TDLNA2628SEP

22 – 31.5 GHz Low Noise Amplifier

Product Overview

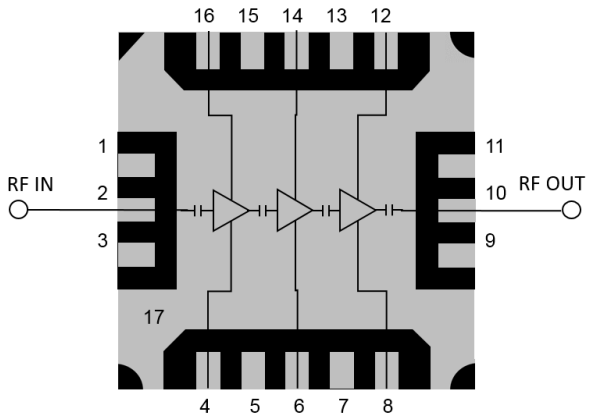
Teledyne e2v HiRel's TDLNA2628SEP is a packaged, high-performance, low noise amplifier fabricated on our 90 nm pHEMT process. Covering 22 – 31.5 GHz, the TDLNA2628SEP provides 23 dB small signal gain and P1dB of 19 dBm, while supporting a noise figure of 1.6 dB and IM3 levels of −54 dBc (at Pout=0 dBm/tone).

Packaged in a small 4 mm x 4 mm plastic overmold QFN, the TDLNA2628SEP is matched to 50 ohms with integrated dc blocking caps on both I/O ports for easy handling and simple system integration.

The TDLNA2628SEP high performance and ease of handling make it ideal for satellite, military or commercial radar applications.

Lead-free and RoHS compliant.

Functional Block Diagram



Features

- Frequency Range: 22 – 31.5 GHz
- Noise Figure: 1.6 dB
- Small Signal Gain: 23 dB
- P1dB: 19 dBm
- IM3: −54 dBc (@ Pout=0 dBm/tone)
- Bias: VD = 3.5 V, IDQ = 90 mA, VG = −0.46 V
- Plastic Overmolded Package
- Package Dimensions: 4.0 x 4.0 x 0.85 mm

Space Enhanced Product (EP) Qualification

- Long term availability –10 years+
- Extended temperatures
- Cold temperature down to -55 °C
- Hot temperatures up to +125 °C
- Baseline control
- Guaranteed traceability throughout the process
- Product repeatability
- Full qualification over specified temperature range
- Extended Change Notification
- Customized ordering options
- Standard Teledyne part number

A Teledyne Defense Electronics Company

TELEDYNE e2v HIREL ELECTRONICS Everywhereyoulook™

Absolute Maximum Ratings

Parameter	Value	Units
Drain Voltage (V_D)	4.5	V
Drain Current ($I_{D1}/I_{D2}/I_{D3}$)	45/45/160	mA
Gate Voltage Range	-1.3 to 0	V
Gate Current ($I_{G1}/I_{G2}/I_{G3}$ at 125 °C)	5.0/5.0/6.6	mA
RF Input Power (50 Ω, 85 °C)	20	dBm
Channel Temperature, T_{CH}	175	°C
Mounting Temperature (30 seconds)	260	°C
Storage Temperature	−55 to 150	°C

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Value	Units
Drain Voltage	3.5	V
Drain Current (quiescent, I_{DQ})	90	mA
Drain Current (I_D, Low noise / P_{SAT})	90 / 175	mA
Gate Voltage (typical)	−0.46	V
Operating Temperature Range	−40 to 85	°C

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

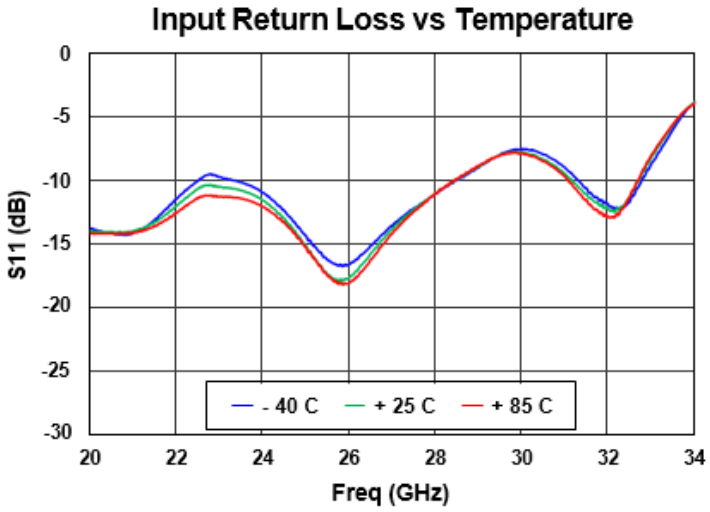
Electrical Specifications

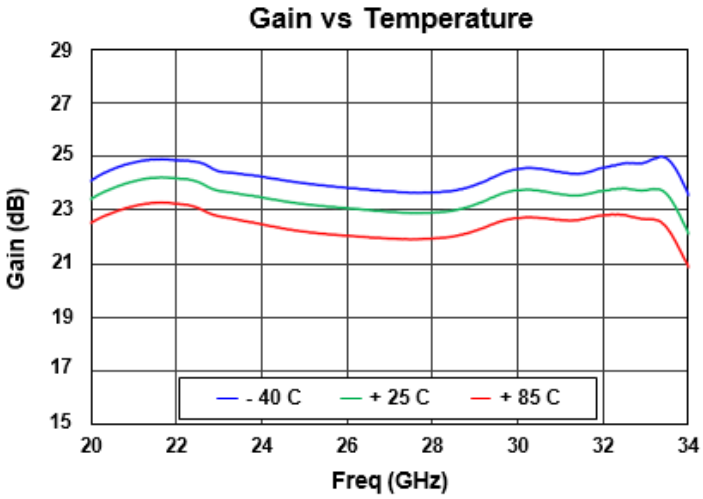
Test conditions unless otherwise noted: V_D = +3.5 V, I_{DQ} = 90 mA, Temp. = +25 °C. Data de-embedded to device reference plane.

