

## De-Multiplexer for Broadcast and Navigation Signals with Resistive DC Loads Dual (AM/FM), DAB3/DAB-L, DVB-T, GNSS, SAT (SDARS)

### Features

- de-multiplexer for broadcast bands
- DC loads in each channel
- optical indication of phantom voltage
- direct fakra connection to (DUT)

### Applications

- AM, FM, DAB, DVB-T, SDARS
- GNSS: GPS, GLONASS, GALILEO
- automotive infotainment test
- R&D
- production



### At a Glance

FDMX from Becker Nachrichtentechnik is a compact de-multiplexer unit as table top unit in 50 Ohm technology. The FDMX splits the broadcast bands into the individual sections and makes them available at 6 RF ports. The ports have coded Fakra connectors, that have become standard in automobile infotainment, for the direct connection to the device under test (DUT). All outputs have integrated DC loads for the emulation of active antennas. Thus the DUT has the full RF and DC environment for ready to use operation in laboratories.

The presences of phantom voltages coming from the DUT are indicated by LEDs on the front side of the FDMX.

With help of the FDMX cost efficient solutions for multi signal distribution in R&D and factory buildings can be realized using only one common coaxial cable for transmission of all broadcast and GNSS signals to the test setups.

### Special Features

The FDMX unit enables plug and play solution for the RF connection of car infotainment components. FDMX has dual ports for “analogue” AM/FM radio signals, one port for digital radio DAB3/DAB-L signals, one port for digital television DVB-T signals, one port for satellite navigation signals GNSS (GPS, GALILEO, GLONASS) and one port for satellite radio signals SAT (SDARS, XM radio). All RF ports features resistive DC loads for the phantom supplies in the DUTs.

A Fakra cable set with cable length 1 m for all RF connectors are part of the product package.

### Rugged Design

The FDMX unit is built in a milled aluminum case to give best shielding for avoiding EMI influences caused by radio signals coming from the environment. The RF connector for the multi signal input is N female.

