

# SAC4014QP3



MMIC Low Noise Amplifier  
18~26GHz

Rev 1.0

## Features

- Frequency: 18~26GHz
- Gain: 15dB
- Noise Figure: 1.8dB Typ. 2.2dB Max.
- Output P<sub>-1dB</sub>: 0dBm
- Supply Voltage: +5V/12mA
- Package Size: 3mm×3mm×1.3mm

## Typical Applications

- Telecommunication
- SATCOM

## General Description

SAC4014QP3 is a MMIC Low Noise Amplifier die which operates between 18GHz~26GHz. The amplifier can provide 15dB gain, 0dBm Output P<sub>-1dB</sub>, 1.8dB noise figure from a 12mA supply current.

The bare chip offers full passivation for increased reliability and moisture protection. This amplifier is the perfect alternative to higher cost hybrid amplifiers.

## Electrical Performance

T<sub>A</sub>=25°C, V<sub>D</sub>=+5V, I<sub>D</sub>=12mA, Z<sub>0</sub>=50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency Range	18~26			GHz
Gain	13	15	—	dB
Gain Flatness	—	±1	±1.5	dB
Input/Output VSWR	—	1.5	2	:1
Noise Figure	—	1.8	2.2	dB
Reverse Isolation	—	-32	—	dB
Output Power for 1 dB Compression (OP <sub>-1dB</sub> )	-6	0	—	dBm
Supply Current (I <sub>D</sub> )	—	12	18	mA

## Absolute Maximum Ratings

Maximum Input Power	+16dBm, CW 30s	Operating Temperature	-55°C~+85°C
Channel Temperature	+150°C	Storage Temperature	-55°C~+150°C
Working Voltage	+7V		

### SuperApex, LLC

1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA  
Tel: 1-847-505-8319, 1-847-573-9866  
E-mail: sales@superapexco.com  
Website: www.superapexco.com

# SAC4014QP3



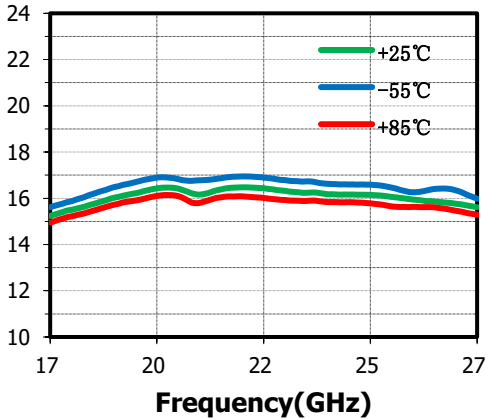
MMIC Low Noise Amplifier  
18~26GHz

Rev 1.0

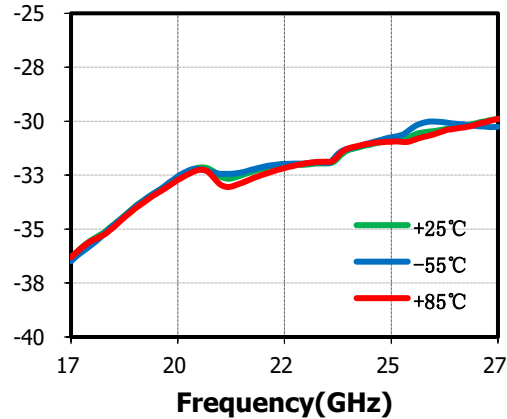
## Typical Performance Curve

$V_D=+5V$ ,  $I_{DQ}=12mA$ , the following curves are taken from SAC4014QP3 evaluation board. De-embedding operation has been Implemented.

