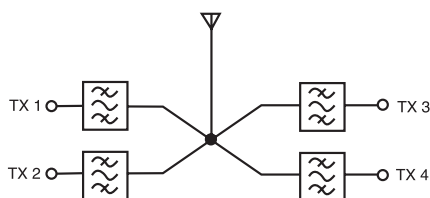


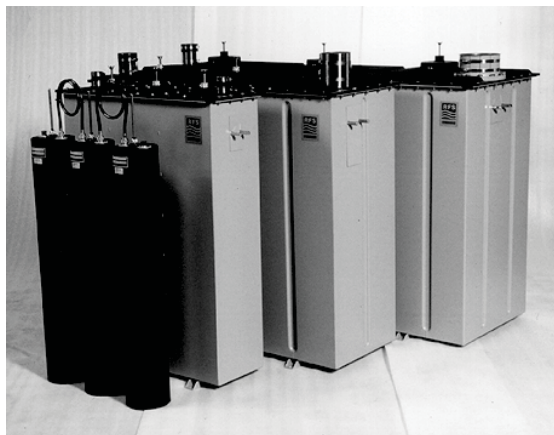
CS FM - 2 Pole, 3 Pole and Integrated Filters

The branched or star point combiner range utilizes bandpass filters connected to a common output. This arrangement provides a lower cost alternative to the balanced design while retaining the advantages of the RFS bandpass filter range.

- 2, 3 and 4 channel versions available as standard
- Additional channels can be added using balanced combiner modules
- Compact size for given power rating
- Fixed coupling aperture for maximum reliability and ease of tuning
- Vertical entry and exit without additional elbows
- 2 and 3 pole versions standard
- Natural convection cooling
- Invar temperature compensation
- 4 filter sizes for 500W, 1kW, 6kW and 15kW transmitter output powers
- Higher powers may be possible, please consult RFS for further information
- Shipped in "knock down" condition for ease of handling through standard doors and elevators
- Custom options such as patching facilities and power monitoring are available



Combiner Configuration



Bandpass Filters

Band II (VHF) FM Branched Combiner

87.5 - 108 MHz

CS FM - 2 Pole Filters

SPECIFICATIONS (ALL MODELS)

Frequency Range, MHz	87.5 - 108
Channel Spacing	2.4 MHz, 1.6 MHz reduced spec
Impedance, ohms	50 unbalanced
Filter Type	4 x (2 Pole 400mm)
Narrowband Input Return Loss, dB	> 23 +/-150kHz
N'band Input Group Delay variation over Channel	< 25 to +/- 100 kHz
Bandwidth, nsec	
Intermod Spurs (10dB Tx Conversion Loss), dB	< -85 at min channel spacing
Narrowband to Narrowband Isolation, dB	> 35 at min channel spacing
Amplitude Variation, dB	< 0.2 to +/- 200kHz

SPECIFICATIONS	CS2P150B-2	CS2P150B-3	CS2P150B-4	CS2P200B-2
Narrowband Input Power (maximum), kW Average	0.5	0.5	0.5	1
Output Power (maximum), kW Average	0.5	0.5	0.5	2
Number of Channels	2	3	4	2
Narrowband Input Connector	N	N	N	7/8" EIA; 1-5/8" EIA
Narrowband Insertion Loss at Channel Center	0.7	0.7	0.7	0.35
Frequency, dB				
Output Connector	N	N	N	1-5/8" EIA
Weight, kg (lb)	10 (22) /Channel	10 (22) /Channel	10 (22) /Channel	35 (77) /Channel
Dimensions (Height or Length), cm (in)	120.0 (47) / Channel	120.0 (47) / Channel	120.0 (47) / Channel	140.0 (55) /channel
Dimensions (Width), cm (in)	40.0 (16) /Channel	40.0 (16) /Channel	40.0 (16) /Channel	60.0 (24) /channel
Dimensions (Depth), cm (in)	20.0 (8) /Channel	20.0 (8) /Channel	20.0 (8) /Channel	30.0 (12) /channel

