Report on the FCC and IC Testing of the dormakaba EAD GmbH
Model: dormakaba registration unit 90 01
In accordance with FCC 47 CFR Part 15C and ISED Canada RSS-210, ISED Canada RSS-247 and ISED Canada RSS-GEN

Prepared for: dormakaba EAD GmbH
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Germany

FCC ID: NVI-DKRU9001K6
IC: 11038A-DKRU9001K6

Product Service

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Date: 2020-06-15
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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alex Fink	2020-06-15	SIGN-ID 368545
Authorised Signatory	Martin Steindl	2020-06-15	SIGN-ID 368619

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C and ISED Canada RSS-210, ISED Canada RSS-247 and ISED Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Alex Fink	2020-06-15	SIGN-ID 368545

Laboratory Accreditation	Laboratory recognition	ISED Canada test site registration
DAkkS Reg. No. D-PL-11321-11-02 DAkkS Reg. No. D-PL-11321-11-03	Registration No. BNetzA-CAB-16/21-15	3050A-2

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C, ISED RSS-210, Issue 10 (12-2019), ISED Canada RSS-247, Issue 2 (2017-02) and ISED Canada RSS-GEN:2016, Issue 5 (2019-03).

ACCREDITATION
Our BNetzA Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our BNetzA Accreditation.
Results of tests not covered by our BNetzA Accreditation Schedule are marked NBA (Not BNetzA Accredited).

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Product Service

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2020-03-20
2	FCC ID corrected	2020-03-26
3	Section 3.12.: RFID Exposure Calculation added	2020-06-15

Table 1

1.2 Introduction

Applicant	dormakaba EAD GmbH
Manufacturer	dormakaba EAD GmbH
Model Number(s)	dormakaba registration unit 90 01
Serial Number(s)	111815100002
Hardware Version(s)	Series: K6
Software Version(s)	Series: K6
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C, ISED Canada RSS-210, Issue 10 (12-2019), ISED Canada RSS-247, Issue 2 (2017-02) and ISED Canada RSS-GEN:2016, Issue 5 (2019-03)
Test Plan/Issue/Date	---
Order Number	---
Date	2020-03-05
Date of Receipt of EUT	2020-03-05
Start of Test	2020-03-09
Finish of Test	2020-03-17
Name of Engineer(s)	Alex Fink
Related Document(s)	ANSI C63.10 (2013)

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and ISED Canada RSS-210, ISED Canada RSS-247 and ISED Canada RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Continuously Transmitting with RFID and BLE				
3.1	15.247 (d), 15.205, 5.5 and 6.13	Spurious Radiated Emissions	Pass	ANSI C63.10 (2013)
3.2	15.205 N/A and 8.10	Restricted Band Edges	Pass	ANSI C63.10 (2013)
3.3	15.247 (d), 5.5 and N/A	Authorised Band Edges	Pass	ANSI C63.10 (2013)
3.4	15.247 (a)(2), 5.2 and 6.6	Emission Bandwidth	Pass	ANSI C63.10 (2013)
3.5	15.247 (e), 5.2 and 6.12	Power Spectral Density	Pass	ANSI C63.10 (2013) KDB 662911 D01 v02r02
3.6	15.247 (b), 5.4 and 6.12	Maximum Conducted Output Power	Pass	ANSI C63.10 (2013) KDB 662911 D01 v02r02
3.7	15.207, N/A and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10 (2013)
3.8	RSS-Gen, Issue 5, 6.11	Transmitter frequency stability	Pass	RSS-Gen, Issue 5, April 2018, chapter 6.11
3.9	15.215 (c); --- and 6.7	Occupied Bandwidth	Pass	ANSI C63.10 (2013)
3.10	15.225 (a)(b)(c)(d); B.6; 6.13	Field Strength of any Emission	Pass	ANSI C63.10 (2013)
3.11	15.225 (e); B.6; ---	Frequency Tolerance Under Temperature Variations	Pass	ANSI C63.10 (2013)
3.12	---; --- and 3.2	Exposure of Humans to RF Fields	Pass	IC RSS-102, Issue 5, section 2.5 KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

Table 2

Product Service

1.4 Basic information of EUT

The registration unit is a remote reader for authorization checking within an access control system. The registration unit enables the contactless reading and writing of RFID media as well as access via a smartphone (Mobile Access). The registration unit supports the following technologies:

- RFID MIFARE DESFire/Classic
- RFID LEGIC advant/prime
- NFC (Android Smartphone)
- Bluetooth Low Energy (Android Smartphone + iPhone)

The actually usable technologies depend on the system solution in which the registration unit is integrated. The registration unit is connected to a superior control device using a coaxial cable. The registration unit is installed directly on the wall in the door area. The registration unit is equipped with a light icon (red/green) and a buzzer for optical and acoustic signalling.

1.5 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer, S/N: 111815100002	Not Applicable	Not Applicable

Table 3

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer, S/N: --- (antenna port replaced with 50 Ohm resistor)	Not Applicable	Not Applicable

Table 4

Product Service

1.6 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)
Configuration and Mode: Continuously Transmitting with RFID and BLE	
Spurious Radiated Emissions	Alex Fink
Restricted Band Edges	Alex Fink
Authorised Band Edges	Alex Fink
Emission Bandwidth	Alex Fink
Power Spectral Density	Alex Fink
Maximum Conducted Output Power	Alex Fink
AC Power Line Conducted Emissions	Alex Fink
Transmitter frequency stability	Alex Fink
Exposure of Humans to RF Fields	Alex Fink

Table 5

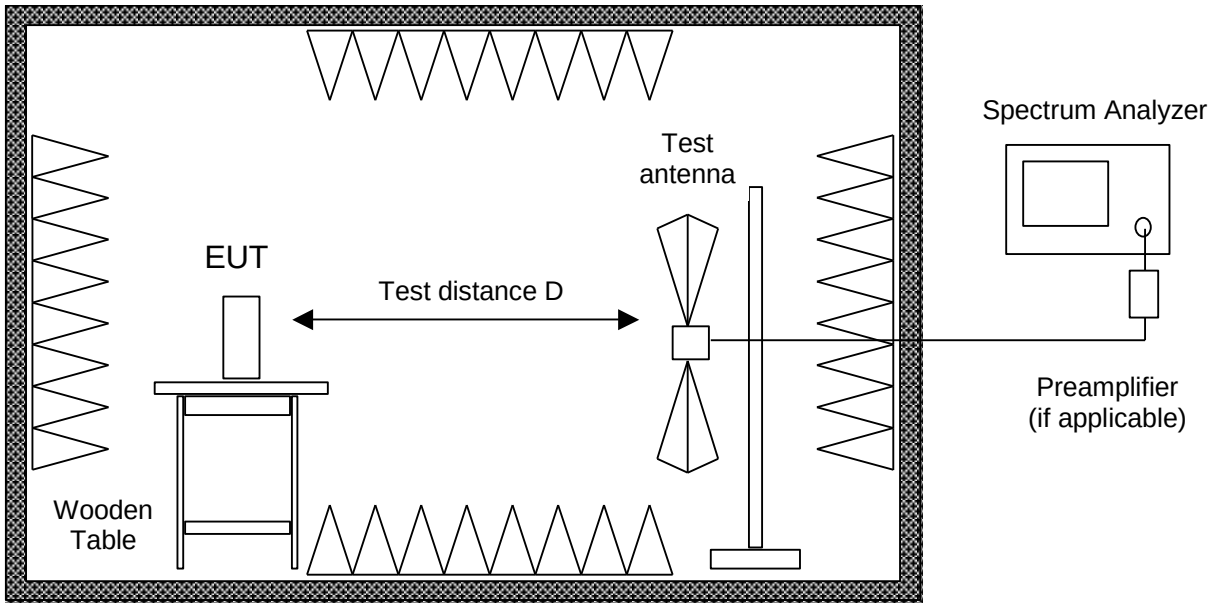
Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Setup

2.1 Radiated Emission in Fully or Semi Anechoic Room



Fully or semi anechoic room

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 8.2 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz a semi anechoic room complying with the NSA requirements of ANSI C63.4 for alternative test sites is used (see 2.2). If prescans are recorded in fully anechoic room they are indicated appropriately.

Product Service

According to section 13 of KDB558074 the requirement for radiated emissions on the band edges was performed with a reduced bandwidth of 100 kHz instead of 1 MHz.

Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

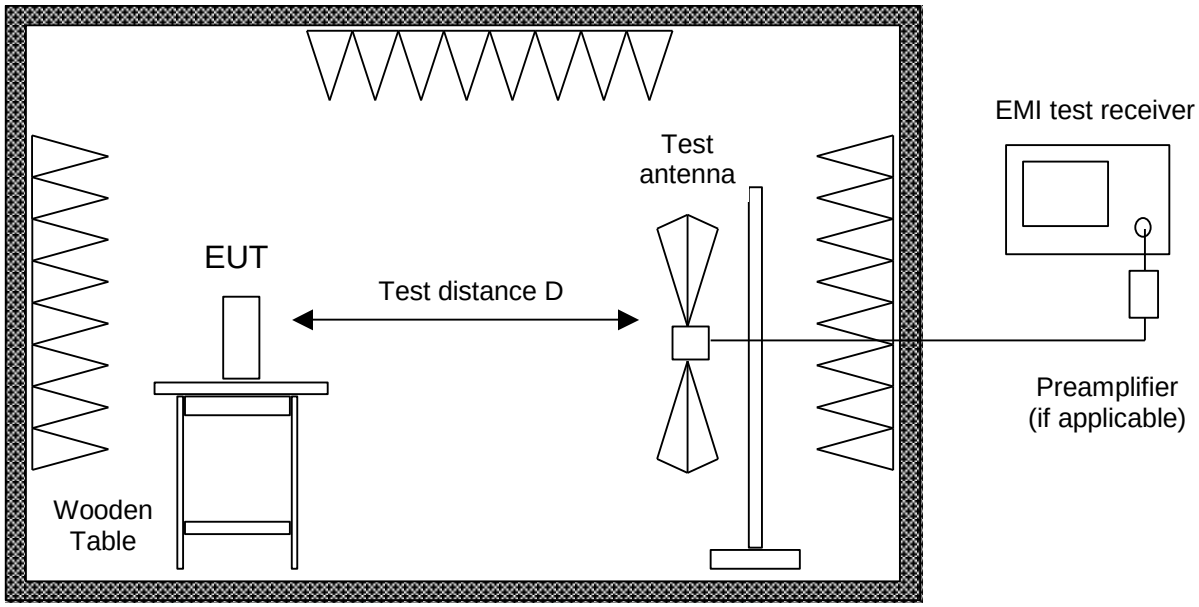
EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.
If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances).

Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Product Service

2.2 Radiated Emission at Alternative Test Site



Alternate test site (semi anechoic room)

Radiated emission in the frequency range 30 MHz to 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4 for alternative test sites. A linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna") is used. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in fully anechoic room.

If no prescan in a fully anechoic room is used first a peak scan is performed in four positions to get the whole spectrum of emission caused by EUT with the measuring antenna raised and lowered from 1 to 4 m to find table position, antenna height and antenna polarization for the maximum emission levels. Data reduction is applied to these results to select those levels having less margin than 10 dB to or exceeding the limit using subranges and limited number of maximums. Further maximization is following.
With detector of the test receiver set to quasi-peak final measurements are performed immediately after frequency zoom (for drifting disturbances) and maximum adjustment.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

In cases where prescans in a fully anechoic room are taken (e. g. if EUT is operating for a short time only or battery is dircharged quickly) final measurements with quasi-peak detector are performed manually at frequencies indicated by prescan with EUT rotating all around and receiving antenna raising and lowering within 1 meter to 4 meters to find the maximum levels of emission.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

Product Service

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.

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3 Test Details

3.1 Spurious Emissions

3.1.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (d), 15.205, 5.5 and 6.13

3.1.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.1.3 Date of Test

2020-03-10 and 2020-03-11

3.1.4 Test Method

Plots for average measurements were taken in accordance with ANSI C63.10-2013 clause 4.1.4.2.3 to characterize the EUT. Where emissions were detected, final average measurements were taken in accordance with ANSI C63.10-2013 clause 4.1.4.2.2.

