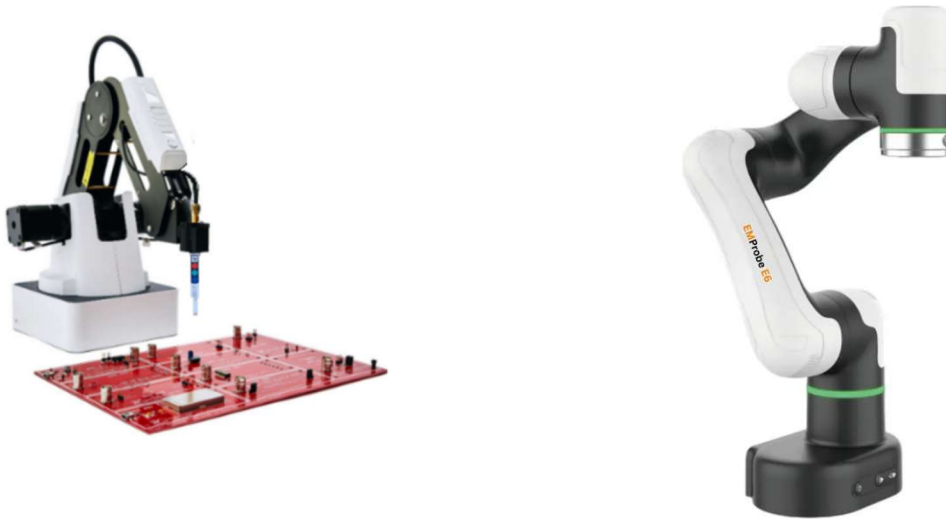


EMProbe/ EMProbeE6

User Manual



DISCLAIMER

Warranty

The material contained in this user manual is provided “as is” and is subject to being changed, without notice, in future editions. Further to the maximum extent permitted by applicable law, YIC Technologies disclaims all warranties, either expressed or implied, regarding this user manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. YIC Technologies shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or any information contained herein. Should YIC Technologies and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Safety Notices

Caution

A CAUTION notice denotes a hazard. It calls attention to operating procedure, practice, or the like. Not correctly performing or adhering to the notice could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

Warning

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like. Not correctly performing or adhering to the notice could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.



ABOUT EM PROBE PRODUCTS

The **EM**Probe product family provides board-level design teams with much faster ways to obtain nearfield magnetic data to help diagnose EMC design issues.

These instruments rapidly capture the data through spectral and spatial scans and display the result to the user through the **EM**Viewer software. This allows the design team to immediately analyse and compare design iterations.

PCB designers can scan any board to identify both constant and time-based emission sources in the range of 150 kHz to 6 GHz.

The **EM**Probe system consists of a robotic arm, attachable probe set and printed scanner-grid table mat used with a customer provided Spectrum Analyser and PC running the **EM**Viewer software.

There are three **EM**Probe solutions available:

- **EM**Probe – Comes with a smaller, 3-Axis robotic arm.
- **EM**Probe **Rail** – Smaller 3-Axis robotic arm mounted to a motorized sliding rail.
- **EM**Probe**E6** – Comes with a larger, 6-Axis robotic arm with greater lateral and vertical reach.

The working premise for the three solutions is the same, the robotic arm moves a probe from cell to cell on a user defined grid, taking measurements at each point, and the results are reflected in the **EM**Viewer software.

MINIMUM SYSTEM REQUIREMENTS

Operating System: Windows 11

CPU: 1 GHz or faster with two or more cores, on a compatible 64-bit processor

Memory: 8 GB or more

Storage: 200 MB for installation, and 1 GB for project saves

Graphics card: Compatible with OpenGL 4.2

TECHNICAL SUPPORT

For fast and seamless technical support, please gather the following information and contact Y.I.C. Technologies technical support as instructed further below: (support@yictechnologies.com)

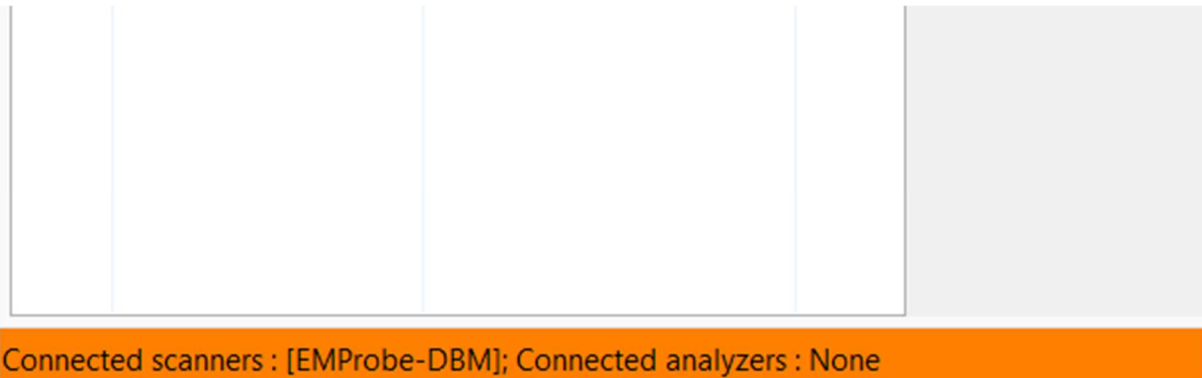
1. *Serial number of your unit (Shown in the device list).*
2. *Software version (Menu: Help -> About).*
3. *The log file stored in %appdata%/YIC Technologies/EMViewer2/log.txt*
4. *A detailed description of the problem, including screenshots and video footage.*

ESTABLISHING A CONNECTION

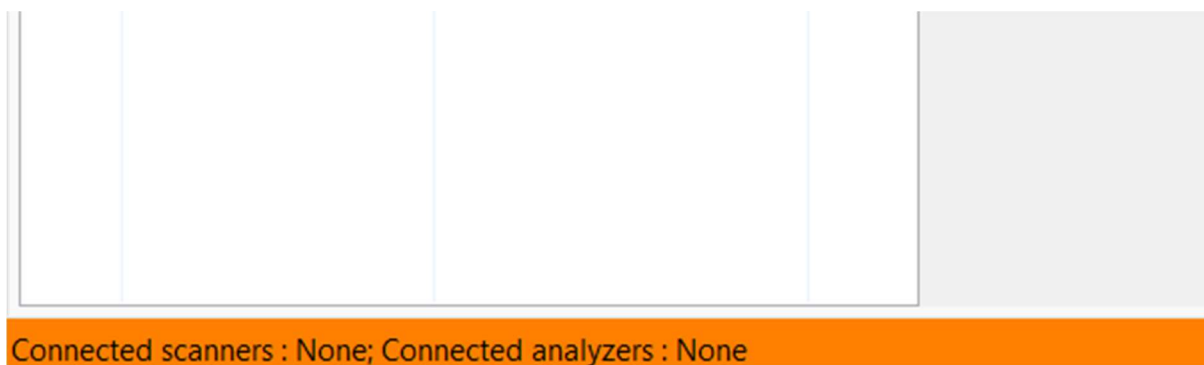
For detailed information regarding the setup of the **EMProbe** and **EMViewer**, refer to the setup guide provided with your solution. You can also download any documents you need from the yictechnologies.com website.

