

# GSP01502AQ

12-15.7 GHz Power Amplifier



## Features

- 27 dB Small Signal Gain
- -44 dB Third Order Intercept Point (IMD3) @ Pout=+20 dBm SCL
- 32.5 dBm Output P1dB
- >33.5 dBm Saturated Output Power
- Integrated Power Detector
- Bias 1200 mA @ 6 V
- Lead-Free 5 mm 24-lead QFN Package
- RoHS\* Compliant

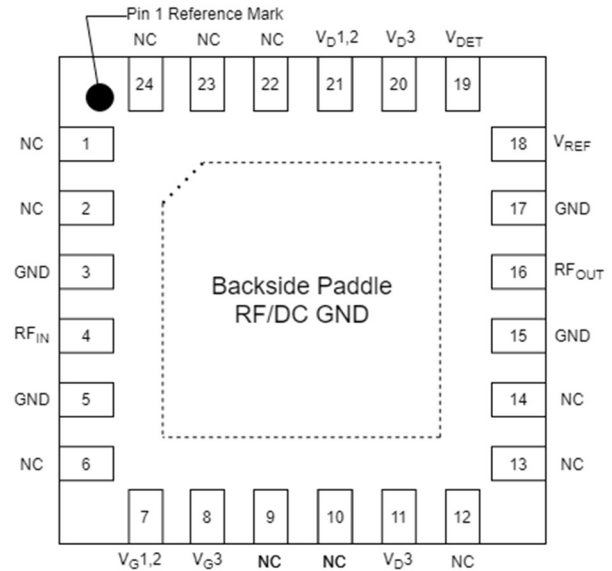
## Applications

- point-to-point radios for cellular backhaul applications
- radar
- General Purpose Wireless

## Description

A packaged linear power amplifier that operates from 12-15.7 GHz. The device provides 27 dB gain and -44 dB IMD3 @ Pout=+20 dBm SCL with 32.5 dBm typical output P1dB and 33.5 dBm saturated output power. The packaged amplifier comes in an industry standard, 5 mm QFN package and is comprised of a three-stage power amplifier with an integrated, temperature compensated on-chip power detector. The device includes on-chip DC bias ESD protection and DC by-pass capacitors.

## Functional Block Diagram



## Ordering Information

- GSP01502AQ



## Recommended Operating Conditions

Parameter	Units	Min	Typ	Max
DC Supply Voltage ( $V_D$ )	V	5.5	6	6.5
Operational Frequency Range	GHz	12		15.7
Operating Temperature	°C	-40		85

## Absolute Maximum Ratings

Parameter	Units	Min	Typ	Max
DC Supply Voltage ( $V_D$ )	V	0		+7
Gate Voltage ( $V_G$ )	V	-2		0
Detector Voltage ( $V_{DET}$ )			6	+7
Detector Reference Voltage ( $V_{REF}$ )			6	+7
RF Input Power ( $P_{in}$ ), CW, 50ohms, $T_A=25^{\circ}C$	dBm			20
Operating Temperature	°C	-40		+85
Storage Temperature	°C	-65		+150
ESD Rating	HBM	V	250	
	CDM	V	250	



## Electrical Specifications (VD=6V)

Electrical Specifications: VD=6V, IDQ=1200mA, TA=+25°C, (de-embedded data);

Parameter	Conditions	Units	Min	Typ	Max
Small Signal Gain	12.7 - 15.4 GHz	dB		27	
Input Return Loss	12.7 - 15.4 GHz	dB		-10	
Output Return Loss	12.7 - 15.4 GHz	dB		-15	
P1dB	12.7 - 15.4 GHz	dBm		32.5	
PSAT	12.7 - 15.4 GHz	dBm		33.5	
Output IMD3, +20 dBm SCL	12.7 - 15.4 GHz	dB		-44	
Noise Figure	12.7 - 15.4 GHz	dB		4.5	

