

## RSWM-4X4ER

Extremely Wideband Non-Blocking 4X4 Switching Matrix, 20 MHz ... 8000 MHz

### Features

- high dynamic
- high isolation
- non-reflective
- compact 19" 1U design
- graphical user interface
- variants for AC or DC power supply

### Applications

- radio monitoring
- spectrum monitoring
- COMINT / SIGINT
- signal routing
- research & development (R&D)
- test equipment



### At a Glance

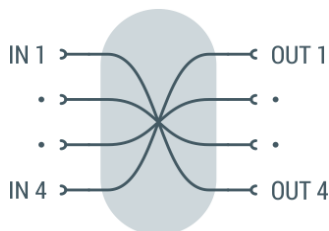
Modern radio monitoring systems need an unrestricted access to many antennas from a variety of receivers. By using the non-blocking architecture of RSWM, specialized and general-purpose receivers can be used alongside each other and choose any of the available antennas without interference between the receivers.

The high linearity and low noise figure of the device ensure the best signal integrity on the way from antenna to receiver. Low cross-talk allows to listen to small signals on one antenna in the presence of strong signals on a different antenna.

The very large bandwidth covers all commercial cellular and ISM communication bands up to and including WiFi7.

### Principal Block Diagram

The RSWM-4X4ER features four equivalent inputs and four equivalent outputs interconnected via a non-blocking matrix. A single input can route to multiple outputs without any loss of signal transmission.



### Wear-free Solid-State Switches

The RSWM-4X4ER incorporates modern solid-state switching elements, guaranteeing rapid response to operational inputs and an unlimited number of switching cycles with minimal maintenance requirements.

### High Channel Isolation

To prevent unintentional signal coupling between different signal types, the device provides high channel isolation. Strong and weak signals in adjacent radio channels do not affect each other.

### Versatile Control

The RSWM-4X4ER is equipped with multiple control options for user convenience. It features a local MMI on the front panel, as well as LAN and USB interfaces. Depending on the customer's needs, the system can be managed using the intuitive web-based graphical user interface or through SCPI-based ASCII commands via its interface ports.

### Synchronous Operation

The RSWM-4X4ER offers two switching modes:

- Direct: every switching operation is executed after reception of the command.
- Synchronous: all switching commands are stored until a "SYNC" command executes the switching operation synchronously.

## External Triggering

Similar to several other products from Becker Nachrichtentechnik GmbH, the RSWM-4X4ER includes a TRIGGER IO port. This physical interface enables the device to execute switching operations synchronously across multiple matrices, triggered by hardware signals.

## RF Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	$Z_{IN}/Z_{OUT}$		50		$\Omega$	
number of inputs	$N_{IN}$		4			
number of outputs	$N_{OUT}$		4			
low frequency	$f_{min}$		10	20	MHz	
high frequency	$f_{max}$	8000	8500		MHz	
gain	$S_{21}$	0.5	4	7.5	dB	$f \leq 6$ GHz
	$S_{21}$	-1.5	1		dB	$f = 8$ GHz
input return loss	$S_{11}$		-15	-9	dB	
output return loss	$S_{22}$		-13	-10	dB	$f \leq 3$ GHz
	$S_{22}$		-10	-7	dB	$f > 3$ GHz
1 dB compression	$P_{1dB}$	+2	+5		dBm	
3 <sup>rd</sup> order intercept	$OIP3^1$	+15	+20		dBm	$f \leq 3$ GHz
	$OIP3^1$	+10	+15		dBm	$f > 3$ GHz
2 <sup>nd</sup> order intercept	$OIP2^2$		+40		dBm	
noise figure	NF		9	11	dB	$f < 100$ MHz
	NF		8	10	dB	$100 \text{ MHz} \leq f \leq 6 \text{ GHz}$
	NF		9	12	dB	$f > 6 \text{ GHz}$
channel isolation	$S_{21}$		-80	-70	dB	$f \leq 3 \text{ GHz}$
	$S_{21}$		-70	-45	dB	$3 \text{ GHz} < f \leq 6 \text{ GHz}$
	$S_{21}$		-60	-45	dB	$f > 6 \text{ GHz}$
output isolation	$S_{32}$		-21	-18	dB	Output 1 to 2 or 3 to 4
	$S_{32}$		-40		dB	Output 1 or 2 to 3 or 4
input power	$P_{IN}$		+10		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				
processing time	$t_{SW}$		15		ms	between two switching commands
trigger input	$X_{TRIG}$	BNC female				internal 1 k $\Omega$ pull up, active high
trigger level	$U_{TRIG}$	TTL (0 / 5 V)				
trigger offset	$t_{O\_FALL}$		6.5		$\mu$ s	50% trigger $\rightarrow$ 50% RF falling edge, note 3
	$t_{O\_RISE}$		1.1		$\mu$ s	50% trigger $\rightarrow$ 50% RF rising edge, note 3
switch rise time	$t_{RISE}$		1		$\mu$ s	10% $\rightarrow$ 90% RF
switch fall time	$t_{FALL}$		2		$\mu$ s	90% $\rightarrow$ 10% RF

