R&S®SMCVB-K160
DRM
User Manual

ROHDE&SCHWARZ

Make ideas real

This document describes the following software options:

- R&S®SMCVB-K160 DRM (1434.3819.xx)

This manual describes firmware version FW 4.90.002.xx and later of the R&S®SMCV100B.

The following abbreviations are used throughout this manual: R&S®SMCV100B is abbreviated as R&S SMCVB, R&S®WinIQSIM2 is abbreviated as R&S WinIQSIM2

Contents

1 Welcome to the DRM Option

The R&S SMCVB-K160 is a firmware application that adds functionality to generate signals in accordance with the DRM digital standard.

The R&S SMCVB-K160 option features:

- DRM signal generation

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 SMCV100B user manual. The latest version is available at:

www.rohde-schwarz.com/manual/SMCV100B

Installation

You can find detailed installation instructions in the delivery of the option or in the R&S SMCV100B service manual.

1.1 Accessing the DRM Dialog

To open the dialog with DRM settings

► In the block diagram of the R&S SMCV100B, select "Baseband > DRM".

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 SMCV100B user documentation. Unless specified otherwise, you find the documents on the R&S SMCV100B product page at:

www.rohde-schwarz.com/manual/smcv100b

1.2.1 Getting Started Manual

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

1.2.2 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 SMCV100B is not included.

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

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

1.2.3 Service Manual

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

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

https://gloris.rohde-schwarz.com

1.2.4 Instrument Security Procedures

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

1.2.5 Printed Safety Instructions

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

1.2.6 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S SMCV100B. 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/smcv100b

1.2.7 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/smcv100b

1.2.8 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/smcv100b

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 SMCV100B 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 DRM Option

The DRM system is designed for digital audio broadcasting in the bands below 300 MHz using OFDM modulation and MPEG audio coding techniques.

The DRM system is specified in ETSI ES 201 980. DCP operation is specified in ETSI TS 102 821.

2.1 Required Options

The equipment layout for generating DRM signals includes:

- Base unit
- Option Enable Broadcast Standard (R&S SMCVB-K519)
- Option DRM (R&S SMCVB-K160)

3 DRM Configuration and Settings

Access:

► Select "Baseband > DRM".

The remote commands required to define these settings are described in Chapter 4, "Remote Control Commands", on page 18.

Settings:

3.1 General Settings

Access:

► Select "Baseband > DRM".
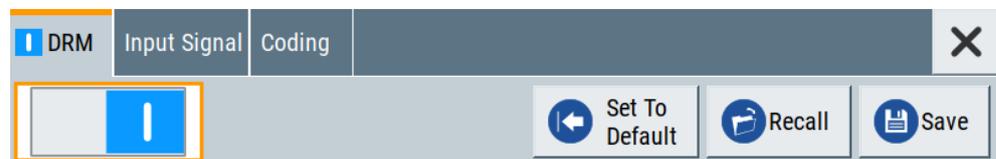
The tab provides functionality for calling default settings, save and recall settings.

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:DRM:STATe on page 19

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 the "Set to Default"

Remote command:

[:SOURce<hw>]:BB:DRM:PRESet on page 19

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 SMCV100B user manual.

Remote command:

[:SOURce<hw>]:BB:DRM:SETTing:CATalog? on page 20
[:SOURce<hw>]:BB:DRM:SETTing:DELete on page 20
[:SOURce<hw>]:BB:DRM:SETTing:LOAD on page 20
[:SOURce<hw>]:BB:DRM:SETTing:STORe on page 20

3.2 Input Signal Settings

Access:

► Select "Baseband > DRM > Input Signal".
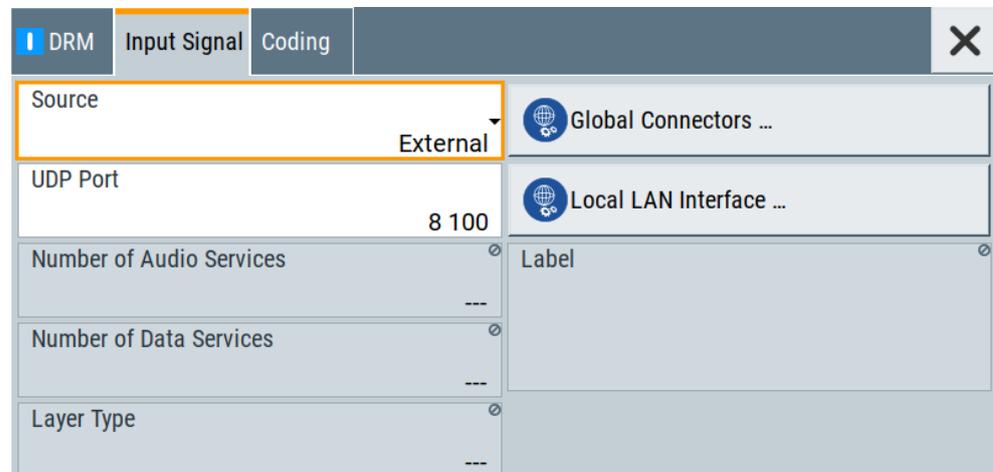
The dialog provides to settings necessary to configure the input signal.

Settings:

Source

Sets the modulation source for the input signal.

The input signal is a MDI stream built upon the DCP stack.

"External"   Uses a UDP/IP stream input at the "LAN" connector of the host PC of
                    the R&S SMCV100B.
                    Access the LAN

"DCP File"   Reads the input stream from a `*.dcp` file. The binary file contains the
                    MDI data encapsulated in DCP packets.

Remote command:
[:SOURce<hw>]:BB:DRM:SOURce on page 21

UDP Port

Requires "Source > External".

Sets the UDP port.

Enter the port number on that the UDP/IP receiver listens for UDP datagrams. The port
is the same port number that the UDP sender uses. If the port is unknown, try the
default port "8100".

Remote command:
[:SOURce<hw>]:BB:DRM:PORT on page 22

Select File

Requires "Source > DCP File".

Provides access to the standard "File Select" function of the instrument. The provided
navigation possibilities in the dialog are self-explanatory.

See also, chapter "File and Data Management" in the R&S SMCV100B User Manual.

The name of the loaded DCP file is displayed next to the button. By default, the file
`Default.dcp` is loaded.

Remote command:
[:SOURce<hw>]:BB:DRM:FILename on page 22

Number of Audio Services

Displays the number of audio services contained in the input stream.

Remote command:
[:SOURce<hw>]:BB:DRM:NUMaudio? on page 23

Number of Data Services

Displays the number of data services contained in the input stream.

Remote command:
[:SOURce<hw>]:BB:DRM:NUMData? on page 23

Layer Type

Displays the type of audio in the transmission.

"Base"　　　　　　　Decodable by all DRM receivers.

"Enhancement"

　　　　　　　　　Only decodable by receivers with appropriate capabilities.

Remote command:

[:SOURce<hw>]:BB:DRM:TYPE? on page 23

Label

Displays the label of the transmitted service.

The maximum length specified for each service is 16 characters. The services are separated by line-breaks.

Example: Labels of a DRM signal with four services

"DRM Service A"

"DRM Service B"

"DRM Service C"

"DRM Service D"

Remote command:

[:SOURce<hw>]:BB:DRM:LABel? on page 22

Local LAN Interface

Accesses the network settings tab.

The tab allows you to configure network parameters for IP signal input at the "LAN" connector.

The settings are also relevant for remote access to the R&S SMCV100B. See the chapter "Network Settings" in the R&S SMCV100B user manual.

3.3　Coding Settings

Access:

► Select "Baseband > DRM > Coding".

　　The tab provides settings for coding.

Settings:

3.3.1 General Settings

Access:

► Select "Coding > General".

