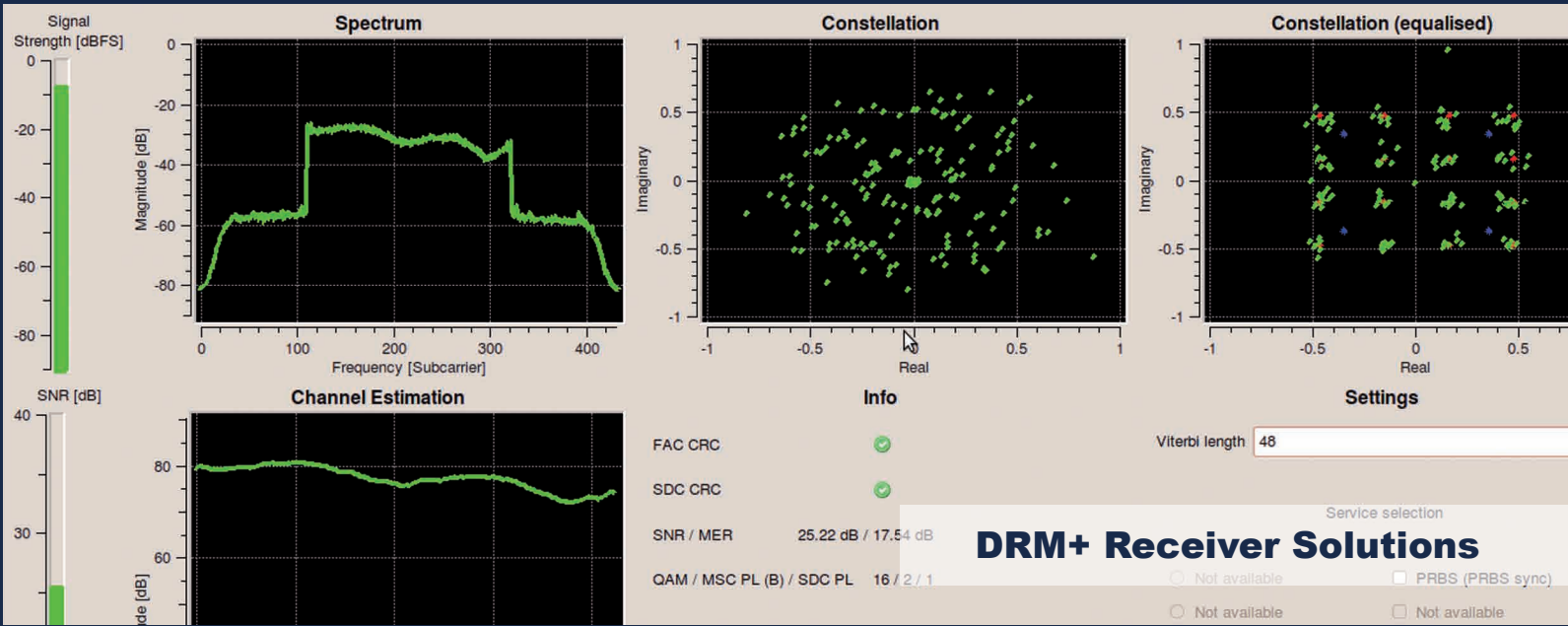


About us

RFmondial offers professional products and services for digital broadcasting. This covers stand-alone products for transmitting, receiving, and monitoring of digital broadcasts as well as IP core implementations and services in the field of digital radio technology. As a DRM consortium member RFmondial possesses a wide record of experience and know-how in the field of digital audio broadcasting. DRM30 and DRM+ measurement campaigns as well as technologies like transmitter diversity for digital broadcasts are part of its innovative portfolio.

The DRM standards family: DRM30 and DRM+

DRM, Digital Radio Mondiale, the international consortium founded in 1998, developed a digital transmission system for the AM-bands, i.e. for long-, medium- and short waves up to 30 MHz (DRM30) and launched this system worldwide. The extension of the DRM system family to upper frequency bands above 30MHz (DRM+) is a possible system to enhance and/or replace analog FM radio transmission. A close placement of a DRM+ signal to an FM signal is possible and can be flexibly configured depending on the existing use of spectrum. In this way, DRM+ may be introduced into the FM frequency bands and the analog distribution can be kept.



