



ROHDE & SCHWARZ

Test and Measurement
Division

Release Notes

TD-SCDMA Mobile Station Test Application Firmware R&S FS-K77

Release 4.60

for R&S FSP, FSU, FSQ, FSG, FSMR, FSUP
Analyzer Firmware 4.6x

New Features:

- Optional code channel phase synchronization on associated midamble

Release Note Revision: 4

Printed in the Federal
Republic of Germany

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History

| Date | Rel Note Rev | Changes |
|-------------------|--------------|---|
| 17 June 2010 | 1 | First revision for R&S FS-K77 Firmware 4.60. |
| 20 September 2010 | 2 | Description for SEM MEAS STD added. New hot line phone number for calls from Europe. |
| 07 March 2011 | 3 | New chapter "Customer Support". |
| 06 June 2011 | 4 | Entry for FSUP. |

General Topics

Compatibility of R&S FS-K77 TD-SCDMA MS Application Firmware

The following table shows the compatible versions of the basic analyzer firmware version and the TD-SCDMA MS application firmware:

Table of compatible versions:

| R&S FS-K77 Application Firmware | R&S FSP Basic Firmware | R&S FSU Basic Firmware | R&S FSQ Basic Firmware | R&S FSMR Basic Firmware | R&S FSUP Basic Firmware | R&S FSG Basic Firmware |
|---------------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|--|------------------------------|
| 4.60 | - | 4.61 | 4.65 | - | Please refer to the FSUP release notes | 4.69 |
| 4.50 | 4.50 | 4.51 | 4.55 | - | | 4.59 |
| 4.40 SP1 | - | - | - | - | | - |
| 4.40 | 4.40 | 4.41 | 4.45 | - | | 4.49 |
| 4.30 | 4.30 | 4.31 | 4.35 | 4.36 | | 4.39 |
| 4.20 | 4.20 | 4.21 | 4.25 | 4.26 | | 4.29 |
| 4.10 | 4.10 | 4.11 | 4.15 | 4.16 | | - |
| 4.00 | 4.00 | 4.01 | 4.05 | 4.06 | | - |
| 3.90 | 3.90 | 3.91 | 3.95 | 3.96 | | - |
| 3.80 | 3.80 | 3.81 | 3.85 | 3.86 | | - |
| 3.70 | 3.70 | 3.71 | 3.75 | - | | - |
| 3.60 | 3.60 | 3.61 | 3.65 | 3.66 SP1 | | - |
| 3.50 | 3.50 | 3.51 | 3.55 | - | | - |
| 3.40 | 3.40 | 3.41 | 3.45 | - | | - |
| 3.30 | 3.30 | 3.31 | 3.35 | - | | - |
| 2.80 | 2.80 | 2.81 | - | - | | - |
| 2.60 | 2.60 | 2.61 | - | - | | - |
| 2.40 | 2.40 | 2.41 | 2.45 | - | | - |
| 2.30 | 2.30 | 2.31 | 2.35 | - | | - |

Application firmware versions 3.xx are running on R&S FSPs with order # 1164.4391.xx or R&S FSU with order # 1166.1660.xx or R&S FSQ with operating system XP.

Application firmware version 2.xx are running on R&S FSPs with order # 1093.4495.xx or R&S FSU with order # 1129.9003.xx or R&S FSQ with operating system NT.

Firmware Update of R&S FS-K77 TD-SCDMA MS Application Firmware

Since basic firmware version 4.2x a ZIP file with the update sets of the basic system firmware and all available applications is provided. This ZIP file is available in the instruments FIRMWARE section, e.g. R&S FSU of the Service Board on GLORIS.

Please follow the steps described in the instrument's basic firmware release note to perform a complete firmware update.

Enabling the Application Firmware via License Key Code Entry

This section can be skipped if the option key was entered once.

After installing the application firmware package a license key for validation must be entered. The license key is printed either on a label on the rear panel of the analyzer or delivered as a part of the R&S FS-K77 TD-SCDMA MS application firmware package.

The key sequence for entering the license key is:

SETUP - GENERAL SETUP – OPTIONS - INSTALL OPTION

Use the numeric keypad to input the license key number and press ENTER.

