

R&S[®]SMCVB-KV12

DRM+ Waveforms

User Manual



1179277702
Version 04

ROHDE & SCHWARZ
Make ideas real



This document describes the following software options:

- R&S®SMCVB-KV12 DRM+ Waveforms (1434.5405.xx)

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Throughout this document, R&S® is indicated as R&S.

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1 Welcome to the R&S SMCVB-KV12 option

The R&S SMCVB-KV12 is a waveform library that provides waveform files in accordance with the DRM+ digital standard.

This user manual contains a reference description of the functionality that the waveform library provides. All functions not discussed in this manual are described in the R&S SMCV100B user manual. The latest version is available at:

www.rohde-schwarz.com/manual/SMCV100B

1.1 Key features

The R&S SMCVB-KV12 features:

- Numerous waveform files in accordance with DRM+ digital standard
- Efficient use with dedicated waveforms

1.2 Installation

Required options

The equipment layout for processing files of waveform libraries includes:

- R&S SMCV100B base unit, including arbitrary waveform generator (64 MSample ARB memory, 60 MHz RF bandwidth)
- Waveform library option (R&S SMCVB-KVxx)

For more information on ARB options, see chapter "Using the arbitrary waveform generator (ARB)" in the R&S SMCV100B user manual.

To register for access to the libraries

R&S SMCV100B stream and waveform libraries are available for download for registered users on the "Vector Signal Generator Customer Web" at the global Rohde & Schwarz information system (GLORIS).

1. For access, register at <https://gloris.rohde-schwarz.com>:
In the section "How to register", follow the instructions provided in the introduction video "How to register for GLORIS".
2. Register to GLORIS with the creation of a personal account.

Mr.
 Mrs.
 Ms.
 No information

First Name Last Name

Email

Country City

Company

Reason for registration
 Please tell us the reason for your registration (i.e. which product you have or what kind of information you want to get). If you already have a contact person at Rohde & Schwarz, please add the email address of your contact as well.

Password Retype Password

I accept the [Terms of Use](#) for a global Rohde & Schwarz Extranet account
 I accept the following [Marketing Permission](#)
 I want to register for e-commerce

Register Now

3. For access to the "Vector Signal Generator Customer Web", provide the following information:
- Specify that you want access to the "Vector Signal Generator Customer Web".
 - Include the material number and serial number of your device.
The label is located on the rear panel of the R&S SMCV100B.
- a) When using a new GLORIS account, fill the information in the "Reason for registration" field.

Reason for registration

Please tell us the reason for your registration (i.e. which product you have or what kind of information you want to get). If you already have a contact person at Rohde & Schwarz, please add the email address of your contact as well.

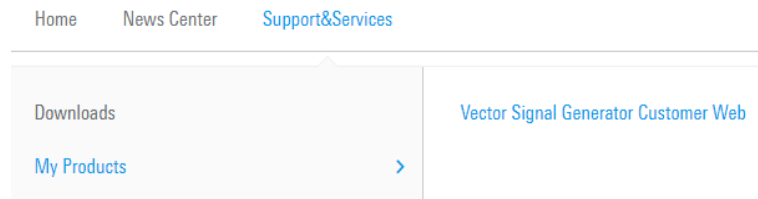
- b) When using an existing GLORIS account, click "Customer support" and fill in the information into an email.

Contact

E-Mail [Customer Support](#)

To access "Product Related Documents"

1. Log in to GLORIS.
2. In the menu bar, select "Support&Services > My Products > Vector Signal Generator Customer Web".



The "R&S SMCV100B Customer Web" page opens.

3. In the selection field "Product Selection for VSG", select "R&S®SMCV100B".

A webpage opens and displays search results for products related to the R&S SMCV100B.

Product Related Documents



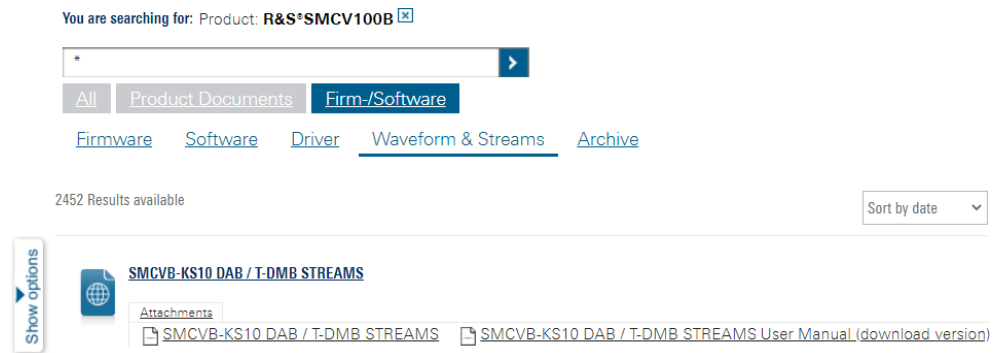
To download a library file

This procedure describes how to download library files. It provides a step-by-step description for download of a stream library file. The download of waveform library files is analogous.

1. Access the "Product Related Documents" webpage as described in "[To access "Product Related Documents"](#)" on page 6.
2. In the search navigation bar, select "Firm-/Software" > "Waveform & Streams".

The search lists all information related to stream and waveform libraries of the R&S SMCV100B:

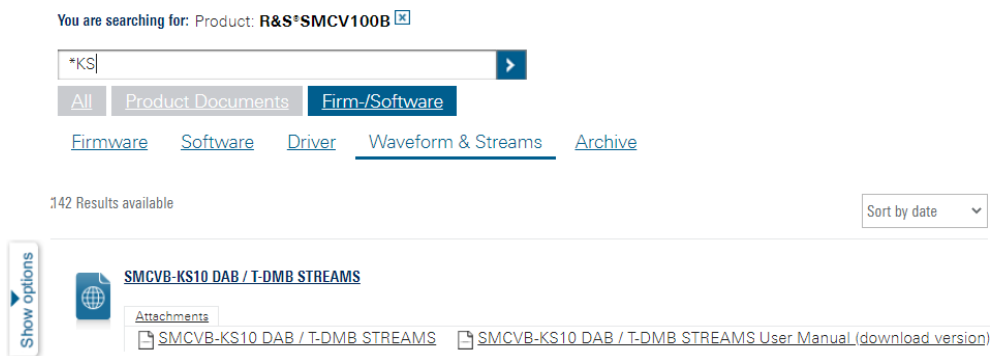
- R&S SMCVB-KSxx results relate to stream libraries.
- R&S SMCVB-KVxx results relate to waveform libraries.



