becker nachrichtentechnik

RSWM-8X8ER

Extremely Wideband Non-Blocking 8X8 Switching Matrix 20 MHz … 8000 MHz

Features

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

Applications

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

At a Glance

Modern communication standards like digital broadcast, cellular, LTE, 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-8X8ER is an innovative, highly integrated and efficient solution for modern radio monitoring and signal routing systems covering the frequency range up to more than 8 GHz. RSWM-8X8ER has internal 64 wideband constellations for RF signal routing. This enables a free non-blocking access of the 8 outputs to the 8 inputs.

AC or DC Supply

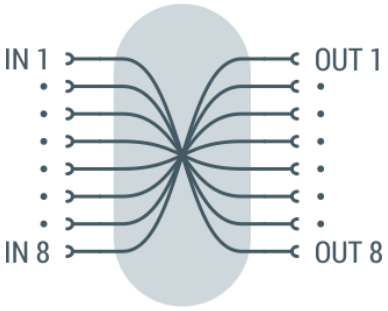
The RSWM-8X8ER is available in variants for DC or AC mains power supply for the use stationary or mobile applications. Both variants cover a wide AC or DC input voltage range.

Automatic Energy Saving

Unused RF path are automatically switch off. This reduces power consumption of the device and saves energy costs.

Principal Block Diagram

The RSWM-8X8ER has 8 equivalent inputs and 8 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-8X8ER 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 a negligible influence to each other.

Versatile Control

To control and operate with RSWM-8X8ER 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-8X8ER 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.

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External Triggering

Like many other products of Becker Nachrichtentechnik GmbH, the RSWM-8X8ER 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}		8			
number of outputs	N_{OUT}		8			
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}	-4.0	0		dB	f = 8 GHz
input return loss	S_{11}		-15	-10	dB	
output return loss	S_{22}		-11	-7	dB	
1 dB compression	P_{1dB}	-1	+5		dBm	f ≤ 3 GHz
	P_{1dB}	-1	+2		dBm	f > 3 GHz
3rd order intercept	OIP3[1]	+12	+16		dBm	f ≤ 3 GHz
	OIP3[1]	+6	+11		dBm	f > 3 GHz
2nd order intercept	OIP2[2]		+32		dBm	
noise figure	NF		11	13	dB	f < 100 MHz
	NF		9	11	dB	100 MHz ≤ f ≤ 6 GHz
	NF		11	13	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		dB	Output 1 to 2 or 3 to 4
	S_{32}		-40		dB	Output 1 or 2 to 3 or 4
reverse isolation	S_{12}		-95		dB	
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}		SMA female			
trigger input	X_{TRIG}		BNC female			internal 1 kΩ pull up, active high
trigger level	u_{TRIG}		TTL (0 / 5 V)			
trigger offset (note 3)	t_{O_FALL}		2		µs	50% trigger → 50% RF falling edge
	t_{O_RISE}		60		µs	50% trigger → 50% RF rising edge, RF IN previously inactive
	t_{O_RISE}		5		µs	50% trigger → 50% RF rising edge, RF IN previously active
switch rise time	t_{RISE}		4		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

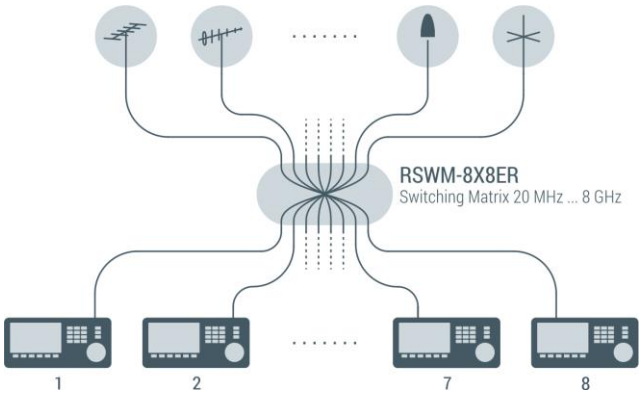
Note 3: capacitive load at 'TRIGGER IO' Port ≤ 100pF, trigger mode "OUT"

