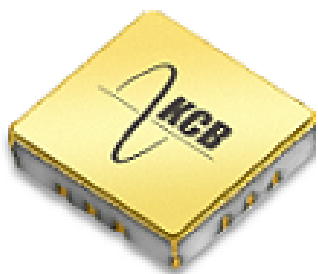


KA113

Amplifier,
Low Noise
0.02 – 8.0 GHz

DESCRIPTION

The KA113 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 20 MHz to 8.0 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: 18 dB typical @ 2 GHz.
- ✓ Low Noise Figure: 1.4 dB typical @ 2 GHz.
- ✓ High OIP3dB: +38 dBm typical @ 2 GHz.
- ✓ NASA EEE-INST-002 compliant.
- ✓ High Reliability Class B and S Screening Available.
- ✓ See Page 5 for MFR HI –REL Ordering Details.

APPLICATIONS

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

ELECTRICAL CHARACTERISTICS (-40 to +85 C)¹

Parameter	Symbol	Conditions	Min	Typical	Max	Units
Gain	S ₂₁	0.02 – 2.0 GHz	17	18		dB
		2.0 – 4.0 GHz	14	16		
		4.0 – 8.0 GHz	10	12		
Input Return Loss	S ₁₁	0.02 – 2.0 GHz	8	10		dB
		2.0 – 4.0 GHz	12	14		
		4.0 – 8.0 GHz	7	9		
Output Return Loss	S ₂₂	0.02 – 2.0 GHz	7	9		dB
		2.0 – 4.0 GHz	4	6		
		4.0 – 8.0 GHz	2	4		
Supply Current	I _{DD}	VDD = 5V		86	90	mA

1. All electrical characteristics are measured at +25 C at a minimum.

KA113 | Amplifier, Low Noise 0.02 – 8.0 GHz

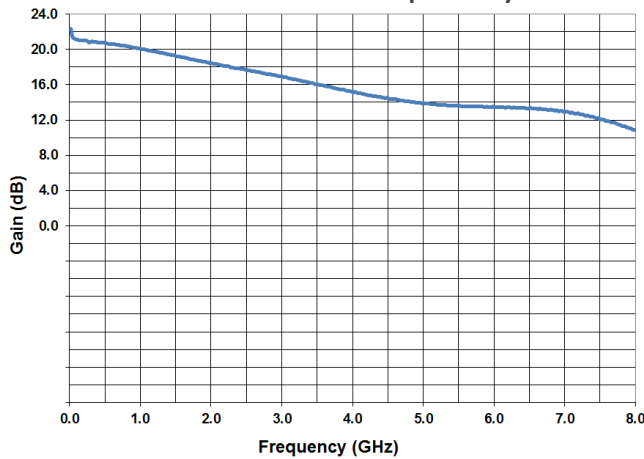
OPERATING CHARACTERISTICS (-40 TO +85 °C)¹

Parameter	Symbol	Conditions	Min	Typical	Max	Units
Output Compression Point	OP1dB	0.02 – 2.0 GHz	+21	+23		dBm
		2.0 – 4.0 GHz	+19	+21		dBm
		4.0 – 8.0 GHz	+18	+20		dBm
3rd order output intercept point (+/- 1% spacing)	OIP3	0.02 – 2.0 GHz	+35	+38		dBm
		2.0 – 4.0 GHz	+33	+36		dBm
		4.0 – 8.0 GHz	+31	+34		dBm
Noise Figure	NF	0.02 – 2.0 GHz		1.3	1.7	dB
		2.0 – 4.0 GHz		1.5	2.0	dB
		4.0 – 8.0 GHz		2.2	3.2	dB

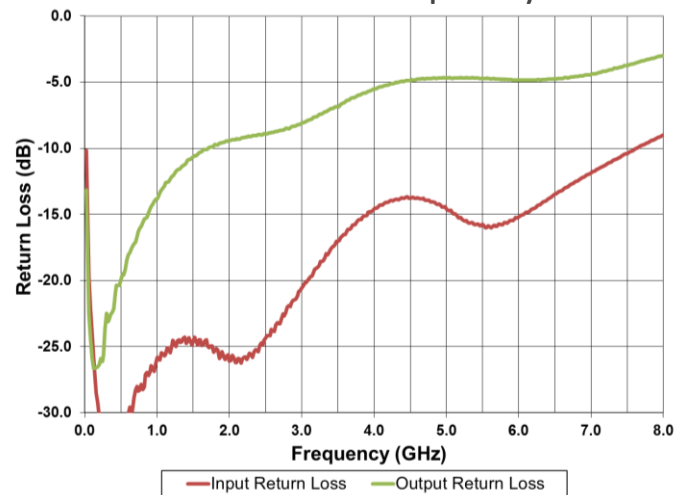
1. All operating characteristics are guaranteed over full performance temperature range but not tested.