## RF Specification

| Parameter              | Symbol             | Min.                            | Typ. | Max. | Unit | Condition                           |
|------------------------|--------------------|---------------------------------|------|------|------|-------------------------------------|
| impedance              | Z                  |                                 | 50   |      | Ohm  |                                     |
| <b>RF COM port</b>     |                    |                                 |      |      |      |                                     |
| low frequency          | f <sub>min</sub>   |                                 | 50   | 150  | kHz  |                                     |
| high frequency         | f <sub>max</sub>   | 2345                            | 2700 |      | MHz  |                                     |
| return loss            | S <sub>11</sub>    |                                 | -12  | -7   | dB   |                                     |
| RF input power         | P <sub>in</sub>    |                                 |      | +10  | dBm  |                                     |
| maximum DC Voltage     | U <sub>DC</sub>    |                                 |      | 20   | V    |                                     |
| ESD discharge resistor | R <sub>ESD</sub>   |                                 | 4.7  |      | kΩ   |                                     |
| connector              | X <sub>COM</sub>   | N female                        |      |      |      |                                     |
| <b>AM (Dual AM/FM)</b> |                    |                                 |      |      |      |                                     |
| low frequency          | f <sub>min</sub>   |                                 | 50   | 150  | kHz  |                                     |
| high frequency         | f <sub>max</sub>   | 30                              |      |      | MHz  |                                     |
| return loss            | S <sub>22</sub>    |                                 | -15  | -10  | dB   |                                     |
| insertion loss         | S <sub>21</sub>    | -4.5                            | -3.5 | -3.0 | dB   |                                     |
| <b>FM (Dual AM/FM)</b> |                    |                                 |      |      |      |                                     |
| low frequency          | f <sub>min</sub>   |                                 |      | 77   | MHz  |                                     |
| high frequency         | f <sub>max</sub>   | 108                             |      |      | MHz  |                                     |
| return loss            | S <sub>22</sub>    |                                 | -20  | -12  | dB   |                                     |
| insertion loss         | S <sub>21</sub>    | -5.5                            | -4.0 | -3.0 | dB   |                                     |
| attenuations           | a <sub>DAB</sub>   |                                 | -35  | -25  | dB   | DAB3 (174 ... 228 MHz)              |
|                        | a <sub>DVB-T</sub> |                                 | -75  | -50  | dB   | DVB-T (474 ... 786 MHz)             |
|                        | a <sub>GNSS</sub>  |                                 | -90  | -65  | dB   | GNSS (1555 ... 1625 MHz)            |
|                        | a <sub>SAT</sub>   |                                 | -80  | -55  | dB   | SAT (2320 ... 2345 MHz)             |
| RF input power         | P <sub>RF</sub>    |                                 |      | +10  | dBm  |                                     |
| DC load                | I <sub>DC</sub>    | 32                              | 35   | 38   | mA   | U <sub>DC</sub> = 8.5 V             |
|                        | U <sub>DC</sub>    | 0                               | 8.5  | 10.0 | V    | R <sub>L</sub> = 248 Ω, 400 mW max. |
| connector              | X <sub>AMFM</sub>  | Dual Fakra B plug (white, male) |      |      |      |                                     |
| <b>DAB3 / DAB-L</b>    |                    |                                 |      |      |      |                                     |
| low frequency          | f <sub>min</sub>   |                                 |      | 170  | MHz  | DAB3                                |
| high frequency         | f <sub>max</sub>   | 240                             |      |      | MHz  |                                     |
| return loss            | S <sub>33</sub>    |                                 | -15  | -9   | dB   |                                     |
| insertion loss         | S <sub>31</sub>    | -3.0                            | -2.0 | -0.5 | dB   |                                     |
|                        |                    | -2.5                            | -1.5 | -0.5 | dB   | f ≥ 174 MHz                         |
| low frequency          | f <sub>min</sub>   |                                 |      | 1452 | MHz  | DAB-L                               |
| high frequency         | f <sub>max</sub>   | 1480                            |      |      | MHz  |                                     |
| return loss            | S <sub>33</sub>    |                                 | -15  | -9   | dB   |                                     |
| insertion loss         | S <sub>31</sub>    | -6.0                            | -4.0 | -3.0 | dB   |                                     |
| attenuation            | a <sub>AMFM</sub>  |                                 | -45  | -35  | dB   | AM/FM (0.15 ... 108 MHz)            |
|                        | a <sub>DVB-T</sub> |                                 | -35  | -25  |      | DVB-T (474 ... 786 MHz)             |
|                        | a <sub>GNSS</sub>  |                                 | -40  | -25  |      | GNSS (1555 ... 1625 MHz)            |
|                        | a <sub>SAT</sub>   |                                 | -35  | -25  |      | SAT (2320 ... 2345 MHz)             |
| RF input power         | P <sub>RF</sub>    |                                 |      | +10  | dBm  |                                     |
| DC load                | I <sub>DC</sub>    | 32                              | 35   | 38   | mA   | U <sub>DC</sub> = 8.5 V             |
|                        | U <sub>DC</sub>    | 0                               | 8.5  | 10   | V    | R <sub>L</sub> = 248 Ω, 400 mW max. |
| connector              | X <sub>DAB</sub>   | Fakra A plug (black, male)      |      |      |      |                                     |

