

Supplement



Multi Carrier CW Signal Generator

R&S[®] AMU-K61
1402.7102.02

R&S[®] SMATE-K61
1404.5707.02

R&S[®] SMJ-K61
1404.0705.02

R&S[®] SMU-K61
1160.8505.02

R&S[®] AFQ-K261
1401.6802.02

R&S[®] AMU-K261
1402.8609.02

R&S[®] SMJ-K261
1409.1516.02

R&S[®] SMU-K261
1408.6514.02



Dear Customer,

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Multi Carrier Continuous Wave

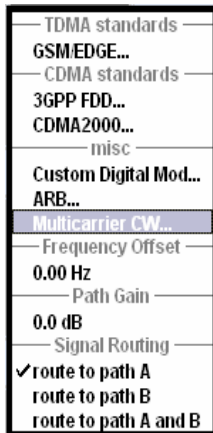
Introduction - Multi Carrier CW

The R&S Signal Generator can generate a Multi Carrier CW signal with user-definable offset from carrier, based on a selection of up to 8192 unmodulated carriers. Each carrier can be separately set and switched on, or multiple carriers can be jointly configured. Automatic start phase setting is provided in order to minimize the crest factor.

Multi Carrier CW signals can be very easily configured as broadband test signals and used for such purposes as receiver tests.

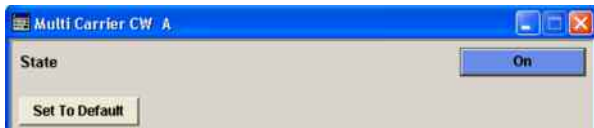
The equipment layout for generating multi carrier signals includes the options Baseband Main Module (B13) and one of the options Baseband Generator (B9/B10/B11) and option Multi Carrier CW (K61).

The menu for setting a Multi Carrier CW signal can be opened either in the Baseband function block or in the menu tree for the **[MENU]** key under Baseband.

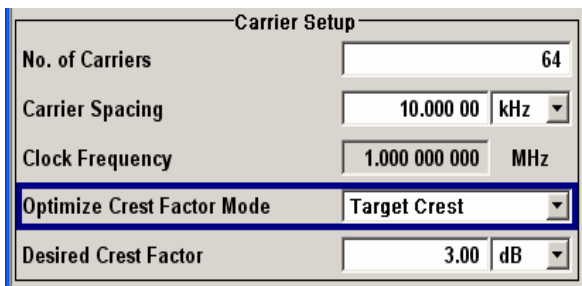


Multi Carrier CW Menu

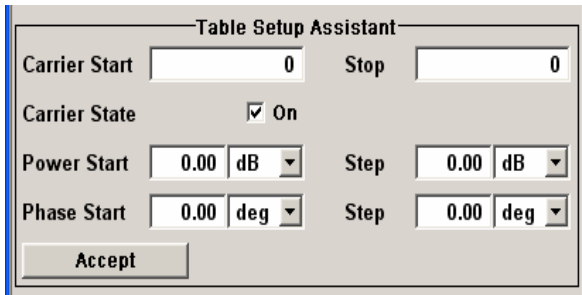
The **Multi Carrier CW** menu is divided into the following sections.



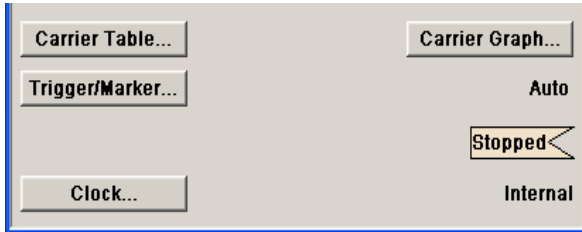
The upper part of the menu is used for powering up the Multi Carrier CW and calling the default settings.



The **Carrier Setup** section is used to configure the Multi Carrier CW signal.



The **Table Setup Assistant** section can be used to set a selectable carrier range.



The buttons in the lower part of the menu open submenus for defining carrier tables and for configuring markers and, in case of two-path instruments, triggers and clocks. The carrier settings can be checked in the graphical **Carrier Graph** submenu.

General Settings for Multi Carrier CW

The upper part of the menu is used for powering up the Multi Carrier CW signal and calling the default settings.

State - Multi Carrier CW

Enables/disables the Multi Carrier CW.

Switching on this standard turns off all the other digital standards and digital modulation modes (in case of two-path instruments, this affects the same path).

Since Multi Carrier CW signals are computed in arbitrary waveform mode, changes to the settings of individual carriers are not adopted until the **Accept** button is pressed. This applies to the settings in the **Table Setup Assistant** menu section and the **Carrier Table** submenu.

Remote-control command:
SOUR:BB:MCCW:STAT ON

Set to Default - Multi Carrier CW

Calls default settings. The values are shown in the following table.

Remote-control command:
SOUR:BB:MCCW:PRES

Parameter	Value
State	Not affected by Set to Default
Carrier Setup	
Number of Carriers	64
Carrier Spacing	10 kHz
Optimize Crest Factor	Chirp
Desired Crest Factor	3 dB
Trigger	
Mode	Auto
Source	Internal
Ext. Delay	0
Ext. Inhibit	0

Parameter	Value
Marker	
Channel 1...4	Restart
Clock	
Source	Internal
Multi Channel Setup	
Start Carrier	0
Stop Carrier	0
State	ON
Power	0 dB
Power Step	0 dB
Initial Phase	0°
Phase Step	0°
Channel Setup	
State	ON
Power	0 dB
Phase	0°

The **Carrier Setup** section is used to configure the Multi Carrier CW.

Number of Carriers - Multi Carrier CW

Sets the number of carriers for the Multi Carrier CW signal.
 By default the multi carrier table already lists 64 carriers that are preset to the settings State = ON, Power = 0 dB, Phase = 0°.

When entering fewer carriers than the table contains, the approach is generally to delete the superfluous entries from the table, and when entering more carriers than the table contains the missing entries are usually added at the end of the table.

Remote-control command:
 SOUR:BB:MCCW:CARR:COUN 64

Carrier Spacing - Multi Carrier CW

Sets the spacing between carriers for the Multi Carrier CW signal.
 The carriers are arranged symmetrically around the HF carrier.
 The total bandwidth = (Number of carriers - 1) * Carrier spacing; the result must not exceed 80 MHz.

Remote-control command:
 SOUR:BB:MCCW:CARR:SPAC 10 kHz

Clock Frequency - Multi Carrier CW

Displays the clock rate at which the multi carrier signal is output by the arbitrary waveform generator. The output clock rate depends on the number of carriers and the selected carrier offset.

The value indicates the resolution during the marker generation.

Remote-control command:
 SOUR:BB:MCCW:CLOC?

Optimize Crest Factor - Multi Carrier CW

Selects the mode for automatically minimizing the crest factor.

The carrier start phases are automatically set to this.

The crest factor represents the ratio of the peak voltage value to the rms voltage value. The higher the crest factor and resulting dynamics of a signal, the greater the requirement for a power amplifier fed by the signal to be linear.

A very high crest factor arises when the carriers have an identical start phase, since the carriers are periodically superposed and very high peak voltages occur in relation to the rms voltage values.

Methods of reducing the crest factor differ with regard to both the optimization achievable and the time required for computation.

The following modes are available:

Off There are no automatic settings for minimizing the crest factor. The **Phase** setting has an effect.

Remote-control command:

SOUR:BB:MCCW:CFAC:MODE OFF

Chirp Very rapid crest factor optimization regardless of the number of carriers. A minimal crest factor of < 3 dB is only obtained for multi carrier signals in which all carriers are switched on and the power of the carriers is identical. In a configuration which differs from this, the achievable crest factor is worse.

