ONE WORLD ◦ OUR APPROVAL

Wireless test report – 409346-4TRFWL

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 L

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

Table of contents

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
FCC 16-24 (March 2, 2016)	Memorandum opinion and order for U-NII-3 (5.725–5.85 GHz) band
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
409346-4TRFWL	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	Not applicable
§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	Pass
§15.407(b)(1)	Undesirable emission limits for 5.15–5.25 GHz band	Not applicable
§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	Pass
§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	Pass
§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

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

2.3 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 ISED RSS-247, Issue 2, test results

Section	Test description	Verdict
6.1 (1)[1]	Types of Modulation	Pass
6.2.1 (1)	Power limits for 5150–5250 MHz band	Not applicable
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	Pass
6.2.4 (1)	Minimum 6 dB bandwidth	Pass
6.2.1 (2)	Unwanted emission limits for 5150–5250 MHz band	Not applicable
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	Pass
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 modulations: 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	5725–5850 MHz
Frequency Min (MHz)	5745 (20 MHz channel); 5755 (40 MHz channel)
Frequency Max (MHz)	5825 (20 MHz channel); 5795 (40 MHz channel))
RF power Max (W), Conducted	11.8 mW (10.7 dBm for 20 MHz channel)
Measured BW (MHz) (26 dB)	23.1 MHz
Measured BW (MHz) (6 dB)	16.2 MHz
Measured BW (MHz) (99%)	16.7 MHz
Type of modulation	802.11a/n
Emission classification (F1D, G1D, D1D)	W7D
Equipment Class	NII
Transmitter spurious, Units @ distance	58.7 dBµV/m @ 3m
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

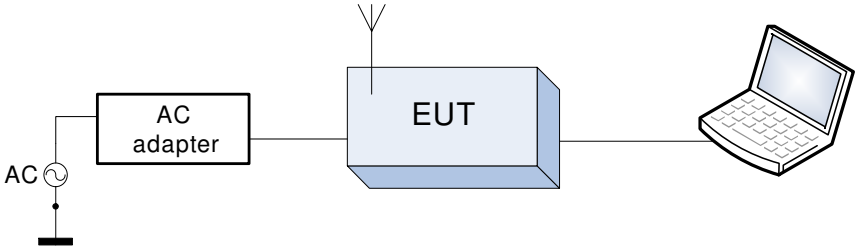
Configuration 1

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 IoT 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, 15.407(e) 6 dB bandwidth

8.1.1 Definitions and limits

FCC:
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.
15.407(e) Within the 5.725–5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

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 (for 26 dB BW), 100 kHz (for 6 dB BW)
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	5745	22.7
	5785	23.1
	5825	23.0

Table 8.1-3: *6 dB bandwidth results*

Modulation	Frequency, MHz	6 dB bandwidth, MHz	Minimum limit, MHz	Minimum margin, MHz
802.11a	5745	15.8	0.5	15.3
	5785	15.7	0.5	15.2
	5825	16.2	0.5	15.7

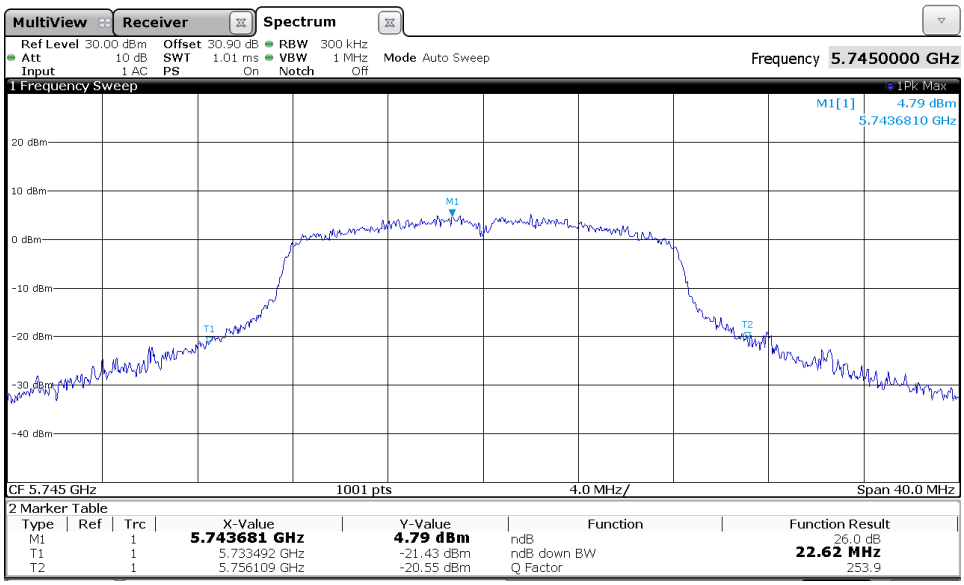


Figure 8.1-1: *26 dB bandwidth on 802.11a, low channel*

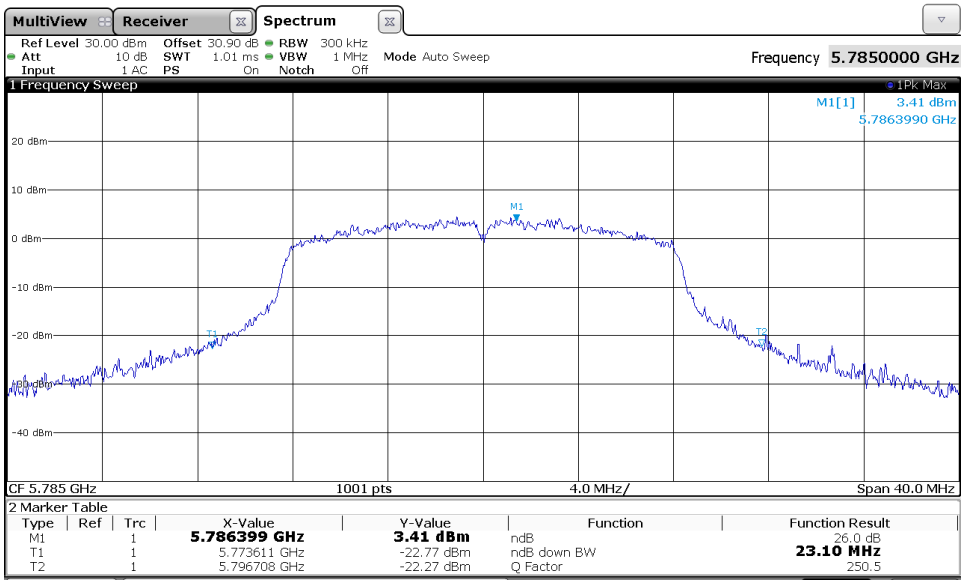


Figure 8.1-2: *26 dB bandwidth on 802.11a, mid channel*

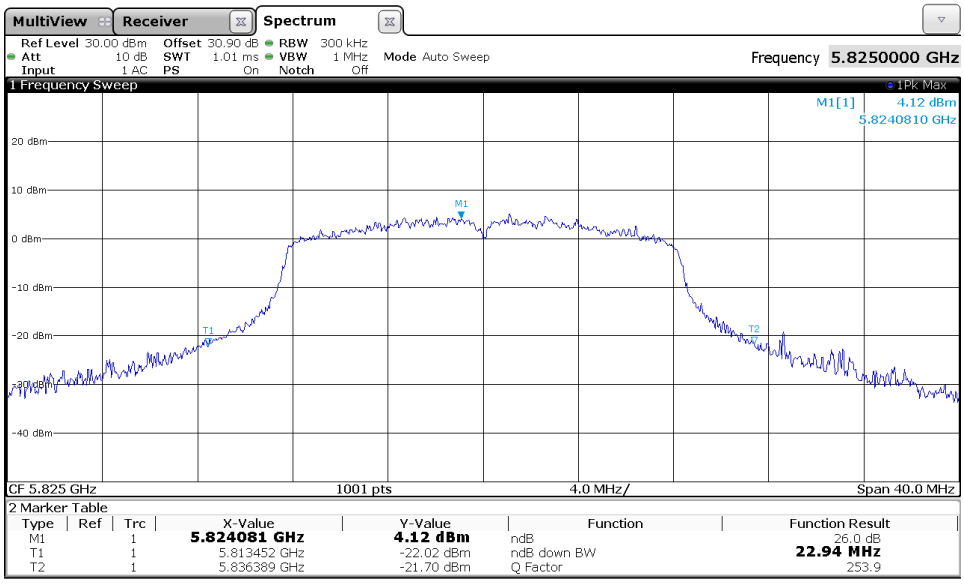


Figure 8.1-3: *26 dB bandwidth on 802.11a, high channel*

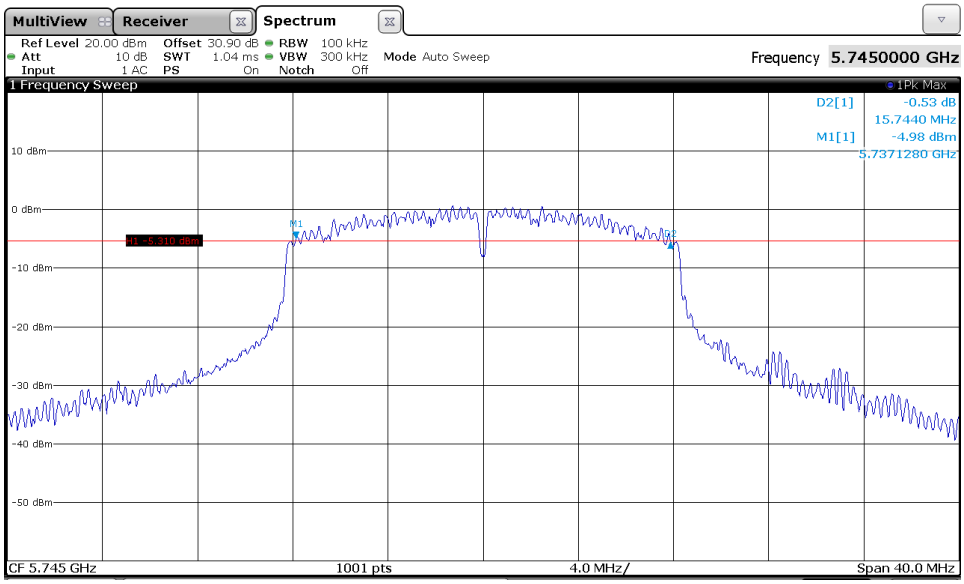


Figure 8.1-4: *6 dB bandwidth on 802.11a, low channel*

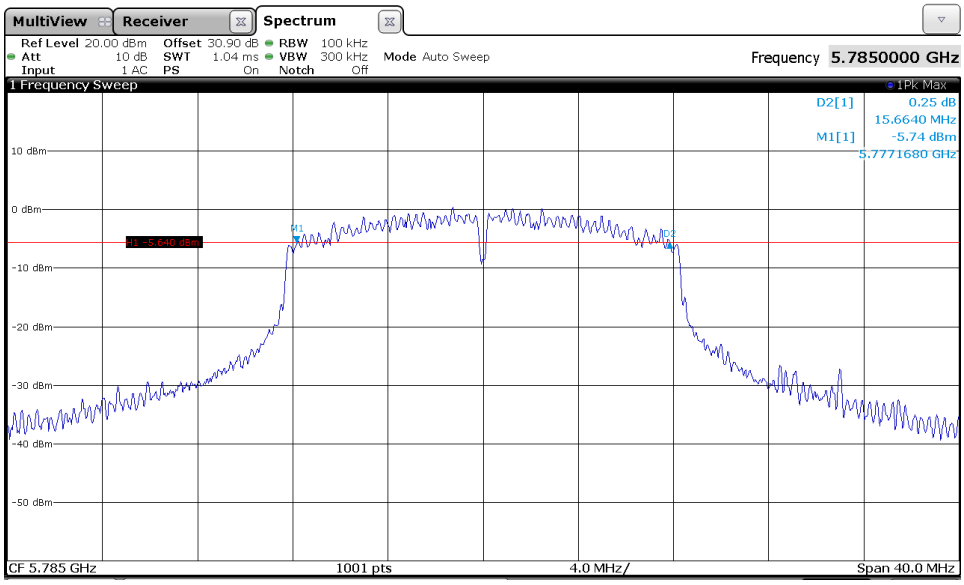


Figure 8.1-5: *6 dB bandwidth on 802.11a, mid channel*

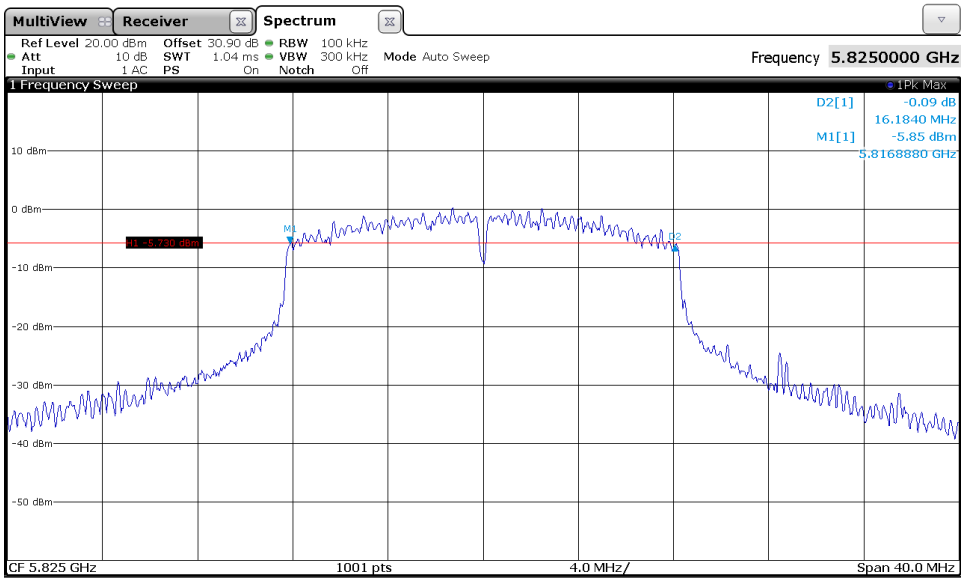


Figure 8.1-6: *6 dB bandwidth on 802.11a, high channel*

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 analyzer 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	5745	16.7
	5785	16.7
	5825	16.7

8.2.4 Test data, continued

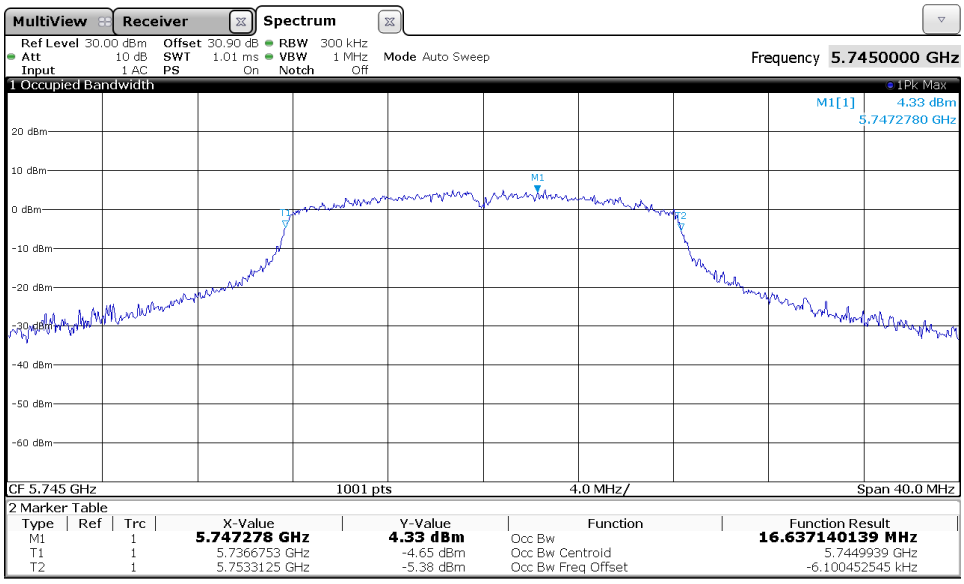


Figure 8.2-1: *99 % bandwidth on 802.11a, low channel*

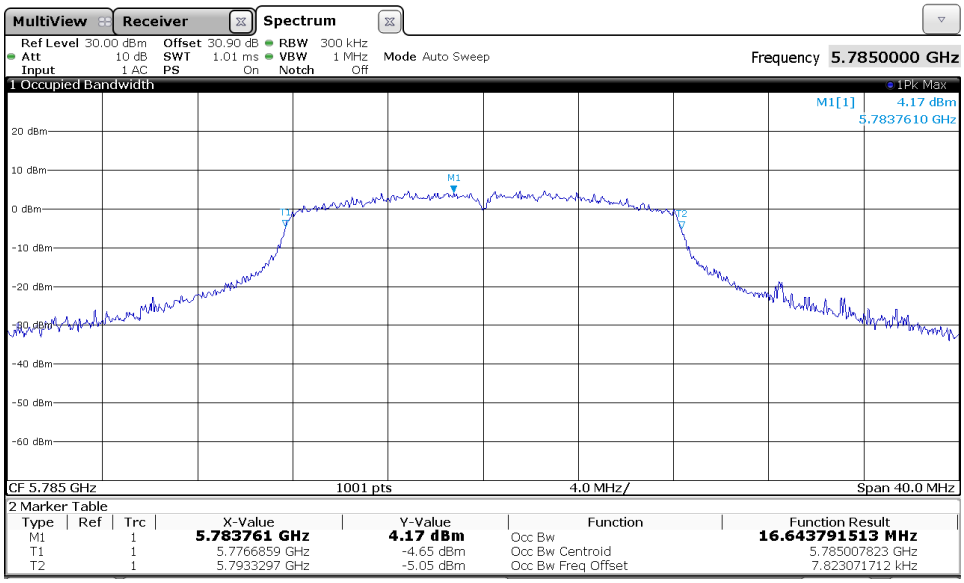


Figure 8.2-2: *99 % bandwidth on 802.11a, mid channel*

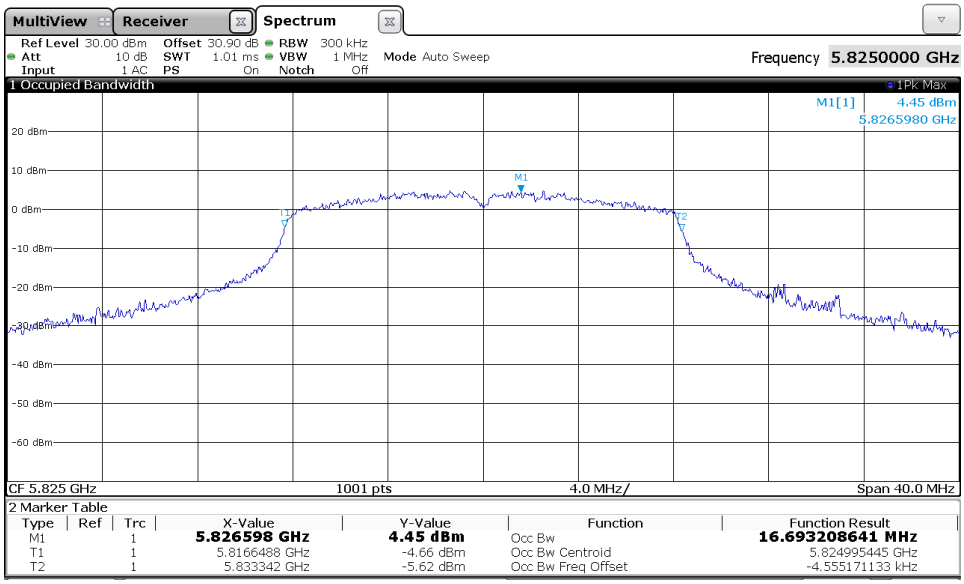


Figure 8.2-3: *99 % bandwidth on 802.11a, high channel*

8.3 FCC 15.407(a)(3) and RSS-247 6.2.4.1 5.725–5.85 GHz band output power and spectral density limits

8.3.1 Definitions and limits

FCC:
For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. 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.

ISED:
The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

8.3.2 Test summary

Test start date:	January 19, 2021

8.3.3 Observations, settings and special notes

As per manufacturer declaration, EUT is for indoor use 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	500 kHz
Video bandwidth	2 MHz
Frequency span	> EBW
Detector mode	RMS
Trace mode	Power Averaging over 100 sweeps

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

Total antenna gain was calculated as follows: $Directional\ gain = 10 \log [(10^{\frac{G1}{20}} + 10^{\frac{G2}{20}})^2 / N_{ANT})$

Output power/EIRP/PSD limit adjustment(in case antenna gain is more than 6 dBi): Output power/EIRP/PSD limit – (Total antenna gain – 6 dBi).

8.3.1 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

8.3.2 Test data

Table 8.3-2: *Output power measurements results*

Modulation	Frequency, MHz	Output power, dBm	Power limit, dBm	Margin, dB
802.11a	5745	10.7	30.0	-19.3
	5785	10.3	30.0	-19.7
	5825	10.3	30.0	-19.7

Table 8.3-3: *PSD measurements results*

Modulation	Frequency, MHz	PSD, dBm/500 kHz	Limit, dBm/500 kHz	Margin, dB
802.11a	5745	-3.8	30.0	-33.8
	5785	-4.1	30.0	-34.1
	5825	-4.2	30.0	-34.2