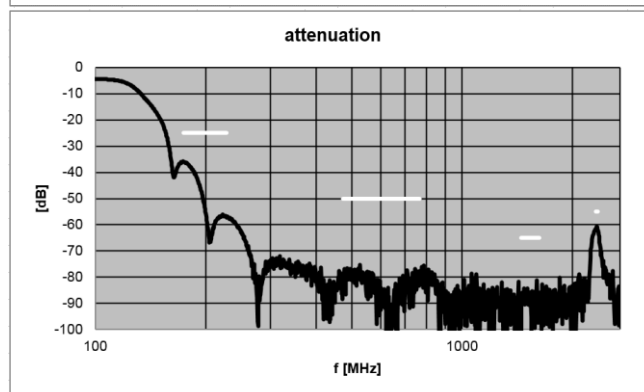
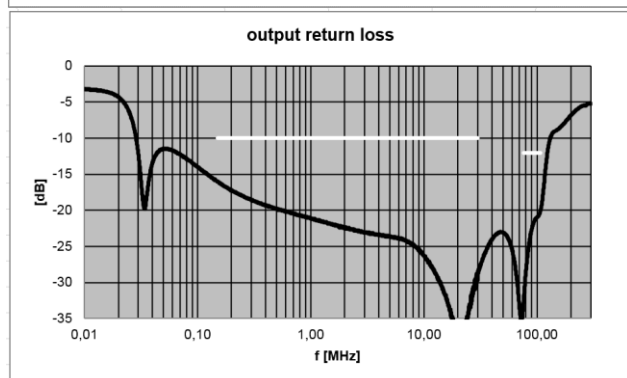
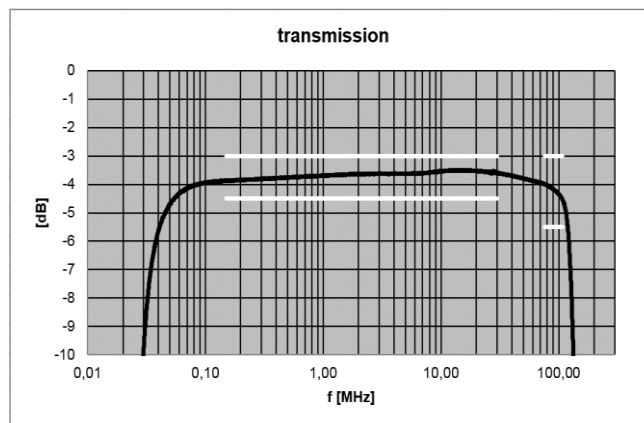
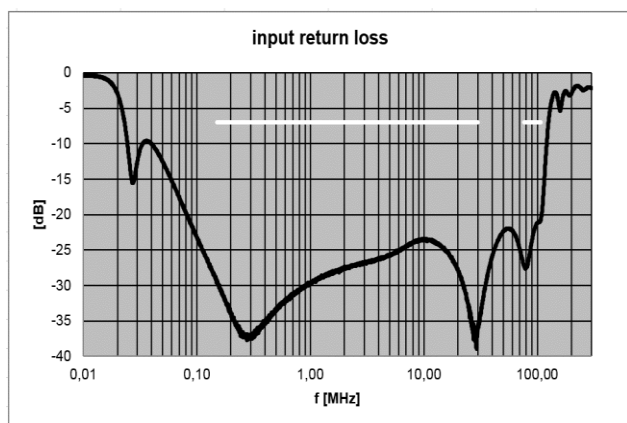
| DVB-T                |                    |                            |      |      |     |                                    |
|----------------------|--------------------|----------------------------|------|------|-----|------------------------------------|
| low frequency        | f <sub>min</sub>   |                            |      | 470  | MHz |                                    |
| high frequency       | f <sub>max</sub>   | 790                        |      |      | MHz |                                    |
| return loss          | S <sub>44</sub>    |                            | -12  | -7   | dB  |                                    |
| insertion loss       | S <sub>41</sub>    | -2.5                       | -1.5 | -0.5 | dB  |                                    |
| attenuation          | a <sub>AMFM</sub>  |                            | -100 | -60  | dB  | AM/FM (0.15...108 MHz)             |
|                      | a <sub>DAB3</sub>  |                            | -45  | -35  | dB  | DAB3 (174...228 MHz)               |
|                      | a <sub>DABL</sub>  |                            | -45  | -35  | dB  | DAB-L (1452...1492 MHz)            |
|                      | a <sub>GNSS</sub>  |                            | -50  | -40  | dB  | GNSS (1555...1625 MHz)             |
|                      | a <sub>SAT</sub>   |                            | -55  | -40  | dB  | SAT (2320...2345 MH)               |
| RF input power       | P <sub>RF</sub>    |                            |      | +10  | dBm |                                    |
| DC load              | I <sub>DC</sub>    | 32                         | 35   | 38   | mA  | U <sub>DC</sub> = 8.5 V            |
|                      | U <sub>DC</sub>    | 0                          | 8.5  | 10.0 | V   | R <sub>L</sub> = 248Ω, 400mW max.  |
| connector            | X <sub>DVB-T</sub> | Fakra E plug (green, male) |      |      |     |                                    |
| GNSS                 |                    |                            |      |      |     |                                    |
| low frequency        | f <sub>min</sub>   |                            |      | 1555 | MHz |                                    |
| high frequency       | f <sub>max</sub>   | 1625                       |      |      | MHz |                                    |
| return loss          | S <sub>55</sub>    |                            | -12  | -7   | dB  |                                    |
| insertion loss       | S <sub>51</sub>    | -7                         | -4   | -3   | dB  |                                    |
