Report on the FCC and IC Testing of the Sirona Dental Systems GmbH Model: 6744978 D3691 In accordance with FCC 47 CFR Part 15C and Industry Canada RSS-210 and Industry Canada RSS-GEN

Product Service

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Prepared for: Sirona Dental Systems GmbH
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FCC ID: 2AD7W-6744978
IC: 12730A-6744978

COMMERCIAL-IN-CONFIDENCE

Date: 2021-04-14
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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alex Fink	2021-04-14	SIGN-ID 493826
Authorised Signatory	Matthias Stumpe	2021-04-14	SIGN-ID 495499

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 Industry Canada RSS-210 and Industry 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	2021-04-14	SIGN-ID 493826

Laboratory Accreditation	Laboratory recognition	Industry 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 15 C:2019 and ISED RSS-210:2019 and ISED RSS-Gen:2019

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Product Service

Contents

Product Service

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	2021-04-14

Table 1

1.2 Introduction

Applicant	Sirona Dental Systems GmbH
Manufacturer	Sirona Dental Systems GmbH
Model Number(s)	6744978 D3691
Serial Number(s)	700101
Hardware Version(s)	---
Software Version(s)	---
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15 C : 2019 and ISED RSS-210, Issue 10, Amd. 1 : 2019 ISED RSS-Gen, Issue 5, Amd. 1 : 2019
Test Plan/Issue/Date	---
Order Number Date	713212522 2021-03-26
Date of Receipt of EUT	2021-04-08
Start of Test	2021-04-09
Finish of Test	2021-04-14
Name of Engineer(s)	Alex Fink, Martin Steindl
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 Industry Canada RSS-210 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Transmitting continuously and waiting for badge (RFID card)				
3.1	15.215 (c), N/A and 6.6	20 dB Bandwidth	Pass	ANSI C63.10 (2013)
3.2	15.225 (a)(b)(c)(d), B.1 to B.9, 6.4 and 6.5.	Field Strength of any Emission	Pass	ANSI C63.10 (2013)
3.3	15.225 (e), B.1 to B.9 and 6.11.	Frequency Tolerance Under Temperature Variations	Pass	ANSI C63.10 (2013)
3.4	15.207, N/A and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10 (2013)
3.5	IC RSS-102 Issue 5	Exposure of Humans to RF Fields	Pass	ANSI C63.4: 2014

Table 2

Product Service

1.4 Marking plate

Marking plate


Table 3

1.5 Product Information

1.5.1 Technical Description

Intended Use

The Dentsply Sirona 3D printer Primeprint is designed to produce three-dimensional dental applications from printable viscous materials. It is part of an overall system of Computer Aided Imaging, Computer Aided Design, and Computer Aided Manufacturing. The product only covers the initial manufacturing process. For this purpose, three-dimensional objects are produced in a process of specific material cartridges with printable viscous materials by using a projection unit in a layer-by-layer three-dimensional process.

RFID functionality

Three parts of Primeprint are controlled by RFID functionality:

1. Construction platform The dental application is printed onto the construction platform. The construction platform with then be transported to the Primeprint PPU for the post processing. To select the needed post processing steps the RFID tag of the construction platform bears the information of the printed material and the type and size of the dental application.

2. Tray The Tray is initially selected for a special printable viscous material. This information is stored in an RFID tag. Before the printing process will start it is checked if the RFID tag information is compatible to the material which is planned to be used for the printing job.

3. Cartridge The Cartridge is manually adapted to the Tray. For a successful printing job the viscous material of the Cartridge has to be the same as it is identified by the Tray. Before the Cartridge is used for a printing job the material ID is checked against the Tray ID.

1.5.2 Test Configuration

Configuration	Description
AC Powered	Connected to power supply 120V/60Hz

Table 4

1.5.3 Modes of Operation

Mode	Description
RFID units transmitting continuously	Continuously reading RFID TAG of “Vat”, “Cartridge” and “Building Platform”

Table 5

Product Service

1.6 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
Serial Number:			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6

1.7 Test Location

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

Test Name	Name of Engineer(s)
Configuration and Mode: Transmitting continuously	
20 dB Bandwidth	Martin Steindl
Field Strength of any Emission	Alex Fink
Frequency Tolerance Under Temperature Variations	Alex Fink
AC Power Line Conducted Emissions	Martin Steindl
Exposure of Humans to RF Fields	Alex Fink

