TV filters

TYPES

BF4-3C500
BF4-4C500
BF4-4C100D-N
BF4-6C500
BF4-6C100D-N
BF4-3C1K0
BF4-4C1K0
BF4-4C250D-N
BF4-6C1K0
BF4-6C250D-N
BF4-4C1K7
BF4-4C2K1-HS
BF4-4C3K5
BF4-4C4K0-HS
BF4-4C13K-LC
BF4-4C7K0
BF4-4C9K0-HS
BF4-4C20K-LC
BF4-6C130D-N
BF4-7C130D-C
BF4-6C250D-N
BF4-7C250D-C
BF4-6C550D-N
BF4-6C700D-N-HS
BF4-6C550D-C
BF4-6C700D-C-HS
BF4-8C500D-C
BF4-8C600D-C-HS
BF4-6C1K1D-N
BF4-6C1K5D-N-HS
BF4-6C1K1D-C
BF4-6C1K5D-C-HS
BF4-8C1K0D-C
BF4-8C1K3D-C-HS
BF4-6C2K5D-N
BF4-6C7K5D-N-LC
BF4-6C2K5D-C

Band-pass filters are used to attenuate frequencies outside a narrow pass-band. They are commonly used as components in the design of combiners, for the attenuation of noisy side bands, to achieve additional decoupling between transmitters installed in close proximity in the same antenna system, and to combine digital channels with existing analogue channels.

The band-pass filters are factory tuned to the desired operating channels. All filters are retunable on whole frequency bands III (VHF) and bands IV and V (UHF).

Band-pass filters consist of 3, 4, 6, 7 or 8 magnetic coupled coaxial resonators with adjustable coupling. One end of the resonator is open-circuited and the other short-circuited and tuning is accomplished by rotating the circular central conductor at the lower end of each resonator. The coaxial input and output lines are coupled to the first and last resonator by magnetic coupling loops.

ELTI critical mask filters for digital operation are 6, 7 and 8 cavity filters with elliptical response to satisfy critical mask requirements or adjacent channel configuration for DVB, ISDB-T and ATSC standards. Critical mask filter with 6 cavities are generally used with ELTI transmitters only.

Main advantages of these filters are:
- foreshorten folded combline design,
- iris couplings with fine bandwidth regulation,
- retunable on whole frequency bands III, IV and V.

Filters are part of ELTI complete solutions:
- transmitter TERX, as output filter available on request,
- regenerative repeater ARX, as output filter available on request,
- combiners for adjacent channel configuration and/or non-critical & critical mask requirements.

Operating Power

The maximum operating power of a filter is limited by heating and peak voltage.

Heating is caused by high currents on resonators and are the main cause of dissipation due to Joule effect. Other secondary causes are the dissipations in the remaining circuit elements and in the dielectrics. To reduce losses, particularly at high frequencies, the conducting surfaces need to be excellent conductors. An accurate analysis of dissipations conducted using electromagnetic simulations makes it possible to optimize the construction for minimal loss.

The peak voltage represents the absolute power limit of a filter. The possibility of a breakdown occurring is related to the dielectric rigidity and the various ambient conditions (temperature, humidity and pressure). An accurate analysis of the breakdown limits requires specific electromagnetic and circuit simulations. All ELTI filters are designed for a voltage safety factor of at least 2 at the maximum rated power.

In specifications are stated power in rms (digital mode) and p.s. (analogue mode) for 8 MHz channel (UHF) and 7 MHz (VHF). Filters for digital operation can be used for analogue or dual cast mode. Use multiplier 1,5 of rms power to calculate peak sync power. For digital 7 MHz channel use multiplier 0,9 and for 6 MHz channel multiplier 0,75.

Operating temperature

All ELTI filters are designed to operate in severe environmental conditions such as -5 to +55 °C, as expected inside a typical transmitter operating in a standard environment (EN 300 190, Class 3.1). In these conditions, the maximum temperature raise is specified for each filter (typically < 40 °C). For safety reasons, and for optimum performances and filter's lasting, the maximum filter's body temperature should never exceed 70°C, and the recommended operating temperature limit is 60°C.