- On a successful validation the message 'option key valid' will appear.
- If the validation failed, the application firmware is not installed.
The most likely reason will be that the instrument is not equipped with the correct basic firmware version. In this case a message box will appear asking for installation of the correct basic firmware version.
If the application firmware package was not installed prior to entering the license key code, a message will appear asking for installation of the application firmware package.
In any case please make sure that the correct basic firmware version and the application firmware package is installed prior to entering the license key code.

New Functions in Version 4.60

- **Optional code channel phase synchronization on associated midamble**
By default the R&S FS-K77 determines one phase reference for all midambles and code channels of a data slot. The new setting considers phase rotations between the code channels. Each code channel gets its own phase reference from the associated midamble according to section AA.2 of the standard document 3GPP TS 25.221.

Improvements

The version numbers in brackets indicate the version in which the issue was observed for the first time.

1. [V4.50] Bitstream for 64QAM modulated code channels incorrect.

The bitstream result for 64QAM code channels has been corrected.

2. [V4.50] Bad EVM results or discarded code channels using 64QAM modulation.

The detection and demodulation of 64QAM code channels has been improved.

Known Issues

None

Modified Functions

1. [V3.50] Change of default node for CALC2:FEED 'XTIM:CDP:PVSL'.

For compatibility reason with other 3G applications the default node for the IEC/IEEE bus command

CALC2:FEED 'XTIM:CDP:PVSL[:ABS]' is changed to

CALC2:FEED 'XTIM:CDP:PVSL[:RAT]'.

2. [V3.50] CDP measurement over 11970 consecutive PCGs for R&S FSQ possible (8 seconds of IQ data).

3. [V3.60/V2.60] External trigger level adjustable from 0.5 to 3.5V.

4. [V3.60/V2.60] Center Frequency Stepsize softkey available.

5. [V3.60/V2.60] Changed SCPI commands.

In order to limit to 12 chars the :CALCulate2:FEED 'XTIME:CDPower:SYMBOL:CONStellation' and :CALCulate2:FEED 'XTIME:CDPower:COMPOSITE:CONStellation' are changed to

:CALCulate2:FEED 'XTIME:CDPower:SYMBOL:CONSt' and

:CALCulate2:FEED 'XTIME:CDPower:COMPOSITE:CONSt'.

6. [V3.70/V2.80] ACP: number of adjacent channels increased to 12.

7. [V3.70/V2.80] ACP: power mode to max holds the power results.

8. [V3.80/V2.80] Trace view available within code domain analyzer.

9. [V3.90] Support for noise correction in ACLR measurement with power trigger.

10. [V4.00] Spectrum emission mask: List evaluation in lower screen now supported.

11. [V4.10] High Dynamic Mode for Power vs. Time Measurement.

12. [V4.20] Support for instrument R&S FSG.

13. [V4.20] Softkey REF VALUE Y AXIS available for CDP measurements.

14. [V4.20] Power vs Time: Sweep Mode SINGLE/CONTINUOUS is now restored to its previous state, when HIGH DYNAMIC is switched off.

15. [V4.30] Synchronization to Midamble of Selected Slot (softkey SYNC to SLOT).

16. [V4.30] Measurements in presence of the DwPCH supported if K76 is enabled.

17. [V4.30] Softkey AC / DC Coupling available.

18. [V4.30]New Ref Value Y Axis / Reference Level coupling simplifies grid scaling configuration for Code Domain measurements.

Since version 4.20 the Reference Level and the grid scaling (REF VALUE Y AXIS) with unit dBm can be independently set for Code Domain measurements. In previous versions changing the Reference Level and changing the Ref Value Y Axis were independent. If the Reference Level value is changed the Ref Value Y Axis is now automatically adjusted to keep the difference between Reference Level and Ref Value Y axis constant.

Example:

Ref Level set to 0 dBm

Ref Value Y axis set to -10 dBm (at Y Axis Position 100%)

► The upper Y limit of the grid scaling is now at 10 dB below reference level.

Change Reference Level to -10dBm

The Ref Value Y Axis is now adjusted to -20 dB

► The upper Y limit of the grid scaling is at 10 dB below reference level as before.

Note: The internal reference level change with function ADJUST REF LEVEL is treated in the same way.

