

PCB-MOUNTED, YIG SOURCES

Two new series of miniature yttrium-iron-garnet (YIG) oscillators have been developed that are configured in printed-circuit-board (PCB)-mount packages. These YIG oscillators operate over the 2 to 8 GHz frequency range and feature reduced cost and high reliability. Both series feature a 1" X 1" X 0.5" miniature PCB-mount package that weighs one ounce. **Figure 1** shows the PCB-mountable oscillator.

The MLMB series miniature YIG-tuned oscillator series has been specifically designed for commercial applications, where small size at low cost is the primary consideration. These oscillators find application in signal generators, microwave and automatic test equipment, receivers and synthesizers. They utilize a bipolar or FET coup-

led to a YIG sphere in a thin-film oscillator circuit. The choice of transistor depends on the phase noise requirements. YIG heaters with low surge currents are used to maintain temperature stability. Standard output power levels of +15 dBm are provided over the specified frequency bands and the 0° to 65°C temperature range.

The MLMB series is comprised of four models, including the -0204 that operates from 2 to 4 GHz, the -0306 that operates from 3 to 6 GHz, the -0408 that operates from 4 to 8 GHz and the -0208 that operates from 2 to 8 GHz. **Table 1** lists the miniature oscillator's phase noise @ 100 kHz. All four models provide a maximum of ±2 dB output power variation at +15 dBm. Frequency drift is 6 MHz (max) except for the MLMB-0208, which is 10 MHz (max). Pulling is 1 MHz (max) into a 12 dB return loss. Pushing is rated at 0.1 MHz/V (max) for the +15 V DC supply and 5 MHz/V (max) for the =5 V DC supply. Harmonic output levels are -12 and -20 dBc for the second and third harmonics, respectively. Spurious outputs

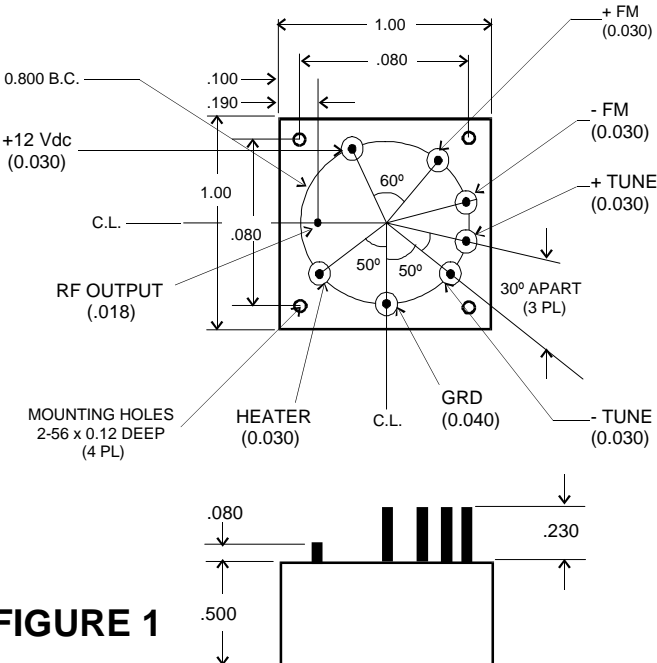


FIGURE 1

**TABLE 1
PHASE NOISE
OF THE MINIATURE OSCILLATORS**

MLMB-	Frequency (GHz)	Phase Noise (dBc/Hz)
O2O4	2 to 4	-125
O3O6	3 to 6	-126
O4O8	4 to 8	-123
O2O8	2 to 8	-123

Continued on reverse.

