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

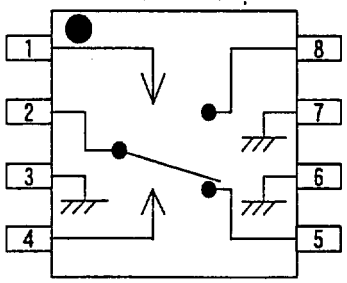
■ FEATURES

●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

R TYPE

(Top View)



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℃)

PARAMTER	SYNBOL	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	℃
Storage Temp.	T_{stg}	-40～+150	℃

■ ELECTRICAL CHARACTERISTICS 1

(TEST CIRCUIT 1 : $V_{CTR(L)}$=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	-	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

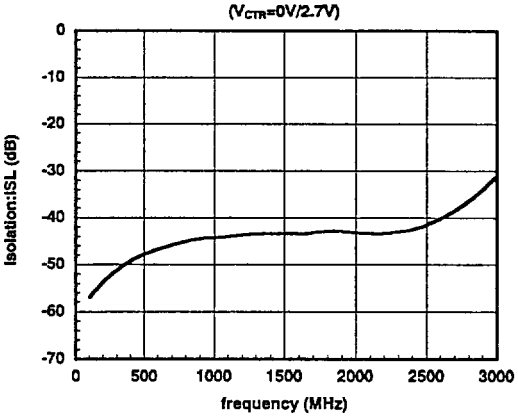
(TEST CIRCUIT 2 : $V_{CTR(L)}$=0V、$V_{CTR(H)}$=2.7V、Z_S=Z_O=50ohm、Ta=25℃)

PARAMTER	SYNBOL	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

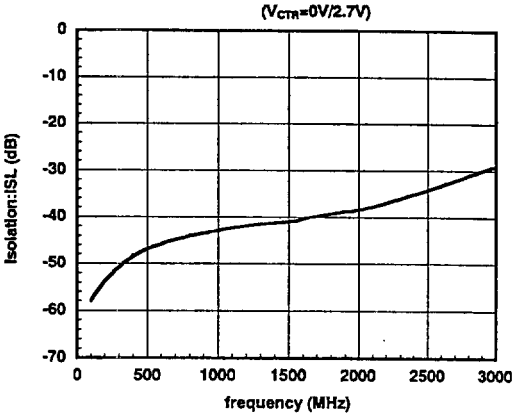
PC-P1 Isolation

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



PC-P2 Isolation

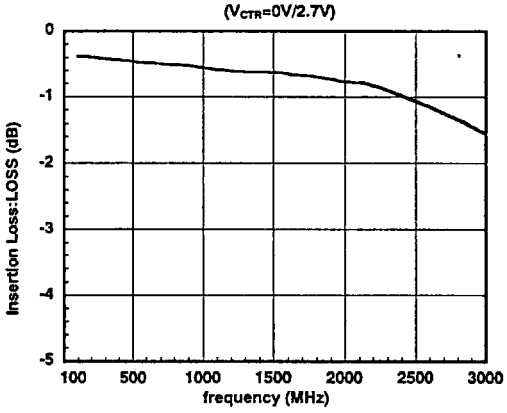
(V_{CTR}=0V/2.7V)



PC-P1 Insertion Loss

0.1-3GHz

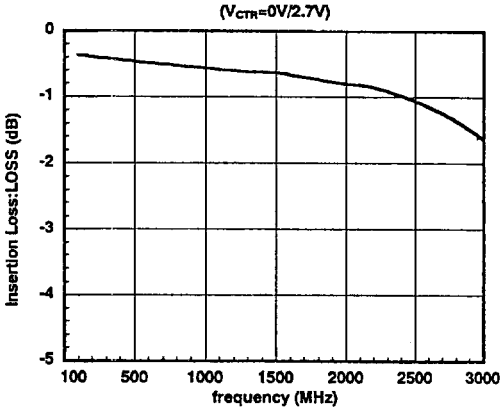
(V_{CTR}=0V/2.7V)



