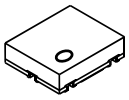
GPS LOW NOISE AMPLIFIER GaAs MMIC

■ GENERAL DESCRIPTION

The NJG1108HA8 is a low noise amplifier GaAs MMIC designed for GPS. This amplifier provides low noise figure, high gain and high IP3 operated by single low positive power supply. This IC has the function of Stand-by mode. This amplifier can be tuned to wide frequency point (1.5GHz~2.7GHz) by changing the external matching components.

An ultra-small and ultra-thin package of the USB6-A8 is adopted.

■ PACKAGE OUTLINE



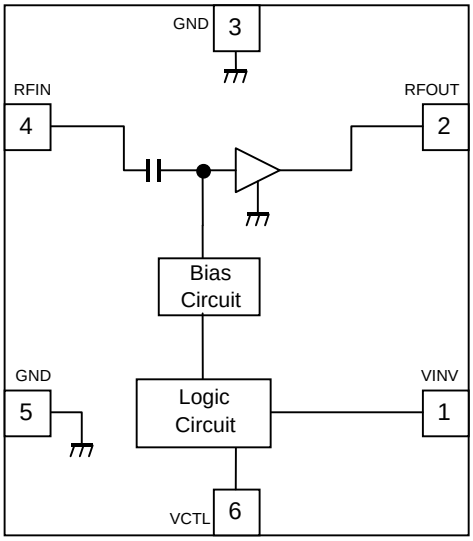
NJG1108HA8

■ FEATURES

● Low voltage operation	+2.7V typ.	
● Low current consumption	2.0mA typ.	@V_{CTL}=1.85V
	1uA typ.	@V_{CTL}=0V
● High gain	19dB typ.	@V_{CTL}=1.85V, f=1.575GHz
● Low noise figure	1.0dB typ.	@V_{CTL}=1.85V, f=1.575GHz
● Input power at 1dB gain compression point	-15.0dBm typ.	@V_{CTL}=1.85V, f=1.575GHz
● High input IP3	0dBm typ.	@V_{CTL}=1.85V, f=1.575+1.5751GHz
● Ultra-small and ultra-thin package	USB6-A8 (Package size: 1.0x1.2x0.38mm)	

■ PIN CONFIGURATION

(Top View)



Pin Connection
1. VINV
2. RFOUT
3. GND
4. RFIN
5. GND
6. VCTL

■TRUTH TABLE

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

V_{CTL}	LNA Mode
H	Active Mode
L	Sleep Mode

Note: Specifications and description listed in this datasheet are subject to change without notice.

■ABSOLUTE MAXIMUM RATINGS

T_a=+25°C, Z_s=Z_l=50ohm

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNITS
Drain Voltage	V_{DD}		5.0	V
Inverter voltage	V_{INV}		5.0	V
Control voltage	V_{CTL}		5.0	V
Input power	Pin	V_{DD}=2.7V	+15	dBm
Power dissipation	P_D	On PCB board, Tjmax=150°C	150	mW
Operating temperature	T_{opr}		-40~+85	°C
Storage temperature	T_{stg}		-55~+150	°C

■ELECTRICAL CHARACTERISTICS 1

GENERAL CONDITIONS: V_{DD}=V_{INV}=2.7V, T_a=+25°C, Z_s=Z_l=50ohm, with application circuit

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating voltage	V_{DD}		2.5	2.7	3.5	V
Inverter supply voltage	V_{INV}		2.5	2.7	3.5	V
Control voltage (High)	V_{CTL}(H)		1.5	1.85	V_{INV}+0.3	V
Control voltage (Low)	V_{CTL}(L)		0	0	0.3	V
Operating current1 (Active Mode, RF OFF)	I_{DD}1	RF OFF, V_{CTL}=1.85V	-	2.0	3.0	mA
Operating current2 (Sleep Mode, RF OFF)	I_{DD}2	RF OFF, V_{CTL}=0V	-	1	5	µA
Inverter current1	I_{INV}1	RF OFF, V_{CTL}=1.85V	-	30	60	µA
Inverter current2	I_{INV}2	RF OFF, V_{CTL}=0V	-	9	20	µA
Control current	I_{CTL}	RF OFF, V_{CTL}=1.85V	-	6	20	µA

■**ELECTRICAL CHARACTERISTICS 2** (Active Mode)

GENERAL CONDITIONS: V_{DD}=V_{INV}=2.7V, V_{CTL}=1.85V, f_{RF}=1575MHz, T_a=+25°C, Z_s=Z_l=50ohm, with application circuit