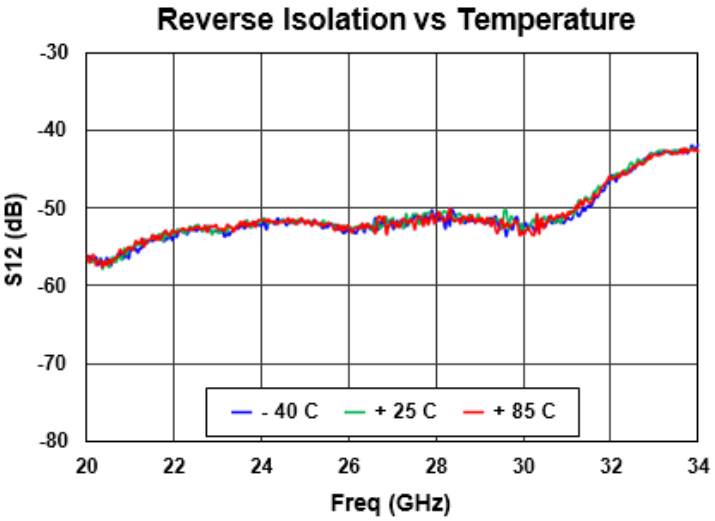
Parameter	Min	Typical	Max	Units
Frequency	22		31.5	GHz
Small Signal Gain	19	23		dB
Noise Figure		1.6		dB
1-dB Compression Point		19		dBm
Input Return Loss		11		dB
Output Return Loss		16		dB
3RD Order Intermodulation level (Pout=0 dBm/tone)		−54		dBc
Output TOI (Pout=0 dBm/tone)		27		dBm
Gain Temperature Coefficient		−0.013		dB/°C

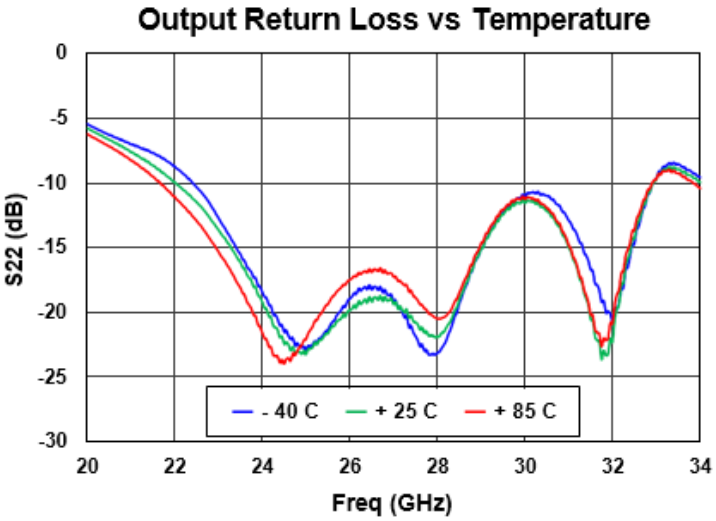
Small Signal Performance Plots

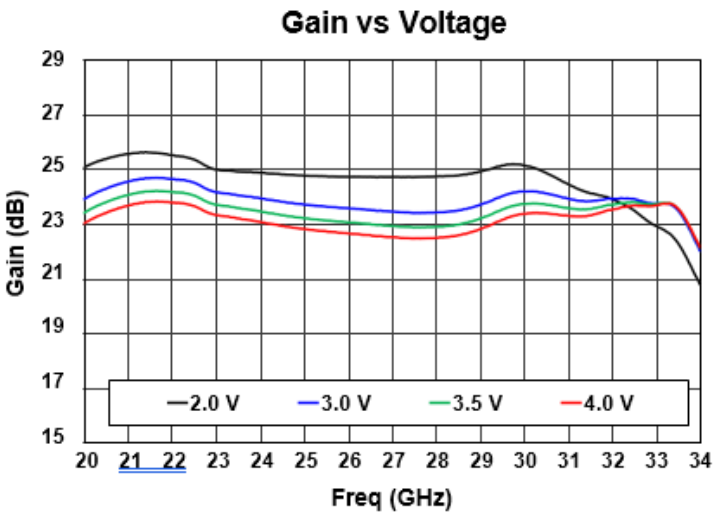
Test conditions unless otherwise noted: V_D = +3.5 V, I_{DQ} = 90 mA, Temp. = +25 °C.

