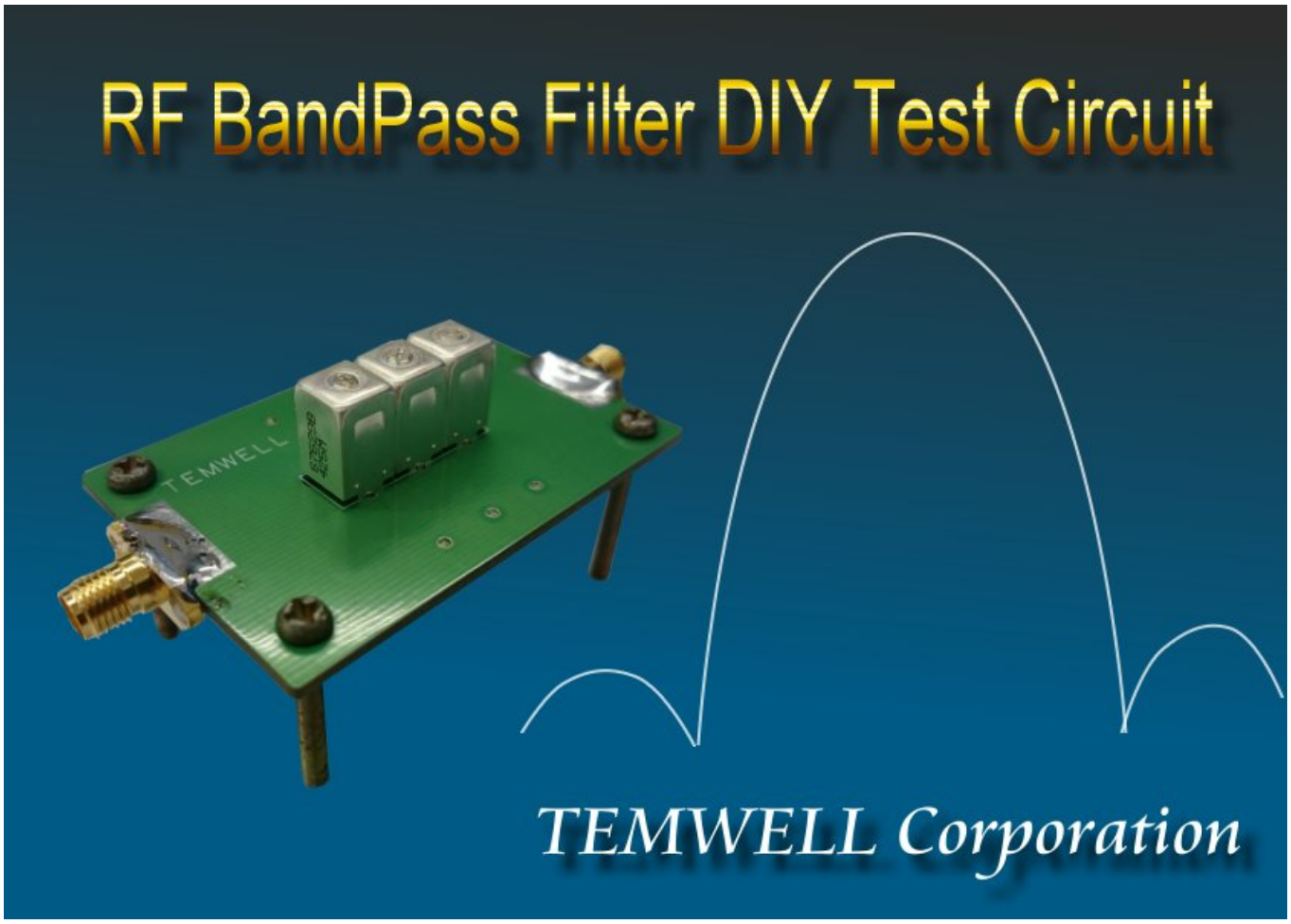
DIY Testing Circuit Kit



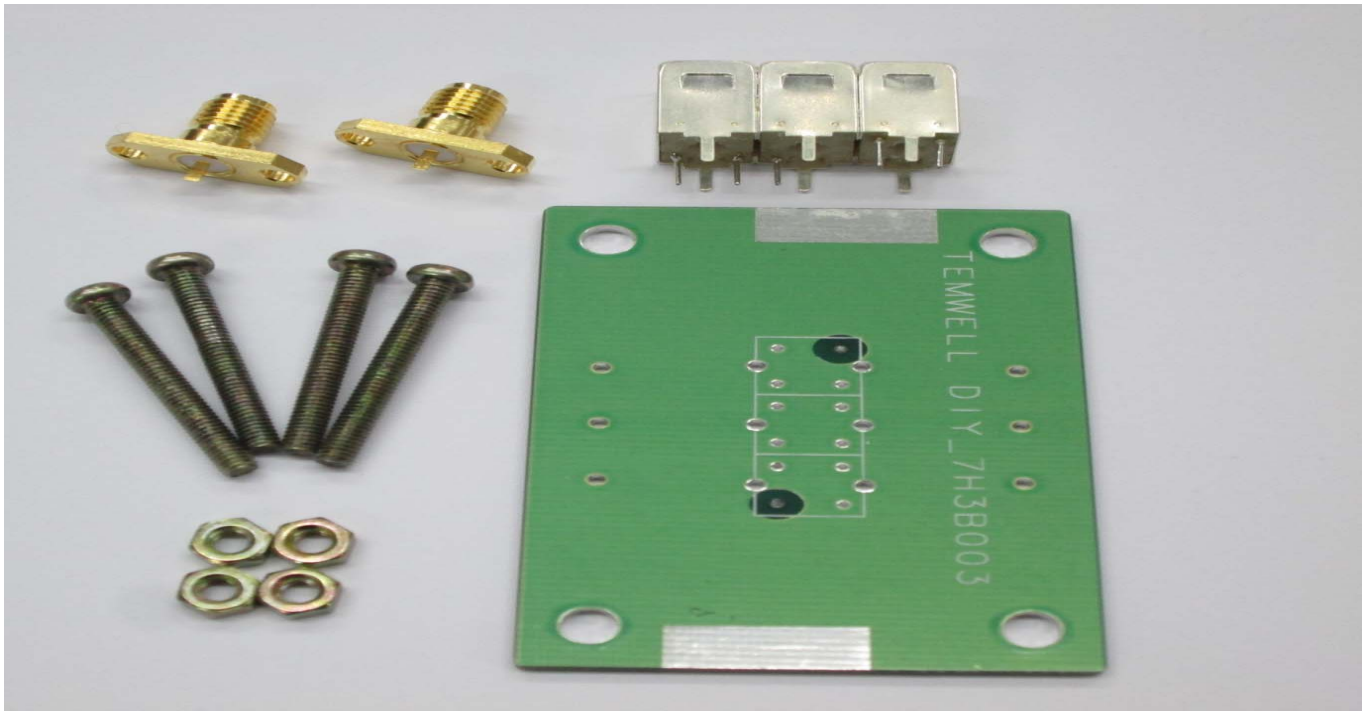
Operating Instructions

a. Purpose

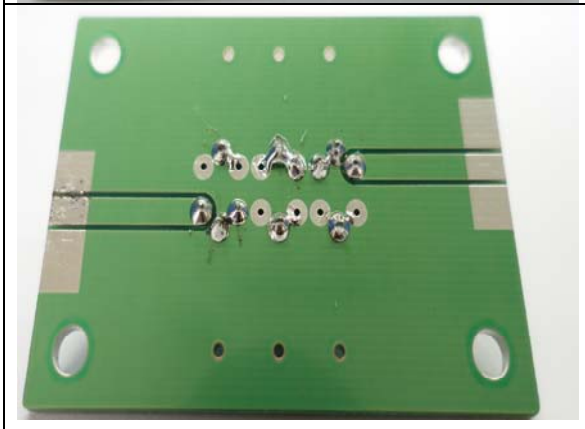
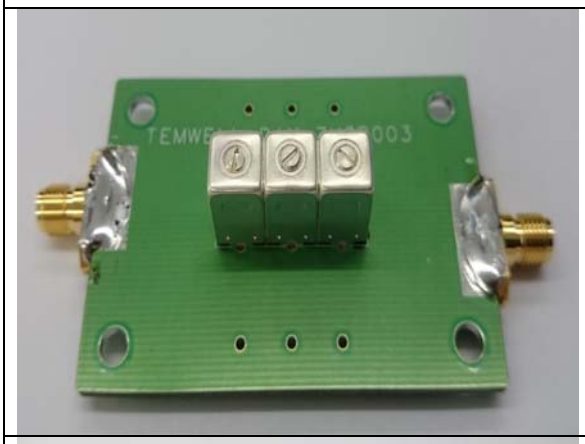
Through Temwell RF BandPass Filter DIY Test Circuit Kit learning how to measure the five parameters of helical filter, including Center Frequency (Fo), Bandwidth (BW), Rejection (Attenuation), Insertion Loss (IL) and Return Loss (RL). Besides learning how to install and weld helical filter, you will also learn the characteristics of helical filter and the ability of adjust screw to change the center frequency.

