"Plug 'n Play" with New Easy-to-Use Tunable Bench Top Filters

This issue's cover features a new bench top tunable filter instrument that makes it easy to use high performance YIG filters in the design lab and production line test environments

A new series of bench test filters has been introduced by Micro Lambda Wireless. The MLBF Series uses any of the tunable filters manufactured by the company in a compact, easy to operate instrument. These tunable filters are available in bandpass or band-reject (notch) configurations. Frequency coverage is 500 MHz to 50 GHz for the bandpass designs and 500 MHz to 20 GHz for the band-reject designs. Target applications include laboratory test, production test, simulators and general purpose test sets.

The MLBF-Series bench test filters include a tunable filter that is chosen by the user, in an enclosure with an internal heat sink, cooling fans, power supply, compensation driver, cabling, frequency display and tuning knob. Tuning of the bench test filters is accomplished using the front panel controls, or via the USB interface or Ethernet port. PC operating software is provided for both interface methods.

Overview and Specifications

The MLBF-Series Bench Test Filter can be supplied as a wide band tunable bandpass (MLBFP-*xxxx*) or band reject (MLBFR-*xxxx*) filter, covering frequency ranges between 500 MHz and 50 GHz. Frequency accuracy is improved by the use of digital calibration techniques with correction data stored in non-volatile memory. Front panel RF input and output jacks on the front panel allow easy connection to the device under test (DUT). A sim-

The new MLBF Series of bench top tunable filters brings Micro Lamba Wireless' high performance YIG technology to the laboratory workbench or production line test station.

ple block diagram is shown in Figure 1.

Key electrical specifications are based on the selected YIG-tuned filter. The only performance parameter that is affected by the inclusion of the YIG assembly into the bench test filter assembly is a small increase in the insertion loss due to the additional cabling and RF connectors.
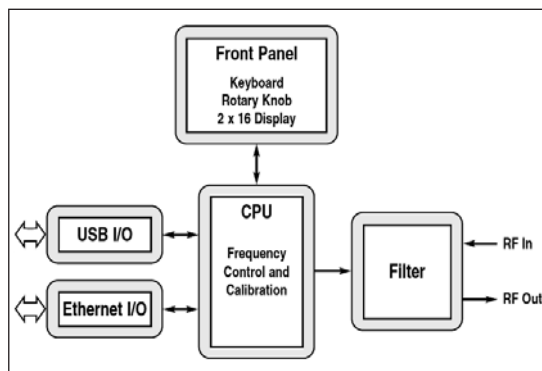
Typical performance of a bench test filter

