Report on the FCC and IC Testing of the Agrident GmbH AWR250 In accordance with FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN and FCC 47 CFR Part 15B and ICES-003

Prepared for: Agrident GmbH
Steinklippenstraße 10
D-30890 Barsinghausen

FCC ID: QG2AWR250
IC: 6252A-AWR250

Product Service

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COMMERCIAL-IN-CONFIDENCE

Date: 2019-10-18
Document Number: TR-09774-69416-01 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alex Fink	2019-10-18	
Authorised Signatory	Martin Steindl	2019-10-18	

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, ISED Canada RSS-210 and ISED Canada RSS-GEN and FCC 47 CFR Part 15B and ICES-003. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Alex Fink	2019-10-18	

Laboratory Accreditation	Laboratory recognition	ISED Canada test site registration
DAkkS Reg. No. D-PL-11321-11-02	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 Canada RSS-210 and ISED Canada RSS-GEN:2016, Issue 09 (08-2016), Issue 04 (11-2014) and FCC 47 CFR Part 15B and ICES-003:2017 and 2016.

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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	2019-10-18

Table 1

1.2 Introduction

Applicant	Agrident GmbH
Manufacturer	Agrident GmbH
Model Number(s)	AWR250
Serial Number(s)	1246000703
Hardware Version(s)	N/A
Software Version(s)	N/A
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN:2016, Issue 09 (08-2016), Issue 04 (11-2014) and FCC 47 CFR Part 15B and ICES-003:2017 and 2016
Test Plan/Issue/Date	N/A
Order Number Date	1278 2019-09-04
Date of Receipt of EUT	2019-10-04
Start of Test	2019-10-07
Finish of Test	2019-10-17
Name of Engineer(s)	Alex Fink
Related Document(s)	ANSI C63.10 (2013) ANSI C63.4: 2014

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN and FCC 47 CFR Part 15B and ICES-003 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: 3.6 V Battery Supply - Continuously reading RFID Tag				
2.1	15.249 (b)(2), N/A and 6.11	Frequency Tolerance Under Temperature Variations	Pass	ANSI C63.10 (2013)
2.2	15.209, 4.3 and 6.13	Field Strength of any Emission	Pass	ANSI C63.10 (2013)
2.3	15.215 (c), N/A and 6.6	20 dB Bandwidth	Pass	ANSI C63.10 (2013)
2.4	15.207, N/A and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10 (2013)
2.5	15.205, 4.1 and 8.10	Restricted Band Edges	Pass	ANSI C63.10 (2013)
2.6	RSS GEN, RSS 102	Exposure of Humans to RF Fields	Pass	---
Configuration and Mode: 3.6 V Battery Supply – normal operation mode				
2.7	15.109 and 6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014
2.8	15.107 and 6.1	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014

Table 2

Product Service

1.4 Application Form

Please enter the information below in english language, since it is directly copied to the reports, thank you!

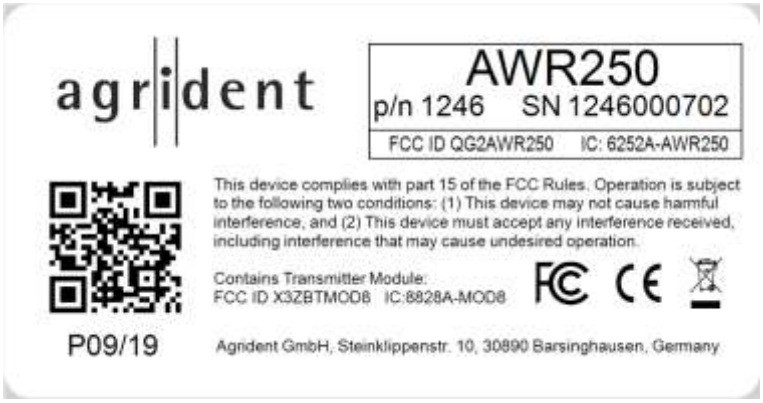
General information (for report)	
Ordernumber (your PO number)	1278 (AWR250 Kit)
Brand	Agrident
Applicant (incl. address and contact person)	Agrident GmbH, Steinklippenstr. 10, 30890 Barsinghausen, Germany, Mr. Helmut Ruppert
Manufacturer (when different to applicant)	
Name and address of factory(ies)	Agrident GmbH, Steinklippenstr. 10, 30890 Barsinghausen, Germany
HS Code	84713000