Table 7

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

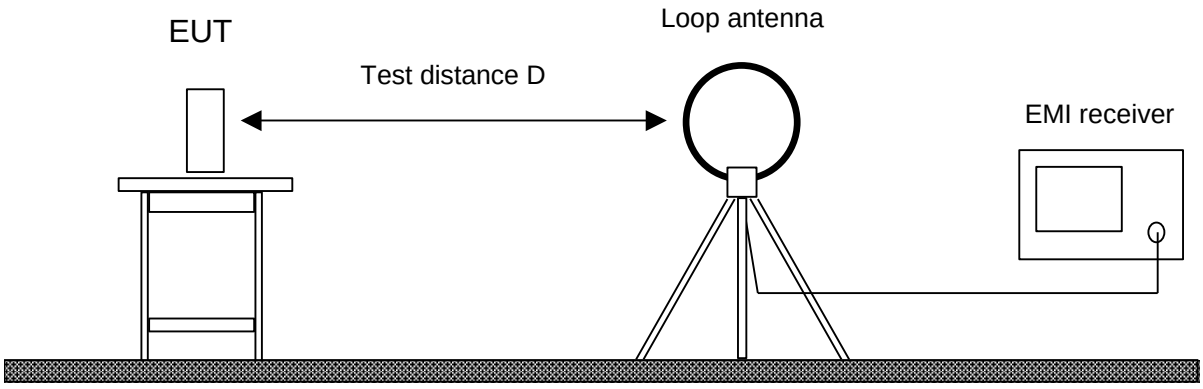
2 Test Setups

2.1.1.1 Radiated Emission at Alternative Test Site

The test was performed according to ANSI C63.10, sections 11.11 and 11.12

Prescans are performed in six positions of the EUT to get the full spectrum of emission caused by the EUT with the measuring antenna raised and lowered from 1 m to 4 m with vertical and horizontal polarisation to find the combination of table position, antenna height and antenna polarisation for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB or exceeding the limit using subranges and limited number of maximums.
Further maximisation for adjusting the maximum position is following.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