| attenuation          | a <sub>AMFM</sub>  |                            | -90  | -75  | dB  | AM/FM (0.15 ... 108 MHz)           |
|                      | a <sub>DAB3</sub>  |                            | -90  | -75  | dB  | DAB3 (174 ... 228 MHz)             |
|                      | a <sub>DABL</sub>  |                            | -35  | -25  | dB  | DAB-L (1452 ... 1480 MHz)          |
|                      | a <sub>DVB-T</sub> |                            | -80  | -55  | dB  | DVB-T (474 ... 786 MHz)            |
|                      | a <sub>SAT</sub>   |                            | -35  | -25  | dB  | SAT (2320 ... 2345 MH)             |
| RF input power       | P <sub>RF</sub>    |                            |      | +10  | dBm |                                    |
| DC load              | I <sub>DC</sub>    | 27                         | 30   | 33   | mA  | U <sub>DC</sub> = 5 V              |
|                      | U <sub>DC</sub>    | 0                          | 5    | 9    | V   | RL = 165 Ω, 500 mW max.            |
| connector            | X <sub>GNSS</sub>  | Fakra C plug (blue, male)  |      |      |     |                                    |
| SAT (SDARS)          |                    |                            |      |      |     |                                    |
| low frequency        | f <sub>min</sub>   |                            |      | 2320 | MHz |                                    |
| high frequency       | f <sub>max</sub>   | 2345                       |      |      | MHz |                                    |
| return loss          | S <sub>66</sub>    |                            | -15  | -8   | dB  |                                    |
| insertion loss       | S <sub>61</sub>    | -3.0                       | -2.0 | -0.5 | dB  |                                    |
| attenuation          | a <sub>800M</sub>  |                            | -90  | -75  | dB  | ≤ 786 MHz                          |
|                      | a <sub>DABL</sub>  |                            | -25  | -18  | dB  | DAB-L (1452 ... 1480 MHz)          |
|                      | a <sub>GNSS</sub>  |                            | -20  | -15  | dB  | GNSS (1555 ... 1625 MHz)           |
| RF input power       | P <sub>RF</sub>    |                            |      | +10  | dBm |                                    |
| DC load <sup>2</sup> | I <sub>DC</sub>    | 47                         | 50   | 53   | mA  | U <sub>DC</sub> = 5 V              |
|                      | U <sub>DC</sub>    | 0                          | 5    | 7    | V   | R <sub>L</sub> = 100 Ω, 500mW max. |
| connector            |                    | Fakra F plug (brown, male) |      |      |     |                                    |

