

R&S® MSR4 MULTIPURPOSE SATELLITE RECEIVER

Enabling software defined radio applications



Product Brochure
Version 02.01

ROHDE & SCHWARZ

Make ideas real



AT A GLANCE

The R&S®MSR4 multipurpose satellite receiver is a multichannel receiver optimized for software defined radio applications in satellite communications.

The R&S®MSR4 receives signals in the L band from 500 MHz to 3 GHz on four tunable channels and provides an on-board recording function. In addition, the receiver's two transmit channels can use data from internal storage or external sources to generate an RF signal in the frequency range from 900 MHz to 2.5 GHz.

The small form factor allows easy integration in various scenarios. The R&S®MSR4 comes with a web based graphical user interface, which makes it convenient to operate.

The R&S®MSR4 is a key component in the Rohde&Schwarz SATCOM measuring system. It can also be used independently, such as for SATCOM quality of service monitoring. An internal monitoring application controls the four input channels independently of each other and evaluates them. The range of functions can optionally be expanded, for example to record I/Q signals.

The R&S®MSR4 offers extensive functions with proven Rohde&Schwarz quality, and is developed and produced in Germany.



KEY FACTS

- ▶ Four receive channels tunable from 500 MHz to 3 GHz
- ▶ Two transmit channels tunable from 900 MHz to 2.5 GHz
- ▶ Bandwidth of 200 MHz for receive and transmit channels
- ▶ Up to 200 MHz wide I/Q streaming for each receive channel
- ▶ Dedicated 10 Gbit interfaces for each receive channel
- ▶ On-board SSD for signal recording and replay over one of the transmit channels
- ▶ Easy to operate via web GUI or via an application programming interface (API)
- ▶ Compact and ideal as a standalone solution or integrated into system solutions – a 1 RU, 19" wide, 10 kg device

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STANDALONE APPLICATION

The R&S®MSR4 can be used standalone. It offers a record and replay feature and an I/Q streaming feature.

Record and replay feature

The record and replay (RnR) feature of the R&S®MSR4 is helpful for anyone working with RF signals. With its internal recording and replay capabilities as well as seamless upload and download, this device is useful for post signal analyses and repeatable RF playback.

Internal recording of one RF channel

The internal record and replay feature of the R&S®MSR4 allows you to capture and store RF signals as I/Q data with a maximum bandwidth of 103 MHz, giving you the flexibility to replay and analyze them at your convenience. With the ability to record an RF channel, you can focus on the specific signal that matters most to your application – whether for research, development or testing.

RF replay of the recorded signal

But recording is just the beginning. The R&S®MSR4 also enables you to replay the recorded signal, allowing you to retransmit it and analyze its behavior in a controlled environment. This feature is particularly useful for testing and validation, since it enables you to reproduce complex signal scenarios precisely and accurately.

Seamless record uploads and downloads

The R&S®MSR4 makes it easy to transfer records to and from the device, giving you the freedom to work with your data wherever you need to. The upload and download capabilities of the R&S®MSR4 enable you to analyze signals on your PC and share them with colleagues.

Compact all-in-one device

What really sets the R&S®MSR4 apart is its compact size, making it the perfect tool for field testing, research and development.

I/Q streaming feature

The R&S®MSR4 is more than just a powerful RF signal analysis tool – it is also a fully fledged I/Q streamer capable of transmitting data to other systems for processing and storage. With the receiver's advanced architecture, the individual RF input paths can be used independently, each with their own dedicated 10 Gbit/s streaming output.

But that is not all. If you have I/Q data stored on an external data storage device, the R&S®MSR4 can receive a data stream and output it via its RF outputs (TX option required). This enables effortless data transfer and processing, giving you the flexibility to work with your data in the way that suits you best.



The R&S®MSR4 RnR feature allows convenient operation with one click on a single screen.

COMMUNICATIONS SYSTEM MONITORING APPLICATION

Monitoring of spectrum and carriers: R&S®MSR4 and R&S®GSACSM communications system monitoring – a perfect fit for observing SATCOM links



R&S®GSACSM software suite

Monitoring solution based on the R&S®MSR4 and R&S®GSACSM

In combination with the R&S®GSACSM software suite, the R&S®MSR4 is the perfect hardware platform for spectrum monitoring, carrier monitoring and classification of SATCOM signals on up to four channels. In a scalable client/server architecture, R&S®GSACSM allows remote spectrum analysis in distributed systems. The communications system monitoring (CSM) server is therefore installed directly on the R&S®MSR4 to provide access to up to four I/Q streams. All R&S®GSACSM functions can then be used from anywhere in the world by connecting a CSM client to the server.

R&S®GSACSM supports signal monitoring on multiple devices simultaneously and allows multiple users to monitor the same device.