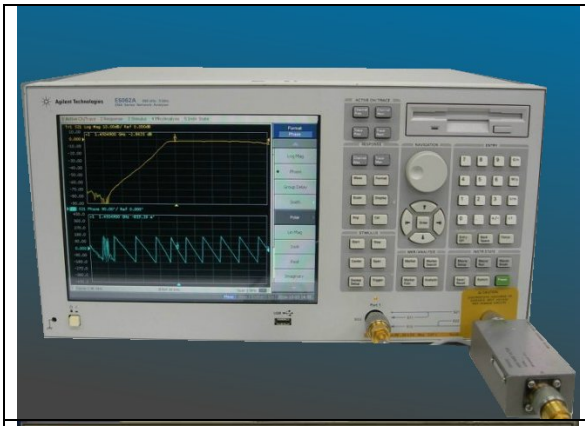
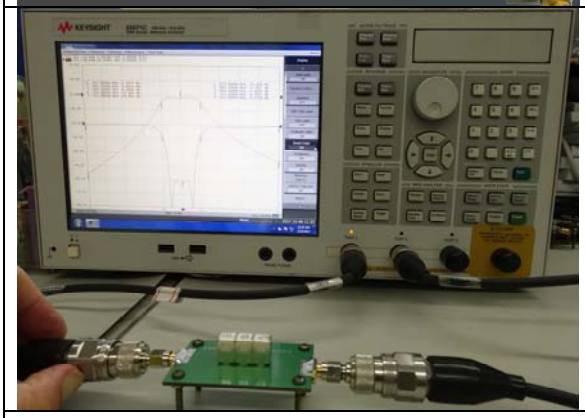
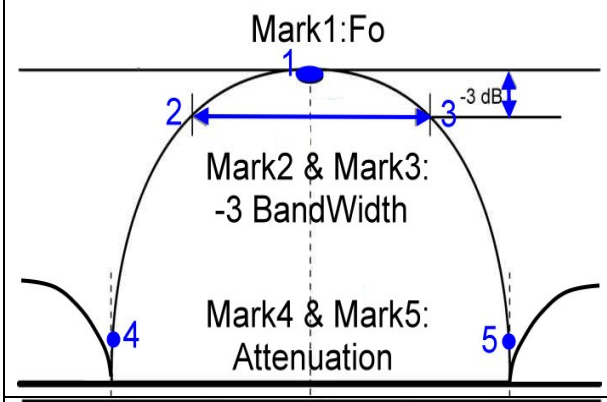
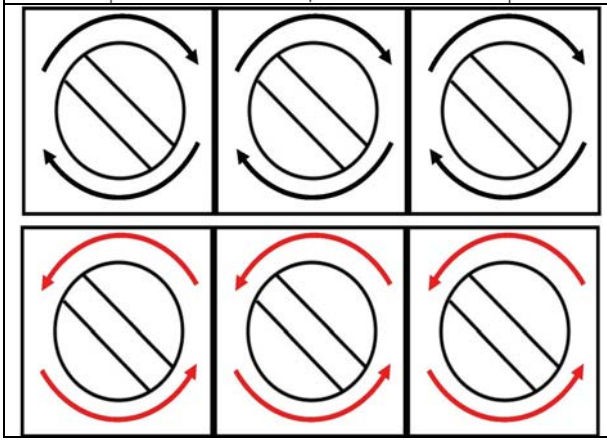
b. Main Unit

