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Wireless test report – 425119-4TRFWL

Type of assessment:

Transmitters co-location

Applicant:

Bling Wireless, Inc

Product name:

Base station

Model:

FW300i-B48-46-HP-NA

FCC ID:

ROR0010

Specifications:

◆ **FCC 47 CFR Part 15 Subpart C, §15.407**

Unlicensed National Information Infrastructure Devices – General technical requirements

◆ **FCC 47 CFR Part 96**

Citizens Broadband Radio Service

Date of issue: **May 19, 2021**

Test engineer(s): **Fahar A Sukkoor, Wireless/EMC Specialist**

Signature:

Reviewed by: **Andrey Adelberg, Senior Wireless/EMC Specialist**

Signature:

www.nemko.com

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SCC File Number: 15064 (Ottawa/Almonte); 151100 (Montreal); 151097 (Cambridge)



FCC 15.209 and RSS-GEN.docx; Date: Nov 2017

Test location(s)

Company name	Nemko Canada Inc.	
Facilities	Cambridge site: 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2 Tel: +1 519 650 4811	
Test site registration	Organization FCC/ISED	Recognition numbers and location CA2040 (Ottawa/Almonte); CA2041 (Montreal); CA0101 (Cambridge)
Website	www.nemko.com	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Blinq Wireless, Inc.
Address	140 Renfrew Dr Suite 205 Markham ON L3R6B3 Canada

1.2 Test specifications

FCC 47 CFR Part 15, Subpart E, Clause 15.407	Unlicensed National Information Infrastructure Devices operating in the 5.15–5.35 GHz, 5.47–5.725 GHz, 5.725–5.85 GHz, and 5.925–7.125 GHz bands.
FCC 47 CFR Part 96	Citizens Broadband Radio Service

1.3 Test methods

ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
789033 D02 General U-NII Test Procedures New Rules v02r01 (December 14, 2017)	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
662911 D01 Multiple Transmitter Output v02r01(October 31, 2013)	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
662911 D02 MIMO with Cross Polarized Antenna v01 (October 25, 2011)	Emissions testing of transmitters with multiple outputs in the same band (MIMO) with Cross Polarized Antenna

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.5 below. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.5 Exclusions

As per quote, the purpose of this report is verification of transmitters colocation. Only inter-modulation products within restricted bands were assessed, other requirements were excluded from the scope of this report.

1.6 Test report revision history

Revision #	Date of issue	Details of changes made to test report
TRF	May 19, 2021	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.407	Undesirable emission limits (Operating in band 5.15-5.25 GHz and 5.725-5.850 GHz)	Pass
§96.41	Additional protection levels below 3530 or above 3720 MHz	Pass

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	March 18, 2021
Nemko sample ID number	1

3.2 EUT information

Product name	Base station
Model	FW300i-B48-46-HP-NA
Serial number	F30C-20350046
Power supply requirements	DC: 48 V from external 100–240 V(AC) power adapter
Product description and theory of operation	<p>The BLiNQ FW-300i Dual Band system is a one sector, dual band Long-Term Evolution (LTE) Evolved Node B (eNB) with the ability to operate in the following bands: 46 (5GHz up to 6Ghz) and 48 (Citizens Broadband Radio Service (CBRS)). This dual band wireless radio system has 3 Component Carriers (CC) capabilities when using both bands and up to 2CC when using one band.</p> <p>With a distinctive feature set and integration level, the FW-300i Dual Band brings an ideal solution to an “install anywhere” micro-base transceiver station (micro-BTS) that fully serves private networks, fixed wireless access and mobility use cases.</p>
Software details	Version 2.1.5_4339003

3.3 Technical information

Device type	<input checked="" type="checkbox"/> Outdoor access point
	<input type="checkbox"/> Indoor access point
	<input type="checkbox"/> Fixed point-to-point access point
	<input type="checkbox"/> Client device
	<input type="checkbox"/> Device installed in vehicles
Frequency band	5150–5250 MHz (U-NII-1) 5725 – 5850 MHz (U-NII-3) 3550 – 3700 MHz (CBRS)
Antenna information	Antenna gain: 17 dBi , Brand name: BLiNQ Antenna Antennas are uncorrelated cross polarized.