PC-P2 Insertion Loss

0.1-3GHz

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

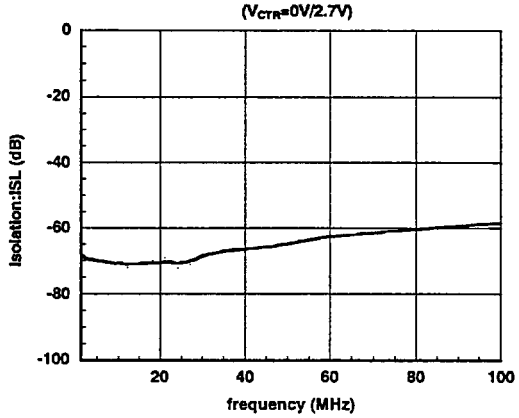


■ TYPICAL CHARACTERISTICS

PC-P1 Isolation

1-100MHz

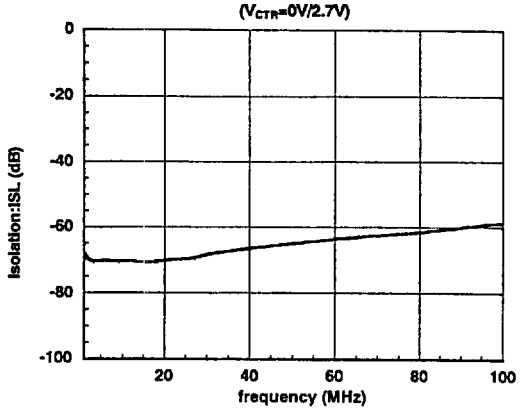
(V_{CTR}=0V/2.7V)



PC-P2 Isolation

1-100MHz

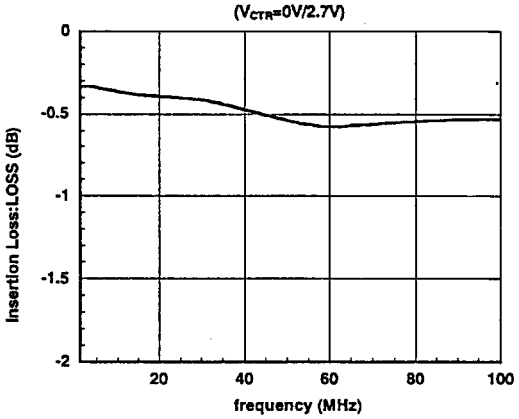
(V_{CTR}=0V/2.7V)



PC-P1 Insertion Loss

1-100MHz

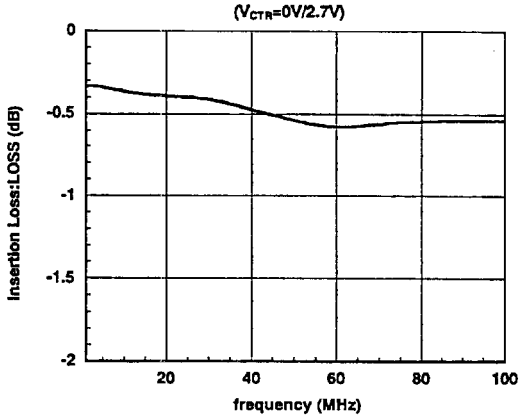
(V_{CTR}=0V/2.7V)



