TDLNA3024SP

2 – 22 GHz Low Noise Amplifier with Adjustable Gain Control

Product Overview

Teledyne e2v HiRel's TDLNA3024SP is a distributed Low Noise Amplifier with Adjustable Gain Control (AGC) which operates between 2 GHz and 22 GHz.

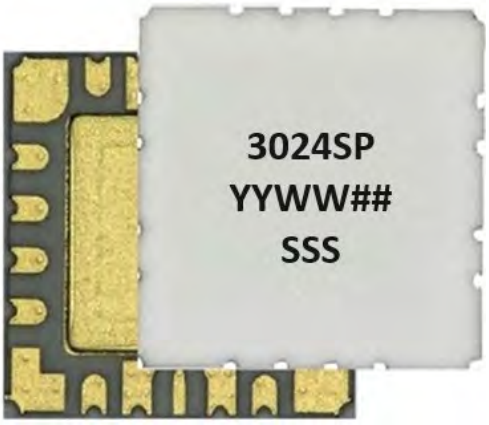
It is designed for a wide range of applications, such as Space, electronic warfare, X and Ku point to point radio, and test instrumentation.

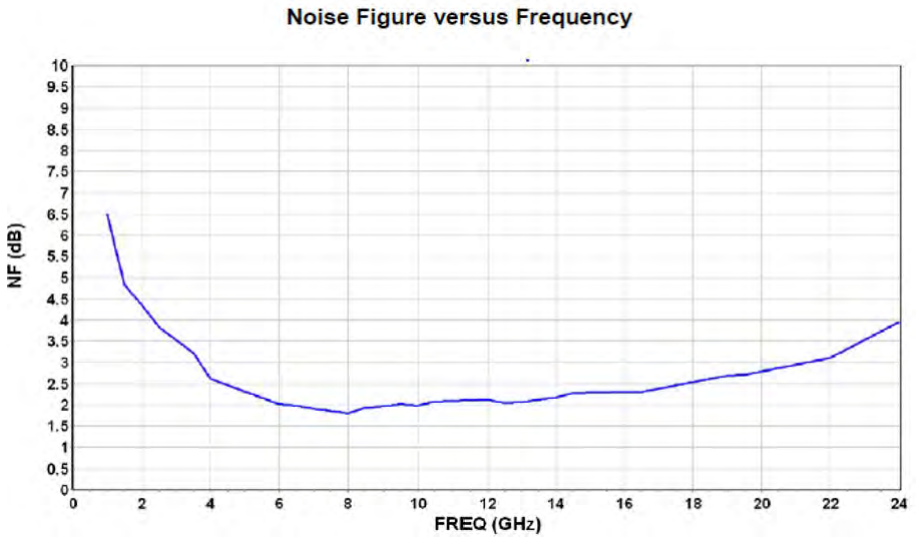
The circuit is manufactured with a pHEMT process, 0.15 µm gate length, via holes through the substrate, air bridges and electron beam gate lithography.

Packaged in a 7 mm x 7 mm 16-Lead hermetic leadless ceramic package.

Features

- Frequency Range: 2 – 22 GHz
- Noise Figure: 3 dB (typical)
- Linear Gain: 15 dB (typical)
- Up to 30 dB adjustable gain with V_{G2}
- DC Bias: VD = 3.5 V@ IDQ = 100 mA, V_{G1} = −0.3 V and V_{G2} = 1.7 V
- Hermetic ceramic leadless packaging
- Package Dimensions: 7.0 x 7.0 mm
- Radiation Performance: 100kRad (Si)





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Absolute Maximum Ratings (1)

Tamb.= +25°C

Symbol	Parameter	Values	Unit
Vd	Drain bias voltage	7V	V
loo	Drain bias current	190	mA
V_{G1}	Gate bias voltage	-2 to 0	V
V_{G2}	Gate bias voltage (AGC)	-2 to 2	V
P1N	Maximum CW input power overdrive	15	dBm

(1 Operation of this device above anyone of these parameters may cause permanent damage.

Main Electrical Characteristics

Tamb.= +25° C Vo= +SV V_{G2}= 1.7V V_{G}1set to have I_{DQ}= 100mA

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Frequency range	2		22	GHz
Gain	Linear Gain		15		dB
NF	Noise Figure		3		dB
Pout	Output Power@1dB comp.		18		dBm

Electrical Specifications

Tamb.= +25° C Vo=+5V V_{G2}=1.7V V_{G1} set to have I_{DQ}=100mA

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Frequency range	2		22	GHz
Gain	Linear Gain	14	15		dB
ΔG	Gain control		30		dB
NF	Noise Figure		3		dB
IRL	Input Return Loss		10		dB
ORL	Output Return Loss		10		dB
P1dB	Output power for 1dB Gain Compression		18		dBm
P sat	Saturated output power		22		dBm
I_{DO}	Quiescent current on Vd		100		mA
V_D	Supply voltage on Vd	4.5	5	5.5	V
I_D	Drain current @3dB gain compression		125		mA

Temperature Range)

Ta	Operating Temperature Range	-40 to 85	℃
Tstg	Storage Temperature Range	-55 to 150	℃

