

GaAs SPDT SWITCH IC

GENERAL DESCRIPTION

NJG1505R is a GaAs SPDT switch IC featuring a high isolation and low loss.

In the frequency range from 1MHz to 3GHz, this switch operates at low voltage operation from 2.5V. A small package is adopted.

It is very suited for the switching synthesizer on sending and receiving.

PACKAGE OUTLINE



NJG1505R

FEATURES

● Single and low control voltage

+2.5 ~ +5.5V

● High isolation

47dB Typ. @f=0.1~1GHz, $P_{in}=0dBm$

37dB Typ. @f=1GHz~2GHz, $P_{in}=0dBm$

● Low insertion loss

0.6dB Typ. @f=1GHz, $P_{in}=0dBm$

0.8dB Typ. @f=2GHz, $P_{in}=0dBm$

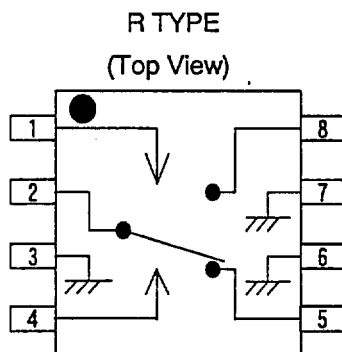
● Low Control current

2 μA Typ. @f=0.1~2.5GHz, $P_{in}=10dBm$

● Small package

VSP8

PIN CONFIGURATION



Pin Connection

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

TRUTH TABLE

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

V_{CTR1}	H	L	L	H
V_{CTR2}	L	H	L	H
PC-P1	OFF	ON	-	-
PC-P2	ON	OFF	-	-


■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input power	P_{in}	27	dBm
Control voltage	V_{CTR}	6	V
Power dissipation	P_D	320	mW
Operating Temp.	T_{opr}	-30~+85	°C
Storage Temp.	T_{stg}	-40~+150	°C

■ ELECTRICAL CHARACTERISTICS 1

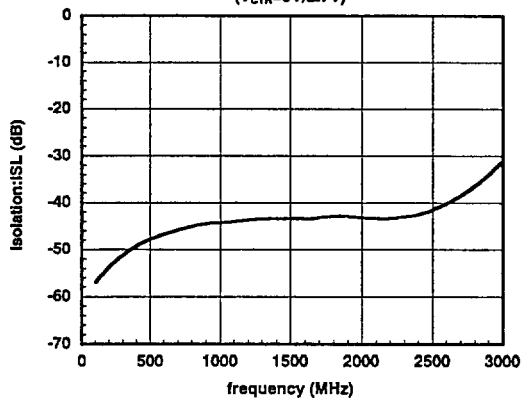
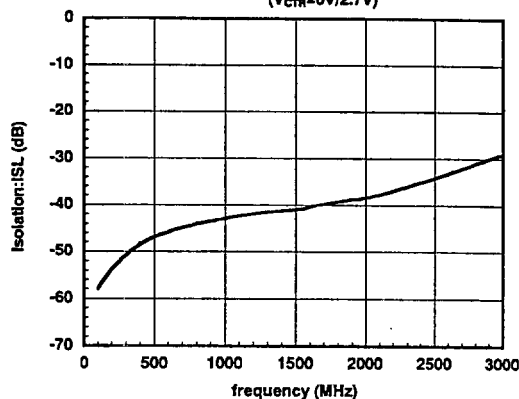
 (TEST CIRCUIT 1 : $V_{CTR(L)}=0V$, $V_{CTR(H)}=2.7V$, $Z_S=Z_O=50\Omega$, Ta=25°C)

