

# **3 Standard Scripts**

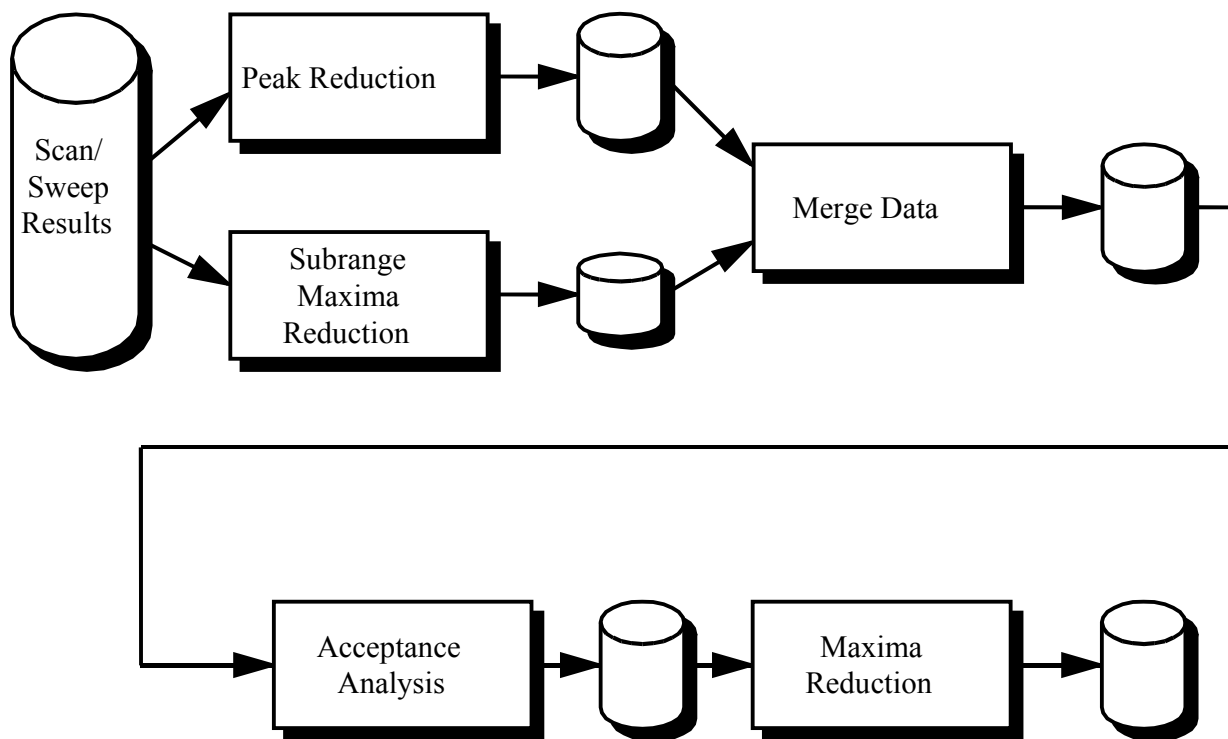
The standard scripts are designed for a maximum flexibility thus enabling to perform the tests most effectively with all kinds of test equipment.

The design of the scripts helps to save time while still providing complete measurements as required for compliance testing. Through a wide range of parameters (accessible after starting a test) that can be stored and reloaded as "Script Parameters", it is possible to adapt and optimize the test proceedings to the needs of the operator:

- when a test has been completed, the **results can be partially overwritten through remeasuring** in a second test, defining a frequency band only
- the preview test can be skipped and instead a **former preview result** can be defined as an input of the data reduction and the final test; alternatively, **frequency lists** or **former final results** can be used as an input of a final test
- in a **semi automatic mode** the operator can skip certain parts of the test (preview test, final test, test report) or repeat the same test, then optionally leaving out other parts than during the first pass
- the total frequency range of the test can be split into **subranges** (linear or logarithmic, with respect to the ranges of the range table) that will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in the field strength test: one single antenna change during the whole test)
- an **ID string** makes it easy to identify results and other files related to the test: the string will be used to build up default filenames (e.g. if test reports shall always include the same report header), but it is also possible to define fixed names
- since the variation of accessory devices (LISN, automatic turntable and antenna mast, etc.) can be specified for preview and final test separately, it is possible to **optimize the test to the test equipment** (the kind of test also influences the optimum concept):
  - **EMI analyzer (fast sweeps** with limited frequency resolution):
    - preview test with sweeps on a number of accessory settings, storing the maximum levels and the corresponding settings
    - data reduction
    - final test on the accessory settings found in the preview test:
      - partial scans to compensate for the limited frequency resolution of the preview sweeps;
      - search for local maxima through fine tuning of the accessory (if possible)
      - measurements with final detector QP (+ AV);
  - **EMI test receiver** (relatively slow scans with **high frequency resolution**):
    - preview test with one or two scans on accessory settings, where all interesting frequencies should be detectable (exact level information may be of less interest because of the complete final test)
    - data reduction, maybe with an increased acceptance offset to compensate for the few preview settings
    - optional partial scans to detect drifting interference
    - measurements on all (predefined) accessory settings, storing the maximum levels and the corresponding settings
    - measurements with final detector QP (+ AV) on the "worst case" accessory settings
- besides the normal test results (frequency, level, etc.), **frequency lists derived from the preview or final results** will implicitly be generated, labeled with the same name as the

corresponding source results; such a frequency list might be used to perform a scan on these frequencies

Y the data reduction has a very flexible design: the scan or sweep results are analyzed on the one hand with the peak reduction (a level threshold of 0 dB means no reduction; a value of 10 dB means that only obvious pikes in the spectrum will come through; a value of e.g. 100 dB should block all data), on the other hand with the subrange maxima reduction (number of subranges is identical to the maximum number of results to be kept from each test range in the script); a smaller level threshold means fewer subrange maxima will remain in the end; the remaining points will be merged (only one list entry if frequencies are identical) and further filtered with an acceptance analysis (cut off all points below an imaginary acceptance line; an acceptance offset of e.g. -100 dB wouldn't filter any points); for certain tests where the measurements come close to the sensitivity limitations of the instruments, the acceptance analysis can alternatively work with an arbitrarily defined acceptance line (which means no offset in reference to a limit line) so that the acceptance line goes above the noise floor; from the remaining points only those many will be kept (the margin will be evaluated) as defined by the operator; if more broadband signals shall be kept then the level threshold for the peak reduction (which finds narrowband interference) should be set to a higher value.



The optional interactive frequency selection enables to review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test. To do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog.

Before the standard scripts can be used, some data has to be imported from the **Standard Data import directories**:

- ÿ the **scripts** needed for testing plus the referring subscripts
- ÿ the **limit lines** for the required specifications
- ÿ the **probe and system transducers** that are used for the tests (the files hold typical values and - if available - should be replaced with the exact values for the transducers in use)
- ÿ for calibration tests the frequency lists if needed (for open area measurements the lists should be adapted to the ambient interference of the test site)

In addition the required **scan and / or sweep range tables** have to be imported from the corresponding **import directories** for the receivers(s) in use (ES-K1x); these range tables are already adapted to the receivers and the test specifications, but they normally need some modification concerning the specified transducers (depending on the test equipment).

When a script has been started, a window will come up that enables the operator to modify the so called script parameters to control the proceedings of the test. Pressing **<ENTER>** or clicking the **OK** button (modified parameters will be stored) or the **Cancel** button (modified parameters will be ignored) will close this window and the test will run, using the stored settings of the script parameters; **Stop** aborts the test immediately.

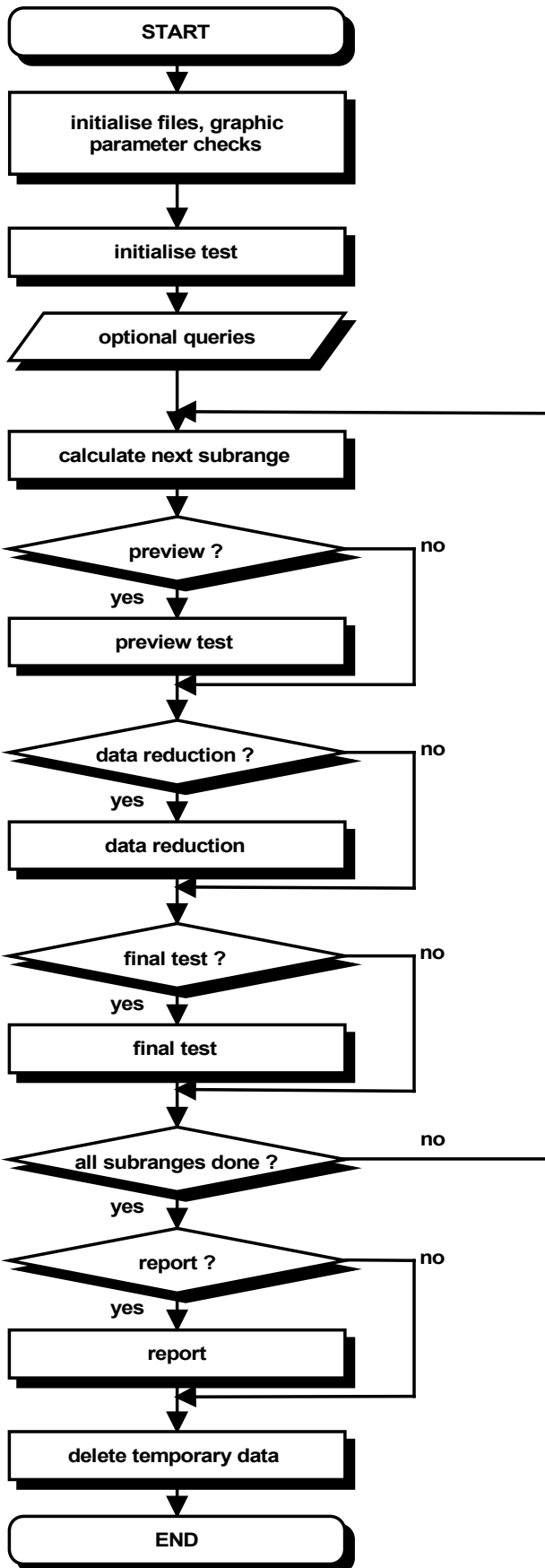
To select other (default) settings for the script parameters (e.g. to run the test with another specification), the selection box on top of the script parameter window has to be used: a list with script parameters matching those of the current test will come up; any of the given script parameter files can be chosen to replace the current parameter settings; with **Save As** new parameter sets can be created.

A running test may be aborted at any time with the **Stop** button (an active sweep or scan might have to be aborted before), but the measurements stored so far may be of only limited use. Afterwards the test can't be continued but restarted from the beginning.

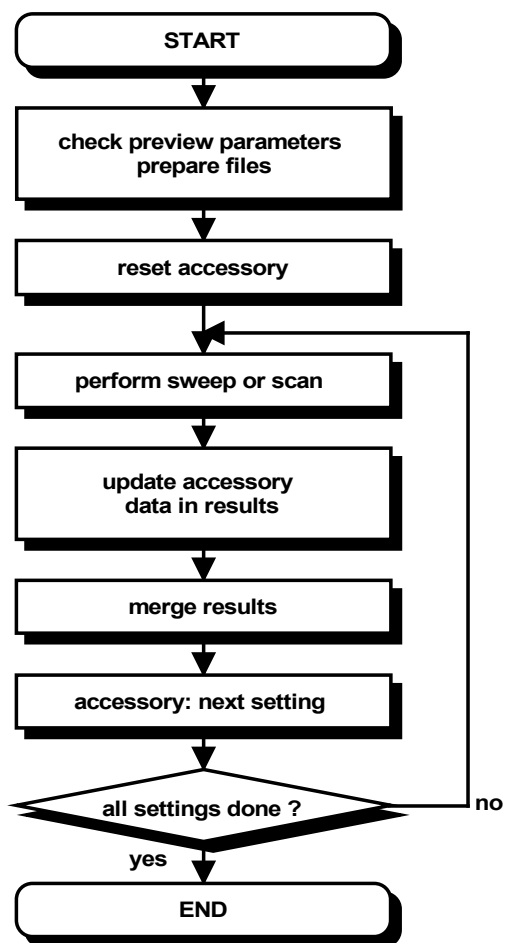
Although the scripts provide automatic printing at the end of a test, sometimes it may be useful to skip the report, redefine some elements in the graphics configuration (e.g. line styles, colors, etc.), in the report header or in the report configuration, and then start the report with the selection of **Print...** in the **File** menu.

On the following pages there are some flowcharts that show in principle the steps of the tests:

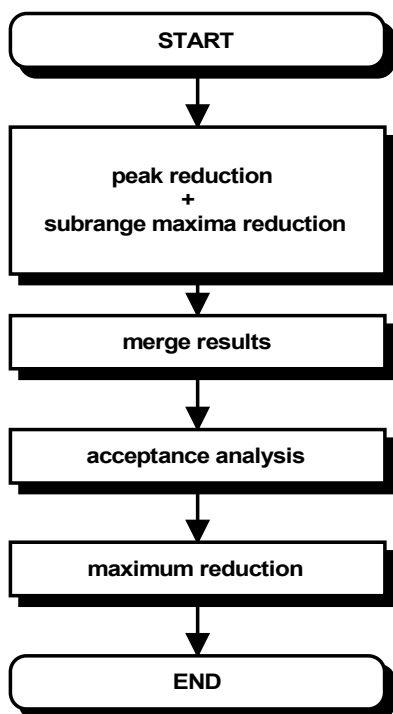
# Standard Test Procedure



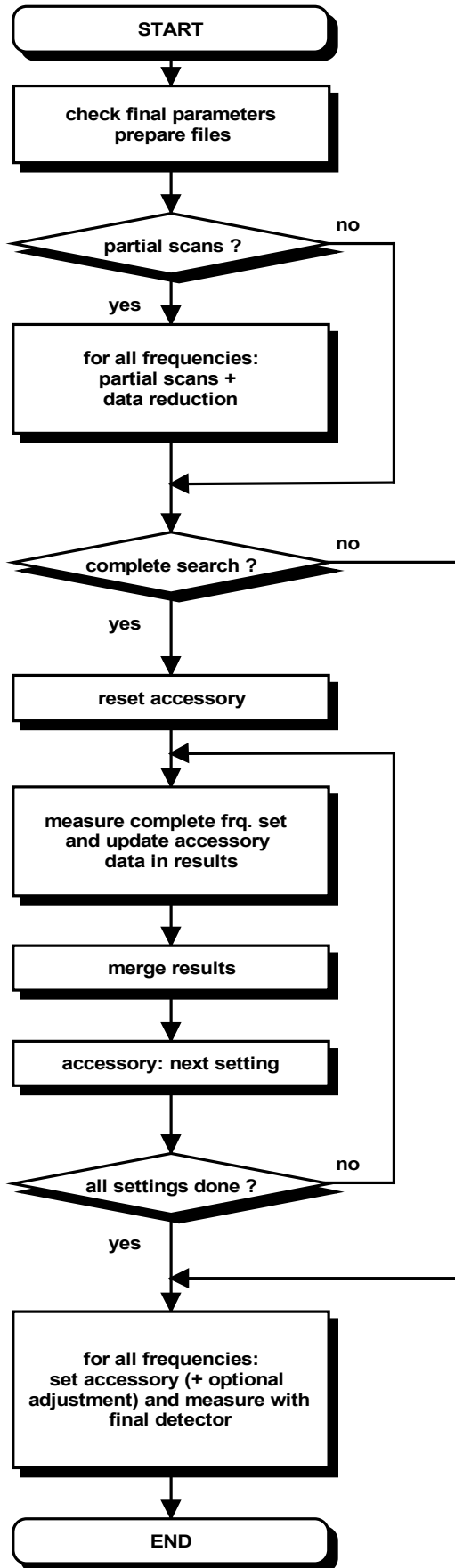
# Preview Test Procedure



# Data Reduction



# Final Test Procedure



## 3.1 Cable Calibration

### 3.1.1 Description

This test provides measuring cable transducers or any other system transducers (e.g. impedance converters, preamplifiers, attenuators, filters, etc.). The main result of the test is a system transducer table that can directly be used for level correction in the ES-K1 (scan/sweep tables).

The test can be performed with a scan or a sweep (plus data reduction), as well as on a given frequency list.

Since the test represents a two-gate measurement, a scan or sweep table has to be used that activates the tracking generator of the instrument; an "empty" (dummy) transducer (or simply "<none>") has to be declared as the probe transducer. For scan tables it is recommended to use the average detector in combination with a very small IF bandwidth.

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver 'USER\_IEC' can be added to the device list; the assigned to this driver could be e.g. "GENERATOR" or the model name of the generator (e.g. "SMP"). The settings should first be checked with the corresponding interactive dialog ("Set Device...").

In the script parameters of **Topic "ExtGenerator"** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R&S (SMxx) have to be set like this:

```

...
Topic           Calibration

Parameter:       04: scan table for measurements
Value:           [must be selected!]

Parameter:       05: optional frequ. list for single measurements
Value:           [must be selected!]

Parameter:       06: sweep table for measurements
Value:           <none>
...
Topic           ExtGenerator

Parameter:       02: GPIB initialization command
Value:           "*RST;*CLS;POW -10DBM;FREQ:CW 1E9;OUTP1 ON"

Parameter:       03: GPIB frequ. command incl. format string
Value:           "FREQ:CW %G"

Parameter:       04: frequency factor (e.g. 1E-6 for MHz)
Value:           1
...

```



### 3.1.2 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "cable_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 0.1 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: test configuration, <none>: ID "<none>" optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

#### Topic Calibration

Parameter: Default value: Function:	01: result file (default: ID) "<none>" optional filename for the results from the test (filetype is system transducer); if no filename is specified then a default name will be used
Parameter: Default value: Function:	02: name of correction factor from reference meas. "Cable Reference" filename of a reference correction factor to be used for the test: if a reference measurement shall be done, then the levels from the reference measurements with the reference cable attached will be stored as a system transducer of the given name, before the actual comparison test starts; any further tests - if run under the same conditions - then can be performed without the reference measurements (see next parameter) if the appropriate reference file is selected
Parameter: Default value: Function:	03: create new reference factor (else use given factor) checked if checked then a reference measurement will be performed and stored as a system transducer with the given name (see previous parameter); else no reference measurements will be done but the selected system transducer will be taken as the corresponding reference measurement result
Parameter: Default value: Function:	04: scan table for measurements "CAL" filename of the scan range table to be used for the test
Parameter:	05: optional frequency list for single measurements

Default value: "CAL"  
 Function: filename of an optional frequency list to be used for single measurements; this frequency list can be used only in combination with a scan table

Parameter: 06: sweep table for measurements  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the test

Parameter: 07: no. of results kept from scan/sweep  
 Default value: 20  
 Function: the number of results that shall be kept from a scan or sweep through data reduction (if no single measurements according to a frequency list are done)

### Topic Graphics

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

### Topic Report

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

### Topic ReportHeader

Parameter: 01: test report header, <none>: ID

Default value:	"<none>"
Function:	optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"Cable Calibration"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: cable name
Default value:	"Cable"
Function:	a string that will be taken as the description of the test object; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)

Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic ExtGenerator**

Parameter: 01: external generator device  
 Default value: "<none>"  
 Function: symbolic name of the device for controlling of an external generator as defined in the device configuration

Parameter: 02: GPIB initialization command  
 Default value: "RECALL 09"  
 Function: GPIB command for the initialization of the external generator; it is recommended to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command

Parameter: 03: GPIB frequ. command incl. format string  
 Default value: "RF %G MHZ"  
 Function: GPIB command for the setup of the RF frequency of the external generator; the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string "%G"; variations for the format string are possible as with the C function *printf()* or as described in the ES-K2 manual on the script function *convertf()*

Parameter: 04: frequency factor (e.g. 1E-6 for MHz)  
 Default value: 1.0E-6  
 Function: the frequency to be programmed is internally represented with the unit Hertz; the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

## 3.2 Probe Calibration

### 3.2.1 Description

This test provides measuring of the transducer factor of antennas or any other probes through a comparing test with a probe of known transducer factor. The main result of the test is a probe transducer table that can directly be used for level correction in the ES-K1 (scan/sweep tables).

The test can be performed with a scan or a sweep (plus data reduction), as well as on a given frequency list.

For open area test site (OATS) measurements, the test should run using a frequency list that has been modified so that any measurement of ambient signals will never happen.

Since the test represents a two-gate measurement, a scan or sweep table has to be used that activates the tracking generator of the instrument; an "empty" (dummy) transducer (or simply "<none>") has to be declared as the probe transducer. For scan tables it is recommended to use the average detector in combination with a very small IF bandwidth.

Calibration of antennas is done best with vertical polarization and at a preferably high position (e.g. 4 m); the antennas should be mounted in a way so that their axes match exactly.

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver 'USER\_IEC' can be added to the device list; the assigned to this driver could be e.g. "GENERATOR" or the model name of the generator (e.g. "SMP"). The settings should first be checked with the corresponding interactive dialog ("Set Device...").

In the script parameters of **Topic "ExtGenerator"** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R&S (SMxx) have to be set like this:

```

...
Topic           Calibration

Parameter:        04: scan table for measurements
Value:            [must be selected!]

Parameter:        05: optional frequ. list for single measurements
Value:            [must be selected!]

Parameter:        06: sweep table for measurements
Value:            <none>
...
Topic           ExtGenerator

Parameter:        02: GPIB initialization command
Value:            "*RST;*CLS;POW -10DBM;FREQ:CW 1E9;OUTP1 ON"

Parameter:        03: GPIB frequ. command incl. format string
Value:            "FREQ:CW %G"

Parameter:        04: frequency factor (e.g. 1E-6 for MHz)
Value:            1
...

