

# What's inside the PolyPhaser 098-1013G-A Lightning Protector

June 2<sup>nd</sup> 2018

Matthias

DD1US

Hello,

Recently I got some lightning protection devices marked with 098-1013G-A from PolyPhaser. Here is the specification I found in the internet.

Mount Type	Bulkhead
Frequency Range	0-1.2 GHz
Maximum Power	100 W
Turn On Voltage	+/- 300 VDC
Nominal Insertion Loss	0.1 dB
RF Power	100W
Maximum Throughput Energy	120 mJ
Protected Side Connector	N Female
Surge Side Connector	N Female
Mfg. Warranty	10 Years

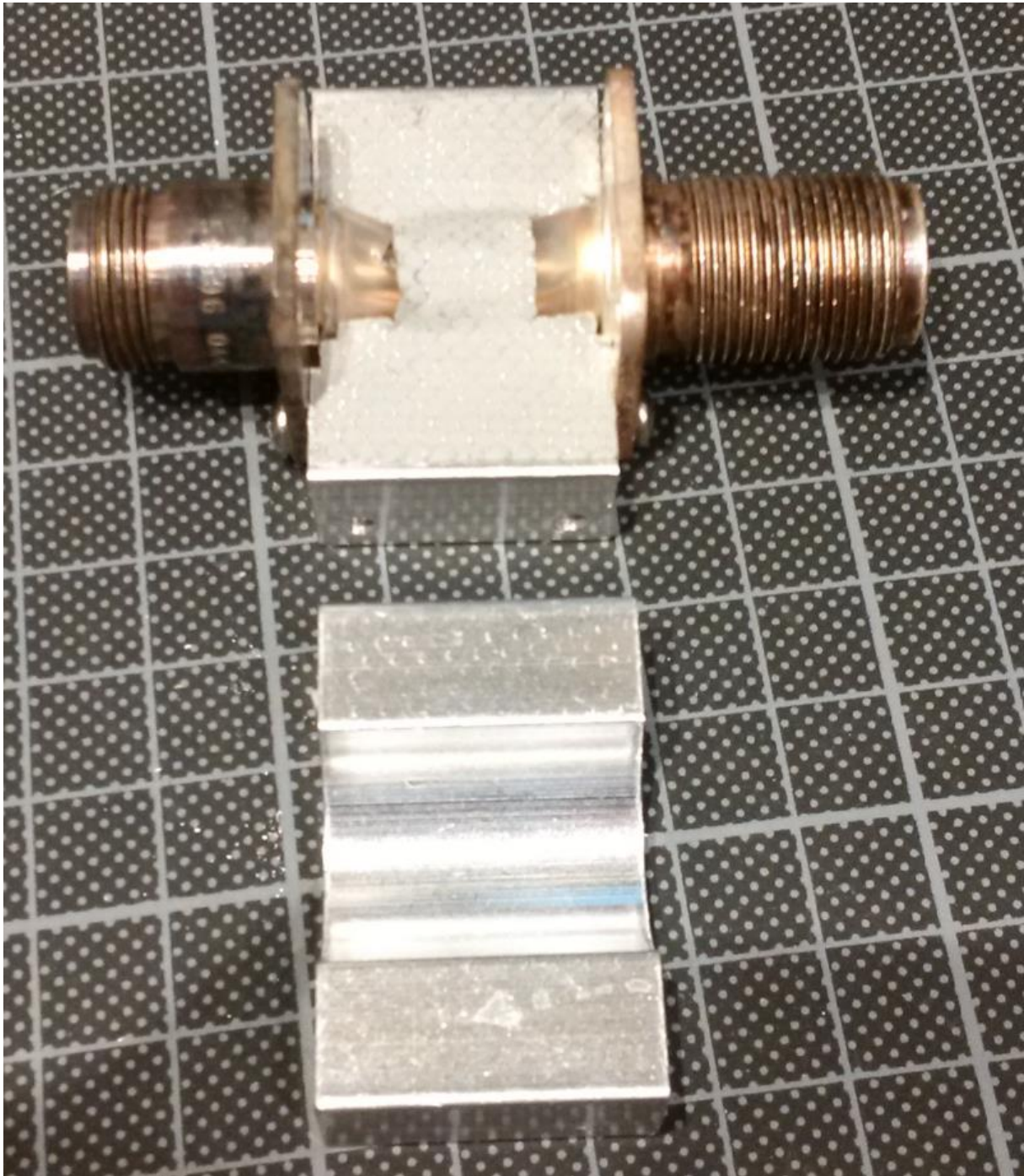
Here is how the device looks like:



On the top side you see the N-Jack which is the unprotected side and should be connected to the antenna, on the bottom side you can see the N-Jack which is protected and should be connected to the equipment. A bracket is attached to the protector and thus it can be conveniently mounted on a grounded metal plate.

As I was curious to see how the protector is built I decided to open it.

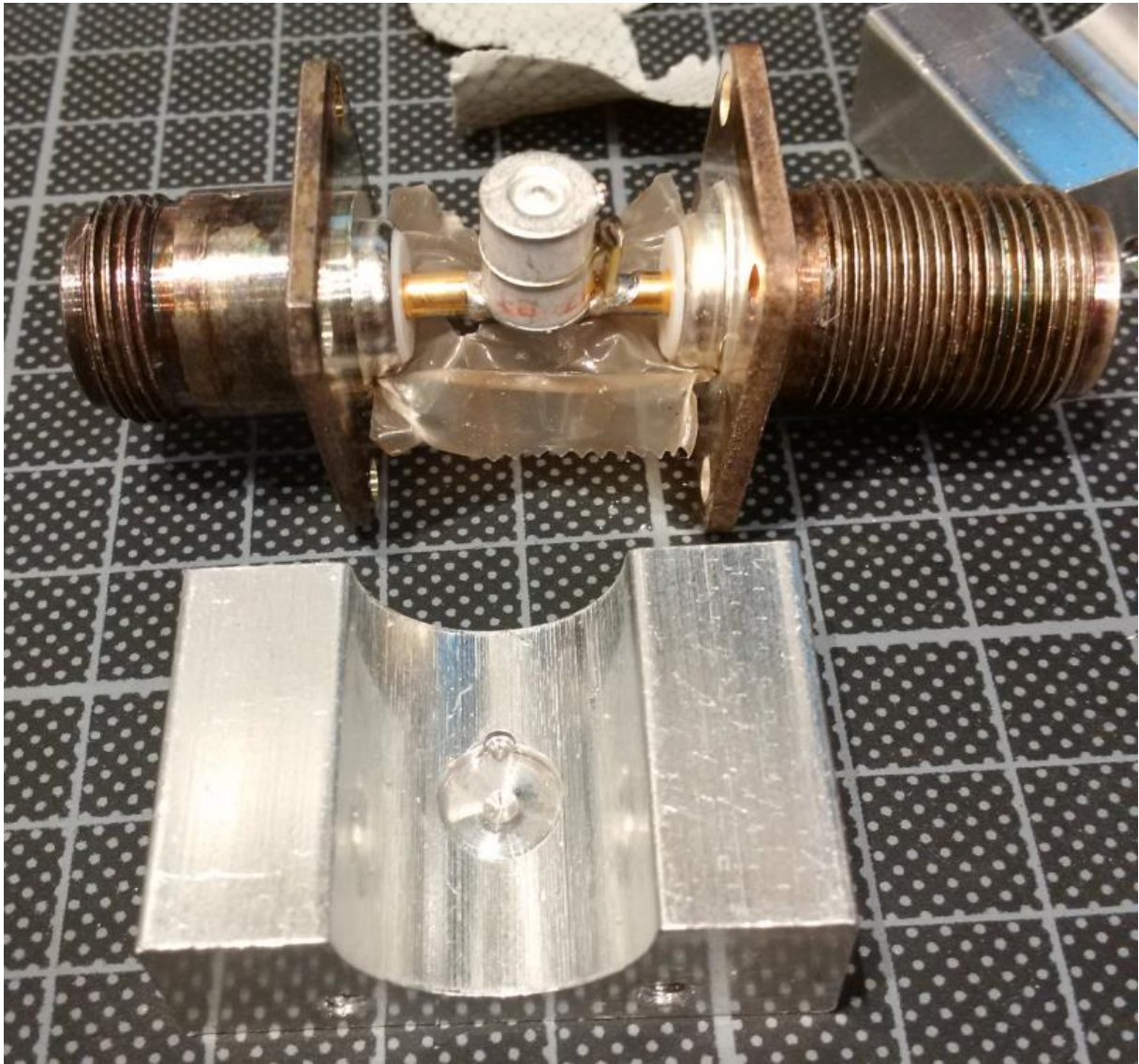
Opening the device is not a problem. Just unscrew the 4 screws holding the bracket and the 8 screws holding the N-Jacks. You can lift off the lid. Here you can see what's inside:



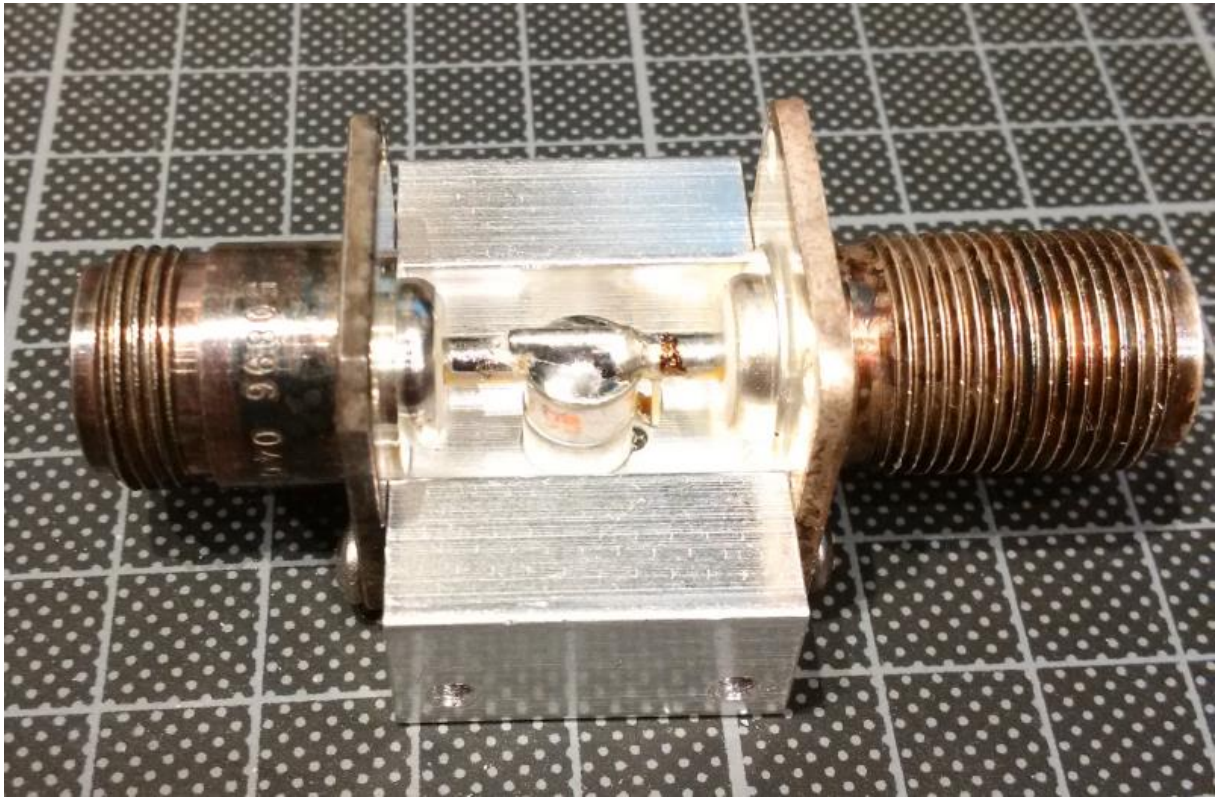
The inner part is covered by a kind of rubber material with an embedded metal shield. I assume that the main function of this layer is to protect the inner part against moisture.



Removing the rubber material with embedded metal shield reveals the inner structure which is protected with a thin isolating film.

