ONE WORLD ○ OUR APPROVAL

Wireless test report – 409346-3TRFWL

Applicant:

Eurotech SpA

Product name:

ReliaGATE 10-12

DynaGATE 10-12

Model:

REGATE-10-12-GS04

Model variant:

DYGATE-10-12-GS04

FCC ID:

UKMMRG1012

IC Registration number:

21442-MRG1012

Specifications:

- FCC 47 CFR Part 15 Subpart E, §15.407

  Unlicensed National Information Infrastructure Devises

- RSS-247, Issue 2, Section 6, Feb 2017

  Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Date of issue: February 15, 2021

Tested by (name, function and signature)	S: Tessa	(project handler)	Signature:	Sara Tessa
Reviewed by (name, function and signature)	P.Barbieri	(verifier)	Signature:	Barb

Test location

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	www.nemko.com
Site number	FCC: 682159; IC: 9109A (10 m semi anechoic chamber)

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 Spa ISO/IEC 17025 accreditation.

Copyright notification

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Eurotech SpA
Address	Via Fratelli Solari 3/a 33020 Amaro, UD, Italy

1.2 Test specifications

FCC 47 CFR Part 15, Subpart E, Clause 15.407 RSS-247, Issue 2, February 2017	Unlicensed National Information Infrastructure Devises Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

1.3 Test methods

789033 D02 General UNII Test Procedures New Rules v02r01 (Dec 14, 2017)	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. 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

None

1.6 Test report revision history

Revision #	Date of issue	Details of changes made to test report
409346-3TRFWL	February 15, 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
§15.31(e)	Variation of power source	Pass[1]
§15.203	Antenna requirement	Pass[2]

Notes: [1]Measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, was performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. No noticeable output power variation was observed

[2]The Antennas uses a unique coupling to the intentional radiator.

2.2 FCC Part 15 Subpart E, test results

Part	Test description	Verdict
§15.403(i)	Emission bandwidth	Pass
§15.407(a)(1)	Power and density limits within 5.15–5.25 GHz band	Pass
§15.407(a)(2)	Power and density limits within 5.25–5.35 GHz and 5.47–5.725 GHz bands	Not applicable
§15.407(a)(3)	Power and density limits within 5.725–5.85 GHz band	Not applicable
§15.407(b)(1)	Undesirable emission limits for 5.15–5.25 GHz band	Pass
§15.407(b)(2)	Undesirable emission limits for 5.25–5.35 GHz band	Not applicable
§15.407(b)(3)	Undesirable emission limits for 5.47–5.725 GHz bands	Not applicable
§15.407(b)(4)	Undesirable emission limits for 5.725–5.85 GHz band	Not applicable
§15.407(b)(6)	Conducted limits for U-NII devices using an AC power line	Pass
§15.407(e)	Minimum 6 dB bandwidth of U-NII devices within the 5.725-5.85 GHz band	Not applicable
§15.407(g)	Frequency stability	Pass
§15.407(h)(1)[1]	Transmit power control (TPC)	Not applicable
§15.407(h)(2)[1]	Dynamic Frequency Selection (DFS)	Not applicable

Note: [1]DFS and TPC requirements are only applicable to 5.25–5.35 GHz and 5.47–5.725 GHz bands

2.3 IC RSS-GEN, Issue 5, test results

Part	Test description	Verdict
6.6	Occupied Bandwidth	Pass
7.1.2[1]	Receiver radiated emission limits	Not applicable
7.1.3[1]	Receiver conducted emission limits	Not applicable
8.8	Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus	Pass
8.11[2]	Frequency stability	Pass

Notes: [1]According to sections 5.2 and 5.3 of RSS-Gen, Issue 4: if EUT does not have a stand-alone receiver neither scanner receiver, then it exempt from receiver requirements.

[2]According to section 8.11 of RSS-Gen, Issue 4: if the frequency stability of the licence-exempt radio apparatus is not specified in the applicable standard (RSS), measurement of the frequency stability is not required

2.4 IC RSS-247, Issue 2, test results

Section	Test description	Verdict
6.1[1]	Types of Modulation	Pass
6.2.1.1	Power limits for 5150–5250 MHz band	Pass
6.2.2.1	Power limits for 5250–5350 MHz band	Not applicable
6.2.3.1	Power limits for 5470–5600 MHz and 5650–5725 MHz bands	Not applicable
6.2.4.1	Power limits for 5725–5850 MHz band	Not applicable
6.2.4.1	Minimum 6 dB bandwidth	Not applicable
6.2.1.2	Unwanted emission limits for 5150–5250 MHz band	Pass
6.2.2.2	Unwanted emission limits for 5250–5350 MHz band	Not applicable
6.2.2.2	TPC requirements for devices with a maximum e.i.r.p. greater than 500 mW	Not applicable
6.2.2.3	e.i.r.p. at different elevations restrictions for 5250–5350 MHz band	Not applicable
6.2.3.2	Unwanted emission limits for 5470–5600 MHz and 5650–5725 MHz bands	Not applicable
6.2.4.2	Unwanted emission limits for 5725–5850 MHz band	Not applicable
6.3	Dynamic Frequency Selection (DFS) for devices operating in the bands 5250–5350 MHz, 5470–5600 MHz and 5650–5725 MHz	Not applicable

Notes: [1] The EUT employs digital modulation: 802.11a/n

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	December 22, 2020
Nemko sample ID number	4093460001 and 4093460002

3.2 EUT information

Product name	ReliaGATE 10-12
Model	REGATE-10-12-GS04
Model variant	DYGATE-10-12-GS04
Serial number	Y120HKA0082 and Y119LKA0010

3.3 Technical information

RSS number and Issue number	RSS-247 Issue 2, Section 6, February 2017
Frequency band	5150–5250 MHz
Frequency Min (MHz)	5180 (20 MHz channel); 5190 (40 MHz channel)
Frequency Max (MHz)	5240 (20 MHz channel); 5230 (40 MHz channel)
RF power Max (W), Conducted	18.2 mW (12.6 dBm for 20 MHz channel)
Measured BW (MHz) (26 dB)	23.2 MHz for 20 MHz channel
Measured BW (MHz) (99%)	16.7 MHz for 20 MHz channel
Type of modulation	802.11a/n
Emission classification (F1D, G1D, D1D)	W7D
Equipment Class	NII
Transmitter spurious, Units @ distance	58.6 dBµV/m @ 3 m
Power requirements	24 $V_{DC,}$ via 120 V_{AC} adapter or battery
Antenna information	The EUT uses a unique antenna coupling. EUT has 2 antenna configurations as following

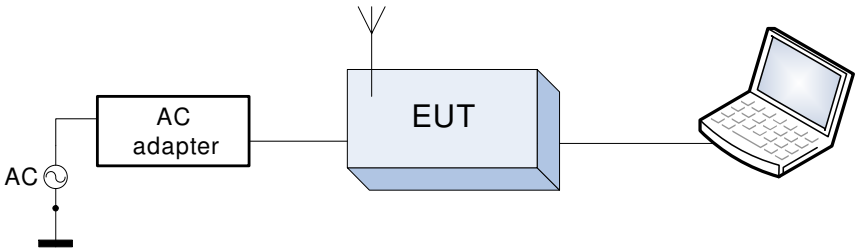
Configuration 1

NOTES	VENDOR	MODEL	BANDS	Peak Gain (dBi)	VSWR
CELLULAR / LTE	2J-ANTENNA	2J5424P	698-960 MHz 1710-2170 MHz 2500-2700 MHz	1.8 / 2.4 / 2.1	2.7 / 2.1 / 2.0
WiFi / BT	2J-ANTENNA	2J4802P	2410-2490 MHz 4920-5925 MHz	3.2 / 4.2	1.3 / 1.3
GPS	2J-ANTENNA	2J4301MPGF	1575.42-1606 MHz		NA

Configuration 2

NOTES	VENDOR	MODEL	BANDS	Peak Gain (dBi)	VSWR
CELLULAR / LTE	2J-ANTENNA	2JW0124-C868B	698-960 MHz 1710-2170 MHz 2500-2700 MHz	0.4 / 2.6 / 1.3	2.4 / 1.6 / 2.2
WiFi / BT	LINX Technologies	ANT-DB1-RAF-RPS	2.40–2.483 MHz 5.15–5.825 GHz	2.5 / 4.6	<1.9
GNSS	2J-ANTENNA	2J4301MPGF	1575.42-1606 MHz		NA

3.4 EUT setup diagram



3.5 Product description and theory of operation

The ReliaGATE and DynaGATE 10-12 are loT Edge Gateways that have been designed to deliver LTE connectivity (with 3G fallback) to industrial and lightly rugged applications. Based on the TI AM335x Cortex-A8 (Sitara) processor family, with 1 GB of RAM, 4 GB of eMMC and user-accessible MicroSD and dual Micro-SIM slots, the ReliaGATE and DynaGATE 10-12 are low power gateways suitable for demanding use cases. They support a 6 to 36 V power supply with transient protection and ignition sense, two protected RS-232/RS-485 serial ports, two CAN bus interfaces, three noise and surge protected USB ports, and four isolated digital interfaces

3.6 EUT sub assemblies

Table 3.6-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number
ReliaGATE 10-12	Eurotech	REGATE-10-12-GS04	Y120HKA0082
AC adapter	Sunny	SYS1541-2424	None

3.7 EUT exercise details

EUT was set to continuously transmit mode during tests, by test software provided by client.
The EUT runs a Linux operating system which allows for the testing to be performed using engineering test tools and scripts. Communication with the EUT is via a serial console or Ethernet connection which provides a Linux command line interface for execution of the test tools/scripts. These tools/scripts configure the radio modules to enable continuous transmission with the ability to adjust modulation, frequency and output power as required.

Linux operating system version: 4.9.57-eurotech-ti.

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

The EUT has two WIFI standard and two channel bandwidths; 802.11a with 20 MHz bandwidth standard is chosen to be the representative worst-case due to higher output power.

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

In the laboratory, the following ambient conditions are respected for each test reported below:

Temperature	18 – 33 °C
Relative humidity	25 – 70 %
Air pressure	860 – 1060 mbar

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model no.	Asset no.	Cal date	Next cal.
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305	2020-12	2022-12
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703	2020-12	2022-12
Barometer	Castle	GPB 3300	072015	2020-03	2021-03

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 ±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)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	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)

EUT	Type	Test	Range	Measurement Uncertainty	Notes
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)
		Sensitivity measurement	1 MHz ÷ 18 GHz	6.0 dB	(1)
	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)

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	2020-08	2021-08
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESW44	101620	2020-08	2021-08
Trilog Antenna (30 MHz ÷ 7 GHz)	Schwarzbeck	VULB 9162	9162-025	2018-07	2021-07
Bilog antenna (1 ÷ 18 GHz)	Schwarzbeck	STLP 9148	9148-123	2018-07	2021-07
Preamplifier (1 ÷ 18 GHz)	Schwarzbeck	BBV 9718	9718-137	2020-09	2021-09
Horn antenna (18 ÷ 40 GHz)	A.H. System	SAS-574	558	2020-01	2023-01
Preamplifier (18 ÷ 40 GHz)	SAGE	STB-1834034030-KFKF-L1	18490-01	2020-03	2021-03
LISN three phase (9 kHz ÷30 MHz)	Rohde & Schwarz	ESH2-Z5	872 460/041	2020-08	2021-08
Controller	Maturo	FCU3.0	10041	NCR	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR	NCR
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2019-09	2021-09
Shielded room	Siemens	10m control room	1947	NCR	NCR
Climatic chamber	Espec	ARS-1100	4100000067	2021-01	2022-01
Shielded room	Siemens	Conducted emission test room	1862	NCR	NCR

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

Section 8. Testing data

8.1 FCC 15.403(i) Emission bandwidth

8.1.1 Definitions and limits

15.403(i) For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

8.1.2 Test summary

Test start date	January 19, 2021

8.1.3 Observations, settings and special notes

Spectrum analyzer settings:

Resolution bandwidth	approximately 1% of EBW
Video bandwidth	> RBW
Detector mode	Peak
Trace mode	Max Hold

8.1.4 Test equipment list

Table 8.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESW44	101620	2020-08	2021-08
Shielded room	Siemens	Conducted emission test room	1862	NCR	NCR

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

8.1.5 Test data

Table 8.1-2: *26 dB bandwidth results*

Modulation	Frequency, MHz	26 dB bandwidth, MHz
802.11a	5180	23.2
	5200	22.2
	5240	22.8

8.1.4 Test data, continued

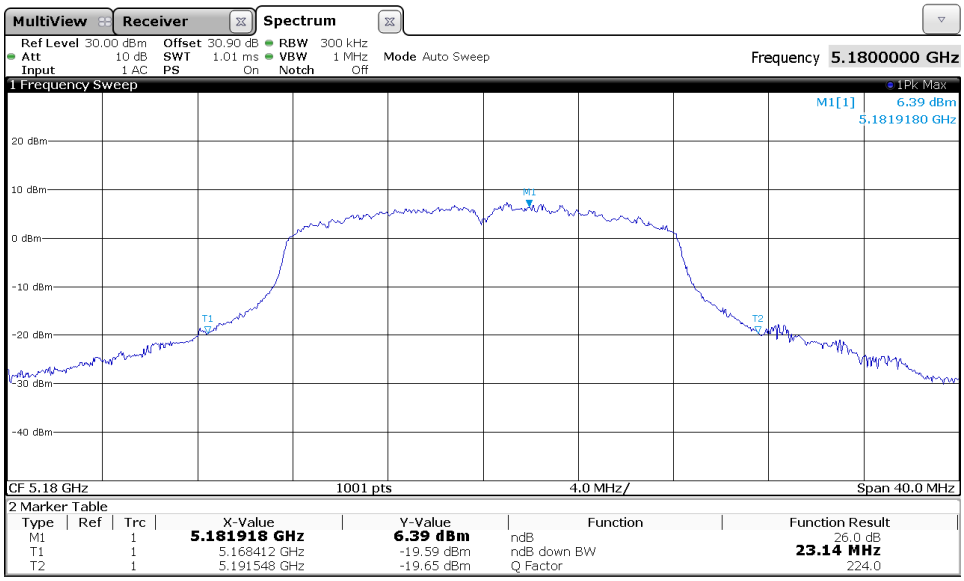


Figure 8.1-1: *26 dB bandwidth on 802.11a, low channel*

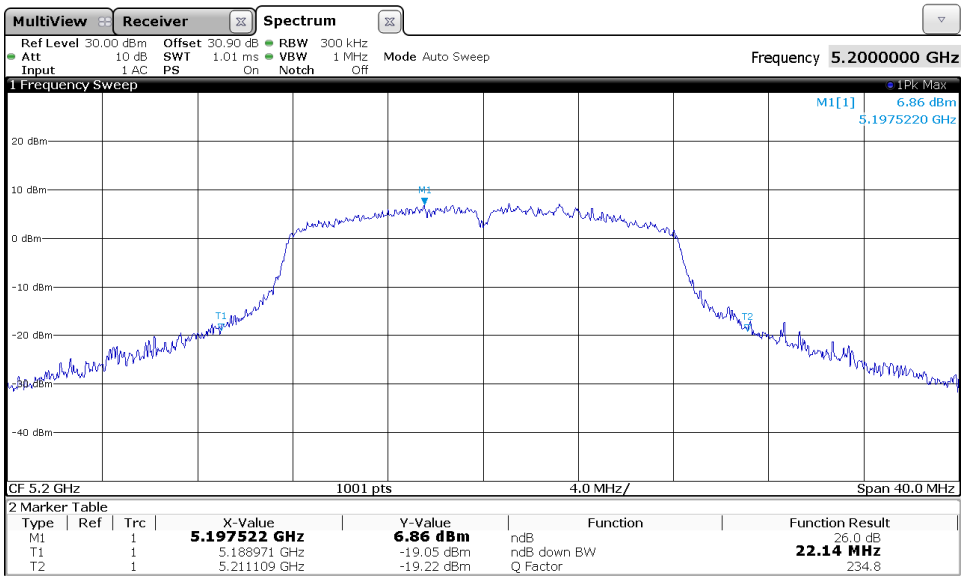


Figure 8.1-2: *26 dB bandwidth on 802.11a, mid channel*

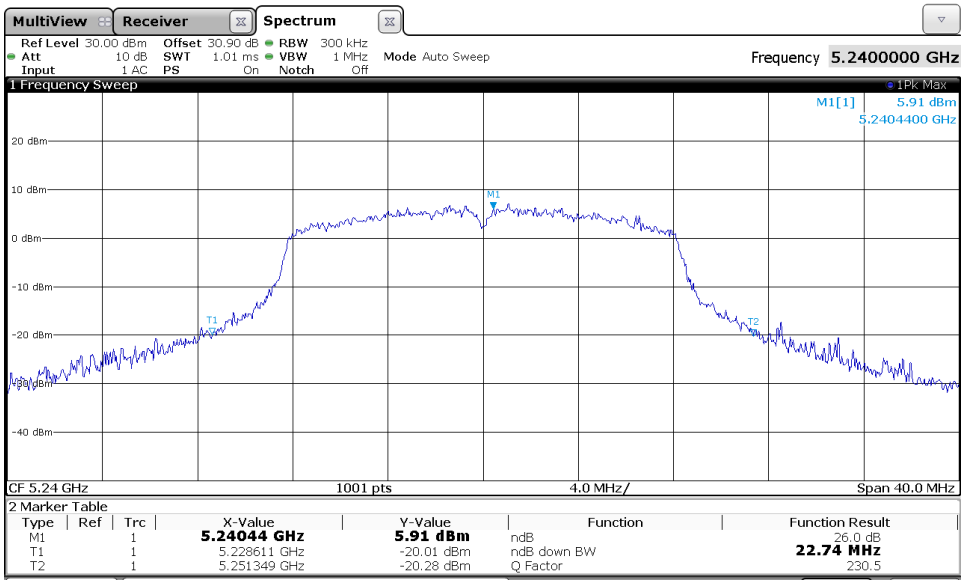


Figure 8.1-3: *26 dB bandwidth on 802.11a, high channel*

8.2 RSS-Gen 6.6 Occupied bandwidth

8.2.1 Definitions and limits

The emission bandwidth (×dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated × dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3× the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

8.2.2 Test summary

Test start date	January 19, 2021

8.2.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth:	1 % to 5 % of OBW
Video bandwidth:	≥3 × RBW
Detector mode:	Peak
Trace mode:	Max Hold

8.2.4 Test equipment list

Table 8.2-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESW44	101620	2020-08	2021-08
Shielded room	Siemens	Conducted emission test room	1862	NCR	NCR

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

8.2.5 Test data

Table 8.2-2: *99 % bandwidth results*

Modulation	Frequency, MHz	99 % bandwidth, MHz
802.11a	5180	16.7
	5200	16.7
	5240	16.7

Note: 99% bandwidth is verified for ISED requirement that it does not fall within the 5250-5350 MHz band.

8.2.4 Test data, continued

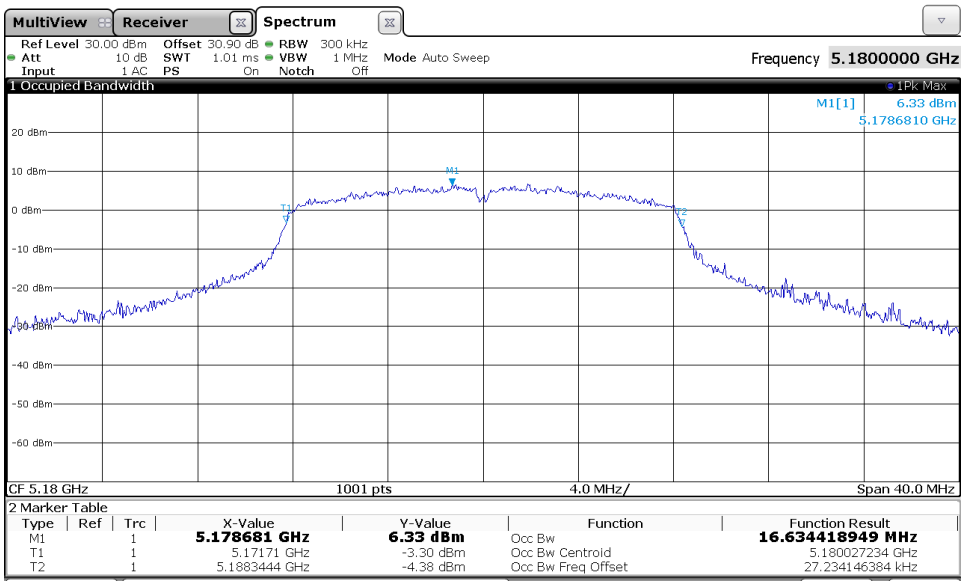


Figure 8.2-1: *99 % bandwidth on 802.11a, low channel*

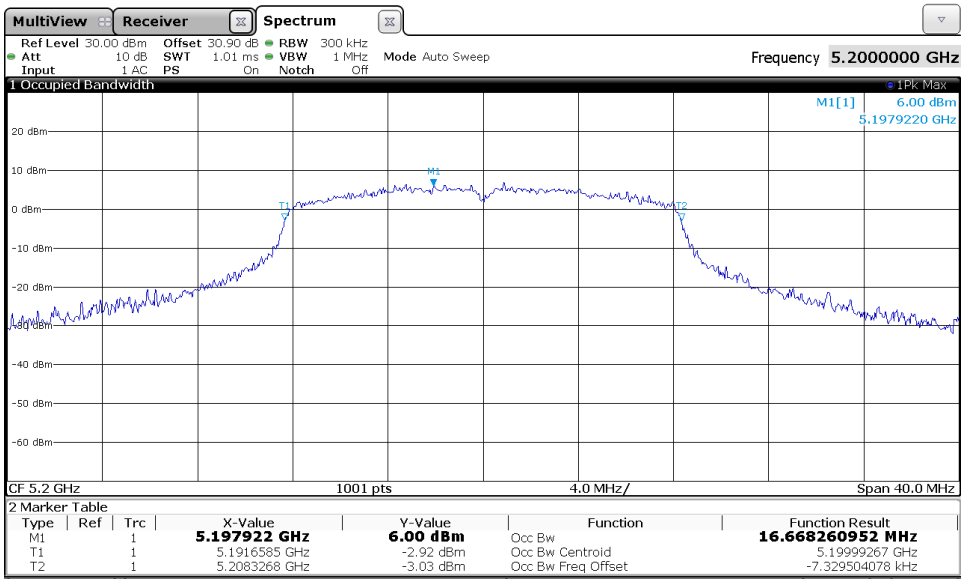


Figure 8.2-2: *99 % bandwidth on 802.11a, mid channel*

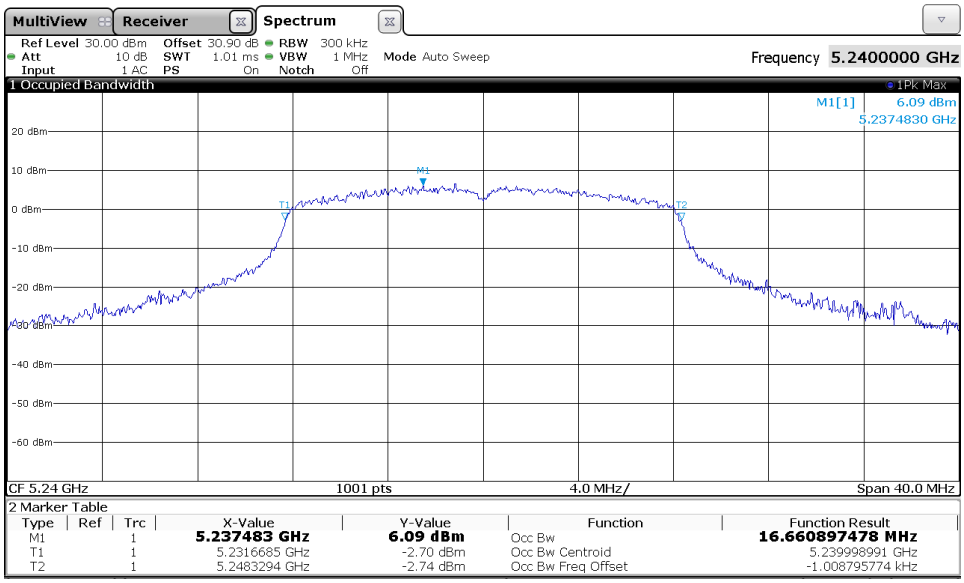


Figure 8.2-3: *99 % bandwidth on 802.11a, high channel*

8.3 FCC 15.407(a)(1) 5.15–5.25 GHz band output power and spectral density limits

8.3.1 Definitions and limits

FCC:

(i) For an outdoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30 dBm) provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30 dBm) provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30 dBm). In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24 dBm) provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

ISED:

LE-LAN devices are restricted to indoor operation only in the band 5150–5250 MHz.

The maximum e.i.r.p. shall not exceed 200 mW (23 dBm) or $10 + 10 \times \log_{10}(B)$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

8.3.2 Test summary

Test start date:	January 19, 2021

8.3.3 Test equipment list

Table 8.3-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESW44	101620	2020-08	2021-08
Shielded room	Siemens	Conducted emission test room	1862	NCR	NCR

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

8.3.4 Observations, settings and special notes

As per manufacturer declaration, EUT is for indoor fix operation only. EUT was configured to continuous transmit mode during tests.
Output power was tested using RMS power meter.
The highest and lowest data rate setting have been investigated, only the worst-cases were presented.

Spectrum analyzer settings for PSD measurement:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Frequency span	> EBW
Detector mode	RMS
Trace mode	Power Averaging over 100 sweeps

EIRP was calculated as follows: $EIRP = P_{combined} + antenna\ directional\ gain$

Output power/EIRP/PSD limit adjustment: Output power/EIRP/PSD limit – (Total antenna gain – 6 dBi).

