R&S®SMW-K52/-K116
DVB-H/T, DVB-S2/S2X
User Manual

1175677802
Version 17

ROHDE&SCHWARZ
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This document describes the following software options:

- R&S®SMW-K52 DVB-H/T (1413.6090.xx)
- R&S®SMW-K116 DVB-S2/S2X (1414.2630.xx)

This manual describes firmware version FW 4.80.041.xx and later of the R&S®SMW200A.

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1175.6778.02 | Version 17 | R&S®SMW-K52/-K116

The following abbreviations are used throughout this manual: R&S®SMW200A is abbreviated as R&S SMW, R&S®WinIQSIM2™ is abbreviated as R&S WinIQSIM2; the license types 02/03/07/11/13/16/12 are abbreviated as xx.

Contents

1 Welcome to the DVB Options

The R&S SMW-K52/-K116 are firmware applications that add functionality to generate signals in accordance with:

- The DVB-H/T (Digital Video Broadcasting - Transmission System for Handheld Terminals) standard
- The standards describing the second-generation DVB system for satellite communication DVB-S2 and the optional extension DVB-S2X.

DVB (digital video broadcasting) provides a communications infrastructure for powerful transmission of MPEG-2-based data. Besides satellite-based (DVB-S), terrestrial (DVB-T) and cable-bound (DVB-C) transmission schemes, the version (DVB-H) is for portable/handheld terminals.

DVB-H is an extension to DVB and is compatible with the basic concept of the standard. The extensions bring advantages that are especially important for portable devices: low power consumption, small hardware and robustness against fading effects. For DVB-H the current firmware supports non-hierarchical coding only.

The DVB-S2 standard is introduced as successor the DVB-S for the transmission of digital video broadcasts over satellite links. The DVB-S2X standard is an optional extension of the DVB-S2 standard. DVB-S2X allows an efficiency gain of up to 51% compared to DVB-S2. With that, higher data rates can be transported over the same satellite transponder capacity.

The main advantages of the DVB-H / DVB-T digital standard option **R&S SMW-K52** are:

- Possibility to test both mobile communications standards (such as WCDMA 3GPP FDD, TD-SCDMA, GSM/EDGE) and DVB-H or DVB-T using only one signal generator
- Simple generation of standard-compliant DVB-H or DVB-T signals

Option **R&S SMW-K116** extends the functionalities with the following key features:

- Fully encoded DVB-S2 and DVB-S2X signal generation
- Support of the stream types: transport stream (TS), generic packetized (GP), generic continuos (GC), generic stream encapsulated high efficiency mode (GSE-HEM)
- Signal generation form arbitrary data sources and TS or GSE files
- Channel coding according to the standard, incl. scrambling, interleaving, outer code (BCH), inner code (LDPC) with varying code rates from 1/4 to 31/45
- Support of all specified Walsh-Hadamard sequences for VL-SNR (very low signal to noise ratio) mode
- Configurable header information, incl. baseband (BB) header, VL-SNR header, TS header, GSE header
- Supported modulation schemes:
  - For DVB-S2: QPSK, 8PSK, 16APSK, 32APSK
  - For DVB-S2X: QPSK, 8APSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK, 256APSK

  - For VL-SNR: QPSK, pi/2 BPSK
- Pilot insertion and configuration
- Signals suitable for testing of satellite transponders, components and ground modems

This user manual contains a description of the functionality that the application provides, including remote control operation.

All functions not discussed in this manual are the same as in the base unit and are described in the R&S SMW user manual. The latest version is available at:

www.rohde-schwarz.com/manual/SMW200A

Installation

You can find detailed installation instructions in the delivery of the option or in the R&S SMW service manual.

1.1 Accessing the DVB Dialog

To open the dialog with DVB settings

► In the block diagram of the R&S SMW, select "Baseband > DVB".

A dialog box opens that displays the provided general settings.

The signal generation is not started immediately. To start signal generation with the default settings, select "State > On".

1.2 Documentation Overview

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

www.rohde-schwarz.com/manual/smw200a

1.2.1 Getting Started Manual

Introduces the R&S SMW 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.

1.2.2 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 SMW is not included.

The contents of the user manuals are available as help in the R&S SMW. 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.

1.2.3 Tutorials

The R&S SMW provides interactive examples and demonstrations on operating the instrument in form of tutorials. A set of tutorials is available directly on the instrument.

1.2.4 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

1.2.5 Instrument Security Procedures

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

1.2.6 Printed Safety Instructions

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

1.2.7 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S SMW. It also lists the options 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/smw200a

1.2.8 Release Notes and Open Source Acknowledgment (OSA)

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

The open-source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/smw200a

1.2.9 Application Notes, Application Cards, White Papers, etc.

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

See www.rohde-schwarz.com/application/smw200a and www.rohde-schwarz.com/manual/smw200a

1.3 Scope

Tasks (in manual or remote operation) that are also performed in the base unit in the same way are not described here.

In particular, it includes:

- Managing settings and data lists, like saving and loading settings, creating and accessing data lists, or accessing files in a particular directory.
- Information on regular trigger, marker and clock signals and filter settings, if appropriate.
- General instrument configuration, such as checking the system configuration, configuring networks and remote operation
- Using the common status registers

For a description of such tasks, see the R&S SMW user manual.

1.4 Notes on Screenshots

When describing the functions of the product, we use sample screenshots. These screenshots are meant to illustrate as many as possible of the provided functions and possible interdependencies between parameters. The shown values may not represent realistic usage scenarios.

The screenshots usually show a fully equipped product, that is: with all options installed. Thus, some functions shown in the screenshots may not be available in your particular product configuration.

2 About the DVB Options

The digital video broadcasting (DVB) suite of standards described methods for data and video signals transmission through different medium including cable, terrestrial, mobile and satellite.

This section lists required options and provides brief background information on basic terms and principles used in the DVB standards.

2.1 Required Options

The basic equipment layout for generating DVB signals includes the:

- Standard or wideband Baseband Generator (R&S SMW-B10/-B9)
- Baseband main module (R&S SMW-B13) or wideband baseband main module (R&S SMW-B13XT)
- Frequency option (e.g. R&S SMW-B1003)
- Digital standard DVB-H / DVB-T (R&S SMW-K52)
- Digital standard DVB-S2 / DVB-S2X (R&S SMW-K116)

You can generate signals via play-back of waveform files at the signal generator. To create the waveform file using R&S WinIQSIM2, you do not need a specific option.

To play back the waveform file at the signal generator, you have two options:

- Install the R&S WinIQSIM2 option of the digital standard, e.g. R&S SMW-K255 for playing LTE waveforms
- If supported, install the real-time option of the digital standard, e.g. R&S SMW-K55 for playing LTE waveforms

For more information, see data sheet.

2.2 About DVB-H/T

The Digital Video Broadcasting - Handheld (DVB-H) standard is based on the earlier standard DVB-T, which is used for terrestrial digital broadcasting.

The block diagram on Figure 2-1 shows the components of the DVB-H transmission system.

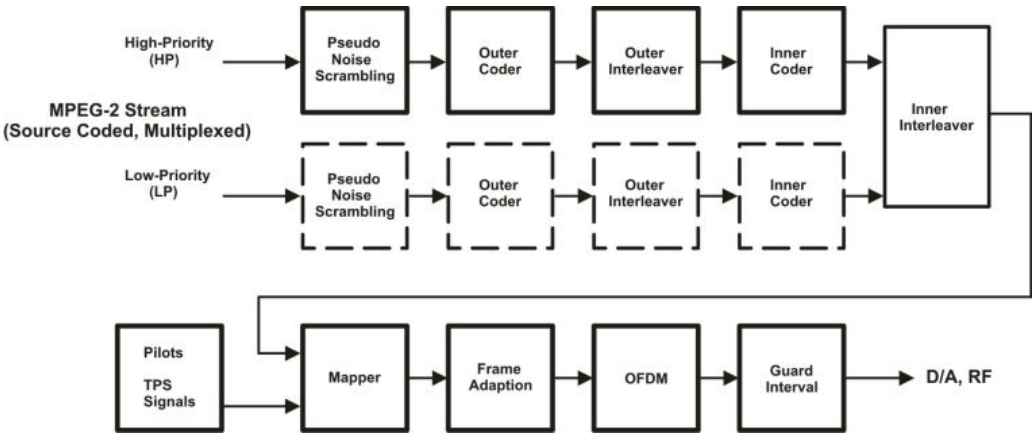


Figure 2-1: Components of the transmission system DVB-H

The current firmware does not support hierarchical coding including low-priority coding. The Low-Priority (LP) path of the MPEG-2 Stream indicates this by dotted squares of the low-priority coding procedure.

DVB-H provides features to meet the specific requirements for handheld, mobile terminals such as:

- Power off some part of the reception chain to increase the battery duration
- Ease access to the services when receivers switching to the next cell
- Mitigate the effects of man-maid noise and severe mobile multipath channels on the receiving capabilities
- Offer sufficient flexibility and scalability to allow reception of services at various speeds
- Offer the flexibility to be used in various transmission bands and channel bandwidths

The basic technical extensions that make it possible to receive digital video broadcasting services on handheld terminals are:

- 4K mode and in-depth interleavers
- Time-slicing
- Forward error correction for multiprotocol encapsulated data (MPE-FEC)

2.3 About DVB-S2/S2X

Figure 2-2 illustrates schematically the components of the DVB-S2/S2X transmission systems. The block diagram is a simplified version of the DVB-S2 system specified in the DVB standard.

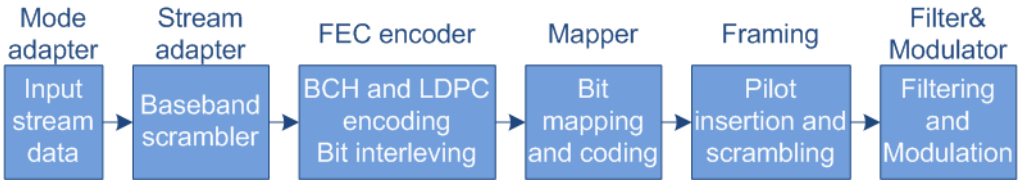


Figure 2-2: Components of the transmission system DVB-S2/S2X

FEC = Forward error correction
BCH = Bose-Chaudhuri-Hocquenghem multiple error correction binary block codes
LDPC = Low-density parity check

The main improvements of the second-generation DVB system for satellites (DVB-S2) compared to DVB-S are:

- Input stream adapter, suitable for operation with single and multiple input streams and different formats (packetized or continuous)
- FEC system based on LDPC codes concatenated with BCH codes
- Range of code rates (from 1/4 up to 9/10);
  Four constellations with different spectrum efficiency and optimized for operation over non-linear transponders
- Three predefined spectrum shapes with rolloff factors 0.35, 0.25 and 0.20
- Adaptive coding and modulation (ACM) functionality for optimized channel coding and modulation on a frame-by-frame basis.

The DVB-S2X is an extension to the DVB-S2 standard. The DVB-S2X reuses the DVB-S2 system architecture and improves it with the following:

- Adds finer MODCOD steps, higher-order modulations and complex constellations
- Three new sharper spectrum shapes
- Defines the VL-SNR (low signal to noise ratio) mode for example for mobile applications
- Optional periodic pilots and physical layer scrambles for easy synchronization
- GSE-Lite compliant signaling and streaming
- Adds a high-efficiency mode (GSE-HEM) intended to transport GSE and GSE-Lite packets

3 DVB Configuration and Settings

Access:

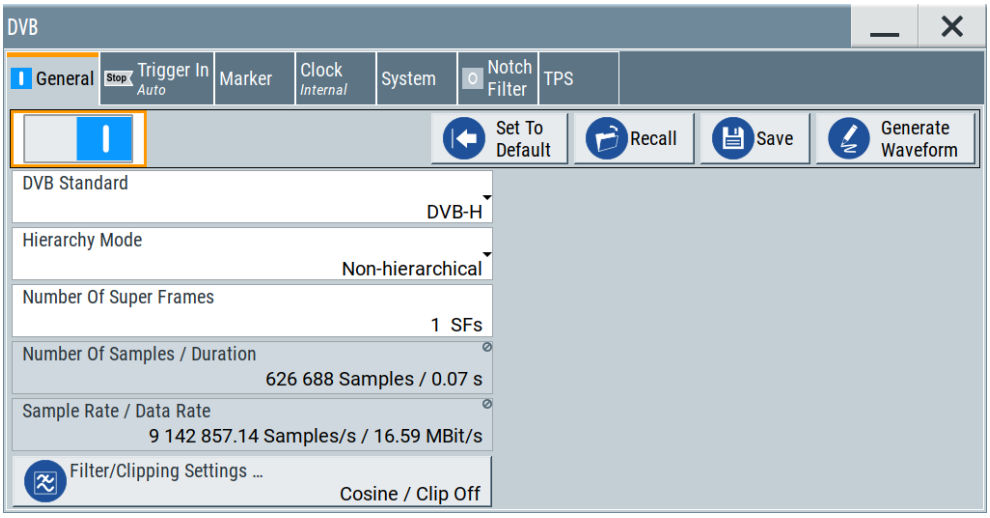
► Select "Baseband > DVB".

The remote commands required to define these settings are described in Chapter 5, "Remote-control Commands", on page 54.

3.1 General Settings

Access:

► Select "Baseband > DVB > General".



This dialog comprises the standard general settings, the default and the "Save/ Recall" settings, and access to dialogs with further settings.

Settings:

State
Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Remote command:
`[:SOURce<hw>]:BB:DVB:STATe` on page 56

Set to Default
Calls the default settings. The values of the main parameters are listed in the following table.

Parameter	Value
State	Not affected by "Set to default"
Number of Super-Frames	1
Hierarchy Mode	Non-hierarchical
HP Source	PN 23
Filter Type	Cosine
Clipping	Off
Cell Identification	On
Time-Slicing	On
ID [4 hex]	0000
MPE-FEC	Off
PN Scrambler	On
Outer Coder	On
Outer Interleaver	On
Inner Coder	On
Rate	1/2
Inner Bit Interleaver	On
Inner Symbol Interleaver	On
Inner Interleaver Mode	Native
TX Mode	2 K
OFDM/RF Bandwidth	8 MHz

Parameter	Value
Modulation	QPSK
Alpha	1
Guard Interval	1/8

Remote command:
[:SOURce<hw>]:BB:DVB:PRESet on page 56

Save/Recall
Accesses the "Save/Recall" dialog, that is the standard instrument function for saving and recalling the complete dialog-related settings in a file. The provided navigation possibilities in the dialog are self-explanatory.

The settings are saved in a file with predefined extension. You can define the filename and the directory, in that you want to save the file.

See also, chapter "File and Data Management" in the R&S SMW user manual.

Remote command:
[:SOURce<hw>]:BB:DVB:SETTing:CATalog? on page 56
[:SOURce<hw>]:BB:DVB:SETTing:LOAD on page 57
[:SOURce<hw>]:BB:DVB:SETTing:STORe on page 57
[:SOURce<hw>]:BB:DVB:SETTing:DELete on page 57

Generate Waveform File
With enabled signal generation, triggers the instrument to save the current settings of an arbitrary waveform signal in a waveform file with predefined extension `*.wv`. You can define the filename and the directory, in that you want to save the file.

Using the ARB modulation source, you can play back waveform files and/or process the file to generate multi-carrier or multi-segment signals.

Remote command:
[:SOURce<hw>]:BB:DVB:WAVeform:CREate on page 57

DVB Standard
Selects the DVB standard to be used to generate the modulation signal.

Remote command:
[:SOURce<hw>]:BB:DVB:STANdard on page 58

Hierarchy Mode
Indicates the hierarchy coding mode, that is "Non-hierarchical".

The current firmware does not support hierarchical coding.

