

# Wireless test report – REP039746

Applicant:

TOPCON POSITIONING SYSTEMS, INC.  
7400 National Drive, Livermore CA 94551, USA

Product name:

Multiradio module

Model:

CL20

Variant:

CL-20 LTE VZW

FCC ID:

WR4-CL20

IC Registration number

6050B-CL20

- ◆ FCC 47 CFR Part 15 Subpart C, §15.209 and RSS-210 Issue 10 §7.3
- ◆ FCC 47 CFR Part 15 Subpart C, §15.247 (d) and RSS-247 Issue 3 §5.5
- ◆ FCC 47 CFR Part 27 Subpart C, §27.53 (c) and (h)

*This test report may not be partially reproduced, except with the prior written permission of Nemko Spa  
The test report merely corresponds to the tested sample.  
The phase of sampling / collection of equipment under test is carried out by the customer.*

#### Test location(s)

Company name	Nemko Spa
Address	Via del Carroccio, 4
City	Biassono
Province	MB
Postal code	20853
Country	Italy
Telephone	+39 039 220 12 01
Facsimile	+39 039 220 12 21
Website	<a href="http://www.nemko.com">www.nemko.com</a>
Site number	FCC test site registration number: 682159 (10 m semi anechoic chamber) ISED test site number: 9109A

#### 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 contained in this report are within Nemko Spa's ISO/IEC 17025 accreditation.

#### Copyright notification

Nemko Spa authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Spa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Date of issue: October 19, 2023

Tested by  
(name, function) O. Frau

(project handler)

Signature:



Reviewed by  
(name, function) R. Giampaglia

(verifier)

Signature:



## Table of contents

<b>Table of contents</b>	<b>3</b>
<b>Section 1. Report summary</b>	<b>4</b>
1.1 Applicant and manufacturer	4
1.2 Test specifications	4
1.3 Test methods	4
1.4 Statement of compliance	4
1.5 Exclusions	4
1.6 Test report revision history	4
<b>Section 2. Summary of test results</b>	<b>5</b>
2.1 FCC Part 15 Subpart C, and FCC Part 27 test results	5
2.2 IC RSS-210, Issue 10, test results	5
2.3 IC RSS-247, Issue 3, test results	5
<b>Section 3. Equipment under test (EUT) details</b>	<b>6</b>
3.1 Sample information	6
3.2 EUT information	6
3.3 Technical information	6
3.4 EUT setup diagram	6
3.5 EUT exercise details	6
<b>Section 4. Engineering considerations</b>	<b>7</b>
4.1 Modifications incorporated in the EUT	7
4.2 Technical judgment	7
4.3 Deviations from laboratory tests procedures	7
<b>Section 5. Test conditions</b>	<b>8</b>
5.1 Atmospheric conditions	8
5.2 Power supply range	8
<b>Section 6. Measurement uncertainty</b>	<b>9</b>
6.1 Uncertainty of measurement	9
<b>Section 7. Test equipment</b>	<b>11</b>
7.1 Test equipment list	11
<b>Section 8. Testing data</b>	<b>12</b>
8.1 Radiated emission	12
<b>Section 9. Block diagrams of test set-ups</b>	<b>36</b>
9.1 Radiated emissions set-up for frequencies below 1 GHz	36
9.2 Radiated emissions set-up for frequencies above 1 GHz	36
<b>Section 10. Photos</b>	<b>37</b>
10.1 Photos of the test set-up	37
10.2 Photos of the EUT	38

## Section 1. Report summary

### 1.1 Applicant and manufacturer

Company name	TOPCON POSITIONING SYSTEMS, INC.
Address	7400 National Drive, Livermore CA 94551, USA

### 1.2 Test specifications

FCC 47 CFR Part 15 Subpart C, §15.209 FCC 47 CFR Part 15 Subpart C, §15.247 FCC 47 CFR Part 27 Subpart C, §27.53	Radiated emission limits; general requirements. Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. Emission limits.
RSS-210 Issue 10, December 2019, Amendment (April 2020) - §7.3 RSS-247 Issue 3, August 2023 - §5.5 RSS-Gen Issue 5, April 2018, Amendment 1 (March 2019), Amendment 2 (February 2021)	Licence-Exempt Radio Apparatus: Category I Equipment - Transmitters with wanted and unwanted emissions that are within the general field strength limits Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices - Unwanted emissions  General Requirements for Compliance of Radio Apparatus

### 1.3 Test methods

ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.26 v2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

### 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
REP039746	October 19, 2023	Original report issued

## Section 2. Summary of test results

---

### 2.1 FCC Part 15 Subpart C, and FCC Part 27 test results

---

Part	Test description	Verdict
§15.209	Radiated emission limits; general requirements.	Pass
§15.247 (d)	Spurious emissions.	Pass
§27.53 (c)	Emission limit for operations in the 746-758 MHz band and the 776-788 MHz band	Pass
§27.53 (h)	Emission limit for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands	Pass

### 2.2 IC RSS-210, Issue 10, test results

---

Part	Test description	Verdict
7.3	Transmitters with wanted and unwanted emissions that are within the general field strength limits	Pass

### 2.3 IC RSS-247, Issue 3, test results

---

Part	Test description	Verdict
5.5	Unwanted emissions	Pass

## Section 3. Equipment under test (EUT) details

---

### 3.1 Sample information

---

Receipt date	March 5, 2020
Nemko sample ID number	392900

### 3.2 EUT information

---

Product name	Multiradio module
Model	CL-20 LTE VZW
Serial number	007-2007-0003-02

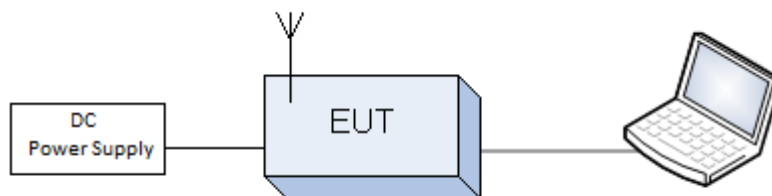
### 3.3 Technical information

---

Frequency band	WIFI: 2400–2483.5 MHz band LTE: North America Bands
Type of modulation	GFSK, 802.11a/n, OFDM
Emission classification (F1D, G1D, D1D)	FXD, W7D
EUT power requirements	5 V DC
Antenna information	Integral antenna Tekfun model FX-W06 and antenna for LTE diversity Wavelink model WL-4GE50

### 3.4 EUT setup diagram

---



**Figure 3.4-1:** Setup diagram

### 3.5 EUT exercise details

---

Test mode forced in transmission mode with dedicated script. Hardware version revision 2 code 1949190604020. Firmware version 01.01

## 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

---

None

### 4.3 Deviations from laboratory tests procedures

---

No deviations were made from laboratory procedures.

## Section 5. Test conditions

---

### 5.1 Atmospheric conditions

---

Temperature	18–33 °C
Relative humidity	30–60 %
Air pressure	980–1060 mbar

Test equipment used for the monitoring of the environmental conditions

Equipment	Manufacturer	Model no.	Asset no.	Cal date	Next cal.
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305	2022-12	2024-12
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703	2022-12	2024-12
Barometer	Castle	GPB 3300	072015	2023-04	2024-04

### 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

---

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002.

The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
Receiver	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Sensitivity measurement	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Conducted spurious emissions	1 MHz ÷ 18 GHz	6.0 dB	(1)
Receiver	Conducted	Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Sensitivity measurement	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)

## NOTES:

(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95 %

## 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.
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESU8	100202	2023-01	2024-01
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESW44	101620	2023-05	2024-05
Trilog Antenna (30 MHz ÷ 7 GHz)	Schwarzbeck	VULB 9162	9162-025	2021-07	2024-07
Bilog antenna (1 ÷ 18 GHz)	Schwarzbeck	STLP 9148	9148-123	2021-07	2024-07
Preamplifier (1 ÷ 18 GHz)	Schwarzbeck	BBV 9718	9718-137	2023-02	2026-02
Horn antenna (4 ÷ 40 GHz)	RFSpin	DRH40	061106A40	2023-08	2024-08
Preamplifier (18 ÷ 40 GHz)	Miteq	JS44-18004000-35-8P-R	1.627	2023-08	2024-08
Controller	Maturo	FCU3.0	10041	NCR	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR	NCR
Turntable	Maturo	TT4.0-ST	2.527	NCR	NCR
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2021-09	2024-09
Shielded room	Siemens	10m control room	1947	NCR	NCR

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

## Section 8. Testing data

---

### 8.1 Radiated emission

---

#### Definitions and limits

---

##### FCC § 15.209 (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 §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

##### FCC §27.53 (c)

For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $76 + 10 \log (P)$  dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

## FCC §27.53 (h)

## AWS emission limits—

- (1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.
- (2) Additional protection levels. Notwithstanding the foregoing paragraph (h)(1) of this section:
  - (i) Operations in the 2180-2200 MHz band are subject to the out-of-band emission requirements set forth in §27.1134 for the protection of federal government operations operating in the 2200-2290 MHz band.
  - (ii) For operations in the 2000-2020 MHz band, the power of any emissions below 2000 MHz shall be attenuated below the transmitter power (P) in watts by at least  $70 + 10 \log_{10}(P)$  dB.
  - (iii) For operations in the 1915-1920 MHz band, the power of any emission between 1930-1995 MHz shall be attenuated below the transmitter power (P) in watts by at least  $70 + 10 \log_{10}(P)$  dB.
  - (iv) For operations in the 1995-2000 MHz band, the power of any emission between 2005-2020 MHz shall be attenuated below the transmitter power (P) in watts by at least  $70 + 10 \log_{10}(P)$  dB.
- (3) Measurement procedure.
  - (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
  - (ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
  - (iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.
- (4) Private agreements.
  - (i) For AWS operations in the 2000-2020 MHz and 2180-2200 MHz bands, to the extent a licensee establishes unified operations across the AWS blocks, that licensee may choose not to observe the emission limit specified in paragraph (h)(1), above, strictly between its adjacent block licenses in a geographic area, so long as it complies with other Commission rules and is not adversely affecting the operations of other parties by virtue of exceeding the emission limit.
  - (ii) For AWS operations in the 2000-2020 MHz band, a licensee may enter into private agreements with all licensees operating between 1995 and 2000 MHz to allow the  $70 + 10 \log_{10}(P)$  dB limit to be exceeded within the 1995-2000 MHz band.
  - (iii) An AWS licensee who is a party to a private agreement described in this section (4) must maintain a copy of the agreement in its station files and disclose it, upon request, to prospective AWS assignees, transferees, or spectrum lessees and to the Commission.

## RSS-247 Issue 3 §5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

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

Frequency, MHz	Field strength of emissions		Measurement distance, m
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	
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			

**Table 8.1-3: ISSED restricted frequency bands**

MHz	MHz	MHz	GHz
0.090–0.110	12.57675–12.57725	399.9–410	7.25–7.75
0.495–0.505	13.36–13.41	608–614	8.025–8.5
2.1735–2.1905	16.42–16.423	960–1427	9.0–9.2
3.020–3.026	16.69475–16.69525	1435–1626.5	9.3–9.5
4.125–4.128	16.80425–16.80475	1645.5–1646.5	10.6–12.7
4.17725–4.17775	25.5–25.67	1660–1710	13.25–13.4
4.20725–4.20775	37.5–38.25	1718.8–1722.2	14.47–14.5
5.677–5.683	73–74.6	2200–2300	15.35–16.2
6.215–6.218	74.8–75.2	2310–2390	17.7–21.4
6.26775–6.26825	108–138	2483.5–2500	22.01–23.12
6.31175–6.31225	149.9–150.05	2655–2900	23.6–24.0
8.291–8.294	156.52475–156.52525	3260–3267	31.2–31.8
8.362–8.366	156.7–156.9	3332–3339	36.43–36.5
8.37625–8.38675	162.0125–167.17	3345.8–3358	
8.41425–8.41475	167.72–173.2	3500–4400	
12.29–12.293	240–285	4500–5150	Above 38.6
12.51975–12.52025	322–335.4	5350–5460	

Note: Certain frequency bands listed in Table 8.1-3 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

## Test summary

---

Test start date	September 28, 2023
Test engineer	P. Barbieri

## Observations, settings and special notes

---

The spectrum was searched from 30 MHz to 25 GHz.

