Orbital 694XA Series

Ka BAND EXTERNAL REFERENCE LNB with rear anchor posts

Orbital Research.net

Wide range of Frequencies and Bandwidths

How to order an Orbital 694XA Series Ka Ext Ref LNB

Frequencies (GHz):

LO	Input	Output	Bandwidth
16.35M	- 17.3 to 17.8	.95 to 1.45	0.500
17.25M	- 18.2 to 19.2	.95 to 1.95	1.000
18.25M	- 19.2 to 20.2	.95 to 1.95	1.000
18.55M	- 19.5 to 20.5	.95 to 1.95	1.000
19.20M	- 20.2 to 21.2	1.0 to 2.0	1.000
19.25M	- 20.2 to 21.2	.95 to 1.95	1.000
19.50M	- 20.6 to 21.2	1.1 to 1.7	0.600
20.25M	- 21.2 to 22.2	.95 to 1.95	1.000
20.45M	- 21.4 to 22.0	.95 to 1.55	0.600

Bandwidth in MHz

'X' Signifies External Reference

LNB 1855M – 1000 XA-WN60

A - Anchor Posts

Input Connector
Ka LNB is WR-42

Output Connector
F - F, 75 ohm
N - N, 50 ohm
S - SMA, 50 ohm
T - TNC, 50 ohm

Gain
50 - 50 dB
60 - 60 dB

Standard Quality

The Orbital 694XA Series Ka-XR LNBs meet Mil Standard 188-164A specifications. Part of this Mil Standard Interoperability spec is that the output frequency range is 1000 to 2000 MHz. We can provide that output or the traditional commercial frequency range of 950 to 1950 MHz.

Hi Vibration

Along with 188-164B, the 694XA Series LNB also meets MIL-STD-810F for vibration. These LNBs are qualified to operate in all standard commercial and military mobile applications.

Temperature Ranges

The standard temperature range for the 694XA Series LNB is -40 to +60°C. We also offer the increased ranges of:

- -40 to +70°C and,
- -40 to +90°C

Orbital Features:

Environmental

- O ring sealed connectors for weather resistant operation
- RoHS & REACH Compliant

Options

- Other input / output frequency ranges available
- Full test documentation available
- Temperature Compensated Gain

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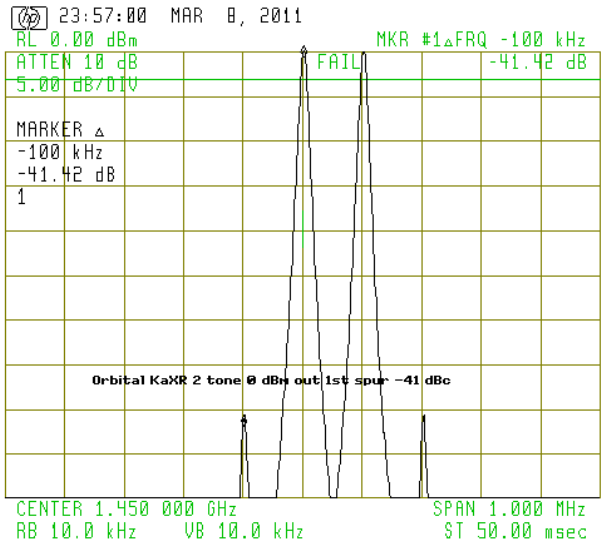
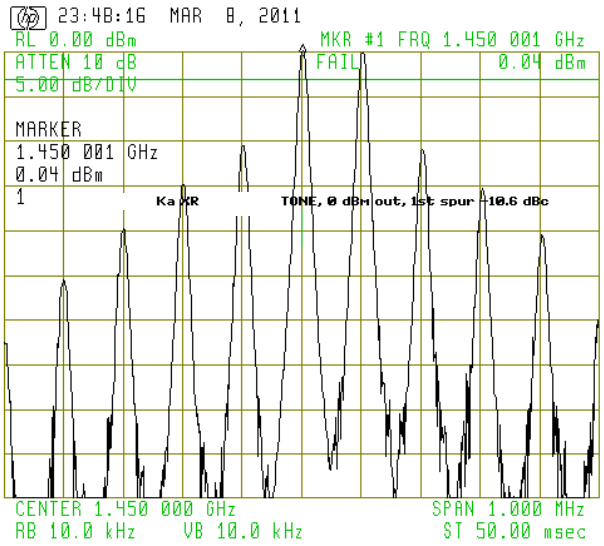
Two-Tone spec

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



Competitive 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 two 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.