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Frequency	freq		1.57	1.575	1.58	GHz
Small signal gain	Gain		17.0	19.0	21.5	dB
Noise figure	NF	Exclude PCB & connector losses (IN: 0.05dB)	-	1.0	1.2	dB
Input power at 1dB gain compression point	$P_{-1dB(IN)}$		-19.0	-15.0	-	dBm
Input 3rd order intercept point	IIP3	f1=f_{RF}, f2=f_{RF}+100kHz, Pin=-34dBm	-5.0	0	-	dBm
RF IN VSWR	VSWRi		-	2.0	2.5	
RF OUT VSWR	VSWRo		-	1.5	2.0	

■TERMINAL INFORMATION

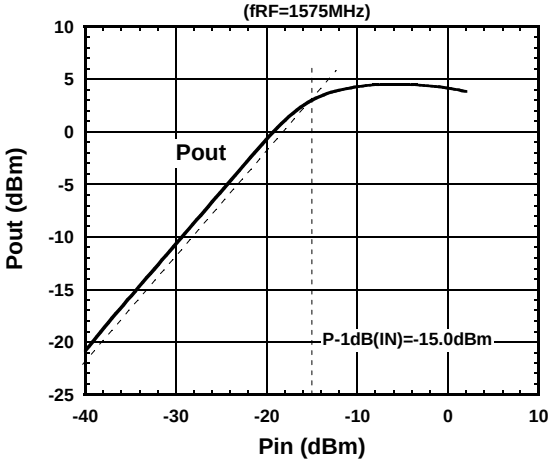
No.	SYMBOL	DESCRIPTION
1	VINV	Power supply pin of the inverter circuit.
2	RFOUT	RF Output and voltage supply pin. External matching circuits and a bypass capacitor is required. L3 is a RF choke inductor. These elements are used as output matching circuit.
3	GND	Ground pin. To keep good RF grounding performance, please use multiple via holes to connect with ground plane and this pin.)
4	RFIN	RF input pin. A DC blocking capacitor is not required. An external matching circuit is required.
5	GND	Ground pin. To keep good RF grounding performance, please use multiple via holes to connect with ground plane and this pin.)
6	VCTL	Control voltage input pin. This control pin is set to high. LNA suffers from standby state when LNA puts the changeover voltage of "Low" in a state of movement when the changeover voltage of "High" is put in this terminal.

CAUTION
1) Ground terminal (3, 5) should be connected to the ground plane as low inductance as possible.

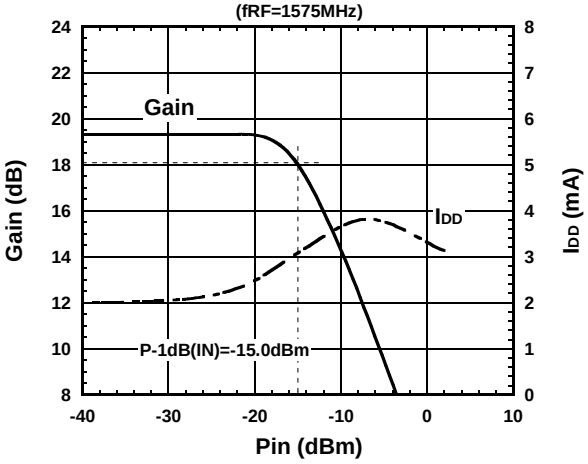
■ ELECTRICAL CHARACTERISTICS

(Conditions: V_{DD}=V_{INV}=2.7V, V_{CTL}=1.85V, f_{RF}=1575MHz, T_a=+25°C, Z_s=Z_l=50ohm, with application circuit)

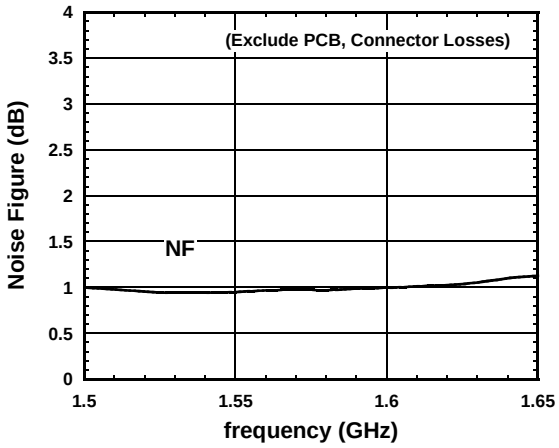
Pout vs. Pin
(fRF=1575MHz)



