AMPLIFIER, LOW NOISE 1.3 – 3.0 GHz

Part Numbers: KA107

Preliminary Data Sheet

The KA107 is a GaAs pHEMT broadband Low Noise Amplifier with high linearity in a hermetic Surface-Mount Technology (SMT) package for high reliability applications. This Amplifier offers excellent gain, Low noise and high linearity from 1.3 to 3.0 GHz. It can be supplied and tested to the screening requirements of MIL-PRF-38535 Class B and S in addition to the required QCI.

Features

- High Gain: 20 dB typical @ 1.5 GHz
- Low Noise Figure: 0.8 dB typical @ 1.5 GHz
- High OP1dB: +22 dBm typical
- NASA EEE-INST-002 compliant
- High Reliability Class B and S screening available

Applications

- PA Driver
- Cascaded Gain Block
- GPS Transceivers
- IF Amplifier

Revision History

Revision	Description	Release Date
-	Initial Release IAW CDCO-1837	3/21/18
A	Updated IAW CDCO-1900	2/13/19
B	Updated IAW CDCO-2122	7/27/21
C	Updated IAW CDCO-2145	11/9/21
C1	Updated IAW CDCO-2180	6/3/22
C2	Updated IAW CDCO-2218	11/1/22
D	Updated IAW CDCO-2276	9/15/23

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1.0 Electrical Characteristics

(V_{DD} = +5 V, T = -40 to +85 °C)

Table 1. Electrical Characteristics 1/ 2/						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typical**	**Max**	**Units**
Gain	|S21|	1.3 – 2.0 GHz 2.0 – 3.0 GHz	20.0 18.0			dB dB
Input Return Loss	|S11|	1.3 – 3.0 GHz		11		dB
Output Return Loss	|S22|	1.3 – 3.0 GHz		11		dB
Supply Current	I_{DD}	V_{DD} = +5 V		65	85	mA

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

2/ See plots for more details

2.0 Dynamic Operating Characteristics

(V_{DD} = +5 V, T = -40 to +85 °C)

Table 2. Dynamic Operating Characteristics						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typical**	**Max**	**Units**
1 dB Output Compression Point	OP1dB	1.3 – 3.0 GHz		22		dB
Output 3rd Order Interception Point **1/**	OIP3	1.3 – 3.0 GHz		38		dB
Noise Figure	NF	1.3 – 3.0 GHz		0.8	1.5	dB

1/ ±1% tone spacing

3.0 Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings				
Parameter	**Symbol**	**Min**	**Max**	**Units**
Supply Voltage	V_{CC}		6.0	V
RF Input Power	P_{IN}		+20.0	dBm
Operating Temperature	T_{OP}	-40	+85	°C
Storage Temperature	T_{ST}	-65	150	°C
Junction Temperature (MTTF>10^6 Hrs)	T_J		170	°C
Thermal Resistance	θ_{JC}		98	°C/W
Dissipated Power (Continuous)			0.5	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 1B (HBM 500V) Electrostatic Sensitive Device. Proper ESD precaution should be used when handling device.

4.0 Plots

(V_{DD} = 5 V)

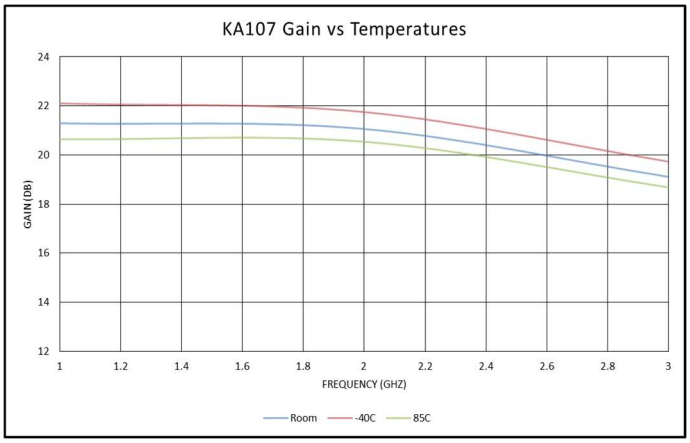

Figure 1. Gain vs. Frequency (-40, +25, +85 °C)

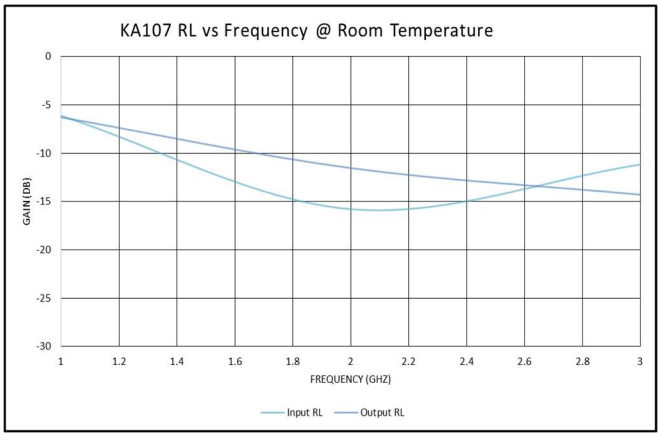

Figure 2. Return Loss vs. Frequency (+25 °C)

