



Filters & Duplexers



Filters & Duplexers

Bird Technologies designs and builds superior reliable RF filters for harsh conditions and the most RF challenging situations. Reliability is both a promise and our reality.

Although a primary building block for duplexers, multicouplers and preselectors, these cavities filters can be used individually or cascaded together to prevent interference or provide system clean up.

Bandpass Cavity Filters

The Bandpass cavity passes one narrow band of frequencies and attenuates all others with increasing attenuation above and below the pass frequency.

T-PASS Cavity Filters

Are a variation of the Bandpass cavity used for our expandable multicoupler applications. Its general characteristics are nearly identical to a bandpass cavity but the output loop has a pair of N-connectors so it can easily be coupled to other channels.

Series-Notch® Cavity Filters

The Series-Notch® passes a relatively wide band of frequencies while rejecting a very narrow band of frequencies.

Vari-Notch® Cavity Filters

The Vari-Notch® design passes a relatively narrow band of frequencies and rejects (notches out) a relatively wide frequency band.

All cavity types mentioned above may be cascaded to achieve an arithmetic sum of individual filter attenuation. Up to 6 dB of additional attenuation can be achieved when the proper length of cable is used to interconnect the cavities. (This additional 6 dB does not occur in the filter passband but only at frequencies where moderate to high attenuation occurs.) A TX RX system specialist can assist you in ordering the proper length of interconnecting cable for your frequencies

Cavity Filter Loop Kits

76 Series, Cavity Filter Loop Kits allow the same cavity shells to be configured for different responses in order to suit different application needs.

Duplexers

A Duplexer (or diplexer as they are sometimes called) is a 3-port device most commonly used to allow a transmitter and receiver, operating on different frequencies, to share a common antenna while operating simultaneously. It is also used to protect the receiver from transmitter carrier overload.

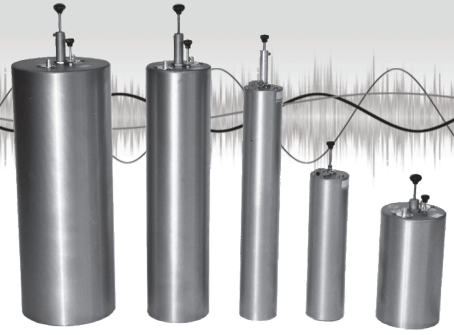
Second Harmonic Filters

The ferrite used to make circulators is a non-linear material that generates a significant amount of 2nd harmonic power which can contribute to the formation of 3rd order intermodulation products when mixed with other transmitter carriers. For this reason, either a bandpass cavity filter or a harmonic filter must always be installed between the isolator and the antenna. TX RX manufactures single and dual-section filters for applications where bandpass cavities are not used.

Compact Bandpass Filters

Compact multipole cavity filter designs, both standard and custom performance profiles. High Q bandpass, band reject, low pass, high pass standard configuration. Complex multiple pass band and reject designs Compact duplexer, triplexer and multiband configurations. Bird Technologies cavity filter designs are generally machined from lightweight aluminum alloys and use silver plating on our resonators and internal cavity surfaces, reducing loss and providing higher Q at low cost.

Bandpass Cavity Filters



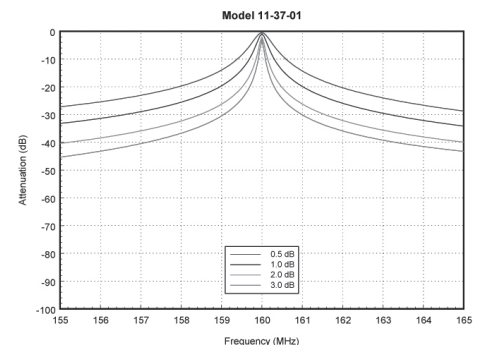
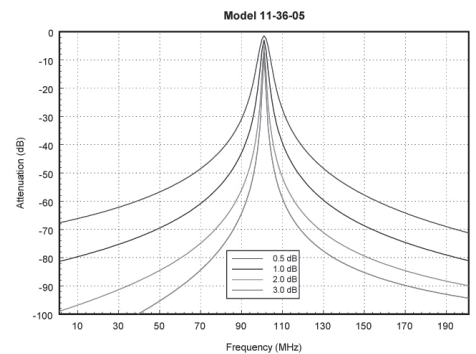
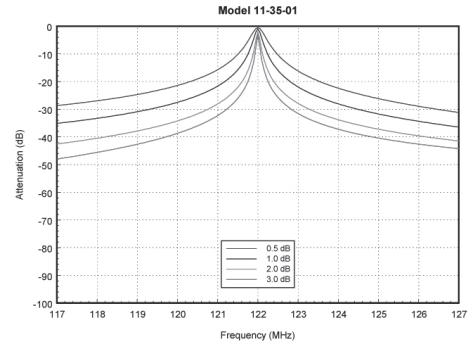
The Bandpass cavity passes one narrow band of frequencies and attenuates all others with increasing attenuation above and below the pass frequency. It is equivalent to a parallel-tuned circuit and is most often used for general transmitter spurious clean-up or a sharpening of a single receiver front end selectivity with or without amplifications.

TX RX bandpass cavities (4", 6", 8" and 10") have adjustable selectivity characteristics (rotatable loops) to allow a trade-off between insertion loss (0.5 -- 3.0 dV) and selectivity. Maximum power handling typically determined by insertion loss setting.

