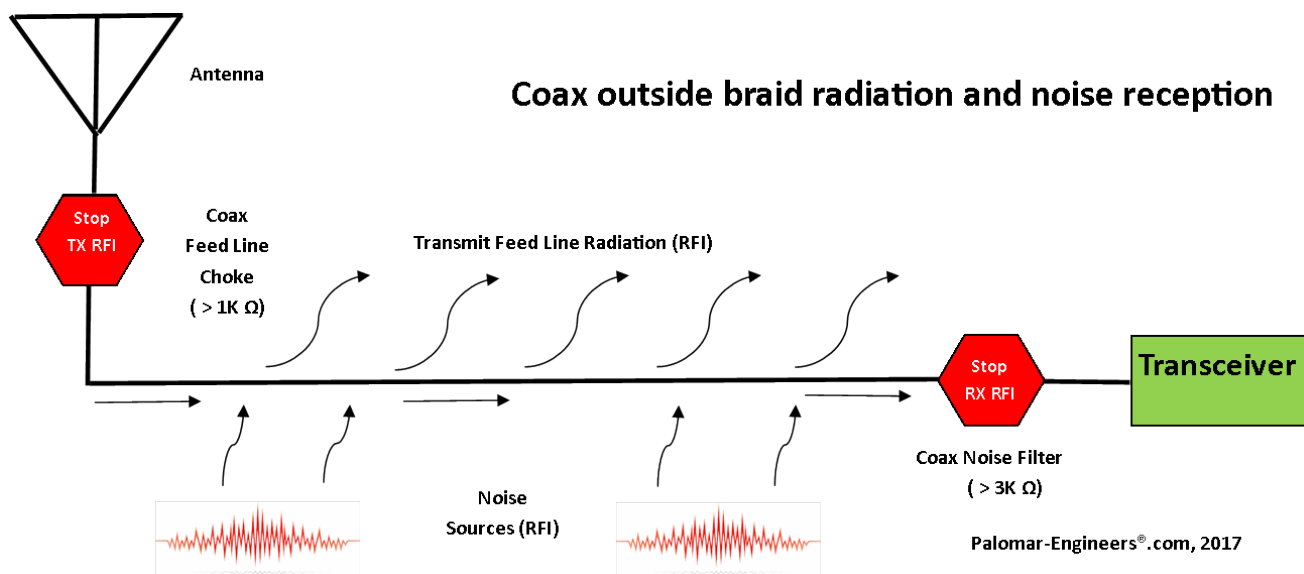


COAX COMMON MODE NOISE FILTERS, MINI-CHOKER, MINI BALUN RFI-AS-FLEX, GEN PRODUCT MANUAL

The Problem:

Common mode current induced by radiated sources (plasma TV, routers, computers, transmitters, etc.) can be picked up by the outside of the coax braid from the antenna feed point back to the receiver. This portion of the coax braid acts like a second receiving antenna, picking up common mode noise signals that combine with weak signals (traveling down the center conductor and inside of the coax braid) making it difficult or impossible to hear weak signals! See diagram below.



The Solution:

A coax common mode noise filter with high choking impedance at the receiver/transceiver end of the coax effectively reduces common mode noise present on the coax braid while passing desired signals present on the coax center conductor. For best results, and to reduce co-interference between choked and un-choked feed lines with multiple antennas, EACH antenna feed line entering the radio room needs to have a coax noise filter even if it feeds a common coax switch since most antenna switches ONLY switch the center conductor of the coax line, yet all the coax braids are ALWAYS connected together in parallel. So when an antenna is NOT SELECTED, its coax sheath still contributes to the noise level of the connected antenna through the common connector ground!

