AASP702AQ

- General Purpose Wireless
- TDD / FDD System

Features

- 16 Pin 3X3mm QFN Package
- 2.0 - 4.2 GHz Operational Frequency
- +28.5 dBm P3dB
- 36.5dB Gain at 2.6 GHz
- +5 V Single Supply, ICQ adjustable
- DC Power Shutdown Feature

Applications

- 5G m-MIMO
- Mobile Infrastructure

Description

The AASP702AQ is a wideband, high gain and high linearity driver amplifier. It provides 36.5dB gain at 2.6GHz and achieves a peak

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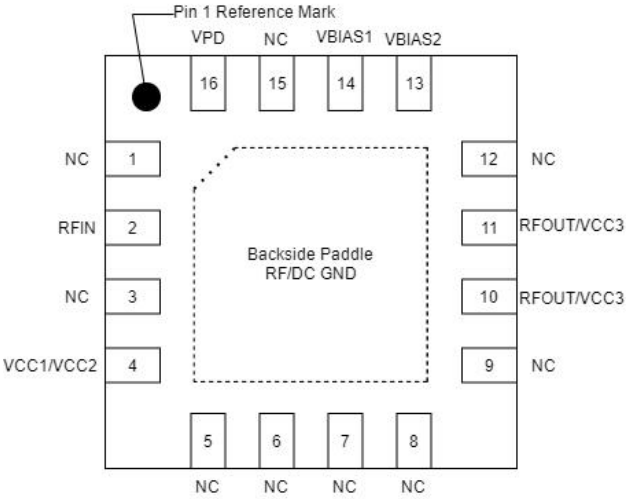
power of 28.5dBm P3dB. The amplifier can provide good DPD linearity performance with wideband signals of up to 200 MHz wide 5G NR signals, making it perfectly suited for m-MIMO applications.

The AASP702AQ is externally match to 50Ω over the entire operating frequency band of 2.0 – 4.2 GHz and incorporates a shut-down function through the VPD pin. AASP702AQ also has external bias control capability for linearity optimization.

The AASP702AQ is housed in a 16-pin 3X3mm QFN package.

Functional Block Diagram



Ordering Information

- AASP702AQ

Recommended Operating Conditions

Parameter	Units	Min	Typ	Max
Supply Voltage (VCC1/VCC2、RFOUT/VCC3)	V	+4.75	+5	+5.25
Operational Frequency Range	GHz	2.0		4.2
Enable Voltage (VPD)	V	1.2		3.6
Disable Voltage (VPD)	V	0		0.6
Operating Temperature	℃	-40		+105

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Absolute Maximum Ratings

Parameter	Units	Min	Typ	Max
Device Voltage (VCC1/VCC2、RFOUT/VCC3)	V	0		5.5
RF Input Power (Pin), CW, 50ohms, T=25℃	dBm			25
RF Input Power (Pin), CW, Off State, T=25℃	dBm			25
Storage Temperature	℃	-65		+150
ESD Rating	HBM	V	700	
	CDM	V	1000	

Electrical Specifications

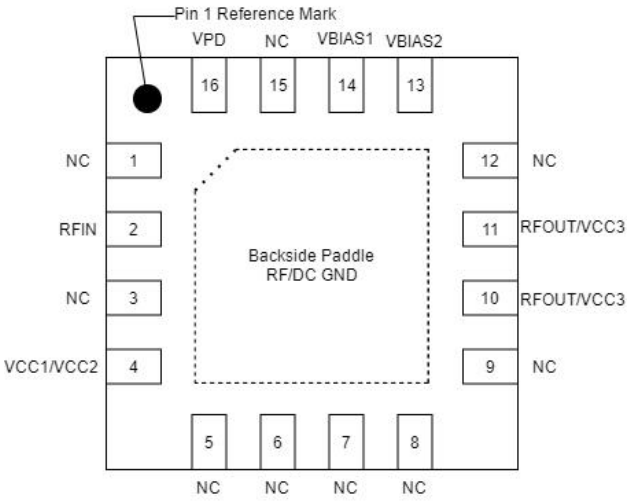
Test Conditions: VCC1/VCC2 and RFOUT/VCC3 = +5.0V, VPD = +1.8V, Temp=+25 °C

Parameter	Conditions	Units	Min	Typ	Max
Operational Frequency Range		MHz	2000		4200
Gain	At 2.6 GHz	dB		36.5	
	At 3.5 GHz	dB		38.5	
Gain Flatness	Any 100 MHz BW within band	dB			0.8