Technical Specifications

Temperature Range	-30 to +60°C
Impedance	50 ohms
VSWR	1.25:1

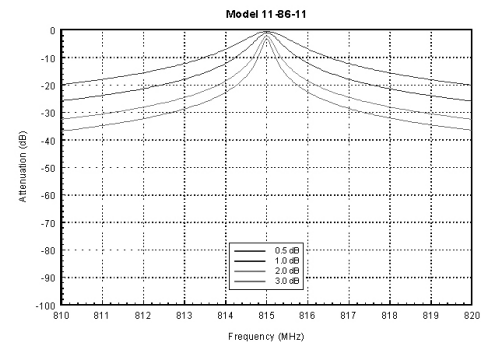
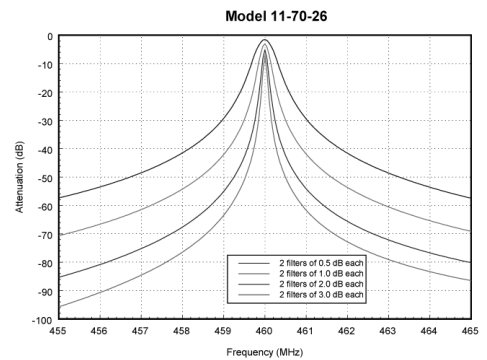
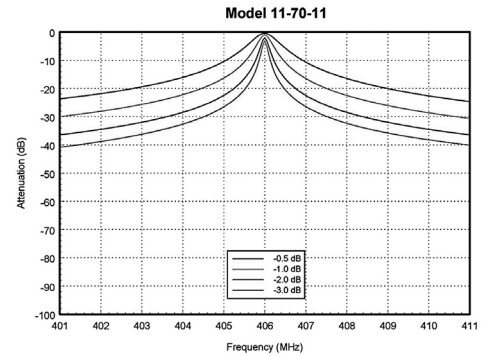
Model Number	Frequency Range (MHz)	Max Power per cavity @ 0.5 / 3.0 dB IL (W)	Cavity Length (Electrical Wave)	No. of Cavities / Size	Connectors	Dimensions HxWxD (Inches)	Shipping Weight (lbs)
11-35-01	108-136	270 / 60	1/4 λ	1/6.625"	N	31.5x6.625x6.625	20
11-35-02	108-136	270 / 60	1/4 λ	2/6.625"	N	31.5x6.625x6.625	42
11-35-05	108-136	270 / 60	1/4 λ	1/10"	N	33.5x10x10	27
11-35-06	108-136	270 / 60	1/4 λ	2/10"	N	33.5x10x10	56
11-36-01	132-150	270 / 60	1/4 λ	1/6.625"	N	31.5x6.625x6.625	15
11-36-02	132-150	270 / 60	1/4 λ	2/6.625"	N	31.5x6.625x6.625	30
11-36-05	132-150	270 / 60	1/4 λ	1/10"	N	26x10x10	21
11-36-06	132-150	270 / 60	1/4 λ	2/10"	N	26x10x10	44
11-37-01	144-174	270 / 60	1/4 λ	1/6.625"	N	26x6.625x6.625	15
11-37-02	144-174	270 / 60	1/4 λ	2/6.625"	N	26x6.625x6.625	30
11-37-05	144-174	270 / 60	1/4 λ	1/10"	N	26x10x10	21
11-37-06	144-174	270 / 60	1/4 λ	2/10"	N	26x10x10	44
11-37-09	144-174	100 / N/A	1/4 λ	1/4"	N	15x4x4	5
11-37-09N	144-174	100 / N/A	1/4 λ	1/4"	N	15x4x4	5
11-53-01	220-400	100 / 100	3/4 λ	1/8"	N	25x8x8	8.6
11-65-26	406-420	270 / 60	3/4 λ	2/10"	N	26x10x10	43
11-69-01	470-512	270 / 60	1/4 λ	1/6.625"	N	11.5x6.625x6.625	8
11-69-02	470-512	270 / 60	1/4 λ	2/6.625"	N	11.5x6.625x6.625	16
11-69-05	470-512	270 / 60	1/4 λ	1/10"	N	12.5x10x10	11
11-69-06	470-512	270 / 60	1/4 λ	2/10"	N	12.5x10x10	23
11-69-09	470-512	100 / N/A	1/4 λ	1/4"	BNC	9x4x4	4
11-69-11	470-512	270 / 60	3/4 λ	1/6.625"	N	12.5x10x10	21



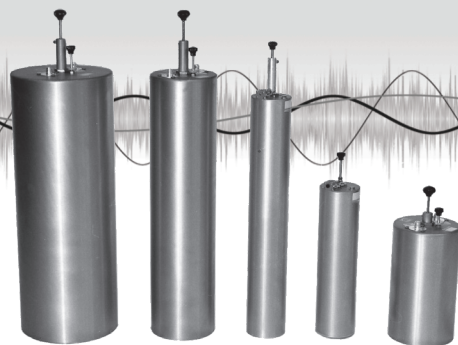
Bandpass Cavity Filters

Specifications continued

Model Number	Frequency Range (MHz)	Max Power per cavity @ 0.5 / 3.0 dB IL (W)	Cavity Length (Electrical Wave)	No. of Cavities / Size	Connectors	Dimensions HxWxD (Inches)	Shipping Weight (lbs)
11-70-01	450-470	270 / 60	1/4 λ	1/6.625"	N	11.5x6.625x6.625	8
11-70-02	450-470	270 / 60	1/4 λ	2/6.625"	N	11.5x6.625x6.625	16
11-70-05	450-470	270 / 60	1/4 λ	1/10"	N	12.5x10x10	11
11-70-06	450-470	270 / 60	1/4 λ	2/10"	N	12.5x10x10	23
11-70-09	450-470	100 / 60	1/4 λ	1/4"	BNC	9x4x4	4
11-70-11	450-470	270 / N/A	3/4 λ	1/6.625"	N	11.5x6.625x6.625	12
11-70-12	450-470	270 / 60	3/4 λ	2/6.625"	N	11.5x6.625x6.625	25
11-70-25	450-470	270 / 60	3/4 λ	1/10"	N	26x10x10	21
11-70-26	450-470	270 / 60	3/4 λ	2/10"	N	26x10x10	43
11-83B-11	746-869	270 / 60	3/4 λ	1/6.625"	N	14x6.625x6.625	10
11-83B-12	746-869	270 / 60	3/4 λ	2/6.625"	N	14x6.625x6.625	19
11-86-11	806-821	270 / 60	3/4 λ	1/6.625"	N	13x6.625x6.625	9
11-86-12	806-821	270 / 60	3/4 λ	2/6.625"	N	13x6.625x6.625	18
11-87-11	851-866	270 / 60	3/4 λ	1/6.625"	N	13x6.625x6.625	9
11-87-12	851-866	270 / 60	3/4 λ	2/6.625"	N	13x6.625x6.625	18
11-88-11	890-960	270 / 60	3/4 λ	1/6.625"	N	13x6.625x6.625	9
11-88-12	890-960	270 / 60	3/4 λ	2/6.625"	N	13x6.625x6.625	18
11-90-05	806-960	270 / 60	3/4 λ	1/6.625"	N	6.5x4x4	3



Series-Notch[®] Cavity Filter

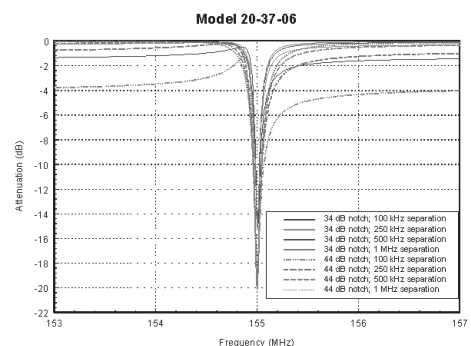
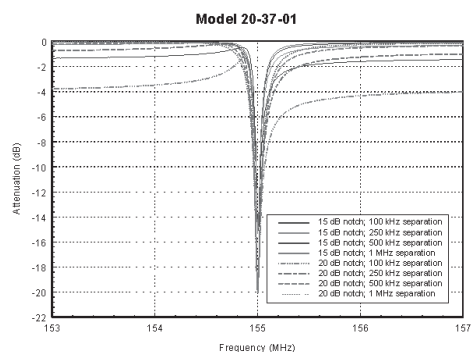
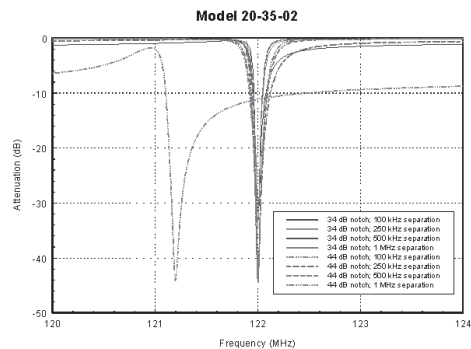


The Series-Notch[®] passes a relatively wide band of frequencies while rejecting a very narrow band of frequencies. It is equivalent to a series-tuned circuit. Notch depth is variable from 15-25 dB. Pass and notch frequencies must be known so the optimum loop assembly can be used. This is the best filter for very close separations (200-400kHz) in UHF applications.

