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1 Relevant CISPR standards

QUESTION
Which CISPR standards are relevant to set up projects in EMCview?

ANSWER:
EMCview already contains many pre-defined project. In most cases it is as simple as connecting your DUT to a LISN and the spectrum analyzer, start EMCview, select the applicable standard / project file and click the start button to run a measurement.
The spectrum analyzer parameters have been chosen in order to cover many different analyzer brands and models.
With respect to spectrum analyzer settings, you have to look primarily at CISPR 16-1-1, CISPR 16-2-1, CISPR 16-2-2, CISPR 16-2-3 and CISPR 25.
With respect to emission limits, you need to figure out which of the standards CISPR 11, 13, 14, 15, 22, 25, 32 are applicable for your DUT. Most limit lines for conducted and radiated noise are already predefined in EMCview. EMCview segment files are specified to be on the safe side, rather than to achieve the fastest measurement speed. However, with good knowledge of CISPR 16 and depending on the properties of your DUT and on the capabilities of your analyzer model, you can optimize segment files to speed measurement time.

Below a few screenshots of relevant CISPR 16 and CISPR 25 details. CISPR xx and EN 550xx standards are equivalent. The full standards need to be purchased.
Standards can be obtained in the web shops of national standardization institutes and various other sellers in the internet.
There are also free sources as some countries provide free access to national standards which often are adopted CISPR standards. They may however not always match the latest edition of the relevant base standards. For example:
https://law.resource.org/pub/in/bis/manifest.litd.9.html

CISPR 25 / 4.4.1 Parameters when using spectrum analyzers:

Table 1 – Spectrum analyser parameters

Service / Frequency range MHz		Peak detection		Quasi-peak detection		Average detection	
		RBW at -3 dB	Scan time	RBW at -6 dB	Scan time	RBW at -3 dB	Scan time
AM broadcast and mobile services	0,15 - 30	9/10 kHz	10 s / MHz	9 kHz	200 s / MHz	9/10 kHz	10 s / MHz
FM broadcast	76 - 108	100/120 kHz	100 ms / MHz	120 kHz	20 s / MHz	100/120 kHz	100 ms / MHz
Mobile services	30 - 1 000						
TV Band I TV Band III TV Band IV/V	41- 88 174 - 230 470- 890						
DAB	171- 245						
DTTV	470 - 770	100/120 kHz	100 ms / MHz	Does not apply	Does not apply	100/120 kHz	100 ms / MHz
Mobile service	1 000 - 2 500	100/120 kHz	100 ms / MHz	Does not apply	Does not apply	100/120 kHz	100 ms / MHz
GPS L1 civil	1 567 – 1 583	Does not apply	Does not apply	Does not apply	Does not apply	9/10 kHz	1 s / MHz

When a spectrum analyser is used for measurements, the video bandwidth shall be at least three times the resolution bandwidth (RBW).

CISPR 16-2-1 / 6.6.2 Measurement times / scan rates for CW signals:

Table 1 – Minimum scan times for the three CISPR bands with peak and quasi-peak detectors

Frequency band		Scan time T_s for peak detection	Scan time T_s for quasi-peak detection
A	9 kHz to 150 kHz	14,1 s	2 820 s = 47 min
B	0,15 MHz to 30 MHz	2,985 s	5 970 s = 99,5 min = 1 h 39 min
C and D	30 MHz to 1 000 MHz	0,97 s	19 400 s = 323,3 min = 5 h 23 min

Table 2 – Minimum measurement times for the four CISPR bands

Frequency band		Minimum measurement time T_m
A	9 kHz to 150 kHz	10,00 ms
B	0,15 MHz to 30 MHz	0,50 ms
C and D	30 MHz to 1 000 MHz	0,06 ms
E	1 GHz to 18 GHz	0,01 ms

Depending on the type of disturbance, the scan time may have to be increased, especially for swept quasi-peak measurements. In extreme cases, the measurement time T_m at a certain frequency may have to be increased to 15 s, if the level of the observed disturbance is not steady (see 6.5.1).

CISPR 16-2-1 Minimum sweep time

B.7 Frequency scan rate

The scan rate of a spectrum analyzer or a scanning measuring receiver should be adjusted for the CISPR frequency band and the detection mode used. The minimum sweep time/frequency, or the fastest scan rate, is listed in Table B.1:

Table B.1 – Sweep time/frequency or fastest scan rate

Band	Peak-detection	Quasi-peak detection
A	100 ms/kHz	20 s/kHz
B	100 ms/MHz	200 s/MHz
C and D	1 ms/MHz	20 s/MHz

For a spectrum analyzer or scanning measuring receiver used in a fixed tuned non-scanning mode, the display sweep time may be adjusted independently of the detection mode, and according to the needs for observing the behaviour of the disturbance. If the level of disturbance is not steady, the reading on the measuring receiver should be observed for at least 15 s to determine the maximum (see 6.5.1).

CISPR 16-2-1 / D.2.1 Scan rates and measurement times for AVG detector

Table D.1 – Pulse suppression factors and scan rates for a 100 Hz video bandwidth

	Band A	Band B	Bands C and D
Frequency range	9 kHz to 150 kHz	150 kHz to 30 MHz	30 MHz to 1 000 MHz
IF bandwidth B_{res}	200 Hz	9 kHz	120 kHz
Video bandwidth B_{video}	100 Hz	100 Hz	100 Hz
Max. scan rate	17,4 kHz/s	0,9 MHz/s	12 MHz/s
Max. suppression factor	6 dB	39 dB	61,5 dB

CISPR 16-2-1 / D.4 Measurement of slowly intermittent, unsteady or drifting narrowband disturbances

Table D.2 – Meter time constants and the corresponding video bandwidths and maximum scan rates

	Band A	Band B	Bands C and D
Frequency range	9 kHz to 150 kHz	150 kHz to 30 MHz	30 MHz to 1 000 MHz
IF bandwidth B_{res}	200 Hz	9 kHz	120 kHz
Meter time constant	160 ms	160 ms	100 ms
Video bandwidth B_{video}	0,64 Hz	0,64 Hz	1 Hz
Maximum scan rate	8,9 s/kHz	172 s/MHz	8,3 s/MHz

2 Measurement time

QUESTION 1
Measurements take very long. Can´t it be accelerated?

ANSWER 1:
In short: Yes, measurement times can be accelerated. However it requires good knowledge of the CISPR standards and of the technical specifications of your spectrum analyzer. If the sweep time is too short, the measurement result may not be correct. You can change the sweep time easily by modifying the segment files of your project.
The implementation of sweep times of EMCview is conservative to put you on the safe side and to find a common denominator for all the supported spectrum analyzer models.
Things you need to consider:
CISPR 16 standards
DUT properties – are its emissions mainly CW or are there also slowly fluctuating or short sporadic emissions?
Spectrum analyzer properties such as the number of display points / frequency steps per sweep, sweep settings for its Quasi-Peak detector

The measurement time is dominated by sweep time settings. Next, the number of segments could be reduced by matching it with the number of display points of your analyzer. Less segments means less sweeps and consequently less time for initializing sweeps and read out measurement data via SCPI. However the gain in speed is relatively small, compared to what you can achieve with faster sweep times.

Detailed answer:

We were considering following points when choosing the sweep time settings in the segment files:

1) CISPR 16 which specifies measurement equipment, measurement equipment settings and test set ups is done for measurement receivers mainly. There are also some specifications for spectrum analyzers, but for really compliant measurements you must use a measurement receiver. FFT based measurement / real time spectrum analysis can considerably speed up measurement times. Optimizing measurement speed for FFT based analyzers is not considered, as the documented technical properties of various analyzers may not be detailed enough.
2) Measurement equipment settings also depend on the properties of the DUT. A DUT which predominantly produces CW emissions can be measured with faster sweep times than a DUT which produces random disturbances. E.g. a device with a microcontroller that carries out various tasks and turns peripherals on/off depending on firmware tasks; a fast measurement could miss noisy events. In practice, the engineer in the test house would observe the DUT emissions for fluctuations first and then determine measurement time.
3) It must be clear, that it is not a target of EMCview to carry out 100% CISPR compliant measurements. First of all, we use a low-cost spectrum analyzer and not an expensive measurement receiver. We are carrying out pre-compliance measurements to get an idea, if our DUT behaves well and most likely would pass type approval in the test house. Else, we would improve and re-test the design of the DUT, until we are confident to carry it to the test house.
4) We want to make pre-compliance measurements as simple as possible for.
5) EMCview has to cover many different models of low-cost spectrum analyzers.
6) We want to find a “common denominator” for the settings in order to cover analyzer models with different specifications
7) We want to make the settings to cover as many possible noise scenarios

In order to accomplish the points above, we tried to make a general table for measurement settings based on CISPR 16 specs. These meant, that we had to find the most applicable settings and consequently the sweep time is not optimized for every single case. You can measure too fast to be compliant, but you can´t measure too slow.
QP detector measurement times are rather influenced by SA model performance than by CISPR specs. Typically, according to CISPR 16 we could measure faster, but we were looking at the sweep time auto settings of the analyzers, based on RBW and sweep frequency range. Using CISPR 16 parameters, would make the UNCAL message pop up at many spectrum analyzers.

Our considerations for sweep segment size:

1) The frequency step size must be equal to half of the resolution bandwidth (band A: 200 Hz, band B: 9 kHz, band C/D: 120 kHz) or less.
2) The number of frequency steps is determined by the number of pixels on the frequency axis of the display
3) Taking a Rigol DSA815 with its relatively small display with 601 measurement points per sweep as a common denominator.

As an example for the 150 khz – 30 MHz band, we have RBW = 9kHz, -> frequency step size = 4.5 kHz, maximum sweep bandwidth = 600 * 4.5 kHz = 2.7 MHz
To simplify the creation of segment files, we use a sweep bandwidth of 2.5 MHz
This results in following sweep segments: 150 kHz – 2.5 MHz, 2.5 MHz – 5 MHz, 5 MHz -7.5 MHz, 7.5 MHz – 10 MHz, ...27.5 MHz – 30 MHz

(easier to write down, copy and paste, etc. than 150 kHz – 2.7 MHz, 2.7 MHz – 5.4 MHz, 5.4 MHz – 8.1 MHz, 8.1 MHz – 10.8 MHz .....)
Optimizing sweep range to every analyzer would not significantly increase measurement time. The time reduction would come from less segments requiring less time to set up the sweep and read out the measurement results via SCPI.
Our sweep time selection is based on the following table:

Frequency range	CISPR Band	CISPR RBW	VBW	spacing between adjacent measurement points (=RBW/2)	min. Peak detection sweep time	min. QP detection sweep time	min. AVG detection sweep time
9 kHz - 150 kHz	Band A	200 Hz	>= 3* RBW	100 Hz	100 ms/kHz	20 s/kHz	100 ms/kHz
150 kHz - 30 MHz	Band B	9 kHz	>= 3* RBW	4.5 kHz	10 s/MHz	200 s / MHz	10 s/MHz
30 MHz - 300 MHz	Band C	120 kHz	>= 3* RBW	60 kHz	100 ms/MHz	20 s/MHz	100 ms/MHz
300 MHz - 1 GHz	Band D	120 kHz	>= 3* RBW	60 kHz	100 ms/MHz	20 s/MHz	100 ms/MHz
1 GHz - 18 GHz	Band E	1 MHz	>= 3* RBW	500 kHz	100 ms/MHz	n.a.	100 ms/MHz

It is conservatively taking values from various CISPR tables and selecting the slowest sweep times as common denominator. Anyhow, every user can easily modify it upon his own considerations.

QUESTION 2
EMCview uses the default settings for measurement points per sweep. Can´t I accelerate the measurement time by changing the settings to a higher number of measurement points per sweep?

ANSWER 2:
Any manual settings of the spectrum analyzer will be overwritten by an initialization sequence of EMCview to ensure a defined state prior to starting any measurement.
Furthermore, the dominating factor is the sweep speed in [MHz/s] specified by the standards. Changing the number of measurement points per sweep would enable larger sweep segments, but the overall measurement time would remain unchanged, as the sweep speed in [MHz/s] cannot be changed. There would also hardly be any gain in speed with respect to the time needed in between segments to download the measurement data from the analyzer. Though fewer segments would mean less breaks in between the sweeps, the time to download data would increase due to an increased number of measurement points or in other words – fewer breaks, but longer breaks. A disadvantage of segments with a wider frequency span is increased measurement time, when measuring single segments.
To summarize – increasing the number of measurement points will not result in reduced overall measurement time.

3 Segment files

QUESTION
In the software, if I want to select a different STEP frequency, e.g. 5 KHz (inside the CN RBW) to get more information or 20 KHz (more than CN RBW) to speed up the measuring, how can I do?
I think that I must change the low and high limit for each SEG1 band that compose the test configuration file right? But how many points for each band to increase or decrease the frequency step? Can you explain better with a little example?

ANSWER:
Inside EMCview segment files you specify a series of single sweeps.
Example:
.....
FRQa__1=150.000

FRQb__1=2.500.000
BW____1=9000
Sweep_1=25000
Att___1=0
PreAmp1=off
Detector1=VAV
FRQa__2=2.500.000
FRQb__2=5.000.000
BW____2=9000
Sweep_2=25000
Att___2=0
PreAmp2=off
Detector2=VAV
.....

In the above example, each segment has a start and stop frequency. With exception of the very first sweep, we always use 2.5 MHz sweep bandwidth between 150kHz and 30 MHz. Reason is that CISPR16 specifies two adjacent frequency points shall not be separated more than half of the RBW. Now CISPR 16 specifies in parallel the RBW for the frequency ranges 9kHz to 150kHz (RBW 200Hz), 150kHz to 30MHz (RBW 9kHz), 30 MHz to 1GHz (RBW 120kHz) and above 1 GHz (RBW 1 MHz).

Coming back to the above example, the step size shall be 9 kHz / 2 = 4.5 kHz. Given the default number of measurement points of Rigol analyzers per sweep, 601 points, you can make a single sweep not larger than (601-1)*4.5 kHz = 2.7 MHz. For easier segment file creation, I use 2.5 MHz per sweep. Siglent has a larger display and hence 710 points per sweep. Means, in order to be compliant with CISPR 16, you can make sweeps of (710-1)*4.5 kHz = 3.2 MHz. You could make segments of 150 kHz – 3.35 MHz, 3.35 MHz – 6.55 MHz, 6.55 MHz to 9.75 MHz and so on all the way up to 30 MHz. This would be perfectly compliant with CISPR 16.

In our segment files we use 2.5 MHz segments, because the segment file is easy to read and it is CISPR 16 compliant for all analyzers supported by EMCview plus some margin.

If you want any other step size, e.g. 1 kHz and you use a Siglent with 710 measurement points, simply change the segment file using a text editor to:

.....
FRQa__1=150.000
FRQb__1=860.000
BW____1=9000
Sweep_1=25000
Att___1=0
PreAmp1=off
Detector1=VAV
FRQa__2=860.000
FRQb__2=1.570.000
BW____2=9000
Sweep_2=25000
Att___2=0
PreAmp2=off
Detector2=VAV
.....

However, CISPR 16 specifies one more parameter – the sweep time. For the band 150 kHz to 30 MHz, CISPR 16 specifies a sweep time of 100 kHz/second. This is why for 2.5MHz sweep segments, the segment file sets the sweep time to 25000 (=25000ms = 25 sec). Means that you could change the above segment file to:

.....
FRQa__1=150.000

FRQb__1=860.000
BW____1=9000
Sweep_1=7100
Att___1=0
PreAmp1=off
Detector1=VAV
FRQa__2=860.000
FRQb__2=1.570.000
BW____2=9000
Sweep_2=7100
Att___2=0
PreAmp2=off
Detector2=VAV
.....
The sweep is faster now, but you have more segments. Neglecting the time needed to read out the results of a sweep and starting a new sweep, the total sweep time remains the same. It would be no different, if you would increase the step size. Your sweep bandwidth becomes larger, but since you have to adjust the sweep time, the time would remain the same. At least unless you want to operate outside CISPR 16 specs, which you already would do by increasing the step size above RBW/2 anyway.

I have seen that is it possible into the SEG file to change the sweep time (expressed in ms) but it is set to a high value high value. I have tried some tests and noticed that longer sweep times deliver more detailed results of final sweep. From you side what are the best value to use (compared to EMI Receiver) for Peak, Qpeak and Avg detectors?

