



Product Service

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2017-09-11

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Anhang zum Prüfbericht / ANNEX to Test Report

Nr. / No TR-33368-03325-03 (Edition 2)

Applicant: Häfele GmbH & Co. KG

Type of equipment:

Type designation: BLEBox

Order No.:

Test standards: BLE interface

Note:

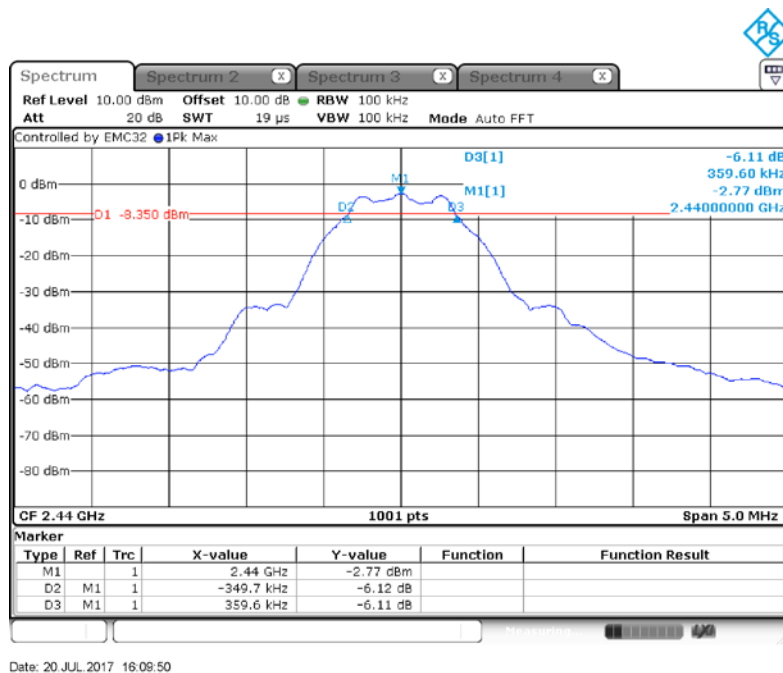
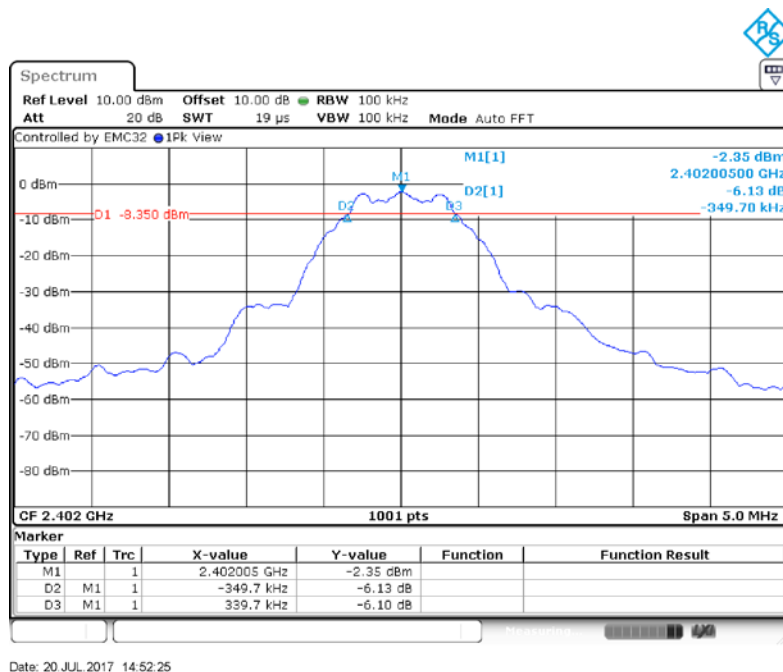
The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

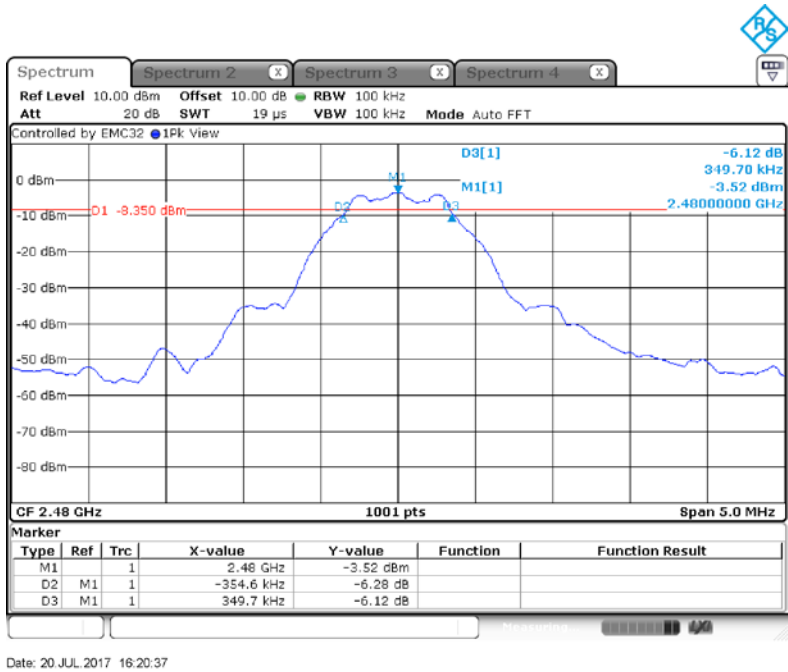
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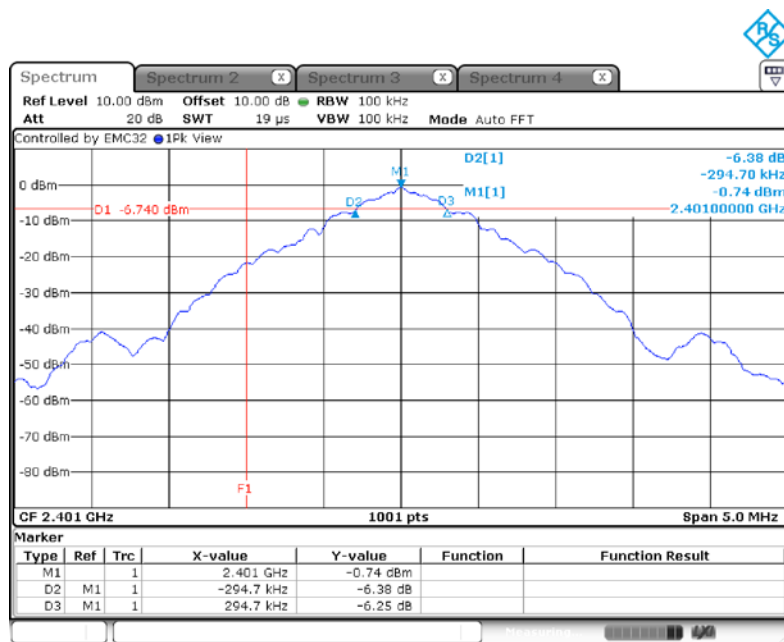
1 Plots for 6 dB / DTS bandwidth

1.1 Test plots for Bluetooth Low Energy (BLE)

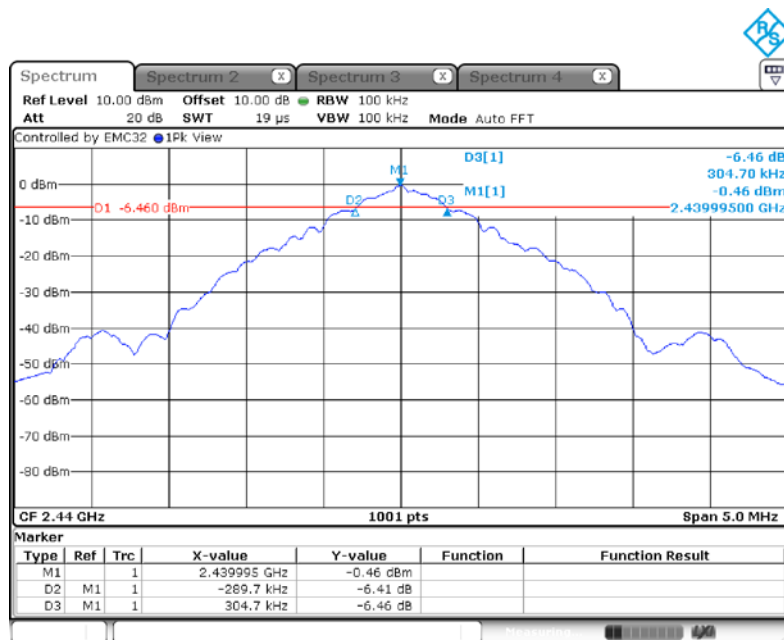




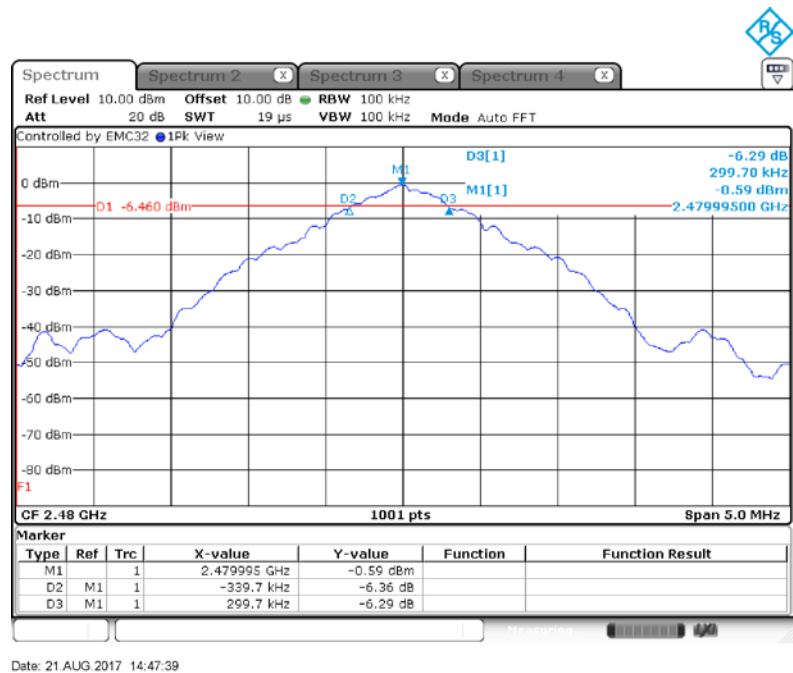
1.2 Test plots for Proprietary radio



Date: 21 AUG 2017 14:45:05

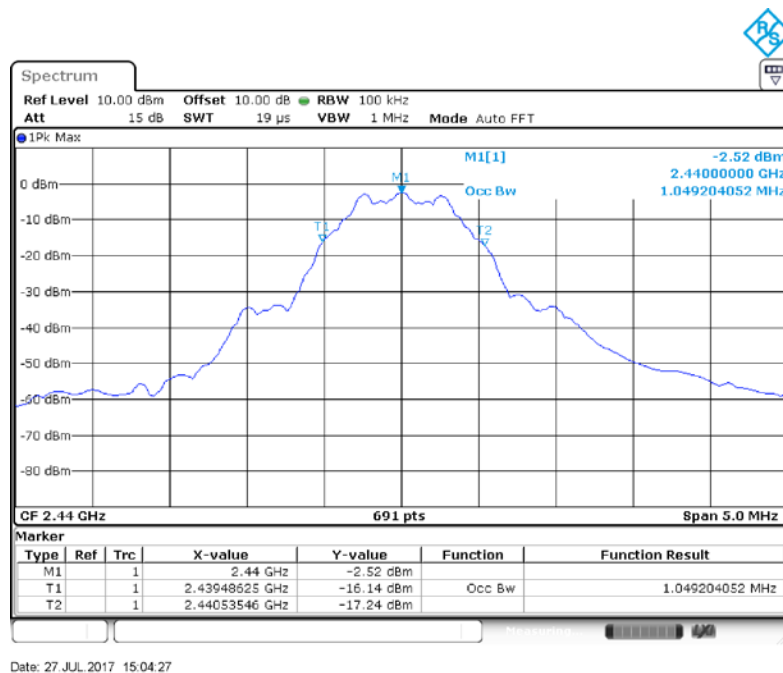
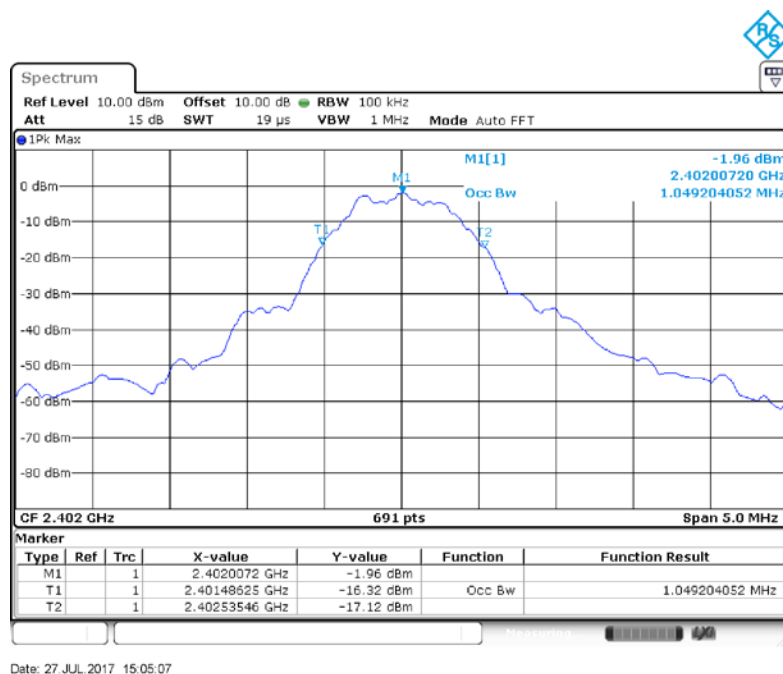


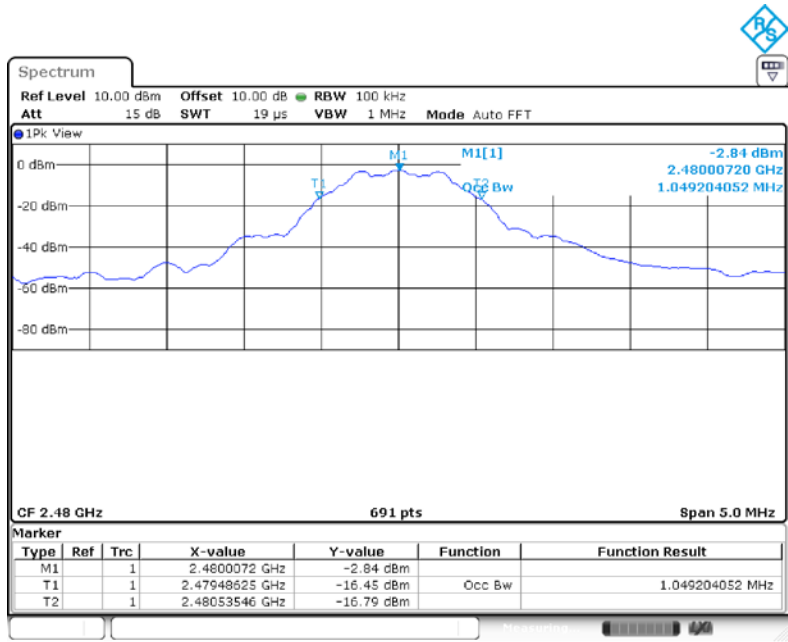
Date: 21 AUG 2017 14:46:27



2 Plots for Occupied Bandwidth (99 %)

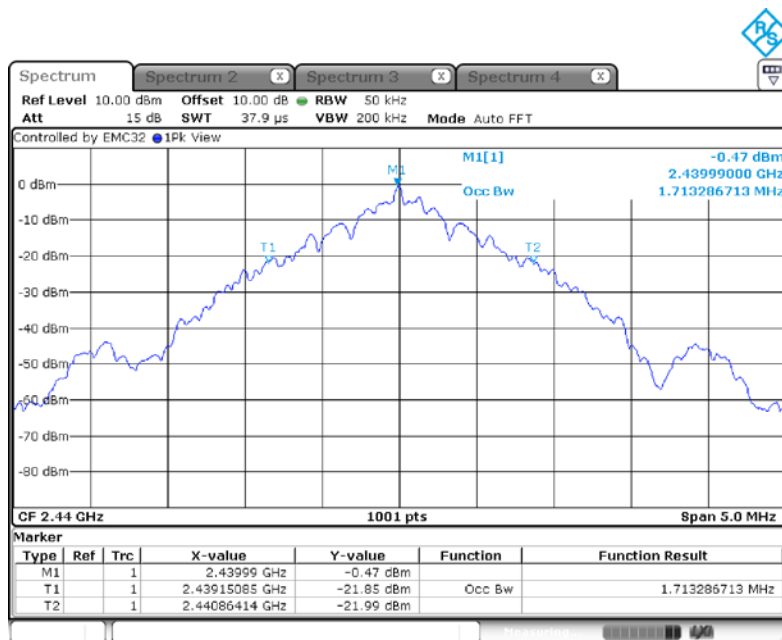
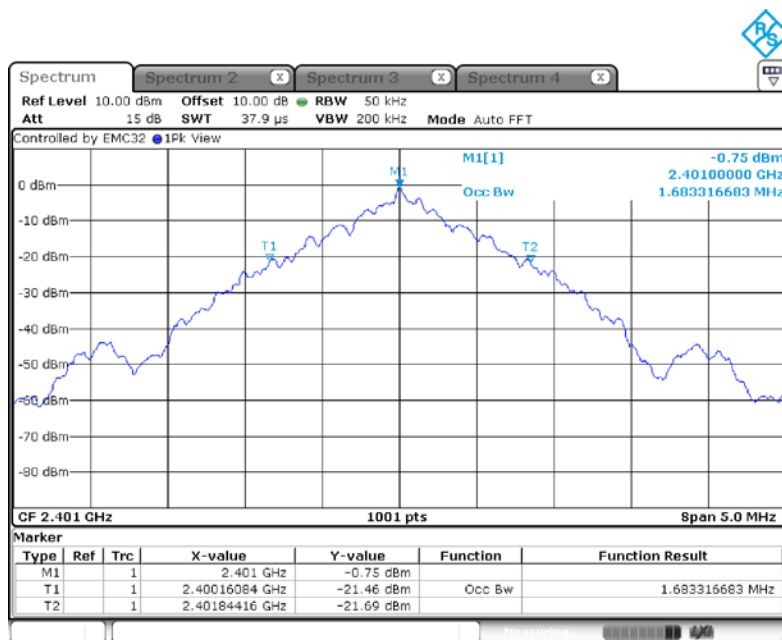
2.1 Test plots for Bluetooth Low Energy (BLE)

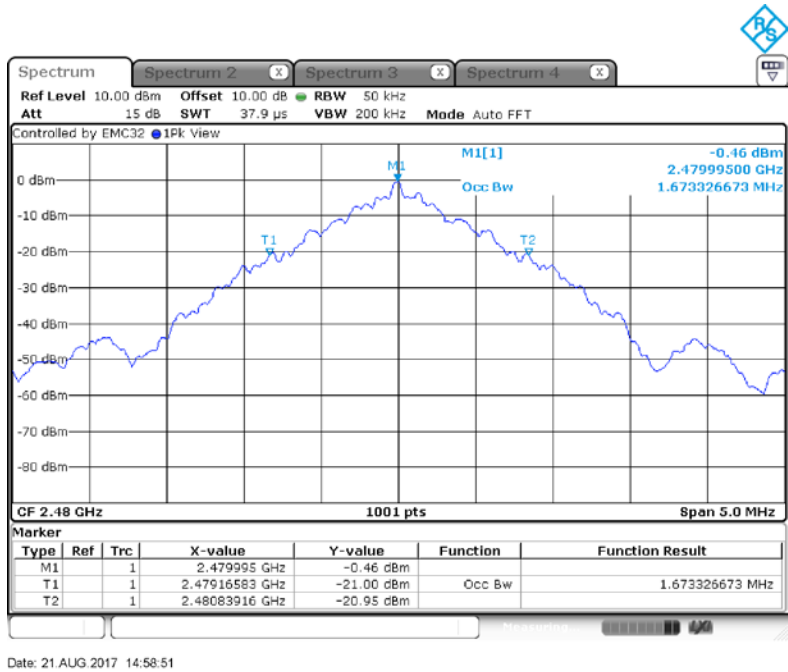




Date: 27.JUL.2017 15:02:15

2.2 Test plots for Proprietary radio

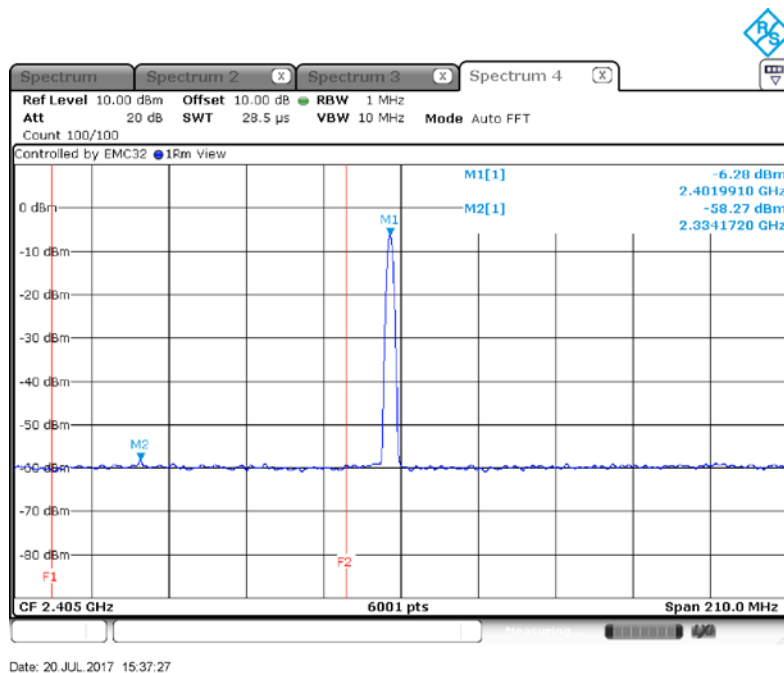
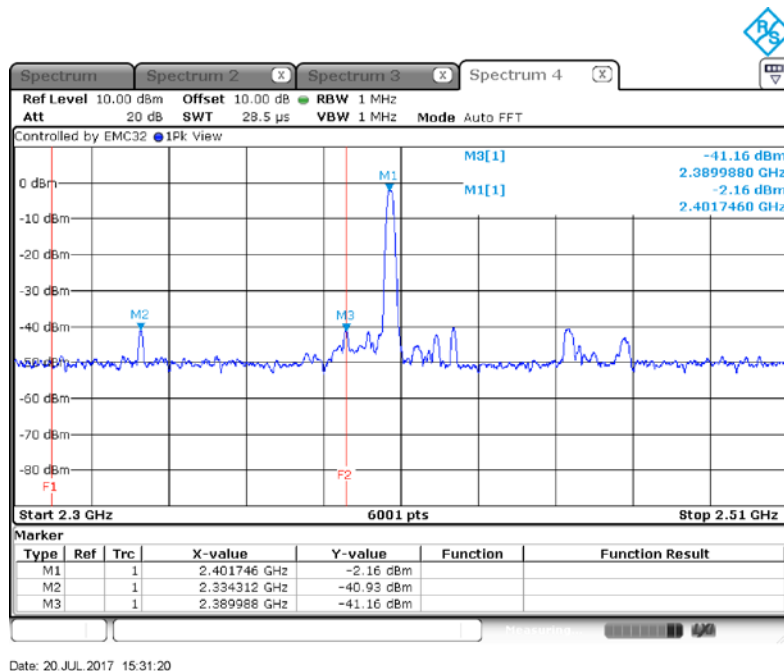


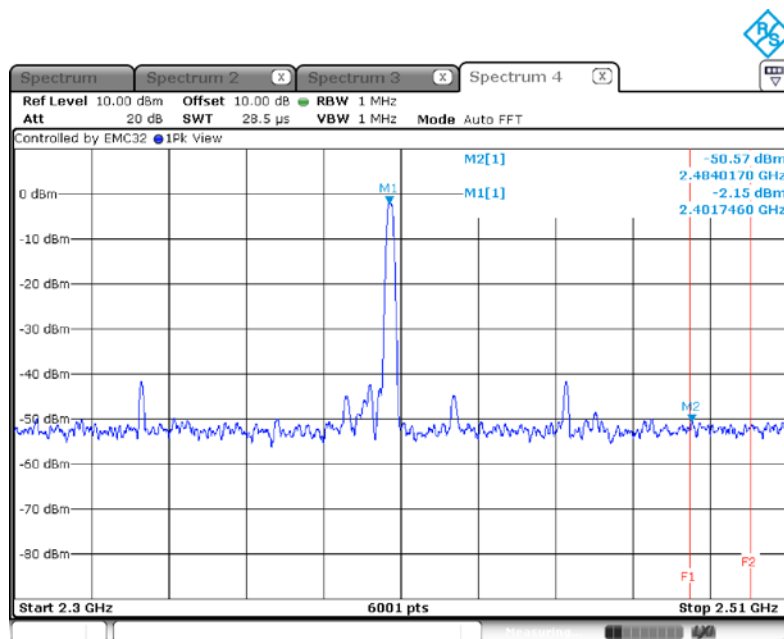


3 Plots for Restricted Bands of Operation Requirement

3.1 Test plots for Bluetooth Low Energy (BLE)

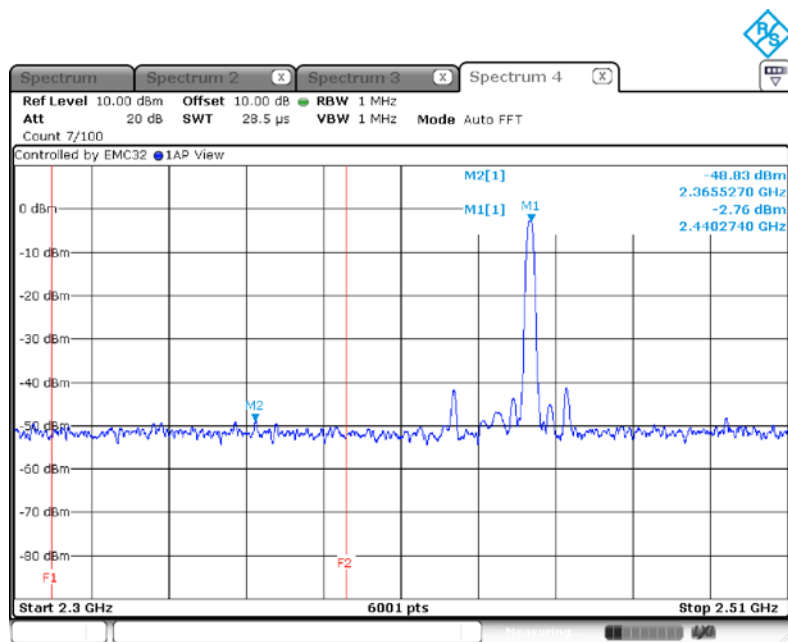
3.1.1 Lowest Channel



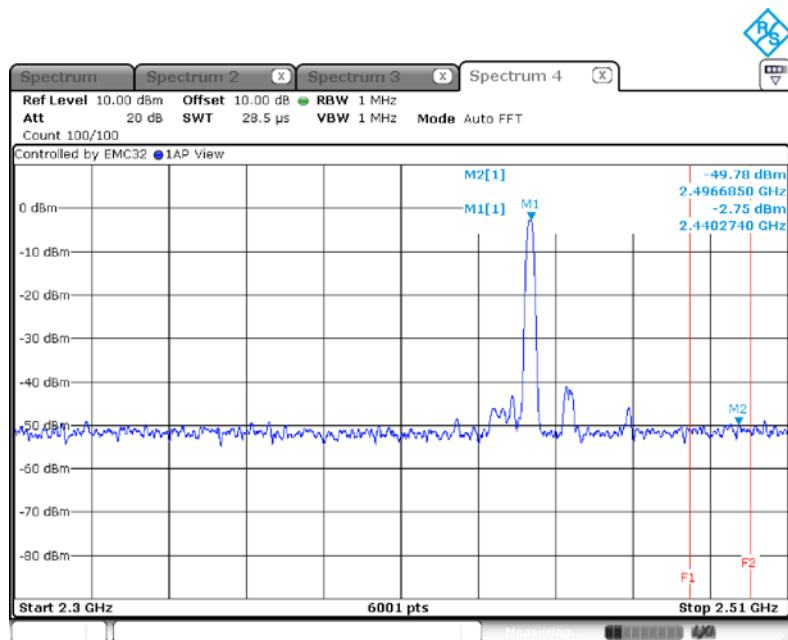


Date: 20 JUL 2017 15:32:27

3.1.2 Middle Channel

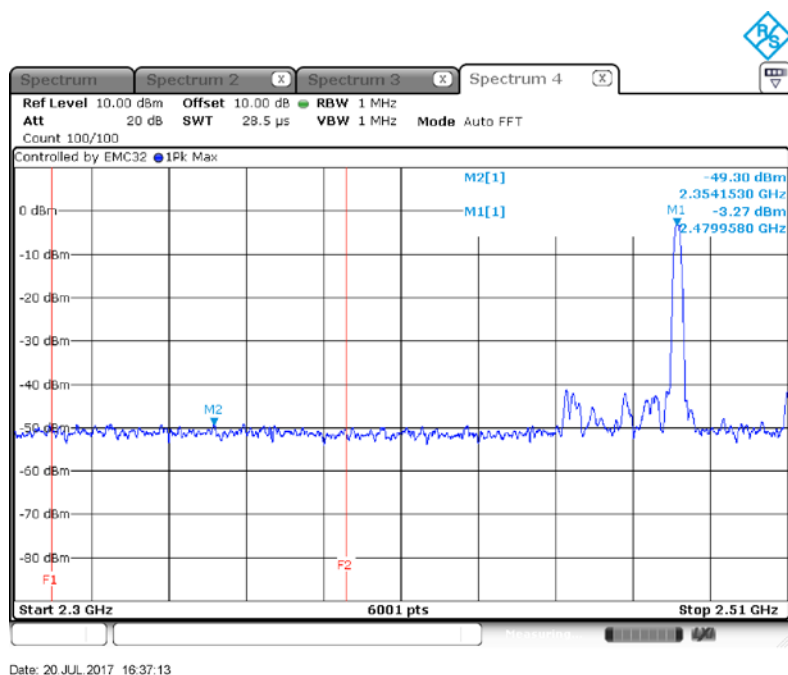


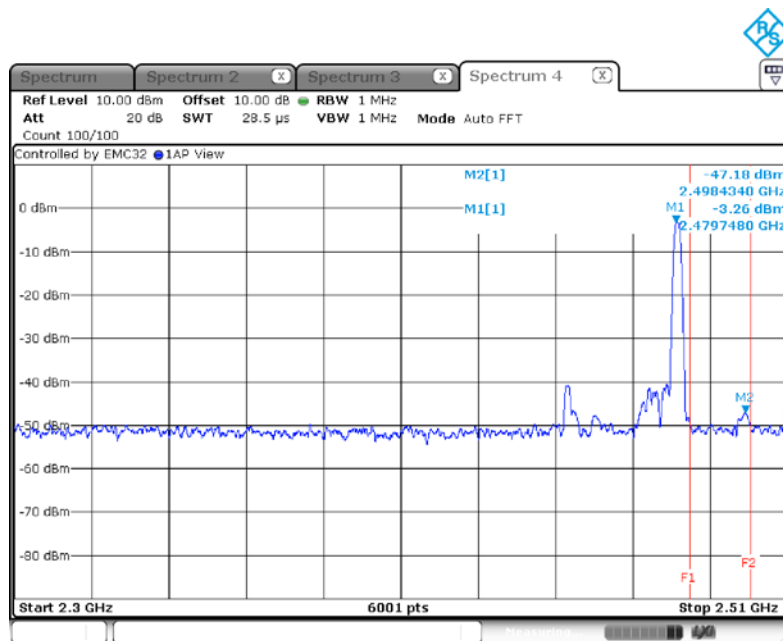
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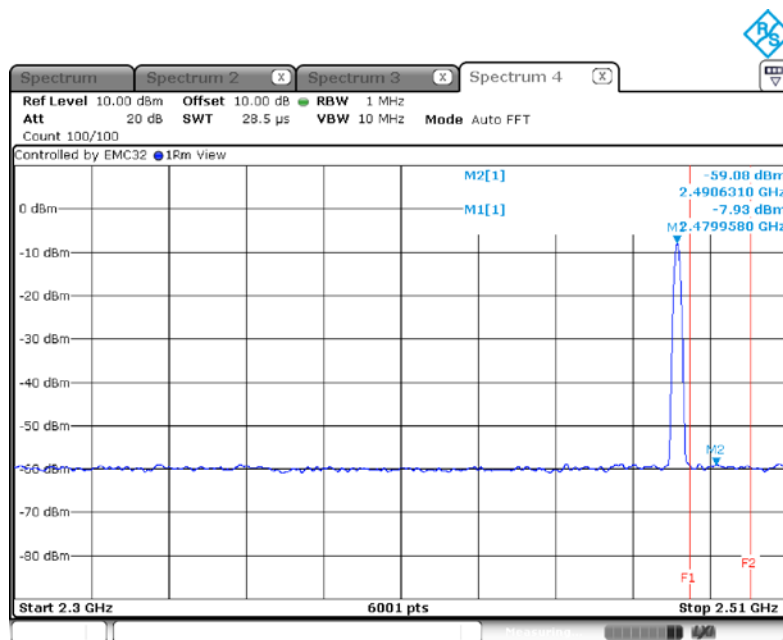
Date: 20 JUL 2017 16:18:36

3.1.3 Highest Channel





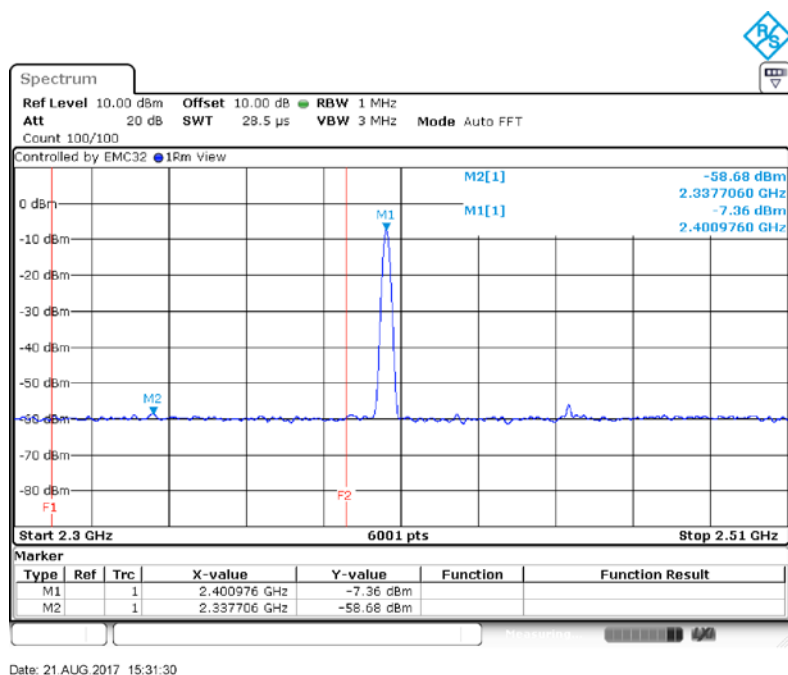
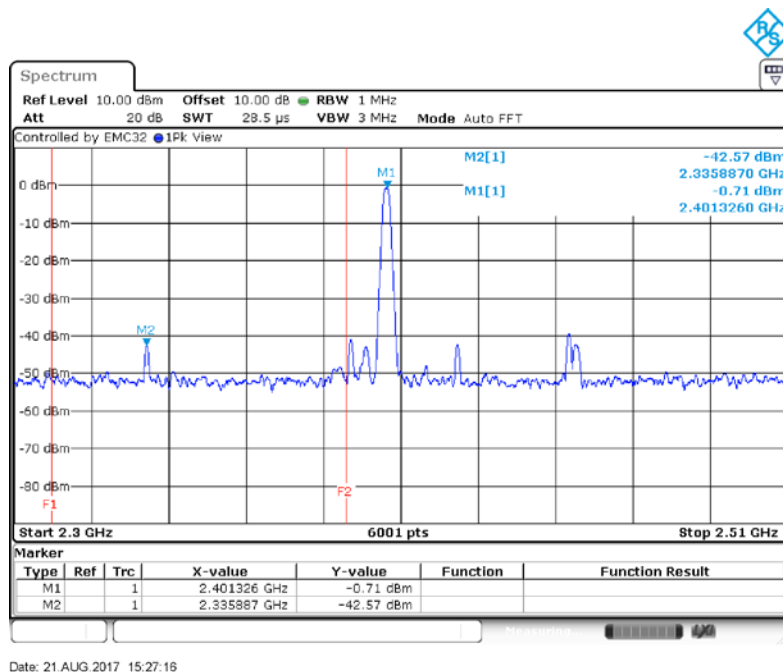
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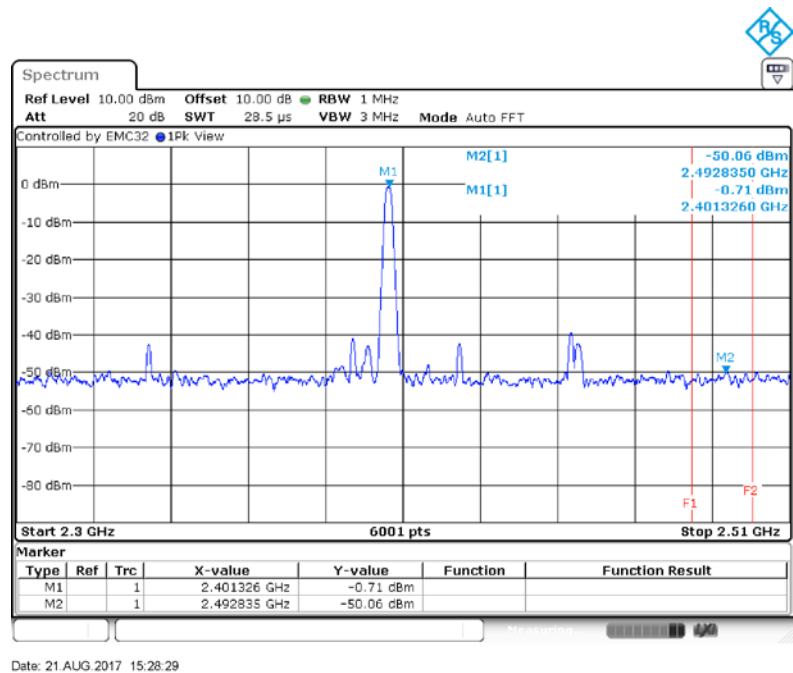


