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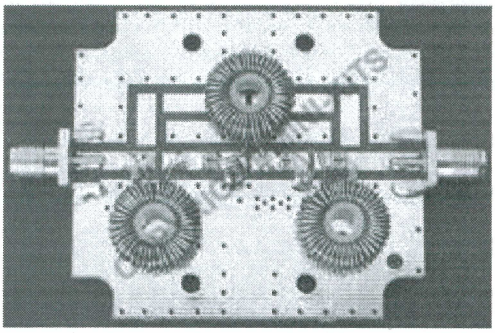
40M BAND PASS FILTER

Rev2

SPECIFICATIONS: EME184-BPF7-40M

Filter Type:	7th Order Chebychev Band Pass
Centre Frequency:	7.150MHz
Bandwidth:	-3dB 770kHz
Insertion Loss:	<1.2dB
IF Rejection at 9MHz:	>46dB
Return Loss:	>20dB at 7.15MHz
RF Power:	10 Watts minimum
Kit Webpage:	**www.minikits.com.au/eme184**



DESCRIPTION: The 40M band pass filter is a 7th order Chebychev design that has been designed as a front end filter to provide image rejection to receivers from strong out of band signals. The filter has been modelled on the PA3AKE design, but has been made more compact by using smaller components at the expense of some reduced inter-modulation performance.

RF CIRCUIT: Refer to the circuit diagram. The design uses a 50ohm strip line printed on double sided FR4 PCB material. Low loss ceramic NPO capacitors have been used, along with wire wound high Q inductors to reduce RF losses.

CONSTRUCTION:

1. To make construction easier, the PC Board supplied is a professionally made plated through hole board. To assist construction, especially winding and mounting the 3 coil inductors, please refer to the PC board overlay diagram and the Kits webpage. **www.minikits.com.au/eme174 filters.htm**

2. Follow the component placement and circuit diagram carefully, by checking the components before placing them onto the board. First mount the SMD chip capacitors to the board soldering one side of the capacitor to the board ,and then the other.

3. Next wind the 3 inductors using the supplied 0.4mm ECW onto the toroids. When winding the turns space them evenly around the core by the spacing shown below.

INDUCTOR	TOROID	TURNS	SPACING
9.06uH	T50-2	43t	360 deg

Then press the plastic spacers onto the toroids to hold the windings in place. **If the board is to mounted into a Hammond 1550Q enclosure, then it is suggested that the Toroids are mounted on the same side of the board as the capacitors.** Line up each of the inductors on the PC board, and cut the wires to length to suit, then strip and tin the ends with solder. **A fume extractor, and or very good ventilation should be used when tinning the wire as it is toxic.** Position and solder all 3 inductors to the board. A suitable electronics grade non acidic silicone or superglue can then be used to glue the plastic spacers to the board.

4. The board has been designed to use PCB mount connectors like the SMA33 soldered directly to the board. Other types should be avoided as it will affect the 50ohm impedance and return loss. If you are going to use the optional 1550Q enclosure, then chassis mount connectors like the SMA35 will need to be used. The use of these connectors will require a short connection to the PC board, which is fine for frequencies up to around 150MHz.

MOUNTING INTO AN ENCLOSURE:

1. Please refer to the pictures on the Kits webpage on how to mount the EME174 PC board to the Hammond 1550Q enclosure. The enclosure shields the filter circuitry from signals that could reduce the filtering performance.

TESTING and ALIGNMENT:

1. If the filter is constructed using the correct capacitor values and turns on the toroids, then it was found to be easily reproducible and required no adjustment. Moving the turns spacing has minimal affect on the filters response, but can improve the return loss if you are able to measure it.

2. If you do not have access to test equipment, then the filter can be tested by seeing how much attenuation there is outside the filters pass band by tuning the receiver and noting the reduction in signals and noise levels. There should be no reduction of signals between 7.0 and 7.4MHz

3. If you have access to test equipment then test the filter to make sure that it has <3dB loss between 6.73 to 7.475MHz and There should be at least 46dB attenuation at 9MHz, and more at higher frequencies.