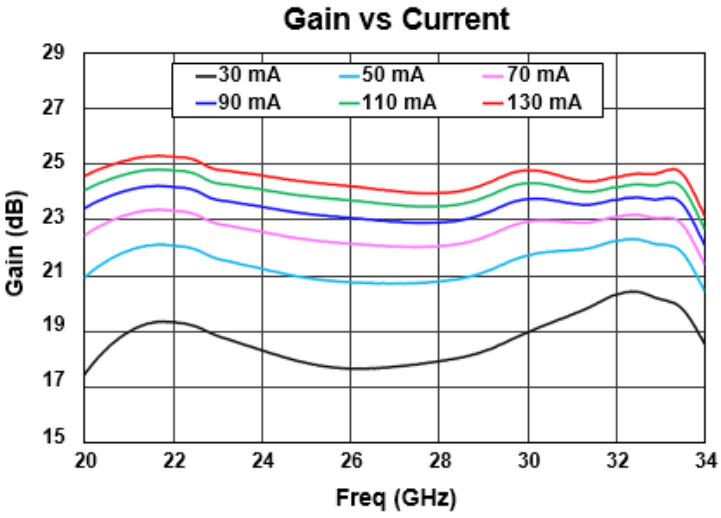






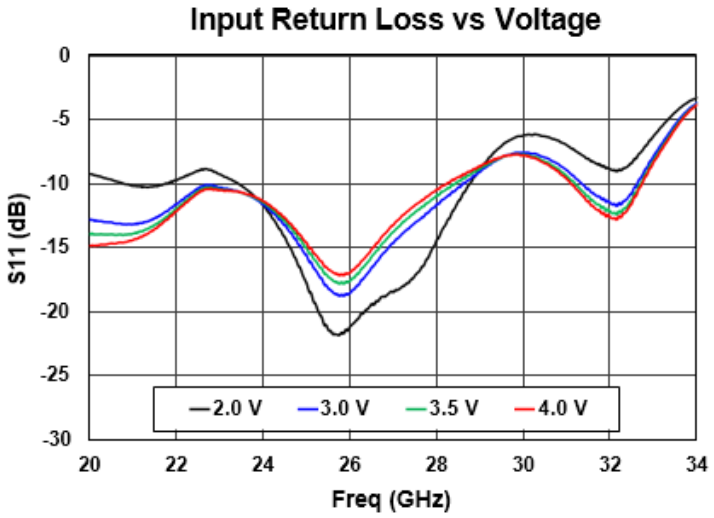


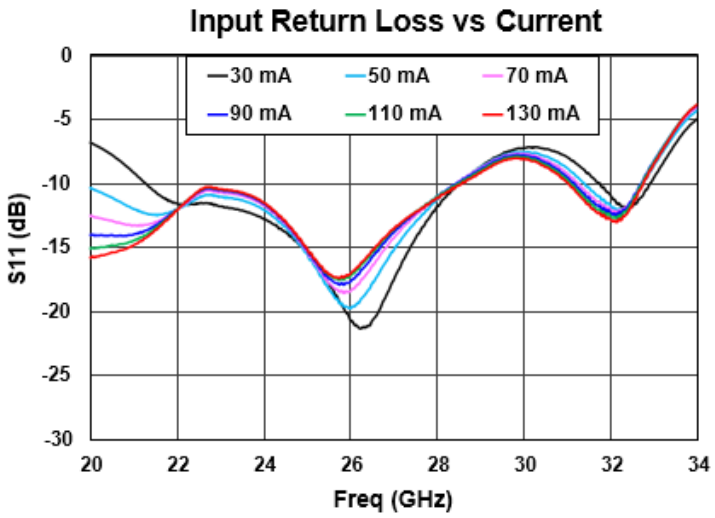


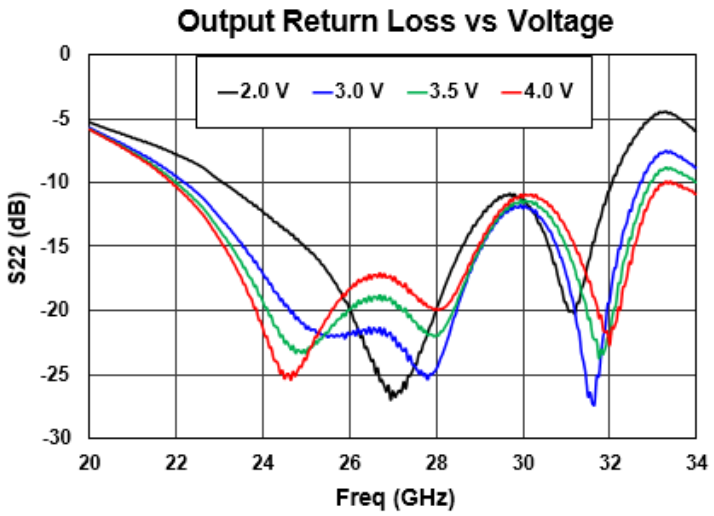


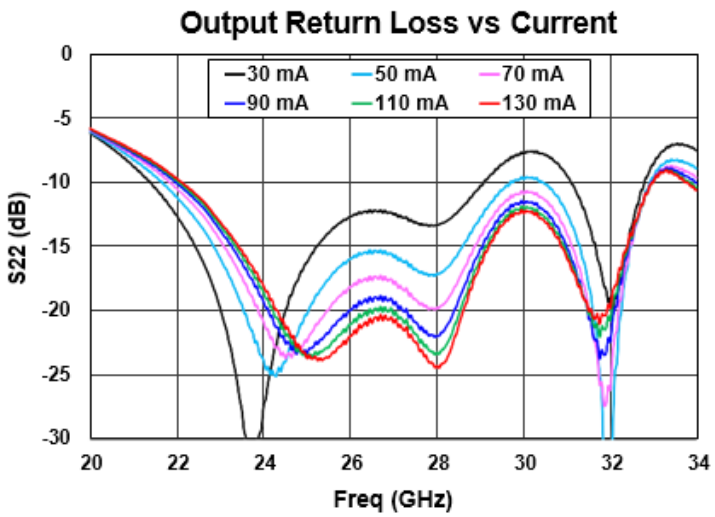
Small Signal Performance Plots

Test conditions unless otherwise noted: V_D = +3.5 V, I_{DQ} = 90 mA, Temp. = +25 °C. Data de-embedded to MMIC bond wires.