Common Specification

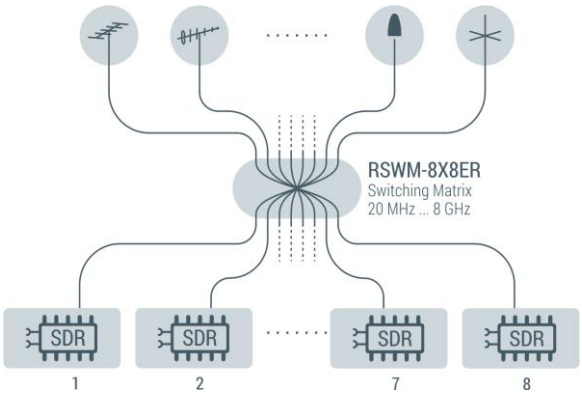
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Variant with AC power supply						
mains input voltage	u_{AC}	90	230	260	V	50 / 60 Hz AC
power consumption	P_{AC}		28		W	all inputs active
power socket	X_{AC}	IEC-60320 C14				country specific mains cable
Variant with DC power supply						
input voltage	U_{DC}	12		27	V	DC
current consumption	I_{DC}		1		A	@ 24 V, all inputs active
power socket	X_{AC}	3 pole XLR male				
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 455			mm	19” 1 U, without connectors and handles
weight	m		8		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), EN55024, 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-8X8ER		2103.4602.1			Variant with AC supply
	RSWM-8X8ER		2103.4602.2			Variant with DC supply

Application Example

The RSWM-8X8ER is suitable for both radio monitoring applications as well as test environments for research and development. Aided by the RSWM-8X8ER 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:



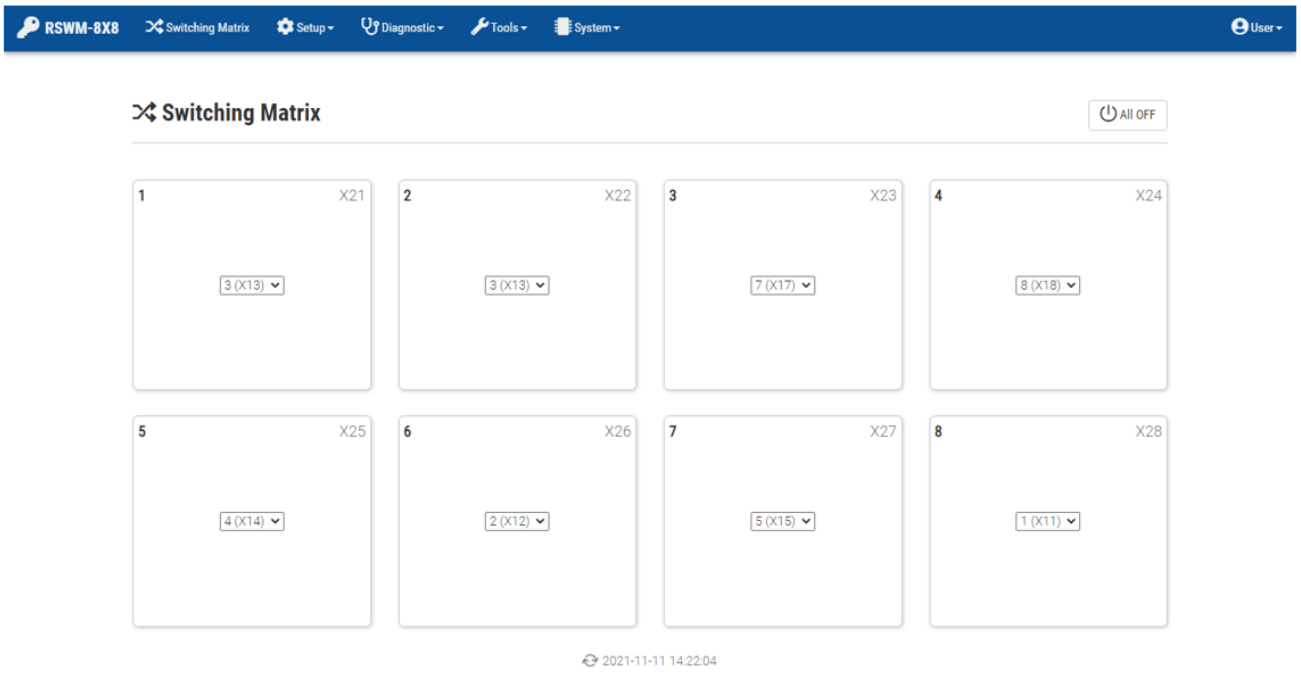
Extremely Wideband Radio Monitoring



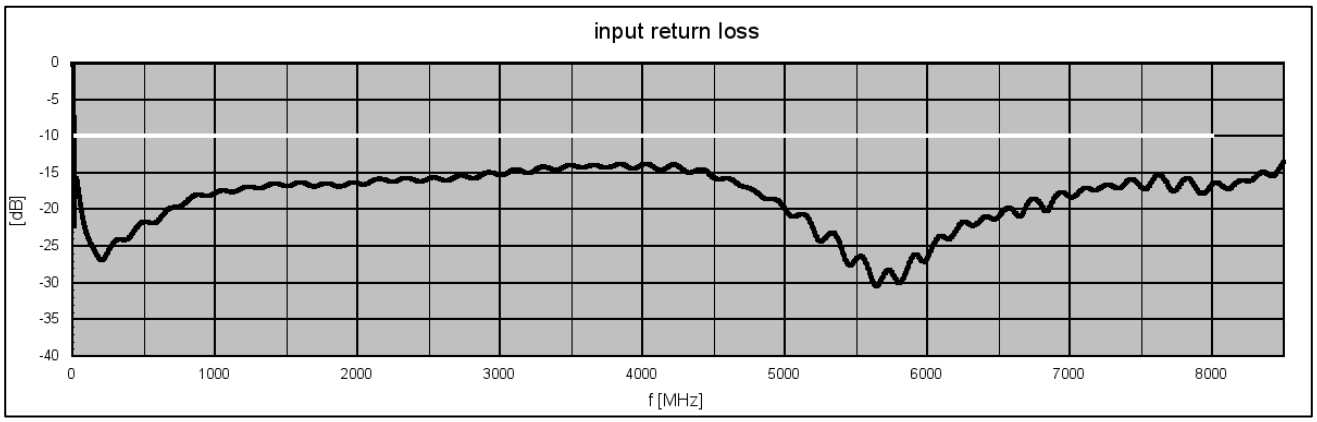
Research and development by usage of Software Defined Radios (SDRs)