EUT's LTE and WIFI transmitters were set to transmit continuously, different channel setting has been investigated as per provided by client's setup  
Radiated measurements were performed at a distance of 3 m.

Spectrum analyzer settings for frequencies below 1000 MHz:

Detector mode	Quasi-Peak
Resolution bandwidth	120 kHz
Trace mode	Max Hold
Measurement time	100 ms

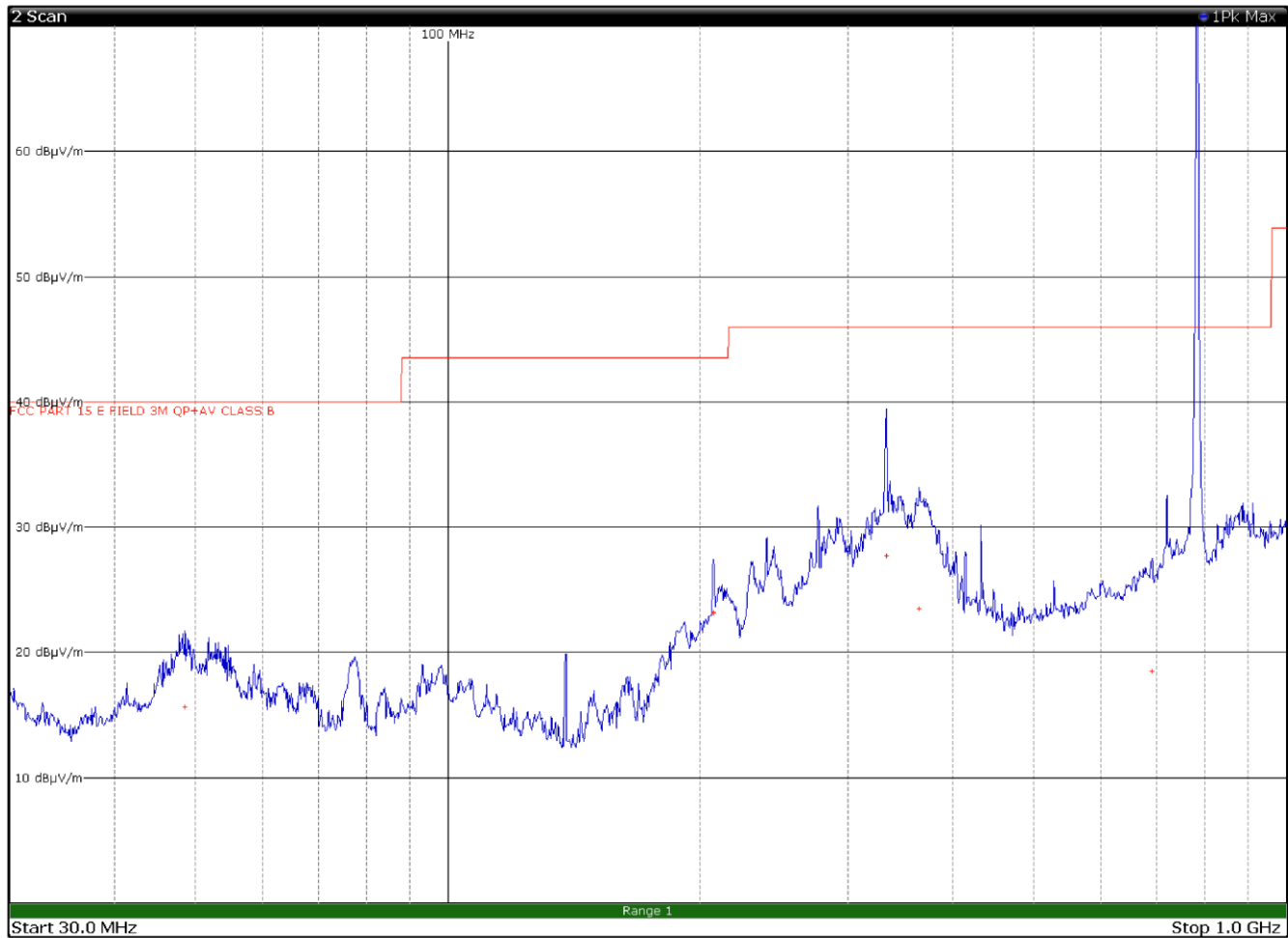
Spectrum analyser settings for peak radiated measurements within restricted bands above 1 GHz:

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:	3 MHz
Detector mode:	Average
Trace mode:	Max Hold

## 8.1.4 Test data



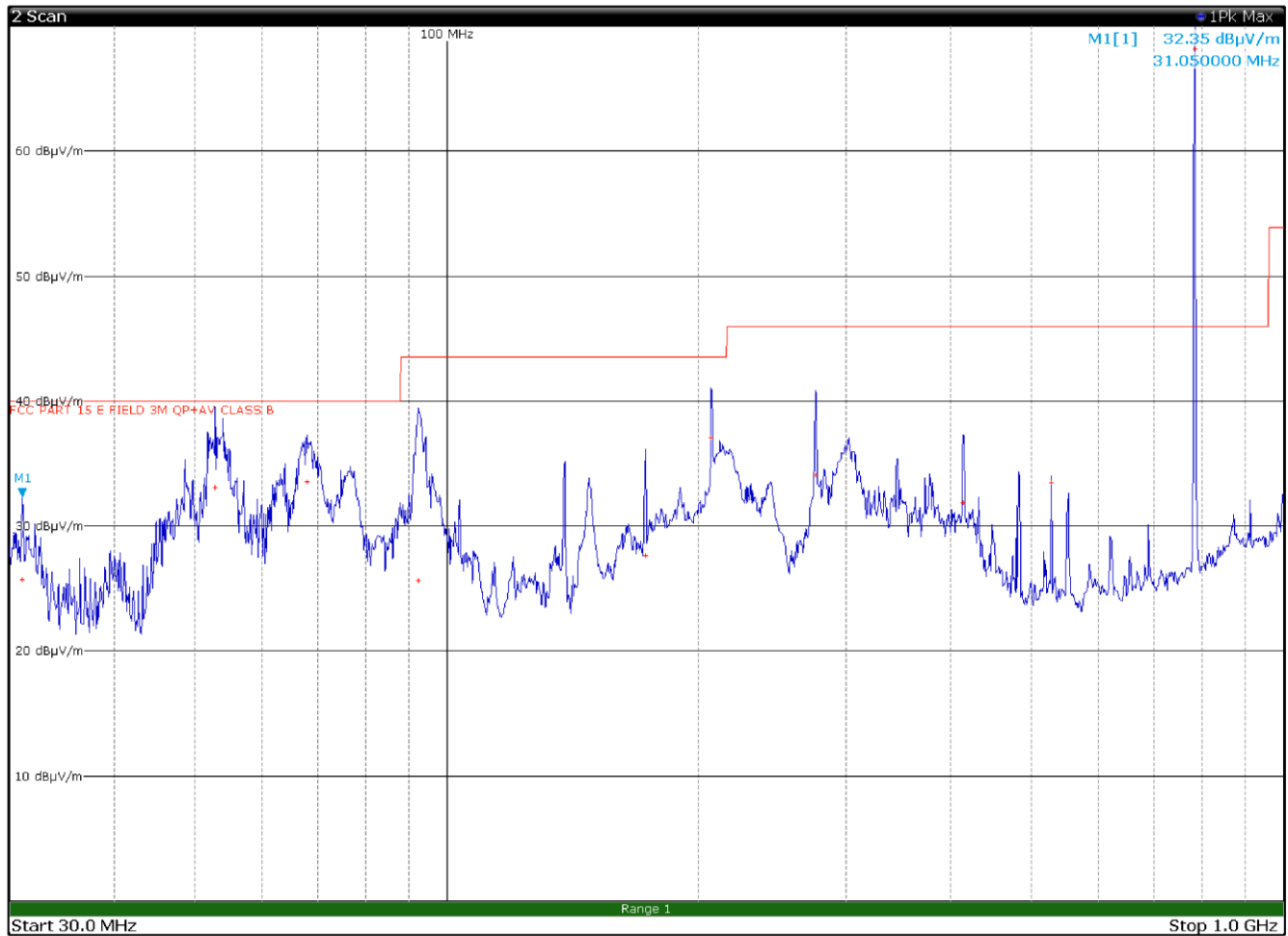
Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
48.5700	15.7	40.0	-24.3	QP
207.4800	23.2	43.5	-20.3	QP
333.2100	27.7	46.0	-18.3	QP
365.0400	23.5	46.0	-22.5	QP
691.7700	18.6	46.0	-27.4	QP

Limit exceeded by the carrier



## 8.1.4 Test data, continued



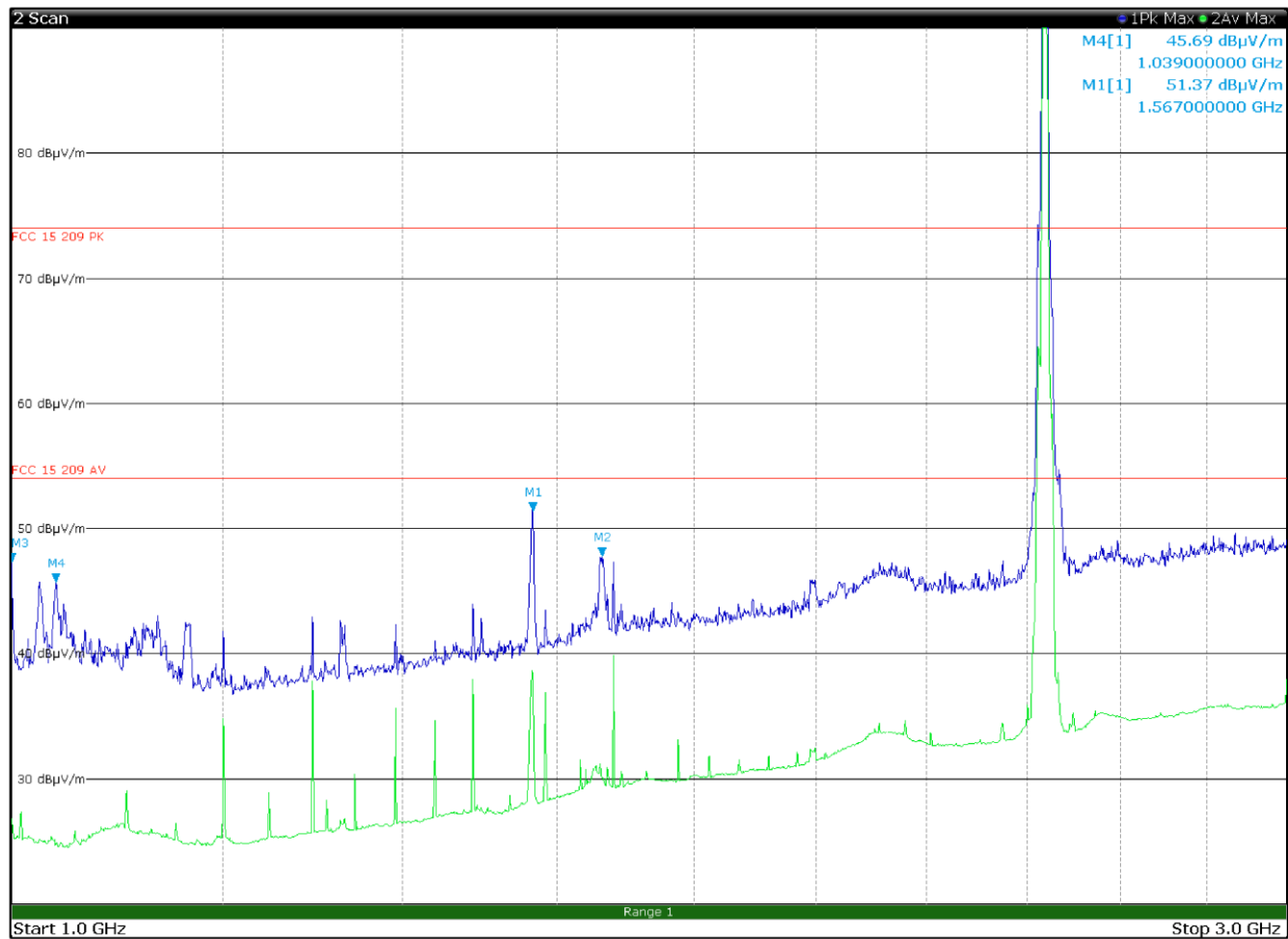
Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
31.0500	25.7	40.0	-14.3	QP
52.8300	33.1	40.0	-6.9	QP
67.9500	33.6	40.0	-6.4	QP
92.3700	25.7	43.5	-17.8	QP
172.8000	27.7	43.5	-15.8	QP
206.7900	37.1	43.5	-6.4	QP
275.7300	34.1	46.0	-11.9	QP
413.5800	31.9	46.0	-14.1	QP
528.0000	33.5	46.0	-12.5	QP

