AMPLIFIER, HIGH GAIN, 0.1 – 2.0 GHz

Part Numbers: KA122

Preliminary Data Sheet

KA122 is a InGaP HBT high gain LNA in a 4-lead Micro-X Hermetic Surface-Mount Technology (SMT) package for Harsh Environments including Defense and Satellite application. This device can be ordered with the 100% screening requirements of MIL-PRF-38535 Class B and S.

Features

- High Gain 0.01-1GHz
- 23+dBm IP3 to 2GHz
- 10+ dBm OP1dB to 1GHz

Applications

- Telecom Infrastructure
- Test Equipment

Revision History

Revision	Description	Release Date
1.0	Initial Release	7/20/2023

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1.0 Electrical Characteristics

(VCC = +11V, TOP = -40 TO +85 °C, PIN = = -20 dBm, Z0 = 50 Ω)

Table 1. Electrical Characteristics						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typical**	**Max**	**Units**
Gain	|S21|	0.1-0.5GHz 0.5-1.0GHz 1.0-2.0GHz	27.5 24.5 18.5	30.3 26.6 21.5		dB dB dB
Input Return Loss	|S11|	0.1-0.5GHz 0.5-1.0GHz 1.0-2.0GHz	12.5 13.4 9.5	15.1 16.2 12.1		dB dB dB
Output Return Loss	|S22|	0.1-0.5GHz 0.5-1.0GHz 1.0-2.0GHz	10.0 10.0 9.5	12.9 12.4 10.7		dB dB dB
Supply Current	I_{CC}	0.1-2.0GHz		35		mA

1/ Performance is guaranteed only under the conditions listed in Table 1

2/ See plots for more details

2.0 Operating Characteristics

(VCC = 11 V, TOP = -40 TO 85 °C, PIN = -20 dBm, Z0 = 50 Ω)

Table 2. Dynamic Operating Characteristics						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typical**	**Max**	**Units**
1 dB Output Compression Point	OP1dB	100 MHz 500 MHz 1.0 GHz 2.0 GHz	11.5 11.0 10.5 6.5	12.9 12.1 11.7 8.0		dBm dBm dBm dBm
Output 3rd Order Interception Point	OIP3	100 MHz 500 MHz 1.0 GHz 2.0 GHz	27.5 26.5 24.0 21.0	29.0 27.7 26.1 22.5		dBm dBm dBm dBm
Noise Figure	NF	0.1 – 2.0 GHz		2.75	4.0	dB

3.0 Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings				
Parameter	**Symbol**	**Min**	**Max**	**Units**
Operating Current	V_{CC}	0	65	mA
RF Input Power (V_{CTL} > 0.9GHz) 1/	P_{IN}		+13.0	dBm
Operating Temperature	T_{OP}	-40	+85	°C
Dissipated Power (Continuous)			0.25	W

1/ Maximum power for junction temperature to remain below maximum in worst-case conditions

Note: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to the device with only one parameter set at the limit and all other parameters set at or below their nominal value.

Caution: Class 1A (HBM 250V) Electrostatic Sensitive Device. Proper ESD precaution should be used when handling device.

4.0 Plots

(VCC = 5V, PIN = -20 dBm, Z0 = 50 Ω)

