

Hello OMs,

I'm going to share some measurements made on my UHF Duplexer that will be installed on my MMDVM equipment for the upgrade from simple hotspot to a repeater, using a Diamond X-510 antenna.

I bought this very cheap Duplexer from the Chinese e-shop "409Shop", at only 97\$: [http://www.409shop.com/409shop\\_product.php?id=104460](http://www.409shop.com/409shop_product.php?id=104460)

**Duplexer**

UHF 380~485Mhz  
6 Cavity for N-connector  
50W

19.5cm  
19cm  
3.5cm

LOW  
ANT  
HIGH

www.409shop.com

N connector

**409 SHOP**

SGQ-450D-N

50W Duplexer UHF 6 Cavity for N-connector

**Specifications:**

- 50W RF power Handling
- 6 cavity Design
- Minimum Tx and Rx frequency difference: UHF 5Mhz
- Maximum Tx and Rx frequency difference:UHF 12Mhz
- Power Isolation >75dB
- Power loss <1dB
- Easy to build your repeater
- Support Frequency: UHF 380~485Mhz
- Free Frequency Tuning - send me the high / low frequency
- N connector
- Size: 22.2cm X 19.5cm X 3.5cm

It's a 6 cavity Duplexer (3 notch filters for each path), so I expected a very good out-of-band attenuation, which is a very interesting feature in installation sites with strong RF signals coming from other transmitters.

I choose the 50W version, because the price difference between the 35W and 50W was only 14\$.

For the payment, I used paypal, without any problem. As suggested on the site, I specified the Low and High Frequencies of my repeater in the order notes.

The Duplexer arrived very quickly. The order dates are the following:

- Order and Payment: **14 November 2017**
- Order Confirmation: **15 Novemver 2017**
- Shipment confirmation and Tracking Number: **18 November 2017**
- Arrival: **01 December 2017**

Before the installation, I took some measurement with a Vector Network Analyzer, at ambient temperature and at cold and hot temperatures in a climatic chamber, in order to verify the tuning made by the seller, and the temperature drifts, which affects most of the low-cost Duplexers.

I choose +55°C and -25°C as worst case temperature, although my region has a very mild climate and probably we'll never reach these temeperatures.

Note: during every measurement, the third port (not connected to the VNA) is connected to a 50ohm dummy load.

The frequency of my repeater are:

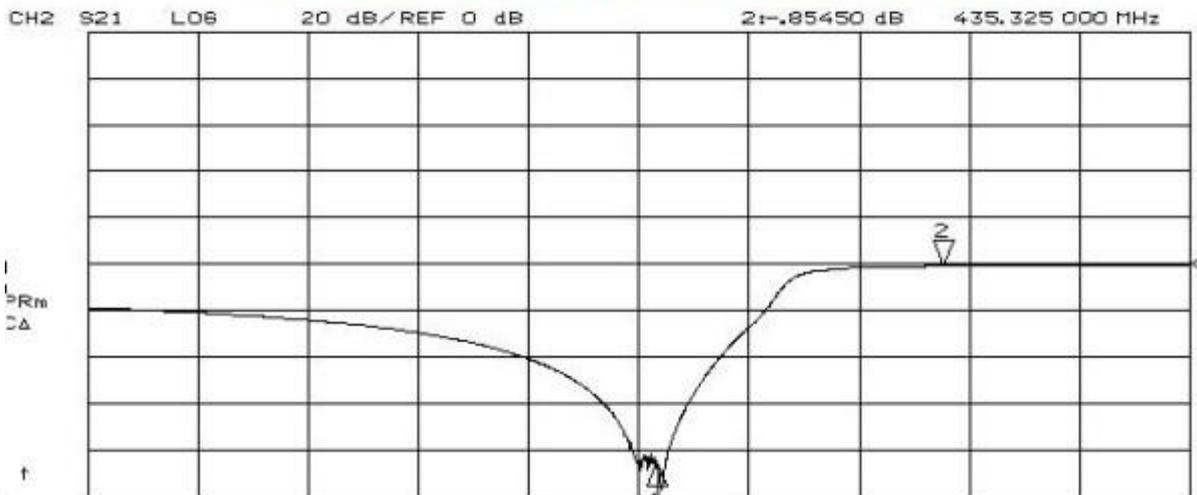
- Low (TX): 430.325 MHz
- High (RX): 435.325 MHz