Sample Test Data Sheets for one LNB

Client	Sample	Part No	LNBKa Mul@LO	41 WGS	SCD	Sample	Rev	G
PO	Sample	Serial	Sample	Tested By	MS	Product	Ka LNB Multiple LOs	
Date	30-Jun-14	Unit	41 WGS	Checked By	LT	Orb ID	LNBKa MultiLO	

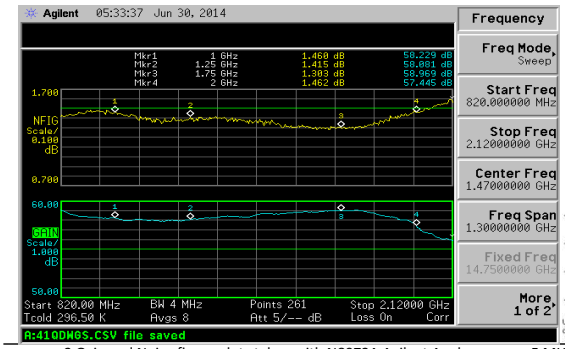
SCD	Compliance Parameters	Specification	Unit	Status
3.1.1	RF Input Frequency	20.20321.20 GHz		confirmed
3.2.1	IF Output Frequency	100032000 MHz		confirmed
3.3.1	10 Mhz 38 to +8 dBm	tested to +8 dB		confirmed
3.4.1	Local Osc Frequency	19.20 GHz		confirmed
3.6.1	DC Input 18 ± 1 VDC	18 VDC		confirmed
4.0	Length x Width x Height	44x44x145 mm		confirmed
4.2	Input Connector	WR342 std		confirmed
4.3	Output Connector	Type N (f) std		confirmed
4.4	Weight, 3603370gms	480 gms		confirmed
4.5	Mil Sped 595	TBD White		confirmed

SCD	Measured Parameters	Spec	Data	Unit
3.1.5	**Noise Figure**	< 1.5	**1.37**	dB
3.5.1	**Gain**	~~56~~	**~~58.42~~**	dB
3.5.3	Max Ripple 10 MHz	± 0.15	0.07	dB
3.5.4	In Band Spurs signal	> 60	<390	dBc
3.5.5	Image RejecWon	> 45	351	dBc
3.4.3	LO Leakage Output	345	395	dBm
3.2.3	1dB Comp @ 1ghz	+7	13	dBm
	Third Order Intercept	+17	23	dBm
3.6.1	DC Current, 18 VDC	400	140	mA
3.1.4	Input VSWR	1.5:1	1.11	

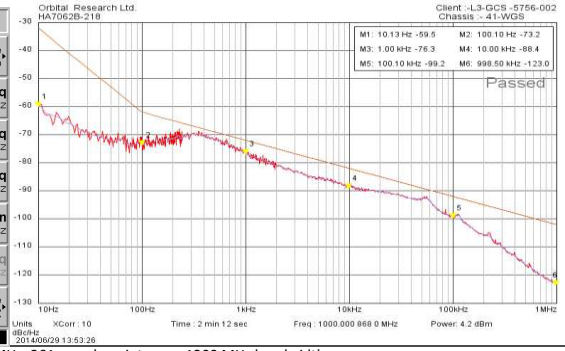
SCD	Measured Phase Noise, as per plot				
3.4.4	10 Hz	390	332	359.5	dBc/Hz
3.4.4	100 Hz	~~3151~~	~~362~~	~~373.2~~	dBc/Hz
3.4.4	1 KHz	3155	372	376.3	dBc/Hz
3.4.4	10 KHz	3158	382	388.4	dBc/Hz
3.4.4	100 KHz	3158	392	399	dBc/Hz
3.4.4	1 MHz	3160	3102	3123	dBc/Hz

Offset	Ref	Spec	Data	Unit

Gain and Noise Figure at 23C with Isolator and Quick Disconnect



Phase Noise at23C



Note 1 3 Gain and Noise figure plots taken with N8973A Agilent Analyzer every 5 MHz, 261 sample points over 1200 MHz bandwidth.
Note 2 3 Phase Noise measured with Holzworth 7062A phase noise analyzer and Agilent E8257D 40 GHz source with ultra low phase noise opWon
Note 3 3 Noise and Gain Data plus ripple computaWons in columns AC through AH, client can create custom formulas for specific data analysis
Note 4 3 For 1 dB compression point, the reference output level is +22 dBm

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

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.