"Non-hierarchical"
The high priority input is used.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:HMODe on page 72

VL-SNR Mode
(requires option R&S SMW-K116)

For "DVB Standard > DVB-S2X", includes the VL-SNR (very low - signal to noise ratio) header in the physical layer frame.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBX:VSMode on page 58

CCM/ACM
Option: R&S SMW-K116

Selects whether constant coding and modulation (CCM) or adaptive coding and modulation (ACM) communication is used.

In ACM mode, for instance, the receiver sends feedback information on received signal quality. Depending on this feedback, the channel coding and modulation is optimized on a frame-by-frame basis.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:CACM on page 96

Number of Super Frames
For "DVB Standard > DVB-T/H", sets the number of the transmitted super-frames. Each super-frame consists of four OFDM frames.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:SFRames on page 58

Number of Frames
Option: R&S SMW-K116

For "DVB Standard > DVB-S2/S2X", sets the number of the transmitted frames.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:FRAMes on page 58

Number of Samples / Duration
Requires "DVB Standard > DVB-T/H" and "State > On".

Displays the number of the transmitted samples and the signal duration.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:SAMPle:LENGth? on page 59
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:DURation? on page 59

Sample Rate / Data Rate
Requires "DVB Standard > DVB-T/H" and "State > On".

Displays the sample rate and data rate.

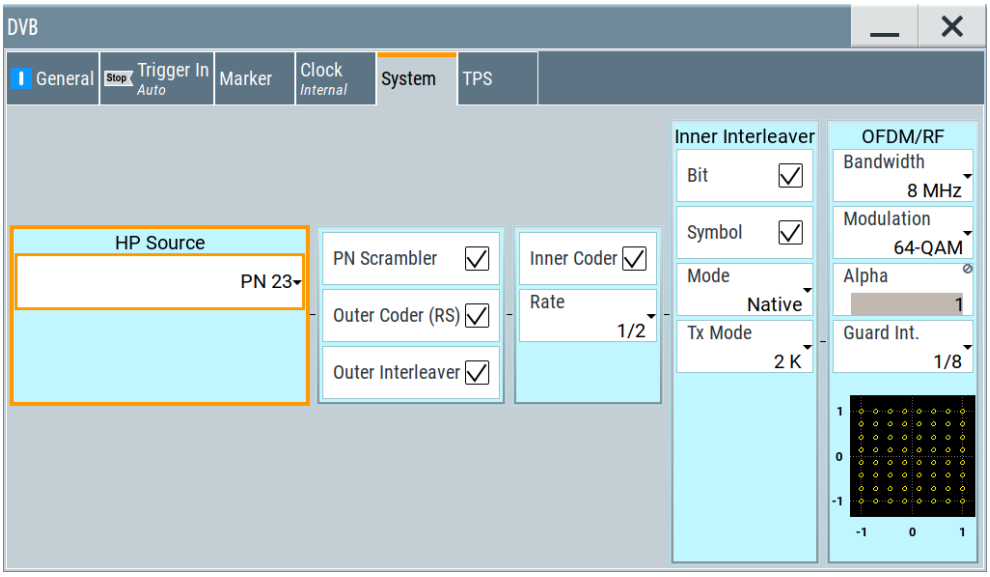
Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:SAMPle:RATE? on page 59
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:DRATe? on page 59

Filter/Clipping Settings
Accesses the dialog for setting baseband filtering and clipping, see Chapter 4.1, "Filter/Clipping Settings", on page 40.

3.2 DVB-T/DVB-H System Settings

Access:

1. Select "DVB > DVB Standard > DVB-T/DVB-H"
2. Select "System".



The dialog provides settings to configure the DVB system. The DVB system is displayed in form of a block diagram including all parameters necessary to configure the high priority path of DVB the system.
Hierarchical coding is not supported, the low priority path is not configurable.

Settings:

HP Source, Select File
Selects the data source for the high priority path.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:DATA on page 72
[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:DATA:DSELection on page 73

PN Scrambler
Activates PN scrambling. The data packets of the incoming transport stream are transformed to a pseudo random binary sequence (PRBS). This transformation is performed to obtain a bit sequence that has a positive effect on the transmitted RF spectrum.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:PNSCrambler[:STATe]
on page 74

Outer Coder (RS)
Activates the outer coder. The outer coder applies a Reed-Solomon error correction code to the PRBS data stream.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:OCODer[:STATe] on page 73

Outer Interleaver
Activates the outer convolutional interleaver.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:OINTerleaver[:STATe]
on page 74

Inner Coder
Activates the inner coder. The inner coder is a punctured convolutional error-correcting coder.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:ICODer[:STATe] on page 73

Rate
If "Inner Coder > On", selects the code rate of the inner coder.

For encoding incoming bits (m), the inner coder transforms the bits into a bit symbol containing n bits. The ratio m/n is the code rate.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:ICODer:RATE on page 73

Inner Bit Interleaver
Activates the inner bit interleaver.

The inner interleaver consists of a bit-wise interleaving followed by symbol interleaving. Both interleaving processes are block based.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:BIT[:STATe]
on page 74

Inner Symbol Interleaver
Activates the inner symbol interleaver.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:SYMBol[:STATe]
on page 75

Inner Interleaver Mode
Selects the inner interleaver mode. Interleaver mode in-depth is available only for transmission mode 2K and 4K.

"Native" Available for all transmission modes ("Tx Mode").

"In-depth" Requires "Tx Mode > 2K/4K".

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:SYMBol:MODE
on page 74

Inner Interleaver Tx Mode
Selects the transmission mode.

The transmission mode determines the number of the OFDM subcarriers.

For "Tx Mode > 8 K", the in-depth interleaver mode is not available. "Tx Mode > 4 K" is available only for "Standard > DVB-H".

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:SYMBol:TMODe
on page 75

OFDM/RF Bandwidth
Selects the system bandwidth.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:BWIDth on page 75

OFDM/RF Modulation
Selects the constellation for the OFDM modulation.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:MODulation on page 76

OFDM/RF Alpha
Displays the alpha value, that is fixed to "1" for non-hierachical coding.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:ALPHa on page 75

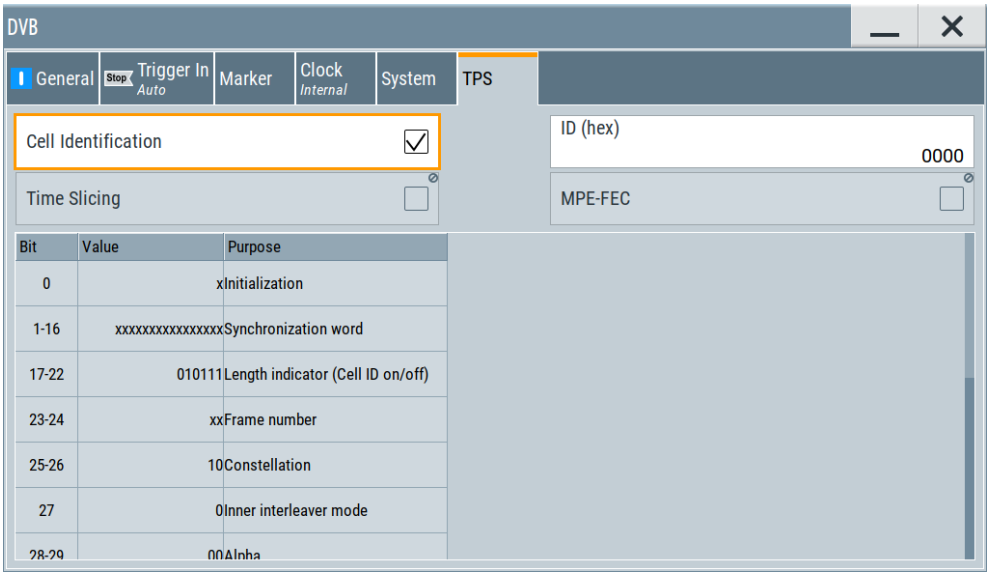
OFDM/RF Guard Int.
Selects the length of guard interval. The guard interval extends the length of the transmitted symbol. Guard interval values resemble fractions of a symbol period.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:GINTerval on page 76

3.3 DVB-T/DVB-H TPS Settings

Access:

1. Select "DVB > DVB Standard > DVB-T/DVB-H"
2. Select "TPS".



The dialog allows you to select the bits to transmit via the TPS signal and displays the status of the parameter bits.

Settings:

Cell Identification
Activates TPS cell identification. If activated, the cell from which the signal comes from is identified.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:ID:STATe` on page 88

ID (hex)
Sets the cell ID for cell identification.

The cell ID identifies the cell from which the signal is transmitted. This value is read by the receiver if Cell Identification is activated.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:ID:PATTern` on page 87

Time Slicing
Indicates the status of the time-slicing bit. If activated, the average power consumption of the terminal is reduced.

The current firmware does not support generation of time-slicing information. Time slicing is always used for DVB-H and permanently disabled for DVB-T.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:TSLicing[:STATe]?` on page 88

MPE FEC
Activates the multiprotocol encapsulation forward error correction bit. MPE-FEC must be performed in the transport stream. This implementation does not support MPE-FEC.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:MFEC[:STATe]` on page 88

TPS Table
The TPS parameter bit table displays the status of the transmitted TPS parameter bits.

Bit	Value	Purpose
0	x	Initialization
1-16	xxxxxxxxxxxxxxxx	Synchronization word
17-22	011111	Length indicator (Cell ID on/off)
23-24	xx	Frame number
25-26	10	Constellation
27	0	Inner interleaver mode
28-29	00	Alpha
30-32	000	Code rate HP stream
33-35	000	Code rate LP stream
36-37	10	Guard interval

Table 3-1: TPS signaling information transmitted in DVB-H

Bit number	Format	Purpose
0	0/1	Initialization bit for the differential 2PSK modulation. The modulation of the TPS initialization bit is derived from the PRBS sequence
1-16		Bits 1 to 16 of the TPS are the synchronization words for the TPS blocks in the super-frames:
	0011010111101110	Synchronization word for the first and the third TPS block in each super-frame
	11001010000100001	Synchronization word for the second and the fourth TPS block in each super-frame
17-22		The first 6 bits of the TPS information is used as a TPS length indicator to signal the number of used bits of the TPS:
	010111	Cell identification is not transmitted (23 TPS bits in use)

Bit number	Format	Purpose
	011111	Cell identification information is transmitted (31 TPS bits in use)
	100001	Cell identification information is transmitted for DVB-H (33 TPS bits in use)
23-24		Indicates the frame in the super-frame. Four frames constitute a super-frame.
	00	Frame 1 in the super-frame
	01	Frame 2 in the super-frame
	10	Frame 3 in the super-frame
	11	Frame 4 in the super-frame
25-26		Indicates the constellation
	00	QPSK
	01	16-QAM
	10	64-QAM
	11	Reserved
27		Indicates the interleaver mode. The in-depth interleaver can be used for 2K and 4K transmission mode. For transmission mode 8K, only the native interleaver is used:
	0	The native interleaver is used
	1	The in-depth interleaver is used
28-29		Indicates the hierarchical transmission and the value of the alpha-factor
	00	Transmission in non-hierarchical mode
	01	Alpha = 1
	10	Alpha = 2
	11	Alpha = 4
30-32		Indicates the code rate for the HP transmission stream
	000	1/2
	001	2/3
	010	3/4
	011	5/6
	100	7/8
	101	reserved
	110	reserved
	111	reserved
33-35		Indicates the code rate for the LP transmission stream
	000	1/2

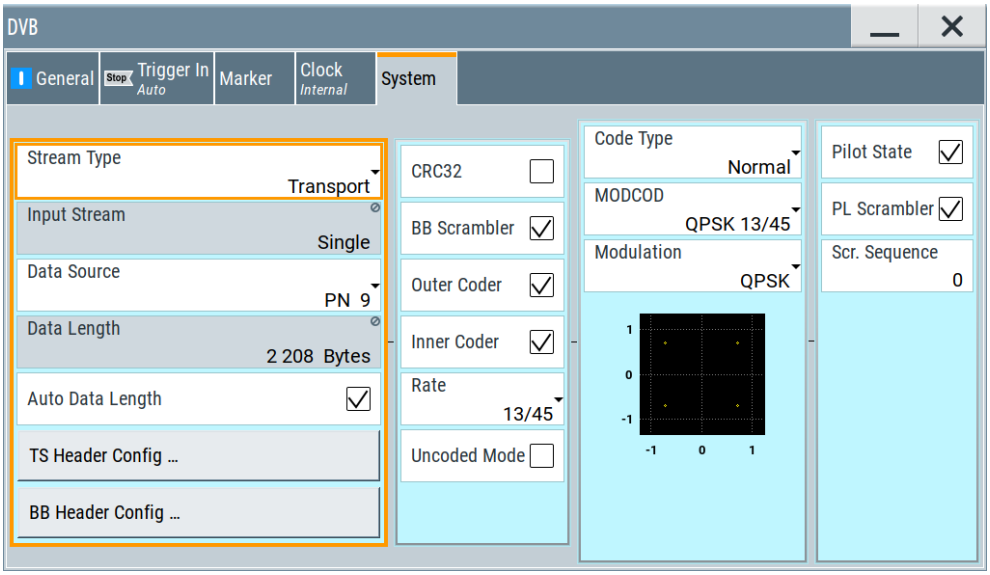
Bit number	Format	Purpose
	001	2/3
	010	3/4
	011	5/6
	100	7/8
	101	reserved
	110	reserved
	111	reserved
36-37		Indicates the value for the guard interval
	00	1/32
	01	1/16
	10	1/8
	11	1/4
38-39		Indicates the transmission mode
	00	2K mode
	01	8K mode
	10	4K mode
	11	reserved
40-47	Cell_id	32 bits are used for the cell ID. Every frame contains 8 bits. The 8 bits are used to identify the cell from which the signal comes from.
48		Indicates the usage of time-slicing
	0	Time-slicing is not used
	1	At least one elementary stream uses time-slicing
49		Indicates the usage of MPE-FEC
	0	MPE-FEC is not used
	1	At least one elementary stream uses MPE-FEC
50-53	reserved	
54-67	xxxxxxxxxxxxxxx	BCH error protection

3.4 DVB-S2/DVB-S2X System Settings

Option: R&S SMW-K116

Access:

1. Select "DVB > DVB Standard" > "DVB-S2/DVB-S2X".
2. Select "CCM/ACM" > "CCM".
3. Select "System".



The dialog provides settings to configure the DVB system. The DVB system is displayed in form of a block diagram including all related parameters.
The provided settings depend on the selected DVB Standard and on whether constant coding and modulation (CCM) or adaptive coding and modulation (ACM) communication is used.

The blocks indicate the first four logical signal processing parts:

- Mode adaptation:
  Input stream configuration, incl. configuration of the header information
- Stream adaptation:
  Baseband scrambling and FEC (forward error correction) encoding
- Constellation mapping:
  Modulation and coding
- Pilot:
  Insertion and scrambling of the optional pilot.

The last processing part is the baseband spectrum shaping. Find the required filter parameters in the "Filter" dialog, see Chapter 4.1.1, "Filter Settings", on page 40.

Settings:

Stream Type
Selects the type of input stream.

"Transport"	Transport stream TS
"GP"	Generic packetized
"GC"	Generic continuous
"GSE-HEM"	Requires "DVB Standard > DVB-S2X". Generic stream encapsulation, high efficiency mode (HEM) packetized.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:STYPe` on page 79

Input Stream
Indicates that the input stream is single (SIS).

Multiple input streams (MIS) are not supported.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ISTReam?` on page 79

Data Source, Select File
Selects the data source.

The following standard data sources are available:

- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"

A binary data from a data list, internally or externally generated.
Select "Select DList" to access the standard "Select List" dialog.

– Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
– Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
– Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

"TS File, Select File"

For "DVB Standard > DVB-S2", uses a transport stream (TS) file as data source. TS files are files with extension `*.gts`, `*.ts` or `*.trp`

File extension	Format	Description
`*.gts`	Rohde & Schwarz proprietary	
`*.trp`	MPEG-2	Standard DVB file format for HD video transport Contains high definition transportation stream
`*.ts`	MPEG	Standard digital container format for transmission and storage of audio, video, and program and system information protocol (PSIP) data.