Technical Specifications

Temperature Range	-30 to +60°C
Connectors	N
Impedance	50 ohms
VSWR	1.5:1

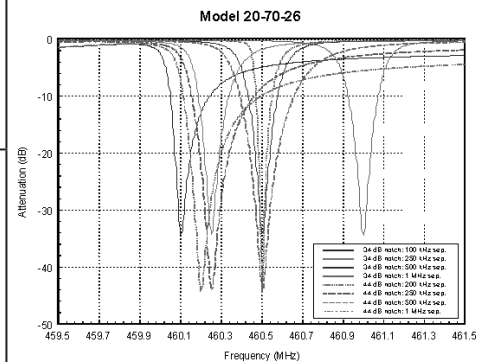
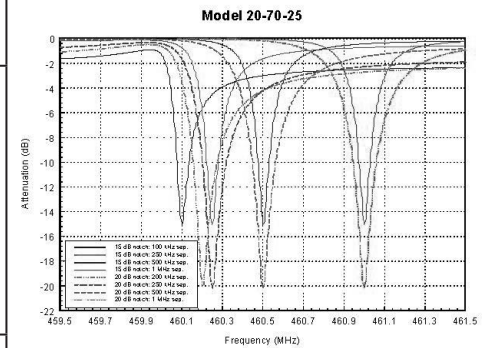
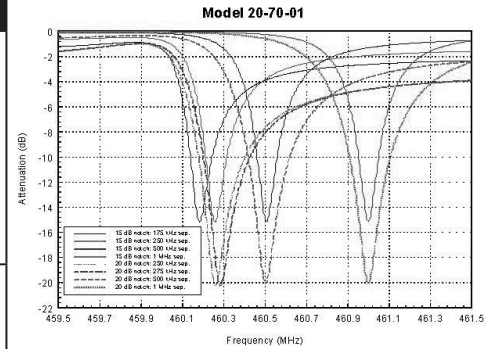
Model Number	Frequency (MHz)	Insertion Loss Frequency Separations (no. cavity / notch depth)	Max Power (Watts @ stated separation)	Cavity Length (Electrical)	Cavity Height / Size	Weight
20-35-01	108-136	<1.0 dB @ 100 khz (1 / @ 15 dB) <0.2 dB @ 250 khz (1 / @ 15 dB) <0.2 dB @ 500 khz (1 / @ 15 dB) <0.2 dB @ 1 Mhz (1 / @ 15 dB) <1.5 dB @ 100 khz (1 / @ 20 dB) <0.3 dB @ 250 khz (1 / @ 20 dB) <0.2 dB @ 500 khz (1 / @ 20 dB) <0.2 dB @ 1 Mhz (1 / @ 20 dB)	60W @ 100 khz 250W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	31.5", with tuning rod Extended, 43 Max / 6.625"	18 lbs
20-35-02	108-136	<3.5 dB @ 50 khz (2 / @ 34 dB) <0.2 dB @ 100 khz (2 / @ 34 dB) <0.6 dB @ 250 khz (2 / @ 34 dB) <0.5 dB @ 500 khz (2 / @ 34 dB) <0.4 dB @ 1 Mhz (2 / @ 34 dB) <3.5 dB @ 50 khz (2 / @ 44 dB) <2.0 dB @ 100 khz (2 / @ 44 dB) <0.6 dB @ 250 khz (2 / @ 44 dB) <0.5 dB @ 500 khz (2 / @ 44 dB) <0.4 dB @ 1 Mhz (2 / @ 44 dB)	60W @ 100 khz 250W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	31.5", with tuning rod Extended, 43 Max / 6.625"	36 lbs
20-36-01	132-150	<1.0 dB @ 100 khz (1 / @ 15 dB) <0.2 dB @ 250 khz (1 / @ 15 dB) <0.2 dB @ 500 khz (1 / @ 15 dB) <0.2 dB @ 1 Mhz (1 / @ 15 dB) <1.5 dB @ 100 khz (1 / @ 20 dB) <0.3 dB @ 250 khz (1 / @ 20 dB) <0.2 dB @ 500 khz (1 / @ 20 dB) <0.2 dB @ 1 Mhz (1 / @ 20 dB)	60W @ 100 khz 250W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	26", with tuning rod Extended, 38 Max / 6.625"	17 lbs
20-36-02	132-150	<0.2 dB @ 100 khz (2 / @ 34 dB) <0.6 dB @ 250 khz (2 / @ 34 dB) <0.5 dB @ 500 khz (2 / @ 34 dB) <0.4 dB @ 1 Mhz (2 / @ 34 dB) <0.3 dB @ 100 khz (2 / @ 44 dB) <0.8 dB @ 250 khz (2 / @ 44 dB) <0.5 dB @ 500 khz (2 / @ 44 dB) <0.4 dB @ 1 Mhz (2 / @ 44 dB)	60W @ 100 khz 250W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	26", with tuning rod Extended, 38 Max / 6.625"	34 lbs
20-37-01	144-174	<1.0 dB @ 100 khz (1 / @ 15 dB) <0.2 dB @ 250 khz (1 / @ 15 dB) <0.2 dB @ 500 khz (1 / @ 15 dB) <0.2 dB @ 1 Mhz (1 / @ 15 dB) <1.8 dB @ 100 khz (1 / @ 20 dB) <0.3 dB @ 250 khz (1 / @ 20 dB) <0.2 dB @ 500 khz (1 / @ 20 dB) <0.2 dB @ 1 Mhz (1 / @ 20 dB)	60W @ 100 khz 250W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	26", with tuning rod Extended, 38 Max / 6.625"	17 lbs
20-37-02	144-174	<0.2 dB @ 100 khz (2 / @ 34 dB) <0.6 dB @ 250 khz (2 / @ 34 dB) <0.5 dB @ 500 khz (2 / @ 34 dB) <0.4 dB @ 1 Mhz (2 / @ 34 dB) <0.3 dB @ 100 khz (2 / @ 44 dB) <0.8 dB @ 250 khz (2 / @ 44 dB) <0.5 dB @ 500 khz (2 / @ 44 dB) <0.4 dB @ 1 Mhz (2 / @ 44 dB)	60W @ 100 khz 250W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	26", with tuning rod Extended, 38 Max / 6.625"	34 lbs



