

RSWM-4X4ER

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

Features

- high dynamic
- high isolation
- non-reflective
- compact 19", 1 U design
- graphical user interface

Applications

- radio monitoring
- signal routing
- research & development (R&D)
- test equipment

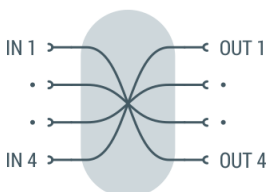
At a Glance

Modern communication standards like digital broadcast, cellular, Wi-Fi, ISM and Bluetooth permanently grow up to higher frequency ranges with larger system bandwidths. Due to the huge amount of radio signals covered in the wide frequency bandwidth, high demands to the linearity of the matrices are required. Additionally, a low noise figure is very important for a high dynamic range.

The RSWM-4X4ER is an innovative and efficient solution for modern radio monitoring and signal routing systems that must cover the frequency range up to more than 8 GHz. To enable a free access to many signal sources like antennas or signal generators it offers a non-blocking switch system which allows the combination of any input with every output in a flexible and easy way.

Principal Block Diagram

The RSWM-4X4ER has 4 equivalent inputs and 4 equivalent outputs interconnected with a non-blocking matrix. Furthermore one input can route to several outputs without any loss of transmission.



Wear-free Solid State Switches

Inside the RSWM-4X4ER modern solid state switching elements are integrated. This ensures a quick response to operating inputs and a huge number of switching cycles with a minimum of maintenance.



High Channel Isolation

To avoid unintended coupling between different types of signals the device offers a high channel isolation. Adjacent radio channels with strong and weak signals have no influence to each other.

Versatile Control

To control and operate with RSWM-4X4ER the device is equipped with a local MMI on the front panel as well as LAN and USB interfaces. Suitable to the customer's application the user is able to manage the system either through the associated and intuitive web-based user interface or with SCPI-based ASCII-commands via its interface ports.

Synchronous Operation

The RSWM-4X4ER offers two switching modes:

- Direct switch execution after receiving single commands.
- Common synchronous switching after executed by a SYNC command.

In synchronous mode all upcoming switching operations are done only after receiving a SYNC command.

External Triggering

Like many other products of Becker Nachrichtentechnik GmbH, the RSWM-4X4ER offers a TRIGGER IO port. Due to the physical interface the device features a synchronous execution of switching operations in a compound of many matrices, triggered by hardware.

RF Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	Z _{IN} /Z _{OUT}		50		Ω	
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 ≤ 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 ≤ 3 GHz
	S ₂₂		-10	-7	dB	f > 3 GHz
1 dB compression	P _{1dB}	+2	+5		dBm	
3 rd order intercept	OIP3 ¹	+15	+20		dBm	f ≤ 3 GHz
	OIP3 ¹	+10	+15		dBm	f > 3 GHz
2 nd order intercept	OIP2 ²		+40		dBm	
noise figure	NF		9	11	dB	f < 100 MHz
	NF		8	10	dB	100 MHz ≤ f ≤ 6 GHz
	NF		9	12	dB	f > 6 GHz
channel isolation	S ₂₁		-80	-70	dB	f ≤ 3 GHz
	S ₂₁		-70	-45	dB	3 GHz < f ≤ 6 GHz
	S ₂₁		-60	-45	dB	f > 6 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		kΩ	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 kΩ pull up, active high
trigger level	U _{TRIG}		TTL (0 / 5 V)			
trigger offset	t _{O_FALL}		6.5		μs	50% trigger → 50% RF falling edge, note 3
	t _{O_RISE}		1.1		μs	50% trigger → 50% RF rising edge, note 3
switch rise time	t _{RISE}		1		μs	10% → 90% RF
switch fall time	t _{FALL}		2		μs	90% → 10% RF

Note 1: P_{in} = 2 x -10 dBm, specified and tested for Δf = 2 MHz

Note 2: P_{in} = 2 x -10 dBm, Δf = 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 ≤ 100pF, trigger mode "OUT"