Select "Select File" to access the standard "File Select" dialog.

"GSE File, Select File"

For "DVB Standard > DVB-S2X", uses a generic stream encapsulation (GSE) file as data source. GSE files are files with extension `*.gse`.
Select "Select File" to access the standard "File Select" dialog.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA` on page 80
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:DSELection|TSELection|GSELection` on page 80
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:PATTern` on page 80

Data Length
If "Auto Data Length > Off", sets the data length in bytes.

The value is used to calculate the value of the parameter Total Length.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:LENGth` on page 81

Auto Data Length
Defines, if the "Data Length" is set automatically or manually.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ADLength:STATe on page 81

TS Header Config
Requires "Stream Type > Transport". Accesses the transport stream header settings, see Chapter 3.6, "TS Header Settings", on page 33.

GSE Header Config
Requires "Stream Type > GSE-HEM". Accesses the GSE header settings, see Chapter 3.7, "GSE Header Settings", on page 35.

BB Header Config
Accesses the baseband header settings, see Chapter 3.8, "BB Header Settings", on page 37.

CRC32
If enabled, a CRC-32 check sum is calculated and appended to the baseband frame (BBFRAME). The BB header is excluded.

The CRC-32 is calculated over the first (80+DFL-32) bits of the BBFRAME, and inserted into the final 32 bits of the data field. The technique guarantees, that any errors in the received BBFRAME can be reliably detected, as BCH error indicator is not reliable. The CRC polynomial is as follows:

x32 + x26 + x23 + x22 + x12 + x11 + x10 + x8 + x7 + x5 + x4 + x2 + x + 1

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:CRC[:STATe] on page 81

BB Scrambler
Activates baseband scrambling.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BSCRambler[:STATe] on page 81

Outer Coder
Enables the BCH outer coder.

BCH codes are Bose-Chaudhuri-Hocquenghem multiple error correction binary block codes.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:OCODer[:STATe] on page 82

Inner Coder
Applies LDPC (low-density parity check) encoding to data bits.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ICODer[:STATe] on page 82

CCM settings
The following settings require mode "CCM/ACM > CCM".

Rate ← CCM settings
Selects the code rate of the inner LDPC coder.

The code rate is calculated as *code rate* = *m*/*n*, where:
- *m* is the number of incoming bits
- *n* are the number of bits in the coded output symbol

A wide range of code rates is specified. The available code rates depend on the selected "Modulation", modulation coder ("MODCOD") and if "VL-SNR Mode" is used or not.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ICODer:RATE` on page 82

SF ← CCM settings
Requires "DVB Standard > DVB-S2X", "VL-SNR Mode > On" and "Code Type > Short".

Sets the spreading factor. Per default, the VL-SNR mode uses "Modulation > pi/2 BPSK" and "SF = 2". The spreading factor of 2 means that encoded bits are repeated twice before they are mapped into the constellation.

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBX:SFACtor` on page 83
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:SFACtor?` on page 83

Code Type ← CCM settings
Selects the FEC code type.

"Code Type > Medium" requires "VL-SNR Mode > On".

In VL-SNR mode, the required Walsh-Hadamard sequence is selected automatically as function of the parameters "MODCOD" and "Code Type".

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:CTYPe` on page 84
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:CTYPe` on page 84

MODCOD ← CCM settings
Selects the MODCOD.

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MCOD` on page 84
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:MCOD` on page 84

Modulation ← CCM settings
Selects the modulation scheme.

Suitable modulation schemes are selected automatically to fit the selected MODCOD.

The DVB-S2/S2X standards specify different modulation schemes, ranging in power and spectrum efficiency. The available values depend on the used "DVB Standard", the selected "MODCOD", "Code Type" and if "VL-SNR Mode" is used or not.
- "DVB Standard > DVB-S2"

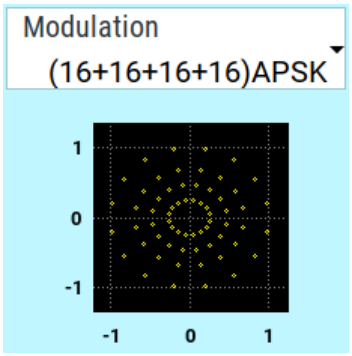
QPSK, 8PSK, 16APSK, 32APSK
- "DVB Standard > DVB-S2X"
  QPSK, 8APSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK, 256APSK
- "DVB Standard > DVB-S2X" with "VL-SNR Mode > On"
  QPSK, pi/2 BPSK

The constellation diagram illustrates the selected modulation and coding.

Example:

"Modulation = (16 + 16 + 16 + 16) APSK" is an APSK modulation with 64 constellation points, distributed on 4 concentric rings with 16 constellation point each.

The radius of each ring is defined as function of the selected code rate.



Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MODulation` on page 85

Pilot State ← CCM settings
Activates/deactivates the pilot.

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:PSTate[:STATe]` on page 86
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:PSTate[:STATe]` on page 86

ACM settings
The following settings are available in "CCM/ACM > ACM" mode:

Bit Interleaver ← ACM settings
If enabled, the output of the LDPC encoder is bit interleaved using a block interleaver.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BINTerleaver[:STATe]` on page 83

MODCOD Table Config ← ACM settings
Opens the "MODCCOD Table Configuration" dialog, where you can configure a set of different PLSCODEs. The PLSCODEs are processed cyclically.

See Chapter 3.5, "MODCOD Table Configuration Settings", on page 30.

Uncoded Mode
Activates raw bit stream streaming.

If enabled, all parameters relevant for coding as well as header parameters are disabled.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:UCMode[:STATe]` on page 83

PL Scrambler
Activates pilot scrambling.

The pilot data is scrambled with the selected scrambling sequence (Scr. Sequence).

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:PSCRambler[:STATe]` on page 86

Scr. Sequence
For "DVB Standard > DVB-S2X", sets the bit sequence used to scramble the pilot.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:SSEQuence` on page 86

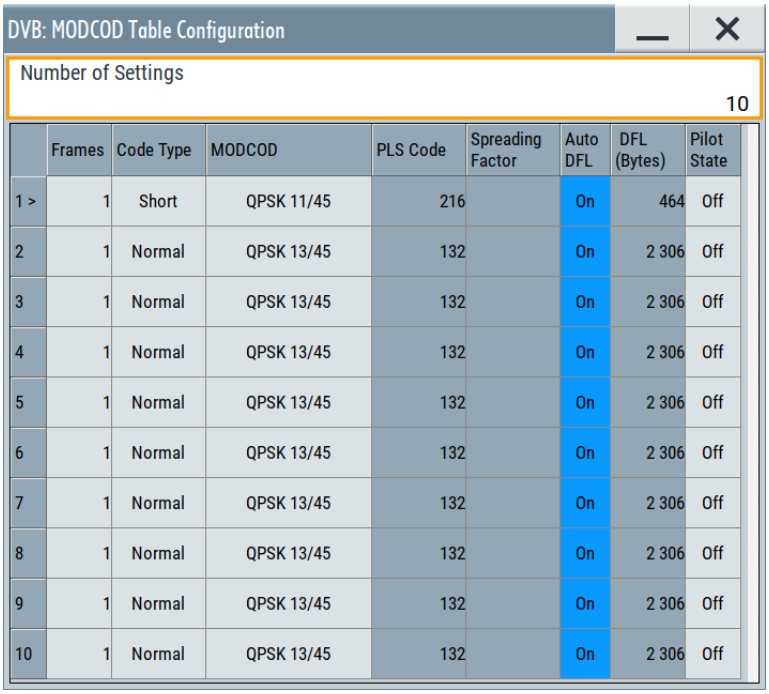
3.5 MODCOD Table Configuration Settings

Option: R&S SMW-K116

Access:

1. Select "DVB > DVB Standard > DVB-S2/DVB-S2X".
2. Select "CCM/ACM" > "ACM".
3. Select "System".

4. Select "MODCOD Table Config".



	Frames	Code Type	MODCOD	PLS Code	Spreading Factor	Auto DFL	DFL (Bytes)	Pilot State
1 >	1	Short	QPSK 11/45	216		On	464	Off
2	1	Normal	QPSK 13/45	132		On	2 306	Off
3	1	Normal	QPSK 13/45	132		On	2 306	Off
4	1	Normal	QPSK 13/45	132		On	2 306	Off
5	1	Normal	QPSK 13/45	132		On	2 306	Off
6	1	Normal	QPSK 13/45	132		On	2 306	Off
7	1	Normal	QPSK 13/45	132		On	2 306	Off
8	1	Normal	QPSK 13/45	132		On	2 306	Off
9	1	Normal	QPSK 13/45	132		On	2 306	Off
10	1	Normal	QPSK 13/45	132		On	2 306	Off

The dialog provides settings to configure a set of different PLSCODEs. The PLSCODEs are processed cyclically.

Settings:

Number of Settings
Sets the number of PLSCODEs, that can be configured.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:NOSettings` on page 86

Frames
Sets the number of the transmitted frames.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:FRAMes` on page 87

Code Type
Selects the FEC code type.

"Code Type > Medium" requires "VL-SNR Mode > On".

In VL-SNR mode, the required Walsh-Hadamard sequence is selected automatically as function of the parameters "MODCOD" and "Code Type".

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:CTYPe` on page 84
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:CTYPe` on page 84

MODCOD
Selects the MODCOD.

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MCOD` on page 84
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:MCOD` on page 84

PLS Code
Indicates the PLS code for the selected MODCOD.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:PCOD?` on page 87

SF
Requires "DVB Standard > DVB-S2X", "VL-SNR Mode > On" and "Code Type > Short".

Sets the spreading factor. Per default, the VL-SNR mode uses "Modulation > pi/2 BPSK" and "SF = 2". The spreading factor of 2 means that encoded bits are repeated twice before they are mapped into the constellation.

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBX:SFACtor` on page 83
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:SFACtor?` on page 83

Auto DFL
Defines if the "DFL" is set automatically or manually.

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:ADFL:STATe` on page 97
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:ADFL[:STATe]` on page 97

DFL
If "Auto DFL > Off", sets the data field length (DFL).

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:DFL` on page 97
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:DFL` on page 97

Pilot State
Activates/deactivates the pilot.

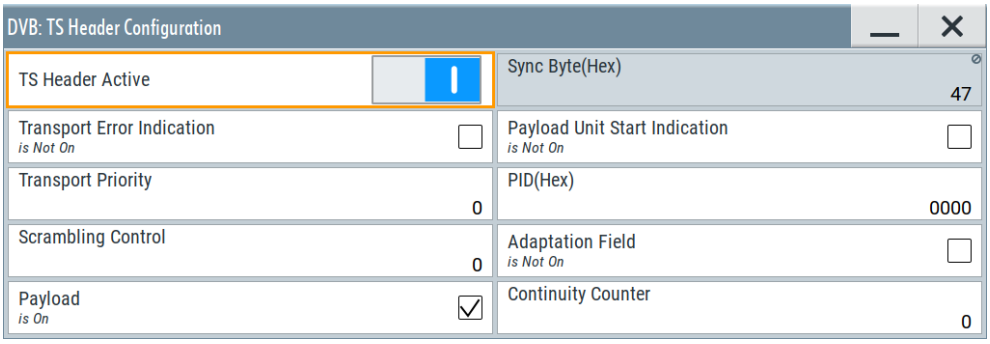
Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:PSTate[:STATe]` on page 86
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:PSTate[:STATe]` on page 86

3.6 TS Header Settings

Option: R&S SMW-K116

Access:

1. Select "DVB > DVB Standard > DVB-S2/DVB-S2X".
2. Select "System".
3. Select "Stream Type > Transport".
4. Select "TS Header Config".



The dialog lists the transport stream header settings.

Settings:

TS Header Active
Inserts header information in the transport stream.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig[:STATe] on page 89

Sync Byte (Hex)
Displays the information carried by the synchronization byte. The value is in a hexadecimal format.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:SBYTe? on page 89

Transport Error Indication
Inserts transport error indication information in the header.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:TEINdication[:STATe] on page 89

Payload Unit Start Indication
If enabled, the PES (packetized elementary streams), PSI (program-specific information), or DVB-MIP (megaframe initialization) packet begin immediately after the header.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:PUS on page 90

Transport Priority
Marks the current packet as high priority packet compared to packets with the same PID.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:TPRiority on page 90

PID (Hex)
Sets the packet identifier PID in hexadecimal format.

Packet identifiers describe the payload data.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:PID:PATTern on page 90

Scrambling Control
Sets the scrambling information.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:SCONtrol on page 91

Adaptation Field
Inserts an adaptation field in the packet.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:AFIeld[:STATe] on page 91

Payload
Adds a payload field in packet.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:PAYLoad[:STATe]
on page 91

Continuity Counter
Sets the sequence number of the first payload packet.

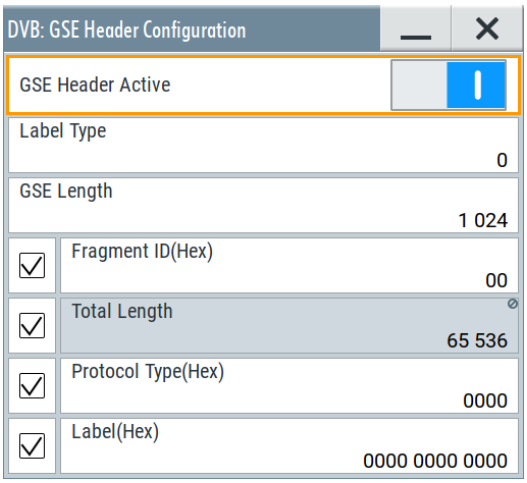
Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:CCOunter on page 91

3.7 GSE Header Settings

Option: R&S SMW-K116

Access:

1. Select "DVB > DVB Standard > DVB-S2X"
2. Select "System".
3. Select "Stream Type > GSE-HEM".
4. Select an arbitrary data source, e.g. "Data Source > PN15".
5. Select "GSE Header Config".



The dialog provides settings to configure generic stream encapsulation (GSE) header settings.

Settings:

GSE Header Active
Inserts header information in the transport stream.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig[:STATe]` on page 92

Label Type
Set the type of the used label field.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:LTYPe` on page 92

GSE Length
Sets the number of bytes following in the GSE packet.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:GLENgth` on page 93

Use, Fragment ID(Hex)
Indicates that a PDU fragment is included in the GSE packet.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:FID:PATTern` on page 93
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:FIUSe[:STATe]` on page 93

Use, Total Length
Indicates the total length in bytes, calculated as follows:

"Total Length" = PDU length ("Data Length") + [2 bytes if "Use Protocol Type > On"] + [6 (or 3) bytes if "Use Label > On"].

Extension headers are not supported and hence not included in the calculation.

Example:

If "Data Length = 4000", "Use Protocol Type > On" and "Use Label > Off", the "Total Length = 4002"

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:TLENgth?` on page 93
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:TLUSe[:STATe]` on page 94

Use, Protocol Type(Hex)
Indicates the payload type carried in the PDU.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:PTYPe:PATTern` on page 94
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:PTUSe[:STATe]` on page 94

Use, Label(Hex)
For "Label Type = 0 | 1", sets the label used for addressing.

The value range changes depending on the "Label Type".