```

### 3.2.2 List of the Script Parameters

<b>Topic</b>	<b>Test</b>
Parameter:	01: ID max. 12 chars to be included in filenames
Default value:	"probe_0001"
Function:	a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter:	02: global start frequency [MHz] for the test
Default value:	0.1
Function:	no measurements will be done below this frequency
Parameter:	03: global stop frequency [MHz] for the test
Default value:	1000
Function:	no measurements will be done above this frequency
Parameter:	04: suppress queries as far as possible
Default value:	not checked
Function:	filename of a reference correction factor to be used for the test: if a reference measurement shall be done, then the levels from the reference measurements with the known probe will be stored as a system transducer of the given name, before the actual comparison test starts; any further tests - if run under the same conditions - then can be performed without the reference measurements (see next parameter) if the appropriate reference file is selected
Parameter:	05: test configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

#### **Topic**                      **Calibration**

Parameter:	01: result file (default: ID)
Default value:	"<none>"
Function:	optional filename for the results from the test (filetype is probe transducer); if no filename is specified then a default name will be used
Parameter:	02: name of correction factor from reference meas.
Default value:	"Probe Reference"
Function:	filename of a reference correction factor to be used for the test: if a reference measurement shall be done, then the levels from the reference measurements with the known probe will be stored as a system transducer of the given name, before the actual comparison test starts; any further tests - if run under the same conditions - then can be performed without the reference measurements (see next parameter) if the appropriate reference file is selected
Parameter:	03: create new reference factor (else: use given factor)
Default value:	checked
Function:	if checked then a reference measurement will be performed and stored as a system transducer with the given name (see previous parameter); else no reference measurements will be done but the selected system transducer will be taken as the corresponding reference measurement result
Parameter:	04: scan table for measurements

Default value: "CAL"  
 Function: filename of the scan range table to be used for the test

Parameter: 05: optional frequency list for single measurements  
 Default value: "CAL"  
 Function: filename of an optional frequency list to be used for single measurements; this frequency list can be used only in combination with a scan table

Parameter: 06: sweep table for measurements  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the test

Parameter: 07: no. of results kept from scan/sweep  
 Default value: 20  
 Function: the number of results that shall be kept from a scan or sweep through data reduction (if no single measurements according to a frequency list are done)

Parameter: 08: receive antenna reference probe transd. table  
 Default value: "<none>"  
 Function: probe transducer to be used for the reference measurements (transducer correction of the receiving antenna)

**Topic Graphics**

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

**Topic Report**

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is

used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

### **Topic ReportHeader**

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID  
 Default value: "<none>"  
 Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used

Parameter: 03: 1st header line  
 Default value: "TEST"  
 Function: a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 04: 2nd header line  
 Default value: "Probe Calibration"  
 Function: a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 05: probe name  
 Default value: "Probe"  
 Function: a string that will be taken as the description of the test object; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer  
 Default value: ""  
 Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed

Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""



Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line

Default value: ""

Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)

Default value: ""

Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic Mast**

Parameter: 01: use manual positioning only

Default value: checked

Function: if checked then manual control of the antenna mast through dialogue boxes will be used

Parameter: 02: use auto positioning only

Default value: not checked

Function: if checked then automatic control of the antenna mast will be used

Parameter: 03: symbolic name of autom. moved mast

Default value: "MAST"

Function: symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu

Parameter: 04: antenna height [cm] for antenna mounting

Default value: 100

Function: defines the antenna height for mounting of the antenna (at the beginning and at the end of the test, each time with horizontal polarization)

Parameter: 04: antenna height [cm] for measurements

Default value: 400

Function: defines the antenna height for the measurements

**Topic Polarization**

Parameter: 01: use manual switching only

Default value: checked

Function: if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter: 02: use auto switching only

Default value: not checked

Function: if checked then automatic control of the antenna polarization will be used

Parameter: 03: symbolic name of autom. controlled polariz.

Default value: "MAST"

Function: symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu

Parameter: 04: delay time [sec] for auto switching

Default value: 4

Function: defines a waiting time with automatic switching of the antenna polarization; the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)

Parameter: 05: measurements with horizontal polariz. only

Default value: not checked

Function: if checked then the all measurements will be done with horizontal polarization only

Parameter: 06: measurements with vertical polariz. only

Default value: checked

Function: if checked then the all measurements will be done with vertical polarization only

### Topic **ExtGenerator**

Parameter: 01: external generator device

Default value: "<none>"

Function: symbolic name of the device for controlling of an external generator as defined in the device configuration

Parameter: 02: GPIB initialization command

Default value: "RECALL 09"

Function: GPIB command for the initialization of the external generator; it is recommended to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command

Parameter: 03: GPIB frequ. command incl. format string

Default value: "RF %G MHZ"

Function: GPIB command for the setup of the RF frequency of the external generator; the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string "%G"; variations for the format string are possible as with the C function *printf()* or as described in the ES-K2 manual on the script function *convertf()*

Parameter: 04: frequency factor (e.g. 1E-6 for MHz)

Default value: 1.0E-6

Function: the frequency to be programmed is internally represented with the unit Hertz; the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

## 3.3 Site Attenuation

### 3.3.1 Description

This test provides measuring of the normalized site attenuation (NSA).

The test can be performed with a scan or a sweep (plus data reduction), as well as on a given frequency list (also necessary for measurements with tuned dipoles).

For open area test site (OATS) measurements, the test should run with single measurements on a frequency list that has been modified so that measurements of ambient signals will never happen.

With a spectrum analyzer in combination with broadband antennas, measurement is also possible through continuous sweeps while the antenna captures the whole height range (as described in CISPR 16-1: "swept frequency method").

Since the test represents a two-gate measurement, a scan or sweep table has to be used that activates the tracking generator of the instrument; an "empty" (dummy) transducer (or simply "<none>") has to be declared as the probe transducer. The transducers tables of the transmit and receive antennas have to be selected with the script parameters for each subrange (max. 5) of the scan/sweep table. For scan tables it is recommended to use the average detector in combination with a very small IF bandwidth.

The ideal NSA is defined as a limit line; its name indicates the significant parameters of the test, including antenna type (tuned half wave **D**ipole or **B**roadband), distance between antennas (3 / 10 / 30 m), height of the transmit antenna (1 / 1.5 / 2 / 2.7 m) and antenna polarization (horizontal or vertical).

Example: "NSA B 10m h=1m ver" means

- antenna type = broad band dipole
- distance between antennas = 10 m
- height of transmit antenna = 1 m
- polarization of antennas = vertical

The following test setups are currently supported directly (see also CISPR 16, CISPR 22):

NSA B 3m h=2m hor  
NSA B 3m h=1m ver  
NSA B 3m h=1.5m ver

NSA B 10m h=1m hor  
NSA B 10m h=2m hor  
NSA B 10m h=1m ver  
NSA B 10m h=1.5m ver

NSA B 30m h=1m hor  
NSA B 30m h=2m hor  
NSA B 30m h=1m ver

NSA D 3m h=2m hor  
NSA D 3m h=2.7m ver

NSA D 10m h=2m hor  
NSA D 10m h=2.7m ver

NSA D 30m h=2m hor  
NSA D 30m h=2.7m ver

Optionally an additional correction (mutual impedance correction, defined as a system transducer) can be used to compensate for the coupling effects of the antennas in the near field (so far the mutual

impedance correction is defined only for tuned dipoles antennas 3 m apart; see CISPR 16-1 and CISPR 22).

Example: "CPL D 3m h=1m hor" means

- antenna type = tuned half wave dipole
- distance between antennas = 3 m
- height of transmit antenna = 1 m
- polarization of antennas = horizontal

To retrieve reference levels, a reference measurement will be done first for each subrange, which means that the cables that are normally connected to the antennas have to be put directly together. Once the reference levels have been stored (as a system transducer) they can be used again for further NSA tests.

The names of the transducer tables that refer to the transmitting and to the receiving antennas have to be specified for each (max. 5) range (of the scan / sweep table), as well as the stepsize for the height variation of the receiving antenna.

The NSA will be displayed with two diagrams, one for the absolute representation of the ideal and the measured NSA, and one for the relative representation of the measured NSA in comparison to the ideal NSA.

The columns of the result list contain the following:

- \* frequency
- \* measured level
- \* measured reference level
- \* measured NSA  
(measured level, corrected with reference level, mutual impedance correction and antenna transducer corrections)
- \* ideal NSA
- \* deviation of the measured NSA from the ideal NSA
- \* antenna height of minimum attenuation (not with continuous sweeps during height variation)

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver 'USER\_IEC' can be added to the device list; the assigned to this driver could be e.g. "GENERATOR" or the model name of the generator (e.g. "SMP"). The settings should first be checked with the corresponding interactive dialog ("Set Device...").

In the script parameters of **Topic "ExtGenerator"** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R&S (SMxx) have to be set like this:

...

<b>Topic</b>	<b>NSA</b>
Parameter:	<b>07: scan table for measurements</b>
Value:	<b>[must be selected!]</b>
Parameter:	<b>08: optional frequ. list for single measurements</b>
Value:	<b>[must be selected!]</b>
Parameter:	10: sweep table for measurements
Value:	<none>

...

<b>Topic</b>	<b>ExtGenerator</b>
Parameter:	02: GPIB initialization command
Value:	<b>"*RST;*CLS;POW -10DBM;FREQ: CW 1E9;OUTP1 ON"</b>

Parameter: 03: GPIB frequ. command incl. format string  
Value: **"FREQ: CW %G"**

Parameter: 04: frequency factor (e.g. 1E-6 for MHz)  
Value: **1**

...

### 3.3.2 List of the Script Parameters

Topic	Test
Parameter:	01: ID max. 12 chars to be included in filenames
Default value:	"site_0001"
Function:	a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter:	02: global start frequency [MHz] for the test
Default value:	30
Function:	no measurements will be done below this frequency
Parameter:	03: global stop frequency [MHz] for the test
Default value:	1000
Function:	no measurements will be done above this frequency
Parameter:	04: suppress queries as far as possible
Default value:	not checked
Function:	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter:	05: test configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

Topic	NSA
Parameter:	01: NSA name (defined as limit line)
Default value:	"<none>"
Function:	filename of the ideal NSA, defined as a limit line
Parameter:	02: opt. mutual imped. correction (defined as system transd.)
Default value:	"<none>"
Function:	filename of the optional mutual impedance correction to compensate for the coupling effects of the antennas in the near field, defined as a system transducer
Parameter:	03: result file (default: ID)
Default value:	"<none>"
Function:	optional filename for the results from the test (filetype is system transducer); if no filename is specified then a default name will be used
Parameter:	04: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range): therefore it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	05: name of correction factor from reference
Default value:	"NSA Reference"

Function:	filename of the reference correction, stored as a system transducer: if a reference measurement will be done, then first then before the actual NSA test there will be measurements with the coaxial cables connected directly together; these results will be stored as a system transducer so that any further NSA tests can use these results - if the same cables are used - without another reference measurement (see next parameter)
Parameter:	06: create new reference factor (else: use given factor)
Default value:	checked
Function:	if checked then a reference measurement will be performed and stored as a system transducer with the given name (see previous parameter); else no reference measurements will be done but the selected system transducer will be taken as the corresponding reference measurement result
Parameter:	07: scan table for measurements
Default value:	"NSA"
Function:	filename of the scan range table to be used for the test
Parameter:	08: opt. frequency list for single meas. mode
Default value:	"NSA"
Function:	filename of an optional frequency list to be used for single measurements; this frequency list can be used only in combination with a scan table
Parameter:	09: tuned dipoles (with single meas. only)
Default value:	not checked
Function:	if checked then with each new frequency the antenna will be put to horizontal polarization, set to the lowest height and the required dipole length be displayed; for measurements with vertical polarization the lowest position depends on the length of the dipoles; this mode can be used only in combination with single measurements based on a frequency list
Parameter:	10: sweep table for measurements
Default value:	"<none>"
Function:	filename of the sweep range table to be used for the test
Parameter:	11: continuous sweeping (with sweep table only)
Default value:	not checked
Function:	if checked then the antenna won't be moved step by step but continuously (and preferably slowly) over the whole range (upwards + down) while new sweeps will start all the time (see also CISPR 16-1: "swept frequency method"); this mode can be used only in combination with a selected sweep table and represents the fastest method although without information about corresponding antenna heights
Parameter:	12: time [sec] for single measurements
Default value:	1.0
Function:	a time that will be used for the single measurements based on a frequency list, regardless of the setting in the scan table
Parameter:	13: NSA tolerance [dB]
Default value:	4.0
Function:	tolerance level for the maximum deviation of the measured NSA from the ideal NSA (parameter will be used with a later version)
Parameter:	14: no. of results kept from scan/sweep per range
Default value:	20

Function: the number of results that shall be kept from a scan or sweep through data reduction (if no single measurements according to a frequency list are done)

**Topic                      Antennas**

Parameter: 01: 1st range: transmit antenna probe transd. table

Default value: "<none>"

Function: filename of the transducer table of the transmit antenna to be used for the 1st subrange of the scan/sweep table

Parameter: 02: 1st range: receive antenna probe transd. table

Default value: "<none>"

Function: filename of the transducer table of the receive antenna to be used for the 1st subrange of the scan/sweep table

Parameter: 03: 1st range: height step size [cm]

Default value: 20

Function: stepsize for the antenna movements to be used for the 1st subrange of the scan/sweep table

Parameter: 04: 2nd range: transmit antenna probe transd. table

Default value: "<none>"

Function: filename of the transducer table of the transmit antenna to be used for the 2nd subrange of the scan/sweep table

Parameter: 05: 2nd range: receive antenna probe transd. table

Default value: "<none>"

Function: filename of the transducer table of the receive antenna to be used for the 2nd subrange of the scan/sweep table

Parameter: 06: 2nd range: height step size [cm]

Default value: 10

Function: stepsize for the antenna movements to be used for the 2nd subrange of the scan/sweep table

Parameter: 07: 3rd range: transmit antenna probe transd. table

Default value: "<none>"

Function: filename of the transducer table of the transmit antenna to be used for the 3rd subrange of the scan/sweep table

Parameter: 08: 3rd range: receive antenna probe transd. table

Default value: "<none>"

Function: filename of the transducer table of the receive antenna to be used for the 3rd subrange of the scan/sweep table

Parameter: 09: 3rd range: height step size [cm]

Default value: 5

Function: stepsize for the antenna movements to be used for the 3rd subrange of the scan/sweep table

Parameter: 10: 4th range: transmit antenna probe transd. table

Default value: "<none>"

Function: filename of the transducer table of the transmit antenna to be used for the 4th subrange of the scan/sweep table

Parameter: 11: 4th range: receive antenna probe transd. table



Default value:	"<none>"
Function:	filename of the transducer table of the receive antenna to be used for the 4th subrange of the scan/sweep table
Parameter:	12: 4th range: height step size [cm]
Default value:	5
Function:	stepsize for the antenna movements to be used for the 4th subrange of the scan/sweep table
Parameter:	13: 5th range: transmit antenna probe transd. table
Default value:	"<none>"
Function:	filename of the transducer table of the transmit antenna to be used for the 5th subrange of the scan/sweep table
Parameter:	14: 5th range: receive antenna probe transd. table
Default value:	"<none>"
Function:	filename of the transducer table of the receive antenna to be used for the 5th subrange of the scan/sweep table
Parameter:	15: 5th range: height step size [cm]
Default value:	5
Function:	stepsize for the antenna movements to be used for the 5th subrange of the scan/sweep table

**Topic****Graphics**

Parameter:	01: 1st graphics config., <none>: ID
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test (absolute representation); if no filename is specified then a default name will be used
Parameter:	02: 2nd graphics config., <none>: ID + '_rel'
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test (relative representation); if no filename is specified then a default name will be used

**Topic****Report**

Parameter:	01: generate printer hardcopy
Default value:	checked
Function:	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter:	02: generate RTF file
Default value:	not checked
Function:	if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter:	03: RTF file: 'X:\<path>\<name8.3>', empty: dialog
Default value:	"c:\xxx.rtf"
Function:	path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter:	04: report config. for printing, <none>: ID + '_prnt'

Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

### **Topic ReportHeader**

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID  
 Default value: "<none>"  
 Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used

Parameter: 03: 1st header line  
 Default value: "TEST"  
 Function: a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 04: 2nd header line  
 Default value: "Site Attenuation"  
 Function: a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 05: NSA name  
 Default value: "NSA ..."  
 Function: a string that will be taken as the description of the test object; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer  
 Default value: ""  
 Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed

Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""  
 Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic Mast**

Parameter: 01: use manual positioning only  
 Default value: checked  
 Function: if checked then manual control of the antenna mast through dialogue boxes will be used

Parameter: 02: use auto positioning only  
 Default value: not checked  
 Function: if checked then automatic control of the antenna mast will be used

Parameter: 03: symbolic name of autom. moved mast  
 Default value: "MAST"  
 Function: symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu

Parameter: 04: min. height [cm] to be measured  
 Default value: 100  
 Function: defines the minimum mast height for the measurements

Parameter: 05: max. height [cm] to be measured  
 Default value: 400  
 Function: defines the maximum mast height for the measurements

Parameter: 06: speed value for movements  
 Default value: 4  
 Function: defines the speed of the mast movements: faster for absolute positioning, slower for continuous sweeps

**Topic Polarization**

Parameter: 01: use manual switching only  
 Default value: checked  
 Function: if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter:	02: use auto switching only
Default value:	not checked
Function:	if checked then automatic control of the antenna polarization will be used
Parameter:	03: symbolic name of autom. controlled polariz.
Default value:	"MAST"
Function:	symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu
Parameter:	04: delay time [sec] for auto switching
Default value:	4
Function:	defines a waiting time with automatic switching of the antenna polarization; the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)
Parameter:	05: measurements with horizontal polariz. only
Default value:	not checked
Function:	if checked then the all measurements will be done with horizontal polarization only
Parameter:	06: measurements with vertical polariz. only
Default value:	checked
Function:	if checked then the all measurements will be done with vertical polarization only

**Topic****ExtGenerator**

Parameter:	01: external generator device
Default value:	"<none>"
Function:	symbolic name of the device for controlling of an external generator as defined in the device configuration
Parameter:	02: GPIB initialization command
Default value:	"RECALL 09"
Function:	GPIB command for the initialization of the external generator; it is recommended to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command
Parameter:	03: GPIB frequ. command incl. format string
Default value:	"RF %G MHZ"
Function:	GPIB command for the setup of the RF frequency of the external generator; the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string "%G"; variations for the format string are possible as with the C function <i>printf()</i> or as described in the ES-K2 manual on the script function <i>convertf()</i>
Parameter:	04: frequency factor (e.g. 1E-6 for MHz)
Default value:	1.0E-6
Function:	the frequency to be programmed is internally represented with the unit Hertz; the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

## **3.4 Overview Test**

### **3.4.1 Description**

This test consists of a preview test (scan or sweep) as well as an automatic and/or a manual data reduction (for finding critical frequencies).

The automatic data reduction works as with other standard scripts.

With the manual data reduction the user can select suspect frequencies with the marker from the spectrum of the preview test and add these to a list. In addition, either a partial scan or a partial sweep can be run around these frequencies, thus improving the accuracy of the frequencies.

It is a good idea to define the scan/sweep table such that a continuous repetition will occur. If any accessory dialogs (e.g. for a LISN or an automatic antenna mast) then these devices can be controlled all over the test, i.e. the user himself does the maximization through varying of the accessories.

### 3.4.2 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "ovw_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	06: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	07: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value: Function:	08: test configuration, <none>: ID "<none>" optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

### Topic Preview

Parameter:	01: preview result file, <none>: ID + '_pre'
Default value:	"<none>"
Function:	optional filename for the results (1 <sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used
Parameter:	02: 2nd preview result file, <none>: ID + '_pre2'
Default value:	"<none>"
Function:	optional filename for the results (2 <sup>nd</sup> detector, e.g. AVERAGE) from the preview test; if no filename is specified then a default name will be used
Parameter:	03: scan table for preview
Default value:	"<none>"
Function:	filename of the scan range table to be used for the preview test
Parameter:	04: sweep table for preview
Default value:	"<none>"
Function:	filename of the sweep range table to be used for the preview test
Parameter:	05: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	06: optional input: preview result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or for PK+AV) or optionally two (e.g. 1 <sup>st</sup> for PK, 2 <sup>nd</sup> for AV) input files
Parameter:	07: optional input: preview result file (2nd det.)
Default value:	"<none>"
Function:	see previous parameter

## Topic DataReduction

Parameter:	01: perform manual (interactive) data reduction
Default value:	not checked
Function:	if checked then you can select and review the critical points (also those that have been found through the automatic data reduction if also the next parameter is activated), i.e. you can remove points or add new ones for the test;. to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog
Parameter:	02: perform automatic data reduction
Default value:	not checked
Function:	if checked then an automatic data reduction will be performed; if the previous parameter is also activated then the manual data reduction will be done after the automatic one
Parameter:	03: 1st limit line
Default value:	"<none>"
Function:	a filename that corresponds to the limit line assigned to the 1 <sup>st</sup> detector (e.g.

## QUASIPeAK)

Parameter:	04: optional 1st acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of the preview results from the 1 <sup>st</sup> detector; if used then the given value for the acceptance offset will be ignored
Parameter:	05: optional 2nd limit line
Default value:	"<none>"
Function:	a filename that corresponds to the limit line assigned to the 2 <sup>nd</sup> detector (e.g. AVERAGE)
Parameter:	06: optional 2nd acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of preview results from the 2 <sup>nd</sup> detector; if used then the given value for the acceptance offset will be ignored
Parameter:	07: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	08: decision threshold [dB] for peak reduction
Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	09: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	10: freq. list of ambients to be cut out from preview
Default value:	"<none>"
Function:	optional name of a frequency list (ambient interference) with frequencies to be "cut out" from measurement results (preview test: scans/sweeps, final test: partial scans), each "cut" with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used; to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter:	11: cutting width for sweeps (ambients): no. of IF-BWs
Default value:	10
Function:	with sweeps the width of a "cut" range (see previous parameter) has to be larger because of the lower frequency resolution of the results; therefore this factor (=number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results

**Topic****Monitor**



Parameter: 01: scan table for partial scans  
 Default value: "<none>"  
 Function: filename of the scan table to be used for partial scans; this parameter cannot be used together with the next parameter; to observe the spectrum more easily it is recommended to define a scan table with continuous repetitions;

Parameter: 02: sweep table for partial sweeps  
 Default value: "<none>"  
 Function: filename of the sweep table to be used for partial sweeps; this parameter cannot be used together with the previous parameter; to observe the spectrum more easily it is recommended to define a sweep table with continuous repetitions; note that partial sweeps only give back a very small number of measurement points, e.g. a 1% portion of the frequency range as defined in the sweep table range will result in 1% of the sweep trace points only; this is due to a conceptual limitation to the handling of sweep trace data; the situation can be improved through a sweep table which is defined with many ranges so that a partial sweep still covers more than only a small fraction of the corresponding sweep range of the selected table; alternatively use partial scans

Parameter: 03: partial scan/sweep width: no. of IF-BWs (0=use ratio)  
 Default value: 0  
 Function: determines the frequency range for partial scans/sweeps expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter

Parameter: 04: partial scan/sweep width: ref. frequ. ratio  
 Default value: 0.01  
 Function: determines the frequency range for partial scans/sweeps (e.g. 0.01 means +/- 0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0

## Topic Final

Parameter: 01: final result file, <none>: ID + '\_fin PK'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. QUASPEAK) from the final measurements; if no filename is specified then a default name will be used

Parameter: 02: 2nd final result file, <none>: ID + '\_fin2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the final measurements; if no filename is specified then a default name will be used

## Topic Graphics

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional graphics template (new graph only)  
 Default value: "<none>"  
 Function: optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

<b>Topic</b>	<b>Report</b>
Parameter: Default value: Function:	01: generate printer hardcopy checked if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter: Default value: Function:	02: generate RTF file not checked if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter: Default value: Function:	03: RTF file: 'X:\<path>\<name8.3>', empty: dialog "c:\xxx.rtf" path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter: Default value: Function:	04: report config. for printing, <none>: ID + '_prnt' "<none>" optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used
Parameter: Default value: Function:	05: footnote, empty field: ID "" optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used
Parameter: Default value: Function:	06: optional text file to be included "<none>" filename of an optional file of type 'Text' which shall be included in the report

<b>Topic</b>	<b>ReportHeader</b>
Parameter: Default value: Function:	01: test report header, <none>: ID "<none>" optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter: Default value: Function:	02: optional test report header template, <none>: ID "<none>" optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter: Default value: Function:	03: 1st header line "TEST" a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	04: 2nd header line "Overview" a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed

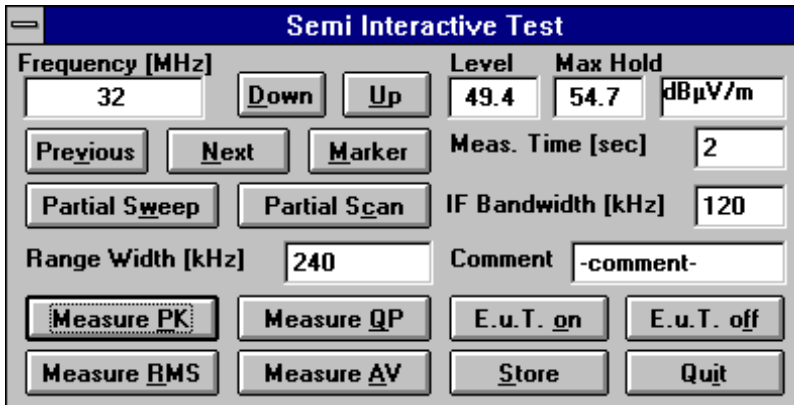
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

### 3.5 Semi Interactive Test

#### 3.5.1 Description

An open area test site (OATS) is normally not suitable for automatic tests because of the many ambient disturbances. In this case the operator has to find out (e.g. through switching the EuT off and on if possible or by looking at / listening to the signal) whether the field strength generated by the EuT is above the limit, but sometimes this can be impossible, when the ambient disturbance exceeds the limit.

