



RF - TEST REPORT

- FCC Part 15.247, RSS-247 -

Model Name : WRTZ-1550 RDR

Product Description : UHF RFID reader

Applicant : Checkpoint Systems Inc.

Address : 101 Wolf Dr. Thorofare

New Jersey 08086, United States

Manufacturer : Checkpoint Systems Inc.

Address : 101 Wolf Dr. Thorofare

New Jersey 08086, United States

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : **80294489-00 Rev_1**

30. July 2026

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-00



Deutsche
Akkreditierungsstelle
D-PL-12030-01-00

Contents

1	TEST STANDARDS	3
2	EQUIPMENT UNDER TEST	4
2.1	Information provided by the Client	4
2.2	Sampling	4
2.3	General remarks	4
2.4	Photo documentation of the EUT – Detailed photos see ATTACHMENT A	4
2.5	Equipment type	4
2.6	Short description of the equipment under test (EUT)	4
2.7	Variants of the EUT	4
2.8	Operation frequency and channel plan	5
2.9	Antenna	5
2.10	Power supply system utilised	6
2.11	Peripheral devices and interface cables	6
2.12	Determination of worst-case conditions for final measurement	6
3	TEST RESULT SUMMARY	7
3.1	Revision history of test report	8
3.2	Final assessment	8
4	TEST ENVIRONMENT	9
4.1	Address of the test laboratory	9
4.2	Environmental conditions	9
4.3	Statement of the measurement uncertainty	9
4.4	Conformity Decision Rule	9
4.5	Measurement protocol for FCC and ISCED	10
5	TEST CONDITIONS AND RESULTS	13
5.1	AC power line conducted emissions	13
5.2	EBW and OBW	17
5.3	Maximum peak output power	21
5.4	Spurious emissions conducted	25
5.5	Spurious emissions radiated	35
5.6	Dwell time	63
5.7	Number of hopping channels	65
6	USED TEST EQUIPMENT AND ACCESSORIES	68
7	Detailed measurement uncertainty	70

ATTACHMENTs A, B as separate supplements

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 (June 2026)

Part 15, Subpart A	General
Part 15, Subpart C, Section 15.247	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz
ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024	Testing Unlicensed Wireless Devices
KDB 558074 D01 v05r02	Guidance for compliance measurements on DTS; FHSS and hybrid system devices operating under Section 15.247 of the FCC rules, April 2, 2019.

ISED Canada Rules and Regulations

RSS-Gen, Issue 5 + Amendment 1 + 2	General Requirements for Compliance of Radio Apparatus
RSS-247, Issue 4	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024	Testing Unlicensed Wireless Devices
KDB 558074 D01 v05r02	Guidance for compliance measurements on DTS; FHSS and hybrid system devices operating under Section 15.247 of the FCC rules, April 2, 2019.

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

2.3 General remarks

None

2.4 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

2.5 Equipment type

UHF-RFID Reader, FHSS, fixed equipment.

2.6 Short description of the equipment under test (EUT)

UHF-RFID Reader WRTZ-1550 RDR is the electronics system of an Ultra High Frequency (UHF) radio frequency identification (RFID) system (typically called an interrogator or reader) which communicates with targets that are applied to or incorporated into an item. The targets (typically referred to as tags or labels) serve to identify the item to which it is attached based on a unique ID stored on the target.

Number of tested samples : 1
Serial number : 1003961203F0356508
Firmware number : 7.01_t0108.26-01-e48
HVIN : Rev. 5

FCC ID : DO4WRTZ1550
IC ID : 3356B-WRTZ1550

2.7 Variants of the EUT

There are no variants.

2.8 Operation frequency and channel plan

The operating frequency is 902 MHz to 928 MHz.

Channel plan:

Channel No.	Frequency (MHZ)	Channel No.	Frequency (MHZ)	Channel No.	Frequency (MHZ)
1	902.75	21	912.75	41	922.75
2	903.25	22	913.25	42	923.25
3	903.75	23	913.75	43	923.75
4	904.25	24	914.25	44	924.25
5	904.75	25	914.75	45	924.75
6	905.25	26	915.25	46	925.25
7	905.75	27	915.75	47	925.75
8	906.25	28	916.25	48	926.25
9	906.75	29	916.75	49	926.75
10	907.25	30	917.25	50	927.25
11	907.75	31	917.75		
12	908.25	32	918.25		
13	908.75	33	918.75		
14	909.25	34	919.25		
15	909.75	35	919.75		
16	910.25	36	920.25		
17	910.75	37	920.75		
18	911.25	38	921.25		
19	911.75	39	921.75		
20	912.25	40	922.25		

Note: the marked frequencies are determined for final testing.

2.9 Antenna

The following antennas shall be used with the EUT:

Number	Characteristic	Name	Connector	Frequency band (MHz)	Gain (dBic)	Gain (dBi)
1	HPBW	Kathrein 520 10073	TNC	902 - 928	8.2	5.2
2	HPBW	Laird S9028PCL/S9028PCR	TNC	902 - 928	9.0	6.0
3	HPBW	Checkpoint A1212	SMA	902 - 928	6.5	3.5
4	HPBW	Checkpoint A1230 FCC	SMA	902 - 928	8.0	5.0
5	HPBW	Checkpoint A1266 FCC	SMA	902 - 928	8.5	5.5
6	HPBW	Checkpoint A1268 FCC	SMA	902 - 928	7.0	4.0
7	HPBW	Checkpoint A1270 FCC	SMA	902 - 928	6.5	3.5
8	HPBW	Checkpoint A1278 FCC	SMA	902 - 928	5.5	2.5
9	HPBW	Checkpoint OH2 10042405	SMA	902 - 928	9.0	6.0
10	HPBW	Jiakang 10048079	SMA	902 - 928	7.0	4.0

Note: Laird antenna was used for radiated measurements.

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 12 V_{DC}

2.11 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- _____ Model : _____
 - _____ Model : _____

2.12 Determination of worst-case conditions for final measurement

Preliminary tests are performed in all three orthogonal axes of the EUT to locate at which position and at what setting of the EUT produces the maximum of the emissions.

For the final test the following channels and test modes are selected:

902 MHz – 928 MHz

For the final test the following channels and test modes are selected:

Available channel	Tested channels	Power setting	Modulation
1 to 50	1, 26, 50	30 dBm	ASK

2.12.1 Test jig

No test jig is used.

2.12.2 Test software

The test software for the EUT provides special test modes TX continuous mode, modulated and unmodulated. The EUT is set with test modulation to transmit data during the tests with a maximum duty cycle (x) from an internal packet generator.

3 TEST RESULT SUMMARY

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen, 8.8	AC power line conducted emissions	passed
15.247(a)(1)	RSS-247, 6.2.2.1	20 dB EBW	passed
-	RSS-Gen, 6.6	99 % Bandwidth	passed
15.247(a)(1)	RSS-247, 6.2.2.1	Channel separation	passed
15.247(a)(1)	RSS-247, 6.2.2.1	Dwell time	passed
15.247(b)(1)	RSS-247, 6.2.2.2	Peak power	passed
15.247(d)	RSS-247, 6.6	Spurious emissions	passed
15.247(d)	RSS-247, 6.6	Out-of-band emission, radiated	passed
15.247(d)	RSS-Gen, 8.10	Emissions in restricted bands	passed
15.247(e)	RSS-247, 6.2.2.1	Hopping sequence	Not tested ^{*1}
15.247(a)	RSS-247, 6.2.1	Receiver input bandwidth	Not tested ^{*2}
15.247(a)	RSS-247, 6.2.1	Number of hopping channels	passed
15.247(a)	RSS-247, 6.2.1	Equal hopping frequency use	Not tested ^{*3}

- *1 The channel is represented by a pseudo-random hopping sequence hopping through the 50 RF-channels. For detailed information about the hopping sequence, please refer to user manual.
- *2 The receiver bandwidth is equal to the transmitter bandwidth in the 50 hopping channel mode (declared by the manufacturer). For detailed information about the hopping sequence, please refer to user manual.
- *3 The device fulfills the requirement according to FCC Part 15C, Section 15.247(a). The manufacturer declares in the system manual that this function is controlled via software. For detailed information about the hopping sequence, please refer to user manual.

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80294489-00	0	16 June 2026	Initial test report
80294489-00	1	30 July 2026	Antenna data corrected, emissions measurement corrected

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

The equipment under test fulfils the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 20 March 2026

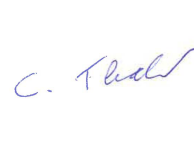
Testing concluded on : 13 May 2026

Checked by:

 Klaus
Gegenfurtner
2026.07.30
11:00:37 +02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

 Christopher
Thaller
2026.07.30
10:34:32 +02'00'

Christopher Thaller
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Straubinger Strasse 100
94447 PLATTLING
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15 - 35 °C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2: 2011 + A1: 2014 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

4.5 Measurement protocol for FCC and ISED

4.5.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011
ISED: DE0009

4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

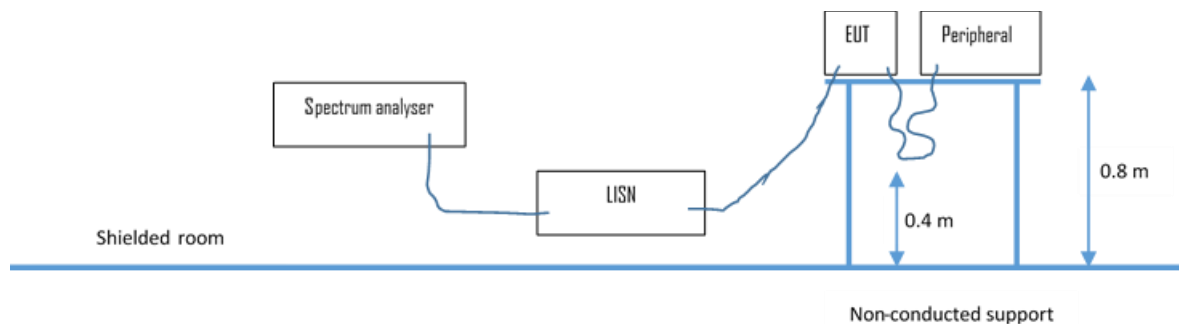
4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

4.5.3 Details of test procedures

4.5.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in dB μ V, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

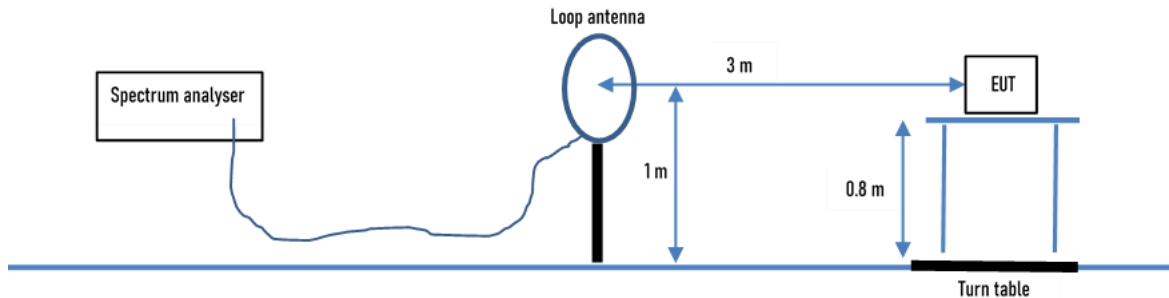
$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω / 50 μ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Tabletop equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.5.3.2 Radiated emission

4.5.3.2.1 Anechoic chamber test site (9 kHz - 30 MHz):

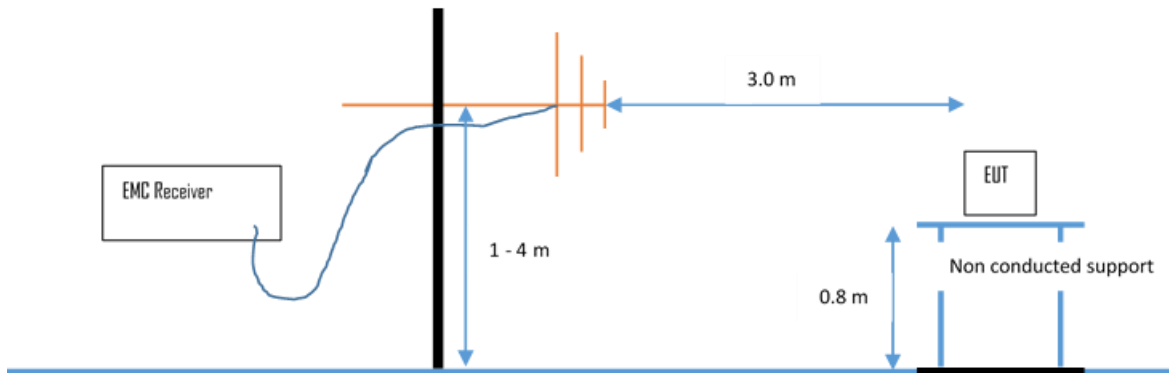
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

4.5.3.2.2 Anechoic chamber (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Tabletop equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dB μ V/m is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

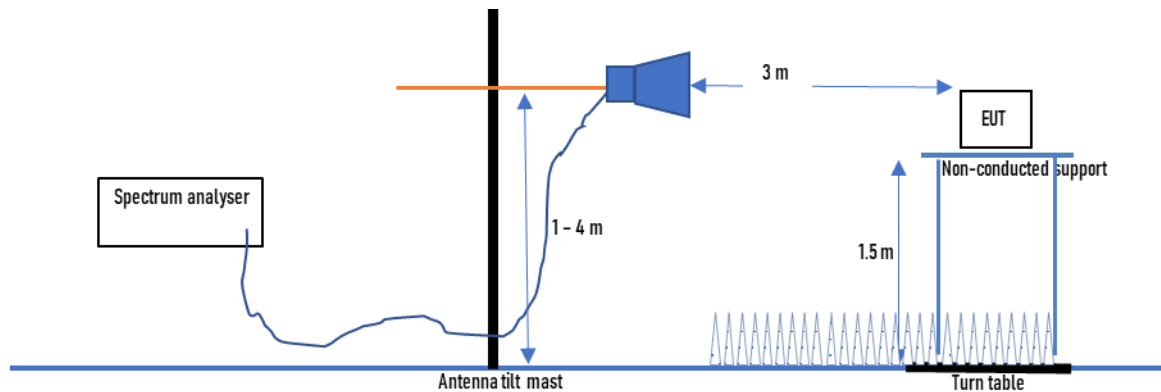
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	-	Limit (dB μ V/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

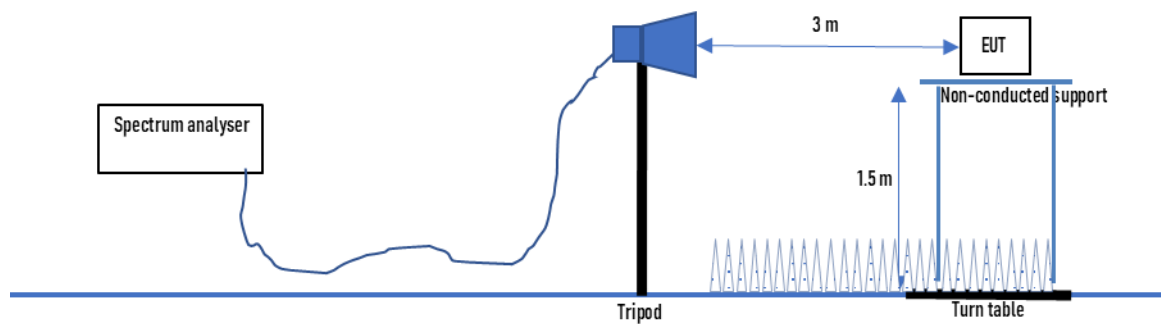
4.5.3.2.3 Anechoic chamber (1000 MHz – 18000 MHz)

Test setup according to ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Tabletop equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

4.5.3.2.4 Anechoic chamber (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Tabletop equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit is adopted.

5 TEST CONDITIONS AND RESULTS

5.1 AC power line conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: Shielded Room SR2

5.1.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

According to RSS-Gen 8.8:

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μ H / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10 described under item 6.2. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin -16.3 dB at 157.8 kHz

Limit according to FCC Part 15, Section 15.207(a):

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Limit according to RSS-Gen 8.8:

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* The level decreases linearly with the logarithm of the frequency.

The requirements are **FULFILLED**.

Remarks: AC/DC Power supply: VEC65US12

For detailed test result please refer to following test protocols.

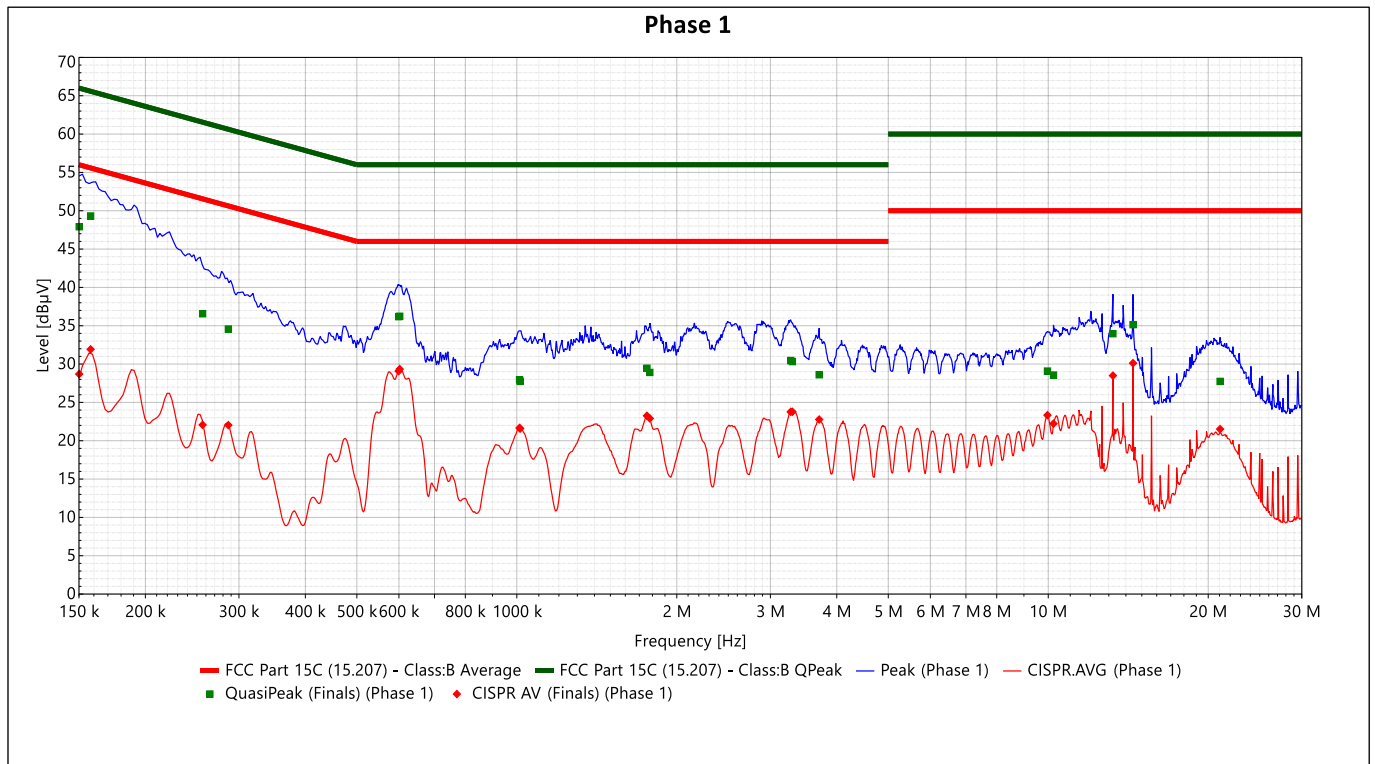
5.1.6 Test protocol

Position	Phase 1		
Limit	FCC/FCC Part 15C (15.207)		

Finals

Frequency (Hz)	QuasiPeak (dBμV)	QP Margin	QP Limit (dBμV)	CISPR AV (dBμV)	CISPR AV Margin	AV Limit (dBμV)	RBW (Hz)	Correction (dB)
150.141 k	47.92	-18.08	65.99	28.7	-27.3	55.99	9000	10.37
157.763 k	49.31	-16.27	65.58	31.92	-23.66	55.58	9000	10.36
256.292 k	36.57	-24.98	61.55	22.07	-29.48	51.55	9000	10.36
286.541 k	34.57	-26.06	60.62	22.03	-28.59	50.62	9000	10.36
599.277 k	36.19	-19.81	56	29.08	-16.92	46	9000	10.42
602.163 k	36.23	-19.77	56	29.34	-16.66	46	9000	10.42
1.012 M	27.95	-28.05	56	21.67	-24.33	46	9000	10.47
1.014 M	27.74	-28.26	56	21.58	-24.42	46	9000	10.47
1.757 M	29.45	-26.55	56	23.25	-22.75	46	9000	10.57
1.779 M	28.91	-27.09	56	22.91	-23.09	46	9000	10.57
3.276 M	30.46	-25.54	56	23.77	-22.23	46	9000	10.65
3.301 M	30.32	-25.68	56	23.78	-22.22	46	9000	10.65
3.707 M	28.61	-27.39	56	22.77	-23.23	46	9000	10.65
9.966 M	29.08	-30.92	60	23.33	-26.67	50	9000	10.6
10.231 M	28.57	-31.43	60	22.23	-27.77	50	9000	10.61
13.236 M	33.96	-26.04	60	28.49	-21.51	50	9000	10.72
14.44 M	35.15	-24.85	60	30.12	-19.88	50	9000	10.77
21.056 M	27.74	-32.26	60	21.52	-28.48	50	9000	11.17