SPECIFICATIONS	CS2P200B-3	CS2P200B-4	CS2P400B-2	CS2P400B-3
Narrowband Input Power (maximum), kW Average	1	1	6	6
Output Power (maximum), kW Average	3	4	12	18
Number of Channels	3	4	2	3
Narrowband Input Connector	7/8" EIA; 1-5/8" EIA	7/8" EIA; 1-5/8" EIA	3-1/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center	0.35	0.35	0.25	0.25
Frequency, dB				
Output Connector	1-5/8" EIA	1-5/8" EIA	3-1/8" EIA	3-1/8" EIA
Weight, kg (lb)	35 (77) /Channel	35 (77) /Channel	60 (132)/Channel	60 (132)/Channel
Dimensions (Height or Length), cm (in)	140.0 (55) /channel	140.0 (55) /channel	150.0 (59) /Channel	150.0 (59) /Channel
Dimensions (Width), cm (in)	60.0 (24) /channel	60.0 (24) /channel	90.0 (35) /Channel	90.0 (35) /Channel
Dimensions (Depth), cm (in)	30.0 (12) /channel	30.0 (12) /channel	50.0 (20) /Channel	50.0 (20) /Channel

SPECIFICATIONS	CS2P400B-4	CS2P600B-2	CS2P600B-3	CS2P600B-4
Narrowband Input Power (maximum), kW Average	6	15	15	15
Output Power (maximum), kW Average	24	30	40	40
Number of Channels	4	2	3	4
Narrowband Input Connector	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center	0.25	0.2	0.2	0.2
Frequency, dB				
Output Connector	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA
Weight, kg (lb)	60 (132)/Channel	95 (209) /Channel	95 (209) /Channel	95 (209) /Channel
Dimensions (Height or Length), cm (in)	150.0 (59) /Channel	160.0 (63) /Channel	160.0 (63) /Channel	160.0 (63) /Channel
Dimensions (Width), cm (in)	90.0 (35) /Channel	130.0 (51) /Channel	130.0 (51) /Channel	130.0 (51) /Channel
Dimensions (Depth), cm (in)	50.0 (20) /Channel	70.0 (28) /Channel	70.0 (28) /Channel	70.0 (28) /Channel

CS FM - 3 Pole Filters

SPECIFICATIONS (ALL MODELS)

Frequency Range, MHz	87.5 - 108
Channel Spacing	1.6 MHz , 1.2 MHz reduced spec
Impedance, ohms	50 unbalanced
Filter Type	2 x (3 Pole 150mm)
Narrowband Input Return Loss, dB	> 23 +/-200kHz
N'band Input Group Delay variation over Channel	< 25 to +/- 100 kHz
Bandwidth, nsec	
Intermod Spurs (10dB Tx Conversion Loss), dB	< -85 at min channel spacing
Narrowband to Narrowband Isolation, dB	> 35 at min channel spacing
Amplitude Variation, dB	< 0.2 to +/- 200kHz

SPECIFICATIONS	CS3P150B-2	CS3P150B-3	CS3P150B-4	CS3P200B-2
Narrowband Input Power (maximum), kW Average	0.5	0.5	0.5	1
Output Power (maximum), kW Average	0.5	0.5	0.5	2
Number of Channels	2	3	4	2
Narrowband Input Connector	N	N	N	7/8" EIA; 1-5/8" EIA
Narrowband Insertion Loss at Channel Center Frequency, dB	1	1	1	0.5
Output Connector	N	N	N	1-5/8" EIA
Weight, kg (lb)	12 (26)/Channel	12 (26)/Channel	12 (26)/Channel	45 (99)/Channel
Dimensions (Height or Length), cm (in)	120.0 (47)/Channel	120.0 (47)/Channel	120.0 (47)/Channel	140.0 (55)/Channel
Dimensions (Width), cm (in)	60.0 (24)/Channel	60.0 (24) /Channel	60.0 (24) /Channel	80.0 (31)/Channel
Dimensions (Depth), cm (in)	20.0 (8)/Channel	20.0 (8)/Channel	20.0 (8)/Channel	30.0 (12)/channel

SPECIFICATIONS	CS3P200B-3	CS3P200B-4	CS3P400B-2	CS3P400B-3
Narrowband Input Power (maximum), kW Average	1	1	6	6
Output Power (maximum), kW Average	3	4	12	18
Number of Channels	3	4	2	3
Narrowband Input Connector	7/8" EIA; 1-5/8" EIA	7/8" EIA; 1-5/8" EIA	3-1/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center Frequency, dB	0.5	0.5	0.3	0.3
Output Connector	1-5/8" EIA	1-5/8" EIA	3-1/8" EIA	3-1/8" EIA
Weight, kg (lb)	45 (99)/Channel	45 (99)/Channel	80 (176)/Channel	80 (176)/Channel
Dimensions (Height or Length), cm (in)	140.0 (55)/Channel	140.0 (55)/Channel	150.0 (59)/Channel	150.0 (59)/Channel
Dimensions (Width), cm (in)	80.0 (31)/Channel	80.0 (31)/Channel	130.0 (51)/Channel	130.0 (51)/Channel
Dimensions (Depth), cm (in)	30.0 (12)/Channel	30.0 (12)/Channel	50.0 (20)/Channel	50.0 (20)/Channel