### Common Specification

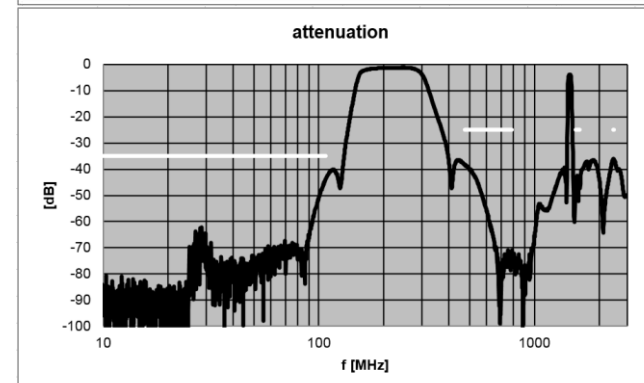
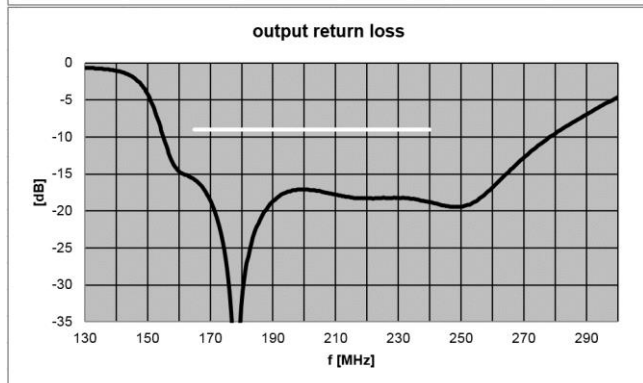
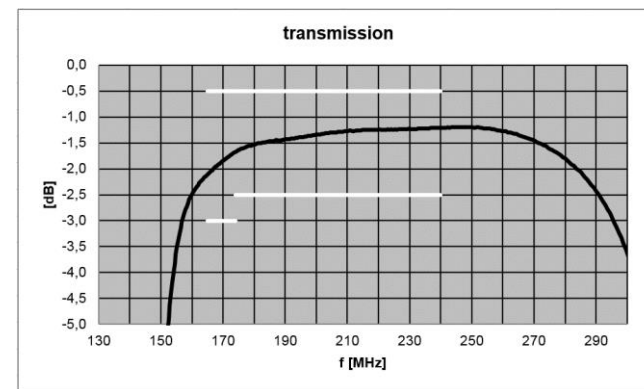
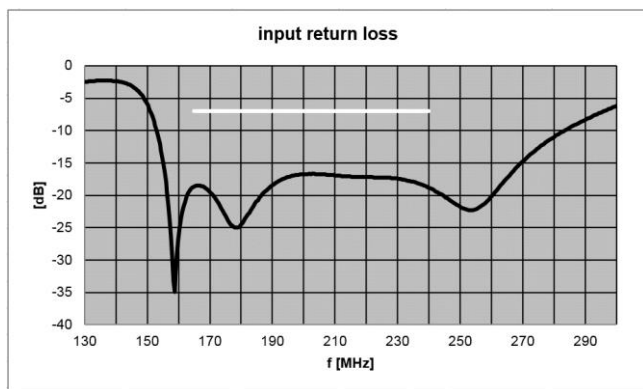
| Parameter             | Symbol    | Min.                  | Typ.             | Max. | Unit                                       | Condition          |
|-----------------------|-----------|-----------------------|------------------|------|--|--------------------|
| dimensions            | W x H x D | approx. 154 x 37 x 93 |                  |      | mm   | without connectors |
| weight                | m         |                       | 0.7              |      | kg   |                    |
| operating temp. range | $T_o$     | +5                    |                  | +40  | °C   | housing surface    |
| storage temp. range   | $T_s$     | -40                   |                  | +70  | °C   |                    |
| ordering information  | FDMX      |                       | P/N: 1310.6003.1 |      | Fakra cable set is part of product package |                    |