Graph

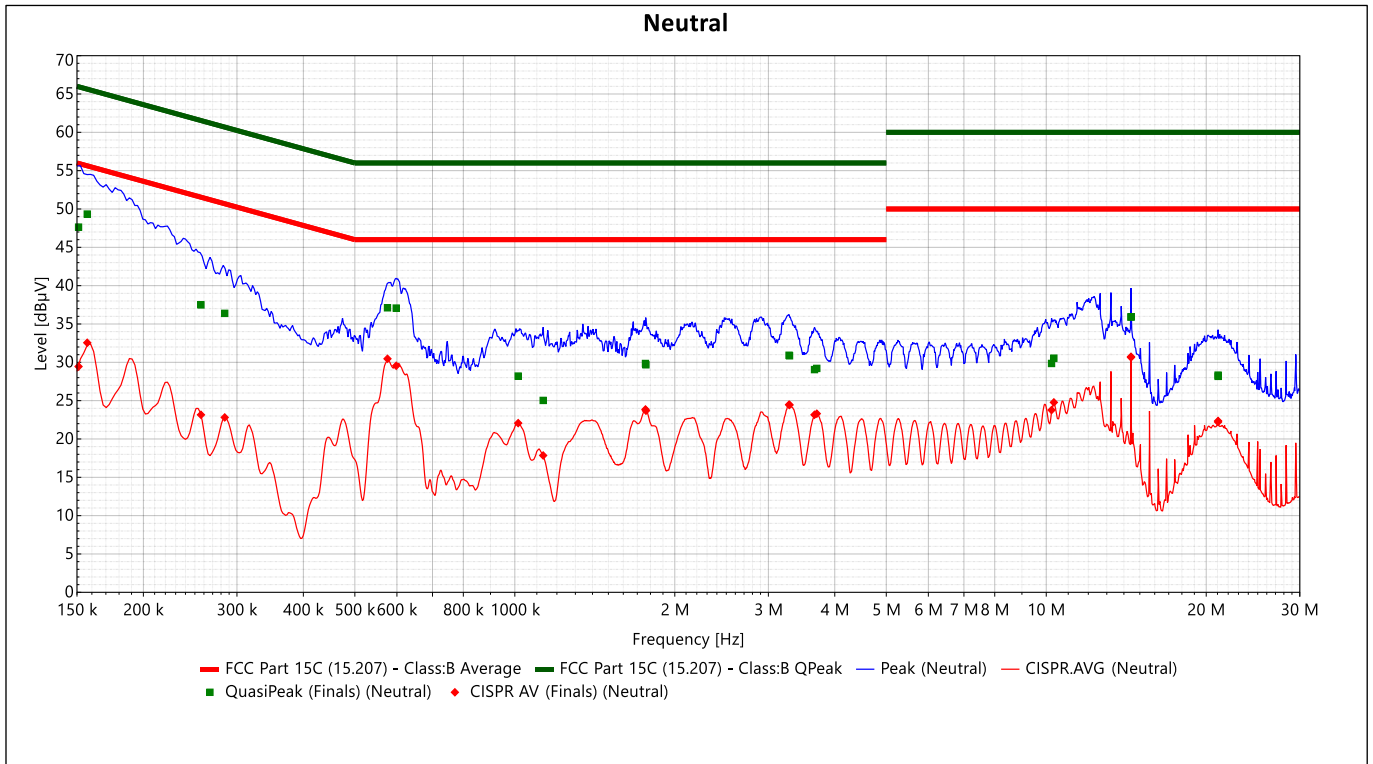


Position	Neutral		
Limit	FCC/FCC Part 15C (15.207)		

Finals

Frequency (Hz)	QuasiPeak (dBµV)	QP Margin	QP Limit (dBµV)	CISPR AV (dBµV)	CISPR AV Margin	AV Limit (dBµV)	RBW (Hz)	Correction (dB)
151.031 k	47.63	-18.31	65.94	29.45	-26.49	55.94	9000	10.37
156.815 k	49.34	-16.29	65.63	32.55	-23.08	55.63	9000	10.37
256.69 k	37.49	-24.05	61.54	23.16	-28.38	51.54	9000	10.37
284.53 k	36.39	-24.3	60.68	22.81	-27.87	50.68	9000	10.37
575.974 k	37.11	-18.89	56	30.46	-15.54	46	9000	10.41
598.155 k	37.07	-18.93	56	29.55	-16.45	46	9000	10.42
1.015 M	28.2	-27.8	56	22.07	-23.93	46	9000	10.47
1.131 M	25.03	-30.97	56	17.85	-28.15	46	9000	10.5
1.761 M	29.85	-26.15	56	23.86	-22.14	46	9000	10.58
1.765 M	29.68	-26.32	56	23.69	-22.31	46	9000	10.58
3.281 M	30.92	-25.08	56	24.48	-21.52	46	9000	10.67
3.288 M	30.85	-25.15	56	24.44	-21.56	46	9000	10.67
3.664 M	29.05	-26.95	56	23.16	-22.84	46	9000	10.67
3.701 M	29.21	-26.79	56	23.3	-22.7	46	9000	10.67
10.232 M	29.85	-30.15	60	23.77	-26.23	50	9000	10.72
10.337 M	30.54	-29.46	60	24.78	-25.22	50	9000	10.73
14.439 M	35.91	-24.09	60	30.73	-19.27	50	9000	10.99
14.439 M	35.92	-24.08	60	30.64	-19.36	50	9000	10.99
21.054 M	28.17	-31.83	60	22.22	-27.78	50	9000	11.45
21.056 M	28.33	-31.67	60	22.35	-27.65	50	9000	11.45

Graph



5.2 EBW and OBW

For test instruments and accessories used see section 6 Part **MB**.

5.2.1 Description of the test location

Test location: Shielded room SR6

5.2.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.2.3 Applicable standard

According to FCC Part 15, Section 15.247(a):

Frequency hopping systems shall have hopping carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

According to RSS-247 6.2.2.1:

- (a) The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.
- (b) If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 s within a 20 s period

According to RSS-Gen 6.7:

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

5.2.4 Description of Measurement

The emission bandwidth is measured according to ANSI C63.10, item 6.9.2, at an amplitude level reduced from the reference level of a modulated channel by a ratio of -20 dB. The reference level is the level of the highest signal amplitude observed at the transmitter at either the fundamental frequency or the first order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. An alternative is to use the bandwidth measurement of the analyser.

The 99% bandwidth is measured according to ANSI C63.10, item 6.9.3, with the 99% power bandwidth function of the analyser.

Spectrum analyser settings for EBW:

RBW: 3 kHz, VBW: 10 kHz, Detector: Max peak, Span: 300 kHz;

Spectrum analyser settings for OBW:

RBW: 3 kHz, VBW: 10 kHz, Detector: Max peak, Span: 300 kHz;

5.2.5 Test result

20dB bandwidth

Modulation / Data rate	Channel	Frequency	20dB BW
		(MHz)	(kHz)
RFID/UHF	CH1	902.75	105.1
	CH26	915.25	104.1
	CH50	927.25	105.1

99% bandwidth

Modulation / Data rate	Channel	Frequency	OBW99
		(MHz)	(kHz)
RFID/UHF	CH1	902.75	104.9
	CH26	915.25	105.2
	CH50	927.25	105.1

There is no bandwidth limit for hopping devices according to FCC Part15C, Section 15.247(a).

According to RSS-247 6.2.2.1 (a):

The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.

Remarks:

For detailed test result please see the following test protocols

5.2.6 Test protocols EBW

CH1



CH26



CH50



5.2.7 Test protocols OBW

CH1



CH26



CH50



5.3 Maximum peak output power

For test instruments and accessories used see section 6 Part **CPC3**.

5.3.1 Description of the test location

Test location: Shielded room SR6

5.3.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.3.3 Applicable standard

According to FCC Part 15, Section 15.247(b)(2):

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

According to FCC Part 15, Section 15.247(b)(4):

The conducted output power limits specified in paragraph (b) of 15.247 is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2) and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-247 6.2.2.2:

The following transmitter output power and e.i.r.p. requirements shall apply:

- a. if the hopset uses 50 or more hopping channels, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W.

5.3.4 Description of Measurement

The maximum peak conducted output power is measured using a spectrum analyser following the procedure set out in ANSI C63.10, item 11.9.1.1. The EUT is set in TX continuous mode while measuring.

5.3.5 Test result

Peak Power conducted:

Conducted Measurement - cond. power					
FCC §15.247 (b)(2) RSS-247 6.2.2.2					
Modulation / Data rate	Channel	Frequency	Measured Conducted TX Power	Conducted Tx-Power Limit	Margin
		(MHz)	(dBm)	(dBm)	(dB)
RFID/UHF	CH1	902.75	29.3	30.0	-0.8
	CH26	915.25	29.2	30.0	-0.8
	CH50	927.25	29.4	30.0	-0.6

EIRP results (calculated):

Conducted Measurement - EIRP							
RSS-247 6.2.2.2							
Modulation / Data rate	Channel	Frequency	Measured Conducted TX Power	Antenna gain	Calculated EIRP	EIRP Limit	Margin
		(MHz)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)
RFID/UHF	CH1	902.75	29.3	6.0	35.3	36	-0.7
	CH26	915.25	29.2	6.0	35.2	36	-0.8
	CH50	927.25	29.4	6.0	35.4	36	-0.6

Average Power (calculated):

Duty Cycle: 6 ms on time in 100 ms

Modulation / Data rate	Channel	Frequency	Peak TX Power	Duty Cycle Correction	AV TX Power
		(MHz)	(dBm)	(dB)	(dBm)
RFID/UHF	CH1	902.75	35.3	-24.4	10.9
	CH26	915.25	35.2	-24.4	10.8
	CH50	927.25	35.4	-24.4	11.0

Peak Power Limit according to FCC Part 15, Section 15.247(b)(3):

Frequency (MHz)	Peak Power Limit	
	(dBm)	(W)
902-928	30	1.0
2400-2483.5	30	1.0
5725-5850	30	1.0

Peak output power limit according to RSS-247 6.3.2:

Frequency (MHz)	Peak Power Limit	
	(dBm)	(W)
902-928	30	1.0
2400-2483.5	30	1.0

Frequency (MHz)	EIRP Limit	
	(dBm)	(W)
902-928	36	4.0
2400-2483.5	36	4.0

The requirements are **FULFILLED**.

Remarks: For conducted measurement an SMA cable with cable loss of 0.4 dB was used.
For detailed test result please see the following test protocols

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

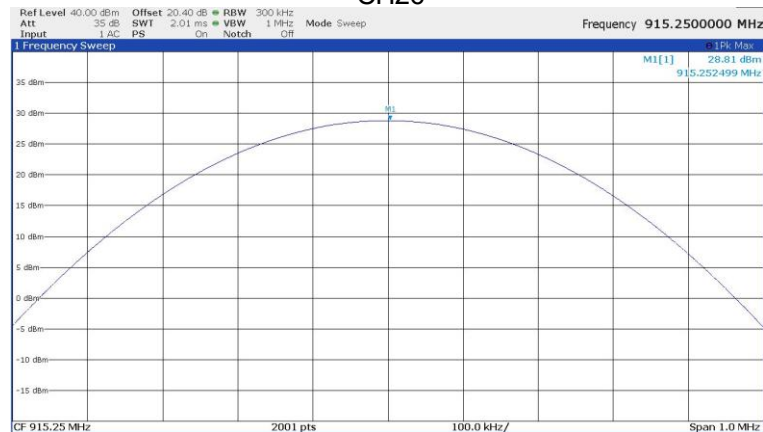
5.3.6 Test protocols

Conducted measurements:

CH1



CH26



CH50



5.4 Spurious emissions conducted

For test instruments and accessories used see section 6 Part **SEC 1-3**.

5.4.1 Description of the test location

Test location: Shielded Room SR6

5.4.2 Photo documentation of the test set-up – see Attachment B

5.4.3 Applicable standard

According to FCC Part 15C, Section 15.247(d):

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

5.4.4 Description of Measurement

A spectrum analyser is connected to the output of the transmitter via a suitable attenuator while EUT is operating in transmit mode using the assigned frequency according to ANSI C63.10, 7.8.8.

Spectrum analyser settings:

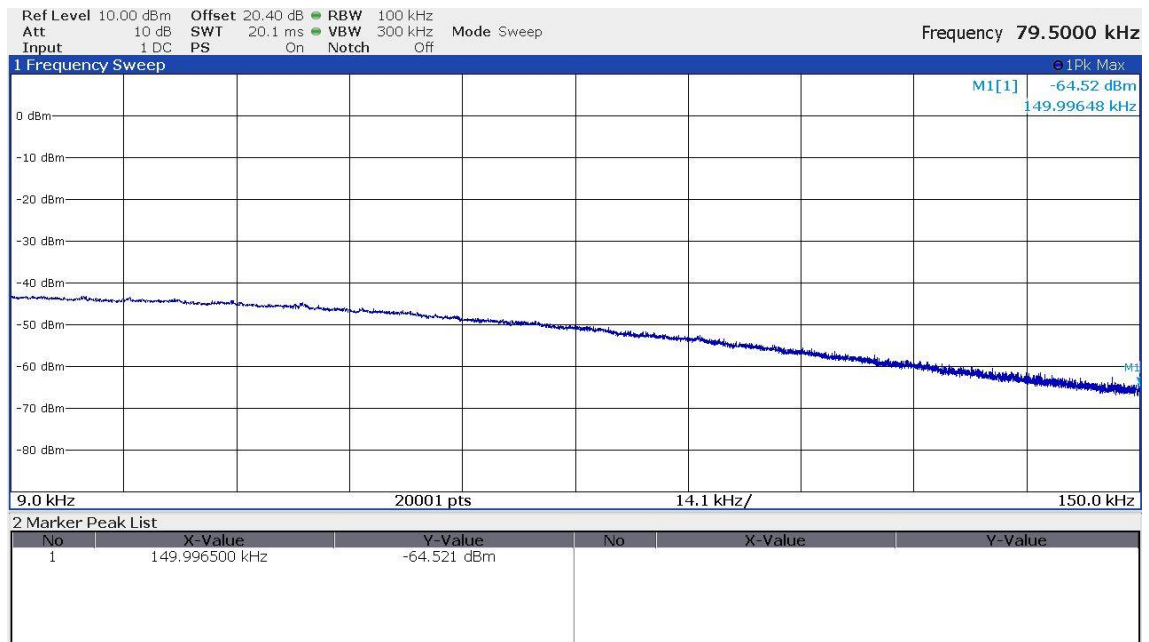
RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Trace: Max hold, Sweep: auto

5.4.5 Test result

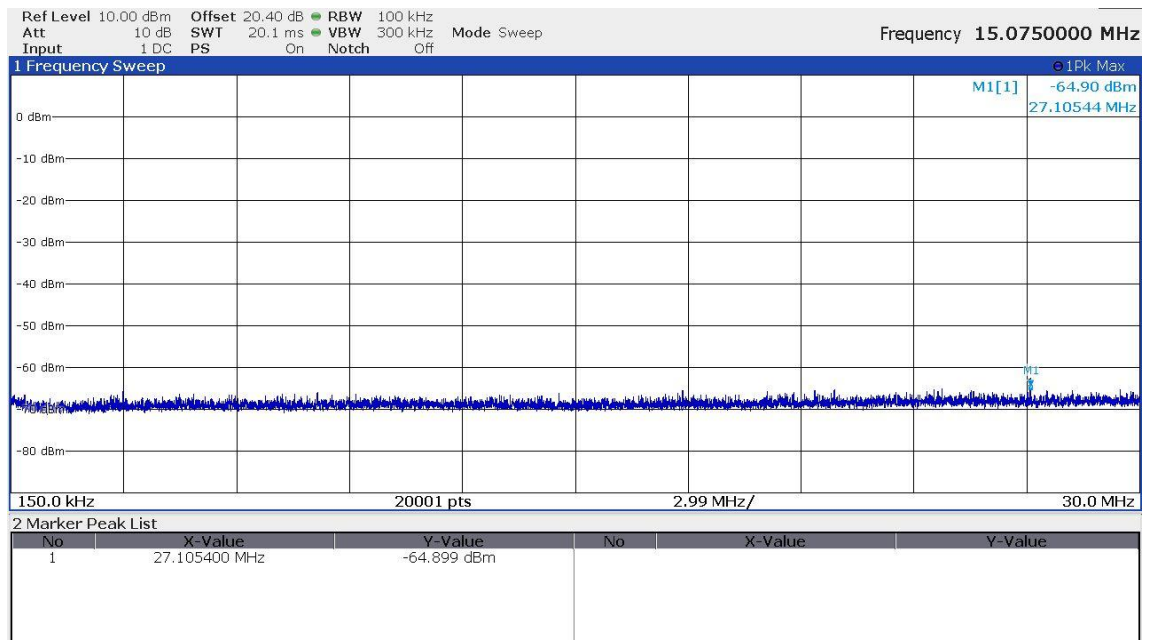
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