The tab provides general settings necessary to configure the coding.

Settings:

Robustness Mode

Displays the robustness mode of the signal. The different robustness modes "A" to "E" provide different OFDM parameter sets, each of them adapted to different propagation conditions.

Remote command:

[:SOURce<hw>]:BB:DRM:MODE? on page 25

Constellation MSC

Displays the constellation of the main service channel (MSC).

Remote command:

[:SOURce<hw>]:BB:DRM:MSC:CONStel? on page 26

Constellation SDC

Displays the constellation of the service description channel (SDC).

Remote command:

[:SOURce<hw>]:BB:DRM:SDC:CONStel? on page 28

Interleaver Depth

Displays the interleaver depth.

The depth depends on the robustness mode, see "Robustness Mode" on page 14:
- "Robustness Mode > A to D": "400 ms" or "2 s" interleaver depth
- "Robustness Mode > E": "600 ms" interleaver depth

Remote command:

[:SOURce<hw>]:BB:DRM:INTerleaver? on page 26

Channel Bandwidth

Displays the channel bandwidth.

The bandwidth depends on the robustness mode, see "Robustness Mode" on page 14:
- "Robustness Mode > A to D": "4.5 kHz", "5 kHz", "9 kHz", "10 kHz", "18 kHz", or "20 kHz" channel bandwidth
- "Robustness Mode > E": "100 kHz" channel bandwidth

Remote command:

[:SOURce<hw>]:BB:DRM:BANDwidth? on page 25

3.3.2 Code Rate Settings

Access:

► Select "Coding > Code Rate".
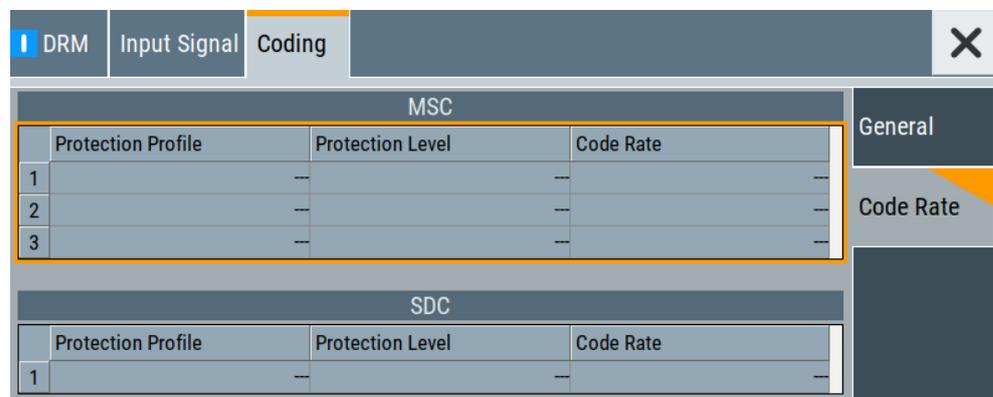
The tab displays code rate parameters of MSC and SDC.

Settings:

Code Rate MSC table

In the table, the corresponding code rate parameters of the main service channel (MSC) are shown.

Protection Profile ← Code Rate MSC table

Displays the protection profile used in the transmission.

"LPP"   If EEP is used, the lower protected part (LPP) is displayed. See "Protection Profile" on page 16.

"HPP"   If UEP is used, the higher protected part (HPP) and LPP are displayed.

"VSPP"   Very strongly protected part. The profile is displayed for stream 0, if hierarchical modulation is used.

Remote command:

[:SOURce<hw>]:BB:DRM:MSC:PROFile<ch>? on page 27

Protection Level ← Code Rate MSC table

Displays the protection level used in each of the protection profiles.

Remote command:

[:SOURce<hw>]:BB:DRM:MSC:LEVel<ch>? on page 27

Code Rate ← Code Rate MSC table

Displays the overall code rate used in each of the protection profiles.