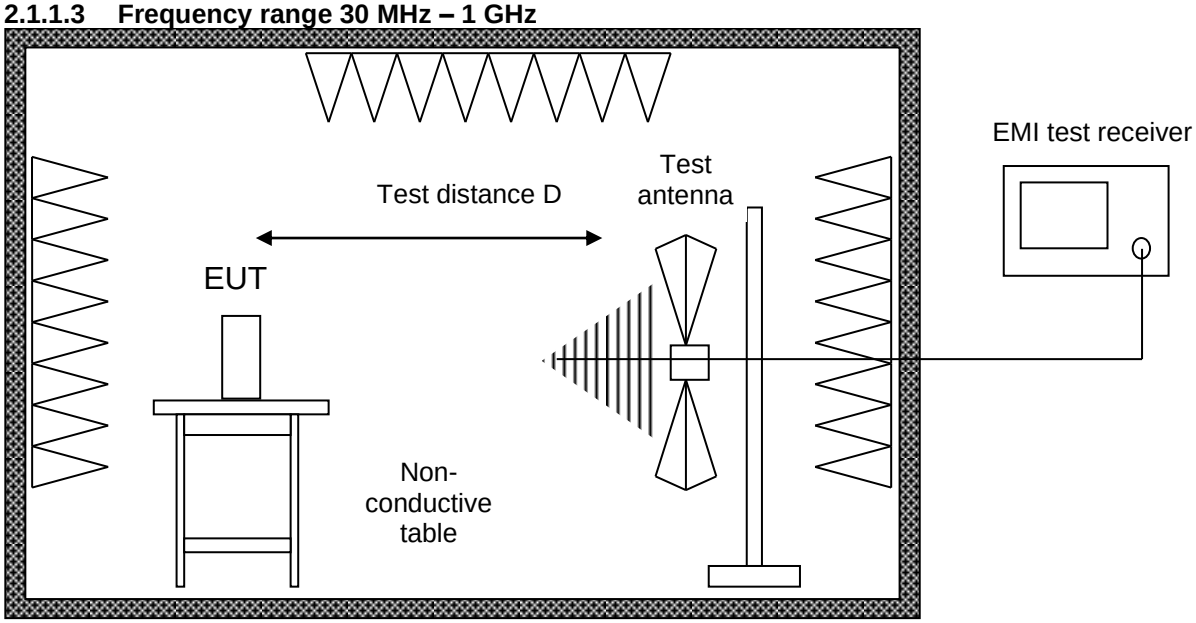
2.1.1.2 Frequency range 9 kHz – 30 MHz



The EUT was placed on a non-conductive table, 0.8 m above the ground.
Radiated emissions in the frequency 9 kHz – 30 MHz is measured within a semi-anechoic room with an active loop antenna with the measurement detector set to peak. In addition in the frequency range 9 kHz to 490 kHz also an average detector was used. The measurement bandwidth of the receiver was set to 300 Hz in the frequency range 9 kHz to 150 kHz and 10 kHz in the frequency range 150 kHz to 30 MHz. Prescans were performed in six positions of the EUT.
For final measurements the detector was set to CISPR quasi-peak and in addition to CISPR average in the frequency range 9 kHz to 490 kHz with a resolution bandwidth 200 Hz in the frequency range 9 kHz to 150 kHz and 9 kHz in the frequency range 150 kHz to 30 MHz. Final tests were performed immediately after a final frequency and zoom (for drifting disturbances) and maximum adjustment.

Product Service

2.1.1.3 Frequency range 30 MHz – 1 GHz

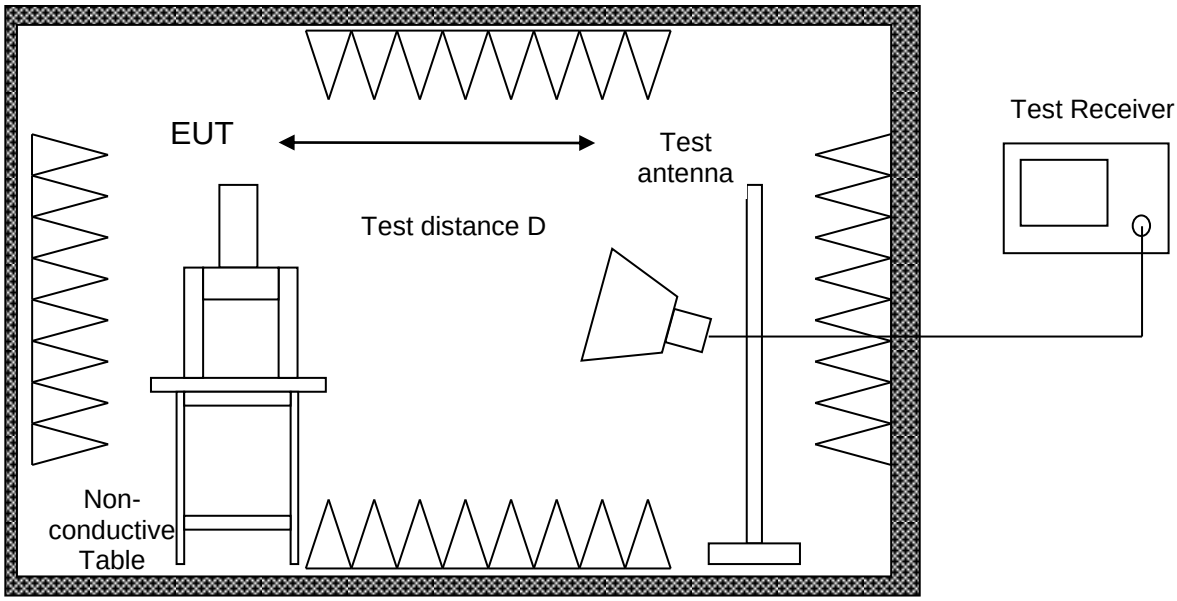


Alternate test site (semi anechoic room)

The EUT was placed on a non-conductive table, 0.8 m above the ground plane
Radiated emissions in the frequency range 30 MHz – 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 polarised logarithmic periodic antenna combined with a 4:1 broadband dipole (“Trilog broadband antenna”) is used.
For prescan tests the test receiver is set to peak-detector with a bandwidth of 120 kHz.
With the measurement bandwidth of the test receiver set to 120 kHz CISPR quasi-peak detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