19. [V4.50]The Relative Code Domain Error (RCDE) is displayed in the result summary.**20. [V4.50]Support for 64QAM modulation.**

64QAM constellations are fully supported as code channel modulation. An improved robust channel search algorithm classifies the modulation automatically from QPSK up to 64QAM. For bad SNR environments the automatic search can optionally be limited to lower constellations.

21. [V4.50]New midamble based synchronization mode.

By default the R&S FS-K77 determines the phase reference by a multi-step algorithm using both code channels and midambles. At least one of the code channels had to be QPSK or 8PSK modulated. The new midamble based synchronization is independent of the code channel modulation and thus allows synchronization on slots with arbitrary code channel modulation.

22. [V4.60]Optional code channel phase synchronization on associated midamble.

By default the R&S FS-K77 determines one phase reference for all midambles and code channels of a data slot. The new setting considers phase rotations between the code channels. Each code channel gets its own phase reference from the associated midamble according to section AA.2 of the standard document 3GPP TS 25.221.

Modifications to the Operating Manual and Supplements

For the R&S FS-K77 TD-SCDMA Mobile Station Test Application Firmware manuals please refer to the following order numbers:

- 1300.7304.44-02 (German/English)

They can be downloaded from R&S internet – search: FS-K77:

<http://www.rohde-schwarz.com>

Modified Chapters

Menu CHAN CONF

HEADER
VALUES

MODULATION TYPE:

Modulation type of the channel. You can choose between QPSK, 8PSK, 16QAM and 64 QAM

IEC-Bus-command:

```
:CONFigure:CDPower[:BTS]:CTABLE:DATA 1..6, 0..4,
1..16, 0..3, 1..16, 0 | 1, 0, 0...
```

< Channel type >, <Code class>, <Code number>, <Modulation type>,
<Midamble shift>, <Status>, <Reserved 1>, <Reserved 2>,

Modulation type: 0 = invalid (for midamble)
1 = QPSK
2 = 8PSK
3 = 16QAM
4 = 64QAM

MAX MOD
<64QAM>

The MAX MOD setting defines the highest modulation to be considered in the automatic channel search. In low SNR environments it may be necessary to limit the channel search to lower modulations than 64QAM.

IEC/IEEE-bus command:

```
SENSe:CDPower:MMAx QPSK | PSK8 | QAM16 | QAM64
```

Menu RESULTS

RESULT
SUMMARY



The RESULT SUMMARY softkey selects numeric evaluation of all measured results. Evaluation is subdivided as follows:

| RESULT SUMMARY TABLE | | | | DR | 52.8 kbps |
|---|---------------------------|------------|--|----------------|-------------|
| | | | | Chan | 1.16 |
| | | | | Slot | 4 |
| CF 1 GHz | | | | | |
| Ref -6.00 dBm Att 20 dB 1 CLRWR | GLOBAL RESULTS FOR SET 0: | | | Trg to Frame | 59 ns |
| | Chip Rate Error | | | 0.05 ppm | |
| | SLOT RESULTS | | | Carr Freq Err | -38.40 Hz |
| | P Data | -10.75 dBm | | IQ Imbal/Offs | 0.03/0.05 % |
| | P D1 | -11.30 dBm | | RHO | 1.0000 |
| | P D2 | -10.27 dBm | | Composite EVM | 0.18 % |
| | P Midamble | -10.19 dBm | | Pk CDE(SF 16) | -62.68 dB |
| | Active Channels | 2 | | Average RCDE | -59.75 dB |
| | CHANNEL RESULTS | | | Data Rate | 52.8 kbps |
| | Channel.SF | 1.16 | | ChannelPwr Rel | -13.76 dBm |
| | | | | Symbol EVM | 0.31 %Pk |
| | | | | Symbol EVM | 0.31 %Pk |

Fig. 1 Result summary

The second part shows measured results relating to all channels for the slot selected with the SELECT SLOT softkey:

Average RCDE: Average relative code domain error of the active channels

IEC/IEEE bus command:

```
:CALC2:FEED "XTIM:CDP:ERR:SUMM"
:CALC2:MARK1:FUNC:CDP:BTS:RES?
SLOT | PDAT | PD1 | PD2 | PMID |
RHO | MACC | PCD | FERR | CERR | TFR |
IQIMB | IQOF | ACT | SRAT | CHAN
| SFAC | CDPR | CDP | EVMR | EVMP | ARCD
```

Menu SETTINGS – NEXT

SYNC
TO SLOT

By default the R&S FS-K77 determines the phase reference for all data slots from the midamble of slot 1. For e.g. beamforming or repeater measurements it might be necessary to apply different phase offsets to each time slot. Using slot 1 as phase reference leads to rotated constellation diagrams and bad EVM values in the other time slots.

