

SAC4017AQP3



MMIC Low Noise Amplifier
0.03~18GHz

Rev 1.0

Features

- Frequency: 0.03~18GHz
- Gain: 20dB
- Noise Figure: 1.8dB Typ. 2.5dB Max.
- Output P_{-1dB}: 13dBm
- Supply Voltage: +5V/60mA Single Supply
- Package Size: 3mmx3mmx1.3mm

Typical Applications

- Telecommunication

General Description

SAC4017AQP3 is a MMIC Low Noise Amplifier die which operates between 0.03GHz~18GHz. The amplifier can provide 22dB gain, 13dBm Output P_{-1dB}, 1.8dB noise figure from a 60mA 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_A=25°C, V_D=+5V, I_D=60mA, Z₀=50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency Range	0.03~18			GHz
Gain	17	20	—	dB
Gain Flatness	—	±1	±1.5	dB
Input/Output VSWR	—	1.5	2.5	:1
Noise Figure*	—	1.8	2.5	dB
Reverse Isolation	—	-30	—	dB
Output Power for 1 dB Compression (OP _{-1dB})	11	13	—	dBm
Supply Current (I _D)	—	60	90	mA

* f=0.03~18GHz

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
VD Bias	+7V	RF input port reverse withstand voltage	-2V

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

SAC4017AQP3



MMIC Low Noise Amplifier
0.03~18GHz

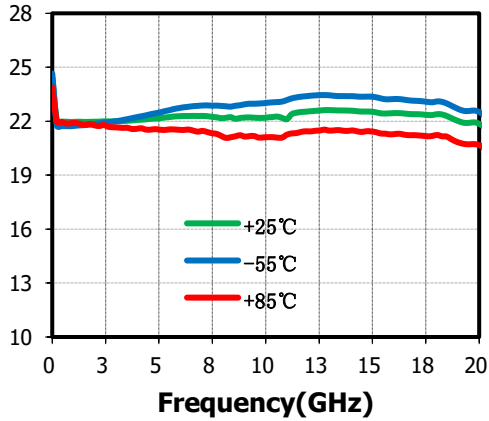
Rev 1.0

Typical Performance Curve

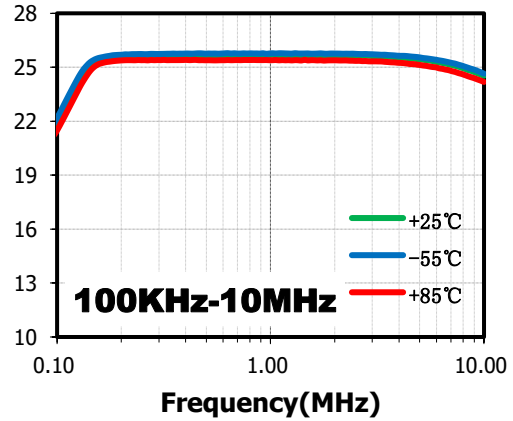
$V_D=+4V, I_{DQ}=60mA, VNA\ Bias$

The following curves are taken from SAC4017AQP3 evaluation board. De-embedding operation has been Implemented.

