

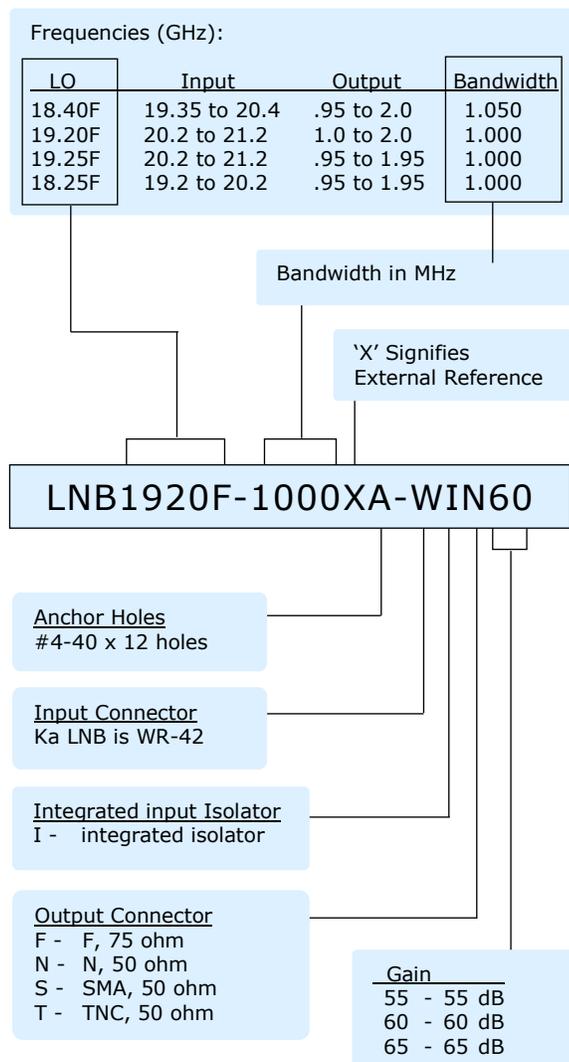
# Orbital Ka-ISO

## Ext Ref Ka LNB with integrated isolator



Orbital Research Ltd  
#10-3871 North Fraser Way  
Burnaby, BC V5J5G6

### Part number generator



### Ka-ISO Features:

- Integrated input isolator ensures good match and is hermetically sealed
- The DC and 10 MHz are multiplexed onto the output L-Band signal.
- With internal, input isolator, the input VSWR is only 1.4:1 max, nominal 1.25:1 - and the noise figure is 1.4 dB max, nominal 1.3 dB.
- Anchor holes on back of LNB for mounting support
- Other frequencies available. Check with Orbital.
- Meets Mil Standard 188-164B specifications.
- Just slightly longer than our 694XA series LNB.