RFmondial

Products and Services for Digital Broadcasting

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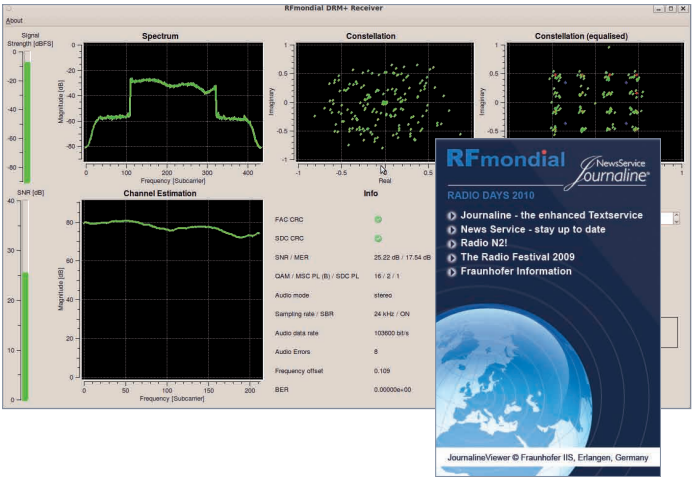
Managing Directors: Stefan Galler, Dr. Jens Schroeder
Technical Director: Albert Waal

DRM+ Receiver Solutions

The DRM+ Test Receiver allows you to investigate and demonstrate the audio and multimedia capabilities of DRM+ broadcasting as well as perform field trials and intensive measurement campaigns.

The receiver software is conform to the current DRM+ system specification (ETSI ES 201980) and the upcoming RSCI enhancement to DRM+ (ETSI TS 102 349).

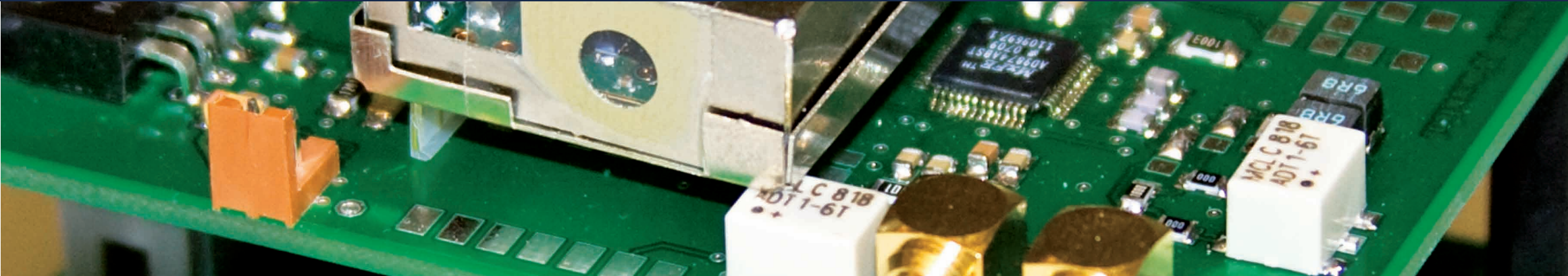
The DRM+ receiver software accepts base-band IQ-streams at 192 kHz sampling rate and outputs DRM+ decoded Main Service Channel (MSC) streams as well as Multiplex Distribution Interface (MDI) and Receiver Status and Control Interface (RSCI) over Distribution and Communication Protocol (DCP).



Available Versions

Other features (e.g. debugging pre/post FFT), interfaces or designs are available on request.

