Z5100A

COMMON MODE CHOKE

Assembly and Operation Manual

Version 1.0 March 2011

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Model Z5100A Common Mode Choke

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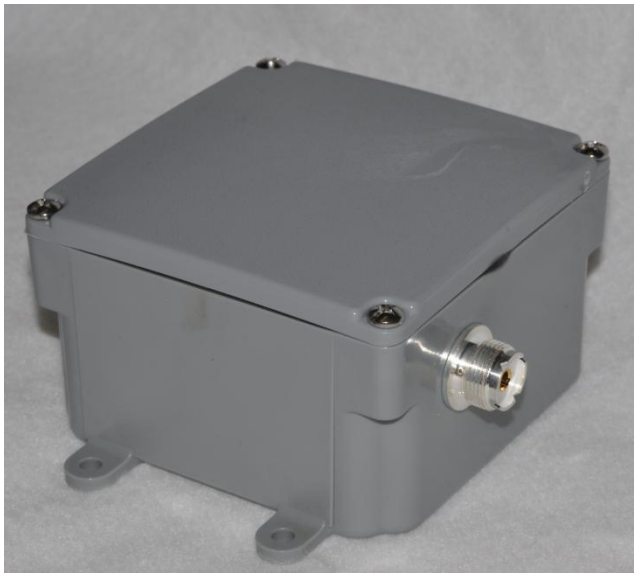
Under no circumstances is Clifton Laboratories liable for damage to your equipment connected to the Z5100A resulting from use of the Z5100A, whether in accordance with the instructions in this Manual or otherwise.

General Information and Specifications

Description

The Z1500A is not available as a kit from Clifton Laboratories, but rather is provided as a detailed design for interested parties to duplicate. Specifications are based upon several prototype units built at Clifton Laboratories and similar performance should be possible if the design provided in this manual is followed.



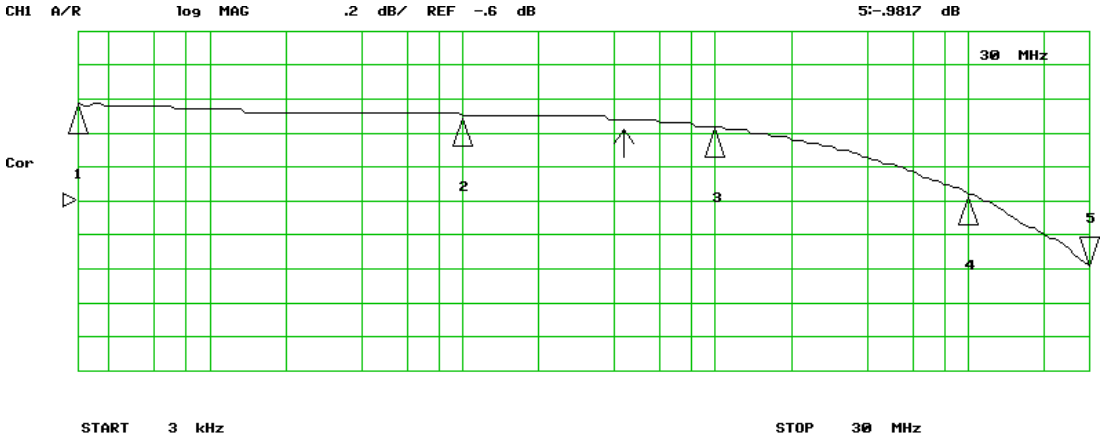
The Z5100A Common Mode Choke decouples unwanted signals that might propagate along the outer surface of coaxial cable. When used with an active antenna, such as Clifton Laboratories' Z1501D, noise and other unwanted signals from digital equipment can be coupled onto the coaxial cable shield and be coupled into the active antenna. (The recommended location and installation of common mode chokes is covered in the Z1501D manual.)

