

TDLNA2626SEP

17 – 22 GHz Low Noise Amplifier

Product Overview

Teledyne e2v HiRel's TDLNA2626SEP is a packaged high-performance, low noise MMIC amplifier fabricated on our 90nm pHEMT process. Covering 17 – 22 GHz, the TDLNA2626SEP provides 25 dB small signal gain and P1dB of 20 dBm, while supporting a noise figure of 1.3 dB and IM3 levels of -55 dBc (at Pout=0 dBm/ tone).

Packaged in a small 4 mm x 4 mm plastic overmold QFN, the TDLNA2626SEP is matched to 50 ohms with integrated DC blocking caps on both I/O ports for easy handling and simple system integration.

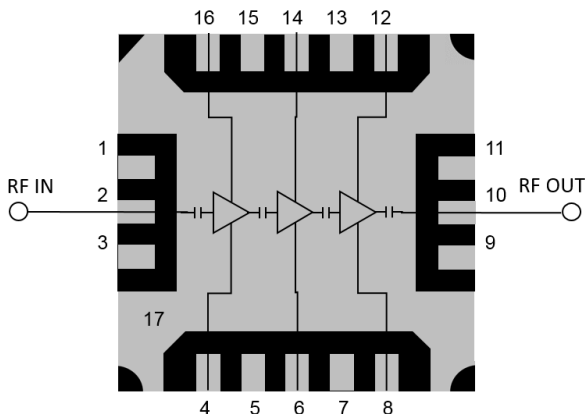
The high performance of the TDLNA2626SEP makes it ideal for satellite and military point to point communication systems.

Lead-free and RoHS compliant.

Features

- Frequency Range: 17 – 22 GHz
- Noise Figure: 1.3 dB (typical)
- Small Signal Gain: 25 dB (typical)
- P1dB: 20 dBm (typical)
- IM3: -55 dBc (typical) (Pout=0 dBm/tone)
- Bias: VD = 3.5 V, IDQ = 90 mA, VG = -0.46 V (typical)
- Plastic Overmolded Package
- Package Dimensions: 4.0 x .4.0 x 0.85 mm

Functional Block Diagram



Space Enhanced Product (SEP) 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
Everywhere you look™

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage (V_D)	4.5 V
Drain Current ($I_{D1}/I_{D2}/I_{D3}$)	45/45/160 mA
Gate Voltage Range (V_G)	-1.3 V 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 the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Typ	Units
Drain Voltage	3.5 V	V
Drain Current (quiescent, I_{DQ})	90 mA	mA
Drain Current (I_D , Low noise / P_{SAT})	90 / 175 mA	mA
Gate Voltage (typical)	-0.46 V	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.