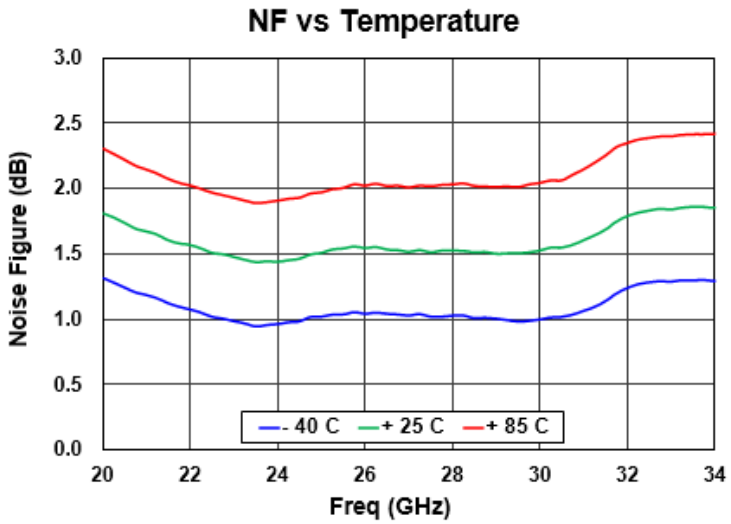


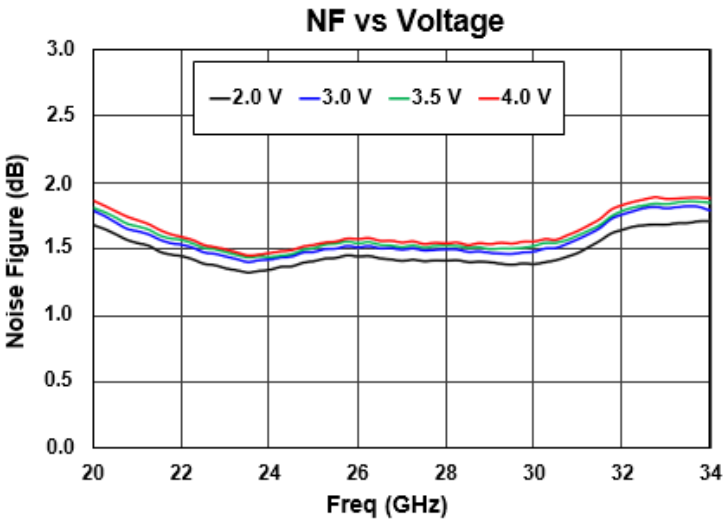


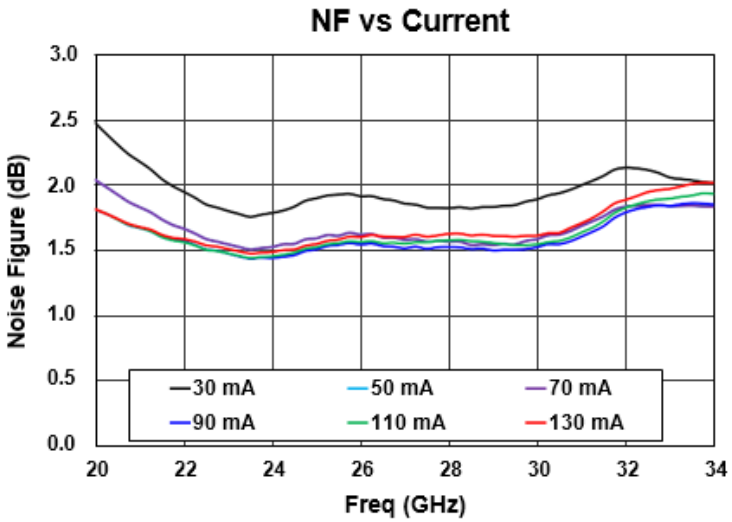


Noise Figure Performance Plots

Test conditions unless otherwise noted: V_D = +3.5 V, I_{DQ} = 90 mA, Temp. = +25 °C. Data de-embedded to MMIC bond wires.







Large Signal Performance Plots

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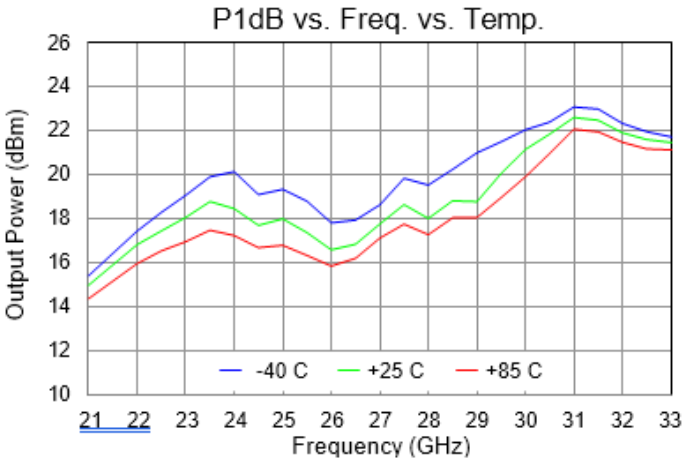