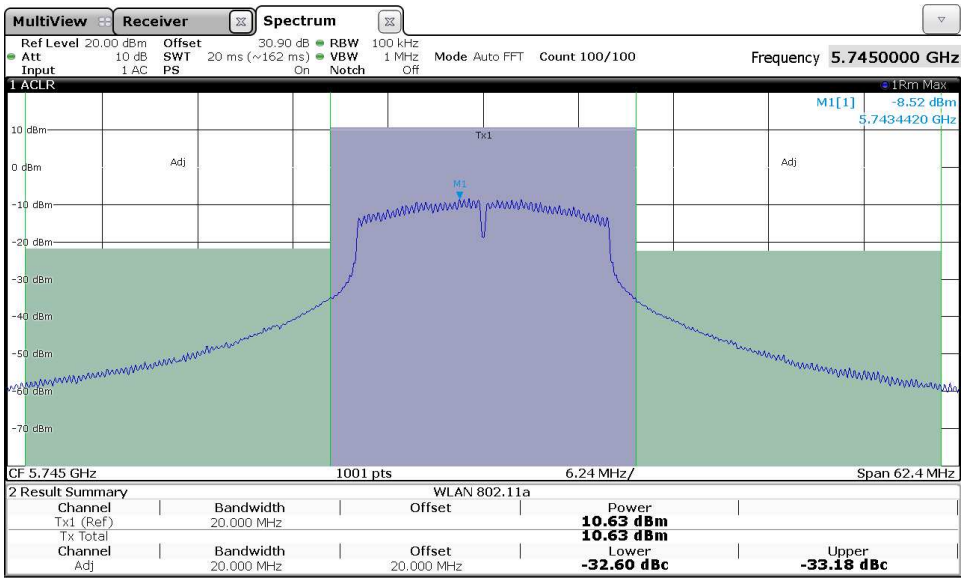


Figure 8.3-1: *Output power on 802.11a – low channel*

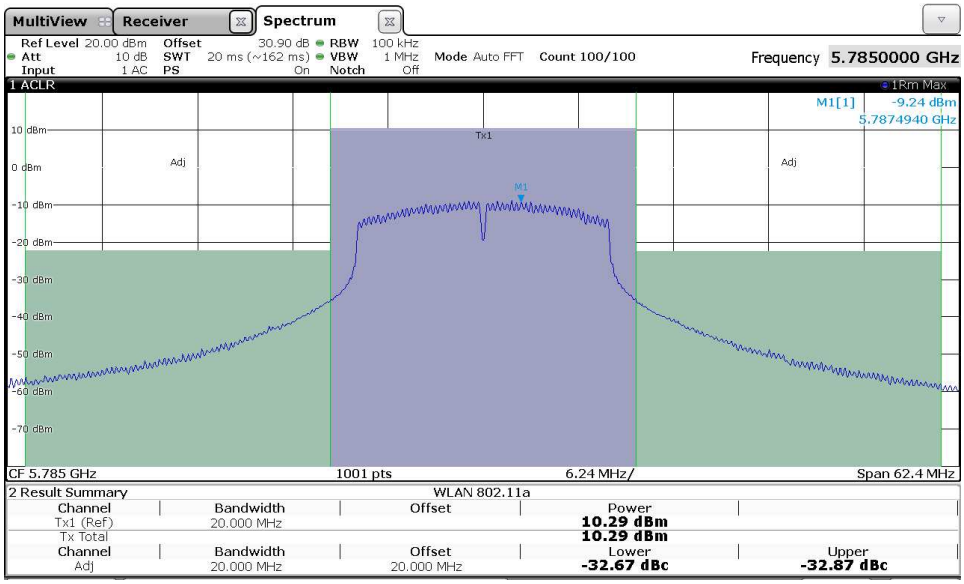


Figure 8.3-2: *Output power on 802.11a – mid channel*

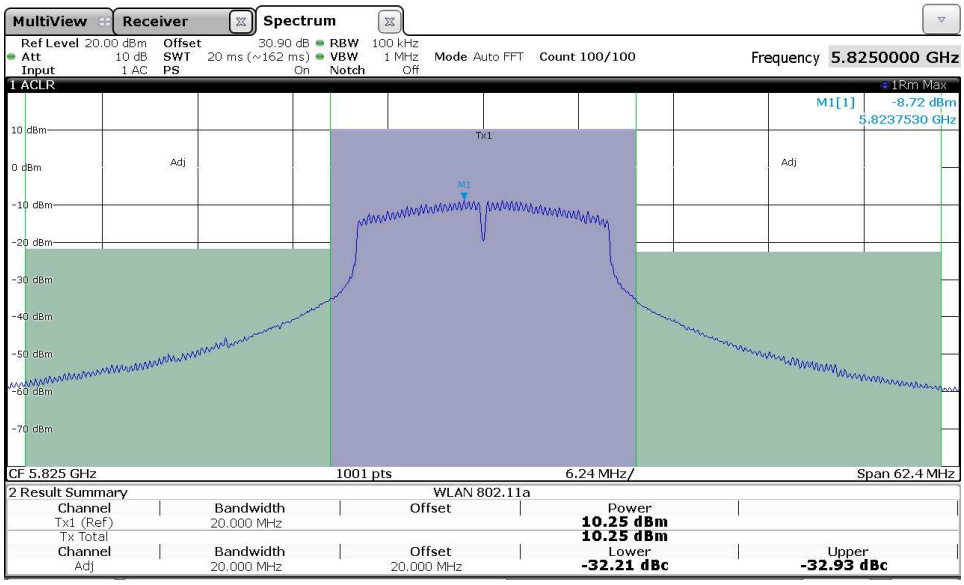


Figure 8.3-3: *Output power on 802.11a – high channel*

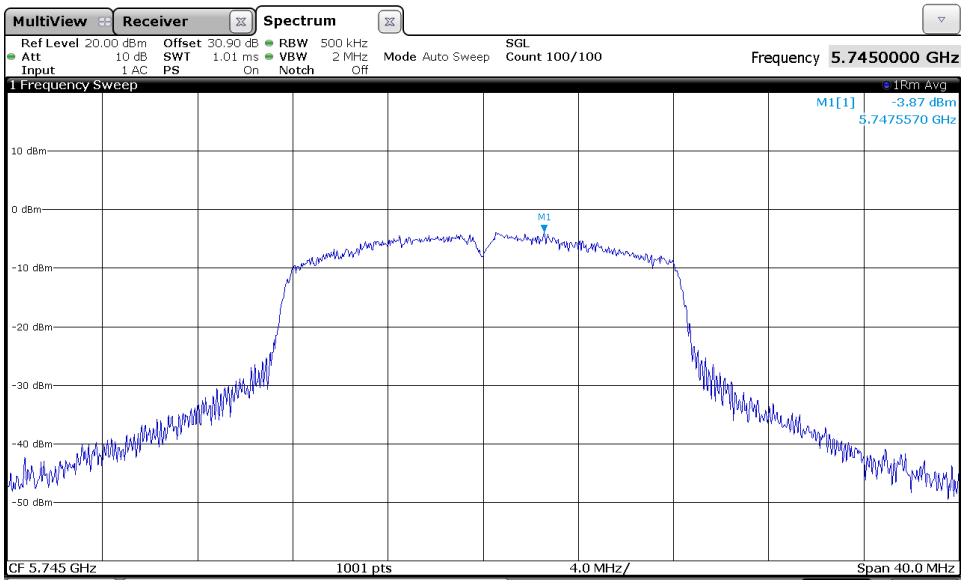


Figure 8.3-4: *PSD on 802.11a – low channel*

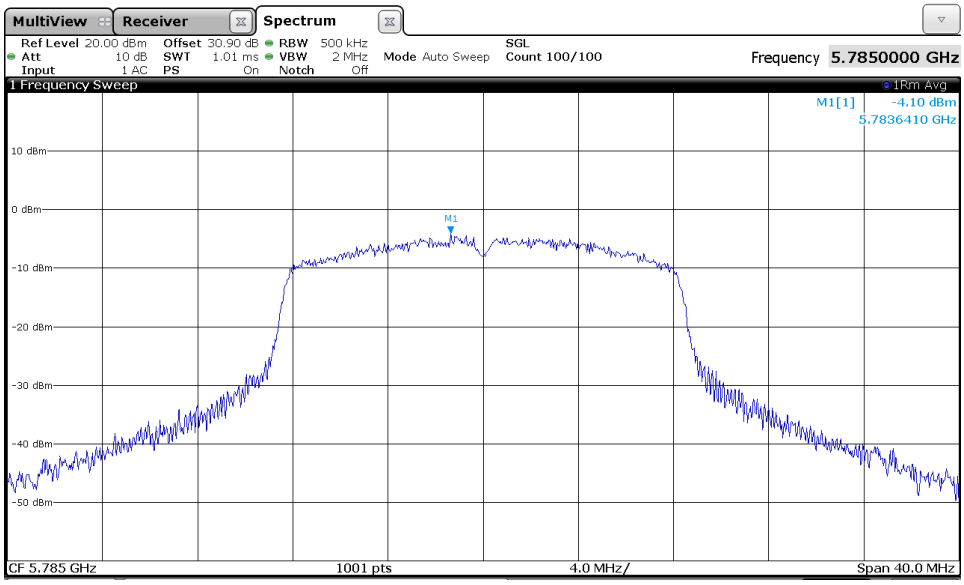


Figure 8.3-5: *PSD on 802.11a – mid channel*

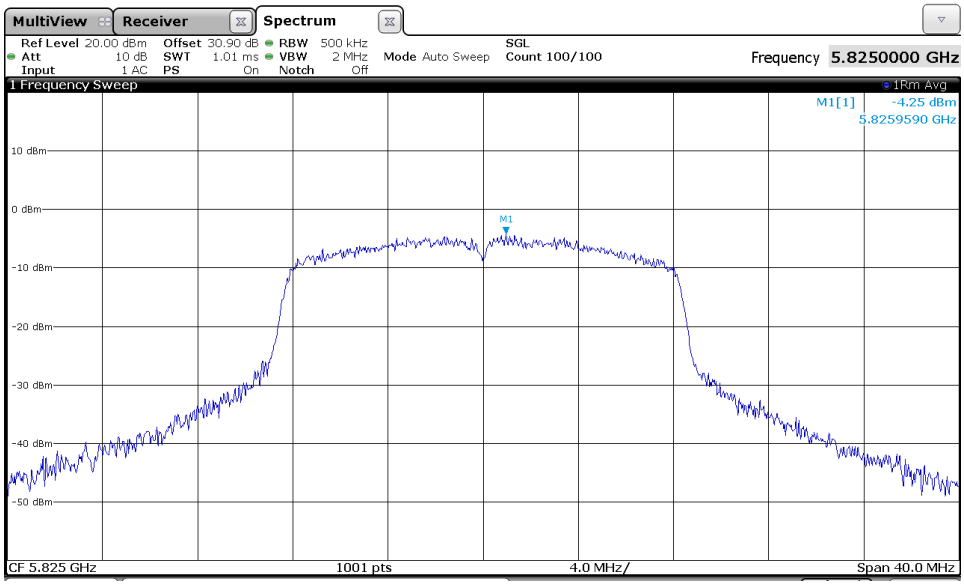


Figure 8.3-6: *PSD on 802.11a – high channel*

8.4 FCC 15.407(b) and RSS-247 6.2.4.2 Spurious (out-of-band) emissions

8.4.1 Definitions and limits

FCC:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

ISED:
Devices operating in the band 5725-5850 MHz with antenna gain greater than 10 dBi can have unwanted emissions that comply with either the limits in this section or in section 5.5 until six (6) months after the publication date of this standard for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2018.

Devices operating in the band 5725-5850 MHz with antenna gain of 10 dBi or less can have unwanted emissions that comply with either the limits in this section or in section 5.5 until April 1, 2018 for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2020.

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

a. 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;
b. 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
c. 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to −27 dBm/MHz at 75 MHz above or below the band edges; and
d.−27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

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

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/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

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

8.4.1 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

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

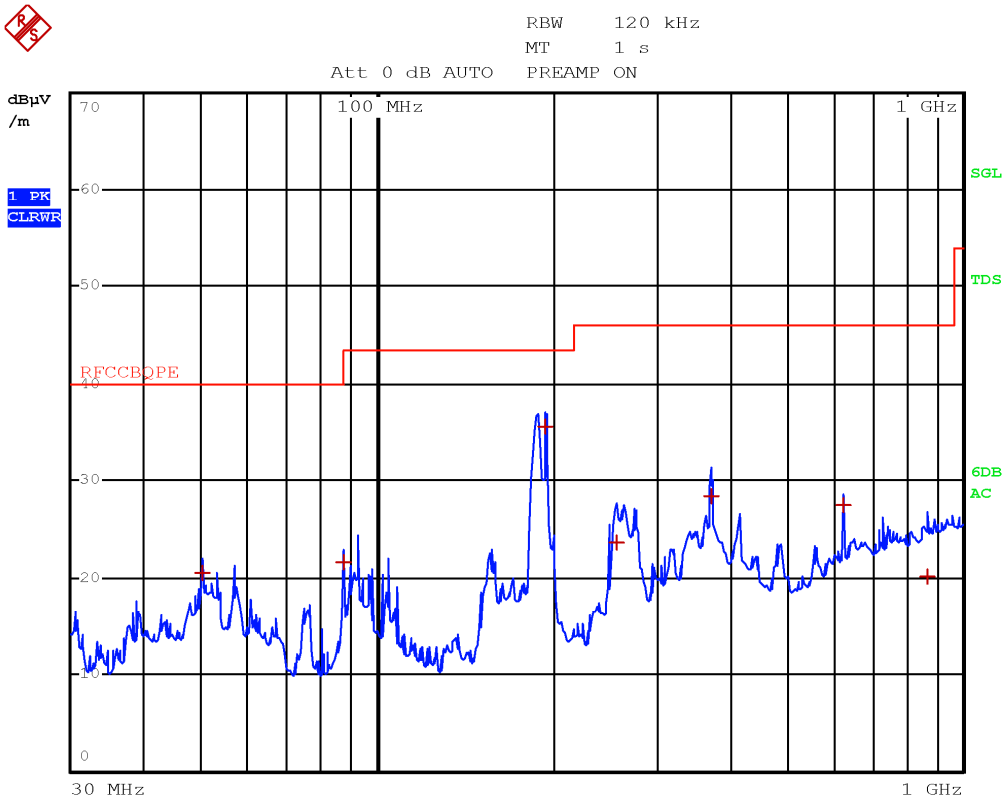


Figure 8.4-1: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4400	20.3	40.0	-19.7	QP
87.6800	21.4	40.0	-18.6	QP
194.3200	35.5	43.5	-8.0	QP
256.4800	23.6	46.0	-22.4	QP
372.1200	28.5	46.0	-17.5	QP
624.9600	27.5	46.0	-18.5	QP
870.2800	20.7	46.0	-25.3	QP

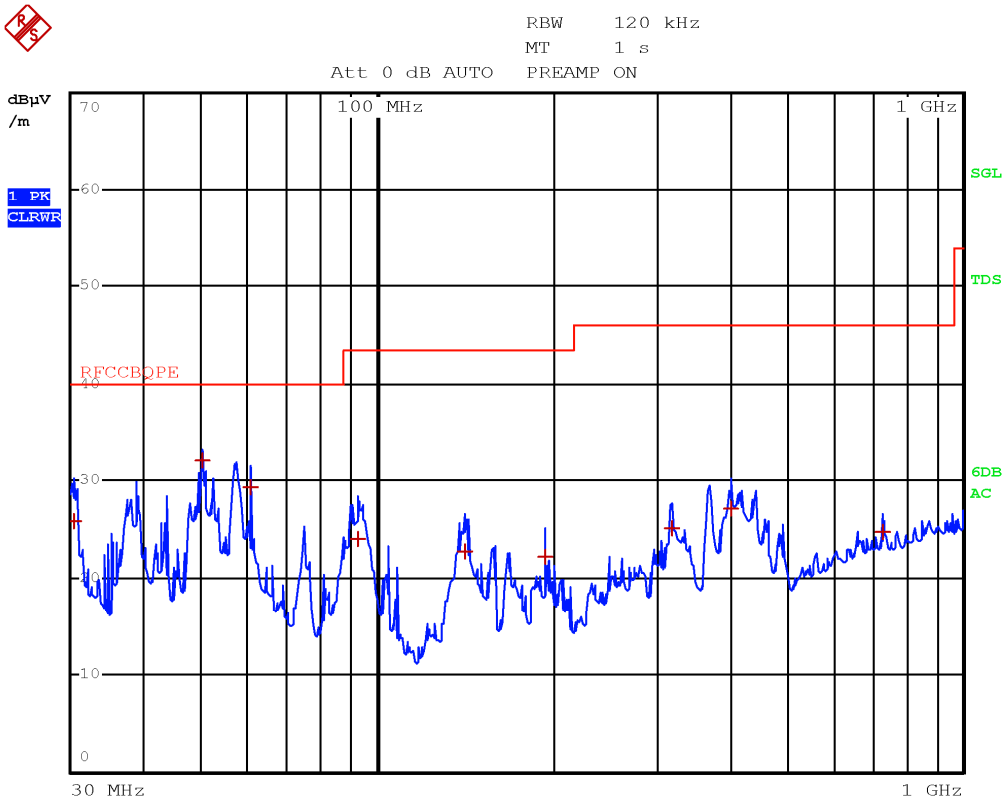


Figure 8.4-2: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.3200	25.6	40.0	-14.4	QP
50.4400	32.3	40.0	-7.7	QP
60.8000	29.3	40.0	-10.7	QP
92.5200	24.2	43.5	-19.3	QP
141.3200	22.9	43.5	-20.6	QP
194.0000	22.3	43.5	-21.2	QP
318.5200	25.2	46.0	-20.8	QP
402.3200	27.4	46.0	-18.6	QP
731.2400	24.7	46.0	-21.3	QP

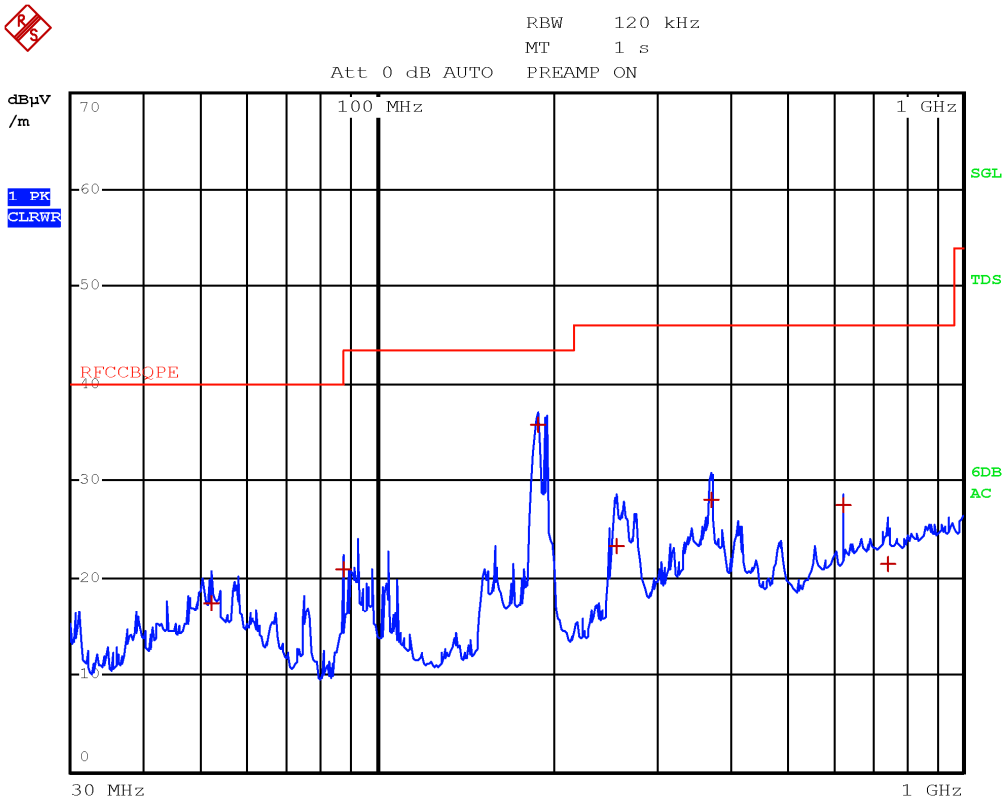


Figure 8.4-3: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
52.2400	17.7	40.0	-22.3	QP
87.7200	20.7	40.0	-19.3	QP
188.6400	35.9	43.5	-7.6	QP
256.4400	23.0	46.0	-23.0	QP
372.9600	28.1	46.0	-17.9	QP
624.9600	27.4	46.0	-18.6	QP
744.8000	21.0	46.0	-25.0	QP

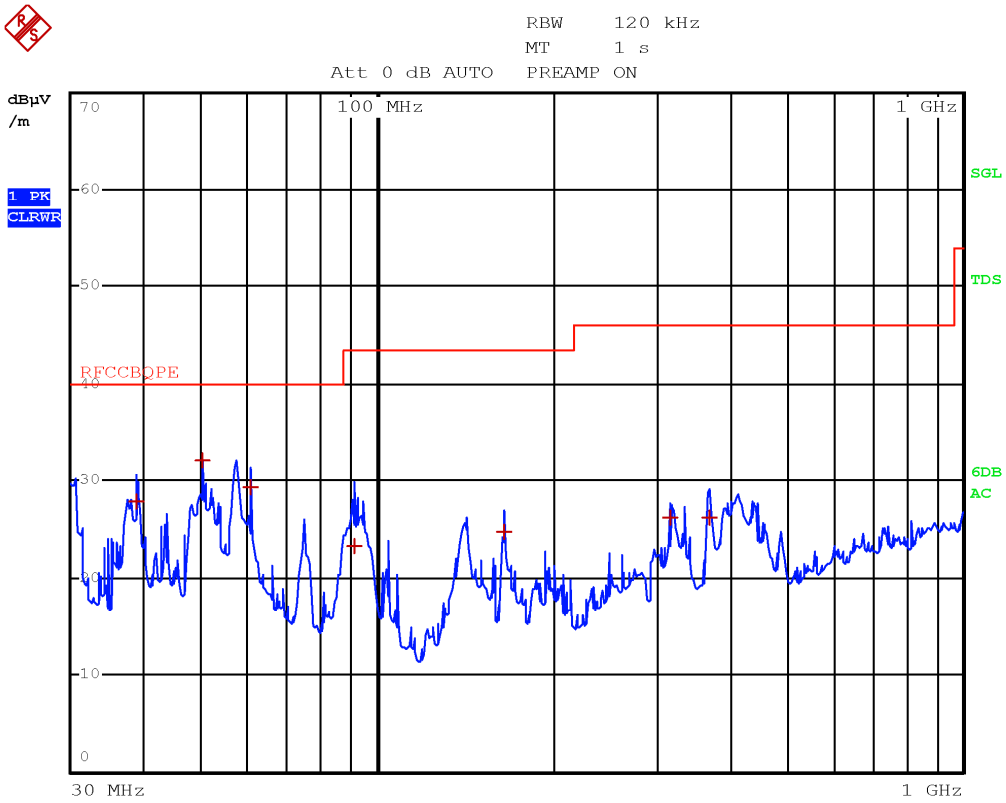


Figure 8.4-4: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
38.9600	28.2	40.0	-11.8	QP
50.4400	32.3	40.0	-7.7	QP
60.8000	29.3	40.0	-10.7	QP
91.5200	23.3	43.5	-20.2	QP
164.8800	24.9	43.5	-18.6	QP
316.1200	26.4	46.0	-19.6	QP
368.8800	26.4	46.0	-19.6	QP

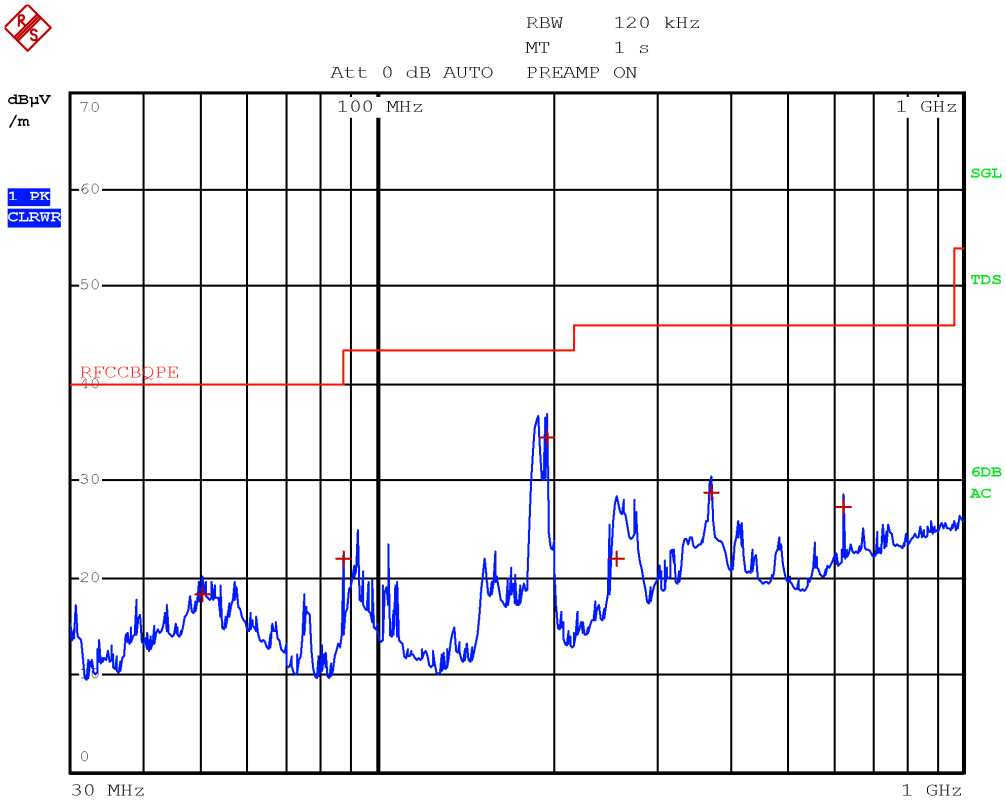


Figure 8.4-5: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4800	18.3	40.0	-21.7	QP
87.6800	22.2	40.0	-17.8	QP
194.8400	34.5	43.5	-9.0	QP
256.5600	22.3	46.0	-23.7	QP
372.1600	28.6	46.0	-17.4	QP
624.9600	27.5	46.0	-18.5	QP

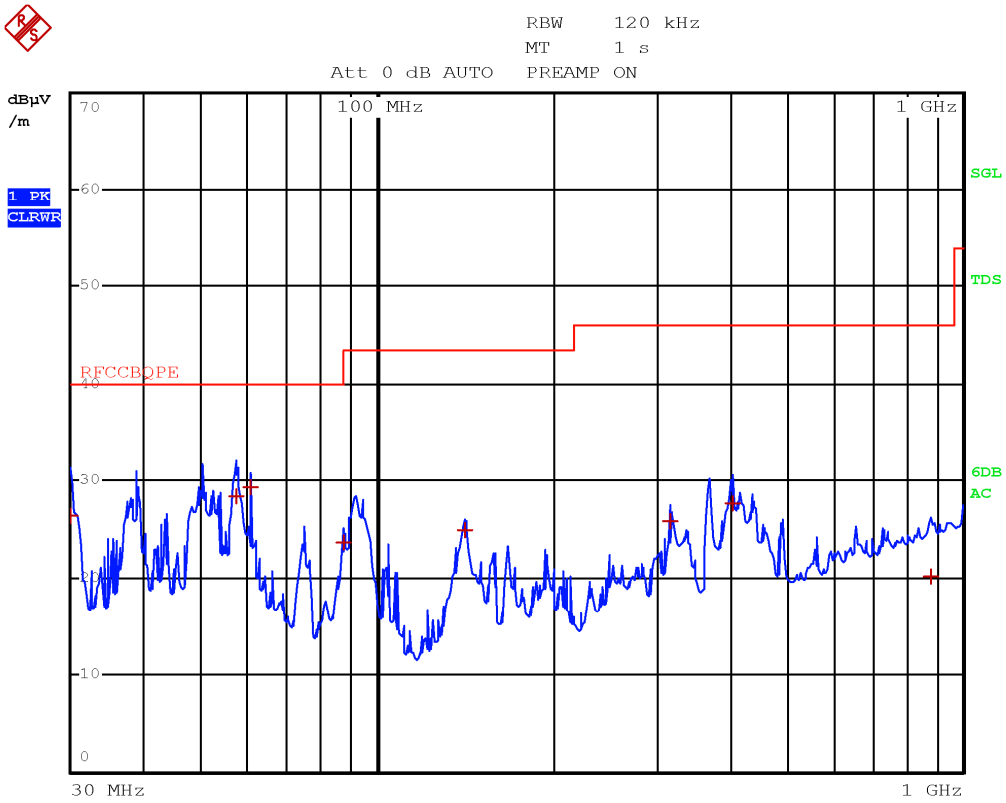


Figure 8.4-6: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.0400	26.3	40.0	-13.7	QP
57.5600	28.3	40.0	-11.7	QP
60.8000	29.3	40.0	-10.7	QP
87.6800	23.5	40.0	-16.5	QP
141.3600	25.2	43.5	-18.3	QP
316.1200	25.5	46.0	-20.5	QP
404.7200	27.6	46.0	-18.4	QP
883.8400	20.8	46.0	-25.2	QP

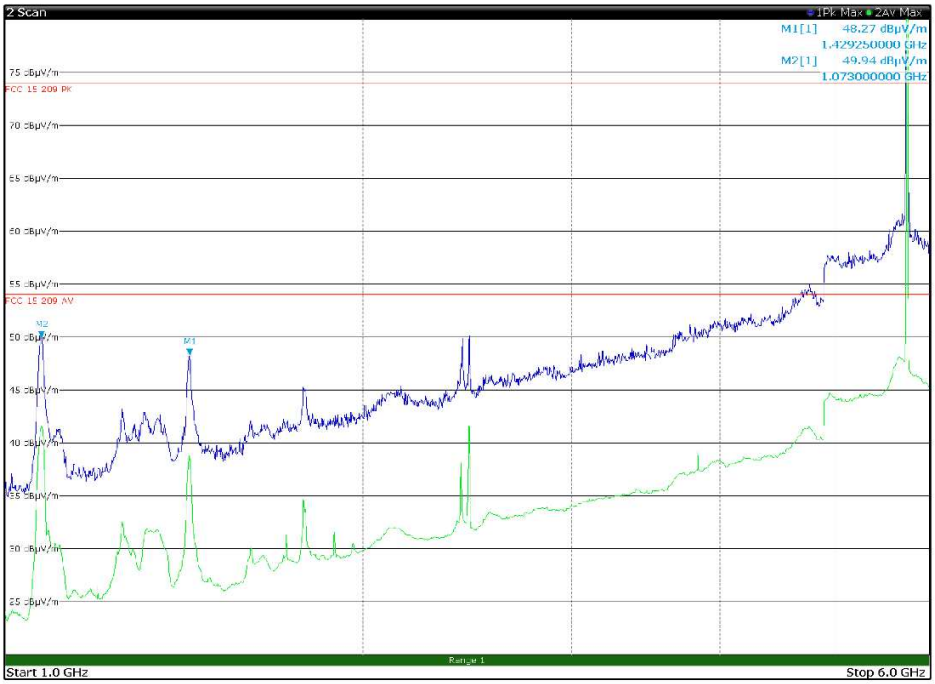


Figure 8.4-7: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in horizontal polarization*

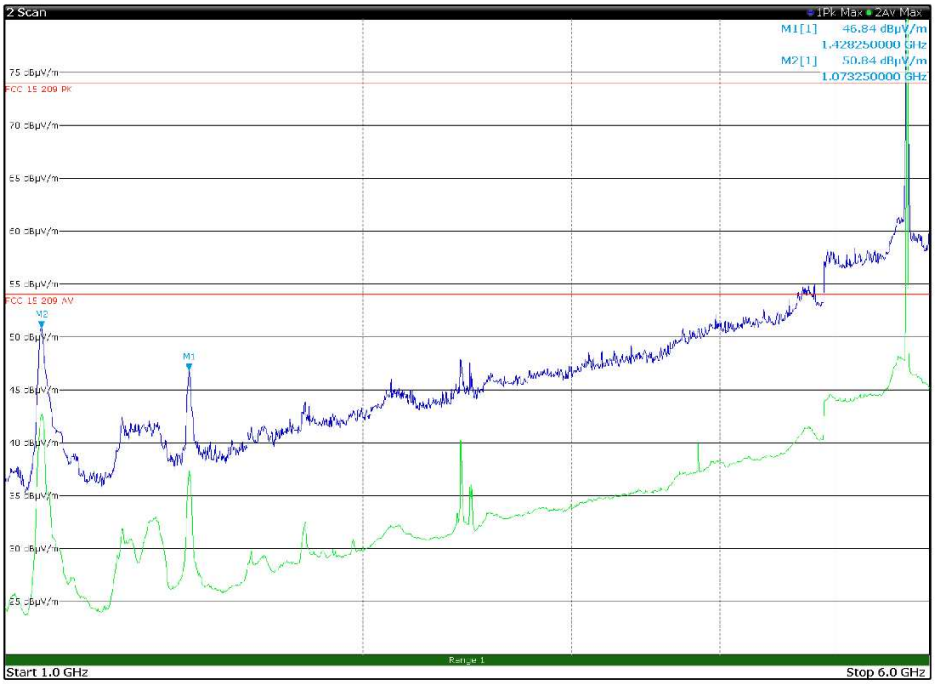


Figure 8.4-8: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in vertical polarization*

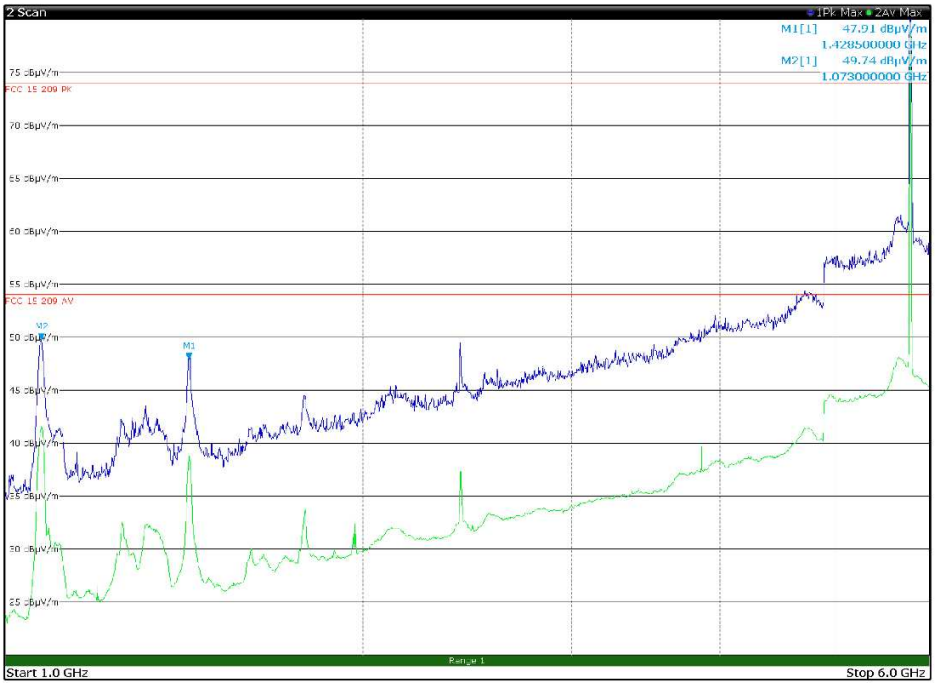


Figure 8.4-9: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in horizontal polarization*