By activating the new setting 'SYNC TO SLOT' the R&S FS-K77 determines the phase reference from the midamble of the selected slot. Thus the data slots can be phase rotated to each other without degrading the EVM results. The selected slot must contain at least one data channel with sufficient power for successful synchronization.

The softkey *SYNC TO SLOT* changes the phase reference from the midamble of slot 1 to the midamble of the selected slot.

IEC/IEEE-bus command:

```
:SENSe:CDPower:STSLOT ON | OFF
```

SYNC TO
CODE MA

This softkey selects the synchronization mode.

If CODE is selected, the phase reference is determined by a multi-stage algorithm involving code channels and midambles. At least one code channel within the selected slot must be QPSK or 8PSK modulated.

If MA is selected, the phase reference is determined by the midamble area. Hence there is no requirement about the code channel modulation.

IEC/IEEE-bus command:

```
:SENSe:CDPower:STSLOT:MODE CODE | MA
```


ROTATE
CODE TO MA

By default the R&S FS-K77 determines one phase reference for all midambles and code channels of a data slot. If ROTATE CODE TO MA is selected, phase rotations between the code channels are allowed. Each code channel gets its own phase reference from the associated midamble according to section AA.2 of the standard document 3GPP TS 25.221. If the associated midamble is missing, the common phase reference is used for this code channel.

IEC/IEEE-bus command:

:SENSe:CDPower:STSLOT:ROTate ON | OFF

Menu MEAS - ACLR

NOISE CORR
ON OFF

The softkey *NOISE CORR* is since firmware version 3.90 also available in IF or RF power trigger mode.

Menu MEAS – SPECTRUM EM MASK

LIST
EVALUATION



The softkey *LIST EVALUATION* reconfigures the SEM output to a split screen. In the upper half the trace with the limit line is shown. In the lower half the peak value list is shown. For every range of the spectrum emission defined by the standard the peak value is listed. For every peak value the frequency, the absolute power, the relative power to the channel power and the delta limit to the limit line is shown. As long as the delta limit is negative, the peak value is below the limit line. A positive delta indicates a failed value. The results are then colored in red, and a star is indicated at the end of the row, for indicating the fail on a black and white printout.

If the list evaluation is active, the peak list function is not available.

IEC/IEEE-bus command:

:CALCulatel:PEAKsearch:AUTO ON | OFF

With this command the list evaluation which is by default for backwards compatibility reasons off can be turned on.

TRACel:DATA? LIST

With this command the list evaluation results are queried in the following order:
 <no>, <start>, <stop>, <rbw>, <freq>, <power abs>, <power rel>, <delta>, <limit
 check>, <unused1>, <unused2>
 All results are float values.

| | | |
|-------------|--|-------|
| no | : range number | |
| start | : start frequency | |
| stop | : stop frequency | |
| rbw | : resolution bandwidth of range | |
| freq | : frequency of peak | |
| power abs | : absolute power in dBm of peak | |
| power rel | : relative power in dBc (related to the channel power) of peak | |
| delta | : distance to the limit line in dB (positive indicates above the limit, fail) | value |
| limit check | : limit fail (pass = 0, fail =1) | |
| unused1 | : reserved (0.0) | |
| unused2 | : reserved (0.0) | |

| |
|-------------|
| MEAS STD |
| 7.5.0 7.6.0 |

The softkey *MEAS STD* selects the SEM limits according to the 3GPP Standard version 7.5.0 or according to version 7.6.0 or newer. The default is the newer version 7.6.0.

IEC/IEEE-bus command:

:SENS:CDP:STAN:REL R750 | R760

Menu MEAS – POWER VS TIME

START
MEAS

The softkey *START MEAS* starts a single sweep measurement.