The plots shown are the characterization of the EUT. The limits on the plots represent the most stringent case for restricted bands, (54/74 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

3.1.5 Environmental Conditions

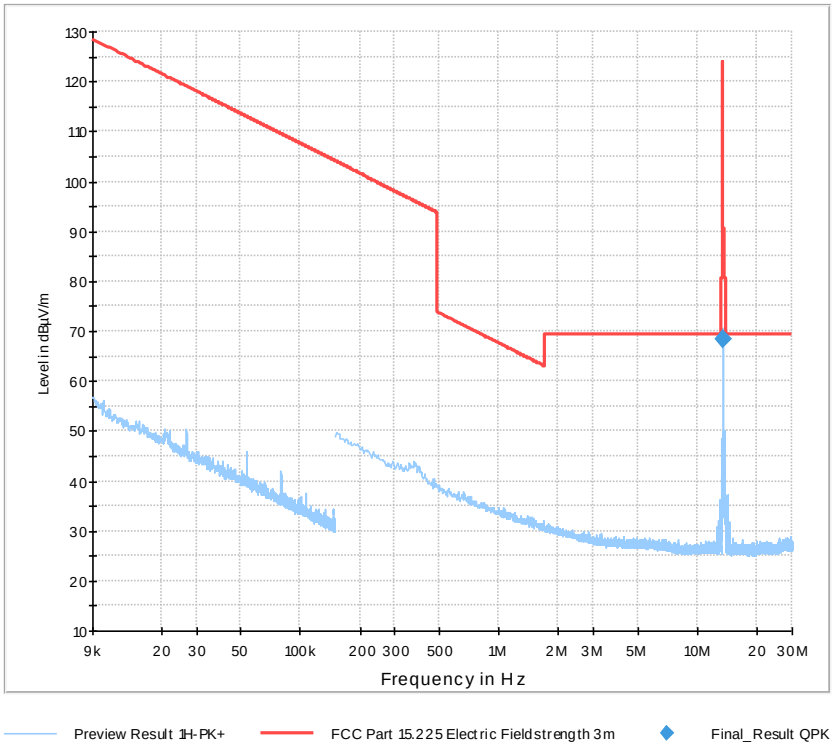
Ambient Temperature	22.0 °C
Relative Humidity	33.0 %

3.1.6 Test Results

Sample calculation of final values:

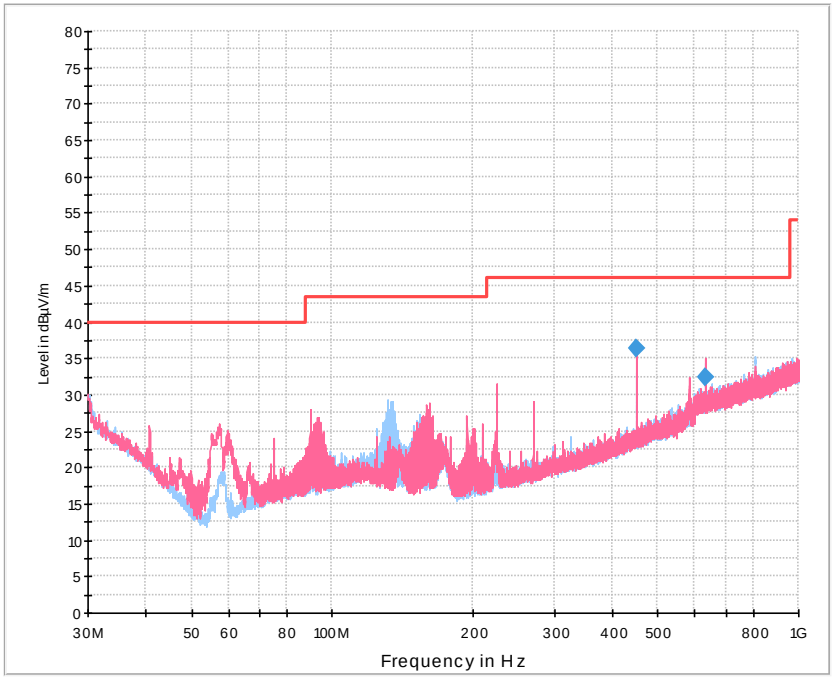
Final Value (dBµV/m) = Reading Value (dBµV) + Cable Correction Factor (dB)
+ Antenna Correction Factor (dB/m)
+ Pulse Train Correction (dB)

Transmission on 13.56 MHz (RFID) and 2402 MHz (BLE)



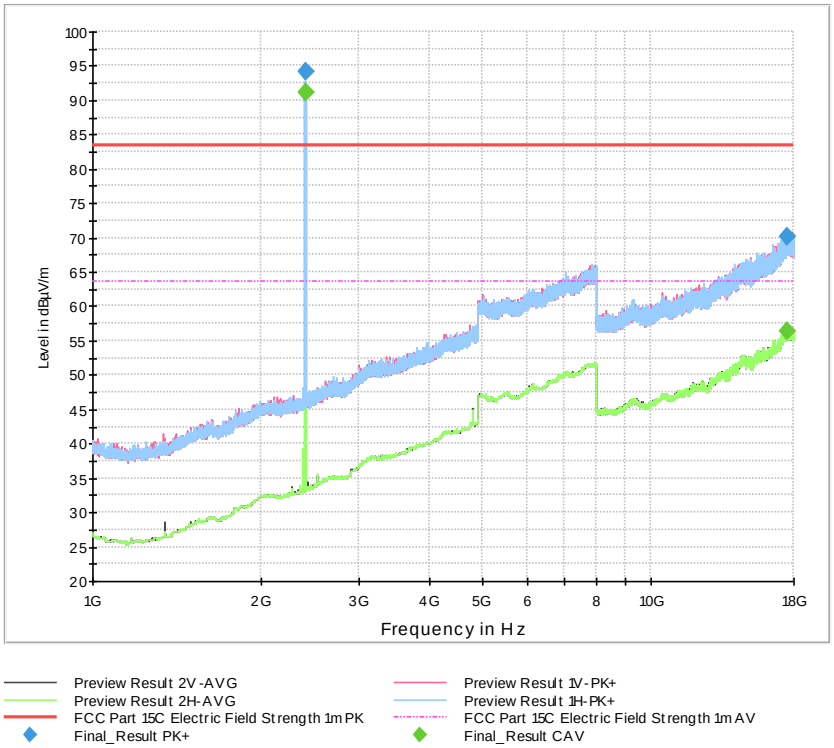
Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
13.560000	68.40	---	124.00	55.60	1000.0	9.000	100.0	H	184.0	18.8



Final Results:

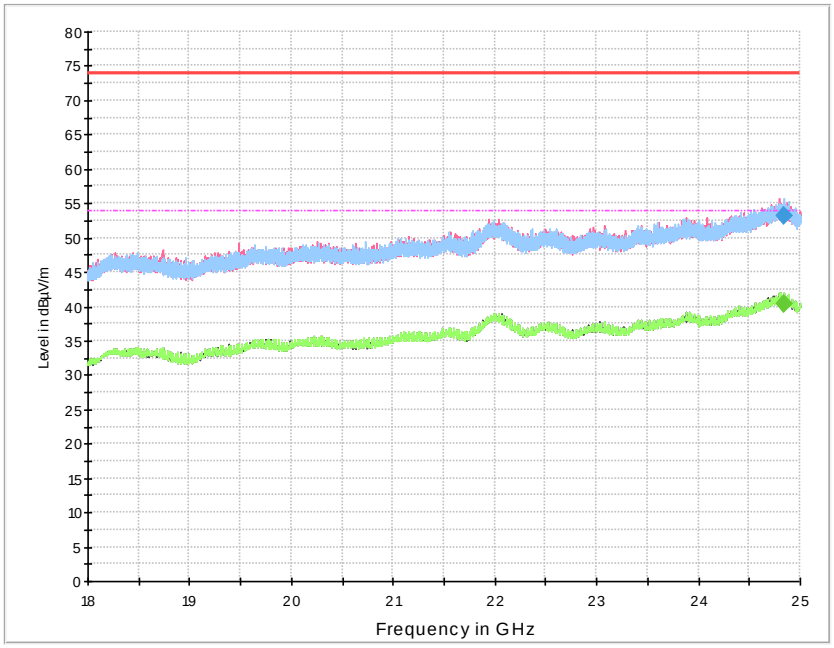
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
449.970000	36.39	46.02	9.63	1000.0	120.000	137.0	V	-126.0	22.7
630.000000	32.47	46.02	13.55	1000.0	120.000	104.0	V	-17.0	25.5



Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2402.250000	94.06	---	#1	#1	1000.0	1000.000	195.0	H	192.0	32.3
2402.250000	---	91.22	#1	#1	1000.0	1000.000	195.0	H	192.0	32.3
17573.250000	70.12	---	83.50	13.38	1000.0	1000.000	109.0	H	-98.0	54.4
17573.250000	---	56.37	63.50	7.13	1000.0	1000.000	109.0	H	-98.0	54.4

Note: #1: Emission within the frequency band

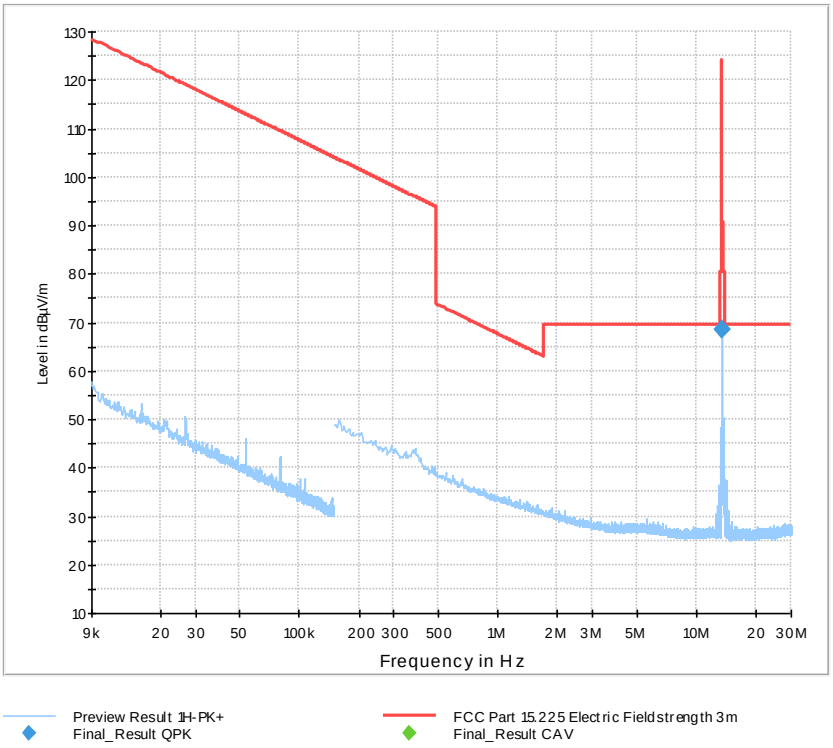


Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
24843.500000	---	40.27	53.98	13.71	1000.0	1000.000	107.0	V	-104.0	21.4
24843.500000	53.27	---	73.98	20.71	1000.0	1000.000	107.0	V	-104.0	21.4

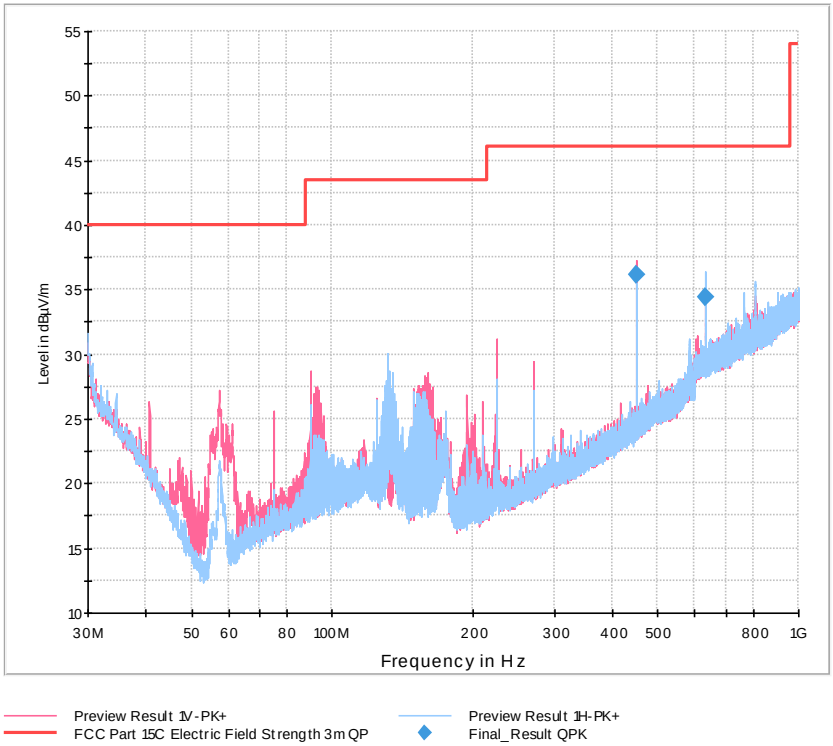
Product Service

Transmission on 13.56 MHz (RFID) and 2442 MHz (BLE)



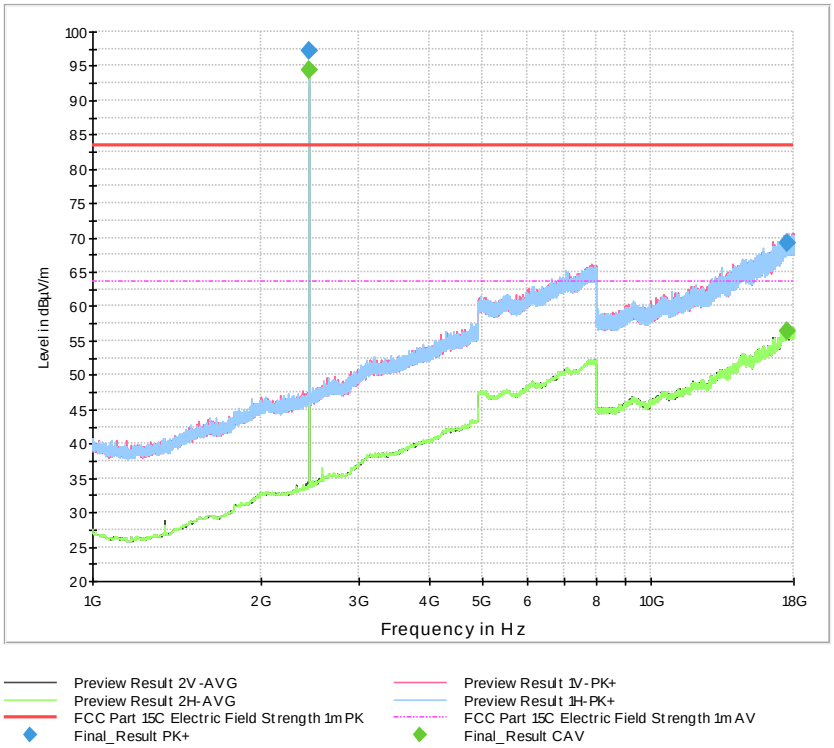
Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
13.560000	68.53	---	124.00	55.47	1000.0	9.000	100.0	H	182.0	18.8