3.4 Co-location test plan

Table 3.4-1: Co-Location configurations

Radio module device	Radio parameters
Configuration 1: CBRS + UNI-1	
CBRS	Mid channel (3625 MHz)
UNII-1	Mid channel (5200 MHz)
Configuration 2: CBRS + UNI-3	
CBRS	Mid channel (3625 MHz)
UNII-3	Mid channel (5800 MHz)

3.5 EUT exercise details

Methods used to exercise the EUT and all relevant ports:

EUT is controlled via telnet link. Power settings are:

Carrier power settings

FCC 15.407 UNII-1:

Carrier Configuration		1CC		2CC	
BW (MHz)		10	20	10	20
Aggregated BW (MHz)		10	20	20	40
Carrier 0	Power set per BW	12dBm	15dBm	12dBm	15dBm
Carrier 2	Power set per BW	12dBm	15dBm	12dBm	15dBm

FCC 15.407 UNII-3:

Carrier Configuration		1CC		2CC	
BW (MHz)		10	20	10	20
Aggregated BW (MHz)		10	20	20	40
Carrier 0	Power set per BW	16dBm	16dBm	16dBm	16dBm
Carrier 2	Power set per BW	16dBm	16dBm	16dBm	16dBm

Note: 2dB power backoff needed for any carrier center frequency set above 5830MHz

FCC 96:

Carrier Configuration		1CC		2CC	
BW (MHz)		10	20	10	20
Aggregated BW (MHz)		10	20	20	40
Carrier 1	Power set per BW	30dBm	33dBm	30dBm	30dBm
	Power per 10MHz	30dBm	30dBm	30dBm	27dBm

3.6 EUT setup diagram

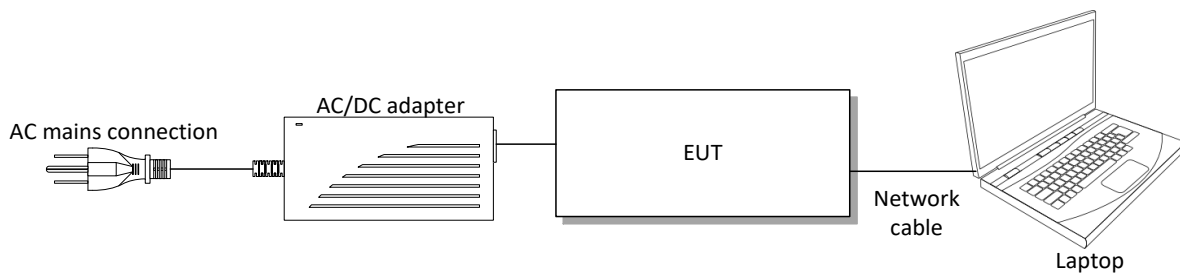


Figure 3.6-1: Setup diagram

3.7 EUT support equipment

Table 3.7-1: EUT support equipment

Description	Brand name	Model/Part number	Serial number
Power adaptor	Mean Well	HLG-600H-48	RB99055874
Laptop	Dell Latitude	E6440	FA002914

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

Channels are determined between bands based on highest power levels is considered worst case scenario

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

UKAS Lab 34 and TIA-603-B have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada, Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products.

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of $K = 2$ with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA003012	1 year	Oct 10/21
Flush mount turntable	SUNAR	FM2022	FA003006	—	NCR
Controller	SUNAR	SC110V	FA002976	—	NCR
Antenna mast	SUNAR	TLT2	FA003007	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	FA002969	1 year	Nov 12/21
Spectrum analyzer	Rohde & Schwarz	FSW43	FA002971	1 year	Nov 13/21
Temperature chamber	Espec	EPX-4H	FA003033	1 year	VOU
Radiated Emissions cable set	Huber + Suhner Inc	—	FA003047	—	NCR
Radiated Emissions cable set	Huber + Suhner Inc	—	FA003044	—	NCR
Preamp (1–18 GHz)	ETS-Lindgren	124334	FA002956	1 year	Sep 18/21
Bilog antenna (20–2000 MHz)	Sun AR	JB1	FA003009	1 year	Sep 17/21
Horn antenna (1–18 GHz)	Electro-Metrics	3115	FA000649	1 year	Sep 11/21
Horn antenna (18–40 GHz)	ETS Lindgren	3116	FA002948	1 year	Jan 22/22

Note: NCR - no calibration required, VOU - verify on use

Section 8. Testing data

8.1 Spurious emissions caused by co-located transmitters

8.1.1 Definitions and limits

FCC Part 15:

(f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device.

FCC Part 96.41 (e) (2):

Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

Table 8.1-1: FCC §15.209 – Radiated emission limits

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.

