

## 4 Channel Active Antenna Combiner for Broadcast and Navigation Signals

### Features

- 50 ohms technology
- frequency selective inputs
- low noise, low distortion pre-amplifiers for FM, DAB and DVB-T
- integrated GNSS phantom supply
- 19", 1 U rack mountable design

### Applications

- broadcast signal distribution
- AM/FM, DAB, DVB-T, GNSS
- facility infrastructures
- R&D



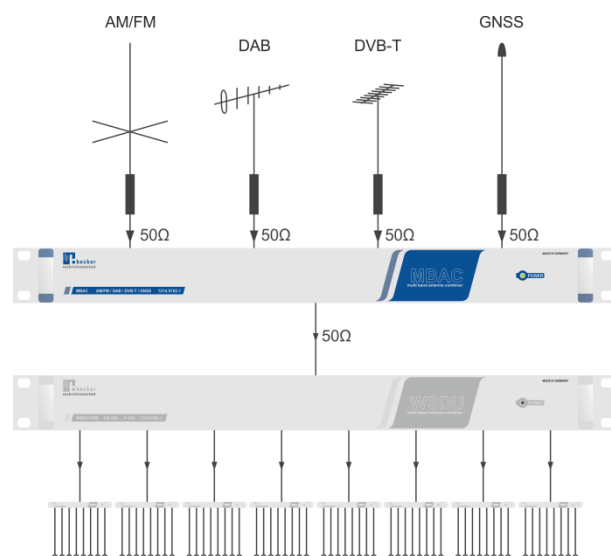
### Scope

MBAC is a high dynamic, four-channel active antenna combiner in 50 Ohm technology foreseen in professional broadcast distribution systems with high demand to signal quality. It has inputs for an AM/FM, DAB, DVB-T and GNSS antennas. MBAC combines all inputs to a common frequency multiplex signal. All inputs have preselection filters for suppression of unwanted signals. The FM, DAB and DVB-T inputs have low noise, low distortion amplifiers for compensation of losses caused by external cables. GNSS input offers a phantom power source for supplying an active antenna with current up to 200 mA. AM input is equipped with a surge arrester for lightning protection.

### Signal Distributions in Facilities

In combination with the WSDU wideband multicouplers broadcast distributions can be realized with only one RF cable between MBAC and the multicouplers for local distribution. The signal transmission in the frequency domain minimizes cable costs and cost for their installation.

### Typical Setup



Example: MBAC in combination with the WSDU Signal Distribution to supply 64 DUTs.

### Connecting Infotainment DUTs

For the direct connection of DUTs (Device Under Test) Becker Nachrichtentechnik offers Frequency De-Multiplexers with Fakra connectors. The De-Multiplexers of the FDMX Series are available in different variants with fixed DC loads or programmable current sinks for intensive tests of the phantom supply sources in the DUTs.

## RF Specification

### AM/FM

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
<b>AM</b>						
impedance	$Z_{in} / Z_{out}$		50		Ohm	
low frequency	$f_{min}$		100	150	kHz	AM
high frequency	$f_{max}$	26	30		MHz	
input return loss	$S_{11}$		-18	-12	dB	
output return loss	$S_{22}$		-18	-12	dB	
insertion loss AM	$S_{21}$	-1.5		-0.2	dB	$f < 20$ MHz
	$S_{21}$	-2.5		-0.5	dB	$f \geq 20$ MHz
3 <sup>rd</sup> order intermodulation	IIP3 <sup>1</sup>	+30			dBm	input
<b>FM</b>						
low frequency	$f_{min}$		85	87	MHz	FM
high frequency	$f_{max}$	108	115		MHz	
input return loss	$S_{11}$		-17	-12	dB	
output return loss	$S_{22}$		-20	-12	dB	
gain	$S_{21}$	8		10	dB	
suppression	$S_{21}$			-80	dBr	$474 \text{ MHz} \leq f \leq 2 \text{ GHz}$ rel. 100 MHz
reverse isolation	$S_{12}$		-28	-25	dB	
noise figure	NF		3	4	dB	
3 <sup>rd</sup> order intermodulation	OIP3 <sup>1</sup>	+35	+38		dBm	
1 dB compression	P1dB	+16	+18		dBm	output