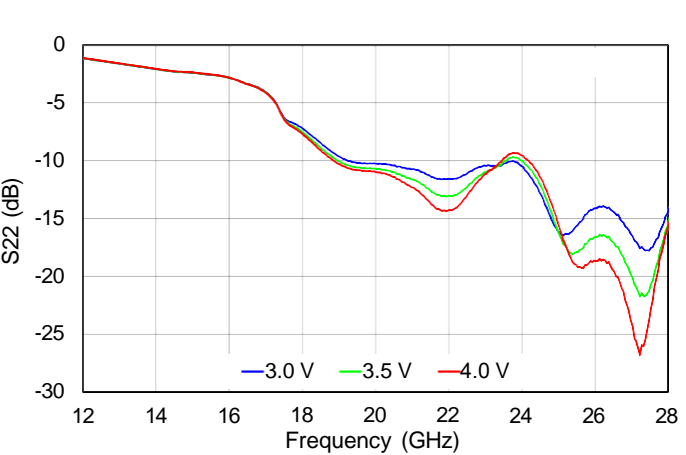
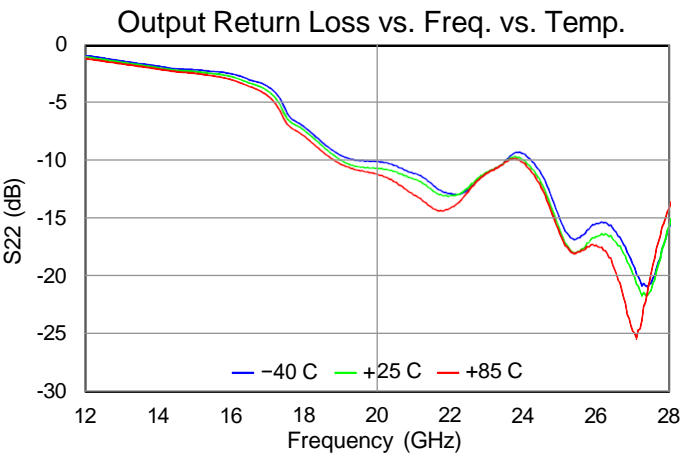
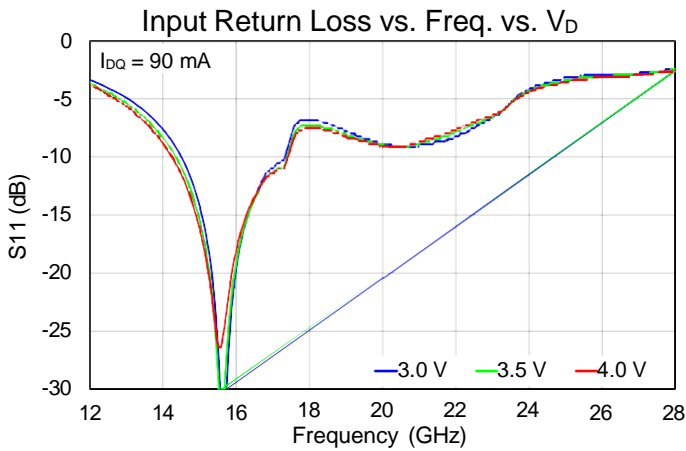
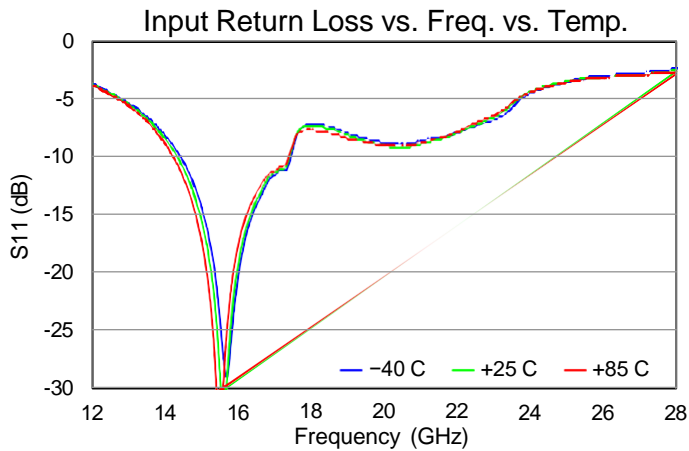
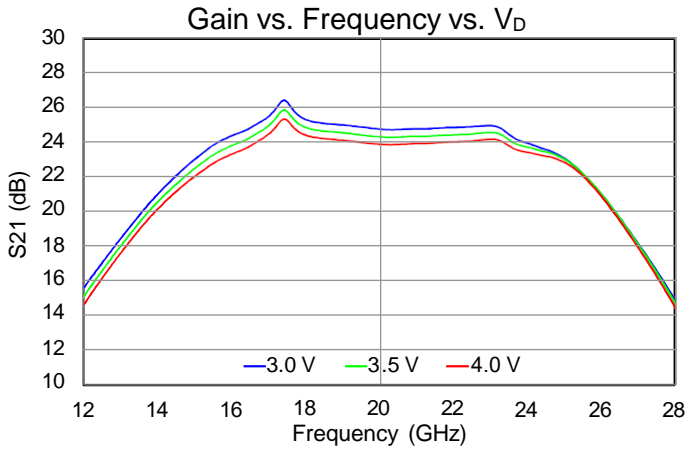
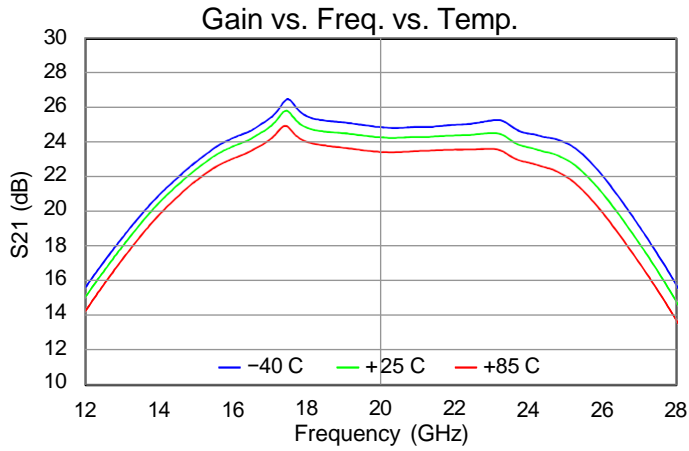
Electrical Specifications

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

Parameter	Min	Typical	Max	Units
Frequency	17		22	GHz
Small Signal Gain	20	25		dB
Noise Figure		1.3		dB
1-dB Compression Point		20		dBm
Input Return Loss		12		dB
Output Return Loss		17		dB
3 RD Order Intermodulation level ($P_{out}=0$ dBm/tone)		-55		dBc
Output TOI ($P_{out}=0$ dBm/tone)		28		dBm
Gain Temperature Coefficient		-0.013		dB/°C