IEC/IEEE-bus command:

INIT:CONT OFF;:INIT

HIGH
DYNAMIC

The softkey *HIGH DYNAMIC* selects the high dynamic mode. The sweep mode is automatically set to single sweep.

The High Dynamic mode uses a digital 2 MHz RBW filter with an outstanding low settling time of about 1 chip duration. The Power vs. Time sweep is divided into a TX on power and a TX off power section. The TX on power section uses reference level and attenuator settings according to the maximum input level, whereas the TX off power section is optimized for a noise power of less than -80 dBm. Each section is averaged over the selected number of subframes. The measurement can be performed in single sweep mode only.

Due to the low reference level, power values above -50dBm are not displayed with the correct magnitude, if they fall into the TX off power section. However, these power values will clearly fail the time mask.

For all Power vs. Time measurements it is mandatory to keep the input power within the instruments specifications. The internal attenuator is set to 0 dB for reference levels below 20 dBm.

If the input power is increased above 20 dBm, the Auto Level & Time routine must be called before starting the measurement. Alternatively an RF attenuation of at least 10 dB can be set manually.

IEC/IEEE-bus command:

:CONFigure:CDPower:PVTime:HDYNamic ON|OFF

Menu TRACE

VIEW

The softkey *VIEW* freezes the trace.

IEC/IEEE-bus command:

:DISP:WIND:TRAC:MODE VIEW

Remote Control Commands

CALCulate subsystem

:CALCulate<1|2>:MARKer<1>:FUNction:CDPower[:BTS]:RESult?

SLOT | PDATa | PD1 | PD2 | PMIDamble | RHO | MACCuracy | PCDerror |
 FERRor | CERRor | TFRame | IQOffset | IQIMbalance | ACTive | SRATe |
 CHANnel | SFACtor | CDPabsolute | CDPRelative | EVMRms | EVMPeak |
 ARCDerror

This command polls the measured and calculated values of code domain power analysis. The results are provided for the channel to which the code selected by the CDPower:CODE command belongs.

Parameters:

Global results of selected slot:

| | | | |
|-----------|------------------------------|-------------|---------------------------------|
| SLOT | Slot number | | |
| PDATa | Power data fields in dBm | FERRor | Frequency error in Hz |
| PD1 | Power data field 1 in dBm | CERRor | Chip rate error in ppm |
| PD2 | Power data field 2 in dBm | TFRame | Trigger to frame |
| PMIDamble | Power midamble in dBm | IQIMbalance | IQ imbalance in % |
| RHO | RHO | IQOffset | IQ offset in % |
| MACCuracy | Composite EVM in % | ACTive | Number of active channels |
| PCDerror | Peak code domain error in dB | ARCDerror | Average RCDE of active channels |

Channel results:

| | |
|-------------|----------------------------------|
| SRATe | Data rate in kbps |
| CHANnel | Channel number |
| SFACtor | Spreading factor of channel |
| CDPRelative | Channel power relative in dB |
| CDPabsolute | Channel power absolute in dBm |
| EVMRms | Error vector magnitude RMS in % |
| EVMPeak | Error vector magnitude Peak in % |

Note: The trigger to frame (*TFRame*) value produces a "9" if the trigger is set to *FREE RUN*.

Example:

| | |
|--------------------------------|-------------------------------------|
| "INST:SEL BTDS" | ' Activate TD-SCDMA BTS meaning |
| | ' CDP relative on screen A and |
| | ' Result Summary active on screen B |
| "INIT:CONT OFF" | ' Select single sweep |
| "INIT;*WAI" | ' Start measurement with |
| | ' synchronization |
| "CALC:MARK:FUNC:CDP:RES? PDAT" | ' Read out power of data fields |
| "CDP:SLOT 5" | ' Selects slot 5 |
| "CDP:CODE 11" | ' Select code number 11 |
| "CALC:MARK:FUNC:CDP:RES? EVMR" | ' Read out EVM RMS of code with |
| | ' number 11 in slot 5 |

Characteristics:

| | |
|-------------|---------------------|
| *RST value: | - |
| SCPI: | instrument-specific |

CONFigure subsystem

:CONFigure:CDPower:CTABLE:DATA 1|2|8|9, 0..4, 1..16, 0..2, 1..16, 0 | 1, 0, 0...

