New Technology Improves LMDS Synthesizer Phase-Hit Performance

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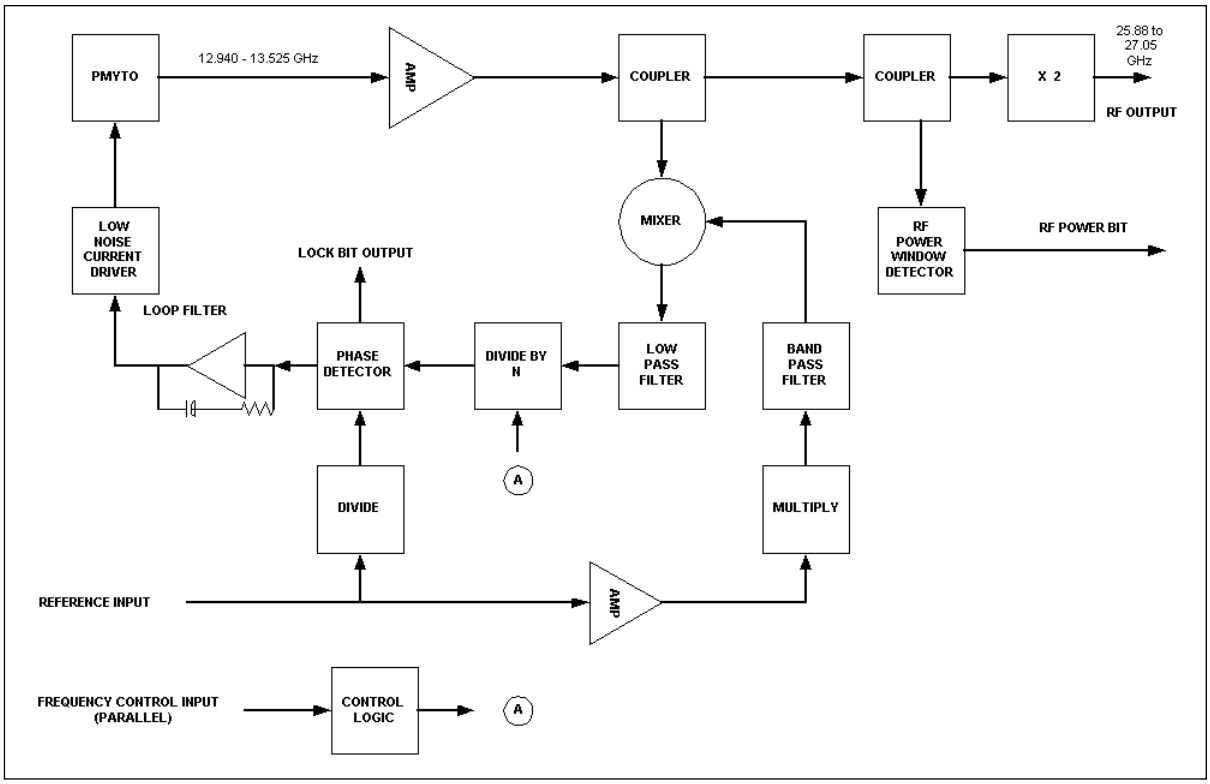
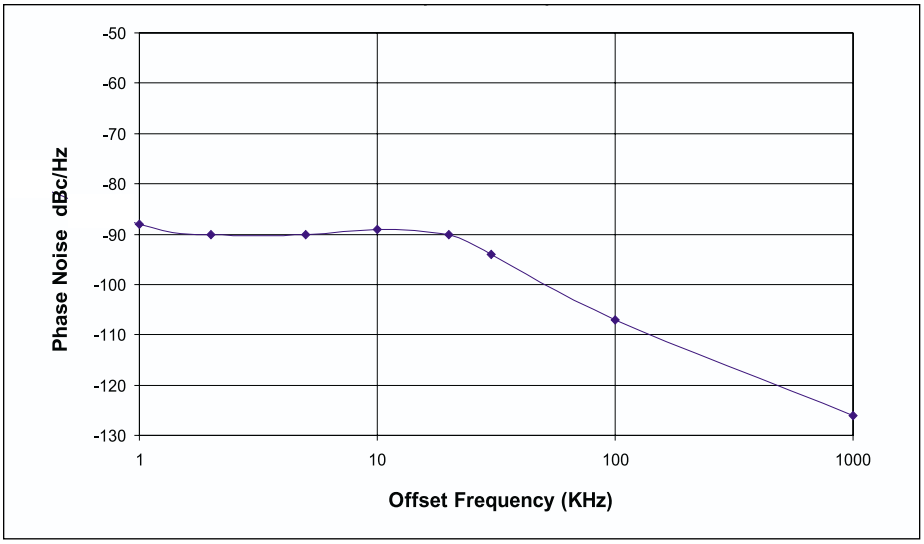
Permanent Magnet YIG Tuned Oscillator (PMYTO) based synthesizers from Microsource Inc. (MSI) have overcome the mechanical problem of external shock sensitivity that has been associated with YIG technology in the past. This breakthrough in technology allows the synthesizers to be actively deployed in outdoor-mounted distribution sites as node local oscillators for Local Multipoint Distribution Service (LMDS) systems.