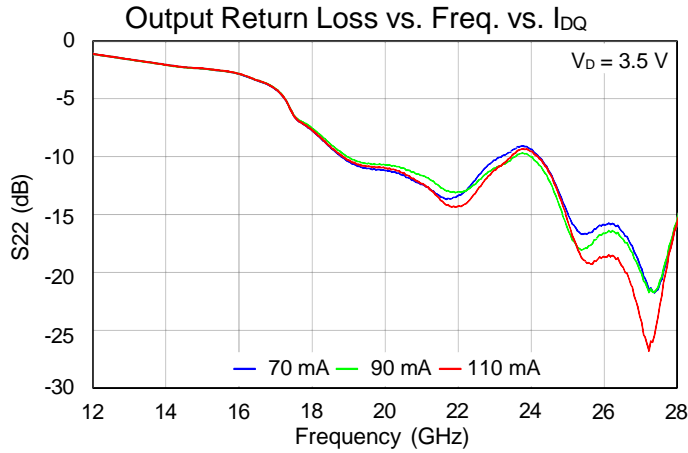
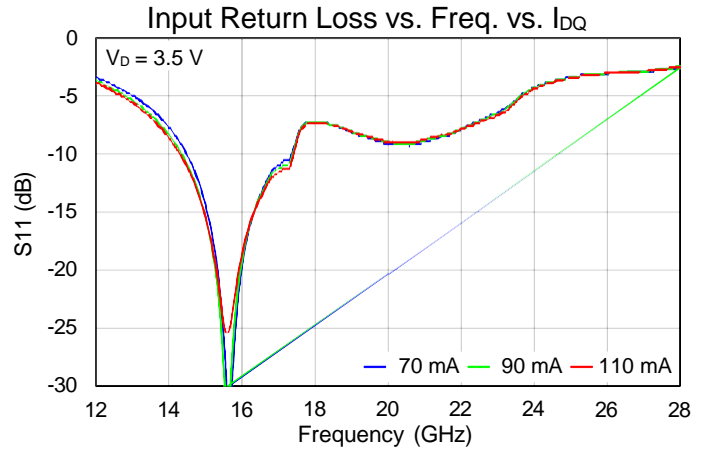
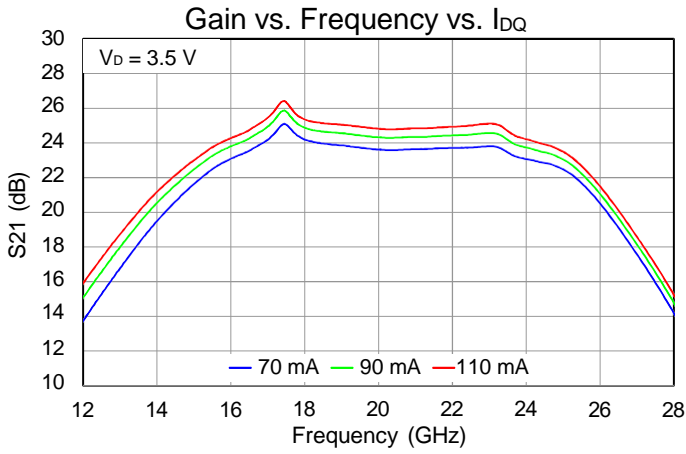
Small Signal Performance Plots