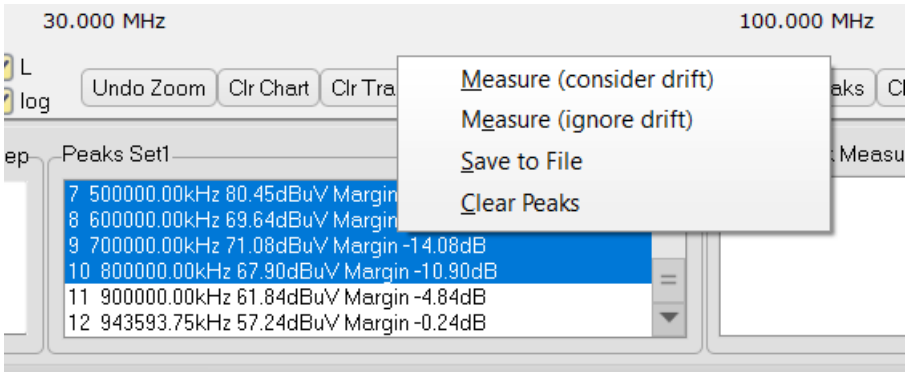
ANSWER:
A part of this question is already covered by the answer to the previous question. Of course CISPR 16 sweep times differ depending on frequency range and detector type. Have a look at our CN application notes for more details.
When it comes to QP sweep times, we could use any sweep time equal or higher specified in CISPR 16. Now the sweep times specified for QP detectors specified by CISPR 16 would be too fast for the Rigol and Siglent analyzers. Using CISPR 16 QP sweep time would make an UNCALIBRATED message or icon pop up on the Siglent or Rigol analyzer. Uncalibrated means, that the sweep time is too fast for the chosen resolution bandwidth and sweep bandwidth. The filter would not have sufficient time to settle and the displayed amplitude would be lower than in reality. You would also see a frequency shift due to the delay of the filter response. Of course, you can change any settings in the segment file according to your will, however watch for the UNCALIBRATED message/icon on your analyzer.

4 Span / peak re-measurement

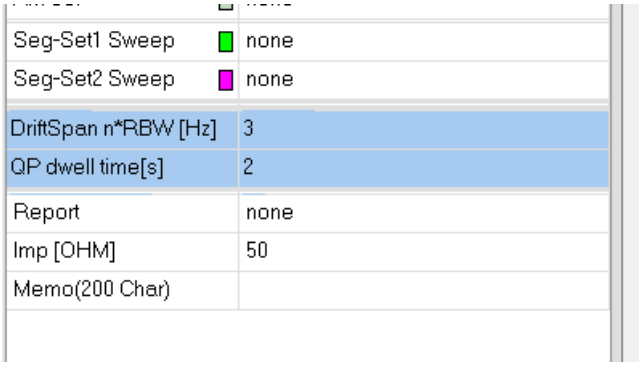
Question:
How can I change the parameters of the quasi-peak scan?

Answer:
In order to avoid settings that may contradict the regular sweep, the quasi-peak scan is carried out using the corresponding settings specified in the segment files of Set1 or Set2.
EMCview enables creation of dedicated quasi-peak scans, however, depending on CISPR band, measurement time per frequency point is in the range of 0,5 sec – 1 sec, which results in a very long measurement time for an entire scan. As the amplitude measured with a quasi-peak detector is always lower or equal than the result measured with a peak detector, a peak scan is carried out instead of a quasi-peak scan. Peaks crossing

the quasi-peak limits are then re-measured using the quasi-peak detector, as there is a chance that the result may be below the limits:



The picture above shows 4 peaks selected to be re-measured with the QP-detector. Right clicking the selected peaks opens a context menu, which lets you choose between a re-measurement considering or ignoring frequency drift. If the peak is a harmonic of a clock frequency, it is unlikely that the frequency drifted in the time between the initial measurement and the re-measurement. Drift can be ignored which results in the QP measurement being carried out on exactly the frequency listed in the peak table.
If the spurious emission is caused by a switched mode regulator, the switching frequency may drift over time and the re-measurement should be carried out considering drift.



The span of the measurement considering drift can be specified in the configuration section of the EMCview screen. In the example above, 7 quasi-peak measurements are carried out. If the resolution frequency specified in the segment file is 9 kHz, the first measurement is carried out at fpeak – 3*9 kHz, next at fpeak – 2*9 kHz,….and finally fpeak + 3*9 kHz. EMCview then displays the highest amplitude measured at these frequencies. The number of frequency points can be reduced or increased, depending on how much the frequency may drift. The parameter in the line below the drift span is the measurement time per frequency point.

5 Manual setting of spectrum analyzer parameters / VBW

Question:
I want to manually set the video bandwidth upfront to a measurement; however it always jumps to VBW “auto”,

Answer:
We can´t enable setting VBW manually upfront to the measurement. As we need to have a defined state for the initialization of the measurement, we issue a preset command to the analyzer first. Consequently the VBW BW gets preset to auto and once in remote mode, there is no manual access anymore, except by pressing the escape button which would abort communication between EMCview and the analyzer.
With EMCview REV 5.xxx you will be able to choose between VBW = Auto and VBW = 3*RBW.

6 Graph / Traces

Question:
If I want to compare some traces in the same windows, I need to save each sweep in CHART mode? And is it possible to load the previous sweep and make a traces compare?

Answer:
Go to the FILE/UTILITIES menu and click SAVE CHART. You then can load up to three charts as reference traces in FILE/UTILITIES/LOAD REFERENCE TRACE/TRACE1,2,3
You would then see your latest chart plus 3 loaded charts (reference traces) in the graph window. In total you could see up to 8 curves – 4 charts composed of two graphs (set1/set2). The selected traces will then be listed on top of the graph window. By clicking on either the chart name or trace name, you can move it into the foreground. You can also compare curves against each other using the math function. E.g. subtract two curves from each other to explicitly show the difference.

7 ADC overload / IF overload

Question 1:
When I make measurements, the analyzer beeps and displays the warning ADC overload or IF overload. What is the reason?

Answer 1:
ADC overload or IF overload warnings report that the input of the spectrum analyzer is overdriven. Overdriven does not necessarily mean that the maximum permitted RF input power is exceeded.
If the internal attenuator setting is 0 and/or the pre-amplifier is on, strong input signals can drive the IF or ADC section into saturation. Increase the internal attenuation and / or turn off the pre-amplifier in the EMCview segment file.

Question 2:
When making conducted noise measurements with a Tekbox RF-current probe I get ADC / IF overload warnings? However I do not see any noise with excessive amplitude.

Answer 2:
The useful frequency range of Tekbox RF-current probes starts in the very low kHz range. You may measure an automotive switched mode regulator, starting conductive noise testing at 150 kHz according to CISPR 25. Have a look at the frequency range below 150 kHz. Your switched mode regulator may produce sub – harmonics, which you are not aware of. Sub-harmonics typically have high amplitude. The RF current probe picks it up and the amplitudes are high enough to saturate the spectrum analyzer. Use a 150 kHz high pass filter to suppress the sub harmonics, without losing dynamic range in the main frequency range of your measurement.

8 Base noise at low frequencies

Question:
When I make measurements using a pre-configured project, even with the DUT not powered, I see that the base noise at very low frequencies is higher and then decreases towards higher frequencies. Is this normal?

Answer:
There are two reasons, why you see higher noise at very low frequencies. The architecture of spectrum analyzers causes “0” Hz falling into the pass-band of the IF filter. As the filter curve does not have a perfectly rectangular shape, sideband noise appears at low frequencies, decreasing with increasing frequency. This noise behavior can also be observed without using EMCview. Second, when applying frequency response correction for LISN or RF-current probes, there is increased transmission loss towards low frequencies. Means conducted emission levels need to be compensated for the frequency response of the LISN or RF-current

probe. This compensation also shifts the base noise of the analyzer to higher levels, similar as you would see on your analyzer in manual mode, when increasing the internal attenuator value.

9 Manually adding frequency points to the peak list

Question 1:
I want to add some spurious which are close to the limits to the list of peaks?

Answer 1:
Set a margin line, so that these spurious cross the margin line. Next press display peaks and all peaks crossing the margin line will be listed for consecutive peak measurement.

Question 2:
I want to manually add frequencies to the peak list?

Answer 2:
Press the MARKER button in the upper right corner of the EMCview screen. Select the measurement graph to which you want to add a marker (Set1/M1 or Set2/M2). Place a marker at the frequency, which you want to get added to the peak list. Press the COPY MARKERS button and the frequency will be copied into the peak list for consecutive peak measurement.

10 How to merge two measurement graphs to a worst-case graph

Question 1:
I carry out conducted noise measurements on Line and Neutral, or on the positive and negative supply line. How can I merge the two graphs to a worst-case graph, showing the maximum spurious levels of both measurements in a single graph?

Answer 1:
Carry out the measurement runs and save the results as chart. Click the MATH button in the right upper corner of the EMCview screen. In the File menu, load both graphs as traces, e.g. the measurement result of the positive supply line as Trace 1 and the measurement result of the negative supply line as Trace 2. Select the two traces, using the mathematical operations box at the right side of the EMCview screen. Select MAX as mathematical operation. Press the CALC button and a graph with the merged result will be displayed.

11 How to recalculate an existing measurement using different correction files

Question 1:
I figured out, that my measurements were done choosing wrong correction files. Can I avoid re-measuring the set up and instead recalculate the graph with the right correction files?

Answer 1:
Yes, this can be done by using the DISPL. PEAKS feature. Searching peaks also re-calculates and re-displays the graph. A chart file is composed of the graph data, plus limit lines and correction lines. However, the chart file stores limit lines and correction lines as data only, not containing their file names. In order to avoid overlaying newly chosen correction files with previous correction data, proceed as follows:
Start EMCview and load the chart that you want to re-calculate with new correction files. If you loaded the chart, without loading a project before, all configuration file boxes will be empty. Next, click the RELOAD PROJECT FILES button in the right upper corner of EMCview. Next click the DISPL.PEAKS button. This

action stripped any correction files from the chart and displays the raw data as received from the spectrum analyzer.
Next, load the desired correction file and click the DISPL. PEAKS button. The resulting graph will then be re-calculated using the right correction file.

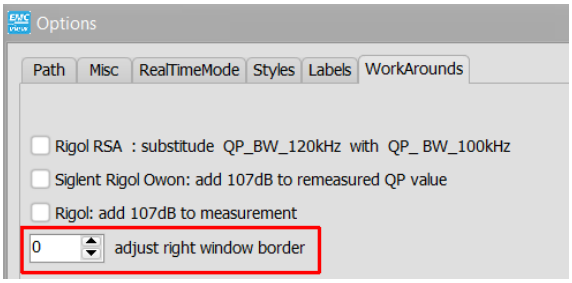
Answer 2:
Starting with EMCview V5.44, you have the option to load the raw data of any previously saved chart. The FILE / UTILITIES / LOAD CHART menu was updated to load RAW DATA only. The chart raw data can then be combined with any correction file and re-calculated accordingly, using the DISPL. PEAKS feature. This way, you don´t need to strip existing correction data using the process described in Answer 1.

Additional comment: You can load raw data of any chart, and then save this chart. The resulting chart file will not contain any correction data then. Note, that such files can only be re-loaded as chart then. If you would want to load it as trace, you had to re-calculate it with the DISPL.PEAKS feature while all correction files are set to NONE and then save as chart. Such charts, despite not containing real correction data, can also be loaded as trace.

12 Graphic / Display Issues

Question:
I run EMCview on a tiny laptop and don´t get the complete EMCview window displayed on the screen. Is there any solution?

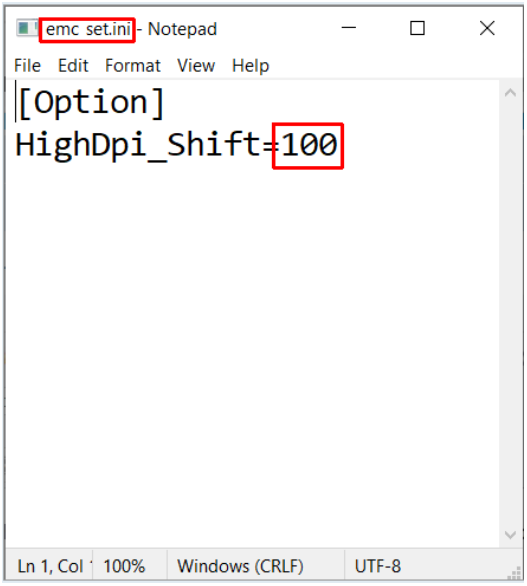
Answer:
First open Windows screen settings and try to change the screen scaling factor to 125% or another value. 125% is typically the best value. If this does not work, open the menu **Setup / Options / Workarounds:**



Change the value until the right window border aligns with the screen.

Question:
A few screen items at the top of the screen are overlapping. How can I fix it?

Answer:
Depending on the resolution of the display, in Windows Display Settings, reduce the scaling factor to 125% or 100%.
Furthermore ensure that Windings 1/2/3 fonts are installed.
For screens with very high resolution it may be necessary to create a text file named emc_set.ini and place it in the EMCview directory. Adjust the dpi value and re-start EMCview:



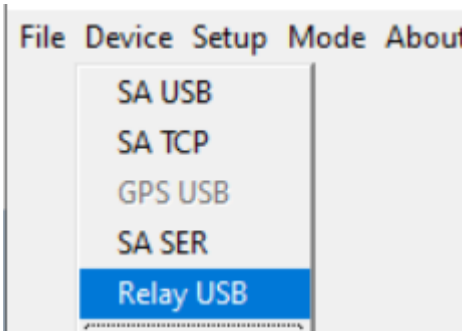
Depending on the screen resolution, it may be necessary to try different values.

13 Control of additional equipment with EMCview

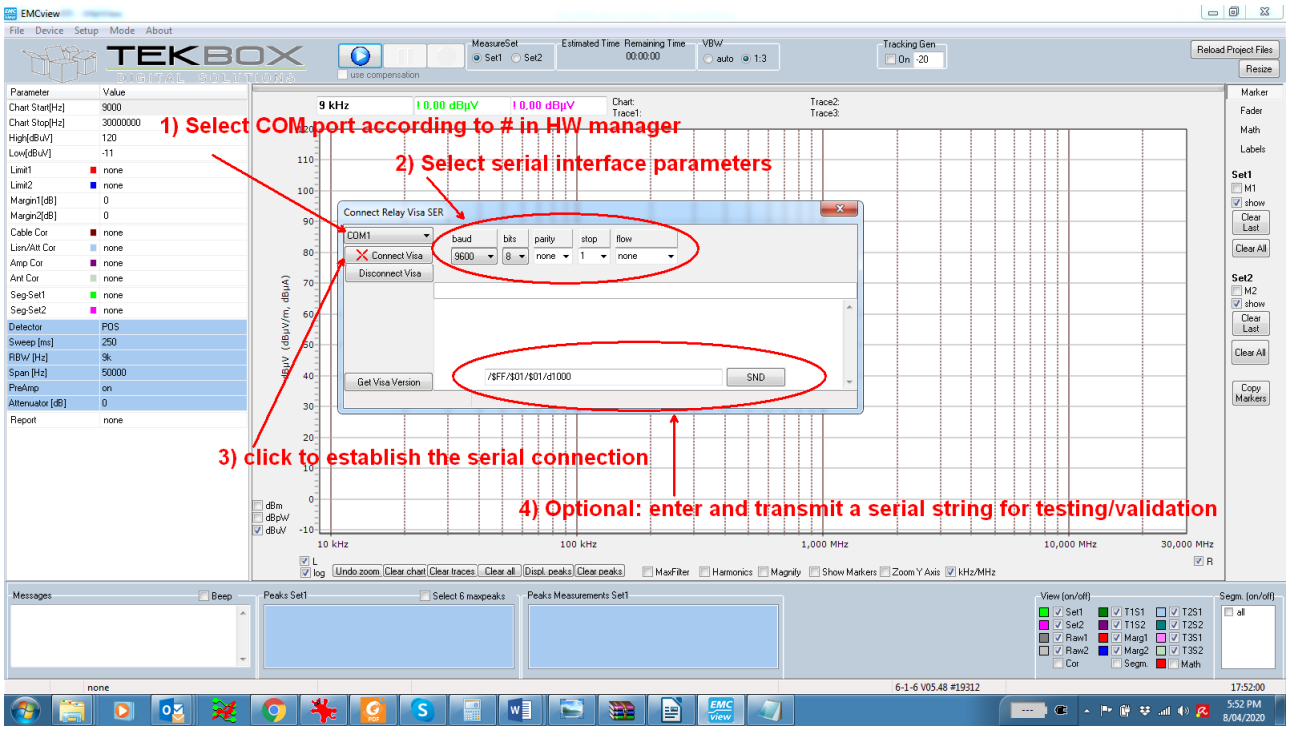
Question:
I would like to automatically switch between antennas during an EMCview measurement run. Is this possible?

Answer:
With EMCview V5.48 or higher, commands for ASCII controllable devices can be added to the segment files. You can use a device such as KMTronic 4UCRB Relay Controller to switch coaxial antenna relays or external attenuators.

Go to menu DEVICE to connect to the relay controller:



Next select the COM port and set up the parameters for the serial interface of the relay controller or any other serial device. Establish the connection and optionally transmit a string for testing/validation:



In order to automatically transmit test strings, they need to be entered into the desired segment file.
You can add two serial command strings to each segment. Command SCPI_A will be executed before the sweep of the corresponding segment. Command SCPI_B will be executed after the sweep of the corresponding segment.