Note 1:  $P_{in} = 2 \times -5$  dBm;  $\Delta f = 1$  MHz

### DAB

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	$Z_{in}$		50		Ohm	
low frequency	$f_{min}$		170	174	MHz	
high frequency	$f_{max}$	230	240		MHz	
input return loss	$S_{11}$		-13	-8	dB	
output return loss	$S_{22}$		-15	-10	dB	
Gain	$S_{21}$	10		12	dB	
suppression	$S_{21}$			-60	dBr	$f \leq 108$ MHz rel. 200 MHz
	$S_{21}$			-80	dBr	$474 \text{ MHz} \leq f \leq 2 \text{ GHz}$ rel. 200 MHz
reverse isolation	$S_{12}$		-26	-23	dB	
noise figure	NF		3.0	4.5	dB	
3 <sup>rd</sup> order intermodulation	OIP3 <sup>1</sup>	+35	+38		dBm	output
1 dB compression	P1dB	+19	+21		dBm	output

Note 1: tested at  $P_{in} = 2 \times -5$  dBm;  $\Delta f = 1$  MHz

**DVB-T**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	$Z_{in}$		50		Ohm	
low frequency	$f_{min}$		470	474	MHz	
high frequency	$f_{max}$	790			MHz	
input return loss	$S_{11}$		-14	-8	dB	$f \leq 740$ MHz rel
output return loss	$S_{22}$		-14	-9	dB	$f \leq 740$ MHz
gain	$S_{21}$	12.0		14.5	dB	$f \leq 740$ MHz
	$S_{21}$	5.5		8.5	dB	$f > 740$ MHz
suppression	$S_{21}$			-60	dBr	$f \leq 108$ MHz rel. 600 MHz
				-40	dBr	$108 \text{ MHz} < f \leq 240 \text{ MHz}$ r.600 MHz
				-33	dBr	$410 \text{ MHz} \leq f \leq 430 \text{ MHz}$ r.600 MHz
	$S_{21}$			-40	dBr	$920 \text{ MHz} \leq f \leq 2 \text{ GHz}$ rel. 600 MHz
reverse isolation	$S_{12}$		-23	-20	dB	
noise figure	NF		3.5	4.5	dB	
3 <sup>rd</sup> order intermodulation	OIP3 <sup>1</sup>	+32	+36		dBm	output
1 dB compression	P1dB	+21	+23		dBm	output

Note 1: tested at  $P_{in} = 2 \times -5$  dBm;  $\Delta f = 1$  MHz

**GNSS (GPS / GLONASS / GALILEO)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	$Z_{in}$		50		Ohm	
low frequency	$f_{min}$		1555	1575	MHz	
high frequency	$f_{max}$	1602	1625		MHz	
input return loss	$S_{11}$		-14	-9	dB	
output return loss	$S_{22}$		-12	-7	dB	
insertion loss	$S_{21}$	-6	-4	-3	dB	
suppression	$S_{21}$		-63	-55	dBr	$f \leq 960$ MHz rel. 1.6 GHz
	$S_{21}$			-23	dBr	$1.8 \text{ GHz} \leq f \leq 2 \text{ GHz}$ rel.1.6 GHz
3 <sup>rd</sup> order intermodulation	OIP3 <sup>1</sup>	+30			dBm	output
phantom supply	$U_{PH}$	4.8		5.2	V	
	$I_{PH}$			200	mA	