The operation at the maximum rated power generally requires some cooling:

- conventional cooling,
- conventional cooling with heat sinks added on the top of the filter,
- UHF high power filters can be optionally equipped with a state-of-the art water cooling circuit, to be inserted in liquid cooled transmitters.

Type of cooling is given in specifications. Extremely low temperatures (< -15 °C) should be avoided, as they could deteriorate the filters due to excessive thermal shocks, primarily during the transient warm-up.

Passive Intermodulation

All of the passive components involved with digital signals must possess a very high degree of linearity, to prevent Passive Inter Modulation (PIM). All ELTI passive components are designed and fully meet the typical PIM < -153 dBc requirement.

Electrostatic Protection

All ELTI filters have an adequate electrostatic protection on input / output connectors, i.e. the inner terminals are electrically connected to ground (DC short circuit), with a current capacity always much higher than the one of the connector itself.

TYPES

BF4-6C7K5D-C-LC
BF4-8C2K5D-C
BF4-8C7K5D-C-LC
BF4-6C5K0D-N
BF4-6C12K5D-N-LC
BF4-6C5K0D-C
BF4-6C12K5D-C-LC
BF4-8C4K5D-C
BF4-8C11KD-C-LC
BF3-6C125D-N
BF3-6C900D-N
BF3-6C1K8D-N
BF3-6C6K0D-N-LC
BF3-8C1K5D-C
BF3-8C5K5D-C-LC
BF3-6C4K0D-N
BF3-6C10KD-N-LC
BF3-8C3K5D-C
BF3-8C9K0D-C-LC
BF3-6C8K0D-N
BF3-6C20KD-N-LC
BF3-8C7K0D-C
BF3-8C17KD-C-LC

TYPE DESCRIPTION

ANALOGUE:
BFx-yCppp-M-(zz)
DIGITAL:
BFx-yCpppD-M-(zz)

BF - band pass filter

x - frequency range
3 - VHF band III (174-230 MHz)
4 - UHF band IV/V (470-862 MHz)

yC - number of cavities
3C - 3 cavity filter
4C - 4 cavity filter
6C - 6 cavity filter
7C - 7 cavity filter
8C - 8 cavity filter

ppp - input power peak sync
pppD - input power rms
100 - up to 100 W
1K0 - up to 1 kW
10K - up to 10 kW

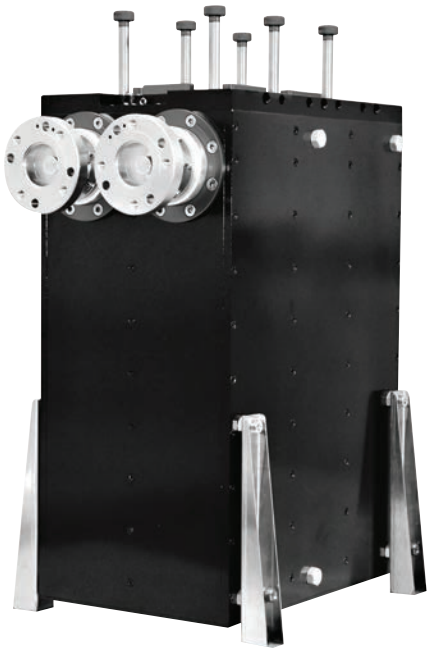
M - mask (for digital mode)
N - non-critical mask
C - critical mask