The more interesting measurements which I'll report hereafter, are:

- Attenuation from Antenna port to RX port;
- Attenuation from TX port to Antenna port;
- Matching at RX, TX, and Antenna ports;
- Isolation between TX and RX ports;

Here below, the ambient temperature measurements are reported:

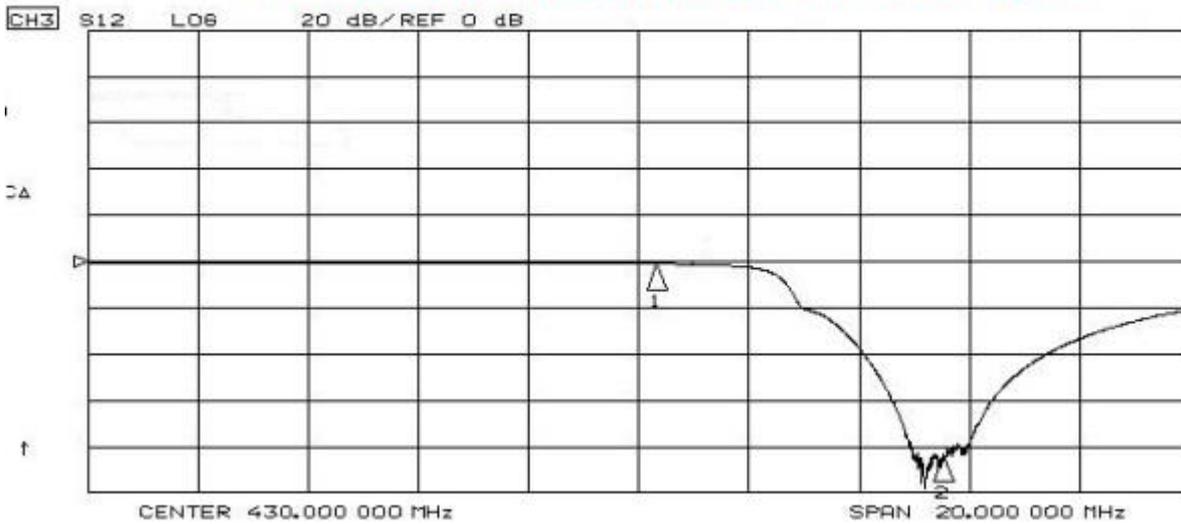
## ATTENUATION FROM ANTENNA TO RX PORT



CH2 Markers

