

pendulum
.....●.....

EMC Scanner Software

DETECTUS EMC-SCANNERS



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Detectus AB



In short

The system contains:

- a Scanners table that moves in 3 axis,
- a spectrum analyzer,
- a near field probe and
- a standard PC with
- a custom software

Basically what we do is that we scan a grid of points above a test object with a near-field probe.

We store frequency and amplitude from each measuring position and then we make a map showing the electromagnetic fields emitted from the test object.

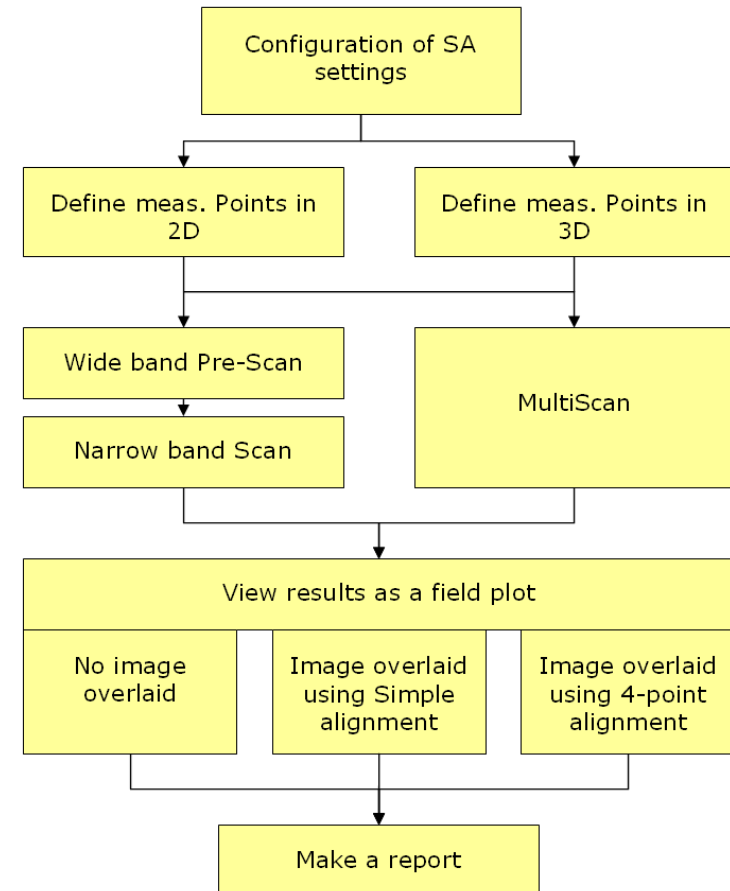
Thus helping designers finding the emission sources and enabling them to, more easily, make better designs.



Program flow

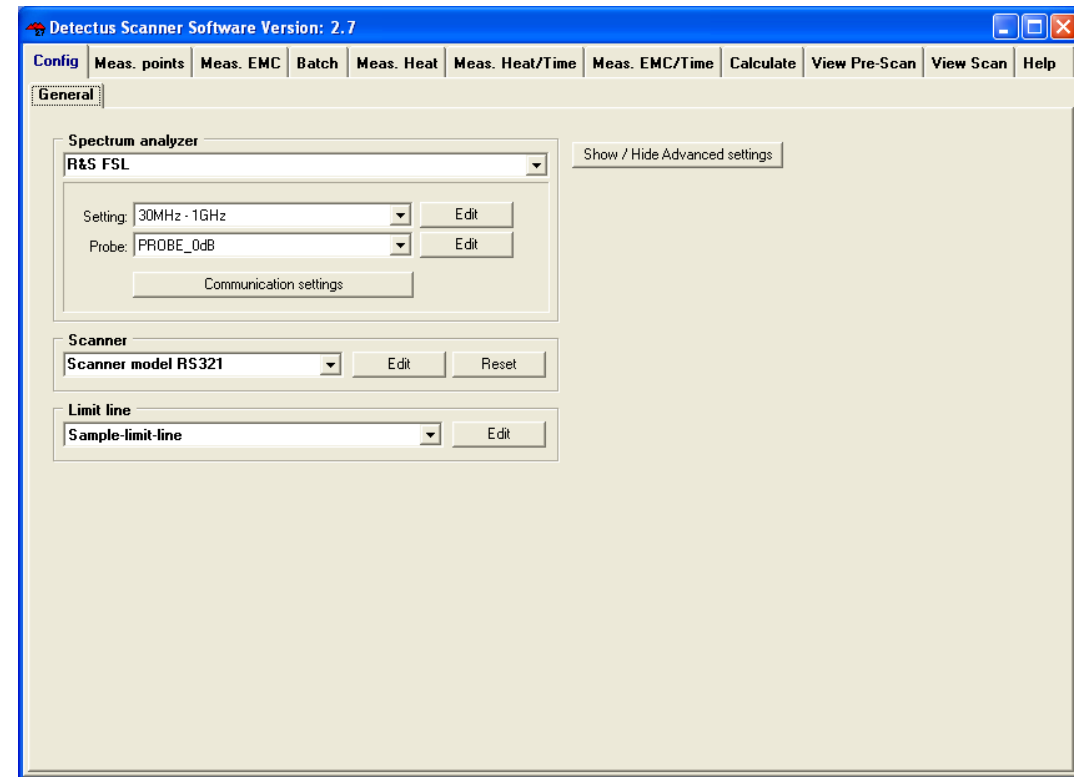
How to produce a field plot

- Configuration of frequency range, bandwidths and so on...
- Define the size and shape of the grid of measuring points.
- Either measure Pre-Scan and Scan or measure MultiScan
- View the field plot either with or without an image overlaid
- The overlaid image can be loaded and aligned either with the Simple alignment or the 4-point alignment



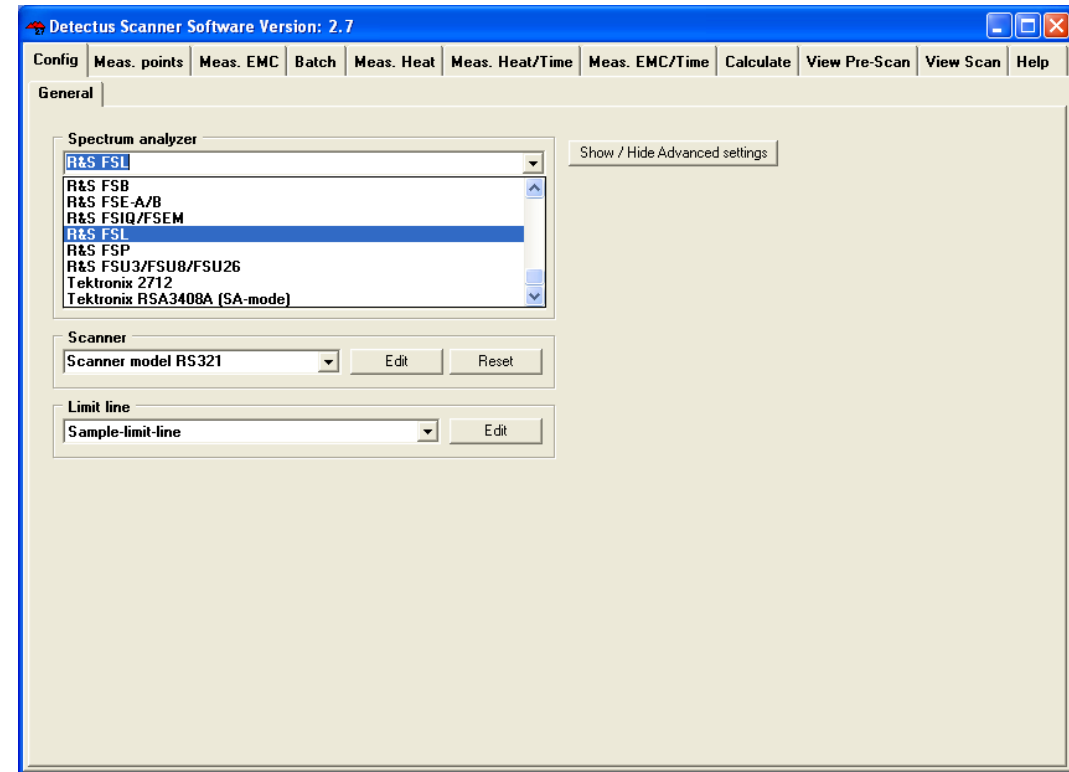
Configuration

- First we need to make some basic settings.



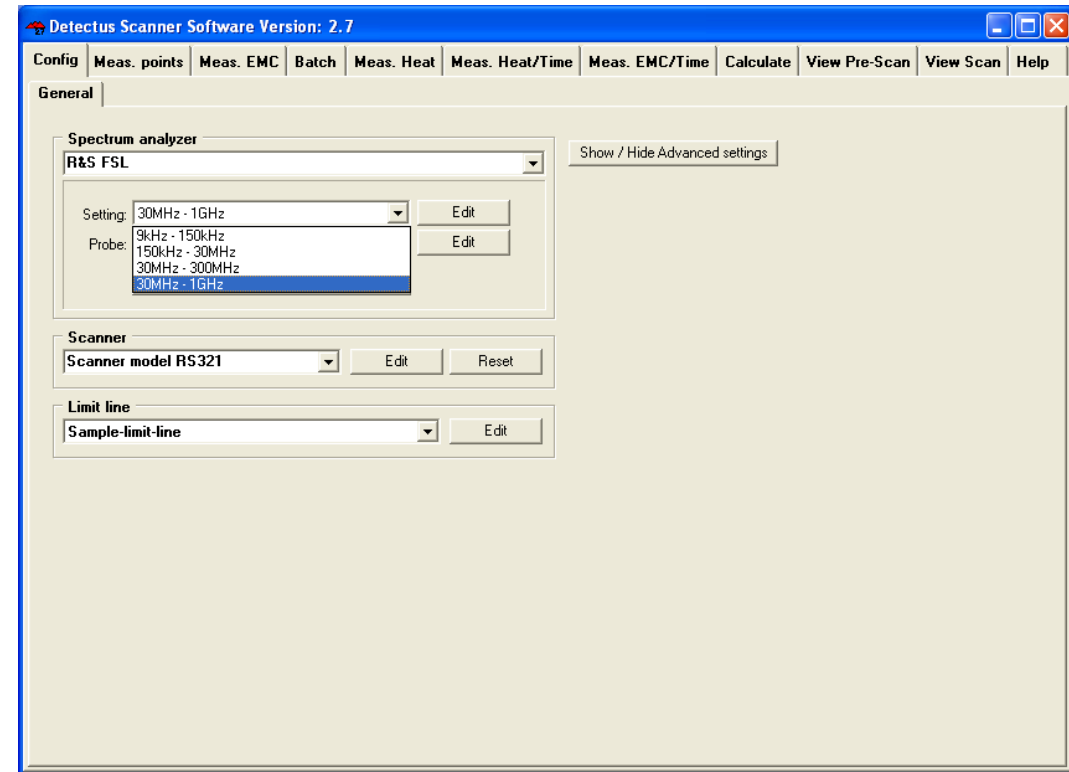
Configuration

- We need to tell the software what spectrum analyzer we are using.
- We have drivers for most common spectrum analyzers.
- If you happen to have one that we don't have a driver for, we will try to make one.
- Free of charge!



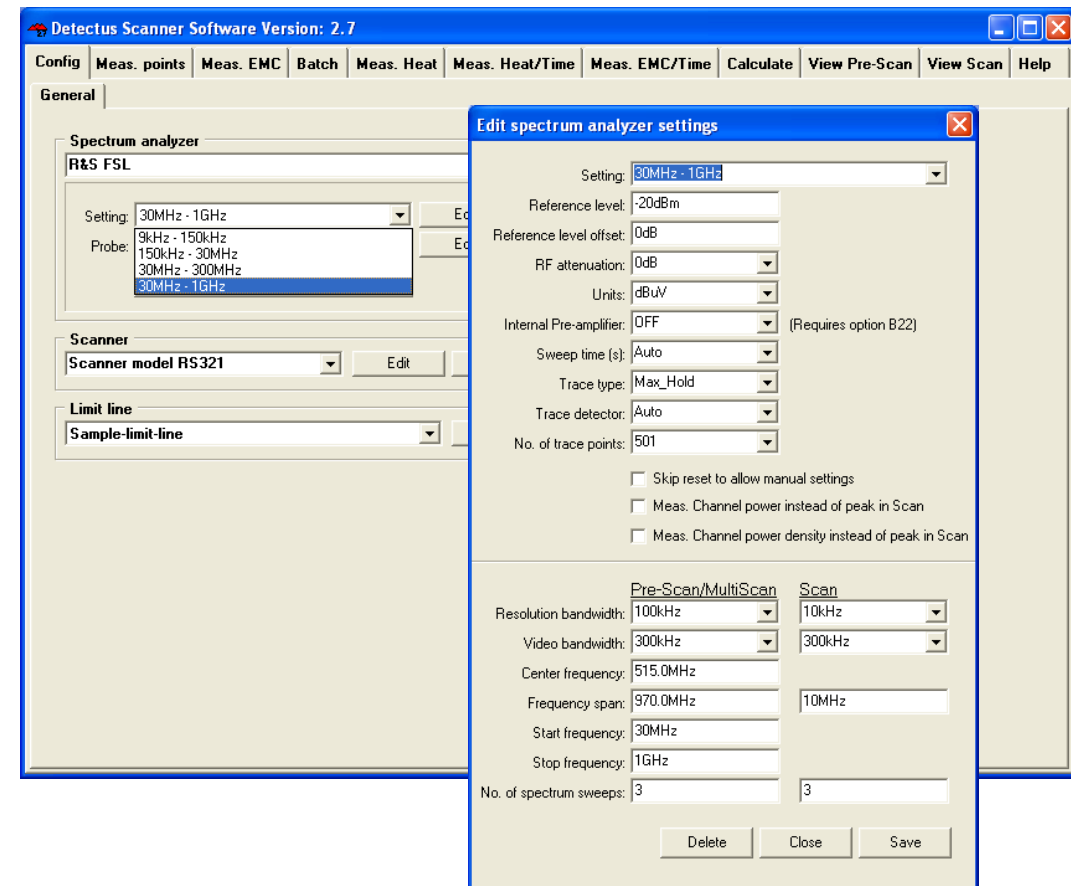
Configuration

- Then we must select a setting for the spectrum analyzer.
- We have a few predefined, but of course you can change them or make your own.
- Click on the edit button to change a setting.