A. Triple Tuning Helical Filter (B TYPE) x 1
(Choosing one B type Helical Filter from Temwell standard Catalog, e.g. P/N: TT67629B-425M)
B. Helical Filter B Type Pin Position PCB (4 x 6cm) x 1
C. SMA Connector x 2
D. Filter Screw for tuning x 3
E. Long Screw as Kit pillar x 4



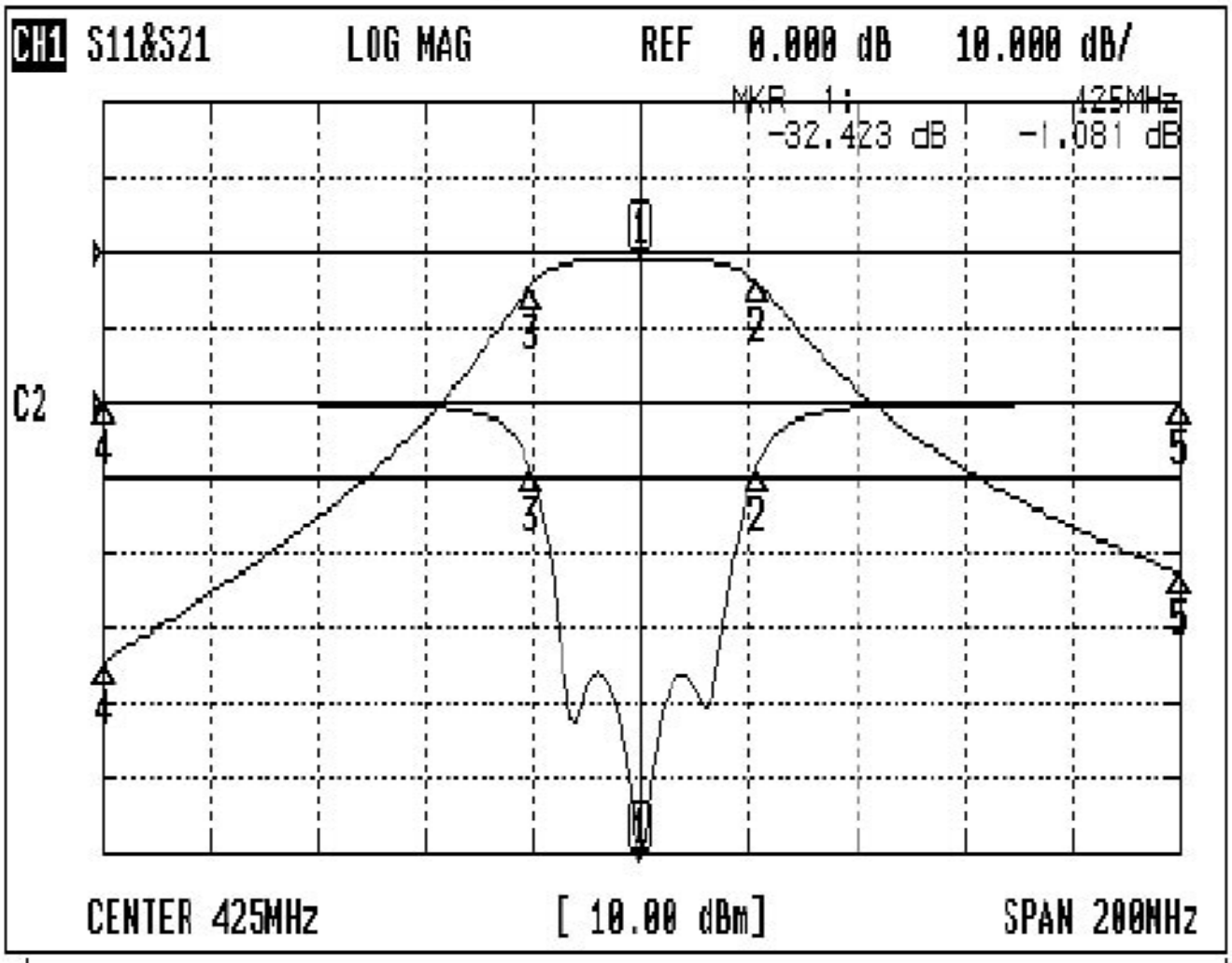
c. DIY Test Circuit Kit Installation

	1. Insert Helical Filter into PCB component side (PCB logo face up). Please pay attention to whether shell feet and pin was tight inserted into PCB hole.
	2. Turn PCB to the back (solder side). Melting solder wire with soldering iron. Then solder shell feet and pin in circuit diagram of PCB. (Note: The soldering temperature should not be too high. Soldering time should not take too long. Soldering contact about 1-2 seconds.)
	3. Soldering SMA connector at the place marked on PCB. (Note: In order to prevent cold solder when grounding soldering, adhere tin as much as possible on the solder side between connector and PCB.)
	4. Long screws and hexagon nuts lock into four corners of PCB.