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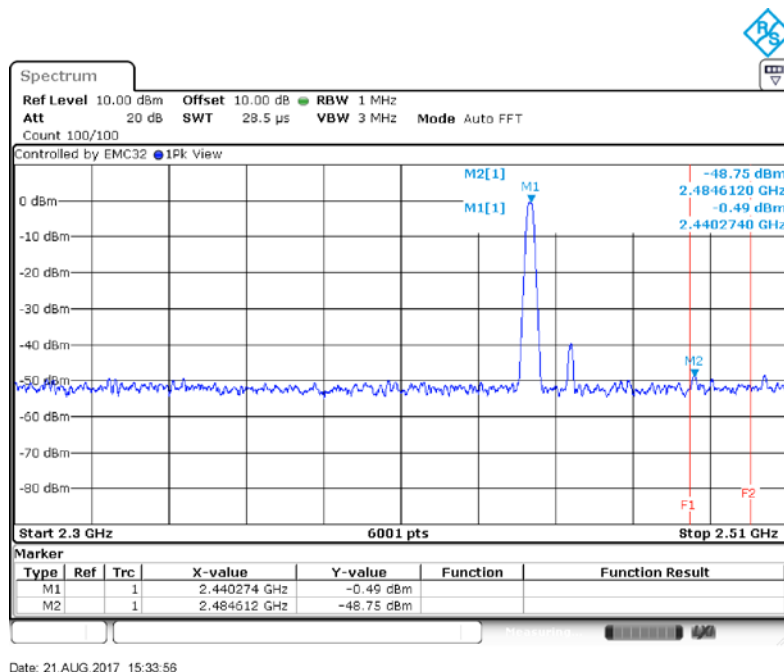
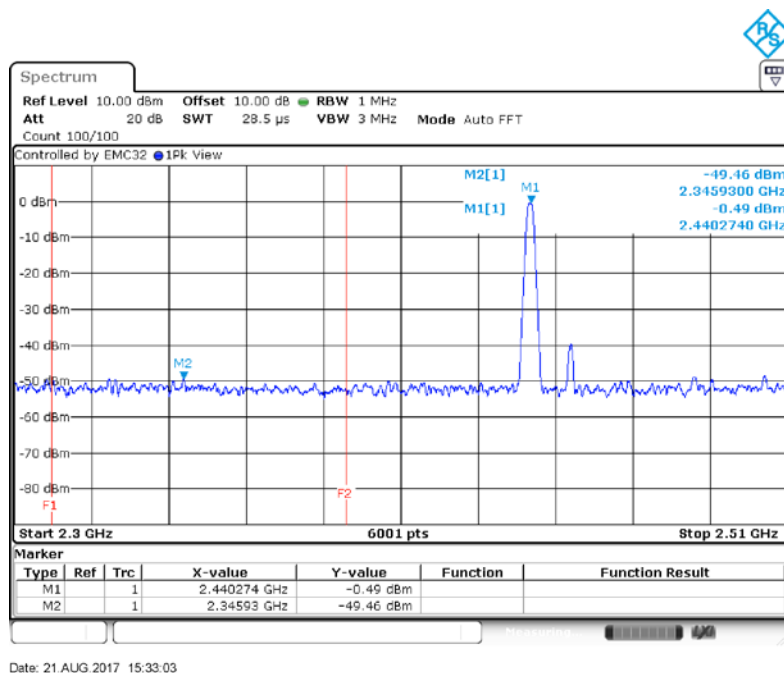
3.2 Test plots for Proprietary Radio

3.2.1 Lowest Channel

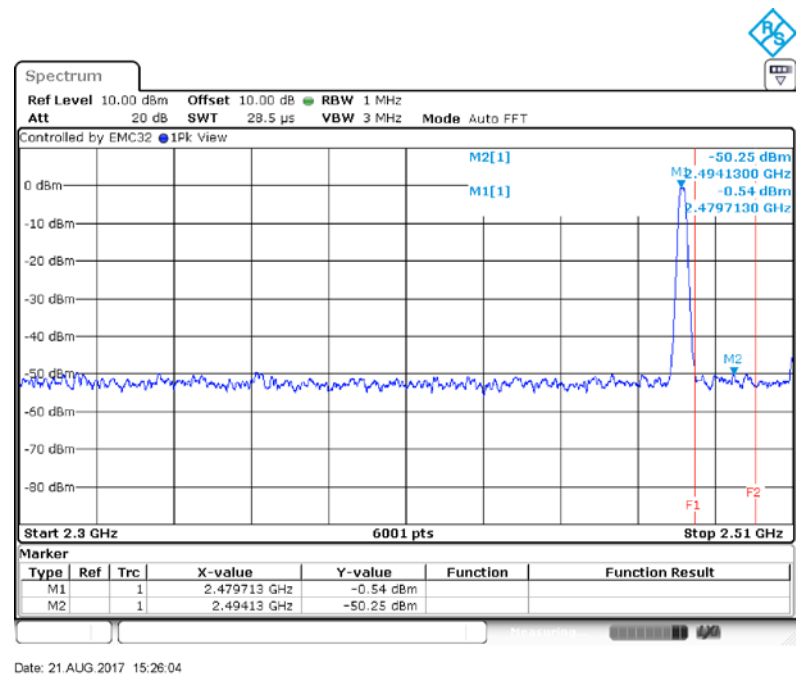
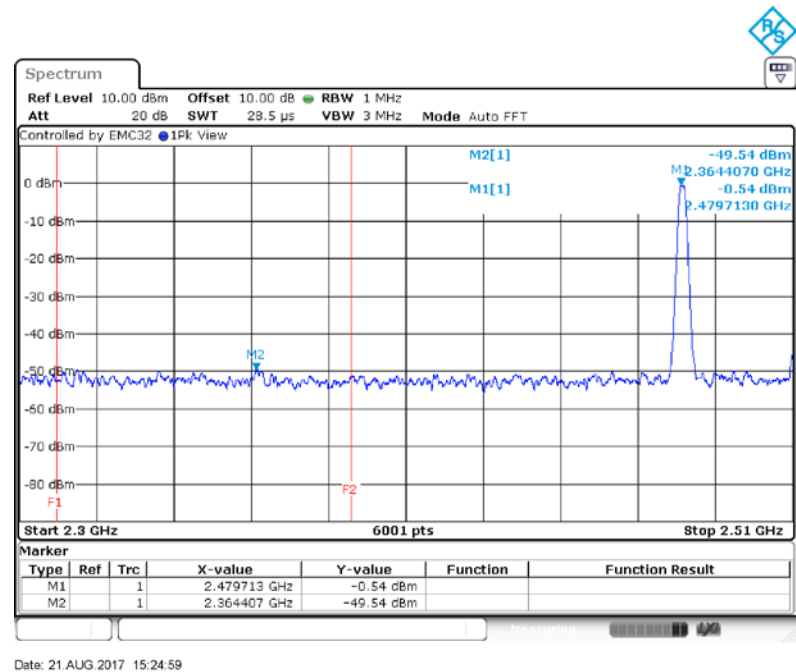




3.2.2 Middle Channel



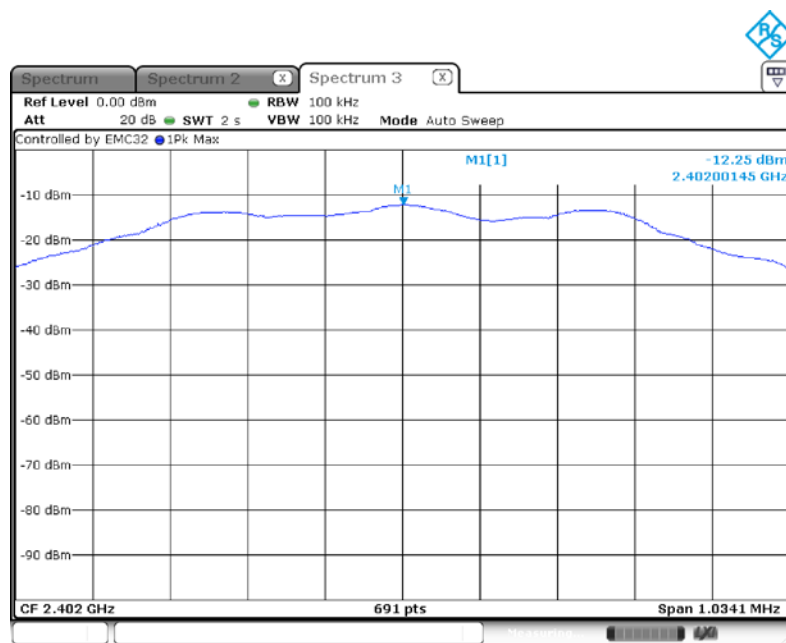
3.2.3 Highest Channel



4 Power Spectral Density

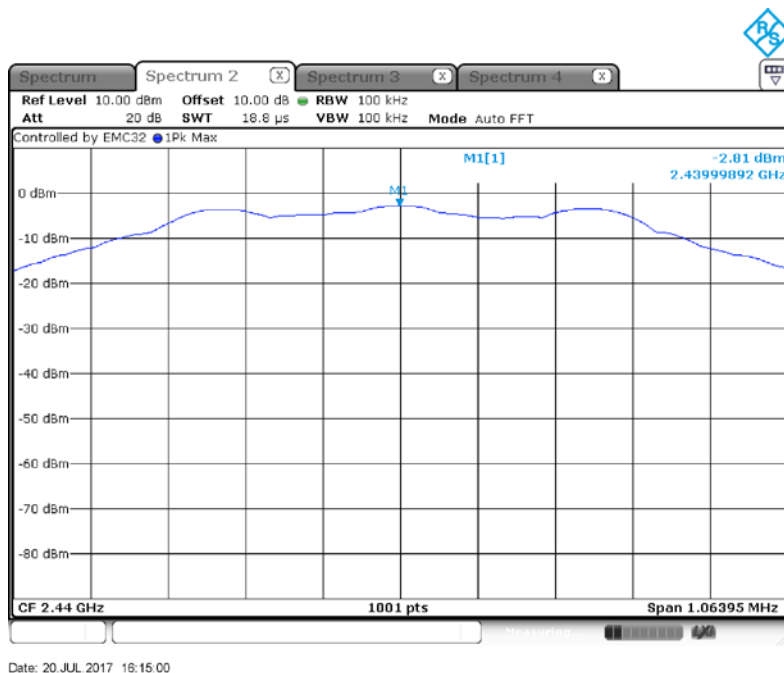
4.1 Test plots for Bluetooth Low Energy (BLE)

4.1.1 Lowest channel

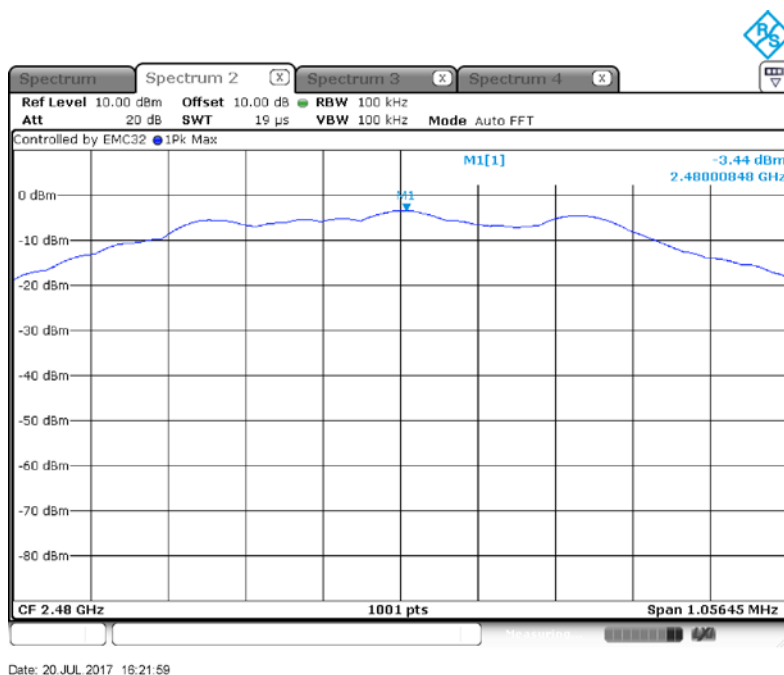


Note: Offset of 10 dB added to measurement value manually

4.1.2 Middle channel

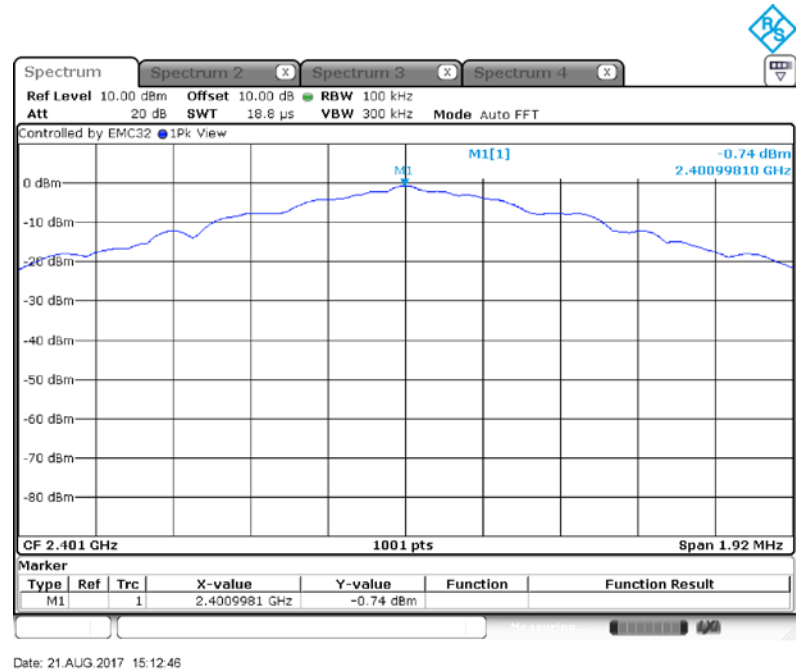


4.1.3 Highest channel

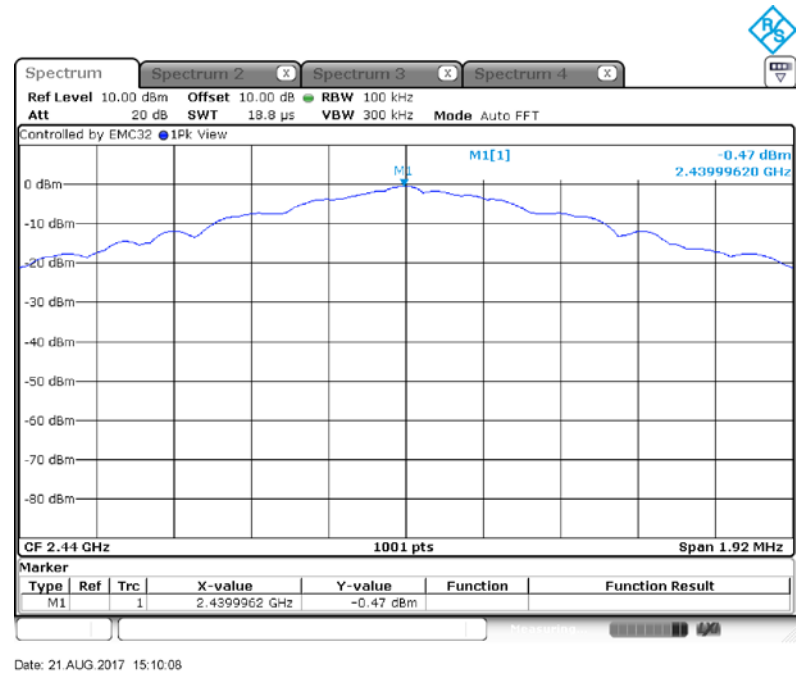


4.2 Test plots for Proprietary radio

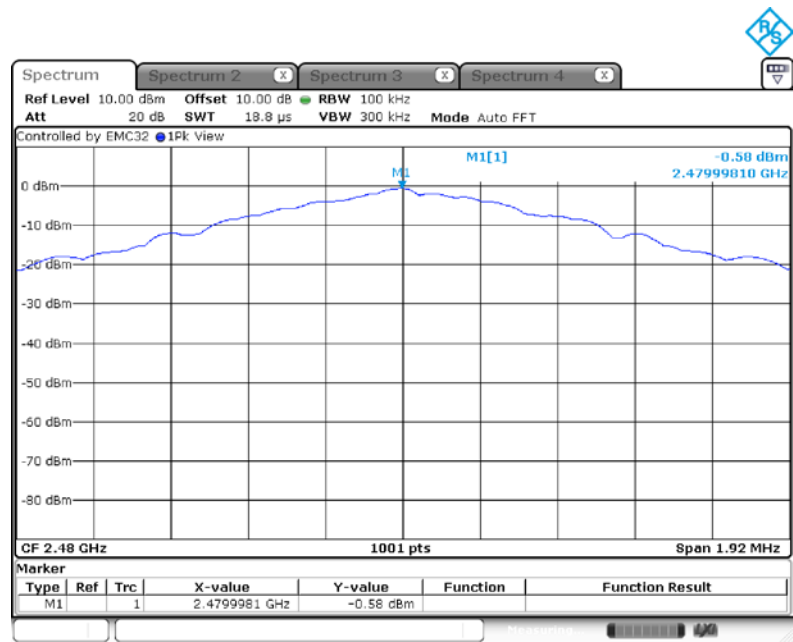
4.2.1 Lowest channel



4.2.2 Middle channel



4.2.3 Highest channel

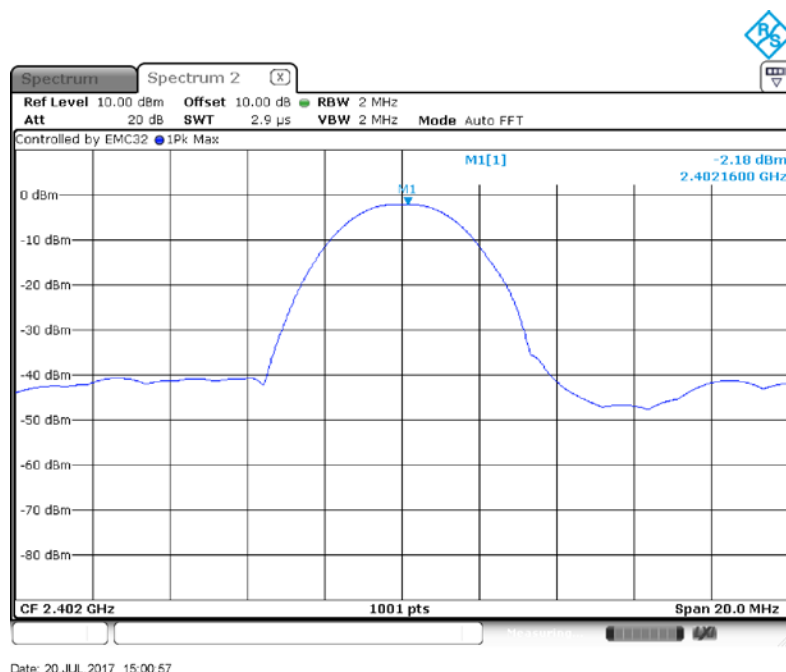


Date: 21 AUG 2017 15:08:33

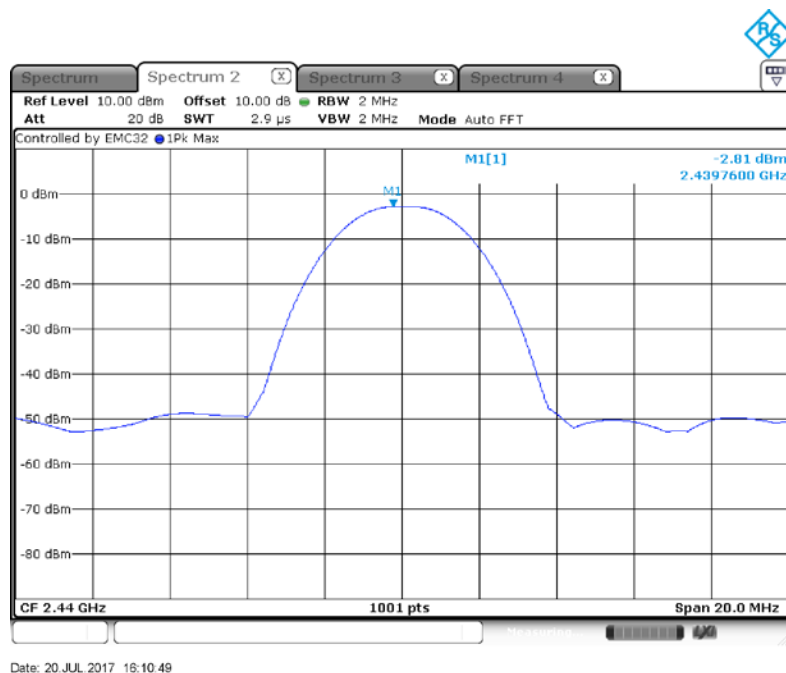
5 Maximum Output Power

5.1 Test plots for Bluetooth Low Energy (BLE)

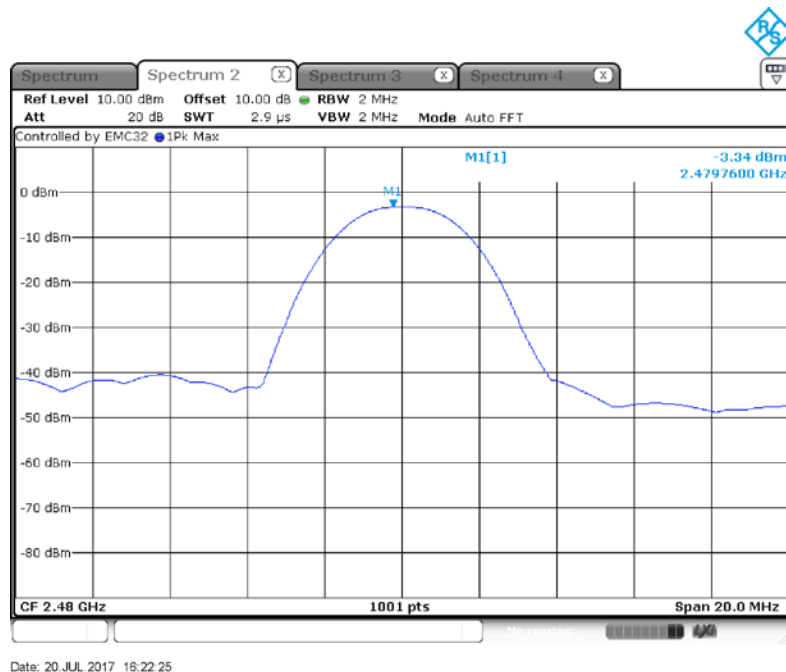
5.1.1 Lowest Channel



5.1.2 Middle Channel

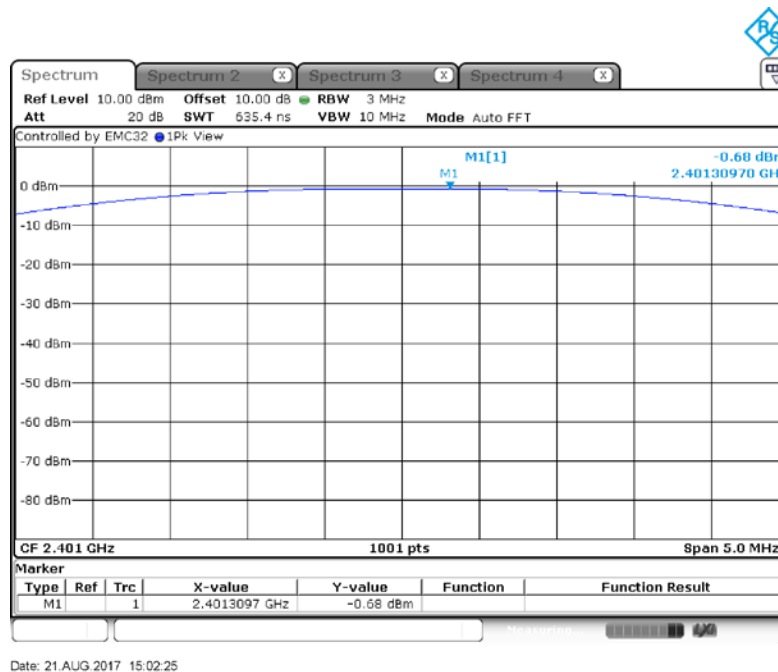


5.1.3 Highest Channel

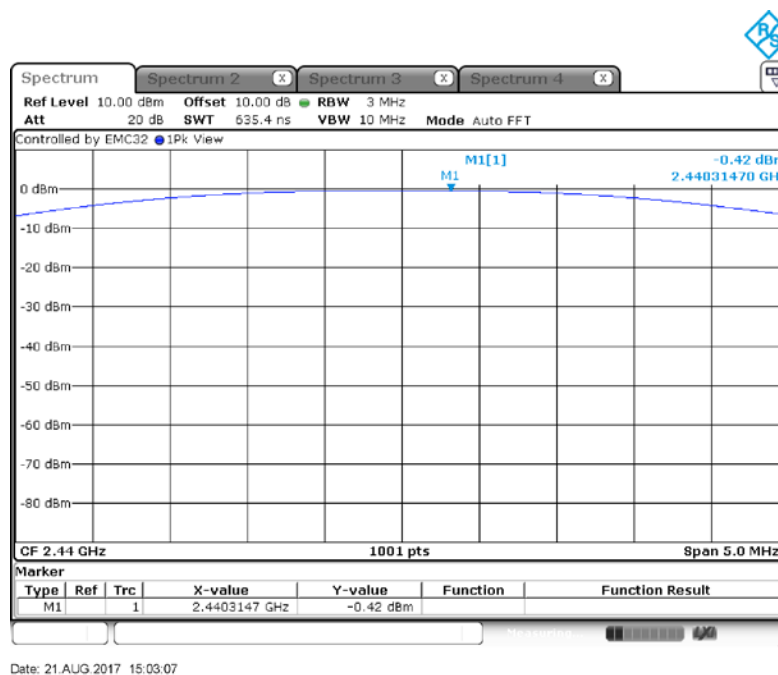


5.2 Test plots for Proprietary Radio

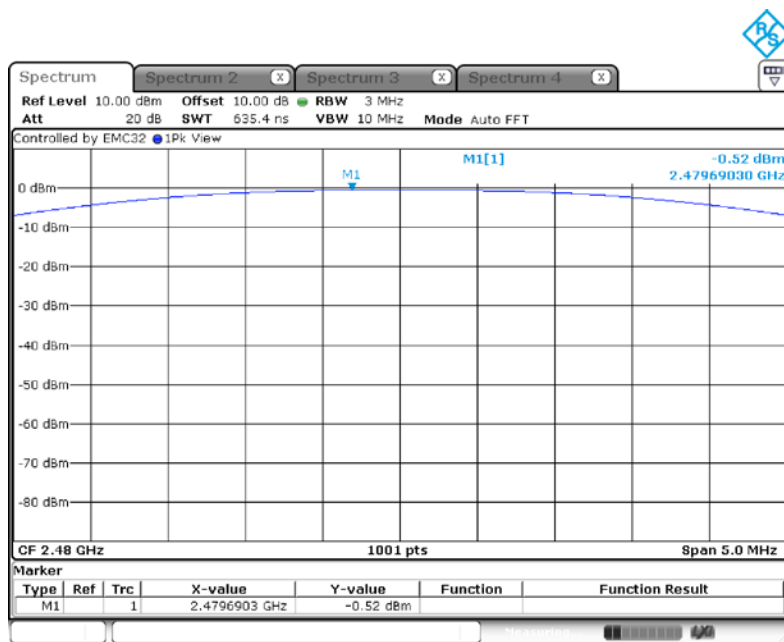
5.2.1 Lowest Channel



5.2.2 Middle Channel



5.2.3 Highest Channel

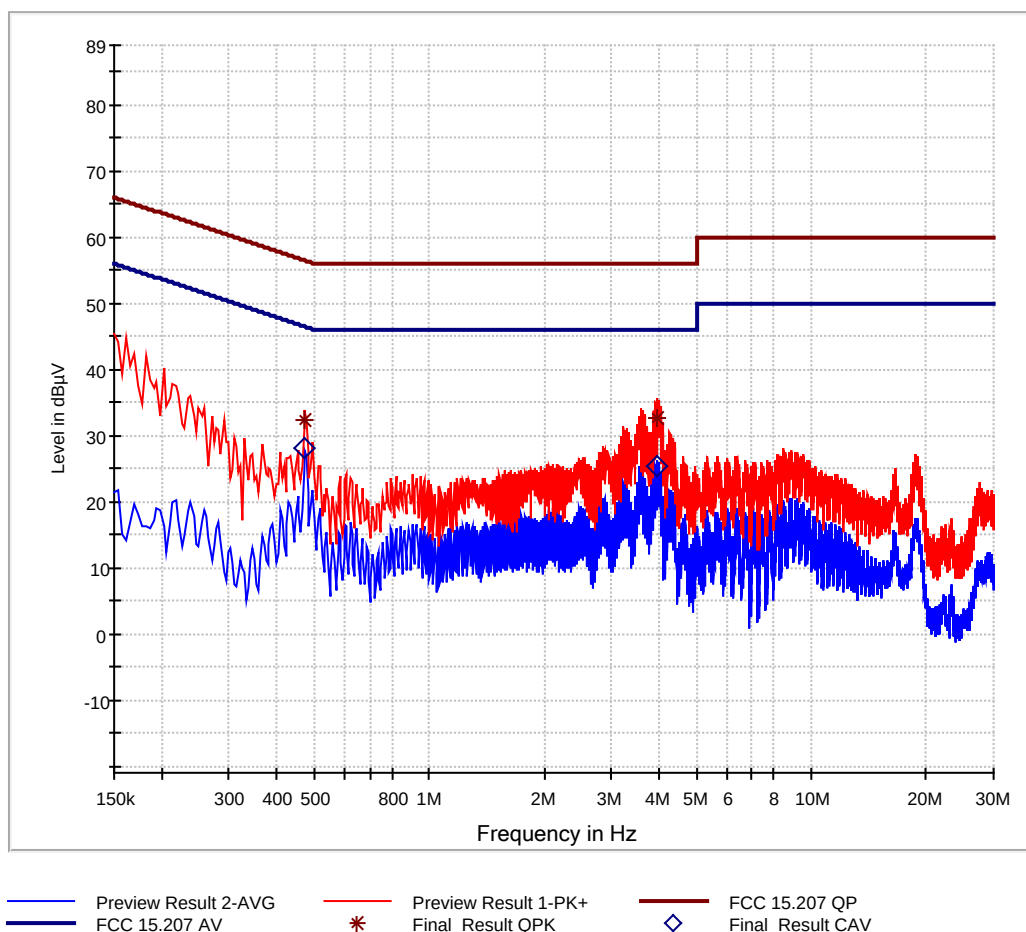


Date: 21.AUG 2017 15:03:36

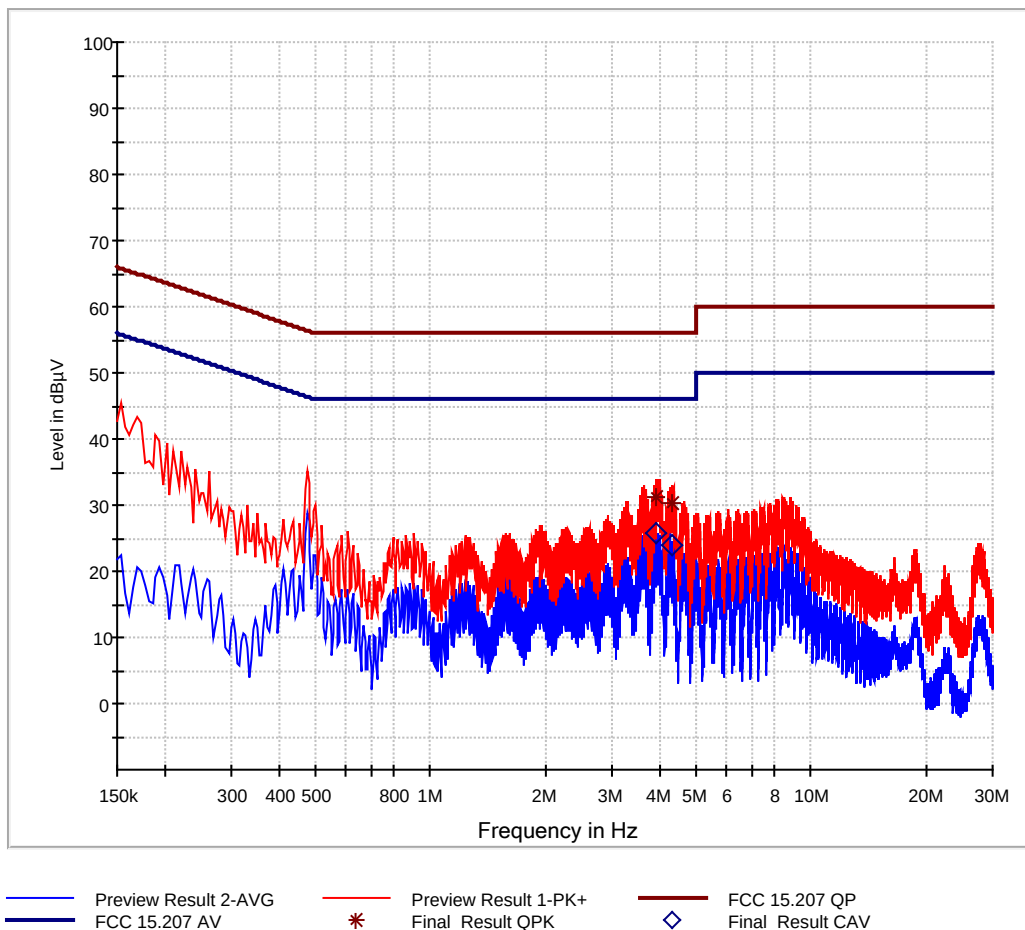
6 Conducted Powerline Emissions 150 kHz – 30 MHz

