LOW NOISE AMPLIFIER GaAs MMIC

■GENERAL DESCRIPTION

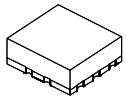
NJG1107HB3 is a Low Noise Amplifier GaAs MMIC designed for GPS This amplifier provides low noise figure, high gain and high IP3 operated by single low positive power supply.

This amplifier includes internal self-bias circuit and input DC blocking capacitor.

This amplifier can be tuned to wide frequency point (1.5GHz~2.4GHz).

An ultra small and ultra thin package of USB8-B3 is adopted.

■PACKAGE OUTLINE



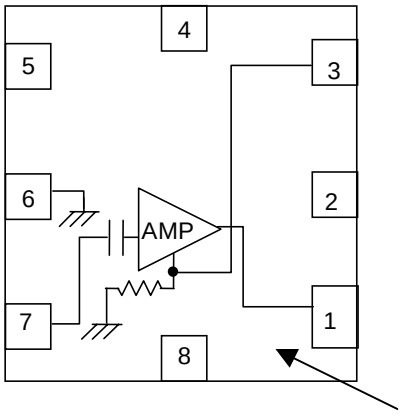
NJG1107HB3

■FEATURES

●Low voltage operation	+2.7V typ.
●Low current consumption	2.5mA typ.
●High small signal gain	17dB typ. @f=1.575GHz
●Low noise figure	1.1dB typ. @f=1.575GHz
●High Input IP3	-4.0dBm typ. @f=1.575+1.5751GHz
●Ultra small & ultra thin package	USB8-B3 (Package size: 1.5x1.5x0.75mm)

■PIN CONFIGURATION

HB3 Type
(Top View)



Pin Connection
1.RF_{OUT}
2.N/C
3.EXTCAP
4.N/C
5.N/C
6.GND
7. RF_{IN}
8. N/C

Orientation Mark

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

■ABSOLUTE MAXIMUM RATINGS

(T_a=+25°C, Z_s=Z_l=50ohm)

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Drain Voltage	V_{DD}		6.0	V
Input Power	Pin	V_{DD}=2.7V	+15	dBm
Power Dissipation	P_D	At on PCB board	135	mW
Operating Temp.	T_{opr}		-40~+85	°C
Storage Temp.	T_{stg}		-55~+150	°C

■ELECTRICAL CHARACTERISTICS

(V_{DD}=2.7V, f=1.575GHz, T_a=+25°C, Z_s=Z_l=50ohm, TEST CIRCUIT)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Frequency	freq1		1.57	1.575	1.58	GHz
Drain Voltage	V_{DD}		2.5	2.7	5.5	V
Operating Current	I_{DD}	RF OFF	-	2.5	3.2	mA
Small Signal Gain	Gain		15.0	17.0	-	dB
Noise Figure	NF		-	1.1	1.3	dB
Pin at 1dB Gain Compression point	P_{-1dB}		-20.0	-16.0	-	dBm
Input 3rd Order Intercept Point	IIP3	f=1.575+1.5751GHz RFin=-35dBm	-6.0	-4.0	-	dBm
RF Input Port VSWR	$VSWR_i$		-	1.6	2.0	
RF Output Port VSWR	$VSWR_o$			1.6	2.0	

