ROHDE&SCHWARZ

Test and Measurement
Division

Release Notes

cdma2000/1xEV-DV
Base Station Test
Application Firmware R&S FS-K82

Release 4.30
for R&S FSP, FSU, FSQ, FSG, FSMR, FSUP
Analyzer Firmware 4.3x

New Features:

- New Softkey RF INPUT AC / DC.
- New Ref Value Y Axis / Reference Level coupling simplifies grid scaling configuration for Code Domain measurments.

Release Note Revision: 2

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Republic of Germany

Contents

History

Date	Rel Note Rev	Changes
06 March 2008	1	First revision for R&S FS-K82 Firmware 4.30
11 August 2008	2	FMU added.

General Topics

Compatibility of R&S FS-K82 cdma2000 BTS Application Firmware

The following table shows the compatible version of the basic analyzer firmware version and the cdma2000 BTS application firmware:

Table of compatible versions:

R&S FS-K82 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 FMU Basic Firmware	R&S FSG Basic Firmware
4.30	4.30	4.31	4.35	-	-	4.38	4.39
4.21	4.20	4.21	4.25	-	4.27	-	4.29 SP1
4.20	-	-	-	-	-	-	4.29
4.10	4.10	4.11	4.15	-	4.17	-	-
4.00	4.00	4.01	4.05	-	-	-	-
3.90	3.90	3.91	3.95	3.96	3.99	-	-
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	-	-	-	-
3.28	3.20	3.21	3.25	-	-	-	-
3.24	3.10	3.11	3.15	-	-	-	-
3.20	3.00	-	3.05	-	-	-	-
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	-	-	-	-
2.28	2.20	2.21	2.25	-	-	-	-
2.24	2.10	2.11	2.15	-	-	-	-
1.20	1.80	1.81	1.85	-	-	-	-
1.12	1.70	1.71	-	-	-	-	-
1.10	1.60	1.61	1.65	-	-	-	-

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-K82 cdma2000 BTS 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-K82 cdma2000 BTS 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 4.30

- **Softkey RF INPUT AC / DC is now available for the application.**
  Note: AC /DC coupling is not provided by all instrument models.

- **New Ref Value Y Axis / Reference Level coupling simplifies grid scaling configuration for Code Domain measurments.**
  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 10dB 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.

Modified Functions

The version numbers in brackets indicate the version in which the function was modified.

1. [V1.20] FSQ Baseband Inputs R&S FSQ-B71 supported for Code Domain Analyzer.

2. [V3.20/V1.20] Evaluation Channel Table in conjunction with Time/Phase Offset measurement shows maximum values for Time and Phase Offset.

3. [V3.24/V2.24] Higher resolution of trigger to frame value on display.

4. [V3.24/V2.24] Result summary evaluation allows MIN/MAX and AVERAGE statistics.

5. [V3.24/V2.24] Transducer factors supported also for Code Domain Analyzer.

6. [V3.24/V2.24] Number of Sweep Points selectable in RF measurements.

7. [V3.28/V2.28] Unit circle display in constellation diagrams.

8. [V3.28] option FS-K9 power sensor support for RF measurements.

9. [V3.30/V2.30] Read out of spectrum emission mask worst fail position.

10. [V3.40/V2.40] Support for 1xEV-DV channels PDCCH and PDCH including additional modulation types 8PSK, 16QAM.

11. [V3.40/2.40] Sign change for frequency offset, phase offset and q-inversion for symbol constellation and bitstream.
Due to a correction of the cdma2000 specific –q definition, the mention values had been changed.

12. [V3.50/V2.60] CDP measurement over 2432 consecutive PCGs for R&S FSQ possible (over 3 seconds of IQ data).

13. [V3.50/V2.60] CDP measurement over 64 PCGs in R&S FSU and R&S FSP with B70 possible.

14. [V3.50/V2.60] Maximal capture length is increased to 64 for R&S FSU and R&S FSQ. On R&S FSQ also up to 38 sets of 64 PCGs are possible.

15. [V3.50/V2.60] `:[SENSe:]CDPower:ORDer?` **Delivers now short form** `HAD` **or** `BITR` **as result**.

16. [V3.60/V2.60] Enhanced multicarrier support with improved algorithm for multicarrier and low pass filter.

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

18. [V3.60/V2.60] Carrier frequency step size softkey available.

19. [V3.60/2.60] 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'`.