5.4.6 Test protocol

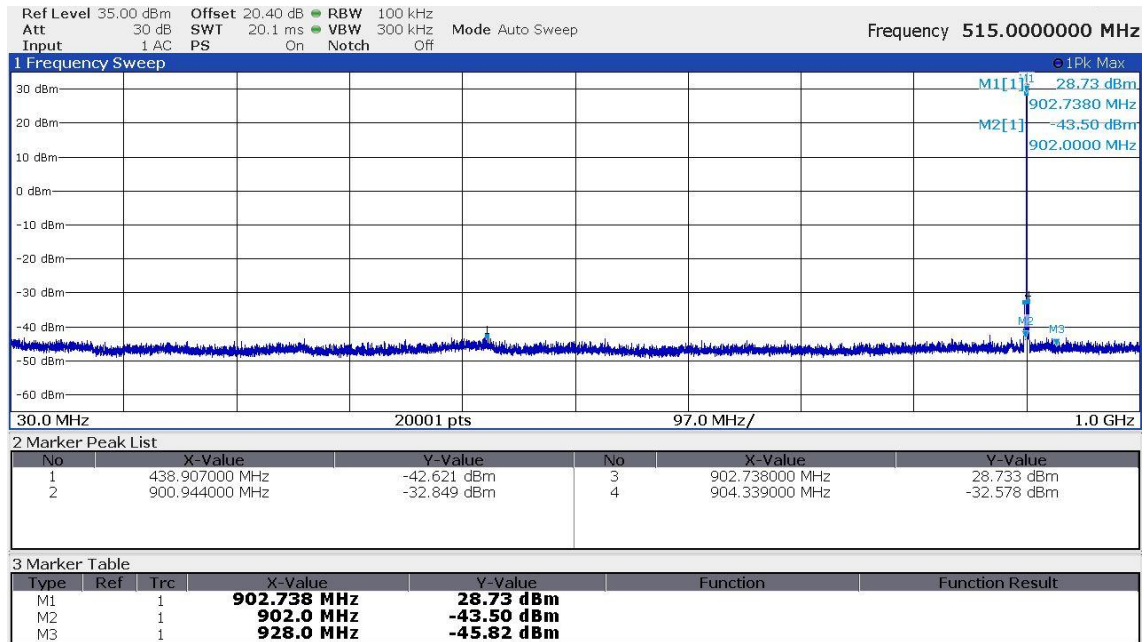
CH1, 9 kHz – 150 kHz



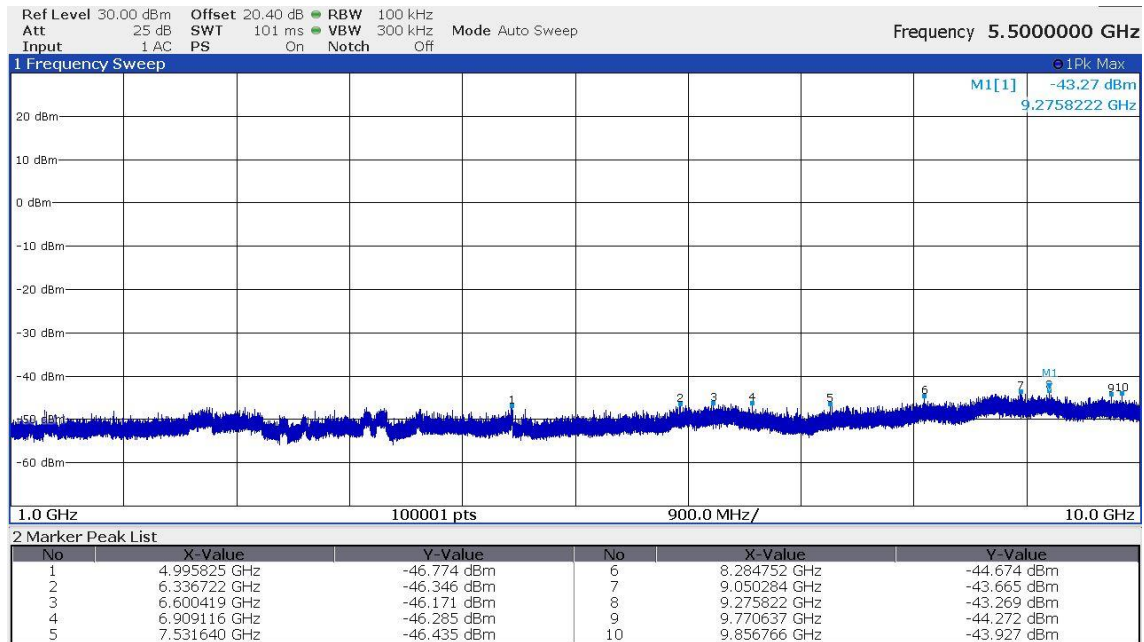
CH1, 150 kHz – 30 MHz



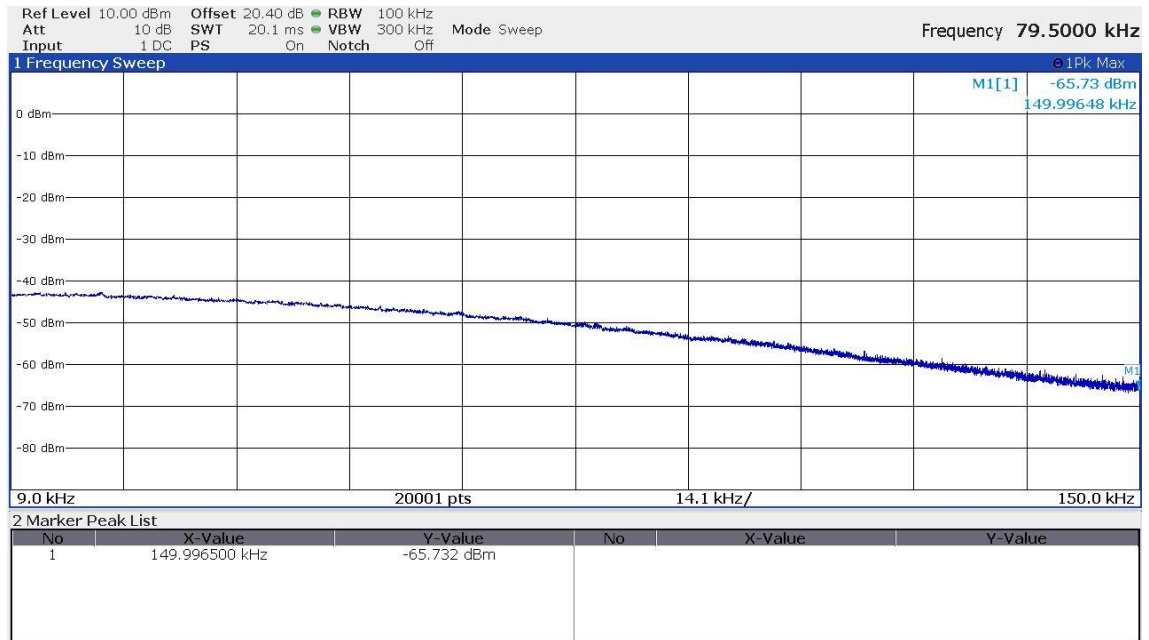
CH1, 30 MHz – 1000 MHz



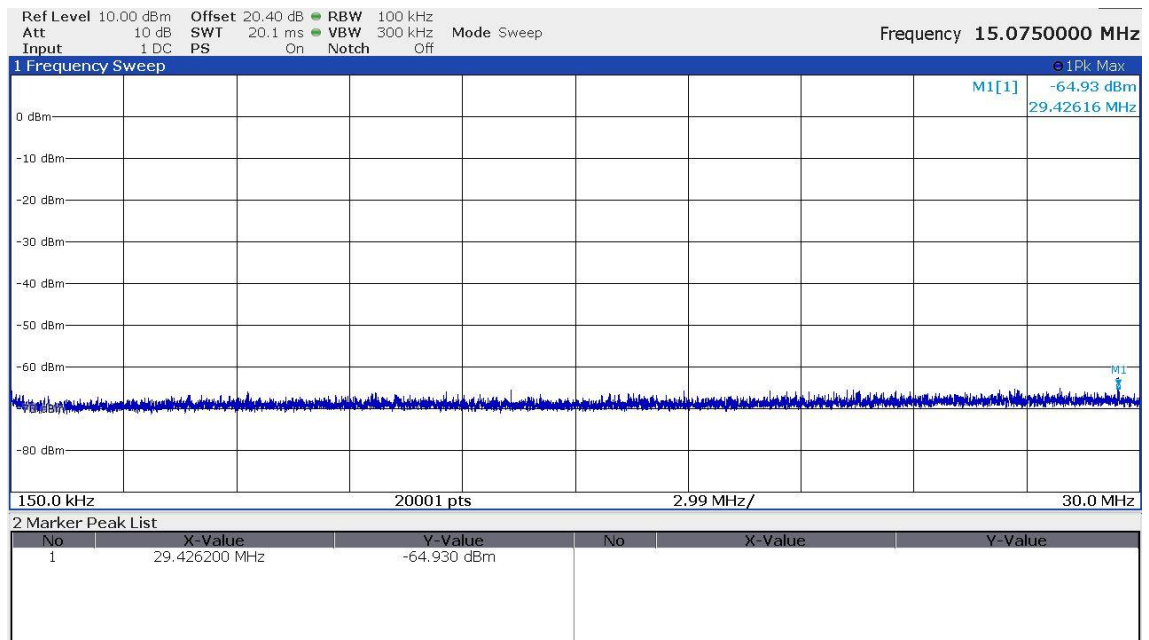
CH1, 1 GHz – 10 GHz



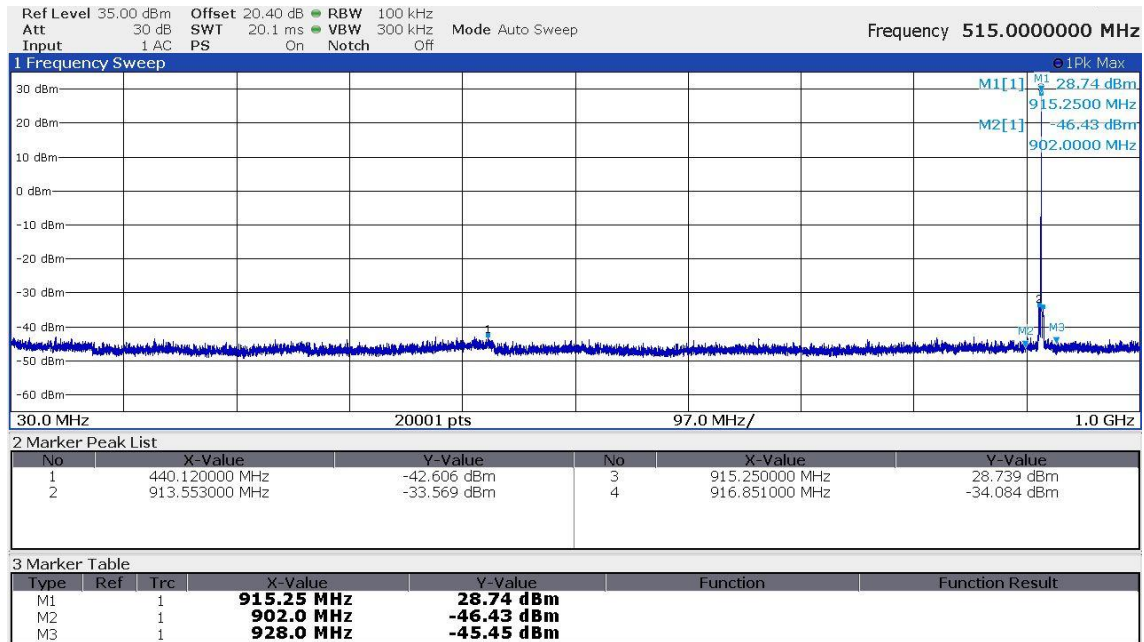
CH26, 9 kHz – 150 kHz



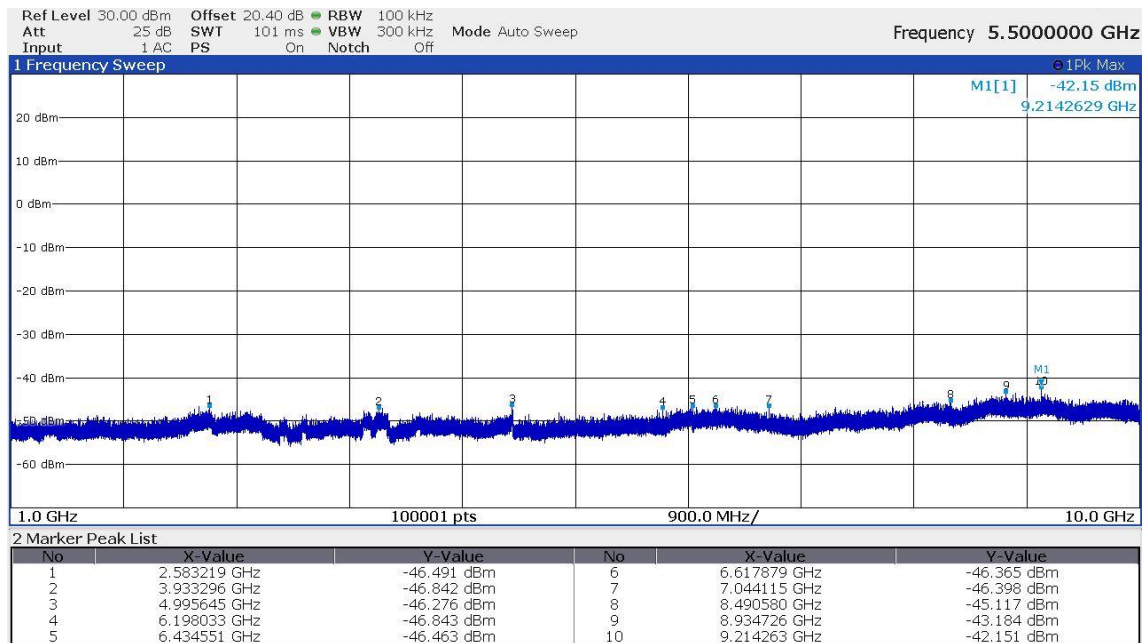
CH26, 150 kHz – 30 MHz



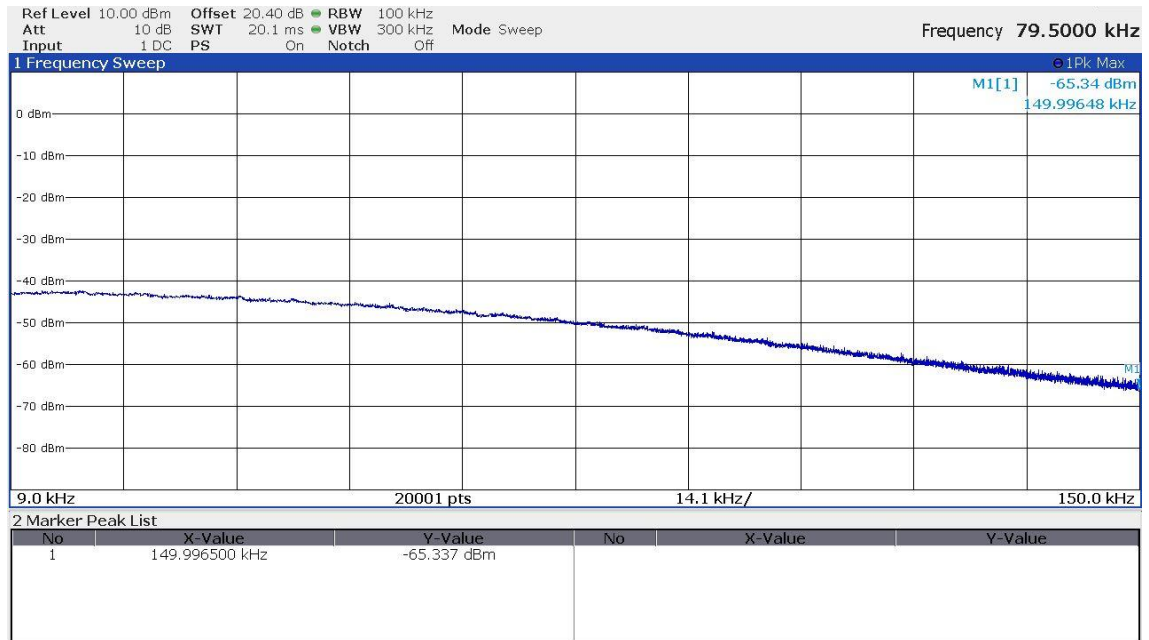
CH26, 30 MHz – 1000 MHz



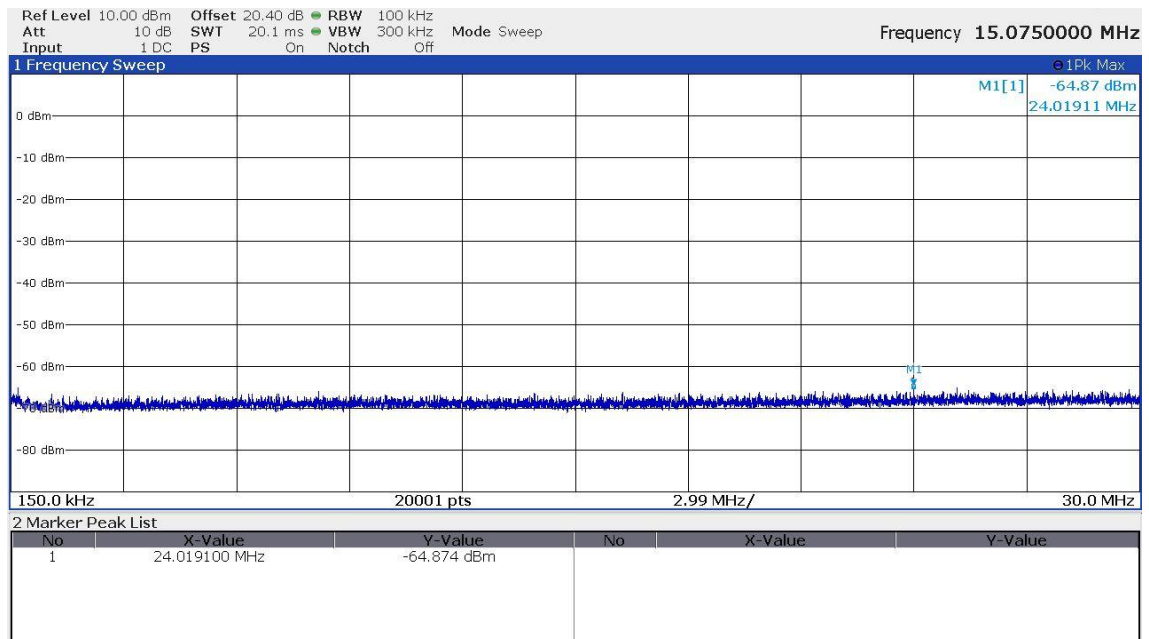
CH26, 1 GHz – 10 GHz



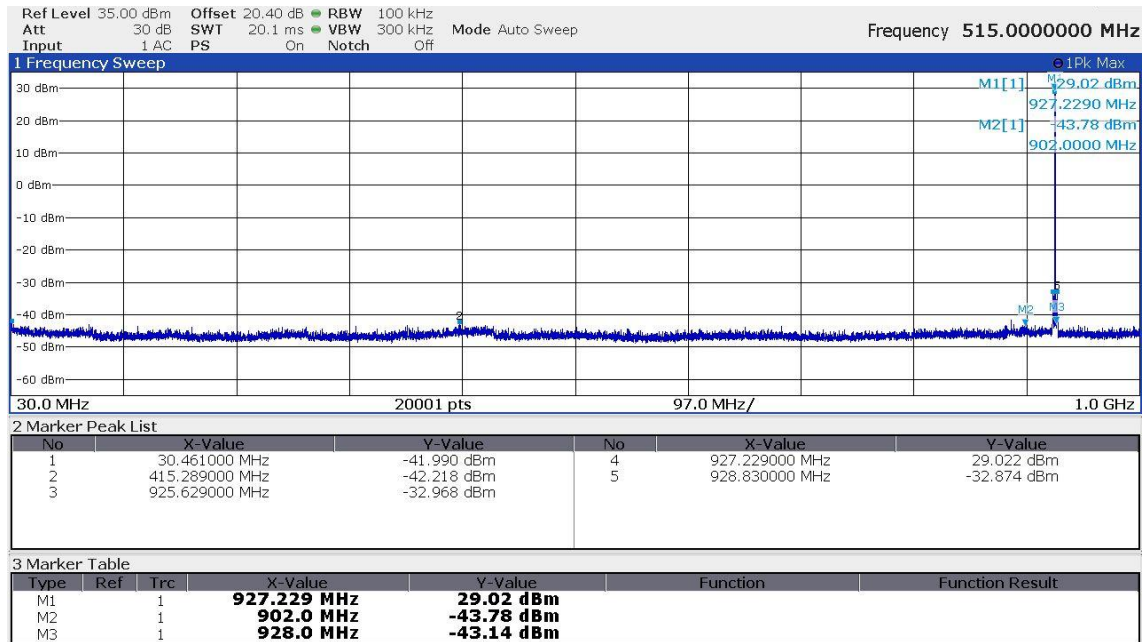
CH50, 9 kHz – 150 kHz



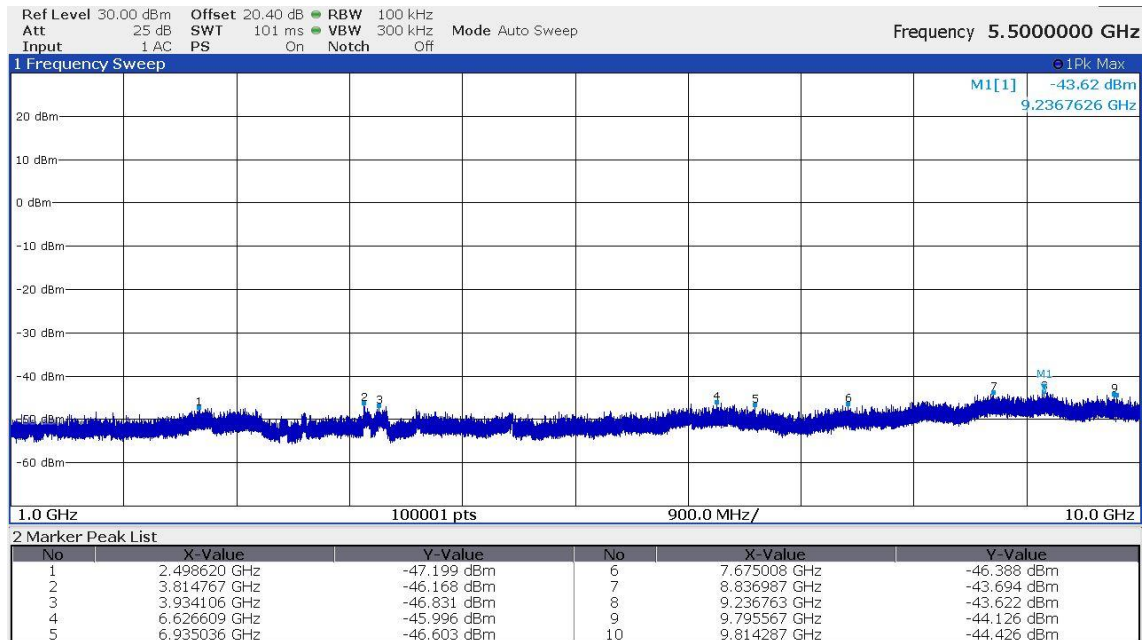
CH50, 150 kHz – 30 MHz



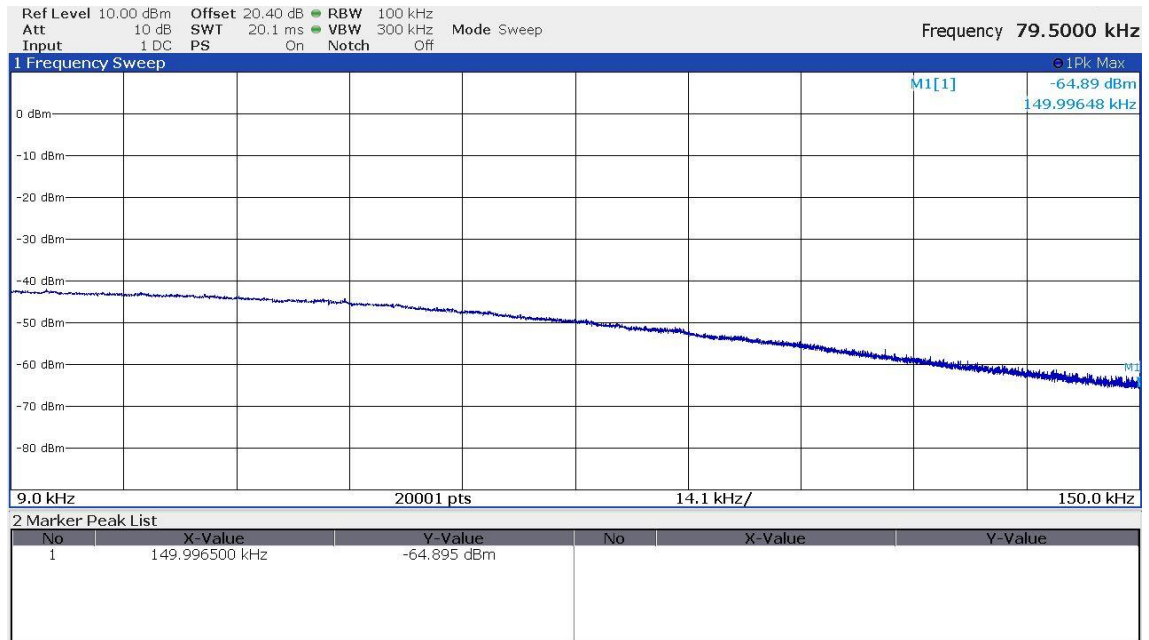
CH50, 30 MHz – 1000 MHz



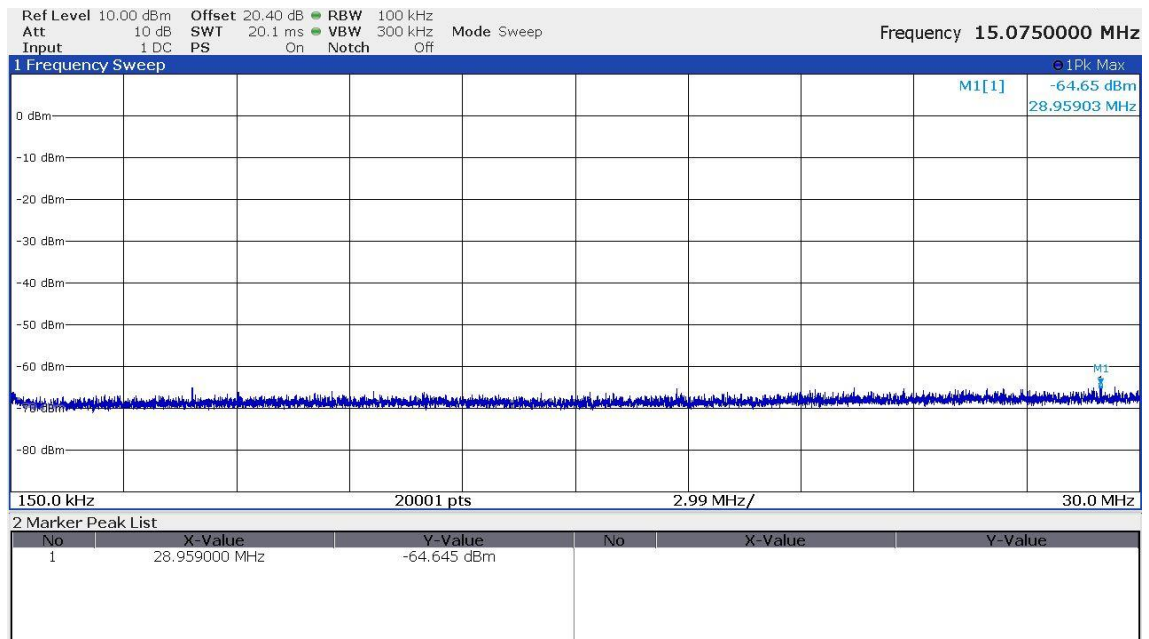
CH50, 1 GHz – 10 GHz



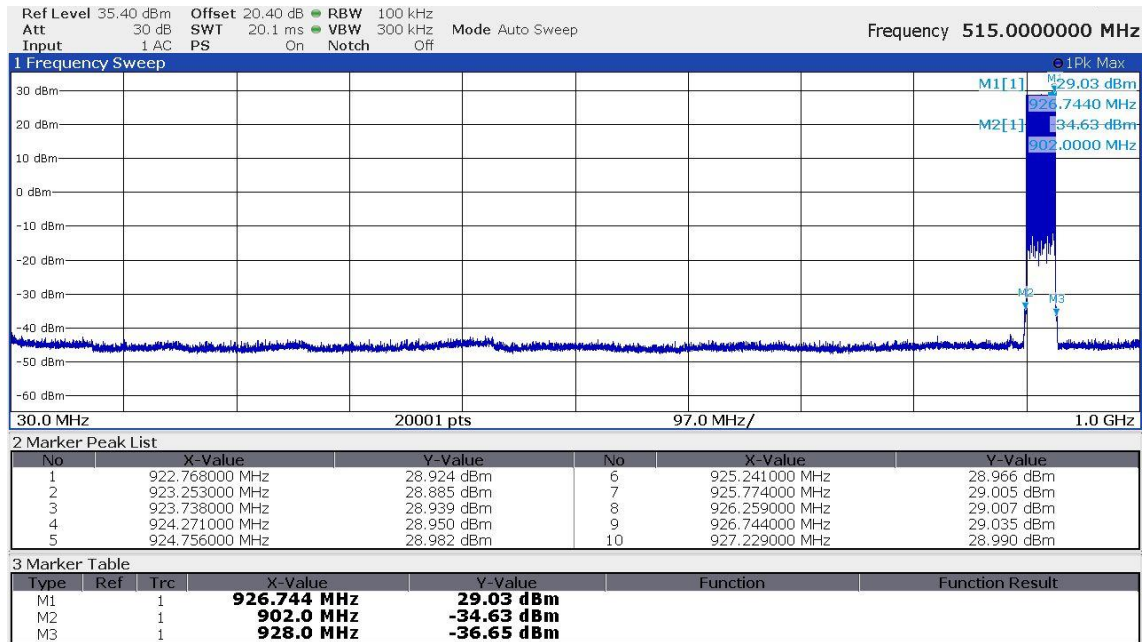
hopping, 9 kHz – 150 kHz



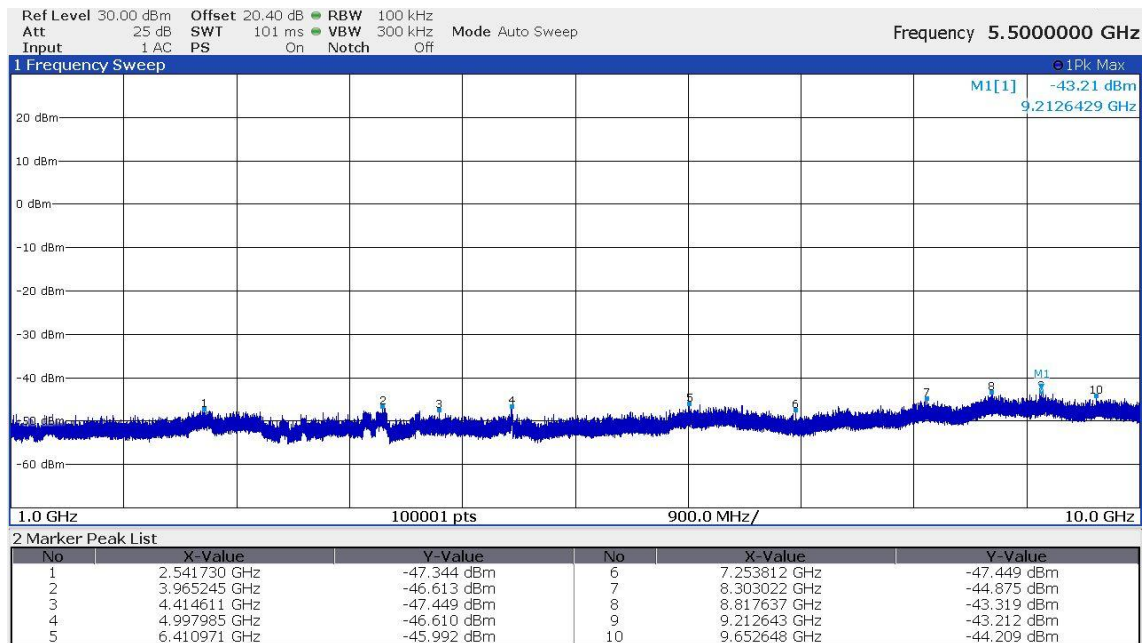
hopping, 150 kHz – 30 MHz



hopping, 30 MHz – 1000 MHz



hopping, 1 GHz – 10 GHz



Limit according to FCC Part 15, Section 15.247(d) for emissions falling not in restricted bands:

Frequency (MHz)	Spurious emission limit
Below 1000	20 dB below the highest level of the desired power
Above 1000	20 dB below the highest level of the desired power

Attenuation below the general limits specified in Section 15.209(a) is not required.