The remainder of this user manual assumes you have connected all devices as stated in the setup guide.

Once you have connected your scanner, and launched the **EMViewer** software, it will appear on the bottom-left of the screen.



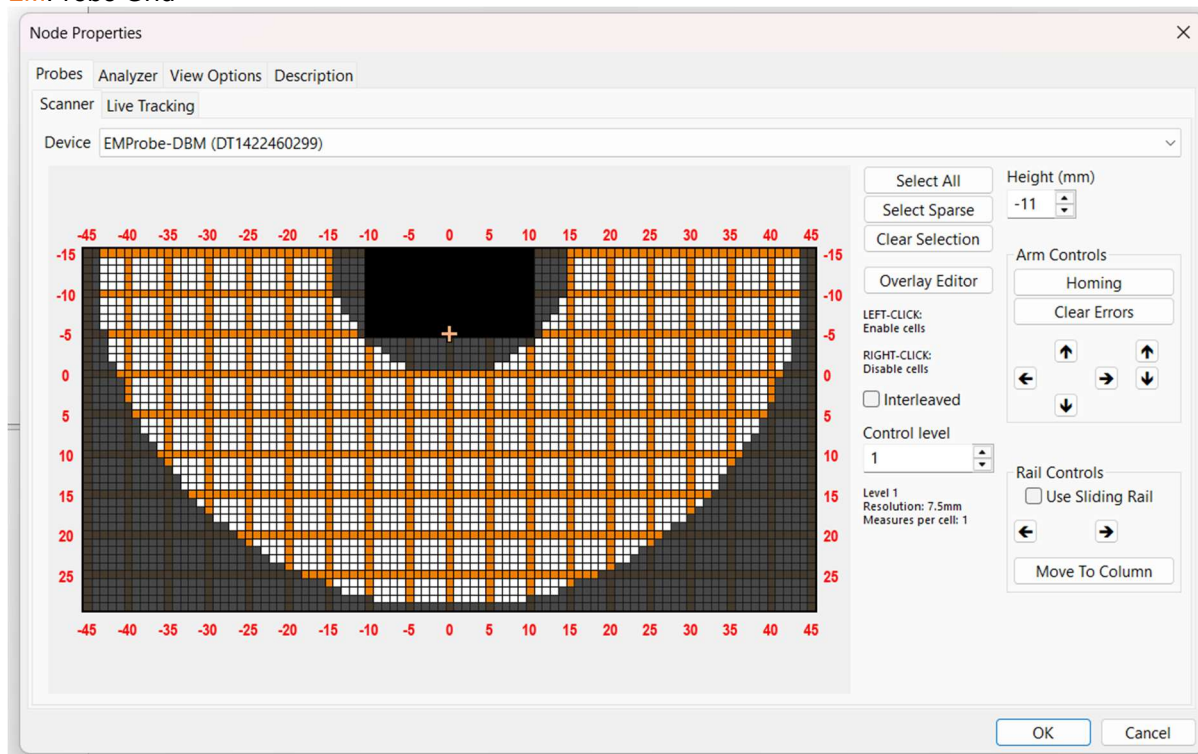
The **EMViewer** software automatically searches for devices. If a device is not connected properly, **EMViewer** will not display it.



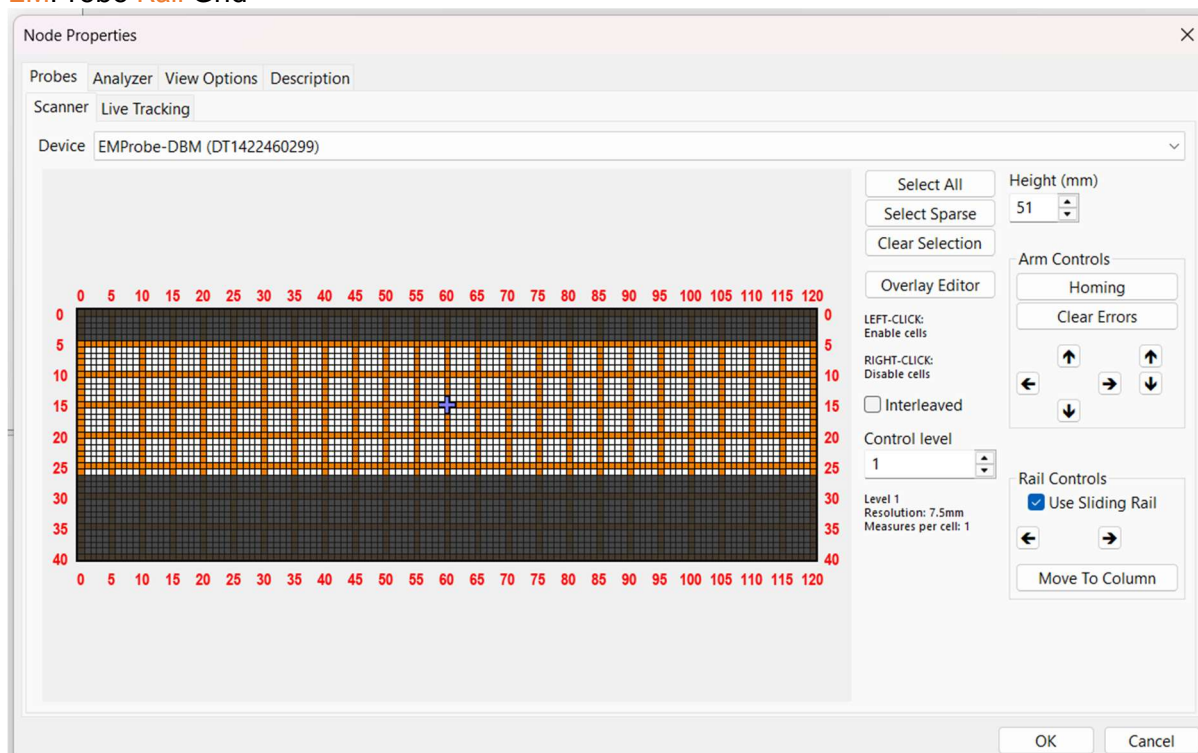
If you are having trouble connecting to the scanner, try closing the **EMViewer** software, ensure the connection is stable, and then start the **EMViewer** software again.

GENERAL USAGE AND CONTROLS

EMProbe Grid

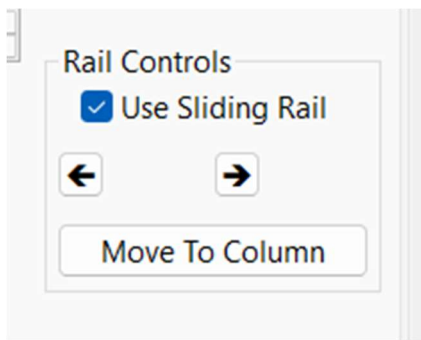


EMProbe Rail Grid



The EMProbe solution grid spans across the range the robotic arm can move to.