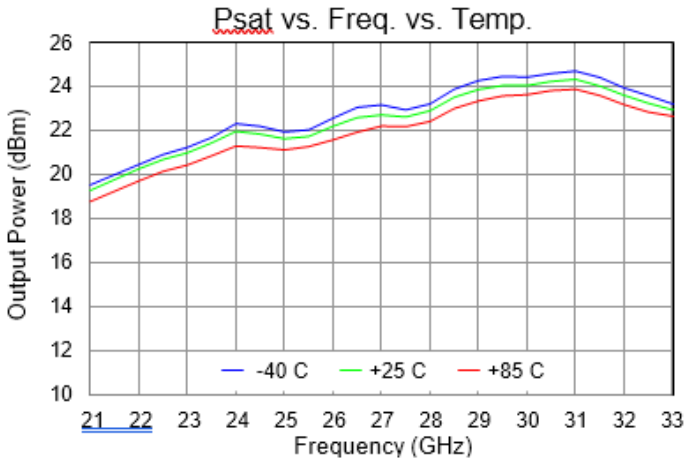

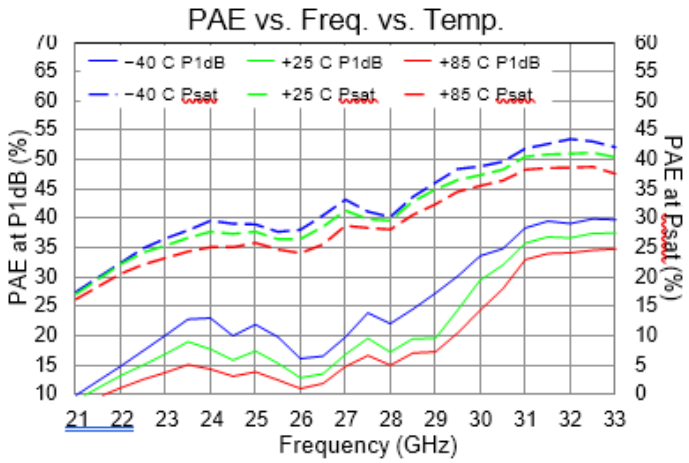

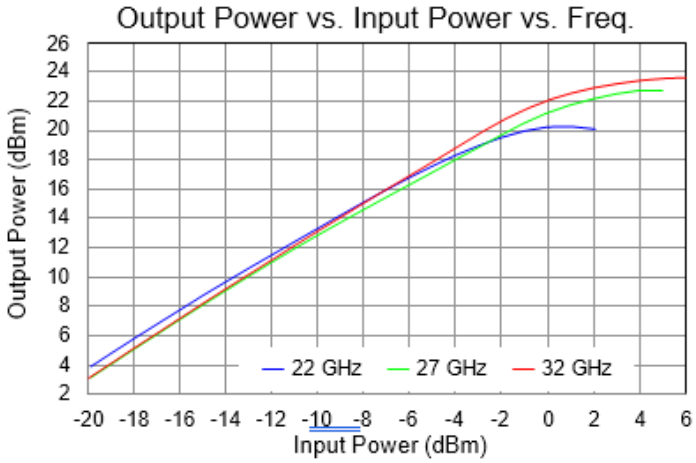

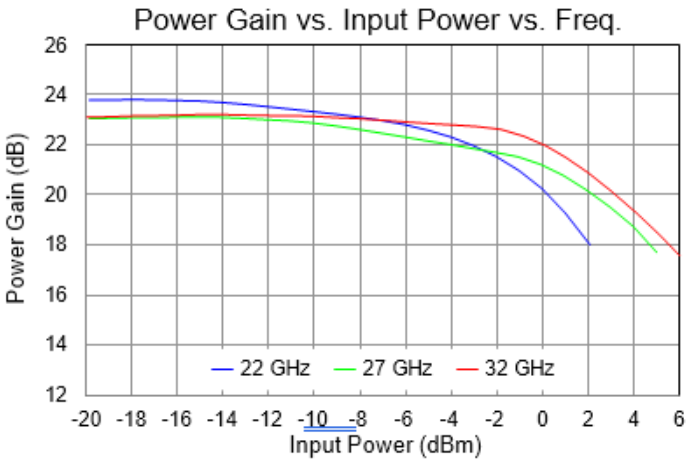

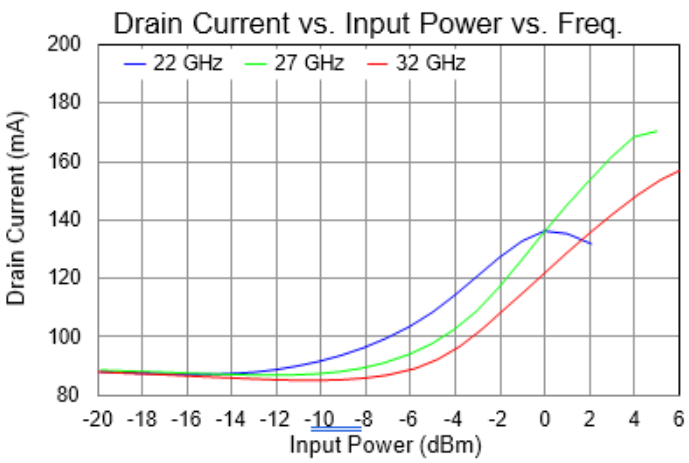

Linearity Performance Plots

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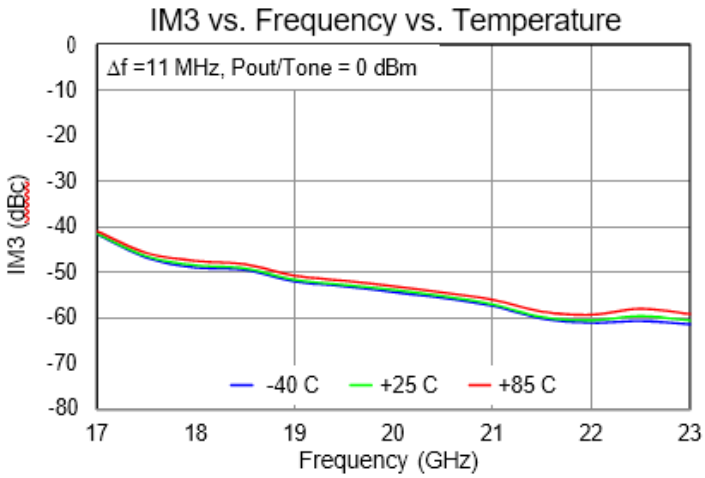