	5. Calibration Network Analyzer and make measurement settings. (Network Analyzer Calibration method please refer to our website at www.temwell.com)
	6. Connect DIY Test Circuit to Network Analyzer to make measurements.
	7. Set up Network Analyzer to measure parameters of Center Frequency (Fo), Bandwidth (BW), Rejection (Attenuation), Insertion loss (IL) and Return Loss (RL).
	8. Tuning all screws with same direction, distance, angle and the numbers of times. The curve will shift from the original Center Frequency to the one you want. The filter can be adjusted +/- 5MHz.

d. Determine Helical Filter measurement result

Through Network Analyzer to measure the values of Helical Filter Center Frequency (Fo), Bandwidth (BW), Rejection (Attenuation), Insertion Loss (IL) and Return Loss (RL). It will show the following performance under normal circumstances.



CH1 MARKER LIST

1:	425.000MHz	-32.423 dB	-1.081 dB
2:	446.666MHz	-4.280 dB	-4.108 dB
3:	404.833MHz	-4.654 dB	-4.108 dB
4:	325.000MHz	-0.064 dB	-54.506 dB
5:	525.000MHz	-0.105 dB	-42.813 dB

e. Troubleshooting

Situation 1: Check whether you have completed Network Analyzer Calibration.

Solution: Please do calibration procedures in accordance with “How to make calibration”.

Situation 2: Check whether Helical Filter is short circuit.

Solution: Please check each part of DIY test circuit kit was solder connection completed. If there is any void, please solder again.

Situation 3: Check whether connectors are properly soldered.

Solution: Please check each connector is properly connected to PCB. If there is any void, please solder again.

Situation 4: Check whether Helical Filter is installed in the correct direction of PCB.

Solution: Please make sure that Helical Filter is installed on the side of PCB logo face up (component side). Shell feet and pin are soldered on the circuit diagram of PCB (solder side). If not, please solder again.

Situation 5: Check whether Network Analyzer Calibration contain the loop from connectors to NA?

Solution: Please do calibration procedures in accordance with “How to make calibration”.

Situation 6: Check whether Network Analyzer has correctly setting the measuring band.

Solution: First set Center frequency +/-50MHz~100MHz, and then reset the measurement range of Network Analyzer. (Measurement range can be adjusted according to actual frequency specifications.)

f. Additional information:

-How to connect and calibration Network Analyzer properly

Step 1: Setting frequency
Step 2: Setting range
Step 3: PORT 1 connect to OPEN/SHORT/LOAD
Step 4: PORT 2 connect to OPEN/SHORT/LOAD
Step 5: PORT 1 and PORT 2 connect to TRANSMISSION
Step 6: Setting specifications
Step 7: Connect test fixture

-Understanding S Parameters

S Parameters (S11, S22, S21, S12) describe the input-output relationship between ports (or terminals) in an electrical system.

S11 represents the return loss at port 1. It is the loss of power in the transmitting terminal. The lower value, the better. Reasonable return loss results range about 25 to 40dB. Lower return loss indicates small reflection in transmission. Also know as Input Reflection Coefficient.

S12 represents the insertion loss of signal transmitted from port 1 to port 2. It is used to know how much signal is received at the receiving end. The value close to 1 (0dB) is better. Lower insertion loss indicates small loss in transmission. Also know as Forward Transmission Coefficient.

S22 represents the return loss at port 2. It is the loss of power in the receiving terminal. The lower value, the better. Reasonable return loss results range about 25 to 40dB. Lower return loss indicates small reflection in transmission. Also know as Output Reflection Coefficient.

S12 represents the insertion loss of signal transmitted from port 2 to port 1. It is used to know how much signal is received at the receiving end. The value close to 1 (0dB) is better. Lower insertion loss indicate small loss in transmission. Also know as Reverse Transmission Coefficient (isolation).