

TDLNA3024QFN

2 – 22 GHz Low Noise Amplifier with Adjustable Gain Control

Product Overview

Teledyne e2v HiRel's TDLNA3024QFN is a distributed Low Noise Amplifier with Adjustable Gain Control (AGC) which operates between 2 and 22 GHz.

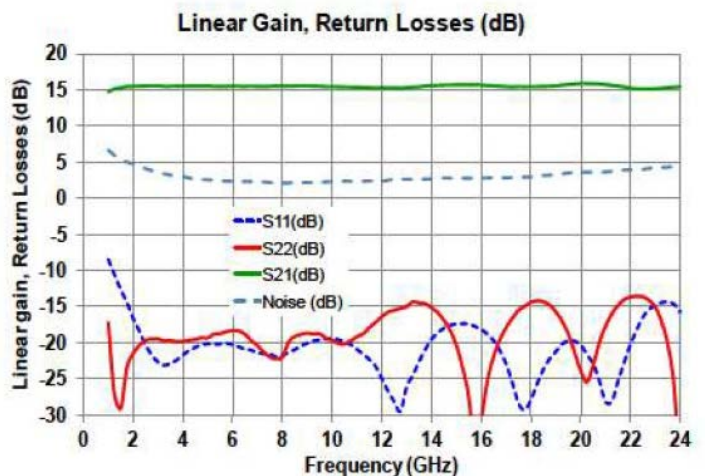
It is designed for a wide range of applications, such as electronic warfare, X and Ku Point-to-Point Radio, and test instrumentation. The circuit is manufactured with a pHEMT process, 0.15 μm gate length, via holes through the substrate, air bridges and electron beam gate lithography.

Packaged in a RoHS compliant 16-Lead SMD 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: $V_D = 5\text{ V}$ @ $I_{DQ} = 100\text{ mA}$, $V_{G1} = -0.3\text{ V}$ and $V_{G2} = 1.7\text{ V}$
- MSL Level: 3



Absolute Maximum Ratings ⁽¹⁾

T_{amb.} = +25 °C

Symbol	Parameter	Values	Unit
V _d	Drain bias voltage	7V	V
I _{dq}	Drain bias current	190	mA
V _{G1}	Gate bias voltage	-2 to 0	V
V _{G2}	Gate bias voltage (AGC)	-2 to 2	V
P _{1N}	Maximum CW input power overdrive	15	dBm

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

Main Electrical Characteristics

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

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

Electrical Specifications

T_{amb.} = +25 °C V_d = +5 V V_{G2} = 1.7 V, V_{G1} set to have I_{DQ} = 100 mA

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
P _{1dB}	Output power for 1 dB Gain Compression		18		dBm
P _{sat}	Saturated output power		22		dBm
I _{DQ}	Quiescent current on V _d		100		mA
V _D	Supply voltage on V _d	4.5	5	5.5	V
I _D	Drain current @ 3 dB gain compression		125		mA

Temperature Range

Ta	Operating Temperature Range	-40 to 95	°C
Tstg	Storage Temperature Range	-55 to 150	°C

Typical Bias Conditions

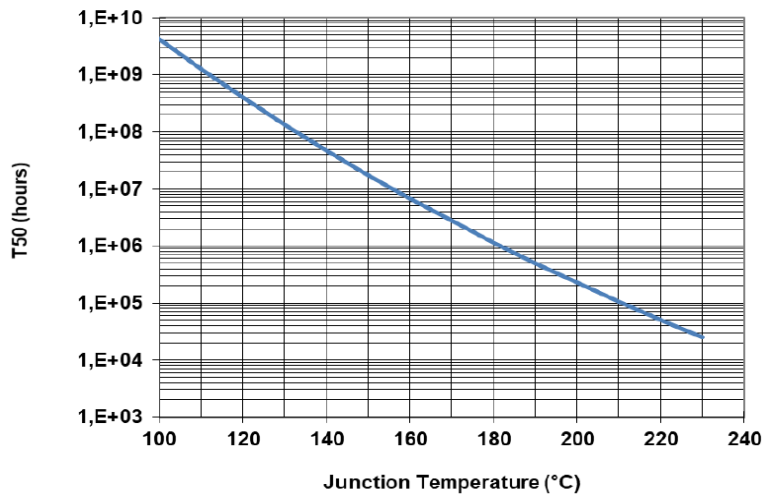
Tamb.= +25°C

Symbol	Pad #	Parameter	Values	Unit
V _{G1}	13	Maximum Gain	-0.4	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