**S-Parameters** (typical responses)

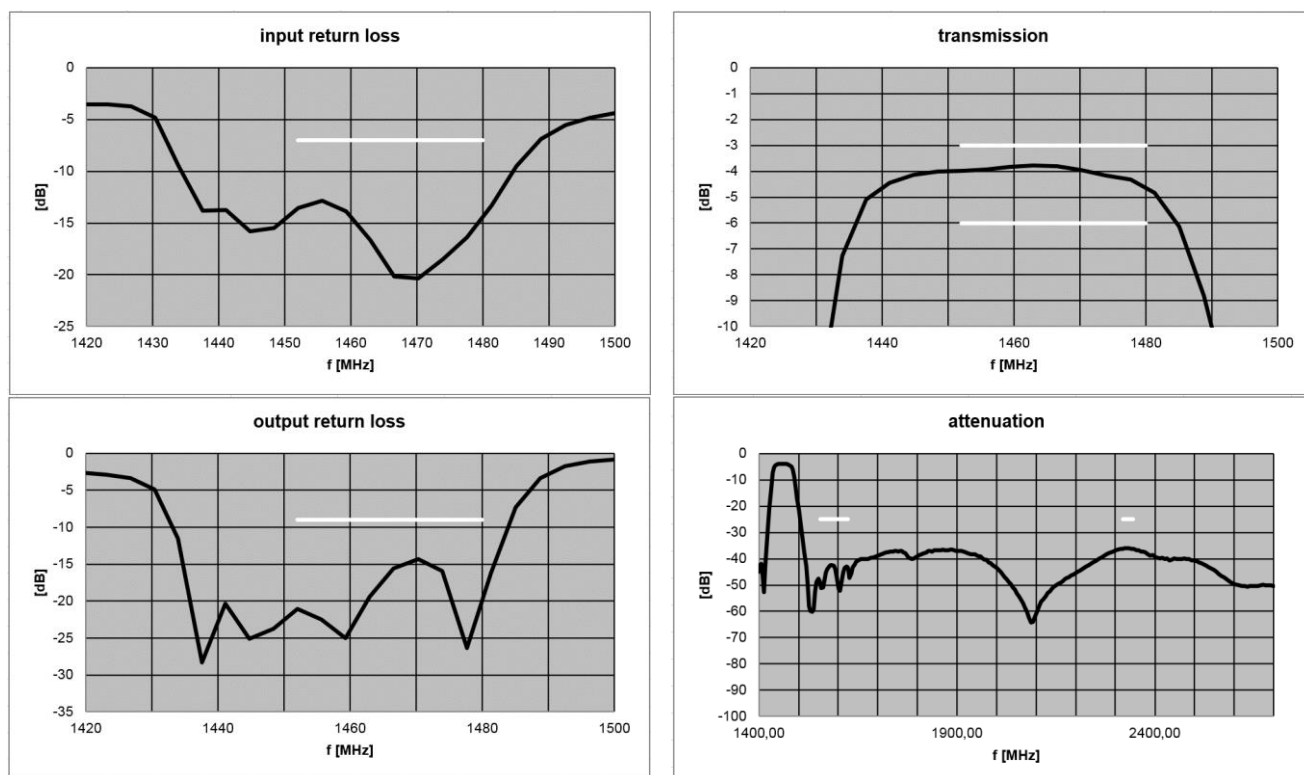
AM/FM signal path



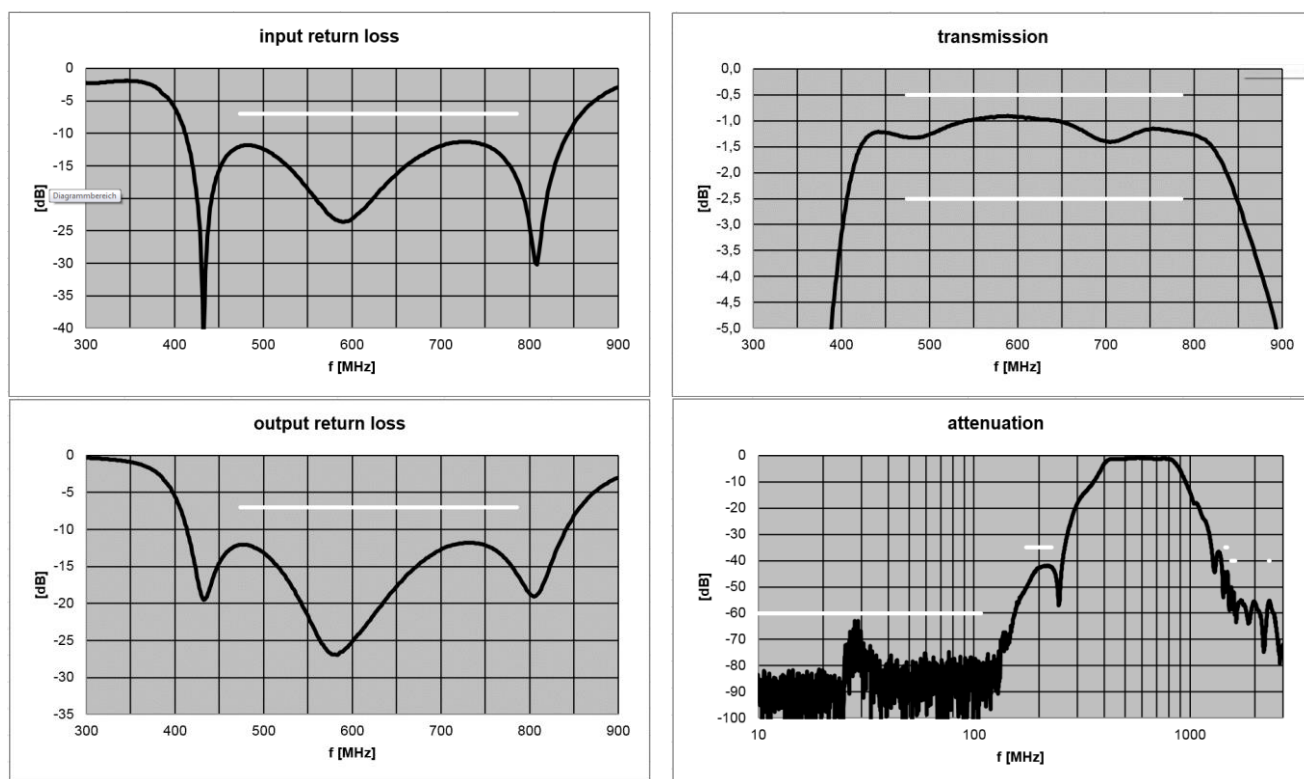
## DAB3 signal path



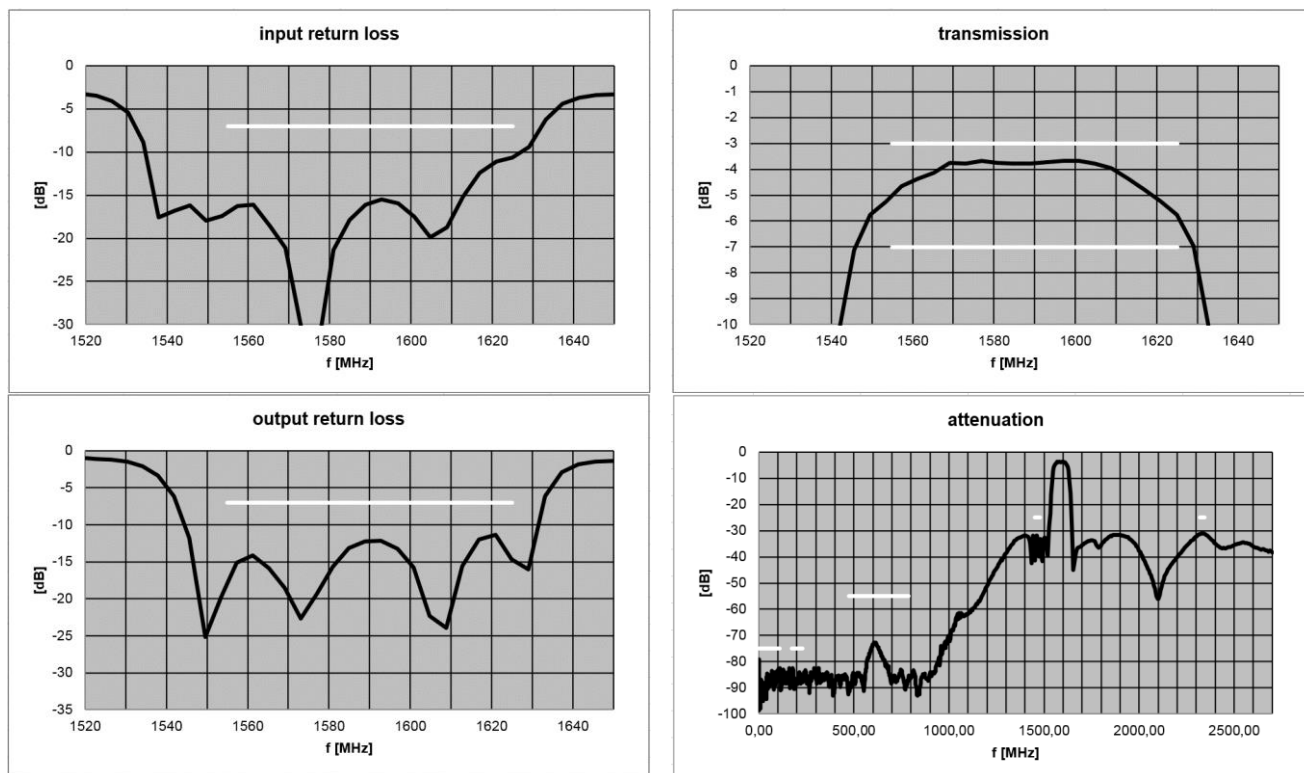
## DAB-L signal path



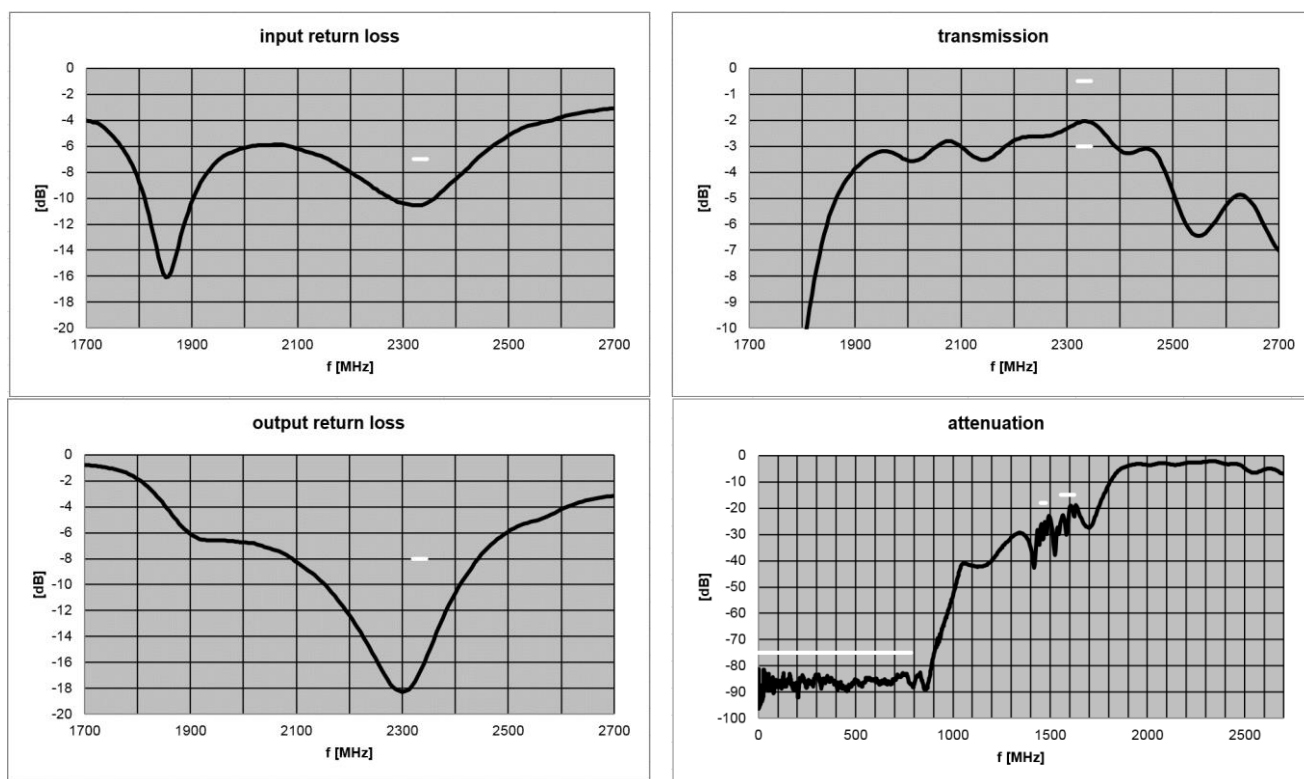
## DVB-T signal path



## GNSS signal path



## SAT (SDARS) signal path





## Appearances

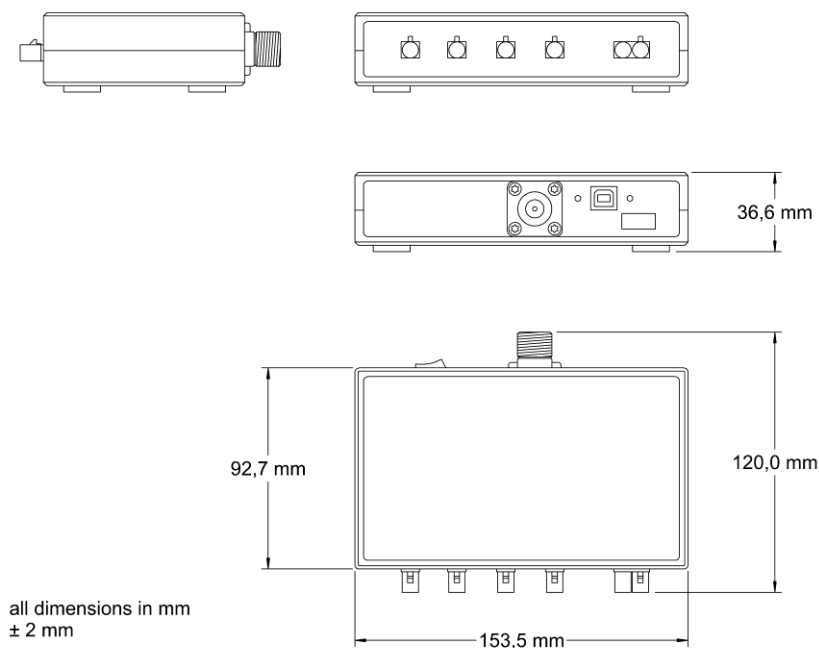


Front side



Rear Side

## Dimensions



## Related Products

| Product  | Description   | P/N         |
