

# Dual-Channel YIGs Filter Signals To 18 GHz

These compact dual-channel, band-reject YIG-tuned filters help cut size requirements and power consumption in multichannel receivers.

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**F**ilters based on yttrium-iron-garnet (YIG) technology provide passbands or rejection bands that can be tuned across wide microwave frequency ranges. One of the companies that has succeeded in shrinking the size of the technology in recent years, Micro Lambda Wireless ([www.microlambdawireless.com](http://www.microlambdawireless.com)), in the form of its compact cube-shaped filters, has now packed two filter channels into these miniature 1.4-in. cube-shaped packages. The company's MLFRD series of dual-channel YIG band-reject filters each provides two tunable rejection bands

with coverage within the overall 2-to-18-GHz band. Individual coverage includes 2 to 6 GHz, 2 to 8 GHz, 6 to 18 GHz, and 8 to 18 GHz, making these band-reject filters well suited for removal of unwanted signals in electronic-warfare (EW) and electronic-countermeasures (ECM) receivers, especially where high alternate-channel rejection is needed.

The MLFRD series (see figure) of dual-channel YIG band-reject filters includes the models MLFRD-0206 (2 to 6 GHz), MLFRD-0208 (2 to 8



The MLFRD series of dual-channel YIG band-reject filters provide frequency coverage from 2 to 18 GHz in a compact cube-shaped housing measuring a mere 1.4 in. on a side.

GHz), MLFRD-0618 (6 to 18 GHz), and MLFRD-0818 (8 to 18 GHz), each housed in a 1.4-in. cube and available with an analog or digital driver (see table). The two lower-frequency models provide 40-dB rejection bands of at least 5 MHz wide and maximum of 20 MHz wide. The two higher-frequency filters offer 40-dB rejection bands of at least 15 MHz wide and a maximum of 35 MHz wide. The maximum 3-dB rejection band for the two lower-frequency filters is 120 MHz while the maximum 3-dB rejection band for the two higher-frequency filters is 100 MHz.

For applications such as military-grade receivers, where it is essential to maintain consistent performance for both band-reject channels, the filters are specified for maximum channel-to-channel tracking of 3 MHz for the two lower-frequency models (MLFRD-0206 and MLFRD-0208)

**The MLFRD series dual-channel YIG band-reject filters at a glance**

MODEL	MLFRD-0206	MLFRD-0208	MLFRD-0618	MLFRD-0818
Frequency range	2 to 6 GHz	2 to 8 GHz	6 to 18 GHz	8 to 18 GHz
Max. 3-dB BW	120 MHz	120 MHz	100 MHz	100 MHz
Min. 40-dB BW	5 MHz	5 MHz	15 MHz	15 MHz
Max 40-dB BW	20 MHz	20 MHz	35 MHz	35 MHz
Passband range	DC to 8 GHz	DC to 8 GHz	DC to 18 GHz	DC to 18 GHz
Passband IL (max.)	2 dB	2 dB	2 dB	2 dB
Channel-to-channel tracking	3 MHz	3 MHz	5 MHz	5 MHz
Channel-to-channel isolation	50 dB	50 dB	50 dB	50 dB

## Product Technology

and maximum channel-to-channel tracking of 5 MHz for the two higher-frequency filters (MLFRD-0618 and MLFRD-0818). The channel-to-channel isolation is at least 50 dB for all four filters.

In spite of the high signal rejection provided by the MLFRD series dual-channel YIG band-reject filters, they exhibit low insertion loss for other signals in the band, reaching a maximum of 2 dB for all models. The maximum VSWR for all models is also low, at 2.0:1. The filters are designed to handle input levels as high as +28 dBm without damage, and have a minimum limiting level of +5 dBm for the two lower-frequency models and +10 dBm for the two higher-frequency models. The maximum spurious level for each filter is 4 dB.

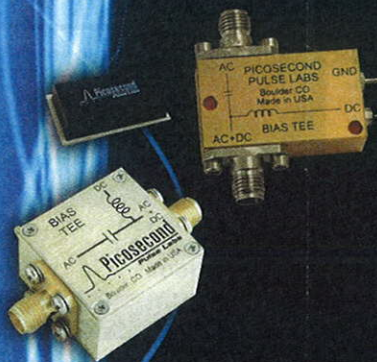
The filters benefit from the high-quality-factor (high-Q) properties of YIG spheres, which can be tuned within an electromagnetic (EM) field by means of an applied current. The tuning sensitivity for all four filters is typically 20 MHz/mA, with worst-case tuning linearity of  $\pm 3$  MHz for the two lower-frequency filters and  $\pm 5$  MHz for the two higher-frequency filters. The tuning hysteresis is typically 5 MHz for the two lower-frequency filters and typically 10 MHz for the two higher-frequency filters. With full tuning, the two lower-frequency filters provide a total passband range of DC to 8 GHz while the two higher-frequency filters have a passband range of DC to 18 GHz.

The MLFRD series YIG band-reject filters are specified for operating case temperatures of 0 to +65°C. Over that temperature range, the maximum frequency drift with changing temperature is 10 MHz for the two lower-frequency models and 20 MHz for the two higher-frequency models. The filters require heater voltage of +28 VDC for temperature stability, drawing heater current of 300 mA during surge operation and 100 mA during steady-state operation (at +25°C). For applications in severe environments, all four filter models can be supplied in versions with extended oper-

ating temperature ranges. In addition to application in EW and ECM receivers, such filters have been used in broadband communications receivers as well as in sensitivity deep-space (astronomy) receiver applications. Their excellent channel-to-channel frequency tracking

and high isolation makes them suitable for a number of uses. Micro Lambda Wireless, Inc., 46515 Landing Parkway, Fremont, CA 94538; (510) 770-9221; Fax: (510) 770-9213; E-mail: sales@microlambdawireless.com, Internet: www.microlambdawireless.com. MRi

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### BIAS TEE PRODUCT SPECIFICATIONS

Model	Bandwidth	Low Frequency 3dB	Max DC Voltage	Max DC Current
5530A	12.5 GHz	20 KHz	200 V	10 mA
5531	10 GHz	750 KHz	1.5 KV	20 mA
5541A	>26 GHz	80 kHz	50 V	100 mA
5542	50 GHz	10 kHz	16 V	100 mA
5542K	40 GHz	12 KHz	16 V	100 mA
5542LL	>40 GHz	12 kHz	16 V	100 mA
5545	20 GHz	65 kHz	50 V	500 mA
5546	7 GHz	3.5 KHz	50 V	500 mA
5547	15 GHz	5 kHz	50 V	500 mA
5550B	18 GHz	100 kHz*	50 V	500 mA*
5575A	12 GHz	10 kHz*	50 V	500 mA*
5580	15 GHz	10 kHz	50 V	2 Amp
5585	18 GHz	2 GHz	100 V	6 Amps
5586	5 GHz	1 GHz	100 V	8 Amps
5587	2 GHz	200 MHz	100 V	6 Amps
5589	2.8 GHz	300 MHz	100 V	7 Amps
SM100	13 GHz	14 kHz	16 V	500 mA
SM101	15 GHz	7 kHz*	16 V	500 mA

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