FCC Output power limit is 30 dBm
FCC PSD limit is 17 dBm/MHz
ISED e.i.r.p limit is 200 mW (23 dBm) or $10 + 10 \times \log_{10}(B)$, dBm, whichever power is less.
ISED PSD limit is 10 dBm/MHz e.i.r.p

8.3.5 Test data

Table 8.3-2: *FCC Output power measurements results*

Modulation	Frequency, MHz	Output power, dBm	Power limit, dBm	Margin, dB
802.11a	5180	12.6	30.0	-17.4
	5200	12.6	30.0	-17.4
	5240	12.3	30.0	-17.7

Table 8.3-3: *ISED e.i.r.p measurements results for antenna configuration 1*

Modulation	Frequency, MHz	Output power, dBm	Antenna Gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
802.11a	5180	12.6	4.2	16.8	22.2	-5.4
	5200	12.6	4.2	16.8	22.2	-5.4
	5240	12.3	4.2	16.5	22.2	-5.7

Table 8.3-4: *ISED e.i.r.p measurements results for antenna configuration 2*

Modulation	Frequency, MHz	Output power, dBm	Antenna Gain, dBi	EIRP, dBm	EIRP limit, dBm	Margin, dB
802.11a	5180	12.6	4.6	17.2	22.2	-5.0
	5200	12.6	4.6	17.2	22.2	-5.0
	5240	12.3	4.6	16.9	22.2	-5.3

Table 8.3-5: *FCC PSD measurements results*

Modulation	Frequency, MHz	PSD, dBm/MHz	Limit, dBm/MHz	Margin, dB
802.11a	5180	0.7	17.0	-16.3
	5200	1.1	17.0	-15.9
	5240	1.0	17.0	-16.0

Table 8.3-6: *ISED PSD measurements results for antenna configuration 1*

Modulation	Frequency, MHz	Conducted PSD, dBm/MHz	Antenna Gain, dBi	PSD, dBm/MHz e.i.r.p	Limit, dBm/MHz	Margin, dB
802.11a	5180	0.7	4.2	4.9	10	-5.1
	5200	1.1	4.2	5.3	10	-4.7
	5240	1.0	4.2	5.2	10	-4.8

Table 8.3-7: *ISED PSD measurements results for antenna configuration 2*

Modulation	Frequency, MHz	Conducted PSD, dBm/MHz	Antenna Gain, dBi	PSD, dBm/MHz e.i.r.p	Limit, dBm/MHz	Margin, dB
802.11a	5180	0.7	4.6	5.3	10	-4.7
	5200	1.1	4.6	5.7	10	-4.3
	5240	1.0	4.6	5.6	10	-4.4

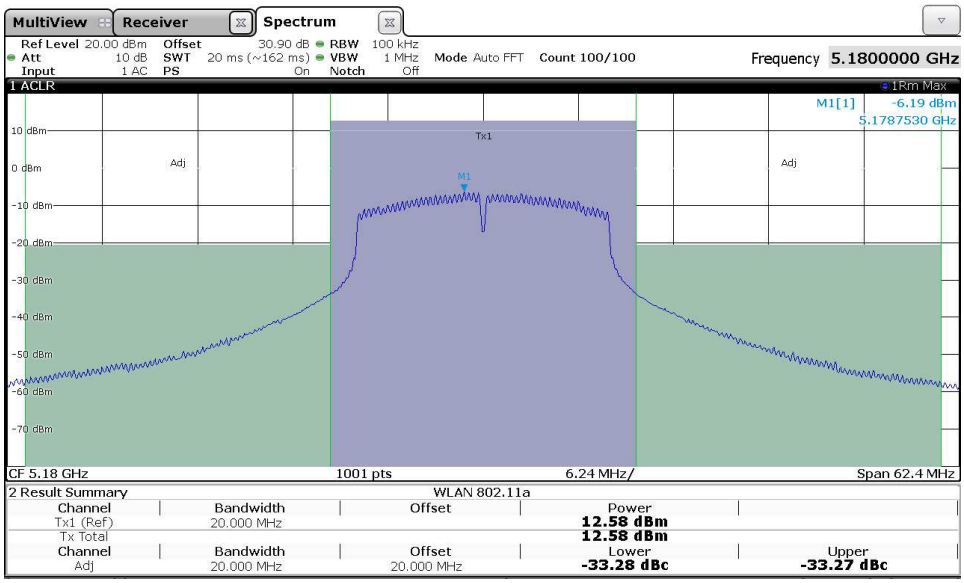


Figure 8.3-1: *Output power on 802.11a – low channel*

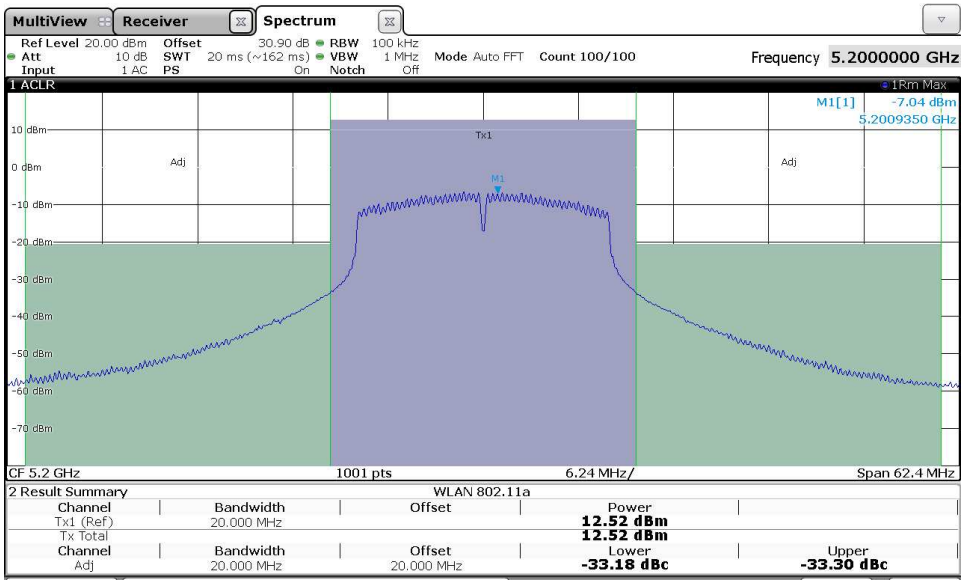


Figure 8.3-2: *Output power on 802.11a – mid channel*

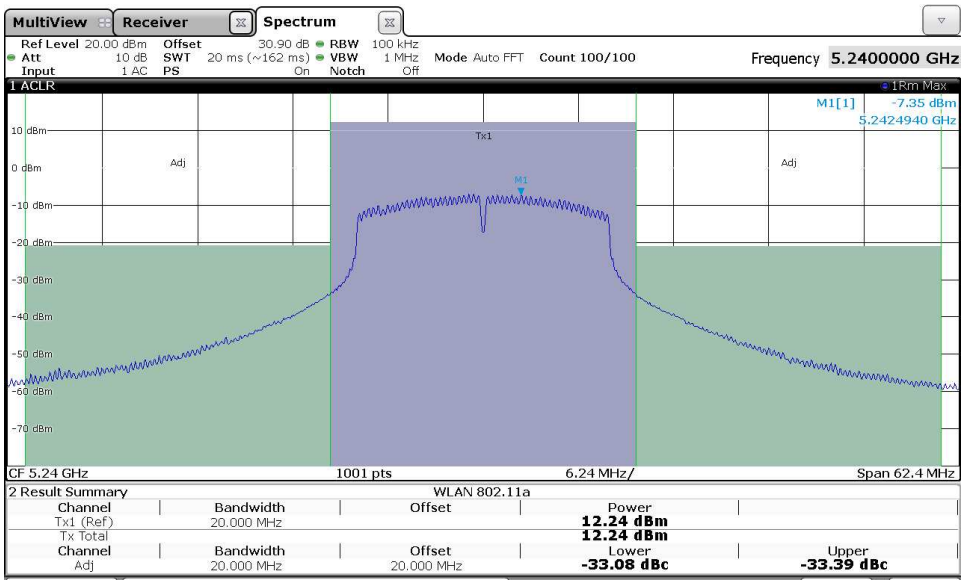


Figure 8.3-3: *Output power on 802.11a – high channel*

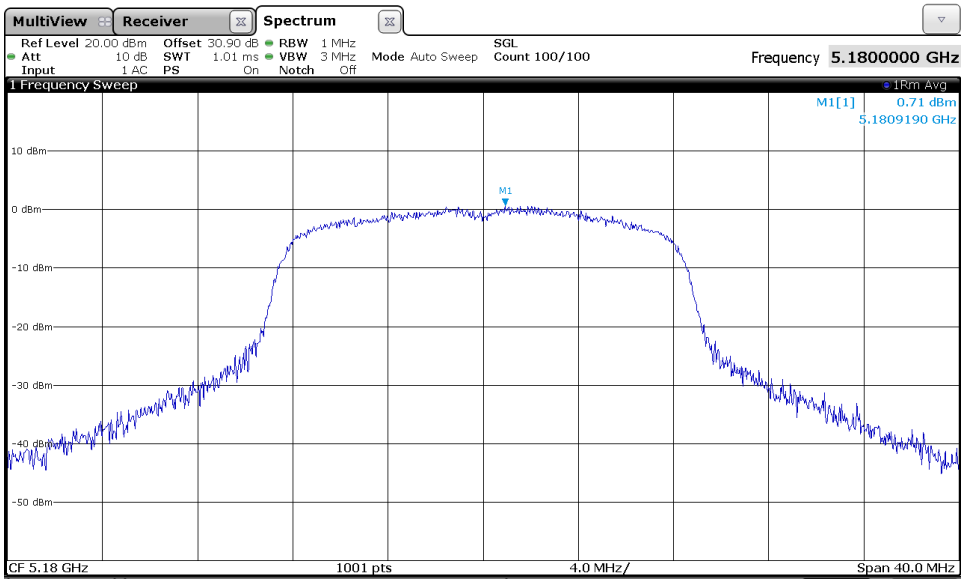


Figure 8.3-4: *PSD on 802.11a – low channel*

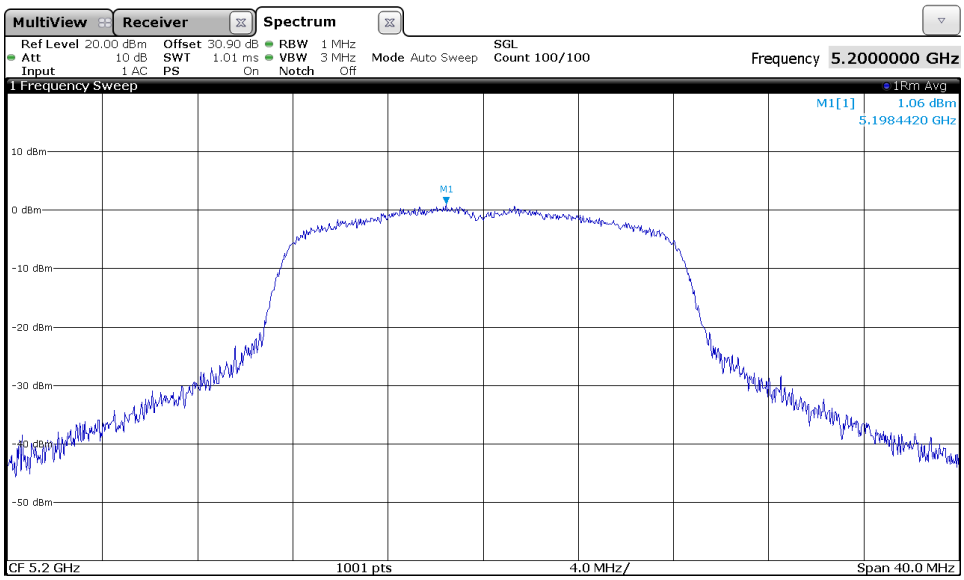


Figure 8.3-5: *PSD on 802.11a – mid channel*

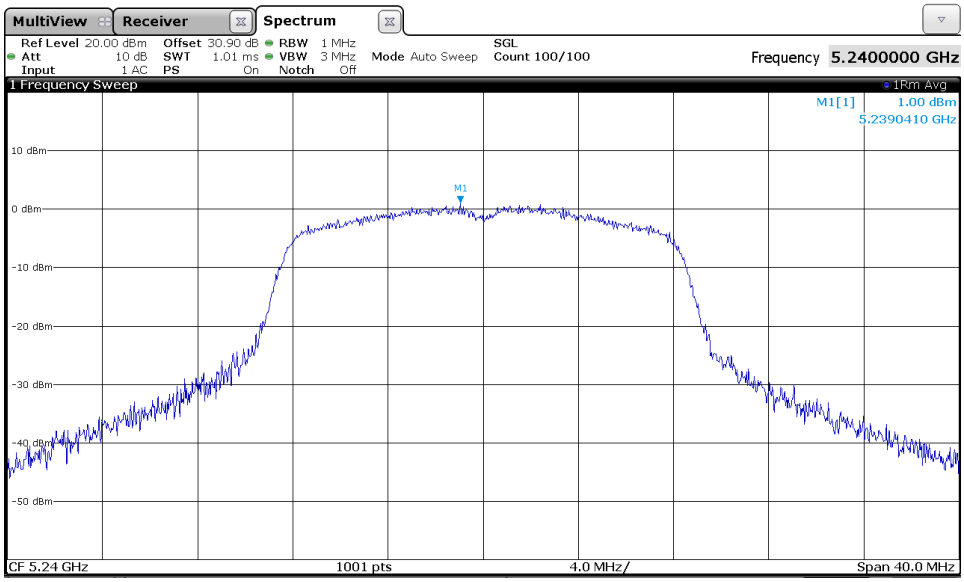


Figure 8.3-6: *PSD on 802.11a – high channel*

8.4 FCC 15.407(b) Undesirable (unwanted) emissions

8.4.1 Definitions and limits

FCC:
(1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.
(7) The provisions of § 15.205 apply to intentional radiators operating under this section.
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

ISED:
For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

RSS-Gen 8.10 Emissions falling within restricted frequency bands
Restricted bands, identified in Table 8.4-2, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply:
(a) fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of below;
(b) unwanted emissions falling into restricted bands of below shall comply with the limits specified in RSS-Gen;
(c) unwanted emissions not falling within restricted frequency bands shall either comply with the limits specified in the applicable RSS, or with those specified in RSS-Gen.

Table 8.4-1: *FCC §15.209 and RSS-Gen – Radiated emission limits*

Frequency, MHz	Field strength of emissions µV/m	Field strength of emissions dBµV/m	Measurement distance, m
0.009–0.490	2400/F *(F in kHz)*	67.6 – 20 × $\log_{10}$(F) *(F in kHz)*	300
0.490–1.705	24000/F *(F in kHz)*	87.6 – 20 × $\log_{10}$(F) *(F in kHz)*	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

8.4.1 Definitions and limits, continued

Table 8.4-2: *ISED restricted frequency bands*

MHz	MHz	MHz	GHz
0.090–0.110	12.51975–12.52025	399.9–410	5.35–5.46
2.1735–2.1905	12.57675–12.57725	608–614	7.25–7.75
3.020–3.026	13.36–13.41	960–1427	8.025–8.5
4.125–4.128	16.42–16.423	1435–1626.5	9.0–9.2
4.17725–4.17775	16.69475–16.69525	1645.5–1646.5	9.3–9.5
4.20725–4.20775	16.80425–16.80475	1660–1710	10.6–12.7
5.677-5.683	25.5–25.67	1718.8–1722.2	13.25–13.4
6.215–6.218	37.5–38.25	2200–2300	14.47–14.5
6.26775–6.26825	73–74.6	2310–2390	15.35–16.2
6.31175–6.31225	74.8–75.2	2655–2900	17.7–21.4
8.291–8.294	108–138	3260–3267	22.01–23.12
8.362–8.366	156.52475–156.52525	3332–3339	23.6–24.0
8.37625–8.38675	156.7–156.9	3345.8–3358	31.2–31.8
8.41425–8.41475	240–285	3500–4400	36.43–36.5
12.29–12.293	322–335.4	4500–5150	Above 38.6

Note: Certain frequency bands listed in Table 8.4-2 and above 38.6 GHz are designated for low-power license-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

Table 8.4-3: *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			

8.4.2 Test summary

Test start date:	January 19, 2021

8.4.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to 40 GHz while the EUT was continuously transmitting.
Conducted measurements were performed on the antenna ports, with the highest and the lowest data rate, the worst case is presented.
In the conducted plots below, the reference level offset was adjusted to include antenna directional gains, the max peak gain of two antenna configurations has been applied to show as representative worst case.
Radiated measurements below 18 GHz were performed at a distance of 3 m. Radiated measurements above 18 GHz were performed at a distance of 1 m.
Cabinet radiation were performed while the antenna connector was terminated with 50 Ω load. Below 1 GHz and above 18 GHz, no emissions related to RF transmitter were detected within 6 dB below the limit.

Spectrum analyser for peak conducted measurements within restricted bands below 1 GHz:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

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

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

Spectrum analyser for average conducted measurements within restricted bands above 1 GHz for frequencies where peak results were above the average limit:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	RMS
Trace mode:	Power average
Number of averaging traces:	100

Spectrum analyser for peak conducted measurements outside restricted bands:

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

Spectrum analyzer settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyzer 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

8.4.4 Equipment list

Table 8.4-4: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESU8	100202	2020-08	2021-08
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESW44	101620	2020-08	2021-08
Trilog Antenna (30 MHz ÷ 7 GHz)	Schwarzbeck	VULB 9162	9162-025	2018-07	2021-07
Bilog antenna (1 ÷ 18 GHz)	Schwarzbeck	STLP 9148	9148-123	2018-07	2021-07
Preamplifier (1 ÷ 18 GHz)	Schwarzbeck	BBV 9718	9718-137	2020-09	2021-09
Horn antenna (18 ÷ 40 GHz)	A.H. System	SAS-574	558	2020-01	2023-01
Preamplifier (18 ÷ 40 GHz)	SAGE	STB-1834034030-KFKF-L1	18490-01	2020-03	2021-03
Controller	Maturo	FCU3.0	10041	NCR	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR	NCR
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2019-09	2021-09
Shielded room	Siemens	10m control room	1947	NCR	NCR

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

8.4.5 Test data for REGATE-10-12-GS04 Antenna configuration 1

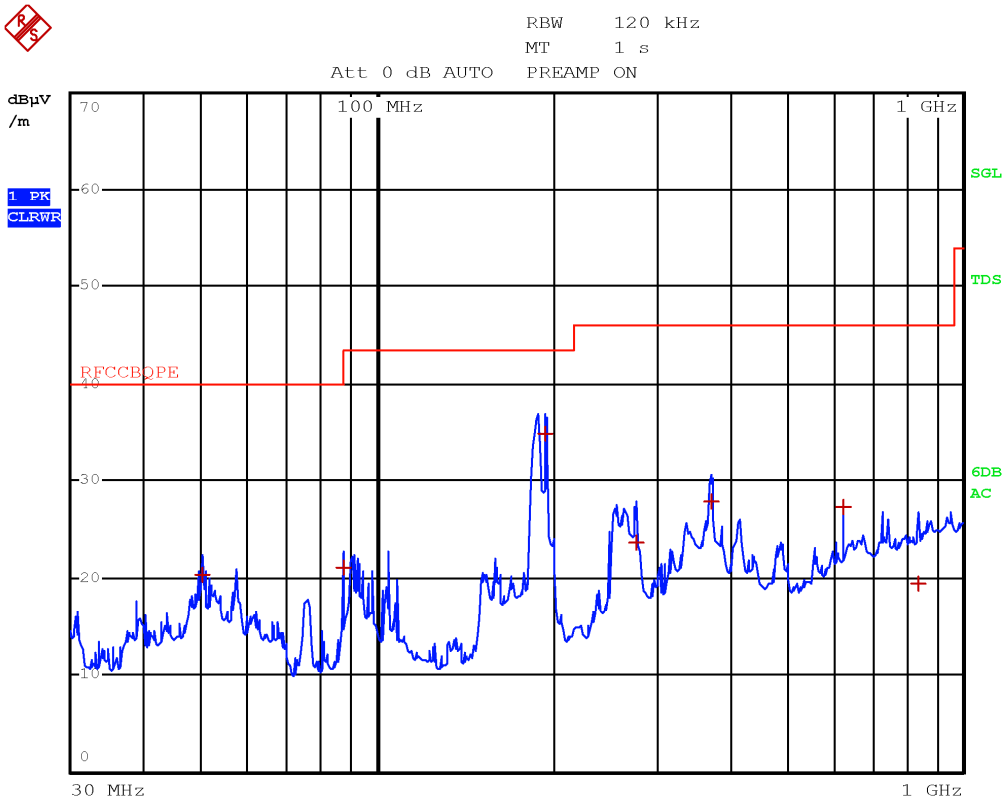


Figure 8.4-1: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4400	20.1	40.0	-19.9	QP
87.7200	21.2	40.0	-18.8	QP
194.2400	34.4	43.5	-9.1	QP
277.8800	23.5	46.0	-22.5	QP
371.7600	27.6	46.0	-18.4	QP
624.9600	27.7	46.0	-18.3	QP
841.4000	19.3	46.0	-26.7	QP

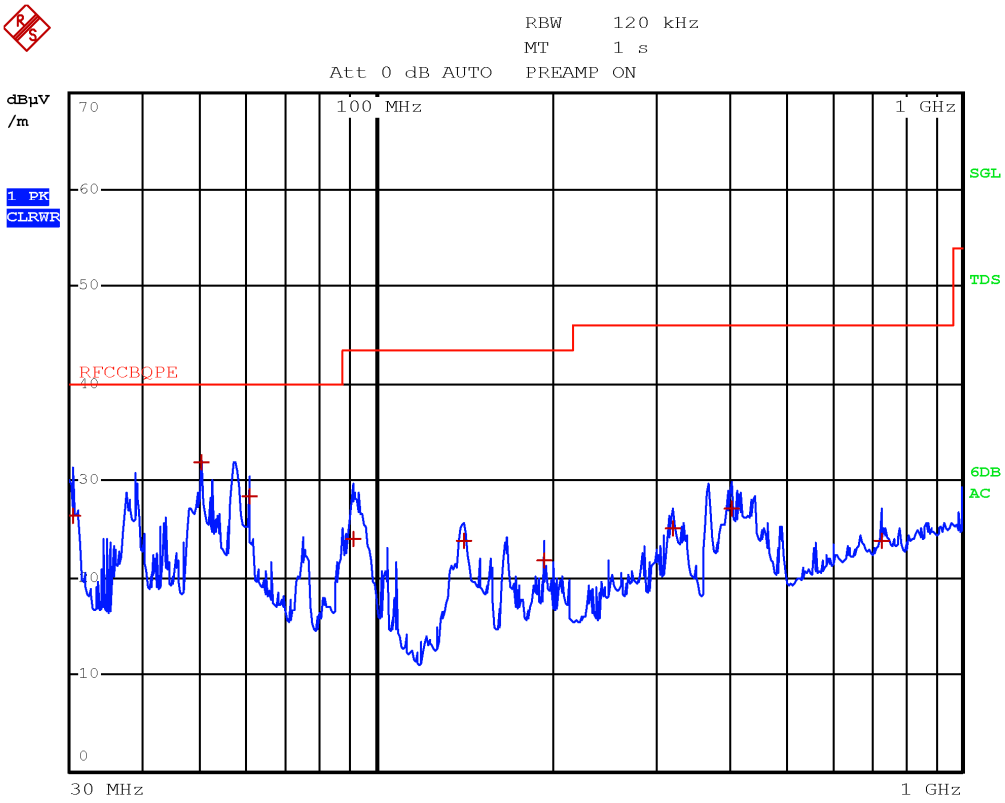


Figure 8.4-2: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.4400	26.5	40.0	-13.5	QP
50.4400	32.3	40.0	-7.7	QP
60.8400	28.4	40.0	-11.6	QP
91.2400	24.3	43.5	-19.2	QP
141.3600	23.5	43.5	-20.0	QP
194.0000	21.6	43.5	-21.9	QP
320.9200	25.3	46.0	-20.7	QP
404.8000	27.9	46.0	-18.1	QP
731.2800	23.6	46.0	-22.4	QP

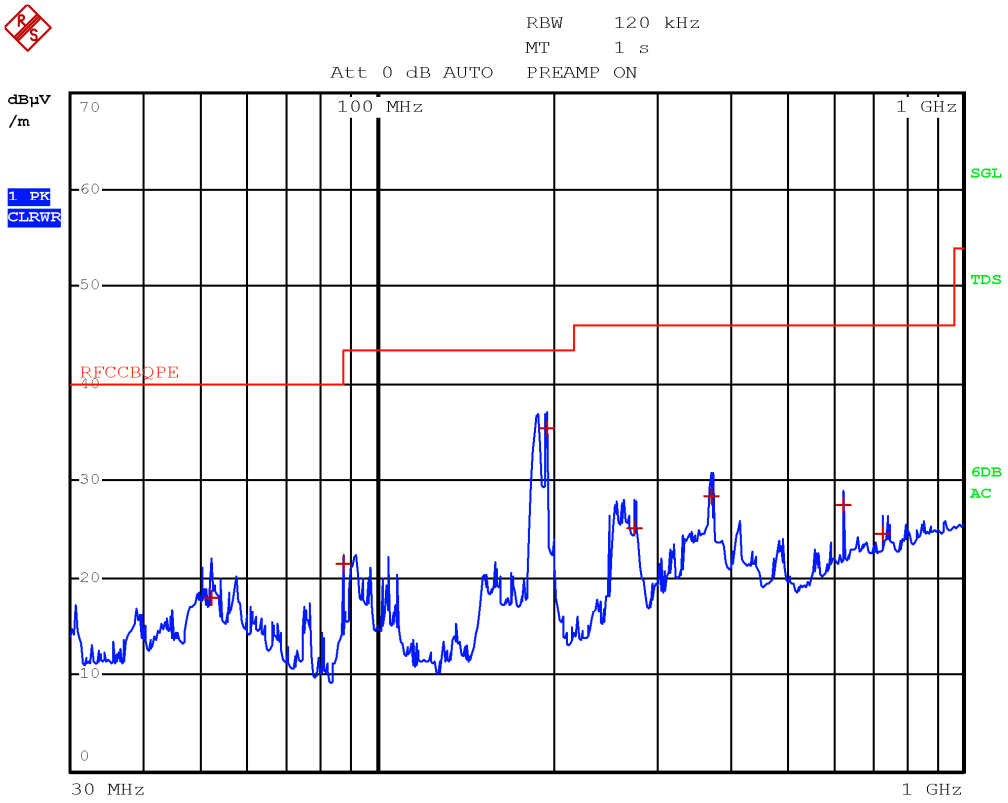


Figure 8.4-3: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
52.2400	17.8	40.0	-22.2	QP
87.6800	21.3	40.0	-18.7	QP
194.4400	35.3	43.5	-8.2	QP
275.0000	25.1	46.0	-20.9	QP
372.0000	28.4	46.0	-17.6	QP
624.9600	27.8	46.0	-18.2	QP
731.2800	24.9	46.0	-21.1	QP

