Above 1GHz measurement Issues

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Details

Test	Test various EUTs and see the difference between planer scanning and one particular bore-site set up. Focusing initially on the range from 1GHz-6GHz.
Various Set Up	IXIA traffic generator White medium size router 1 U Cisco router Router (Small) IXIA v Small Combo Two Small Combo 1.8m 1 U Cisco router 1.8m IXIA 1.8m white medium size router
CISPR I	At the last CISPR I MT7 meeting, it was decided to send out a CDV (for CISPR 32) with a planer scan from 1m-4m and setting the limits to those in 47CFR.

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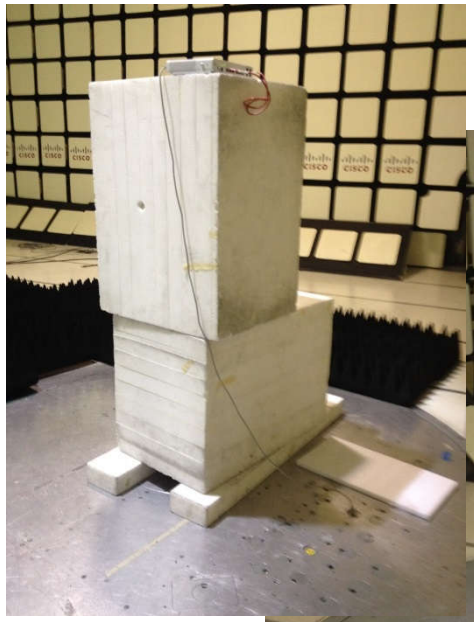
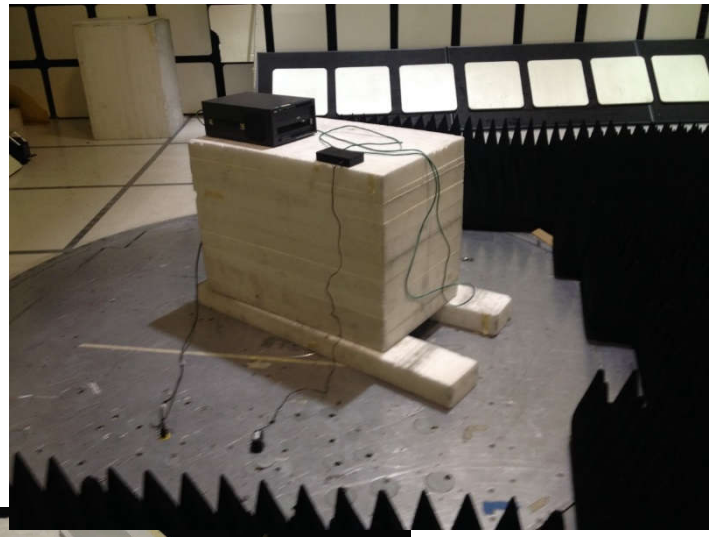
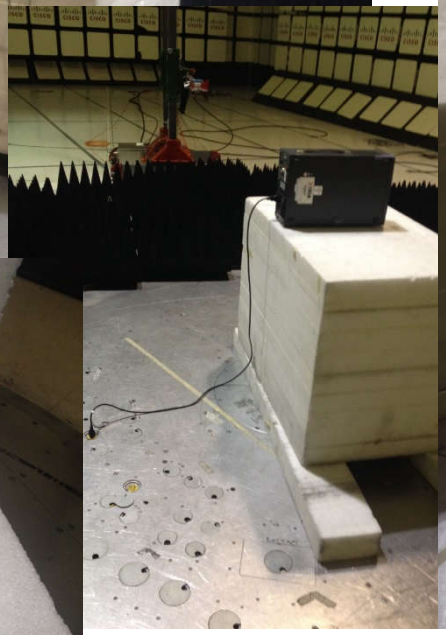
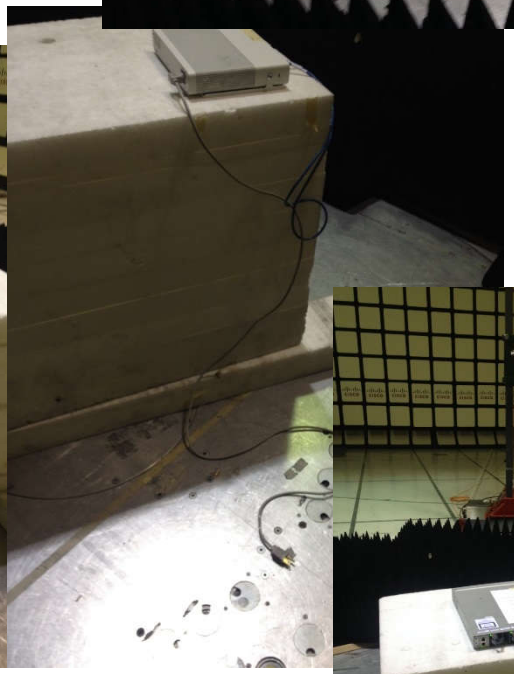
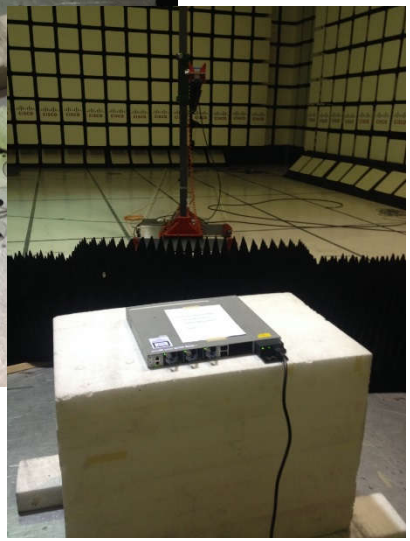
EUT Photos











