

# Test Report

Report Number:

**F231570E4**

Equipment under Test (EUT):

**NB-IoT modem inside ZONESCAN AI Leak Logger**

Applicant:

**Gutermann Technology GmbH**

Manufacturer:

**Gutermann Technology GmbH**



Deutsche  
Akkreditierungsstelle  
D-PL-17186-01-00

## References

- [1] **ANSI C63.26-2015** American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
- [2] **CFR 47 Part 2** Frequency allocations and radio treaty matters; General rules and regulations
- [3] **CFR 47 Part 22** Public mobile services, Subpart H – Cellular Radiotelephone service
- [4] **CFR 47 Part 24** Public mobile services, Subpart E – Broadband PCS
- [5] **CFR 47 Part 27** Miscellaneous wireless communications services
- [6] **RSS-130 Issue 2** Equipment Operating in the Frequency Bands 617 - 652 MHz, 663 - 698 MHz, 698 - 756 MHz and 777 - 787 MHz
- [7] **RSS-199 Issue 4** Broadband Radio Service (BRS) Equipment Operating in the Band 2500-2690 MHz
- [8] **RSS-133 Issue 6** 2 GHz Personal Communication Services
- [9] **RSS-139 Issue 4** Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710 - 1780 MHz and 2110 - 2180 MHz

## Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.

“Passed” indicates that the equipment under test conforms with the relevant limits of the testing standard without taking any measurement uncertainty into account as stated in clause 10.2.8.2 of ANSI C63.4 (2014). However, the measurement uncertainty is calculated and shown in this test report.

Tested and written  
by:

---

Signature

Reviewed and  
approved by:

---

Signature

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The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

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# 1 Identification

## 1.1 Applicant

Name:	Gutermann Technology GmbH
Address:	Gottlieb Daimler Str. 10, 88214 Ravensburg
Country:	Germany
Name for contact purposes:	Mr. Carles ESTELLERS CASAS
Phone:	+49 751 35 90 16 - 89
eMail address:	carles.estellers@gutermann-water.com
Applicant represented during the test by the following person:	None

## 1.2 Manufacturer

Name:	Gutermann Technology GmbH
Address:	Gottlieb Daimler Str. 10, 88214 Ravensburg
Country:	Germany
Name for contact purposes:	Mr. Carles ESTELLERS CASAS
Phone:	+49 751 35 90 16 - 89
eMail address:	carles.estellers@gutermann-water.com
Manufacturer represented during the test by the following person:	None

## 1.3 Test Laboratory

The tests were carried out by: **PHOENIX TESTLAB GmbH**  
**Königswinkel 10**  
**32825 Blomberg**  
**Germany**

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkKS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-05 and D-PL-17186-01-06, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

#### 1.4 EUT (Equipment under Test)

Type of equipment: *	NB-IoT modem
Type / PMN: *	ZSAI Modem
Product number: *	NA
FCC ID: *	ZSS-ZSAIBC660K
IC certification number: *	9789A-ZSAIBC660K
HVIN (Hardware Version Identification Number): *	GTBC660K
FVIN (Firmware Version Identification Number): *	NBR01AI01
HMN (Host Marketing Name)	ZSNB-L20
EUT marking:	NA

\* Declared by the applicant

	EUT number		
	1	2	3
Serial number: *	MPY23IE19029979		-
PCB identifier: *	NA		-
IMEI	863663063363726		
Host S/N	500000064		
Hardware version: *	R1.0		-
Software version: *	BC660KGLAAR01A03		-

\* Declared by the applicant

1 EUT was used for the tests.

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

## 1.5 Technical Data of Equipment

EUT						
Manufacturer:	Quectel					
Model name: *	BC660K-GL					
Power supply module: *	by host					
Supply voltage module: *	U <sub>nom</sub> =	NA	U <sub>min</sub> =	NA	U <sub>max</sub> =	NA
Serial Number: *	MPY23IE19029979					
IMEI: *	863663063363726					
Supported bands: *	2G: None		3G: None		LTE NB-IoT: 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 18, 19, 20, 25, 28, 66, 70, 85	
Max. output power: *	LTE (max. 25.7 dBm)					
Antenna type: *	External monopole antenna					
Gain: * (max) (On a 10 cm x 10 cm groundplane with ANT-BASE-06)	ANT-ROD-30 (Bands 1, 2, 3, 4, 25, 66, 70) 1.4 dBi @ 1695 MHz -0.2 dBi @ 1845 MHz -2.15 dBi @ 1980 MHz					
	ANT-ROD-65 (Band 8) -2.3 dBd @ 880 MHz -2.5 dBd @ 897 MHz -3.4 dBd @ 915 MHz					
	ANT-ROD-76 (Bands 5, 18, 19, 20) -3.0 dBd @ 814 MHz -3.0 dBd @ 838 MHz -2.3 dBd @ 862 MHz					
	ANT-ROD-90 (Bands 12, 13, 17, 28, 85) -2.8 dBd @ 698 MHz -1.8 dBd @ 743 MHz -3.4 dBd @ 787 MHz					
Antenna type: *	ANT-ZS-FLEX-30 (Band 1, 2, 3, 4, 25, 66, 70): -4.2 dBi @ 1695 MHz -3.3 dBi @ 1845 MHz -5.2 dBi @ 1980 MHz					
	ANT-ZS-FLEX-65 (Band 8) -4.2 dBd @ 880 MHz -4.4 dBd @ 897.5 MHz -5.1 dBd @ 915 MHz					
	ANT-ZS-FLEX-76 (Band 5, 18, 19, 20, 26): -5.3 dBd @ 814 MHz -5.8 dBd @ 838 MHz -4.8 dBd @ 862 MHz					
	ANT-ZS-FLEX-90 (Band 12, 13, 17, 28, 85): -3.1 dBd @ 698 MHz -5.6 dBd @ 743 MHz -5.6 dBd @ 787 MHz					

Host	
Power supply: *	Battery powered
Supply voltage: *	U = 3.6 V
Temperature range: *	-30 °C to +70 °C
Highest internal clock / generated frequency: *	1915 MHz

\* Declared by the applicant

Ports / Connectors				
Identification			Length during test	Shielding (Yes / No)
	EUT	Ancillary		
Antenna / programming port	RP-SMA male	RP-SMA female	0.5 m	Yes

\*1 Provided by the laboratory

\*2 Provided by the applicant

Equipment used for testing	
Laptop PC: *1	Lenovo IdeaPad 3 15ITL6
Lenovo power adapter	ADLX65CLGE2A
-	-

\*1 Provided by the applicant

\*2 Provided by the laboratory

Ancillary equipment	
Programming jig *1	ZSAI-JIG20
-	-
-	-

\*1 Provided by the applicant

## 1.6 Dates

Date of receipt of test sample:	15.01.2024
Start of test:	22.01.2024
End of test:	29.01.2024



## 2 Operational States

The following states were defined as the operating conditions:

### **NB-IoT LTE band 5 (FDD)**

- Downlink channel UARFCN 2525 (881.5 MHz),
- Uplink channel UARFCN 20525 (836.5 MHz),
- BS-Power -85 dBm; Mobile-Power 23 dBm; Mode PRBS9.

### **NB-IoT LTE band 13 (FDD)**

- Downlink channel UARFCN 5278 (755.8 MHz),
- Uplink channel UARFCN 23278 (786.8 MHz),
- BS-Power -85 dBm; Mobile-Power 23 dBm; Mode PRBS9.

### **NB-IoT LTE band 25 (FDD)**

- Downlink channel UARFCN 8689 (1994.9 MHz),
- Uplink channel UARFCN 26689 (1914.9 MHz),
- BS-Power -85 dBm; Mobile-Power 23 dBm; Mode PRBS9.

### **NB-IoT LTE band 66 (FDD)**

- Downlink channel UARFCN 132671 (2199.9 MHz),
- Uplink channel UARFCN 67335 (1779.9 MHz),
- BS-Power -85 dBm; Mobile-Power 23 dBm; Mode PRBS9.

### **NB-IoT LTE band 85 (FDD)**

- Downlink channel UARFCN 70456 (737.0 MHz),
- Uplink channel UARFCN 134092 (707.0 MHz),
- BS-Power -85 dBm; Mobile-Power 23 dBm; Mode PRBS9.

The system was setup as follows:



**EUT Setup**

A GSM /LTE connection to the EUT was established by using a Wideband Communication Tester (CMW500). The EUT was connected wireless to the tester via a narrowband antenna.

Two types of antennas were used during testing:

Setup #1: Monopole antenna mounted separately to a rod and connected via a coaxial cable to the EUT.

Setup #2: Monopole antenna connected directly to the EUTs antenna port.

For both antennas antenna measurements were carried out. The patterns and maximum gains can be found in Annex D of this test report.

### 3 Additional Information

The applicant integrates in its device the already certified RF cellular module BC660K-GL (FCC ID: ZSS-ZSAIBC660K / IC: 9789A-ZSAIBC660K) with a change in the RF trace layout design.

Therefore, retesting of radiated spurious emissions has been requested to apply for a class 2 permissive change to add the trace design. The test report includes only worst-case test results for radiated emissions as ordered by the applicant.

Different rigid and Flexible antennas were used as described in the tables below.

Antenna \ Band	1	2	3	4	5	8	12	13	17	18	19	20	25	28	66	70	85
ANT-ROD-30	x	x	x	x									x		x	x	
ANT-ROD-65						x											
ANT-ROD-76					x					x	x	x					
ANT-ROD-90							x	x	x					x			x

Antenna \ Band	1	2	3	4	5	8	12	13	17	18	19	20	25	28	66	70	85
ANT-ZS-FLEX-30	x	x	x	x									x		x	x	
ANT-ZS-FLEX-65						x											
ANT-ZS-FLEX-76					x					x	x	x					
ANT-ZS-FLEX-90							x	x	x					x			x

During the tests, the module was not appropriately labelled with the correct FCC and IC IDs.



## 4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Parts 24 [4], 27 [5] ISED RSSs 130 [6], 133 [8], 139 [9], 199 [7]	Status	Refer page
Radiated spurious emissions	30 – to the 10 <sup>th</sup> harmonic	22.917 (a) (b) 24.238 (a) (b) 27.53 RSS130 / 4.7.1 RSS133 / 6.5 RSS 139 / 6.6 RSS 199 / 5.6	Passed	17 et seq.

### Test setups

The EUT is measured in the frequency range from 30 MHz to 26.5 GHz in a semi anechoic chamber with a metal ground plane, which has been validated to the requirements of ANSI C63.4. It is placed on a 3D-positioner to allow different positions at a distance of 3 meters from the receiving antenna. Both polarizations (vertical and horizontal) have been evaluated and the turn table has been turned to 360° to maximize the emissions. The receiving antenna is raised from 1 to 4 m.

The frequency range from 30 MHz to 18 GHz has been tested using the substitution method as described in [1], and the frequency range from 18 to 26.5 GHz has been tested using the field strength method [1]. The measured field strength using the field strength method is then converted to an ERP or EIRP [dBm] using the formula:

$E \text{ [dB}\mu\text{V/m]} = \text{EIRP [dBm]} - 20\log(d) + 104.8$  according to chapter 5.2.7 [1].

→  $\text{EIRP} = E - 95.25$  ( $d = 3 \text{ m}$  measuring distance)

$\text{ERP [dBm]} = \text{EIRP} - 2.15 \text{ dB}$

Level (dBm)  $\triangleq$  ERP (below 1GHz) or EIRP (above 1 GHz)

Procedure preliminary measurement:

The following procedure is used:

1. Set the measurement antenna to 1 m height.
2. Monitor the frequency range at vertical polarisation and a EUT azimuth of 0°.
3. Rotate the EUT by 360° to maximize the detected signals.
4. Repeat 1) to 2) with the horizontal polarisation of the measuring antenna.
5. Increase the height of the antenna for 0.5 m and repeat steps 2 – 4 until the final height of 4 m is reached.
6. The highest values for each frequency will be saved by the software, including the antenna height, measurement antenna polarization and turntable azimuth for that value.

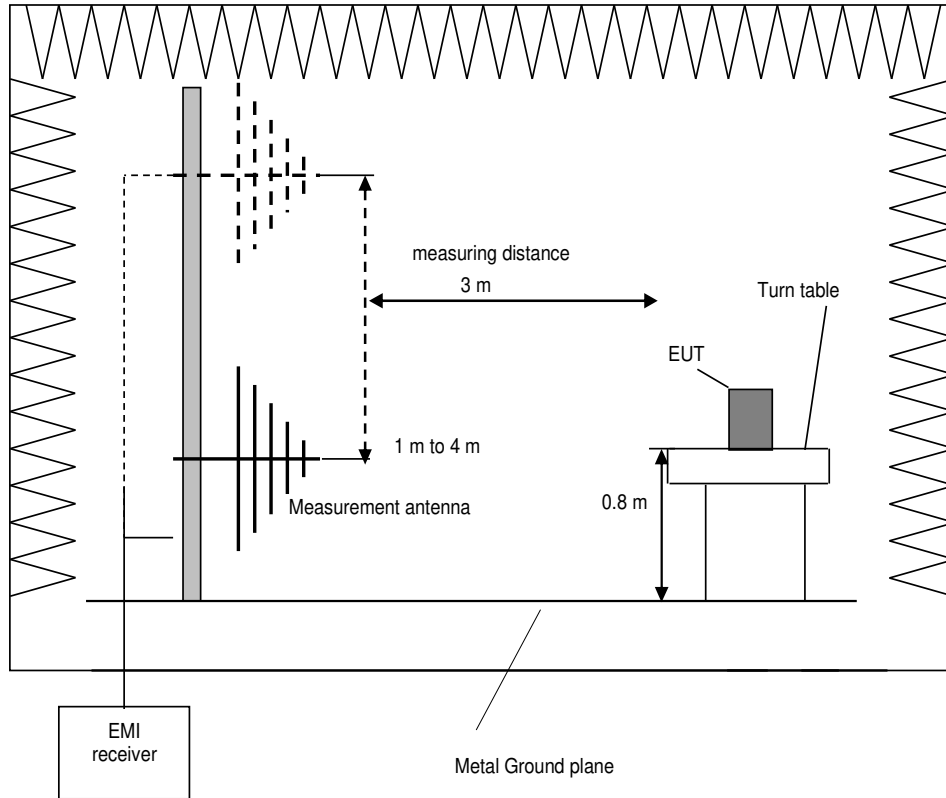
Procedure final measurement:

The following procedure is used:

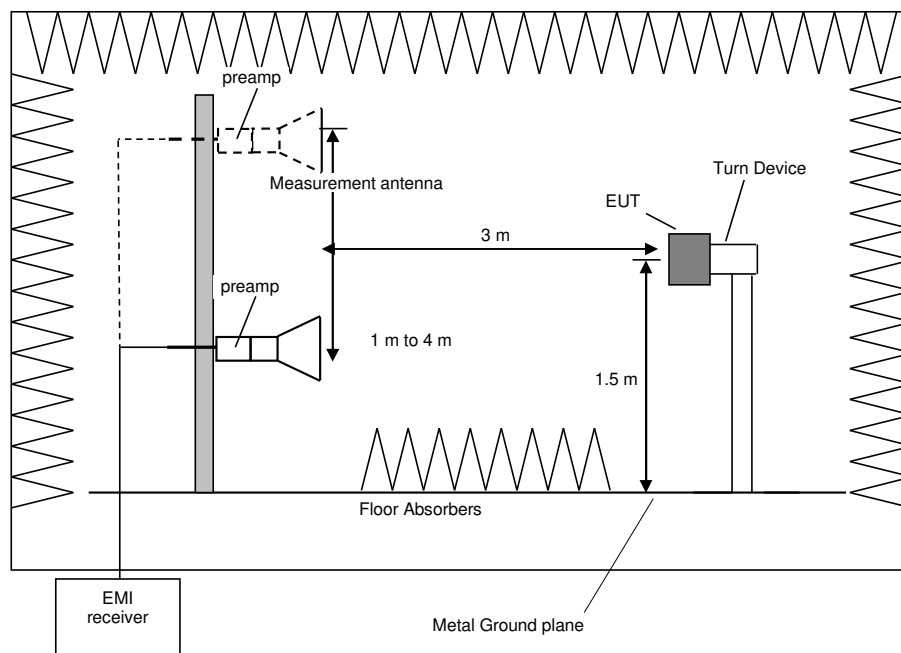
1. Select the highest frequency peaks to the limit for the final measurement.
2. The software will determine the exact peak frequencies by doing a partial scan with reduced RBW with  $\pm 10$  times the RBW of the pre-scan of the selected peaks.
3. If the EUT is portable or ceiling mounted, find the worst case EUT position (x, y, z) for the final test.
4. The worst measurement antenna height is found by the measurement software by varying the measurement antenna height by  $\pm 0.5$  m from the value obtained in the preliminary measurement, and to monitor the emission level.
5. The worst azimuth turntable position is found by varying the turntable azimuth by  $\pm 25^\circ$  from the value obtained in the preliminary measurement, and to monitor the emission level.
6. The final measurement is performed at the worst-case antenna height and the worst-case turntable azimuth
7. Steps 2 – 6 will be repeated for each frequency peak selected in step 1.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	100 kHz
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Test setup for measurements below 1 GHz



Test setup for measurements above 1 GHz

## 5 Results

### 5.1 Radiated emission measurement

#### 5.1.1 Radiated emissions - UE in traffic mode (NB-IoT band 5)

Ambient temperature:	22 °C
Relative humidity:	30 %

Date:	24-29.01.2024
Tested by:	Y. KHALEK

Measurement at uplink channel 20525:

Spurious emissions level								
Frequency (MHz)	MaxPeak (dBm)	Average (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
1053.0	-48.88	-	-13.0	35.88	1.0	1000	327	-
1140.5	-49.86	-	-13.0	36.86	1.0	1000	315	-
836.5	Uplink channel, no spurious							
881.5	Downlink channel, no spurious							

**Limit:** The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

This results into a limit of -13 dBm for all power levels of the UE.