Note 1: tested at  $P_{in} = 2 \times -5$  dBm;  $\Delta f = 1$  MHz

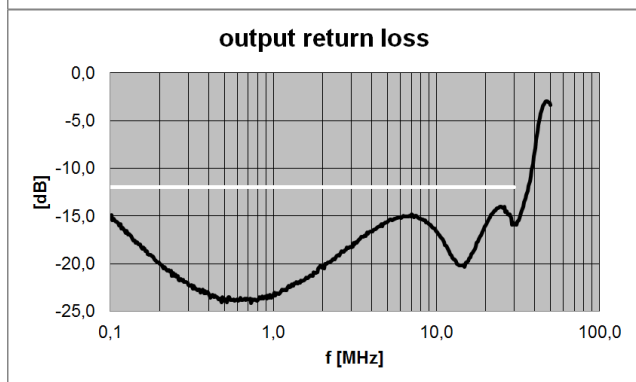
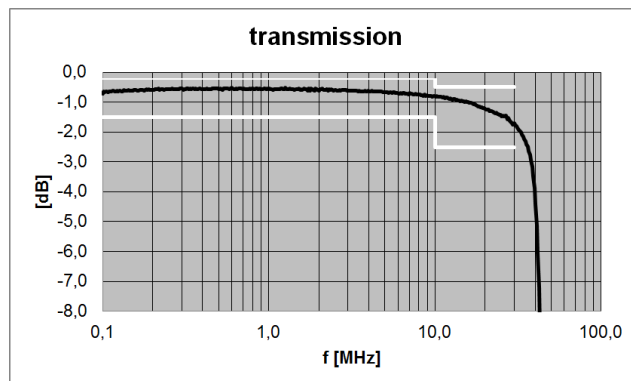
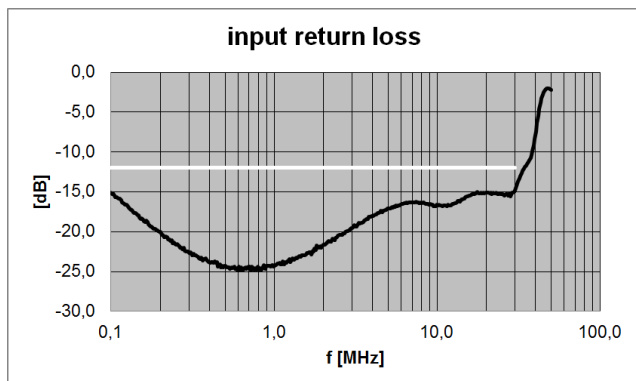
**Common Specifications**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
power supply	$U_{AC}$	90	230	260	V	50 / 60 Hz AC
power consumption	$P_{AC}$		7	50	W	
<b>Dimensions and weight</b>						
dimensions	W x H x D	approx. 482 x 44 x 265			mm	19" 1 U, without connectors and handles
weight	m		3.4		kg	
<b>Environment conditions</b>						
operating temp. range	$T_o$	+5		+45	°C	
storage temp. range	$T_s$	-40		+70	°C	
<b>Product conformity</b>						
Electromagnetic compatibility	EU: in line with EMC directive (2014/30/EC)				applied harmonized standards: EN 61326-1 (for use in industrial environment), EN 61326-2-1, EN 55011 (class B), EN 61000-3-2, EN 61000-3-3	
Electrical safety	EU: in line with low voltage directive (2014/35/EC)				applied harmonized standard: EN 61010-1	
<b>Ordering information</b>	MBAC		P/N: 1314.5102.1			

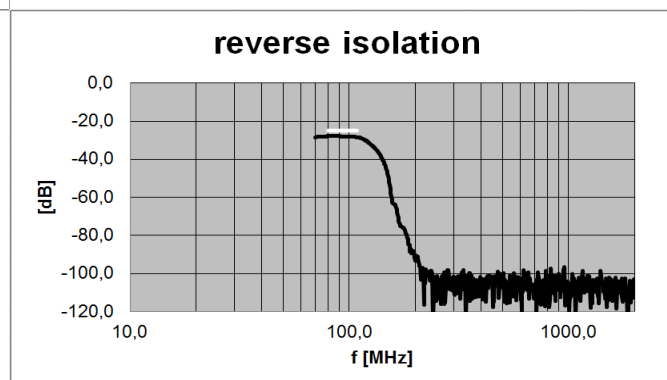
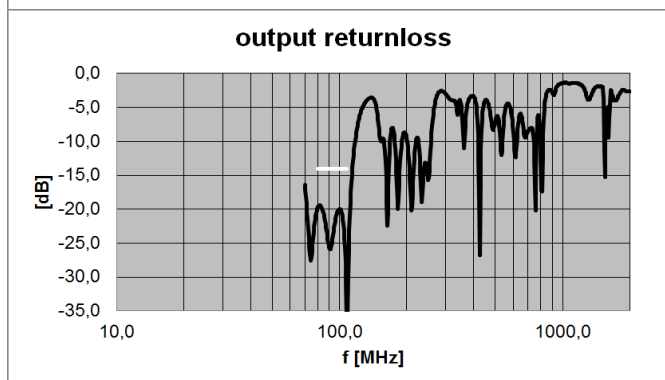
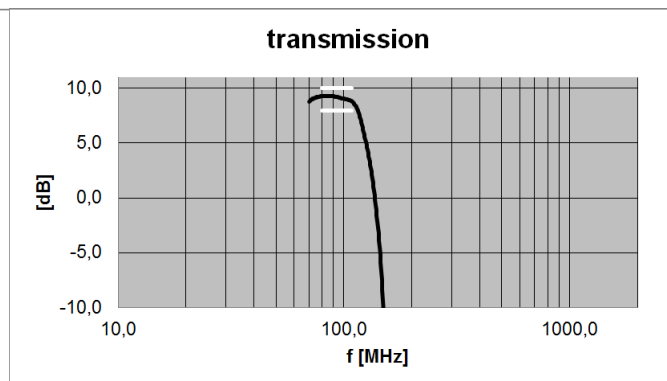
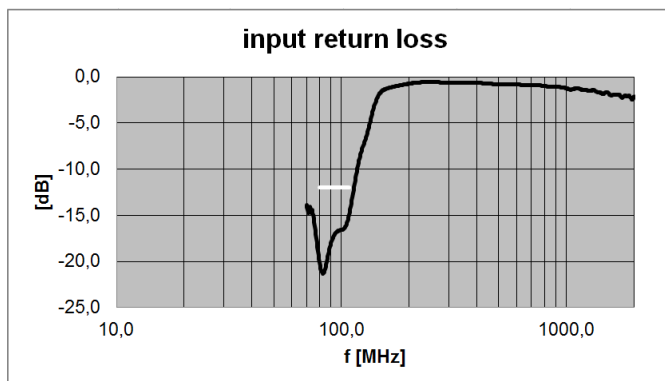