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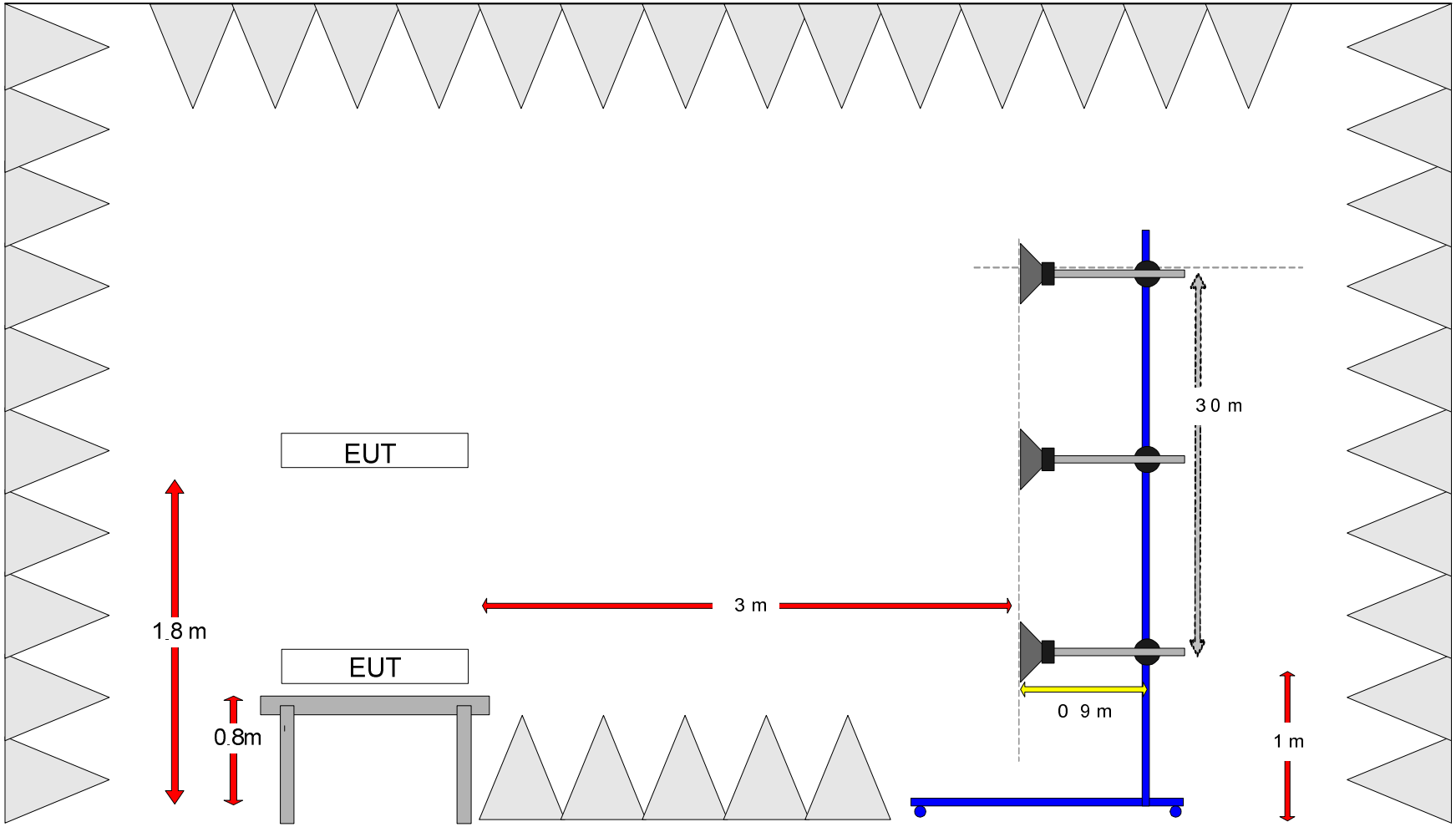
Planer Scan from 1m-4m



