

TDLNA2069SP

16 – 32 GHz Low Noise Amplifier

Product Overview

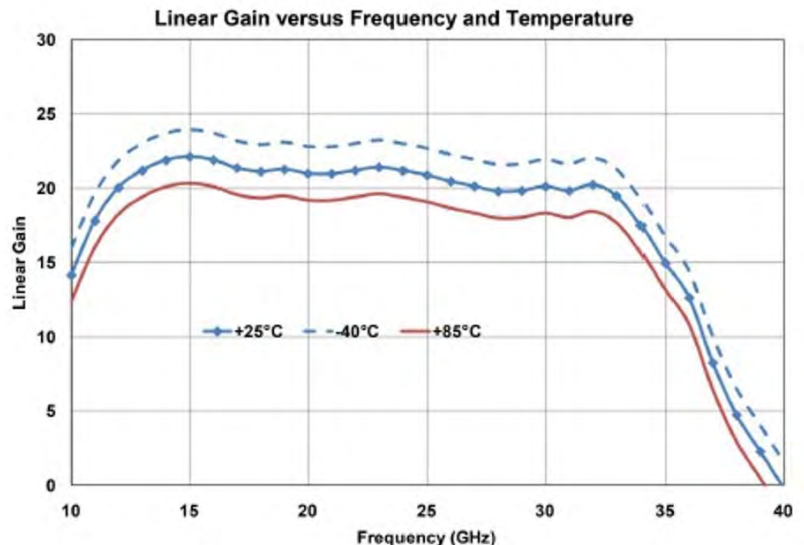
The TDLNA2069SP is a three-stage self-biased wide band monolithic low noise amplifier.

The circuit is manufactured with a standard pHEMT process: 0.25 μm gate length, via holes through the substrate, air bridges and electron beam gate lithography.

It is proposed in leadless surface mount hermetic metal ceramic 6 x 6 mm² package. The overall power supply is of 4.5 V / 55 mA. The circuit is dedicated to space applications and also well suited for a wide range of microwave and millimeter wave applications and systems.

Features

- Broadband performance 16-32 GHz
- 2.5 dB typical Noise Figure
- 20 dBm 3rd order intercept point
- 22 dB gain
- Low dc power consumption
- 6 x 6 mm² metal ceramic hermetic package
- Radiation Performance: 100 krad (Si) TID (Typical)



Absolute Maximum Ratings

Tamb.= +25 °C

Symbol	Parameter	Values	Unit
Vd	Drain bias voltage ⁽³⁾	5	V
Id	Drain bias current	120	mA
Pin	Maximum peak input power overdrive ⁽²⁾	+15	dBm
Tj	Junction temperature	175	°C
Ta	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +150	°C

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

(2) Duration < 1s.

(3) See chip biasing options

Recommended Operating Conditions

Tamb.= +25 °C

Symbol	Parameter	Min	Typ	Max	Unit
Fop	Operating frequency range	16		32	GHz
NF	Noise figure		2.5		dB
G	Small signal Gain		22		dB

ESD Protection: Electrostatic discharge sensitive device, please observe handling precautions!

Electrical Specifications

Tamb.= +25 °C, Vd = +4.5 V, Pads B=D=E=Gnd, C=F=NC.

Symbol	Parameter	Min	Typ	Max	Unit
Fop	Operating frequency range	16		32	GHz
G	Gain ⁽¹⁾		22		dB
11G	Gain flatness ⁽¹⁾		± 1		dB
NF	Noise figure ⁽¹⁾		2.5		dB
IS111	Input return loss ⁽¹⁾		10		dB
IS221	Output return loss ⁽¹⁾		10		dB
IP3	3rd order intercept point		20		dBm
P1dB	Output power at 1dB gain compression		10		dBm
Id	Drain bias current		55	75	mA

(1) These values are representative of on board measurements as defined on the drawing 99622 (see below).

Typical Package Sij Parameters

For low current configuration in 99622 board - in connector plane
 Temp= +25 °C, Vd= +4.5 V, B, D, E grounded, C=F=NC