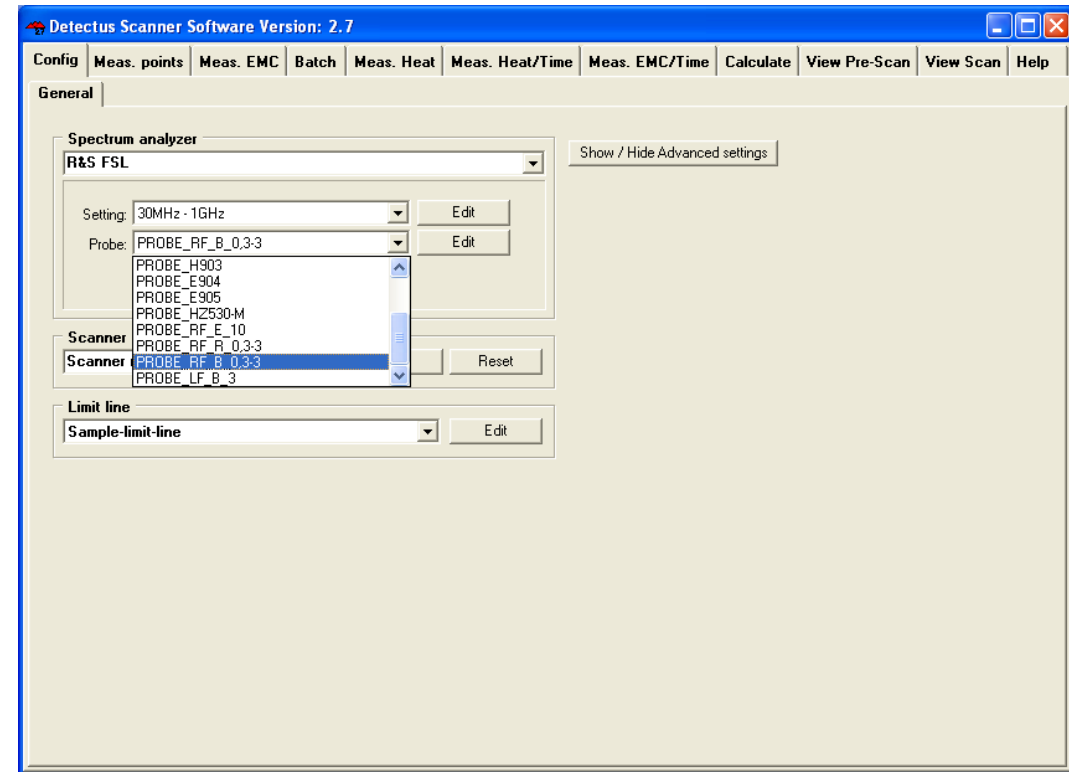
Configuration

- The spectrum analyzer settings dialog includes basic settings like frequency range, bandwidth, reference level and so on...
- There are two columns of settings. One for Pre-Scan/ MultiScan measurements and one for Scan measurements.
- At the bottom you can set the number of sweeps the spectrum analyzer are to make at each measuring position.
- This may be very useful if you are tracking signals that are intermittent.



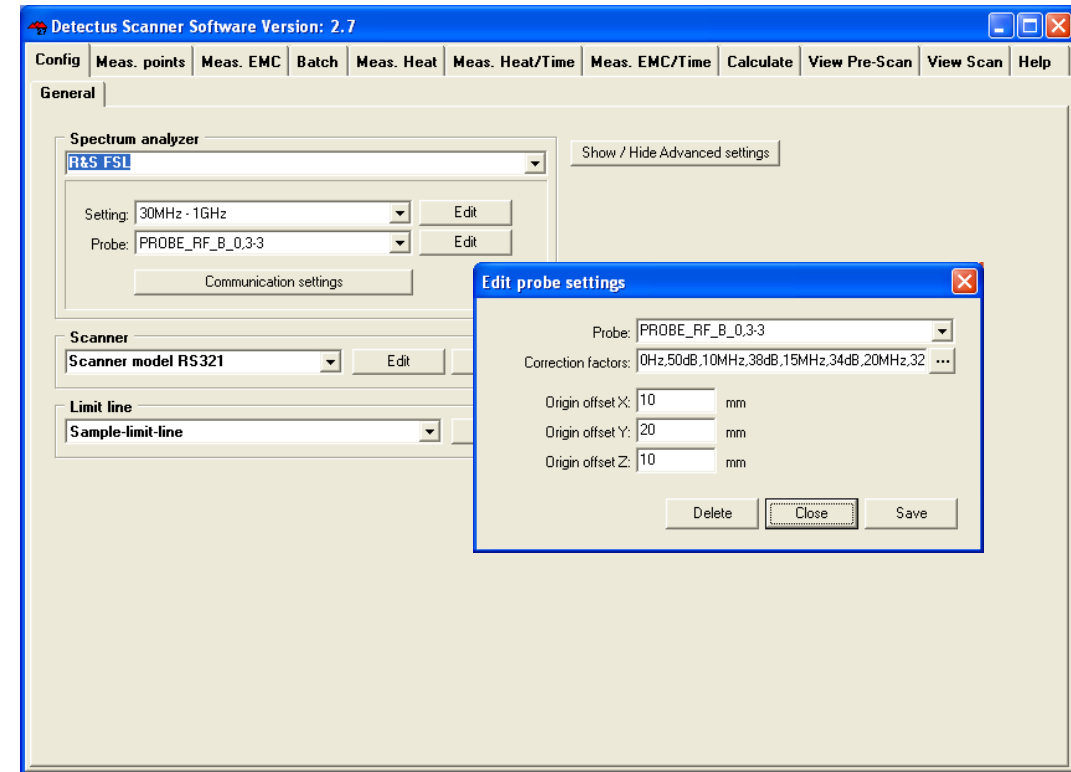
Configuration

- We have predefined the characteristics of some standard near field probes.
- If you have another type of probe you can easily make a new probe setting and enter the characteristics.
- Click on the edit button to change a setting.



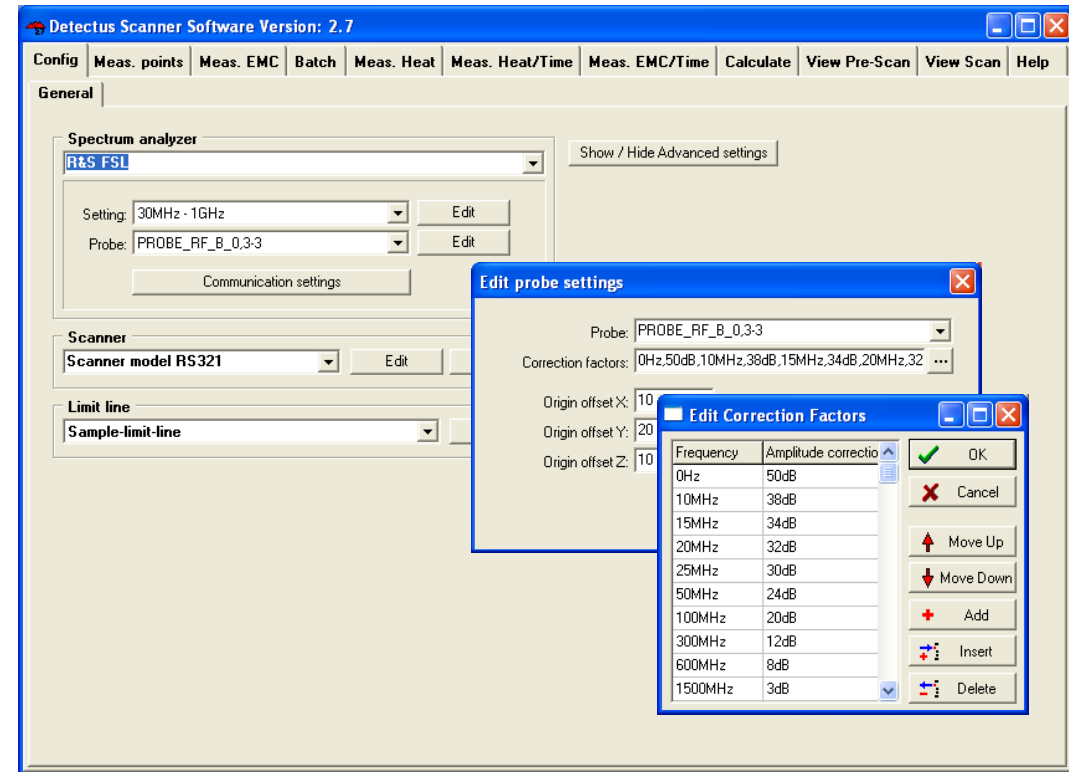
Configuration

- Compensate for differences in mounting of the probe by changing the origin offset values.
- Click on the three-dot-button to change the antenna correction factors.



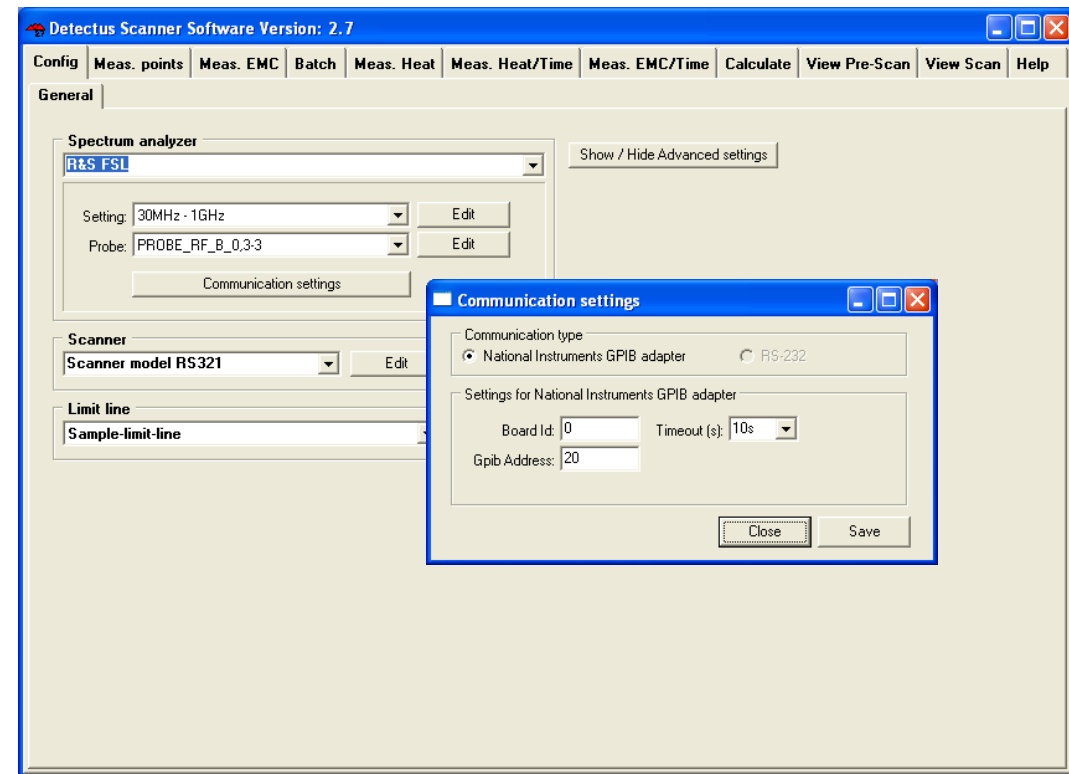
Configuration

- Enter the antenna correction factor of each frequency in the table.



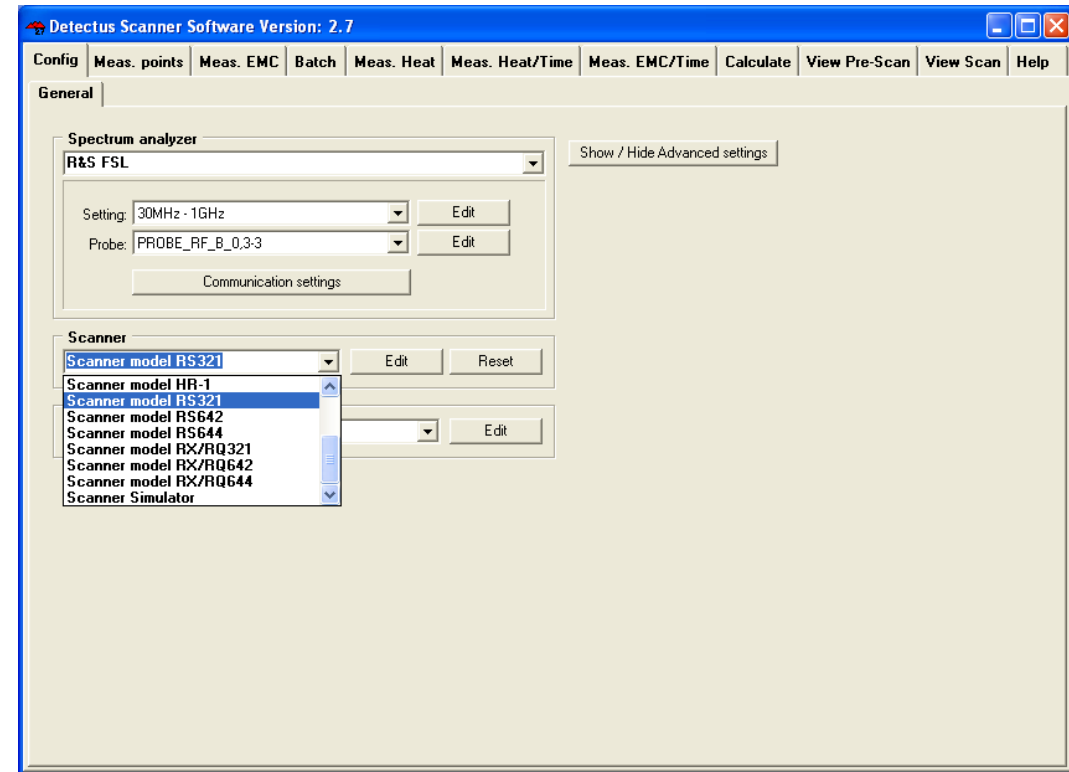
Configuration

- The PC communicates with the spectrum analyzer using a GPIB interface.
- We need to tell the software what GPIB address the spectrum analyzer is using.