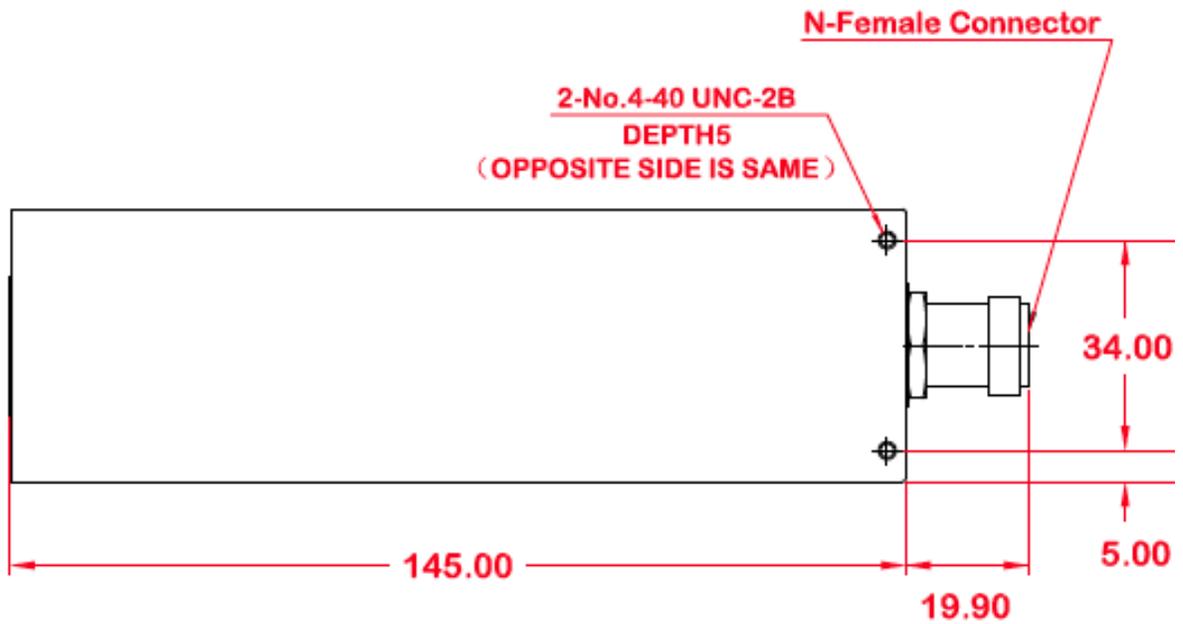
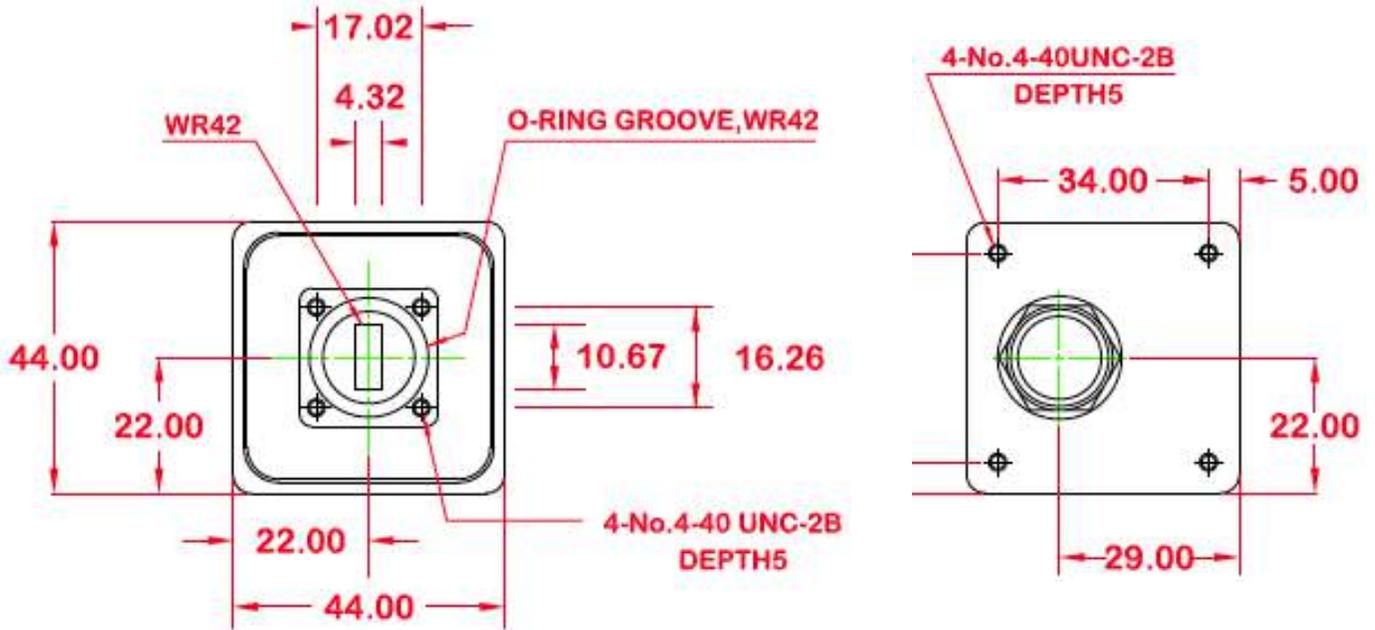