|----------|---|-------------|
| FDMX     | De-Multiplexer for Broadcast and Navigation Signals with Resistive DC Loads. Dual (AM/FM), DAB3/DAB-L, DVB-T, GNSS, SAT (SDARS)                 | 1310.6003.1 |
| FDMX-PT  | De-Multiplexer for Broadcast and Navigation Signals with Programmable DC Loads 0 ... 300 mA. Dual (AM/FM), DAB3/DAB-L, DVB-T, GNSS, SAT (SDARS) | 1310.6003.2 |
| FDMX2    | De-Multiplexer for Broadcast and Navigation Signals with Resistive DC Loads. Dual (AM/FM/DAB3), DVB-T, GNSS, SAT (SDARS)                        | 1809.6003.1 |
| FDMX2-PT | De-Multiplexer for Broadcast and Navigation Signals with Programmable DC Loads 0 ... 300 mA. Dual (AM/FM/DAB3), DVB-T, GNSS, SAT (SDARS)        | 1809.6003.2 |
| FDML     | Dual Port Adapter for AM/FM and DAB3 Broadcast Signals with Resistive DC Loads  | 1310.6103.2 |
| FDMX-CS  | Fakra Cable Set, length 1 m. Includes 4 RF cables with 1 dual RF cable  | 1310.0107.1 |
| FDMX-AA  | AC/DC Wall Wart Power Adapter for USB   | 1310.0108.1 |