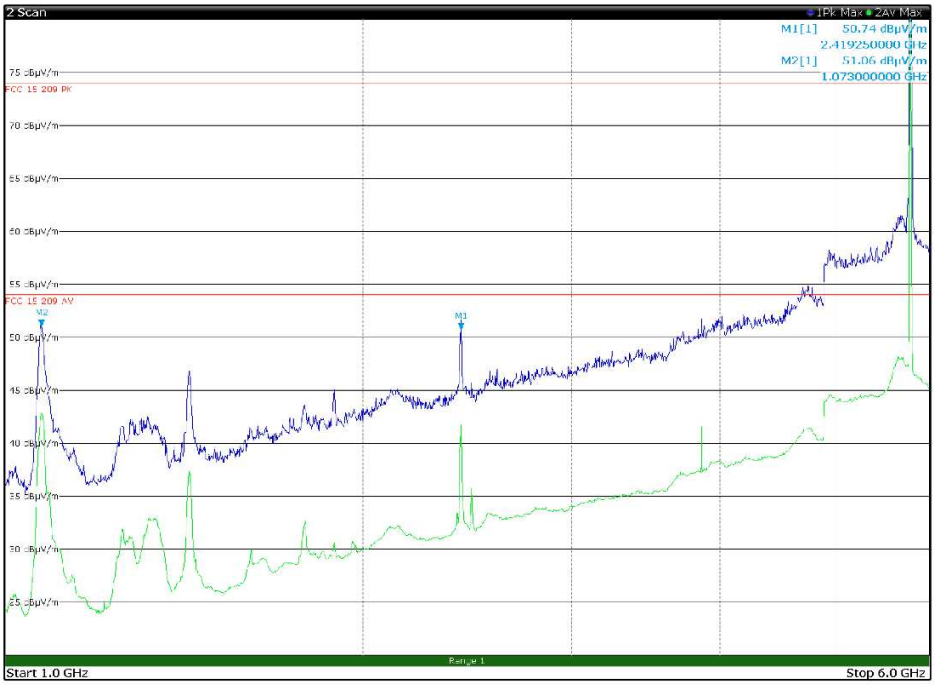


Figure 8.4-10: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in vertical polarization*

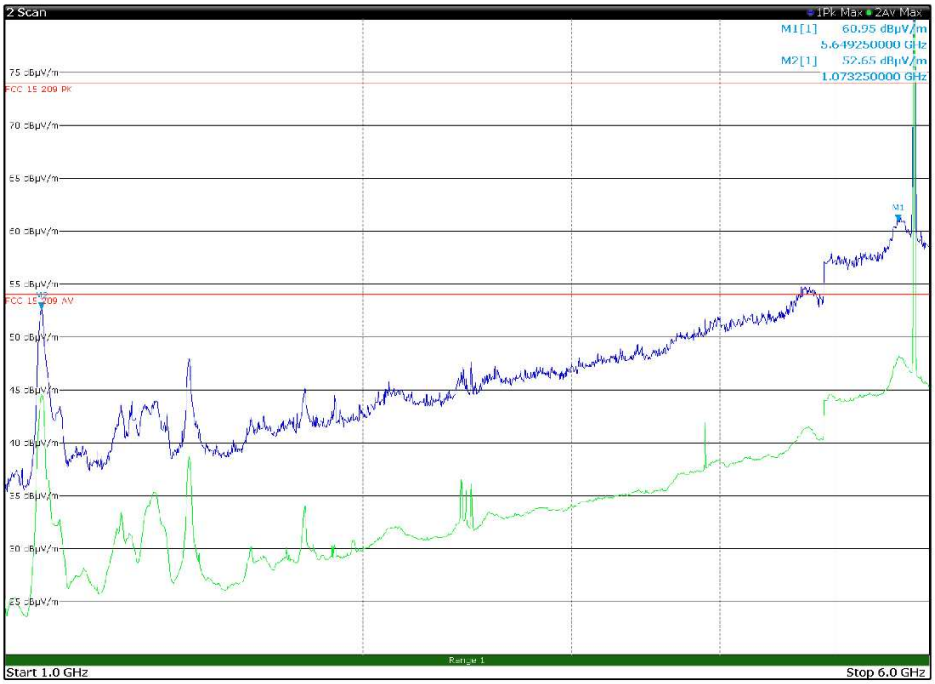


Figure 8.4-11: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in horizontal polarization*

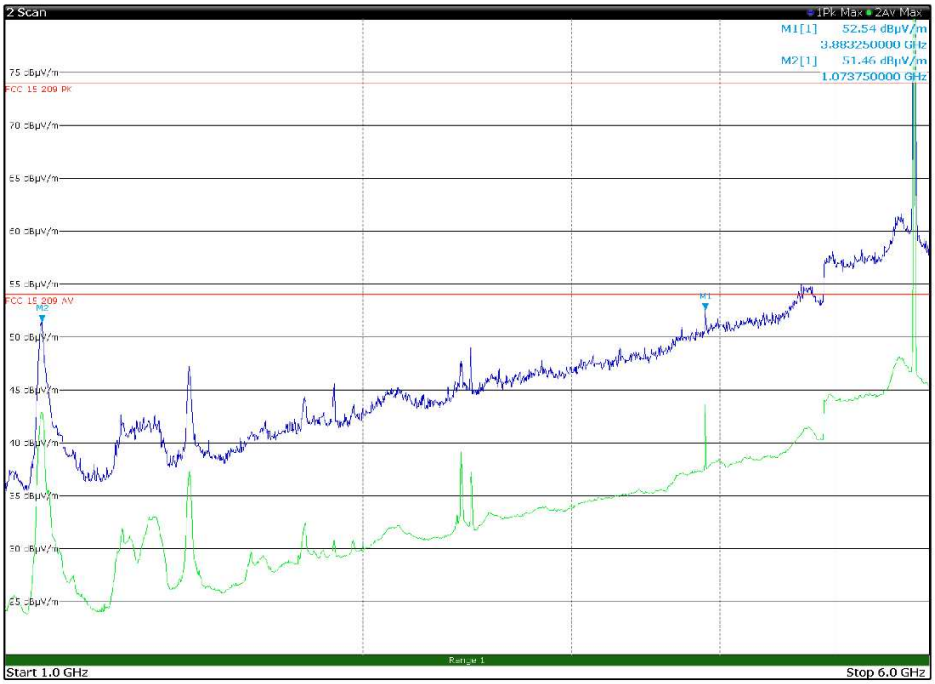


Figure 8.4-12: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

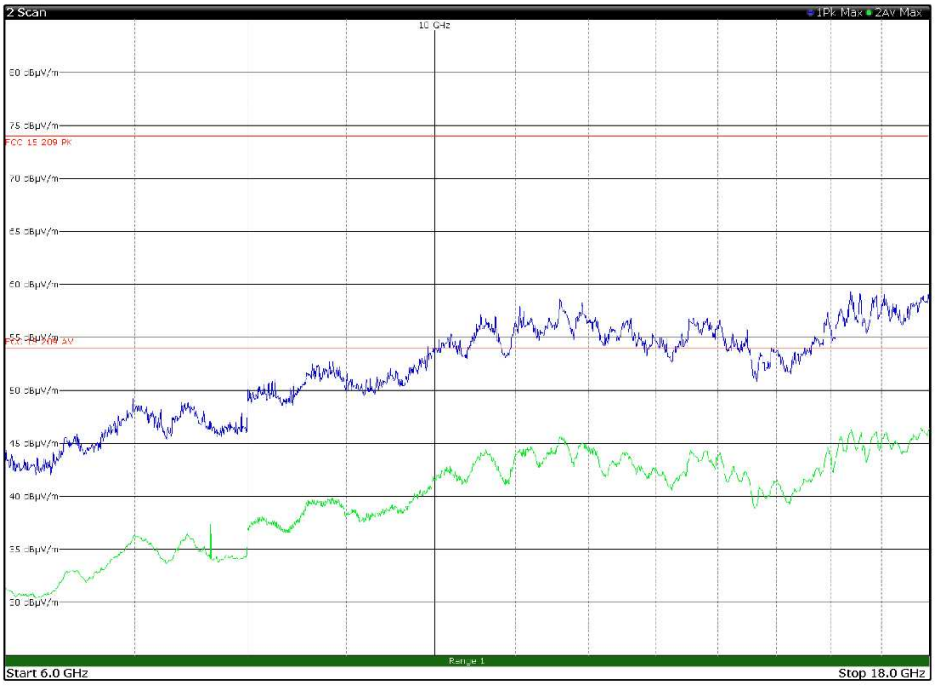


Figure 8.4-13: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in horizontal polarization*

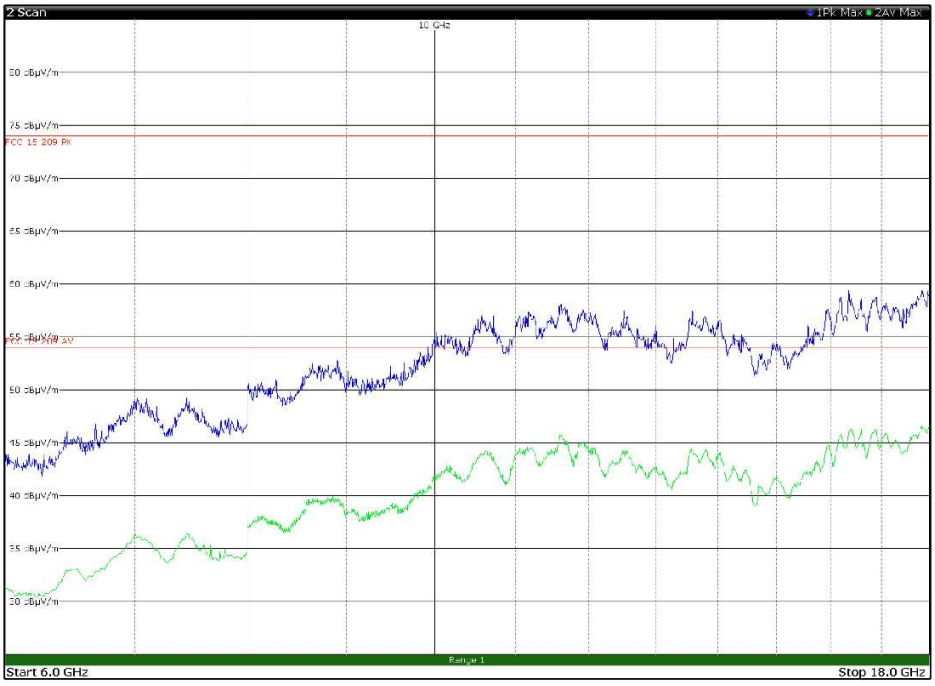


Figure 8.4-14: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in vertical polarization*

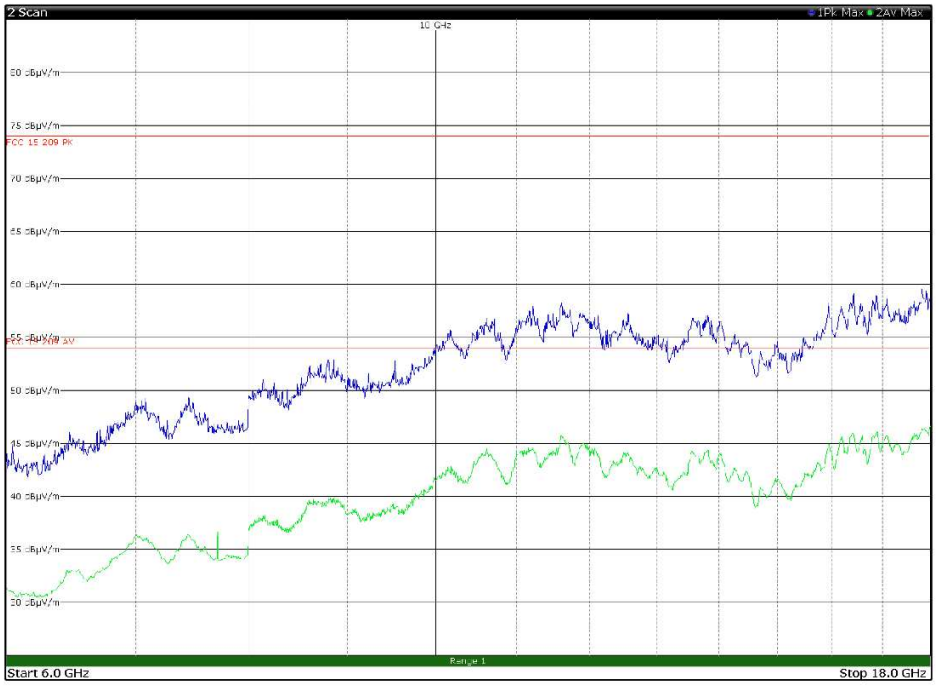


Figure 8.4-15: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in horizontal polarization*

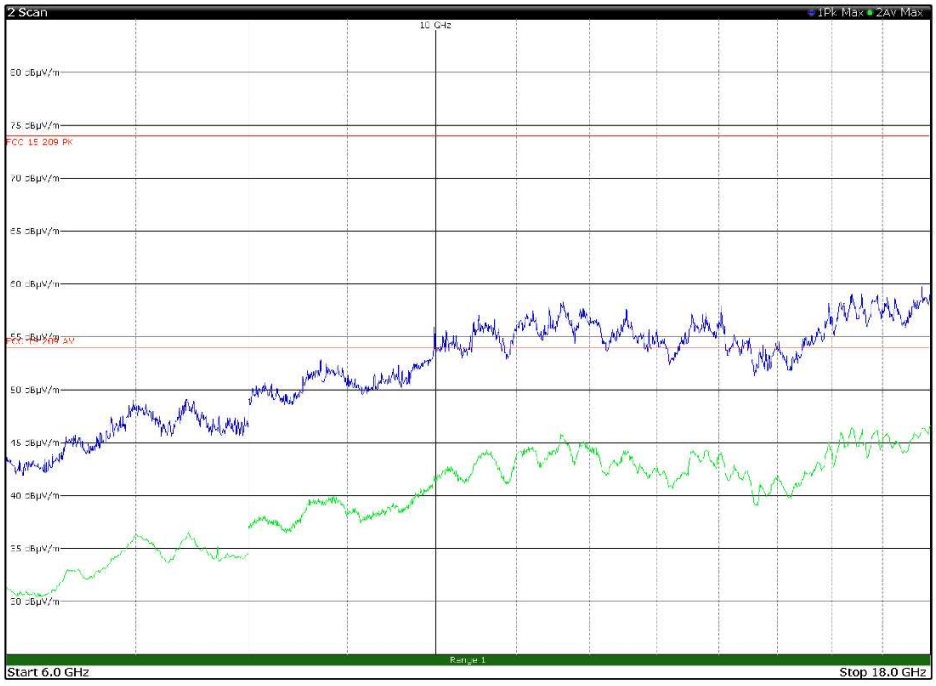


Figure 8.4-16: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in vertical polarization*

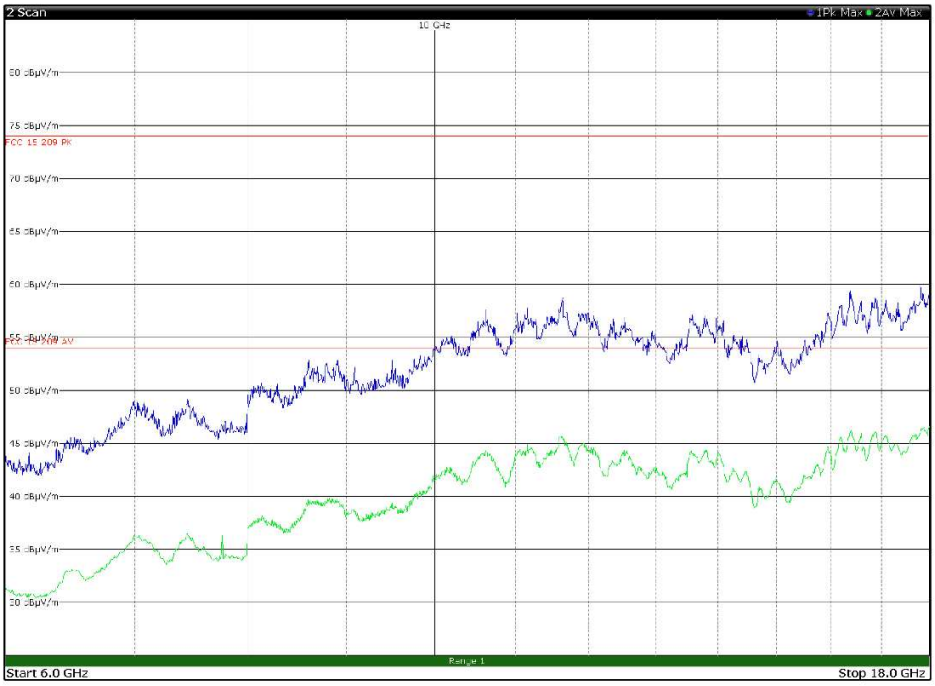


Figure 8.4-17: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in horizontal polarization*

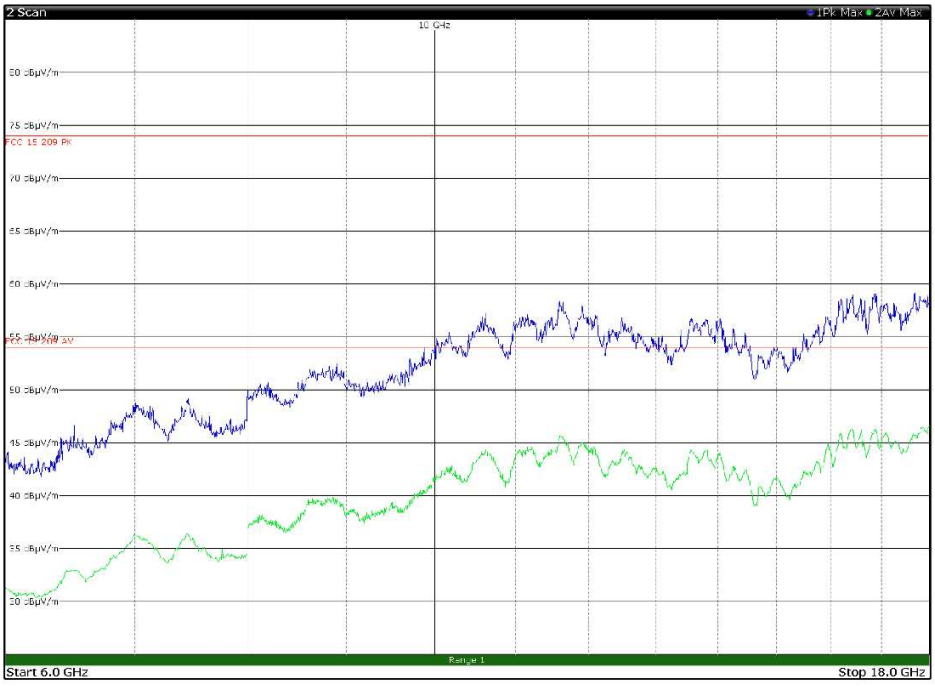


Figure 8.4-18: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

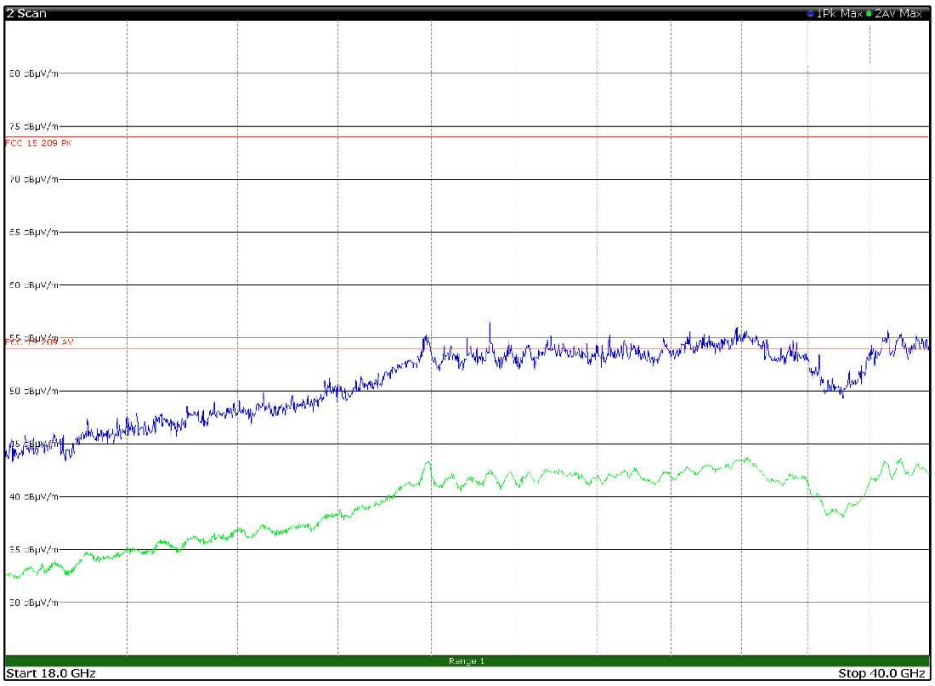


Figure 8.4-19: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in horizontal polarization*

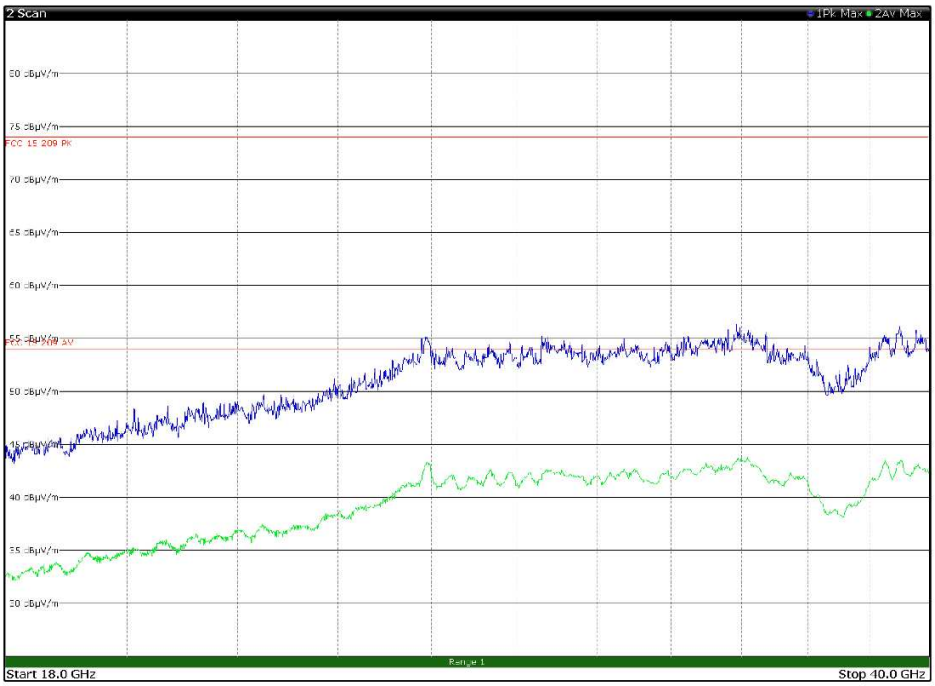


Figure 8.4-20: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in vertical polarization*

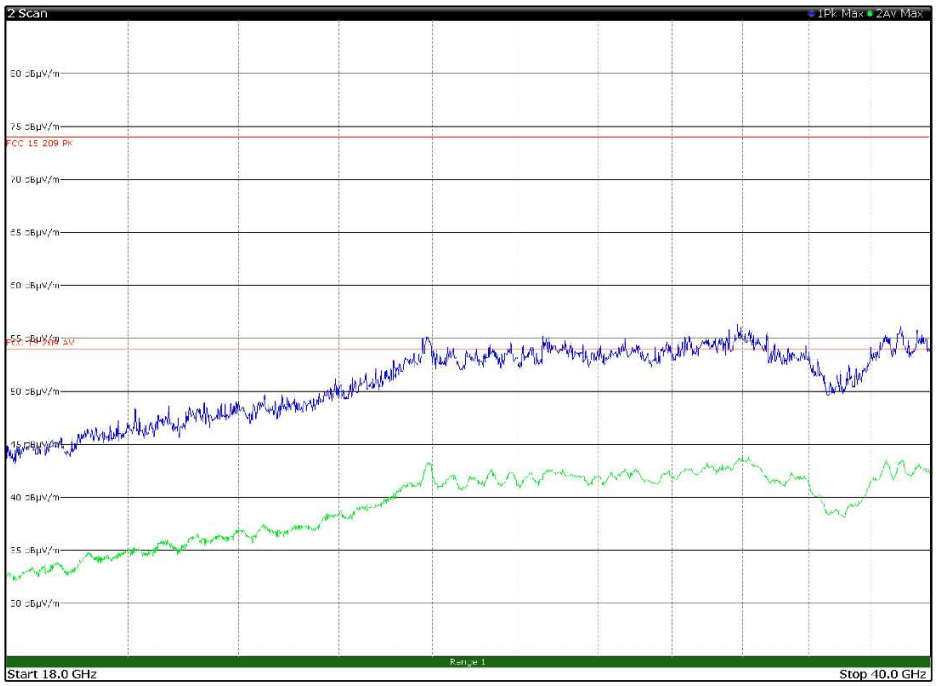


Figure 8.4-21: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in horizontal polarization*

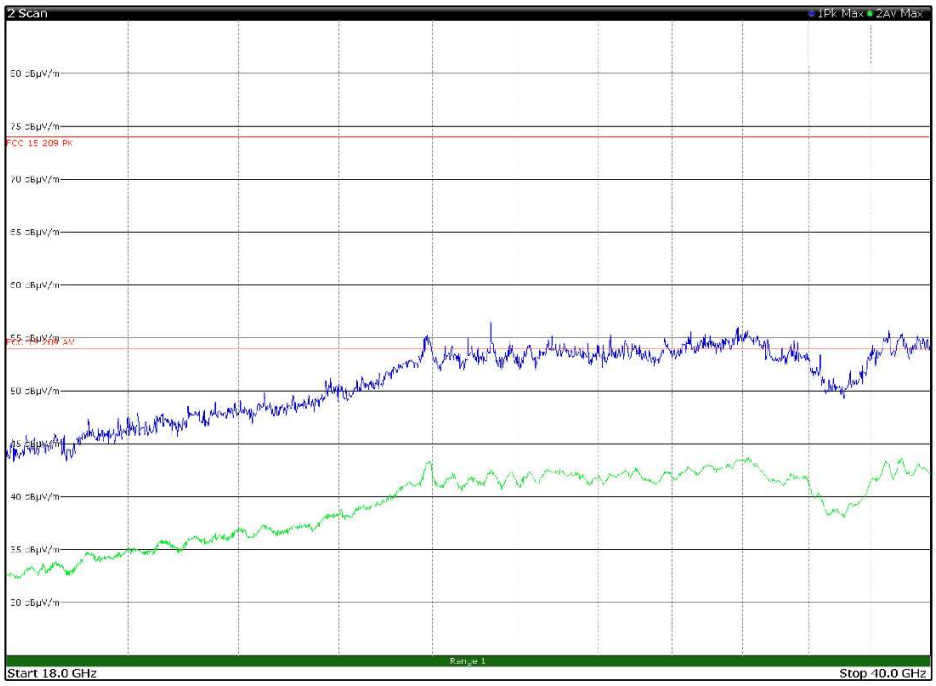


Figure 8.4-22: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in vertical polarization*