6.1 Test plots for 12 V power adapter

6.1.1.1 Phase L1

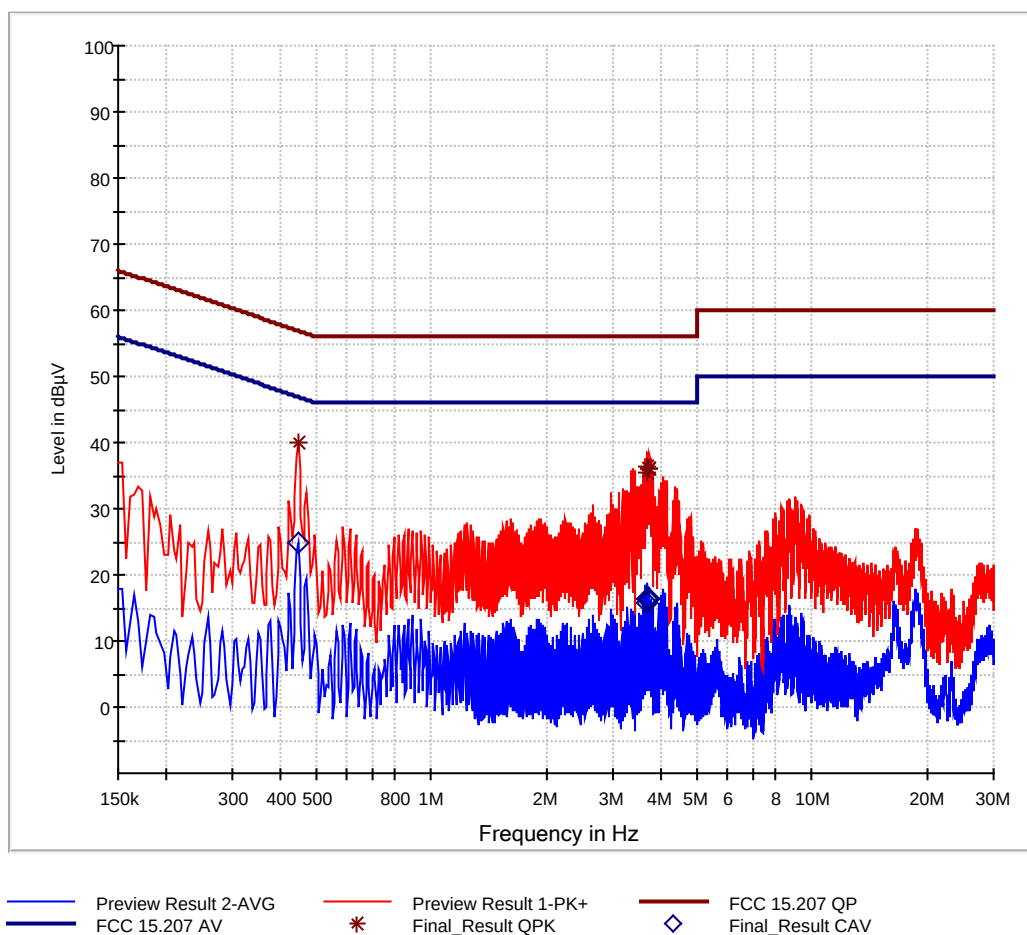


6.1.1.2 Phase N

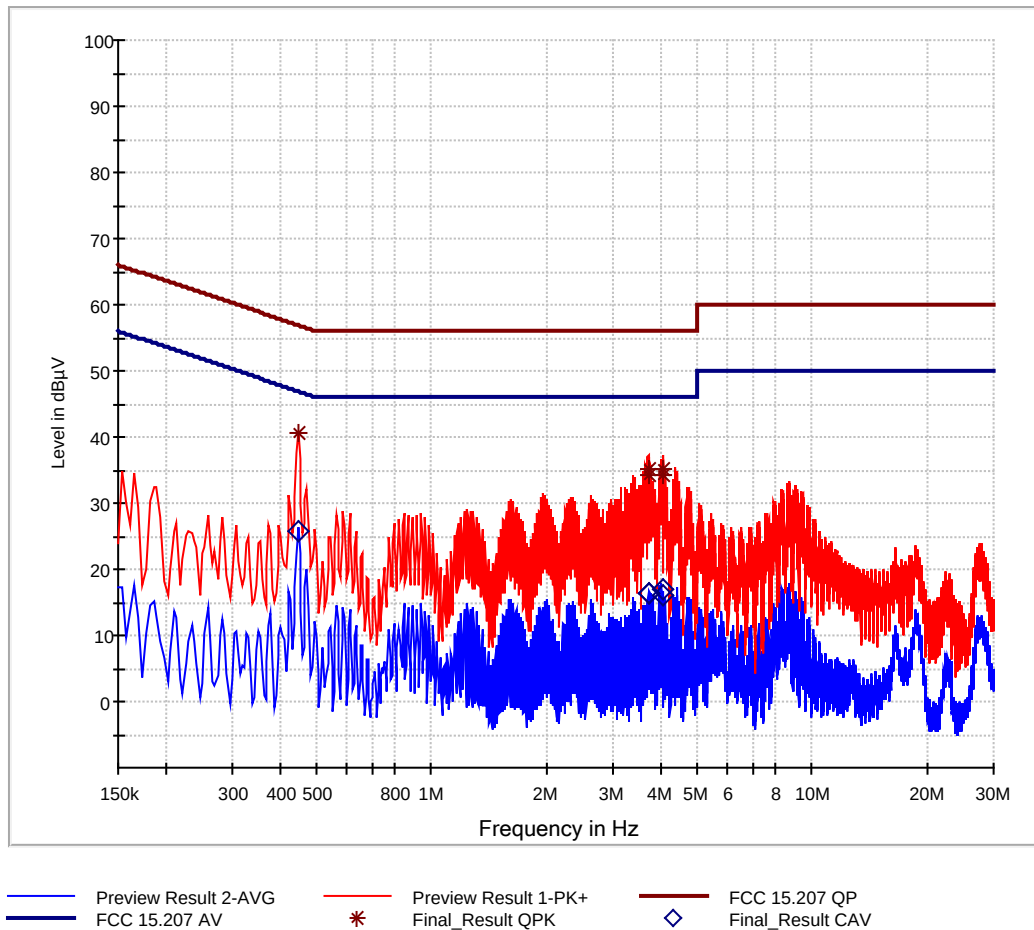


6.2 Test plots for 24 V power adapter

6.2.1.1 Phase L1



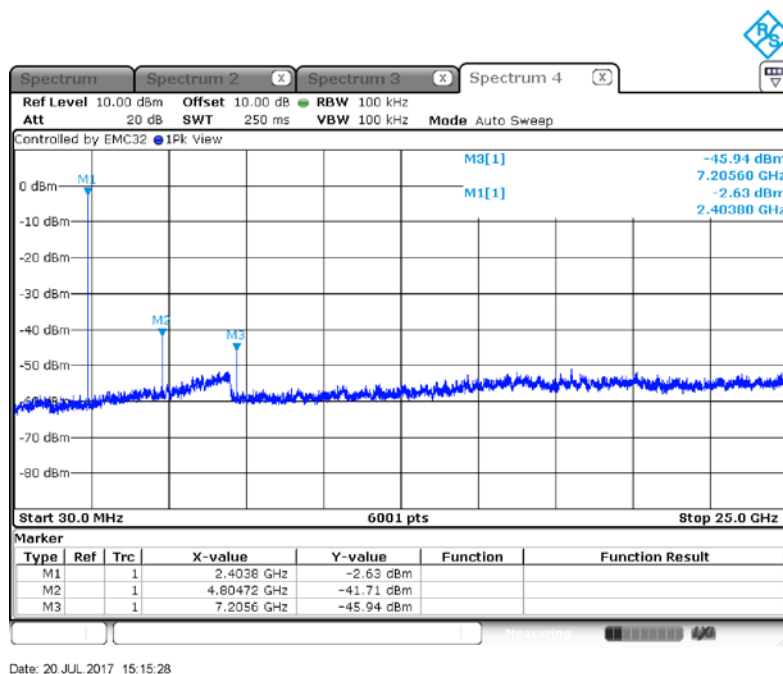
6.2.1.2 Phase N



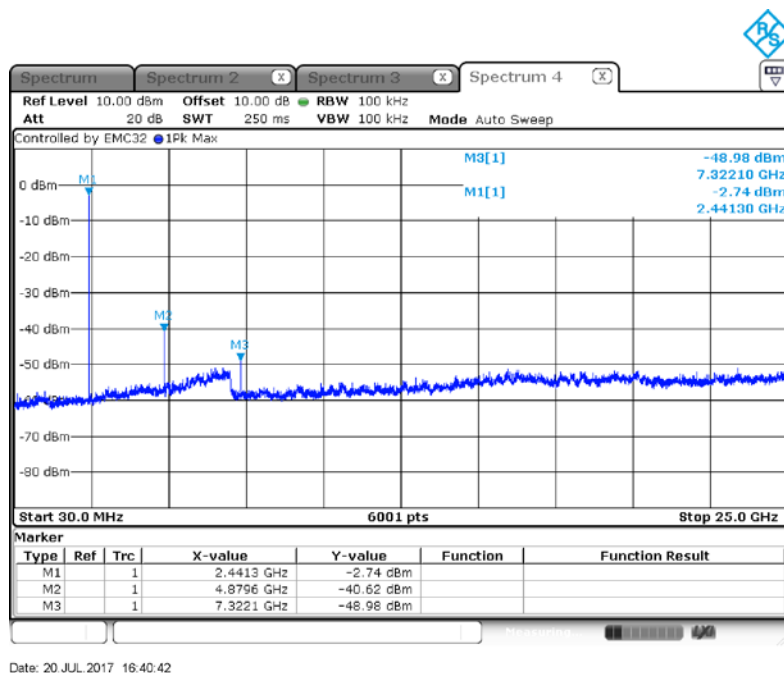
7 Plots for Conducted Emissions 30 MHz – 30 MHz

7.1 Test plots Bluetooth Low Energy (BLE)

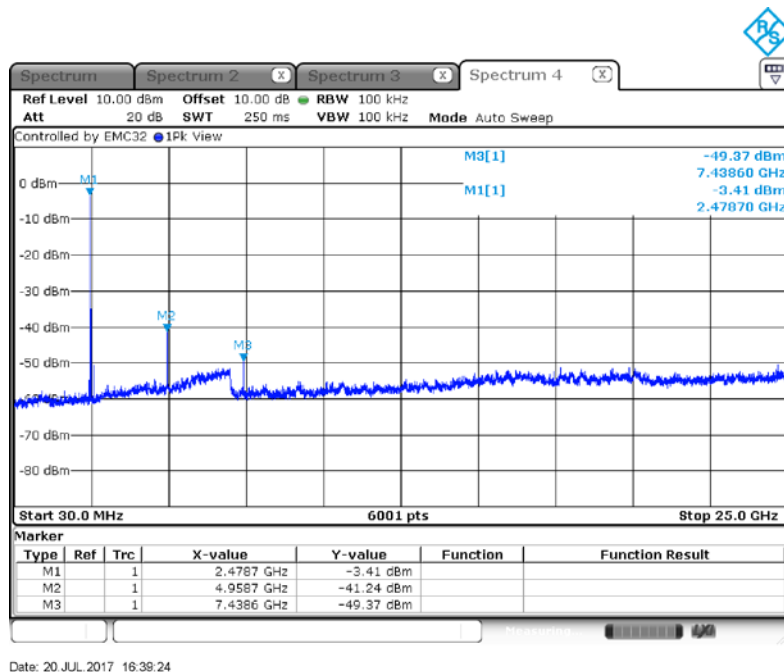
7.1.1 Lowest Channel



7.1.2 Middle Channel

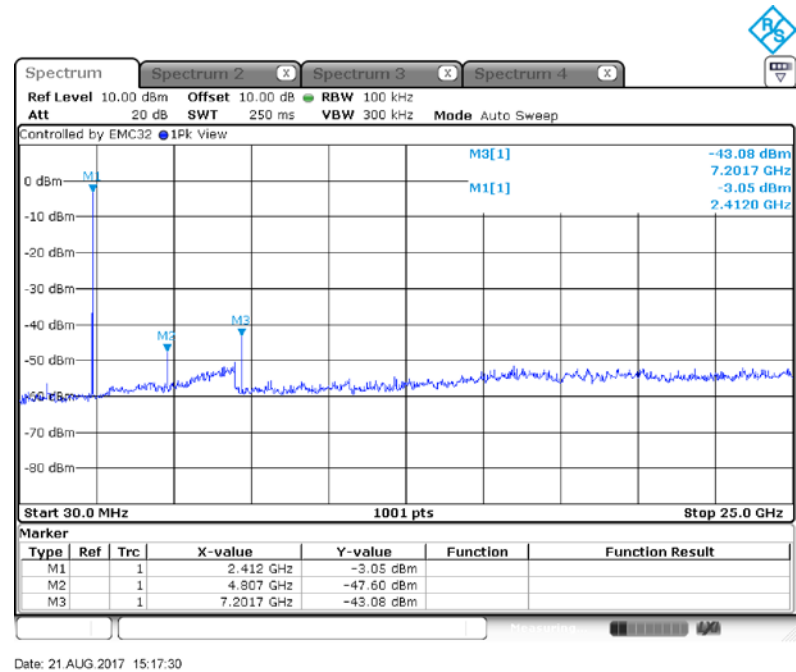


7.1.3 Highest Channel

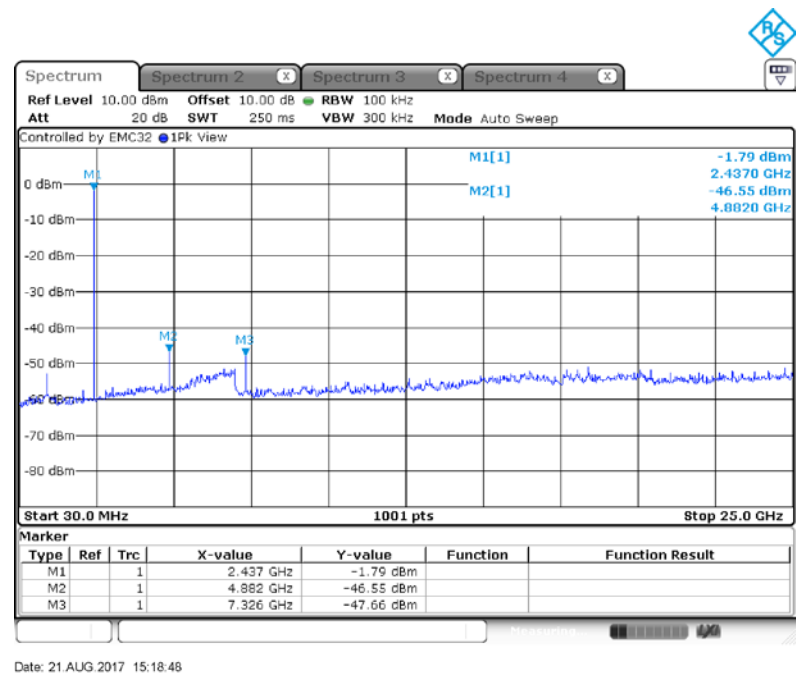


7.2 Test plots for Proprietary Radio

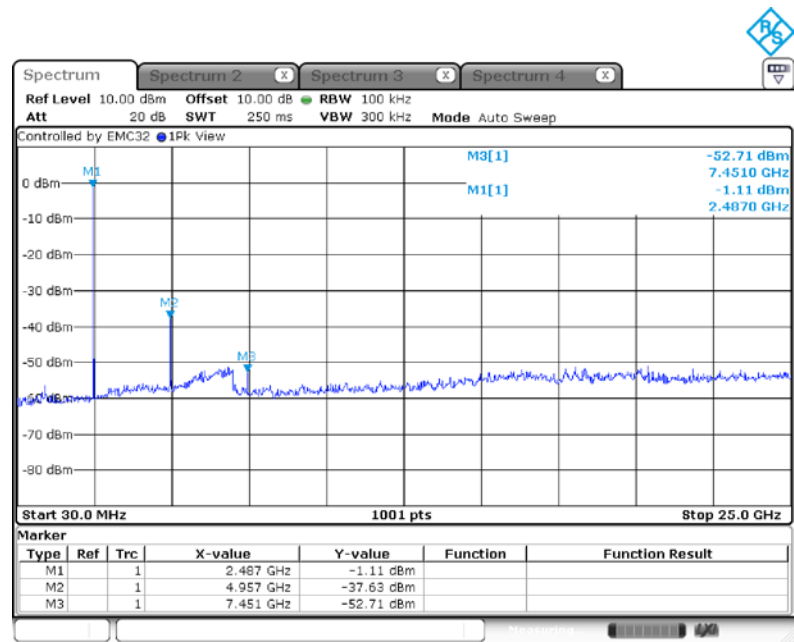
7.2.1 Lowest Channel



7.2.2 Middle Channel



7.2.3 Highest Channel

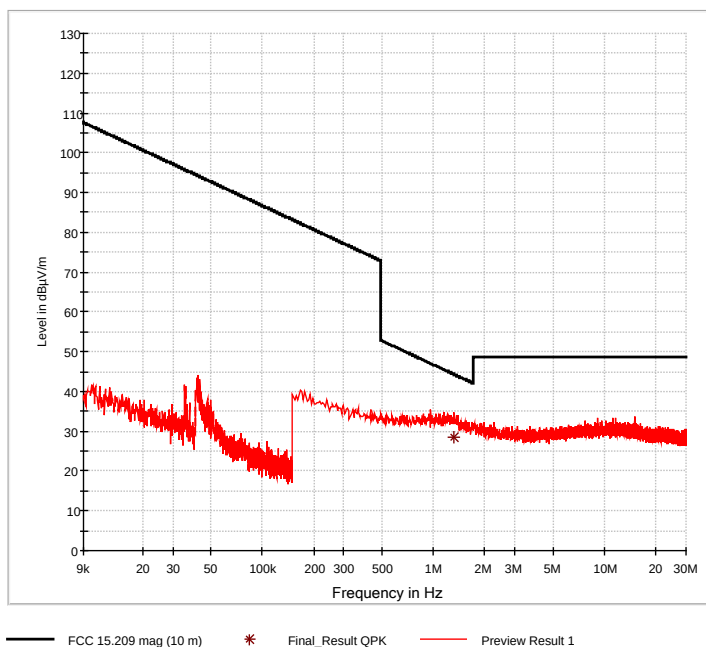


Date: 21 AUG.2017 15:19:31

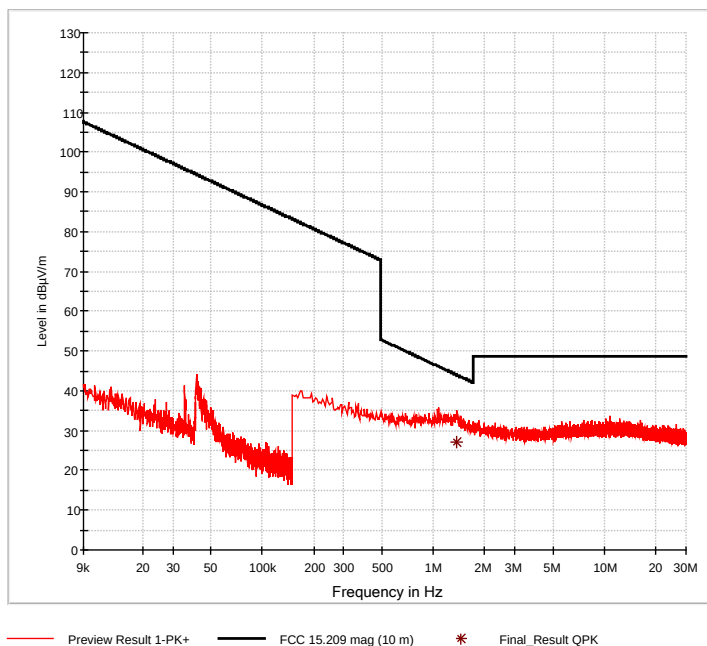
8 Plots for Radiated Emissions 9 kHz – 30 MHz

8.1 Test plots for Bluetooth Low Energy (BLE)

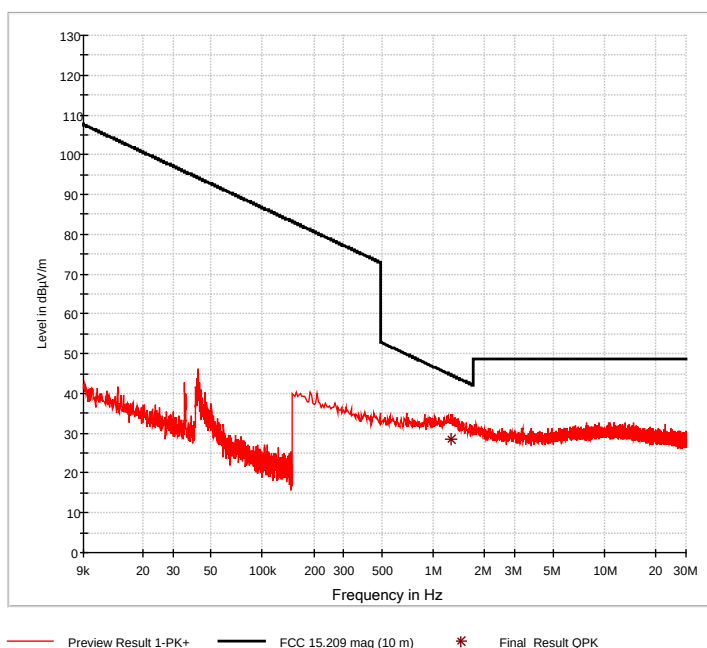
8.1.1 Lowest Channel



EUT flat on table

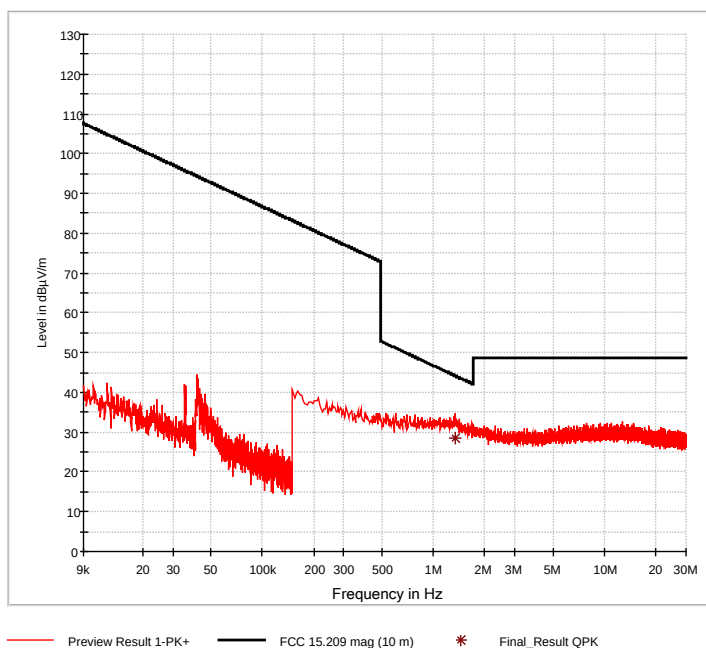


EUT on long side

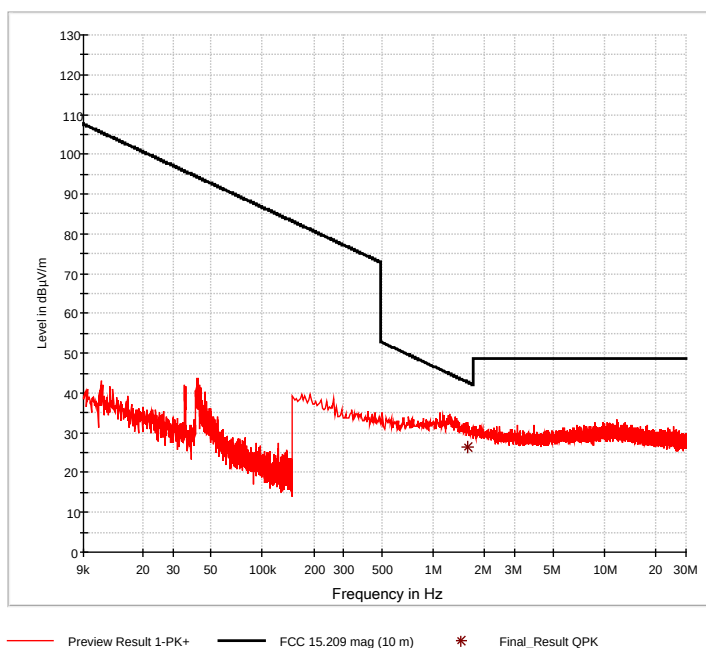


EUT in upright position

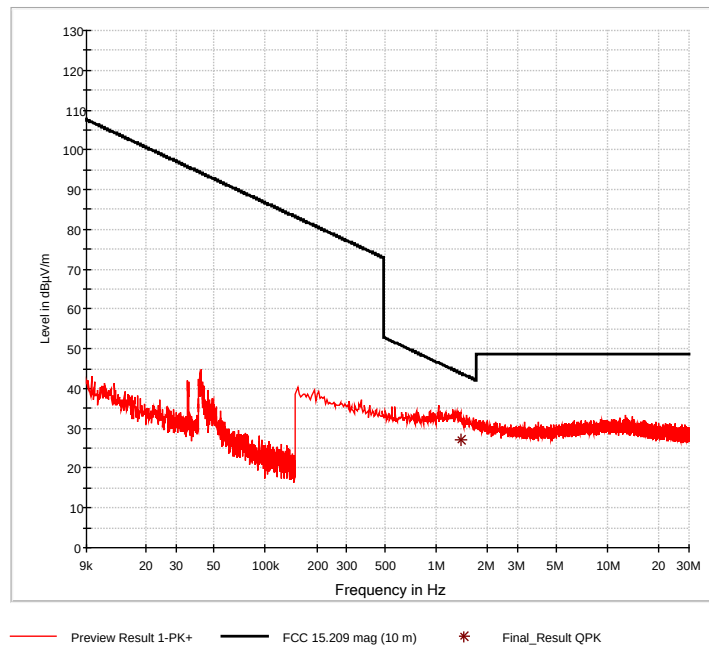
8.1.2 Middle channel



EUT flat on table

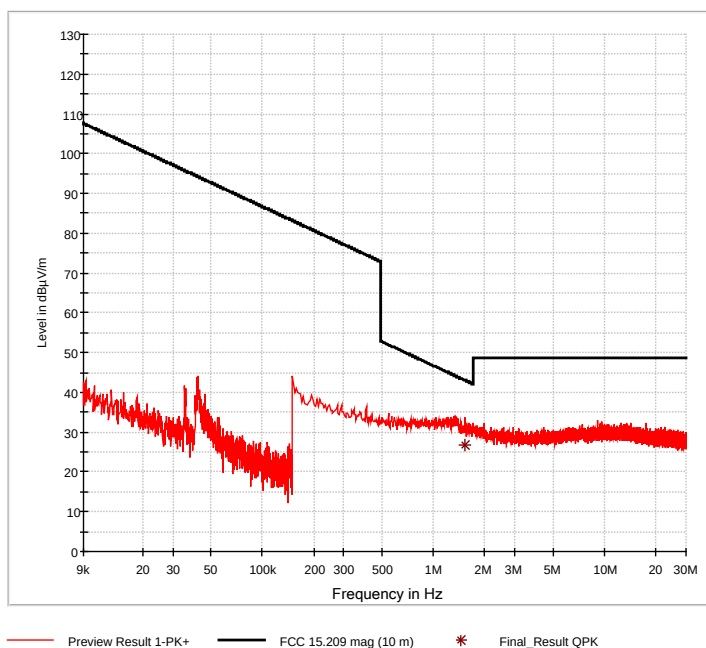


EUT on long side

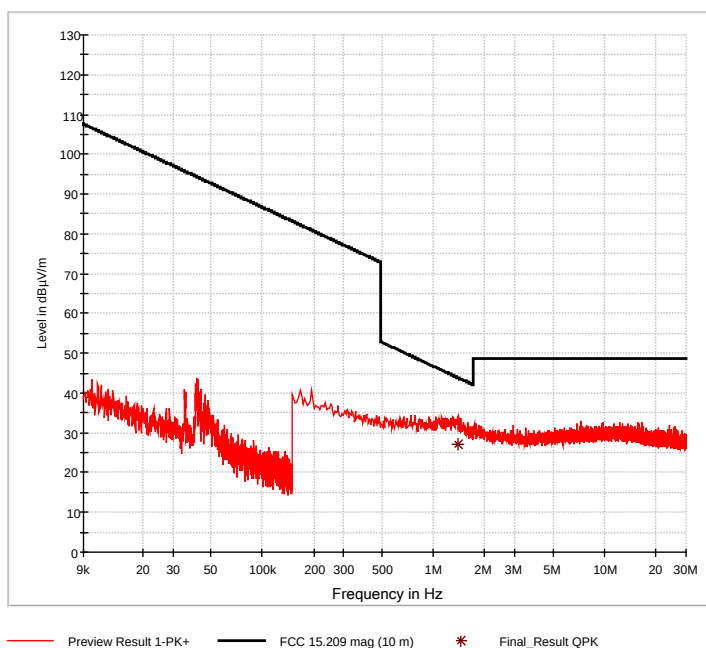


EUT in upright position

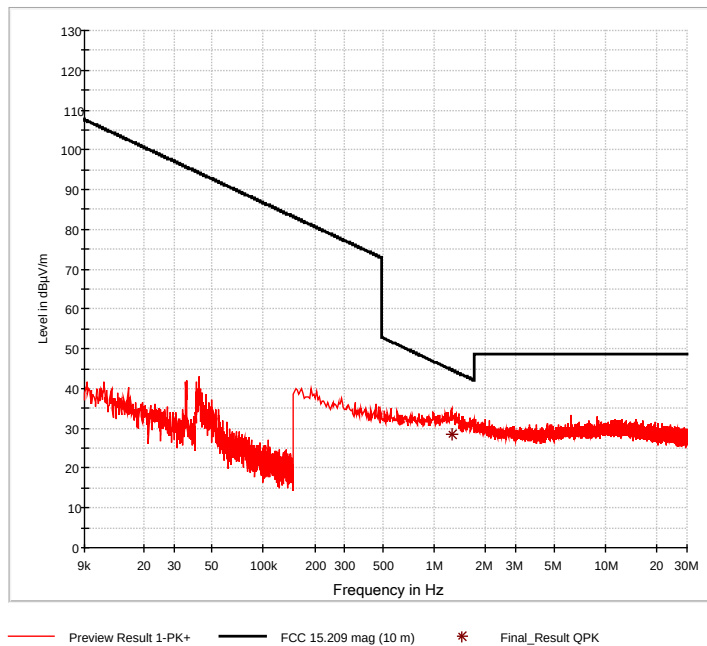
8.1.3 Highest channel



EUT flat on table



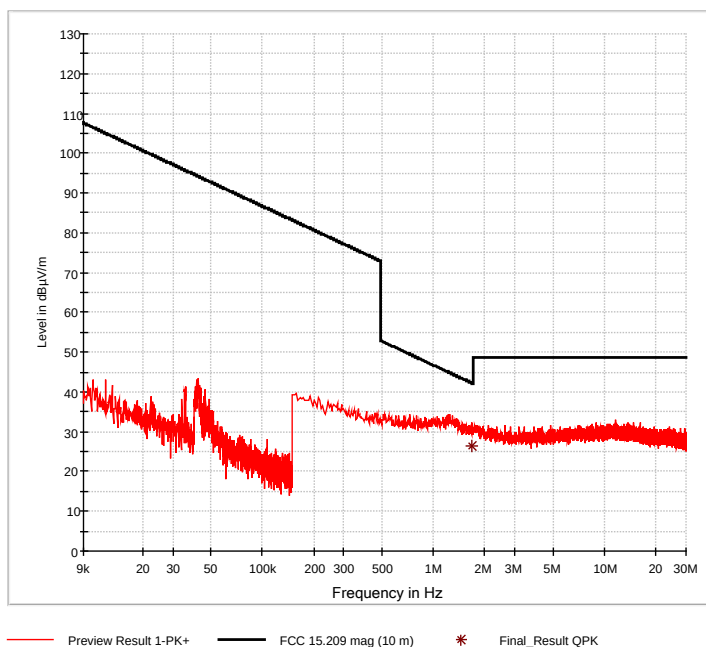
EUT on long side



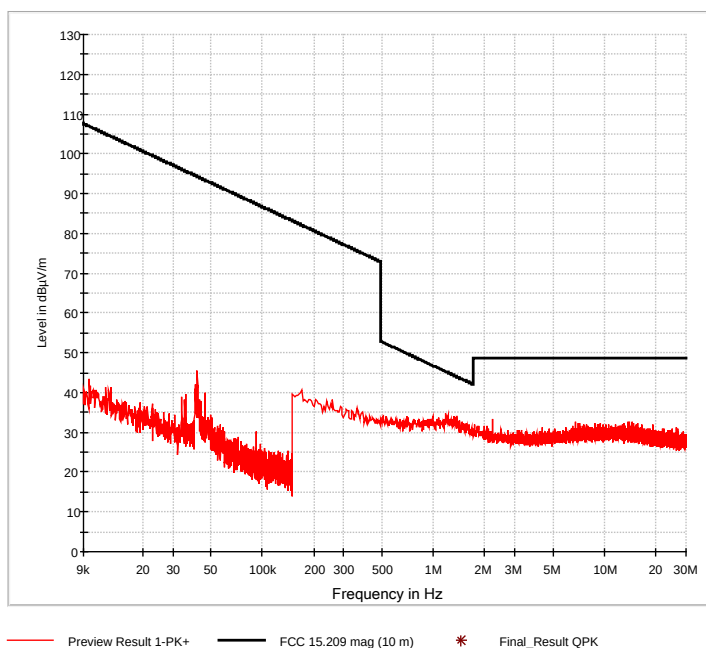
EUT in upright position

8.2 Test plots for Proprietary Radio

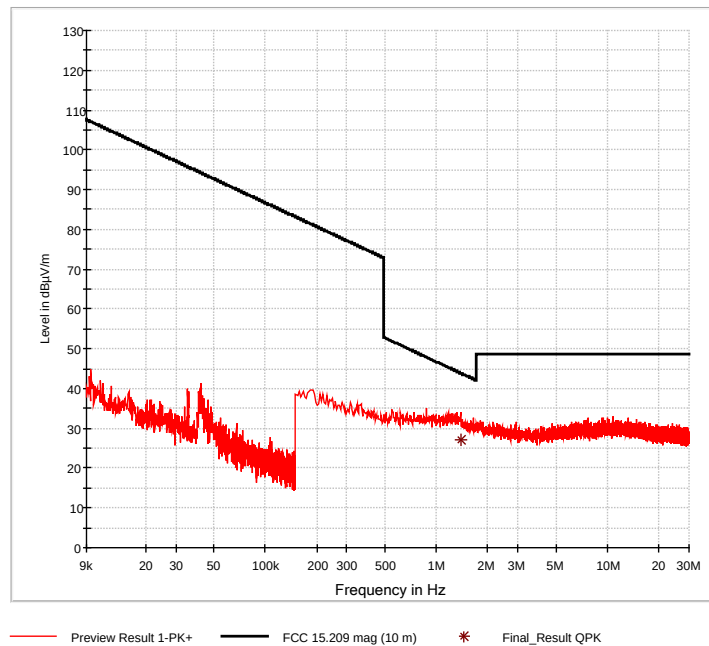
8.2.1 Lowest Channel



EUT flat on table

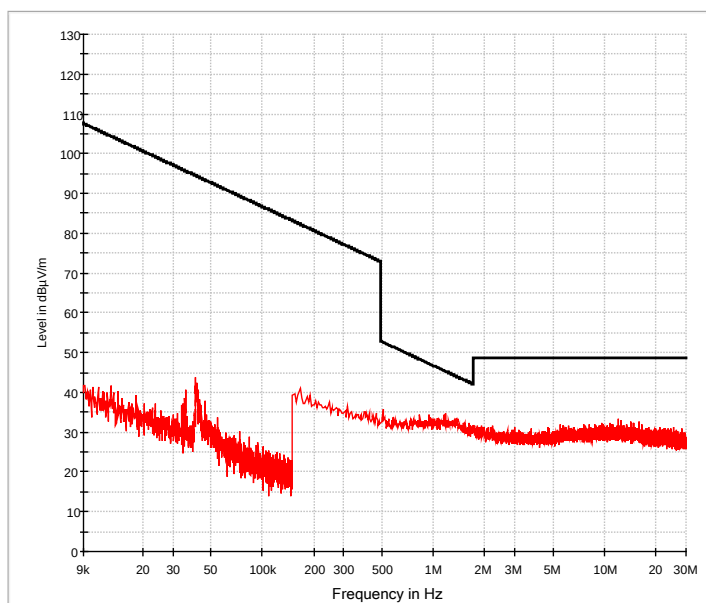


EUT on long side



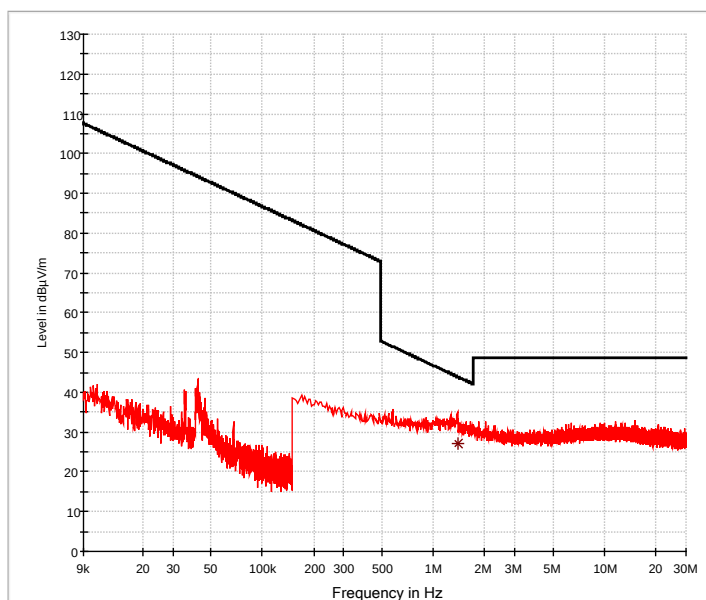
EUT in upright position

8.2.2 Middle Channel



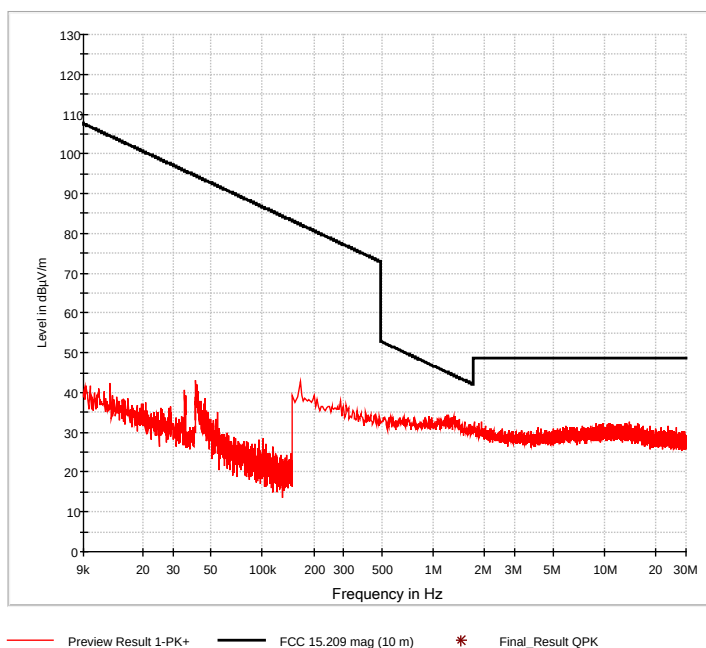
— Preview Result 1-PK+ — FCC 15.209 mag (10 m) * Final_Result QPK

