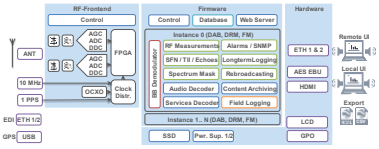
Product Line DRM Monitoring Receiver RF-SE

Overview

RF-SE is a professional digital radio monitoring and measurement receiver, which is available in different models.

The outstanding reception characteristics are based on a high-performance frontend with digital direct-down conversion system approach. The field-proven digital baseband demodulator provides access to all needed measurement and monitoring parameter. Furthermore, various modular blocks like RSCI capability, audio and data decoder, alarm feature, browser-based GUI, RFmonitor connector are available to suite the specific needs of the desired application.



Applications

- Transmitter, spectrum and coverage monitoring
- Modulation quality and parameter measurements
- RSCI long-term logging and analysis
- Reference for receiver development
- High accuracy field strength measurements
- Content verification and logging
- QoS (Quality of Service) monitoring
- Mobile field trials and measurements

Specification

Common Features

- Stand-alone monitoring receiver for reception analysis and content verification
- NTP synchronization
- Field proven demodulator
- Browser based configuration and services decoding. No installation of software necessary.
- Multi-decoder configuration possible
- Proven long-term stability
- Firmware update via remote GUI
- Extendible to work with RFarchiver for long-term content logging

- Fully compliant to DRM standard (ETSI ES 201 980)
- RSCI compatible to ETSI TS 102 349

DRM Decoder

- Decoding status
- Display of all services
- Audio decoding of a single service
- Streaming of audio as AAC
- Decoding of DL/TM(+), Journaline®, Slideshow, Broadcast Website, SPI, TPEG(optional)
- Full ensemble MDI output to Ethernet
- DCP/MDI output via Ethernet (including multicast support)

DRM Demodulation

DRM-AM (DRM30): below 30MHz, including the SW, MW and LW broadcasting bands

- Robustness modes A, B, C, D
- Spectrum occupancy 4.5, 5, 9, 10, 18, 20kHz
- MSC modes 16 QAM, 64 QAM, and hierarchical (HM-mix, HMsym)
- SDC modes 4 QAM and 16 QAM
- Interleaver depth 0.4s and 2s
- EEP and UEP with all protection ratios / code rates

DRM-FM (DRM+): above 30 MHz, incl. the VHF broadcast bands I, II (FM) and III

- Robustness mode E
- Spectrum occupancy 96kHz
- MSC modes 4 and 16 QAM
- SDC mode 4 QAM, code rates 0.5 & 0.25
- Interleaver depth 0.6s
- EEP and UEP with all protection ratios / code rates

Remote Control

- Full remote control via Ethernet
- Browser-based user interface
- SNMP (Get, Set, Treewalk)
- Control via DCP/UDP

Advanced GUI

The advanced graphical user interface (GUI) is designed to provide the full experience of a modern and professional measurement device:

- State-of-the-art HTML5 technology
- No software / plug-in installation necessary
- Same browser based advanced GUI remotely and locally (if available)
- Touchscreen and mouse capability
- Adapts to different screen sizes

Hardware

RF-Frontend DRM-FM

Parameter	Value
Input frequency range	Band I/II: 65 - 108 MHz Band III: 174 - 230 MHz (optional)
Max. input level	+0 dBm
Max. input level for optimal decoding	-15 dBm
Sensitivity	-105 dBm
Level measurement accuracy calibrated	±1 dB
Noise figure	2.2 dB

RF-Frontend DRM-AM

Parameter	Value
Input frequency range	144 kHz - 30 MHz down to 100 kHz (opt.)
Max. input level	+0 dBm
Max. input level for optimal decoding	-15 dBm
Sensitivity	-110 dBm
Level measurement accuracy calibrated	±1 dB
Noise figure	2.2 dB

Front Panel Signaling

- LCD display with status information and IP address
- LED status

Interfaces

- Antenna 50 Ohm, N connector
- 1 Ethernet & 1 Ethernet (optional)
- USB
- 10 MHz input, max. 5V, BNC

Optional:

- 1 PPS input, max. 5V, BNC
- Displayport / HDMI
- Digital audio output AES/EBU XLR
- Internal GNSS

- External GNSS input 10 MHz, 1 PPS, NMEA
- ETI in / out

Power Supply Input

- Auto-sensing supply, 100 VAC to 240 VAC, 50-60 Hz
- DC input (optional)
- Redundant power supply (optional)
- Power consumption 1 decoding instance: 35 W typ., 45W. max.
- Power consumption 2 decoding instances: 45 W typ., 55W. max.

Mechanical

- Aluminum extrusion front bezel
- Industrial 19“ 1RU, rack mountable
- 420 (483) x 250 x 44 mm
- Weight: 5.5 kg
- Operating temperature: 0 – 50°C
- Humidity: 20 – 80% non-condensing

Options

Several options can be added to the standard version of the RF-SE.

