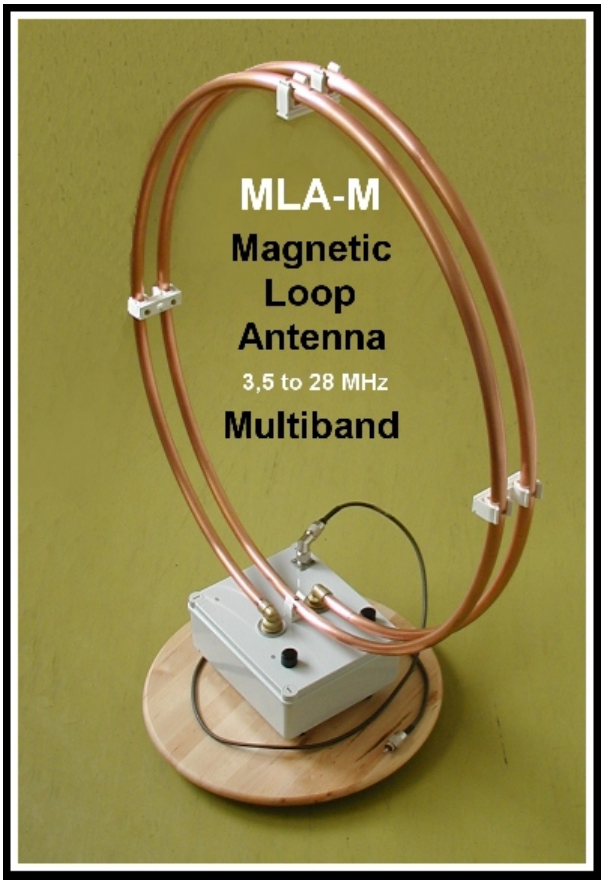
MLA-M

Magnetic Loop Antenna - Multiband



Instruction Manual

Thank you for purchasing this new product small Magnetic Loop Antenna Multiband. Manual contains important information. Please read all instructions carefully before operating the antenna.

BTV
B PLUS TV a.s.

MLA-M

Description

Magnetic Loop Antenna MLA-M supplied by the BTV corporation (http://www.btv.cz) is „plug and play" type product. Antenna is given up to the QRP service on all HF radioamateur bands except for the 160 m. In spite of the fact, that the diameter of the MLA is only 60 cm (less than 2 ft), it is possible to use this antenna with minimalistic design for communication on 8 HF bands 3,5, 7, 10, 14, 18, 21, 24 and 28 MHz.

In the case of small magnetic loop antenna you can not suppose the same efficiency in transformation of HF current into HF (electro)magnetic field as for let`s say half-wave dipole. Power loss is min. abt. 10 dB. But antenna MLA-M is supposed to be acceptable compromise which enables to carry on the radioamateur hobby, not only for portable QTH, but for example in condominium with restricted possibilities of building classic antennas, in conservation urban areas etc.

MLA-M is ideal for the communication through digital modes with sofisticated protocoles convinient for very low signals. The loss of abt. 10 dB due to using indoor antenna is in comparison with another influences of ionosphere atc. negligible.

Technical parameters

Frequency range	3,5 - 28 MHz
Input impedance	50 Ohm
Max. power	10 W
SWR after tuning	1:1; max. 1:1,2
Input connector	PL
Dimmensions	630 x 750 x 180 mm
Weight of antenna	2,6 kg
Diameter of the loop	600 mm (<2ft)

Design details

Perfect impedance adaptation of the antenna in all HF radioamateur bands from 3,5 to 28 MHz is achieved by the industrial protected solution developed by the corporation BTV. Point of such wide range of tuning of magnetic antenna is based on two-turns construction of the main antenna circuit inductivity with the possibility of partly short-circuiting see fig. 1-3.

Possible switching of the antenna

1. Mode 3,5 MHz
Loop consists of two turns, jumper J1 is switched off and the jumper J2 connecting parallel capacity is switched on, see fig. 1.

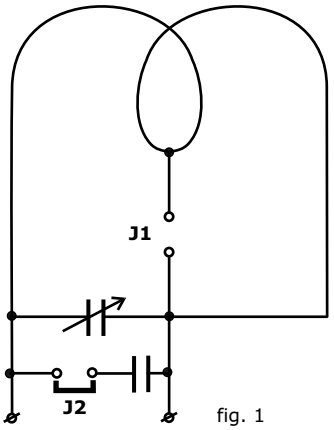


fig. 1

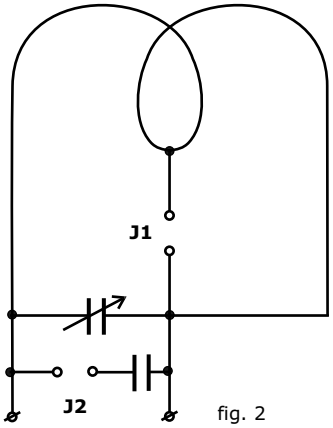


fig. 2

2. Mode 7-10 MHz
Loop consists of two turns, jumper J1 is switched off and the jumper J2 connecting parallel capacity is switched off, see fig. 2.

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3. Mode 10-28 MHz

Loop consists of one turn, the jumper J1 is switched on and the jumper J2 is switched off, see fig. 3.

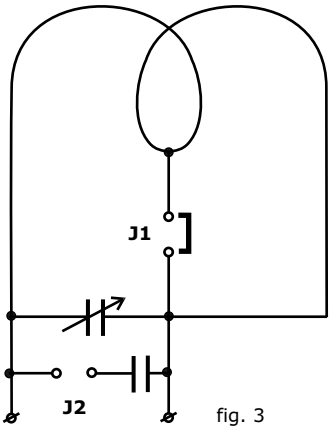
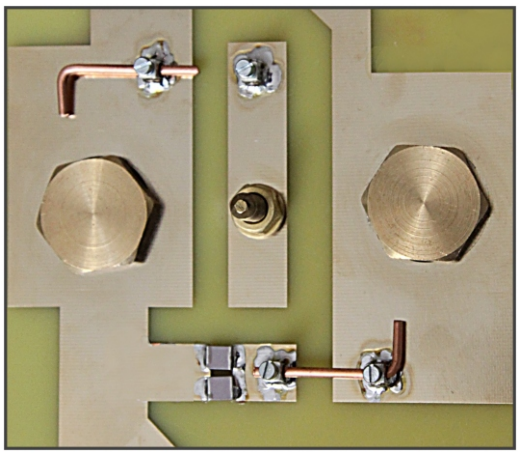


