

# PRELIMINARY DATA SHEET: CKRF3004XS07

## GNSS LOW NOISE AMPLIFIER



### Description :

The CKRF3004XS07 is a pHEMT GaAs Low noise amplifier for GNSS (Global Navigation Satellite Systems). The consumption current needed is only 1.2mA which means critical to help to conserve batteries.

### Applications :

- GNSS Applications (GPS, Galileo, GLONASS and BeiDou etc.)
- Wearables, mobile, IoT devices

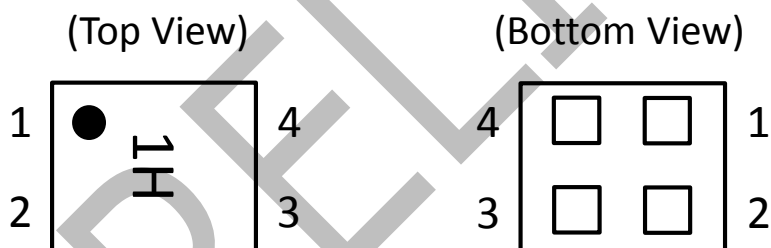
### Package :

- 4-pin Small Outline No-lead package (0.7mm x 0.9mm x 0.47mm)

### Features :

- Operating frequencies : 1550 – 1615 MHz
- High Gain : 17.0 dB TYP.  
Ultra-low current : 1.2mA(@1.2V)
- Low noise figure : 0.70 dB TYP.  
Ultra-low current : 1.2mA(@1.2V)
- Built in on chip ESD protection circuit.
- Ultra small leadless package
- Output internally matched to 50 Ohm
- Only one external chip Inductor for input matching

### Pin Configuration And Internal Block Diagram :



Pin No.	Pin Name
1	Vdd
2	RFout
3	GND
4	RFin

### Ordering Information :

Part Number	Order Number	Package	Marking	Supplying Form
CKRF3004XS07-C2	CKRF3004XS07-C2	4-pin Small Outline No-lead package	1H	<ul style="list-style-type: none"> <li>• Embossed tape 8 mm wide</li> <li>• Pin 1, 4 face the perforation side of the tape</li> <li>• Qty 10 Kpcs/reel</li> </ul>

**Absolute Maximum Ratings :**

Parameter	Symbol	Rating	Unit
Supply Voltage	V <sub>dd</sub>	3.6	V
Input Power	P <sub>in</sub>	+5	dBm
Operating Ambient Temperature	T <sub>A</sub>	-40~+85	°C
Storage Temperature	T <sub>stg</sub>	-55~+150	°C

**Electrical Characteristics 1 (DC) :**

(T<sub>A</sub>=+25°C, unless otherwise specified)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage	V <sub>dd</sub>		TBD	1.2	2.85	V
Supply Current1	I <sub>dd1</sub>	V <sub>dd</sub> =1.2V	-	1.2	TBD	mA
Supply Current2	I <sub>dd2</sub>	V <sub>dd</sub> =2.85V	-	2.0	TBD	mA

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**Electrical Characteristics 2 (RF) :**

( $T_A=+25^{\circ}\text{C}$ ,  $V_{dd}=1.2\text{V}$ ,  $\text{freq}=1575\text{MHz}$ ,  $Z_o=50\Omega$  with application circuit)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Power Gain	Gain		---	17.0	---	dB
Noise Figure	NF	Exclude PCB and connector losses	---	0.7	---	dB
Input Return Loss	$RL_{in}$		---	10	---	dB
Output Return Loss	$RL_{out}$		---	15	---	dB
1dB Gain Compression Input Power	$P_{in(1dB)}$		---	-17	---	dBm
Input 3rd Order Intercept Point	IIP3	$f_1=f_{RF}$ , $f_2=f_1\pm 1\text{MHz}$ ; $P_{in}=-30\text{dBm}$	---	TBD	---	dBm
Out of Band Input 3rd Order Intercept Point	IIP3_OB	$f_1 = 1713 \text{ MHz}$ ; $P_{in} = -20 \text{ dBm}$ $f_2 = 1851 \text{ MHz}$ ; $P_{in} = -20 \text{ dBm}$	---	TBD	---	dBm

