Sirius Radio
Digital Standard for
R&S®Signal Generators
Operating Manual

ROHDE&SCHWARZ

This document describes the following software options:

- R&S®AMU-K58
  1403.0301.02

- R&S®SMATE-K58
  1404.8364.02

- R&S®SMBV-K58
  1415.8202.02

- R&S®SMJ-K58
  1409.2806.02

- R&S®SMU-K58
  1408.7910.02

This manual version corresponds to firmware version:
FW 3.50.082.xx and later of the R&S®SMBV100A
FW 3.20.286.xx and later of the R&S®SMU200A, R&S®SMATE200A, R&S®SMJ100A and R&S®AMU200A

Customer Information Regarding Recording in the Sirius XM Band
Sirius XM does not support recording of Sirius XM broadcast. If a customer purchases equipment from Rohde & Schwarz with the intention of recording the Sirius XM broadcast, this customer does so at its own risk. Sirius XM will not provide any support or assistance to this customer. Rohde & Schwarz decline to assist customers in recording the Sirius XM broadcast.

Contents

1 Preface

1.1 Documentation Overview

This section provides an overview of the R&S Signal Generator user documentation. You find it on the product page at:

http://www.rohde-schwarz.com/product/SMBV100A.html > "Downloads"

Quick start guide

Introduces the R&S Signal Generator 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.

Online help

Offers quick, context-sensitive access to the complete information for the base unit and the software options directly on the instrument.

Operating manual

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 quick start guide manual.
- Software option manual
  Contains the description of the specific functions of an option. Basic information on operating the R&S Signal Generator is not included.

The **online version** of the operating manual provides the complete contents for immediate display on the Internet.

Service manual

Describes the performance test for checking the rated specifications, module replacement and repair, firmware update, troubleshooting and fault elimination, and contains mechanical drawings and spare part lists.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS, https://gloris.rohde-schwarz.com).

Instrument security procedures manual

Deals with security issues when working with the R&S Signal Generator in secure areas.

Basic safety instructions

Contains safety instructions, operating conditions and further important information. The printed document is delivered with the instrument.

Data sheet and brochure

The data sheet contains the technical specifications of the software options, see "Digital Standards for Signal Generators - Data sheet" on the web site. It also lists the options and their order numbers.

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

Release notes and open source acknowledgment (OSA)

The release notes of the base units 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 the product page of the base unit, e.g. at:

http://www.rohde-schwarz.com/product/SMBV100A.html > "Downloads" > "Firmware"

Application Notes, Application Cards, White Papers, etc.

These documents deal with special applications or background information on particular topics, see http://www.rohde-schwarz.com/appnotes.

1.2 Typographical Conventions

The following text markers are used throughout this documentation:

Convention	Description
"Graphical user interface elements"	All names of graphical user interface elements on the screen, such as dialog boxes, menus, options, buttons, and softkeys are enclosed by quotation marks.
KEYS	Key names are written in capital letters.
`File names, commands, program code`	File names, commands, coding samples and screen output are distinguished by their font.
Input	Input to be entered by the user is displayed in italics.

Convention	Description
Links	Links that you can click are displayed in blue font.
"References"	References to other parts of the documentation are enclosed by quotation marks.

1.3 Notes on Screenshots

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

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 Introduction

The R&S Signal Generator enables you to generate signals in accordance with the Sirius satellite radio standard.

The equipment layout of the instrument for generating multicarrier signals includes:

- Option Baseband Main Module (R&S SMx/AMU-B13)
- Options Baseband Generator (R&S SMx/AMU-B9/B10/B11)
  Options Baseband Generator (R&S SMx/AMU-B10/B51)
  (per signal path)
- Sirius Digital Radio (R&S SMx/AMU-K58)
  (per signal path)

Per baseband, one satellite signal or one terrestrial signal can be generated.

2.1 Modulation System Sirius Digital Radio

The Sirus Radio signal is transmitted via two satellites (QPSK-modulation) and additionally via one terrestrial repeater (COFDM-modulation).
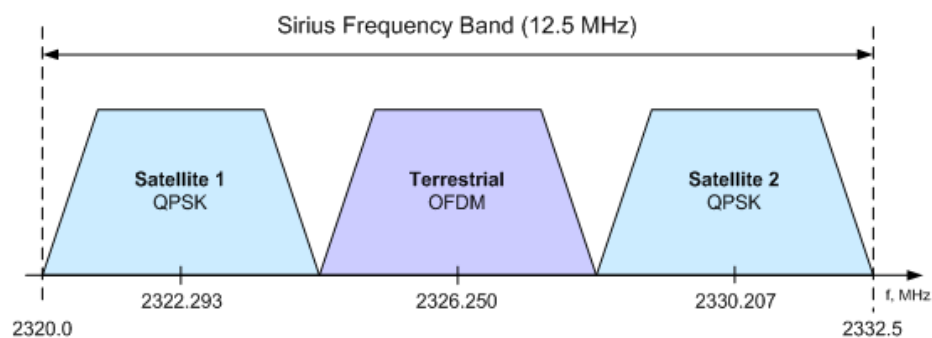

Figure 2-1: Sirius frequency band

The following table shows the carrier frequencies for the corresponding channels:

Channel	Modulation	Center Frequency [MHz]	Bandwidth [MHz]	Notes
Satellite 1	TDM1 (QPSK)	2322.293	4.51008	Real time
Satellite 2	TDM2 (QPSK)	2330.207	4.51008	Delayed 4.1685 sec (time diversity)
Terrestrial	COFDM	2326.250	4.012	Delayed 4.1685 sec (time diversity)

2.2 Handling of Data Sources

2.2.1 Using Data Lists and Sirius Test Files

For the simulation of Sirius radio, the R&S Signal Generator provides two main data sources: data lists and Sirius files.

Although any of the standard data sources can be used, the generation of signals in accordance to the Sirius satellite radio standard requires that the files provided by Sirius satellite radio are used.

The data lists are Rohde&Schwarz proprietary files with extension `*.dm_iqd`, that can be created and modified in the data list editor (see "Data List Management" on page 14).

The official Sirius test files are provided by Sirius satellite radio. There are two types of test files currently available in the field: encrypted Sirius test files and the still in use non-encrypted files. R&S Signal Generator supports both of them.

The non-encrypted test files are the former Sirius test files; they are files with extension `*.tdm` and are not provided any more by Sirius satellite radio.

The currently provides test files are encrypted to ensure the usage of the appropriate files. The encrypted test files are delivered in form of the so called triples, containing an encrypted test file with extension `*.sirius_iqd` and two support files with extensions `*.sirus_subkey1` and `*.sirus_subkey2` respectively.

> Each signal generator manufacturer uses it own encrypting procedure. Files encrypted by one signal generator manufacturer cannot be decrypted by or used with the signal generators of other manufactures.

There are no Sirius test files installed on the R&S Signal Generator and Rohde&Schwarz does not provide any Sirius test files. Requesting of encrypted Sirius test files by Sirius satellite radio is under the responsibility of the customer.

The encrypted triples of Sirius test files and the non-encrypted test files have to be stored on the hard disk or on a USB flash drive connected to the R&S Signal Generator. The filenames and the directory they are stored in are user-definable. The files belonging to a triple must be stored in the same directory (see an example on the figure below).

Sirius test files can be for instance downloaded via the internet. They are available at the following page: www.arena.com

## 2.2.2 Test Files Handling in the R&S Signal Generator

To play a Sirius test file with the R&S Signal Generator, the corresponding file has to be selected as a data source for the signal generation. Set the Data Source to "Data List" and select the required file in the Select Data List dialog.

The encrypted Sirius test files are decrypted by the R&S Signal Generator in real time and the decrypted files are not stored on the hard drive of the instrument. Each encrypted file has a timestamp; the expiration date of the test file is displayed on the user interface (see "Expire Date" on page 15). The test files are rendered unusable after the expiration date and as long no new license is available. The R&S Signal Generator informs you with a warning message if the encrypted files are about to expire.

Example:

The license will expire in 23 day(s).

3 Sirius Radio User Interface
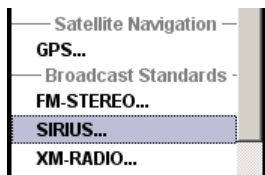
The dialog for setting the Sirius Radio digital standard is either called from the "Base-band" block or from the menu tree under "Baseband".

ℹ The screenshots provided in this description show parameter values that have been selected to illustrate as much as possible of the provided functions and possible inter-dependencies between them.

These values are not necessarily representative of realistic test situations.

3.1 General Settings

The menu is split into several sections for configuring the standard.

The upper menu section is where the Sirius Radio digital standard is activated and deactivated. Configuration settings can be stored and already stored configuration set-tings can be loaded.
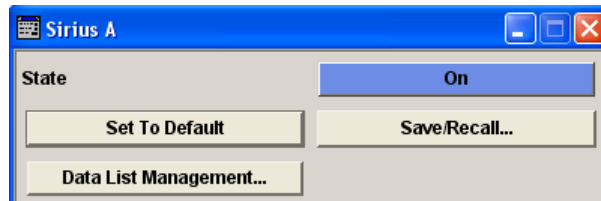
In the next section, the physical layer, the physical layer transmission and the data source are selected.