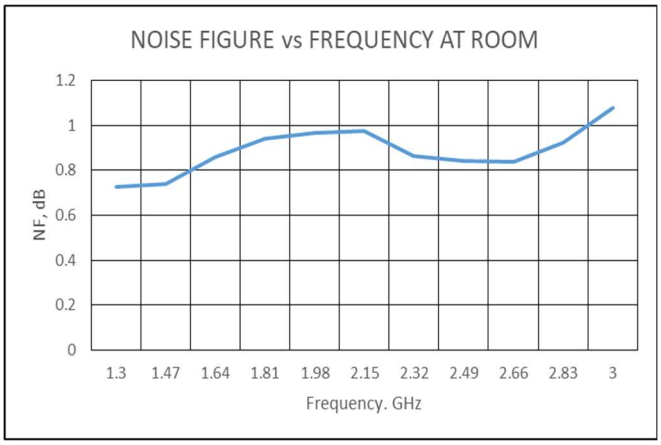

Figure 3. Noise Figure vs. Frequency (+25 °C)

5.0 Test Fixture

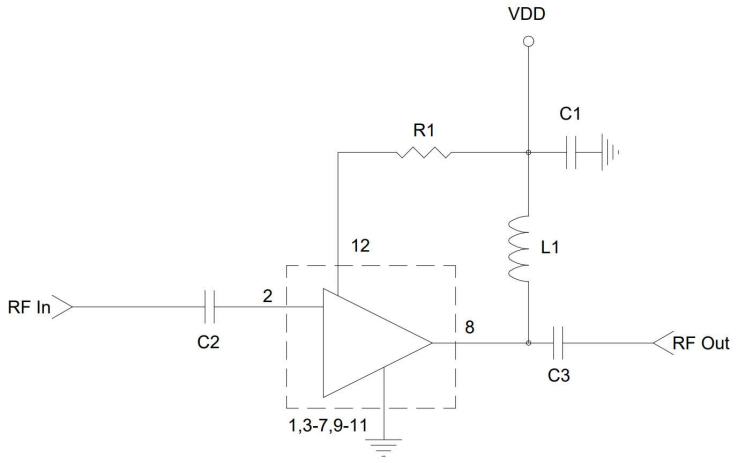

Figure 4. Test Fixture Schematic

1. R_1 set selected to achieve desired I_{DD}

Table 4. Component List				
Component	**Part Number**	**Manufacturer**	**Description**	**Value**
C1	600F200FT250XT	ATC	0805 Capacitor	20 pF
C2	CGA3E2X8R1H103K080AA	TDK	0603 Capacitor	10,000 pF
C3	CGA3E2X8R1H103K080AA	TDK	0603 Capacitor	10,000 pF
L1	IMC0805ERR10J01	VISHAY/DALE	0805 Inductor	100 nH
R1	RC0805FR-072K74L	YAGEO	0805 Resistor	2.74 kΩ