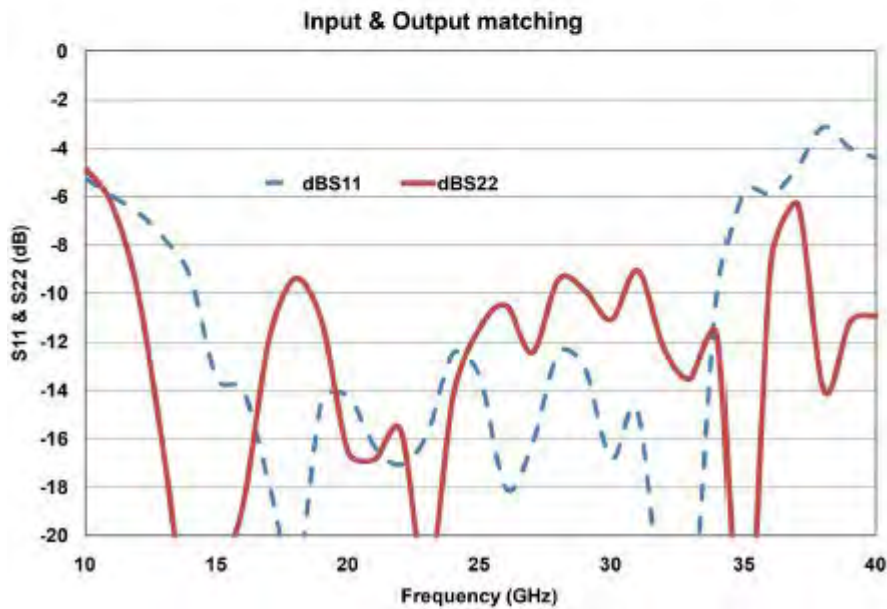
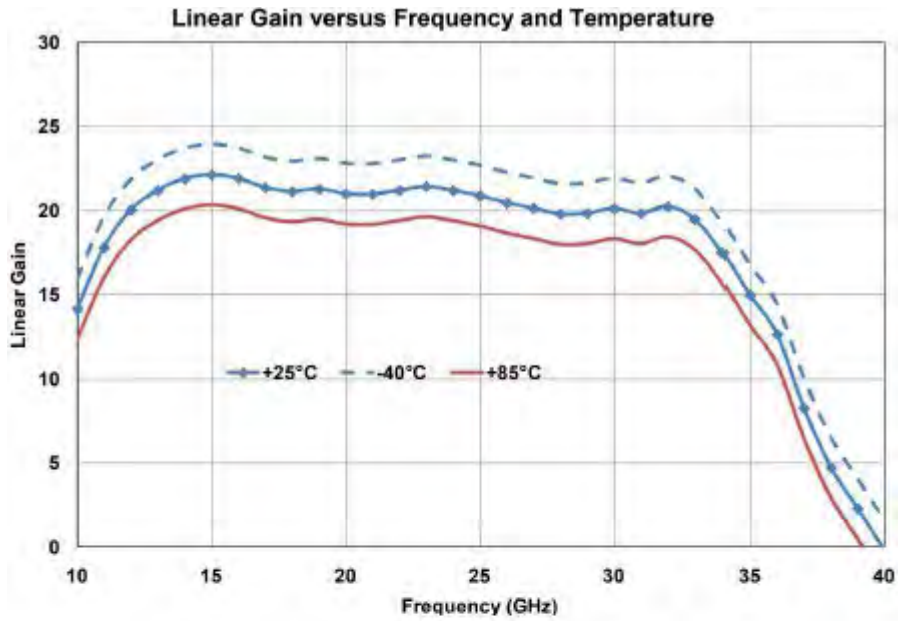
FREQ (GHz)	dBS11	PhS11 (0)	dBS12	PhS12 (0)	dBS21	PhS21 (0)	dBS22	PhS22 (0)
10.00	-5.26	-139.50	-52.14	19.61	14.17	47.38	-4.80	125.30
11.00	-5.98	86.98	-51.10	-106.90	17.82	-106.00	-6.29	3.35
12.00	-6.67	-32.51	-51.48	112.80	20.05	103.30	-9.90	-94.31
13.00	-7.74	-149.00	-50.15	-20.08	21.21	-42.75	-16.62	179.50
14.00	-9.37	94.70	-48.25	-153.70	21.90	175.30	-23.95	87.51
15.00	-13.54	-39.12	-46.94	78.00	22.14	35.08	-21.77	65.93
16.00	-13.99	-176.10	-47.79	-43.35	21.92	-100.80	-18.77	-48.01
17.00	-17.92	76.36	-48.41	-154.50	21.38	127.20	-11.87	-167.20
18.00	-21.77	-111.30	-49.72	98.54	21.14	-0.31	-9.37	112.50
19.00	-14.36	130.00	-50.28	-8.54	21.29	-128.20	-11.17	28.74
20.00	-14.24	29.75	-54.55	-126.00	21.01	104.00	-16.54	-87.36
21.00	-16.32	-77.70	-55.85	144.70	20.99	-21.16	-16.86	122.30
22.00	-17.07	177.50	-59.32	46.11	21.21	-147.50	-15.65	24.26
23.00	-15.81	68.76	-58.70	-88.09	21.43	84.81	-22.00	-3.87
24.00	-12.47	-20.93	-60.84	132.70	21.20	-44.78	-14.18	-13.27
25.00	-13.44	-99.95	-58.67	-23.64	20.89	-171.90	-11.43	-113.10
26.00	-18.05	152.50	-54.54	-175.20	20.47	61.54	-10.51	143.30
27.00	-16.22	36.49	-52.21	45.44	20.14	-64.19	-12.44	33.96
28.00	-12.46	-34.87	-54.01	-78.85	19.80	169.80	-9.41	-77.53
29.00	-13.11	-108.80	-55.02	163.10	19.84	45.70	-9.90	-164.20
30.00	-16.84	129.50	-55.63	28.57	20.13	-84.86	-11.08	72.67
31.00	-14.87	9.06	-54.07	-131.40	19.84	145.00	-9.06	-23.83
32.00	-23.40	-94.34	-49.78	56.26	20.25	9.39	-12.28	-92.82
33.00	-24.20	48.25	-54.43	142.00	19.50	-126.30	-13.52	151.00
34.00	-10.19	-153.90	-46.78	-61.91	17.52	89.64	-11.71	96.35
35.00	-5.80	121.30	-48.48	167.80	14.98	-42.68	-26.11	-42.73
36.00	-5.95	12.35	-52.86	84.83	12.65	179.90	-8.62	-178.20
37.00	-4.83	-135.40	-47.47	27.68	8.27	47.13	-6.31	137.90
38.00	-3.14	132.90	-48.04	-60.40	4.76	-73.37	-14.00	68.03
39.00	-4.01	42.61	-41.73	-159.90	2.29	165.10	-11.17	-118.80
40.00	-4.42	-78.52	-42.89	103.70	-0.19	37.92	-10.92	137.40



