10GHz LNB TCXO manual

Modification of the satellite Low Noise Block (LNB) with PLL and 25 MHz X-tal.

10 GHz receiver down converter for QO-100 satellite.

You only need some receiver at IF frequency - SDR or 432MHz SSB.

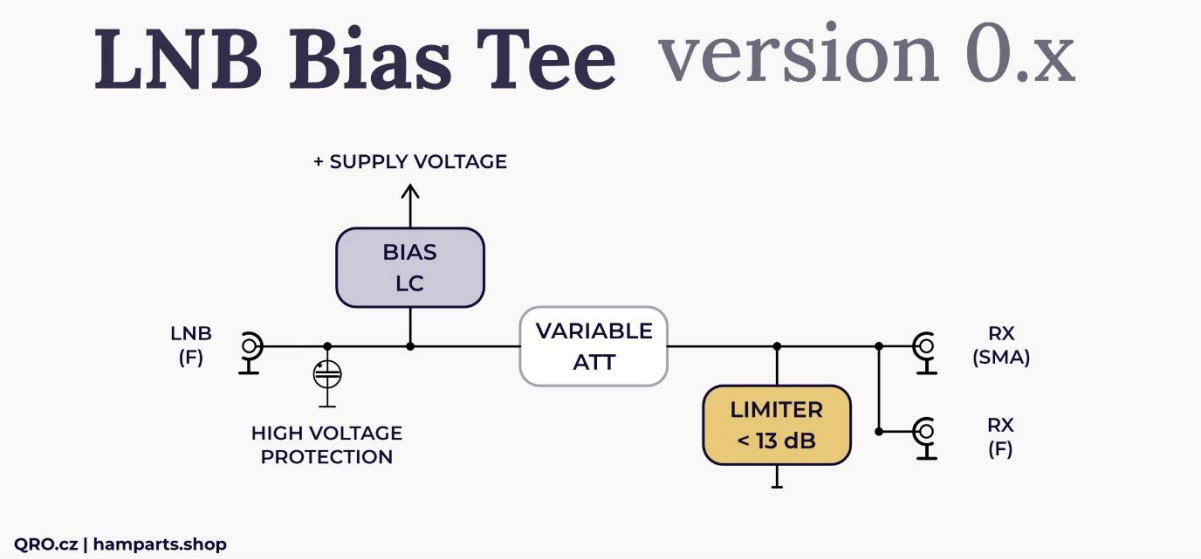
Very good frequency stability with built-in TCXO 1ppm.

Available in Europe from Passion Radio :

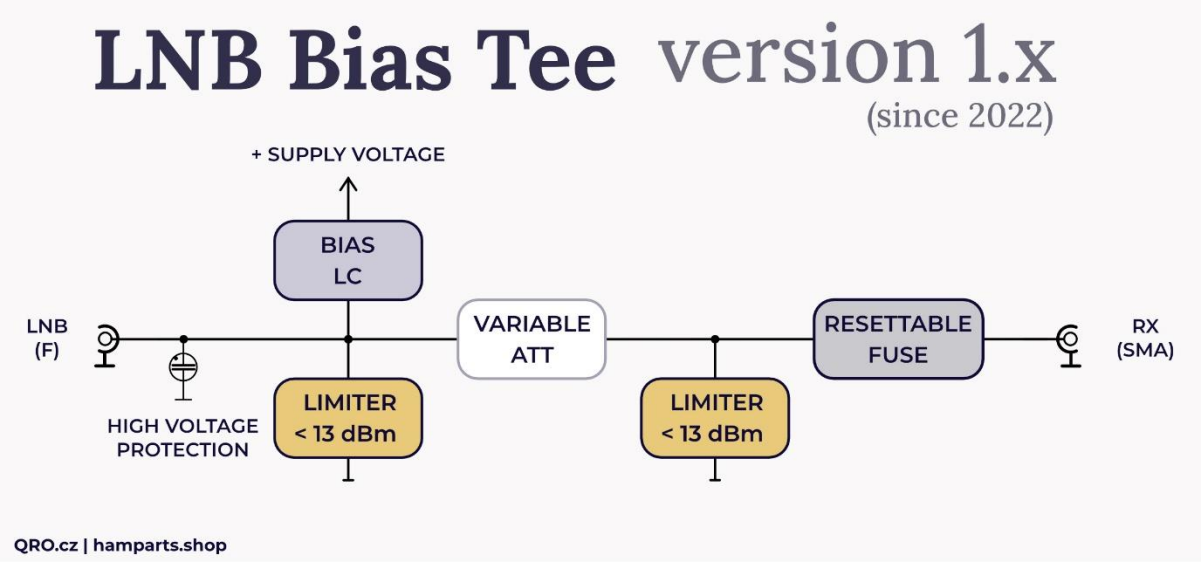
https://www.passion-radio.com/satellite-qo-100/converter-432-936.html

Applications

Bias Tee block diagram - version 0.x



Bias Tee block diagram - version 1.x



classic LNB & Bias tee version 0.x vs 1.x

LNB & Bias tee with POTY adapter version 0.x vs 1.x

Ku band LNB

- Very low noise block - down converter
- 1 ppm temperature stability TCXO built-in
- Input of LNB is designed for 10 to 12.5 GHz
- Vertical and Horizontal polarisation
- Voltage supply +12V for V-pol, +15V for H-pol*****
*** New IF IC in LNB needs +18V to switch to H-pol.**