Remote-control command:

SOUR:BB:MCCW:CFAC:MODE CHIR

Target Crest Optimization of the crest factor to a desired value for all carrier configurations. The optimization time depends on the number of carriers and the desired crest factor. Computation time increases only when the number of carriers exceeds 256 and the crest factor is below 4 dB. The desired value can be entered in **Desired Crest Factor**.

Note:

Optimization can be cancelled at any time, and the current value being displayed at that moment is then used.

Remote-control command:

SOUR:BB:MCCW:CFAC:MODE SLOW

Desired Crest Factor - Multi Carrier CW

Enters the desired crest factor.

This is only possible when the optimization **Target Crest** has been selected.

Remote-control command:

SOUR:BB:MCCW:CFAC 3 dB

The **Table Setup Assistant** section can be used to set a selectable carrier range. The carrier table can be edited in the **Carrier Table** submenu.

Carrier Start - Multi Carrier CW	<p>Defines the start index of the carrier range to which the following settings are intended to apply.</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:STAR 2</p>
Carrier Stop - Multi Carrier CW	<p>Defines the stop index of the carrier range to which the following settings are intended to apply.</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:CARR:STOP 202</p>
Carrier State - Multi Carrier CW	<p>Switches the carriers in the carrier range on/off.</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:STAT ON</p>
Power Start - Multi Carrier CW	<p>Sets the power of the starting carrier.</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:POW 0 dB</p>
Power Step - Multi Carrier CW	<p>Sets the width of the step with which the power will be changed from carrier to carrier.</p> <p>The carrier power that is set with $Power + n * Power Step$ must be within the valid value range -80 dB to 0 dB.</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:POW:STEP -0.2 dB</p>
Phase Start - Multi Carrier CW	<p>Sets the phase of the starting carrier. This setting is only available for Optimize Crest Factor Mode = Off.</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:PHAS 0</p>
Phase Step - Multi Carrier CW	<p>Sets the width of the step with which the phase will be changed from carrier to carrier.</p> <p>The phase that is set with $Phase + n * Phase Step$ must be within the valid value range 0° to 360°.</p> <p>This setting is only available for Optimize Crest Factor Mode = Off.</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:PHAS:STEP 1DEG</p>
Accept - Multi Carrier CW	<p>Adopts the carrier range setting into the table (Carrier Table).</p> <p>Remote-control command: SOUR:BB:MCCW:EDIT:CARR:EXEC</p>

The lower part of the menu is used to open submenus for configuring carrier tables and for setting triggers, markers and clocks.

Note:

The trigger, clock, and marker delay functions are available for R&S SMx and R&S AMU instruments only.

Carrier Table - Multi Carrier CW

Calls the table for configuring individual carriers. This configuration can be checked with the aid of the **Carrier Graph**.

	State	Power / dB	Phase / deg
0	On	0.00	0.00
1	On	0.00	0.00
2	On	0.00	0.00
3	Off	0.00	0.00
4	Off	0.00	0.00
5	Off	0.00	0.00
6	On	0.00	0.00
7	On	0.00	0.00
8	On	0.00	0.00

Accept

The table displays the settings of all available carriers. Carriers in the On state are highlighted. All carrier parameters can be edited in the table.

The Multi Carrier CW signal is only computed when the **Accept** button is pressed. Whenever the table contains settings that have not yet been adopted with the **Accept** button, the background is yellow.

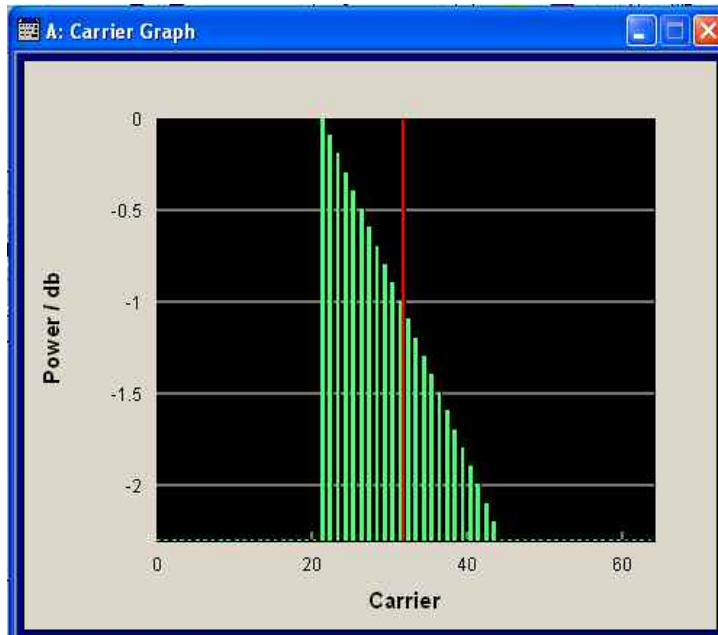
Note:

The phase/deg settings are only valid if optimization of the crest factor is disabled (Optimize Crest Factor = Off).

No.	This is the carrier index. Remote-control command: - (individual carriers can be set using the commands <code>SOUR:BB:MCCW:CARR:..</code> by specifying the index in the parameter. All the carriers in a multi carrier configuration can also be set using a value list with the commands <code>SOUR:BB:MCCW:CARR:LIST...</code>)
State	Switch a carrier on/off Remote-control command: <code>SOUR:BB:MCCW:CARR:LIST:STAT ON,OFF,..</code> <code>SOUR:BB:MCCW:CARR:STAT 2,ON</code>
Power	Sets the power of a carrier. Remote-control command: <code>SOUR:BB:MCCW:CARR:LIST:POW -3,-3,..</code> <code>SOUR:BB:MCCW:CARR:POW 2,-30dB</code>
Phase	Sets the starting phase of a carrier. Remote-control command: <code>SOUR:BB:MCCW:CARR:LIST:PHAS 0,0,..</code> <code>SOUR:BB:MCCW:CARR:PHAS 2, 0DEG</code>
Accept	Transfer the settings in the carrier table into the instrument. Remote-control command: n.a. (the values specified when the command is given are adopted immediately)

Carrier Graph - Multi Carrier CW

Calls a graphical representation of the chosen carrier configuration. The carriers are on the X-axis and the colored bars represent those carriers which are in the On state. Power is on the Y-axis, and the height of the bars corresponds to the chosen power of each individual carrier.



Trigger-Marker - Multi Carrier CW

(R&S SMx and R&S AMU instruments only)

Calls the **Trigger/Marker** menu. This menu is used to select the trigger source, set the time delay on an external trigger signal and configure the marker output signals (see section ["Trigger/Marker/Clock Menu - Multi Carrier CW"](#), page 8).

Remote-control command: n.a.

Clock - Multi Carrier CW

(R&S SMx and R&S AMU instruments only)

Calls the **Clock** menu. The **Clock** menu is used to select the clock source (see section ["Trigger/Marker/Clock Menu - Multi Carrier CW"](#), page 8).