3. Optionally, deactivate the filtering to display all waveform and stream library content.
 - a) On the left menu, select "Show options".
 - b) Click "Filtering on. Reset all filters."

Filtering on. Reset all filters.

4. Optionally, to filter for stream library content enter *KS in the search input field.



5. In the search result list, navigate to the required library.
6. To download required library files, click the download link in the "Attachments" section of the library product page.
For example, for DAB/T-DMB streams, click the download link "R&S SMCVB-KS10 DAB / T-DMB STREAMS".

A download dialog opens to select and save files of the stream library.

To save a library file

- ▶ Save the library file to one of the following storage locations:
 - External storage device (HDD, memory stick): Use an external USB storage device to save large files or complete libraries. Connect the storage device to one of the USB 3.0 connectors on the rear panel of the R&S SMCV100B. If detected correctly, you can access the files on the R&S SMCV100B in the /usb/ directory in the file-select dialogs.

The R&S SMCV100B supports the following storage formats: ext2/ext3/ext4, FAT16/FAT32, NTFS (read-only), ISO9660, UDF

- Internal memory (SSD): Use the internal memory to save single files to the user directory `/var/user/` of the R&S SMCV100B, for example, using FTP via a LAN connection.

To load and play a waveform library file

1. Load the waveform file from its storage location:
 - External storage device (HDD, memory stick): Load the file from the `/usb/` directory.
 - Internal memory (SSD): Load the file from the user directory `/var/user/`

Note: Library files are encrypted files. Loading the library file at the R&S SMCV100B requires installation of the corresponding library option. See "[Required options](#)" on page 5.
2. To load the file at the R&S SMCV100B, select the file in the dialog "Baseband" > "ARB" > "Load Waveform".
3. To select the file, navigate to the storage location (1).
4. Select "ARB" > "State" > "On".
The R&S SMCV100B processes the waveform file.
5. In the block diagram, select "RF" > "On"
The waveform file is modulated onto the RF carrier and output at the RF 50 Ω connector.

For more information on loading waveform files, see chapter "How to create, generate and play waveform files" in the R&S SMCV100B user manual.

1.3 What's new

Compared to the previous version the documentation provides updated installation instructions to access, download and play waveform library files, see [Chapter 1.2, "Installation"](#), on page 5.

1.4 Documentation overview

This section provides an overview of the R&S SMCV100B user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/smcv100b

1.4.1 Getting started manual

Introduces the R&S SMCV100B and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

1.4.2 User manuals and help

Separate manuals for the base unit and the software options are provided for download:

- **Base unit manual**
Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.
- **Software option manual**
Contains the description of the specific functions of an option. Basic information on operating the R&S SMCV100B is not included.

The contents of the user manuals are available as help in the R&S SMCV100B. The help offers quick, context-sensitive access to the complete information for the base unit and the software options.

All user manuals are also available for download or for immediate display on the internet.

1.4.3 Service manual

Describes the performance test for checking compliance with rated specifications, firmware update, troubleshooting, adjustments, installing options and maintenance.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS):

<https://gloris.rohde-schwarz.com>

1.4.4 Instrument security procedures

Deals with security issues when working with the R&S SMCV100B in secure areas. It is available for download on the internet.

1.4.5 Printed safety instructions

Provides safety information in many languages. The printed document is delivered with the product.

1.4.6 Specifications and product brochures

The specifications document, also known as the data sheet, contains the technical specifications of the R&S SMCV100B. It also lists the firmware applications and their order numbers, and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/smcv100b

1.4.7 Calibration certificate

The document is available on <https://gloris.rohde-schwarz.com/calcert>. You need the device ID of your instrument, which you can find on a label on the rear panel.

1.4.8 Release notes and open source acknowledgment

The release notes list new features, improvements and known issues of the current software version, and describe the software installation.

The software uses several valuable open source software packages. An open source acknowledgment document provides verbatim license texts of the used open source software.

www.rohde-schwarz.com/firmware/smcv100b

1.4.9 Application notes, application cards, white papers, etc.

These documents deal with special applications or background information on particular topics.

For some application sheets, see also:

www.rohde-schwarz.com/application/smcv100b

1.4.10 Videos

Find various videos on Rohde & Schwarz products and test and measurement topics on YouTube: <https://www.youtube.com/@RohdeundSchwarz>

2 Available waveform files

2.1 General settings and features

All files have general features and settings as follows:

- DRM Mode E (DRM+)
- Sample rate 192 kHz
- Bandwidth 100 kHz
- Filter bandwidth 2x 76.8 kHz
- File length approx. 500 MB
- Play time per file approx. 10 minutes
- Included PRPS services have the polynomial $G_{23}(x)=x^{23} + x^{18} + 1$, register contents are initially all set to binary 1.

2.2 Naming conventions

DRM setting files (chapter 2.3)

The file name consists of:

- MSC mapping type
- MSC lower protection level
- MSC higher protection level
- SDC protection level

Example: `MSC_4QAM_MSC_LPP_0_MSC_HPP_0_SDC_1.wv`

This file has the following characteristics:

- MSC mapping type: 4QAM
- MSC lower protection level (MSC_LPP): 0
- MSC higher protection level (MSC_HPP): 0
- SDC protection level (SDC): 1

DRM service files (chapter 2.3)

The file name consists of:

- Services
- Number of services
- Audio coding of each service

Example: `Services_3_HE-AAC_HE-AAC_PRBS.wv`

This file has the following characteristics:

- Contains 3 services
- Audio coding: service 0: HE-AAC; service 1: HE-AAC; service 2: data PRBS

EN 303 345 DRM testing files (chapter 2.5)

The file name consists of:

- Frequency band
- Wanted/unwanted signal

Example: VHF_wanted.wv

In this standard, there are three different frequency bands defined. Only the VHF band uses robustness mode E. The other frequency bands use robustness mode B and are excluded from this library. These files are part of the waveform library R&S SMCVB-KV11 DRM Waveforms (1434.5370.xx).

