

Single Polarized Hybrid Couplers for 2 Outdoor Radio Units

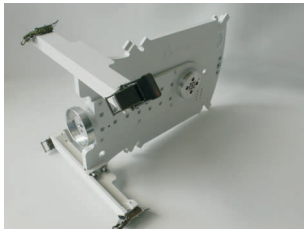
6 ... 80 GHz

Introduction

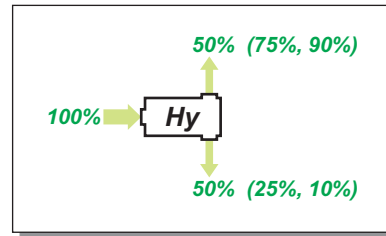
Today's high speed point to point communication links place extreme challenge on the network operators. High reliability and high capacity is essential for all service providers. GRANTE Corporation offers a future proof solution to satisfy the professional requirements. Application of the hybrid coupler family yields to extreme flexibility and superior performance, setting the target on leading solutions in microwave technology.

Hybrid Coupler System

Hybrids couplers are 3-port microwave waveguide systems that split the input power into two parts. Typical coupling coefficients are 3 dB (50 %), 6 dB (25 %) and 10 dB (10 %), however, any other coupling factor is available upon customer's request.



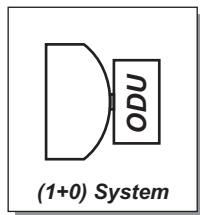
GRANTE Hybrid Coupler



Hybrids divide the input power into two (not necessarily equal) parts

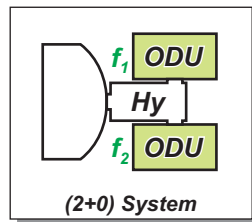
Since hybrids provide high inter-port isolation and low return loss, their application together with single polarized high performance antennas lead to use of two independent transmission channels on a single antenna at the same time.

The transmission capacity of the microwave link can be doubled by using the two outdoor radio units (ODUs) in simultaneous operation mode (on different frequency channels). The link availability may be increased by several orders of magnitude in hot standby mode (the second radio is for the immediate replacement of the main ODU in case of failure).



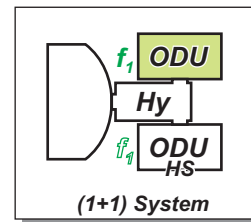
(1+0) System

Initial configuration



(2+0) System

Simultaneous operation (double capacity)



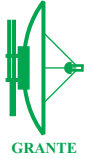
(1+1) System

Hot standby operation (increased availability)

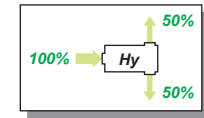
GRANTE hybrids can be attached to the back of the antennas in direct and separate mounted ways. The interfaces on the ODU side are upon customer's request (coaxial cable connector, standard waveguide flanges, ODU interface or any special request).



(1+1) system outdoor units directly mounted on a hybrid+antenna system



Single Polarized 2-radio Hybrid Couplers Specifications (3 dB nominal coupling)



Electrical Specification (Single Band)

Operating Frequency Band	6L GHz	6U GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Operating Frequency Range	5.925–6.425 GHz	6.425–7.125 GHz	7.125–7.750 GHz	7.750–8.500 GHz	10.100–10.700 GHz	10.700–11.700 GHz	12.750–13.250 GHz	14.200–15.350 GHz	17.700–19.700 GHz
Insertion Loss <i>main</i>	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB
Insertion Loss <i>standby</i>	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB	3.5 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB
Return Loss	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB

Interface ¹ *antenna side* Upon Customer's Request
¹ Direct and separate mounting is available upon request.

Interfaces ² *ODU side* Upon Customer's Request
² Coaxial connector, standard waveguide flanges or any ODU interface is available upon request.

Electrical Specification (Single Band)

Operating Frequency Band	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz	42 GHz	80 GHz
Operating Frequency Range	21.200–23.600 GHz	24.500–26.500 GHz	27.500–29.500 GHz	31.800–33.400 GHz	37.000–39.500 GHz	40.500–43.500 GHz	71.000–86.000 GHz
Insertion Loss <i>main</i>	3.5 dB	3.8 dB	3.8 dB	3.8 dB	3.8 dB	3.8 dB	4.7 dB
Insertion Loss <i>standby</i>	3.5 dB	3.8 dB	3.8 dB	3.8 dB	3.8 dB	3.8 dB	4.7 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	18 dB
Return Loss	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	17.7 dB	14 dB

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Electrical Specification (Dual Band)

Operating Frequency Band	6L–6U GHz	7–8 GHz	10–11 GHz	13–15 GHz	18–23 GHz	23–26 GHz	28–32 GHz
Operating Frequency Range	5.925–7.125 GHz	7.125–8.500 GHz	10.100–11.700 GHz	12.750–15.350 GHz	17.700–23.600 GHz	21.200–26.500 GHz	27.500–33.400 GHz
Insertion Loss <i>main</i>	4.0 dB	4.0 dB	4.0 dB	4.0 dB	4.2 dB	4.2 dB	4.2 dB
Insertion Loss <i>standby</i>	4.0 dB	4.0 dB	4.0 dB	4.0 dB	4.2 dB	4.2 dB	4.2 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB
Return Loss	17.7 dB	17.7 dB	17.7 dB	17.7 dB	16.5 dB	16.5 dB	16.5 dB