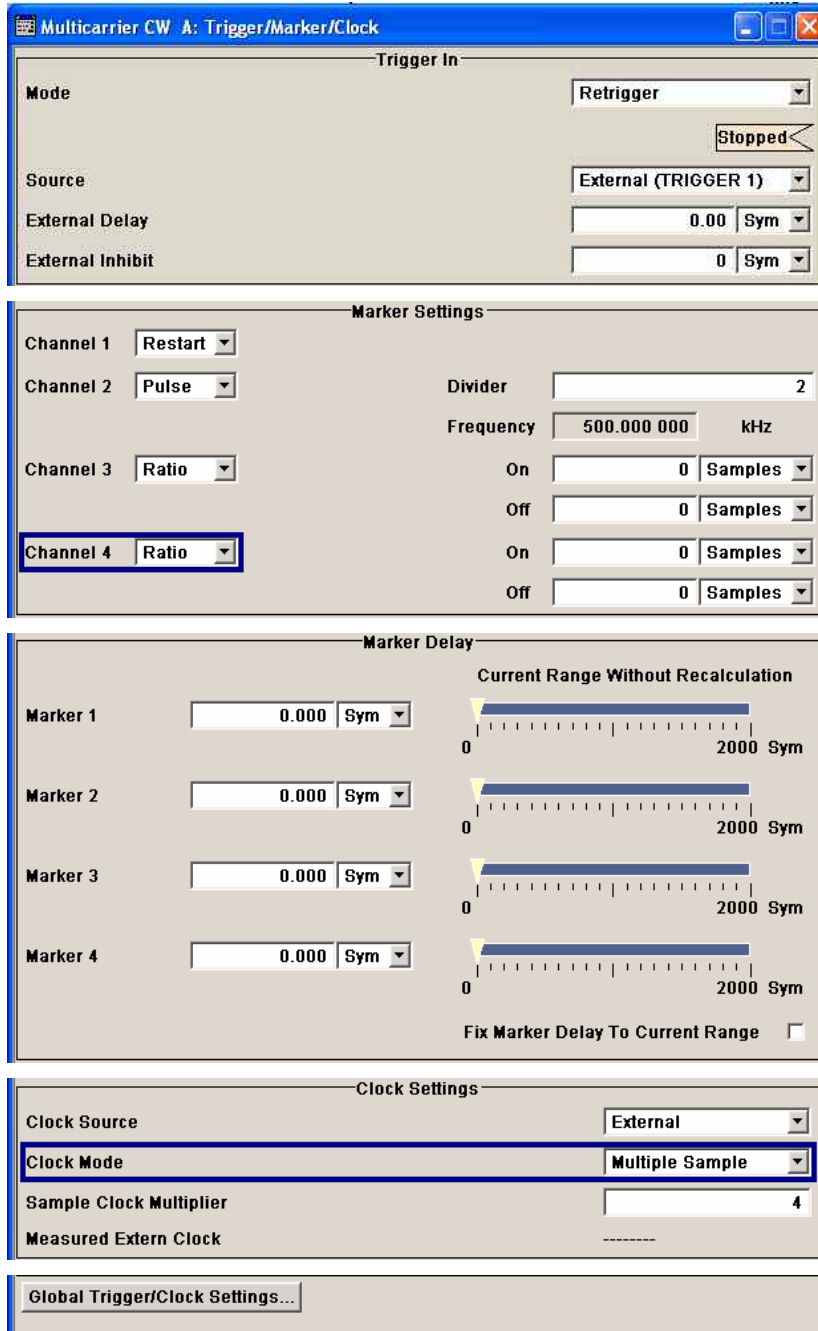
Remote-control command: n.a.

Trigger/Marker/Clock Menu - Multi Carrier CW

Note:

The trigger, clock, and marker delay functions are available for R&S SMx and R&S AMU instruments only.

The Trigger menu is accessed via the **Multi Carrier CW** main menu.



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

The **Marker Settings** 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, either without restriction or restricted to the dynamic section, i.e., the section in which it is possible to make settings without restarting signal and marker generation.

The **Clock Settings** section is where the clock source is selected and - in the case of an external source - the clock type.

The **Global Trigger/Clock Settings** button leads to a submenu for general trigger, clock and external input settings

The **Trigger In** section is used to configure the trigger signal for the Multi Carrier CW modulation. The current status of signal generation is indicated for all trigger modes.

**Trigger Mode - Multi Carrier (R&S SMx and R&S AMU instruments only)
CW**

Selects trigger mode.

Auto The multi carrier signal is generated continuously.

Remote-control command:
SOUR:BB:MCCW:SEQ AUTO

Retrigger The multi carrier signal is generated continuously. A trigger event (internal or external) causes a restart.

Remote-control command:
SOUR:BB:MCCW:SEQ RETR

Armed_Auto The multi carrier signal is generated only when a trigger event occurs. Then the multi carrier signal is generated continuously.

Pressing the button **Arm** stops the signal generation. A subsequent trigger event (internal with **Execute Trigger** or external) causes a restart.

Remote-control command:
SOUR:BB:MCCW:SEQ AAUT

Armed_Retrigger The multi carrier signal is generated only when a trigger event occurs. Then the signal is generated continuously. Every subsequent trigger event causes a restart.

Pressing the button **Arm** stops the signal generation. A subsequent trigger event (internal with **Execute Trigger** or external) causes a restart.

Remote-control command:
SOUR:BB:MCCW:SEQ ARET

Single The multi carrier signal is generated only when a trigger event occurs. Then the signal is output once in the length specified in **Signal Duration**. Every subsequent trigger event (internal with **Execute Trigger** or external) causes a restart.

Remote-control command:
SOUR:BB:MCCW:SEQ SING

Trigger Signal Duration - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

Enters the length of the signal sequence to be output in the **Single** trigger mode.

The input is to be entered in sequence length (SL). The output can be just a defined part of the waveform, a sequence of the waveform or a defined number of repetitions of the waveform.

Remote-control commands:

SOUR:BB:MCCW:TRIG:SLEN 2

Running - Stopped - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

Displays the status of multi carrier signal generation for all trigger modes. This display appears only when Multi Carrier CW is enabled (**State On**).

Remote-control command:

SOUR:BB:MCCW:TRIG:RMOD?

Response: RUN or STOP

Running

The multi carrier signal is generated; a trigger was (internally or externally) initiated in triggered mode.

If Armed_Auto and Armed_Retrigger have been selected, generation of signals can be stopped with the Arm button. A new trigger (internally with Execute Trigger or externally) causes a restart.

Stopped

The signal is not generated, and the instrument waits for a trigger event (internal or external).

Arm - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

Stops multi carrier signal generation. This 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-control command:

SOUR:BB:MCCW:TRIG:ARM:EXEC

Execute Trigger - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

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

Remote-control command:

SOUR:BB:MCCW:TRIG:SOUR INT

SOUR:BB:MCCW:SEQ RETR

SOUR:BB:MCCW:TRIG:EXEC

Trigger Source - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

Selects the trigger source.

Internal The trigger event is executed by **Execute Trigger**. As a precondition a trigger mode other than **Auto** must be selected.

Remote-control command:
SOUR:BB:MCCW:TRIG:SOUR INT

Internal (Baseband A/B) The trigger event is executed by the trigger signal from the second path (two-path instruments only).

Remote-control command:
SOUR:BB:MCCW:TRIG:SOUR OBAS

External (TRIGGER 1|2) The trigger event is executed with the aid of the active edge of an external trigger signal. The trigger signal is supplied via the TRIGGER 1 or TRIGGER 2 connector.

The polarity, the trigger threshold and the input impedance of the TRIGGER input can be set in the **Global Trigger Settings** menu.

Remote-control command:
SOUR:BB:MCCW:TRIG:SOUR EXT | BEXT

Trigger Delay - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

Sets a trigger signal delay in samples by external triggering or, in case of two-path instruments, by internal triggering via the second path. This enables the R&S Signal Generator to be synchronized with the device under test or other external devices.

Note:

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

Remote-control command:
SOUR:BB:MCCW:TRIG:EXT:DEL 0
SOUR:BB:MCCW:TRIG:OBAS:DEL 0

Trigger Inhibit - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

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, in case of two-path instruments, on internal triggering via the second path.