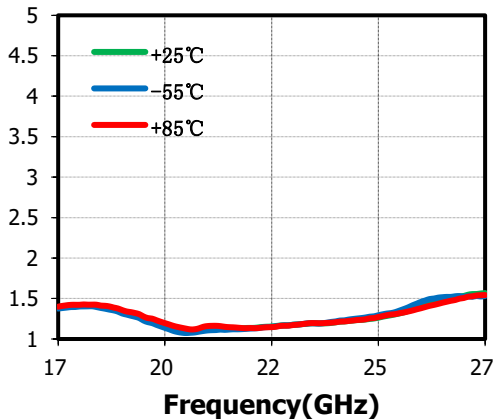
Small Signal Gain(dB) vs.Temperature



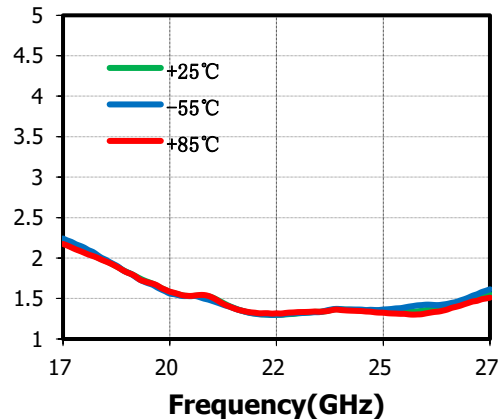
Reverse Isolation(dB) vs.Temperature



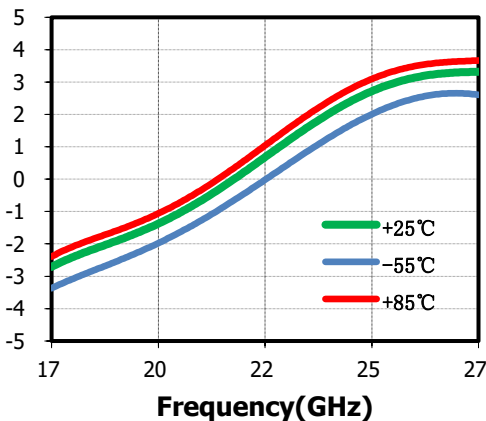
Input VSWR(:1) vs.Temperature



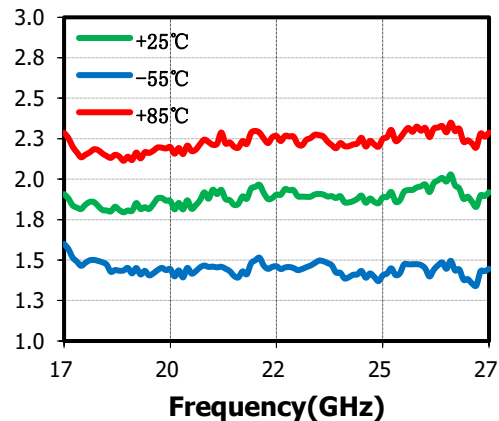
Output VSWR(:1) vs.Temperature



Output P-1dB(dBm) vs.Temperature



Noise Figure(dB) vs.Temperature



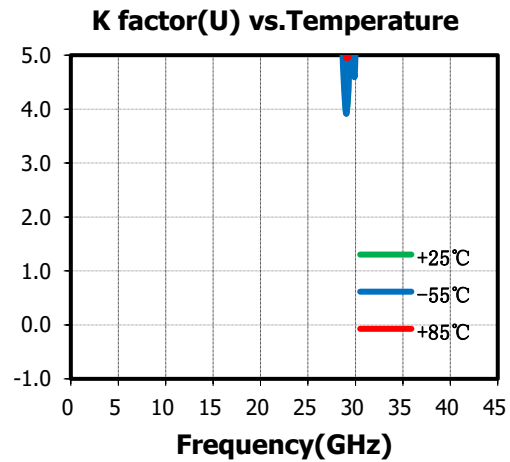
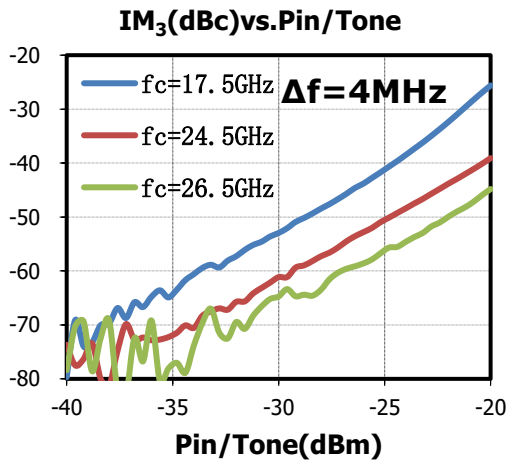
### SuperApex, LLC

1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA  
Tel: 1-847-505-8319, 1-847-573-9866  
E-mail: sales@superapexco.com  
Website: www.superapexco.com

# SAC4014QP3

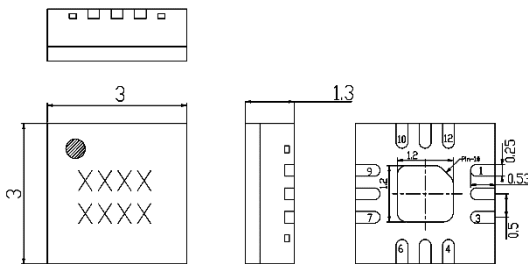
MMIC Low Noise Amplifier  
18~26GHz

Rev 1.0

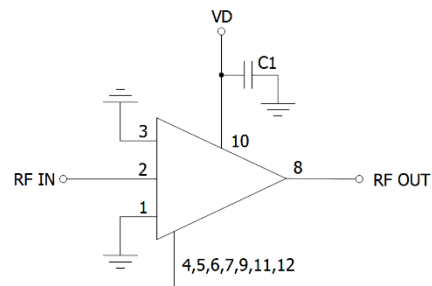


## Outline Drawing

(All dimensions in mm)