20. [V3.70/V2.80] Multi carrier adjacent channel power measurement within application.

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

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

23. [V3.70/V2.80] SEM: configurable transition frequency for RBW change between 30 kHz and 1 MHz.

24. [V3.70/V2.80] Extended configuration of multi carrier filter: Selectable enhanced algorithm and additional filter type (RRC filter with configurable roll off factor and cut off frequency).

25. [V3.80/V2.80] SEM now supports peak list evaluation.

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

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

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

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

30. [V4.21] Band Classes 14 and 15 supported.

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

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

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.

Problems Eliminated

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

1. [V4.20] A Reference Level Offset ≠ 0 dB is not taken into account when the dialog REF VALUE X AXIS is opened.

A wrong REF VALUE X AXIS is displayed after changing the reference level offset. The problem is only visible on the input dialo. The grid scaling settings are correct. Wheh a new value is entered the reference level is correctly taken into account.

2. [V4.20] Some open dialogs are not automatically closed when softkey CHANNEL BANDWIDTH is pressed.

Following dialogs are affected: EDIT ACLR LIMIT, ACP CHANNEL BW and ADJ CHANNEL SPACING.

3. [V4.20] ACLR / MULTI CARR ACLR Measurement: A few softkeys are not visible but described in the manual.

Following softkeys are not available:

ACLR measurement:

Menu ACLR:	Softkey SWEEPTIME

MULTI CARR ACLR measurement:

Menu MULTI CARR ACLR:	Softkey SWEEPTIME
Menu CP/ACP CONFIG:	Softkey ACP REF SETTING

Known Problems

None

Modifications to the Operating Manual

For the R&S FS-K82 cdma2000 BTS Application Firmware manuals please refer to the following order numbers:

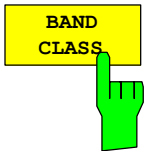
- 1007.9797.44-04 (German/English)

They can be downloaded from R&S internet – search: FS-K82:

http://www.rohde-schwarz.com

Modified Chapters

Menu SETTINGS



The *BAND CLASS* softkey supports entry of the frequency band used for the RF measurements "adjacent channel power" and "spectrum emission mask". The selection is made from a table in which the name of the band class is displayed. The center frequency entry is not restricted by the selected band class.

Fig. 6-27 Band class selection

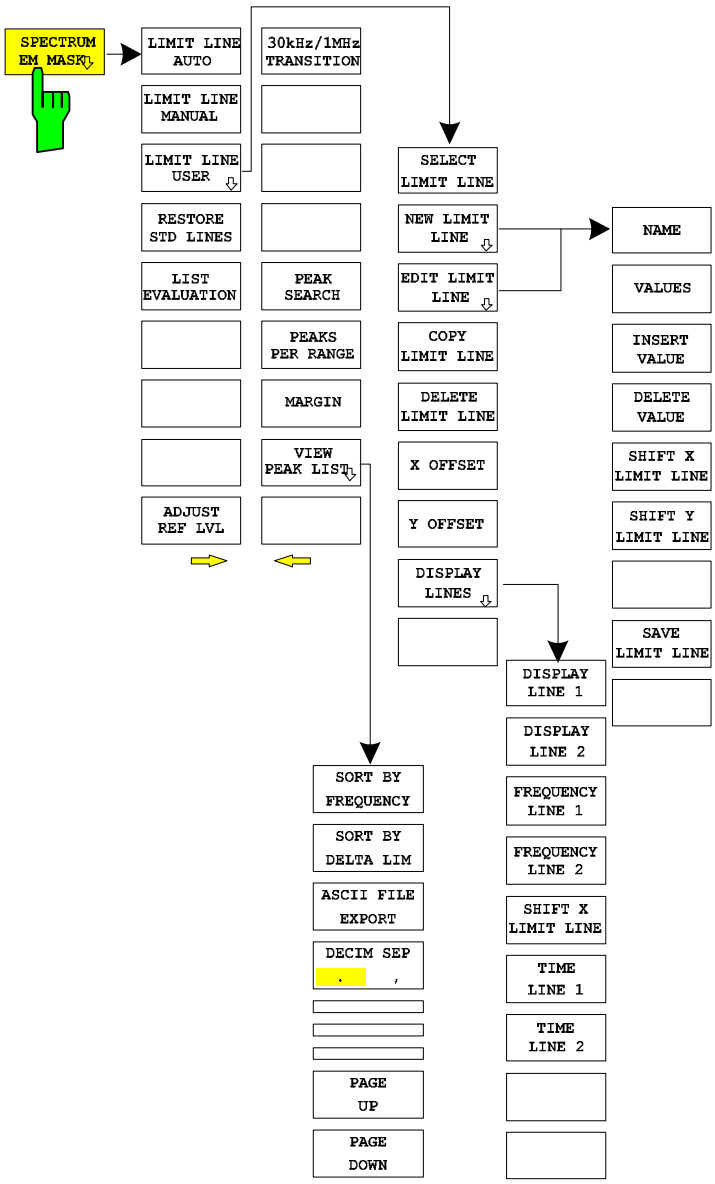
The user can scroll in the table, and the entry currently being used is checked, while a bar displays the selected entry; click ENTER to apply the value.
The numerical value is specified over the IEC/IEEE bus.