Note:

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

Remote-control command:
SOUR:BB:MCCW:TRIG:EXT:INH 0
SOUR:BB:MCCW:TRIG:OBAS:INH 0

The settings for the marker output signals are entered in the **Marker Mode** section.

Marker Channel x - Multi Carrier CW

Selects a marker signal for the associated MARKER output.

Restart

A brief marker signal is generated at the start of the waveform.

Remote-control command:

```
SOUR:BB:MCCW:TRIG:OUTP1:MODE REST
```

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.

Divider	8.00
Frequency	33.854 17 kHz

Remote-control command:

```
SOUR:BB:MCCW:TRIG:OUTP1:MODE PULS
SOUR:BB:MCCW:TRIG:OUTP1:PULS:DIV 4
SOUR:BB:MCCW:TRIG:OUTP1:PULS:FREQ?
```

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.

0000 0000

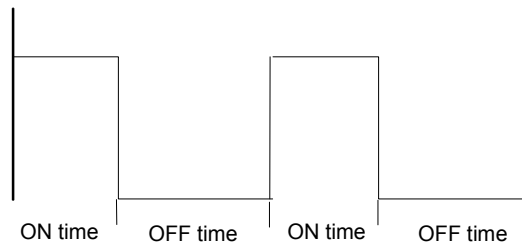
Remote-control command:

```
SOUR:BB:MCCW:TRIG:OUTP1:MODE PATT
SOUR:BB:MCCW:TRIG:OUTP1:PATT #H00,8
```

ON/OFF ratio

A regular marker signal that is defined by an ON/OFF ratio is generated. A period lasts one ON and OFF cycle.

Start of signal



The ON time and OFF time are each expressed as a number of samples and are set in an input field which opens when **ON/OFF ratio** is selected.

On Time	1	Samples
Off Time	1	Samples

Remote-control command:

```
SOUR:BB:MCCW:TRIG:OUTP1:MODE RAT
SOUR:BB:MCCW:TRIG:OUTP1:OFFT 20
SOUR:BB:MCCW:TRIG:OUTP1:ONT 20
```


The delays for the marker output signals are entered in the **Marker Delay** section.

Note:

The marker delay functions are available for R&S SMx and R&S AMU instruments only.

Marker x Delay - Multi Carrier CW

(R&S SMx and R&S AMU instruments only)

Enters the delay between the marker signal at the marker outputs and the start of the signal.

The input is expressed as a number of 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-control command:

SOUR:BB:MCCW:TRIG:OUTP2:DEL 2

Current Range without Recalculation - Multi Carrier CW

(R&S SMx and R&S AMU instruments only)

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-control command:

SOUR:BB:MCCW:TRIG:OUTP2:DEL:MAX?

SOUR:BB:MCCW:TRIG:OUTP2:DEL:MIN?

Fix marker delay to current range - Multi Carrier CW

(R&S SMx and R&S AMU instruments only)

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-control command:

SOUR:BB:MCCW:TRIG:OUTP:DEL:FIX ON

The **Clock Settings** section can be used to select the clock source.

Note:

The clock functions are available for R&S SMx and R&S AMU instruments only.

Clock Source - Multi Carrier CW

(R&S SMx and R&S AMU instruments only)

Selects the clock source.

Internal

The internal clock reference is used to generate the sample clock.

Remote-control command:

SOUR:BB:MCCW:CLOC:SOUR INT

External

The external clock reference is fed in as the sample clock or a multiple thereof via the CLOCK connector.

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-control command:

SOUR:BB:MCCW:CLOC:SOUR EXT

Clock Mode - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

Enters the type of externally supplied clock.

Sample

A sample clock is supplied via the CLOCK connector.

Remote-control command:

SOUR:BB:MCCW:CLOC:MODE SAMP

Multiple

A multiple of the sample clock is supplied via the CLOCK connector; the sample clock is derived internally from this.

The **Multiplier** window provided allows the multiplication factor to be entered.

Remote-control command:

SOUR:BB:MCCW:CLOC:MODE MSAM

Sample Clock Multiplier - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**Enters the multiplication factor for clock type **Multiple**.

Remote-control command

SOUR:BB:MCCW:CLOC:MULT 4

Measured External Clock - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**

Indicates of the measured frequency of the external clock signal. This enables the user to permanently monitor the frequency of the externally introduced clock.

This information is displayed only if the external clock source has been selected.

Remote-control command:

CLOC:INP:FREQ?

Global Trigger-Clock-Input Settings - Multi Carrier CW**(R&S SMx and R&S AMU instruments only)**Calls the **Global Trigger/Clock/Input Settings** menu. The trigger threshold, the input impedance and the polarity of the clock and trigger inputs can be set in this menu.

In two-path instruments, these settings are valid for both paths.

The parameters in this menu affect all digital modulations and standards, and are described in the section "*Global Trigger/Clock/Input Settings – Setup -Environment*".

SOURce:BB:MCCW Subsystem - Remote-Control Commands

This subsystem contains the commands for setting the Multi Carrier CW signals.

The numeric suffix to SOURce distinguishes between multi carrier generation for path A and path B in the case of two-path instruments:

SOURce<1> = path A

SOURce2 = path B

For two-path instruments, the keyword SOURce is optional in the case of commands for path A and can be omitted. For path B, the command must contain the keyword with suffix 2.

For one-path instruments, the keyword SOURce is optional and can be omitted.

Command	Parameter	Default unit	Note
[SOURce<[1] 2>]:BB:MCCW:CARRier:COUNT	1 ... 8192	-	
[SOURce<[1] 2>]:BB:MCCW:CARRier:LIST:PHASe	0° ... 360°, 0° ... 360°, ...	RAD	
[SOURce<[1] 2>]:BB:MCCW:CARRier:LIST:POWER	-80 ... 0 dB , -80 ... 0 dB, ...	dB	
[SOURce<[1] 2>]:BB:MCCW:CARRier:LIST:STATe	ON OFF, ON OFF, ...		
[SOURce<[1] 2>]:BB:MCCW:CARRier:PHASe	<index>, 0 ... 360DEG	RAD	
[SOURce<[1] 2>]:BB:MCCW:CARRier:POWER	<index>, -80 ... 0 dB	dB	
[SOURce<[1] 2>]:BB:MCCW:CARRier:SPACing	0 Hz ... 50 MHz	Hz	
[SOURce<[1] 2>]:BB:MCCW:CARRier:STATe	<index>, ON OFF		
[SOURce<[1] 2>]:BB:MCCW:CFACTOR	0 ... 100 dB	dB	
[SOURce<[1] 2>]:BB:MCCW:CFACTOR:MODE	OFF CHIRp SLOW		
[SOURce<[1] 2>]:BB:MCCW:CLOCK			Query only
[SOURce<[1] 2>]:BB:MCCW:CLOCK:MODE	SAMPlE MSAMPlE		
[SOURce<[1] 2>]:BB:MCCW:CLOCK:MULTIplier	1 ... 64		
[SOURce<[1] 2>]:BB:MCCW:CLOCK:SOURce	INTernal EXTernal		
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:EXECute			No query
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:PHASe[:START]	0 ... 360DEG	RAD	
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:PHASe:STEP	-360 ... 360DEG	RAD	
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:POWER[:START]	-80 ... 0 dB	dB	
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:POWER:STEP	-80 ... 80 dB	dB	
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:START	<carrier_index>		
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:STATe	ON OFF		
[SOURce<[1] 2>]:BB:MCCW:EDIT:CARRier:STOP	<carrier_index>		
[SOURce<[1] 2>]:BB:MCCW:PRESet	-		
[SOURce<[1] 2>]:BB:MCCW:SEQuence	AUTO / RETRigger / AAUTO / ARETRigger / SINGle		
[SOURce<[1] 2>]:BB:MCCW:STATe	ON OFF		
[SOURce<[1] 2>]:BB:MCCW:TRIGger:ARM:EXECute			No query