"Label Type" value	"Label" value range
0	000000000000 to FFFFFFFFFFFF
1	000000 to FFFFFF

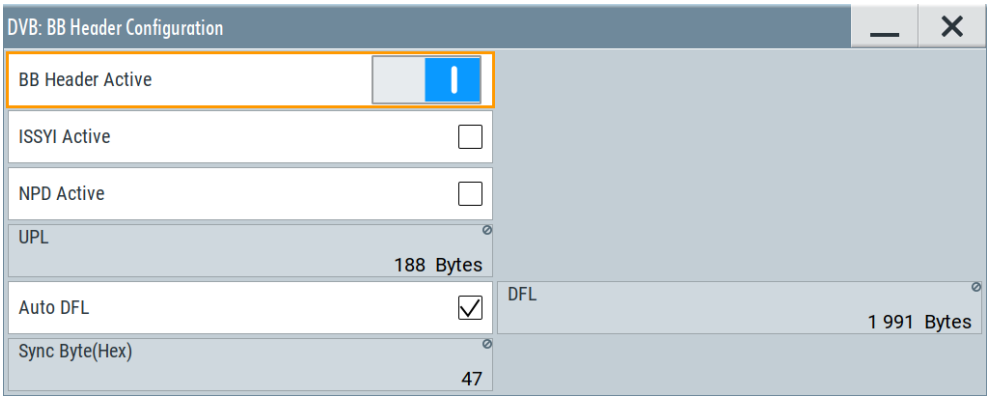
Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:LABel:PATTern` on page 94
`[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:LUSE[:STATe]` on page 95

3.8 BB Header Settings

Option: R&S SMW-K116

Access:

1. Select "DVB > DVB Standard > DVB-S2/DVB-S2X"
2. Select "CCM/ACM > CCM".
3. Select "System > Stream Type > Transport".
4. Select "BB Header Config".



The dialog provides settings to configure the baseband (BB) header.
Use the "Filter" settings, to set the baseband filter parameter Roll-off factor and determine the roll-off bits of the BB header.

Settings:

BB Header Active
If enabled, the BB header is inserted into the set stream.

If disabled, BB header parameter settings, e.g. ISSYI, are still valid for the set stream.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig[:STATe]` on page 95

ISSYI Active
If enabled, sets the ISSYI (input stream synchronization indicator) bit to 1.

The ISSY field is inserted after the user packets (UP) or in the BB header of the GSE-HEM stream.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:IACTive[:STATe]`
on page 96

GSE-Lite Active
For Stream Type > "GSE-HEM", indicates that the GSE stream is GSE-Lite compliant.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBX:BHConfig:GLACtive[:STATe]` on page 96

NPD Active
Activates null-packet deletion (NPD).

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:NACTive[:STATe]`
on page 96

UPL
Indicates the user packet length (UPL).

The user packet length depends on the "Stream Type":
- For "Transport", "UPL = 188 Bytes"
- For "GC", "UPL = 0 Bytes" which results in a continuous stream
- For "GP", UPL is a configurable value.

Remote command:
`[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:UPL` on page 97

DFL
If "Auto DFL > Off", sets the data field length (DFL).

Remote command:
CCM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:DFL` on page 97
ACM mode: `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:DFL`
on page 97

Auto DFL
Defines if the "DFL" is set automatically or manually.

Remote command:
CCM mode: [:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:ADFL:STATe on page 97
ACM mode: [:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:ADFL[:STATe] on page 97

Sync (Hex)
Indicates the user packet synchronization byte.

The value and the value range depend on the used Stream Type:

- For "TS" and "GP", "Sync = 47".
  This value indicates MPEG transport stream packets.
- For "GC", the value is configurable.

Remote command:
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:SBYTe:PATTern on page 97

4 Signal Generation Control

This section lists settings provided for configuring the baseband filter, for defining the signal generation start and for generating signals necessary for synchronization with other instruments.

It covers the following topics:

4.1 Filter/Clipping Settings

Access:

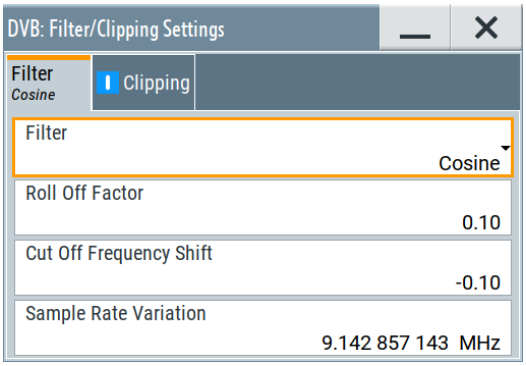
► Select "General > Filter/Clipping Settings".

The dialog provides settings to configure the baseband filter and to enable clipping.

4.1.1 Filter Settings

Access:

► Select "Filter".



The dialog comprises the settings, necessary to configure the baseband filter.

Settings:

Filter
Selects the baseband filter.

The DVB-S2/S2X standards use the predefined root cosine (RC) filter to shape the baseband signal spectrum.

Remote command:
`[:SOURce<hw>]:BB:DVB:FILTer:TYPE` on page 60

Rolloff Range
Requires option R&S SMW-K116 and "DVB Standard > DVB-S2X".

Selects whether the high or the low filter roll-off range is used, see Table 4-1.

Remote command:
`[:SOURce<hw>]:BB:DVB:FILTer:RORange` on page 61

Rolloff Factor or BxT
Sets the filter parameter.

The rolloff factor affects the steepness of the filter slopes. A "Rolloff Factor = 0" results in the steepest slopes; values near to 1 make the slopes more flat.

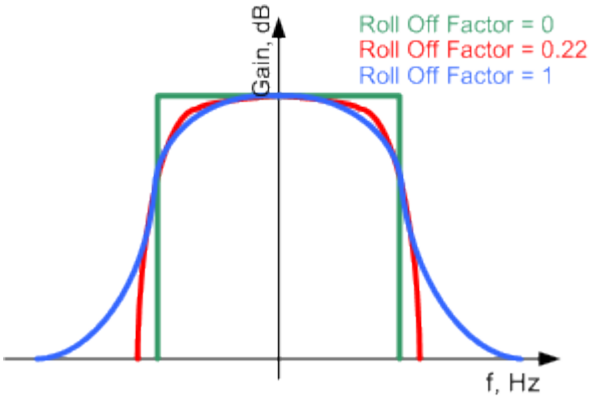


Figure 4-1: Example of the frequency response of a filter with different rolloff factors

For "DVB Standard > DVB-S2/S2X", the rolloff factors are predefined.

Table 4-1: Predefined sets of spectrum shapes

"DVB Standard"	"Roll Off Range"	"Roll Off Factor"
"DVB-S2"	-	0.35, 0.25, 0.2
"DVB-S2X"	Low	0.15, 0.1, 0.05
	High	0.35, 0.25, 0.2

Remote command:
`[:SOURce<hw>]:BB:DVB:FILTer:PARameter:RCOSine` on page 61
`[:SOURce<hw>]:BB:DVB:FILTer:PARameter:COSine` on page 60

[:SOURce<hw>]:BB:DVB:FILTer:PARameter:GAUSs on page 61
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:PGAuss on page 61
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:SPHase on page 61
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:APCO25 on page 60
[:SOURce<hw>]:BB:DVB:FILTer:ROFactor on page 61

Cutoff Frequency Shift
The cutoff frequency is a filter characteristic that defines the frequency at the 3 dB down point. The "Cut Off Frequency Shift" affects this frequency in the way that the filter flanks are "moved" and the transition band increases by "Cut Off Frequency Shift"*"Sample Rate".

- A "Cut Off Frequency Shift" = -1 results in a very narrow-band filter
- Increasing the value up to 1 makes the filter more broad-band
- By "Cut Off Frequency Shift" = 0, the -3 dB point is at the frequency determined by the half of the selected "Sample Rate".

Tip: Use this parameter to adjust the cutoff frequency and reach spectrum mask requirements.

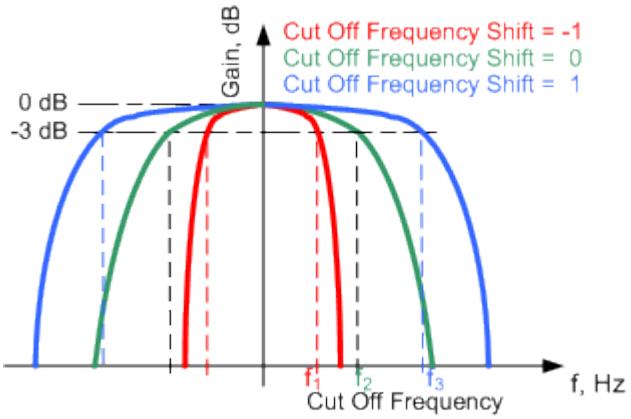


Figure 4-2: Example of the frequency response of a filter with different cutoff frequency shift

Remote command:
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:COSine:COFS on page 60

Cutoff Frequency Factor
Sets the value for the cutoff frequency factor. The cutoff frequency of the filter can be adjusted to reach spectrum mask requirements.

Remote command:
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:LPASs on page 61
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:LPASSEVM on page 61

Sample/Symbol Rate Variation
"Sample Rate Variation" requires "DVB Standard > DVB-H/T", "Symbol Rate Variation" requires "DVB Standard > DVB-S2/S2X".

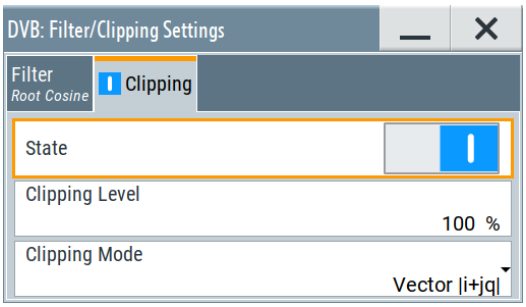
Sets the symbol/sample rate of the signal. A variation of the parameter affects the ARB clock rate; all other signal parameters remain unchanged.

Remote command:
[:SOURce<hw>]:BB:DVB:SRATe:VARiation on page 62

4.1.2 Clipping Settings

Access:

► Select "Clipping".



The dialog provides settings to configure clipping.

DVB signals can have a high crest factor (~ 11 dBm) because of high amplitude variations that come along with OFDM signals having a noise-like spectrum. High crest factors entail two basic problems:

- The nonlinearity of the power amplifier (compression) causes intermodulation which expands the spectrum (spectral regrowth).
- Since the level in the D/A converter is relative to the maximum value, the average value is converted with a relatively low resolution. A low resolution results in a high quantization noise.

Both effects increase the adjacent-channel power.

Since clipping the signal not only changes the peak value but also the average value, the effect on the crest factor is unpredictable.

The following pictures demonstrate the effect of clipping with vector mode (`|i+jq|`), using the default signal configuration with a PN23 input sequence.

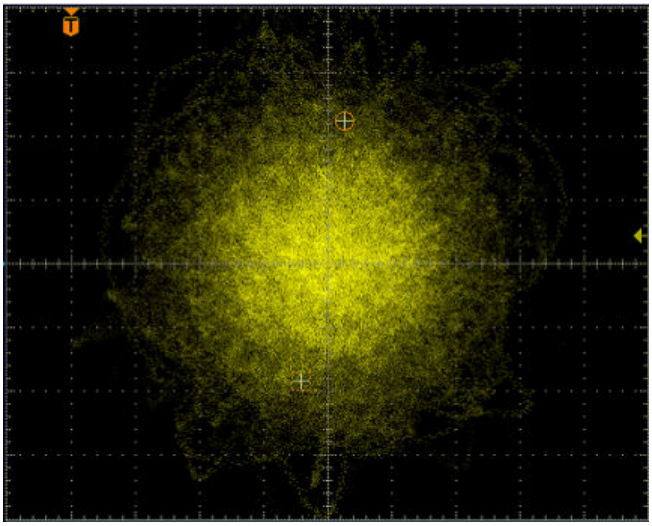


Figure 4-3: Constellation diagram of the signal without clipping, shows the level mapping

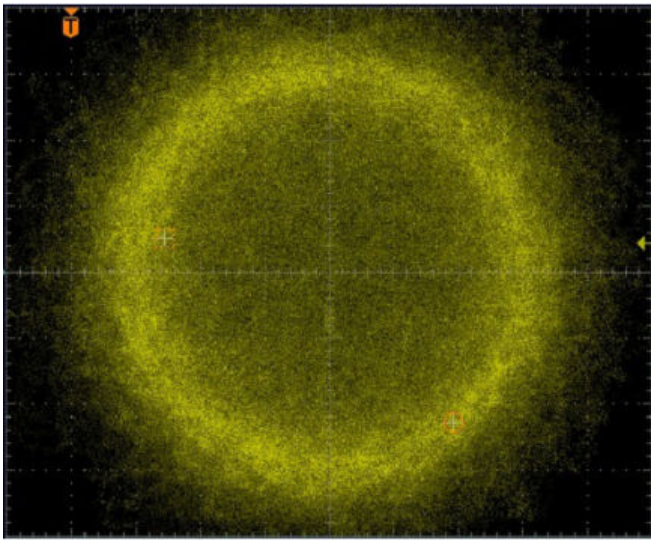


Figure 4-4: Constellation diagram with clipping level 10 %, clipping mode Vector |i+jq|)

Settings:

Clipping State
Switches baseband clipping on and off.

Baseband clipping is a simple and effective way of reducing the crest factor of the signal. Since clipping is done before to filtering, the procedure does not influence the spectrum. The EVM however increases.

Remote command:
`[:SOURce<hw>]:BB:DVB:CLIPping:STATe` on page 63

Clipping Level
Sets the limit for clipping.

This value indicates at what point the signal is clipped. It is specified as a percentage, relative to the highest level. 100% indicates that clipping does not take place.

Remote command:
`[:SOURce<hw>]:BB:DVB:CLIPping:LEVel` on page 62

Clipping Mode
Selects the clipping method. The dialog displays a graphical illustration on how this two methods work.

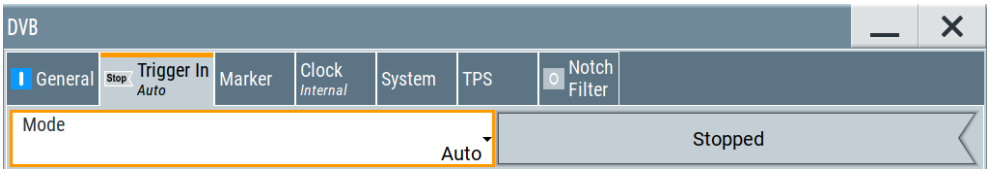
- "Vector | i + jq |"
  The limit is related to the amplitude | i + q |. The I and Q components are mapped together, the angle is retained.
- "Scalar | i | , | q |"
  The limit is related to the absolute maximum of all the I and Q values | i | + | q |. The I and Q components are mapped separately, the angle changes.

Remote command:
`[:SOURce<hw>]:BB:DVB:CLIPping:MODE` on page 63

4.2 Trigger Settings

Access:

► Select "Baseband > DVB > Trigger In".



The dialog provides settings to select and configure the trigger, like trigger source and trigger mode, and to arm or trigger an internal trigger manually. The current signal generation status is displayed in the header of the dialog together with information on the enabled trigger mode. As in the "Marker" and "Clock" dialogs, this dialog provides also access to the settings of the related connectors.

This section focuses on the available settings.

For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

Routing and enabling a trigger

The provided trigger signals are not dedicated to a particular connector. Trigger signals can be mapped to one or more USER x or T/M connectors.

Use the Local and Global Connector Settings to configure the signal mapping, the polarity, the trigger threshold and the input impedance of the input connectors.

To route and enable a trigger signal, perform the following *general steps*:

- Define the signal source and the effect of a trigger event.
  Select the "Trigger In > Mode" and "Trigger In > Source".
- Define the connector where the selected signal is provided.
  Use the "Global Connectors" settings.

Settings:

Trigger Settings Common to All Basebands

To enable simultaneous signal generation in all basebands, the R&S SMW couples the trigger settings in the available basebands in any instrument's configuration involving signal routing with signal addition. For example, in MIMO configuration, routing and summing of basebands or of streams.

The icon indicates that common trigger settings are applied.

You can access and configure the common trigger source and trigger mode settings in any of the basebands. An arm or a restart trigger event applies to all basebands, too. You can still apply different delay to each of the triggers individually.

Trigger Mode

Selects trigger mode, i.e. determines the effect of a trigger event on the signal generation.

For more information, refer to chapter "Basics" in the R&S SMW user manual.

