

MBS2-LP

**GLONASS BAND
NOISE AND SPURIOUS
TESTS**

050-801-0014 R02

October 5, 2006



**Unit 1A, 3751 North Fraser Way
Burnaby, B.C. V5J 5G4
Tel: (604) 439-2444 Fax: (604) 439-2447**

1 Purpose

The purpose of this test is to determine the noise and spurious emissions of the MBS2-LP in the GLONASS band (1525MHz to 1610 MHz). The measurements are shown in the following plots, as well as the specification limits. The specification limits are shown for a 10dBi antenna, approximately 5 dB higher gain than the antenna used with the MBS2-LP, providing a worst case result.

The measurements shown were made with the transmitter tuned to its lowest frequency (1626.5 MHz) to provide worst-case measurements.

2 Test Equipment

Following is a list of test equipment used.

- **HP Spectrum Analyzer 4396A** with frequency range from 2Hz to 1.8GHz.
S/N: 3413J00458
- **HP Spectrum Analyzer 70000 series** with IF and RF plug-ins for frequencies up to 22GHz. S/N: 2731A01233
- **Boonton 4220** digital RF power meter with ± 0.1 dB accuracy.
S/N: 25502BA
- **HP 8648B RF Signal Generator** with frequency range from 0.1 to 2000 MHz.
S/N: 3426A00299
- **K & L Microwave Tunable Bandreject Filter** Model 3TNF-1000/2000-N/N
- **GW Dual Power Supply Model: GPC-1850**
- **LNA** Designed and built by Wireless Matrix for Noise Measurements.
Gain = 29dB; Noise Figure = 0.47

3 Test Setup: All measurements are performed as per RSS170, 6.3 and 25.216

The setup for all measurements is shown in Figure 1. The Tunable Notch Filter is used to notch the transmitter carrier at 1626.5 MHz to increase the effective dynamic range of the measurement. An external low noise amplifier is used to lower the noise floor of the spectrum analyzer.

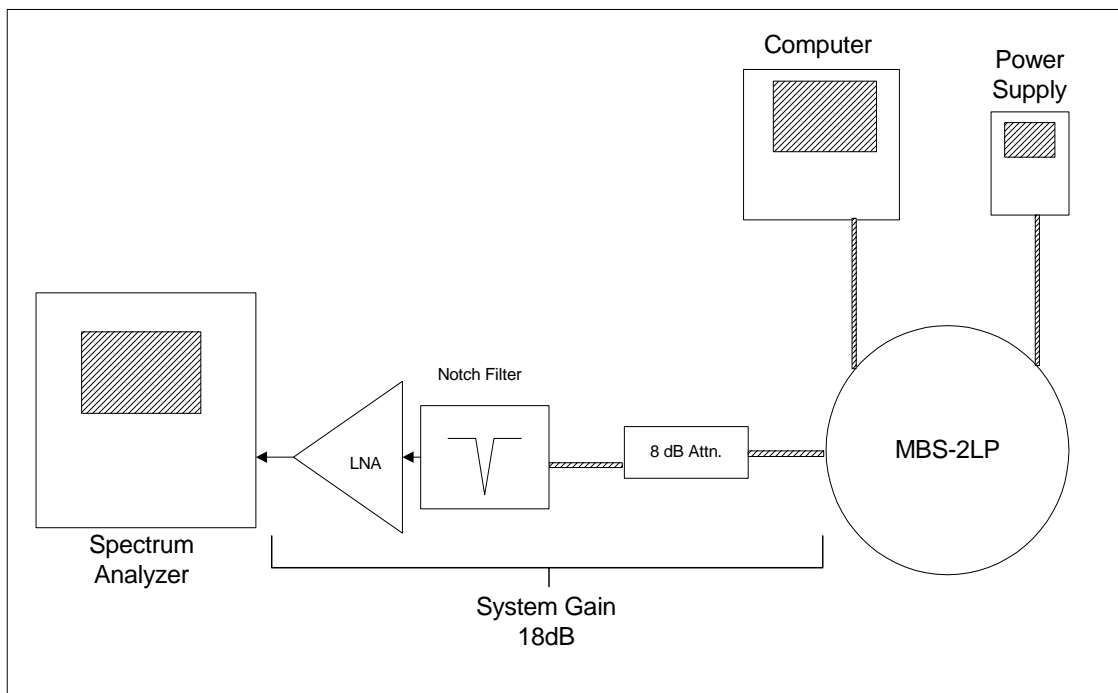


Figure 1. Test set up for Noise and Spurious Emissions 1525-1610MHz.