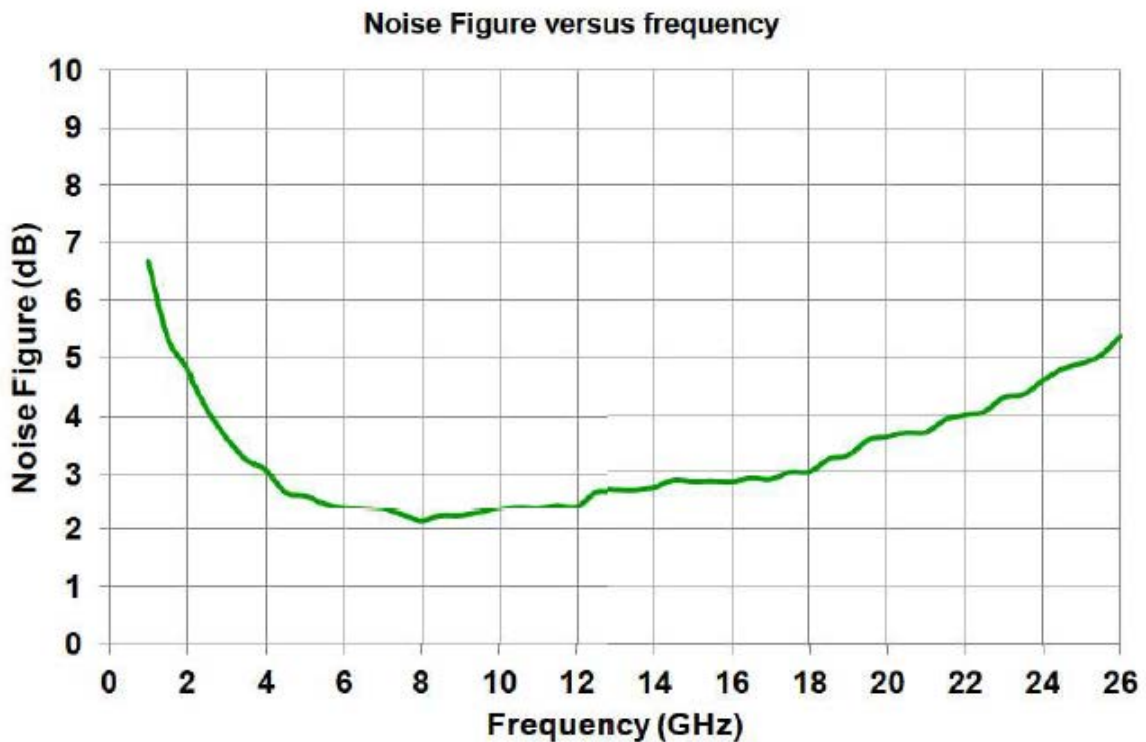
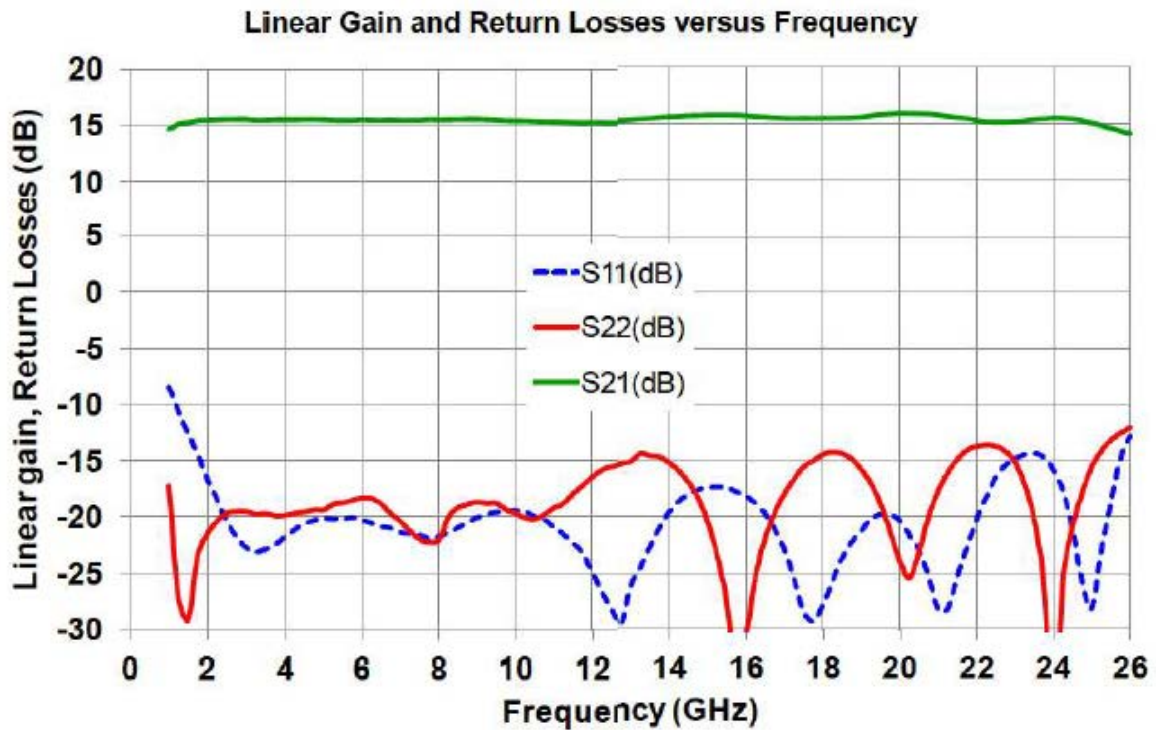
All the figures given in this section are obtained assuming that the QFN device is only cooled down by conduction through the package thermal pad (no convection mode considered). The temperature is monitored at the package back-side interface (T case). The system maximum temperature must be adjusted 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	Biassing conditions	Tjunction (C)	RTH (C/W)	TSO (hours)
R _{TH} ⁽¹⁾ Thermal Resistance (Junction to Case)	Vd= 5 V Id=100 mA P _{diss} =0.5 W	114	57.7	8.05E+08