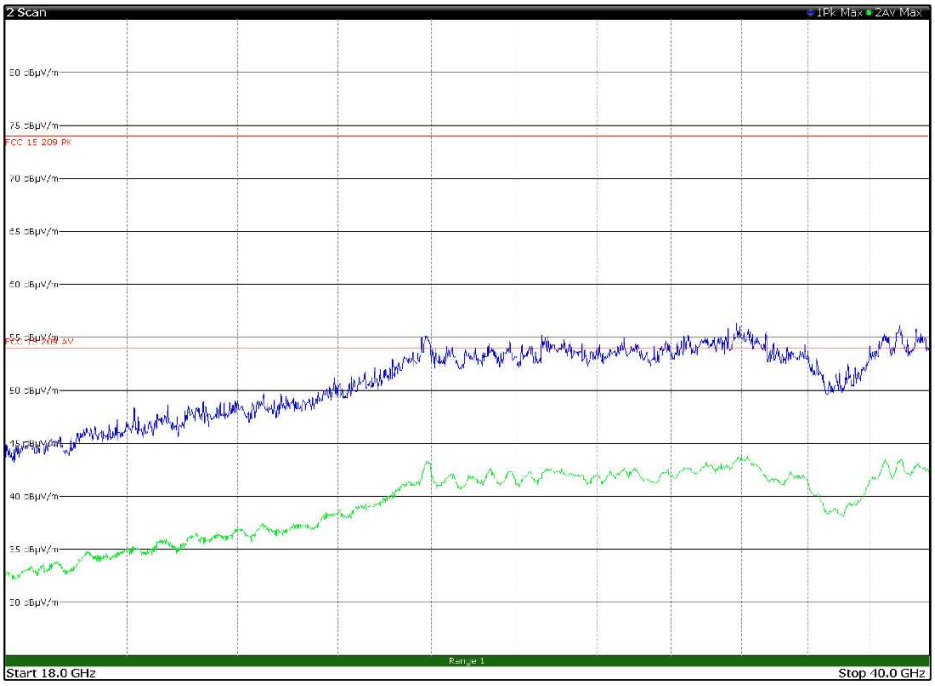


Figure 8.4-23: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in horizontal polarization*

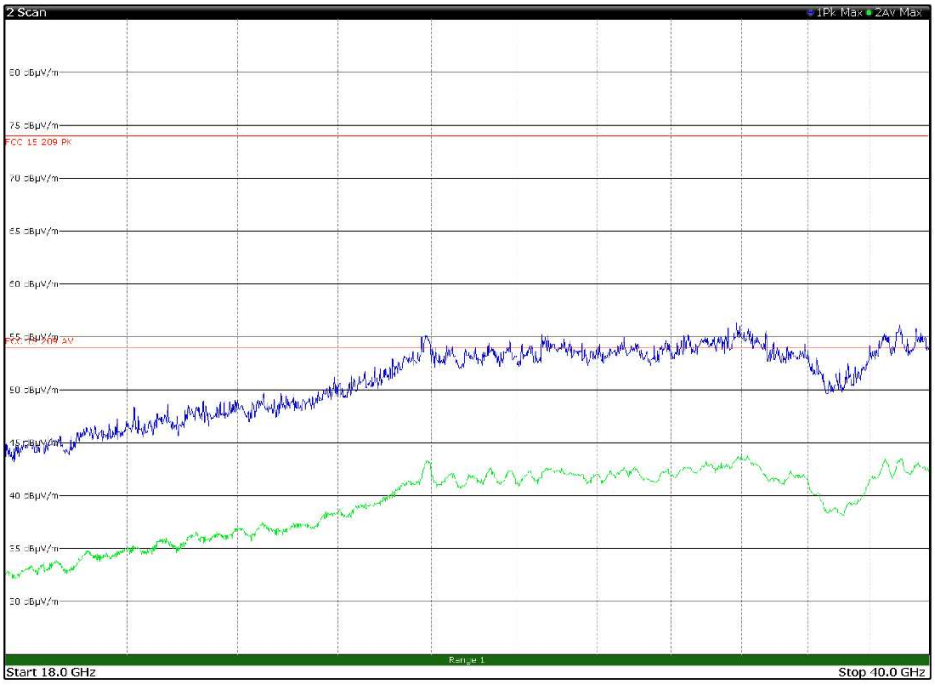


Figure 8.4-24: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in vertical polarization*

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

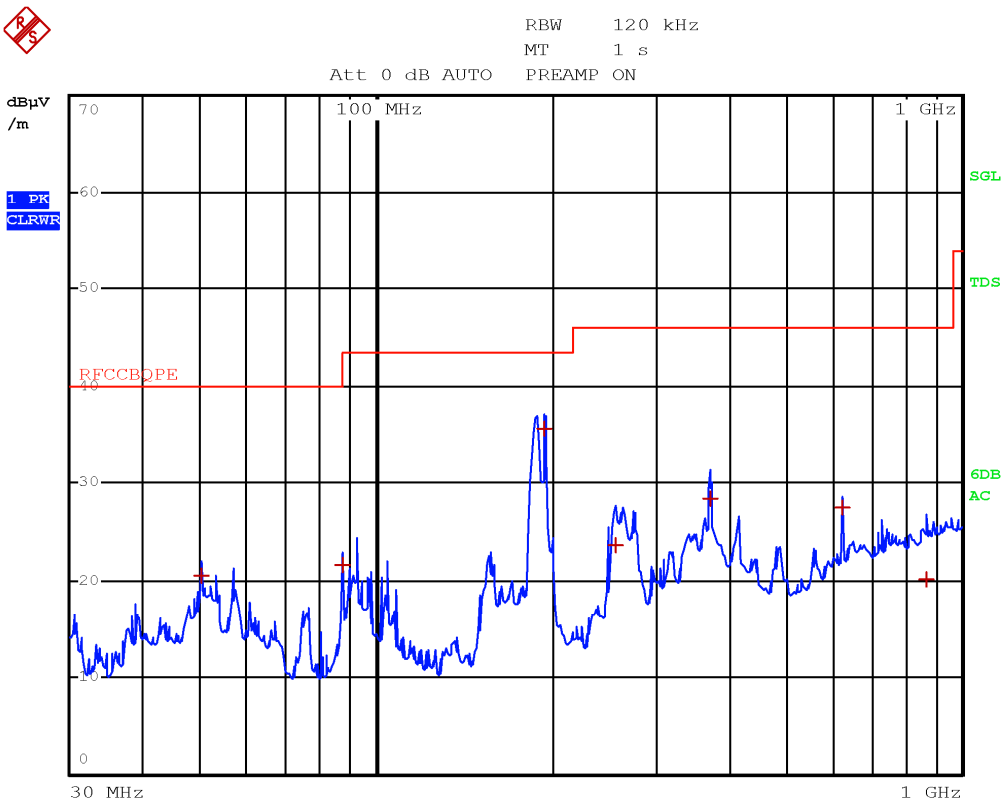


Figure 8.4-25: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4400	20.4	40.0	-19.6	QP
87.6800	21.6	40.0	-18.4	QP
194.3200	35.6	43.5	-7.9	QP
256.4800	23.6	46.0	-22.4	QP
372.1200	28.5	46.0	-17.5	QP
624.9600	27.4	46.0	-18.6	QP
870.2800	20.2	46.0	-25.8	QP

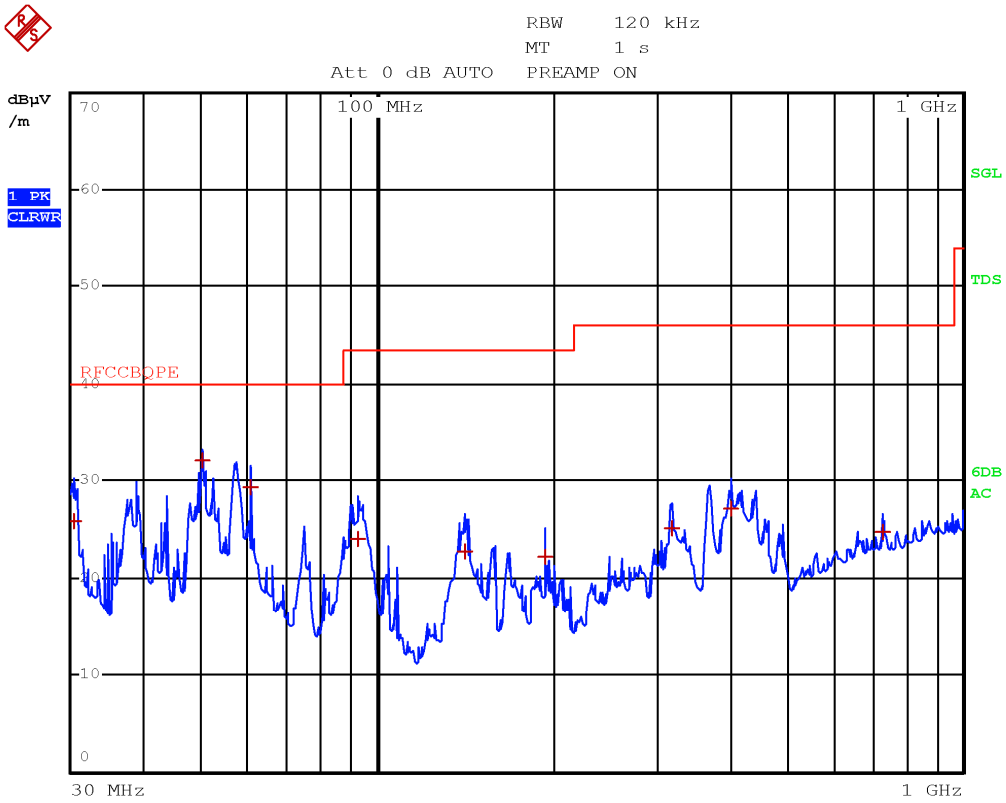


Figure 8.4-26: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.3200	25.8	40.0	-14.2	QP
50.4400	32.1	40.0	-7.9	QP
60.8000	29.4	40.0	-10.6	QP
92.5200	24.0	43.5	-19.5	QP
141.3200	22.8	43.5	-20.7	QP
194.0000	22.1	43.5	-21.4	QP
318.5200	25.1	46.0	-20.9	QP
402.3200	27.1	46.0	-18.9	QP
731.2400	24.8	46.0	-21.2	QP

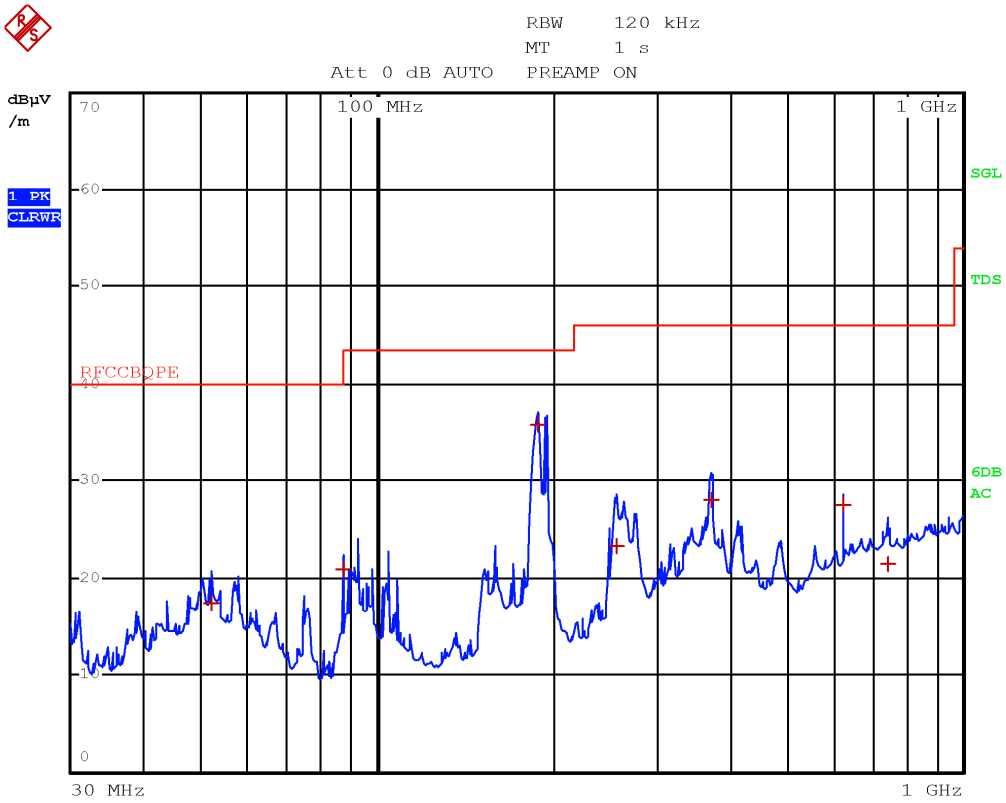


Figure 8.4-27: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
52.2400	17.5	40.0	-22.5	QP
87.7200	20.9	40.0	-19.1	QP
188.6400	35.8	43.5	-7.7	QP
256.4400	23.3	46.0	-22.7	QP
372.9600	28.2	46.0	-17.8	QP
624.9600	27.5	46.0	-18.5	QP
744.8000	21.5	46.0	-24.5	QP

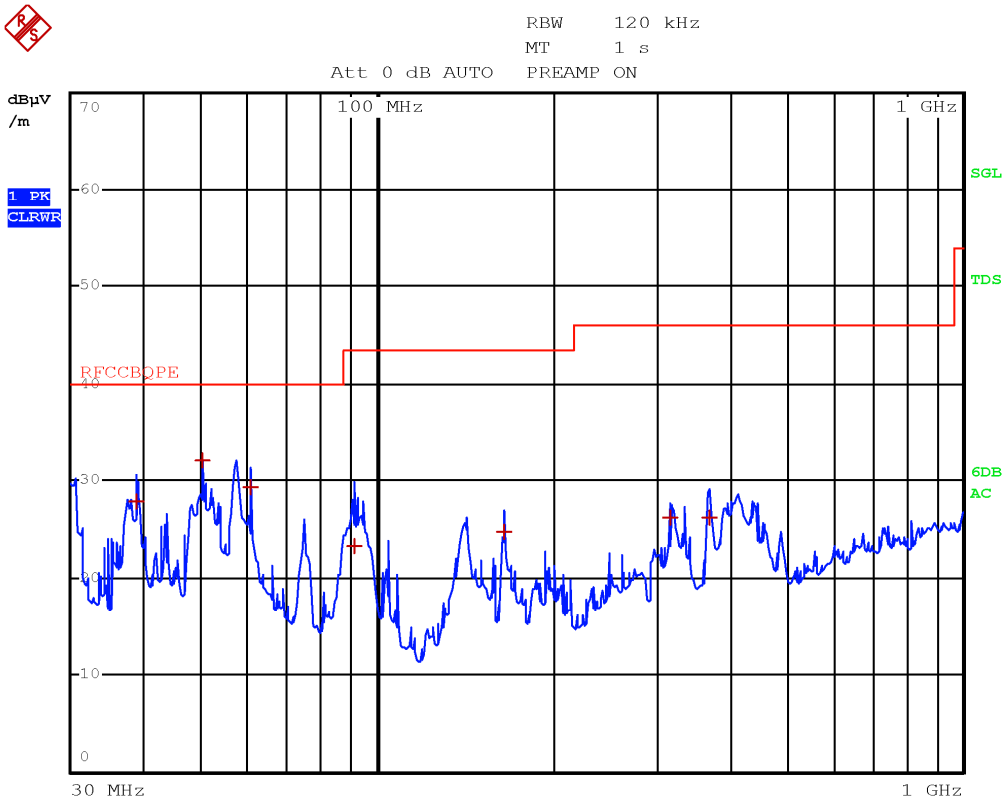


Figure 8.4-28: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
38.9600	28.0	40.0	-12.0	QP
50.4400	32.1	40.0	-7.9	QP
60.8000	29.4	40.0	-10.6	QP
91.5200	23.4	43.5	-20.1	QP
164.8800	24.8	43.5	-18.7	QP
316.1200	26.2	46.0	-19.8	QP
368.8800	26.2	46.0	-19.8	QP

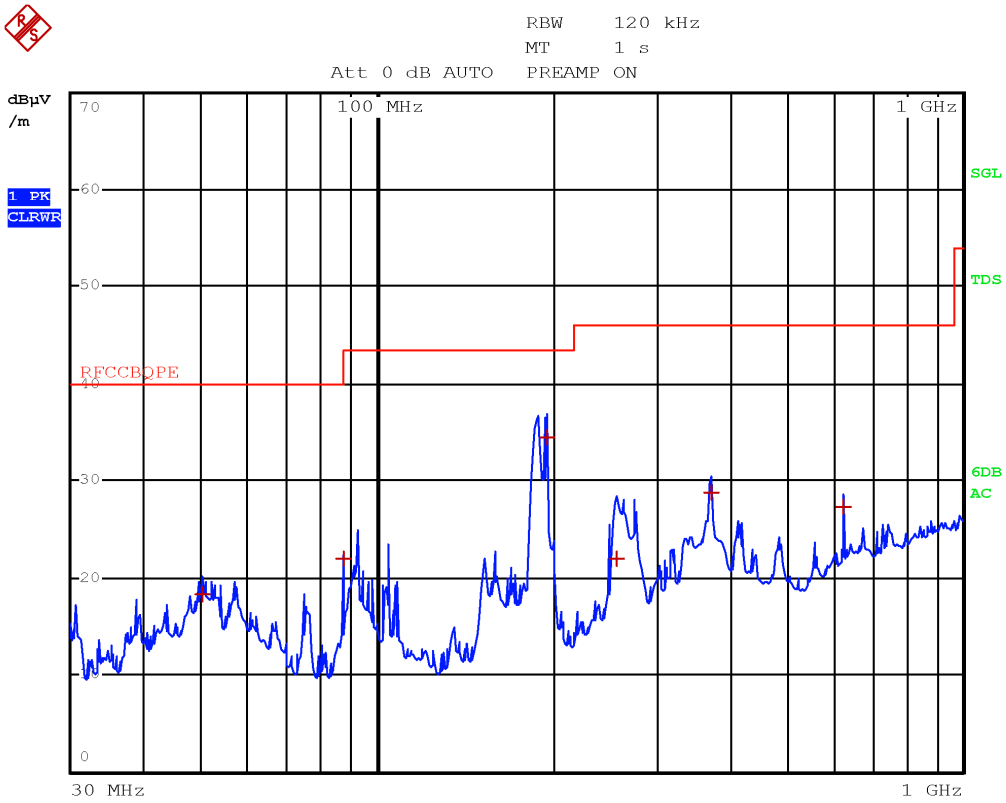


Figure 8.4-29: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
50.4800	18.4	40.0	-21.6	QP
87.6800	22.0	40.0	-18.0	QP
194.8400	34.6	43.5	-8.9	QP
256.5600	22.1	46.0	-23.9	QP
372.1600	28.8	46.0	-17.2	QP
624.9600	27.4	46.0	-18.6	QP

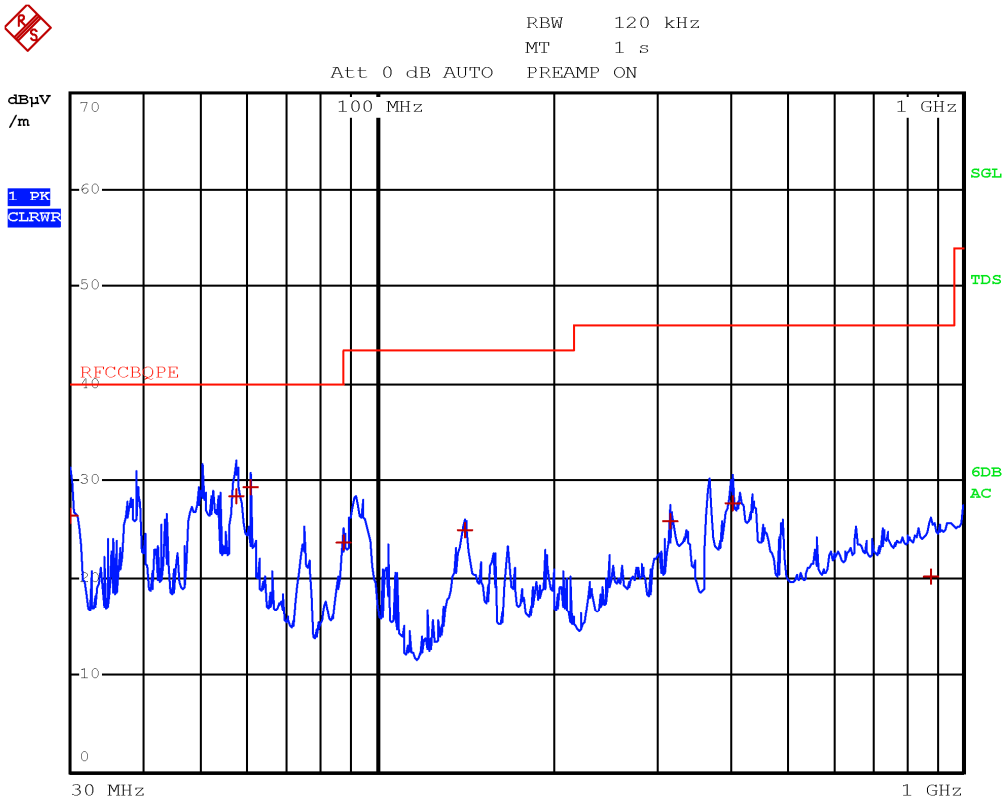


Figure 8.4-30: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.0400	26.4	40.0	-13.6	QP
57.5600	28.5	40.0	-11.5	QP
60.8000	29.3	40.0	-10.7	QP
87.6800	23.7	40.0	-16.3	QP
141.3600	25.0	43.5	-18.5	QP
316.1200	25.8	46.0	-20.2	QP
404.7200	27.7	46.0	-18.3	QP
883.8400	20.2	46.0	-25.8	QP

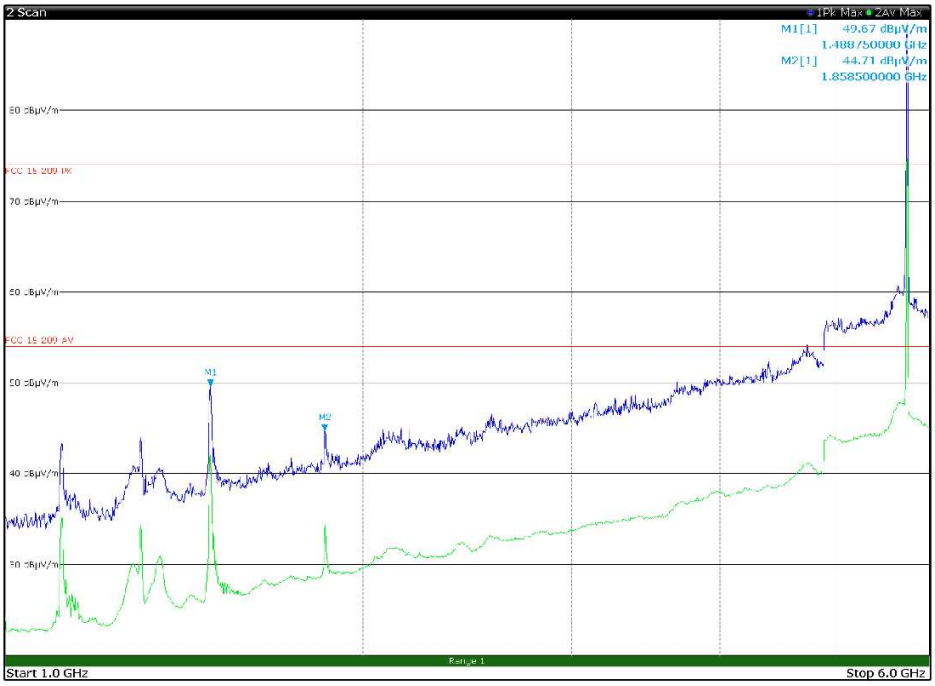


Figure 8.4-31: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in horizontal polarization*

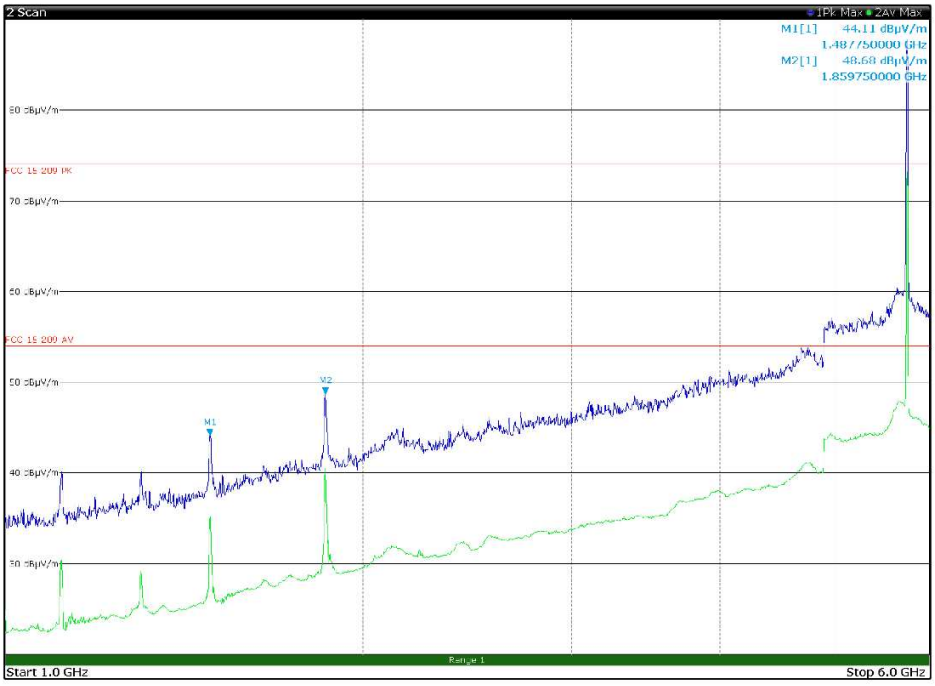


Figure 8.4-32: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in vertical polarization*

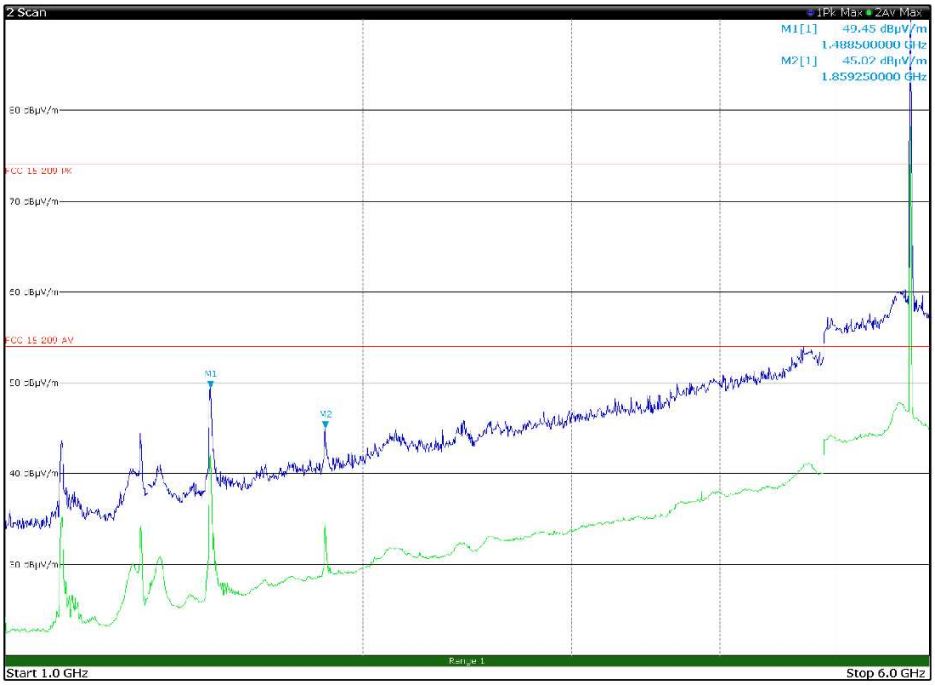


Figure 8.4-33: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in horizontal polarization*