Note 1:  $P_{in} = 2 \times -10$  dBm, specified and tested for  $\Delta f = 2$  MHz

Note 2:  $P_{in} = 2 \times -10$  dBm,  $\Delta f = 20$  MHz

OIP2 & OIP3 values are the average of the upper and lower intermodulation distortion, in band spurs only

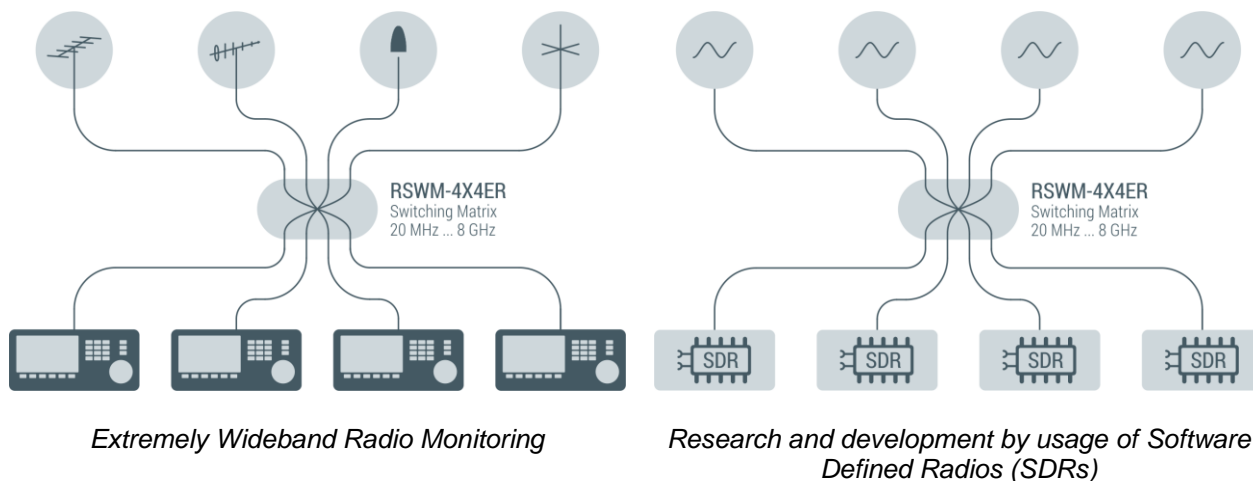
Note 3: capacitive load at 'TRIGGER IO' Port  $\leq 100$  pF, trigger mode "OUT"

## Common Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
power supply		90	230	260	V	50 / 60 Hz AC
power consumption			13		W	
power socket	X <sub>AC</sub>	IEC-60320 C14				country specific mains cable
Remote interfaces						
	LAN	10/100 BaseT		TCP/IP		RJ45
	USB	2.0 (high speed)				USB type B
Dimensions and weight						
dimensions	W x H x D	approx. 482 x 44 x 265			mm	19" 1U, without connectors and handles
weight	m		3.4		kg	
Environment conditions						
operating temp. range	T <sub>o</sub>	+5		+45	°C	
storage temp. range	T <sub>s</sub>	-40		+70	°C	
Product conformity						
Electromagnetic compatibility	EU: in line with EMC directive (2014/30/EC)			applied harmonized standards: EN61326-2-1, (for use in control and laboratory environments), EN55035, EN55032, EN61000-3-2, EN61000-3-3		
Electrical safety	EU: in line with low voltage directive (2014/35/EC)			applied harmonized standard: EN 61010-1		
Ordering information	RSWM-4X4ER		1205.4202.1			

## Application Example

The RSWM-4X4ER is suitable for both radio monitoring applications as well as test environments for research and development. Aided by the RSWM-4X4ER the customer is able to route input signals to any output of the device. As the illustration shows the input can either be equipped with different signal sources or antennas:



## Graphical User Interface

The graphical user interface (GUI) enables users to define custom labels tailored to their specific applications, making input selection more contextually meaningful.