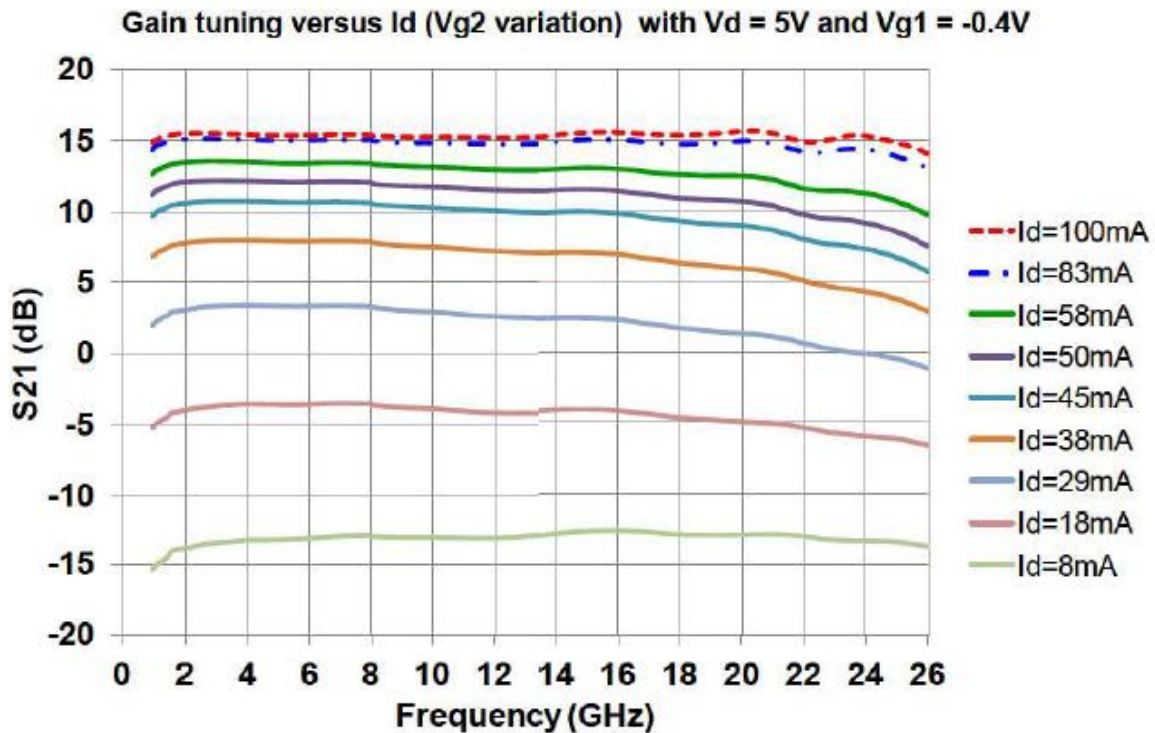
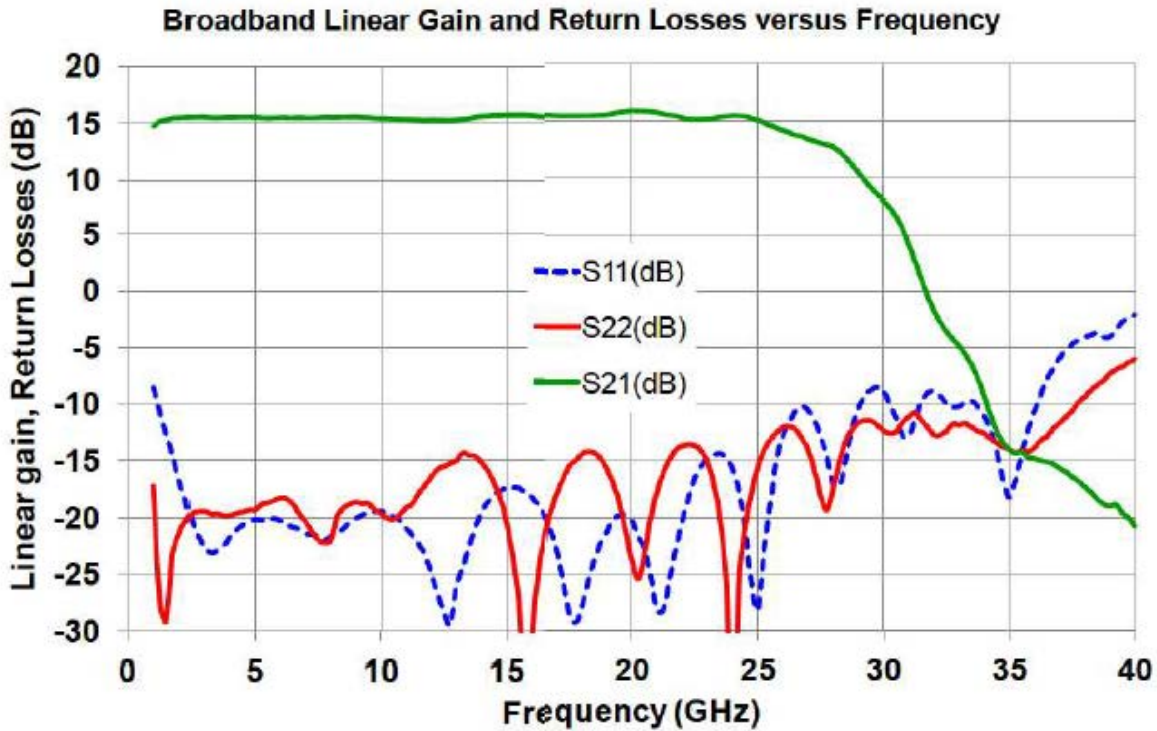
Typical Board Measurements

