

## WSDU-1X8R

High Dynamic 8 Way Multicoupler 100 kHz ... 4000 MHz, 20 MHz ... 3600 MHz

### Features

- wideband
- high dynamic
- lossless signal distribution
- auxiliary input / output
- variants with AC and DC supply
- optional VLF/HF suppression filter
- ultra low jitter

### Applications

- antenna radio signal distribution
- radio monitoring
- direction finding
- broadcast and GNSS distribution
- low jitter femto clock distribution



### At a Glance

Multicouplers are needed to distribute a common signal source to many outputs without loss in level and low distortion. In receiving applications, a huge amount of radio signals covered in the large frequency range effort high demands to the linearity and the noise of the multicoupler. The WSDU-1X8R is the right solution for modern radio signal distribution systems that must cover the frequency range up to 4 GHz.

### Simplified Block Diagram

The WSDU-1X8R distributes the signals from one input to 8 equal outputs without loss in level.



The WSDU-1X8R is available in variants with AC or DC power supply.

### Lossless 1 to 8 Signal Distribution

The signal at the input is amplified by using broadband low-noise amplifiers with a wide dynamic range -weak signals are linearly amplified even if they occur next to signals with very strong levels-. As a result, the distributed input signal is made available at the eight outputs without any loss in level. The hardware structure of the distribution offers optimal phase and amplitude balance performance.

All inputs and outputs have N female connectors.

### V/UHF Receiving Systems

For the use in VHF and UHF receiving systems a variant with a 20 MHz high pass filter in the input path is available. The high pass filter suppresses unwanted signals like local radio stations in the LF and HF range.

### High Port-to-Port Isolation

WSDU-1X8R features a high port-to-port isolation. The connected receivers are prevented from affecting each other, e.g. via local oscillators or synthesizers.

### Auxiliary Port

For maintenance during operation the auxiliary port offers the complete signal spectrum. It can be monitored without signal interruption. Alternative the auxiliary port can be used for e.g. test signal injection.

## Filters for Short Wave

For operation in short wave applications, different bandpass filters for external mounting are available. With help of this filters out band signals are effectively suppressed to avoid unwanted distortions in the short-wave range. The filters can be easily mounted on the RF input socket of the WSDU-1X8R.