Limit exceeded by the carrier



8.1.4 Test data, continued



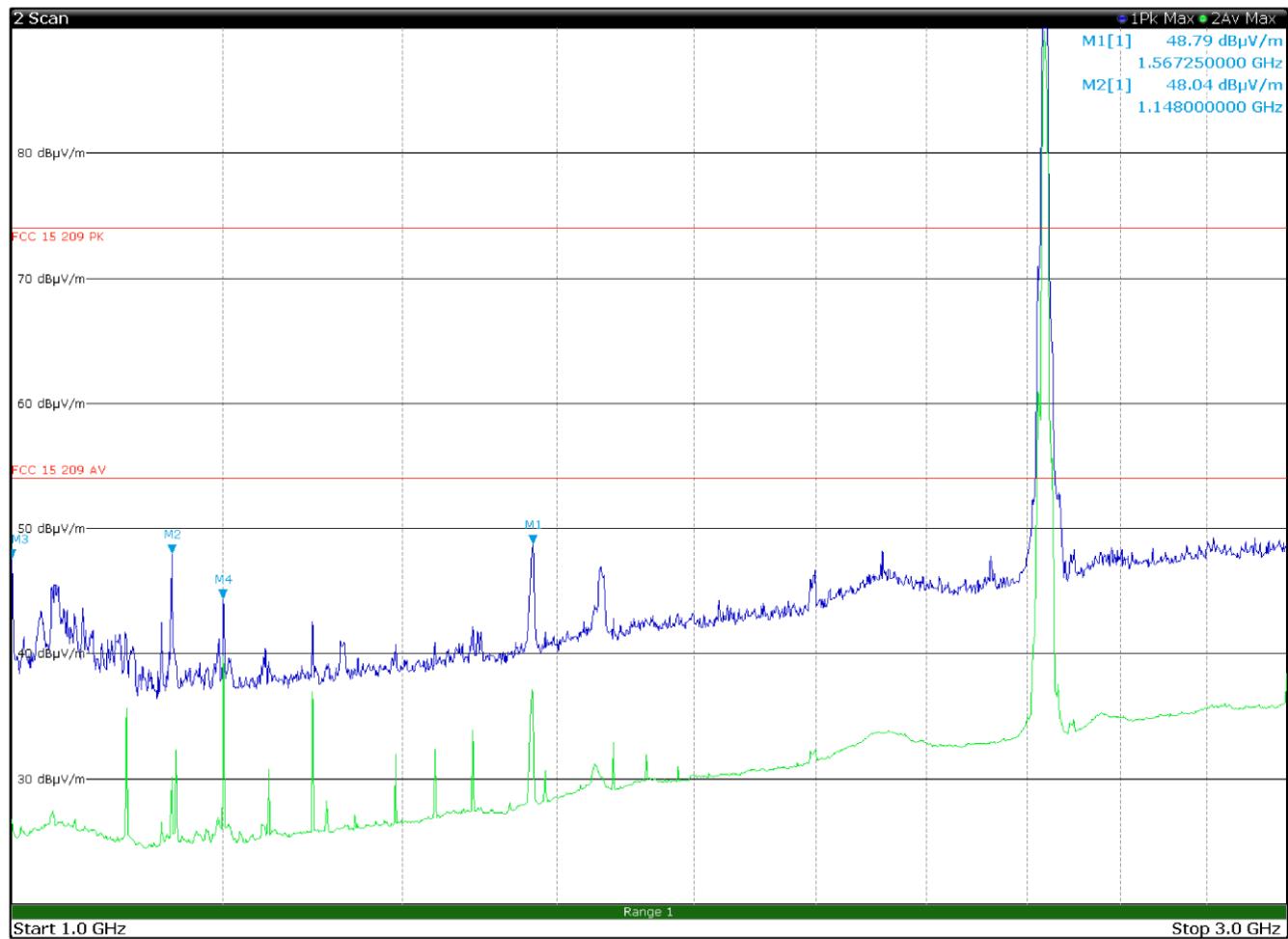
Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

3 Marker Table					
Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	1.567 GHz	51.37 dBµV/m
Scan	M2		1	1.663 GHz	47.79 dBµV/m
Scan	M3		1	1.0 GHz	47.29 dBµV/m
Scan	M4		1	1.039 GHz	45.69 dBµV/m

Limit exceeded by the carrier



8.1.4 Test data, continued

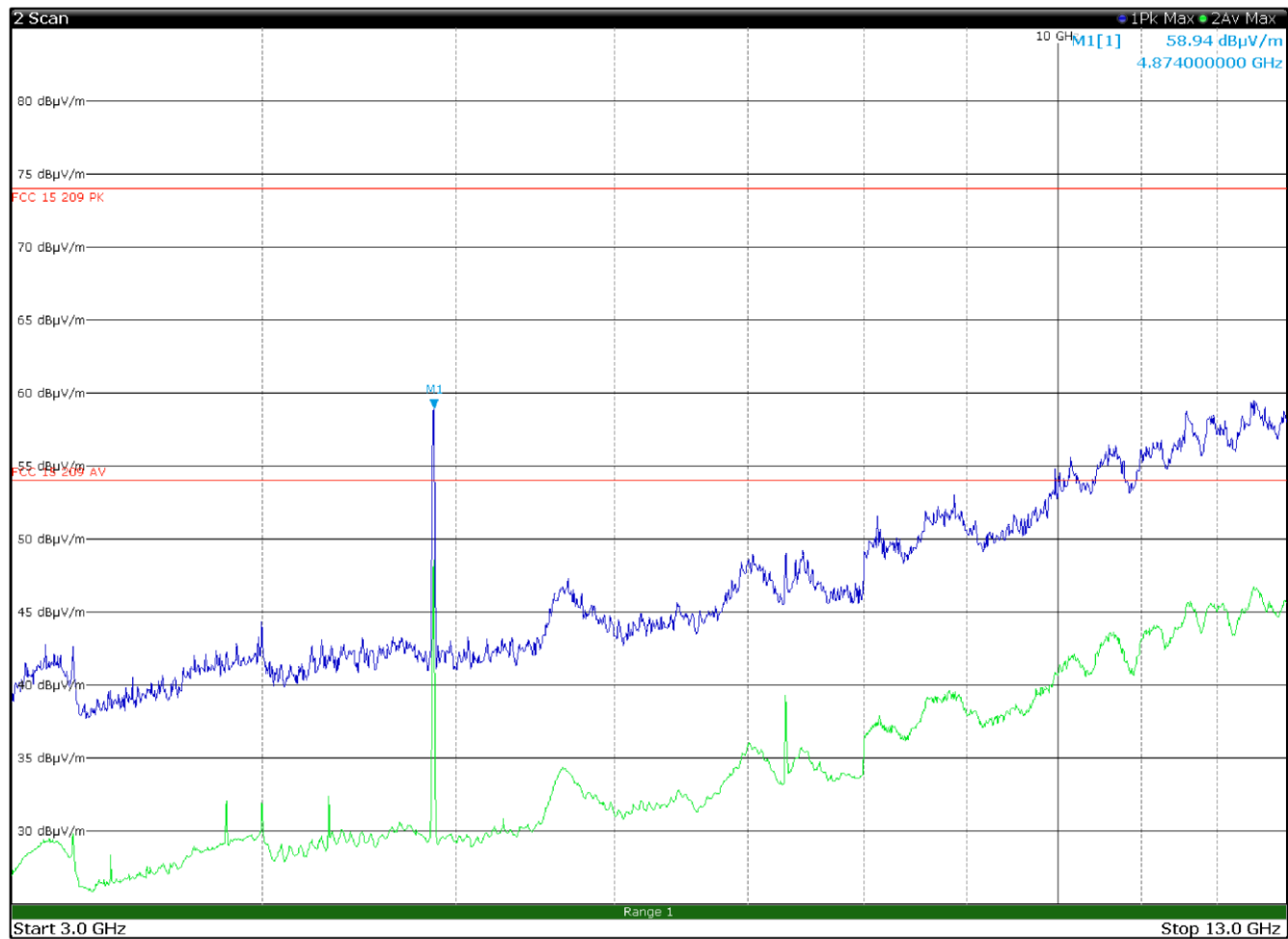


Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

3 Marker Table					
Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	1.56725 GHz	48.79 dBµV/m
Scan	M2		1	1.148 GHz	48.04 dBµV/m
Scan	M3		1	1.0 GHz	47.61 dBµV/m
Scan	M4		1	1.2 GHz	44.4 dBµV/m

Limit exceeded by the carrier

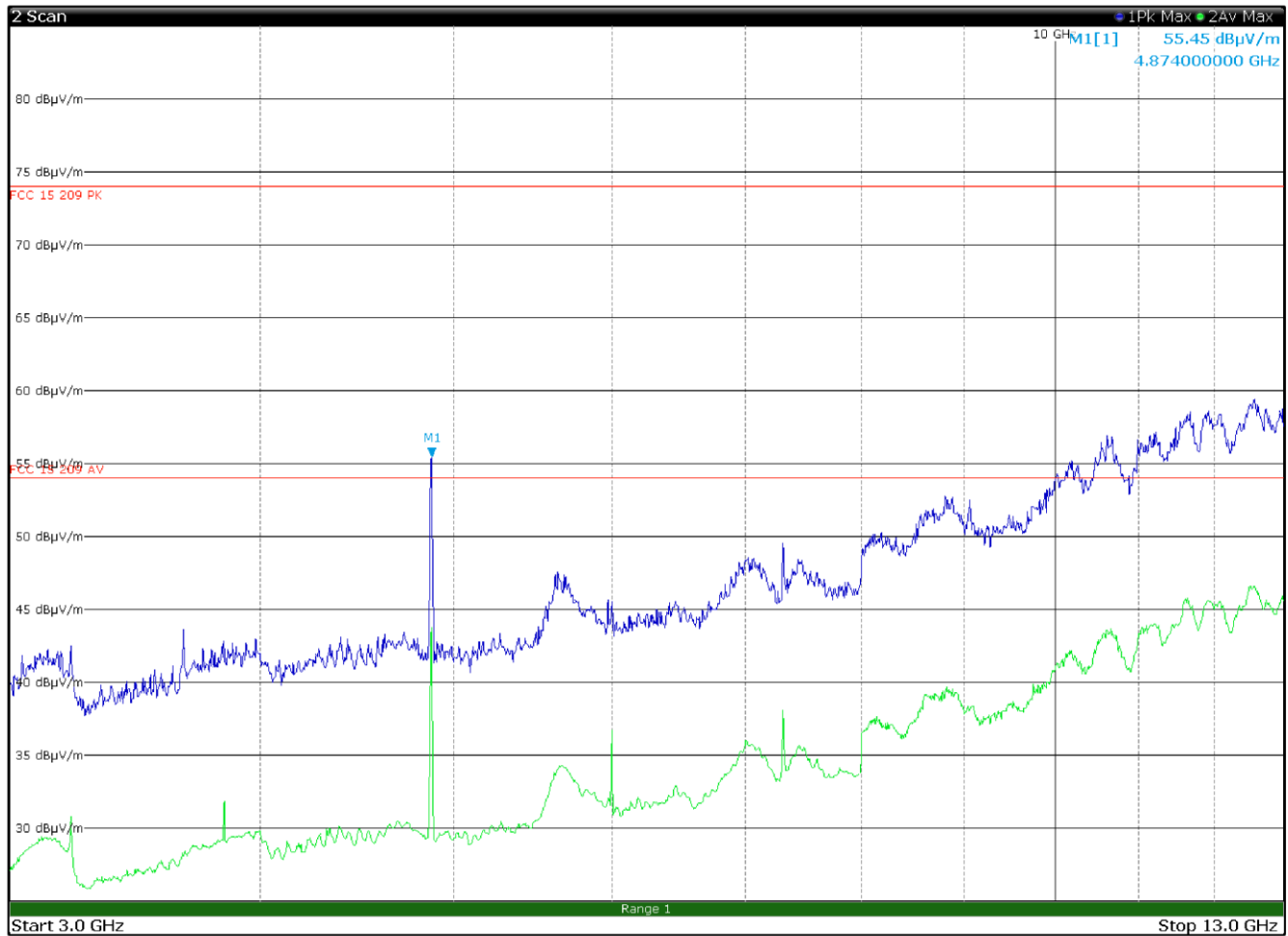
8.1.4 Test data, continued



Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

Frequency (GHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
4.8740	47.9	54.0	-6.1	AV
4.8740	59.0	74.0	-15.0	PK