Example: Segment file with commands for the KMTronic 4UCRB Relay Controller

```
[Application]
Software=TekBox RP-W32-D10
Version=Release
Date=18.02.2020 13:52:22
[General]
Name=CN_CISPR15_SEGMENTS_AUG_relais.seg
[Data]
FRQa__1=150000
FRQb__1=2500000
BW____1=9000
Sweep_1=25000
Att___1=10
PreAmp1=off
Detector1=VAV
SCPI_A_1=/$FF/$01/$01/d1000
SCPI_B_1=/$FF/$01/$00/d1000
FRQa__2=2500000
FRQb__2=5000000
BW____2=9000
Sweep_2=25000
Att___2=10
PreAmp2=off
Detector2=VAV
```

SCPI_A_x: command sent at the beginning of the segment

SCPI_B_x: command sent at the end of the segment

Explanation:

SCPI_A_x with x being the segment number; command sent at the beginning of the segment
SCPI_B_x with x being the segment number; command sent at the end of the segment

SCPI_B_x is optional. A single command at the beginning of the segments would be sufficient to turn ON/OFF a relay.

/$FF/$01/$01: serial string to turn on output 1 of the KMTronic 4UCRB Relay Controller. It will send the characters FF 01 01. This string is not EMCview specific. Its syntax has to be chosen according to the manual of the corresponding device. FF 01 01 means turn ON Output 1 of the 4UCRB. EMCview will send whatever string is entered in this place.

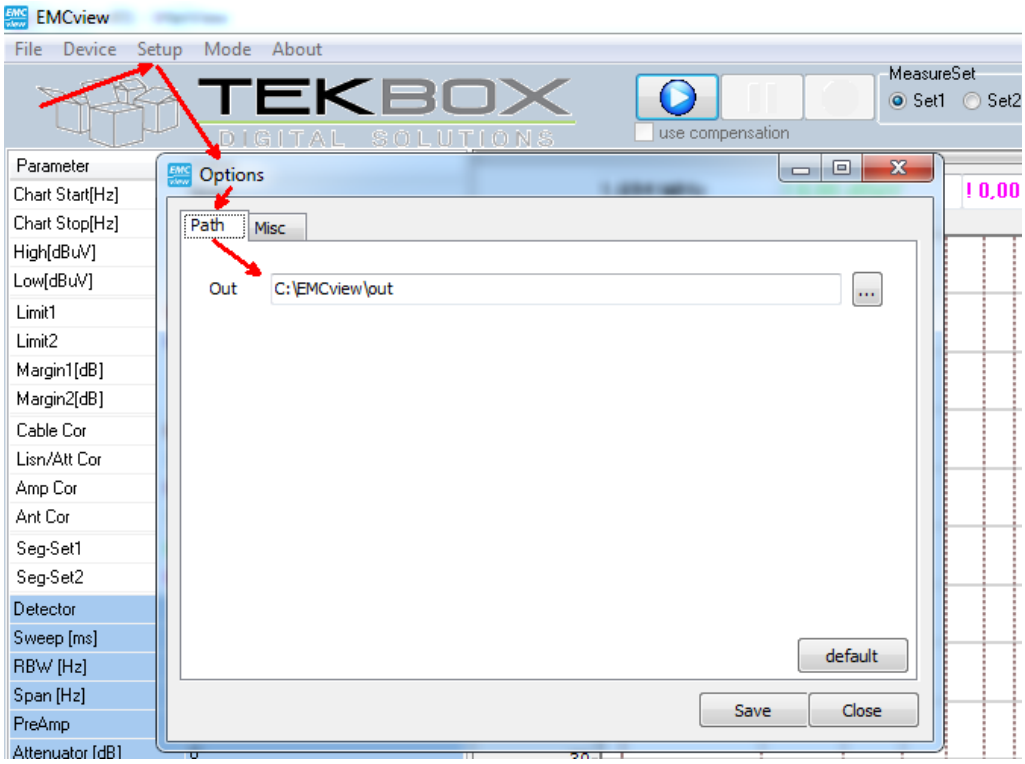
/d1000: wait 1000 ms before starting the sweep. Maximum value: 9999 ms

Special control commands can be entered as **/$XX** (upper case, always 2 characters)
Example:
/$0A LF, Line Feed (not /$0a)
/$0D CR, Carriage Return (not /$cr)

14 Setting the output path

Question:
How can I make EMCview remember the path where to save charts or reports?

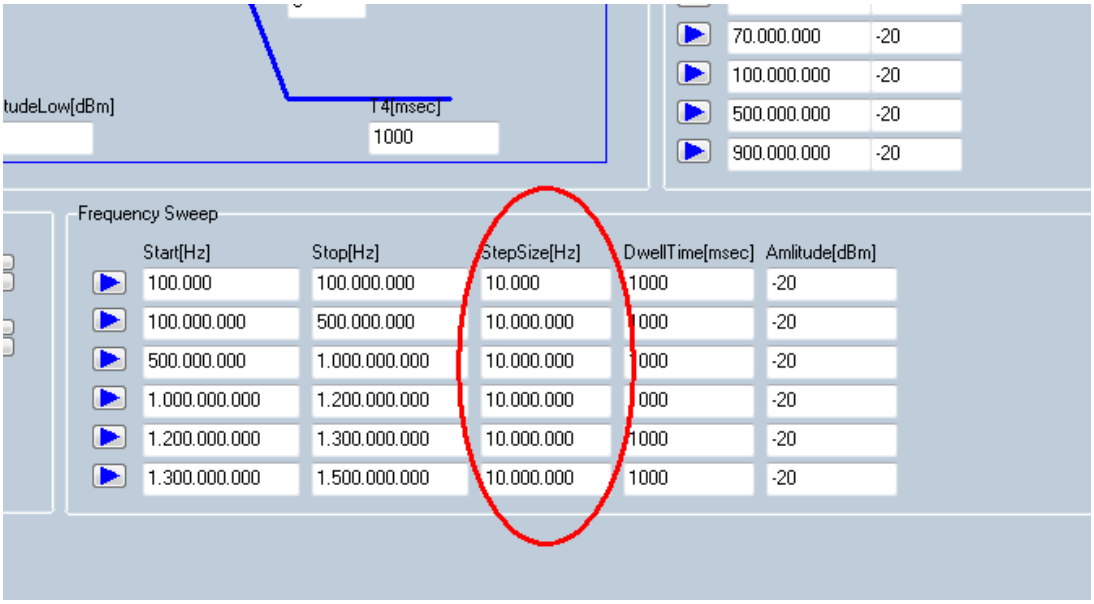
Answer:
When saving reports or charts, use the windows file dialog to change the path, if required. However, EMCview always first points to the default **\EMCview\out** directory. If you want to change the default directory, enter the **SETUP / OPTIONS** menu and set whatever path you want:



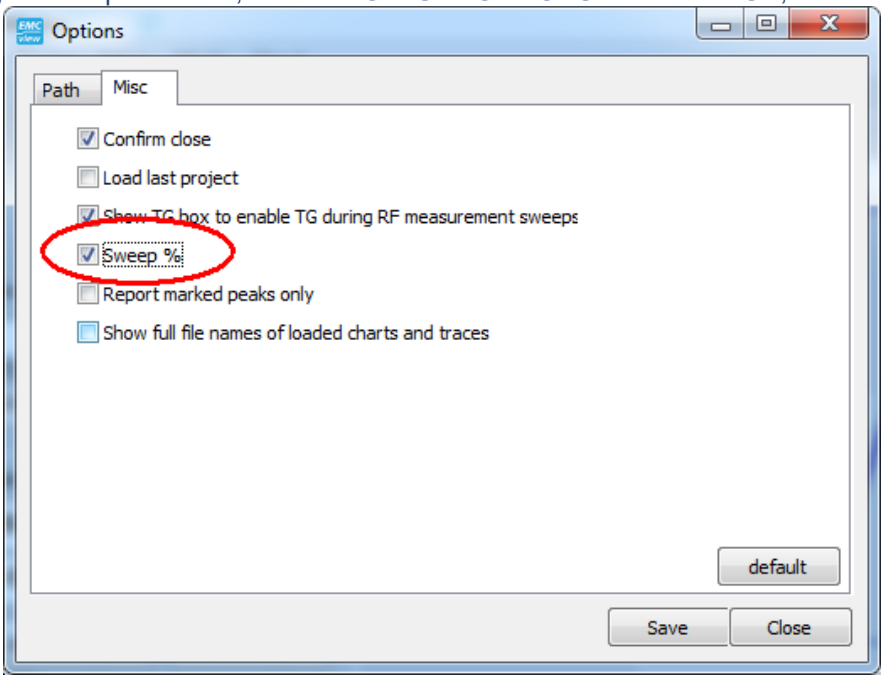
15 Sweep step size in Hz or in %

Question:
Can I change the sweep step size from Hz to %, in Generator mode?

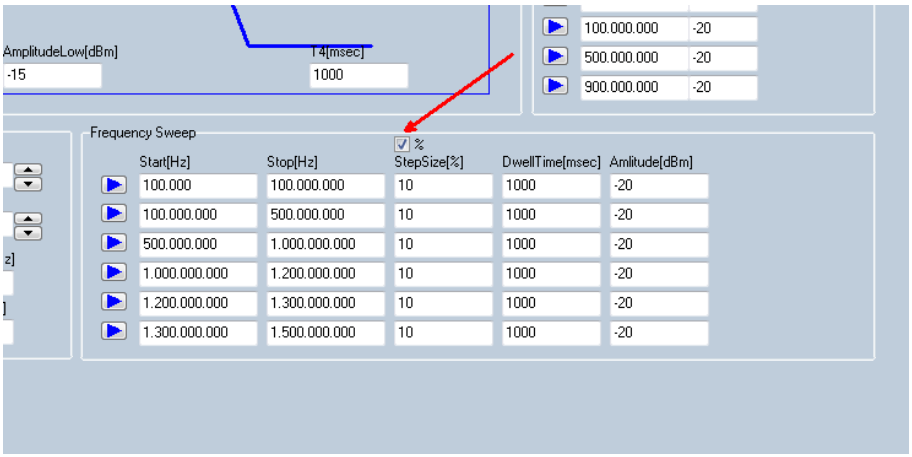
Answer:
By default, the step size of Frequency Sweeps is set to Hz:



In order to change the step size to %, enter the **SETUP / OPTIONS** menu. In **MISC**, tick the % sweep box:



Click **Save** and **CLOSE**.
In the Frequency sweep window, a **%** tick box will appear. By activating/deactivating it, you can switch between step size in Hz or in %.



16 Correct sign for the values in correction / compensation files

Question:
I am not sure, which sign I have to enter for the values in the correction/compensation files. How does EMCview calculate the amplitude values of the graph?

Answer:

Graph amplitude = Raw amplitude [dBµV] – cable file [dB] – LISN file [dB] + ant file [dB] – amp file [dB]

Raw amplitude: spectrum analyzer measurement values
For more information, such as how to deal with current monitoring probe trans-impedance, antenna factors, unit conversion and other operations that can be carried out using the correction files, have a look at our EMCview application notes.

17 Internal vs. external attenuation; ADC overload

Question:
I have an ADC overload issue. Should I apply internal or external attenuation? Why isn´t EMCview automatically dealing with ADC overload? What is the impact of increasing or reducing attenuation?

Answer:

ADC / IF overload:
An ADC overload event is only reported via buzzer beep and a message on the spectrum analyzer display. None of the spectrum analyzers supported by EMCview provides any means to remotely query the ADC/IF overload status.

Internal versus external attenuation:
Unless the maximum amplitude of the signal at the RF input of the spectrum analyzer is known, it is safer to use external attenuation. In contrary to an external attenuator, the internal attenuator of the spectrum analyzer does not offer increased protection with respect to excessive RF input power and frontend damage. From analyzer protection point of view, apply as much attenuation as possible without running into noise and sensitivity issues. Depending on the emission limits of the relevant standards, you have more or less margin for attenuation. Various standards, such as for example CISPR 25 Class 5 have limits close to the base noise of spectrum analyzer and not only require zero attenuation, but even use of a pre-amplifier to avoid crossing the limits with the analyzer base noise.
Most of the EMCview segment files are configuring minimum base noise, so review it with respect to your DUT and increase attenuation, if you are not sure about potentially harmful emission levels.

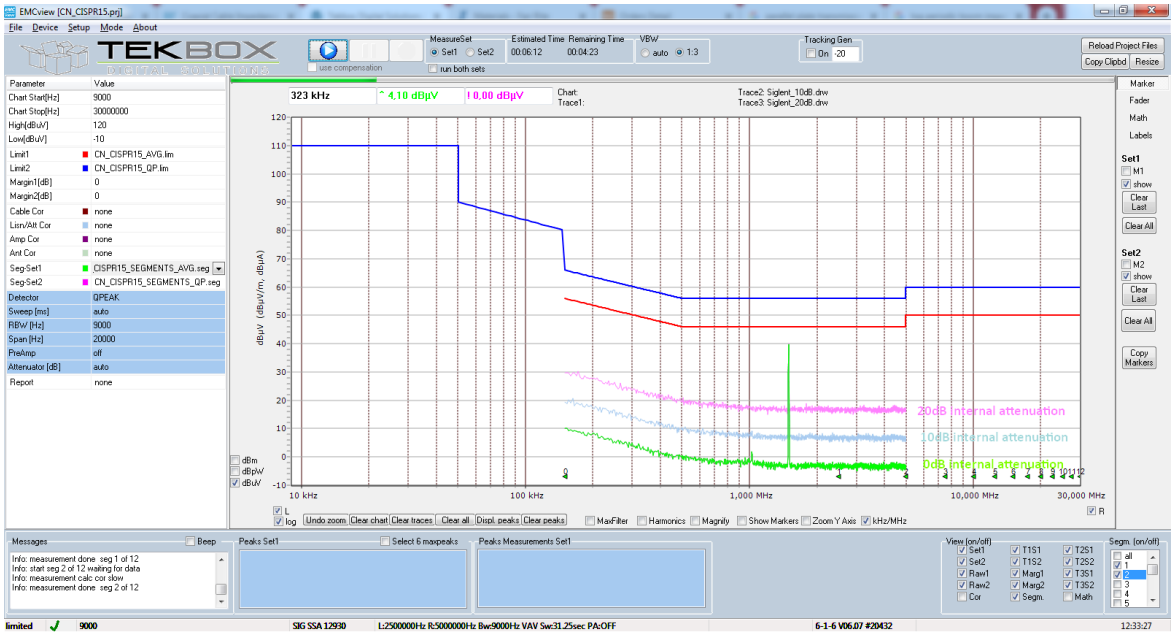
Configuring internal attenuation:

Internal attenuation is configured in the segment files, which you find in the SRC folder of EMCview:

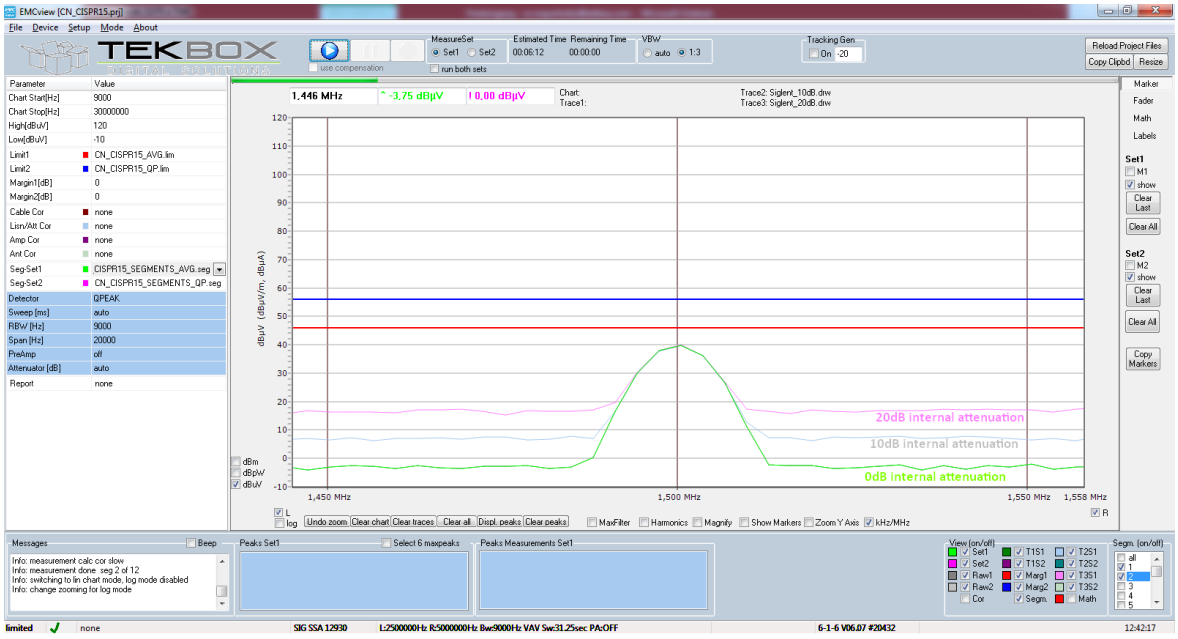
…..
FRQa__1=150.000
FRQb__1=2.500.000
BW____1=9000
Sweep_1=25000
Att___1=10
PreAmp1=off
Detector1=VAV
….