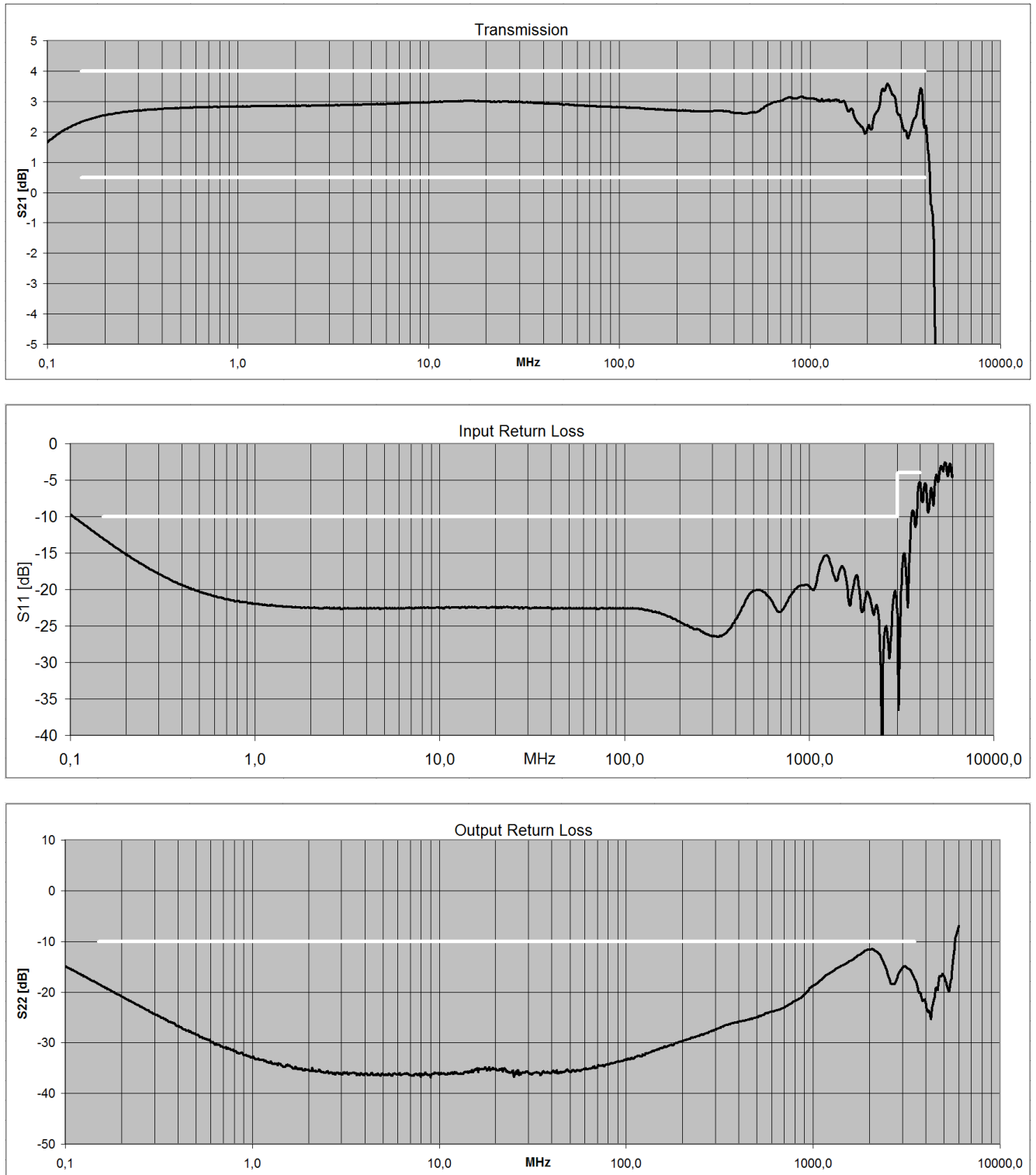
## RF Specification

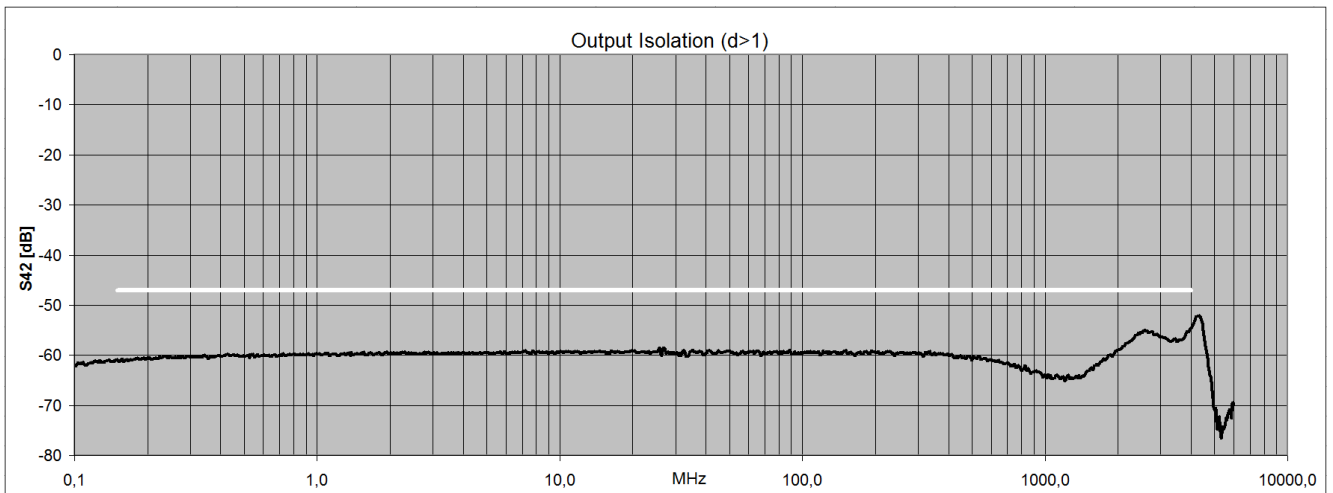
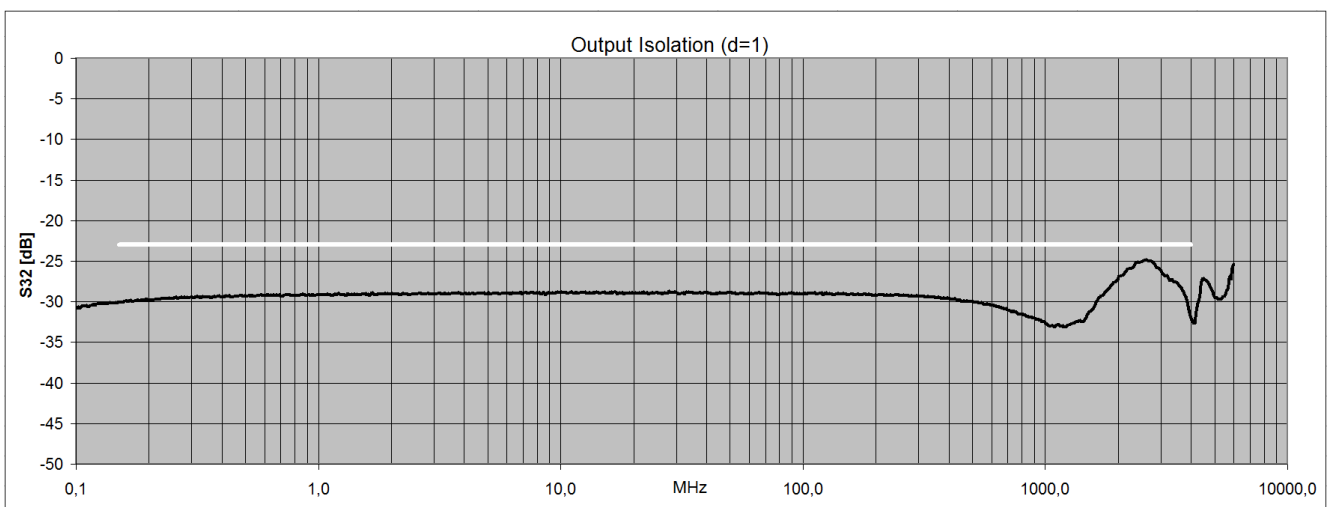
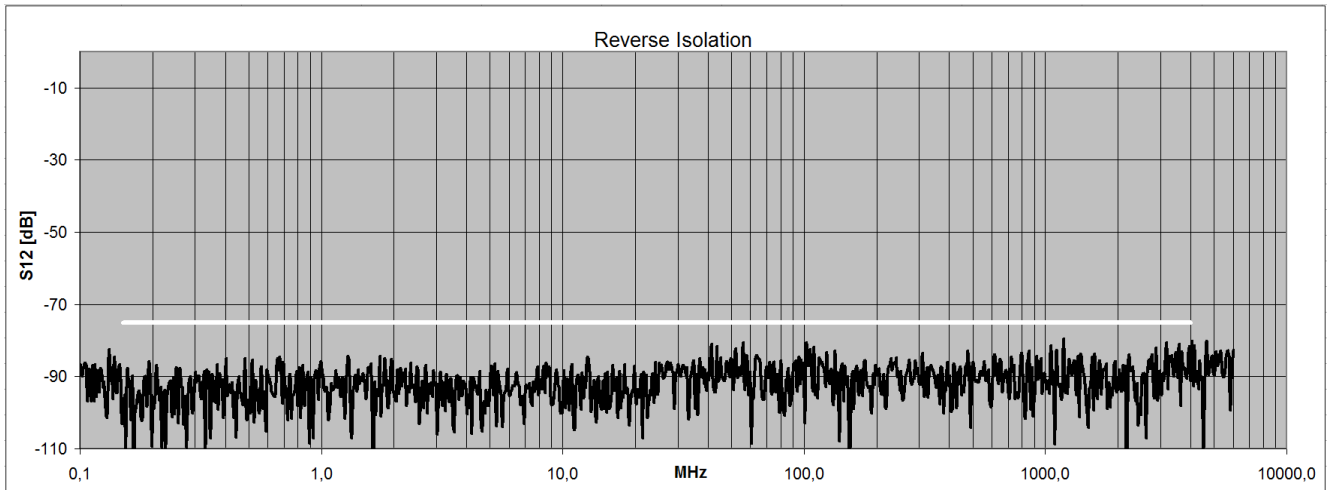
| Parameter                       | Symbol             | Min. | Typ.      | Max.      | Unit       | Condition                      |
|---------------------------------|--------------------|------|-----------|-----------|------------|--------------------------------|
| impedance                       | $Z_{in} / Z_{out}$ |      | 50        |           | Ohm        |                                |
| low frequency                   | $f_{min}$          |      | 100       | 150       | kHz        | without high pass filter       |
| high frequency                  | $f_{max}$          | 4000 | 5000      |           | MHz        |                                |
| low frequency                   | $f_{min}$          |      |           | 20        | MHz        | with high pass filter, note 2  |
| high frequency                  | $f_{max}$          | 3600 | 4000      |           | MHz        |                                |
| high pass suppression           | $S_{21}$           |      | -23       |           | dBr        | @ 5 MHz                        |
|                                 | $S_{21}$           |      | -60       |           | dBr        | @ 1 MHz                        |
| gain                            | $S_{21}$           | 0.5  | 2.5       | 4.0       | dB         |                                |
| gain flatness                   | $\Delta S_{21}$    |      | $\pm 1.0$ | $\pm 1.5$ | dB         |                                |
| input return loss               | $S_{11}$           |      | -17       | -10       | dB         | 150 kHz $\leq f \leq$ 3000 MHz |
|                                 | $S_{11}$           |      | -8        | -4        | dB         | $f > 3000$ MHz                 |
| output return loss              | $S_{22}$           |      | -17       | -10       | dB         |                                |
| reverse isolation               | $S_{12}$           |      | -75       | -90       | dB         |                                |
| output isolation                | $S_{23}$           |      | -23       | -28       | dB         | neighbored outputs (d=1)       |
|                                 | $S_{23}$           |      | -60       | -47       | dB         | distance $> 1$                 |
| amplitude balance               | $dS_{23}$          |      | $\pm 0.1$ |           | dB         | $f \leq 2500$ MHz              |
|                                 | $dS_{23}$          |      | $\pm 0.3$ |           | dB         | $f > 2500$ MHz                 |