Limit according to RSS-247, 6.6 for emissions falling not in restricted bands:

Frequency (MHz)	Spurious emission limit
Below 1000	20 dB below the highest level of the desired power
Above 1000	20 dB below the highest level of the desired power

Attenuation below the general limits specified in RSS-Gen is not required.

The requirements are **FULFILLED**.

Remarks: None.

5.5 Spurious emissions radiated

For test instruments and accessories used see section 6 Part **SER1, SER 2, SER 3.**

5.5.1 Description of the test location

Test location: Anechoic chamber SAC2

Test location: Anechoic chamber FAR

Test distance: 3 m

5.5.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.5.3 Applicable standard

According to FCC Part 15, Section 15.205(a):

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

5.5.4 Description of Measurement

The restricted bands are measured radiated. The span of the spectrum analyser was set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.

Test receiver settings for SER1, SER2:

9kHz-150kHz	RBW: 200 Hz	Detector: Quasi peak*	Meas. Time: 1 s,
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150kHz-30MHz	RBW: 9 kHz	Detector: Quasi peak*	Meas. Time: 1 s,
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30MHz-1GHz	RBW: 120 MHz	Detector: Quasi peak	Meas. Time: 1 s,
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*AV Detector in the ranges 9-90kHz and 110-490kHz

Spectrum analyser settings for SER3:

1GHz-10GHz	RBW: 1 MHz	Detector: Max. peak	Trace: Max. hold	Sweep: Auto
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5.5.5 Test result

$f < 30 \text{ MHz}$

FCC:

Frequency (kHz)	Level @3m (dB μ V)	Ant. factor (dB 1/m)	Field strength @3m dB(μ V/m)	Extrapolation factor @300m (dB)	Field strength level @300m dB(μ V/m)	Limit dB(μ V/m)	Delta (dB)
36,29	36,2	20,0	56,2	-80,0	-23,8	36,4	-60,2
68,79	31,7	20,0	51,7	-80,0	-28,3	30,9	-59,2
71,98	31,9	20,0	51,9	-80,0	-28,1	30,5	-58,6
108,06	25,4	20,0	45,4	-80,0	-34,6	26,9	-61,6
144,04	17,9	20,0	37,9	-80,0	-42,1	24,4	-66,6
171,60	28,6	20,0	48,6	-80,0	-31,4	22,9	-54,3

RSS:

Frequency (kHz)	Level @3m (dB μ A)	Ant. factor (dB 1/m)	Field strength @3m dB(μ A/m)	Extrapolation factor @300m (dB)	Field strength level @300m dB(μ A/m)	Limit dB(μ A/m)	Delta (dB)
36,29	-15,3	20,0	4,7	-80,0	-75,3	-15,1	-60,2
68,79	-19,8	20,0	0,2	-80,0	-79,8	-20,6	-59,2
71,98	-19,6	20,0	0,4	-80,0	-79,6	-21,0	-58,6
108,06	-26,1	20,0	-6,1	-80,0	-86,1	-24,6	-61,6
144,04	-33,6	20,0	-13,6	-80,0	-93,6	-27,1	-66,6
171,60	-22,9	20,0	-2,9	-80,0	-82,9	-28,6	-54,3

30 MHz < f < 1000 MHz:

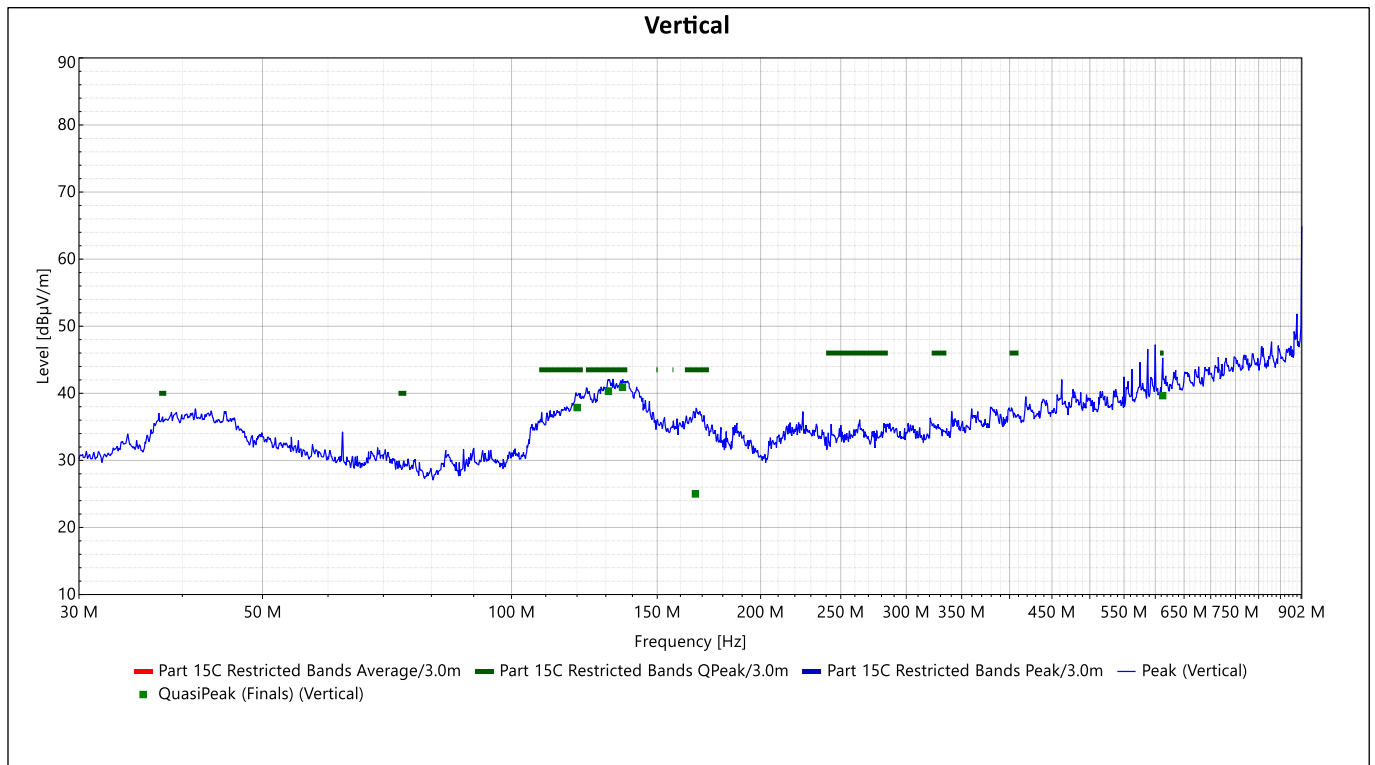
CH1:

Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
120 M	37.88	-5.62	43.5	140	1	Vertical	120000	16.71
130.956 M	40.34	-3.16	43.5	130	1	Vertical	120000	17.83
136.165 M	40.92	-2.58	43.5	108	1	Vertical	120000	18.57
166.799 M	25	-18.5	43.5	17	1.5	Vertical	120000	19.1
612.49 M	39.65	-6.35	46	343	1	Vertical	120000	26.21

Graph

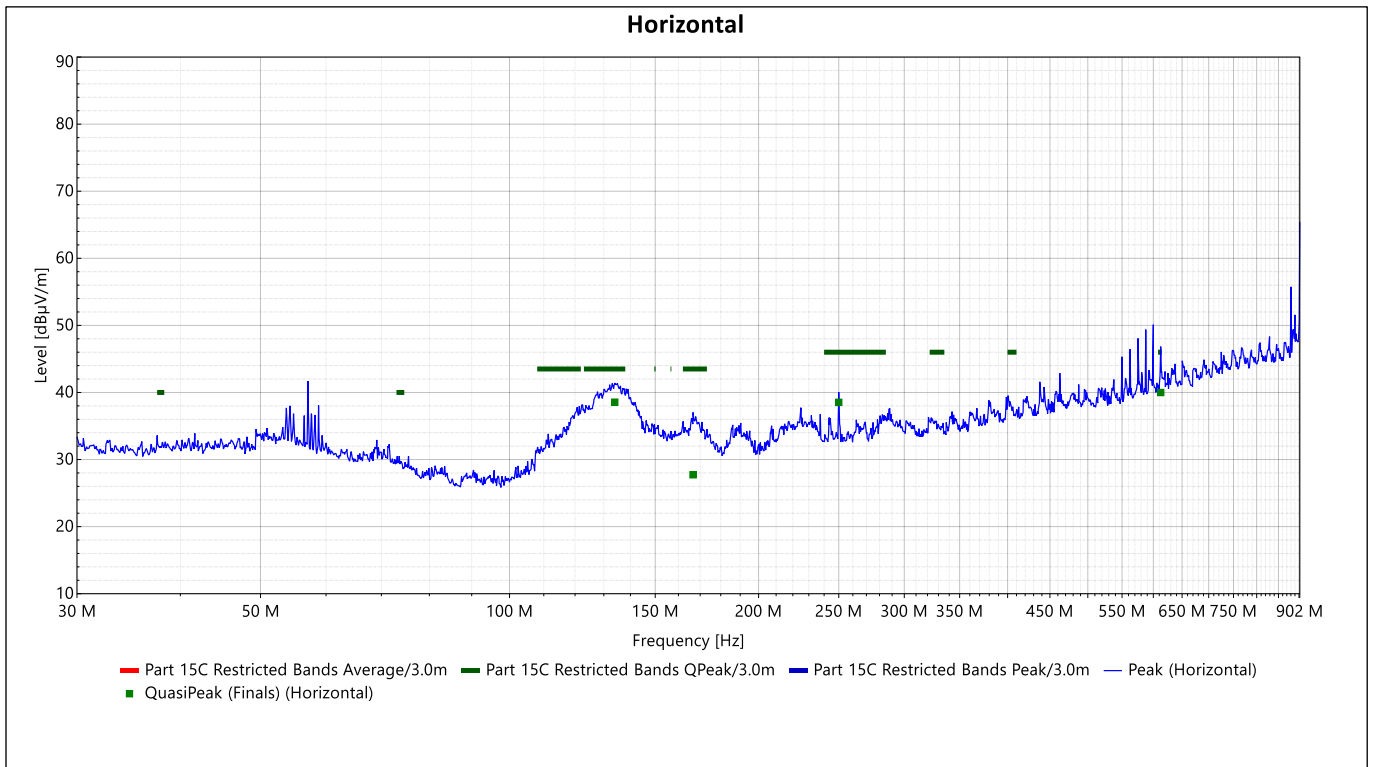


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
134.031 M	38.55	-4.95	43.5	48	2.29	Horizontal	120000	17.7
166.638 M	27.73	-15.77	43.5	264	1.5	Horizontal	120000	18.72
249.994 M	38.52	-7.48	46	99	1	Horizontal	120000	17.65
612.499 M	39.99	-6.01	46	391	1.39	Horizontal	120000	26.52

Graph

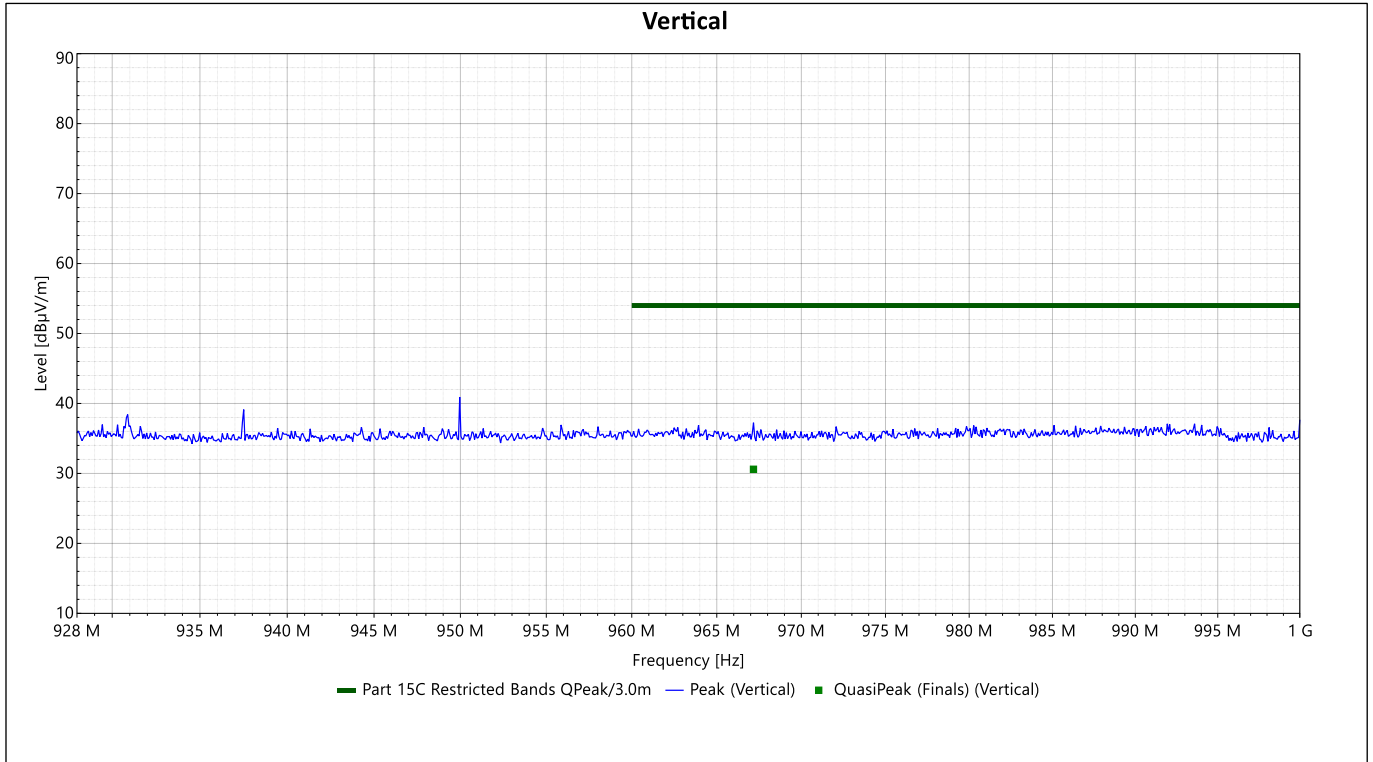


Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
967.166 M	30.59	-23.41	54	148	3	Vertical	120000	30.7

Graph

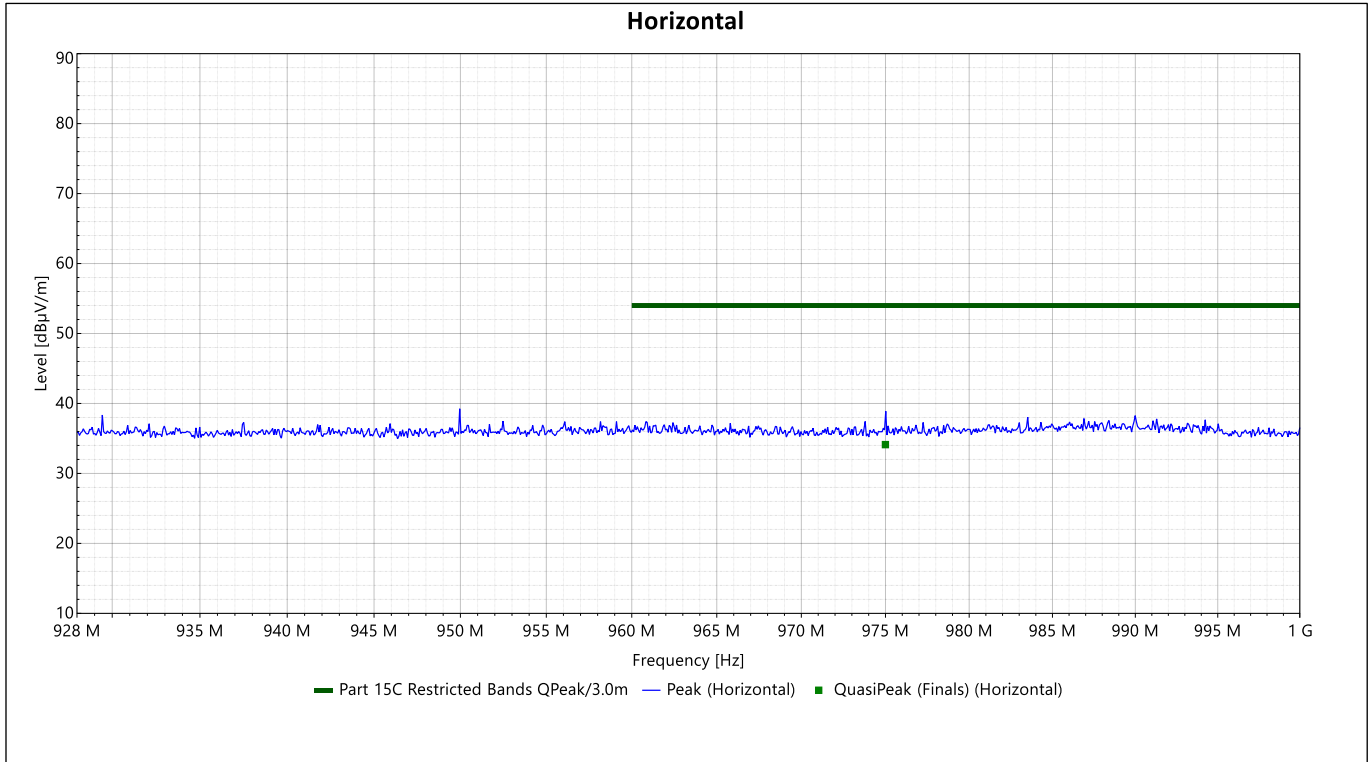


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
974.996 M	34.12	-19.88	54	343	1	Horizontal	120000	31.24

Graph



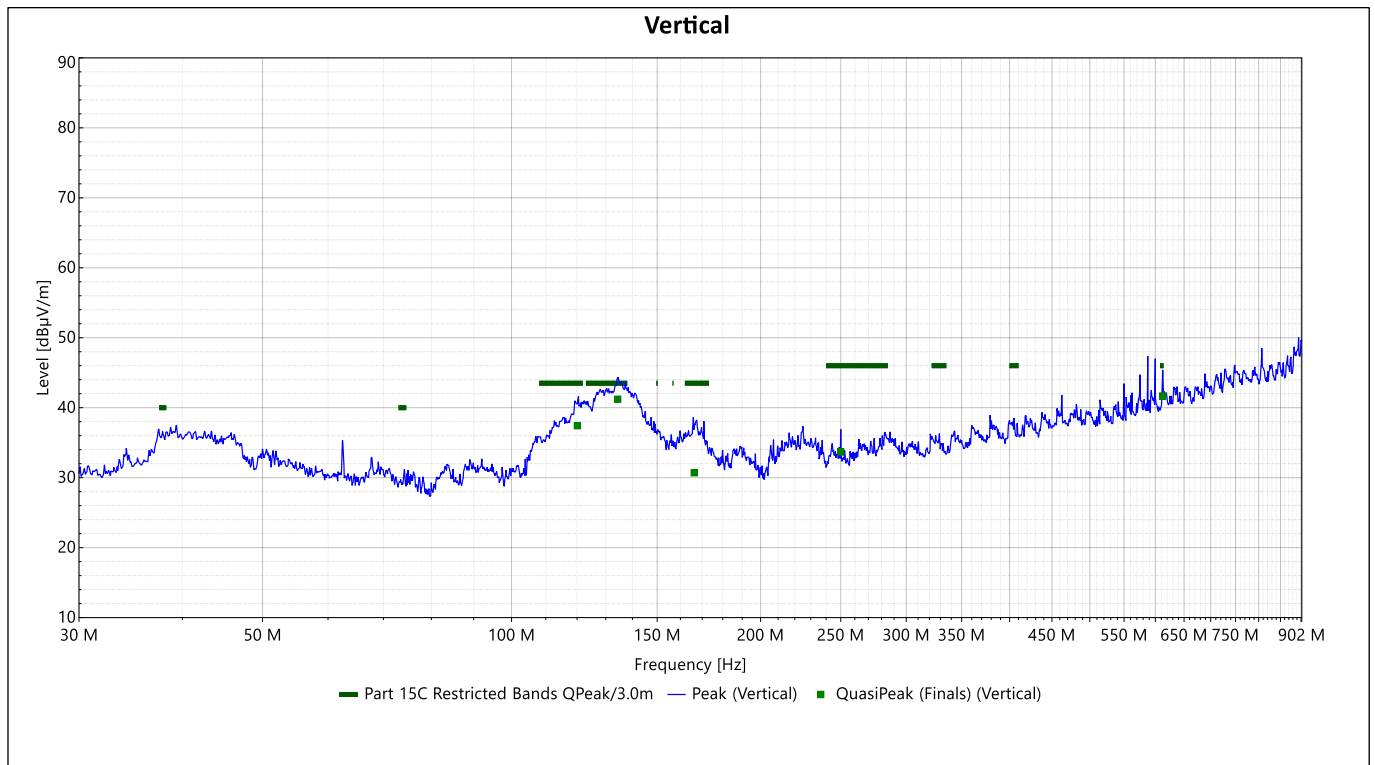
CH26:

Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
120.111 M	37.43	-6.07	43.5	107	1	Vertical	120000	16.72
134.363 M	41.2	-2.3	43.5	130	1	Vertical	120000	18.33
166.28 M	30.71	-12.79	43.5	5	1	Vertical	120000	19.15
249.996 M	33.67	-12.33	46	107	1	Vertical	120000	17.61
612.503 M	41.66	-4.34	46	332	1	Vertical	120000	26.21

Graph

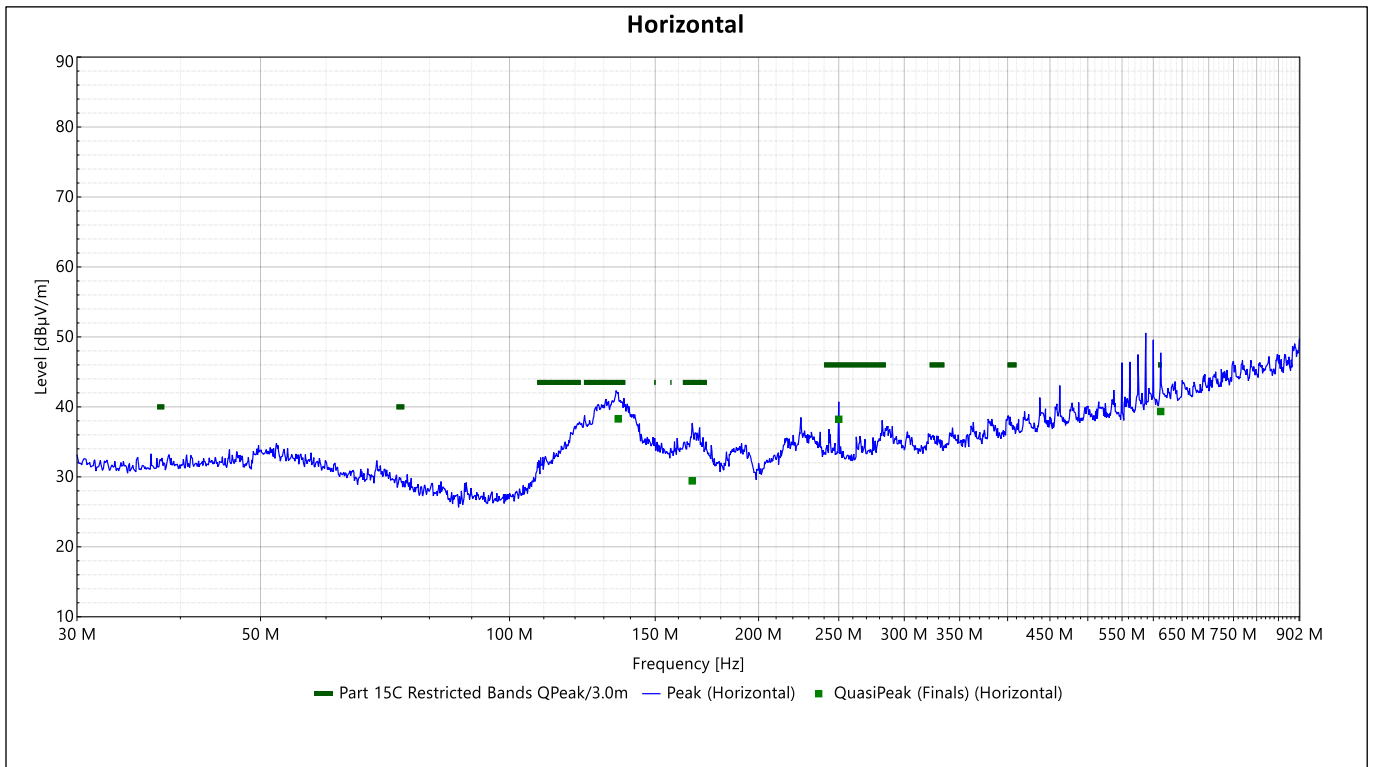


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
135.294 M	38.28	-5.22	43.5	53	3.18	Horizontal	120000	17.83
166.244 M	29.42	-14.08	43.5	252	1.79	Horizontal	120000	18.73
249.999 M	38.23	-7.77	46	113	1	Horizontal	120000	17.65
612.507 M	39.34	-6.66	46	373	1.39	Horizontal	120000	26.52

Graph

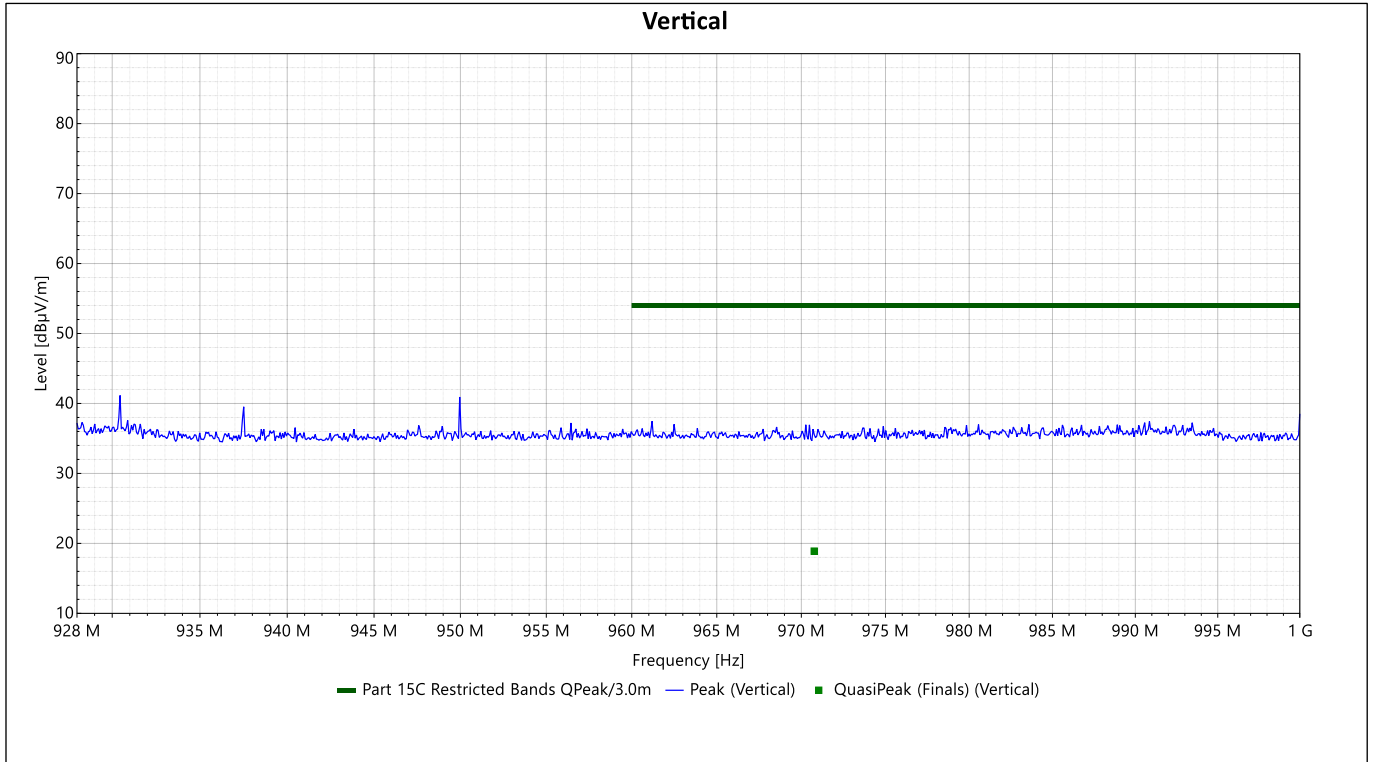


Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
970.764 M	18.89	-35.11	54	185	2.5	Vertical	120000	30.71

Graph

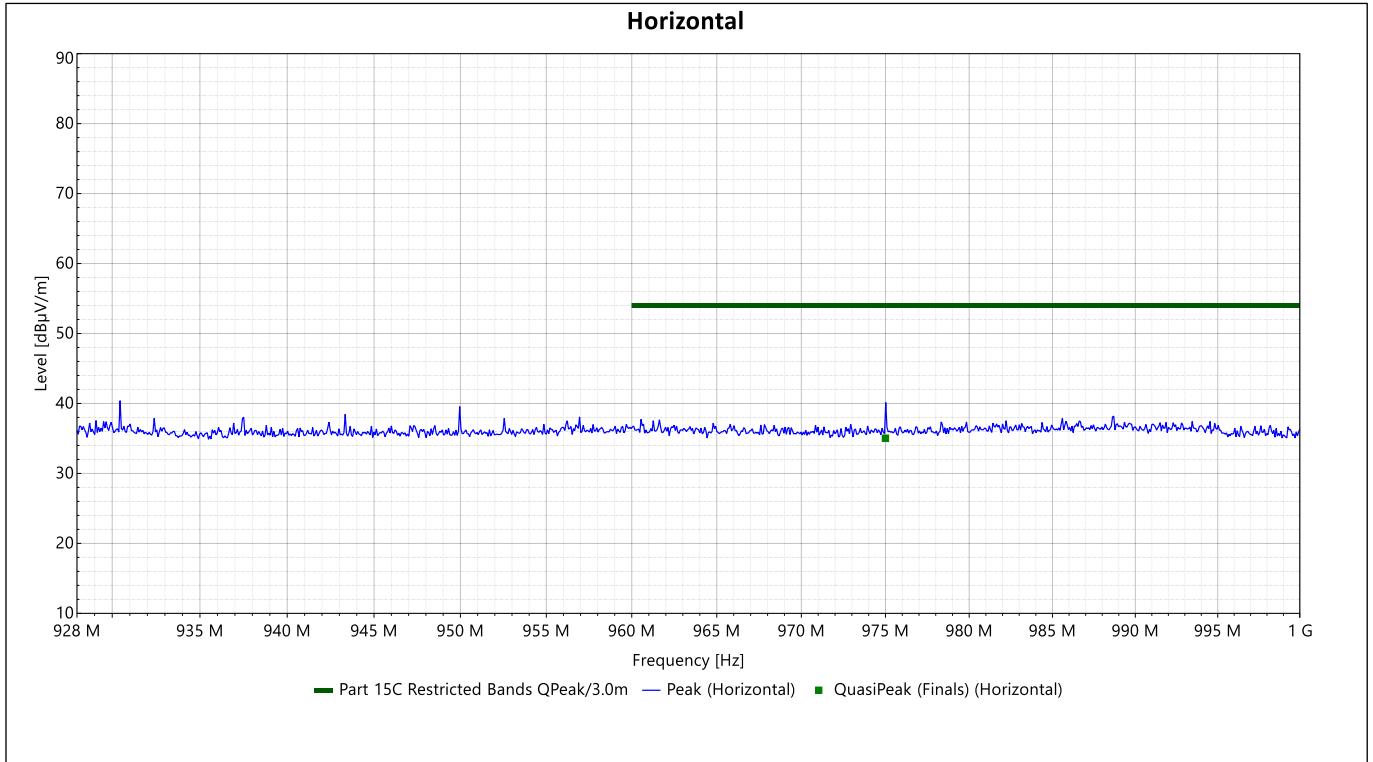


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
974.997 M	35.03	-18.97	54	346	1	Horizontal	120000	31.24

Graph



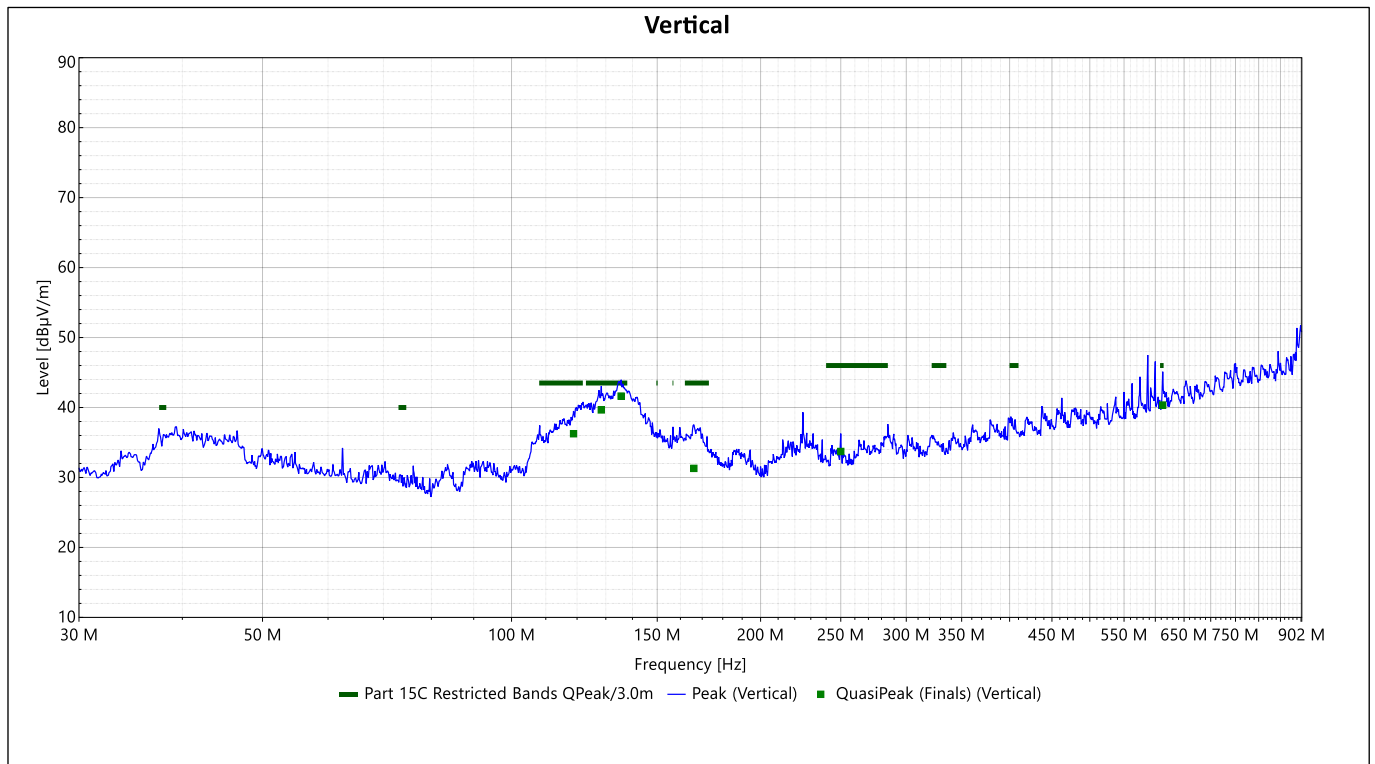
CH 50:

Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
118.834 M	36.25	-7.25	43.5	126	1.16	Vertical	120000	16.59
128.367 M	39.66	-3.84	43.5	134	1	Vertical	120000	17.58
135.649 M	41.63	-1.87	43.5	112	1	Vertical	120000	18.53
166.099 M	31.3	-12.2	43.5	158	1	Vertical	120000	19.17
250.002 M	33.72	-12.28	46	118	1	Vertical	120000	17.61
612.489 M	40.35	-5.65	46	24	1	Vertical	120000	26.21

Graph

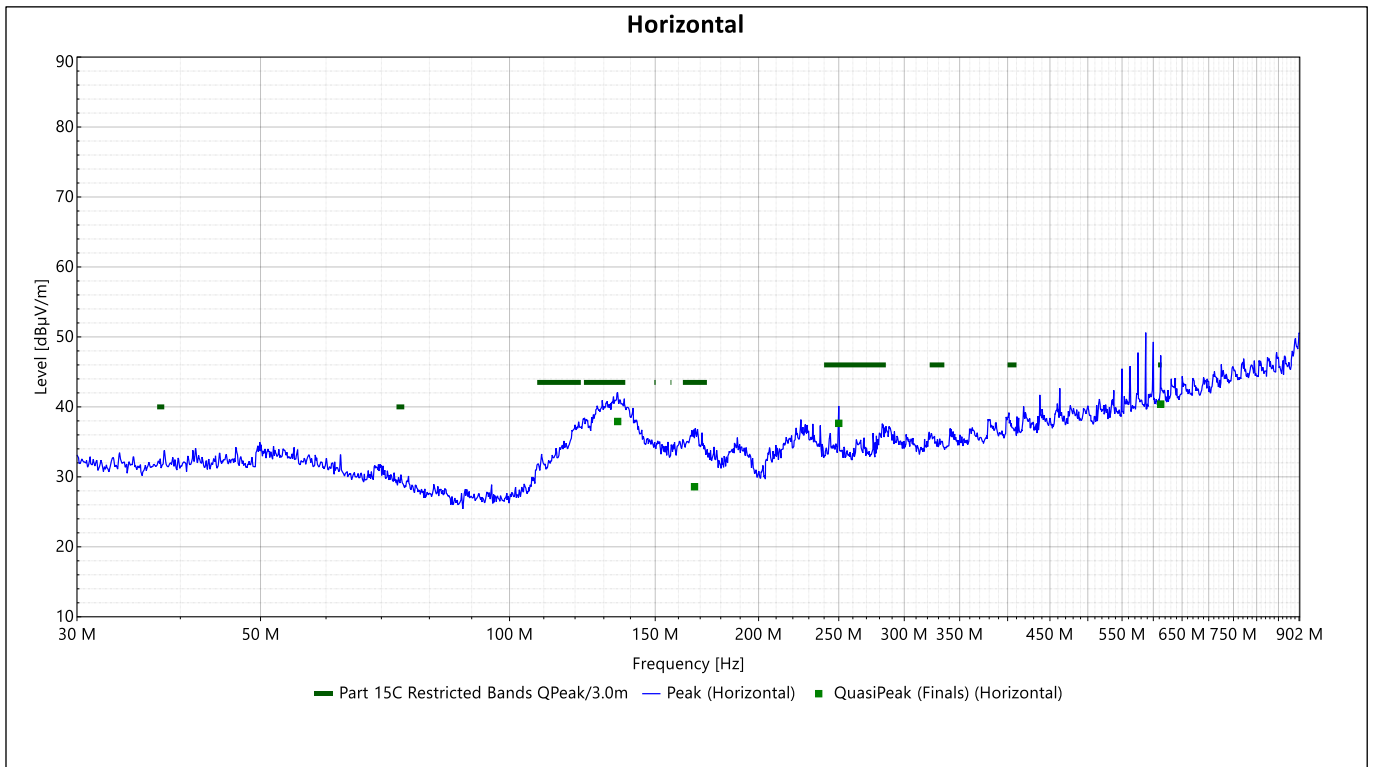


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
135.114 M	37.91	-5.59	43.5	60	2.29	Horizontal	120000	17.82
167.338 M	28.59	-14.91	43.5	234	2	Horizontal	120000	18.67
250.004 M	37.65	-8.35	46	118	1	Horizontal	120000	17.65
612.5 M	40.4	-5.6	46	391	1.59	Horizontal	120000	26.52

Graph

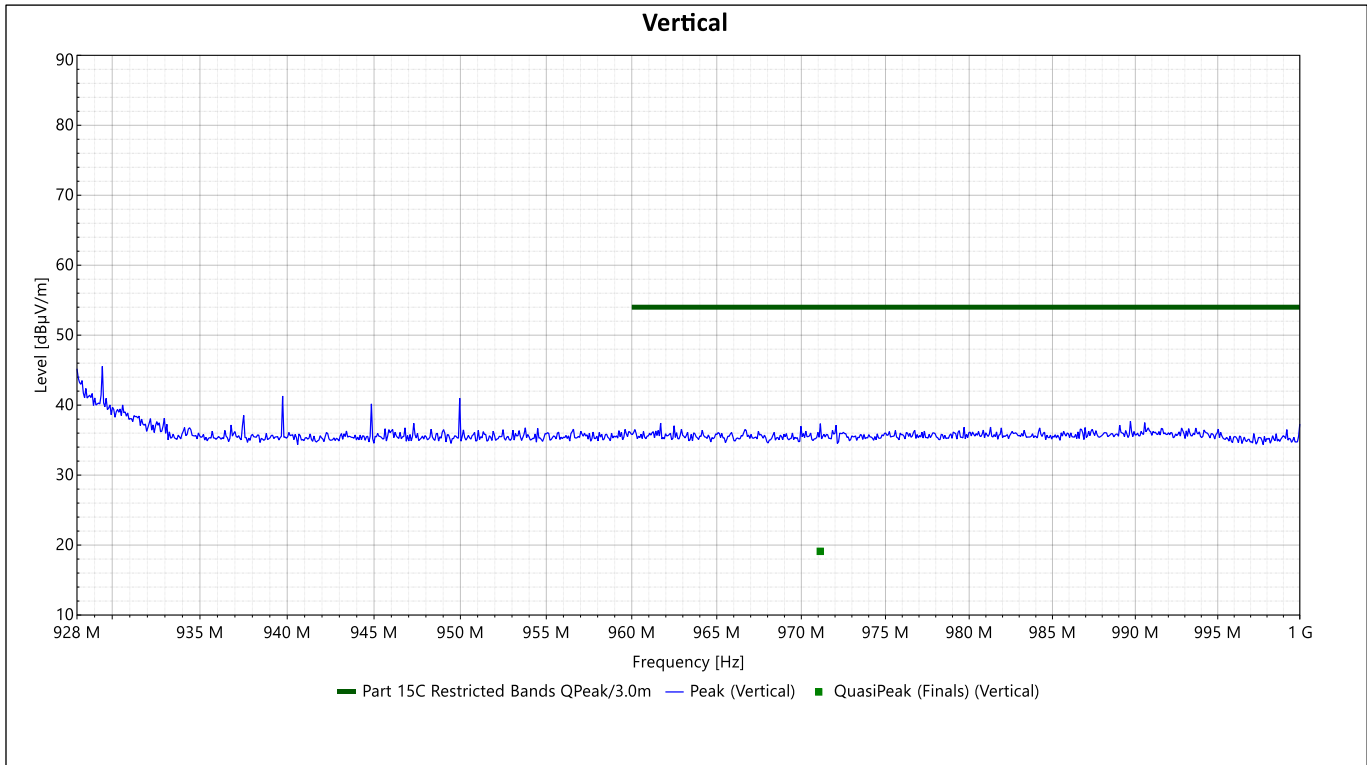


Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands	Class	

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
971.122 M	19.1	-34.9	54	14	2.5	Vertical	120000	30.73