In the "Terrestrial Parameters" section, the parameters for the terrestrial transponder are set.

In the "Satellite Parameters" section, the parameters for the satellite transponder are set.

The buttons in the lower menu section lead to submenus for setting the filter, trigger, and clock parameters.

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

Remote command:
[:SOURce<hw>]:BB:SIRius:STATe on page 37

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"
Physical Layer	Legacy
Physical Layer transmission	Satellite 1
Data Source	PN9
HDD streaming	On

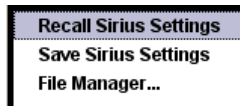| Parameter	Value
Delay	0.000 s
Modulation	QPSK
Filter	Root cosine
Rolloff factor	0.20
Symbol Rate variation	3,758 Msym/s

Remote command:
[:SOURce<hw>]:BB:SIRius:PRESet on page 34

Save/Recall...
Calls the Save/Recall menu.

From the "Save/Recall "menu, the "File Select" windows for saving and recalling Sirius Radio configurations and the "File Manager" is called.

Sirius Radio configurations are stored as files with the predefined file extension *.sirius. The filename and the directory they are stored in are user-definable.

The complete settings in the "Sirius" menu are saved and recalled.

"Recall Sirius Setting"	Opens the "File Select" window for loading a saved Siruis Radio configuration. The configuration of the selected (highlighted) file is loaded by pressing the "Select" button.
"Save Sirius Setting"	Opens the "File Select" window for saving the current Sirius Radio signal configuration. The name of the file is specified in the "Filename" entry field. The file is saved by pressing the "Save" button. The "Fast Save" checkbox determines whether the instrument performs an absolute or a differential storing of the settings. Enable this function to accelerate the saving process by saving only the settings with values different to the default ones. "Fast Save" is not affected by the "Preset" function.
"File Manager"	Calls the "File Manager". The "File Manager" is used to copy, delete, and rename files and to create directories.

Remote command:
[:SOURce<hw>]:BB:SIRius:SETTing:CATalog? on page 35
[:SOURce<hw>]:BB:SIRius:SETTing:LOAD on page 36
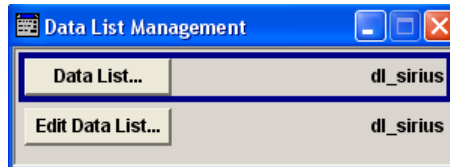[:SOURce<hw>]:BB:SIRius:SETTing:STORe on page 36
[:SOURce<hw>]:BB:SIRius:SETTing:STORe:FAST on page 36
[:SOURce<hw>]:BB:SIRius:SETTing:DELete on page 35

Data List Management

Calls the "Data List Management" menu. This menu is used to create and edit a data list.

The data lists are stored as files with the predefined file extension `*.dm_iqd`. The filename and the directory they are stored in are user-definable.

To use a data list created in this menu, this data list has to be selected as a data source in the "Select Data List" submenu.

Remote command:

[:SOURce<hw>]:BB:SIRius:DATA on page 31

[:SOURce<hw>]:BB:SIRius:DATA:DSELect on page 31

Version

Displays the current version of the Sirius standard depending on the selected Modulation Mode ("Legacy" or "Overlay").

The default settings and parameters provided are oriented towards the specifications of the version displayed.

Remote command:

[:SOURce<hw>]:BB:SIRius:VERSion? on page 38

Physical Layer

Selects the physical layer mode, i.e. determines whether a legacy or overlay waveform is generated.

"Legacy"   This physical layer mode is used for legacy support, i.e. for generating of Sirius signals in accordance to the former Sirius Satellite Radio standard without overlay modulation.

"Overlay"   Selects an overlay physical layer mode, i.e. defines the modulation of the physical layer modes according to the hierarchal overlay modulation.

Remote command:

[:SOURce<hw>]:BB:SIRius:PLAYer on page 33

Physical Layer Transmission

Selects the physical layer transmission.

"Satellite 1/   Transmits the QPSK-modulated signal.
Satellite 2"

"Terrestrial"   Transmits the COFDM-modulated signal.

Remote command:

[:SOURce<hw>]:BB:SIRius:PLTRansmission on page 33

Data Source

Selects the data source for the Sirius signal.

The following data sources are available for selection:

"ALL0, ALL1"   0 data and 1 data is generated internally.

"PNxx"   PRBS data as per CCITT with period length between (2^9-1) and
                 (2^{23}-1) are generated internally.

"Pattern"   A user-definable bit pattern with a maximum length of 64 bits is gen-
                 erated internally.
                 The bit pattern is defined in the "Data Pattern" entry field.

"Data List"   Internal data from a programmable data list is used. The data list can
                 be generated by the "Data Editor" or generated externally (see Chap-
                 ter 2.2, "Handling of Data Sources", on page 9).
                 Data lists are selected in the "Select Data List" field.

Remote command:

[:SOURce<hw>]:BB:SIRius:DATA on page 31

[:SOURce<hw>]:BB:SIRius:DATA:PATTern on page 33

[:SOURce<hw>]:BB:SIRius:DATA:DSELect on page 31

Select Data List

Opens a menu to select the data list file and change the content of the transmission.

Only internally generated data lists (*.dm_iqd), non-encrypted Sirus test files (*.tdm)
and encrypted Sirius test files (*.sirius_iqd) are displayed (see Chapter 2.2, "Han-
dling of Data Sources", on page 9).

Remote command:

[:SOURce<hw>]:BB:SIRius:DATA:DSELect on page 31

Expire Date

Displays the date of the selected test file beyond which the files are rendered unusa-
ble.

The expiration date is displayed in format DD.MM.YYYY.

Remote command:

[:SOURce<hw>]:BB:SIRius:DATA:EDATe? on page 32

HDD Streaming

Enables/disables the streaming of modulation data direct from the hard drive (HDD).

HDD streaming is recommended for processing of large files that require more ARB
memory than the currently installed one.

Remote command:

[:SOURce<hw>]:BB:SIRius:DATA:HDDStreaming:STATe on page 33

Streaming Buffer

Displays the filling level of the streaming buffer.

During normal operation, the streaming buffer level has a value between 90% and
100%. Buffer level around 0% indicates that a buffer underruns. It also indicates that
the signal processing is interrupted.

Adjustment in the parameter value or state usually results in short decreasing of the streaming buffer level. Do not misunderstand this buffer state as buffer underrun.

Remote command:
[:SOURce<hw>]:BB:SIRius:DATA:HDDStreaming:BLEVel? on page 32

Delay
Sets the signal delay.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:DELay on page 34
[:SOURce<hw>]:BB:SIRius:TERRestrial:DELay on page 37

Modulation
Selects the modulation used for the selected band, depending on the selected "Physical Layer".

For satellite physical layer, additionally to the default QPSK modulation, 8-PSK and 8-PSK inverted are available.

The modulation is also displayed in the graphic.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:MODulation on page 34
[:SOURce<hw>]:BB:SIRius:TERRestrial:MODulation? on page 37

Overlay Angular Offset
(for "Physical Layer > Overlay")

Sets the overlay angular offset for the 8-PSK and 8-PSK inverted modulation or for the COFDM modulation, depending on the selected "Physical Layer".

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:OAOFfset on page 35
[:SOURce<hw>]:BB:SIRius:TERRestrial:OAOFfset on page 38

Filter...
Calls the menu for setting baseband filtering. The current filter is displayed next to the button.

The menu is described in section Chapter 3.2, "Filter Settings", on page 17.

Remote command:
n.a.

Trigger/Marker
Calls the menu for selecting the trigger mode and trigger source, for configuring the marker signals, and for setting the time delay of an external trigger signal.

This menu is described in section Chapter 3.3, "Trigger/Marker/Clock Settings", on page 19.

The currently selected trigger mode and trigger source are displayed next to the button.

Remote command:
n.a.

Execute Trigger

Executes the trigger manually. A manual trigger can be executed only if an internal trigger source and a trigger mode other than "Auto" have been selected.

Remote command:

[:SOURce<hw>]:BB:SIRius:TRIGger:EXECute on page 44

Arm

Stops signal generation manually. The "Arm" button appears only with "Running" signal generation in the "Armed_Auto" and "Armed_Retrigger" trigger modes

Signal generation can be restarted by a new trigger (internally with "Execute Trigger" or externally).

Remote command:

[:SOURce<hw>]:BB:SIRius:TRIGger:ARM:EXECute on page 44

Clock

Calls the menu for selecting the clock source and for setting a delay.

This menu is described in section Chapter 3.3.4, "Clock Settings", on page 27.

Remote command:
n.a.

3.2 Filter Settings

To access this dialog, select "Main Menu > Filter".

The baseband filter, sample rate variation and clipping are defined in this menu.