Command	Parameter	Default unit	Note
[SOURce<[1]>]:BB:MCCW:TRIGger:EXECute			No query
[SOURce<[1]>]:BB:MCCW:TRIGger[:EXTernal<[1]>]:DELay	0 ... 2 ³² -1 Samples	-	
[SOURce<[1]>]:BB:MCCW:TRIGger[:EXTernal<[1]>]:INHibit	0 ... 2 ³² -1 Samples	-	
[SOURce<[1]>]:BB:MCCW:TRIGger:OBASeband:DELay	0 ... 2 ³² -1 Samples	-	
[SOURce<[1]>]:BB:MCCW:TRIGger:OBASeband:INHibit	0 ... 2 ³² -1 Samples	-	
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:DELay	0 ... 2 ²⁰ -1 Samples		
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut:DELay:FIXed	ON OFF		
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:DELay:MAX?			Query only
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:DELay:MIN?			Query only
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:MODE	REStart PULSe PATtern RATio		
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:OFFTime	1 ... max. wavelength - 1 sample		
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:ONTime	1 ... max. wavelength - 1 sample		
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:PATtern	#B0,1 ... #B111 ... 1,32		
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:PULSe:DIVider	2 ... 2 ¹⁰		
[SOURce<[1]>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:PULSe:FREQ			Query only
[SOURce<[1]>]:BB:MCCW:TRIGger:RMODE			Query only
[SOURce<[1]>]:BB:MCCW:TRIGger:SLENgth	1 ... 2 ³² -1 Samples		
[SOURce<[1]>]:BB:MCCW:TRIGger:SOURce	INTernal EXTernal BEXTernal OBASeband		

[SOURce<[1]>]:BB:MCCW:CARRier:COUNT 1 ... 8192

The command sets the number of carriers in the Multi Carrier CW signal. The total bandwidth (*Number of carriers - 1*) * *Carrier spacing* is 80 MHz. The number of carriers entered therefore defines the maximum carrier spacing (:BB:MCCW:CARRier:SPACing).

Example: " :BB:MCCW:CARR:COUN 10 "
'sets 10 CW carriers for the multi carrier signal.

*RST value	Resolution	Dependencies	SCPI
64	1	The carrier spacing (:BB:MCCW:CARRier:SPACing) is reduced if the total bandwidth of 80 MHz is not respected when entering the number of carriers.	Device-specific

[SOURce<[1]>]:BB:MCCW:CARRier:LIST:PHASe 0 ... 360 DEG[, 0 ... 360 DEG].

The command sets the start phase of the carrier with the aid of a value list. The first value in the list is assigned to the carrier with index 0, the second value to the carrier with index 1, etc. The maximum length corresponds to the maximum number of multi carriers. There is no need to enter all the values every time. Values not set by the value list are set with the default values provided they have already been explicitly set by a previous command. If this is the case, the values continue to apply until overwritten.

If the query is expanded by using the two parameters <start> and <count>, the value list is read out in smaller sections. Start is expressed in position of bit, count in number of values. Without the parameters all values are always read out starting from the first value.

Example: ":BB:MCCW:CARR:LIST:PHAS 90 DEG, 90 DEG, 90 DEG, 80 DEG"
 'sets a start phase for carriers 0, 1, 2 and 3.
 ":BB:MCCW:CARR:LIST:PHAS 2,3"
 'queries the phase of carrier 1, 2 and 3.
 Response: "90,90,80"

*RST value	Resolution	SCPI
0 DEG	0.01 DEG	Device-specific

[SOURce<[1]>]:BB:MCCW:CARRIER:LIST:POWER - 80 dB ... 0 dB[, - 80 dB ... 0 dB]

The command sets the power of the carrier with the aid of a value list. The first value in the list is assigned to the carrier with index 0, the second value to the carrier with index 1, etc. The maximum length corresponds to the maximum number of multi carriers. There is no need to enter all the values every time. Values not set by the value list are set with the default values provided they have already been explicitly set by a previous command. If this is the case, the values continue to apply until overwritten.

If the query is expanded by using the two parameters <start> and <count>, the value list is read out in smaller sections. Start is expressed in position of bit, count in number of values. Without the parameters all values are always read out starting from the first value.

Example: ":BB:MCCW:CARR:LIST:POW -65 dB, -30 dB, -50 dB,..."
 'sets the power of carrier 0 to -65 dB, carrier 1 to -30 dB and so on.
 ":BB:MCCW:CARR:LIST:POW 2,2"
 'queries the power of carrier 1 and 2.
 Response: "-30,-50"

*RST value	Resolution	SCPI
0 dB	0.01 dB	Device-specific

[SOURce<[1]>]:BB:MCCW:CARRIER:LIST:STATE ON | OFF, ON | OFF, ...

The command switches the carrier on or off with the aid of a value list. The first value in the list is assigned to the carrier with index 0, the second value to the carrier with index 1, etc. The maximum length corresponds to the maximum number of multi carriers. There is no need to enter all the values every time. Values not set by the value list are set with the default values provided they have already been explicitly set by a previous command. If this is the case, the values continue to apply until overwritten.

If the query is expanded by using the two parameters <start> and <count>, the value list is read out in smaller sections. Start is expressed in position of bit, count in number of values. Without the parameters all values are always read out starting from the first value.

Example: ":BB:MCCW:CARR:LIST:STAT ON, OFF, ON,..."
 'switches carrier 0 on, carrier 1 off, etc.
 ":BB:MCCW:CARR:LIST:POW 2,2"
 'queries the states of carrier 1 and 2.
 Response: "0,1"

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:CARRier:PHASe <carrier_index>, 0 ... 360 DEG.

The command sets the start phase of the selected carrier. The carrier is selected by the numerical parameter <carrier_index>.

The phase settings are only valid if optimization of the crest factor is disabled (:SOURce:BB:MCCW:CFACTOR:MODE OFF).

Example: ":BB:MCCW:CARR:PHAS 15, 90 DEG"
 'sets a start phase of 90° for carrier 15.

*RST value	Resolution	SCPI
0 DEG	0.01 DEG	Device-specific

[SOURce<[1]|2>]:BB:MCCW:CARRier:POWer <carrier_index>, 80 dB ... 0 dB

The command sets the power of the selected carrier. The carrier is selected by the numerical parameter <carrier_index>.

Example: ":BB:MCCW:CARR:POW 15, -50 dB"
 'sets the power of carrier 15 to -50 dB.

*RST value	Resolution	SCPI
0 dB	0.01 dB	Device-specific

[SOURce<[1]|2>]:BB:MCCW:CARRier:SPACing 0 Hz ... 50 MHz

The command sets the carrier spacing. The carriers are generated symmetrically around the RF carrier. The total bandwidth (*Number of carriers - 1*) * *Carrier spacing* is 80 MHz. The maximum carrier spacing that can be set is dependent on the chosen number of carriers

Example: ":BB:MCCW:CARR:SPAC 10 MHz"
 'sets a carrier spacing of 10 MHz.

*RST value	Resolution	Dependencies	SCPI
10 kHz	0.01 Hz	The maximum carrier spacing is automatically reduced so that the maximum total bandwidth of 80 MHz is not exceeded on entering the number of carriers (:BB:MCCW:CARRier:COUNT).	Device-specific

[SOURce<[1]|2>]:BB:MCCW:CARRier:STATe <carrier_index>, ON | OFF

The command switches the selected carrier on or off. The carrier is selected by the numerical parameter <carrier_index>. The counting in remote control differs from the numbers in the carrier table. Index 0 corresponds to number 1 (first line) in the table. Therefore, switching the state of the channel via remote control always switches the state of channel index + 1 in the table.