For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

Table 8.1-2: FCC restricted frequency bands

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

8.1.2 Test summary

Test start date	April 19, 2021
Test engineer	Fahar A Sukkoor

8.1.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to 40 GHz.
- The spectral plots have been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).
- Radiated measurements were performed at a distance of 3 m
- Emissions detected within restricted bands that were close to the limit were found to be digital emissions.
- No intermodulation product is found and emissions detected within restricted bands that were above limit are found to be digital emissions.

Spectrum analyzer settings for radiated measurements from 30 MHz – 1GHz

Detector mode	Quasi-Peak
Resolution bandwidth	100 kHz
Video bandwidth	30 kHz
Trace mode	Max Hold
Measurement time	100 ms

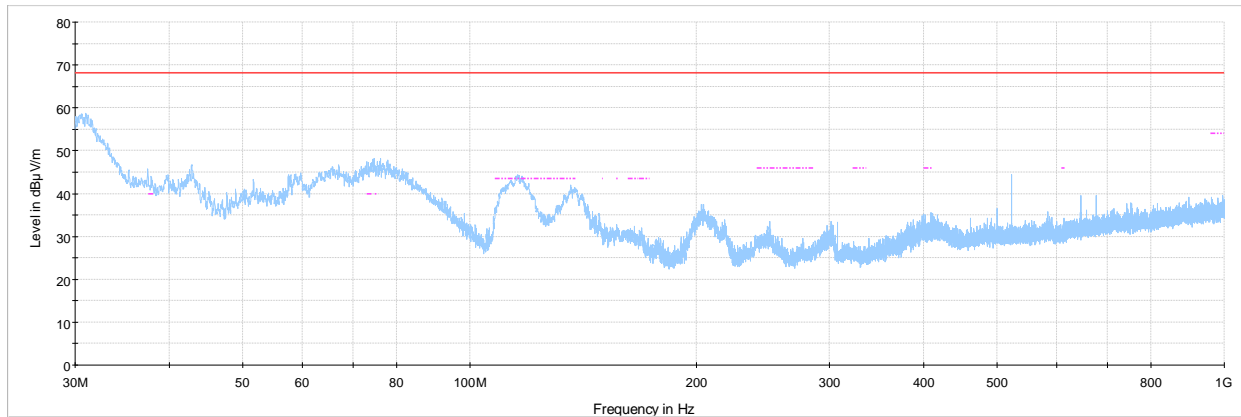
Spectrum analyser settings for radiated measurements above 1 GHz :

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for average radiated measurements within restricted bands above 1 GHz:

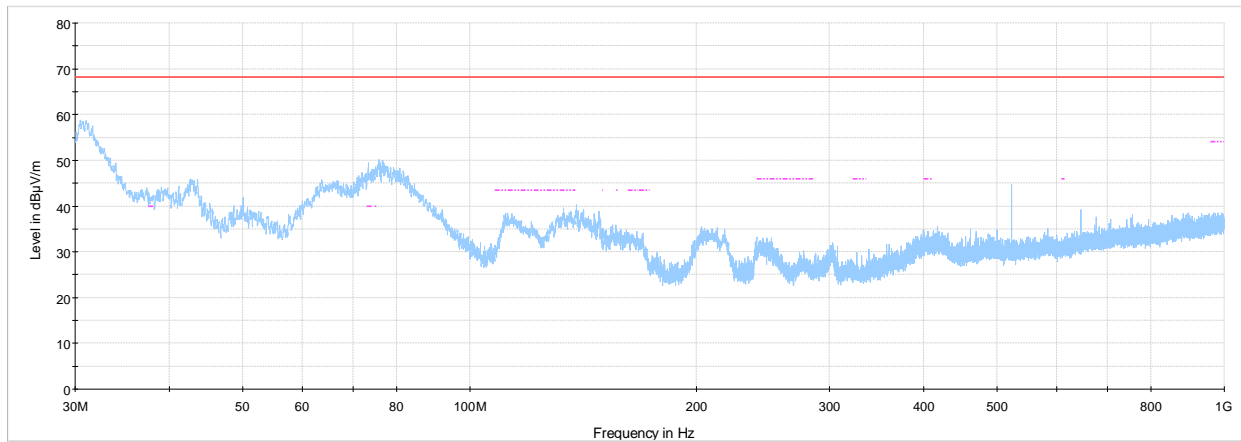
Resolution bandwidth:	1 MHz
Video bandwidth:	10 Hz
Detector mode:	Peak
Trace mode:	Max Hold