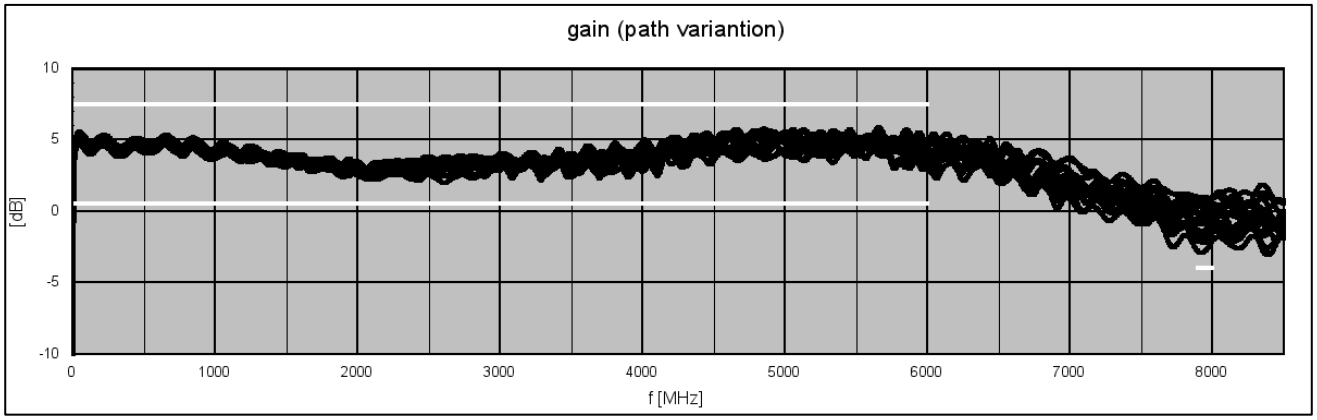
Screenshot of Graphic User Interface

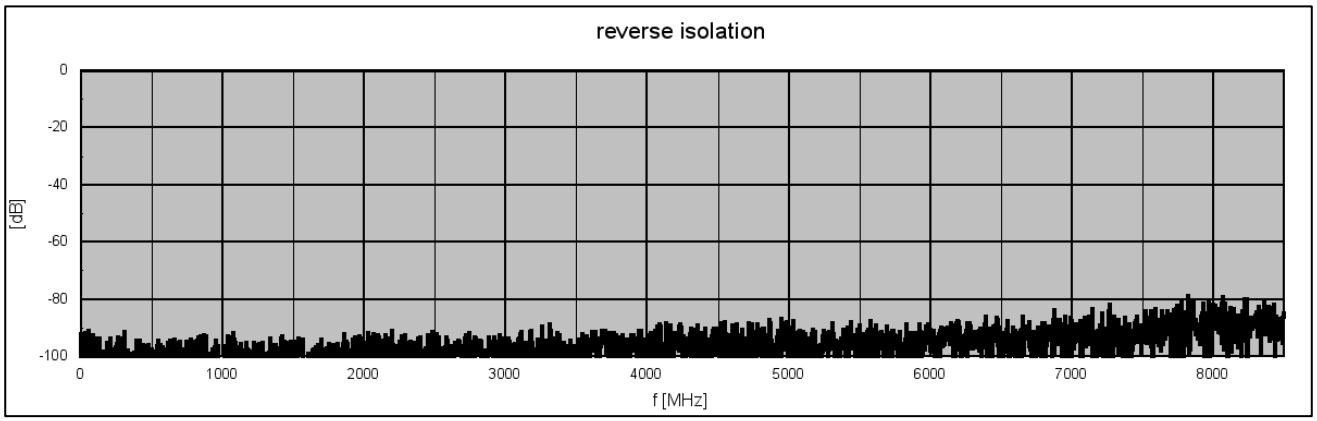
The GUI allows the definition of application-specific labels to make the selection of inputs more meaningful.