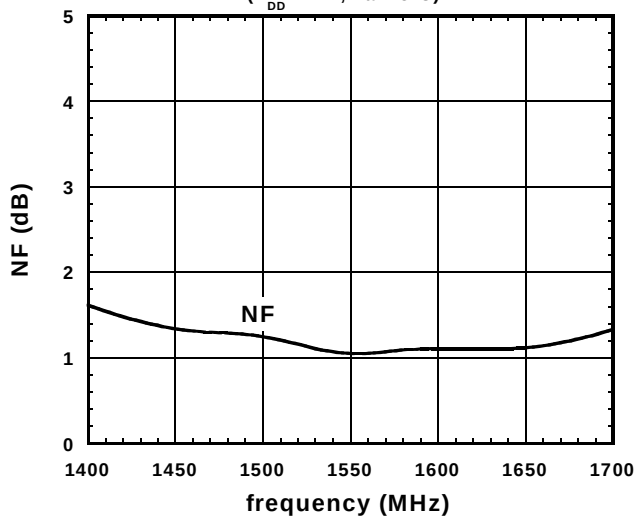
■PIN CONFIGURATION

Pin	Function	Description
1	Rfout	RF output and voltage supply pin. External matching circuits and a bypass capacitor is required. L3 is a RF choke inductor and C1 is a DC blocking capacitor. These elements are used as output matching circuit. C2 is a bypass capacitor.
2,4,5,8	N/C	Neutral terminal. Should be connected to the ground.
3	EXTCAP	An external bypass capacitor is required.
6	GND	Ground pin. To keep good RF grounding performance, please use multiple via holes to connect with ground plane and this pin.
7	Rfin	RF input pin. A DC blocking capacitor is not required. An external matching circuit is required.

■TYPICAL CHARACTERISTICS

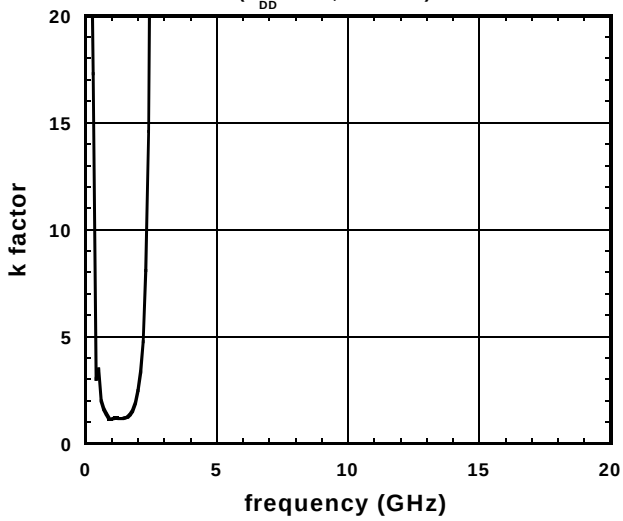
NF vs. frequency

(V_{DD}=2.7V, Ta=25°C)



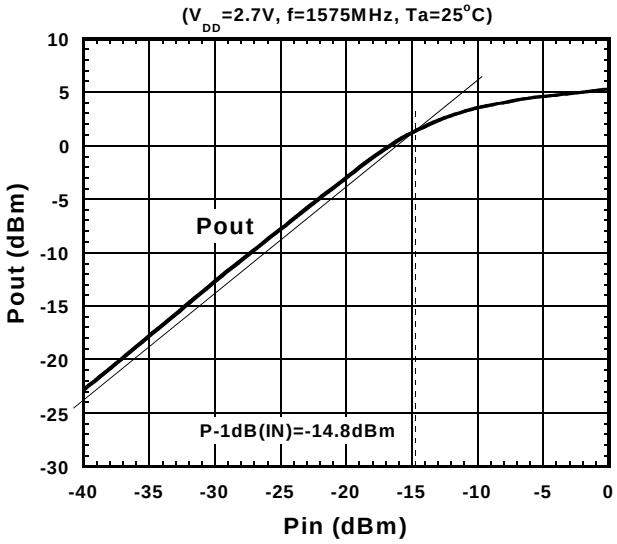
k factor vs. frequency

(V_{DD}=2.7V, Ta=25°C)



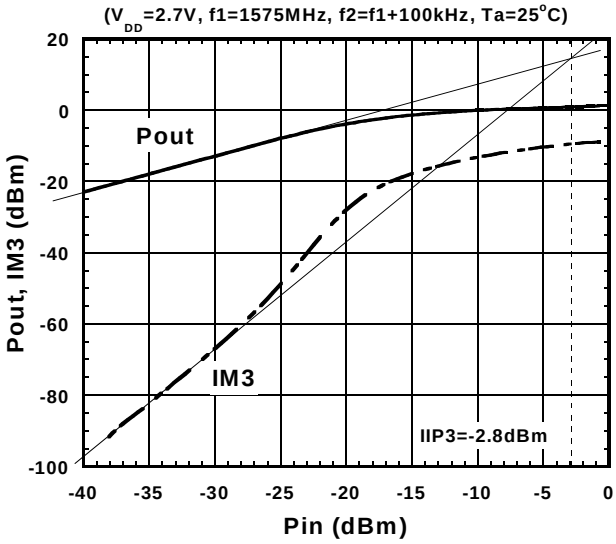
Pout vs. Pin

(V_{DD}=2.7V, f=1575MHz, Ta=25°C)