Example: ":BB:MCCW:CARR:STAT 15, ON"
 'switches carrier 16 on.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:CFACtor 0 ... 100 dB

The command sets the desired crest factor for the multi carrier signal on selection of the command `SOURce:BB:MCCW:CFACtor:MODE SLOW`.

Example: "`:BB:MCCW:CFAC:MODE SLOW`"
 'sets the Target Crest optimization mode.

"`:BB:MCCW:CFAC 10 dB`"
 'sets the desired crest factor to 10 dB.

*RST value	Resolution	SCPI
3 dB	0.01 dB	Device-specific

[SOURce<[1]|2>]:BB:MCCW:CFACtor:MODE OFF | CHIRp | SLOW

The command sets the mode by which automatic settings will minimize the crest factor or hold it at a chosen value.

Parameter: **OFF**
 Crest factor optimization is switched off. The carrier PHASE setting has an effect.

CHIRp
 The crest factor is very rapidly optimized to < 3 dB for multi carrier signals so that all carriers are switched on and have the same amplitude. The computation time is independent of the number of carriers. In other carrier configurations the achievable crest factor is worse.

SLOW
 The crest factor entered using `SOURce:BB:MCCW:CFACtor` is maintained for all carrier configurations by means of automatic settings. The computation time depends on the number of carriers and on the crest factor that has been set. Computation time increases only when the number of carriers exceeds 256 and the crest factor is above 4 dB.

Example: "`:BB:MCCW:CFAC:MODE OFF`"
 'switches off automatic crest factor optimization. The setting `SOUR:BB:MCCW:CARR:PHAS` has an effect.

*RST value	Resolution	SCPI
FAST	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:CLOCK?

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command queries the output clock rate. The output clock rate depends on the number of carriers and the selected carrier spacing.

The command is a query only and therefore has no *RST value.

Example: "`:BB:MCCW:CLOC?`"
 'queries the output clock rate.

Response: "`256 000 000`"
 'the output clock rate is 256 MHz.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:CLOCK:MODE SAMPLE | MSAMPLE

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command enters the type of externally supplied clock (:BB:MCCW:CLOCK:SOURCE EXTERNAL). When MSAMPLE is used, a multiple of the sample clock is supplied via the CLOCK connector and the sample clock is derived internally from this. The multiplier is entered with the command BB:MCCW:CLOCK:MULTIPLIER.

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

Example: " :BB:MCCW:CLOCK:MODE SAMP"
 'selects clock type **Sample**, i.e. the supplied clock is a sample clock.

*RST value	Resolution	SCPI
SAMPLE	-	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:CLOCK:MULTIPLIER 1 ... 64

The command specifies the multiplier for clock type **Multiple Samples** (:BB:MCCW:CLOCK:MODE MSAM) in the case of an external clock source.

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

Example: " :BB:MCCW:CLOCK:SOURCE EXT"
 'selects the external clock source. The clock is supplied via the CLOCK connector.
 " :BB:MCCW:CLOCK:MODE MSAM"
 'selects clock type **Multiple Samples**, , i.e. the supplied clock has a rate which is a multiple of the sample rate.
 " :BB:MCCW:CLOCK:MULT 12 "
 'the multiplier for the external clock rate is 12.

*RST value	Resolution	SCPI
4	1	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:CLOCK:SOURCE INTERNAL | EXTERNAL

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command selects the source for the digital modulation clock.

For two-path instruments, selecting EXTERNAL is only possible for path A, since the external clock source is permanently allocated to path A.

Parameter: **INTERNAL**
 The internal clock reference is used.
EXTERNAL
 The external clock reference is supplied to the CLOCK connector.

Example: " :BB:MCCW:CLOCK:SOURCE EXT"
 'selects an external clock reference. The clock is supplied via the CLOCK connector.

*RST value	Resolution	SCPI
INTERNAL		Device-specific

[SOURce<[1]|2>]:BB:MCCW:EDIT:CARRier:EXECute

The command adopts the settings for the carrier range which has been defined using the :BB:MCCW:EDIT:CARR: commands.

Example: ":BB:MCCW:EDIT:CARR:STAR 4"
 'the carrier range starts at carrier 4.

 ":BB:MCCW:EDIT:CARR:STOP 400"
 'the carrier range stops at carrier 400.

 ":BB:MCCW:EDIT:CARR:STAT ON"
 'sets all the carriers in the carrier range to ON.

 ":BB:MCCW:EDIT:CARR:EXEC"
 'adopts the settings for all the carriers in the carrier range.

 ":BB:MCCW:STAT"
 'starts generation of the multi carrier signal. Carriers 4 to 400 are in the ON state.

*RST value	Resolution	SCPI
		Device-specific

[SOURce<[1]|2>]:BB:MCCW:EDIT:CARRier:PHASe[:START] 0 ... 360 DEG.

The command sets the start phase for the individual carriers in the defined carrier range. If the command :BB:MCCW:EDIT:CARR:PHAS:STEP is used to define a step width, the phase entered here applies only to the starting carrier. The phases of the remaining carriers are stepped up or down by the phase value specified in the :BB:MCCW:EDIT:CARR:PHAS:STEP command.

The phase settings are only valid if optimization of the crest factor is disabled (:SOURce:BB:MCCW:CFACTOR:MODE OFF).

Example: ":BB:MCCW:EDIT:CARR:PHAS 90 DEG"
 'sets a start phase of 90° for the carriers in the carrier range.

*RST value	Resolution	SCPI
0 DEG	0.01 DEG	Device-specific

[SOURce<[1]|2>]:BB:MCCW:EDIT:CARRier:PHASe:STEP 0 ... 360 DEG.

The command sets the step width by which the start phases of the carriers in the defined carrier range will be incremented.

The phase settings are only valid if optimization of the crest factor is disabled (:SOURce:BB:MCCW:CFACTOR:MODE OFF).

Example: ":BB:MCCW:EDIT:CARR:PHAS 90 DEG"
 'sets a start phase of 90° for the carriers in the carrier range.

 ":BB:MCCW:EDIT:CARR:PHAS:STEP 1 DEG"
 'the start phase is incremented by 1° for each carrier, i.e. the first carrier has a start phase of 90°, the second a start phase of 91°, etc.

*RST value	Resolution	SCPI
0 DEG	0.01 DEG	Device-specific

[SOURCE<[1]>]:BB:MCCW:EDIT:CARRIER:POWER[:START] 80 dB ... 0 dB

The command sets the power for the individual carriers in the defined carrier range. If the command :BB:MCCW:EDIT:CARR:POW:STEP is used to define a step width, the power entered here applies only to the starting carrier. The power of the remaining carriers is stepped up or down by the power specified in the :BB:MCCW:EDIT:CARR:POW:STEP command.

Example: " :BB:MCCW:EDIT:CARR:POW -50 dB"
 'sets the power of the carrier to -50 dB.

*RST value	Resolution	SCPI
0 dB	0.01 dB	Device-specific

[SOURCE<[1]>]:BB:MCCW:EDIT:CARRIER:POWER:STEP -80 dB ... +80 dB.

The command sets the step width by which the starting power of the carriers in the defined carrier range will be incremented.

Example: " :BB:MCCW:EDIT:CARR:POW -80dB"
 'sets a power of -80 dB for the carriers in the carrier range.
 " :BB:MCCW:EDIT:CARR:POW:STEP 1 dB"
 'the power phase is incremented by 1dB for each carrier, i.e. the first carrier has -80dB, the second -79dB, etc.