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



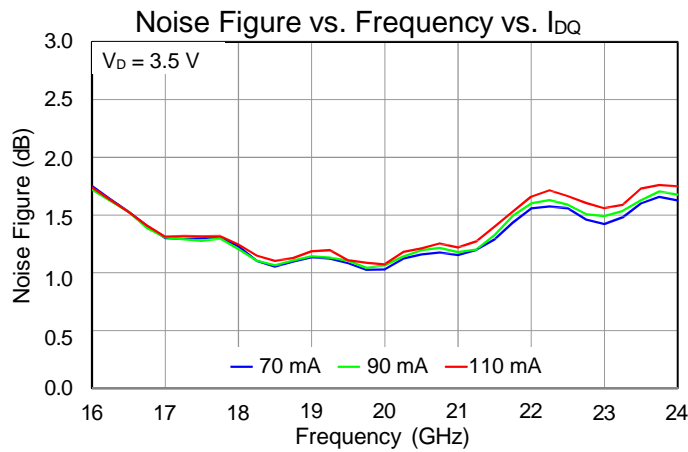
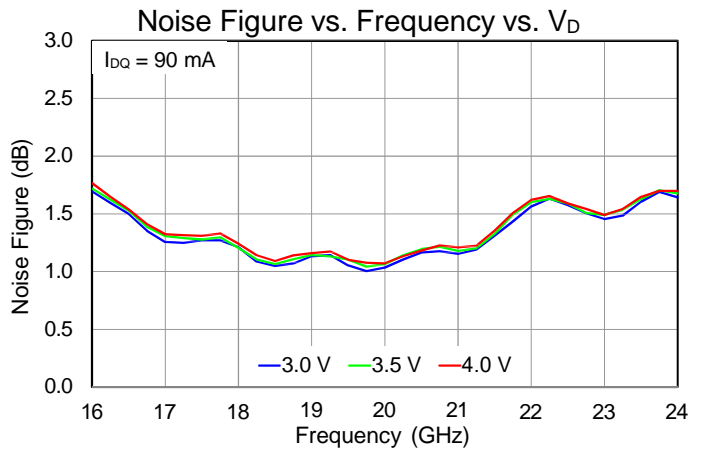
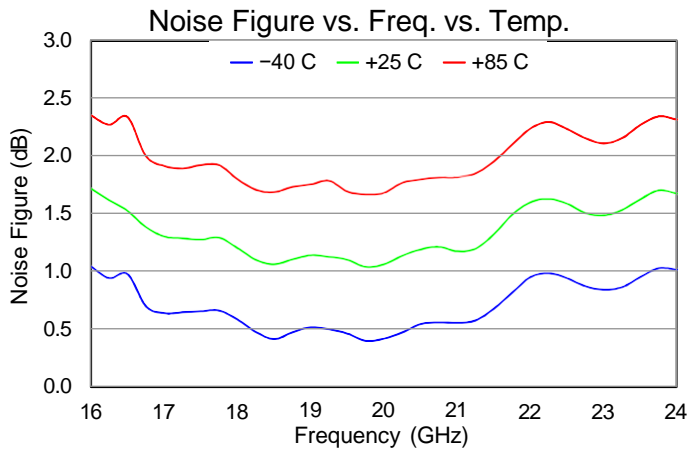
Small Signal Performance Plots