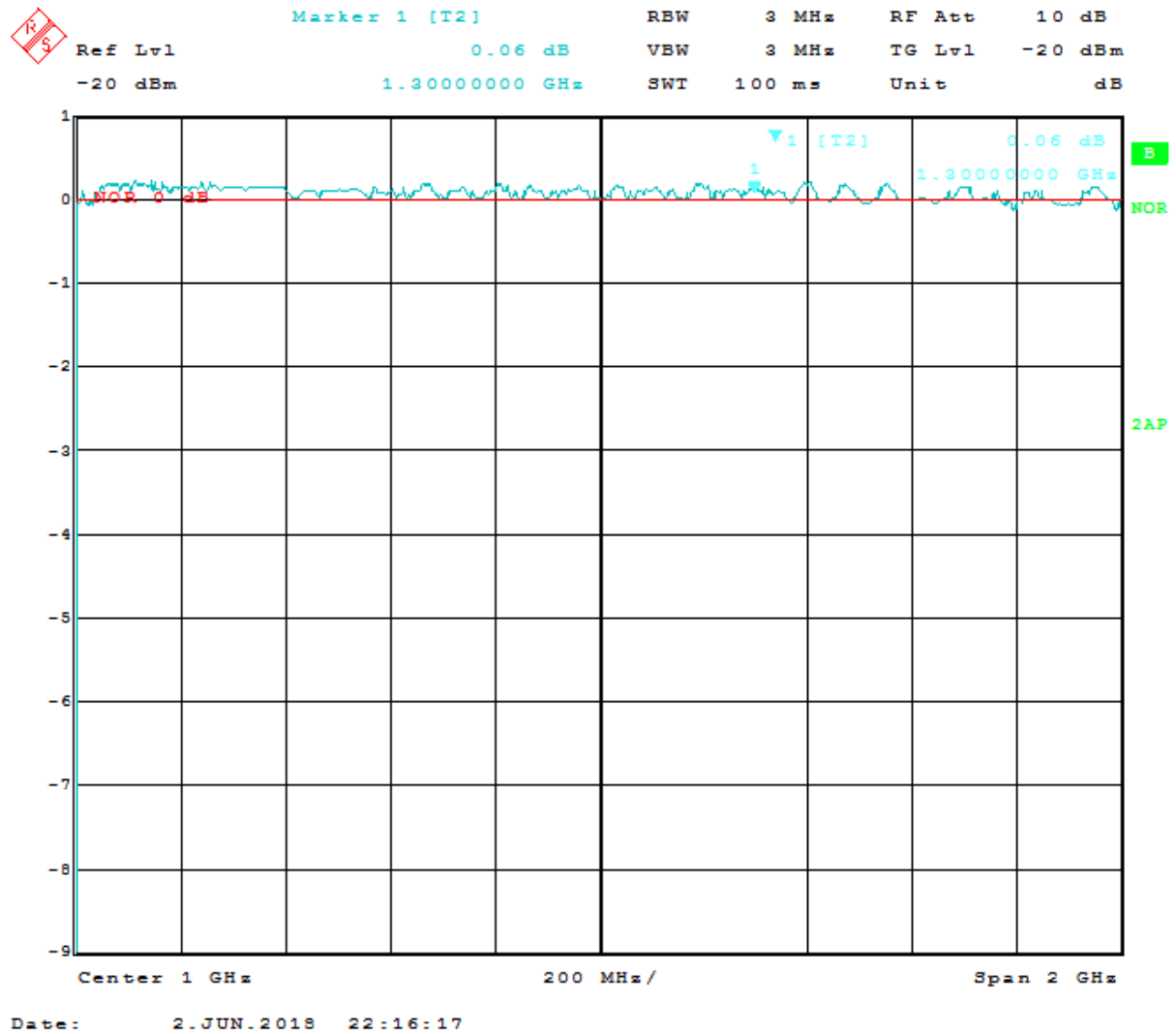


A double stacked gas discharge tube element is placed between the inner conductor and the shield of the coaxial structure. The specified turn-on-voltage of this stacked element is 300 V.



The inner conductor of the coaxial structure is soldered to the gas discharge tube element.

Next I measured the insertion loss of the device measured with a spectrum analyzer with integrated tracking generator.