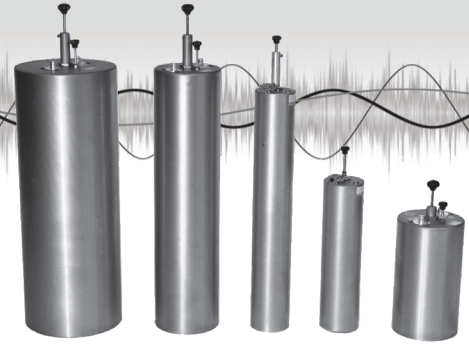
SeriesNotch® Cavity Filter

Technical Specifications continued

Model Number	Frequency (MHz)	Insertion Loss Frequency Separations (no. cavity / notch depth)	Max Power (Watts @ stated separation)	Cavity Length (Electrical)	Cavity Height / Size	Weight
20-37-05	144-174	<0.2 dB @ 50 khz (1 / @ 15 dB) - @ 100 khz (1 / @ 15 dB) <0.2 dB @ 250 khz (1 / @ 15 dB) <0.2 dB @ 500 khz (1 / @ 15 dB) <0.2 dB @ 1 Mhz (1 / @ 15 dB) - @ 50 khz (1 / @ 20 dB) <1.0 dB @ 100 khz (1 / @ 20 dB) <0.2 dB @ 250 khz (1 / @ 20 dB) <0.2 dB @ 500 khz (1 / @ 20 dB) <0.2 dB @ 1 Mhz (1 / @ 20 dB)	80W @ 50 khz 150 @ 100 khz 350W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	26", with tuning rod Extended, 38 Max / 10"	22 lbs
20-37-06	144-174	<3.5 dB @ 50 khz (2 / @ 34 dB) <2.0 dB @ 100 khz (2 / @ 34 dB) <0.5 dB @ 250 khz (2 / @ 34 dB) <0.5 dB @ 500 khz (2 / @ 34 dB) <0.4 dB @ 1 Mhz (2 / @ 34 dB) <3.5 dB @ 50 khz (2 / @ 44 dB) <2.0 dB @ 100 khz (2 / @ 44 dB) <0.6 dB @ 250 khz (2 / @ 44 dB) <0.5 dB @ 500 khz (2 / @ 44 dB) <0.4 dB @ 1 Mhz (2 / @ 44 dB)	80W @ 50 khz 150 @ 100 khz 350W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	1/4λ	26", with tuning rod Extended, 38 Max / 10"	45 lbs
20-70-01	450-470	1.5 dB @ 175 khz (1 / @ 15 dB) 1.5 dB @ 250 khz (1 / @ 15 dB) 0.7 dB @ 250 khz (1 / @ 15 dB) 1.2 dB @ 275 khz (1 / @ 15 dB) 0.2 dB @ 500 khz (1 / @ 15 dB) 0.1 dB @ 1 Mhz (1 / @ 15 dB) 1.5 dB @ 175 khz (1 / @ 20 dB) 1.5 dB @ 250 khz (1 / @ 20 dB) 0.7 dB @ 250 khz (1 / @ 20 dB) 1.2 dB @ 275 khz (1 / @ 20 dB) 0.4 dB @ 500 khz (1 / @ 20 dB) 0.1 dB @ 1 Mhz (1 / @ 20 dB)	35W @ 175 khz 35W @ 250 khz 40W @ 275 khz 120W @ 500 khz 350W @ 1 Mhz	1/4λ	11.5", with tuning rod Extended, 16.5 Max / 6.625"	11 lbs
20-70-02	450-470	3.0 dB @ 175 khz (2 / @ 34 dB) 3.1 dB @ 250 khz (2 / @ 34 dB) 1.5 dB @ 250 khz (2 / @ 34 dB) 2.6 dB @ 275 khz (2 / @ 34 dB) 0.5 dB @ 500 khz (2 / @ 34 dB) 0.4 dB @ 1 Mhz (2 / @ 34 dB) 3.0 dB @ 175 khz (2 / @ 44 dB) 3.1 dB @ 250 khz (2 / @ 44 dB) 1.5 dB @ 250 khz (2 / @ 44 dB) 2.6 dB @ 275 khz (2 / @ 44 dB) 1.0 dB @ 500 khz (2 / @ 44 dB) 0.4 dB @ 1 Mhz (2 / @ 44 dB)	35W @ 175 khz 35W @ 250 khz 40W @ 275 khz 120W @ 500 khz 350W @ 1 Mhz	1/4λ	11.5", with tuning rod Extended, 16.5 Max / 6.625"	23 lbs
20-70-25	450-470	1.2 dB @ 100 khz (1 / @ 15 dB) 0.6 dB @ 200 khz (1 / @ 15 dB) 0.4 dB @ 250 khz (1 / @ 15 dB) <0.1 dB @ 500 khz (1 / @ 15 dB) <0.1 dB @ 1 Mhz (1 / @ 15 dB) 1.2 dB @ 100 khz (1 / @ 20 dB) 0.6 dB @ 200 khz (1 / @ 20 dB) 0.4 dB @ 250 khz (1 / @ 20 dB) 0.1 dB @ 500 khz (1 / @ 20 dB) <0.1 dB @ 1 Mhz (1 / @ 20 dB)	55W @ 100 khz 100W @ 200 khz 180W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	3/4λ	26", with tuning rod Extended, 37 Max / 10"	21 lbs
20-70-26	450-470	2.6 dB @ 100 khz (2 / @ 34 dB) 1.5 dB @ 200 khz (2 / @ 34 dB) 1.0 dB @ 250 khz (2 / @ 34 dB) 0.3 dB @ 500 khz (2 / @ 34 dB) 0.3 dB @ 1 Mhz (2 / @ 34 dB) 2.6 dB @ 100 khz (2 / @ 44 dB) 1.5 dB @ 200 khz (2 / @ 44 dB) 1.0 dB @ 250 khz (2 / @ 44 dB) 0.4 dB @ 500 khz (2 / @ 44 dB) 0.3 dB @ 1 Mhz (2 / @ 44 dB)	55W @ 100 khz 100W @ 200 khz 180W @ 250 khz 350W @ 500 khz 350W @ 1 Mhz	3/4λ	26", with tuning rod Extended, 37 Max / 10"	44 lbs



Vari-Notch® Cavity Filters



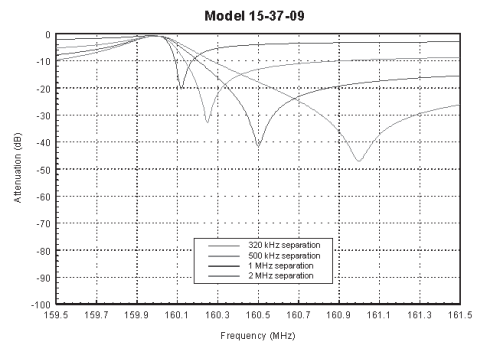
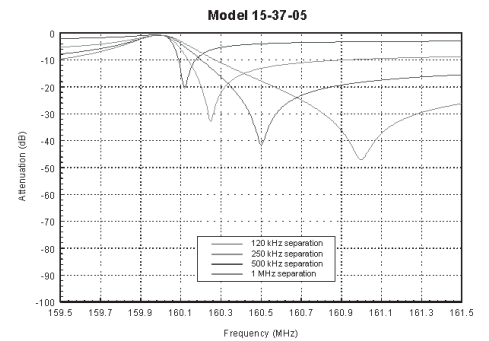
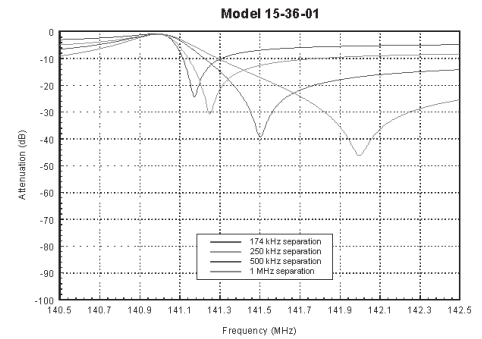
Vari-Notch® Cavity Filters & Cascading Filters

Equivalent to a combination series-tuned and parallel-tuned circuit, this filter has a greater notch depth than the Series-Notch® design. The notch depth is adjustable but varies with passband insertion loss (0.3 dB or 0.6 dB typical) and the difference between pass and notch frequencies. Vari-Notch® is ideal for moderately close to wide separations (400 KHz and greater) in UHF applications.