The parameters available in the Filter menu depend on the selected Physical Layer Transmission.
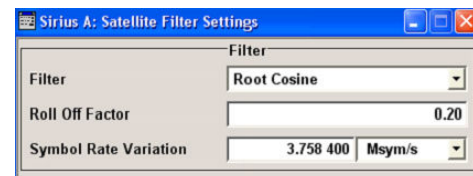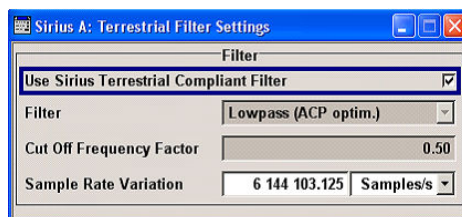
Use Sirius Terrestrial Compliant Filter

(for "Physical Layer > Transmission")

Activates or deactivates the usage of the filter which is in compliance with the terrestrial standard.

Remote command:

[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:TCFilter[:STATe]
on page 43

Filter

Sets the baseband filter.

Remote command:

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:TYPE` on page 39

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:TYPE` on page 39

Rolloff factor / BxT

Sets the filter parameter.

The filter parameter offered ("rolloff factor" or "BxT") depends on the currently selected filter type. This parameter is preset to the default for each of the predefined filters.

Remote command:

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:APCO25`
on page 39

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:COSine`
on page 40

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:GAUSs`
on page 40

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:PGAuss`
on page 40

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:RCOSine`
on page 41

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:SPHase`
on page 41

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:APCO25`
on page 39

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:COSine`
on page 40

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:GAUSs`
on page 40

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:PGAuss`
on page 40

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:RCOSine`
on page 41

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:SPHase`
on page 41

Cutoff Frequency Shift

Sets the value for the cutoff frequency shift for a Cosine filter. The cutoff frequency of the cosine filter can be adjusted to reach spectrum mask requirements.

Remote command:

`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:COSine:COFS`
on page 42

Cutoff Frequency Factor

Sets the value for the cutoff frequency factor of a Lowpass filter. The cutoff frequency of the filter can be adjusted to reach spectrum mask requirements.

Remote command:

`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:LPASs`
`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:LPASs`
`[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:LPASSEVM`
`[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:LPASSEVM`

Symbol Rate Variation
(for "Physical Layer > Transmission")

Sets the symbol rate of the signal. According to the standard, the default value is 3.7584 Msym/s.

Remote command:
`[:SOURce<hw>]:BB:SIRius:SATellite:SRATe:VARiation`

Sample Rate Variation
(for "Physical Layer > Transmission")

Sets the terrestrial sample rate variation.

Remote command:
`[:SOURce<hw>]:BB:SIRius:TERRestrial:SRATe:VARiation`

3.3 Trigger/Marker/Clock Settings

To access this dialog, select "Main Menu > Trigger/Marker".

The "Trigger In" section is where the trigger for the signal is set. Various parameters are provided for the settings, depending on which trigger source - internal or external - is selected. The status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.
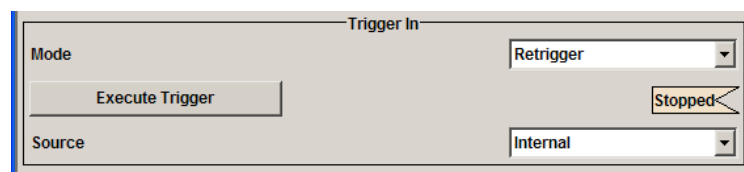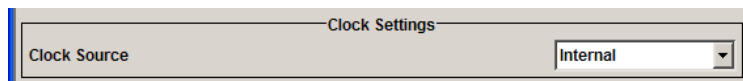

The "Marker Mode" section is where the marker signals at the MARKER output connectors are configured.
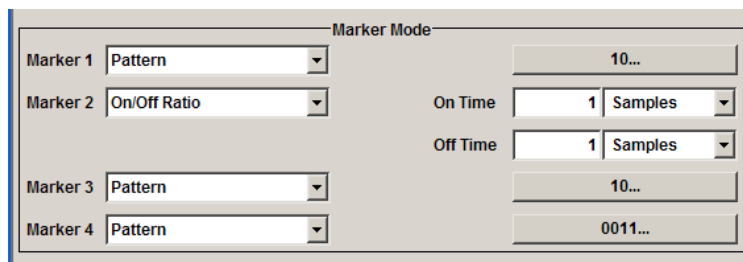
The "Marker Delay" section is where a marker signal delay can be defined.
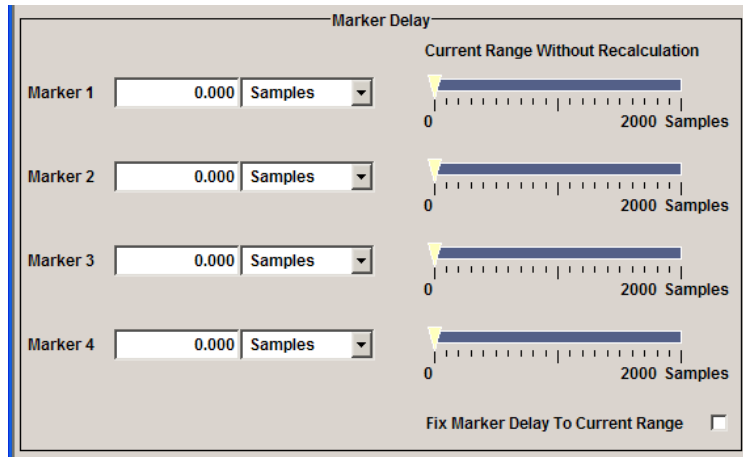
The "Clock Settings" section is where the clock source is selected and - in the case of an external source - the clock type.

The buttons in the last section lead to submenu for general trigger, clock and mapping settings.

3.3.1 Trigger In

The "Trigger In" section is where the trigger for the signal is set. Various parameters are provided for the settings, depending on which trigger source - internal or external - is selected. The status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.

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

- "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 with 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 with 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:SIRius:SATellite[:TRIGger]:SEQuence on page 49
[:SOURce<hw>]:BB:SIRius:TERRestrial[:TRIGger]:SEQuence on page 49

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

The input is to be expressed in symbols (for physical layer transmission satellite) or in samples (for physical layer transmission Terrestrial). It is possible to output deliberately just part of the signal, an exact sequence of the signal, or a defined number of repetitions of the signal.

The symbol/sample rate depends on the selected physical layer transmission and is displayed in the corresponding Filter menu. The default symbol/sample rates are as follows:
- For physical layer transmission satellite
  Symbol Rate = 3.758 400 Msym/s
- For physical layer transmission Terrestrial
  Sample Rate = 6 144 103.125 Samples/s (with factor 1.5)

Remote command:

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:SLENgth on page 46
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:SLENgth on page 48

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:SIRius:TRIGger:RMODe? on page 44

Arm

Stops signal generation manually. The "Arm" button appears only with "Running" signal generation in the "Armed_Auto" and "Armed_Retrigger" trigger modes

Signal generation can be restarted by a new trigger (internally with "Execute Trigger" or externally).

Remote command:

[:SOURce<hw>]:BB:SIRius:TRIGger:ARM:EXECute on page 44

Execute Trigger

Executes the trigger manually. A manual trigger can be executed only if an internal trigger source and a trigger mode other than "Auto" have been selected.

Remote command:

[:SOURce<hw>]:BB:SIRius:TRIGger:EXECute on page 44

Trigger Source

Selects trigger source. This setting is effective when a trigger mode other than "Auto" has been selected.

- "Internal"
  The trigger event is executed by "Execute Trigger".
- "Internal (Baseband A/B)"
  (two-path instruments)
  The trigger event is the trigger signal from the second path
- "External (Trigger 1/2)"
  The trigger event is the active edge of an external trigger signal, supplied at the TRIGGER 1/2 connector.
  Use the "Global Trigger/Clock Settings" dialog to define the polarity, the trigger threshold and the input impedance of the trigger signal.

Remote command:

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:SOURce on page 46

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:SOURce on page 48

Sync. Output to External Trigger

(enabled for Trigger Source External)

Enables/disables output of the signal synchronous to the external trigger event.

For or two or more R&S SMBV that work in a master-slave mode, configure this parameter depending on the provided system trigger event and the properties of the output signal. See the table below for an overview of the required settings.