4 Test Results

4.1 Noise and Spurious: 1525MHz < f < 1559MHz

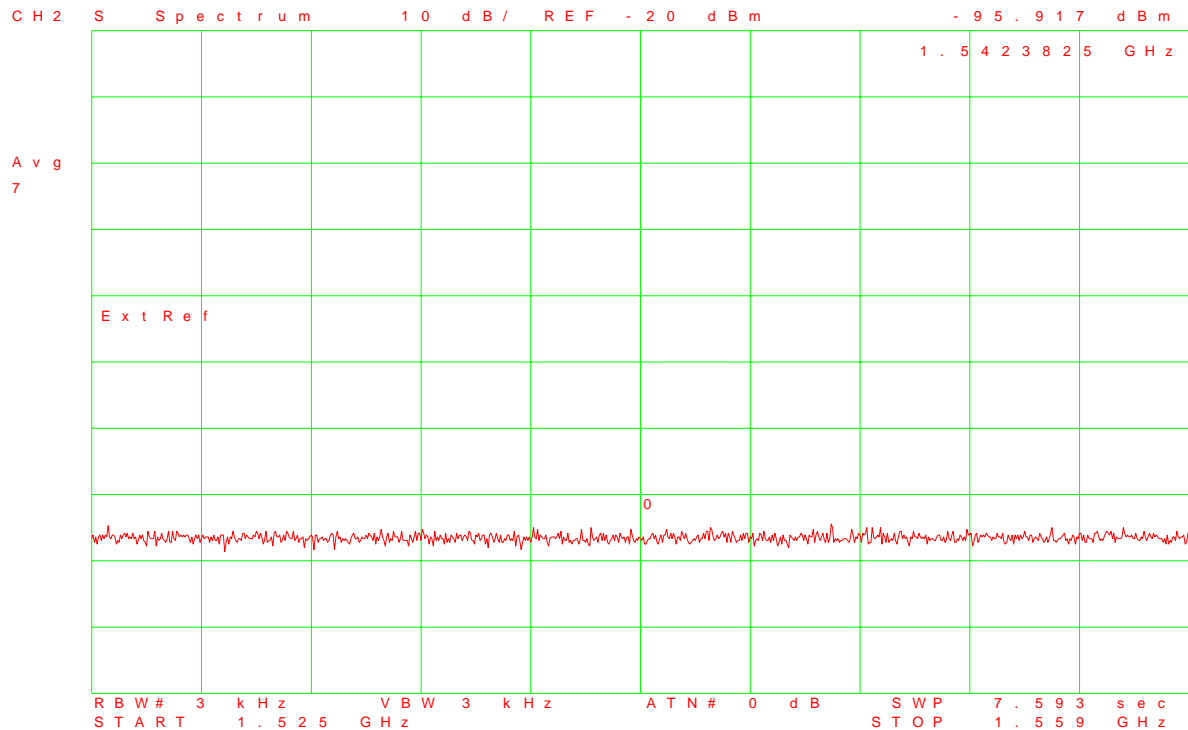


Figure 2. Noise and Spurious in Receive Band 1525 to 1559 MHz.

Calculations:

Limit for noise **EIRP = -130dBW/3KHz**

$$\begin{aligned} \text{EIRP} &= -95.9\text{dBm}/3\text{Khz} - 18\text{dB}(\text{system gain}) + 6\text{dBi}(\text{max antenna gain}) - 30\text{dB}(\text{to dBW}) \\ &= \mathbf{-137.9\text{dBW}/3\text{KHz}} \end{aligned}$$

