

YIG Filters Tune From 3 To 40 GHz

These four-stage filters provide the excellent linearity and frequency stability needed by high performance test equipment

FILTERS based on yttrium-iron-garnet (YIG) tuning are noted for their excellent linearity and good image rejection. For that reason, they are often used as preselectors in a spectrum analyzers. While YIG filters have traditionally been limited in total bandwidth to approximately 26 GHz, the MLFP series of YIG-tuned filters from Micro Lambda offers coverage as wide as 3 to 40 GHz in a single unit (see figure). The four-stage filters promise high selectivity for a wide range of applications, including wideband receivers and test equipment.

The MLFP series currently has two members: the model MLFP-43040, which tunes from 3 to 40 GHz, and the model MLFP-47040, which tunes from 7 to 40 GHz. Both are four-stage designs with 24 dB/octave typical selectivity (see table). The maximum insertion loss for either model is 6 dB while the maximum passband VSWR is 2.0:1. Both exhibit 80 dB minimum off-resonance isolation and off-resonance spurious performance of -60 dBc or better.

The MLFP-43040 features a minimum passband of 33 MHz at the low-frequency bandwidth and a minimum passband of 70 MHz at 40 GHz. The MLFP-47040 has a minimum passband of 42 MHz at 7 GHz and a minimum

passband of 75 MHz at 40 GHz. The former provides limiting at an input level of +10 dBm while the latter similarly provides limiting at input signals of +10 dBm or more. For the MLFP-43040, temperature drift is less than 17 MHz at 3 GHz and less than 35 MHz at 40 GHz. For the MLFP-47040, temperature drift is less than 21 MHz at 7 GHz and less than 38 MHz at 40 GHz.

The resonant frequency of a YIG-tuned device changes in response to an applied current, which alters a magnetic field around one or more YIG sphere resonators. The tuning sensitivity characterizes the responsiveness of the device to changes in current while linearity is a gauge of the tuning characteristic's



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smoothness across the full applied current range. In the case of the models MLFP-43040 and MLFP-47040, the nominal tuning sensitivities are 32 and 28 MHz/mA, respectively, while the maximum linearities are ±35 and ±30 MHz, respectively.

The MLFP series of broadband YIG-tuned filters is designed for operating temperatures from 0 to +70°C. The filters require heater voltage of +20 to +30 VDC, drawing surge current of 750 mA (such as during turn-on and warm-up periods) and steady-state current of 150 mA (during normal operating conditions). Hysteresis is 50 MHz or less for both models.

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The MLFP YIG filter at a glance

Parameter	MLFP-43040	MLFP-47040
Frequency range	3 to 40 GHz	7 to 40 GHz
Bandwidth (3 dB) [min.]	30 + (f/GHz)	35 + (f/GHz)
Insertion loss (max.)	6 dB	6 dB
Selectivity (typ.)	24 dB/octave	24 dB/octave
Linearity (max.)	+/- 35 MHz	+/- 30 MHz
Off-resonance isolation (min.)	80 dB	80 dB