Product Service

2.1.1.4 Frequency range above 1 GHz



Fully anechoic room

The EUT was placed on a non-conductive table, 1.5 m above the ground plane
Radiated emission tests above 1 GHz are performed in a fully anechoic room with the S_{VSWR} requirements of ANSI C63.4. Measurements are performed both in the horizontal and vertical planes of polarisation using a test receiver with the detector function set to peak and average and the resolution bandwidth set to 1 MHz.
Testing above 1 GHz is performed with horn antennas with the EUT in boresight of the antenna.
For prescan tests the test receiver is set to peak- and average-detector with a bandwidth of 1 MHz.
With the measurement bandwidth of the test receiver set to 1 MHz and peak- and CISPR average-detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

Product Service

3 Test Details

3.1 20 dB Bandwidth

3.1.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.225 (c), N/A and 6.6

3.1.2 Equipment Under Test and Modification State

6744978 D3691, S/N: 700101 - Modification State - 0

3.1.3 Date of Test

2021-04-09

3.1.4 Test Method

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

3.1.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	29.0 %

3.1.6 Test Results

RFID units transmitting continuously

Frequency (MHz)	20 dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	F_{LOWER} (MHz)	F_{UPPER} (MHz)
13.56	130.2	445.007	13.4949	13.6251

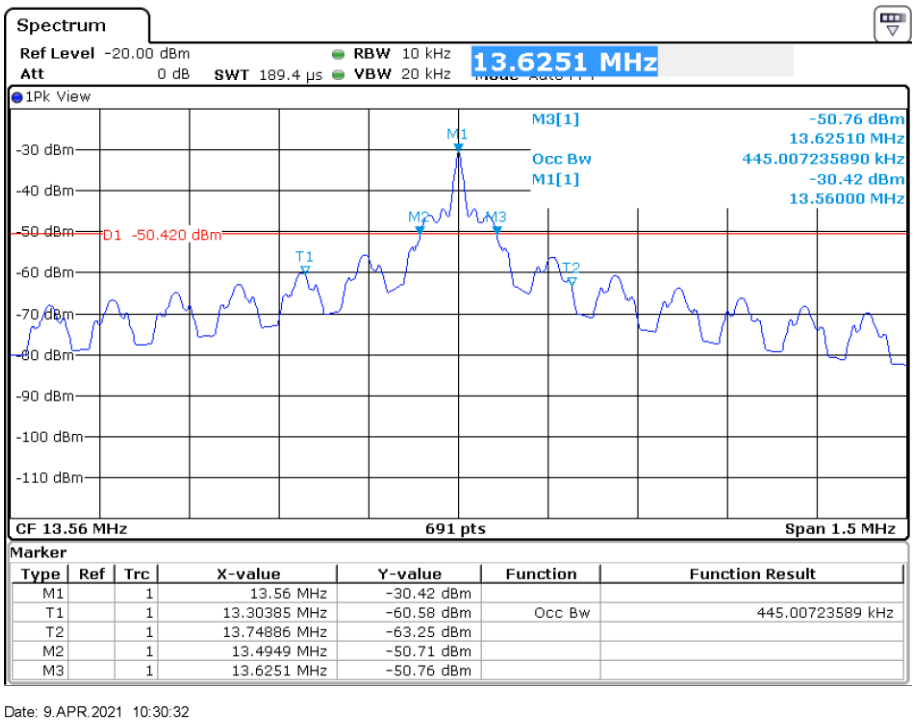


Figure 1 - 20 dB and 99% Bandwidth

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.

Industry Canada RSS 210 and Industry Canada RSS GEN, Limit Clause

None specified.

3.1.7 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	24	2022-01-31
Climatic test chamber	Feutron	KPK200-2	19868	36	2023-02-28

Table 8

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

Product Service

3.2 Field Strength of any Emission

3.2.1 Specification Reference

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

3.2.2 Equipment Under Test and Modification State

6744978 D3691, S/N: 700101 - Modification State 0

3.2.3 Date of Test

2021-04-14

3.2.4 Test Method

See Section 2 “Test Setups” of test report.