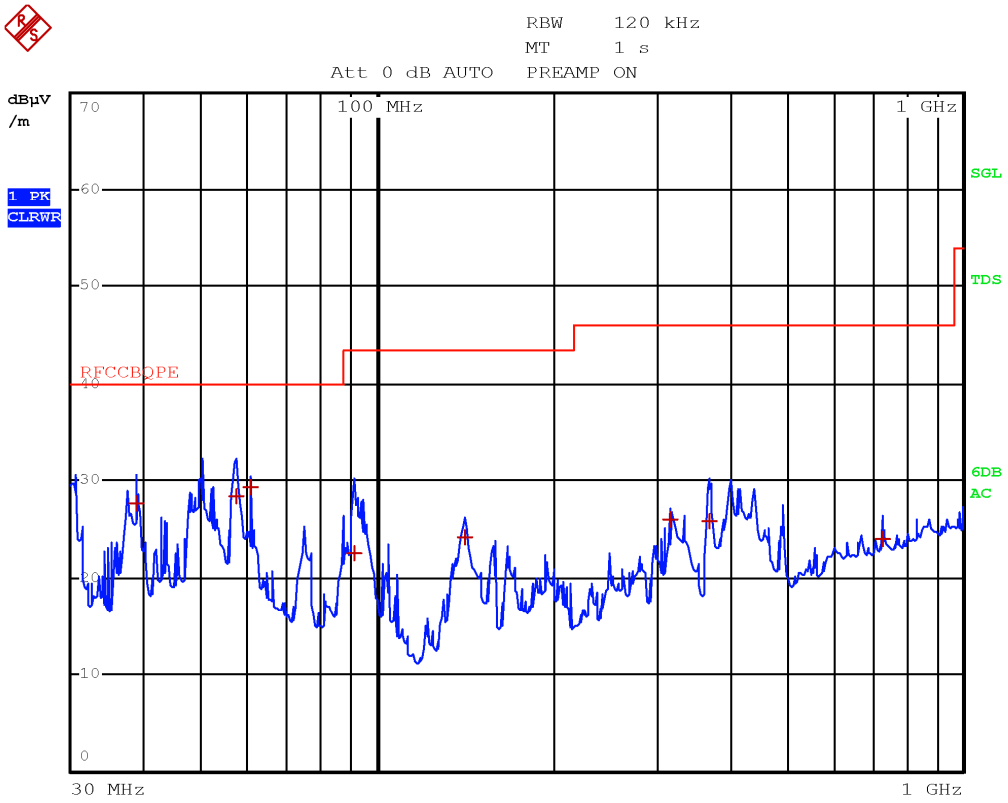


Figure 8.4-4: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
38.9600	27.3	40.0	-12.7	QP
57.6800	28.4	40.0	-11.6	QP
60.8000	29.5	40.0	-10.5	QP
91.4800	22.4	43.5	-21.1	QP
141.4000	24.2	43.5	-19.3	QP
316.1200	26.6	46.0	-19.4	QP
369.3600	25.5	46.0	-20.5	QP
731.2800	24.3	46.0	-21.7	QP

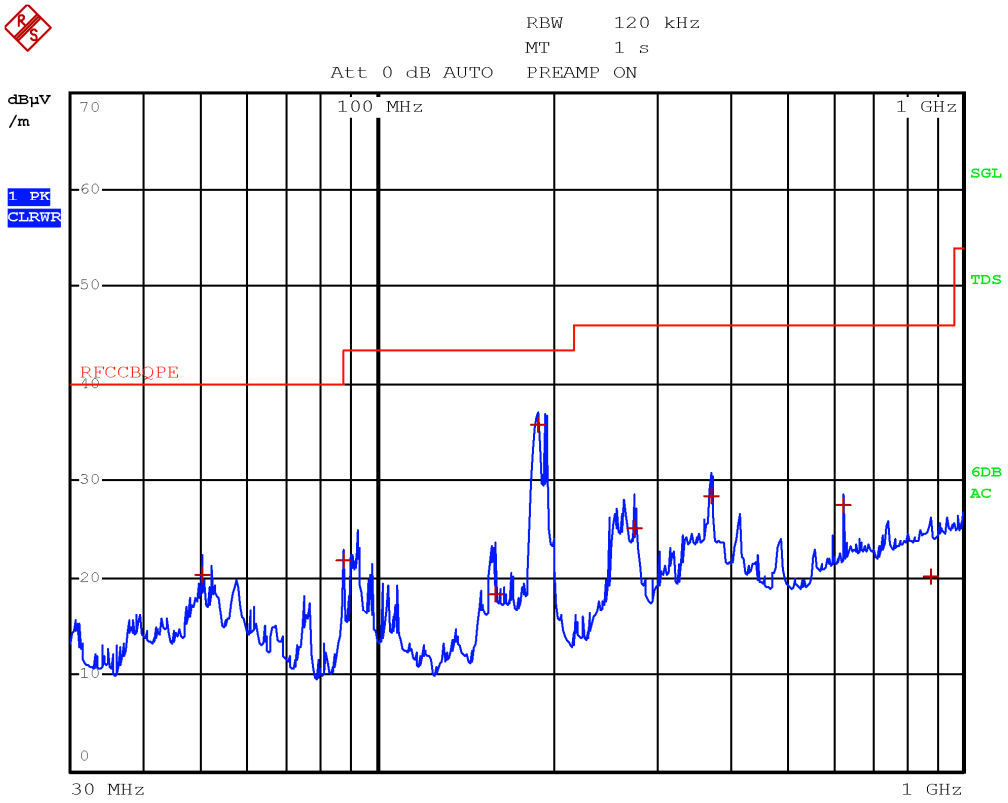


Figure 8.4-5: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4400	20.5	40.0	-19.5	QP
87.6400	21.7	40.0	-18.3	QP
159.1200	18.7	43.5	-24.8	QP
188.2400	35.6	43.5	-7.9	QP
275.0000	25.2	46.0	-20.8	QP
371.7200	28.5	46.0	-17.5	QP
624.9600	27.2	46.0	-18.8	QP
883.6400	20.3	46.0	-25.7	QP

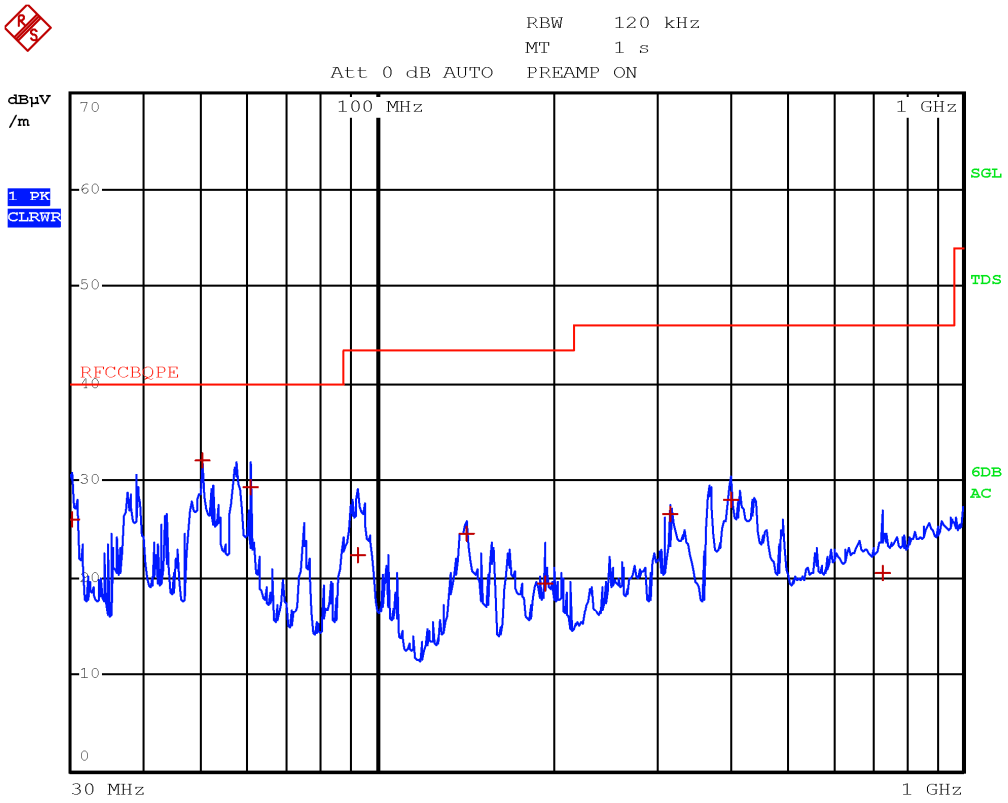


Figure 8.4-6: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.1200	26.3	40.0	-13.7	QP
50.4400	32.3	40.0	-7.7	QP
60.8000	29.2	40.0	-10.8	QP
92.5600	22.4	43.5	-21.1	QP
142.4000	24.4	43.5	-19.1	QP
193.9200	19.3	43.5	-24.2	QP
316.1200	26.4	46.0	-19.6	QP
402.3600	28.0	46.0	-18.0	QP
730.9200	20.2	46.0	-25.8	QP

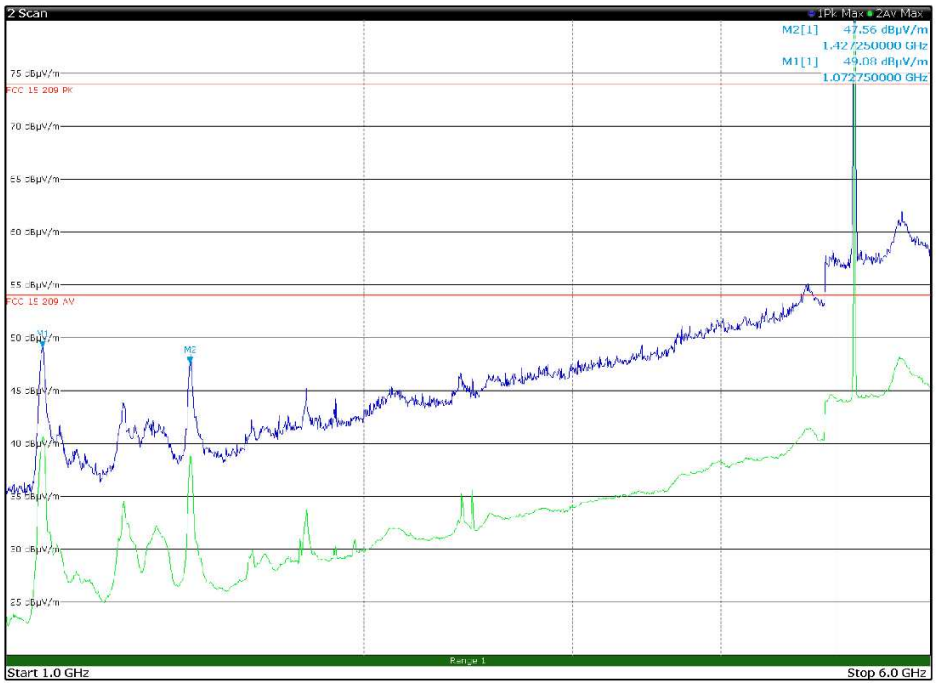


Figure 8.4-7: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in horizontal polarization*

Limit exceeded by the carrier

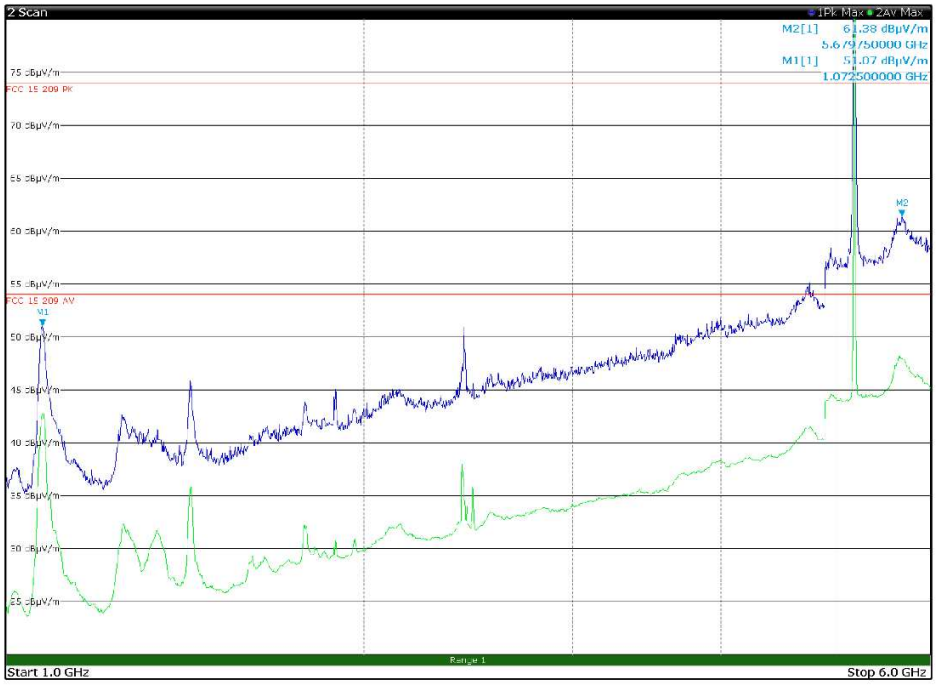


Figure 8.4-8: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in vertical polarization*

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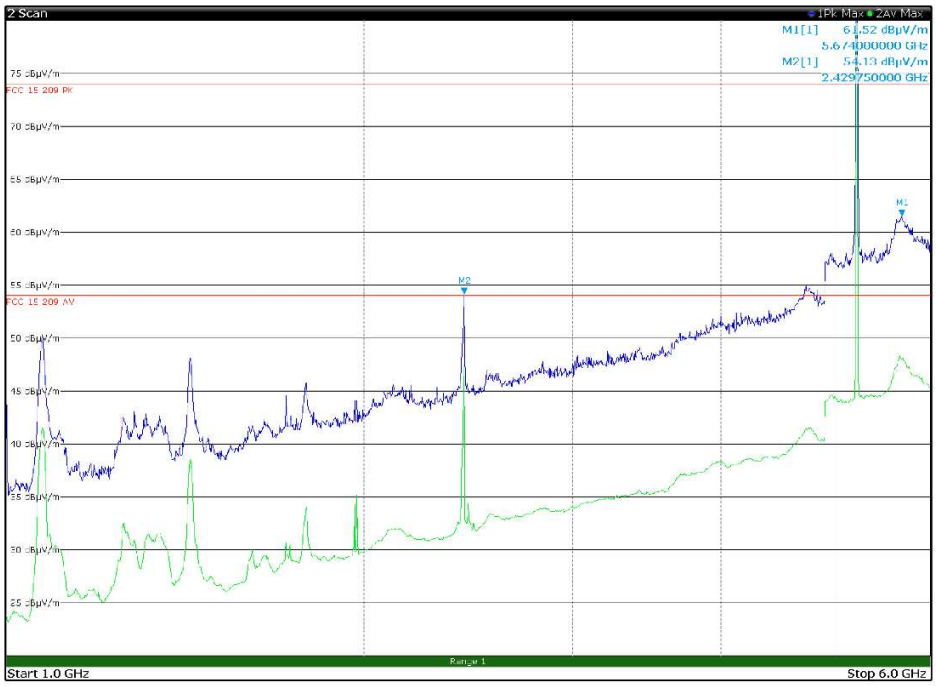

Figure 8.4-9: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in horizontal polarization*

Limit exceeded by the carrier

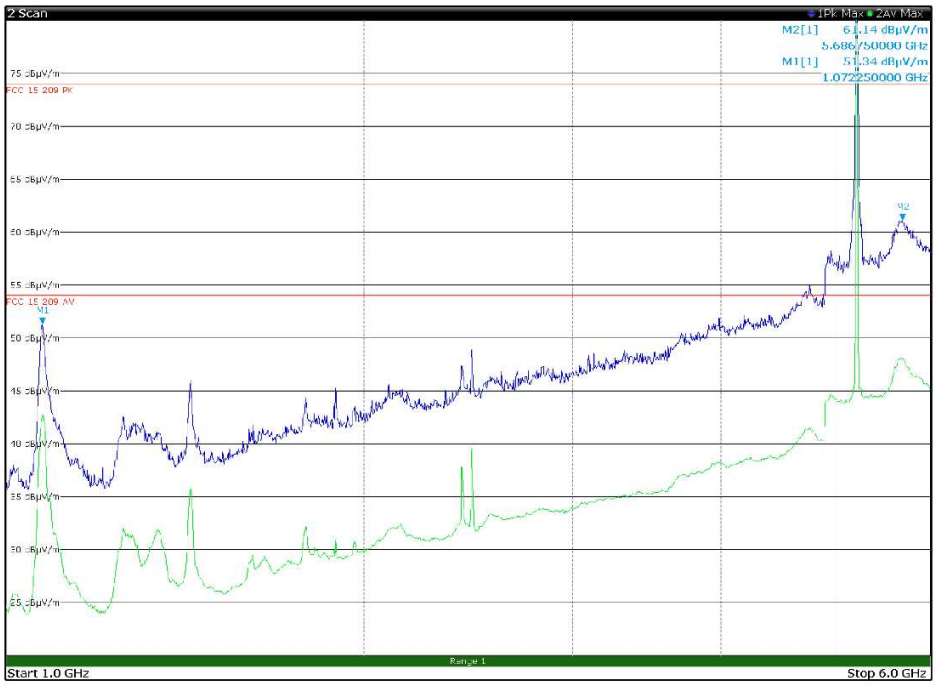

Figure 8.4-10: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in vertical polarization*

Limit exceeded by the carrier

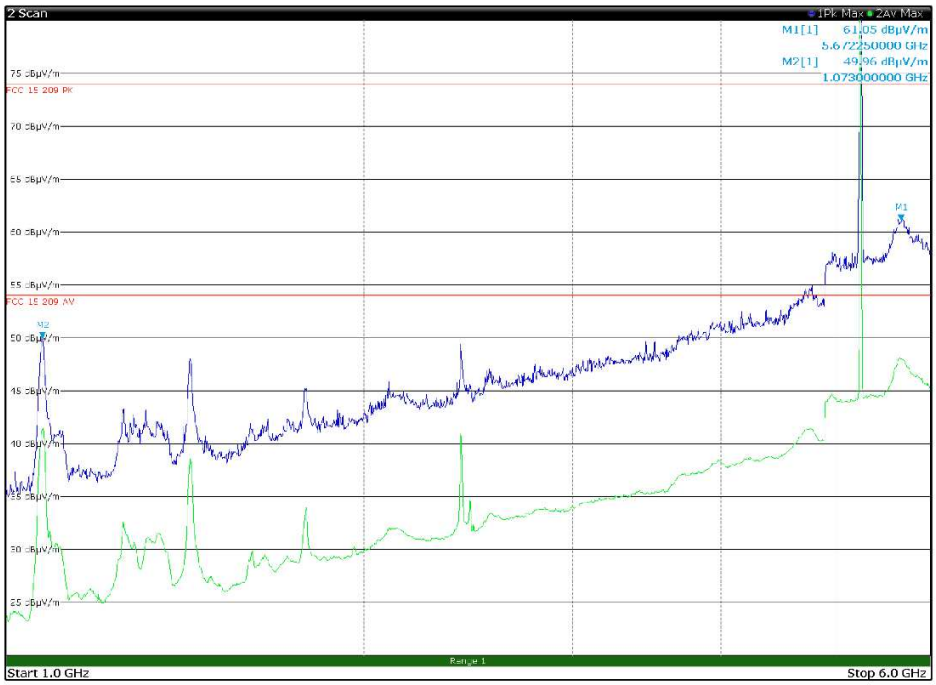

Figure 8.4-11: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in horizontal polarization*

Limit exceeded by the carrier

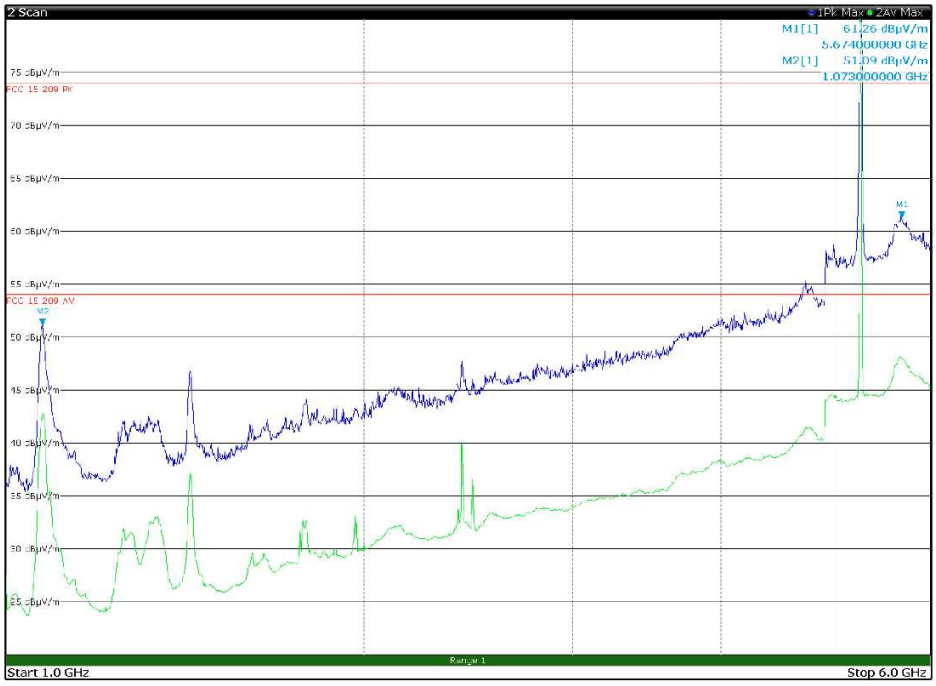

Figure 8.4-12: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

Limit exceeded by the carrier

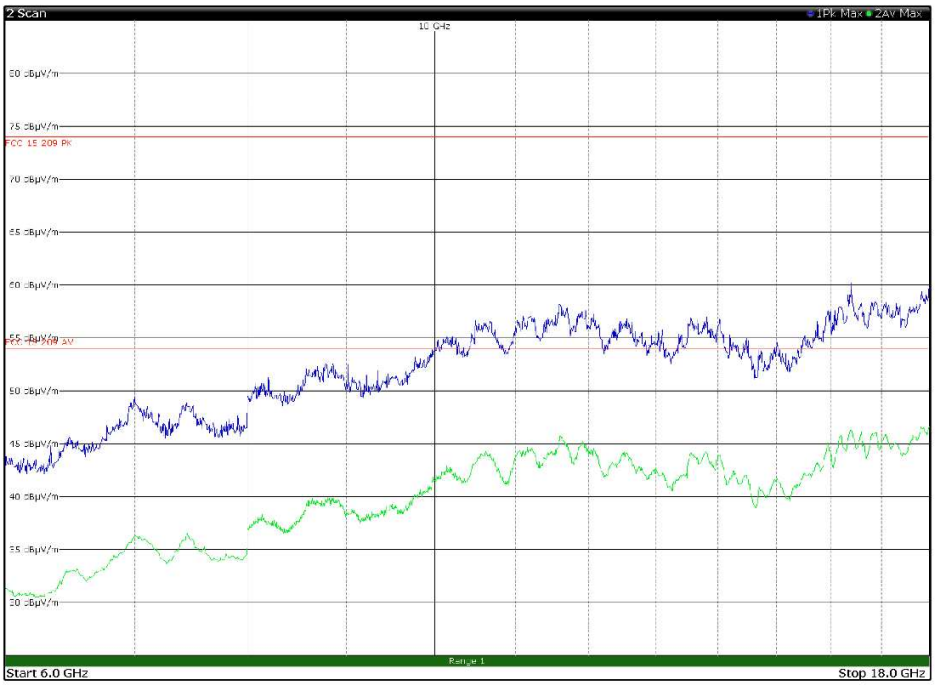

Figure 8.4-13: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in horizontal polarization*

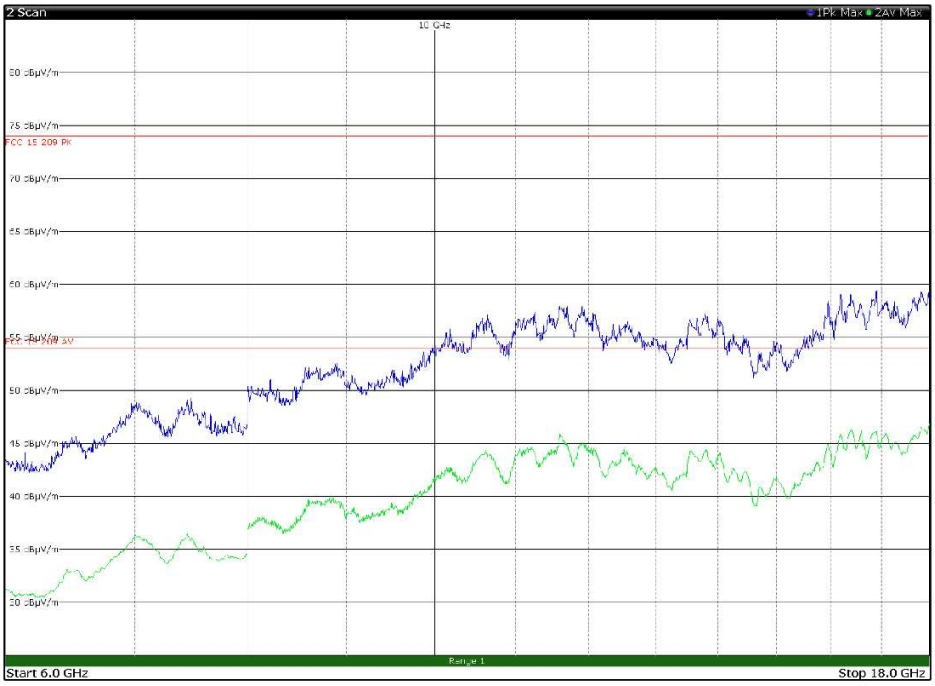

Figure 8.4-14: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in vertical polarization*