This command defines a channel table. The whole table is defined in one operation. The inactive channels (INACTIVE) do not have to be defined. Eight values are specified for a line of a table.

< Channel type >, <Code class>, <Code number>, <Modulation type>, <Midamble shift>, <Status>, <Reserved 1>, <Reserved 2>,

Channel type: The channel type is coded with numbers as follows:

1 = Midamble
2 = DPCH
8 = PRACH
9 = PUSCH

Code class: 0–4

Code number: 1–16

Modulation type: 0 = invalid (for midamble)

1 = QPSK
2 = 8PSK
3 = 16QAM
4 = 64QAM

Midamble shift: 1–16

Status: 0: inactive, 1: active

Can be used in a setting command to disable a channel temporarily.

Reserved 1: Always 0, reserved for additions

Reserved 2: Always 0, reserved for additions

Before using this command, you must set the name of the channel table using the

CONF:CDP:CTAB:NAME command.

Example: "INST:SEL MTDS" 'Activate TD-SCDMA MS
"CONF:CDP:CTAB:NAME 'NEW_TAB'" 'Select table to edit
"CONF:CDP:CTAB:DATA 2,4,1,1,1,1,0,0,
2,4,2,1,1,1,0,0"
'Defines two data channels with QPSK
'modulation

Features: *RST value: –
SCPI: instrument-specific

SENSe subsystem

:[SENSe<1|2>:]CDPower:STANDart:RELease R750 | R760

This command selects the SEM limits according to the 3GPP Standard version 7.5.0 or according to version 7.6.0 or newer. The default is the newer version 7.6.0.

Parameter: R750: SEM Limits according to 3GPP Standard V7.5.0.

R760: SEM Limits according to 3GPP Standard V7.6.0 or newer.

Example: "SENS:CDP:STAND:REL R750 " 'selects the former SEM limits

Characteristics: *RST value: R760
SCPI: device-specific

:[SENSe<1|2>:]CDPower:STSLot ON | OFF

This command selects the phase reference to be used.

By default the R&S FS-K77 determines the phase reference for all data slots from the midamble of slot 1. For e.g. beamforming or repeater measurements it might be necessary to apply different phase offsets to each time slot. Using slot 1 as phase reference leads to rotated constellation diagrams and bad EVM values in the other time slots.

By activating the new setting 'SYNC TO SLOT' the R&S FS-K77 determines the phase reference from the midamble of the selected slot. Thus the data slots can be phase rotated to each other without degrading the EVM results. The selected slot must contain at least one data channel with sufficient power for successful synchronization.

Parameter: ON: Selects the midamble of the selected slot as phase reference.
OFF: Selects the midamble of slot 1 as phase reference.

Example: "SENS:CDP:STSL ON" 'use selected slot as phase reference
Characteristics: *RST value: OFF
SCPI: device-specific

:[SENSe<1|2>:]CDPower:STSLot:MODE CODE | MA

This command selects the slot synchronization mode. It is effective only if SYNC TO SLOT is activated.

If CODE is selected, the phase reference is determined by a multi-stage algorithm involving code channels and midambles. At least one code channel within the synchronization slot must be QPSK or 8PSK modulated.

If MA is selected, the phase reference is determined by the midamble area. Hence there is no requirement about the code channel modulation.

Parameter: CODE: Uses code channels and midamble of the selected slot as phase reference
MA: Uses the midamble of the selected slot as phase reference.

Example: "SENS:CDP:STSL:MODE MA" 'use midamble in selected slot as phase reference

Characteristics: *RST value: CODE
SCPI: instrument-specific

:[SENSe<1|2>:]CDPower:STSLot:ROTate ON | OFF

By default the R&S FS-K77 determines one phase reference for all midambles and code channels of a data slot. If ROTATE CODE TO MA is selected (SENS:CDP:STSL:ROT ON), phase rotations between the code channels are allowed. Each code channel gets its own phase reference from the associated midamble according to section AA.2 of the standard document 3GPP TS 25.221. If the associated midamble is missing, the common phase reference is used for this code channel.