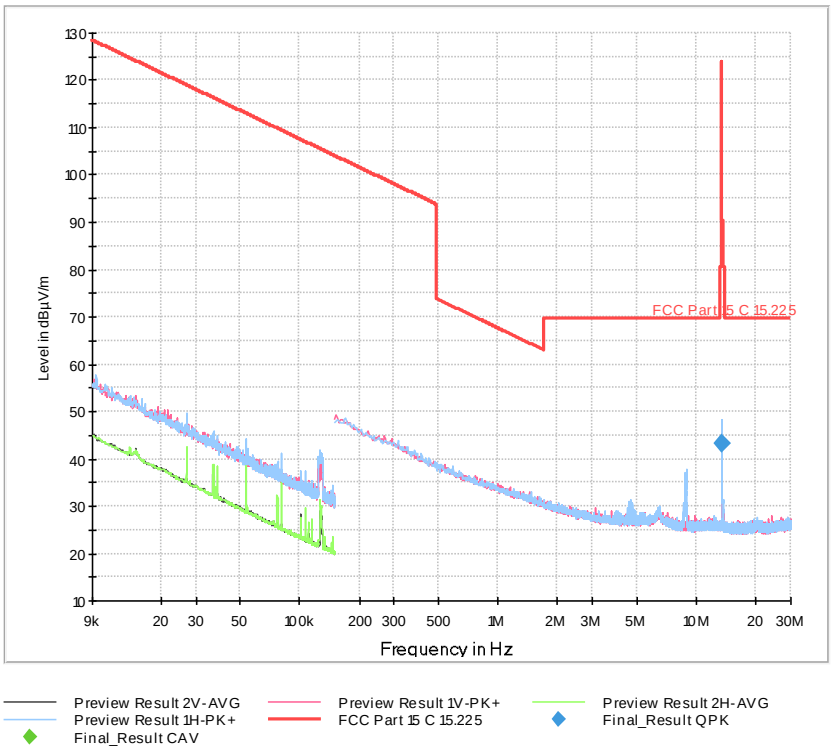
3.2.5 Environmental Conditions

Ambient Temperature	21.0 °C
Relative Humidity	29.0 %

Product Service

3.2.6 Test Results

RFID units transmitting continuously – Frequency range 9 kHz to 30 MHz



Final Results:

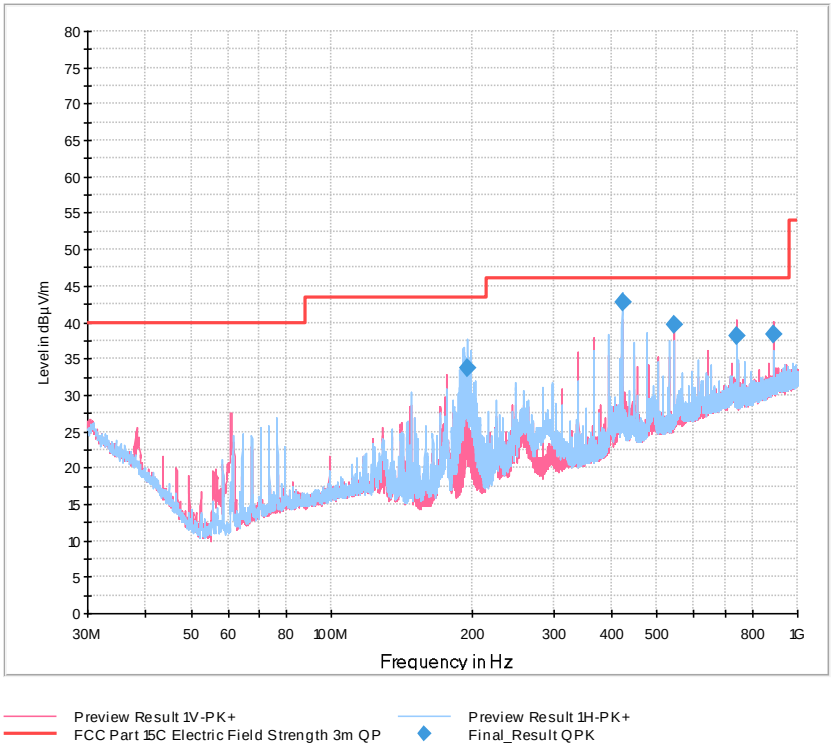
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
13.560000	43.12	124.00	80.88	1000.0	9.000	100.0	H	143.0	18.9

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	24,2	18,9	-40,0		3,1	84,0	**80,9**

Table 9 - 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)

RFID units transmitting continuously – Frequency range 30 MHz to 1 GHz



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*
196.500000	33.67	43.50	9.83	1000.0	120.000	122.0	H	-60.0	15.3
420.360000	42.68	46.02	3.34	1000.0	120.000	173.0	H	14.0	22.9
544.470000	39.58	46.02	6.44	1000.0	120.000	109.0	V	-57.0	25.4
742.470000	38.04	46.02	7.98	1000.0	120.000	167.0	V	-91.0	28.7
890.970000	38.30	46.02	7.72	1000.0	120.000	104.0	V	37.0	30.5

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	3

Table 10 - FCC Radiated Emission Limit

Industry Canada 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.