Phase Noise plot provided.

Included is a list of test equipment used.

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

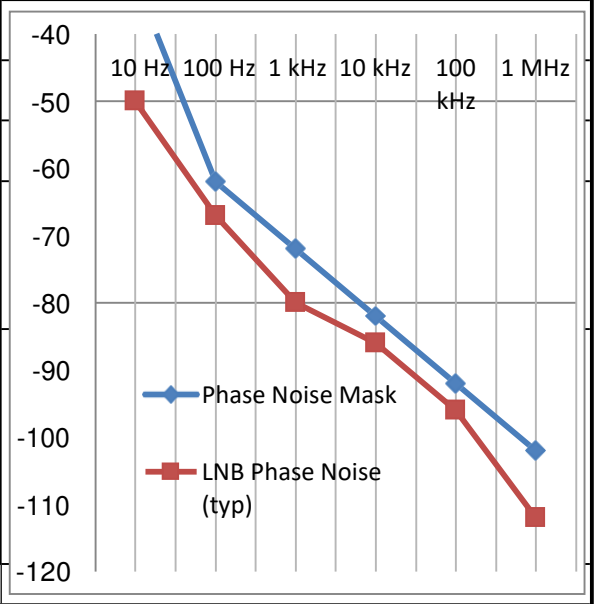
The above 2 test data examples are for WGS and Global Xpress frequencies.

Individual plots of Gain & NF are provided.

One sheet per frequency range is supplied with each LNB shipped.

ELECTRICAL SPECIFICATIONS

Item	Spec
RF Input Frequency	Standard Frequencies on first page. Others available.
Noise Figure	Approx. 1.2 dB @+23°C, dependent upon connecting components
IF Output Freq	950 up to 1950 MHz; or 1,000 up to 2,000 MHz
LO Frequency	Standard Frequencies on first page. Others available.
LO Freq Stability	Phase locked to external 10MHz reference
10 MHz input level	-10 to +5 dBm, multiplexed onto IF output
10 MHz Reference	-120 dBc/Hz @ 10 Hz -145 dBc/Hz @ 100Hz -160 dBc/Hz @ 1 kHz -165 dBc/Hz @ 10 kHz -165 dBc/Hz @ 100 kHz
LO Phase Noise (meets or exceeds MIL-STD 188-164A phase noise mask)	Phase Noise Mask Offset Phase Noise (typ) -32 dBc/Hz 10Hz -50 dBc/Hz -62 dBc/Hz 100Hz -67 dBc/Hz -72 dBc/Hz 1kHz -80 dBc/Hz -82 dBc/Hz 10kHz -86 dBc/Hz -92 dBc/Hz 100kHz -96 dBc/Hz -102 dBc/Hz 1 MHz -112 dBc/Hz
Gain	60dB nominal. (50dB to 70db optional)
LO Leakage	-50 dBm max at RF input; -70dBm with Isolator
Flatness	±0.5 dB max over any 27 MHz segment
Gain Variation	±1.5 dB max. over Temperature & Frequency
Optional Gain Variation	±0.75 dB max. over Temperature & Frequency (Temperature range: -20 to +55°C)
Input VSWR	3.0:1, 1.5:1 to 2.5:1 with Isolator, dependent upon connecting components
Output VSWR	1.8:1 max.
Output Stability	Unconditionally stable (no oscillation) for all possible input loads
In-Band Spurious Rejection	>50 dBc or <-90 dBm
Image Rejection	50 dB min. 53 dB nominal
P1dB Comp point	+10 dBm min.
3rd order Intercept	+20 dBm
Overdrive	-20dBm @Non-damaging
Input DC Power	+12 to +24VDC, 300mA Transient, over & reverse voltage protected Multiplexed on a single coaxial connector with the IF and 10MHz reference signal.
Input Interface	WR-42 waveguide, gasketed
Output Interface	50Ω, N-type female coaxial connector, F-type (75Ω) or SMA (50Ω) also available