6.0 Solder Layout

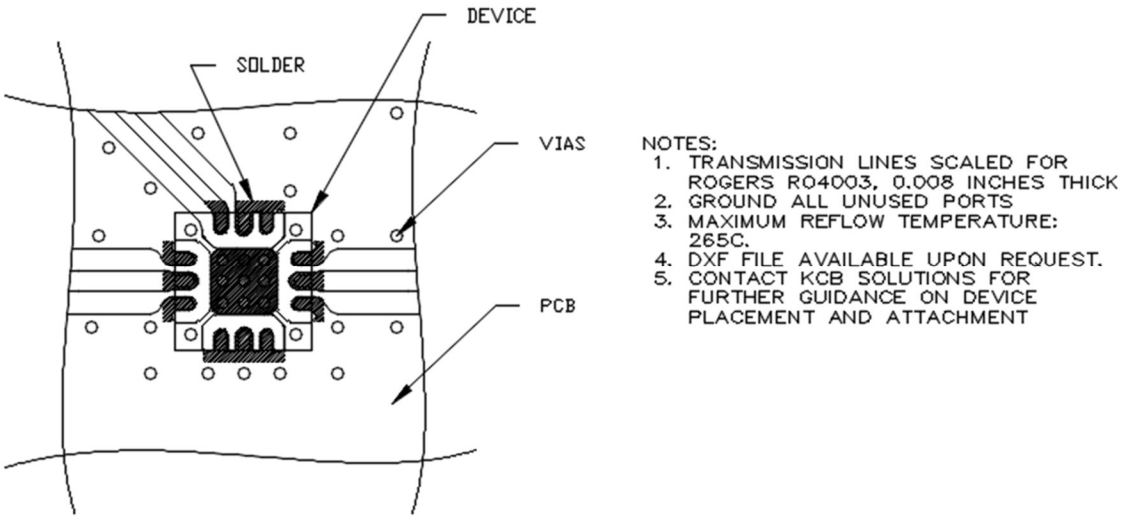

Figure 5. Solder Layout

1. Contact Micross Hi-Rel RF Solutions for further guidance on device placement and attachment

7.0 Device Marking/Pin Out

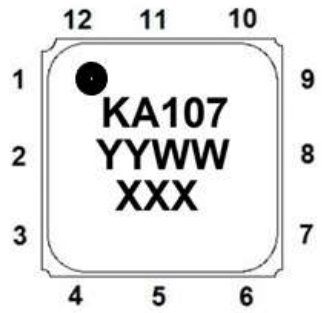

Table 5. Pin Layout			
Pin	**Designation**	**Pin**	**Designation**
1	GND	7	GND
2	RF In	8	RF Out / V_{DD}
3	GND	9	GND
4	GND	10	GND
5	GND	11	GND
6	GND	12	V_{enable}

Figure 6. Device Marking/Pin Out

Package:

- Lid: ASTM F-15 Alloy
- Base/Walls: Alumina
- Lid/Bottom Finish: Gold over Nickel
- KA107: Part Number
- YYWW: Lot Date Code
- XXX: Serial Number (added for class B and S devices only)

Additional

- Maximum reflow temperature: 265°C for 90 seconds maximum
- Package base is RF ground
- External blocking capacitors required on all RF ports

8.0 Tape and Reel

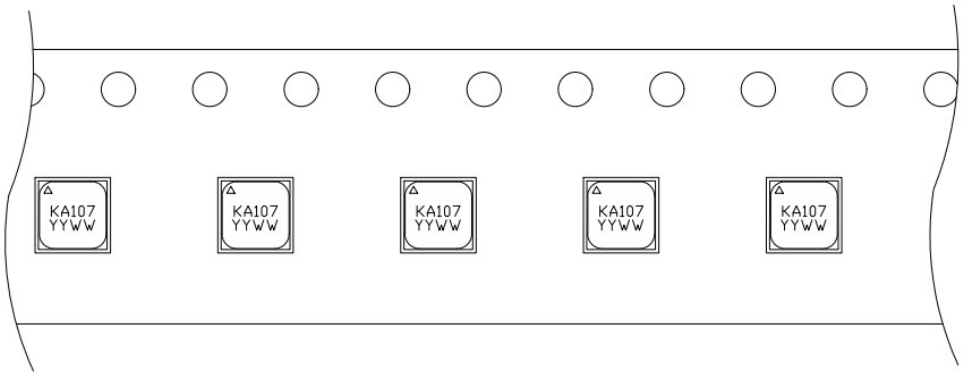

Figure 7. Tape & Reel

W: 12mm
P0: 4mm
P1: 8mm
P2: 2mm

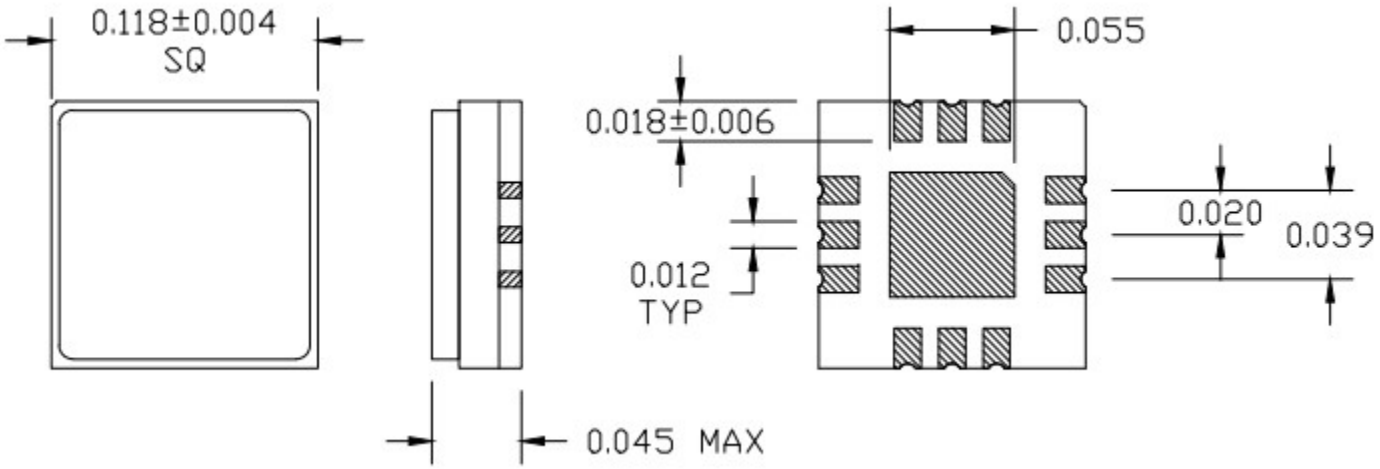

Figure 8. Outline

Dimensions are in inches

9.0 Screening Flow

Table 6. 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/125°C	100%/240 Hours/125°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 7. Ordering Information			
Part Number	**Upscreened**	**Class B**	**Class S**
#	KA107C	KA107B	KA107S