Industry Canada 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 10 - Industry Canada 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 11 - Industry Canada Radiated Emission Limit - 30 MHz to 1 GHz

3.2.7 Test Location and Test Equipment Used

This test was carried out in and Semi anechoic room - cabin no. 11.

Instrument	Manufacturer	Type No	T-ID	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESR7	22643	36	2022-10
Loop antenna	Schwarzbeck	FMZB 1519B	44334	36	2023-01
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2022-11
EMI test software	Rohde & Schwarz	EMC32 V10.50.10	---	---	---

Table 12

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

Product Service

3.3 Frequency Tolerance Under Temperature and Voltage Variations

3.3.1 Specification Reference

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

3.3.2 Equipment Under Test and Modification State

6744978 D3691, S/N: 700101 - Modification State 0

3.3.3 Date of Test

2021-04-13

3.3.4 Test Method

3.3.5 Environmental Conditions

Ambient Temperature	21.0 °C
Relative Humidity	31.0 %

3.3.6 Test Results

RFID units transmitting continuously

Temperature	Voltage	Measured Frequency (MHz)	Frequency Deviation (%)	Frequency Error (ppm)
-20.0 °C	120 V	13.560100	0.000000	0.000000
-10.0 °C	120 V	13.560100	0.000000	0.000000
0.0 °C	120 V	13.560100	0.000000	0.000000
+10.0 °C	120 V	13.560100	0.000000	0.000000
+20.0 °C	120 V	13.560100	0.000000	0.000000
+30.0 °C	120 V	13.560100	0.000000	0.000000
+40.0 °C	120 V	13.560050	0.000369	3.687288
+50.0 °C	120 V	13.560050	0.000369	3.687288

Table 13 - Frequency Tolerance Under Temperature Variation

Temperature	Voltage	Measured Frequency (MHz)	Frequency Deviation (%)	Frequency Error (ppm)
+20.0 °C	102	13.560100	0.000000	0.000000
+20.0 °C	120	13.560100	0.000000	0.000000
+20.0 °C	138	13.560100	0.000000	0.000000

Table 14 - Frequency Tolerance Under Voltage Variation

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.

Industry Canada RSS-210, Limit Clause B.6

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

3.3.7 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	24	2022-01-31
Climatic test chamber	Feutron	KPK200-2	19868	36	2023-02-28

Table 15

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

Product Service

3.4 AC Power Line Conducted Emissions

3.4.1 Specification Reference

FCC 47 CFR Part 15C, Industry Canada RSS-210 and Industry Canada RSS-GEN, Clause 15.207, N/A and 8.8