**Electrical Characteristics 3 (RF) :**

( $T_A=+25^{\circ}\text{C}$ ,  $V_{dd}=2.85\text{V}$ ,  $\text{freq}=1575\text{MHz}$ ,  $Z_o=50\Omega$  with application circuit)

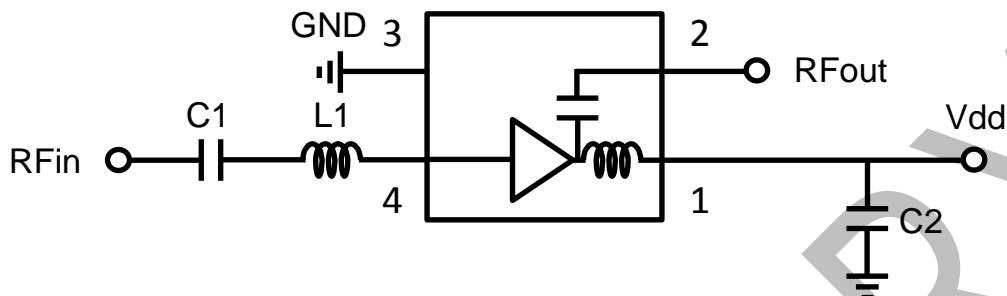
Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Power Gain	Gain		---	17.5	---	dB
Noise Figure	NF	Exclude PCB and connector losses	---	0.65	---	dB
Input Return Loss	$RL_{in}$		---	10	---	dB
Output Return Loss	$RL_{out}$		---	15	---	dB
1dB Gain Compression Input Power	$P_{in(1dB)}$		---	-13	---	dBm
Input 3rd Order Intercept Point	IIP3	$f_1=f_{RF}$ , $f_2=f_1\pm 1\text{MHz}$ ; $P_{in}=-30\text{dBm}$	---	TBD	---	dBm
Out of Band Input 3rd Order Intercept Point	IIP3_OB	$f_1 = 1713 \text{ MHz}$ ; $P_{in} = -20 \text{ dBm}$ $f_2 = 1851 \text{ MHz}$ ; $P_{in} = -20 \text{ dBm}$	---	TBD	---	dBm

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### Application Circuit :



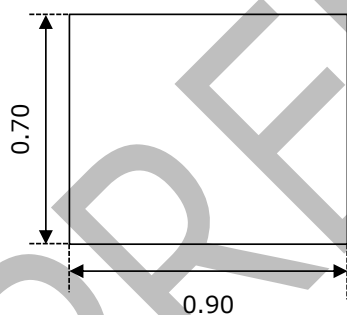
### Parts list

Name	Value	Manufacturer
C1	100 pF	Murata GRM15 Series
C2	1000 pF	Murata GRM15 Series
L1	27 nH	Murata LQW15A Series

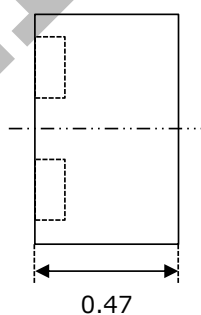
### Package Dimensions :

Unit [mm]

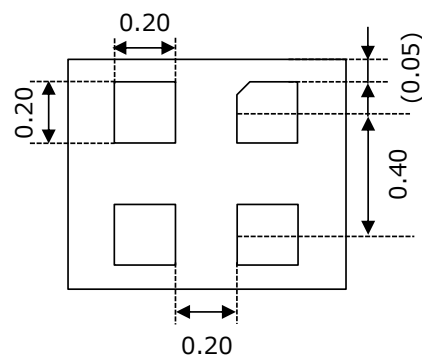
Top View



Side View



Bottom View

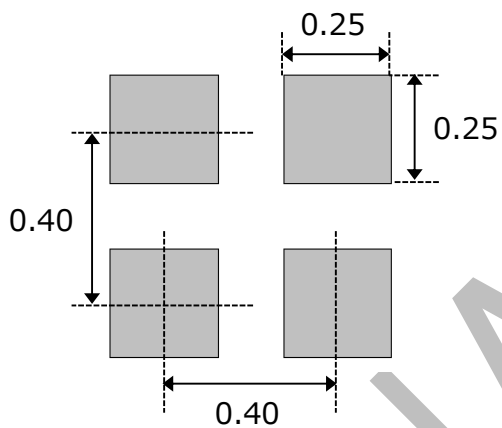


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**PCB Layout Footprint :**

4-pin Small Outline No-lead package (Unit : mm)



The PCB Layout Footprint in this document is for reference only.