EUT flat on table



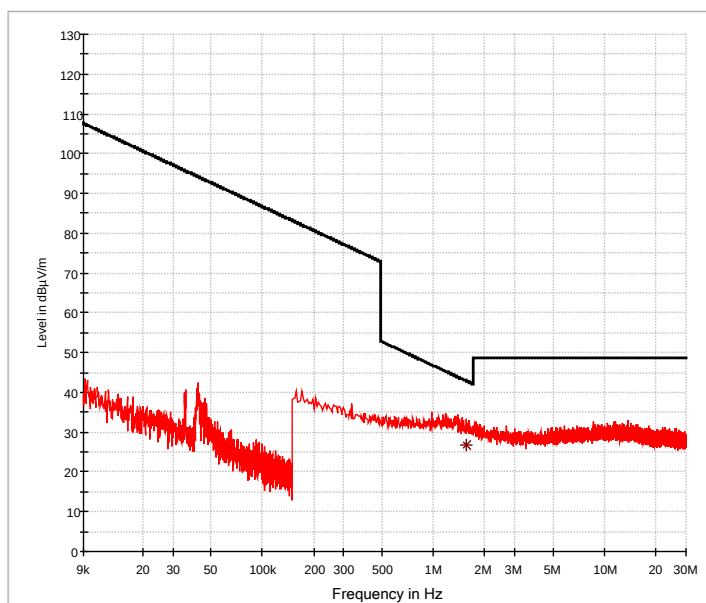
— Preview Result 1-PK+ — FCC 15.209 mag (10 m) * Final_Result QPK

EUT on long side



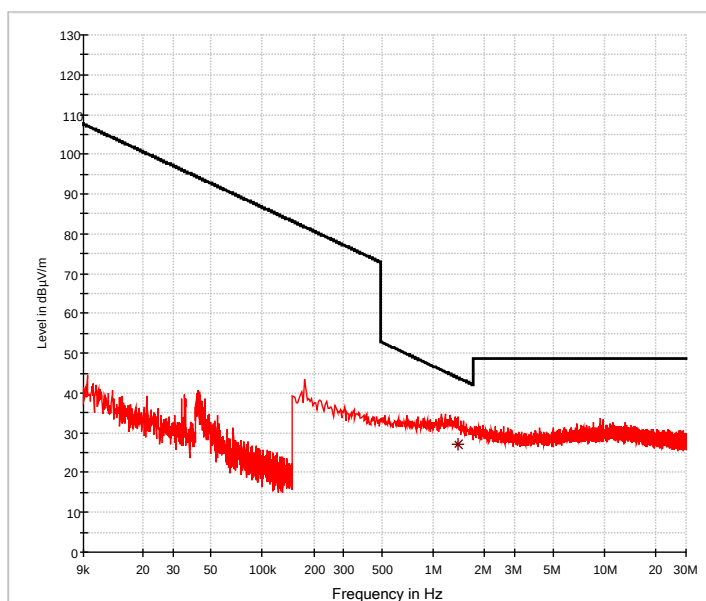
EUT on long side

8.2.3 Highest channel



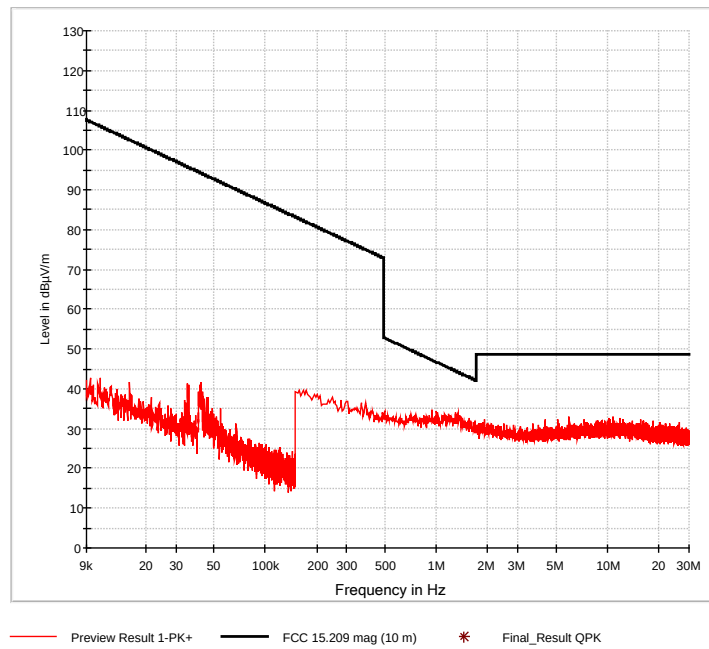
— Preview Result 1-PK+ — FCC 15.209 mag (10 m) * Final_Result QPK

EUT flat on table



— Preview Result 1-PK+ — FCC 15.209 mag (10 m) * Final_Result QPK

EUT on long side



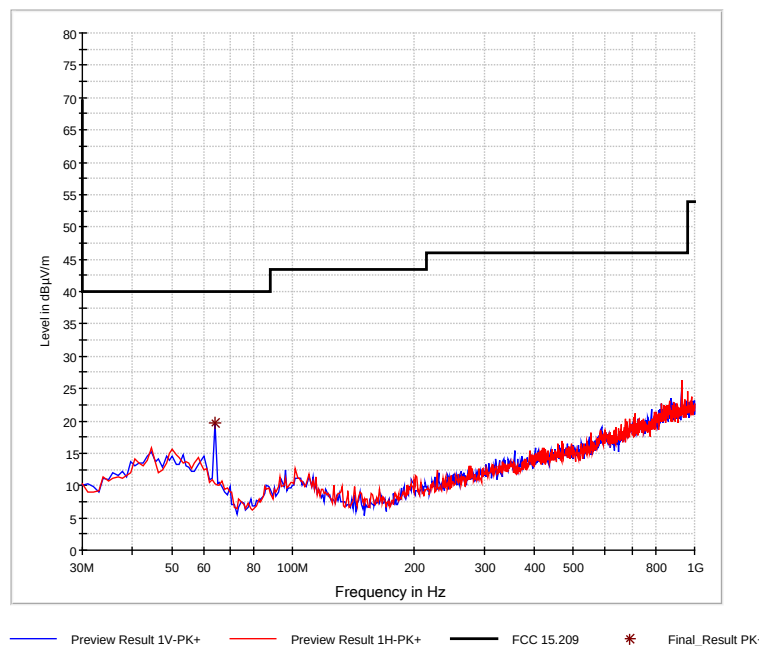
EUT in upright position

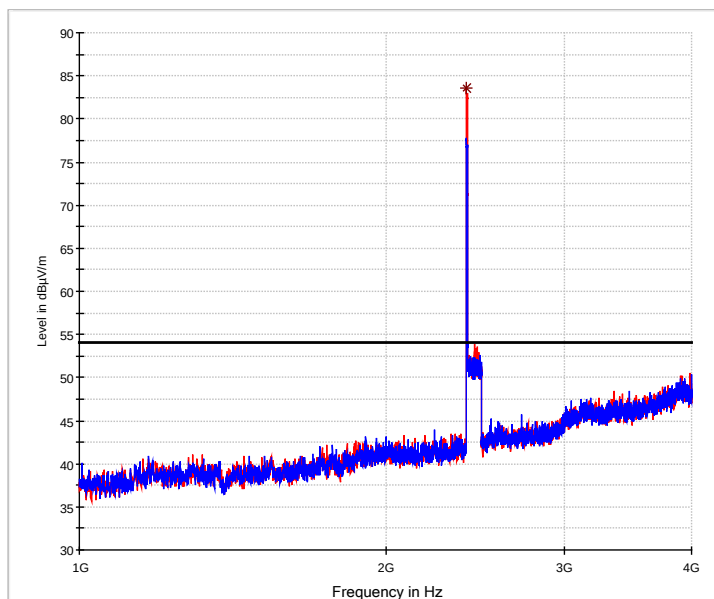
9 Plots for Radiated Emissions 30 MHz – 25 GHz

9.1 Test plots for Bluetooth Low Energy (BLE)

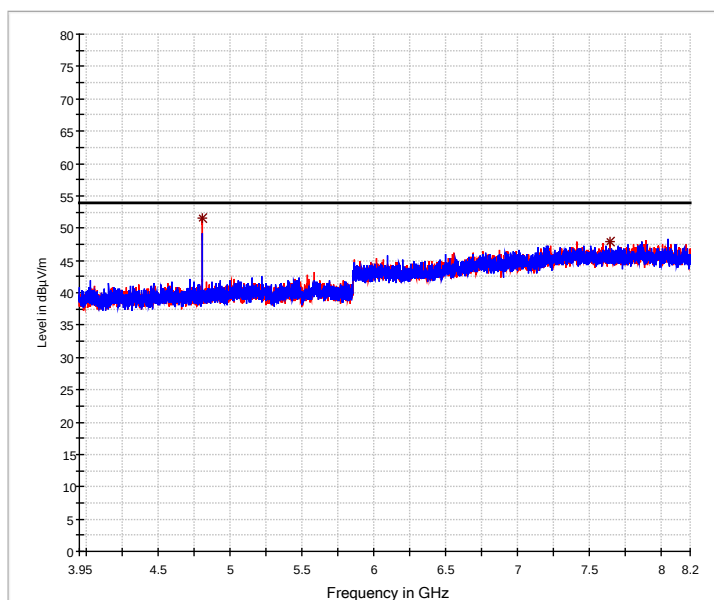
9.1.1 Lowest Channel

9.1.1.1 EUT flat on table

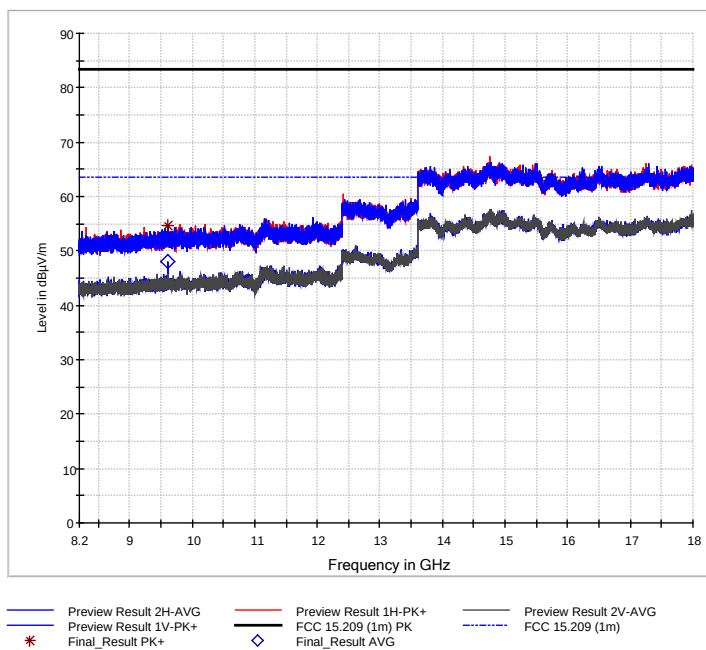


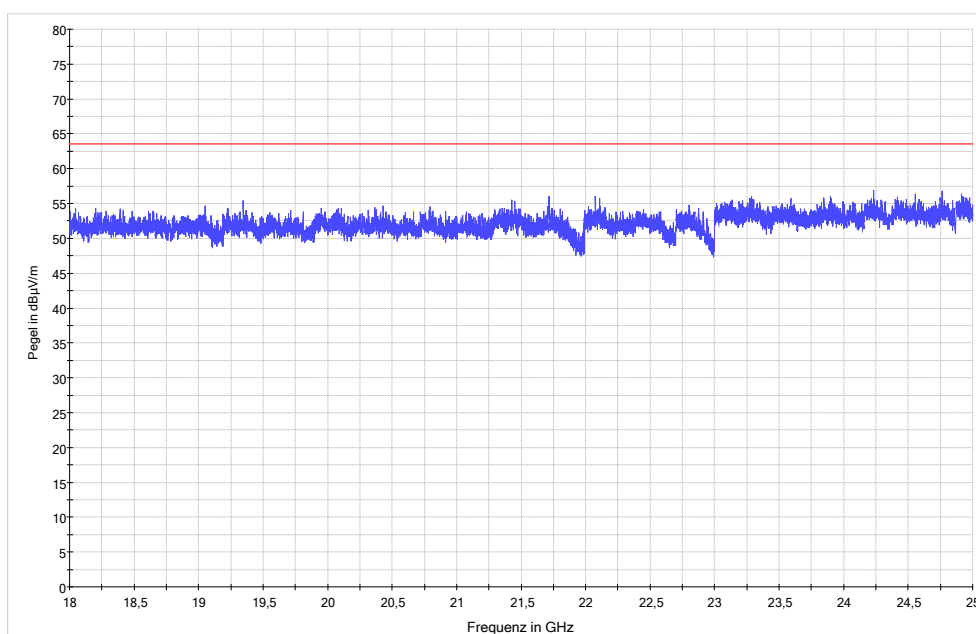
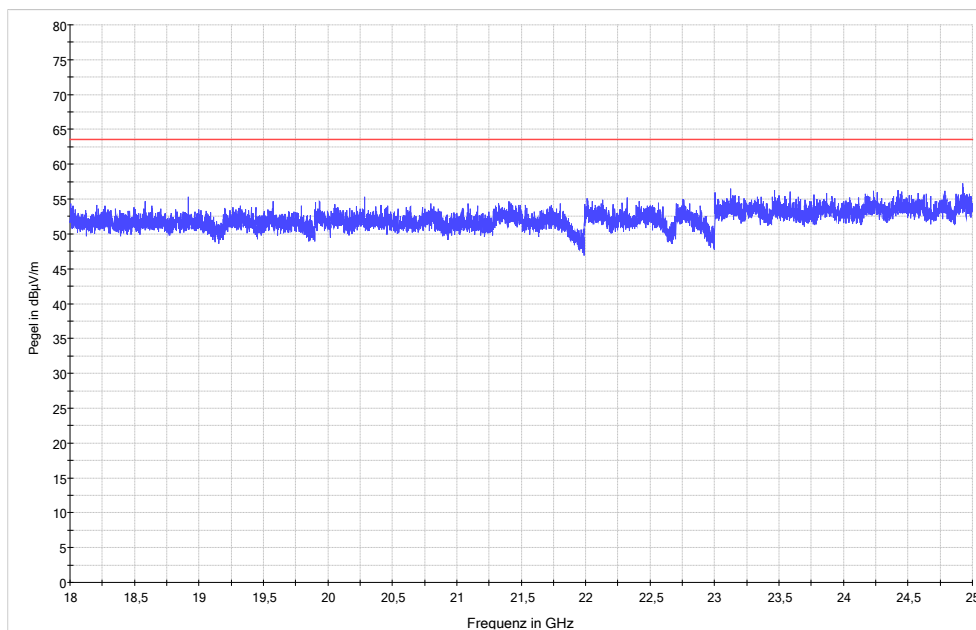


— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

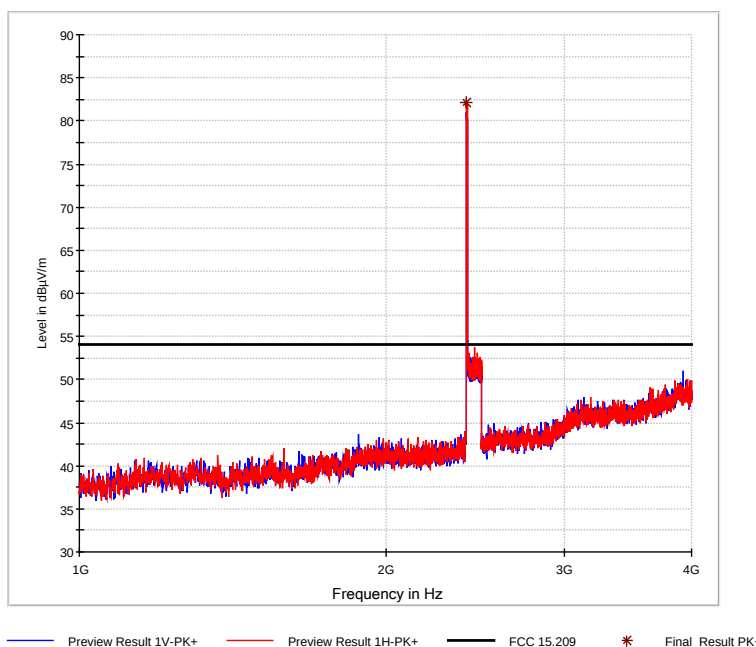
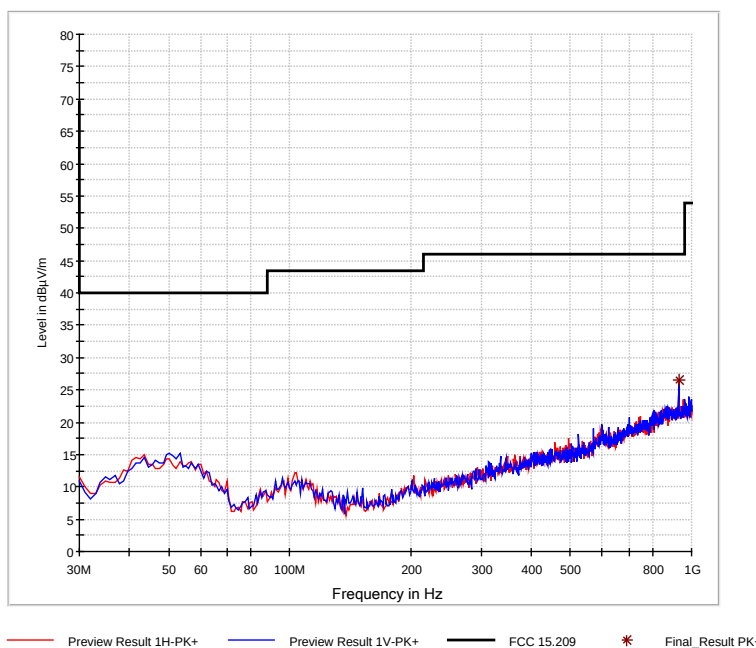


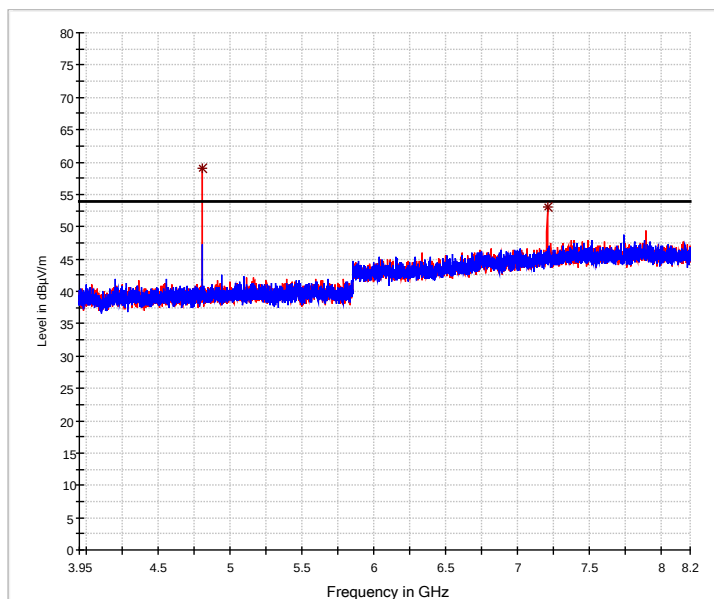
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * MaxPeak



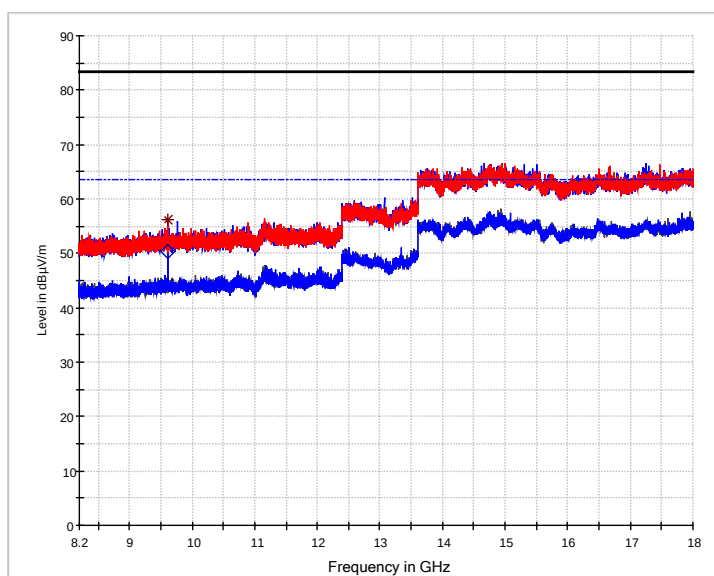


9.1.1.2 EUT on long side:

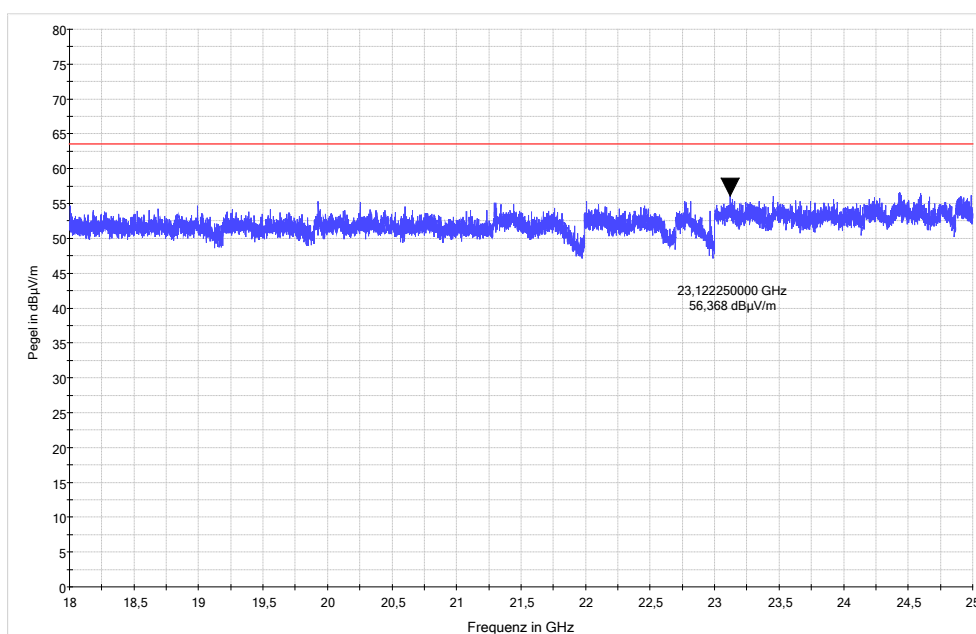
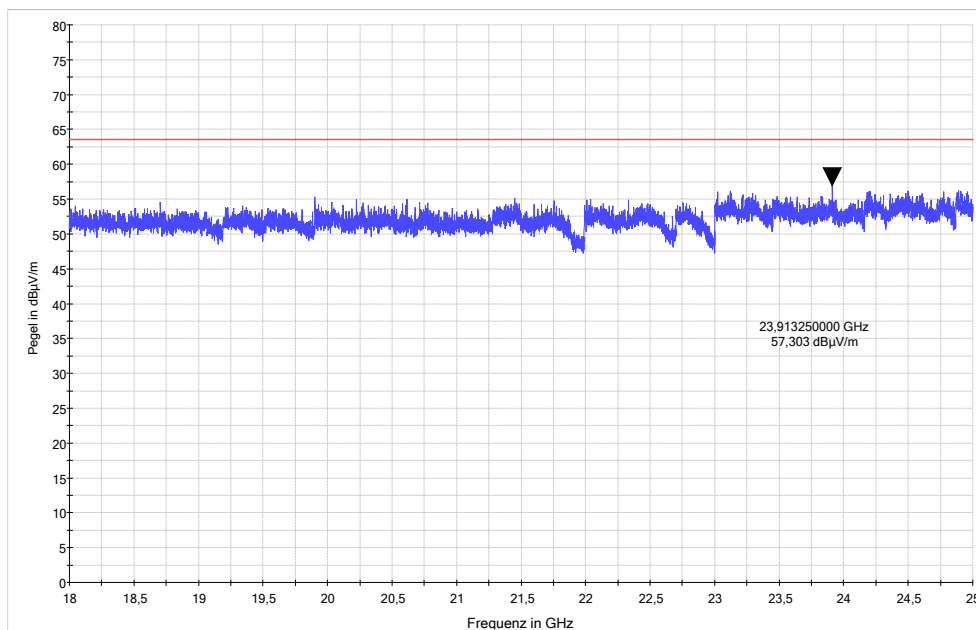




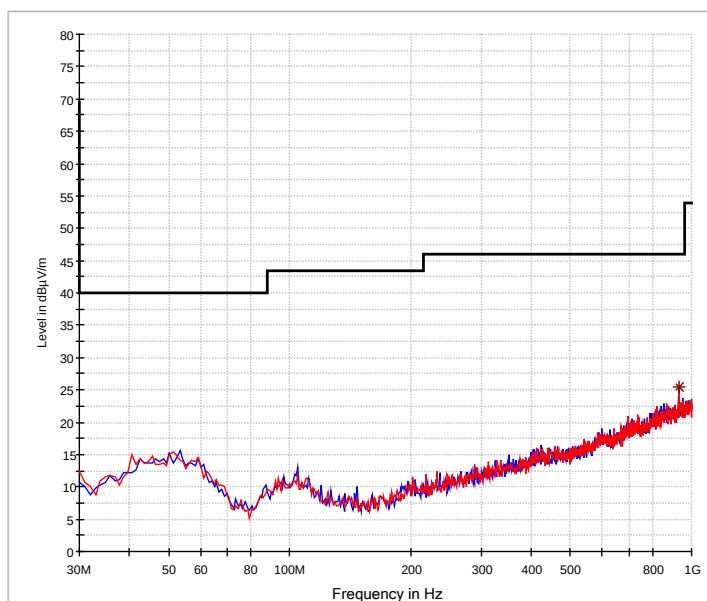
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * MaxPeak



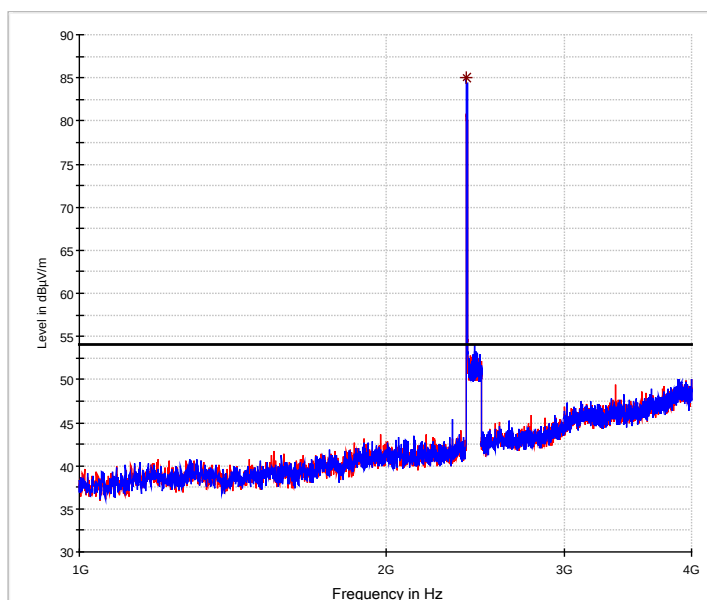
— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG
* Final_Result PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
◇ Final_Result AVG



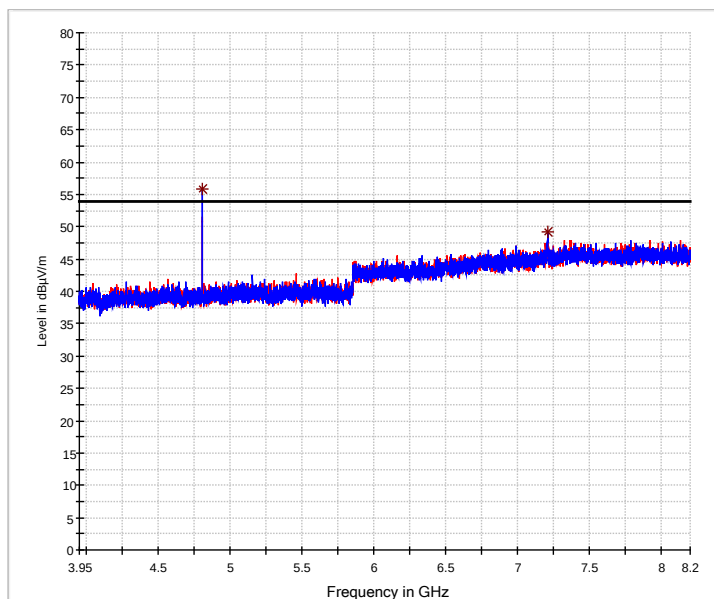
9.1.1.3 EUT in upright position:



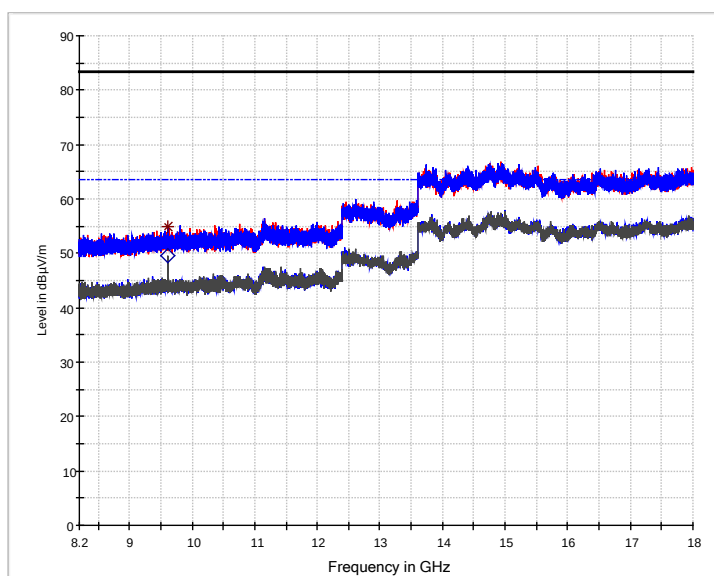
Preview Result 1V-PK+ Preview Result 1H-PK+ FCC 15.209 Final_Result PK



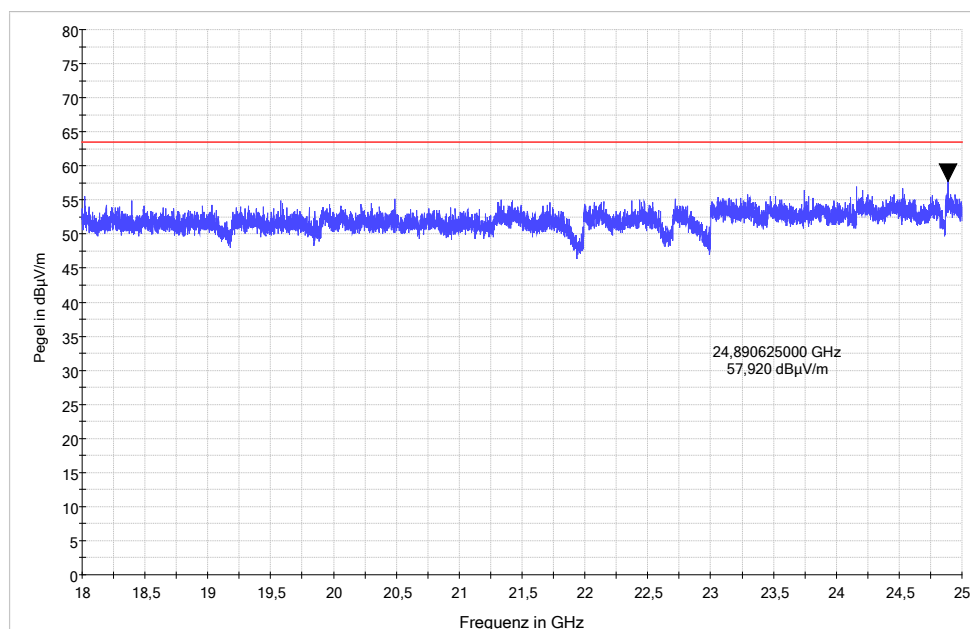
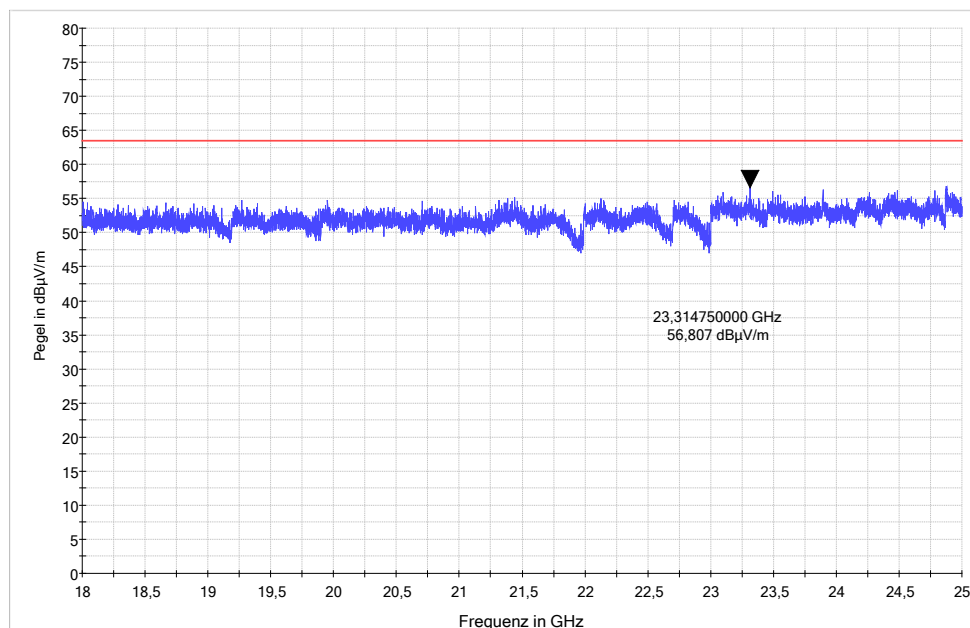
Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15.209 Final_Result PK



Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15.209 Final_Result PK

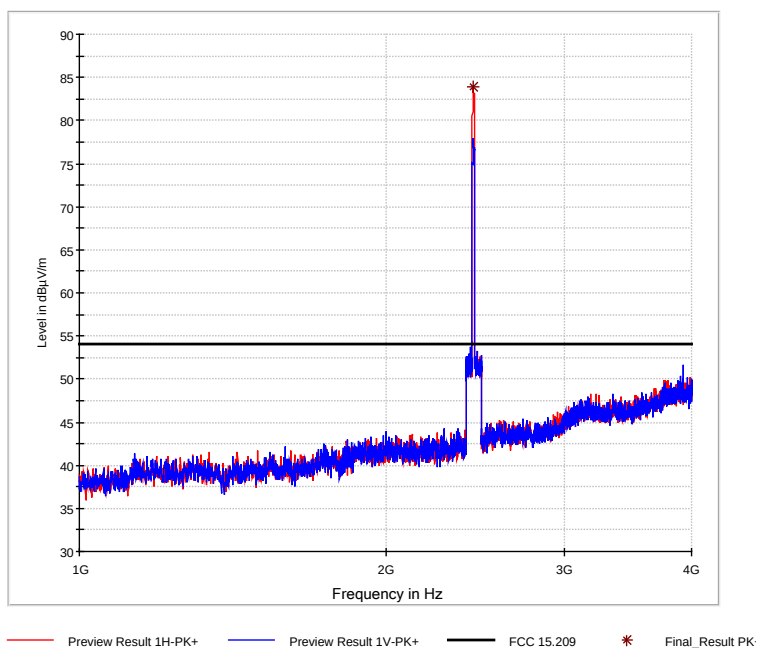
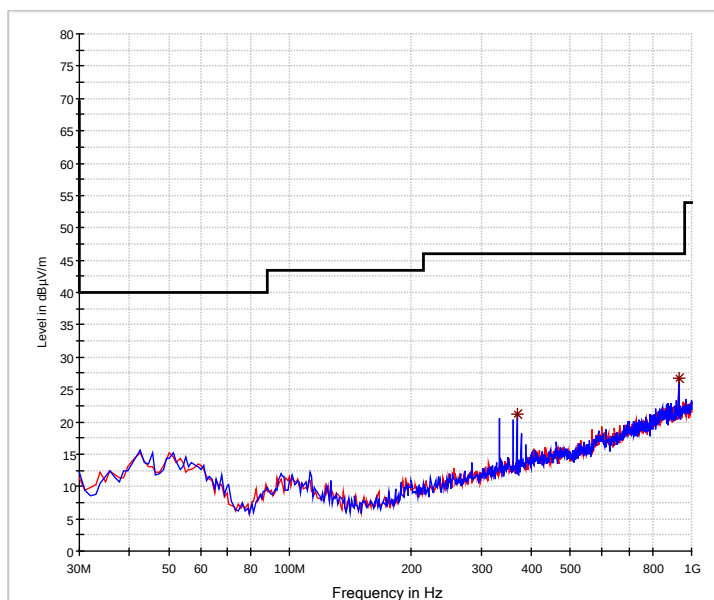


