



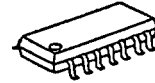
## GaAs POWER AMPLIFIER IC

**■ GENERAL DESCRIPTION**

NJG1303 is a GaAs MMIC designed mainly for driver amplifier of PHS base station in Japan.

It features very low distortion and  $P_{acp}$  is less than -70dBc at 17dBm output power. It has input and output matching circuits internally. It enables low voltage and high efficiency operation.

Small Plastic mold Package are adopted.

**■ PACKAGE OUTLINE**


NJG1303E

**■ APPLICATIONS**

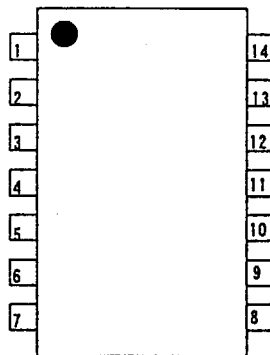
- PHS base station etc.

**■ FEATURES**

- Low voltage operation ( $V_{DD}=3.0V$ )
- Input and output internal matching circuits
- Low distortion ( $P_{acp}=-70dBc$  Typ.@1.9GHz,17dBm)
- Low current consumption ( $I_{DD}=170mA$  Typ.@1.9GHz,17dBm)
- Reduction of parasitic oscillation
- EMP 14    Maximum Power Dissipation: 1000mW( $T_j=150^\circ C$ ,PCB: 24\*30\*1.0mm FR4)

**■ PIN CONFIGURATION**

(Top View)



Pin Connection

1.GND	8.GND
2.RF <sub>In</sub>	9.RF <sub>out</sub>
3.V <sub>GG1</sub>	10.V <sub>DD2</sub>
4.V <sub>GG2</sub>	11.GND
5.GND	12.V <sub>DD1</sub>
6.GND	13.GND
7.GND	14.GND


**■ ABSOLUTE MAXIMUM RATINGS**
 $(Z_s=Z_o=50\text{ohm}, T_a=25^\circ\text{C})$ 

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Drain Voltage	$V_{DD1}, V_{DD2}$	$V_{GG1,2}=-0.9\text{V}$	6	V
Gate Voltage	$V_{GG1}, V_{GG2}$	$V_{DD1,2}=3.0\text{V}$	-4	V
Input Power	$P_{in}$	$V_{DD1,2}=3.0\text{V}, V_{GG1,2}=-0.9\text{V}$	10	dBm
Power Dissipation	$P_D$	24*30*1.0mm PCB : FR4, $T_J=150^\circ\text{C}$	1000	mW
Operating Temperature	$T_{opr}$		-30~+85	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-40~+150	$^\circ\text{C}$

**■ ELECTRICAL CHARACTERISTICS**
 $(f=1.9\text{GHz}, Z_s=Z_o=50\text{ohm}, T_a=25^\circ\text{C})$ 

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Frequency	freq	$V_{DD1,2}=3.0\text{V}$	1.89	-	1.92	GHz
Drain Voltage	$V_{DD1,2}$		2.9	3.0	5.3	V
Gate Voltage	$V_{GG1,2}$	$V_{DD1,2}=3.0\text{V}, I_{idle}=170\text{mA}$	-1.25	-0.9	-0.6	V
Idle Current *1	$I_{idle}$	$V_{DD1,2}=3.0\text{V}$ , No RF Signal	165	170	175	mA
Operating Current *1	$I_{DD}$	$P_{out}=17\text{dBm}, V_{DD1,2}=3.0\text{V}$	170	185	180	mA
Gate Current *2	$I_{GG}$	$P_{out}=21\text{dBm}, V_{DD1,2}=3.0\text{V}$	-150	-70	-	$\mu\text{A}$
Small Signal Gain	Gain	$V_{DD1,2}=3.0\text{V}, I_{idle}=170\text{mA}$	20	23	26	dB
Gain Flatness	$G_{flat}$	$V_{DD1,2}=3.0\text{V}, I_{idle}=170\text{mA}$	0.0	0.5	1.0	dB
Pout at 1dB Compression	$P_{-1dB}$	$V_{DD1,2}=3.0\text{V}$	21	22	-	dBm
Adjacent Channel Leakage Power ①	$P_{acc1}$	$P_{out}=17\text{dBm}, \text{offset}=600\text{kHz}$ , $P_{in}; \pi/4 \text{ QPSK}, V_{DD1,2}=3.0\text{V}$	-	-	-70	dBc
Adjacent Channel Leakage Power ②	$P_{acc2}$	$P_{out}=17\text{dBm}, \text{offset}=900\text{kHz}$ , $P_{in}; \pi/4 \text{ QPSK}, V_{DD1,2}=3.0\text{V}$	-	-	-70	dBc
Harmonics	$P_{sp}$	$P_{out}=17\text{dBm}, V_{DD1,2}=3.0\text{V}$	-	-35	-30	dBc
Input VSWR	$VSWR_i$	$V_{DD1,2}=3.0\text{V}$	-	-	2.2	
Load VSWR Tolerance		$P_{out}=17\text{dBm}, V_{DD1,2}=3.0\text{V}$ Load VSWR=4:1, All Phase	Parasitic Oscillation for Fundamental Signal Level : $\leq -60\text{dBc}$			