1: -84.873 dB  
430.325 MHz

## ATTENUATION FROM TX TO ANTENNA PORT

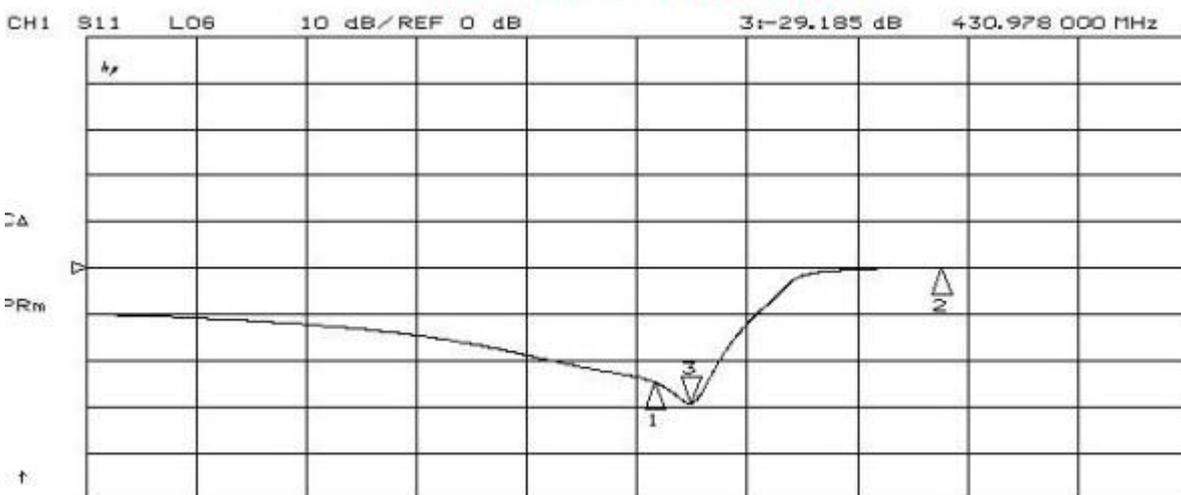


CH3 Markers

1: -90.440 dB  
430.325 MHz

2: -83.743 dB  
435.325 MHz

## MATCHING AT TX PORT

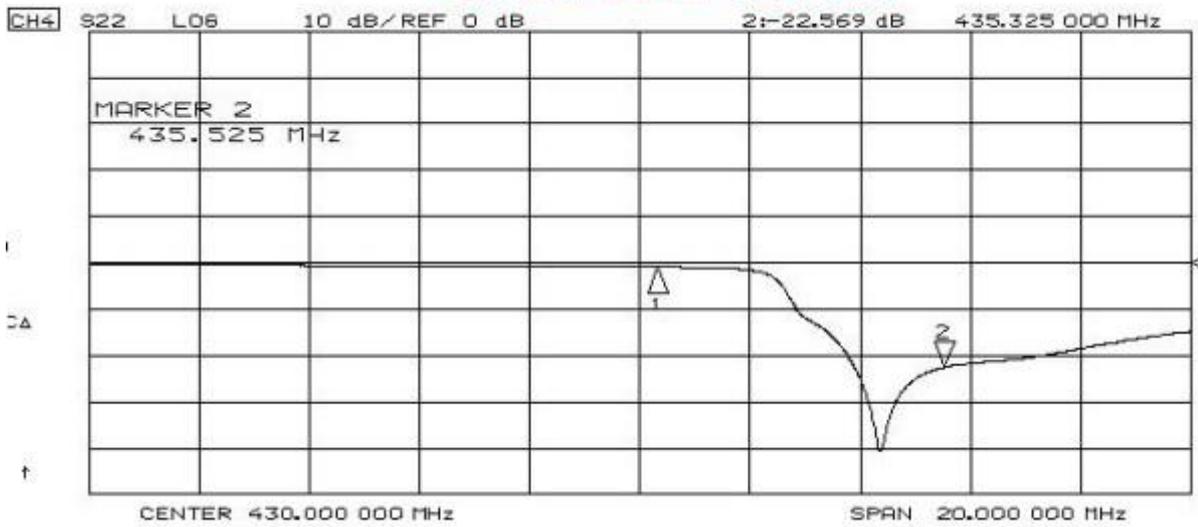


CH1 Markers

1: -24.756 dB  
430.325 MHz

2: -0.6130 dB  
435.325 MHz

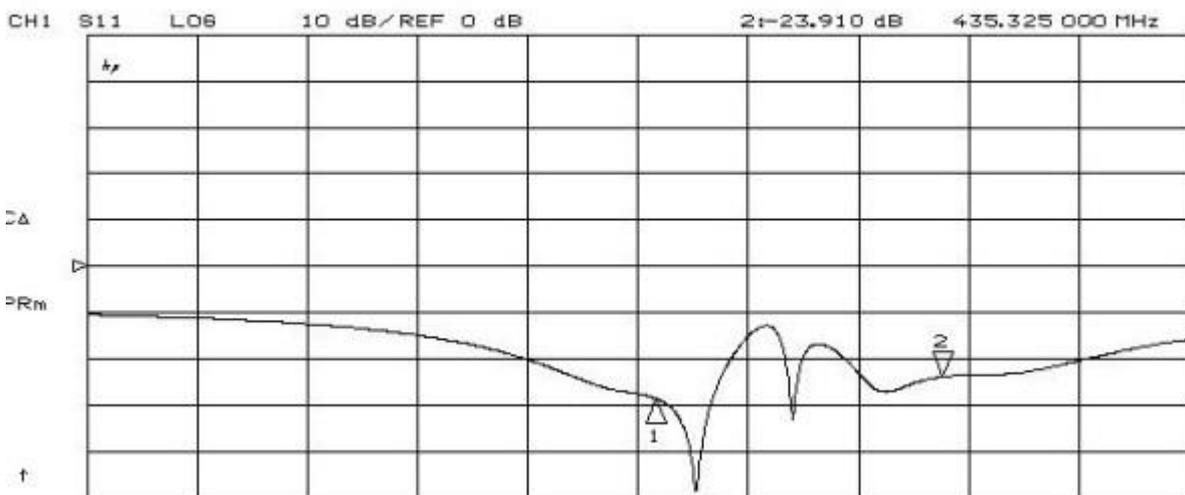