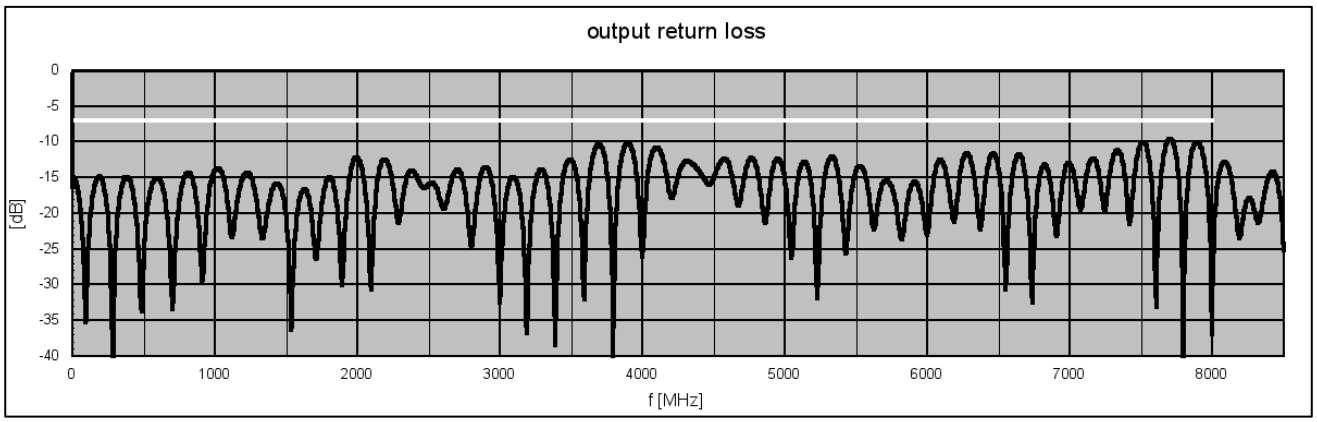


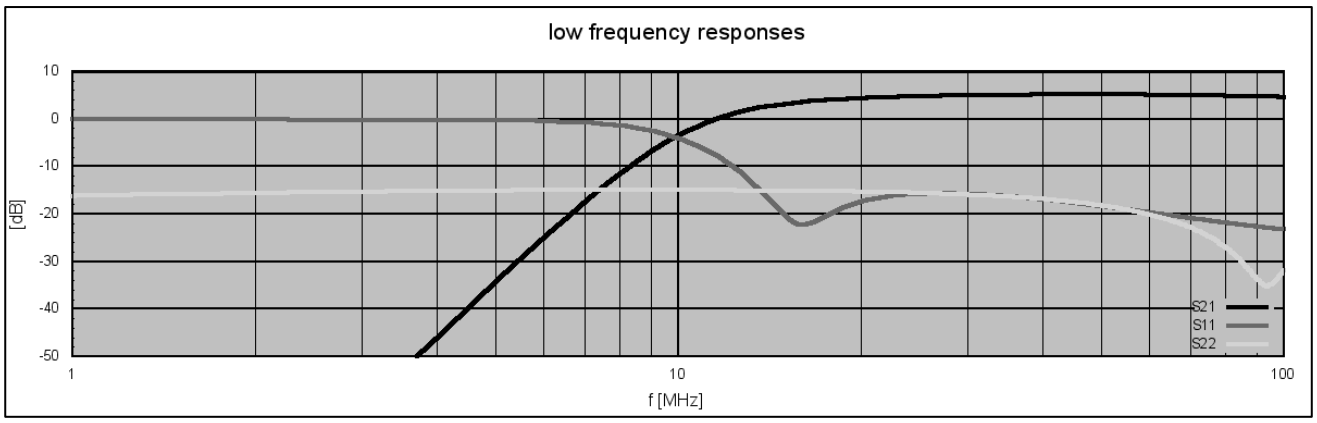
S-Parameters (typical responses)