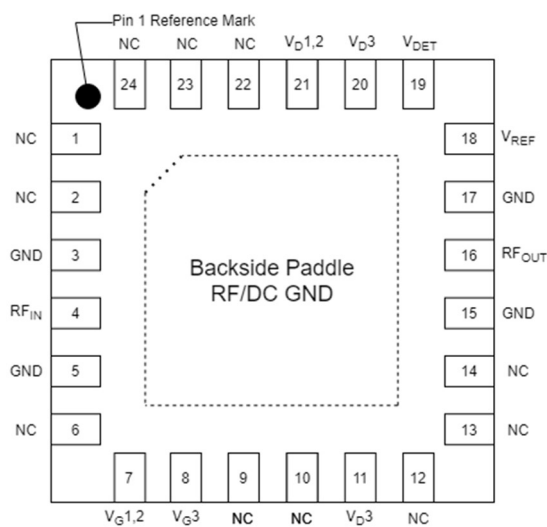
Adjust VG between -0.9 and -0.6 V to achieve specified IDQ.

## Typical Performance - VD=6V

Electrical Specifications: VD=6V, IDQ=1200mA, TA=+25°C, (de-embedded data);

Parameter	Conditions	Units	Typical					
Freq		GHz	12.7	13.3	13.9	14.5	15.1	15.4
Small Signal Gain		dB	24.3	26.0	28.3	28.0	25.7	25.0
Input Return Loss		dB	-13.9	-16.2	-15.5	-13.5	-26.7	-24.3
Output Return Loss		dB	-22.6	-16.8	-16.3	-21.3	-23.1	-29.8
P1dB		dBm	32.4	32.2	32.1	32.8	33.5	33.2
PSAT		dBm	33.8	33.6	33.5	34.1	34.0	33.6
Output IMD3	+20 dBm SCL	dB	-47.8	-46.9	-44.1	-44.4	-44.7	-46.3
Noise Figure		dB	4.8	4.8	4.5	4.2	4.3	4.4