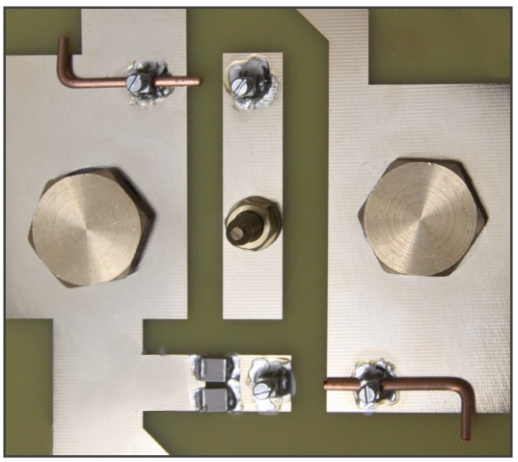
fig. 3

Unusual method of tuning of the MLA-M by means of two variable condensers does not represent any complication in case of desk-top design. Circuit works by analogous way as a classic matching circuit. This type of circuit favourably enables exact tuning of the antenna in whole range of HF frequencies and input impedance is very near to 50±j0 Ohm. For another types of feeding circuits for magnetic antenna it is in principle unpossible. Switching among low and high bands by means of mechanical switching of jumper inside the box of antenna represents in case of desktop design of MLA-M also no problem, see figs. 4-6. It is necessary to emphasize that without using SWR-meter is exact tuning not simple, at least during the start of this procedure.



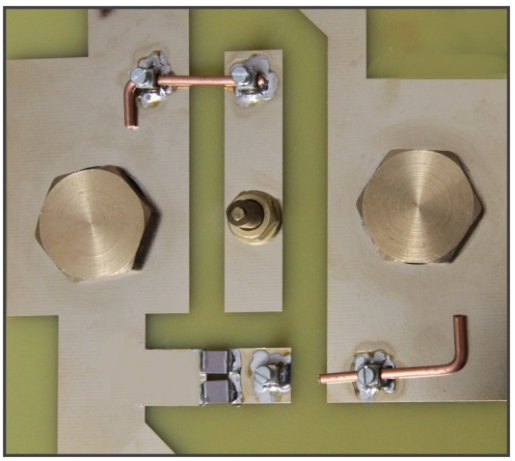
3,5 MHz

fig. 4



7 a 10 MHz

fig. 5



14 - 28 MHz

fig. 6

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Setting the antenna for the 10 MHz band is possible either in one turn or in two turns mode. We reccomend testing of both these alternatives.

Due to short circuit of one turn and different values of L/C ratio at each band the quality Q of the antenna circuit is not identical through all HF range. Testing of antenna demonstrated that it is acceptable penalty for the possibility of simple tuning in whole range of HF frequencies with SWR near to 1:1. After correct tuning the SWR ratio does not exceed value 1:1,1 see measured impedance characteristics and SWR on next figures. Typical diagrams of the parameters of MLA-M antenna measured by means of antenna analyser AA-230PRO are provided on pages 6-12.

Operation

Employment of MLA-M is very simple. For concrete band we switch proper mode by means of the jumpers see figs. 4-6. After connecting the 50 Ohm coaxial cable from transceiver we try to set strongest received signal or noise by setting both variable condensers. Then in TX regime with input max. 10 W we must find by changing the ratio of capacitance of both condensers the very small value of SWR. Due to very high quality Q of the antenna circuit, especially in mode with two turns (figs. 2 and 3) is the selectivity of the antenna so high that correct tuning changes even under the influence of closeness of operators hand a few attempts and some training will solve this possible problem.

Horizontal radiation diagramm of MLA oriented perpendicurarly towards earth see fig. 7. It shows two rounded maxima and two sharp minima (A - shaped). The depth of minimum depends very strongly on neighbour objects (instalation in wall), on the type of propagation, ionosphere etc. Diagram in horizontal plane with loop paralel to earth is ilustrated on figs. 8, 8a. Possible inclination of the loop (figs. 9, 9a) enables alternatively to obtain a few dB increase.

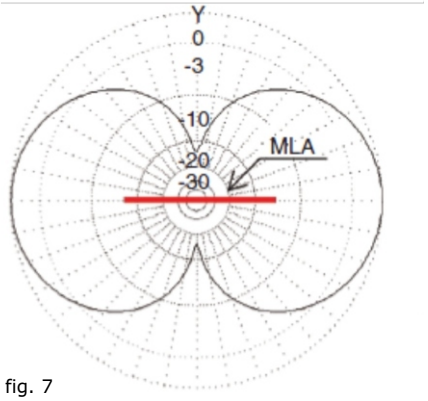

fig. 7

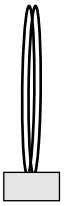

fig. 7a

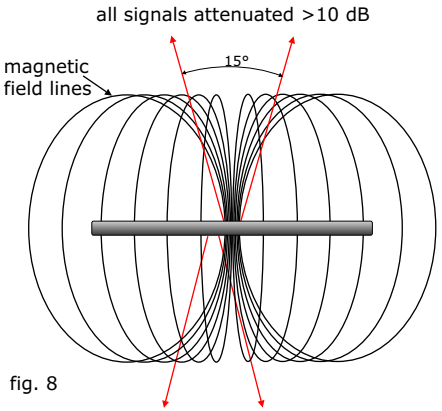

fig. 8

fig. 8a

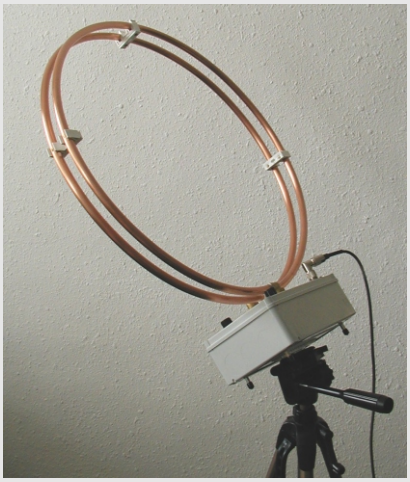

fig. 9

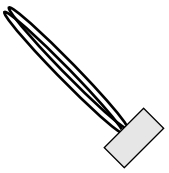

fig. 9a

Important safety warning

Antenna is predetermined for QRP operation only (power max. 10 W) and enabled indoor using. During transmission avoid any direct touch contact with „hot" parts the copper coil which may cause painfull burning smell!