3.4.2 Equipment Under Test and Modification State

6744978 D3691, S/N: 700101 - Modification State 0

3.4.3 Date of Test

2021-04-09

3.4.4 Environmental Conditions

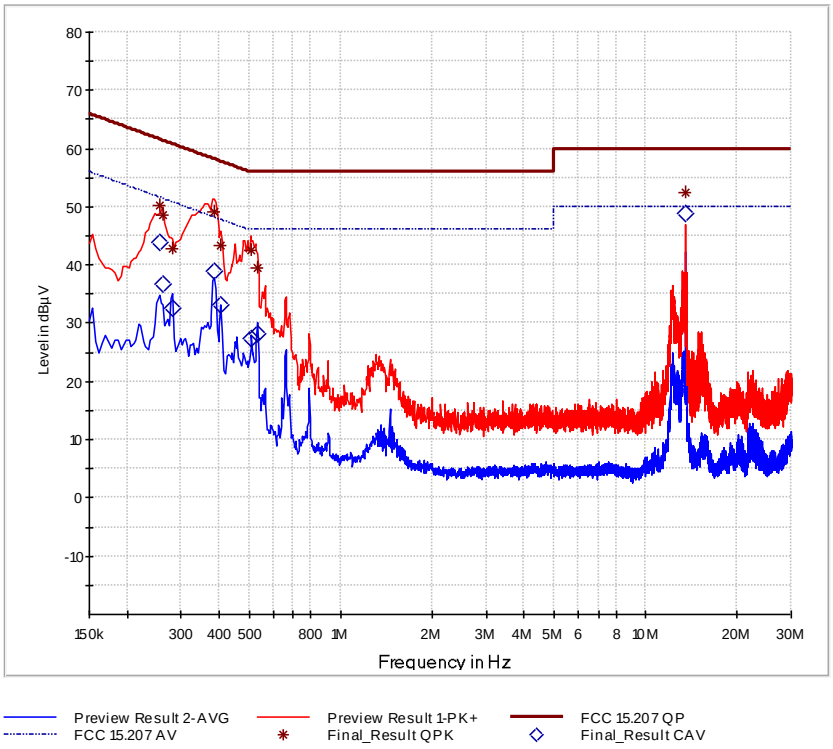
Ambient Temperature	20.3 °C
Relative Humidity	29.1 %

Product Service

3.4.5 Test Results

RFID units transmitting continuously

Line L Emissions Results with the Antenna

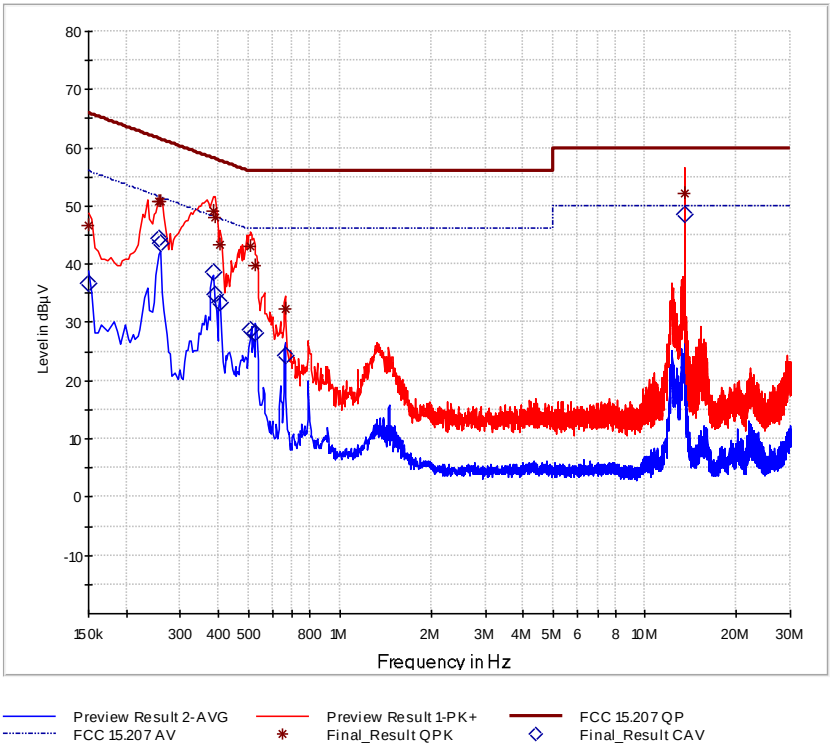


Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV*	*CAverage* *dBµV*	*Limit* *dBµV*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Line*	*Filter*	*Corr.* *dB*
0.254000	---	43.82	51.63	7.81	1000.0	9.000	L1	OFF	10.03
0.254000	50.25	---	61.63	11.38	1000.0	9.000	L1	OFF	10.03
0.262000	---	36.80	51.37	14.57	1000.0	9.000	L1	OFF	10.03
0.262000	48.68	---	61.37	12.69	1000.0	9.000	L1	OFF	10.03
0.282000	---	32.64	50.76	18.12	1000.0	9.000	L1	OFF	10.03
0.282000	42.79	---	60.76	17.97	1000.0	9.000	L1	OFF	10.03
0.386000	---	39.08	48.15	9.07	1000.0	9.000	L1	OFF	10.03
0.386000	49.14	---	58.15	9.01	1000.0	9.000	L1	OFF	10.03
0.406000	---	33.07	47.73	14.66	1000.0	9.000	L1	OFF	10.03
0.406000	43.26	---	57.73	14.47	1000.0	9.000	L1	OFF	10.03
0.506000	---	27.36	46.00	18.64	1000.0	9.000	L1	OFF	10.04
0.506000	42.52	---	56.00	13.48	1000.0	9.000	L1	OFF	10.04
0.534000	---	28.32	46.00	17.68	1000.0	9.000	L1	OFF	10.04
0.534000	39.51	---	56.00	16.49	1000.0	9.000	L1	OFF	10.04
13.560000	---	48.83	50.00	1.17	1000.0	9.000	L1	OFF	10.23
13.560000	52.51	---	60.00	7.49	1000.0	9.000	L1	OFF	10.23