2.3 DRM settings

2.3.1 4QAM MSC mapping

Describes the files with 4QAM MSC mapping and different protection levels.

2.3.1.1 MSC_4QAM_MSC_LPP_0_MSC_HPP_0_SDC_1.wv

Table 2-1: General settings

Samples	125337600
Peak offset	3.12 dB
Peak/RMS	12.44 dB
Duration	10 minutes 52 seconds
MSC mapping	4QAM
MSC lower protection	0 (highest)
MSC higher protection	0 (highest)
SDC protection	1 (highest)

Service 2 and 3 are not available.

Table 2-2: Services

	Service 0	Service 1
Service ID	0xAFFE	0xAFFF
Language	Japanese	Korean

Service label	HE-AAC	Data PRBS
Service content	Audio HE-AAC 16.32 kb/s HPP 43 bytes 24 kHz Param. stereo + SBR	PRBS 20.88 kb/s Synchronized Low protected: 226 bytes High protected: 35 bytes
Program type	Varied	
Links to AFS1		
Service	eFM+RDS, 0xD001	
Schedule	None	
Content	Equal	
Frequency	96.6 MHz	
Local Information		
Country	Germany	
Language of audience	English	
Text		
Text headline	Text Message Service 0	
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	
Text transmit	4 times	

2.3.1.2 MSC_4QAM_MSC_LPP_1_MSC_HPP_1_SDC_1.wv

Table 2-3: General settings

Samples	126028800
Peak offset	2.83 dB
Peak/RMS	12.75 dB
Duration	10 minutes 56 seconds
MSC mapping	4QAM
MSC lower protection	1 (high)
MSC higher protection	1 (high)
SDC protection	1 (highest)

Service 2 and 3 are not available.

Table 2-4: Services

	Service 0	Service 1
Service ID	0xAFFA	0xAFFF
Language	German	English
Service label	Service 0 xHE	Data PRBS
Service content	Audio xHE-AAC 32.08 kb/s No HPP 38.4 kHz Stereo no SBR	Data PRBS 17.6 kb/s Synchronized Low protected: 220 bytes High protected: 0 bytes
Program type	Varied	
Links to AFS1		
Service	eFM+RDS, 0xD001	-
Schedule	None	-
Content	Equal	-
Frequency	96.6 MHz	-
Local Information		
Country	Germany	
Language of audience	English	
Text		
Text headline	Text Message Service 0	
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	
Text transmit	4 times	

2.3.1.3 MSC_4QAM_MSC_LPP_1_MSC_HPP_1_SDC_0.wv

Table 2-5: General settings

Samples	125107200
Peak offset	3.84 dB
Peak/RMS	12.06 dB
Duration	10 minutes 51 seconds
MSC mapping	4QAM
MSC lower protection	1 (high)

MSC higher protection	1 (high)
SDC protection	0 (weak)

Service 3 is not available.

Table 2-6: Services

	Service 0	Service 1	Service 2
Service ID	0xAFFE	0xF	0xFF
Language	German	German	German
Service label	Audio 0 HE-AAC	Audio 1 HE-AAC	Audio 2 HE-AAC
Service content	Audio HE-AAC 16.32 kb/s HPP: 43 bytes 24 kHz Param. stereo + SBR	Audio HE-AAC 16.32 kb/s HPP: 43 bytes 24 kHz Param. stereo + SBR	Audio xHE-AAC 16.32 kb/s HPP 43 bytes 24 kHz Param. stereo + SBR
Program type	Pop music	Other music	Science
Links to AFS1			
Service	eFM+RDS, D001	eFM+RDS 0xD001	eFM (no service ID)
Schedule	None	None	None
Content	Equal	Equal	Equal
Frequency	96.6 MHz	88.9 MHz	88.9 MHz
Local Information			
Country	Germany	Canada	Canada
Language of audience	English	Kakota	Balinese
Text			
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2
Text content	Munich, Germany Waveform Library DRM Mode E Rohde&Schwarz	DRM Mode E Waveform Library Rohde & Schwarz GmbH & Co. KG Munich, Germany	DRM Mode E Waveform Library Rohde & Schwarz Broadcast and Media Division Munich, Germany
Text transmit	4 times	6 times	4 times

2.3.1.4 MSC_4QAM_MSC_LPP_2_MSC_HPP_1_SDC_1.wv

Table 2-7: General settings

Samples	125107200
Peak offset	3.76 dB

Peak/RMS	11.79 dB
Duration	10 minutes 51 seconds
MSC mapping	4QAM
MSC lower protection	2 (medium)
MSC higher protection	1 (high)
SDC protection	1 (highest)

Table 2-8: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xAFFE	0xF	0xFF	0xAFFF
Language	German	German	English	Not specified
Service label	Audio 0 HE-AAC	Audio 1 HE-AAC	Audio 2 HE-AAC	Data PRBS
Service content	Audio HE-AAC 16.32 kb/s HPP: 43 bytes 24 kHz Param. stereo + SBR	Audio HE-AAC 16.32 kb/s HPP: 43 bytes 24 kHz Param. stereo + SBR	Audio HE-AAC 16.32 kb/s HPP: 43 bytes 24 kHz Param. stereo + SBR	Data PRBS 8.48 kb/s Synchronized Low protected: 104 bytes High protected : 2 bytes
Program type	Pop music	Other music	Science	
Links to AFS1				
Service	eFM+RDS, D001	eFM+RDS 0xD001	eFM (no service ID)	
Schedule	None	None	None	
Content	Equal	Equal	Different	
Frequency	96.6 MHz	88.9 MHz	87.5 MHz	
Local Information				
Country	Germany	Canada	Canada	
Language of audience	English	Dakota	Balinese	
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	

Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	DRM Mode E Waveform Library Rohde & Schwarz GmbH & Co. KG Munich, Germany	DRM Mode E Waveform Library Rohde & Schwarz Broadcast and Media Division Munich, Germany	
Text transmit	4 times	6 times	5 times	

2.3.1.5 MSC_4QAM_MSC_LPP_2_MSC_HPP_2_SDC_1.wv

Table 2-9: General settings

Samples	125337600
Peak offset	4.73 dB
Peak/RMS	11.75 dB
Duration	10 minutes 52 seconds
MSC mapping	4QAM
MSC lower protection	2 (medium)
MSC higher protection	2 (medium)
SDC protection	1 (highest)

