Options

Several options can be added to the standard version of the RF-SE. All options are integrated into the RF-SE user interface, i.e. no external software installation is necessary. The options are activated via a license update.

RSCI to CSV Format Converter

As RSCI is a binary format and it needs ETSI standard experience to be able to interpret the measurement results, an RSCI to CSV (comma separated values) format converter can be integrated into the RF-SE. The main features are as follows:

- Parsing of RSCI tags from file compatible to ETSI TS 102 349
- Writing RSCI tags in human readable format to CSV format

RSCI to KML Format Converter

As RSCI is a binary format and it needs ETSI standard experience to be able to interpret the measurement results, an RSCI to KML-file converter can be integrated into the RF-SE. The main features are as follows:

- Parsing of RSCI tags from file compatible to ETSI TS 102 349
- Writing of selected tags (e.g. audio frame error, SNR, MER, field strength) in Open Geospatial Consortium KML/KMZ format
- Classification of tag values in meaningful level ranges including legend generation
- Import to Google Earth possible

Long-term Logging and Analysis

For long-term analysis of transmitter performance, varying transmission characteristics like Ionosphere, weather, sun activity, day/night, seasons or proof of coverage, a longterm logging capability can be integrated into the RF-SE:

- All RF measurements and content information can be logged for up to 120 days
- Display of parameter over time
- Export of all measurements and content information
- Playback of audio and data services at selected time point
- Integrated into the RF-SE user interface, accessible via a web browser, no software installation necessary

Scheduler

Next to the built-in remote control interface via RSCI, a scheduler can be used for monitoring various broadcasting situations:

- CSV-based schedule list containin time slots with date/time/frequency information
- Once activated the schedule is automatically followed and – if desired – corresponding files (e.g. RSCI) are recorded

Model RF-SE12
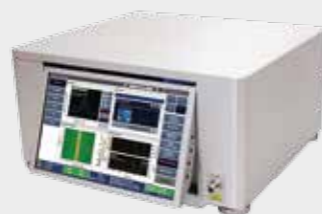
- Full feature monitoring receiver
- DRM30/AM or DRM+ version
- Industrial chassis with touchscreen and built-in stereo loudspeakers
- Advanced user interface for local and remote usage
- Integrated audio and data decoder
- Alarm system functionality with 2 relay outputs and email notification
- Integrated RSCI logging and analysis

Mechanical

All aluminium chassis, 435 x 390 x 220 mm, 12.1" TFT touch screen display, 1280 x 800 resolution, Weight: 12 kg, 19" rack mounting kit available, Operating temperature: 0 – 40°C, Humidity: 20 – 80 % non-condensing.

Model RF-SE19
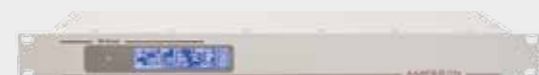
- Compact measurement receiver
- DRM30/AM or DRM+ version
- Industrial, 1RU chassis
- Advanced user interface for remote usage
- Integrated audio and data decoder
- Alarm system functionality with email notification
- Integrated RSCI logging and analysis

Mechanical

All aluminium chassis, Industrial 19" 1RU, rack mountable, 420 (483) x 220 x 44mm, Weight: 2kg, Operating temperature: 0 – 40°C, Humidity: 20 – 80 % non-condensing.

RF-SE

DRM Monitoring Receiver

Science   MedTech   Industry   Broadcast
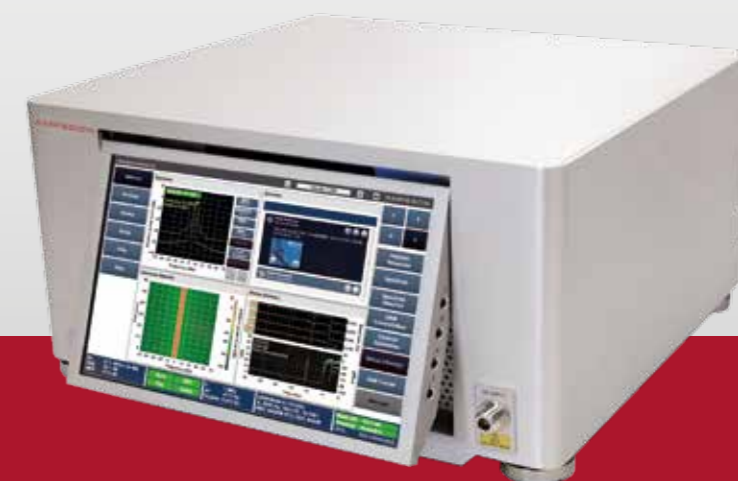
DRM Monitoring Receiver RF-SE

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 preselector filter banks and digital direct-down conversion system approach. The fieldproven 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.