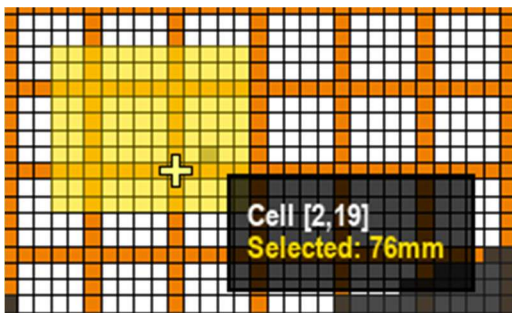
EMProbe Rail only – Before any action can be performed, the device must be homed. Clear the area around the device, as well as along the rail. Select “**Use Sliding Rail**” then click “**Homing**”. After homing, **wait for the audible beep** before trying to move the arm.



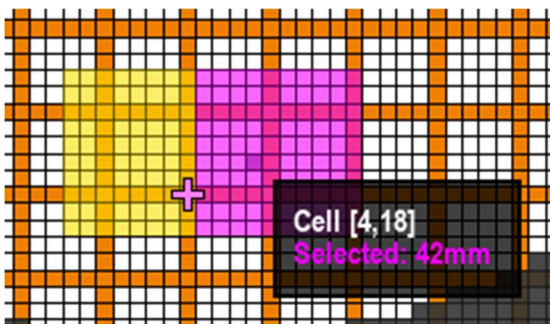
EMProbe only - Before any action can be performed, clear the area around **EMProbe**, remove the current probe attachment and click “**Homing**”, found in the node window. After homing, **wait for the audible beep** before trying to move the arm.

The **Height** (mm) setting determines what height you will scan a cell at. When you move the robotic arm manually using the unlock button, the height **automatically** updates to the height you moved it to.

The coloured + indicates the probe’s current position on the grid, with height indicated by the current colour.



Different heights will show different colors in cell selection.



EMProbe Rail Only functions

Move to Column – The **Move to Column** function is used to move the rail position to the column specified.

EMProbeE6 Only functions

Zero Probe – The **Zero Probe** button is used to move the probe to the 0,0 position on the grid. This point is centered and raised in front of the Robotic Arm (the side with the power button, opposite the IO). Ensure that nothing is connected to the Robotic Arm and the area is clear when performing this function.

Align Probe – The **Align Probe** button is used to level the head of the Robotic Arm, angling the probe straight downwards. Ensure that nothing is connected to the Robotic Arm and the area is clear when performing this function.

Clear Errors – In the event that the **EMProbeE6** encounters an error, the Robotic Arm will enter an error state. It can enter two possible error states: **Red LED**: **EMProbeE6** has attempted to make an invalid movement. **Amber LED**: The **EMProbeE6** collided with something or has left its internal working bounds. This function can be used to clear any alarm or error state and restore the **EMProbeE6** to a regular working state.



Step arrow buttons and setting - The arrow buttons can be used to move the **EMProbeE6** around in space independently of any scans. The **Step (mm)** setting is used to change the amount that the arrow buttons move the **EMProbeE6**, down to the **EMProbeE6** maximum resolution of 0.1mm. **Note that** the **Step (mm)** setting does not affect behavior when scanning.

Using Drag Mode on the **EMProbeE6**

The **EMProbeE6** features a button on the back of its head that is used to toggle **drag mode**. The **drag mode** can be used to unlock the arm's joints to allow manipulation of the robot's pose manually.

Important considerations:

- The arm's middle joint can be manually manipulated such that arm can collide with itself while scanning if it is incorrectly positioned. Please ensure that the Robotic Arm is correctly positioned with the middle joint **Up and Away** from the scan area rather than **Down and Close** to the scan area.
- The Robotic Arm's base joint and head joint can be manipulated freely in a circle when using drag mode, however anything outside of the Robotic Arm's initial 360-degree range is invalid. In the case that this happens, the arm will enter recovery mode (amber LED) and the error will not be clearable via the EMViewer software. In this case, drag mode must be used to manipulate the arm back into the original 360-degree range. The arm will automatically exit recovery mode, and the LED will turn green once it is back in range. Be sure to fully wind the arm back, and not just to the edge where it turns green, in order to prevent the arm winding itself around in a full 360 when zeroing or scanning.

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USER INTERFACE

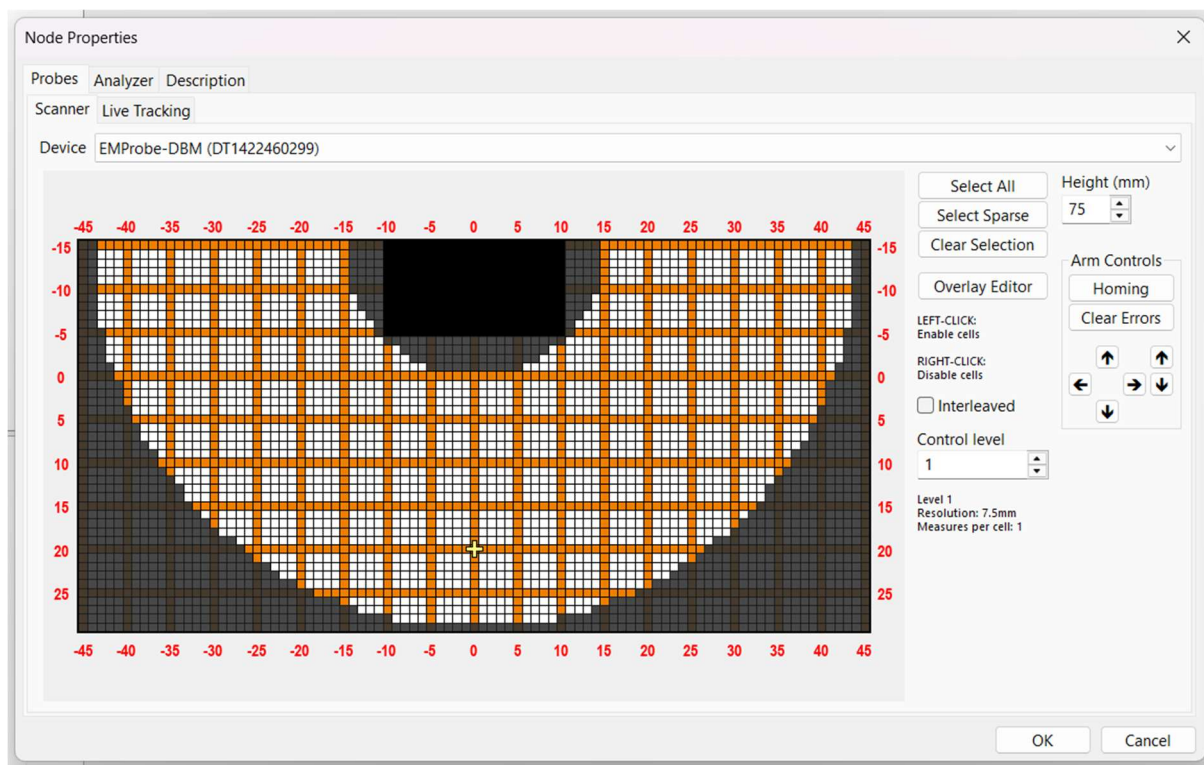


The toolbar is located at the top of the screen. Controls are from left to right:

- Creating a new project.
- Opening an existing project.
- Saving your project.
- Starting a scan.
- Starting a continuous (repeating) scan.
- Stopping scans.
- Node properties.
- Create a module node.
- Create a spectral node.
- Create a spatial node.
- Create a combined node.
- Create a report.
- Create a comparison node.