Coax Common Mode Noise Filter/Mini-Balun Models

<u>Model #</u>	<u>Range (MHz)</u>	<u>PEP (ICA S)</u>	<u>CMRR</u>	<u>Size/notes</u>	
 <p>Palomar Engineers® Coax Noise Filter 50W PEP 1-60 MHz >30dB Rejection Install at receiver 50 ohms Model # CMNF-500</p> <p>1:1 Mini Balun with Isolator 10W Watts PEP 1-60 MHz 50 Oh Input to 50 Oh Balanced Output Excellent 1:1 isolation & low loss Coax Interface Common Mode Rejection <= 30dB Palomar-Engineers.com</p>	CMNF-500-50 MC-1-500	1.8-65	500	20-38 dB	3" x 2" x 1", SO-239 I/O
 <p>Palomar Engineers® 1:1 Balun 500 Watts PEP 1-60 MHz >30dB Rejection 50 Oh Input to 50 Oh Balanced Output Model # MB-1-500-50</p> <p>Use at antenna feed point on dipoles, verticals, yagis, magnetic loops, Zigzag antennas, etc. © Palomar Engineers, Inc., 2023</p>	MB-1-500-50	1.8-65 MHz	500	20-38 dB	3" x 2" x 1", SO-239 In, Balanced output
 <p>Palomar Engineers® Common Mode Noise Filter 1-60 MHz <=30dB Rejection 500 Watts PEP 75 Oh In/Out Model # CMNF-500-75</p> <p>© Palomar Engineers® 2015</p>	CMNF-500-75 or CMNF-TV	1.8-65	500	20-38 dB	3" x 2" x 1" ", "F" connector I/O
 <p>Palomar Engineers® Common Mode Noise Filter 70-170 MHz <=30dB Rejection 500 Watts PEP 50 Oh In/Out Model # CMNF-500-50VHF</p>	CMNF-500-VHF CMNF-500-50UHF	70-170 225-500	500 500	<30 dB <28 dB	3" x 2" x 1" ", SO-239 I/O
 <p>PALOMAR ENGINEERS® RFI Solutions from kHz to GHz Common Mode Noise Filter CMNF-1500LF 1500 Watts PEP 20 kHz - 1 MHz 16-60GHz 20-38 dB Noise Rejection Place in 50 ohm coax line to reduce common mode noise Palomar-Engineers.com</p>	CMNF-1500LF CMNF-5000LF	.2-7	1500 5000	20-38 dB	4" x 4" x 2", SO-230 I/O
 <p>PALOMAR ENGINEERS® RFI Solutions from kHz to GHz Common Mode Noise Filter CMNF-1500HF 1500 Watts PEP 200 kHz - 1 MHz 16-60GHz Choking Impedance Place in coax line at amplifier output to reduce common mode noise Palomar-Engineers.com</p>	CMNF-1500HF	1.8-65	1500	20-38 dB	4" x 4" x 2" ", SO-239 I/O
 <p>PALOMAR ENGINEERS® RFI Solutions from kHz to GHz Common Mode Noise Filter CMNF-5000HF 5000 Watts PEP 1-8.65 MHz 16-60GHz Choking Impedance Place in coax line at amplifier output to reduce common mode noise Palomar-Engineers.com</p>	CMNF-5000HF	1.8-65	5000	20-38 dB	4" x 4" x 2" ", SO-239 I/O



Example installation of CMNF-500-50 on an Icom 756 Pro III with two antenna inputs and using the internal antenna switch. Each coax shield is isolated from the other by the common mode filter. Coax braid common mode current are effectively stopped before they can combine at the coax connector.



A similar installation can be used to isolate the unswitched coax braids in a multi-antenna switch by using short coax jumper or double mail coax connector from the CMNF-500-50's to the antenna switch.