Final Results:

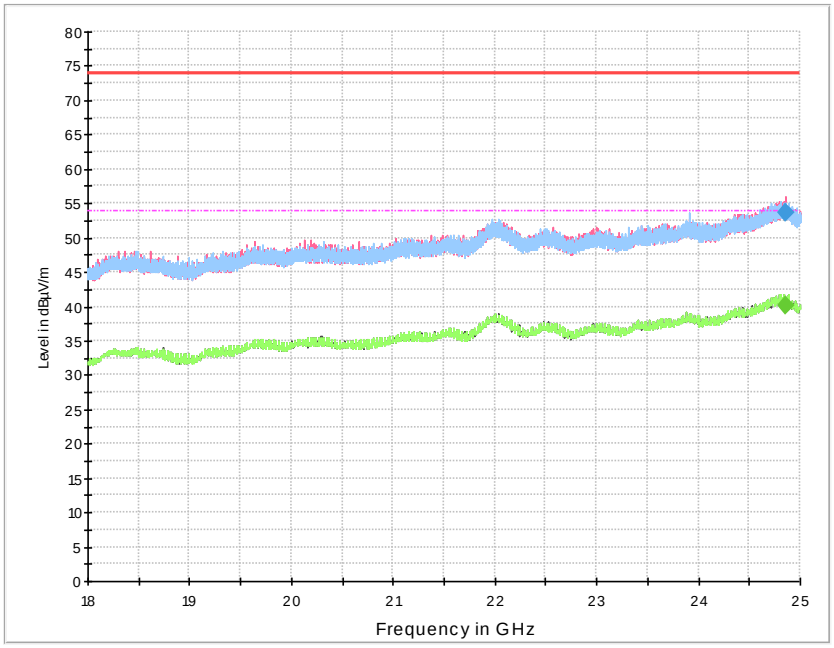
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
450.000000	36.17	46.02	9.85	1000.0	120.000	116.0	V	-128.0	22.7
630.000000	34.37	46.02	11.65	1000.0	120.000	133.0	H	-55.0	25.5



Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2442.250000	---	94.32	#1	#1	1000.0	1000.000	215.0	H	197.0	32.6
2442.250000	97.12	---	#1	#1	1000.0	1000.000	215.0	H	197.0	32.6
17574.750000	---	56.47	63.50	7.03	1000.0	1000.000	120.0	V	-176.0	54.4
17574.750000	69.25	---	83.50	14.25	1000.0	1000.000	120.0	V	-176.0	54.4

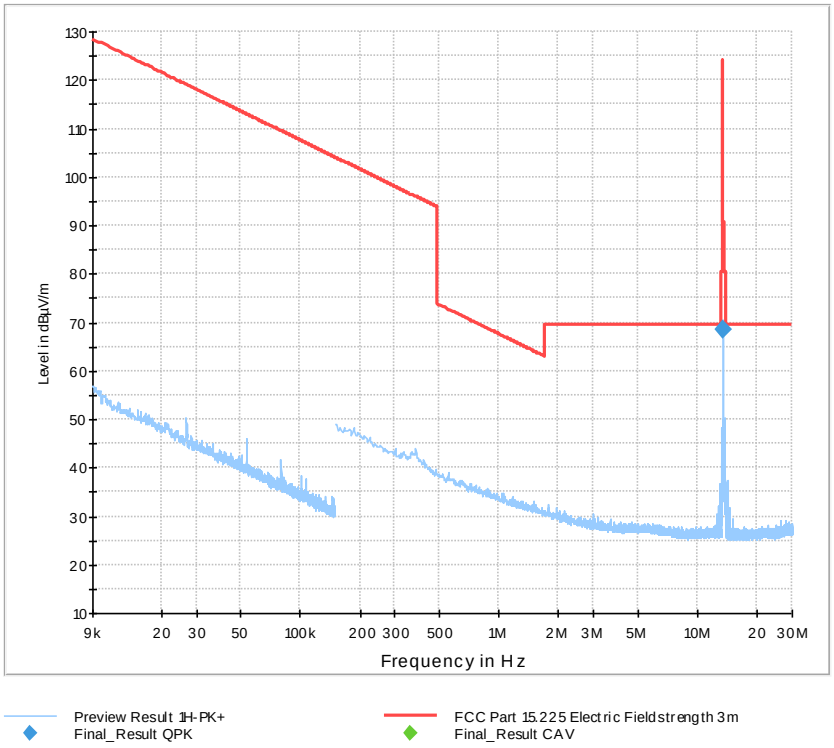
Note: #1: Emission within the frequency band



Final Results:

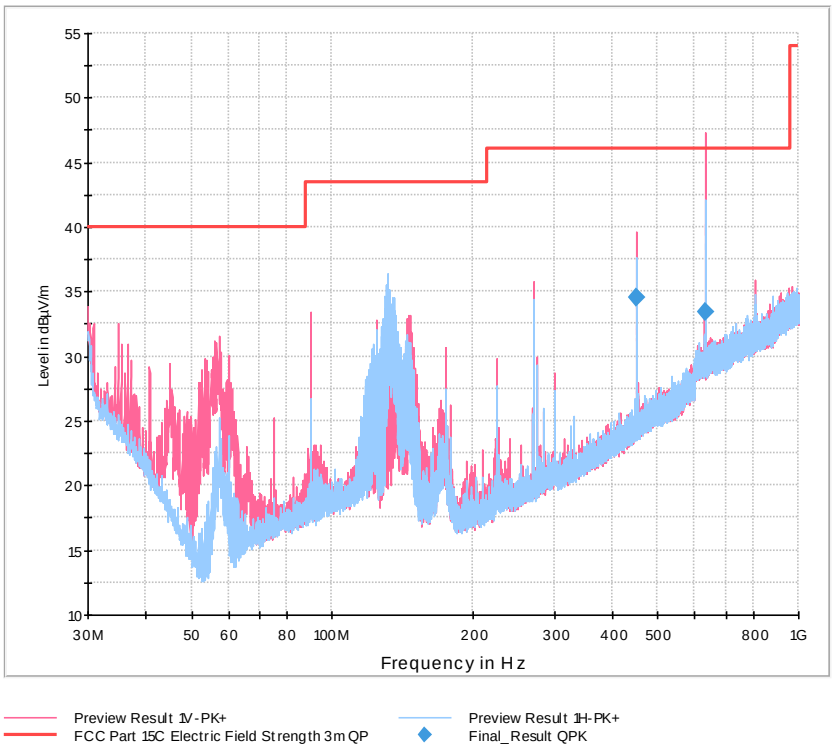
Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
24858.500000	---	40.18	53.98	13.80	1000.0	1000.000	112.0	V	162.0	21.4
24858.500000	53.61	---	73.98	20.37	1000.0	1000.000	112.0	V	162.0	21.4

Transmission on 13.56 MHz (RFID) and 2480 MHz (BLE)



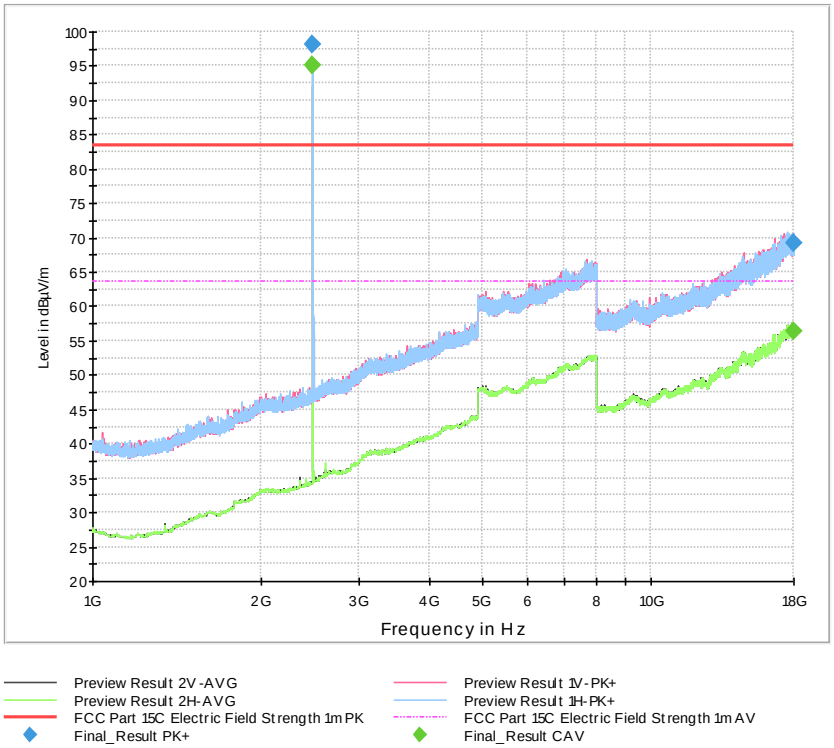
Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
13.560000	68.42	---	124.00	55.58	1000.0	9.000	100.0	H	179.0	18.8



Final Results:

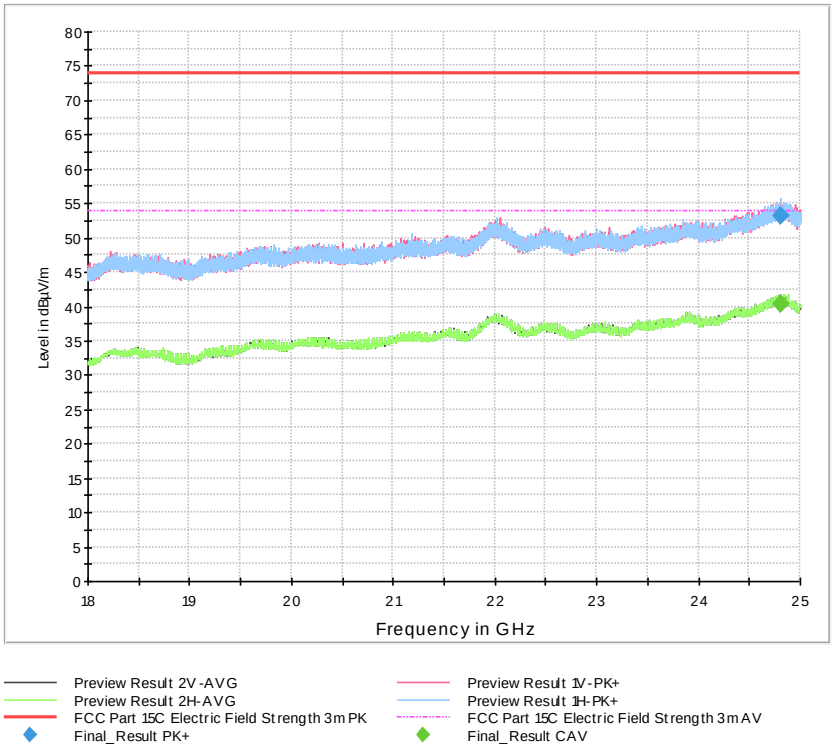
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
450.000000	34.51	46.02	11.51	1000.0	120.000	111.0	V	57.0	22.7
630.000000	33.41	46.02	12.61	1000.0	120.000	104.0	V	-9.0	25.5



Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2480.250000	98.09	---	#1	#1	1000.0	1000.000	214.0	H	200.0	32.9
2480.250000	---	95.21	#1	#1	1000.0	1000.000	214.0	H	200.0	32.9
17996.750000	69.24	---	83.50	14.26	1000.0	1000.000	115.0	V	-122.0	55.0
17996.750000	---	56.30	63.50	7.20	1000.0	1000.000	115.0	V	-122.0	55.0

Note: #1: Emission within the frequency band



Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
24818.250000	---	40.27	53.98	13.71	1000.0	1000.000	275.0	H	76.0	21.3
24818.250000	53.28	---	73.98	20.70	1000.0	1000.000	275.0	H	76.0	21.3

Product Service

FCC 47 CFR Part 15, Limit Clause 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)

ISED Canada RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Product Service

3.1.7 Test Location and Test Equipment Used

Radiated Tests were carried out in FAR No.11

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2021-03-31
Double ridged horn antenna	Rohde & Schwarz	HF907	40089	24	2021-02-28
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2023-01-31
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2022-11-30
Horn Antenna with preamplifier	Rohde & Schwarz	A-INFOMW LB-180400H-KF+ TS-	43661	12	2020-10-31
EMC measurement software	Rohde & Schwarz	EMC32 Emission K11 - V10.50.10	42986	---	---
Semi Anechoic Room	Frankonia	Cabin No. 11	42961	36	2022-08-31

Table 6

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.2 Restricted Band Edges

3.2.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.205 N/A and 8.10

3.2.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.2.3 Date of Test

2020-03-10 and 2020-03-11

3.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3. These are shown for information purposes and were used to determine the worst case measurement point. Final average measurements were then taken in accordance with ANSI C63.10 clause 4.1.4.2.2. to obtain the measurement result recorded in the test results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

3.2.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	33.0 %

3.2.6 Test Results

Results are shown in chapter 2.1

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 7

ISED Canada RSS-GEN, Limit Clause 8.9

Frequency (MHz)	Field Strength (µV/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

Table 8

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Product Service

3.2.7 Test Location and Test Equipment Used

Radiated Tests were carried out in FAR No.11

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2021-03-31
Double ridged horn antenna	Rohde & Schwarz	HF907	40089	24	2021-02-28
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2023-01-31
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2022-11-30
Horn Antenna with preamplifier	Rohde & Schwarz	A-INFOMW LB-180400H-KF+ TS-	43661	12	2020-10-31
EMC measurement software	Rohde & Schwarz	EMC32 Emission K11 - V10.50.10	42986	---	---
Semi Anechoic Room	Frankonia	Cabin No. 11	42961	36	2022-08-31