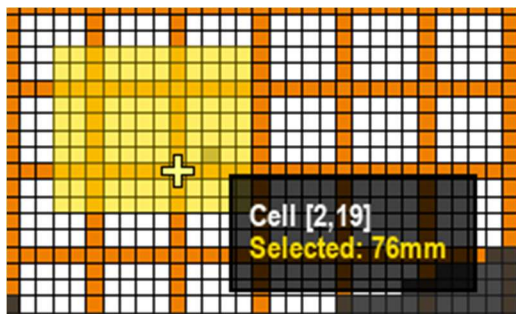
Module Nodes

Module nodes, like project nodes contain scanner and analyzer options. Create a spectral, spatial, or combined node under a module node to inherit the module node's settings, analyzer settings and overlay information. This is helpful if you want to make multiple nodes with similar settings and overlays quickly. Below, we adjust the project node settings, which will be copied by future nodes.

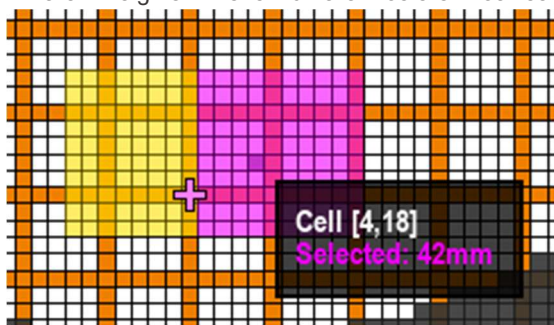




The **Height** (mm) setting determines what height you will scan a cell at. When you move the robotic arm manually using the unlock button, the height **automatically** updates to the height you moved it to.
The coloured + indicates the probe's current position on the grid, with height indicated by the current colour.

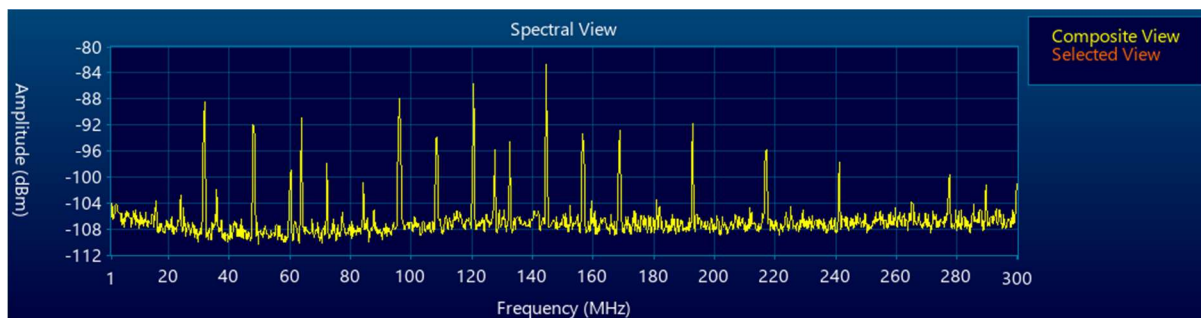


Different heights will show different colors in cell selection.



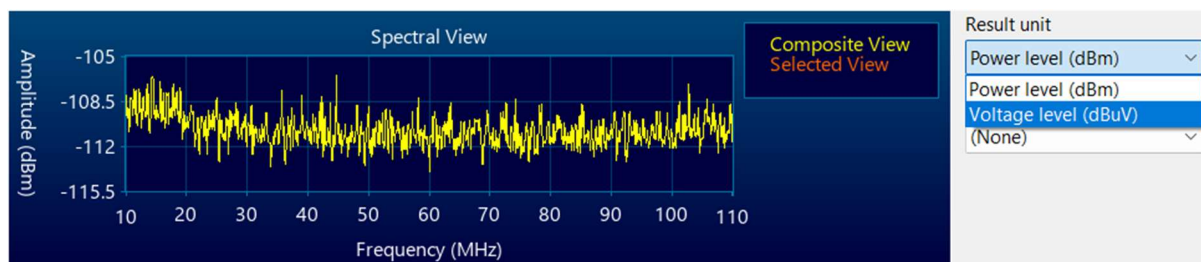
Spectral

Spectral scans show you what frequencies are present in the selected area. Here is an example of some spectral scan data:



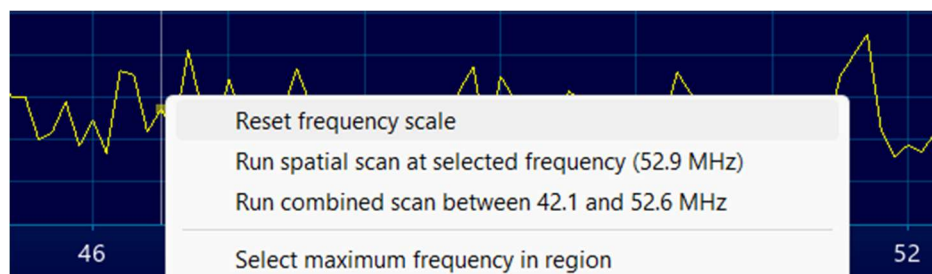
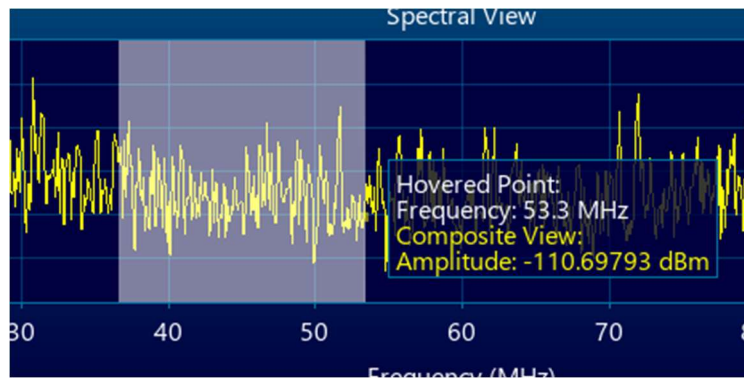
Mouse over the graph to display the frequency and amplitude values. To select a peak, mouse over the peak and left click.

The spectral view can be adjusted by the checkboxes and dropdowns to the right of the graph. You can change the unit of amplitude between dBm and dBuV or apply a compensation file.