8.1.4 Test data



NEX-425119 Radiated co-location 30 MHz - 1 GHz CBRS 3625 MHz + UNI-1 5200 MHz
Preview Result 1-PK+
-27 dBm
FCC 15.209 and RSS-Gen Restricted bands average limits

Figure 8.1-1: Radiated spurious emissions, 30 MHz – 1 GHz, configuration 1



NEX-425119 Radiated co-location 30 MHz - 1 GHz CBRS 3625 MHz + UNI-3 5800 MHz
Preview Result 1-PK+
-27 dBm
FCC 15.209 and RSS-Gen Restricted bands average limits

Figure 8.1-2: Radiated spurious emissions, 30 MHz – 1 GHz, configuration 2

Note: Emissions above the limit were EMC digital noise. no intermodulation emissions were detected

Test data, continued

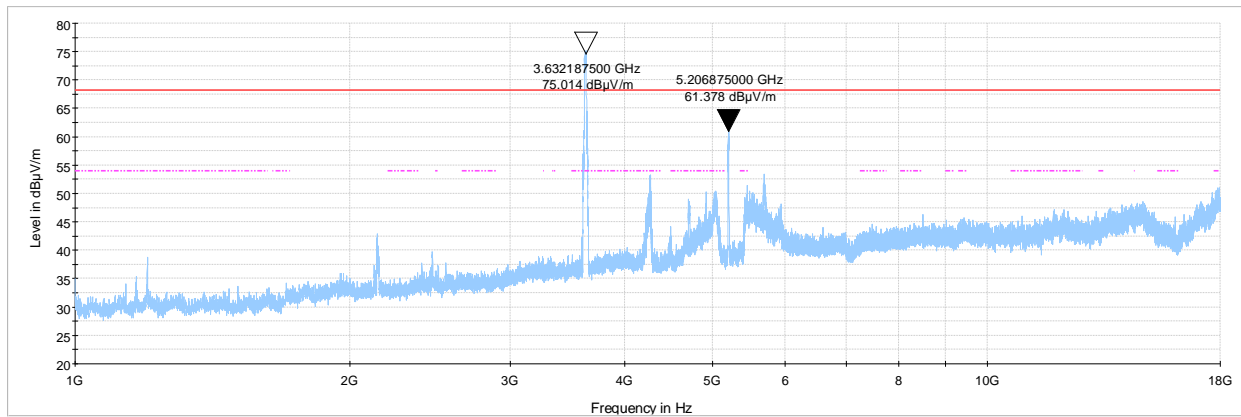


Figure 8.1-3: Radiated spurious emissions, 1 – 18 GHz, configuration 1

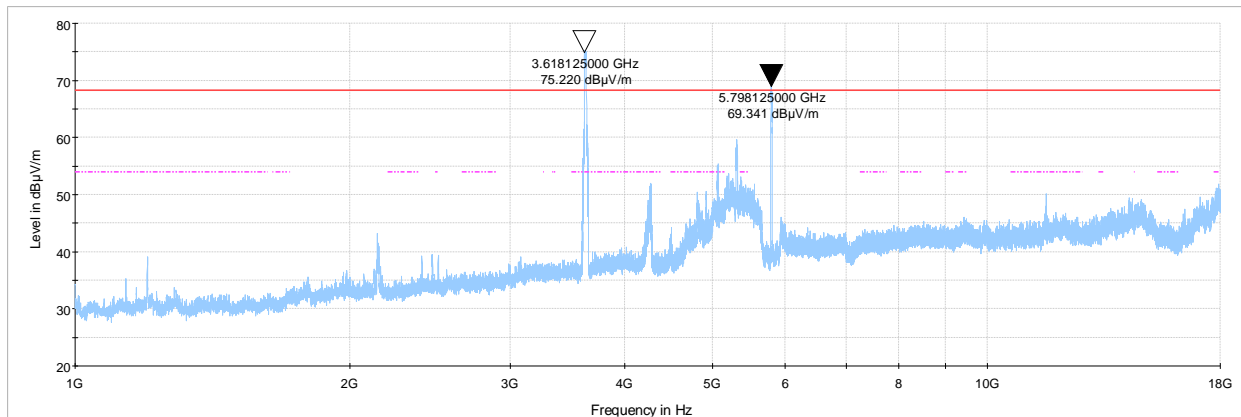


Figure 8.1-4: Radiated spurious emissions, 1 – 18 GHz, configuration 2



Test data, continued

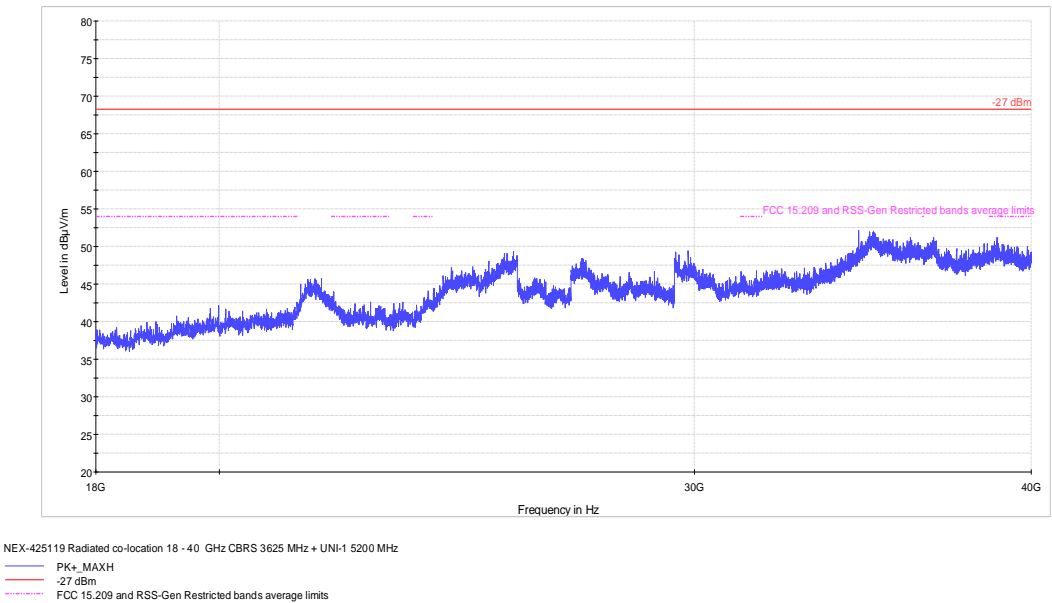


Figure 8.1-5: Radiated spurious emissions, 18- 40 GHz configuration 1

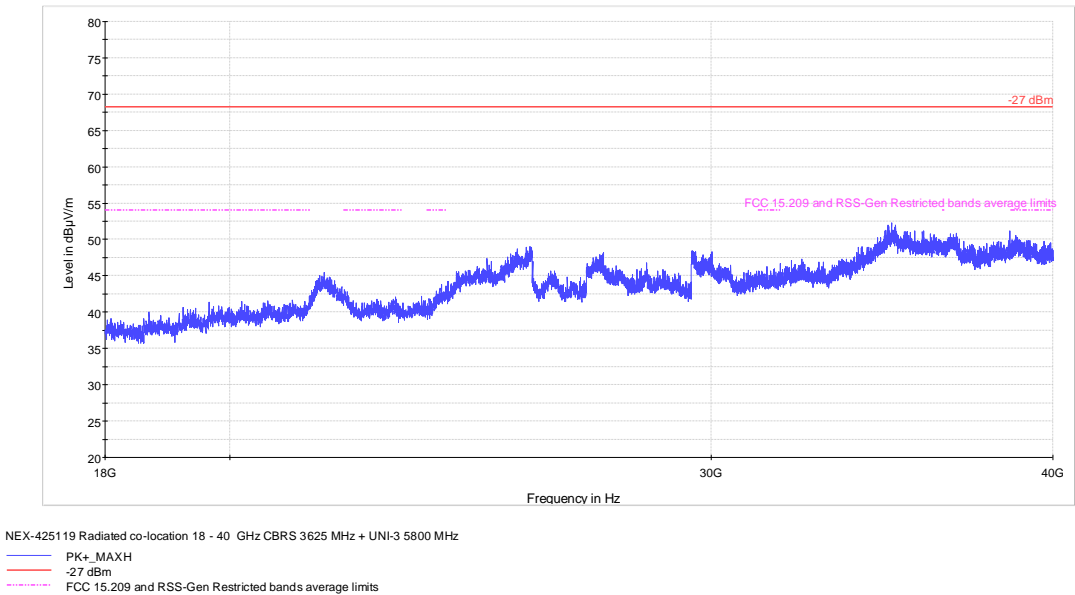
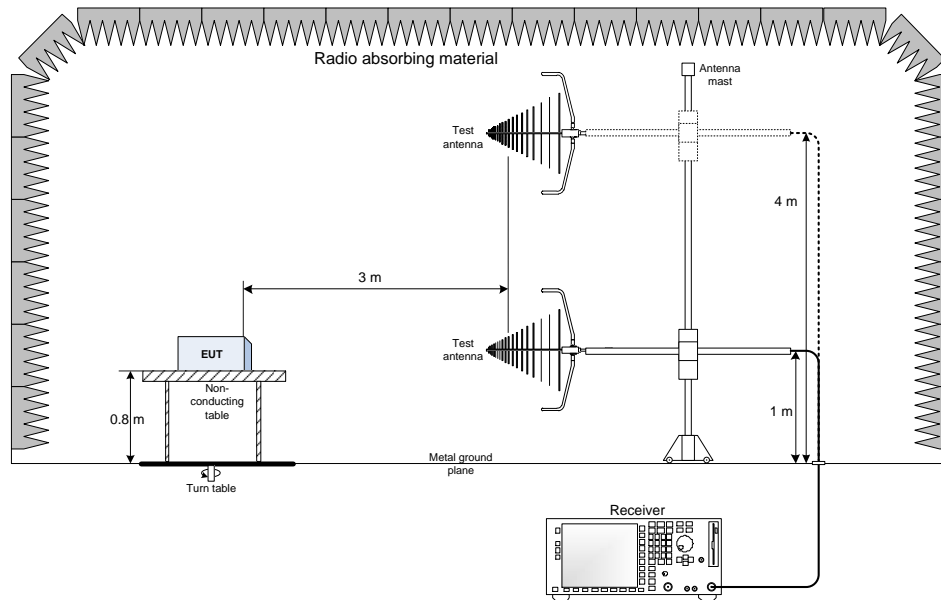