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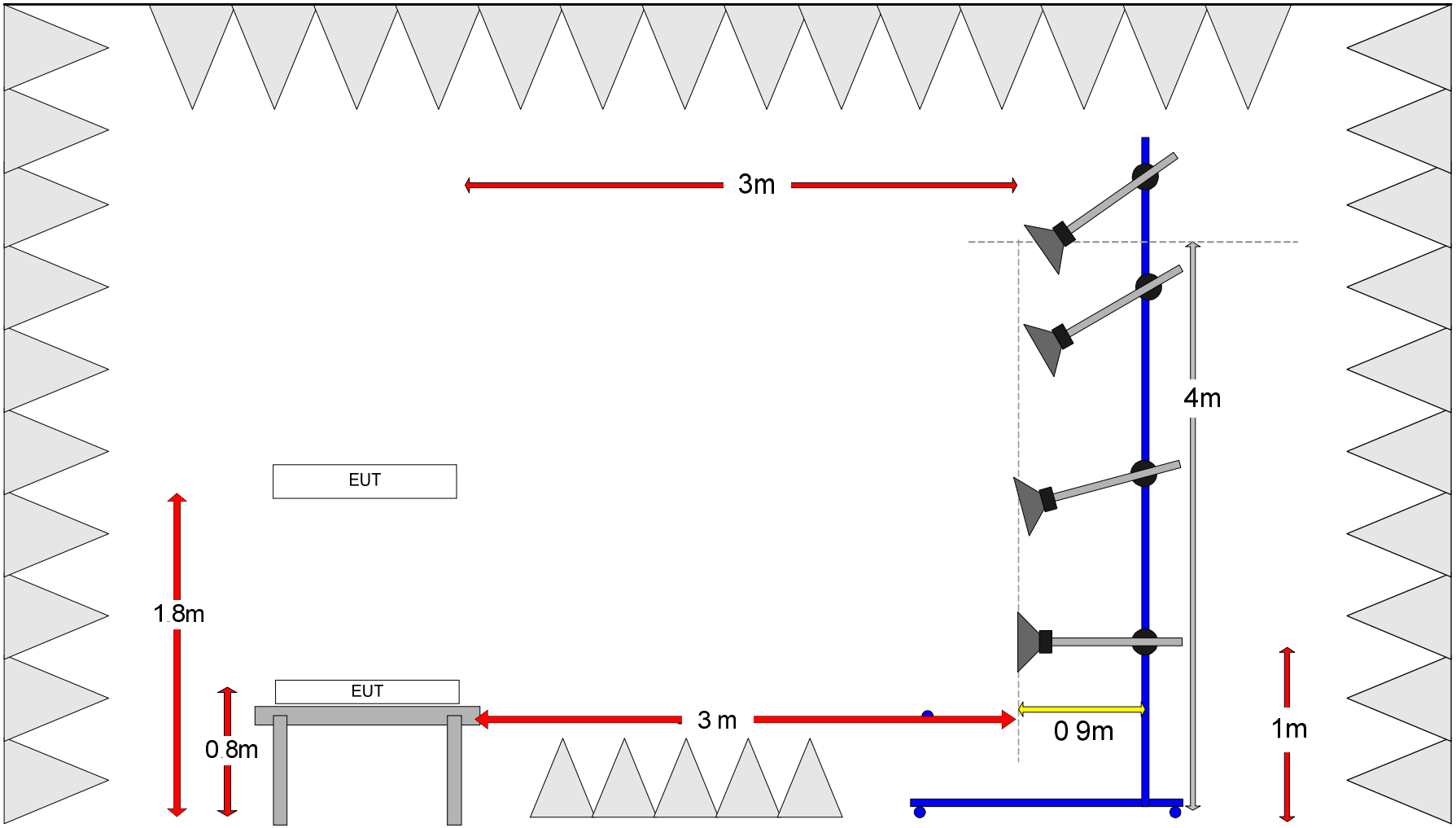
Bore-sight Scan from 1m-4m