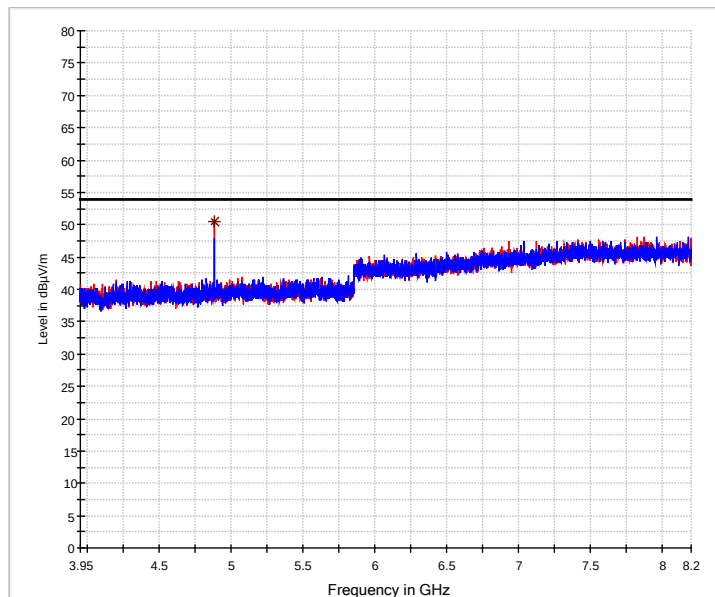
Preview Result 2H-AVG Preview Result 1H-PK+ Preview Result 2V-AVG
Preview Result 1V-PK+ FCC 15.209 (1m) PK FCC 15.209 (1m)
Final_Result PK+ Final_Result AVG



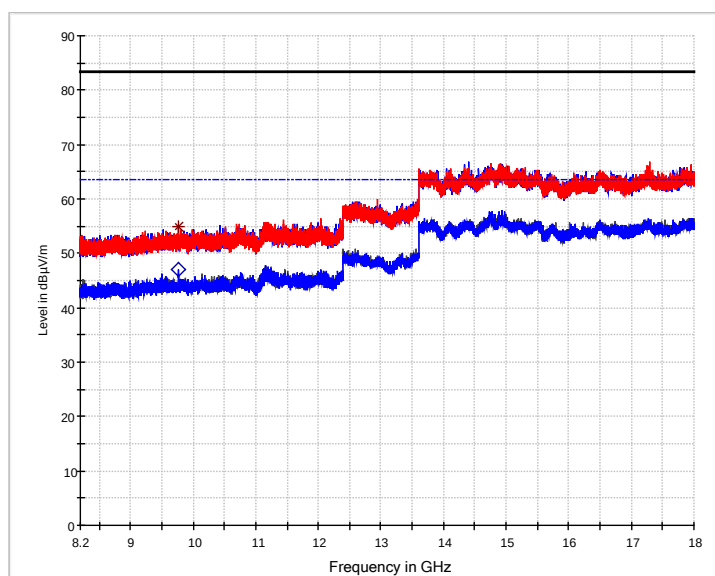
9.1.2 Middle channel

9.1.2.1 EUT flat on table

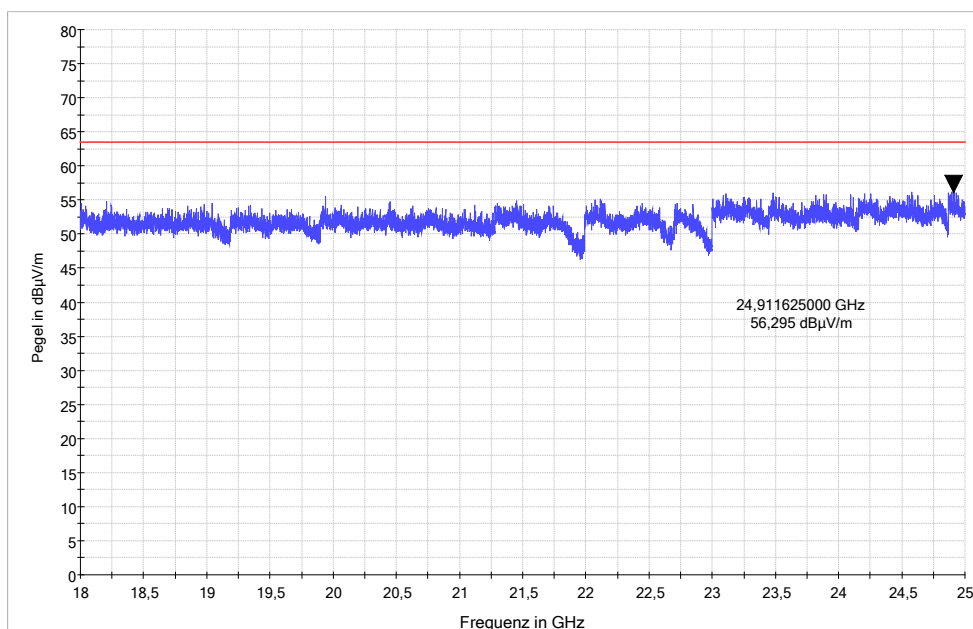
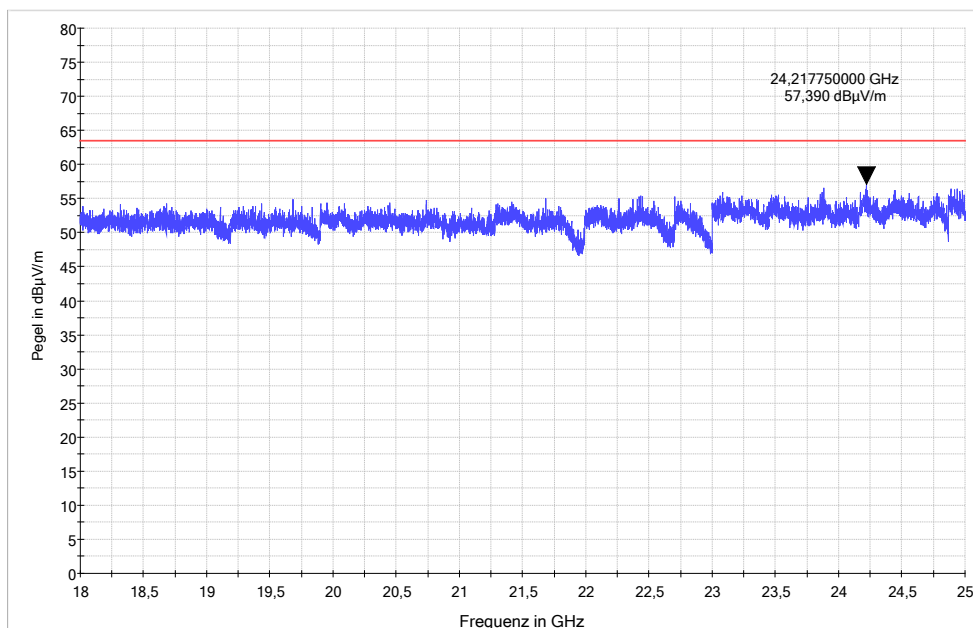




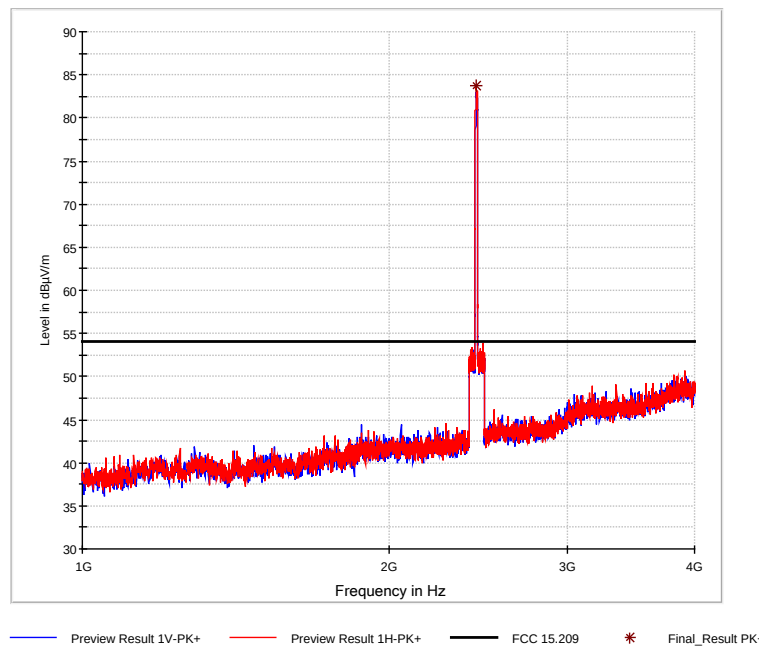
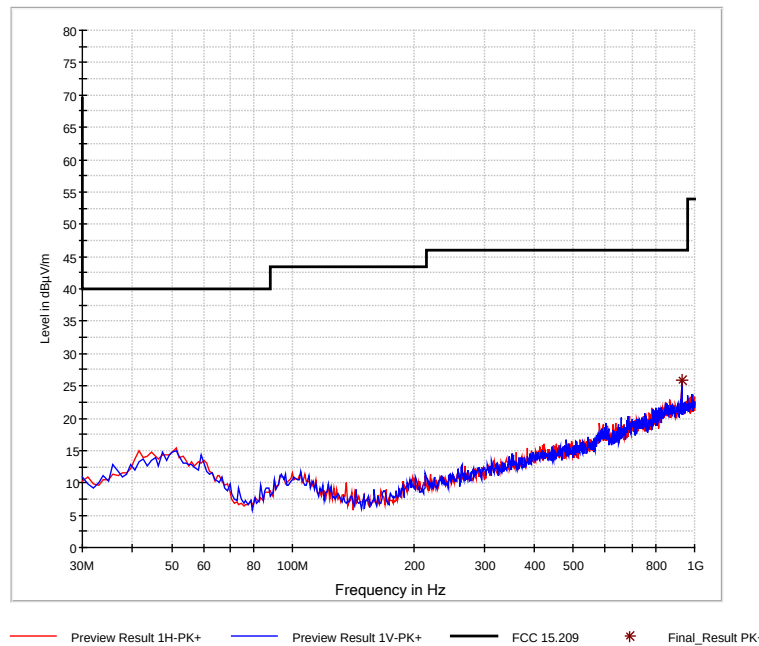
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

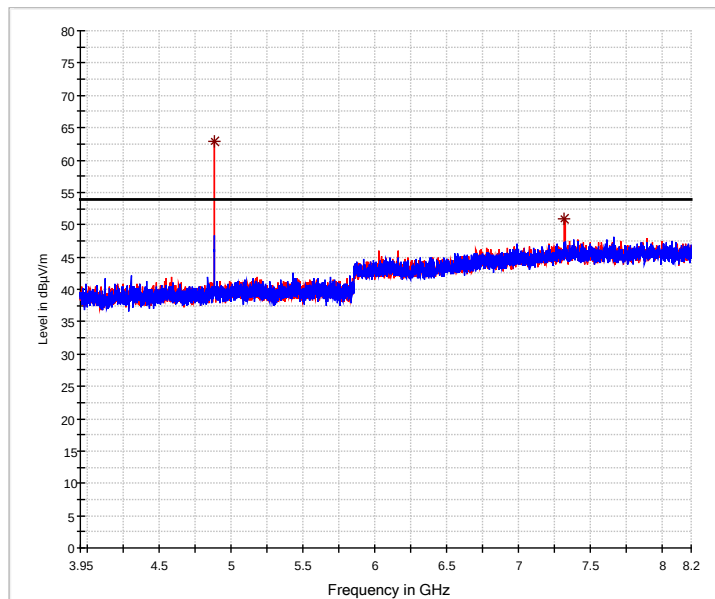


— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG
* Final_Result PK+ ◇ FCC 15.209 (1m) PK — FCC 15.209 (1m)

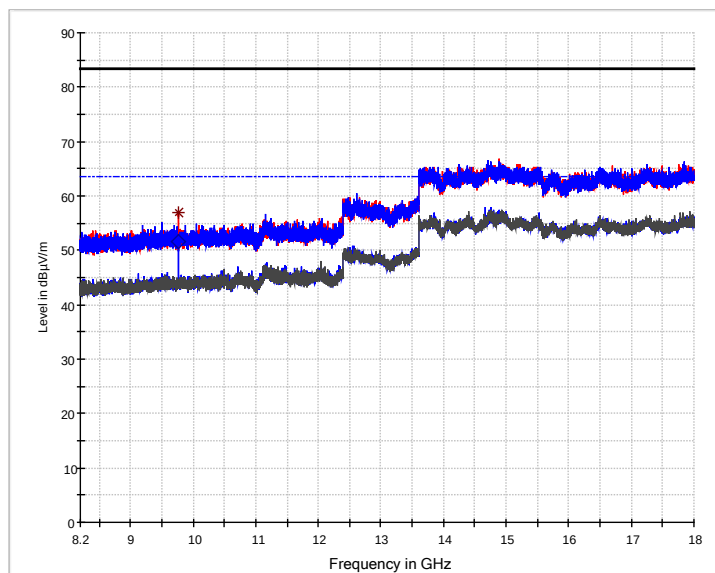


9.1.2.2 EUT on long side

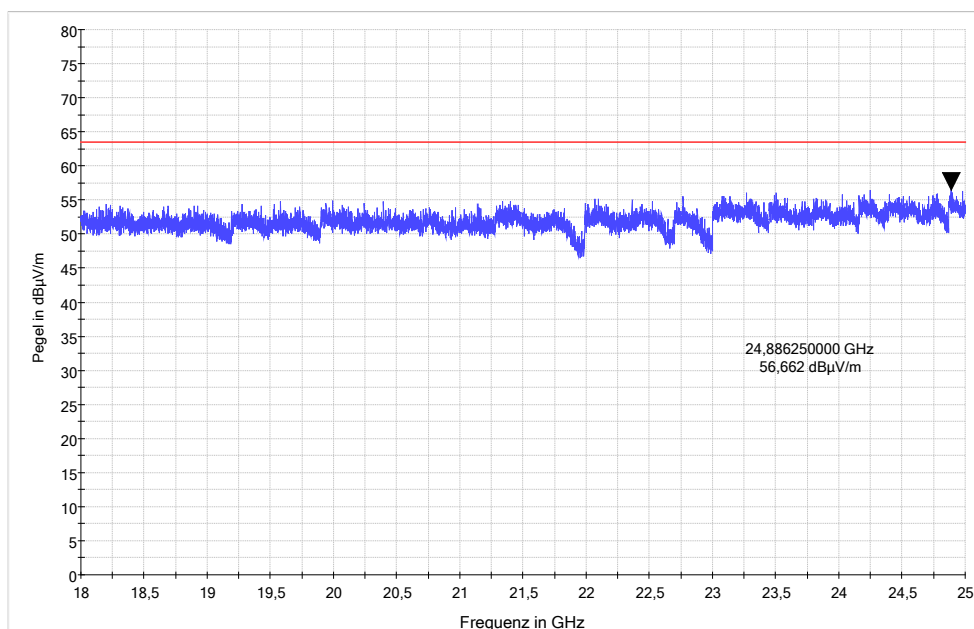
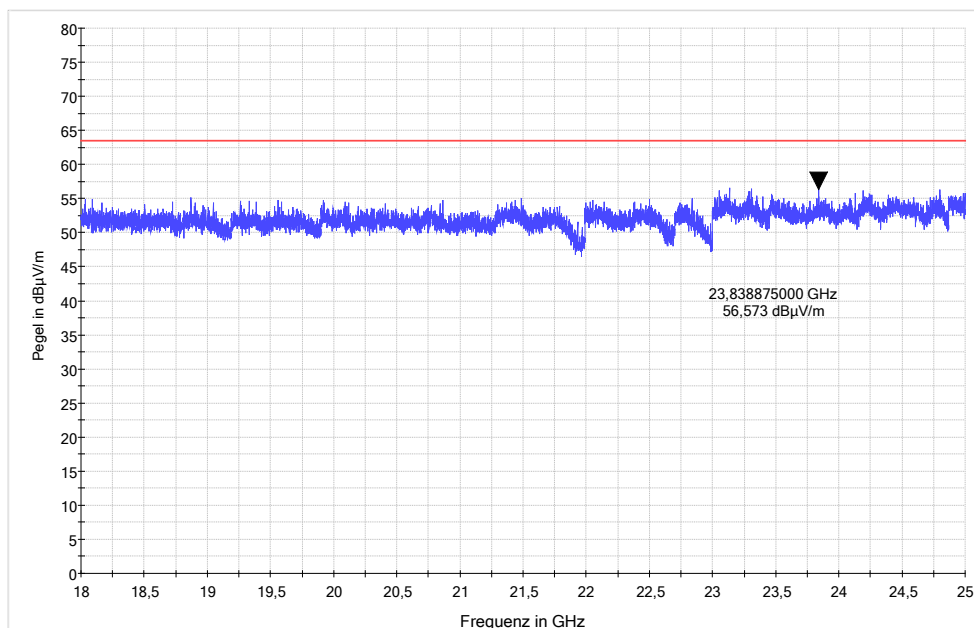




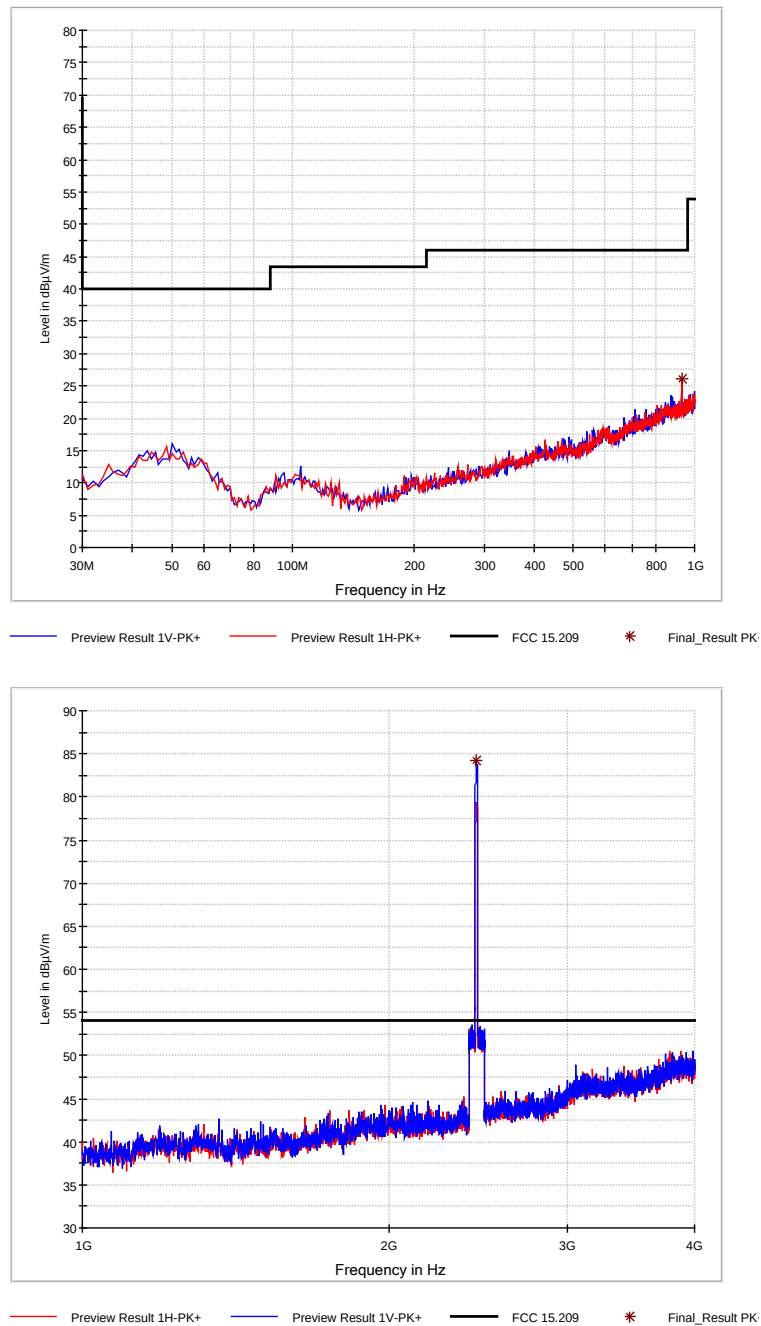
Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15.209 Final_Result PK+

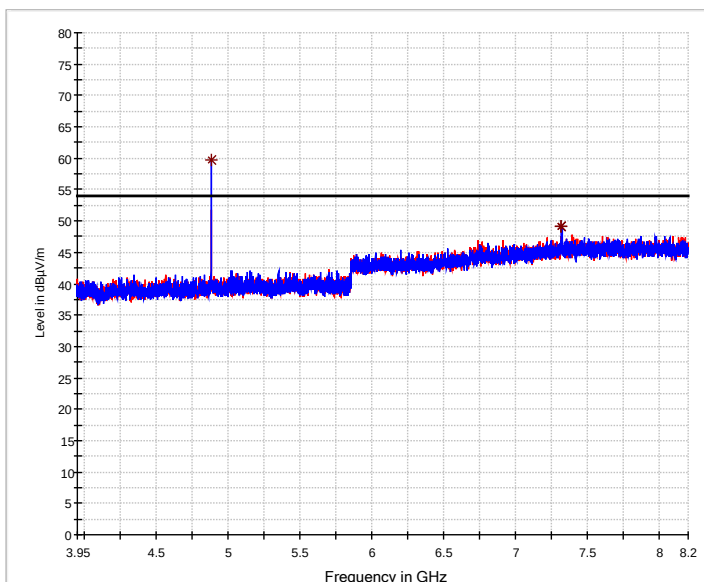


Preview Result 2H-AVG Preview Result 1H-PK+ Preview Result 2V-AVG
Preview Result 1V-PK+ FCC 15.209 (1m) PK Final_Result AVG
Final_Result PK+ Final_Result AVG FCC 15.209 (1m)

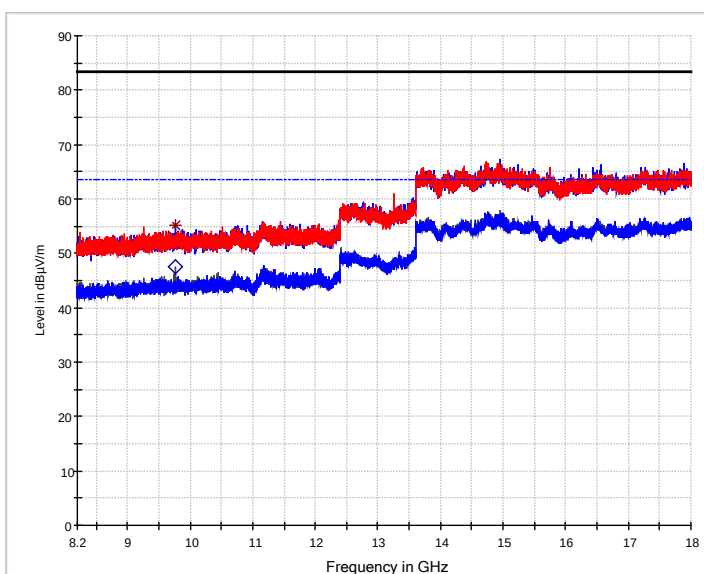


9.1.2.3 EUT in upright position

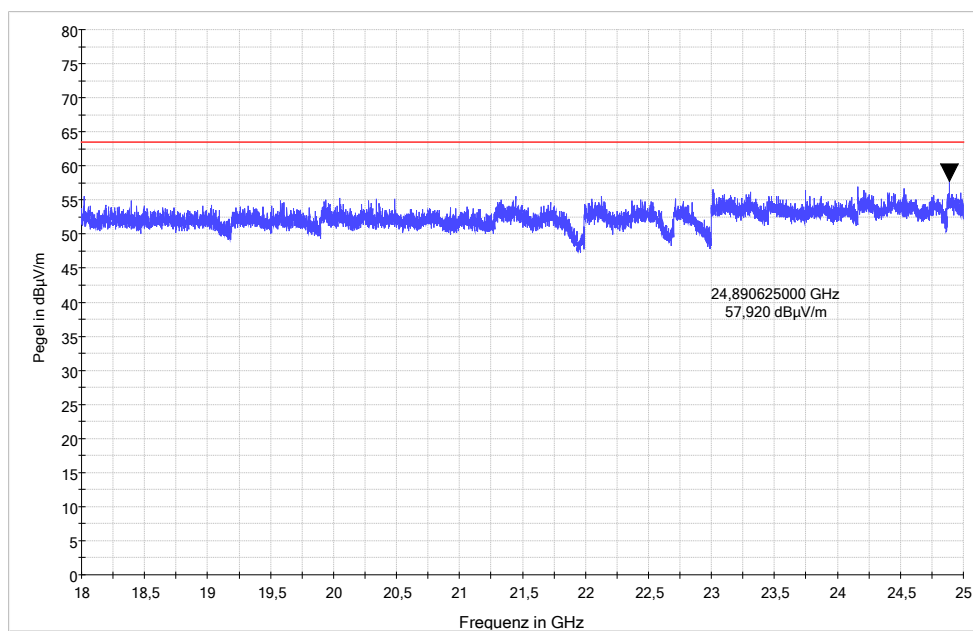
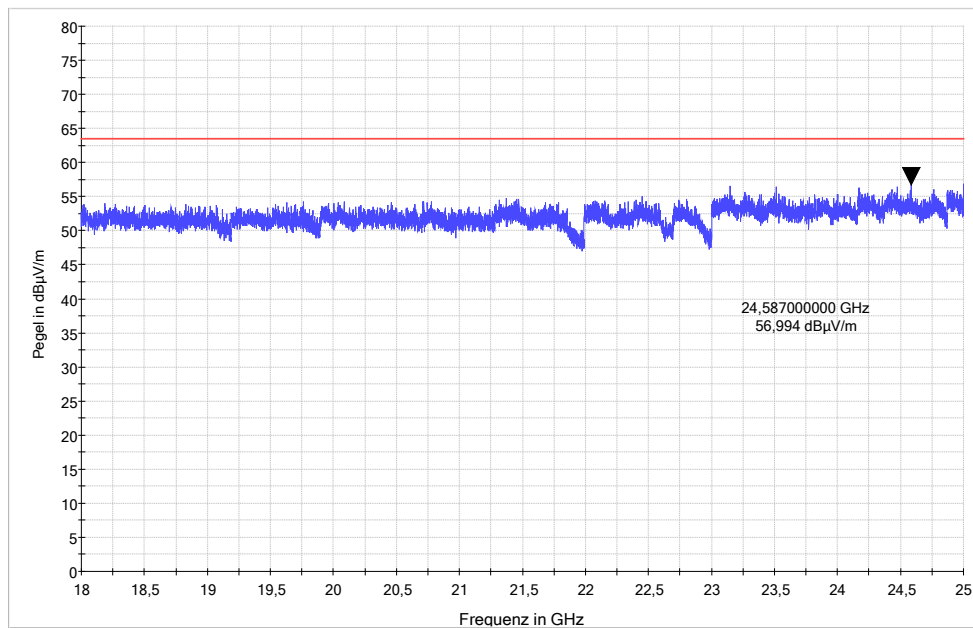




— Preview Result 1H-PK+ — Preview Result 1V-PK+ * MaxPeak-PK+
 — FCC 15.209 * Final_Result PK+

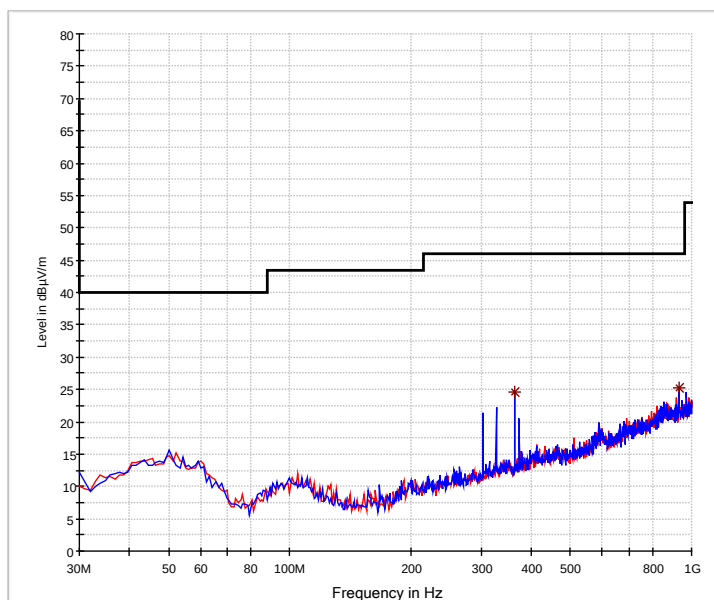


— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG
 * Preview Result 1H-PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
 * Final_Result PK+ ◇ Final_Result AVG

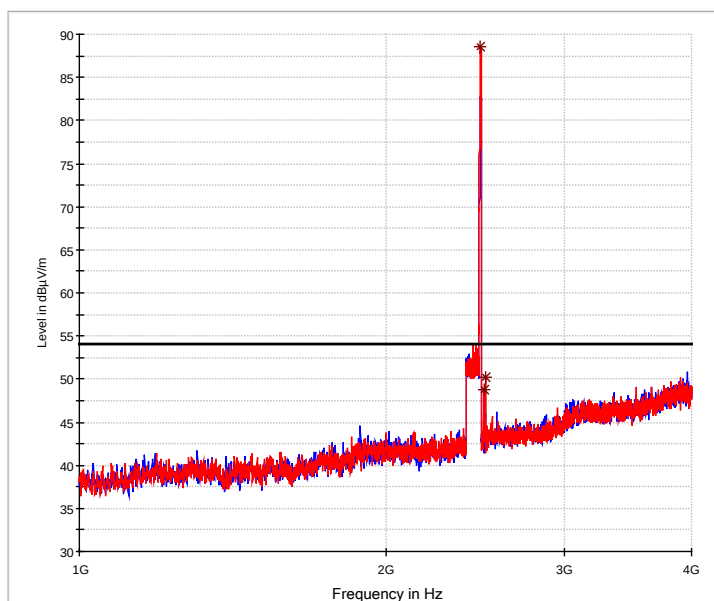


9.1.3 Highest channel

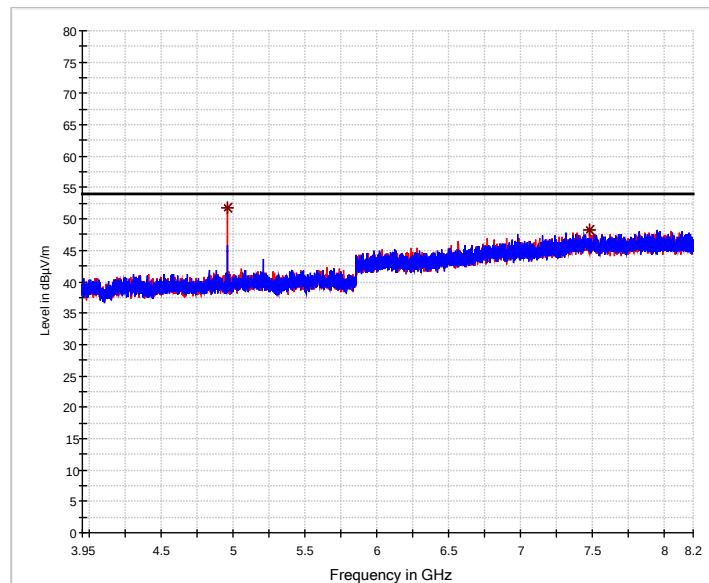
9.1.3.1 EUT flat on table



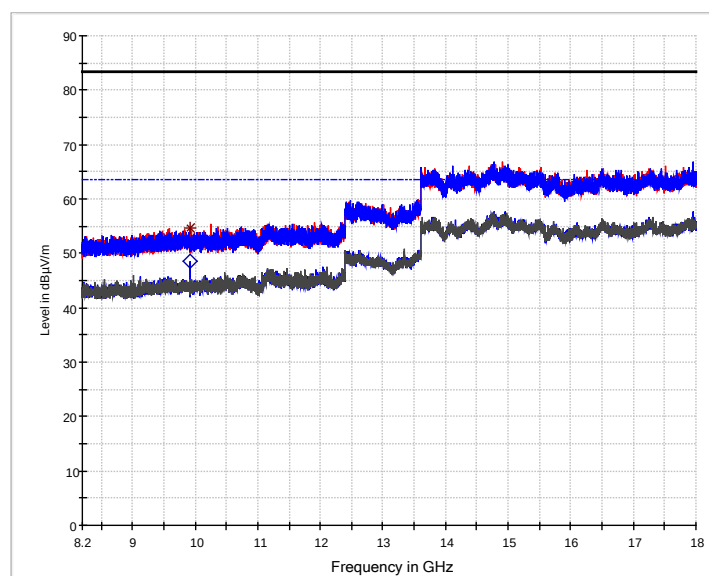
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK



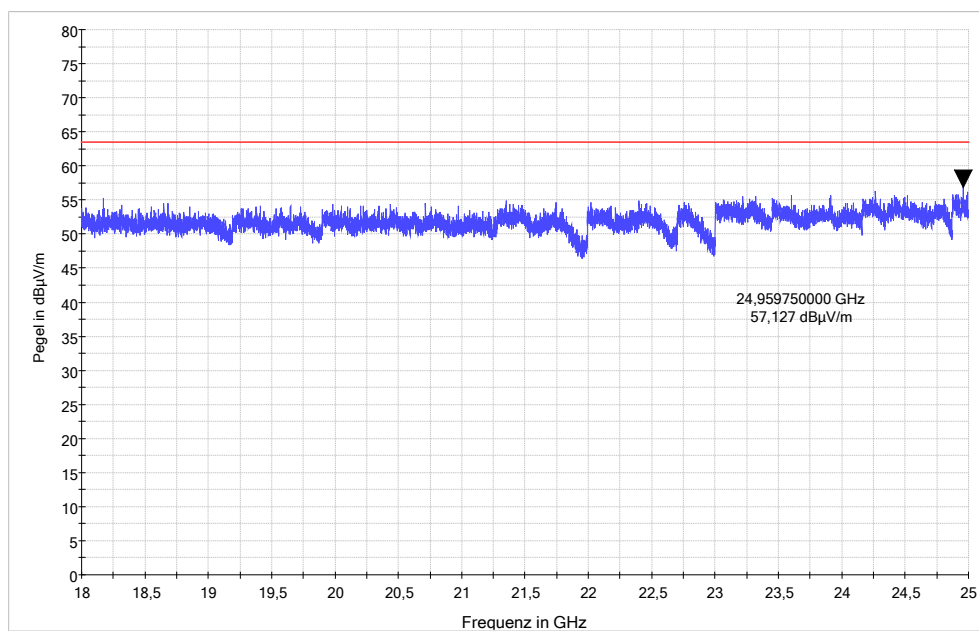
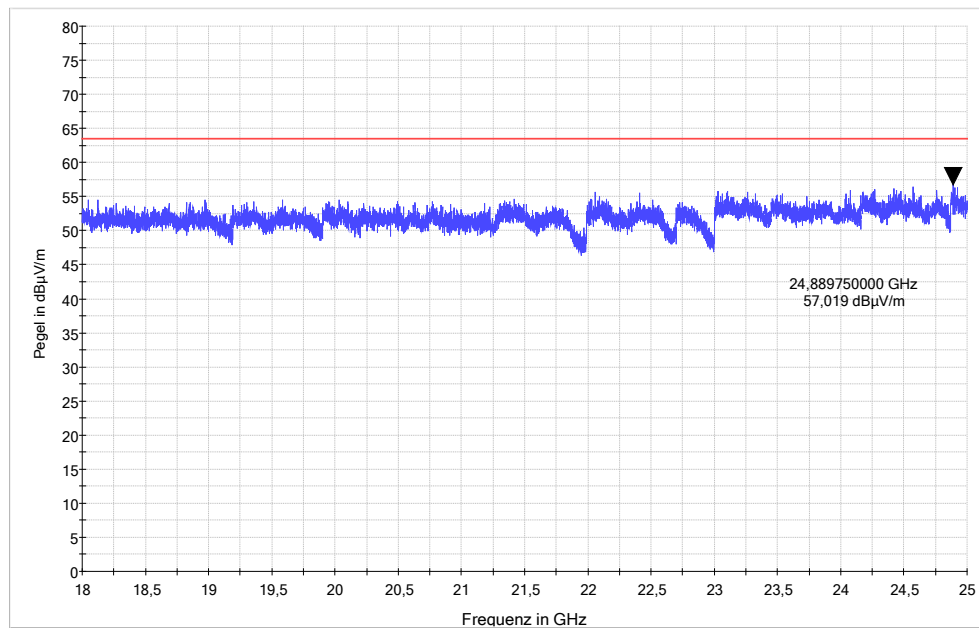
— Preview Result 1V-PK+ — Preview Result 1H-PK+ — FCC 15.209 * Final_Result PK