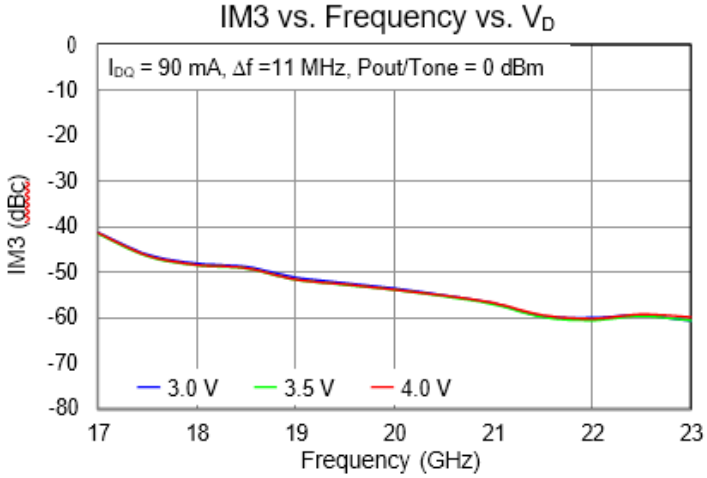

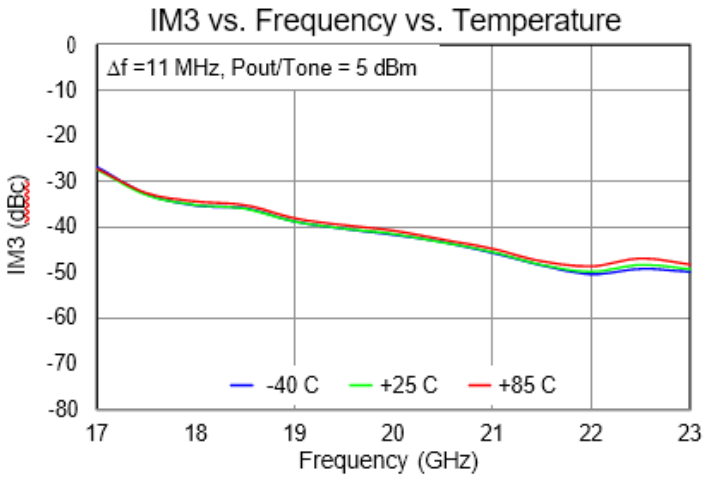

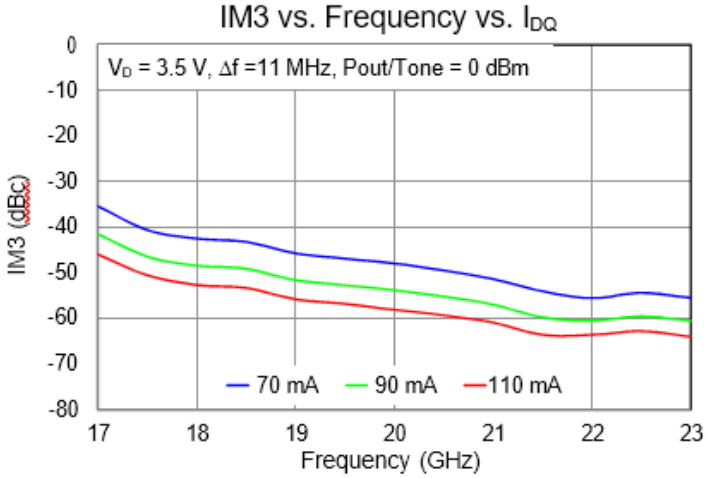

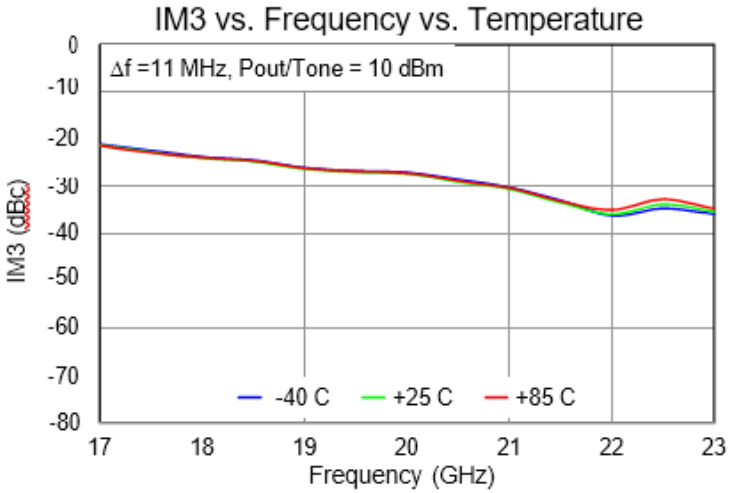

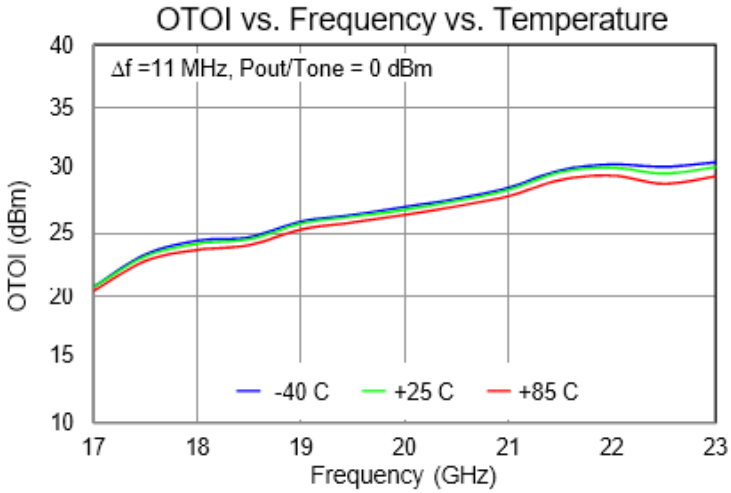

Linearity Performance Plots