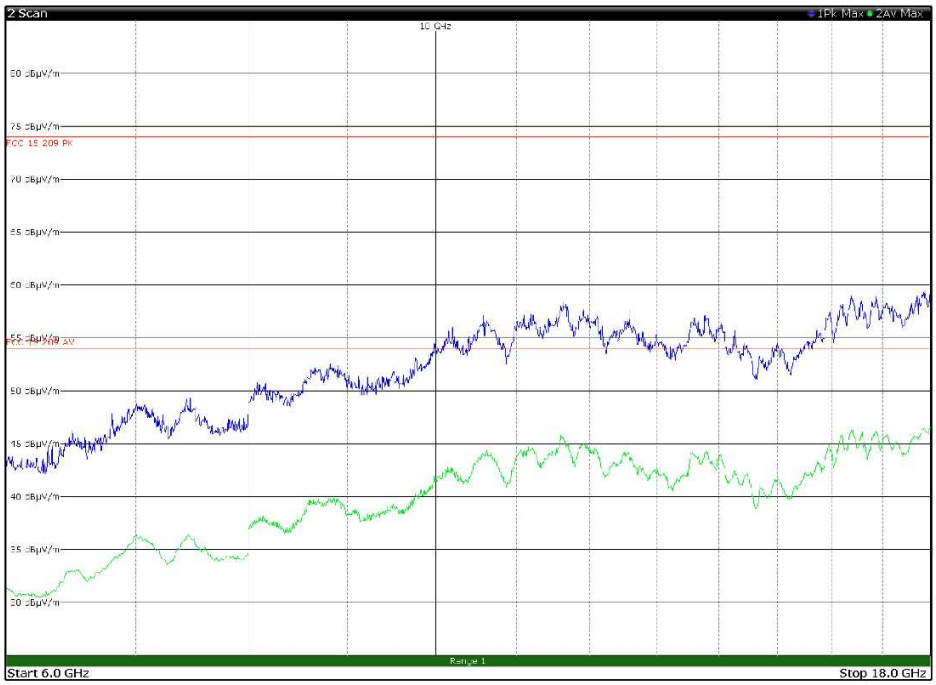

Figure 8.4-15: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in horizontal polarization*

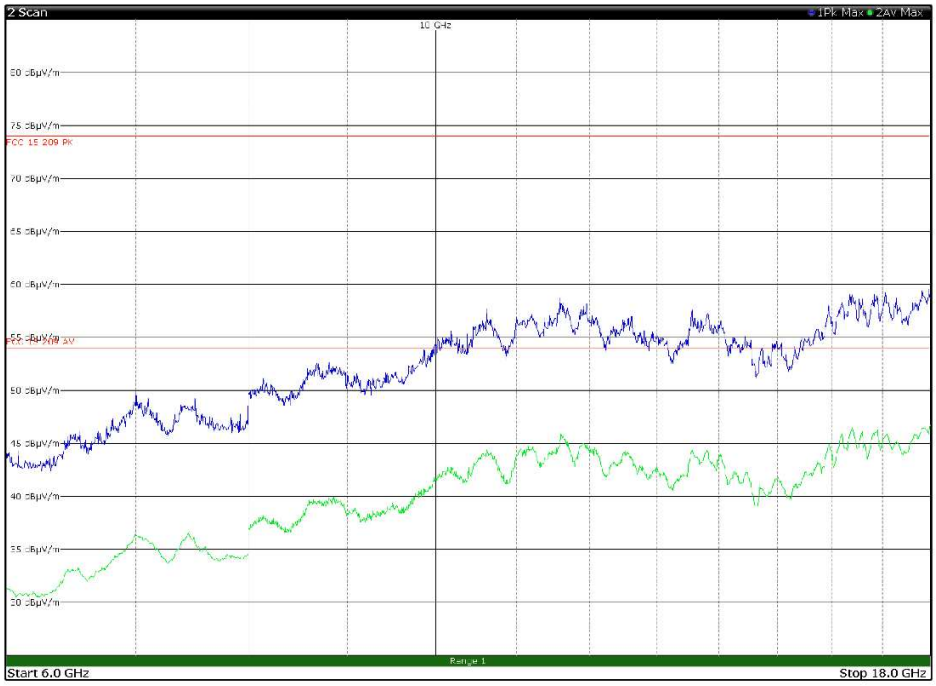

Figure 8.4-16: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in vertical polarization*

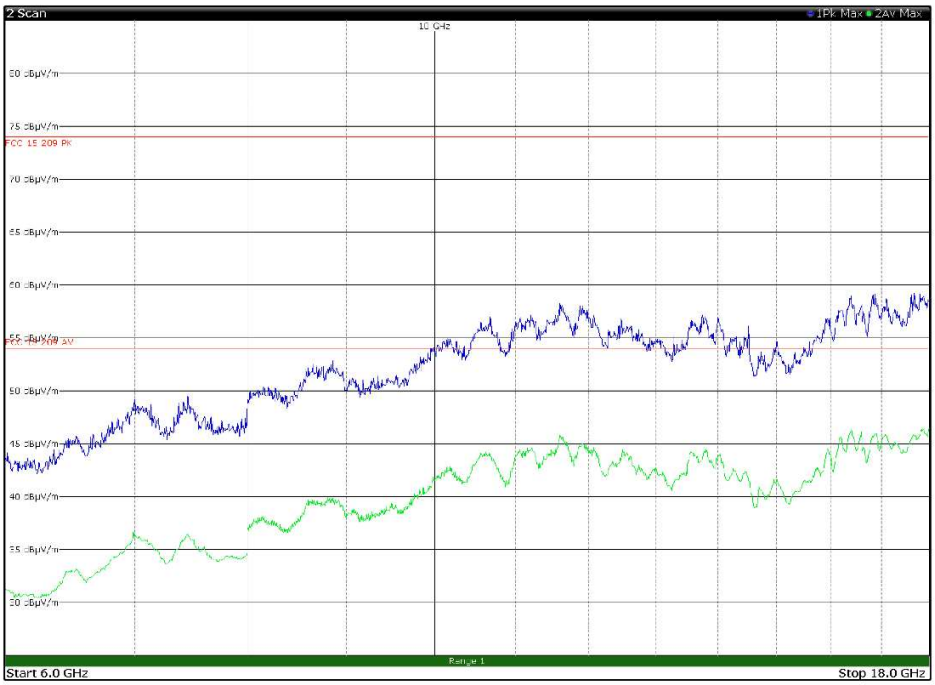

Figure 8.4-17: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in horizontal polarization*

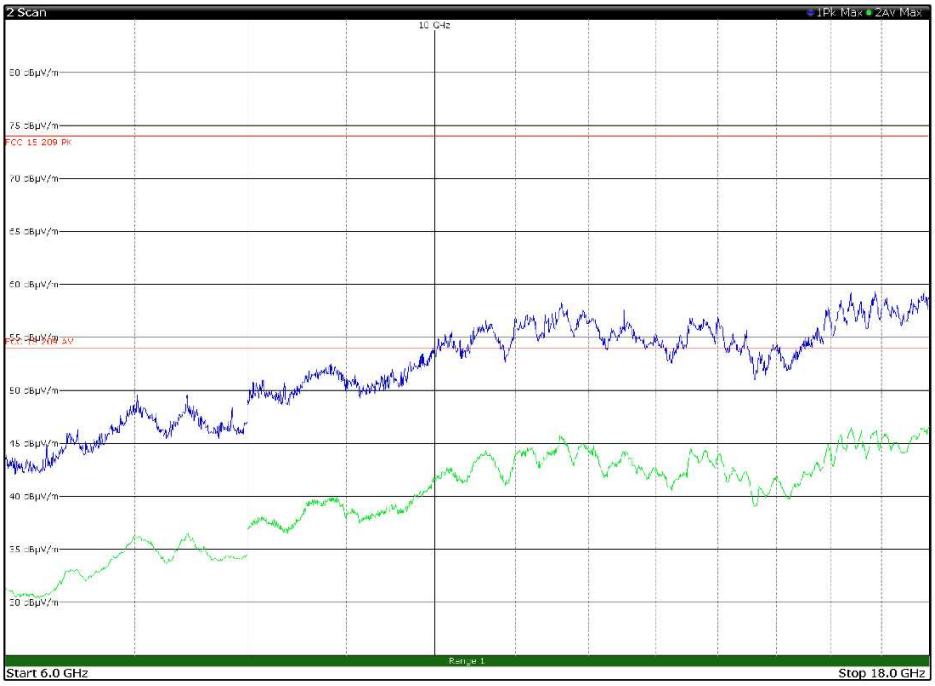

Figure 8.4-18: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in vertical polarization*

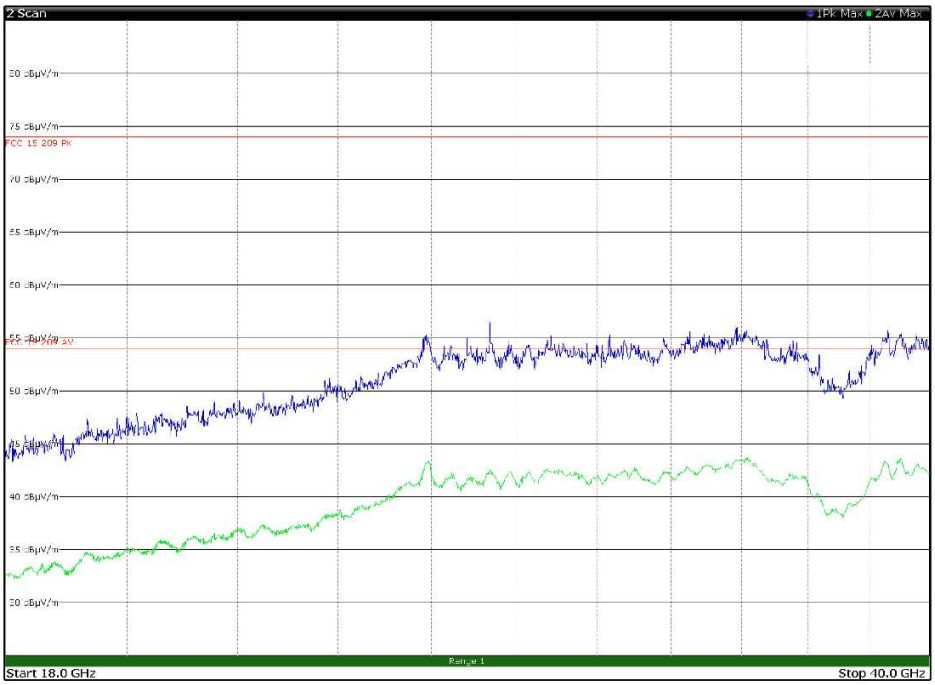

Figure 8.4-19: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in horizontal polarization*

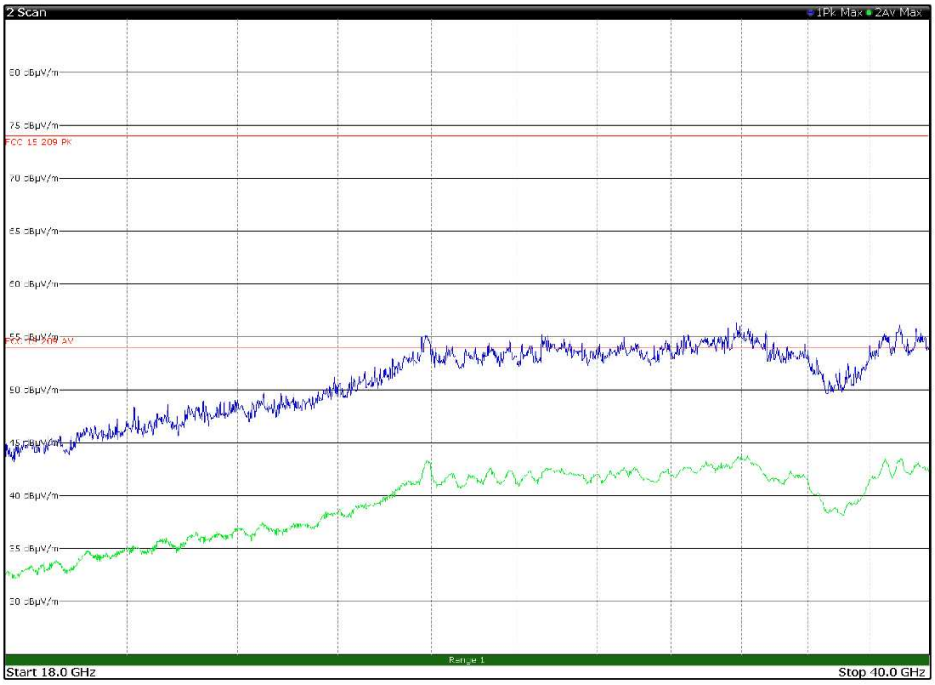

Figure 8.4-20: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in vertical polarization*

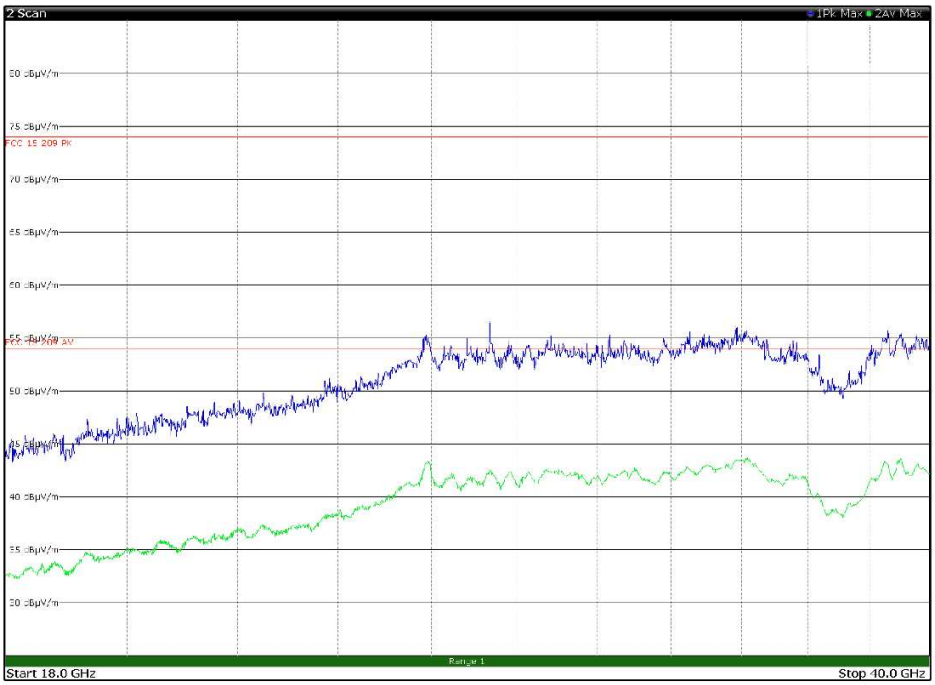

Figure 8.4-21: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in horizontal polarization*

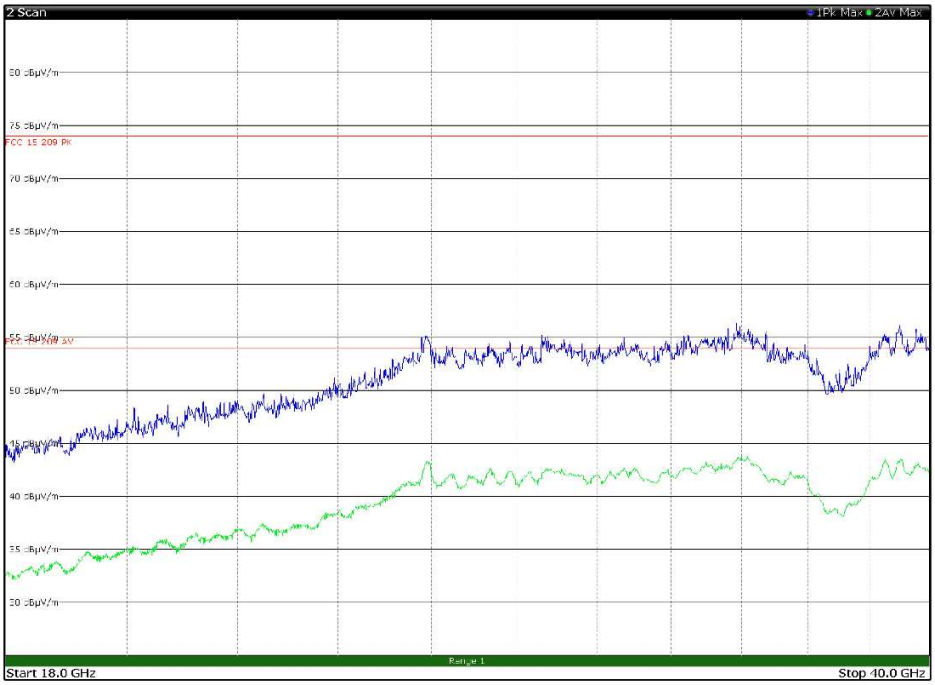

Figure 8.4-22: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in vertical polarization*

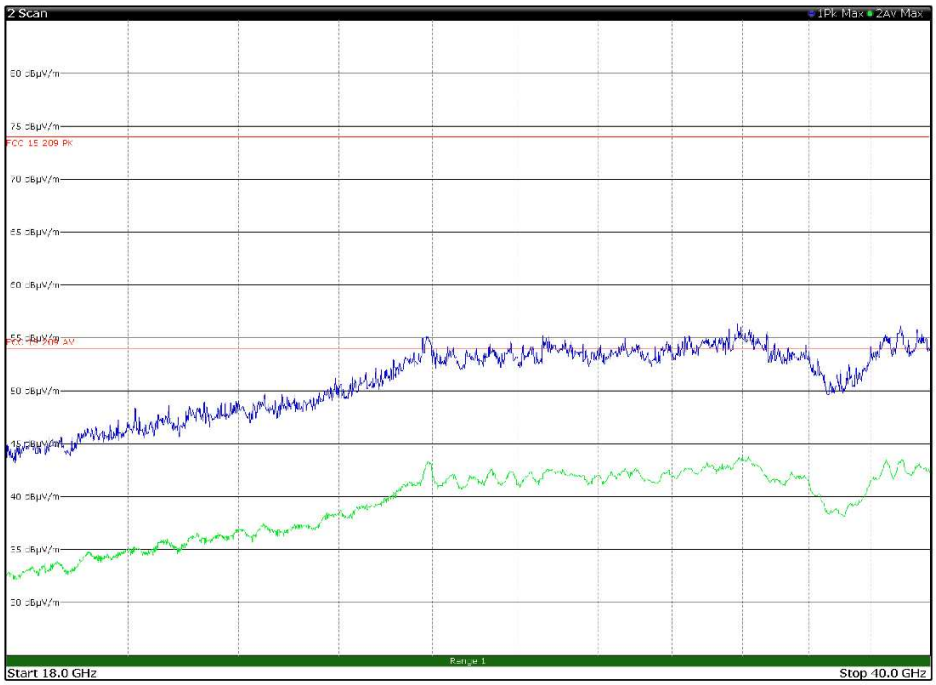

Figure 8.4-23: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in horizontal polarization*

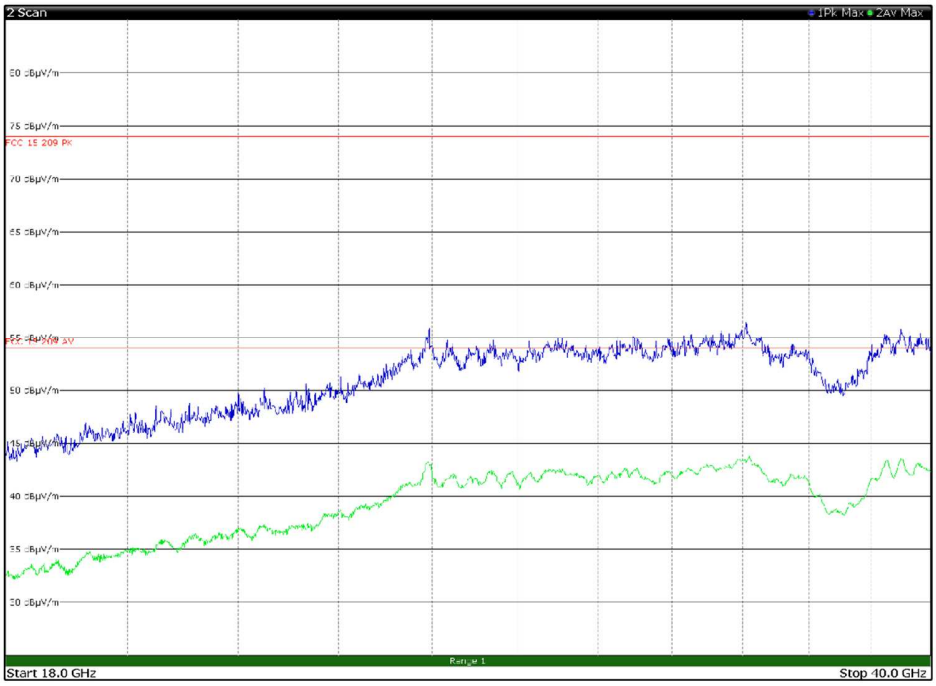

Figure 8.4-24: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in vertical polarization*

8.4.1 Test data for REGATE-10-12-GS04 Antenna configuration 2

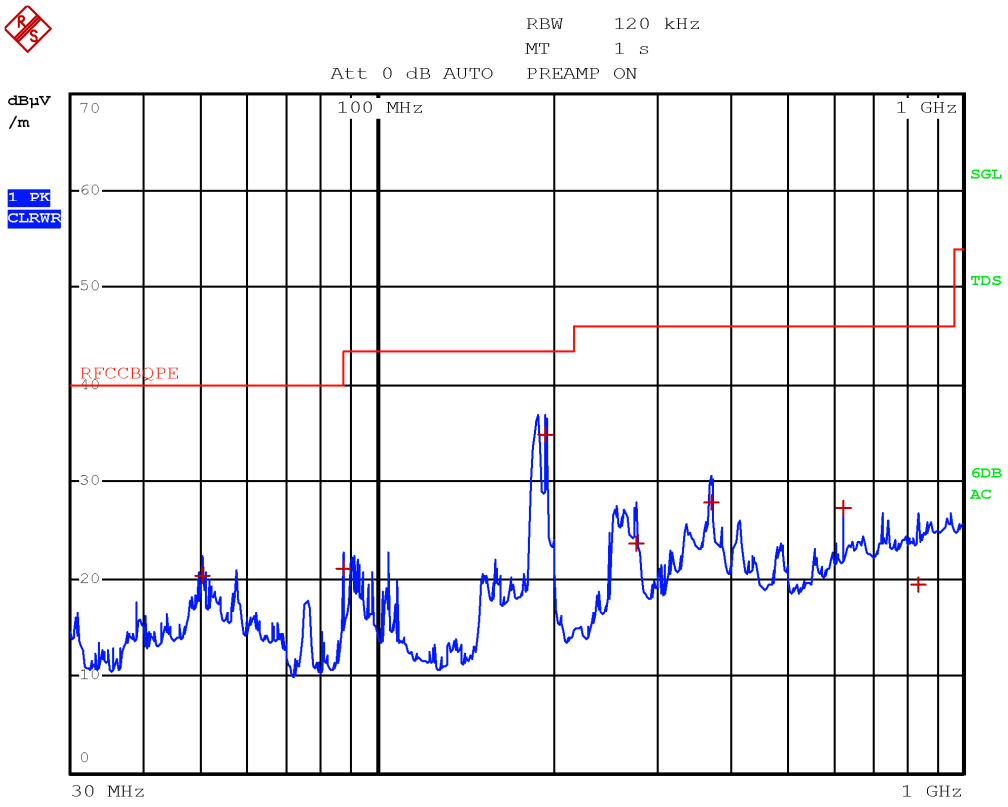

Figure 8.4-25: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4400	20.4	40.0	-19.6	QP
87.7200	21.0	40.0	-19.0	QP
194.2400	34.8	43.5	-8.7	QP
277.8800	23.6	46.0	-22.4	QP
371.7600	27.9	46.0	-18.1	QP
624.9600	27.4	46.0	-18.6	QP
841.4000	19.5	46.0	-26.5	QP