Input Return Loss	At 2.6 GHz	dB	11	
	At 3.5 GHz	dB	15	
Output Return Loss	At 2.6 GHz	dB	20	
	At 3.5 GHz	dB	15	
Reverse Isolation	ON state	dB	50	
Forward Isolation	OFF state	dB	45	
Output P1dB	At 2.6 GHz	dBm	27.5	
	At 3.5 GHz	dBm	27	
Output P3dB	At 2.6 GHz	dBm	28.5	
	At 3.5 GHz	dBm	28	
ACPR	At 2.6 GHz, Pout=+15 dBm, 2C NR 100MHz, 8dB PAR	dBc	-40	
	At 3.5 GHz, Pout=+15 dBm, 2C NR 100MHz, 8dB PAR	dBc	-37	
Noise Figure	At 2.6 GHz	dB	6	
	At 3.5 GHz	dB	5.5	
Quiescent Current, ICQ	VPD = HIGH	mA	110	
Device Current, OFF	VPD = 0 V	mA	5	
VPD, Logic Low		V	0	0.6

VPD, Logic High		V	1.2	3.6
Device ON or OFF Timing	50% Ctrl to 10/90% RF	ns	500	
Thermal Resistance, θjc	Junction to case	°C/W	60	

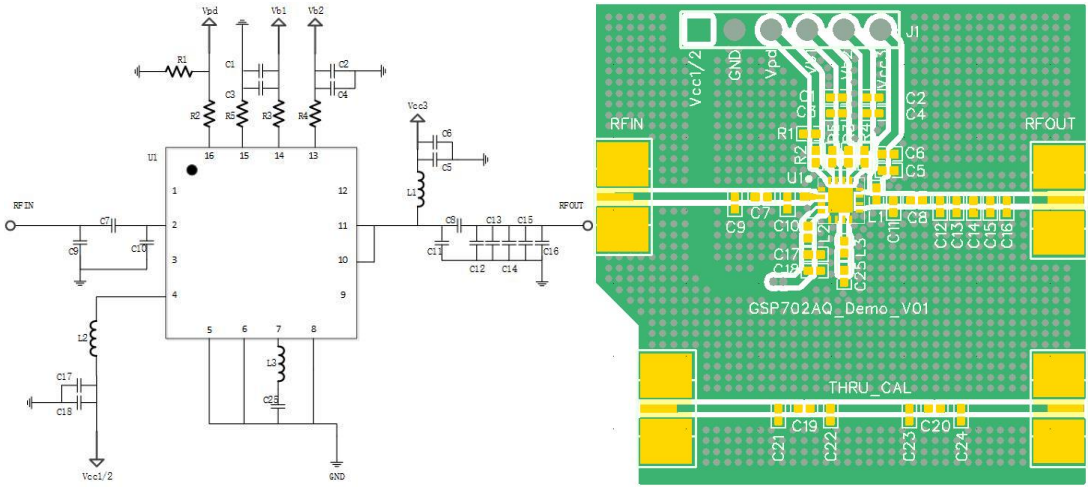
Pin Assignments and Description



Pin	Name	Description
1, 3, 5, 6, 7, 8, 9, 12, 15	NC	No electrical connection internally.
2	RFIN	RF input. External DC block is required.
4	VCC1/VCC2	First and second stage DC supply.
10, 11	RFOUT/VCC3	RF output and third stage DC supply. External choke and DC block capacitor required.
13	VBIAS2	Sets the quiescent current of the AMP.

14	VBIAS1	Sets the quiescent current of the AMP.
16	VPD	PA on/off logic control.
Backside Paddle	GND	RF/DC ground connection.

PCB Evaluation Board



Evaluation Board BOM

Reference Des.	Conditions	Value	Manuf.	Part Num.
PCB	-	N/A	MacMIC	AASP702AQ_Demo_V01
U1	-	N/A	MacMIC	AASP702AQ
C10、C14	-	0.5pF	Muarta	0402
C11	-	1.5pF	Muarta	0402
C3、C4、C5、C17	-	100pF	Muarta	0402
C1、C2、C6、C18	-	4.7uF	Muarta	0402

C7、C8	-	1nF	Muarta	0402
R2、L2	-	0Ω	Muarta	0402
R3	-	1.3kΩ	Muarta	0402
R4	-	1.2kΩ	Muarta	0402
L1	-	2.2nH	LQG	0402
RFIN、RFOUT	-	-	Huada	SMA-KHD9A2