### Sales contact:

Trevor Hiebert 604-419-8585 ext. 836  
David Zuvic 604 419-8585 ext. 837

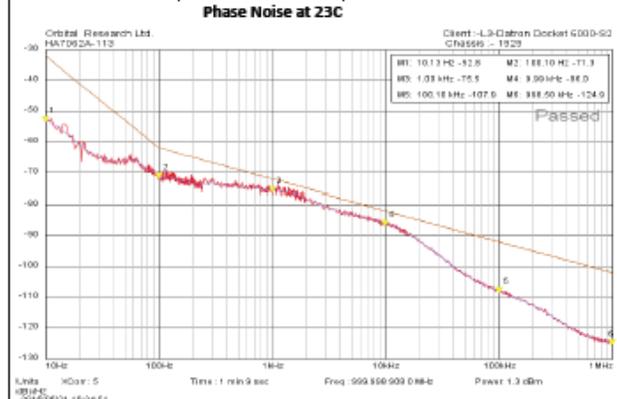
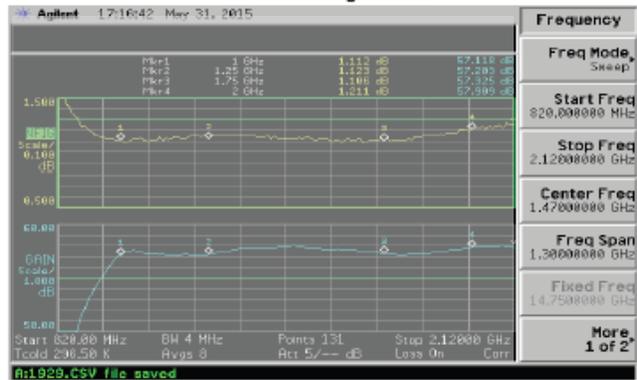
thiebert@orbitalresearch.net  
dzuvic@orbitalresearch.net

# Mechanical Diagram



# Sample Test Data Sheets for one LNB

Client	Sample	Part No	LNB1920M-1000X-W555-T90			SCD	Ka Single WGS		Rev	H	
PO	0	Serial	6000-070	Tested By	MS	Product	Ka LNB HiVibe, HiTemp				
Date	30-May-15	Band	1929	Checked By	LT	Orb ID	0				
SCD	Compliance Parameters	Specification	Unit	Status	SCD	Measured Parameters	Spec	Data	Unit	SCD	Measured Phase Noise, as per plot
3.1.1	RF Input Frequency	20.20-21.20 GHz	confirmed	3.1.5	Noise Figure	< 1.3	1.13	dB	3.4.4	10 Hz	-90 -32 -52.8 dBc/Hz
3.2.1	IF Output Frequency	1000-2000 MHz	confirmed	3.5.1	Gain (+4,-0)	55	57.42	dB	3.4.4	100 Hz	-131 -62 -71.3 dBc/Hz
3.3.1	10 MHz -5 to +7 dBm	Tested to +8 dB	confirmed	3.5.3	Max Ripple 10 MHz	± 0.25	0.10	dB	3.4.4	1 KHz	-133 -72 -75.5 dBc/Hz
3.4.1	Local Osc Frequency	19.2 GHz	confirmed	3.5.4	In Band Spurs signal	> 45	>90	dBc	3.4.4	10 KHz	-138 -82 -86.0 dBc/Hz
3.6.1	DC Input 18 ± 1 VDC	18 VDC	confirmed	3.5.5	Image Rejection	> 40	-53	dBc	3.4.4	100 KHz	-138 -92 -108 dBc/Hz
4.0	Length x Width x Height	4.4 x 2.0 x 1.75 in	confirmed	3.4.3	LO Leakage Output	-45	-68	dBm	3.4.4	1 MHz	-160 -102 -125 dBc/Hz
4.2	Input Connector	WR-42 std	confirmed	3.2.3	1dB Comp @ 1ghz	+7	12	dBm		Offset	Ref Spec Data Unit
4.3	Output Connector	Type 5 (f) std	confirmed	0	Third Order Intercept	+17	22	dBm			
4.4	Weight, 500 gms	495 gms	confirmed	3.6.1	DC Current@24 vdc	200	199	mA			
4.5	MIL-A-8625	Type 2 CL2 gld	confirmed	3.1.4	Input / Output VSWR	1.5-1	1.4				



- Note 1 - Gain and Noise figure plots taken with N8973A Agilent Analyzer every 10 MHz, 131 sample points over 1300 MHz bandwidth.
- Note 2 - Phase Noise measured with Holzworth 7062A phase noise analyzer and Agilent E8257D 40 GHz source with ultra low phase noise option
- Note 3 - Noise and Gain Data plus ripple computations in columns AC through AH, client can create custom formulas for specific data analysis
- Note 4 - For 1 dB compression point, the reference output level is +0 dBm

Included are references to customer's order info such as PO & SCD (if applicable).