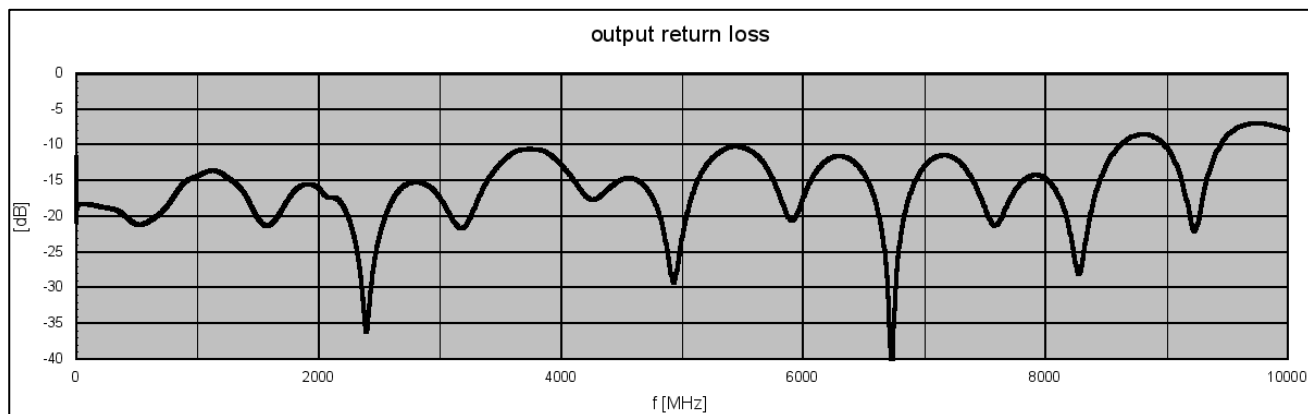
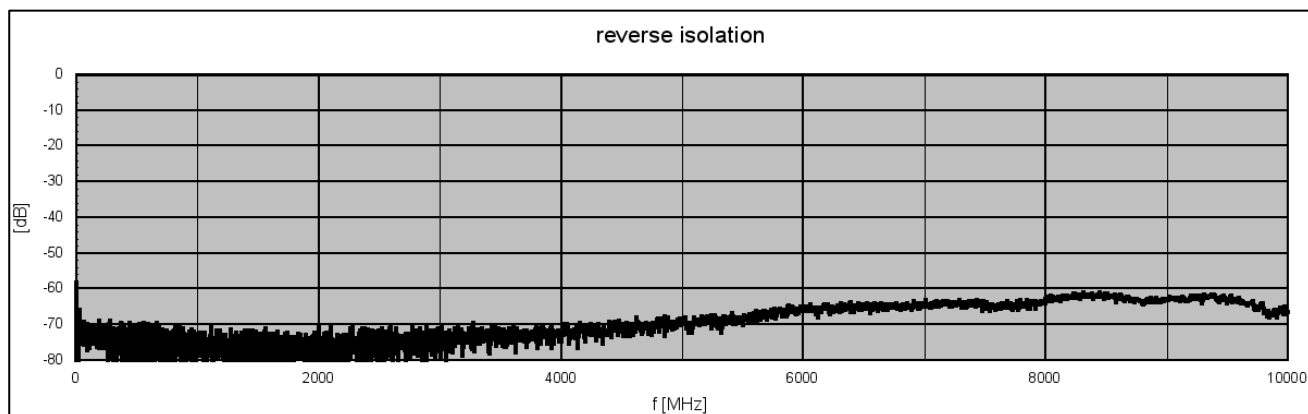