Table 9

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.3 Authorised Band Edges

3.3.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (d), 5.5 and N/A

3.3.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.3.3 Date of Test

2020-03-11

3.3.4 Test Method

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 8.7 and ANSI C63.10-2013

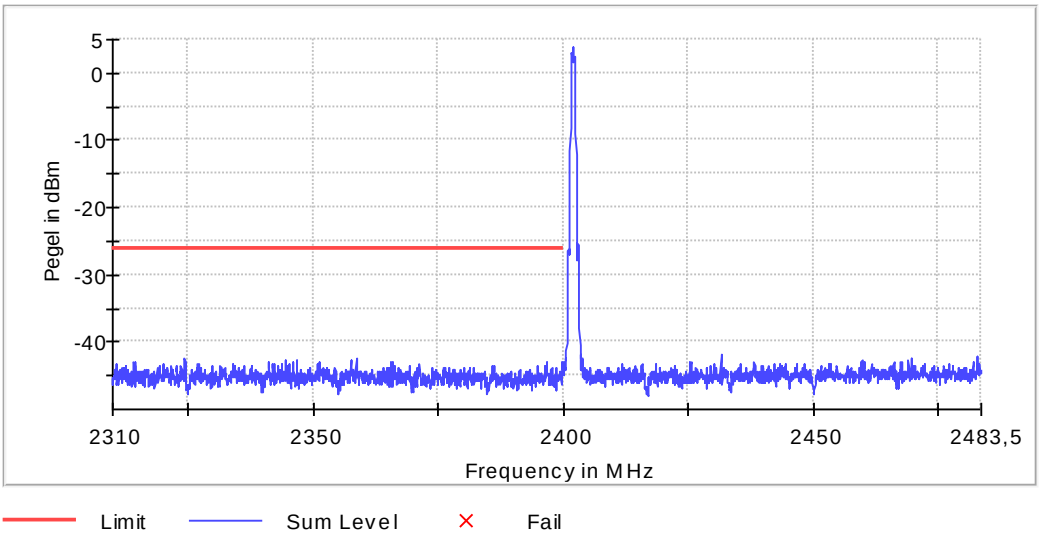
3.3.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	37.0 %

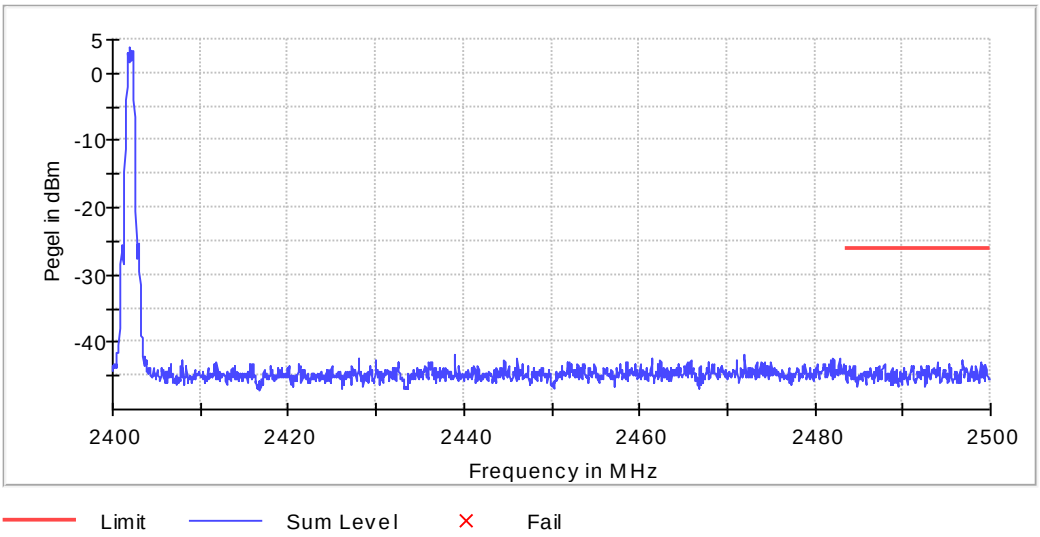
3.3.6 Test Results

Transmission on 13.56 MHz (RFID) and 2402 MHz (BLE)

Band Edge Low

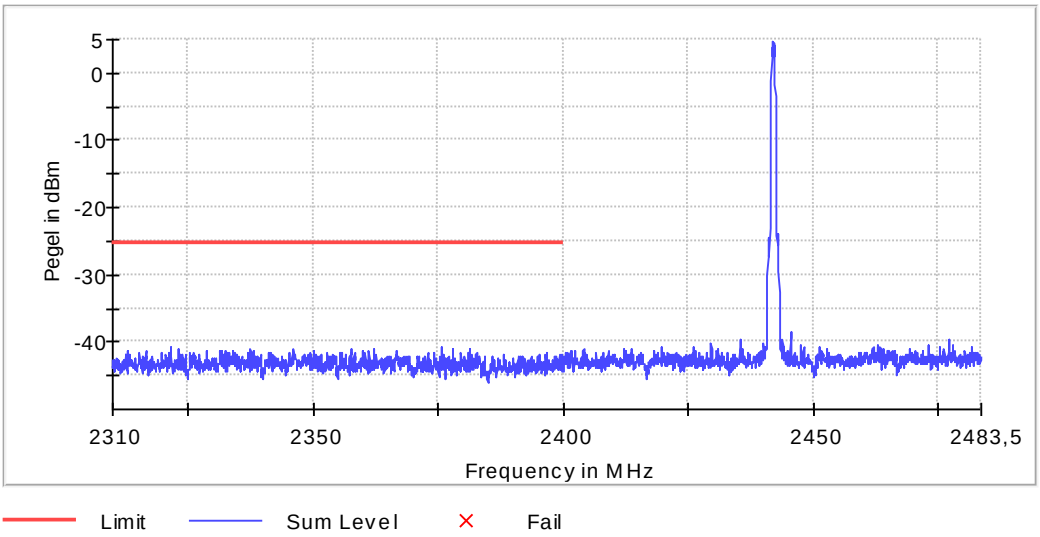


Band Edge High

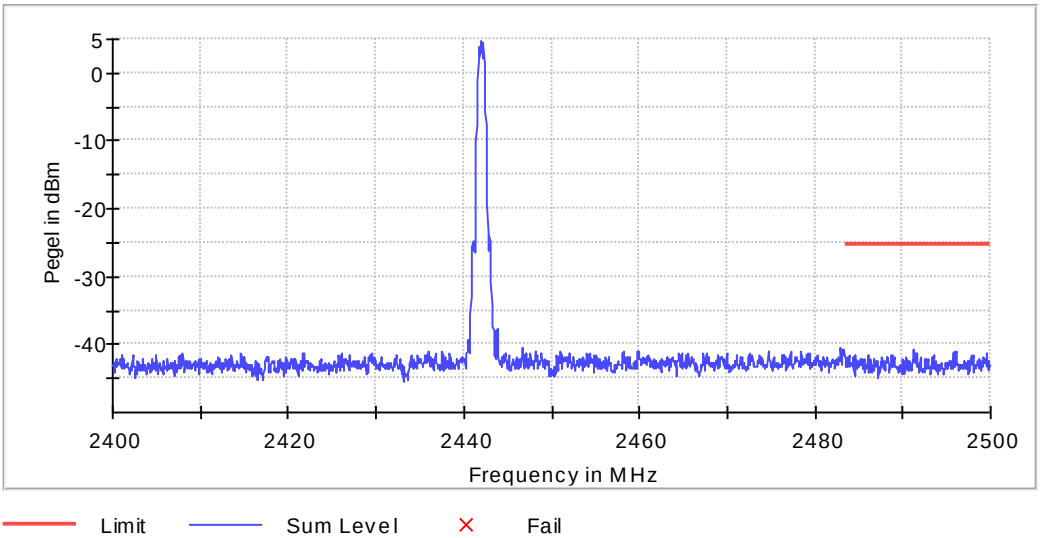


Transmission on 13.56 MHz (RFID) and 2442 MHz (BLE)

Band Edge Low

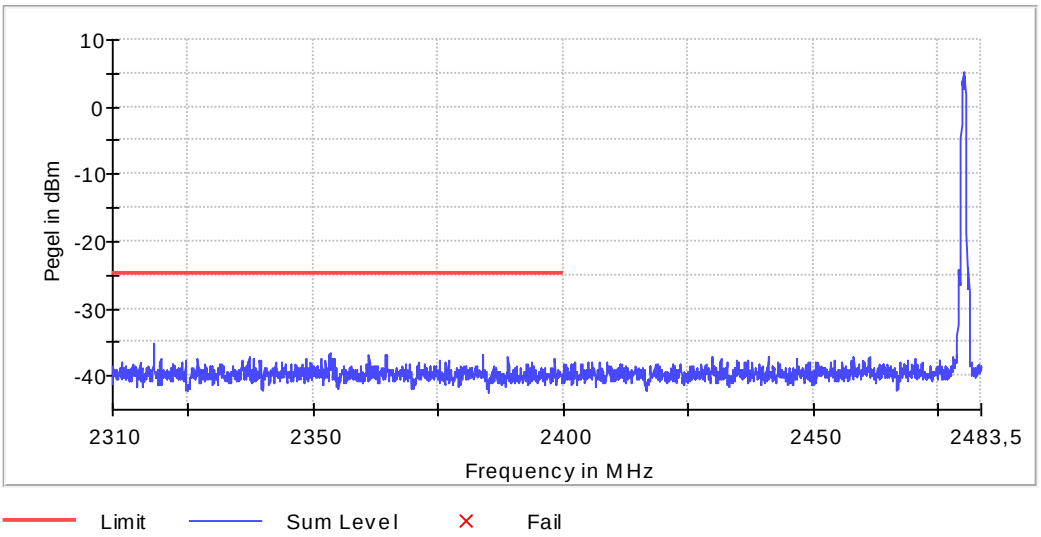


Band Edge High

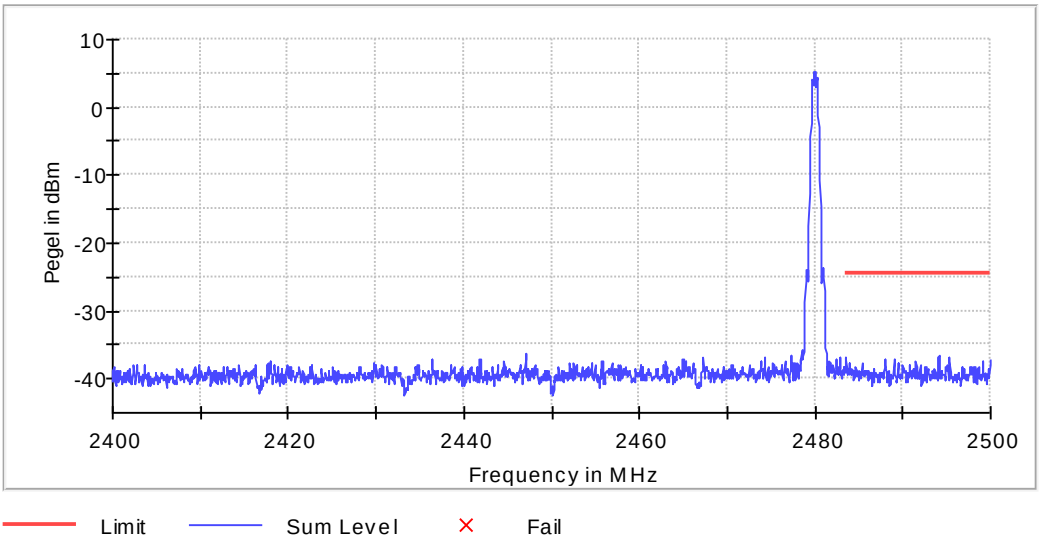


Transmission on 13.56 MHz (RFID) and 2402 MHz (BLE)

Band Edge Low



Band Edge High



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

ISED Canada RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

3.3.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	12	2021-01-31
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2022-11-30
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	24	2022-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 10

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.4 Emission Bandwidth

3.4.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (a)(2), 5.2 and 6.6

3.4.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.4.3 Date of Test

2020-03-11

3.4.4 Test Method

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.8.1

3.4.5 Environmental Conditions

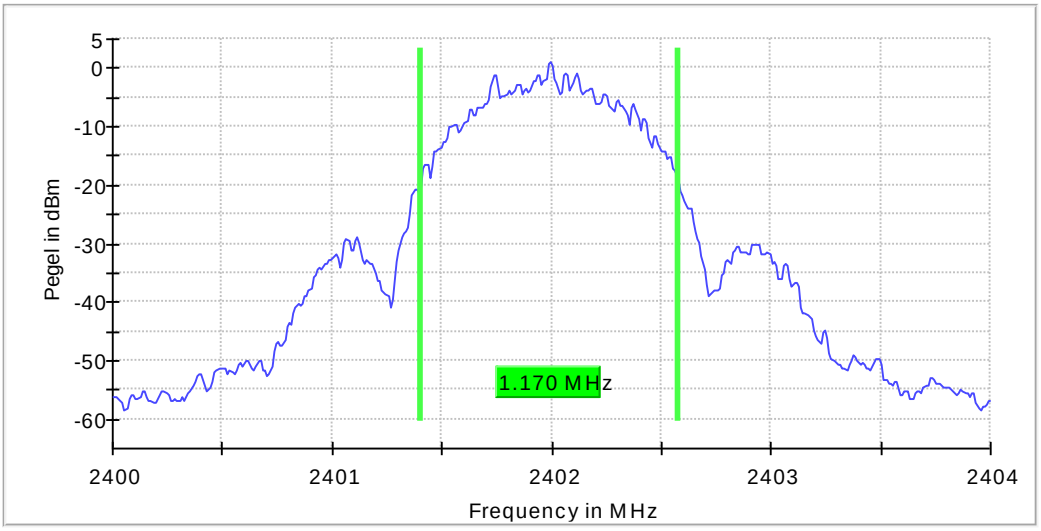
Ambient Temperature	22.0 °C
Relative Humidity	37.0 %