This test provides interactive single measurements plus protocolling, controlled from a special dialog:

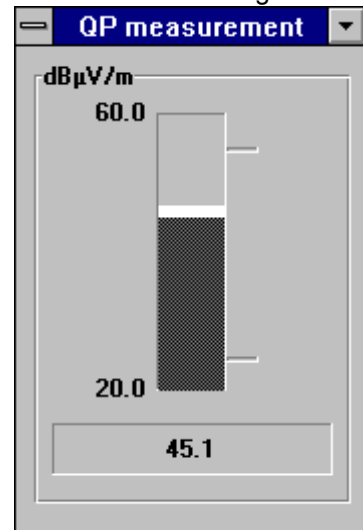


By clicking **Down** and **Up** the arbitrarily editable frequency will be decreased and increased by the step size defined in the scan table. If the test is based on a frequency list or on a measurement result list then with **Previous** and **Next** the dialogue will switch to the corresponding frequency. With measurement results the referring positions of the antenna and the EuT can optionally be set. A click on the button **Marker** will copy the

marker frequency of the currently active graphics diagram (if it has the marker activated).

The buttons **Partial Sweep** and **Partial Scan** start measurements to watch the spectrum around the current frequency if suitable range tables are selected with the script parameters. If those range tables are defined with continuous repetitions then also variations in the spectrum can be observed (e.g. while moving the antenna). The resulting curve(s) will be shown in an extra window with the marker activated so that the maximum of the curve can easily be retrieved. The width of the partial scan or sweep can be defined in the field 'Range Width'.

Through activating one of the measurement detectors (**Measure Peak / Quasipeak / RMS / Average**) a single measurement will be started, using the given values for measurement time ('Meas.Time' in seconds) and for IF filter bandwidth ('IF Bandwidth' in kHz). The level will be displayed both digitally in the dialogue (current and maximum value) and as an analog bar. The analog bar display which can also be seen from a distance will adapt its "operating range" to the current level value. As soon as the maximum has been found, the result (the maximum level) along with a short text ('Comment') can be saved by pressing **Store**. For each of the detectors there will be one measurement result file which also holds information about the limit and optionally about the settings of mast and turntable.



If the EuT can be remotely switched then by pressing **EuT on** and **EuT off** a line of the parallel port (device driver LPT I/O) can be used as a TTL control signal; this feature enhances the identification of interference signals on an OATS.

### 3.5.2 List of the Script Parameters

<b>Topic</b>	<b>Test</b>
Parameter:	01: ID max. 12 chars to be included in filenames
Default value:	"semi_0001"
Function:	a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter:	02: global start frequency [MHz] for the test
Default value:	30
Function:	no measurements will be done below this frequency
Parameter:	03: global stop frequency [MHz] for the test
Default value:	1000
Function:	no measurements will be done above this frequency
Parameter:	04: suppress queries as far as possible
Default value:	not checked
Function:	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter:	05: frequency list to be used (if next param is NONE)
Default value:	"<none>"
Function:	optional name of a frequency list with frequencies on which the test shall be based; the list might hold critical frequencies that have been entered manually or have been the output of a data reduction; this frequency list won't be used if a measurement result list is selected with the next parameter
Parameter:	06: measurement result to be used
Default value:	"<none>"
Function:	optional name of a measurement result list with frequencies on which the test shall be based; the list might hold results that have been the output of a data reduction or of an automatic test; if this result list also holds information (columns) about mast and turntable settings, then parameter <i>Final 09</i> will make the script use these data for positioning mast and turntable accordingly
Parameter:	07: test configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used
<b>Topic</b>	<b>Final</b>
Parameter:	01: file for PEAK results, <none>: ID + '_fin PK'
Default value:	"<none>"
Function:	optional filename for the PEAK results from the data reduction; if no filename is specified then a default name will be used
Parameter:	02: file for QUASIPEAK results, <none>: ID + '_fin QP'
Default value:	"<none>"
Function:	optional filename for the QUASIPEAK results from the data reduction; if no filename is specified then a default name will be used
Parameter:	03: file for AVERAGE results, <none>: ID + '_fin AV'

Default value:	"<none>"
Function:	optional filename for the AVERAGE results from the data reduction; if no filename is specified then a default name will be used
Parameter:	04: file for RMS results, <none>: ID + '_fin RMS'
Default value:	"<none>"
Function:	optional filename for the RMS results from the data reduction; if no filename is specified then a default name will be used
Parameter:	05: scan table for single measurements
Default value:	"<none>"
Function:	filename of the scan range table to be used for single measurements; the settings will be loaded and then modified according to the settings of the dialogue (detector, IF bandwidth and measurement time)
Parameter:	06: scan table for partial scans
Default value:	"<none>"
Function:	filename of the scan range table to be used for partial scans; to observe the spectrum more easily it is recommended to define a scan table with continuous repetitions
Parameter:	07: sweep table for partial sweeps
Default value:	"<none>"
Function:	filename of the sweep range table to be used for partial sweeps; to observe the spectrum more easily it is recommended to define a sweep table with continuous repetitions; note that partial sweeps only give back a very small number of measurement points, e.g. a 1% portion of the frequency range as defined in the sweep table range will result in 1% of the sweep trace points only; this is due to a conceptual limitation to the handling of sweep trace data; the situation can be improved through a sweep table which is defined with many ranges so that a partial sweep still covers more than only a small fraction of the corresponding sweep range of the selected table; alternatively use partial scans
Parameter:	08: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	09: use/store field mast/turntable data if available
Default value:	not checked
Function:	if checked then any information about mast/turntable positions will be used (measurement result list as a basis for the test, see parameter <i>Test 06</i> ); those positions will be directly set each time when a frequency is selected (previous or next); besides, the current positions will be stored in the result files of the test

**Topic****Limits**

Parameter:	01: optional PEAK limit line
Default value:	"<none>"
Function:	a filename that corresponds to an optional limit line for the PEAK detector; if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

Parameter: 02: optional QUASIPeAK limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to an optional limit line for the QUASIPeAK detector; if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

Parameter: AVERAGE  
 Default value: "<none>"  
 Function: a filename that corresponds to an optional limit line for the AVERAGE detector; if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

Parameter: 04: optional RMS limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to an optional limit line for the RMS detector; if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

## Topic Graphics

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional graphics template (new graph only)  
 Default value: "<none>"  
 Function: optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter: 03: range of the analog level bar display [dBxx]  
 Default value: 40  
 Function: defines the display range of the analogue level display; as soon as the level comes closer than 5 dB to one end of the display range then the range will be shifted accordingly by 10 dB

## Topic Report

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

### **Topic ReportHeader**

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID  
 Default value: "<none>"  
 Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used

Parameter: 03: 1st header line  
 Default value: "TEST"  
 Function: a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 04: 2nd header line  
 Default value: "Semi Interactive Test"  
 Function: a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 05: EuT name  
 Default value: "EuT"  
 Function: a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer  
 Default value: ""  
 Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given



then the referring entry of the report header won't be changed

Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""  
 Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

### Topic SwitchEUT

Parameter: 01: symbolic name of autom. EuT switch  
 Default value: "LPTIO"  
 Function: symbolic device name of the CENTRONICS parallel I/O interface driver as defined in the device configuration menu; one output line will be used as a TTL control line

Parameter: 02: LPT I/O output pin no. (1-9)  
 Default value: 2  
 Function: defines an output line (connector pin no. 1 - 9) of the parallel port as the control line for automatic switching of the EuT

### Topic Mast

Parameter: 01: use manual positioning only  
 Default value: checked  
 Function: if checked then manual control of the antenna mast through dialogue boxes will be used

Parameter: 02: use auto positioning only  
 Default value: not checked  
 Function: if checked then automatic control of the antenna mast will be used

Parameter: 03: symbolic name of autom. moved mast  
 Default value: "MAST"  
 Function: symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu

Parameter: 04: speed value for movements  
 Default value: 4  
 Function: determines the speed of the automatically moved mast

### Topic Turntable

Parameter: 01: use manual positioning only  
 Default value: checked  
 Function: if checked then manual control of the turntable through dialogue boxes will be used

Parameter: 02: use auto positioning only  
 Default value: not checked  
 Function: if checked then automatic control of the turntable will be used

Parameter: 03: symbolic name of autom. moved turntable  
 Default value: "TURNTABLE"  
 Function: symbolic device name of the automatically controlled turntable as defined in the device configuration menu

Parameter: 04: speed value for faster movements  
 Default value: 4  
 Function: determines the speed of the automatically moved turntable

### **Topic Polarization**

Parameter: 01: use manual switching only  
 Default value: checked  
 Function: if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter: 02: use auto switching only  
 Default value: not checked  
 Function: if checked then automatic control of the antenna polarization will be used

Parameter: 03: symbolic name of autom. controlled polariz.  
 Default value: "MAST"  
 Function: symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu

Parameter: 04: delay time [sec] for auto switching  
 Default value: 4  
 Function: defines a waiting time with automatic switching of the antenna polarization; the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)

## 3.6 Power Test

### 3.6.1 Description

This test provides automatic measurement of electromagnetic interference (power) using a power absorbing clamp moved along the mains cable, optionally with control of a sidebar for moving the clamp automatically.

The exact positions for the clamp settings will be calculated from the actual start and stop frequencies of the active test range through a simple but very effective algorithm (position step size depends on highest frequency, maximum position depends on lowest frequency).

With test receivers the preview test (for finding the relevant frequencies) is normally done with the absorbing clamp in the zero position, which means very close to the equipment under test (EuT); with that position all critical frequencies should show up, but not necessarily with the maximum level that might be detected at an other position.

If the test chamber is not shielded properly then ambient signals might find their way into the long mains cable. The software can help: An optional frequency list with ambients can be used to cut out for each frequency a range one IF bandwidth wide that won't be further analyzed; of course this method has its problems if one or more frequencies of ambient interference are identical to those critical ones of the EuT

If needed, an **auxiliary switch** can be used for additional switching (extra shielding, different operation modes, etc.), currently with the states ON and OFF only; if activated, an extra column, holding the state of that switch, will be added to the results. If both states are defined for searching, then this will double the number of states to be analyzed.

### 3.6.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

**EN 55014**

Frequency Range:	30 - 300 MHz
Detectors:	QP and AV
Test Samples:	Household Equipment

### 3.6.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "pow_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 300 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 06</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic****Preview**

Parameter: 01: preview result file, <none>: ID + '\_pre'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used

Parameter: 02: 2<sup>nd</sup> preview result file, <none>: ID + '\_pre2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the preview test; if no filename is specified then a default name will be used

Parameter: 03: scan table for preview  
 Default value: "<none>"  
 Function: filename of the scan range table to be used for the preview test

Parameter: 04: sweep table for preview  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the preview test

Parameter: 05: complete search (all accessory settings)  
 Default value: not checked  
 Function: if checked sweeps/scans will be done **on all clamp settings** as specified with clamp parameters for the preview test (recommended for preview tests with sweeps, e.g. with an EMI analyzer); else only one sweep/scans will be done **with one fixed setting** as specified with clamp parameters for the preview test (recommended for preview tests with scans, e.g. with an EMI test receiver)

Parameter: 06: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

**Topic****DataReduction**

Parameter: 01: also perform interactive frequency selection  
 Default value: not checked  
 Function: if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test; to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog

Parameter: 02: 1st limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to the limit line assigned to the 1<sup>st</sup> detector (e.g. QUASPEAK)

Parameter:	03: 2nd limit line
Default value:	"<none>"
Function:	a filename that corresponds to the limit line assigned to the 2 <sup>nd</sup> detector (e.g. AVERAGE)
Parameter:	04: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	05: decision threshold [dB] for peak reduction
Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	06: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	07: freq. list of ambients to be cut out from preview
Default value:	"<none>"
Function:	optional name of a frequency list (ambient interference) with frequencies to be "cut out" from measurement results (preview test: scans/sweeps, final test: partial scans), each "cut" with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used; to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter:	08: cutting width for sweeps (ambients): no. of IF-BWs
Default value:	10
Function:	with sweeps the width of a "cut" range (see previous parameter) has to be larger because of the lower frequency resolution of the results; therefore this factor (=number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results
Parameter:	09: merge all points from both detectors into same list
Default value:	not checked
Function:	if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test

**Topic****Final**

Parameter:	01: final result file, <none>: ID + '_fin'
Default value:	"<none>"
Function:	optional filename for the results (1 <sup>st</sup> detector, e.g. QUASIPeAK) from the final measurements; if no filename is specified then a default name will be used
Parameter:	02: 2nd final result file, <none>: ID + '_fin2'
Default value:	"<none>"
Function:	optional filename for the results (2 <sup>nd</sup> detector, e.g. AVERAGE) from the final measurements; if no filename is specified then a default name will be used

Parameter:	03: scan table for partial scans + maximization
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for maximization measurements as well as for partial scans
Parameter:	04: perform partial scans
Default value:	not checked
Function:	if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter:	05: max. no. of results kept from partial scans
Default value:	2
Function:	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)
Parameter:	06: partial scan width: no. of IF-BWs (0=use ratio)
Default value:	0
Function:	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter:	07: partial scan width: ref. frequ. ratio
Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	08: complete search (all accessory settings)
Default value:	checked
Function:	determines the search mode for the preview test: complete search means that measurements will be done on all clamp settings as specified with clamp parameters for the final test (recommended when the preview test has been performed with a fixed setting of the clamp); else: measurements will be done on those clamp settings that were determined through a "complete search" in the preview test
Parameter:	09: perform accessory adjustment
Default value:	checked
Function:	if checked then an additional search (in a small range) for the (local) maximum level will be performed with the absorbing clamp; this is recommended, if the preview test was performed with only one or a small number of clamp positions
Parameter:	10: adjustment full range
Default value:	not checked
Function:	if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range of the absorbing clamp
Parameter:	11: scan table for final measurements
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements

Parameter:	12: opt. scan table for final meas. >1GHz
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASPEAK)
Parameter:	13: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	14: optional input: preview result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or PK+AV) or optionally two (e.g. 1st for PK, 2nd for AV) input files
Parameter:	15: optional input: preview result file (2 <sup>nd</sup> det.)
Default value:	"<none>"
Function:	see previous parameter
Parameter:	16: optional input: frequency list
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or QP+AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter:	17: optional input: frequency list (2nd det.)
Default value:	"<none>"
Function:	see previous parameter
Parameter:	18: optional input: final result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or QP+AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter:	19: optional input: final result file (2nd det.)
Default value:	"<none>"
Function:	see previous parameter

**Topic****Graphics**

Parameter:	01: graphics configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional graphics template (new graph only)
Default value:	"<none>"
Function:	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color



settings)

Parameter: 03: split result display  
 Default value: not checked  
 Function: if checked then the results will be displayed with two graphics:  
 the first shows the PEAK and QUASIPEAK results and the QUASIPEAK limit line;  
 the second shows the AVERAGE results and the AVERAGE limit line;  
 the name of the second diagram is based on the first one's plus "\_2" appended to it

Parameter: 04: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

### Topic Report

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

### Topic ReportHeader

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is

specified then a default name will be used

Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"Power Test"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start

time of the test will be entered

**Topic****Clamp**

Parameter:	01: use manual positioning only
Default value:	checked
Function:	if checked then manual control of the absorbing clamp through dialogue boxes will be used
Parameter:	02: use auto positioning only
Default value:	not checked
Function:	if checked then automatic control of the absorbing clamp will be used
Parameter:	03: symbolic name of autom. moved clamp
Default value:	"CLAMP"
Function:	symbolic device name of the automatically controlled absorbing clamp as defined in the device configuration menu
Parameter:	04: speed value for slower movements
Default value:	2
Function:	determines the speed of the automatically moved clamp for the relatively slow movements for the "adjustment" in the final test (some 1 or 2 measurements per sec. only !)
Parameter:	05: speed value for faster movements
Default value:	4
Function:	determines the speed of the automatically moved clamp for the relatively fast movements for absolute positioning
Parameter:	06: fixed/max. length [cm] to be measured (preview)
Default value:	500
Function:	depending on the mode of the preview test: complete preview search: determines the maximum length to be used for measurements initial setting only: position to be used for measurements (normally 0 cm)
Parameter:	07: no. of steps per shortest half wave length (preview)
Default value:	3
Function:	determines the number of steps that shall be measured within the first half wave of the highest frequency (of the current test range), with steadily increasing stepsize for greater distances, e.g.: a test 60 - 200 MHz, 3 steps per shortest half wave length: => 3 steps within 75 cm (half wave length at 200 MHz) => ever increasing steps (factor is 1 + 1/3) up to 250 cm (= half wave length at 60 MHz) => positions: 0 / 25 / 50 / 75 / 100 / 133 / 177 / 237 / 250 cm
Parameter:	08: max. length [cm] to be measured (finals)
Default value:	500
Function:	depending on the mode of the final test: complete final search: determines the maximum distance of the absorbing clamp to be used for measurements in the final test else: preview data will be used
Parameter:	09: no. of steps per shortest half wave length (finals)
Default value:	3

Function: determines the number of steps that shall be measured within the first half wave of the highest frequency (of the current test range), with steadily increasing stepsize for greater distances, see example above (parameter *Clamp 07*)

Parameter: 10: no. of steps as adjustment range (finals)

Default value: 1

Function: final test with "adjustment":  
determines the number of steps that shall be taken as a position range for the adjustment of the clamp

**Topic Auxiliary**

Parameter: 01: use manual auxiliary switching

Default value: not checked

Function: if checked then manual control of an auxiliary switch through dialogue boxes will be used; if activated an extra column, holding the state ("ON" or "OFF") of the switch will be added to the results

Parameter: 02: name of auxiliary device

Default value: "Auxiliary Device"

Function: name of the auxiliary switch (will be displayed with the dialog boxes for switching)

Parameter: 03: preview measurements with aux. switch OFF

Default value: not checked

Function: if checked then the preview measurements will (also) be done with the state "OFF"

Parameter: 04: preview measurements with aux. switch ON

Default value: not checked

Function: if checked then the preview measurements will (also) be done with the state "ON"

Parameter: 05: final measurements with aux. switch OFF

Default value: not checked

Function: if checked then the final measurements will (also) be done with the state "OFF"

Parameter: 06: final measurements with aux. switch ON

Default value: not checked

Function: if checked then the final measurements will (also) be done with the state "ON"

## 3.7 Voltage Mains Test

### 3.7.1 Description

This test provides automatic measurement of electromagnetic interference on supply lines, optionally with automatic control of an artificial mains network (LISN).

Depending on the kind of LISN, the parameters have to be set:

- Y with a **single line LISN** measurements are normally done on a number of (AC or DC) supply lines; switching between lines has to be done manually
- Y with a **2-line LISN** like the ESH3-Z5 switching can be done automatically between lines N and L1, protective earth between grounded floating (with ENV 216: high pass setting)
- Y with a **4-line LISN** like the ESH2-Z5 switching can be done automatically between lines N, L1, L2 and L3, protective earth between grounded floating (not with ENV 4200)

With test receivers the preview test (for finding the critical frequencies) is normally done on a single setting of the LISN (e.g. phase L1 with the protective earth floating).

The artificial mains networks ESH2-Z5 and ESH3-Z5 are normally controlled via the user port of the receiver. With this test procedure the parallel interface can alternatively be defined for controlling, using the LPT I/O driver. When doing so, the lines of the parallel port will be used as follows:

- DATA 0 (Pin No. 2): N
- DATA 1 (Pin No. 3): L1
- DATA 2 (Pin No. 4): L2 (ESH2-Z5 only)
- DATA 3 (Pin No. 5): L3 (ESH2-Z5 only)
- DATA 4 (Pin No. 6): PE for ESH2-Z5
- DATA 5 (Pin No. 7): PE for ESH3-Z5

If needed, an **auxiliary switch** can be used for additional switching (extra shielding, different operation modes, etc.), currently with the states ON and OFF only; if activated, an extra column, holding the state of that switch, will be added to the results. If both states are defined for searching, then this will double the number of states to be analyzed.

