

What's inside the PolyPhaser 101-0103S-A Lightning Protector

Rev 2.0

May 15th 2019

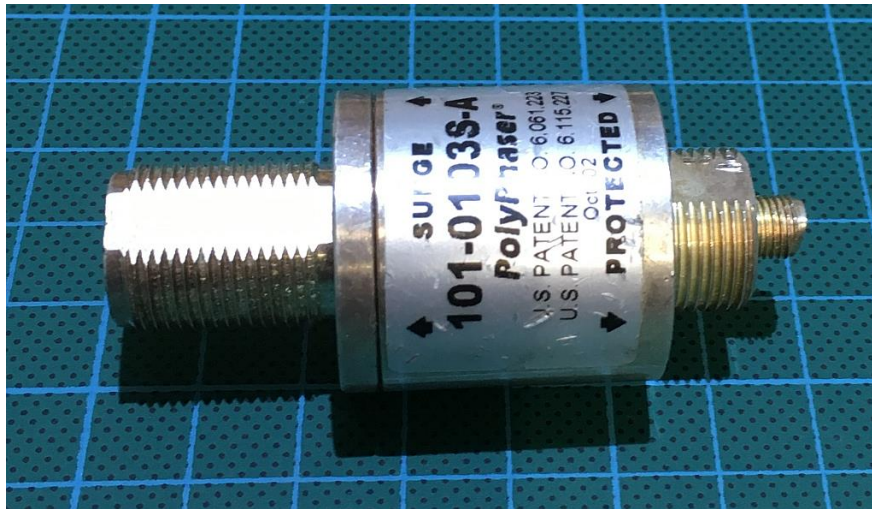
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Hello,

cleaning out my collection of lightning protection devices I found some 101-0103S-A lightning protectors from PolyPhaser. As I did not find any information in the internet I decided to open one of them to see how it is built.

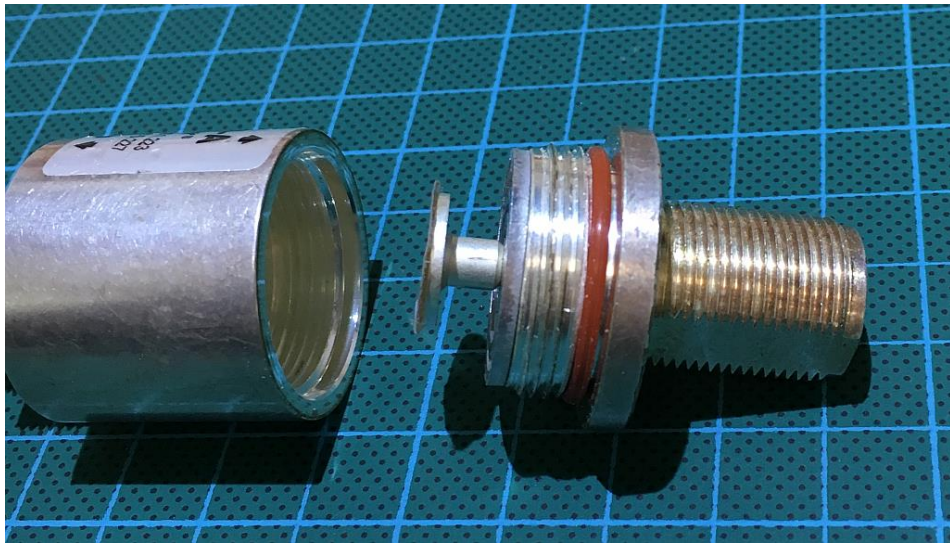
Here is how the device looks like:



On the left side you see the N-Jack which is the unprotected side and should for instance be connected to the antenna, on the right side you can see the SMA-Jack which is protected and DC-decoupled from the antenna.

Opening the device is not a problem as the two parts of the encasing are simply screwed together. Here you can see what's inside:



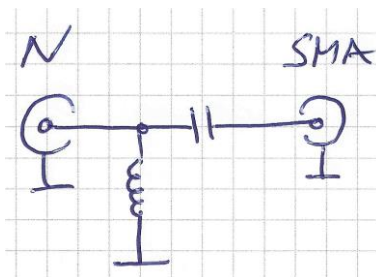




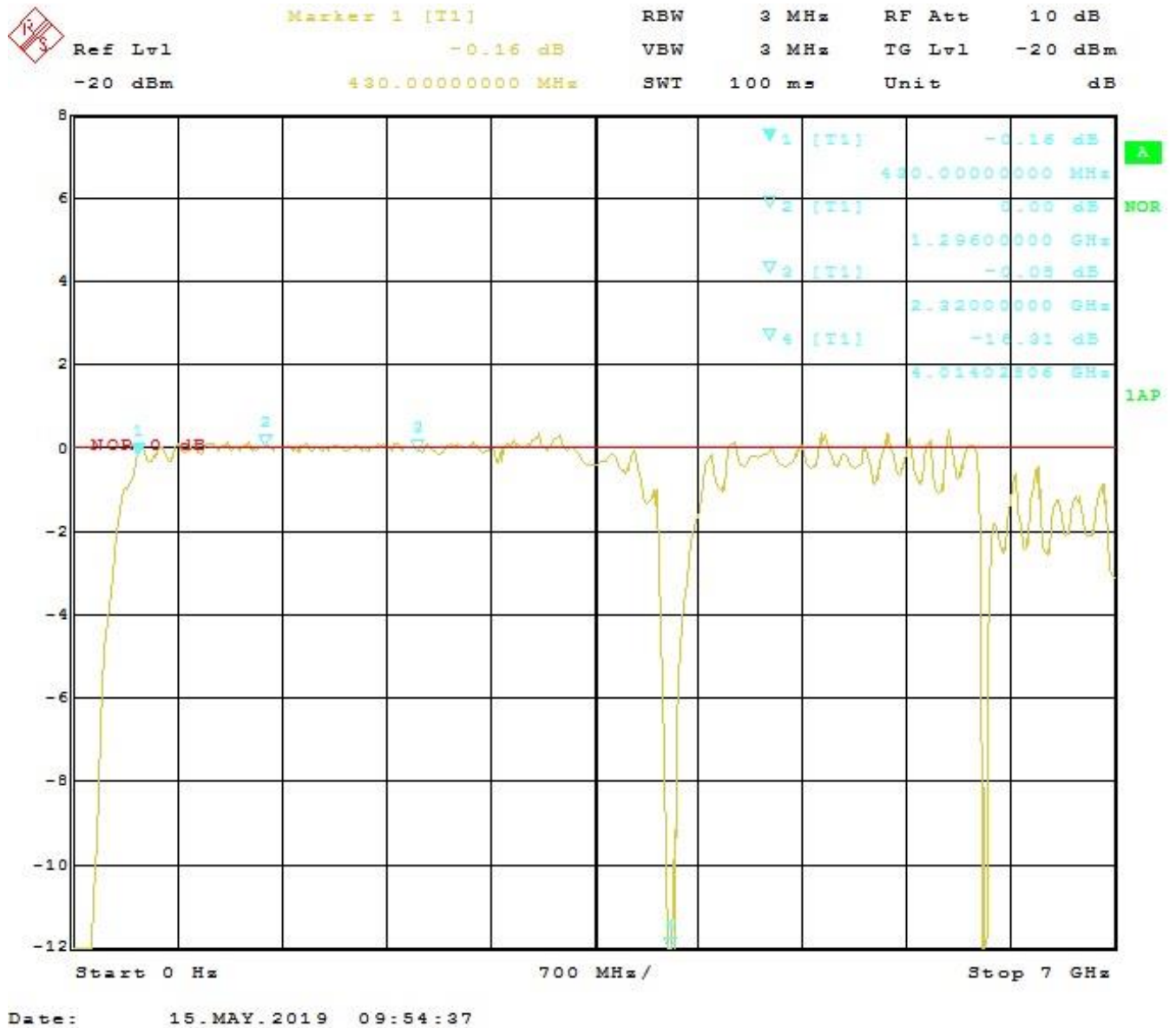
Here are some more pictures with the internals further disassembled:



