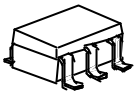
SPDT SWITCH GaAs MMIC

■GENERAL DESCRIPTION

NJG1508F is a GaAs SPDT switch MMIC which features low loss, high isolation and low control current, and ideally suitable the cellular phone handsets which needs to switch during two frequency bands.

NJG1508F is operated in the wide frequency range from 50MHz to 3GHz at a low voltage from 2.5V with very small MTP6 package.

■PACKAGE OUTLINE

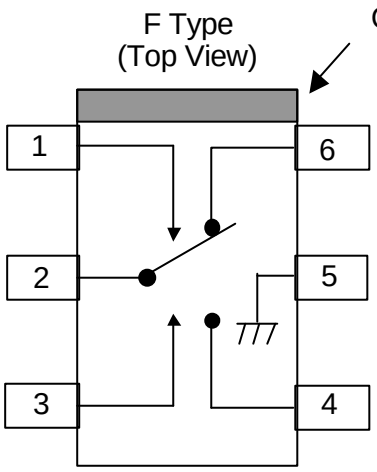


NJG1508F

■FEATURES

●Single and low control voltage	+2.5~+5.5V
●Low insertion loss	0.3dB typ. @f=1.0GHz, P_{in}=0dBm
●High isolation	27dB typ. @f=1.0GHz, P_{in}=0dBm
●Transmission power	19dBm max. @f=2.0GHz, V_{CTL}=3.0V
●Low control current	1.0uA typ. @f=0.05~2.5GHz, P_{in}=10dBm
●Package	MTP6 (Mount Size: 2.8x2.9x1.2mm)

■PIN CONFIGURATION



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

■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 P1 Return Loss=-3dB	Loss=16dB P1 Return Loss=-2dB
P2-PC	ON	OFF	Loss=15dB P2 Return Loss=-3dB	Loss=16dB P2 Return Loss=-2dB

Note) The values of "Loss" and "Return Loss" are typical values.

■ABSOLUTE MAXIMUM RATINGS

(T_a=25°C)

PARAMETER	SYMBOL	RATINGS	UNITS
Input Power	P_{in}	28	dBm
Control Voltage	V_{CTR}	6.0	V
Power Dissipation	P_D	300	mW
Operating Temp.	T_{opr}	-20~+85	°C
Storage Temp.	T_{stg}	-40~+150	°C

■ELECTRICAL CHARACTERISTICS

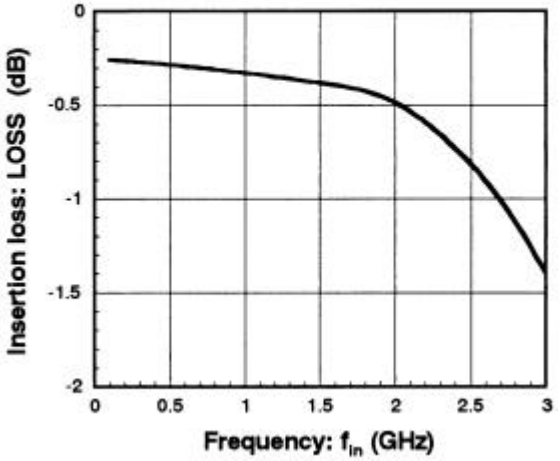
($V_{CTR\ (L)}$=0V, $V_{CTR\ (H)}$=2.7V, Z_S=Z_O=50Ω, T_a=25°C)

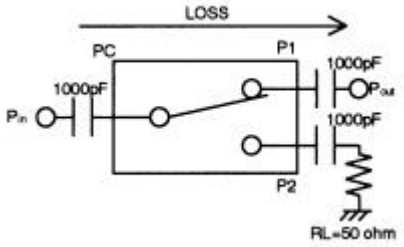
PARAMETER	SYMBOL	RATINGS	MIN	TYP	MAX	UNITS
Control voltage (L)	$V_{CTR\ (L)}$	f=0.05~2.5GHz, P_{in}=10dBm	-0.2	0.0	0.2	V
Control voltage (H)	$V_{CTR\ (H)}$	f=0.05~2.5GHz, P_{in}=10dBm	2.5	2.7	5.5	V
Control current	I_{CTR}	f=0.05~2.5GHz, P_{in}=10dBm	-	1.0	2.0	uA
Insertion loss 1	Loss1	f=1.0GHz, P_{in}=0dBm	-	0.3	0.6	dB
Insertion loss 2	Loss2	f=2.0GHz, P_{in}=0dBm	-	0.5	0.85	dB
Isolation 1 (PC-P1, PC-P2, P1-P2)	ISL1	f=1.0GHz, P_{in}=0dBm	23	27	-	dB
Isolation 2 (PC-P1, PC-P2, P1-P2)	ISL2	f=2.0GHz, P_{in}=0dBm	20	23	-	dB
Pin at 1dB compression point	P_{-1dB}	f=2.0GHz	19	22	-	dBm
VSWR (PC, P1, P2)	VSWR	f=0.05~2.5GHz, ON State	-	1.3	1.6	
Switching time	T_{sw}	f=0.05~2.5GHz	-	15	-	ns