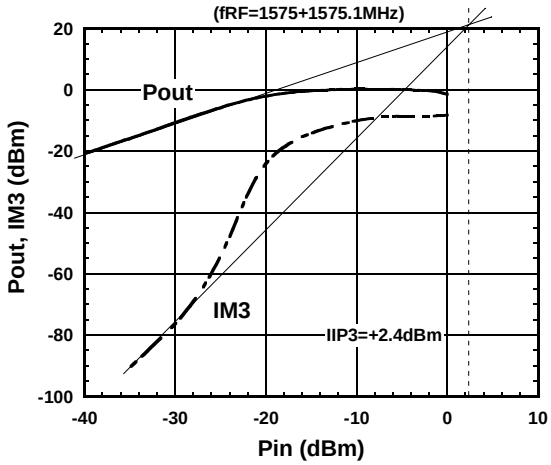
Gain, IDD vs. Pin
(fRF=1575MHz)



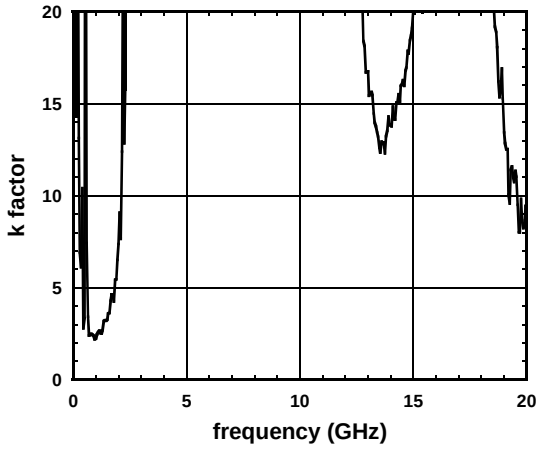
NF vs. frequency



Pout, IM3 vs. Pin
(fRF=1575+1575.1MHz)



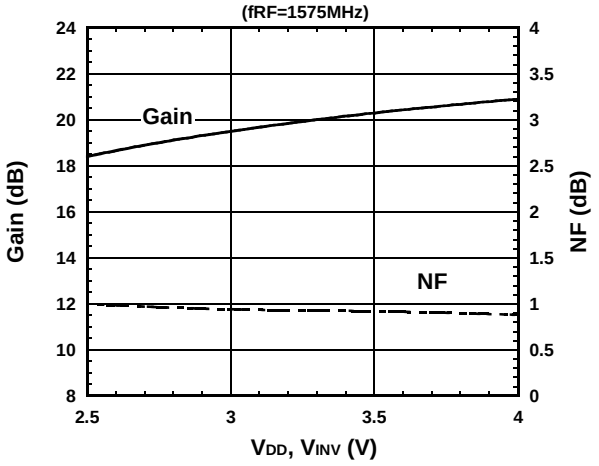
k factor vs. frequency



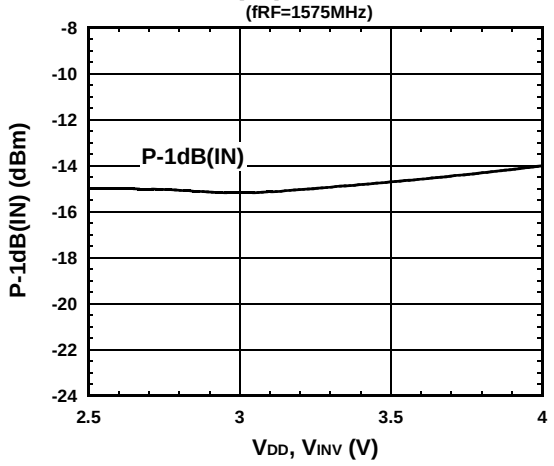
■ ELECTRICAL CHARACTERISTICS

(Conditions: V_{DD}=V_{INV}=2.7V, V_{CTL}=1.85V, f_{RF}=1575MHz, T_a=+25°C, Z_s=Z_l=50ohm, with application circuit)

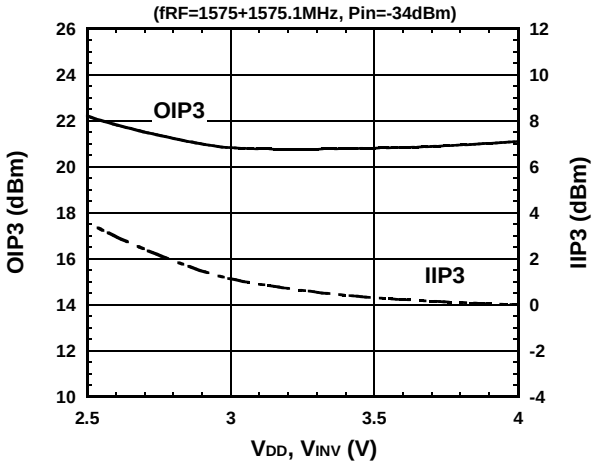
Gain, NF vs. VDD, VINV
(fRF=1575MHz)