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Process

Highlighting major emissions from a prescan

Set EUT to relevant height.

Set resolution and video bandwidth lower than typical to get improvements in noise floor. During tower/turntable rotation, set video bandwidth to 100 Hz, to remove impacts of modulation.

1. Select frequency, set to zero span.
2. EUT Rotate thru 360, go back to worst case.
3. Changing antenna height (scanned) from 1 m to 4 m.
   a. Bore-sight
   b. Planer scanner
4. Find the highest amplitude response from the a) and b) scans then subtract a) from b).

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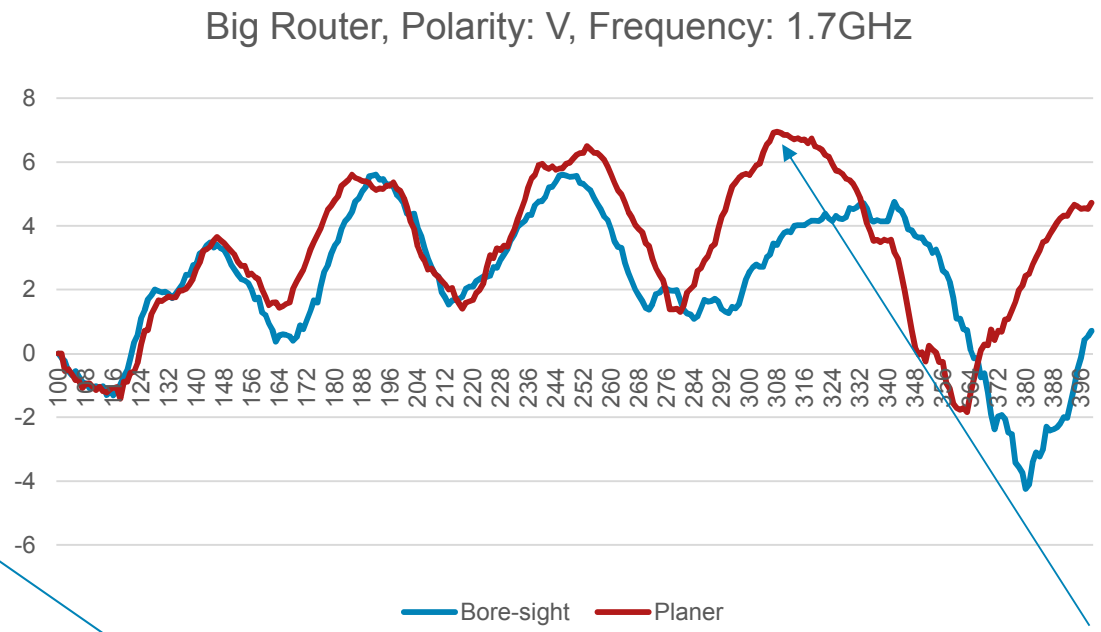
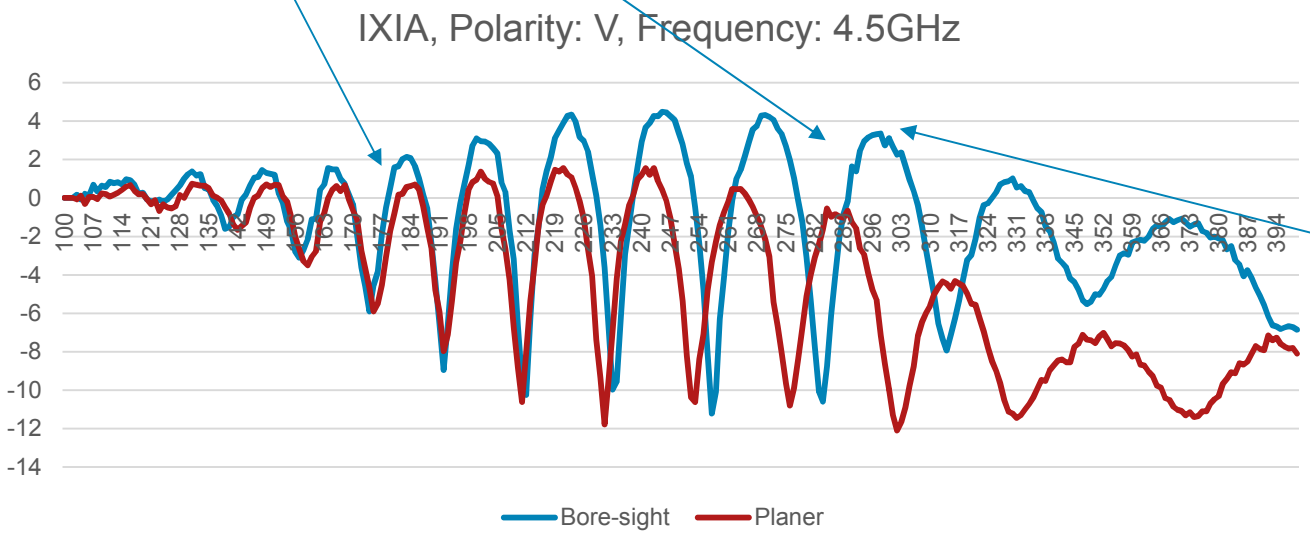
Example EUT Test Results