T_{amb}. = +25 °C V_d = +5 V V_{G2} = 1.7 V, V_{G1} set to have I_{DQ} = 100 mA



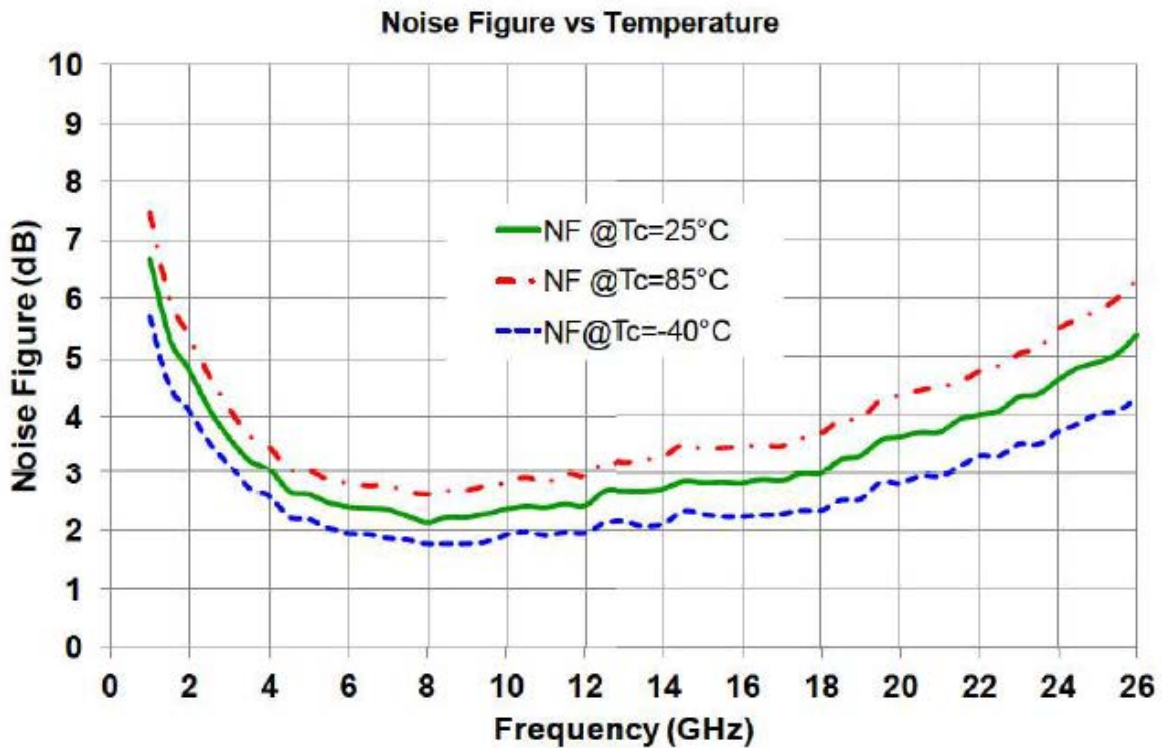
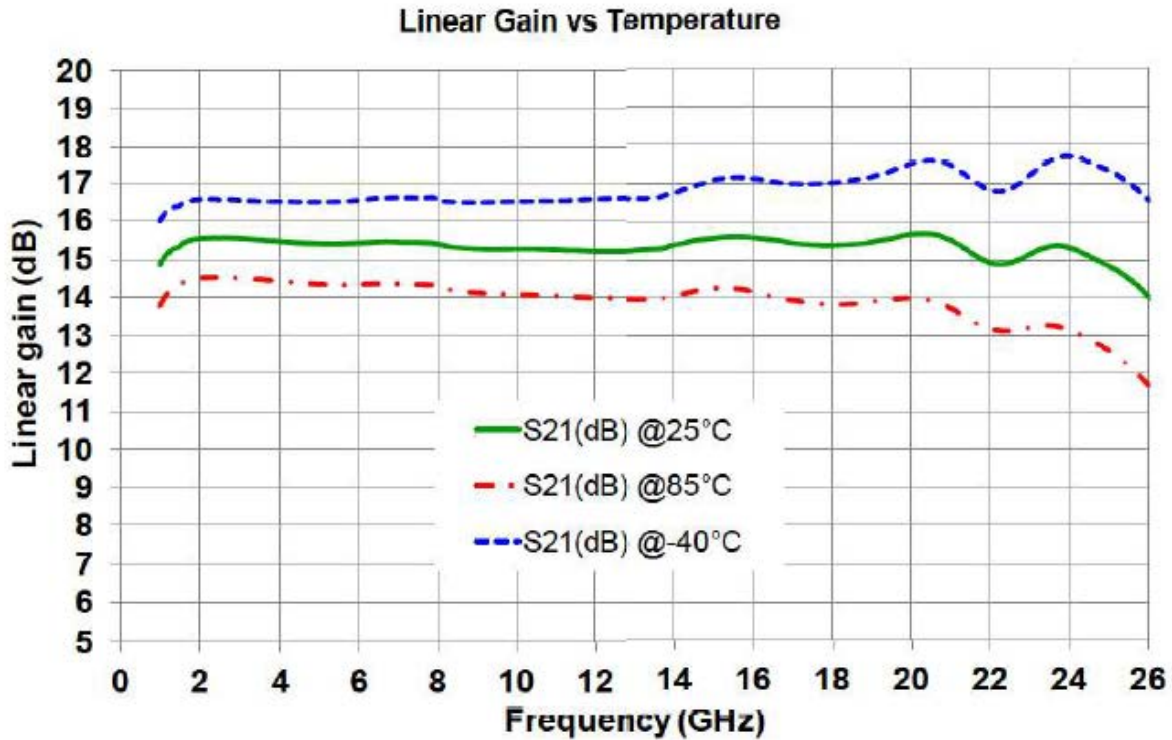
Typical Board Measurements