The health impact of long term influence of HF magnetic field is not fully recognized, so set the proper distance from antenna. Do not try to use power higher than 10 W danger and possibility of the breakdown of some parts!

Antenna MLA-M is not constructed for outdoor usage and is not waterproof. Take it into consideration if you place it for example on the balcony etc.

Photo

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Measurement protocols

fig. 10

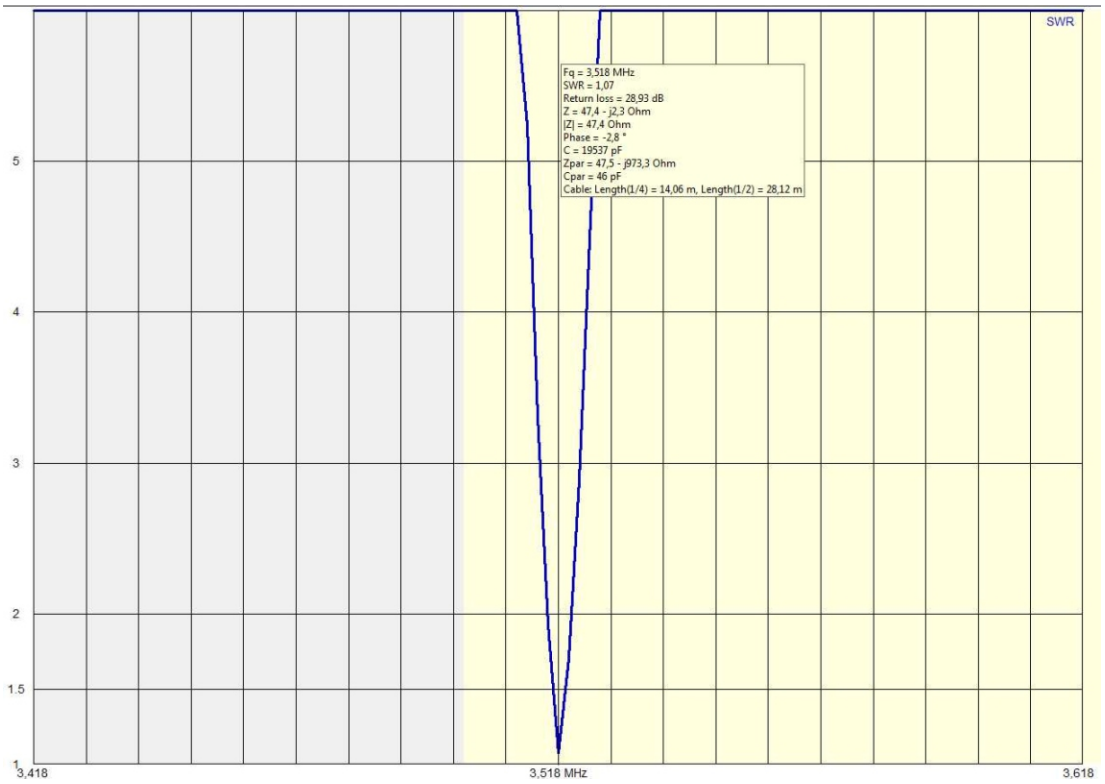
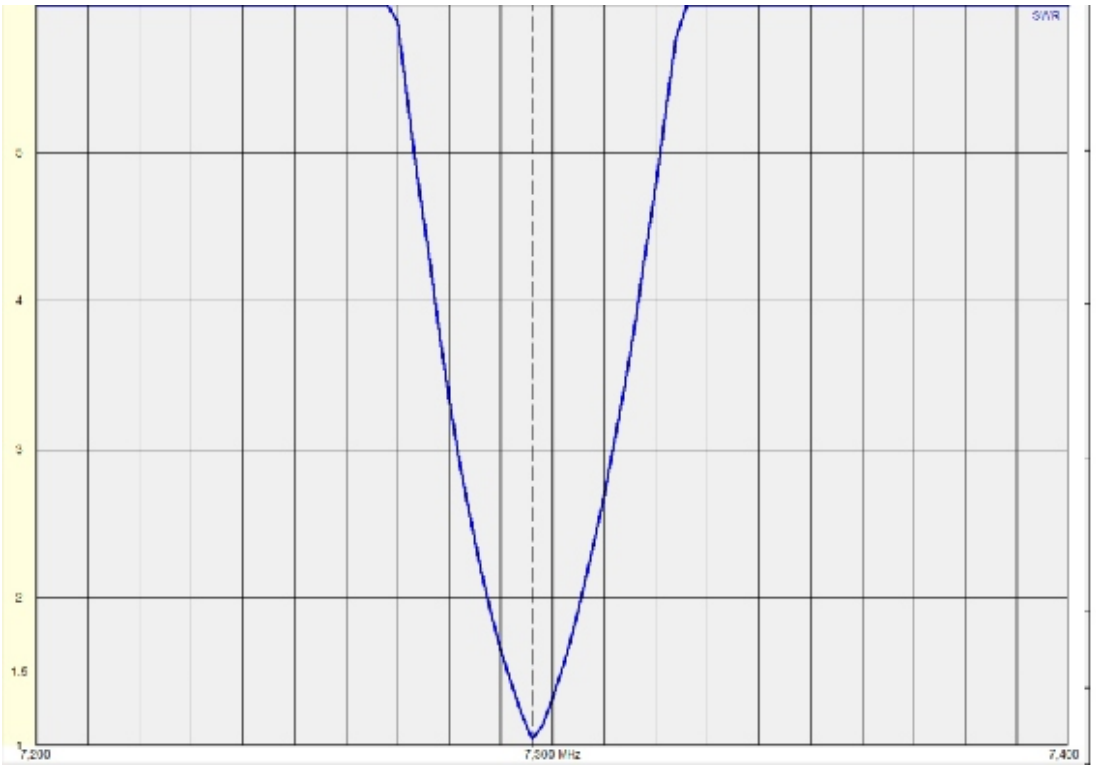