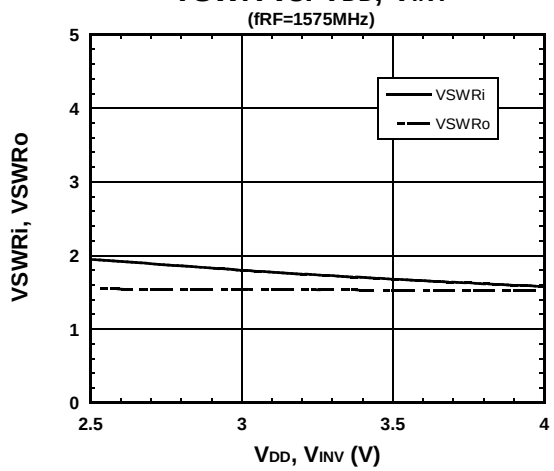
P-1dB(IN) vs. VDD, VINV
(fRF=1575MHz)



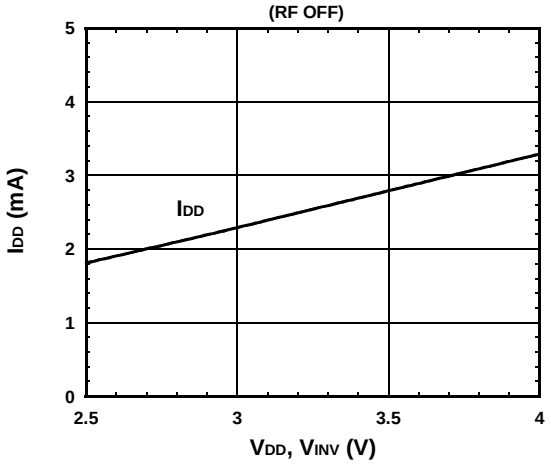
OIP3, IIP3 vs. VDD, VINV
(fRF=1575+1575.1MHz, Pin=-34dBm)



VSWR vs. VDD, VINV
(fRF=1575MHz)

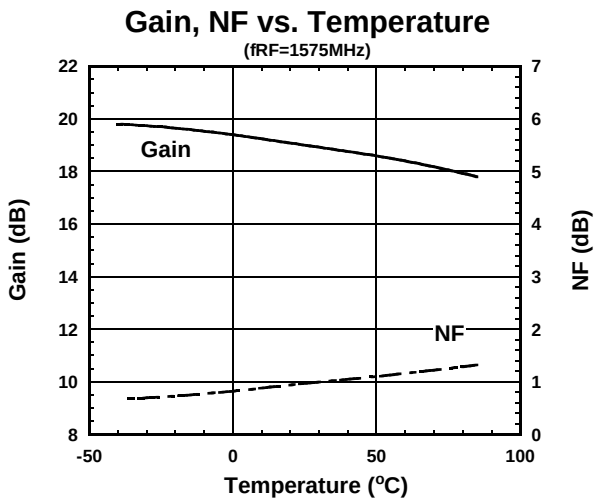


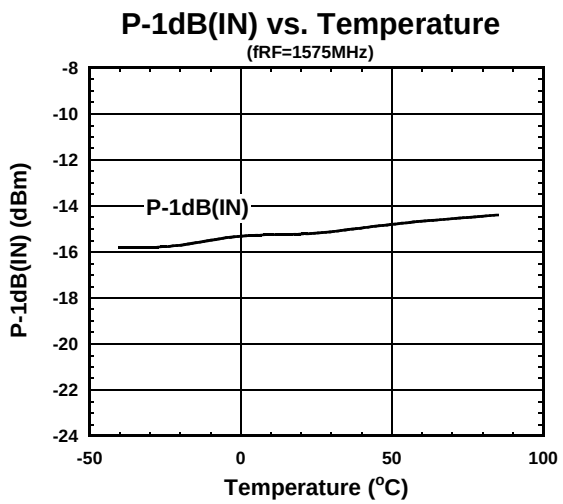
IDD vs. VDD, VINV
(RF OFF)

