



Basel Precision Instruments



Cryogenic Microwave Filter & Thermalizer (MFT)

high attenuation, low cutoff frequency, strong thermalization

- 25 filtered lines in a compact non-magnetic box
- Easy to mount at 10 mK
- **Exponentially strong attenuation**, free of resonances (plot on next page)
- More than 100 dB attenuation above ~100 MHz
- **Strong thermalization** (filter wire embedded in silver epoxy)
- Ultra-low resistance for high current applications: **~25 m Ω @ 4K**
- Ultra-low capacitance, reduced noise in current measurements: **2.5 nF**
- Resistance to ground > 1 T Ω ; **negligible leakage current**
- **NEW: 2-pole RCRC stage option with 3dB cutoff down to kHz, integrated into the same compact box**

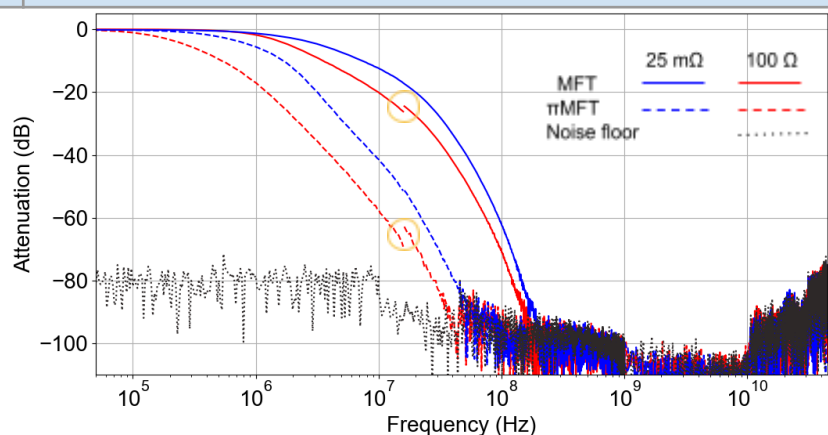


Single Filter Models		MFT-100 Ω	π MFT-100 Ω	MFT-25m Ω	π MFT-25m Ω
		Resistive for optimum thermalization		Ultra-low (m Ω) resistance for high-current applications	
Connector type		SMA, MCX, or customized SMP, etc.			
Dimensions (not including connector)		Length ~ 25 mm, Diameter ~ 6 mm			
Capacitance	300 K / 4.2 K	≤ 2.5 nF	≤ 12 nF	≤ 2.5 nF	≤ 12 nF
Resistance	T = 300 K	$\leq 100 \Omega$		$\leq 2.5 \Omega$	
	T = 4.2 K	$\leq 100 \Omega$		≤ 25 m Ω	
Attenuation	3 dB cutoff *	~ 1.3 MHz **	~ 0.2 MHz **	~ 2 MHz	~ 0.5 MHz
	20 dB cutoff *	~ 10 MHz **	~ 1.2 MHz **	~ 20 MHz	~ 3 MHz
	100 dB cutoff *	~ 180 MHz	~ 45 MHz	~ 200 MHz	~ 70 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 Ω			

Table shows typical specs; * Variations of up to $\pm 20\%$ in cutoff frequencies can be expected; ** Extracted from measurements with 1 M Ω input impedance; all other cutoff frequencies are extracted with 50 Ω input impedance (typical spectra plotted below); *** Maximum current at 10 mK for dissipation below 10 μ W.

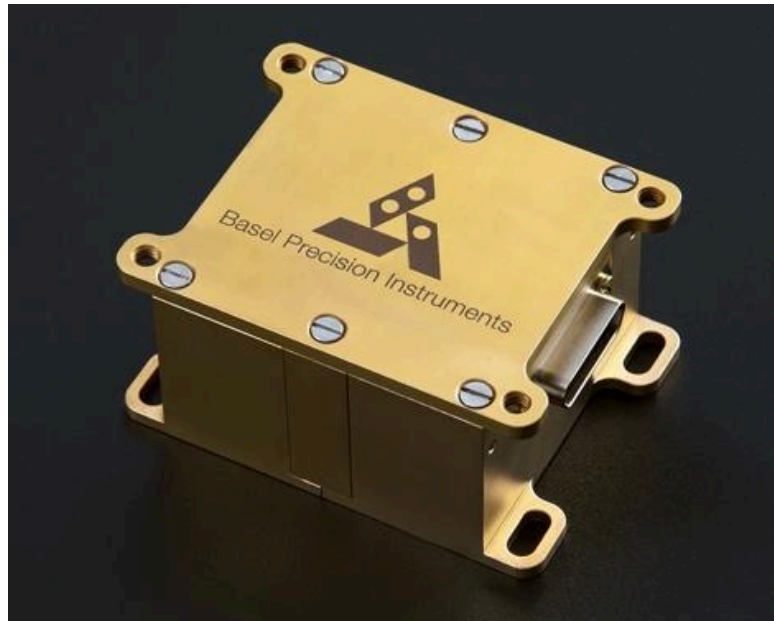
Filter Box Models	MFT25-100 Ω	MFT25-25m Ω
Number of filters per box	25	
Filter type	MFT-100 Ω	MFT-25m Ω
Connector type	Micro-D connector	
Dimensions and weight	30 x 56 x 68 mm, 400 gr	