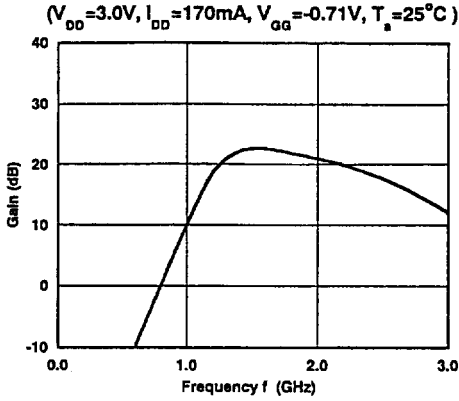
\*1 ;  $V_{DD1}$  Terminal and  $V_{DD2}$  Terminal Total Current

\*2 ;  $V_{GG1}$  Terminal and  $V_{GG2}$  Terminal Total Current

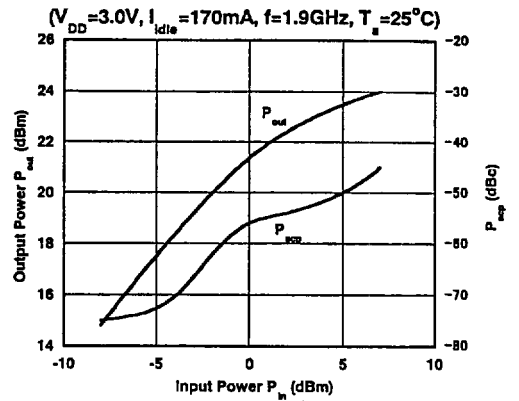


## TYPICAL CHARACTERISTICS

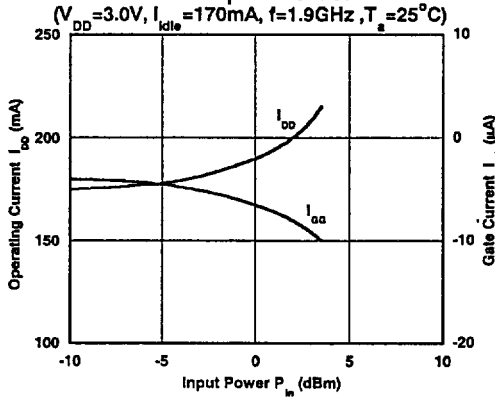
### Gain vs. Frequency



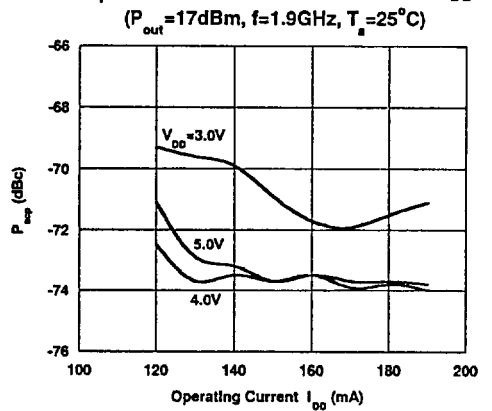
### Output Power, $P_{acp}$ vs. Input Power