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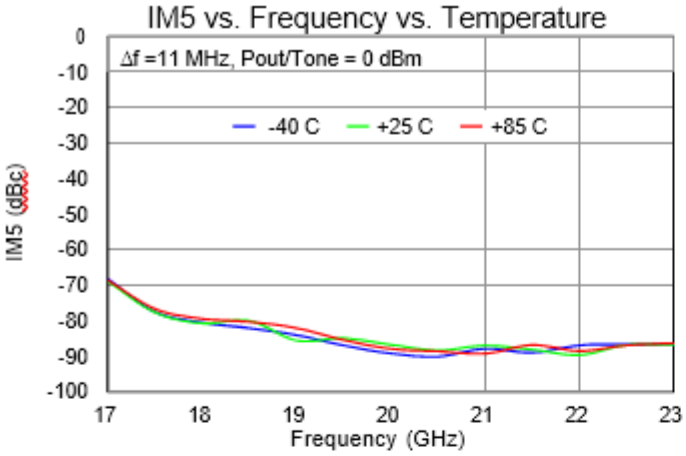
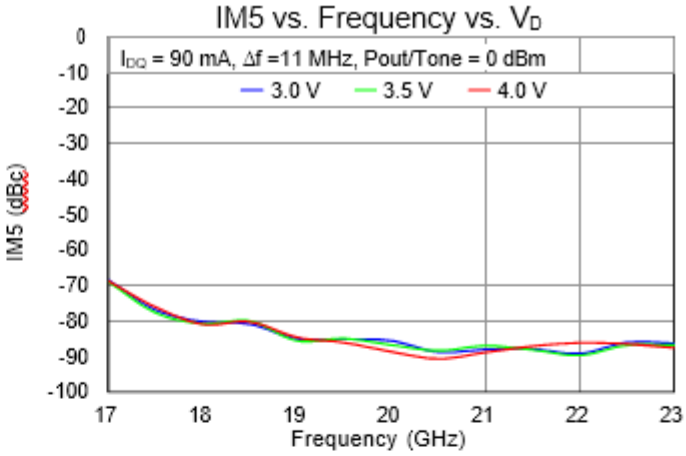
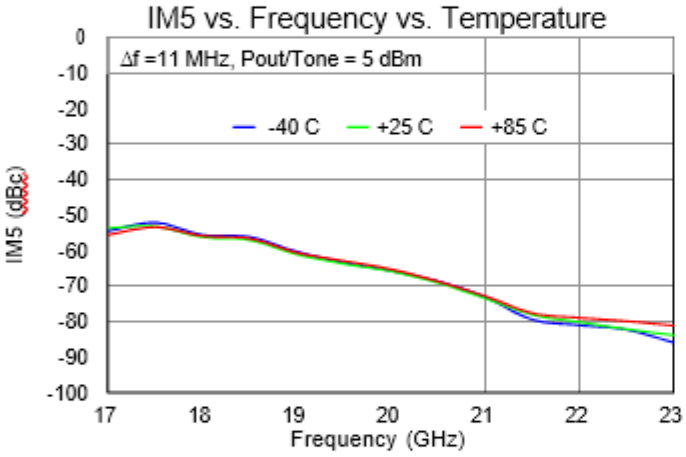
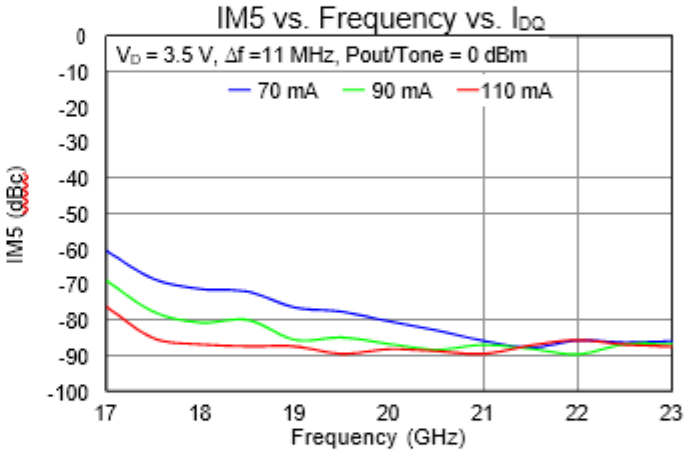
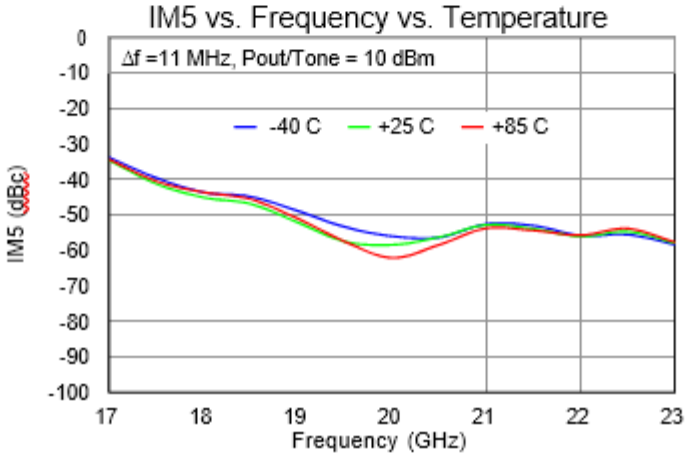








