PRELIMINARY DATA SHEET: CKRF3002MM66

GNSS LOW NOISE AMPLIFIER

Description :

The CKRF3002MM66 is a pHEMT GaAs Low noise amplifier for GNSS (Global Navigation Satellite Systems). The device has stand-by function to save the supply current and on chip ESD protection circuit.

Features :

- Operating frequencies : 1550 – 1615 MHz
- High Gain : 17.0 dB TYP.
  @Vdd=1.8/ 2.85V, Vctl=1.8/ 2.85V, f=1575MHz
- Low noise figure : 0.60 dB TYP.
- @Vdd=1.8/ 2.85V, Vctl=1.8/ 2.85V, f=1575MHz
- Low Supply Current : 3.5 mA TYP.
  @Vdd=1.8/ 2.85V, Vctl=1.8/ 2.85V
- High IIP3 : +3 dBm TYP.
  @Vdd=1.8/ 2.85V, Vctl=1.8/ 2.85V,
  f=1575+1576MHz

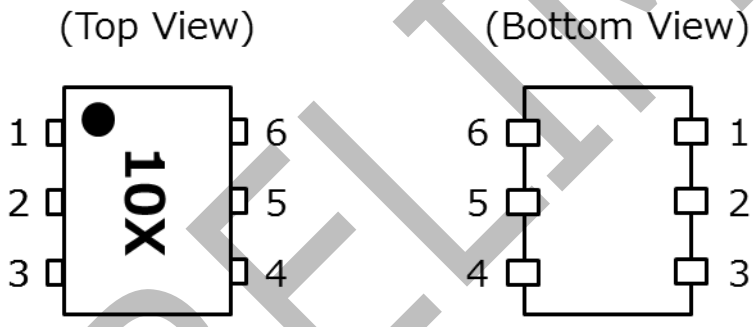
Applications :

- GNSS Applications
  (GPS, Galileo, GLONASS and BeiDou etc.)

Package :

- 6-pin lead-less mini mold package
  (1.5mm x 1.1mm x 0.55mm)

Pin Configuration And Internal Block Diagram :



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

Ordering Information :

Part Number	Order Number	Package	Marking	Supplying Form
CKRF3002MM66-C2	CKRF3002MM66-C2	6-pin lead-less mini mold package	10X	・Embossed tape 8 mm wide ・Pin 1, 6 face the perforation side of the tape ・Qty 9 Kpcs/reel

Absolute Maximum Ratings :

Parameter	Symbol	Rating	Unit
Supply Voltage	Vdd	5.0 Note 1	V
Control Voltage	Vctl	5.0 Note 1	V
Input Power	P_{in}	+10	dBm
Operating Ambient Temperature	T_A	-40～+85	℃
Storage Temperature	T_{stg}	-55～+150	℃

Note 1. Vctl ≦ Vdd

Electrical Characteristics 1 (DC) :

(T_A=+25℃, unless otherwise specified)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage	Vdd		1.5	2.85	3.3	V
Control Voltage (ON)	Vctl (ON)		1.5	1.8	3.3	V
Control Voltage (OFF)	Vctl (OFF)		0	0	0.3	V
Supply Current1	Idd1	Active mode; Vdd=2.85V, Vctl=2.85V	-	3.5	6.0	mA
Supply Current2	Idd2	Active mode; Vdd=1.8V, Vctl=1.8V	-	3.5	6.0	mA
Supply Current3	Idd3	Stand-by mode; Vdd=2.85V, Vctl=0V	-	-	3	uA
Supply Current4	Idd4	Stand-by mode; Vdd=1.8V, Vctl=0V	-	-	3	uA
Control Current	Ictl	Vctl=2.85V	-	1	5	uA

Electrical Characteristics 2 (RF) :

(T_A=+25℃, Vdd=2.85V, Vctl=2.85V, RF=1575MHz, Zo=50Ω with application circuit)