Table 2-10: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xAFFE	0xF	0xFF	0xAFFF
Language	German	German	English	Not specified
Service label	Audio 0 HE-AAC	Audio 1 HE-AAC	Audio 2 HE-AAC	Not specified
Service content	Audio HE-AAC 16.32 kb/s HPP 43 bytes 24 kHz Param. stereo +SBR	Audio HE-AAC 16.32 kb/s HPP 43 bytes 24 kHz Param. stereo +SBR	Audio HE-AAC 16.32 kb/s HPP 43 bytes 24 kHz Param. stereo + SBR	Data PRBS 10.64 kb/s Synchronized Low protected: 130 bytes High protected : 3 bytes
Program type	Music	Other music		
Links to AFS1				
Service	eFM+RDS, D001	eFM+RDS, D001	eFM (no service ID)	
Schedule	None	None	None	
Content	Equal	Equal	Equal	
Frequency	96.6 MHz	88.9 MHz	88.9 MHz	

Local Information				
Country	Germany	Canada	Canada	
Language of audience	English	Dakota	Balinese	
Text				
Text headline	Message Service 0	Text Message Service 1	Text Message Service 2	
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	DRM Mode E Waveform Library Rohde & Schwarz GmbH & Co. KG Munich, Germany	DRM Mode E Waveform Library Rohde & Schwarz Broadcast and Media Division Munich, Germany	
Text transmit	4 times	6 times	5 times	

2.3.1.6 MSC_4QAM_MSC_LPP_2_MSC_HPP_3_SDC_1.wv

Table 2-11: General settings

Samples	125337600
Peak offset	2.38 dB
Peak/RMS	12.82 dB
Duration	10 minutes 52 seconds
MSC mapping	4QAM
MSC lower protection	2 (medium)
MSC higher protection	3 (weak)
SDC protection	1 (highest)

Service 3 is not available.

Table 2-12: Services

	Service 0	Service 1	Service 2
Service ID	0xAFFE	0x422	0x423
Language	German	German	Not specified
Service label	Audio 0 HE-AAC	Label audio 1 AAC	Data PRBS
Service content	Audio HE-AAC 16.32 kb/s HPP: 43 bytes 24 kHz Param. stereo no SBR	Audio AAC 32.0 kb/s HPP 83 bytes 48 kHz Mono	Data PRBS 13.36 bit/s Synchronized Low protected: 163 bytes High protected: 4 bytes
Program type	Pop music	Serious classical	--

Links to AFS1			
Service	eFM+RDS, D001	DAB 0x422	
Schedule	None	None	
Content	Equal	Equal	
Frequency	96.6 MHz	5A	
Local Information			
Country	Germany	Austria	
Language of audience	English	Not specified	
Text			
Text headline	Text Message Service 0	Text Message Service 1	
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	DRM Mode E Waveform Library Rohde & Schwarz GmbH & Co. KG Munich, Germany	
Text transmit	4 times	6 times	

2.3.1.7 MSC_4QAM_MSC_LPP_2_MSC_HPP_3_SDC_0.wv

Table 2-13: General settings

Samples	125337600
Peak offset	3.36 dB
Peak/RMS	12.49 dB
Duration	10 minutes 52 seconds
MSC mapping	4QAM
MSC lower protection	2 (medium)
MSC higher protection	3 (weak)
SDC protection	0 (weak)

Table 2-14: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xC1D2	0x467	0x468	0x469
Language	Hindi	German	German	German
Service label	Audio xHE-AAC	Audio xHE-AAC	Audio xHE-AAC	Data slideshow

Service content	Audio xHE-AAC 16.32 kb/s No HHP 32 kHz Stereo no SBR	Audio xHE-AAC 14.96 kb/s No HPP 32 kHz Stereo no SBR	Audio xHE-AAC 14.96 kb/s No HHP 24 kHz Stereo no SBR	Packed data 10.96 kb/s Low protected: 155 bytes High protected: 5 bytes MOT slideshow 10.96 kb/s
Program type	Science	Varied	Other music	
Links to AFS1				
Service	aFM (no Service ID)	aFM+PI 0x467	DRM+	
Schedule	Schedule 1	Schedule 1	Schedule 1	
Content	Equal	Equal	Equal	
Frequency	76 MHz	76 MHz	100.0 MHz	
Local Information				
Country	India	Pakistan	Afghanistan	Cameroon
Language of audience	Hindi	Urdu	Artificial language	Not specified
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	
Text content	Company Rohde&Schwarz Munich, Germany DRM Mode E Waveform Library	Waveform Library DRM+ ES 201 980 Rohde & Schwarz Germany, Munich	PC based DRM modulator DRM Mode E Rohde&Schwarz GmbH & Co. KG Germany, Munich	
Text transmit	4 times	11 times		

2.3.1.8 MSC_4QAM_MSC_LPP_3_MSC_HPP_3_SDC_0.wv

Table 2-15: General settings

Samples	125337600
Peak offset	3.09 dB
Peak/RMS	12.60 dB
Duration	10 minutes 52 seconds
MSC mapping	4QAM
MSC lower protection	3 (weak)

MSC higher protection	3 (weak)
SDC protection	0 (weak)

Table 2-16: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xC1D2	0x467	0x468	0x469
Language	Hindi	German	German	German
Service label	Audio0 xHE-AAC	Audio1 xHE-AAC	Audio2 HE-AAC	Data slideshow
Service content	Audio xHE-AAC 18.08 kb/s No HHP 32 kHz Stereo no SBR	Audio xHE-AAC 22.96 kb/s No HHP 32 kHz Stereo no SBR	Audio HE-AAC 16.32 kb/s HHP: 43 bytes 24 kHz Parm. Stereo + SBR	Packed data 17.12 kb/s Low protected: 209 bytes High protected: 5 bytes MOT slideshow 17.12 kb/s
Program type	Science	Varied	Other music	
Links to AFS1				
Service	aFM (no Service ID)	aFM+PI 0x467	DRM+ 0x486	
Schedule	Schedule 1	Schedule 1	Schedule 1	
Content	Different	Different	Equal	
Frequency	76 MHz	76 MHz	100.0 MHz	
Local Information				
Country	India	Pakistan	Afghanistan	Cameroon
Language of audience	Hindi	Urdu	Artificial language	Not specified
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	
Text content	Company Rohde&Schwarz Munich, Germany DRM Mode E Waveform Library	Waveform Library DRM+ ES 201 980 Rohde & Schwarz Germany, Munich	PC based DRM modulator DRM Mode E Rohde&Schwarz GmbH & Co. KG Germany, Munich	
Text transmit	4 times	11 times		

2.3.2 16QAM MSC mapping

Describes the files with 16QAM MSC mapping and different protection levels.