You can use the EMCview internal editor or any plain text editor to change the attenuation values of the segments. Attenuation has to be entered with positive sign. Press the **Reload Project Files** button, in case that you change any configuration files during run time of EMCview.

The screenshot below shows the effect on base noise for various attenuation levels:



And here the zoomed view. The amplitude values obtained from the analyzer are already compensated with respect to the internal attenuation.



Configuring external attenuation:

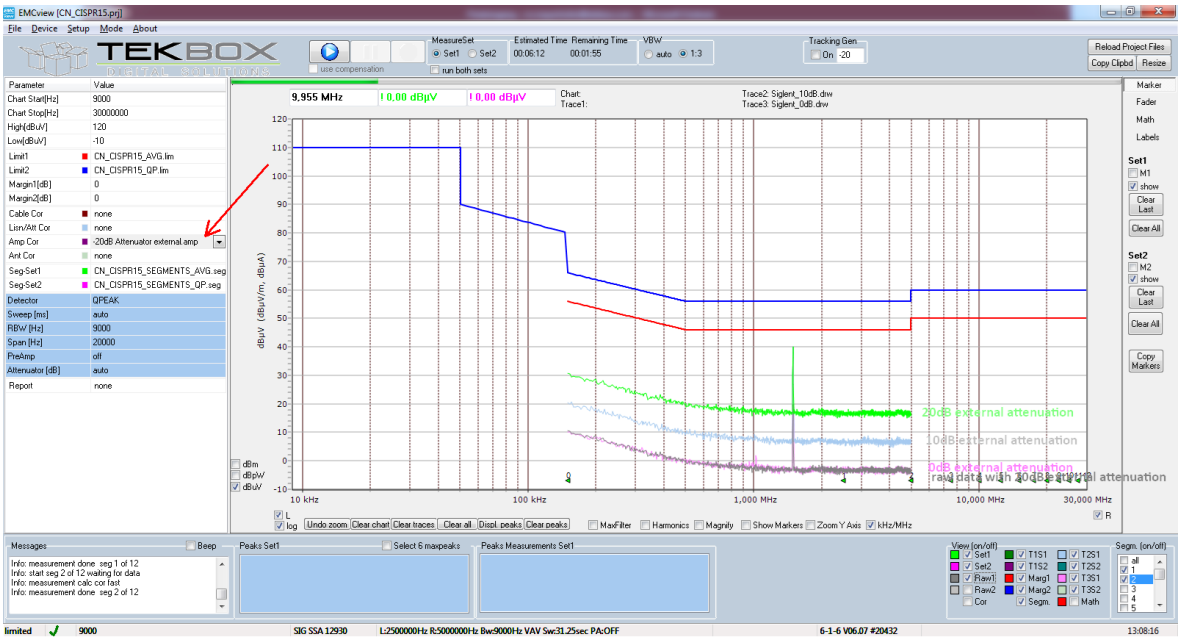
External attenuation is configured in amplifier files, which you find in the SRC folder of EMCview. You can use the EMCview internal editor or any plain text editor to create or edit amplifier files.

……

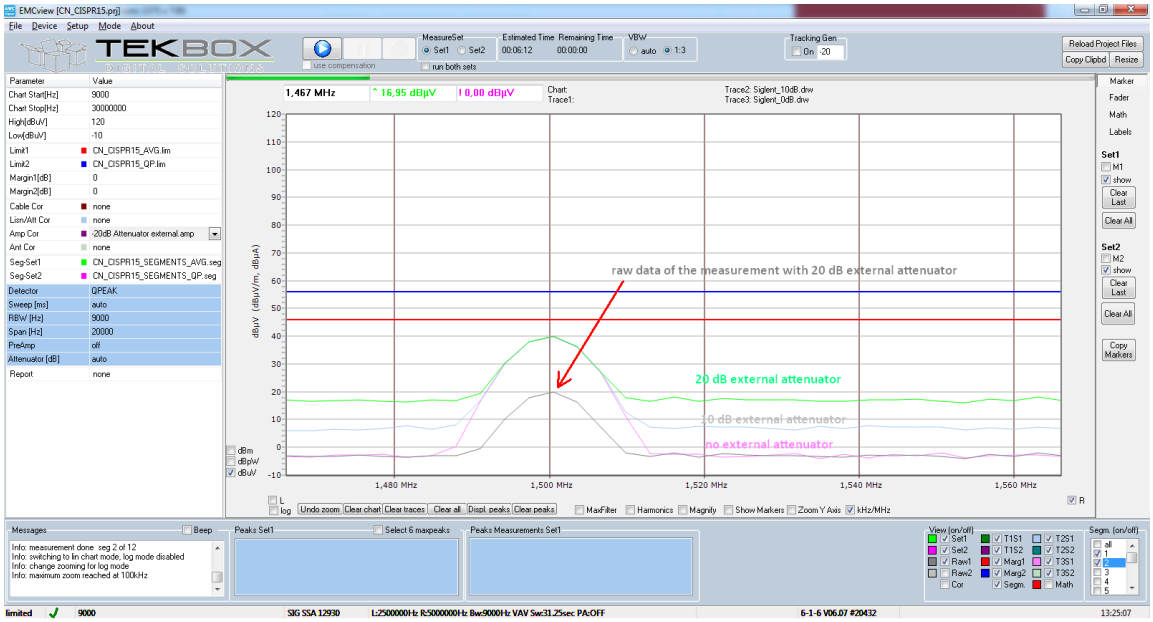
Name=-20dB Attenuator external
Freq_Interplot_Mode=log
Level_Interplot_Mode=log
[Data]
Freq1=9000
Lev1=-20
Freq2=3000000000
Lev2=-20

……..

this file configures 20 dB attenuation in the frequency range 9 kHz to 3 GHz. In the amplifier file, attenuation is considered as negative gain and consequently has to be entered with negative sign. the amplifier file is loaded using the Amp Cor field of EMCview.



And here the zoomed view. The amplitude values (raw values) obtained from the analyzer are not compensated with respect to the internal attenuation. EMCview compensates the raw values based on the content of the amplitude file.

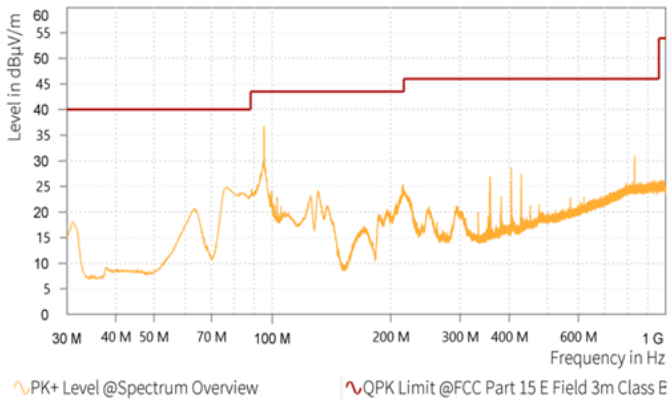


18 Radiated emission measurements

Question:
How shall I carry out pre-compliance radiated emission measurements?

Answer:
The majority of standards require radiated emission measurements using the quasi-peak detector. However, quasi peak measurements are extremely slow. It would take hours to carry out any radiated emission measurement.
Let´s have a look at two measurement plots from a test-house to see how they proceed:

Radiated emissions FCC Part 15 Class B



In the legend of the screenshot you can see QP limits, but the measurement was carried out using the peak detector. Peak detector measurement results are far faster than QP measurements and Peak detector measurements always deliver a higher value than QP measurements. As in the above case, the Peak result is not crossing the QP limits, you know that the radiated noise test is passed and there is no need to make a QP measurement.

Here another screenshot:
Radiated emissions EN 55032 Class B

Again QP limits and a peak detector measurement. Now, several spurious cross the QP limits and as QP detector amplitudes are always lower than peak detector amplitudes, there is a chance that the spurious are still below the QP limit line. Consequently, at the frequencies with the highest spurious levels, QP

measurements are carried out. You can see that the emissions in the 100 MHz and 250 MHz region still pass QP limits. However, at frequencies from 150 MHz to 250 MHz, both peak and QP amplitudes are above limits and the DUT does not pass the test. The procedure of first making a peak measurement and thereafter a QP re-measurement at the critical frequencies saves a lot of time.

EMCview contains radiated emission measurement projects with QP limits and corresponding segment files using QP detector scans. In order to create projects most suitable for your spectrum analyzer, take any of the segment files, change the QP detector entry to Peak detector and reduce the sweep time.
EMCview radiated emission segment files are also split into various frequency bands, as changing antennas according to CISPR 16 would be necessary. Furthermore, project files are split, considering analyzers may cover 1.5 GHz, 3 GHz or 6 GHz frequency ranges.

Below a segment file example for a setup, using a TEM cell or a hybrid antenna, covering a frequency range of 30 MHz to 1 GHz. Segment size is 25 MHz, considering spectrum analyzers with ≥ 600 measurement points per sweep and CISPR 16 requirements for the maximum spacing between adjacent frequency points. RBW is 120 kHz, sweep time is 10 seconds. Peak detector.

```
[Application]
Software=TekBox RP-W32-D7
Version=Demo
Date=30/01/2017 6:56:06 PM
[General]
Name=RN_30M_1G_PK.seg
[Data]
FRQa__1=30.000.000
FRQb__1=50.000.000
BW____1=120000
Sweep_1=10000
Att___1=0
PreAmp1=on
Detector1=POSPEAK
FRQa__2=50.000.000
FRQb__2=75.000.000
BW____2=120000
Sweep_2=10000
Att___2=0
PreAmp2=on
Detector2=POSPEAK
FRQa__3=75.000.000
FRQb__3=100.000.000
BW____3=120000
Sweep_3=10000
Att___3=0
PreAmp3=on
Detector3=POSPEAK
FRQa__4=100.000.000
FRQb__4=125.000.000
BW____4=120000
Sweep_4=10000
Att___4=0
PreAmp4=on
Detector4=POSPEAK
.
.
.
FRQa__37=925.000.000
FRQb__37=950.000.000
BW____37=120000
Sweep_37=10000
Att___37=0
PreAmp37=on
```

Detector37=POSPEAK
FRQa__38=950.000.000
FRQb__38=975.000.000
BW____38=120000
Sweep_38=10000
Att___38=0
PreAmp38=on
Detector38=POSPEAK
FRQa__39=975.000.000
FRQb__39=1000.000.000
BW____39=120000
Sweep_39=10000
Att___39=0
PreAmp39=on
Detector39=POSPEAK

The entire range from 30 MHz is covered with 39 segments with 10s sweep time each. Assuming another 10 seconds per segment for the transmission of the measurement values from spectrum analyzer to PC results in a measurement time of 13 minutes. Critical frequencies can then be measured with QP detector using the peak re-measurement feature of EMCview.

19 Fast Quasi Peak Measurements

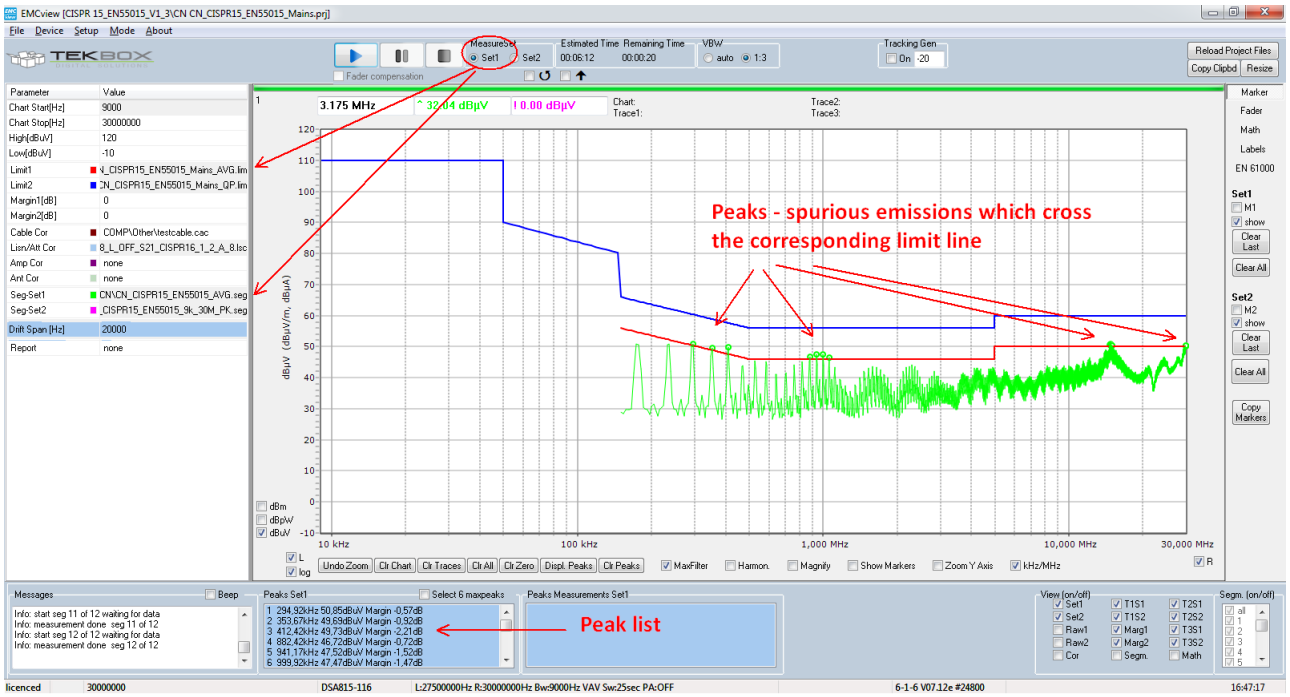
Question:
How are QP measurements carried out?

Answer:
Quasi Peak measurements require the QP detector to measure at least 1 second per measurement point. This would result into sweep times of 601 measurement points * 1 sec per segment for Rigol spectrum analyzers and 751 seconds per second for Siglent spectrum analyzers. Measuring an entire frequency band using the QP detector would result in hours of measurement time.
Chapter 19 explains, how QP measurements can be substantially accelerated by making a scan using the peak detector and then only investigate the frequency points, where the result of the peak detector violates the Quasi Peak limits. Reducing the measurement to single spurious or frequency points of interest, reduces measurement time to 1 second per frequency point. This is a net time however, as additional time is consumed for remote control routines such as configuring the spectrum analyzer and reading out the measurement result.

The procedure is as follows:

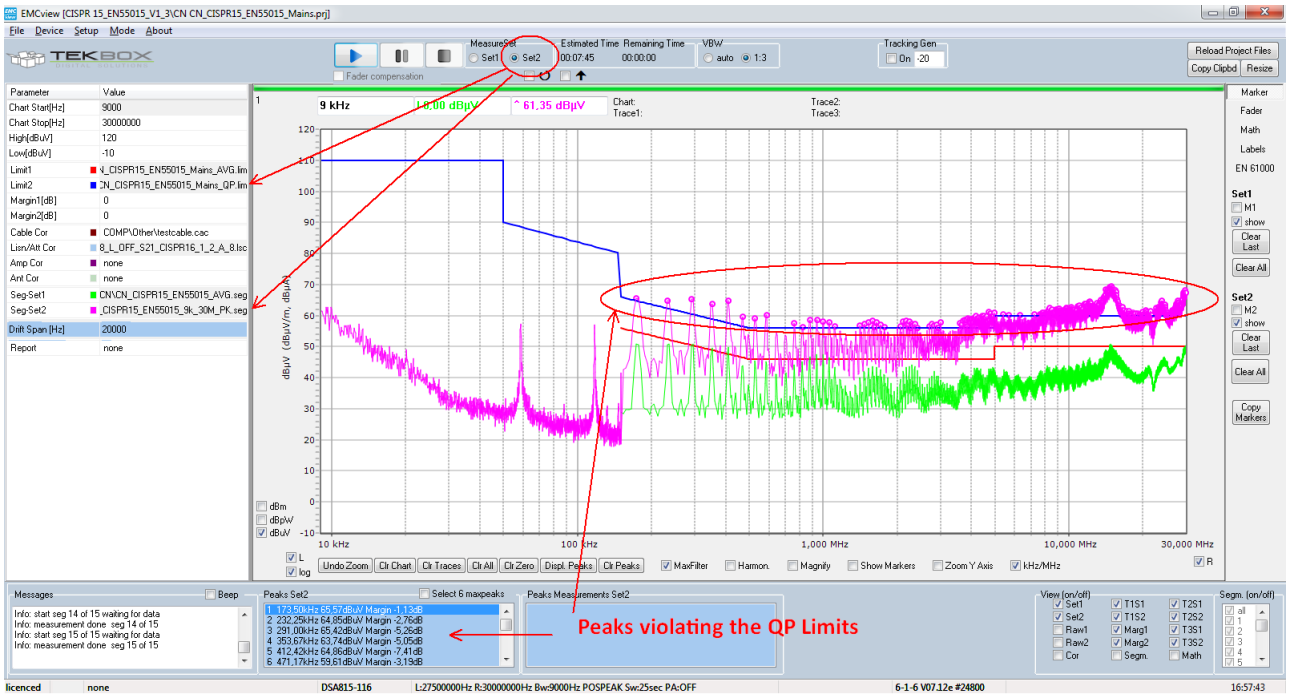
1) Carry out a measurement using the peak detector
2) Are there any spurious violating the QP limits?
   NO – your DUT passed, no need to carry out any QP measurements
   YES- you need to carry out QP measurements at the frequencies, where QP limits are violated; proceed with step 3)
3) Select the peaks listed in the **Peaks-Box** at the bottom of the screen with the left mouse button. Next click the right mouse button and select **measure (with or without drift)**. The analyzer will then carry out a QP measurement for the selected frequencies. The QP measurement result will be displayed in the **Peak Measurements – Box** at the bottom of the screen. In addition, the QP measurement results will be displayed in the graph window.