Typical Board Measurements

Temp= +25 °C, Vd=4.5 V Pads B, D, E grounded, C=F=NC.

Measurements in the connector planes, using the proposed land pattern & board 99622.

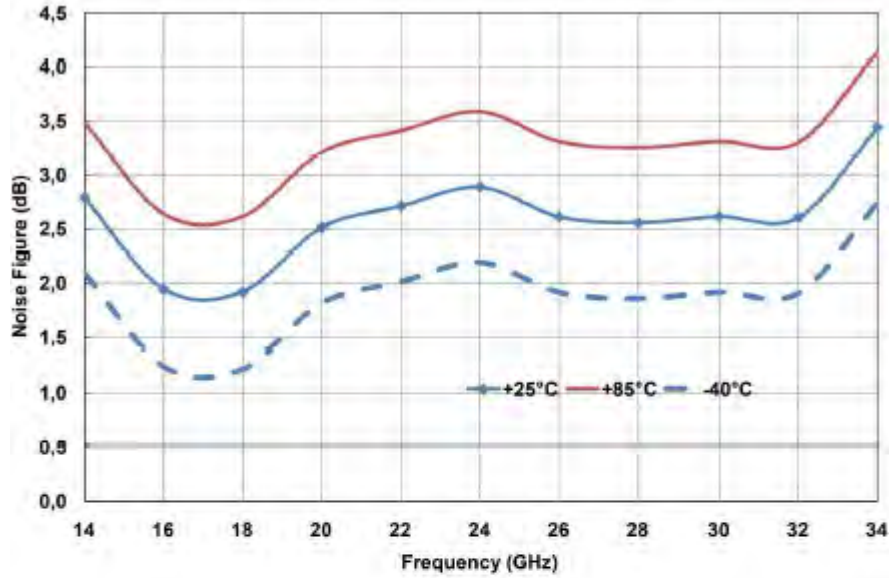


Typical Board Measurements

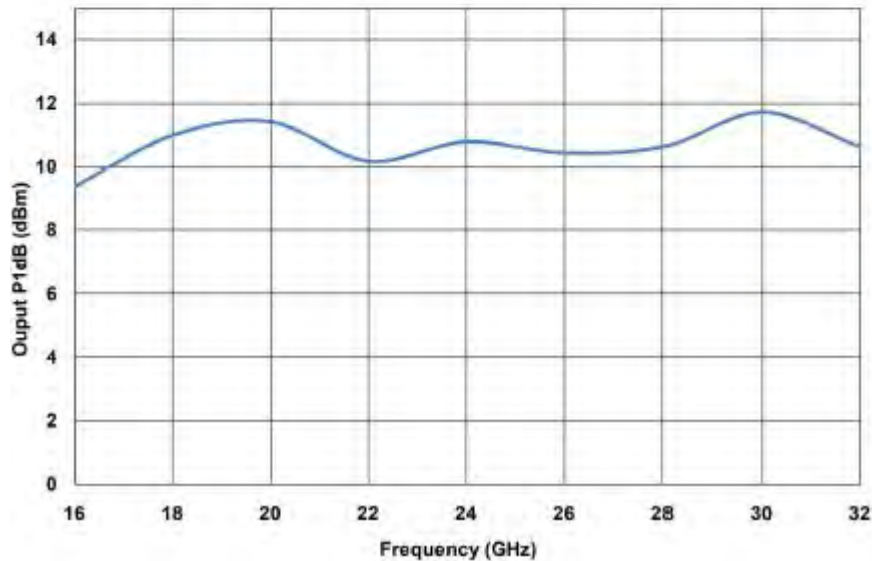
Temp= +25 °C, Vd=4.5 V Pads B, D, E grounded, C=F=NC.

Measurements in the connector planes, using the proposed land pattern & board 99622.

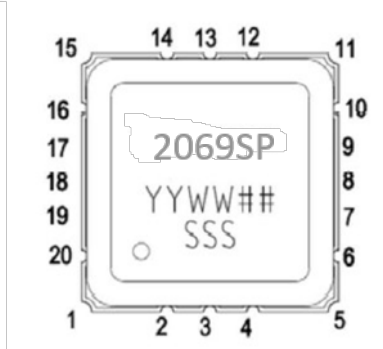
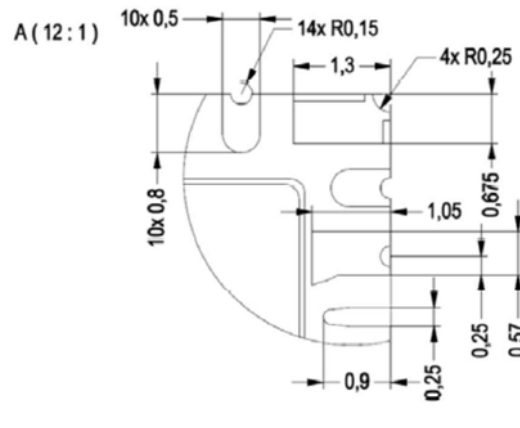
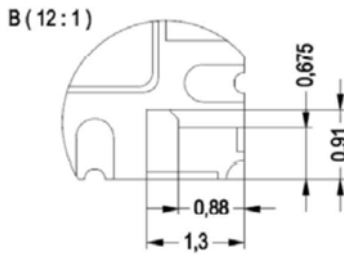
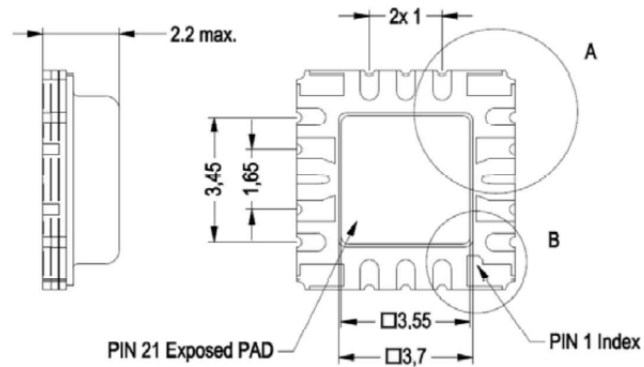
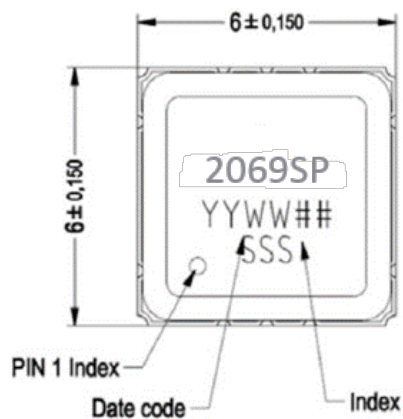
Noise Figure versus Frequency and Temperature



Output power at 1dB compression versus frequency



Package Outline 1



1- GND	8- RF OUT	15- GND
2- C	9- GND	16- Nc
3- D	10- Nc	17- GND
4- E	11- GND	18- RF IN
5- GND	12- VD1	19- GND
6- F	13- Nc	20- B
7- GND	14- GND	21- GND

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
TDLNA2069SP	16 - 32 GHz Low Noise Amplifier	6 x 6 Ceramic QFN	Tray

Revision Information

Document	Description / Date	Change/Revision Details
TDLNA2069SP-4-2024 Rev 0.4	TDLNA2069SP / April 2024	Initial Release: Preliminary Specification

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

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

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