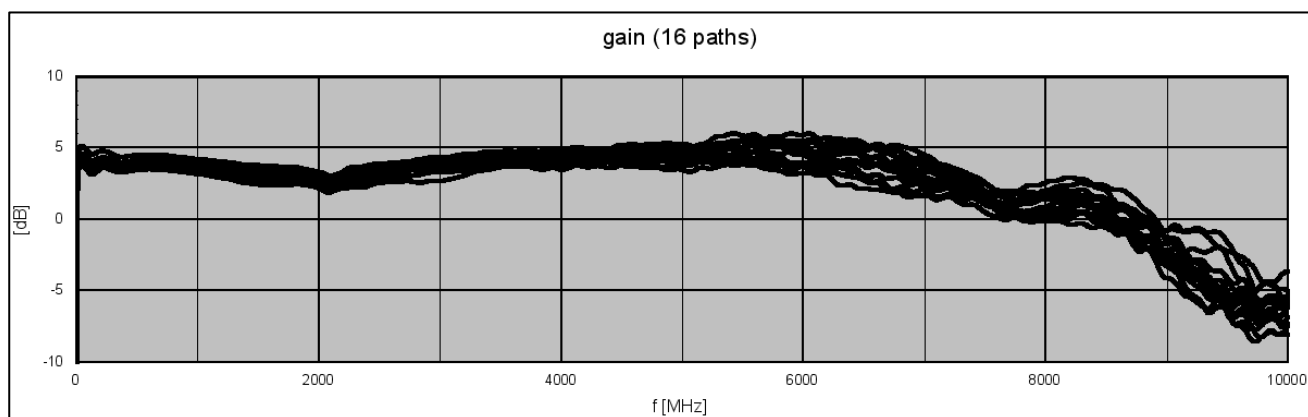
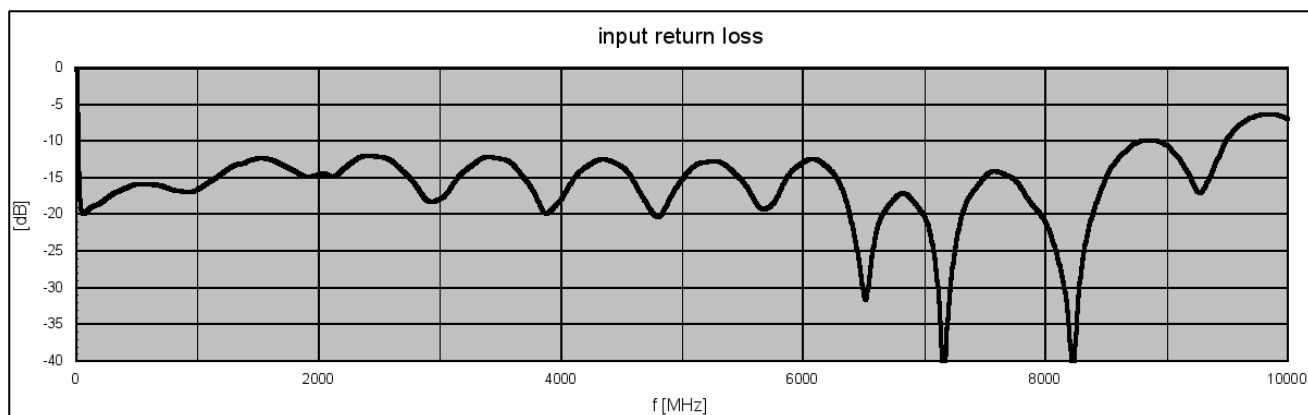