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



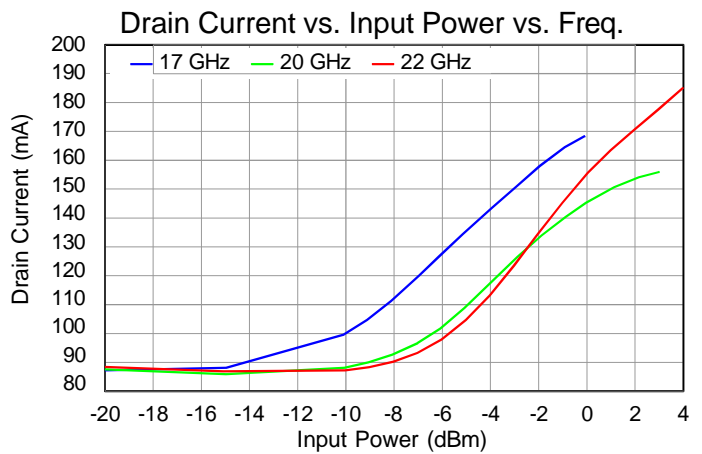
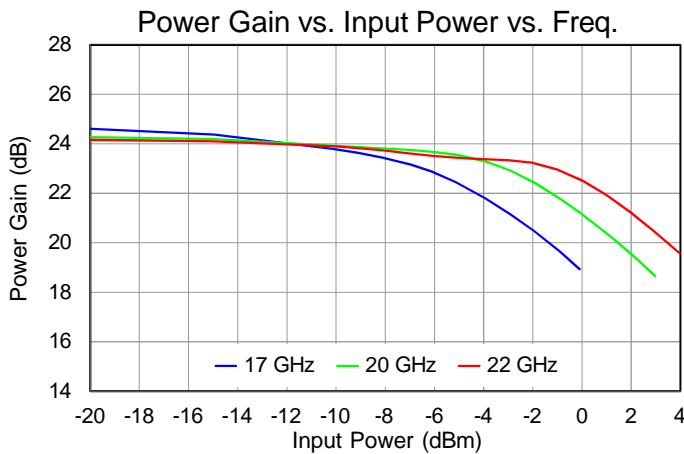
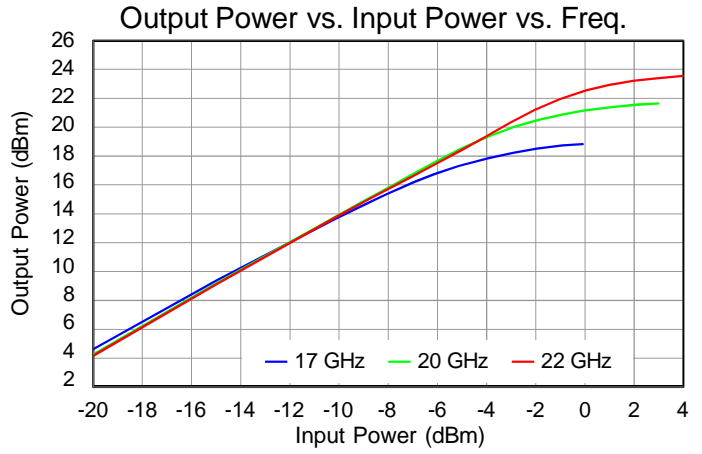
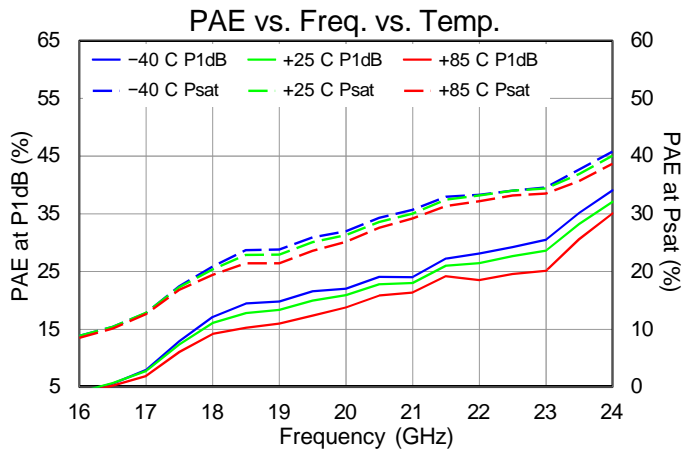
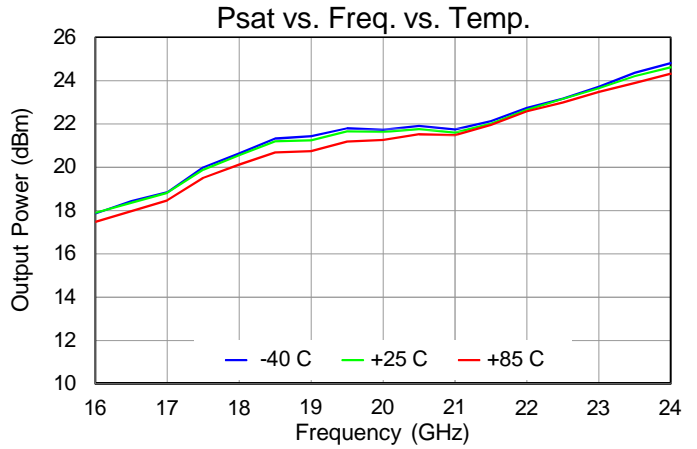
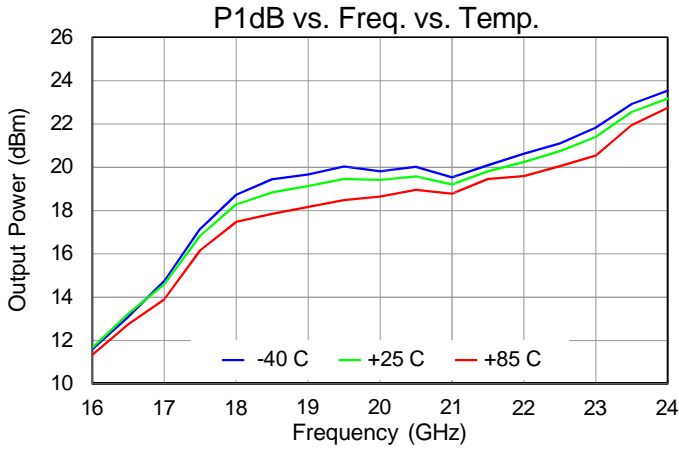
Noise Figure Performance Plots