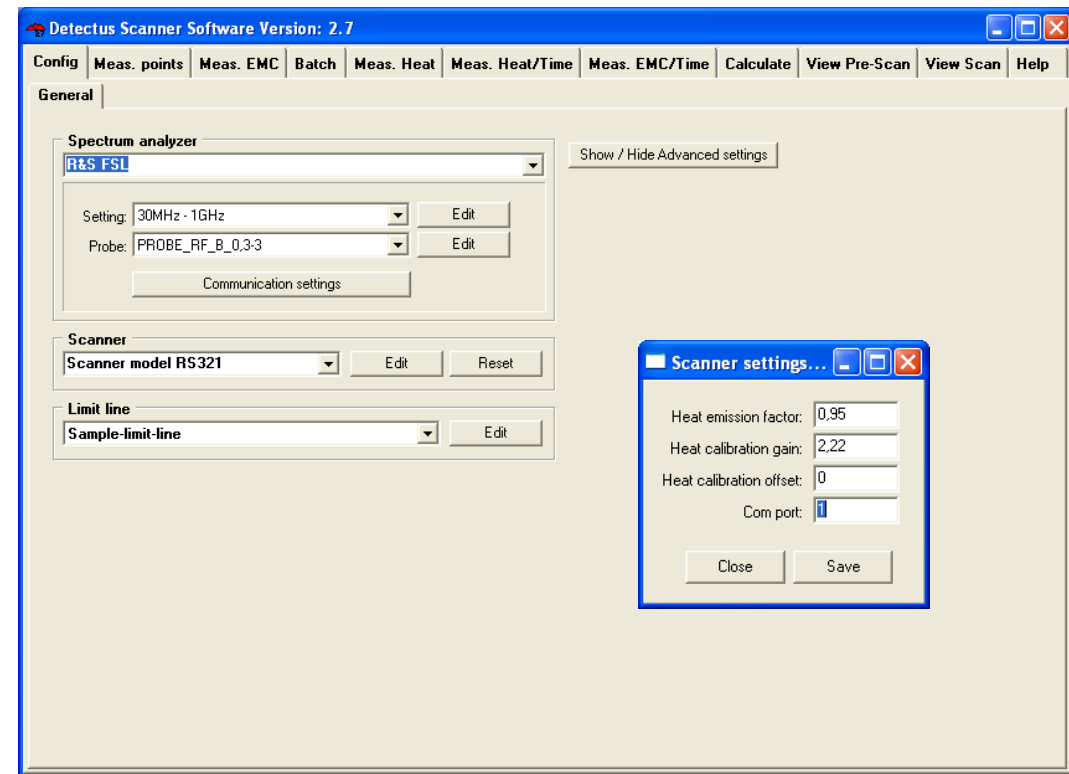
Configuration

- There are several different EMC-Scanner models.
- Just select the Scanner model you are using.
- Click on the Edit button to enter the Scanner settings dialog



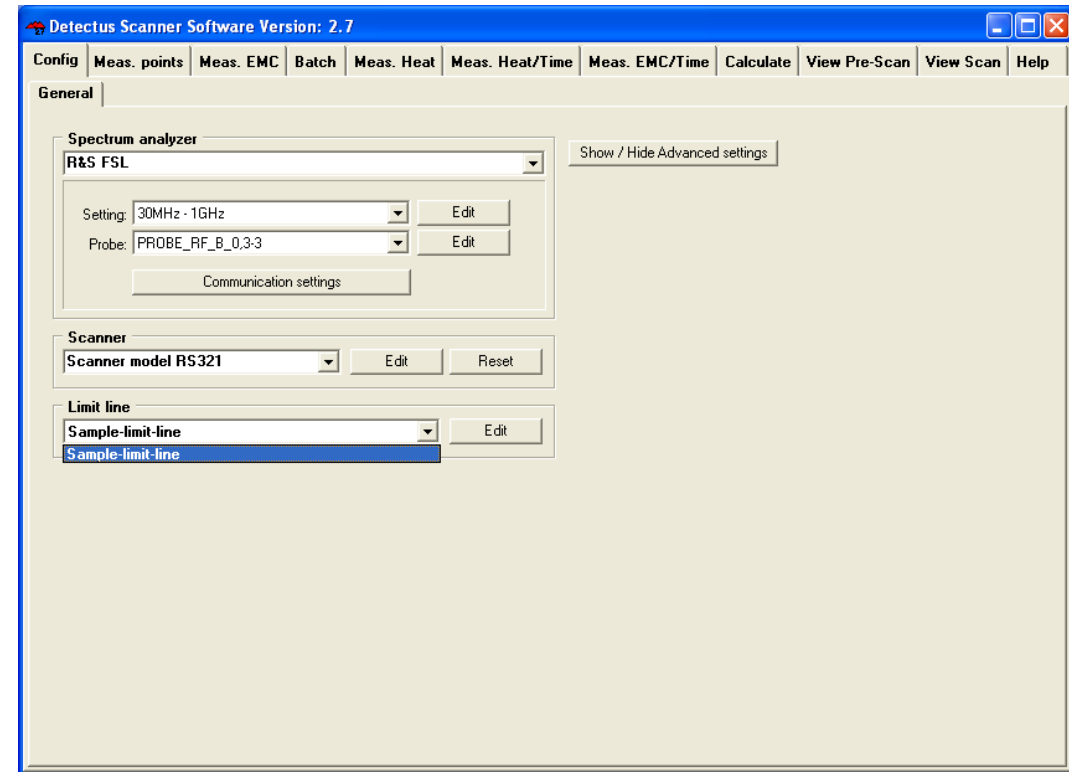
Configuration

- The PC communicates with the Scanner using a standard RS232 serial interface.
- Select the com port connected to the Scanner.
- The Scanner settings dialog also includes settings for the IR-probe.



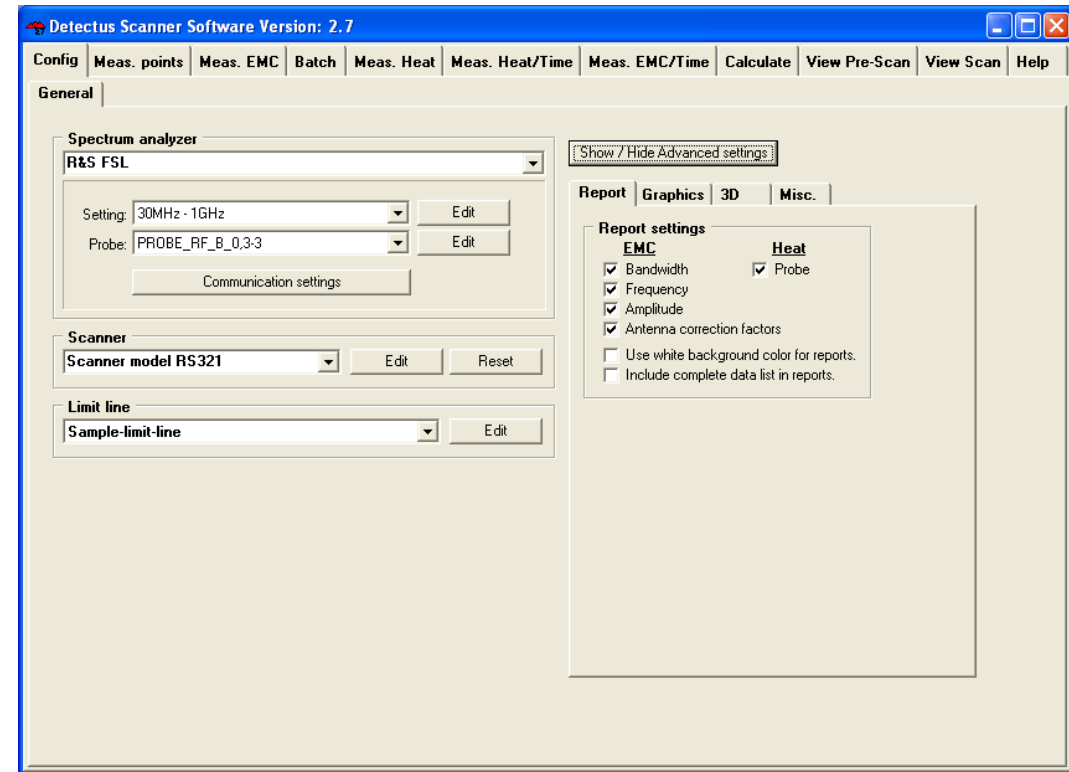
Configuration

- You may create relative limit lines to be used in Pre-Scan reports.
- Click on the Edit button to change or make new limit lines.



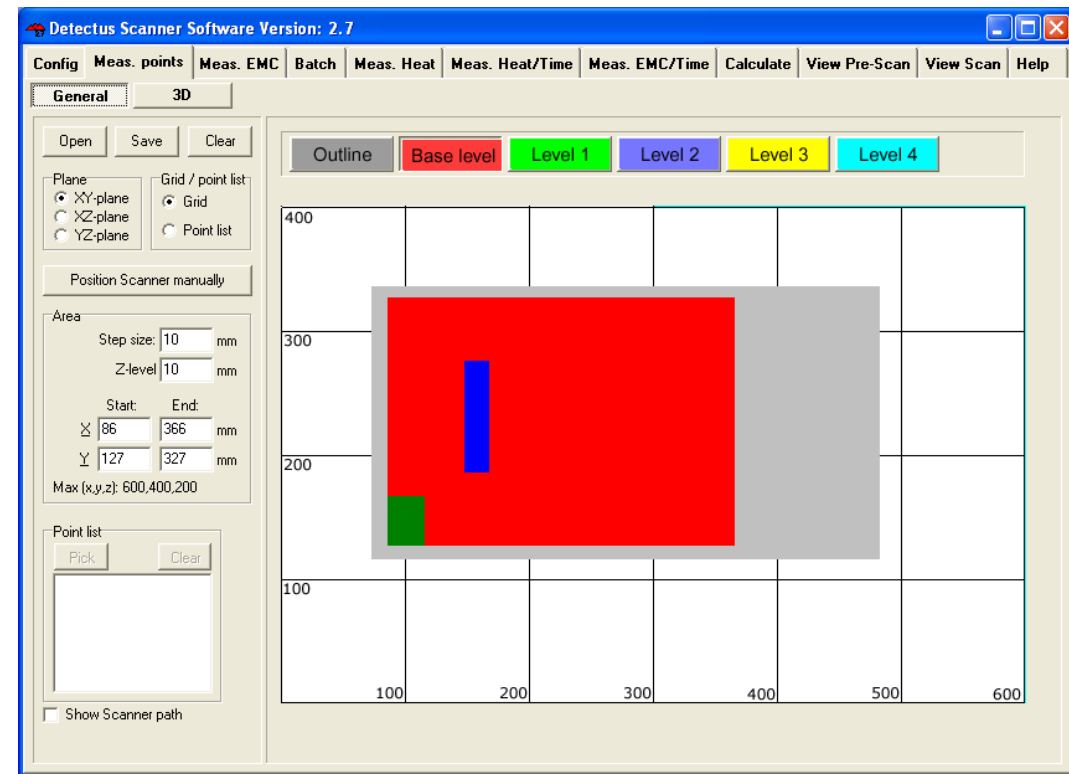
Configuration

- There are some more setting hidden by the “Show/Hide advanced settings” button.
- These setting are more or less of a one-time-nature. You will not have to change them very often.



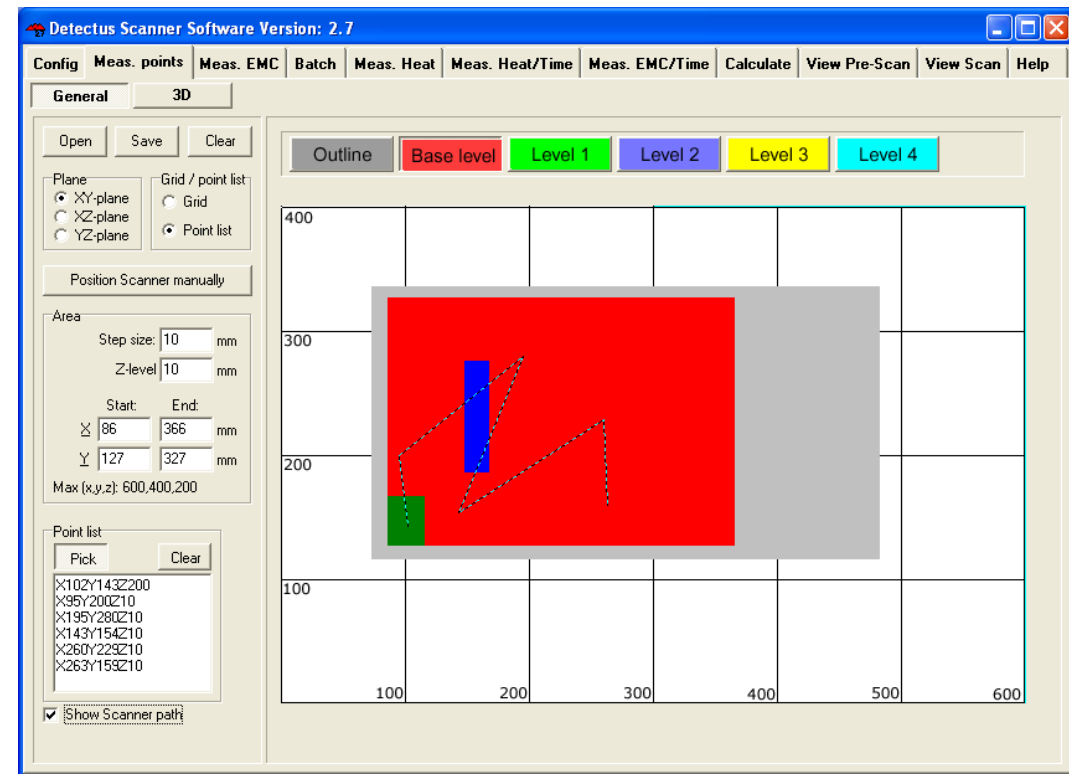
Measuring points

- To define the area to scan...
 - You can click and draw...
 - Or type in the coordinates.
 - Enter height...
 - And step size.
- If you are scanning a PCB with some high components. You may want to define islands with different height.
- Normally you scan in the XY-plane but it is also possible to scan in the XY- and YZ-plane.