## Assembly Diagram



## Pin Function

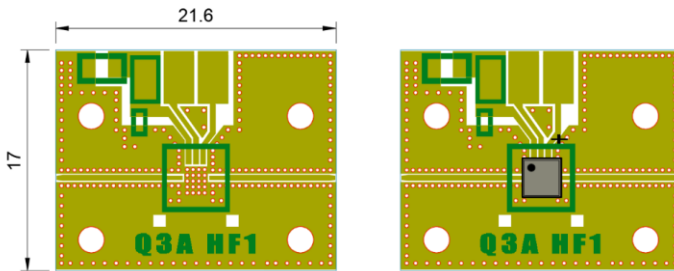
Pin No.	Description	Pin No.	Description
1	Connect to ground	7	Connect to ground
2	RF input, DC Coupled	8	RF output, DC Coupled
3	Connect to ground	9	Connect to ground
4	Connect to ground	10	Drain supply
5	Connect to ground	11	Connect to ground
6	Connect to ground	12	Connect to ground

# SAC4014QP3

MMIC Low Noise Amplifier  
18~26GHz

Rev 1.0

## SAC4014QP3 Evaluation Board



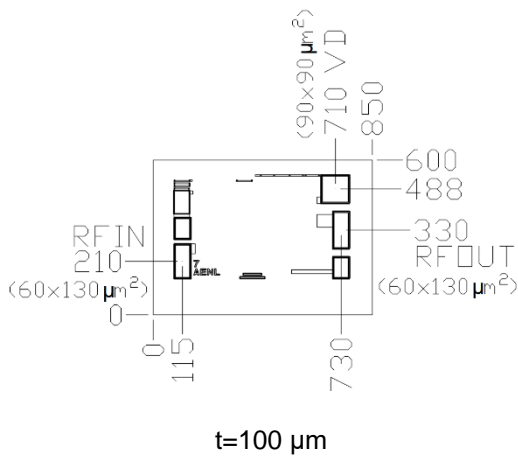
The Evaluation board is a 2-layer board fabricated using Rogers 4350  $t=0.254$  and using best practices for high frequency RF design. The RF input and RF output traces have a  $50 \Omega$  characteristic impedance.

## Components List

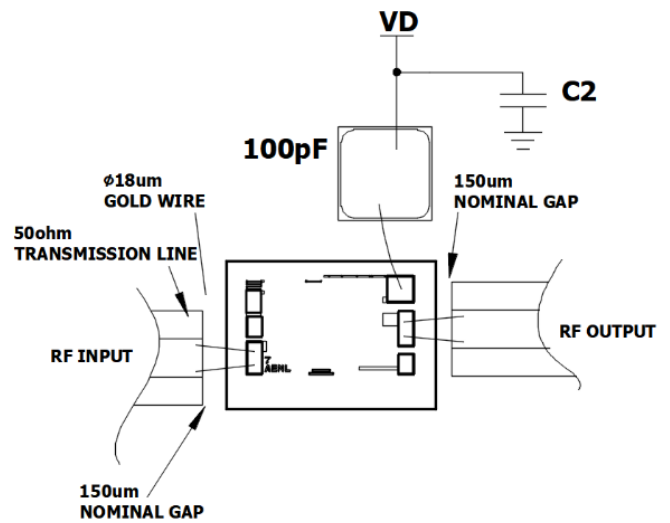
Reference Des.	Value	Part Number	Manuf.
C1	0.01uF	GRM0336R61A103KE	Murata

## Die Outline Drawing

(All dimensions in  $\mu\text{m}$ )



## Assembly Diagram



## Attention:

1. Bare chips need to be stored in a dry, nitrogen environment and used in an ultra-clean environment;
2. The chip should be sintered with conductive adhesive or alloy (the alloy temperature should not exceed  $300 \text{ }^\circ\text{C}$ , and the time should not exceed 30 seconds) to ensure sufficient grounding;
3. The gap between the chip microwave port and the substrate should not exceed  $350\mu\text{m}$   $\Phi$   $18\mu\text{m}$  wire bonding, recommended wire length  $250\text{-}350\mu\text{m}$ ;
4. The RF input and output ports of the chip have integrated DC capacitors, with a withstand voltage of  $15\text{V}$ ;
5. The moisture proof level of the packaged product is Class 1a, and the storage environment is less than or equal to  $30 \text{ }^\circ\text{C}/60\% \text{ RH}$ , with a lifespan of four workshops;
6. When using packaged products, try to use thin RF boards as much as possible and increase the number of

## SuperApex, LLC

1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA  
Tel: 1-847-505-8319, 1-847-573-9866  
E-mail: sales@superapexco.com  
Website: www.superapexco.com

# SAC4014QP3



MMIC Low Noise Amplifier  
18~26GHz

Rev 1.0

groundings vias at the bottom of the device to reduce the grounding inductance;

7. Remove the vacuum packaging and bake in a 125+/-5° environment for 6 hours before reflow soldering.

## Revision History

Revision	Date	Comment
1.0	August 7, 2023	First Release

---

### SuperApex, LLC

1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA  
Tel: 1-847-505-8319, 1-847-573-9866  
E-mail: sales@superapexco.com  
Website: www.superapexco.com