MECHANICAL SPECIFICATIONS

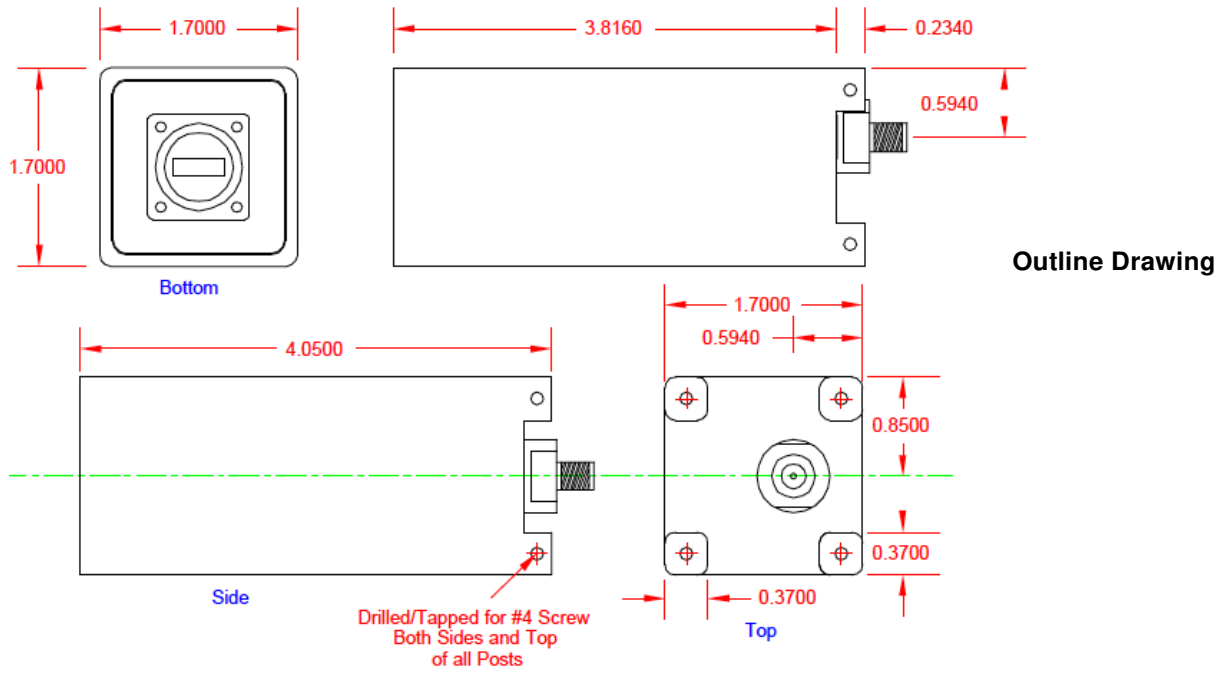
Size	(L) 103mm x (W) 43mm x (H) 43mm (4.05 x 1.70 x 1.70 inches)
Weight	approx. 350g
Color	Blue or Gold Anodized, MIL-STD-595 paint

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-40°C to +60°C (other ranges available, see below)
Operating Altitude	10,000 ft ASL
Operating Relative Humidity	Up to 100%, condensation and frost
Non-operating Temp.	-50°C to +90°C
F Shock	40g, 11ms, half sine
Vibration	MIL-STD-810F, method 514-5, DO-160G
MTBF	>125,000 hours
Compliance Standards	RoHS & REACH

EXTENDED TEMPERATURE RANGES

Orbital has the option of extended temperature ranges. Even at the following temperature ranges, the above specs are all met. However, Noise Figure is only spec'd at room temperature. The typical Noise figure at the upper temperature of the ranges below are as shown.		
Temperature Range	-40 to +70°C	-40 to +90°C
Noise Figure	1.5 dB typical (at +70°C)	1.7 dB typical (at +90°C)



Outline Drawing