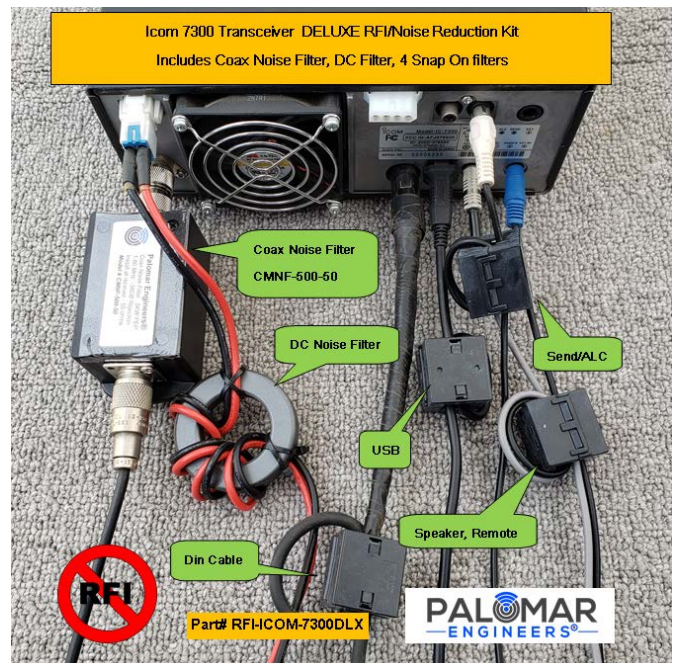
Mini Balun/Ladder Line Interface

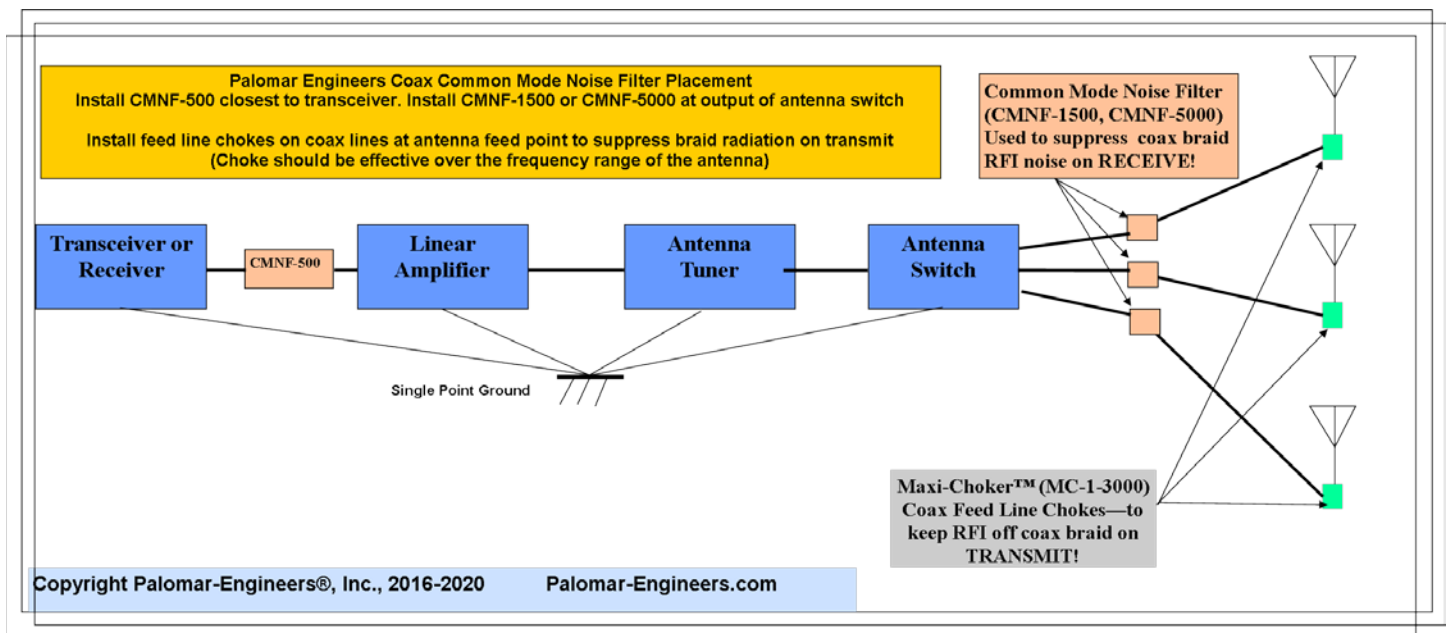


- MB-1-500-50 uses proprietary Multi-Mix, Multi-Core, Multi-Turn ferrite technology for maximum choking (up to -38 dB common mode noise rejection) and maximum bandwidth
- 500 Watts PEP, 50 ohm SO-239 connectors Input and Balanced Output, 1-61 MHz (usable to 100 MHz), 1:1 balun included
- Works for all ladder line antennas from 1.8-61 MHz (160-6 meters) - excellent for G5RV/ZS6BKW, OCF flagpole antennas, ladder line to remote antenna interface..
- 2-5 times more common mode noise rejection, wider bandwidth and higher power than competing isolators

Noise Filter Installation and Use (Typical transceiver)

The CMNF-500-50 is designed to be placed in a 50 ohm coax line entering the transceiver (or between the transceiver and amplifier). The CMNF-1500 (1500 watts PEP) or CMNF-5000 (5KW PEP) should be placed at the end of the coax into the station before any antenna switches. All CMNF's have high choking impedance over a very broadband frequency range and are very useful for high bandwidth SDR receivers and general coverage/ham transceivers from 160 to 6 meters. Typical common mode noise rejection is 30-40 dB (4-7 "S" units). Either connector can be input or output.





Installation Note: Just as the CMNF's reduce RECEIVE noise picked up on the coax braid by electrically isolating the receive signals on the external coax braid between the receiver and antenna feed point, a proper feed line choke at the antenna feed point will isolate the coax braid from the antenna on TRANSMIT. In other words, it will prevent your dipole from becoming a tripole using the coax braid as part of the antenna. An excellent feed line choke is the Palomar Engineers Maxi-Choker™, model MC-1-3000 (3KW PEP rated from 1-61 MHz) or the Mini-Choker™ (500 watts) shown below:.



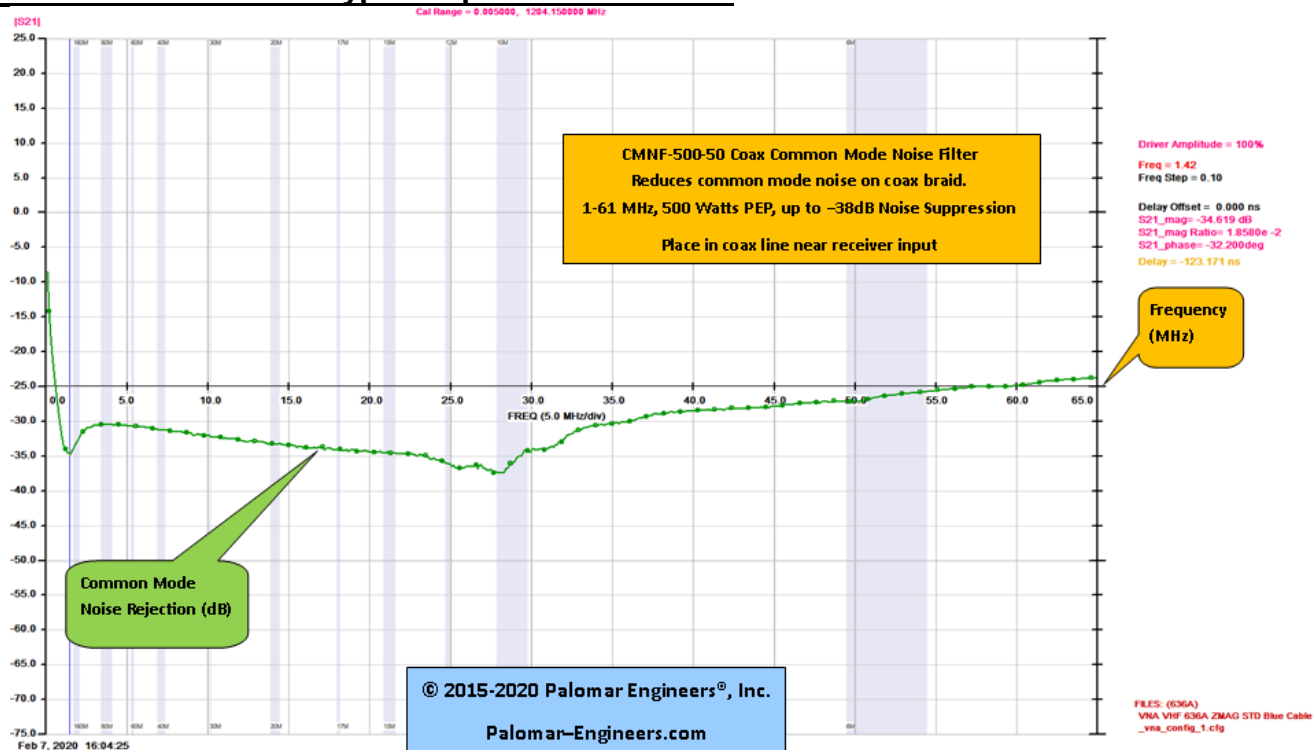
MC-1-3000 (3KW) Maxi-Choker™ - shown with optional ground, static bleeder installed