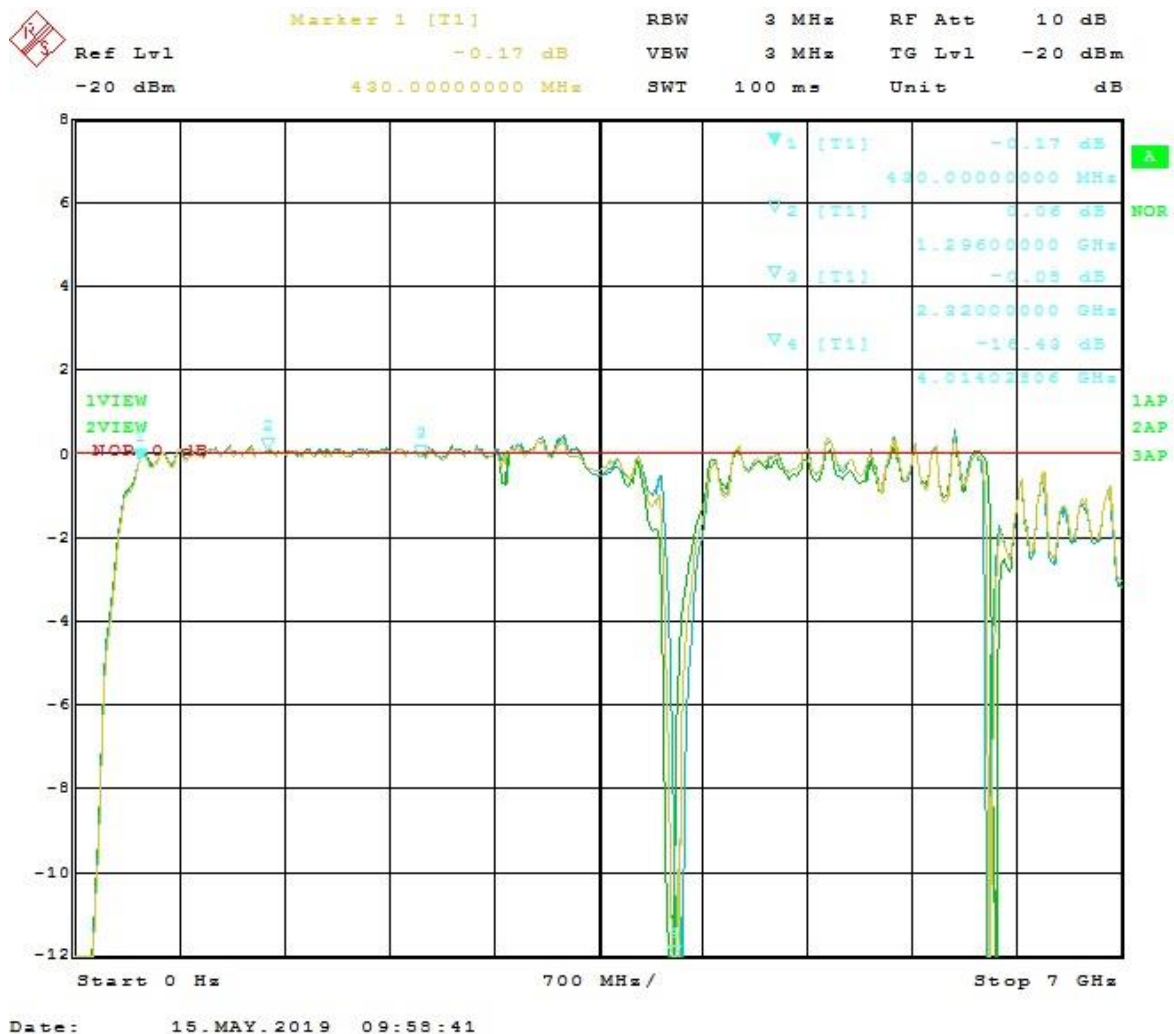
Thus, we can see that the lightning protector is a simple but very nice made high pass filter, consisting of an inductor to ground and a series capacitor. Here is a sketch of the simple schematic:



Here is a measurement of the transfer function S21 of the device measured with a spectrum analyzer with integrated tracking generator in the frequency range DC to 7 GHz. As you can see the high-pass filter function allows the device to be used at 435 MHz (70cm amateur radio band) with an insertion loss of about 0.16 dB. At higher frequencies the insertion loss further drops further down to below 0.1dB in the 23cm and 13cm bands. The first strong resonance which makes the devices unsuitable in the respective frequency range is around 4 GHz.



The second plot shows S21 of 3 units. They behave almost identically.



Meanwhile I got the following specifications for this device:

- Frequency range: 800 MHz to 2.3 GHz @VSWR <= 1.1:1
(700MHz to 2.7 GHz @VSWR 1.2:1)
- Insertion loss: <=0.1dB (800 MHz to 2.3 GHz)
- Continuous power: 300 Watt
- Surge: 20kA (IEC 1000-4-5 8/20us waveform)
- Let through voltage: <=3 V for 3kA (@ 8/20us waveform)
- Throughput energy: <=0.5uJ for 3kA (@8/20us waveform)
- Operating temperature: -40 to +85 degree C

Based on this data and the measurements shown above this device is excellent for the 23cm and 13cm bands.

I am always grateful for any comments or further hints. I will be also happy to answer any questions. Please address them by Email to me.

Best regards

Matthias

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