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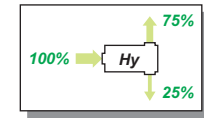
Interfaces ² *ODU side* Upon Customer's Request
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GRANTE Hybrid Coupler



Single Polarized 2-radio Hybrid Couplers Specifications (6 dB nominal coupling)



Electrical Specification (Single Band)

Operating Frequency Band	6L GHz	6U GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Operating Frequency Range	5.925–6.425 GHz	6.425–7.125 GHz	7.125–7.750 GHz	7.750–8.500 GHz	10.100–10.700 GHz	10.700–11.700 GHz	12.750–13.250 GHz	14.200–15.350 GHz	17.700–19.700 GHz
Insertion Loss <i>main</i>	1.7 dB	1.7 dB	1.7 dB	1.7 dB	1.7 dB	1.7 dB	1.7 dB	1.7 dB	1.7 dB
Insertion Loss <i>standby</i>	7.0 dB	7.0 dB	7.0 dB	7.0 dB	7.0 dB	7.0 dB	7.0 dB	7.0 dB	7.0 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB
Return Loss	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB

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Operating Frequency Range	21.200–23.600 GHz	24.500–26.500 GHz	27.500–29.500 GHz	31.800–33.400 GHz	37.000–39.500 GHz	40.500–43.500 GHz
Insertion Loss <i>main</i>	1.7 dB	1.8 dB	1.8 dB	1.8 dB	1.8 dB	1.8 dB
Insertion Loss <i>standby</i>	7.0 dB	7.2 dB	7.2 dB	7.2 dB	7.2 dB	7.2 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB
Return Loss	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	17.7 dB

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Operating Frequency Range	5.925–7.125 GHz	7.125–8.500 GHz	10.100–11.700 GHz	12.750–15.350 GHz	17.700–23.600 GHz
Insertion Loss <i>main</i>	2.0 dB	2.0 dB	2.0 dB	2.0 dB	2.0 dB
Insertion Loss <i>standby</i>	7.4 dB	7.4 dB	7.4 dB	7.4 dB	7.4 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB
Return Loss	17.7 dB	17.7 dB	17.7 dB	17.7 dB	16.5 dB

Interface ¹ *antenna side* Upon Customer's Request

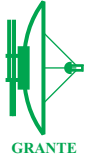
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Interfaces ² *ODU side* Upon Customer's Request

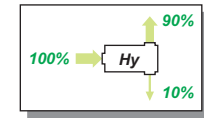
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GRANTE Hybrid Coupler



Single Polarized 2-radio Hybrid Couplers Specifications (10 dB nominal coupling)



Electrical Specification (Single Band)

Operating Frequency Band	6L GHz	6U GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Operating Frequency Range	5.925–6.425 GHz	6.425–7.125 GHz	7.125–7.750 GHz	7.750–8.500 GHz	10.100–10.700 GHz	10.700–11.700 GHz	12.750–13.250 GHz	14.200–15.350 GHz	17.700–19.700 GHz
Insertion Loss <i>main</i>	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB
Insertion Loss <i>standby</i>	10.8 dB	10.8 dB	10.8 dB	10.8 dB	10.8 dB	10.8 dB	10.8 dB	10.8 dB	10.8 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB
Return Loss	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB

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Electrical Specification (Single Band)

Operating Frequency Band	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz	42 GHz
Operating Frequency Range	21.200–23.600 GHz	24.500–26.500 GHz	27.500–29.500 GHz	31.800–33.400 GHz	37.000–39.500 GHz	40.500–43.500 GHz
Insertion Loss <i>main</i>	1.0 dB	1.1 dB	1.1 dB	1.1 dB	1.1 dB	1.1 dB
Insertion Loss <i>standby</i>	10.8 dB	11.0 dB	11.0 dB	11.0 dB	11.0 dB	11.0 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB	20 dB	20 dB
Return Loss	20.8 dB	20.8 dB	20.8 dB	20.8 dB	20.8 dB	17.7 dB

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Electrical Specification (Dual Band)

Operating Frequency Band	6L–6U GHz	7–8 GHz	10–11 GHz	13–15 GHz
Operating Frequency Range	5.925–7.125 GHz	7.125–8.500 GHz	10.100–11.700 GHz	12.750–15.350 GHz
Insertion Loss <i>main</i>	1.4 dB	1.4 dB	1.4 dB	1.4 dB
Insertion Loss <i>standby</i>	11.2 dB	11.2 dB	11.2 dB	11.2 dB
Isolation <i>inter-port</i>	20 dB	20 dB	20 dB	20 dB
Return Loss	17.7 dB	17.7 dB	17.7 dB	17.7 dB

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