SPECIFICATIONS	CS3P400B-4	CS3P600B-2	CS3P600B-3	CS3P600B-4
Narrowband Input Power (maximum), kW Average	6	15	15	15
Output Power (maximum), kW Average	24	30	40	40
Number of Channels	4	2	3	4
Narrowband Input Connector	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center Frequency, dB	0.3	0.25	0.25	0.25
Output Connector	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA
Weight, kg (lb)	80 (176)/Channel	125 (276)/Channel	125 (276)/Channel	125 (276)/Channel
Dimensions (Height or Length), cm (in)	150.0 (59)/Channel	160.0 (63)/Channel	160.0 (63)/Channel	160.0 (63)/Channel
Dimensions (Width), cm (in)	130.0 (51)/Channel	190.0 (75)/Channel	190.0 (75)/Channel	190.0 (75)/Channel
Dimensions (Depth), cm (in)	50.0 (20)/Channel	70.0 (28)/Channel	70.0 (28)/Channel	70.0 (28)/Channel

Band II (VHF) FM Branched Combiner

87.5 - 108 MHz

CS FM - Integrated Filters

SPECIFICATIONS (ALL MODELS)

Frequency Range, MHz	87.5 - 108
Channel Spacing	1.6 MHz
Number of Channels	2
Impedance, ohms	50 unbalanced
Filter Type	Integrated
Narrowband Insertion Loss at Channel Center Frequency, dB	< 0.5
Narrowband Input Return Loss, dB	> 23 +/-200kHz
Narrowband to Narrowband Isolation, dB	> 40 at min channel spacing
Amplitude Variation, dB	< 0.2 to +/- 200kHz

SPECIFICATIONS

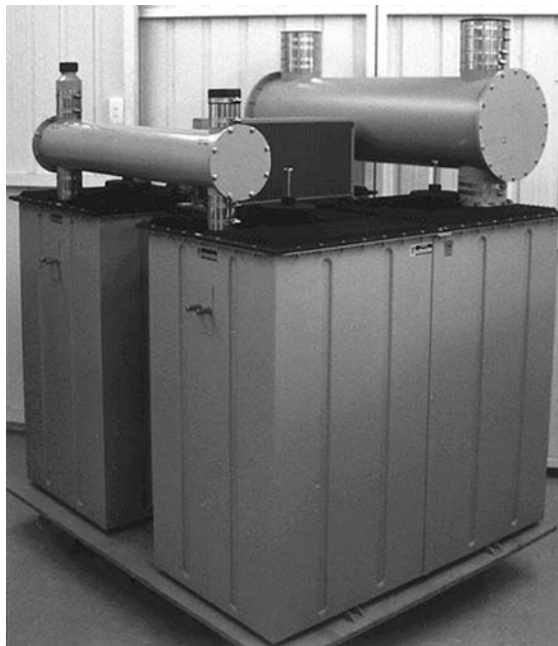
	CS2P400IB-2	CS3P200IB-2	CS3P400IB-2
Narrowband Input Power (maximum), kW Average	N/A	1	N/A
Output Power (maximum), kW Average	N/A	4	N/A
Narrowband Input Connector	3-1/8" EIA	7/8" EIA	3-1/8" EIA
Output Connector	3-1/8" EIA	7/8" EIA	3-1/8" EIA
Weight, kg (lb)		95 (209)	
Dimensions (Height or Length), cm (in)		160.0 (63)	
Dimensions (Width), cm (in)		70.0 (28)	
Dimensions (Depth), cm (in)		50.0 (20)	

CA FM - 2 Pole, 3 Pole and Integrated Filters

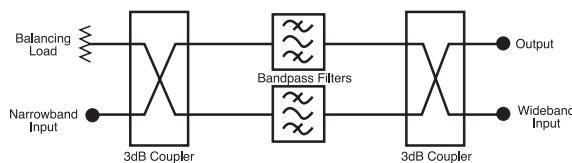
RFS offers a comprehensive product line of FM combiners to suit a wide range of applications. The balanced (or constant impedance) bandpass design offers an expandable system which is built in a modular form enabling extra stations to be added at a future date. This configuration provides state of the art performance with the best frequency response and isolation attainable.