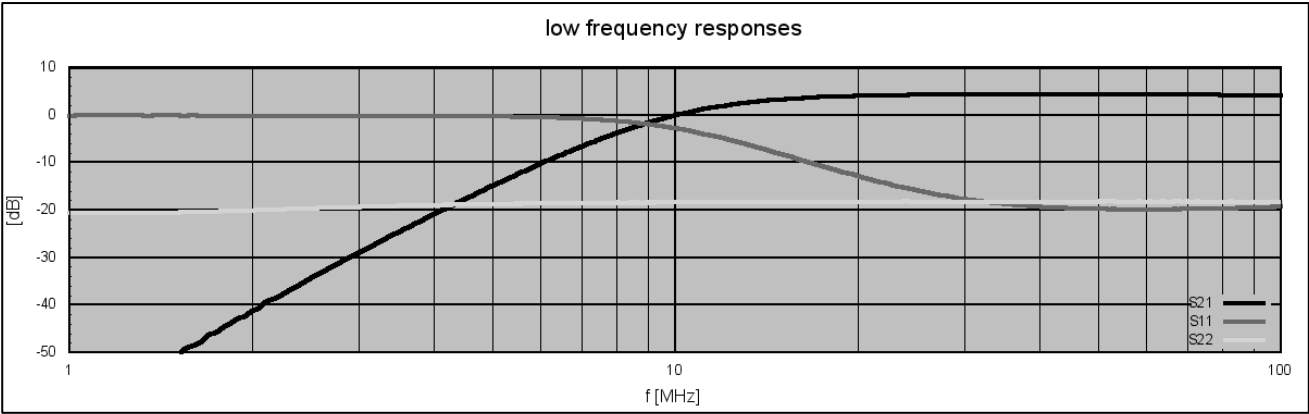
### Switching Matrix

⏻ All OFF

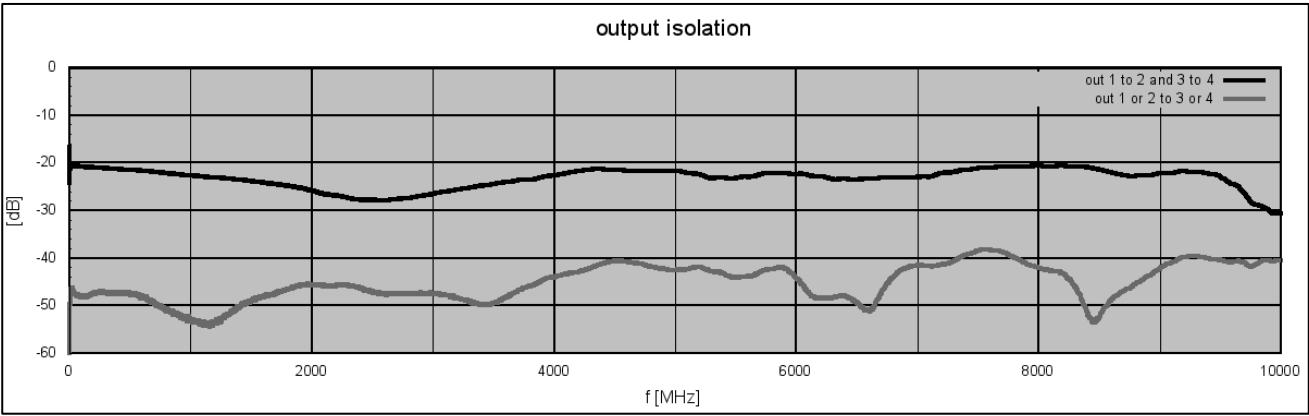
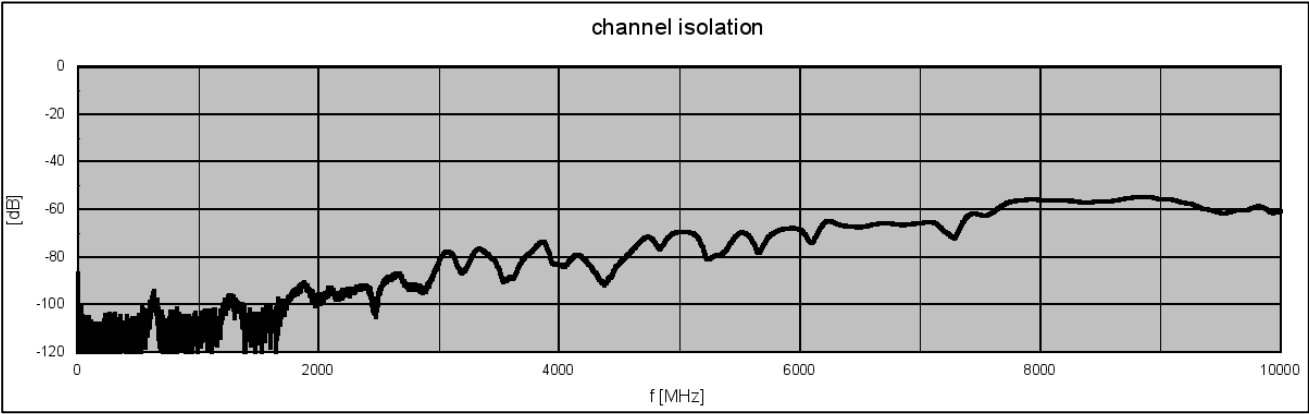
OUT1	X21	OUT2	X22	OUT3	X23	OUT4	X24
<div>X (OFF) ▼</div>							