### 3.7.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### EN 55015

Frequency Range:	0.15 - 30 MHz
Detectors:	QP and AV
Test Samples:	Fluorescent Lamps and Luminaries

#### EN 55022

Frequency Range:	0.15 - 30 MHz
Detectors:	QP and AV
Test Samples:	ITE: Class B

### 3.7.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "vol_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 0.15 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 30 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 08</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic****Preview**

Parameter: 01: preview result file, <none>: ID + '\_pre'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used

Parameter: 02: 2<sup>nd</sup> preview result file, <none>: ID + '\_pre2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the preview test; if no filename is specified then a default name will be used

Parameter: 03: scan table for preview (N)  
 Default value: "<none>"  
 Function: filename of the scan range table to be used for the preview test

Parameter: 04: opt. scan table for preview on LISN line L1  
 Default value: "<none>"  
 Function: filename of an additional scan range table for the preview test to be used only when measurements are done on line L1; if used then the first scan range table will only be used with measurements on line N

Parameter: 05: opt. scan table for preview on LISN line L2  
 Default value: "<none>"  
 Function: filename of an additional scan range table for the preview test to be used only when measurements are done on line L2

Parameter: 06: opt. scan table for preview on LISN line L3  
 Default value: "<none>"  
 Function: filename of an additional scan range table for the preview test to be used only when measurements are done on line L3

Parameter: 07: sweep table for preview (N)  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the preview test

Parameter: 08: opt. sweep table for preview on LISN line L1  
 Default value: "<none>"  
 Function: filename of an additional sweep range table for the preview test to be used only when measurements are done on line L1; if used then the first sweep range table will only be used with measurements on line N

Parameter: 09: opt. sweep table for preview on LISN line L2  
 Default value: "<none>"  
 Function: filename of an additional sweep range table for the preview test to be used only when measurements are done on line L2

Parameter: 10 opt. sweep table for preview on LISN line L3  
 Default value: "<none>"  
 Function: filename of an additional sweep range table for the preview test to be used only when measurements are done on line L3

Parameter: 11: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten;  
 else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

### Topic **DataReduction**

Parameter: 01: also perform interactive frequency selection  
 Default value: not checked  
 Function: if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test;. to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog

Parameter: 02: 1st limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to the limit line assigned to the 1<sup>st</sup> detector (e.g. QUASPEAK)

Parameter: 03: 2nd limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to the limit line assigned to the 2<sup>nd</sup> detector (e.g. AVERAGE)

Parameter: 04: max. no. of results kept per test range  
 Default value: 6  
 Function: the maximum number of results that will be kept from each test range through data reduction

Parameter: 05: decision threshold [dB] for peak reduction  
 Default value: 6.0  
 Function: determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through

Parameter: 06: level offset [dB] for acceptance analysis  
 Default value: -10.0  
 Function: determines the level offset when data reduction is done with the "Acceptance Analysis"

Parameter: 07: merge all points from both detectors into same list  
 Default value: not checked  
 Function: if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test

### Topic **Final**

Parameter: 01: final result file, <none>: ID + '\_fin'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. QUASPEAK) from the final measurements; if no filename is specified then a default name will be used



Parameter:	02: 2nd final result file, <none>: ID + '_fin2'
Default value:	"<none>"
Function:	optional filename for the results (2 <sup>nd</sup> detector, e.g. AVERAGE) from the final measurements; if no filename is specified then a default name will be used
Parameter:	03: scan table for partial scans + maximization (N)
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for maximization measurements as well as for partial scans
Parameter:	04: opt. scan table for partial scans + max. (L1)
Default value:	"<none>"
Function:	filename of an additional scan range table for maximization measurements and for partial scans to be used only when measurements are done on line L1; if used then the first scan range table will only be used with measurements on line N
Parameter:	05: opt. scan table for partial scans + max. (L2)
Default value:	"<none>"
Function:	filename of an additional scan range table for maximization measurements and for partial scans to be used only when measurements are done on line L2
Parameter:	06: opt. scan table for partial scans + max. (L3)
Default value:	"<none>"
Function:	filename of an additional scan range table for maximization measurements and for partial scans to be used only when measurements are done on line L3
Parameter:	07: perform partial scans
Default value:	not checked
Function:	if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter:	08: max. no. of results kept from partial scans
Default value:	2
Function:	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)
Parameter:	09: partial scan width: no. of IF-BWs (0=use ratio)
Default value:	0
Function:	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter:	10: partial scan width: ref. frequ. ratio
Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	11: complete search
Default value:	checked

Function:	determines the search mode for the preview test: complete search means that measurements will be done on all LISN(/AUX) settings as specified with LISN(/AUX) parameters for the final test (recommended for final tests, when the preview test has not been performed as "complete search"; normally with EMI test receivers); use LISN(/AUX) data means that measurements will be done on those LISN(/AUX) settings that were determined through a "complete search" in the preview test (normally with EMI analyzers)
Parameter:	12: scan table for final measurements (N)
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements
Parameter:	13: opt. scan table for final measurements (L1)
Default value:	"<none>"
Function:	filename of an additional scan range table for the final measurements to be used only when measurements are done on line L1; if used then the first scan range table will only be used with measurements on line N
Parameter:	14: opt. scan table for final measurements (L2)
Default value:	"<none>"
Function:	filename of an additional scan range table for the final measurements to be used only when measurements are done on line L2
Parameter:	15: opt. scan table for final measurements (L3)
Default value:	"<none>"
Function:	filename of an additional scan range table for the final measurements to be used only when measurements are done on line L3
Parameter:	16: QP limit relaxation according to FCC
Default value:	not checked
Function:	if checked then every final measurement with the 1 <sup>st</sup> detector will be extended through an additional measurement with the AVERAGE detector; should the QUASISPEAK level then be more than 6 dB above the AVERAGE level, then we have a broadband signal; as a consequence the QUASISPEAK limit will be increased (relaxed) by 13 dB as described in the FCC standard
Parameter:	17: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	18: optional input: preview result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or for PK+AV) or optionally two (e.g. 1 <sup>st</sup> for PK, 2 <sup>nd</sup> for AV) input files
Parameter:	19: optional input: preview result file (2nd det.)
Default value:	"<none>"
Function:	see previous parameter
Parameter:	20: optional input: frequency list

Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or for QP+AV) or optionally two (e.g. 1 <sup>st</sup> for QP, 2 <sup>nd</sup> for AV) input files
Parameter:	21: optional input: frequency list (2nd det.)
Default value:	"<none>"
Function:	see previous parameter
Parameter:	22: optional input: final result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or for QP+AV) or optionally two (e.g. 1 <sup>st</sup> for QP, 2 <sup>nd</sup> for AV) input files
Parameter:	23: optional input: final result file (2nd det.)
Default value:	"<none>"
Function:	see previous parameter

### Topic Graphics

Parameter:	01: graphics configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional graphics template (new graph only)
Default value:	"<none>"
Function:	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)
Parameter:	03: split result display
Default value:	not checked
Function:	if checked then the results will be displayed with two graphics: the first shows the PEAK and QUASIPEAK results and the QUASIPEAK limit line; the second shows the AVERAGE results and the AVERAGE limit line; the name of the second diagram is based on the first one's plus "_2" appended to it
Parameter:	04: minimize graphics for test
Default value:	not checked
Function:	if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

### Topic Report

Parameter:	01: generate printer hardcopy
Default value:	checked
Function:	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter:	02: generate RTF file
Default value:	not checked
Function:	if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter:	03: RTF file: 'X:\<path>\<name8.3>', empty: dialog
Default value:	"c:\xxx.rtf"
Function:	path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter:	04: report config. for printing, <none>: ID + '_prnt'
Default value:	"<none>"
Function:	optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used
Parameter:	05: footnote, empty field: ID
Default value:	""
Function:	optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used
Parameter:	06: optional text file to be included
Default value:	"<none>"
Function:	filename of an optional file of type 'Text' which shall be included in the report

**Topic****ReportHeader**

Parameter:	01: test report header, <none>: ID
Default value:	"<none>"
Function:	optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"Voltage Mains Test"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no

string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed

Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""  
 Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

## **Topic LISN**

Parameter: 01: use manual switching only  
 Default value: checked  
 Function: if checked then manual control of the artificial mains network (LISN) through dialogue boxes will be used

Parameter: 02: use auto switching only  
 Default value: not checked  
 Function: if checked then automatic control of the artificial mains network (LISN) will be used

Parameter: 03: use LPT I/O switching only  
 Default value: not checked  
 Function: if checked then automatic control of the artificial mains network (LISN) via the driver LPT I/O will be used; in this case the lines of the parallel port will be used as follows:  
 DATA 0 (Pin No. 2): N  
 DATA 1 (Pin No. 3): L1  
 DATA 2 (Pin No. 4): L2 (ESH2-Z5 only)  
 DATA 3 (Pin No. 5): L3 (ESH2-Z5 only)  
 DATA 4 (Pin No. 6): PE for ESH2-Z5  
 DATA 5 (Pin No. 7): PE for ESH3-Z5

---

Parameter:	04: symbolic device name of autom. switched LISN
Default value:	"ESH2-Z2"
Function:	symbolic device name of the automatically controlled artificial mains network as defined in the device configuration menu; the device properties must match with the controlling device (e.g. IEEE command strings for an EMI test receiver)
Parameter:	05: single line LISN
Default value:	not checked
Function:	if checked then a single-line-LISN for measurements on a number of supply lines is assumed
Parameter:	06: sgl.: no. of lines to be measured for preview
Default value:	0
Function:	specifies the number of lines to be analyzed in the preview test, if a single-line-LISN is used
Parameter:	07: sgl.: no. of lines to be measured for finals
Default value:	0
Function:	specifies the number of lines to be analyzed in the final test, if a single-line-LISN is used
Parameter:	08: preview measurements with PE floating
Default value:	checked
Function:	if checked then the preview measurements will (also) be done with the protective earth floating
Parameter:	09: preview measurements with PE grounded
Default value:	checked
Function:	if checked then the preview measurements will (also) be done with the protective earth grounded
Parameter:	10: preview measurements on line N
Default value:	checked
Function:	if checked then the preview measurements will (also) be done on the neutral line N
Parameter:	11: preview measurements on line L1
Default value:	checked
Function:	if checked then the preview measurements will (also) be done on the line L1
Parameter:	12: preview measurements on line L2
Default value:	checked
Function:	if checked then the preview measurements will (also) be done on the line L2
Parameter:	13: preview measurements on line L3
Default value:	checked
Function:	if checked then the preview measurements will (also) be done on the line L3
Parameter:	14: final measurements with PE floating
Default value:	checked
Function:	if checked then the final measurements will (also) be done with the protective earth floating
Parameter:	15: final measurements with PE grounded
Default value:	checked
Function:	if checked then the final measurements will (also) be done with the protective

earth grounded

Parameter: 16: final measurements on line N  
 Default value: checked  
 Function: if checked then the final measurements will (also) be done on the neutral line N

Parameter: 17: final measurements on line L1  
 Default value: checked  
 Function: if checked then the final measurements will (also) be done on the line L1

Parameter: 18: final measurements on line L2  
 Default value: checked  
 Function: if checked then the final measurements will (also) be done on the line L2

Parameter: 19: final measurements on line L3  
 Default value: checked  
 Function: if checked then the final measurements will (also) be done on the line L3

### **Topic Auxiliary**

Parameter: 01: use manual auxiliary switching  
 Default value: not checked  
 Function: if checked then manual control of an auxiliary switch through dialogue boxes will be used; if activated an extra column, holding the state ("ON" or "OFF") of the switch will be added to the results

Parameter: 02: name of auxiliary device  
 Default value: "Auxiliary Device"  
 Function: name of the auxiliary switch (will be displayed with the dialog boxes for switching)

Parameter: 03: preview measurements with aux. switch OFF  
 Default value: not checked  
 Function: if checked then the preview measurements will (also) be done with the state "OFF"

Parameter: 04: preview measurements with aux. switch ON  
 Default value: not checked  
 Function: if checked then the preview measurements will (also) be done with the state "ON"

Parameter: 05: final measurements with aux. switch OFF  
 Default value: not checked  
 Function: if checked then the final measurements will (also) be done with the state "OFF"

Parameter: 06: final measurements with aux. switch ON  
 Default value: not checked  
 Function: if checked then the final measurements will (also) be done with the state "ON"

## 3.8 Voltage Terminal Test

### 3.8.1 Description

This test provides automatic measurement of conducted electromagnetic interference on the antenna terminals of TV sets, VCRs and radios.

The test starts with a preview test to look for critical frequencies while the tuner is in a "channel search mode". If there are any of them (ambient signals can optionally be cut out according to a frequency list), then the user can decide whether to continue testing with test signals. In that case (a power divider will be required and the signal loss has to be defined as a system transducer for the sweep/scan tables) the critical frequencies will be analyzed to find the corresponding channel (IF will be subtracted and a frequency list with channel width information will be used):

A message will come up to provide a test signal (channel + carrier frequency) for the (next) required channel. The oscillator frequency and all harmonic frequencies within the test range will be evaluated against the matching limit. Then these frequencies will be cut out from the spectrum and the rest will be evaluated against the limit that is defined for "other" signals. The procedure will be repeated for all critical frequencies from the preview test. In the test report for all QP measurements (if level is above the acceptance line) a note will indicate the signal type and the corresponding carrier frequency.

Without QP measurements, the list with the critical points from the preview test (PK results) will be shown in the test report.

### 3.8.2 Parameter Sets

Currently the following specification is supported by the ES-K1 Standard Data:

**EN 55013**

Frequency Range:	0.15 - 30 MHz
Detectors:	QP and AV
Test Samples:	Television Sets, FM Tuners, VCRs, DVD Players, etc.



### 3.8.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "vterm_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: frequency list with channel info "<none>"

Function: defines the channel list to be used in the test, a frequency list which also holds information like channel names and channel widths

Parameter: 10: measurement of wanted signals (ignore IF offset)

Default value: not checked

Function: if checked then the test is configured for the measurement of "wanted signals" (e.g. for measuring VCRs or DVD players): the value of the tuner IF offset will be ignored and the carrier will not be cut off the spectrum

Parameter: 11: test configuration, <none>: ID

Default value: "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

## Topic

## Preview

Parameter: 01: preview result file, <none>: ID + '\_pre'

Default value: "<none>"

Function: optional filename for the results (1<sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used

Parameter: 02: scan table for preview

Default value: "<none>"

Function: filename of the scan range table to be used for the preview test

Parameter: 03: sweep table for preview

Default value: "<none>"

Function: filename of the sweep range table to be used for the preview test

Parameter: 04: insert results into existing result file

Default value: not checked

Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten;  
else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

## Topic

## DataReduction

Parameter: 01: all/others limit line

Default value: "<none>"

Function: a filename that corresponds to the required limit line for all "other" (not fundamental and harmonic) frequencies (e.g. a QUASISPEAK limit)

Parameter: 02: fundamentals limit line

Default value: "<none>"

Function: a filename that corresponds to the required limit line for the oscillator's fundamental frequencies (e.g. a QUASISPEAK limit)

Parameter: 03: harmonics limit line

Default value: "<none>"

Function: a filename that corresponds to the required limit line for the oscillator's harmonic frequencies (e.g. a QUASISPEAK limit)

Parameter: 04: max. no. of results kept per testrange

Default value:	6
Function:	the maximum number of results that will be kept from each testrange through data reduction
Parameter:	05: decision threshold [dB] for peak reduction
Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	06: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	07: frequency list of ambients to be cut out of from preview
Default value:	"<none>"
Function:	optional name of a frequency list (ambient interference) with frequencies to be "cut out" from measurement results (preview test: scans/sweeps, final test: partial scans), each "cut" with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used; to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter:	08: cut factor for sweeps (ambients+osc.+har.)
Default value:	10
Function:	with sweeps the width of a "cut" range has to be larger because of the lower frequency resolution of the results; therefore this factor (=number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results
<b>Topic</b>	<b>Final</b>
Parameter:	01: final result file, <none>: ID + '_fin'
Default value:	"<none>"
Function:	optional filename for the (QUASIPeAK) results from the final test; if no filename is specified then a default name will be used
Parameter:	02: final result file, <none>: ID + '_fin2'
Default value:	"<none>"
Function:	optional filename for the (PeAK) results from the final test; if no filename is specified then a default name will be used
Parameter:	03: scan table for meas. with carrier on
Default value:	"<none>"
Function:	filename of the scan range table to be used for the final test, when a carrier signal is present
Parameter:	04: sweep table for meas. with carrier on
Default value:	"<none>"
Function:	filename of the sweep range table to be used for the final test, when a carrier signal is present
Parameter:	05: scan table for partial scans
Default value:	"<none>"

Function:	filename of the corresponding <b>scan range table</b> to be used for partial scans
Parameter:	06: perform partial scans
Default value:	not checked
Function:	if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter:	07: partial scan width: no. of IF-BWs (0=use ratio)
Default value:	0
Function:	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter:	08: partial scan width: ref. frequ. ratio
Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	09: scan table for final measurements
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements
Parameter:	10: opt. scan table for final meas. >1GHz
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter:	11: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	12: optional input: preview result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test
Parameter:	13: optional input: frequency list
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test
Parameter:	14: optional input: final result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test

<b>Topic</b>	<b>Graphics</b>
Parameter:	01: graphics configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional graphics template (new graph only)
Default value:	"<none>"
Function:	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

<b>Topic</b>	<b>Report</b>
Parameter:	01: generate printer hardcopy
Default value:	checked
Function:	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter:	02: generate RTF file
Default value:	not checked
Function:	if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter:	03: RTF file: 'X:\<path>\<name8.3>', empty: dialog
Default value:	"c:\xxx.rtf"
Function:	path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter:	04: report config. for printing, <none>: ID + '_prnt'
Default value:	"<none>"
Function:	optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used
Parameter:	05: footnote, empty field: ID
Default value:	""
Function:	optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used
Parameter:	06: optional text file to be included
Default value:	"<none>"
Function:	filename of an optional file of type 'Text' which shall be included in the report

<b>Topic</b>	<b>ReportHeader</b>
Parameter:	01: test report header, <none>: ID
Default value:	"<none>"
Function:	optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional test report header template, <none>: ID

Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"Voltage Terminal Test"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

## 3.9 Azimuth Chart Test

### 3.9.1 Description

With this test the radiation pattern of an EuT as well as the azimuth pattern of an antenna can be measured and be displayed in a polar chart.

For gaining the radiation pattern of an EuT, the device has to be mounted onto a turntable.

The azimuth pattern of an antenna can be retrieved by turning the (receiving) antenna (optionally with a turntable) while transmitting antenna - e.g. mounted on a tripod - radiates with a constant level (provided by the tracking generator of the receiver). Maximum eight frequencies will be measured with each azimuth step. The measured levels will be stored along with the azimuths and displayed in a polar diagram (level against azimuth; one curve per frequency). The display of the levels may be either absolute or relative to the levels of the main azimuth (an offset can be defined); the levels of the main azimuth can be stored as a reference so that with another test they can be used for a relative display.

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver 'USER\_IEC' can be added to the device list; the assigned to this driver could be e.g. "GENERATOR" or the model name of the generator (e.g. "SMP"). The settings should first be checked with the corresponding interactive dialog ("Set Device...").

In the script parameters of **Topic "ExtGenerator"** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R&S (SMxx) have to be set like this:

...

<b>Topic</b>	<b>Calibration</b>
Parameter:	04: <b>scan table for measurements</b>
Value:	<b>[must be selected!]</b>
Parameter:	05: optional <b>frequ. list for single measurements</b>
Value:	<b>[must be selected!]</b>
Parameter:	06: sweep table for measurements
Value:	<none>

...

<b>Topic</b>	<b>ExtGenerator</b>
Parameter:	02: GPIB initialization command
Value:	<b>"*RST;*CLS;POW -10DBM;FREQ:CW 1E9;OUTP1 ON"</b>
Parameter:	03: GPIB frequ. command incl. format string
Value:	<b>"FREQ:CW %G"</b>
Parameter:	04: frequency factor (e.g. 1E-6 for MHz)
Value:	<b>1</b>

...

### 3.9.2 List of the Script Parameters

<b>Topic</b>	<b>Test</b>
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "chart_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: frequ. list for single measurements "CAL" frequency with the frequencies to be measured; only the first eight frequencies within the given and available frequency range will be used
Parameter: Default value: Function:	03: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	04: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	05: main azimuth [deg] (used as azimuth offset) 0 defines the main azimuth; the value will be used as an offset for the results
Parameter: Default value: Function:	06: relative display not checked if checked then the levels will be calculated relatively either to the main azimuth or to the loaded reference
Parameter: Default value: Function:	07: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	08: name of reference results to be used "" name of the reference file (stored as a transducer) which shall be used for the relative display of the levels
Parameter: Default value: Function:	09: name of reference results to be stored "" name of the reference file which holds the levels of the main azimuth (will be stored as a transducer)
Parameter: Default value: Function:	10: test configuration, <none>: ID "<none>" optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

#### **Topic**                      **Measurement**

Parameter:                      01: scan table for single measurements  
Default value:                      "<none>"



Function: filename of the scan range table to be used for the (single) measurements

### Topic Graphics

Parameter: 01: graphics configuration, <none>: ID

Default value: "<none>"

Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: minimum level

Default value: 0

Function: defines the minimum level of the polar graphics diagram

Parameter: 03: maximum level

Default value: 80

Function: defines the maximum level of the polar graphics diagram

### Topic Report

Parameter: 01: generate printer hardcopy

Default value: checked

Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file

Default value: not checked

Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog

Default value: "c:\xxx.rtf"

Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'

Default value: "<none>"

Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID

Default value: ""

Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included

Default value: "<none>"

Function: filename of an optional file of type 'Text' which shall be included in the report

### Topic ReportHeader

Parameter: 01: test report header, <none>: ID

Default value: "<none>"

Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

---

Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"Azimuth Chart"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

<b>Topic</b>	<b>Turntable</b>
Parameter:	01: use manual positioning only
Default value:	checked
Function:	if checked then manual control of the turntable through dialogue boxes will be used
Parameter:	02: use auto positioning only
Default value:	not checked
Function:	if checked then automatic control of the turntable will be used
Parameter:	03: symbolic name of autom. moved turntable
Default value:	"TURNTABLE"
Function:	symbolic device name of the automatically controlled turntable as defined in the device configuration menu
Parameter:	04: min. azimuth [deg]
Default value:	0
Function:	defines the minimum azimuth for the measurements
Parameter:	05: max. azimuth [deg]
Default value:	360
Function:	defines the maximum azimuth for the measurements
Parameter:	06: azimuth stepsize [deg] for finals
Default value:	45
Function:	defines the stepsize for the azimuth variation
Parameter:	07: speed value for positioning movements
Default value:	4
Function:	determines the speed of the automatically moved turntable
Parameter:	08: use continuous movements
Default value:	not checked
Function:	if checked then the turntable will not be moved in steps but will rotate continuously while the single measurements are being performed and stored along with their current azimuth; the azimuth steps are somewhat random because they depend on the measurement time and the turntable speed
Parameter:	09: speed value for continuous movements
Default value:	4
Function:	determines the speed of the automatically moved turntable for continuous movements

<b>Topic</b>	<b>ExtGenerator</b>
Parameter:	01: external generator device
Default value:	"<none>"
Function:	symbolic name of the device for controlling of an external generator as defined in the device configuration
Parameter:	02: GPIB initialization command
Default value:	"RECALL 09"
Function:	GPIB command for the initialization of the external generator; it is recommended

to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command

Parameter: 03: GPIB frequ. command incl. format string  
Default value: "RF %G MHZ"  
Function: GPIB command for the setup of the RF frequency of the external generator; the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string "%G"; variations for the format string are possible as with the C function *printf()* or as described in the ES-K2 manual on the script function *convertf()*

Parameter: 04: frequency factor (e.g. 1E-6 for MHz)  
Default value: 1.0E-6  
Function: the frequency to be programmed is internally represented with the unit Hertz; the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

## 3.10 Field Strength Test

### 3.10.1 Description

This test provides automatic measurement of electric field strength with antennas, optionally with control of an automatic antenna tower for setting the antenna height and polarization automatically (two masts are also possible), as well as an automatic turntable for setting the orientation of the equipment under test (EuT).

For a complete test the critical frequencies have to be measured with all settings of the three "dimensions" antenna height, antenna polarization and turntable azimuth.