fig. 11



Measurement protocols

fig. 12

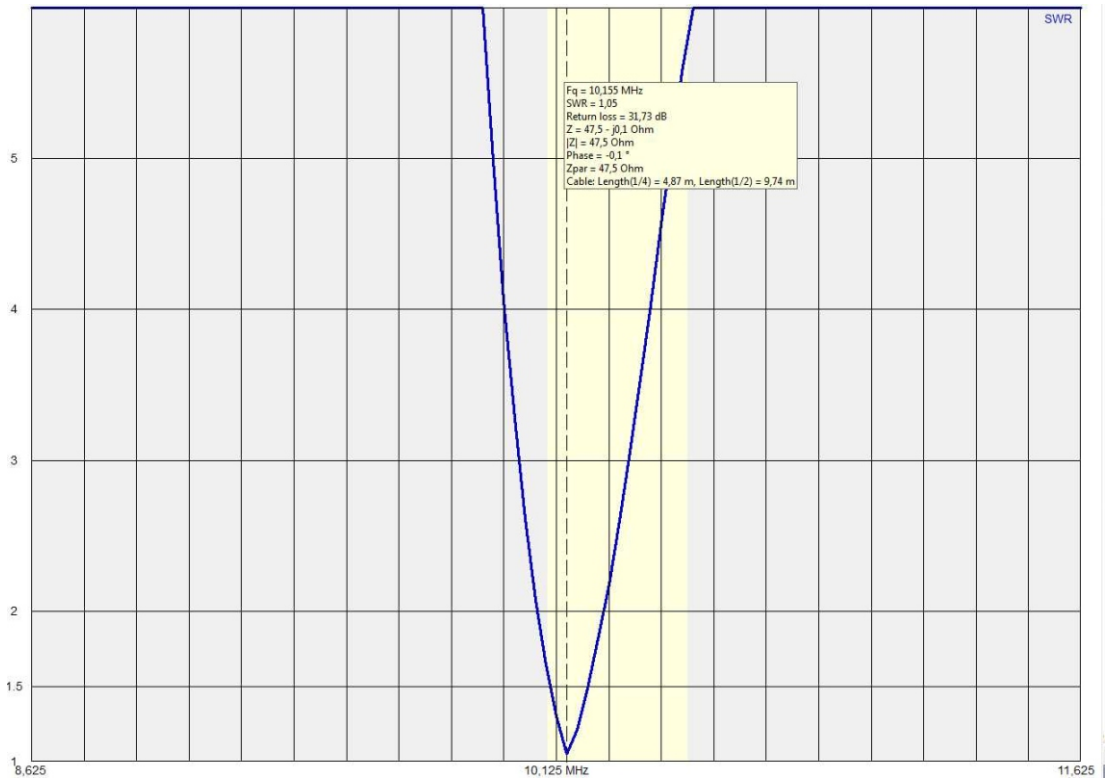
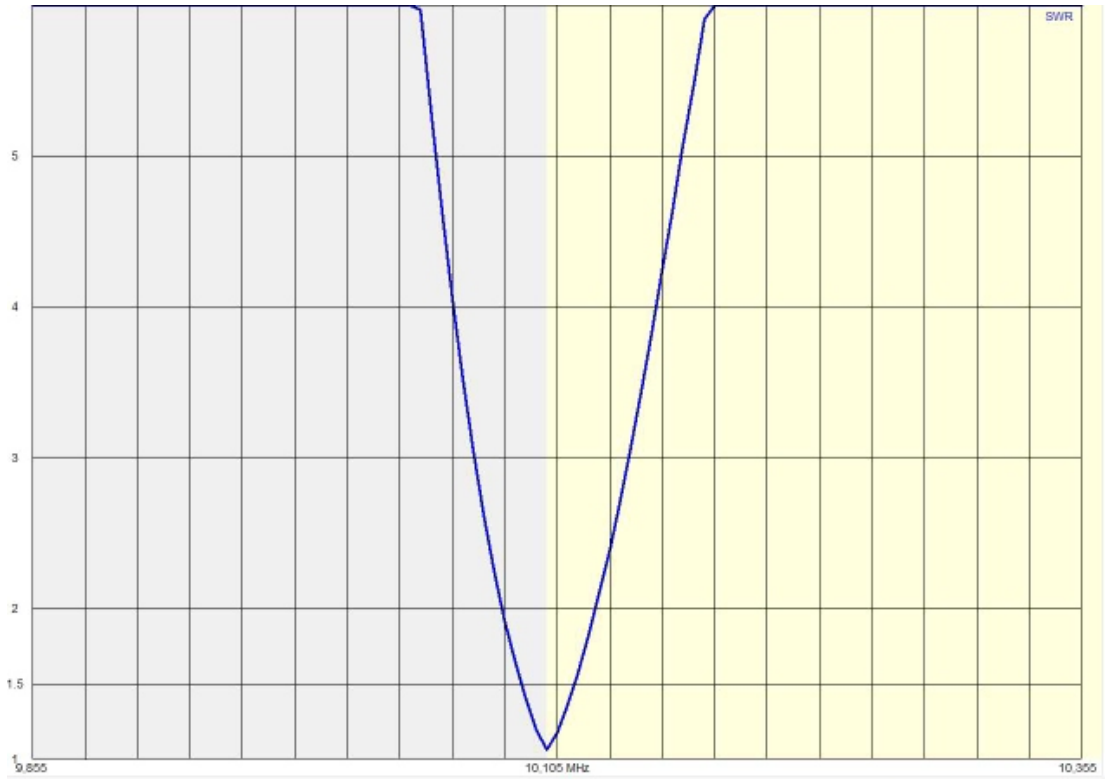