■TYPICAL CHARACTERISTICS

(PC-P1) Insertion loss vs. Frequency

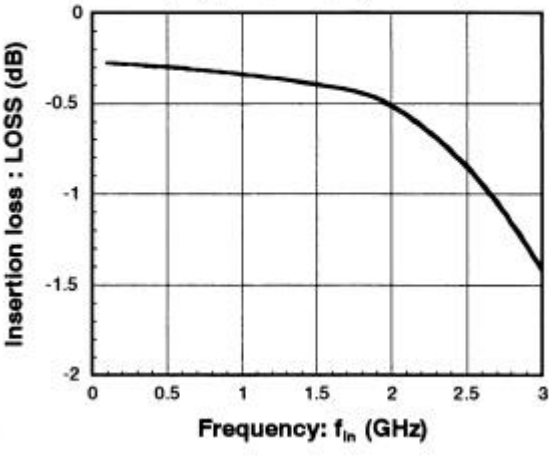
(V_{CTR}=0V/2.7V, P_{in}=0dBm)

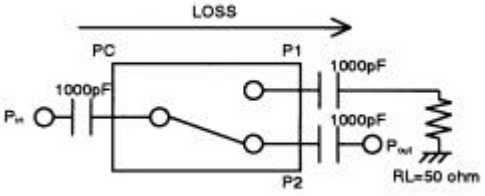




(PC-P2) Insertion loss vs. Frequency

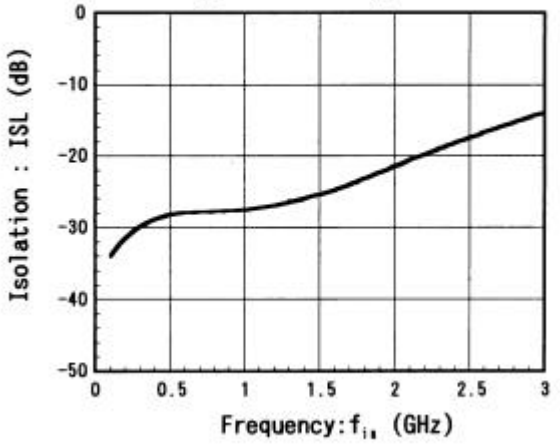
(V_{CTR}=0V/2.7V, P_{in}=0dBm)

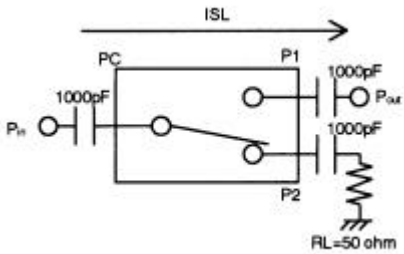




(PC-P1) Isolation vs. Frequency

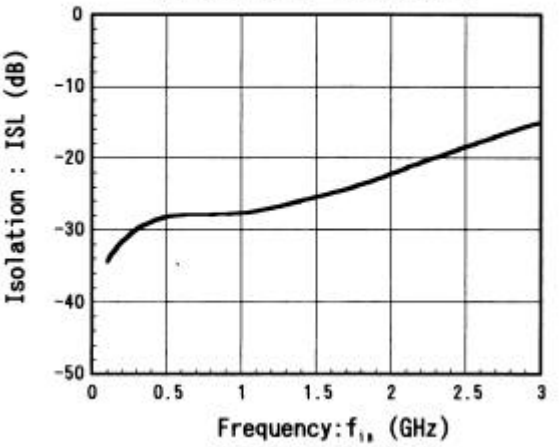
(V_{CTR}=0V/2.7V , P_{in}=0dBm)