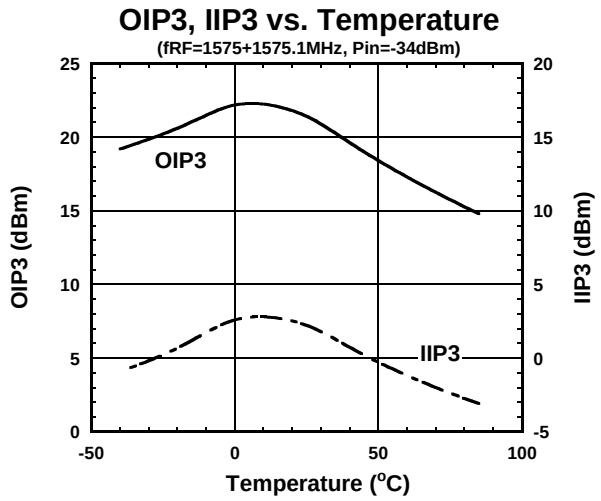


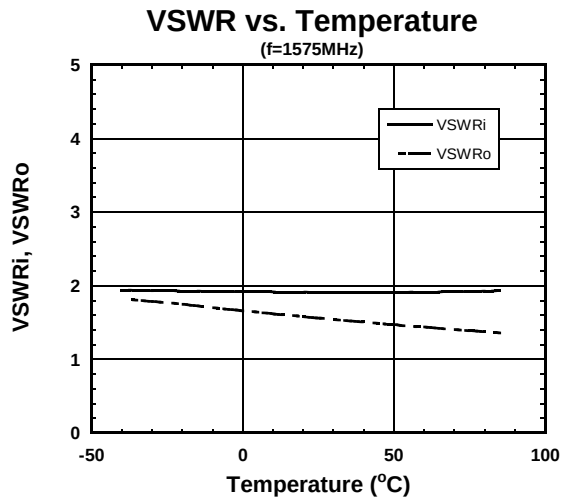
■ ELECTRICAL CHARACTERISTICS

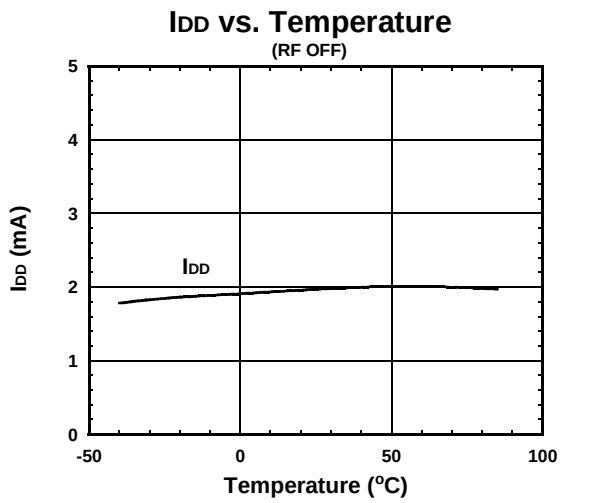
(Conditions: V_{DD}=V_{INV}=2.7V, V_{CTL}=1.85V, f_{RF}=1575MHz, T_a=+25°C, Z_s=Z_l=50ohm, with application circuit)

