Micro-Miniature, SMD, Ultra Low Phase Noise, HF OCXO

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Ultra low phase noise (ULPN), high frequency (HF) reference OCXOs have become extremely critical components in radar, communications, military systems, and instrumentation (test and measurement). All of these applications to somewhat different extend would greatly benefit from significantly reduced size, supply voltage, power consumption, and vibration sensitivity of the reference. Current state of the art ULPN (around -180 dBc/Hz on the noise floor) HF (80 to 125 MHz) OCXO are quite bulky – around 20 to 80 cc, use supply voltage of 12 V to 15 V and consume more than 2 W of power at room temperature. Additional vibration isolation would significantly increase the volume even further. The goal of this work was to develop an OCXO with order of magnitude smaller size, light weight, lower supply voltage, lower power consumption, surface mountable, while maintaining outstanding ultra low phase noise and stability performance. The implementation of the original oven and oscillator circuit designs resulted in the development of a SMD OCXO with the dimensions of 21x14x6.8 mm^3, volume of 2.0 cc, operating off 5.0 V supply voltage, consuming 1 W of power at room temperature, and exhibiting the phase noise (100 MHz carrier), of -110 dBc/Hz at 10 Hz offset, -163 dBc/Hz at 1 KHz offset, and better than -180 dBc/Hz on the noise floor. The minuscule size allows for implementation in small and PXI based instrumentation. Also it perfectly lends itself to vibration dampening and isolation without adding significant bulk to the system.

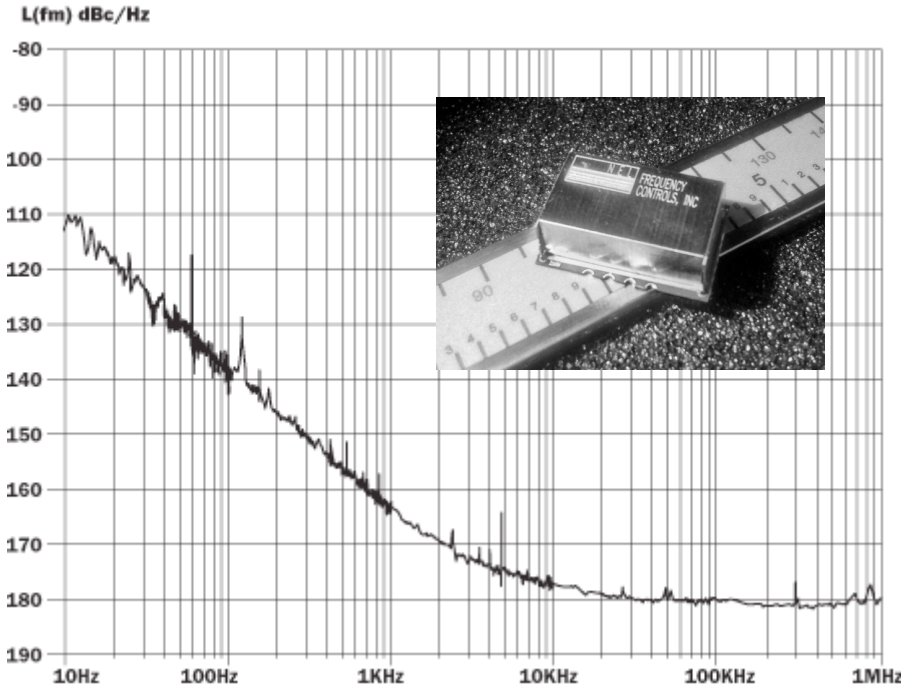

Fig.1. Phase Noise Plot of SMD ULPN OCXO