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PARTS LIST

CAPACITORS

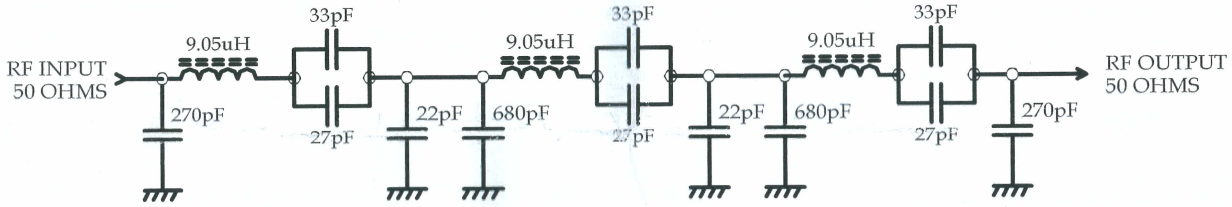
3 x 22pF	SMD 0805 NPO 50v **(1 spare)**
4 x 27pF	SMD 0805 NPO 50v **(1 spare)**
4 x 33pF	SMD 0805 NPO 50v **(1 spare)**
3 x 270pF	SMD 0805 NPO 50v **(1 spare)**
3 x 680pF	SMD 0805 NPO 50v **(1 spare)**

MISCELLANEOUS

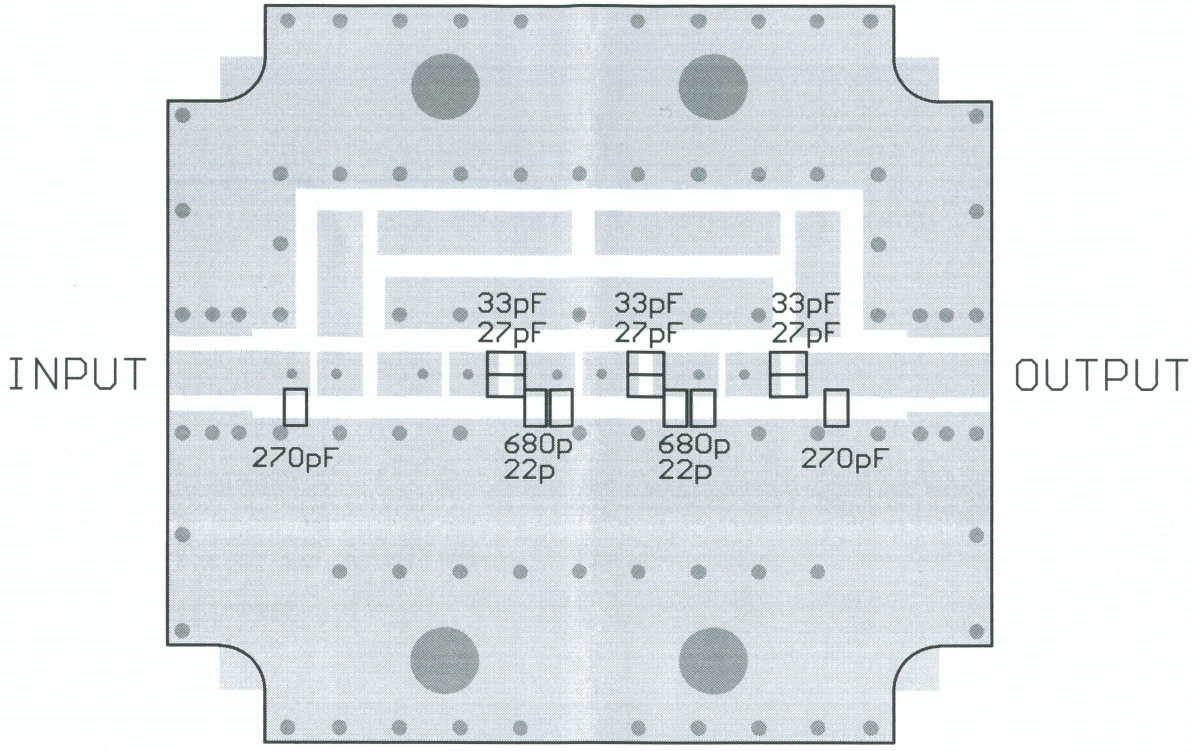
1 x PC Board	EME184
1 x Instructions	EME184-BPF7-40M
1 x 0.4mm ECW	210cm Length (cut into 3 lengths)
3 x T50-2	Micrometals Toroid
3 x INSULATOR10	M4x5x8.2mm Nylon