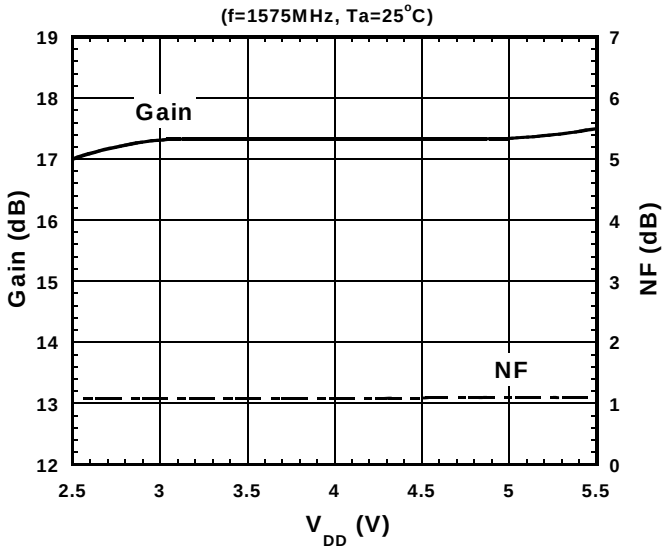
Pout, IM3 vs. Pin

(V_{DD}=2.7V, f1=1575MHz, f2=f1+100kHz, Ta=25°C)



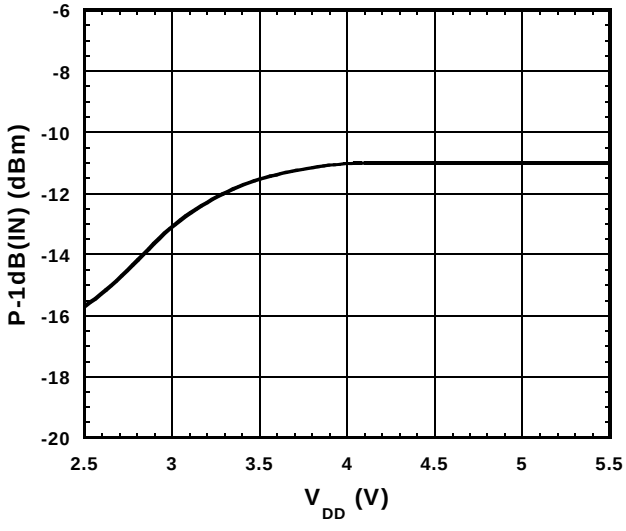
Gain, NF vs. V_{DD}

(f=1575MHz, Ta=25°C)



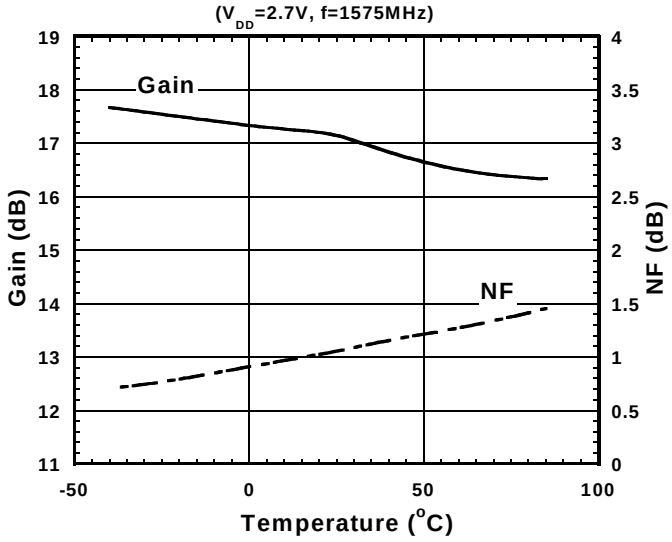
P-1dB(IN) vs. V_{DD}

(f=1575MHz, Ta=25°C)