fig. 13



Measurement protocols

fig. 14

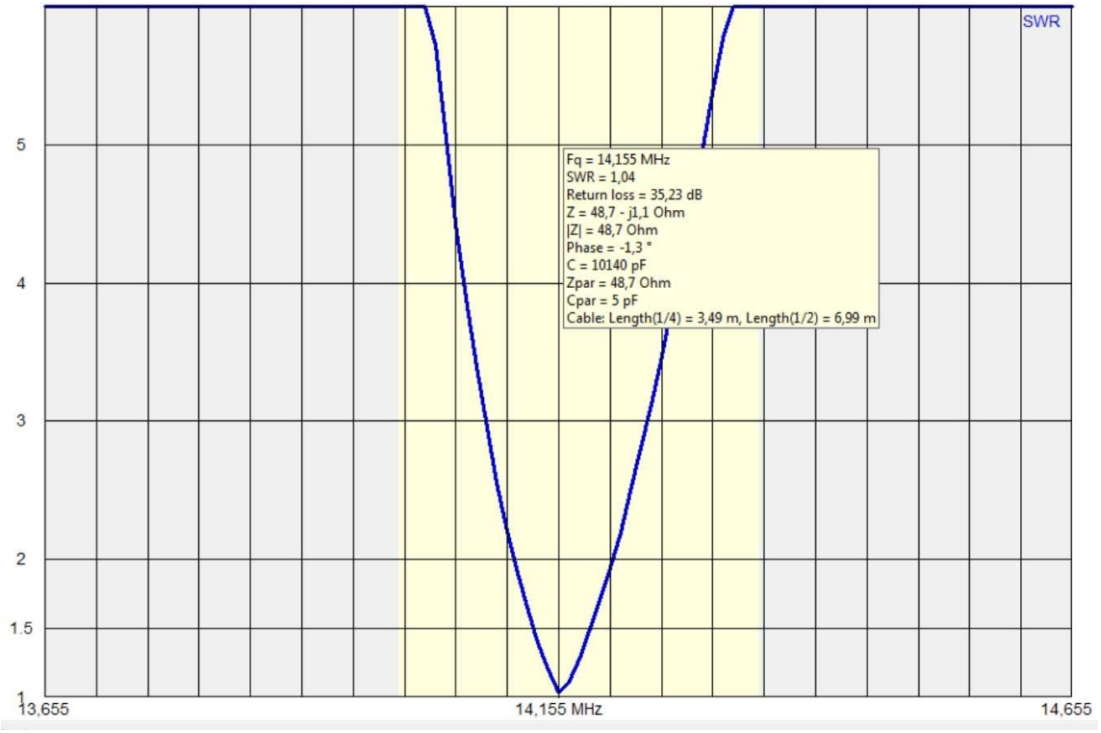
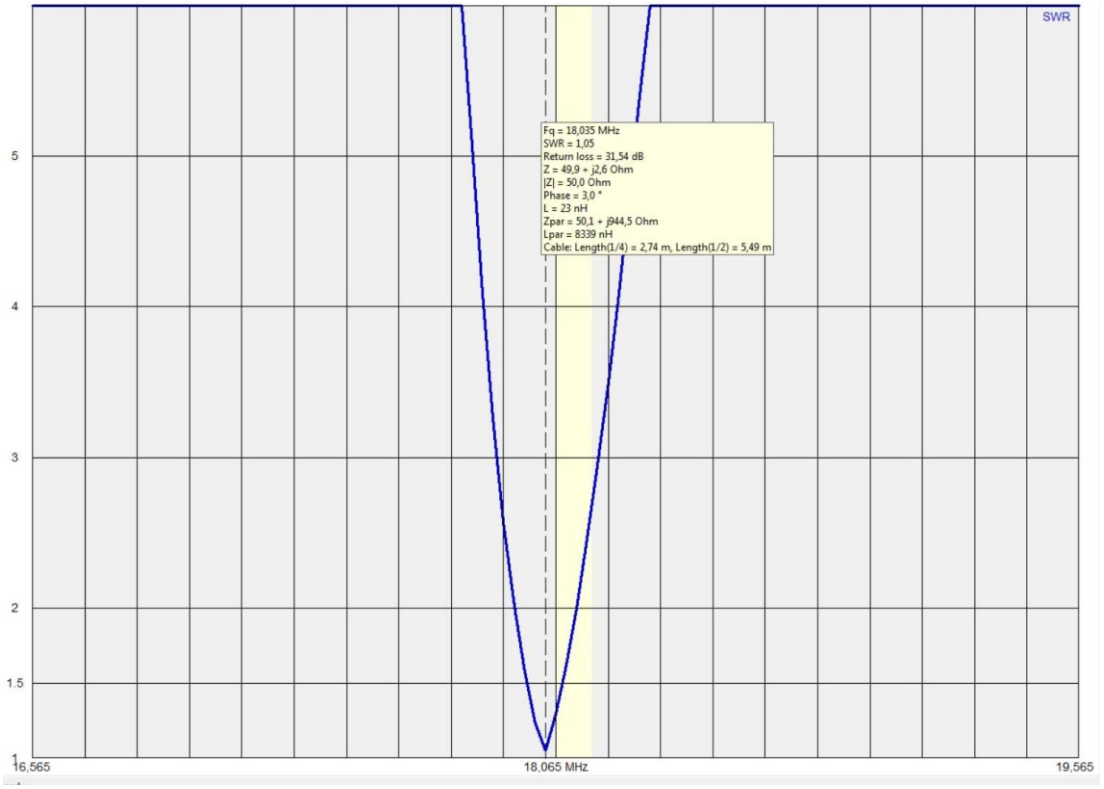


