



# Design Note

From: DEMI R & D Dept.

DN#: 035

Date: July 19, 2018

Re: False Reading when testing Noise Figure on L33HP and L23HP

---

**PREFACE:** All DEM L33HP and L23HP may exhibit high measured Noise figure when being tested with standard Noise Figure measurement equipment such as a HP8970 series. If the Transverter is working properly, the issue mainly exists when utilizing the transverter with its internal clock oscillator on the Digilo Synthesizer.

**EXPLANATION:** The Digilo Synthesizer utilizes a 14.400 MHz internal clock oscillator as a reference for the synthesizer's functions. This clock is always running when the transverter is powered up. As the clock signal is distributed throughout the Digilo circuit, it generates harmonics. Some of these harmonics are conducted and some are radiated. The results are that no matter what IF frequency is chosen to utilize, (28 or 144 MHz) a strong enough signal will be conducted through the IF connection of the transverter and interfere with the Noise Figure meter's measurement process. If during the testing process a standard external 10 MHz source can be connected to the transverter, the Noise Figure meter will produce a more accurate measurement but may not be totally correct.

When an external source is connected, the Digilo performs an automatic switch over but it allows the internal 14.400 MHz clock to run, still producing harmonics that are radiated. For a completely accurate measurement, the R10 resistor would need to be removed to disable the 14.400 MHz clock.

**SELF TEST:** A simple tests that can be done without Noise Figure measurement equipment to verify your transverters performance is to first determine what IF frequency you are using, then look for the strong harmonics in your transceiver. When using a 28/29 MHz IF, a very strong harmonic can be heard on 28.800 MHz. utilizing the transverter with its internal clock. Connecting an external 10 MHz source all but eliminates the signal. This Spur will cause the false noise figure measurement. The other strong signal exists at 28.000 /29.000 which is a product of the synthesizer's programming. With a 144MHz IF, the spur is on 144.000 MHz. Again, these strong signals go away with the external 10 MHz Source. No issues have been found utilizing 50 or 52 MHz. as an IF

To test for system noise performance, if the transverter and your transceiver are functioning normally, tuning off the spurious frequency should allow the transceiver to return to normal noise floor. Then by placing a 50 ohm load on the antenna port should cause a subtle change in receiver noise. An alternate method would be to utilize a calibrated signal generator and determine the minimal disable signal. It should be less than -140dBm in a standard 2.4 KHz bandwidth receiver.