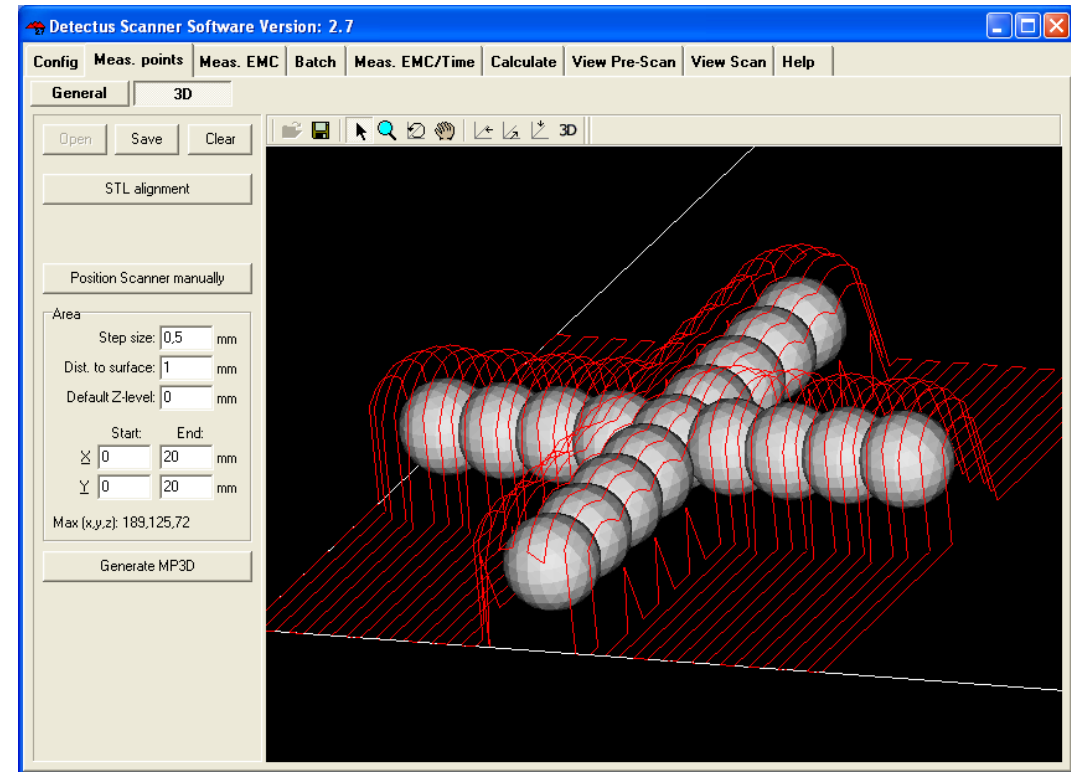
Measuring points

- To make fast Pre-Scan measurements you may want to measure at just a few selected positions instead of a grid of point.
- This may be very useful for quality assurance measurements in production.
- To do this you select “Point list” instead of “Grid” and then just point and click to pick the desired positions.



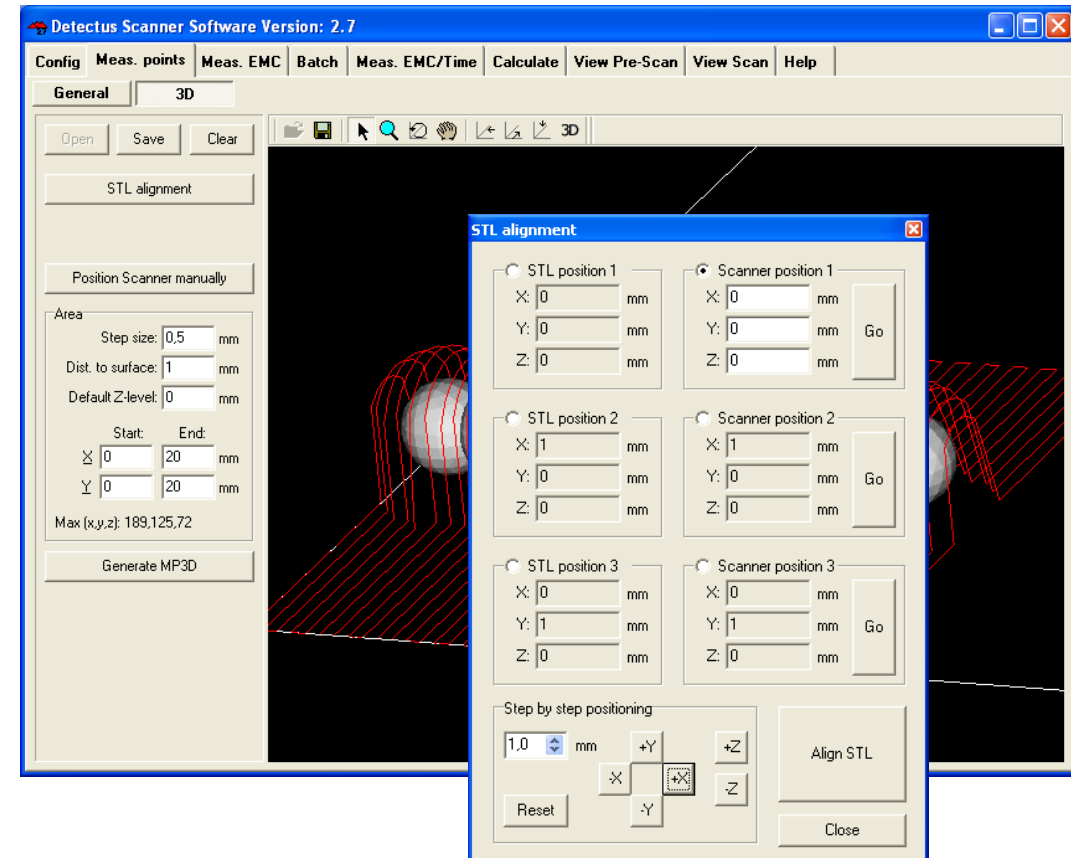
Measuring points

- Measuring point can also be generated as a grid of points at a fixed distance from a 3D surface model (STL-file)
- The surface model can easily be aligned to the physical test object using the STL alignment feature.



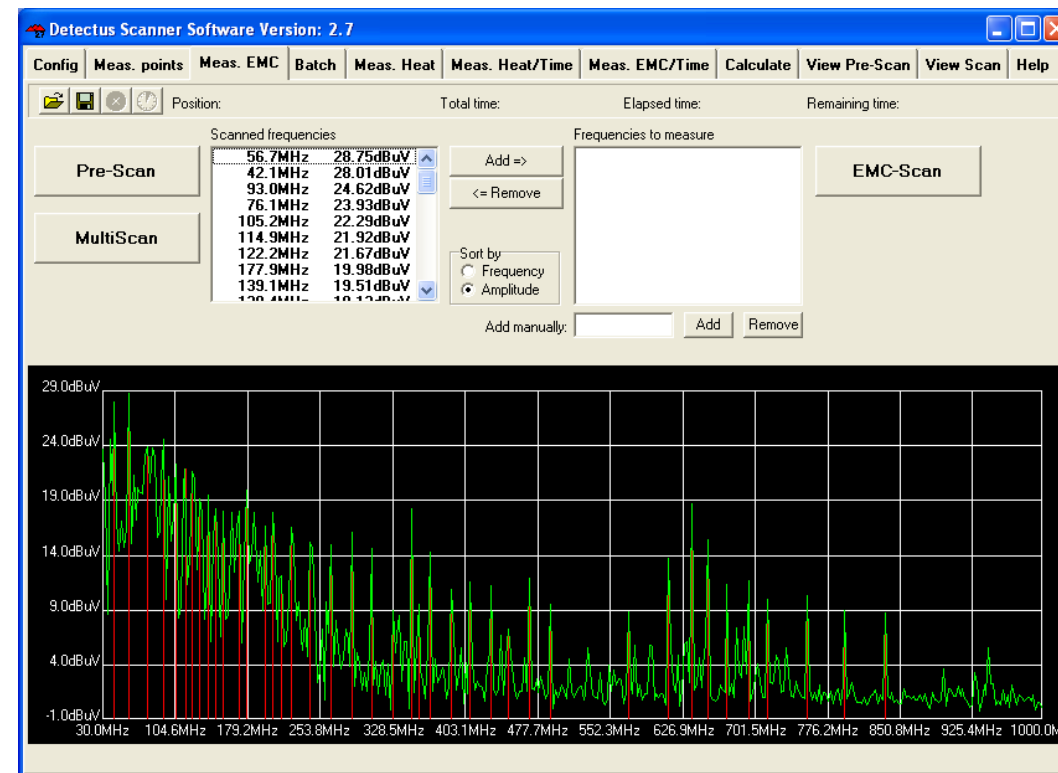
Measuring points

- The STL alignment feature uses three points picked on the screen and three points picked on the physical test object to accurately align the 3D surface model with the test object.



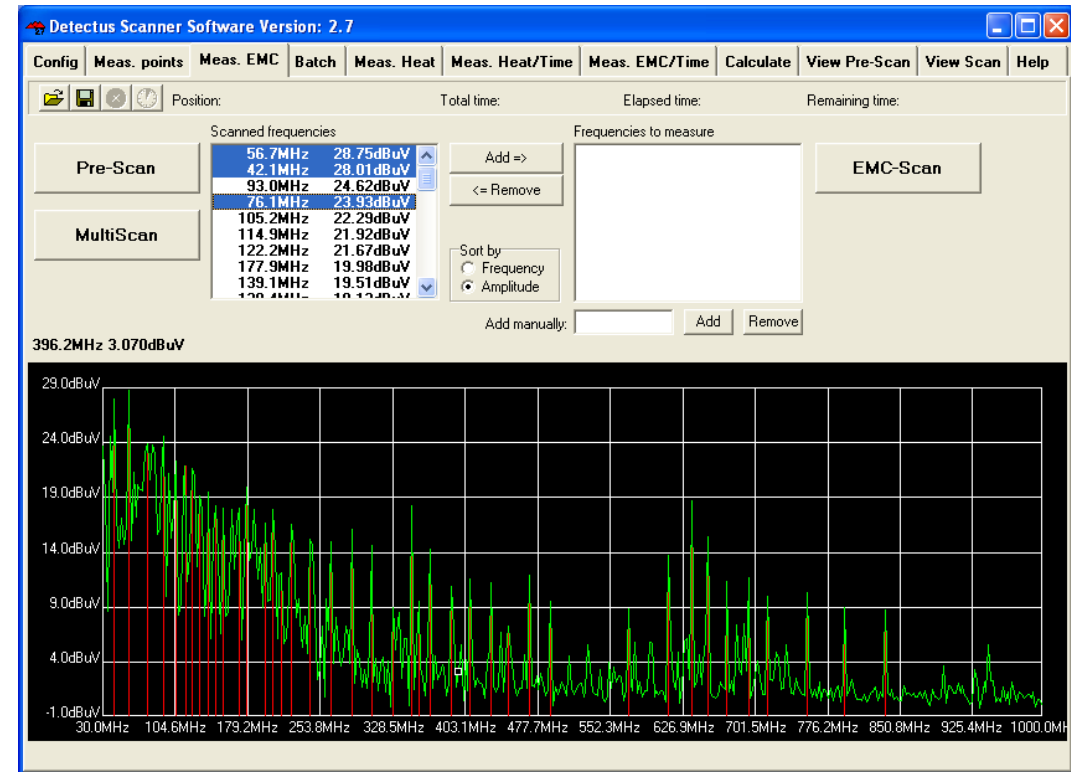
Measure EMC

- The Pre-Scan measurement is a wide-band measurement where the spectrum analyzer is set to “Max Hold”-mode while scanning.
- While scanning the amplitudes accumulate at each frequency.
- The result is a worst-case measurement of every frequency.
- The result is presented as a graph and a list of all the peaks.



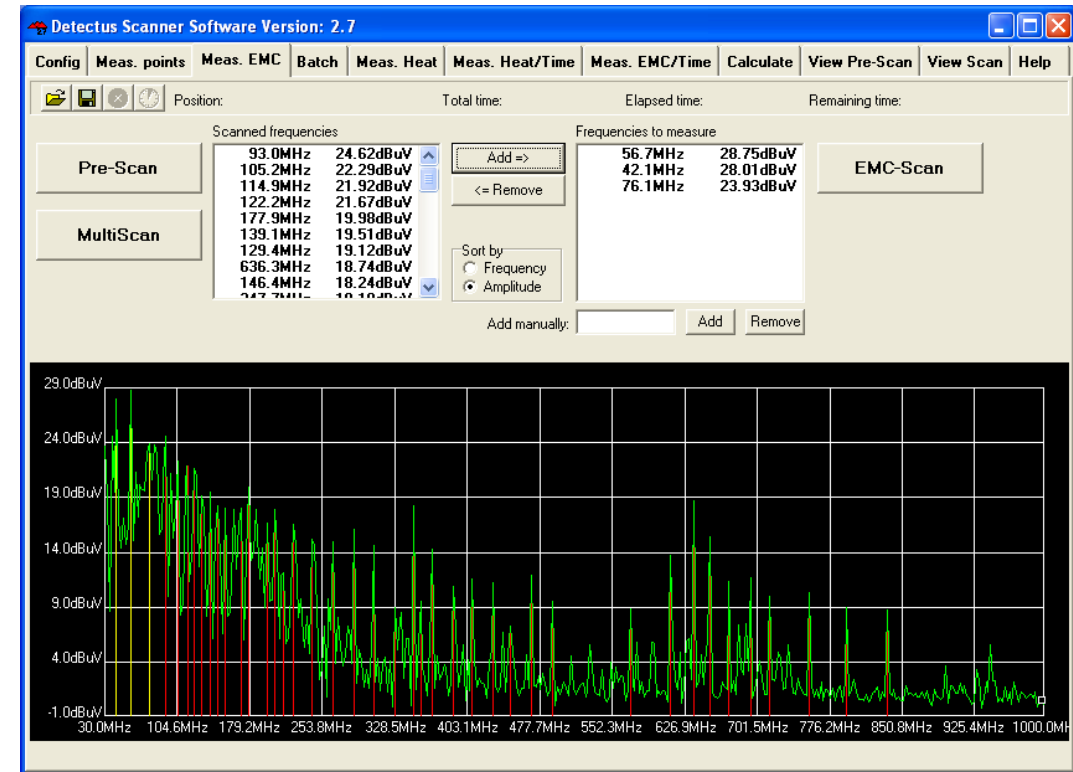
Measure EMC

- In the graph the spectra is green and the peaks are red.
- From the result of the Pre-Scan measurement we select a few peaks...