RF Measurements (RFM)

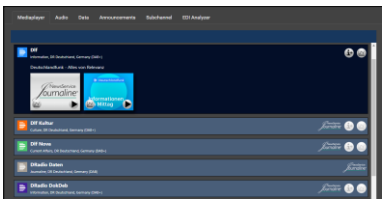
The option RFM includes high quality measurements on various stages of the reception and decoding chain:

- Either four window view or full screen display of diagrams.
- Relevant measurement values are available on SNMP.
- A comprehensive and configurable band-scan.

High quality measurements on various stages of the reception and decoding chain:

- Spectrum and spectrum waterfall
- QAM constellation
- Channel impulse response
- RF input power (storable offset)
- Frequency offset
- SNR
- MER (> 45 dB)
- MER over carrier
- Channel estimation
- Delay spread
- Doppler spread
- Error rate of synchronization, FAC CRC, SDC CRC, audio frames, PRBS

Advanced Application Decoder (AAD)



The option AAD enhances the device with an integrated professional audio and data services decoder, based on Fraunhofer technology:

- Parallel full ensemble decoding and access to all audio and data services
- Multi-user, browser-based decoding of all audio and data services
- Display of audio related information, e.g. audio rate, sampling rate, mode
- Streaming of selected audio service
- Parallel streaming of all audio services in AAC/WAV format
- Service information (Labels, Service country, Program Type)
- Journaline®, MOT Slideshow, Broadcast Website, EPG/SPI
- Optional: TPEG
- Announcements and Emergency Warning Feature (EWF)
- PAD and NPAD, primary and secondary services
- Display of all audio levels, data services and subchannels in parallel
- Statistical information of each service
- Relevant audio and data parameter are available on SNMP
- Audio decoding: HE-AACv2, xHE-AAC, with SBR, PS, MPEG Surround Optional: HVXC, CELP
- Decoding of TextMessages

Local GUI and Audio (LGA)

The option LGA enhances the device for local monitoring via a connected touchscreen and one digital AES/EBU XLS audio outputs:

- Displayport / HDMI output
- Touch functionality via USB
- Local AES/EBU XLR audio output
- Requires ET2 option

Alarm System (ALM)

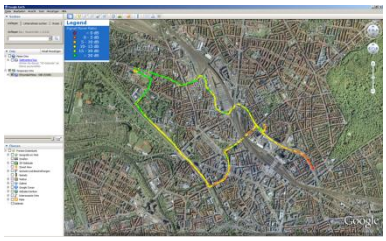
The option ALM enhances the receiver to a flexible, multi-level, built-in alarm system:

- Configurable thresholds
- Measurements/content parameters, e.g. MER, input level, BER, audio level, single stream data rate, announcements, detailed data services parameter
- Monitoring on multiplex and subchannel level possible
- Alarm and status signaling via SNMP (Traps, Informs)

Field Measurements (FIM)

The option FIM provides a comprehensive tool set for mobile field measurements:

- Delivery with USB GPS mouse
- 12VDC input in addition to VAC
- Recording of geo-referenced measurements to file
- Live DCP/UDP output of measurements
- Export of selected tags (e.g. audio frame error, MER, field strength) in KML and CSV format
- Import to Google Earth possible
- Requires RFM option



Diversity Reception (DIV)

- Fully digital dual frequency tuner with high accuracy OCXO reference oscillator
- Dual independent synchronization, channel estimation, channel equalization, and FAC decoding
- Combined MSC decoder, SDC decoder, SDC database, and FAC decoder (for the combined signal)

MDI Input (EDI)

- DCP/MDI input via Ethernet and file
- Full service and data decoding
- In-depth statistics and alarms on DCP
- Requires AAD option

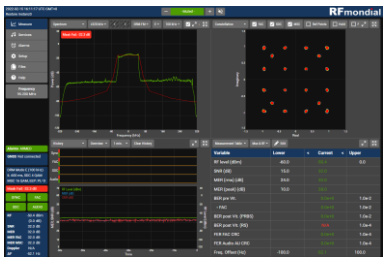
MDI Analyzer (EAN)

The MDI Analyzer option parses MDI content from RF or UDP and displays the following information in detail:

- Service structure (services, service components, signaling)
- MSC layout (position within MSC, protection level)
- Announcement information (when was which announcement signaled)
- Service linking information
- Dynamic PTy information
- Checking for correct and consistent FAC signaling. Various protocol levels.
- Requires AAD option

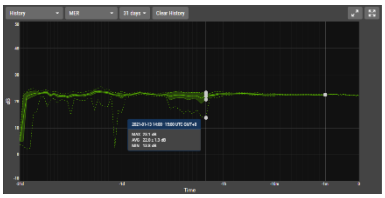
Mask Measurement (MAM)