**S-Parameters (typical responses)**

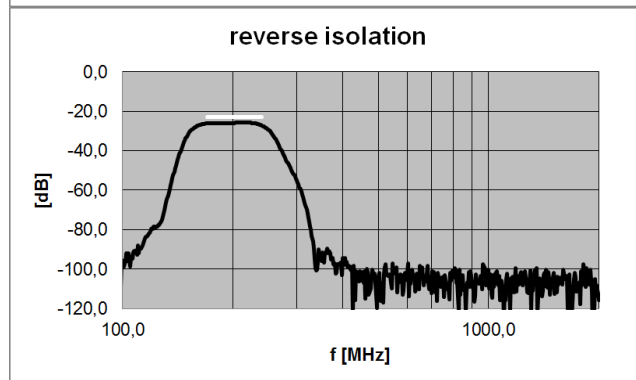
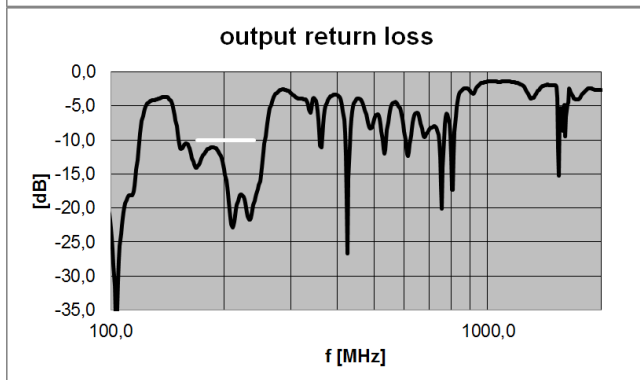
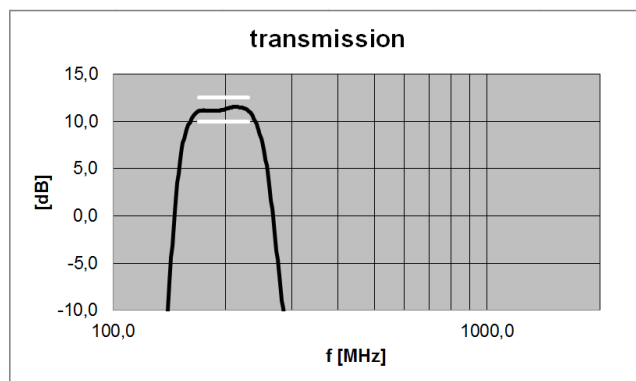
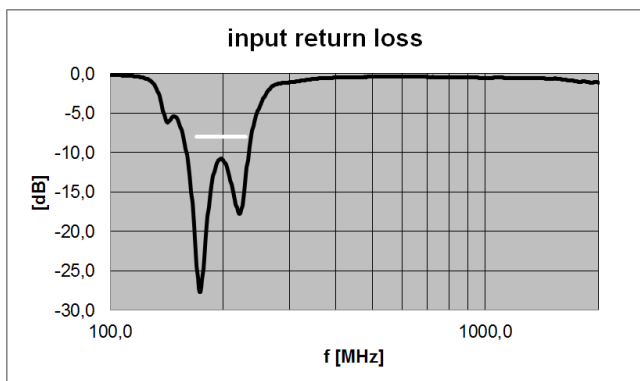
**AM**