Technical Specifications

Temperature Range	-30 to +60°C
Impedance	50 ohms
VSWR	1:25:01

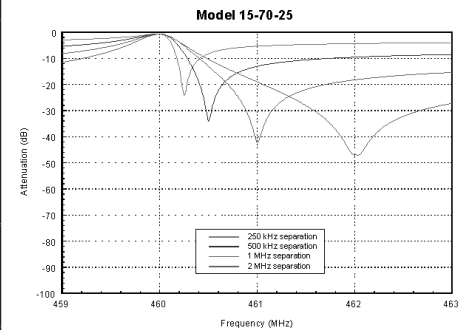
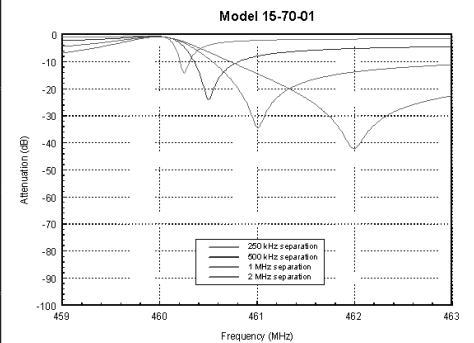
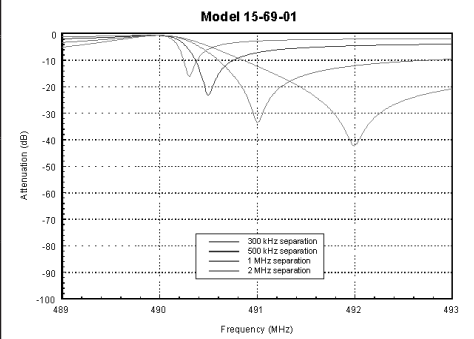
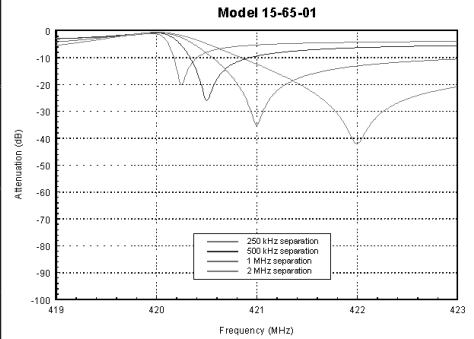
Model Number	Frequency (MHz)	Frequency separation vs. insertion loss	Power Rating	Cavity Length (Electrical)	No. of Cavities / Size	Connector	Cavity Height	Weight
15-35-01	108-136	24 dB @ 174 khz 30 dB @ 250 khz 39 dB @ 500 khz 46 dB @ 1 Mhz	300 Watts	1/4λ	1/6.625"	N	31.5", with tuning rod Extended, 44 Max	20 lbs
15-35-05	108-136	24 dB @ 130 khz 34 dB @ 250 khz 43 dB @ 500 khz 47 dB @ 1 Mhz	300 Watts	1/4λ	1/10"	N	33.5", with tuning rod Extended, 48 Max	27 lbs
15-36-01	132-150	19 dB @ 140 khz 27 dB @ 250 khz 37 dB @ 500 khz 45 dB @ 1 Mhz	300 Watts	1/4λ	1/6.625"	BNC	26", with tuning rod Extended, 38 Max	17 lbs
15-36-05	132-150	19 dB @ 100 khz 33 dB @ 250 khz 42 dB @ 500 khz 47 dB @ 1 Mhz	300 Watts	1/4λ	1/10"	N	26", with tuning rod Extended, 38 Max	23 lbs
15-37-01	144-174	22 dB @ 170 khz 27 dB @ 250 khz 37 dB @ 500 khz 45 dB @ 1 Mhz	300 Watts	1/4λ	1/6.625"	N	26", with tuning rod Extended, 38 Max	17 lbs
15-37-05	144-174	20 dB @ 120 khz 32 dB @ 250 khz 41 dB @ 500 khz 47 dB @ 1 Mhz	300 Watts	1/4λ	1/10"	N	26", with tuning rod Extended, 38 Max	23 lbs
15-37-09	144-174	18 dB @ 320 khz 24 dB @ 500 khz 35 dB @ 1 Mhz 44 dB @ 2 Mhz	150 Watts	1/4λ Low Pass	1/4"	N	15", with tuning rod Extended, 20 Max	5 lbs
15-65-01	406-430	20 dB @ 250 khz 26 dB @ 500 khz 35 dB @ 1 Mhz 42 dB @ 2 Mhz	300 Watts	1/4λ	1/6.625"	N	11.5", with tuning rod Extended, 16.5 Max	6 lbs
15-65-21	406-430	23 dB @ 1 Mhz 32 dB @ 2 Mhz 48 dB @ 3 Mhz 19 dB @ 500 khz	150 Watts	1/4λ High Selectivity	1/4"	BNC	10", with tuning rod Extended, 13 Max	4 lbs



Vari-Notch[®] Cavity Filters

Technical Specifications continued

Model Number	Frequency (MHz)	Frequency separation vs. insertion loss	Power Rating	Cavity Length (Electrical)	No. of Cavities / Size	Connector	Cavity Height	Weight
15-65-22	406-430	19 dB @ 500 khz 26 dB @ 1 Mhz 38 dB @ 2 Mhz 47 dB @ 5 Mhz	150 Watts	1/4λ High Selectivity	1/4"	BNC	10", with tuning rod Extended, 13 Max	4 lbs
15-69-01	470-512	16 dB @ 300 khz 23 dB @ 500 khz 33 dB @ 1 Mhz 42 dB @ 2 Mhz	300 Watts	1/4λ	1/6.625"	N	11.5", with tuning rod Extended, 16.5 Max	8 lbs
15-69-21	470-512	23 dB @ 1 Mhz 32 dB @ 2 Mhz 48 dB @ 3 Mhz	150 Watts	1/4λ	1/4"	BNC	9", with tuning rod Extended, 13 Max	4 lbs
15-69-22	470-512	19 dB @ 500 khz 26 dB @ 1 Mhz 38 dB @ 2 Mhz 47 dB @ 5 Mhz	150 Watts	1/4λ	1/4"	BNC	9", with tuning rod Extended, 13 Max	4 lbs
15-70-01	450-470	14 dB @ 250 khz 24 dB @ 500 khz 34 dB @ 1 Mhz 42 dB @ 2 Mhz	300 Watts	1/4λ	1/6.625"	N	11.5", with tuning rod Extended, 16.5 Max	8 lbs
15-70-11	450-470	19 dB @ 250 khz 29 dB @ 500 khz 38 dB @ 1 Mhz 45 dB @ 2 Mhz	300 Watts	3/4λ	1/6.625"	N	26", with tuning rod Extended, 37 Max	11 lbs
15-70-21	450-470	23 dB @ 1 Mhz 32 dB @ 2 Mhz 48 dB @ 3 Mhz	150 Watts	1/4λ	1/4"	BNC	10.5", with tuning rod Extended, 13 Max	4 lbs
15-70-22	450-470	19 dB @ 250 khz 26 dB @ 500 khz 38 dB @ 1 Mhz 47 dB @ 2 Mhz	150 Watts	1/4λ High Selectivity	1/4"	BNC	10.5", with tuning rod Extended, 13 Max	4 lbs
15-70-25	450-470	24 dB @ 250 khz 34 dB @ 500 khz 42 dB @ 1 Mhz 47 dB @ 2 Mhz	300 Watts	3/4λ	1/10"	N	26", with tuning rod Extended, 37 Max	21 lbs
15-88-01	890-960	15 dB @ 500 khz 23 dB @ 1 Mhz 31 dB @ 2 Mhz 48 dB @ 10 Mhz	150 Watts	1/4λ	1/4"	BNC	6.5", with tuning rod Extended, 10 Max	3 lbs
15-88-02	890-960	24 dB @ 1.45 Mhz 29 dB @ 2 Mhz 51 dB @ 10 Mhz	150 Watts	1/4λ	2/4"	BNC	6.5", with tuning rod Extended, 10 Max	3 lbs
15-88-11	890-960	22 dB @ 500 khz 32 dB @ 1 Mhz 40 dB @ 2 Mhz 45 dB @ 10 Mhz	300 Watts	3/4λ	1/6.625"	N	13", with tuning rod Extended, 19 Max	9 lbs
15-88-12	890-960	50 dB @ 500 khz 70 dB @ 1 Mhz 86 dB @ 2 Mhz 96 dB @ 10 Mhz	300 Watts	3/4λ	2/6.625"	N	13", with tuning rod Extended, 19 Max	18 lbs
15-88-12-DM	890-960	39 dB @ 400 khz 45 dB @ 500 khz 50 dB @ 600 khz 60 dB @ 1 Mhz	250 Watts	3/4λ	2/6.625"	N	17.5", with tuning rod Extended, 23 Max	17 lbs