Figure shows the typical attenuation characteristics of individual MFT filters. A vector network analyzer with 50 Ω input was used. For 100 Ω filters (red curves), a spectrum analyzer with 1 M Ω input impedance was used below 20 MHz. Disclaimer: measurement results depend on the total setup and load impedance (real and imaginary). The jump observed (yellow circles) is caused by switching the input impedance from 1 M Ω to 50 Ω .





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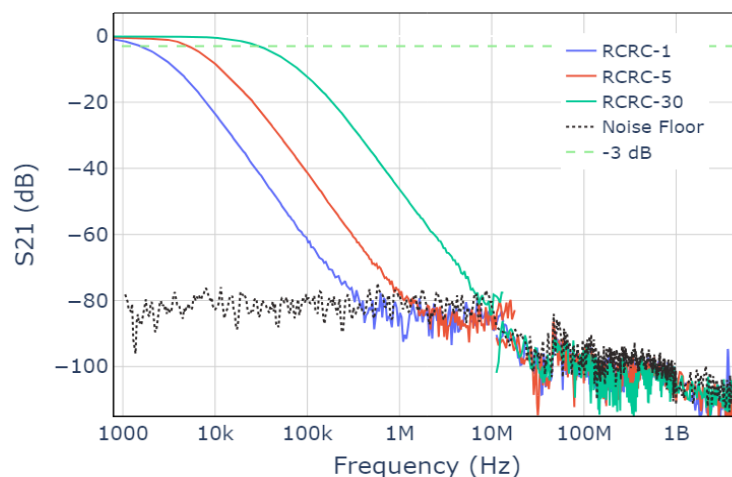