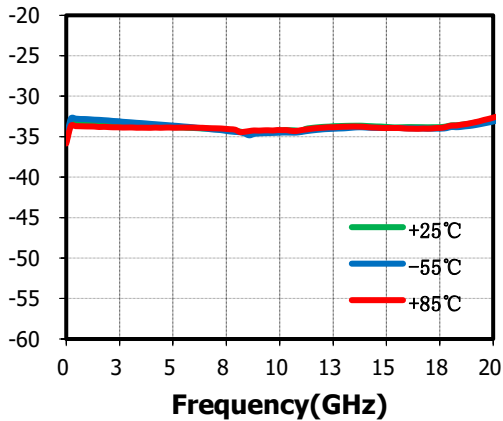
Small Signal Gain(dB) vs.Temperature



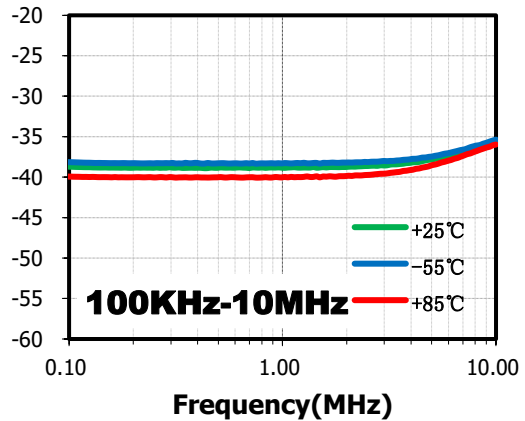
Small Signal Gain(dB) vs.Temperature



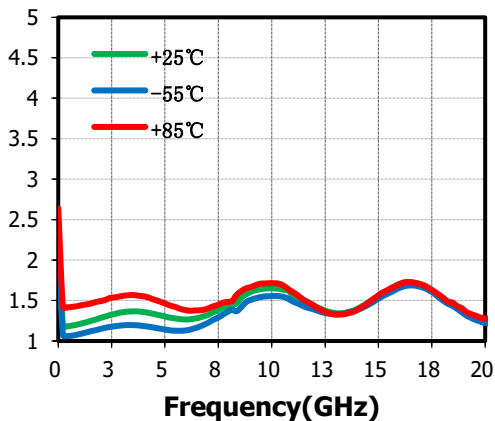
Reverse Isolation(dB) vs.Temperature



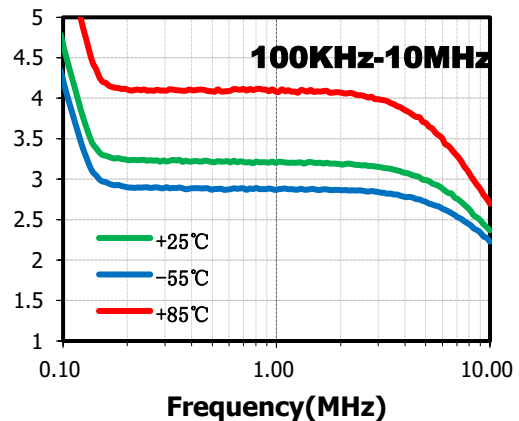
Reverse Isolation(dB) vs.Temperature



Input VSWR(:1) vs.Temperature



Input VSWR(:1) 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

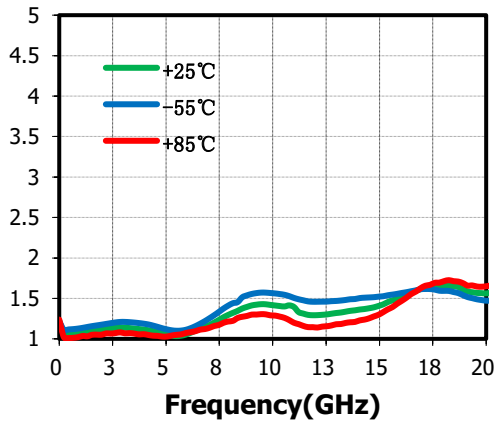
SAC4017AQP3



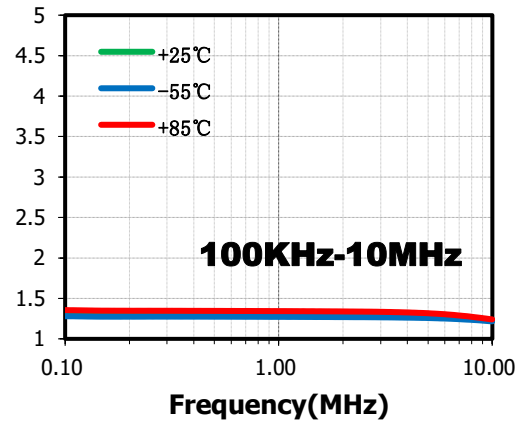
MMIC Low Noise Amplifier
0.03~18GHz

Rev 1.0

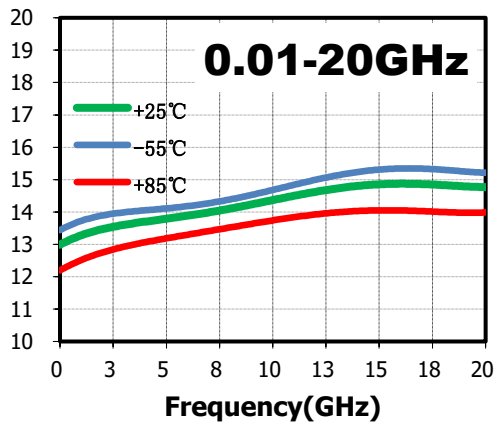
Output VSWR(:1) vs.Temperature



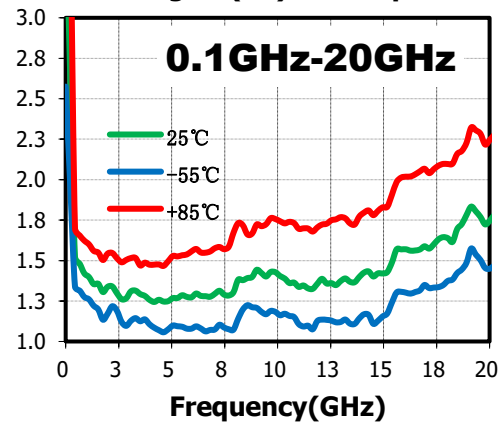