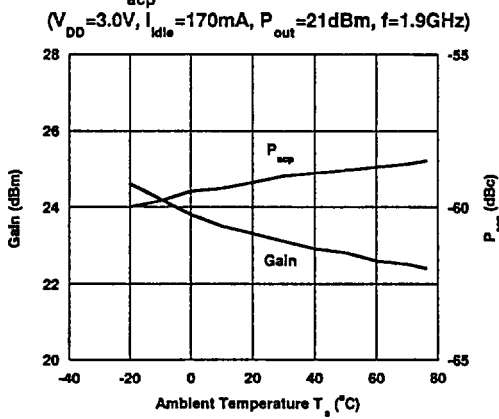
### Operating Current, Gate Current vs. Input Power



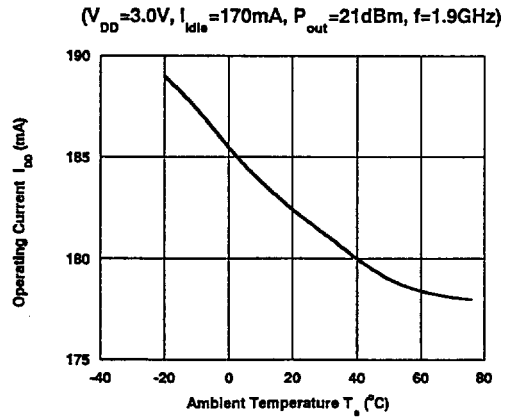
### $P_{acp}$ vs. Operating Current vs. $V_{DD}$

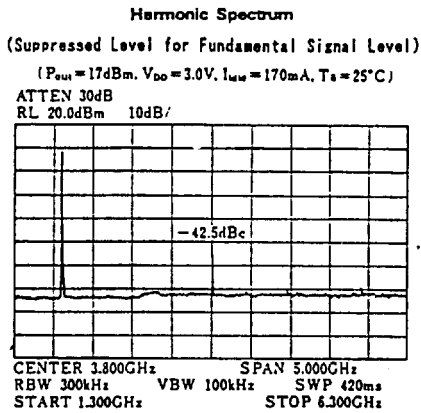
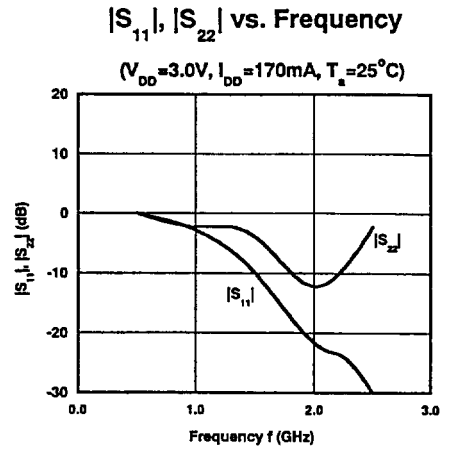
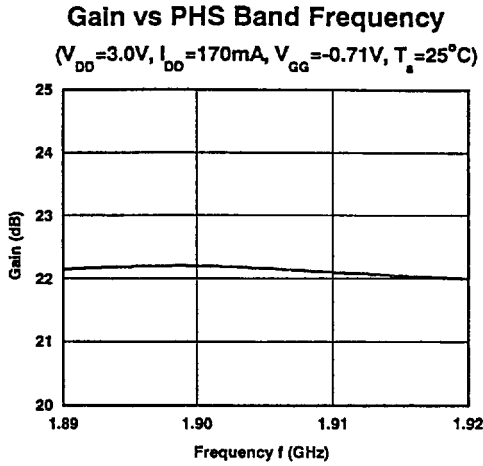