Equipment characteristics:			
Type of equipment:	Mobile RFID Reader for electronic animal identification		
Type designation*: (For IC „MN:“)	AWR250		
***Please consider:**	If the type designation has to be changed in the report the whole test of the product has to be repeated! More Info: Only available in german language: http://www.dakks.de/sites/default/files/dokumente/71_sd_0_019_beschluesse_horizontal_20160914_v1.0.pdf		
Parts of the system:	AWR250 Stickreader, Magnetic USB-Cable		
Version of EUT: In case of already tested products please describe the differences to the original sample	Original Equipment		
Serial number:	1246000702, 1246000703		
FCC ID: (If applicable)	QG2AWR250		
IC: (if applicable)	6252A-AWR250		
Modulation Method:	ASK for FDX-B transponder and FSK for HDX transponders		
Emission Designator:	---	---	---

Product Service

Antenna Type	Ferrite Antenna		
Antenna Gain	[State the maximum Antenna Gain] -> not applicable (magnetic antenna)		
Power supply:	☐ AC Nominal: V Minimum: V Maximum: V Nominal frequency: Hz	☐ DC Nominal: V Minimum: V Maximum: V	☒ Battery Nominal: 3.6 V
highest frequency generated or used within the EUT	62.00 MHz ☒ < 108 MHz		

Marking plate (may only be a draft)



Operating mode(s) // Methods of Observation	
Operating mode(s) for emission tests:	▪ Continuous Reading Mode ▪ FDX-B and HDX Transponder within the reading zone
Operating mode(s) for immunity tests:	▪ Continuous Reading Mode ▪ FDX-B and HDX Transponder within the reading zone
Methods of observation during immunity tests	

List of ports and cables					
No.	*Description*	*Classification*[1]	*Cable type*	*Cable length*	
				used	*maximum*[2]
D1		dc power	Shielded	1.05 m*	1.05 m
S1		signal/control port	Shielded	1.05 m*	1.05 m

* Both, charging the internal battery and data transmission over USB, are done via the same (magnetic) USB cable.

List of devices connected to EUT				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1				
2				
3				

List of support devices				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1	Magnetic USB Cable	LS-CA-411M4	-	Linsone
2				
3				

[1] Ports shall be classified as ac power, dc power or signal/control port.
[2] As specified by applicant

Product Service

1.5 Product Information

1.5.1 Technical Description

Mobile RFID Reader for electronic animal identification

1.6 Deviations from the Standard

none

1.7 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	Not Applicable	Not Applicable

Table 3

1.8 Test Location

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

Test Name	Name of Engineer(s)
Configuration and Mode: 3.6 V Battery Supply - Continuously reading RFID Tag	
Frequency Tolerance Under Temperature Variations	Alex Fink
Field Strength of any Emission	Alex Fink
20 dB Bandwidth	Alex Fink
AC Power Line Conducted Emissions	Alex Fink
Restricted Band Edges	Alex Fink
Configuration and Mode: 3.6 V Battery Supply – normal operation mode	
Radiated Disturbance	Alex Fink
Conducted Disturbance at Mains Terminals	Alex Fink

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Details

2.1 Frequency Tolerance Under Temperature Variations

2.1.1 Specification Reference

ISED Canada RSS-210 and ISED Canada RSS-GEN, Clause N/A and 6.11

2.1.2 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.1.3 Date of Test

2019-10-11

2.1.4 Test Method

The EUT was set to transmit on maximum power with normal modulation. A frequency counter, was used to measure the frequency error. The temperature was adjusted between - 20°C and +50°C.

2.1.5 Environmental Conditions

Ambient Temperature	21.0 °C
Relative Humidity	48.0 %

2.1.6 Test Results

3.6 V Battery Supply - Continuously reading RFID Tag

Temperature	Voltage	kHz
- 20°C	3.6 V DC	134.19250
+ 20°C	3.5 V DC	134.19250
+ 20°C	3.6 V DC	134.19250
+ 20°C	4.2 V DC	134.19250
+ 50°C	3.6 V DC	134.19250

Table 5

ISED Canada RSS-210 Limit Clause

None specified

Product Service

2.1.7 Test Location and Test Equipment Used

This test was carried out in a non-shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP30	19533	12	2020-08-31
Climatic test chamber	ESPEC	PL-2J	18843	24	2020-03-31

Table 6

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

Product Service

2.2 Field Strength of any Emission

2.2.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN, Clause 15.209, 4.3 and 6.13

2.2.2 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.2.3 Date of Test

2019-10-07

2.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5. and ISED Canada RSS-Gen clause 6.13.
Measurements were made at a distance of 3 m. The limit lines shown on the plot were extrapolated from either 300 m or 30 m to the measurement distance of 3 m in accordance with ANSI C63.10 Clause 6.4.4.2.
For any emissions detected within 20 dB of the limit, a final measurement was made and recorded in the table below. The detector used for these measurements was a quasi-peak detector except for emissions within the bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where a CISPR average detector was used.