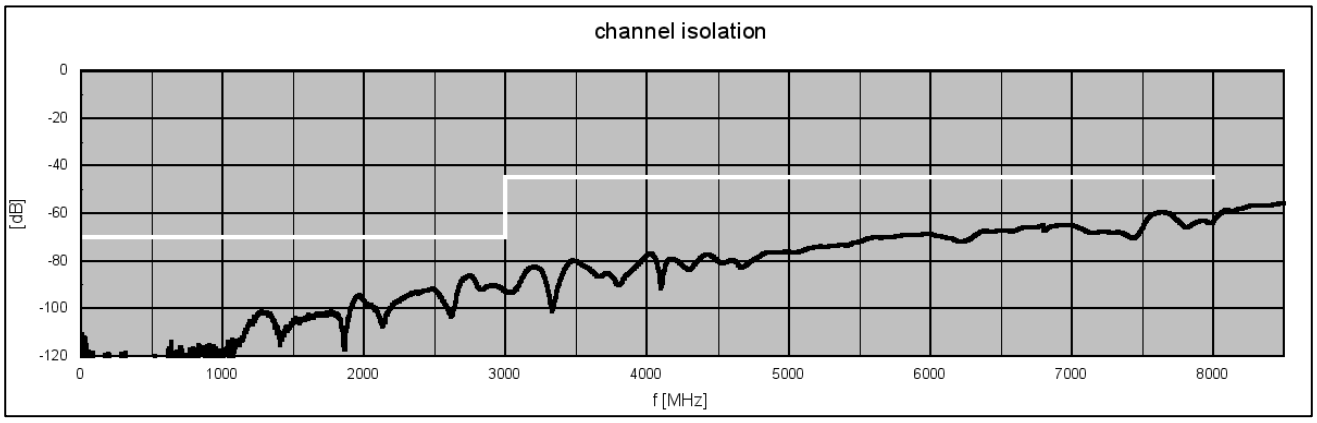


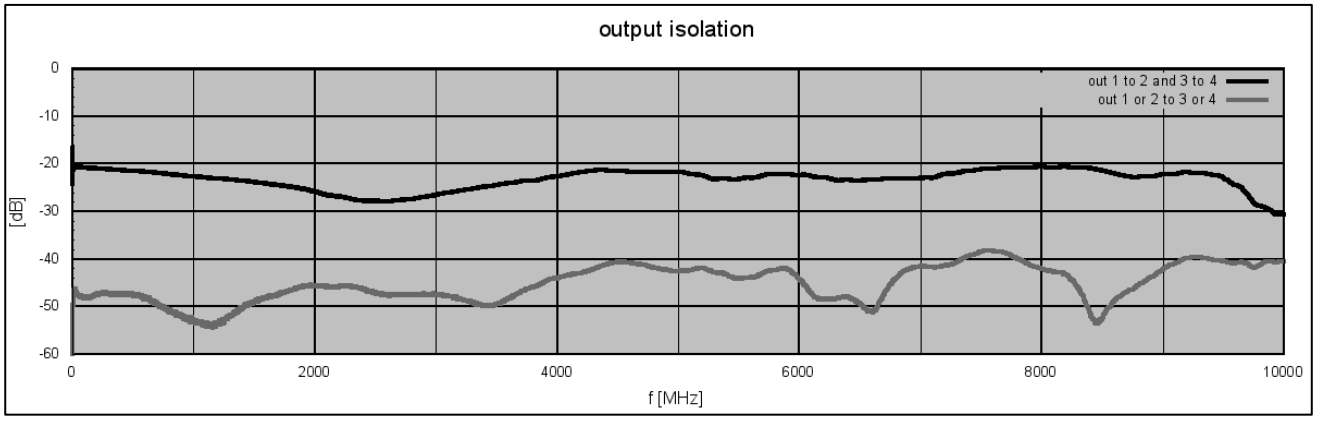