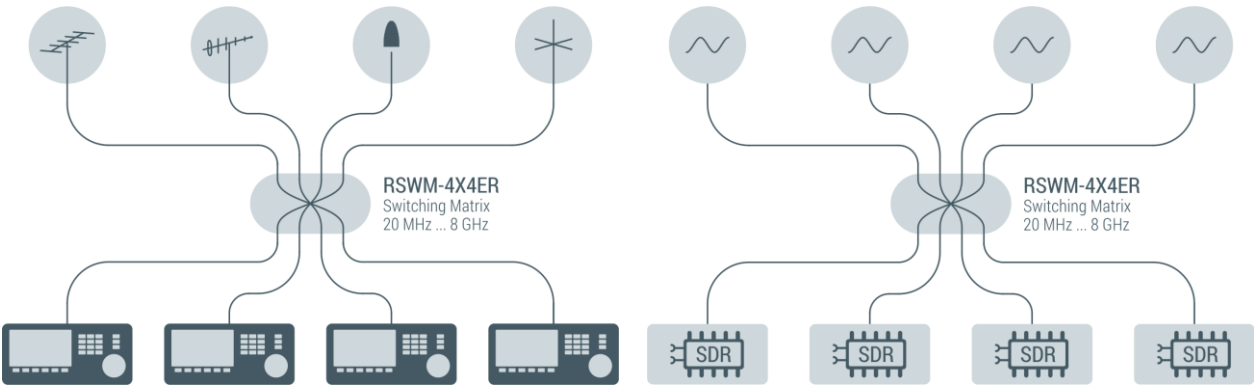


Common Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
power supply		90	230	260	V	50 / 60 Hz AC
power consumption			13		W	
power socket	X _{AC}	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" 1 U, without connectors and handles
weight	m		3.4		kg	
Environment conditions						
operating temp. range	T _o	+5		+45	°C	
storage temp. range	T _s	-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:



Extremely Wideband Radio Monitoring

Research and development by usage of Software Defined Radios (SDRs)




Screenshot of Graphic User Interface

The GUI allows the definition of application-specific labels to make the selection of inputs more meaningful.