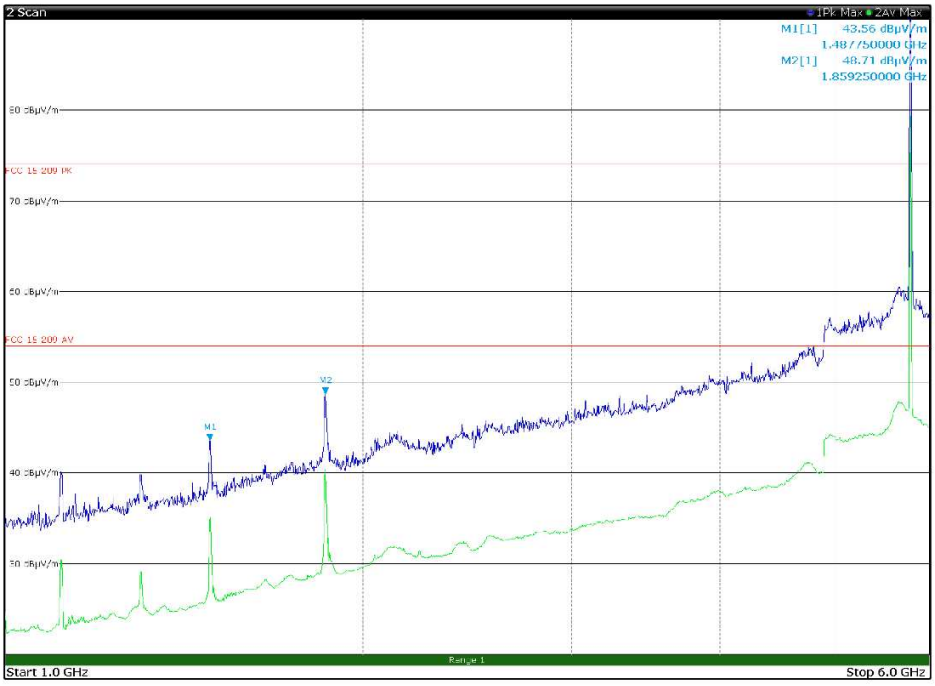


Figure 8.4-34: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in vertical polarization*

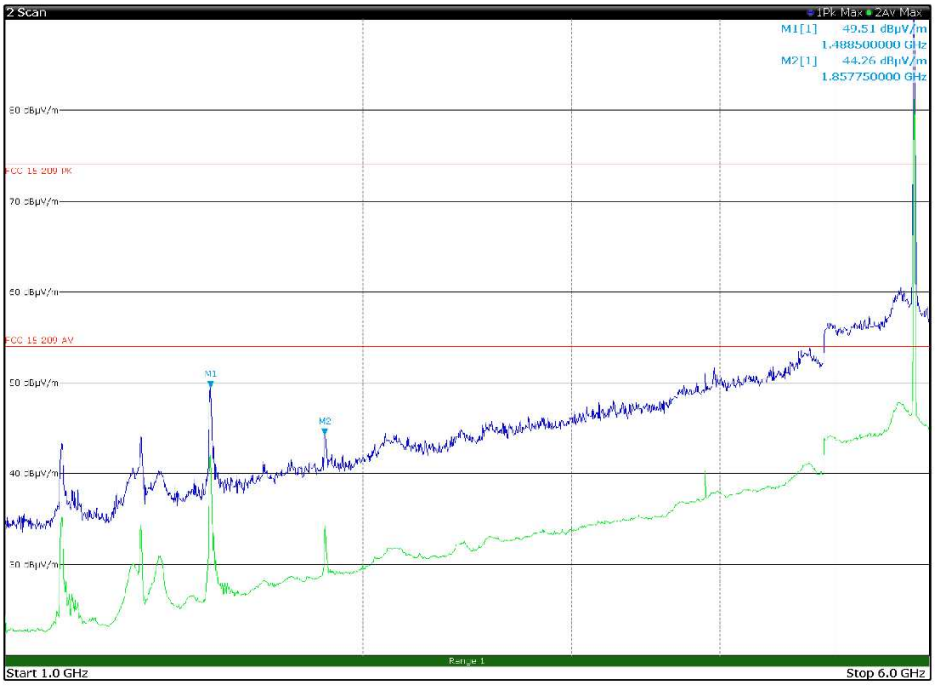


Figure 8.4-35: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in horizontal polarization*

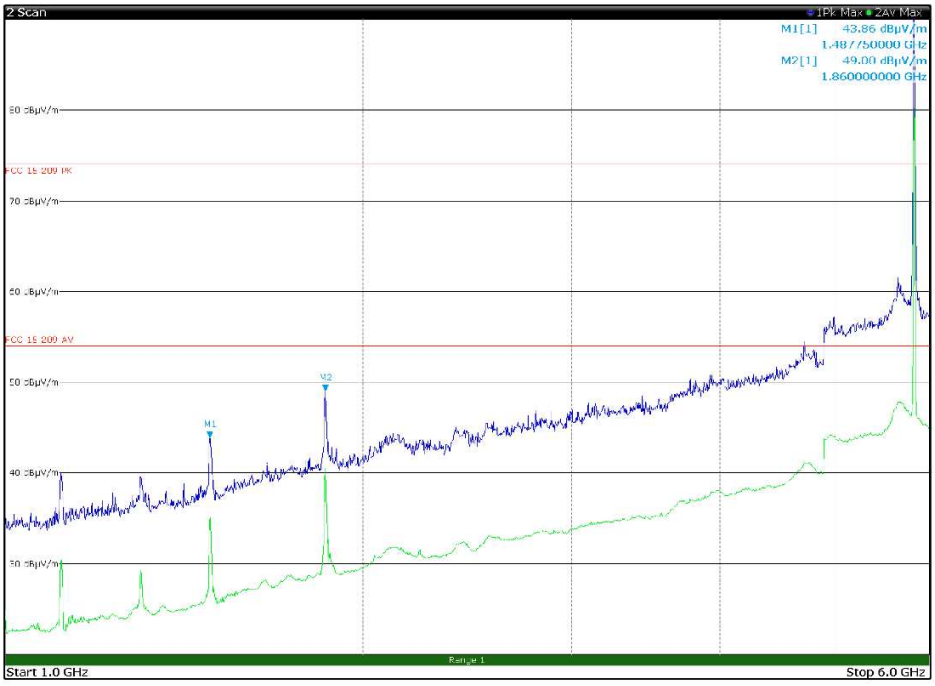


Figure 8.4-36: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

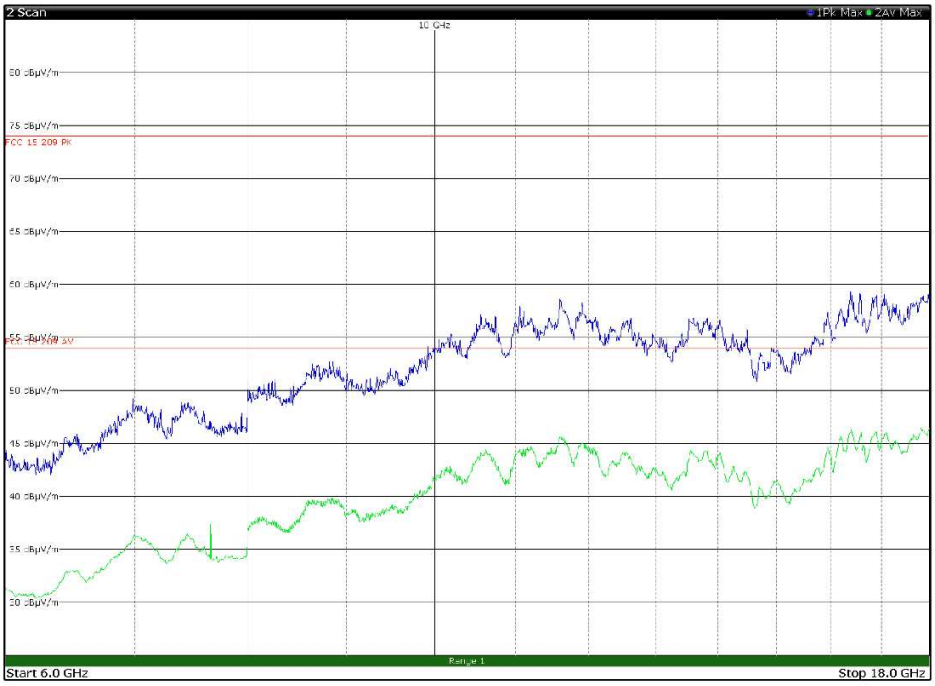


Figure 8.4-37: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in horizontal polarization*

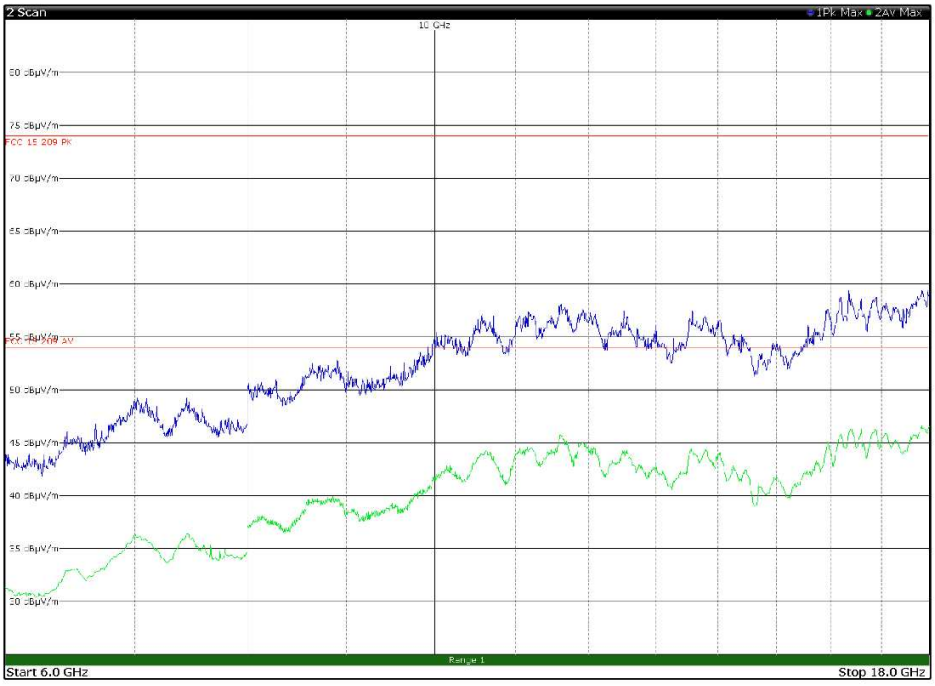


Figure 8.4-38: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in vertical polarization*

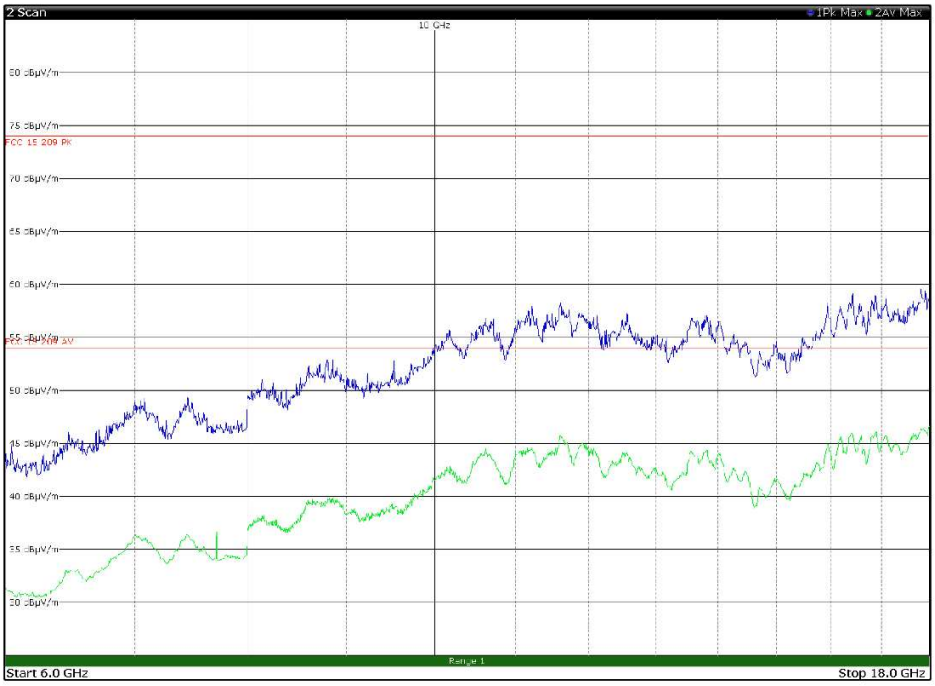


Figure 8.4-39: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in horizontal polarization*

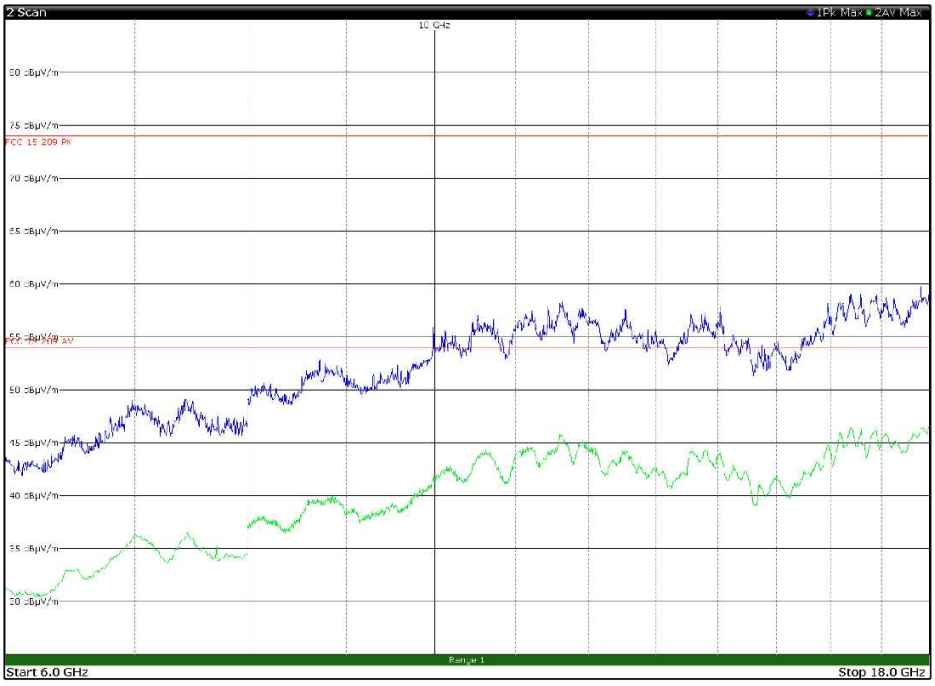


Figure 8.4-40: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in vertical polarization*

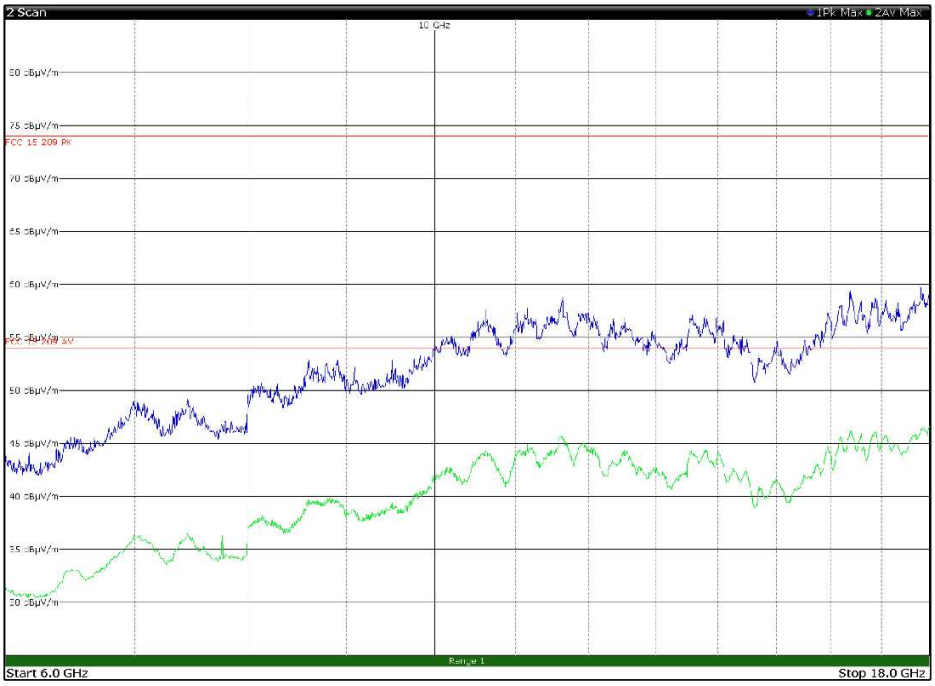


Figure 8.4-41: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in horizontal polarization*

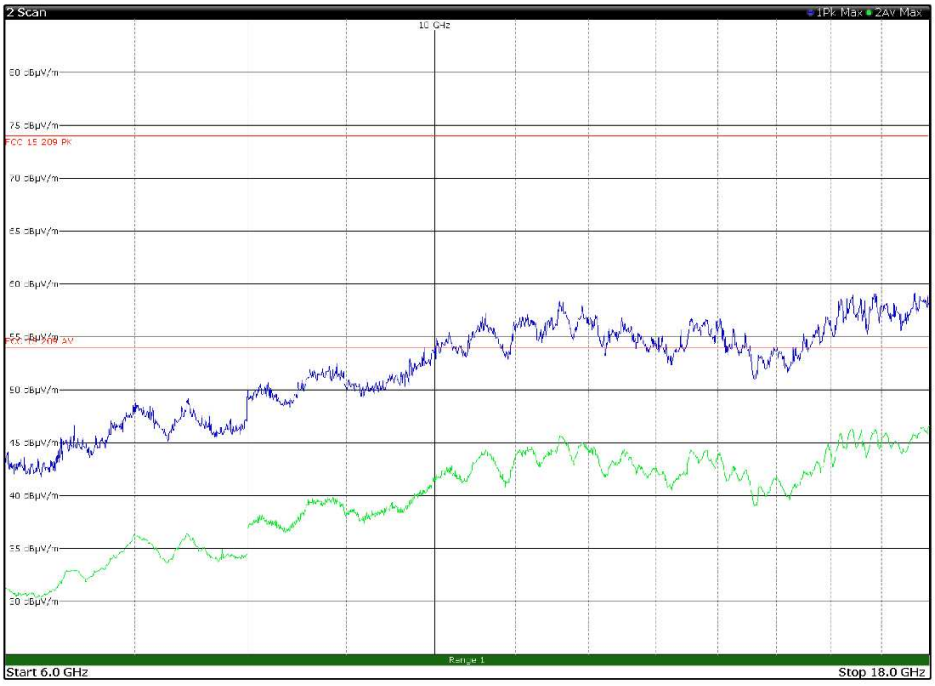


Figure 8.4-42: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

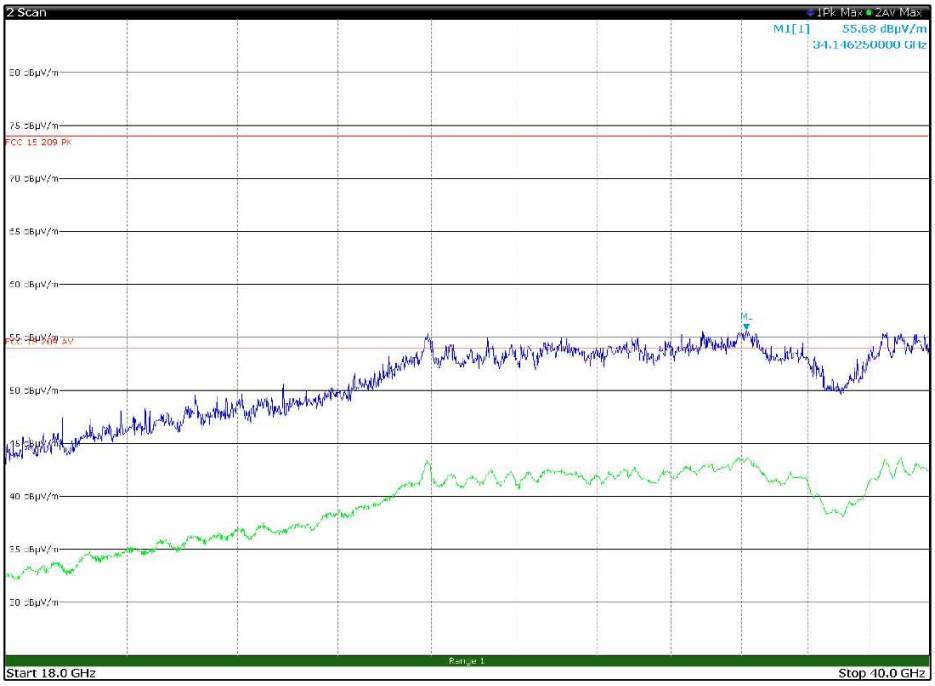


Figure 8.4-43: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in horizontal polarization*

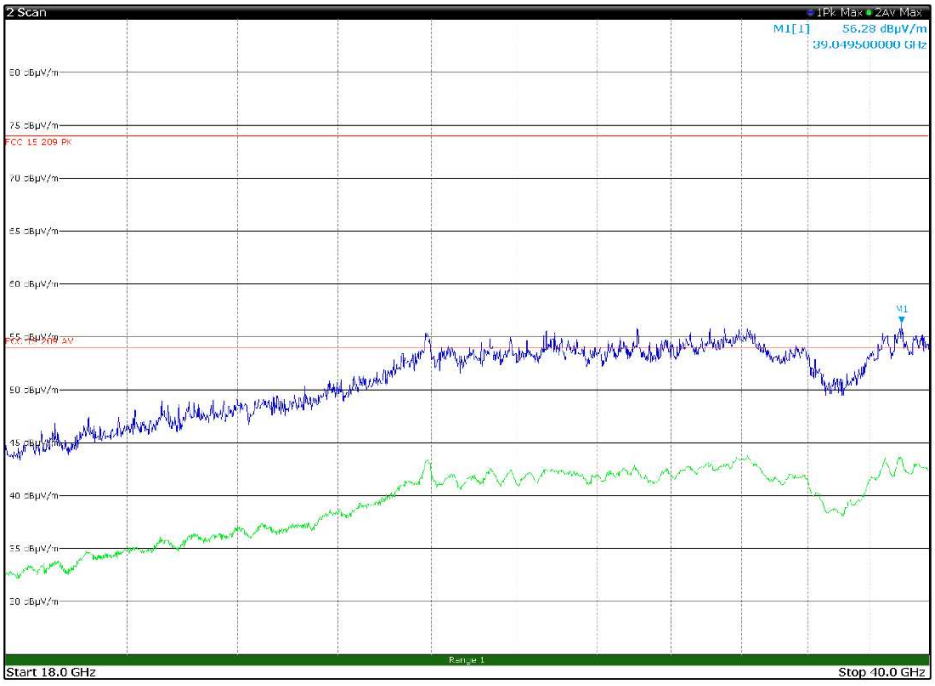


Figure 8.4-44: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in vertical polarization*

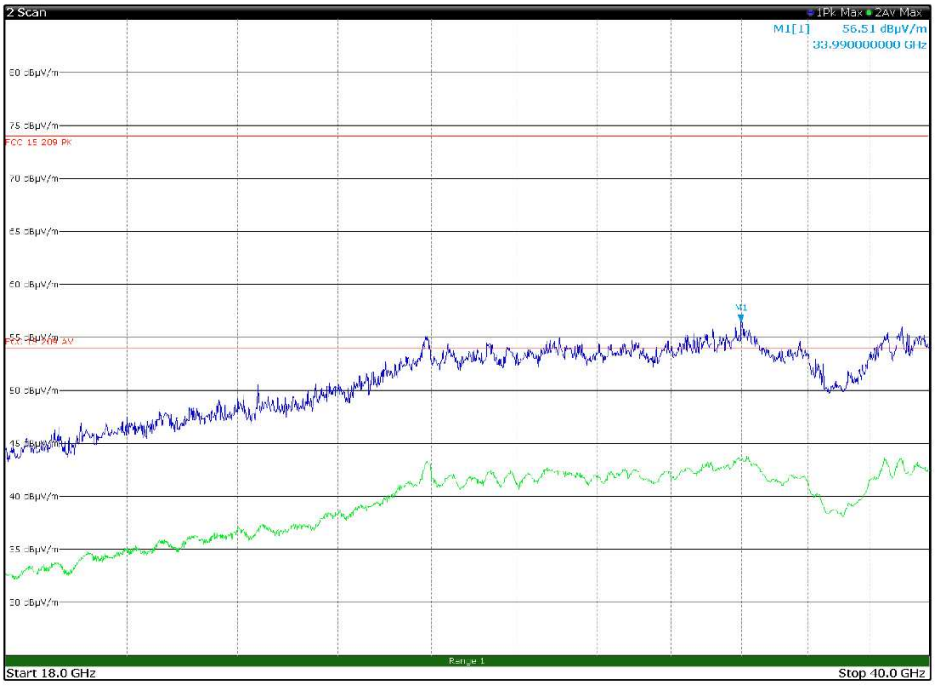


Figure 8.4-45: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in horizontal polarization*

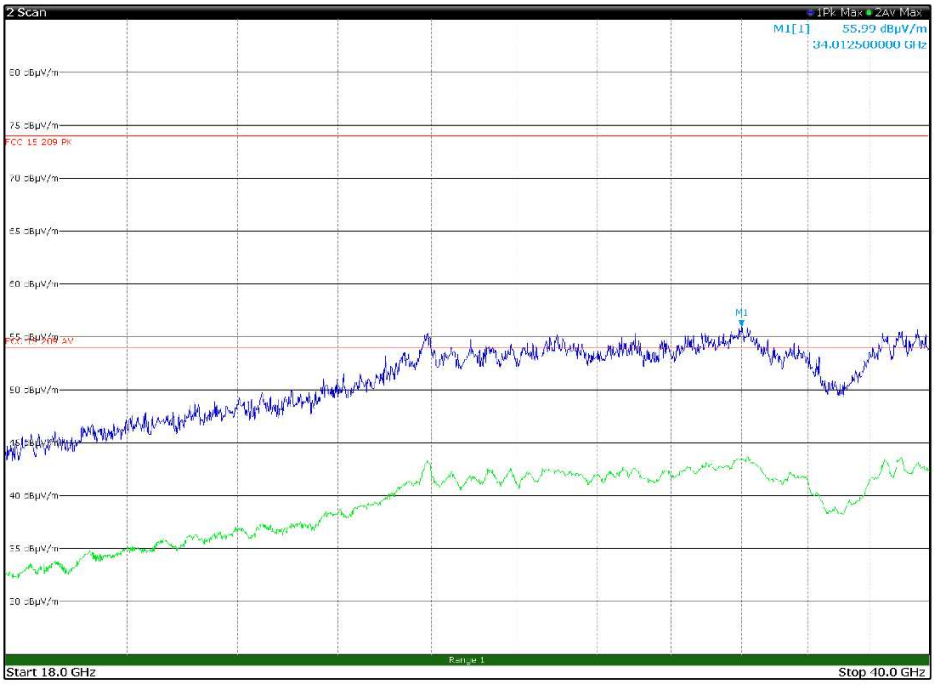


Figure 8.4-46: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in vertical polarization*

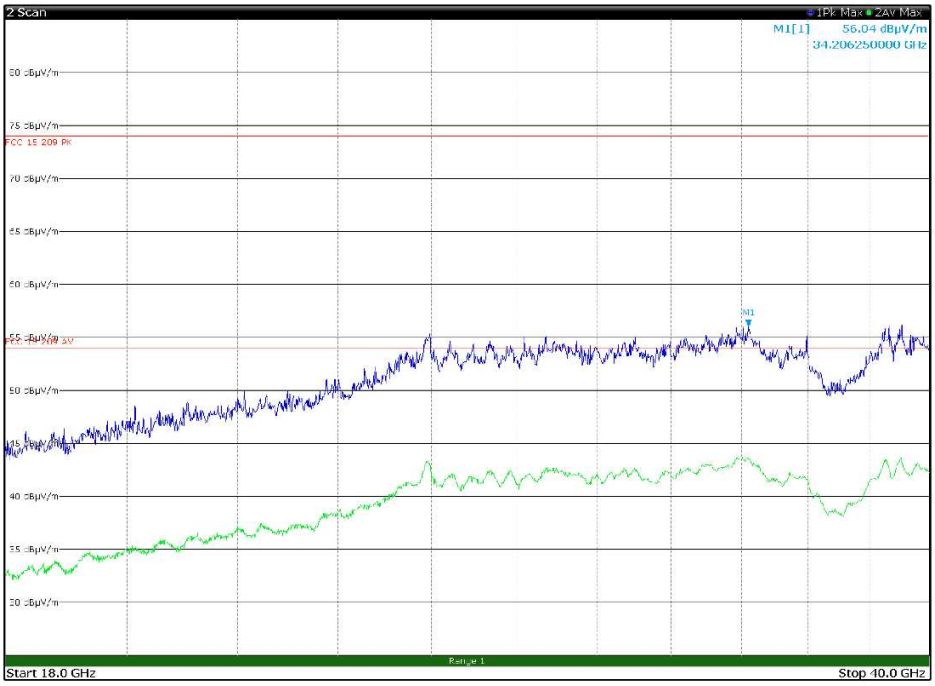


Figure 8.4-47: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in horizontal polarization*