Example: Conducted noise measurement of a LED lamp according to CISPR 15; screenshots from EMCview V8.0
A set up, consisting of a LED lamp, isolation transformer, TBLC08 LISN and a spectrum analyzer with EMI option is controlled via EMCview over USB.
The lamp is powered, EMCview is started and USB communication with the analyzer is initiated. In EMCview, the project CN_CISPR15_EN55015_Mains.prj is loaded and the measurement of **Set1** is started by pressing the Play button. After the measurement of all segments is completed, the measurement result of the Average detector and the peaks violating the Average limits are displayed.



The peaks are displayed in the graph, using marker circles; furthermore the frequencies, amplitudes and offset to the limit line are displayed in the peak list.
Peak markers can be removed and the peak list can be deleted by pressing the **Clr Peaks** button. They can be restored any time by pressing the **Displ Peaks** button.
In case that a margin line is set by entering a margin in the project set up window, peaks will be referenced to the margin line instead of being referenced to the limit line.
Also note, that any peaks related operation is always referring to the currently active measurement setup – Set1 or Set2.

In the next step, a second measurement will be carried out using the Peak detector and applying Quasi-Peak limits. Set2 is activated, on the top of the screen next to the **Play** button. Pressing the **Play** button starts the measurement. CISPR 15 specifies this measurement to start at 9 kHz, using 200 Hz RBW up to 150 kHz and then switching to 9 kHz RBW all the way up to 30 MHz.
The Peak detector is used, though the standard specifies QP-limits, because of a significant reduction of measurement time.

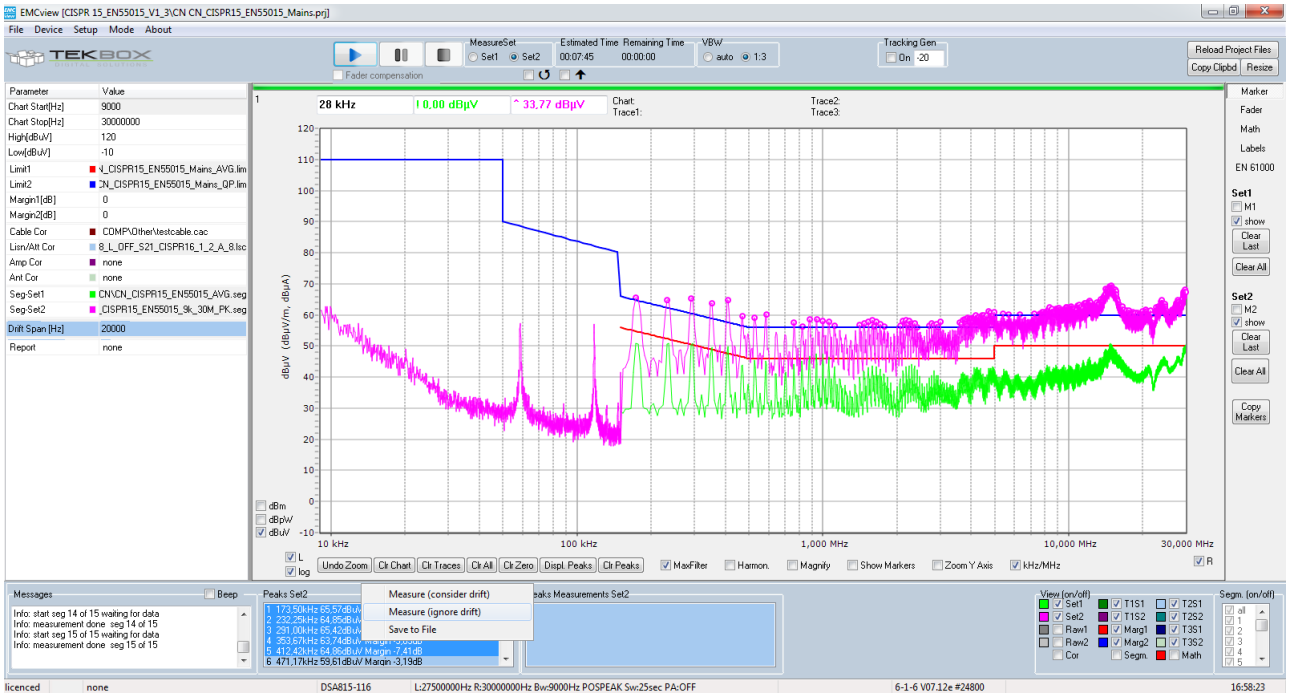


The result shows many peaks violating the QP limits. As explained in chapter 19, measurement results of the Quasi - Peak detector are always lower or equal compared to the results of the Peak detector. Consequently, there is the chance, that the spurious still may pass the QP-Limits, if measured using the QP detector.

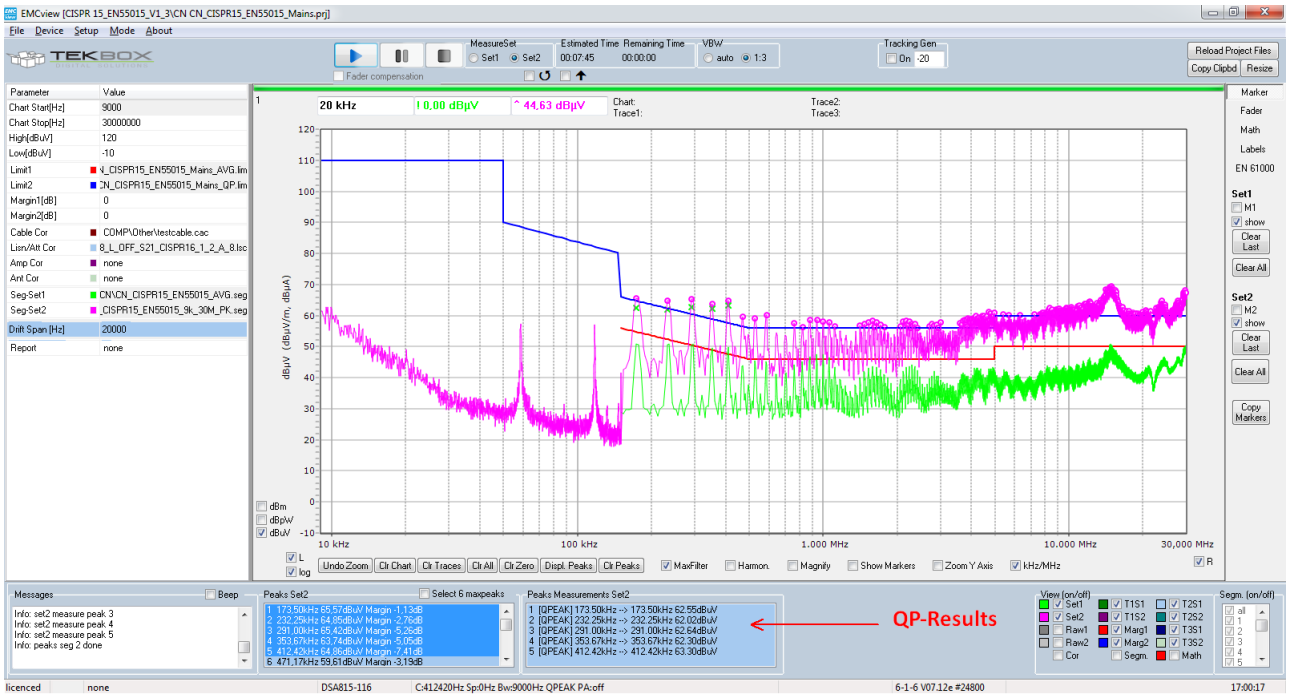
In the next step, a few peaks will be re-measured using the QP detector. Measuring at discrete frequencies will save a lot of time compared to measuring the entire frequency band.

In the example below, the first five peaks are selected, using the left mouse button and CTRL key. After selecting the peaks, press the right mouse button and two measurement options will become available.

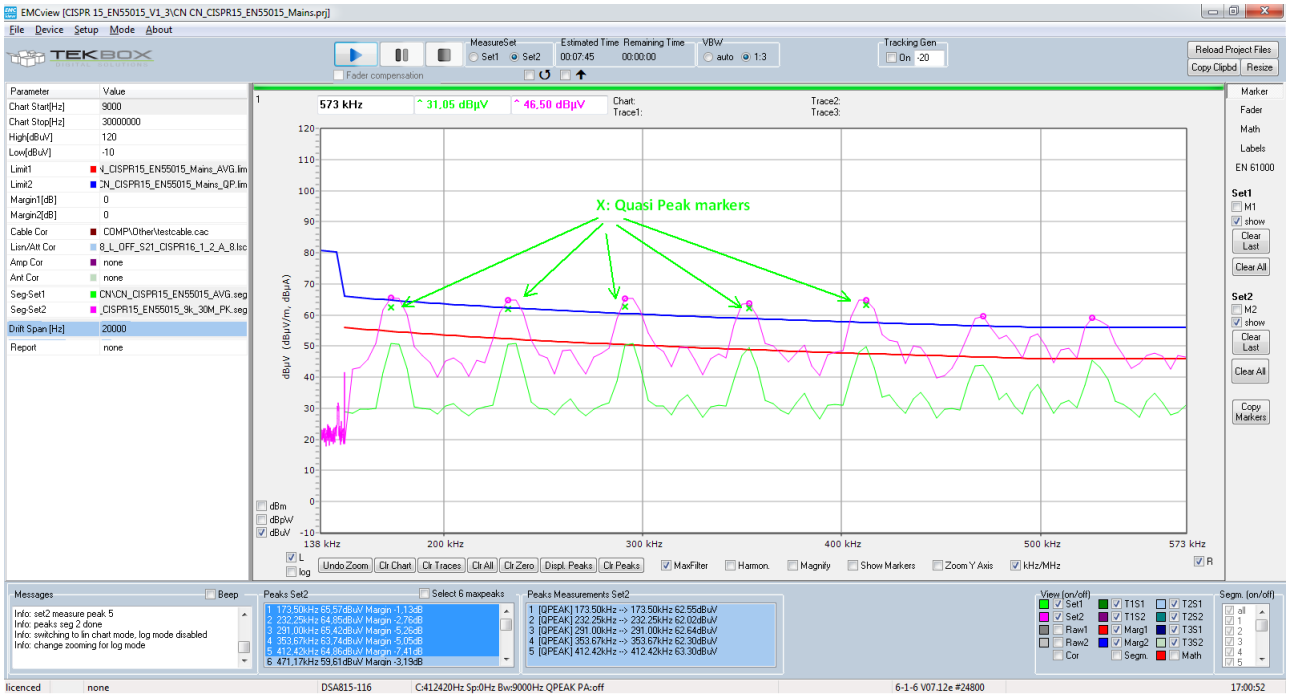
Measure (consider drift) will measure a small frequency band around the peak frequency. The span is configured in the project window under **Drift Span.** This measurement option deals with potential frequency drift of the spurious. This may happen, when the spurious originate from switched mode power supplies, where the switching frequency can drift over time and temperature. There is a time delay between the actual measurement and the peak re-measurement, where the spurious frequency may have drifted and re-measuring may miss the spurious or measure it at the shoulder, giving a wrong result.
The drift span does not specify a sweep, which would consist of 601 or more frequencies, taking 601 seconds or more to measure. EMCview divides the **Drift Span** into a series of discrete frequency points, with neighboring frequency points being spaced RBW/2 (4.5 kHz in our example). Consequently, a 200 kHz **Drift Span** results in 45 measurement points, rather than 601 or more measurement points. After carrying out the series of measurements, EMCview displays the maximum peak within the **Drift span**.
Measure (ignore drift) will measure at exactly the frequency displayed in the peak list. Only a single measurement will be carried out.



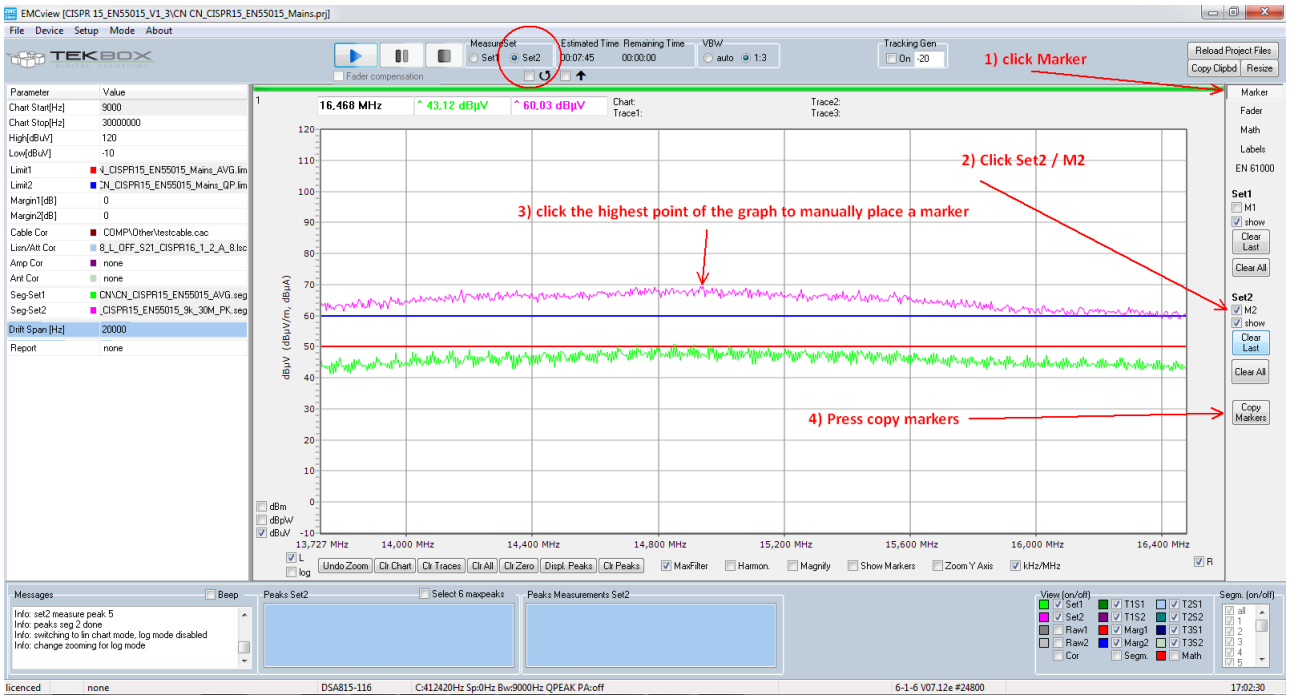
After the measurement of the five peaks is completed, the results of the quasi-peak measurement are displayed in the peak measurement box.