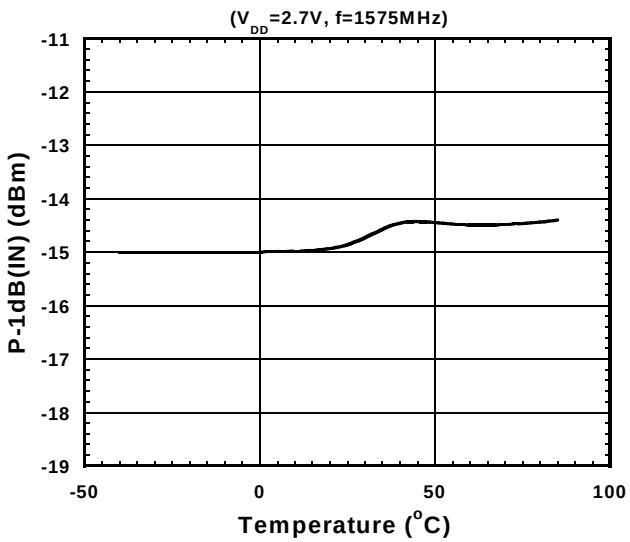


■TYPICAL CHARACTERISTICS

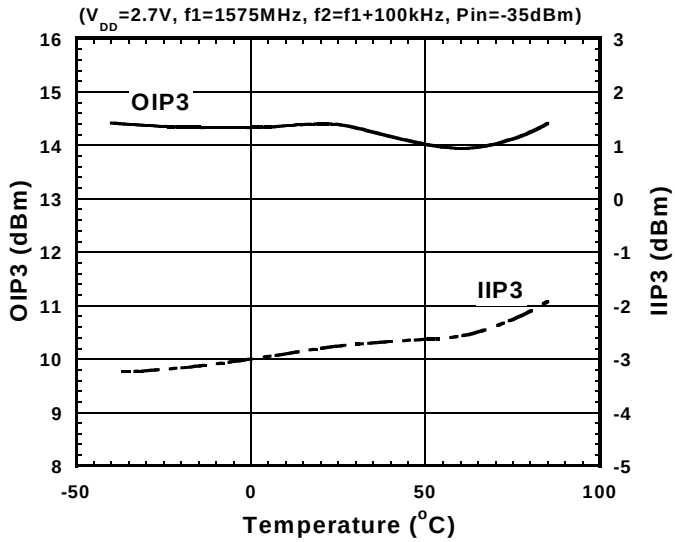
Gain, NF vs. Temperature



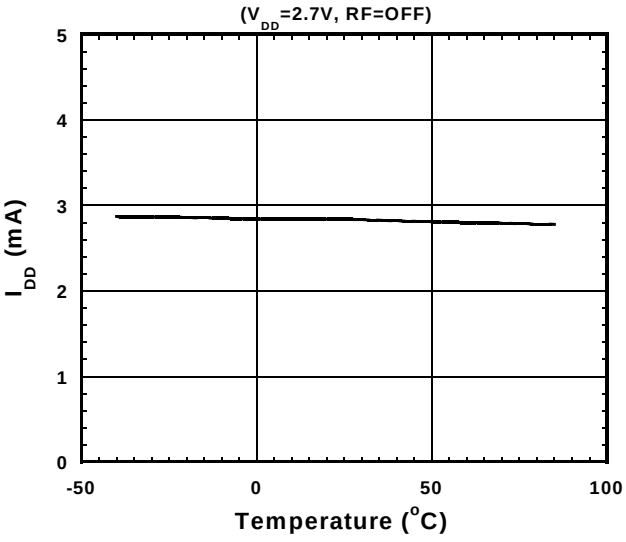
P-1dB(IN) vs. Temperature



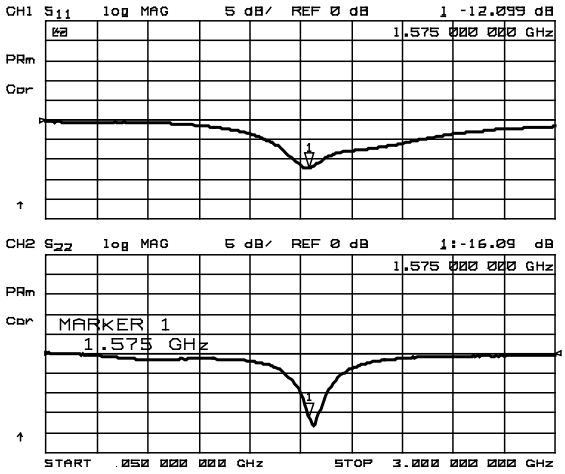