| phase balance                   | $\phi_{23}$        |      | $\pm 3$   |           | deg        | $f \leq 2000$ MHz              |
| 1 dB compression                | $P_{1dB}$          | +6   | +8        |           | dBm        | $f < 1000$ MHz                 |
|                                 | $P_{1dB}$          | +4   | +6        |           | dBm        | 1000 MHz $< f \leq$ 2000 MHz   |
|                                 | $P_{1dB}$          | +2   | +5        |           | dBm        | 2000 MHz $< f \leq$ 3500 MHz   |
| 3 <sup>rd</sup> order intercept | OIP3               | +19  | +22       |           | dBm        | $f = 1000$ MHz, note 1         |
|                                 | OIP3               | +14  | +16       |           | dBm        | $f = 2000$ MHz, note 1         |
|                                 | OIP3               | +11  | +13       |           | dBm        | $f = 3000$ MHz, note 1         |
| 2 <sup>nd</sup> order intercept | OIP2               | +37  | +45       |           | dBm        | $f = 1000$ MHz, note 1         |
|                                 | OIP2               | +20  | +22       |           | dBm        | $f = 2000$ MHz, note 1         |
|                                 | OIP2               | +20  | +25       |           | dBm        | $f = 3000$ MHz, note 1         |
| noise figure                    | NF                 |      | 9         |           | dB         | $f < 500$ kHz                  |
|                                 | NF                 |      | 8         | 9.5       | dB         | 500 kHz $\leq f \leq$ 2000 MHz |
|                                 | NF                 |      | 9         |           | dB         | $f > 2000$ MHz                 |
| spurious                        | $P_{SPUR}$         |      | -125      |           | dBm        | 150 kHz $\pm$ 30kHz            |
|                                 | $P_{SPUR}$         |      | -118      |           | dBm        | 120 kHz $\pm$ 20kHz            |
| added jitter                    | $t_j$              |      | $< 2.3$   |           | fs         | @500 MHz, 1 Hz ... 1 MHz       |
| maximum input power             | $P_{RF max}$       |      |           | +15       | dBm        | CW, no damage                  |
| maximum DC voltage              | $U_{DC}$           |      |           | 20        | V          | all RF ports                   |
| ESD discharge resistor          | $R_{ESD}$          |      | 4.7       |           | k $\Omega$ | all RF ports                   |
| RF connectors                   | $X_{RF}$           |      | N female  |           |            |                                |
| monitor coupling                | a                  |      | -30       |           | dB         | bidirectional                  |

