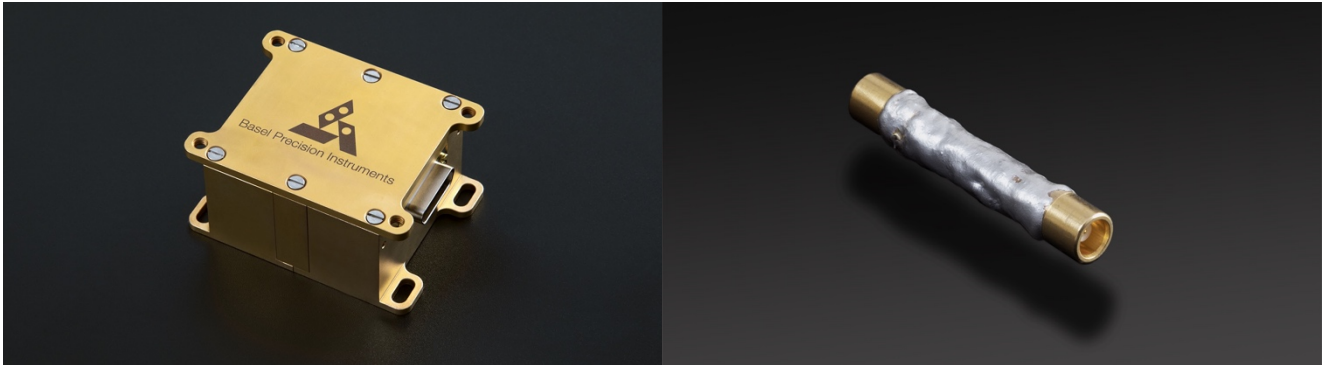




Basel Precision Instruments



# Cryogenic Microwave Filter and Thermalizer (MFT)

high attenuation, low frequency cutoff, strong thermalization

## Single MFT filters:

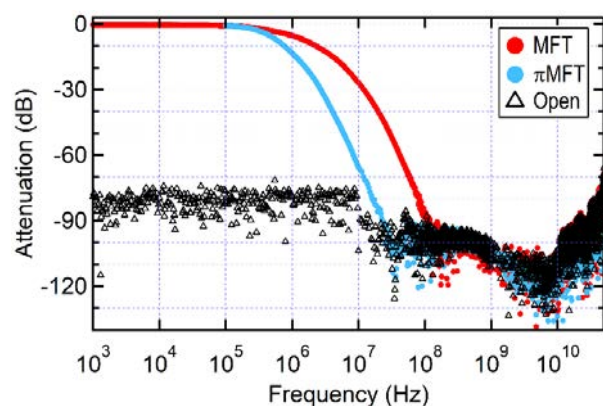
- Strong exponential attenuation of more than typ. 100 dB above ~130 MHz
- Strong thermalization
- Resonance-free attenuation spectrum
- Low resistance ~150  $\Omega$  @ 4K or ultra-low resistance ~25 m $\Omega$  @ 4K, suitable for high-currents
- Low capacitance ~2.5 nF, significantly reducing noise in measurements using IV converters
- Resistance to ground > 1 T $\Omega$ ; negligible RF leakage current measured up to 50 GHz
- MCX, SMA, SMP connectors or customized

## Compact filter box (MFT25):

- 25 filtered lines
- Non-magnetic copper box, gold-plated for optimized thermal contact
- Easy to mount at 10 mK
- Micro-D connectors
- ~ 35 x 50 x 70 mm, 350 gr

## Customization:

- Adjust cutoff frequency
- Adding discrete RC filtering
- Customized connectors on single filters



typical attenuation spectrum of an MFT-25m $\Omega$  (red) and a  $\pi$ MFT-25m $\Omega$  (blue) measured at room temperature. The  $\pi$ MFT is equipped with an additional pair of discoidal capacitors.



Single Filter Models		MFT-150 $\Omega$	$\pi$ MFT-150 $\Omega$	MFT-25m $\Omega$	$\pi$ MFT-25m $\Omega$
Connector type		MCX, or customized SMA, SMP, etc.			
Dimensions		Length ~ 30 mm, Diameter ~ 6 mm			
Capacitance	300 K / 4.2 K	$\lesssim 2.5$ nF	$\lesssim 12$ nF	$\lesssim 2.5$ nF	$\lesssim 12$ nF
Resistance	T = 300 K	$\lesssim 150$ $\Omega$		$\lesssim 2.5$ $\Omega$	
	T = 4.2 K	$\lesssim 150$ $\Omega$		$\lesssim 25$ m $\Omega$	
Attenuation	3 dB cutoff	~ 0.5 MHz	~ 0.3 MHz	~ 0.5 MHz	~ 0.3 MHz
	25 dB cutoff	~ 8 MHz	~ 1 MHz	~ 8 MHz	~ 1 MHz
	100 dB cutoff	~ 130 MHz	~ 30 MHz	~ 130 MHz	~ 30 MHz
Maximum applied voltage		100 V			
Maximum applied current	300 K	10 mA		30 mA	
	10 mK	0.2 mA*		10 mA*	
Resistance to ground		> 1 T $\Omega$			

Table shows typical specs; for details, please contact us at [info@baspi.ch](mailto:info@baspi.ch)

\* Maximum current at 10 mK is calculated such that the dissipated power remains below 10  $\mu$ W

Filter Box Models	MFT25-150 $\Omega$	MFT25-25m $\Omega$
Number of filters per box	25	
Filter type	MFT-150 $\Omega$	MFT-25m $\Omega$
Connector type	Micro-D connector	
Dimensions and weight	~ 35 x 50 x 70 mm, 350 gr	

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## Applications

Microwave filtering & thermalization are key elements of sensitive low-temperature experiments. **Our compact MFT filters combine strong thermalization of the leads with ultra-strong microwave attenuation.** The MFT consists of low-resistivity wire, e.g. copper, embedded in a highly conductive silver matrix that acts as a heat-exchanger, ensuring optimal thermalization. Usage examples:

- 1) Filtering out noise at microwave frequencies and thermalizing the electron in milli-Kelvin and sub-milli-Kelvin experiments, e.g., in a cryogenic or cryogen-free dilution refrigerator.
- 2) Low-capacitance filtering in quantum transport experiments to minimize excess noise.
- 3) Experiments aiming to reach ultra-low electron temperatures below 10 mK.