OIP3, IIP3 vs. Temperature



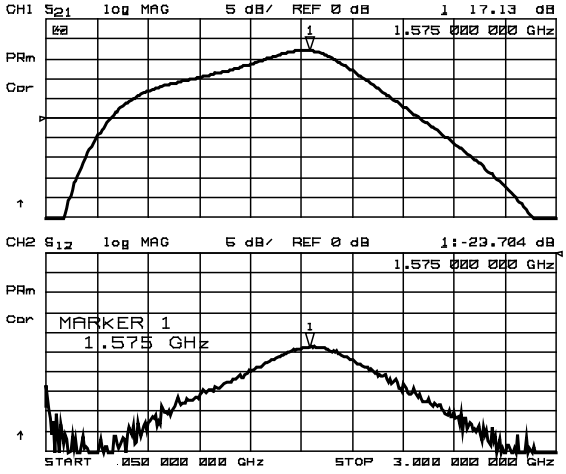
I_{DD} vs. Temperature



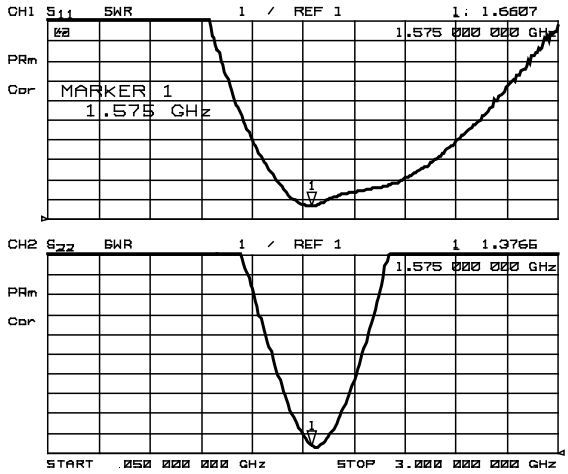
■TYPICAL CHARACTERISTICS



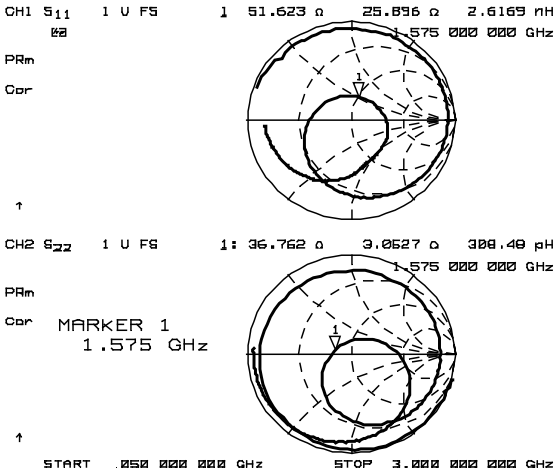
S11,S22