Switching Matrix

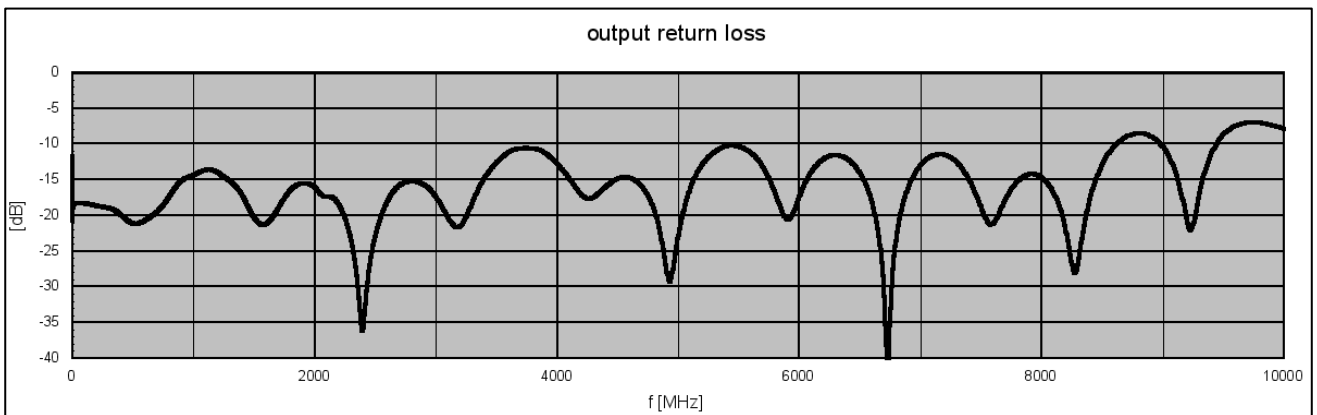
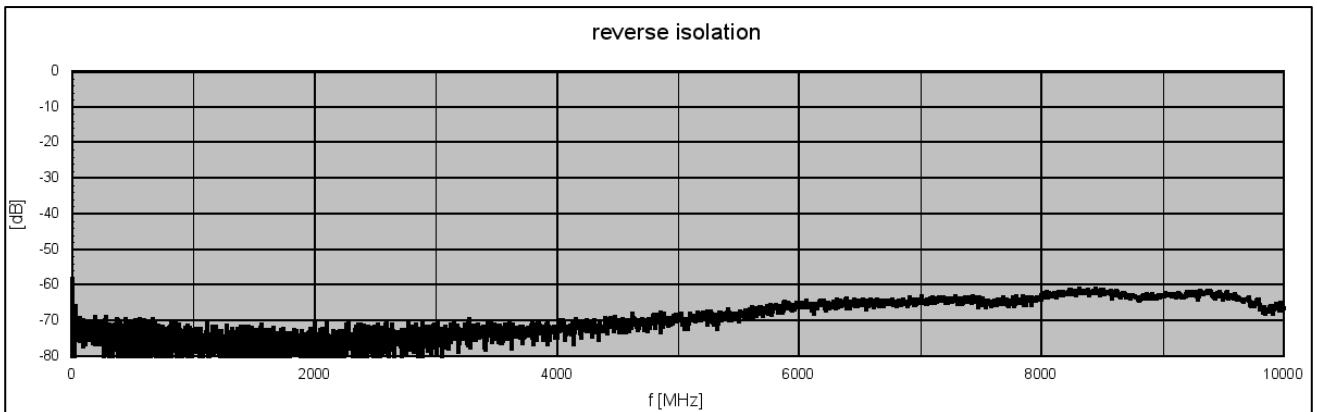