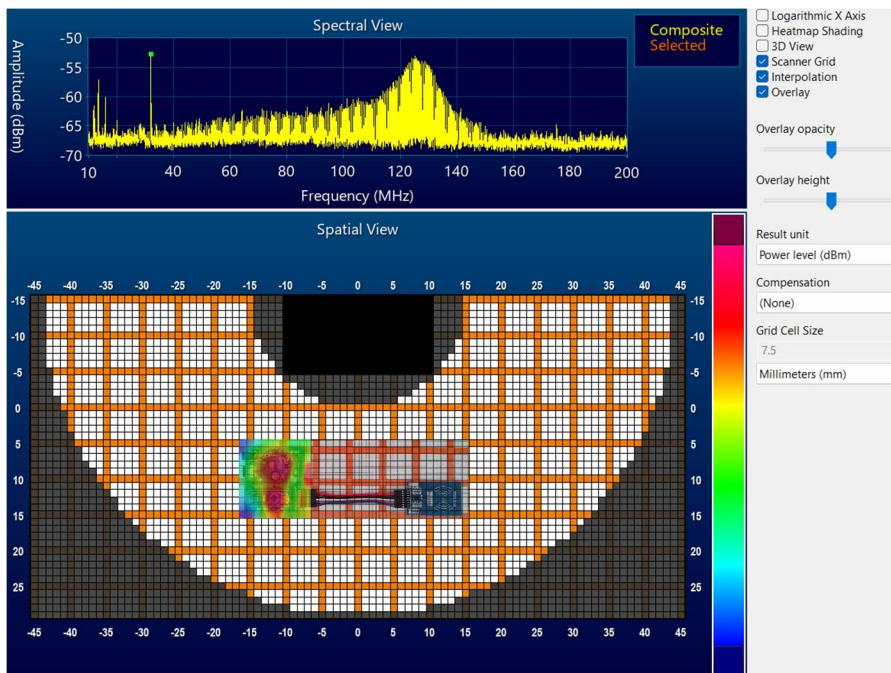
Left click and drag to zoom in. Right click and select “Reset frequency scale” to return to the original view.



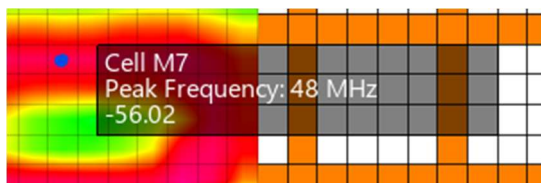
You can also run a spatial scan or combined scan directly from a spectral by selecting “Run spatial scan at selected frequency (X MHz)” or “Run combined scan between X and Y MHz”.

Spatial View

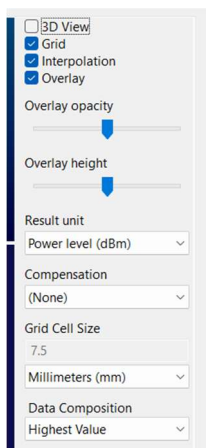
The spatial view displays a scanner grid with the maximum amplitude of each cell displayed as a colour. The lowest values of the scan are displayed as blue, and the highest values are displayed as red.



Mouse over the graph to display row / column coordinates, frequency, and amplitude values.

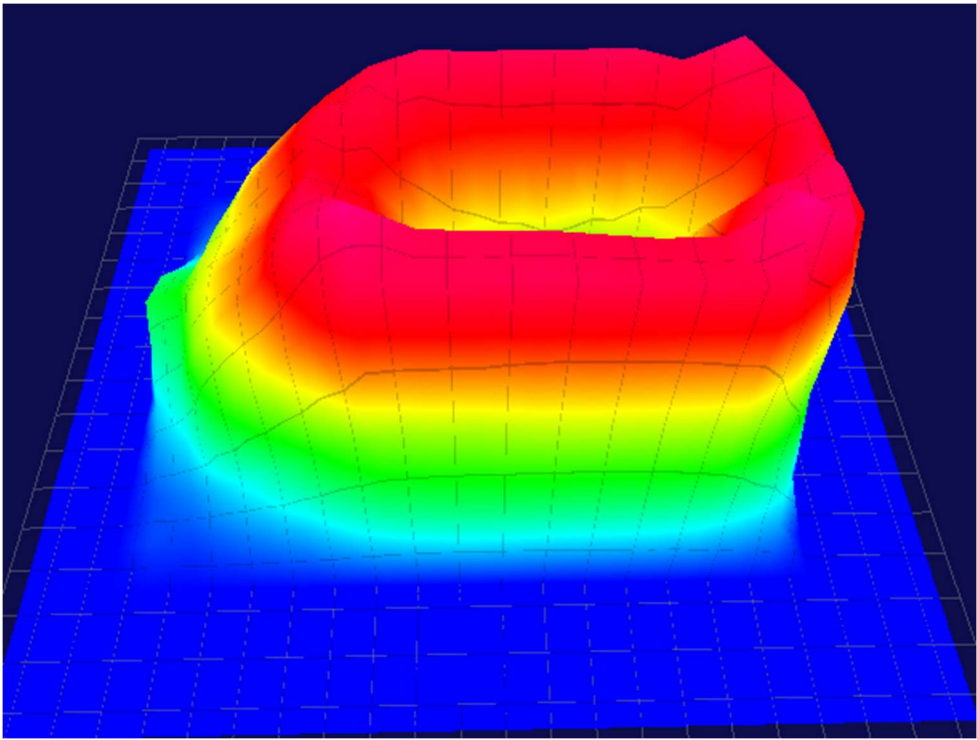


Spatial view can be adjusted by the checkboxes and dropdowns to the right of the graph.

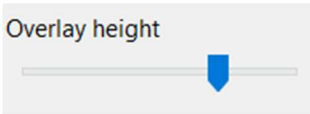


Grid and Overlay can be shown or hidden. Interpolation (data smoothing) can be disabled. You can also change the unit of amplitude or apply a compensation file

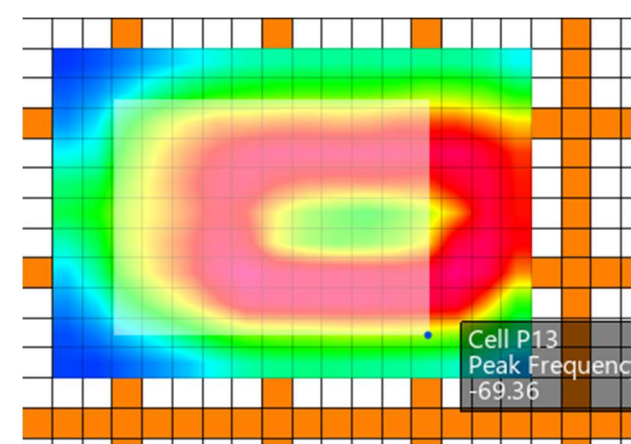
View can be changed to 3D by clicking on the check box. You can rotate the 3D view by left clicking on the graph and moving the mouse.