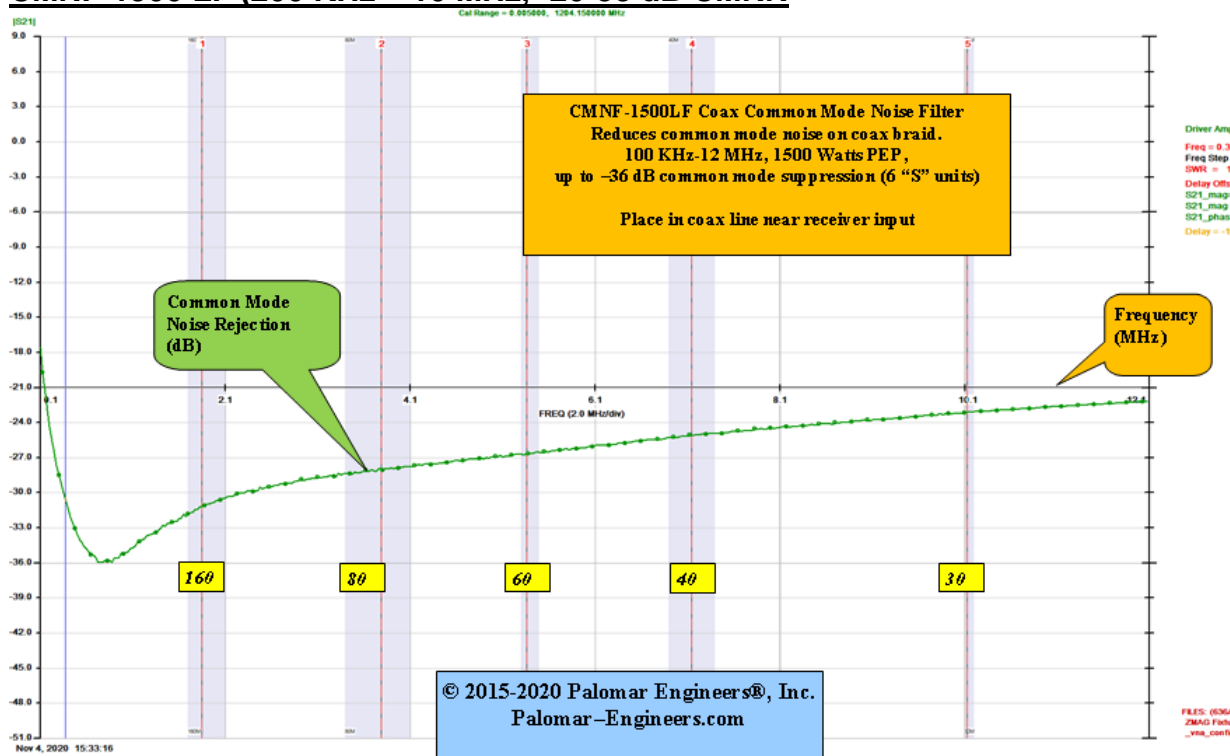
MC-1-500 (500 watts) Mini-Choker™ - Same specs as CMNF-500-50

Note: some models have an optional ground lug and static bleeder. Install CMNF with ground stud closest to radio and connect to low impedance ground.