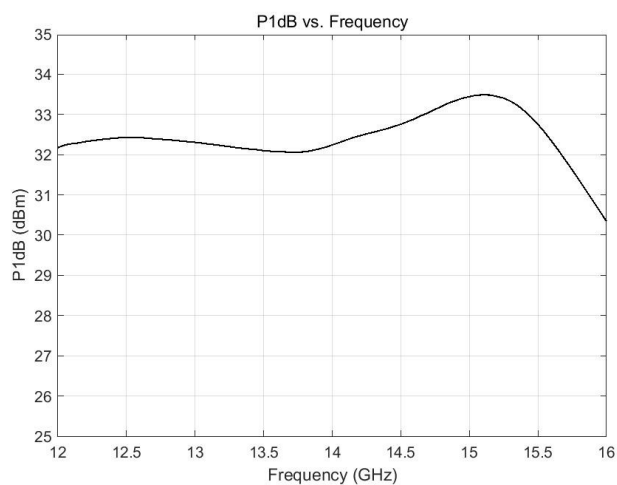
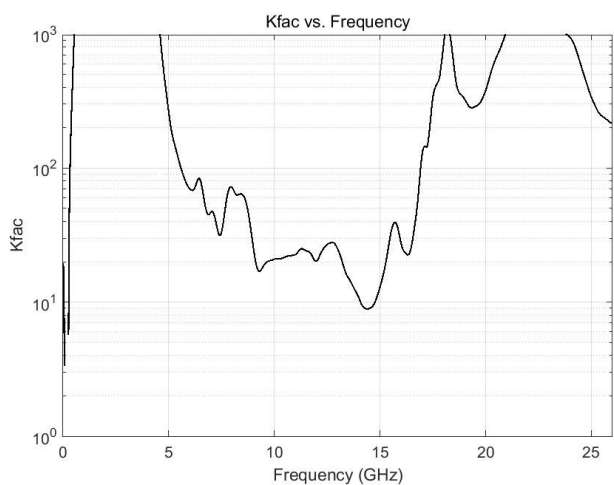
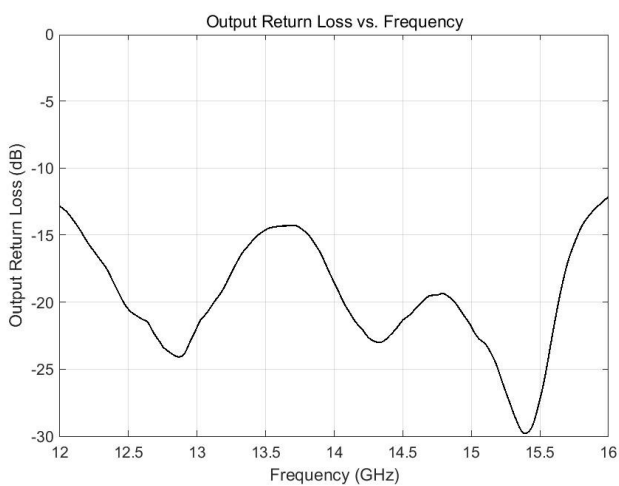
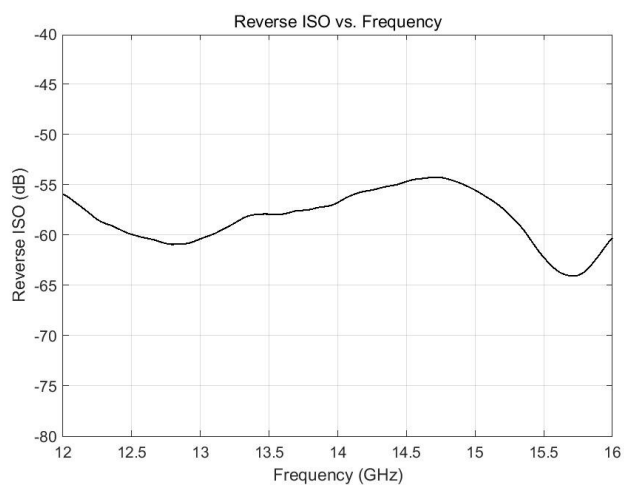
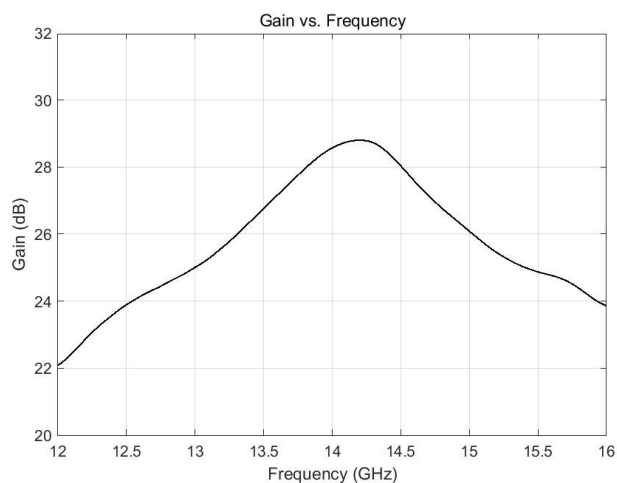
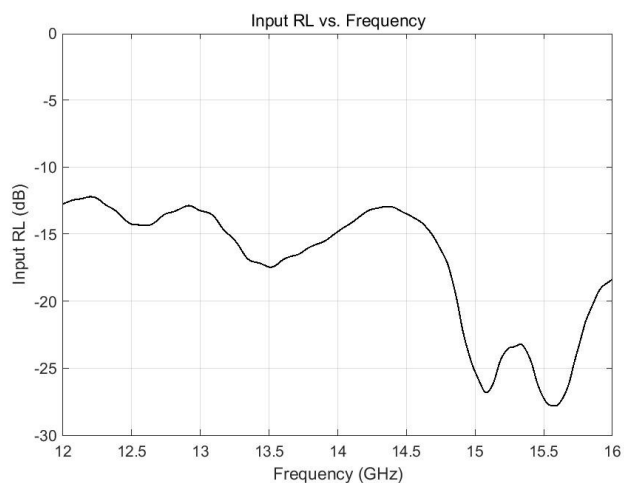
## Pin Assignments and Description