2.3.2.1 MSC_16QAM_MSC_LPP_0_MSC_HPP_0_SDC_1.wv

Table 2-17: General settings

Samples	125337600
Peak offset	4.38 dB
Peak/RMS	11.83 dB
Duration	10 minutes 52 seconds
MSC mapping	16QAM
MSC lower protection	0 (highest)
MSC higher protection	0 (highest)
SDC protection	1 (highest)

Service 2 and 3 are not available.

Table 2-18: Services

	Service 0	Service 1
Service ID	0xAFFD	0xAFFF
Language	Arabic	Bengali
Service label	xHE-AAC	Data PRBS
Service content	Audio xHE-AAC, 41.44 kb/s No HPP 48 kHz Stereo no SBR	PRBS 57.76 kb/s Synchronized Low protected: 629 bytes High protected: 93 bytes
Program type	News	
Links to AFS1		
Service	1: eFM+RDS, 0xD001 2: DAB 0xA	-
Schedule	1: None 2: Schedule 1	-
Content	1: Different 2: Different	-
Frequency	1: 96.6 MHz 2: 5A	-
Local Information		
Country	Afghanistan	

Language of audience	Afar	
Text		
Text headline	Text Message Service 0	
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	
Text transmit	4 times	

2.3.2.2 MSC_16QAM_MSC_LPP_1_MSC_HPP_1_SDC_1.wv

Table 2-19: General settings

Samples	125337600
Peak offset	3.93 dB
Peak/RMS	12.65 dB
Duration	10 minutes 52 seconds
MSC mapping	16QAM
MSC lower protection	1 (high)
MSC higher protection	1 (high)
SDC protection	1 (highest)

Service 1, 2 and 3 are not available.

Table 2-20: Services

	Service 0
Service ID	0xAFFD
Language	Chinese
Service label	xHE-AAC
Service content	Audio xHE-AAC 121.44 kb/s No HPP 48 kHz Stereo no SBR
Program type	Current affairs
Links to AFS1	
Service	eFM+RDS, 0xD001
Schedule	None
Content	Different

Frequency	96.6 MHz
Local Information	
Country	Åland Islands
Language of audience	Abkhazian
Text	
Text headline	Text Message Service 0
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E
Text transmit	4 times

2.3.2.3 MSC_16QAM_MSC_LPP_1_MSC_HPP_1_SDC_0.wv

Table 2-21: General settings

Samples	125107200
Peak offset	3.68 dB
Peak/RMS	12.79 dB
Duration	10 minutes 51 seconds
MSC mapping	16QAM
MSC lower protection	1 (high)
MSC higher protection	1 (high)
SDC protection	0 (weak)

Table 2-22: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xAFFD	0xF	0xFF	0x45A
Language	Dutch	Hindi	German	French
Service label	Audio 0 HE-AAC	Audio 1 HE-AAC	Audio 2 xHE-AAC	Audio 3 HE-AAC
Service content	Audio HE-AAC 16.32 kb/s HPP: 43 bytes 24 kHz Param. stereo + SBR	Audio HE-AAC HE-AAC 4 1.44 kb/s No HPP 24 kHz Mono + SBR	Audio xHE-AAC 14.96 kb/s No HPP 32 kHz Stereo no SBR	Audio HE-AAC 48.64 kb/s HPP 30 bytes 24 kHz Stereo + SBR
Program type	Information	Education	Science	Drama
Links to AFS1				

Service	eFM+RDS, D001	eFM+RDS 0xD001	eFM (no service ID)	DRM+ 0x45B
Schedule	None	None	None	Schedule 1
Content	Different	Different	Different	Equal
Frequency	96.6 MHz	88.9 MHz	88.9 MHz	98.5 MHz
Local Information				
Country	Albania	American Samoa	Andorra	Angola
Language of audience	Achinese	Acoli	Adangme	Adyghe; Adyghei
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	Text Message Service 3
Text content	Munich, Germany Waveform Library DRM Mode E Rohde&Schwarz	Broadcast and media Division Rohde & Schwarz GmbH & Co. KG Mühldorfstraße 15 81671 Munich Germany	DRM Mode E Waveform Library Rohde & Schwarz Broadcast and Media Division Munich, Germany	Test ÏÓßÔöÖµþÙÚý Ÿ˘˙˚˛˜˝˞˟ˠˡˢ
Text transmit	4 times	6 times	4 times	10 times

2.3.2.4 MSC_16QAM_MSC_LPP_2_MSC_HPP_1_SDC_1.wv

Table 2-23: General settings

Samples	125337600
Peak offset	2.61 dB
Peak/RMS	12.82 dB
Duration	10 minutes 52 seconds
MSC mapping	16QAM
MSC lower protection	2 (medium)
MSC higher protection	1 (high)
SDC protection	1 (highest)

Table 2-24: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xAFFD	0xF	0xFF	0xAFFF
Language	Javanese	Korean	Portuguese	Not specified
Service label	Audio 0 HE-AAC	Audio 1 xHE-AAC	Audio 2 xHE-AAC	Data PRBS