Typical Bias Conditions

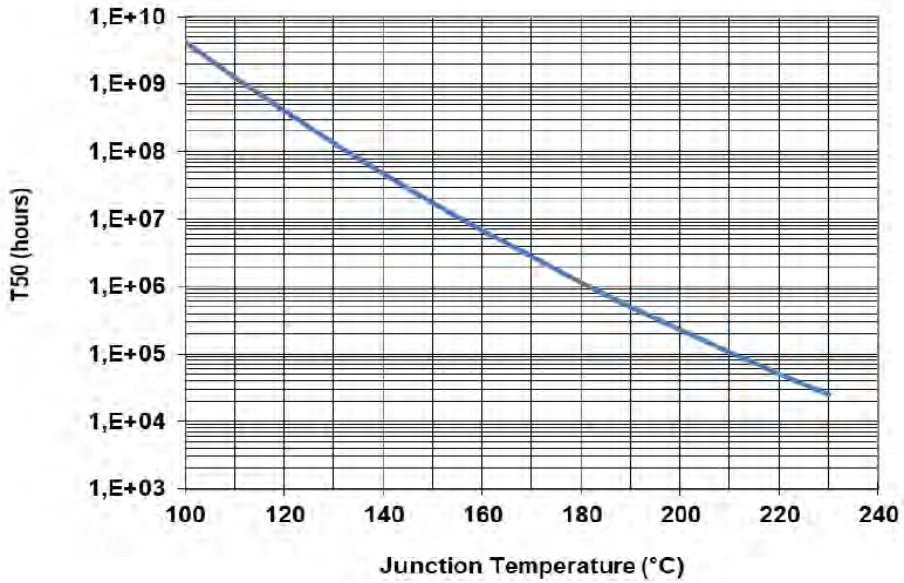
Tamb.= +25° C

Symbol	Pad #	Parameter	Values	Unit
V_{G1}	5	Maximum Gain	-0.3	V
V_{G2}	18	Mean Value to reach I_{DQ} = 100mA	1.7	V
V_D	14	Drain Bias Voltage	5	V

Device Thermal Performance

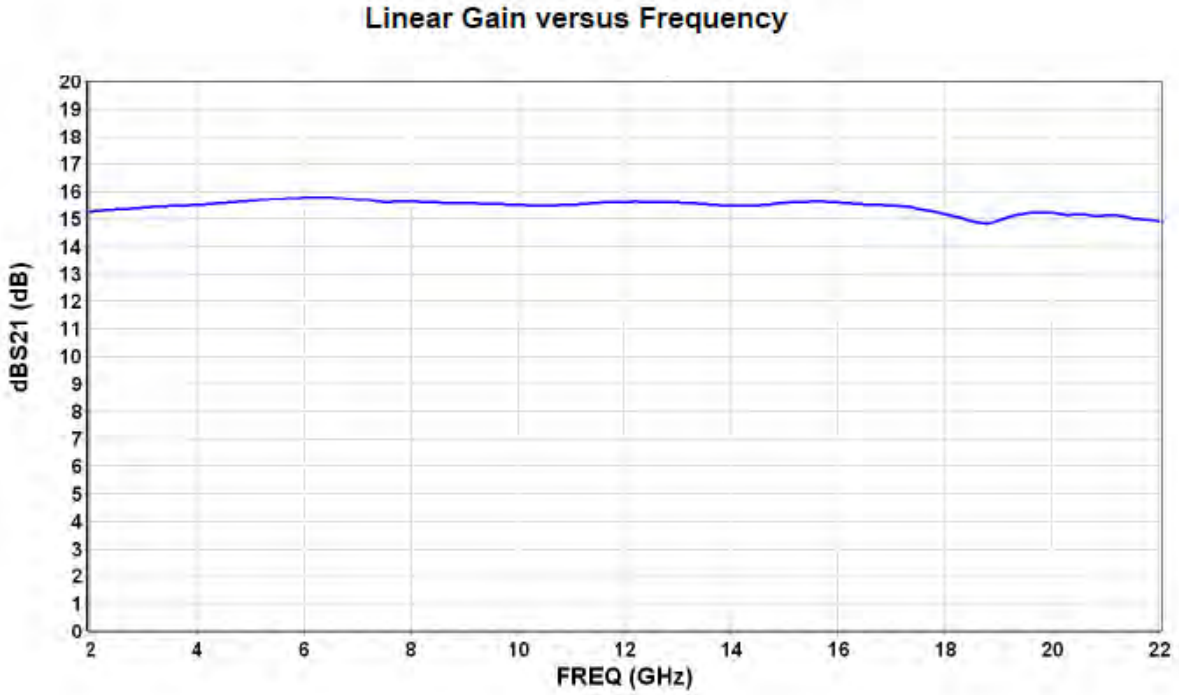
The temperature is monitored at the package back-side interface (Tease). The system maximum temperature must be adjusted in order to guarantee that Tjunction remains below the maximum value specified in the Absolute Maximum Ratings table. So, the system PCB must be designed to comply with this requirement.