Specification

Basic Features
- Stand-alone monitoring receiver for reception analysis and content verification
- High-end fully digital tuner with high accuracy reference oscillator
- Field-proven demodulator for DRM (DRM30 or DRM+), AM, SSB
- Fully compliant to DRM standard (ETSI ES 201 980)
- Integrated audio and data decoder incl. HE-AACv2/xHE-AAC and all DRM data services
- Advanced GUI to evaluate receiver characteristics in real-time
- Browser based configuration and services decoding. No installation of software necessary
- RSCI compatible to ETSI TS 102 349
- Integrated alarm system with email notification and two independent relay outputs (depending on model)
- Proven long term stability
- Firmware update via DVD and USB
- Possible integration into RFmonitor network

Advanced GUI
The RF-SE user interface is designed to provide the full experience of a modern and professional measurement device:
- Same browser based advanced GUI remotely and locally (if available)

- Touchscreen and mouse capability
- Proportional scaling to adapt to different screen sizes
- Either four window view or full screen display of diagrams
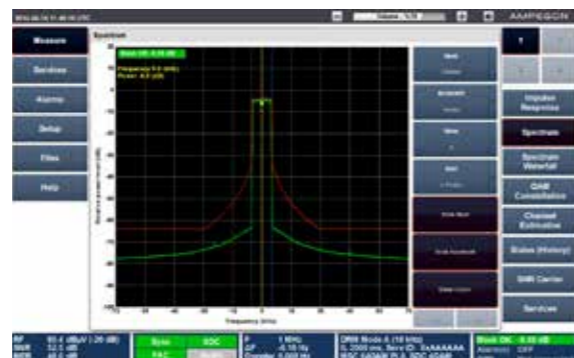
Application Decoder
Integrated audio and data decoding, licensed by Fraunhofer IIS:
- Browser-based selection and decoding of audio and data services
- Audio decoding: HE-AACv2, xHE-AAC, with SBR, PS, MPEG Surround, Optional: AAC, HVXC, CELP
- Display of audio related information, e.g. audio rate, sampling rate, mode
- Streaming and downloading of selected audio service to remote PC
- Service and signalling decoding, e.g. service description, emergency warning feature (EWF)
- Decoding of all DRM data services and signalling, e.g. TextMessages, Journaline, SlideShow, Broadcast Website.
- Statistical information of each service

Measurements
High quality measurements on various stages of the reception and decoding chain:
- Field strength (antenna factor can be specified)
- Frequency offset
- Signal to noise ratio (SNR > 45dB)
- Modulation error ratio (MER > 45dB)
- Delay spread
- Doppler spread
- Error rate of synchronization, FAC CRC, SDC CRC, audio frames, PRBS

Monitoring
The following items can be displayed and monitored:
- Channel impulse response
- Power spectrum and spectrum mask compliance
- Spectrum waterfall
- QAM constellation
- Channel estimation

- History of reception status (sync, FAC CRC, SDC CRC, audio, PRBS) as well as SNR, MER, field strength
- SNR carrier spectrum
- Location of an external USB NMEA compliant GPS receiver

RSCI Capability
The ETSI standardized RSCI (Receiver Status and Control Interface) protocol covers the transport of receiver's status information in addition to the DRM multiplex as well as commands to control the receiver's behavior:
- Display and recording to file
- Live DCP/UDP output of RSCI
- Integration of external GPS information into rgps tag
- Control via DCP/UDP

Alarm System
Flexible, built-in alarm system with the following features:
- Two independent alarm rules using a configurable combination of spectrum mask violation, RF and SNR level, audio drop-out and level, MDI errors, wrong service ID, frequency offset
- Alarm triggering via email and/or relay outputs (depending on model)

DRM Demodulation
DRM30: below 30 MHz, including the SW, MW and LW broadcasting bands
- Robustness modes A, B, C, D
- Spectrum occupancy 4.5, 5, 9, 10, 18, 20 kHz
- MSC modes 16 QAM, 64 QAM, and hierarchical (HM-mix, HMsym)
- SDC modes 4 QAM and 16 QAM
- Interleaver depth 0.4 s and 2 s
- EEP and UEP with all protection ratios/code rates
DRM+: above 30 MHz, incl. the VHF broadcast bands I, II (FM) and III
- Robustness mode E
- Spectrum occupancy 96 kHz
- MSC modes 4 and 16 QAM
- SDC mode 4 QAM, code rates 0.5 & 0.25
- Interleaver depth 0.6 s
- EEP and UEP with all protection ratios/code rates

Configuration/Remote Control
- Full remote control via LAN
- Browser-based user interface
- Touch TFT display or LCD (depending on model)
- Receivers can be remotely scheduled, controlled and automatically tuned via RSCI
- Optional: CSV-based scheduler

RF-Frontend

RF-Frontend DRM+

Parameter	Value
Input frequency range	47 MHz to 240 MHz
Input level	-105 dBm to +0 dBm
Oscillator accuracy	< 0.01 ppm Usage of external 10 MHz reference possible
Level measurement accuracy	±1 dB
RF mask-monitoring	Up to ±90 kHz

RF-Frontend DRM30

Parameter	Value
Input frequency range	100 kHz to 30 MHz
Input filtering	Fixed-tuned 11-band pre-selection filter bank as well as bypass
Input level	-110 dBm to +20 dBm
Oscillator accuracy	< 0.01 ppm Usage of external 10 MHz reference possible
Phase noise at ± 20Hz	<-120 dBc/Hz
Phase noise at ± 20kHz	<-150 dBc/Hz
Level measurement accuracy	±1 dB
RF data bandwidth	40 kHz, ripple 0.2 dB
RF mask-monitoring	Up to ±75 kHz
In-channel IP3	+15 dBm (noise figure 15 dB)
Out of band IP3	+30 dBm (noise figure 15 dB)

Applications

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