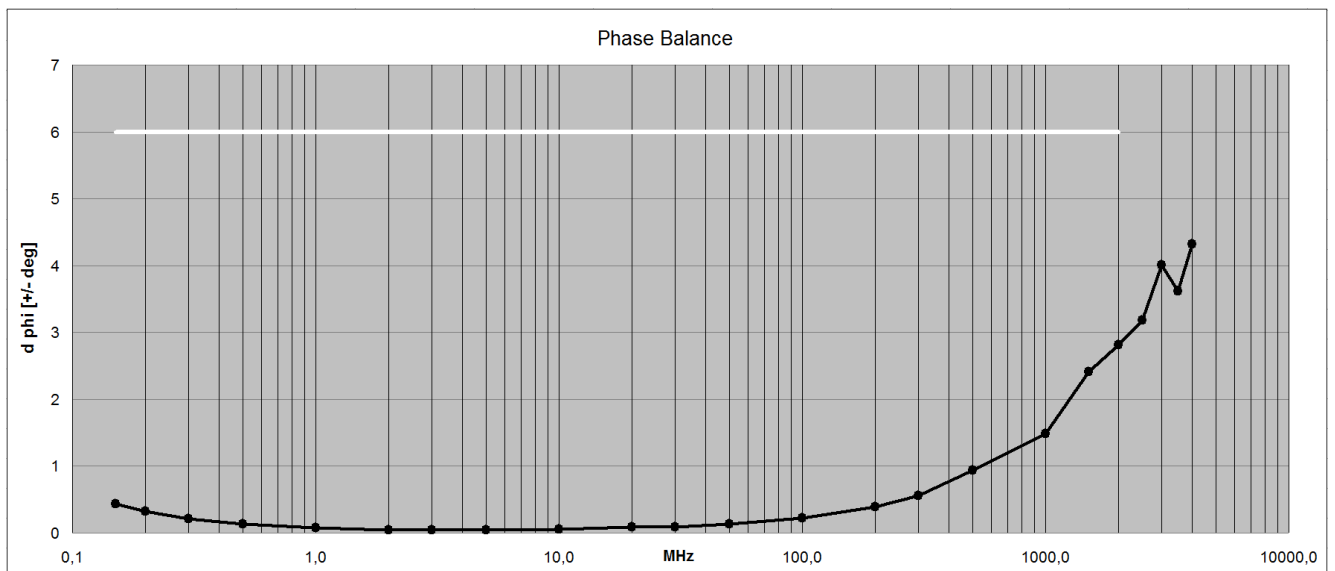
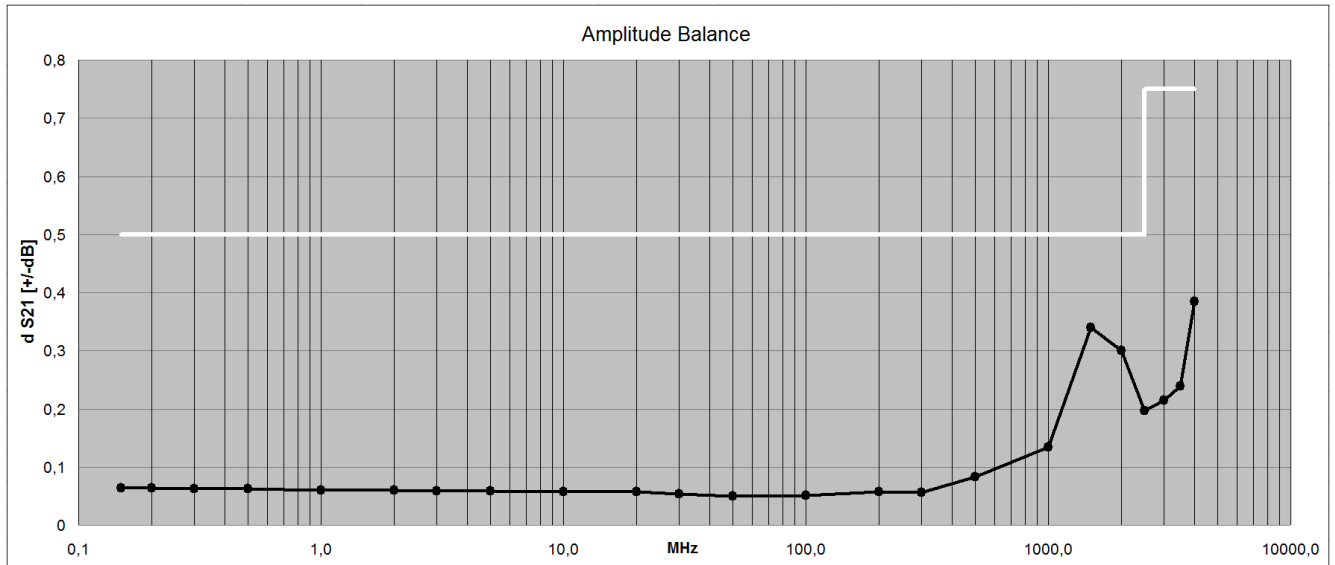
Note 1: frequency space 100 MHz