Satellite transponder monitoring

R&S®GSACSM autonomously scans transponder signals and identifies carriers such as DVB-S, DVB-S2 and DVB-CID. Scanning and evaluating signals continuously enables desired carriers to be detected with detailed information such as baud rate, modulation scheme, FEC rate, C/N and carrier frequency offset. Unwanted services can also be tracked and identified.

Scalable client/server architecture

In a scalable client/server architecture, R&S®GSACSM allows remote spectrum analysis in systems where the sensors are distributed worldwide. Operators can manage their devices at various locations. The R&S®MSR4 receiver allows up to four signal paths to be monitored independently from each other. In addition, the CSM server can be installed directly on the device.

Measurement of cross-polarization

Cross-polarization (XPOL) distortions can occur if both polarization planes (horizontal and vertical) of an antenna are used. If a power offset to either plane occurs, for example because the low-noise blocks (LNB) are not set correctly, the orthogonality of the planes is no longer maintained. This can affect the power in the other plane and cause distortion.

The XPOL mode of R&S®GSACSM can analyze the power difference measured between two channels of the R&S®MSR4. R&S®GSACSM shows the spectra of both inputs and measures the power difference of a beacon signal or a dedicated carrier.

Monitoring solution

The R&S®MSR4 acts as a sensor to monitor up to four RF input paths using the R&S®GSACSM server and client.



SYSTEM APPLICATION

Seamless system integration

As a software defined device, the R&S®MSR4 is designed to be easily and functionally integrated as a key component in your overall system architecture. With its range of features, this powerful device can operate as a satellite receiver, streamlining your system and reducing the need for additional hardware.

Simplify your system, amplify your productivity

By integrating the R&S®MSR4 into your system, you can:

- ▶ Reduce hardware requirements: minimize the need for extra equipment and complexity
- ▶ Minimize error sources: fewer components mean fewer potential points of failure, ensuring a more reliable system

Unlock efficient system design

The R&S®MSR4 is the perfect solution for anyone looking to simplify their system setup and increase productivity. With its advanced features and seamless integration capabilities, this device is the key to unlocking a more efficient and effective system design.



DVB-S2X receiver functionality

Controlled via application programming interface (API) the R&S®MSR4 includes up to two DVB-S2X receiver channels for R&S®GSA1 FSS/VSAT solution applications. The DVB-S2X receiver functionality with optional Annex M support allows very compact systems solutions, realized by Rohde&Schwarz.

Application programming interface (API)

Take control of your RF signal analysis with the API of the R&S®MSR4. With the API of the R&S®MSR4, you can unlock new levels of efficiency, productivity, and customization. It allows you to:

- ▶ Automate tasks: streamline your workflow by automating repetitive tasks and processes
- ▶ Customize your experience: integrate the R&S®MSR4 into your existing systems and workflows
- ▶ Enhance flexibility: easily adapt to changing requirements and applications

Simple network management protocol (SNMP)

The R&S®MSR4 supports SNMP, making it easy to:

- ▶ Monitor and control: remotely monitor and control the status and settings of the R&S®MSR4
- ▶ Integrate with existing networks: seamlessly integrate the R&S®MSR4 into your existing network management systems
- ▶ Reduce downtime: quickly identify and resolve issues with real-time alerts and notifications

Synchronization with precision: network time protocol (NTP) primary and secondary feature

The NTP primary and secondary feature of the R&S®MSR4 ensures that your device is always synchronized or acts as time keeper:

- ▶ Precise timestamping: accurate timestamping of RF signals and events, critical for analysis and troubleshooting
- ▶ Simplified data correlation: easy correlation of data across multiple devices and systems, thanks to a unified time reference
- ▶ Reduced errors: minimized errors caused by clock drift or desynchronization, ensuring reliable and trustworthy data

The R&S®MSR4 can be easily integrated into existing Rohde & Schwarz systems such as the R&S®GSA1 FSS/VSAT solution.

CARRIER-IN-CARRIER SYMMETRIC SEPARATOR SOLUTION

Rohde & Schwarz offers the R&S®MSR4-142x carrier-in-carrier symmetric splitting options for processing of point-to-point SATCOM links with carrier-in-carrier technology.

Carrier-in-carrier technology

Carrier-in-carrier (CiC) technology involves SATCOM terminals at both ends of the link using the same transmit frequency. The downlink signal is a composite of both directions of the link. Since the two terminals know their own transmitted signal, they can separate the receive signal from the link. However, for a non-cooperative interceptor, the two directions of communications are fully distorted and therefore unreceivable.