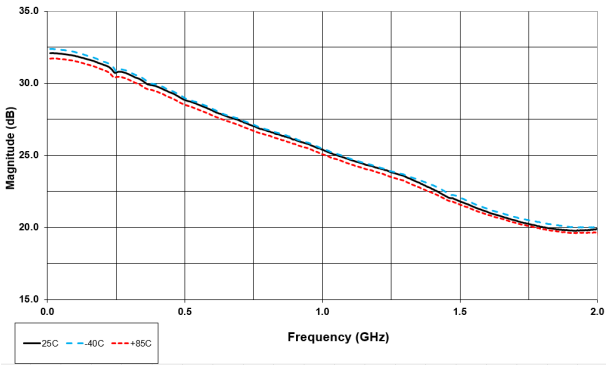


Figure 1. Gain Over Temperature

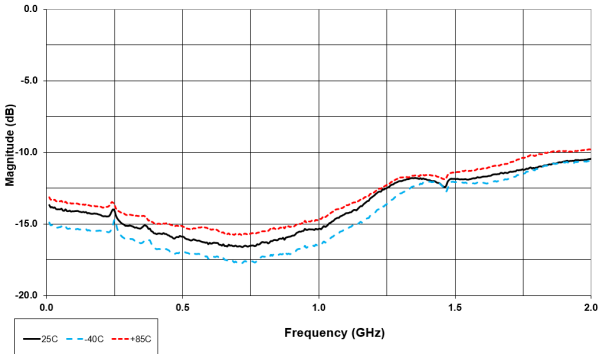


Figure 2. Input Return Loss Over Temperature

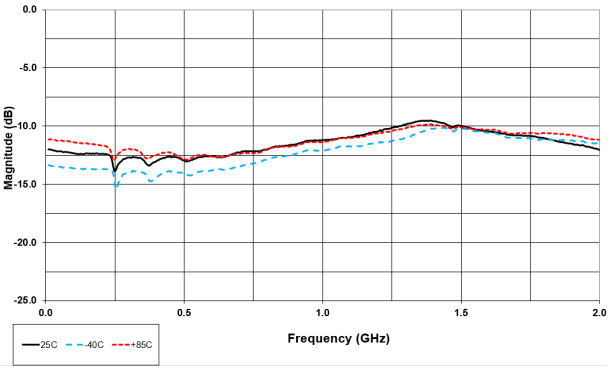


Figure 3. Output Return Loss Over Temperature

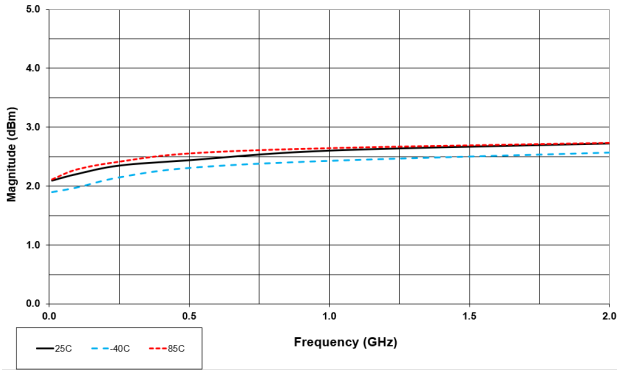


Figure 4. Noise Figure Over Temperature

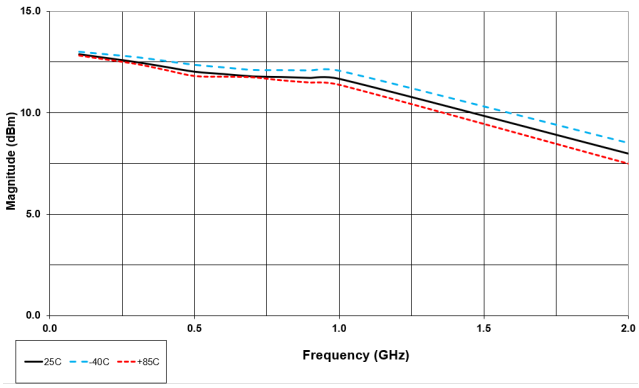


Figure 5. OP1DB Over Temperature

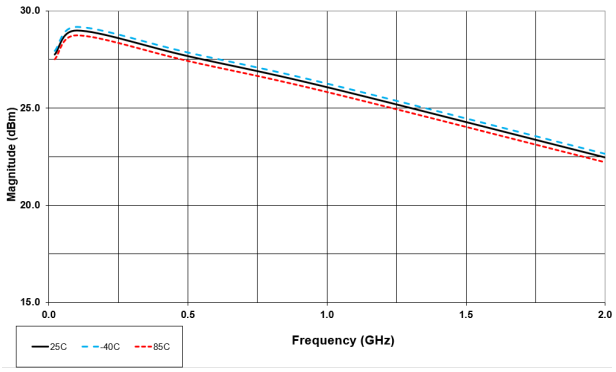


Figure 6. OIP3 Over Temperature

5.0 Test Fixture

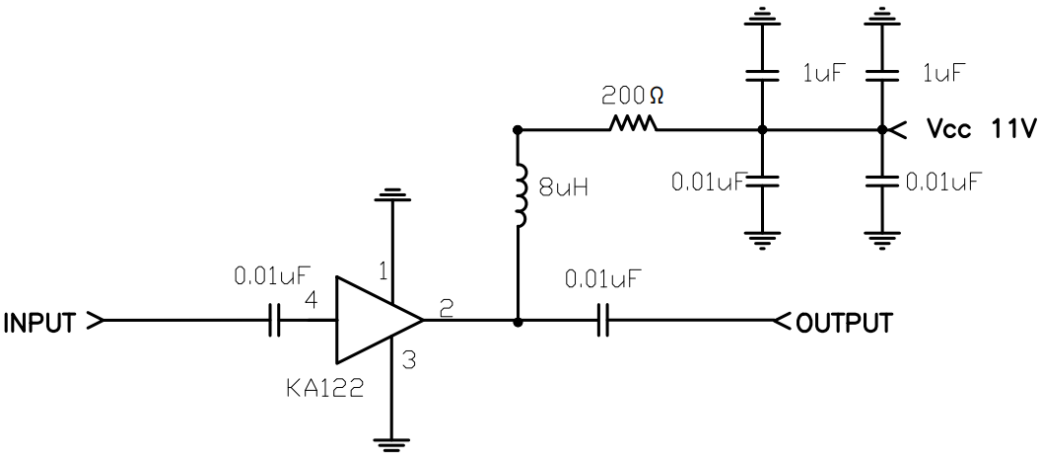


Figure 7. Test Fixture Schematic

1. R_{BIAS} set to 200Ω to achieve typical supply current of 35mA.