Gain & NF data is average over output frequency range.

Measured performance of all relevant parameters against specifications or SCD.

Phase noise plotted using Orbital's POP OCXO Oscillator as reference.

Test Data panel of compliance parameters.

POP phase noise also provided.

Included is a list of test equipment used.

Phase Noise plot provided.

Raw Data (not shown) of Gain & NF is also supplied.

Gain and Noise Figure at 23C

Phase Noise at 23C

Note 1 - Gain and Noise figure plots taken with N8973A Agilent Analyzer every 10 MHz, 131 sample points over 1300 MHz bandwidth.

Note 2 - Phase Noise measured with Holzworth 7062A phase noise analyzer and Agilent E8257D 40 GHz source with ultra low phase noise option

Note 3 - Noise and Gain Data plus ripple computations in columns AC through AH, client can create custom formulas for specific data analysis

Note 4 - For 1 dB compression point, the reference output level is +0 dBm

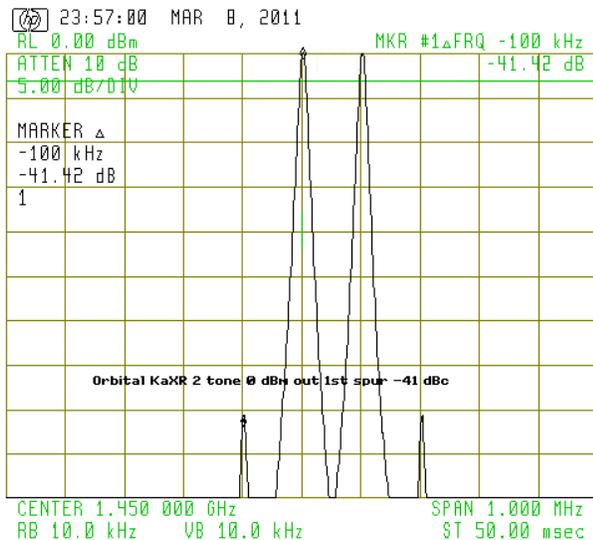
The above 2 test data examples are for WGS and Global Xpress frequencies.

Individual plots of Gain & NF are provided.

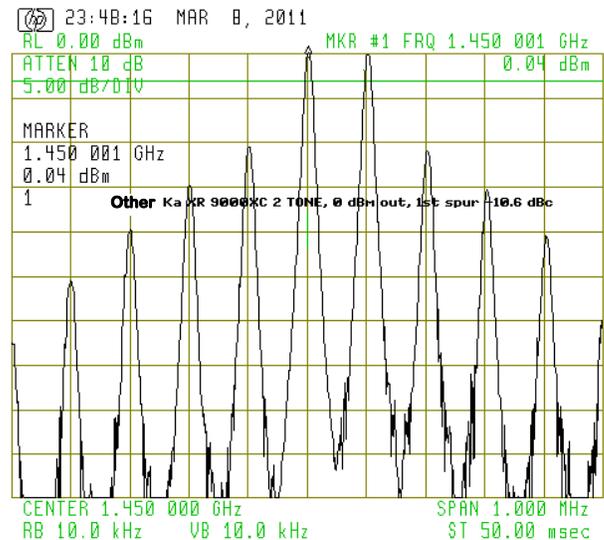
One sheet per is supplied with each LNB shipped.

## Two Tone Test

**What it means** - The two plots below compare gain linearity for the new Orbital design with competitor designs. Two tones at 20.200000 GHz and 20.200100 GHz are injected into the LNBS to provide 0 dBm out. The first spur in the Orbital design is over -40 dBc down compared to the multiple spurs on the competitive LNB starting at only -10 dB down. Intermodulation (IM) distortion for a given output is reduced in the Orbital LNB while providing higher overall gain (60 dB minimum for the Orbital LNB, versus 55 dB for the competitor LNB).



Orbital LNB



Competitor LNB

**How it works** - The LNB has to amplify the multiple signals from the satellite by a factor of a million (60 dB) without adding significant noise (noise figure), but also to perform this conversion without adding distortion. The above graphs represent the comparative levels of distortion between the Orbital design and competitive designs. Basically, if you put two signals into the LNB, you should get two signals, and only two signals, out. You can imagine the mess using a poor quality LNB when you amplify and convert the dozens or even hundreds of signals from the satellite.