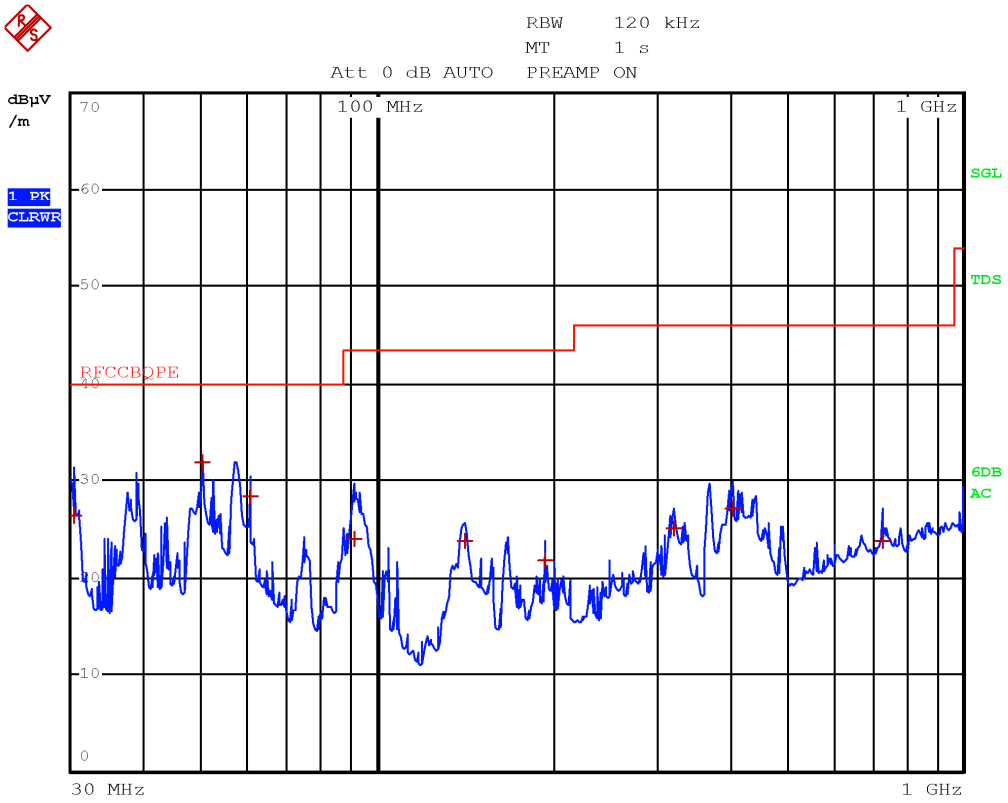

Figure 8.4-26: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.4400	26.3	40.0	-13.7	QP
50.4400	32.0	40.0	-8.0	QP
60.8400	28.5	40.0	-11.5	QP
91.2400	24.1	43.5	-19.4	QP
141.3600	23.8	43.5	-19.7	QP
194.0000	21.8	43.5	-21.7	QP
320.9200	25.2	46.0	-20.8	QP
404.8000	27.2	46.0	-18.8	QP
731.2800	23.8	46.0	-22.2	QP

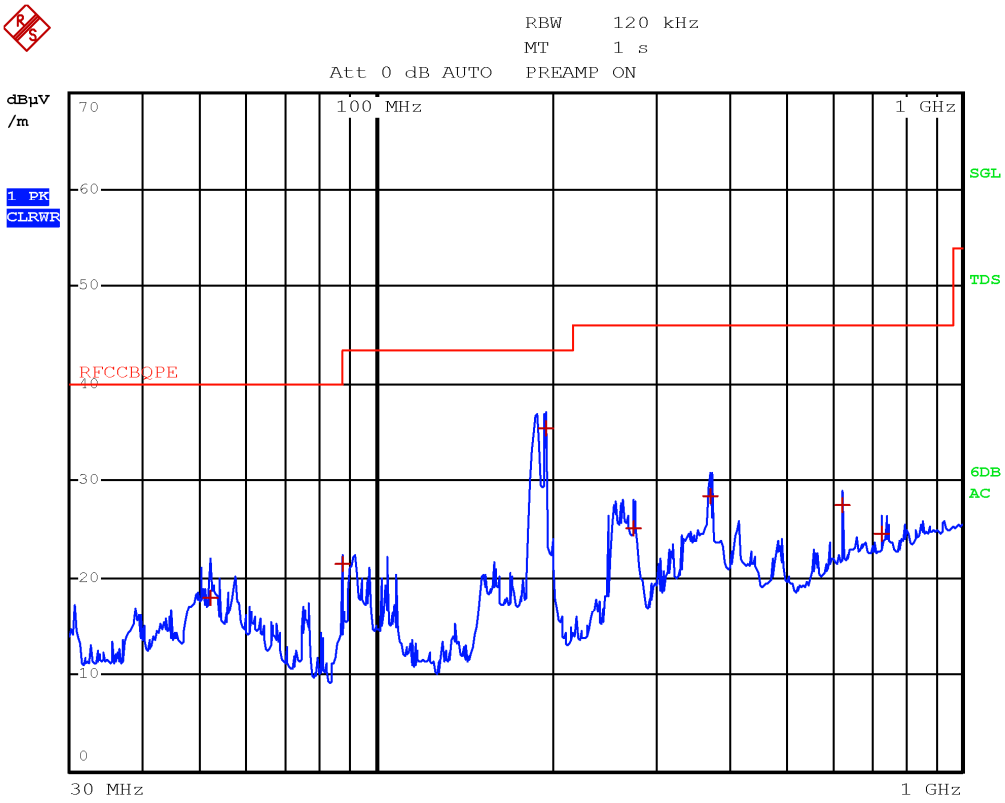

Figure 8.4-27: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
52.2400	18.0	40.0	-22.0	QP
87.6800	21.5	40.0	-18.5	QP
194.4400	35.4	43.5	-8.1	QP
275.0000	25.1	46.0	-20.9	QP
372.0000	28.5	46.0	-17.5	QP
624.9600	27.5	46.0	-18.5	QP
731.2800	24.6	46.0	-21.4	QP

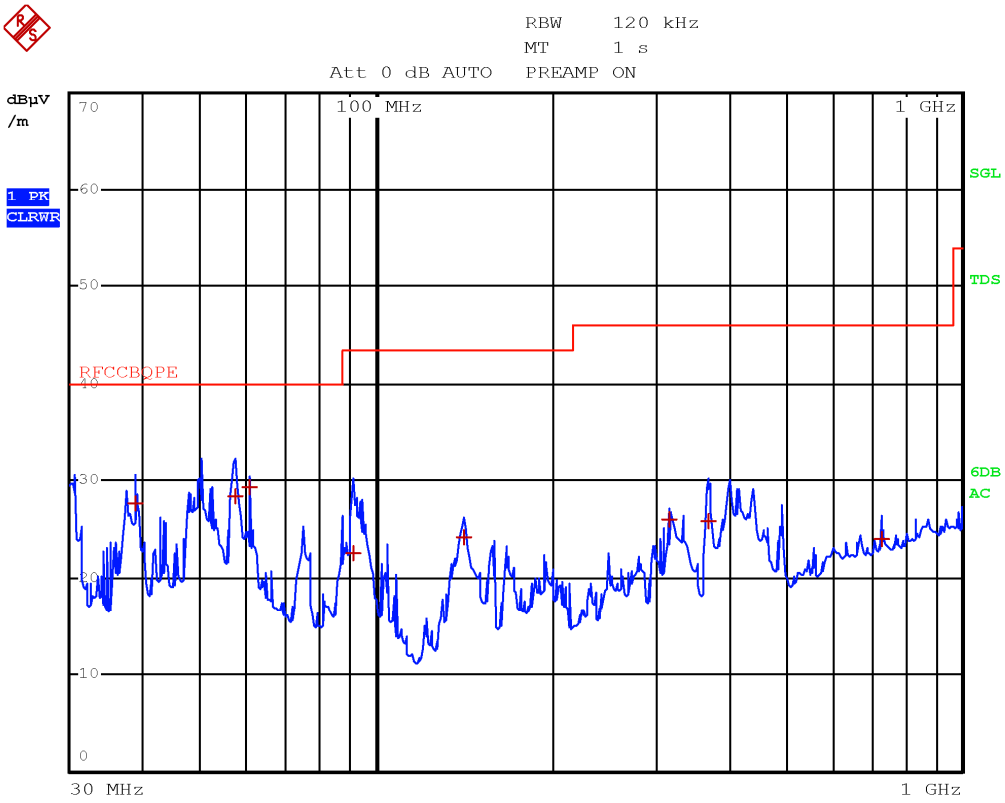

Figure 8.4-28: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
38.9600	27.7	40.0	-12.3	QP
57.6800	28.4	40.0	-11.6	QP
60.8000	29.4	40.0	-10.6	QP
91.4800	22.5	43.5	-21.0	QP
141.4000	24.3	43.5	-19.2	QP
316.1200	26.1	46.0	-19.9	QP
369.3600	25.9	46.0	-20.1	QP
731.2800	24.0	46.0	-22.0	QP

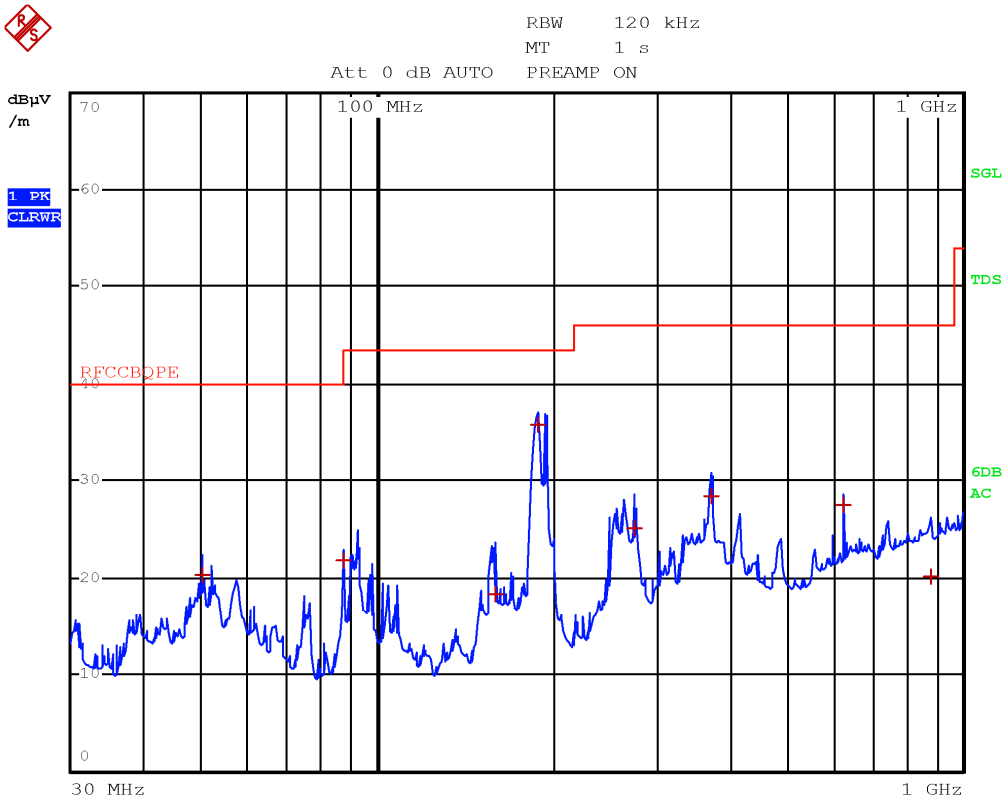

Figure 8.4-29: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4400	20.4	40.0	-19.6	QP
87.6400	21.8	40.0	-18.2	QP
159.1200	18.3	43.5	-25.2	QP
188.2400	35.8	43.5	-7.7	QP
275.0000	25.1	46.0	-20.9	QP
371.7200	28.3	46.0	-17.7	QP
624.9600	27.5	46.0	-18.5	QP
883.6400	20.2	46.0	-25.8	QP

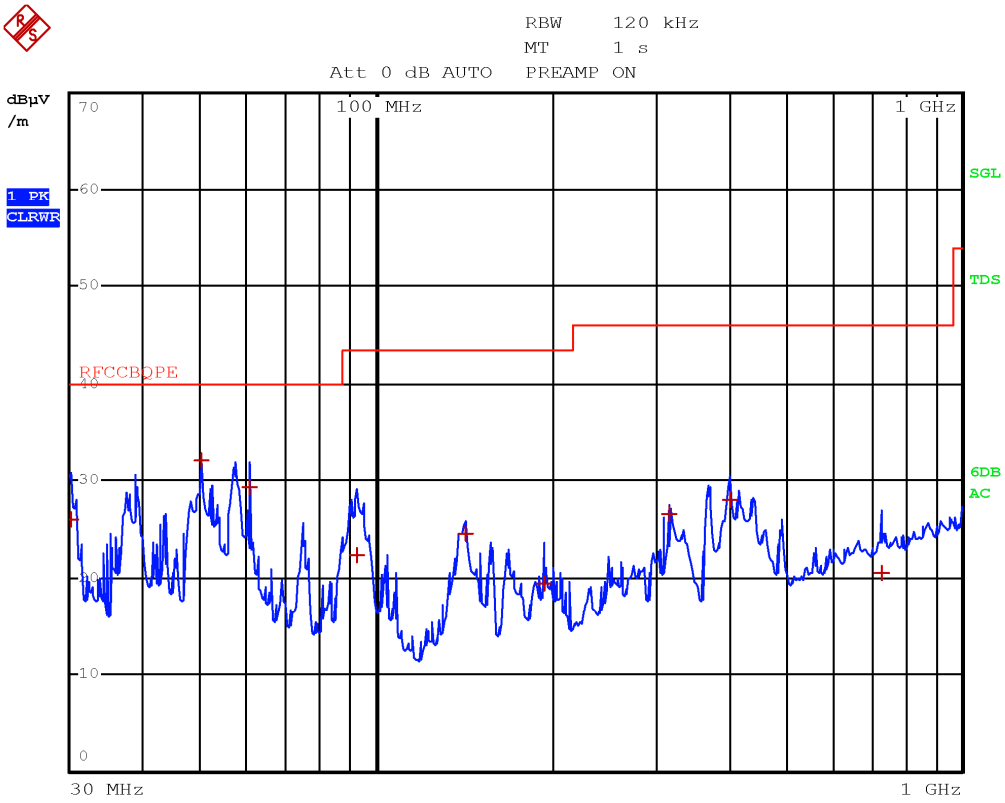

Figure 8.4-30: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.1200	26.1	40.0	-13.9	QP
50.4400	32.1	40.0	-7.9	QP
60.8000	29.4	40.0	-10.6	QP
92.5600	22.3	43.5	-21.2	QP
142.4000	24.6	43.5	-18.9	QP
193.9200	19.4	43.5	-24.1	QP
316.1200	26.5	46.0	-19.5	QP
402.3600	28.0	46.0	-18.0	QP
730.9200	20.6	46.0	-25.4	QP

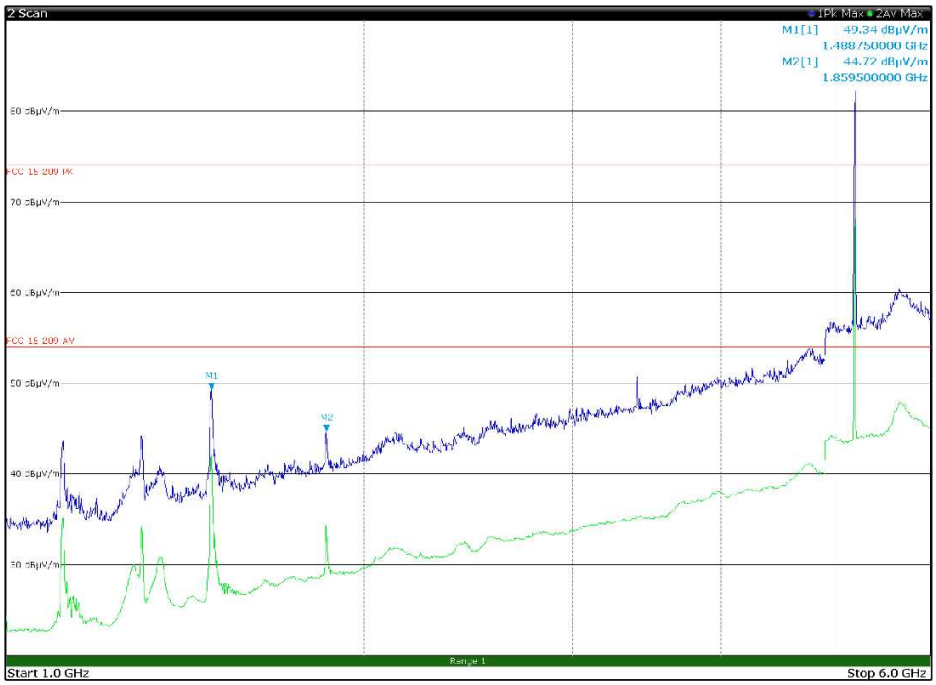

Figure 8.4-31: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in horizontal polarization*

Limit exceeded by the carrier

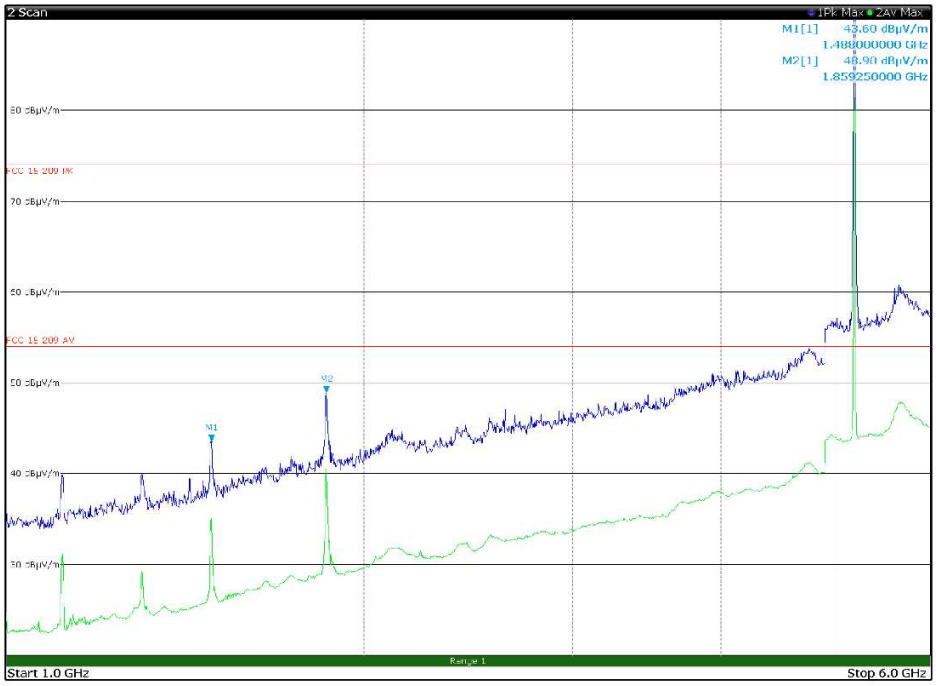

Figure 8.4-32: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in vertical polarization*

Limit exceeded by the carrier

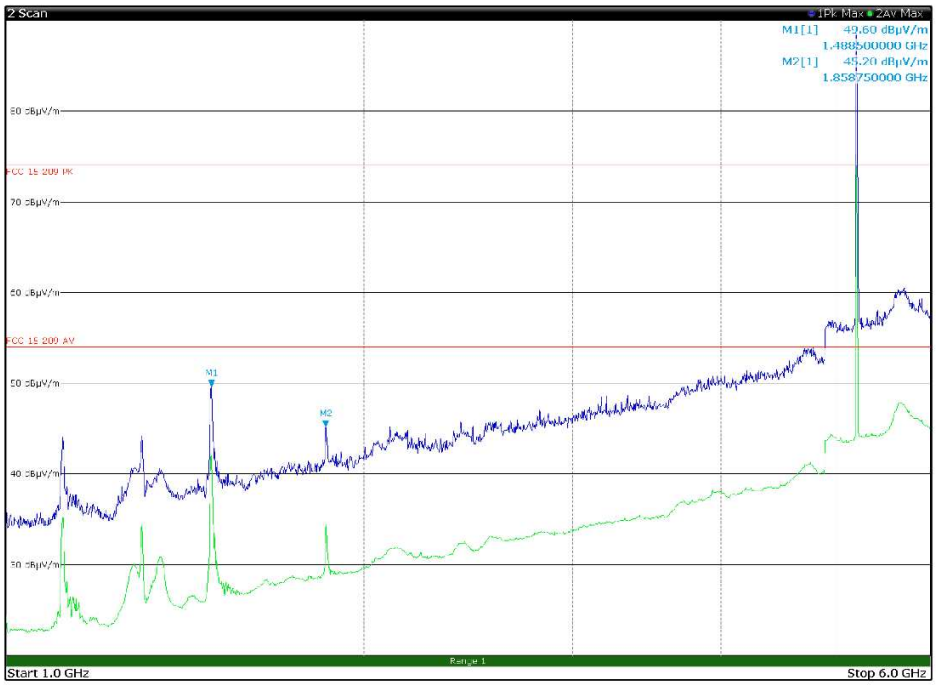

Figure 8.4-33: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in horizontal polarization*

Limit exceeded by the carrier

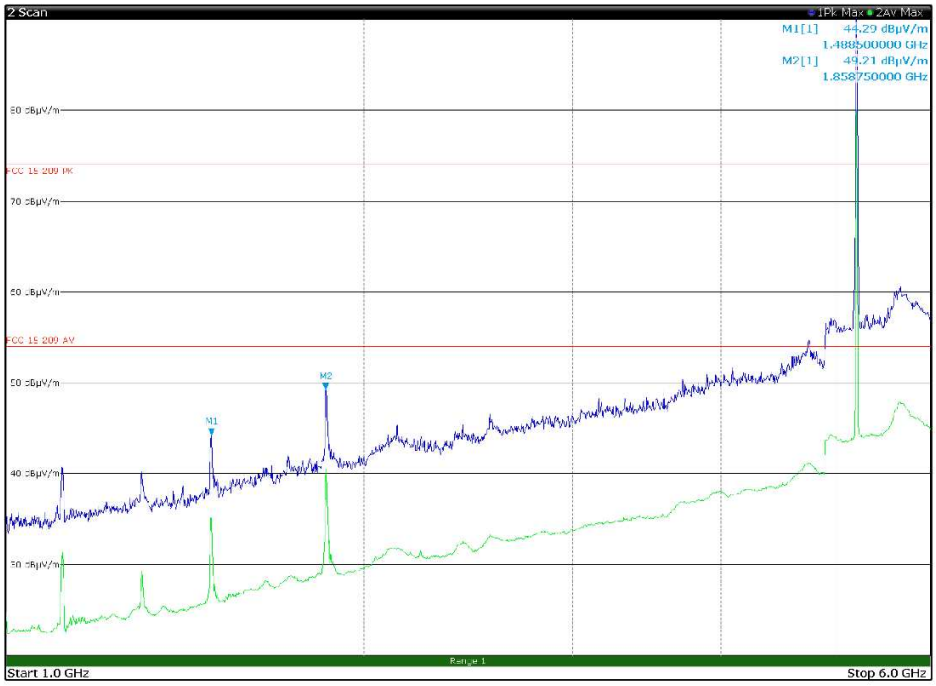

Figure 8.4-34: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in vertical polarization*

Limit exceeded by the carrier

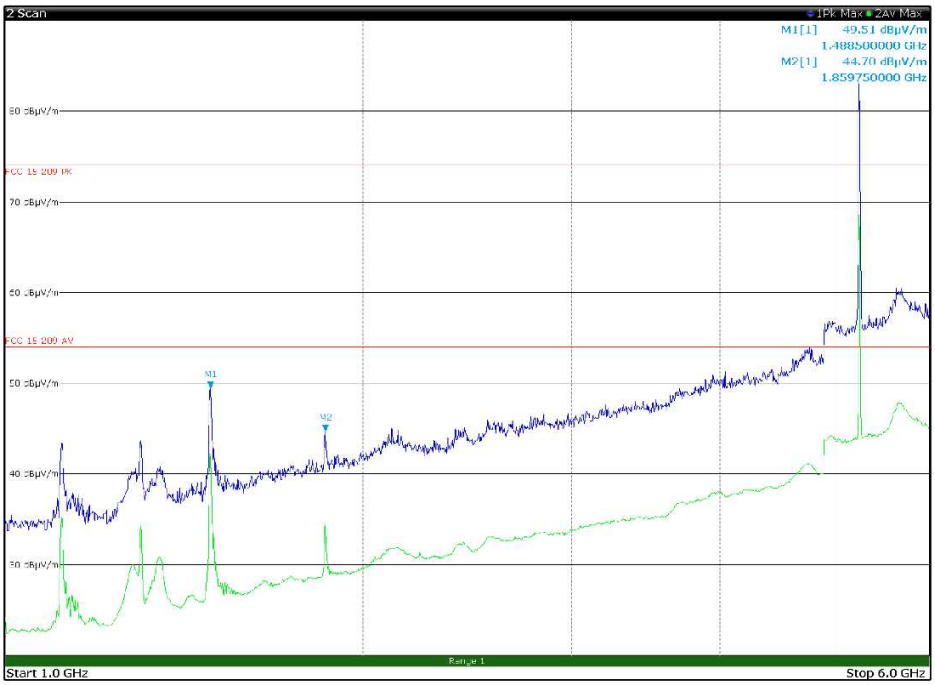

Figure 8.4-35: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in horizontal polarization*