Cavity Filter Loop Kits

Technical Specification

Model Number	Frequency Range (MHz)	Type
76-28-01	66-88	Band Pass
76-28-02	66-88	Vari-Notch, Low Pass
76-28-03	66-88	Vari-Notch, High Pass
76-28-04	66-88	Series-Notch, Low Pass
76-28-05	66-88	Series-Notch, High Pass
76-28-08	66-88	T-Pass
76-28-09	66-88	Band Pass
76-29-01	88-108	Band Pass
76-29-04	88-108	Series-Notch, Low Pass
76-29-05	88-108	Series-Notch, High Pass
76-35-01	108-136	Band Pass
76-35-04	108-136	Series-Notch, Low Pass
76-35-05	108-136	Series-Notch, High Pass
76-35-02	108-136	Vari-Notch, Low Pass
76-35-03	108-136	Vari-Notch, High Pass
76-35-07	108-136	T-Pass
76-36-03	132-150	Vari-Notch, Low Pass
76-36-04	132-150	Vari-Notch, High Pass
76-36-05	132-150	Series-Notch, Low Pass
76-36-06	132-150	Series-Notch, High Pass
76-37-01	144-174	Band Pass
76-37-03	144-174	Vari-Notch, Low Pass
76-37-04	144-174	Vari-Notch, High Pass
76-37-05	144-174	Series-Notch, Low Pass
76-37-06	144-174	Series-Notch, High Pass

Model Number	Frequency Range (MHz)	Type
76-38-01	132-174	T-Pass
76-38-02	132-174	Band Pass
76-38-03	132-174	Vari-Notch, Low Pass
76-38-04	132-174	Vari-Notch, High Pass
76-38-05	132-174	Series-Notch, Low Pass
76-38-06	132-174	Series-Notch, High Pass
76-38-07	132-174	T-Pass, Strip
76-38-08	132-174	Band Pass
76-54-02	220-300	Vari-Notch, Low Pass
76-54-03	220-300	Vari-Notch, High Pass
76-55-02	300-400	Vari-Notch, Low Pass
76-55-03	300-400	Vari-Notch, High Pass
76-65-01	406-420	Band Pass
76-67-01	406-512	T-Pass
76-67-02	406-512	Band Pass, PAIR
76-67-03	406-512	Vari-Notch, Low Pass, High Pass
76-67-04	406-512	Series-Notch, Low Pass
76-67-05	406-512	Series-Notch, High Pass
76-67-06	406-512	T-Pass, 50 Ohm
76-70-01	450-470	Band Pass
76-70-05	450-470	Series-Notch, High Pass
76-70-03	450-470	Vari-Notch
76-90-01	806-960	Band Pass
76-90-03-SC	806-960	T-Pass Short Circuit
76-90-03	806-960	T-Pass

Bandpass Loops



Series Notch Loops®



T-Pass Loops®



Vari Notch Loops



Duplexers

A Duplexer is a 3-port device most commonly used to allow a transmitter and receiver, operating on different frequencies, to share a common antenna while operating simultaneously. The filters that make up the duplexer isolate the transmitter from the receiver by doing two important functions - the most important is filtering out any transmitter noise sidebands that are being generated on the receive frequency. The second function is protecting the receiver from transmitter carrier overload. The amount of isolation necessary is dependent upon the TX to RX frequency spacing. As the frequencies get closer, a higher value of isolation is required.

*30-420 MHz Technical Specifications

Temperature Range -30 to +60°C

Impedance 50 ohms

VSWR 1.3:1

Model Number	Frequency Range (MHz)	Minimum Freq Separation	Power Rating	Isolation (DB)*	Insertion Loss (DB)	No. of Cavities / Size	Dimensions HxWxD (Inches)	Tx Rx Port/Antenna Connectors	Shipping Weight
28-13-01F	30-40	0.3	400 W	90	1.5	4/6.625" Diameter	132x19x15	N/ N	250
28-14-01F	38-50	0.3	400 W	90	1.5	4/6.625" Diameter	101x19x15	N/ N	260
38-36-01A	132-150	4.5	100 W	70	0.9	4/2" Square	5.25x19x7.25	BNC/ N	10
30-36-01A	132-150	3	100 W	100	1.4/1.5	6/2" Square	5.25x19x7.25	BNC/ N	14
30-36-02A	132-150	3	100 W	100	1.4/1.5	6/2" Square	5.25x19x7.25	BNC/ N	14
74-36-02A	132-150	3	400 W	57	1.35	4/6.625" Diameter	33x19x±7.5	N/ N	50
30-36-03A	132-150 Tx High	1.5	100 W	80/90	1.4/2.2	6/2" Square	5.25x19x7.25	BNC/ N	14
30-36-04A	132-150 Tx Low	1.5	100 W	80/90	1.4/2.2	6/2" Square	5.25x19x7.25	BNC/ N	14
28-36-02A	132-150	0.5	400 W	85	1.5	4/6.625" Diameter	33x19x±7.5	N/ N	50
28-36-11e	132-150	0.3	400 W	100	2.2	6/6.625" Diameter	33x24x±7.5	N/ N	75
38-37-01A	144-174	4.5	100 W	70	0.9	4/2" Square	5.25x19x7.25	BNC/ N	10
30-37-01A	144-174 (Tx High)	3	100 W	100	1.4/1.5	6/2" Square	5.25x19x7.25	BNC/ N	14
30-37-02A	144-174 (Tx Low)	3	100 W	100	1.4/1.5	6/2" Square	5.25x19x7.25	BNC/ N	14
28-37-07A	144-174	3	400 W	85	0.7	4/4" Diameter	5.25x19x±4.5-155	N/ N	22
28-37-07c	144-174	3	400 W	85	0.7	4/4" Diameter	9.5x19x10.5	N/ N	24
74-37-02A	144-174	3	400 W	57	1.35	4/6.625" Diameter	33x19x±7.5	N/ N	50
30-37-03A	144-174 (Tx High)	1.5	100 W	80/90	1.4/2.2	6/2" Square	5.25x19x7.25	BNC/ N	14
30-37-04A	144-174 (Tx Low)	1.5	100 W	80/90	1.4/2.2	6/2" Square	5.25x19x7.25	BNC/ N	14
28-37-06A	144-174	1	125 W	75	1.2	4/4" Diameter	5.25x19x±4.5-155	N/ N	22
28-37-06c	144-174	1	125 W	75	1.2	4/4" Diameter	9.5x19x10.5	N/ N	24
28-37-04A	144-174	0.5	125 W	65	1.8	4/4" Diameter	5.25x19x±4.5-155	N/ N	22
28-37-04c	144-174	0.5	125 W	65	1.8	4/4" Diameter	9.5x19x10.5	N/ N	24
28-37-02A	144-174	0.5	400 W	85	1.5	4/6.625" Diameter	33x19x±7.5	N/ N	50
28-37-02A-DIN	144-174	0.5	400 W	85	1.5	4/6.625" Diameter	33x19x±7.5	N/ 7/16 DIN	50
28-37-11e	144-174	0.3	400 W	100	2.2	6/6.625" Diameter	33x24x±7.5	N/ N	75
28-52-02A	215-250	1.6	250 W	90	1.2	4/4" Diameter	5.25x19x±3-15	N/ N	19
28-56c-02A	380-420	3	250 W	80	0.8	4/4" Diameter	5.25x19x±3-9	N/ N	19
28-65-01A	406-430	1.5	350 W	90	1.5	4/6.625" Diameter	17x19x±7.5	N/ N	37
28-65-02A	406-430	3	350 W	80	0.8	4/4" Diameter	5.25x19x±3.9	N/ N	14
28-65-02B	406-430	3	350 W	80	0.8	4/4" Diameter	5.25x19x12	N/ N	16
28-65-05A	406-430	0.7	350 W	100	2.2	6/6.625" Diameter	34x19x±7.5	N/ N	75