Table 3-1: Typical applications

System trigger	Application	"Sync. Output to External Trigger"
Common External Trigger event for the master and the slave instruments	All instruments are synchronous to the external trigger event	On
	All instruments are synchronous among themselves but starting the signal from first symbol is more important than synchronicity with external trigger event	Off
Internal trigger signal of the master R&S SMBV for the slave instruments	All instruments are synchronous among themselves	Off

"On"　　　　　　　Corresponds to the default state of this parameter.
The signal calculation starts simultaneously with the external trigger event but because of the instrument's processing time the first samples are cut off and no signal is outputted. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.
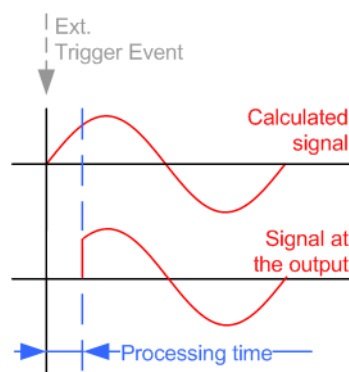
"Off"　　　　　　The signal output begins after elapsing of the processing time and starts with sample 0, i.e. the complete signal is outputted.
This mode is recommended for triggering of short signal sequences with signal duration comparable with the processing time of the instrument.
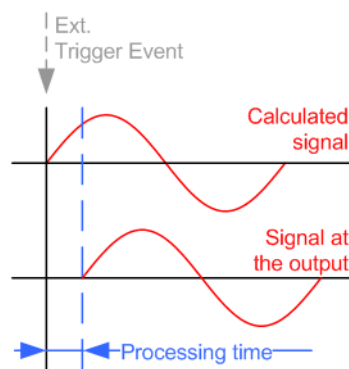
Remote command:

`[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:EXTernal:SYNChronize:OUTPut` on page 50

`[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:EXTernal:SYNChronize:OUTPut` on page 50

Trigger Delay

Delays the trigger event of the signal from:
- The external trigger source
- The other path

Use this setting to:
- Synchronize the instrument with the device under test (DUT) or other external devices

Remote command:

`[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger[:EXTernal<ch>]:DELay` on page 46

`[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger[:EXTernal<ch>]:DELay` on page 48

`[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OBASeband:DELay` on page 45

`[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OBASeband:DELay` on page 47

Trigger Inhibit

Sets the duration for inhibiting a new trigger event subsequent to triggering. The input is to be expressed in samples.

In the "Retrigger" mode, every trigger signal causes signal generation to restart. This restart is inhibited for the specified number of samples.

This parameter is only available on external triggering or on internal triggering via the second path.

For two-path instruments, the trigger inhibit can be set separately for each of the two paths.

Remote command:

`[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger[:EXTernal<ch>]:INHibit` on page 47

`[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger[:EXTernal<ch>]:INHibit` on page 49

`[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OBASeband:INHibit` on page 45

`[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OBASeband:INHibit` on page 47

3.3.2 Marker Mode

The marker output signal for synchronizing external instruments is configured in the marker settings section "Marker Mode".

The R&S SMBV supports only two markers.

Marker Mode

Selects a marker signal for the associated MARKER output.

"ON/OFF Period"	A regular marker signal that is defined by an on/off ratio is generated. A period lasts one on and off cycle. The "ON Time" and "OFF Time" are each expressed as a number of samples.

Remote command:

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:ONTime
on page 53

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:ONTime
on page 55

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:OFFTime
on page 53

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:OFFTime
on page 55

"Frame "	A marker signal is generated at the start of each frame.
"Symbol"	A marker signal is generated at the beginning of each symbol.
"Symbol within Frame"	A marker signal is generated at the beginning of a specified symbol within a frame. The symbol is selected with the parameter "Symbol Position".
"User Period"	A marker signal is generated at the beginning of every user-defined period. The period is defined in "Period."

Remote command:

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:PERiod
on page 54

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:PERiod
on page 54

"Pulse"	A regular marker signal is generated. The pulse frequency is defined by entering a divider. The frequency is derived by dividing the sample rate by the divider. The input box for the divider opens when "Pulse" is selected, and the resulting pulse frequency is displayed below it.

Remote command:

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:PULSe:
DIVider on page 54

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:PULSe:
FREQuency? on page 55

"Pattern "   A marker signal that is defined by a bit pattern is generated. The pattern has a maximum length of 32 bits and is defined in an input field which opens when pattern is selected.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:PATTern
on page 54

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:MODE
on page 53
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:MODE
on page 53

3.3.3 Marker Delay

The delay of the signals on the MARKER outputs is set in the "Marker Delay" section.

Marker x Delay
Enters the delay between the marker signal at the marker outputs and the start of the frame or slot.

The input is expressed as a number of symbols/samples. If the setting "Fix marker delay to dynamic range" is enabled, the setting range is restricted to the dynamic range. In this range, the delay of the marker signals can be set without restarting the marker and signal.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:DELay
on page 51
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:DELay
on page 51

Current Range without Recalculation
Displays the dynamic range within which the delay of the marker signals can be set without restarting the marker and signal.

The delay can be defined by moving the setting mark.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:DELay:
MINimum? on page 52
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:DELay:
MINimum? on page 52
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:DELay:
MAXimum? on page 52
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:DELay:
MAXimum? on page 52

Fix marker delay to current range
Restricts the marker delay setting range to the dynamic range. In this range, the delay can be set without restarting the marker and signal.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut:DELay:FIXed
on page 51
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut:DELay:FIXed
on page 51

3.3.4 Clock Settings

The Clock Settings is used to set the clock source and a delay if necessary.

Sync. Mode
(for R&S SMBV only)

Selects the synchronization mode.

This parameter is used to enable generation of precise synchronous signal of several connected R&S SMBVs.

Note: If several instruments are connected, the connecting cables from the master instrument to the slave one and between each two consecutive slave instruments must have the same length and type.
Avoid unnecessary cable length and branching points.

"None"   The instrument is working in standalone mode.

"Sync. Master"   The instrument provides all connected instrument with its synchronization (including the trigger signal) and reference clock signal.
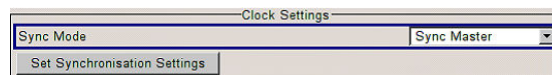
"Sync. Slave"   The instrument receives the synchronization and reference clock signal from another instrument working in a master mode.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:SYNChronization:MODE
on page 57
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:SYNChronization:MODE
on page 57

Set Synchronization Settings
(for R&S SMBV only)

Performs automatically adjustment of the instrument's settings required for the synchronization mode, selected with the parameter "Synchronization Mode".

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:SYNChronization:EXECute
on page 58
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:SYNChronization:
EXECute on page 58

Clock Source
Selects the clock source.

"Internal"   The internal clock reference is used to generate the symbol clock.

"External"   The external clock reference is fed in as the symbol clock or multiple
                    thereof via the CLOCK connector.
                    The symbol rate must be correctly set to accuracy of +/-2 % (see data
                    sheet).
                    The polarity of the clock input can be changed with the aid of "Global
                    Trigger/Clock Settings".
                    In the case of two-path instruments, this selection applies to path A.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:SOURce on page 57
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:SOURce on page 57

Clock Mode
Enters the type of externally supplied clock.

"Sample/   A sample clock (for physical layer transmission Terrestrial) or a sym-
Symbol"   bol clock (for physical layer transmission satellite) is supplied via the
                    CLOCK connector.

"Multiple Sam-   A multiple of the sample/symbol clock is supplied via the CLOCK con-
ple/Symbol"   nector; the sample clock is derived internally from this.

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:MODE on page 56
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:MODE on page 56

Clock Multiplier
Enters the multiplication factor for clock type "Multiple".

Remote command:
[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:MULTiplier on page 56
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:MULTiplier on page 56

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

Remote command:
CLOCk:INPut:FREQuency?

3.3.5 Global Settings

The buttons in this section lead to dialogs for general trigger, clock and mapping set-
tings.

Global Trigger/Clock Settings
Calls the "Global Trigger/Clock/Input Settings" dialog.

This dialog is used among other things for setting the trigger threshold, the input impe-
dance and the polarity of the clock and trigger inputs.

The parameters in this dialog affect all digital modulations and standards, and are
described in chapter "Global Trigger/Clock/Input Settings" in the Operating Manual.

User Marker / AUX I/O Settings
Calls the "User Marker AUX I/O Settings" dialog, used to map the connector on the rear of the instruments.

See also "User Marker / AUX I/O Settings" in the Operating Manual.

4 Remote-Control Commands

The following commands are required to perform signal generation with the Sirius option in a remote environment. We assume that the R&S Signal Generator has already been set up for remote operation in a network as described in the R&S Signal Generator documentation. A knowledge about the remote control operation and the SCPI command syntax are 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 Signal Generator operating manual.

Common suffixes

The following common suffixes are used in remote commands:

Suffix	Value range	Description
SOURce<hw>	[1]|2	available baseband signals
OUTPut<ch>	1 .. 4	available markers R&S SMBV supports two markers
EXTernal<ch>	1|2	external trigger connectors

The commands in the Source:BB:SIRius subsystem are described in the following section.

Placeholder <root>

For commands that read out or save files in the default directory, the default directory is set using command MMEM:CDIRectory. The examples in this description use the place holder <root> in the syntax of the command.

- D:\ - for selecting the internal hard disk of a Windows instrument
- E:\ - for selecting the memory stick which is inserted at the USB interface of a Windows instrument
- /var/user/ - for selecting the internal flash card of a Linux instrument
- /usb/ - for selecting the memory stick which is inserted at the USB interface of a Linux instrument.

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

In particular, this includes:

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

For a description of such tasks, see the R&S Signal Generator operating manual.

The following commands specific to the `Source:BB:SIRius` subsystem are described here:

4.1 General Settings

[:SOURce<hw>]:BB:SIRius:DATA <Data>

Selects the data source for the Sirius signal.

Parameters:

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

                  *RST: PN9

Example: `BB:SIR:DATA PN9`

                  PN9 is the data source for the Sirius signal.