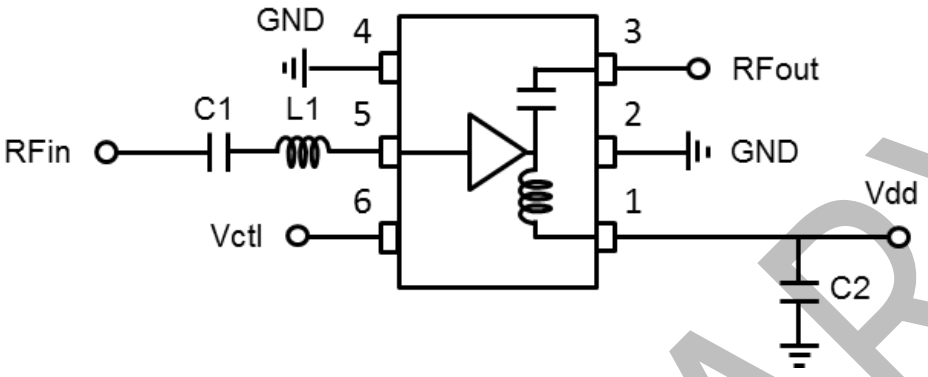
Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Power Gain	Gain		---	17.0	---	dB
Noise Figure	NF	Exclude PCB and connector losses	---	0.6	---	dB
Input Return Loss	RL_{in}		---	10	---	dB
Output Return Loss	RL_{out}		---	15	---	dB
1dB Gain Compression Input Power	$P_{in(1dB)}$		---	-10	---	dBm
Input 3rd Order Intercept Point	IIP3	f1=f_{RF}, f2=f1+/-1MHz; Pin=-30dBm	---	+3	---	dBm
Out of Band Input 3rd Order Intercept Point	IIP3_OB	f1 = 1712.7 MHz; Pin = -20 dBm f2 = 1851 MHz; Pin = -20 dBm	---	TBD	---	dBm

Electrical Characteristics 3 (RF) :

(T_A=+25℃, Vdd=1.8V, Vctl=1.8V, RF=1575MHz, Zo=50Ω with application circuit)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Power Gain	Gain		---	17.0	---	dB
Noise Figure	NF	Exclude PCB and connector losses	---	0.6	---	dB
Input Return Loss	RL_{in}		---	10	---	dB
Output Return Loss	RL_{out}		---	15	---	dB
1dB Gain Compression Input Power	$P_{in(1dB)}$		---	-12	---	dBm
Input 3rd Order Intercept Point	IIP3	f1=f_{RF}, f2=f1+/-1MHz; Pin=-30dBm	---	+3	---	dBm
Out of Band Input 3rd Order Intercept Point	IIP3_OB	f1 = 1712.7 MHz; Pin = -20 dBm f2 = 1851 MHz; Pin = -20 dBm	---	TBD	---	dBm

Application Circuit :

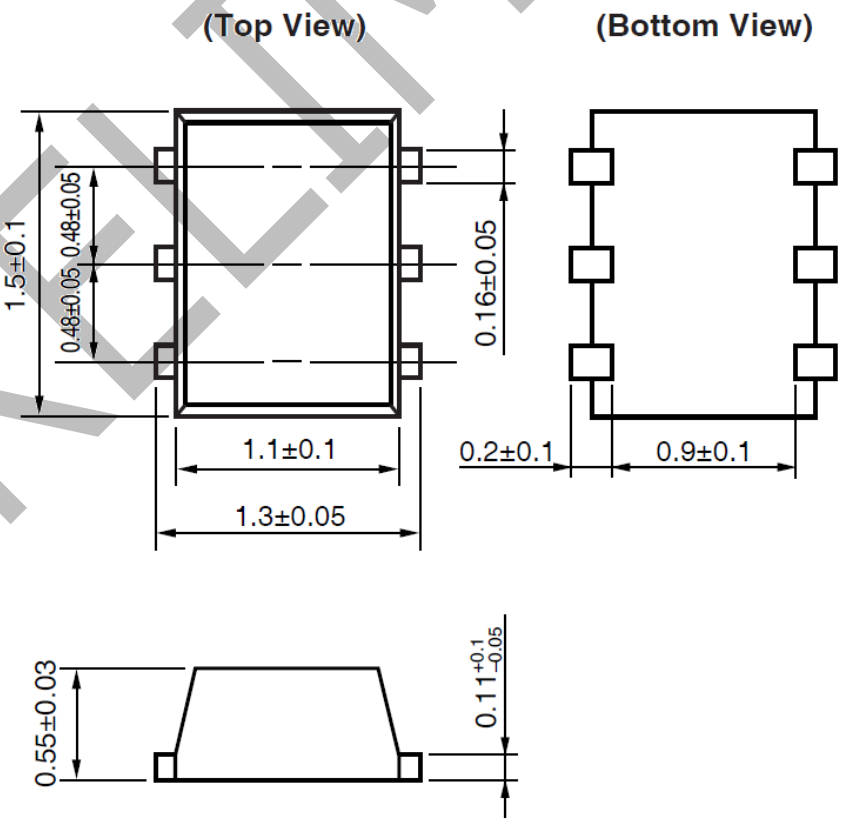


Parts list

Name	Value	Manufacturer
C1	100 pF	Murata GRM15 Series
C2	1000 pF	Murata GRM15 Series
L1	10 nH	Murata LQW15A Series