Typical Performance

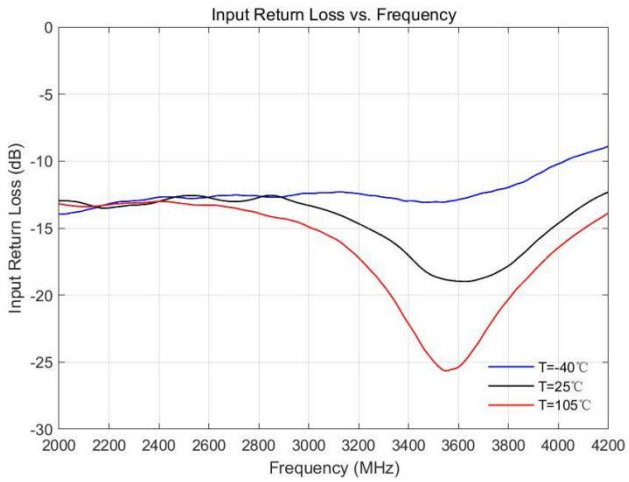
Test Conditions: VCC1/VCC2 and RFOUT/VCC3 = +5.0V, VPD = +1.8V, Temp=+25 °C

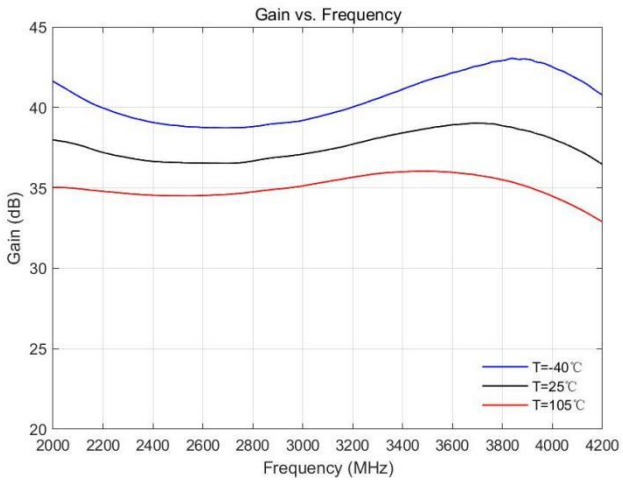
Parameter	Conditions	Units	Typical	
Frequency		MHz	2600	3500
Gain		dB	36.5	38.5
Input Return Loss		dB	11	15
Output Return Loss		dB	20	15
Reverse Isolation		dB	56	52
Output P1dB		dBm	27.5	27
Output P3dB		dBm	28.5	28
ACPR	Pout=+15 dBm, 2C NR 100MHz, 8.5dB PAR	dB	-40	-37