## 8.1.4 Test data, continued

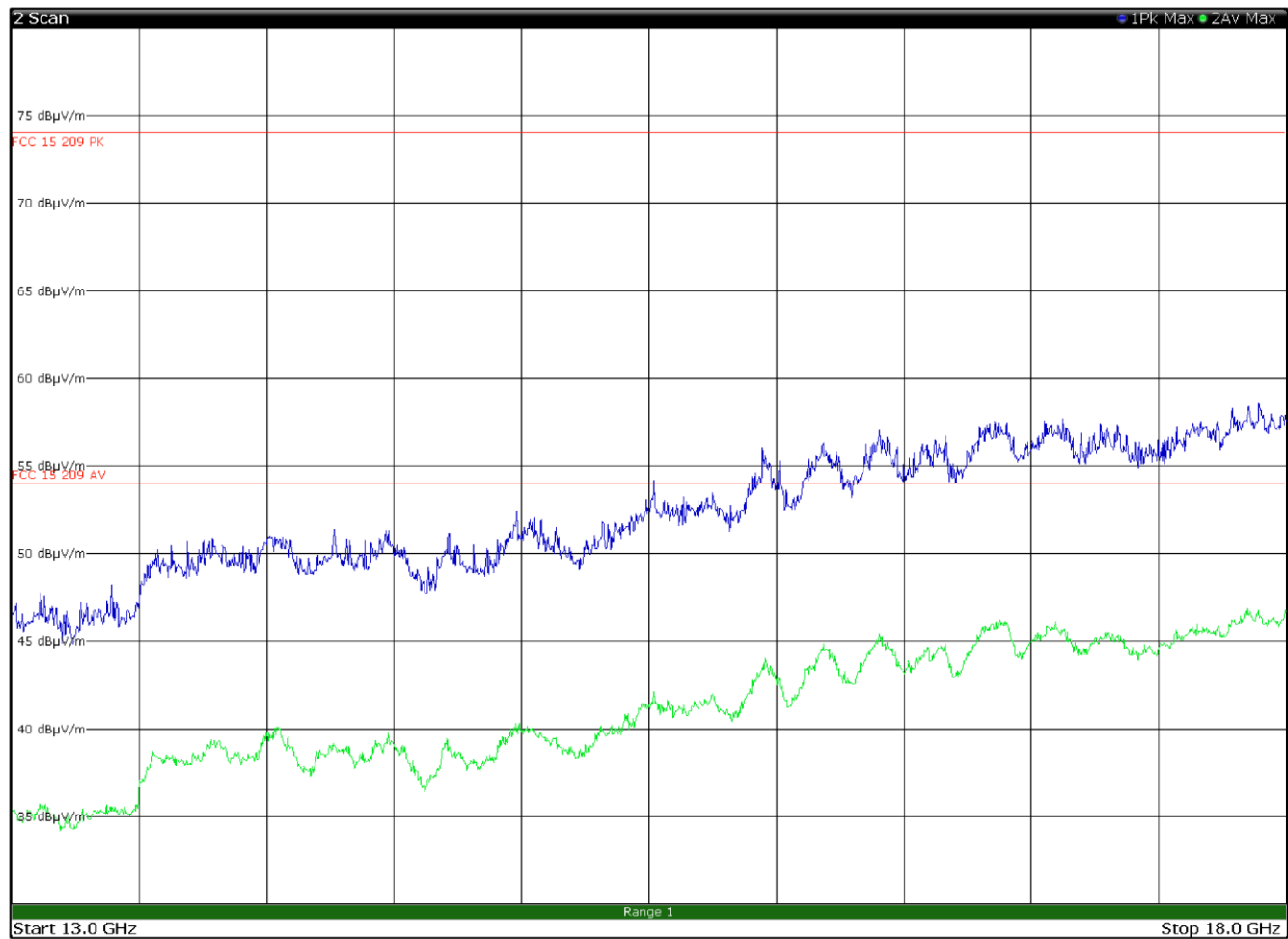


Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

Frequency (GHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
4.8740	43.2	54.0	-10.8	AV
4.8740	55.5	74.0	-18.5	PK