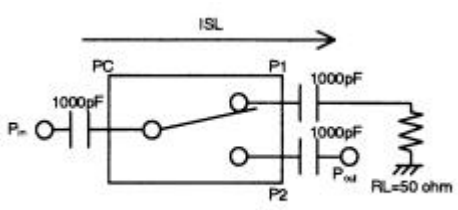




(PC-P2) Isolation vs. Frequency

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

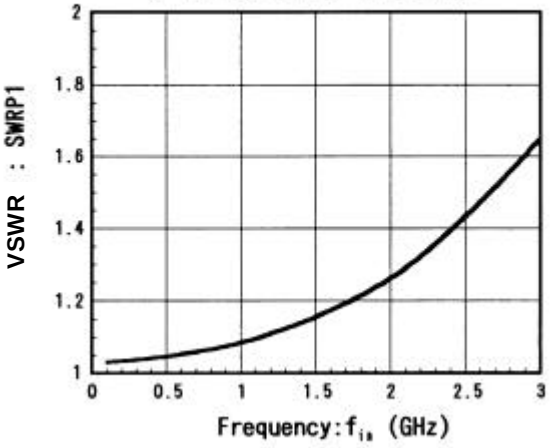


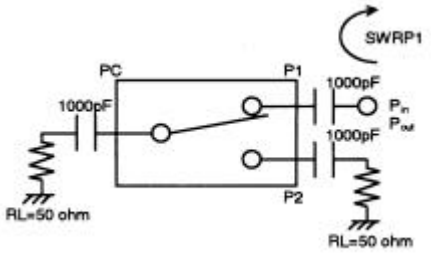


■TYPICAL CHARACTERISTICS

P1-PC(ON) VSWR vs. Frequency

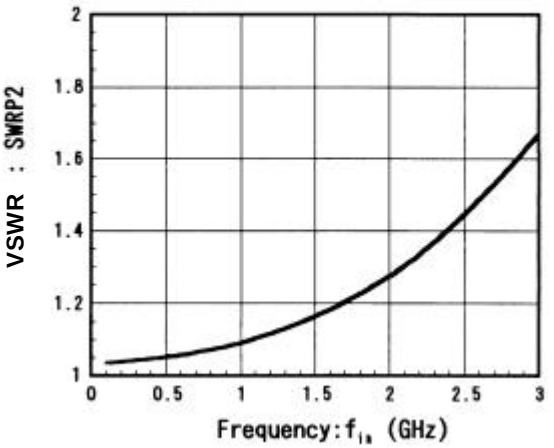
(V_{CTL}=0V/2.7V , P_{in}=0dBm)

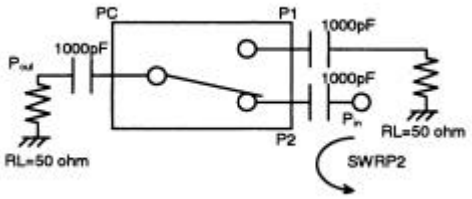




P2-PC(ON) VSWR vs. Frequency

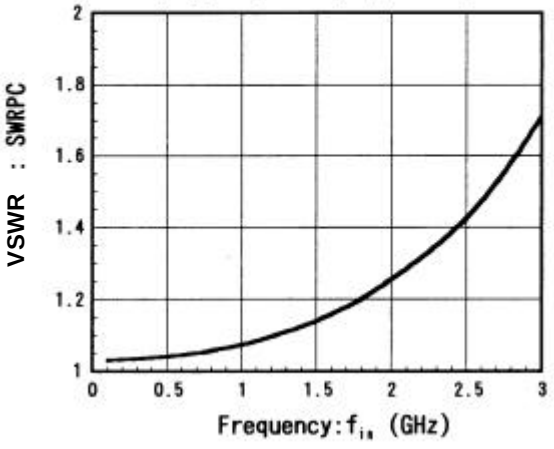
(V_{CTL}=0V/2.7V , P_{in}=0dBm)