Duplexers

*406-1300 MHz Technical Specifications

Temperature Range -30 to +60°C

Impedance 50 ohms

VSWR 1.3:1

Model Number	Frequency Range (MHz)	Minimum Freq Separation	Power Rating	Isolation (DB)*	Insertion Loss (DB)	No. of Cavities / Size	Dimensions HxWxD (Inches)	Tx Rx Port/Antenna Connectors	Shipping Weight
28-65-07A	406-430	3	250 W	85	1.25	4/ 4" Diameter	5.25x19x+3-9	N/ N	14
28-65-07B	406-430	3	250 W	85	1.25	4/ 4" Diameter	5.25x19x12	N/ N	16
28-65-08A	406-430	4.5	100 W	80	1.2	4/1.25" x 2" Rectangle	1.75x19x±2.5	BNC/ N	5
28-65-09A	406-430	2.5	100 W	80	1.8	6/1.25" x 2" Rectangle	3.5x19x±2.5	BNC/ N	7
28-65-10H	406-430	4.5	100 W	80	1.2	4/1.25" x 2" Rectangle	2.7x5.12x7.4	BNC/ UHF	5
26-66-01A	442-450	6	100 W	70	1.2	2/Comblin	10x21.5x7.5	N/ N	12
28-66-02A	442-450	5	350 W	100	0.6	4/4" Diameter	5.25x19x+3.9	N/ N	14
28-66-02B	442-450	5	350 W	100	0.6	4/4" Diameter	5.25x19x12	N/ N	16
28-66-04H	442-450	5	100 W	80	1.2	4/1.25" x 2" Rectangle 2.7	5.12x5.12x7.4	N/ UHF	5
28-70-01A	450-470	1.5	350 W	90	1.5	4/6.625" Diameter	17x19x±7.5	N/ N	37
28-70-02A	450-470	5	350 W	100	0.6	4/4" Diameter	5.25x19x3-9	N/ N	14
28-70-02B	450-470	5	350 W	100	0.6	4/4" Diameter	5.25x19x12	N/ N	16
28-70-07A	450-470	0.7	350 W	100	2.2	6/6.625" Diameter	34x19x7.5	N/ N	55
28-70-09A	450-470	5	250 W	100	1.25	4/4" Diameter	5.25x19x+3-9	N/ N	14
28-70-09B	450-470	5	250 W	100	1.25	4/4" Diameter	5.25x19x12	N/ N	16
28-70-14A	450-470	5	100 W	80	1.2	4/1.25" x 2" Rectangle	1.75x19x±2.5	BNC/ N	5
28-70-15H	450-470	5	100 W	80	1.2	4/1.25" x 2" Rectangle	2.7x5.12x7.4	BNC/ UHF	5
28-69-01A	470-512	1.5	350 W	90	1.5	4/6.625" Diameter	17x19x±7.5	N/ N	37
28-69-02A	470-512	3	350 W	80	0.8	4/4" Diameter	5.25x19x+3-9	N/ N	14
28-69-02B	470-512	3	350 W	80	0.8	4/4" Diameter	5.25x19x12	N/ N	16
28-69-04A	470-512	0.7	350 W	100	2.2	6/6.625" Diameter	34x19x±7.5	N/ N	55
28-83e-01A	764-806	30	125 W	60/90	0.8/0.8	4/4" Diameter	5.25x19x+6-6.5	N/ N	10
28-83e-01B	764-806	30	125 W	60/90	0.8/0.8	4/4" Diameter	5.25x19x10	N/ N	10
26-89-03A	806-866	45	600 W	45/77	0.5/1.0	N/A/Comblin	5.25x19x+7.2	N/ N	14
26-89A-01A	806-869	45	600 W	35/90	0.5/1.5	N/A/Comblin	5.25x19x+7.2	N/ N	15
26-89A-05A	806-869	45	600 W	35/110	0.5/1.0	N/A/Comblin	5.25x19x+7.2	N/ N	16
26-88-01A	890-960	39	600 W	55/100	0.6/1.2	4/Comblin & 4" Diameter	5.25x19x+7-6.5	N/ N	15
28-88-01A	890-960	3.6	125 W	90/90	1.25/1.25	4/4" Diameter	5.25x19x+6-6.5	N/ N	10
28-88-01B	890-960	3.6	125 W	90/90	1.25/1.25	4/4" Diameter	5.25x19x10	N/ N	12
28-88-04A	890-960	39	125 W	90/90	0.8/0.8	4/4" Diameter	5.25x19x+6-6.5	N/ N	10
28-88-04B	890-960	39	125 W	90/90	0.8/0.8	4/4" Diameter	5.25x19x10	N/ N	12
28-97-01A	1.2-1.3 GHz	12	125 W	100	1	4/4" Diameter	5.25x19x+6-6.5	N/ N	13
28-97-01B	1.2-1.3 GHz	12	125 W	100	1	4/4" Diameter	5.25x19x10	N/ N	13
36-97-07053-A	1.2-1.3 GHz	12	100 W	50	1.3/1.3	4" Diameter	10.5x19x8.9	N/ N	13

Pseudo BandPass Duplexers & 2nd Harmonic Filters

Technical Specifications

Pseudo Band Pass Duplexer Section	Model Number	Frequency (MHz)	Bandwidth	Mounting
Notch-Pseudo Band Pass Duplexer	30-36-01A	132-150	3.0 MHz Separation (TX High)	19" Rack Mount
Notch-Pseudo Band Pass Duplexer	30-36-02A	132-150	2.5 MHz Separation (TX Low)	19" Rack Mount
Notch-Pseudo Band Pass Duplexer	30-36-03A	132-150	1.0 MHz Separation (TX High)	19" Rack Mount
Notch-Pseudo Band Pass Duplexer	30-36-04A	132-150	1.0 MHz Separation (TX Low)	19" Rack Mount
Notch-Pseudo Band Pass Duplexer	30-37-01A	144-174	3.0 MHz Separation (TX High)	19" Rack Mount
Notch-Pseudo Band Pass Duplexer	30-37-02A	144-174	3.0 MHz Separation (TX low)	19" Rack Mount
Notch-Pseudo Band Pass Duplexer	30-37-03A	144-174	1.0 MHz Separation (TX High)	19" Rack Mount
Notch-Pseudo Band Pass Duplexer	30-37-04A	144-174	1.0 MHz Separation (TX Low)	19" Rack Mount
Pseudo Band Pass Duplexer	38-36-01A	132-150	4.5 MHz Min Separation	19" Rack Mount
Pseudo Band Pass Duplexer	38-37-01A	144-174	4.5 MHz Min Separation	19" Rack Mount