2. Modify R_{BIAS} to achieve supply current sufficient for higher power.
3. For optimal performance, broadband conical inductor is used (PN CC110T47K240G5-C or equivalent).

6.0 Solder Layout

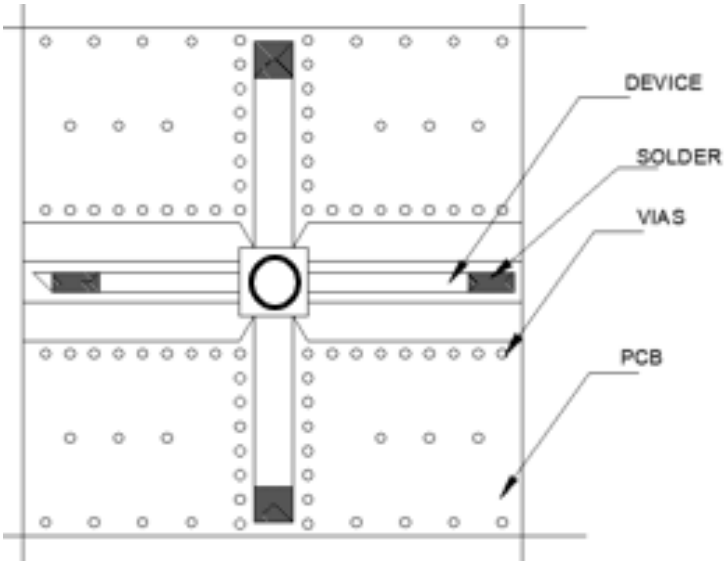
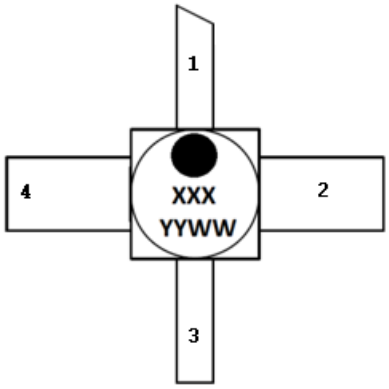


Figure 8. Solder Layout

1. Ports 2 and 4 soldered to ground plane
2. Contact Micross Hi-Rel RF Solutions for further guidance on device placement and attachment

7.0 Device Marking/Pin Out



XXX = Serial # Will be Added for Class B and S Part #s

Figure 9. Device Marking/Pin Out

Package:

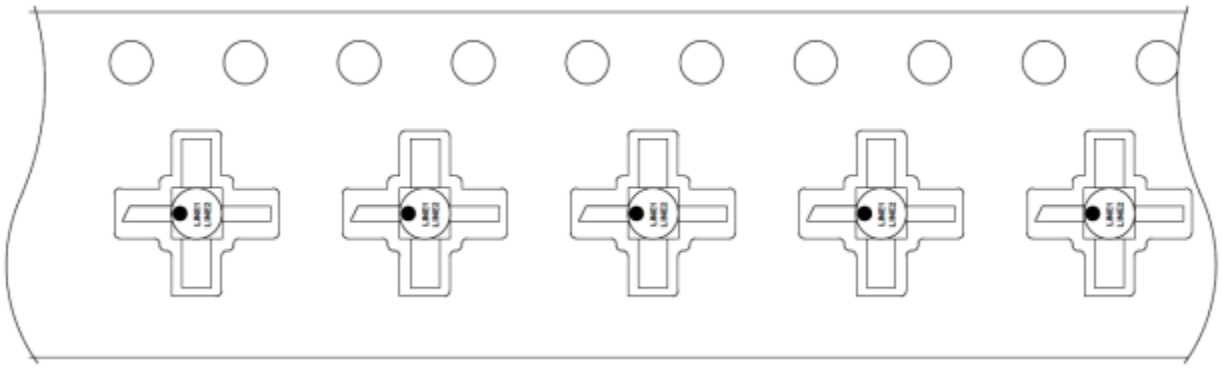
- Lid: ASTM F 15 Alloy
- Base/Walls: Alumina
- Lid/Bottom Finish: Gold over Nickel