The Z5100A is housed in a standard weatherproof plastic electrical junction box, sealed with a gasket. The Z1500A may be used indoors or outdoors.

The Z5100 has two connections; either may be used as the input or output. UHF, BNC, F, SMA and N connectors may be used. Note, however, the thickness of the suggested plastic enclosure may require "deep reach" type connectors.

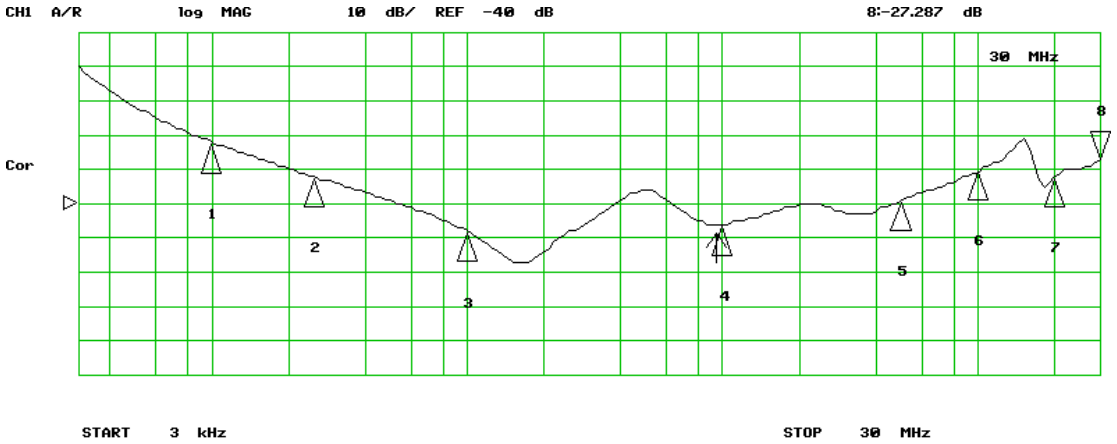
Parameter	Value
Dimensions	(Width, Depth, Height) Approx. 4" x 4" x 2.4 inches, excluding mounting tabs and connector projections (100mm x 100mm x 61mm) thermoplastic, with integral gasket. Weight approx. 22 ounces (460 grams).
DC Ratings	Voltage not to exceed 28V, AC or DC. Current to remote device not to exceed 250 mA.
Maximum RF Power	The Z1203A is designed to be used with typical receiver power levels and should not be used to inject DC voltage into a transmitting circuit.
Frequency Range	20 KHz – 30 MHz; usable to 10 KHz - 100 MHz
Insertion Loss	Maximum loss 1.0 dB over range 20 KHz – 30 MHz.
Common Mode Rejection	Typically 30 dB between 25 KHz and 20 MHz, 25 dB to 30 MHz, with respect to 50 ohms.
Connector Types	UHF, BNC, F, SMA, N.

INSERTION LOSS VERSUS FREQUENCY



N	STIMULUS	val
1	3 kHz	-.0295 dB
2	100 kHz	-.0902 dB
3	1 MHz	-.1646 dB
4	10 MHz	-.5526 dB
5	30 MHz	-.9817 dB

COMMON MODE REJECTION



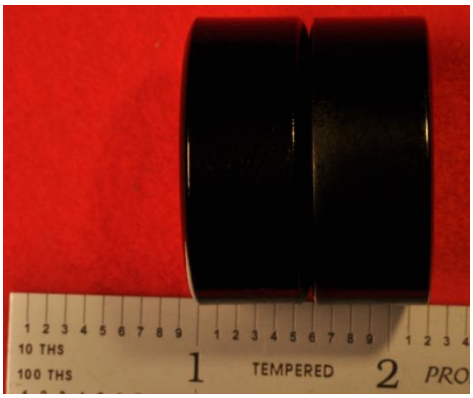
N	STIMULUS	val
1	10 kHz	-22.162 dB
2	25 kHz	-32.115 dB
3	100 kHz	-48.253 dB
4	1 MHz	-45.885 dB
5	5 MHz	-38.976 dB
6	10 MHz	-30.358 dB
7	20 MHz	-32.120 dB
8	30 MHz	-27.287 dB