Depending on the defined stepsizes the test may become time consuming but smaller steps do not necessarily lead to significantly higher levels; normally it is better to compensate for this uncertainty through an appropriate acceptance margin (e.g. 6 dB) during the analysis.

Alternatively to the field strength preview test, a frequency list from a power test (30 - 1000 MHz, PEAK-Detector, advantage: no expensive test chamber required, see 3.2) could be used as an input to the field strength final test; this method however is not considered as very reliable with larger EuTs.

For the preview test it is important to find all disturbances from the EuT (the corresponding frequencies) but because of the superimposition of emitted and reflected signals (on a metallic ground) the antenna might be positioned in a minimum for certain frequency bands; measurements should generally be done with both horizontal and vertical polarization; the antenna should be directed both to the front and to the back of the EuT; the appropriate antenna height depends on the kind of test chamber:

In a **screened chamber** (only partially applied with absorbers; not suitable for final tests but almost no ambient interference) a single mid position (ca. 2 m) seems to be sufficient but because of the many reflections some minor disturbances might be "pushed up" whereas some stronger ones may come up with a decreased level; therefore the data reduction of the preview should be done with a larger acceptance offset and more frequencies have to be kept for the final test (e.g. in the open area).

In an **anechoic chamber with metallic ground** it seems to be sufficient to measure at two positions (1 m and 2.5 m), if the distance between antenna and EuT is 3 m; for greater distances (e.g. 10 m) more positions (e.g. a step size of 1 m) on the full height range (1 m up to 4 m or more) have to be analyzed.

In an **anechoic chamber with ground absorbers** the reflections on the ground can be disregarded (requires a limit line lowered by 6 dB !) so that a single mid position (ca. 2 m) should be sufficient for the preview test.

An **open area test site** (OATS) is normally not suitable for automatic preview tests because of the many ambient disturbances but the software can help: An optional frequency list with ambients can be used to cut out for each frequency a range one IF bandwidth wide that won't be further analyzed; of course this method has its problems if one or more frequencies of ambient interference are identical to those critical ones of the EuT; in this case the operator has to find out (e.g. through switching the EuT off and on if possible or by looking at the signal with a smaller IF bandwidth) whether the field strength generated by the EuT is above the limit, but sometimes this can be impossible, when the ambient disturbance exceeds the limit.

The **delivered script parameters** are designed for compliance testing with measurement receivers; measurements with spectrum analyzers the preview test using (fast) sweeps could be done on more settings of the mast and turntable and the final test then could run without a complete search but with partial scans and "adjustment" of antenna height and turntable azimuth.

For so called **ERP measurements** (ERP = effective radiated power; unit in dBm; power in reference to a half wave dipole) that have to include the test site attenuation, it is necessary to have an individual level correction for each polarization, i.e., two sweep/scan tables that are identical except different system transducers will be used. A second range table for preview and final test respectively has to be defined that will be effective for all measurements with vertical polarization, whereas the first range table will be active with horizontal polarization. That means the range table have different additional corrections (1.

site attenuation for the corresponding polarization and distance; 2. correction factor of the half wave dipole; 3. conversion of electrical voltage [dBuV] into electrical power [dBm]).

If two automatic antenna masts are available then each of them can be used for a complete antenna range (e.g. a biconical antenna: 30 - 300 MHz / a log. per. antenna: 300 - 1000 MHz), thus eliminating manual interaction (if signal switching is done with a relay matrix) when antennas have to be changed (a second symbolic name, e.g. "MAST2" has to be specified for mast and polarization). To compensate for the azimuth deviation of each mast against the zero position axis of the turntable, azimuth correction values have to be defined (e.g. +20 / -20 deg).

Annotation: There are antennas now available that are suitable for the whole frequency range from 30 MHz up to 1 GHz; this way any changing of antennas can be made totally superfluous within that range.

If needed, an **auxiliary switch** can be used for additional switching (extra shielding, different operation modes, etc.), currently with the states ON and OFF only; if activated, an extra column, holding the state of that switch, will be added to the results. If both states are defined for searching, then this will double the number of states to be analyzed.

### 3.10.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### EN 55022

Frequency Range:	30 - 1000 MHz
Detector:	QP
Test Samples:	ITE: Class B
Distance:	10m

#### FCC Part 15 Class A

Frequency Range:	30 - 18000 MHz
Detector:	QP below 1GHz; AV above 1 GHz
Test Samples:	
Distance:	10m

#### FCC Part 15 Class B

Frequency Range:	30 - 5000 MHz
Detector:	QP below 1GHz; AV above 1 GHz
Test Samples:	
Distance:	10m

### 3.10.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "field_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 08</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

### Topic Preview

Parameter: 01: preview result file, <none>: ID + '\_pre'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used

Parameter: 02: 2<sup>nd</sup> preview result file, <none>: ID + '\_pre2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the preview test; if no filename is specified then a default name will be used

Parameter: 03: scan table for preview  
 Default value: "<none>"  
 Function: filename of the scan range table to be used for the preview test

Parameter: 04: optional 2nd scan table for preview (vertical)  
 Default value: "<none>"  
 Function: filename of a second scan range table for the preview test which to be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only

Parameter: 05: sweep table for preview  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the preview test

Parameter: 06: optional 2nd sweep table for preview (vertical)  
 Default value: "<none>"  
 Function: filename of a second sweep range table for the preview test which will be used only when measurements are done with vertical polarization; if used then the first sweep range table will be used with horizontal polarization only

Parameter: 07: complete search (all accessory settings)  
 Default value: not checked  
 Function: if checked sweeps/scans will be done **on all accessory settings** as specified with the mast/turntable/polarization parameters for the preview test (recommended for preview tests with sweeps, e.g. with an EMI analyzer); else only one sweep/scans will be done **with one fixed setting** as specified with clamp parameters for the preview test (recommended for preview tests with scans, e.g. with an EMI test receiver)

Parameter: 08: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

### Topic DataReduction

Parameter: 01: also perform interactive frequency selection



Default value:	not checked
Function:	if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test;. to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog
Parameter:	02: 1st limit line
Default value:	"<none>"
Function:	a filename that corresponds to the limit line assigned to the 1 <sup>st</sup> detector (e.g. QUASISPEAK)
Parameter:	03: optional 1st acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of the preview results from the 1 <sup>st</sup> detector; if used then the given value for the acceptance offset will be ignored
Parameter:	04: optional 2nd limit line
Default value:	"<none>"
Function:	a filename that corresponds to the limit line assigned to the 2 <sup>nd</sup> detector (e.g. AVERAGE)
Parameter:	05: optional 2nd acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of preview results from the 2 <sup>nd</sup> detector; if used then the given value for the acceptance offset will be ignored
Parameter:	06: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	07: decision threshold [dB] for peak reduction
Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	08: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	09: freq. list of ambients to be cut out from preview
Default value:	"<none>"
Function:	optional name of a frequency list (ambient interference) with frequencies to be "cut out" from measurement results (preview test: scans/sweeps, final test: partial scans), each "cut" with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used; to blank a modulated interference it might be necessary to provide more than one frequency in the list

Parameter: 10: cutting width for sweeps (ambients): no. of IF-BWs  
 Default value: 10  
 Function: with sweeps the width of a "cut" range (see previous parameter) has to be larger because of the lower frequency resolution of the results; therefore this factor (=number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results

Parameter: 11: merge all points from both detectors into same list  
 Default value: not checked  
 Function: if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test

### Topic Final

Parameter: 01: final result file, <none>: ID + '\_fin'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. QUASIPeAK) from the final measurements; if no filename is specified then a default name will be used

Parameter: 02: 2nd final result file, <none>: ID + '\_fin2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the final measurements; if no filename is specified then a default name will be used

Parameter: 03: scan table for partial scans + maximization  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for maximization measurements as well as for partial scans

Parameter: 04: optional 2nd scan table (vertical)  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for maximization measurements as well as for partial scans; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only

Parameter: 05: perform partial scans  
 Default value: not checked  
 Function: if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)

Parameter: 06: emulate partial scans through single meas.  
 Default value: not checked  
 Function: if checked then each partial scan will not be performed as a real scan, but instead will be emulated through single measurements at the corresponding frequencies; this is necessary if the receiver only provides a spectrum analyzer mode (pseudo single measurements through zero-span-sweeps plus 'marker-to-peak' to gain the level result)

Parameter: 07: max. no. of results kept from partial scans  
 Default value: 2  
 Function: when a partial scan is performed then after data reduction there might still be

more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)

Parameter: 08: partial scan width: no. of IF-BWs (0=use ratio)  
 Default value: 0  
 Function: determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter

Parameter: 09: partial scan width: ref. frequ. ratio  
 Default value: 0.01  
 Function: determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0

Parameter: 10: complete search  
 Default value: checked  
 Function: determines the search mode for the preview test: complete search means that measurements will be done on all mast/turntable/polarization settings as specified with the corresponding parameters for the final test (recommended when the preview test has been performed with a fixed setting); else: measurements will be done on those mast/turntable/polarization settings that were determined through a "complete search" in the preview test

Parameter: 11: perform accessory adjustment  
 Default value: checked  
 Function: if checked then an additional search (in a small range) for the (local) maximum level will be performed (mast height and turntable azimuth); this is recommended, if the preview test was performed with only one or a small number of settings of mast and turntable

Parameter: 12: adjustment full range  
 Default value: not checked  
 Function: if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range (mast and turntable)

Parameter: 13: scan table for final measurements  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for the final measurements

Parameter: 14: optional 2nd scan table (vertical)  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for the final measurements; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only

Parameter: 15: opt. scan table for final meas. >1GHz  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for the final measurements, but only for frequencies above 1 GHz; this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASPEAK)

Parameter: 16: optional 2<sup>nd</sup> scan table (vertical)

Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only
Parameter:	17: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	18: optional input: preview result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or PK+AV) or optionally two (e.g. 1st for PK, 2nd for AV) input files
Parameter:	19: optional input: preview result file (2 <sup>nd</sup> det.)
Default value:	"<none>"
Function:	see previous parameter
Parameter:	20: optional input: frequency list
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or QP+AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter:	21: optional input: frequency list (2nd det.)
Default value:	"<none>"
Function:	see previous parameter
Parameter:	22: optional input: final result file
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or QP+AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter:	23: optional input: final result file (2nd det.)
Default value:	"<none>"
Function:	see previous parameter

**Topic****Graphics**

Parameter:	01: graphics configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional graphics template (new graph only)
Default value:	"<none>"
Function:	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter: 03: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

### Topic Report

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

### Topic ReportHeader

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID  
 Default value: "<none>"  
 Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used

Parameter: 03: 1st header line  
 Default value: "TEST"

Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"Field Strength Test"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic****Mast**

Parameter:	01: use manual positioning only
Default value:	checked
Function:	if checked then manual control of the antenna mast through dialogue boxes will be used
Parameter:	02: use auto positioning only

Default value:	not checked
Function:	if checked then automatic control of the antenna mast will be used
Parameter:	03: symbolic name of autom. moved mast
Default value:	"MAST"
Function:	symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu
Parameter:	04: azimuth offset [deg] of mast
Default value:	0
Function:	if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a <b>value for the azimuth correction</b> can be used
Parameter:	05: symbolic name of optional 2nd automatic mast
Default value:	"MAST2"
Function:	symbolic device name of the optional 2nd automatically controlled antenna mast as defined in the device configuration menu; to make the script run with two masts, an appropriate stop message has to be defined for each subrange in the scan/sweep tables used for the preview or final test; example: 1st mast "1 " or "1 xxxxx" (string has to start with a 2nd Mast "2 " or "2 xxxxx" digit followed by a blank) for a full automatic test (without manual interaction) an additional relay matrix (RSU) would have to be used for switching between antennas (the corresponding signal paths would have to be selected in the scan/sweep tables)
Parameter:	06: azimuth offset [deg] of optional 2nd mast
Default value:	0
Function:	if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a <b>value for the azimuth correction</b> can be used
Parameter:	07: control priority level (1=highest)
Default value:	1
Function:	defines the priority level of the controlling of the antenna height (in combination with turntable azimuth and antenna polarization): a value of 1 means highest priority, 3 means lowest priority
Parameter:	08: min. height [cm] to be measured for preview
Default value:	100
Function:	depending on the mode of the preview test: complete preview search: minimum height to be used for measurements else: value will be ignored
Parameter:	09: fixed/max. height [cm] to be measured for preview
Default value:	300
Function:	depending on the mode of the preview test: complete preview search: determines the maximum height to be used for measurements else: fixed height to be used for measurements
Parameter:	10: height stepsize [cm] for preview
Default value:	200
Function:	stepsize for height variation in the preview test; normally two or three positions in all is sufficient (for finding all suspect frequencies), if the final test includes a

complete search; this stepsize will be used in the final test as the height range for an optional "adjustment", if the final test is done without complete search

Parameter: 11: min. height [cm] to be measured for finals  
 Default value: 100  
 Function: depending on the mode of the final test:  
 complete final search: determines the minimum height of the mast to be used for measurements in the final test  
 else: preview data will be used

Parameter: 12: max. height [cm] to be measured for finals  
 Default value: 400  
 Function: depending on the mode of the final test:  
 complete final search: determines the maximum height of the mast to be used for measurements in the final test  
 else: preview data will be used

Parameter: 13: height stepsize [cm] for finals  
 Default value: 50  
 Function: stepsize for height variation in the final test; this stepsize will also be used as the height range for an optional "adjustment", if the final test is done with a complete search

Parameter: 14: speed value for slower movements  
 Default value: 2  
 Function: determines the speed of the mast for the relatively slow movements for the "adjustment" in the final test (some 1 or 2 measurements per sec. only !)

Parameter: 15: speed value for faster movements  
 Default value: 4  
 Function: determines the speed of the automatically moved mast for the relatively fast movements for absolute positioning

## Topic

## Turntable

Parameter: 01: use manual positioning only  
 Default value: checked  
 Function: if checked then manual control of the turntable through dialogue boxes will be used

Parameter: 02: use auto positioning only  
 Default value: not checked  
 Function: if checked then automatic control of the turntable will be used

Parameter: 03: symbolic name of autom. moved turntable  
 Default value: "TURNTABLE"  
 Function: symbolic device name of the automatically controlled turntable as defined in the device configuration menu

Parameter: 04: control priority level (1=highest)  
 Default value: 2  
 Function: defines the priority level of the controlling of the turntable azimuth (in combination with antenna height and antenna polarization): a value of 1 means highest priority, 3 means lowest priority

Parameter: 05: min. azimuth [deg] to be measured for preview



Default value:	90
Function:	depending on the mode of the preview test: complete preview search: minimum azimuth to be used for measurements else: value will be ignored
Parameter:	06: fixed/max. azimuth [deg] to be measured for preview
Default value:	270
Function:	depending on the mode of the preview test: complete preview search: determines the maximum azimuth to be used for measurements else: fixed azimuth to be used for measurements
Parameter:	07: azimuth stepsize [deg] for preview
Default value:	180
Function:	stepsize for azimuth variation in the preview test; normally two positions in all is sufficient (for finding all suspect frequencies), if the final test includes a complete search; this stepsize will be used in the final test as the azimuth range for an optional "adjustment", if the final test is done without complete search
Parameter:	08: min. azimuth [deg] to be measured for finals
Default value:	0
Function:	depending on the mode of the final test: complete final search: determines the minimum azimuth of the turntable to be used for measurements in the final test else: preview data will be used
Parameter:	09: max. azimuth [deg] to be measured for finals
Default value:	360
Function:	depending on the mode of the final test: complete final search: determines the azimuth of the turntable to be used for measurements in the final test else: preview data will be used
Parameter:	10: azimuth stepsize [deg] for finals
Default value:	45
Function:	stepsize for azimuth variation in the final test; this stepsize will also be used as the azimuth range for an optional "adjustment", if the final test is done with a complete search
Parameter:	11: speed value for slower movements
Default value:	2
Function:	determines the speed of the turntable for the relatively slow movements for the "adjustment" in the final test (some 1 or 2 measurements per sec. only !)
Parameter:	12: speed value for faster movements
Default value:	4
Function:	determines the speed of the automatically moved turntable for the relatively fast movements for absolute positioning
<b>Topic</b>	<b>Polarization</b>
Parameter:	01: use manual switching only
Default value:	checked
Function:	if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter:	02: use auto switching only
Default value:	not checked
Function:	if checked then automatic control of the antenna polarization will be used
Parameter:	03: symbolic name of autom. controlled polariz.
Default value:	"MAST"
Function:	symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu
Parameter:	04: symbolic name of optional 2nd autom. polariz.
Default value:	"<none>"
Function:	symbolic device name of an optional 2nd automatically controlled antenna polarization as defined in the device configuration menu (see also <b>Topic Mast</b> )
Parameter:	05: control priority level (1=highest)
Default value:	3
Function:	defines the priority level of the controlling of the antenna polarization (in combination with antenna height and turntable azimuth): a value of 1 means highest priority, 3 means lowest priority
Parameter:	06: delay time [sec] for auto switching
Default value:	4
Function:	defines a waiting time with automatic switching of the antenna polarization; the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)
Parameter:	07: preview measurements with horizontal polariz.
Default value:	not checked
Function:	if checked then the preview measurements will (also) be done with horizontal polarization
Parameter:	08: preview measurements with vertical polariz.
Default value:	not checked
Function:	if checked then the preview measurements will (also) be done with vertical polarization
Parameter:	09: final measurements with horizontal polariz.
Default value:	not checked
Function:	if checked then the final measurements will (also) be done with horizontal polarization
Parameter:	10: final measurements with vertical polariz.
Default value:	not checked
Function:	if checked then the final measurements will (also) be done with vertical polarization

**Topic****Auxiliary**

Parameter:	01: use manual auxiliary switching
Default value:	not checked
Function:	if checked then manual control of an auxiliary switch through dialogue boxes will be used; if activated an extra column, holding the state ("ON" or "OFF") of the switch will be added to the results
Parameter:	02: name of auxiliary device

Default value:	"Auxiliary Device"
Function:	name of the auxiliary switch (will be displayed with the dialog boxes for switching)
Parameter:	03: preview measurements with aux. switch OFF
Default value:	not checked
Function:	if checked then the preview measurements will (also) be done with the state "OFF"
Parameter:	04: preview measurements with aux. switch ON
Default value:	not checked
Function:	if checked then the preview measurements will (also) be done with the state "ON"
Parameter:	05: final measurements with aux. switch OFF
Default value:	not checked
Function:	if checked then the final measurements will (also) be done with the state "OFF"
Parameter:	06: final measurements with aux. switch ON
Default value:	not checked
Function:	if checked then the final measurements will (also) be done with the state "ON"

## 3.11 Field Strength Test (fast)

### 3.11.1 Description

Basically this test offers the same functionality as the normal "Field Strength Test", but it is optimized for using an automatic antenna mast and an automatic turntable:

The preview test can be performed with sweeps only (a genuine EMI test receiver cannot be used!) with the turntable **simultaneously** being moved. This way the total time for the preview test should be reduced in half.

In the final test a partial scan will be done for each critical frequency.

### 3.11.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### EN 55022

Frequency Range:	30 - 1000 MHz
Detector:	QP
Test Samples:	ITE: Class B
Distance:	10m

#### FCC Part 15 Class A

Frequency Range:	30 - 18000 MHz
Detector:	QP below 1GHz; AV above 1 GHz
Test Samples:	
Distance:	10m

#### FCC Part 15 Class B

Frequency Range:	30 - 5000 MHz
Detector:	QP below 1GHz; AV above 1 GHz
Test Samples:	
Distance:	10m

### 3.11.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "fast_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

### Topic Preview

Parameter: 01: preview result file, <none>: ID + '\_pre'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used

Parameter: 02: optional 2nd preview result file, <none>: ID + '\_pre2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the preview test; if no filename is specified then a default name will be used

Parameter: 03: sweep table for preview  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the preview test

Parameter: 04: optional 2nd sweep table for preview (vertical)  
 Default value: "<none>"  
 Function: filename of a second sweep range table for the preview test which will be used only when measurements are done with vertical polarization; if used then the first sweep range table will be used with horizontal polarization only

Parameter: 05: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten;  
 else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

### Topic DataReduction

Parameter: 01: also perform interactive frequency selection  
 Default value: not checked  
 Function: if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test; to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog

Parameter: 02: 1st limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to the limit line assigned to the 1<sup>st</sup> detector (e.g. QUASPEAK)

Parameter: 03: optional 1st acceptance line (no offset)  
 Default value: "<none>"  
 Function: a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of the preview results from the 1<sup>st</sup> detector; if used then the given value for the acceptance offset will be ignored

Parameter: 04: optional 2nd limit line

Default value:	"<none>"
Function:	a filename that corresponds to the limit line assigned to the 2 <sup>nd</sup> detector (e.g. AVERAGE)
Parameter:	05: optional 2nd acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of preview results from the 2 <sup>nd</sup> detector; if used then the given value for the acceptance offset will be ignored
Parameter:	06: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	07: decision threshold [dB] for peak reduction
Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	08: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	09: merge all points from both detectors into same list
Default value:	not checked
Function:	if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test
<b>Topic</b>	<b>Final</b>
Parameter:	01: final result file, <none>: ID + '_fin'
Default value:	"<none>"
Function:	optional filename for the results (1 <sup>st</sup> detector, e.g. QUASPEAK) from the final measurements; if no filename is specified then a default name will be used
Parameter:	02: 2nd final result file, <none>: ID + '_fin2'
Default value:	"<none>"
Function:	optional filename for the results (2 <sup>nd</sup> detector, e.g. AVERAGE) from the final measurements; if no filename is specified then a default name will be used
Parameter:	03: scan table for partial scans + maximization
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for maximization measurements as well as for partial scans
Parameter:	04: optional 2nd scan table (vertical)
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for maximization measurements as well as for partial scans; it will be used only when measurements are done with vertical polarization; if used then the first scan

range table will be used with horizontal polarization only

Parameter:	05: emulate partial scans through single meas.
Default value:	not checked
Function:	if checked then each partial scan will not be performed as a real scan, but instead will be emulated through single measurements at the corresponding frequencies; this is necessary if the receiver only provides a spectrum analyzer mode (pseudo single measurements through zero-span-sweeps plus 'marker-to-peak' to gain the level result)
Parameter:	06: partial scan width: no. of IF-BWs (0=use ratio)
Default value:	0
Function:	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter:	07: partial scan width: ref. frequ. ratio
Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	08: adjustment full range
Default value:	not checked
Function:	if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range (mast and turntable)
Parameter:	09: scan table for final measurements
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements
Parameter:	10: optional 2nd scan table (vertical)
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only
Parameter:	11: opt. scan table for final meas. >1GHz
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASPEAK)
Parameter:	12: optional 2 <sup>nd</sup> scan table (vertical)
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only
Parameter:	13: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the



filename used in the final test will be deleted/overwritten;  
 else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

**Topic****Graphics**

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional graphics template (new graph only)  
 Default value: "<none>"  
 Function: optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter: 03: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

**Topic****Report**

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"

Function: filename of an optional file of type 'Text' which shall be included in the report

**Topic ReportHeader**

Parameter: 01: test report header, <none>: ID

Default value: "<none>"

Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID

Default value: "<none>"

Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used

Parameter: 03: 1st header line

Default value: "TEST"

Function: a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 04: 2nd header line

Default value: "Electric Field Strength"

Function: a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 05: EuT name

Default value: "EuT"

Function: a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer

Default value: ""

Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions

Default value: ""

Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site

Default value: ""

Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed

Parameter: 09: operator

Default value: ""

Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification

Default value: ""

Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line

Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

### Topic Mast

Parameter: 01: use auto positioning  
 Default value: checked  
 Function: if checked then automatic control of the antenna mast will be used

Parameter: 02: symbolic name of autom. moved mast  
 Default value: "MAST"  
 Function: symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu

Parameter: 03: azimuth offset [deg] of mast  
 Default value: 0  
 Function: if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a **value for the azimuth correction** can be used

Parameter: 04: symbolic name of optional 2nd automatic mast  
 Default value: "MAST2"  
 Function: symbolic device name of the optional 2nd automatically controlled antenna mast as defined in the device configuration menu; to make the script run with two masts, an appropriate stop message has to be defined for each subrange in the scan/sweep tables used for the preview or final test;  
 example:  
 1st mast "1 " or "1 xxxxx" (string has to start with a  
 2nd mast "2 " or "2 xxxxx" digit followed by a blank)  
 for a full automatic test (without manual interaction) an additional relay matrix (RSU) would have to be used for switching between antennas (the corresponding signal paths would have to be selected in the scan/sweep tables)

Parameter: 05: azimuth offset [deg] of optional 2nd mast  
 Default value: 0  
 Function: if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a **value for the azimuth correction** can be used

Parameter: 06: control priority level (1=highest)  
 Default value: 1  
 Function: defines the priority level of the controlling of the antenna height (in combination with the antenna polarization) in the preview test: a value of 1 means highest priority (after the turntable) , 2 means lowest priority

Parameter: 07: min. height [cm] to be measured for preview  
 Default value: 100  
 Function: defines the minimum height to be used in the preview test

Parameter: 08: max. height [cm] to be measured for preview

Default value:	300
Function:	defines the maximum height to be used in the preview test
Parameter:	09: height stepsize [cm] for preview
Default value:	200
Function:	defines the stepsize for height variation in the preview test
Parameter:	10: min. height [cm] to be measured for adjustment
Default value:	100
Function:	defines the minimum height to be used for the adjustment measurements
Parameter:	11: max. height [cm] to be measured for adjustment
Default value:	400
Function:	defines the maximum height to be used for the adjustment measurements
Parameter:	12: height range [cm] for adjustment
Default value:	50
Function:	defines the height range for the adjustment measurements; normally the value corresponds to the height stepsize for the preview test (parameter 09)
Parameter:	13: speed value for faster movements
Default value:	4
Function:	determines the speed of the automatically moved mast for the relatively fast movements for absolute positioning
Parameter:	14: speed value for slower movements
Default value:	2
Function:	determines the speed of the mast for the relatively slow movements for the "adjustment" in the final test (some 1 or 2 measurements per sec. only !)