IEC/IEEE bus command: `:CONFigure:CDPower:BCLass <band_class>`

Table 6-3 ACLR settings for band classes 1, 4, 8, 14 and 15

Adjacent channel type	Spacing	RBW	Rel. Limit	Abs. Limit
Adjacent	885 kHz	30 kHz	–45 dBc	none
Alternate	1.25 MHz	30 kHz	–45 dBc	–9 dBm
Alternate2	1.98 MHz	30 kHz	–55 dBc	–22 dBm

Menu MEAS – SPECTRUM EM MASK



The *SPECTRUM EM MASK* (Spectrum Emission Mask) softkey measures the signal power in defined offsets from the carrier and compares the power values with the spurious emission mask, specified in the cdma2000 specification, in the near–carrier range from –4 MHz to 4 MHz.

The limits depend on the band class setting (*BAND CLASS* softkey).

Table 6-11 Band classes 1, 4, 8, 14 and 15 for carrier power P<28 dBm

Offset frequency	Limit	Type/name C2KB1CA and C2KB1CR	RBW
–4.00 MHz	–13 dBm	absolute	1 MHz
–2.25 MHz	–13 dBm	absolute	1 MHz
–2.25 MHz	–50 dBc	relative to carrier power	30 kHz
–1.98 MHz	–50 dBc	relative to carrier power	30 kHz
–1.98 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
–1.25 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
–1.25 MHz	–45 dBc	relative to carrier power	30 kHz
–885 kHz	–45 dBc	relative to carrier power	30 kHz
+885 kHz	–45 dBc	relative to carrier power	30 kHz
+1.25 MHz	–45 dBc	relative to carrier power	30 kHz
+1.25 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
+1.98 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
+1.98 MHz	–50 dBc	relative to carrier power	30 kHz
+2.25 MHz	–50 dBc	relative to carrier power	30 kHz
+2.25 MHz	–13 dBm	absolute	1 MHz
+4.00 MHz	–13 dBm	absolute	1 MHz

Table 6-12 Band classes 1, 4, 8, 14 and 15 for carrier power 28 dBm <= P < 33 dBm

Offset frequency	Limit	Type/name C2KB1BA and C2KB1BR	RBW
–4.00 MHz	–13 dBm	absolute	1 MHz
–2.25 MHz	–13 dBm	absolute	1 MHz
–2.25 MHz	–22 dBm	absolute	30 kHz
–1.98 MHz	–22 dBm	absolute	30 kHz
–1.98 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
–1.25 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
–1.25 MHz	–45 dBc	relative to carrier power	30 kHz
–885 kHz	–45 dBc	relative to carrier power	30 kHz
+885 kHz	–45 dBc	relative to carrier power	30 kHz
+1.25 MHz	–45 dBc	relative to carrier power	30 kHz
+1.25 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
+1.98 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
+1.98 MHz	–22 dBm	absolute	30 kHz
+2.25 MHz	–22 dBm	absolute	30 kHz
+2.25 MHz	–13 dBm	absolute	1 MHz
+4.00 MHz	–13 dBm	absolute	1 MHz