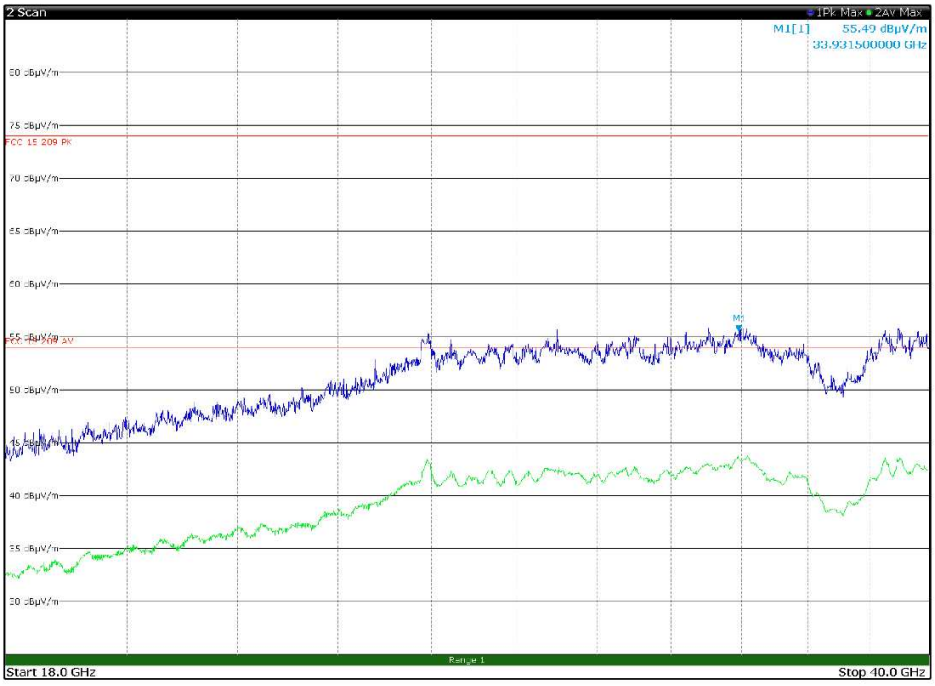


Figure 8.4-48: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in vertical polarization*

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

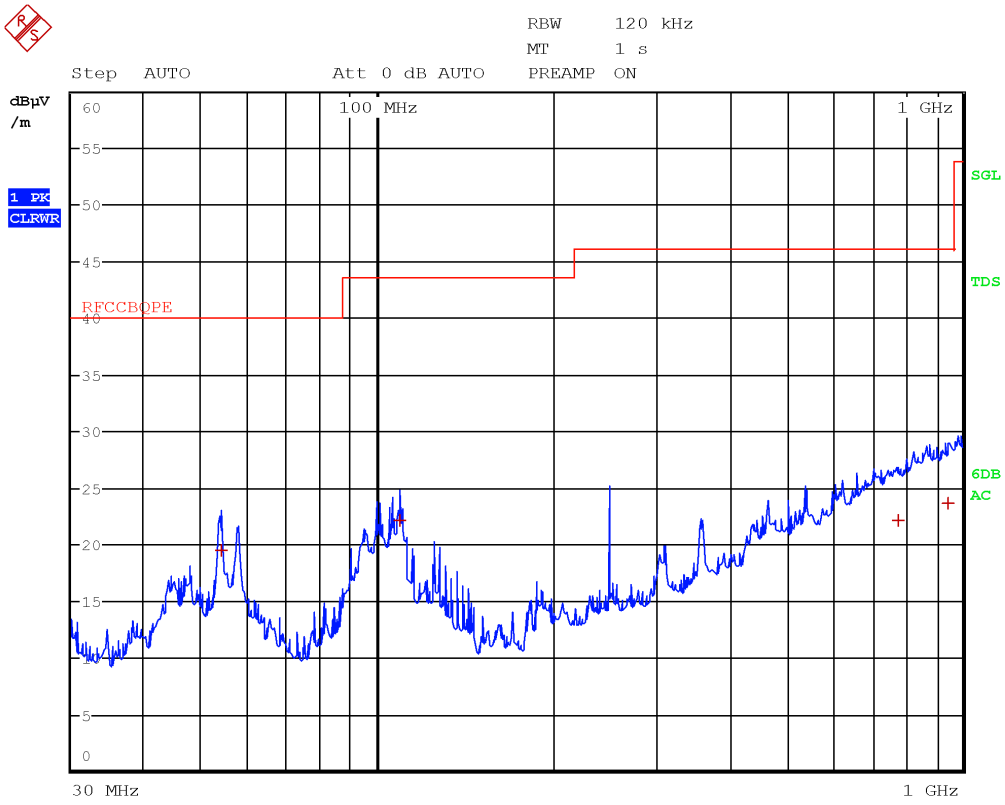


Figure 8.4-49: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
53.9600	19.3	40.0	-20.7	QP
109.0400	22.3	43.5	-21.2	QP
778.0000	22.4	46.0	-23.6	QP
947.6400	23.6	46.0	-22.4	QP

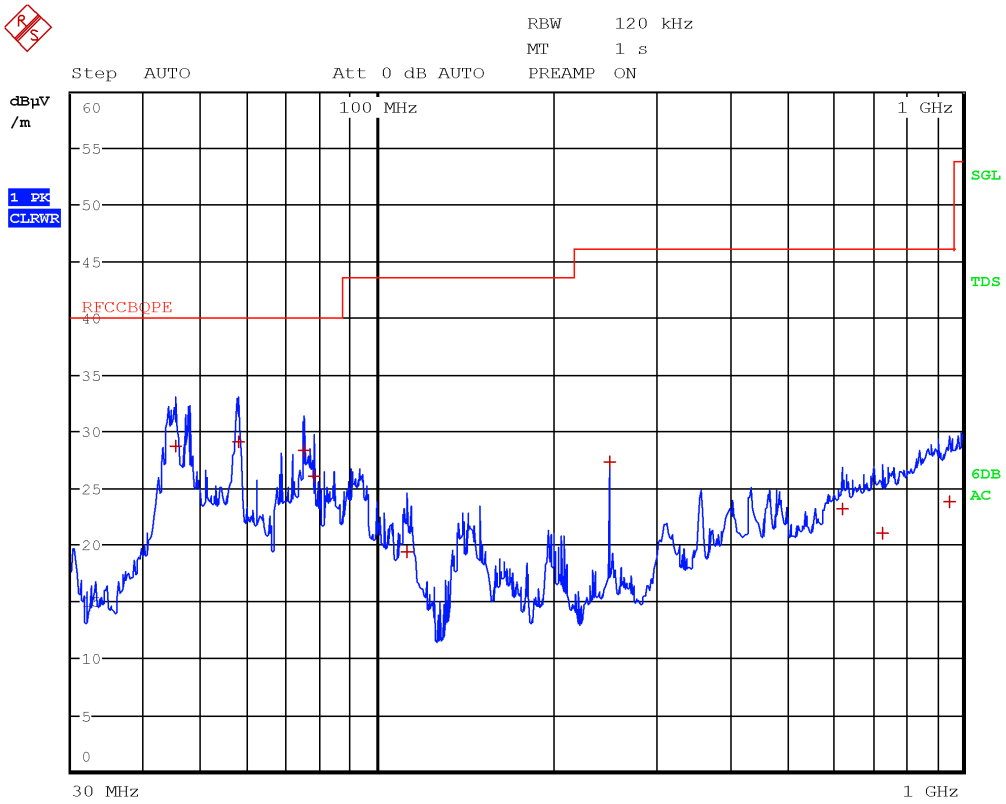


Figure 8.4-50: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
45.2400	28.5	40.0	-11.5	QP
57.7600	29.6	40.0	-10.4	QP
74.8000	28.5	40.0	-11.5	QP
77.9200	26.2	40.0	-13.8	QP
112.2400	19.4	43.5	-24.1	QP
250.0000	27.5	46.0	-18.5	QP
625.0000	23.3	46.0	-22.7	QP
728.8800	21.5	46.0	-24.5	QP
950.6000	23.6	46.0	-22.4	QP

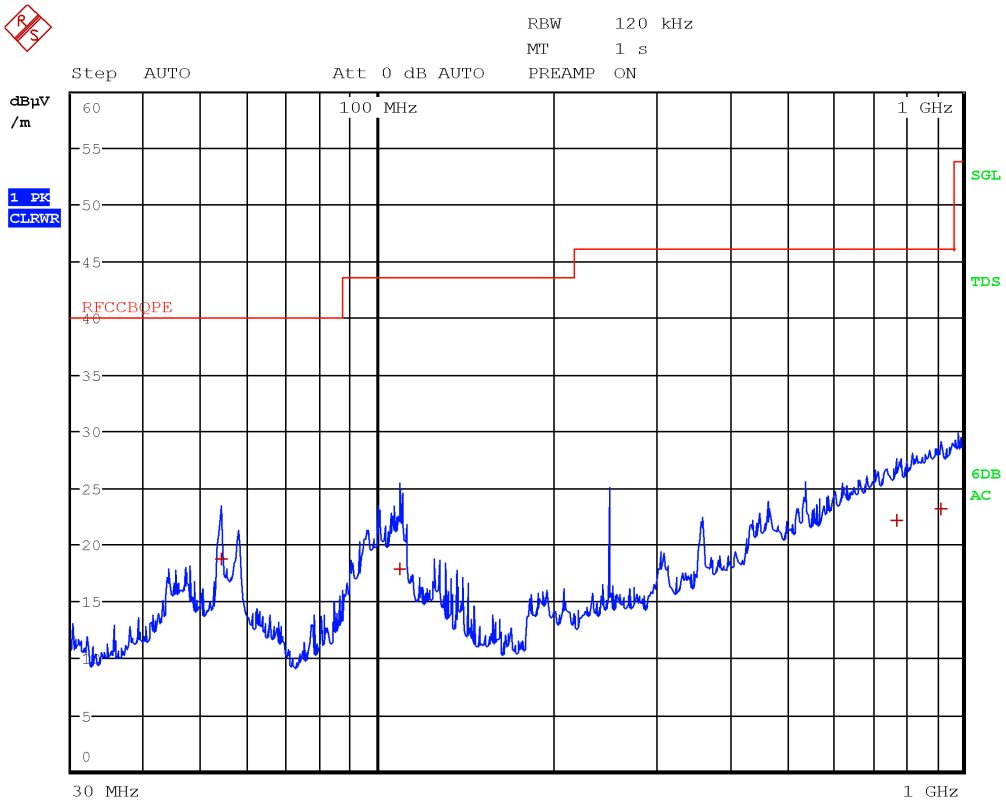


Figure 8.4-51: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
54.1600	18.6	40.0	-21.4	QP
109.2000	17.5	43.5	-26.0	QP
774.1600	22.6	46.0	-23.4	QP
917.1200	23.5	46.0	-22.5	QP

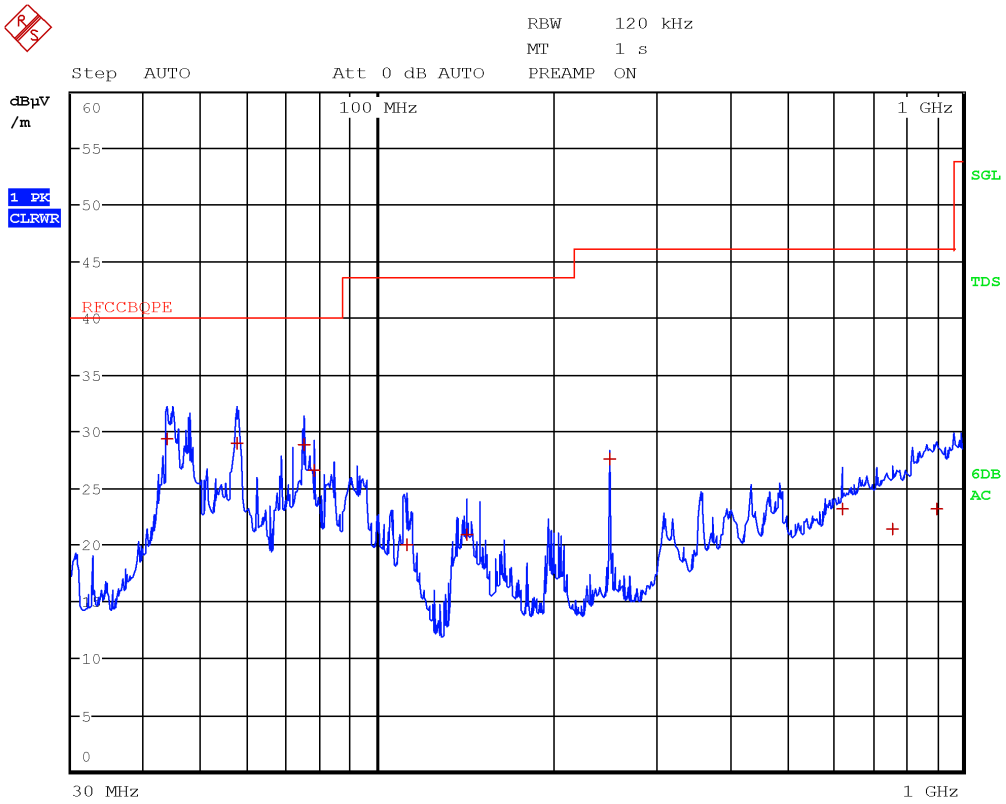


Figure 8.4-52: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
43.7600	29.3	40.0	-10.7	QP
57.6400	29.0	40.0	-11.0	QP
74.7600	28.4	40.0	-11.6	QP
77.8800	26.4	40.0	-13.6	QP
112.2000	20.1	43.5	-23.4	QP
142.1200	20.2	43.5	-23.3	QP
250.0000	27.4	46.0	-18.6	QP
625.0000	23.5	46.0	-22.5	QP
761.0000	21.3	46.0	-24.7	QP
902.4400	23.5	46.0	-22.5	QP

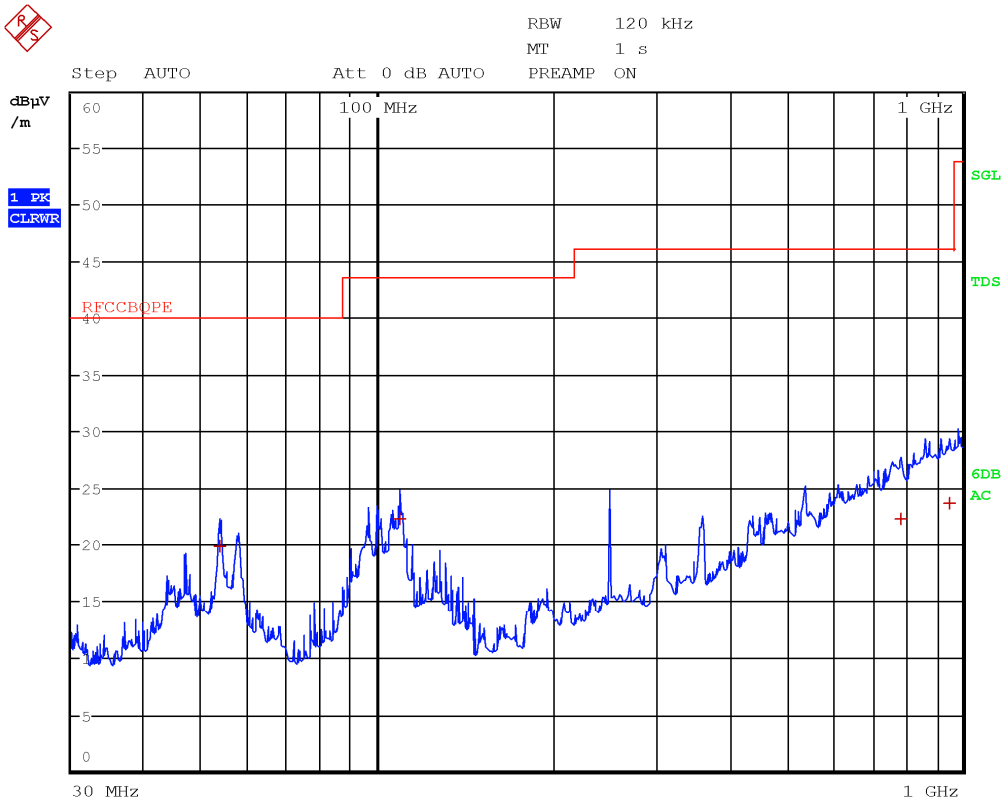


Figure 8.4-53: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
53.8400	19.9	40.0	-20.1	QP
109.0400	22.4	43.5	-21.1	QP
786.0000	22.3	46.0	-23.7	QP
950.6000	23.6	46.0	-22.4	QP

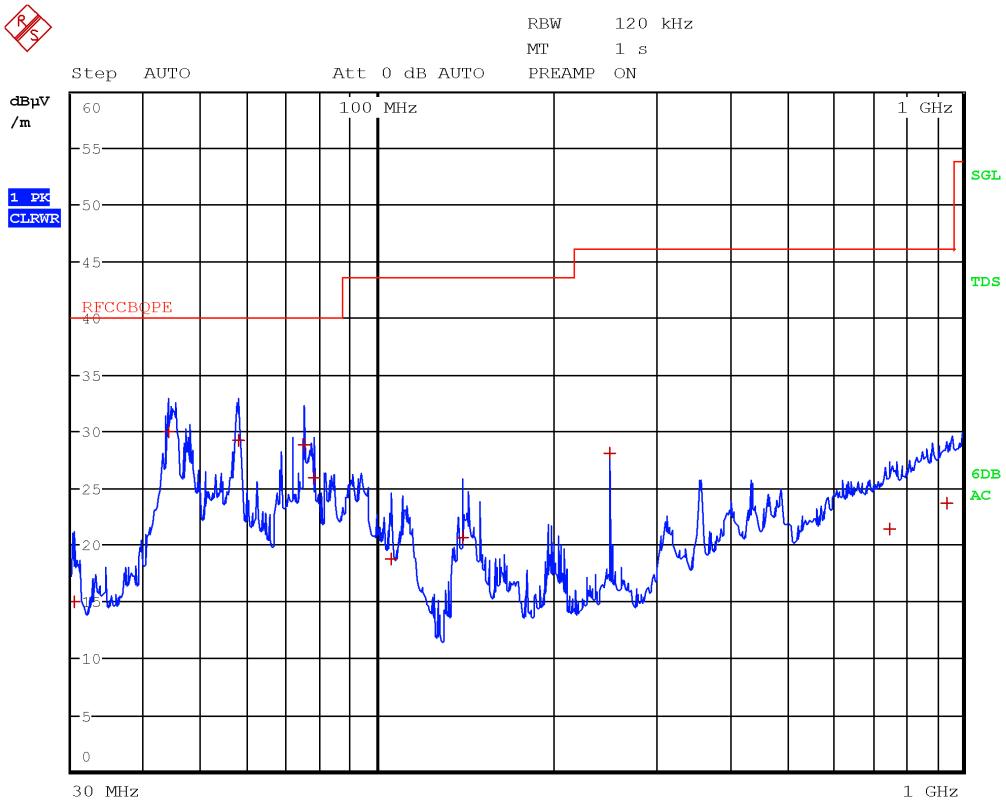


Figure 8.4-54: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.3200	15.0	40.0	-25.0	QP
43.8000	30.0	40.0	-10.0	QP
57.7600	29.2	40.0	-10.8	QP
74.7600	28.8	40.0	-11.2	QP
77.9200	26.1	40.0	-13.9	QP
105.8400	18.9	43.5	-24.6	QP
140.2400	20.5	43.5	-23.0	QP
250.0000	28.3	46.0	-17.7	QP
749.7200	21.4	46.0	-24.6	QP
939.6800	23.5	46.0	-22.5	QP

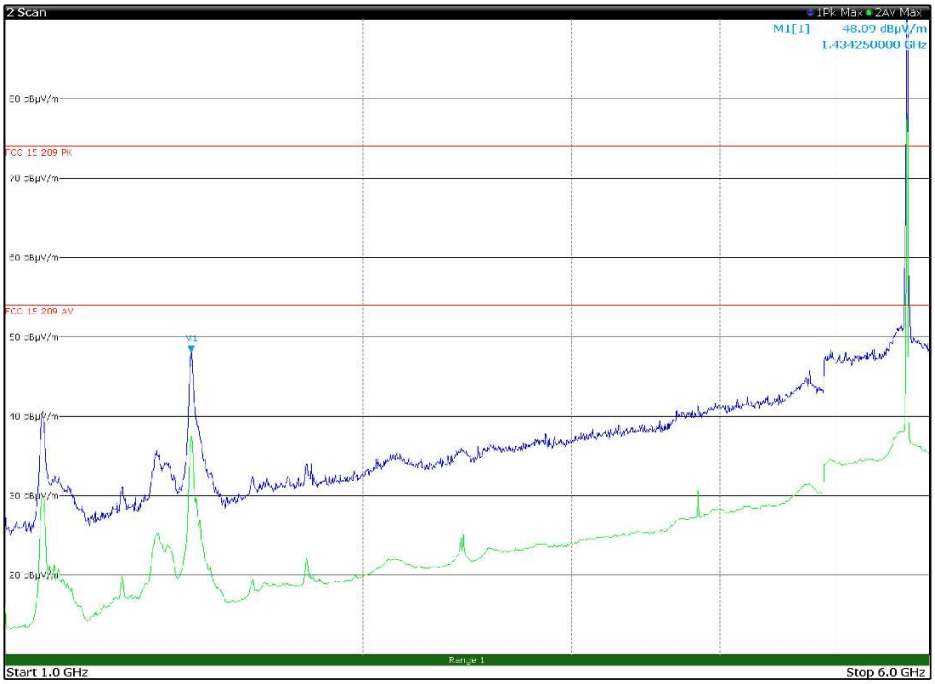


Figure 8.4-55: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in horizontal polarization*

Limit exceeded by the carrier

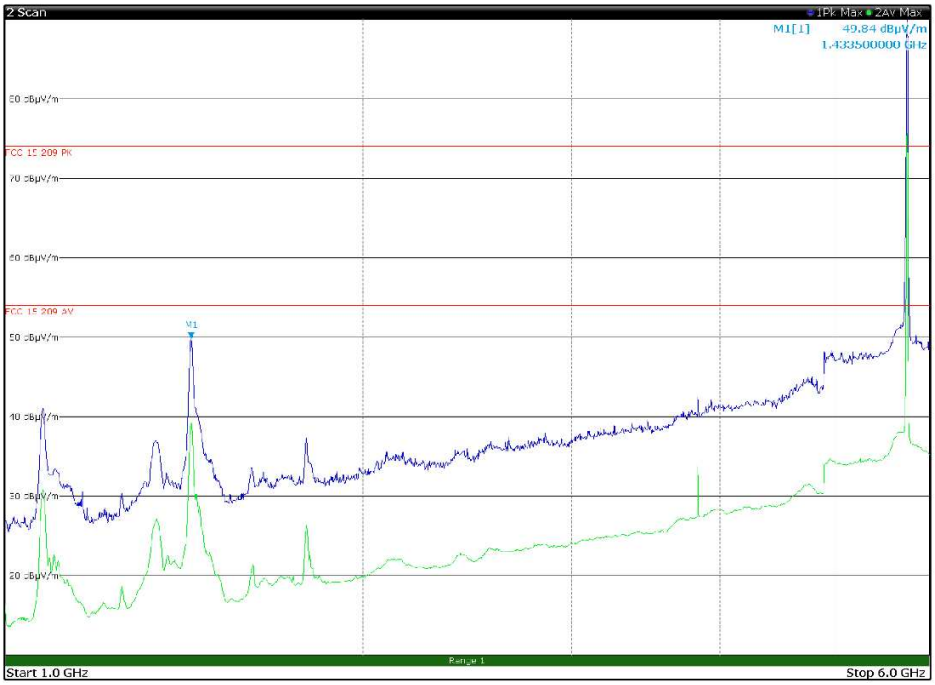


Figure 8.4-56: *Radiated spurious emissions 1 to 6 GHz, Low channel with antenna in vertical polarization*

Limit exceeded by the carrier

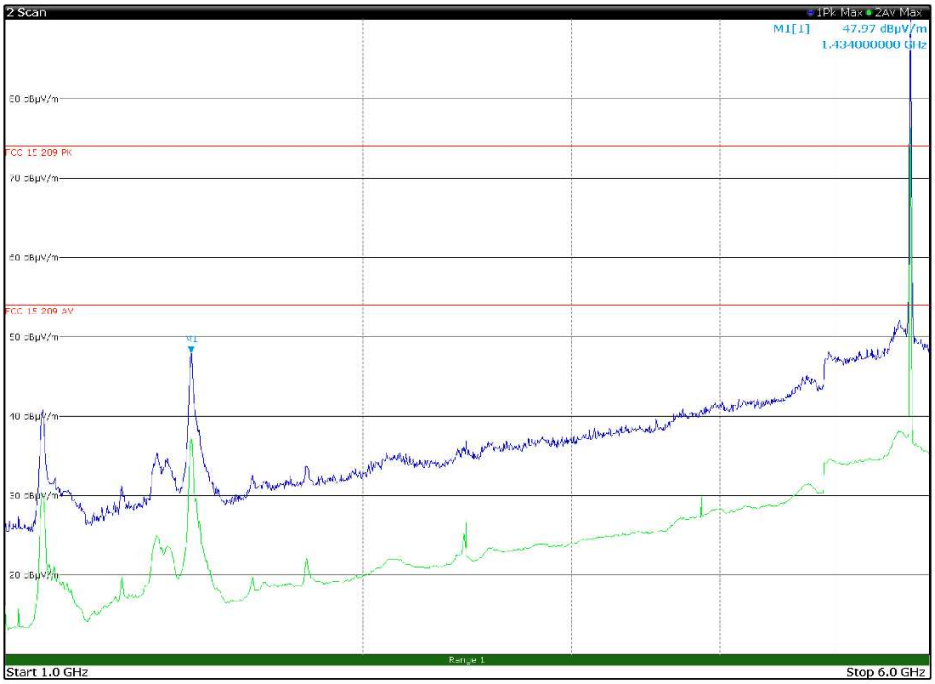


Figure 8.4-57: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in horizontal polarization*

Limit exceeded by the carrier

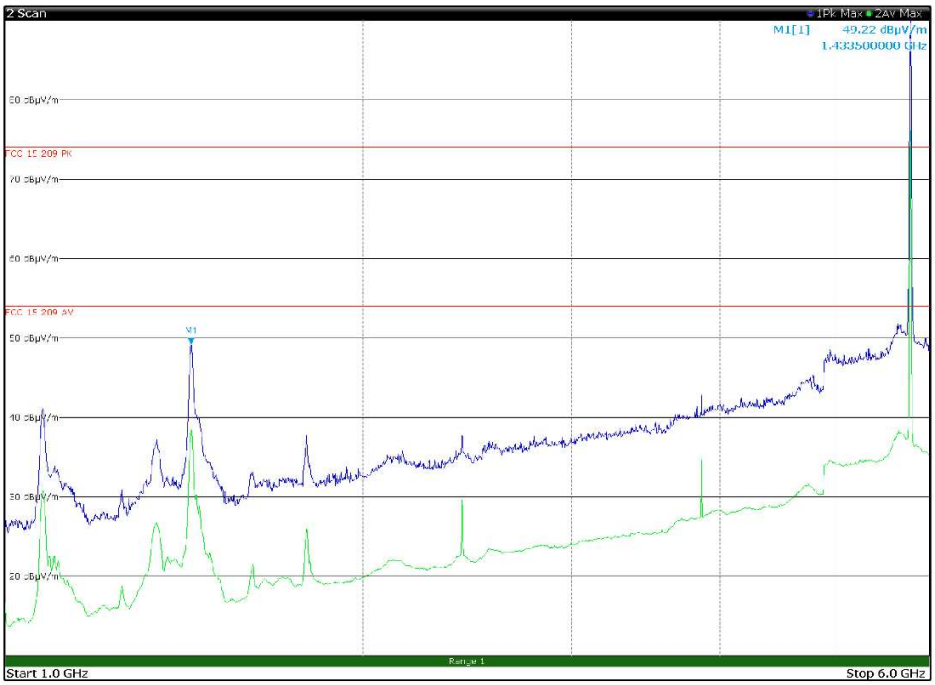


Figure 8.4-58: *Radiated spurious emissions 1 to 6 GHz, mid channel with antenna in vertical polarization*