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



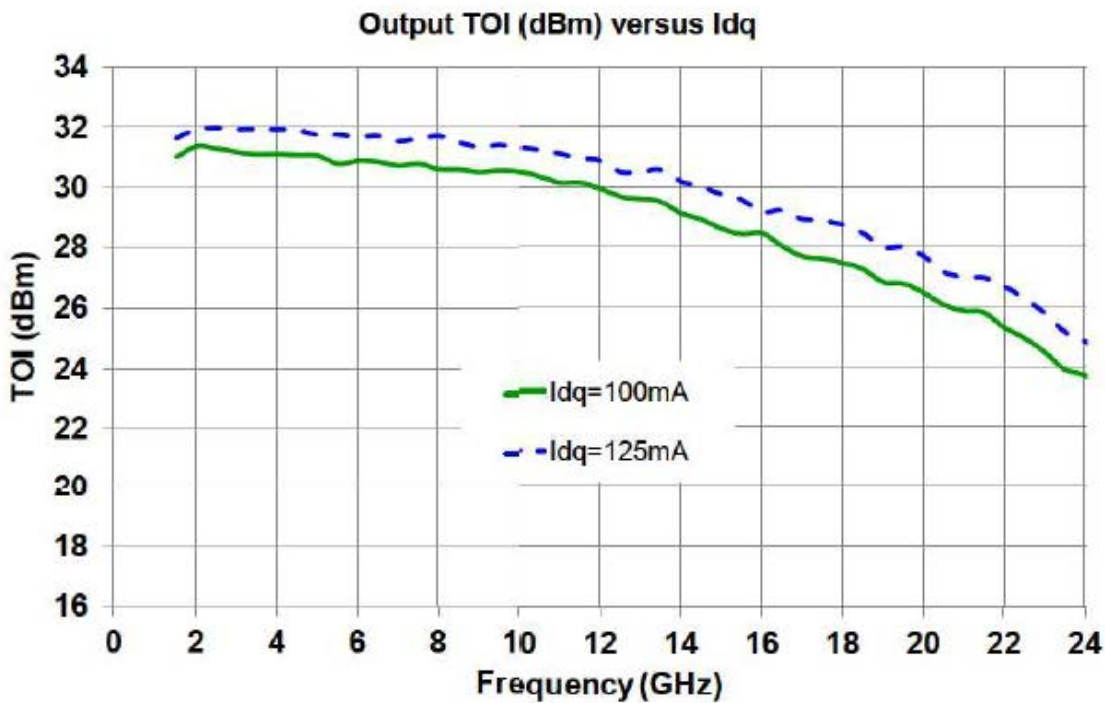
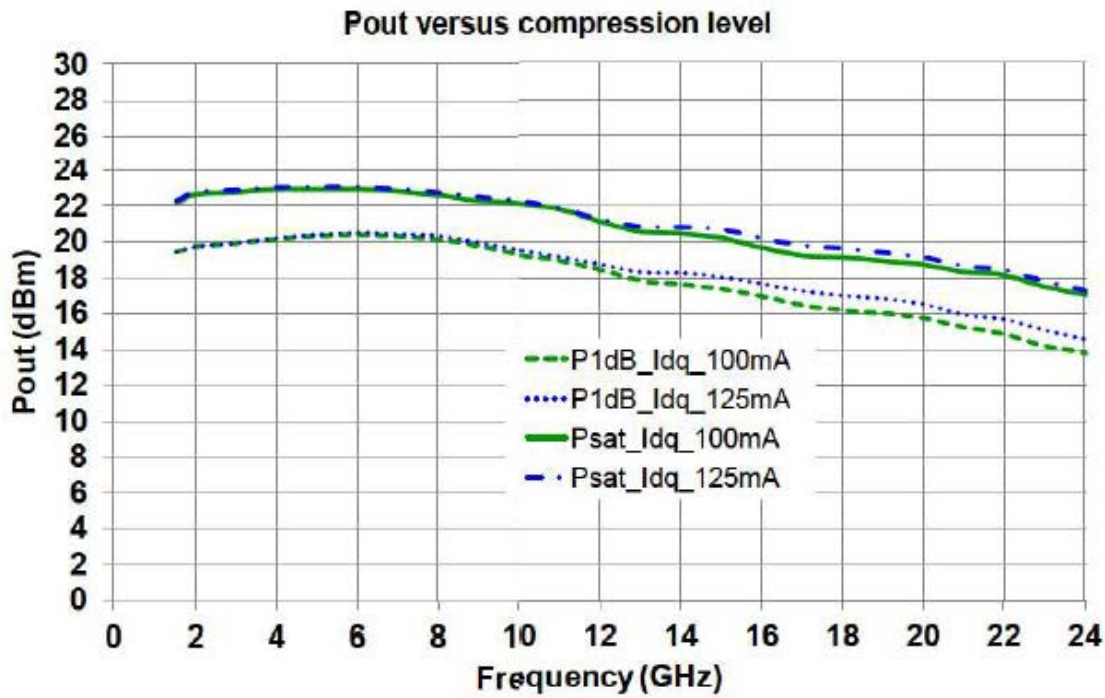
Typical Board Measurements

Tamb. = +25 °C, +85 °C, -40 °C, Vd = 5 V, Vg1 set in order to get Idq = 100 mA, Vg2 = 1.7 V