PARAMETER	SYMBOL	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, $P_{in}=10dBm$	-	2.0	4.0	uA
Isolation 1	ISL1	f=0.1~1GHz, $P_{in}=0dBm$	42	47	-	dB
Isolation 2	ISL2	f=1GHz~2GHz, $P_{in}=0dBm$	33	37	-	dB
Insertion loss 1	LOSS1	f=1GHz, $P_{in}=0dBm$	-	0.6	1.0	dB
Insertion loss 2	LOSS2	f=2GHz, $P_{in}=0dBm$	-	0.8	1.2	dB
Input power at 1dB compression	P-1dB	f=2GHz	19	22	-	dBm
VSWR	V.S.W.R.	f=0.1~2.5GHz, ON STATE	-	1.5	1.8	
Switching time	T_{SW}	f=0.1~2.5GHz	-	8	-	ns

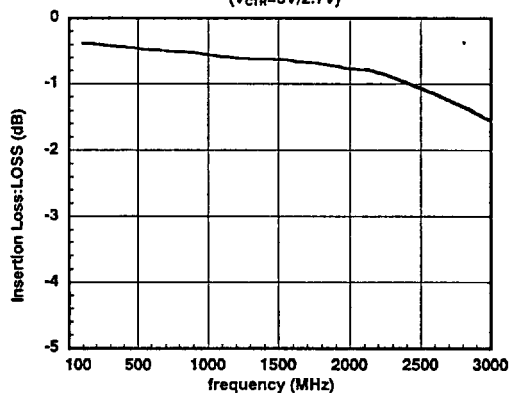
■ ELECTRICAL CHARACTERISTICS 2

 (TEST CIRCUIT 2 : $V_{CTR(L)}=0V$, $V_{CTR(H)}=2.7V$, $Z_S=Z_O=50\Omega$, Ta=25°C)

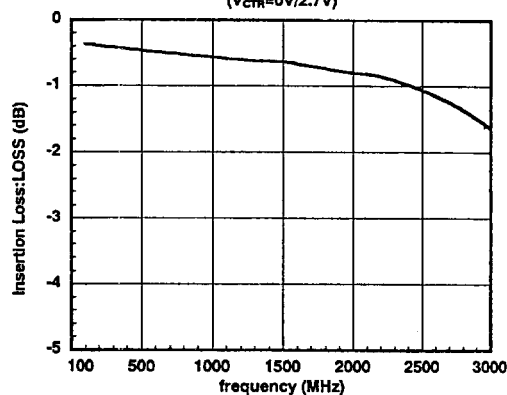
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Isolation 3	ISL3	f=1~100MHz, $P_{in}=0dBm$	-	55	-	dB
Insertion loss 3	LOSS3	f=1~100MHz, $P_{in}=0dBm$	-	0.5	-	dB