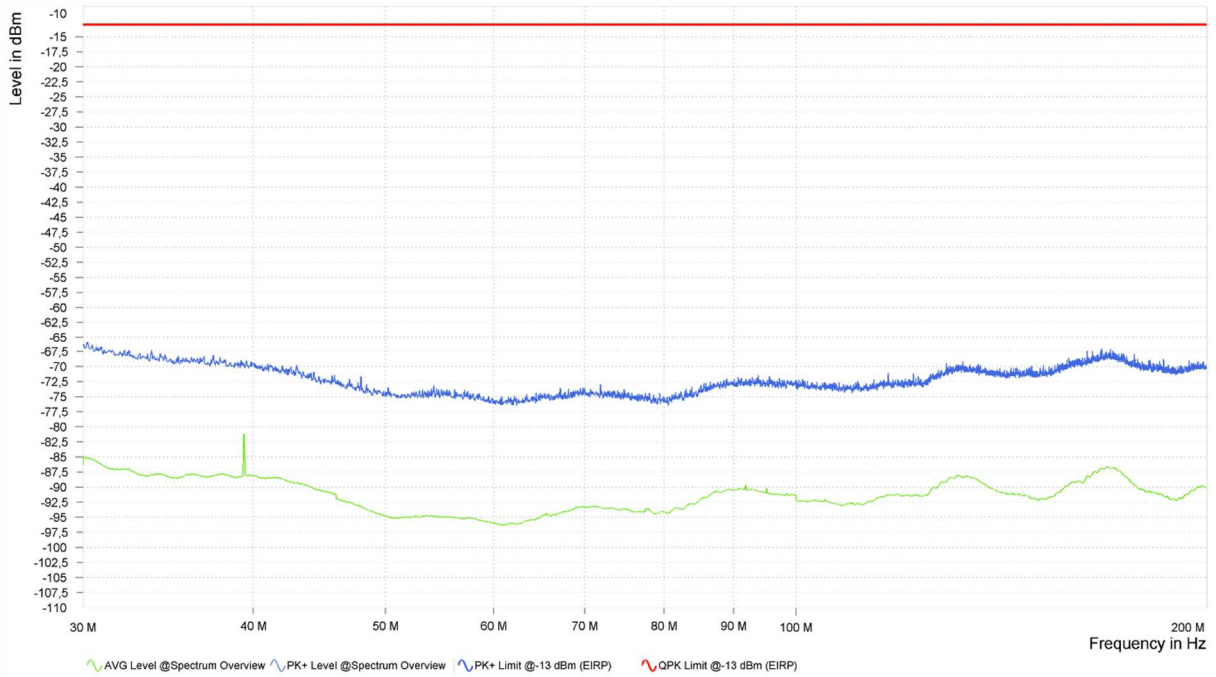
No significant frequencies were found during the spurious emission measurement.

Test equipment used (see chapter 6 for details):

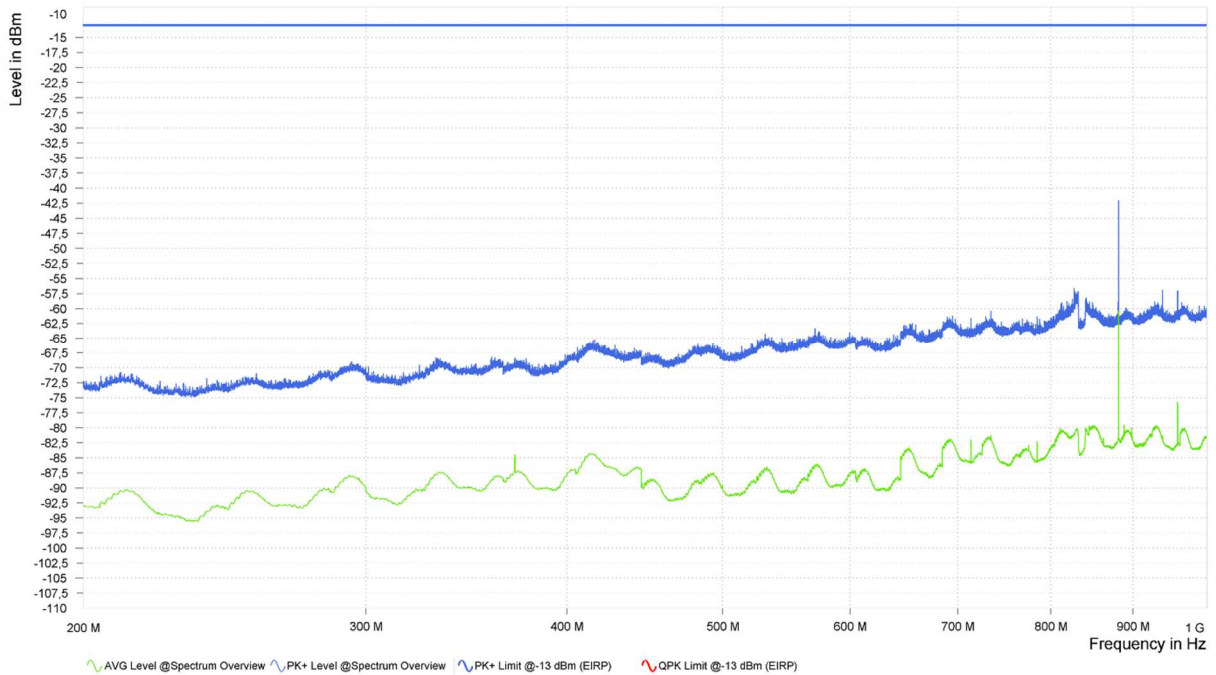
1-14, 18-28
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The measurement plots are shown in the following:

Setup 1# results:

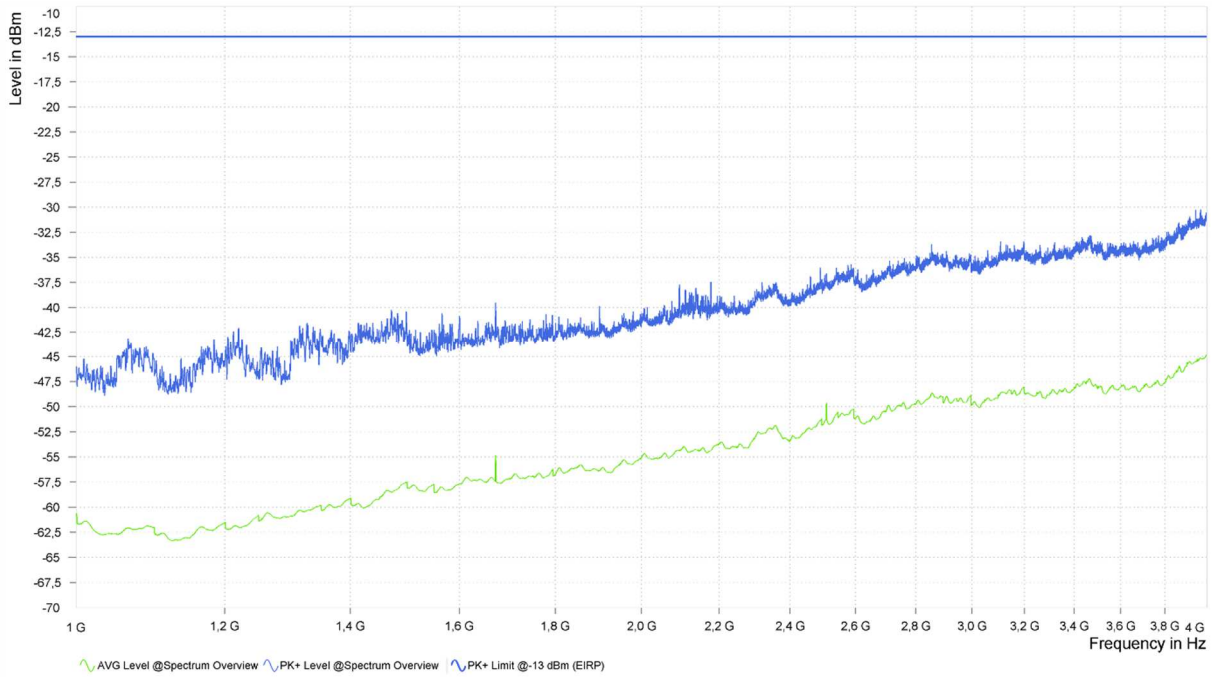


**Results 30 MHz to 200 MHz**

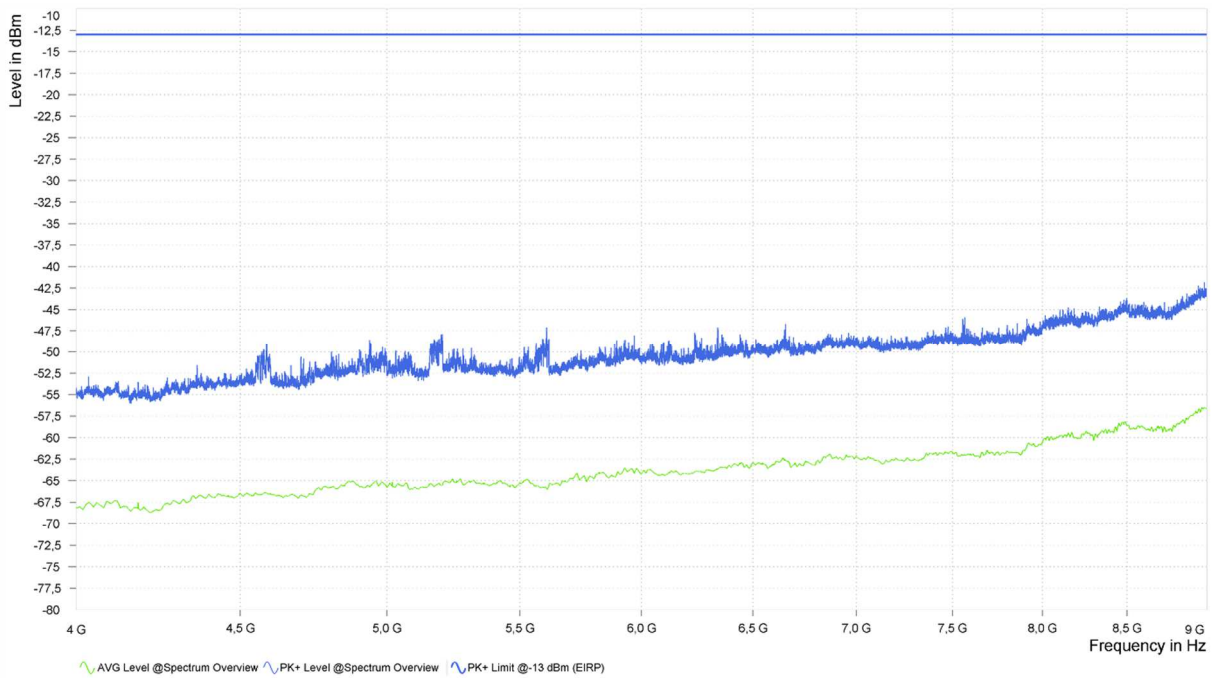


**Results 200 MHz to 1 GHz (uplink channel notched)**



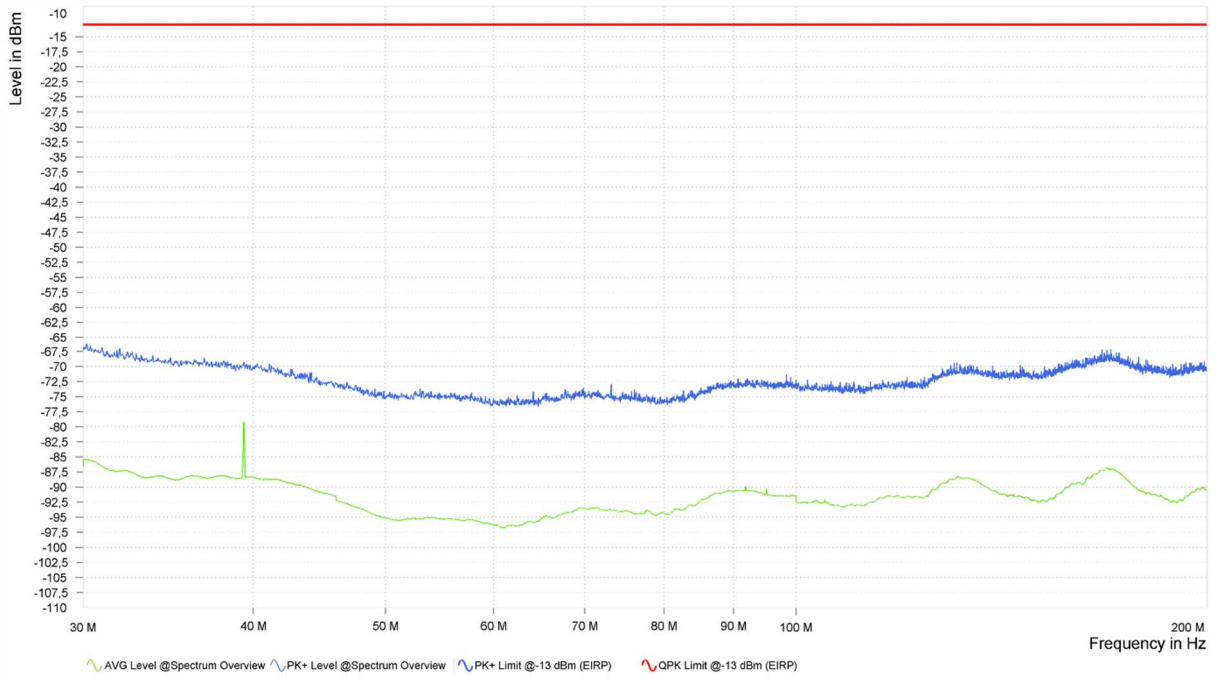


**Results 1 GHz to 4 GHz**

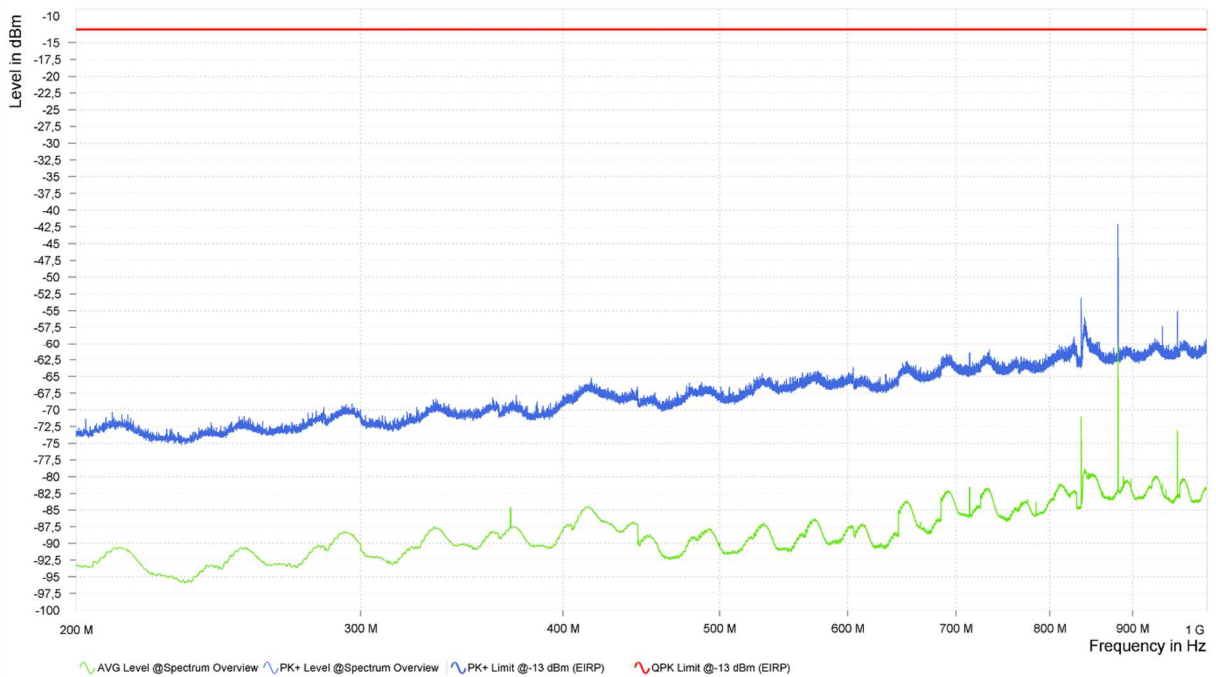


**Results 4 GHz to 9 GHz**

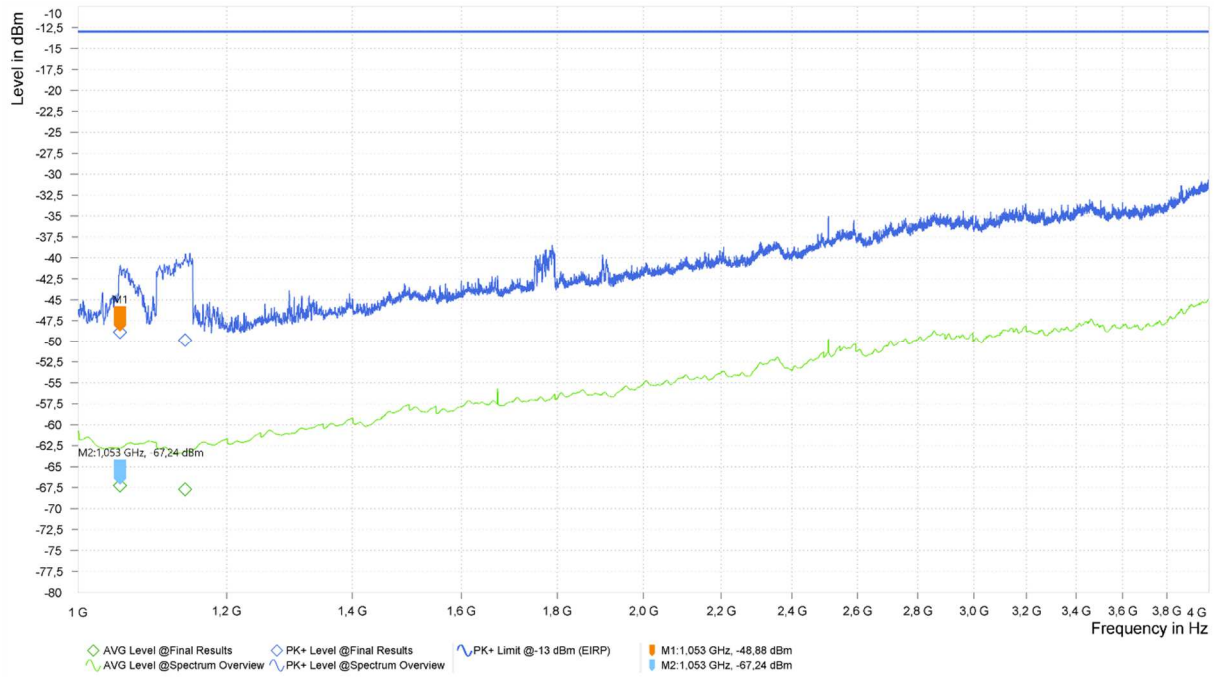
Setup 2# results:



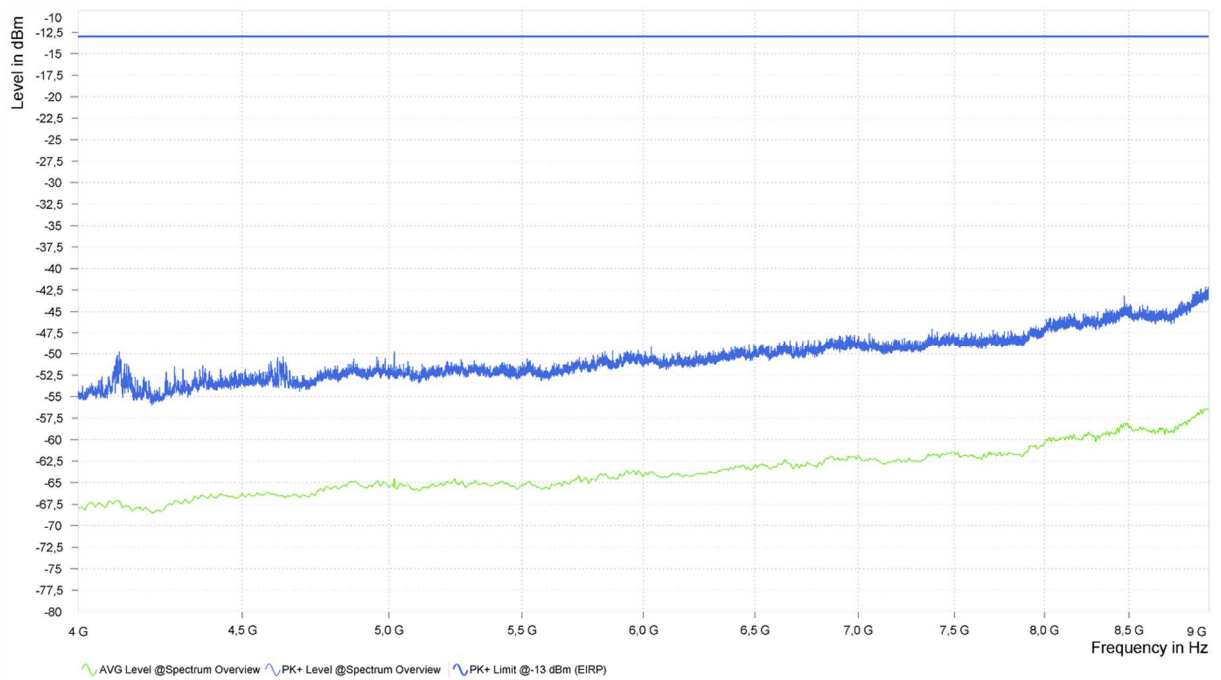
**Results 30 MHz to 200 MHz**



**Results 200 MHz to 1 GHz (uplink channel notched)**



### Results 1 GHz to 4 GHz



### Results 4 GHz to 9 GHz

### 5.1.2 Radiated emissions - UE in traffic mode (NB-IoT band 13)

Ambient temperature:	22-23 °C
Relative humidity:	30-34 %

Date:	24-27.01.2024
Tested by:	Y. KHALEK

Measurement at uplink channel 23278:

Spurious emissions level								
Frequency (MHz)	MaxPeak (dBm)	Average (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
786.8	Uplink channel, no spurious							
755.8	Downlink channel, no spurious							

Limit: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

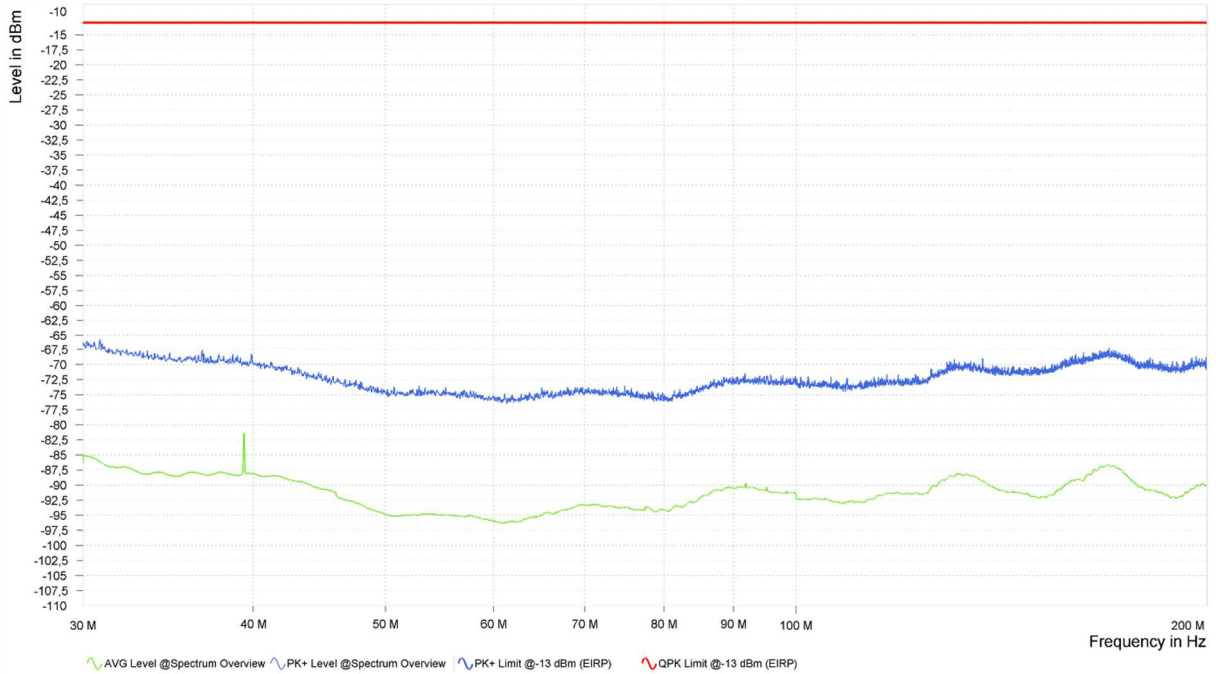
This results into a limit of -13 dBm for all power levels of the UE.

Test equipment used (see chapter 6 for details):

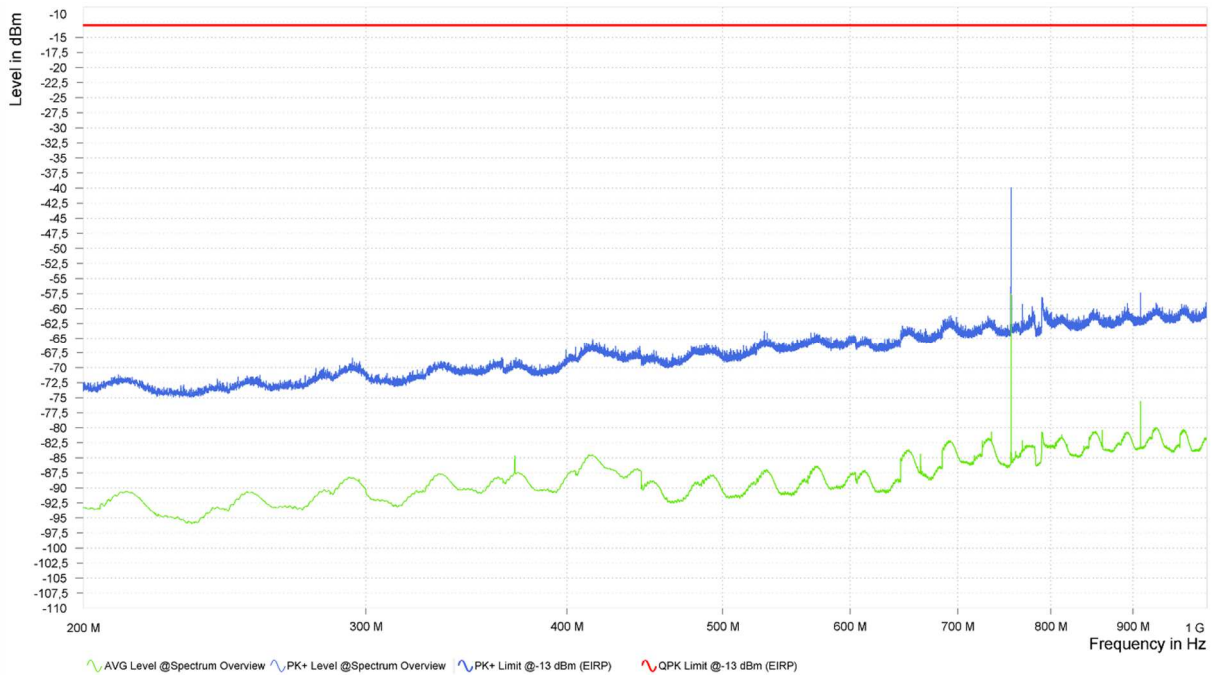
1-14, 18-28
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The measurement plots are shown in the following:

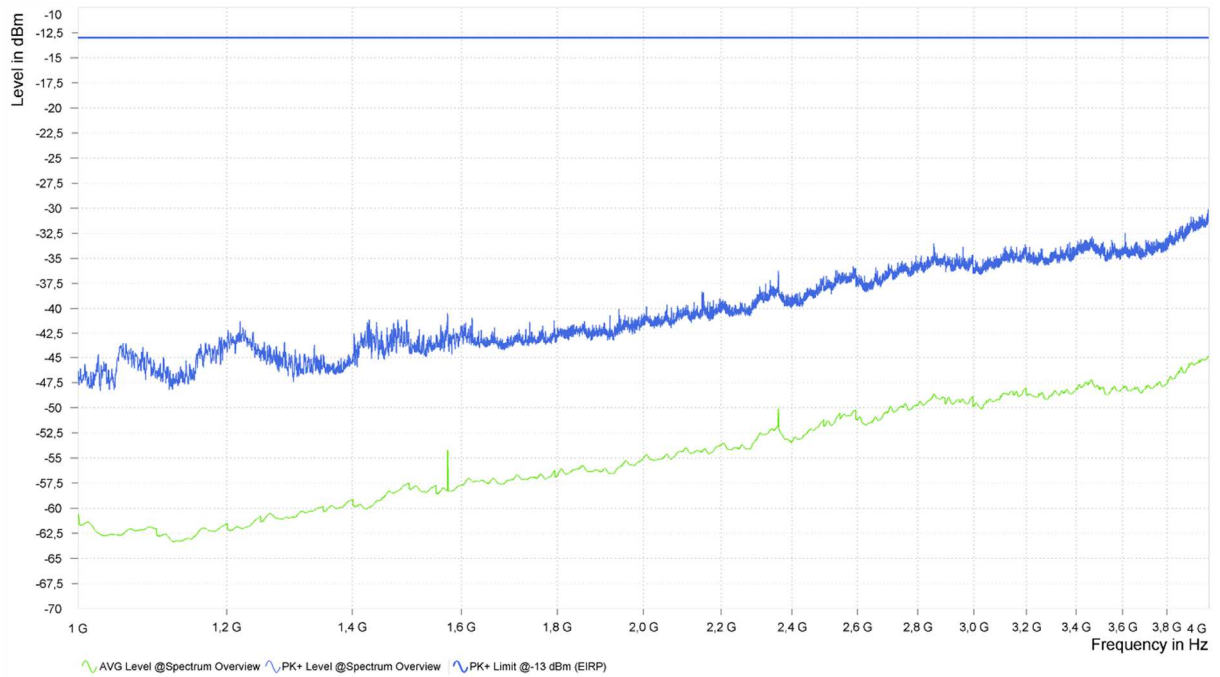
Setup 1# results:



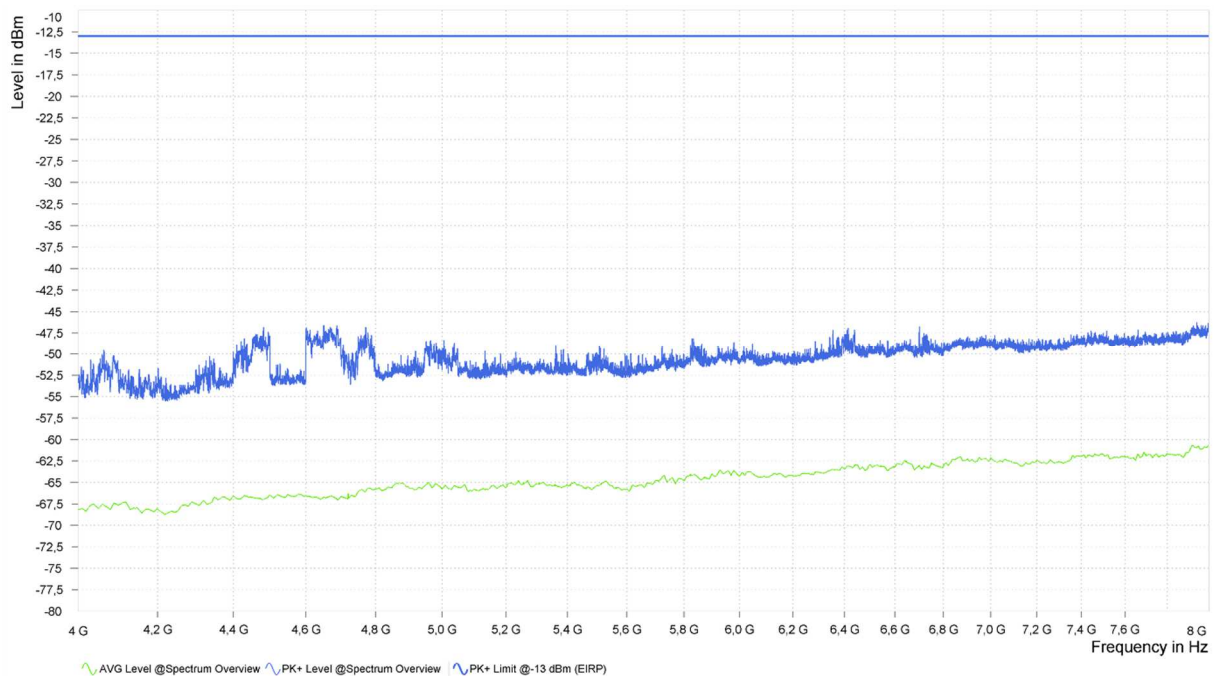
Results 30 MHz to 200 MHz



Results 200 MHz to 1 GHz (uplink channel notched)