Limit exceeded by the carrier

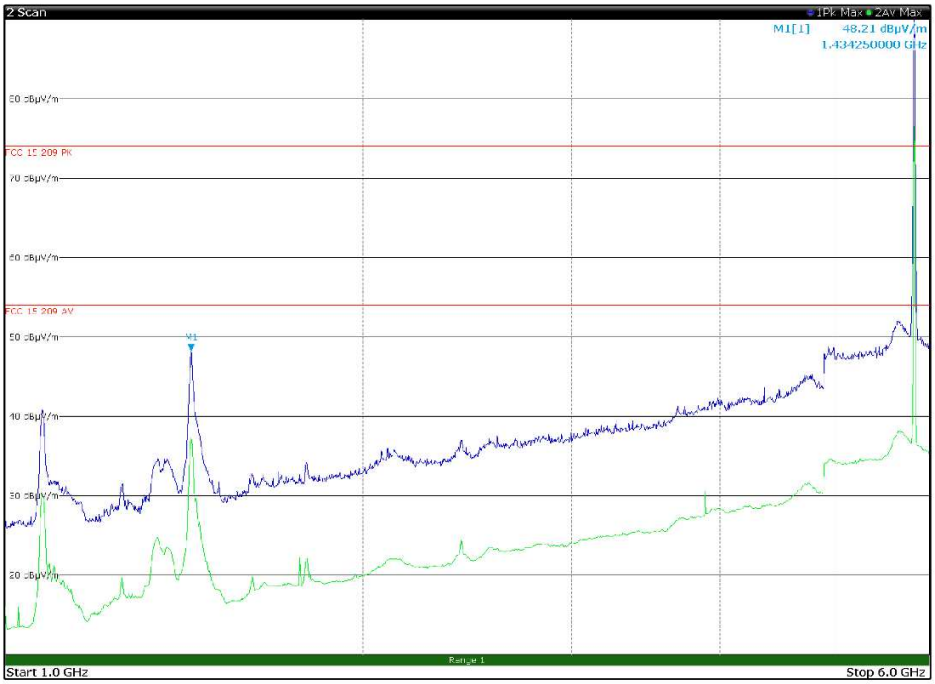


Figure 8.4-59: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in horizontal polarization*

Limit exceeded by the carrier

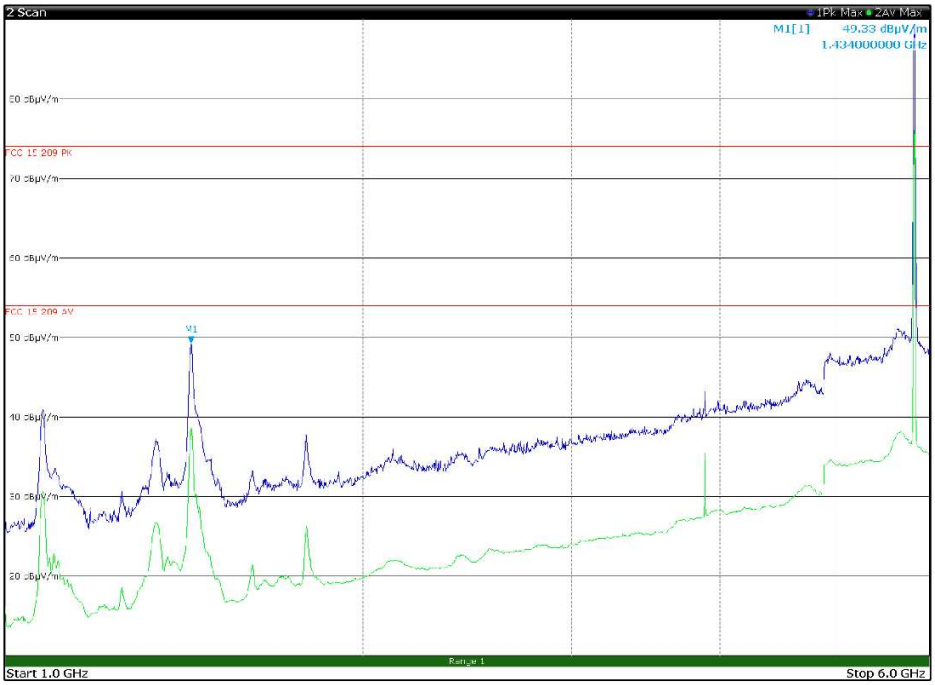


Figure 8.4-60: *Radiated spurious emissions 1 to 6 GHz, high channel with antenna in vertical polarization*

Limit exceeded by the carrier

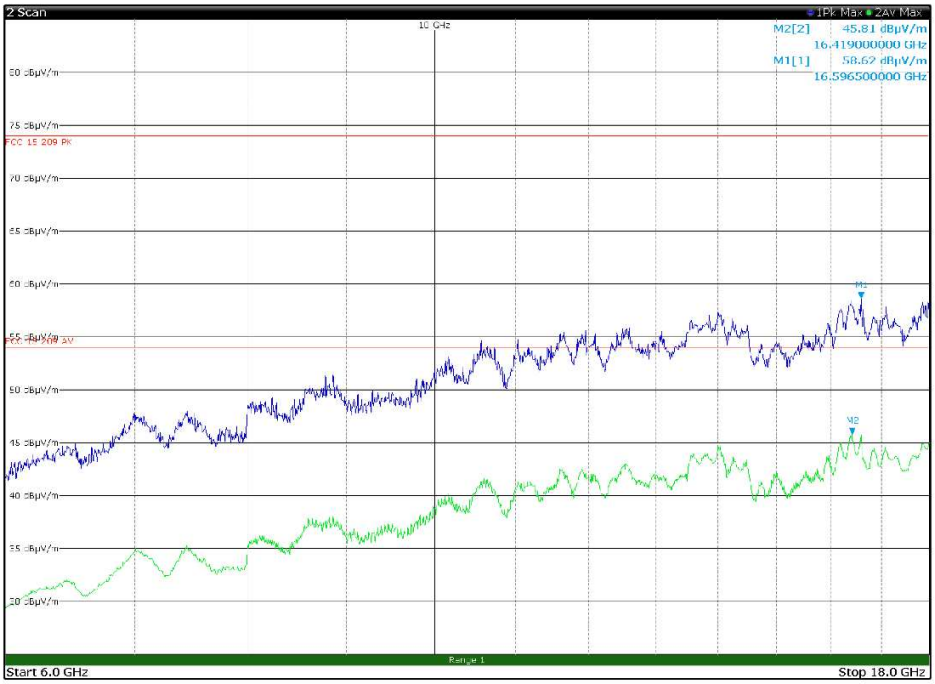


Figure 8.4-61: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in horizontal polarization*

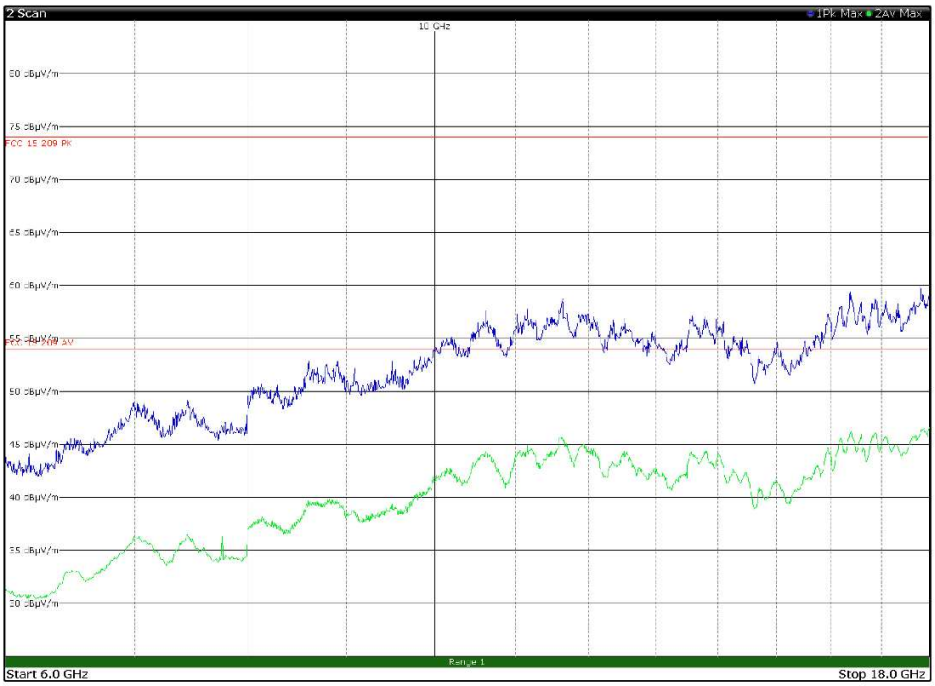


Figure 8.4-62: *Radiated spurious emissions 6 to 18 GHz, Low channel with antenna in vertical polarization*

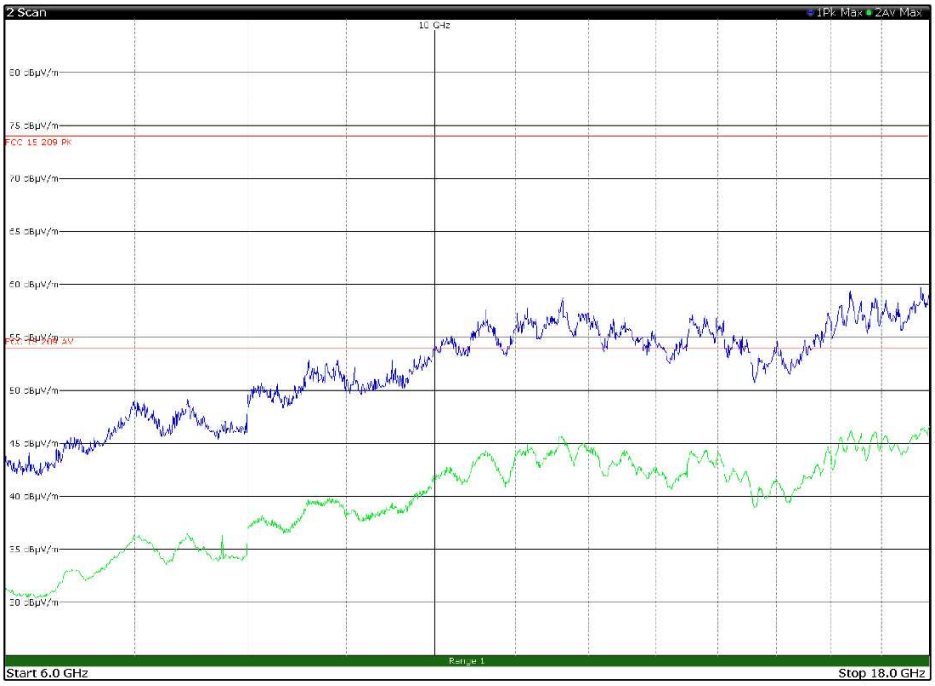


Figure 8.4-63: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in horizontal polarization*

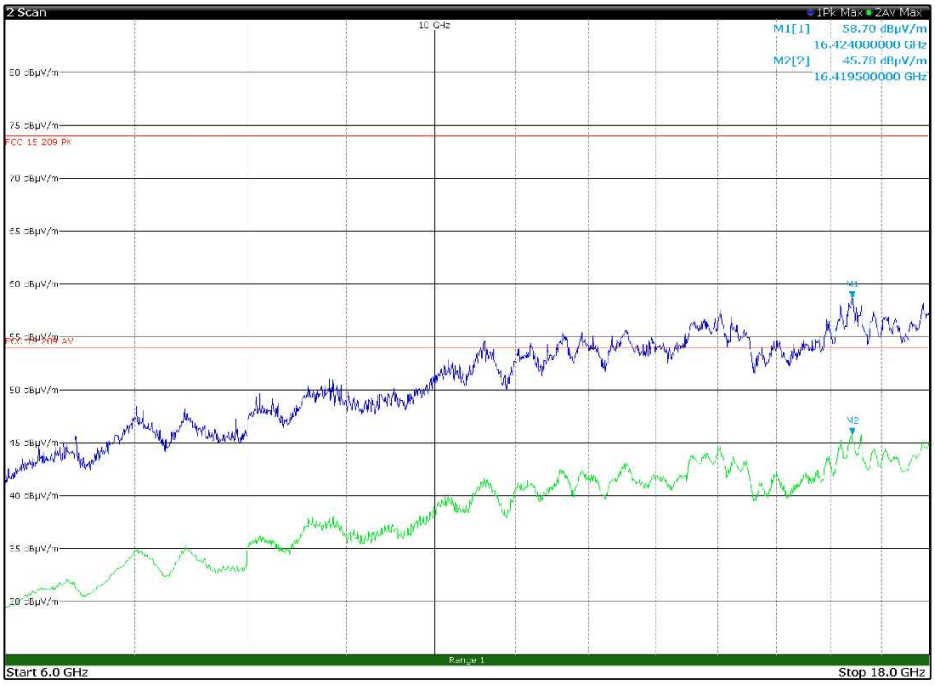


Figure 8.4-64: *Radiated spurious emissions 6 to 18 GHz, mid channel with antenna in vertical polarization*

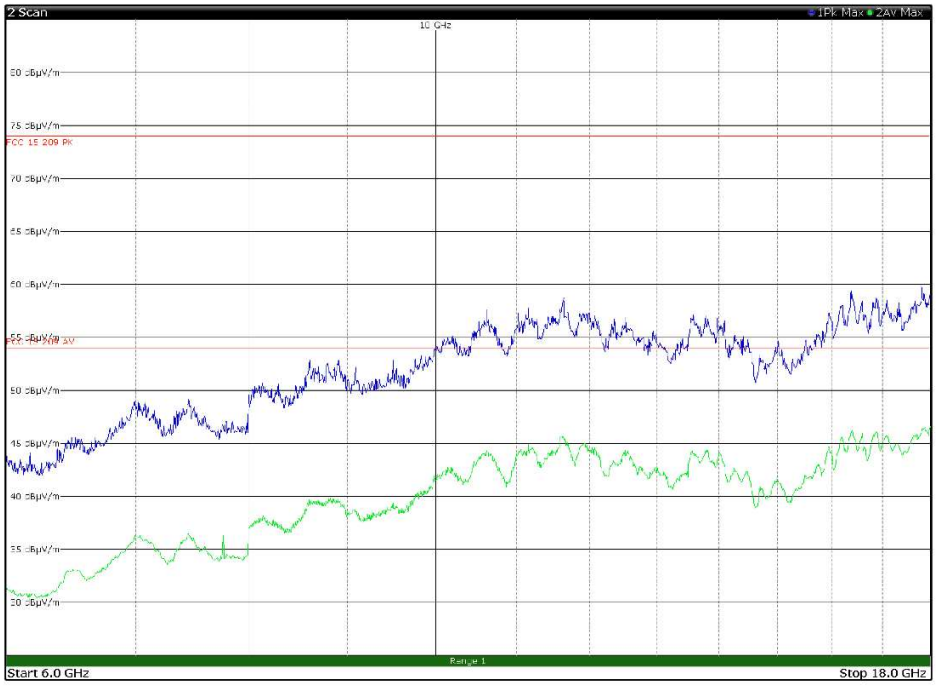


Figure 8.4-65: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in horizontal polarization*

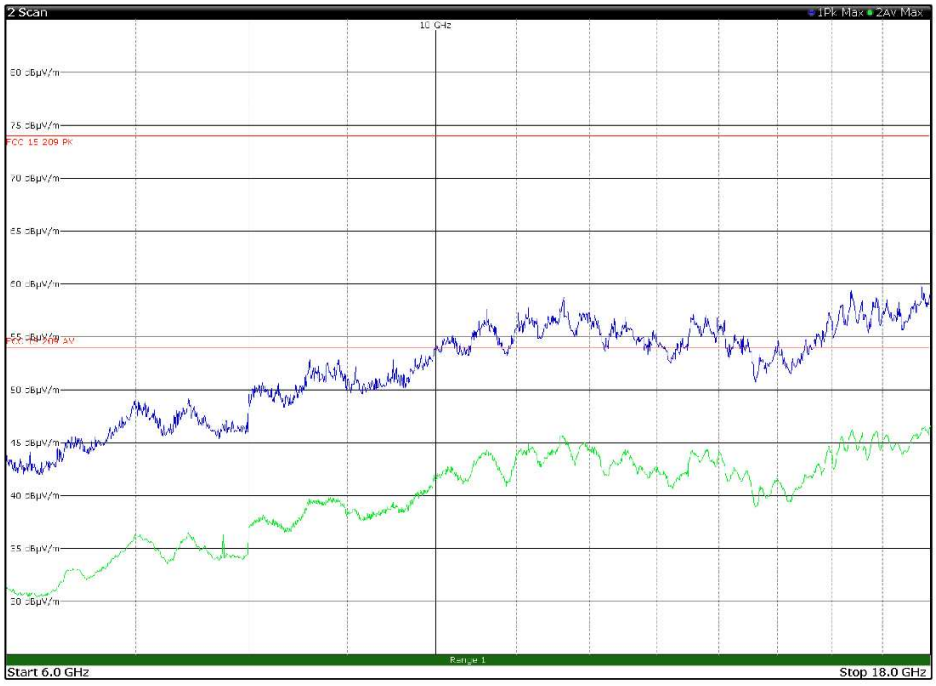


Figure 8.4-66: *Radiated spurious emissions 6 to 18 GHz, high channel with antenna in vertical polarization*

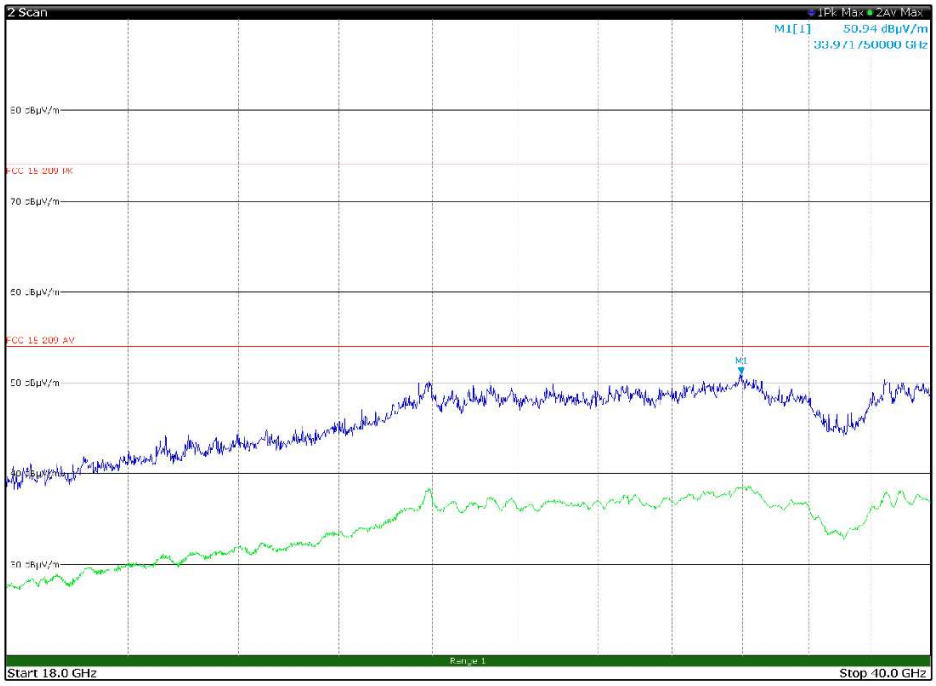


Figure 8.4-67: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in horizontal polarization*

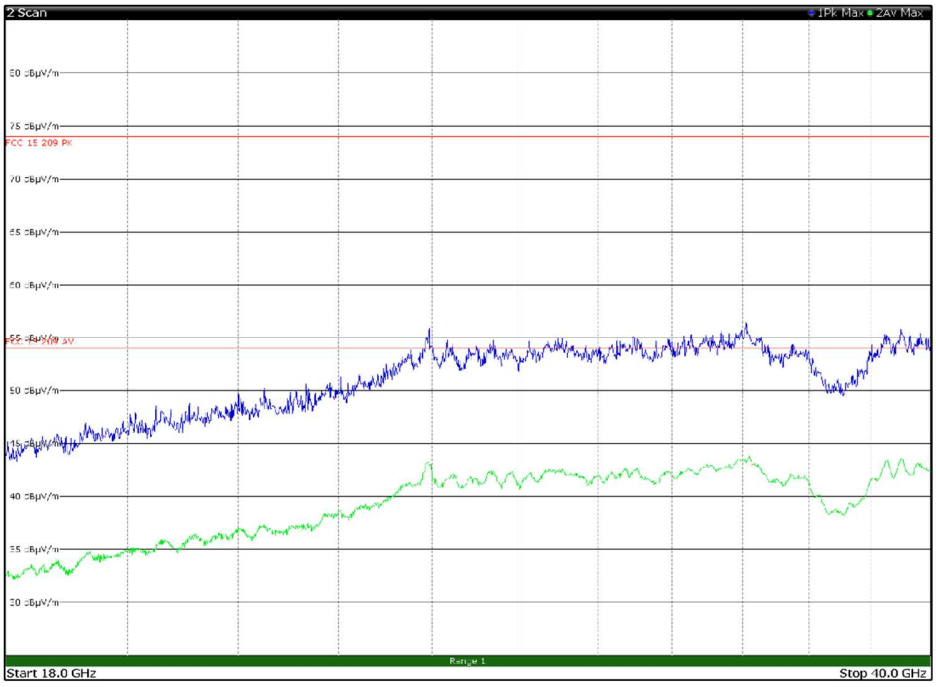


Figure 8.4-68: *Radiated spurious emissions 18 to 40 GHz, Low channel with antenna in vertical polarization*

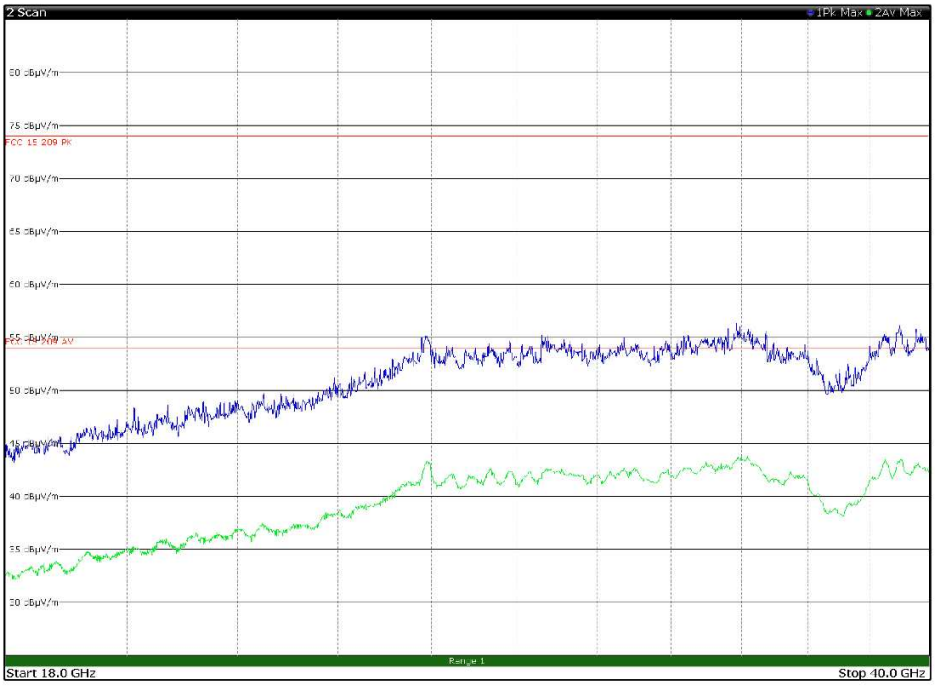


Figure 8.4-69: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in horizontal polarization*

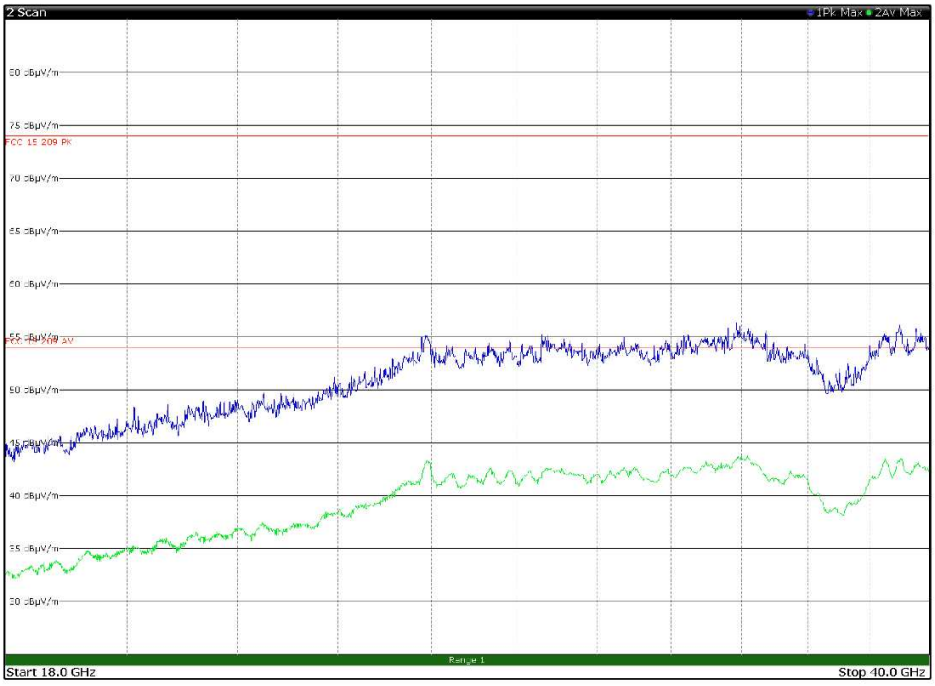


Figure 8.4-70: *Radiated spurious emissions 18 to 40 GHz, mid channel with antenna in vertical polarization*

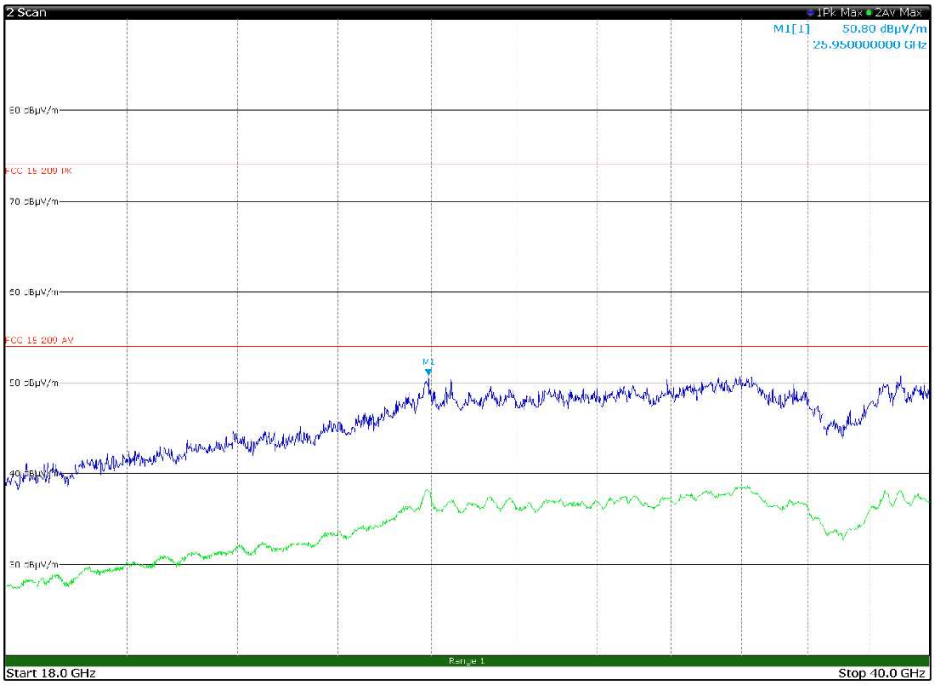


Figure 8.4-71: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in horizontal polarization*

