

Triplexer Application

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DBD3 Triplexer Application

Introduction

An RF triplexer is a type of passive device used in radio frequency (RF) systems to either split, in terms of frequency bands, a single signal into three signals or combine three signals into one. The "tri-" in triplexer refers to its ability to handle three frequency bands. There are also diplexers that handle two frequency bands (see DBD1).



Structure and How It Works

A triplexer has four ports, the common port, the low-band, mid-band and high-band ports. It is composed of RF filters arranged in a way that allows splitting and combining, see Figure 2. The RF filters are usually three band-pass filters corresponding to the low, mid, and high bands. They are individually tuned to allow only their specific frequency range to go through while blocking the other two. They are all connected on one end to a “common” port. The other ends of the filters are connected to their specific band ports. When splitting the “common” port is the input, when combining it is the output. The diagram in Figure 2. illustrates the filters arrangement.

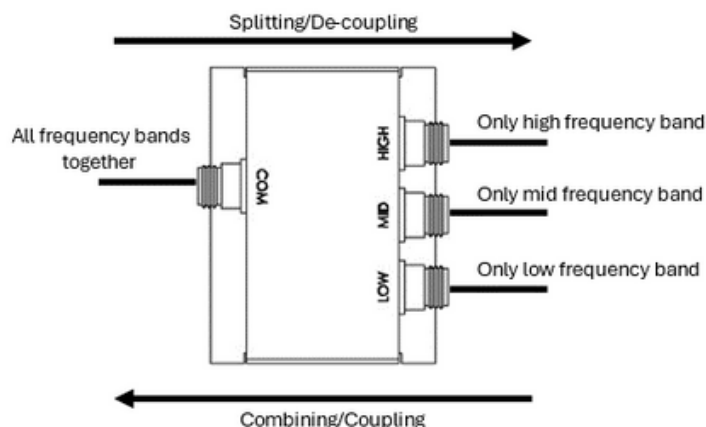


Figure 1

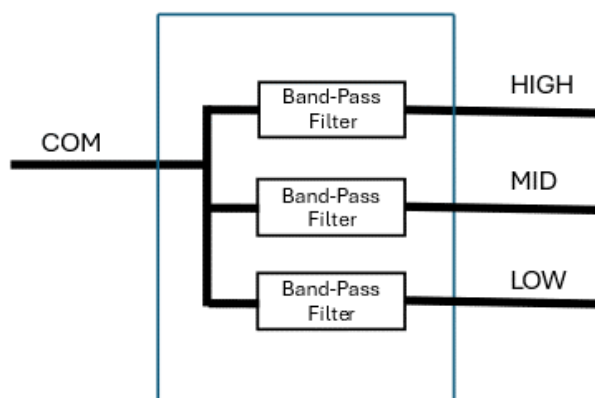


Figure 2

Mobile Mark DBD3

Mobile Mark's DBD3 triplexer frequency bands are 144-174 MHz (VHF), 406-512 MHz (UHF) and 745-870 MHz. The filters are packaged into a durable aluminum casing. The ports connectors are N-type female, and all the ports are matched for 50 ohms. It is rated for 150 watts maximum. The casing offers mounting features that allow the user to attach it to poles, walls and custom brackets.



Figure 3

Common use case

Most of the use-case for triplexers will be to share or reduce the number of RF components. They help make an RF installation simpler, cleaner and sometimes more efficient.

- **Share a tri-band antenna**

One way the DBD3 can be used is to share a tri-band antenna. If three different transceivers are needed, one way to make the installation cleaner would be to have only one wideband or multiband antenna. That way, only one cable run, and one antenna installation are needed. Mobile Mark A55136 tri-band antenna is a good match for the DBD3 in a mobile environment.