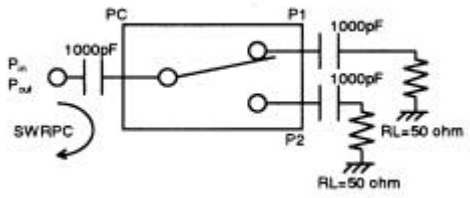




PC-P1(ON) VSWR vs. Frequency

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

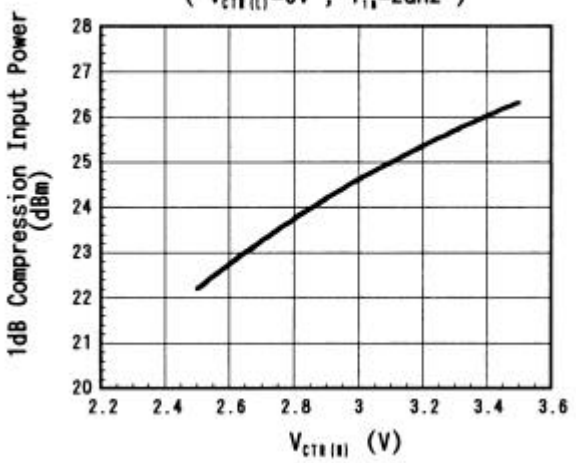




■TYPICAL CHARACTERISTICS

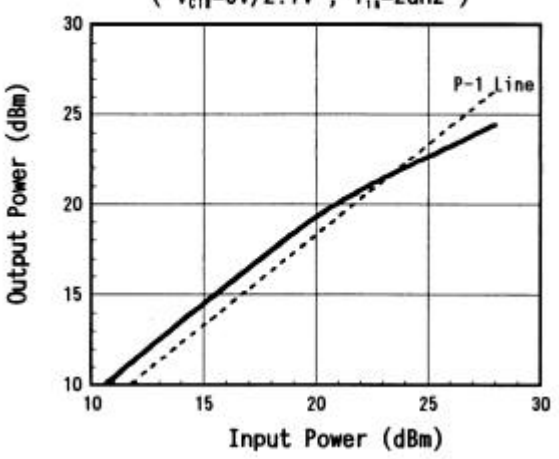
P-1dB vs. Control Voltage

($V_{CTR(L)}$=0V , f_{in}=2GHz)



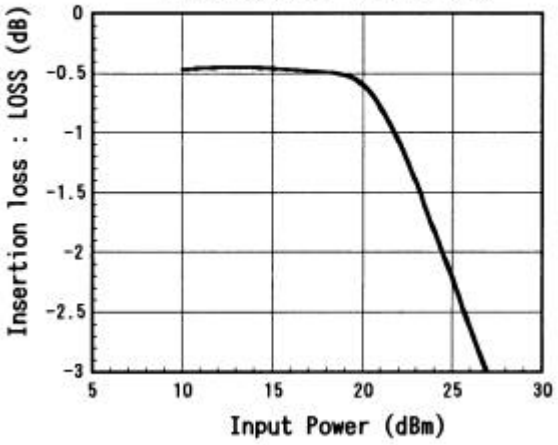
Output Power vs. Input Power

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



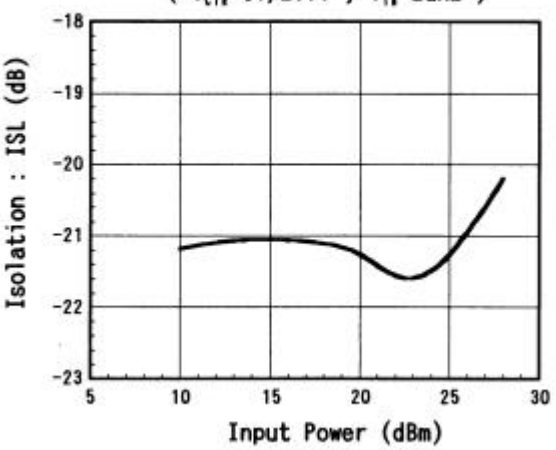
Insertion Loss vs. Input Power

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



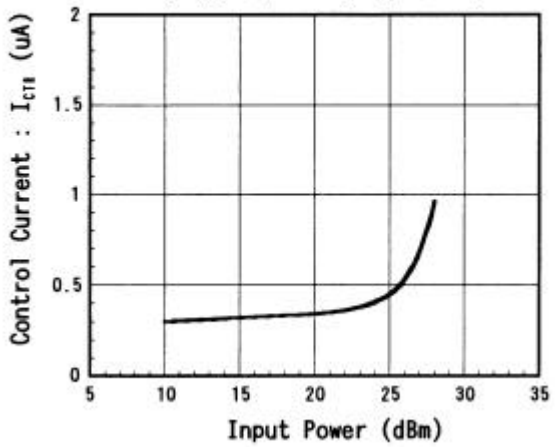
Isolation vs. Input Power

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



Control Current vs. Input Power

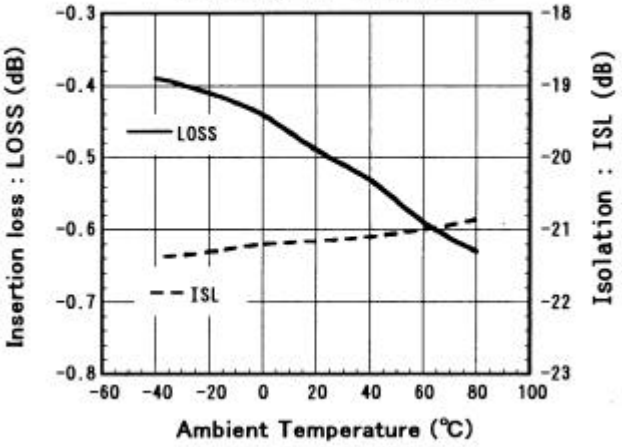
(V_{CTR}=0V/2.7V , f_{in}=2GHz)