Table 6-13 Band classes 1, 4, 8, 14 and 15 for carrier power P >= 33 dBm

Offset frequency	Limit	Type/name C2KB1AA and C2KB1AR	RBW
–4.00 MHz	–13 dBm	absolute	1 MHz
–2.25 MHz	–13 dBm	absolute	1 MHz
–2.25 MHz	–55 dBc	relative to carrier power	30 kHz
–1.98 MHz	–55 dBc	relative to carrier power	30 kHz
–1.98 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
–1.25 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
–1.25 MHz	–45 dBc	relative to carrier power	30 kHz
–885 kHz	–45 dBc	relative to carrier power	30 kHz
+885 kHz	–45 dBc	relative to carrier power	30 kHz
+1.25 MHz	–45 dBc	relative to carrier power	30 kHz
+1.25 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
+1.98 MHz	Stricter of: –45 dBc / –9 dBm	relative to carrier power/absolute	30 kHz
+1.98 MHz	–55 dBc	relative to carrier power	30 kHz
+2.25 MHz	–55 dBc	relative to carrier power	30 kHz
+2.25 MHz	–13 dBm	absolute	1 MHz
+4.00 MHz	–13 dBm	absolute	1 MHz

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. Since version 4.00 the peak list softkeys are moved to the side menu.

IEC/IEEE-bus command:
`:CALCulate1:PEAKsearch:AUTO ON | OFF`

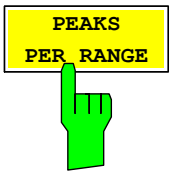
With this command the list evaluation which is by default for backwards compatibility reasons off can be turned on.

`TRACe1: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 value above the limit, fail)
limit check	: limit fail (pass = 0, fail =1)
unused1	: reserved (0.0)
unused2	: reserved (0.0)

The *PEAK SEARCH* softkey activates a single evaluation of spectrum emission mask. The limit mask - reduced by an overall margin - is checked against the trace. The fail positions are marked by crosses as long as not a next sweep is preformed. It is recommended to use single sweep. Every value is added to a peak list which can be opened and saved in ASCII format or read out via an IEC/IEEE command.
The peaks are calculated using the same peak search algorithm like markers do. It is possible to define the peak excursion value via *MKR->NEXT*, softkey *PEAK EXCURSION*. In addition the worst fail of each fail area without a peak is marked and added to the peak list.

IEC/IEEE bus command: `:CALC:PEAK`



The *PEAKS PER RANGE* softkey defines how many peaks are searched for within one range. The ranges are according to the band class setting (SETTINGS -> BAND CLASS) e.g. for BAND CLASS 0, 2, 3, 5, 9, 10, 11 and 12:

- from -4.00 MHz to -1.98 MHz from the carrier,
- from -1.98 MHz to -0.75 MHz from the carrier,

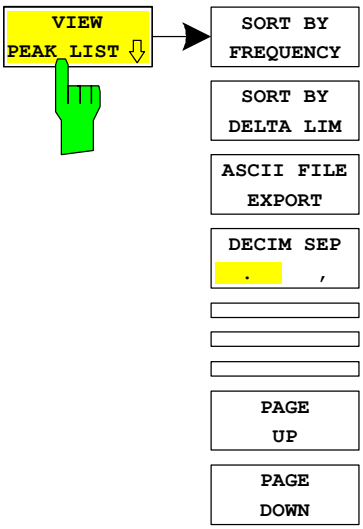
- the area from -0.75 MHz to +0.75 MHz around the carrier,
- from +0.75 to +1.98 MHz from the carrier
- from +1.98 MHz to +4.00 MHz from the carrier.

The default value of *PEAKS PER RANGE* is 25.

IEC/IEEE bus command: `:CALC:PEAK:SUBR 1...50`

The *MARGIN* softkey defines an overall margin which is subtracted from the limit line to make the peak search more stronger. If the values of the trace are above the limit line minus margin value it will be marked with a cross as shown in the peak list. The DELTA LIMIT of the list will be positive thus indicating that only the margin and not the limit itself is reached. A negative sign would indicate the real fail.
The default value of *MARGIN* is 6 dB.

IEC/IEEE bus command:
`:CALC:PEAK:MARG -200dB...200dB`



The *VIEW PEAK LIST* softkey opens the peak list. The list is empty if either no peak search (see softkey *PEAK SEARCH*) has been done, or if no peaks/fails have been found.
The list shows for every peak value the following entries:

- the range (LOWer side or UPper side from carrier)
- the frequency,
- the level in dBc (relative to the carrier channel power)
- the delta level to the limit (negative deltas indicate a fail).