4.2 Noise and Spurious: 1559MHz < f < 1600MHz

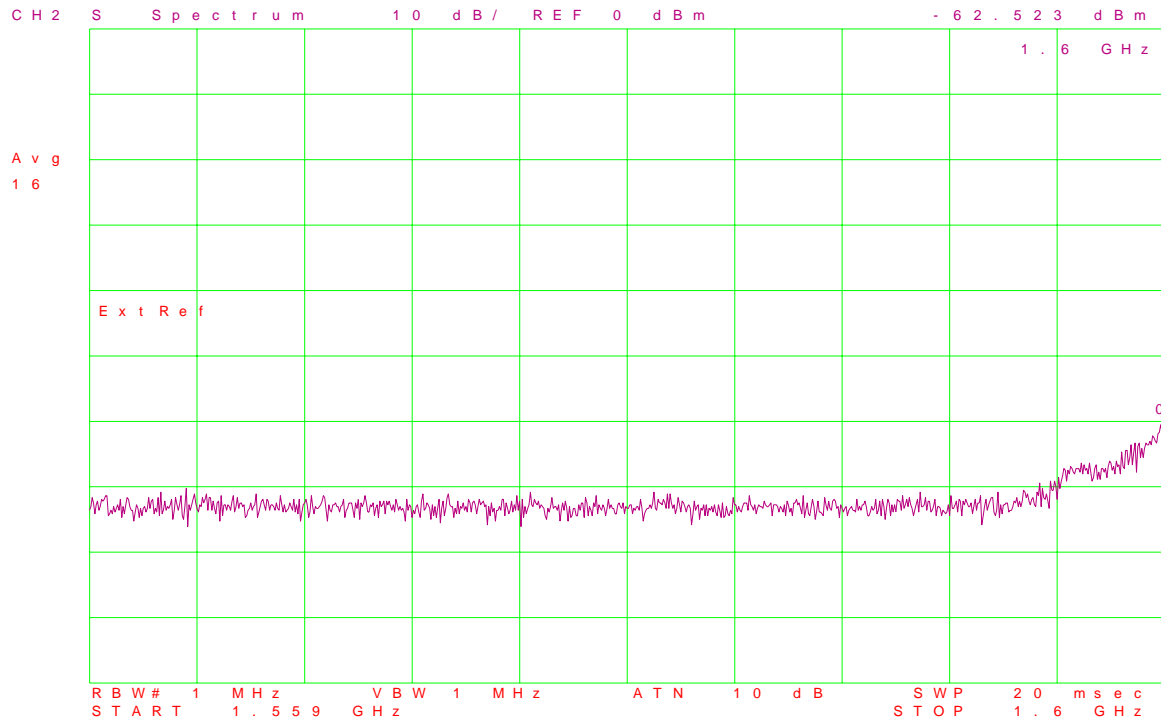


Figure 3. Noise and Spurious in Receive Band 1559 to 1600 MHz.

Calculations:

Limit for noise **EIRP = -70dBW/MHz**

$$\begin{aligned} \text{EIRP} &= -62.5\text{dBm/MHz} - 18\text{dB (system gain)} + 6\text{dBi (max antenna gain)} - 30\text{dB (to dBW)} \\ &= \mathbf{-104.5\text{ dBW/MHz}} \end{aligned}$$

4.3 Noise and Spurious: 1600MHz < f < 1610MHz

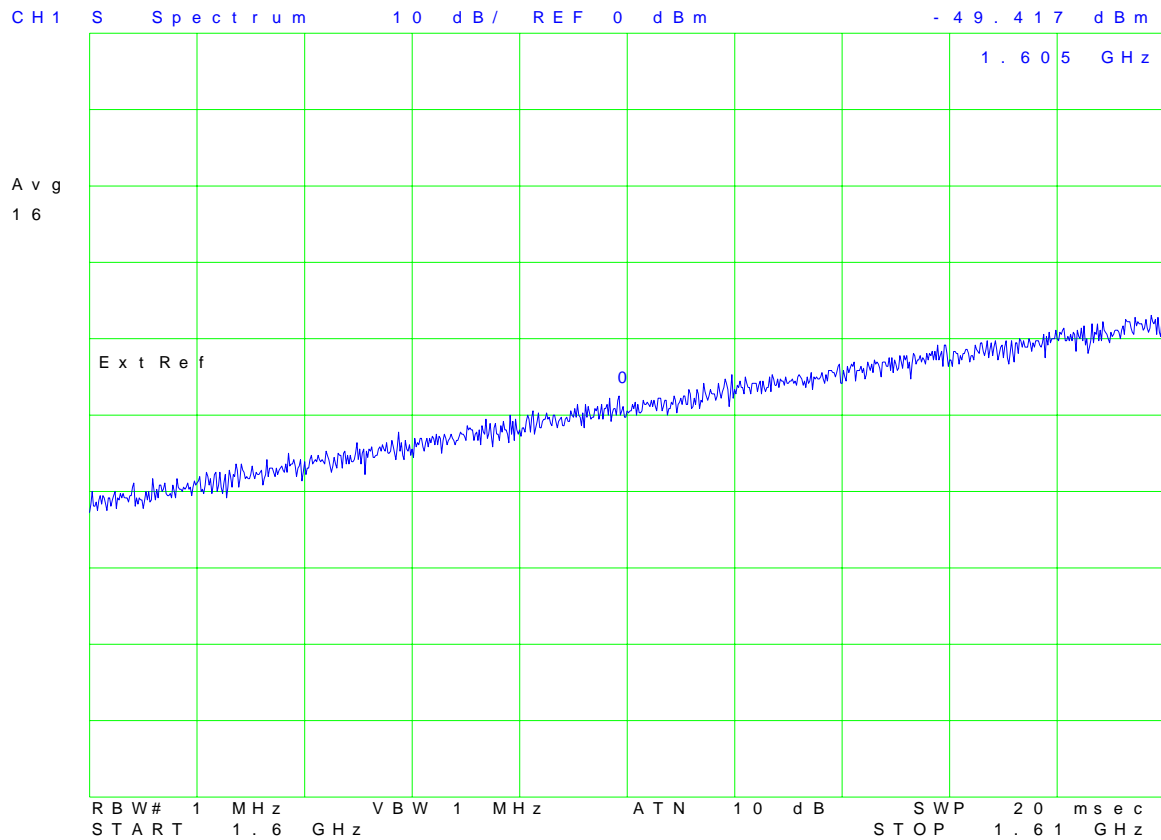


Figure 4. Noise and Spurious in GLONASS Band 1600 to 1610 MHz.