2.2.5 Environmental Conditions

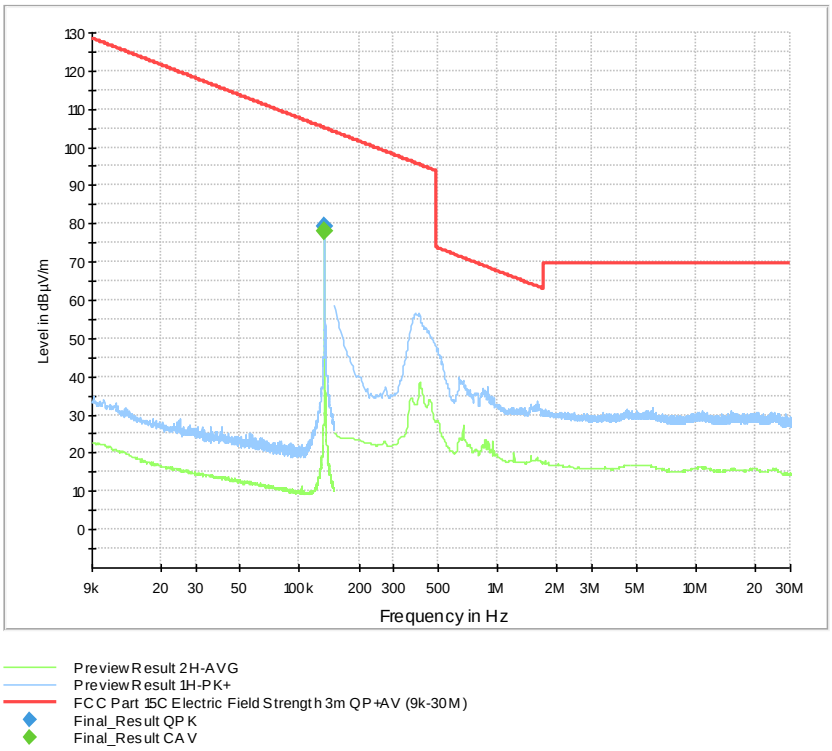
Ambient Temperature	22.0 °C
Relative Humidity	32.0 %

Product Service

2.2.6 Test Results

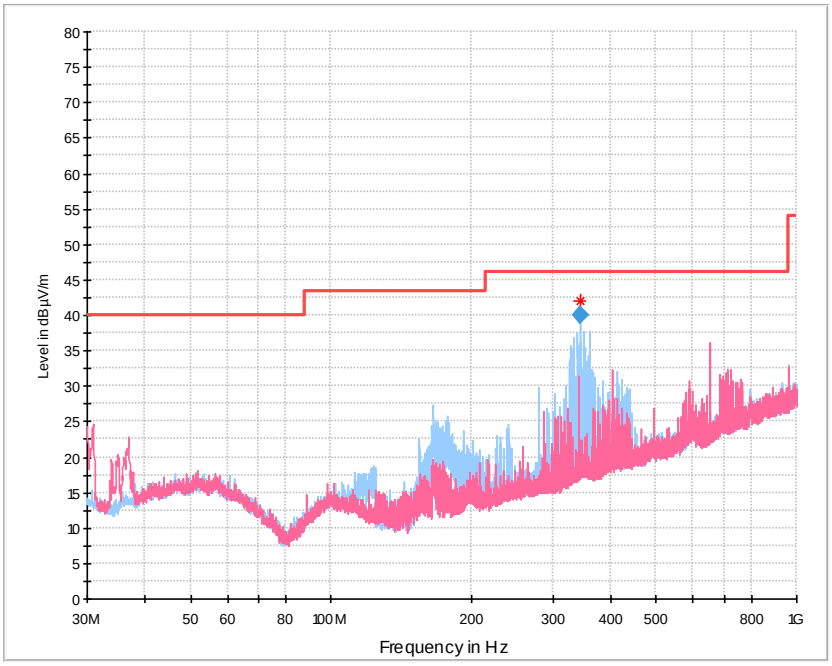
Continuously reading RFID Tag

1. Orthogonal axis (A)



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*
0.134200	---	78.11	---	---	1000.0	0.200	100.0	H	-44.0	20.0
0.134200	79.42	---	105.05	25.63	1000.0	0.200	100.0	H	-44.0	20.0