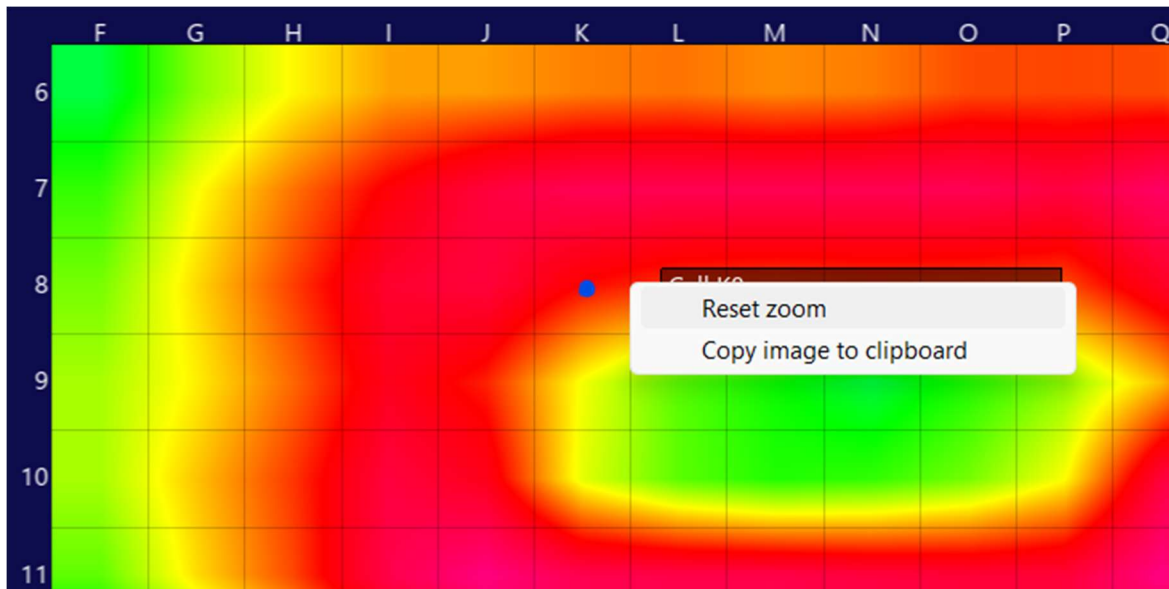
When Overlay is checked in 3D view, you can use the overlay height slider to move the overlay up and down on the graph.



When in 2D view, you can left click on the graph and drag to zoom in.



Right click and select Reset Zoom to return to the original.

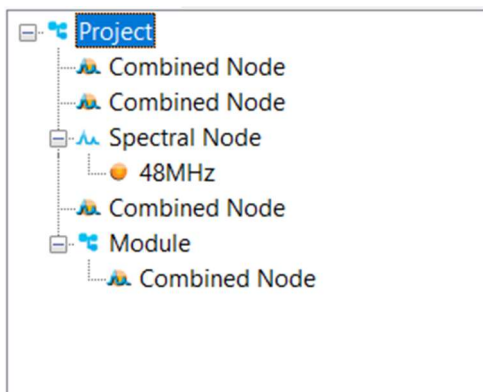


NODES

All scan types in a project are called nodes.

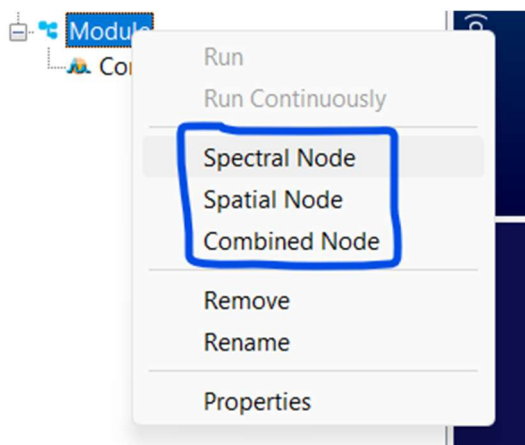
A project is the root node. It can be considered a folder like in Windows directories to store related data. You can add different types of scans and/or notes to a project node. You can rename, copy, and paste a node or node settings only. Project's settings are inherited throughout the entire project tree.

A module is the sub-root node. It can be considered as a subfolder like in Windows directories to store related data. You can add different types of scans and/or notes to a project node. Module's settings are inherited throughout the module tree only. Modules can be used to store data for different revisions of the PCB.



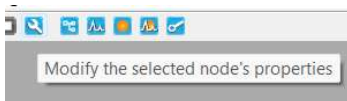
How to Add a Node?

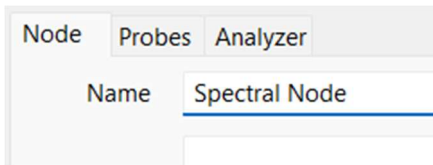
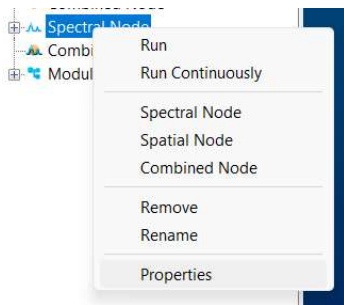
To add a node either right click on the Project node, click on Spectral/Spatial/Combined node, and then select one of the scans, or click the relevant icon on the tool bar.



How to Name a Node?

To name a node open the Properties of the node and click on the Node tab. When you add a node for the first time, the Settings window opens automatically. By default, the node name is blank, which means a name will be automatically selected. If you want to rename a node after it has already been added, either right click on the node and select Properties or select the node and then click the properties button on the task bar.

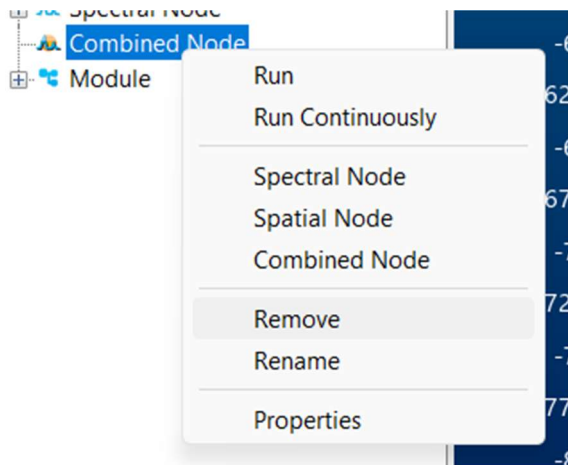




How to Delete a Node?

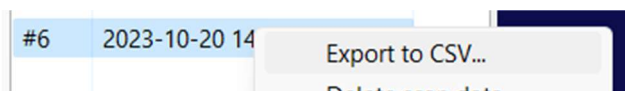
Double click on the node that you want to view.

Right click on the node that you want to delete and then select "Remove"



How to Export Data?

You can export any data in .csv format. To export data right click on a scan data and select Export to CSV.