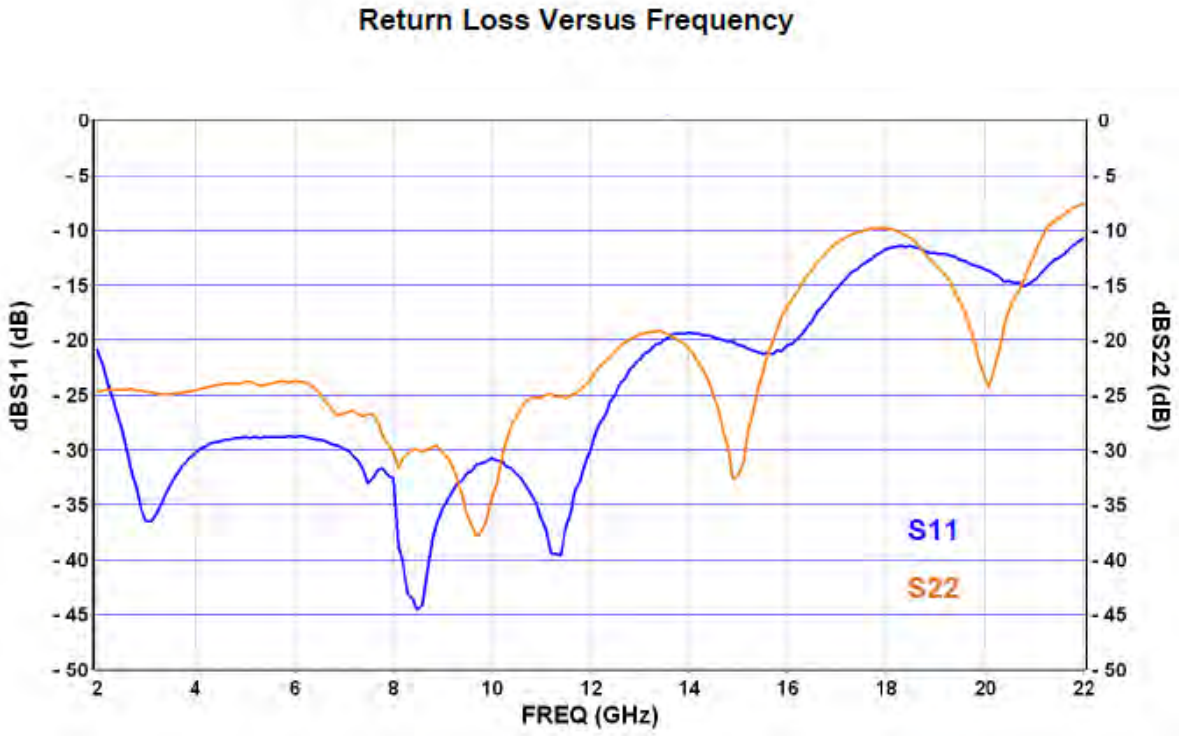
Parameter	Biasing conditions	Tjunction (℃)	RTH (℃/W	TSO (hours)
R_{TH}(1) Thermal Resistance (Junction to Case)	Vo= 5V Io=100mA Po1ss= 0.5W	145	40	3E+07



Typical Board Measurements

Tamb.= +25° C Vd=+SV V_{G2}=1.7V V_{G1} set to have I_{DQ} = 100mA
Measurements in the package access planes





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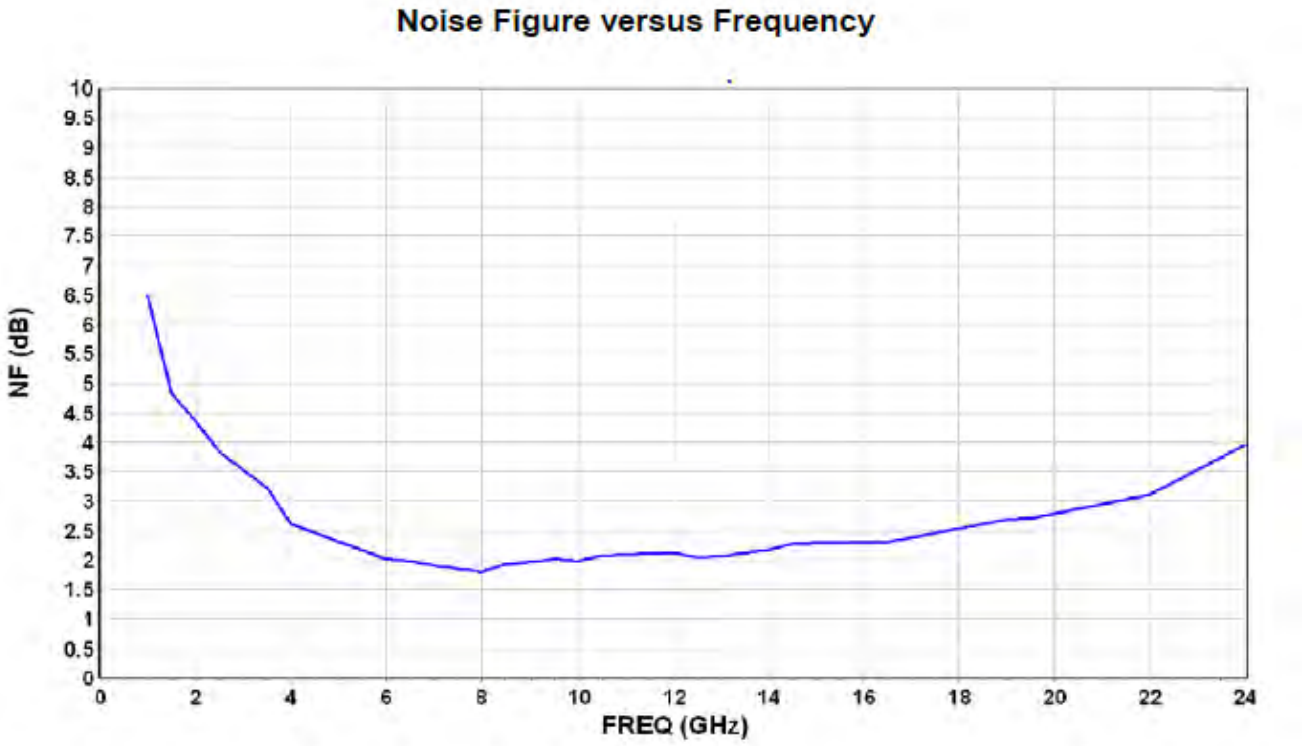