■TYPICAL CHARACTERISTICS

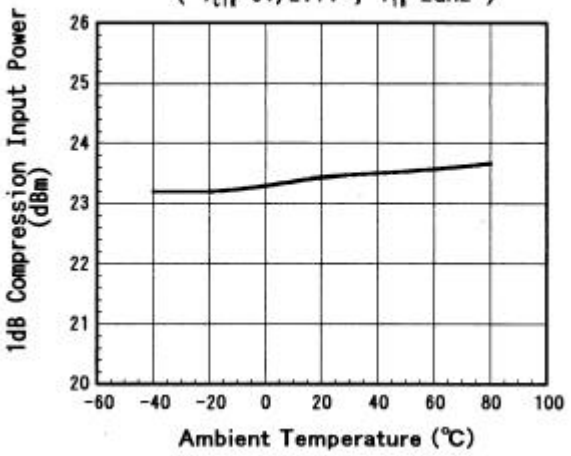
Loss/Isolation vs. Temperature

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



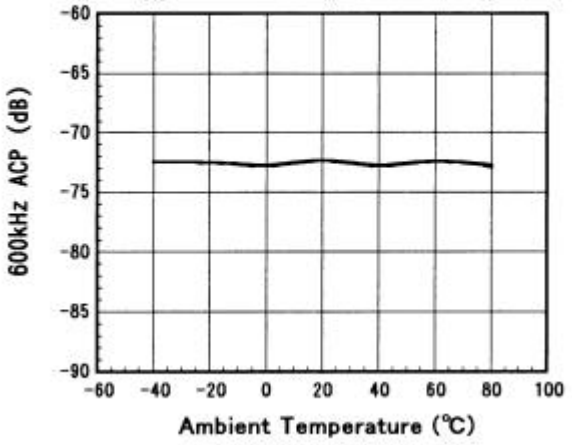
P-1dB vs. Temperature

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



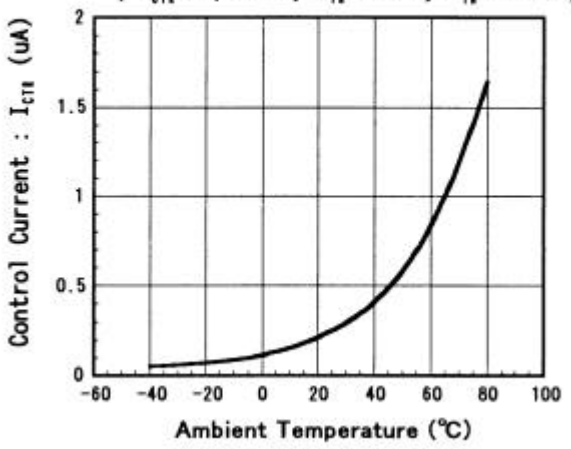
600kHz ACP vs. Temperature

(V_{CTL}=0V/2.7V , f_{in}=1.9GHz , P_{in}=0dBm)