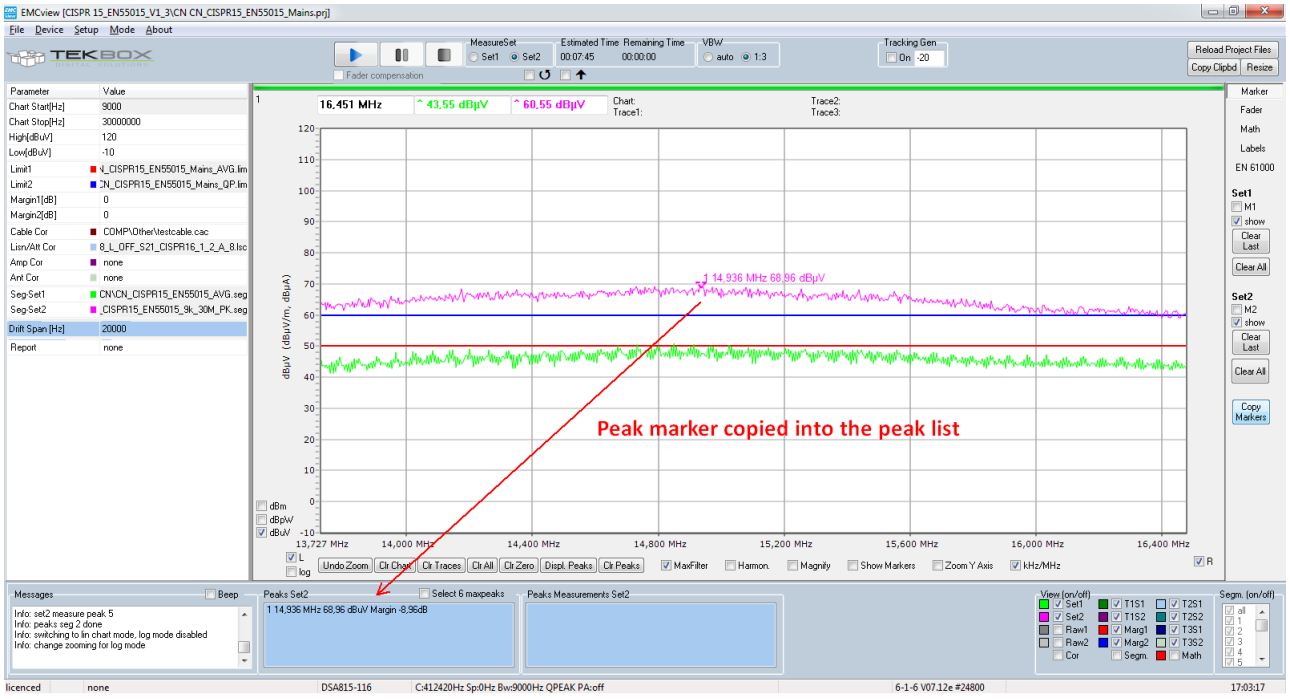


The QP Levels are furthermore displayed in the graph, as can be seen in the zoomed graph of the screenshot below. As expected, the QP results are always in between the levels of the peak and average measurement. The QP re-measurement shows that the first two spurious would pass QP limits with some tiny margin.



The next screenshots show the frequency range around 15 MHz. The highest point is selected by manually placing a marker. First, pressing the **Clr Marker** button deletes the automatically generated markers. Next a manual marker is placed at the graph and then transferred into the peak list:





Finally, a QP measurement is carried out, selecting the peak in the peaks list, right mouse button and selecting Measure (consider drift). After the measurement, the QP measurement result appears in the graph window and peak measurement list. The result is at the same frequency, which shows that the spurious maximum has not drifted.

Note that the chapter is based on EMCview V8.0 or higher. This version simplified the UI with respect to the peak measurement settings. Since the peak re-measurement is typically always carried out with QP-detector and the attenuator and preamplifier settings should be identical with those of the initial measurements, the corresponding entry boxes were removed from the project window. Measurement time is always 1 to 2 seconds, depending on analyzer model. Peak re-measurements now always use the QP detector and derive their settings from the relevant segment files.

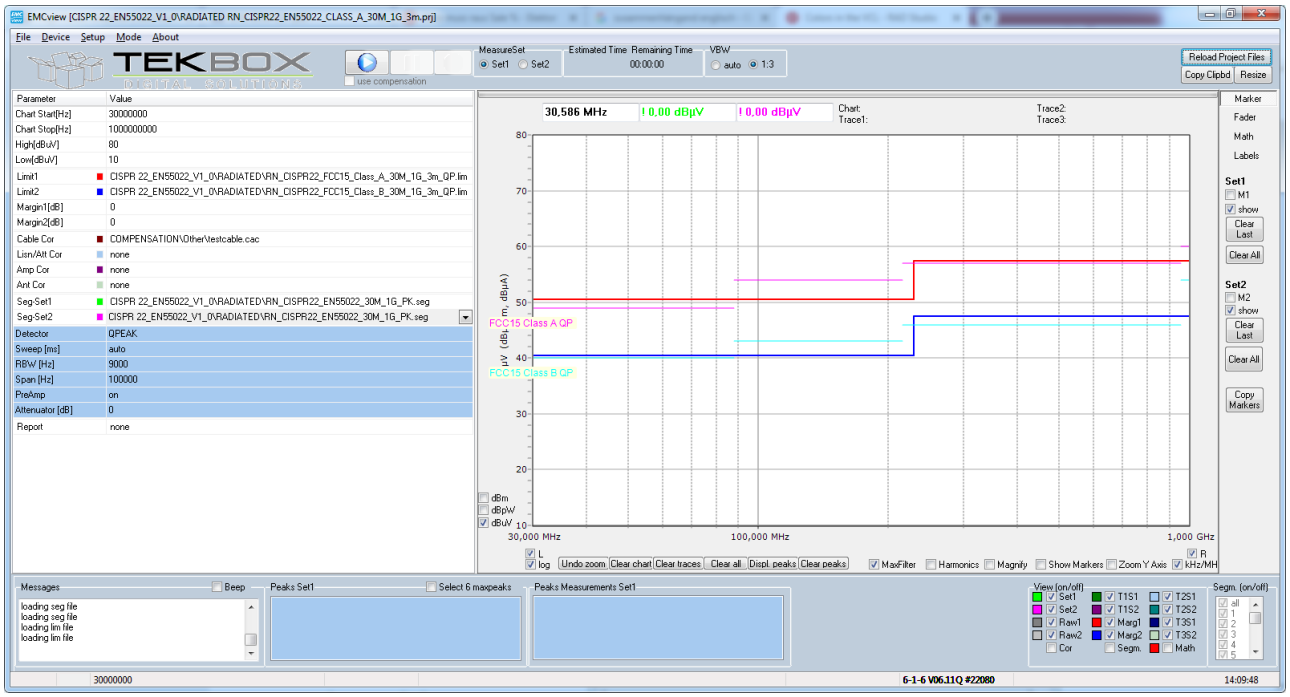
Peaks can be displayed for both traces (Set1 or Set 2). If you want to get peaks displayed for Set 1, click “Set1” at the top of the screen. Likewise click “Set2”, if you want to get peaks displayed for Set2.

20 Additional limit lines

Question:
Is it possible to display more than two limit lines in a graph?

Answer:
With EMCview V7.0, every limit file can contain a main limit line plus up to 15 auxiliary limit lines. In addition, EMCview can display a margin line for each main limit line. The main limit line will be used as reference for margin lines and to calculate peaks, which exceed the major limit line or the margin line. Auxiliary limit lines are basically graphic content which cannot be used for any processing purpose. Main limit lines must be coherent, whereas auxiliary limit lines can be segmented / interrupted.

Example: CISPR22 Class A and Class B as main limit lines and FCC 15 Class A and FCC 15 Class B as auxiliary limit lines



Limit File structure:

```
[Application]                    * start header
Software=TekBox RP-W32-D7
Version=Demo
Date=18.01.2017 09:42:29
[General]
Name=RN_CISPR22_FCC15_Class_A_30M_1G_3m_QP.lim
Freq_Interplot_Mode=lin
Level_Interplot_Mode=log
[Data]                           * Main limit line (CISPR 22 Class A)
Freq1=30.000.000                 * first frequency point [Hz]
Lev1=50.5                        * amplitude level of the first frequency point [dBµV]
Freq2=230.000.000                * second frequency point
Lev2=50.5                        * amplitude level of the second frequency point [dBµV]
Freq3=230.000.010                * third frequency point (using a point with 10 Hz offset
Lev3=57.5                          creates a vertical step and keeps the line coherent)
Freq4=1.000.000.000
Lev4=57.5                        * amplitude level of the last point of the main limit line
[Data_Limit1]                    * start first auxiliary limit line
Caption=FCC15 Class A QP         * text label for 1st auxiliary limit line
Color=$FF00FF                    * line color “Fuchsia” (alternatively enter clFuchsia instead of the Hex value)
Style=psSolid                    * line style “solid”
Freq1=30.000.000                 * first frequency point of auxiliary limit line [Hz]
Lev1=49.6                        * amplitude of the first frequency point of the first limit line [dBµV]
Freq2=88.000.000                 * second frequency point of auxiliary limit line [Hz]
Lev2=49.6                        * amplitude of the second frequency point of the first limit line [dBµV]
Break2=1                         * suppress the limit line between second and third frequency point
Freq3=88.000.000                 * third frequency point of auxiliary limit line [Hz]
Lev3=54
Freq4=216.000.000
Lev4=54
Break4=1
Freq5=216.000.000
Lev5=56.9
Freq6=960.000.000
Lev6=56.9
Break6=1
```

Freq7=960.000.000
Lev7=60
Freq8=1.000.000.000
Lev8=60 * end of 1st auxiliary limit line
[Data_Limit2] * start 2nd auxiliary limit line
Caption=enter label here * text label for auxiliary limit line
Color=$FFFF00 * line color “Aqua” (alternatively enter clAqua instead of the Hex value)
Style=psDash * line style “dashed”
Freq1=……..
……..

Colors:

Value	Meaning	Hex Value	Color
clBlack	Black	$000000	
clMaroon	Maroon	$000080	
clGreen	Green	$008000	
clOlive	Olive Green	$008080	
clNavy	Navy Blue	$800000	
clPurple	Purple	$800080	
clTeal	Teal	$808000	
clGray	Gray	$808080	
clSilver	Silver	$C0C0C0	
clRed	Red	$0000FF	
clLime	Lime Green	$00FF00	
clYellow	Yellow	$00FFFF	
clBlue	Blue	$FF0000	
clFuchsia	Fuchsia	$FF00FF	
clAqua	Aqua	$FFFF00	
clWhite	White	$FFFFFF	
clMoneyGreen	Mint Green	$C0DCC0	
clSkyBlue	Sky Blue	$F0CAA6	
clCream	Cream	$F0FBFF	
clMedGray	Medium Gray	$A4A0A0	
clNone	Represents no colors (black)	$1FFFFFFF	

Line styles:
psSolid
psDash
psDot
psDashDot
psDashDotDot

21 Visibility of peak markers

Question:
How can I set peak markers to front/back?

Answer:
use CTRL-O to move circles to front or back
use CTRL-P to move crosses to front or back
use CTRL-M to move markers to front or back
use CTRL-J to move auxiliary limit lines to front or back

22 New SRC directory structure / installation of EMCview V7.0 and higher

With EMCview V7.0, the structure of the SRC directory, which contains limit files, segment files, project files and hardware related compensation files, such as LISN files, current probe trans-impedance files, antenna factor files and signal gain/loss files changed to give an easier access to standard related projects.

Furthermore, all project files were updated and many new project files were added. All project files are now documented.

The installation directory of EMCview 7.0 contains an additional directory with all documentation, such as manual, FAQ document, application notes and project file documentation.

Installation of EMCview V7.0 or higher:

1) First installation of EMCview:
   Download the latest NI-VISA drivers from the National Instruments website
   Download EMCview from the Tekbox website
   Create a directory, e.g. C:\EMCview\
   Unzip the downloaded file into the installation directory
   Execute EMCview*.exe
   The installation routine will create the EMCview directory structure
   Copy the license file into the installation directory
   Execute EMCview*.exe to run the SW

2) You already use an earlier version of EMCview:
   Either delete the SRC folder of the existing installation directory, or create a new installation directory – e.g. C:\EMCview_New\ and install EMCview into the new directory.
   Add your license file into the new directory
   Reason for the new directory: In order to protect user defined projects, EMCview never updates/overwrites the SRC directory. In order to get the new SRC directory installed, the existing one has to be deleted or EMCview has to be installed into another empty installation directory.

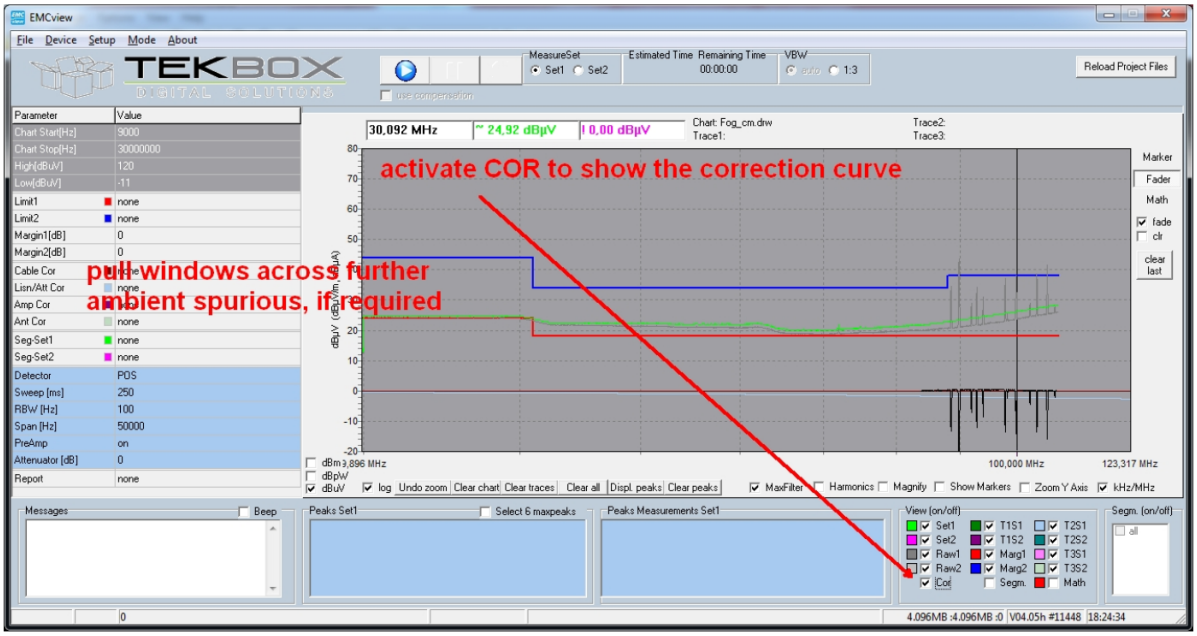
23 The Fader feature does not work as expected

Question:
The fader does not work as expected. What is wrong?

Answer:
The Fader feature was implemented upon repeated customer requests and is based on the idea of making an empty (DUT not powered) measurement to record the ambient noise and subsequently subtract the ambient noise from consecutive measurements, with powered DUT. This idea sounds very tempting; however it only works reliably with a static ambient noise spectrum. In reality, the ambient noise spectrum is very dynamic. Main culprits are cellular networks, IOT, remote controls and many more sources.
Shielded set ups are the right things to combat ambient noise, but static signals such as FM broadcast can be removed using the fader feature with some success.

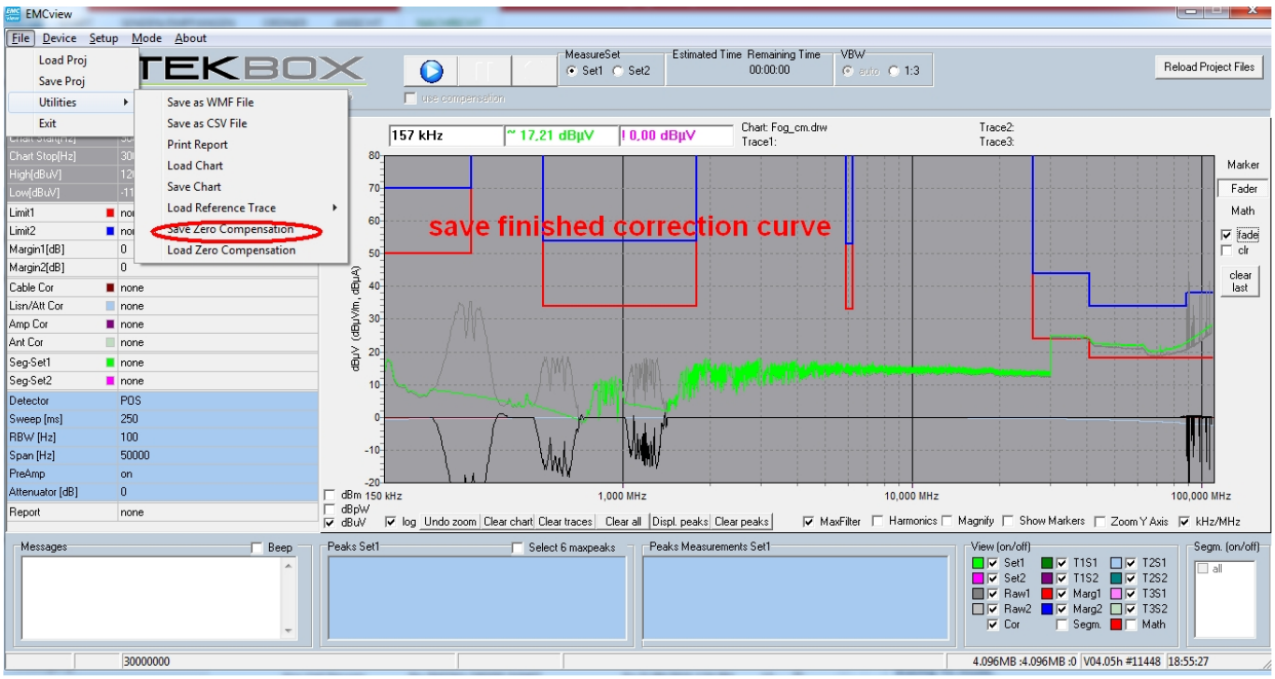
Here is how to use it:
Example - disable FM stations in ambient spectrum. Rather than pulling a window across the entire frequency span, you need to pull individual boxes across the spurious such as below. Click **Fader** and activate **fade**. Then use the mouse to pull boxes across every spurious that you want to have compensated. EMCview can handle up to 100 boxes. Activate the **Clr** box at the right side of the screen in order to pull windows across frequency segments where you want to undo fading. Use **Clear Last** to undo previous segments:

In fact, below just the worst spurious were selected. Activate the **Cor** box in the **View** settings window in the lower right corner. The black curve shows the resulting zero compensation curve:



In the **File** menu, save the zero-compensation curve and thereafter load the zero-compensation curve. Disable the **Cor** box, if you want to make the compensation curve invisible. Then re-measure with the **Use Compensation** box under the **Play** button enabled.