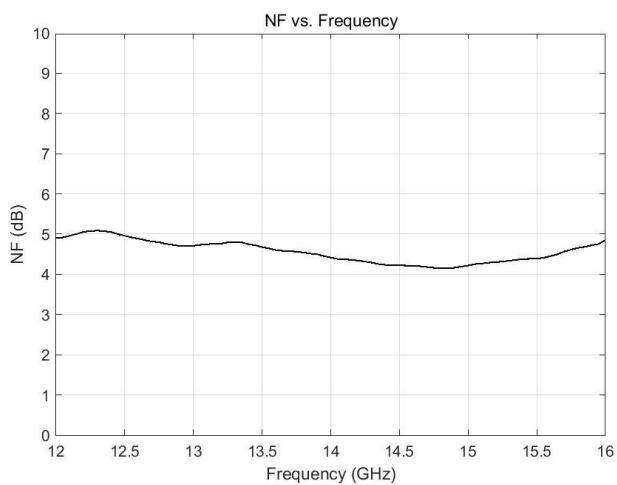
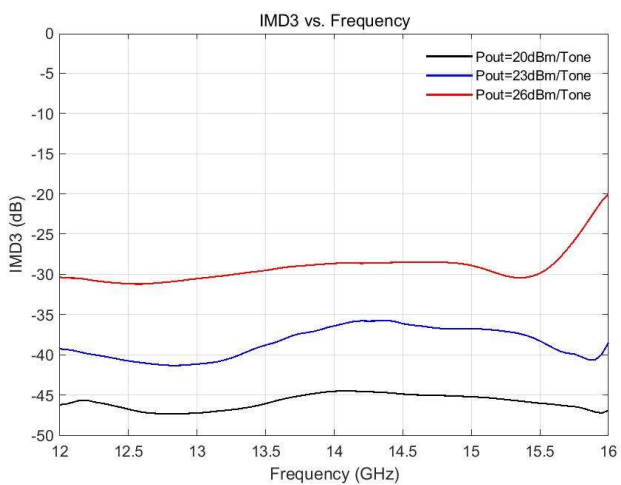
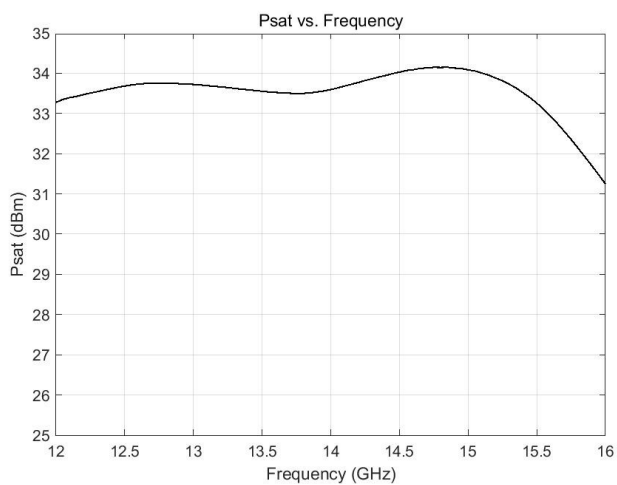


Pin	Name	Description
1,2,6,9,10,12,13, 14,22,23,24	NC	No Connection
3,5,15,17	GND	Ground
4	RF <sub>IN</sub>	RF Input
7	V <sub>G1,2</sub>	Gates 1,2 Bias
8	V <sub>G3</sub>	Gate 3 Bias
11	V <sub>D3</sub>	Drain 3 Bias
16	RF <sub>OUT</sub>	RF Output
18	V <sub>REF</sub>	Pwr Det Ref
19	V <sub>DET</sub>	Pwr Det
20	V <sub>D3</sub>	Drain 3 Bias
21	V <sub>D1,2</sub>	Drains 1,2 Bias

## Performance Plots - VD=6V

Electrical Specifications: VD=6V, IDQ=1200mA, TA=+25°C, (de-embedded data);







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## 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 °C maximum reflow temperature) soldering processes.

## RoHS Compliance

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

## Contact Information

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## Revision history

Document ID	Release date	Data sheet status	Change notice
V1.0	20210622	Preliminary	● Initial version.
V1.1	20211020	Preliminary	● Update typical performance and plots.