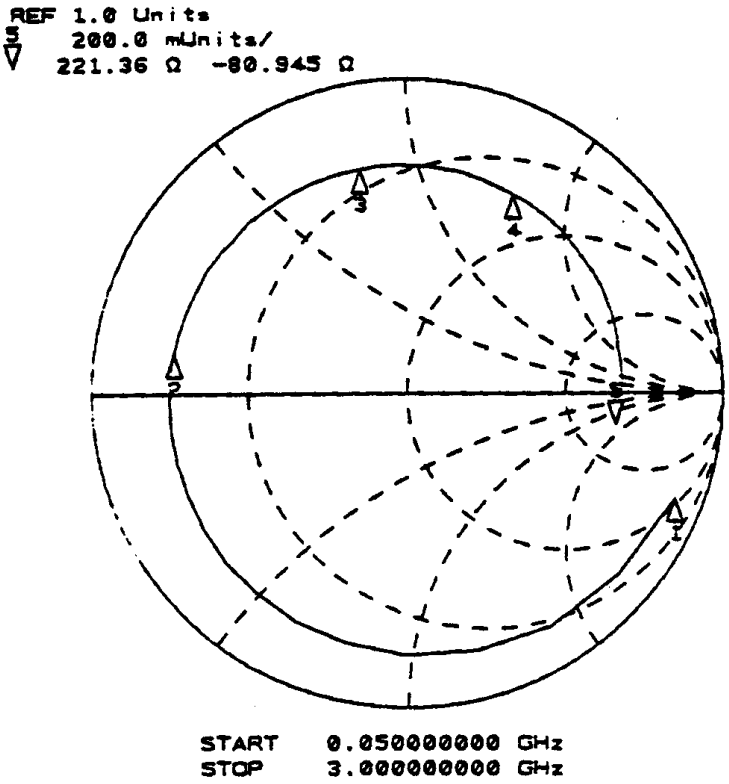
Control Current vs. Temperature

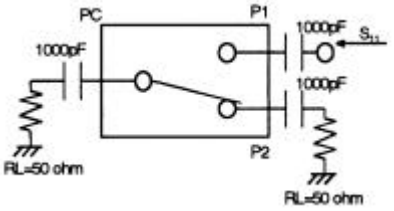
(V_{CTL}=0V/2.7V , f_{in}=2GHz , P_{in}=10dBm)



■TYPICAL CHARACTERISTICS

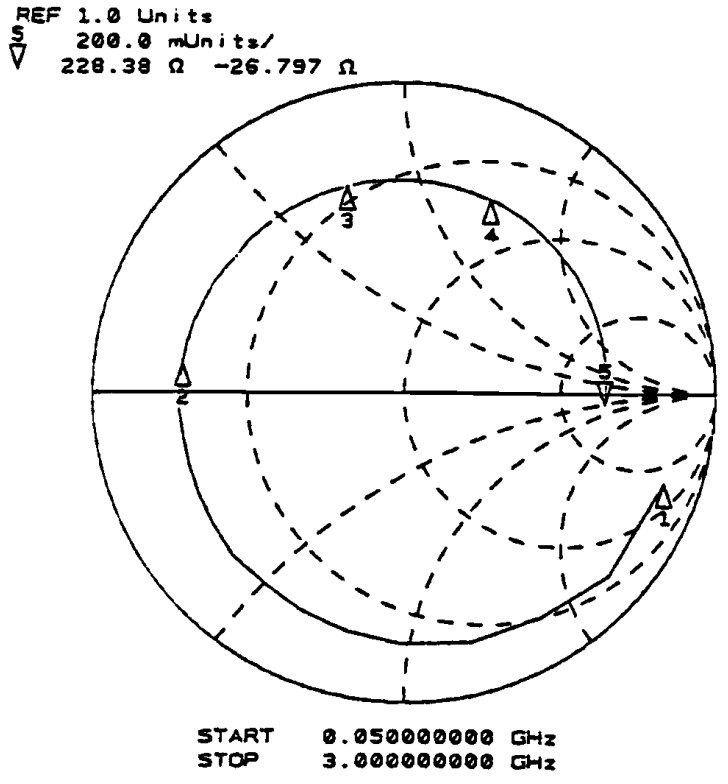
P1 PORT IMPEDANCE (OFF STATE)

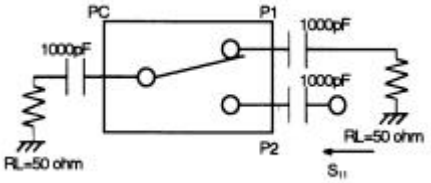




MARKER	f(MHz)	Mag.	Ang. (∠°)
1	50	0.912	-21.7
2	800	0.748	170.1
3	1500	0.728	101.3
4	2000	0.718	61.7
5	3000	0.671	-8.7

P2 PORT IMPEDANCE (OFF STATE)