— Preview Result 1H-PK+ — Preview Result 1V-PK+ * MaxPeak-PK+
— FCC 15.209 * Final_Result PK+

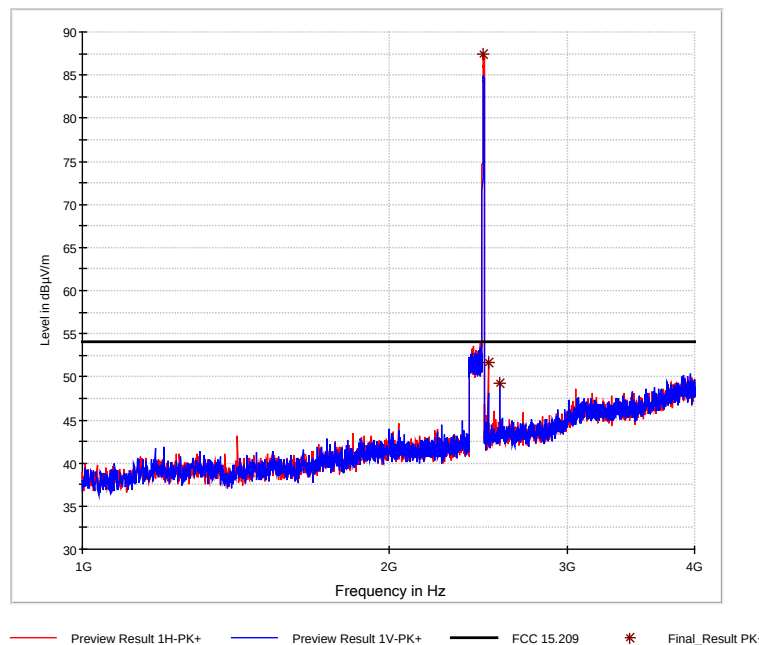
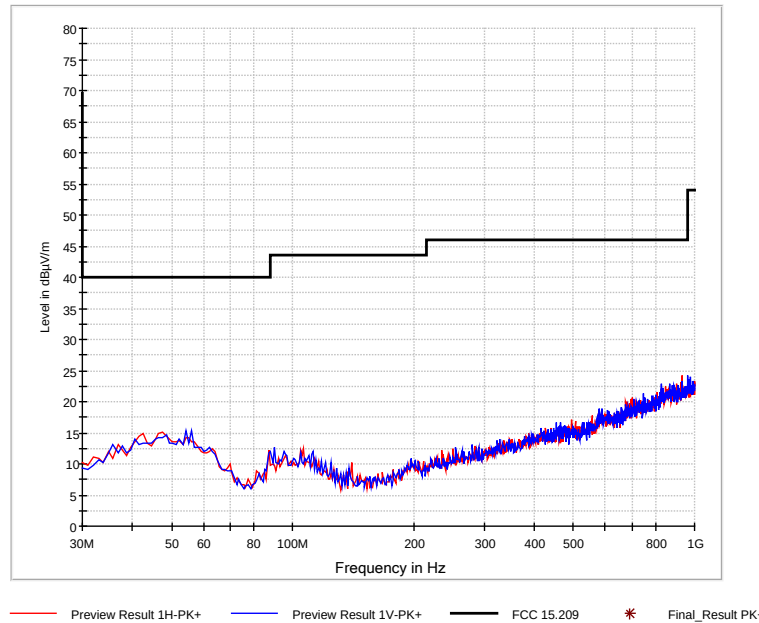


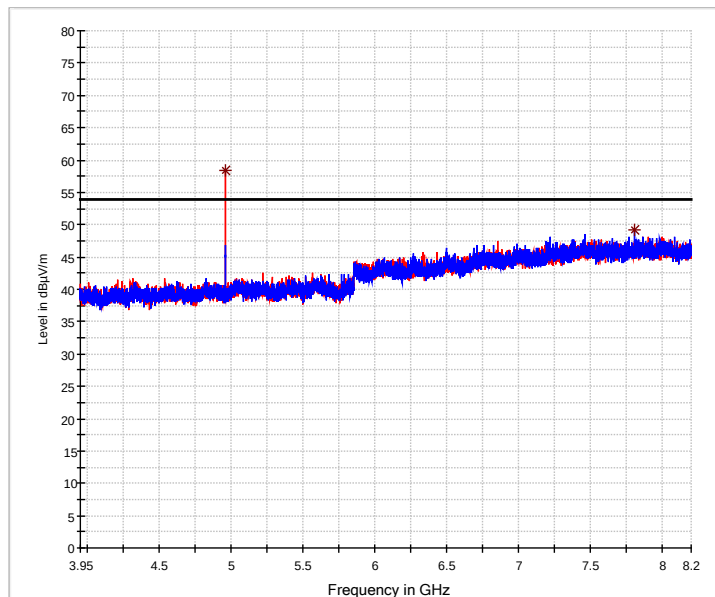
— Preview Result 2H-AVG — Preview Result 1H-PK+ — Preview Result 2V-AVG
— Preview Result 1V-PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
* Final_Result PK+ ◇ Final_Result AVG



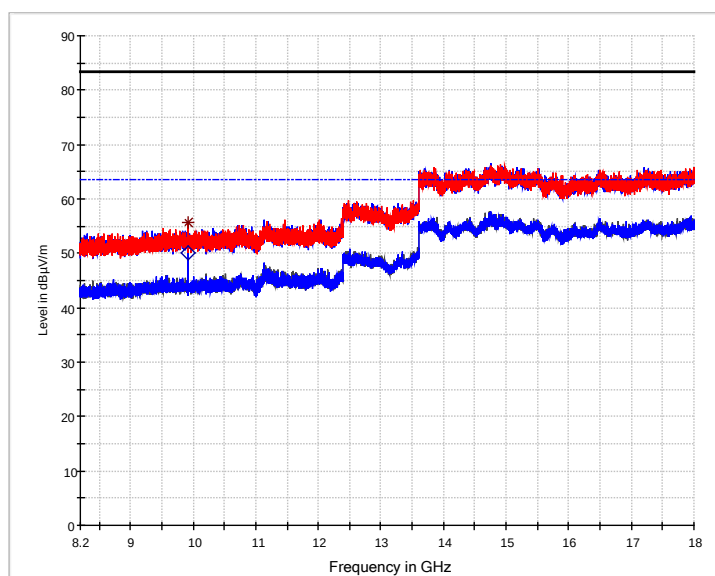
9.1.3.2 EUT on long side:

Full Spectrum

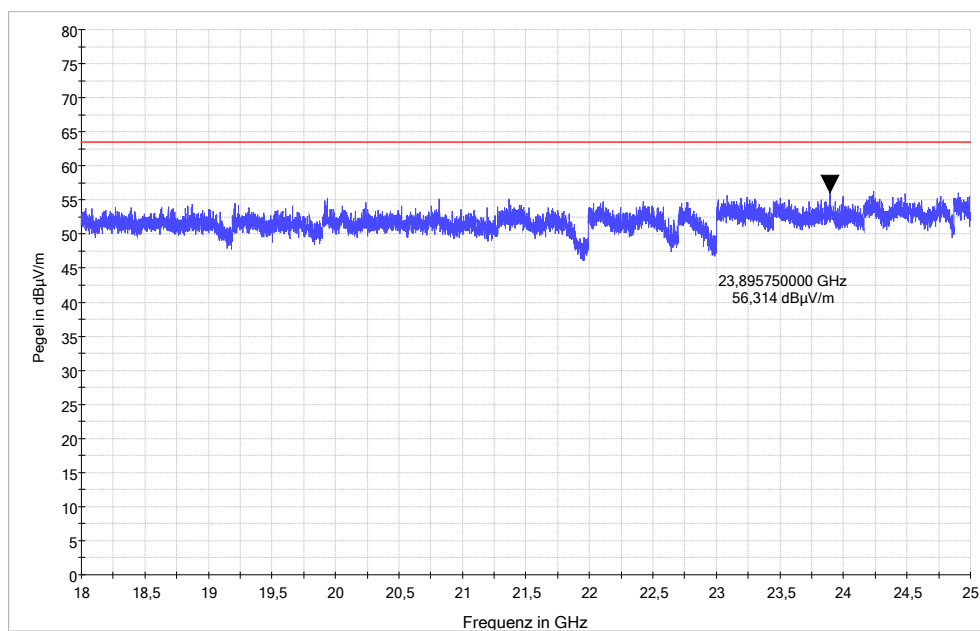
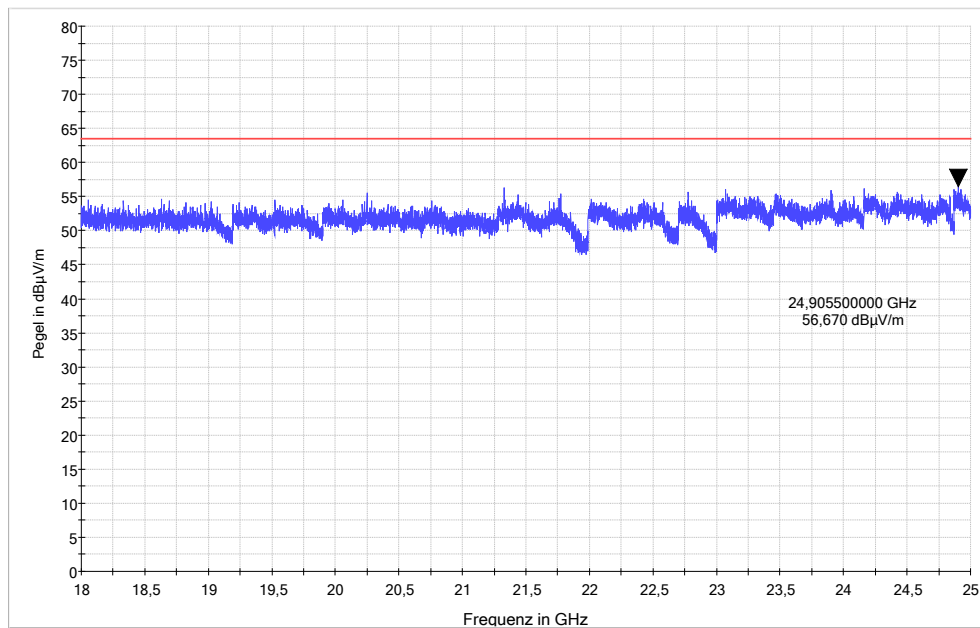




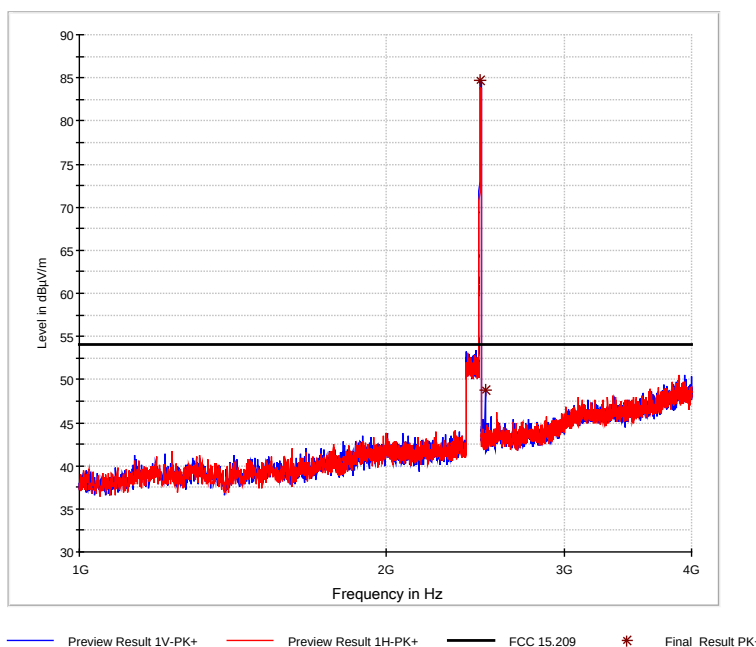
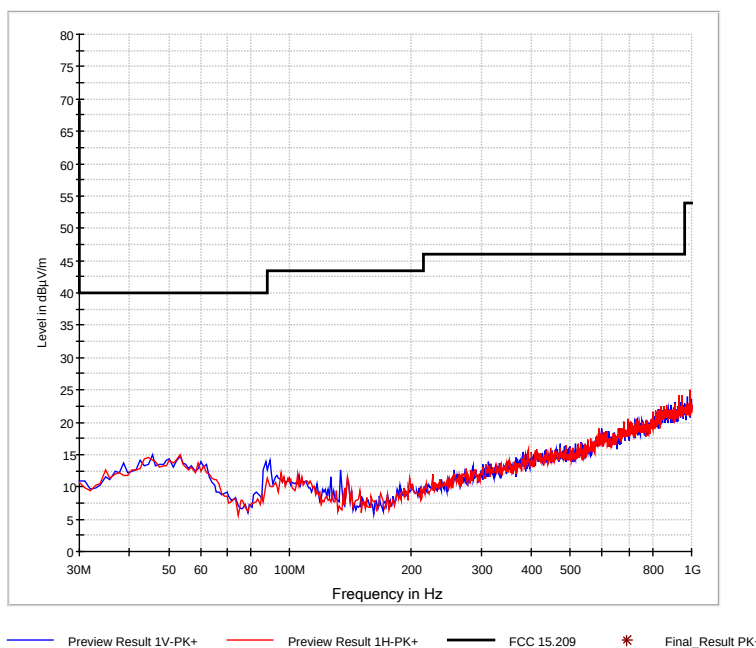
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

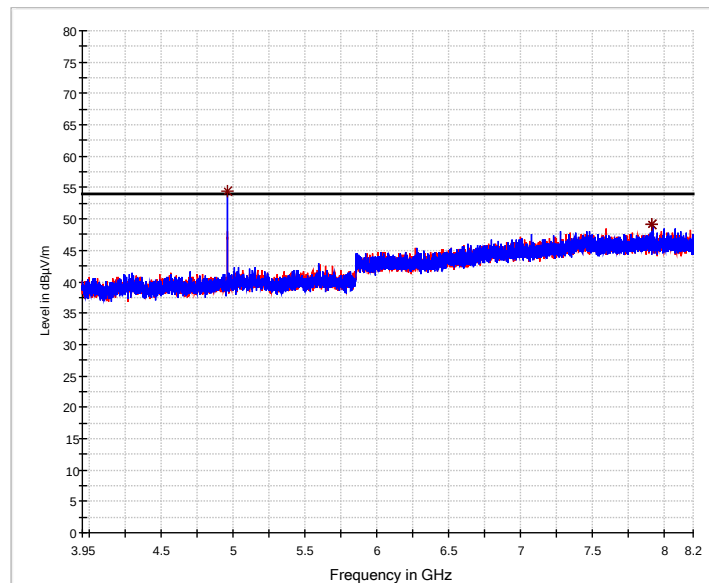


— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG
* Final_Result PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
◇ Final_Result AVG

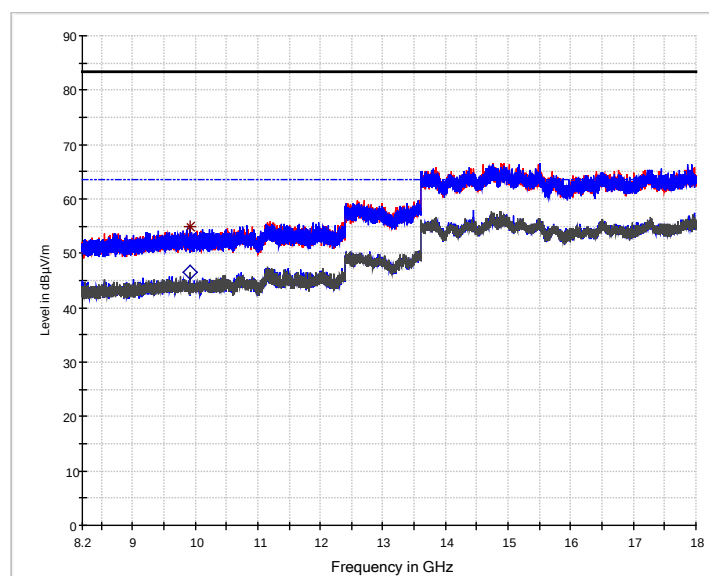


9.1.3.3 EUT in upright position:

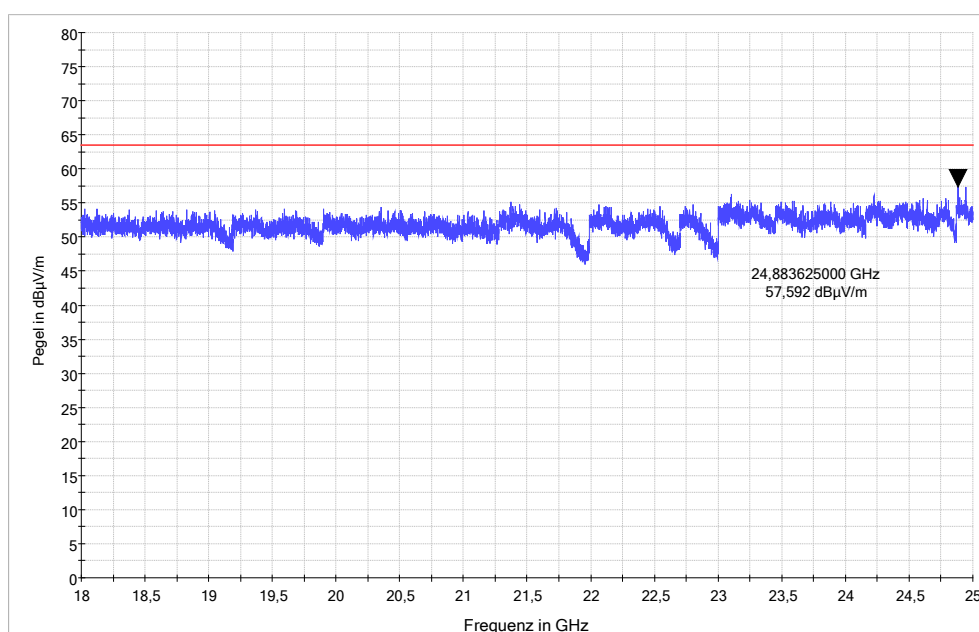
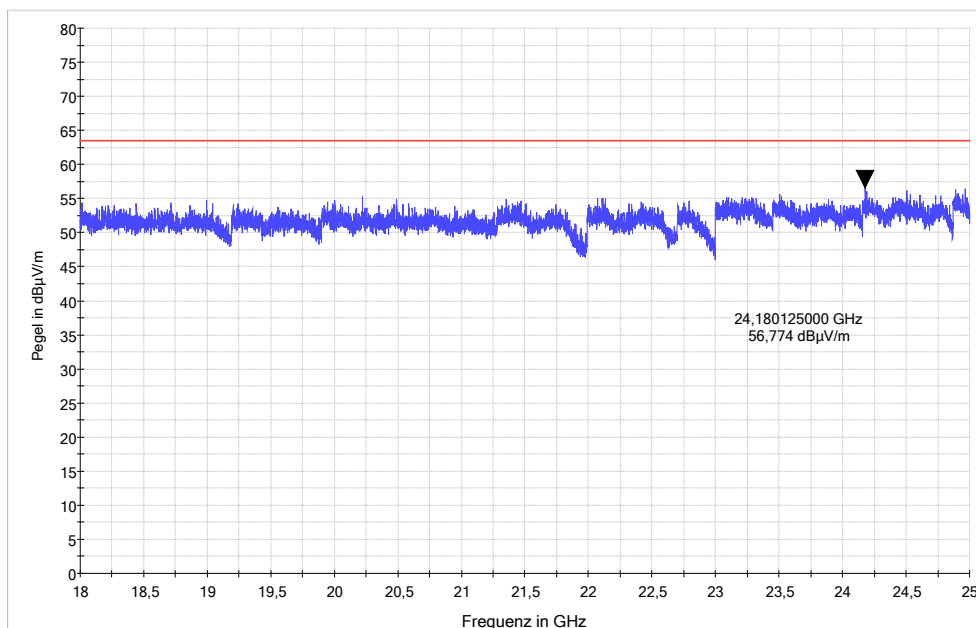




— Preview Result 1H-PK+ — Preview Result 1V-PK+ * MaxPeak-PK+
— FCC 15.209 * Final_Result PK+



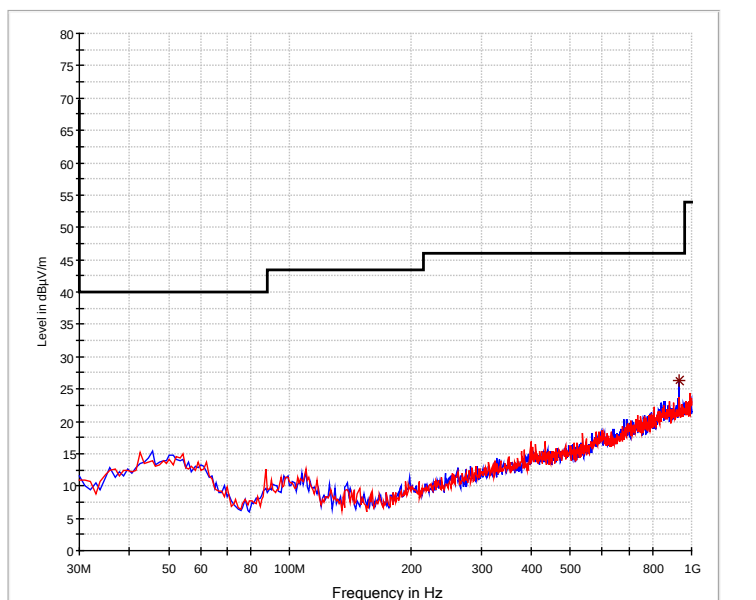
— Preview Result 2H-AVG — Preview Result 1H-PK+ — Preview Result 2V-AVG
— Preview Result 1V-PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
* Final_Result PK+ ◇ Final_Result AVG



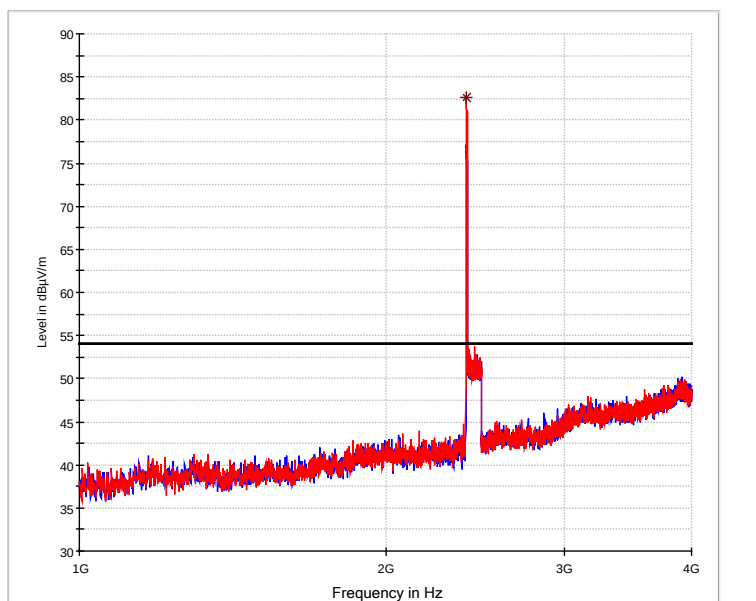
9.2 Test plots for Proprietary radio

9.2.1 Lowest channel

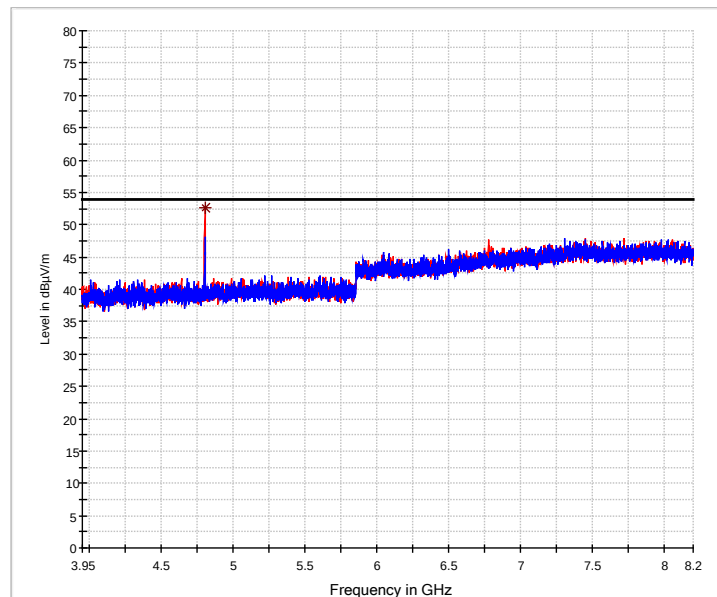
9.2.1.1 EUT flat on table



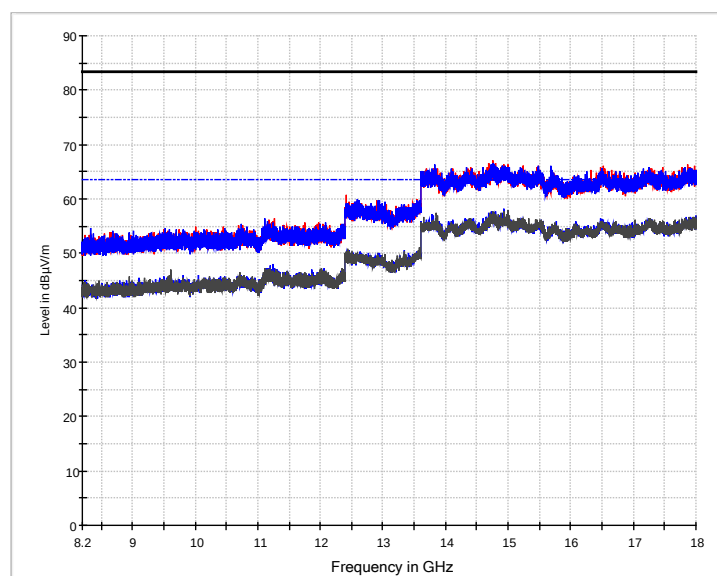
— Preview Result 1V-PK+ — Preview Result 1H-PK+ — FCC 15.209 * Final_Result PK



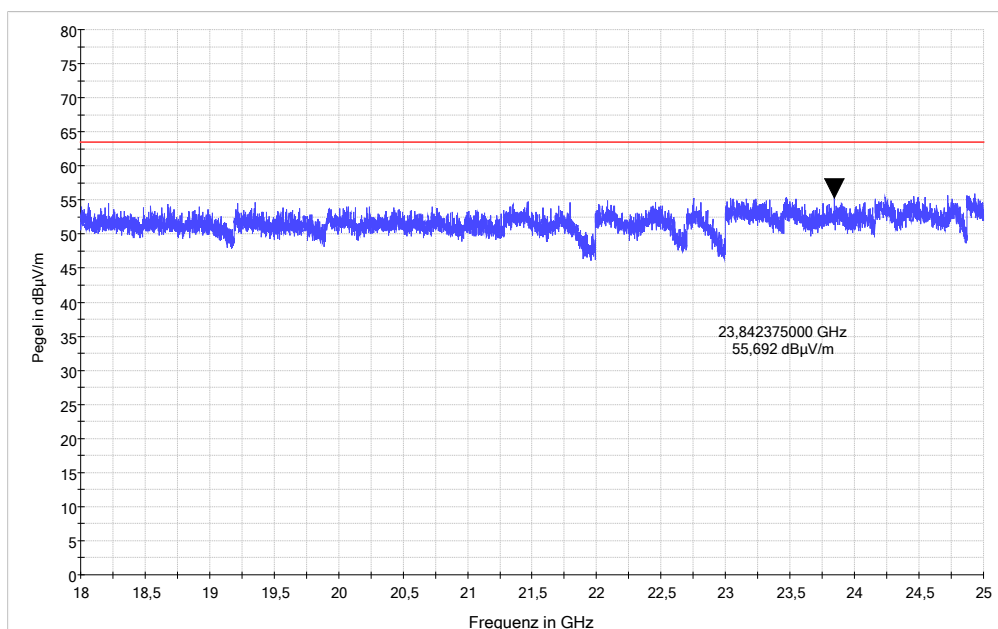
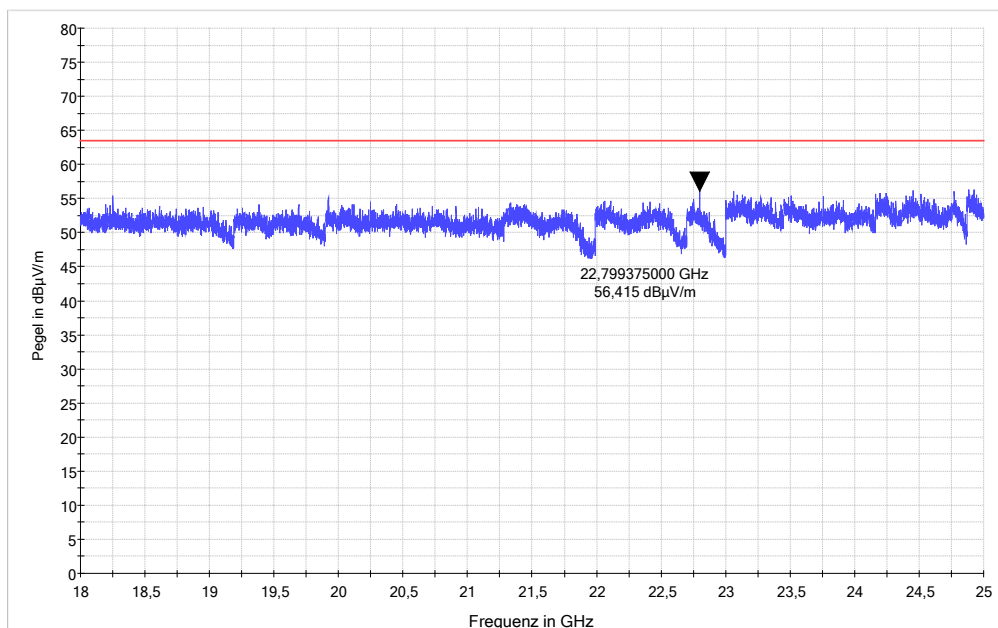
— Preview Result 1V-PK+ — Preview Result 1H-PK+ — FCC 15.209 * Final_Result PK



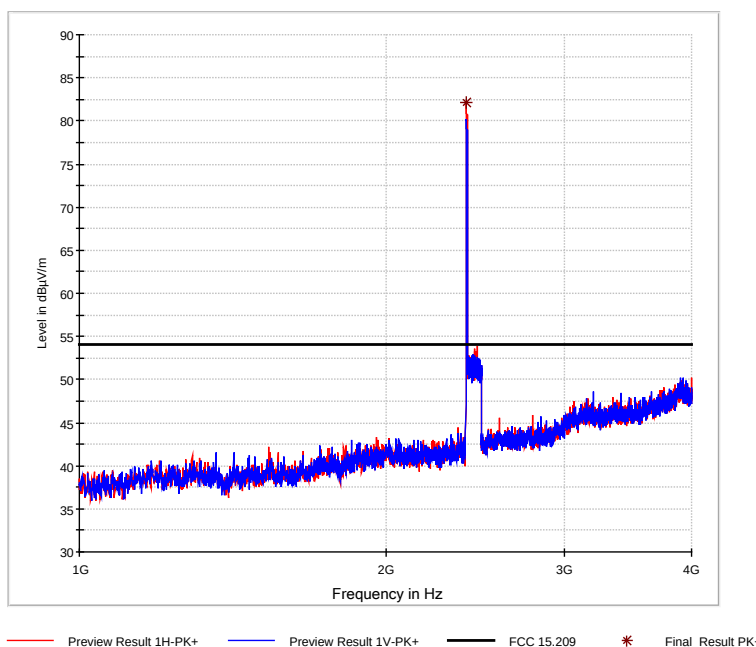
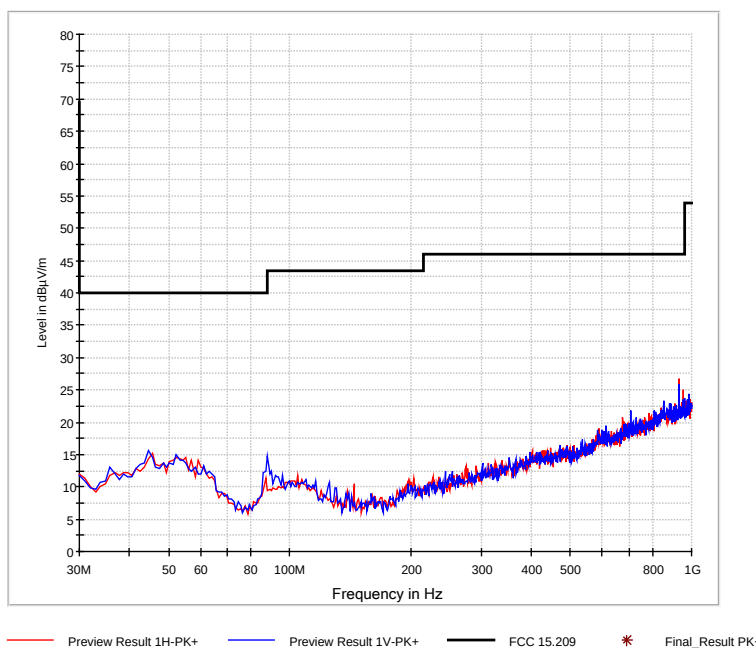
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

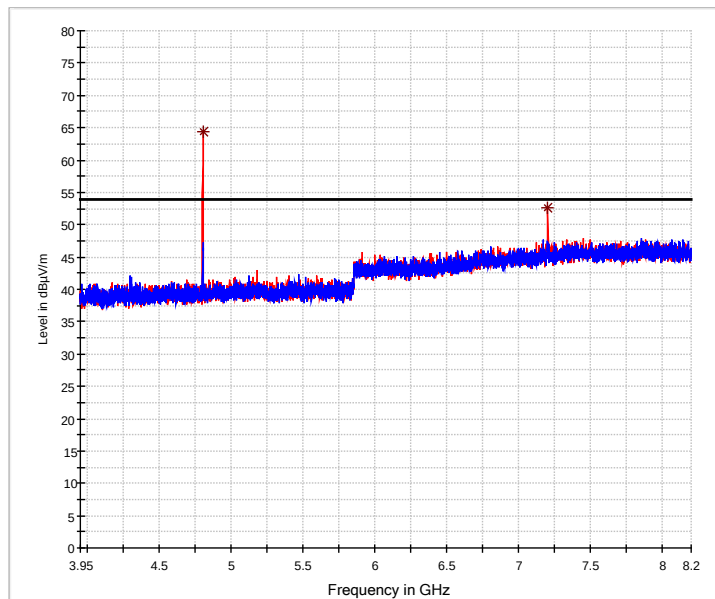


— Preview Result 2H-AVG — Preview Result 1H-PK+ — Preview Result 2V-AVG
— Preview Result 1V-PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
* Final_Result PK+ ♦ Final_Result AVG