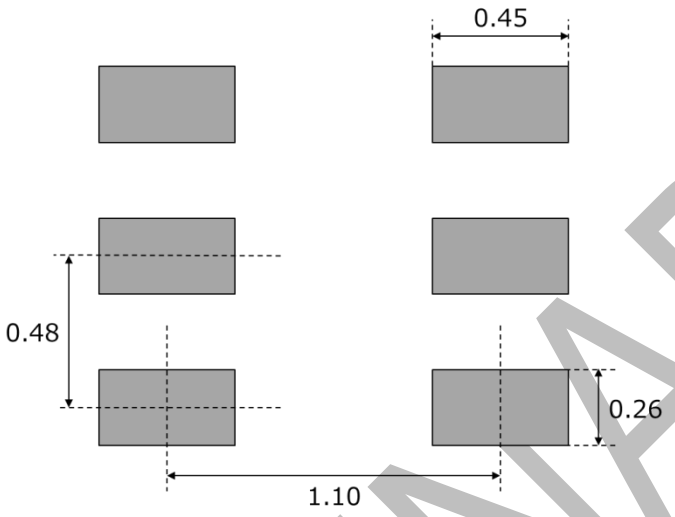
Package Dimensions :

Unit [mm]



PCB Layout Footprint :

6-PIN LEAD-LESS MINIMOLD (Unit : mm)



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

Application Note for GNSS L5 (1176.5MHz) Band Application

This application note presents the CKRF3002MM66 performance at GNSS L5 Band.

The performance of CKRF3002MM66 for GNSS L5 band application is shown in the following tables.

Electrical Characteristics (DC) :

(T_A=+25℃, unless otherwise specified)

Parameter	Symbol	Condition	TYP.	Unit
Supply Voltage	Vdd		1.8/2.85	V
Control Voltage (ON)	Vctl (ON)		1.8/2.85	V
Control Voltage (OFF)	Vctl (OFF)		0	V
Supply Current1	Idd1	Active mode; Vdd=2.85V, Vctl=2.85V	3.5	mA
Supply Current2	Idd2	Active mode; Vdd=1.8V, Vctl=1.8V	3.5	mA
Control Current	Ictl	Vctl=2.85V	1	uA

Electrical Characteristics (RF) :

(T_A=+25℃, Vdd=2.85V, Vctl=2.85V, RF=1176.5MHz, Zo=50Ω with application circuit)

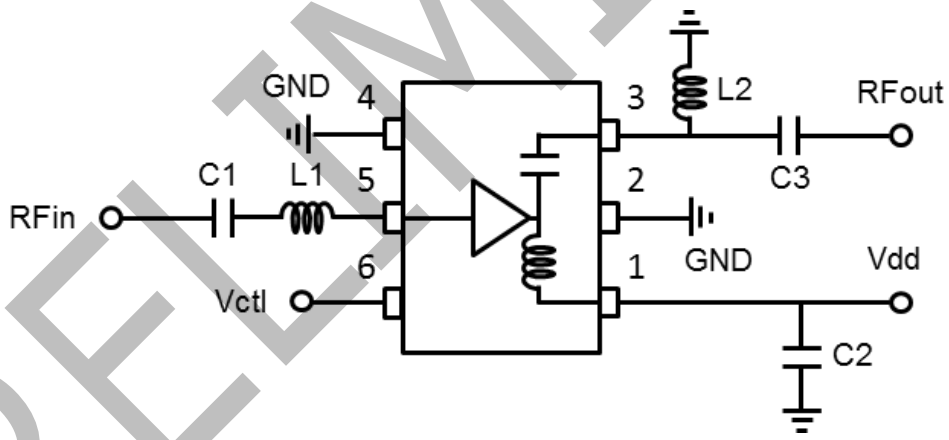
Parameter	Symbol	Condition	TYP.	Unit
Power Gain	Gain		17.0	dB
Noise Figure	NF	Exclude PCB and connector losses	0.7	dB
Input Return Loss	RL_{in}		10	dB
Output Return Loss	RL_{out}		15	dB
1dB Gain Compression Input Power	$P_{in(1dB)}$		-10	dBm
Input 3rd Order Intercept Point	IIP3	f1=f_{RF}, f2=f1+/-1MHz; Pin=-30dBm	TBD	dBm

Electrical Characteristics (RF) :

(T_A=+25℃, Vdd=1.8V, Vctl=1.8V, RF=1176.5MHz, Zo=50Ω with application circuit)

Parameter	Symbol	Condition	TYP.	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	$P_{in(1dB)}$		-12	dBm
Input 3rd Order Intercept Point	IIP3	f1=f_{RF}, 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	18 nH	Murata LQW15A Series
L2	4.3 nH	Murata LQW15A Series
C3	1.3 pF	Murata GRM15 Series

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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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