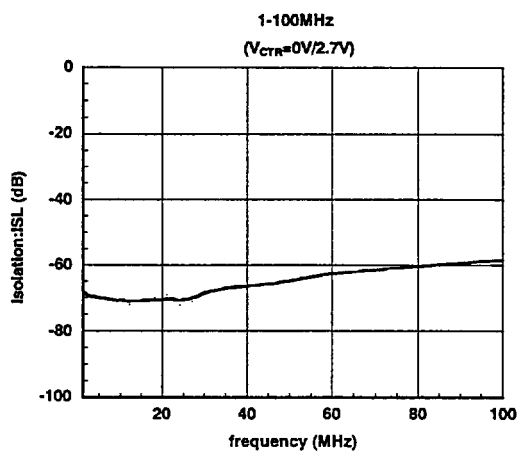
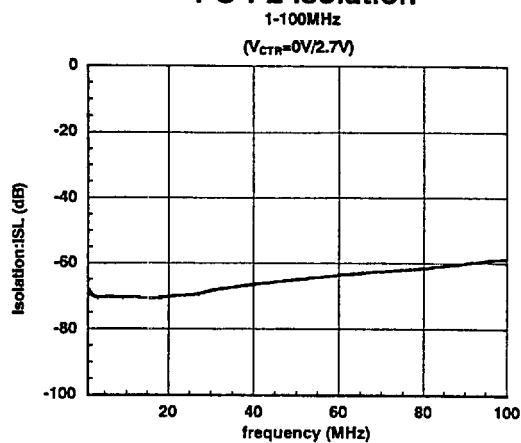
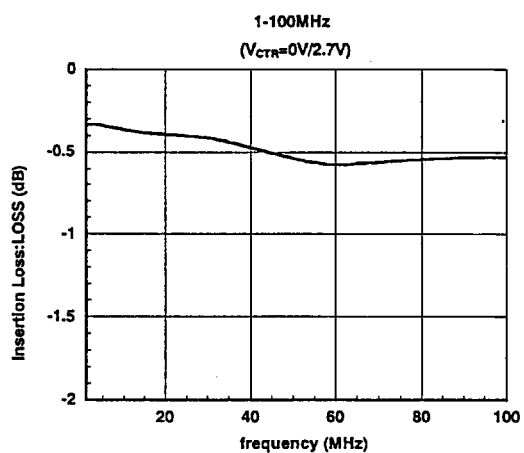
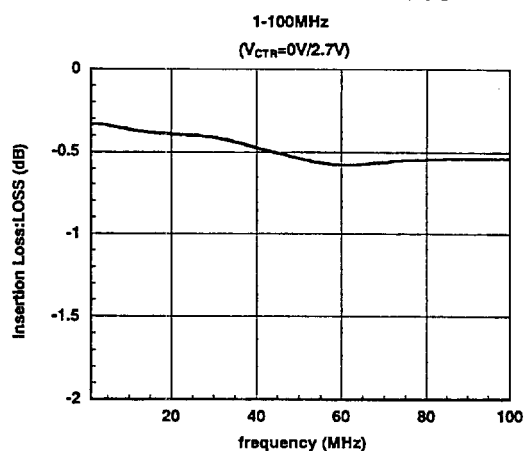
■ TYPICAL CHARACTERISTICS
PC-P1 Isolation
 $(V_{CTR}=0V/2.7V)$

