

## Diplexer Application

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### DBD1 Diplexer Application

#### Introduction

An RF Diplexer, like the DBD3, is a type of passive device used in radio frequency (RF) systems to either split, in terms of frequency bands, a single signal into two signals or combine two signals into one. The "di-" in diplexer refers to its ability to handle two frequency bands. There are also triplexers that handle three frequency bands (see DBD1).



## Structure and How It Works

A diplexer has three ports, the common port, the low-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 two filters, in the case of the DBD1, one low-pass and one band-pass. They are individually tuned to allow only their specific frequency range to go through while blocking the other. They are 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.

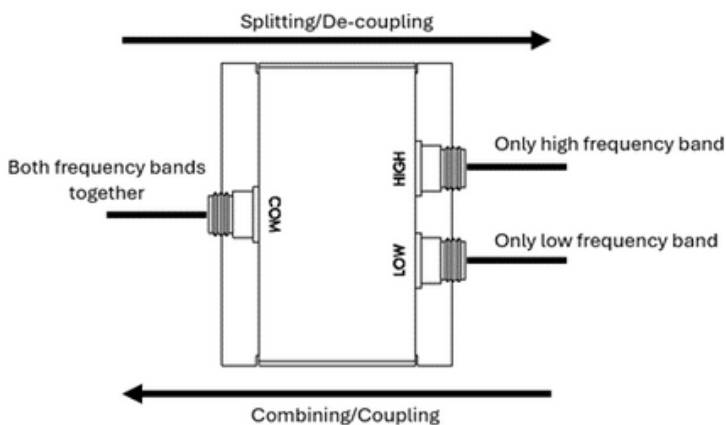


Figure 1

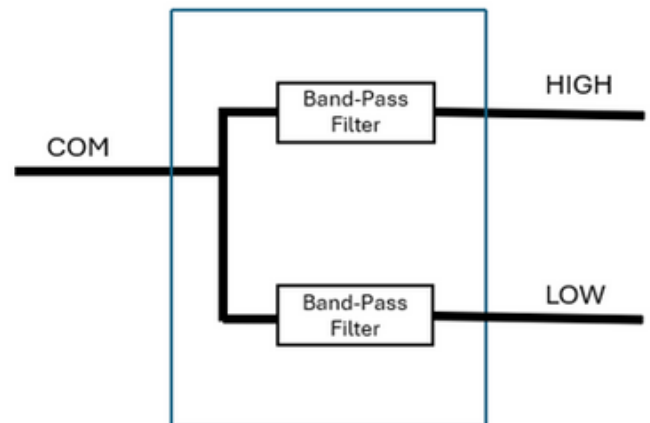


Figure 2

## Mobile Mark DBD1

Mobile Mark's DBD1 diplexer frequency bands are 3-174 MHz (VHF) and 350-512 MHz (UHF). 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 diplexers 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 dual-band antenna**

One way the DBD1 can be used is to share a dual-band antenna. If two 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 A1833 dual-band antenna is a good match for the DBD1 in a mobile environment.

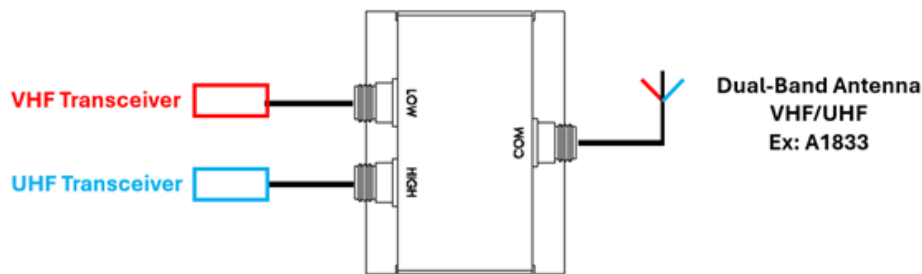


Figure 4

- **Share a multi-band radio**

If a dual-band transceiver is used, one might want to use two 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 diplexers will make the installation more efficient. See Mobile Mark's Yagi antenna page.

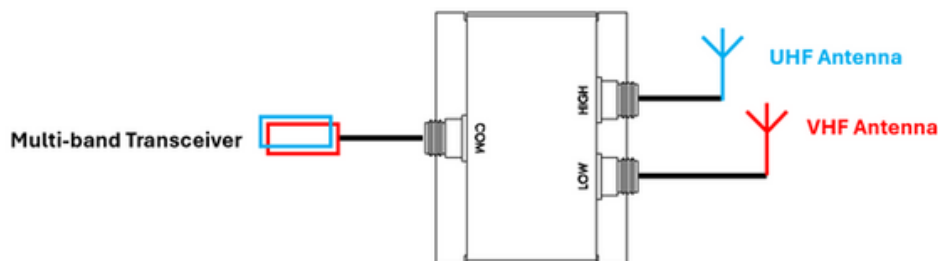


Figure 5

- **Share cables**

Diplexers can also be installed to save on cable runs. Using two diplexers back-to-back as in Figure 6, would replace one 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 diplexers simplify the installation.

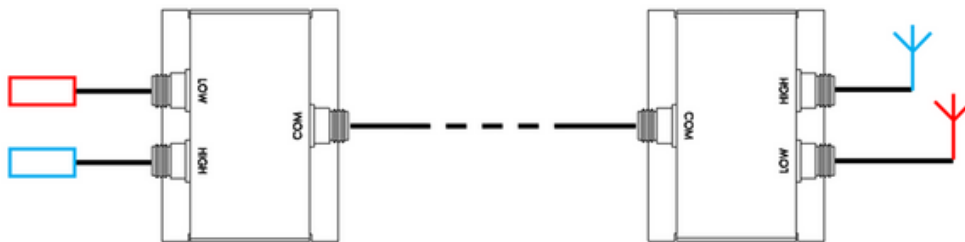


Figure 6

## Conclusion

RF diplexers 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 dual-band antenna, a multi-band radio, or minimizing cable runs, diplexers like the DBD1 offer practical solutions for streamlining RF installations, making them an essential tool in communication systems.



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## Mobile Mark Resources

- DBD1 Product Page: <https://www.mobilemark.com/product/dbd1/>
- Dual Band Antenna Spec Sheet: <https://www.mobilemark.com/?s=a1833>
- Yagi Products Page: <https://www.mobilemark.com/product-category/lmr-hf-uhf-vhf-220/yagi/>
- DBD3 Product Page: <https://www.mobilemark.com/product/dbd3/>

**To learn more, please refer to our additional White Papers  
or reach out to speak with an antenna expert  
through [info@mobilemark.com](mailto:info@mobilemark.com).**