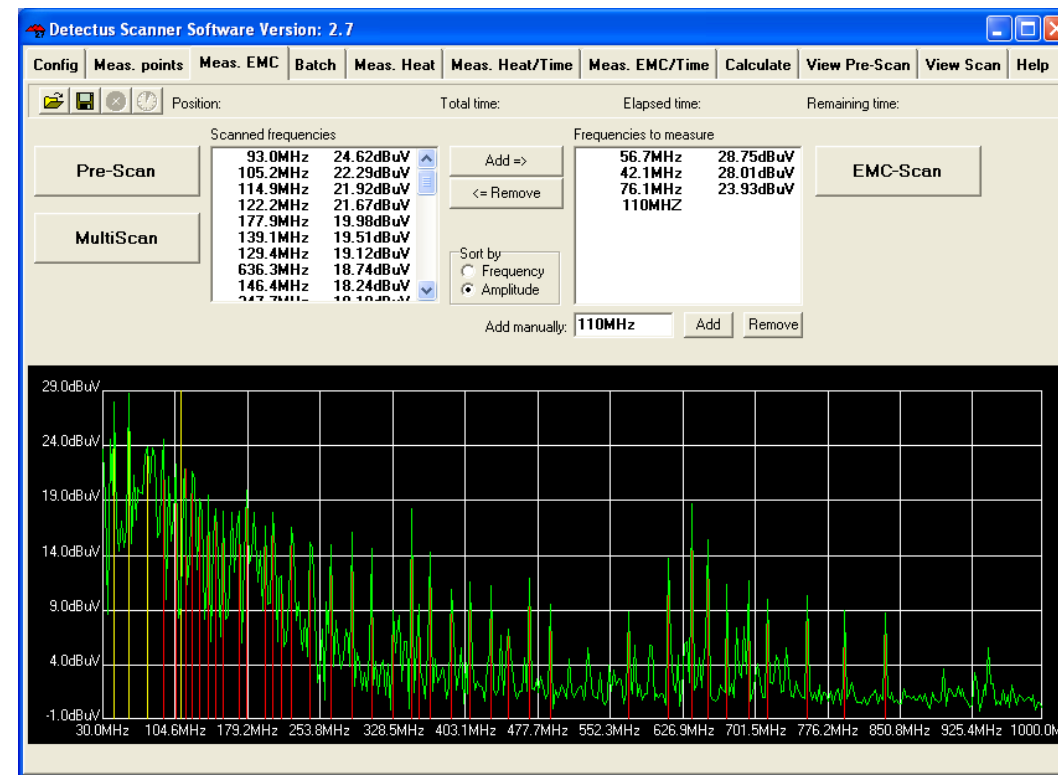
Measure EMC

- And click on the “Add=>” button to move them to the list of frequencies to measure.



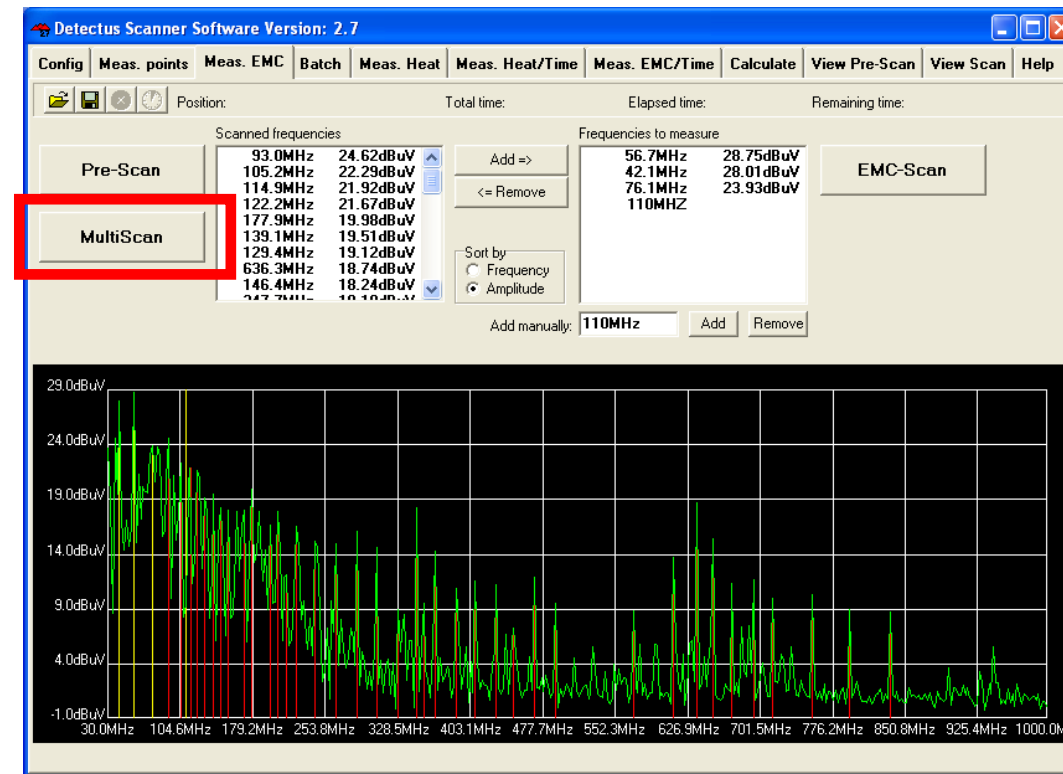
Measure EMC

- If you want to measure other frequencies than those selected as peaks by the spectrum analyzer, you type in any frequency and add it manually.
- Clicking the EMC-Scan button will start a measurement that results in one measurement file for each frequency in the list.
- Let's have a look at such a measurement...



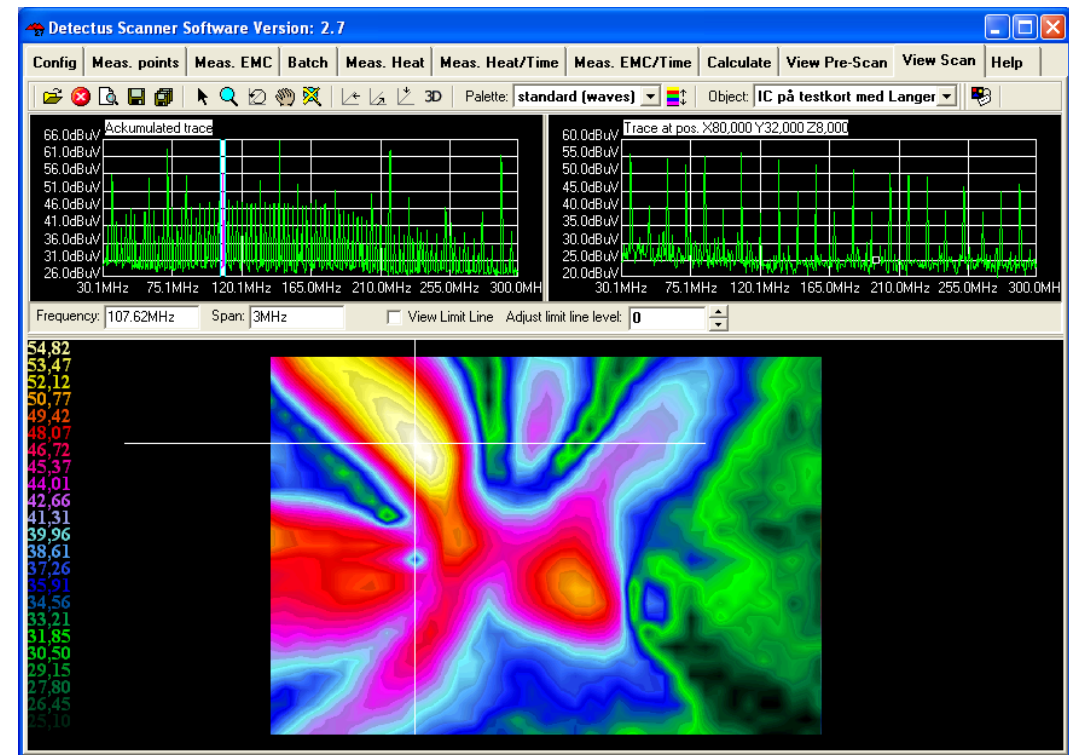
Measure EMC

- The MultiScan measurement is in fact a Pre-Scan measurement in every measuring position.
- The whole wide band spectra from every measuring position is stored.
- The MultiScan measurement is almost as quick as a Scan measurement and it brings so much more analysis capability.



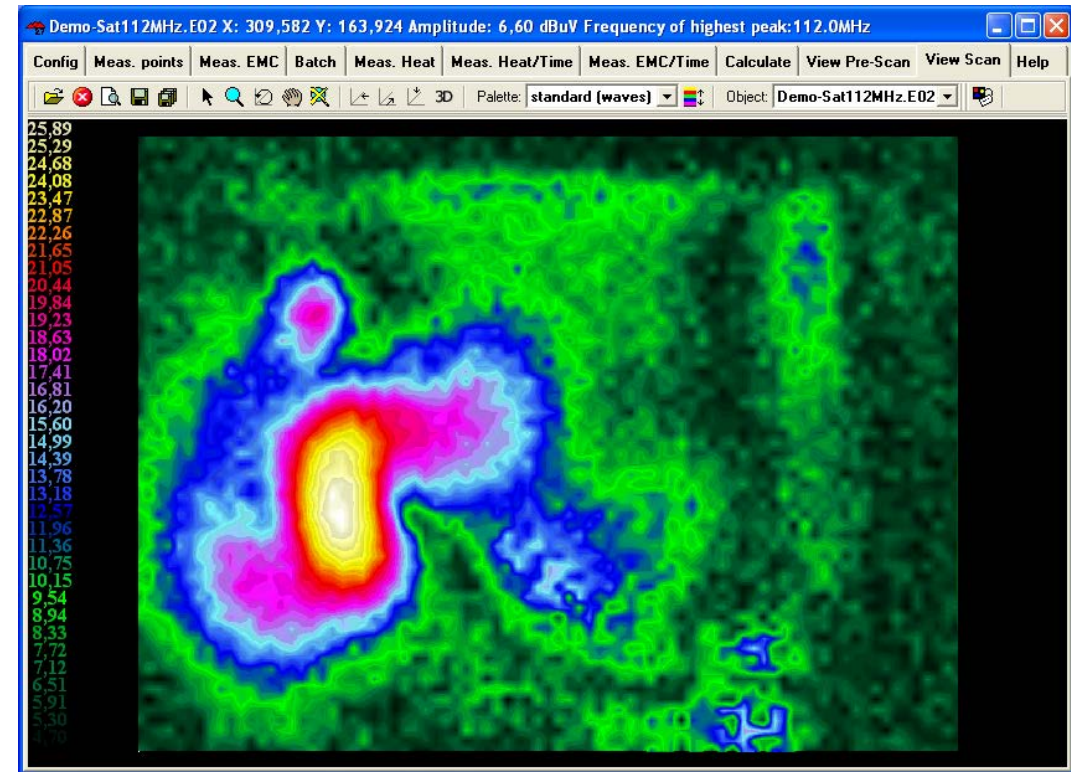
View Scan

- This is a sample MultiScan measurement
- The upper left graph shows the accumulated trace from all measuring positions. (That is, the exact same thing as a Pre-Scan.)
- At the bottom you can see the field plot.
- The field plot is generated from the frequency and span selected in the upper left graph.
- The upper right graph shows the wide band spectra from just one measuring position - the selected position marked with a white cross.



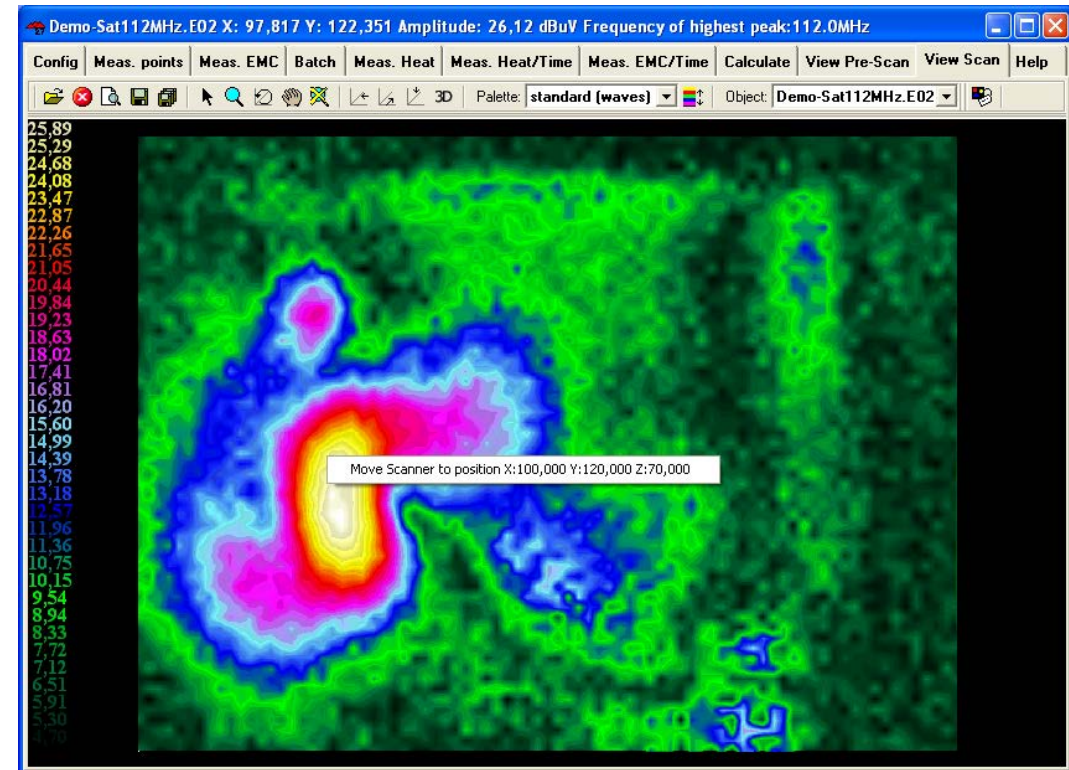
View Scan

- This is a sample measurement of a satellite receiver at 112MHz.
- As you move the cursor over the measurement you can see the coordinates and amplitude at the top of the window change.
- You can easily find the highest peak, read the X- and Y-coordinates and thus locate the emission source on the test object.
- There is an even better way to locate the emission source...