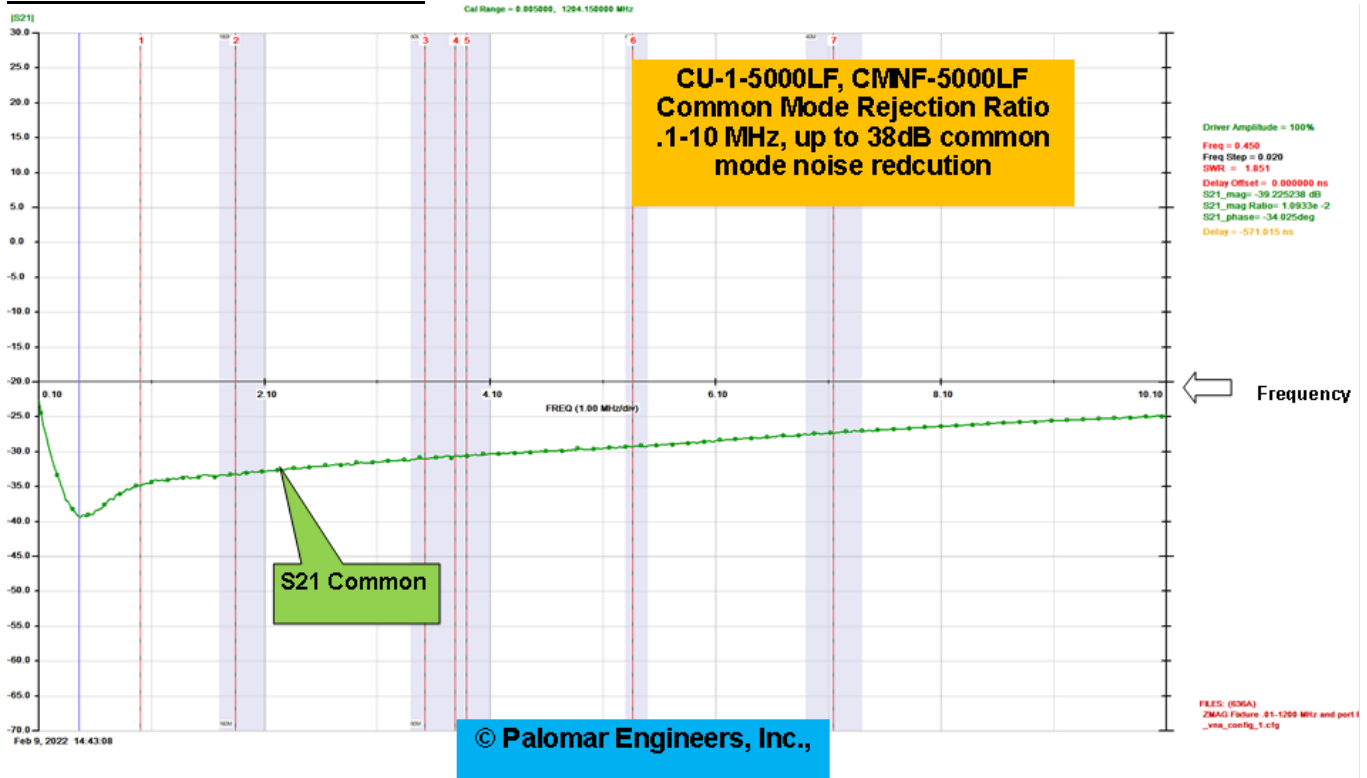
CMNF-500-50/MB-1-500 – typical up to -38dB CMRR!



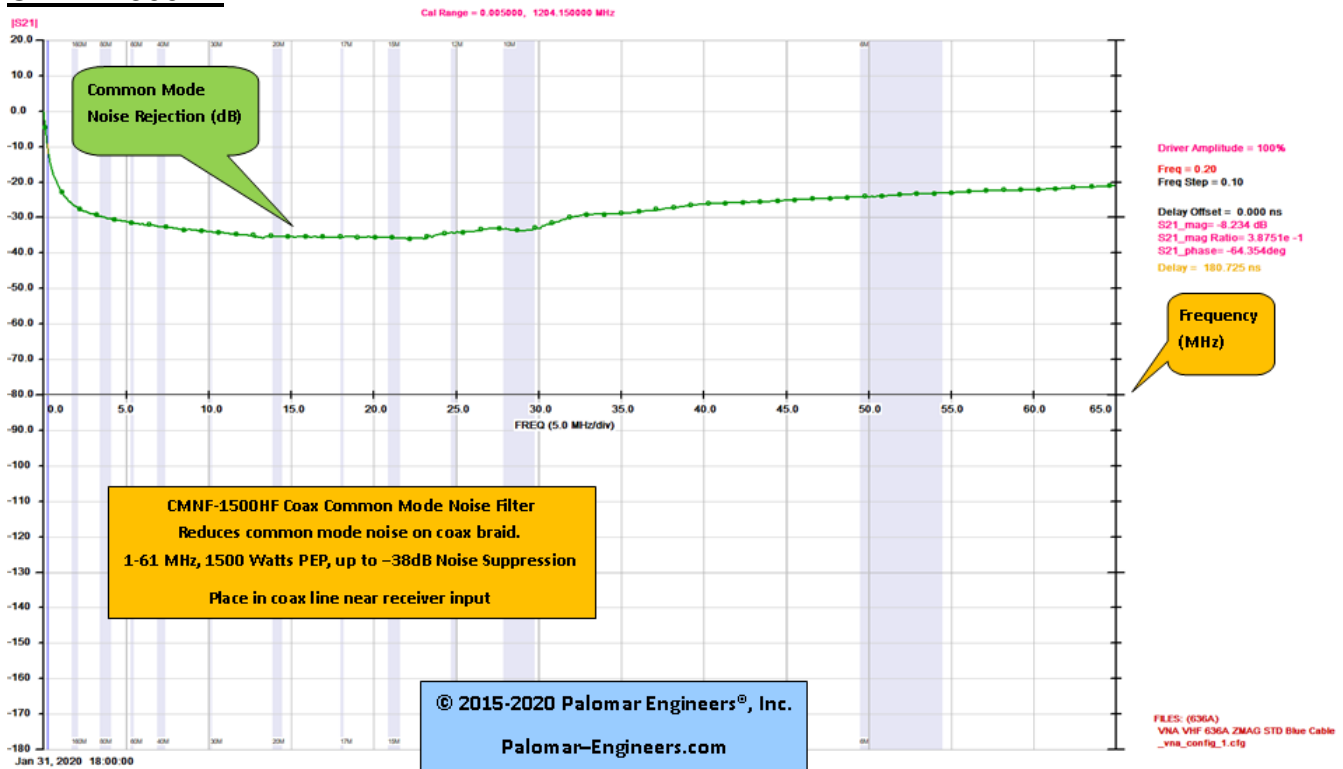
CMNF-1500 LF (200 KHz – 10 MHz, -20-38 dB CMRR)