fig. 15



Measurement protocols

fig. 16

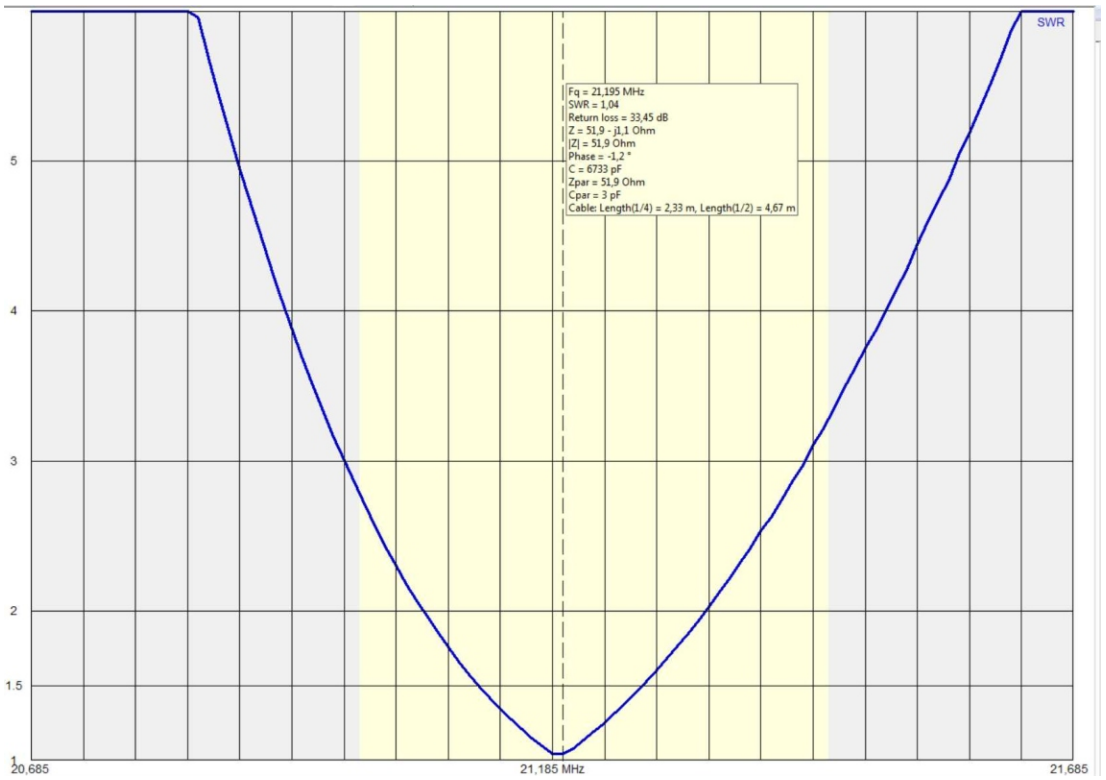
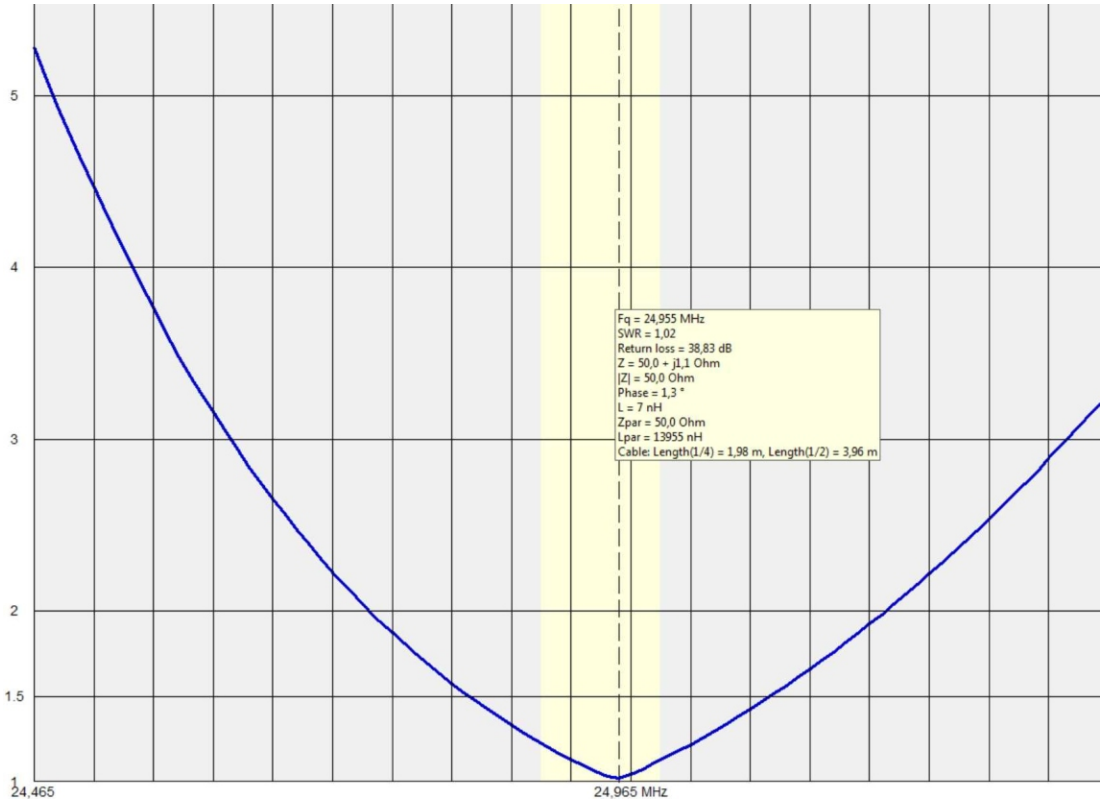