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



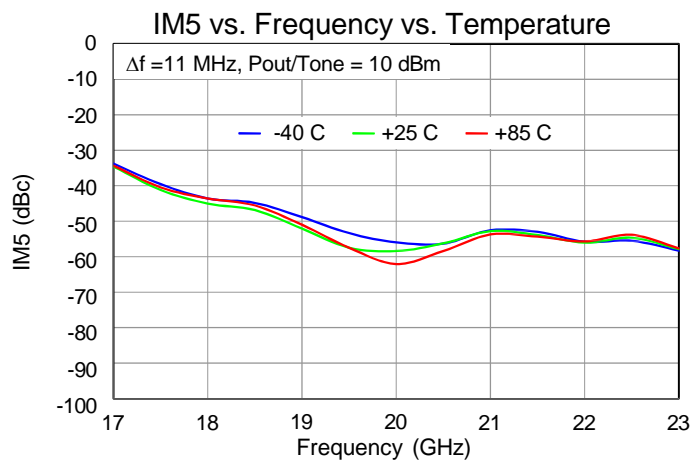
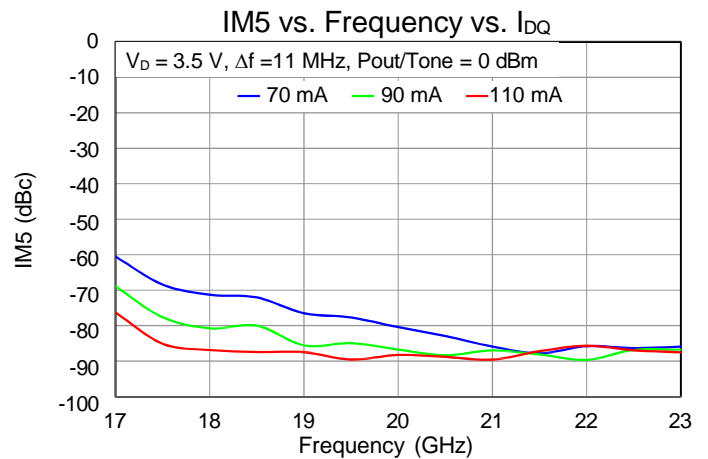
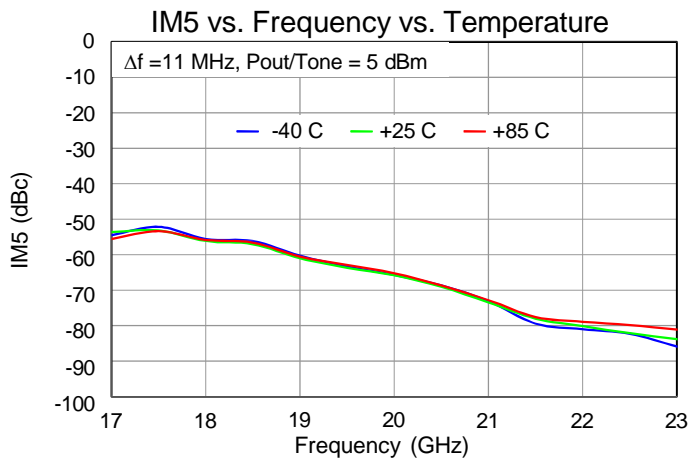
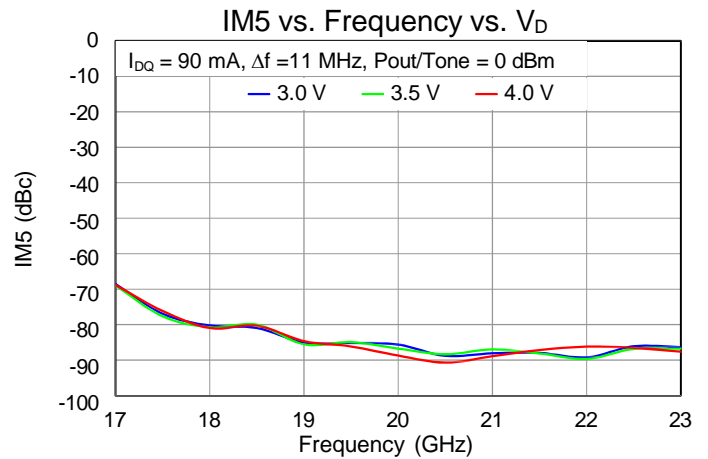
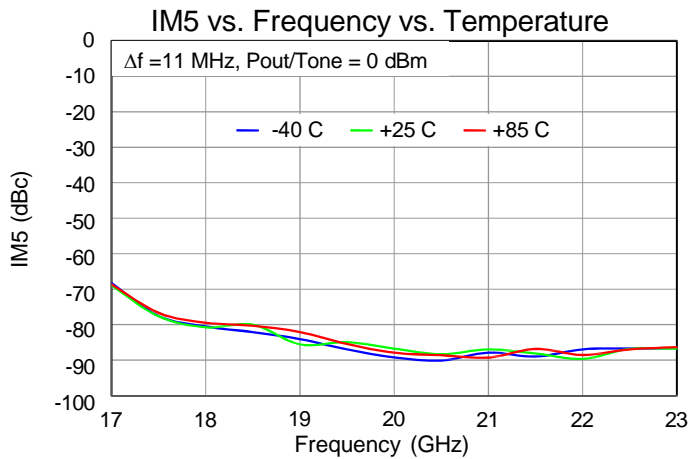
Large Signal Performance Plots