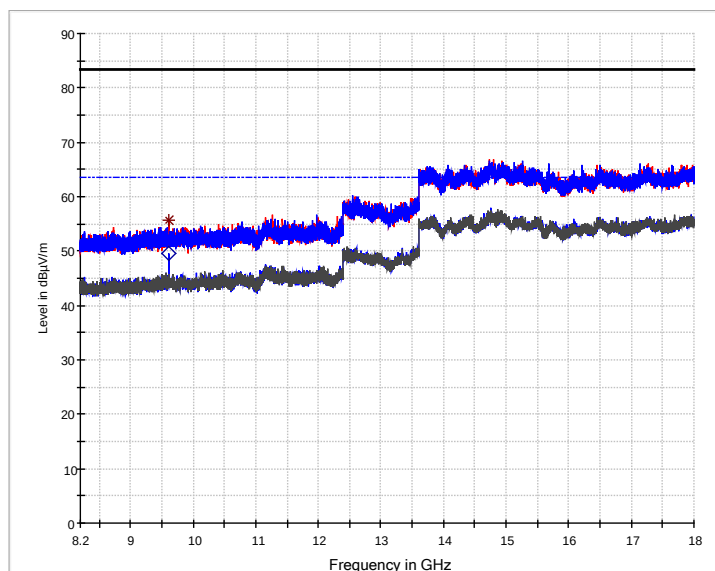
9.2.1.2 EUT on long side



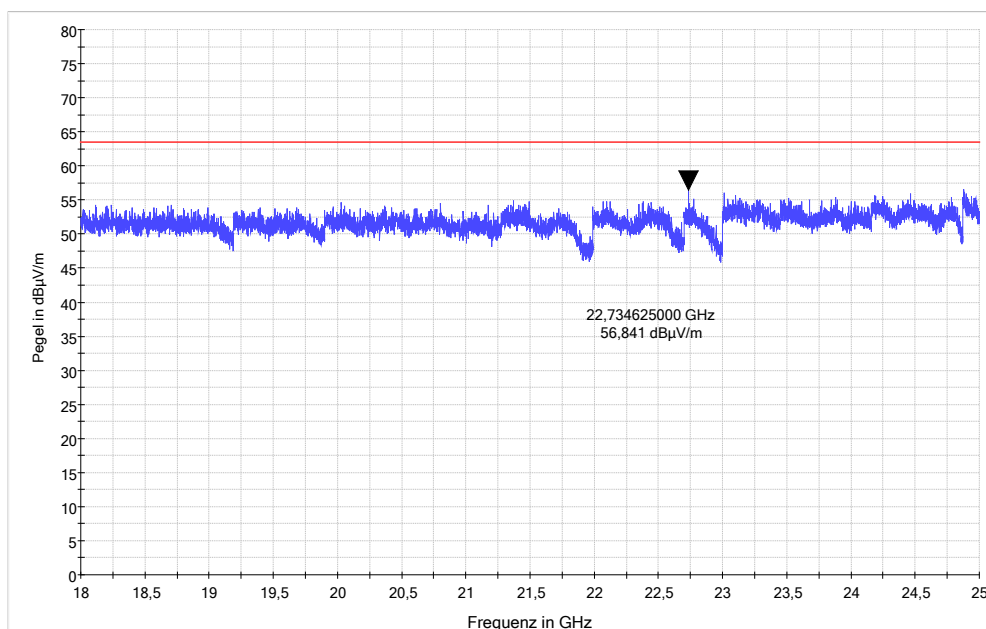
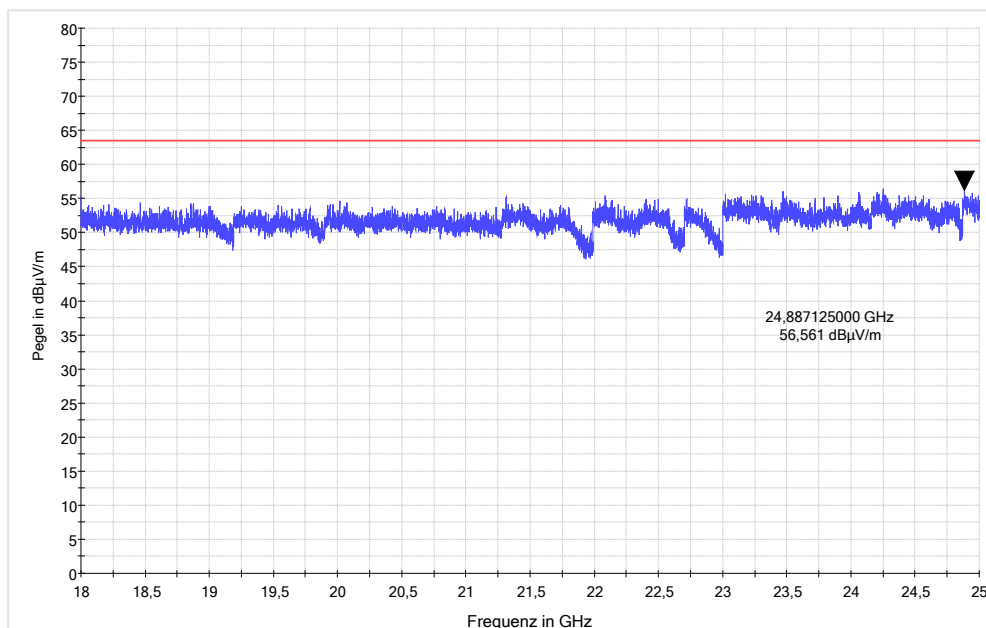


Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15.209 Final_Result PK-

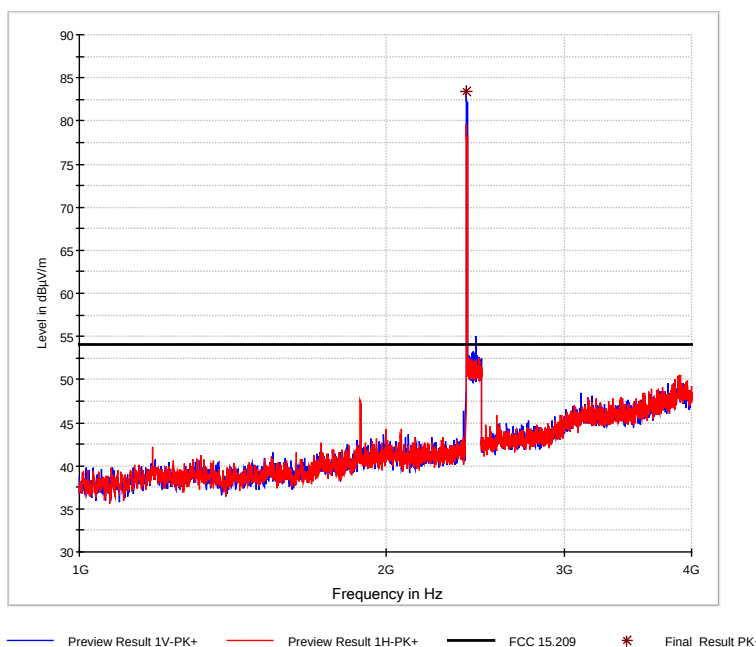
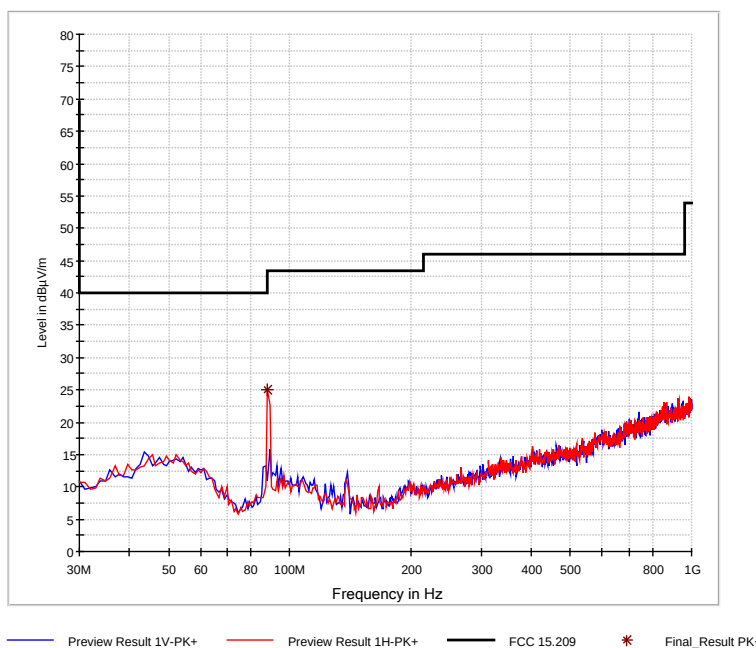
Nachmessen1!!

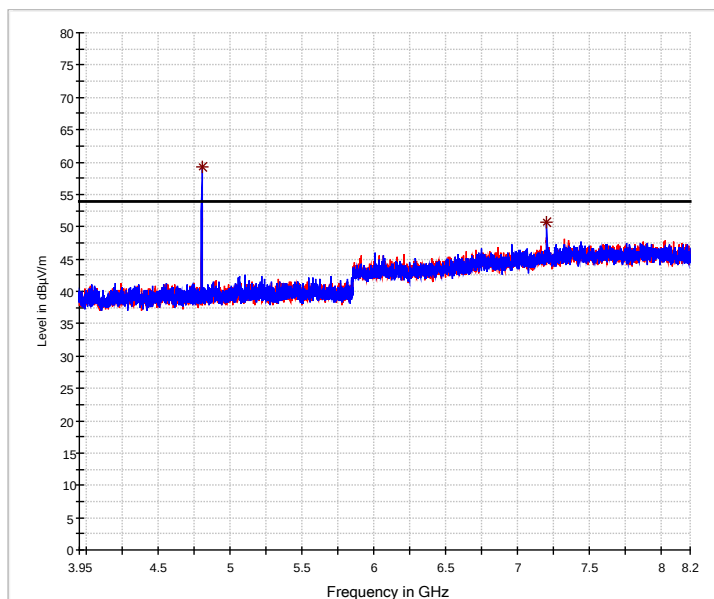


Preview Result 2H-AVG Preview Result 1V-PK+ Preview Result 1H-PK+ FCC 15.209 (1m) PK Preview Result 2V-AVG
Final_Result PK+ Final_Result AVG FCC 15.209 (1m)

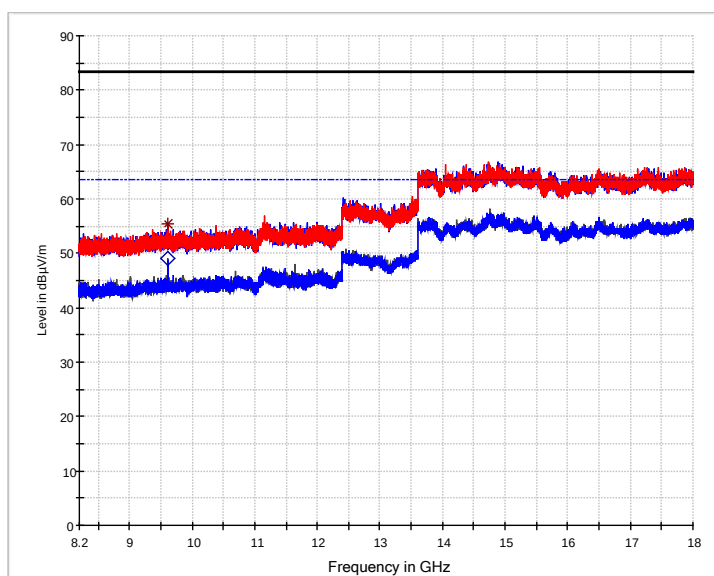


9.2.1.3 EUT in upright position:

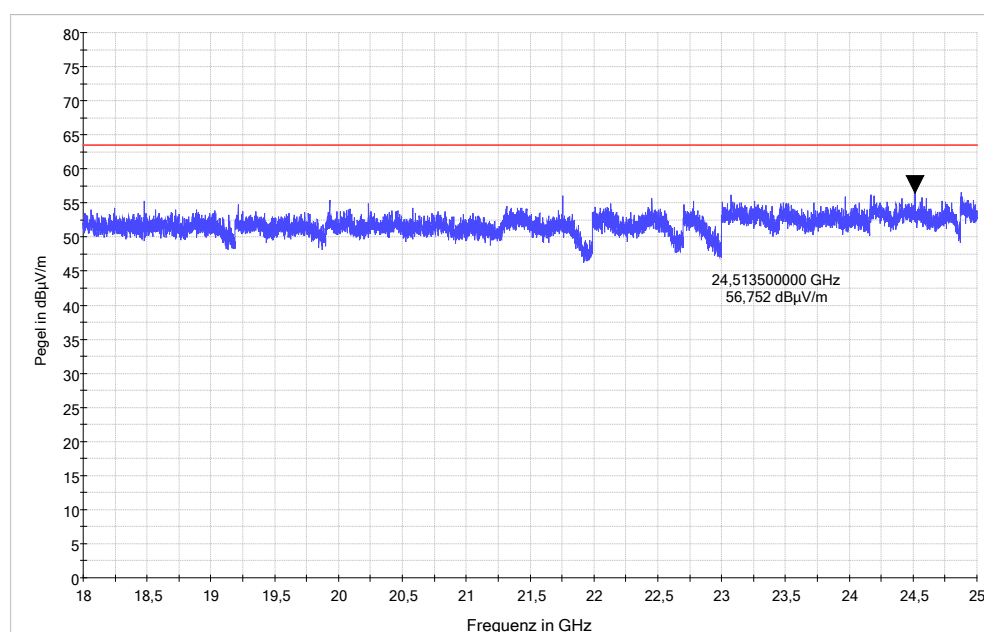
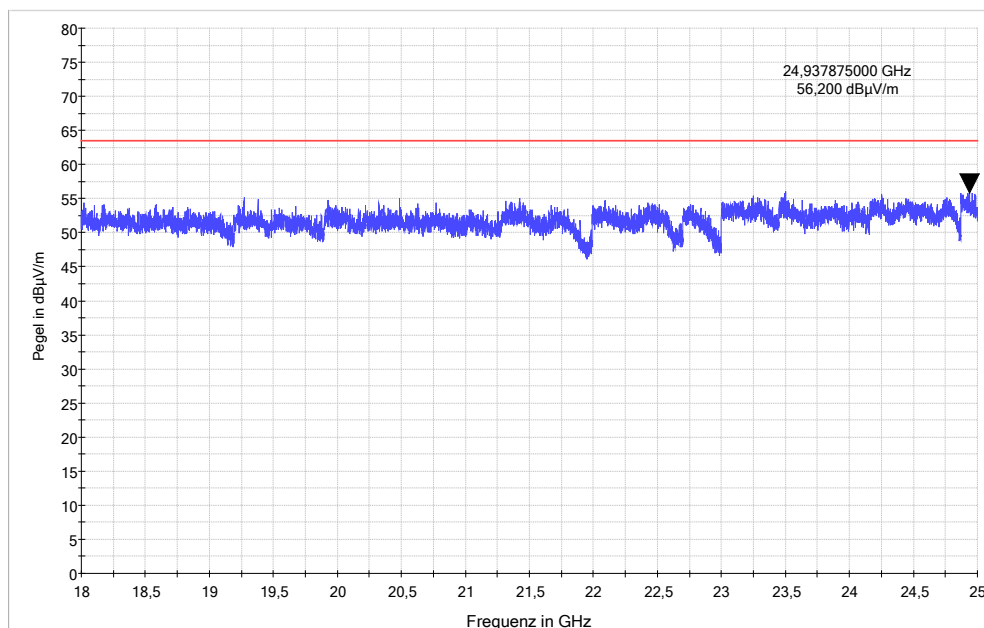




— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

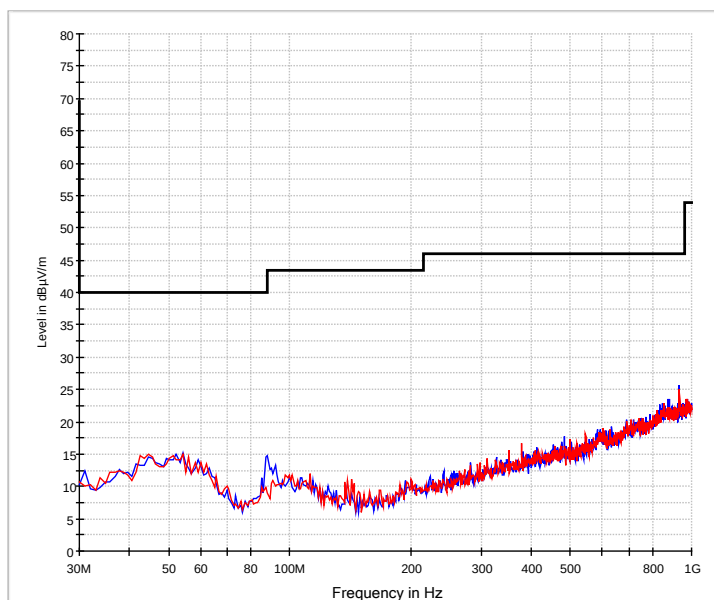


— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG
* Final_Result PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
◇ Final_Result AVG

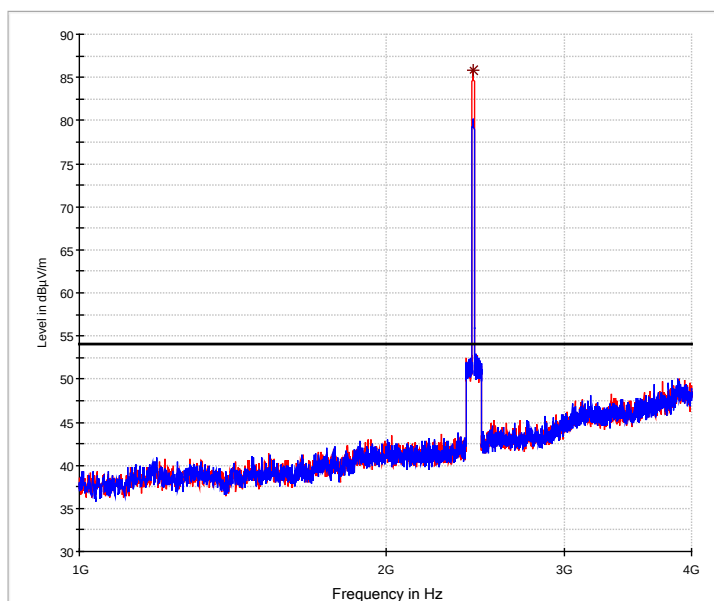


9.2.2 Middle channel

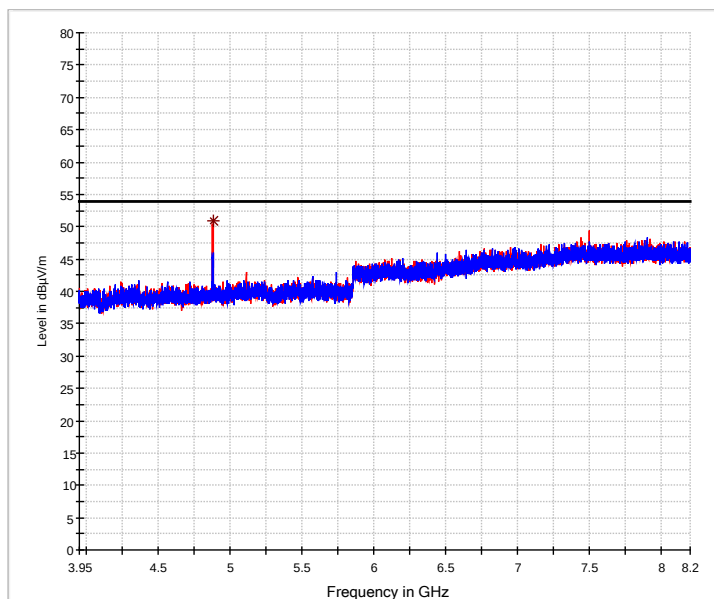
9.2.2.1 EUT flat on table:



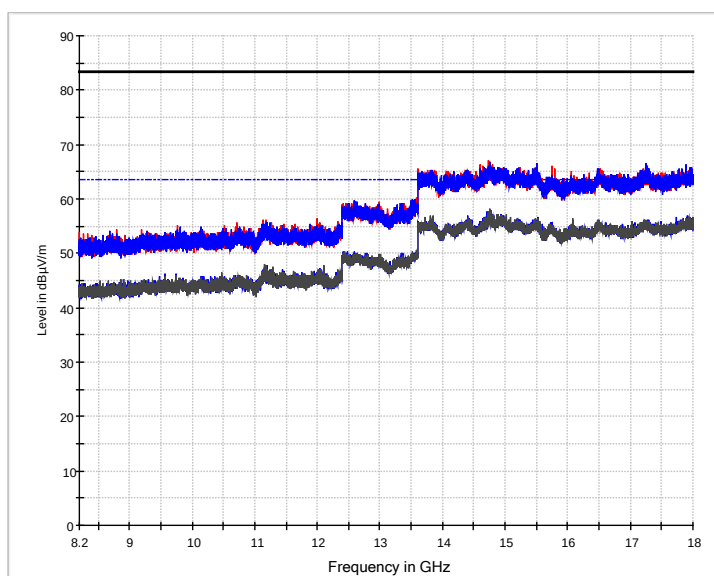
Preview Result 1V-PK+ Preview Result 1H-PK+ FCC 15.209 * Final_Result PK



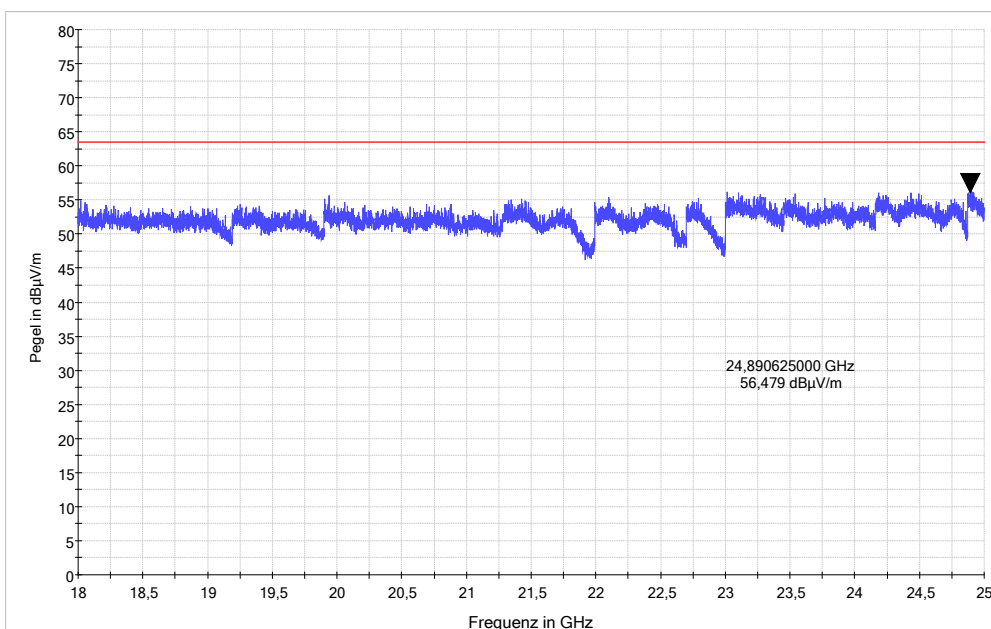
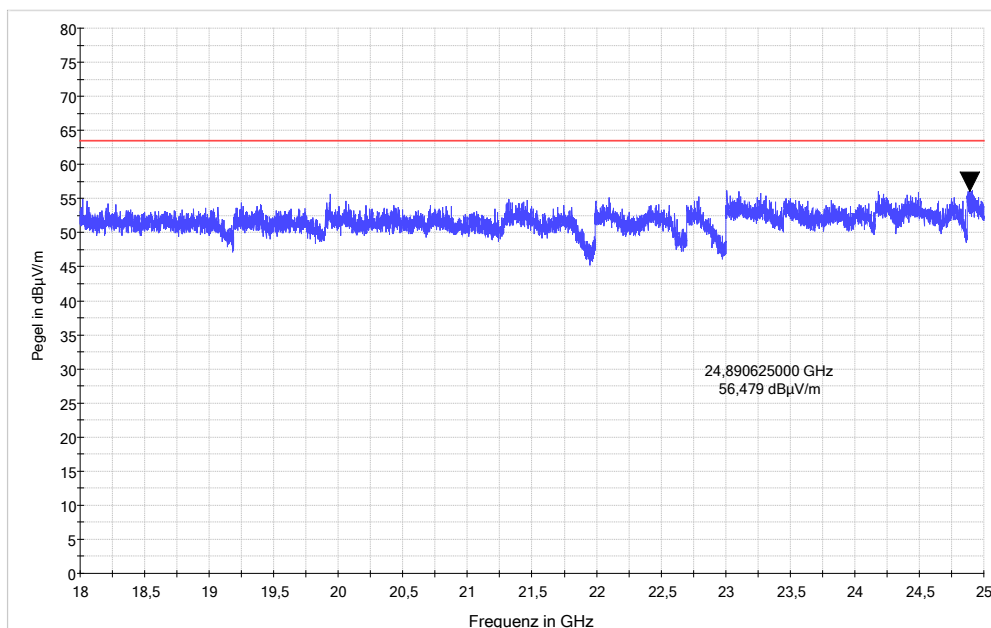
Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15.209 * Final_Result PK



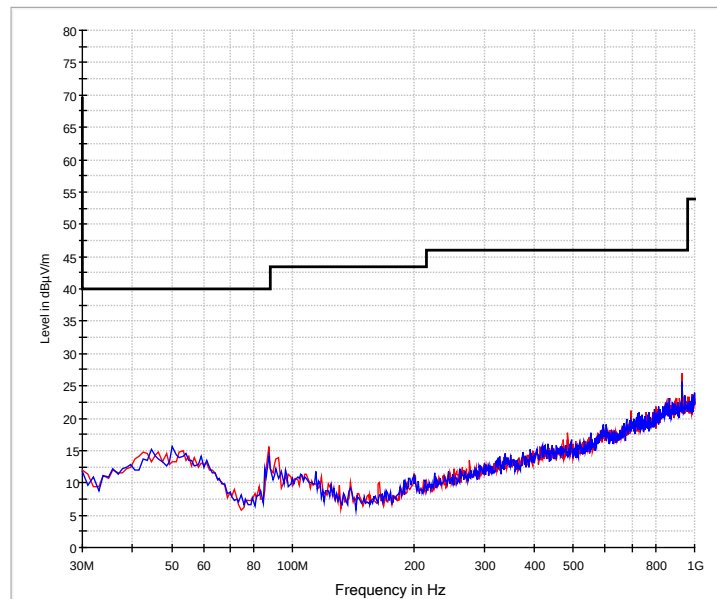
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-



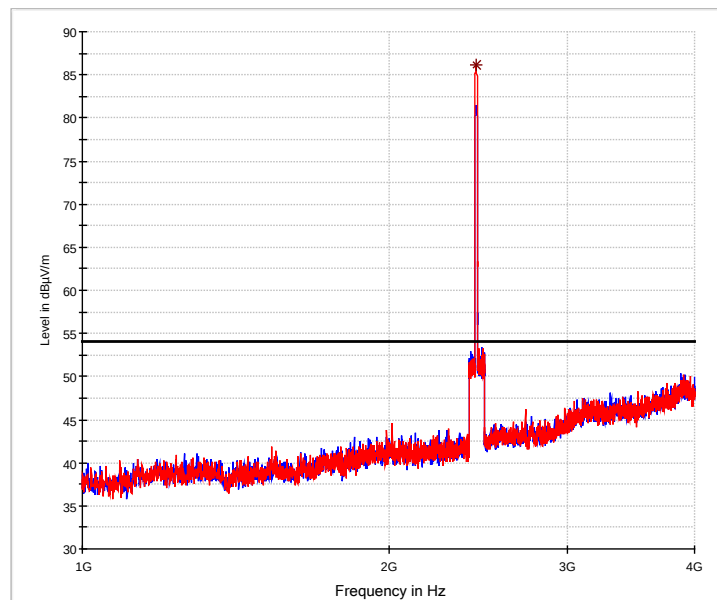
— Preview Result 2H-AVG — Preview Result 1H-PK+ — Preview Result 2V-AVG
— Preview Result 1V-PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
* Final_Result PK+ ◇ Final_Result AVG



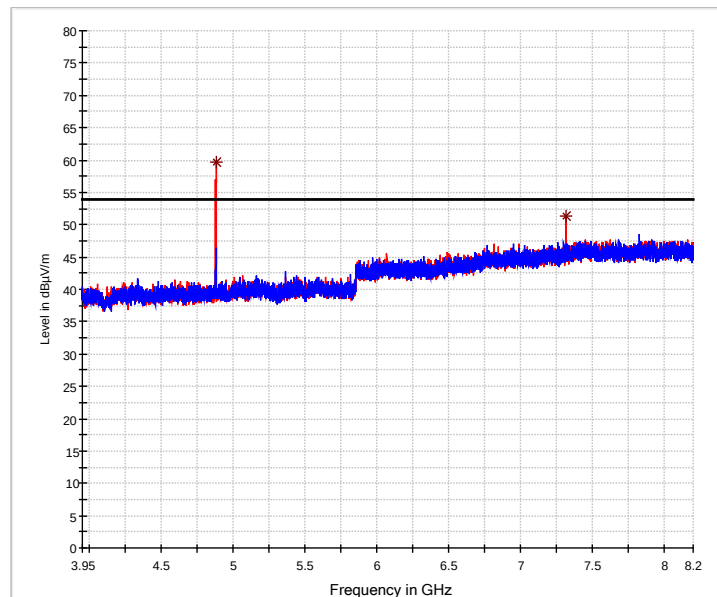
9.2.2.2 EUT on long side:



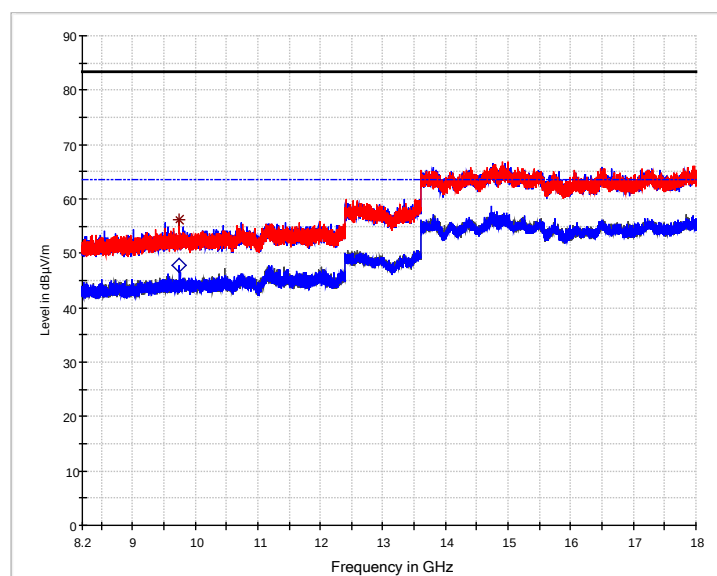
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK



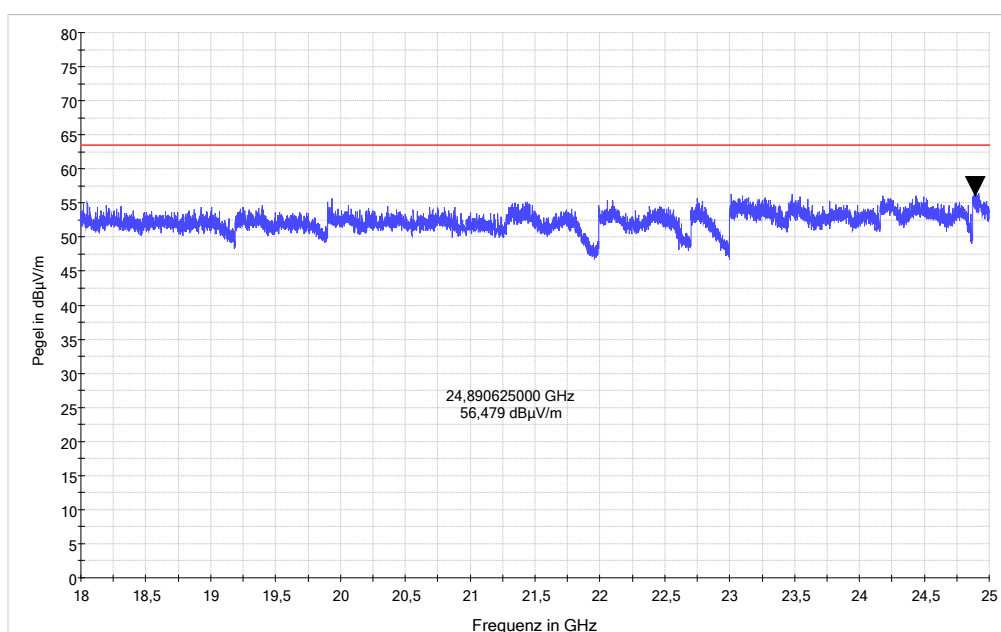
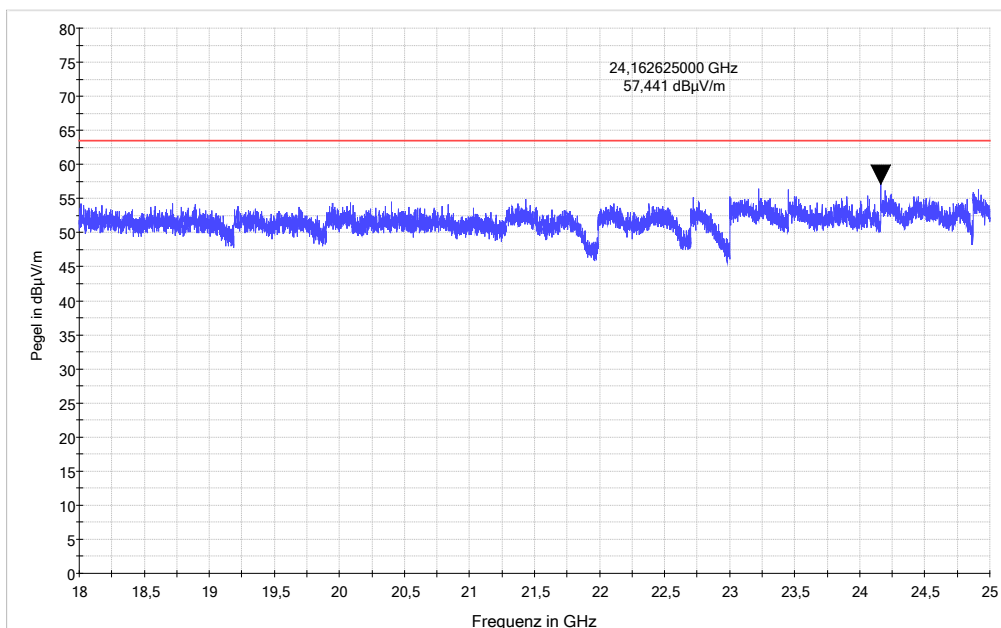
— Preview Result 1V-PK+ — Preview Result 1H-PK+ — FCC 15.209 * Final_Result PK



— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

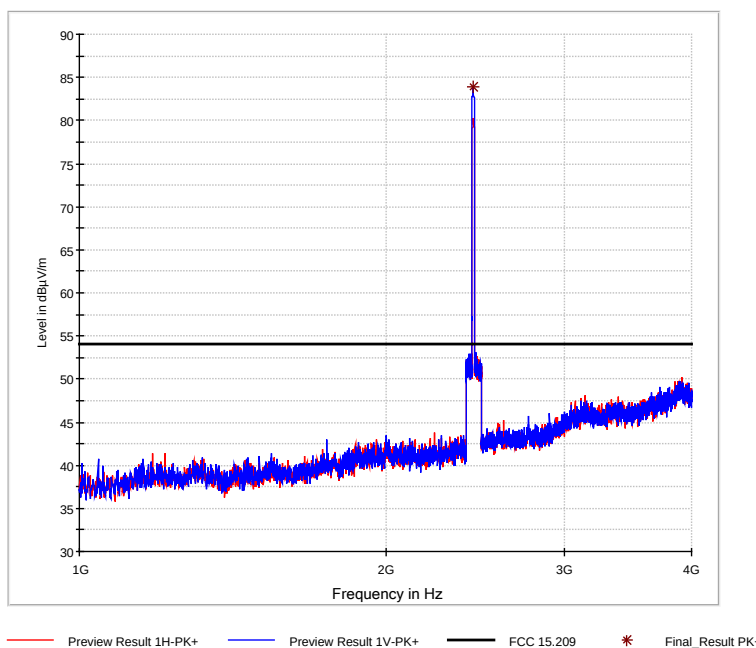
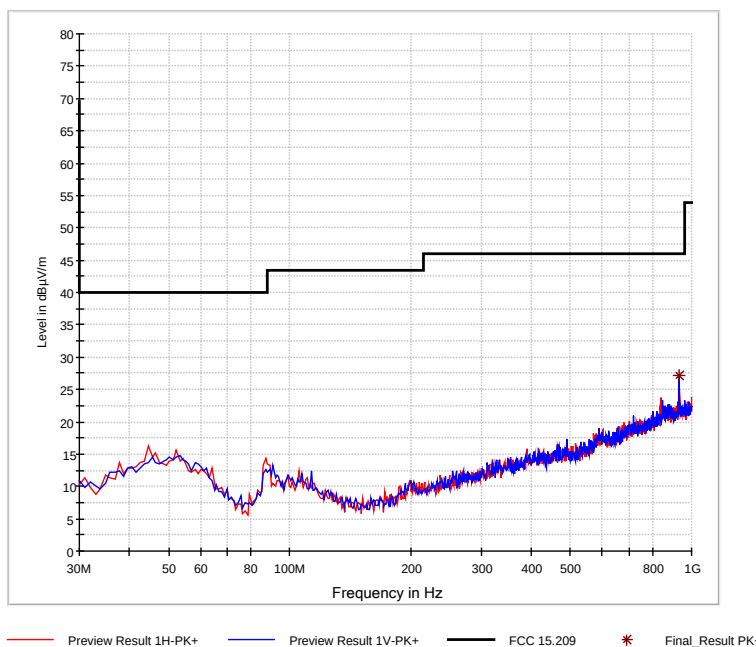