Manual operation: See "Data List Management" on page 14

[:SOURce<hw>]:BB:SIRius:DATA:DSELect <DSelect>

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name without the path and the file extension.

Parameters:

<DSelect>   string

Example: `BB:SIR:DATA DLIS`

selects Data Lists as data source.

`BB:SIR:DATA:DSEL '<root>TFD23T-3'`

selects file `TFD23T-3.sirius_iqd` as the data source.

Manual operation: See "Data List Management" on page 14

[:SOURce<hw>]:BB:SIRius:DATA:EDATe?

Queries the date of the selected test file beyond which the files are rendered unusable.

Return values:

<EDate>   DD.MM.YYYY

Example: `BB:SIR:DATA DLIS`

Selects Data Lists as data source.

`BB:SIR:DATA:DSEL '<root>TFD23T-3'`

Selects the Sirius test file `TFD23T-3.sirius_iqd` as the data source.

`BB:SIR:DATA:EDAT?`

Queries the expire date.

Response: 14.09.2008

Usage: Query only

Manual operation: See "Expire Date" on page 15

[:SOURce<hw>]:BB:SIRius:DATA:HDDStreaming:BLEVel?

Queries the filling level of the streaming buffer.

During normal operation, the streaming buffer level has a value between 90% and 100%. Buffer level around 0% indicates that a buffer underruns; the signal processing is interrupted.

Adjustment in the parameter value or state usually results in short decreasing of the streaming buffer level. Do not mislead this buffer state with buffer underrun.

Return values:

<BLevel>   float

                                Range: 0 to 100

Example: `BB:SIR:DATA:HDDS:STAT ON`

Enables HDD streaming.

`BB:SIR:DATA:HDDS:BLEV?`

Queries the streaming buffer level.

Response: 94%

Usage: Query only

Manual operation: See "Streaming Buffer" on page 15

[:SOURce<hw>]:BB:SIRius:DATA:HDDStreaming:STATe <State>

Enables/disables the streaming of modulation data direct from the hard drive (HDD).

HDD streaming is recommended for processing of large files that require more "ARB memory" than the currently installed one.

Parameters:

<State>   0 | 1 | OFF | ON

                           *RST: 1

Example: BB:SIR:DATA:HDDS:STAT ON
                           Enables HDD streaming.

Manual operation: See "HDD Streaming" on page 15

[:SOURce<hw>]:BB:SIRius:DATA:PATTern <Pattern>

Selects the bit pattern for the Data selection. The maximum length is 64 bits.

Parameters:

<Pattern>   64 bits

Example: BB:SIR:DATA:PATT #B10
                           defines the bit pattern.

Manual operation: See "Data Source" on page 15

[:SOURce<hw>]:BB:SIRius:PLAYer <Player>

The command selects the physical layer mode for the transmission of the Sirius signal.

Parameters:

<Player>   LEGacy | OVERlay

                           LEGacy
                           This physical layer mode is used for legacy support

                           OVERlay
                           Selects an overlay physical layer mode, i.e. defines the modula-
                           tion of the physical layer modes according to the hierarchal over-
                           lay modulation.

                           *RST: LEGacy

Example: BB:SIR:PLAY LEG
                           selects legacy physical layer.

Manual operation: See "Physical Layer" on page 14

[:SOURce<hw>]:BB:SIRius:PLTRansmission <PlTransmission>

The command selects the physical layer transmission for the transmission of the Sirius signal.

Parameters:

<PlTransmission>	SAT1 | SAT2 | TERR

SAT1/SAT2
Transmits the QPSK-modulated signal via up to two satellites.

TERR
Transmits the COFDM-modulated signal.

*RST: SAT1

Example:	`SOURce1:BB:SIRius:PLTRansmission SAT1`
	selects SAT1 as physical layer transmission.
Manual operation:	See "Physical Layer Transmission" on page 14

[:SOURce<hw>]:BB:SIRius: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:SIRius:STATe`.

Example:	`SOURce1:BB:SIRius:PRESet`
Usage:	Event
Manual operation:	See "Set To Default" on page 12

[:SOURce<hw>]:BB:SIRius:SATellite:DELay <Delay>

Sets the signal delay in physical layer transmission satellite.

Parameters:

<Delay>	float

Range: 0 to 8
Increment: 1E-9
*RST: 0

Example:	`BB:SIR:SAT:DEL 5.0MS`
	sets a signal delay of 5 ms.
Manual operation:	See "Delay" on page 16

[:SOURce<hw>]:BB:SIRius:SATellite:MODulation <Modulation>

Sets the modulation used in the selected satellite band.

Additionally to the default QPSK modulation, 8-PSK and 8-PSK Inverted are available.

Parameters:

<Modulation>	QPSK | PSK8 | P8INV
	*RST: QPSK

Example:	SOURce1:BB:SIRius:PLTRansmission SAT1
	selects SAT1 as physical layer transmission.
	SOURce1:BB:SIRius:SATellite:MODulation QPSK
	selects QPSK modulation scheme.
Manual operation:	See "Modulation" on page 16

[:SOURce<hw>]:BB:SIRius:SATellite:OAOFfset <OAOffset>

Sets the overlay angular offset for the 8-PSK and 8-PSK Inverted modulation.

Parameters:

<OAOffset>	integer
	Range: 0 to 20
	*RST: 12
Example:	SOURce1:BB:SIRius:PLTRansmission SAT1
	selects SAT1 as physical layer transmission.
	SOURce1:BB:SIRius:SATellite:MODulation P8INV
	selects 8-PSK Inverted modulation scheme.
	SOURce1:BB:SIRius:SATellite:OAOFfset 2
	sets the overlay angular offset
Manual operation:	See "Overlay Angular Offset" on page 16

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

This command reads out the files with Sirius settings in the default directory. The default directory is set using command MMEM:CDIRectory. Only files with the file extension *.SIRius are listed.

Return values:

<Catalog>	string
Example:	MMEM:CDIR '<root>SIRIUS'
	Sets the default directory.
	BB:SIR:SETT:CAT?
	Reads out all the files with Sirius settings in the default directory.
	Response: 'SIRius_1','SIRius_'
	The files SIRius1 and SIRius2 are available.
Usage:	Query only
Manual operation:	See "Save/Recall..." on page 13

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

This command deletes the selected file with "SIRIUS" settings. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. The file extension can be omitted. Only files with the file extension *.SIRius are deleted.

Setting parameters:

<Filename>	string

Example: BB:SIR:SETT:DEL 'SIRius_1'
               Deletes file SIRius_1.

Usage: Setting only

Manual operation: See "Save/Recall..." on page 13

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

This command loads the selected file with "SIRIUS" settings. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. The file extension can be omitted. Only files with the file extension *.SIRius are loaded.

Setting parameters:

<Filename>	string

Example: BB:SIR:SETT:LOAD 'SIRius_1'
               Loads file SIRius_1.

Usage: Setting only

Manual operation: See "Save/Recall..." on page 13

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

This command stores the current "SIRIUS" settings into the selected file. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. Only enter the file name. "SIRIUS" settings are stored as files with the specific file extensions *.SIRius.

Setting parameters:

<Filename>	string

Example: BB:SIR:SETT:STOR 'SIRius_1'
               Stores the current settings into file 'SIRius_1'.

Usage: Setting only

Manual operation: See "Save/Recall..." on page 13

[:SOURce<hw>]:BB:SIRius:SETTing:STORe:FAST <Fast>

Determines whether the instrument performs an absolute or a differential storing of the settings.

Enable this function to accelerate the saving process by saving only the settings with values different to the default ones.

Note: This function is not affected by the "Preset" function.

Parameters:

<Fast>   0 | 1 | OFF | ON

                                *RST: 1

Manual operation: See "Save/Recall..." on page 13

[:SOURce<hw>]:BB:SIRius: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: SOURce1:BB:SIRius:STATe ON

Manual operation: See "State" on page 12

[:SOURce<hw>]:BB:SIRius:TERRestrial:DELay <Delay>

Sets the signal delay in physical layer transmission terrestrial.

Parameters:

<Delay>   float

                                Range: 0 to 8
                                Increment: 1E-9
                                *RST: 0

Example: BB:SIR:TERR:DEL 5.0MS
                          sets a signal delay of 5 ms.

Manual operation: See "Delay" on page 16

[:SOURce<hw>]:BB:SIRius:TERRestrial:MODulation?

Queries the modulation used in the selected terrestrial band.

Return values:

<Modulation>   COFDM

                                *RST: COFDM

Example: BB:SIR:LAY TERR
                          Selects the physical layer transmission.
                          BB:SIR:TERR:MOD?
                          Response: COFDM

Usage: Query only

Manual operation: See "Modulation" on page 16

[:SOURce\<hw\>]:BB:SIRius:TERRestrial:OAOFfset \<OAOffset\>

Sets the overlay angular offset.

Parameters:

\<OAOffset\>   integer

                              Range: 0 to 20
                              *RST: 0

Example: `BB:SIR:LAY TERR`
                              Selects the physical layer transmission.
                              `BB:SIR:TERR:OAOF 12`
                              Sets the overlay angular offset

Manual operation: See "Overlay Angular Offset" on page 16

[:SOURce\<hw\>]:BB:SIRius:VERSion?