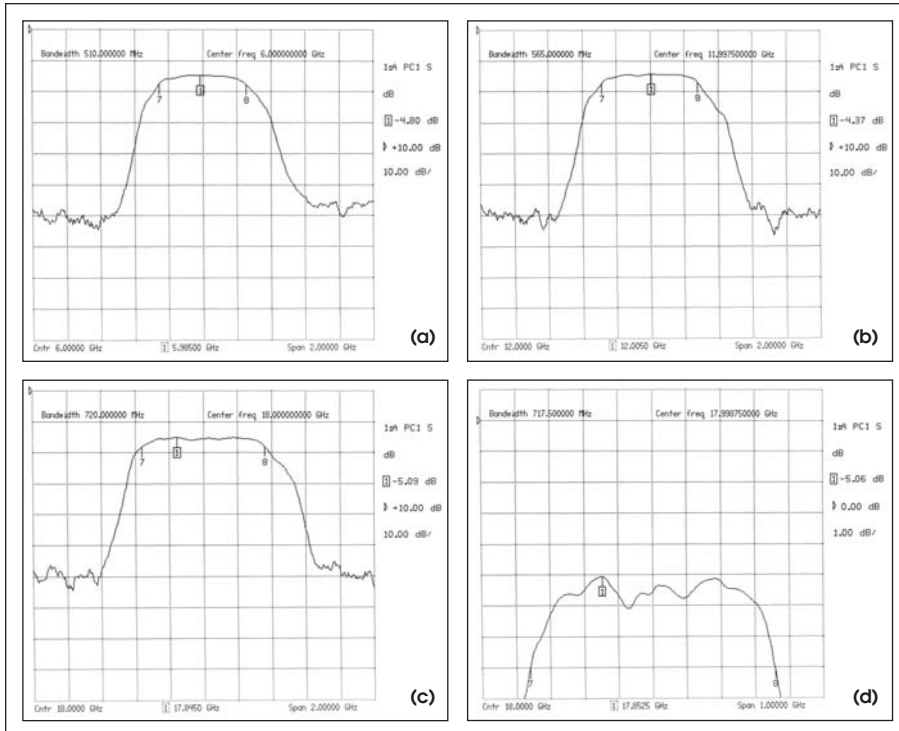**Figure 1 · Simplified block diagram.**

Figure 2 · Performance plots of the instrument with a 6-18 GHz bandpass filter: (a) passband at 6 GHz; (b) passband at 12 GHz; (c) passband at 18 GHz; and (d) detail of passband ripple at 18 GHz.
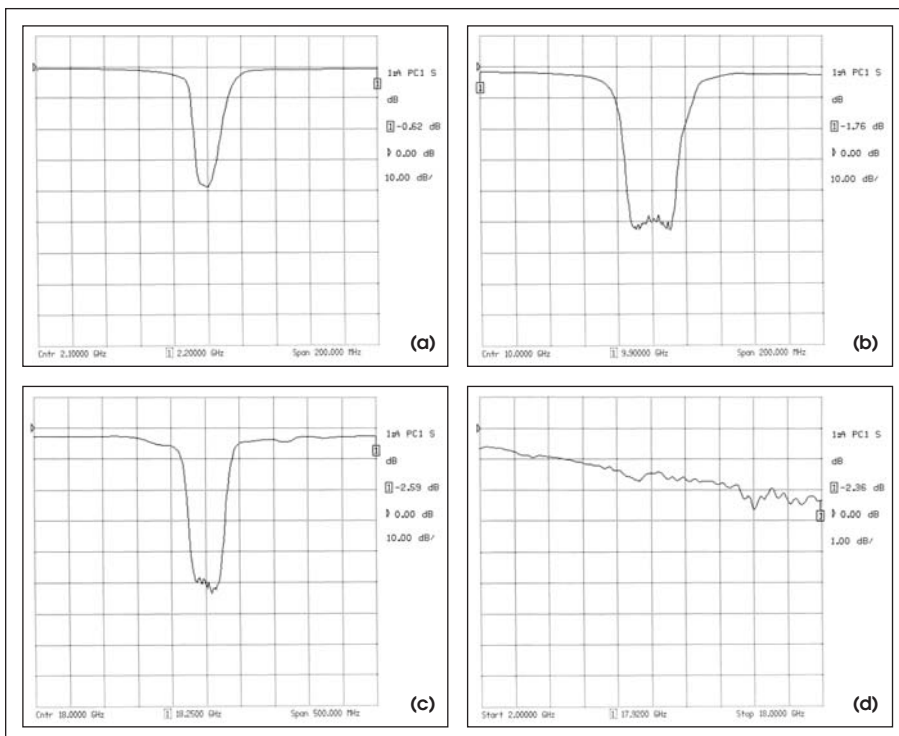

Figure 3 · Performance plots of the instrument with a 2-18 GHz band-reject filter: (a) stopband at 6 GHz; (b) stopband at 12 GHz; (c) stopband at 18 GHz; and (d) insertion loss over 2-18 GHz.

assembly using a bandpass filter operating over the 6 GHz to 18 GHz frequency range is given in Figure 2. Performance graphs for a unit utilizing a band reject filter covering 2 to 18 GHz are given in Figure 3. A list of available filters is shown in Table 1.

Front Panel Operation
Keypad and Tuning Knob

The bench test filter assembly incorporates a keypad and a simple tuner knob for manual control. Basic functions of the keypad include:

· Press the > key on the front panel to move the cursor to the right. When in the Settings Menu, this moves to the next menu selection.
· Press the < key to move the cursor left, backspace data entry, or when in the Settings Menu, return to the previous menu selection.
· Press the + key on the front panel to increment cursor position or enable a menu option.
· Press the – key on the front panel to decrement cursor position or disable a menu option.
· Enter numbers and decimal point via the keyboard as needed. The MHz key is also used as the Enter Data key.

The tuner knob may be used in multiple fashions by the user:

· The knob rotated clockwise is increment; counter clockwise is decrement (equivalent to pressing the + or – key).
· Press the encoder knob on the front panel to enter the Settings Menu.
· Press the encoder knob again to exit the Settings Menu. Upon exit, any changes made while in the menu mode will be enabled.

Frequency Entry

Under normal operation the alphanumeric display of the bench test filter shows the current center frequency setting on the top display line, while the bottom display line is

Table 1

— BANDPASS FILTERS —		
MODEL NO.	FREQ. RANGE	3 dB BW
MLBFP-40520	0.5 to 2.0 GHz	20 MHz
MLBFP-40540	0.5 to 4.0	15
MLBFP-41002	1.0 to 2.0	20
MLBFP-41004	1.0 to 4.0	20
MLBFP-42004	2.0 to 4.0	40
MLBFP-42006	2.0 to 6.0	40
MLBFP-42008	2.0 to 8.0	40
MLBFP-42012	2.0 to 12.4	40
MLBFP-42018	2.0 to 18.0	40
MLBFP-42020	2.0 to 20.0	40
MLBFP-42026	2.0 to 26.5	25
MLBFP-44008	4.0 to 8.0	40
MLBFP-46012	6.0 to 12.4	100
MLBFP-46018	6.0 to 18.0	100
MLBFP-46020	6.0 to 20.0	100
MLBFP-48012	8.0 to 12.4	200
MLBFP-48018	8.0 to 18.0	400
MLBFP-48020	8.0 to 20.0	400
MLBFP-41218	12.0 to 18.0	400
MLBFP-43030	3.0 to 30.0	30
MLBFP-43040	3.0 to 40.0	30
MLBFP-43044	3.0 to 44.0	30
MLBFP-43050	3.0 to 50.0	30
MLBFP-47040	7.0 to 40.0	35
MLBFP-41840	18.0 to 40.0	50