**Topic****Turntable**

Parameter:	01: use auto positioning
Default value:	checked
Function:	if checked then automatic control of the turntable will be used
Parameter:	02: symbolic name of autom. moved turntable
Default value:	"TURNTABLE"
Function:	symbolic device name of the automatically controlled turntable as defined in the device configuration menu
Parameter:	03: min. azimuth [deg] to be measured for preview
Default value:	90
Function:	defines the minimum azimuth to be used in the preview test
Parameter:	04: max. azimuth [deg] to be measured for preview
Default value:	270
Function:	defines the maximum azimuth to be used in the preview test
Parameter:	05: bidirectional azimuth sweeps at each position
Default value:	not checked
Function:	if checked then at each position (made up of polarization and mast height) not one but two movements - each in another direction - will be done within the given azimuth limits
Parameter:	06: min. azimuth [deg] to be measured for final adjustment

Default value: 0  
 Function: defines the minimum azimuth to be used for the adjustment measurements

Parameter: 07: max. azimuth [deg] to be measured for final adjustment  
 Default value: 360  
 Function: defines the maximum azimuth to be used for the adjustment measurements

Parameter: 08: azimuth stepsize [deg] for finals  
 Default value: 45  
 Function: defines the azimuth range for the adjustment measurements; normally the value corresponds to the azimuth range being covered by one sweep in the preview test

Parameter: 09: fast speed value for absolute positioning  
 Default value: 4  
 Function: determines the speed of the automatically moved turntable for the relatively fast movements for absolute positioning

Parameter: 10: speed value for azimuth sweeps  
 Default value: 1  
 Function: determines the (typically slowest) speed of the turntable for the movements in the preview test when sweeps will be simultaneously be performed

Parameter: 11: slow speed value for adjustment  
 Default value: 2  
 Function: determines the speed of the turntable for the relatively slow movements for the "adjustment" in the final test (some 1 or 2 measurements per sec. only !)

**Topic Polarization**

Parameter: 01: use auto switching only  
 Default value: checked  
 Function: if checked then automatic control of the antenna polarization will be used

Parameter: 02: symbolic name of autom. controlled polariz.  
 Default value: "MAST"  
 Function: symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu

Parameter: 03: symbolic name of optional 2nd autom. polariz.  
 Default value: "<none>"  
 Function: symbolic device name of an optional 2nd automatically controlled antenna polarization as defined in the device configuration menu (see also **Topic Mast**)

Parameter: 04: control priority level (1=highest)  
 Default value: 2  
 Function: defines the priority level of the controlling of the antenna polarization (in combination with the antenna height) in the preview test: a value of 1 means highest priority (after the turntable), 2 means lowest priority

Parameter: 05: delay time [sec] for auto switching  
 Default value: 4  
 Function: defines a waiting time with automatic switching of the antenna polarization; the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)

Parameter: 06: preview measurements with horizontal polariz.  
Default value: not checked  
Function: if checked then the preview measurements will (also) be done with horizontal polarization

Parameter: 07: preview measurements with vertical polariz.  
Default value: not checked  
Function: if checked then the preview measurements will (also) be done with vertical polarization

## 3.12 Magnetic Field Strength Test

### 3.12.1 Description

This test provides automatic measurement of magnetic interference, optionally with automatic control of a triple loop antenna like the R&S HM020.

Besides, an automatic turntable can be controlled to turn the EuT.

An **open area test site** (OATS) is normally not suitable for automatic preview tests because of the many ambient disturbances but the software can help: An optional frequency list with ambients can be used to cut out for each frequency a range one IF bandwidth wide that won't be further analyzed; of course this method has its problems if one or more frequencies of ambient interference are identical to those critical ones of the EuT; in this case the operator has to find out (e.g. through switching the EuT off and on if possible or by looking at the signal with a smaller IF bandwidth) whether the field strength generated by the EuT is above the limit, but sometimes this can be impossible, when the ambient disturbance exceeds the limit.

### 3.12.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### **VDE0875/211**

Frequency Range:	0.009 - 30 MHz
Detector:	QP
Test Samples:	ISM

### 3.12.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "mfield_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 0.09 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 30 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"



Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic****Preview**

Parameter: 01: preview result file, <none>: ID + '\_pre'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used

Parameter: 02: 2nd preview result file, <none>: ID + '\_pre2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the preview test; if no filename is specified then a default name will be used

Parameter: 03: scan table for preview  
 Default value: "<none>"  
 Function: filename of the scan range table to be used for the preview test

Parameter: 04: sweep table for preview  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the preview test

Parameter: 05: complete search (all accessory settings)  
 Default value: not checked  
 Function: if checked sweeps/scans will be done **on all settings** as specified with the turntable parameters for the preview test (recommended for preview tests with sweeps, e.g. with an EMI analyzer); else only sweeps/scans will be done **with one fixed setting** as specified with turntable parameters for the preview test (recommended for preview tests with scans, e.g. with an EMI test receiver)

Parameter: 06: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

**Topic****DataReduction**

Parameter: 01: also perform interactive frequency selection  
 Default value: not checked  
 Function: if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test; to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog

Parameter: 02: 1st limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to the limit line assigned to the 1<sup>st</sup> detector (e.g. QUASPEAK)

Parameter: 03: 2nd limit line

Default value:	"<none>"
Function:	a filename that corresponds to the limit line assigned to the 2 <sup>nd</sup> detector (e.g. AVERAGE)
Parameter:	04: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	05: decision threshold [dB] for peak reduction
Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	06: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	07: freq. list of ambients to be cut out from preview
Default value:	"<none>"
Function:	optional name of a frequency list (ambient interference) with frequencies to be "cut out" from measurement results (preview test: scans/sweeps, final test: partial scans), each "cut" with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used; to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter:	08: cutting width for sweeps (ambients): no. of IF-BWs
Default value:	10
Function:	with sweeps the width of a "cut" range (see previous parameter) has to be larger because of the lower frequency resolution of the results; therefore this factor (=number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results
Parameter:	09: merge all points from both detectors into same list
Default value:	not checked
Function:	if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test

**Topic****Final**

Parameter:	01: final result file, <none>: ID + '_fin'
Default value:	"<none>"
Function:	optional filename for the results (1 <sup>st</sup> detector, e.g. QUASIPeAK) from the final measurements; if no filename is specified then a default name will be used
Parameter:	02: 2nd final result file, <none>: ID + '_fin2'
Default value:	"<none>"
Function:	optional filename for the results (2 <sup>nd</sup> detector, e.g. AVERAGE) from the final measurements; if no filename is specified then a default name will be used
Parameter:	03: scan table for partial scans + maximization

Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for maximization measurements as well as for partial scans
Parameter:	04: perform partial scans
Default value:	not checked
Function:	if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter:	05: max. no. of results kept from partial scans
Default value:	2
Function:	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)
Parameter:	06: partial scan width: no. of IF-BWs (0=use ratio)
Default value:	0
Function:	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter:	07: partial scan width: ref. frequ. ratio
Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	08: complete search
Default value:	checked
Function:	determines the search mode for the preview test: complete search means that measurements will be done on all loop antenna and turntable settings as specified with loop antenna parameters for the final test (recommended when the preview test has been performed with a fixed setting of the loop antenna); else: measurements will be done on those loop antenna and turntable settings that were determined through a "complete search" in the preview test
Parameter:	09: perform accessory adjustment
Default value:	checked
Function:	if checked then an additional search (in a small range) for the (local) maximum level will be performed with the turntable; this is recommended, if the preview test was performed with only one or a small number of positions of the turntable
Parameter:	10: adjustment full range
Default value:	not checked
Function:	if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range (mast and turntable)
Parameter:	11: scan table for final measurements
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements

Parameter: 12: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Parameter: 13: optional input: preview result file  
 Default value: "<none>"  
 Function: if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or for PK+AV) or optionally two (e.g. 1<sup>st</sup> for PK, 2<sup>nd</sup> for AV) input files

Parameter: 14: optional input: preview result file (2nd det.)  
 Default value: "<none>"  
 Function: see previous parameter

Parameter: 15: optional input: frequency list  
 Default value: "<none>"  
 Function: if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or for QP+AV) or optionally two (e.g. 1<sup>st</sup> for QP, 2<sup>nd</sup> for AV) input files

Parameter: 16: optional input: frequency list (2nd det.)  
 Default value: "<none>"  
 Function: see previous parameter

Parameter: 17: optional input: final result file  
 Default value: "<none>"  
 Function: if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or for QP+AV) or optionally two (e.g. 1<sup>st</sup> for QP, 2<sup>nd</sup> for AV) input files

Parameter: 18: optional input: final result file (2nd det.)  
 Default value: "<none>"  
 Function: see previous parameter

## Topic Graphics

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional graphics template (new graph only)  
 Default value: "<none>"  
 Function: optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter: 03: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very

long scan curves

<b>Topic</b>	<b>Report</b>
Parameter:	01: generate printer hardcopy
Default value:	checked
Function:	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter:	02: generate RTF file
Default value:	not checked
Function:	if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter:	03: RTF file: 'X:\<path>\<name8.3>', empty: dialog
Default value:	"c:\xxx.rtf"
Function:	path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter:	04: report config. for printing, <none>: ID + '_prnt'
Default value:	"<none>"
Function:	optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used
Parameter:	05: footnote, empty field: ID
Default value:	""
Function:	optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used
Parameter:	06: optional text file to be included
Default value:	"<none>"
Function:	filename of an optional file of type 'Text' which shall be included in the report

<b>Topic</b>	<b>ReportHeader</b>
Parameter:	01: test report header, <none>: ID
Default value:	"<none>"
Function:	optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"Magn. Field Strength Test"
Function:	a string that will be taken as the second header line; if no string is given then the

referring entry of the report header won't be changed

Parameter: 05: EuT name  
 Default value: "EuT"  
 Function: a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer  
 Default value: ""  
 Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed

Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""  
 Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

### **Topic LoopAntenna**

Parameter: 01: use manual switching only  
 Default value: checked  
 Function: if checked then manual control of the loop antenna through dialogue boxes will be used

Parameter: 02: use auto switching only  
 Default value: not checked  
 Function: if checked then automatic control of the triple loop antenna will be used

Parameter: 03: symbolic name of autom. switched triple loop  
 Default value: "HM020"  
 Function: symbolic device name of the automatically controlled triple loop antenna as

defined in the device configuration menu; the device properties must match with the controlling device (e.g. IEEE command strings for an EMI test receiver)

Parameter: 04: preview measurements on loop X  
 Default value: checked  
 Function: if checked then the preview measurements will (also) be done with the antenna loop "X"

Parameter: 05: preview measurements on loop Y  
 Default value: checked  
 Function: if checked then the preview measurements will (also) be done with the antenna loop "Y"

Parameter: 06: preview measurements on loop Z  
 Default value: checked  
 Function: if checked then the preview measurements will (also) be done with the antenna loop "Z"

Parameter: 07: final measurements on loop X  
 Default value: checked  
 Function: if checked then the final measurements will (also) be done with the antenna loop "X"

Parameter: 08: final measurements on loop Y  
 Default value: checked  
 Function: if checked then the final measurements will (also) be done with the antenna loop "Y"

Parameter: 09: final measurements on loop Z  
 Default value: checked  
 Function: if checked then the final measurements will (also) be done with the antenna loop "Z"

**Topic Turntable**

Parameter: 01: use manual positioning only  
 Default value: checked  
 Function: if checked then manual control of the turntable through dialogue boxes will be used

Parameter: 02: use auto positioning only  
 Default value: not checked  
 Function: if checked then automatic control of the turntable will be used

Parameter: 03: symbolic name of autom. moved turntable  
 Default value: "TURNTABLE"  
 Function: symbolic device name of the automatically controlled turntable as defined in the device configuration menu

Parameter: 04: min. azimuth [deg] to be measured for preview  
 Default value: 90  
 Function: depending on the mode of the preview test:  
 complete preview search: minimum azimuth to be used for measurements  
 else: value will be ignored

Parameter: 05: fixed/max. azimuth [deg] to be measured for preview

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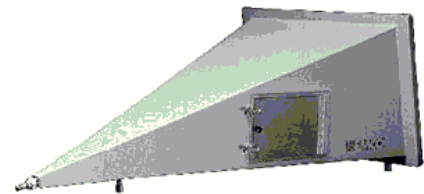
Default value:	270
Function:	depending on the mode of the preview test: complete preview search: determines the maximum azimuth to be used for measurements else: fixed azimuth to be used for measurements
Parameter:	06: azimuth stepsize [deg] for preview
Default value:	180
Function:	stepsize for azimuth variation in the preview test; normally two positions in all is sufficient (for finding all suspect frequencies), if the final test includes a complete search; this stepsize will be used in the final test as the azimuth range for an optional "adjustment", if the final test is done without complete search
Parameter:	07: min. azimuth [deg] to be measured for finals
Default value:	0
Function:	depending on the mode of the final test: complete final search: determines the minimum azimuth of the turntable to be used for measurements in the final test else: preview data will be used
Parameter:	08: max. azimuth [deg] to be measured for finals
Default value:	360
Function:	depending on the mode of the final test: complete final search: determines the azimuth of the turntable to be used for measurements in the final test else: preview data will be used
Parameter:	09: azimuth stepsize [deg] for finals
Default value:	45
Function:	stepsize for azimuth variation in the final test; this stepsize will also be used as the azimuth range for an optional "adjustment", if the final test is done with a complete search
Parameter:	10: speed value for slower movements
Default value:	2
Function:	determines the speed of the turntable for the relatively slow movements for the "adjustment" in the final test (some 1 or 2 measurements per sec. only !)
Parameter:	11: speed value for faster movements
Default value:	4
Function:	determines the speed of the automatically moved turntable for the relatively fast movements for absolute positioning



## 3.13 GTEM Test

### 3.13.1 Description

This test provides automatic measurement of radiated electromagnetic interference with an **GTEM** measurement cell. The test starts with a preview test on three orientations of the EuT and does a data reduction. In the final test (again on three orientations) optionally partial scans can be performed; at all critical points simple single measurements - based on a scan table - will be done.



The measurement results will always be correlated to OATS results and be displayed in a separate diagram. If a field strength limit is selected, then the correlated final results will be evaluated against this limit, too.

For measurements optionally a "manipulator" for positioning the EuT can be used. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver 'USER\_IEC' can be added to the device list; the assigned to this driver could be e.g. "MANIPULATOR" or the model name of the device (e.g. "BOSS"). The settings should first be checked with the corresponding interactive dialog ("Set Device...").

In the script parameters of **Topic "Manipulator"** the device has to be selected and the appropriate GPIB commands have to be entered.

### 3.13.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### EN 55022

Frequency Range:	30 - 1000 MHz
Detector:	Pk
Test Samples:	(small and without preferred orientation)

### 3.13.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "gtem_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic****Preview**

Parameter: 01: GTEM X preview result, <none>: ID + '\_pre X'

Default value: "<none>"

Function: optional filename for the results from the preview test, gained with the EuT oriented to axis 'X'; if no filename is specified then a default name will be used

Parameter: 02: GTEM Y preview result, <none>: ID + '\_pre Y'

Default value: "<none>"

Function: optional filename for the results from the preview test, gained with the EuT oriented to axis 'Y'; if no filename is specified then a default name will be used

Parameter: 03: GTEM Z preview result, <none>: ID + '\_pre Z'

Default value: "<none>"

Function: optional filename for the results from the preview test, gained with the EuT oriented to axis 'Z'; if no filename is specified then a default name will be used

Parameter: 04: OATS H preview result, <none>: ID + '\_pre H'

Default value: "<none>"

Function: optional filename for the **correlated field strength results** (horizontal polarization) from the preview test; if no filename is specified then a default name will be used

Parameter: 05: OATS V preview result, <none>: ID + '\_pre V'

Default value: "<none>"

Function: optional filename for the **correlated field strength results** (vertical polarization) from the preview test; if no filename is specified then a default name will be used

Parameter: 06: scan table for preview

Default value: "<none>"

Function: filename of the scan range table to be used for the preview test

Parameter: 07: sweep table for preview

Default value: "<none>"

Function: filename of the sweep range table to be used for the preview test

Parameter: 08: insert results into existing result file

Default value: not checked

Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten;  
else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

**Topic****DataReduction**

Parameter: 01: also perform interactive frequency selection

Default value: not checked

Function: if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test;. to do so you have to position the marker accordingly and select "Remove"

or "Test" in a dialog

Parameter: 02: limit line  
 Default value: "<none>"  
 Function: a filename of the field strength limit line (for OATS) which shall be used for the evaluation of the correlated final measurements; if no limit line is selected, then no evaluation will be done

Parameter: 03: max. no. of results kept per test range  
 Default value: 6  
 Function: the maximum number of results that will be kept from each test range through data reduction

Parameter: 04: decision threshold [dB] for peak reduction  
 Default value: 6.0  
 Function: determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through

## Topic Final

Parameter: 01: GTEM X final result, <none>: ID + '\_fin X'  
 Default value: "<none>"  
 Function: optional filename for the results from the final test, gained with the EuT oriented to axis 'X'; if no filename is specified then a default name will be used

Parameter: 02: GTEM Y final result, <none>: ID + '\_fin Y'  
 Default value: "<none>"  
 Function: optional filename for the results from the final test, gained with the EuT oriented to axis 'Y'; if no filename is specified then a default name will be used

Parameter: 03: GTEM Z final result, <none>: ID + '\_fin Z'  
 Default value: "<none>"  
 Function: optional filename for the results from the final test, gained with the EuT oriented to axis 'Z'; if no filename is specified then a default name will be used

Parameter: 04: OATS H final result, <none>: ID + '\_pre H'  
 Default value: "<none>"  
 Function: optional filename for the **correlated field strength results** (horizontal polarization) from the final test; if no filename is specified then a default name will be used

Parameter: 05: OATS V final result, <none>: ID + '\_pre V'  
 Default value: "<none>"  
 Function: optional filename for the **correlated field strength results** (vertical polarization) from the final test; if no filename is specified then a default name will be used

Parameter: 06: perform partial scans  
 Default value: not checked  
 Function: if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)

Parameter:	07: max. no. of results kept from partial scans
Default value:	2
Function:	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)
Parameter:	08: partial scan width: no. of IF-BWs (0=use ratio)
Default value:	0
Function:	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter:	09: partial scan width: ref. frequ. ratio
Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	10: scan table for partial scans
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for partial scans
Parameter:	11: scan table for final measurements
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the single measurements
Parameter:	12: opt. scan table for final meas. >1GHz
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter:	13: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	14: optional input: frequency list
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test

**Topic****Graphics**

Parameter:	01: GTEM graphics configuration, <none>: ID + ' CELL'
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test to display the results from the GTEM cell; if no filename is specified then a default name will be used
Parameter:	02: OATS graphics configuration, <none>: ID + ' OATS'

Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test to display the results correlated for the OATS; if no filename is specified then a default name will be used

Parameter: 03: optional graphics template (new graph only)  
 Default value: "<none>"  
 Function: optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

**Topic****Report**

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

**Topic****ReportHeader**

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID  
 Default value: "<none>"  
 Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be

used

Parameter: 03: 1st header line  
 Default value: "TEST"  
 Function: a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 04: 2nd header line  
 Default value: "GTEM Test"  
 Function: a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 05: EuT name  
 Default value: "EuT"  
 Function: a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer  
 Default value: ""  
 Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed

Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""  
 Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic GTEM**

Parameter: 01: GTEM parameter 'a' (cell size) [m]  
 Default value: 0.5

Function:	defines the GTEM cell parameter 'a' (see chapter 2.9) which represents the size of the cell
Parameter:	02: GTEM parameter 'b' (septum height) [m]
Default value:	1.0
Function:	defines the GTEM cell parameter 'b' (see chapter 2.9) which represents the height of the septum
Parameter:	03: GTEM parameter 'g' (septum gap) [m]
Default value:	0.36
Function:	defines the GTEM cell parameter 'g' (see chapter 2.9) which represents the gap besides the septum
Parameter:	04: GTEM parameter 'x' (EuT position) [m]
Default value:	0.0
Function:	defines the GTEM cell parameter 'x' (see chapter 2.9) which represents the horizontal position of the EuT
Parameter:	05: GTEM parameter 'y' (EuT position) [m]
Default value:	0.5
Function:	defines the GTEM cell parameter 'y' (see chapter 2.9) which represents the vertical position of the EuT
Parameter:	06: GTEM parameter 'Z' (impedance) [Ohm]
Default value:	50
Function:	defines the GTEM cell parameter 'Z' (see chapter 2.9) which represents the impedance of the cell
Parameter:	07: OATS parameter 'd' (distance) [m]
Default value:	10
Function:	defines the OATS parameter 'd' (see chapter 2.9) which represents the measurement distance
Parameter:	08: OATS parameter 'e' (EuT height) [m]
Default value:	0.5
Function:	defines the OATS parameter 'e' (see chapter 2.9) which represents the vertical position of the EuT
Parameter:	09: OATS parameter 'hmin' (antenna height) [m]
Default value:	1.0
Function:	defines the OATS parameter 'h <sub>min</sub> ' (see chapter 2.9) which represents the minimum antenna height
Parameter:	10: OATS parameter 'hmax' (antenna height) [m]
Default value:	4.0
Function:	defines the OATS parameter 'h <sub>max</sub> ' (see chapter 2.9) which represents the maximum antenna height
Parameter:	11: OATS parameter 'height step size' [m]
Default value:	0.5
Function:	defines the OATS parameter 'height step size' (see chapter 2.9) which represents the virtual step size of the antenna height positions
Parameter:	12: OATS parameter 'fully absorbing ground plane'
Default value:	not checked
Function:	if checked then a fully absorbing ground plane is assumed, else a metal ground



plane (see chapter 2.9)

**Topic****Manipulator**

Parameter:	01: external manipulator device
Default value:	"<none>"
Function:	symbolic name of the device for controlling of a GTEM EuT manipulator as defined in the device configuration
Parameter:	02: GPIB initialization command
Default value:	" *RST;PLD;RTL "
Function:	GPIB command for the initialization of the manipulator
Parameter:	03: GPIB command for position 'X'
Default value:	"P4"
Function:	GPIB command make the manipulator move the EuT to the X position
Parameter:	04: GPIB command for position 'Y'
Default value:	"P5"
Function:	GPIB command make the manipulator move the EuT to the Z position
Parameter:	05: GPIB command for position 'Z'
Default value:	"P6"
Function:	GPIB command make the manipulator move the EuT to the Z position
Parameter:	06: waiting time in [s] for positioning
Default value:	10
Function:	defines a waiting time positioning of the EuT; the delay time depends on the mechanical system and maybe also on the weight of the EuT

## 3.14 S-LINE Test

### 3.14.1 Description

This test provides automatic measurement of radiated electromagnetic interference with an **S-LINE** measurement cell. The test starts with a preview test on three orientations of the EuT and does a data reduction. In the final test (again on three orientations) optionally partial scans can be performed; at all critical points simple single measurements - based on a scan table - will be done.