Operating at 25.88 to 27.05 GHz, these synthesizers were designed to improve the receiver's phase-hit performance when subjected to large temperature gradients and external mechanical shocks. As Node Local Oscillators, this product has undergone extensive field trials and is now in production at Microsource.

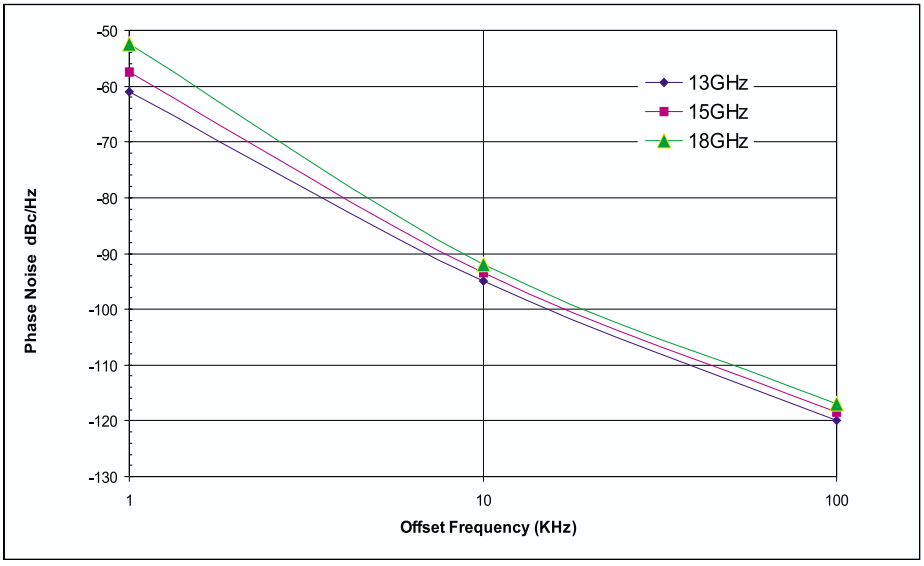
Operating from ±15 VDC and +5 VDC supplies, the synthesizer produces a nominal output power of +7 dBm across the operating frequency band. In customer tests, MSI's synthesizer design has proven capable of standing up to the environmental punishments of wind, rain, hail and large temperature changes with-



▲ **Figure 1. A simplified block diagram of the synthesizer.**



▲ **Figure 2. LMDS synthesizer noise data at 26.5 GHz.**



▲ **Figure 3. FET PMYTO phase noise data at 12, 15 and 18 GHz.**

out causing the LMDS system to lose frame or bit information.

A simplified block diagram of the synthesizer is shown in Figure 1. The synthesizer is a single loop design having an external reference input of 960 MHz. The synthesizer loop locks a PMYTO operating at half the output frequency; a ×2 multiplier on the output of the loop establishes the final frequency. The operational temperature range is –40° C to +80° C, the frequency step size for the synthesizer is 10 MHz and the spurious are –65 dBc.

The plot shown in Figure 2 details the synthesizer's typical production phase noise capability over the operational frequency range. Measurement has shown that the phase noise of the unit is typically better than –88 dBc at 10 kHz offset from the carrier.

The heart of the synthesizer is the PMYTO. MSI has developed a ruggedized FET oscillator design that has a typical phase noise of –95 dBc/Hz at 10 kHz offset from the carrier over its frequency range of operation. This FET PMYTO design is used to cover 2 GHz bandwidths through 18 GHz where it provides similar phase noise performance. Figure 3 shows data from the PMYTO family.

One of the advantages of the FET-based oscillator is its performance over temperature. When used in an enclosed distribution site environment, case temperatures of the PMYTO can reach 100° C for extended periods of time. Each production PMYTO is actively tested at 105° C to ensure performance over harsh environmental conditions.

This synthesizer provides a ruggedized architecture, which also supports option changes in step size, operating frequency and reference frequency. ■

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