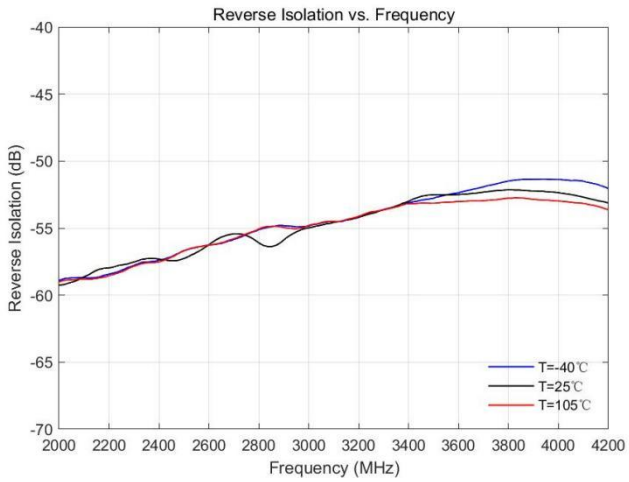
Noise Figure	dB	6	5.5

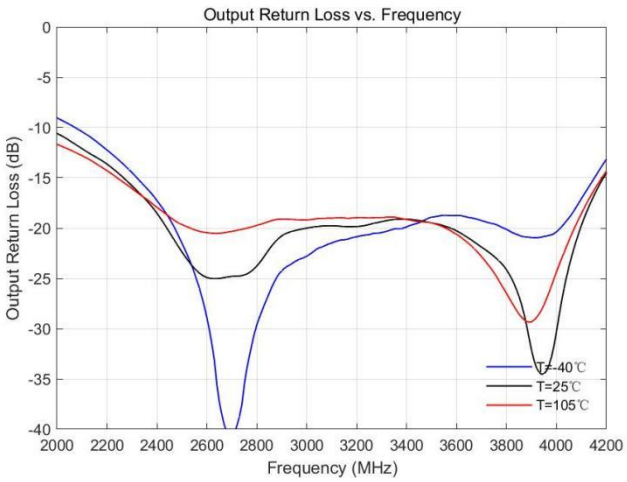
Performance Plots

Test Conditions: VCC1/VCC2 and RFOUT/VCC3 = +5.0V, VPD = +1.8V, Temp=+25 °C









Performance Plots（Cont.）

Test Conditions: VCC1/VCC2 and RFOUT/VCC3 = +5.0V, VPD = +1.8V, Temp=+25 °C

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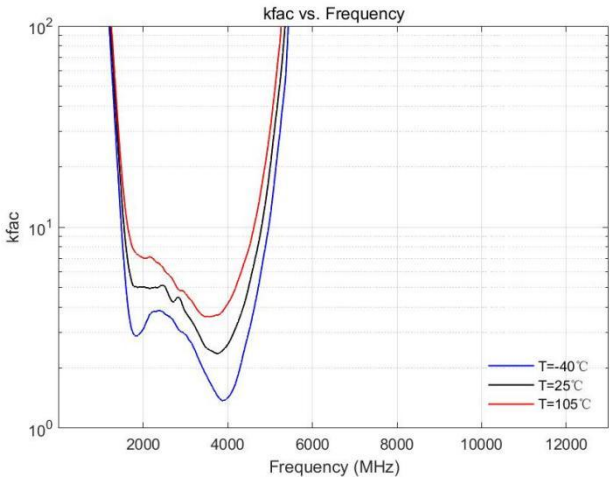