- Spectrum mask compliance according to ETSI EN 302245
- Power distribution CCDF for transmitter crest factor measurements



Long-term logging / analysis (LOG)

- The option LOG provides all RF measurements and content information to be logged for 31 days:
- Display of measurements and statistics over time
- Time interval extension possible



IQ file logging / playback (IQF)

The option IQF provides RF input signal logging to IQ file as well as baseband file replay:

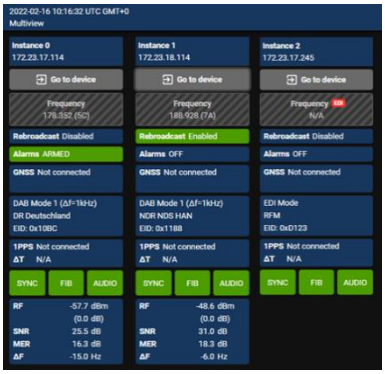
- Logging of baseband IQ to file
- Playback of baseband IQ files with all analysis possibilities
- Playback of arbitrary sample-rate baseband WAV-files
- Extended storage (optional)
- Requires RFM option

Rebroadcasting (RBC)

- With the option RBC the DCP output can be used to feed a transmitter for rebroadcasting and partly overwriting the received multiplex:
- Reconstruction of EDI/MDI and timing
- Highly configurable extension to replace ensemble and/or data/program service IDs in the DCP output stream
- Adjustable DCP transmission offset
- Configurable via the GUI
- Automatic fragmentation to adapt to network MTU (1500B)

Multi Instance Operation (MIx)

- The option Mix enhances the device to be able to operate more than one demodulation instance in parallel. Depending on the frontend, various configurations are possible:
- Input to instance can be RF or IP/DCP
- Demodulation can be DAB, DRM, FM, AM
- Independent advanced GUI, alarm system and SNMP per instance
- Summarizing multi-view
- Shared hardware and system related functionalities



Ball Receiver (BAL)

- The option BAL enhances the receiver to a comprehensive Ball Receiver:
- 2 AES/EBU XLR outputs
- 2 selectable audio services
- Smart conversion of DL/TM or Journaline content for RDS
- Requires AAD option

Digital output option (DOO)

The option DOO provides feeding decoded data services to UDP and/or TCP for external processing (e.g. for an external SSR-receiver).

- Requires AAD option.

Second Network Interface (ET2)

The option ET2 adds a separate circuit board with a second network, and an XLR AES/EBU output interface

- Add second physical network interface (100Mb/s)
- LGA is necessary to use the XLR output

Redundant power supply (RPS)

The option RPS comprises two fully internal redundant power supplies with automatic switchover and monitoring:

- Add second internal AC power supply with dedicated AC input port
- Power supply status monitoring and alarm

General Purpose Outputs (GPO)

This option adds general purpose outputs to the device:

- 15 pin SUB-D connector
- Outputs freely configurable in the alarm system
- Requires ALM option

Virtualization (VIR)

The option VIR is especially targeted for content monitoring and verification of EDI streams:

- Delivered as virtual machine image, without hardware
- Software protection via USB dongle
- In combination with option Mix, many EDI inputs can be monitored on one machine
- Support of multi-port network dongle servers

Archiver (ARC)

The archiver functionality is an uncomplicated solution to fulfil the logging task of your broadcasting content in a fully digital manner. Designed for the enhanced audio and multimedia services of digital radio (DAB/DRM), the system can directly store one or several DCP streams for a specified period of time.

- Digital storage of DCP streams (EDI/MDI) for a configurable time frame
- Independent of operating system: usage of WebAudio and Javascript
- Easy remote access: access to live and historical data is available from any location
- Access: direct access to each second as well as live access
- Download: Download of DCP streams, download of selected audio service as wave- or MP3-file
- Streaming: Streaming of selected stream via DCP/UDP from server
- Length of archiving period (max. 90 days) is configurable

Ordering Information

RF-SE19-DRM-AM:
Basic DRM-AM receiver

RF-SE19-DRM-FM:
Basic DRM-FM receiver

Option RFM:
RF Measurements

Option AAD:
Advanced Application Decoder

Option LGA:
Local GUI and Audio Output

Option ALM:
Alarm System and SNMP Informs

Option FIM:
Field Measurements

Option DIV:
Diversity Reception

Option EDI:
MDI Input

Option EAN:
MDI Analyzer

Option SCH:
CSV based scheduler

Option MAM:
Mask Measurement

Option LOG:
Long-term logging & analysis

Option IQF:
Logging/playback to/from IQ file

Option RBC:
Rebroadcasting

Option MIO:
Multi Instance Operation

Option BAL:
Ball Receiver

Option DOO:
Digital output option

Option ET2:
Second Network Interface

Option RPS:
Redundant power supply

Option GPO:
General Purpose Outputs

Option VIR:
Virtual machine w/o hardware

Option ARC:
Archiver functionality