Output VSWR(:1) vs.Temperature



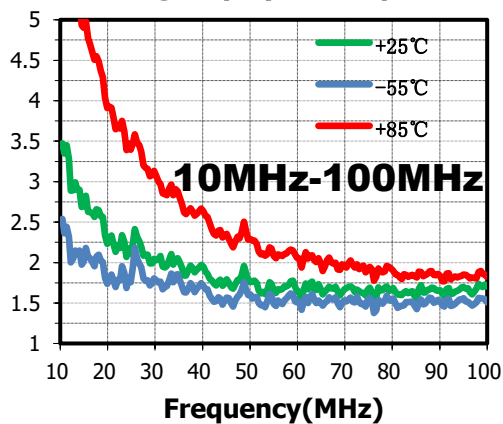
Output P-1dB(dBm) vs.Temperature



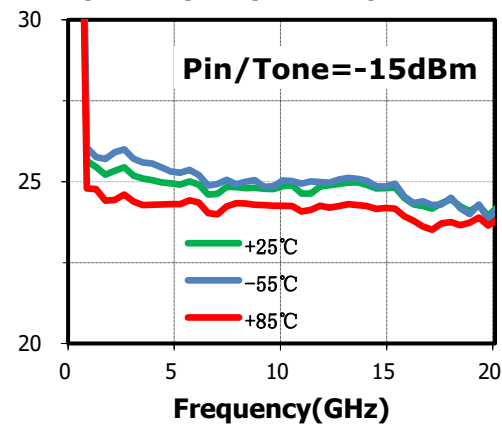
Noise Figure(dB) vs.Temperature



Noise Figure(dB) vs.Temperature



Output IP₃(dBm) vs.Temperature



SuperApex, LLC

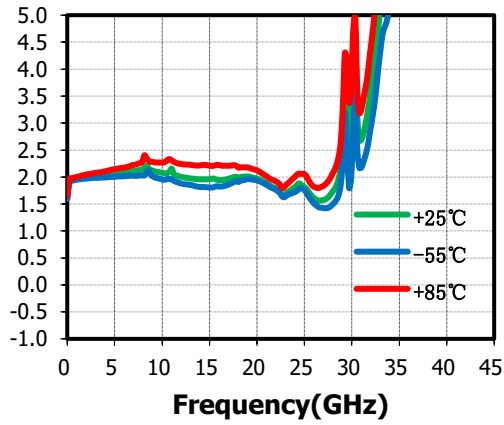
1580 S. Milwaukee Ave. Suite 405, Libertyville, IL 60048, USA
Tel: 1-847-505-8319, 1-847-573-9866
E-mail: sales@superapexco.com
Website: www.superapexco.com

SAC4017AQP3

MMIC Low Noise Amplifier
0.03~18GHz

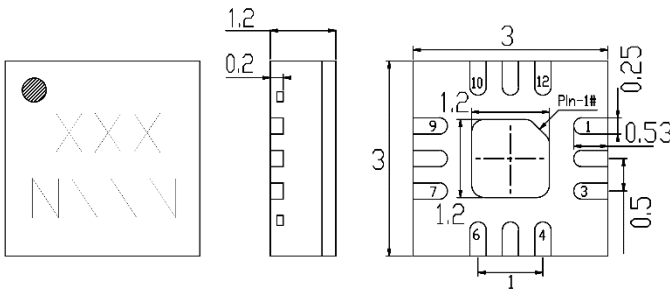
Rev 1.0

K factor(U) vs.Temperature

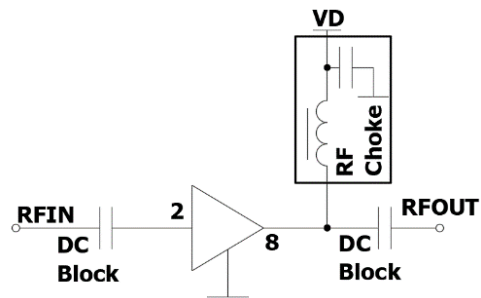


Outline Drawing

(All dimensions in mm)