Rohde & Schwarz solution: R&S®MSR4-142x options

The R&S®MSR4-142x carrier-in-carrier symmetric splitting options and an additional GPU server resolve the issue described above by processing the received composite signal and providing the two directions of communications separately at the output.

With input and output signals in the L band intermediate frequency range, the device can be easily integrated into existing single carrier per channel (SCPC) intercept systems, regardless of the vendor and technology used.

Options overview

Type	Designation
R&S®MSR4-1420	CiC symmetric splitting, QPSK, basic
R&S®MSR4-1421	CiC symmetric splitting, QPSK, bandwidth extension
R&S®MSR4-1422	CiC symmetric splitting, 8QAM
R&S®MSR4-1423	CiC symmetric splitting, 8QAM, bandwidth extension

Separating CiC communications without knowledge of the contents of both signals is a technological challenge. Leveraging our extensive experience in providing solutions for SATCOM interception, Rohde & Schwarz has developed this innovative solution.



The R&S®MSR4-142x carrier-in-carrier symmetric splitting options are seamlessly integrated in the R&S®MSR4 GUI.

OPTIMIZED USER EXPERIENCE AND MULTITOOl

The R&S®MSR4 is versatile and easy to set up and operate.

User-friendly setup and operation

The R&S®MSR4 is very easy to set up and operate. Its web GUI combines all the main settings in a clear interface and enables intuitive operation.

Rohde&Schwarz used its many years of expertise in high frequency technology to develop the R&S®MSR4. Every single function and detail of the system has been optimized to ensure the best possible user experience.

Compact and powerful

The compact and powerful R&S®MSR4 has outstanding size, weight and power consumption (SWaP). The four R&S®MSR4 RF input channels can be operated individually and simultaneously, providing maximum application flexibility and efficiency.

What makes the multipurpose satellite receiver even more useful is its suitability for a wide variety of application scenarios, so users do not have to compromise on functionality. This reduces system-level investment costs and minimizes potential error sources.



The user-friendly R&S®MSR4 home screen

FLEXIBLE SERVICE AND UPGRADE CONCEPT

Rohde & Schwarz maintenance and support services aim to maximize and protect the investment of users' Rohde & Schwarz products.

Software defined platform

The R&S®MSR4 is an innovative software defined platform that saves users from having to carry out annoying hardware adjustments. Straightforward software updates greatly simplify subsequent system scaling. Systems can be adapted to new requirements at any time.

Sophisticated licensing concept

The R&S®MSR4 offers a sophisticated licensing concept, which helps optimize spare parts stocks. Changing the hardware unit dongle activates additional functions without additional license costs. This not only reduces the amount of work required, but also maintenance and operation costs.

Service level agreements

Rohde & Schwarz offers various service level agreements (SLA) to protect the R&S®MSR4 hardware over its entire lifetime. Users can choose the SLA that best suits their needs and benefit from ongoing software maintenance to ensure that the system continues to meet future requirements.