Service content	Audio HE-AAC 41.44 kb/s No HPP 24 kHz Mono + SBR	Audio xHE-AAC 30.96 kb/s No HPP 38.4 kHz Stereo no SBR	Audio xHE-AAC 22.96 kb/s No HPP 32 kHz Stereo no SBR	Data PRBS 53.68 kb/s Synchronized Low protected: 671 bytes High protected: 0 bytes
Program type	Serious classical music	Rock Music	Easy listening music	
Links to AFS1				
Service	eFM+RDS, D001	eFM+RDS 0xD001	eFM (no service ID)	
Schedule	None	None	None	
Content	Different	Different	Different	
Frequency	96.6 MHz	88.9 MHz	87.5 MHz	
Local Information				
Country	Anguilla	Antarctica	Antigua and Barbuda	
Language of audience	Afro-Asiatic languages	Afrihili	Afrikaans	
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	DRM Mode E Waveform Library Rohde & Schwarz GmbH & Co. KG Munich, Germany	DRM Mode E Waveform Library Rohde & Schwarz Broadcast and Media Division Munich, Germany	
Text transmit	4 times	6 times	5 times	

2.3.2.5 MSC_16QAM_MSC_LPP_2_MSC_HPP_2_SDC_1.wv

Table 2-25: General settings

Samples	125337600
Peak offset	3.51 dB
Peak/RMS	12.94 dB
Duration	10 minutes 52 seconds
MSC mapping	16QAM
MSC lower protection	2 (medium)

MSC higher protection	2 (medium)
SDC protection	1 (highest)

Table 2-26: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xAFFD	0xF	0xFF	0xAFFF
Language	Russian	Korean	Portuguese	Not specified
Service label	Audio 0 xHE-AAC	Audio 1 HE-AAC	Audio 2 HE-AAC	Service 3 PRBS
Service content	Audio xHE-AAC 41.44 kb/s No HPP 48 kHz Stereo no SBR	Audio HE-AAC 16.32 kb/s HPP 43 bytes 24 kHz Param. stereo +SBR	Audio ScienceHE-AAC 16.32 kb/s HPP 43 bytes 24 kHz Param. stereo + SBR	Data PRBS 74.8 kb/s Synchronized Low protected: 935 bytes High protected: 0 bytes
Program type	Light classical	Other music	Science	
Links to AFS1				
Service	eFM+RDS, D001	eFM+RDS, D002	eFM (no service ID)	
Schedule	None	None	None	
Content	Different	Different	Different	
Frequency	96.6 MHz	88.9 MHz	87.5 MHz	
Local Information				
Country	Antigua and Barbuda	Canada	Cabo Verde	
Language of audience	Ainu	Dakota	Dargwa	
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	DRM Mode E Waveform Library Rohde & Schwarz GmbH & Co. KG Munich, Germany	DRM Mode E Waveform Library Rohde & Schwarz Broadcast and Media Division Munich, Germany	
Text transmit	4 times	6 times	4 times	

2.3.2.6 MSC_16QAM_MSC_LPP_2_MSC_HPP_3_SDC_1.wv

Table 2-27: General settings

Samples	125337600
Peak offset	3.04 dB
Peak/RMS	12.49 dB
Duration	10 minutes 52 seconds
MSC mapping	16QAM
MSC lower protection	2 (medium)
MSC higher protection	3 (weak)
SDC protection	1 (highest)

Table 2-28: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xAFFD	0x3FE	0x3FF	0x400
Language	Russian	Spanish	Arabic	Not specified
Service label	Audio 0 xHE-AAC	Audio 1 xHE-AAC	Audio 2 xHE-AAC	Data PRBS
Service content	Audio xHE-AAC 30.96 kb/s No HPP 38.4 kHz Stereo no SBR	Audio xHE-AAC 30.96 kb/s No HPP 38.4 kHz Stereo no SBR	Audio xHE-AAC 32.4 bit/s No HPP 38.4 kHz Stereo no SBR	Data PRBS 54.72 kb/s Low protected: 684 bytes High protected: 0 bytes
Program type	Business	Pop music	Science	
Links to AFS1				
Service	aFM (no service ID)	DAB+EEC 0x3FE	DAB 0x3FF	
Schedule	None	None	None	
Content	Different	Equal	Equal	
Frequency	78.6 MHz	5A	5A	
Local Information				
Country	Cayman Islands	Central African Republic	Chad	
Language of audience	Land Dayak languages	Caddo	Basa	
Text				
Text headline	Text Message Service 0	Text Message Service 1	Headline Service 2	

Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	DRM Mode E Waveform Library Rohde & Schwarz GmbH & Co. KG Munich, Germany	DRM+ Library Waveforms Rohde & Schwarz	
Text transmit	4 times	4 times	4 times	

2.3.2.7 MSC_16QAM_MSC_LPP_2_MSC_HPP_3_SDC_0.wv

Table 2-29: General settings

Samples	125337600
Peak offset	3.03 dB
Peak/RMS	12.43 dB
Duration	10 minutes 52 seconds
MSC mapping	16QAM
MSC lower protection	2 (medium)
MSC higher protection	3 (weak)
SDC protection	0 (weak)

Table 2-30: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xC1D2	0x467	0x468	0x469
Language	Hindi	Dutch	Chinese	Bengali
Service label	Audio 0 xHE-AAC	Audio 1 xHE-AAC	Audio 2 HE-AAC	Data slideshow
Service content	Audio xHE-AAC 30.96 kb/s No HPP 38.4 kHz Stereo no SBR	Audio xHE-AAC 41.44 kb/s No HPP 48 kHz Stereo no SBR	Audio HE-AAC 29.12 kb/s No HPP 24 kHz Param. stereo + SBR	Packed data 48.16 kb b Low protected: 557 Bytes High protected: 45 bytes Packet size: 258 bytes MOT slideshow 41.28 kb/s
Program type	Science	Varied	Other music	
Links to AFS1				
Service	aFM +PI 0xC1D2	aFM (no service ID)	eFM+ECC 0x468	
Schedule	None	Schedule 2	Schedule 1	
Content	Different	Different	Different	

Frequency	76 MHz	76 MHz	87.5 MHz	
Local Information				
Country	India	Pakistan	Afghanistan	Cameroon
Language of audience	Hindi	Urdu	Artificial language	Not specified
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	
Text content	Company Rohde&Schwarz Munich, Germany DRM Mode E Waveform Library	Waveform Library DRM+ ES 201 980 Rohde & Schwarz Germany, Munich	PC based DRM modulator DRM Mode E Rohde&Schwarz GmbH & Co. KG Germany, Munich	
Text transmit	4 times	11 times		