PC-P2 Isolation
 $(V_{CTR}=0V/2.7V)$

PC-P1 Insertion Loss

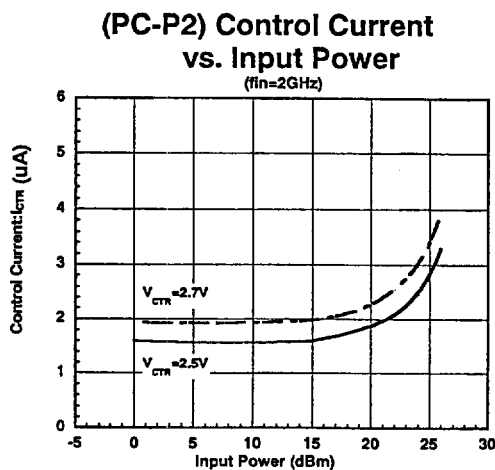
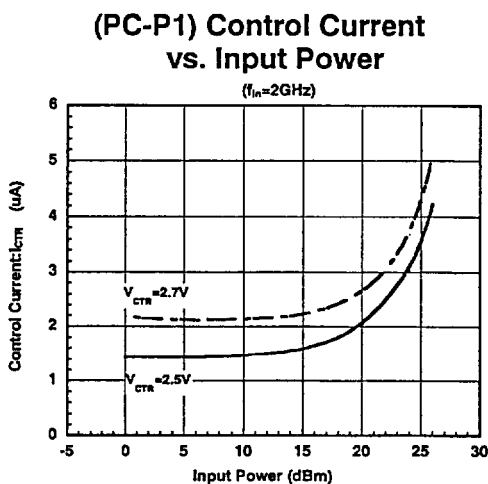
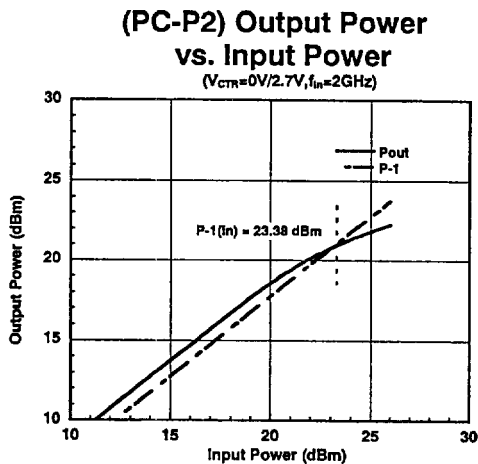
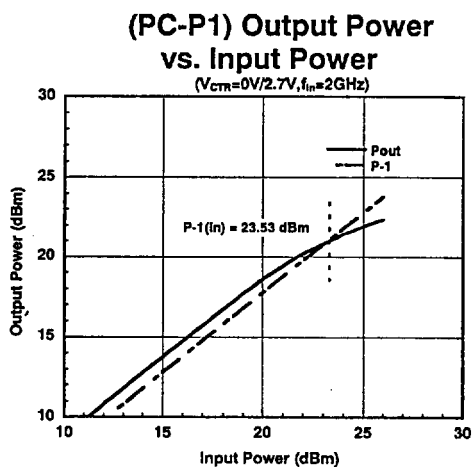
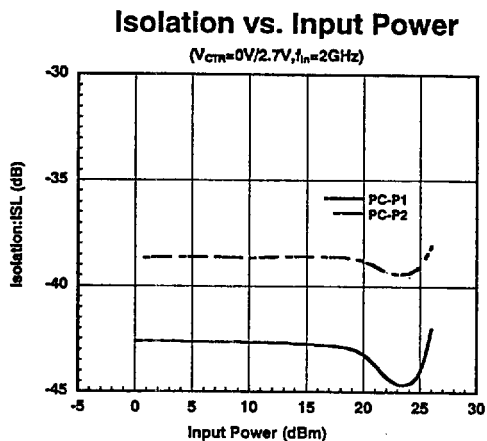
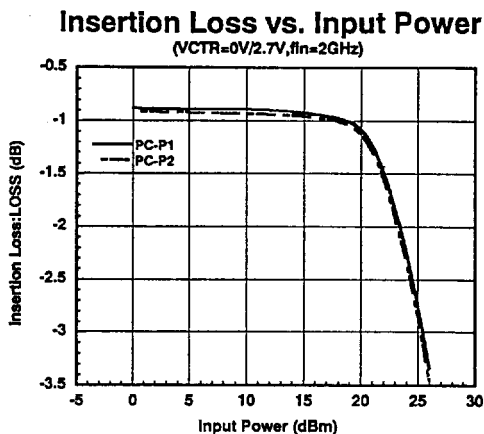
0.1-3GHz