Rapid changes in amplitude with small antenna height changes



Bore-sight lower



Bore-sight higher

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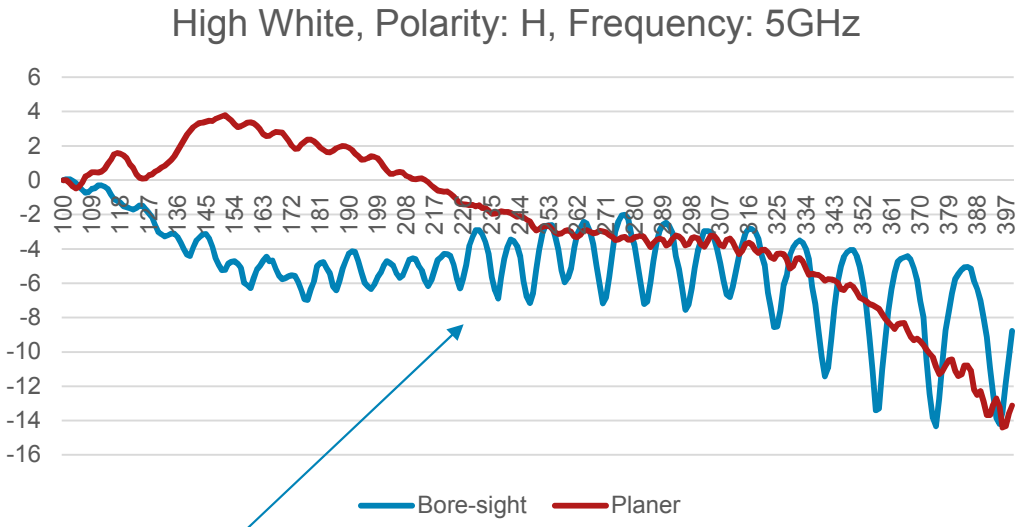
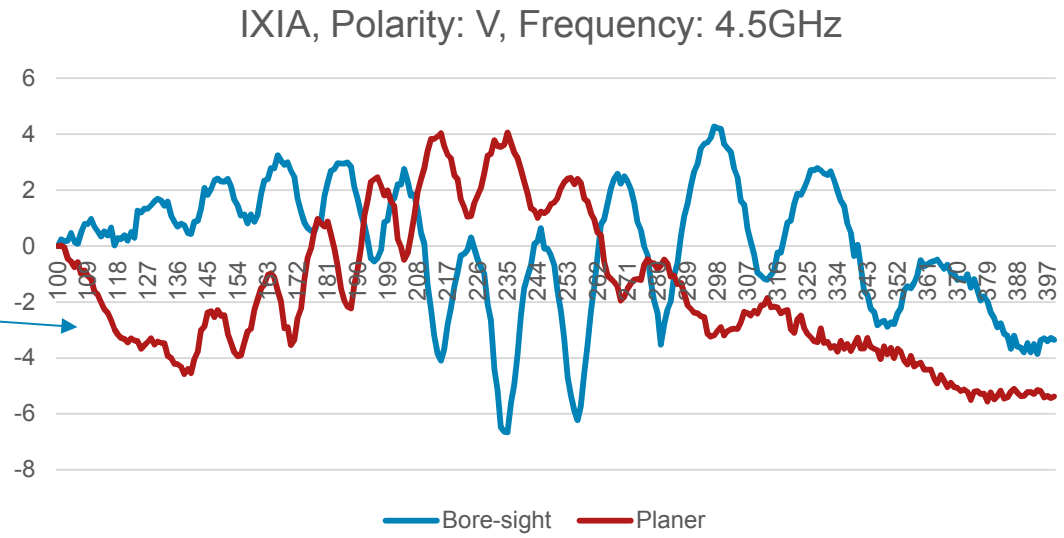
Example EUT Test Results