CLEARLY STRUCTURED USER INTERFACE

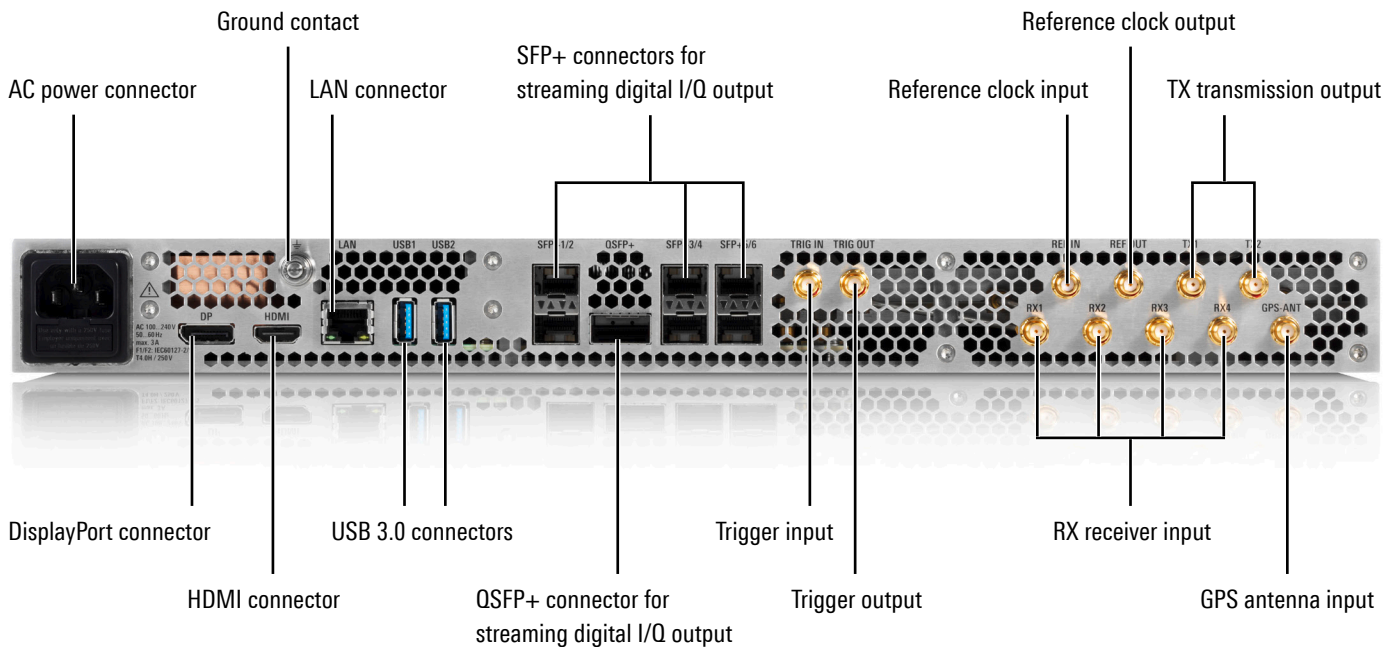
FRONT PANEL

Three status LEDs:

- ▶ Top: status LED shows device status (off, booting, ready) and errors
- ▶ Middle: link LED shows that the link between the R&S®MSR4 and computer has been established
- ▶ Bottom: stream LED shows that I/Q streaming is in progress



BACK PANEL



The terms HDMI and HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing, LLC in the United States and other countries.

SPECIFICATIONS IN BRIEF

Specifications in brief

Antenna ports		SMA female, 50 Ω
Analysis bandwidth (fixed to 80% of sample rate)	RX1 to RX4 receive channels	52 kHz to 200 MHz
	TX1 to TX2 transmit channels	52 kHz to 200 MHz
Frequency range	RX1 to RX4 receive channels	500 MHz to 3 GHz
	TX1 to TX2 transmit channels	900 MHz to 2.5 GHz
Tuning resolution		1 Hz
A/D converter resolution		12 bit, absolute
D/A converter resolution		14 bit, absolute
Dimensions	W × H × D	482.6 mm (19") × 44.5 mm (1 RU) × 550 mm (19.0 in × 1.8 in × 21.7 in)
Weight		10.2 kg (22.5 lb)

ORDERING INFORMATION

Designation	Type	Order No.
Base unit with mandatory firmware		
Multipurpose satellite receiver, with internal licensing option	R&S®MSR4	3066.8550.03
Multipurpose satellite receiver, with external licensing option	R&S®MSR4	3066.8550.04
Software package	R&S®MSR4-SW	3066.8673.02
Documentation		
Getting started		1179.3096.01
Operating manual		1179.3109.01
Safety instructions		1171.1771.99
Software options (firmware)		
I/Q streamer	R&S®MSR4-IQ	3066.8644.02
Internal recording and replay via RF	R&S®MSR4-RNR	3066.8709.02
I/Q snapshot, for internal communications system monitoring processing (unlocks all RX channels)	R&S®MSR4-CSMRX	3075.3429.02
I/Q upgrade, to upgrade the internal I/Q snapshot to external I/Q streaming	R&S®MSR4-IQUPG	3075.3412.02
Satellite monitoring (only in combination with R&S®GSA1 FSS/VSAT solution)	R&S®MSR4-SATMON	3066.8680.02
Primary network time protocol (NTP) server	R&S®MSR4-NTP	3066.8715.02
Carrier-in-carrier (CiC) symmetric splitting options		
CiC symmetric splitting, QPSK, basic	R&S®MSR4-1420	3066.8667.02
CiC symmetric splitting, QPSK, bandwidth extension (requires R&S®MSR4-1420)	R&S®MSR4-1421	3066.8744.02
CiC symmetric splitting, 8QAM (requires R&S®MSR4-1420)	R&S®MSR4-1422	3066.8750.02
CiC symmetric splitting, 8QAM, bandwidth extension (requires R&S®MSR4-1420 and R&S®MSR4-1422)	R&S®MSR4-1423	3069.5346.02

Service options

Extended warranty, one year	R&S®WE1	
Extended warranty, two years	R&S®WE2	Contact your local
Extended warranty, three years	R&S®WE3	Rohde & Schwarz sales office
Extended warranty, four years	R&S®WE4	

Service at Rohde & Schwarz
You're in great hands

- ▶ Worldwide
- ▶ Local and personalized
- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

Rohde & Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

Rohde & Schwarz training

www.training.rohde-schwarz.com

Rohde & Schwarz customer support

www.rohde-schwarz.com/support