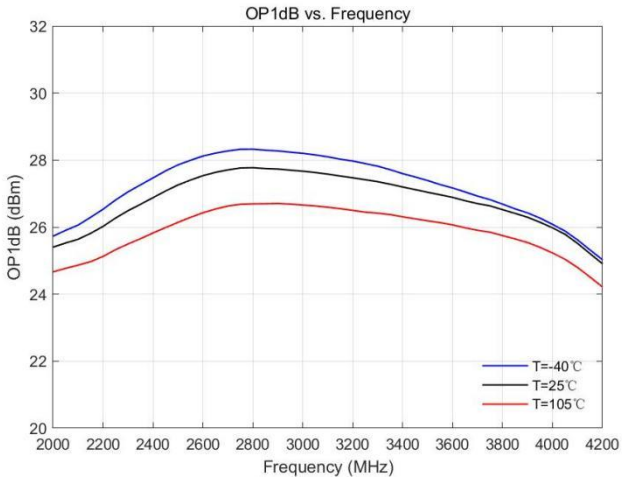

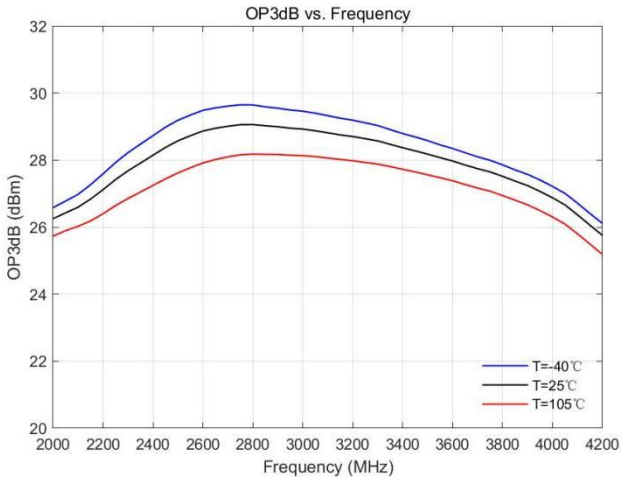

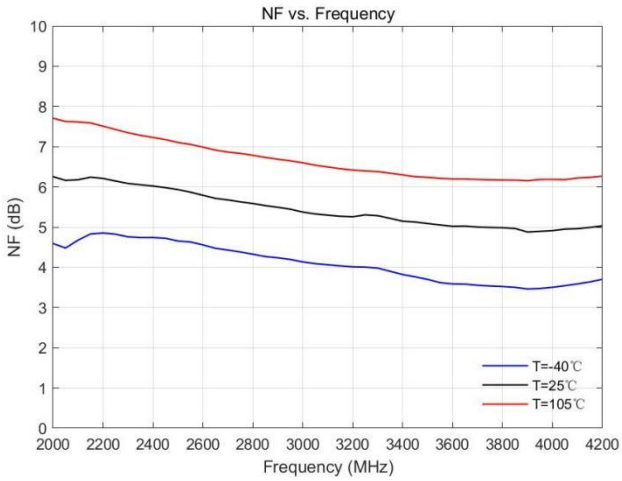

Package Marking and Dimensions

Marking: Part number – 702A

Lot code – XXXX

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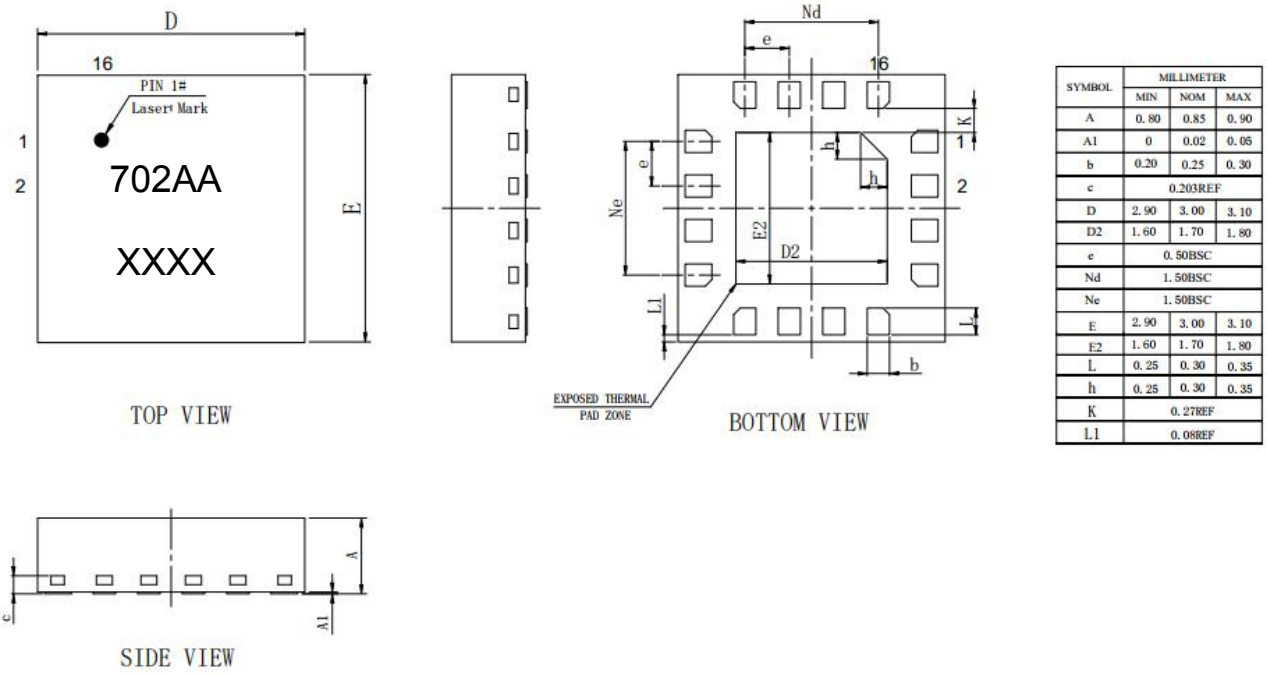

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.80	0.85	0.90
A1	0	0.02	0.05
b	0.20	0.25	0.30
c	0.203REF		
D	2.90	3.00	3.10
D2	1.60	1.70	1.80
e	0.50BSC		
Nd	1.50BSC		
Ne	1.50BSC		
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
L	0.25	0.30	0.35
h	0.25	0.30	0.35
K	0.27REF		
L1	0.08REF		

Notes: 1. All dimensions are in millimeters.

2. Coplanarity applies to the exposed heat sink slug as well as the terminals.

3. QFN 16 pin 3x3x0.85mm Package.

Handling Precaution

ESD countermeasure methods should be developed and used to control potential ESD damage during handling in a factory environment at each manufacturing site.

Solderability

Compatible with lead-free (260 ℃ maximum reflow temperature) soldering processes.

RoHS Compliance

This product is compliant with the EU RoHs2.0, EU Directive 2015/863.

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Revision History

Document ID	Release date	Data sheet status	Change notice
V1.0	20210825	Preliminary	● Initial version.