3.4.6 Test Results

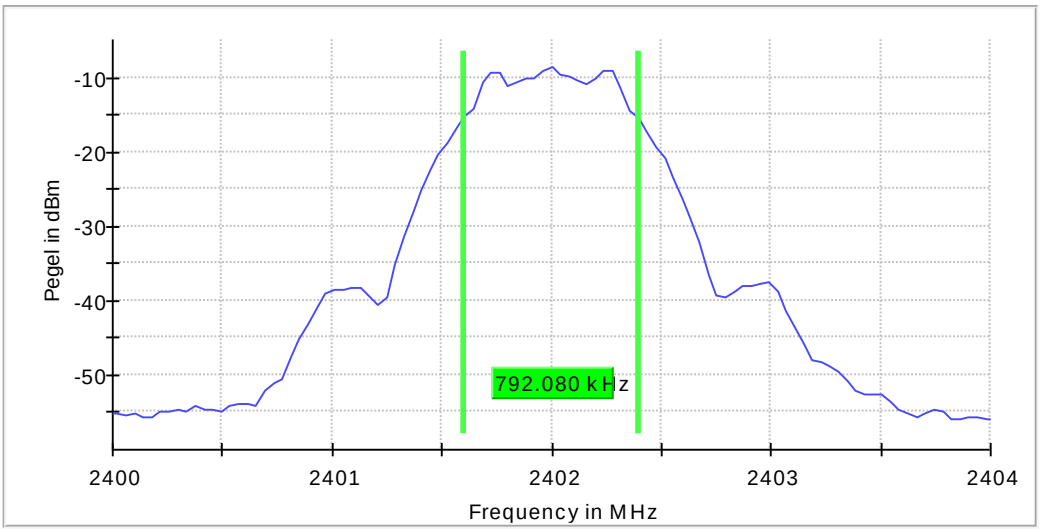
Operating Mode	Frequency (MHz)	20 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
BLE	2402	1.170	0.792	1.060
BLE	2442	1.180	0.792	1.080
BLE	2480	1.230	0.752	1.090

Product Service

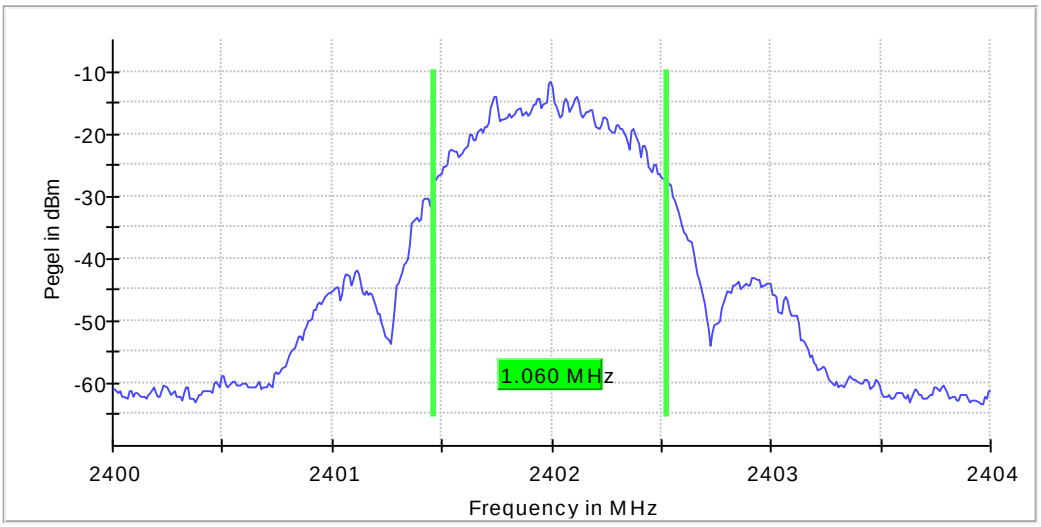
Transmission on 13.56 MHz (RFID) and 2402 MHz (BLE)



20dB-BW, 2410 MHz, BLE

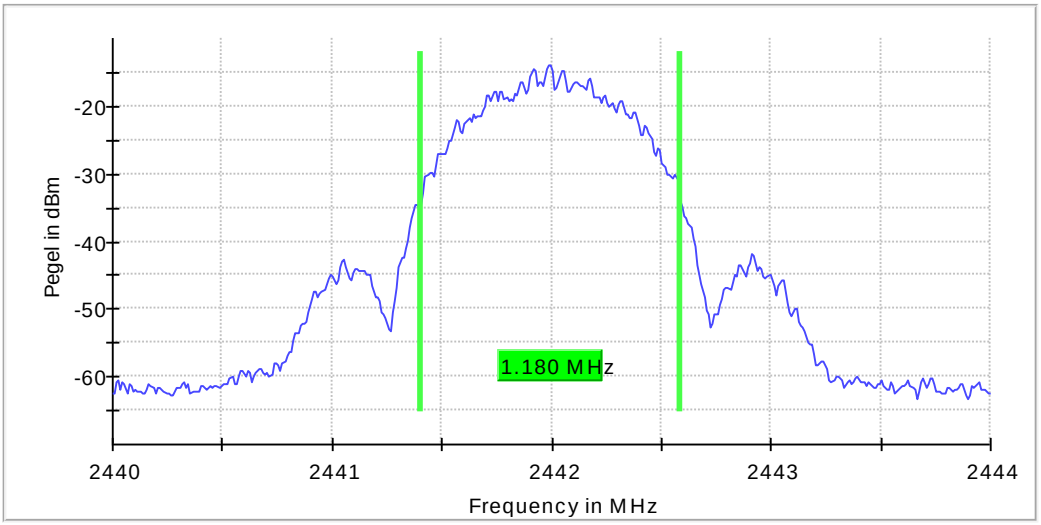


6dB-BW, 2410 MHz, BLE

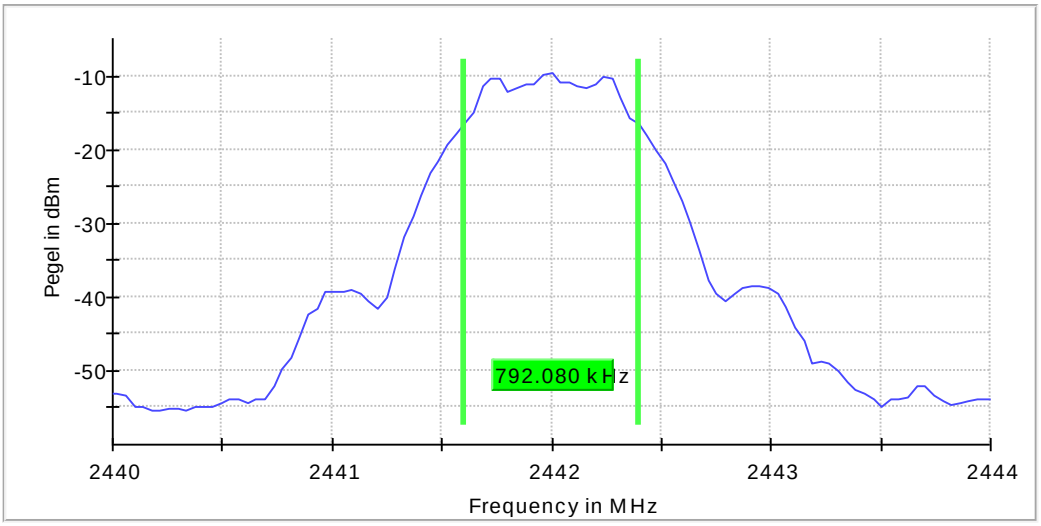


99%-BW, 2410 MHz, BLE

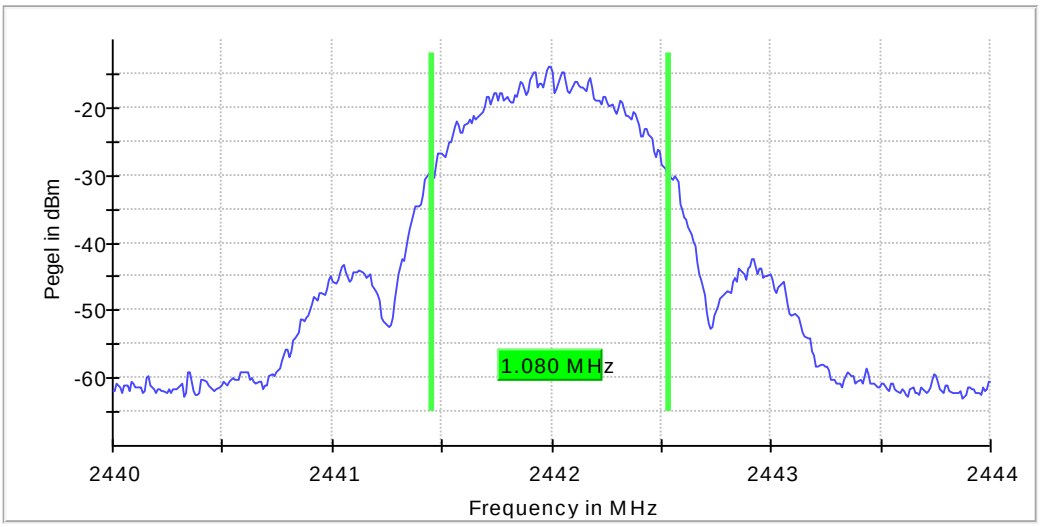
Transmission on 13.56 MHz (RFID) and 2442 MHz (BLE)



20dB-BW, 2445 MHz, BLE

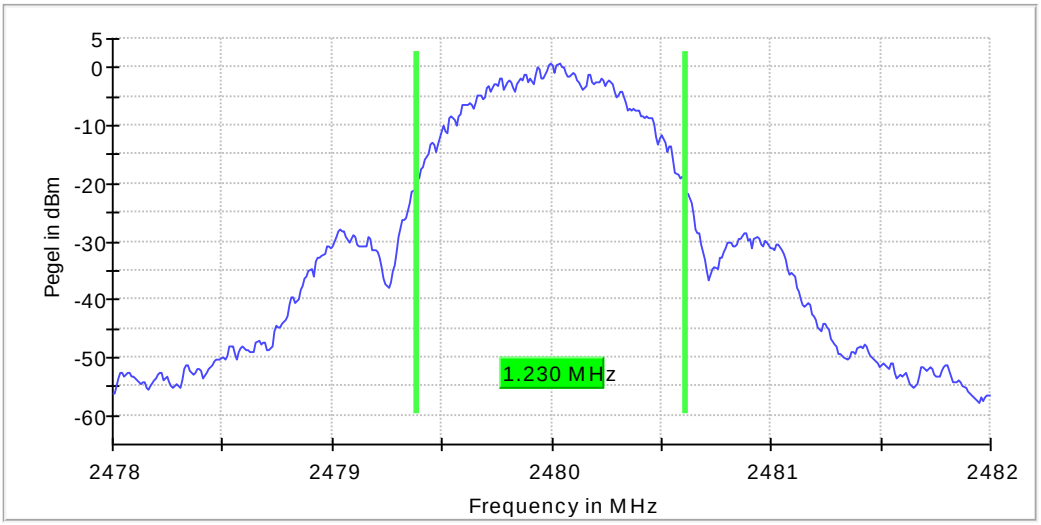


6dB-BW, 2445 MHz, BLE

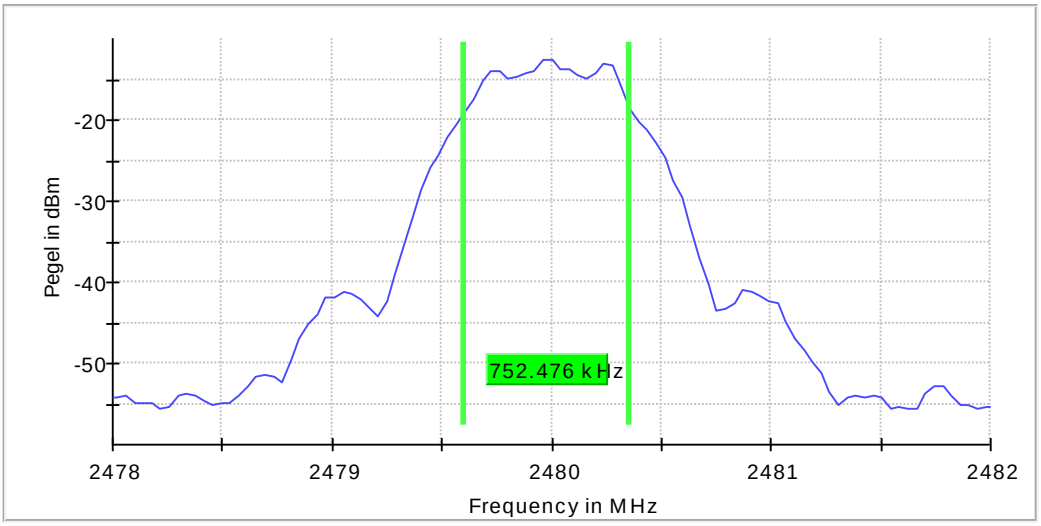


99%-BW, 2445 MHz, BLE

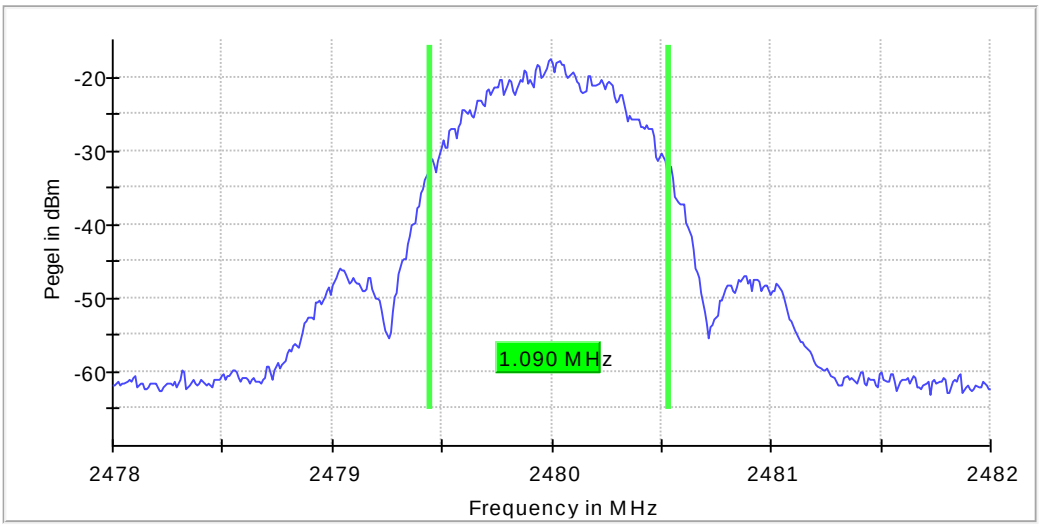
Transmission on 13.56 MHz (RFID) and 2480 MHz (BLE)