Product Service

Line N Emissions Results with the Antenna



Final Results:

Frequency MHz	QuasiPeak dBµV	CAverage dBµV	Limit dBµV	Margin dB	Meas. Time ms	Bandwidth kHz	Line	Filter	Corr. dB
0.150000	---	36.70	56.00	19.30	1000.0	9.000	N	OFF	10.0
0.150000	46.80	---	66.00	19.20	1000.0	9.000	N	OFF	10.0
0.254000	---	44.40	51.63	7.23	1000.0	9.000	N	OFF	10.0
0.254000	50.92	---	61.63	10.71	1000.0	9.000	N	OFF	10.0
0.258000	---	43.50	51.50	8.00	1000.0	9.000	N	OFF	10.0
0.258000	50.82	---	61.50	10.68	1000.0	9.000	N	OFF	10.0
0.386000	---	38.67	48.15	9.48	1000.0	9.000	N	OFF	10.0
0.386000	49.28	---	58.15	8.87	1000.0	9.000	N	OFF	10.0
0.390000	---	34.87	48.06	13.19	1000.0	9.000	N	OFF	10.0
0.390000	48.01	---	58.06	10.05	1000.0	9.000	N	OFF	10.0
0.406000	---	33.42	47.73	14.31	1000.0	9.000	N	OFF	10.0
0.406000	43.41	---	57.73	14.32	1000.0	9.000	N	OFF	10.0
0.510000	---	28.72	46.00	17.28	1000.0	9.000	N	OFF	10.0
0.510000	43.19	---	56.00	12.81	1000.0	9.000	N	OFF	10.0
0.530000	---	28.28	46.00	17.72	1000.0	9.000	N	OFF	10.0
0.530000	39.72	---	56.00	16.28	1000.0	9.000	N	OFF	10.0
0.662000	---	24.46	46.00	21.54	1000.0	9.000	N	OFF	10.1
0.662000	32.44	---	56.00	23.56	1000.0	9.000	N	OFF	10.1
13.560000	---	48.51	50.00	1.49	1000.0	9.000	N	OFF	10.2
13.560000	52.25	---	60.00	7.75	1000.0	9.000	N	OFF	10.2

FCC 47 CFR Part 15. Limit Clause 15.207 and Industry 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 16

*Decreases with the logarithm of the frequency.

3.4.6 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	ESCI3	19730	18	2022-05-31
V-network	Rohde & Schwarz	ENV216	39908	12	2022-03-31
Test Software	Rohde & Schwarz	EMC32 Emission K4 - V10.60.00	44377	---	---

Table 17

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

Product Service

3.5 Exposure of Humans to RF Fields

3.5.1 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

3.5.2 Guide

Industry Canada RSS-102 Issue 5

3.5.3 Equipment Under Test and Modification State

6744978 D3691. S/N: 700101 - Modification State - 0

3.5.4 Date of Test

2021-04-14

3.5.5 Test Results

acc. to KDB 447498 D01:

Maximum Radiated Power (EIRP) Pmax:	61.5 nW (see section 3.3 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. 61.5 nW < 237 mW → criteria fulfilled

IC RSS-GEN Issue 5, section 3.2 and IC RSS-102, Issue 5, section 2.5

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:				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = 61.5 nW				
with:				
Field strength in V/m: FS = 3.1 dBµV/m = 1.429 µV/m			☒	
Distance between the two antennas in m: D = 30 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 =61.5 nW				

[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	=	61.5 mW	
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

4 Measurement Uncertainty

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

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to CISPR16-4-2: 2011 + A1 + A2 + Cor1 (U_{CISPR}). This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

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 18

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 19

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			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 20

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%