Parameter: ON: Phase rotations between the code channels allowed
OFF: Phase rotations not allowed

Example: "SENS:CDP:STSL:ROT ON"
Characteristics: *RST value: OFF
SCPI: device-specific

:[SENSe<1|2>:]CDPower:MMAX QPSK | PSK8 | QAM16 | QAM64

This command defines the highest modulation to be considered in the automatic channel search. In low SNR environments it may be necessary to limit the channel search to lower modulations than 64QAM.

Parameter: QPSK: Consider QPSK modulation only
 PSK8: Consider QPSK and 8PSK modulation.
 QAM16: Consider QPSK, 8PSK and 16QAM modulation
 QAM64: Consider QPSK, 8PSK, 16QAM and 64QAM modulation

Example: "SENS:CDP:MMAX PSK8" ' assume QPSK and 8PSK modulations only for the automatic channel search

Characteristics: *RST value: QAM64
 SCPI: instrument-specific

TRACe subsystem

:TRACe[:DATA] TRACE1 | TRACE2

CHANNEL TABLE (TRACE1)

The following is output for each channel:

| | |
|-----------------|--|
| Channel type | The channel type is coded by numbers as follows: 0 = inactive 1 = midamble 2 = DPCH 8 = PRACH 9 = PUSCH |
| Code class | Code class of channel, values between 0 and 4 |
| Code number | Code number of channel, values between 1 and 16 |
| Modulation type | Modulation type of channel 0 = invalid (for midamble) 1 = QPSK 2 = 8PSK 3 = 16QAM 4 = 64QAM |
| Absolute level | In dBm |
| Relative level | In dB |
| Midamble shift | Values between 1 and 16 |
| Δ MidD1 | Power offset between sum power of channels (belonging to midamble(k), only data field 1) and midamble(k) Power |
| Δ MidD2 | Power offset between sum power of channels (belonging to midamble(k), only data field 2) and midamble(k) Power |
| reserved 1 | Reserved for additions |
| reserved 2 | Reserved for additions |

The class specifies the spreading factor of the channel

Class 4 is the highest spreading factor (16, data rate 17.6 kbps for QPSK, data rate 26.4 kbps for 8PSK), class 0 is the lowest spreading factor (1, data rate 281.6 kbps for QPSK, data rate 422.4 kbps for 8PSK).

Thus 11 values are transferred for all channels:

<Channel type>, <Code class>, <Code number>, <Modulation type>, <Absolute level in dBm>, <Relative level in dB>, <Midamble shift>, < Δ MidD1>, < Δ MidD2>, <Reserved 1>, <Reserved 2>

In code sorting (CONF:CDP:CTAB:ORD CODE), first all midambles are output, then the control channels, and finally the data channels in ascending order of code number.

In midamble sorting (CONF:CDP:CTAB:ORD MID), first the midamble is output and then its control and data channels.

Example:

The example shows the results of the poll for three channels in common midamble allocation with the following configuration:

```

Midamble m(3)          -3.0 dBm
DPCH 1.16              QPSK          -7.78 dBm
DPCH 2.8               QPSK          -7.78 dBm
DPCH 3.4               8PSK          -7.78 dBm

"INST:SEL MTDS"        'Activate TD-SCDMA MS meaning
                        'CDP relative on screen A and
                        'Result Summary active on screen B

"INIT:CONT OFF"        'Select single sweep
"CALC2:FEED 'XTIM:CDP:ERR:CTAB'"
                        'Channel table evaluation

"INIT;*WAI"            'Start measurement with synchronization
"TRAC? TRACE1"         'Read out channel table
1, 0, 0, 0, -3.0, 0, 3, 0.005, 0.005, 0, 0
2, 4, 1, 1, -7.78, -4.78, 3, 0, 0, 0, 0
2, 3, 2, 1, -7.78, -4.78, 3, 0, 0, 0, 0
2, 2, 3, 2, -7.78, -4.78, 3, 0, 0, 0, 0
0, 4, 2, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 5, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 6, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 7, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 8, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 13, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 14, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 15, 1, -46.9, -43.9, 3, 0, 0, 0, 0
0, 4, 16, 1, -46.9, -43.9, 3, 0, 0, 0, 0

```


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