**Common Specification**

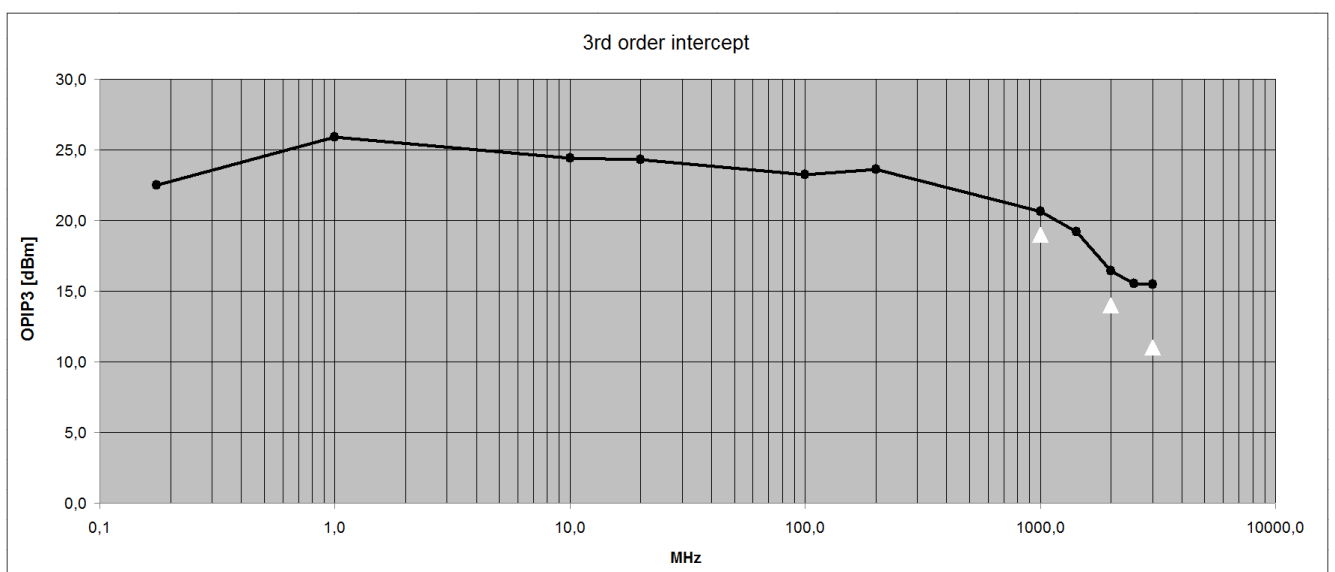
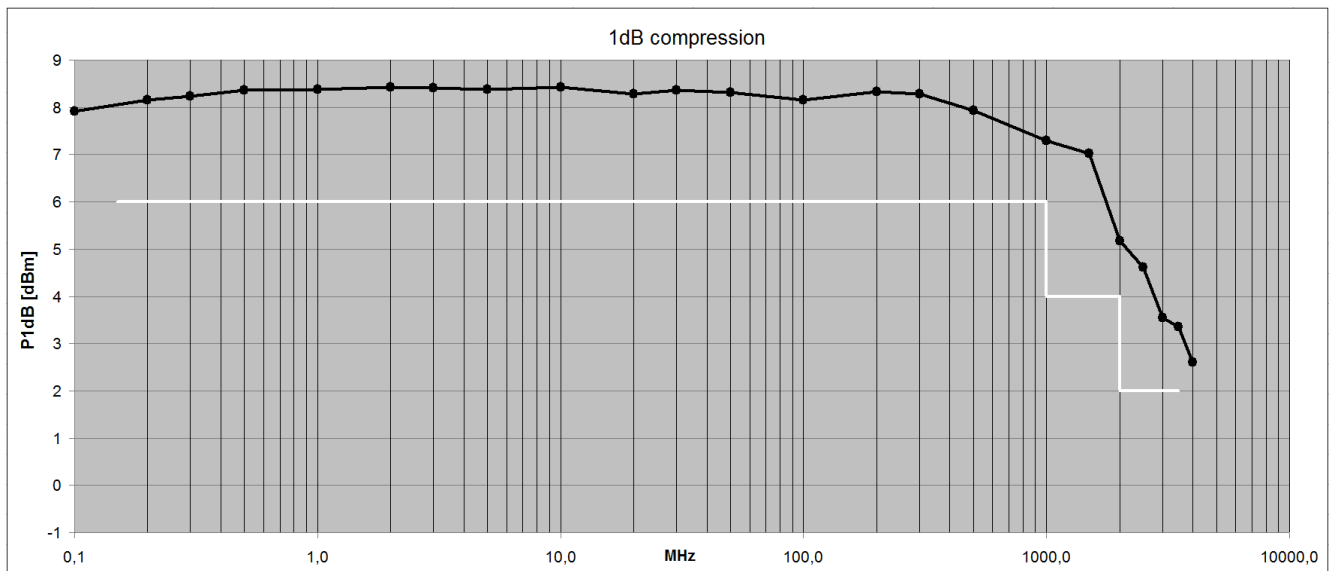
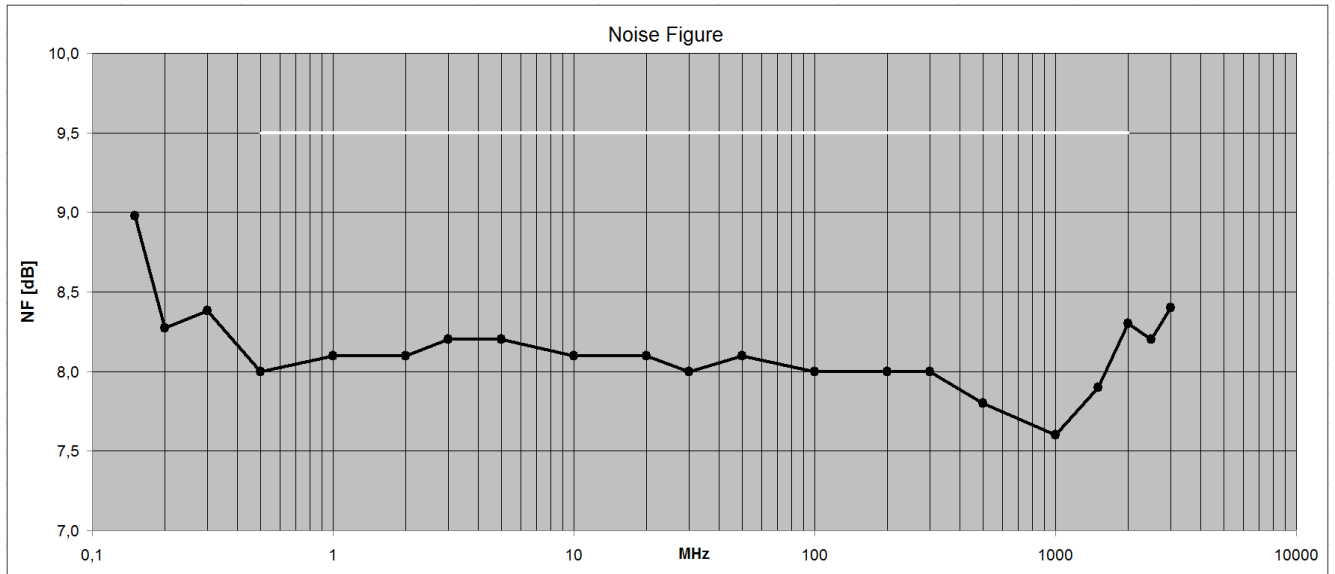
| Parameter                     | Symbol                                              | Min.                   | Typ.             | Max. | Unit                                                                                                                                                      | Condition                               |
|-------------------------------|-----------------------------------------------------|------------------------|------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>AC supply variant</b>      |                                                     |                        |                  |      |                                                                                                                                                           |                                         |
| voltage supply range          | U <sub>AC</sub>                                     | 90                     | 230              | 260  | V                                                                                                                                                         | 50 / 60 Hz AC                           |
| power consumption             | P                                                   |                        | 18               | 50   | W                                                                                                                                                         |                                         |
| power socket                  | X <sub>AC</sub>                                     | IEC-60320 C14          |                  |      |                                                                                                                                                           | country specific mains cable            |
| <b>DC supply variant</b>      |                                                     |                        |                  |      |                                                                                                                                                           |                                         |
| voltage supply range          | U <sub>DC</sub>                                     | 22                     | 24               | 30   | V                                                                                                                                                         |                                         |
| power consumption             | P                                                   |                        | 15               |      | W                                                                                                                                                         |                                         |
| power socket                  | X <sub>AC</sub>                                     | XLR male               |                  |      |                                                                                                                                                           |                                         |
| <b>Dimensions and weight</b>  |                                                     |                        |                  |      |                                                                                                                                                           |                                         |
| dimensions                    | W x H x D                                           | approx. 482 x 44 x 145 |                  |      | mm                                                                                                                                                        | 19" 1 U, without connectors and handles |
| weight                        | m                                                   |                        | 3.5              |      | kg                                                                                                                                                        |                                         |
| <b>Environment Conditions</b> |                                                     |                        |                  |      |                                                                                                                                                           |                                         |
| operating temp. range         | T <sub>o</sub>                                      | +5                     |                  | +45  | °C                                                                                                                                                        |                                         |
| storage temp. range           | T <sub>s</sub>                                      | -40                    |                  | +70  | °C                                                                                                                                                        |                                         |
| <b>Product conformity</b>     |                                                     |                        |                  |      |                                                                                                                                                           |                                         |
| Electromagnetic compatibility | EU: in line with EMC directive (2014/30/EC)         |                        |                  |      | applied harmonized standards:<br>EN 61326-1 (for use in industrial environment),<br>EN 61326-2-1,<br>EN 55011 (class B),<br>EN 61000-3-2,<br>EN 61000-3-3 |                                         |
| Electrical safety             | EU: in line with low voltage directive (2014/35/EC) |                        |                  |      | applied harmonized standard:<br>EN 61010-1                                                                                                                |                                         |
| <b>Ordering information</b>   | WSDU-1X8R                                           |                        | P/N: 1107.6102.1 |      | AC supply                                                                                                                                                 |                                         |
|                               | WSDU-1X8R                                           |                        | P/N: 1107.6102.2 |      | DC supply                                                                                                                                                 |                                         |
|                               | WSDU-1X8R                                           |                        | P/N: 1107.6102.3 |      | 20 MHz HP-filter, AC supply                                                                                                                               |                                         |
|                               | WSDU-1X8R                                           |                        | P/N: 1107.6102.4 |      | 20 MHz HP-filter, DC supply                                                                                                                               |                                         |