kHz Cutoff with 2-pole RCRC stage

Integrated into the Same Compact MFT25 Box

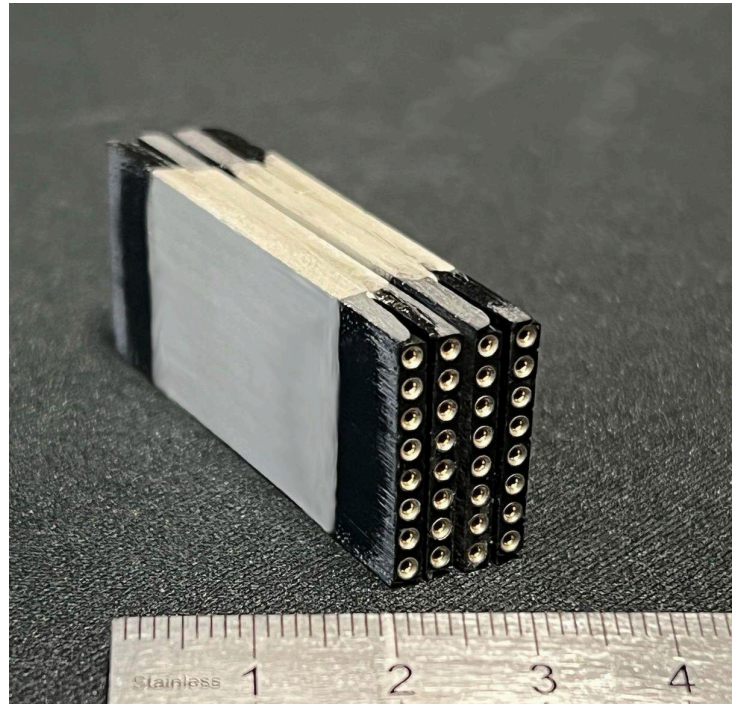
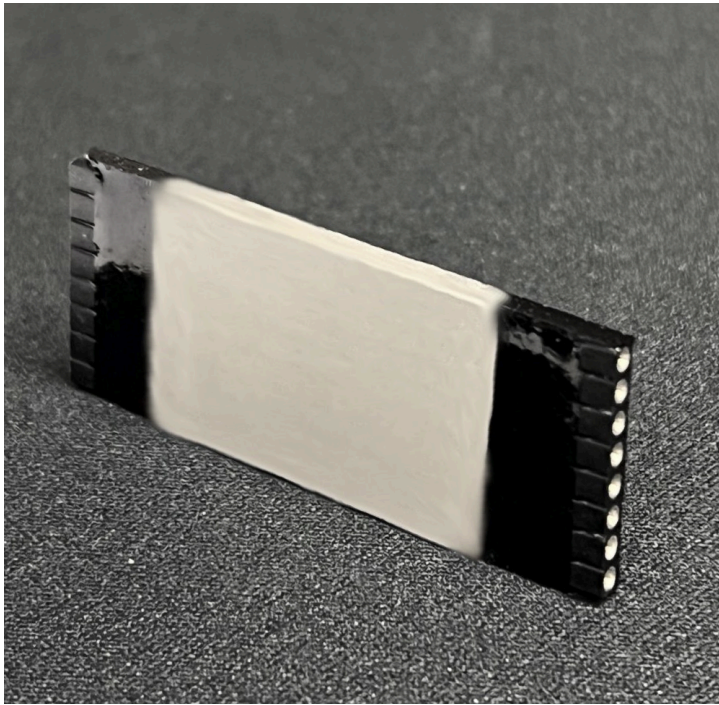
2-pole RCRC options	3 dB Cutoff	Maximum R	Maximum C
RCRC-1	1 - 2 kHz	15 - 25 k Ω	17 - 14 nF
RCRC-5	5 - 7 kHz	4.5 - 12 k Ω	14 - 6.5 nF
RCRC-10	10 - 15 kHz	2 - 5 k Ω	12 - 4 nF
RCRC-30	30 - 35 kHz	2 - 5 k Ω	7 - 2.5 nF
RCRC-C	customized cutoff with R and C values based on application requirements		

Figure shows the typical attenuation characteristics of individual MFT filters with an RCRC-1, RCRC-5 and an RCRC-30 stage. A spectrum analyzer with 1 M Ω input impedance was used for the measurements.





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Slim Cryogenic Microwave Filter & Thermalizer (SlimMFT)

Stackable slim MFT package for small dilution fridge inserts

- Slim ultra-compact MFT package for small (50 mm) dilution fridge inserts
- Ultra-low resistance ultra-low capacitance silver epoxy based microwave filter and thermalizer (MFT)
- One SlimMFT8 package includes 8 filtered lines (photo on the top left)
- Several packages can be stacked on top of each other (photo top right)
- Up to 6 packages (48 filtered lines) fit in a 50 mm insert
- Dimensions of one SlimMFT8 package: ~ 52 x 21 x 3.2 mm
- SIP-socket connectors for easy plugging/unplugging
- Easy mounting on cold finger



		SlimMFT8-30mΩ	SlimMFT8-120Ω
Number of filtered lines per SlimMFT8 unit		8	
Connector Type		SIP-Socket connectors	
Dimensions		~ 52 x 21 x 3.2 mm	
Capacitance	300 K / 4.2 K	2.6 nF	
Resistance	T = 300 K	3 Ω	120 Ω
	T = 4.2 K	30 mΩ	120 Ω
Attenuations	3 dB cutoff *	~ 2.3 MHz **	~ 1.3 MHz **
	20 dB cutoff *	~ 35 MHz **	~ 10 MHz **
	100 dB cutoff *	~ 330 MHz	~ 180 MHz
Maximum applied voltage		100 V	
Maximum applied current	300 K	30 mA	10 mA
	10 mK	10 mA	0.2 mA
Resistance to ground		> 1 TΩ	

Table shows typical specs; * Variations of up to $\pm 20\%$ in cutoff frequencies can be expected; ** SlimMFT8-120Ω model is under development; shown specs are calculated estimates; *** Maximum current at 10 mK for dissipation below 10 μ W.

Figure shows the typical attenuation characteristics of four individual SlimMFT-30mΩ filters with MCX connectors. A vector network analyzer with 50 Ω input was used. Disclaimer: measurement results depend on the total setup and load impedance (real and imaginary). The small jump observed in the spectrum is caused by switching measurement apparatus.