Graph

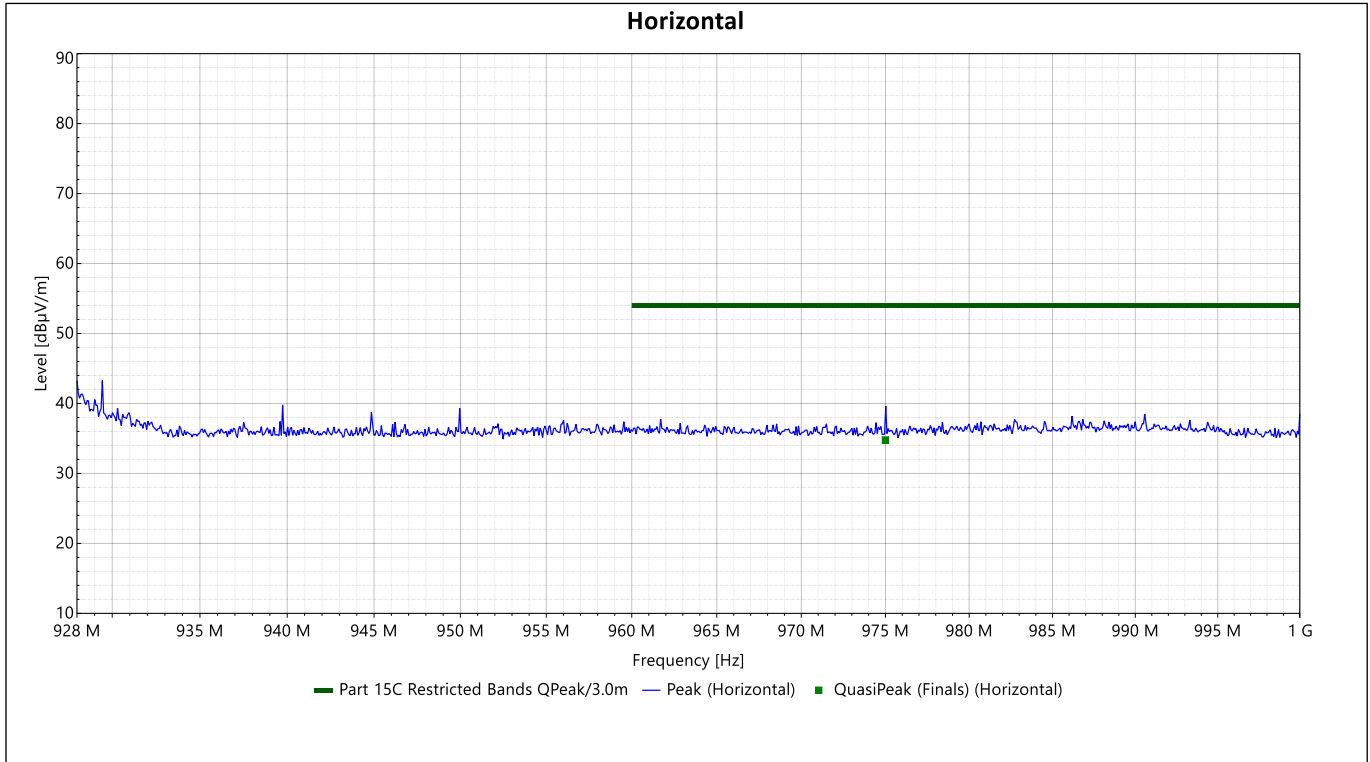


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands	Class	

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
974.998 M	34.78	-19.22	54	338	1.5	Horizontal	120000	31.24

Graph



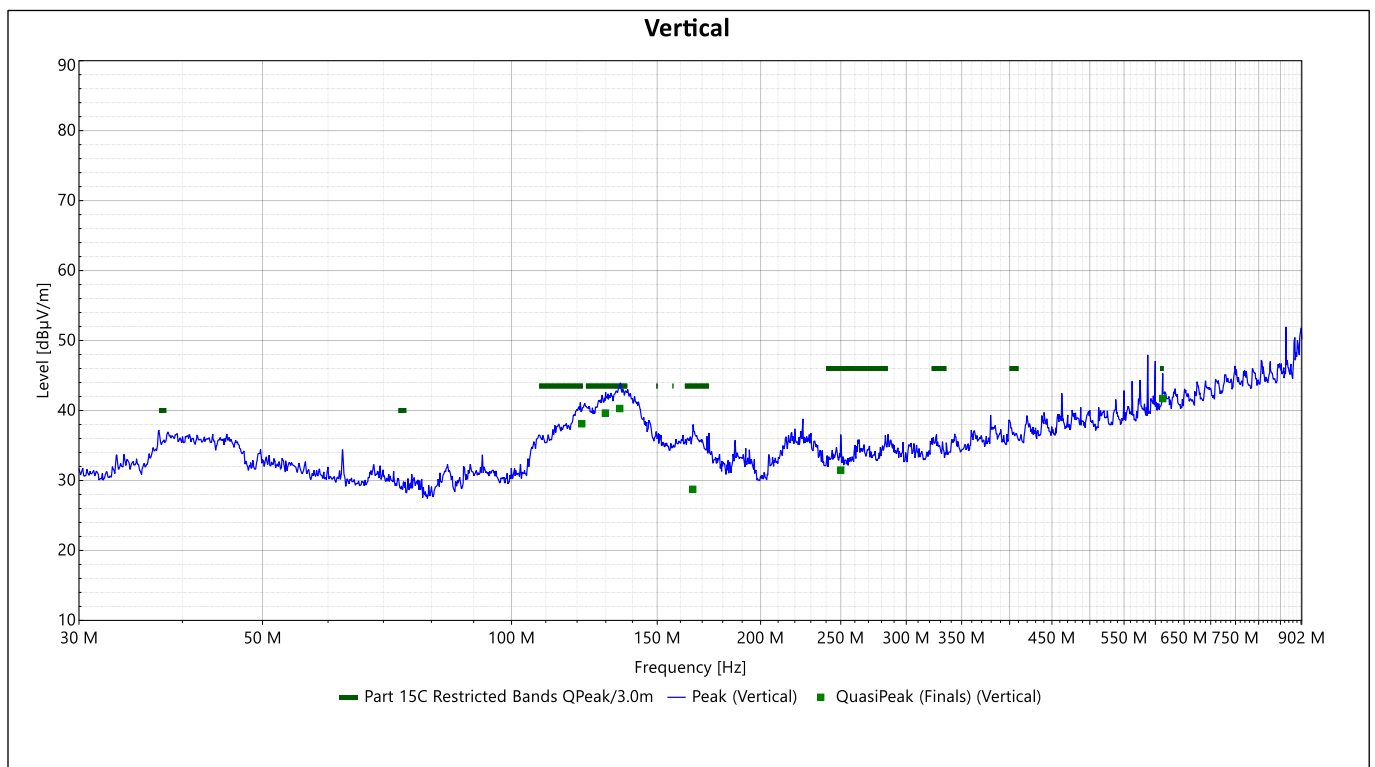
Hopping:

Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
121.593 M	38.11	-5.39	43.5	127	1	Vertical	120000	16.91
129.834 M	39.64	-3.86	43.5	127	1	Vertical	120000	17.78
135.142 M	40.28	-3.22	43.5	137	1	Vertical	120000	18.5
165.589 M	28.74	-14.76	43.5	350	1.5	Vertical	120000	19.2
249.984 M	31.48	-14.52	46	137	1	Vertical	120000	17.61
612.496 M	41.71	-4.29	46	333	1	Vertical	120000	26.21

Graph

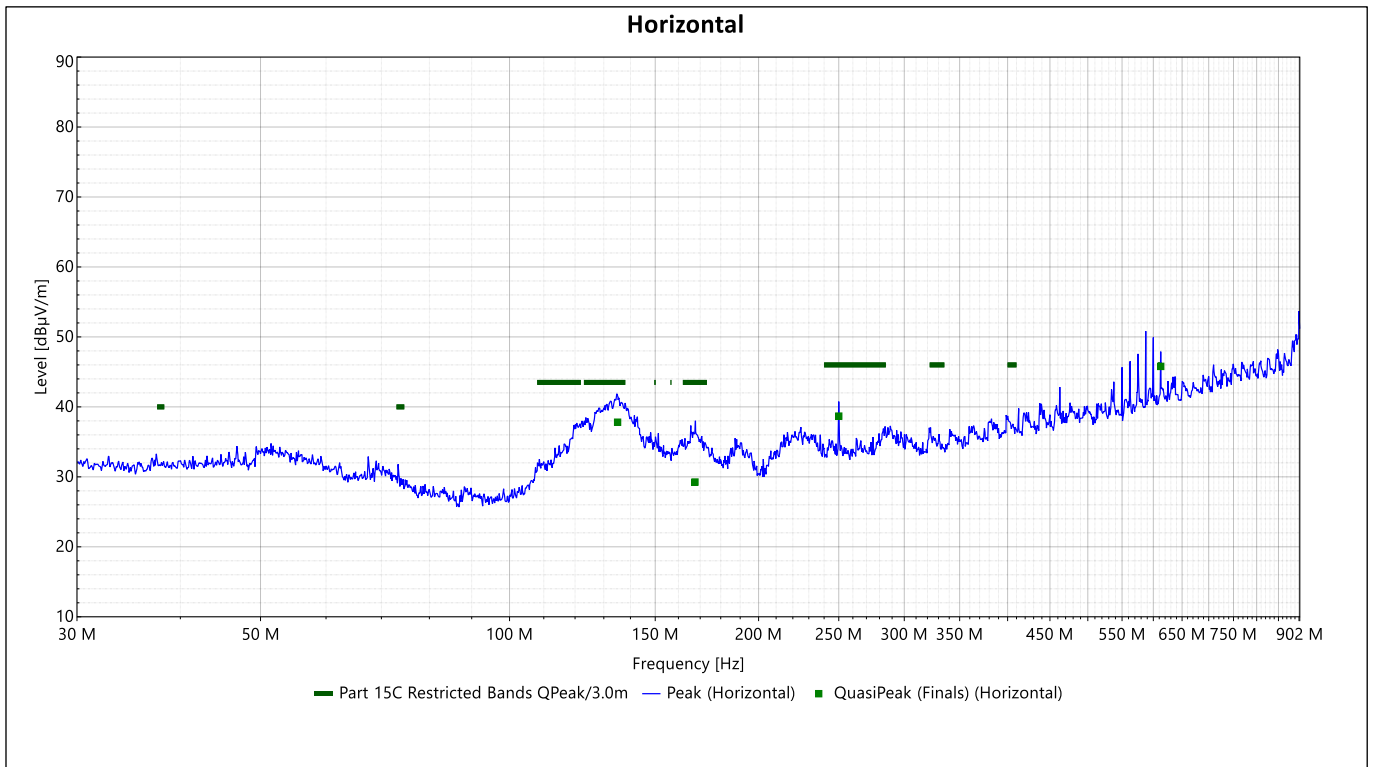


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
135.086 M	37.81	-5.69	43.5	52	1.5	Horizontal	120000	17.81
167.553 M	29.26	-14.24	43.5	225	1.5	Horizontal	120000	18.65
250.004 M	38.68	-7.32	46	103	1	Horizontal	120000	17.65
612.497 M	45.79	-0.21	46	329	1.5	Horizontal	120000	26.52

Graph

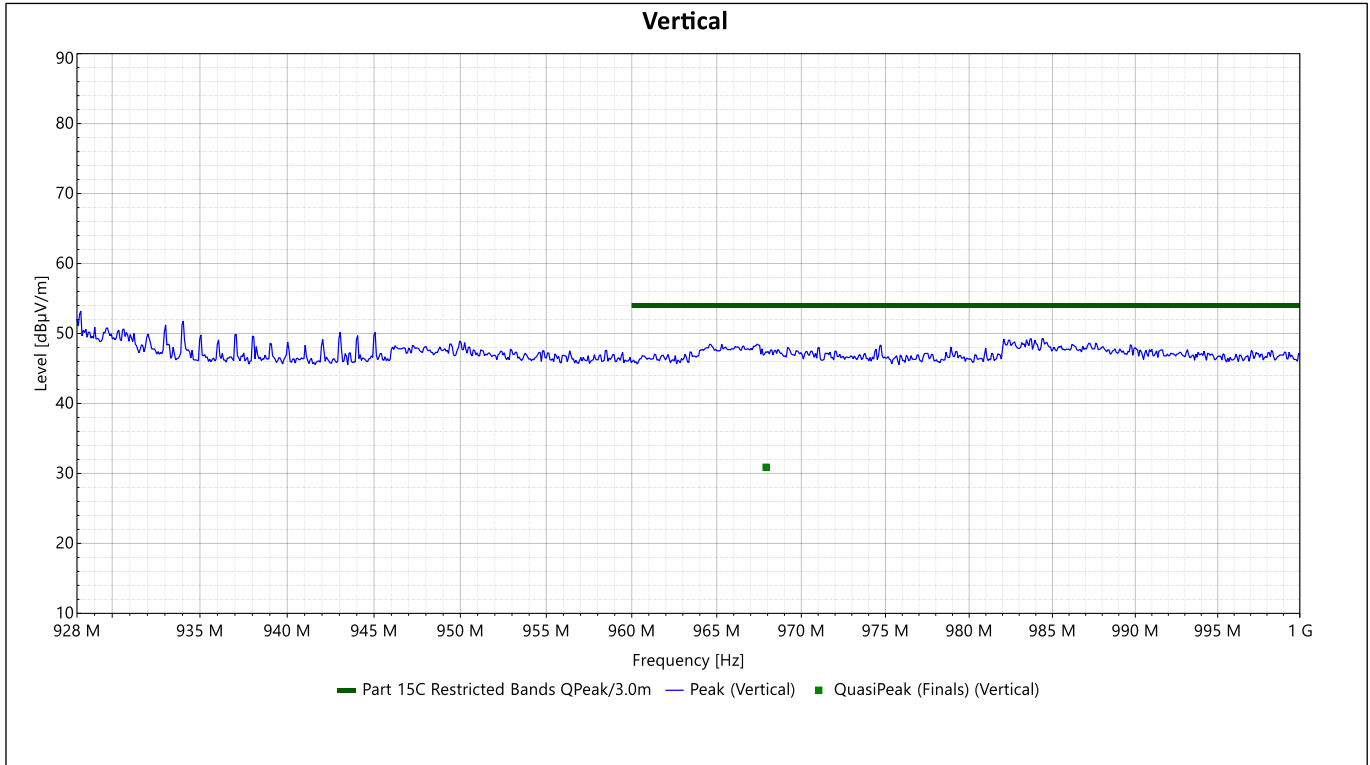


Position	Vertical		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
967.915 M	30.88	-23.12	54	36	1	Vertical	120000	30.68

Graph

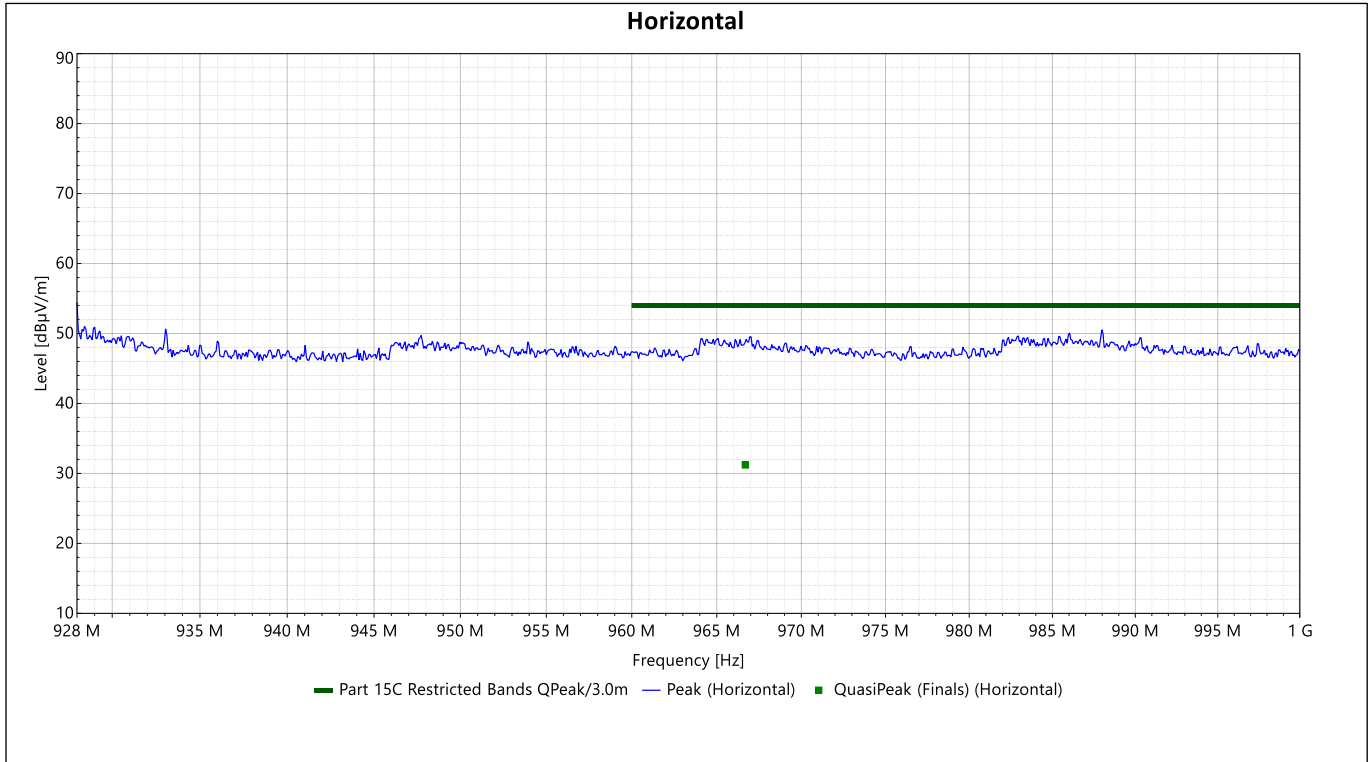


Position	Horizontal		
Limit	FCC Funk/Part 15C Restricted Bands		

Finals

Frequency (Hz)	QuasiPeak (dBμV/m)	QP Margin	QP Limit (dBμV/m)	angle	height	polarization	RBW (Hz)	Correction (dB)
966.684 M	31.22	-22.78	54	99	2	Horizontal	120000	31.31

Graph



f > 1000 MHz

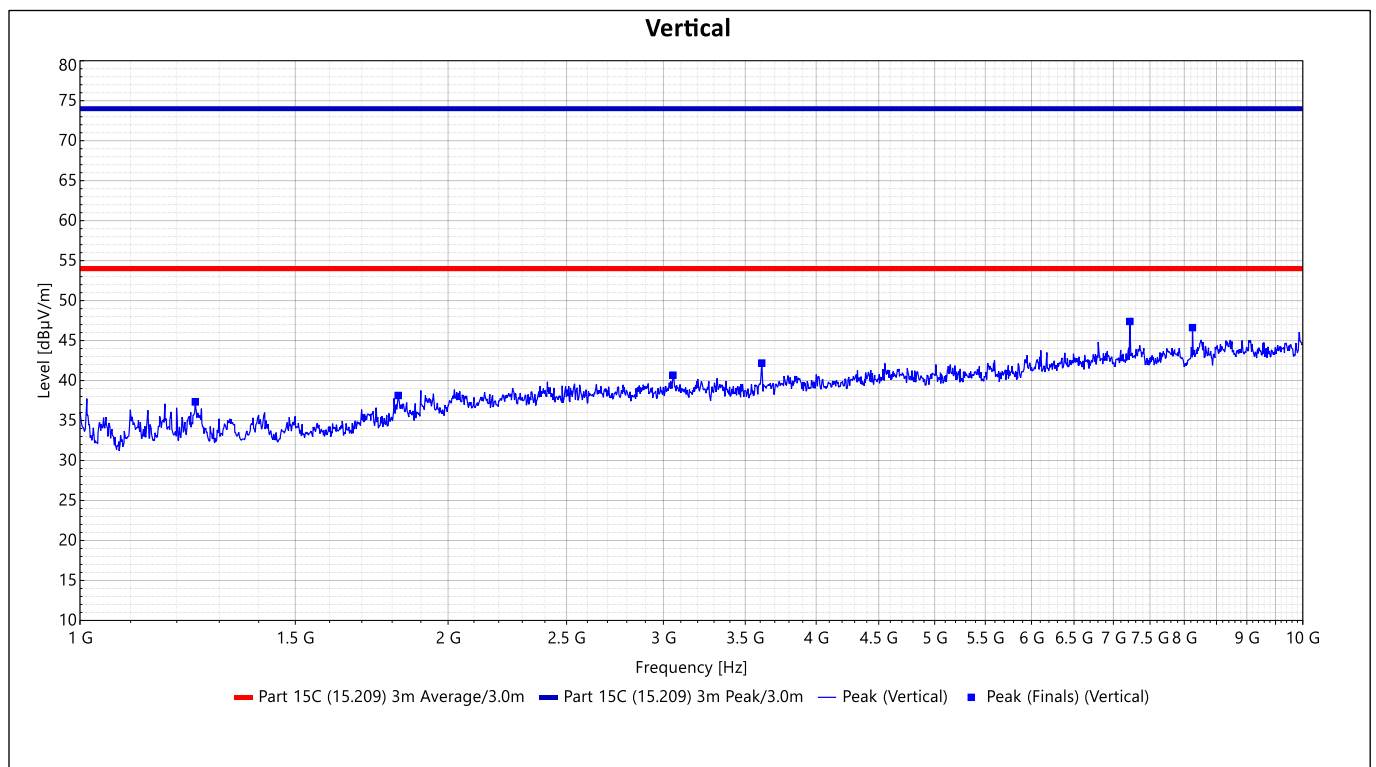
CH1:

Position	Vertical		
Limit	FCC Funk/Part 15C (15.209) 3m		

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.243 G	37.33	-36.67	74	261	Vertical	1	1000000	-10.11
1.821 G	38.13	-35.87	74	11	Vertical	3	1000000	-8.45
3.055 G	40.67	-33.33	74	63	Vertical	1.5	1000000	-5.9
3.611 G	42.19	-31.81	74	58	Vertical	1	1000000	-5.98
7.222 G	47.39	-26.61	74	132	Vertical	1	1000000	-0.59
8.125 G	46.62	-27.38	74	132	Vertical	1	1000000	-0.03