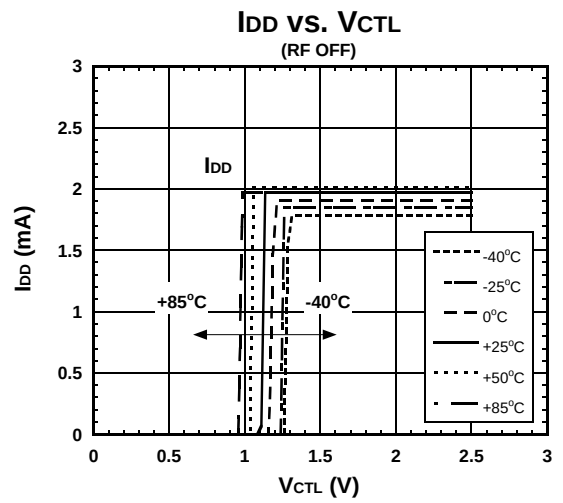






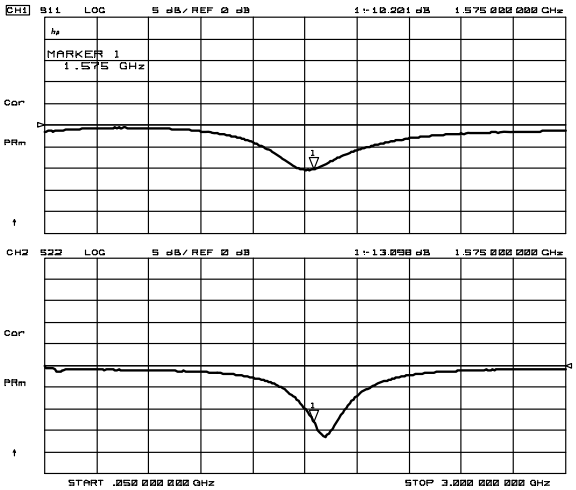




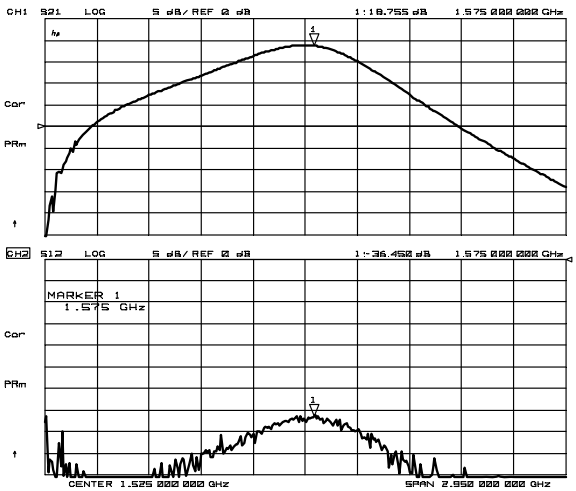


■ ELECTRICAL CHARACTERISTICS

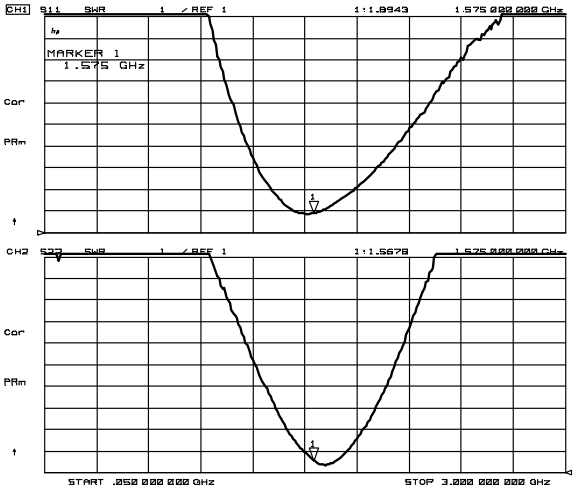
(Conditions: V_{DD}=V_{INV}=2.7V, V_{CTL}=1.85V, f_{RF}=1575MHz, T_a=+25°C, Z_s=Z_l=50ohm, with application circuit)