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

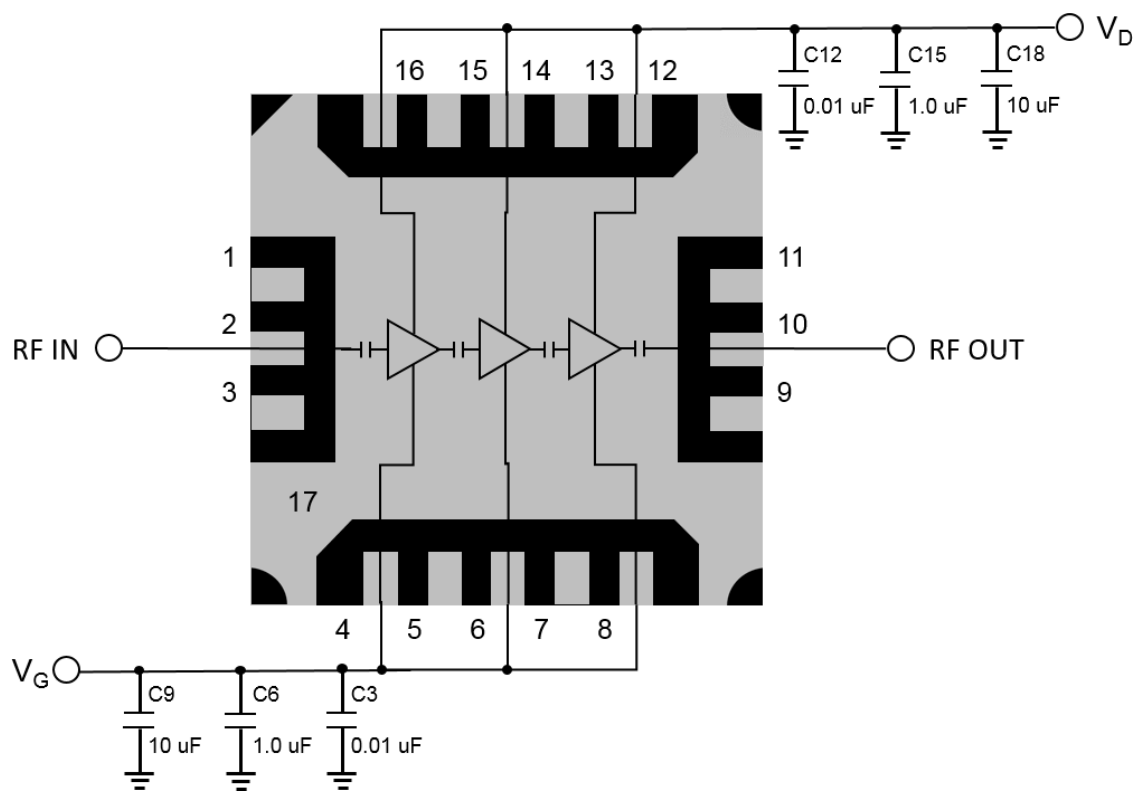


Linearity Performance Plots

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



Application Circuit



Bias-up Procedure

1. Set I_D limit to 220 mA, I_G limit to 10 mA
2. Set V_G to -1.5 V
3. Set V_D +3.5 V
4. Adjust V_G more positive until $I_{DQ} = 90$ mA
($V_G \approx -0.46$ V Typical)
5. Apply RF signal