fig. 17



Measurement protocols

fig. 18

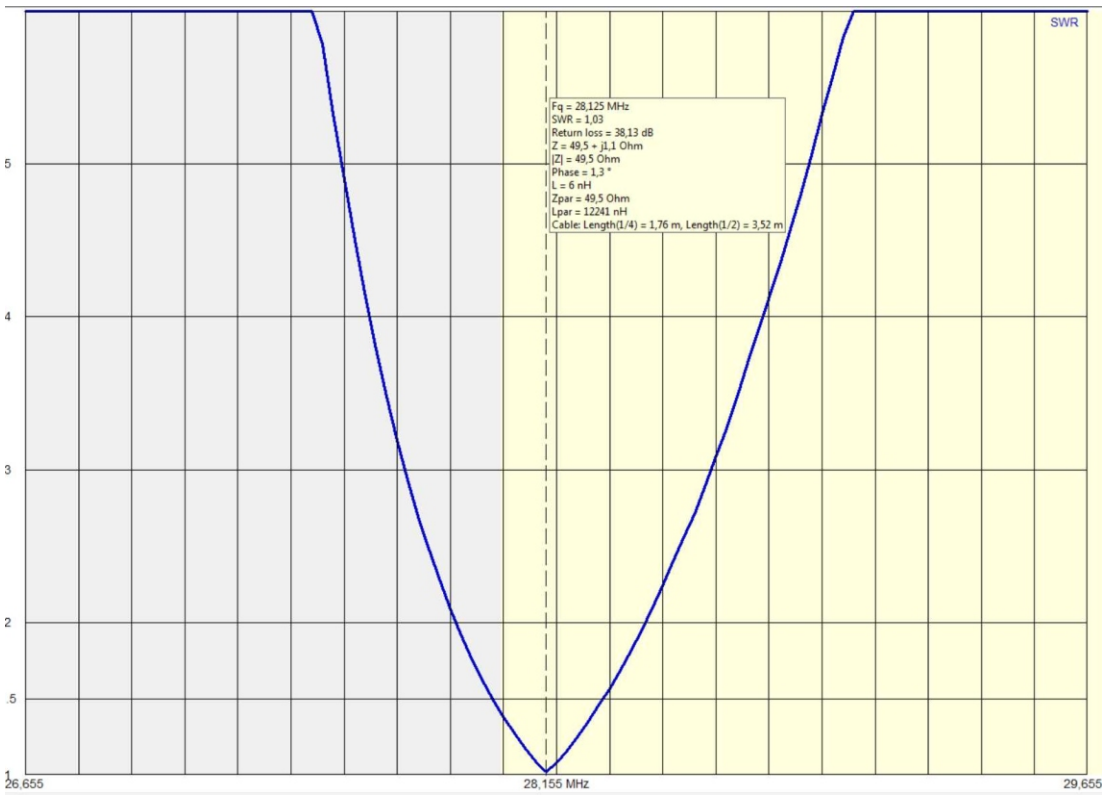
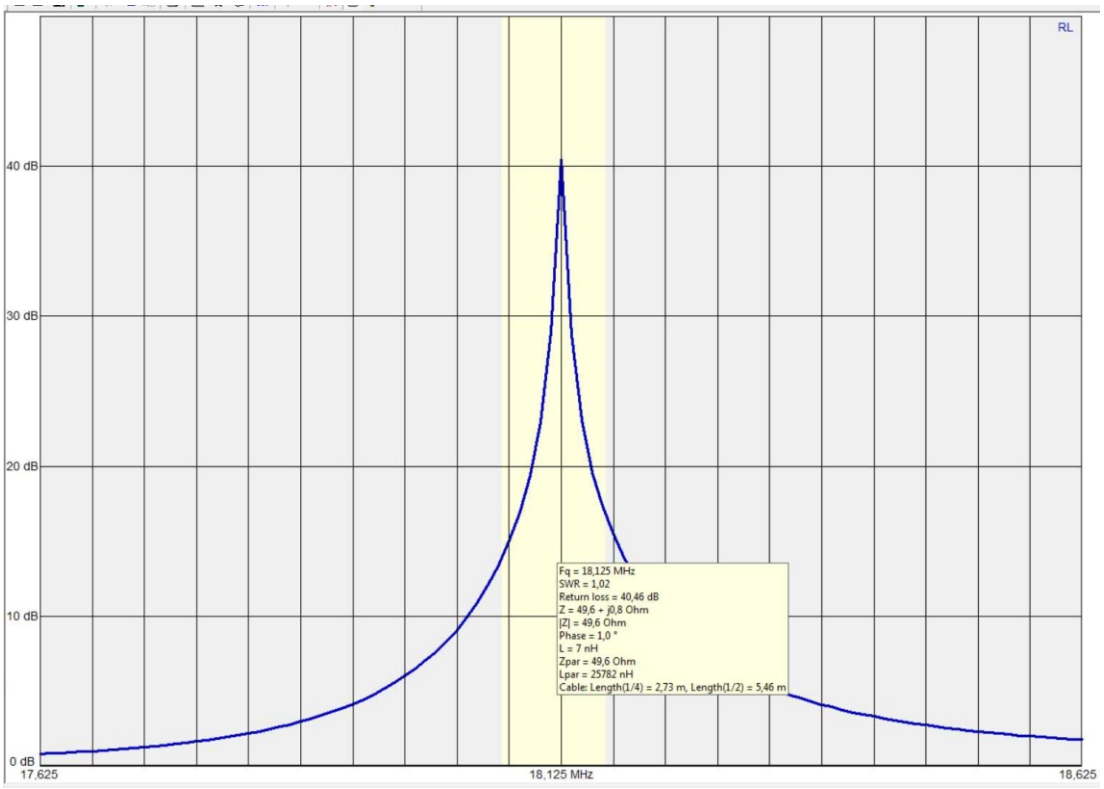