- "Auto"
  The signal is generated continuously.
- "Retrigger"
  The signal is generated continuously. A trigger event (internal or external) causes a restart.
- "Armed Auto"
  The signal is generated only when a trigger event occurs. Then the signal is generated continuously.

An "Arm" stops the signal generation. A subsequent trigger event (internal or external) causes a restart.

- "Armed Retrigger"
  The signal is generated only when a trigger event occurs. Then the signal is generated continuously. Every subsequent trigger event causes a restart.
  An "Arm" stops signal generation. A subsequent trigger event (internal or external) causes a restart.
- "Single"
  The signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified at "Signal Duration".
  Every subsequent trigger event (internal or external) causes a restart.

Remote command:
`[:SOURce<hw>]:BB:DVB[:TRIGger]:SEQuence` on page 67

Signal Duration Unit
Defines the unit for describing the length of the signal sequence to be output in the "Single" trigger mode.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger:SLUNit` on page 66

Signal Duration
Enters the length of the signal sequence to be output in the "Single" trigger mode.

Use this parameter to output part of the signal deliberately, an exact sequence of the signal, or a defined number of repetitions of the signal.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger:SLENgth` on page 66

Running/Stopped
With enabled modulation, displays the status of signal generation for all trigger modes.

- "Running"
  The signal is generated; a trigger was (internally or externally) initiated in triggered mode.
- "Stopped"
  The signal is not generated and the instrument waits for a trigger event.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger:RMODe?` on page 65

Arm
Stops the signal generation until subsequent trigger event occurs.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger:ARM:EXECute` on page 64

Execute Trigger
For internal trigger source, executes trigger manually.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger:EXECute` on page 64

Trigger Source
The following sources of the trigger signal are available:

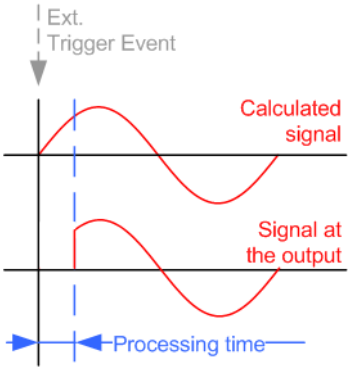
- "Internal"
  The trigger event is executed manually by the "Execute Trigger".
- "Internal (Baseband A/B)"
  The trigger event is provided by the trigger signal from the other basebands.
  If common trigger settings are applied, this trigger source is disabled.
- "External Global Trigger"
  The trigger event is the active edge of an external trigger signal provided and configured at the USER x connectors.
- "External Local Trigger"
  The trigger event is the active edge of an external trigger signal provided and configured at the local T/M/C connector.
  With coupled trigger settings, the signal has to be provided at the T/M/C1/2/3 connectors.
- "External Local Clock"
  The trigger event is the active edge of an external local clock signal provided and configured at the local T/M/C connector.
  With coupled trigger settings, the signal has to be provided at the T/M/C1 connector.
- "Baseband Sync In"
  Option: R&S SMW-B9
  In master-slave mode, slave instruments are triggered by the active edge of the synchronization signal.

"External Local Clock/Trigger" require R&S SMW-B10.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger:SOURce` on page 66

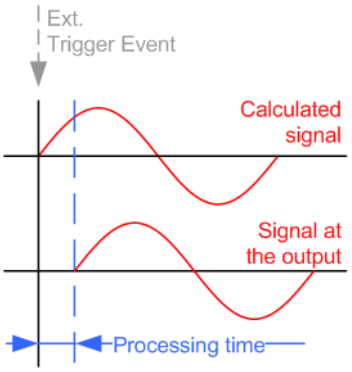
Sync. Output to External Trigger/Sync. Output to Trigger
Enables signal output synchronous to the trigger event.

- "On"
  Corresponds to the default state of this parameter.
  The signal calculation starts simultaneously with the trigger event. Because of the processing time of the instrument, the first samples are cut off and no signal is output. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.



- "Off"

The signal output begins after elapsing of the processing time. Signal output starts with sample 0. The complete signal is output.
This mode is recommended for triggering of short signal sequences. Short sequences are sequences with signal duration comparable with the processing time of the instrument.



In master-slave mode, this setting ensures that once achieved, synchronization is not lost if the baseband signal sampling rate changes.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger:EXTernal:SYNChronize:OUTPut` on page 64

External / Trigger Inhibit
Applies for external trigger signal or trigger signal from the other path.

Sets the duration with that any following trigger event is suppressed. In "Retrigger" mode, for example, a new trigger event does not cause a restart of the signal generation until the specified inhibit duration does not expire.

For more information, see chapter "Basics" in the R&S SMW user manual.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger[:EXTernal]:INHibit` on page 67
`[:SOURce<hw>]:BB:DVB:TRIGger:OBASeband:INHibit` on page 65

External / Trigger Delay
Delays the trigger event of the signal from:
- The external trigger source
- The other path
- The other basebands (internal trigger), if common trigger settings are used.

Use this setting to:
- Synchronize the instrument with the device under test (DUT) or other external devices
- Postpone the signal generation start in the basebands compared to each other
- Compensate delays and align the signal generation start in multi-instrument setup

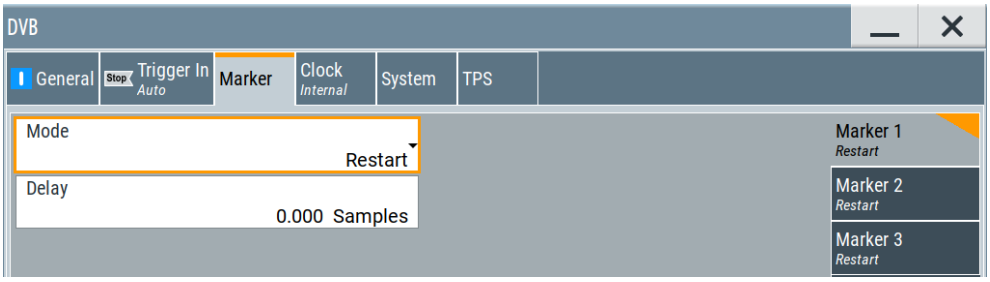
For more information, see chapter "Basics on ..." in the R&S SMW user manual.

Remote command:
`[:SOURce<hw>]:BB:DVB:TRIGger[:EXTernal]:DELay` on page 67
`[:SOURce<hw>]:BB:DVB:TRIGger:OBASeband:DELay` on page 65

4.3 Marker Settings

This dialog provides access to the settings necessary to select and configure the marker output signal, like the marker mode or marker delay settings.

► To access this dialog, select "Baseband > DVB > Marker".



The dialog provides settings to select and configure the marker output signal, like marker mode and the marker delay.

This section focuses on the available settings.

For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

Routing and enabling a marker

The provided marker signals are not dedicated to a particular connector. They can be mapped to one or more USER x or T/M connectors.

To route and enable a marker signal, perform the following *general steps*:

- Define the shape of the generated marker, i.e. select the "Marker > Mode".
- Define the connector where the selected signal is provided.
  Use the Local and Global Connector Settings.

Settings:

Marker Mode

Marker configuration for up to 3 markers. The settings are used to select the marker mode defining the shape and periodicity of the markers. The contents of the dialog change with the selected marker mode.

"Restart" A marker signal is generated at the start of every sequence length loop.

"Super Frame Start" A marker signal is generated at the start of every super-frame period.

"Frame Start" A marker signal is generated at the start of each frame.

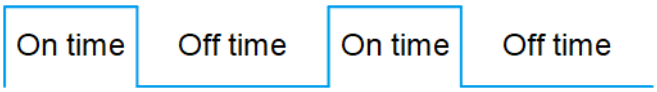
"Pulse" A regular marker signal is generated. The pulse frequency is derived by dividing the sample rate by the selected divider.

Remote command:
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:PULSe:DIVider on page 69
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:PULSe:FREQuency?
on page 70

"Pattern" A marker signal that is defined by a bit pattern is generated.

Remote command:
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:PATTern on page 69

"On/Off Ratio"
A regular marker signal that is defined by an on/off ratio is generated. A period lasts one on-cycle and one off-cycle.



Remote command:
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:ONTime on page 69
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:OFFTime on page 69

Remote command:
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:MODE on page 68

Marker x Delay
Delays the marker signal at the marker output relative to the signal generation start.

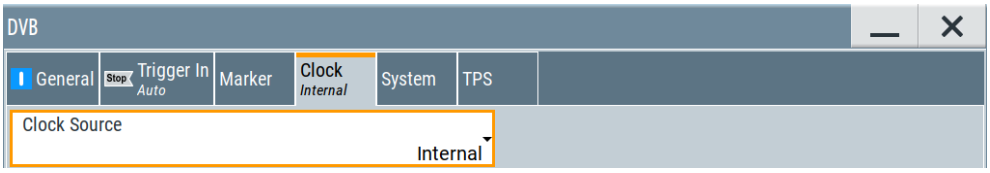
Variation of the parameter "Marker x Delay" causes signal recalculation.

Remote command:
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:DELay on page 70

4.4 Clock Settings

Access:

► Select "Baseband > DVB > Clock".



The dialog provides settings to select and configure the clock signal, like the clock source and clock mode.

This section focuses on the available settings.

For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

Defining the clock

The provided clock signals are not dedicated to a particular connector. They can be mapped to one or more USER x and T/M/C connectors.

Use the Local and Global Connector Settings to configure the signal mapping, the polarity, the trigger threshold, and the input impedance of the input connectors.

To route and enable a trigger signal, perform the following *general steps*:

- Define the signal source, that is select the "Clock > Source".
- Define the connector where the selected signal is provided.
  Use the Local and Global Connector Settings.

Settings:

Clock Source

Selects the clock source.

- "Internal"
  The instrument uses its internal clock reference.
- "External Local Clock"
  Option: R&S SMW-B10
  The instrument expects an external clock reference at the local T/M/C connector.

"External Local Clock" requires R&S SMW-B10.

Remote command:

`[:SOURce<hw>]:BB:DVB:CLOCk:SOURce` on page 71

Clock Mode

Option: R&S SMW-B10

Sets the type of externally supplied clock.

Remote command:

`[:SOURce<hw>]:BB:DVB:CLOCk:MODE` on page 70

Measured External Clock

Provided for permanent monitoring of the enabled and externally supplied clock signal.

Remote command:

`CLOCk:INPut:FREQuency?`

4.5 Local and Global Connector Settings

Each of the "Trigger In", "Marker" and "Clock" dialogs and the "Trigger Marker Clock" dialog provides a quick access to the related connector settings.

See also chapter "Local and Global Connector Settings" in the user manual.

5 Remote-control Commands

The following commands are required to perform signal generation with the DVB options in a remote environment. We assume that the R&S SMW has already been set up for remote operation in a network as described in the R&S SMW documentation. A knowledge about the remote control operation and the SCPI command syntax is assumed.

Conventions used in SCPI command descriptions

For a description of the conventions used in the remote command descriptions, see section "Remote Control Commands" in the R&S SMW user manual.

Common suffixes

The following common suffixes are used in remote commands:

Suffix	Value range	Description
`ENTity<ch>`	1 to 4	Entity in a multiple entity configuration with separate baseband sources `ENTity3|4` require option R&S SMW-K76
`:SOURce<hw>`	[1] to 4	Available baseband signals Only `:SOURce1` possible, if the keyword `ENTity` is used.
`OUTPut<ch>`	1 to 3	Available markers
`SET<st>`	1 to 100	MODCOD set

Using SCPI command aliases for advanced mode with multiple entities

You can address multiple entities configurations by using the SCPI commands starting with the keyword `:SOURce` or the alias commands starting with the keyword `ENTity`.

Note that the meaning of the keyword `:SOURce<hw>` changes in the second case.

For details, see section "SCPI Command Aliases for Advanced Mode with Multiple Entities" in the R&S SMW user manual.

Programming examples

This description provides simple programming examples. The purpose of the examples is to present **all** commands for a given task. In real applications, one would rather reduce the examples to an appropriate subset of commands.

The programming examples have been tested with a software tool which provides an environment for the development and execution of remote tests. To keep the example as simple as possible, only the "clean" SCPI syntax elements are reported. Non-executable command lines (e.g. comments) start with two // characters.

At the beginning of the most remote control program, an instrument preset or reset is recommended to set the instrument to a definite state. The commands `*RST` and

SYSTem:PRESet are equivalent for this purpose. *CLS also resets the status registers and clears the output buffer.

The following commands specific to the DVB are described here:

5.1 Common Commands

Example: Saving and recalling settings

```
:SOURce1:BB:DVB:STANdard DVBH
:SOURce1:BB:DVB:DVBH:HMODe?
// Response: "NHI"
// Non-hierarchical coding mode
:SOURce1:BB:DVB:DVBH:SFRames 10
:SOURce1:BB:DVB:DVBH:STATe 1
:SOURce1:BB:DVB:WAVeform:CREate "/var/user/dvbh.wv"
:SOURce1:BB:DVB:DVBH:SAMPle:LENGth?
// 6266880
:SOURce1:BB:DVB:DVBH:SAMPle:DURation?
// 0.68544
:SOURce1:BB:DVB:DVBH:SAMPle:RATE?
// 9142857.14285714
:SOURce1:BB:DVB:DVBH:SAMPle:DRATe?
// 16.5882352941176

:SOURce1:BB:DVB:SETTing:STORe "/var/user/dvbh"
:SOURce1:BB:DVB:PRESet
:SOURce1:BB:DVB:SETTing:CATalog?
// dvbh,dvbt,dvb_h
:SOURce1:BB:DVB:SETTing:DELete "dvb_h"
:SOURce1:BB:DVB:SETTing:LOAD "/var/user/dvbt"
```

[:SOURce<hw>]:BB:DVB:STATe <State>

Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 0

Example: See Example "Saving and recalling settings" on page 55.

Manual operation: See "State" on page 14

[:SOURce<hw>]:BB:DVB:PRESet

Sets the parameters of the digital standard to their default values (`*RST` values specified for the commands).

Not affected is the state set with the command `SOURce<hw>:BB:DVB:STATe`.

Example: See Example "Saving and recalling settings" on page 55.

Usage: Event

Manual operation: See "Set to Default" on page 14

[:SOURce<hw>]:BB:DVB:SETTing:CATalog?

Queries the files with settings in the default directory. Listed are files with the file extension `*.dvb`.

Return values:

<Catalog> <filename1>,<filename2>,...

Returns a string of filenames separated by commas.

Example: See Example "Saving and recalling settings" on page 55.

Usage: Query only

Manual operation: See "Save/Recall" on page 15

[:SOURce<hw>]:BB:DVB:SETTing:DELete <Filename>

Deletes the selected file from the default or specified directory. Deleted are files with the file extension `*.dvb`.

Setting parameters:

<Filename> string

Filename or complete file path; file extension can be omitted

Example: See Example "Saving and recalling settings" on page 55.

Usage: Setting only

Manual operation: See "Save/Recall" on page 15

[:SOURce<hw>]:BB:DVB:SETTing:LOAD <Filename>

Loads the selected file from the default or the specified directory. Loaded are files with extension `*.dvb`.

Setting parameters:

<Filename> string

Filename or complete file path; file extension can be omitted

Example: See Example "Saving and recalling settings" on page 55.

Usage: Setting only

Manual operation: See "Save/Recall" on page 15

[:SOURce<hw>]:BB:DVB:SETTing:STORe <Filename>

Saves the current settings into the selected file; the file extension (`*.dvb`) is assigned automatically.

Setting parameters:

<Filename> string

Filename or complete file path

Example: See Example "Saving and recalling settings" on page 55.

Usage: Setting only

Manual operation: See "Save/Recall" on page 15

[:SOURce<hw>]:BB:DVB:WAVeform:CREate <Filename>

Saves the current settings as an ARB signal in a waveform file (`*.wv`).