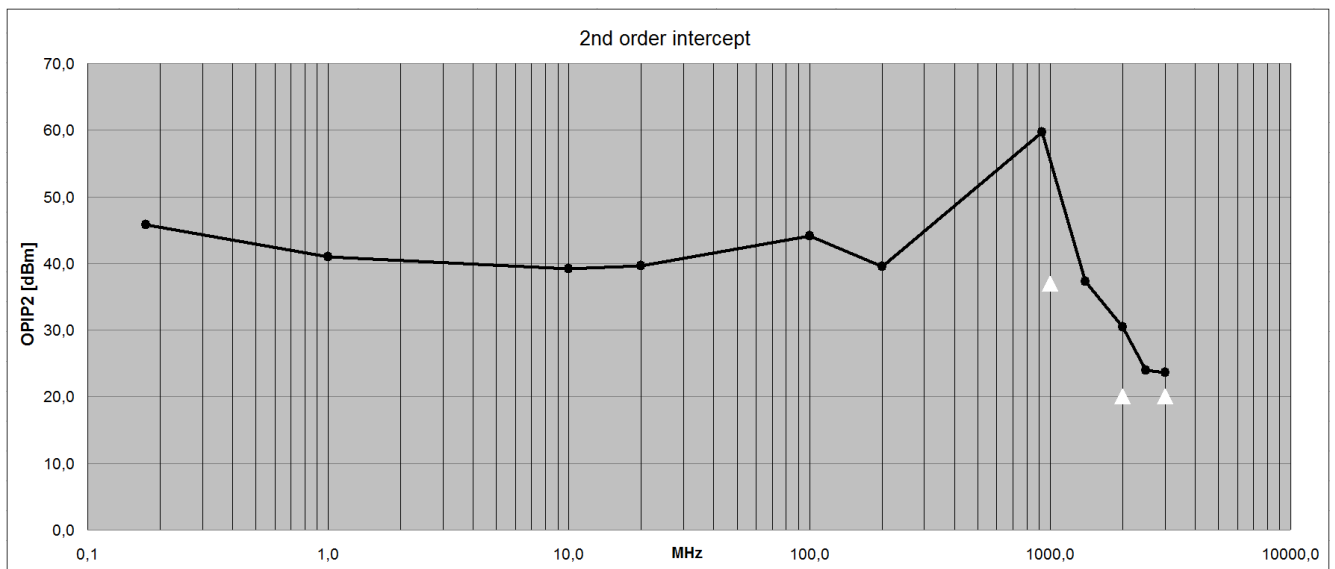
**S-Parameters** (typical responses)