TYPICAL PERFORMANCE (+25 °C)

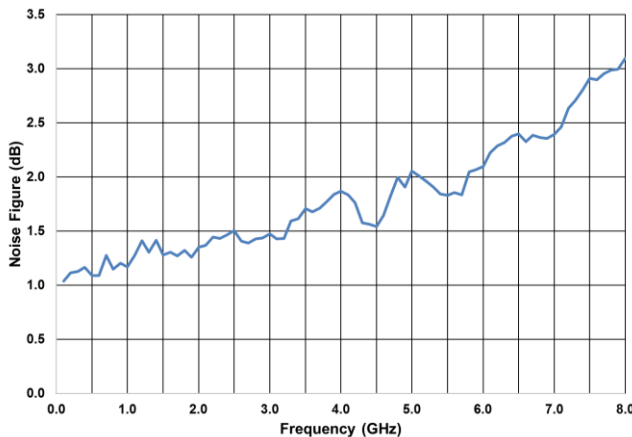
Gain vs Frequency



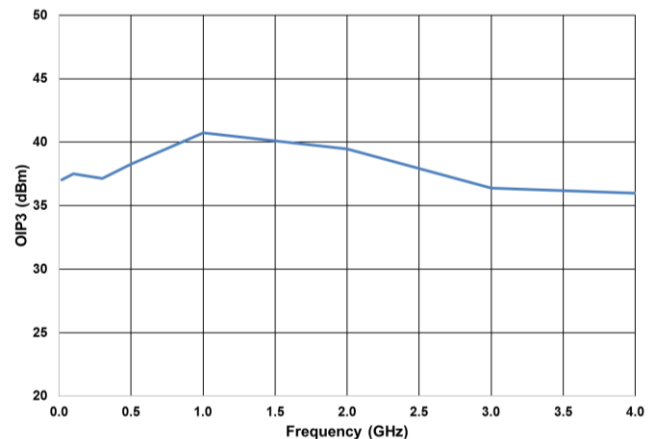
Return Loss vs Frequency



Noise Figure vs Frequency



OIP3 vs Frequency



KA113 | Amplifier, Low Noise 0.02 – 8.0 GHz

ABSOLUTE MAXIMUM RATINGS

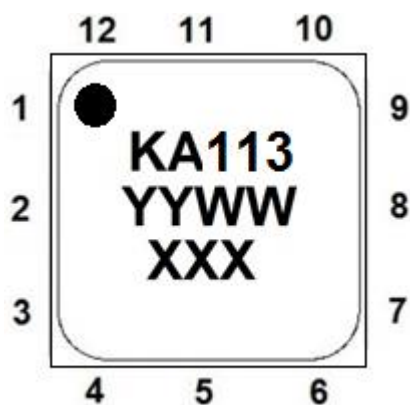
Characteristic	Min.	Typ.	Max.	Units
Supply voltage			6.0	V
RF Input power			+20	dBm
Operating temperature	-40		+85	°C
Storage temperature	-65		+150	°C
Channel temperature (MTTF > 170 Hrs)			+170	°C
Dissipated Power			1.5	W
Thermal resistance		52		°C/W
ESD sensitivity (HBM)	250 (Class 1A)			V



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

1. Unit shall survive operation without damage over the temperature range but not tested.

DEVICE MARKING/PIN OUT:



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_{SEL}

PACKAGE/MARKING NOTES:

- Lid: ASTM F-15 Alloy
- Base/Walls: Alumina
- Lid/Bottom Finish: Gold over Nickel
- KA113: Part Number
- YYWW: Lot Date Code
- XXX: Serial number (added for class B and S devices only)

ADDITIONAL NOTES:

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

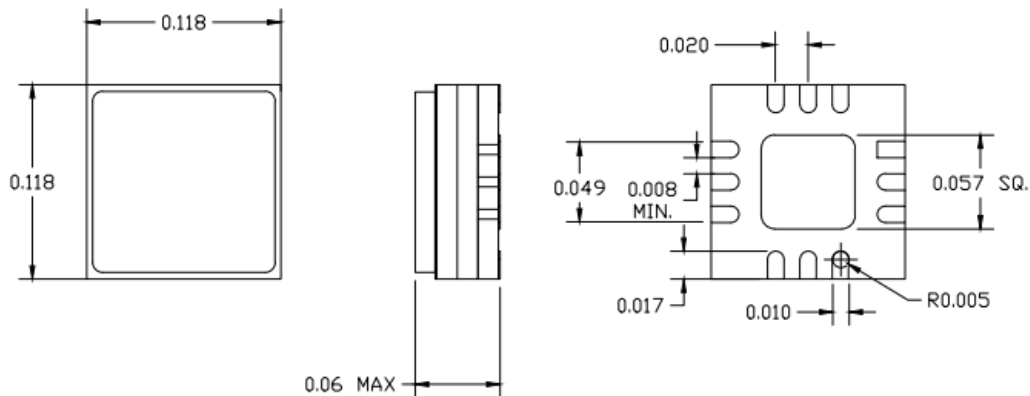


KA113 | Amplifier, Low Noise 0.02 – 8.0 GHz

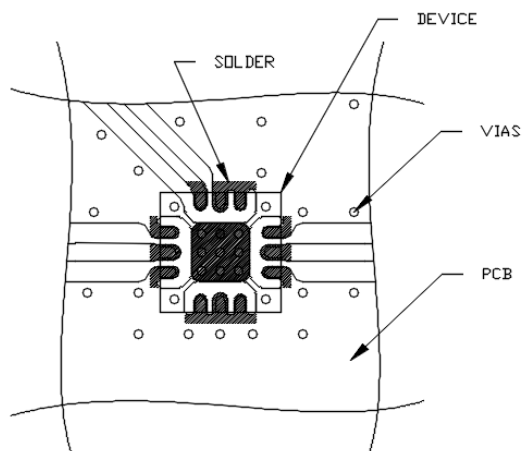
APPLICATION BOARD



OUTLINE:



RECOMMENDED SOLDER LAYOUT:

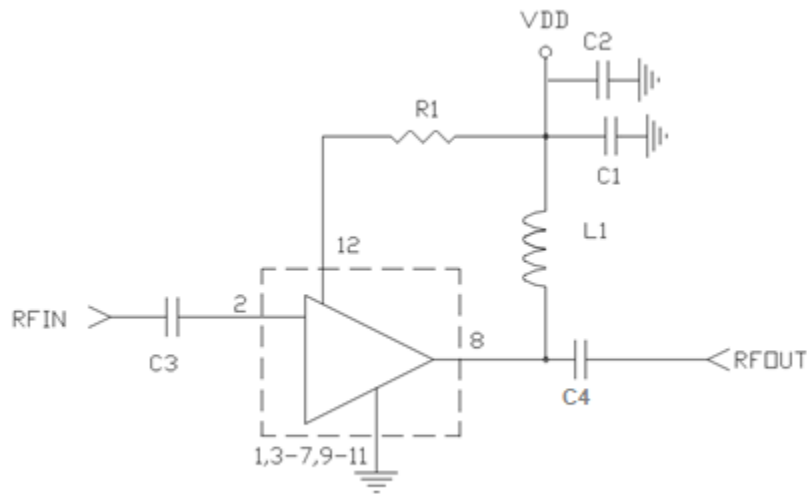


NOTES:

1. TRANSMISSION LINES SCALED FOR ROGERS R04003, 0.008 INCHES THICK
2. GROUND ALL UNUSED PORTS
3. MAXIMUM REFLOW TEMPERATURE: 265C.
4. DXF FILE AVAILABLE UPON REQUEST.
5. CONTACT KCB SOLUTIONS FOR FURTHER GUIDANCE ON DEVICE PLACEMENT AND ATTACHMENT