🔄 22.1.2018, 08:24:10

**S-Parameters***typical responses*

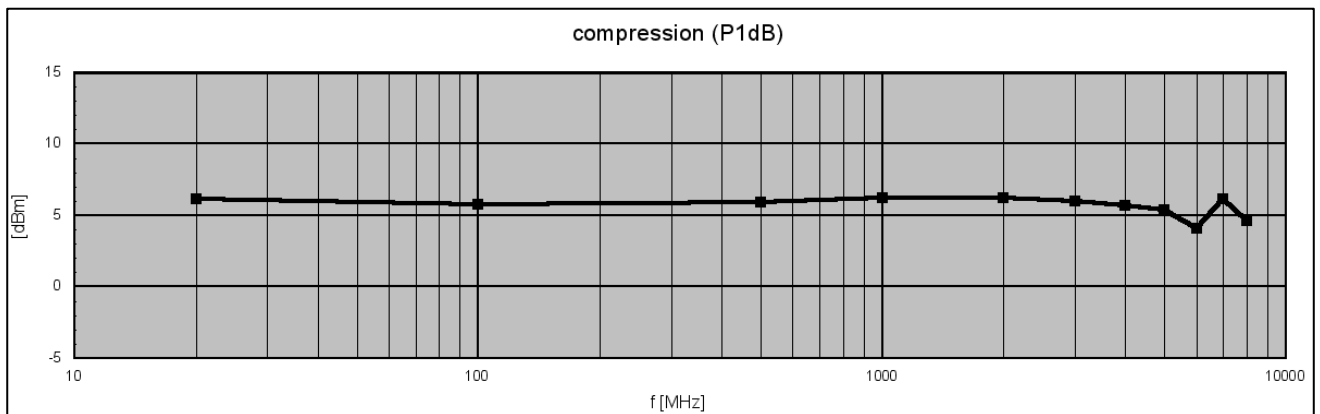
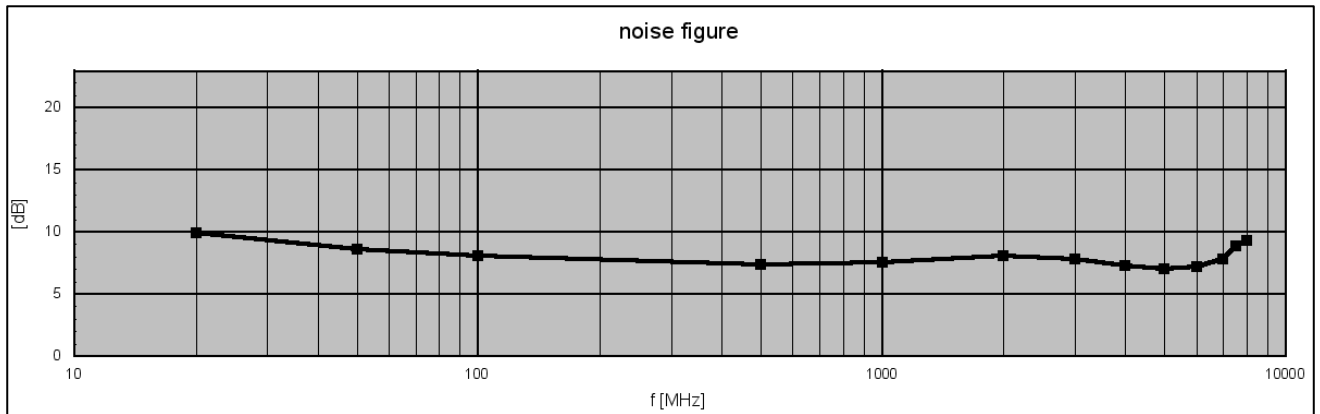


Isolations (typical responses)