The command queries the version of the "SIRIUS" standard underlying the definitions.
The displayed version depends on the selected physical layer mode.

Return values:

\<Version\>   string

Example: `BB:SIR:VERS?`
                              Queries the SIRIUS version.
                              `Response: "FDSC-608-110000/Ed03/Rev01"`

Usage: Query only

Manual operation: See "Version" on page 14

4.2 Filter Settings

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:TYPE <Type>

The command selects the baseband filter type for the satellite physical layer transmission.

Parameters:

<Type>	RCOSine | COSine | GAUSs | LGAuss | CONE | COF705 | COEQualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPShape | LPASSEVM
	*RST: COSine
Example:	BB:SIR:SAT:FILT:TYPE COS sets the cosine filter type.
Manual operation:	See "Filter" on page 17

[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:TYPE <Type>

The command selects the baseband filter type for the terrestrial physical layer transmission.

Parameters:

<Type>	RCOSine | COSine | GAUSs | LGAuss | CONE | COF705 | COEQualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPShape | LPASSEVM
	*RST: LPASs
Example:	BB:SIR:TERR:FILT:TYPE COS sets the cosine filter type.
Manual operation:	See "Filter" on page 17

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:APCO25 <Apco25>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:APCO25 <Apco25>

The command sets the roll-off factor for the APCO25 filter type.

Parameters:

<Apco25>	float
	Range: 0.05 to 0.99 Increment: 0.01 *RST: 0.2

Example:	BB:SIR:TERR:FILT:PAR:APCO25 0.05
	the roll-off factor is set to 0.05.

Manual operation:	See "Rolloff factor / BxT" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:COSine <Cosine>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:COSine <Cosine>

The command sets the roll-off factor for the cosine filter type.

Parameters:

<Cosine>	float	
	Range:	0.05 to 1.0
	Increment:	0.01
	*RST:	0.05

Example:	BB:SIR:TERR:FILT:PAR:COS 0.05
	the roll-off factor is set to 0.05.

Manual operation:	See "Rolloff factor / BxT" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:GAUSs <Gauss>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:GAUSs <Gauss>

The command sets the BxT for the gauss filter type.

Parameters:

<Gauss>	float	
	Range:	0.15 to 2.5
	Increment:	0.01
	*RST:	0.5

Example:	BB:SIR:TERR:FILT:PAR:GAUS 0.15
	the BxT is set to 0.15.

Manual operation:	See "Rolloff factor / BxT" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:PGAuss <PGauss>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:PGAuss <PGauss>

The command sets the BxT for the pure gauss filter type.

Parameters:

<PGauss>	float	
	Range:	0.15 to 2.5
	Increment:	0.01
	*RST:	0.5

Example:	BB:SIR:TERR:FILT:PAR:PGA 0.15
	the BxT is set to 0.15.

Manual operation:	See "Rolloff factor / BxT" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:RCOSine <RCosine>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:RCOSine <RCosine>

The command sets the roll-off factor for the root cosine filter type.

Parameters:

<RCosine>	float

	Range:	0.05 to 1.0
	Increment:	0.01
	*RST:	0.22

Example:	BB:SIR:TERR:FILT:PAR:RCOS 0.15
	the roll-off factor is set to 0.15.

Manual operation:	See "Rolloff factor / BxT" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:SPHase <SPhase>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:SPHase <SPhase>

The command sets the BxT for the split phase filter type.

Parameters:

<SPhase>	float

	Range:	0.15 to 2.5
	Increment:	0.01
	*RST:	2

Example:	BB:SIR:TERR:FILT:PAR:SPH 0.15
	the BxT is set to 0.15.

Manual operation:	See "Rolloff factor / BxT" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:LPASs <LPass>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:LPASs <LPass>

The command sets the cutoff frequency factor for the Lowpass (ACP optimization) filter type.

Parameters:

<LPass>	float

	Range:	0.05 to 2
	Increment:	0.01
	*RST:	0.5

Example:	BB:SIR:TERR:FILT:PAR:LPAS 0.15
	The cut of frequency factor is set to 0.15.

Manual operation:	See "Cutoff Frequency Factor" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:FILTer:PARameter:LPASSEVM
    <LPassEvm>
[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:LPASSEVM
    <LPassEvm>

The command sets the cutoff frequency factor for the Lowpass (EVM optimization) filter type.

Parameters:

<LPassEvm>   float

	Range:	0.05 to 2
	Increment:	0.01
	*RST:	0.5

Example: BB:SIR:TERR:FILT:PAR:LPASSEVM 0.15

The cut of frequency factor is set to 0.15.

Manual operation: See "Cutoff Frequency Factor" on page 18

[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:PARameter:COSine:COFS <Cofs>

The command sets the "cut of frequency shift' value for the Cosine filter type.

Parameters:

<Cofs>   float

	Range:	-1 to 1
	Increment:	0.01
	*RST:	-0.1

Example: BB:SIR:TERR:FILT:PAR:COS:COFS 0.04

Manual operation: See "Cutoff Frequency Shift" on page 18

[:SOURce<hw>]:BB:SIRius:SATellite:SRATe:VARiation <Variation>

Sets the output symbol rate.

Parameters:

<Variation>   integer

	Range:	3E6 to 5E6
	*RST:	3758400

Example: BB:SIR:SAT:SRAT:VAR 4000000

sets the output sample rate to 4000000 symbols/s.

Manual operation: See "Symbol Rate Variation" on page 19

[:SOURce<hw>]:BB:SIRius:TERRestrial:SRATe:VARiation <Variation>

Sets the output sample rate.

Parameters:

<Variation>　　　　　　　float

　　　　　　　　　　　　Range:　　　6E6 to 6.3E6
　　　　　　　　　　　　Increment:　0.001
　　　　　　　　　　　　*RST:　　　　6144103.125

Example:　　　　　　`BB:SIR:TERR:SRAT:VAR 6 144 103.125`
　　　　　　　　　　　　sets the output sample rate.

Manual operation:　　See "Sample Rate Variation" on page 19

[:SOURce<hw>]:BB:SIRius:TERRestrial:FILTer:TCFilter[:STATe] <State>

Activates or deactivates the Sirius filter which is in compliance with the spectral mask of the terrestrial standard.

Parameters:

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

Example:　　　　　　`BB:SIR:TERR:FILT:TCF:STAT ON`
　　　　　　　　　　　　activates the Sirius terrestrial compliant filter.

Manual operation:　　See "Use Sirius Terrestrial Compliant Filter" on page 17

4.3　Trigger Settings

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

The command stops signal generation for trigger modes "Armed_Auto" and "Armed_Retrigger". A subsequent internal or external trigger event restarts the signal generation.

Example: `BB:SIR:TERR|SAT:TRIG:SOUR INT`
Sets internal triggering.
`BB:SIR:TERR|SAT:SEQ ARET`
Sets Armed_Retrigger mode, i.e. every trigger event causes the signal generation to restart.
`BB:SIR:TRIG:EXEC`
Executes a trigger, the signal generation is started.
`BB:SIR:TRIG:ARM:EXEC`
The signal generation is stopped.
`BB:SIR:TRIG:EXEC`
Executes a trigger, the signal generation is started again.
`BB:SIR:TRIG:RMOD?`
Queries the status of signal generation.
Response:
`RUN`
The signal is generated, the trigger was executed.

Usage: Event

Manual operation: See "Arm" on page 17

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

The command executes a trigger. The internal trigger source must be selected using the command `:BB:SIR:TERR|SAT:TRIG:SOUR INT` and a trigger mode other than `AUTO` must be selected using the command `:BB:SIR:TERR|SAT:SEQ`.

Example: `BB:SIR:TERR|SAT:TRIG:SOUR INT`
Sets internal triggering.
`BB:SIR:TERR|SAT:SEQ RETR`
Sets Retrigger mode, i.e. every trigger event causes signal generation to restart.
`BB:SIR:TRIG:EXEC`
Executes a trigger.

Usage: Event

Manual operation: See "Execute Trigger" on page 17

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

The command queries the status of signal generation for all trigger modes with Sirius modulation on.

Return values:

<RMode>	STOP | RUN

RUN

The signal is generated. A trigger event occurred in the triggered mode.

STOP

The signal is not generated. A trigger event did not occur in the triggered modes, or signal generation was stopped by the command `SOUR:BB:SIR:TRIG:ARM:EXEC` (armed trigger modes only).

*RST: STOP

Example: `BB:SIR:TERR|SAT:TRIG:SOUR EXT`

Sets external triggering via the TRIGGER 1 connector.

`BB:SIR:TERR|SAT:SEQ ARET`

Selects the Armed_Retrigger mode.

`BB:SIR:TRIG:RMOD?`

Queries the status of signal generation.

Response:

`RUN`

The signal is generated, an external trigger was executed.

Usage: Query only

Manual operation: See "Running/Stopped" on page 21

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

The command specifies the trigger delay (expressed as a number of symbols) for triggering by the trigger signal from the second path.