PCB-MOUNTED OSCILLATORS

TABLE 2
LINEARITY AND TUNING DATA
OF THE MINIATURE OSCILLATOR

Current (mA)	Frequency (MHz)	Frequency Error (MHz)
231.70	4500	0
257.20	4987	+2
282.67	5472	+2
308.15	5960	+5
33.64	6445	+5
359.12	6929	+4
383.60	7415	+5
410.09	7900	+5
435.58	8385	+5
461.06	8870	+5
486.56	9350	0

are -60 dBc (min). The main tuning port sensitivity is 20 MHz/mA ±10 percent, with a linearity of ±0.1 percent and a 3 dB tuning bandwidth of 5 kHz. **Table 2** lists the actual tuning data showing the linearity error over the 4.5 to 9.35 GHz frequency range. The frequency modulation port has a typical sensitivity of 310 kHz/mA and a 3 dB modulation bandwidth of 400 kHz for a frequency deviation of ±50 MHz. The DC power required is +15 V DC at 100 mA and -5 V DC at 50 mA. The YIG heater requires +24 V DC at 25 mA steady state and 250 mA maximum surge current. Phase noise at the 10 kHz offset for all four MLMB models is -100 dBc/Hz.

The MLPB series permanent magnet YIG-tuned oscillators have been designed with the latest permanent magnet technology to yield good performance over temperature and environmental conditions. The oscillators

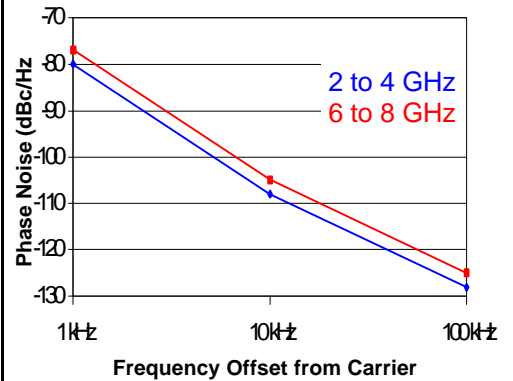
TABLE 3
FREQUENCY DRIFT
OF THE PERMANENT
MAGNET OSCILLATOR

MLPB-	Frequency (GHz)	Frequency Drift (MHz)
O2O4	2 to 4	+/- 2.5
O3O5	3 to 5	+/- 3.5
O4O6	4 to 6	+/- 4.5
O6O8	6 to 8	+/- 6.0

operate from a single +12 V DC supply. The MLPB series oscillators are available in customer-selected 2 GHz frequency bands in the 2 to 8 GHz range and come standard in 2 to 4, 3 to 5, 4 to 6, 5 to 7, and 6 to 8 GHz models. Minimum power output is +16 dBm into 50 Ω with a ±1 dB maximum variation. **Table 3** lists the permanent magnet oscillator's frequency drift over the 20° to 70°C operating temperature range.

Phase noise at 10 kHz offset is -100 dBc/Hz for all MLPB models. Phase noise at 100 kHz offset is -128 dBc/Hz for the 2 to 4 and 3 to 5 GHz models, -126 dBc/Hz for the 4 to 6 and 5 to 7 GHz models, and -123 dBc/Hz for the 6 to 8 GHz model, as shown in **Figure 2**. Frequency pulling, pushing, and harmonic and spurious levels are the same as the MLMB series sources. The main tuning port sensitivity is typically 10 MHz/mA ±10 percent. Linearity and hysteresis are both 1 MHz (max). The frequency modulation port sensitivity is 150 kHz/mA with a bandwidth of 400 kHz and a deviation of ±50 MHz. DC power is +12 V DC at 100 mA. The YIG heater power required is 15 V DC at 25 mA steady

FIGURE 2
PERMANENT MAGNET
OSCILLATOR TYPICAL
PHASE NOISE



The MLPB series YIG-tuned oscillators serve as replacements for dielectric-resonator oscillators and offer good phase noise performance. These oscillators find use in the latest telecom and satcom systems, and digital radios. Extensive testing has been performed on these oscillators to qualify them for MSK, 16 QAM and 64 QAM digital radios where there is little tolerance for microphonics and phase hits.

The MLMB and MLPB oscillators offer high reliability at reduced costs. They are small in size and can be mounted directly onto a PCB, saving space and reducing cost. Delivery: 3 to 4 weeks.

Micro Lambda, Inc.
48041 Fremont Blvd.
Fremont, CA 94538
Phone: (510) 770-9221
Fax: (510) 770-9213
E-mail: mcrolambda@aol.com
Web: <http://www.micro-lambda.com>