Limit exceeded by the carrier

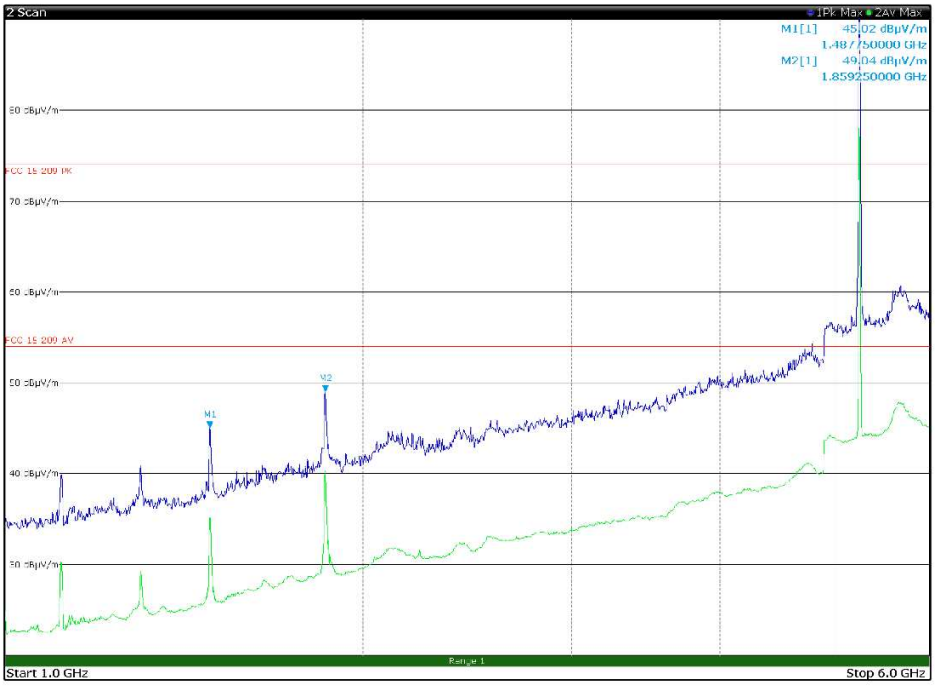

Figure 8.4-36: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

Limit exceeded by the carrier

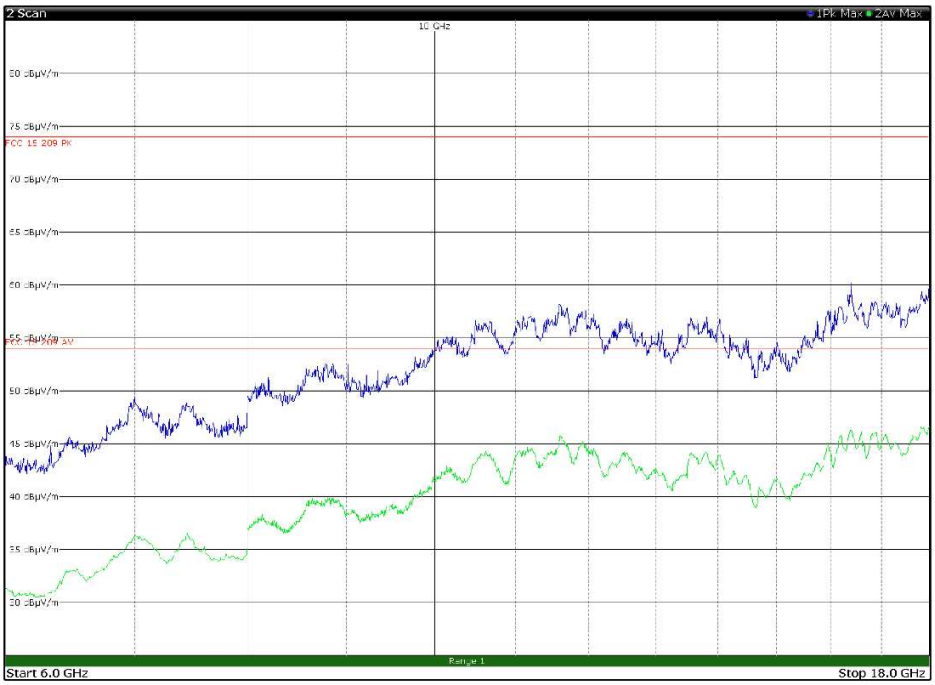

Figure 8.4-37: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in horizontal polarization*

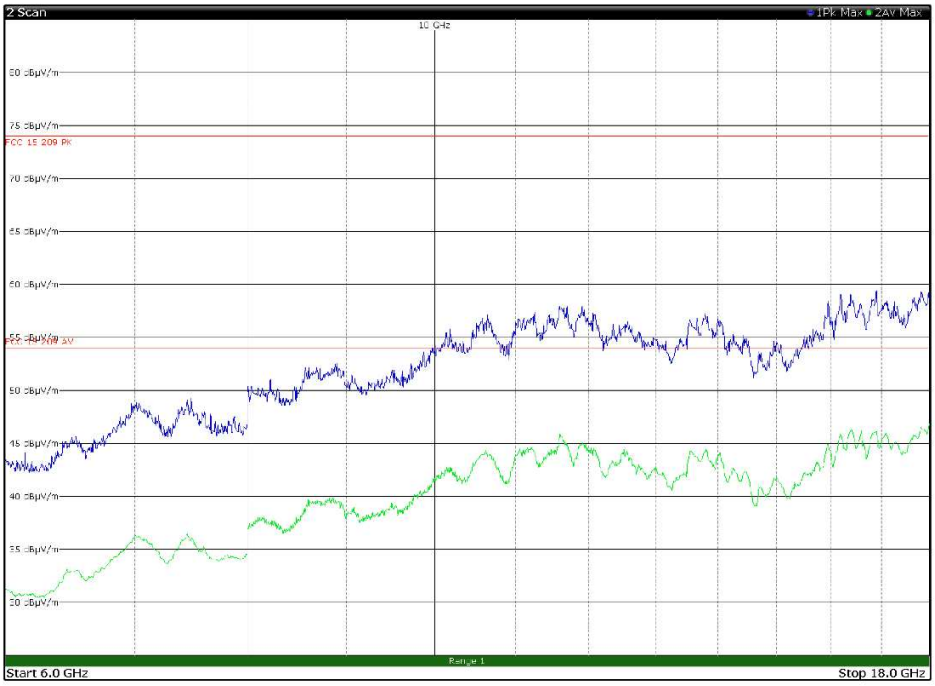

Figure 8.4-38: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in vertical polarization*

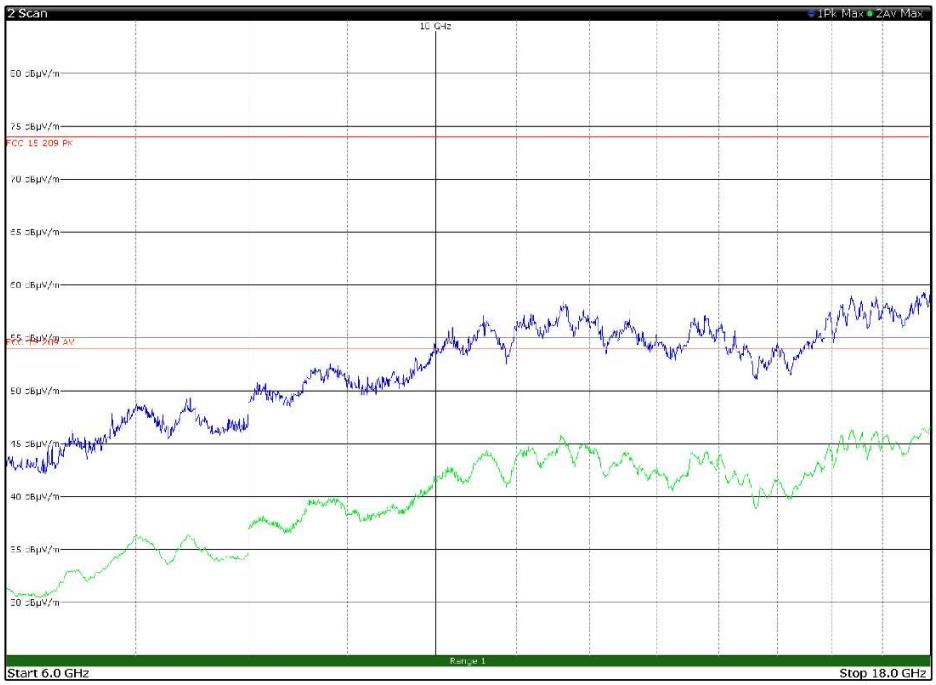

Figure 8.4-39: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in horizontal polarization*

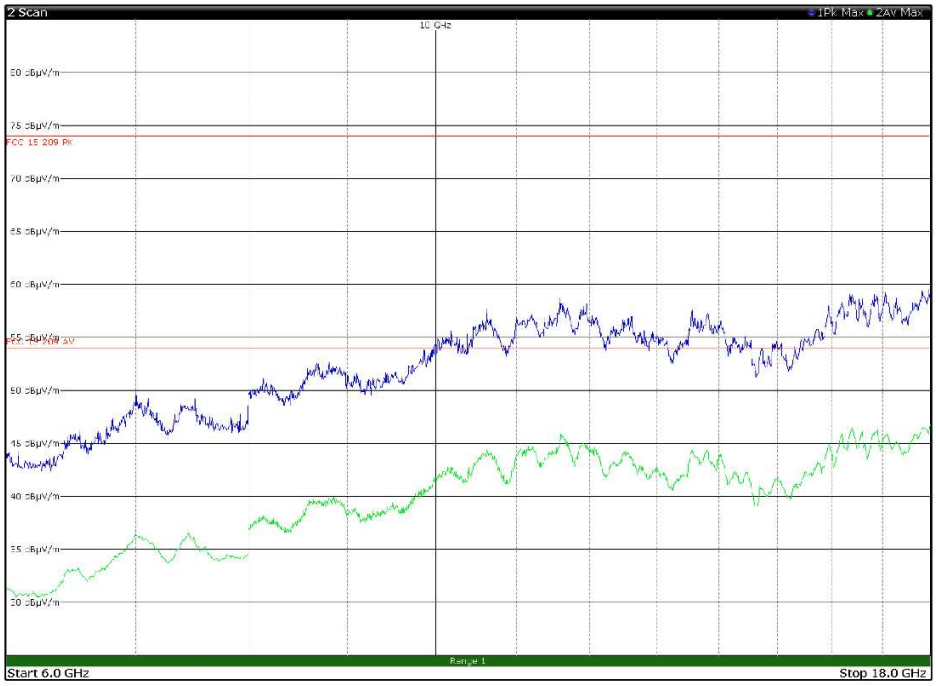

Figure 8.4-40: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in vertical polarization*

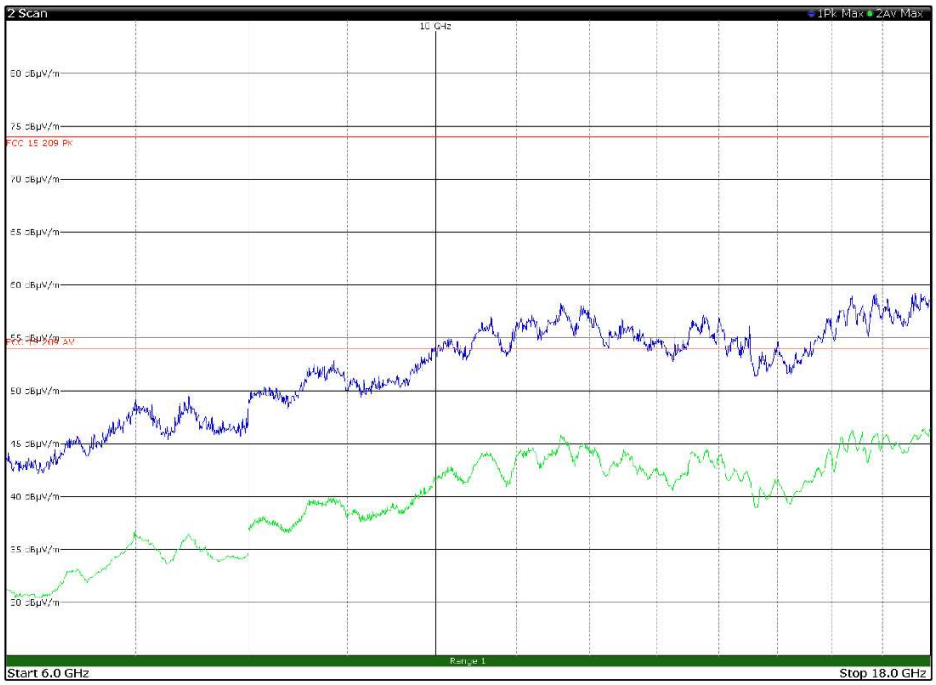

Figure 8.4-41: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in horizontal polarization*

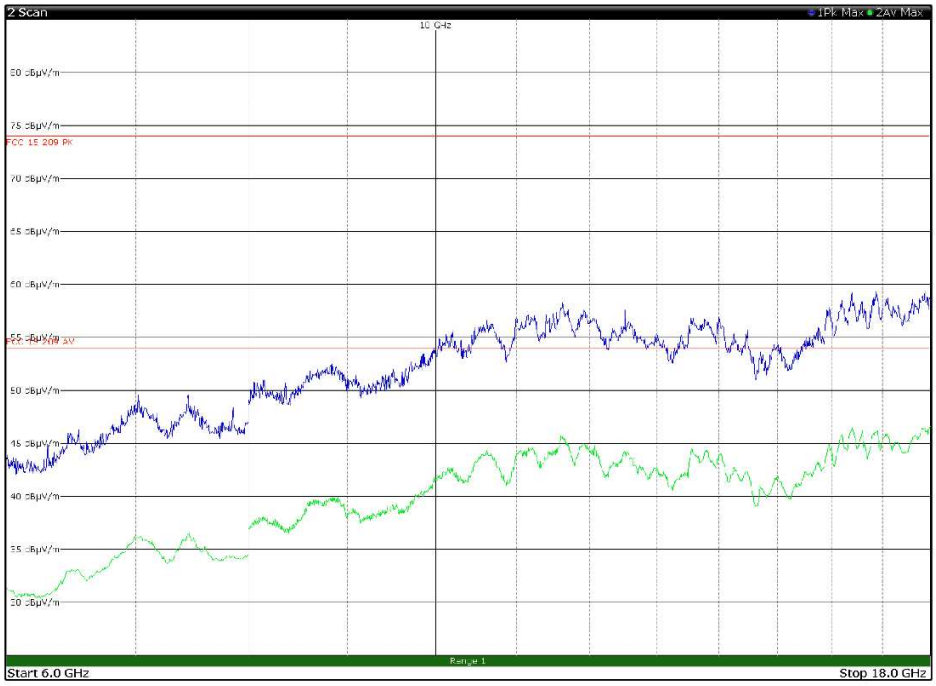

Figure 8.4-42: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in vertical polarization*

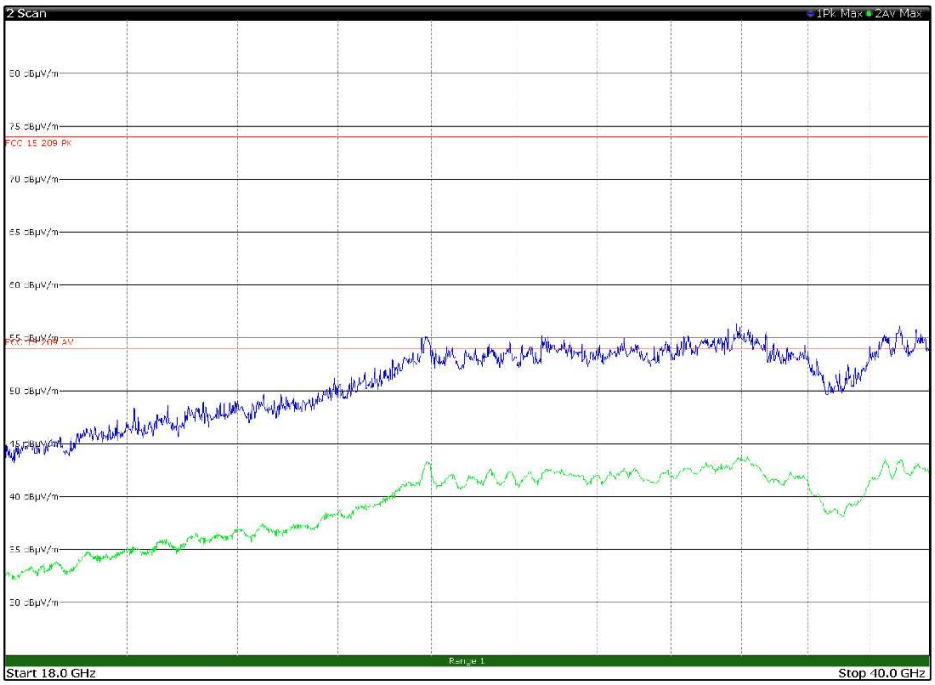

Figure 8.4-43: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in horizontal polarization*

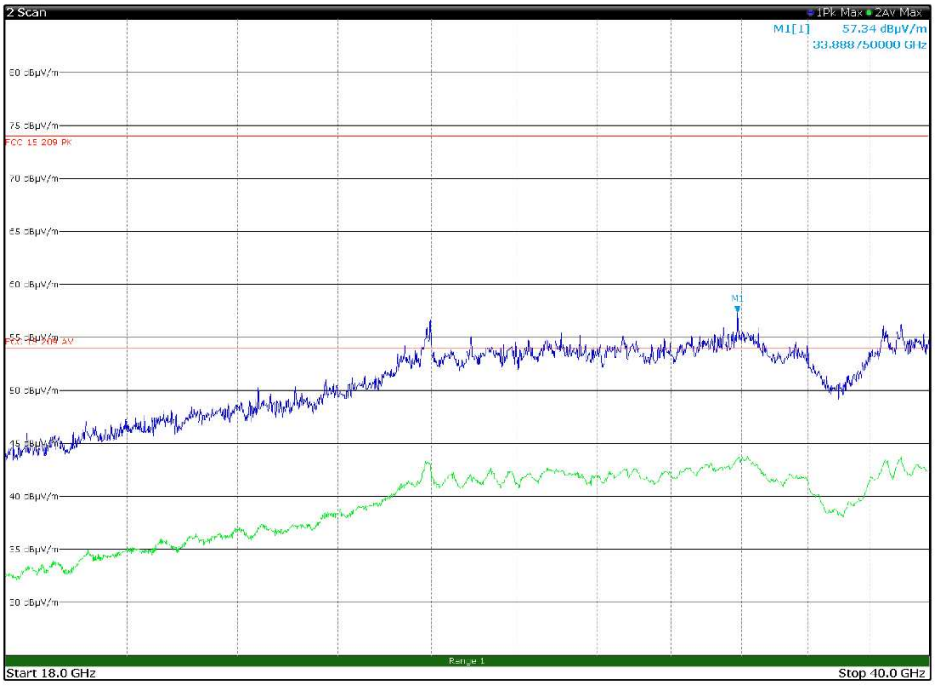

Figure 8.4-44: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in vertical polarization*

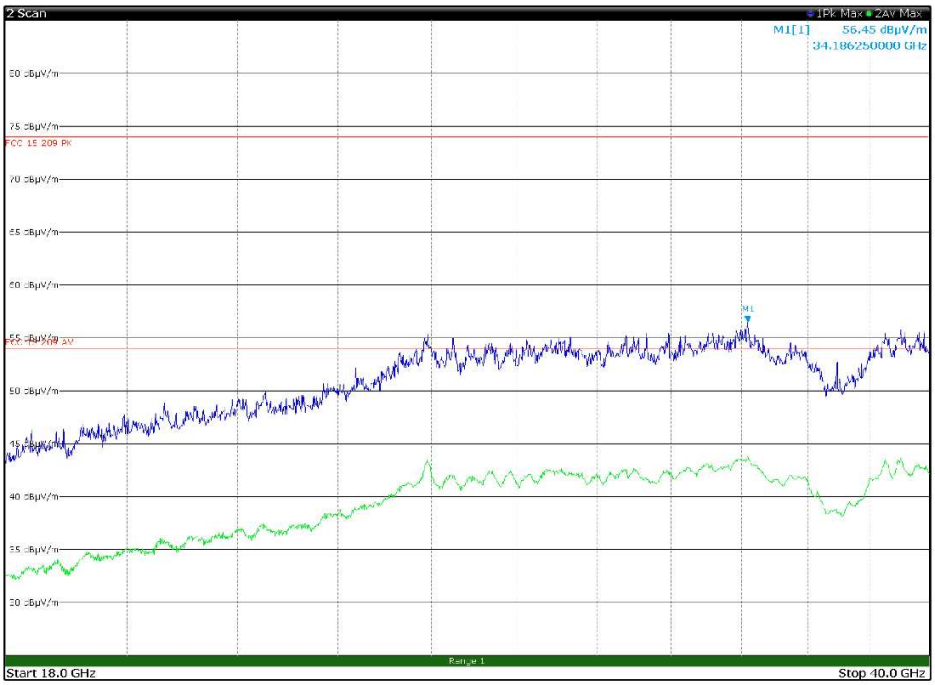

Figure 8.4-45: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in horizontal polarization*

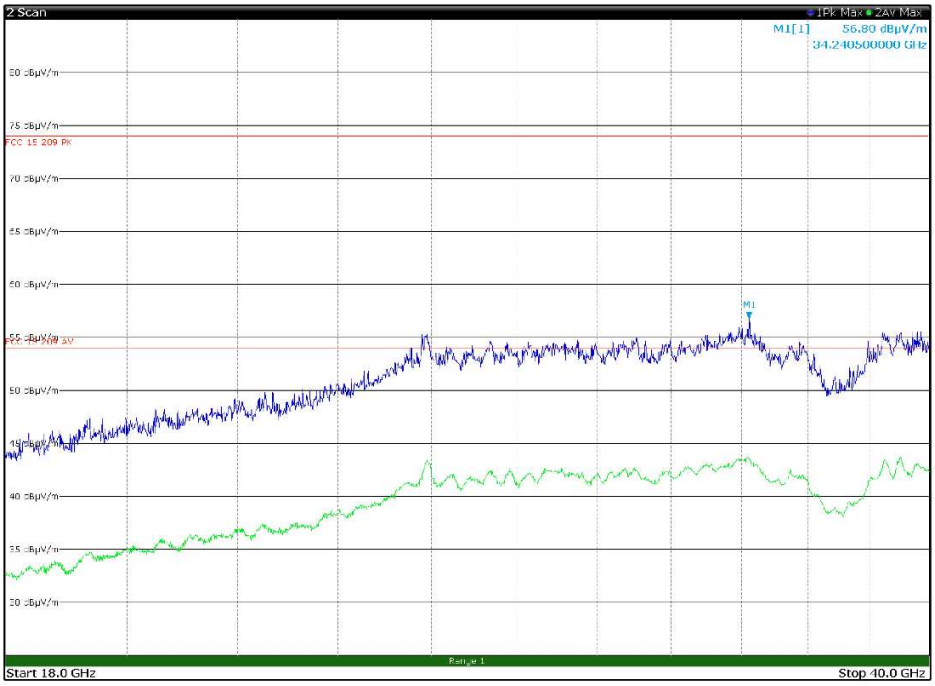

Figure 8.4-46: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in vertical polarization*

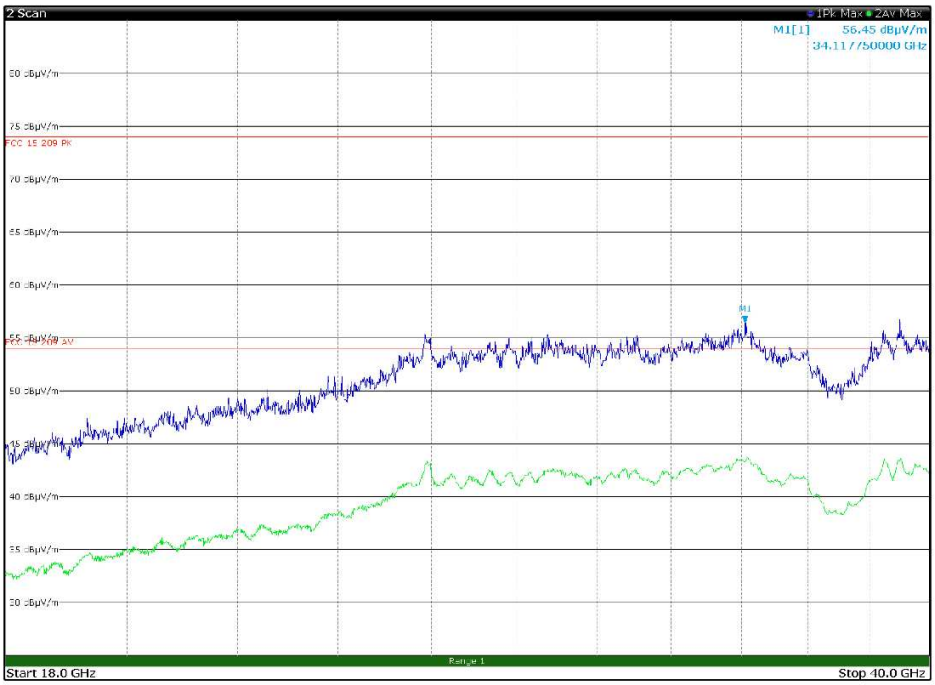

Figure 8.4-47: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in horizontal polarization*

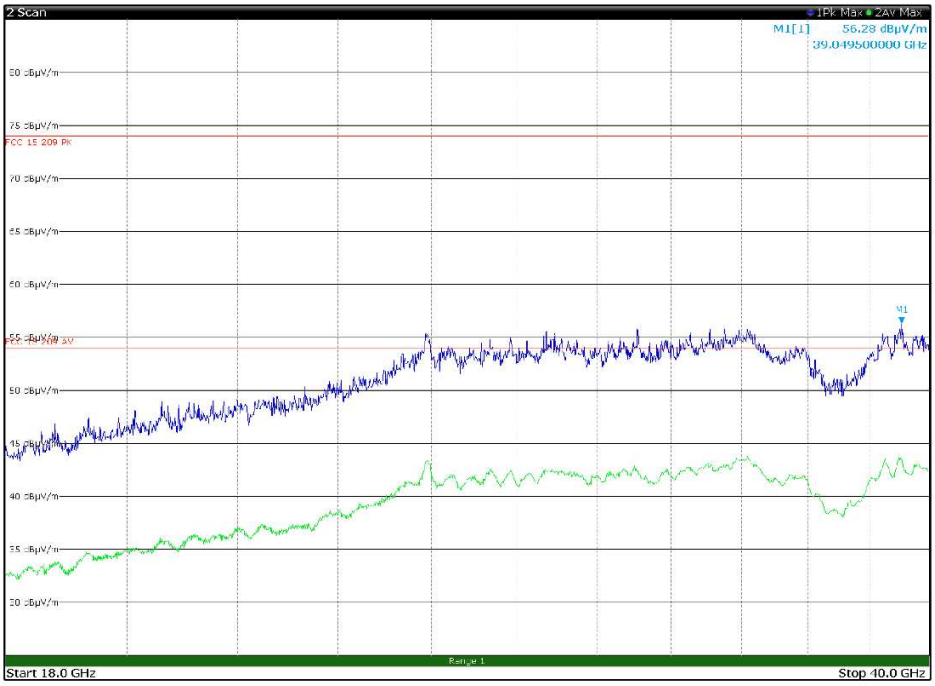

Figure 8.4-48: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in vertical polarization*