KA113 | Amplifier, Low Noise 0.02 – 8.0 GHz

SCHEMATIC

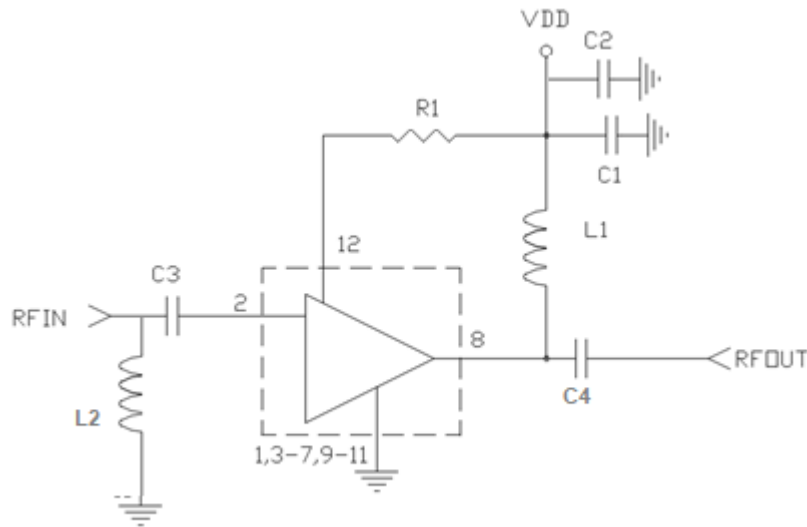


Low Frequency Configuration 0.02 GHz – 8.0 GHz

Components	Part Descriptions	Manufacturer	Part Number	Value
C1	0603 Capacitor	Kemet	C0805C104M5RAC7800	0.1 uF
C2	0805 Capacitor	ATC	600S200JW250XT	20 pF
C3, C4	0603 Capacitor	TDK	C1608NPO2E102J080AA	0.01 uF
L1	Conical Inductor	Piconics	CC21T36K240G5	1.65 uH
R1	0603 Resistor	Panasonic	ERJ-2RKF4990X	499 OH

KA113 | Amplifier, Low Noise 0.02 – 8.0 GHz

SCHEMATIC

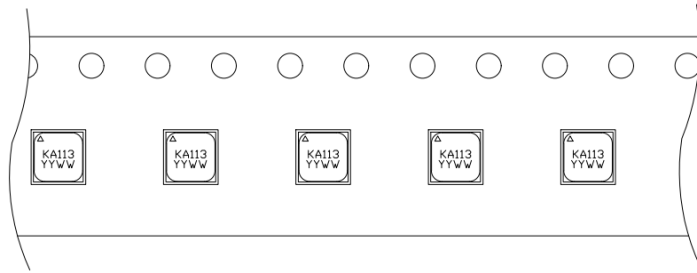


Standard Frequency Configuration (0.05 GHz-8.0 GHz)

Components	Part Descriptions	Manufacturer	Part Number	Value
C1	0603 Capacitor	Kemet	C0805C104M5RAC7800	0.1 uF
C2	0805 Capacitor	ATC	600S200JW250XT	20 pF
C3,C4	0603 Capacitor	TDK	C1608NPO2E103J080AA	0.01 uF
L1	0603 Inductor	CoilCraft	0603LS-561XJE	560 nH
L2	6003 Inductor	CoilCraft	0603LS-241XJE	240 nH
R1	0603 Resistor	Panasonic	ERJ-2RKF4990X	499 OH

KA113 | Amplifier, Low Noise 0.02 – 8.0 GHz

TAPE & REEL:



- W = 12MM
- PO = 4MM
- P1 = 8MM

SCREENING FLOW (MIL-PRF-38535):

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	+25OC	100%	100%
Burn In	1015	A	100%/160 Hours/ 125 °C	100%/320 Hours/ 125 °C
Final Electrical	Small Signal Testing	+25OC	100%	100%
PDA Calculation	5004	25% Δ IL / 100% Δ Icc	5%	5%/3% functional
Group A Electrical /5	Per Product Specification	-55OC + 125OC	45/0	45/0
Leak Test	1014 A and C	1 x 10 ⁻⁸ Max	100%	100%
External Visual	2009		100%	100%

Notes:

1. Product under configuration control per KCB 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, SS) will be tested at +25c only.

ORDERING INFORMATION:

	Unscreened	Class B	Class S
KCB Solutions Part Number	KA113C	KA113B	KA113S