20dB-BW, 2480 MHz, BLE



6dB-BW, 2480 MHz, BLE



99%-BW, 2480 MHz, BLE

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247(a)(2) and ISED Canada RSS-247, Clause 5.2(a)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

3.4.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	12	2021-01-31
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2022-11-30
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	24	2022-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 11

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.5 Power Spectral Density

3.5.1 Specification Reference

Test according to FCC title 47 part 15 §15.247(a), (e), KDB 558074 D01 DTS Meas Guidance v05 F and ANSI C63.10-2013

3.5.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.5.3 Date of Test

2020-03-11

3.5.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.10.2.

3.5.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	37.0 %

3.5.6 Test Results

Operating Mode	Frequency (MHz)	PSD (dBm)	Limit (dBm)
BLE	2402	-13.04	8.0
BLE	2442	-14.05	8.0
BLE	2480	-14.81	8.0

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

ISED Canada RSS-247, Limit Clause 5.2(b)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

3.5.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	12	2021-01-31
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2022-11-30
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	24	2022-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 12

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.6 Maximum Conducted Output Power

3.6.1 Specification Reference

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.9.2.3.2

3.6.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.6.3 Date of Test

2020-03-11

3.6.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.9.1.1.

3.6.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	37.0 %

Product Service

3.6.6 Test Results

Operating Mode	Frequency (MHz)	Gated EIRP (dBm)	DutyCycle (%)	Limit Max (dBm)
BLE	2402	2.90	100	30
BLE	2442	1.76	100	30
BLE	2480	2.37	100	30

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

ISED Canada RSS-247, Limit Clause 5.4 (b)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.

3.6.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	12	2021-01-31
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2022-11-30
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	24	2022-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 13

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.7 AC Power Line Conducted Emissions

3.7.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.207, N/A and 8.8

3.7.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0
dormakaba registration unit 90 01, S/N: --- - Modification State 0

3.7.3 Date of Test

2020-03-17

3.7.4 Test Method

The EUT was placed on a non-conductive table 0.8m above a reference ground plane and 0.4m away from a vertical coupling plane. All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.

3.7.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	33.0 %

Product Service

3.7.6 Test Results

Results for Configuration and Mode: normal operation mode - transmitting on 13.56 MHz

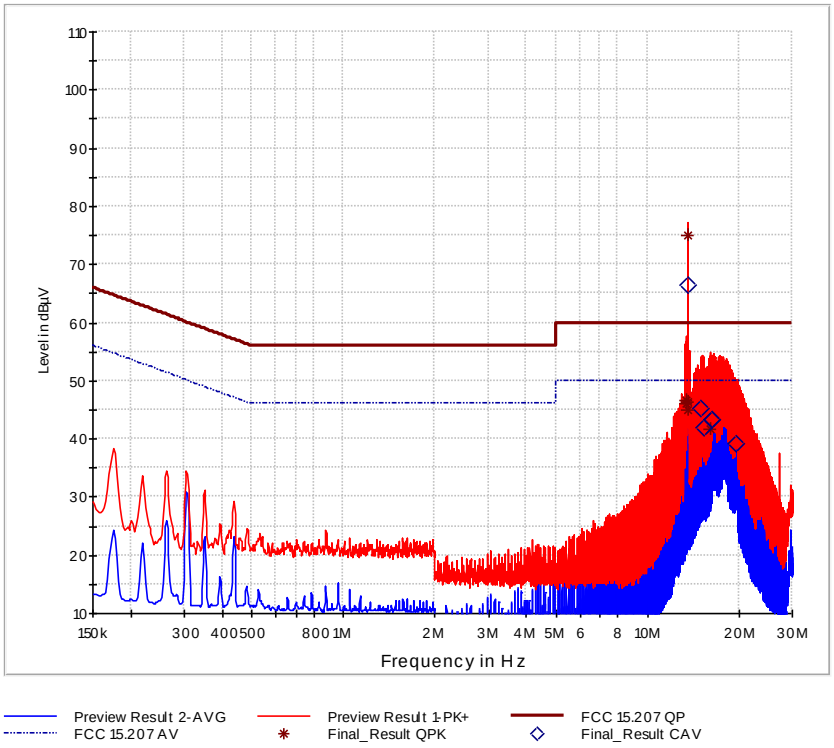
Power supplied by Dormakaba 9200-K5.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Product Service

Line Under Test: AC Mains - L

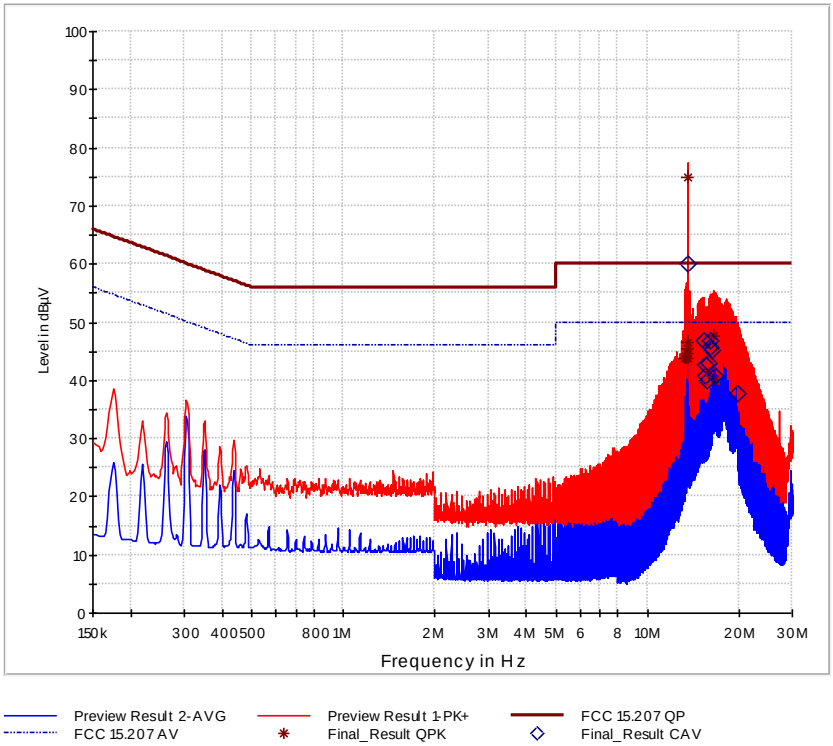


Final Results:

Frequency MHz	QuasiPeak dBµV	CAverage dBµV	Limit dBµV	Margin dB	Meas. Time ms	Bandwidth kHz	Line	Filter	Corr. dB
13.427250	46.71	---	60.00	13.29	1000.0	9.000	L1	ON	10.2
13.479000	46.09	---	60.00	13.91	1000.0	9.000	L1	ON	10.2
13.560000	---	66.46	50.00	-16.46	1000.0	9.000	L1	ON	10.2
13.560000	74.96	---	60.00	-14.96	1000.0	9.000	L1	ON	10.2
13.638750	46.25	---	60.00	13.75	1000.0	9.000	L1	ON	10.2
13.692750	45.10	---	60.00	14.90	1000.0	9.000	L1	ON	10.3
14.997750	---	45.26	50.00	4.74	1000.0	9.000	L1	ON	10.3
15.436500	---	41.95	50.00	8.05	1000.0	9.000	L1	ON	10.4
16.233000	41.73	---	60.00	18.27	1000.0	9.000	L1	ON	10.4
16.309500	---	43.32	50.00	6.68	1000.0	9.000	L1	ON	10.4
16.397250	---	43.22	50.00	6.78	1000.0	9.000	L1	ON	10.4
19.720500	---	39.09	50.00	10.91	1000.0	9.000	L1	ON	10.3

Product Service

Line Under Test: AC Mains - N

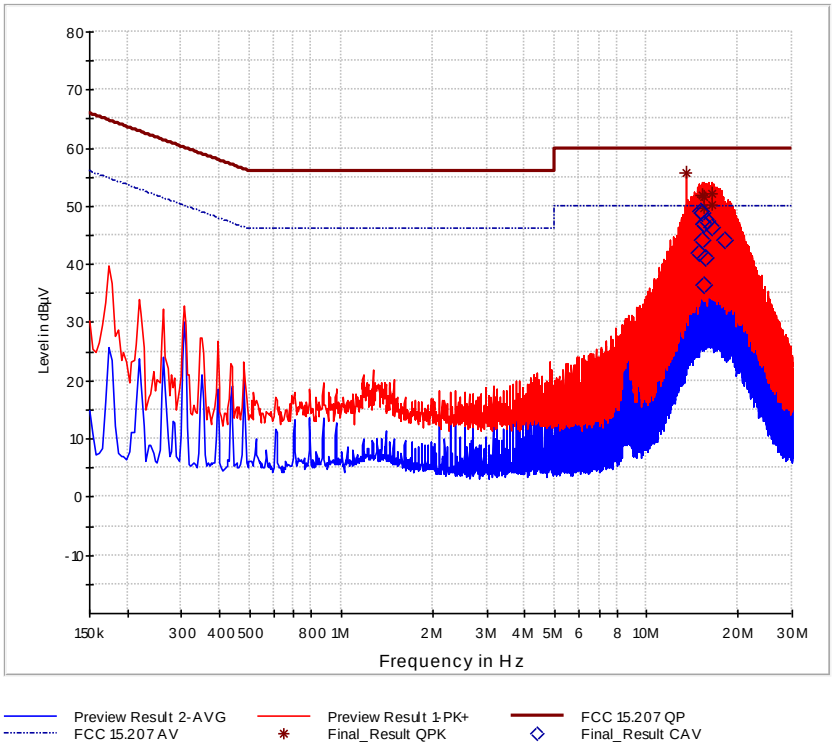


Final Results 1:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*Filter*	*Corr. dB*
13.348500	43.71	---	60.00	16.29	1000.0	9.000	N	ON	10.2
13.422750	43.75	---	60.00	16.25	1000.0	9.000	N	ON	10.2
13.560000	---	60.05	50.00	-10.05	1000.0	9.000	N	ON	10.2
13.560000	74.99	---	60.00	-14.99	1000.0	9.000	N	ON	10.2
13.636500	45.59	---	60.00	14.41	1000.0	9.000	N	ON	10.2
13.638750	46.49	---	60.00	13.51	1000.0	9.000	N	ON	10.2
13.681500	43.69	---	60.00	16.31	1000.0	9.000	N	ON	10.3
13.692750	44.71	---	60.00	15.29	1000.0	9.000	N	ON	10.3
15.418500	---	46.72	50.00	3.28	1000.0	9.000	N	ON	10.4
15.508500	---	42.66	50.00	7.34	1000.0	9.000	N	ON	10.4
15.596250	---	40.77	50.00	9.23	1000.0	9.000	N	ON	10.4
15.684000	---	40.07	50.00	9.93	1000.0	9.000	N	ON	10.4
15.857250	---	42.93	50.00	7.07	1000.0	9.000	N	ON	10.4
16.116000	---	46.73	50.00	3.27	1000.0	9.000	N	ON	10.4
16.203750	---	45.73	50.00	4.27	1000.0	9.000	N	ON	10.4
16.291500	---	45.29	50.00	4.71	1000.0	9.000	N	ON	10.4
16.476000	47.67	---	60.00	12.33	1000.0	9.000	N	ON	10.4
16.644750	---	40.75	50.00	9.25	1000.0	9.000	N	ON	10.4
16.829250	40.34	---	60.00	19.66	1000.0	9.000	N	ON	10.4
19.785750	---	37.87	50.00	12.13	1000.0	9.000	N	ON	10.3