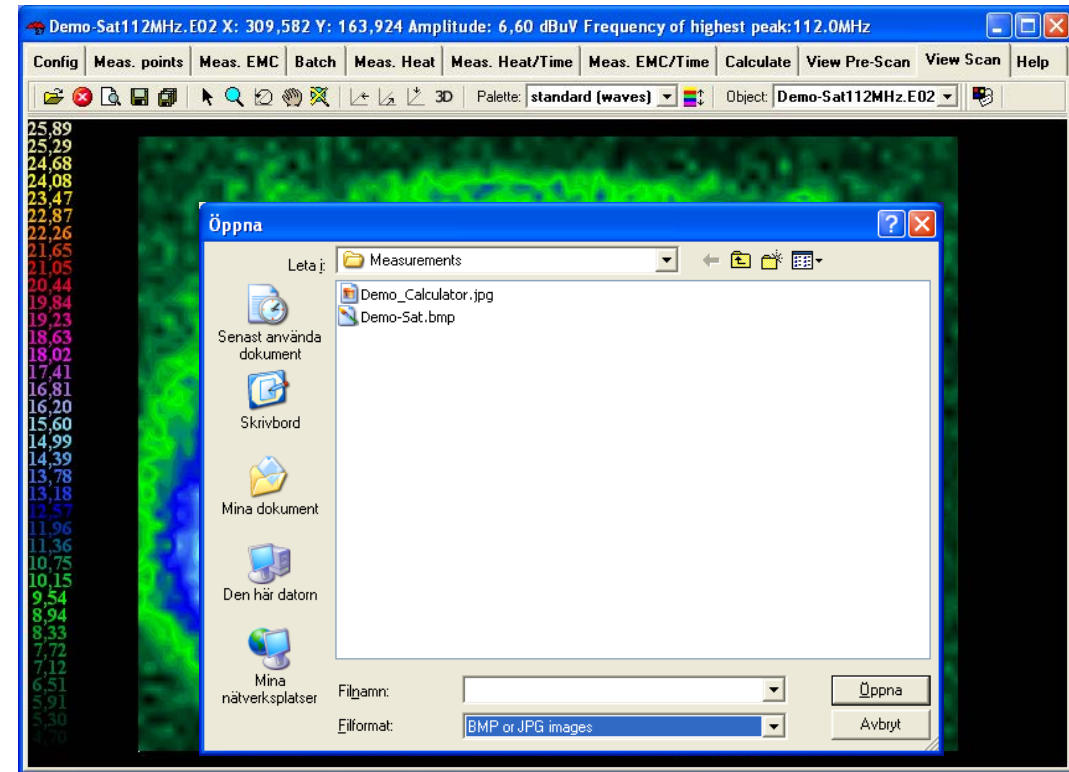
View Scan

- Simply right-click on the field plot and select “Move Scanner to ...” in the menu.
- The Scanner will move the probe to the measurement position you just clicked.



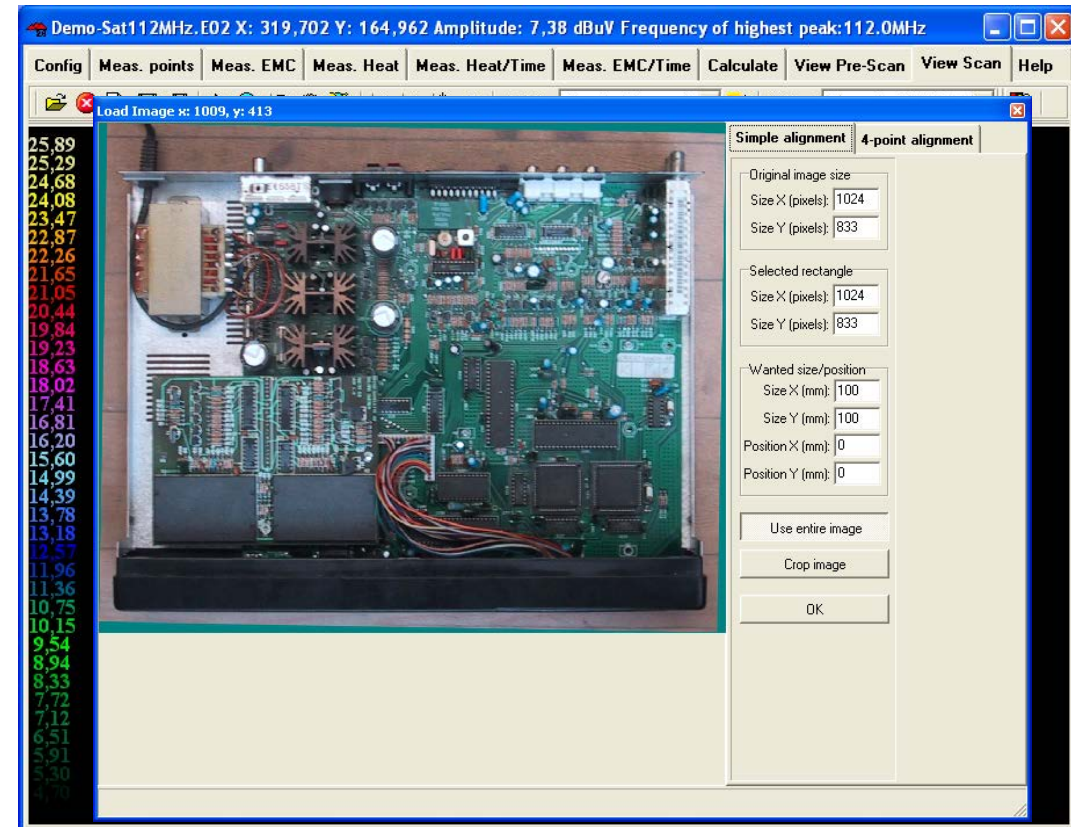
View Scan

- A third way of finding the emission source...
- If you have a digital photo of the test object, or a scanned drawing, or any picture in .bmp or .jpg format...
- You can import it and overlay it.



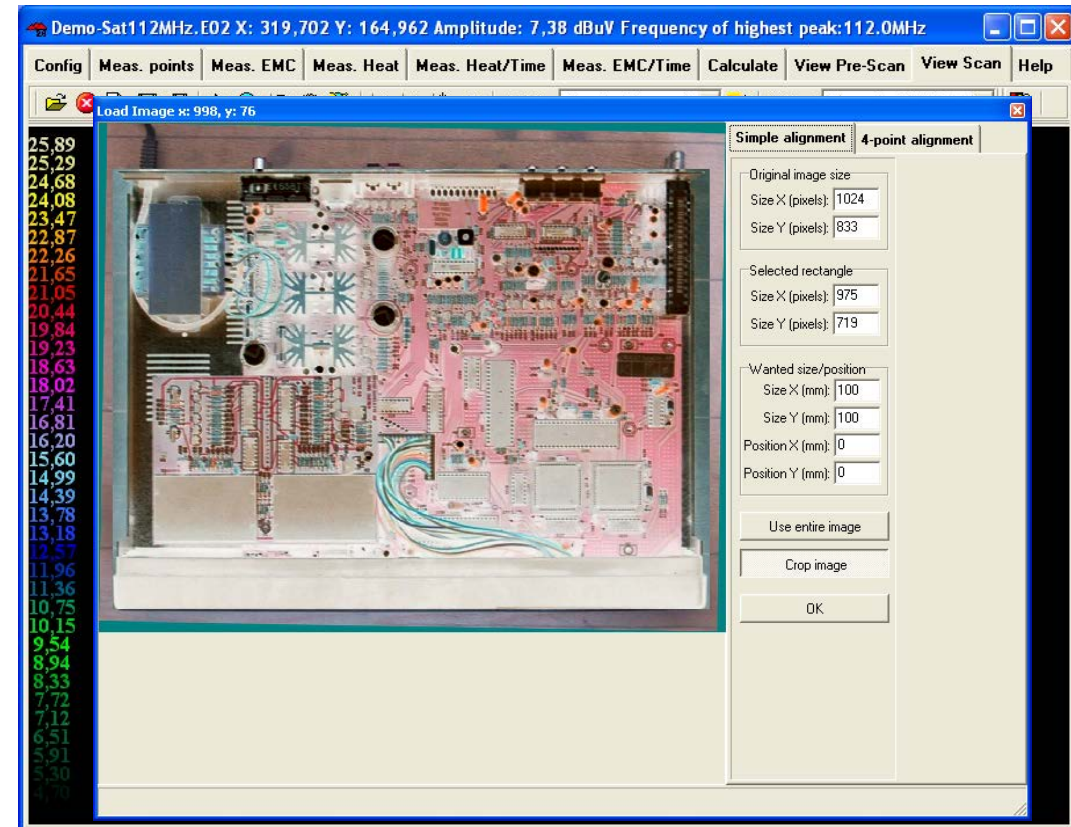
View Scan

- This is a digital photo of the satellite receiver we measured on.
- First thing we must do is to define the part of that we want to import.
- We click on the “Crop image” button...



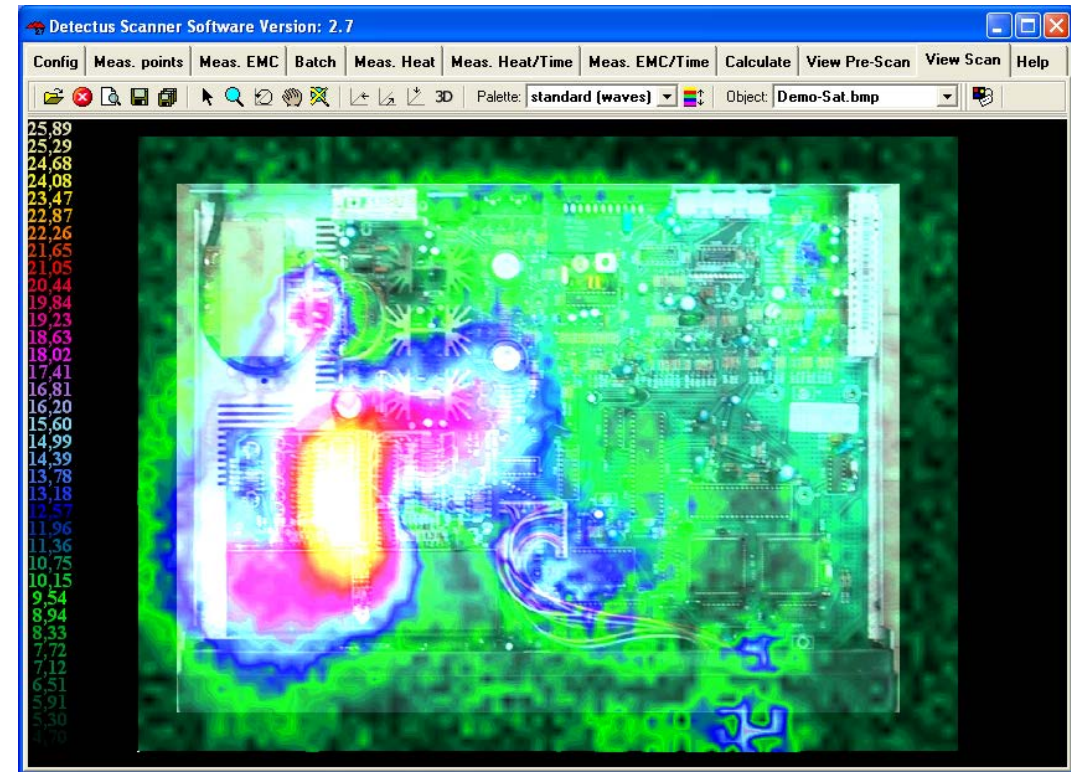
View Scan

- ... and click and draw a square around the area we want to import.
- Next we must enter the true size of the selected area.
- Finally we enter the position that the lower left corner of the selected area had on the Scanner table when we measured.
- Click OK...



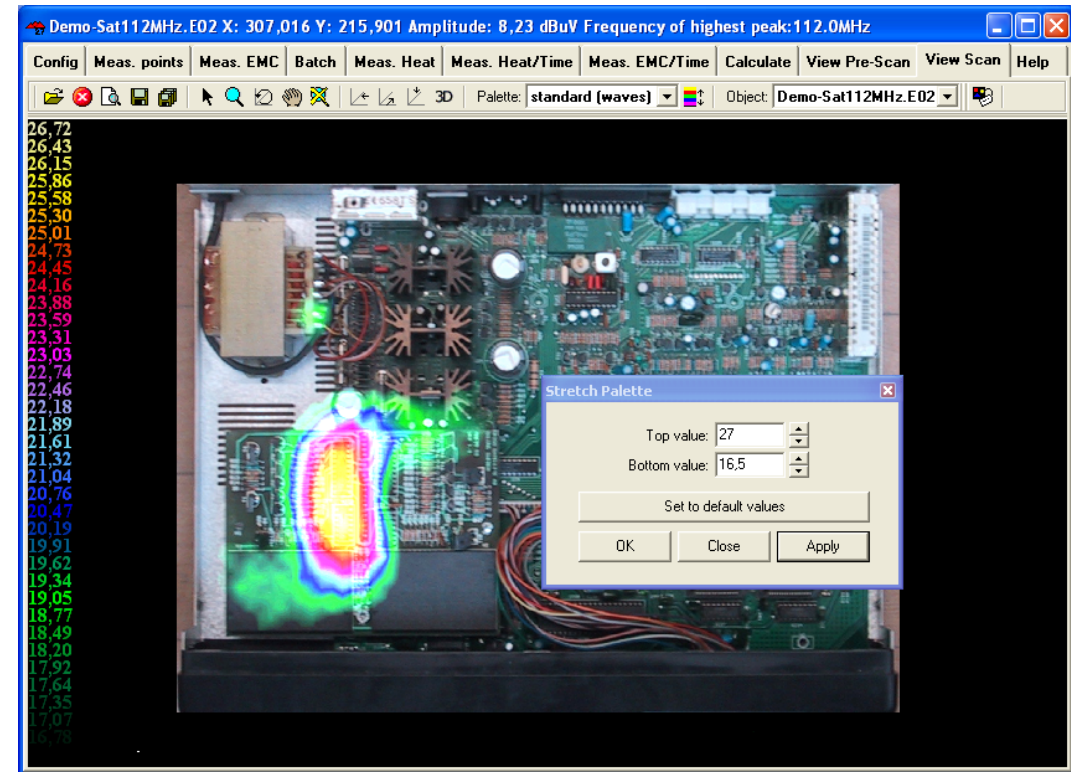
View Scan

- ... and the image is imported.
- Now we can see both the measurement and the photo.
- We can very easily locate the emission sources.