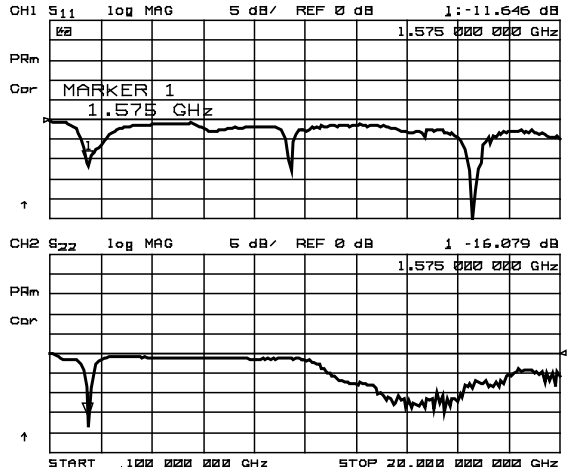
S21,S12



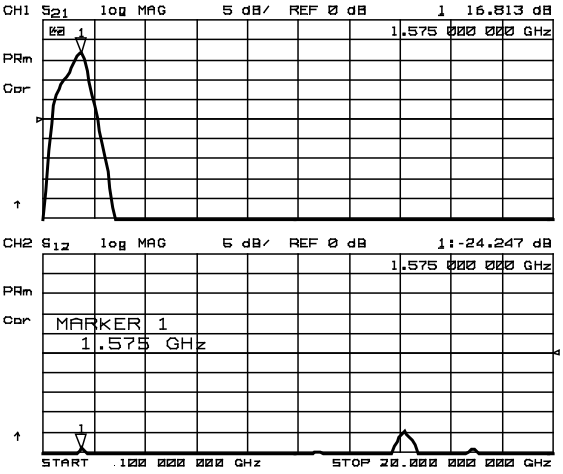
VSWR



Zin, Zout

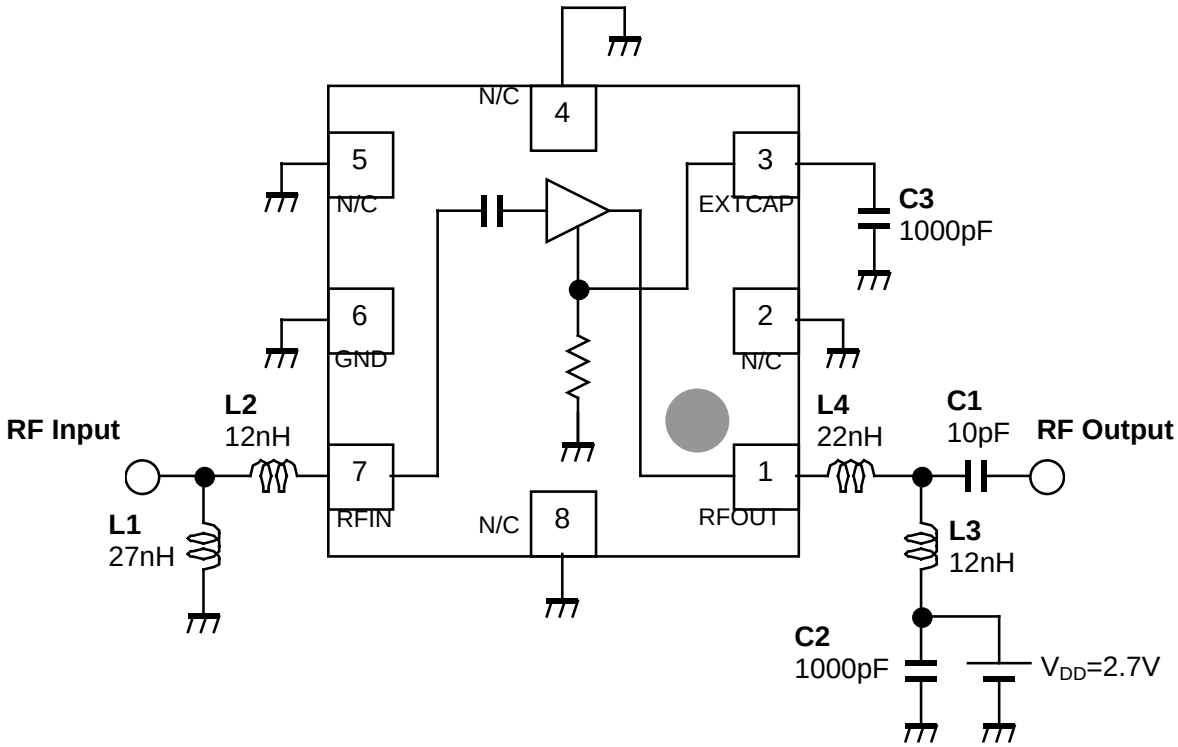


S11, S22(~20GHz)



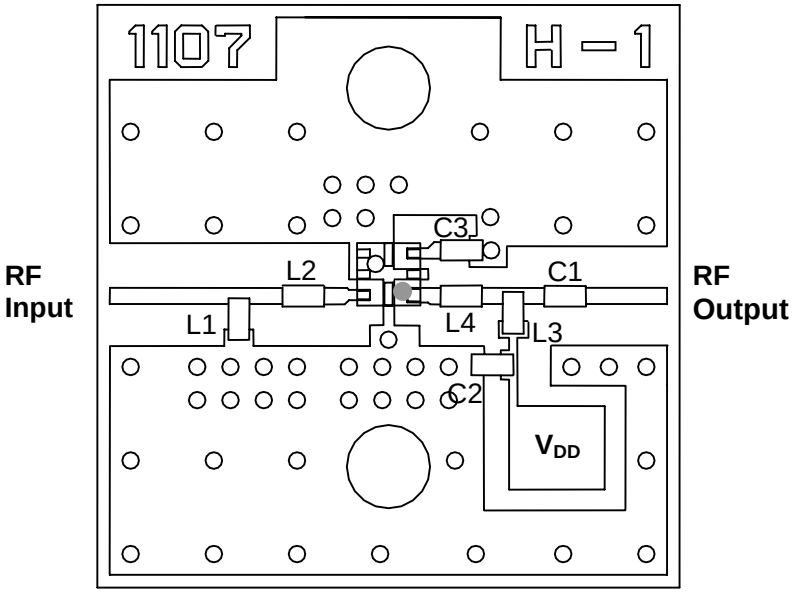
S21, S12(~20GHz)