**What it shows** - While an LNB would never be operated at 0 dBm output level, the test and design represent the linear conversion quality of each LNB and the P1 dB compression point. The Two Tone tests are proxies for the quality of conversion that is absolutely necessary for low bit error rate satellite transmissions. LNB non-linearity starts at much lower levels than 0 dBm output, and the 2 tone test is the best method of comparing the quality of design and manufacture of LNBS. The ultimate benefit to the end user is lower noise figure, higher conversion gain, and most importantly, lower bit error rate for their digital transmissions.

## Orbital Ka Isolator

Until recently, Orbital has been adding an input isolator to the LNB when required by the customer. Because of recent proprietary improvements in isolator design, Orbital has been able to reduce the width of the isolator so that it can fit inside the case of a standard LNB (without the load sticking out sideways). This gives the added benefit of sealing the isolator into the case with the LNB.

# Specifications

## **Frequency Range:**

Input RF Frequency: See first page  
Output IF Frequency: 950 to 1950 MHz, or  
1000 to 2000 MHz  
Local Frequency: See first page  
LO Stability: Phase locked to external  
10 MHz reference

## **Gain:**

Gain: 60 dB  $\pm$ 4dB max. over temp & freq  
Flatness:  $\pm$ 1.5 dB max over freq  
Ripple:  $\pm$ 0.15 dB per 10 MHz  
Stability:  $\pm$ 0.25dB max over 24hr @ +25°C

## **VSWR:**

Input: 1.4:1 max (integrated input isolator)  
1.25:1 nominal  
Output: 1.8:1 max

## **Amplitude Response:**

10 MHz Band:  $\pm$ 0.3dB max  
120 MHz Band:  $\pm$ 1.0dB max  
Receive Band:  $\pm$ 1.5dB max

## **Interfaces:**

Input: WR-42 waveguide flange with O-ring groove & threaded screw holes (#4-40 UNC x .38 deep thread)  
Output: N, 50 $\Omega$  female coax connector.  
Optional: SMA (50 $\Omega$ ) & F (75 $\Omega$ )

## **Environmental:**

Operating Temp: -40°C to +60°C  
Operating Altitude: 10,000 ft ASL  
Operating Rel Humidity: 100% condensing  
Non-operating Temp: -50°C to +70°C  
F Shock: 10g, 11ms, half sine  
MTBF: >125,000 hours  
Standards Compliant to: RoHS & REACH

## **10 MHz Reference:**

Insertion: Multiplexed onto the IF coaxial connector  
Input Level: -5 to +5 dBm  
Phase Noise: -135dBc/Hz max. @ 100 Hz  
-148dBc/Hz max. @ 1 kHz  
-152dBc/Hz max. @ 10 kHz  
-155 dBc/Hz max. @ 100 kHz

## **Mechanical:**

Dimensions: 44 x 44 x 128 mm  
Color: White or blue (standard)  
Weight: 485 grams **TBC**  
Anchor holes: #4 threaded (4-40) x 12

## **LNB 10 MHz Phase Noise:**

-62 dBc/Hz max. @ 100 Hz  
-72 dBc/Hz max. @ 1 kHz  
-82 dBc/Hz max. @ 10 kHz  
-92 dBc/Hz max. @ 100 kHz  
-102 dBc/Hz max. @ 1 MHz

## **Noise Figure:**

1.4 dB max. @ +23°C  
(1.3 dB nominal)

## **Power:**

DC in: +12 to +24 VDC, 300mA  
Interface: DC power is multiplexed with the IF & 10 MHz reference signals on the output connector

## **Other Specs:**

LO Leakage: Output: -45 dBm min  
Input: -45 dBm max at waveguide flange  
Image Rejection: -45 dB min  
P1 dB comp pt: +10 dBm min  
3<sup>rd</sup> order ICP: +20 dBm min  
Overdrive: -20 dBm, non-damaging  
Spurious: Input Spurious level of -85 dBm equates to <-140 dBm  
Desense level: -50dBm transmit signal level results in no more than 0.1dB of NF degradation

Orbital Research Ltd. designs and builds products for satellite communications applications. Orbital website: [www.orbitalresearch.net](http://www.orbitalresearch.net).  
Copyright © 2017 Genie in the Bottle Enterprises Inc. All rights reserved.  
Specifications subject to change without notice.