PC-P2 Insertion Loss

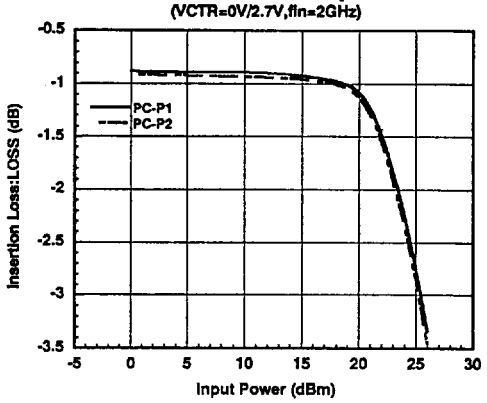
1-100MHz

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

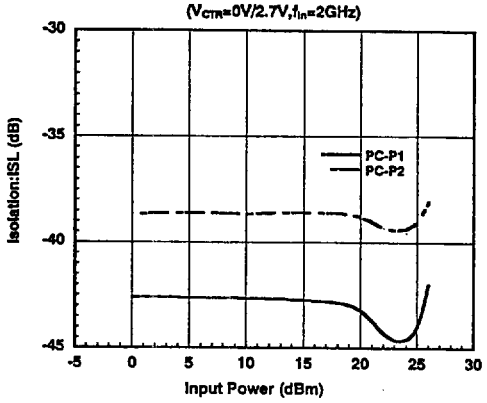


■ TYPICAL CHARACTERISTICS

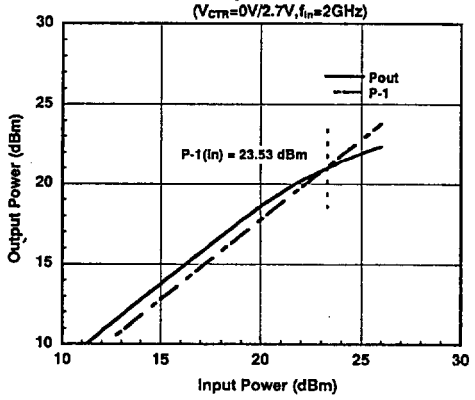
Insertion Loss vs. Input Power



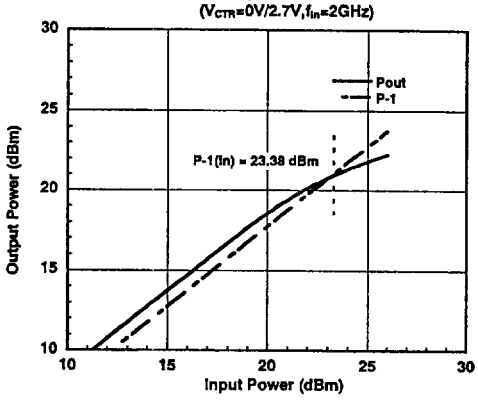
Isolation vs. Input Power



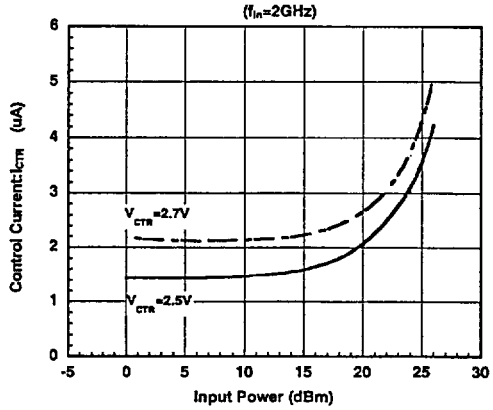
(PC-P1) Output Power vs. Input Power



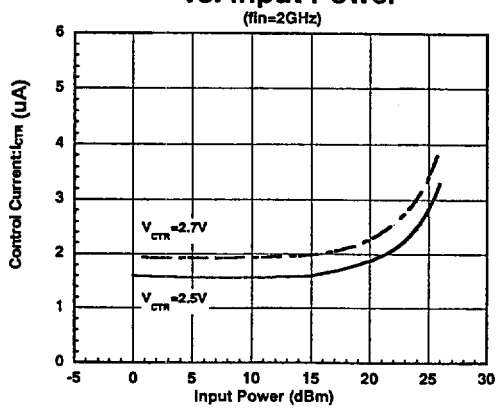
(PC-P2) Output Power vs. Input Power



(PC-P1) Control Current vs. Input Power

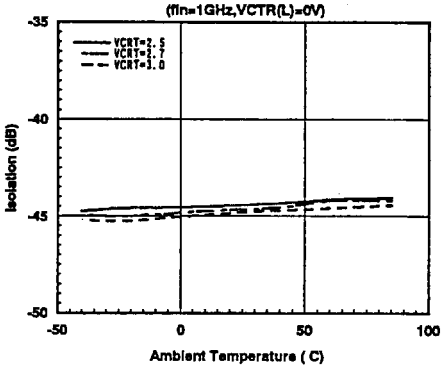


(PC-P2) Control Current vs. Input Power

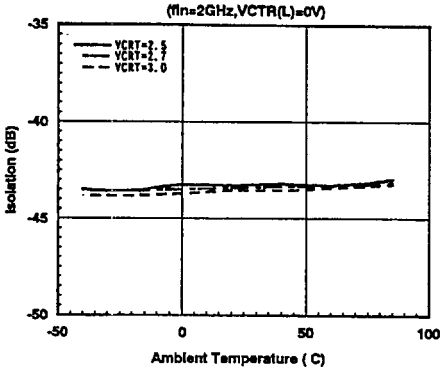


■ TYPICAL CHARACTERISTICS

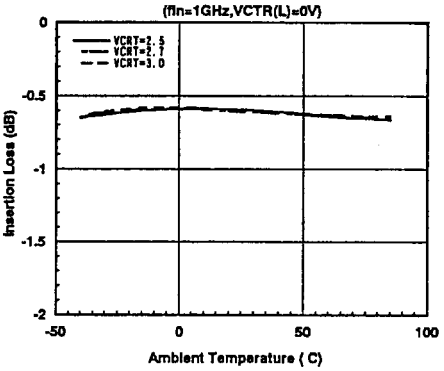
Isolation v.s.
Ambient Temperature
(fIn=1GHz,VCTR(L)=0V)