■TEST CIRCUIT



■RECOMMENDED PCB DESIGN

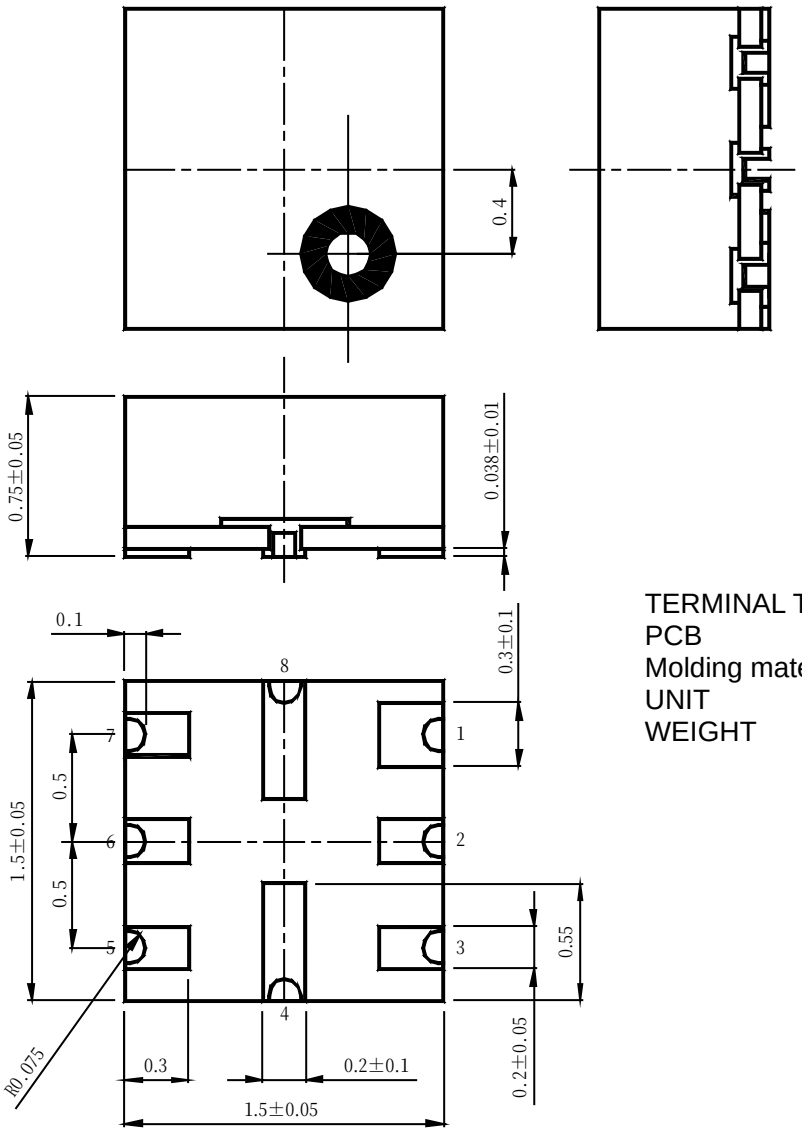
(Top View)



Parts ID	Comment
L1, L3, L4	TDK (MLK1005)
L2	TDK (MLG1005)
C1~C3	MURATA (GRP15)

PCB (FR-4):
t=0.2mm
MICROSTRIP LINE WIDTH
=0.4mm (Z_0=50ohm)
PCB SIZE=14.0mmX14.0mm

■PACKAGE OUTLINE (USB8-B3)



TERMINAL TREAT	:Au
PCB	:FR5
Molding material	:Epoxy resin
UNIT	:mm
WEIGHT	:4mg

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.