**Isolation (typical responses)**

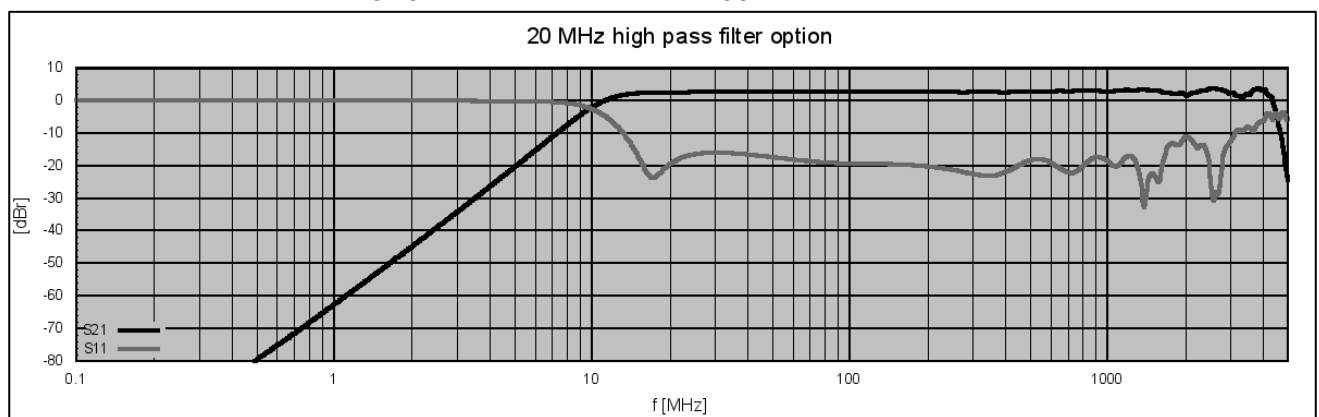
**Balances (typical responses)**

## Dynamic Range (typical responses)

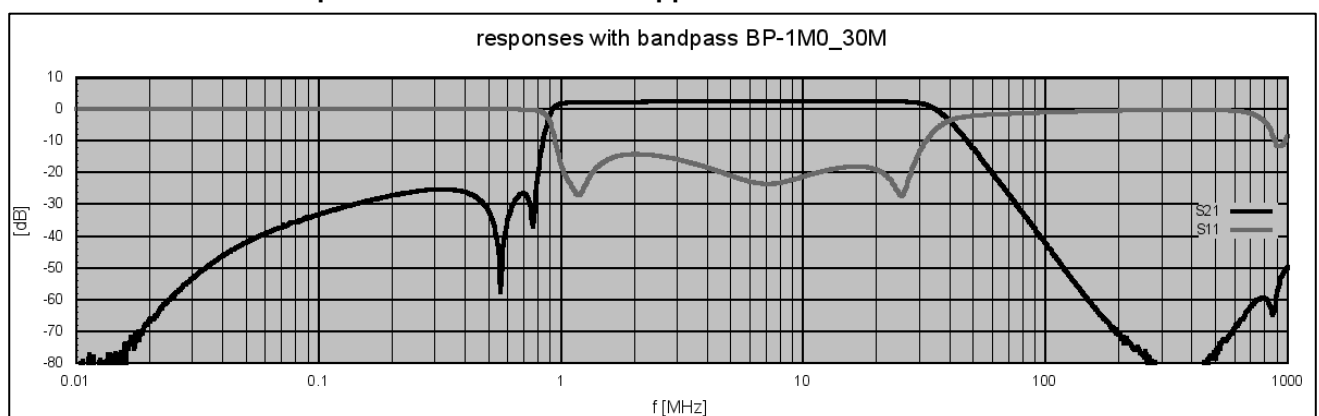




### S-Parameters with 20 MHz high pass filter for VHF/UHF application



### S-Parameters with band pass filter for short wave application



Transmission and input return loss with 1 ... 30 MHz band pass filter BP-1M0\_30M installed in RF input.

### Appearance of external mountable filter



Filters for short wave with different bandwidths are available. See table related products.