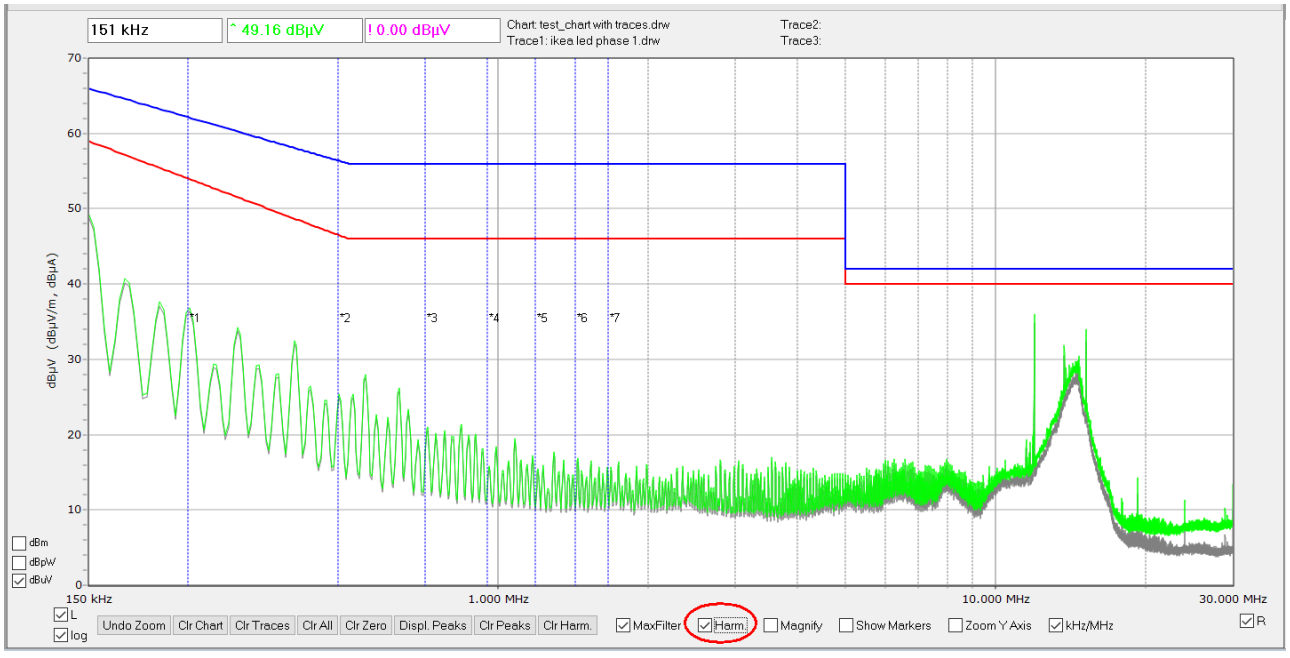
The curve below shows the result of a measurement, where several sections of the spectrum were faded. However, as mentioned at the beginning of this chapter, the fader only works reliably with static interferers. If an interferer was present, when creating the compensation curve and then is absent during the following measurement with compensation applied, a “negative spurious” would result.



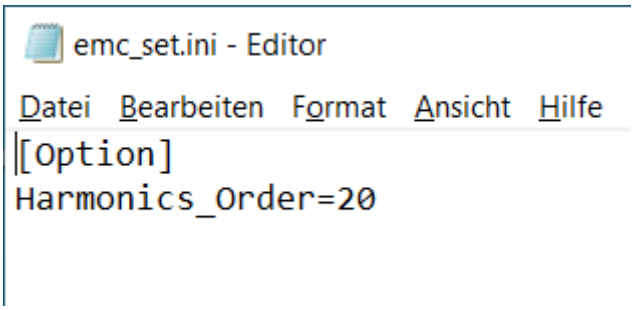
Activate the Clr box at the right side of the screen in order to pull windows across frequency segments where you want to undo fading

24 Identifying harmonic spurious

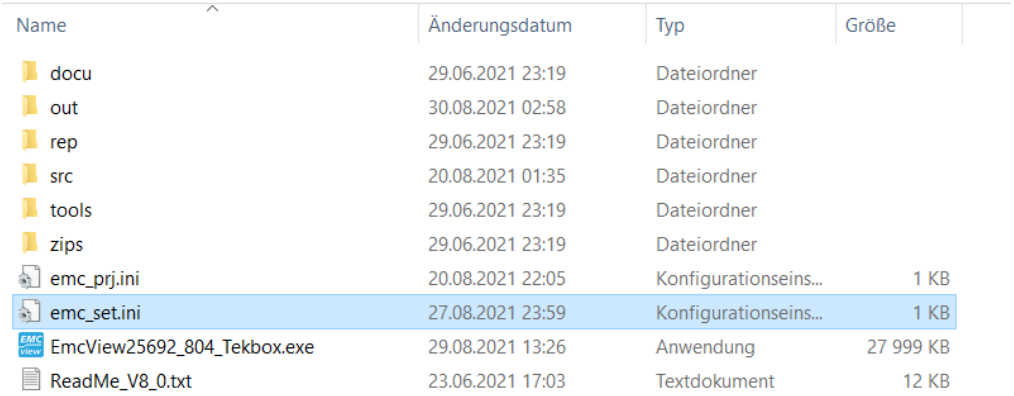
In order to analyze emission spectrums, it is sometimes useful to identify which spurious are harmonics of a base frequency. By default, EMCview can display harmonics up to the 7 th order. Left click the desired base frequency and you will see 7 lines marking the harmonic frequencies:



If you want to change the base frequency, left click any other point in the graph and the harmonic lines will move accordingly.
If you need more than 7 harmonic lines, create following file with an ASCII text editor:

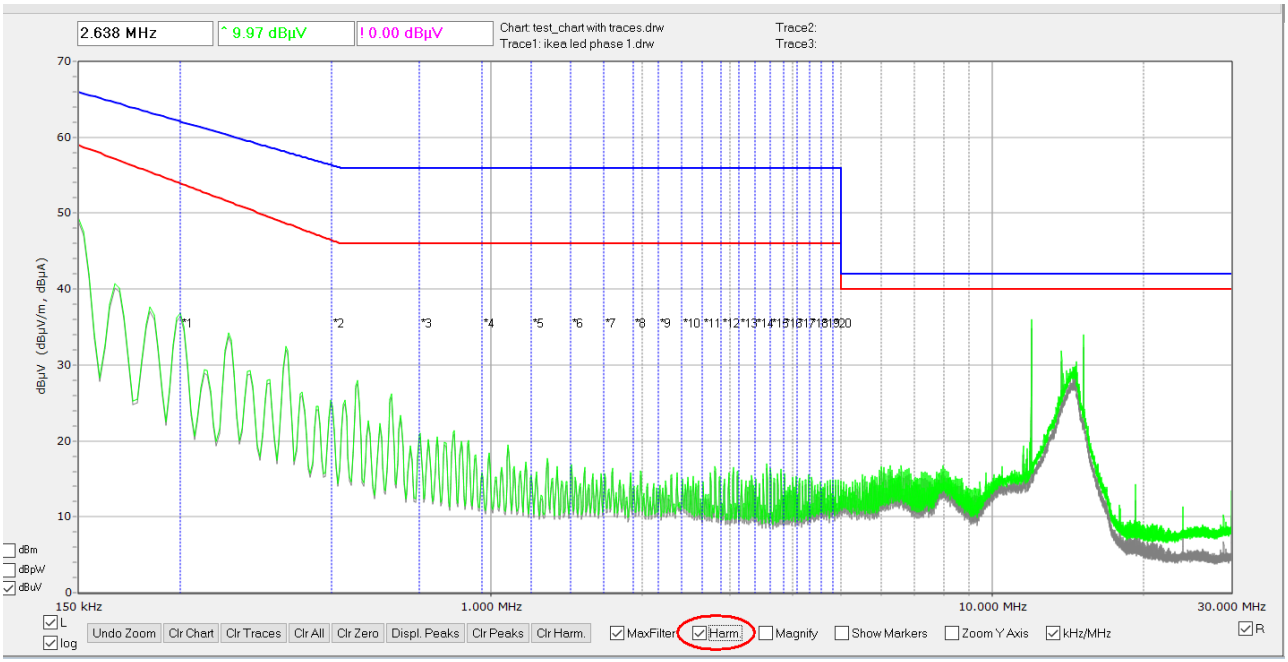


Save it as “emc_set.ini” in the root directory where you installed EMCview. The above file will display 20 harmonic lines. The maximum number of harmonic lines is 99.

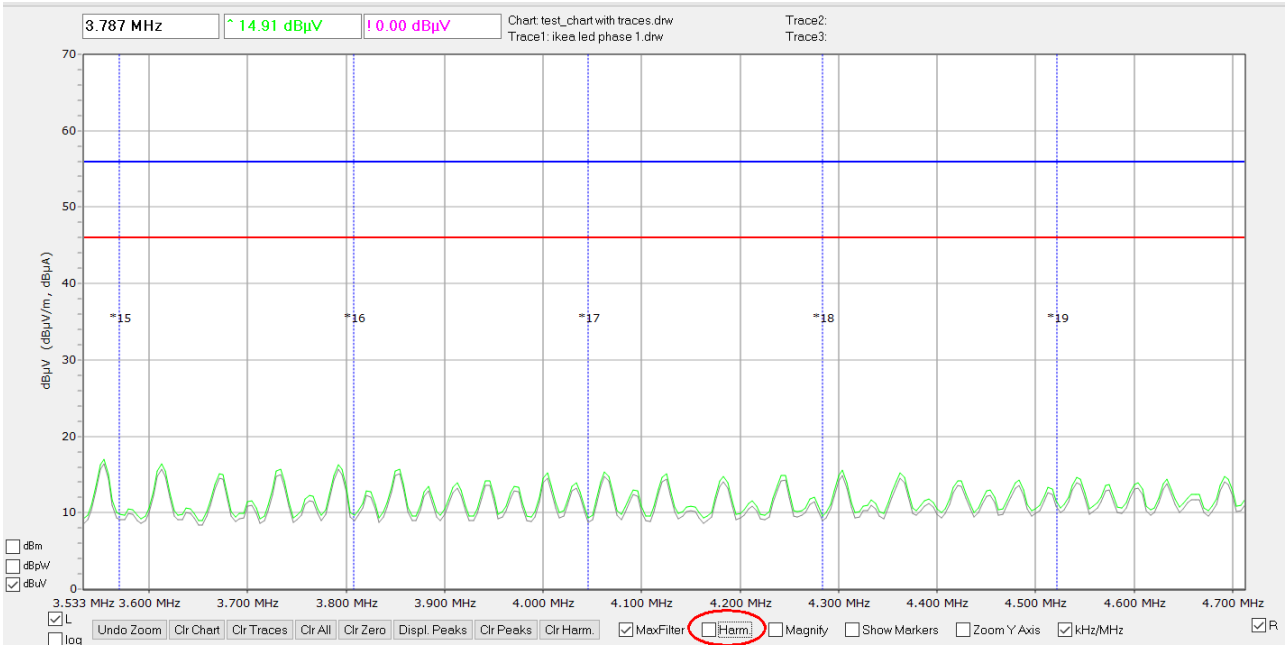


Name	Änderungsdatum	Typ	Größe
docu	29.06.2021 23:19	Dateiordner	
out	30.08.2021 02:58	Dateiordner	
rep	29.06.2021 23:19	Dateiordner	
src	20.08.2021 01:35	Dateiordner	
tools	29.06.2021 23:19	Dateiordner	
zips	29.06.2021 23:19	Dateiordner	
emc_prj.ini	20.08.2021 22:05	Konfigurationseins...	1 KB
emc_set.ini	27.08.2021 23:59	Konfigurationseins...	1 KB
EmcView25692_804_Tekbox.exe	29.08.2021 13:26	Anwendung	27 999 KB
ReadMe_V8_0.txt	23.06.2021 17:03	Textdokument	12 KB

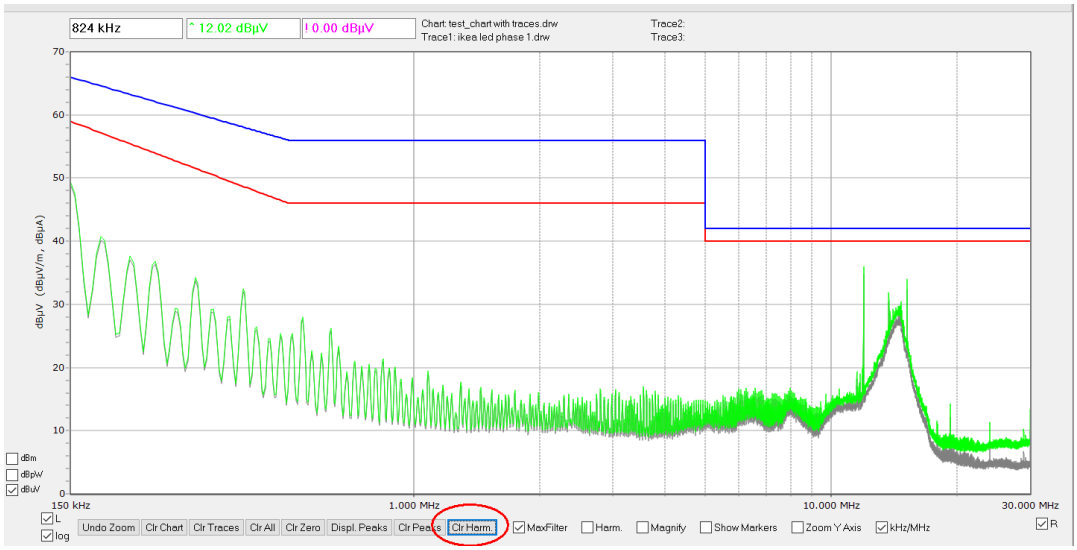
After re-starting EMCview with the above ini file, you will get 20 harmonic lines:



If you want to zoom into the graph to get a better view what is going on at higher order harmonics, you need to deactivate the harmonics box first. After deactivating it, you can pull a zoom window across the frequency range of interest:



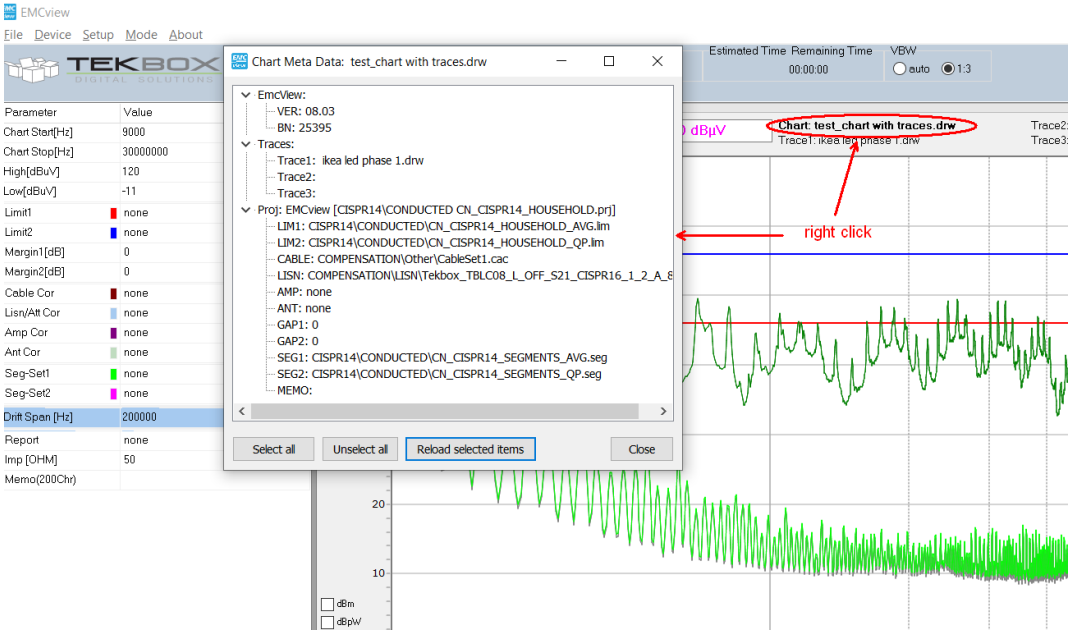
In order to clear the harmonics, press the “Clr. Harm.” Button



25 Saving Charts

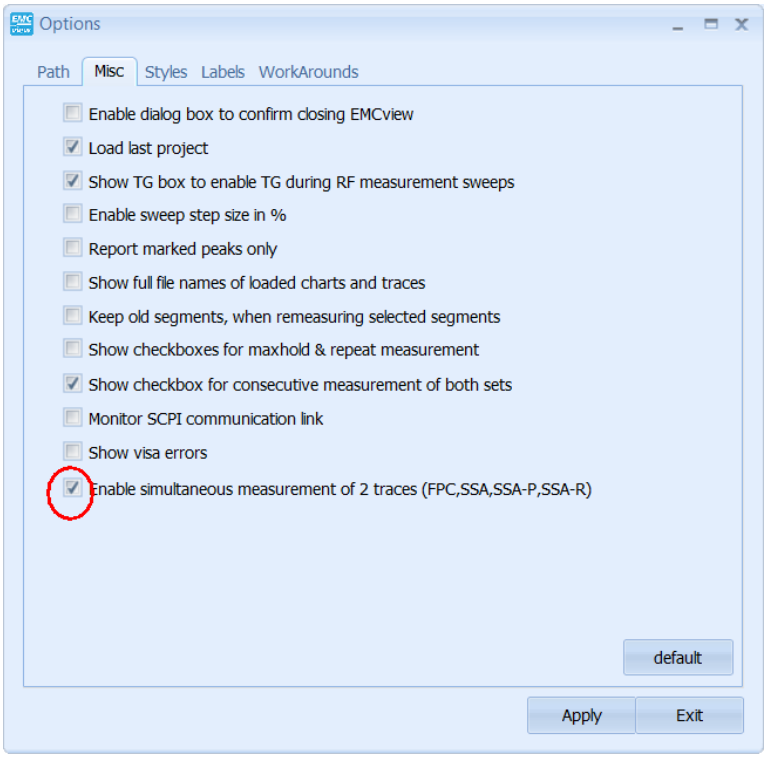
With EMCview V8.0, saving a chart by invoking the menu File / Utilities / Save Chart not only saves the main graphs and the associated raw data and compensation curve, but also any trace present in the graph window. In addition, it saves meta data such as the file name of any included traces and any configuration files involved when creating the measurement – project files, limit line files, segment files and compensation files. Right clicking into the line displaying the file name of the loaded chart on top of the graph window will open a pop-up window with all corresponding information.