Remote command:

[:SOURce<hw>]:BB:DRM:MSC:RATE<ch>? on page 27

Code Rate SDC table

In the table, the corresponding code rate parameters of the service description channel (SDC) are shown.

Protection Profile ← Code Rate SDC table

Displays the protection profile of the SDC.

"EEP"   Fixed value

Remote command:

[:SOURce<hw>]:BB:DRM:SDC:PROFile<ch>? on page 29

Protection Level ← Code Rate SDC table

Displays the protection level of the SDC.

Remote command:

[:SOURce<hw>]:BB:DRM:SDC:LEVel<ch>? on page 28

Code Rate ← Code Rate SDC table

Displays the overall code rate of the SDC.

Remote command:

[:SOURce<hw>]:BB:DRM:SDC:RATE<ch>? on page 29

3.4　Global Connector Settings

The "Input Signal" dialog, the "Trigger/Marker/Clock" dialog and "Trigger In", "Marker" and "Clock" tabs in "Baseband > ARB/Custom Digital Mod" configuration dialogs provide quick access to the related connector settings. Click the "Global Connectors" button to access the settings.
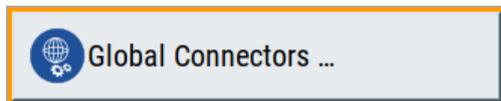
See also chapter "Global Connector Settings" in the user manual.

4 Remote Control Commands

The following commands are required to generate signals with the DRM option in a remote environment. We assume that the R&S SMCV100B has already been set up for remote operation in a network as described in the R&S SMCV100B 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 SMCV100B user manual.

Common suffixes

The following common suffixes are used in the remote commands:

Suffix	Value range	Description
SOURce<hw>	1	Available baseband signals
<ch>	1 to 3	MSC channels
	1	SDC channels

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/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 DRM are described here:

4.1 General Commands

Example: Saving current configuration

```
:SOURce1:BB:DRM:SETTing:STORe "/var/user/my_DRM"
// Saves the file "my_DRM.DRM" in the directory as above.

*RST

:SOURce1:BB:DRM:SETTing:CATalog?
// Response: "my_DRM"
:SOURce1:BB:DRM:SETTing:LOAD "/var/user/my_DRM"
:SOURce1:BB:DRM:STATe ON
:SOURce1:BB:DRM:SETTing:DELete "/var/user/my_DRM"
```

Commands:

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

Example:	See Example "Saving current configuration" on page 19.
Usage:	Event
Manual operation:	See "Set To Default" on page 10

[:SOURce<hw>]:BB:DRM: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 current configuration" on page 19.
Manual operation:	See "State" on page 10

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

Queries the files with settings in the default directory. Listed are files with the file extension $*.drm$.

Return values:

<FileNames>   <filename1>,<filename2>,...

                          Returns a string of filenames separated by commas.

Example: See Example "Saving current configuration" on page 19.

Usage: Query only

Manual operation: See "Save/Recall" on page 11

[:SOURce<hw>]:BB:DRM:SETTing:DELete <DrmDelete>

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

Parameters:

<DrmDelete>   "<filename>"

                          Filename or complete file path; file extension can be omitted

Example: See Example "Saving current configuration" on page 19.

Usage: Setting only

Manual operation: See "Save/Recall" on page 11

[:SOURce<hw>]:BB:DRM:SETTing:LOAD <DrmRecall>

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

Parameters:

<DrmRecall>   "<DrmRecall>"

                          Filename or complete file path; file extension can be omitted

Usage: Setting only

Manual operation: See "Save/Recall" on page 11

[:SOURce<hw>]:BB:DRM:SETTing:STORe <DrmSave>

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

Parameters:

<DrmSave>   "<filename>"

                          Filename or complete file path

Example: See Example "Saving current configuration" on page 19.