ASSEMBLY

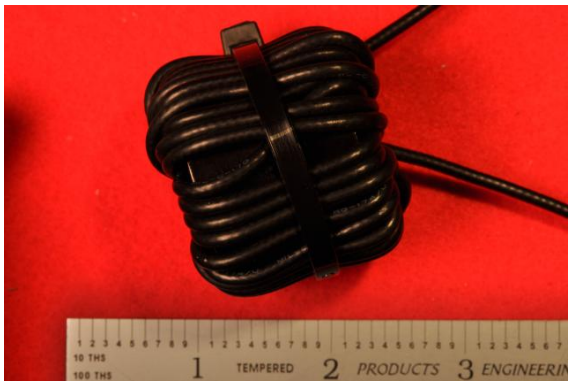
Appendix B contains a complete parts list for the Z1500A and their suggested source. These are NOT available from Clifton Laboratories.

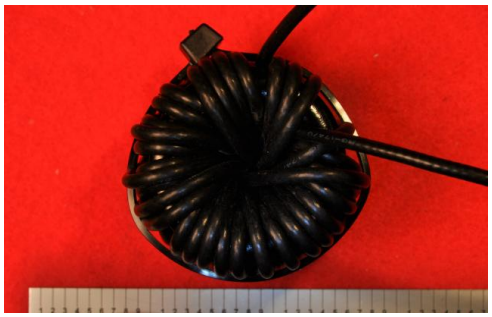
Assembly Process:

1. Glue the two 40T1417-10H cores together with "super glue" (cyanoacrylate based glue) to form a double thickness core. Allow a few minutes for the adhesive to cure.



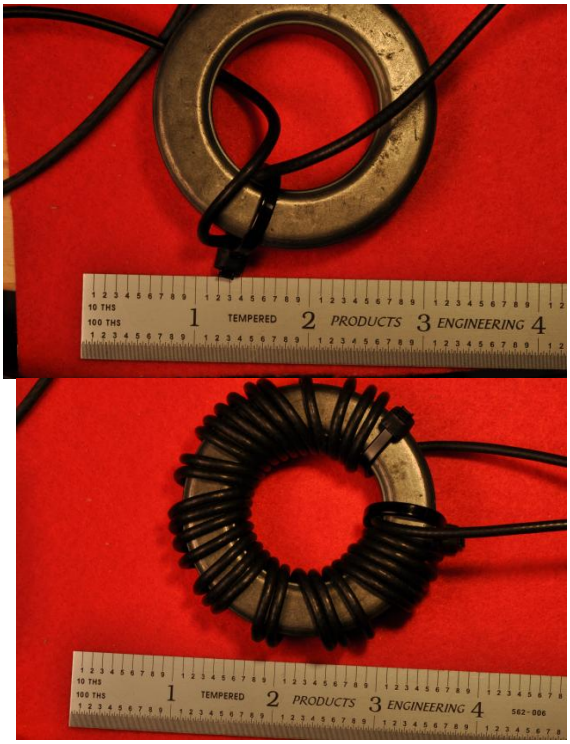
2. Cut 26 ft (8.0m) of RG-174 coaxial cable. Wind approximately 33 to 35 turns onto the double core assembled in step 1. Allow 10 inches of RG-174 to extend on the starting end. Secure the RG-174 cable to the core with a 7.5" tie-wrap. Do not over tighten the tie-wrap as over time excess compression may cause the center conductor to migrate and short to the shield. If you cannot wind as many as 33 turns, wind as many as possible. When wound, the center opening will be filled with the RG-174 cable.