2.3.2.8 MSC_16QAM_MSC_LPP_3_MSC_HPP_3_SDC_0.wv

Table 2-31: General settings

Samples	125337600
Peak offset	3.37 dB
Peak/RMS	12.76 dB
Duration	10 minutes 52 seconds
MSC mapping	16QAM
MSC lower protection	3 (weak)
MSC higher protection	3 (weak)
SDC protection	0 (weak)

Table 2-32: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xC1D2	0x467	0x468	0x469
Language	French	Arabic	Chinese	German
Service label	Service0 xHE-AAC	Service1 HE-AAC	Service2 HE-AAC	Data slideshow

Service content	Audio xHE-AAC 41.44 kb/s No HHP 48 kHz Stereo no SBR	Audio HE-AAC 48.64 kb/s HHP 30 Bytes 24 kHz Stereo + SBR	Audio HE-AAC 31.2 kb/s HHP 78 bytes 24 kHz Stereo + SBR	Packed data 64.72 kb/s Low protected: 804 bytes High protected: 5 bytes Packet size: 258 bytes MOT slideshow 61.92 kb/s
Program type	Science	Varied	Other music	
Links to AFS1				
Service	aFM (no Service ID)	aFM+PI 0x467	DRM+ 0x496	
Schedule	Schedule 1	Schedule 1	Schedule 1	
Content	Different	Different	Equal	
Frequency	76 MHz	76 MHz	100.0 MHz	
Local Information				
Country	India	Pakistan	Germany	Cameroon
Language of audience	Hindi	Urdu	Artificial language	Not specified
Text				
Text headline	Text Message Service 0	Text Message Service 1	Text Message Service 2	
Text content	Company Rohde&Schwarz Munich, Germany DRM Mode E Waveform Library	Waveform Library DRM+ ES 201 980 Rohde & Schwarz Germany, Munich	PC based DRM modulator DRM Mode E Rohde&Schwarz GmbH & Co. KG Germany, Munich	
Text transmit	4 times	11 times	11 times	

2.4 DRM services

All files of this group have DRM settings as follows:

- MSC mapping: 16QAM
- MSC lower protection: 2 (medium)
- MSC higher protection: 2 (medium)
- SDC protection: 1 (highest)

2.4.1 Services_1_aac.wv

Table 2-33: General settings

Samples	125337600
Peak offset	3.11 dB
Peak/RMS	12.26 dB
Duration	10 minutes 52 seconds

Service 1, 2 and 3 are not available.

Table 2-34: Services

	Service 0
Service ID	0xABCD
Language	Japanese
Service label	Sweep 20 Hz 20 kHz
Service content	Audio AAC 149.04 kb/s HHP: 377 bytes
Program type	Science
Links to AFS1	
Service	DAB data 0x3ED
Schedule	None
Content	Different
Frequency	5A
Local Information	
Country	Åland Islands
Language of audience	Acoli
Text	
Text headline	Headline Service 0
Text content	Test wave sweep sine 20 Hz to 20 kHz Duration 20 s
Text transmit	4 times

2.4.2 Services_2_he-aac_xhe-aac.wv

Table 2-35: General settings

Samples	125337600
Peak offset	3.41 dB
Peak/RMS	12.65 dB
Duration	10 minutes 52 seconds

Service 2 and 3 are not available.

Table 2-36: Services

	Service 0	Service 1
Service ID	0xBCDE	0xBCDF
Language	Portuguese	Other Language
Service label	Audio0 HE-AAC	Audio 1 xHE-AAC
Service content	Audio HE-AAC 121.44 kb/s HPP: 307 bytes 48 kHz Stereo no SBR	Audio xHE-AAC 27.6 kb/s No HPP 38.4 kHz Stereo no SBR
Program type	Science	Rock music
Links to AFS1		
Service	eFM+EEC, BCDE	
Schedule	None	
Content	Equal	
Frequency	87.5 MHz	
Local Information		
Country	Yemen	Western Sahara
Language of audience	Zande languages	Zenaga
Text		
Text headline	Headline Service 0	Headline Service 1
Text content	Mozart 121.44 kbit/s HE-AAC 48 kHz Stereo, no SBR	Schadstoff Rock xHE-AAC 28.24 kbit/s Stereo
Text transmit	4 times	4 times

2.4.3 Services_2_he-aac_aac.wv

Table 2-37: General settings

Samples	125337600
Peak offset	4.10 dB
Peak/RMS	12.42 dB
Duration	10 minutes 52 seconds

Service 2 and 3 are not available.

Table 2-38: Services

	Service 0	Service 1
Service ID	0xCEEE	0x3FB
Language	Russian	Korean
Service label	Audio 0 HE-AAC	Audio AAC
Service content	Audio HE-AAC 61.84 kb/s HPP 157 bytes 48 kHz Stereo no SBR	Audio AAC 87.2 kb/s HPP 227 bytes Mono
Program type	Light classical	Other music
Links to AFS1		
Service	aFM+Pi, 0xCEEE	eFM+RDS, 0x3FB
Schedule	Schedule 1	None
Content	Different	Equal
Frequency	76 MHz	87.5 MHz
Local Information		
Country	Vietnam	Venezuela
Language of audience	Yupik languages	Yoruba
Text		
Text headline	Text Message Service 0	Sweep 20 Hz 20 kHz
Text content	Rohde & Schwarz GmbH & Co. KG Munich, Germany Waveform Library DRM Mode E	Sine sweep 20 Hz to 20 kHz Duration 20 s AAC 87.2 kbit/s HPP = 227 bytes
Text transmit	4 times	4 times

2.4.4 Services_3_he-aac_aac_prbs.wv

Samples	125337600
Peak offset	3.22 dB
Peak/RMS	12.42 dB
Duration	10 minutes 52 seconds

Service 3 is not available.