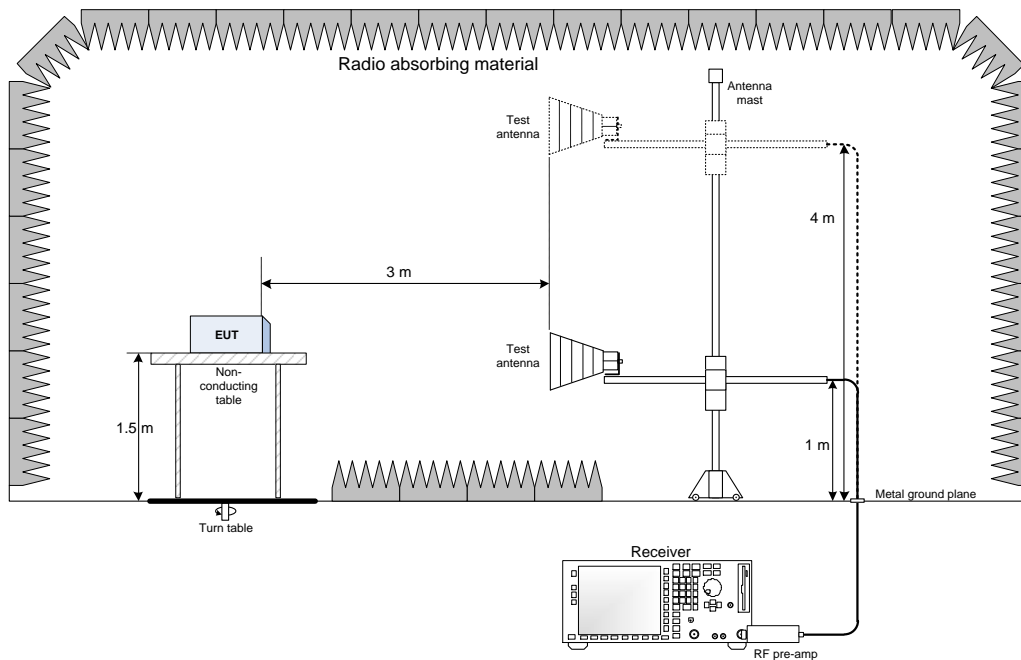
Figure 8.1-6: Radiated spurious emissions, 18- 40 GHz configuration 2

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up for frequencies below 1 GHz



9.2 Radiated emissions set-up for frequencies above 1 GHz



(End of report)