Product Service

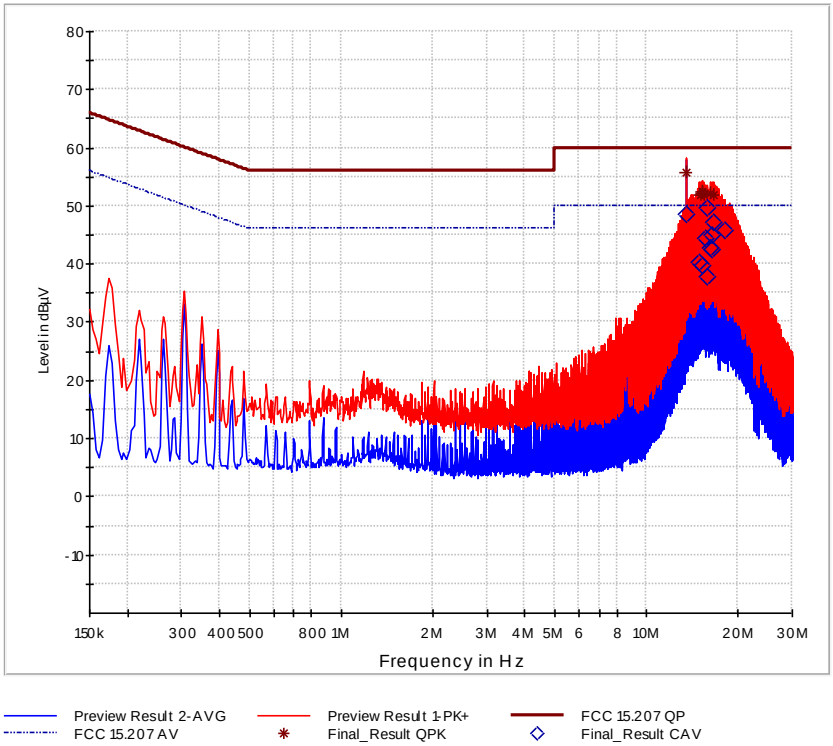
Line Under Test: AC Mains - L (antenna port replaced with 50 Ohm resistor)



Final Results:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*Filter*	*Corr. dB*
13.558000	55.74	---	60.00	4.26	1000.0	9.000	L1	OFF	10.2
14.910000	---	41.89	50.00	8.11	1000.0	9.000	L1	OFF	10.2
15.074000	---	49.16	50.00	0.84	1000.0	9.000	L1	OFF	10.2
15.162000	---	48.75	50.00	1.25	1000.0	9.000	L1	OFF	10.2
15.258000	51.83	---	60.00	8.17	1000.0	9.000	L1	OFF	10.2
15.258000	---	44.17	50.00	5.83	1000.0	9.000	L1	OFF	10.2
15.338000	---	47.07	50.00	2.93	1000.0	9.000	L1	OFF	10.2
15.346000	51.68	---	60.00	8.32	1000.0	9.000	L1	OFF	10.2
15.438000	---	36.52	50.00	13.48	1000.0	9.000	L1	OFF	10.2
15.438000	49.78	---	60.00	10.22	1000.0	9.000	L1	OFF	10.2
15.514000	---	46.86	50.00	3.14	1000.0	9.000	L1	OFF	10.3
15.610000	---	41.11	50.00	8.89	1000.0	9.000	L1	OFF	10.3
15.862000	---	47.61	50.00	2.39	1000.0	9.000	L1	OFF	10.3
16.310000	50.26	---	60.00	9.74	1000.0	9.000	L1	OFF	10.3
16.386000	---	46.45	50.00	3.55	1000.0	9.000	L1	OFF	10.3
16.390000	52.09	---	60.00	7.91	1000.0	9.000	L1	OFF	10.3
17.958000	---	44.13	50.00	5.87	1000.0	9.000	L1	OFF	10.3

Line Under Test: AC Mains - N (antenna port replaced with 50 Ohm resistor)



Final Results:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*Filter*	*Corr. dB*
13.562000	---	48.68	50.00	1.32	1000.0	9.000	N	OFF	10.2
13.562000	55.72	---	60.00	4.28	1000.0	9.000	N	OFF	10.2
14.906000	---	40.40	50.00	9.60	1000.0	9.000	N	OFF	10.2
15.070000	51.97	---	60.00	8.03	1000.0	9.000	N	OFF	10.2
15.162000	52.44	---	60.00	7.56	1000.0	9.000	N	OFF	10.2
15.250000	52.10	---	60.00	7.90	1000.0	9.000	N	OFF	10.2
15.258000	---	39.72	50.00	10.28	1000.0	9.000	N	OFF	10.2
15.334000	52.03	---	60.00	7.97	1000.0	9.000	N	OFF	10.2
15.686000	---	44.43	50.00	5.57	1000.0	9.000	N	OFF	10.3
15.854000	---	49.72	50.00	0.28	1000.0	9.000	N	OFF	10.3
15.870000	---	37.87	50.00	12.13	1000.0	9.000	N	OFF	10.3
16.210000	52.12	---	60.00	7.88	1000.0	9.000	N	OFF	10.3
16.214000	---	42.78	50.00	7.22	1000.0	9.000	N	OFF	10.3
16.386000	---	45.11	50.00	4.89	1000.0	9.000	N	OFF	10.3
16.474000	---	42.61	50.00	7.39	1000.0	9.000	N	OFF	10.3
16.554000	---	47.14	50.00	2.86	1000.0	9.000	N	OFF	10.3
16.558000	51.81	---	60.00	8.19	1000.0	9.000	N	OFF	10.3
17.950000	---	45.79	50.00	4.21	1000.0	9.000	N	OFF	10.3

Product Service

FCC 47 CFR Part 15, Limit Clause 15.207 and ISED Canada RSS-GEN, Limit Clause 8.8

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

Table 14

*Decreases with the logarithm of the frequency.

3.7.7 Test Location and Test Equipment Used

This test was carried out in Shielded room - cabin no. 4.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESU8	19904	12	2021-01-31
Artificial mains network	Rohde & Schwarz	ENV216	39910	12	2021-02-29
EMC measurement software	Rohde & Schwarz	EMC32 Emission K9 - V9.26.01	20090	---	---
Shielded room	Euroshield	Cabin no. 4	19314	---	---

Table 15

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.8 Transmitter frequency stability

3.8.1 Specification Reference

RSS-Gen, Issue 5, April 2018 (General Requirements for Compliance of Radio Apparatus)

3.8.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.8.3 Date of Test

2020-03-12

3.8.4 Test Method

RSS-Gen, Issue 5, March 2019, chapter 6.11

3.8.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	36.0 %

Product Service

3.8.6 Test Results

Note: - Measured Frequency Error does not affect any band edge requirements.
- Measurement was performed with modulated transmitter signal

3.8.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	12	2021-01-31
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2022-11-30
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2021-03-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	24	2022-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	24	2020-09-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 16

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.9 Occupied Bandwidth

3.9.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.215 (c),
ISED RSS-GEN, Issue 9, Section 6.7

3.9.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.9.3 Date of Test

2020-03-16

3.9.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.9.1.

3.9.5 Environmental Conditions

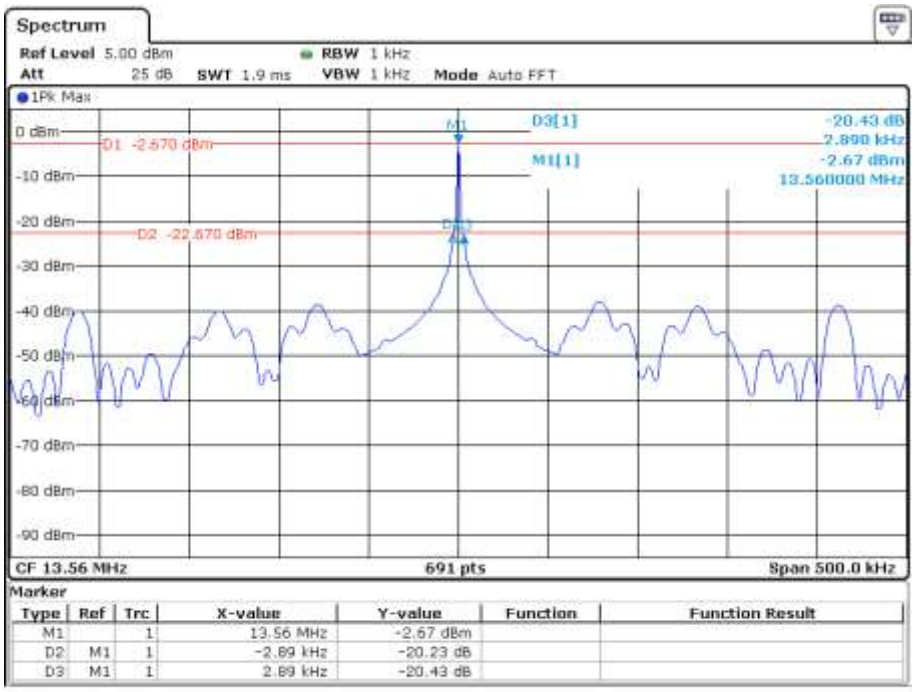
Ambient Temperature	23.0 °C
Relative Humidity	36.0 %

3.9.6 Test Results

Frequency (MHz)	20 dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	F_{LOWER} (MHz)	F_{UPPER} (MHz)
13.56	5.78	154.12	13.55711	13.56289

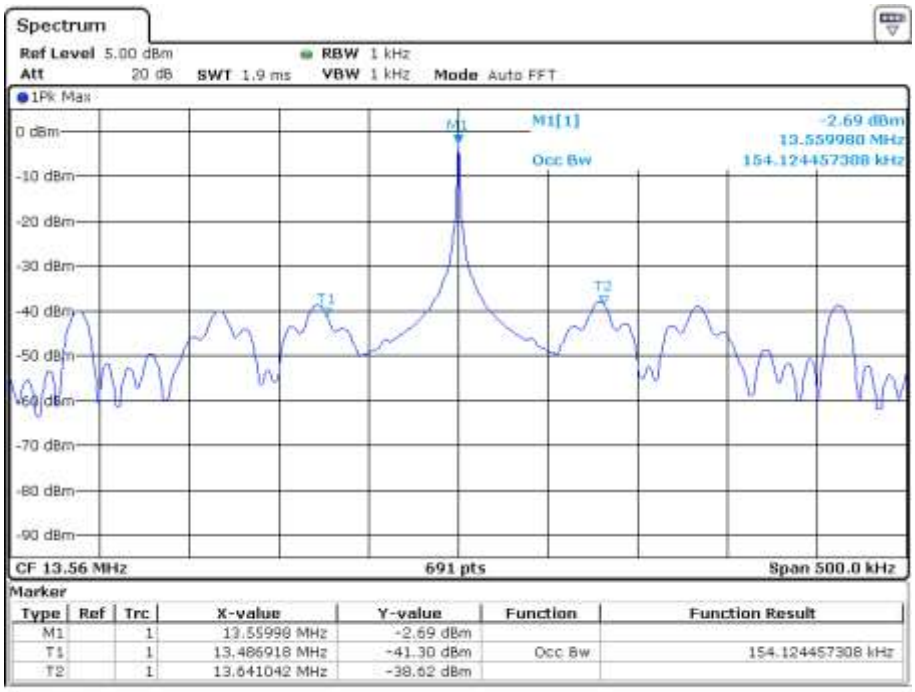
Table 17

Product Service



Date: 16.MAR.2020 08:01:58

20 dB Bandwidth



Date: 16.MAR.2020 07:59:49

99 % Bandwidth

FCC 47 CFR Part 15, Limit Clause 15.215 (c)

The 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

ISED RSS 210 and ISED RSS GEN, Limit Clause

Not specified

3.9.7 Test Location and Test Equipment Used

This test was carried out in Non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	12	2021-01-31

Table 18

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.10 Field Strength of any Emission

3.10.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (a)(b)(c)(d); and
ISED RSS-210; Clause B.1 to B.9 and
ISED RSS-GEN, clause 6.4 and 6.5.

3.10.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.10.3 Date of Test

2020-03-09 and 2020-03-11

3.10.4 Test Method

See section 2.1 of this test report for details.