Table 2-39: Services

	Service 0	Service 1	Service 2
Service ID	0x3F1	0x3EA	0x3EB
Language	Korean	Japanese	German
Service label	Audio HE-AAC	Audio AAC	Data PRBS
Service content	Audio HE-AAC 74.48 kb/s HPP 188 bytes 24 kHz Stereo + SBR	Audio HE-AAC 37.28 kb/s HPP 93 bytes Mono	PRBS Synchronized 37.28 kb/s HPP 0 bytes
Program type	Other music	Science	
Links to AFS1			
Service	aFM (no service ID)	DAB+EEC 0x3EA	
Schedule	None	None	
Content	Different	Equal	
Frequency	76 MHz	5A	
Local Information			
Country	Vanuata	Uzbekistan	
Language of audience	Yiddish	Yapese	
Text			
Text headline	Headline Service 0	Headline Service 1	
Text content	Mozart HE-AAC 74.48 kbit/s HPP 188 bytes 24 kHz stereo	Sweep audio 20 Hz to 20 kHz 20 seconds Audio AAC 37.28 kbit/s HPP 28 bytes	
Text transmit	4 times	4 times	

2.4.5 Services_3_he-aac_he-aac_prbs.wv

Table 2-40: General Settings

Samples	125337600
Peak offset	2.96 dB
Peak/RMS	12.89 dB
Duration	10 minutes 52 seconds

Service 3 is not available.

Table 2-41: Services

	Service 0	Service 1	Service 2
Service ID	0xC111	0x3EA	0x3EB
Language	Arabic	Javanese	Other Language
Service label	Audio Sweep HE	Audio 1 Rock	Data PRBS
Service content	Audio HE-AAC 61.84 kb/s HPP 157 bytes 48 kHz Stereo no SBR	Audio HE-AAC 43.6 kb/s HPP 113 bytes 24 kHz Stereo + SBR	Data PRBS Synchronized 43.6 kb/s No HHP
Program type	Science	Varied	
Links to AFS1			
Service	aFM (no Service ID)	eFM (no service ID)	
Schedule	None	None	
Content	Different	Equal	
Frequency	76 MHz	87.5 MHz	
Local Information			
Country	Uruguay	Tuvalu	
Language of audience	Yao	Xhosa	
Text			
Text headline	Headline Text 0	Headline Service 1	
Text content	Coding HE-AAC 61.84 kbit/s HPP 187 bytes 48 kHz Stereo, no SBR	Mozart HE-AAC 43.6 kbit/s HPP 113 bytes 24 kHz stereo SBR	
Text transmit	4 times	8 times	

2.4.6 Services_4_xhe-aac_xhe-aac_xhe-aac_xhe-aac.wv

Table 2-42: General settings

Samples	125337600
Peak offset	3.77 dB
Peak/RMS	13.11 dB
Duration	10 minutes 52 seconds

Table 2-43: Services

	Service 0	Service 1	Service 2	Service 3
Service ID	0xA001	0xA002	0xA003	A004
Language	Other language	Dutch	French	Hindi
Service label	Audio0 xHE-AAC	Audio1 xHE-AAC	Audio2 xHE-AAC	Audio3 xHE-AAC
Service content	Audio xHE-AAC 30.96 kb/s No HPP 38.4 kHz Stereo no SBR	Audio xHE-AAC 27.92 kb/s No HPP 38.4 kHz Stereo no SBR	Audio xHE-AAC 41.44 kb/s No HPP 48 kHz Stereo no SBR	Audio xHE-AAC 27.92 kb/s No HPP 38.4 kHz Stereo no SBR
Program type	Other music	Rock Music	Serious classical	Varied
Links to AFS1				
Service	aFM (no service ID)	AM+AMSS	AM (no service ID)	aFM+PI 0xA004
Schedule	None	None	None	None
Content	Different	Equal	Equal	Equal
Frequency	76 MHz	6.95 MHz	6.75 MHz	76 MHz
Local Information				
Country	Turkey	Tunisia	Trinidad and Tobago	Tonga
Language of audience	Walloon	Sorbian languages	Welsh	Washo
Text				
Text headline	Headline Service 0	Headline Service 1	Headline Service 2	

Text content	Martin Luther King (speech) Coding xHE-AAC 30.96 kbit/s No HPP 38.4 kHz Stereo, no SBR	Schadstoff Rock Coding xHE-AAC 27.92 kbit/s No HPP 38.4 kHz Stereo no SBR	Mozart Coding xHE-AAC 41.44 kbit/s No HPP 48 kHz Stereo no SBR	Schadstoff Rock Coding xHE-AAC 27.92 kbit/s No HPP 32.8 kHz Stereo no SBR
Text transmit	4 times	4 times	4 times	4 times

2.5 EN 303 345 DRM testing

The files in this folder are for DRM testing according to EN 303 345-5 v0.0.5. Table 1 in this standard defines the required parameters.

The proposed test cases are defined for three different frequency bands:

- LFMF
- HF
- VHF

For each frequency band, two signals are required:

- Wanted signal (1 kHz sine)
- Unwanted signal (2 kHz sine)

The LFMF band and the HF band use robustness mode B. The VHF band uses robustness mode E.

This waveform library (R&S SMCVB-KV12) contains only DRM test signals that use robustness mode E. They are described in [Chapter 2.5.1, "VHF_wanted.wv"](#), on page 39 and [Chapter 2.5.2, "VHF_unwanted.wv"](#), on page 40.

DRM test signals using robustness mode B are part of the waveform library R&S SMCVB-KV11 DRM Waveforms (1434.5370.xx).

2.5.1 VHF_wanted.wv

Table 2-44: General settings

Samples	53683200
Peak offset	0 dB
Peak/RMS	12.11 dB
Duration	6 minutes 59 seconds

Table 2-45: Services

	Service 0
Service ID	0x1001

Language	English
Service label	"Sine 1 kHz"
Program type	Other Music
Country	United Kingdom
Language of audience	English

Table 2-46: Audio Parameters

Parameter	Service 0
Audio Signal	1 kHz tone, -3 dBFs
Audio Coding	AAC
Audio Mode	Mono
SBR	Disabled
Sampling rate	48 kHz
Bit rate	149040 bps

2.5.2 VHF_unwanted.wv

Table 2-47: General settings

Samples	53683200
Peak offset	0 dB
Peak/RMS	12.11 dB
Duration	6 minutes 59 seconds

Table 2-48: Services

	Service 0
Service ID	0x1001
Language	English
Service label	"Sine 2 kHz"
Program type	Other Music
Country	United Kingdom
Language of audience	English

Table 2-49: Audio Parameters

Parameter	Service 0
Audio Signal	2 kHz tone, -3 dBFs
Audio Coding	AAC
Audio Mode	Mono

SBR	Disabled
Sampling rate	48 kHz
Bit rate	149040 bps

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