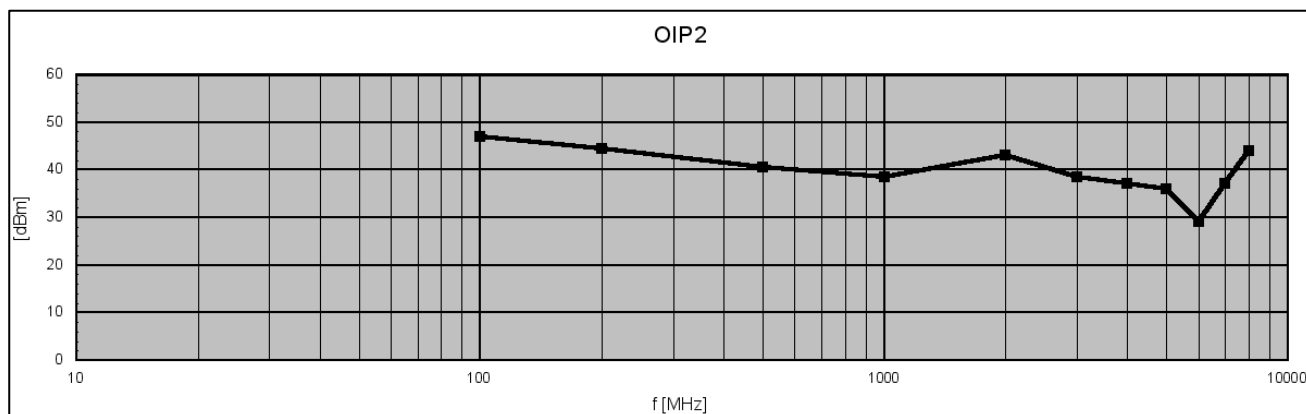
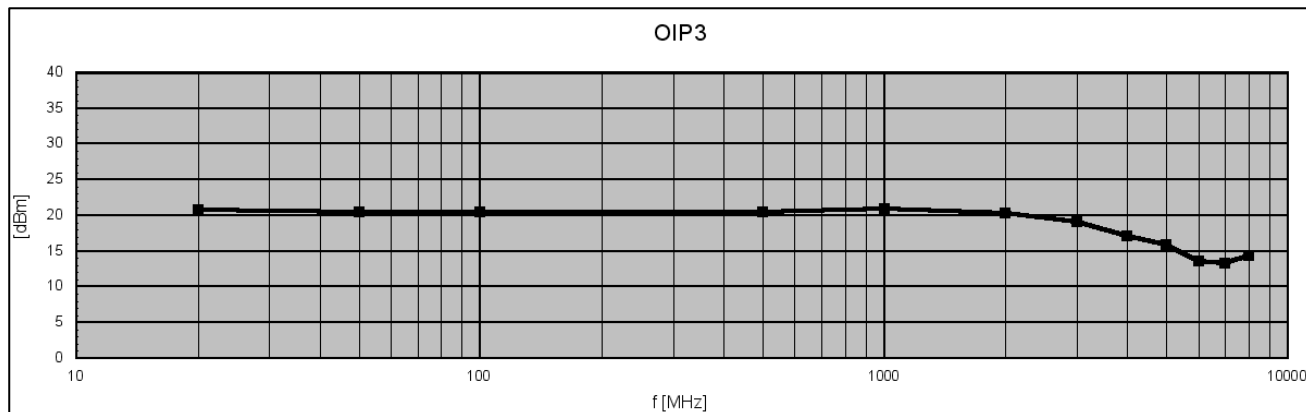
## Dynamic Range