Doing a fixed height of 1m will underestimate emission levels.

Again, rapid changes in amplitude with small antenna height changes



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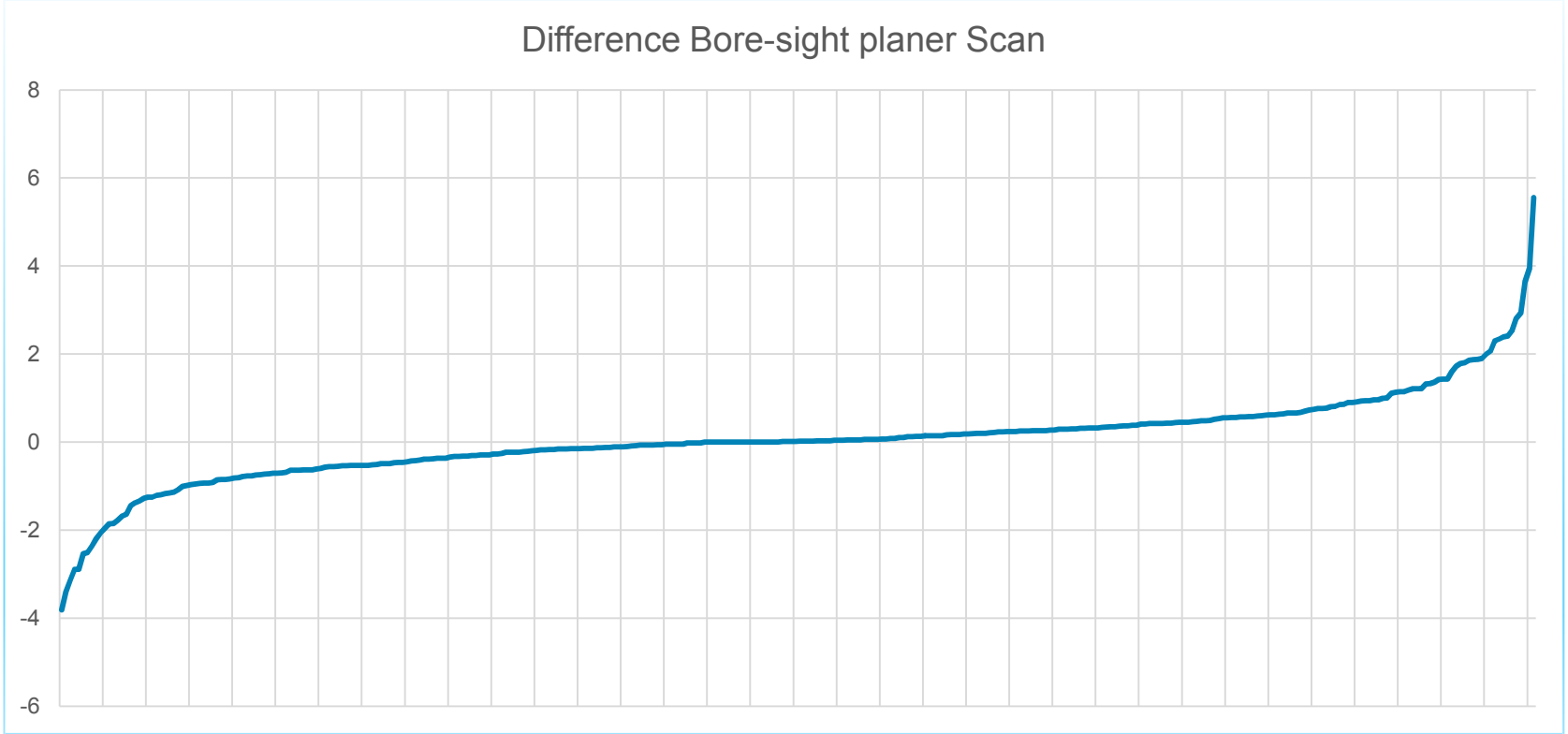
All emissions from the 9 sets up