Duplexers 30-1300 MHz Specification Guide

Continued from Pages 9 & 10

THIRD PAIR OF NUMBERS PLUS LETTER	
TWO DIGIT NUMBER	MOUNTING STYLE
ELECTRICAL SPECIFICATION IDENTIFIER	A: 19" RACK MOUNT
	B: 19" REVERSE FLUSH RACK MOUNT
	C: 19" CROSS RACK MOUNT
	D: DUST COVERED SIDE-OF-CABINET OR WALL MOUNT
	E: 24" RACK MOUNT
	F: WALL MOUNT
	G: CABINET MOUNTED
	H: MOBILE PLATE MOUNTED
DEPTH	+3 -9 = 3" on front of mount plate 9" on back of mount plate
	+2.5 = 2.5" on front of mount plate 2.5" on back of mount plate

*specifications for duplexers of unsymmetrical construction or response are listed as follows:
isolation: noise suppression/carrier suppression insertion loss: Tx loss/rx loss
Duplexer Trouble Shooting Aid

2nd Harmonic Filters

22-38-01 Second Harmonic Filter

The ferrite used to make circulators is a non-linear material that generates a significant amount of 2nd harmonic power which can contribute to the formation of 3rd order intermodulation products when mixed with other transmitter carriers. For this reason, either a bandpass cavity filter or a harmonic filter must always be installed between the isolator and the antenna. TX RX manufactures single and dual-section filters for applications where bandpass cavities are not used.

Technical Specifications

Model Number	Section	Frequency (MHz)
22-15-01	Dual	30-50
22-28B-01	Dual	71-80
22-28C-01	Dual	80-88
22-33-01	Dual	118-174
22-33-02	Single	118-174
22-38-01	Dual	132-174
22-38-02	Single	132-174
22-37-01	Dual	144-174
22-37-02	Single	144-174
22-54A-01	Dual	215-300
22-55-01	Dual	300-400
22-67-01	Dual	406-512
22-67-02	Single	406-512
22-90-01	Dual	806-960

Installed between isolators and antenna when bandpass cavities are not used.
Single and dual-section models for 30 or 60 dB attenuation.

Compact BandPass Filters

Technical Specifications

Model Number	Frequency (MHz)	Bandwidth (MHz)	Power (W)	Tunable	IL (dB) max	Rejection	Connector	Panel Size (RU)	Dimensions DxWxH
89-39B-20-3.0	152-168	3	300	Yes	2.0	40 dB @ Fc±2.5 MHz 65 dB @ Fc±4.0 MHz	N-f	4	16.7"x8.5"x5.8"
89-39B-20-3.0-RM	152-168	3	300	Yes	2.0	40 dB @ Fc±2.5 MHz 65 dB @ Fc±4.0 MHz	N-f	4	16.7"x8.5"x5.8"
89-39B-20-4.0	152-168	4	200	Yes	2.0	40 dB @ Fc±3.0 MHz 65 dB @ Fc±4.5 MHz	N-f	4	16.7"x8.5"x5.8"
89-39B-20-4.0-RM	152-168	4	200	Yes	2.0	40 dB @ Fc±3.0 MHz 65 dB @ Fc±4.5 MHz	N-f	4	16.7"x8.5"x5.8"
89-39B-20-5.0	152-168	5	300	Yes	2.0	40 dB @ Fc±3.5 MHz 65 dB @ Fc±5.0 MHz	N-f	4	16.7"x8.5"x5.8"
89-39B-20-5.0-RM	152-168	5	300	Yes	2.0	40 dB @ Fc±3.5 MHz 65 dB @ Fc±5.0 MHz	N-f	4	16.7"x8.5"x5.8"
89-36D-20-1.0	133-174	1	20	Yes	1.8	33 dB min @ Fc±1.5 MHz 66 dB min @ Fc ±3.5 MHz	N-f	3	6.6"x4.7"x5.1"
89-36D-20-2.0	133-174	2	20	Yes	1.8	33 dB min @ Fc±2 MHz 65 dB min @ Fc ±4 MHz	N-f	3	8.75"x4.7"x5.1"
89-36D-20-3.0	133-174	3	300	Yes	2.0	40 dB @ Fc±2.5 MHz 65 dB @ Fc±4.0 MHz	N-f	4	16.7"x8.5"x5.9"
89-36D-20-4.0	133-174	4	300	No	2.0	40 dB @ Fc±3.0 MHz 65 dB @ Fc±4.5 MHz	N-f	4	16.7"x8.5"x5.9"
89-36D-20-5.0	133-174	5	300	No	2.0	40 dB @ Fc±3.5 MHz 65 dB @ Fc±5.0 MHz	N-f	4	16.7"x8.5"x5.9"
89-39B-20-2.75	152-168	2.75	5	Yes	2.0	33 dB min @ Fc3.0 MHz 65 dB min @ Fc ±5.0 MHz	N-f	3	8.7"x4.7"x5.0"
89-39B-20-2.75-RM	152-168	2.75	5	Yes	2.0	33 dB min @ Fc3.0 MHz 65 dB min @ Fc ±5.0 MHz	N-f	3	8.7"x4.7"x5.0"
89-68-20-1.0	450-512	1	20	Yes	4.0	65 dB min @ Fc±2.0 MHz 80 dB min @ Fc±3.0 MHz	N-f	2	8.75"x4.5"x3.2"
89-68-20-2.0	450-512	2	20	Yes	3.0	65 dB min @ Fc±3.0 MHz 80 dB min @ Fc±5.0 MHz	N-f	2	8.75"x4.5"x3.2"
89-68-20-4.0	450-512	4	20	Yes	4.0	65 dB min @ Fc±3.0 MHz 60 dB min @ Fc±5.0 MHz	N-f	2	11.25"x4.5"x3.2"
89-68-20-5.0	450-512	5	10	Yes	2.0	40 dB @ Fc±3.5 MHz 65 dB @ Fc±5.0 MHz	N-f	4	16.7"x8.5"x5.9"
89-83H-20-3.0	792-824	3	10	Yes	4.0	45 dB min @ Fc +/- 6 MHz	SMA-f	1	8.46"x2.36"x1.73"
89-83H-20-6.0	792-824	6	10	Yes	3.0	45 dB min @ Fc +/- 9 MHz	SMA-f	1	8.46"x2.36"x1.73"
89-83H-20-9.0	792-824	9	10	Yes	2.0	45 dB min @ Fc +/- 10 MHz	SMA-f	1	8.46"x2.36"x1.73"

RM = Rackmount

Bird's mission is to serve as one of the industry's leading RF experts in Coverage Solutions, Off-Air Testing, Radio Infrastructure, Sensor Solutions and Test and Measurement. We strive to provide our customers with the highest quality, innovative RF products and services all based around total reliability.

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