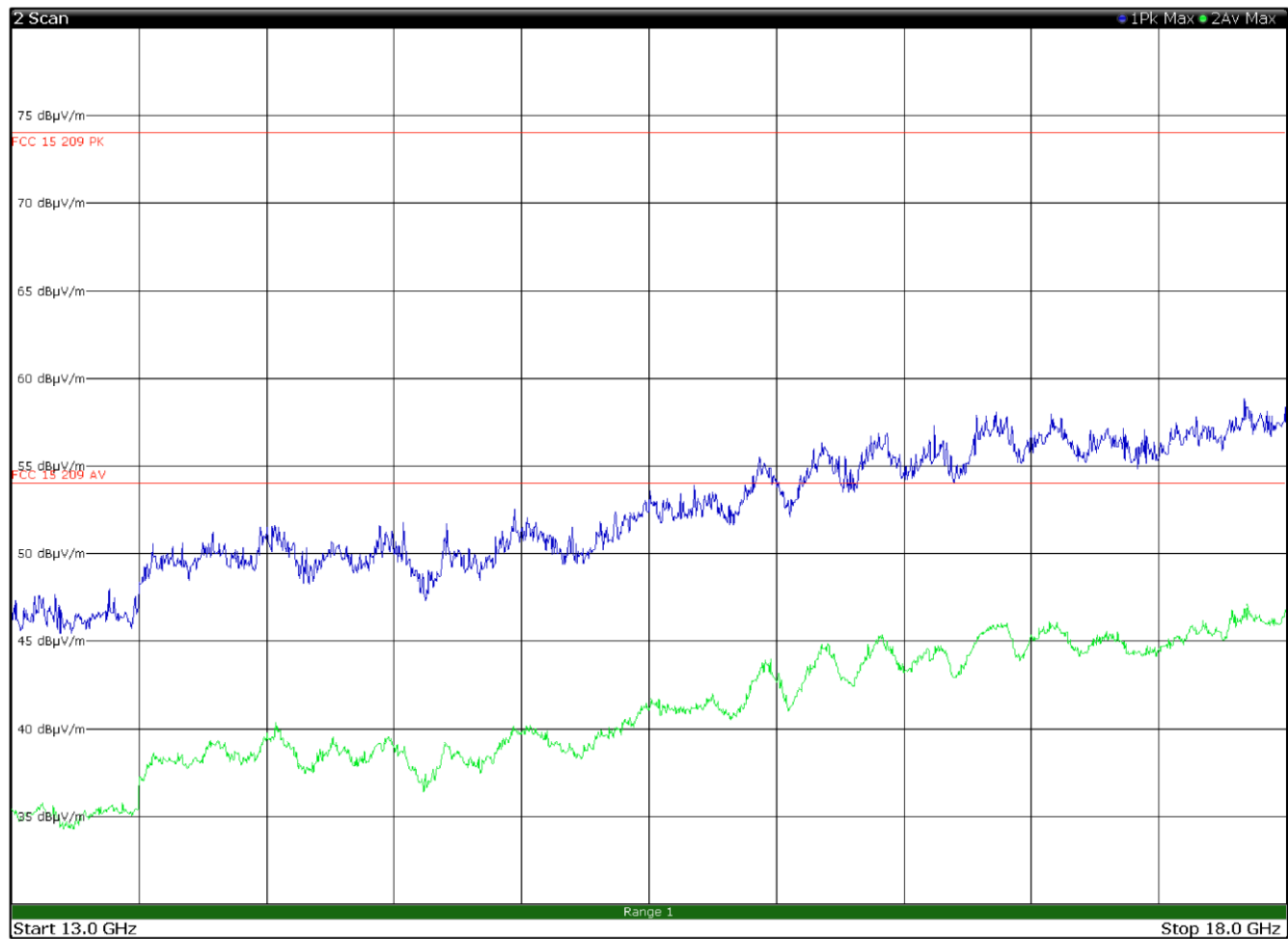


8.1.4 Test data, continued



Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

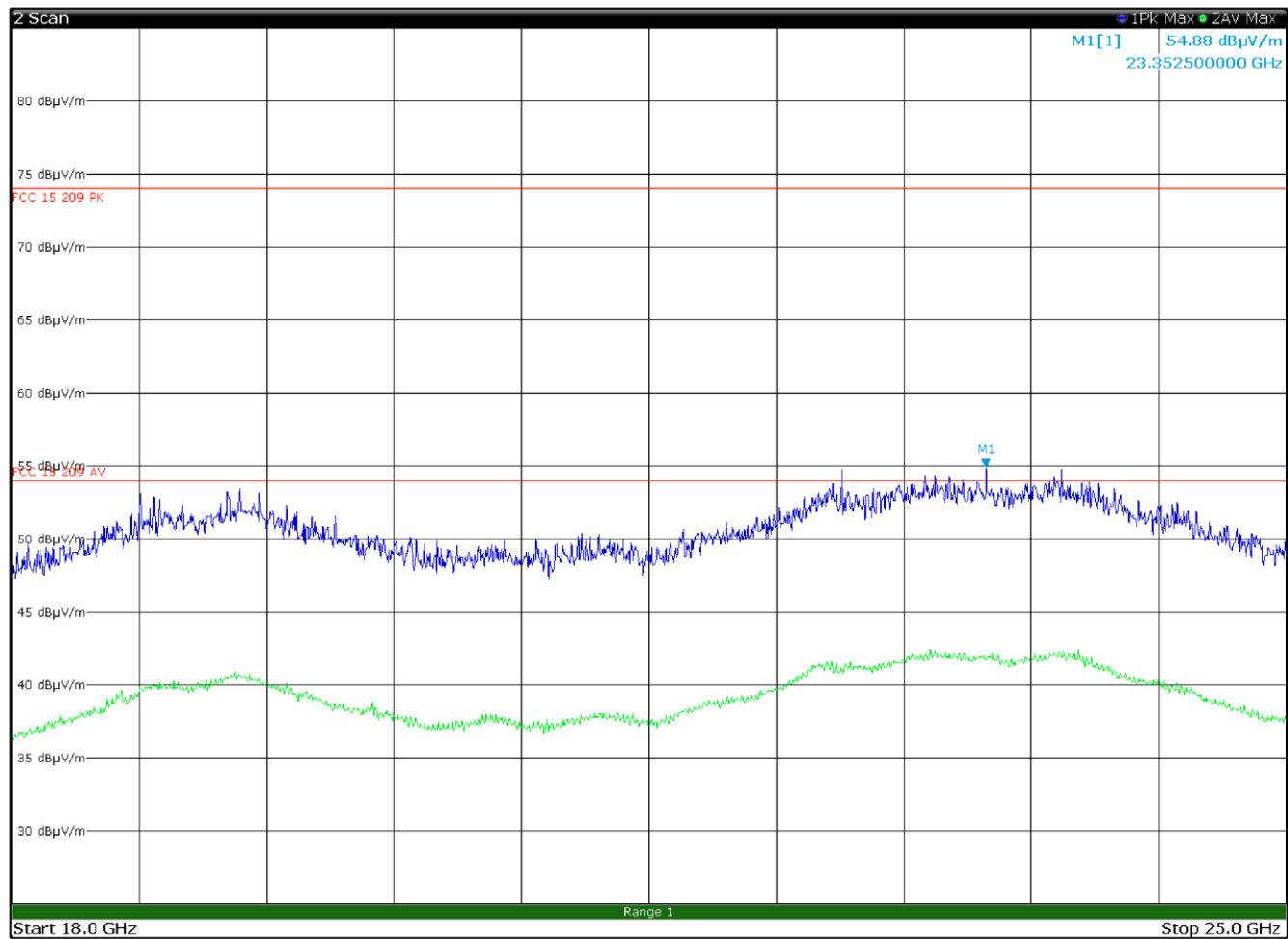
8.1.4 Test data, continued



Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz



8.1.4 Test data, continued

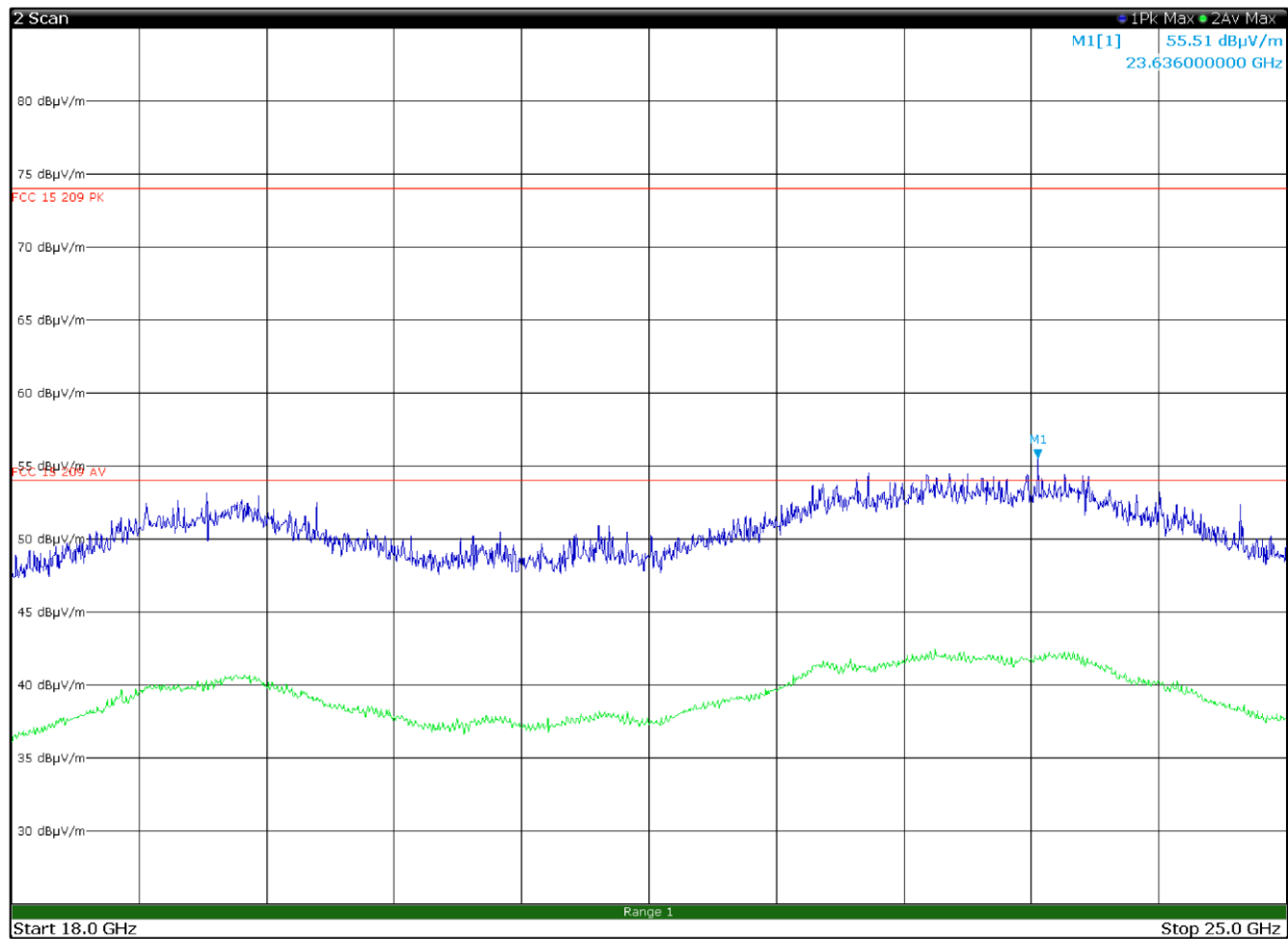


Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz



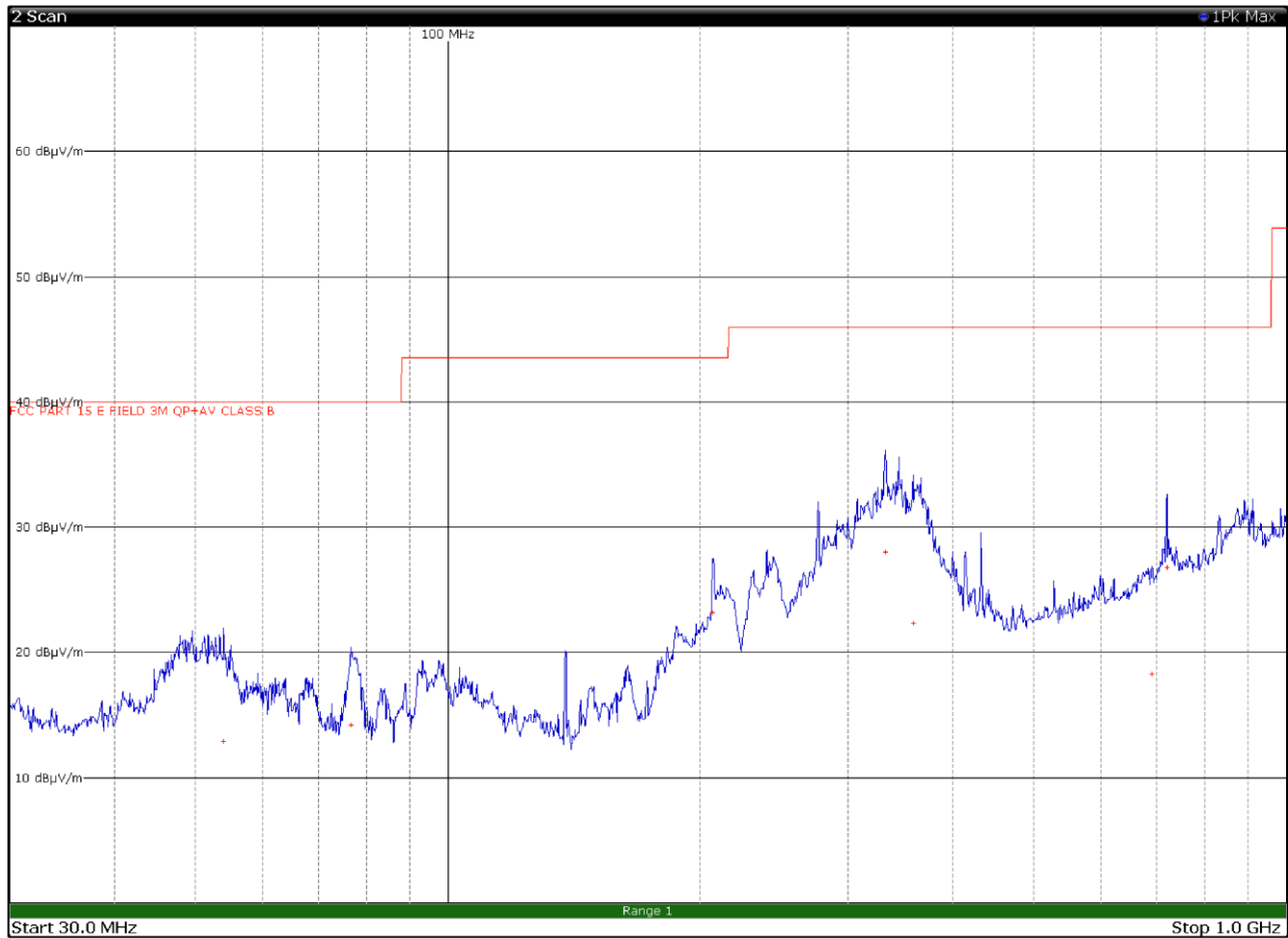


8.1.4 Test data, continued



Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 782 MHz and WIFI Tx at 2437 MHz

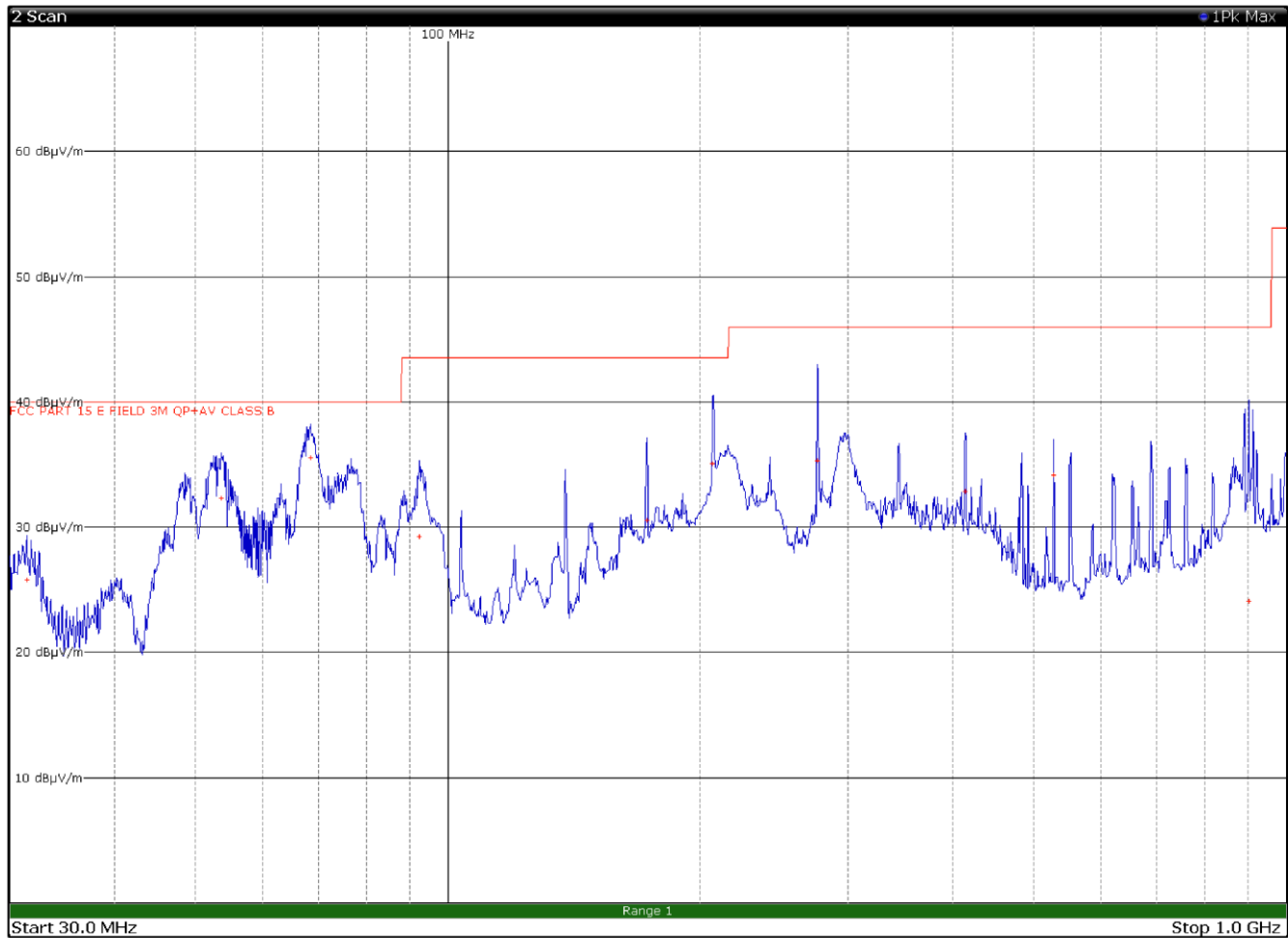
## 8.1.4 Test data, continued



Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
53.9400	12.9	40.0	-27.1	QP
76.6200	14.2	40.0	-25.8	QP
206.7900	23.2	43.5	-20.3	QP
332.4000	28.1	46.0	-17.9	QP
358.7400	22.4	46.0	-23.6	QP
691.7400	18.3	46.0	-27.7	QP
720.0000	26.9	46.0	-19.1	QP