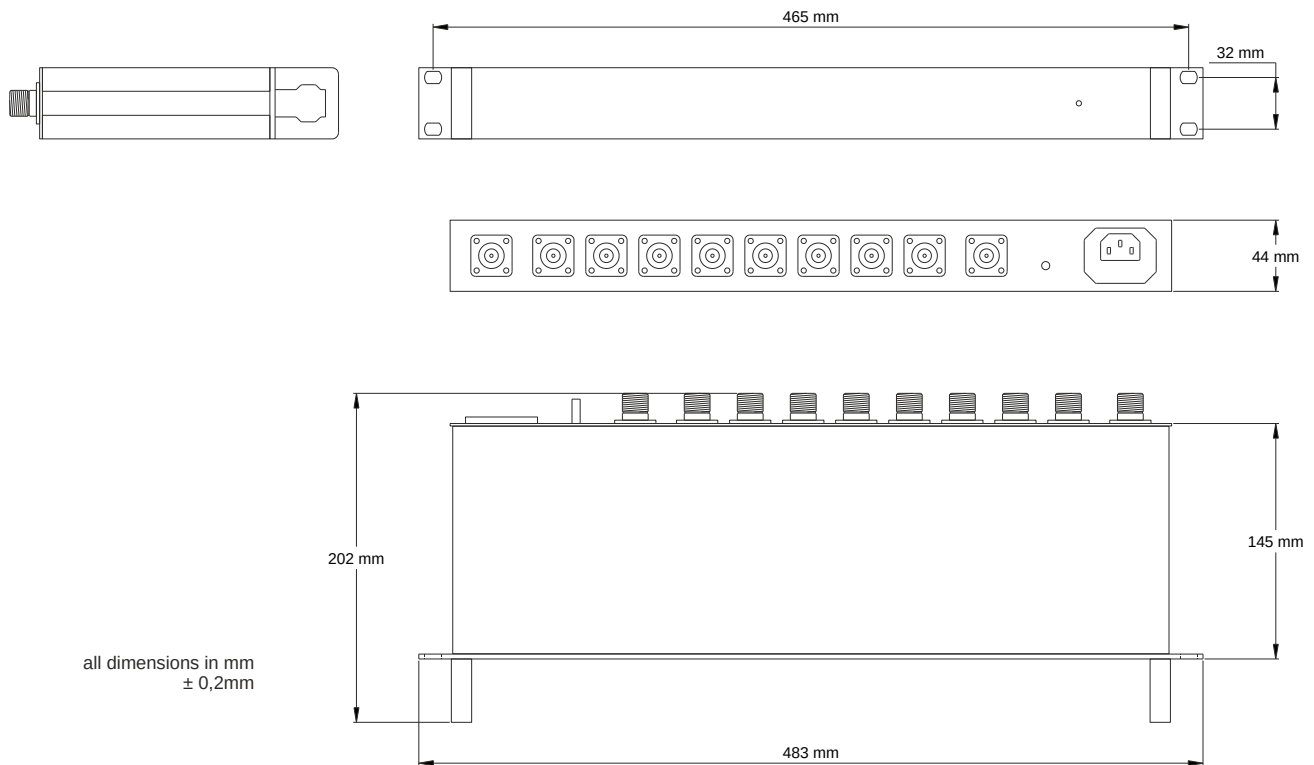
## Front View



## Rear View (Variant with AC supply)



## Dimensions



**Related Products** (External filters for short wave applications)

| Product    | P/N         | Description                                                                                                                                                                                                                                                                                     |
|------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BP-0M5_30M | 1502.6301.1 | Band Pass Filter Module 0.5 ... 30 MHz<br>90 V surge arrestor and 100 k $\Omega$ ESD resistor to GND at input,<br>level limiter,<br>stop band rejections:<br>30 dB typ. $f < 400$ kHz,<br>45 dB typ. $80 \text{ MHz} \leq f \leq 200 \text{ MHz}$ ,<br>N RF connectors (male / female)          |
| BP-1M0_30M | 1502.6311.1 | Band Pass Filter Module 1.0 ... 30 MHz<br>90 V surge arrestor and 100 k $\Omega$ ESD resistor to GND at input,<br>level limiter,<br>stop band rejections:<br>30 dB typ. $f < 800$ kHz,<br>45 dB typ. $80 \text{ MHz} \leq f \leq 200 \text{ MHz}$ ,<br>N RF connectors (male / female)          |
| BP-1M7_30M | 1502.6321.1 | Band Pass Filter Module 1.7 ... 30 MHz<br>90 V surge arrestor and 100 k $\Omega$ ESD resistor to GND at input,<br>level limiter,<br>stop band rejections:<br>30 dB typ. $f < 1.3 \text{ MHz}$ ,<br>45 dB typ. $80 \text{ MHz} \leq f \leq 200 \text{ MHz}$ ,<br>N RF connectors (male / female) |
| LP-30M     | 1107.6301.1 | 30 MHz Low Pass Filter Module<br>Passband DC...30 MHz<br>90 V surge arrestor and 100 k $\Omega$ ESD resistor to GND at input,<br>level limiter,<br>stop band rejection:<br>45 dB typ. @ $80 \text{ MHz} \leq f \leq 200 \text{ MHz}$ ,<br>N RF connectors (male / female)                       |

**Related Products** (Multicouplers and Matrices)

| Product    | P/N         | Description                                                                                                                                                                 |
|------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WSDU-1X8SR | 1502.6102.x | High Dynamic 1X8 Shortwave Signal Distribution Unit<br>200 kHz ... 30 MHz<br>LAN remote interface with SNMPv2 trap function.<br>Variants with AC or DC power supply.        |
| WSDU-1X8R  | 1107.6102.x | High Dynamic 8 Way Multicoupler<br>100 kHz ... 4000 MHz.<br>Variants with AC or DC power supply.                                                                            |
| WSDU-1X8LR | 1107.6152.x | High Dynamic 8 Way Multicoupler for Broadcast Signals<br>100 kHz ... 4000 MHz<br>Variants with AC or DC power supply.                                                       |
| WSDU-2X4R  | 1107.6202.x | High Dynamic 2 Section 4 Way Multicoupler<br>100 kHz ... 4000 MHz.<br>Variants with AC or DC power supply.                                                                  |
| WSDU-2X4LR | 1107.6252.x | High Dynamic 8 Way Multicoupler for Broadcast Signals<br>100 kHz ... 4000 MHz.<br>Variants with AC or DC power supply.                                                      |
| WSDU-1X8ER | 1501.6302.x | Extremely Wideband 1 to 8 Signal Distribution Unit<br>20 ... 8000 MHz<br>LAN remote interface with SNMPv2 trap function.<br>Variants with AC or DC power supply.            |
| WSDU-2X4ER | 1501.6102.x | Extremely Wideband 2 Section 1X4 Signal Distribution Unit<br>20 MHz... 8000 MHz.<br>LAN remote interface with SNMPv2 trap function.<br>Variants with AC or DC power supply. |
| RSWM-4X4R  | 1205.4102.x | Wideband 4X4 Switching Matrix, non-blocking-<br>2 variants: 100 kHz ... 4000 MHz and 20 MHz ... 4000 MHz,<br>LAN remote interface with SNMPv2 trap function.                |
| RSWM-4X4ER | 1205.4202.1 | Extremely Wideband 4X4 Switching Matrix<br>20 ... 8000 MHz,<br>non-blocking<br>LAN remote interface with SNMPv2 trap function.                                              |