*RST value	Resolution	SCPI
0 dB	0.01 dB	Device-specific

[SOURCE<[1]>]:BB:MCCW:EDIT:CARRIER:START <carrier_index>

The command selects the first carrier in the carrier range to which the settings with the :BB:MCCW:EDIT:CARR:.. commands shall apply.

Example: " :BB:MCCW:EDIT:CARR:STAR 4"
 'the carrier range starts at carrier 4.

*RST value	Resolution	SCPI
0		Device-specific

[SOURCE<[1]>]:BB:MCCW:EDIT:CARRIER:STATE ON | OFF

The command switches all the carriers in the selected carrier range on or off.

Example: " :BB:MCCW:EDIT:CARR:STAT ON"
 'sets all the carriers in the carrier range to ON.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURCE<[1]>]:BB:MCCW:EDIT:CARRIER:STOP <carrier_index>

The command selects the last carrier in the carrier range to which the settings with the :BB:MCCW:EDIT:CARR:.. commands shall apply.

Example: " :BB:MCCW:EDIT:CARR:STOP 40"
 'the carrier range stops at carrier 40.

*RST value	Resolution	SCPI
0		Device-specific

[SOURce<[1]|2>]:BB:MCCW:PRESet

The command sets all multi carrier signal parameters to their default values

This command triggers an event and therefore has no *RST value and no query form.

Example: " :BB:MCCW:PRESet"
 'resets the Multi Carrier settings to default values.

*RST value	Dependencies	SCPI
-	:BB:MCCW:CARR:COUN :BB:MCCW:CARR:PHAS :BB:MCCW:CARR:POW :BB:MCCW:CARR:SPAC 10 kHz :BB:MCCW:CARR:STAT ON :BB:MCCW:CLOC:SOUR INT :BB:MCCW:CFAC 3 dB :BB:MCCW:CFAC:MODE FAST :BB:MCCW:STAT OFF :BB:MCCW:TRIG:EXT:DEL 0 :BB:MCCW:TRIG:EXT:INH 0 :BB:MCCW:TRIG:OBAS:DEL 0 (two-path instruments only) :BB:MCCW:TRIG:OBAS:INH 0 (two-path instruments only) :BB:MCCW:TRIG:OUTP<[1] 2 3 4>:MODE REST :BB:MCCW:TRIG:OUTP<[1] 2 3 4>:PFR 1MHz :BB:MCCW:TRIG:OUTP<[1] 2 3 4>:PATT #H0,1 :BB:MCCW:TRIG:OUTP<[1] 2 3 4>:OFFT 0 :BB:MCCW:TRIG:OUTP<[1] 2 3 4>:ONT 0 :BB:MCCW:TRIG:SEQ AUTO :BB:MCCW:TRIG:SOUR INT	64 Device-specific

[SOURce<[1]|2>]:BB:MCCW:SEQuence AUTO | RETRigger | AAUTo | ARETrigger | SINGle

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command selects the trigger mode.

Parameter: AUTO

The multi carrier signal is generated continuously.

RETRigger

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

AAUTo

The multi carrier signal is generated only when a trigger event occurs. After the trigger event the signal is generated continuously. Signal generation is stopped with command `SOUR:BB:MCCW:TRIG:ARM:EXEC` and started again when a trigger event occurs.

ARETrigger

The multi carrier 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:MCCW:TRIG:ARM:EXEC` and started again when a trigger event occurs.

SINGle

The multi carrier signal is output only when a trigger event occurs. After the trigger event the signal is output once to the set sequence length (`SOUR:BB:MCCW:TRIG:SLEN`). Every subsequent trigger event causes a restart.

Example: ":BB:MCCW:SEQ AAUT"
 'sets the **Armed_auto** trigger mode; the device waits for the first trigger (e.g. with *TRG) and then generates the signal continuously.

*RST value	Resolution	SCPI
RETRigger	-	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:STATe ON | OFF

The command turns on the Multi Carrier CW signal. Any other digital standards or digital modulation that may be in the ON state will be automatically turned OFF.

Example: ":BB:MCCW:STAT ON"
 'switches on generation of the Multi Carrier CW signal.

*RST value	Resolution	Dependencies	SCPI
OFF	-	:BB:MCCW:STAT ON switches off all the digital standards and digital modulationon (in case of two-path instruments, this affects the same path.	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:TRIGger:ARM:EXECute

Note:
 This command is available for R&S SMx and R&S AMU instruments only.

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

This command triggers an event and therefore has no *RST value and no query form.

Example: ":BB:MCCW:TRIG:SOUR INT"
 'sets internal triggering.

 ":BB:MCCW:TRIG:SEQ ARET"
 'sets Armed_Retrigger mode, i.e. every trigger event causes signal generation to restart.

 ":BB:MCCW:TRIG:EXEC"
 'executes a trigger, signal generation is started.

 ":BB:MCCW:TRIG:ARM:EXEC"
 'signal generation is stopped.

 ":BB:MCCW:TRIG:EXEC"
 'executes a trigger, signal generation is started again.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:EXECute

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command executes a trigger. The internal trigger source must be selected using the command `MCCW:TRIGger:SOURce INTernal` and a trigger mode other than `AUTO` must be selected using the command `:BB:MCCW:TRIGger:MODE`.

This command triggers an event and therefore has no *RST value and no query form.

Example: `" :BB:MCCW:TRIG:SOUR INT"`
 'sets internal triggering.
 `" :BB:MCCW:TRIG:SEQ RETR"`
 'sets Retrigger mode, i.e. every trigger event causes signal generation to restart.
 `" :BB:MCCW:TRIG:EXEC"`
 'executes a trigger.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger[:EXTernal<[1]|2>]:DELay 0 ... 2^32-1 samples

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command specifies the trigger delay (expressed as a number of samples) for external triggering. The numeric suffix to `EXTernal` distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example: `" :BB:MCCW:TRIG:SOUR EXT"`
 'selects an external trigger via the TRIGGER 1 connector
 `" :BB:MCCW:TRIG:DEL 200"`
 'sets a delay of 200 samples for the trigger.

*RST value	Resolution	SCPI
0	1	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger[:EXTernal<[1]|2>]:INHibit 0 ... 2^26-1 samples

Note:

This command is available for R&S SMx and R&S AMU instruments only.

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. The numeric suffix to `EXTernal` distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example: `" :BB:MCCW:TRIG:SOUR EXT"`
 'selects an external trigger via the TRIGGER 1 connector.
 `" :BB:MCCW:TRIG:INH 200"`
 'sets a restart inhibit for 200 samples following a trigger event.

*RST value	Resolution	SCPI
0	1	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:TRIGGER:OBASband:DELAY 0 ... 2³²-1 samples

Note:

This command is available for SMx and AMU two-path instruments only.

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

Example: "`:BB:MCCW:TRIG:SOUR OBAS`"
 'sets for path A the internal trigger executed by the signal from the second path (path B).
 "`:BB:MCCW:TRIG:DEL 200`"
 'sets a delay of 200 samples for the trigger.

*RST value	Resolution	SCPI
0	1	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:TRIGGER:OBASband:INHIBIT 0 ... 2³²-1 samples

Note:

This command is available for SMx and AMU two-path instruments only.

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 (two-path instruments only).

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

*RST value	Resolution	SCPI
0	1	Device-specific

[SOURCE<[1]|2>]:BB:MCCW:TRIGGER:OUTPUT<[1]...4>:DELAY 0 ... 2²⁰-1 Symbols

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command defines the delay between the signal on the marker outputs and the start of the signals, expressed in terms of samples. Command `:BB:MCCW:TRIGGER:OUTPUT:DELAY:FIXED ON` can be used to restrict the range of values to the dynamic range, i.e. the range within which a delay of the marker signals can be set without restarting the marker and signal.