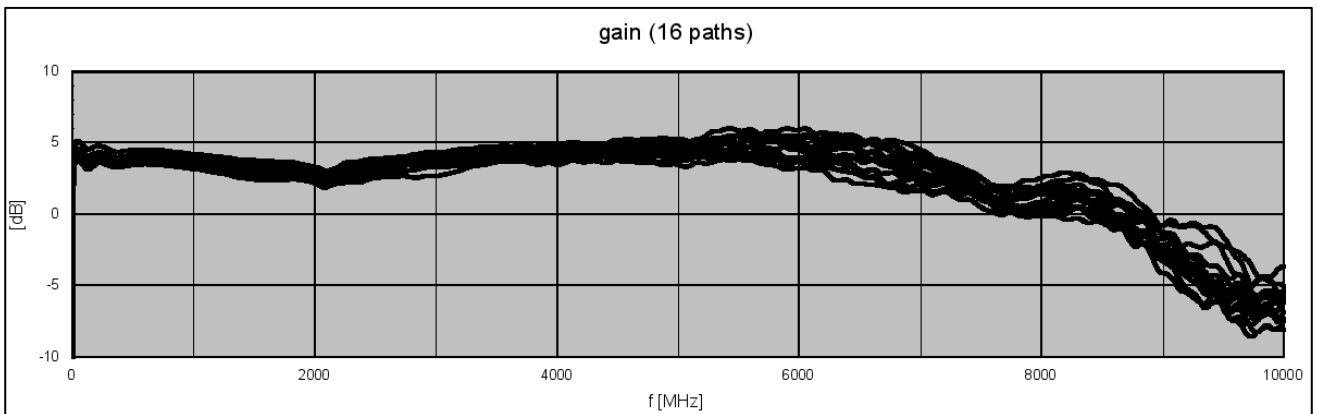
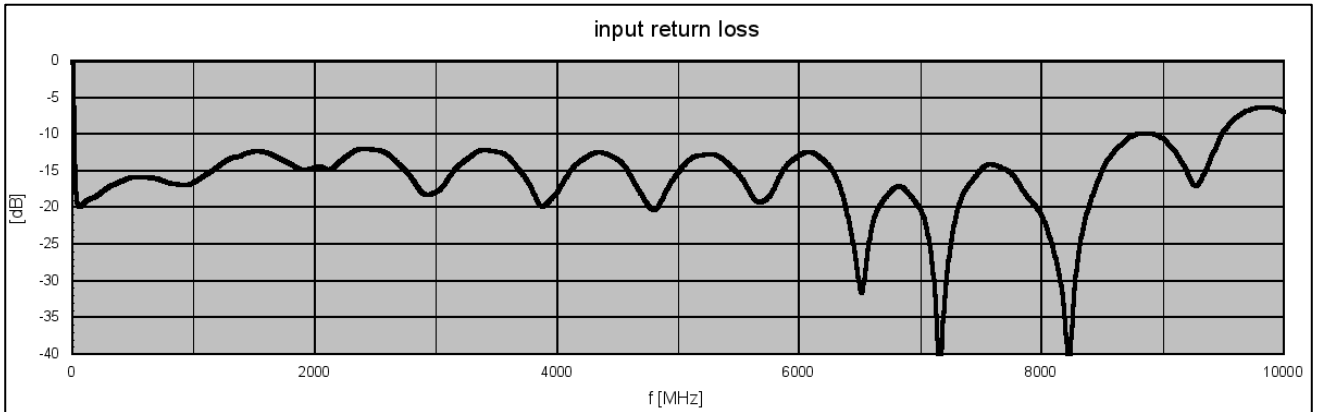
 All OFF