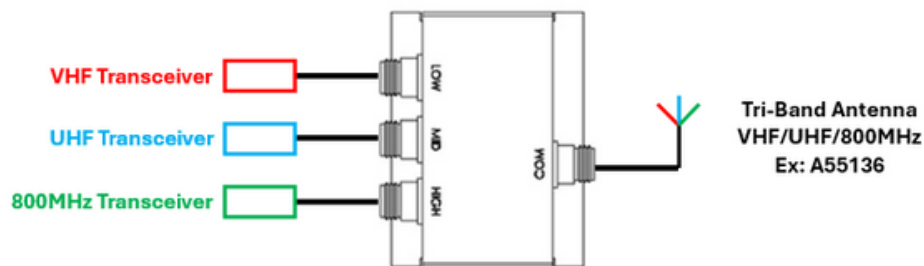


Figure 4

- **Share a multi-band radio**

If a tri-band transceiver is used, one might want to use three narrow band antennas. Narrow band antennas are usually more efficient than their wideband/multi-band counterparts and the radiation patterns are more controlled. In this case using triplexers will make the installation more efficient. See Mobile Mark's Yagi antenna page.

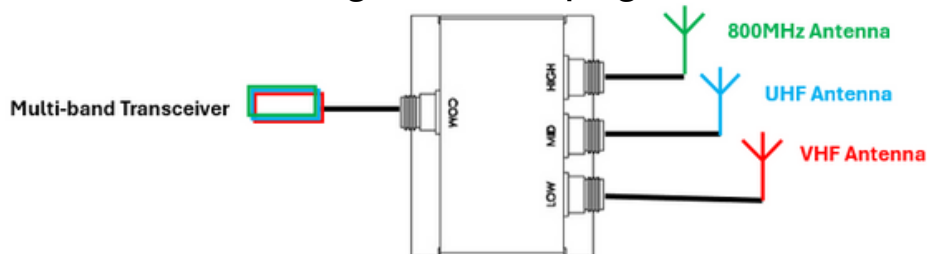


Figure 5

- **Share cables**

Triplexers can also be installed to save on cable runs. Using two triplexers back-to-back as in Figure 6, would replace two cables. It is interesting if the distance between the transceivers and the antennas are very long, or if the antennas are installed up on a pole. In this case the triplexers simplify the installation.

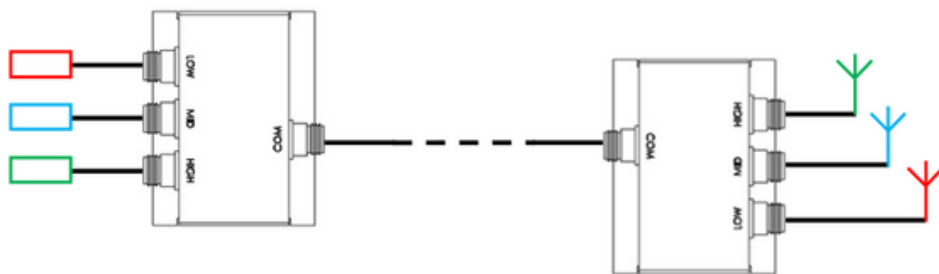


Figure 6

Conclusion

RF triplexers play a crucial role in optimizing RF system installations by enabling the splitting or combining of signals of three distinct frequency bands. Whether sharing a tri-band antenna, a multi-band radio, or minimizing cable runs, triplexers like the DBD3 offer practical solutions for streamlining RF installations, making them an essential tool in communication systems.



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Mobile Mark Resources

- DBD3 Product Page: <https://www.mobilemark.com/product/dbd3/>
- Tri Band Antenna Product Page: <https://www.mobilemark.com/product/a55136-triband-mobile-lmr-antenna/>
- Yagi Products Page: <https://www.mobilemark.com/product-category/lmr-hf-uhf-vhf-220/yagi/>
- DBD1 Product Page: <https://www.mobilemark.com/product/dbd1/>

**To learn more, please refer to our additional White Papers
or reach out to speak with an antenna expert
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