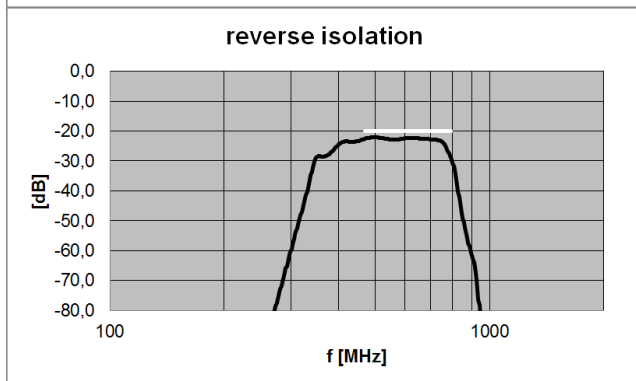
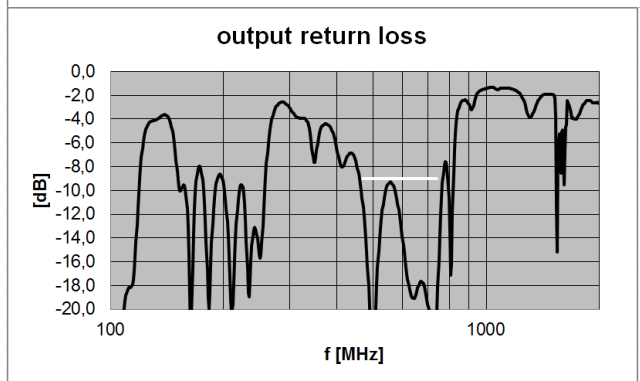
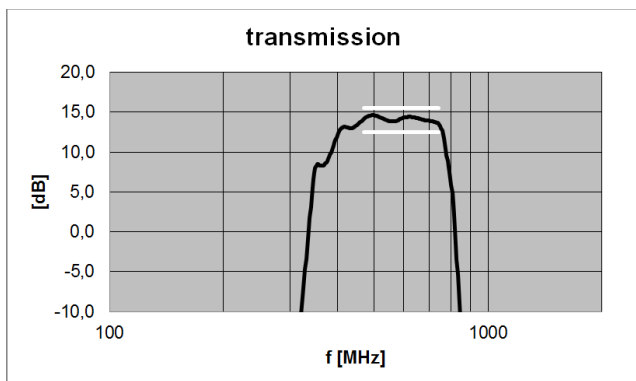
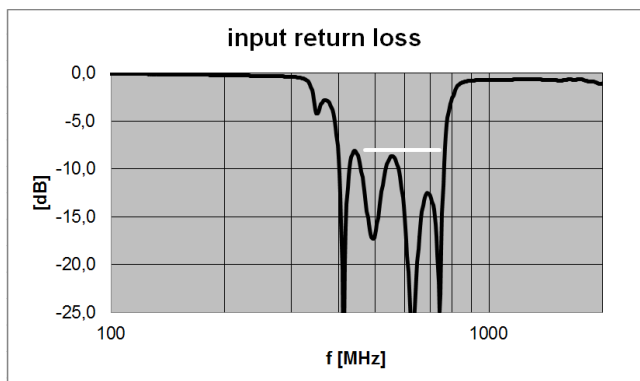
**FM**