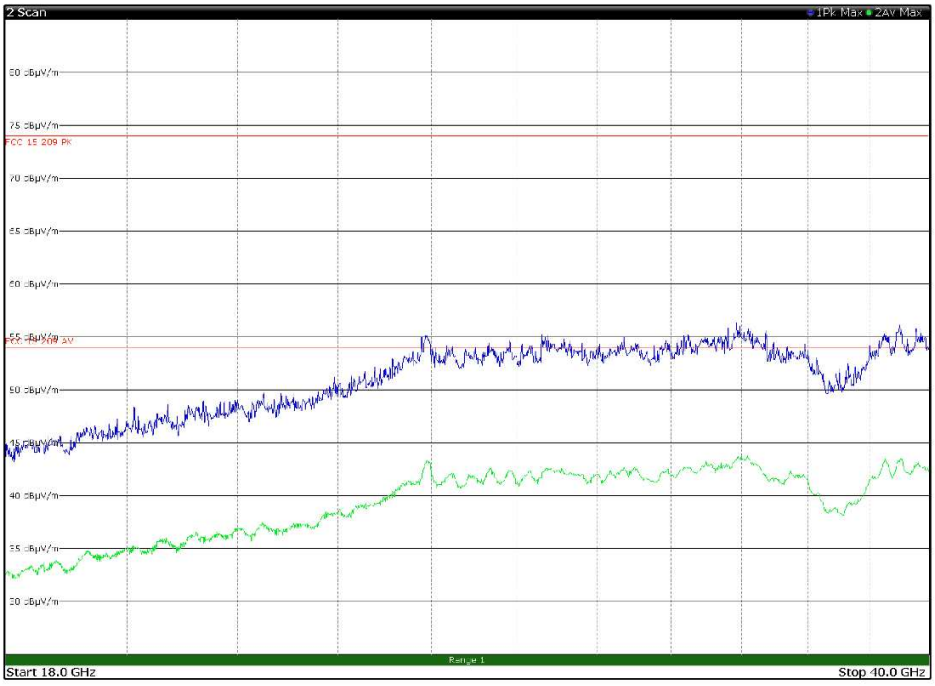


Figure 8.4-72: *Radiated spurious emissions 18 to 40 GHz, high channel with antenna in vertical polarization*

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

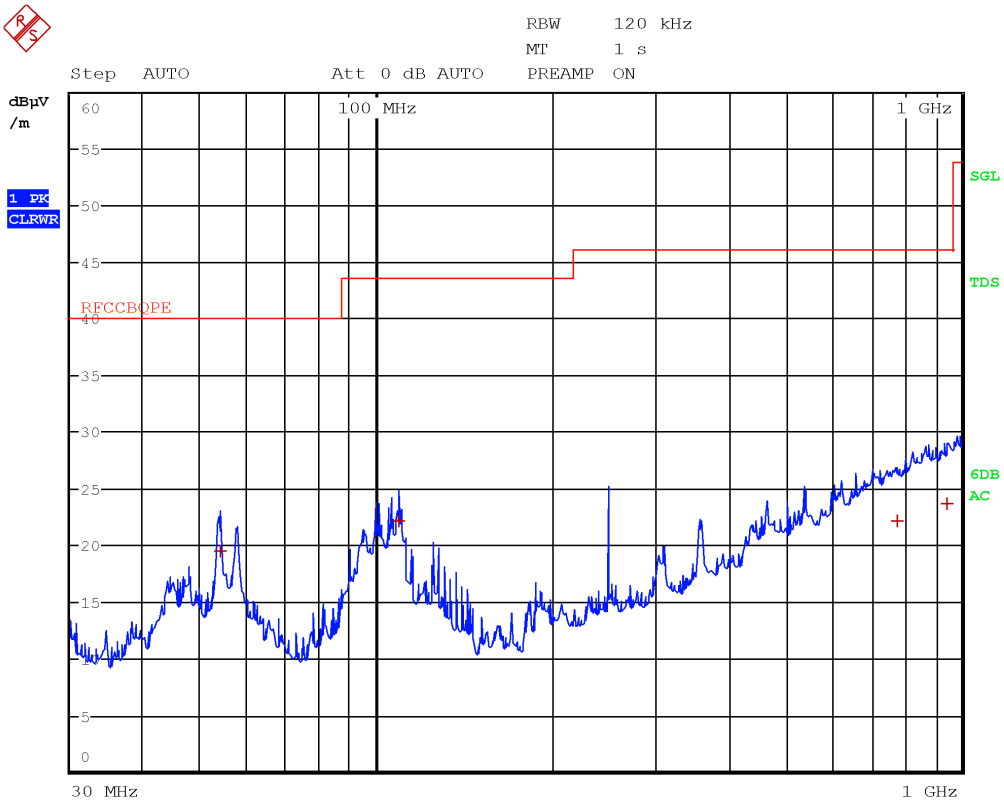


Figure 8.4-73: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
53.9600	19.6	40.0	-20.4	QP
109.0400	22.2	43.5	-21.3	QP
778.0000	22.2	46.0	-23.8	QP
947.6400	23.7	46.0	-22.3	QP

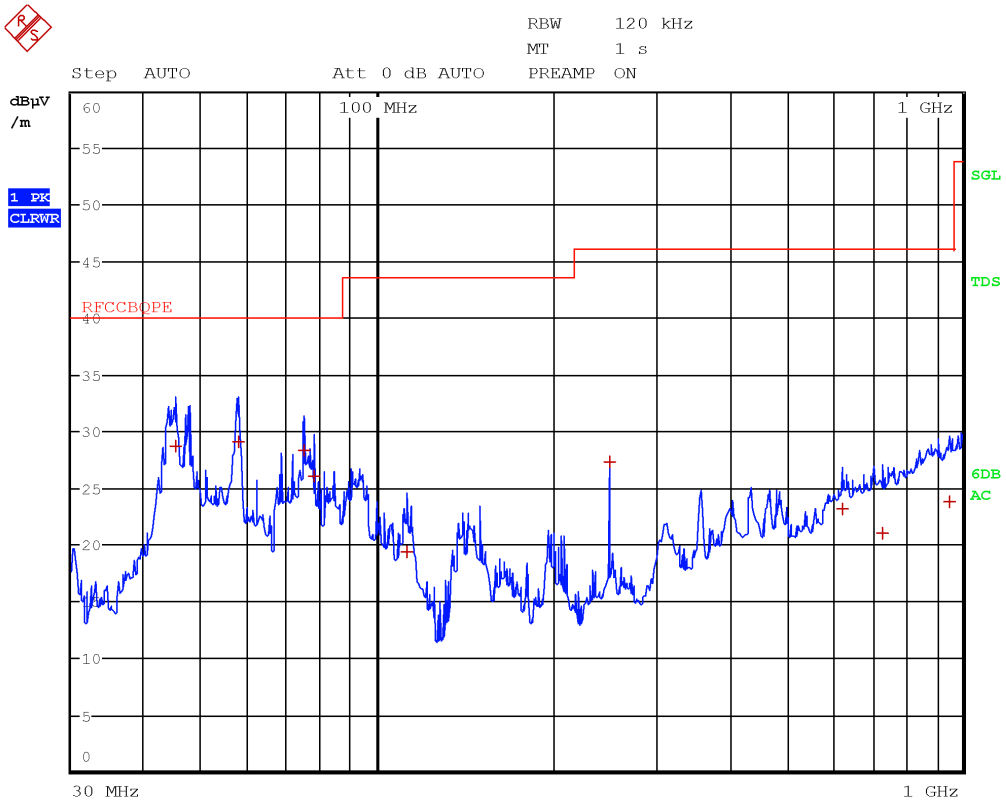


Figure 8.4-74: *Radiated spurious emissions 30 to 1000 MHz, Low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
45.2400	28.7	40.0	-11.3	QP
57.7600	29.2	40.0	-10.8	QP
74.8000	28.4	40.0	-11.6	QP
77.9200	26.1	40.0	-13.9	QP
112.2400	19.4	43.5	-24.1	QP
250.0000	27.4	46.0	-18.6	QP
625.0000	23.2	46.0	-22.8	QP
728.8800	21.0	46.0	-25.0	QP
950.6000	23.8	46.0	-22.2	QP

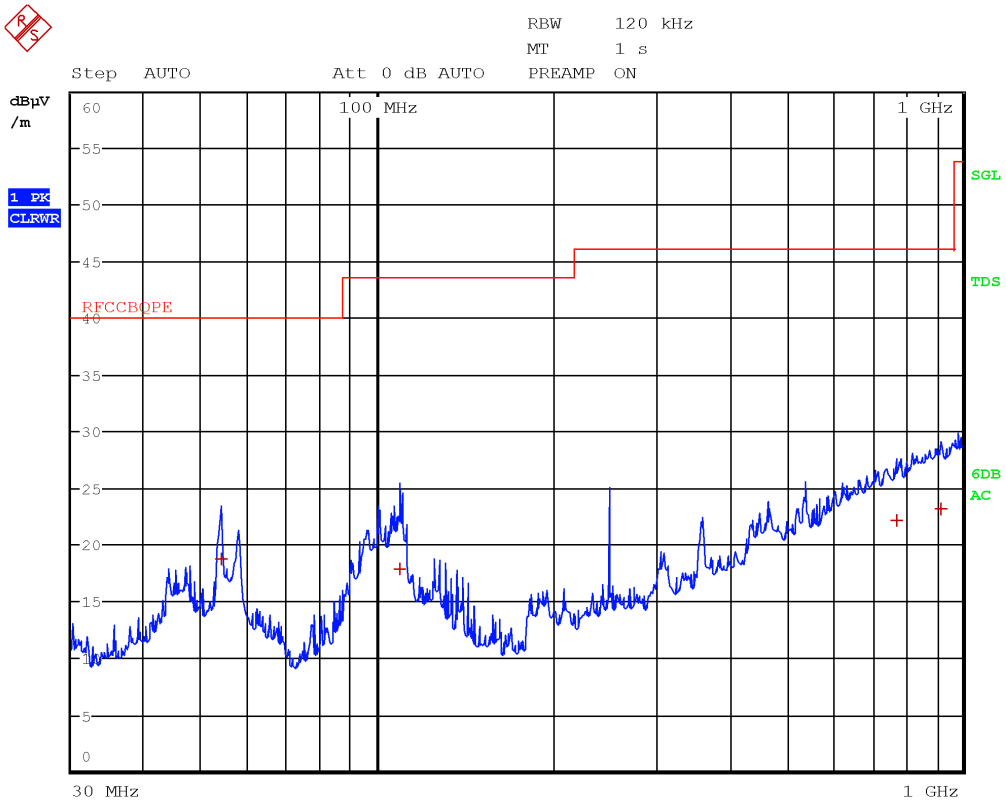


Figure 8.4-75: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
54.1600	18.7	40.0	-21.3	QP
109.2000	17.9	43.5	-25.6	QP
774.1600	22.2	46.0	-23.8	QP
917.1200	23.2	46.0	-22.8	QP

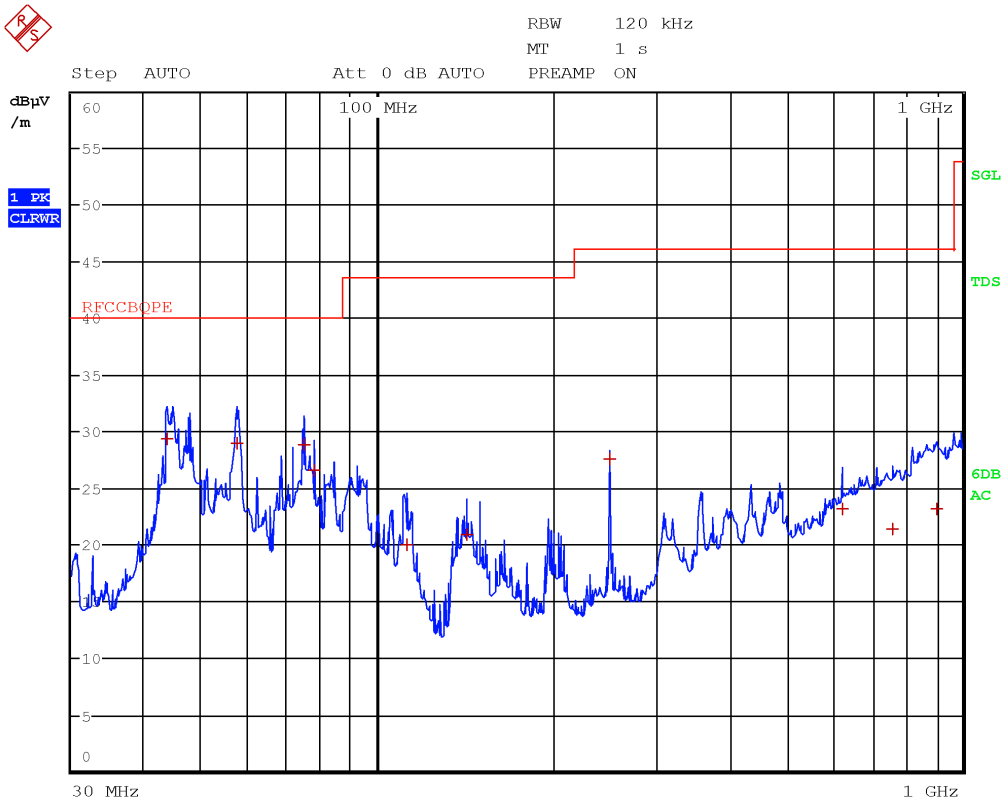


Figure 8.4-76: *Radiated spurious emissions 30 to 1000 MHz, mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
43.7600	29.4	40.0	-10.6	QP
57.6400	29.0	40.0	-11.0	QP
74.7600	28.9	40.0	-11.1	QP
77.8800	26.6	40.0	-13.4	QP
112.2000	20.0	43.5	-23.5	QP
142.1200	20.9	43.5	-22.6	QP
250.0000	27.5	46.0	-18.5	QP
625.0000	23.1	46.0	-22.9	QP
761.0000	21.4	46.0	-24.6	QP
902.4400	23.2	46.0	-22.8	QP

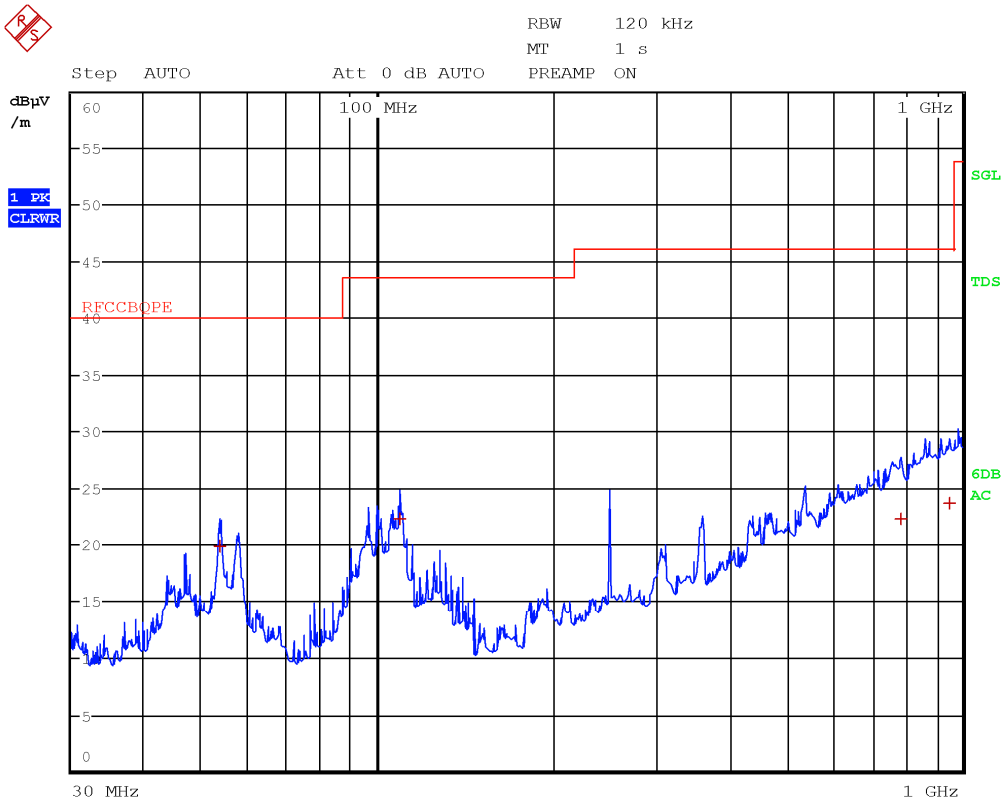


Figure 8.4-77: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
53.8400	19.9	40.0	-20.1	QP
109.0400	22.3	43.5	-21.2	QP
786.0000	22.3	46.0	-23.7	QP
950.6000	23.7	46.0	-22.3	QP

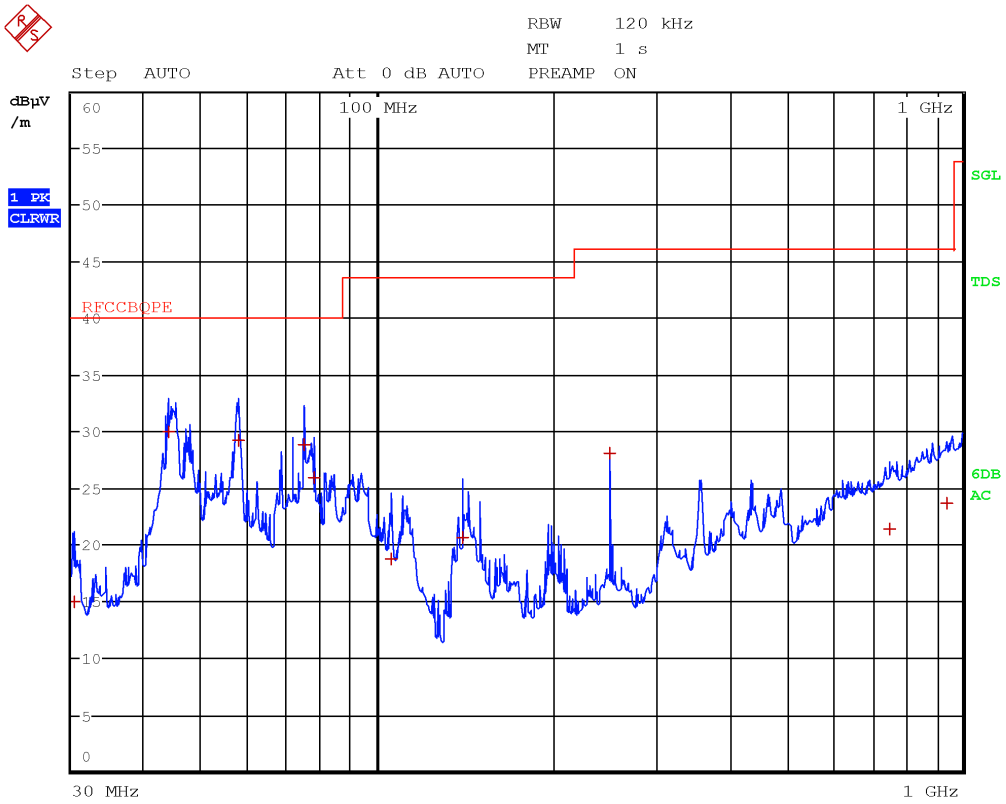


Figure 8.4-78: *Radiated spurious emissions 30 to 1000 MHz, high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.3200	15.0	40.0	-25.0	QP
43.8000	30.0	40.0	-10.0	QP
57.7600	29.3	40.0	-10.7	QP
74.7600	28.9	40.0	-11.1	QP
77.9200	26.0	40.0	-14.0	QP
105.8400	18.8	43.5	-24.7	QP
140.2400	20.6	43.5	-22.9	QP
250.0000	28.1	46.0	-17.9	QP
749.7200	21.4	46.0	-24.6	QP
939.6800	23.6	46.0	-22.4	QP

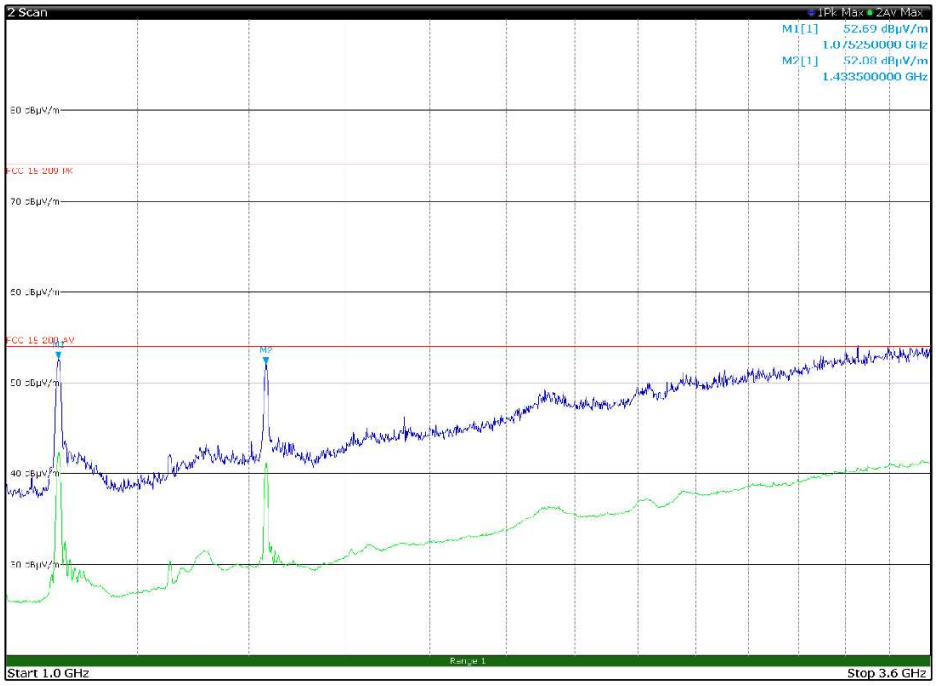


Figure 8.4-79: *Radiated spurious emissions 1 to 3.6 GHz, Low channel with antenna in horizontal polarization*

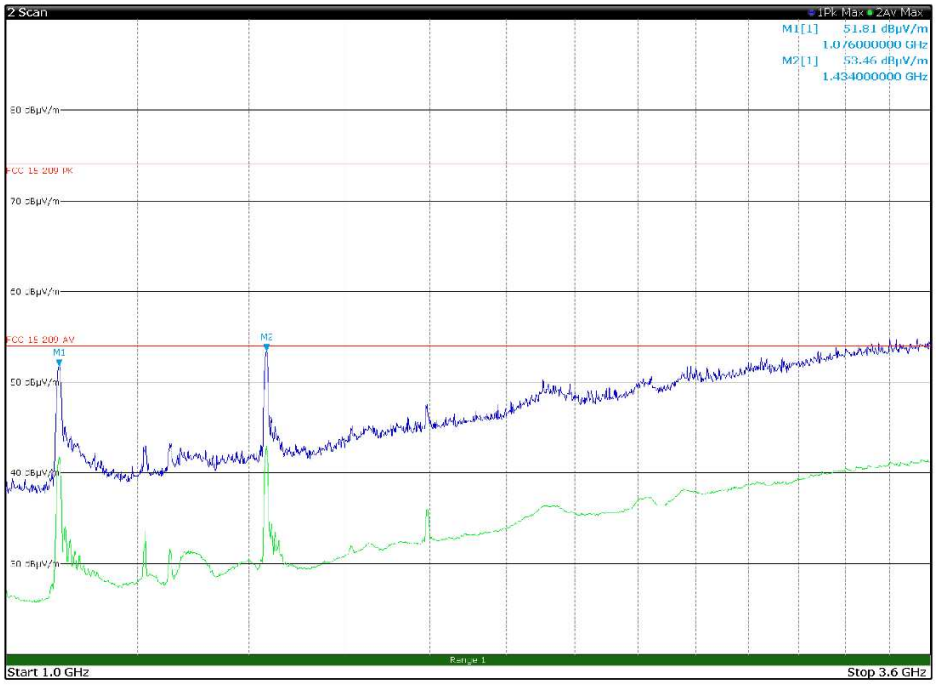


Figure 8.4-80: *Radiated spurious emissions 1 to 3.6 GHz, Low channel with antenna in vertical polarization*

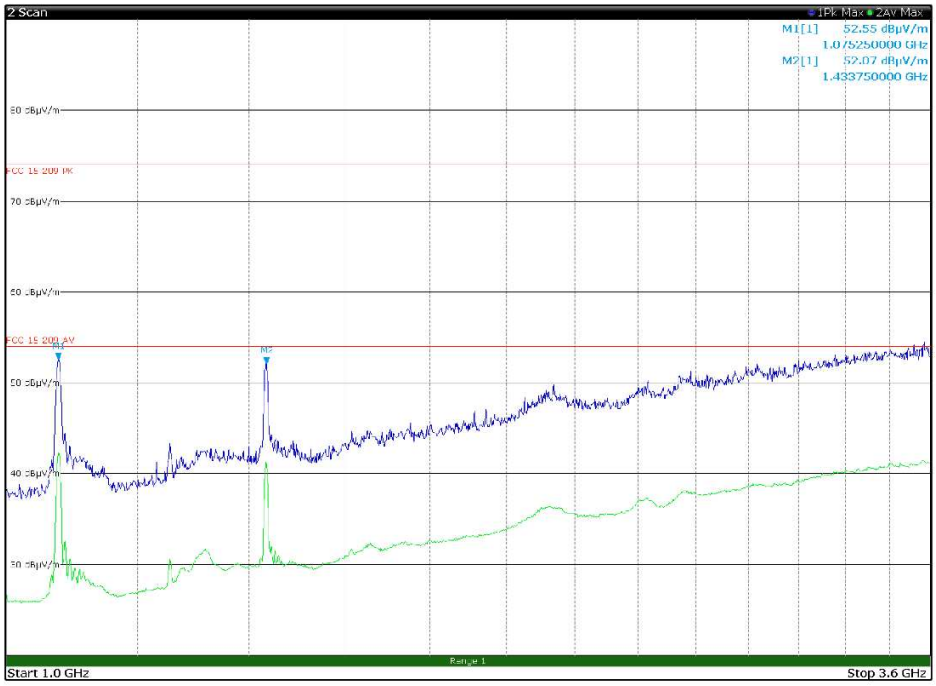


Figure 8.4-81: *Radiated spurious emissions 1 to 3.6GHz, mid channel with antenna in horizontal polarization*

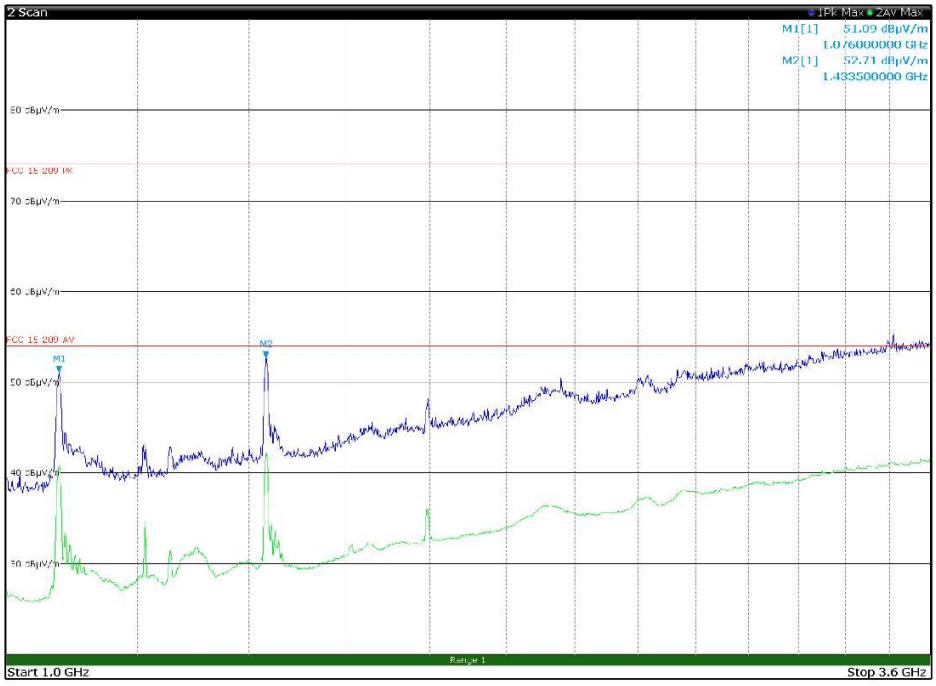


Figure 8.4-82: *Radiated spurious emissions 1 to 3.6GHz, mid channel with antenna in vertical polarization*