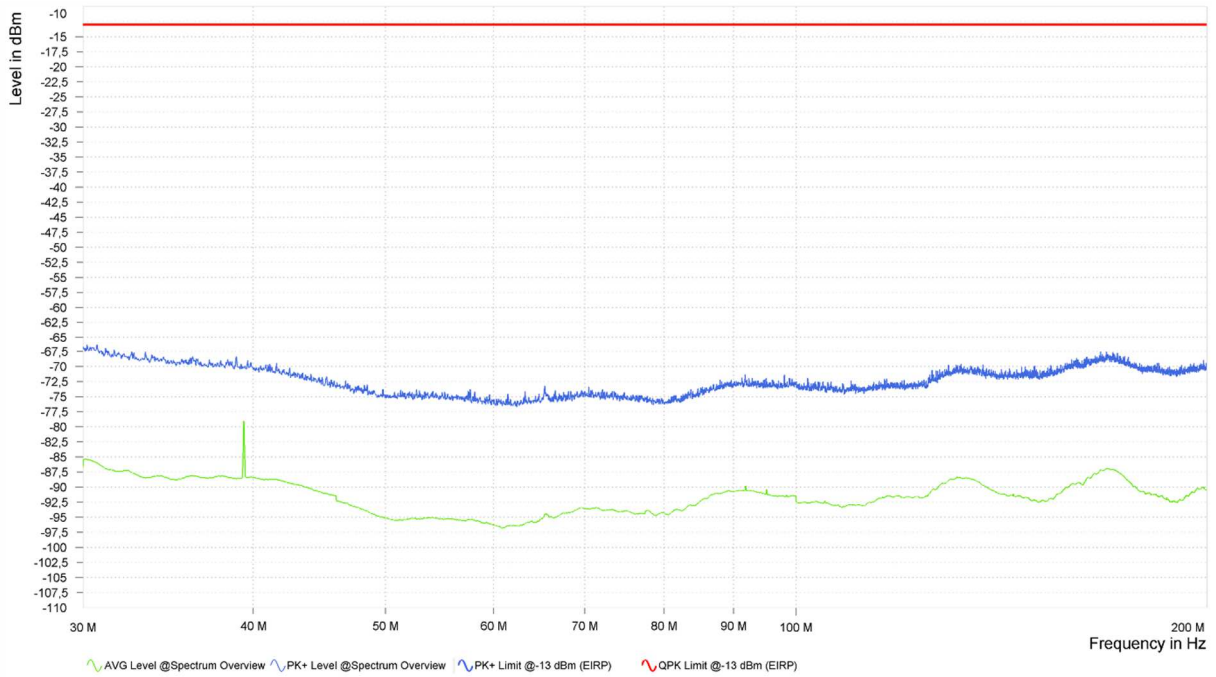


**Results 1 to 4 GHz**

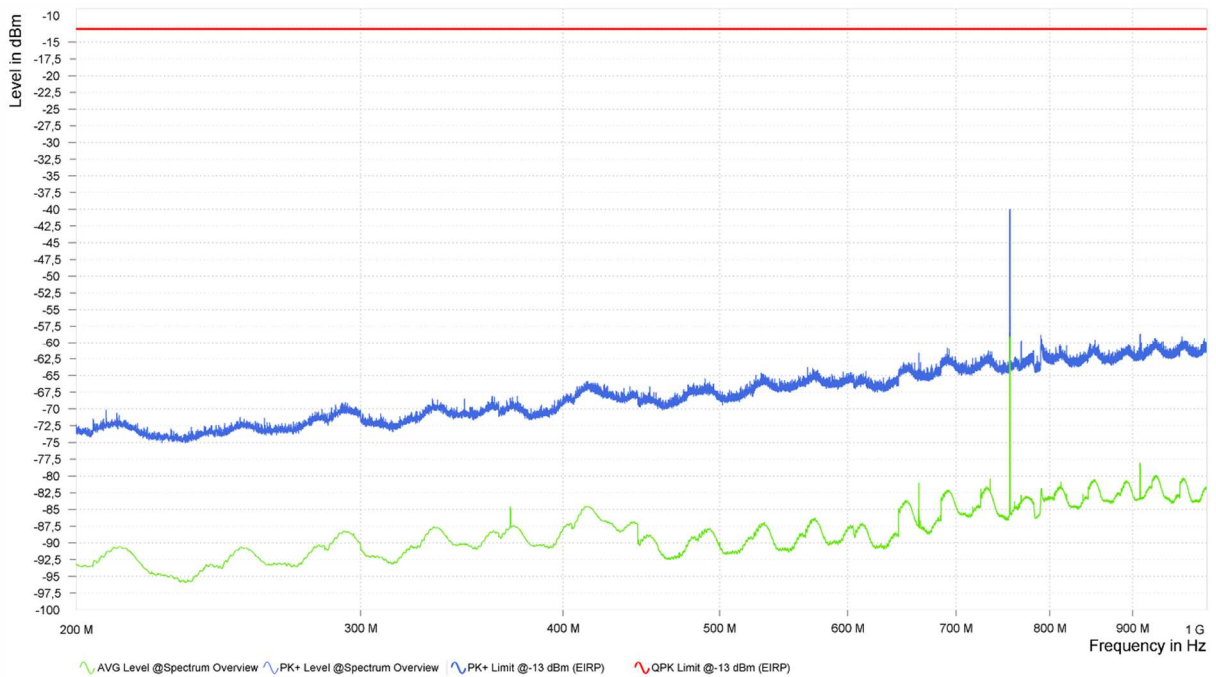


**Results 4 to 8 GHz**

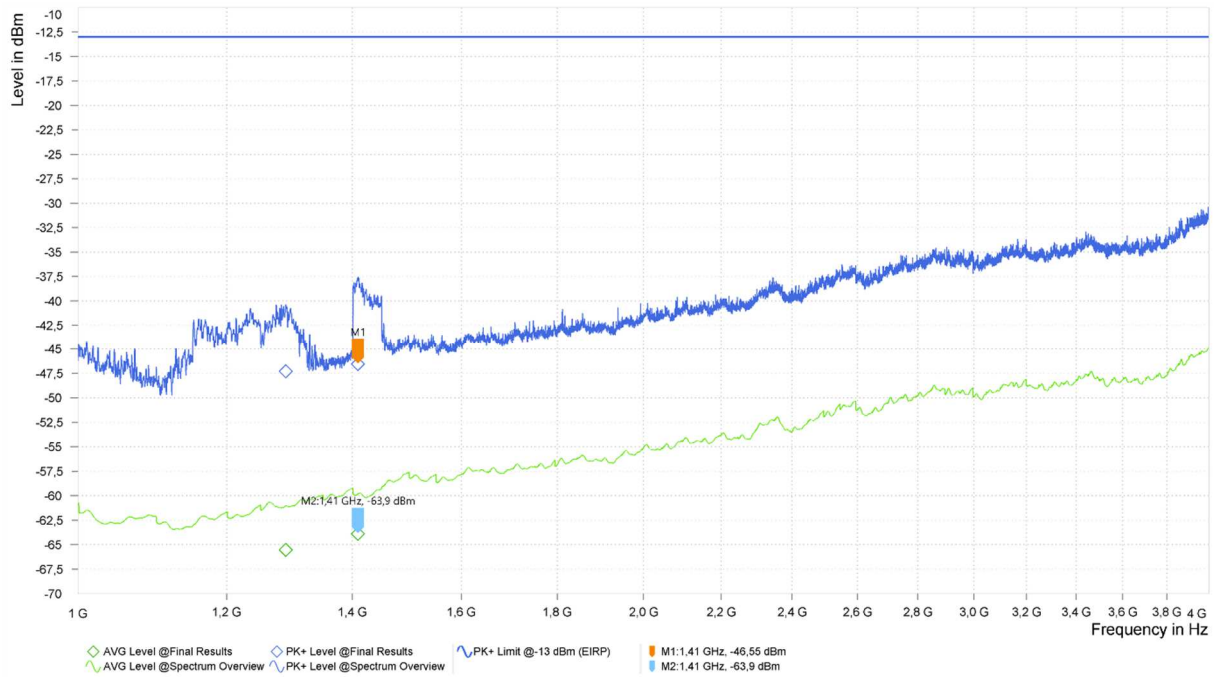
Setup 2# results:



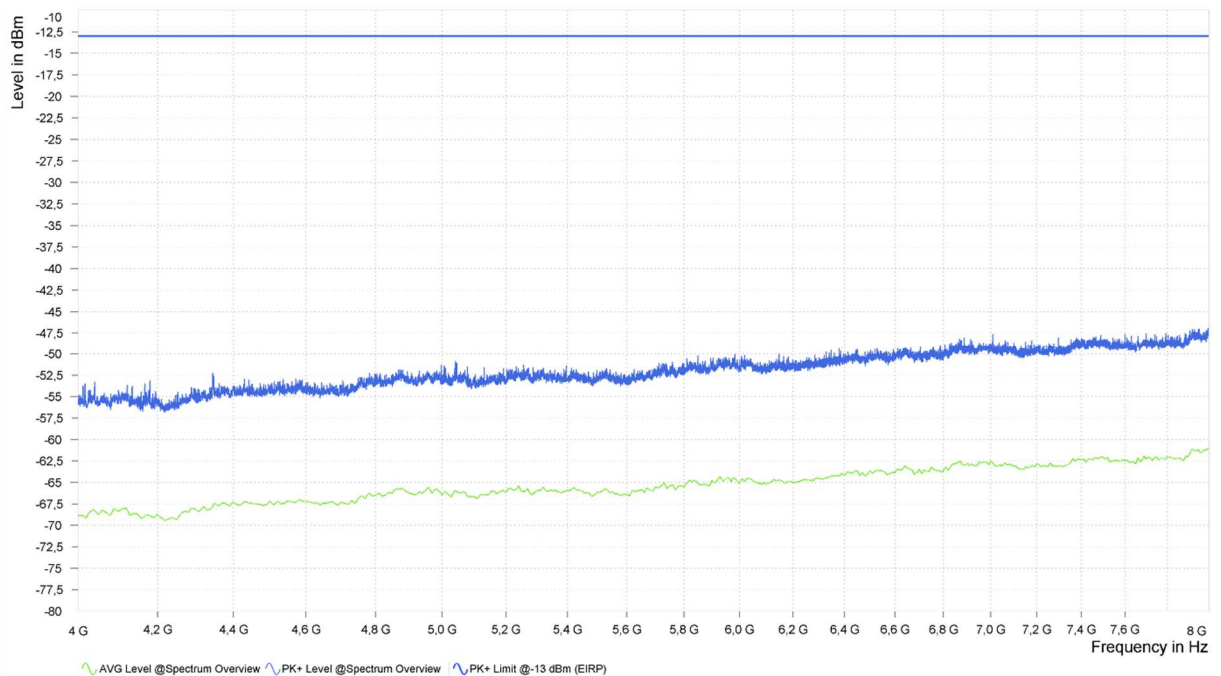
**Results 30 MHz to 200 MHz**



**Results 200 MHz to 1 GHz (uplink channel notched)**



### Results 1 to 4 GHz



### Results 4 to 8 GHz



### 5.1.3 Radiated emissions - UE in traffic mode (NB-IoT band 25)

Ambient temperature:	22 °C
Relative humidity:	30 %

Date:	24-29.01.2024
Tested by:	Y. KHALEK

Measurement at uplink channel 26689:

Spurious emissions level								
Frequency (MHz)	MaxPeak (dBm)	Average (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
1914.9	Uplink channel, no spurious							
1994.9	Downlink channel, no spurious							

Limit: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB [1].

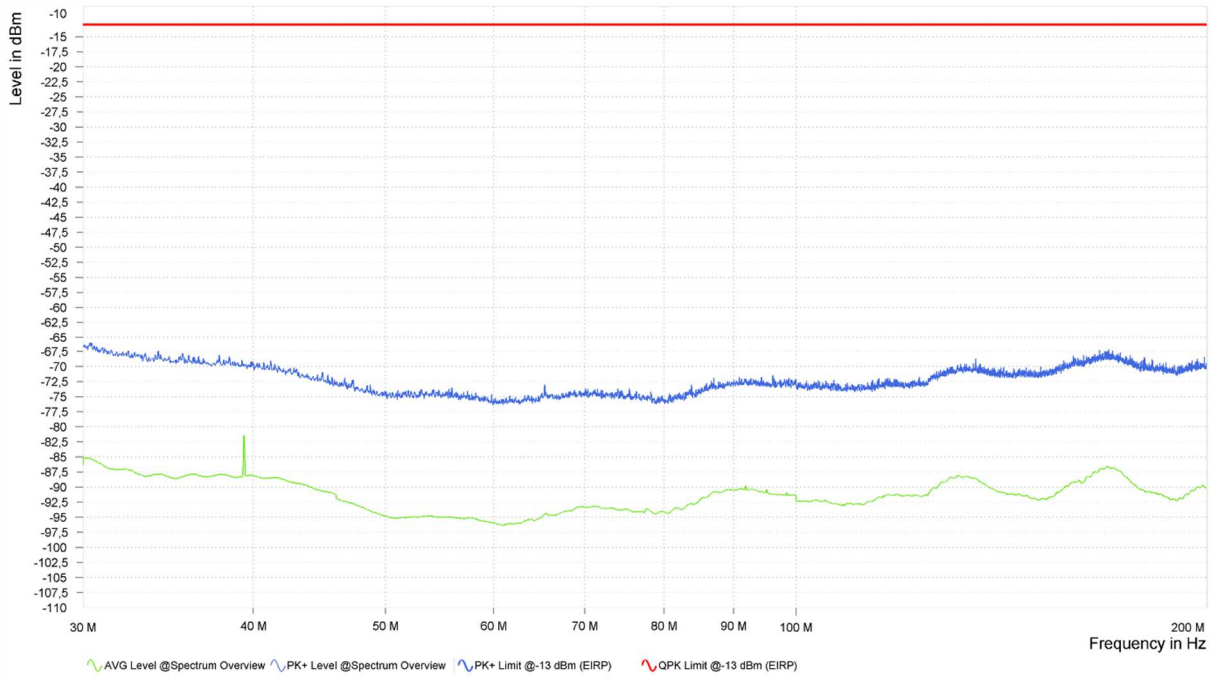
This results into a limit of -13 dBm for all power levels of the UE.

Test equipment used (see chapter 6 for details):

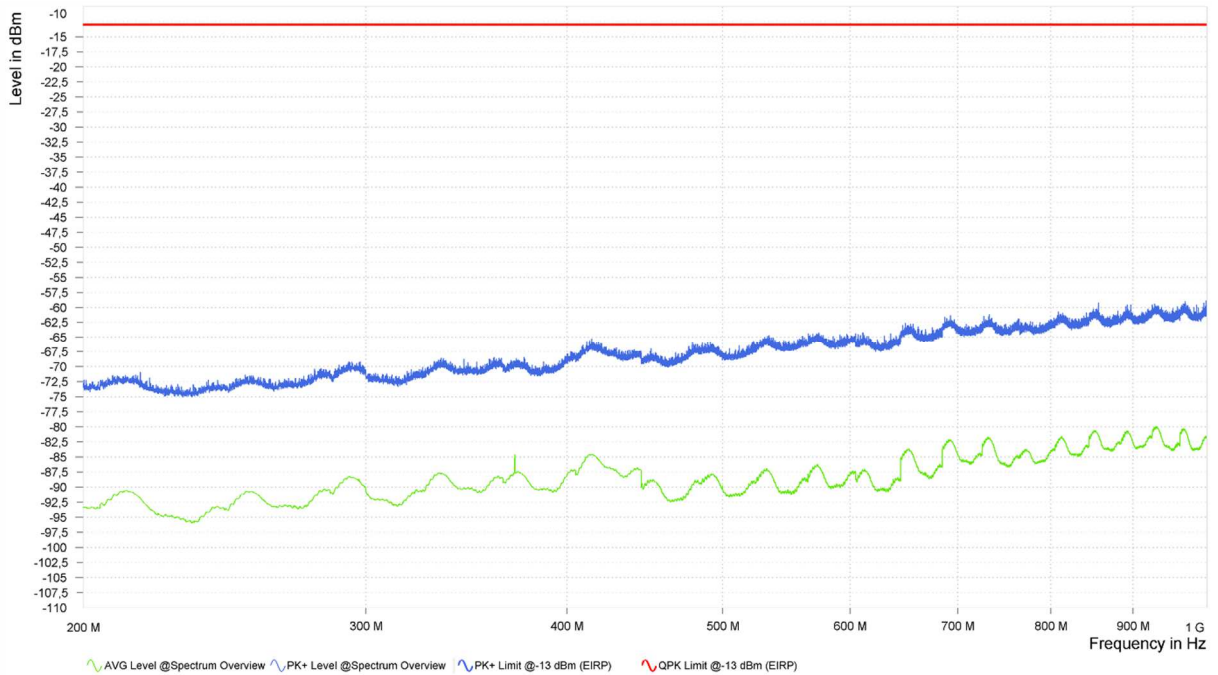
1-14, 18-27, 29
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The measurement plots are shown in the following:

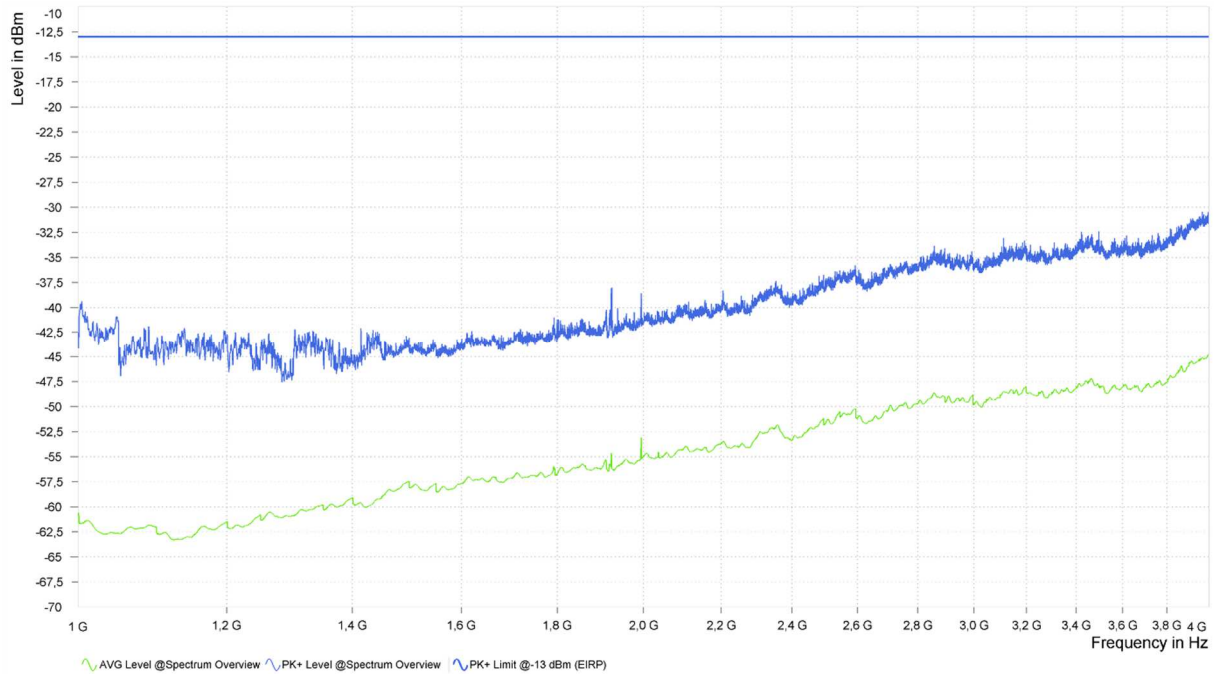
Setup 1# results:



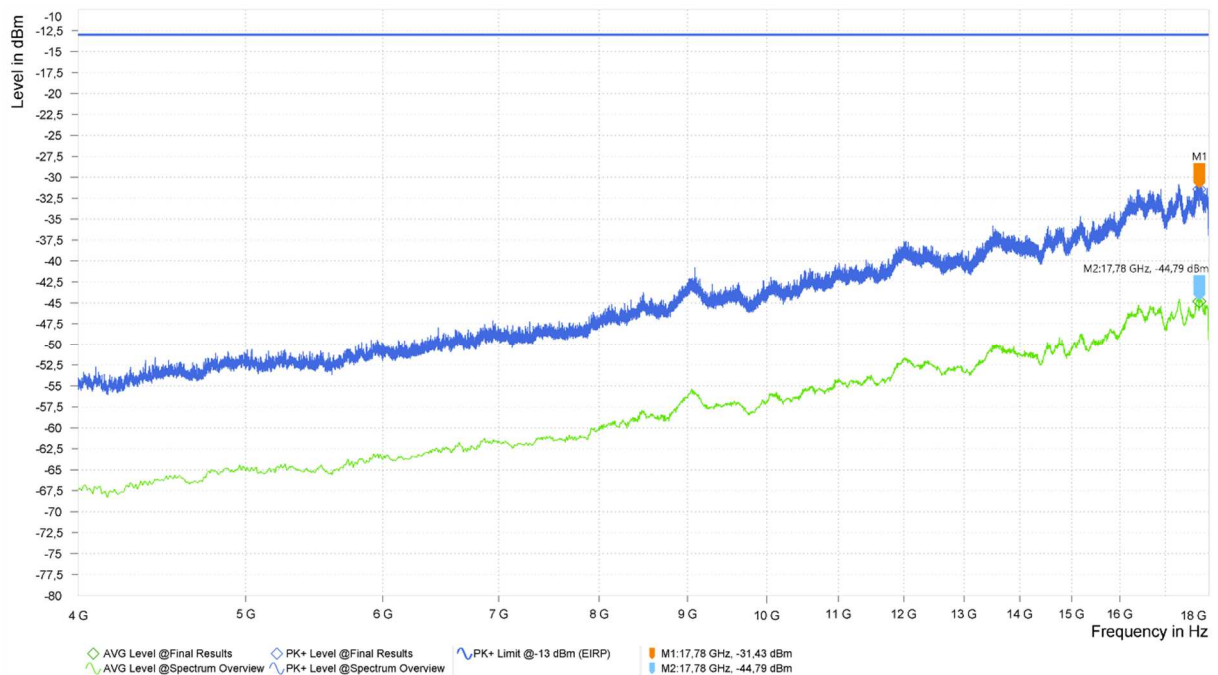
**Results 30M to 200 MHz**



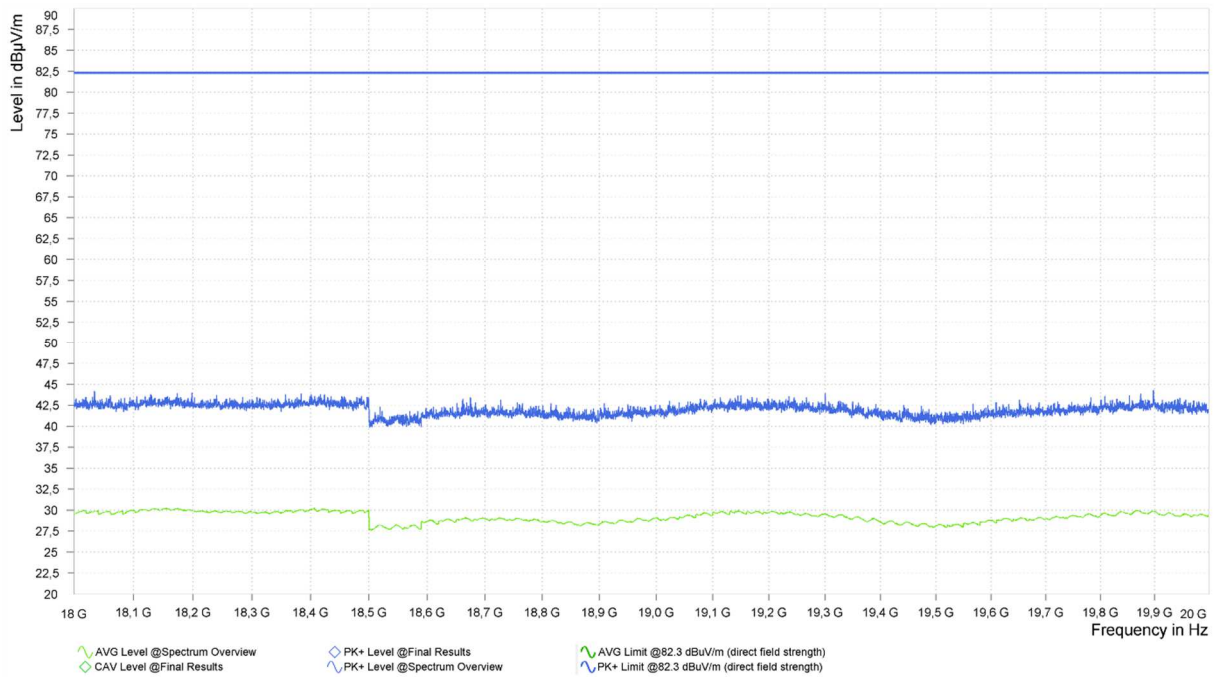
**Results 200 MHz to 1 GHz**



**Results 1 to 4 GHz (uplink channel notched)**

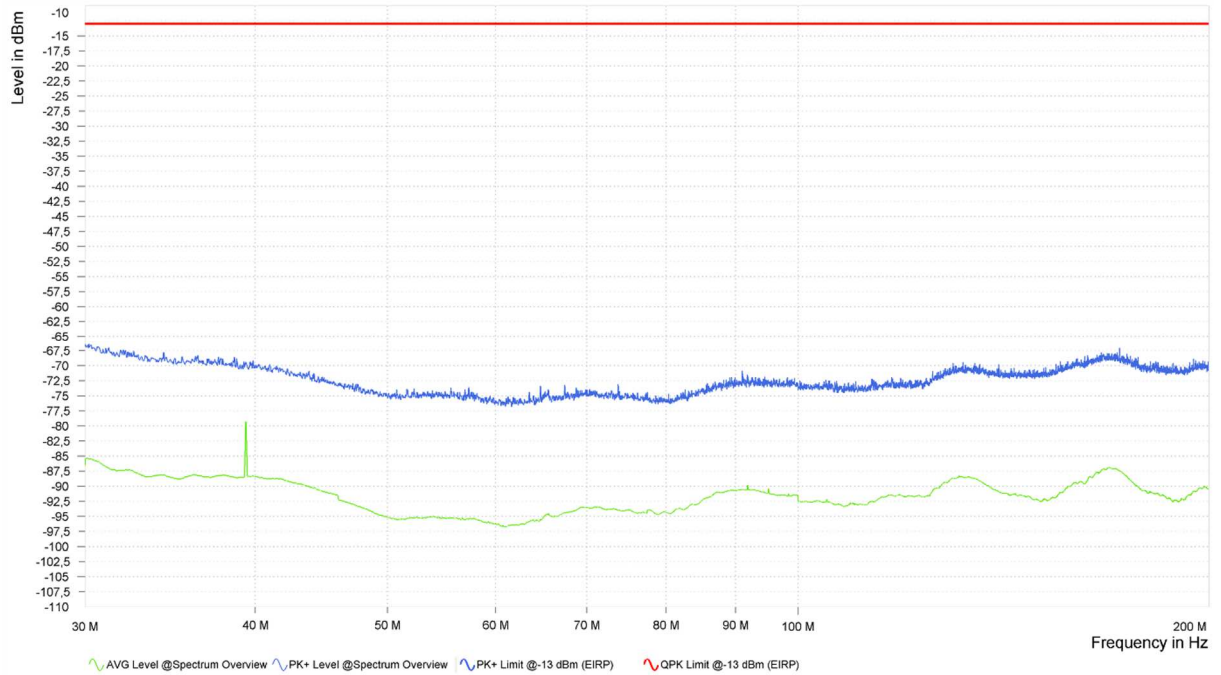


**Results 4 to 18 GHz**

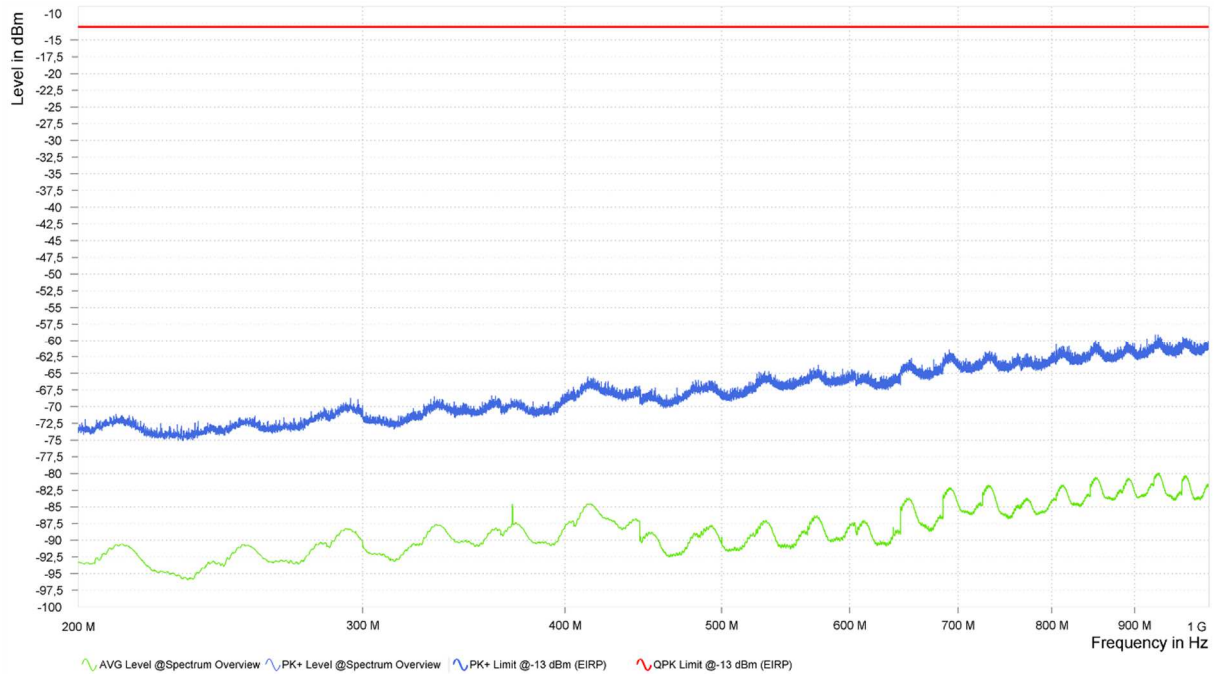


### Results 18 to 20 GHz

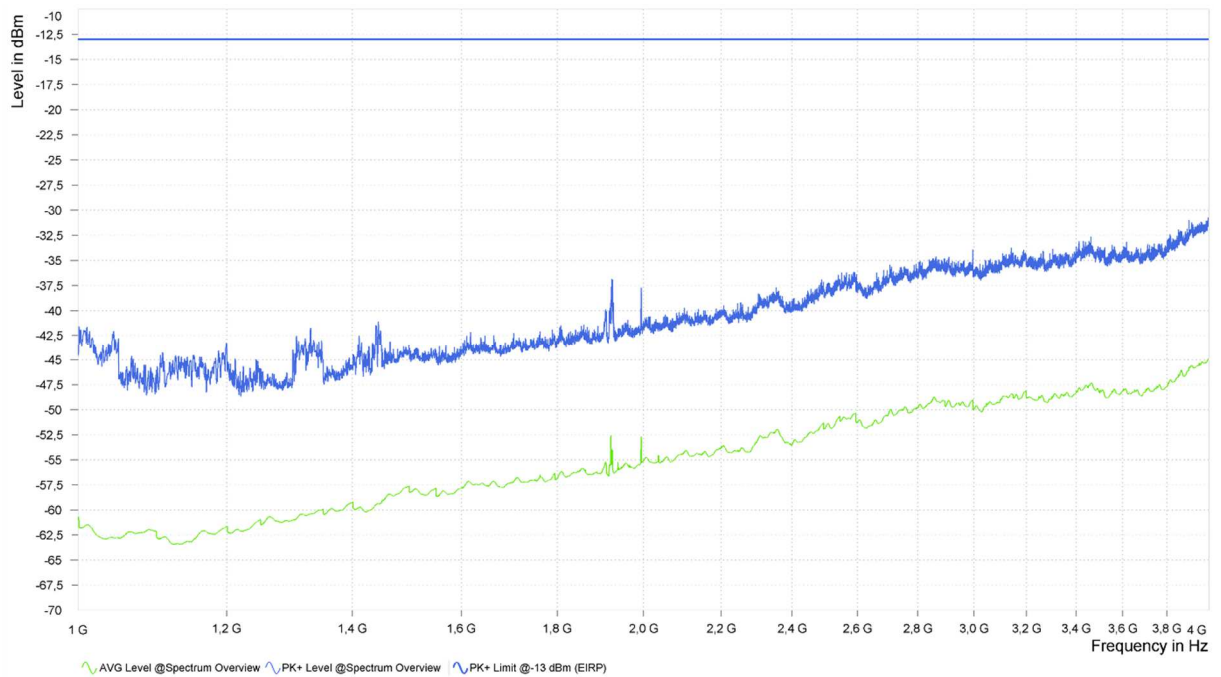
Setup 2# results:



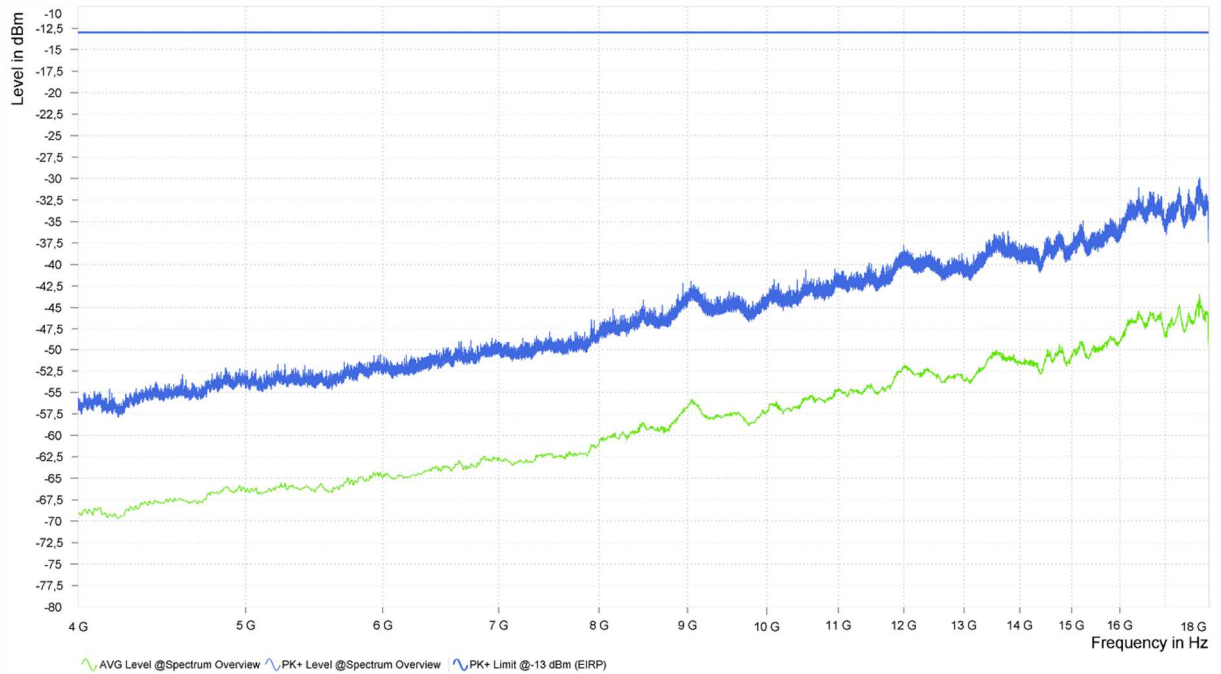
### Results 30M to 200 MHz



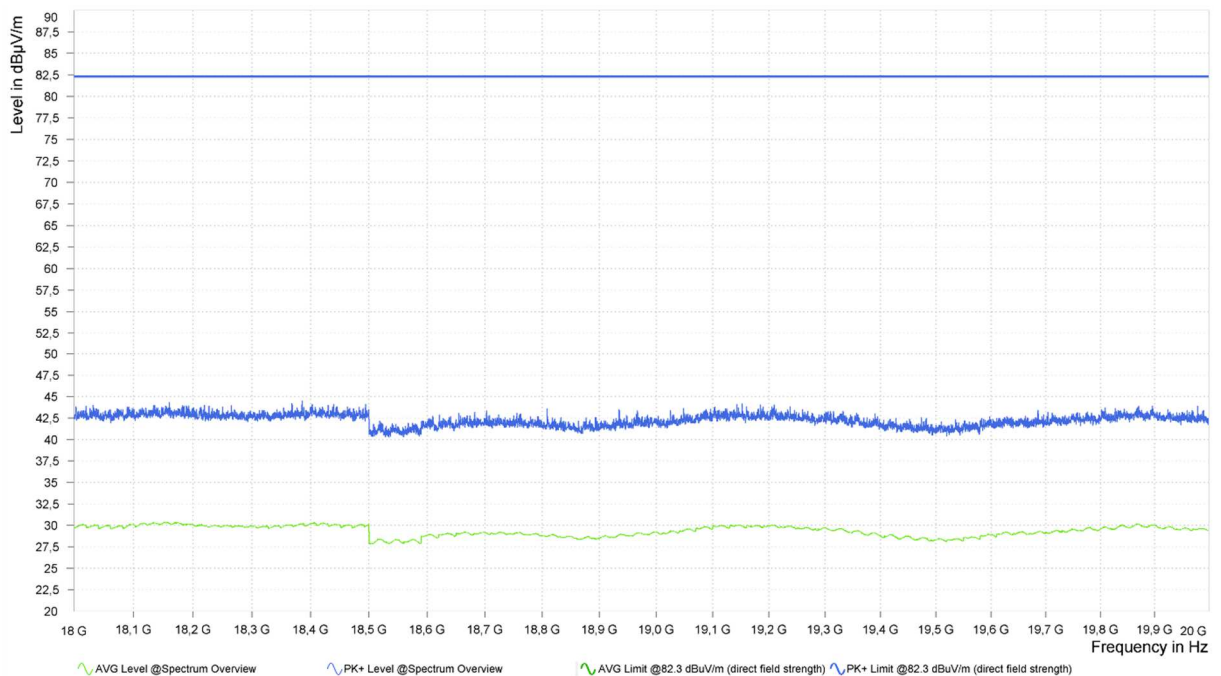
**Results 200 MHz to 1 GHz**



**Results 1 to 4 GHz (uplink channel notched)**



**Results 4 to 18 GHz**



**Results 18 to 20 GHz**

#### 5.1.4 Radiated emissions - UE in traffic mode (NB-IoT band 66)

Ambient temperature:	22 °C
Relative humidity:	30 %

Date:	23-27.01.2024
Tested by:	Y. KHALEK

Measurement at uplink channel 132671:

Spurious emissions level								
Frequency (MHz)	MaxPeak (dBm)	Average (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
1779.9	Uplink channel, no spurious							
2199.9	Downlink channel, no spurious							

Limit: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

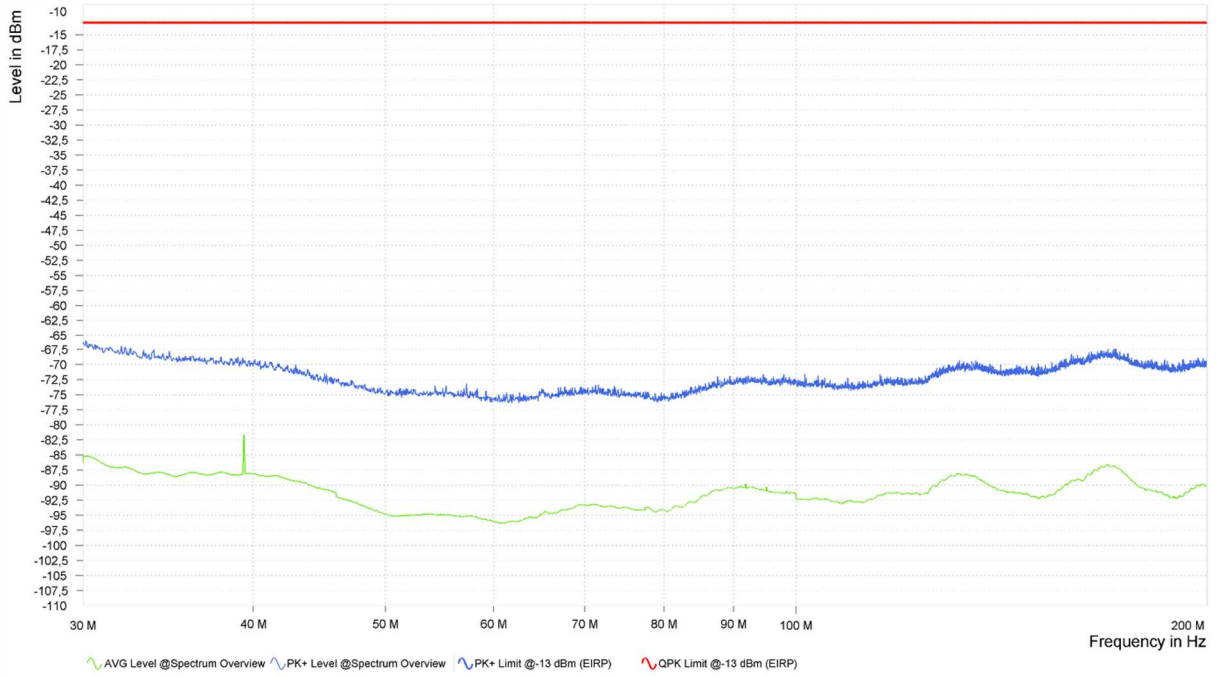
This results into a limit of -13 dBm for all power levels of the UE.

Test equipment used (see chapter 6 for details):

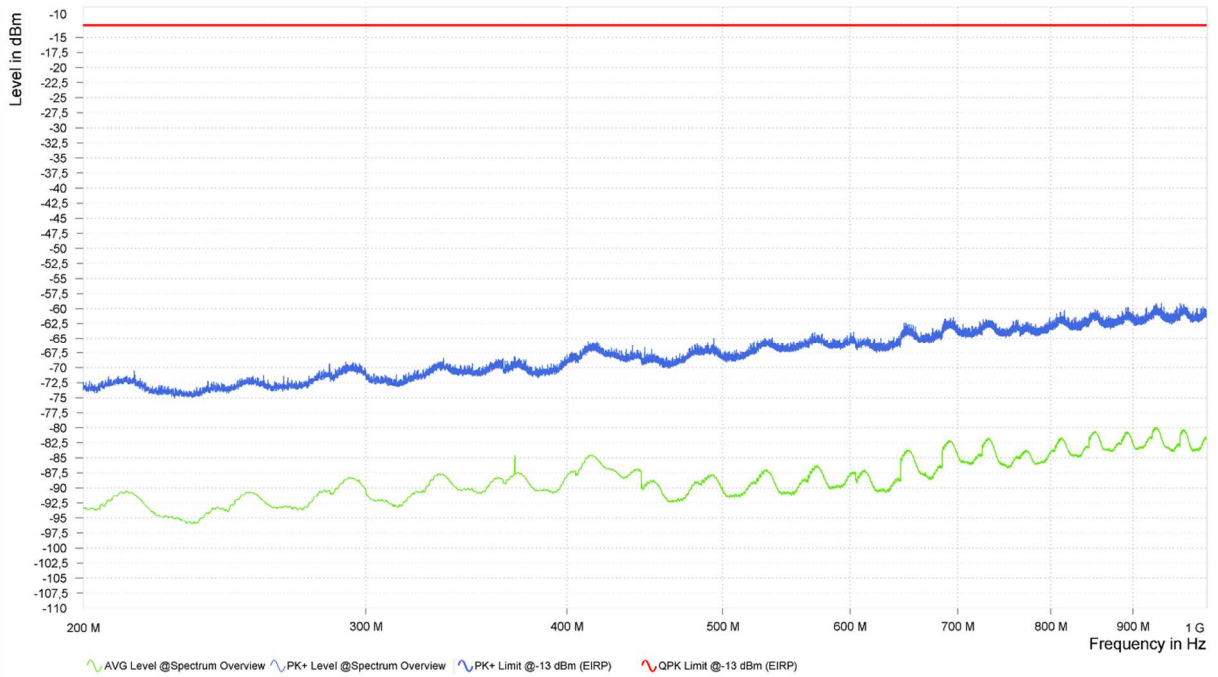
1-14, 18-27, 29
-----------------

The measurement plots are shown in the following:

Setup 1# results:

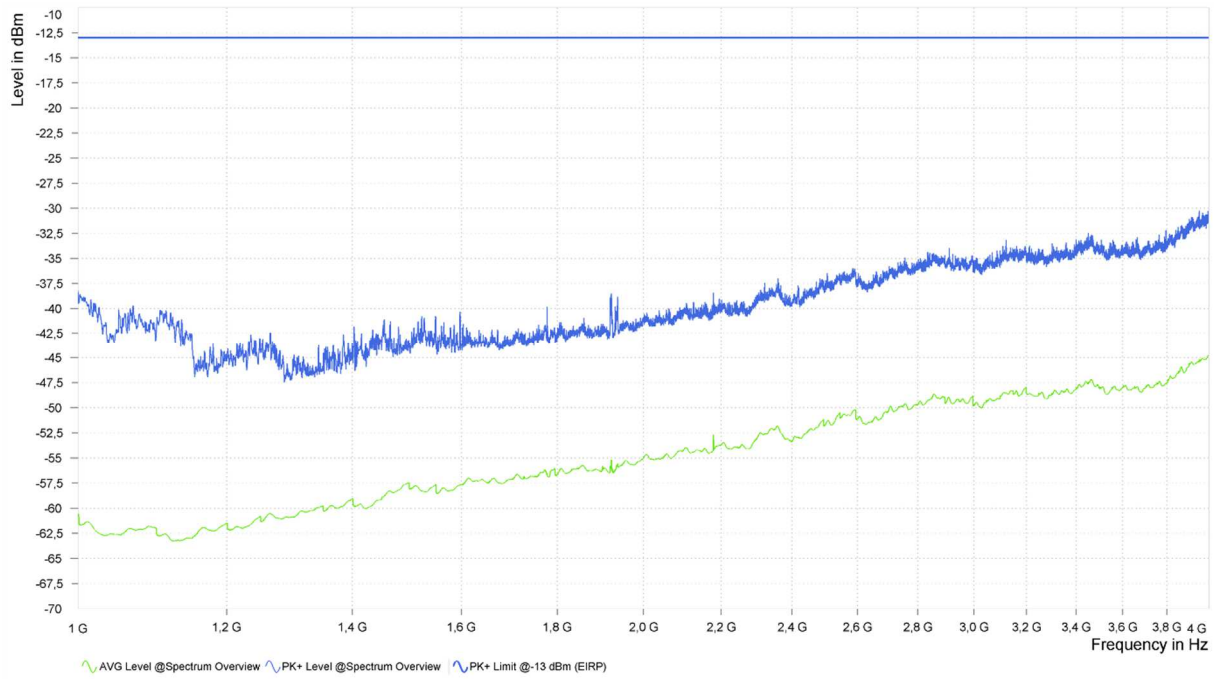


**Results 30 to 200 MHz**

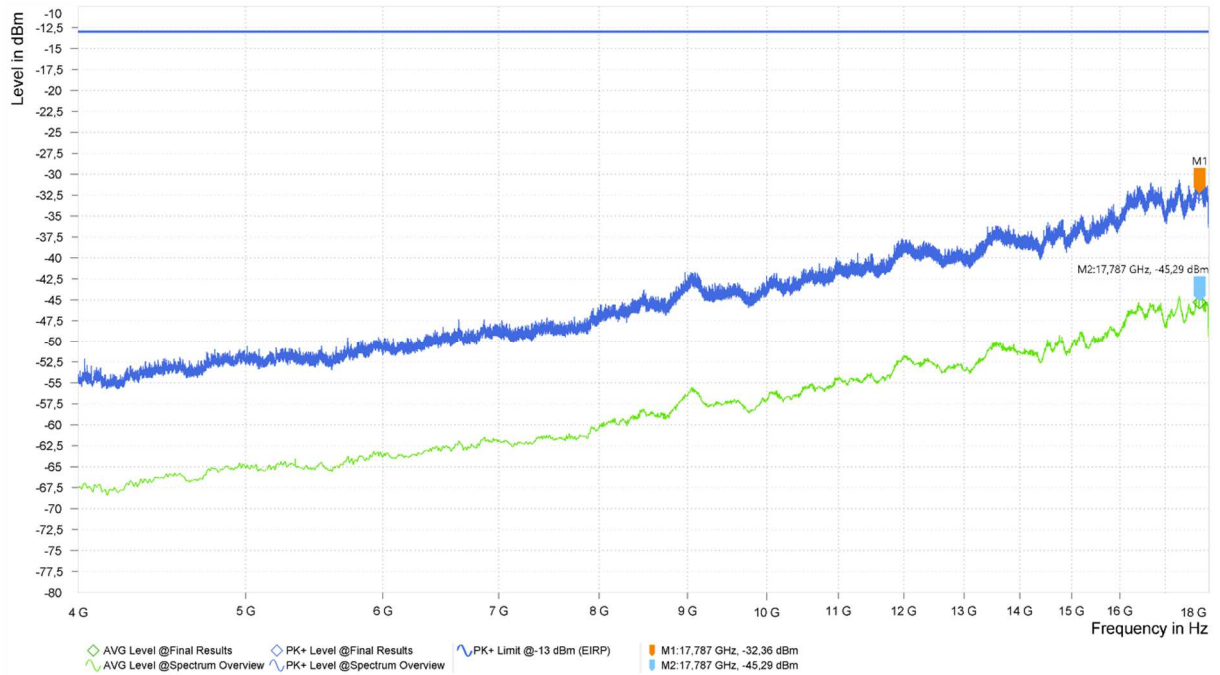


**Results 200 MHz to 1 GHz**



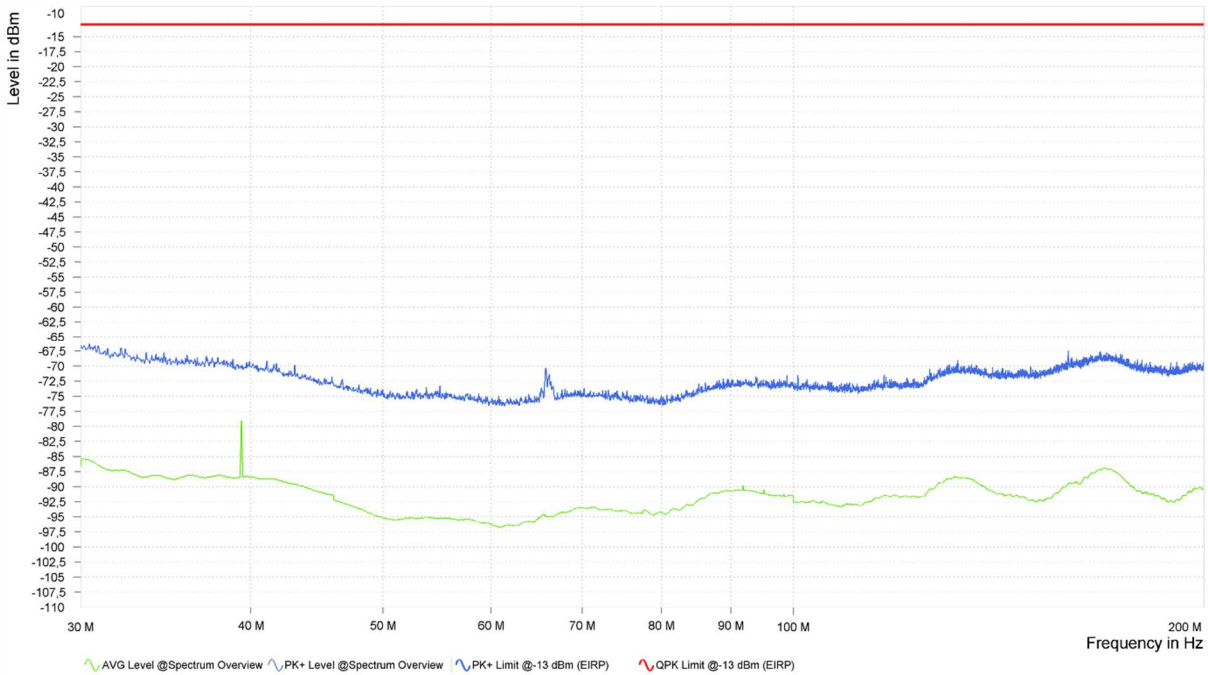


**Results 1 to 4 GHz (uplink channel notched)**

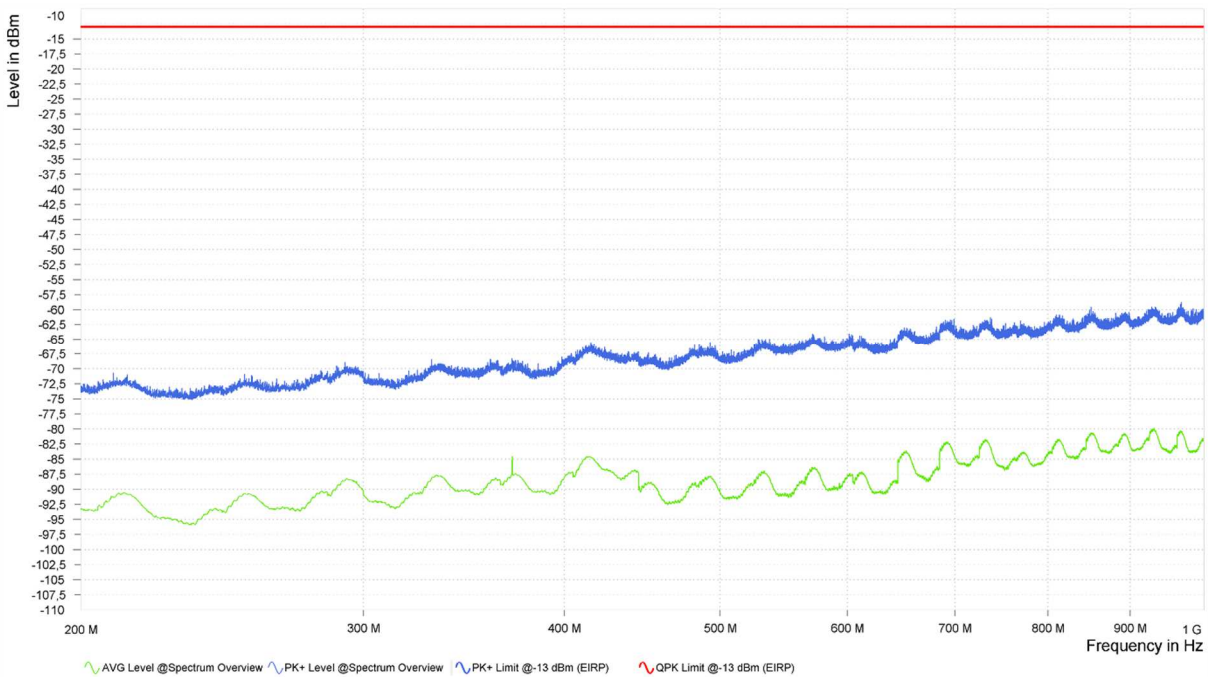


**Results 4 to 18 GHz**

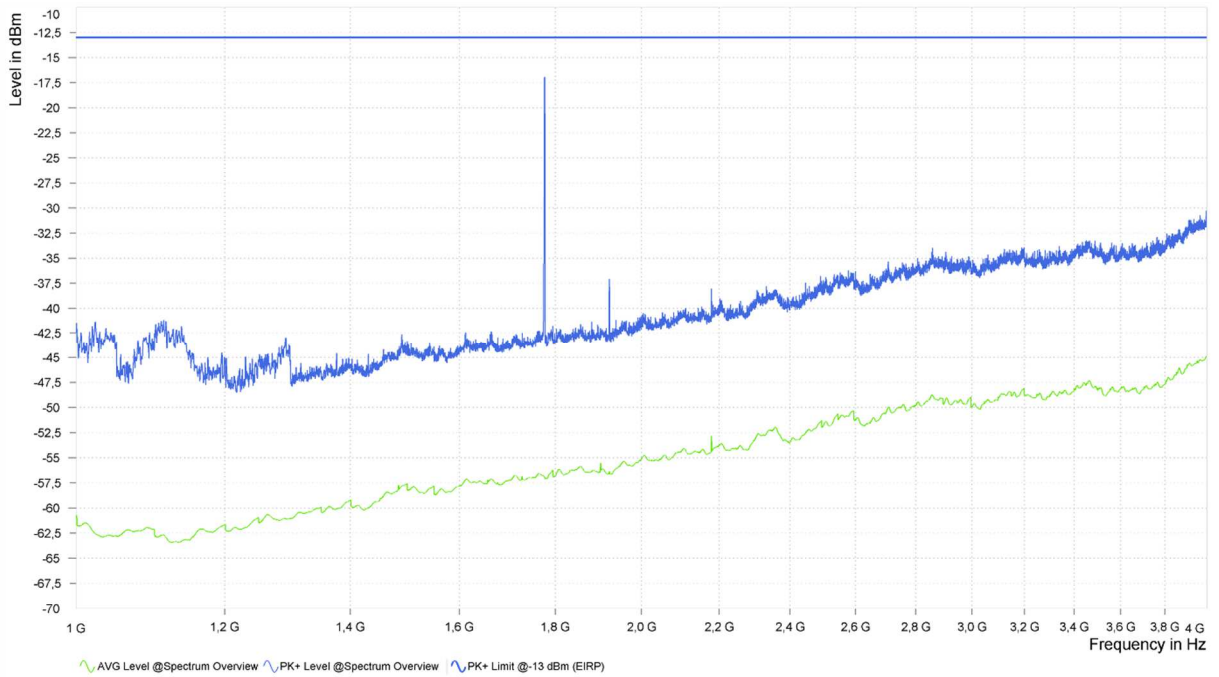
Setup 2# results:



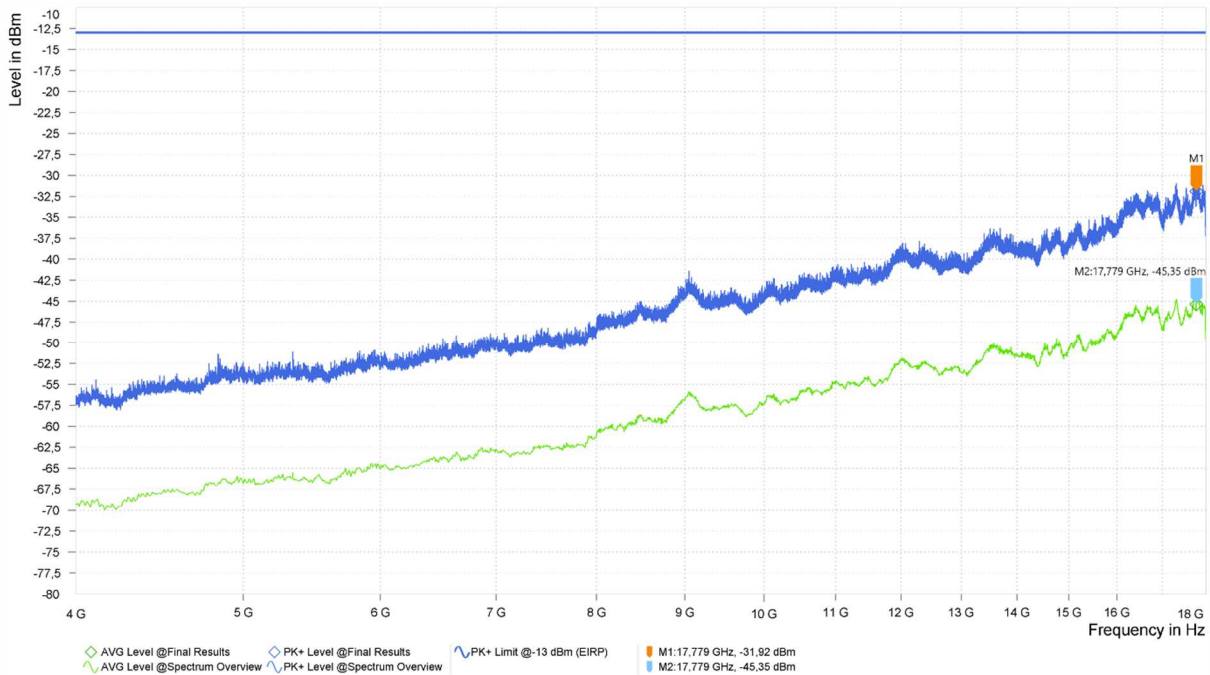
**Results 30 to 200 MHz**



**Results 200 MHz to 1 GHz**



**Results 1 to 4 GHz (uplink channel notched)**



**Results 4 to 18 GHz**

### 5.1.5 Radiated emissions - UE in traffic mode (NB-IoT band 85)

Ambient temperature:	22 °C
Relative humidity:	30 %

Date:	24-27.01.2024
Tested by:	Y. KHALEK

Measurement at uplink channel 134092:

Spurious emissions level								
Frequency (MHz)	MaxPeak (dBm)	Average (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
829.91	-58.9	-	-13.0	41.91	1000	120	102	-
707.0	Uplink channel, no spurious							
737.0	Downlink channel, no spurious							

Limit: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

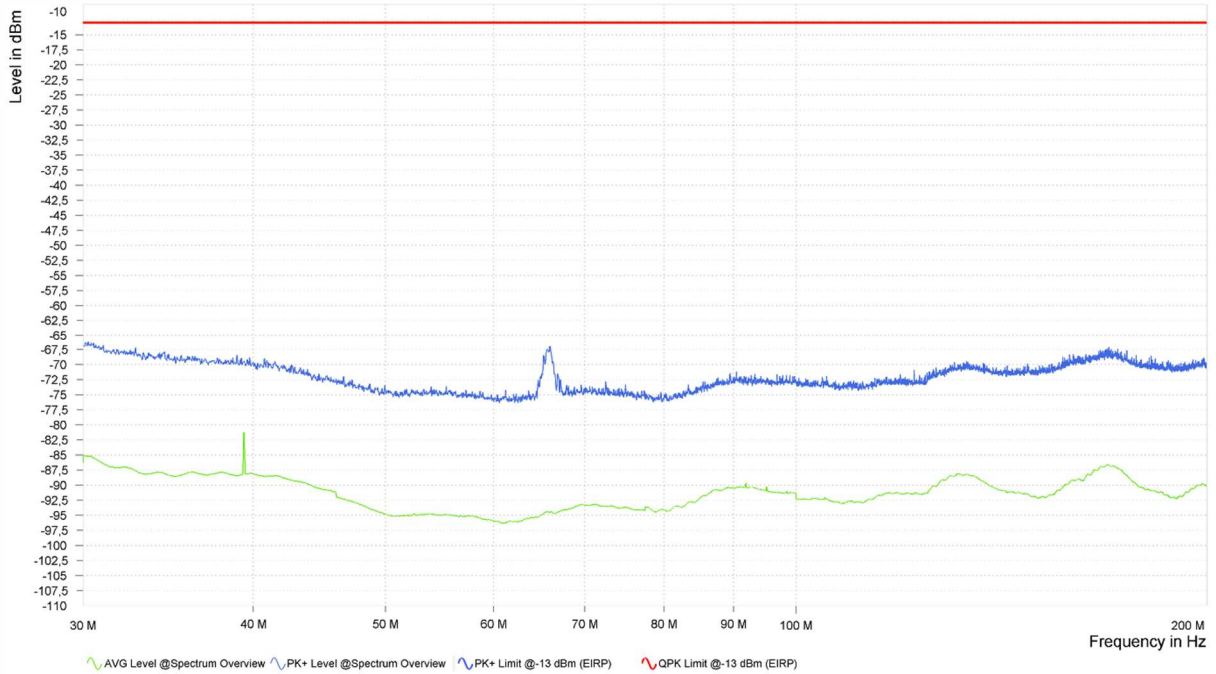
This results into a limit of -13 dBm for all power levels of the UE.

Test equipment used (see chapter 6 for details):

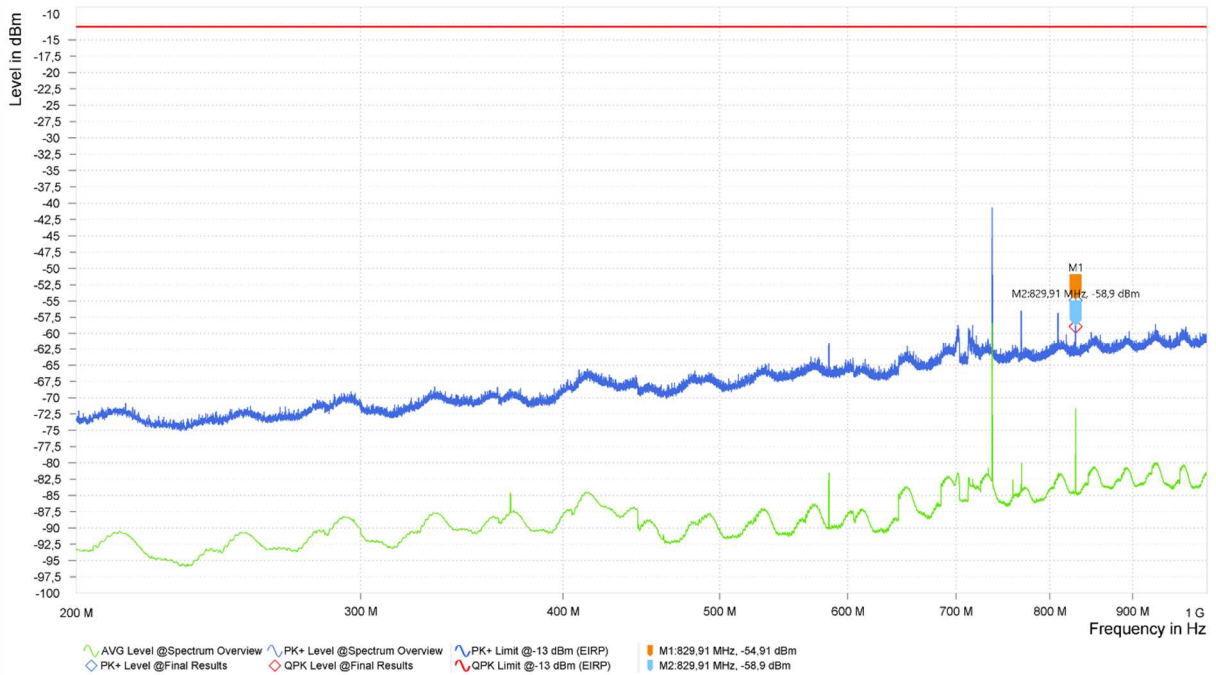
1-14, 18-28
-------------

The measurement plots are shown in the following:

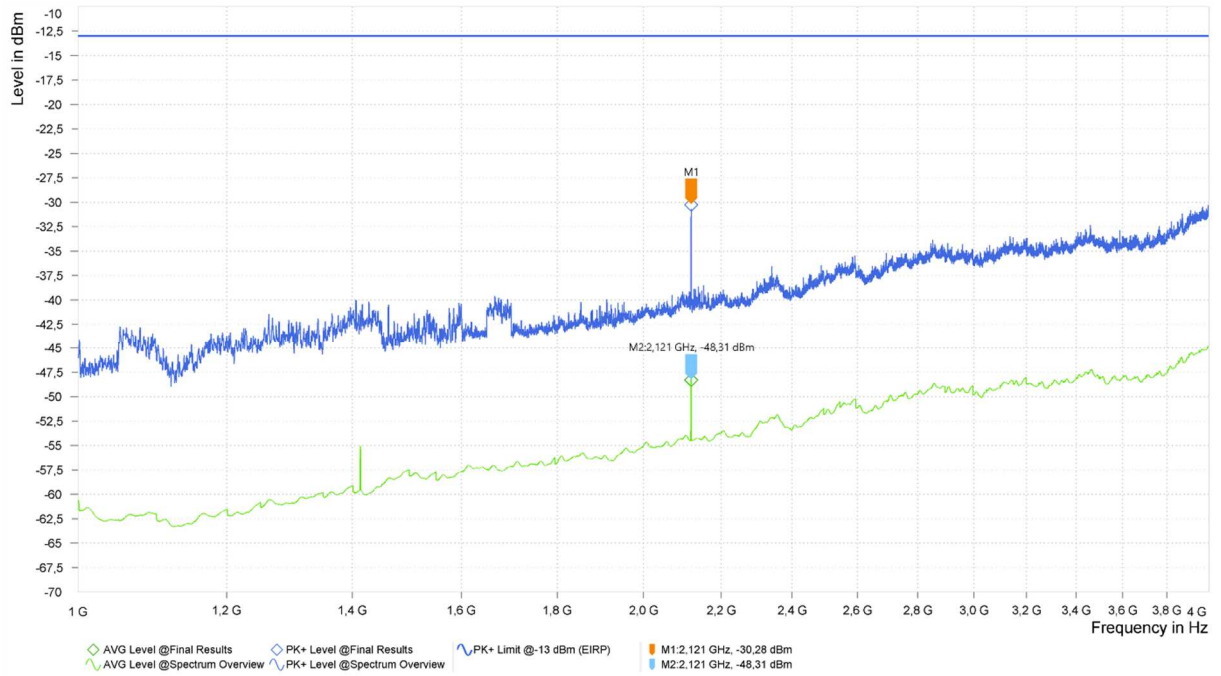
Setup 1# results:



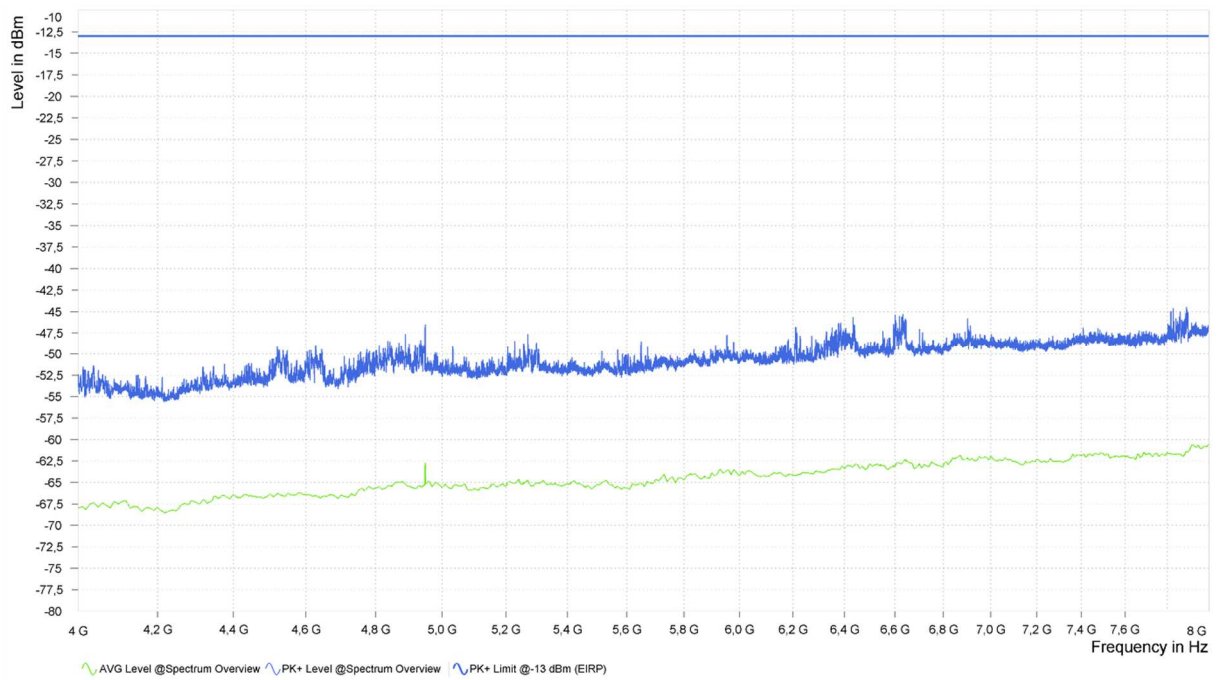
Results 30 to 200 MHz



Results 200 MHz to 1 GHz (uplink channel notched)

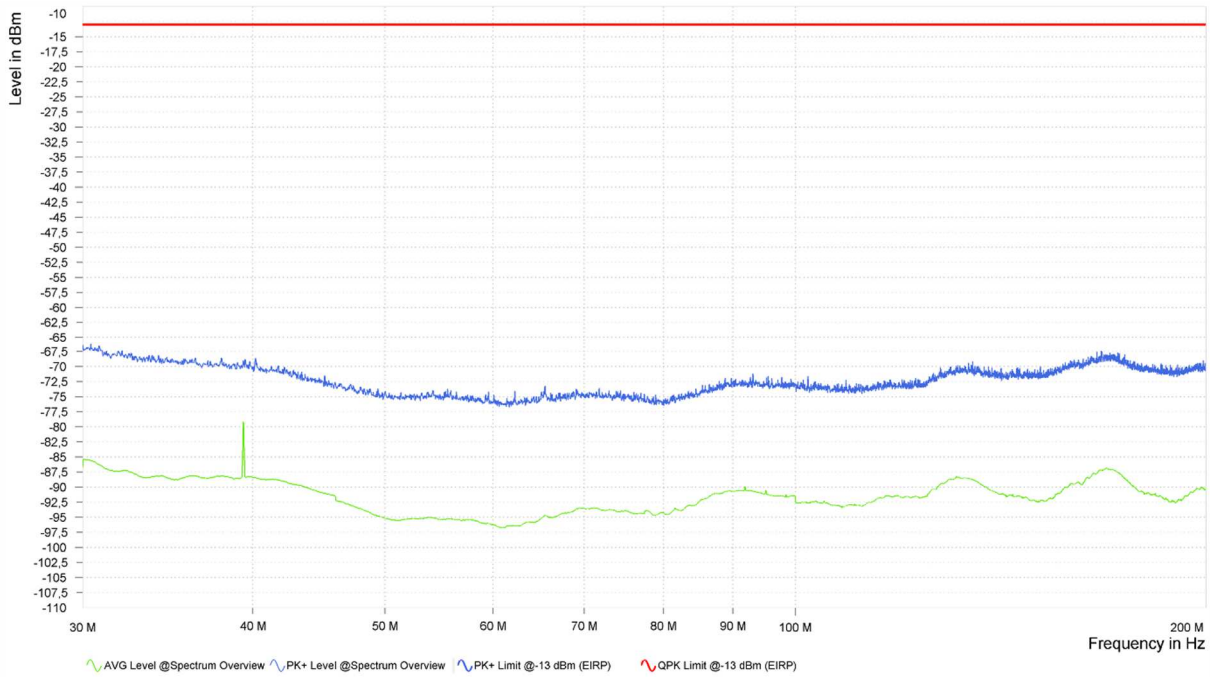


**Results 1 to 4 GHz**

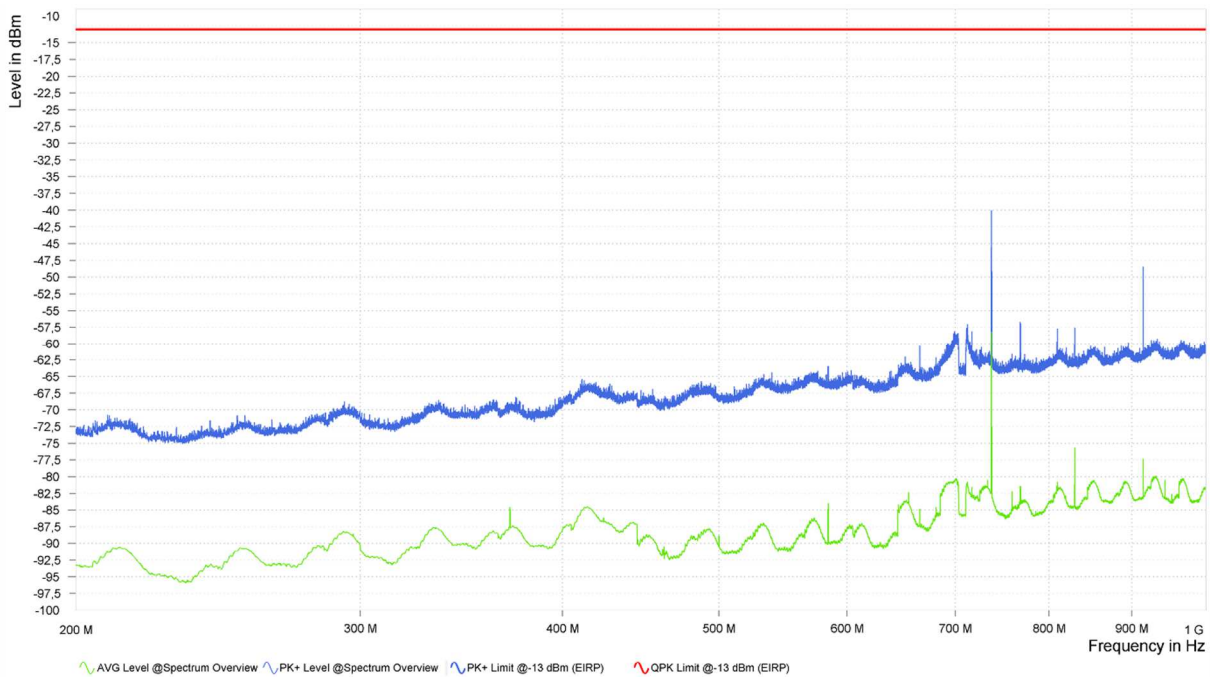


**Results 4 to 8 GHz**

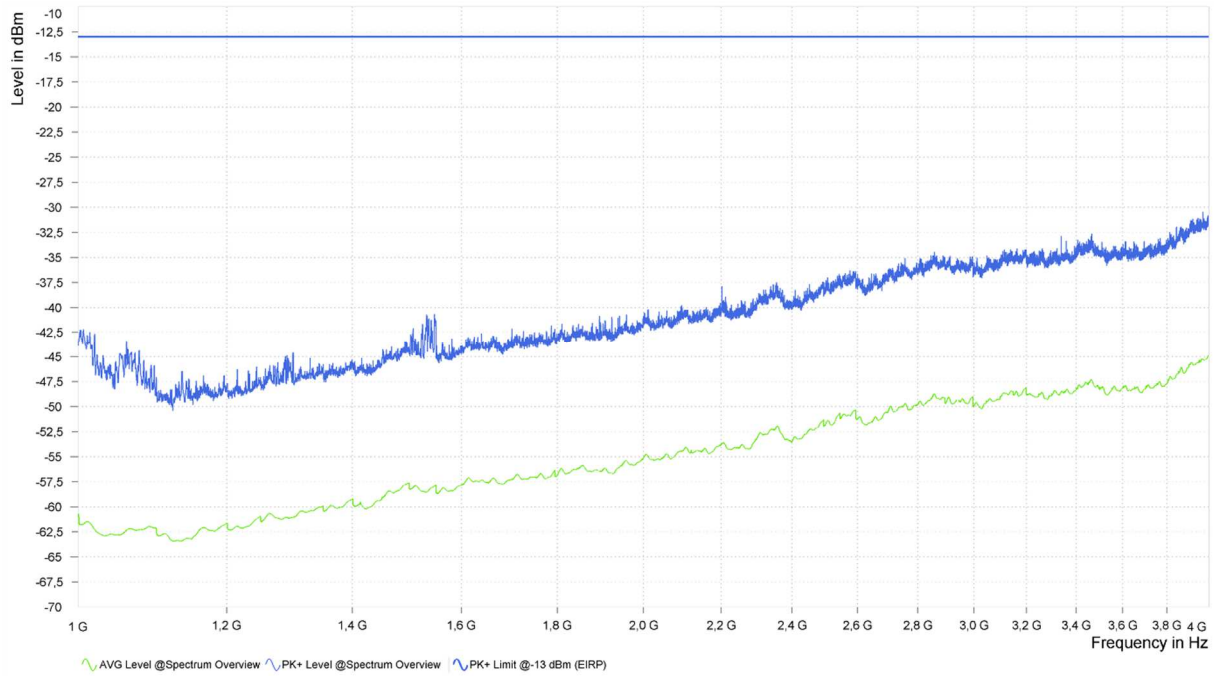
Setup 2# results:



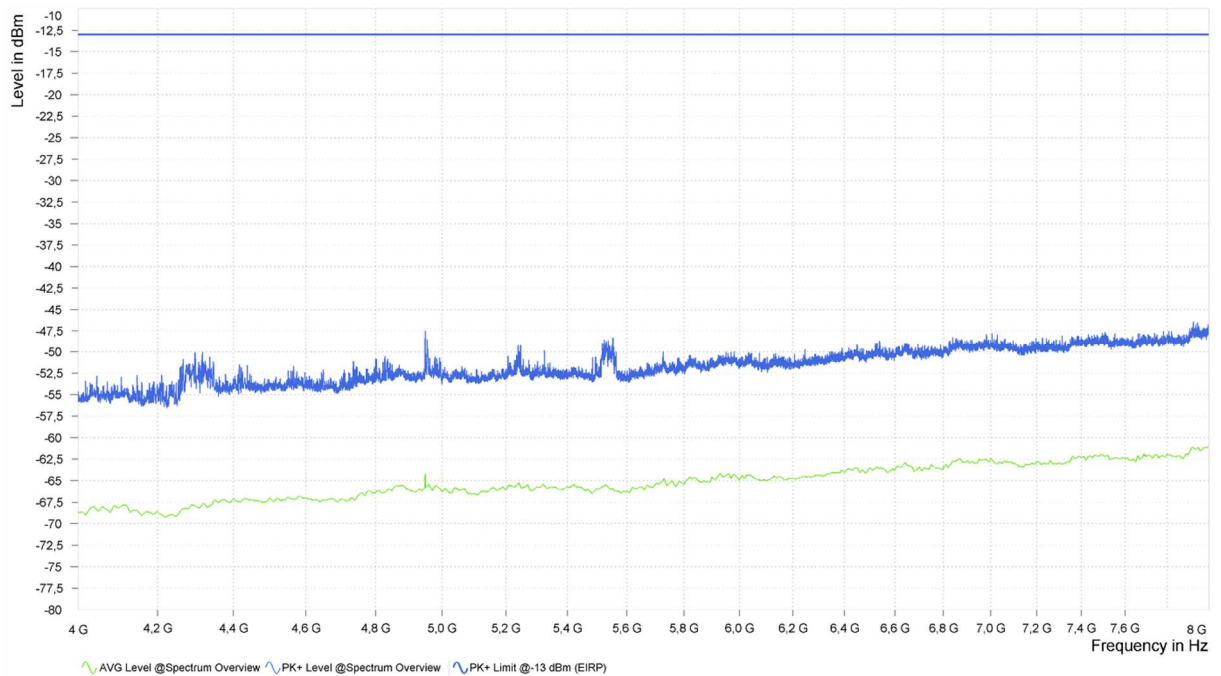
Results 30 to 200 MHz



Results 200 MHz to 1 GHz (uplink channel notched)



### Results 1 to 4 GHz



### Results 4 to 8 GHz



## 6 Measurement Uncertainties

Conducted measurements		
Measurement method	Standard used for calculating measurement uncertainty	Expanded measurement uncertainty (95 %) $U_{lab}$
Conducted emissions from 150 kHz to 30 MHz with LISN	CISPR 16-4-2	2.8 dB

Radiated measurements		
Radiated field strength M276		
R&S HL562E @ 3 m 30 MHz – 1 GHz	CISPR 16-4-2	4.8 dB
R&S HL050 @ 3 m	-	
1 – 6 GHz	CISPR 16-4-2	5.1 dB
6 – 18 GHz	CISPR 16-4-2	5.4 dB
Flann Standard Gain Horns 18 – 40 GHz	-	5.9 dB

## 7 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Log Per Antenna	VUSLP 9111B	Schwarzbeck	464	483279	Calibration not necessary	
2	Software	Elektra	Rohde & Schwarz	101381	483755	Calibration not necessary	
3	RF Switch Matrix	OSP220	Rohde & Schwarz		482976	Calibration not necessary	
4	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
5	Antenna support	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
6	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
7	Anechoic chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
8	EMI Test receiver ESW	ESW44	Rohde & Schwarz	101828	482979	08.12.2023	02.2024
9	Log Per Antenna	HL050	Rohde & Schwarz	4062.4063.02-100908	482977	22.09.2022	09.2025
10	Highpass Filter	WHKX4.0/18G-8SS	Wainwright Instruments	1	480587	Calibration not necessary	
11	Highpass Filter	WHKX12-935-1000-15000-40ST	Wainwright Instruments	1	482908	Calibration not necessary	
12	standard gain horn antenna	20240-20	Flann Microwave	411	480297	Calibration not necessary	
13	Preamplifier 18 GHz - 26 GHz	JS4-18002600-20-5A	MITEQ	658697	480342	17.02.2022	02.2024
14	Wideband Radio Communication Tester	CMW500	Rohde & Schwarz	167339	483023	21.06.2023	06.2024
15	Tunable Band Reject Filter	WRCT 2300/2650-5/40-10EEK	Wainwright Instruments	1	480446	Calibration not necessary	
16	Tuneable Notch Filter	WRCD1700/2000-0.2/40-10EEK	Wainwright Instruments	14	480415	Calibration not necessary	
17	Tunable Band Reject Filter	WTRCD10-1700-1900-5-13-60EEK	Wainwright Instruments	-	482011	Calibration not necessary	
18	Preamplifier	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	Calibration not necessary	
19	Cable	C417	H+S	-	-	Calibration not necessary	
20	Cable	C416	H+S	-	-	Calibration not necessary	
21	Cable	C416.1	H+S	-	-	Calibration not necessary	
22	Cable	C419	H+S	-	-	Calibration not necessary	
23	Biconical antenna	VHA 9103B + VHBB 9124	Schwarzbeck	768	483278	Calibration not necessary	
24	Precision dipole	HZ-13	Rohde & Schwarz	831782/02	480062	Calibration not necessary	
25	Precision dipole	HZ-12	Rohde & Schwarz	831781/02	480061	Calibration not necessary	
26	Signal Generator	ZVA	Rohde & Schwarz	100298	481538	17.02.2022	02.2024
27	Signal generator	SMHU 58	Rohde & Schwarz	844170/017	480266	21.02.2022	02.2024

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
28	Tunable Band Reject Filter	WTRCT8-800-960-5-13-60EEK	Wainwright Instruments	-	482012	Calibration not necessary	
29	Tunable Band Reject Filter	WRCT 1850/2170-5/40-10EESD	Wainwright Instruments	1	480715	Calibration not necessary	

## 8 Test site Verification

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA/RSM	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	01.03.2023	01.03.2025
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	28.02.2023	28.02.2025

## 9 Report History

Report Number	Date	Comment
F231570E4	22.03.2024	Initial Test Report
-	-	-
-	-	-

## 10 List of Annexes

Annex A	Test Setup Photos	10 pages
Annex B	EUT Photos	3 pages
Annex C	Antenna measurements	18 pages