8.4.1 Test data for DYGATE-10-12-GS04 Antenna configuration 1

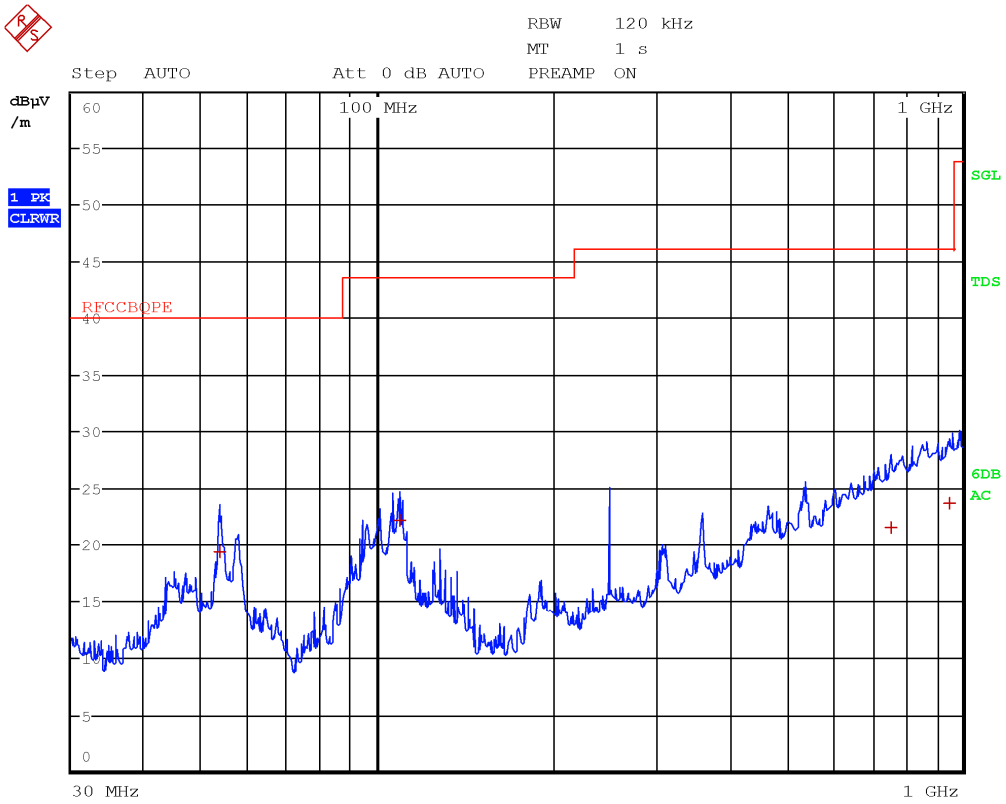

Figure 8.4-49: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
53.8400	19.3	40.0	-20.7	QP
109.0400	22.2	43.5	-21.3	QP
755.0000	21.7	46.0	-24.3	QP
949.3200	23.4	46.0	-22.6	QP

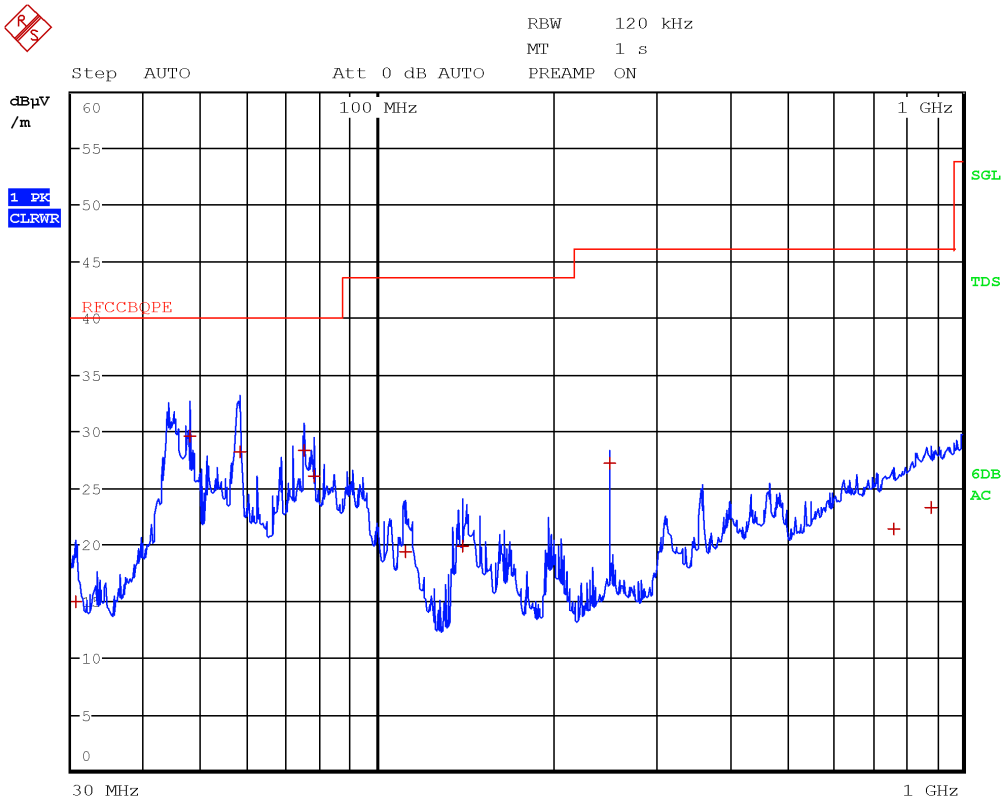

Figure 8.4-50: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.4800	15.0	40.0	-25.0	QP
47.8000	29.4	40.0	-10.6	QP
58.2000	28.3	40.0	-11.7	QP
74.8000	28.4	40.0	-11.6	QP
77.9200	26.3	40.0	-13.7	QP
111.5200	19.8	43.5	-23.7	QP
140.1200	19.7	43.5	-23.8	QP
250.0000	27.8	46.0	-18.2	QP
763.5200	21.6	46.0	-24.4	QP
884.6800	23.5	46.0	-22.5	QP

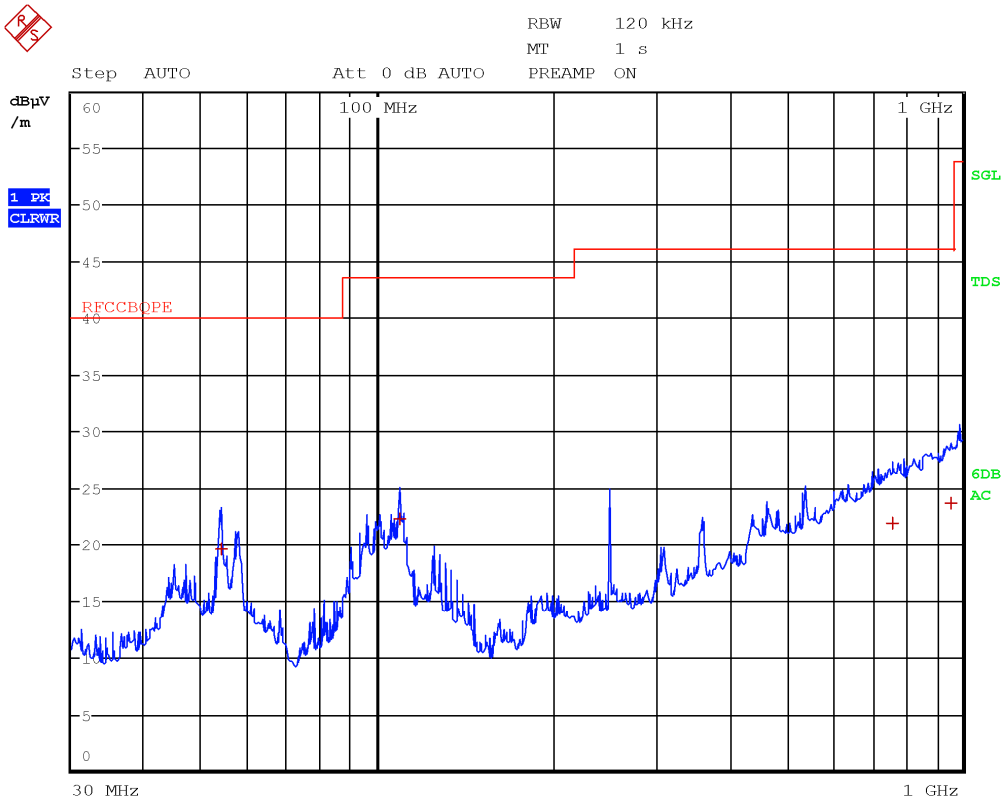

Figure 8.4-51: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
53.9600	19.4	40.0	-20.6	QP
109.0400	22.5	43.5	-21.0	QP
759.7600	21.8	46.0	-24.2	QP
955.2400	23.3	46.0	-22.7	QP

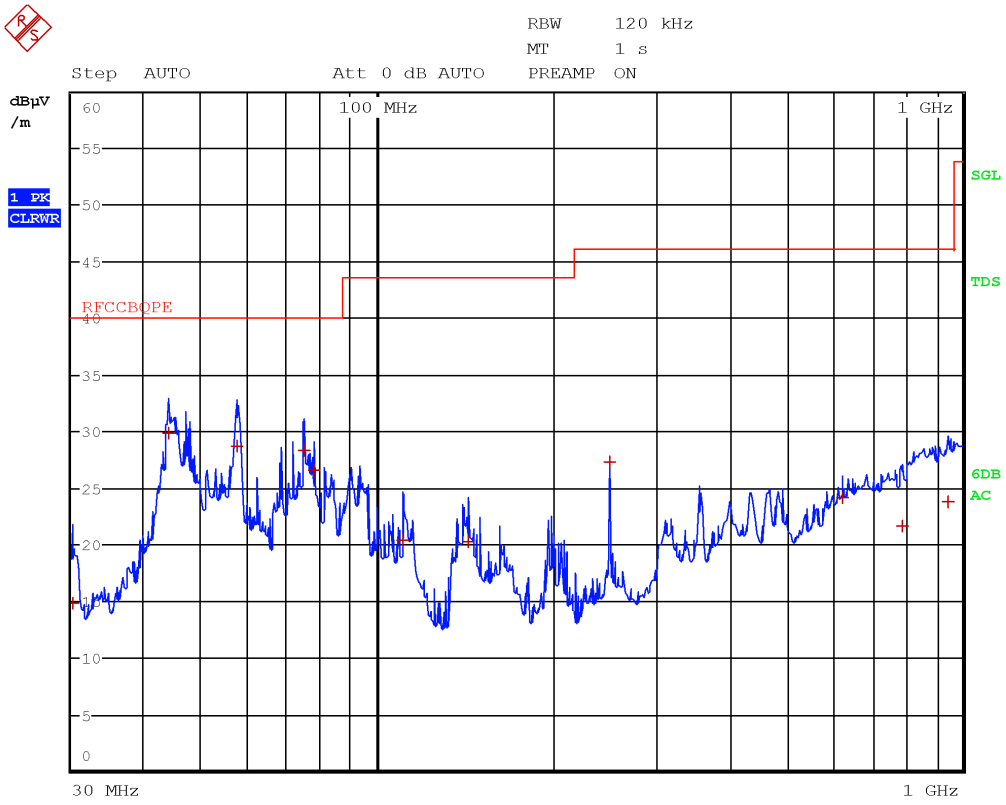

Figure 8.4-52: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.2000	14.6	40.0	-25.4	QP
43.8000	29.7	40.0	-10.3	QP
57.5600	28.6	40.0	-11.4	QP
74.8000	28.8	40.0	-11.2	QP
77.8800	26.5	40.0	-13.5	QP
110.7600	20.6	43.5	-22.9	QP
143.2800	20.1	43.5	-23.4	QP
250.0000	27.5	46.0	-18.5	QP
624.9600	24.2	46.0	-21.8	QP
789.4800	21.3	46.0	-24.7	QP
947.3200	23.6	46.0	-22.4	QP

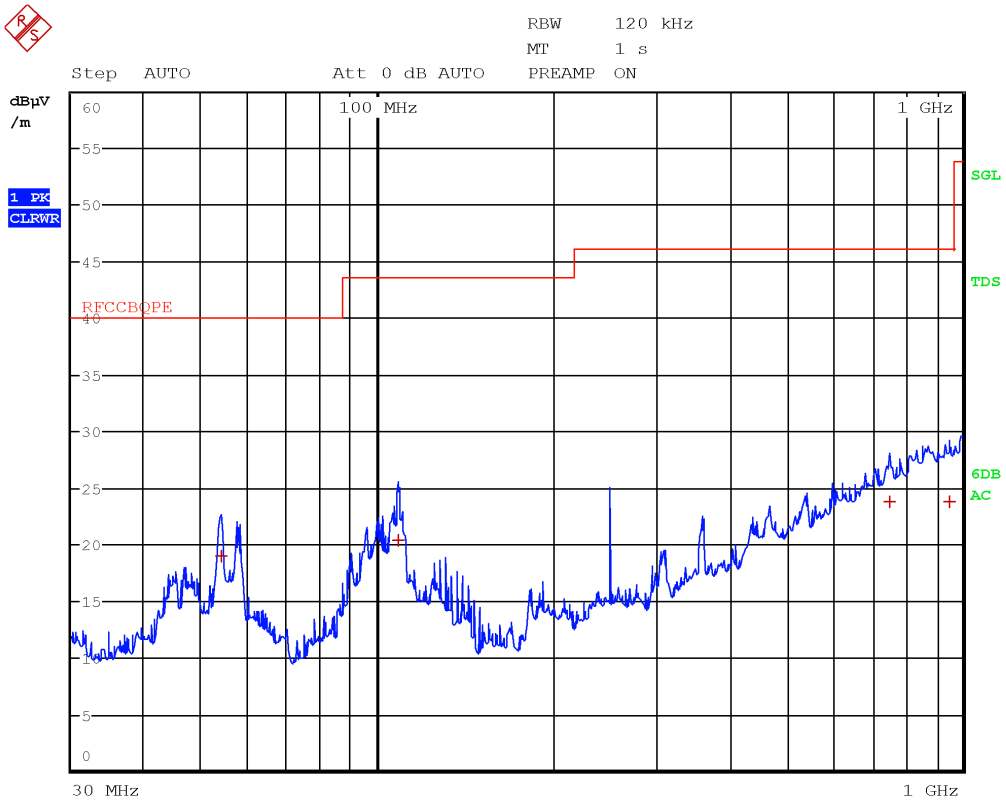

Figure 8.4-53: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
54.1200	19.4	40.0	-20.6	QP
108.8400	20.3	43.5	-23.2	QP
749.9600	23.5	46.0	-22.5	QP
948.6400	23.6	46.0	-22.4	QP

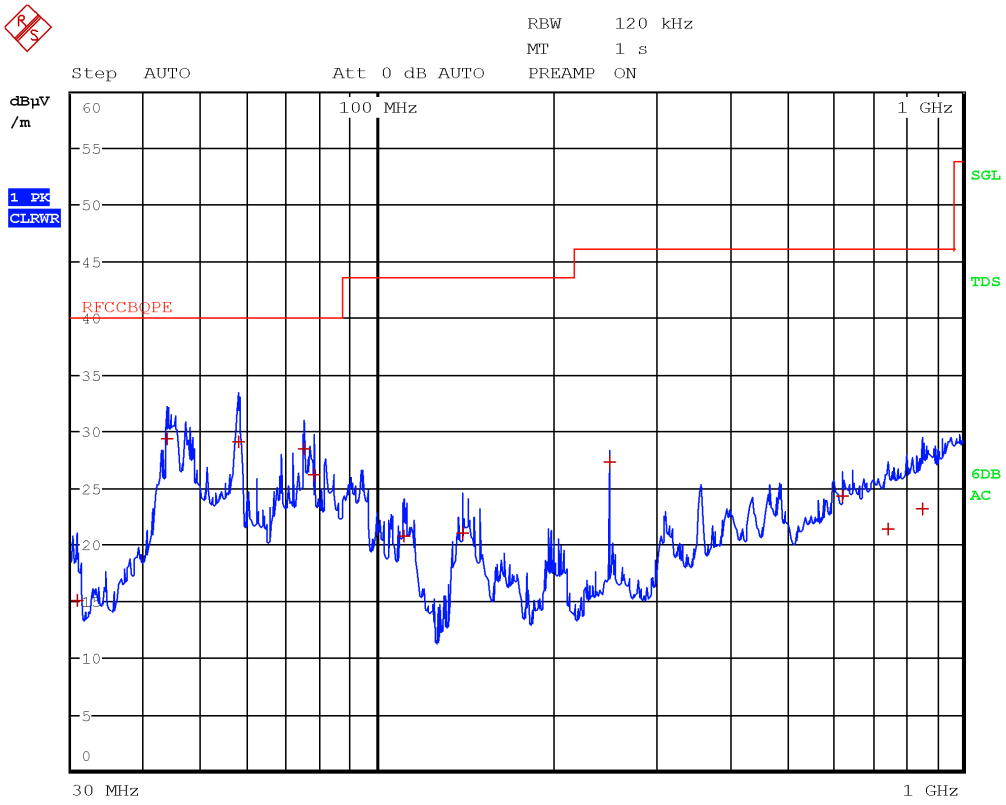

Figure 8.4-54: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.5600	15.4	40.0	-24.6	QP
43.7600	29.3	40.0	-10.7	QP
57.9200	29.5	40.0	-10.5	QP
74.8000	28.4	40.0	-11.6	QP
77.8400	26.7	40.0	-13.3	QP
110.8000	20.8	43.5	-22.7	QP
140.1600	21.5	43.5	-22.0	QP
250.0000	27.3	46.0	-18.7	QP
624.9600	24.5	46.0	-21.5	QP
746.8400	21.7	46.0	-24.3	QP
853.6000	23.5	46.0	-22.5	QP

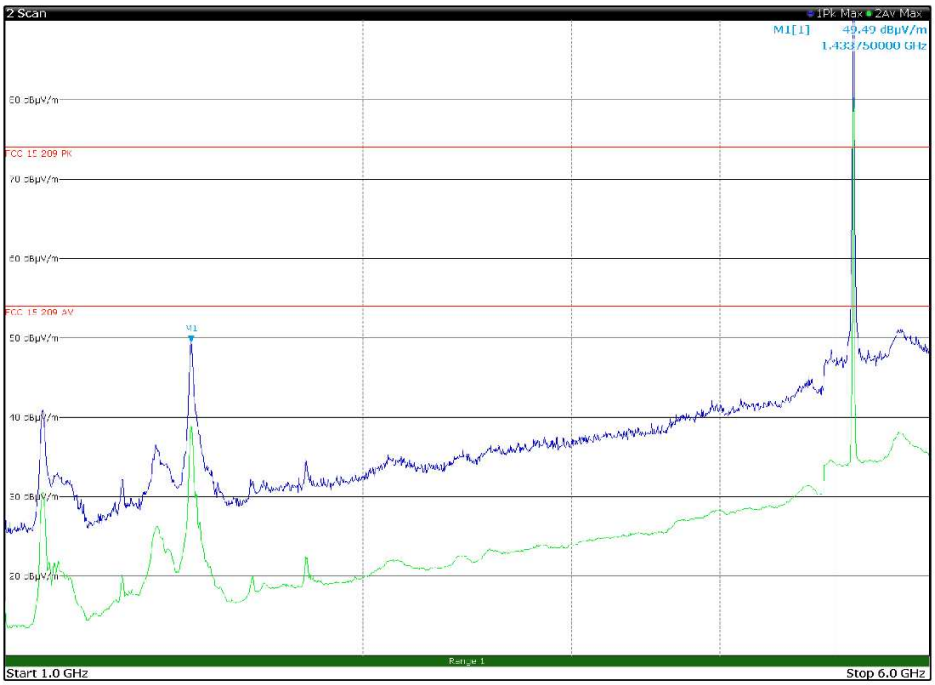

Figure 8.4-55: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in horizontal polarization*

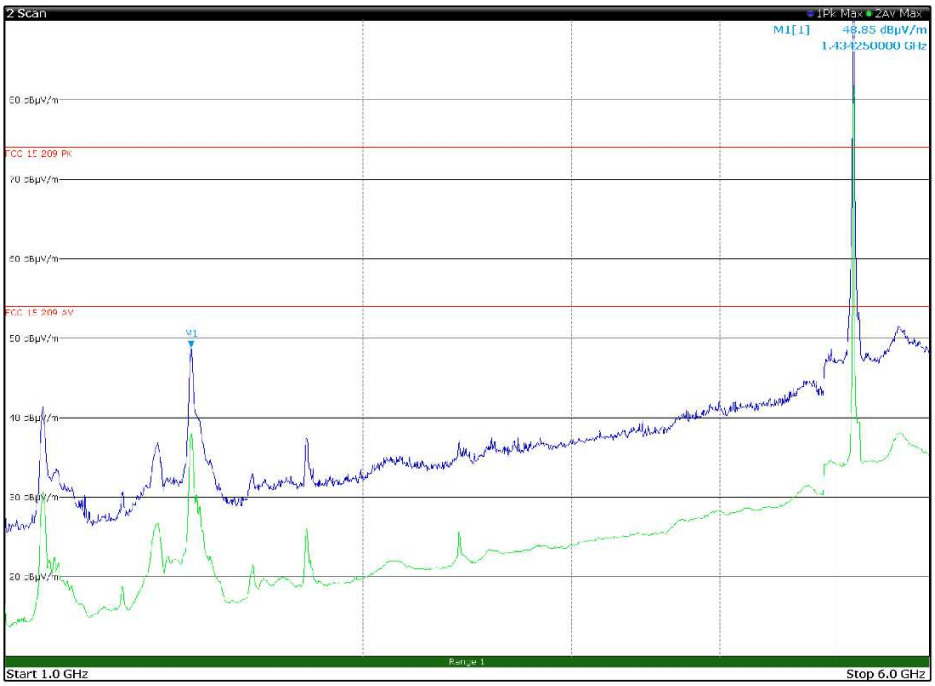

Figure 8.4-56: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in vertical polarization*

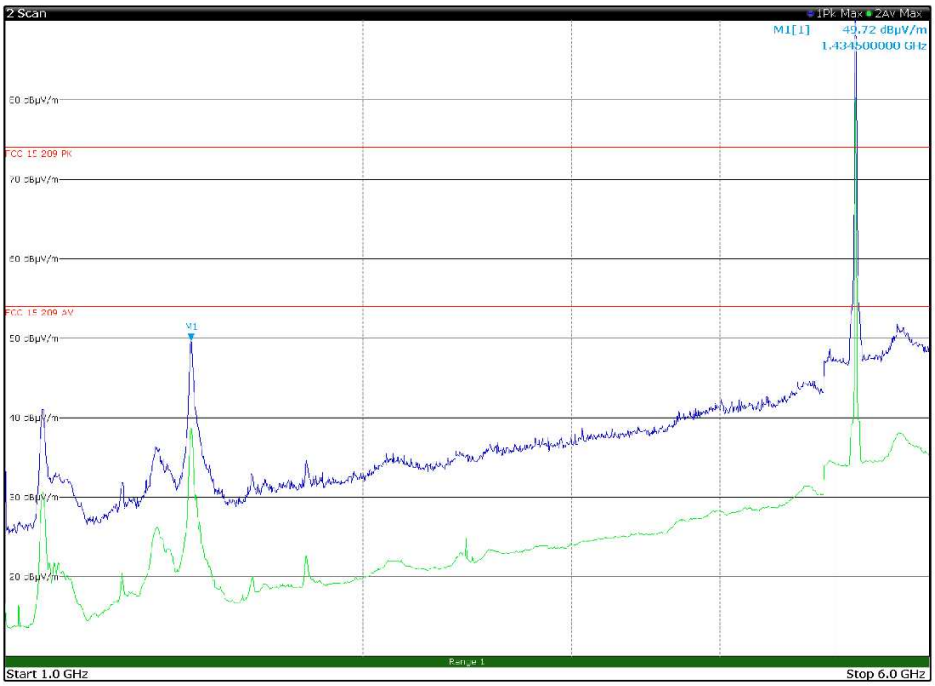

Figure 8.4-57: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in horizontal polarization*

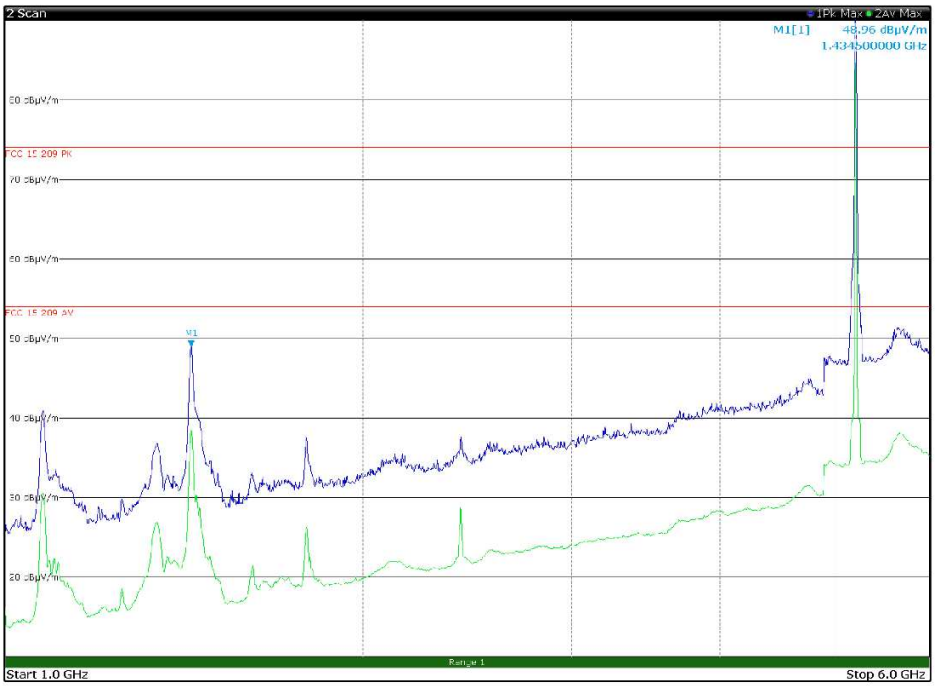

Figure 8.4-58: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in vertical polarization*