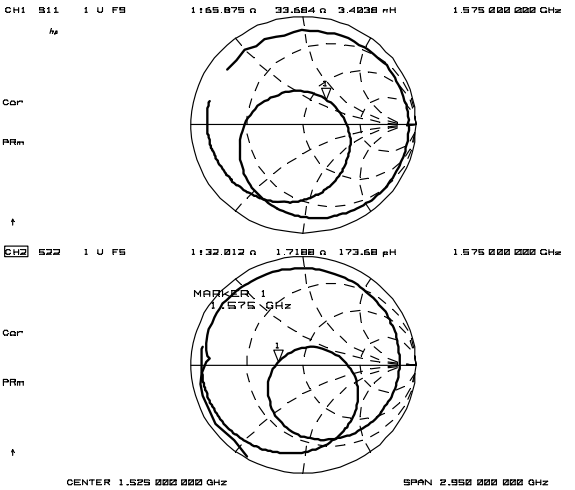
S11, S22



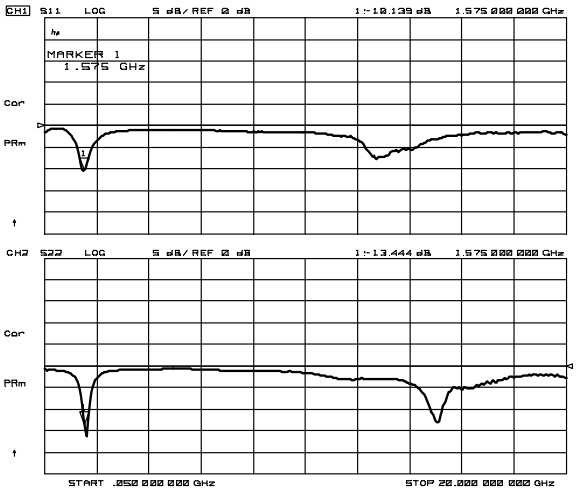
S21, S12



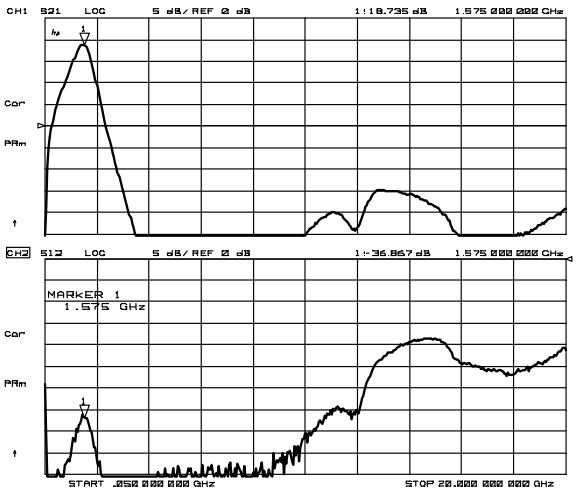
VSWR



Zin, Zout

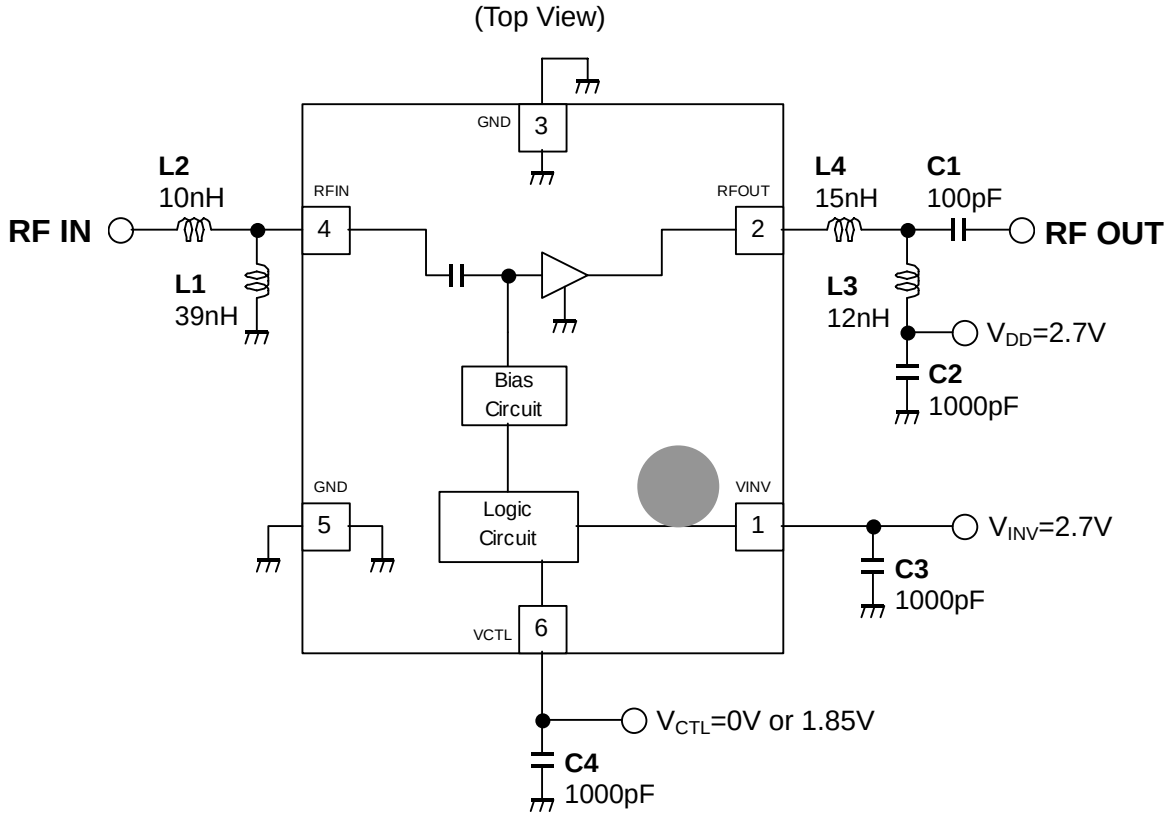


S11, S22 (f=50MHz~20GHz)