Setting parameters:

<Filename> string

Filename or complete file path; file extension is assigned automatically

Example: See Example "Saving and recalling settings" on page 55.

Usage: Setting only

Manual operation: See "Generate Waveform File" on page 15

[:SOURce<hw>]:BB:DVB:STANdard <Standard>

Selects the DVB standard to be used.

Parameters:

<Standard> DVBH | DVBT | DVBS | DVBX

*RST: DVBH

Example: See Example "Saving and recalling settings" on page 55.

Options: DVBS|DVBX require option R&S SMW-K116

Manual operation: See "DVB Standard" on page 15

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:SFRames <SFrames>

Sets the number of super-frames to be transmitted.

Parameters:

<SFrames> integer

Range: 1 to 1633 (dynamic)
*RST: 1

Example: See Example "Saving and recalling settings" on page 55.

Manual operation: See "Number of Super Frames" on page 16

[:SOURce<hw>]:BB:DVB:DVBX:VSMode <VSMode>

Includes the VL-SNR (very low - signal to noise ratio) header in the physical layer frame.

Parameters:

<VSMode> 0 | 1 | OFF | ON

*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Options: R&S SMW-K116

Manual operation: See "VL-SNR Mode" on page 15

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:FRAMes <Frames>

Sets the number of the transmitted frames.

Parameters:
<Frames> integer
Range: 1 to UINT_MAX
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Options: R&S SMW-K116

Manual operation: See "Number of Frames" on page 16

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:SAMPle:LENGth?

Queries the number of the transmitted samples.

Return values:
<Length> integer

Example: See Example "Saving and recalling settings" on page 55.

Usage: Query only

Manual operation: See "Number of Samples / Duration" on page 16

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:DURation?

Queries the signal duration.

Return values:
<Duration> float

Example: See Example "Saving and recalling settings" on page 55.

Usage: Query only

Manual operation: See "Number of Samples / Duration" on page 16

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:SAMPle:RATE?

Queries the sample rate.

Return values:
<Rate> float

Example: See Example "Saving and recalling settings" on page 55.

Usage: Query only

Manual operation: See "Sample Rate / Data Rate" on page 16

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:DRATe?

Queries the data rate.

Return values:

<DRate> float
Increment: 0.01

Example: See Example "Saving and recalling settings" on page 55.

Usage: Query only

Manual operation: See "Sample Rate / Data Rate" on page 16

5.2 Filter Commands

[:SOURce<hw>]:BB:DVB:FILTer:TYPE <Type>

Selects the filter type.

Parameters:

<Type> RCOSine | COSine | GAUSs | LGAuss | CONE | COF705 | COEQualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPShape | LPASSEVM

*RST: COSine

Example:

```
:SOURce1:BB:DVB:STANdard DVBT
:SOURce1:BB:DVB:FILTer:TYPE COSine
:SOURce1:BB:DVB:FILTer:PARameter:COSine 0.1
:SOURce1:BB:DVB:FILTer:PARameter:COSF -0.1
:SOURce1:BB:DVB:SRATe:VARiation?
// Response: 9142857.14285714
```

Manual operation: See "Filter" on page 41

[:SOURce<hw>]:BB:DVB:FILTer:PARameter:APCO25 <Apco25>
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:COSine <Cosine>
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:COSine:COFS <Cofs>

[:SOURce<hw>]:BB:DVB:FILTer:PARameter:GAUSs <Gauss>
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:LPASs <LPass>
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:LPASSEVM <LPassEvm>
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:PGAuss <PGauss>
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:RCOSine <RCosine>
[:SOURce<hw>]:BB:DVB:FILTer:PARameter:SPHase <SPhase>

Sets the filter parameter.

Filter Type	Parameter	Parameter name	Min	Max	Increment	Default
APCO25	Rolloff factor	<Apco25>	0.05	0.99	0.01	0.2
COSine	Cutoff frequency shift	<Cosf>	-1	1	0.01	-0.1
COSine	Rolloff factor	<Cosine>	0	1	0.01	0.1
GAUSs	BxT	<Gauss>	0.15	2.5	0.01	0.5
LPASs	Cutoff frequency factor	<LPass>	0.05	2	0.01	0.5
LPASSEVM	Cutoff frequency factor	<LPassEvm>	0.05	2	0.01	0.5
PGAuss	BxT	<PGauss>	0.15	2.5	0.01	0.5
RCOSine	Rolloff factor	<RCosine>	0	1	0.01	0.22
SPHase	BxT	<SPhase>	0.15	2.5	0.01	2

Parameters:
<SPhase> float
Range: 0.15 to 2.5
Increment: 0.01
*RST: 2

Example: See [:SOURce<hw>]:BB:DVB:FILTer:TYPE on page 60

Manual operation: See "Rolloff Factor or BxT" on page 41

[:SOURce<hw>]:BB:DVB:FILTer:RORange <RORange>

Sets whether the high or the low filter roll-off range is used.

Parameters:
<RORange> HIGH | LOW
*RST: HIGH

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Options: R&S SMW-K116

Manual operation: See "Rolloff Range" on page 41

[:SOURce<hw>]:BB:DVB:FILTer:ROFactor <ROff>

Sets the filter parameter.

Parameters:

<ROff> RO35 | RO25 | RO20 | RO15 | RO10 | RO05

*RST: RO20

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Options: R&S SMW-K116

Manual operation: See "Rolloff Factor or BxT" on page 41

[:SOURce<hw>]:BB:DVB:SRATe:VARiation <Variation>

Sets the output sample/symbol rate.

Parameters:

<Variation> float

Range: 400 to 40E6
Increment: 0.001
*RST: 9142857.14

Example: See `[:SOURce<hw>]:BB:DVB:FILTer:TYPE` on page 60

Manual operation: See "Sample/Symbol Rate Variation" on page 42

5.3 Clipping Commands

[:SOURce<hw>]:BB:DVB:CLIPping:LEVel <Level>

Sets the limit for level clipping. This value indicates at what point the signal is clipped.

Parameters:

<Level> integer

Value specified as a percentage, relative to the highest level. 100 PCT indicates that clipping does not take place.

Range: 1 to 100
*RST: 100

Example:

```
:SOURce1:BB:DVB:CLIPping:LEVel 80
:SOURce1:BB:DVB:CLIPping:MODE SCAL
:SOURce1:BB:DVB:CLIPping:STATe 1
```

Manual operation: See "Clipping Level" on page 45

[:SOURce<hw>]:BB:DVB:CLIPping:MODE <Mode>

Sets the method for level clipping.

Parameters:

<Mode> VECTor | SCALar
*RST: VECTor

Example: See `[:SOURce<hw>]:BB:DVB:CLIPping:LEVel` on page 62

Manual operation: See "Clipping Mode" on page 45

[:SOURce<hw>]:BB:DVB:CLIPping:STATe <State>

Activates level clipping.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: 0

Example: See `[:SOURce<hw>]:BB:DVB:CLIPping:LEVel` on page 62

Manual operation: See "Clipping State" on page 44

5.4 Trigger Settings

Example: Trigger configuration

```
:SOURce1:BB:DVB:TRIGger::SOURce INTernal
:SOURce1:BB:DVB:TRIGger:SEQuence ARETrigger
:SOURce1:BB:DVB:STAT ON
:SOURce1:BB:DVB:TRIGger:EXECute
:SOURce1:BB:DVB:TRIGger:ARM:EXECute
:SOURce1:BB:DVB:TRIGger:RMODe?
// stopped
:SOURce1:BB:DVB:TRIGger:EXECute
:SOURce1:BB:DVB:TRIGger:RMODe?
// run

:SOURce1:BB:DVB:TRIGger:SEQuence SING
:SOURce1:BB:DVB:TRIGger:SLUNit SEQ
:SOURce1:BB:DVB:TRIGger:SLENgth 2


:SOURce1:BB:DVB:TRIGger::SOURce EGT1
:SOURce1:BB:DVB:TRIGger:EXTernal:SYNChronize:OUTPut 1
:SOURce1:BB:DVB:TRIGger:EXTernal:INHibit 100
:SOURce1:BB:DVB:TRIGger:EXTernal:DELay 10
```

```
:SOURce1:BB:DVB:TRIGger:SOURce INTB
:SOURce1:BB:DVB:TRIGger:OBASeband:DELay 100
:SOURce1:BB:DVB:TRIGger:OBASeband:INHibit 10
```

[:SOURce<hw>]:BB:DVB:TRIGger:ARM:EXECute

Stops signal generation; a subsequent trigger event restarts signal generation.

Example: See Example "Trigger configuration" on page 63

Usage: Event

Manual operation: See "Arm" on page 47

[:SOURce<hw>]:BB:DVB:TRIGger:EXECute

Executes a trigger.

Example: See Example "Trigger configuration" on page 63

Usage: Event

Manual operation: See "Execute Trigger" on page 47

[:SOURce<hw>]:BB:DVB:TRIGger:EXTernal:SYNChronize:OUTPut <Output>

Enables signal output synchronous to the trigger event.

Parameters:

<Output> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Trigger configuration" on page 63

Manual operation: See "Sync. Output to External Trigger/Sync. Output to Trigger" on page 48

[:SOURce<hw>]:BB:DVB:TRIGger:OBASeband:DELay <Delay>

Specifies the trigger delay for triggering by the trigger signal from the other path.

Parameters:

<Delay> float

Range: 0 to 2147483647
Increment: 0.01
*RST: 0

Example: See Example "Trigger configuration" on page 63

Manual operation: See "External / Trigger Delay" on page 49

[:SOURce<hw>]:BB:DVB:TRIGger:OBASeband:DELay <Delay>

Sets the trigger delay for triggering by the trigger signal from the second path.

Parameters:

<Delay> float

Range: 0 to 65535
Increment: 0.01
*RST: 0
Default unit: samples

Example: See Example "Trigger configuration" on page 63

[:SOURce<hw>]:BB:DVB:TRIGger:OBASeband:INHibit <Inhibit>

For triggering via the other path, specifies the duration by which a restart is inhibited.

Parameters:

<Inhibit> integer

Range: 0 to 67108863
*RST: 0
Default unit: samples

Example: See Example "Trigger configuration" on page 63

Manual operation: See "External / Trigger Inhibit" on page 49

[:SOURce<hw>]:BB:DVB:TRIGger:RMODe?

Queries the signal generation status.

Return values:

<RMode> STOP | RUN

Example: See Example "Trigger configuration" on page 63

Usage: Query only

Manual operation: See "Running/Stopped" on page 47

[:SOURce<hw>]:BB:DVB:TRIGger:SLUNit <SLunit>

Defines the unit for the entry of the signal sequence length.

Parameters:

<SLunit> FRAMe | SEQuence
*RST: SEQuence

Example: See Example "Trigger configuration" on page 63

Manual operation: See "Signal Duration Unit" on page 47

[:SOURce<hw>]:BB:DVB:TRIGger:SLENgth <SLength>

Defines the length of the signal sequence that is output in the `SINGle` trigger mode.

Parameters:

<SLength> integer
Range: 1 to 7000
*RST: 4

Example: See Example "Trigger configuration" on page 63

Manual operation: See "Signal Duration" on page 47

[:SOURce<hw>]:BB:DVB:TRIGger:SOURce <Source>

Selects the trigger signal source and determines the way the triggering is executed. Provided are:

- Internal triggering by a command (`INTernal`)
- External trigger signal via one of the local or global connectors
  - `EGT1|EGT2`: External global trigger
  - `EGC1|EGC2`: External global clock
  - `ELTRigger`: External local trigger
  - `ELCLock`: External local clock
- Internal triggering by a signal from the other basebands (`INTA|INTB`)
- In master-slave mode, the external baseband synchronization signal (`BBSY`)
- `OBASeband|BEXTernal|EXTernal`: Setting only
  Provided only for backward compatibility with other Rohde & Schwarz signal generators.
  The R&S SMW accepts these values and maps them automatically as follows:
  `EXTernal = EGT1`, `BEXTernal = EGT2`, `OBASeband = INTA or INTB`
  (depending on the current baseband)

Parameters:

<Source> INTB|INTernal|OBASeband|EGT1|EGT2|EGC1|EGC2|ELTRigger|INTA|ELCLock|BEXTernal|EXTernal | BBSY
*RST: INTernal

Example: See Example "Trigger configuration" on page 63.

Options: ELTRigger|ELCLock require R&S SMW-B10
BBSY require R&S SMW-B9

Manual operation: See "Trigger Source" on page 48

[:SOURce<hw>]:BB:DVB:TRIGger[:EXTernal]:DELay <Delay>

Sets the trigger delay.

Parameters:

<Delay> float

Range: 0 to 2147483647
Increment: 0.01
*RST: 0
Default unit: samples

Example: See Example "Trigger configuration" on page 63

Manual operation: See "External / Trigger Delay" on page 49

[:SOURce<hw>]:BB:DVB:TRIGger[:EXTernal]:INHibit <Inhibit>

Specifies the duration by which a restart is inhibited.

Parameters:

<Inhibit> integer

Range: 0 to 21.47*sampRate
*RST: 0

Example: See Example "Trigger configuration" on page 63

Manual operation: See "External / Trigger Inhibit" on page 49

[:SOURce<hw>]:BB:DVB[:TRIGger]:SEQuence <Sequence>

Selects the trigger mode:

- `AUTO` = auto
- `RETRigger` = retrigger
- `AAUTo` = armed auto
- `ARETrigger` = armed retrigger
- `SINGle` = single

Parameters:

<Sequence> AUTO | RETRigger | AAUTo | ARETrigger | SINGle

*RST: AUTO

Example: See Example "Trigger configuration" on page 63

Manual operation: See "Trigger Mode" on page 46

5.5 Marker Settings

Example: Marker configuration

```
:SOURce1:BB:DVB:TRIGger:OUTPut1:MODE PULS
// Sets a pulse marker.
:SOURce1:BB:DVB:TRIGger:OUTPut1:PULSe:DIVider 2
:SOURce1:BB:DVB:TRIGger:OUTPut1:PULSe:FREQuency?

:SOURce1:BB:DVB:TRIGger:OUTPut1:MODE PATTern
// Sets a bit pattern marker.
:SOURce1:BB:DVB:TRIGger:OUTPut1:PATTern #H2,2

:SOURce1:BB:DVB:TRIGger:OUTPut1:MODE RAT
:SOURce1:BB:DVB:TRIGger:OUTPut1:ONTime 10
:SOURce1:BB:DVB:TRIGger:OUTPut1:OFFTime 10


:SOURce1:BB:DVB:TRIGger:OUTPut2:DELay 1600
// delays the marker signal output
```

[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:MODE <Mode>

Defines the signal for the selected marker output.

Parameters:

<Mode> RESTart | SFRame | SFRAMe | FRAMe | PULSe | PATTern | RATio

RESTart
Marks the start of every sequence length loop. Restart mode is available only for ETI data source.

SFRame
Marks the start of every super-frame period.

FRAMe
Marks the start of every frame.

PULSe
Generated continuously according to the frequency and frequency divider.

PATTern
A marker signal according to a bit pattern

RATio
A regular marker signal that is defined by an on/off ratio
*RST: RESTart

Example: See Example "Marker configuration" on page 68

Manual operation: See "Marker Mode" on page 50

[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:ONTime <Ontime>
[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:OFFTime <OffTime>

Sets the number of samples during which the marker output is on or off.

*) If R&S SMW-B9 is installed, the minimum marker duration depends on the sample/ symbol rate.

See chapter "Basics on ..." in the R&S SMW user manual.

Parameters:
<OffTime> integer
Range: 1 (R&S SMW-B10) / 1* (R&S SMW-B9) to 16777215
*RST: 1

Example: See Example "Marker configuration" on page 68

Manual operation: See "Marker Mode" on page 50

[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:PATTern <Pattern>, <BitCount>

Defines the bit pattern used to generate the marker signal.