## MATCHING AT RX PORT



CH4 Markers

1: -0.09230 dB  
430.325 MHz

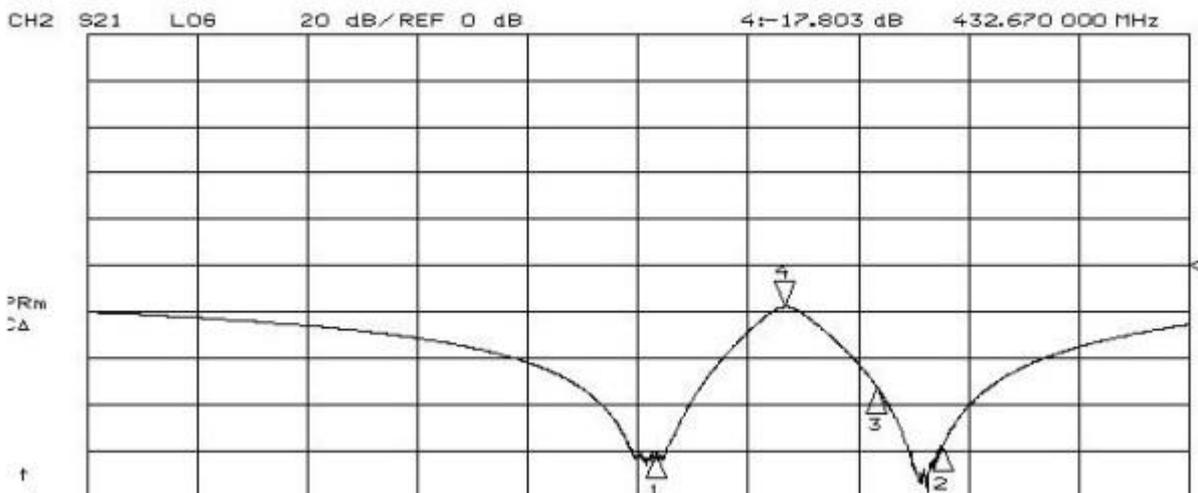
## MATCHING AT ANTENNA PORT



CH1 Markers

1: -28.562 dB  
430.325 MHz

## ISOLATION BETWEEN RX AND TX PORTS



CH2 Markers

1: -80.947 dB  
430.325 MHz

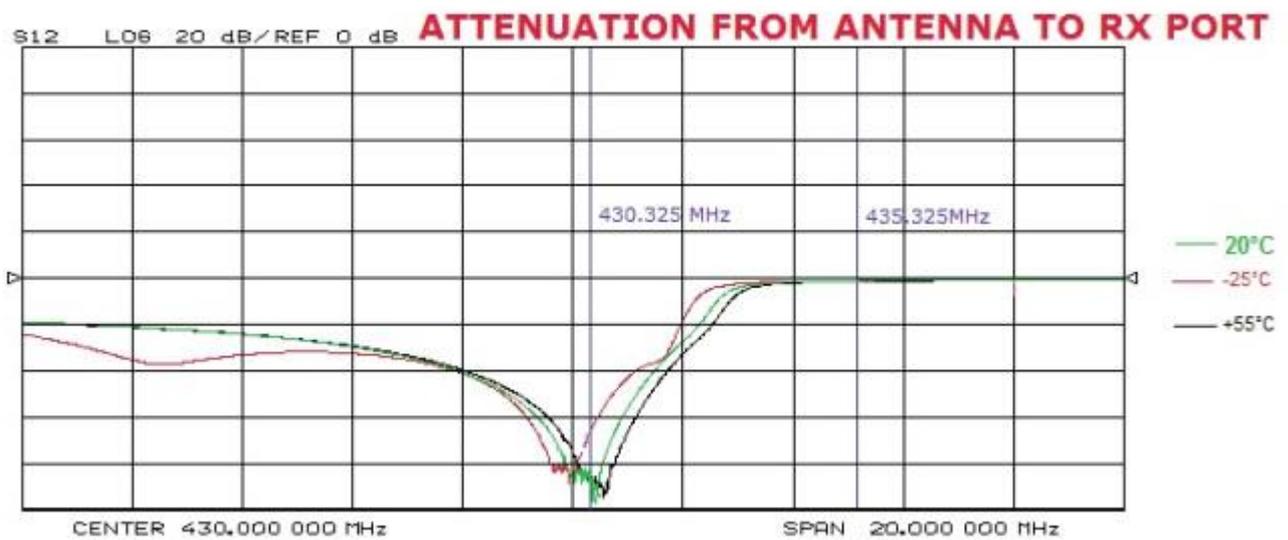
2: -77.688 dB  
435.325 MHz

3: -52.655 dB  
434.338 MHz

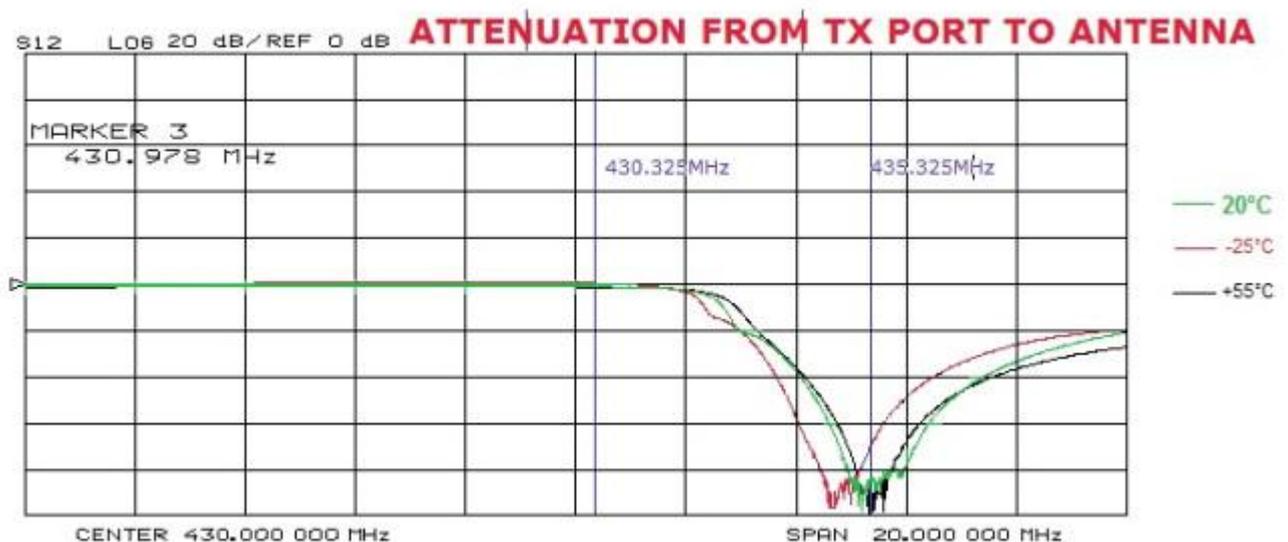
### Considerations about performances at ambient temperature

- The isolation between RX and TX ports is >70db, as declared on the datasheet.
- The loss from ANT to RX port and from TX port to ANT is <1dB.
- The resonance at RX and TX ports are slightly different from the desired frequencies, but the matching is very good anyway (>20dB).
- The matching at antenna port is good (>20dB).