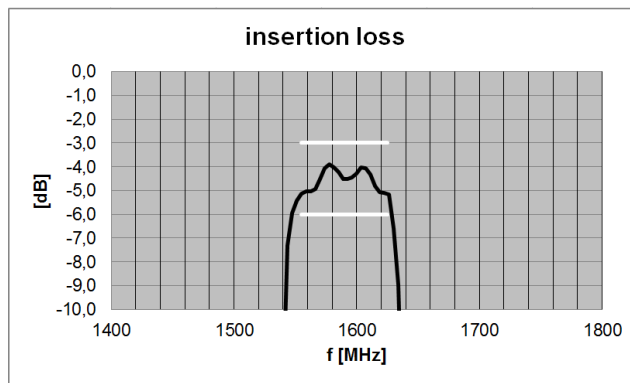
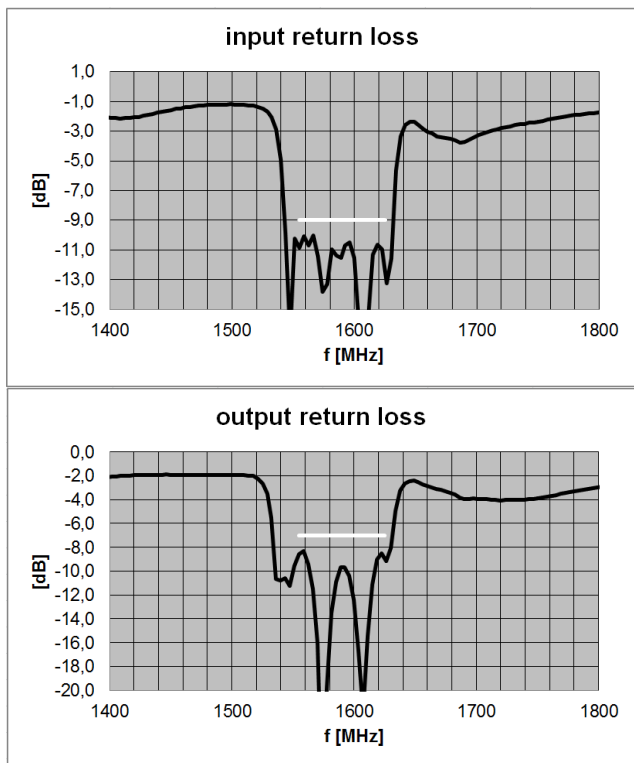
**DAB**