 $(V_{CTR}=0V/2.7V)$

PC-P2 Insertion Loss

0.1-3GHz

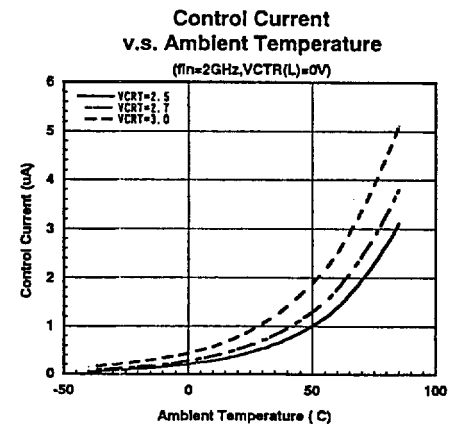
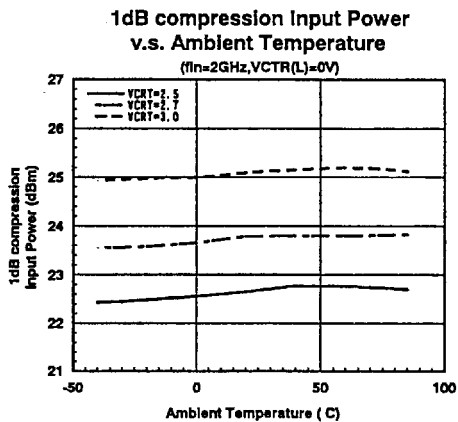
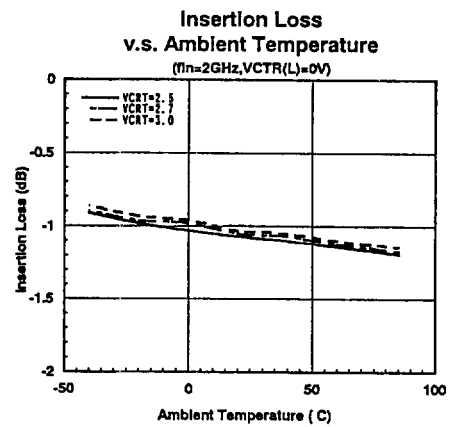
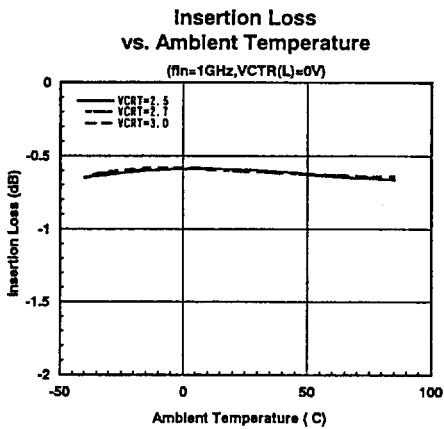
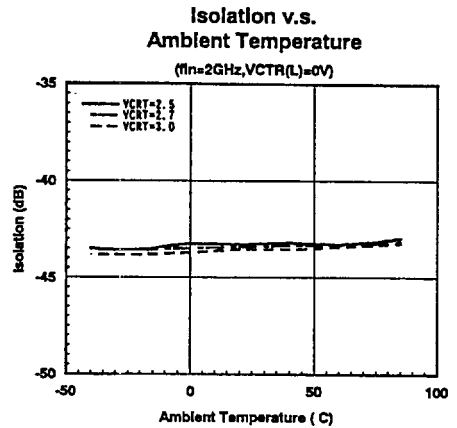
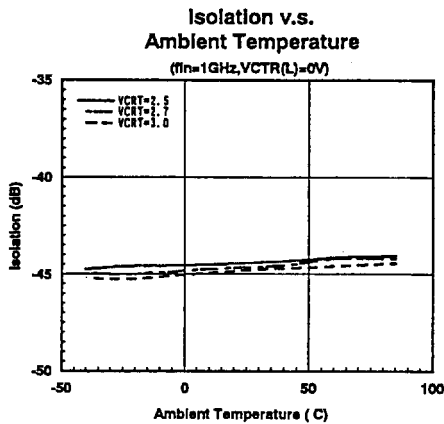
 $(V_{CTR}=0V/2.7V)$