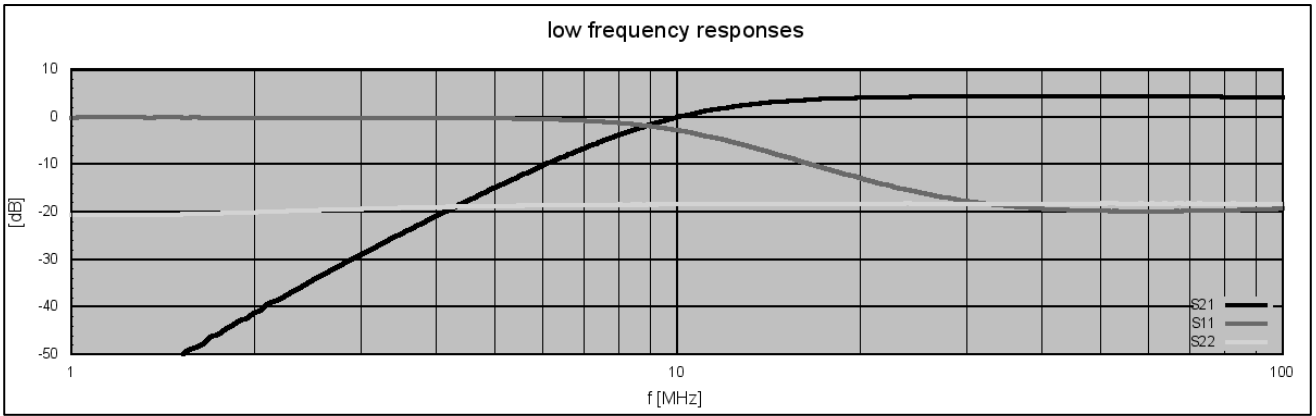
<p>OUT1 X21</p> <p>X (OFF) ▾</p>	<p>OUT2 X22</p> <p>X (OFF) ▾</p>	<p>OUT3 X23</p> <p>X (OFF) ▾</p>	<p>OUT4 X24</p> <p>X (OFF) ▾</p>
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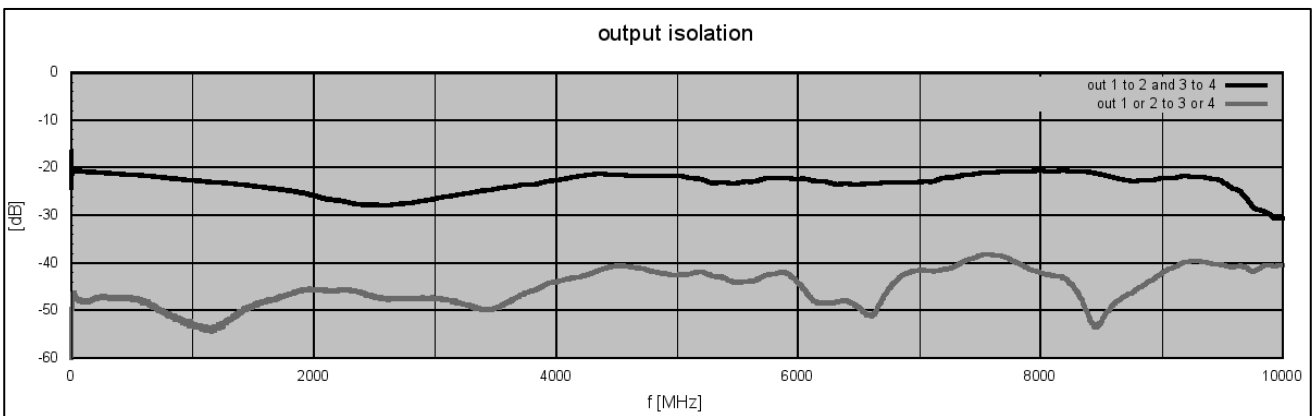
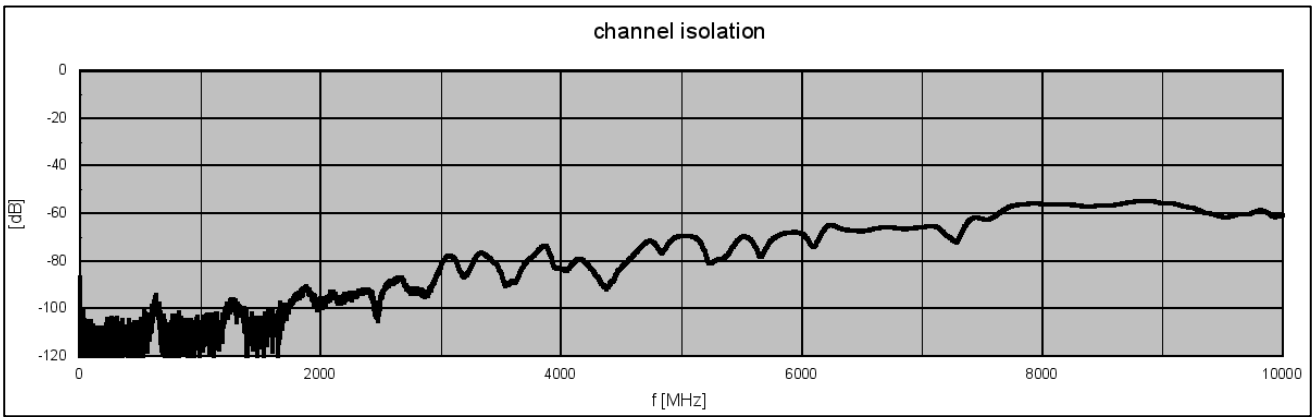