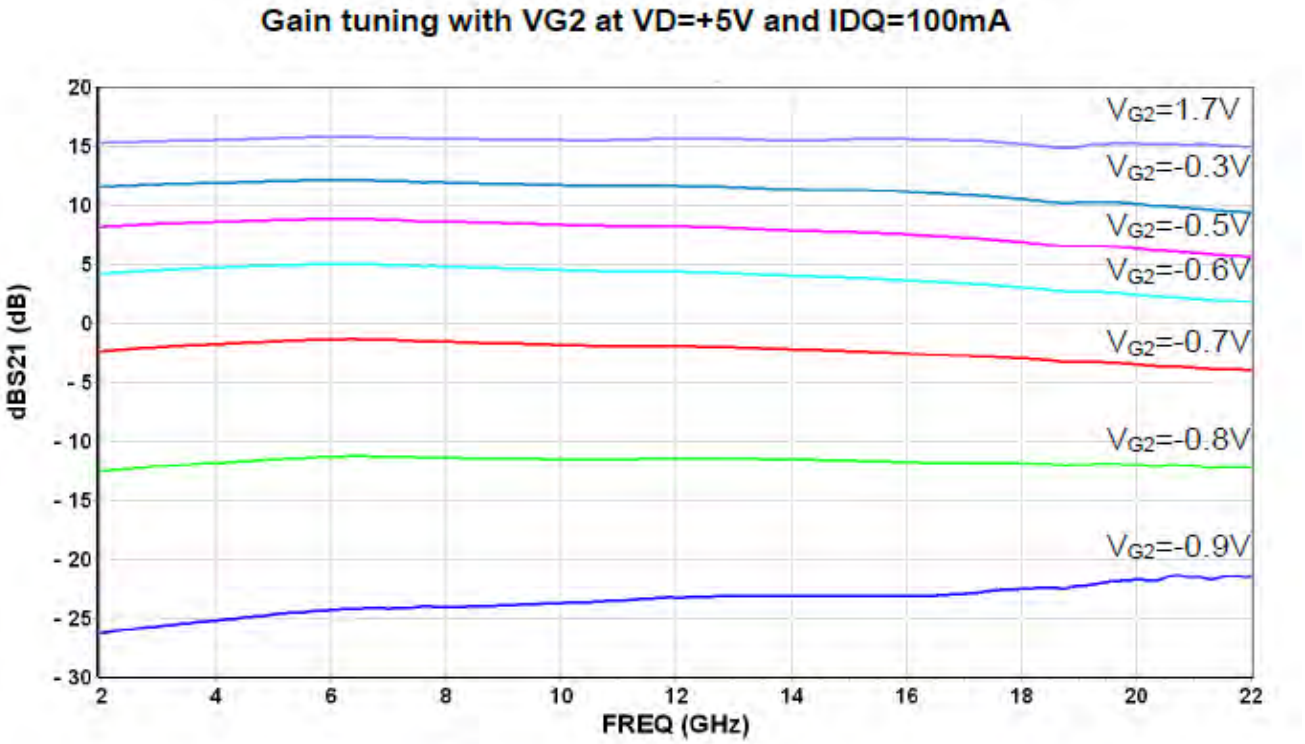

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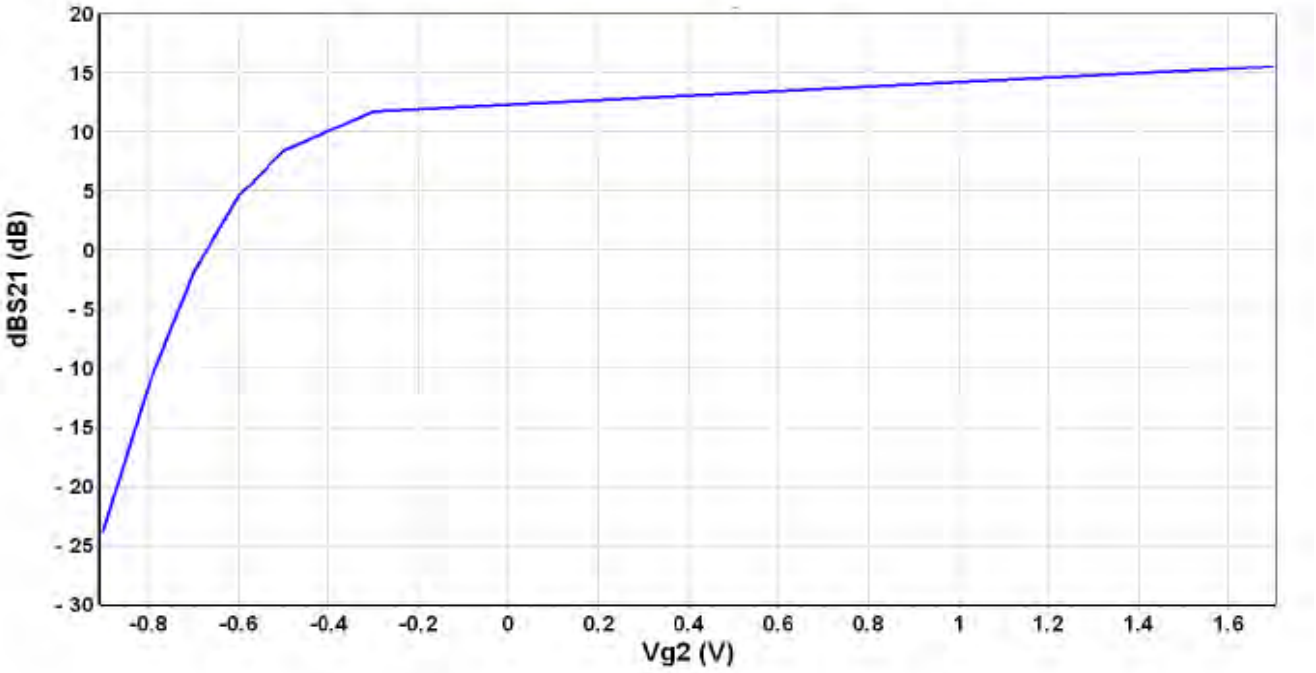