typical responses



## Linearity

typical responses





## Appearances

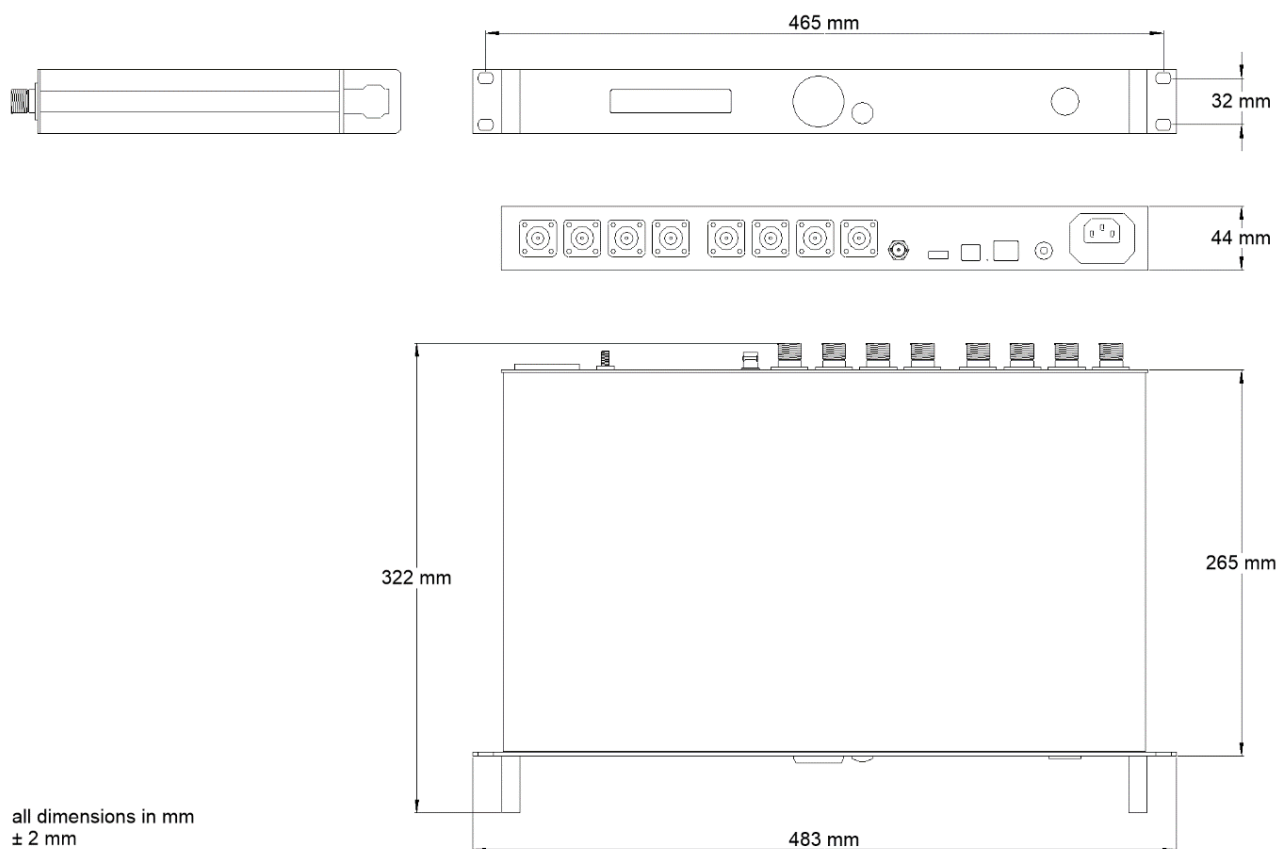
### Front View



### Rear View



### Dimensions



**Related Products**

Product	P/N	Description
RSWM-4X4LR	1205.4402.X	Wideband Non-Blocking 4X4 Switching Matrix 100 kHz ... 4000 MHz LAN remote interface with SNMPv2 trap function
RSWM-4X8LR	2103.4452.X	Wideband Non-Blocking 4X8 Switching Matrix 100 kHz ... 4000 MHz LAN remote interface with SNMPv2 trap function
RSWM-8X8LR	2103.4552.X	Wideband Non-Blocking 8X8 Switching Matrix 100 kHz ... 4000 MHz LAN remote interface with SNMPv2 trap function
RSWM-4X4R	1205.4102.X	High-Dynamic Non-Blocking 4X4 Switching Matrix 100 kHz ... 4000 MHz LAN remote interface with SNMPv2 trap function
RSWM-4X8R	2103.4302.X	High-Dynamic Non-Blocking 4X8 Switching Matrix 100 kHz ... 4000 MHz LAN remote interface with SNMPv2 trap function
RSWM-8X8R	2103.4502.X	High-Dynamic Non-Blocking 8X8 Switching Matrix 100 kHz ... 4000 MHz LAN remote interface with SNMPv2 trap function
RSWM-4X4ER	1205.4202.X	Extremely Wideband Non-Blocking 4X4 Switching Matrix 20 ... 8000 MHz LAN remote interface with SNMPv2 trap function
RSWM-4X8ER	2103.4402.X	Extremely Wideband Non-Blocking 4X8 Switching Matrix 20 ... 8000 MHz LAN remote interface with SNMPv2 trap function
RSWM-8X8ER	2103.4602.X	Extremely Wideband Non-Blocking 8X8 Switching Matrix 20 ... 8000 MHz LAN remote interface with SNMPv2 trap function
BSWM-4X4ER	1205.4502.X	4X4 Bidirectional Blocking Wideband Switching Matrix 100 kHz ... 8000 MHz LAN remote interface with SNMPv2 trap function
BSWM-4X8ER	2103.4702.X	4X8 Bidirectional Blocking Wideband Switching Matrix 100 kHz ... 8000 MHz LAN remote interface with SNMPv2 trap function
BSWM-8X8ER	2103.4802.X	8X8 Bidirectional Blocking Wideband Switching Matrix 100 kHz ... 8000 MHz LAN remote interface with SNMPv2 trap function