Usage: Setting only

Manual operation: See "Save/Recall" on page 11

4.2 Input Commands

Example: Configuring the input signal

```
// Configure DRM input stream.
:SOURce1:BB:DRM:SOURce?
// Response: EXT
:SOURce1:BB:DRM:PORT?
// Response: 8100
:SOURce1:BB:DRM:SOURce
:SOURce1:BB:DRM:FILename "/var/user/DRM1"
// Loads the file "DRM1.dcp".

// Query properties of the DRM input stream.
:SOURce1:BB:DRM:LABel?
// Response: "DRM Service No.A<br>DRM Service No.B<br>DRM Service
// No.C<br>DRM Service No.D"
// 4 DRM services present: DRM Service No.A,  DRM Service No.B,
// DRM Service No.C, DRM Service No.D
// The services are separated by <br>.
:SOURce1:BB:DRM:NUMaudio?
// Response: 4
:SOURce1:BB:DRM:NUMData?
// Response: 4
:SOURce1:BB:DRM:TYPE?
// Response: BASE
```

Commands:

[:SOURce<hw>]:BB:DRM:SOURce <DrmSource>

Sets the modulation source for the input signal.

Parameters:
<DrmSource>   EXTernal | FILE

EXTernal

Uses a UDP/IP stream input at the "LAN" connector of the host PC of the R&S SMCV100B.

FILE

Reads the input stream from a `*.dcp` file. The binary file contains the MDI data encapsulated in DCP packets.

*RST: FILE

Example: See Example "Configuring the input signal" on page 21.

Manual operation: See "Source" on page 12

[:SOURce<hw>]:BB:DRM:PORT <DrmPort>

Sets the UDP port. Enter the port number on that the UDP/IP receiver listens for UDP datagrams.

Parameters:

<DrmPort>   integer

Range: 0 to 65535
*RST: 8100

Example: See Example "Configuring the input signal" on page 21.

Manual operation: See "UDP Port" on page 12

[:SOURce<hw>]:BB:DRM:FILename <DrmDcpFile>

Loads the specified DCP file.

Parameters:

<DrmDcpFile>   string

Filename or complete file path; file extension (`*.dcp`) can be omitted.

*RST: /var/user/

Example: `SOURce1:BB:DRM:FILename "/var/user/DRM1"`
Loads the file `DRM1.dcp`.

Manual operation: See "Select File" on page 12

[:SOURce<hw>]:BB:DRM:LABel?

Queries the label of the transmitted service.

Return values:

<DrmLabel>   string

Each service has a maximum length of 16 characters separated by `<br>`.

Example: See Example "Configuring the input signal" on page 21.

Usage: Query only

Manual operation: See "Label" on page 13

[:SOURce<hw>]:BB:DRM:NUMaudio?

Queries the number of audio services contained in the input stream.

Return values:
<DrmNumAudio>   0 | 1 | 2 | 3 | 4 | INV

0|1|2|3|4
Available number of audio services

INV
Invalid number of audio services

Example: See Example "Configuring the input signal" on page 21.

Usage: Query only

Manual operation: See "Number of Audio Services" on page 12

[:SOURce<hw>]:BB:DRM:NUMData?

Queries the number of data services contained in the input stream.

Return values:
<DrmNumData>   0 | 1 | 2 | 3 | 4 | INV

0|1|2|3|4
Available number of data services

INV
Invalid number of data services

Example: See Example "Configuring the input signal" on page 21.

Usage: Query only

Manual operation: See "Number of Data Services" on page 12

[:SOURce<hw>]:BB:DRM:TYPE?

Queries the type of audio in the transmission.

Return values:
<DrmLayerType>   BASE | ENHancement | INV

BASE
Decodable by all DRM receivers.

ENHancement
Only decodable by receivers with appropriate capabilities.

INV
Invalid type

Example: See Example "Configuring the input signal" on page 21.