Parameters:

<Delay>	float

Range: 0 to 65535
Increment: 0.01
*RST: 0

Example: `BB:SIR:SAT:TRIG:SOUR OBAS`

sets for path A the internal trigger executed by the trigger signal from the second path (path B).

`BB:SIR:SAT:TRIG:OBAS:DEL 50`

sets a delay of 50 symbols for the trigger.

Manual operation: See "Trigger Delay" on page 24

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

The command specifies the number of symbols by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path.

Parameters:

<Inhibit>	integer
	Range: 0 to 67108863
	*RST: 0

Example: BB:SIR:SAT:TRIG:SOUR OBAS

sets for path A the internal trigger executed by the trigger signal from the second path (path B).

BB:SIR:SAT:TRIG:INH 200

sets a restart inhibit for 200 symbols following a trigger event.

Manual operation: See "Trigger Inhibit" on page 24

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:SLENgth <SLength>

Sets the sequence length of the signal in symbols.

Parameters:

<SLength>	integer
	Range: 1 to 4294967295
	*RST: 1

Example: BB:SIR:SAT:TRIG:SLEN 5000

selects the generation of 5000 symbols.

Manual operation: See "Signal Duration" on page 21

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:SOURce <Source>

Selects the trigger source.

Parameters:

<Source>	INTernal|OBASeband|BEXTernal|EXTernal
	INTernal
	manual trigger or *TRG.
	EXTernal|BEXTernal
	trigger signal on the TRIGGER 1/2 connector.
	OBASeband
	trigger signal from the other path
	*RST: INTernal

Example: SOURce1:BB:SIRius:SATellite:TRIGger:SOURce
EXTernal

sets external triggering via the TRIGGER 1 connector.

Manual operation: See "Trigger Source" on page 22

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger[:EXTernal<ch>]:DELay <Delay>

The command specifies the trigger delay (expressed as a number of symbols) for external triggering.

Parameters:

<Delay>	float
	Range: 0 to 65535
	Increment: 0.01
	*RST: 0

Example: `BB:SIR:SAT:TRIG:SOUR EXT`

`BB:SIR:SAT:TRIG:DEL 50`

Manual operation: See "Trigger Delay" on page 24

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger[:EXTernal<ch>]:INHibit <Inhibit>

The command specifies the number of symbols by which a restart is to be inhibited following a trigger event. This command applies only in the case of external triggering.

Parameters:

<Inhibit>	integer
	Range: 0 to 67108863
	*RST: 0

Example: `BB:SIR:SAT:TRIG:SOUR EXT`

`BB:SIR:SAT:TRIG:INH 200`

Manual operation: See "Trigger Inhibit" on page 24

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

The command specifies the trigger delay (expressed as a number of samples) for triggering by the trigger signal from the second path.

Parameters:

<Delay>	float
	Range: 0 to 65535
	Increment: 0.01
	*RST: 0

Example: `BB:SIR:TERR:TRIG:SOUR OBAS`

Sets for path A the internal trigger executed by the trigger signal from the second path (path B).

`BB:SIR:TERR:TRIG:OBAS:DEL 50`

Sets a delay of 50 samples for the trigger.

Manual operation: See "Trigger Delay" on page 24

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

The command specifies the number of samples by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path.

Parameters:

<Inhibit>	integer
	Range: 0 to 67108863
	*RST: 0

Example: `BB:SIR:TERR:TRIG:SOUR OBAS`
Sets for path A the internal trigger executed by the trigger signal
from the second path (path B).
`BB:SIR:TERR:TRIG:INH 200`
Sets a restart inhibit for 200 samples following a trigger event.

Manual operation: See "Trigger Inhibit" on page 24

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:SLENgth <SLength>

Sets the sequence length of the signal in number of samples.

Parameters:

<SLength>	integer
	Range: dynamic to dynamic
	*RST: 1

Example: `BB:SIR:TERR:TRIG:SLEN 5000`
selects the generation of 5000 samples.

Manual operation: See "Signal Duration" on page 21

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:SOURce <Source>

The command selects the trigger source.

Parameters:

<Source>	INTernal|OBASeband|BEXTernal|EXTernal
	INTernal
	manual trigger or `*TRG`.
	EXTernal|BEXTernal
	trigger signal on the TRIGGER 1/2 connector.
	OBASeband
	trigger signal from the other path
	*RST: INTernal

Example: `SOURce1:BB:SIRius:TERRestrial:TRIGger:SOURce`
`EXTernal`
sets external triggering via the TRIGGER 1 connector.

Manual operation: See "Trigger Source" on page 22

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger[:EXTernal<ch>]:DELay <Delay>

The command specifies the trigger delay (expressed as a number of samples) for
external triggering.

Parameters:

<Delay>   float

                   Range: 0 to 65535
                   Increment: 0.01
                   *RST: 0

Example: BB:SIR:TERR:TRIG:SOUR EXT
                   BB:SIR:TERR:TRIG:DEL 50

Manual operation: See "Trigger Delay" on page 24

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger[:EXTernal<ch>]:INHibit <Inhibit>

The command specifies the number of samples by which a restart is to be inhibited following a trigger event. This command applies only in the case of external triggering.

Parameters:

<Inhibit>   integer

                   Range: 0 to 67108863
                   *RST: 0

Example: BB:SIR:TERR:TRIG:SOUR EXT
                   BB:SIR:TERR:TRIG:INH 200

Manual operation: See "Trigger Inhibit" on page 24

[:SOURce<hw>]:BB:SIRius:SATellite[:TRIGger]:SEQuence <Sequence>
[:SOURce<hw>]:BB:SIRius:TERRestrial[:TRIGger]:SEQuence <Sequence>

The command selects the trigger mode.

Parameters:

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

AUTO
The modulation signal is generated continuously.

RETRigger
The modulation signal is generated continuously. A trigger event
(internal or external) causes a restart.

AAUTo
The modulation signal is generated only when a trigger event
occurs. After the trigger event, the signal is generated continu-
ously. Signal generation is stopped with command
`SOUR:BB:SIR:TRIG:ARM:EXEC` and started again when a trig-
ger event occurs.

ARETrigger
The modulation signal is generated only when a trigger event
occurs. The device automatically toggles to RETRIG mode.
Every subsequent trigger event causes a restart.
Signal generation is stopped with command
`SOUR:BB:SIR:TRIG:ARM:EXEC` and started again when a trig-
ger event occurs.

SINGle
The modulation signal is generated only when a trigger event
occurs. Then the signal is generated once to the length specified
with command `SOUR:BB:SIR:TERR:TRIG:SLEN`. Every sub-
sequent trigger event causes a restart.

*RST: AUTO

Example: `BB:SIR:TERR:SEQ AAUT`

Manual operation: See "Trigger Mode" on page 20

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:EXTernal:SYNChronize:OUTPut
       <Output>
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:EXTernal:SYNChronize:OUTPut
       <Output>

(enabled for "Trigger Source" External)

Enables/disables output of the signal synchronous to the external trigger event.

Parameters:

<Output>   0 | 1 | OFF | ON

*RST: 1

Example: `BB:SIR:TERR:TRIG:SOUR EXT`
Sets external triggering.
`BB:SIR:TERR:TRIG:EXT:SYNC:OUTP ON`
Enables synchronous output to external trigger

Manual operation: See "Sync. Output to External Trigger" on page 22

4.4 Marker Settings

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut:DELay:FIXed <Fixed>
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut:DELay:FIXed <Fixed>

Restricts the marker delay setting range to the dynamic range.

Parameters:

<Fixed>	0 | 1 | OFF | ON
	*RST:　　0

Example:	BB:SIR:SAT:TRIG:OUTP:DEL:FIX ON

Manual operation:	See "Fix marker delay to current range" on page 26

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:DELay <Delay>
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:DELay <Delay>

Defines the delay between the signal on the marker outputs and the start of the signal, expressed in terms of symbols.

Use the command `[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut:DELay:FIXed` to restrict the range of values to the dynamic range.

Parameters:

<Delay>	float
	Range:　　0 to $2^{32} - 1$ symbols
	Increment: 1
	*RST:　　0

Example:	`BB:SIR:SAT:TRIG:OUTP2:DEL 1600` Sets a delay of 1600 symbols for the signal on the second marker connector.
Manual operation:	See "Marker x Delay" on page 26

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:DELay: MAXimum?
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:DELay:MINimum?
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:DELay:MAXimum?
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:DELay:MINimum?

Queries the minimum/maximum marker delay for set-
ting `:BB:SIRius:SATellite|TERRestrial:TRIGger:OUTPut:DELay:FIXed ON`.

Return values:

<Minimum>	float
	Range: 0 to max

Example:	`BB:SIR:SAT:TRIG:OUTP:DEL:FIX ON`
	Restricts the marker signal delay setting range to the dynamic range.
	`BB:SIR:SAT:TRIG:OUTP:DEL:MIN?`
	Queries the minimum of the dynamic range.
	Response: `0`
	The minimum for the marker delay setting is 0 symbols.