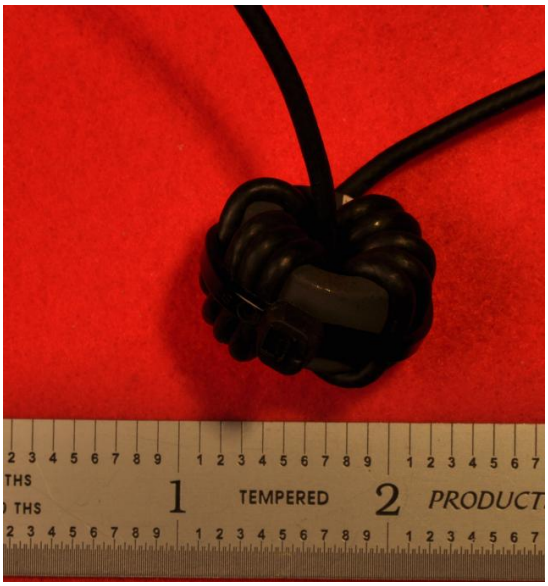
3. Wind a 30 turns (single layer) of turns on the 2631803802 (FT240-31) core.

   Allow about 5 inches of coaxial cable between the end of the dual stack core winding and starting the FT240-31 winding.
   Secure the winding start and finish with a 6” tie-wrap.

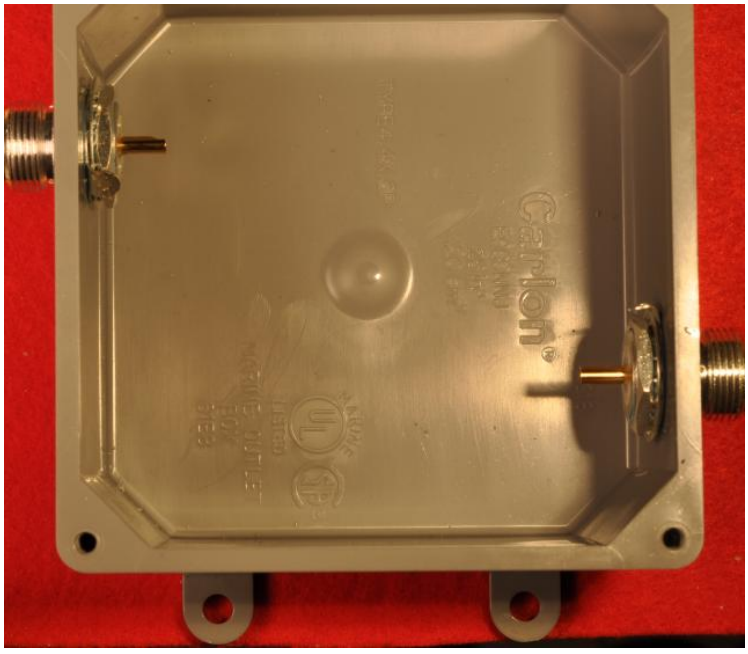


4. Wind 20 turns (single layer) on the 5943002701 (FT140-43) core. Allow about 5 inches of coaxial cable between the end of the FT240-31 core and the start of the FT140-43 winding. When completed, secure the windings with a 7.5 inch tie-wrap along the perimeter.

5. Allow 5 inches of coaxial cable between the end of the preceding winding and the start of the next core. Wind 10 turns on the remaining core, FT114-61. Secure with a tie-wrap around the perimeter.