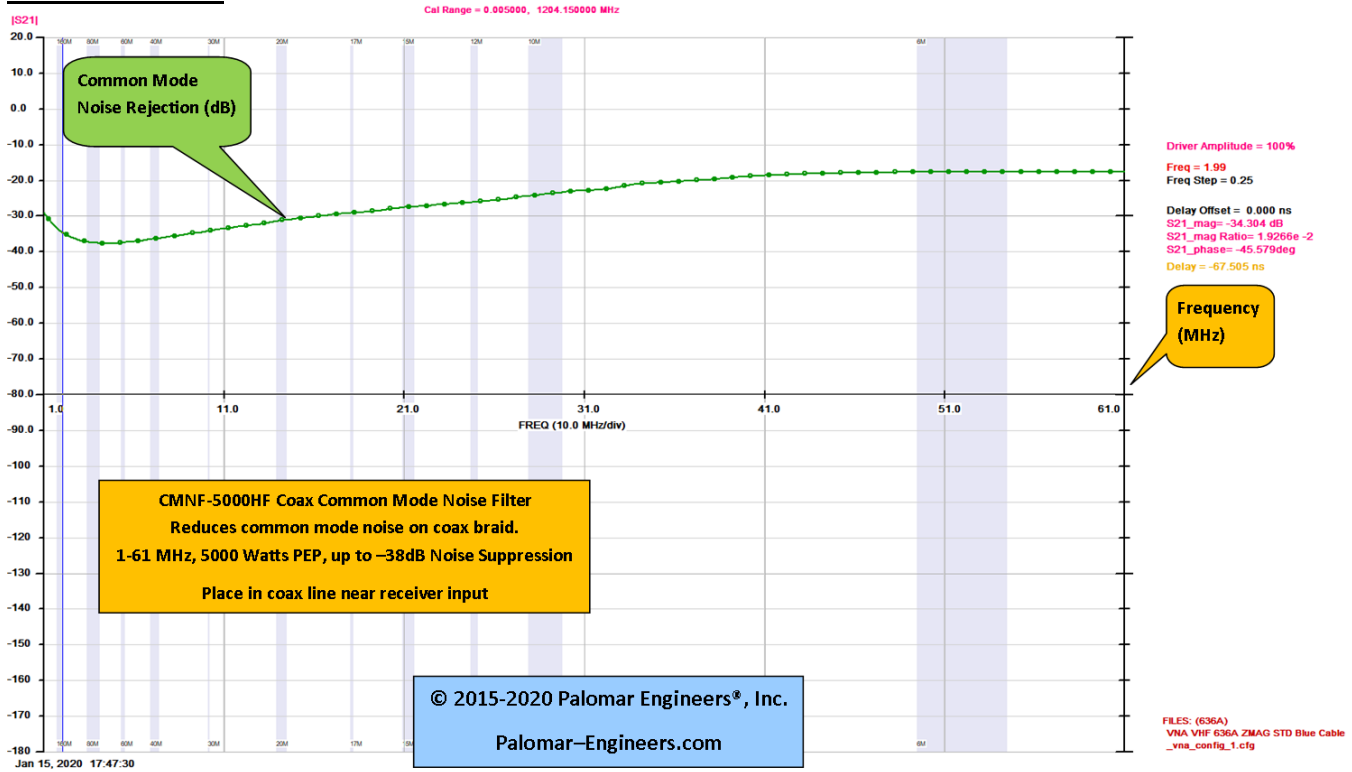
CMNF-5000LF/CU-1-5000LF



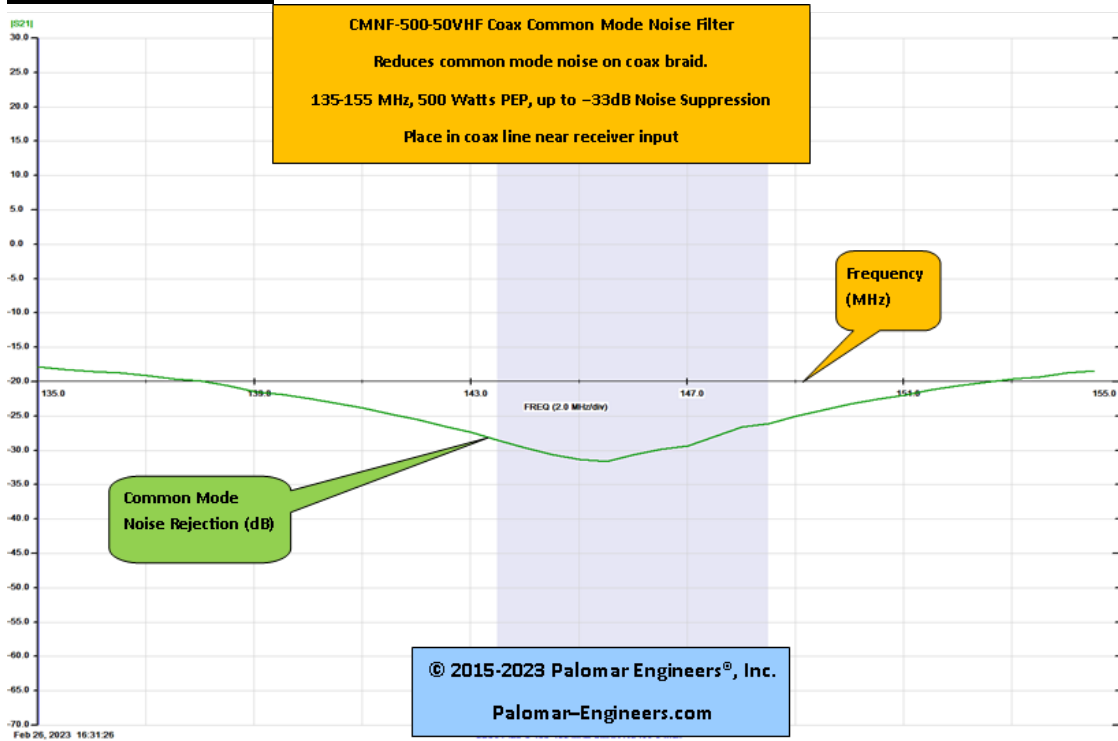
CMNF-1500HF