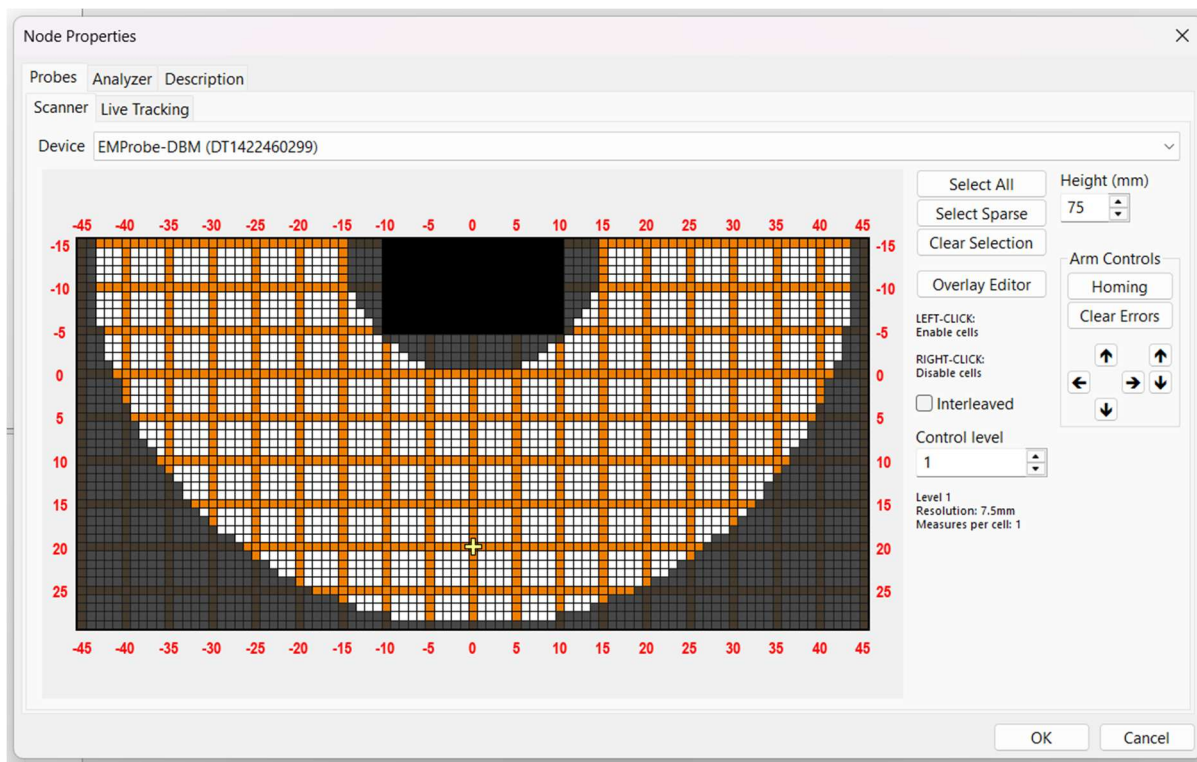
Node Settings

Probes Tab

The Probes/Scanner tab is where you will select your scanning device, scanning location and scanning method. Devices such as the EMScanner, EMScannerR, EMProbe and NFPKit are configured here.

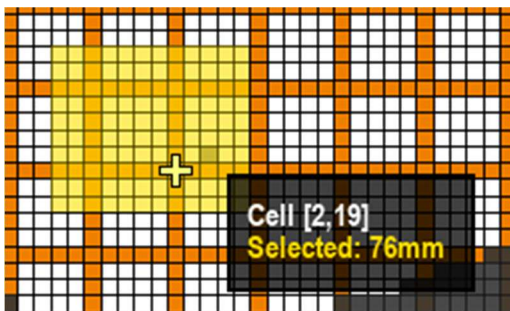
Note:

Importing design file or the picture of the DUT is highly recommended. Please refer to [Overlay Editor](#) section.

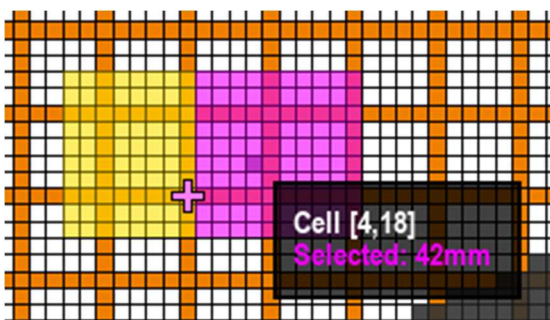


The **Height** (mm) setting determines what height you will scan a cell at. When you move the robotic arm manually using the unlock button, the height **automatically** updates to the height you moved it to.

The coloured + indicates the probe's current position on the grid, with height indicated by the current colour.



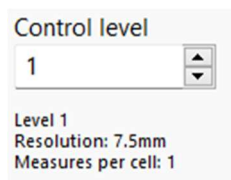
Different heights will show different colors in cell selection.



The interleaved scan is designed to reduce misleading results and blind spots caused by the orientation of the probe. When performing an interleaved scan, the **EMProbe** will sweep the selected area twice – once unchanged then once at a 90-degree angle.

On the basic **EMProbe**, the probe will need to be rotated manually at the end of the first sweep, whereas on the **EMProbeE6**, the probe will be rotated automatically.

Control level: You can perform a high-resolution scan by increasing the control level. Each control level performs 4x the number of sweeps than the previous level. The resolution of the scan and how many measurements taken per cell is shown below the control level control.



Control level

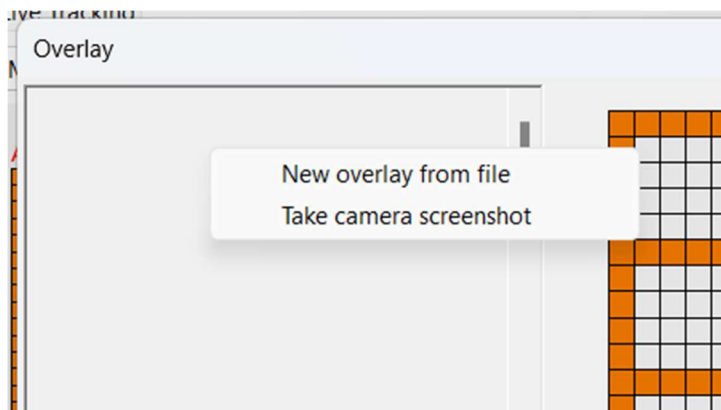
1

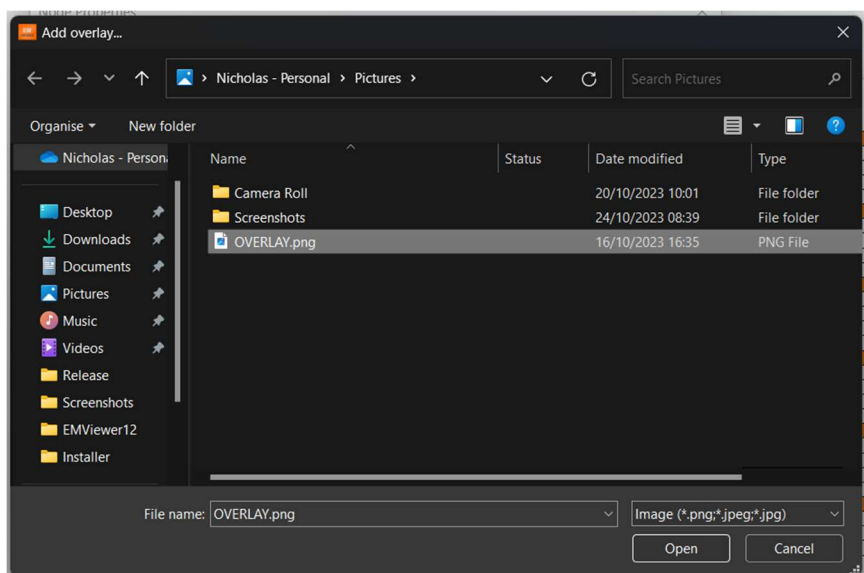
Level 1
Resolution: 7.5mm
Measures per cell: 1