S-Parameters (typical responses)

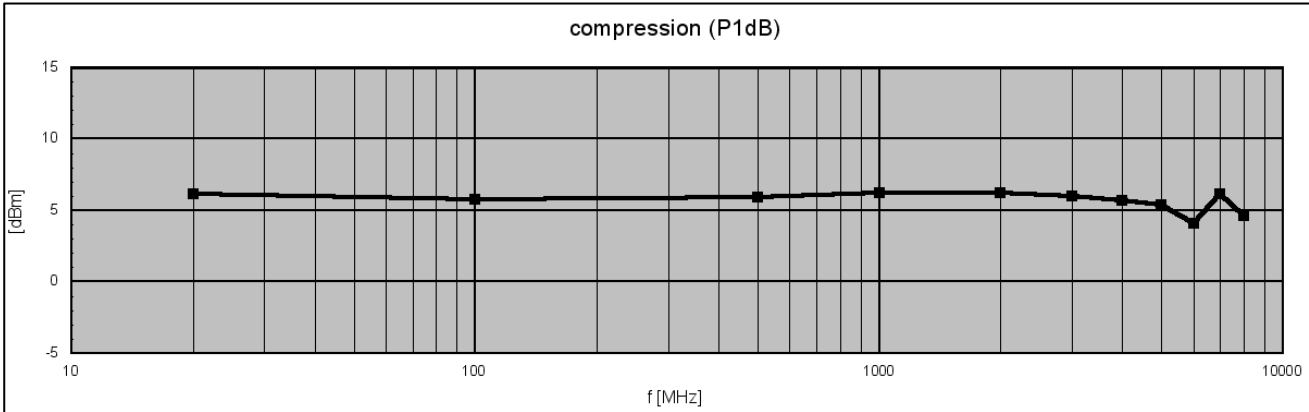
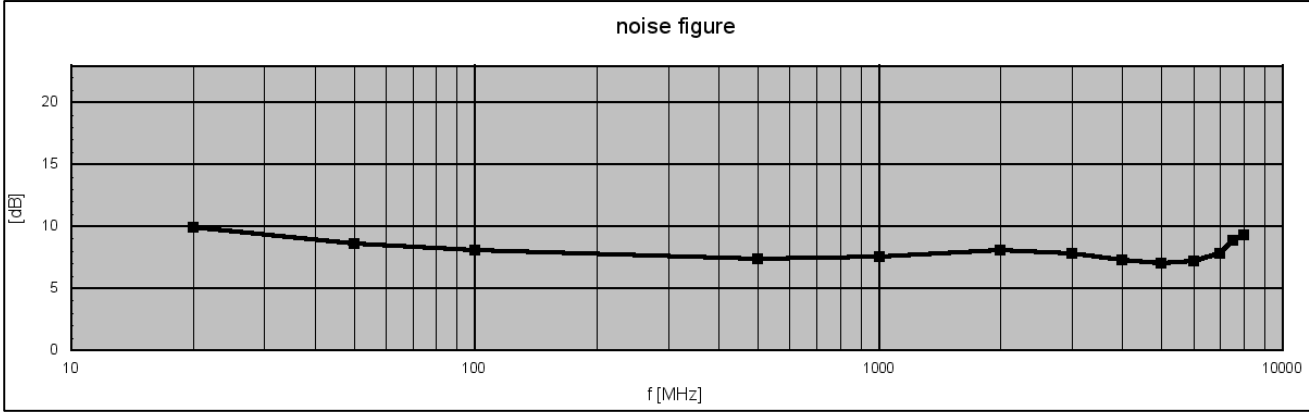