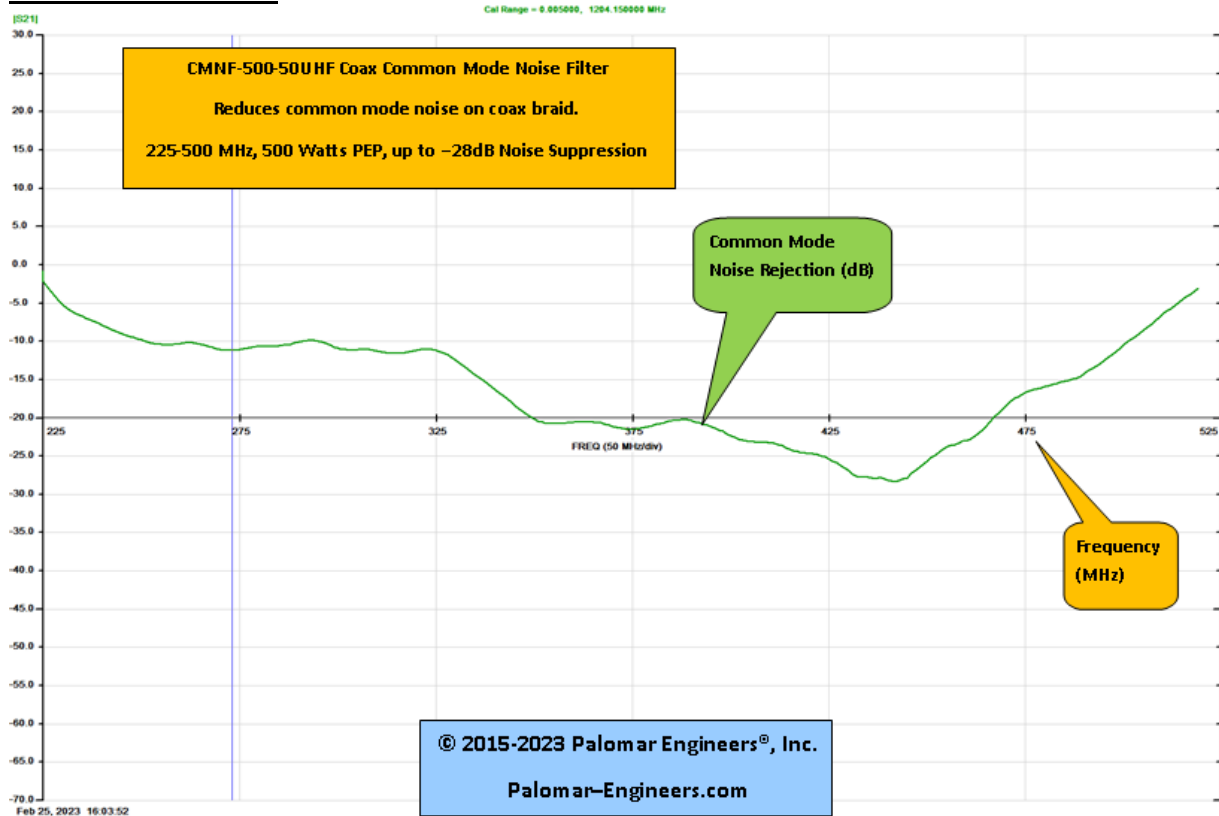
CMNF-5000HF



CMNF-500-50VHF



CMNF-500-50UHF



Do you have common mode noise on your coax?