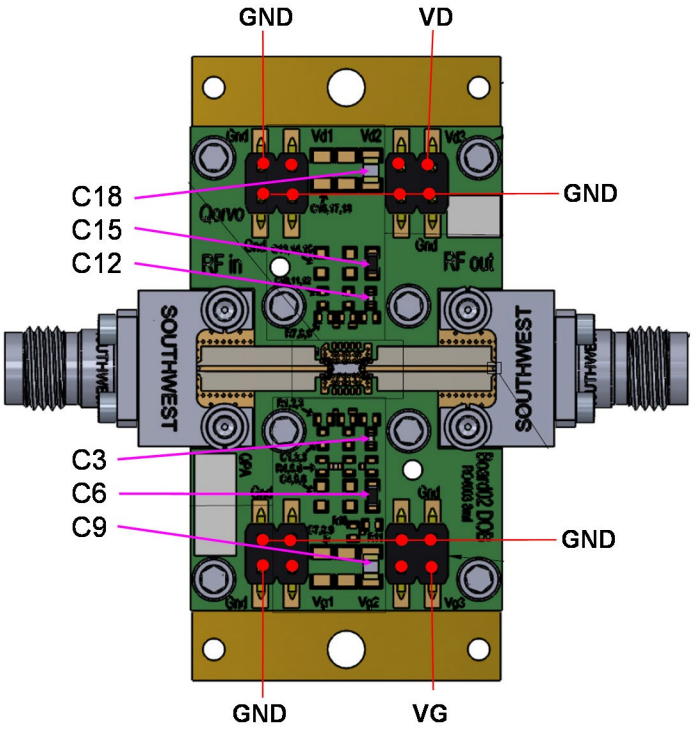


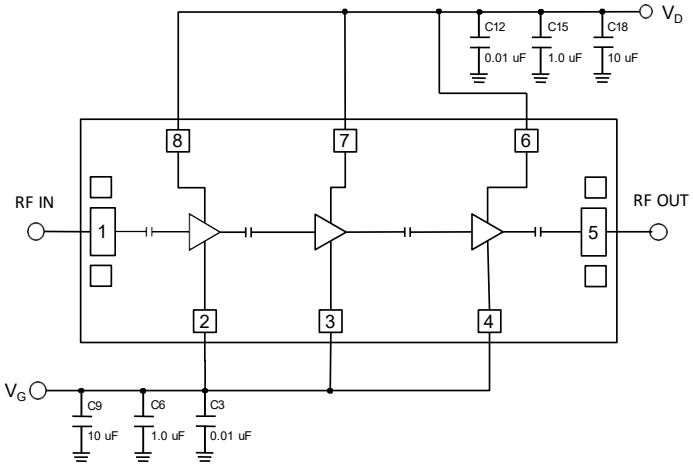
Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	T_{base} = 85 °C, V_D = 3.5 V, I_{DQ} = 90 mA Quiescent/Small Signal operation, P_{DISS} = 0.315 W	65.1	ºC/W
Channel Temperature, T_{CH} (Under RF)		105.5	°C
Median Lifetime (T_M)		1.226E08	Hrs

Notes:
1. Die mounted to 40 mil CuMo carrier plate with AuSn eutectic. Thermal resistance measured at back of carrier plate.

Application Circuit and Evaluation Board Layout





Notes:
1. See Evaluation Board PCB Information for material and stack up.

Bias-up Procedure	Bias-down Procedure
1. Set I_D limit to 220 mA, I_G limit to 10 mA	1. Turn off RF signal
2. Set V_G to −1.5 V	2. Reduce V_G to −1.5 V. Ensure $I_{DQ} \approx$ 0 mA
3. Set V_D +3.5 V	3. Set V_D to 0 V
4. Adjust V_G more positive until I_{DQ} = 90 mA ($V_G \approx$ −0.46 V Typical)	4. Turn off V_D supply
5. Apply RF signal	5. Turn off V_G supply

Bill of Materials

Ref. Des.	Value	Description	Manuf.	Part Number
C3, C12	0.01 µF	CAP 0.01 µF +/-10% 50 V 0402 X7R ROHS	Various	
C6, C15	1.0 µF	CAP 1.0 µF +/-10% 16 V 0603 X7R ROHS	Various	
C9, C18	10 µF	CAP CER 10 µF 10 V X7R 10% 0805 TDK ROHS	Various	
RF IN, RF OUT	2.40 mm	2.40 mm END LAUNCH CONNECTOR	Southwest Microwave	1492-04A-5

Ordering Information

Order Code	Description	Package	Shipping Method
TDLNA2628SEP	17 – 23 GHz Low Noise Amplifier	16-QFN	Tray

Revision Information

Document	Description / Date	Change/Revision Details
TDLNA002628EP-4-2022 Rev 4	TDLNA002628EP / April 2022	Initial Release: Preliminary Specification
TDLNA2628EP-11-2022 Rev 5	TDLNA2628EP / November 2022	Change part number to TDLNA2628EP
TDLNA2628EP-06-2023 Rev 5a	TDLNA2628EP / June 6, 2023	Public Domain revision, page numbers added,

Document Categories / 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

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

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