Example: "`:BB:MCCW:TRIG:OUTP2:DEL 16`"
 'sets a delay of 16 samples for the signal on connector MARKER 2.

*RST value	Resolution	SCPI
0 Symbols	1	Device-specific

[SOURCE<[1]>]:BB:MCCW:TRIGGER:OUTPUT:DELAY:FIXED ON | OFF

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal. If a delay is entered in setting ON but is outside this range, the maximum possible delay is set and an error message is generated.

The numeric suffix in OUTPUT has no significance for this command, since the setting always affects every marker.

Example: ":BB:MCCW:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURCE<[1]>]:BB:MCCW:TRIGGER:OUTPUT<[1]...4>:DELAY:MAXIMUM

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command queries the maximum marker delay for setting :BB:MCCW:TRIGGER:OUTPUT:DELAY:FIXED ON.

The command is a query only and therefore has no *RST value.

Example: ":BB:MCCW:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.
 ":BB:MCCW:TRIG:OUTP:DEL:MAX"
 'queries the maximum of the dynamic range.
Response: "2000"
 'the maximum for the marker delay setting is 2000 samples.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]>]:BB:MCCW:TRIGGER:OUTPUT<[1]...4>:DELAY:MINIMUM

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command queries the minimum marker delay for setting :BB:MCCW:TRIGGER:OUTPUT:DELAY:FIXED ON.

The command is a query only and therefore has no *RST value.

Example: ":BB:MCCW:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.
 ":BB:MCCW:TRIG:OUTP:DEL:MIN"
 'queries the minimum of the dynamic range.
Response: "0"
 'the minimum for the marker delay setting is 0 samples.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:MODE REStart | PULSe | PATtern | RATio

The command defines the signal for the selected marker output.

Parameter: REStart

A marker signal is generated at every signal start.

PULSe

A pulsed marker signal is generated. The pulse frequency (= symbol rate/divider) is defined with the

SOUR:BB:MCCW:TRIG:OUTP:PULS:DIVider command and can be queried with the SOUR:BB:MCCW:TRIG:OUTP:PULS:FREQ? command.

PATtern

A marker signal is generated with the aid of a user-definable bit pattern. The bit pattern is entered with the aid of command

SOURce:BB:MCCW:TRIGger:PATtern. The bit pattern is a maximum of 32 bits long.

RATio

A regular marker signal corresponding to the Time Off / Time On specifications in the commands SOURce:BB:MCCW:TRIGger:OFFT and SOURce:BB:MCCW:TRIGger:ONT is generated.

Example: " :BB:MCCW:TRIG:OUTP2:MODE PULS"
'selects the pulsed marker signal on output MARKER 2.

*RST value	Resolution	SCPI
REStart	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:OFFTime 1 ... max. wave length -1 sample

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

Example: " :BB:MCCW:TRIG:OUTP2:OFFT 20"
'sets an OFF time of 20 samples for marker signal 2.

*RST value	Resolution	SCPI
1 Sample	1	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:ONTime 1 ... max. wavelength -1 sample

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

Example: " :BB:MCCW:TRIG:OUTP2:ONT 20"
'sets an ON time of 20 samples for marker 2.

*RST value	Resolution	SCPI
1 Sample	1	Device-specific

^

[SOURce<[1]|2>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:PATtern #B0,1 ... #B111...1,32

The command defines the bit pattern used to generate the marker signal in the setting SOURce:BB:MCCW:TRIGger:OUTPut:MODE PATtern 0 is marker off, 1 is marker on.

Example: ":BB:MCCW:TRIG:OUTP2:PATT #HE0F52,20"
 'sets a bit pattern.
 ":BB:MCCW:TRIG:OUTP2:MODE PATT"
 'activates the marker signal according to a bit pattern on output MARKER 2.

*RST value	Resolution	SCPI
0		Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:PULSe:DIVider 2 ... 2^10

The command sets the divider for Pulse marker mode (SOUR:BB:MCCW:TRIG:OUTP:MODE PULSe). The resulting pulse frequency is derived by dividing the symbol rate by the divider.

Example: ":BB:MCCW:TRIG:OUTP2:PULS:DIV 2"
 'sets the divider for the marker signal on output MARKER 2 to the value 2.
 ":BB:MCCW:TRIG:OUTP2:FREQ?"
 'queries the resulting pulse frequency of the marker signal
Response: "66 000"
 'the resulting pulse frequency is 66 kHz.

*RST value	Resolution	SCPI
2	1	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:OUTPut<[1]...4>:PULSe:FREQuency?

The command queries the pulse frequency of the pulsed marker signal in the setting SOUR:BB:MCCW:TRIG:OUTP:MODE PULS. The pulse frequency is derived by dividing the symbol rate by the divider. The divider is defined with command SOUR:BB:MCCW:TRIG:OUTP:PULS:DIV.

The command is a query only and therefore has no *RST value.

Example: ":BB:MCCW:TRIG:OUTP2:PULS:DIV 4"
 'sets the divider for the marker signal on output MARKER 2 to the value 4.
 ":BB:MCCW:TRIG:OUTP2:MODE PULS"
 'enables the pulsed marker signal
 ":BB:MCCW:TRIG:OUTP2:PULS:FREQ?"
 'queries the pulse frequency for the marker signal.
Response: "33 000"
 'the resulting pulse frequency is 33 kHz.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:RMODE

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command queries the current status of signal generation for all trigger modes with Multi Carrier CW on.

The command is a query command and therefore has no *RST value.

Parameter:

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

:BB:MCCW:TRIG:ARM:EXECute (armed trigger modes only).

Example:

"SOUR:BB:MCCW:TRIG:SOUR EXT"

'sets external triggering via the TRIGGER 1 connector.

"SOUR:BB:MCCW:TRIG:MODE ARET"

'selects the Armed_Retrigger mode

"SOUR:BB:MCCW:TRIG:RMODE?"

'queries the current status of signal generation.

Response: "RUN"

'the signal is generated, an external trigger was executed.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:SLENgth 1 ... (2^32-1) Samples

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command defines the length of the signal sequence to be output in the **Single** trigger mode. The input is to be expressed in samples. It is then possible to output deliberately just part of the waveform, an exact sequence of the waveform, or a defined number of repetitions of the waveform.

Example:

"SOUR:BB:MCCW:SEQ SING"

'sets trigger mode Single.

"SOUR:BB:MCCW:TRIG:SLEN 200"

'sets a sequence length of 200 samples. The first 200 samples of the current waveform will be output after the next trigger event.

*RST value	Resolution	SCPI
1 Waveform length	-	Device-specific

[SOURce<[1]|2>]:BB:MCCW:TRIGger:SOURce INTernal | EXTernal | BEXTernal | OBASeband

Note:

This command is available for R&S SMx and R&S AMU instruments only.

The command selects the trigger source.

Parameter:

INTernal

Triggering is executed by means of the Trigger command :BB:MCCW:TRIG:EXECute in the case of remote control, and by means of **Execute Trigger** in the case of manual operation.

EXTernal

Triggering is executed by means of the signal on the TRIGGER 1 connector.

BEXTernal

Triggering is executed by means of the signal on the TRIGGER 2 connector.

OBASeband

Triggering is executed by means of the signal from the second path (two-path instruments only).

Example:

" :BB:MCCW:TRIG:SOUR INT"
'sets internal triggering.

*RST value	Resolution	SCPI
INTernal	-	Device-specific

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