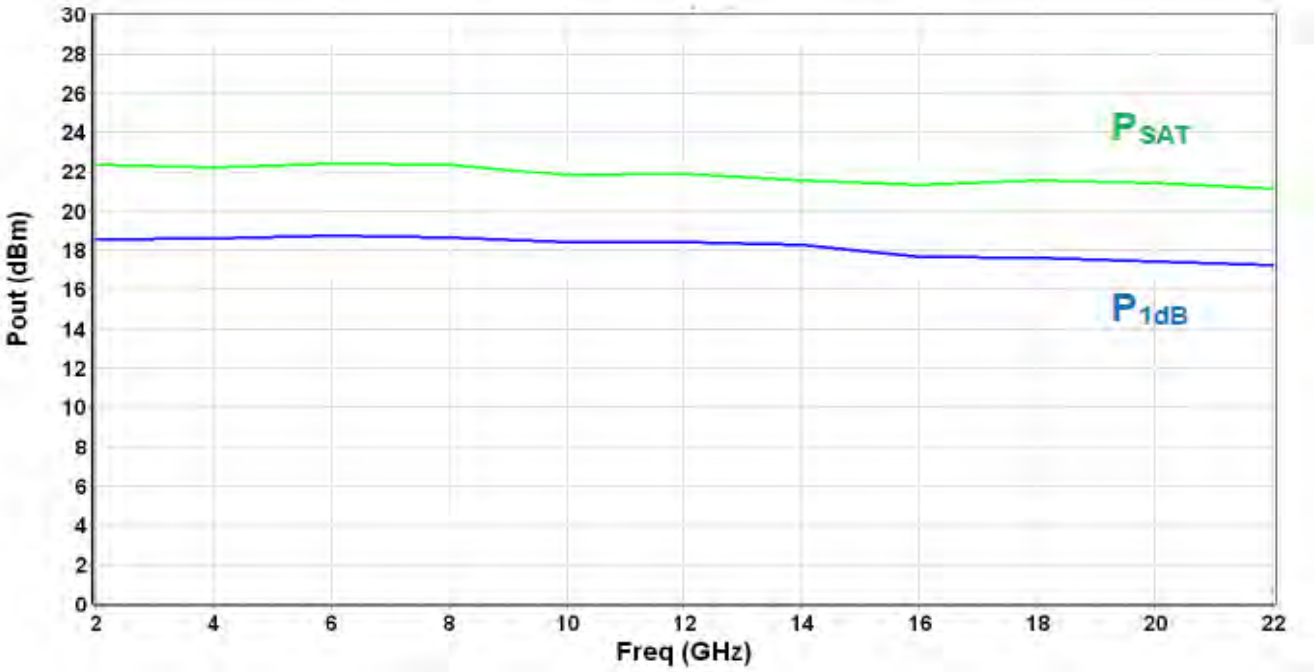
Linear gain versus V_{G2} control voltage @freq=10GHz