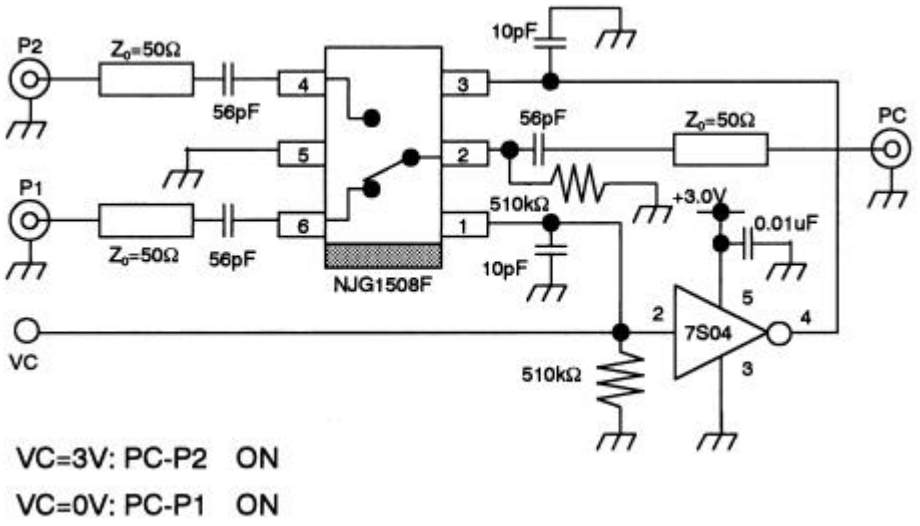
MARKER	f(MHz)	Mag.	Ang. (∠°)
1	50	0.881	-19.2
2	800	0.713	172.3
3	1500	0.690	104.9
4	2000	0.681	66.1
5	3000	0.643	-3.2

■ TYPICAL CHARACTERISTICS

Scattering Parameters: S11 (OFF STATE)

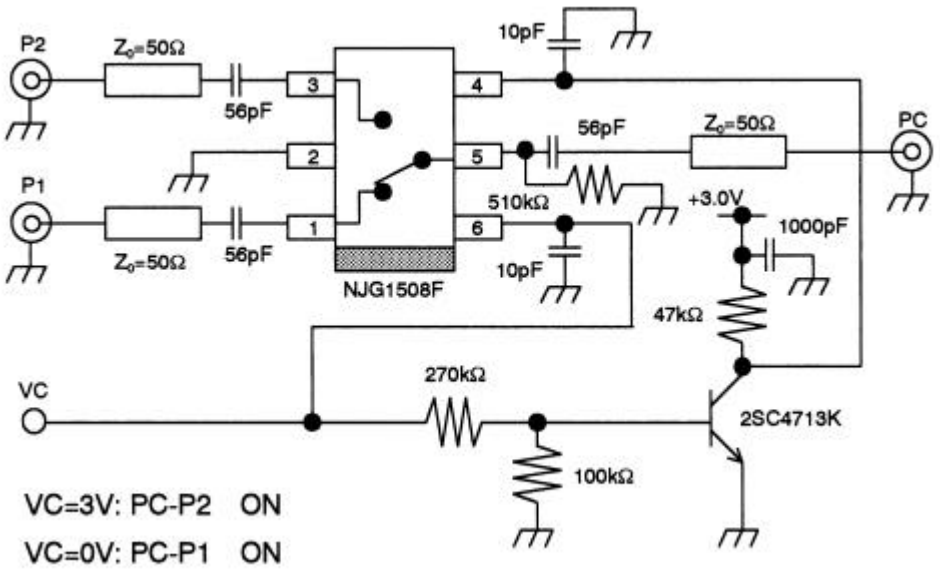
	P1 PORT		P2 PORT	
f(MHz)	Mag.	Ang.(∠°)	Mag.	Ang.(∠°)
50	0.912	−21.7	0.881	−19.2
100	0.886	−40.6	0.883	−41.9
200	0.849	−75.2	0.832	−75.1
300	0.818	−103.8	0.787	−103.6
400	0.792	−127.1	0.757	−126.1
500	0.776	−146.5	0.743	−145.5
600	0.762	−163.0	0.726	−161.4
700	0.754	−177.1	0.721	−175.0
800	0.748	170.1	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 control signal operation by using C-MOS inverter.

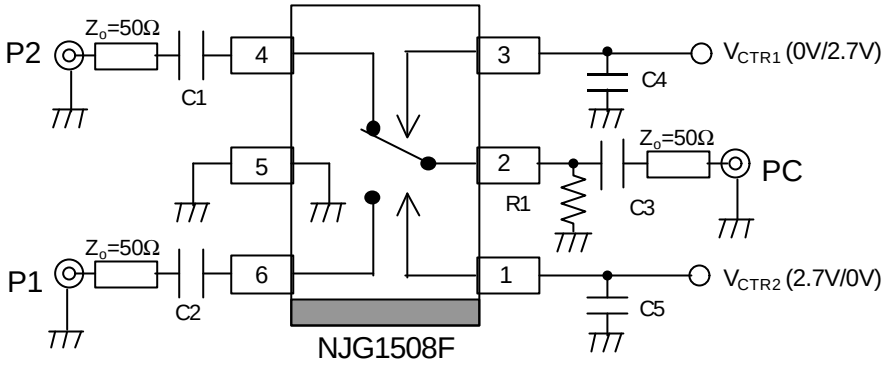


[1]Please connect bypass capacitors to the supply terminals of the C-MOS inverter.
[2]In order to stabilize input impedance of inverter, please pull down using 510kΩ resister from the input terminal of the C-MOS inverter to the ground plane.