Usage: Query only

Manual operation: See "Layer Type" on page 13

4.3 Coding Commands

Example: Querying coding parameters

```
// Query general coding parameters of the DRM input stream.
:SOURce1:BB:DRM:BANDwidth?
// Response: K100
:SOURce1:BB:DRM:MODE?
// Response: E
:SOURce1:BB:DRM:INTerleaver?
// Response: MS6
**********************************************************************
// The DRM input stream signal comprises a bandwith of 100 kHz,
// robustness mode E and an interleaver depth of 600 ms.

// Query main service channel (MSC) parameters.
:SOURce1:BB:DRM:MSC:CONStel?
// Response: Q64N
// The constellation is 64QAM non-hierachical.
// Query MSC channel 1 parameters.
:SOURce1:BB:DRM:MSC:PROFile1?
// Response: LPP
:SOURce1:BB:DRM:MSC:LEVel1?
// Response: 1
:SOURce1:BB:DRM:MSC:RATE1?
// Response: R057

// Query service description channel (SDC) parameters.
:SOURce1:BB:DRM:SDC:CONStel?
// Response: Q16
// The constellation is 16QAM.
// Query SDC channel 1 parameters.
:SOURce1:BB:DRM:SDC:PROFile1?
// Response: EEP
:SOURce1:BB:DRM:SDC:LEVel1?
// Response: 1
:SOURce1:BB:DRM:SDC:RATE1?
// Response: R057
```

Commands:

4.3.1 General Commands

[:SOURce<hw>]:BB:DRM:BANDwidth?

Queries the channel bandwidth.

Return values:

<DrmBandwidth>   K045 | K05 | K09 | K10 | K18 | K20 | K100 | INV

K045
4.5 kHz

K05
5 kHz

K09
9 kHz

K10
10 kHz

K18
18 kHz

K20
20 kHz

K100
100 kHz

INV
Invalid channel bandwidth

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only
Manual operation:	See "Channel Bandwidth" on page 15

[:SOURce<hw>]:BB:DRM:MODE?

Queries the robustness mode of the signal.

Return values:

<DrmMode>   A | B | C | D | E | INV

A|B|C|D|E
Available robustness modes.

INV
Invalid mode.

*RST: INV

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only

Manual operation: See "Robustness Mode" on page 14

[:SOURce<hw>]:BB:DRM:INTerleaver?

Queries the interleaver depth.

Return values:

<DrmInterleaver>   MS4 | MS6 | S2 | INV

MS4
400 ms

MS6
600 ms

S2
2 s

INV
Invalid interleaver depth

Example: See Example "Querying coding parameters" on page 24.

Usage: Query only

Manual operation: See "Interleaver Depth" on page 15

4.3.2 MSC Commands

[:SOURce<hw>]:BB:DRM:MSC:CONStel?

Queries the constellation of the MSC.

Return values:

<DrmConstMsc>   Q64N | Q64I | Q64Q | Q16 | Q4 | INV

Q64N
64QAM non-hierarchical

Q64I
64QAM hierarchical on I

Q64Q
64QAM hierarchical on I and Q

Q16
16QAM non-hierarchical

Q4
4QAM non-hierarchical

INV
Invalid constellation

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only
Manual operation:	See "Constellation MSC" on page 14

[:SOURce<hw>]:BB:DRM:MSC:LEVel<ch>?

Queries the protection level used in each of the protection profiles.

Return values:

<DrmMscLev>	0 | 1 | 2 | 3 | INV
	0|1|2|3 Available protection levels
	INV Invalid protection level

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only
Manual operation:	See "Protection Level" on page 16

[:SOURce<hw>]:BB:DRM:MSC:PROFile<ch>?

Queries the protection profile used in the transmission.

Return values:

<DrmMscProf>	HPP | LPP | VSPP | INV
	HPP Higher protected part
	LPP Lower protected part
	VSPP Very strongly protected part
	INV Invalid protection profile

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only
Manual operation:	See "Protection Profile" on page 16

[:SOURce<hw>]:BB:DRM:MSC:RATE<ch>?