### Gain, $P_{acp}$ vs. Ambient Temperature



### Operating Current vs. Ambient Temperature

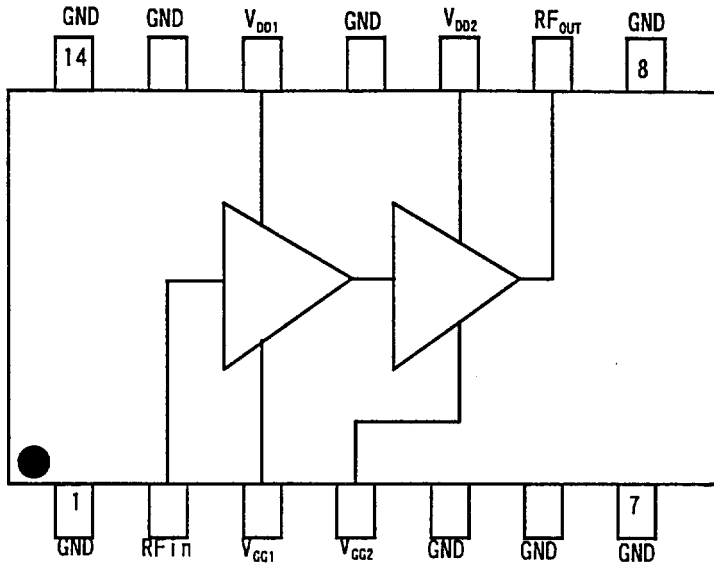


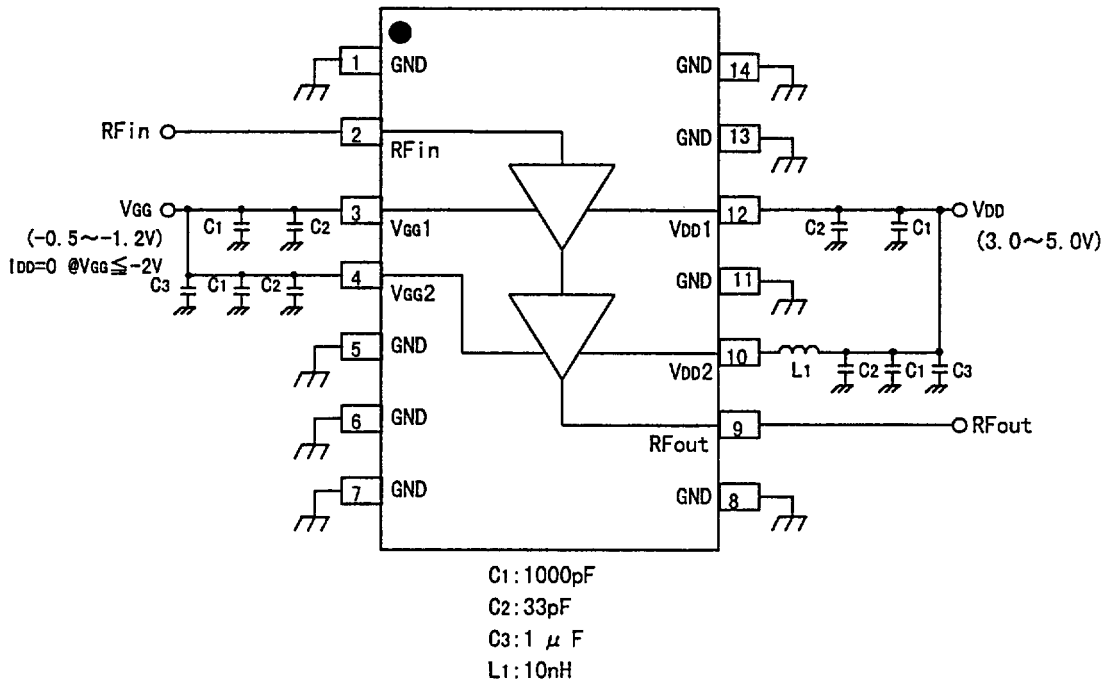
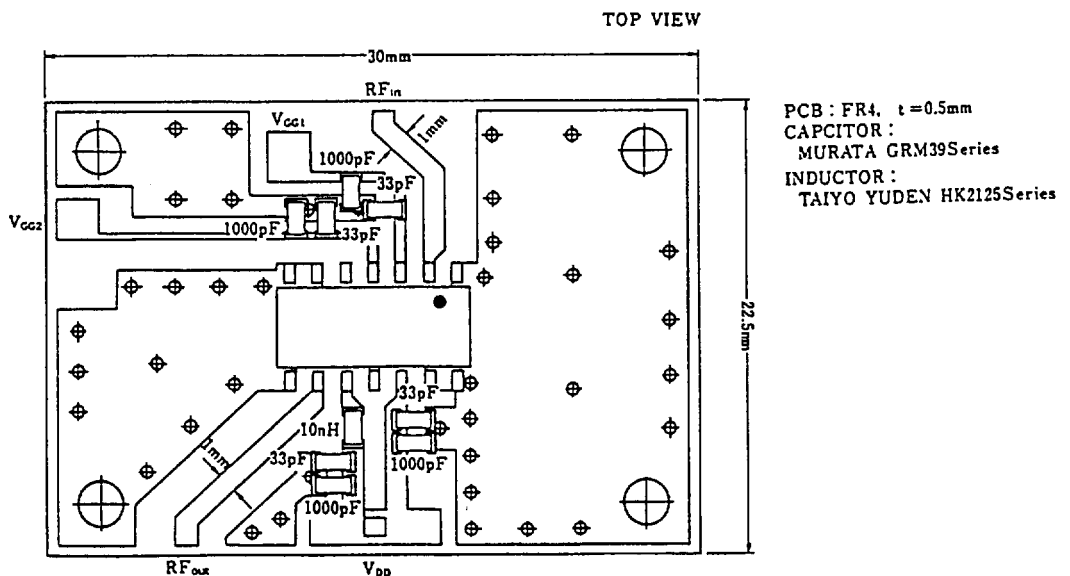