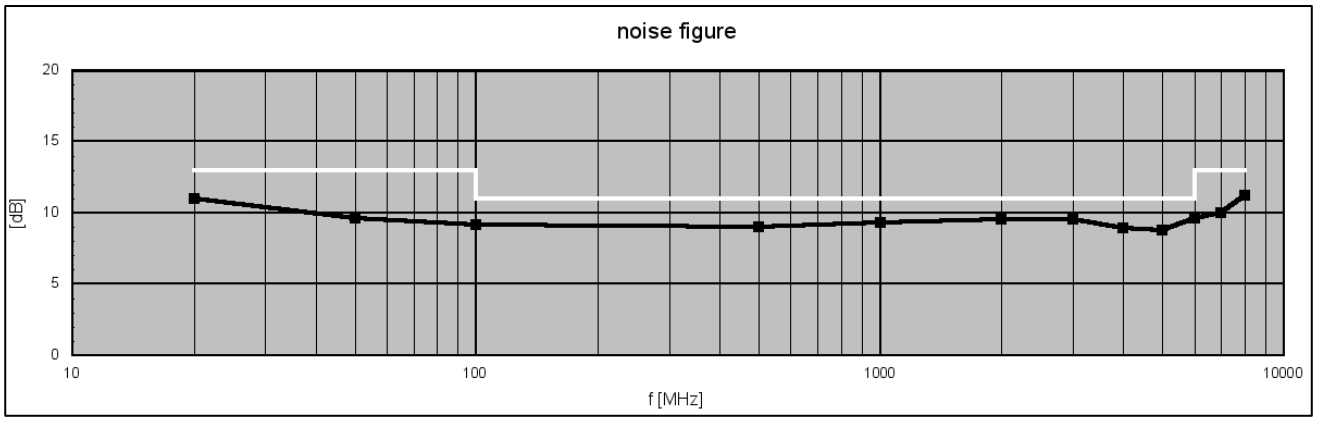


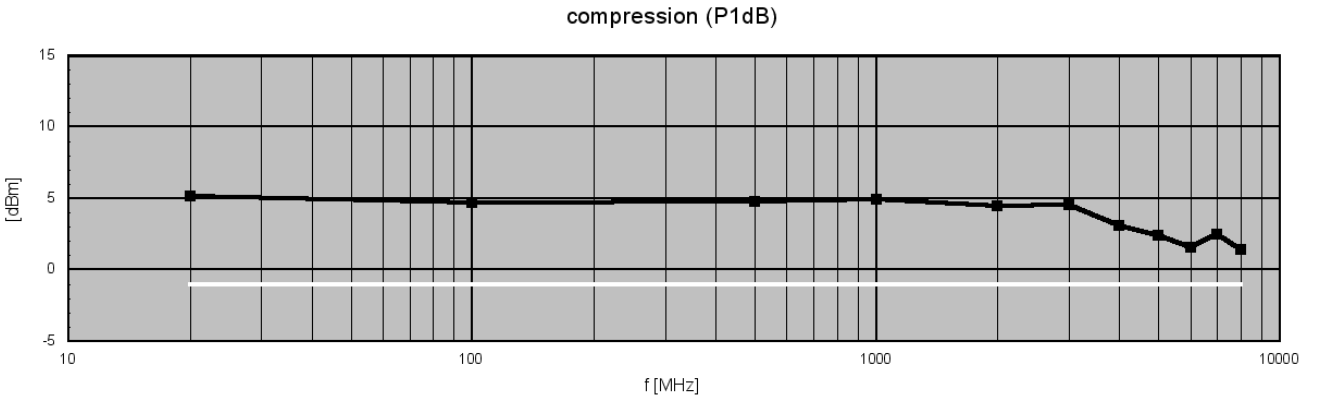
Isolations (typical responses)