Queries the overall code rate used in each of the protection profiles.

Return values:

<DrmMscRate>	R025 | R033 | R040 | R041 | R045 | R048 | R050 | R055 | R057 | R058 | R060 | R062 | R066 | R071 | R072 | R078 | INV

R0xy

`0xy` constitutes a code rate of 0.xy

INV

Invalid code rate

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only
Manual operation:	See "Code Rate" on page 16

4.3.3 SDC Commands

[:SOURce<hw>]:BB:DRM:SDC:CONStel?

Queries the constellation of the SDC.

Return values:

<DrmConstSdc>   Q16 | Q4 | INV

Q16
16QAM

Q4
4QAM

INV
Invalid constellation

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only
Manual operation:	See "Constellation SDC" on page 14

[:SOURce<hw>]:BB:DRM:SDC:LEVel<ch>?

Queries the protection level of the SDC.

Return values:

<DrmSdcLev>   0 | 1 | INV

0|1
Available protection levels

INV
Invalid protection level

Example:	See Example "Querying coding parameters" on page 24.
Usage:	Query only

Manual operation: See "Protection Level" on page 16

[:SOURce<hw>]:BB:DRM:SDC:PROFile<ch>?

Queries the protection profile of the SDC.

Return values:
<DrmSdcProf>   EEP | INV

EEP
Equal error protection

INV
Invalid protection profile

Example: See Example "Querying coding parameters" on page 24.

Usage: Query only

Manual operation: See "Protection Profile" on page 16

[:SOURce<hw>]:BB:DRM:SDC:RATE<ch>?

Queries the overall code rate of the SDC.

Return values:
<DrmSdcRate>   R025 | R033 | R040 | R041 | R045 | R048 | R050 | R055 | R057 | R058 | R060 | R062 | R066 | R071 | R072 | R078 | INV

R0xy
`0xy` constitutes a code rate of 0.xy

INV
Invalid code rate

Example: See Example "Querying coding parameters" on page 24.

Usage: Query only

Manual operation: See "Code Rate" on page 16

Glossary: Abbreviations

D

DCP: Distribution and Communications Protocol
See ETSI TS 102 821.

DHCP: Dynamic Host Configuration Protocol

DRM: Digital Radio Mondiale
See ETSI ES 201 980.

E

EEP: Equal Error Protection

H

HPP: Higher Protected Part

I

IP: Internet Protocol

L

LAN: Local Area Network

LPP: Lower Protected Part

M

MAC: Media Access Control

MDI: Multiplex Distribution Interface

MPEG: Moving Picture Experts Group
https://mpeg.chiariglione.org/

MSC: Main Service Channel

O

OFDM: Orthogonal Frequency-Division Multiplexing

P

PCR: Program Clock Reference

PID: Packet Identifier

PRBS: Pseudo-Random Bit Sequence

PSK: Phase Shift Keying

Q

QAM: Quadrature Amplitude Modulation

QPSK: Quaternary Phase Shift Keying

R

RTP: Real-Time Transport Protocol

S

SDC: Service Description Channel

SMPTE: Society of Motion Picture and Television Engineers
https://www.smpte.org/

T

TCP: Transmission Control Protocol

TS: Transport Stream

U

UDP: User Datagram Protocol

UEP: Unequal Error Protection

V

VSPP: Very Strongly Protected Part

Glossary: Specifications

E

ETSI ES 201 980: Digital Radio Mondiale (DRM); System Specification
https://www.etsi.org/deliver/etsi_es/201900_201999/201980/

ETSI TS 102 821: Digital Radio Mondiale (DRM); Distribution and Communications Protocol (DCP)
https://www.etsi.org/deliver/etsi_es/201900_201999/201980/

I

ITU-T O.151: ITU-T Recommendation O.151
https://www.itu.int/rec/T-REC-O.151-199210-I/en

List of commands

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