Additional

- Maximum reflow temperature: 265°C for 90 seconds maximum

Table 4. Pin Layout	
Pin	**Designation**
1	RF Input
2	GND
3	RF Output
4	GND

8.0 Tape and Reel



W: 12mm
P0: 4mm

P1: 8mm
P2: 2mm

Figure 10. Tape and Reel

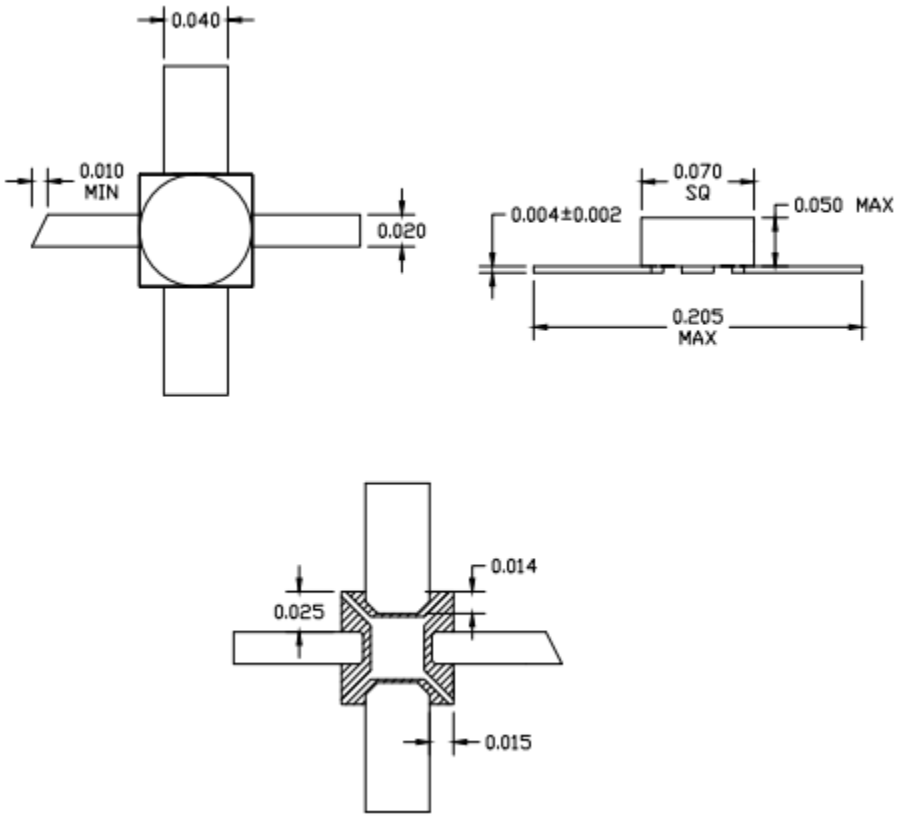


Figure 10. Outline

Dimensions are in inches

9.0 Screening Flow

Table 5. Screening Flow				
Test Inspection	**MIL-STD-883**		**Requirement**	
	Method	Condition	Class B	Class S
Wafer Lot Acceptance /1	5007		N/A	Per Wafer Lot
Non-Destructive Bond Pull	2023		SPC	SPC
Internal Visual	2010	A = Class S, B = Class B	100%	100%
Temperature Cycle	1010	C	100%	100%
Acceleration	2001	E (Y1 Only)	100%	100%
PIND	2020	A (5 Cycles)	N/A	100%
Serialization	Per Product Specification		100%	100%
Radiographic	2012	2 Views	N/A	100%
Electrical Test	Small Signal Testing	+25°C	100%	100%
Burn In	1015	A	100%/160 Hours/85°C	100%/240 Hours/85°C
Final Electrical	Small Signal Testing	+25°C	100%	100%
PDA Calculation	5004	25% Δ Gain / 10% Δ I_{CC}	5%	5%/3% Functional
Group A Electrical /5	Per Product Specification	-40°C + 85°C	45/0	45/0
Leak Test	1014 A and C	1 x 10 -8 Max	100%	100%
External Visual	2009		100%	100%

1/ Product under configuration control per Micross QAP 015.

2/ Customer will be notified of all class 1 changes for Class B and S part numbers.

3/ Wafer Lot Acceptance will include 100% die visual, SEM analysis and Lot Traceability.

4/ Electrical Test Data will be recorded for each serial number and included in Final Test Report for all Class S part numbers.

5/ Group A Electrical testing will include the Small Signal at the Min/Max operating condition. The Dynamic test (P1dB, IP3, NF) will be tested at +25c only.

10.0 Order Information

Table 6. Ordering Information			
Part Number	**Unscreened**	**Class B**	**Class S**
#	KA121C	KA121B	KA121S