Usage:	Query only
Manual operation:	See "Current Range without Recalculation" on page 26

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:MODE <Mode>
[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:MODE <Mode>
Parameters:

<Mode>	SYMBol | FRAMe | SFRame | USER | RATio | TRIGger

(for physical layer transmission Terrestrial)

SYMBol
A marker signal is generated at the beginning of each symbol

FRAMe
A marker signal is generated at the beginning of each frame.

SFRame
A marker signal is generated at the beginning of a specified symbol within a frame. The symbol is selected with the command `[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:SPOSition` on page 56.

USER
A marker signal is generated at the beginning of every user-defined period. The period is defined with the command `[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:PERiod` and `[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:PERiod`.

RATio
A marker signal corresponding to the Time Off / Time On specifications in the commands `[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:ONTime` and `[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:OFFTime` respectively `[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:ONTime` and `[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:OFFTime` is generated.

TRIGger
A received internal or external trigger signal is output at the marker connector.

*RST: RATio

Example: `BB:SIR:TERR:TRIG:OUTP2:MODE FRAMe`
A marker signal is generated at the beginning of each frame.

Manual operation: See "Marker Mode" on page 25

[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:OFFTime <OffTime>
[:SOURce<hw>]:BB:SIRius:SATellite:TRIGger:OUTPut<ch>:ONTime <OnTime>

The command sets the number of symbols in a period (ON time + OFF time) during which the marker signal in setting
`SOURce:BB:SIR:SATellite:TRIGger:OUTPut:MODE RATio` on the marker outputs is ON.

Parameters:

\<OnTime\>	integer

Range: 1 to 2^24-1 symbols
Increment: 1 symbol
*RST: 1

Example: `BB:SIR:SAT:TRIG:OUTP2:ONT 200`

sets an ON time of 200 symbols for marker 2.

Manual operation: See "Marker Mode" on page 25

[:SOURce\<hw\>]:BB:SIRius:SATellite:TRIGger:OUTPut\<ch\>:PATTern \<Pattern\>

Defines the bit pattern used to generate the marker signal in the setting `SOURce:BB:SIRius:SATellite:TRIGger:OUTPut:MODE PATTern`. 0 is marker off, 1 is marker on.

Parameters:

\<Pattern\>	64 bits

Example: `BB:SIR:SAT:TRIG:OUTP2:PATT #B000000011111111,15`

sets a bit pattern.

`BB:SIR:SAT:TRIG:OUTP2:MODE PATT`

activates the marker signal according to a bit pattern on output MARKER 2.

Manual operation: See "Marker Mode" on page 25

[:SOURce\<hw\>]:BB:SIRius:SATellite:TRIGger:OUTPut\<ch\>:PERiod \<Period\>
[:SOURce\<hw\>]:BB:SIRius:TERRestrial:TRIGger:OUTPut\<ch\>:PERiod \<Period\>

The command sets the repetition rate for the signal at the marker outputs, expressed in terms of samples.

Parameters:

\<Period\>	integer

Range: 2 to 16777215
*RST: 2

Example: `BB:SIR:TERR:TRIG:OUTP2:MODE USER`

Selects the user marker

`BB:SIR:TERR:TRIG:OUTP2:PER 1600`

Sets a period of 1600 samples, i.e. the marker signal is repeated every 1600th sample.

Manual operation: See "Marker Mode" on page 25

[:SOURce\<hw\>]:BB:SIRius:SATellite:TRIGger:OUTPut\<ch\>:PULSe:DIVider
      \<Divider\>

The command sets the divider for Pulse marker mode.

Parameters:

\<Divider\>	integer
	Range: 2 to 1024
	*RST: 2

Example: `BB:SIR:SAT:TRIG:OUTP2:PULS:DIV 2`

Sets the divider to 2 for the marker signal

`BB:SIR:SAT:TRIG:OUTP2:FREQ?`

Queries the resulting pulse frequency of the marker signal.

Response: `66 000`

Manual operation: See "Marker Mode" on page 25

[:SOURce\<hw\>]:BB:SIRius:SATellite:TRIGger:OUTPut\<ch\>:PULSe:FREQuency?

Queries the pulse frequency of the pulsed marker signal in the setting
`SOURce:BB:SIRius:SATellite:TRIGger:OUTPut:MODE PULSe`. The pulse frequency is derived by dividing the symbol rate by the divider.

Return values:

\<Frequency\>	float
	Range: 0 to max

Example: `BB:SIR:SAT:TRIG:OUTP2:PULS:DIV 2`

Sets the divider marker signal to the value 2.

`BB:SIR:SAT:TRIG:OUTP2:MODE PULS`

Enables the pulsed marker signal.

`BB:SIR:SAT:TRIG:OUTP2:PULS:FREQ?`

Queries the pulse frequency of the marker signal.

Response: `33 000`

The resulting pulse frequency is 33 kHz.

Usage: Query only

Manual operation: See "Marker Mode" on page 25

[:SOURce\<hw\>]:BB:SIRius:TERRestrial:TRIGger:OUTPut\<ch\>:OFFTime
    \<OffTime\>
[:SOURce\<hw\>]:BB:SIRius:TERRestrial:TRIGger:OUTPut\<ch\>:ONTime
    \<OnTime\>

Sets the number of samples in a period (ON time + OFF time) during which the marker signal is on or off.

Parameters:

\<OnTime\>	integer
	Range: 1 to 16777215
	*RST: 1

Example: `BB:SIR:TERR:TRIG:OUTP2:ONT 200`

Manual operation: See "Marker Mode" on page 25

[:SOURce<hw>]:BB:SIRius:TERRestrial:TRIGger:OUTPut<ch>:SPOSition
    <SPosition>

Sets the symbol within a frame for that a marker signal is generated.

Parameters:

<SPosition>	integer
	Range: 1 to 1275
	*RST: 1

Example: BB:SIR:TERR:TRIG:OUTP:SPOS 200

4.5 Clock Settings

[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:MODE <Mode>
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:MODE <Mode>

Sets the type of externally supplied clock.

For two-path instruments, the only numerical suffix allowed for SOURce is 1, since the external clock source is permanently allocated to path A.

Parameters:

<Mode>	SAMPle | MSAMple
	*RST: SAMPle

Example: BB:SIRius:TERRestrial:CLOC:MODE SAMP
                      selects clock type Sample, i.e. the supplied clock is a sample
                      clock.

Manual operation: See "Clock Mode" on page 28

[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:MULTiplier <Multiplier>
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:MULTiplier <Multiplier>

Sets the multiplier for clock mode multiple in the case of an external clock source.

Parameters:

<Multiplier>	integer
	Range: 1 to 64
	*RST: 4

Example: `BB:SIR:TERR:CLOC:SOUR EXT`
Selects the external clock source. The clock is supplied via the CLOCK connector.
`BB:SIR:TERR:CLOC:MODE MSAM`
Selects clock mode "Multiple Sample", i.e. the supplied clock has a rate which is a multiple of the sample rate.
`BB:SIR:TERR:CLOC:MULT 12`

Manual operation: See "Clock Multiplier" on page 28

[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:SOURce <Source>
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:SOURce <Source>

Selects the clock source.

Parameters:

<Source>   INTernal | EXTernal | AINTernal

INTernal
The internal clock reference is used.

EXTernal
(two-path instruments in path A)
The external clock reference is supplied to the CLOCK connector.

AINTernal
(two-path instruments in path B)

*RST: INTernal

Example: `BB:SIR:TERR:CLOC:SOUR EXT`
selects an external clock reference. The clock is supplied via the CLOCK connector.
`BB:SIR:TERR:CLOC:MODE SAMP`
specifies that a sample clock is supplied via the CLOCK connector.

Manual operation: See "Clock Source" on page 27

[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:SYNChronization:MODE <Mode>
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:SYNChronization:MODE <Mode>

Selects the synchronization mode.

This parameter is used to enable generation of precise synchronous signal of several connected R&S SMBVs.

Note:

If several instruments are connected, the connecting cables from the master instrument to the slave one and between each two consecutive slave instruments must have the same length and type.

Avoid unnecessary cable length and branching points.

Parameters:

<Mode>	NONE | MASTer | SLAVe
	NONE The instrument is working in stand-alone mode.
	MASTer The instrument provides all connected instrument with its synchronization (including the trigger signal) and reference clock signal.
	SLAVe The instrument receives the system and reference clock signal and the trigger signal from another instrument working in a master mode.
	*RST: NONE

Example: BB:SIR:TERR:CLOC:SYNC:MODE MAST
The instrument is configured to work as a master one.

Manual operation: See "Sync. Mode" on page 27

[:SOURce<hw>]:BB:SIRius:SATellite:CLOCk:SYNChronization:EXECute
[:SOURce<hw>]:BB:SIRius:TERRestrial:CLOCk:SYNChronization:EXECute

Performs automatically adjustment of the instrument's settings required for the synchronization mode, set with the command BB:SIR:TERR:CLOC:SYNC:MODE.

Example: BB:SIR:TERR:CLOC:SYNC:MODE MAST
The instrument is configured to work as a master one.
BB:SIR:TERR:CLOC:SYNC:EXEC
All synchronization's settings are adjusted accordingly.

Usage: Event

Manual operation: See "Set Synchronization Settings" on page 27

List of Commands

Index