■ TYPICAL CHARACTERISTICS
PC-P1 Isolation

PC-P2 Isolation

PC-P1 Insertion Loss

PC-P2 Insertion Loss


TYPICAL CHARACTERISTICS


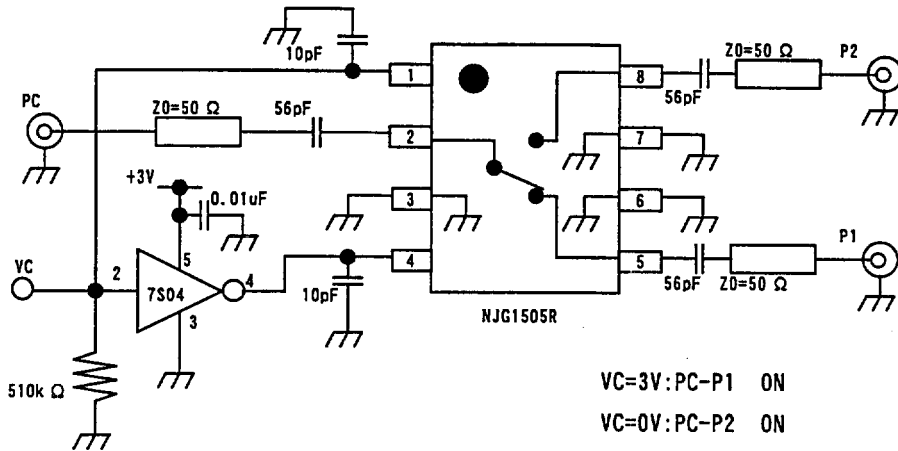


■ TYPICAL CHARACTERISTICS





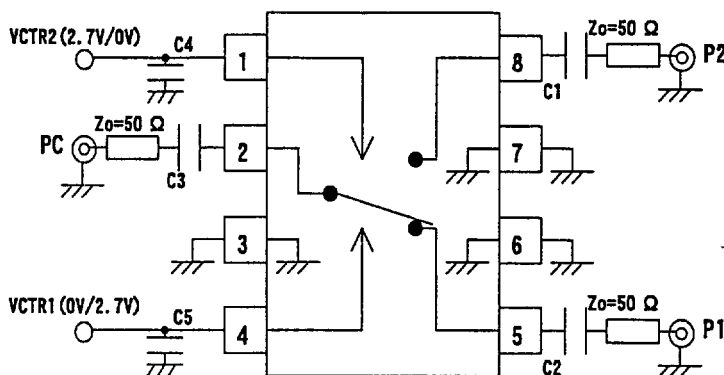
■ APPLICATION CIRCUIT: Single signal control circuit using C-MOS Inverter.



- [1] Please connect the bypass capacitor to C-MOS inverter supply terminals.
- [2] In order to keep the state of input impedance of inverter, please pull-down with 510k Ω of resistor for C-MOS inverter input terminal.

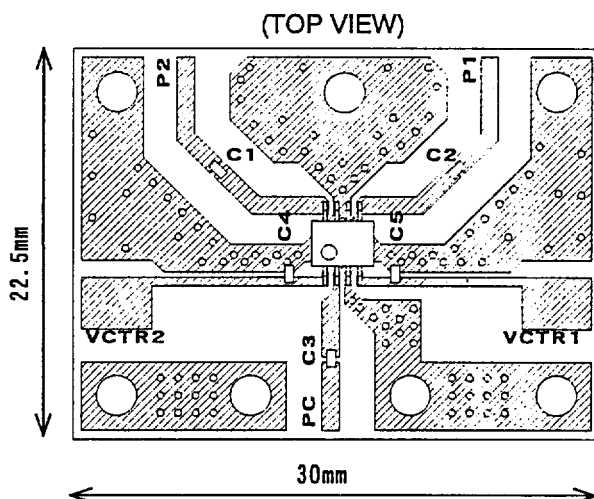


TEST CIRCUIT



	Test circuit 1 0.5~2GHz	Test circuit 2 1~500MHz
C1~C3	56pF	1000pF
C4,C5	10pF	1000pF

RECOMMENDED PCB



PCB:FR-4 t=0.5mm
 STRIP LINE WIDTH=1mm
 CAPACITOR:size 1005

Usage precaution on devices

- [1] Outer capacitors should be connected to the input and output RF frequency terminals (P1,P2,PC) to block the DC current. The values of these capacitors depend on RF frequency. Please use 1000pF at 1~500MHz,and 56pF at 500MHz ~2GHz.
- [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 to 1000pF at 1~500MHz, and 10pF at 500MHz~2GHz.But take care of the switching time because the capacitors make the switching time late.
- [3] In order to keep good isolation characteristics, the grand terminal(3,6,7 pin) should be connected to grand pattern with relatively wide width as near as possible, and Through-hole in the ground plane should be placed as near as possible too.
- [4] The isolation characteristics by PC-P1 port is different from PC-P2 port. In the case of the gotten more high isolations ,please use the PC-P1 port.