Assembly Diagram



Pin Function

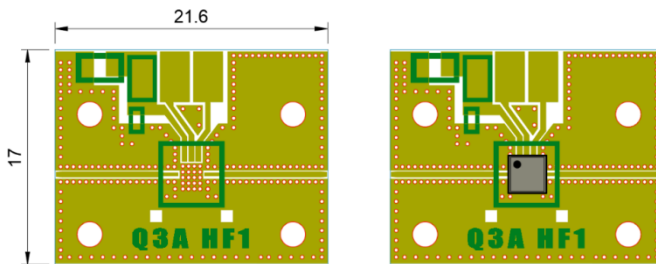
Pin No.	Description	Pin No.	Description
1	Connect to ground	7	Connect to ground
2	RF input, DC Coupled	8	RF Output, VD Bias
3	Connect to ground	9	Connect to ground
4	Connect to ground	10	Connect to ground
5	Connect to ground	11	Connect to ground
6	Connect to ground	12	Connect to ground

SAC4017AQP3

MMIC Low Noise Amplifier
0.03~18GHz

Rev 1.0

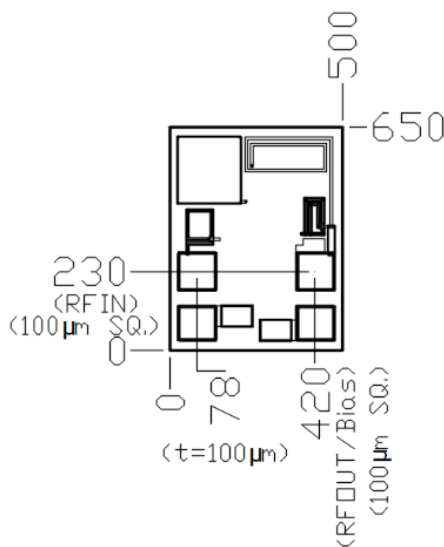
SAC4017AQP3 Evaluation Board



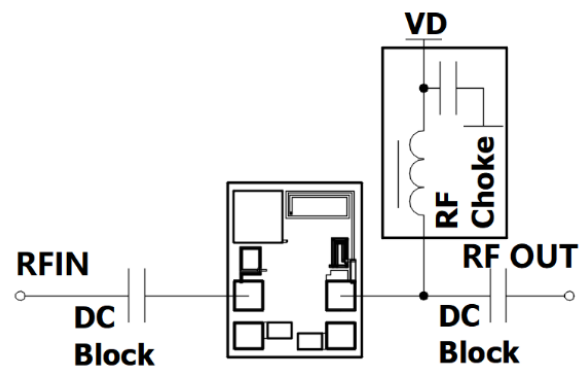
The Evaluation board is a 2-layer board fabricated using Rogers 4350 $t=0.254$ and using best practices for high frequency RF design. The RF input and RF output traces have a $50\ \Omega$ characteristic impedance.

Die Outline Drawing

(All dimensions in μm)



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 $300\ ^\circ\text{C}$, 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 $350\ \mu\text{m}$ Φ $18\ \mu\text{m}$ wire bonding, recommended wire length $250\text{-}350\ \mu\text{m}$;
4. The moisture proof level of the packaged product is Class 1a, and the storage environment is less than or equal to $30\ ^\circ\text{C}/60\% \text{ RH}$, with a lifespan of four workshops;
5. When using packaged products, try to use thin RF boards as much as possible and increase the number of groundings vias at the bottom of the device to reduce the grounding inductance;
6. Remove the vacuum packaging and bake in a $125\ +/-\ 5^\circ$ environment for 6 hours before reflow soldering

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

SAC4017AQP3



MMIC Low Noise Amplifier
0.03~18GHz

Rev 1.0

7. The ESD Sensitivity (HBM) of SAC4017AQP3 is Class 0

Revision History

Revision	Date	Comment
1.0	Jan 16, 2024	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