Make this simple test to find out.



Coax Center Conductor Only—measure noise level



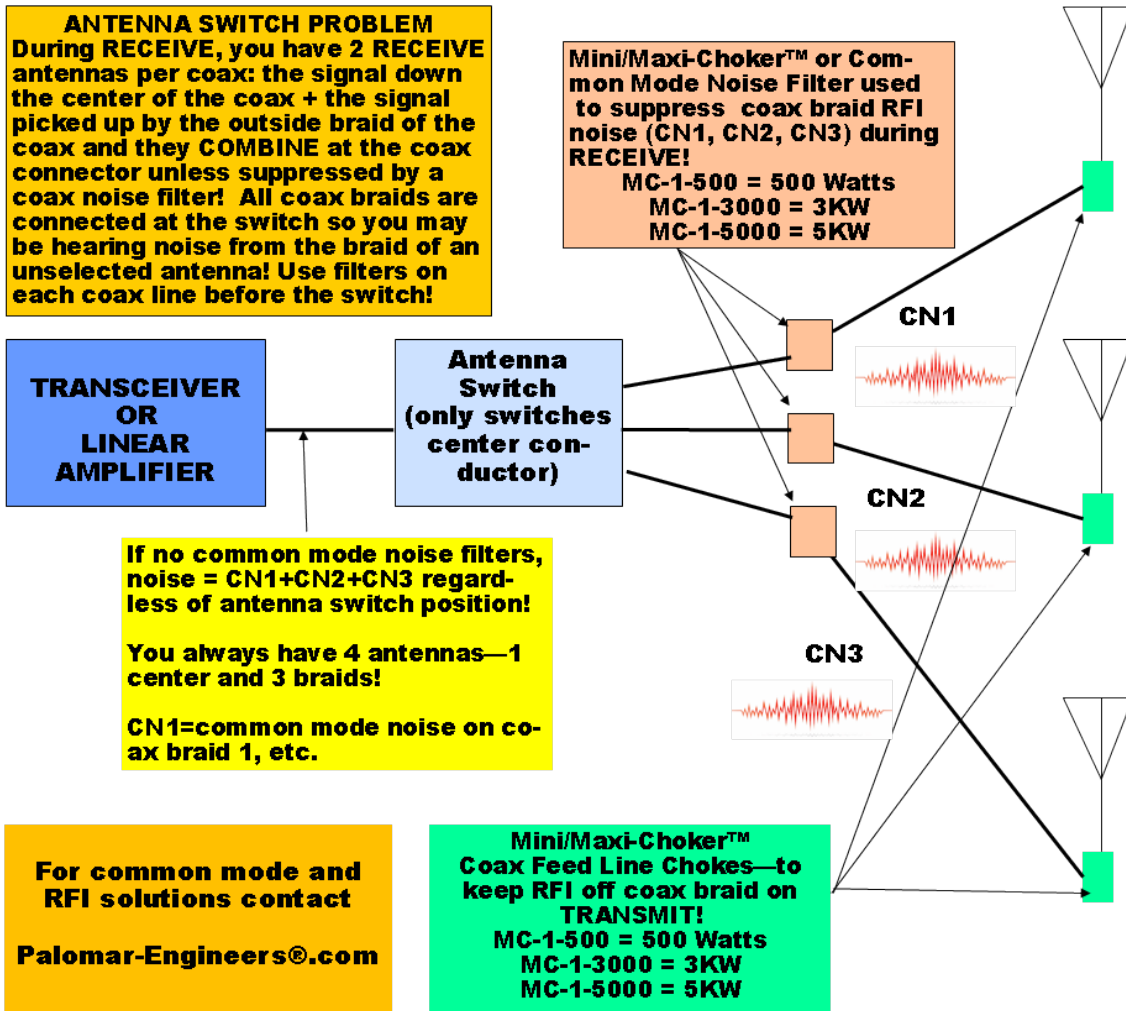
Coax Center Conductor and outer shield — measure noise level. If higher, then you have common mode noise

1. Remove the coax connector and measure the noise level.
2. Now insert the coax connector CENTER CONDUCTOR ONLY into the SO-239 antenna input and measure the noise level (it should be higher and include possible signals)
3. Now connect the OUTER SHELL of the coax connector to the antenna input and measure the noise level. If it is higher you have common mode noise and the common mode noise filter will help suppress this noise which is carried on the outside of the coax braid (acting as a second receive antenna).

Common mode noise suppression with the CMNF series of filters is typically 25-36 dB which is equivalent to 4-6 "S" units on radios with 6 dB/"S" unit or may be more on radios with 3dB/"S" unit.

Note for antenna switch users, perform the above test on each antenna coax lead separately to determine if that particular antenna braid is contributing noise to the receiver – use a coax noise filter on the antennas that have common mode noise.

The Antenna Switch Problem and installation of coax noise filters



Check www.Palomar-Engineers.com for latest product updates.