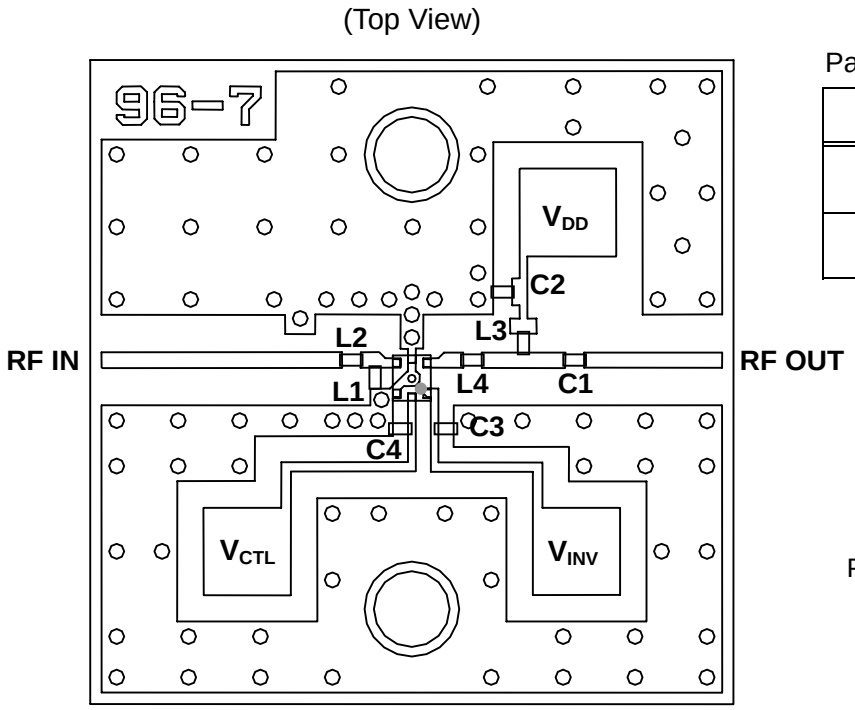


S21, S12 (f=50MHz~20GHz)

■ APPLICATION CIRCUIT



■ TEST PCB LAYOUT

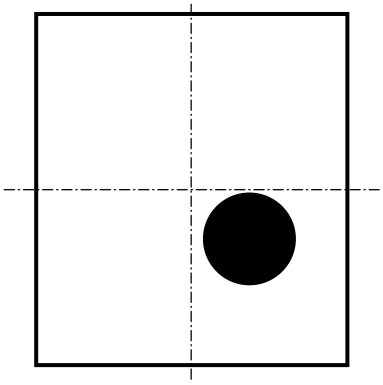


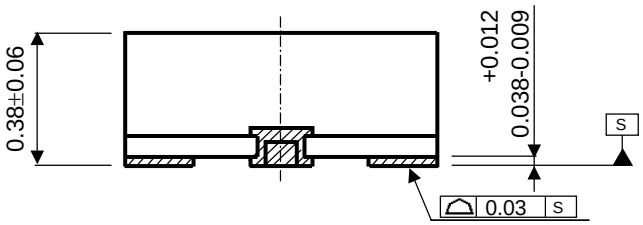
Parts List

Parts ID	Notes
L1~L4	MURATA (LQP03T series)
C1~C3	MURATA (GRM03 series)

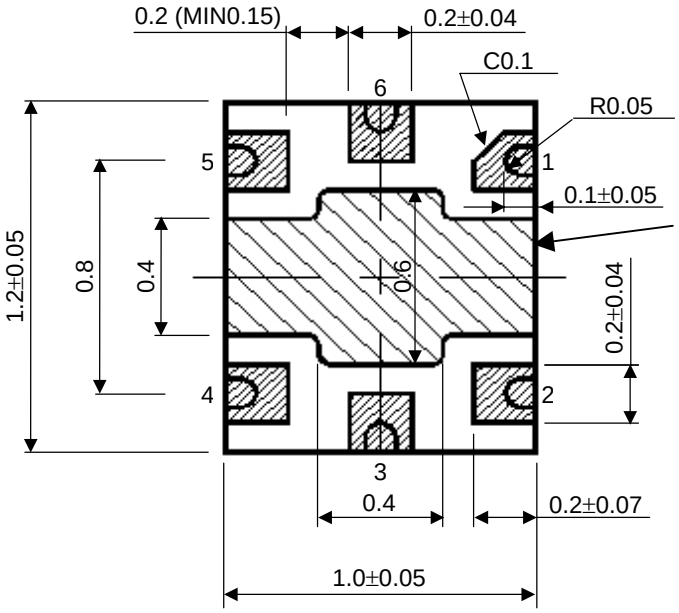
PCB (FR-4): t=0.2mm
MICROSTRIP LINE WIDTH
=0.4mm (Z_0=50ohm)
PCB SIZE=17.0mmx17.0mm

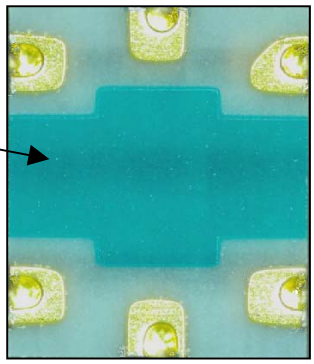
■PACKAGE OUTLINE (USB6-A8)





TERMINAL TREAT	:Au
Substrate	:FR5
Molding material	:Epoxy resin
UNIT	:mm
WEIGHT	:1.1mg





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.

[CAUTION]
The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.

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NJG1108HA8-TE1

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Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

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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