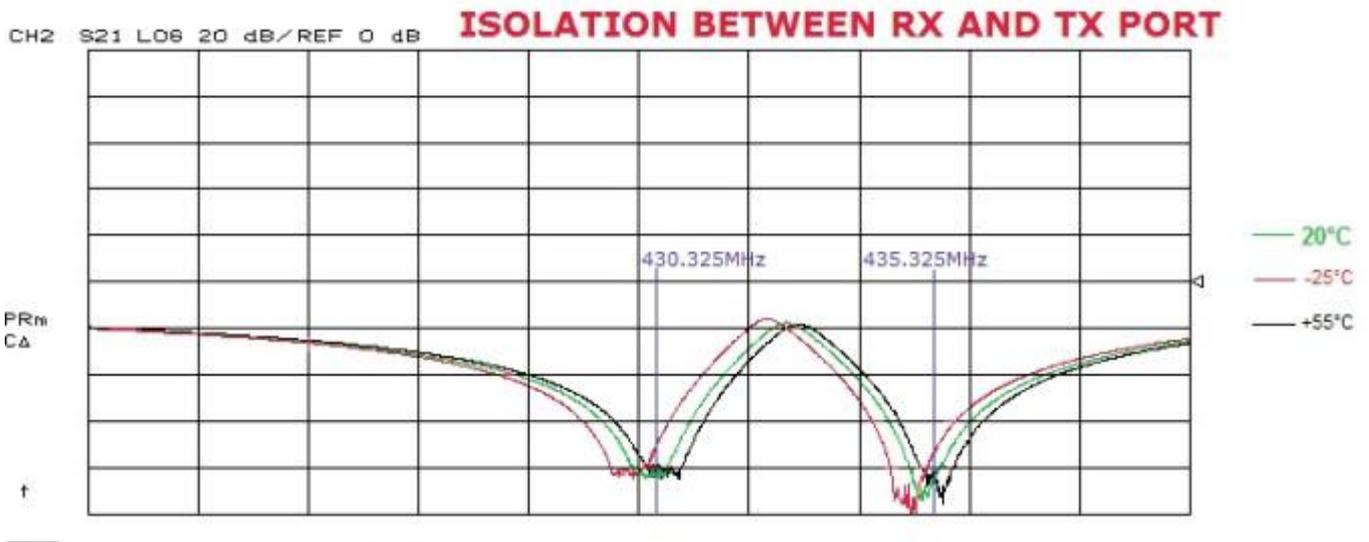
Here below, the temperature drifts of the main measurements are reported:



**Note:** the attenuation @435.325MHz is 1.2dB at +55°C and 1.1dB at -25°C



**Note:** the attenuation @435.325MHz is 1.1dB at both +55°C and -25°C



### Considerations about performances at cold and hot temperatures

- In all the cases, the responses moves up in frequency when the temperature increases.
- The isolation is still  $\geq 70$ dB also at hot and cold temperatures.
- The attenuation from ANT to RX port and from TX to ANT increases slightly (1.2dB),but is still very good, even if the curves move in frequency.

### Conclusions

Here below, I judged and assigned a score for every aspect of Duplexer, from 0 (min) to 5 (max):

**Shipment speed** ★★★★★

**Tuning accuracy** ★★★★★

**RF Performance at T amb** ★★★★★

**RF Performance at extreme temperatures** ★★★★★

Considering the cost, this Duplexer is a good compromise between cost and performances, and I suggest this product for hamradio applications.

The out-of-band rejection is good as well as the temperature stability, so it can be used also in mountain sites or in RF polluted sites.

### Contacts

For any further question, please write at [iz7boj@gmail.com](mailto:iz7boj@gmail.com)

Best 73'

Alfredo, IZ7BOJ ( <http://iz7boj.wordpress.com> )