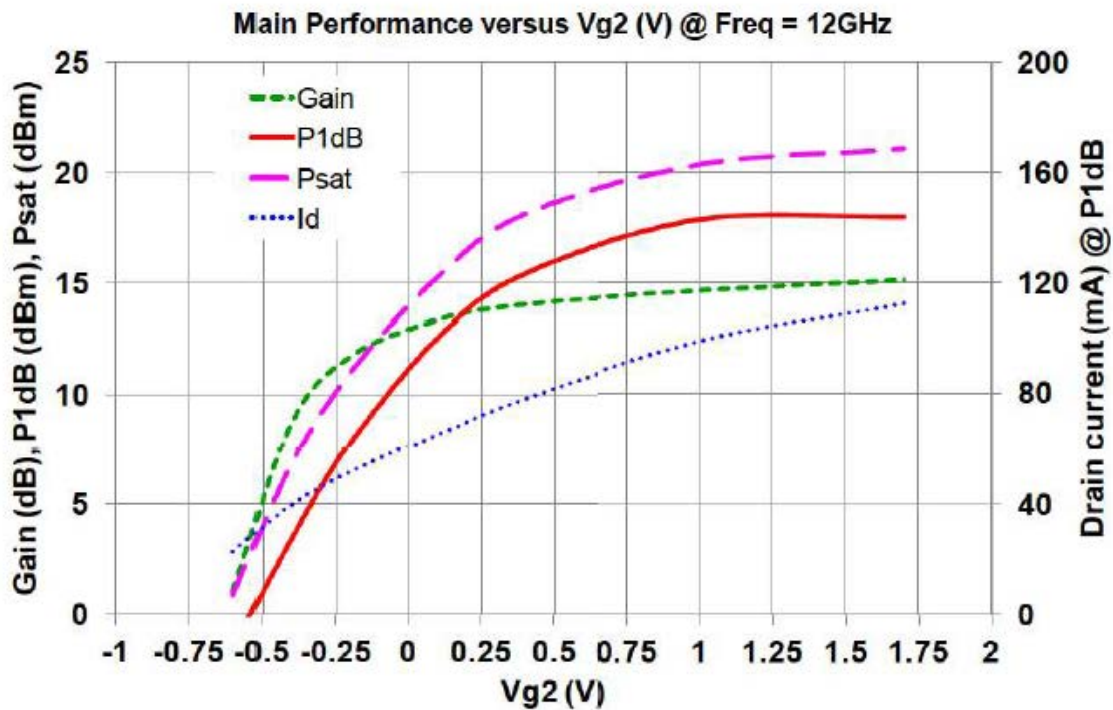
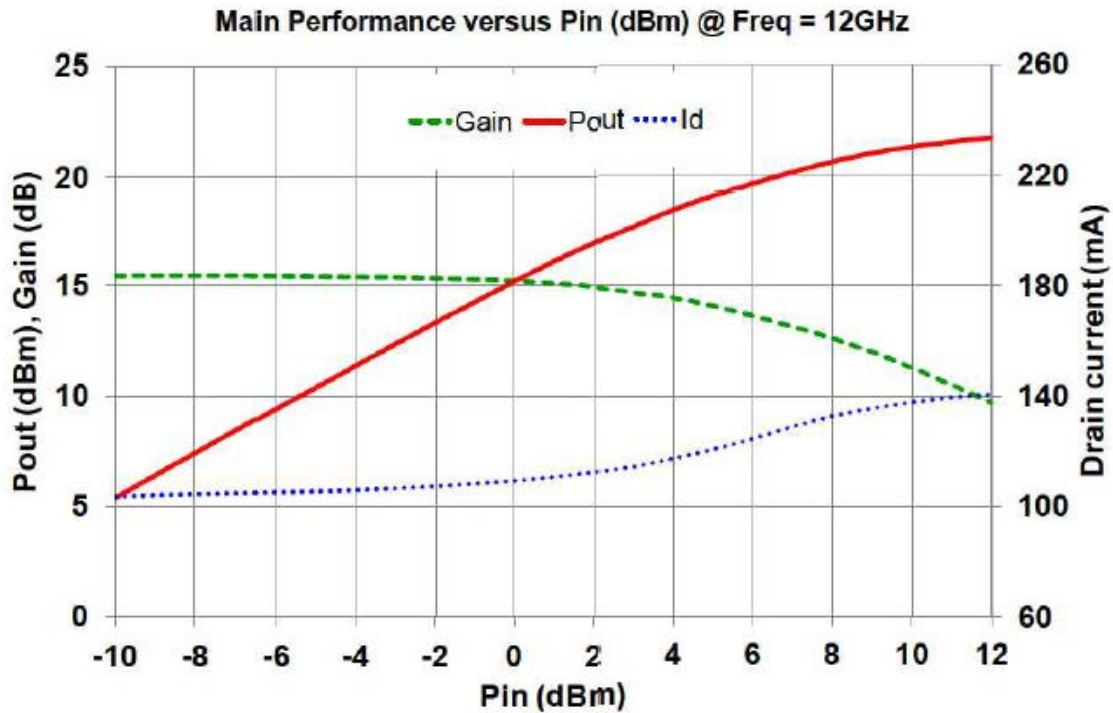
Typical Board Measurements