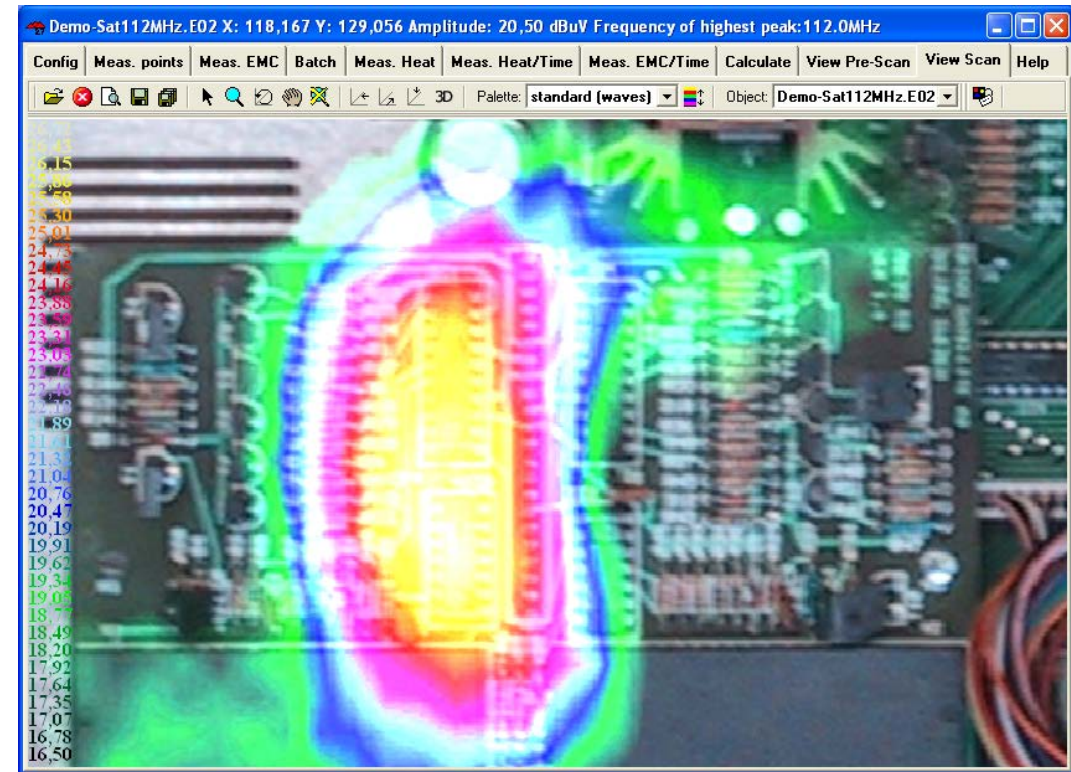
View Scan

- To make the picture more clear we can adjust the color palette.
- Click on the Stretch palette button.
- Adjust the bottom value until all the noise is removed.



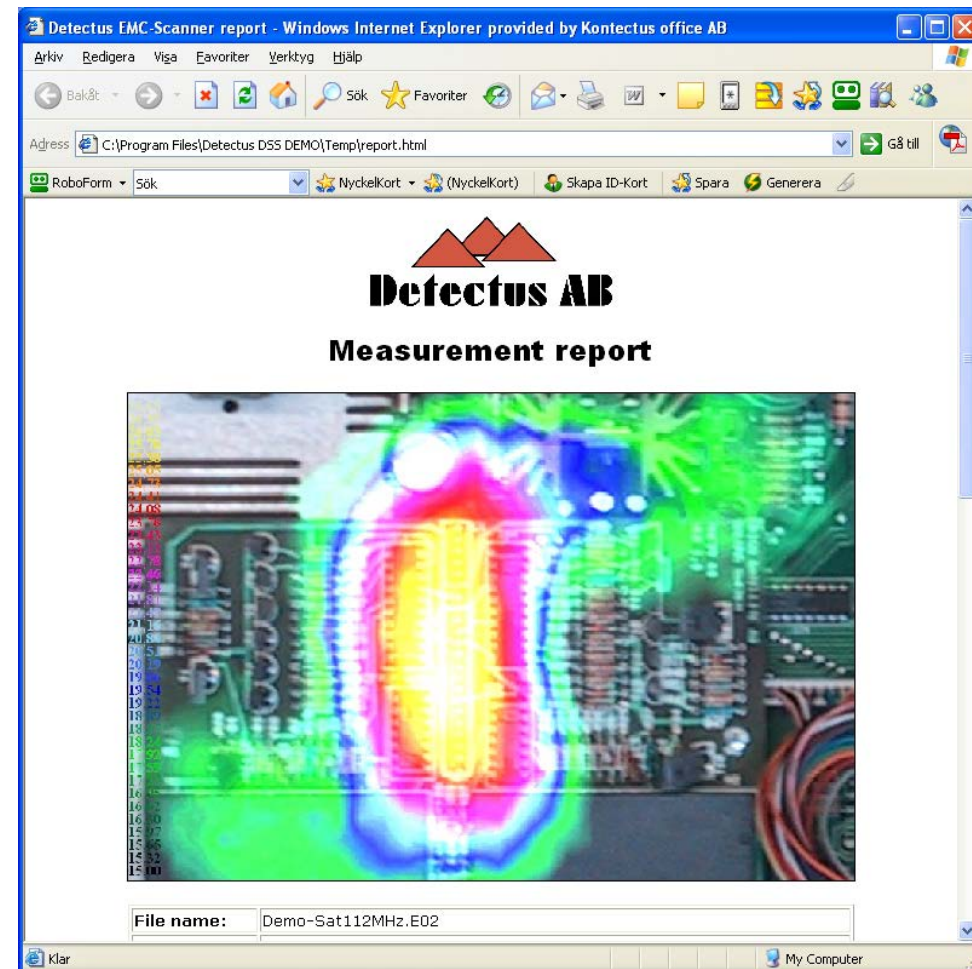
View Scan

- We can zoom in to get a better look at the area we are interested in.
- And by clicking on the report we produce a report...



View Scan

- The measurement report is formatted in HTML and easily edited or printed using normal word processors.
- The report includes the image...



View Scan

- ... and all the setting used when performing the measurement.

Detectus EMC-Scanner report - Windows Internet Explorer provided by Kontectus office AB

Arkiv Redigera Visa Favoriter Verktyg Hjälp

Adress C:\Program Files\Detectus DSS DEMO\Temp\report.html

RoboForm Sök NyckelKort (NyckelKort) Skapa ID-Kort Spara Generera

File name: Demo-Sat112MHz.E02

Date: 2002-02-17

Measured area:

Start X:	0 mm	End X:	400 mm
Start Y:	0 mm	End Y:	300 mm
Step size:	5 mm		

Min and Max:

Min amplitude:	4dBuV	Max amplitude:	26dBuV
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Position of highest amplitude:

X(mm)	Y(mm)
95,000	125,000
Peak frequency:	112.023MHZ

Settings:

Spectrum analyzer setting:	HP_4
Probe:	PROBE_HP11940A

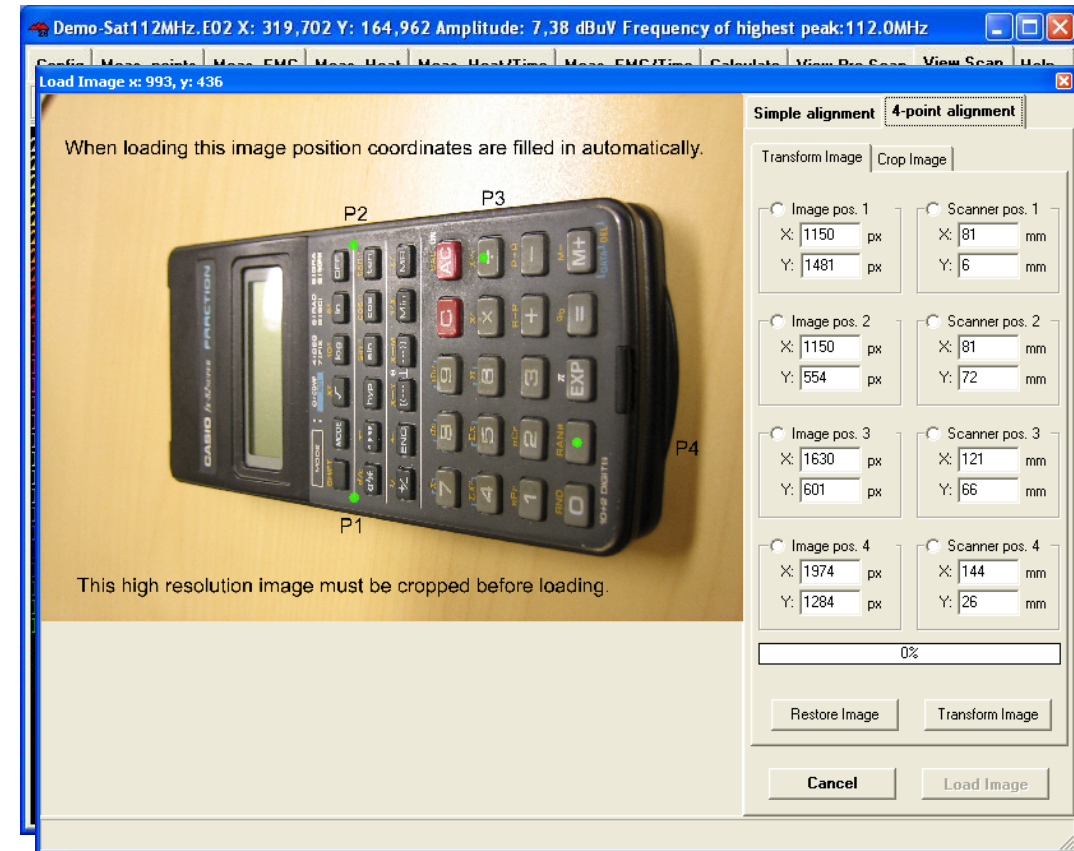
Amplitude:

Reference level offset:	0dB
Reference level:	-60dB
RF attenuation:	0dB
Pre-amplifier:	25dB
Unit:	dBuV

Klar My Computer

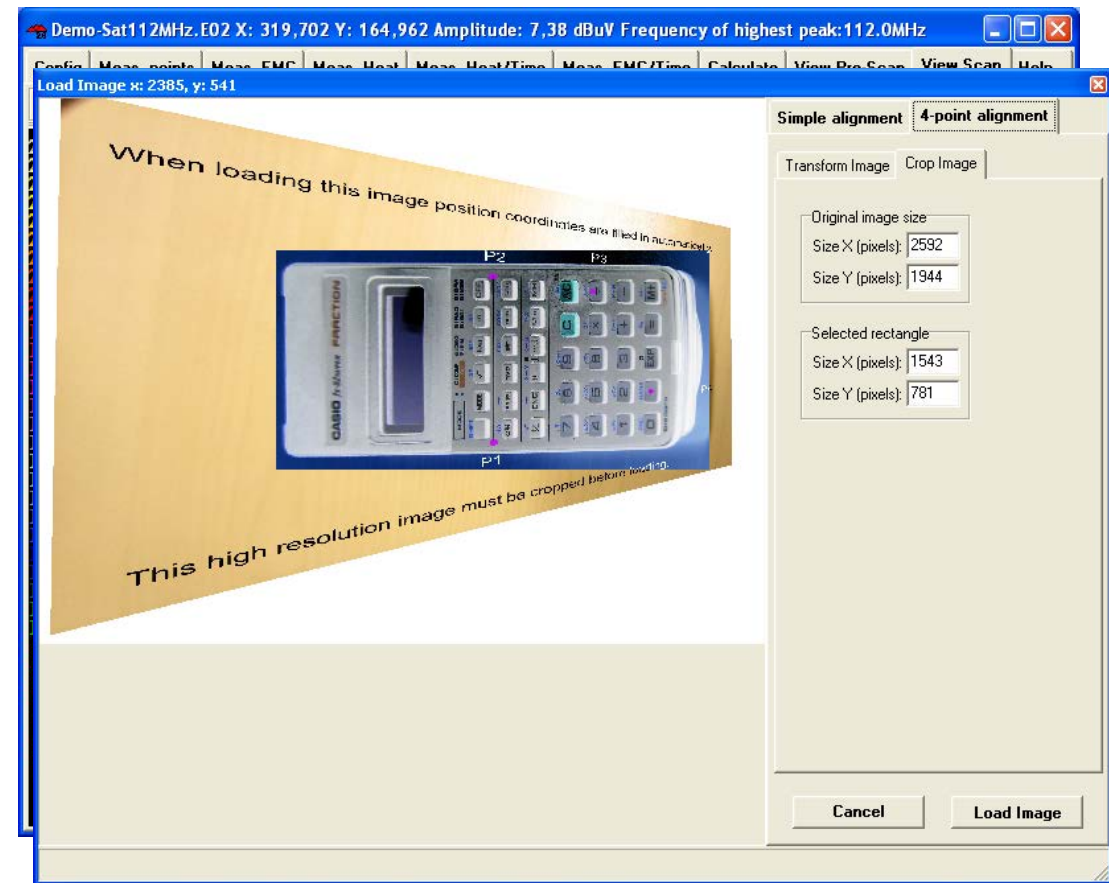
View Scan

- Another way to load and align an image is to use the 4-point alignment feature.
- Simply pick four points on the screen and then the same four points on the test object.
- The 4-point alignment feature allows you to use images that are not perspective correct.
- When the four points are picked just click “Transform image”...



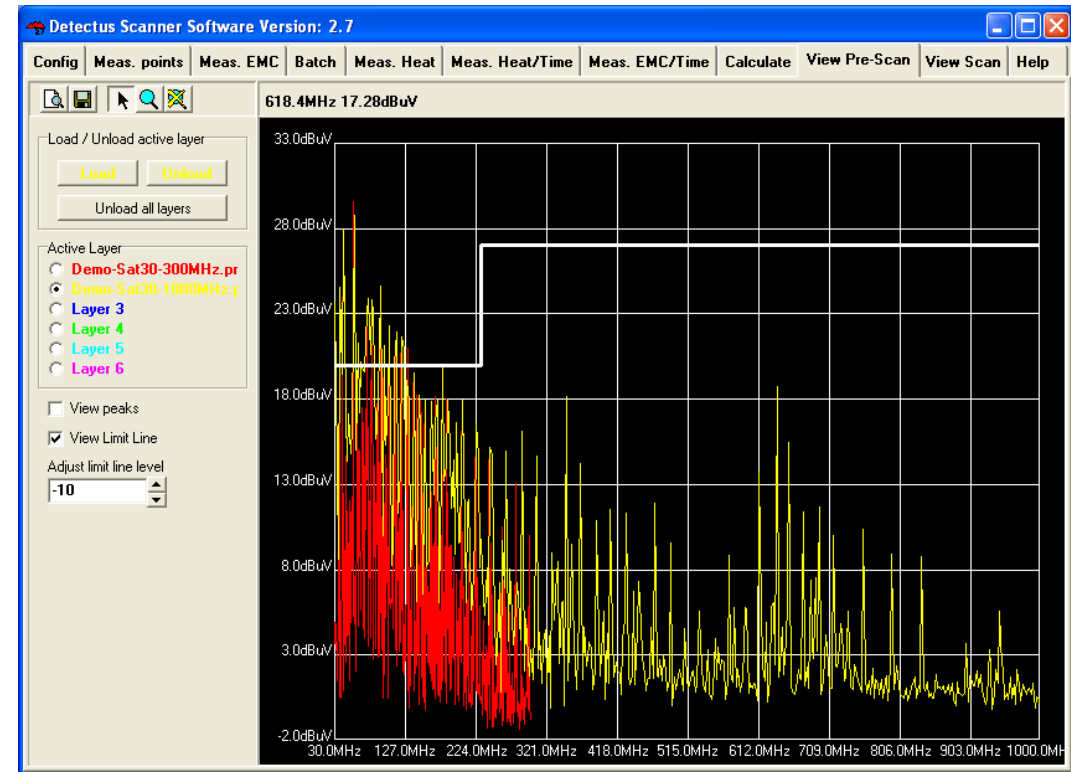
View Scan

- When the image is transformed move to the “Crop image” tab and then mark the area of the image that you want to use.
- Click load image and your done.