Taking all emissions from the different systems, plotting them based on the difference in worst case amplitude from the bore-sight and planer scans.



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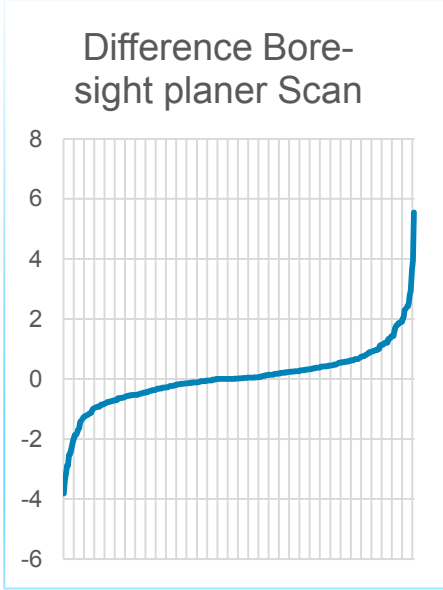
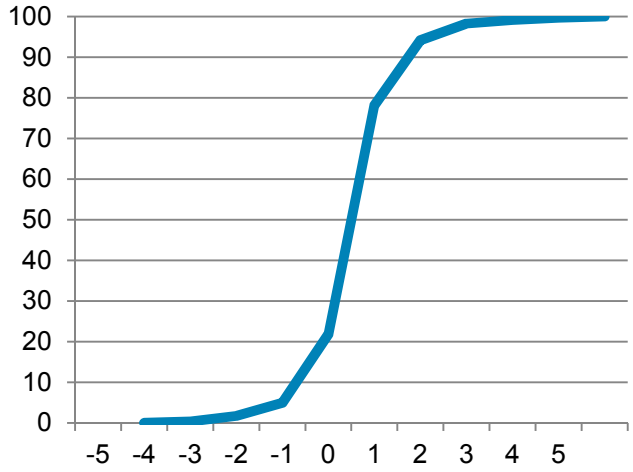
All emissions from the 9 sets up



1. Total number emission = 342
2. Std Dev = 1
3. Approx 95% of emission are within ±2dB.
4. Emissions on the negative side tended to be from the EUT at 1.8m.
5. These are looking at all the emissions from these boxes.