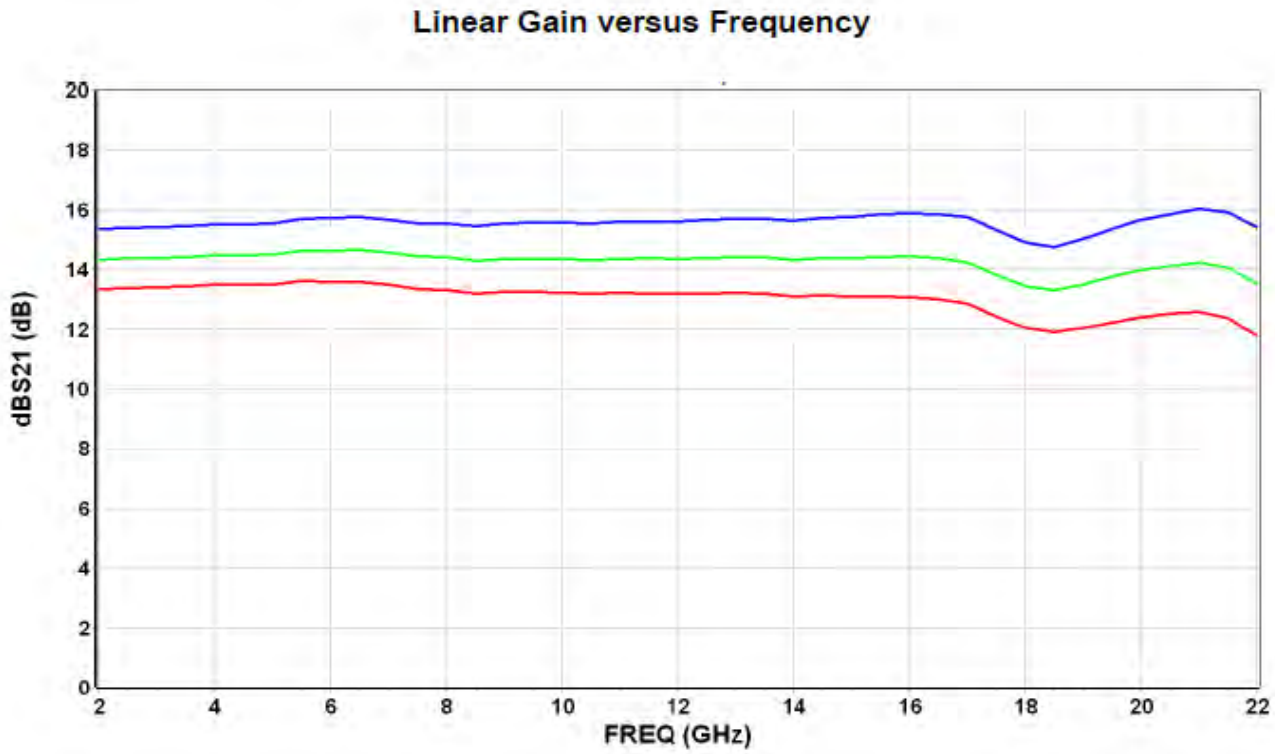


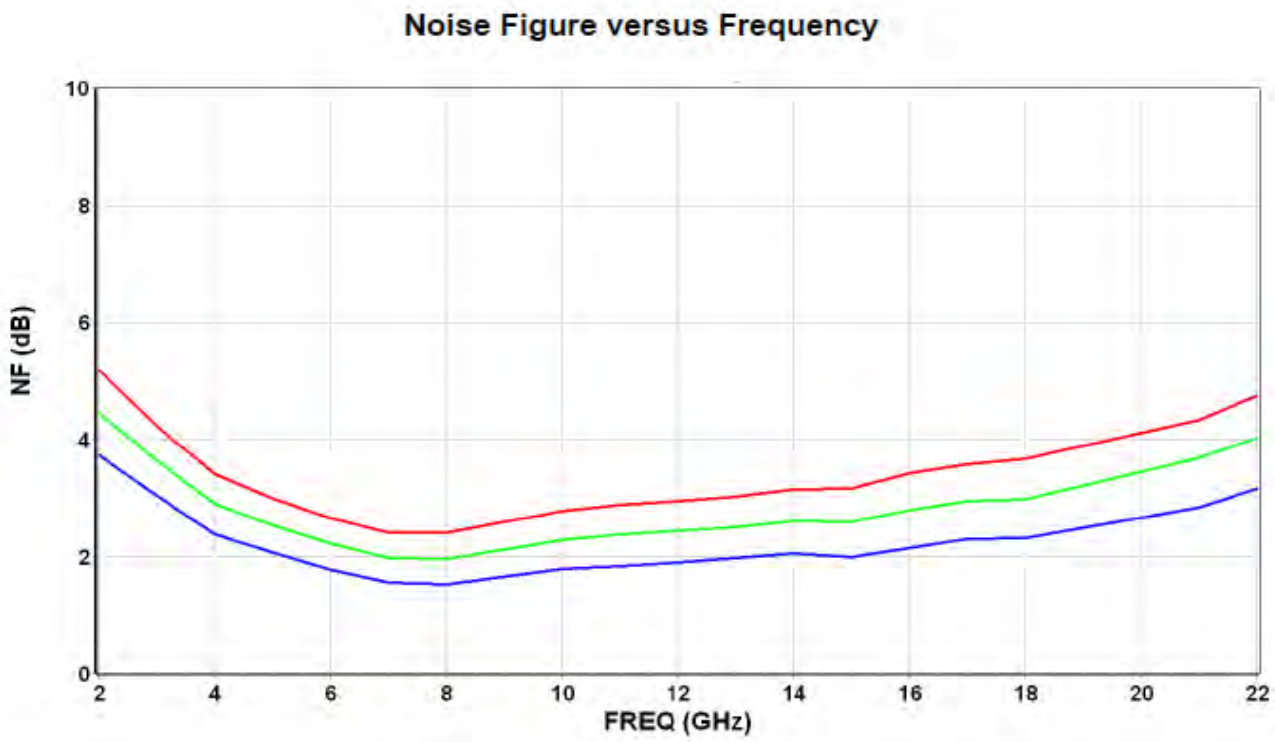
P_{out} compression level versus Frequency



