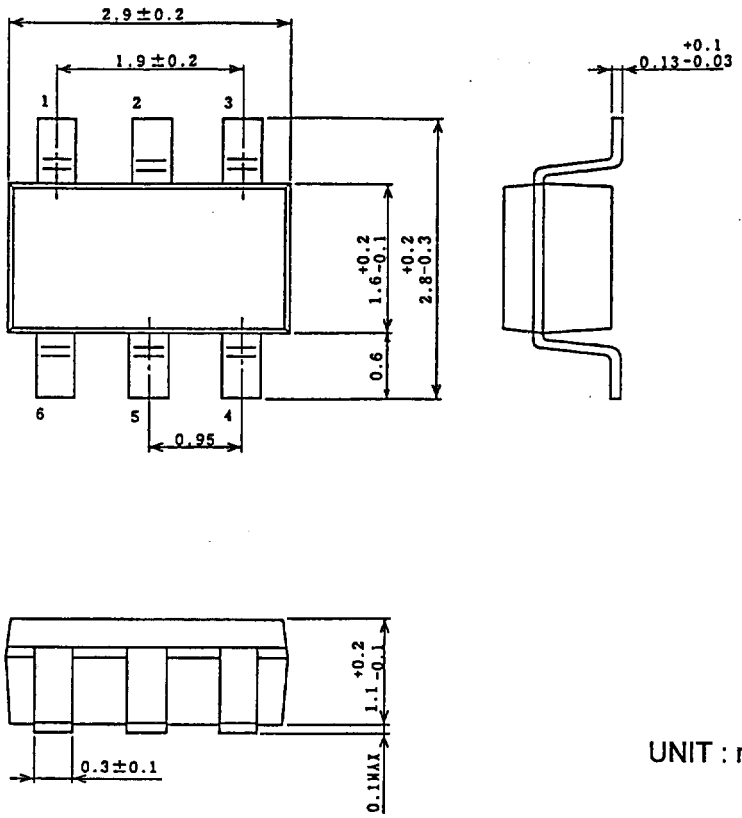
Usage precaution on devices

[1] Outer capacitors should be connected to the input and output RF frequency terminal (P1,P2,PC)to block the DC current. The above figure is a circuit's example to a frequency at 900MHz. Please use a capacitor from 10pF to 1000pF to be suited for using band.

[2] Decoupling capacitors should be connected to the control terminals(V_{CTR1},V_{CTR2}) as near as possible. The values of these capacitors should be selected from 5pF to 100pF for using band. But take care of the switching time because the capacitor make the switching time late.

[3] In order to keep good isolation characteristics, the ground terminal (2pin)should be connected to ground pattern with relatively wide width as near as possible, and Though-hole in the ground plane should be placed as near as possible too.

■ PACKAGE OUTLINE



UNIT : mm

Caution on using the products

A GaAs is used in this products. A GaAs is a harmful material.

- Don't eat or in the mouth.
- Don't dispose in fire or break up the products.
- Don't be make a gas or a powdered with the chemical reaction.
- In the case of wasting the products, please obey the relation rule in the each country.
- This products may be broken with static electric discharge or serge voltage. Therefore, please note a handling.

This products may be broken with static electric discharge or serge voltage.
Therefore, please note a handling.

- The product specifications and descriptions listed in this catalog are subject to change at any time, without notice.
- It is to modify the details of this catalog without making any preliminary announcement.
- We don't take upon ourselves the responsibilities that infringe on other people's rights of a patents bringing about the information and drawing in this catalog.
- It is not purpose to be equipped with the system needs a high reliability as air system, submarine cable system, atomic energy control system and medical instrument for keeping life.
  If you think the above system, please ask for the sales office beforehand.