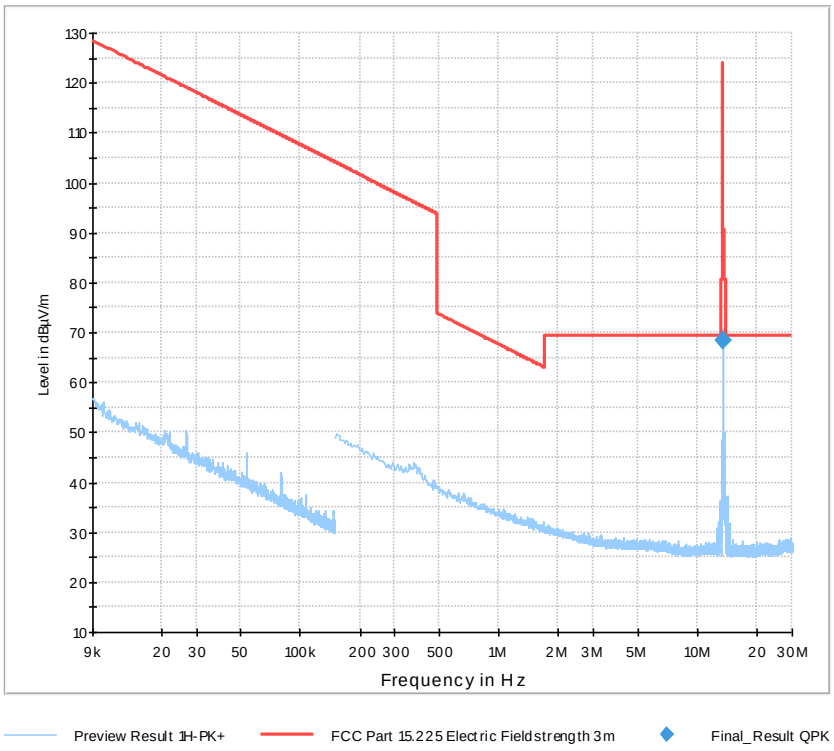
3.10.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	32.0 %

Product Service

3.10.6 Test Results

Transmission on 13.56 MHz (RFID) and 2442 MHz (BLE)



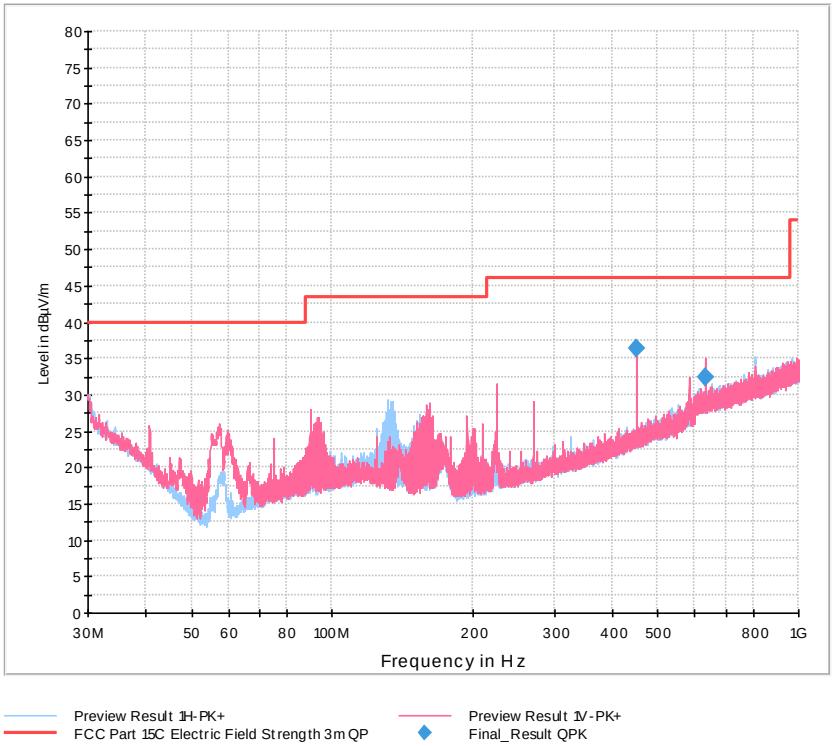
Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
13.560000	68.40	---	124.00	55.60	1000.0	9.000	100.0	H	184.0	18.8

Frequency (MHz)	Detector	Distance d1 (m)	Distance d (m)	Reading Value (dBµV)	Correction Factor (dB/m)	Extrapolation Factor (dB)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
13,56000	Quasi-Peak	3	30	49,6	18,8	-40,0		28,4	84,0	**55,6**

Table 19 - Emissions Results – 9 kHz to 30 MHz

Final Value (dBµV/m) = Reading Value (dBµV) + Cable Correction Factor (dB)
+ Antenna Correction Factor (dB/m)
+ Pulse Train Correction (dB)



Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
449.970000	36.39	46.02	9.63	1000.0	120.000	137.0	V	-126.0	22.7
630.000000	32.47	46.02	13.55	1000.0	120.000	104.0	V	-17.0	25.5

Product Service

FCC 47 CFR Part 15, Limit Clause 15.225 (a)(b)(c)(d)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 m.
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 m.
(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 m.
(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	5

Table 10 - FCC Radiated Emission Limit

ISED RSS-210, Limit Clause B.6

The field strength of any emission shall not exceed the following limits:

(a) 15.848 mW/m (84 dBµV/m) at 30 m, within the band 13.553 – 13.567 MHz.
(b) 334 µV/m (50.5 dBµV/m) at 30 m, withing the bands 13.410 – 13.553 MHz and 13.567 – 13.710 MHz.
(c) 106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz.
(d) RSS-GEN general field strength limits for frequencies outside the band 13.110 – 14.010 MHz.

ISED RSS-GEN, Limit Clause

Frequency	Electric Field Strength (µV/m)	Magnetic Field Strength (H-Field) (µA/m)	Measurement Distance (m)
9 - 490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
490 - 1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1,705 kHz - 30 MHz	30	N/A	30

Table 20 - ISED Radiated Emission Limit - Less than 30 MHz

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 - 88	100
88 - 216	150
216 - 960	200
> 960	500

Table 21 - ISED Radiated Emission Limit - 30 MHz to 1 GHz

3.10.7 Test Location and Test Equipment Used

Radiated Tests were carried out in FAR No.11

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2021-03-31
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2023-01-31
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2022-11-30
EMC measurement software	Rohde & Schwarz	EMC32 Emission K11 - V10.50.10	42986	---	---
Semi Anechoic Room	Frankonia	Cabin No. 11	42961	36	2022-08-31

Table 22

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.11 Frequency Tolerance Under Temperature and Voltage Variations

3.11.1 Specification Reference

FCC 47 CFR Part 15C, ISED RSS-210 and ISED RSS-GEN, Clause 15.225 (e), B.1 to B.9 and 6.11.

3.11.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.11.3 Date of Test

2020-03-12 and 2020-03-16

3.11.4 Test Method

3.11.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	33.0 %

3.11.6 Test Results

Temperature	Voltage	Measured Frequency (MHz)	Frequency Deviation (Hz)	Frequency Error (ppm)
-20.0 °C	24 V DC	13.5599566	31.8	- 2.35
-10.0 °C	24 V DC	13.5599537	34.7	- 2.56
0.0 °C	24 V DC	13.5599537	34.7	- 2.56
+10.0 °C	24 V DC	13.5599537	34.7	- 2.56
+20.0 °C	24 V DC	13.5599884	0	0
+30.0 °C	24 V DC	13.5599540	34.4	- 2.54
+40.0 °C	24 V DC	13.5599540	34.4	- 2.54
+50.0 °C	24 V DC	13.5599540	34.4	- 2.54

Table 23 - Frequency Tolerance Under Temperature Variation

Temperature	Voltage	Measured Frequency (MHz)	Frequency Deviation (Hz)	Frequency Error (ppm)
+20.0 °C	20.4 V DC	13.5599826	5.8	- 0.43
+20.0 °C	24 V DC	13.5599884	0	0
+20.0 °C	27.6 V DC	13.5599855	2.9	- 0.21

Table 24 - Frequency Tolerance Under Voltage Variation

Product Service

FCC 47 CFR Part 15, Limit Clause 15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency.

ISED RSS-210, Limit Clause B.6

Carrier frequency stability shall be maintained to ±0.01% (±100 ppm)

3.11.7 Test Location and Test Equipment Used

This test was carried out in Non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	12	2021-01-31
Climatic test chamber	Feutron	KPK200-2	19868	36	2020-04-30

Table 25

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.12 Exposure of Humans to RF Fields

3.12.1 Specification Reference

IC RSS-GEN Issue 5, section 3.2 and
IC RSS-102, Issue 5, section 2.5
KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

3.12.2 Equipment Under Test and Modification State

dormakaba registration unit 90 01, S/N: 111815100002 - Modification State 0

3.12.3 Date of Test

2020-03-20

Product Service

3.12.4 Test Results

acc. to KDB 447498 D01:

Maximum Radiated Power (EIRP) Pmax:	2.90 dBm = 1.95 mW (see section 3.6 for measurement)
Compliance Boundary d:	5 mm
Frequency f:	2402 MHz = 2.402 GHz
Numeric Threshold (Pmax / d) $(f)^{0.5}$	0.604
Numeric Threshold Limit (1 g SAR):	3.0

Maximum Radiated Power (EIRP) Pmax:	2.028 µW (see section 3.10 for measurement)
Compliance Boundary d:	5 mm
Frequency f:	13.56 MHz

Calculation according to Section 4.3.1

1. $\frac{1}{2}\left[1+\log\left(\frac{100}{100}\right)\right] * \left[\left((Power\ allowed\ at\ numeric\ threshold\ for\ 50\ mm\ in\ step\ a)\right) + (50mm - 50mm) * \left(\frac{100}{150}\right)\right]$
2. $\frac{1}{2}[1+0] * \left[\left((Power\ allowed\ at\ numeric\ threshold\ for\ 50\ mm\ in\ step\ a)\right) + 0 * \left(\frac{100}{150}\right)\right]$
3. $\frac{1}{2}[Power\ allowed\ at\ numeric\ threshold\ for\ 50\ mm\ in\ step\ a]$
4. $\frac{\max power}{\min distance} * \sqrt{f} \leq 3.0$
5. $\max power \leq \frac{3.0 * \min distance}{\sqrt{f}}$
6. $\max power \leq \frac{3.0 * 50\ mm}{\sqrt{0{,}1GHz}} = 474\ mW$
7. $\frac{1}{2} * 474\ mW = 237\ mW$ → maximal allowed Power
8. 2.028 µW < 237 mW → criteria fulfilled

Product Service

IC RSS-GEN Issue 5, section 3.2 and IC RSS-102, Issue 5, section 2.5 (RFID):

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☐ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP =			☐	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☐ the numerical antenna gain: G =		☐		
$EIRP = G \cdot CP \Rightarrow EIRP$ =				
☐ the field strength[1] in V/m: FS = ... V/m			☐	
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = mW				
with:				
Distance between the antennas in m: D = mm		☐		
☒ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by:				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = 2.028 µW				
with:				
Field strength in V/m: FS = 68.4 dBµV/m = 2.6 mV/m = 0.0026 V/m			☒	
Distance between the two antennas in m: D = 3 m			☒	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = 2.028 µW				

[1] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

Product Service

Exposure of Humans to RF Fields (continued)		Applicable	Declared by applicant	Measured	Exemption
Separation distance between the user and the transmitting device is					
☒ less than or equal to 20 cm	☐ greater than 20 cm		☒		
Transmitting device is					
☐ in the vicinity of the human head	☐ body-worn		☐		

Product Service

SAR evaluation				
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required. For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.				

Frequency (MHz)	Exemption limits (mW)[2] at separation distance of									
	≤5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	≥50 mm
450	52	70	88	106	123	141	159	177	195	213
835	17	30	42	55	67	80	92	105	117	130
1900	7	10	18	34	60	99	153	225	316	431
2450	4	7	15	30	52	83	123	173	235	309
3500	2	6	16	32	55	86	124	170	225	290
5800	1	6	15	27	41	56	71	85	97	106

Carrier frequency:	f	=	13.56 MHz	
Distance:	d	=	5 mm	☒
Transmitter output power:	TP	=	2.028 µW	
Limit:	TP_{limit}	=	52 mW	☒

[2] The excemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separaton distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

Product Service

IC RSS-GEN Issue 5, section 3.2 and IC RSS-102, Issue 5, section 2.5 (BLE):

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☐ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP =			☐	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☐ the numerical antenna gain: G =		☐		
$EIRP = G \cdot CP \Rightarrow EIRP$ =				
☐ the field strength[3] in V/m: FS = ... V/m			☐	
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = mW				
with:				
Distance between the antennas in m: D = mm		☐		
☒ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by:				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = 2.90 dBm = 1.95 mW (see section 3.6 for measurement)				
with:				
Field strength in V/m: FS = =			☐	
Distance between the two antennas in m: D =			☐	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.):				
TP = 1.95 mW				

[3] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

Product Service

Exposure of Humans to RF Fields (continued)		Applicable	Declared by applicant	Measured	Exemption
Separation distance between the user and the transmitting device is					
☒ less than or equal to 20 cm	☐ greater than 20 cm		☒		
Transmitting device is					
☐ in the vicinity of the human head	☐ body-worn		☐		

Product Service

SAR evaluation				
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required. For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.				

Frequency (MHz)	Exemption limits (mW)[4] at separation distance of									
	≤5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	≥50 mm
450	52	70	88	106	123	141	159	177	195	213
835	17	30	42	55	67	80	92	105	117	130
1900	7	10	18	34	60	99	153	225	316	431
2450	4	7	15	30	52	83	123	173	235	309
3500	2	6	16	32	55	86	124	170	225	290
5800	1	6	15	27	41	56	71	85	97	106

Carrier frequency:	f	=	2402 MHz	
Distance:	d	=	5 mm	☒
Transmitter output power:	TP	=	1.95 µW	
Limit:	TP_{limit}	=	4 mW	☒

[4] The excemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separaton distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

Product Service

4 Photographs

4.1 Test Setup Photos

See Annex A.

4.2 External and Internal Photos

See Annex B.

Product Service

5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	±1.14 %	2
RF-Frequency error	1.96	±1 · 10-7	7
RF-Power, conducted carrier	2	±0.079 dB	2
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.4 dB / -4.5 dB	8
40 GHz – 170 GHz	1.96	+4.2 dB / -7.1 dB	8
Spectral Power Density, conducted	2.0	±0.53 dB	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	±2,89 %	2
6 kHz – 25 kHz	2	±0.2 dB	2
Maximum frequency deviation for FM	2	±2,89 %	2
Adjacent channel power 25 MHz – 1 GHz	2	±2.31 %	2
Temperature	2	±0.39 K	4
(Relative) Humidity	2	±2.28 %	2
DC- and low frequency AC voltage			
DC voltage	2	±0.01 %	2
AC voltage up to 1 kHz	2	±1.2 %	2
Time	2	±0.6 %	2

Table 26

Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Table 27

Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves		a	4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 28

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%
Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.
Note 5:
The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 6:
The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 7:
The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%
Note 8:
The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%