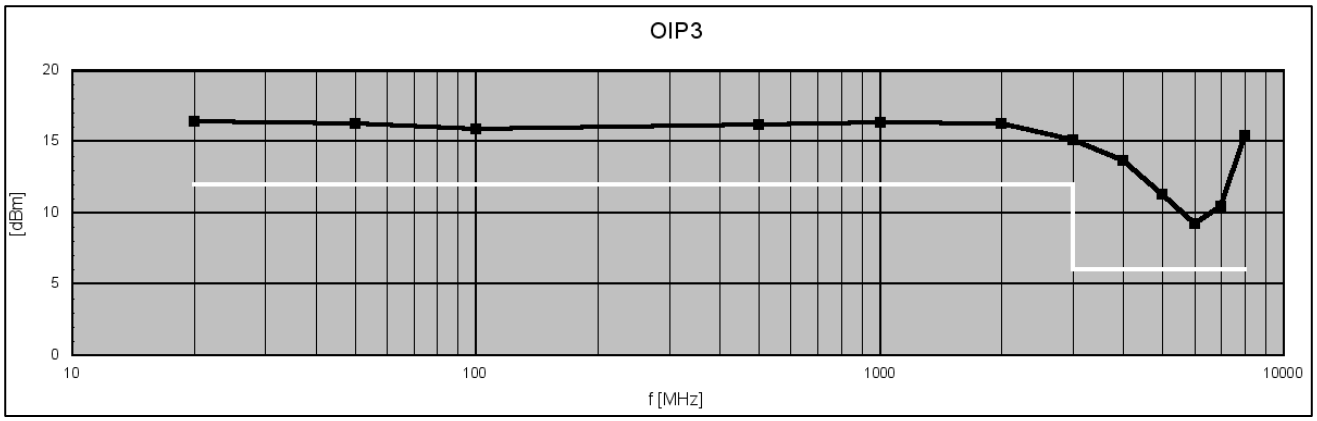


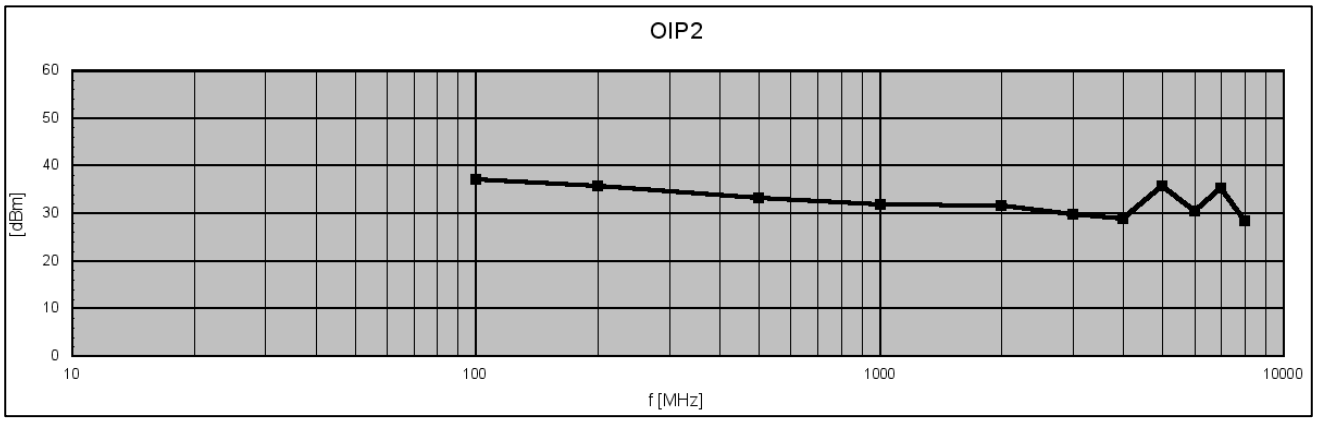


Dynamic Range (typical responses)









Appearances

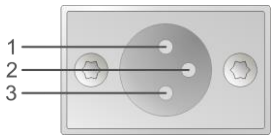
Front View

Rear View (AC Option)

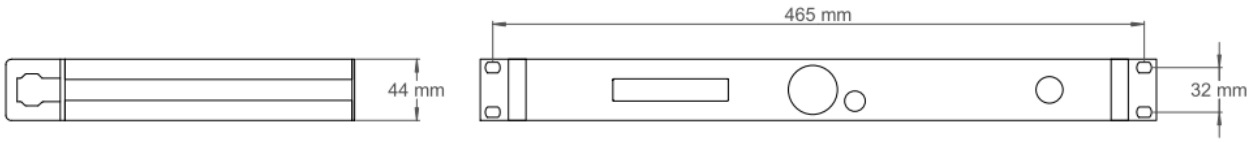
Rear View (DC Option)

DC Option Pin Assignment

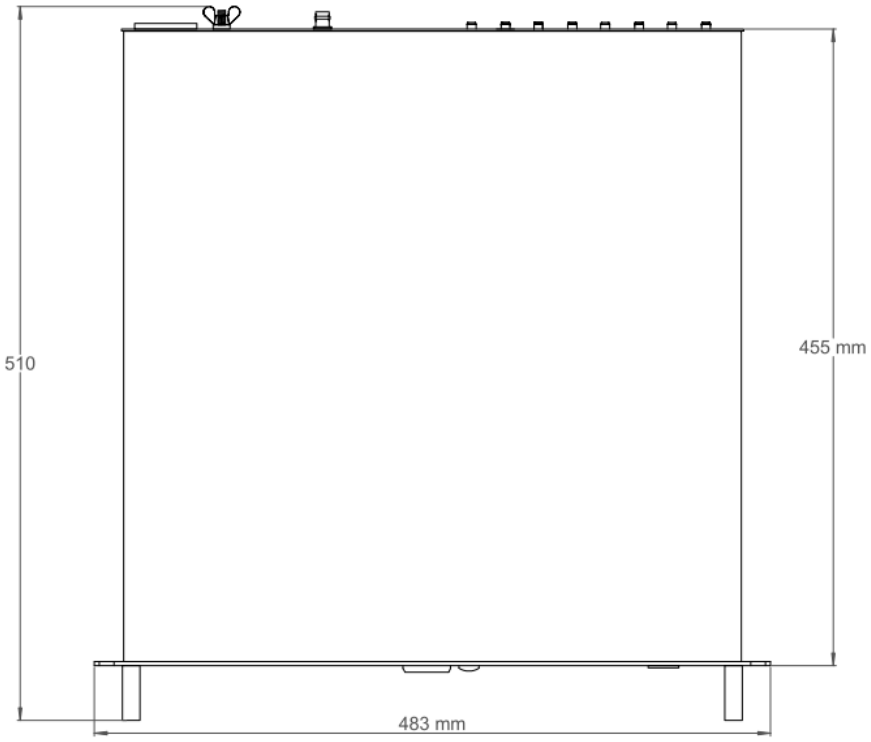
Pin	Assignment
1	DC -
2	Not Connected
3	DC + (12…27 V), 1 A typ., 4 A max.



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.