The measurement results will always be correlated to OATS results and be displayed in a separate diagram. If a field strength limit is selected, then the correlated final results will be evaluated against this limit, too.



### 3.14.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

**EN 55022**

Frequency Range:

30 - 1000 MHz

Detector:

Pk

Test Samples:

(small and without preferred orientation)

### 3.14.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "s-line_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 1000 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic****Preview**

Parameter: 01: S-LINE X preview result, <none>: ID + '\_pre X'

Default value: "<none>"

Function: optional filename for the results from the preview test, gained with the EuT oriented to axis 'X'; if no filename is specified then a default name will be used

Parameter: 02: S-LINE Y preview result, <none>: ID + '\_pre Y'

Default value: "<none>"

Function: optional filename for the results from the preview test, gained with the EuT oriented to axis 'Y'; if no filename is specified then a default name will be used

Parameter: 03: S-LINE Z preview result, <none>: ID + '\_pre Z'

Default value: "<none>"

Function: optional filename for the results from the preview test, gained with the EuT oriented to axis 'Z'; if no filename is specified then a default name will be used

Parameter: 04: OATS E preview result, <none>: ID + '\_pre E'

Default value: "<none>"

Function: optional filename for the correlated field strength results from the preview test; if no filename is specified then a default name will be used

Parameter: 05: scan table for preview

Default value: "<none>"

Function: filename of the scan range table to be used for the preview test

Parameter: 06: sweep table for preview

Default value: "<none>"

Function: filename of the sweep range table to be used for the preview test

Parameter: 07: insert results into existing result file

Default value: not checked

Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten;  
else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

**Topic****DataReduction**

Parameter: 01: also perform interactive frequency selection

Default value: not checked

Function: if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test;. to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog

Parameter: 02: limit line

Default value: "<none>"

Function: a filename of the field strength limit line (for OATS) which shall be used for the evaluation of the correlated final measurements; if no limit line is selected, then no evaluation will be done

Parameter: 03: max. no. of results kept per test range  
 Default value: 6  
 Function: the maximum number of results that will be kept from each test range through data reduction

Parameter: 04: decision threshold [dB] for peak reduction  
 Default value: 6.0  
 Function: determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through

### Topic Final

Parameter: 01: S-LINE X final result, <none>: ID + '\_fin X'  
 Default value: "<none>"  
 Function: optional filename for the results from the final test, gained with the EuT oriented to axis 'X'; if no filename is specified then a default name will be used

Parameter: 02: S-LINE Y final result, <none>: ID + '\_fin Y'  
 Default value: "<none>"  
 Function: optional filename for the results from the final test, gained with the EuT oriented to axis 'Y'; if no filename is specified then a default name will be used

Parameter: 03: S-LINE Z final result, <none>: ID + '\_fin Z'  
 Default value: "<none>"  
 Function: optional filename for the results from the final test, gained with the EuT oriented to axis 'Z'; if no filename is specified then a default name will be used

Parameter: 04: OATS E final result, <none>: ID + '\_fin E'  
 Default value: "<none>"  
 Function: optional filename for the correlated field strength results from the final test; if no filename is specified then a default name will be used

Parameter: 05: perform partial scans  
 Default value: not checked  
 Function: if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)

Parameter: 06: max. no. of results kept from partial scans  
 Default value: 2  
 Function: when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)

Parameter: 07: partial scan width: no. of IF-BWs (0=use ratio)  
 Default value: 0  
 Function: determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter

Parameter: 08: partial scan width: ref. frequ. ratio

Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	09: scan table for partial scans
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for partial scans
Parameter:	10: scan table for final measurements
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the single measurements
Parameter:	11: opt. scan table for final meas. >1GHz
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter:	12: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged
Parameter:	13: optional input: frequency list
Default value:	"<none>"
Function:	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test

**Topic****Graphics**

Parameter:	01: S-LINE graphics configuration, <none>: ID + '_CELL'
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test to display the results from the S-LINE cell; if no filename is specified then a default name will be used
Parameter:	02: OATS graphics configuration, <none>: ID + '_OATS'
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test to display the results correlated for the OATS; if no filename is specified then a default name will be used
Parameter:	03: optional graphics template (new graph only)
Default value:	"<none>"
Function:	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

**Topic****Report**

Parameter:	01: generate printer hardcopy
Default value:	checked
Function:	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter:	02: generate RTF file
Default value:	not checked
Function:	if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter:	03: RTF file: 'X:\<path>\<name8.3>', empty: dialog
Default value:	"c:\xxx.rtf"
Function:	path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter:	04: report config. for printing, <none>: ID + '_prnt'
Default value:	"<none>"
Function:	optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used
Parameter:	05: footnote, empty field: ID
Default value:	""
Function:	optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used
Parameter:	06: optional text file to be included
Default value:	"<none>"
Function:	filename of an optional file of type 'Text' which shall be included in the report

**Topic****ReportHeader**

Parameter:	01: test report header, <none>: ID
Default value:	"<none>"
Function:	optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"S-LINE Test"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"

Function: a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer  
 Default value: ""  
 Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed

Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""  
 Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic SLINE**

Parameter: 01: S-LINE type is 700  
 Default value: checked  
 Function: if checked then a cell of the type S-LINE 700 will be assumed

Parameter: 02: S-LINE type is 1000  
 Default value: not checked  
 Function: if checked then a cell of the type S-LINE 1000 will be assumed

Parameter: 03: S-LINE type is 1500  
 Default value: not checked  
 Function: if checked then a cell of the type S-LINE 1500 will be assumed

Parameter: 04: S-LINE correction factor (C1)  
 Default value: "<none>"  
 Function: selection of the appropriate correction table (a system transducer) which corresponds to the term 'C1' of the S-LINE correlation algorithm (for the S-LINE



type)

Parameter: 05: OATS correction factor (C2)  
Default value: "<none>"  
Function: selection of the appropriate correction table (a system transducer) which corresponds to the term 'C2' of the S-LINE correlation algorithm (for the OATS setup like e.g. the measurement distance)

## 3.15 Automotive Test

### 3.15.1 Description

This test provides measurement of conducted and radiated electromagnetic interference according to the automotive standard CISPR 25 (EN55025).

This standard defines limits for narrowband (NB) and broadband (BB) interference.

The NB/BB discrimination is done through a comparison of the PEAK and AVERAGE levels. This requires a sufficiently low noise floor to avoid that NB interferers will be interpreted as BB interferers.

For radiated emissions the script supports measurements with horizontal and vertical antenna polarization (optionally with automatic switching).

The preview test will be done with the PEAK detector.

If the preview test is done with PEAK+AVERAGE, then the 2<sup>nd</sup> detector is informative only.

Those points critical referring to the NB limit will be evaluated with PEAK and AVERAGE, the BB interferers optionally with QUASIPEAK. The NB/BB discrimination is realized through a simple calculation of the difference (variable threshold) between PEAK and AVERAGE levels.

### 3.15.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### **CISPR 25 (EN 55025) conducted**

Frequency Range: 0.15 - 108 MHz  
Detector: Pk (AV) / QP

#### **CISPR 25 (EN 55025) radiated**

Frequency Range: 0.15 - 960 MHz  
Detector: Pk (AV) / QP

### 3.15.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "auto_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 300 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter: Default value: Function:	06: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 08</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	07: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	08: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value:	09: test configuration, <none>: ID "<none>"

Function: optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic****Preview**

Parameter: 01: preview result file, <none>: ID + '\_pre'  
 Default value: "<none>"  
 Function: optional filename for the results (1<sup>st</sup> detector, e.g. PEAK) from the preview test; if no filename is specified then a default name will be used

Parameter: 02: 2<sup>nd</sup> preview result file, <none>: ID + '\_pre2'  
 Default value: "<none>"  
 Function: optional filename for the results (2<sup>nd</sup> detector, e.g. AVERAGE) from the preview test; if no filename is specified then a default name will be used

Parameter: 03: scan table for preview  
 Default value: "<none>"  
 Function: filename of the scan range table to be used for the preview test

Parameter: 04: optional 2nd scan table for preview (vertical)  
 Default value: "<none>"  
 Function: filename of a second scan range table for the preview test which to be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only

Parameter: 05: sweep table for preview  
 Default value: "<none>"  
 Function: filename of the sweep range table to be used for the preview test

Parameter: 06: optional 2nd sweep table for preview (vertical)  
 Default value: "<none>"  
 Function: filename of a second sweep range table for the preview test which will be used only when measurements are done with vertical polarization; if used then the first sweep range table will be used with horizontal polarization only

Parameter: 07: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten;  
 else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

**Topic****DataReduction**

Parameter: 01: also perform interactive frequency selection  
 Default value: not checked  
 Function: if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test;. to do so you have to position the marker accordingly and select "Remove" or "Test" in a dialog

Parameter: 02: NB limit line  
 Default value: "<none>"  
 Function: a filename that corresponds to the NB limit line

Parameter: 03: optional NB acceptance line (no offset)  
 Default value: "<none>"  
 Function: a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction; if used then the given value for the acceptance offset will be ignored

Parameter: 04: BB limit line (PK)  
 Default value: "<none>"  
 Function: a filename that corresponds to the BB limit for PEAK measurements

Parameter: 05: optional BB limit line (QP)  
 Default value: "<none>"  
 Function: a filename that corresponds to the optional BB limit for QUASIPEAK measurements

Parameter: 04: max. no. of results kept per test range  
 Default value: 6  
 Function: the maximum number of results that will be kept from each test range through data reduction

Parameter: 05: decision threshold [dB] for peak reduction  
 Default value: 6.0  
 Function: determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through

Parameter: 06: level offset [dB] for acceptance analysis  
 Default value: -10.0  
 Function: determines the level offset when data reduction is done with the "Acceptance Analysis"

## Topic Final

Parameter: 01: final NB result file, <none>: ID + '\_fin NB'  
 Default value: "<none>"  
 Function: optional filename for the NB results from the final measurements; if no filename is specified then a default name will be used

Parameter: 02: final BB result file, <none>: ID + '\_fin BB'  
 Default value: "<none>"  
 Function: optional filename for the BB results from the final measurements; if no filename is specified then a default name will be used

Parameter: 03: scan table for partial scans + maximization  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for maximization measurements as well as for partial scans

Parameter: 04: optional 2nd scan table (vertical)  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for maximization measurements as well as for partial scans; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only

Parameter:	05: perform partial scans
Default value:	not checked
Function:	if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter:	06: max. no. of results kept from partial scans
Default value:	2
Function:	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)
Parameter:	07: partial scan width: no. of IF-BWs (0=use ratio)
Default value:	0
Function:	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter:	08: partial scan width: ref. frequ. ratio
Default value:	0.01
Function:	determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter:	09: complete search on selected polarisations
Default value:	checked
Function:	determines the search mode for the preview test: complete search means that measurements will be done on all polarization settings as specified with the polarization parameters for the final test; else: measurements will be done on those clamp settings that were determined through the preview test
Parameter:	10: scan table for final measurements
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements
Parameter:	11: optional 2nd scan table (vertical)
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for the final measurements; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only
Parameter:	12: decision threshold [dB] for NB/BB discrimination
Default value:	6
Function:	determines the decision level threshold for the selected NB/BB discrimination; the standard requires a value of 6.0 dB
Parameter:	13: opt. scan table for final QP measurements
Default value:	"<none>"
Function:	optional filename of the corresponding <b>scan range table</b> to be used for the final QP measurements

Parameter: 14: optional 2<sup>nd</sup> scan table (vertical)  
 Default value: "<none>"  
 Function: optional filename of the corresponding **scan range table** to be used for the final QP measurements; it will be used only when measurements are done with vertical polarization; if used then the first scan range table will be used with horizontal polarization only

Parameter: 15: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

## Topic Graphics

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional graphics template (new graph only)  
 Default value: "<none>"  
 Function: optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter: 03: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

## Topic Report

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'

Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

### **Topic ReportHeader**

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID  
 Default value: "<none>"  
 Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used

Parameter: 03: 1st header line  
 Default value: "TEST"  
 Function: a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 04: 2nd header line  
 Default value: "Automotive Test"  
 Function: a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 05: EuT name  
 Default value: "EuT"  
 Function: a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed

Parameter: 06: manufacturer  
 Default value: ""  
 Function: a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed

Parameter: 07: operating conditions  
 Default value: ""  
 Function: a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter: 08: test site  
 Default value: ""  
 Function: a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed



Parameter: 09: operator  
 Default value: ""  
 Function: a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed

Parameter: 10: test specification  
 Default value: ""  
 Function: a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed

Parameter: 11: comment line  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
 Default value: ""  
 Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic Polarization**

Parameter: 01: use manual switching only  
 Default value: checked  
 Function: if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter: 02: use auto switching only  
 Default value: not checked  
 Function: if checked then automatic control of the antenna polarization will be used

Parameter: 03: symbolic name of autom. controlled polariz.  
 Default value: "MAST"  
 Function: symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu

Parameter: 04: delay time [sec] for auto switching  
 Default value: 4  
 Function: defines a waiting time with automatic switching of the antenna polarization; the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)

Parameter: 05: measurements with horizontal polarization  
 Default value: not checked  
 Function: if checked then the all measurements will (also) be done with horizontal polarization

Parameter: 06: measurements with vertical polarization  
 Default value: checked  
 Function: if checked then the all measurements will (also) be done with vertical polarization

## 3.16 EMI STD Test

### 3.16.1 Description

This test provides automatic measurement of conducted and radiated electromagnetic interference according to those specifications that do not require a classification for narrowband (NB) and broadband (BB) signals ( e.g. MIL STD 461/462 D, DEF-STAN, etc.). The test starts with a preview test (sweep or scan with single detector) and does a data reduction. In the final test optionally partial scans can be performed; at all critical points simple single measurements - based on a scan table - will be done.

### 3.16.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### **MIL STD 461 D CE101**

Frequency Range: 0.03 - 10 kHz

Detector: Pk

Test Samples: Power Leads

#### **MIL STD 461 D CE102**

Frequency Range: 0.01 - 10 MHz

Detector: Pk

Test Samples: Power Leads

#### **MIL STD 461 D RE101**

Frequency Range: 0.03 - 100 kHz

Detector: Pk

Test Samples: Magnetic Field Emissions

#### **MIL STD 461 D RE102**

Frequency Range: 10 kHz - 18 GHz

Detector: Pk

Test Samples: Electric Field Emissions

### 3.16.3 List of the Script Parameters

Topic	Test
Parameter: Default value: Function:	01: ID max. 12 chars to be included in filenames "emi_0001" a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter: Default value: Function:	02: global start frequency [MHz] for the test 30e-6 no measurements will be done below this frequency
Parameter: Default value: Function:	03: global stop frequency [MHz] for the test 10e3 no measurements will be done above this frequency
Parameter: Default value: Function:	04: suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter: Default value: Function:	05: split frequency range into test ranges checked the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter: Default value: Function:	06: if splitting of frequency range: do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter: Default value: Function:	07: no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter: Default value: Function:	08: test configuration, <none>: ID "<none>" optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic**                      **Preview**

Parameter:	01: preview result file, <none>: ID + '_pre'
Default value:	"<none>"
Function:	optional filename for the (PEAK) results from the preview test; if no filename is specified then a default name will be used
Parameter:	02: scan table for preview
Default value:	"<none>"
Function:	filename of the scan range table to be used for the preview test
Parameter:	03: sweep table for preview
Default value:	"<none>"
Function:	filename of the sweep range table to be used for the preview test
Parameter:	04: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged

## Topic **DataReduction**

Parameter:	01: limit line
Default value:	"<none>"
Function:	a filename that corresponds to the required limit line
Parameter:	02: optional acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction; if used then the given value for the acceptance offset will be ignored
Parameter:	03: broadband correction (/MHz) of results
Default value:	not checked
Function:	if checked then an additional bandwidth correction will be done on the results which therefore will be displayed with the broadband unit (required by standard RTCA/DO-160); in that case the limit has to be defined with that level unit, too
Parameter:	03: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	04: decision threshold [dB] for peak reduction
Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	05: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"

Topic	Final
Parameter: Default value: Function:	01: final result file, <none>: ID + '_fin' "<none>" optional filename for the (PEAK) results from the final test; if no filename is specified then a default name will be used
Parameter: Default value: Function:	02: scan table for partial scans + single meas. "<none>" filename of the corresponding <b>scan range table</b> to be used for the final test, for partial scans as well as for single measurements
Parameter: Default value: Function:	03: perform partial scans not checked if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter: Default value: Function:	04: max. no. of results kept from partial scans 2 when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits the number of results from a partial scan (after data reduction)
Parameter: Default value: Function:	05: partial scan width: no. of IF-BWs (0=use ratio) 0 determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter: Default value: Function:	06: partial scan width: ref. frequ. ratio 0.01 determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0
Parameter: Default value: Function:	07: scan table for final measurements "<none>" filename of the corresponding <b>scan range table</b> to be used for the final measurements
Parameter: Default value: Function:	08: opt. scan table for final meas. >1GHz "<none>" filename of the corresponding <b>scan range table</b> to be used for the final measurements, but only for frequencies above 1 GHz; this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter: Default value: Function:	09: insert results into existing result file not checked if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified

frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

**Topic****Graphics**

Parameter: 01: graphics configuration, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional graphics template (new graph only)  
 Default value: "<none>"  
 Function: optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter: 03: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

**Topic****Report**

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

Topic	ReportHeader
Parameter: Default value: Function:	01: test report header, <none>: ID "<none>" optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter: Default value: Function:	02: optional test report header template, <none>: ID "<none>" optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter: Default value: Function:	03: 1st header line "TEST" a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	04: 2nd header line "EMI STD Test" a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	05: EuT name "EuT" a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	06: manufacturer "" a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	07: operating conditions "" a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	08: test site "" a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	09: operator "" a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	10: test specification "" a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter: Default value: Function:	11: comment line "" a string that will be taken as a comment line ; if no string is given then the

referring entry of the report header won't be changed

Parameter: 12: 2nd comment line (empty field: start time)  
Default value: ""  
Function: a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered



## 3.17 MIL STD 461/462 C Test

### 3.17.1 Description

This test provides automatic measurement of conducted and radiated electromagnetic interference according to the American MIL STD 461/462 C specifications. Some of the specifications require a classification for narrowband (NB) and broadband (BB) signals.

A NB/BB discrimination can be done only on scan results (from a preview scan or from partial scans in the final test); single measurements will not be performed.

To make use of the PK-AV method the selected scan table has to be defined with exactly these detectors (1st PK, 2nd AV).

The tuning methods require certain scan step sizes, depending on the defined IF bandwidth; for the points at the edge of the scan table's subranges there won't be any NB/BB results because the algorithm works within these subranges only.

The PK-AV method is the most reliable discrimination method but the scans require more time to perform (two detectors).

Above 1 GHz no discrimination will be done; for that frequency range the specifications don't have BB limits.