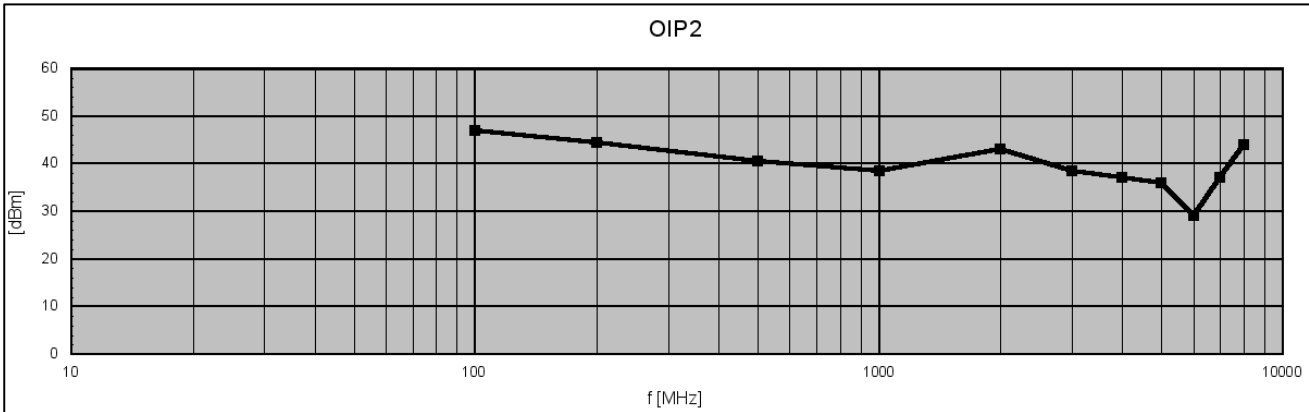
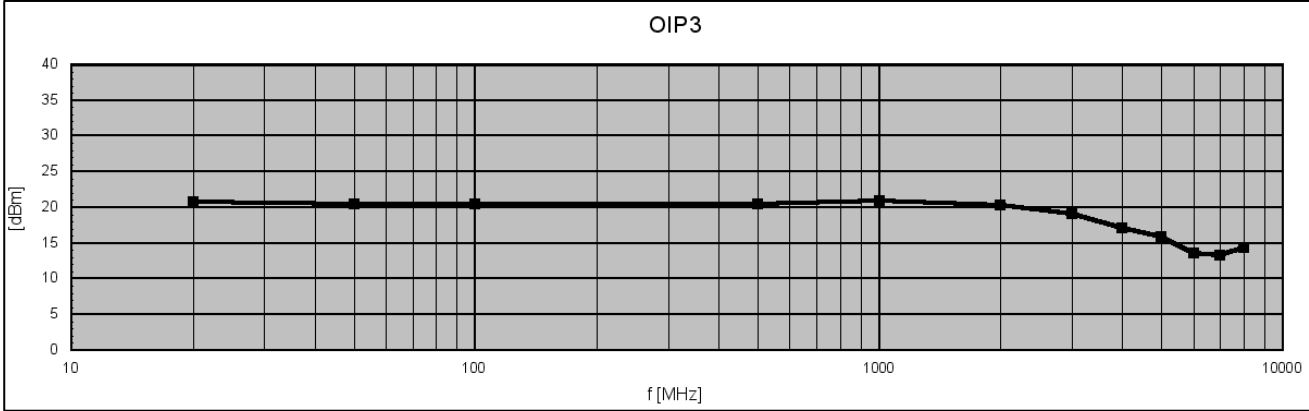
Isolations (typical responses)



Dynamic Range (typical responses)



Linearity (typical responses)