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## GNSS LOW NOISE AMPLIFIER

### Application Note for GNSS L5 (1176.5MHz) Band Application

This application note presents the CKRF3004XS07 performance at GNSS L5 Band.

The performance of CKRF3004XS07 for GNSS L5 band application is shown in the following tables.

### Electrical Characteristics (DC) :

( $T_A=+25^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Condition	TYP.	Unit
Supply Voltage	Vdd		1.2	V
Supply Current1	Idd1	Vdd=1.2V	1.2	mA
Supply Current2	Idd2	Vdd=2.85V	2.0	mA

### Electrical Characteristics (RF) :

( $T_A=+25^{\circ}\text{C}$ , Vdd=1.2V, freq=1176.5MHz,  $Z_o=50\Omega$  with application circuit)

Parameter	Symbol	Condition	TYP.	Unit
Power Gain	Gain		17.0	dB
Noise Figure	NF	Exclude PCB and connector losses	0.8	dB
Input Return Loss	$RL_{in}$		10	dB
Output Return Loss	$RL_{out}$		15	dB
1dB Gain Compression Input Power	$P_{in(1dB)}$		-17	dBm
Input 3rd Order Intercept Point	IIP3	$f1=f_{RF}$ , $f2=f1\pm 1\text{MHz}$ ; $P_{in}=-30\text{dBm}$	TBD	dBm

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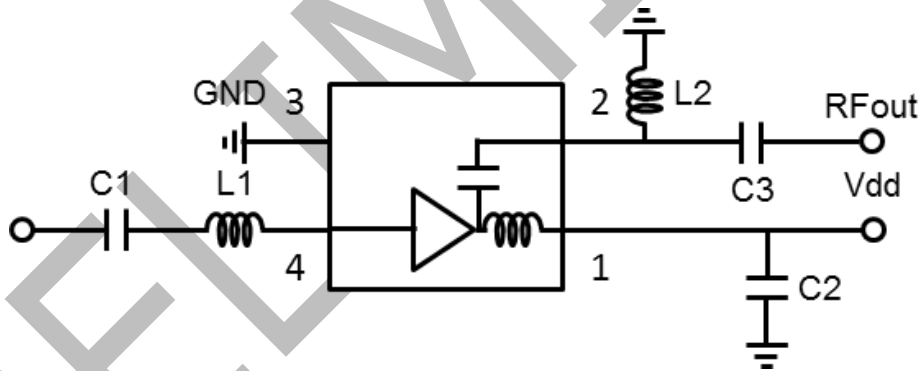


**Electrical Characteristics (RF) :**

(TA=+25°C, Vdd=2.85V, freq=1176.5MHz, Zo=50Ω with application circuit)

Parameter	Symbol	Condition	TYP.	Unit
Power Gain	Gain		17.5	dB
Noise Figure	NF	Exclude PCB and connector losses	0.75	dB
Input Return Loss	RL <sub>in</sub>		10	dB
Output Return Loss	RL <sub>out</sub>		15	dB
1dB Gain Compression Input Power	P <sub>in(1dB)</sub>		-13	dBm
Input 3rd Order Intercept Point	IIP3	f1=f <sub>RF</sub> , f2=f1+/-1MHz; Pin=-30dBm	TBD	dBm

**Application Circuit :**



**Parts list**

Name	Value	Manufacturer
C1	100 pF	Murata GRM15 Series
C2	1000 pF	Murata GRM15 Series
L1	43 nH	Murata LQW15A Series
L2	10 nH	Murata LQW15A Series
C3	0.7 pF	Murata GRM15 Series

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## GNSS LOW NOISE AMPLIFIER

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[Caution in the gallium arsenide (GaAs) product handling]

This product uses gallium arsenide (GaAs) of the toxic substance appointed in laws and ordinances. GaAs vapor and powder are hazardous to human health if inhaled or ingested.

- Do not dispose in fire or break up this product.
- Do not chemically make gas or powder with this product.
- When discard this product, please obey the law of your country.
- Do not lick the product or in any way allow it to enter the mouth.

[CAUTION]

Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

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