Typical Board Measurements

Tamb.= **-40** / **+25°** / **+85C** Vd=+SV V_{G2}=1.7V V_{G1} set to have I_{DQ} = 100mA
Measurements in the package access planes





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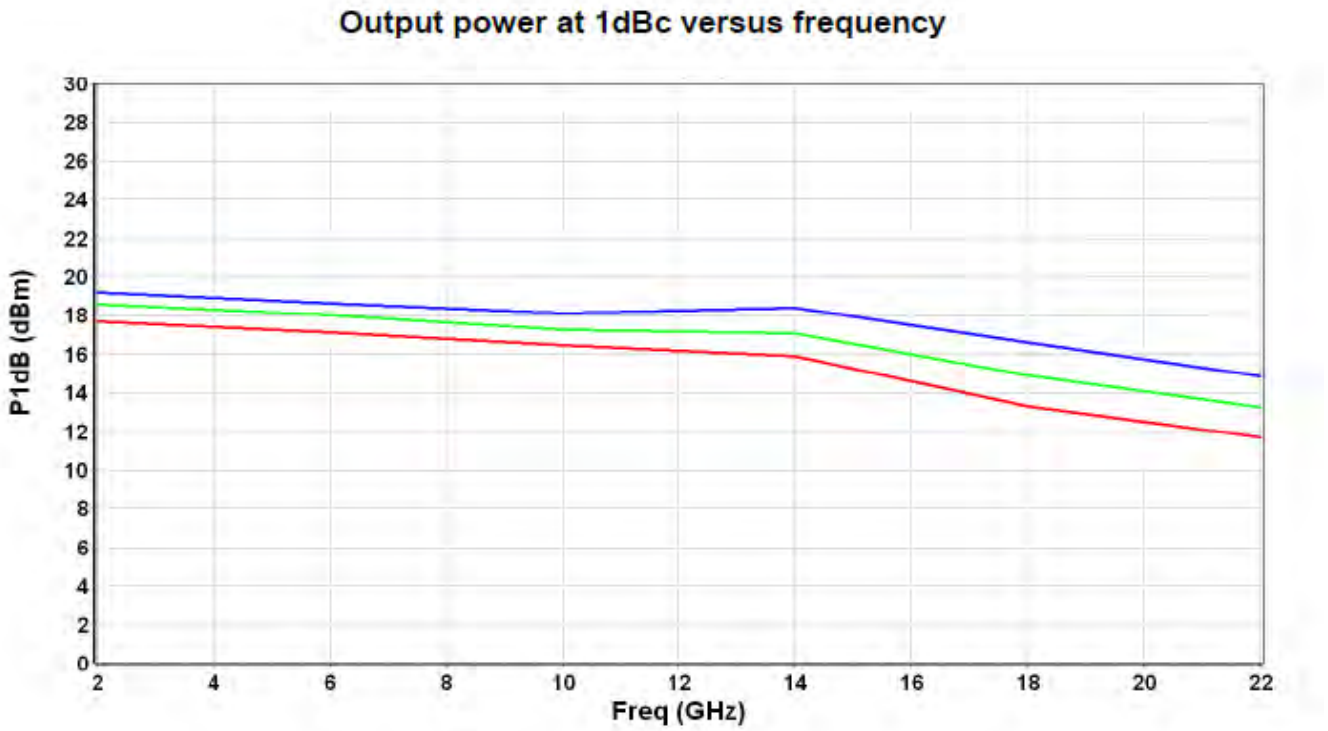
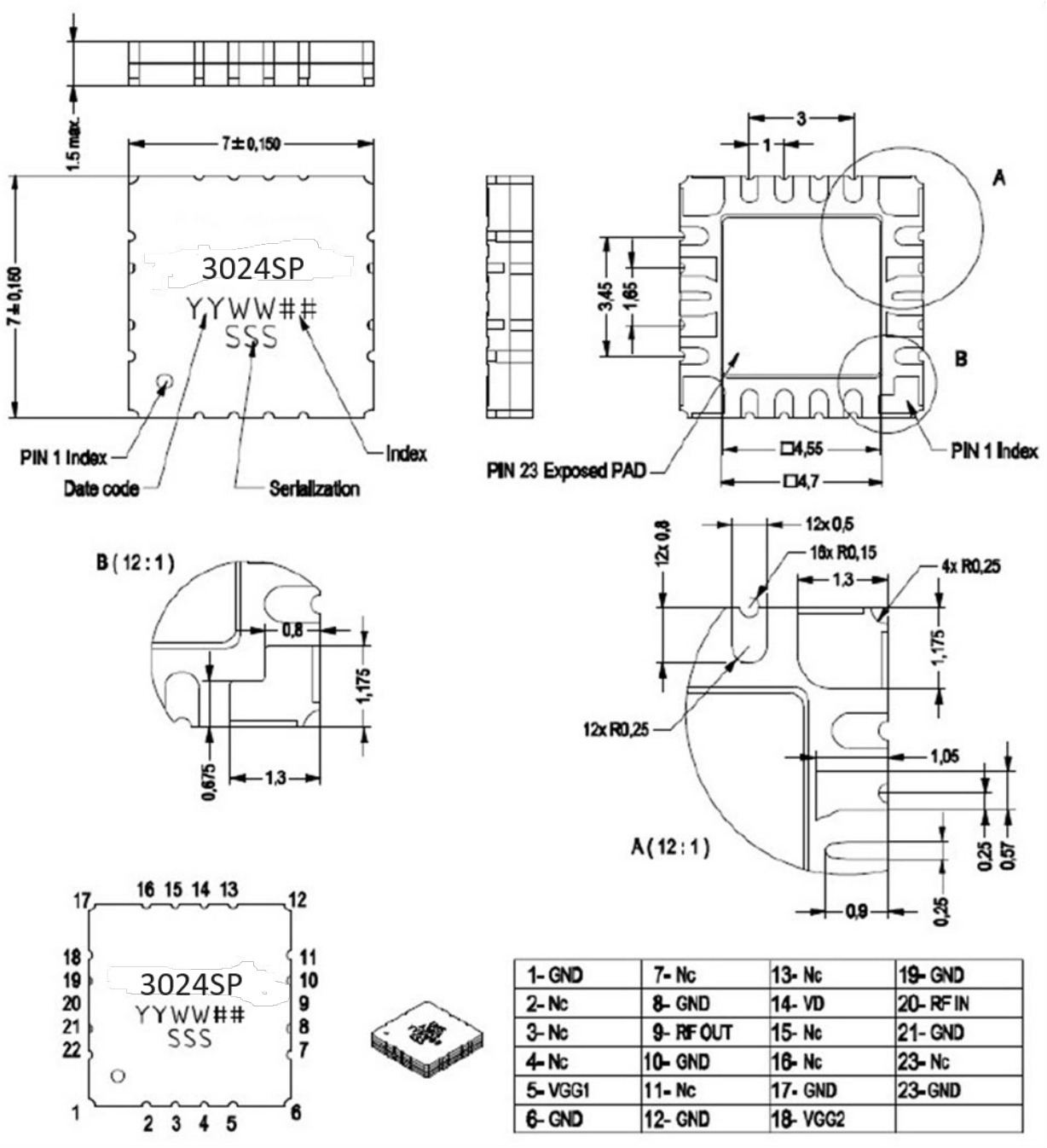


Package Outline [1]



1- GND	7- Nc	13- Nc	19- GND
2- Nc	8- GND	14- VD	20- RF IN
3- Nc	9- RF OUT	15- Nc	21- GND
4- Nc	10- GND	16- Nc	23- Nc
5- VGG1	11- Nc	17- GND	23- GND
6- GND	12- GND	18- VGG2	

All dimensions are in mm

[1] It is strongly recommended to ground all pins marked "Gnd" through the PCB board. Ensure that the PCB board is designed to provide the best possible ground to the package.

Ordering Information

Order Code	Description	Package	Shipping Method
TDLNA3024SP	2 - 22 GHz Low Noise Amplifier	7 x 7 Ceramic QFN	Tray

Revision Information

Document	Description / Date	Change/Revision Details
TDLNA3024SP-04-2024 Rev 0.2	TDLNA3024SP / Mar 2024	Initial Release

Document Categories and :

Advance Information

The product is in a formative or design stage. The data sheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

Preliminary Specification

The data sheet contains preliminary data. Additional data may be added at a later date. Teledyne e2v HiRel Electronics reserves the right to change specifications at any time without notice in order to supply the best possible product.

Product Specification

The data sheet contains final data. In the event Teledyne e2v HiRel Electronics decides to change the specifications, Teledyne e2v HiRel Electronics will notify customers of the intended changes by issuing a CNF (Customer Notification Form).

Sales Contact

For additional information, Email us at: **hirel@teledyne.com** **website: www.tdehirel.com**

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