Overlay Editor (How to Superimpose Image of a DUT)

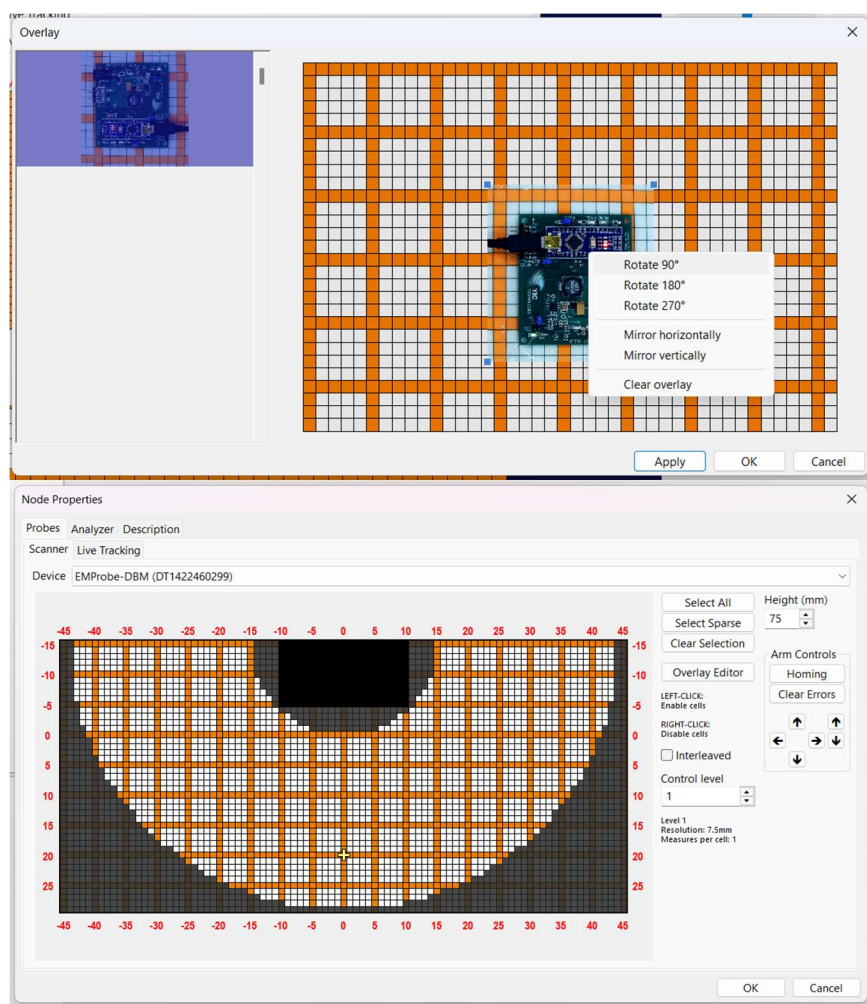
Overlay Editor superimposes a graphical image of the device under test (DUT) onto the scan pattern to guide you in activating the area of the scan. EMViewer supports popular image formats: PNG, JPEG, TGA, etc. Once you import the design file, you can scale, rotate, mirror, and/or drag it to a desired position. It is recommended that you apply the overlay to the project node and module nodes, as child nodes will inherit the overlay.

To import an overlay file, click Overlay Editor, right-click the overlays panel and click “New overlay from file”. Find the image you want to add and click open.





Once the file is imported, a window as shown below will open. You need to position the image to match the actual DUT position on the grid of the **EMProbe** and **EMProbeE6**. Dragging the blue squares on the corners of the image will resize the image. You can right-click on the overlay to show additional options for rotation and mirroring.



Analyzer Tab

The screenshot shows a 'Node Properties' dialog box with three tabs: 'Node', 'Probes', and 'Analyzer'. The 'Analyzer' tab is selected. Inside the dialog, there is a 'Device' dropdown menu showing 'DSA875 (DSA8E163700013)'. Below this, there are input fields for 'Min Frequency (MHz)' (10), 'Max Frequency (MHz)' (110), and 'RBW (kHz)' (100). To the right of these fields are checkboxes for 'Pre-amplifier' (checked), 'Attenuation' (0 dB), 'DC Coupling' (unchecked), and 'Show Display' (unchecked). At the bottom right of the dialog are 'OK' and 'Cancel' buttons.

Enter *Start Frequency* and *Stop Frequency* to identify the span of the scan to be implemented. *RBW (Resolution Bandwidth)*: It is set by default at 100 kHz and can be reduced to the lowest level allowed by the spectrum analyzer. Decreasing the bandwidth will improve the amplitude accuracy and increase the sensitivity; the scan will however take more time to complete. The bandwidth you choose should not be disproportionate to the span. The suggested ratio of Span/RBW should be <10,000 e.g., 10 kHz bandwidth with a 100 MHz span, 100 kHz bandwidth with a 1 GHz span so that the scan can finish in a reasonable time.

Attenuation: Can set to 0, 10, 20 or 30 dB. Attenuates input signals going to the spectrum analyzer.

Reference Level: The maximum signal intensity that the spectrum analyzer can acquire at a given frequency without clipping, this setting does not need to be changed except when measuring very strong signals.

Peak Hold: Also known as Max-Hold this is a very important feature as it allows you to run a Spectral Scan continually replacing the peak amplitude with each successive higher measurement. This is an excellent way to find the frequency of an intermittent or random signal.

Show Display: You can toggle whether the spectrum analyzer will have its display enabled during a scan. Most spectrum analyzers will perform sweeps faster with this option toggled **off**. The display will always be turned back on after a scan is complete (unless connection is lost).



SCAN TYPES

There are four scan types:

- **Spectral Scan:** measures and displays the maximum amplitude vs. frequency of the magnetic field strength over the scanned area.
- **Spatial Scan:** measures the magnetic field of radiated electromagnetic emissions from the DUT at a single frequency as a function of position.
- **Combined Scan:** measures the magnetic field strength of radiated electromagnetic emissions from an object as a function of both frequency and position on the PCB. It collects a series of scans over the entire frequency range and area of interest as opposed to a Spatial Scan (which gathers data at single frequency) or a Spectral Scan (which saves only the composite maximum data set over the scan area).
- **Comparison Scan:** for comparing two scans within the same frequency range. This is used to difference in results after changes have been made to the DUT.

INTERLEAVED SCAN – SPECTRAL BLIND SPOT REDUCTION

The interleaved scan is designed to reduce misleading results and blind spots caused by the orientation of the probe. When performing an interleaved scan, the **EMProbe** will sweep the selected area twice – once unchanged then once at a 90-degree angle.

On the basic **EMProbe**, the probe will need to be rotated manually at the end of the first sweep, whereas on the **EMProbe E6**, the probe will be rotated automatically.

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If you can **see** it, you can **fix** it!