MODEL NO.	FREQ. RANGE	3 dB BW
MLBFP-60540	0.5 to 4.0	25
MLBFP-62080	2.0 to 8.0	40
MLBFP-62018	2.0 to 18.0	50
MLBFP-62026	2.0 to 26.5	30
MLBFP-64080	4.0 to 8.0	50
MLBFP-66018	6.0 to 18.0	100
MLBFP-68018	8.0 to 18.0	500
MLBFP-72018	2.0 to 18.0	40
MLBFP-72026	2.0 to 26.5	30
MLBFP-76018	6.0 to 18.0	500
MLBFP-78020	8.0 to 20.0	500

— BAND-REJECT FILTERS —		
MODEL NO.	FREQ. RANGE	3/40 dB BW
MLBFR-0502	0.5 to 2.0 GHz	100/5 MHz
MLBFR-0204	2.0 to 4.0	125/15
MLBFR-0208	2.0 to 8.0	150/15
MLBFR-0212	2.0 to 12.0	150/10
MLBFR-0218	2.0 to 18.0	150/10
MLBFR-0220	2.0 to 20.0	150/5
MLBFR-0408	4.0 to 8.0	150/20
MLBFR-160418	4.0 to 18.0	150/30
MLBFR-0618	6.0 to 18.0	150/25
MLBFR-160618	6.0 to 18.0	150/40
MLBFR-0812	8.0 to 12.4	150/25
MLBFR-160818	8.0 to 18.0	150/50
MLBFR-1218	12.0 to 18.0	150/25

Table 1 · Available filters for the MLBF bench-top unit.

blank. A cursor is positioned under one of the digits on line 1. This cursor can be positioned using the < or > arrow keys. By pressing the +/– keys or rotating the knob clockwise or counter clockwise, the highlighted digit can be incremented or decremented as required to change the frequency. Entering a new frequency via the keypad will display numbers as they are entered on line 2. The new frequency is selected by pressing the MHz key on the keypad. If a resolution less than a MHz is to be set, the decimal point must be used.

Computer Interface

A USB 2.0 compliant, USB-Mini-B connector allows use of a local PC running Windows® XP, 32 bit; Windows Vista, 32 and 64 bit; or Windows 7, 32 and 64 bit. PC control interface software is provided, using a Windows GUI.

The Ethernet interface is 10/100 Mbps with a standard RJ45 connector. TCP/IP protocols supported are HTTP, UDP socket and Telnet. DHCP and fixed IP modes. Web interface access using most standard internet browsers (IE, Firefox). UDP PC control interface software is provided. Figure 4 shows the rear panel mini-USB and Ethernet connectors.

Operating Conditions

The MLBF Series bench test filter is specifically designed for laboratory and production test environments. Units operate over a +15°C to +55°C temperature range and have been designed to exceed shock, vibration and humidity requirements per MIL-PRF-28800F stated for general instrumentation class 3 requirements.

· Input power: 88 to 264 VAC at 2 A max., 47 to 63 Hz.
· Non-operating temperature range:

Figure 4 · Ethernet and USB interfaces are provided for connection to a computer or network.

–40°C to +71°C
· Shock: Functional, 30 G per MIL-PRF-28800F table 2, class 3. Transit drop, per MIL-PRF-28800F table 13 class 3. Bench Handling, per MIL-PRF-28800F para 4.5.5.4.3, class 3
· Vibration: Random 5-500 Hz per MIL-PRF-28800F table 2, class3
· Humidity: 5% to 95% per MIL-PRF-28800F table 2, class 3

All filter bench test filter assemblies are housed in a 4" × 10" × 13" (h×w×d) enclosure.

Summary

The MLBF Series bench test filter assemblies provide designers and test engineers with a new option in providing wideband filtering capabilities to laboratory and production test facilities. With frequency coverage available from 500 MHz to 50 GHz (in bands), engineers no longer have to do their own design using individual components, therefore saving time and cost.

Units are provided with a power cord, USB cable, Ethernet cable, and a CD with the Users Manual, Quick Start guide and PC operating software for USB and Ethernet.

For more information about the MLBF Series, please contact:

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