Graph

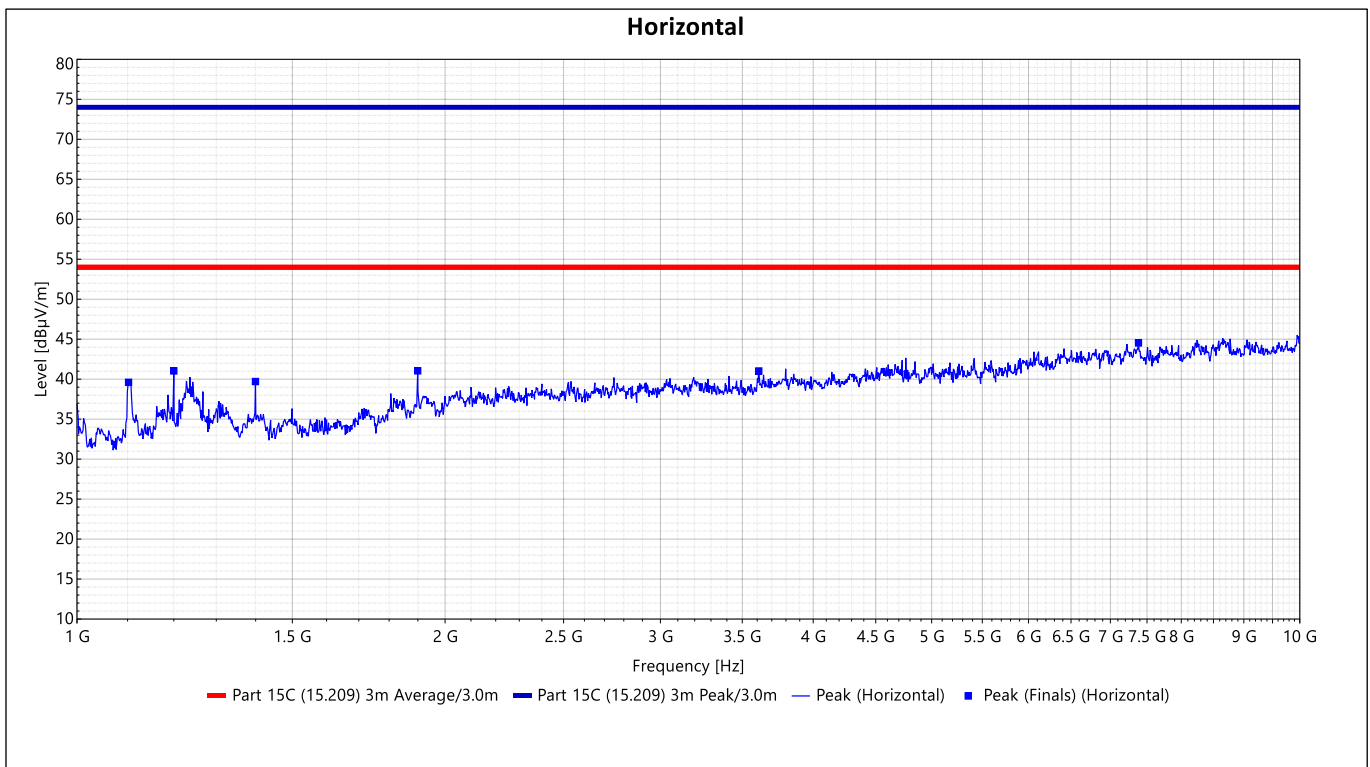


Position	Horizontal		
Limit	FCC Funk/Part 15C (15.209) 3m		

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.102 G	39.61	-34.39	74	354	Horizontal	3	1000000	-11.57
1.2 G	41.03	-32.97	74	139	Horizontal	1	1000000	-10.63
1.4 G	39.7	-34.3	74	244	Horizontal	1.5	1000000	-10.63
1.9 G	41.04	-32.96	74	125	Horizontal	2	1000000	-7.89
3.611 G	41.02	-32.98	74	190	Horizontal	1.5	1000000	-5.98
7.381 G	44.53	-29.47	74	125	Horizontal	2	1000000	-0.43

Graph



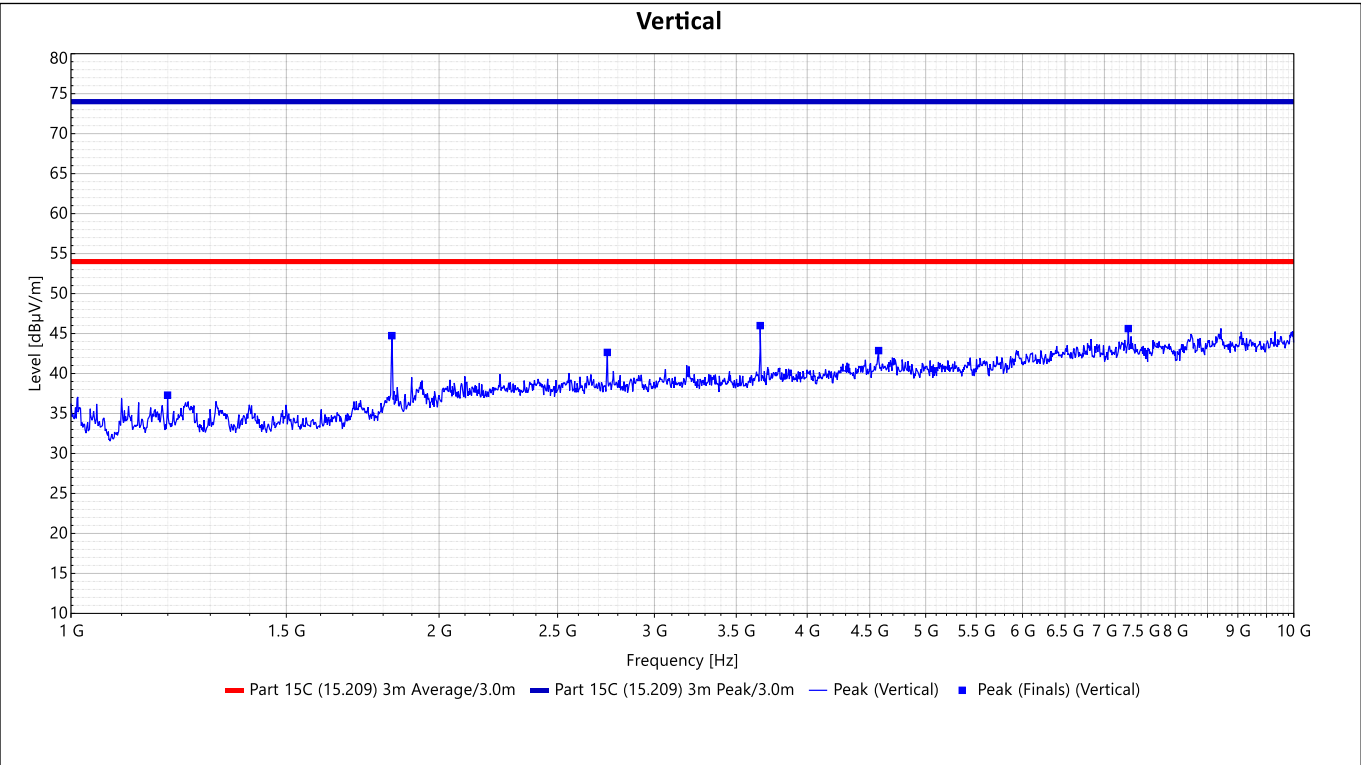
CH26:

Position	Vertical		
Limit	FCC Funk/Part 15C (15.209) 3m	Class	

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.2 G	37.29	-36.71	74	356	Vertical	1	1000000	-10.64
1.83 G	44.73	-29.27	74	356	Vertical	1	1000000	-8.38
2.746 G	42.64	-31.36	74	8	Vertical	2	1000000	-6.07
3.661 G	45.99	-28.01	74	49	Vertical	1.5	1000000	-5.7
4.576 G	42.87	-31.13	74	57	Vertical	1.5	1000000	-3.8
7.322 G	45.62	-28.38	74	34	Vertical	1.5	1000000	-0.33

Graph

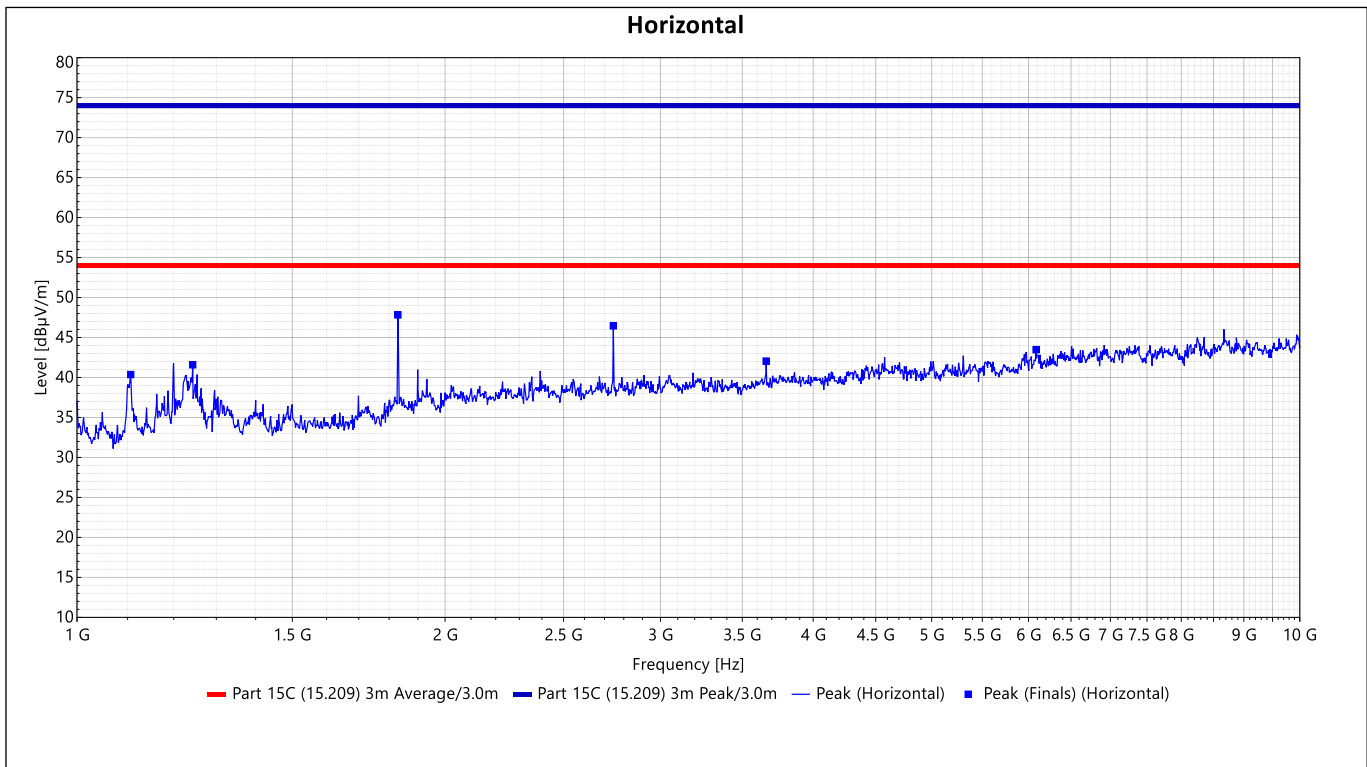


Position	Horizontal		
Limit	FCC Funk/Part 15C (15.209) 3m	Class	

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.107 G	40.37	-33.63	74	164	Horizontal	3	1000000	-11.42
1.244 G	41.59	-32.41	74	359	Horizontal	3	1000000	-10.1
1.83 G	47.83	-26.17	74	0	Horizontal	2	1000000	-8.38
2.746 G	46.46	-27.54	74	351	Horizontal	2	1000000	-6.07
3.661 G	42.05	-31.95	74	207	Horizontal	1	1000000	-5.7
6.086 G	43.48	-30.52	74	83	Horizontal	3	1000000	-2.18

Graph



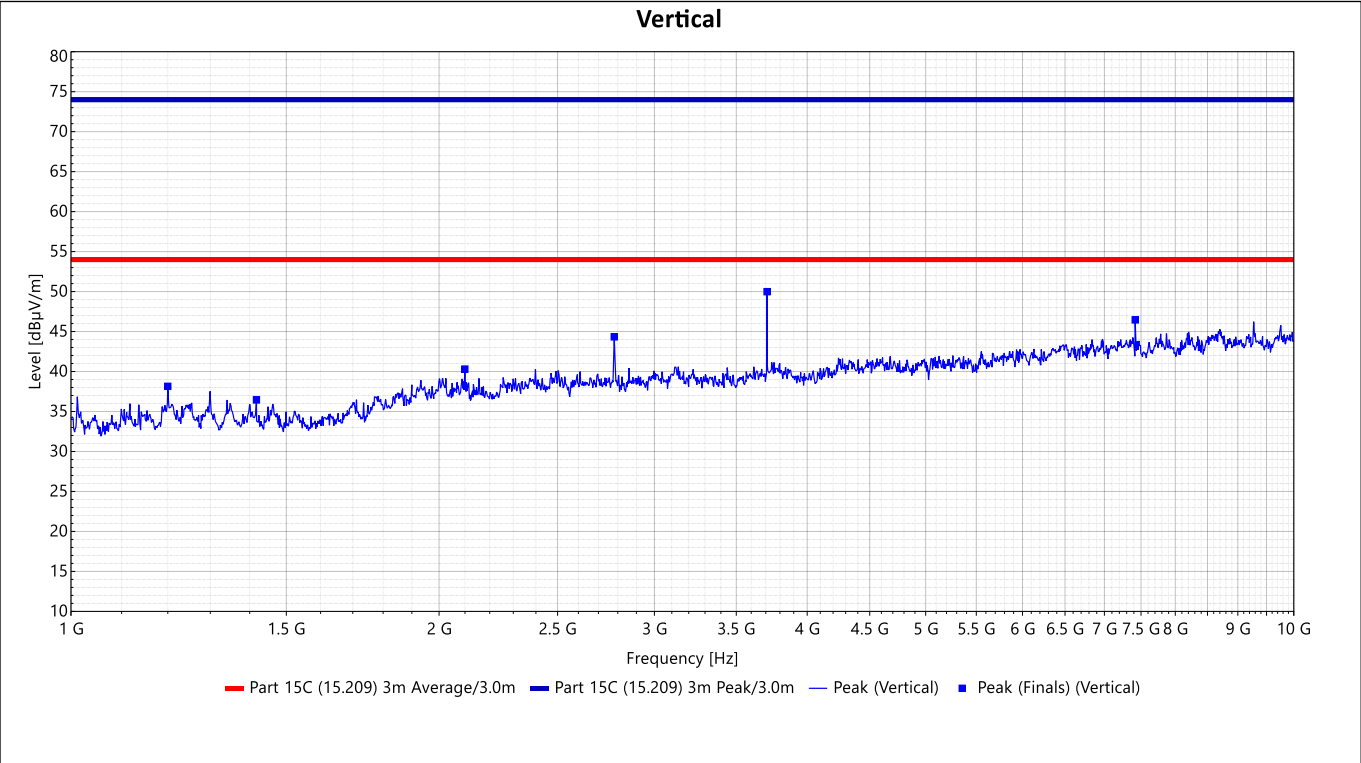
CH50:

Position	Vertical		
Limit	FCC Funk/Part 15C (15.209) 3m	Class	

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.2 G	38.15	-35.85	74	145	Vertical	1.5	1000000	-10.63
1.418 G	36.45	-37.55	74	232	Vertical	1	1000000	-10.7
2.1 G	40.3	-33.7	74	222	Vertical	3	1000000	-6.96
2.782 G	44.34	-29.66	74	26	Vertical	1	1000000	-6.01
3.709 G	49.98	-24.02	74	192	Vertical	1	1000000	-5.54
7.418 G	46.46	-27.54	74	93	Vertical	1	1000000	-0.58

Graph

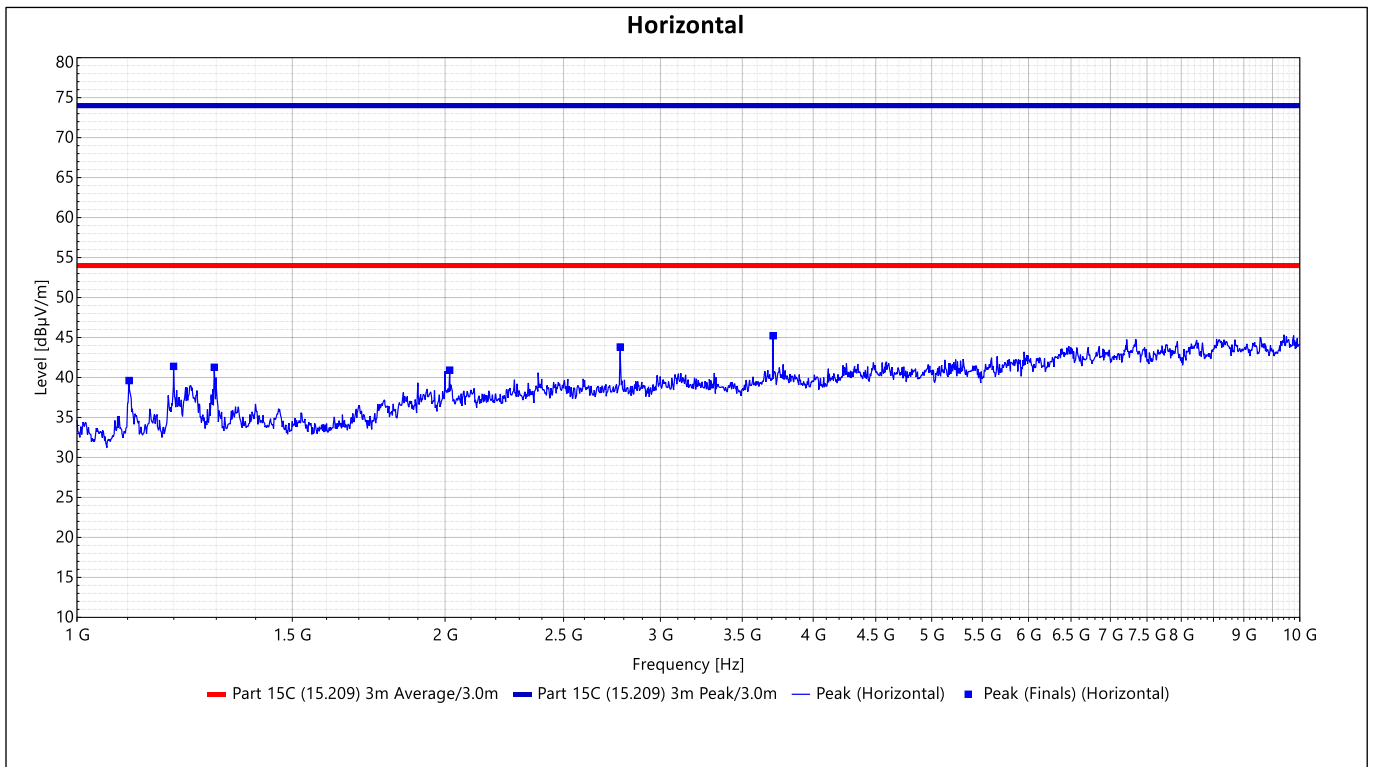


Position	Horizontal		
Limit	FCC Funk/Part 15C (15.209) 3m	Class	

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.103 G	39.62	-34.38	74	158	Horizontal	3	1000000	-11.54
1.2 G	41.39	-32.61	74	231	Horizontal	2	1000000	-10.64
1.295 G	41.28	-32.72	74	36	Horizontal	3	1000000	-10.45
2.018 G	40.92	-33.08	74	357	Horizontal	1.5	1000000	-7.07
2.782 G	43.81	-30.19	74	116	Horizontal	1	1000000	-6.01
3.709 G	45.22	-28.78	74	192	Horizontal	1	1000000	-5.54

Graph



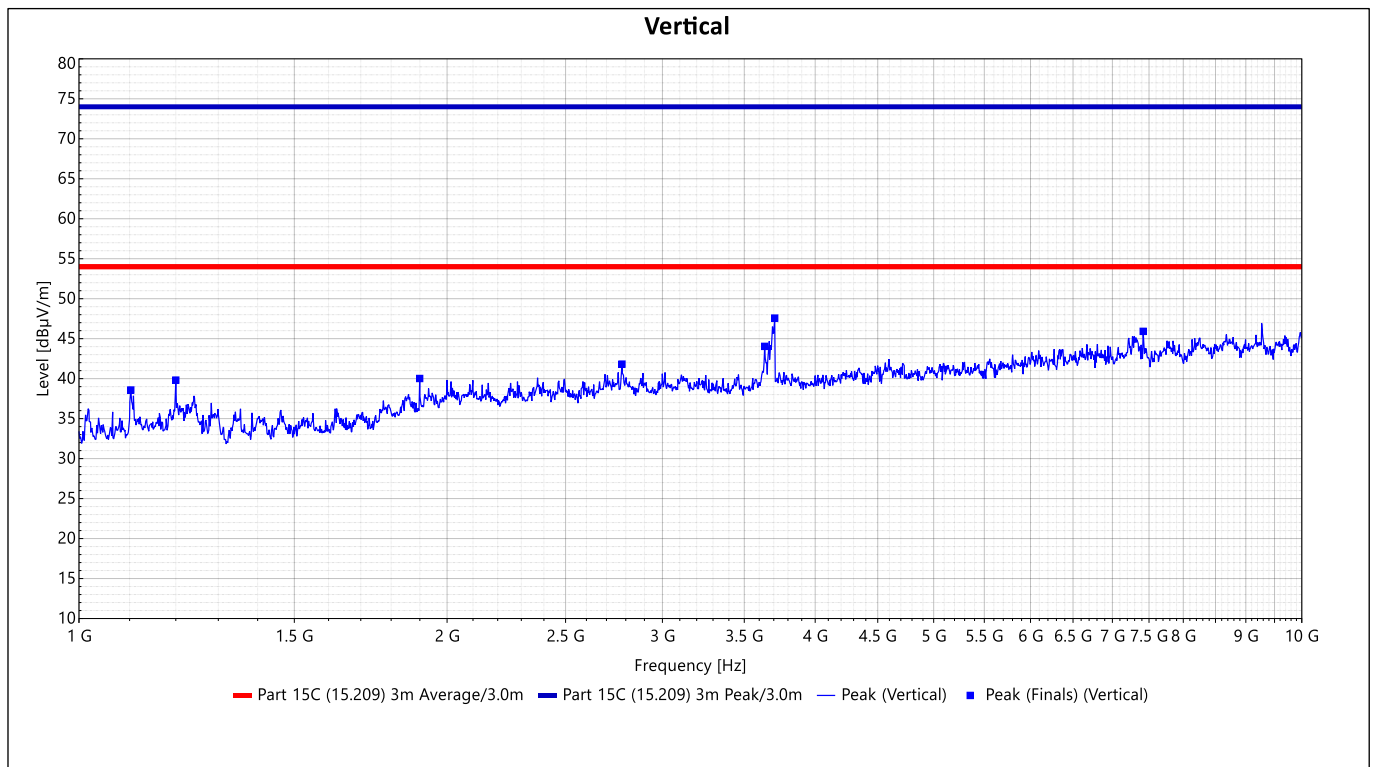
Hopping:

Position	Vertical		
Limit	FCC Funk/Part 15C (15.209) 3m	Class	

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.103 G	38.58	-35.42	74	147	Vertical	3	1000000	-11.55
1.2 G	39.82	-34.18	74	358	Vertical	3	1000000	-10.63
1.9 G	40.02	-33.98	74	249	Vertical	2	1000000	-7.89
2.78 G	41.81	-32.19	74	347	Vertical	1	1000000	-6.01
3.637 G	44.04	-29.96	74	358	Vertical	1.5	1000000	-5.81
3.707 G	47.57	-26.43	74	359	Vertical	1	1000000	-5.56
7.418 G	45.92	-28.08	74	347	Vertical	1	1000000	-0.58