Parameters:
<Pattern> numeric
0 = marker off, 1 = marker on
*RST: #H2

<BitCount> integer
Range: 1 to 64
*RST: 2

Example: See Example "Marker configuration" on page 68

Manual operation: See "Marker Mode" on page 50

[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:PULSe:DIVider <Divider>

Sets the divider for pulse marker mode (`PULSe`).

*) If R&S SMW-B9 is installed, the minimum marker duration depends on the sample/ symbol rate.

See chapter "Basics on ..." in the R&S SMW user manual.

Parameters:

<Divider> integer

Range: 2 (R&S SMW-B10) / 2* (R&S SMW-B9) to 1024
*RST: 2

Example: See Example "Marker configuration" on page 68

Manual operation: See "Marker Mode" on page 50

[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:PULSe:FREQuency?

Queries the pulse frequency of the pulsed marker signal `PULSe`.

Return values:

<Frequency> float

Example: See Example "Marker configuration" on page 68

Usage: Query only

Manual operation: See "Marker Mode" on page 50

[:SOURce<hw>]:BB:DVB:TRIGger:OUTPut<ch>:DELay <Delay>

Defines the delay between the signal on the marker outputs and the start of the signals.

Parameters:

<Delay> float

Range: 0 to 16777215
Increment: 0.001
*RST: 0

Example: See Example "Marker configuration" on page 68

Manual operation: See "Marker x Delay" on page 51

5.6 Clock Settings

[:SOURce<hw>]:BB:DVB:CLOCk:MODE <Mode>

Sets the type of externally supplied clock.

Parameters:

<Mode> SAMP

*RST: SAMP

Example:

```
:SOURce1:BB:DVB:CLOCk:SOURce ELCL
:SOURce1:BB:DVB:CLOCk:MODE SAMP
```

Options: R&S SMW-B10

Manual operation: See "Clock Mode" on page 52

[:SOURce<hw>]:BB:DVB:CLOCk:SOURce <Source>

Selects the clock source:

- `INTernal`: Internal clock reference
- `ELCLock`: External local clock
- `EXTernal = ELCLock`: Setting only
  Provided for backward compatibility with other Rohde & Schwarz signal generators

Parameters:

<Source> INTernal|ELCLock|EXTernal

*RST: INTernal

Example: `:SOURce1:BB:DVB:CLOCk:SOURce INTernal`

Options: ELCLock requires R&S SMW-B10

Manual operation: See "Clock Source" on page 52

5.7 DVB-T/DVB-H System Commands

Example: Example of a DVB-H configuration

```
:SOURce1:BB:DVB:STANdard DVBH
:SOURce1:BB:DVB:DVBH:HMODe?
// Response: "NHI"
// Non-hierachical coding mode
:SOURce1:BB:DVB:DVBH:SFRames 10

:SOURce1:BB:DVB:DVBH:HP:DATA?
// Response "DLIS"
:SOURce1:BB:DVB:DVBH:HP:DATA:DSELection?
// Response: "/var/user/dvbh.gts"
:SOURce1:BB:DVB:DVBH:HP:DATA PN23

:SOURce1:BB:DVB:DVBH:HP:PNSCrambler:STATe 1
:SOURce1:BB:DVB:DVBH:HP:OCODer:STATe 1
:SOURce1:BB:DVB:DVBH:HP:OINTerleaver:STATe 1
:SOURce1:BB:DVB:DVBH:HP:ICODer:STATe 1
:SOURce1:BB:DVB:DVBH:HP:ICODer:RATE CR7D8

:SOURce1:BB:DVB:DVBH:IINTerleaver:BIT:STATe 1
:SOURce1:BB:DVB:DVBH:IINTerleaver:SYMBol:STATe 1
:SOURce1:BB:DVB:DVBH:IINTerleaver:SYMBol:MODE IDEP
:SOURce1:BB:DVB:DVBH:IINTerleaver:SYMBol:TMODe T8K
```

```
:SOURce1:BB:DVB:DVBH:OFDM:BWIDth 8
:SOURce1:BB:DVB:DVBH:OFDM:MODulation QAM64
:SOURce1:BB:DVB:DVBH:OFDM:ALPHa 4
:SOURce1:BB:DVB:DVBH:OFDM:GINTerval GI1D32

:SOURce1:BB:DVB:STATe 1
```

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:HMODe <HMode>

Queries the mode for hierarchical coding, that is non-hierachical coding.

The current firmware does not support hierarchical coding.

Parameters:

<HMode> NHIerarchical

Non-hierchical coding using high priority input only.

*RST: NHIerarchical

Example: See Example "Example of a DVB-H configuration" on page 71.

Manual operation: See " Hierarchy Mode" on page 15

[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:DATA <Data>

Selects the data source to be used.

Parameters:

<Data> PAC0 | PAC1 | PN15 | PN23 | DLISt

ZERO
Internal 0 is used.

ONE
Internal 1 is used.

PN15/23
Internally generated PRBS data as per CCITT with period lengths between (2^9-1 and 2^{23}-1).

DLISt
Internal data from a TS file is used.

*RST: PN23

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " HP Source, Select File" on page 17

[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:DATA:DSELection <DSelection>

Selects an existing TS file from the default directory or from the specific directory.

TS files are files with extension `*.gts`, `*.ts`, or `*.trp`.

Parameters:
<DSelection> string
Filename incl. file extension or complete file path

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " HP Source, Select File" on page 17

[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:ICODer:RATE <Rate>

Selects the code rate of the inner coder.

Parameters:
<Rate> CR1D2 | CR2D3 | CR3D4 | CR5D6 | CR7D8
*RST: CR1D2

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Rate" on page 18

[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:ICODer[:STATe] <State>

Activates/deactivates the inner coder.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Inner Coder" on page 18

[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:OCODer[:STATe] <State>

Activates/deactivates the outer coder (RS).

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Outer Coder (RS)" on page 18

[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:OINTerleaver[:STATe] <State>

Activates/deactivates the outer interleaver.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Outer Interleaver" on page 18

[:SOURce<hw>]:BB:DVB:DVBH|DVBT[:HP|LP]:PNSCrambler[:STATe] <State>

Activates/deactivates the PN scrambler.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " PN Scrambler" on page 18

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:BIT[:STATe] <State>

Activates/deactivates the inner bit interleaver.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Inner Bit Interleaver" on page 18

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:SYMBol:MODE <Mode>

Selects the inner interleaver mode.

Parameters:
<Mode> NATive | NATIve | IDEPth

NATive
The interleaver interleaves the bits over one OFDMA symbol.

IDEPth
The interleaver interleaves the bits over two (4K transmission mode) or four (2K transmission mode) OFDMA symbols.

*RST: NATive

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Inner Interleaver Mode" on page 19

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:SYMBol:TMODe <TMode>

Selects the transmission mode.

Parameters:
<TMode> T2K | T4K | T8K
*RST: T2K

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Inner Interleaver Tx Mode" on page 19

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:IINTerleaver:SYMBol[:STATe] <State>

Activates/deactivates the inner symbol interleaver.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " Inner Symbol Interleaver" on page 18

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:ALPHa <Alpha>

Selects the α value. This value is used to shape the constellation of the modulation.

For DVB-H, this value is always 1.

Parameters:
<Alpha> 1 | 2 | 4
*RST: 1

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " OFDM/RF Alpha" on page 19

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:BWIDth <BWidth>

Selects the system bandwidth.

Parameters:
<BWidth> 5 | 6 | 7 | 8
*RST: 8 MHz

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " OFDM/RF Bandwidth" on page 19

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:GINTerval <GInterval>

Selects the OFDM/RF guard interval.

Parameters:
<GInterval> GI1D4 | GI1D8 | GI1D16 | GI1D32
*RST: GI1D8

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " OFDM/RF Guard Int." on page 19

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:OFDM:MODulation <Modulation>

Selects the constellation for the OFDM modulation.

Parameters:
<Modulation> QPSK | QAM16 | QAM64
*RST: QAM64

Example: See Example "Example of a DVB-H configuration" on page 71

Manual operation: See " OFDM/RF Modulation" on page 19

5.8 DVB-S2/DVB-S2X System Commands

Option: R&S SMW-K116

Example: Configuring the DVB-S2/DVB-S2X settings

CCM mode is assumed.

```
:SOURce1:BB:DVB:STANdard DVBX
:SOURce1:BB:DVB:DVBX:VSMode 0
:SOURce1:BB:DVB:DVBX:FRAMes 5
:SOURce1:BB:DVB:DVBX:BHConfig:CACM CCM

:SOURce1:BB:DVB:DVBX:STYPe TRAN
:SOURce1:BB:DVB:DVBX:DATA PN9
:SOURce1:BB:DVB:DVBX:ADLength:STATe 0
:SOURce1:BB:DVB:DVBX:DATA:LENGth 3000
:SOURce1:BB:DVB:DVBX:CRC:STATe 1
:SOURce1:BB:DVB:DVBX:BSCRambler:STATe 1
:SOURce1:BB:DVB:DVBX:OCODer:STATe 1
```

```
:SOURce1:BB:DVB:DVBX:ICODer:STATe 1
:SOURce1:BB:DVB:DVBX:BINTerleaver:STATe 1
:SOURce1:BB:DVB:DVBX:UCMode:STATe 0
:SOURce1:BB:DVB:DVBX:CTYPe NORM
:SOURce1:BB:DVB:DVBX:MODulation APSK64_16_16_16_16
:SOURce1:BB:DVB:DVBX:MCOD?
// APSK64_X_N3245L
:SOURce1:BB:DVB:DVBX:ICODer:RATE?
// CR128D180
:SOURce1:BB:DVB:DVBX:PSTate:STATe 1
:SOURce1:BB:DVB:DVBX:PSCRambler:STATe 1
:SOURce1:BB:DVB:DVBX:SSEQuence 3

:SOURce1:BB:DVB:DVBX:THConfig:TEINdication:STATe 1
:SOURce1:BB:DVB:DVBX:THConfig:SBYTe?
// #47,8
:SOURce1:BB:DVB:DVBX:THConfig:PUS 1
:SOURce1:BB:DVB:DVBX:THConfig:TPRiority 1
:SOURce1:BB:DVB:DVBX:THConfig:PID:PATTern #H0A00,13
:SOURce1:BB:DVB:DVBX:THConfig:SCONtrol 1
:SOURce1:BB:DVB:DVBX:THConfig:AFIeld:STATe 1
:SOURce1:BB:DVB:DVBX:THConfig:PAYLoad:STATe 1
:SOURce1:BB:DVB:DVBX:THConfig:CCOunter 1
:SOURce1:BB:DVB:DVBX:THConfig:STATe 1

:SOURce1:BB:DVB:DVBX:BHConfig:STATe 1
:SOURce1:BB:DVB:DVBX:BHConfig:IACTive:STATe 1
:SOURce1:BB:DVB:DVBX:BHConfig:NACTive:STATe 1
:SOURce1:BB:DVB:DVBX:BHConfig:UPL?
// 188
:SOURce1:BB:DVB:DVBX:BHConfig:ADFL:STATe 0
:SOURce1:BB:DVB:DVBX:BHConfig:DFL 464
:SOURce1:BB:DVB:DVBX:BHConfig:SYNC:PATTErn?
// #47,8

:SOURce1:BB:DVB:DVBX:VSMode 1
:SOURce1:BB:DVB:DVBX:STYPe GP
:SOURce1:BB:DVB:DVBX:STYPe GHEM

:SOURce1:BB:DVB:DVBX:GHConfig:LTYPe 1
:SOURce1:BB:DVB:DVBX:GHConfig:GLENgth 2048
:SOURce1:BB:DVB:DVBX:GHConfig:FID:PATTern #H01,8
:SOURce1:BB:DVB:DVBX:GHConfig:FIUSe:STATe 1
:SOURce1:BB:DVB:DVBX:GHConfig:TLUSe:STATe 1
:SOURce1:BB:DVB:DVBX:GHConfig:TLENgth?
// 3005
:SOURce1:BB:DVB:DVBX:GHConfig:PTYPe:PATTern #H0001,16
:SOURce1:BB:DVB:DVBX:GHConfig:PTUSe:STATe 1
:SOURce1:BB:DVB:DVBX:GHConfig:LABel:PATTern #H000011,24
:SOURce1:BB:DVB:DVBX:GHConfig:LUSE:STATe 1
:SOURce1:BB:DVB:DVBX:GHConfig:STATe 1
```

```
:SOURce1:BB:DVB:DVBX:BHConfig:GLACtive:STATe 1
:SOURce1:BB:DVB:DVBX:BHConfig:DFL 464
:SOURce1:BB:DVB:DVBX:CTYPe MED
:SOURce1:BB:DVB:DVBX:MCOD BPSK_X_VM1145

:SOURce1:BB:DVB:FILTer:RORange LOW
:SOURce1:BB:DVB:FILTer:ROFactor RO10
:SOURce1:BB:DVB:CLIPping:STATe 1

:SOURce1:BB:DVB:STATe 1
```

Example: Configuring DVB-S2X signal in ACM mode

```
:SOURce1:BB:DVB:PRESet
:SOURce1:BB:DVB:STANdard DVBX
:SOURce1:BB:DVB:DVBX:VSMode 0
:SOURce1:BB:DVB:DVBX:BHConfig:CACM ACM

:SOURce1:BB:DVB:DVBX:CRC:STATe 1
:SOURce1:BB:DVB:DVBX:NOSettings 3
:SOURce1:BB:DVB:DVBX:MTAB:SET1:FRAMes 1
:SOURce1:BB:DVB:DVBX:MTAB:SET1:CTYPe NORM
:SOURce1:BB:DVB:DVBX:MTAB:SET1:MCOD APSK64_X_N3245L
:SOURce1:BB:DVB:DVBX:MTAB:SET1:PCOD?
// 184
:SOURce1:BB:DVB:DVBX:MTAB:SET1:ADFL:STATe 1
:SOURce1:BB:DVB:DVBX:MTAB:SET1:DFL?
//5726
:SOURce1:BB:DVB:DVBX:MTAB:SET1:PSTate:STATe 1
:SOURce1:BB:DVB:DVBX:MTAB:SET2:FRAMes 3
:SOURce1:BB:DVB:DVBX:MTAB:SET2:CTYPe SHOR
:SOURce1:BB:DVB:DVBX:MTAB:SET2:MCOD APSK32_X_S3245
:SOURce1:BB:DVB:DVBX:MTAB:SET2:PCOD?
// 248
:SOURce1:BB:DVB:DVBX:MTAB:SET2:DFL?
// 1409
:SOURce1:BB:DVB:DVBX:MTAB:SET3:FRAMes 20
:SOURce1:BB:DVB:DVBX:MTAB:SET3:MCOD APSK8_X_N2645L
:SOURce1:BB:DVB:DVBX:MTAB:SET3:PCOD?
// 140
:SOURce1:BB:DVB:DVBX:MTAB:SET3:ADFL:STATe 0
:SOURce1:BB:DVB:DVBX:MTAB:SET3:DFL 4646
:SOURce1:BB:DVB:DVBX:MTAB:SET3:PSTate:STATe 0

:SOURce1:BB:DVB:STATe 1
:SOURce1:BB:DVB:DVBX:FRAMes?
// 24
```

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:STYPe <SType>

Selects the input stream type.

Parameters:

<SType> TRANsport | GP | GC | GHEM
*RST: TRANsport

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Stream Type" on page 25

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ISTReam?

Queries the input stream type.

Return values:

<IStream> string

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Usage: Query only

Manual operation: See " Input Stream" on page 25

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA <Data>

Selects the data source.

Parameters:

<Data> ZERO | ONE | PATTern | PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | TFILe | GFILe

PATTern
To set the bit pattern, use the command `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:PATTern`.

DLISt|TFILe|GFILe
To select the data list, TS file or the GSE file, use the command `[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:DSELection|TSELection|GSELection`.

*RST: PN9

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Data Source, Select File" on page 25

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:PATTern <Pattern>, <BitCount>

Sets the the bit pattern.