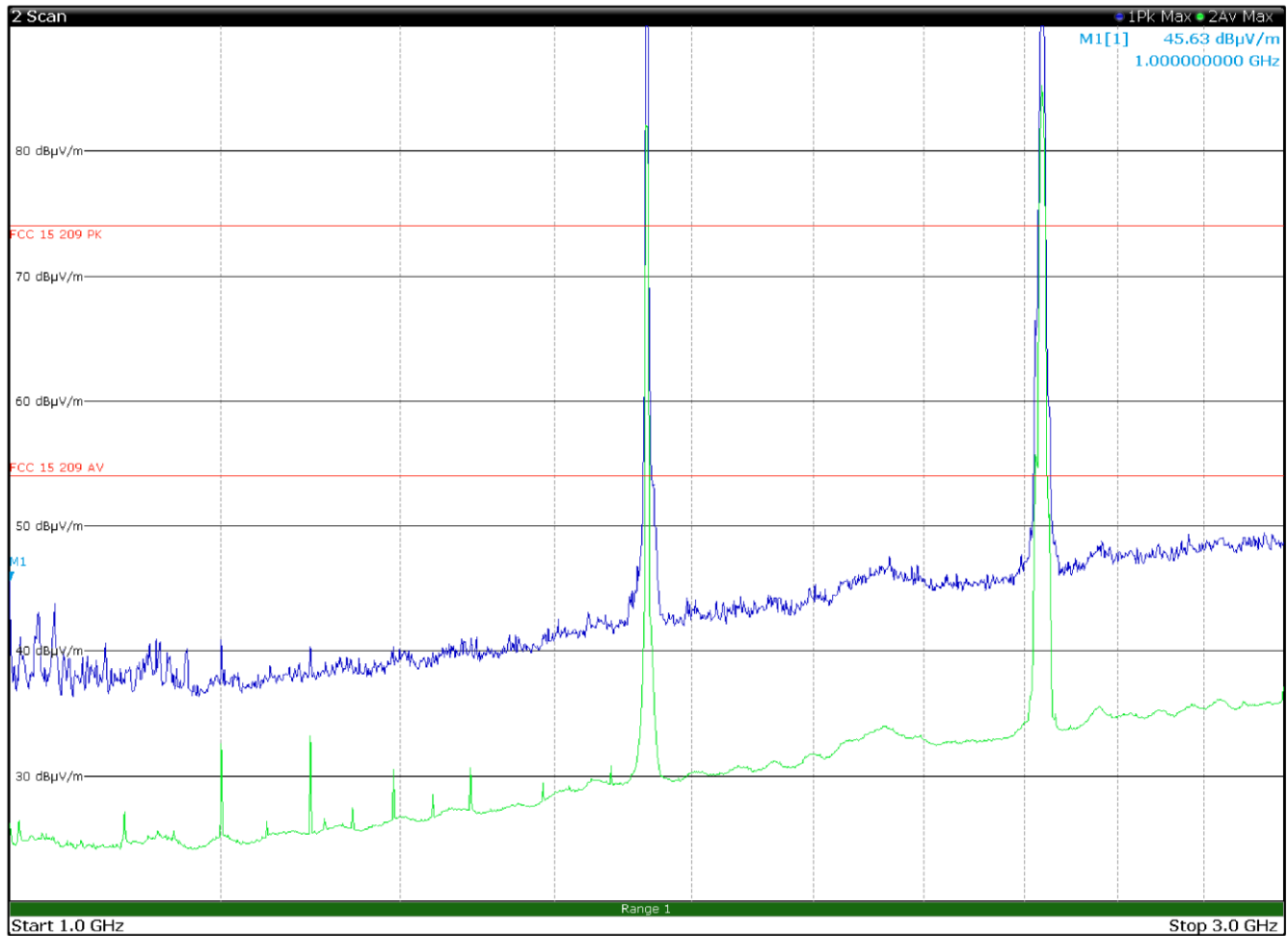
## 8.1.4 Test data, continued



Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
31.4400	25.8	40.0	-14.2	QP
53.5800	32.3	40.0	-7.7	QP
68.5800	35.6	40.0	-4.4	QP
92.4600	29.3	43.5	-14.2	QP
172.8900	30.6	43.5	-12.9	QP
206.8800	35.1	43.5	-8.4	QP
275.7000	35.3	46.0	-10.7	QP
413.5500	32.9	46.0	-13.1	QP
528.0000	34.2	46.0	-11.8	QP
902.0100	24.1	46.0	-21.9	QP