Graph

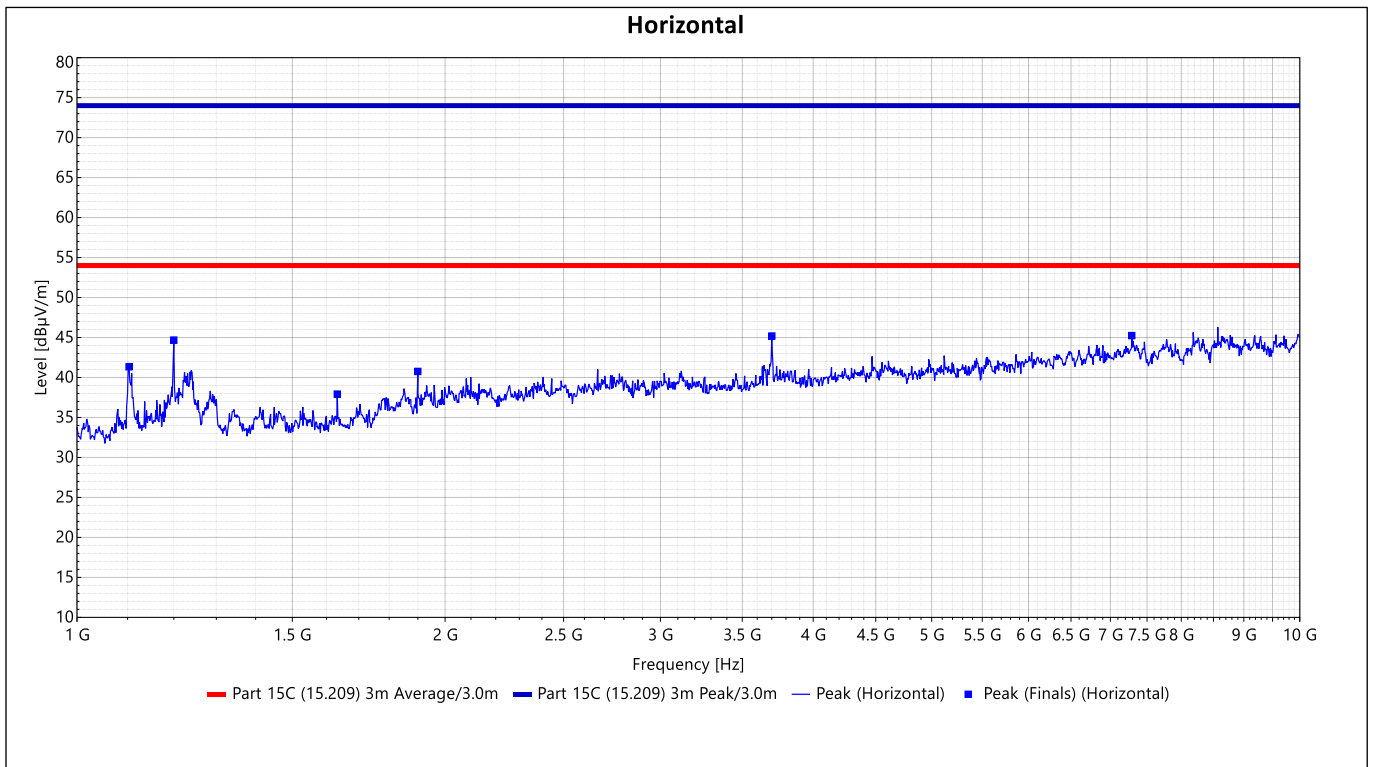


Position	Horizontal		
Limit	FCC Funk/Part 15C (15.209) 3m	Class	

Finals

Frequency (Hz)	Peak (dBµV/m)	Margin	Limit (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
1.103 G	41.34	-32.66	74	319	Horizontal	3	1000000	-11.54
1.2 G	44.68	-29.32	74	44	Horizontal	1	1000000	-10.63
1.633 G	37.92	-36.08	74	359	Horizontal	1.5	1000000	-10.74
1.9 G	40.76	-33.24	74	307	Horizontal	1	1000000	-7.89
3.701 G	45.19	-28.81	74	30	Horizontal	1.5	1000000	-5.6
7.288 G	45.24	-28.76	74	350	Horizontal	3	1000000	-0.39

Graph



Radiated limits according to FCC Part 15, Section 15.209 for spurious emissions which fall in restricted bands:

Frequency (MHz)	15.209 Limits ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - -0.49	$2400/f(\text{kHz})$	300
0.49 - 1.705	$24000/f(\text{kHz})$	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Radiated limits according to RSS-Gen, 8.9 for spurious emissions which fall in restricted bands:

Frequency (MHz)	RSS-Gen Limits ($\mu\text{A/m}$)	Measurement distance (m)
0.009 - -0.49	$63.7/f(\text{kHz})$	300
0.49 - 1.705	$63.7/f(\text{kHz})$	30
1.705 - 30.0	0.08	30

Frequency (MHz)	RSS-Gen Limits ($\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

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

RSS-Gen, Table 6 – Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	12.57675 - 12.57725	399.9 - 410	7.250 - 7.750
0.495 - 0.505	13.36 - 13.41	608 - 614	8.025 – 8.500
2.1735 - 2.1905	16.42 - 16.423	960 - 1427	9.0 - 9.2
3.020 - 3.026	16.69475 - 16.69525	1435 - 1626.5	9.3 - 9.5
4.125 - 4.128	16.80425 - 16.80475	1645.5 - 1646.5	10.6 - 12.7
4.17725 - 4.17775	25.5 - 25.67	1660 - 1710	13.25 - 13.4
4.20725 - 4.20775	37.5 - 38.25	1718.8 - 1722.2	14.47 - 14.5
5.677 - 5.683	73 - 74.6	2200 - 2300	15.35 - 16.2
6.215 - 6.218	74.8 - 75.2	2310 - 2390	17.7 - 21.4
6.26775 - 6.26825	108 – 138	2483.5 - 2500	22.01 - 23.12
6.31175 - 6.31225	149.9 - 150.05	2655 - 2900	23.6 - 24.0
8.291 - 8.294	156.52475 - 156.52525	3260 – 3267	31.2 - 31.8
8.362 - 8.366	156.7 - 156.9	3332 - 3339	36.43 - 36.5
8.37625 - 8.38675	162.0125 - 167.17	3345.8 - 3358	Above 38.6
8.41425 - 8.41475	167.72 - 173.2	3500 - 4400	
12.29 - 12.293	240 – 285	4500 - 5150	
12.51975 - 12.52025	322 - 335.4	5350 - 5460	

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic. Only the worst-case plots are listed.

5.6 Dwell time

For test instruments and accessories used see section 6 Part **MB**.

5.6.1 Description of the test location

Test location: Shielded Room SR6

5.6.2 Applicable standard

According to FCC Part 15, Section 15.247(a):

In Section 15.247(a)(1)(i) are dwell times defined for the special frequency ranges should not exceed by a frequency hopping system.

5.6.3 Test result

Channel frequency (MHz)	Number of Bursts (per 20s)	duration of 1 burst (ms)	Dwell time (ms)
927.25	45	6.5 ms	292,5

Limit according to FCC Part 15C, Section 15.247(1)(i):

For frequency hopping systems operating in the 902-928 MHz band:

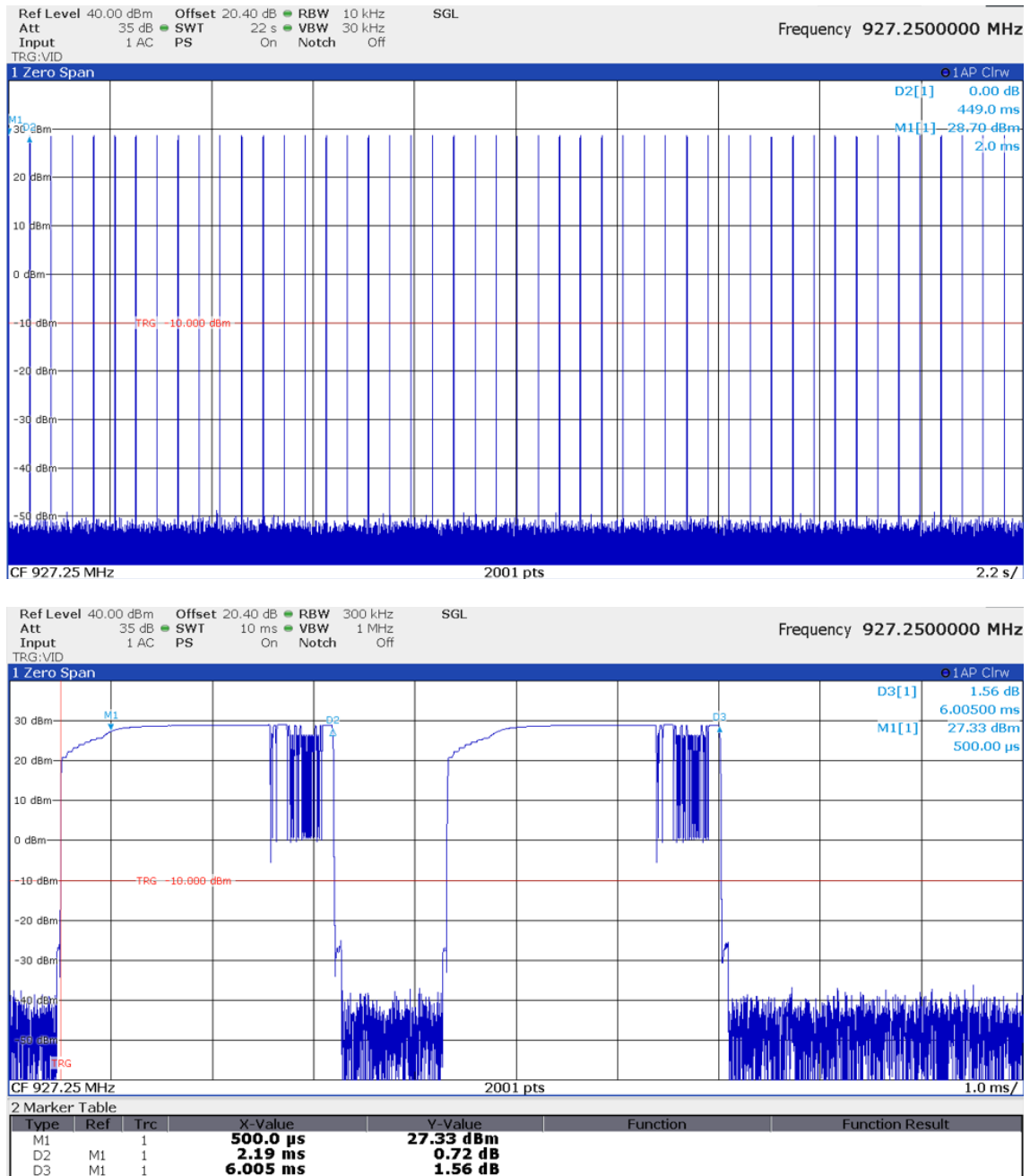
The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period;

Frequency (MHz)	Hopping Channels	time of period (s)	Limit dwell time (ms)
927.25	50	20	< 400

The requirements are **FULFILLED**.

Remarks: For detailed test results please see the following test plots.

5.6.4 Test protocol



5.7 Number of hopping channels

For test instruments and accessories used see section 6 Part **MB**.

5.7.1 Description of the test location

Test location: Shielded Room SR6

5.7.2 Applicable standard

According to FCC Part 15, Section 15.247(a)(1)(i):

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

5.7.3 Description of Measurement

The method of measurement is used set out in ANSI C63.10, 7.8.3.

5.7.4 Test result

Hopping channel frequency range	Number of all available hopping channels
902 - 928	50

Channel 1 (MHz)	Channel 2 (MHz)	Hopping Channels	Separation (kHz)
926.75	927.25	50	500

Limit according to FCC Part 15C, Section 15.247(1):

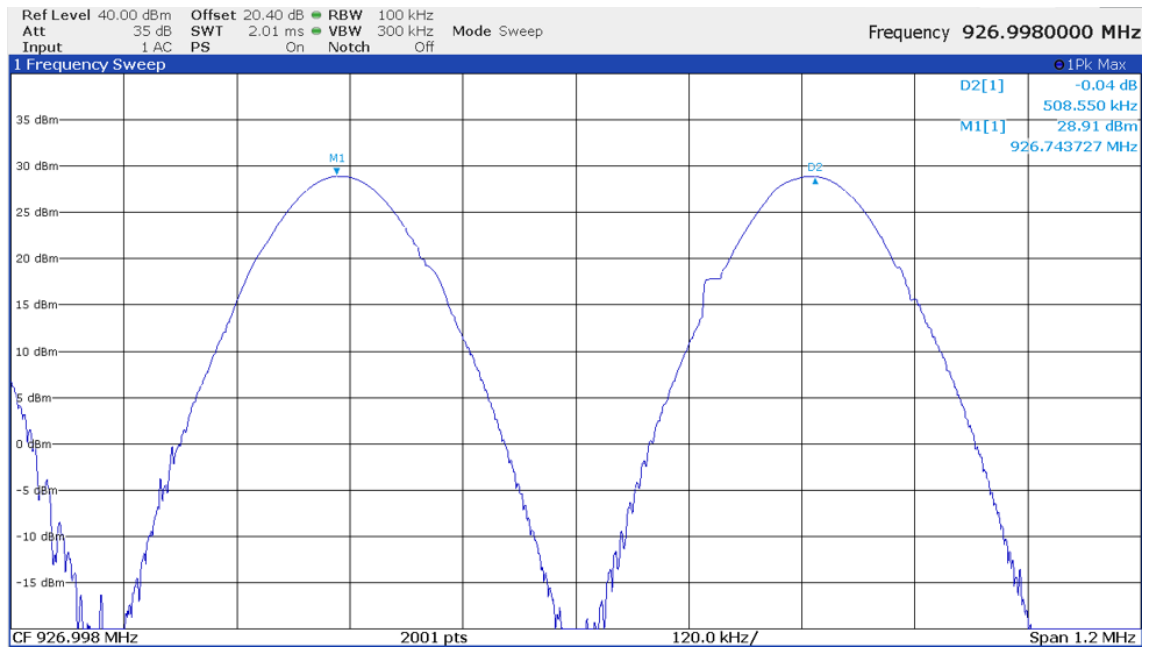
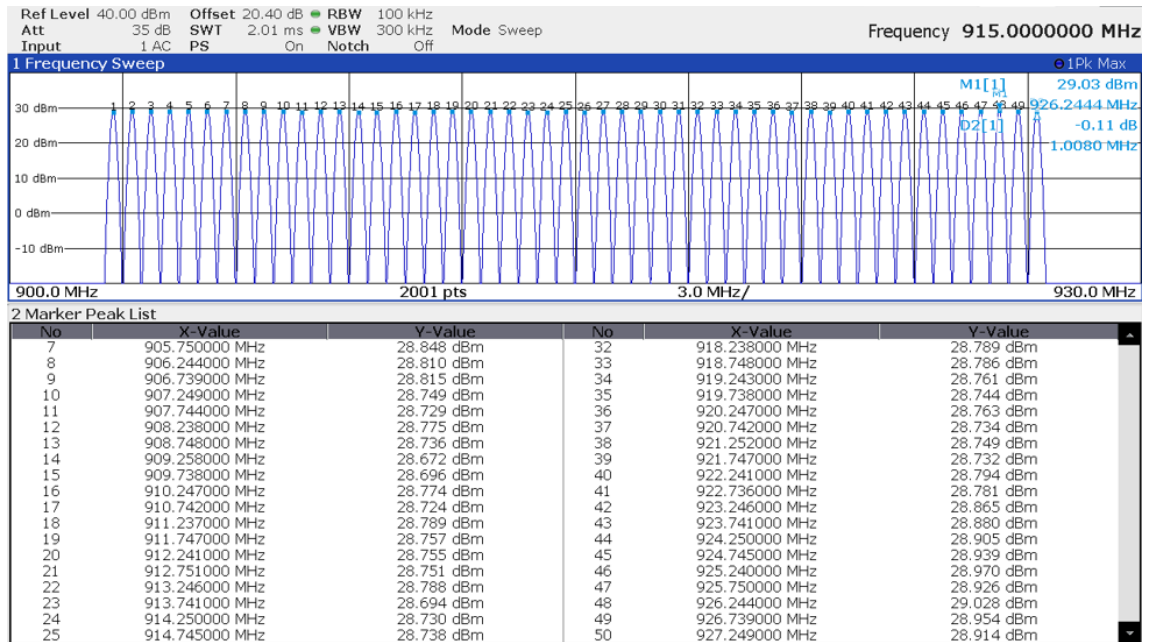
Frequency range (MHz)	LIMIT (Number of Hopping Channels)			
	20dB Bandwidth < 250kHz	20dB Bandwidth > 250kHz	20dB Bandwidth < 1 MHz	20dB Bandwidth > 1MHz
902 - 928	50	-	-	-

The requirements are **FULFILLED**.

Remarks: For detailed test results please see the following test plots.

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

5.7.5 Test protocol



6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESR3	EMI Test Receiver	Rohde & Schwarz Memmingen	09-02/03-21-001	16/07/2026	16/07/2025		
	ENV432	V-Netznachbildung	Rohde & Schwarz Memmingen	09-02/20-21-001	02/09/2026	02/09/2024	30/07/2026	30/07/2025
	KK-SPU195FR01-2X11_N-50-3-64	Kabelkonf. Spuma_195-	Huber + Suhner	09-02/50-21-031				
	KK-SPU195FR01-2X11N-3,5M	Kabelkonf. Spuma_195-	Huber + Suhner	09-02/50-21-037				
	CDB-10K-18-50V-NMF-I	DC Blocker	Tactron Elektronik	09-02/50-22-033			04/06/2026	04/06/2025
	BAT-EMC 2026.0.4.1	Nexio Software	EMCO Elektronik GmbH	09-02/68-21-002				
CPC 3	18N50W-20 dB	Attenuator	Aeroflex / Inmet, Inc.	02-02/50-14-017				
	NMS111-GL200SCC01-	RF Cable	GigaLane Co., Ltd.	02-02/50-17-014				
	ESW44	EMI Test Receiver	Rohde & Schwarz Memmingen	09-16/03-24-001	17/12/2026	17/12/2025		
MB	18N50W-20 dB	Attenuator	Aeroflex / Inmet, Inc.	02-02/50-14-017				
	NMS111-GL200SCC01-	RF Cable	GigaLane Co., Ltd.	02-02/50-17-014				
	ESW44	EMI Test Receiver	Rohde & Schwarz Memmingen	09-16/03-24-001	17/12/2026	17/12/2025		
SEC 1-3	18N50W-20 dB	Attenuator	Aeroflex / Inmet, Inc.	02-02/50-14-017				
	NMS111-GL200SCC01-	RF Cable	GigaLane Co., Ltd.	02-02/50-17-014				
	ESW44	EMI Test Receiver	Rohde & Schwarz Memmingen	09-16/03-24-001	17/12/2026	17/12/2025		

SER 1	ESR 7	EMI Test Receiver	Rohde & Schwarz Memmingen	09-02/03-21-004	18/08/2026	18/08/2025		
	HFH2-Z2E	Active Loop Antenna	Rohde & Schwarz Memmingen	09-02/24-21-001	05/08/2026	05/08/2025		
	IN600	Bias Unit	Rohde & Schwarz Memmingen	09-02/50-21-015				
	KK-7.8F-2XNM_4.0M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-018				
	KK-7.8F-2XNM_4.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-023				
	KK-7.8F-2XNM_9.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-025				
	KK-SF118-2X11N-4.0M	RF Cable	Huber + Suhner	09-02/50-23-034				

SER 2	ESR 7	EMI Test Receiver	Rohde & Schwarz Memmingen	09-02/03-21-004	18/08/2026	18/08/2025		
	VULB9168	Trilog-Broadband	Schwarzbeck Mess-Elektronik	09-02/24-22-003	05/08/2026	05/08/2025	21/08/2026	21/08/2025
	SAC2 - NSA 3m	NSA ANSI C63.5	CSA Group Bayern GmbH	09-02/30-23-003			16/09/2026	16/09/2025
	KK-7.8F-2XNM_4.0M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-018				
	KK-7.8F-2XNM_4.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-023				
	KK-7.8F-2XNM_9.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-025				
	50F-003 N 3dB	Attenuator 3dB	Tactron Elektronik	09-02/50-22-002				
	CDB-10K-18-50V-NMF-I	DC Blocker	Tactron Elektronik	09-02/50-22-031			04/06/2026	04/06/2025
	KK-SF526S-2X11N-10.0M	RF Cable	Tactron Elektronik	09-02/50-25-002				
	BAT-EMC 2026.0.4.1	Nexio Software	EMCO Elektronik GmbH	09-02/68-21-002				

SER 3	ESW26	EMI Test Receiver	Rohde & Schwarz München	02-02/03-17-002	25/06/2026	25/04/2025		
	AMF-6D-01002000-22-10P	RF Amplifier	MITEQ, Inc.	02-02/17-15-004				
	3117	Horn Antenna	ETS Lindgren	02-02/24-20-007	31/08/2026	17/11/2025		
	WHJS 1000-10EF	High Pass Filter	EMCO Elektronik GmbH	02-02/50-13-003				
	BAM 4.5-P	Antenna Mast	maturo GmbH	02-02/50-17-024				
	KK-SF106-2X11N-6,5M	RF Cable	Huber + Suhner	02-02/50-18-016				
	0_5 Meter DC-18GHz	NMS111-GL200SC06_5	Tactron Elektronik	09-16/50-23-003				

7 Detailed measurement uncertainty

Note: The following table provides an overview of all uncertainties for CSA Group Bayern GmbH

Measurement	Ucisp [dB]	Ulab comb. + [dB]	Ulab comb. - [dB]	Ulab exp. + [dB]	Ulab exp. - [dB]
EMISSION					
Conducted disturbance at AC mains and other port power using a V-AMN (150 kHz to 30 MHz)	3.4 dB	1.48 dB	1.58 dB	2.96 dB	3.16 dB
Radiated disturbance (disturbance current in a Loop antenna 9 kHz to 30 MHz)	na	1.36 dB	1.39 dB	2.73 dB	2.78 dB
Radiated disturbance (electrical field strength in a SAC; 30 MHz – 1000 MHz; Hybrid antenna; 3 m or 10 m)	6.3 dB	2.08 dB	2.07 dB	4.17 dB	4.13 dB
Radiated disturbance (electrical field strength in a SAC / FAR; 1 GHz – 6 GHz)	5.2 dB	2.54 dB	1.87 dB	5.07 dB	3.73 dB
Radiated disturbance (electrical field strength in a SAC / FAR; 6 GHz – 18 GHz)	5.5 dB	2.70 dB	2.15 dB	5.40 dB	4.30 dB
Radiated disturbance (electrical field strength in a SAC / FAR ; 18 GHz – 40 GHz)	na	2.95 dB	2.78 dB	5.91 dB	5.55 dB
6 dB / 20 dB / 26 dB / 99% bandwidth	na	$2.5 \cdot 10^{-7} \%$	$2.5 \cdot 10^{-7} \%$	$4.9 \cdot 10^{-6} \%$	$4.9 \cdot 10^{-6} \%$
Frequency stability	na	$2.5 \cdot 10^{-7} \%$	$2.5 \cdot 10^{-7} \%$	$4.9 \cdot 10^{-6} \%$	$4.9 \cdot 10^{-6} \%$

- End of test report -