**DVB-T**



**GNSS**



**Appearances**

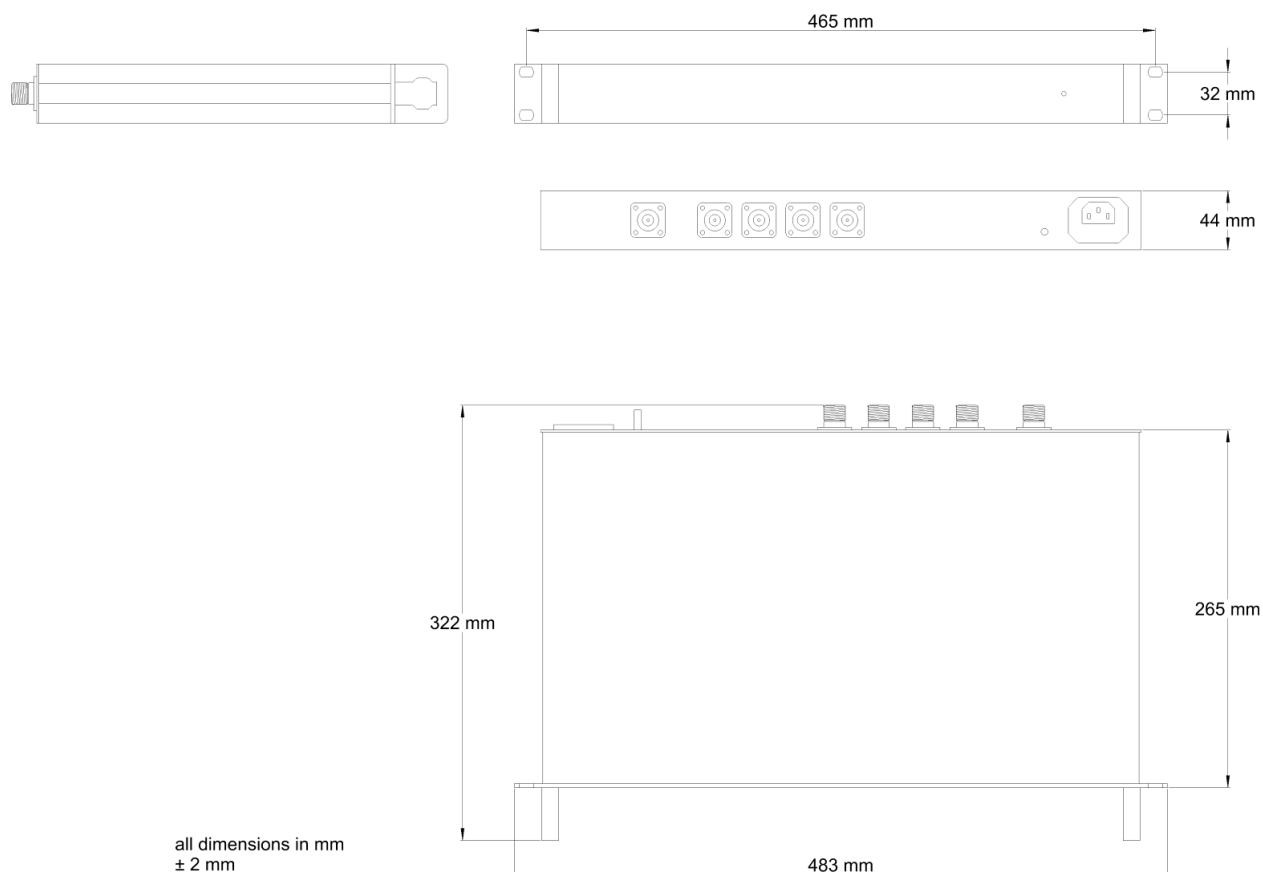
**Front View**



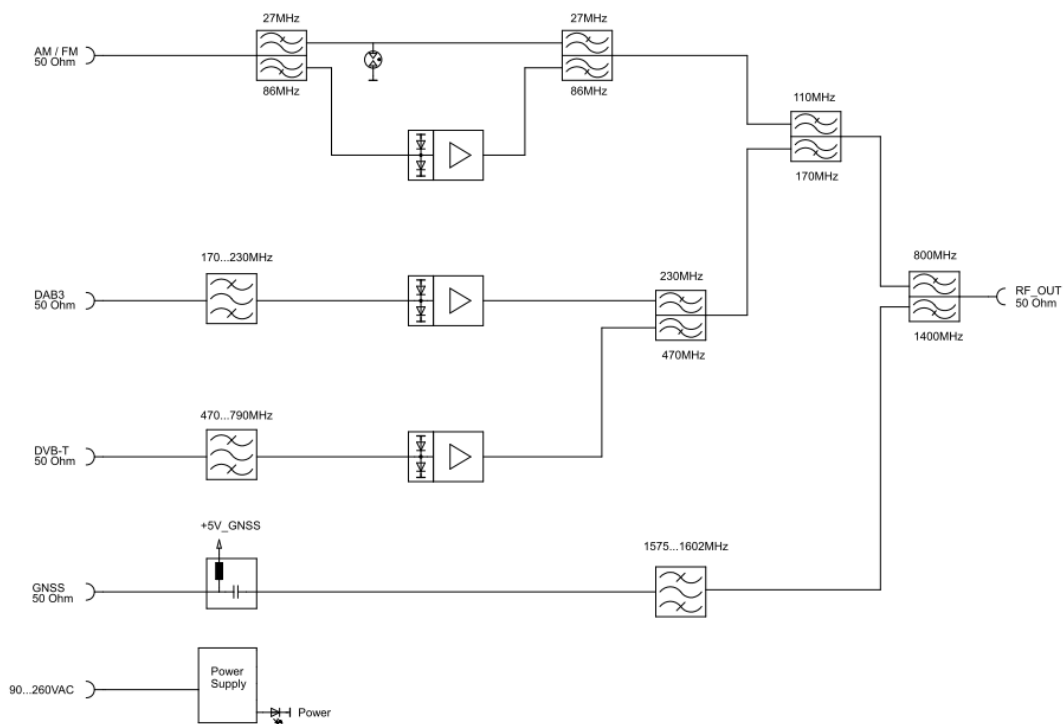
**Rear View**



### Mechanical Drawing



### Block Diagram



**Related Products**

Product	Description	P/N
WSDU1X8R	High Dynamic 8 Way Multicoupler 100 kHz ... 4000 MHz	1107.6102.1
WSDU1X8	High Dynamic 8 Way Multicoupler Module 100 kHz ... 4000 MHz	1202.6100.1
WSDU1X8A	8 Way High Dynamic Signal Conditioning Multicoupler 100 kHz...4000 MHz	1807.6300.1
WSCU8X1R	High Dynamic 8 Way Signal Combiner 100 kHz ... 4000 MHz	1208.6102.1
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