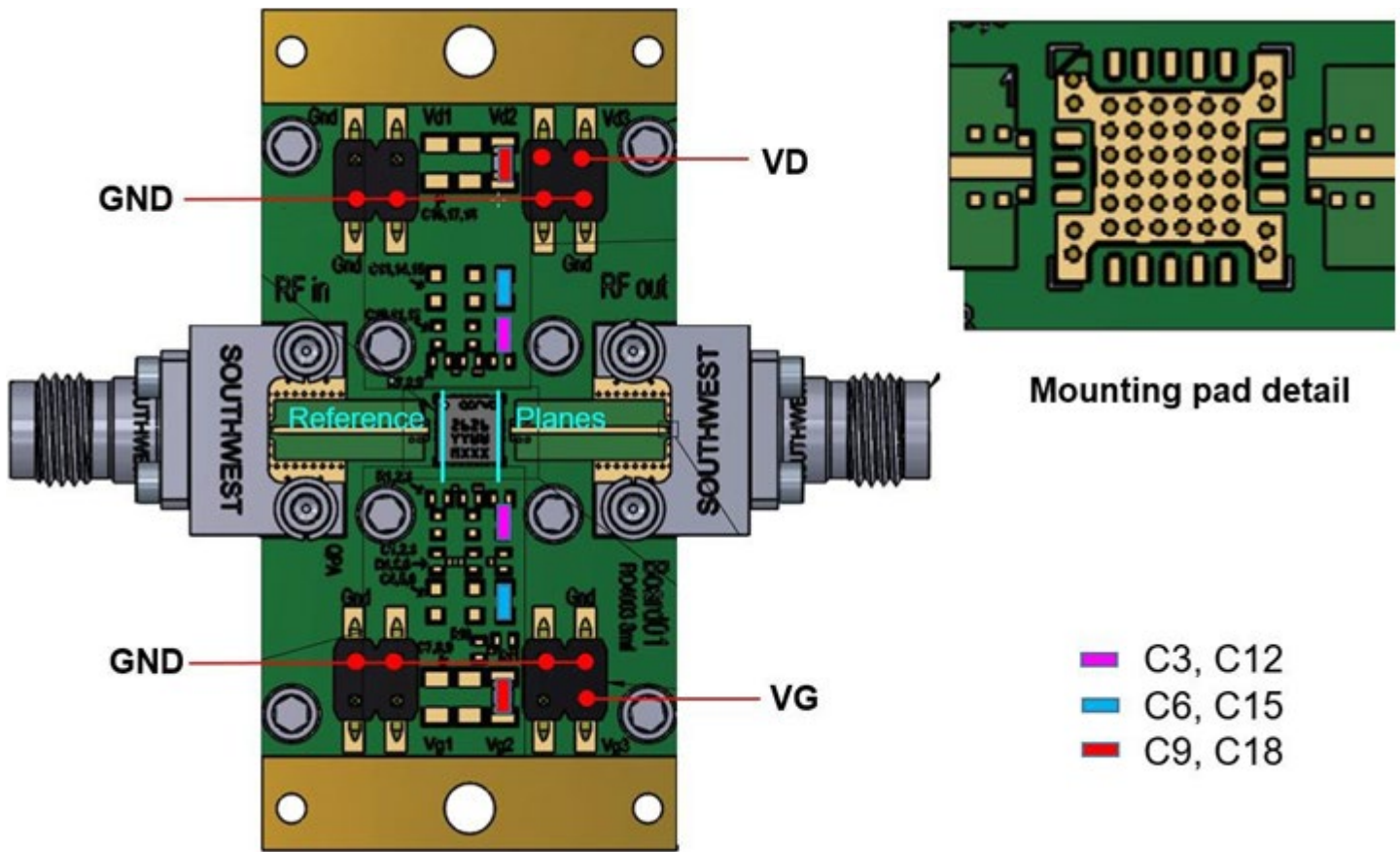
Bias-down Procedure

1. Turn off RF signal
2. Reduce V_G to -1.5 V. Ensure $I_{DQ} \approx 0$ mA
3. Set V_D to 0 V
4. Turn off V_D supply
5. Turn off V_G supply

Bill of Materials

Ref. Des.	Value	Description	Manuf.	Part Number
C3, C12	0.01 μ F	CAP 0.01 μ F +/-10% 50 V 0402 X7R ROHS	Various	
C6, C15	1.0 μ F	CAP 1.0 μ F +/-10% 16 V 0603 X7R ROHS	Various	
C9, C18	10 μ F	CAP CER 10 μ F 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

Evaluation Board and Mounting Detail



RF Layer is 0.008" thick Rogers Corp. RO4003C ($\epsilon_r = 3.35$). Metal layers are 0.5 oz. copper. The microstrip line at the connector interface is optimized for the Southwest Microwave end launch connector 1492-04A-5.

All data de-embedded to the device reference plane (shown).

Ref. Des.	Component	Value	Manuf.	Part Number
C3, C12	Surface Mount Cap.	CAP 0.01 μF +/-10% 50V 0402 X7R ROHS	Various	
C6, C15	Surface Mount Cap.	CAP 1.0 μF +/-10% 16V 0603 X7R ROHS	Various	
C9, C18	Surface Mount Cap.	CAP CER 10 μF 10V X7R 10% 0805 TDK ROHS	Various	

Ordering Information

Order Code	Description	Package	Shipping Method
TDLNA2626SEP	17 – 22 GHz Low Noise Amplifier Flight Parts	16-QFN	Tray
TDLNA002626EP	17 – 22 GHz Low Noise Amplifier EM Parts	16-QFN	Tray

Revision Information

Document	Description / Date	Change/Revision Details
TDLNA002626SEP-10-2022 Rev 0.5	TDLNA002626SEP / Oct 2022	Initial Release: Preliminary Specification
TDLNA2626SEP-11-2022 Rev 0.5	TDLNA2626SEP / Nov. 10, 2022	Change PN to TDLNA2626SEP
TDLNA2626SEP-06_2023 Rev 0.7a	TDLNA2626SEP / June 6, 2023	Public Domain Revision, Add Page Numbers, change to 22 GHz throughout

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

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

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