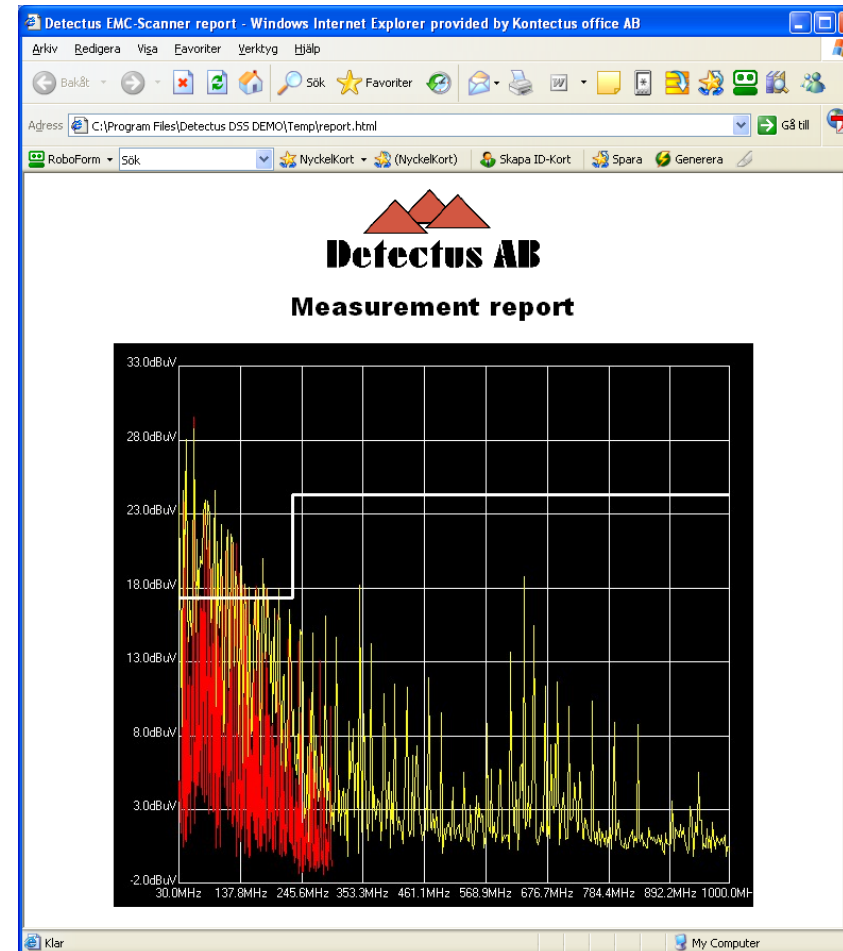
View Pre-Scan

- The wide-band Pre-Scan measurements can be visualized and examined.
- You can visualize up to six measurements simultaneously.



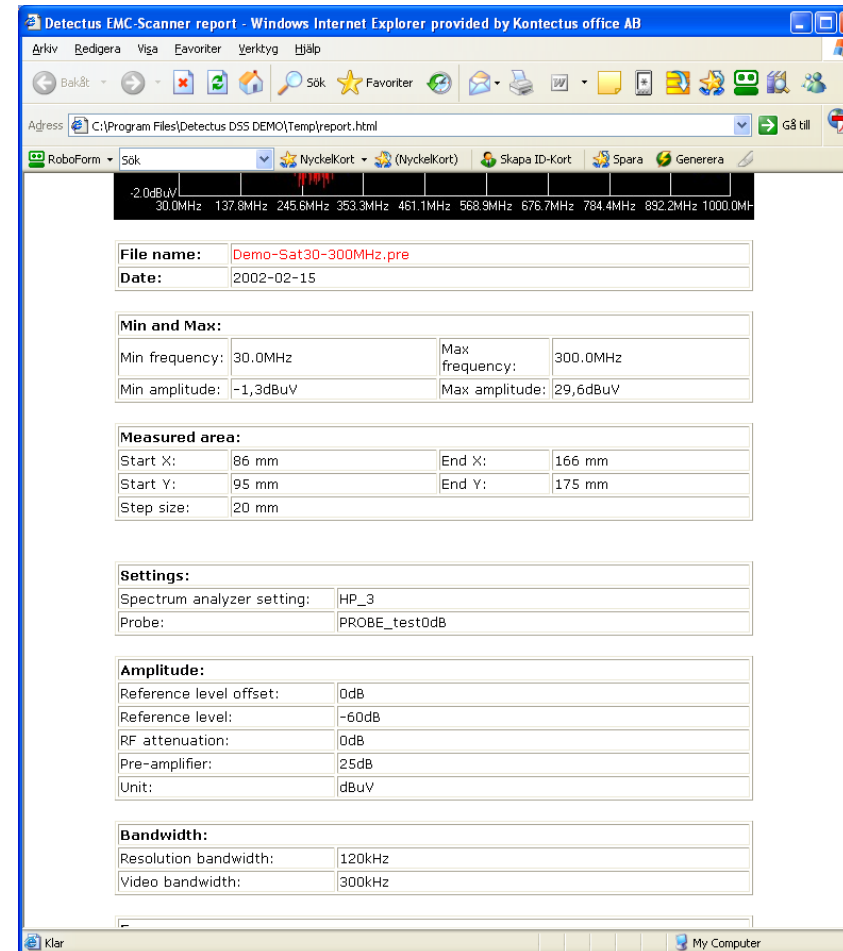
View Pre-Scan

- The Pre-Scan reports include an image showing all loaded measurement ...



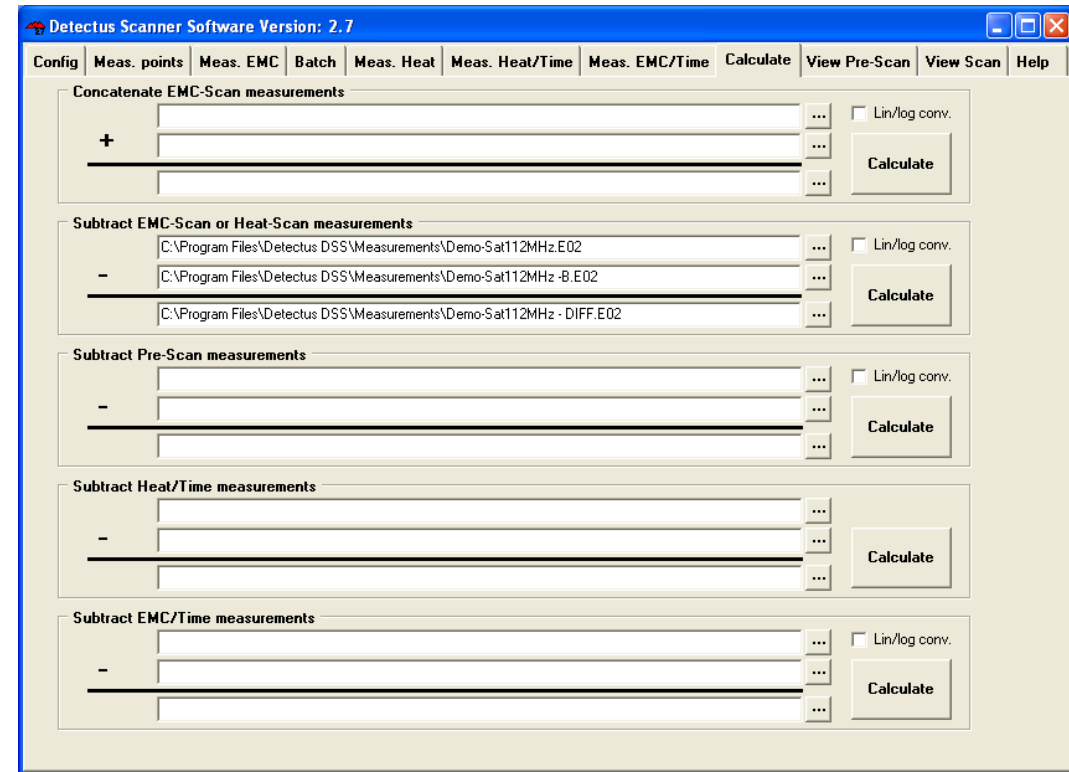
View Pre-Scan

- All the settings of all loaded measurements ...
- And also the list of peaks.



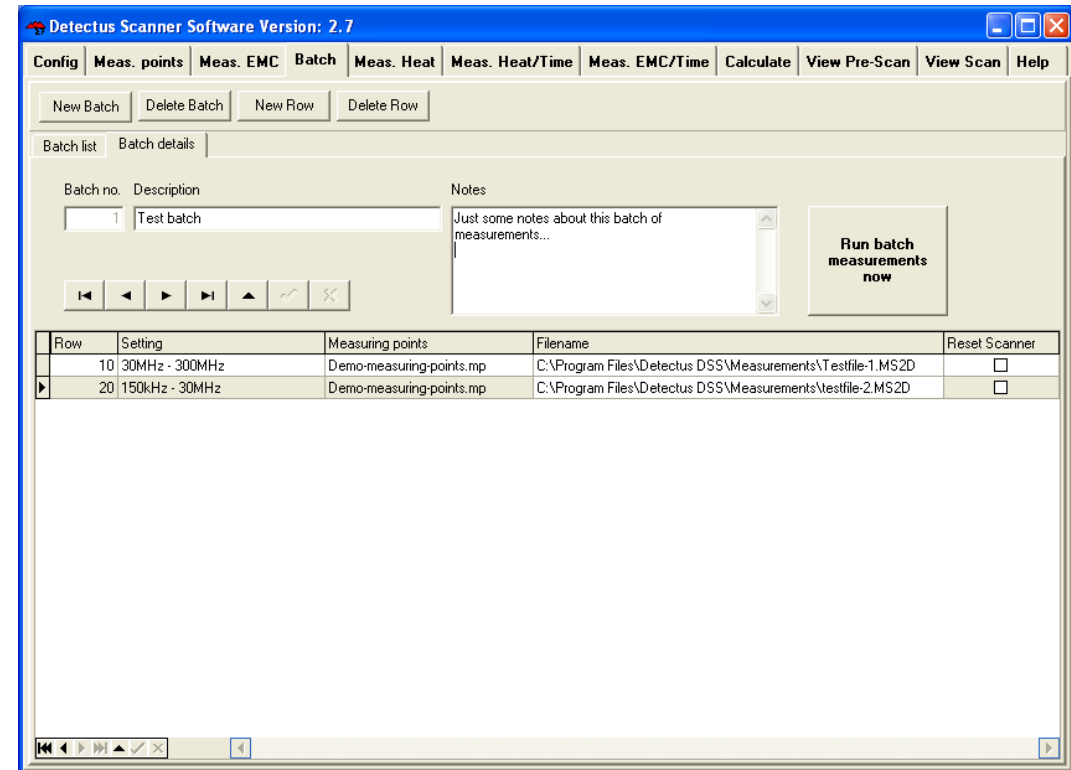
Calculate

- Make objective comparative measurements!
- Measure before and after a change in design and then compare the results.
- To more easily see the true effect of a change in design you can subtract the “after” from the “before” measurement and produce a “delta” measurement.
- The “delta” measurement can be visualized and documented in the same ways as any other measurement.



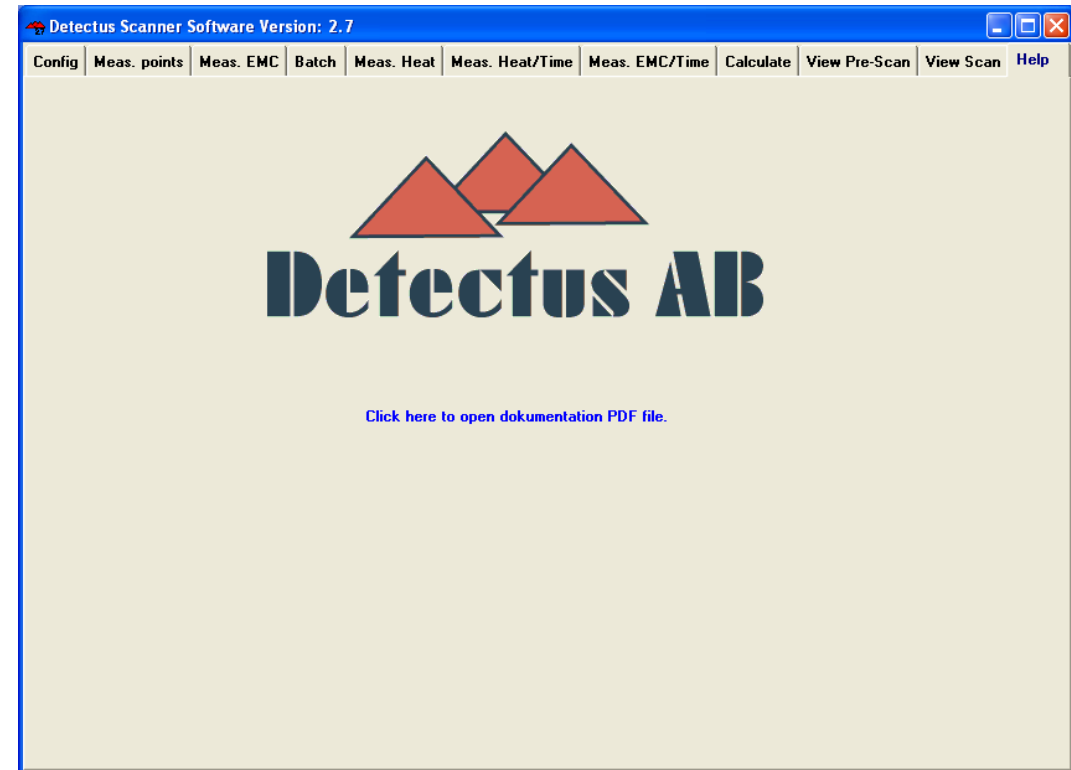
Batch

- The Batch feature enables you to perform unattended measurements.



Help

- Last but not least important...
- Documentation.
- The complete manual is available as a book and also included in the software.



Questions and answers

Q
&
A

Thank you!