zz - cooling
without - conventional
HS - heat sink added
LC - liquid cooled

Specifications VHF filters up to 1,8 kW

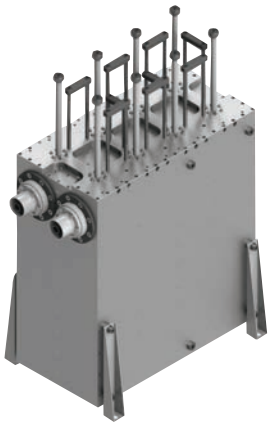
	BF3-6C130D-N	BF3-6C850D-N	BF3-6C1K8D-N BF3-6C6K5D-N-LC	BF3-8C1K5D-C BF3-8C5K5D-C-LC
Frequency range	174 - 240 MHz			
Impedance	50 Ω			
Mask DVB	non critical mask	non critical mask	non critical mask	critical mask
Mask ISDB-T	non critical mask	non critical mask	non critical mask	critical mask
Number of cavities (elliptical response)	6	6	6	8
Band pass width	6 - 8 MHz			
Input power				
conventional cooling	130 W rms	850 W rms	1,8 kW rms	1,5 kW rms
liquid cooling	/	/	6,5 kW rms	5,5 kW rms
Return loss (dB)	> 24		> 26	
Selectivity (dB)*				
f0 ± 3,675 MHz	> 5	> 5	> 5	> 15
f0 ± 5,25 MHz	> 16	> 16	> 16	> 26
f0 ± 10,5 MHz	> 38	> 38	> 41	> 51
Insertion loss (dB)*				
Center frequency (f0)	< 0,82	< 0,42	< 0,34	< 0,45
f0 ± 3,325 MHz	< 2,30	< 1,30	< 0,98	< 1,27
Harmonic attenuation (dB)	> 50 (up to 1,1 GHz)	> 50 (up to 700 MHz)	> 50 (up to 600 MHz)	> 50 (up to 600 MHz)
Group delay variation (ns)	< 200		< 250	< 450
Temperature stability (kHz/K)*	< 4		<2	
Input and output connectors	N female (default) DIN 7/16 female	DIN 7/16 female (default) EIA 7/8" | EIA 1 5/8"	EIA 1 5/8" (default) | EIA 7/8"	
Temperature range	From -5°C to +55°C			
Weight (kg)	4	12	30	38
Dimensions (mm)	286 x 42 x 405	442 x 67 x 405	346 x 302 x 700	452 x 302 x 700
Cooling	Conventional		Conventional | Liquid (4 l/min)	

* measured on mid-channel CH 9. Table corresponds to indicated return loss and flat response



BF3-6C1K8D-N
BF3-6C6K5D-N-LC

BF3-6C850D-N



BF3-8C1K5D-C
BF3-8C5K5D-C-LC

Specifications VHF filters above 3,5 kW

	BF3-6C4K0D-N BF3-6C10KD-N-LC	BF3-8C3K5D-C BF3-8C9K0D-C-LC	BF3-6C8K0D-N BF3-6C20KD-N-LC	BF3-8C7K0D-C BF3-8C17KD-C-LC
Frequency range	174 - 240 MHz			
Impedance	50 Ω			
Mask DVB	non critical mask	critical mask	non critical mask	critical mask
Mask ISDB-T	non critical mask	critical mask	non critical mask	critical mask
Number of cavities (elliptical response)	6	8	6	8
Band pass width	6 - 8 MHz			
Input power				
conventional cooling	4 kW rms	3,5 kW rms	8 kW rms	7 kW rms
liquid cooling	10 kW rms	9 kW rms	20 kW rms	17 kW rms
Return loss (dB)	> 26			
Selectivity (dB)*				
f0 ± 3,675 MHz	> 5	> 15	> 5	> 15
f0 ± 5,25 MHz	> 16	> 26	> 16	> 26
f0 ± 10,5 MHz	> 41	> 51	> 41	> 51
Insertion loss (dB)*				
Center frequency (f0)	< 0,24	< 0,32	< 0,17	< 0,23
f0 ± 3,325 MHz	< 0,70	< 0,91	< 0,49	< 0,64
Harmonic attenuation (dB)	> 50 (up to 600 MHz)			
Group delay variation (ns)	< 250	< 450	< 250	< 450
Temperature stability (kHz/K)*	< 2			
Input and output connectors	EIA 1 5/8" (default) | EIA 3 1/8"		EIA 3 1/8" (default) | EIA 4 1/2"	
Temperature range	From -5°C to +55°C			
Weight (kg)	41	53	72	94
Dimensions (mm)	466 x 378 x 710	612 x 378 x 710	649 x 500 x 760	857 x 500 x 760
Cooling	Conventional | Liquid (6 l/min)		Conventional | Liquid (10 l/min)	

* measured on mid-channel CH 9. Table corresponds to indicated return loss and flat response

BF3-6C4K0D-N
BF3-6C10KD-N-LC

BF3-8C3K5D-C
BF3-8C9K0D-C-LC

BF3-8C7K0D-C
BF3-8C17KD-C-LC

BF3-6C8K0D-N
BF3-6C20KD-N-LC