### 3.17.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### **MIL STD 461 C CE01**

Frequency Range:	0.03 - 15 kHz
Detector:	Pk (NB)
Test Samples:	Part 3 Equipment

#### **MIL STD 461 C CE03**

Frequency Range:	0.015 - 50 MHz
Detector:	Pk (NB), Pk/MHz (BB)
Test Samples:	Part 3 Equipment: Navy and Air Force

#### **MIL STD 461 C RE01**

Frequency Range:	0.03 - 50 kHz
Detector:	Pk (NB)
Test Samples:	Part 3 Equipment

#### **MIL STD 461 C RE02**

Frequency Range:	0.014 - 10000 MHz (NB), 0.014 - 1000 MHz (BB)
Detector:	Pk (NB), Pk/MHz (BB)
Test Samples:	Part 3 Equipment (Curve #1)

### 3.17.3 List of the Script Parameters

<b>Topic</b>	<b>Test</b>
Parameter:	01: ID max. 12 chars to be included in filenames
Default value:	"mil_0001"
Function:	a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter:	02: global start frequency [MHz] for the test
Default value:	30e-6
Function:	no measurements will be done below this frequency
Parameter:	03: global stop frequency [MHz] for the test
Default value:	10e3
Function:	no measurements will be done above this frequency
Parameter:	04: suppress queries as far as possible
Default value:	not checked
Function:	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter:	05: split frequency range into test ranges
Default value:	checked
Function:	the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter:	06: if splitting of frequency range: do with log. scale
Default value:	checked
Function:	if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter:	07: no. of test ranges for splitting of frequency range
Default value:	1
Function:	defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter:	08: test configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic**                      **Preview**

Parameter:	01: preview result file, <none>: ID + '_pre'
Default value:	"<none>"
Function:	optional filename for the PEAK results from the preview test; if no filename is specified then a default name will be used
Parameter:	02: 2nd preview result file, <none>: ID + '_pre2'
Default value:	"<none>"
Function:	optional filename for the AVERAGE results from the preview test; if no filename is specified then a default name will be used
Parameter:	03: scan table for preview
Default value:	"<none>"
Function:	filename of the scan range table to be used for the preview test
Parameter:	04: sweep table for preview
Default value:	"<none>"
Function:	filename of the sweep range table to be used for the preview test
Parameter:	05: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged

## Topic DataReduction

Parameter:	01: NB limit line
Default value:	"<none>"
Function:	a filename that corresponds to the required NB limit line
Parameter:	02: optional NB acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of NB results; if used then the given value for the acceptance offset will be ignored
Parameter:	03: BB limit line
Default value:	"<none>"
Function:	a filename that corresponds to the required BB limit line
Parameter:	04: optional BB acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of BB results; if used then the given value for the acceptance offset will be ignored
Parameter:	05: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	06: decision threshold [dB] for peak reduction

Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	07: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	08: 0/1/2/3: NB/BB discr.: none/tun1BW/tun2BW/PK-AV
Default value:	2
Function:	type of narrowband/broadband discrimination: no discrimination / tuning method +/- 1 IF bandwidth / tuning method +/- 2 IF bandwidths / PK/AV comparison method
Parameter:	09: decision threshold [dB] for NB/BB reduction
Default value:	6.0
Function:	determines the decision level threshold for the selected NB/BB discrimination; recommended values are 6 dB for the tuning methods and 12 dB for the PK-AV comparison method
Parameter:	10: max. no. of BB results kept per octave
Default value:	3
Function:	maximum number of BB results to be kept per octave from the final results

**Topic****Final**

Parameter:	01: final NB result file, default: ID + '_fin NB'
Default value:	"<none>"
Function:	optional filename for the NB results from the final test; if no filename is specified then a default name will be used
Parameter:	02: final BB result file, default: ID + '_fin BB'
Default value:	"<none>"
Function:	optional filename for the BB results from the final test; if no filename is specified then a default name will be used
Parameter:	03: scan table for partial scans
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for partial scans in the final test
Parameter:	04: perform partial scans
Default value:	not checked
Function:	if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter:	05: max. no. of results kept from partial scans
Default value:	2
Function:	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits

the number of results from a partial scan (after data reduction)

Parameter: 06: partial scan width: no. of IF-BWs (0=use ratio)  
 Default value: 0  
 Function: determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter

Parameter: 07: partial scan width: ref. frequ. ratio  
 Default value: 0.01  
 Function: determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0

Parameter: 08: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

## Topic Graphic

Parameter: 01: NB graphics configuration, default: ID + ' NB'  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used for the NB results; if no filename is specified then a default name will be used

Parameter: 02: BB graphics configuration, default: ID + ' BB'  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used for the BB results; if no filename is specified then a default name will be used

Parameter: 03: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

## Topic Report

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog

Default value:	"c:\xxx.rtf"
Function:	path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter:	04: report config. for printing, <none>: ID + '_prnt'
Default value:	"<none>"
Function:	optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used
Parameter:	05: footnote, empty field: ID
Default value:	""
Function:	optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used
Parameter:	06: optional text file to be included
Default value:	"<none>"
Function:	filename of an optional file of type 'Text' which shall be included in the report

**Topic****ReportHeader**

Parameter:	01: test report header, <none>: ID
Default value:	"<none>"
Function:	optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"MIL STD 461/462C Test"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed

Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

## **3.18 MIL STD D Limits**

### **3.18.1 Description**

In the U.S. norm 'MIL-STD 461/462 D' for conducted measurements, depending on the actual current on the leads, the level limit may be increased. With this auxiliary script it is very easy to derive a corresponding new limit line.



### 3.18.2 List of the Script Parameters

Topic	Conversion
Parameter: Default value: Function:	01: Name of the reference limit line "<none>" name of the limit line which shall be used as a reference
Parameter: Default value: Function:	02: Name of the new limit line "<none>" name of the new limit line which shall be calculated (parallel shift by the offset value)
Parameter: Default value: Function:	03: Current in Ampere 1.0 value of the lead current in Ampere
Parameter: Default value: Function:	04: Name of graphics configuration "<none>" name of the graphics configuration to be used
Parameter: Default value: Function:	05: Limit shifting according to CE 101-1 not checked if checked then a constant offset will be calculated to define the new limit line a the sum of the reference limit line and of the offset: current $\leq$ 3.0 A : offset = 0 dB current $\geq$ 185.0 A : offset = 35 dB else: offset = $20 * \log_{10}(\text{current} / 3.0)$
Parameter: Default value: Function:	06: Limit shifting according to CE 101-2 not checked if checked then a constant offset will be calculated to define the new limit line a the sum of the reference limit line and of the offset: current $\leq$ 1.0 A : offset = 0 dB else: offset = $20 * \log_{10}(\text{current} / 3.0)$
Parameter: Default value: Function:	07: Limit shifting according to CE 101-3 not checked if checked then a constant offset will be calculated to define the new limit line a the sum of the reference limit line and of the offset: current $\leq$ 2.0 A : offset = 0 dB else: offset = $20 * \log_{10}(\text{current} / 3.0)$

## 3.19 GAM Test

### 3.19.1 Description

This test provides automatic measurement of conducted and radiated electromagnetic interference according to the French military standard GAM EG 13. Some of the specifications require a classification for narrowband (NB) and broadband (BB) signals.

A NB/BB discrimination can be done only on scan results (from a preview scan or from partial scans in the final test); single measurements will not be performed.

To make use of the PK-AV method the selected scan table has to be defined with exactly these detectors (1st PK, 2nd AV).

The tuning methods require certain scan step sizes, depending on the defined IF bandwidth; for the points at the edge of the scan table's subranges there won't be any NB/BB results because the algorithm works within these subranges only.

The PK-AV method is the most reliable discrimination method but the scans require more time to perform (two detectors).

Above 1 GHz no discrimination will be done; for that frequency range the specifications don't have BB limits.

The standard requires final measurements of NB interferers with AV, BB interferers with PK.

### 3.19.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data:

#### **GAM EG 13 C1**

Frequency Range: 30 Hz - 50 MHz (NB), 10 kHz - 50 MHz (BB)  
 Detector: Pk (NB), Pk (BB)

#### **GAM EG 13 C2**

Frequency Range: 0.01 - 50 MHz  
 Detector: Pk (NB)

#### **GAM EG 13 C3**

Frequency Range: 0.01 - 50 MHz  
 Detector: Pk (NB), Pk (BB)

#### **GAM EG 13 R1**

Frequency Range: 0.03 - 50 kHz  
 Detector: Pk (NB)

#### **GAM EG 13 R3**

Frequency Range: 0.01 - 10000 MHz (NB), 0.01 - 1000 MHz (BB)  
 Detector: Pk (NB), Pk (BB)

### 3.19.3 List of the Script Parameters

<b>Topic</b>	<b>Test</b>
Parameter:	01: ID max. 12 chars to be included in filenames
Default value:	"gam_0001"
Function:	a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter:	02: global start frequency [MHz] for the test
Default value:	30e-6
Function:	no measurements will be done below this frequency
Parameter:	03: global stop frequency [MHz] for the test
Default value:	10e3
Function:	no measurements will be done above this frequency
Parameter:	04: suppress queries as far as possible
Default value:	not checked
Function:	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter:	05: split frequency range into test ranges
Default value:	checked
Function:	the total frequency range of the test can optionally be split into <b>test ranges</b> (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will <b>be completely tested</b> (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency; besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test); the value given with parameter <i>Test 07</i> has to be interpreted as a minimum value; if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each); if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna !)
Parameter:	06: if splitting of frequency range: do with log. scale
Default value:	checked
Function:	if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter:	07: no. of test ranges for splitting of frequency range
Default value:	1
Function:	defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter:	08: test configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

**Topic**                      **Preview**

Parameter:	01: preview result file, <none>: ID + '_pre'
Default value:	"<none>"
Function:	optional filename for the PEAK results from the preview test; if no filename is specified then a default name will be used
Parameter:	02: 2nd preview result file, <none>: ID + '_pre2'
Default value:	"<none>"
Function:	optional filename for the AVERAGE results from the preview test; if no filename is specified then a default name will be used
Parameter:	03: scan table for preview
Default value:	"<none>"
Function:	filename of the scan range table to be used for the preview test
Parameter:	04: sweep table for preview
Default value:	"<none>"
Function:	filename of the sweep range table to be used for the preview test
Parameter:	05: insert results into existing result file
Default value:	not checked
Function:	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to <b>remeasure certain bands of the spectrum</b> while keeping the rest unchanged

## Topic **DataReduction**

Parameter:	01: NB limit line
Default value:	"<none>"
Function:	a filename that corresponds to the required NB limit line
Parameter:	02: optional NB acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of NB results; if used then the given value for the acceptance offset will be ignored
Parameter:	03: BB limit line
Default value:	"<none>"
Function:	a filename that corresponds to the required BB limit line
Parameter:	04: optional BB acceptance line (no offset)
Default value:	"<none>"
Function:	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of BB results; if used then the given value for the acceptance offset will be ignored
Parameter:	05: max. no. of results kept per test range
Default value:	6
Function:	the maximum number of results that will be kept from each test range through data reduction
Parameter:	06: decision threshold [dB] for peak reduction

Default value:	6.0
Function:	determines the decision level when data reduction is done with the "Peak Reduction"; a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter:	07: level offset [dB] for acceptance analysis
Default value:	-10.0
Function:	determines the level offset when data reduction is done with the "Acceptance Analysis"
Parameter:	08: 0/1/2/3: NB/BB discr.: none/tun1BW/tun2BW/PK-AV
Default value:	2
Function:	type of narrowband/broadband discrimination: no discrimination / tuning method +/- 1 IF bandwidth / tuning method +/- 2 IF bandwidths / PK/AV comparison method
Parameter:	09: decision threshold [dB] for NB/BB reduction
Default value:	6.0
Function:	determines the decision level threshold for the selected NB/BB discrimination; recommended values are 6 dB for the tuning methods and 12 dB for the PK-AV comparison method
Parameter:	10: max. no. of BB results kept per octave
Default value:	3
Function:	maximum number of BB results to be kept per octave from the final results

**Topic****Final**

Parameter:	01: final NB result file, default: ID + '_fin NB'
Default value:	"<none>"
Function:	optional filename for the NB results from the final test; if no filename is specified then a default name will be used
Parameter:	02: final BB result file, default: ID + '_fin BB'
Default value:	"<none>"
Function:	optional filename for the BB results from the final test; if no filename is specified then a default name will be used
Parameter:	03: scan table for partial scans
Default value:	"<none>"
Function:	filename of the corresponding <b>scan range table</b> to be used for partial scans in the final test
Parameter:	04: perform partial scans
Default value:	not checked
Function:	if checked then additional partial scans will be performed around the frequencies to be analyzed; in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter:	05: max. no. of results kept from partial scans
Default value:	2
Function:	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference; this parameter limits

the number of results from a partial scan (after data reduction)

Parameter: 06: partial scan width: no. of IF-BWs (0=use ratio)  
 Default value: 0  
 Function: determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table; if the value is set to 0 then the calculation of the partial scan width is based on the following parameter

Parameter: 07: partial scan width: ref. frequ. ratio  
 Default value: 0.01  
 Function: determines the frequency range for partial scans (e.g. 0.01 means +/-0.5 %) in reference to the given mid frequency; the parameter is effective only if the previous parameter is set to 0

Parameter: 08: scan table for final measurements  
 Default value: "<none>"  
 Function: filename of the corresponding **scan range table** to be used for the final measurements; according to GAM EG 13 use: 1<sup>st</sup> detector AV for the NB interferers and 2<sup>nd</sup> detector PK for the BB interferers

Parameter: 08: insert results into existing result file  
 Default value: not checked  
 Function: if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten; else: any existing result files will only partly be overwritten (within the specified frequency range); this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

## Topic Graphic

Parameter: 01: NB graphics configuration, default: ID + ' NB'  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used for the NB results; if no filename is specified then a default name will be used

Parameter: 02: BB graphics configuration, default: ID + ' BB'  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used for the BB results; if no filename is specified then a default name will be used

Parameter: 03: PK curve graphics config., <none>: ID + ' PK'  
 Default value: "<none>"  
 Function: optional filename for the graphics configuration to be used for the PEAK results (preview curve); if no filename is specified then a default name will be used

Parameter: 04: minimize graphics for test  
 Default value: not checked  
 Function: if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

## Topic Report

Parameter: 01: generate printer hardcopy  
 Default value: checked

Function:	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter:	02: generate RTF file
Default value:	not checked
Function:	if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter:	03: RTF file: 'X:\<path>\<name8.3>', empty: dialog
Default value:	"c:\xxx.rtf"
Function:	path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up
Parameter:	04: report config. for printing, <none>: ID + '_prnt'
Default value:	"<none>"
Function:	optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used
Parameter:	05: footnote, empty field: ID
Default value:	""
Function:	optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used
Parameter:	06: optional text file to be included
Default value:	"<none>"
Function:	filename of an optional file of type 'Text' which shall be included in the report

**Topic****ReportHeader**

Parameter:	01: test report header, <none>: ID
Default value:	"<none>"
Function:	optional filename for the report header to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional test report header template, <none>: ID
Default value:	"<none>"
Function:	optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used
Parameter:	03: 1st header line
Default value:	"TEST"
Function:	a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	04: 2nd header line
Default value:	"GAM EG 13 Test"
Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed

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Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the referring entry of the report header won't be changed
Parameter:	12: 2nd comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered



## 3.20 RF Exposure Test

### 3.20.1 Description

This test provides automatic measurement of electromagnetic power, including the calculation of the absolute and (referring to a limit line) the relative power flux density.

The purpose of the test is to evaluate the total ambient RF power that affects a human being at a certain location. To achieve this, the electric field strength will be measured over a large frequency range with antennas that have a receiving characteristic similar to that of a human body (e.g. vertically polarized rod antennas).

The (proposed) limits existing so far describe the equivalent field strength (V/m) against frequency that a single sinusoidal carrier (nothing else in the whole spectrum) may reach: the relative power flux density then has exactly a value of 1.0 .

The units of the limits of the equivalent field strength can be converted using the following formulas:

$E_g$                     limit of the equivalent electric field strength [V/m]  
 $E_g'$                     logarithmic value of the limit of the equivalent electric field strength [dBuV/m]

$$E_g' = 20 \log_{10}(E_g \cdot 10^6)$$

and respectively

$$E_g = (10^{(E'/20)} \cdot 10^{-6})$$

The actual power flux density can be evaluated through summing up of all contributions to the spectrum (3 dB bandwidth of the IF filter):

Absolute power flux density  $S_{abs}$  [W/m<sup>2</sup>]

$E$                     electric field strength [V/m]  
 $E'$                     logarithmic value of the electric field strength [dBuV/m]  
 $Z_o$                     electromagnetic impedance in space ( $120 \cdot \pi$  Ohm = 377 Ohm)

$$\begin{aligned} S_{abs} &= \text{SUM} [E^2 / Z_o] \\ &= 1/ Z_o \cdot \text{SUM} [ E ]^2 \\ &= 1/ Z_o \cdot \text{SUM} [ 10^{(E'/20)} \cdot 10^{-6} ]^2 \\ &= 1/ Z_o \cdot \text{SUM} [ 10^{(E'/10)} \cdot 10^{-12} ] \\ &= 1/ Z_o \cdot \text{SUM} [ 10^{(E'/10 - 12)} ] \end{aligned}$$

Relative power flux density  $S_{rel}$  (has no unit)

E	electric field strength [V/m]
E'	logarithmic value of the electric field strength [dBuV/m]
$E_g$	limit of the equivalent electric field strength [V/m]
$E_g'$	logarithmic value of the limit of the equivalent electric field strength [dBuV/m]

$$\begin{aligned}
 S_{rel} &= \text{SUM} [ E / E_g ]^2 \\
 &= \text{SUM} [ ( 10^{(E'/20)} * 10^{-6} ) / ( 10^{(E_g'/20)} * 10^{-6} ) ]^2 \\
 &= \text{SUM} [ 10^{(E'-E_g')/20} ]^2 \\
 &= \text{SUM} [ 10^{(E'-E_g')/10} ]
 \end{aligned}$$

The time for calculating the relative power flux density can significantly be shortened if a predefined uncertainty (e.g. maximum 2 %) is tolerable, i.e., if only those parts of the spectrum will be considered that contribute enough to the result; this method is realized through an acceptance analysis for each range of constant step size and IF bandwidth, with an acceptance offset (in dB) that will be calculated using the following formula:

B	step size = 3 dB bandwidth of the IF filter [Hz] (typ. 0.7 * nominal IF bandwidth)
sw	frequency range under consideration (scan width) [Hz] (in the test the width of the current subrange)
tol	tolerance (maximum uncertainty) [%]

$$\text{Offset} = 10 * \log_{10}( sw / ( B * tol/100 ) )$$

For those frequency ranges where no limit is defined, only the absolute power flux density can be evaluated.

The step size in the scan range table has to match with the IF bandwidth in use (step size = 3 dB bandwidth), so that the whole spectrum will be evaluated without any gaps and also without any overlaps; the only detector suitable for the test is the RMS detector, which means that a receiving instrument without an RMS detector can't be used for the test. The names of the antenna factors to be used in the test have also to be specified in the scan range table.

### 3.20.2 Parameter Sets

Currently the following specification is supported by the ES-K1 Standard Data:

#### VDE 0848 Part 2

Frequency Range:	30 kHz - 300 GHz
Detector:	RMS
Test Samples:	(exposition range)

### 3.20.3 List of the Script Parameters

<b>Topic</b>	<b>Test</b>
Parameter:	01: ID max. 12 chars to be included in filenames
Default value:	"exp_0001"
Function:	a short string that will be used for building up various default strings (see below); this string enables easy identification of files that belong to the same test
Parameter:	02: global start frequency [MHz] for the test
Default value:	30e-3
Function:	no measurements will be done below this frequency
Parameter:	03: global stop frequency [MHz] for the test
Default value:	300e9
Function:	no measurements will be done above this frequency
Parameter:	04: suppress queries as far as possible
Default value:	not checked
Function:	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter:	05: test configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test; if no filename is specified then a default name will be used

<b>Topic</b>	<b>Preview</b>
Parameter:	01: preview result file, <none>: ID + '_pre'
Default value:	"<none>"
Function:	optional filename for the (PEAK) results from the preview test; if no filename is specified then a default name will be used
Parameter:	02: scan table for preview
Default value:	"<none>"
Function:	filename of the scan range table to be used for the preview test

<b>Topic</b>	<b>Graphics</b>
Parameter:	01: graphics configuration, <none>: ID
Default value:	"<none>"
Function:	optional filename for the graphics configuration to be used in the test; if no filename is specified then a default name will be used
Parameter:	02: optional graphics template (new graph only)
Default value:	"<none>"
Function:	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)
Parameter:	03: minimize graphics for test
Default value:	not checked
Function:	if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report; therefore no graphics

updates will occur which in turn avoids any possible delays when handling very long scan curves

**Topic****Report**

Parameter: 01: generate printer hardcopy  
 Default value: checked  
 Function: if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter: 02: generate RTF file  
 Default value: not checked  
 Function: if checked then a report file will be created using the "Rich Text Format" (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter: 03: RTF file: 'X:\<path>\<name8.3>', empty: dialog  
 Default value: "c:\xxx.rtf"  
 Function: path + file name (8.3 name format) of the RTF file if the RTF report is activated; if an empty string is used then a file selection dialog will come up

Parameter: 04: report config. for printing, <none>: ID + '\_prnt'  
 Default value: "<none>"  
 Function: optional filename for the report configuration for printing, if printer output is selected; if no filename is specified then a default name will be used

Parameter: 05: footnote, empty field: ID  
 Default value: ""  
 Function: optional text as a footnote on the pages of the test report; if an empty string is used then the ID string of the test will be used

Parameter: 06: optional text file to be included  
 Default value: "<none>"  
 Function: filename of an optional file of type 'Text' which shall be included in the report

**Topic****ReportHeader**

Parameter: 01: test report header, <none>: ID  
 Default value: "<none>"  
 Function: optional filename for the report header to be used in the test; if no filename is specified then a default name will be used

Parameter: 02: optional test report header template, <none>: ID  
 Default value: "<none>"  
 Function: optional filename of a report header which shall be taken as a template for the one to be used in the test; if no filename is specified then a default name will be used

Parameter: 03: 1st header line  
 Default value: "TEST"  
 Function: a string that will be taken as the first header line; if no string is given then the referring entry of the report header won't be changed

Parameter: 04: 2nd header line  
 Default value: "RF Exposure"

Function:	a string that will be taken as the second header line; if no string is given then the referring entry of the report header won't be changed
Parameter:	05: EuT name
Default value:	"EuT"
Function:	a string that will be taken as the description of the equipment under test; if no string is given then the referring entry of the report header won't be changed
Parameter:	06: manufacturer
Default value:	""
Function:	a string that will be taken as the name of the manufacturer (of the EuT); if no string is given then the referring entry of the report header won't be changed
Parameter:	07: operating conditions
Default value:	""
Function:	a string that will be taken as the description of the conditions of the test; if no string is given then the referring entry of the report header won't be changed
Parameter:	08: test site
Default value:	""
Function:	a string that will be taken as the description of the test site; if no string is given then the referring entry of the report header won't be changed
Parameter:	09: operator
Default value:	""
Function:	a string that will be taken as the description of the operator; if no string is given then the referring entry of the report header won't be changed
Parameter:	10: test specification
Default value:	""
Function:	a string that will be taken as the description of the test specification; if no string is given then the referring entry of the report header won't be changed
Parameter:	11: comment line (empty field: start time)
Default value:	""
Function:	a string that will be taken as a comment line ; if no string is given then the start time of the test will be entered

**Topic****RfExposure**

Parameter:	01: limit line
Default value:	"<none>"
Function:	limit line for the test
Parameter:	02: rel. power flux: result tolerance [%] (0: no acc. analysis)
Default value:	0
Function:	defines the maximum uncertainty of the relative power flux density if a data reduction shall be done through an acceptance analysis; if the value is set to 0 then all measurements will be considered for the calculation