Tamb.= +25 °C Vd = +5 V V_{G2} = 1.7 V V_{G1} set to have I_{DQ} = 100/125 mA

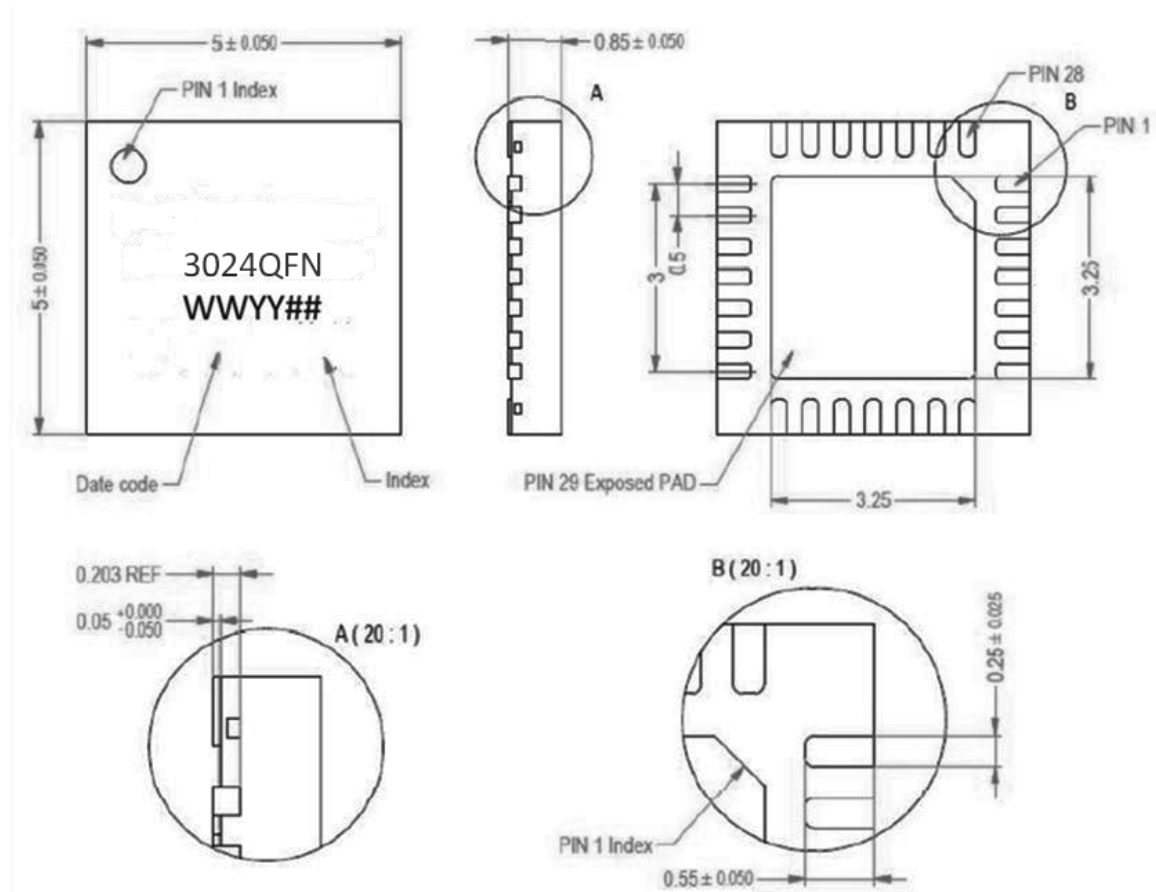


Typical Board Measurements

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



Package Outline ¹



Units : mm
 Finish : Matt tin
 Lead free (Green)



Matte tin, Lead Free (Green)	1- VG2	11- Nc	21- Nc
Units : mm	2- Nc	12- Nc	22- Nc
From the standard : JEDEC MO-220	3- Nc	13- VG1	23- Nc
(VHHD)	4- RF in	14- Nc	24- Nc
29- GND	5- GND ⁽¹⁾	15- Nc	25- VD
	6- Nc	16- Nc	26- Nc
	7- Nc	17- Nc	27- Nc
	8- Nc	18- GND ⁽¹⁾	28- Nc
	9- Nc	19- RF out	
	10- Nc	20- Nc	

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
TDLNA3024QFN	2 - 22 GHz Low Noise Amplifier	5 x 5 28p Plastic QFN	Tray

Revision Information

Document	Description / Date	Change/Revision Details
TDLNA3024QFN-03-2024 Rev 01	TDLNA3024QFN / Oct 2023	Initial Release

Document Categories and Definitions:

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

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