- Compact size for given power rating
- Vertical entry and exit without additional elbows
- Can be field retuned to any frequency in the 87.5 - 108MHz band
- 2 and 3 pole bandpass filter versions standard
- Natural convection cooling for all power levels
- Suitable for channel spacings as close as 800kHz
- Group delay corrector modules available for complex multichannel systems
- Larger units shipped in "knock-down" condition for ease of handling through standard doors and elevators
- Custom options such as patching facilities and power monitoring are available
- Input/output line sizes can be varied to suit using RFS developed R series adaptors

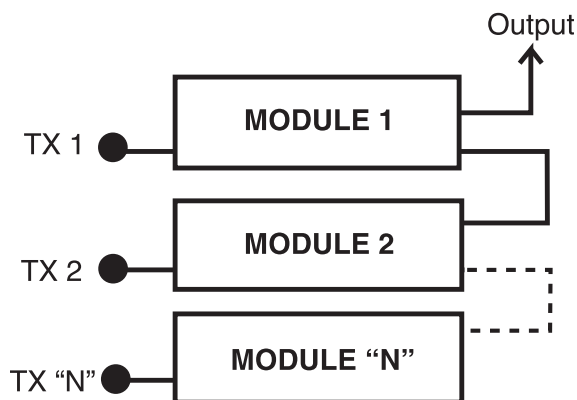
A module consists of a balanced pair of bandpass filters, two 3dB couplers and a balancing load. The narrowband input corresponds to the filter resonant frequency, whereas the wideband input can be any other frequency across the FM band. Modules can therefore be cascaded to form a multichannel combiner. A balancing load absorbs narrowband reflections within the module and any wideband signal which passes through the filter network. This property of redirecting signals between the output and balancing loads results in the transmitter working into a 50 ohm system across the full operating bandwidth of the antenna. The narrowband signal is split by the input coupler, passes through the bandpass filters and is recombined in the output coupler to add at the output port. Wideband signals are split by the output coupler, then reflect from the bandpass filters and, as the path lengths are identical, recombine in the output coupler to add at the output port. Isolation between the inputs is provided by the output coupler directivity and the filter selectivity.



CA3P150-618



Combiner Module Configuration



Multi-station Combiner Arrangement

Band II (VHF) FM Balanced Combiner

87.5 - 108 MHz

CA FM - 2 Pole Filters

SPECIFICATIONS (ALL MODELS)

Frequency Range, MHz	87.5 - 108 Field tunable
Channel Spacing	1.6 MHz
Impedance, ohms	50
Input Return Loss, dB	> 30 to +/- 200kHz
Input Group Delay variation over Channel Bandwidth, nsec	< 25 to +/- 100kHz
Intermod Spurs (10dB Tx Conversion Loss), dB	< -85 at minimum ch spacing
Narrowband to Narrowband Isolation, dB	> 50 at min ch spacing

SPECIFICATIONS	CA2P150B-00N	CA2P400B-318	CA2P400B-318	CA2P400B-412
Dimensions (Depth), cm (in)	50.0 (20)	90.0 (35)	90.0 (35)	90.0 (35)
Narrowband Input Power (maximum), kW Average	0.5	5	12	12
Output Power (maximum), kW Average	0.5	40	40	80
Filter Type	2 Pole (150mm)	2 Pole (Integrated)	2 Pole (400mm)	2 Pole (400mm)
Narrowband Input Connector	N	1-5/8" EIA	3-1/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center Frequency, dB	0.7	0.25	0.25	0.2
Wideband Input Connector	N	3-1/8" EIA	3-1/8" EIA	4-1/2" IEC
Wideband Input Insertion Loss, dB	<0.2	0.1	0.1	0.1
Amplitude Variation, dB	< 0.2 to +/- 200kHz	< 0.1 to +/- 200kHz	< 0.1 to +/- 200kHz	< 0.1 to +/- 200kHz
Output Connector	N	3-1/8" EIA	3-1/8" EIA	4-1/2" IEC
Weight, kg (lb)	25 (55)	100 (220)	170 (375)	190 (419)
Dimensions (Height or Length), cm (in)	120.0 (47)	140.0 (55)	150.0 (59)	160.0 (63)
Dimensions (Width), cm (in)	50.0 (20)	90.0 (35)	120.0 (47)	120.0 (47)