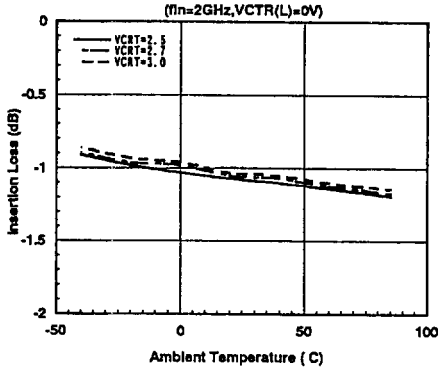
Isolation v.s.
Ambient Temperature
(fIn=2GHz,VCTR(L)=0V)



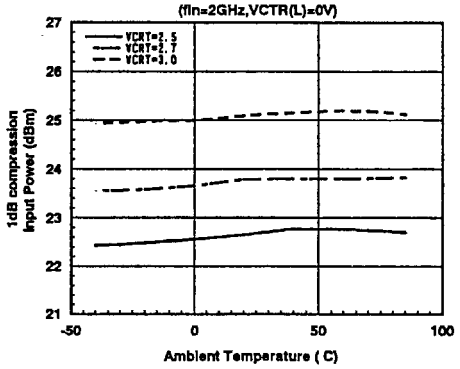
Insertion Loss
vs. Ambient Temperature
(fIn=1GHz,VCTR(L)=0V)



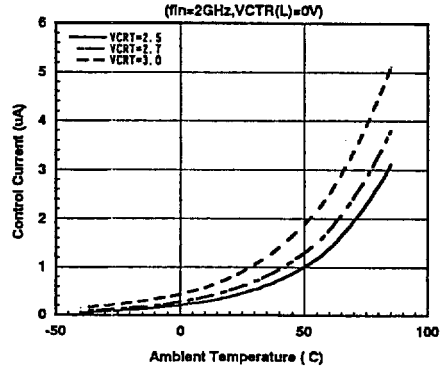
Insertion Loss
v.s. Ambient Temperature
(fIn=2GHz,VCTR(L)=0V)



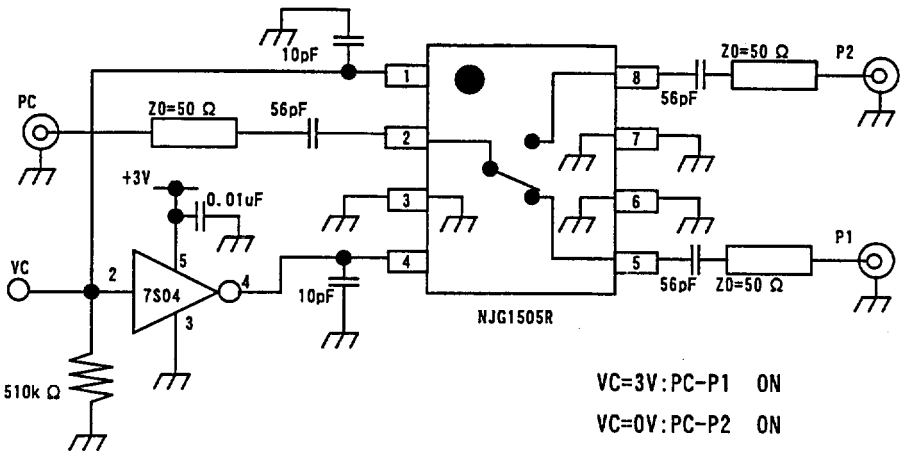
1dB compression Input Power
v.s. Ambient Temperature
(fIn=2GHz,VCTR(L)=0V)



Control Current
v.s. Ambient Temperature
(fIn=2GHz,VCTR(L)=0V)

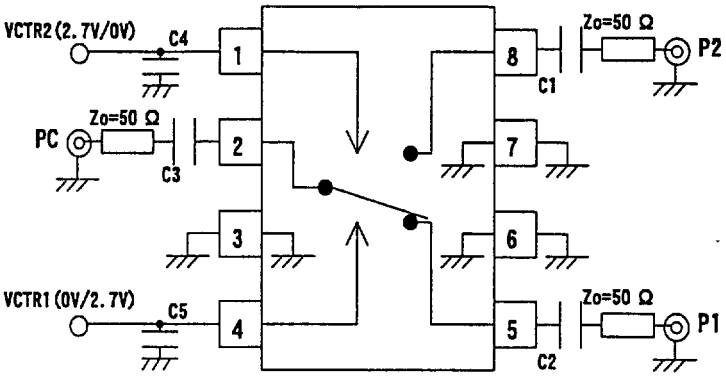


■ **APPLICATION CIRCUIT**: Single signal control circuit using C-MOS Inverter.