Parameters:

<Pattern> numeric

*RST: #H0

<BitCount> integer

Range: 1 to 64
*RST: 1

Example:
```
:SOURce1:BB:DVB:DVBX:DATA PATTern
:SOURce1:BB:DVB:DVBX:DATA:PATTern #H39C,12
```

Manual operation: See " Data Source, Select File" on page 25

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:
DSELection|TSELection|GSELection <FSelection>

Selects an existing data list, transport file (TS) or GSE file from the default or from the specific directory.

- TS files are files with extension `*.gts`, `*.ts`, or `*.trp`.
- GSE files are files with extension `*.gse`
- Data lists are files with extension `*.dm_iqd`

Parameters:

<FSelection> string

Filename incl. file extension or complete file path

Example:
```
:SOURce1:BB:DVB:DVBX:DATA TFILe
:SOURce1:BB:DVB:DVBX:DATA:TSELection "/var/user/temp/dvb.gts"
```

Manual operation: See " Data Source, Select File" on page 25

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ADLength:STATe <State>

Defines if the data length is set automatically or manually.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Auto Data Length" on page 26

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:DATA:LENGth <DLength>

Sets the data length.

Parameters:

<DLength> integer
Range: 1 to 65536
*RST: 5000
Default unit: Bytes

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Data Length" on page 26

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:CRC[:STATe] <State>

Activates generation of CRC32.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: 0

Example: See Example "Configuring DVB-S2X signal in ACM mode" on page 78.

Manual operation: See "CRC32" on page 27

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BSCRambler[:STATe] <BScrambler>

Activates baseband scrambling.

Parameters:

<BScrambler> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " BB Scrambler" on page 27

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:OCODer[:STATe] <OCoder>

Enables the BCH outer coder.

Parameters:

<OCoder> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Outer Coder" on page 27

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ICODer[:STATe] <ICoder>

Activates the inner coder.

Parameters:

<ICoder> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Inner Coder" on page 27

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:ICODer:RATE <Rate>

Selects the code rate of the inner coder.

Parameters:

<Rate> CR1D4 | CR1D3 | CR2D5 | CR1D2 | CR3D5 | CR2D3 | CR3D4 | CR4D5 | CR5D6 | CR8D9 | CR9D10 | CR2D9 | CR13D45 | CR9D20 | CR90D180 | CR96D180 | CR11D20 | CR100D180 | CR104D180 | CR26D45 | CR18D30 | CR28D45 | CR23D36 | CR116D180 | CR20D30 | CR124D180 | CR25D36 | CR128D180 | CR13D18 | CR132D180 | CR22D30 | CR135D180 | CR140D180 | CR7D9 | CR154D180 | CR1D5 | CR11D45 | CR4D15 | CR14D45 | CR7D15 | CR8D15 | CR32D45

*RST: CR1D4

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Rate" on page 28

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:SFACtor?

Queries the spreading factor.

Return values:
<SFactor> float

Range: 1 to 2
*RST: 1

Example:
```
:SOURce1:BB:DVB:DVBS:MTAB:SET1:SFACtor?
```

Usage: Query only

Manual operation: See " SF" on page 28

[:SOURce<hw>]:BB:DVB:DVBX:SFACtor <SFactor>

Sets the spreading factor.

Parameters:
<SFactor> integer

Range: 1 to 2
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " SF" on page 28

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BINTerleaver[:STATe] <BInterleaver>

Enables the bit interleaver.

Parameters:
<BInterleaver> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Bit Interleaver" on page 29

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:UCMode[:STATe] <State>

Enables raw bit streaming.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Uncoded Mode" on page 30

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:CTYPe <CType>
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:CTYPe <CType>

Selects the code type.

Parameters:

<CType> NORMal | MEDium | SHORt

*RST: NORMal

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Code Type" on page 28

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:MCOD <Modcod>
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MCOD <Modcod>

Selects the MODCOD.

Parameters:

<Modcod> QPSK_S_14 | QPSK_S_13 | QPSK_S_25 | QPSK_S_12 | QPSK_S_35 | QPSK_S_23 | QPSK_S_34 | QPSK_S_45 | QPSK_S_56 | QPSK_S_89 | QPSK_S_910 | PSK8_S_35 | PSK8_S_23 | PSK8_S_34 | PSK8_S_56 | PSK8_S_89 | PSK8_S_910 | APSK16_S_23 | APSK16_S_34 | APSK16_S_45 | APSK16_S_56 | APSK16_S_89 | APSK16_S_910 | APSK32_S_34 | APSK32_S_45 | APSK32_S_56 | APSK32_S_89 | APSK32_S_910 | QPSK_X_N1345 | QPSK_X_N920 | QPSK_X_N1120 | APSK8_X_N59L | APSK8_X_N2645L | PSK8_X_N2336 | PSK8_X_N2536 | PSK8_X_N1318 | APSK16_X_N12L | APSK16_X_N815L | APSK16_X_N59L | APSK16_X_N2645 | APSK16_X_N35 | APSK16_X_N35L | APSK16_X_N2845 | APSK16_X_N2336 | APSK16_X_N23L | APSK16_X_N2536 | APSK16_X_N1318 | APSK16_X_N79 | APSK16_X_N7790 | APSK32_X_N23L | APSK32_X_N3245 | APSK32_X_N1115 | APSK32_X_N79 | APSK64_X_N3245L | APSK64_X_N1115 | APSK64_X_N79 | APSK64_X_N45 | APSK64_X_N56 | APSK128_X_N34 | APSK128_X_N79 | APSK256_X_N2945L | APSK256_X_N23L | APSK256_X_N3145L | APSK256_X_N3245 | APSK256_X_N1115L | APSK256_X_N34 | QPSK_X_S1145 | QPSK_X_S415 | QPSK_X_S1445 | QPSK_X_S715 | QPSK_X_S815 | QPSK_X_S3245 | PSK8_X_S715 | PSK8_X_S815 | PSK8_X_S2645 | PSK8_X_S3245 | APSK16_X_S715 | APSK16_X_S815 | APSK16_X_S2645 | APSK16_X_S35 | APSK16_X_S3245 | APSK32_X_S23 | APSK32_X_S3245 | QPSK_X_VN29 | BPSK_X_VM15 | BPSK_X_VM1145 | BPSK_X_VM13 | BPSK_X_VS15S | BPSK_X_VS1145 | BPSK_X_VS15 | BPSK_X_VS415 | BPSK_X_VS13

*RST: QPSK_S_14

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " MODCOD" on page 28

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MODulation <Modulation>

Selects the modulation scheme.

Parameters:

<Modulation> QPSK | APSK16 | APSK32 | PSK8 | P2BPsk | APSK16_8_8 | APSK32_4_12_16R | APSK64_8_16_20_20 | APSK8_2_4_2 | APSK32_4_8_4_16 | APSK64_16_16_16_16 | APSK64_4_12_20_28 | APSK128 | APSK256

*RST: QPSK

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Modulation" on page 28

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:PSTate[:STATe] <PState>
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:PSTate[:STATe] <PState>

Activates the pilot.

Parameters:
<PState> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Pilot State" on page 29

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:PSCRambler[:STATe] <PScrambler>

Activates pilot scrambling.

Parameters:
<PScrambler> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " PL Scrambler" on page 30

[:SOURce<hw>]:BB:DVB:DVBX:SSEQuence <SSequence>

Sets the bit sequence number used to scramble the pilot.

Parameters:
<SSequence> integer
Range: 0 to 6
*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Scr. Sequence" on page 30

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:NOSettings <Settings>

Sets the number of PLSCODEs that can be configured.

Parameters:
<Settings> integer
Range: 1 to 100
*RST: 10

Example: See Example "Configuring DVB-S2X signal in ACM mode" on page 78.

Manual operation: See "Number of Settings" on page 31

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:FRAMes <Frames>

Sets the number of the transmitted frames.

Parameters:

<Frames> integer

Range: 1 to max
*RST: 1

Example: See Example "Configuring DVB-S2X signal in ACM mode" on page 78.

Manual operation: See "Frames" on page 31

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:PCOD?

Queries the PLS code.

Return values:

<PlsCode> integer

Range: 0 to 1000
*RST: 132

Example: See Example "Configuring DVB-S2X signal in ACM mode" on page 78.

Usage: Query only

Manual operation: See "PLS Code" on page 32

5.9 TPS Commands

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:ID:PATTern <Pattern>, <BitCount>

Sets the pattern for cell identification.

Parameters:

<Pattern> numeric

*RST: #H0000

<BitCount> integer

Range: 16 to 16
*RST: 16

Example:

```
:SOURce1:BB:DVB:STANdard DVBH
:SOURce1:BB:DVB:DVBH:HMODe?
// Response: NHI
:SOURce1:BB:DVB:DVBH|DVBT:TPS:TSLIcing:STATe?
// 1
:SOURce1:BB:DVB:DVBH|DVBT:TPS:ID:STATe?
// 1
:SOURce1:BB:DVB:DVBH:TPS:ID:PATTern #HAAAA,16
:SOURce1:BB:DVB:DVBH:TPS:MFEC:STATe 1
```

Manual operation: See " ID (hex)" on page 20

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:ID:STATe <State>

Activates/deactivates the TPS cell identification.

Parameters:

<State> 0 | 1 | OFF | ON

Example: See `[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:ID:PATTern` on page 87.

Manual operation: See " Cell Identification" on page 20

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:MFEC[:STATe] <State>

Activates/deactivates the multiprotocol encapsulation forward error correction bit.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 0

Example: See `[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:ID:PATTern` on page 87.

Manual operation: See " MPE FEC" on page 21

[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:TSLicing[:STATe]?

Queries the time slicing state.

Return values:

<State> 0 | 1 | OFF | ON

Always 1 for DVB-H
Always 0 for DVB-T

Example: See `[:SOURce<hw>]:BB:DVB:DVBH|DVBT:TPS:ID:PATTern` on page 87.

Usage: Query only

Manual operation: See " Time Slicing" on page 21

5.10 TS Header Commands

Option: R&S SMW-K116

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig[:STATe] <State>

Inserts header information in the transport stream.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " TS Header Active" on page 33

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:SBYTe?

Queries the information carried by the synchronization byte.

Return values:

<SByte> 8 bits

Hexadecimal value

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Usage: Query only

Manual operation: See " Sync Byte (Hex)" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:TEINdication[:STATe]
<TEIndication>

Inserts transport error indication information in the header.

Parameters:
<TEIndication> 0 | 1 | OFF | ON
*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Transport Error Indication" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:PUS <PSUIndication>

If enabled, the PES (packetized elementary streams), PSI (program specific information), or DVB-MIP (megaframe initialization) packet begin immediately after the header.

Parameters:
<PSUIndication> 0 | 1 | OFF | ON
*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Payload Unit Start Indication" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:TPRiority <TPriority>

Marks the current packet as high priority packet compared to packets with the same PID.

Parameters:
<TPriority> integer
Range: 0 to 1
*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Transport Priority" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:PID:PATTern <Pattern>, <BitCount>

Sets the packet identifier PID.

Parameters:
<Pattern> numeric
*RST: #H0000

<BitCount> integer
Range: 13 to 13
*RST: 13

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " PID (Hex)" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:SCONtrol <SControl>

Sets the scrambling information.

Parameters:

<SControl> integer

Range: 0 to 3
*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Scrambling Control" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:AFIeld[:STATe] <AField>

Inserts an adaptation field in the packet.

Parameters:

<AField> 0 | 1 | OFF | ON

*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Adaptation Field" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:PAYLoad[:STATe] <Payload>

Adds a payload field in packet.

Parameters:

<Payload> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Payload" on page 34

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:THConfig:CCOunter <CCounter>

Sets the sequence number of the first payload packet.

Parameters:

<CCounter> integer

Range: 0 to 15
*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Continuity Counter" on page 35

5.11 GSE Header Commands

Option: R&S SMW-K116

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig[:STATe] <GHActive>

Inserts header information in the transport stream.

Parameters:

<GHActive> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " GSE Header Active" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:LTYPe <LType>

Set the type of the used label field.

Parameters:

<LType> integer

Range: 0 to 3

*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Label Type" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:GLENgth <GLength>

Sets the number of bytes following in the GSE packet.

Parameters:

<GLength> integer

Range: 1 to 4096
*RST: 1024

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " GSE Length" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:FIUSe[:STATe] <FIUse>

Includes a PDU fragment in the GSE packet.

Parameters:

<FIUse> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Use, Fragment ID(Hex)" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:FID:PATTern <FId>, <BitCount>

Sets the PDU fragment ID.

Parameters:

<FId> numeric

*RST: #H00

<BitCount> integer

Range: 8 to 8
*RST: 8

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Use, Fragment ID(Hex)" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:TLENgth?

Queries the total length.

Return values:

<TLength> integer

Range: 1 to 65536
*RST: 1
Default unit: Bytes

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Usage: Query only

Manual operation: See " Use, Total Length" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:TLUSe[:STATe] <TLUse>

Includes the total length indication in the GSE header.

Parameters:

<TLUse> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Use, Total Length" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:PTYPe:PATTern <PType>, <BitCount>

Queries the payload type carried in the PDU.

Parameters:

<PType> numeric
*RST: #H0000

<BitCount> integer
Range: 16 to 16
*RST: 16

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Use, Protocol Type(Hex)" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:PTUSe[:STATe] <PTUse>

Includes the payload type indication in the GSE header.

Parameters:

<PTUse> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Use, Protocol Type(Hex)" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:LABel:PATTern <Pattern>, <BitCount>

Sets the label used for addressing.

Parameters:

<Pattern> numeric
*RST: #H000000000000

<BitCount> integer
Range: 48 to 48
*RST: 48

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Use, Label(Hex)" on page 36

[:SOURce<hw>]:BB:DVB:DVBX:GHConfig:LUSE[:STATe] <LUse>

Includes the label indication in the GSE header.

Parameters:

<LUse> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Use, Label(Hex)" on page 36

5.12 BB Header Commands

Option: R&S SMW-K116

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig[:STATe] <State>

Inserts header information in the stream.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " BB Header Active" on page 38

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:CACM <CAcm>

Selects whether constant coding and modulation (CCM) or adaptive coding and modulation (ACM) communication is used.

Parameters:

<CAcm> CCM | ACM

*RST: CCM

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " CCM/ACM " on page 16

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:IACTive[:STATe] <IActive>

Sets the ISSYI (input stream synchronization indicator) bit to 1.

Parameters:

<IActive> 0 | 1 | OFF | ON

*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " ISSYI Active" on page 38

[:SOURce<hw>]:BB:DVB:DVBX:BHConfig:GLACtive[:STATe] <GLActive>

Sets that the GSE stream is GSE-Lite compliant.

Parameters:

<GLActive> 0 | 1 | OFF | ON

*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " GSE-Lite Active" on page 38

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:NACTive[:STATe] <NActive>

Activates null-packet deletion (NPD).

Parameters:

<NActive> 0 | 1 | OFF | ON

*RST: 0

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " NPD Active" on page 38

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:UPL <UPLength>

Sets the user packet length (UPL).

Parameters:

<UPLength> integer

Range: 1 to 8192
*RST: 100

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " UPL" on page 38

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:ADFL[:STATe] <State>
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:ADFL:STATe <State>

Defines if the DFL is set automatically or manually.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 1

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Auto DFL" on page 32

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:MTAB:SET<st>:DFL <DFLength>
[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:DFL <DFLength>

Sets the data field length (DFL).

Parameters:

<DFLength> integer

Range: 1 to 7264
*RST: 1024

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " DFL" on page 32

[:SOURce<hw>]:BB:DVB:DVBS|DVBX:BHConfig:SBYTe:PATTern <Sync>, <BitCount>

Sets the user packet synchronization byte.

Parameters:

<Sync> numeric

*RST: #H47

<BitCount> integer

Range: 8 to 8
*RST: 8

Example: See Example "Configuring the DVB-S2/DVB-S2X settings" on page 76.

Manual operation: See " Sync (Hex)" on page 39

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