■**APPLICATION CIRCUIT 2**: Single control signal operation by using a transistor.

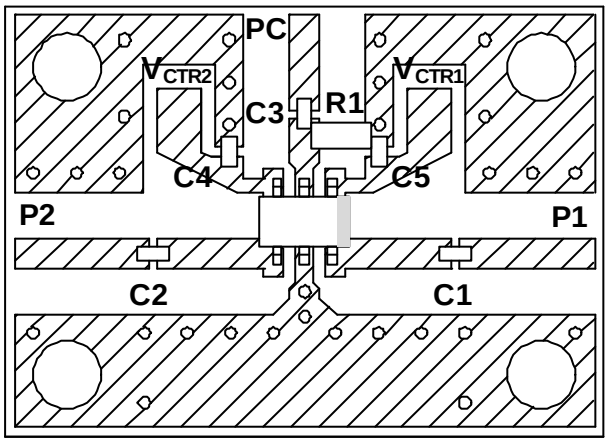


■TEST CIRCUIT



■RECOMMENDED PCB DESIGN

(TOP VIEW)



PCB SIZE=19.4x14.0mm
PCB: FR-4, t=0.5mm
CAPACITOR: size 1005
STRIP LINE WIDTH=1mm
C1~C3: 56pF
C4, C5: 10pF
R1: 510kΩ

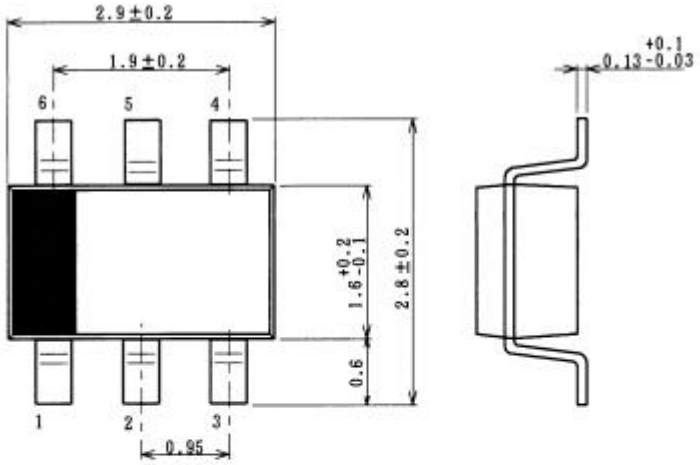
Precautions

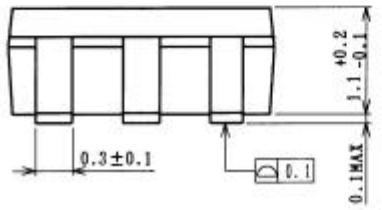
[1]External capacitors should be connected to the input and output RF terminals (P1, P2, PC) to block the DC current. The above example is a circuit at 900MHz.Please select the capacitor value suitable for actual frequency from 10pF to 1000pF.

[2]Decoupling capacitors should be connected to the control terminals (V_{CTR1}, V_{CTR2}) as close as possible. The values of these capacitors should be selected from 5pF to 100pF range. Please consider that these values are very effective to switching time (Larger capacitor gives longer switching time).

[3]In order to keep good isolation characteristics, the ground terminal (5pin) should be connected to the ground pattern with wider width as close as possible, and through-hole in the ground plane should also be placed as close as possible.

■PACKAGE OUTLINE (MTP6)





Lead material	: Copper
Lead surface finish	: Solder plating
Molding material	: Epoxy resin
UNIT	: mm
Weight	: 14mg

Cautions on using this product

This product contains Gallium-Arsenide (GaAs) which is a harmful material.

- Do NOT eat or put into mouth.
- Do NOT dispose in fire or break up this product.
- Do NOT chemically make gas or powder with this product.
- To waste this product, please obey the relating law of your country.

This product may be damaged with electric static discharge (ESD) or spike voltage. Please handle with care to avoid these damages.

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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http://moschip.ru/get-element

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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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