	difference	number of emissions
less than -4.5	-5	0
-3.5 to -4.5	-4	1
-2.5 to -3.5	-3	5
-1.5 to -2.5	-2	11
-0.5 to -1.5	-1	58
-0.5 to 0.5	0	193
0.5 to 1.5	1	55
1.5 to 2.5	2	14
2.5 to 3.5	3	3
3.5 to 4.5	4	2
above 4.5	5	1



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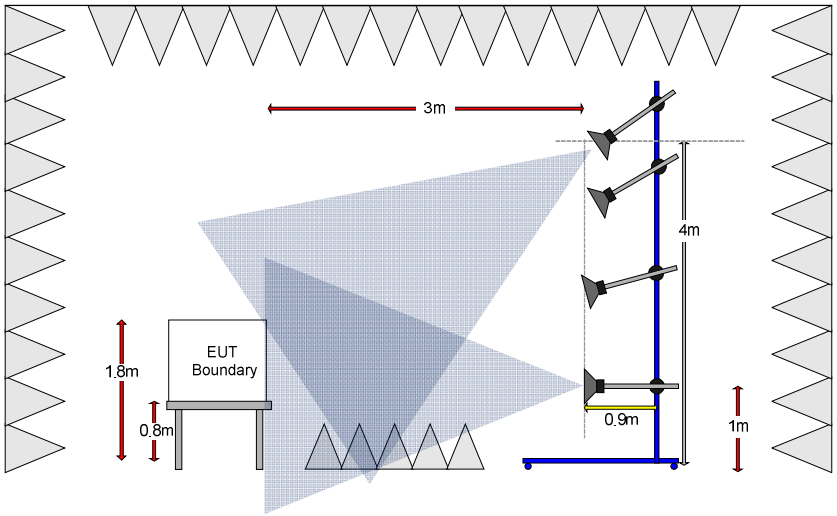
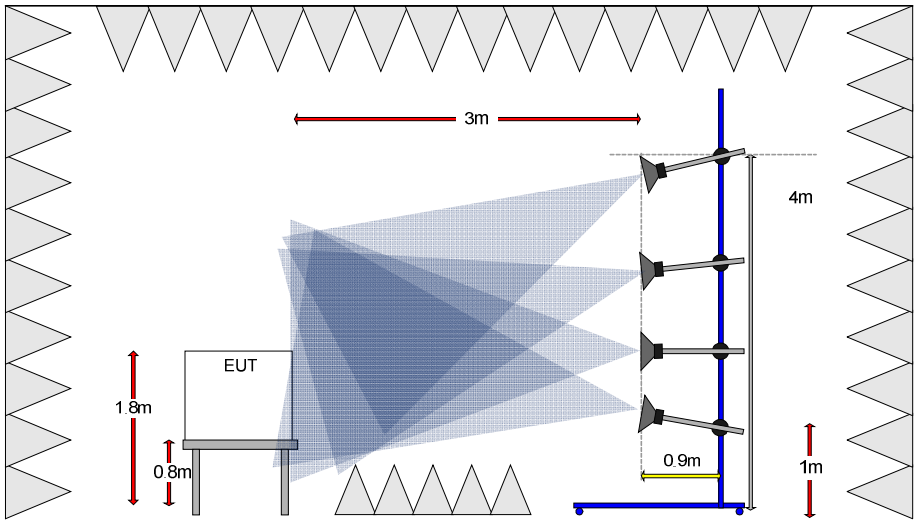
Discussions

Up to 6GHz, the 3117 (or LogPC), beamwidth is 2.5m, pointing at 1m will mean the EUT at 1.8m should be within beamwidth.





Pointing more towards the 1.8m high EUT will give me a completely different set of data.

There a many different variants like this and they will all give me a different answer

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Conclusion

It is clear from the EUT responses that making measurements at every 25cm (for example) will not find a worst case response, neither will doing measurements at 1m only.

Bore-sighting introduces large amount of variances which may not provide any significant benefit over a linear scan.

Some suggested wording to be add …

As a minimum requirement, worst case emissions shall be measured while the antenna is scanned, without tilting, in range from 1m to 4m with a minimum step size of 2cm.

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