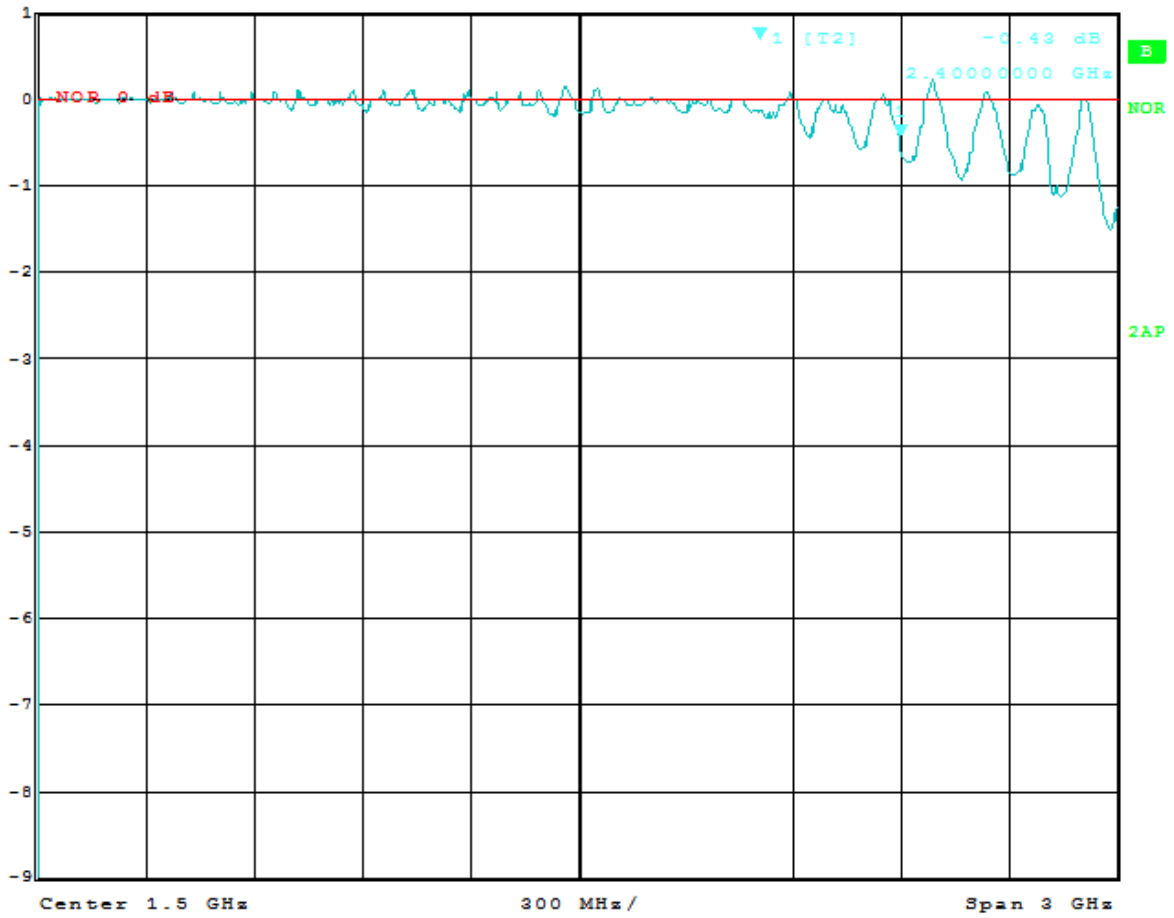


As you can see the unit is well within the specified range of insertion loss of less than 0.1 dB up to 1.3 GHz.

At higher frequencies the ripple increases and at 2.4 GHz the insertion loss is about 0.2dB, as you can see in the next measurement plot.



Marker 1 [T2] RBW 3 MHz RF Att 10 dB  
Ref Lvl -0.43 dB VBW 3 MHz TG Lvl -20 dBm  
-20 dBm 2.40000000 GHz SWT 100 ms Unit dB



Date: 2.JUN.2018 22:24:48

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

Email: [dd1us@amsat.org](mailto:dd1us@amsat.org)

Homepage: [www.dd1us.de](http://www.dd1us.de)