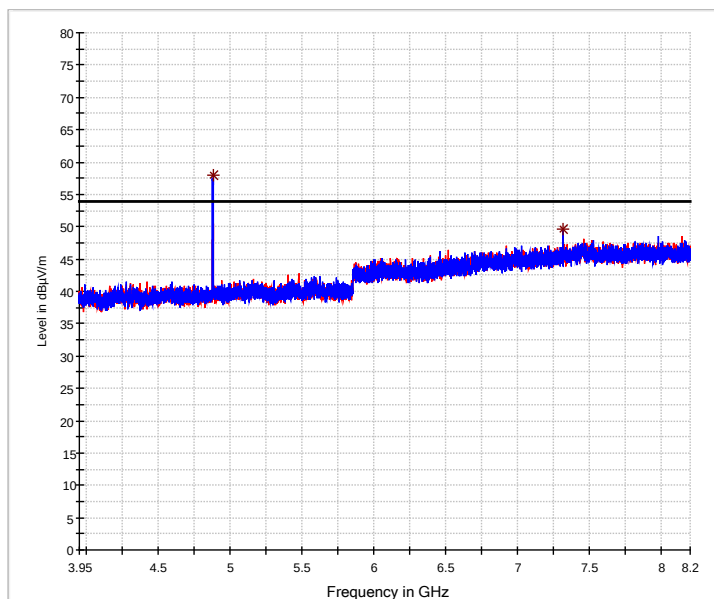
— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG
* Final_Result PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
◇ Final_Result AVG



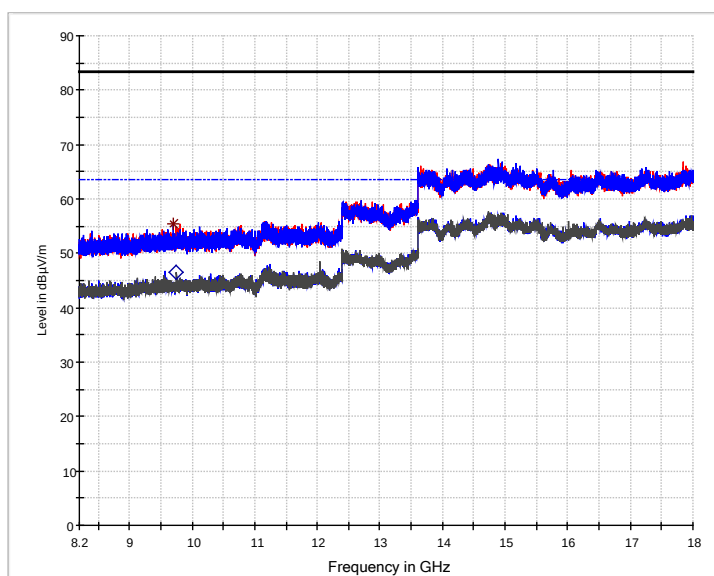
9.2.3 Middle channel

9.2.3.1 EUT in upright position

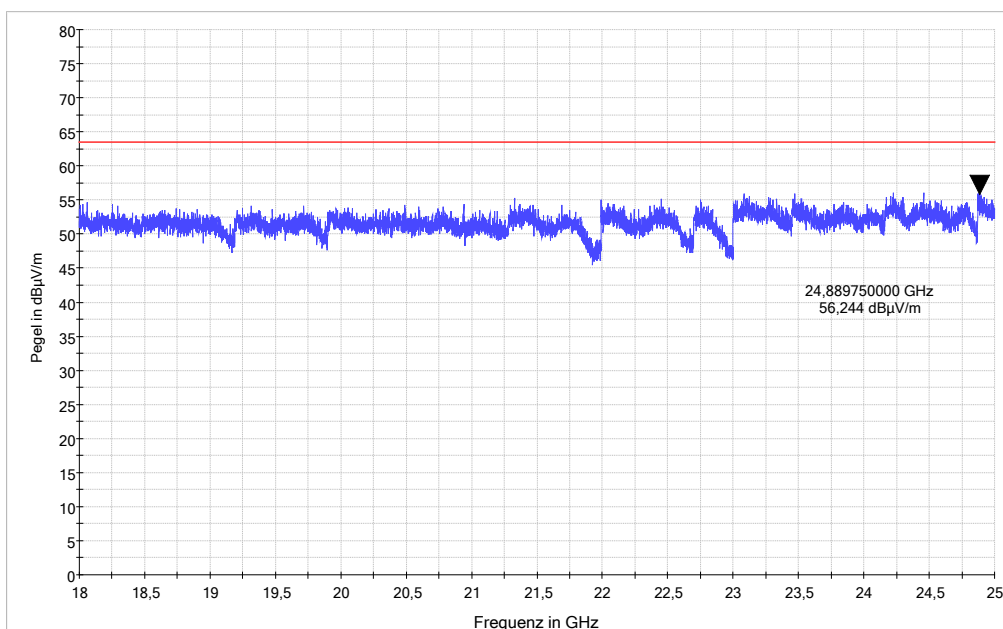
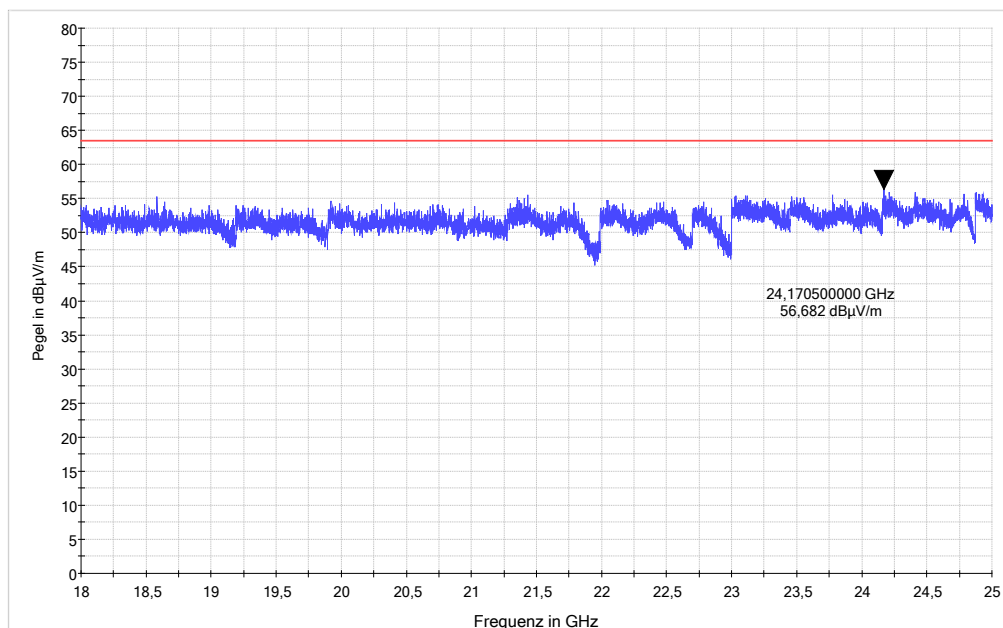




— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

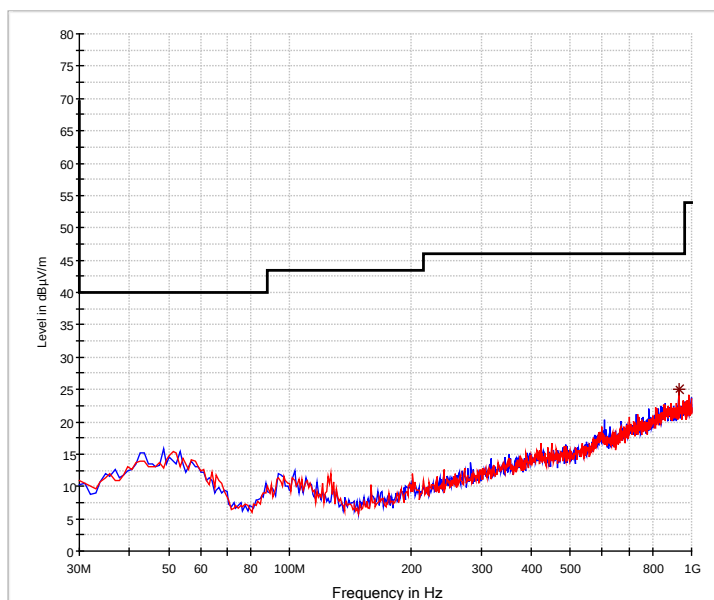


— Preview Result 2H-AVG — Preview Result 1H-PK+ — Preview Result 2V-AVG
 — Preview Result 1V-PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
 * Final_Result PK+ ◇ Final_Result AVG

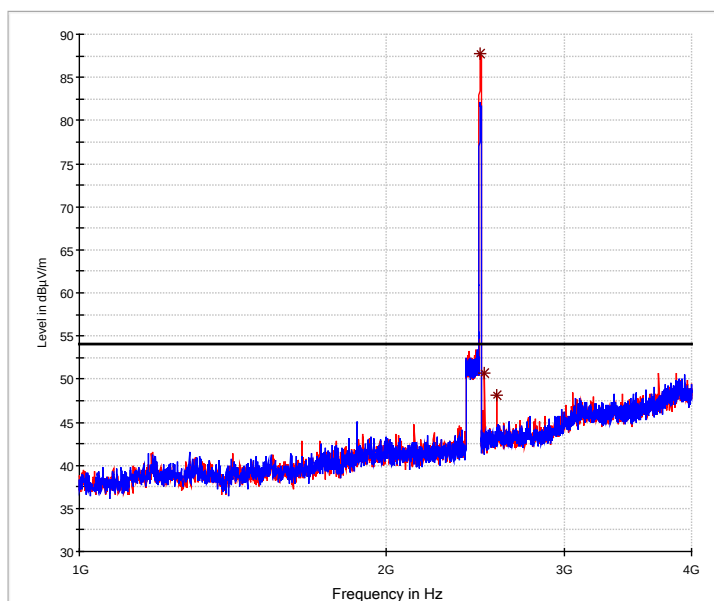


9.2.4 Highest channel

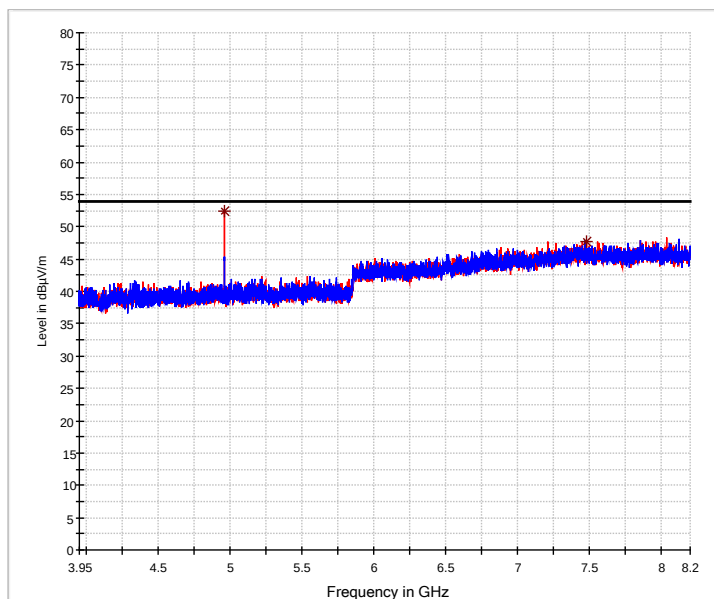
9.2.4.1 EUT flat on table



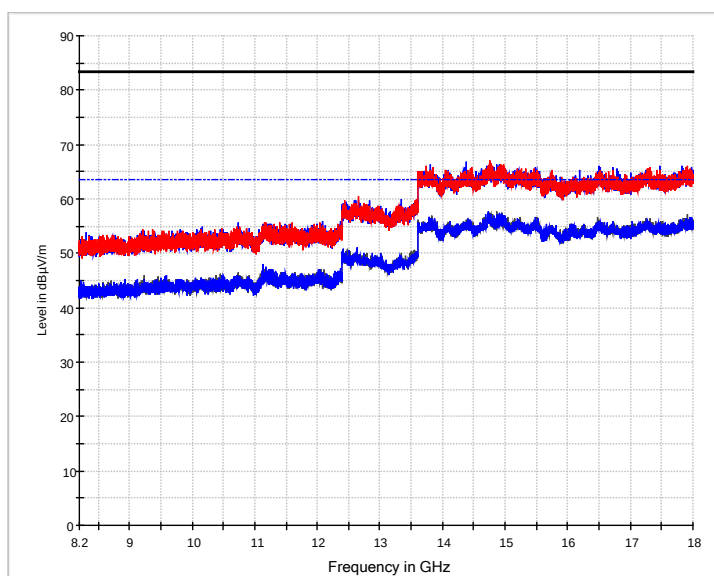
Preview Result 1V-PK+ Preview Result 1H-PK+ FCC 15.209 * Final_Result PK



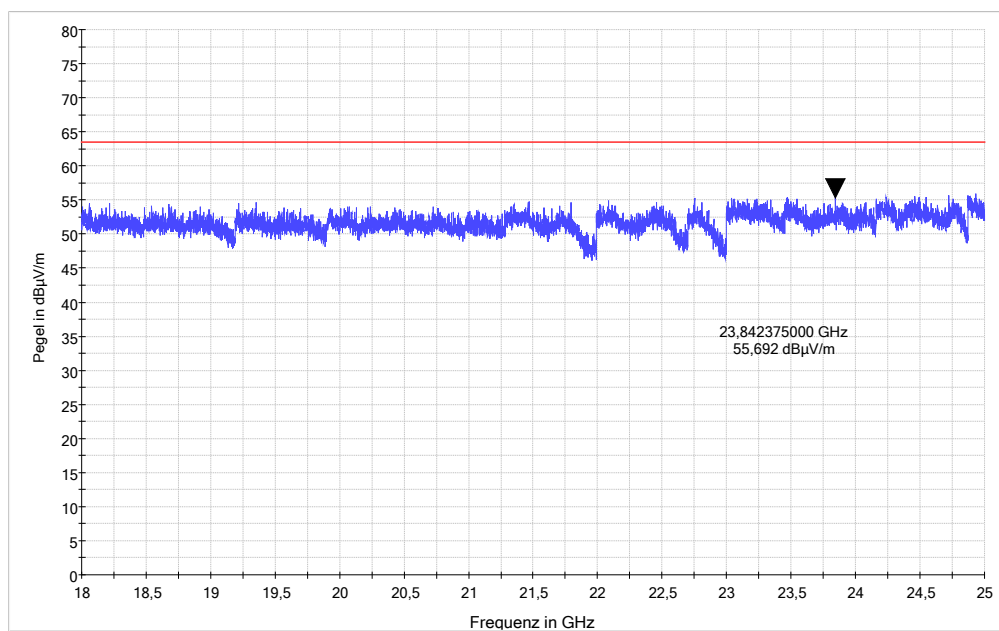
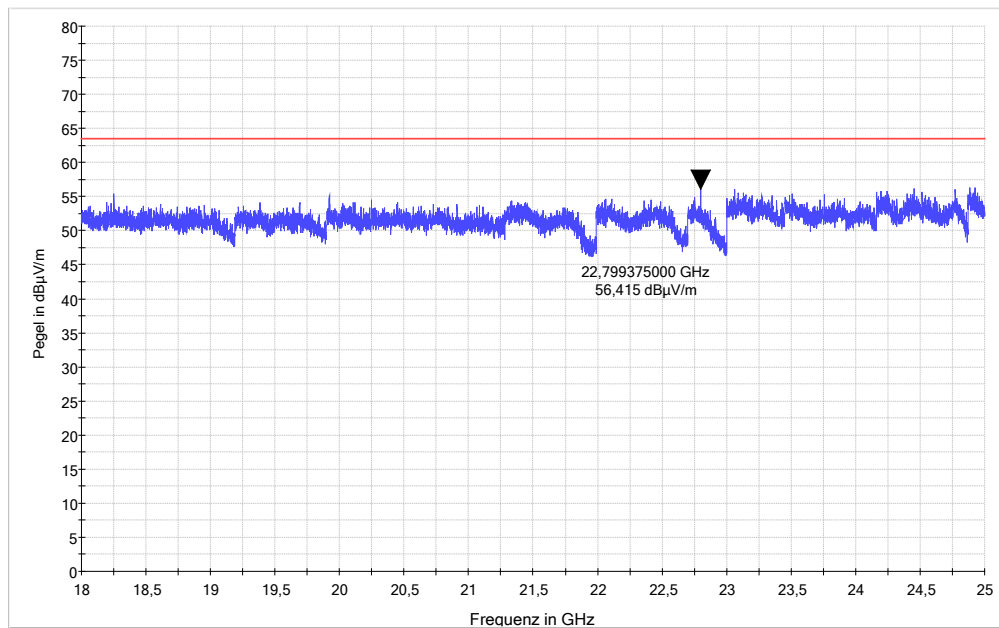
Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15.209 * Final_Result PK



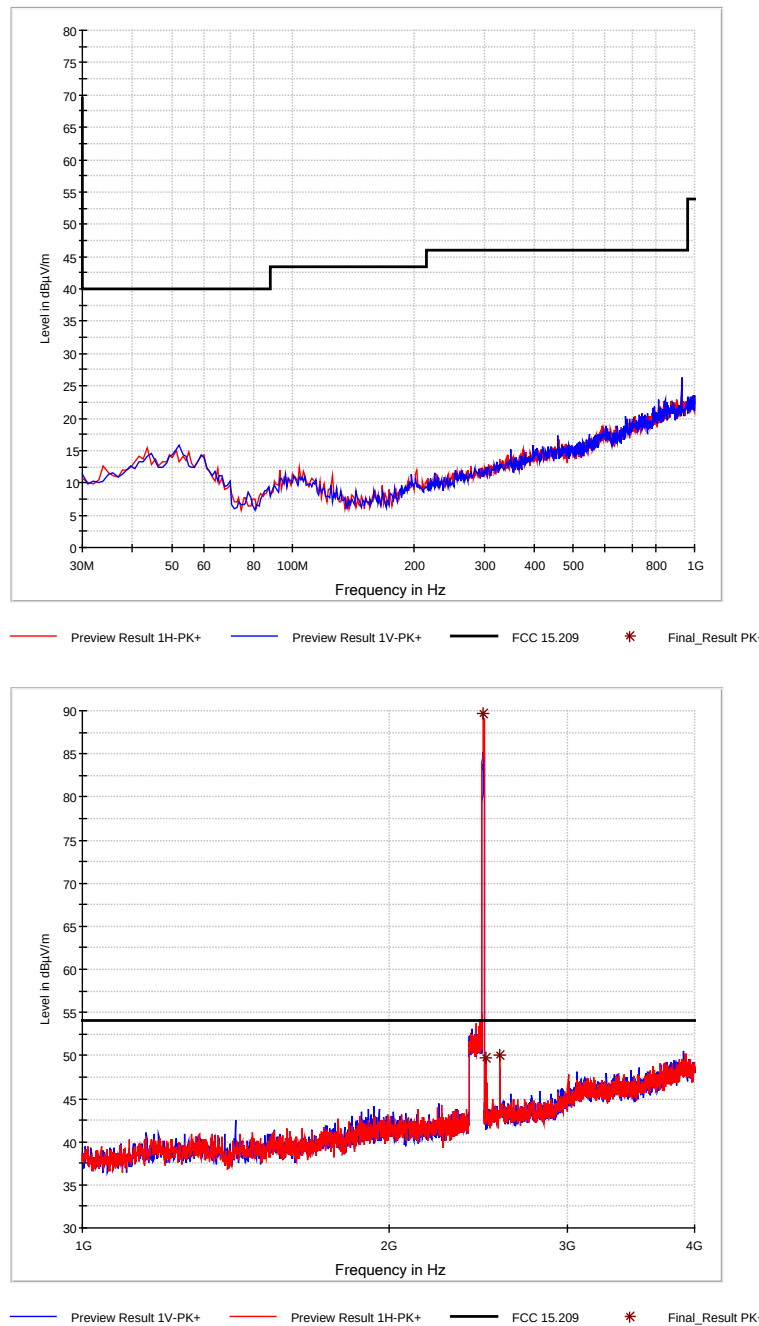
— Preview Result 1H-PK+ — Preview Result 1V-PK+ — FCC 15.209 * Final_Result PK-

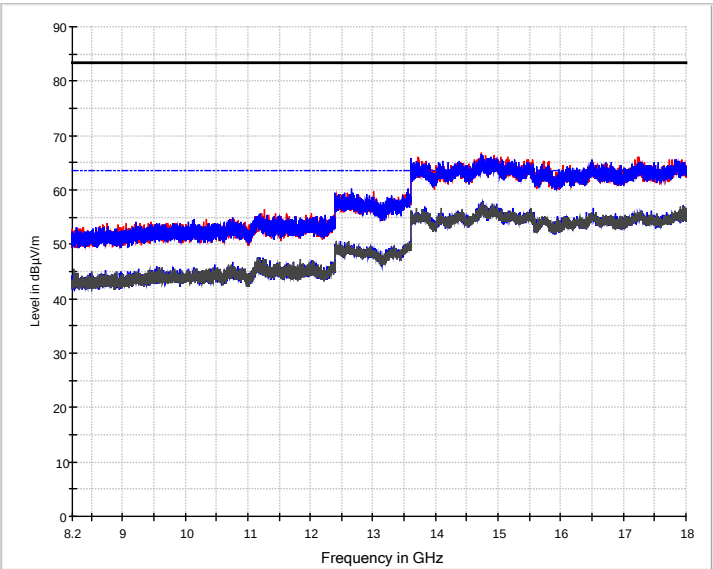
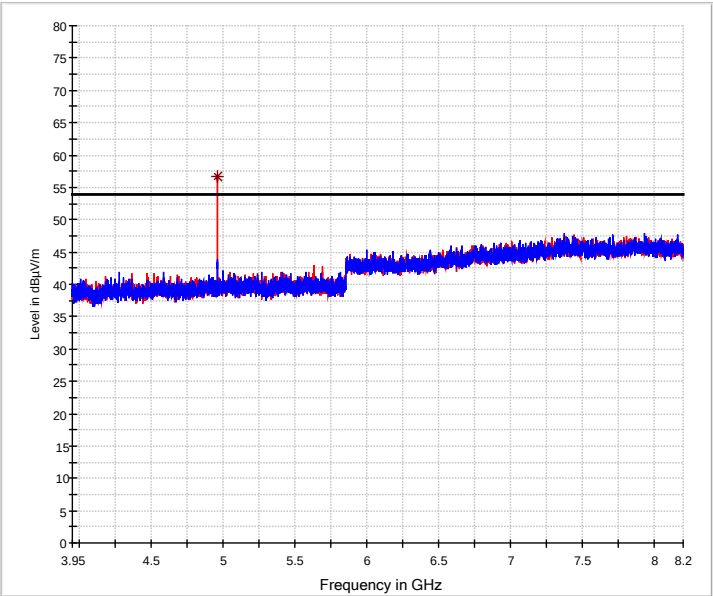


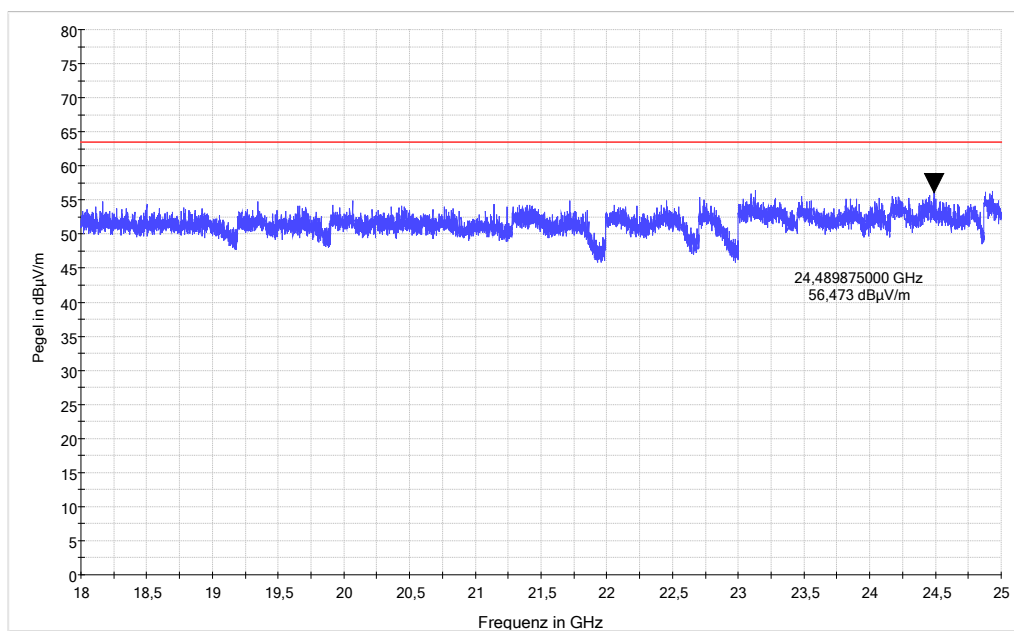
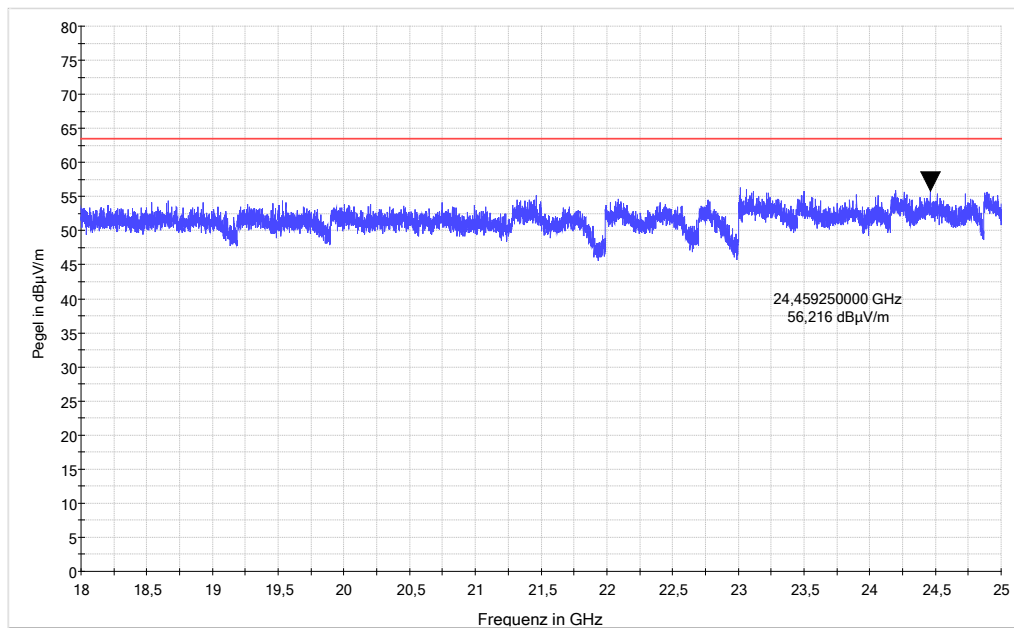
— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG
* Final_Result PK+ — FCC 15.209 (1m) PK — FCC 15.209 (1m)
◇ Final_Result AVG



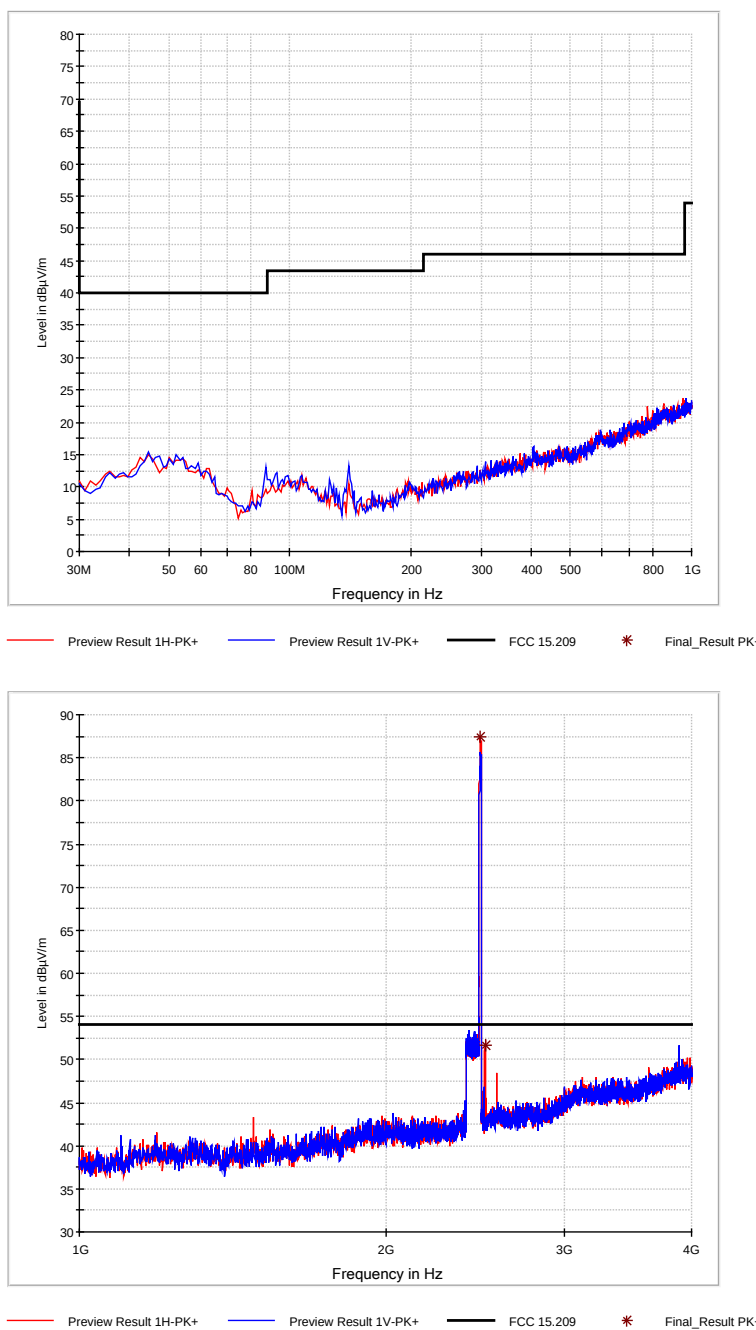
9.2.4.2 EUT on long side:

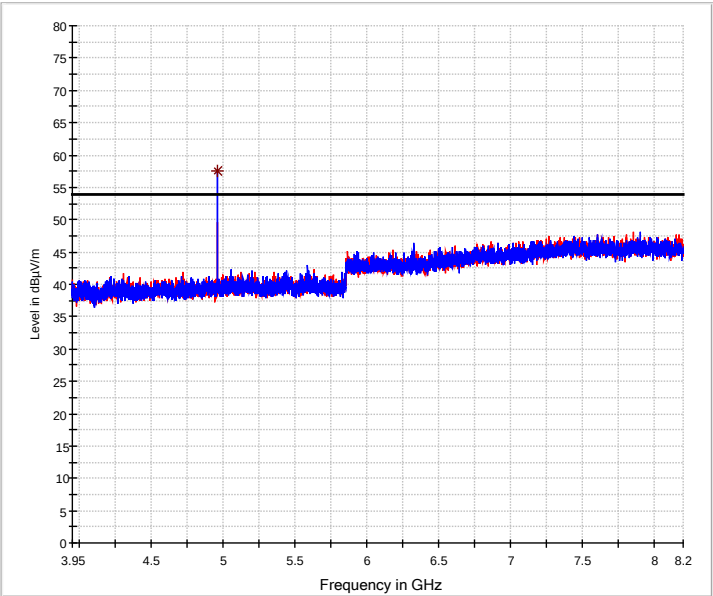




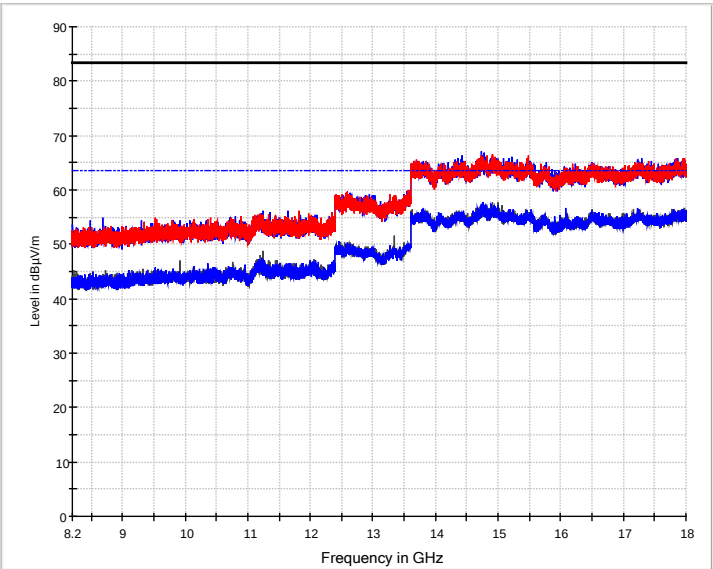


9.2.4.3 EUT in upright position

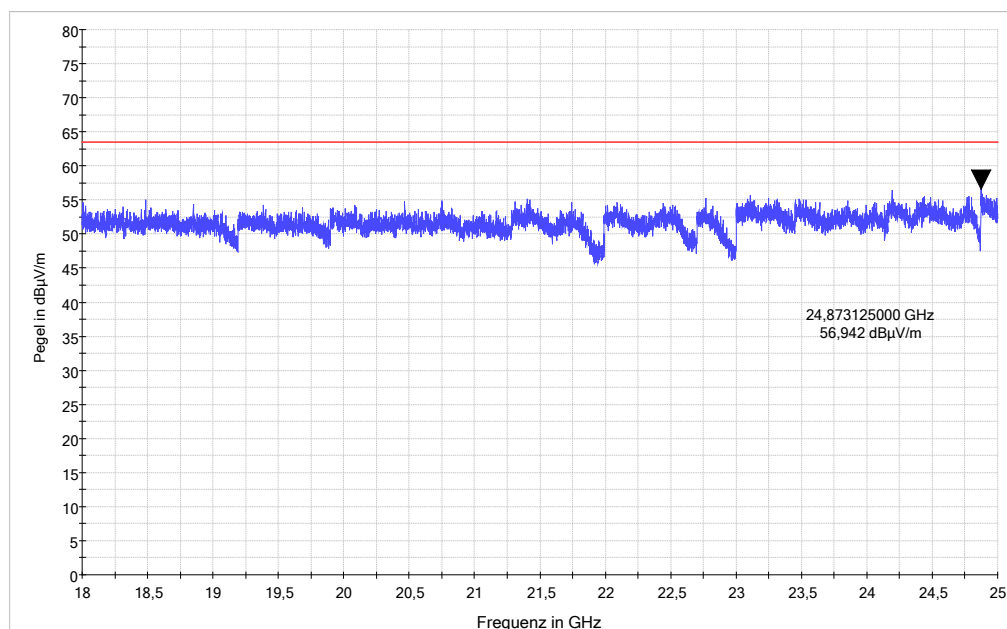
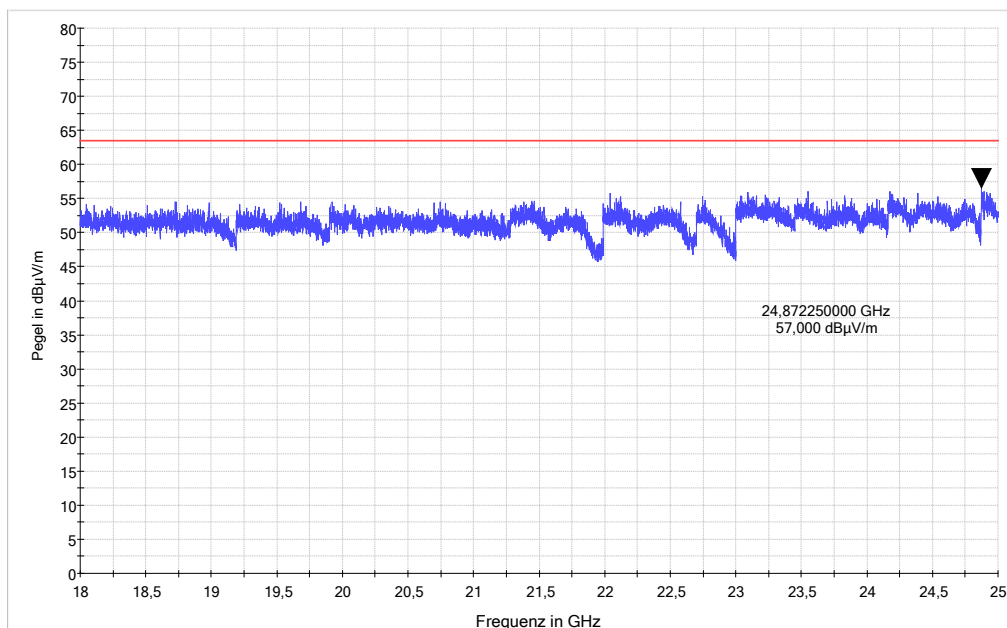




Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15.209 * Final_Result PK+



Preview Result 2V-AVG Preview Result 1V-PK+ Preview Result 2H-AVG
Preview Result 1H-PK+ FCC 15.209 (1m) PK FCC 15.209 (1m)
* Final_Result PK+ ♦ Final_Result AVG



10 Revision History

Revision History			
<i>Edition</i>	<i>Date</i>	<i>Issued by</i>	<i>Modifications</i>
1	2017-08-28	M. Steindl	First Edition
2	2017-09-11	M. Steindl (lc)	Correction of type designation