**■ TYPICAL CHARACTERISTICS**


※All adjacent channel leakage power used in these characteristics are those of 600kHz offset for fundamental wave at PHS operating condition( $\pi/4$  QPSK)

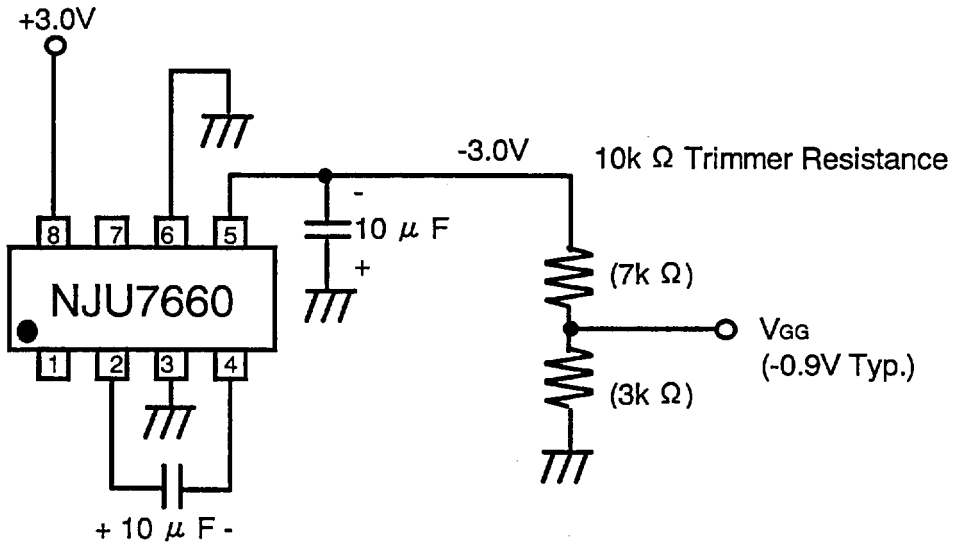


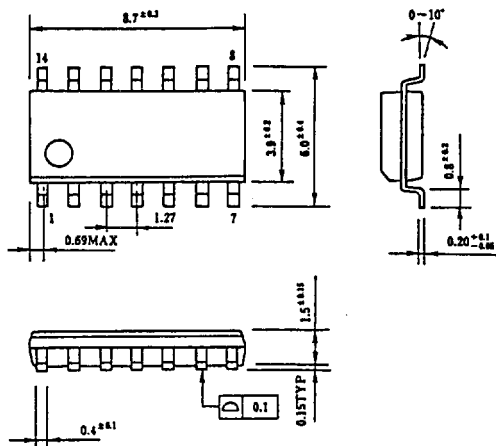
■ BLOCK DIAGRAM




**RECOMMENDED CIRCUIT**

**RECOMMENDED PCB**


This reflow method is recommended to install this device to PCB.

**RECOMMENDED CIRCUIT TO PRODUCE NEGATIVE VOLTAGE**


**■ PACKAGE OUTLINE**
EMP14


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.