Bias Tee

- Low Insertion Loss
- Supply voltage and IF over one coax

- **Variable ATTENUATOR** in the bias tee
- High voltage/current protection
- RF signal protection limiter - max. signal 20 mW (ver. 0.4 and higher)
- Voltage supply +12V for V-pol, +15V for H-pol*

*** New IF IC in LNB needs +18V to switch to H-pol.**

- Bias tee connectors: IN (LNB) = F, OUT = SMA and F

Technical Parameters

LNB local oscillator - model SDR	9750 MHz
LNB local oscillator - model 10489-432	10057 MHz
LNB local oscillator - model 10368-432	9936 MHz
Conversion gain of a LNB	> 50 dB
LNB IF - model SDR	739 MHz for 10489 MHz (QO-100) 618 MHz for 10368 MHz (TROPO/EME)
LNB IF - model 10489-432	432 MHz (10489 MHz RF IN)
LNB IF - model 10368-432	432 MHz (10368 MHz RF IN)
Stability with TCXO	0.5 ppm (X 390)
Frequency error with TCXO	0 to abt 30 kHz
DC voltage	+12 V for Vertical polarisation (NB) +15 V for Horizontal (WB) * NEW IF IC in LNB needs +18V to switch to H-pol.
DC current	typ. 180 mA
Bias TEE IF loss	typ. less than 2.5 dB (ATT set to 0)
Variable Attenuator on IF	1 dB to NO signal

⚠ **IMPORTANT NOTE:** TCXO has got 1 ppm temperature stability and 2 ppm production frequency tolerance. It means that all pieces have got some small frequency offset. Depends on the piece, it is 0 to about 20 kHz. This is not a problem for SDR RX where you can set it in the software. For LNB with 432 MHz IF you have to calculate with this offset from TX frequency and set it in TRX menu.

Options: Recommendations to buy

RTL-SDR receiver with 1ppm TCXO

- **RTL-SDR USB receiver**
- in metal box
- **1 ppm TCXO** for better stability
- input SMA connector
- **compatible with HDSDR, SDR console etc.**

Adalm Pluto

- **SDR TRX up to 6 GHz**

SMA-SMA cable

- **SMA male & SMA male pigtail**
- about 15 cm (total length 17 cm)

POTY ring adapter

FAQ

Usage

- This is Low Noise Block (LNB) which works as Down Converter. You can use it for input frequency in range of 10 to 12 GHz. In amateur radio world you can build 10 GHz RX for QO-100 satellite, 10 GHz EME or tropo.

- Device is designed only for Receiving.

Frequency

- Input of LNB is designed for 10 to 12,5 GHz. Original local oscillator (LO) is locked by 25 MHz reference signal and multiplied 390 - what means 9750 MHz. You can use different reference signals 25MHz +- to change LO frequency.

  IF = Input - LO [MHz]

- For example IF = 432 MHz and Input = 10489 MHz

  LO = 10489 - 432
  LO = 10057 MHz

Variable attenuator

- There is Variable Attenuator (ATT) trimmer. You can reduce signal strength as you need because the gain of LNB is high.

Stability

- LNB with internal TCXO need some warm up time. Depends on the outside temperature, it is around 5 minutes. If you have small signal moving it can be problem of antenna dish (LNB) vibration.

- LNB with external TCXO has got stability around 1ppm stability. Signal can move by a few Hz in the short time period. LNB with external reference signal is locked to the external oscillator and stability is based on stability by this one multiplied by 390.

Input signal polarisation (vertical/horizontal)

- with voltage 11 to about 14 Volts the LNB has got Vertical polarisation, with Voltage over 15 V it is Horizontal.

POTY Adapter

- We offer also LNB with POTY adapter. You can insert 22mm copper pipe as waveguide (WG) and part of YOUR POTY antenna.
- 2,4 GHz POTY antenna is not included. Only 3D printed adapter.
- Please, isolate WG pipe to 3D printed adapter against the water!

Using LNB with POTY antenna

- Do not forget, that dish antenna has got right FOCUS place. LNB holder is designed to mount LNB into the right place for maximal GAIN and also LOWER noise of the dish antenna. When you use POTY antenna, you have to place open part of the WG to the FOCUS. If you place LNB to the holder and POTY is in front of it, you degrade parameters of antenna a lot!
- There is usually problem with the size of the POTY reflector and place in the original LNB holder of the dish antenna.
- Example of the right way of the mounting: amsat forum.

European Union Declaration of Conformity

Manufacturer Ing. Jan Šustr:

ID 05476356, VAT CZ8407024780
Palachova 1777/7, 591 01 Žďár nad Sázavou, Czech republic, Europe

declares that the assembled product:

LNB 10368/10489/9750

is compatible with the relevant Union harmonisation legislation directives:
EMC Directive 2014/30/EU
ČSN EN 61000-6-3 ed. 2
ČSN EN 61000-6-1 ed. 2 (333432)

On behalf of Ing. Jan Šustr
Ing. Jan Šustr, CEO
1st January 2024