OPTIONAL HARDWARE KIT (FILTER-HW KIT)

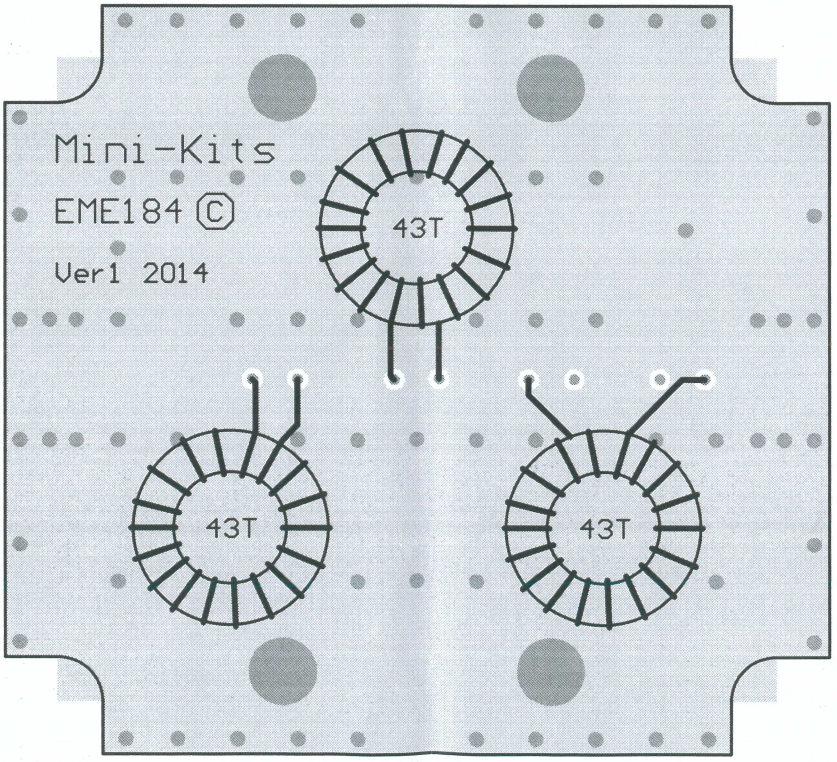
2 x SMA35	PCB Mount SMA Female
1 x ENCL03	Hammond 1550Q Enclosure
4 x PP-M3x6-NB	M3x6mm Pan Philips Screw
4 x CS-M3x6-ZS	M3x6mm Countersunk Screw
4 x PS-M2.5x6-ZS	M2.5x6mm Pan Slot Screw
2 x EYE-M3-A	M3 Solder Eyelet Lug
4 x N-M2.5-ZS	M2.5 ZS Nut
4 x SPA-M3x8-A	M3x8mm Spacer
4 x WSP-M3-NS	M3 Shakeproof Washer
2 x WCS-M2.5-NB	M2.5 Shakeproof Washer



TOP OVERLAY EME184-BPF7-40M



BOTTOM OVERLAY EME184-BPF7-40M



TORIODS ARE ALL T50-2

UPDATED 15/1/2015