SPECIFICATIONS	CA2P600B-318	CA2P600B-412	CA2P600B-618
Dimensions (Depth), cm (in)	130.0 (51)	130.0 (51)	130.0 (51)
Narrowband Input Power (maximum), kW Average	25	25	25
Output Power (maximum), kW Average	40	80	160
Filter Type	2 Pole (600mm)	2 Pole (600mm)	2 Pole (600mm)
Narrowband Input Connector	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center Frequency, dB	0.2	0.2	0.2
Wideband Input Connector	3-1/8" EIA	4-1/2" IEC	6-1/8" EIA
Wideband Input Insertion Loss, dB	0.1	0.1	0.1
Amplitude Variation, dB	< 0.1 to +/- 200kHz	< 0.1 to +/- 200kHz	< 0.1 to +/- 200kHz
Output Connector	3-1/8" EIA	4-1/2" IEC	6-1/8" EIA
Weight, kg (lb)	230 (507)	245 (540)	270 (595)
Dimensions (Height or Length), cm (in)	150.0 (59)	160.0 (63)	160.0 (63)
Dimensions (Width), cm (in)	150.0 (59)	150.0 (59)	150.0 (59)

CA FM - 3 Pole Filters

SPECIFICATIONS (ALL MODELS)

Frequency Range, MHz	87.5 - 108 Field tunable
Channel Spacing	0.8 MHz
Impedance, ohms	50
Input Return Loss, dB	> 30 to +/- 200kHz
Input Group Delay variation over Channel Bandwidth, nsec	< 25 to +/- 100kHz
Intermod Spurs (10dB Tx Conversion Loss), dB	< -85 at minimum ch spacing
Wideband Input Insertion Loss, dB	0.1
Narrowband to Narrowband Isolation, dB	> 50 at min ch spacing
Amplitude Variation, dB	< 0.1 to +/- 200kHz

SPECIFICATIONS	CA3P150B-00N	CA3P200IB-158	CA3P400IB-318	CA3P400B-318
Narrowband Input Power (maximum), kW Average	0.5	2	5	12
Output Power (maximum), kW Average	0.5	10	40	40
Filter Type	3 Pole (150mm)	3 Pole (Integrated)	3 Pole (Integrated)	3 Pole (400mm)
Narrowband Input Connector	N	7/8" EIA	1-5/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center Frequency, dB	1	0.5	0.35	0.35
Wideband Input Connector	N	1-5/8" EIA	3-1/8" EIA	3-1/8" EIA
Output Connector	N	1-5/8" EIA	3-1/8" EIA	3-1/8" EIA
Weight, kg (lb)	32 (71)	61 (135)	145 (320)	210 (463)
Dimensions (Height or Length), cm (in)	120.0 (47)	140.0 (55)	140.0 (55)	150.0 (59)
Dimensions (Width), cm (in)	50.0 (20)	50.0 (20)	90.0 (35)	120.0 (47)
Dimensions (Depth), cm (in)	60.0 (24)	70.0 (28)	120.0 (47)	130.0 (51)

SPECIFICATIONS	CA3P400B-412	CA3P600B-318	CA3P600B-412	CA3P600B-618
Narrowband Input Power (maximum), kW Average	12	25	25	25
Output Power (maximum), kW Average	80	40	80	160
Filter Type	3 Pole (400mm)	3 Pole (600mm)	3 Pole (600mm)	3 Pole (600mm)
Narrowband Input Connector	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA	3-1/8" EIA
Narrowband Insertion Loss at Channel Center Frequency, dB	0.35	0.25	0.25	0.25
Wideband Input Connector	4-1/2" IEC	3-1/8" EIA	4-1/2" IEC	6-1/8" EIA
Output Connector	4-1/2" IEC	3-1/8" EIA	4-1/2" IEC	6-1/8" EIA
Weight, kg (lb)	230 (507)	310 (683)	325 (717)	350 (772)
Dimensions (Height or Length), cm (in)	160.0 (63)	150.0 (59)	160.0 (63)	160.0 (63)
Dimensions (Width), cm (in)	120.0 (47)	150.0 (59)	150.0 (59)	150.0 (59)
Dimensions (Depth), cm (in)	130.0 (51)	190.0 (75)	190.0 (75)	190.0 (75)