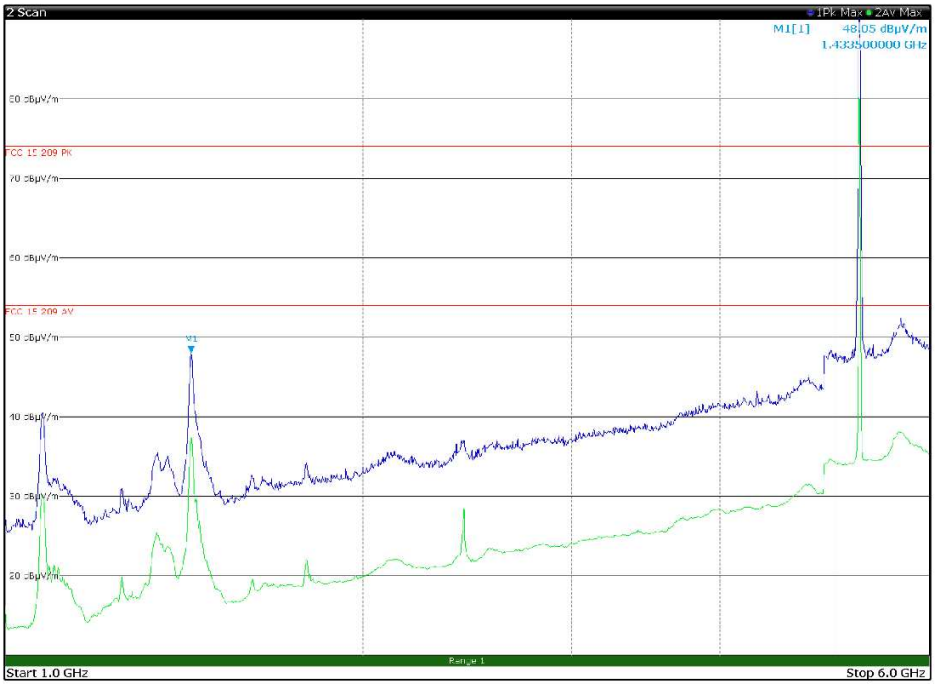

Figure 8.4-59: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in horizontal polarization*

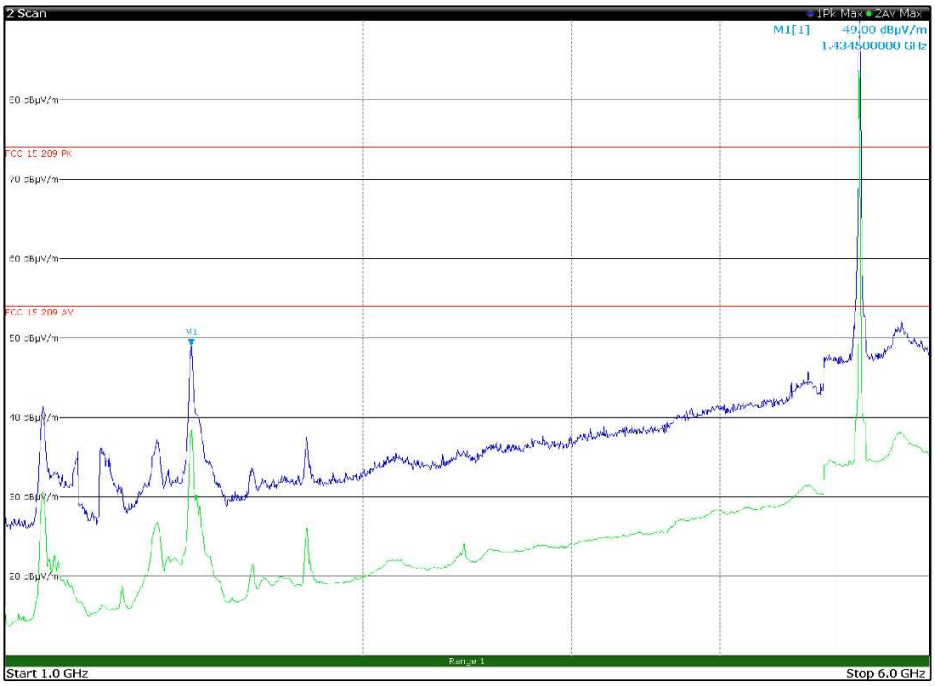

Figure 8.4-60: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

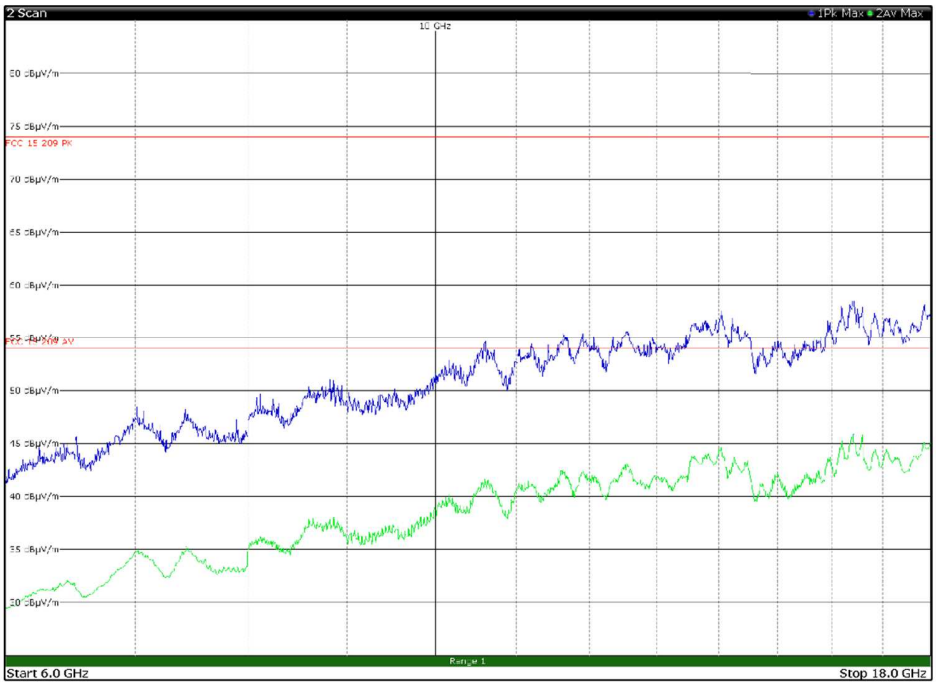

Figure 8.4-61: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in horizontal polarization*

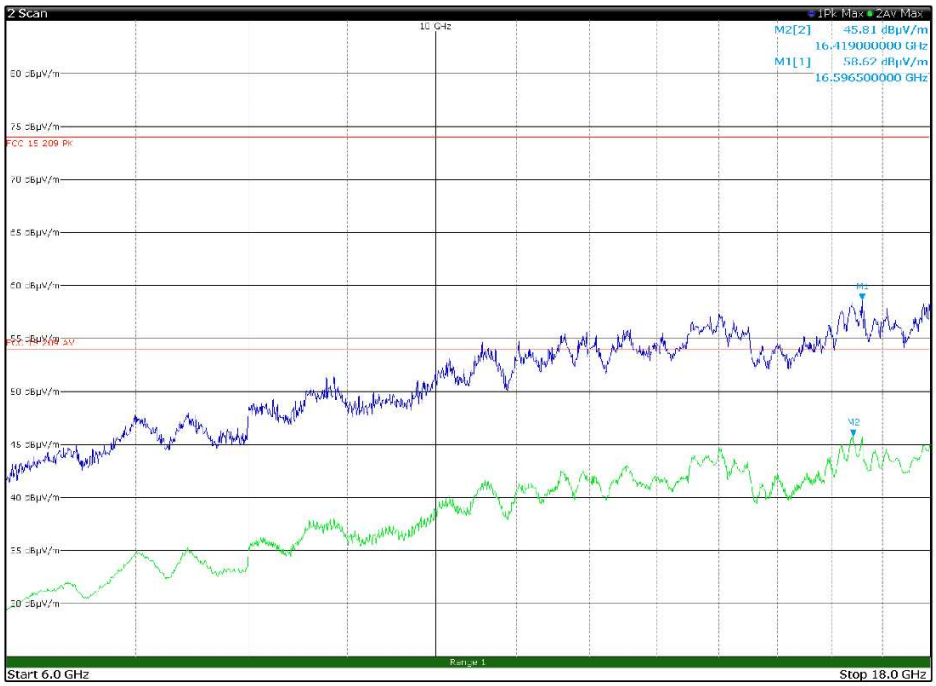

Figure 8.4-62: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in vertical polarization*

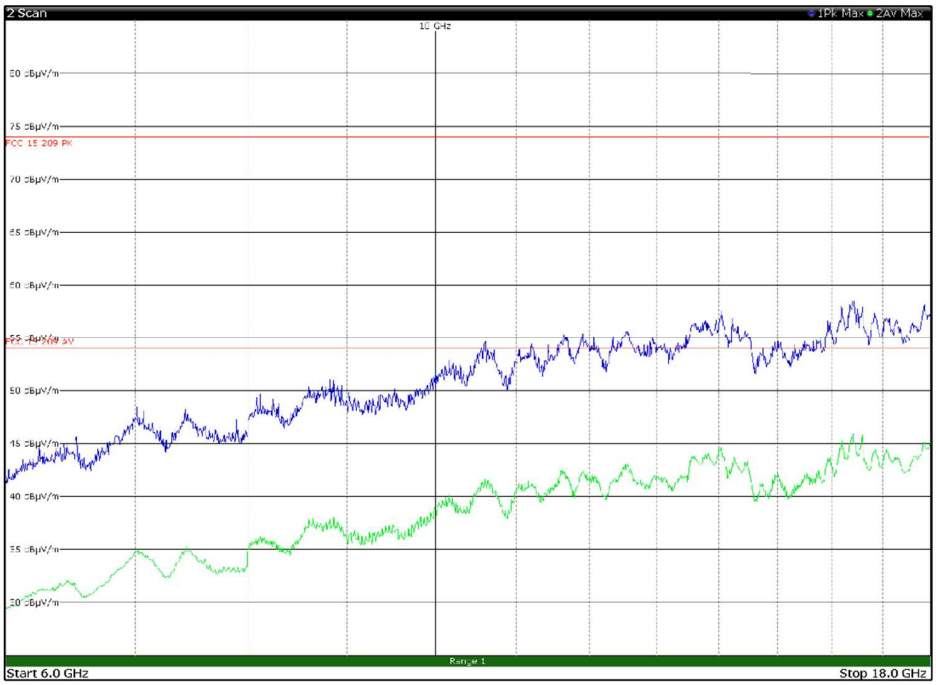

Figure 8.4-63: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in horizontal polarization*

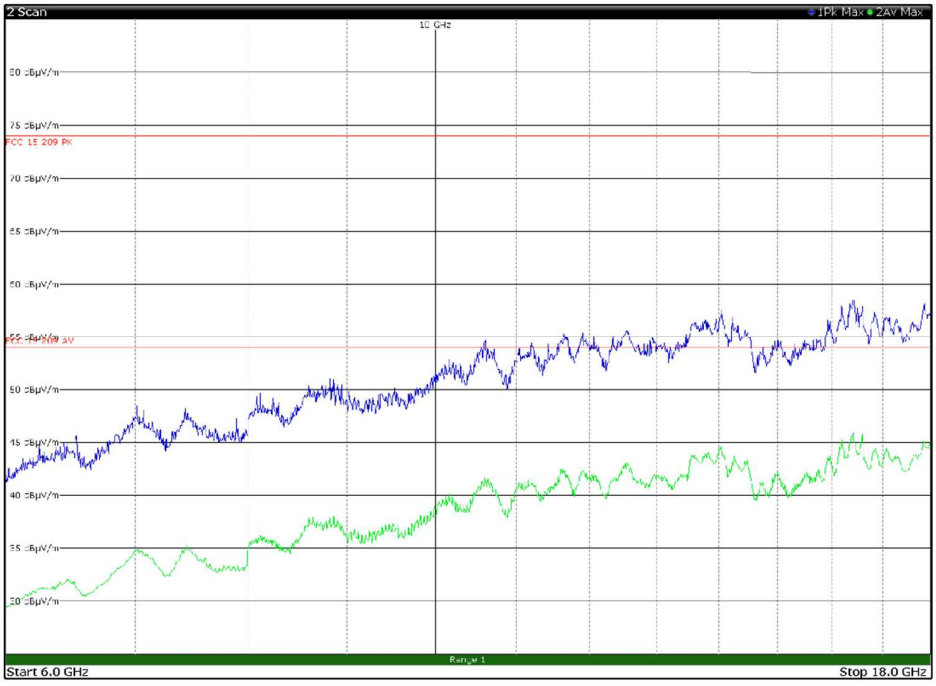

Figure 8.4-64: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in vertical polarization*

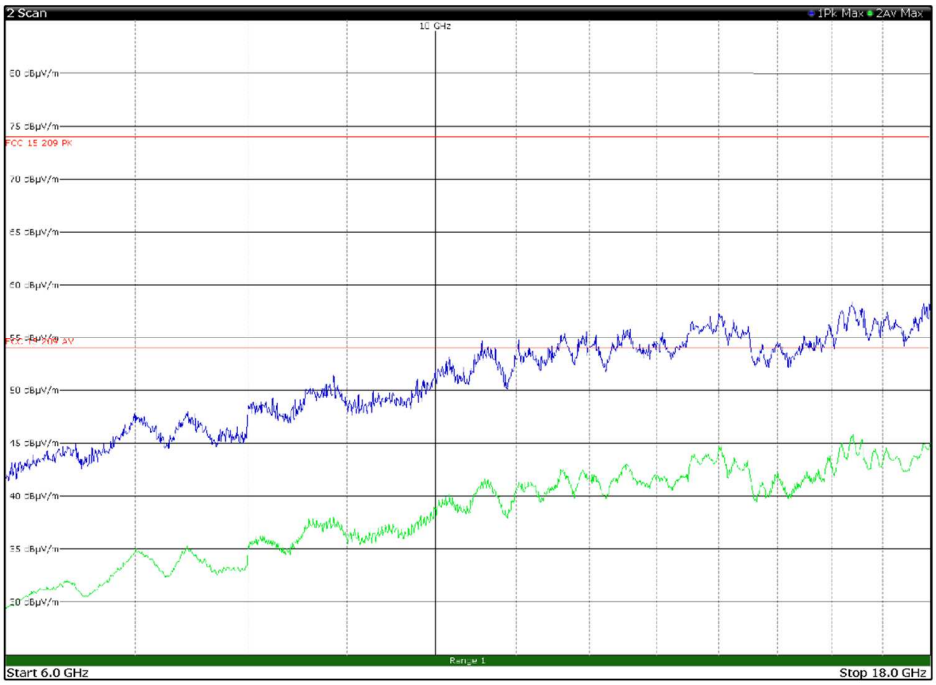

Figure 8.4-65: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in horizontal polarization*

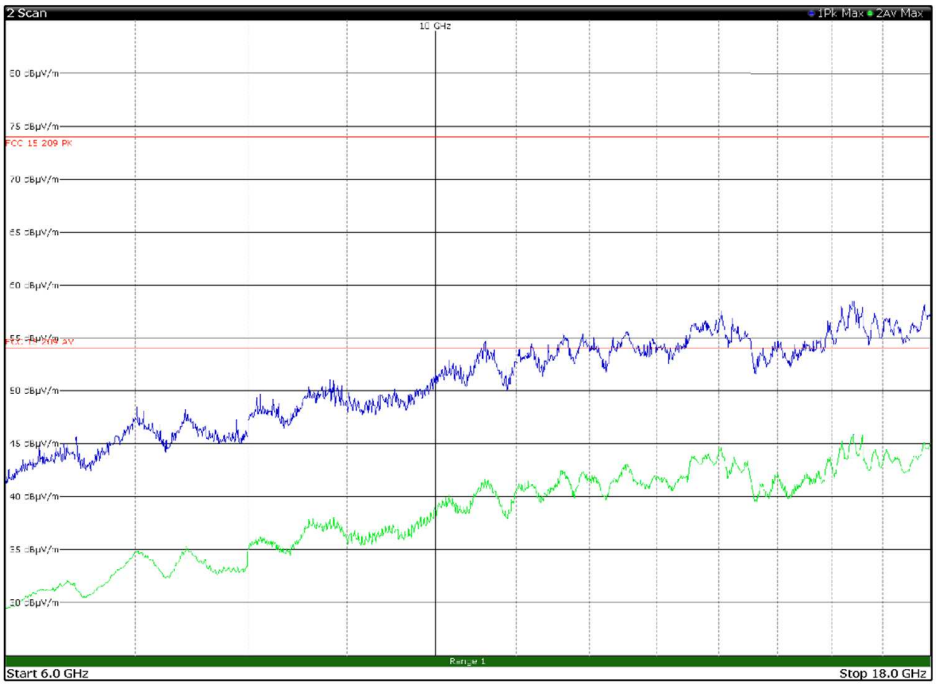

Figure 8.4-66: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in vertical polarization*

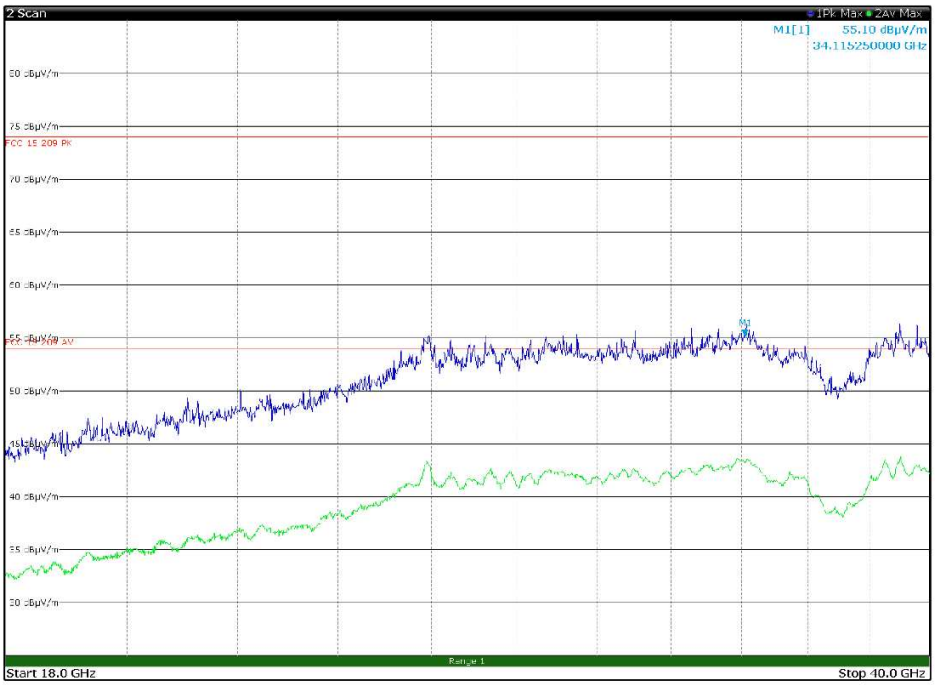

Figure 8.4-67: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in horizontal polarization*

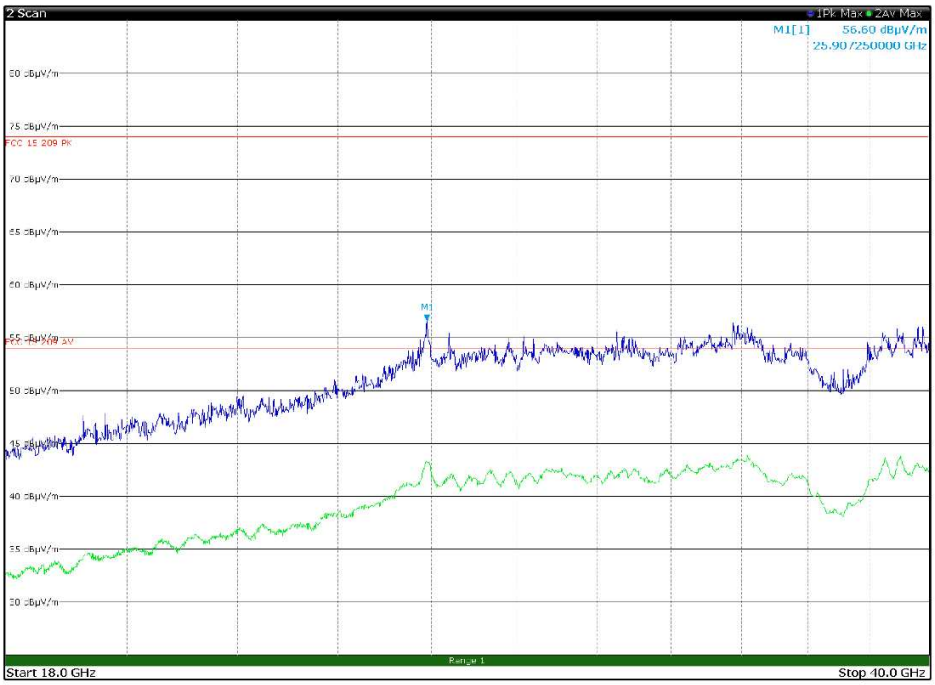

Figure 8.4-68: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in vertical polarization*

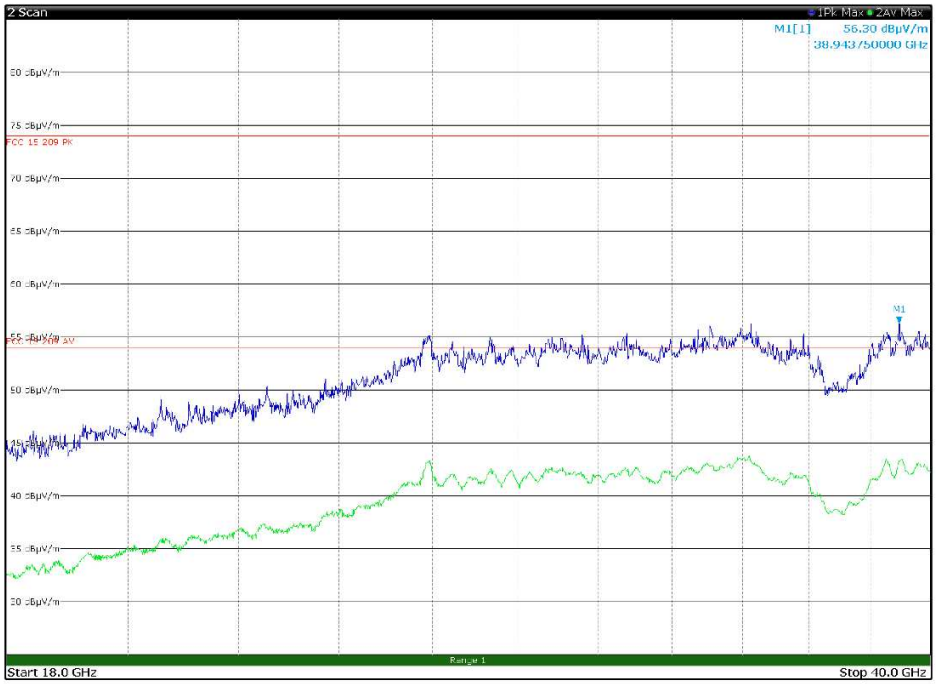

Figure 8.4-69: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in horizontal polarization*

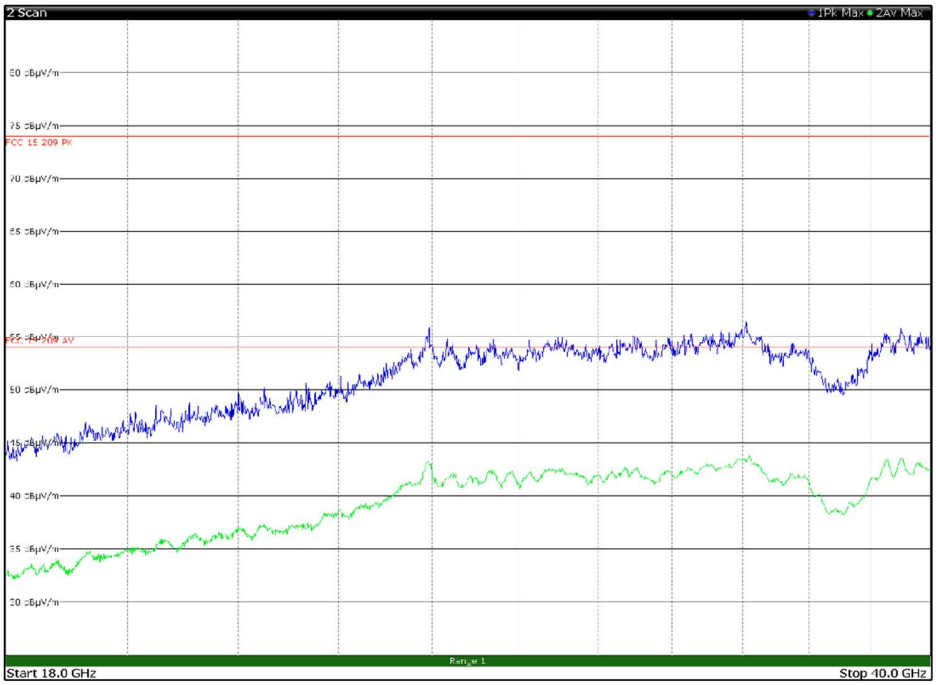

Figure 8.4-70: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in vertical polarization*