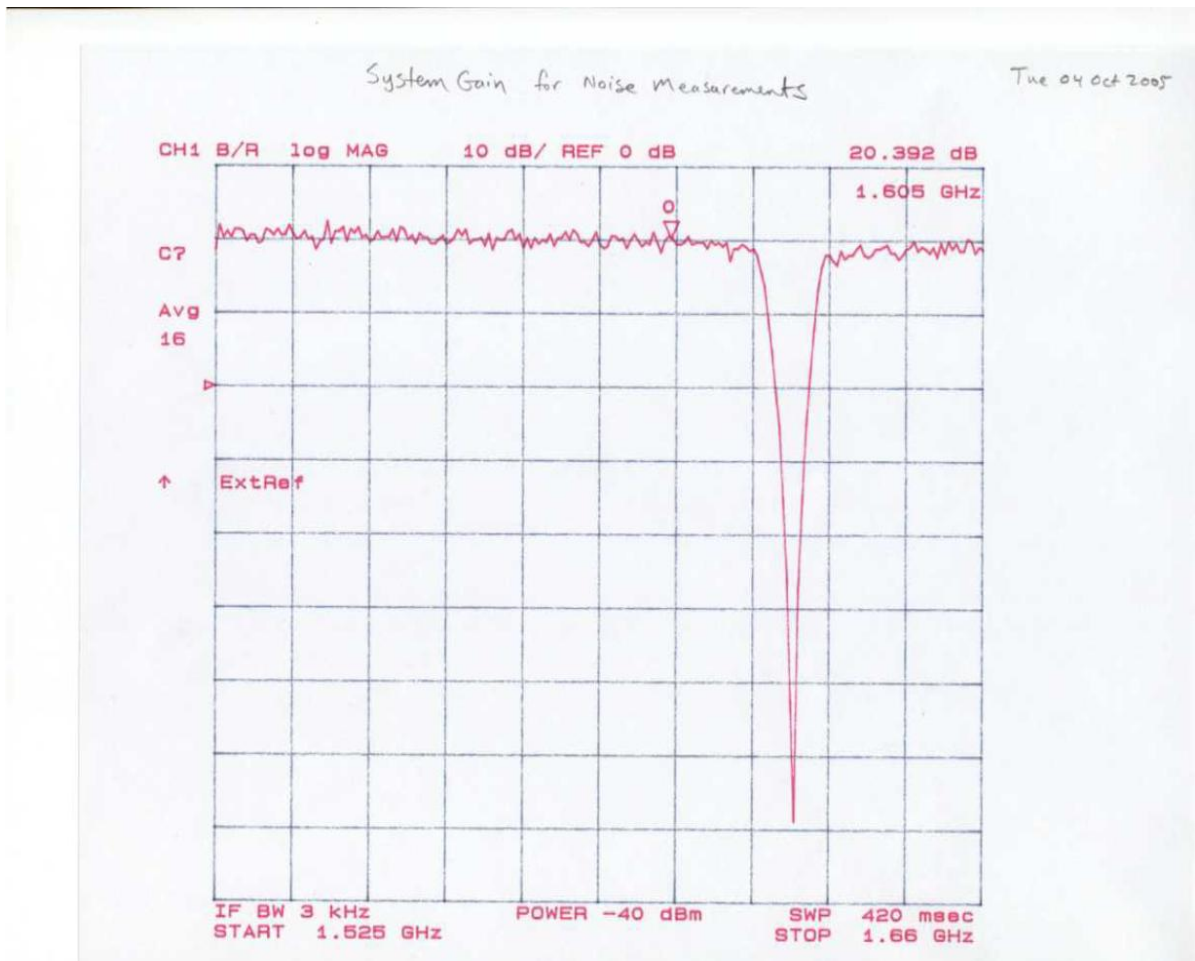
Calculations:

Limit for noise **EIRP = -70dBW/MHz** (up to 1605MHz)
EIRP = -49.4dBm/MHz - 18dB (system gain) + 6dBi (max antenna gain) – 30dB (to dBW)
 = **-91.4 dBW/MHz**

Note: The limit of -70dBW/MHz apply up to 1605MHz

5 Conclusions

As shown in figures 2 to 4, no spurious or noise were found to exceed the specification limits.

Appendix 1. System Gain Low Noise Amplifier /Notch Filter/ Attenuator**Figure 5. System Gain**

Appendix 2. K & L Microwave Notch Filter