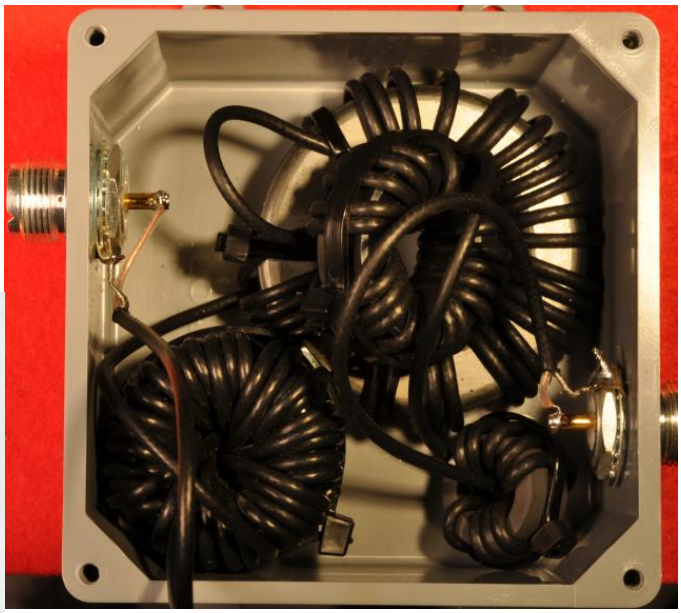


6. Insert the inductor assembly in the enclosure to see how it fits and where the most appropriate mounting points for the connectors are. I find that diagonally mounting the connectors makes the best fit, as illustrated in the photograph. When you have decided the proper connector location, drill the enclosure and mount the connectors.



7. Trim the RG-174 ends, strip and solder to the connectors.

8. If you wish to fill the enclosure to prevent accidental damage to the cores should the enclosure be dropped (ferrite is brittle), I've used "Poly Pellets" which are small pellets of polypropylene used for stuffing dolls. It can be found at most arts and crafts shops. When finished, install the enclosure's top.



APPENDIX A: PARTS LIST

The ruler shown in many of the photographs is in inches and tenths.

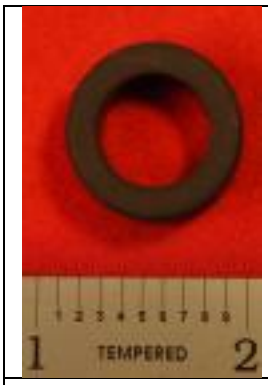
Sources:
Kits and Parts: http://www.kitsandparts.com/

Mouser: http://www.mouser.com/

DigiKey: http://www.digikey.com/

The RF Connection: http://www.therfc.com/

Photograph	Reference	Description, Source & Price	Quantity Required per Choke
	Core for L1	Steward (Laird Signal Integrity Products) P/N 40T1417-10H DigiKey catalog no.: 240-2537-ND Approximate Price: US$ 3.50 **NOTE: 2 of these are required for each choke**	2
	Core for L2	Fair-Rite P/N 2631803802 FT240-31: Kits and Parts Approximate Price US$ 10.00 Mouser catalog no.: 623-2631803802 Approximate Price: US$ 7.00	1
	Core for L3	Fair-Rite P/N 5943002701 FT140-43: Kits and Parts Approximate Price US$ 5.00 for two pieces Not currently stocked by Mouser or DigiKey.	1

	Core for L4	Fair-Rite P/N 5961001001 FT114-61: Kits and Parts Approximate Price US$ 6.00 for 5 pieces. Not currently stocked by Mouser or DigiKey.	1
No photo	None	RG-174 coaxial cable The RF Connection PN RG-174/U Approximate Price $15 per 100 ft. DigiKey PN C1156-100-ND Approximate Price $41 per 100 ft. Mouser PN 566-8216-100 Approximate Price $64 per 100 ft.	Approx. 26 feet per choke
Hardware and Connectors			
	None	Cable tie, black nylon, 7.5 inches (190mm) long	2
	None	Cable tie, black nylon, 6 inches (150mm) long	
No Photo	J1, J2	Coaxial connectors, as desired. The RF Connection is a good source	2
Enclosure		Home Depot, electrical department. Weatherproof plastic junction box Manufacturer: Carlon P/N E989NNJ Nominal dimensions 4” x 4” x 2” weatherproof with gasket and captive screws. Approximate Price $6.00 to $8.00 depending on source.	1