Feature	Description	Basic	Professional
Basic GUI	The basic graphical user interface displays SNR, audio decoding parameters, DRM Service Label and a selector for choosing the desired stream.	✓	✓
Extended GUI	The extended graphical user interface adds spectrum estimation, channel estimation and constellation diagrams as well as various information (e.g. SDC/FAC CRC and audio unit errors, frequency offset estimate, protection level, Viterbi length etc.) and settings (e.g. soft or hard decision Viterbi).		✓
Audio Decoder	Up to 4 audio streams with a maximum bitrate of 186 kBit/sec can be decoded using Fraunhofer's AAC+ decoder. The possible audio features are Spectral Band Replication (SBR), Parametric Stereo (PS), audio sampling rates of 24 and 48 kHz and 5.1 MPEG Surround. Audio output to soundcard or wave-file.	✓	✓
RSCI Monitoring			
Profile B	RSCI (Receiver Status and Control Interface) to TCP/UDP or file - Profile B (measurement parameters only)		✓
GPS extension	GPS position logging		✓
Hardware			
RF frontend	RF-frontend from 45 MHz to 230 MHz incl. digital down conversion (DDC)	✓	✓
Decoder laptop	Laptop with Linux and all ordered software options preinstalled.	✓	✓



DRM+ Receiver Software

The DRM+ Receiver Software is available as Basic or Professional version and includes various audio, data, monitoring and debugging features as well as a graphical user interface.

The receiver implements time and frequency synchronization, mixed-radix FFT, frame synchronization, channel estimation, logical frame demultiplexing and soft/hard decision Viterbi decoder.

Input: Digital base-band IQ via UDP/TCP/ USB.

Output: Audio output to soundcard or wave-file as well as DCP/MDI.

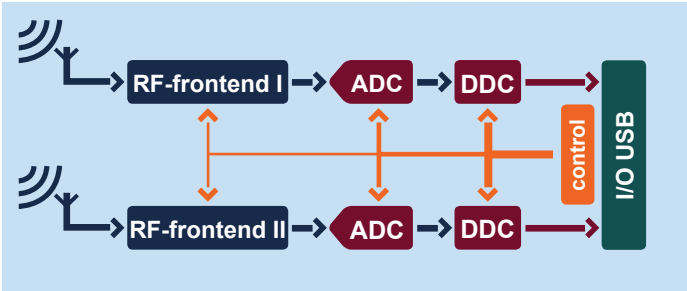
Data Services: Multimedia Services (e.g. News Service Journaline, Text message application, Broadcast website, Slide show) can be decoded in external applications.

VHF Digital Frontend

The RF receiver front-end is a high-class VHF tuner front-end with digital output, especially targeted for demanding transmission environments of DRM+ and other digital signals.

Its double superheterodyne architecture with RF band selection filters and a combination of crystal and SAW IF filters, followed by a fully digital down converter (DDC), features high sensitivity, excellent strong signal immunity, and outstanding selectivity. Designed to process digitally modulated signals, all stages are characterized by high linearity and low phase jitter.

An USB 2.0 interface is used for configuration as well as output of the received signal as digital baseband quadrature I/Q samples. In order to support mobile operation, the VHF frontend features build in automatic gain control (AGC) and can operate with a single 12 V power supply.



Specification

Parameter	Value	Comments
Frequency	Band I (47 - 90 MHz) Band II (88 - 108 MHz) Band III (174 - 230 MHz)	Stepsize 1 kHz
IF frequency bandwidth	120 kHz	
AGC	Internal	
I/Q sampling output	16/24/32 bit	fixed/floating point
Interface	High-speed USB 2.0	
Power supply	Single 12 V	@ 1 A

BENEFITS

- Immediate use to test and evaluate DRM+ in the field
- Cost effective solution for quickly enhancing multi-standard receiver products or chip-sets to DRM+
- Relying on a mature product that has been used in many field trials

KEY FEATURES

- Fully compliant to DRM standard (DRM+)
- Advanced GUI to evaluate reception characteristics in real-time
- High-class VHF tuner front-end with digital baseband output

AVAILABILITY

- PC test receiver with VHF frontend for Band I, II and III
- IP core for fixed or floating point implementations
- Adaptations to existing platforms (hardware, software) possible



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Receiver IP Core

The DRM+ base band decoding IP offers a cost effective solution for quickly enhancing multi-standard receiver products or chip-sets to DRM+. It can easily be combined with other software libraries like AAC audio and multimedia decoding.