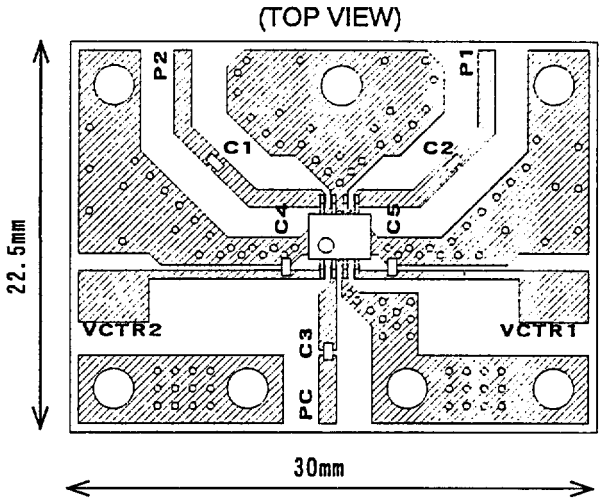
[1] Please connect the bypass capacitor to C-MOS inverter supply terminals.
[2] In order to keep the state of input impeadance of inverter, please pull-down with 510k Ω of resistor for C-MOS inverter input terminal.

■ 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

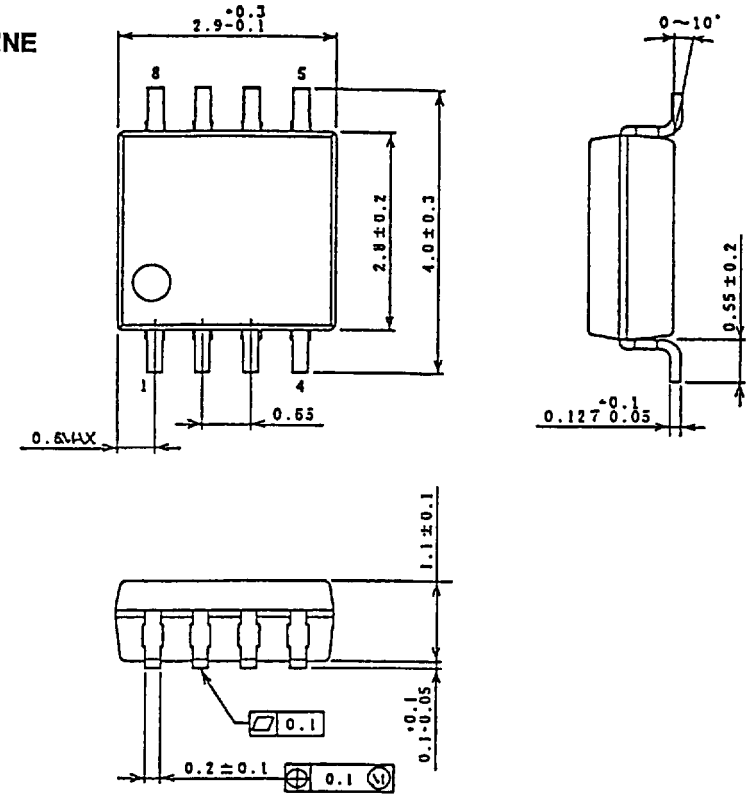
[1] Outer capacitors should be connected to the input and output RF frequency terminals (P1,P2,PC) to block the DC current. The values of these capacitors depend on RF frequency. Please use 1000pF at 1～500MHz,and 56pF at 500MHz ～2GHz.

[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.

■ PACKAGE OUTLINE



UNIT:mm

Caution on using the products

A GaAs is used in this product. 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 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 product may be broken with static electric discharge or serge voltage. Therefore, please note a handling.

The other caution item

- The product specifications and descriptions listed in this catalog are subject to change at any time, without notice.
- 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 before.