fig. 19



Measurement protocols

fig. 20

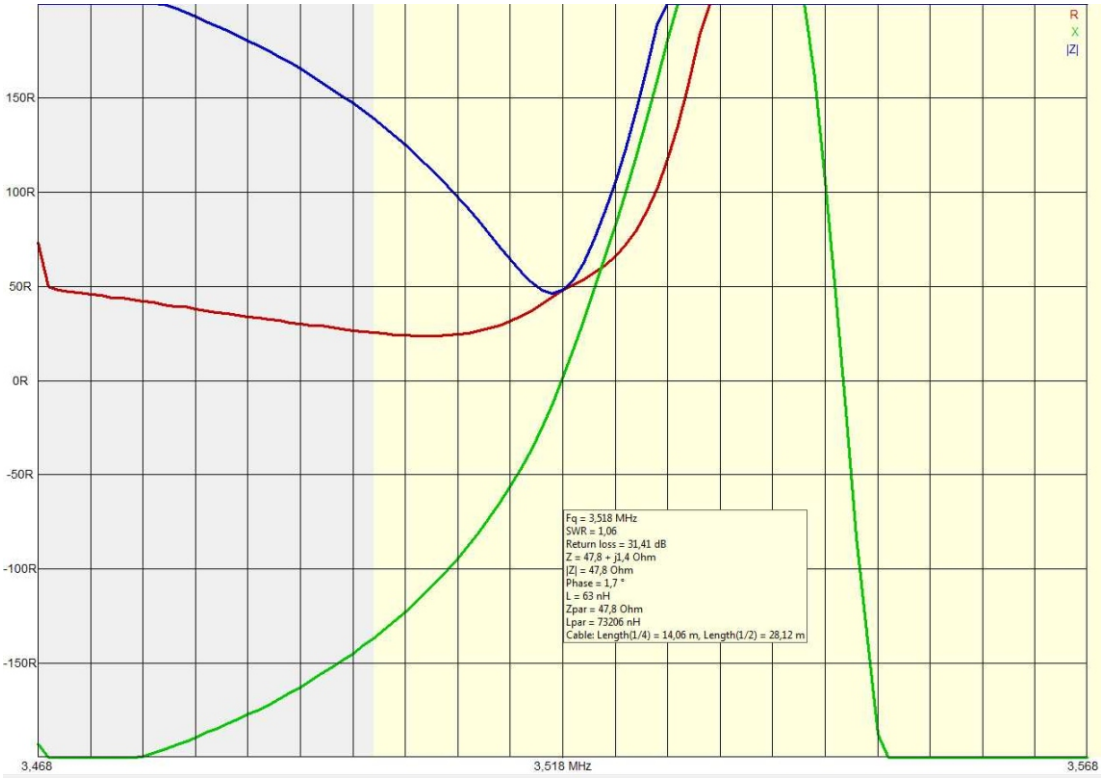
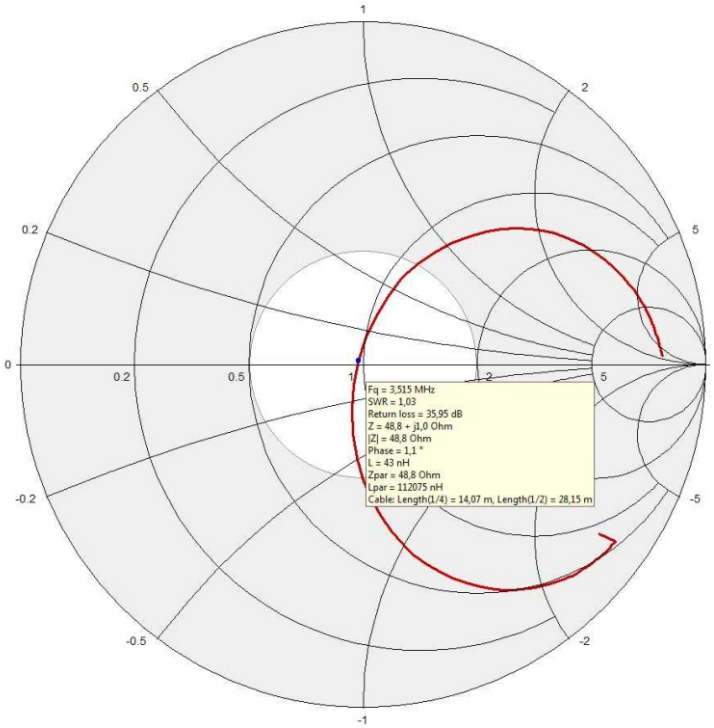


fig. 21



Measurement protocols

fig. 22

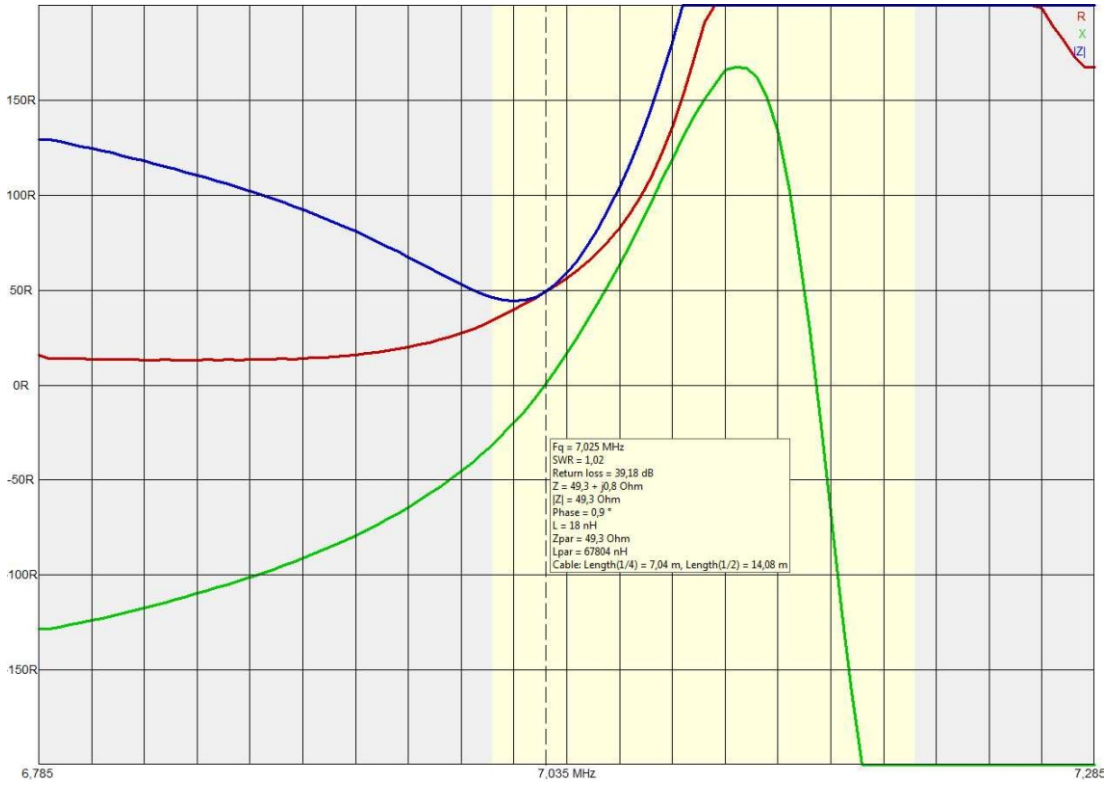


fig. 23