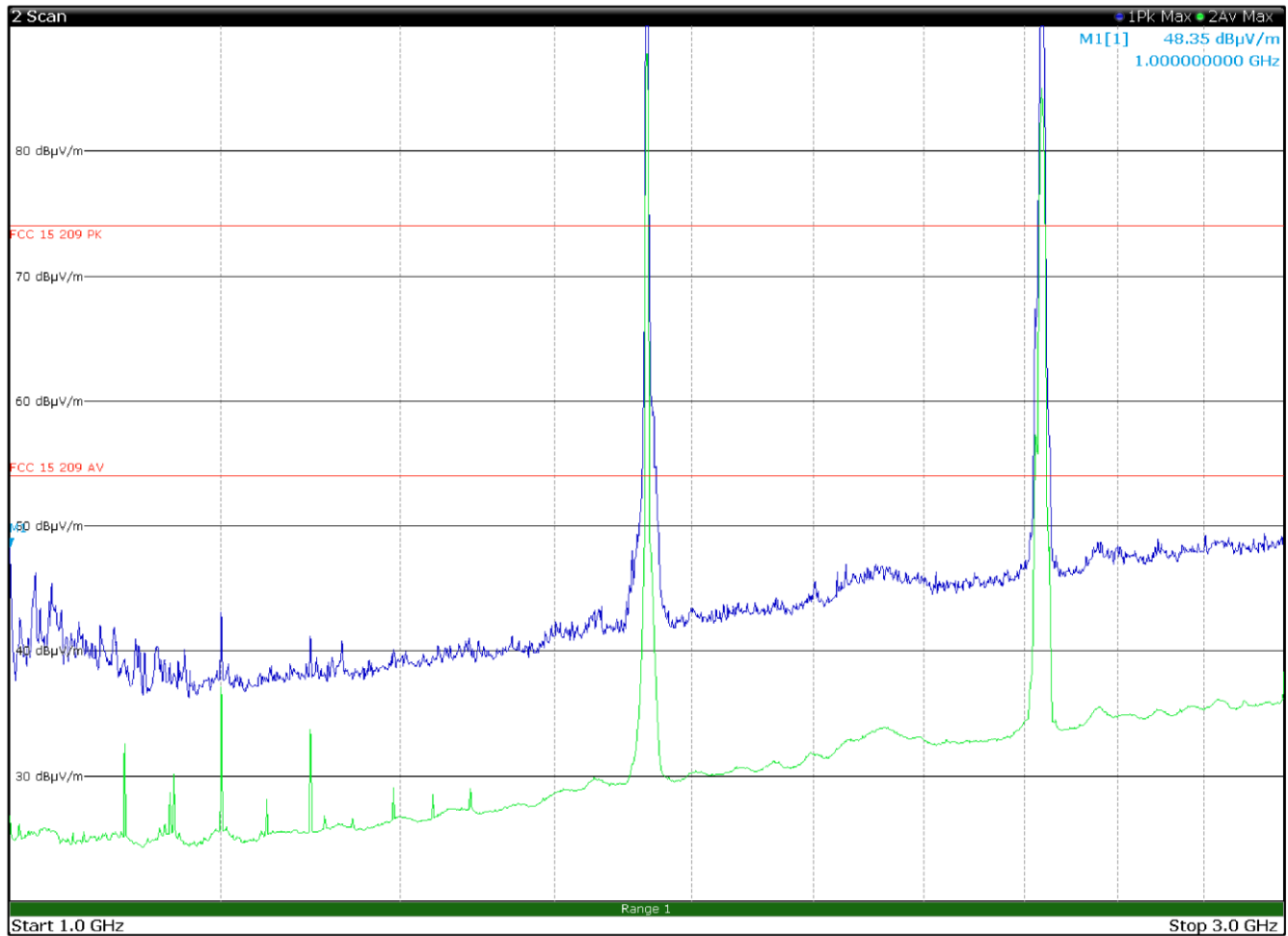
## 8.1.4 Test data, continued



Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz

Limit exceeded by the carrier

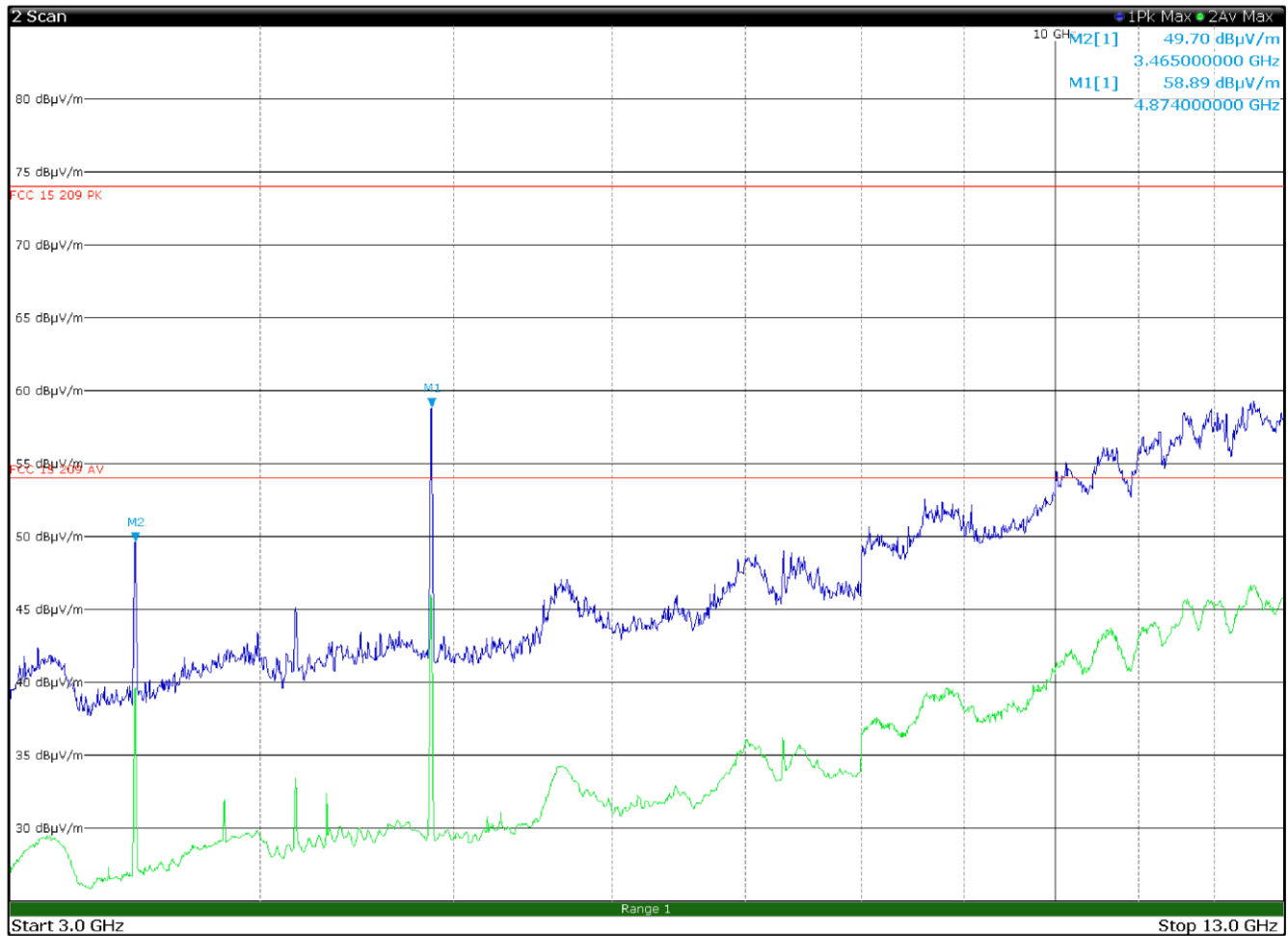
## 8.1.4 Test data, continued



Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz

Limit exceeded by the carrier

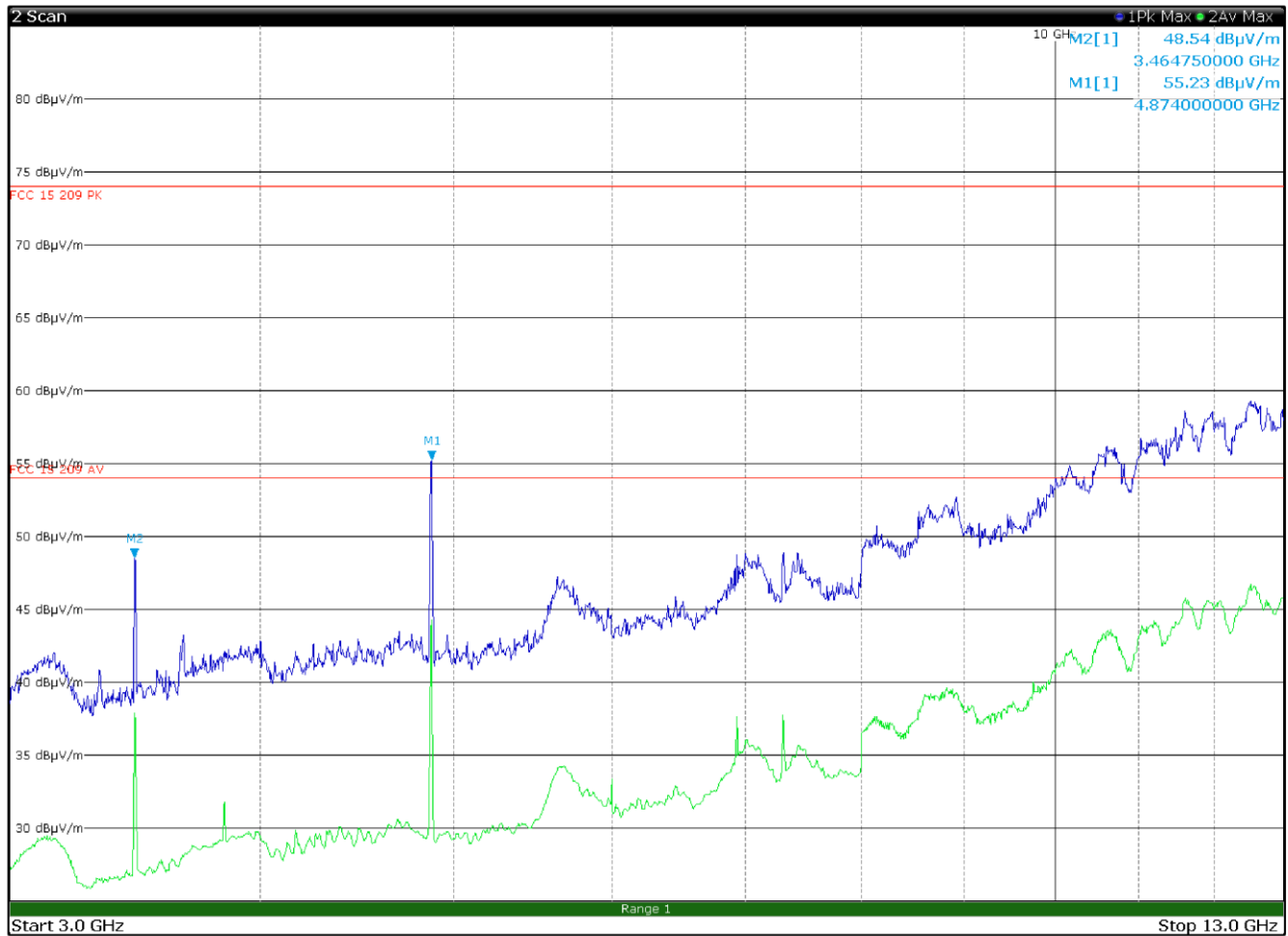
## 8.1.4 Test data, continued



Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz

Frequency (GHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
4.8740	47.5	54.0	-6.5	AV
4.8740	59.0	74.0	-15.0	PK

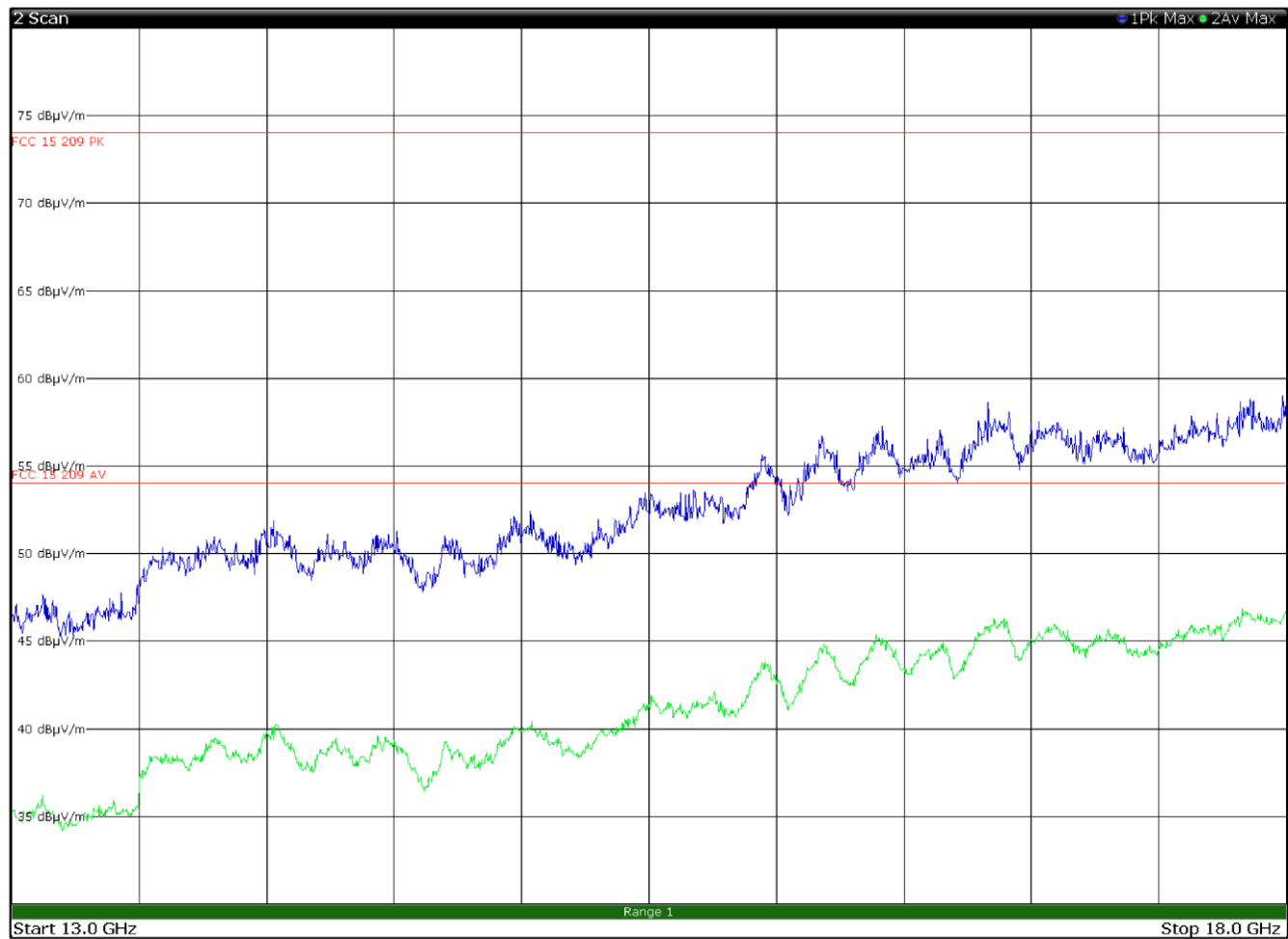
## 8.1.4 Test data, continued



Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz

Frequency (GHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
4.8740	43.0	54.0	-11.0	AV
4.8740	55.3	74.0	-18.7	PK