Appearances

Front

View

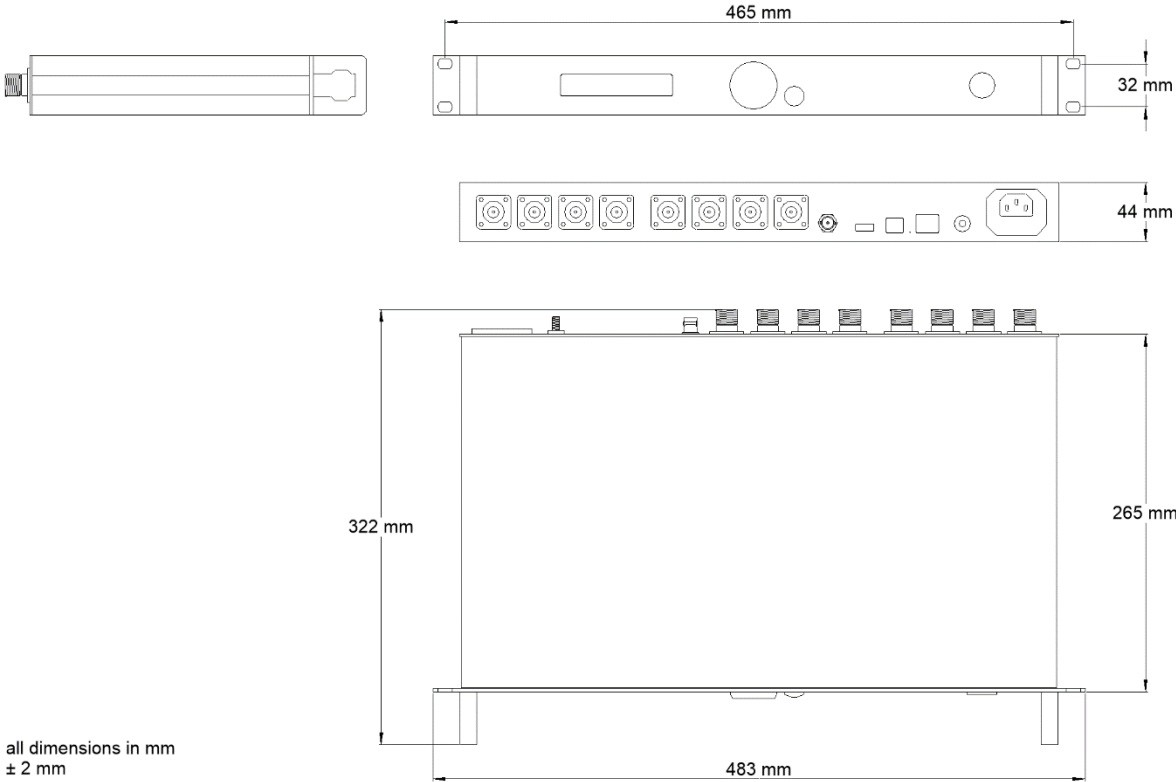


Rear

View



Dimensions



all dimensions in mm ± 2 mm



Related Products

Product	P/N	Description
RSWM-4X4R	1205.4102.x	Wideband Non-Blocking 4X4 Switching Matrix 2 variants: 100 kHz ... 4000 MHz and 20 MHz ... 4000 MHz, LAN remote interface with SNMPv2 trap function.
RSWM-4X8R	2103.4302.1	Wideband Non-Blocking 4X8 Switching Matrix 20 MHz ... 4000 MHz, LAN remote interface with SNMPv2 trap function.
RSWM-8X8R	2103.4502.1	Wideband Non-Blocking 8X8 Switching Matrix 20 MHz ... 4000 MHz, LAN remote interface with SNMPv2 trap function.
RSWM-4X4ER	1205.4202.1	Extremely Wideband Non-Blocking 4X4 Switching Matrix 20 ... 8000 MHz, LAN remote interface with SNMPv2 trap function.
RSWM-4X8ER	2103.4402.1	Extremely Wideband Non-Blocking 4X8 Switching Matrix 20 ... 8000 MHz, LAN remote interface with SNMPv2 trap function.
RSWM-8X8ER	2103.4602.1	Extremely Wideband Non-Blocking 8X8 Switching Matrix 20 ... 8000 MHz, LAN remote interface with SNMPv2 trap function.
BSWM-4X4ER	1205.4502.1	4X4 Bidirectional Blocking Wideband Switching Matrix 100 kHz ... 8000 MHz, LAN remote interface with SNMPv2 trap function.
BSWM-4X8ER	2103.4702.1	4X8 Bidirectional Blocking Wideband Switching Matrix 100 kHz ... 8000 MHz, LAN remote interface with SNMPv2 trap function.
BSWM-8X8ER	2103.4802.1	8X8 Bidirectional Blocking Wideband Switching Matrix 100 kHz ... 8000 MHz, LAN remote interface with SNMPv2 trap function.