With a high *MARGIN* of e.g. 200 dB and a *PEAKS PER RANGE* of 1 it is possible to obtain the worst point of each range, which can be sorted after pressing the *VIEW PEAK LIST* softkey in the order of the frequencies with *SORT BY FREQUENCY*.

The following figure shows a peak list:

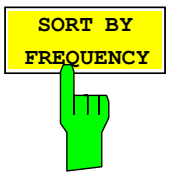
VIEW PEAK LIST			
LOW-UP RANGE /RBW	FREQUENCY	LEVEL dBc	DELTA LIMIT dB
L1.980-4.000M/30k	875.4020 MHz	-54.25	0.74
L0.750-1.980M/30k	876.7620 MHz	-54.41	-9.41
Inner Range /30k	879.2400 MHz	-55.62	-10.62
U0.750-1.980M/30k	880.2180 MHz	-54.07	-9.07
U1.980-4.000M/30k	881.1460 MHz	-53.66	1.33

Fig. 0-1 Peak list of spectrum emission mask

IEC/IEEE bus command: `:TRAC? FINal1`

The comma separated values are :

```
<freq1>, <level1>, <delta level 1>,
<freq2>, <level2>, <delta level 2>, ...
```



The *SORT BY FREQUENCY* softkey sorts the list in ascending order according to the column FREQUENCY.

IEC/IEEE bus command: `--`

The *SORT BY DELTA LIM* softkey sorts the list in descending order according to the column DELTA LIMIT.

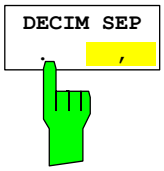
IEC/IEEE bus command: `--`

The *ASCII FILE EXPORT* softkey exports the peak list in ASCII format to a file.
The complete output format is similar to the trace export. The peak values within the file are comma separated in the format:

```
<trace no 1>, <freq1>, <level1>, <delta level 1>,
<trace no 2>, <freq2>, <level2>, <delta level 2>,
...
```

The trace no is always 1.

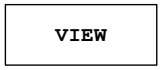
IEC/IEEE bus command: `:MMEM:STOR:FIN 'A:\final.dat'`



Different language versions of evaluation programs may require a different handling of the decimal point. It is therefore possible to select between default separators '.' (decimal point) and ',' (comma) using softkey *DECIM SEP.*

IEC/IEEE bus command: `:FORM:DEXP:DSEP POIN | COMM`

Menu TRACE



The softkey *VIEW* freezes the trace.

IEC-Bus-command:

```
:DISP:WIND:TRAC:MODE VIEW
```

Remote Control Commands

:CONFigure:CDPower[:BTS]:BCLass 0...12

This command selects the band class.

Band class	Name
0	800 MHz Band
1	1900 MHz Band
2	TACS Band
3	JTACS Band
4	Korean PCS Band
5	450 MHz Band
6	2 GHz Band
7	700 MHz Band
8	1800 MHz Band
9	900 MHz Band
10	Secondary 800 MHz Band
11	400 MHz European PAMR Band
12	800 MHz PAMR Band
14	US PCS 1.9GHz Band
15	AWS Band

Example:

```
"INST:SEL BC2K"          'Activate cdma2000 BTS
"INIT:CONT OFF"          'Select single sweep
"CONF:CDP:BCL 1"         'Select band class 1, 1900 MHz
```

Features:

*RST value: 0
SCPI: device–specific

Appendix: Contact to our hotline

Any questions or ideas concerning the instrument are welcome by our hotline:

USA & Canada

Monday to Friday (except US public holidays)
8:00 AM – 8:00 PM Eastern Standard Time (EST)

Tel. from USA	888-test-rsa (888-837-8772) (opt 2)
From outside USA	+1 410 910 7800 (opt 2)
Fax	+1 410 910 7801
E-mail	Customer.Support@rsa.rohde-schwarz.com

East Asia

Monday to Friday (except Singaporean public holidays)
8:30 AM – 6:00 PM Singapore Time (SGT)

Tel.	+65 6 513 0488
Fax	+65 6 846 1090
E-mail	Customersupport.asia@rohde-schwarz.com

Rest of the World

Monday to Friday (except German public holidays)
08:00 – 17:00 Central European Time (CET)

Tel. from Europe	+49 (0) 180 512 42 42
From outside Europe	+49 89 4129 13776
Fax	+49 (0) 89 41 29 637 78
E-mail	CustomerSupport@rohde-schwarz.com