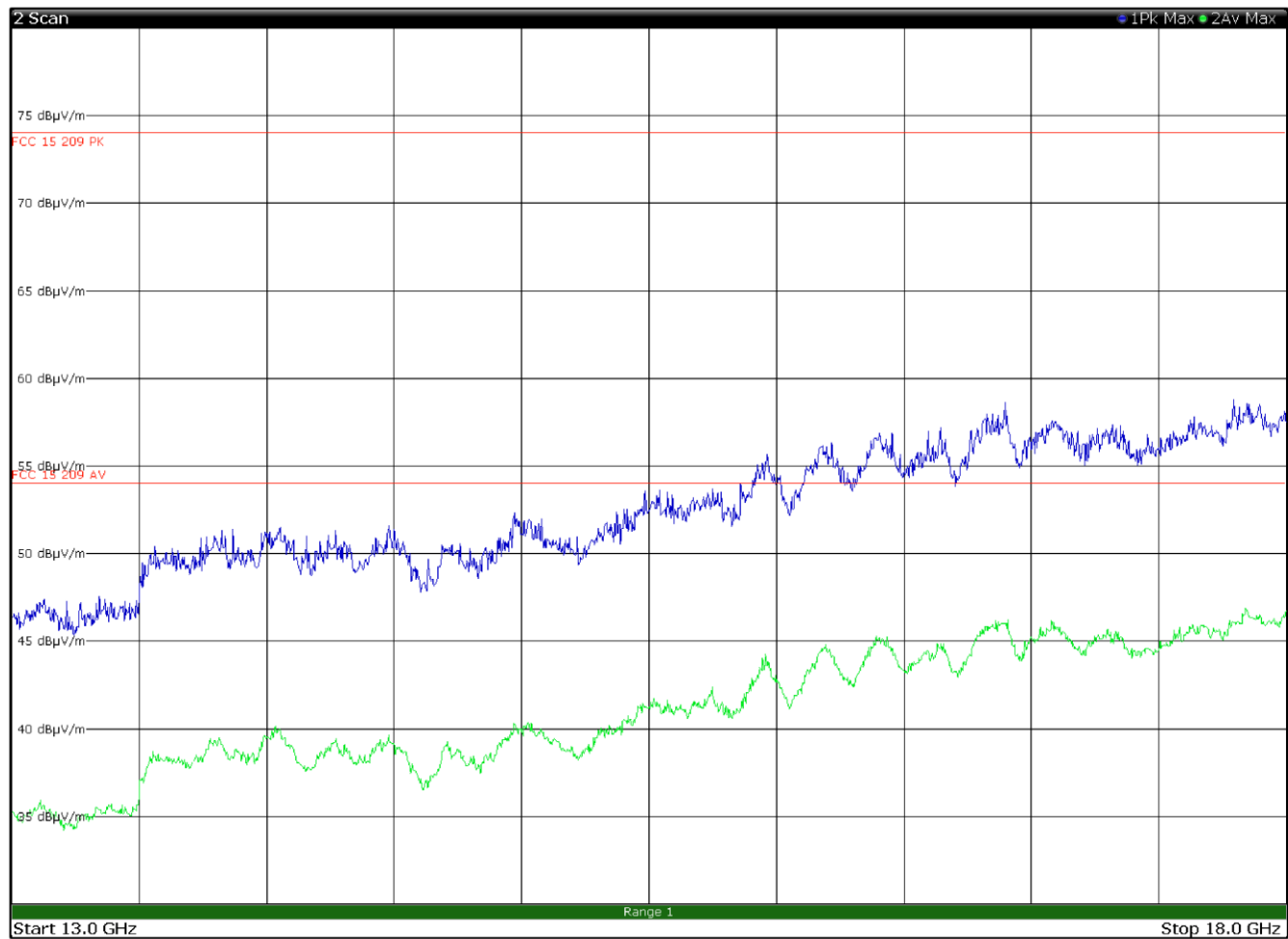
8.1.4 Test data, continued



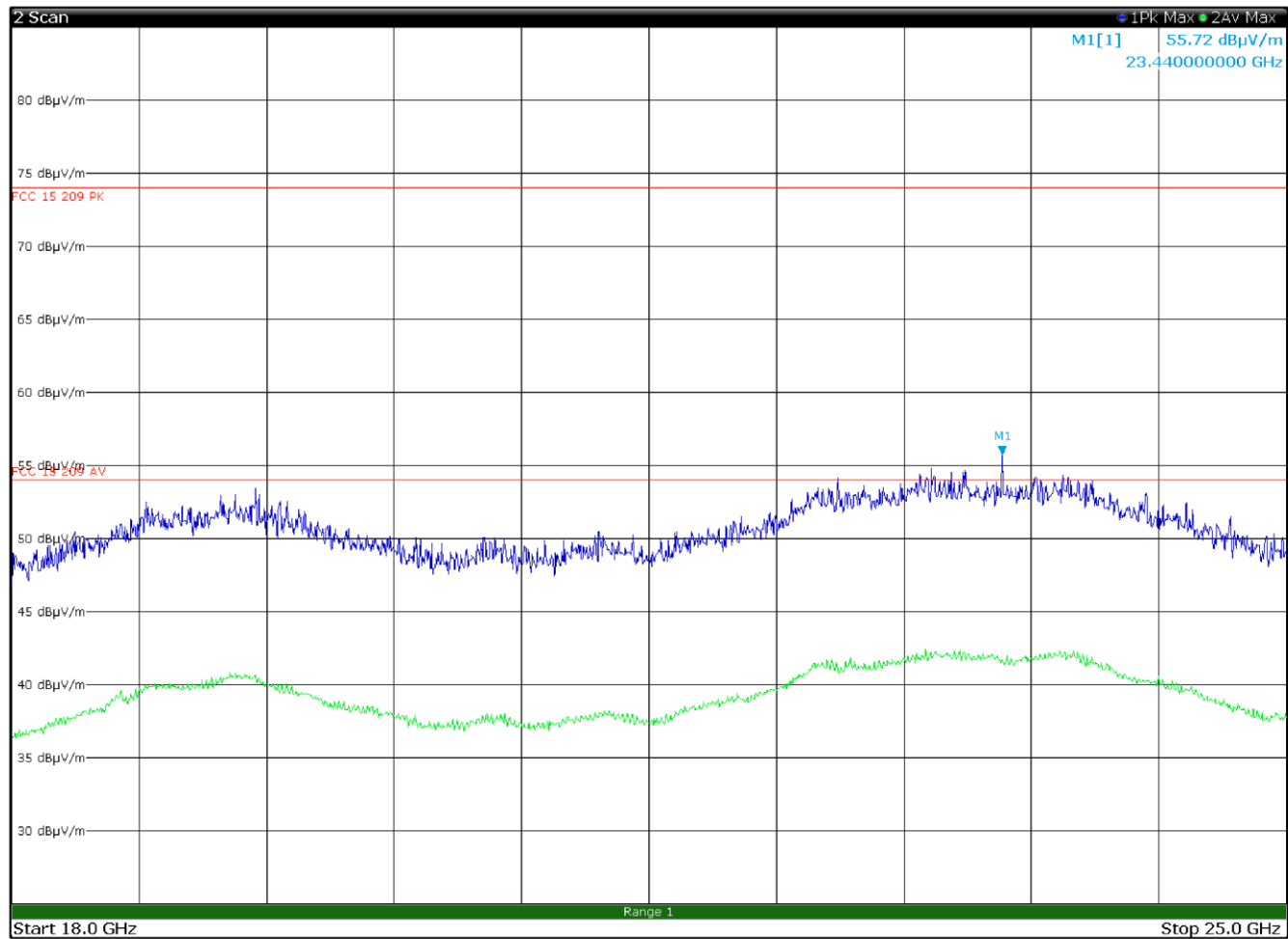
Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz



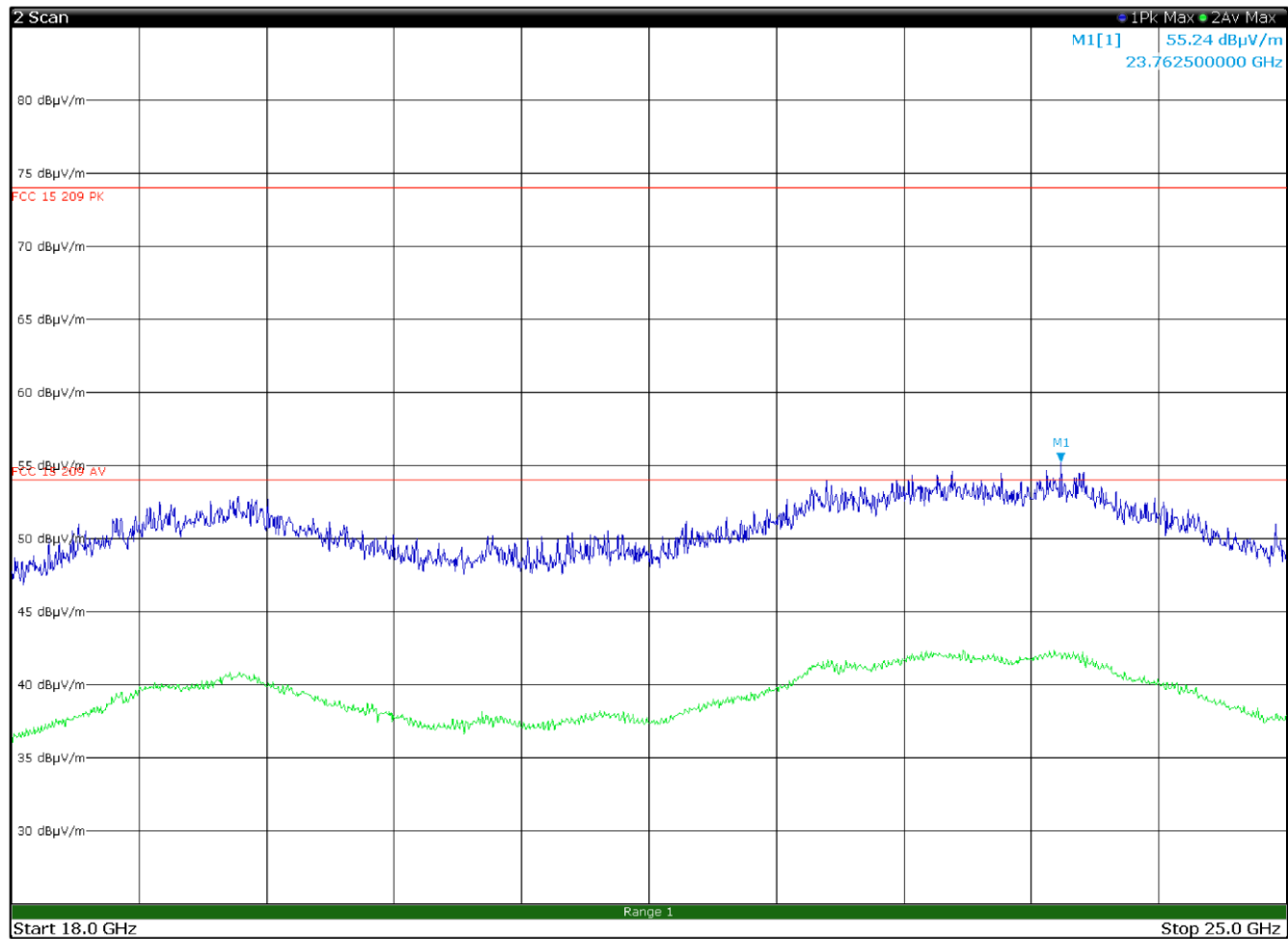
8.1.4 Test data, continued



Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz



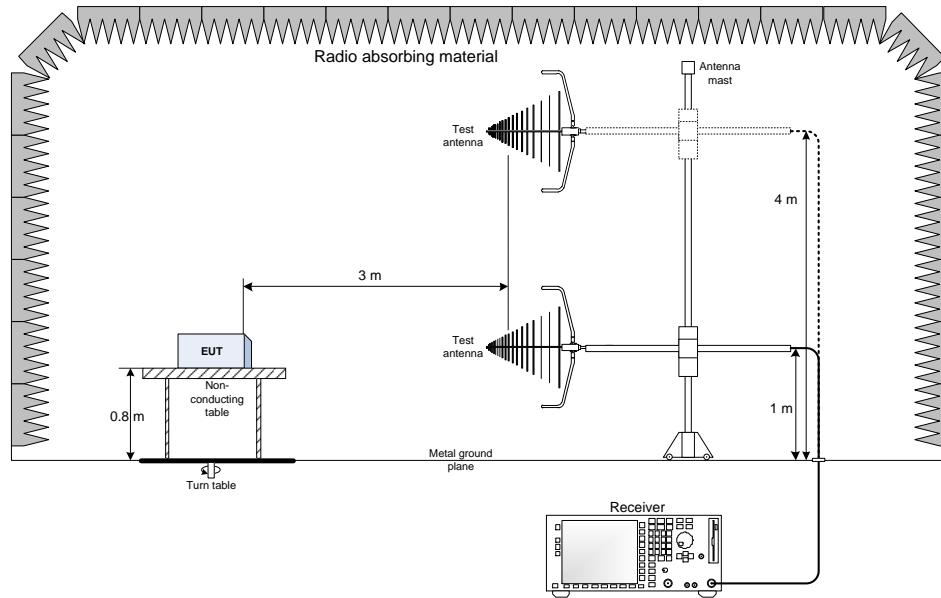
Radiated spurious emissions with antenna in horizontal polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz



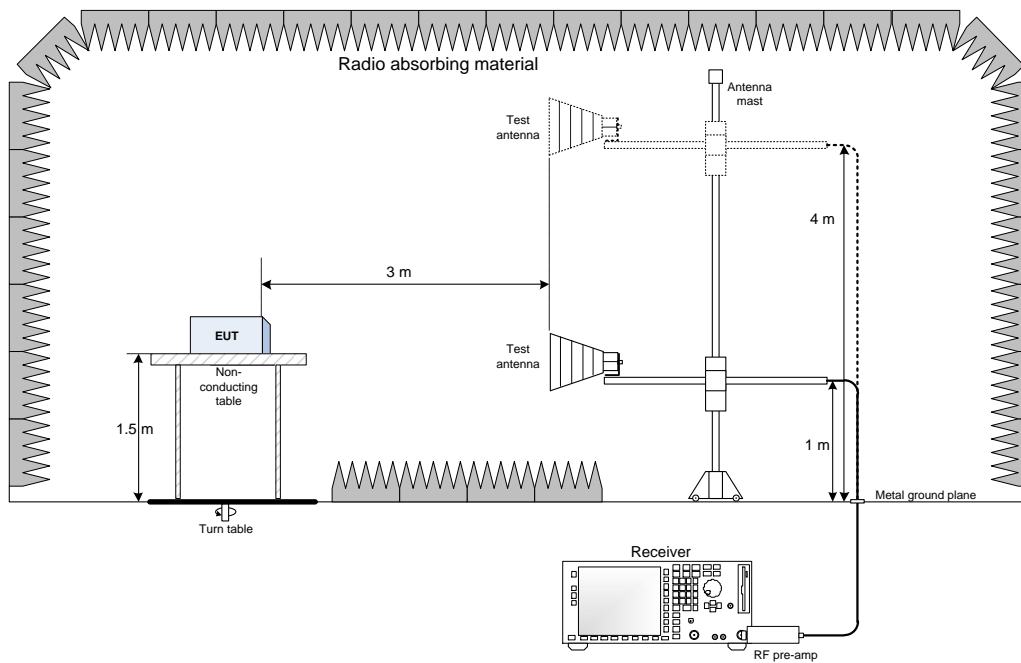
Radiated spurious emissions with antenna in vertical polarization and with  
LTE Tx at 1732.5 MHz and WIFI Tx at 2437 MHz

## 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



## Section 10. Photos

---

### 10.1 Photos of the test set-up

---



Set-up for radiated emission below 1 GHz



Set-up for radiated emission above 1 GHz

## 10.2 Photos of the EUT

---



(End of report)