By selecting the entire set up, or individual files, you can re-create the project that was loaded at the time when the chart was saved. However, be aware that the metadata in the chart contains the files and corresponding file location, but not the data content of these files. In case that the files were modified or deleted in the meantime, the set up will not be restored correctly.



26 Simultaneous measurement of 2 detectors

This feature is currently (EMCview V08.27) supported for the R&S FPC series and Siglent spectrum analyzers. In menu **SETUP**, **OPTIONS**, activate *Enable simultaneous measurement of 2 traces*:



Now, in case that you start the measurement with **Set1** activated, it will simultaneously measure a second graph, using the detector configured in the segment file for **Set2**. Other than that, it will use all settings configured in the segment file for **Set1**. Likewise, if you start the measurement with **Set2** activated, it will

simultaneously measure a second graph, using the detector configured in the segment file for **Set1**. Other than that, it will use all settings configured in the segment file for **Set2**.
In case of projects, such as for example CISPR 15 mains conducted emissions, where Set2 has a span from 9 kHz to 30 MHz and Set1 has a span from 150 kHz to 30 MHz, a simultaneous measurement should be carried out with Set 2 activated, to avoid missing the segment from 9 kHz to 150 kHz.

27 Connecting EMCview with R&S FPC/FPH analyzers

Question:
I cannot connect to my FPC analyzer. What could be wrong?

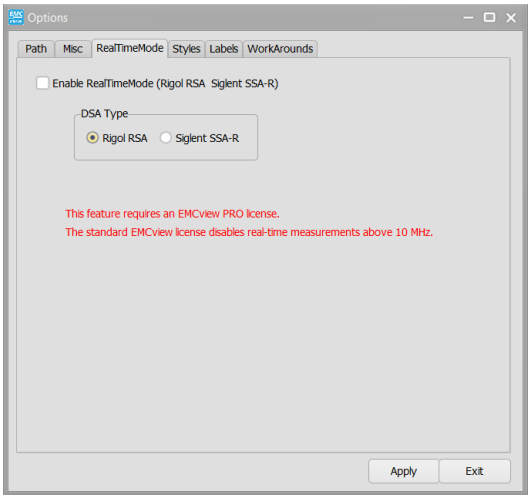
Answer:
First of all, we would recommend USB connection, as reading out data from the FPC via USB is significantly faster than via Ethernet.
In addition to National Instruments Visa Drivers, install "R&S Instrumentview". In order to connect via USB, click menu **DEVICE**, **SA TCP**. In the connection pop up window, enter IP address 172.16.10.10. Next click **Connect DSA** and validate the connection by clicking the **Get Info** button. Close the connection pop up window, load a project and start the measurement.

28 Real time measurements

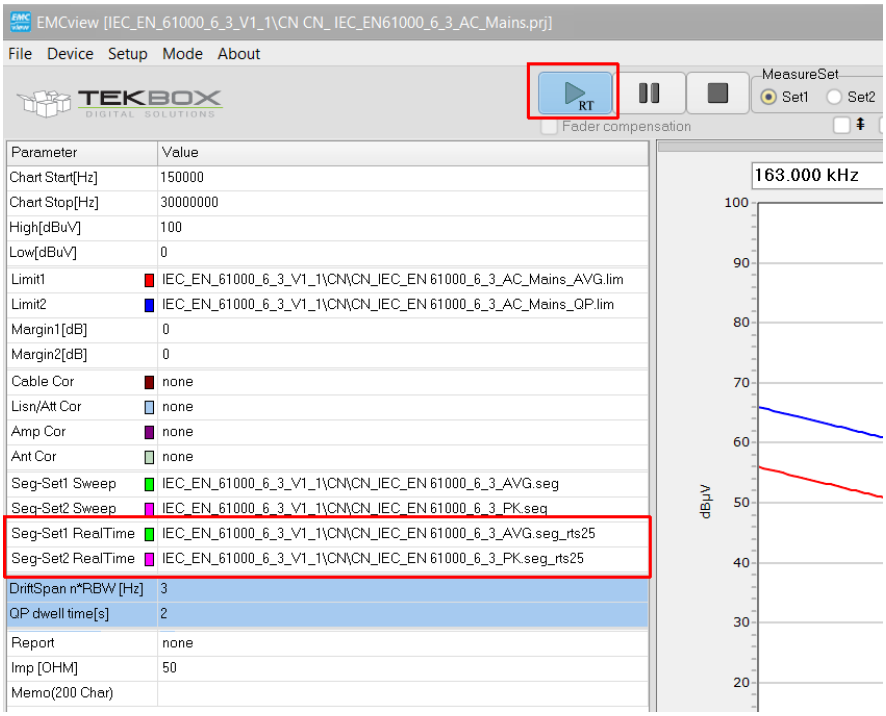
Question:
Does EMCview support real time analysis in order to speed up emission measurements

Answer:
Starting with EMCview version 8.42, the license variant EMCview PRO, offers real time analysis capability and advanced conducted immunity testing features. The customer can select between a standard EMCview license or EMCview PRO. Users with a standard EMCview license have the option to upgrade to EMCview Pro.
Real time analysis can be activated in menu **SETUP**, **OPTIONS, RealTimeMode**.
The **RealTimeMode** feature supports analyzers of Rigol and Siglent.
EMCview version 8.42 supports 10 MHz, 20 MHz and 40 MHz real-time bandwidth for Rigol analyzers and 25 MHz, 40 MHz real-time bandwidth for Siglent analyzers.

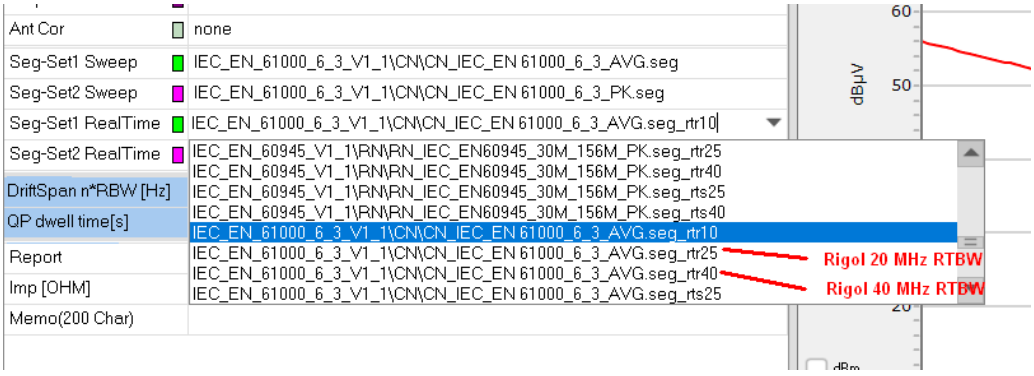
In the **OPTIONS** window, enable real-time mode, select the analyzer brand and press **APPLY**, **EXIT**:



The start button for the measurement will indicate the activation for real-time mode. The configuration section will show two additional segment files, which are used for real-time mode measurements:



In the screenshot above, the extension of the segment file *.seg_rts25 indicates 25 MHz real-time bandwidth for Siglent analyzers. Similarly, the extension *.seg_rtr10 (*.seg rtr20, *.seg_rtr40) would indicate 10 MHz (30 MHz, 40 MHz) real-time bandwidth for Rigol analyzers. In the implementation of EMCview V8.42, the **SETUP** menu does not offer a selection other than the analyzer brand. In order to select 20 MHz or 40 MHz RTBW for Rigol models, the corresponding segment files must be loaded manually:



Similarly, proceed for loading Siglent 40 MHz RTBW segment file. Note that the 20 MHz and 40 MHz RTBW segment files for Rigol and the 40 MHz RTBW segment files for Siglent have not yet been optimized with V8.42.

Limitations of Real Time Mode with respect to CISPR 16 compliance

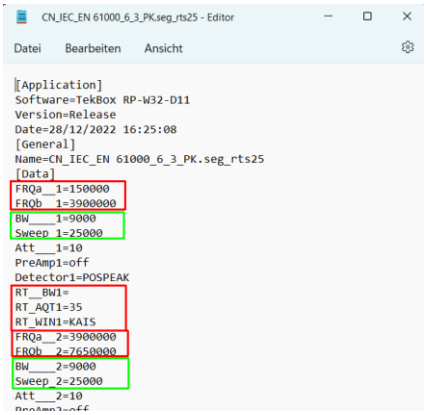
The implementation of real time mode on the analyzer does not permit the selection of CISPR filters and bandwidths. EMCview RTBW segment files configure frequency spans and acquisition times in order to achieve a resolution bandwidth as close as possible to the corresponding CISPR bandwidths. Furthermore, available detectors in real-time mode are limited. There is no QP detector available in real-time mode.

Furthermore, the results of the average detector may deviate up to 10 dB compared to the sweep mode measurement, in case of broadband noise. In contrary, the results of the peak detector measurement in real-time mode comes pretty close to the results in sweep mode.
The currently implemented real-time segment files support the frequency range from 9 kHz to 1 GHz. Above 1 GHz, a RTBW of 10 MHz would require 100 segments/GHz. The advantage of the fast measurement time of a single segment is nullified by the processing time required for downloading data and configuring and starting consecutive segments. Swept measurements above 1 GHz have segment files with 300 MHz span and 30 seconds sweep time.

Real-time mode is significantly speeding up emission measurements, which is a great advantage when tracking modifications for relative improvements during design optimization. However, final measurements should be carried out in sweep mode for confidence reasons.

Real-time segment files

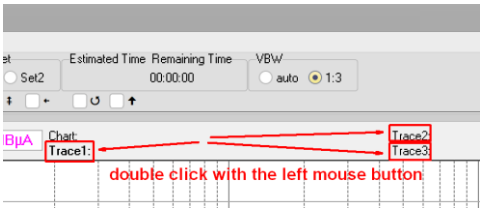
Below an example for a Siglent analyzer with 25 MHz RTBW. The parameters in the red boxes are relevant for real-time mode, whereas the parameters in the green boxes are ignored. In case of Siglent analyzers, the Realtime resolution bandwidth RT_BWx= is ignored as well. The real-time resolution bandwidth results from the settings for the span Freqa_x and Freqb_x and the setting for the acquisition time. These were derived by entering it manually and tuning it until the desired resolution bandwidth could be achieved.



29 Qick-Save Graphs

Question:
How can I temporarily save a graph as trace in the current graph window?

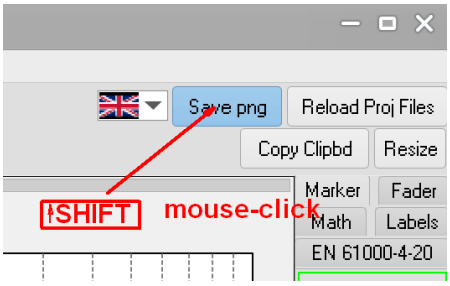
Answer:
You can save any graph using the file menu and thereafter load it as trace, in order to have it available for comparison or documentation purpose in the current graph window.
If you quickly want to save measurement results to the current graph, double click at one of the three traces and the current graph remains displayed as trace.



30 Change screenshot format

Question:
How can I change the screenshot format?

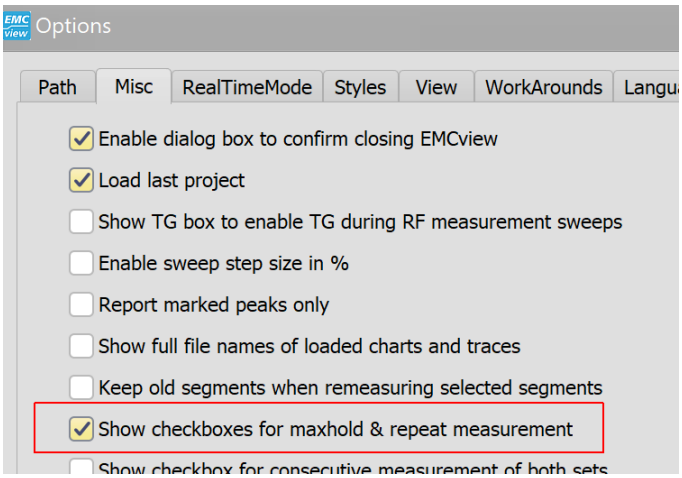
Answer:
Shift – mouse click the screenshot button to scroll through the available formats: png, wmf, jpg, drw.



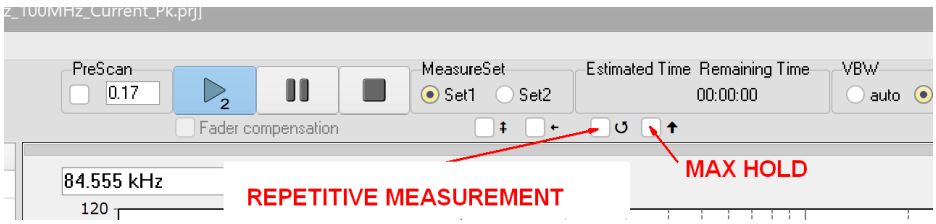
31 Automatically perform repetitive measurements

Question:
How can I perform repetitive measurements?

Answer:
Open the menu Setup, Options, Misc and click the checkbox for maxhold and repetitive measurements.



EMCview will add two checkboxes on top of the graph windows. Click it to activate repetitive measurement with or without Max Hold.



32 History

Version	Date	Author	Changes
V 1.0	30.08.2019	Mayerhofer	Creation of the document
V 1.1	31.08.2019	Mayerhofer	corrections
V 1.2	30.08.2019	Mayerhofer	Chapter 8, 9 added
V 1.3	27.02.2020	Mayerhofer	Chapter 10, 11 added
V 1.4	28.03.2020	Mayerhofer	Chapter 12, 13, 14, 15, 16 added
V 1.5	28.03.2020	Mayerhofer	Chapter 17, 18, 19 added
V 1.6	25.09.2020	Mayerhofer	Chapter 20, 21, 22 added
V 1.7	25.09.2020	Mayerhofer	Chapter 23 added
V 1.8	1.06.2021	Mayerhofer	QP measurement chapter added
V 1.9	1.06.2021	Mayerhofer	Chapter 25 and 26 added
V 2.0	23.03.2022	Mayerhofer	Chapter 27 and 28 added
V 2.1	23.03.2022	Mayerhofer	Chapter 27 updated
V 2.2	16.01.2023	Mayerhofer	Chapter 29, 30, 31 added
V 3.0	9.08.2023	Mayerhofer	EMCview PRO; Chapter 29, 30, 31 updated
V 3.1	14.12.2023	Mayerhofer	EMCview PRO; Chapters re-structured, chapter 29 updated
V 3.2	27.8.2026	Mayerhofer	chapter 30, 31, 32 added
V 3.3	14.10.2026	Mayerhofer	Immunity contents moved into a separate manual