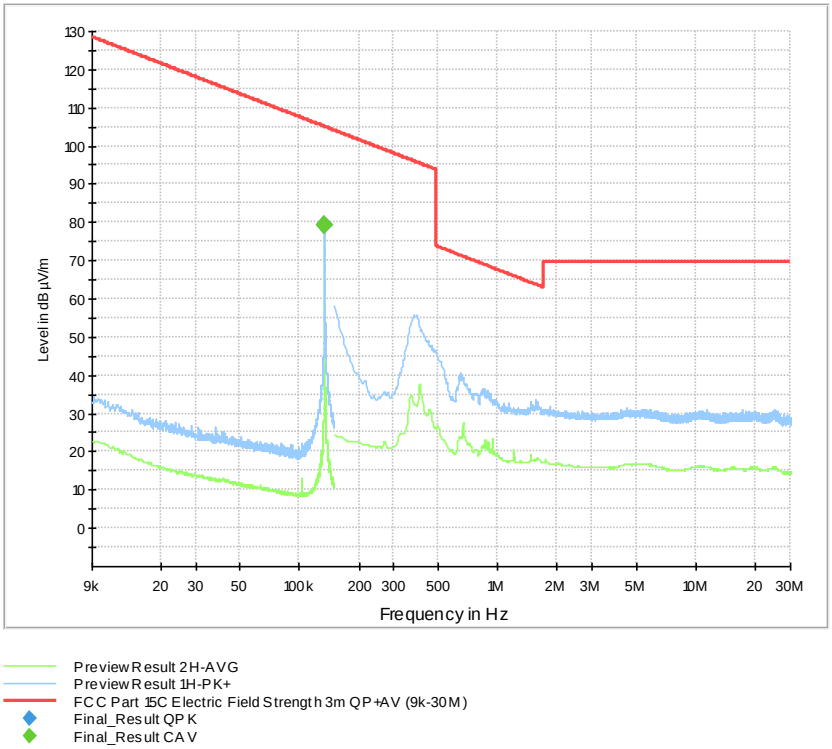


Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
342.630000	39.98	46.02	6.04	1000.0	120.000	104.0	H	180.0	16.2

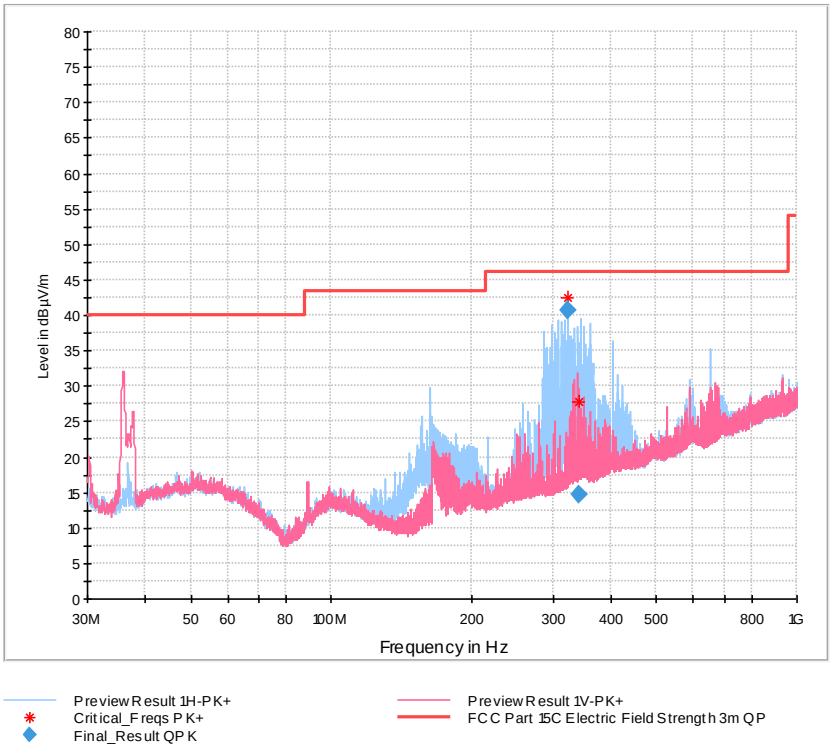
Product Service

2. Orthogonal axis (B)



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*
0.134200	---	79.21	---	---	1000.0	0.200	100.0	H	-44.0	20.0
0.134200	79.32	---	105.05	25.73	1000.0	0.200	100.0	H	-44.0	20.0

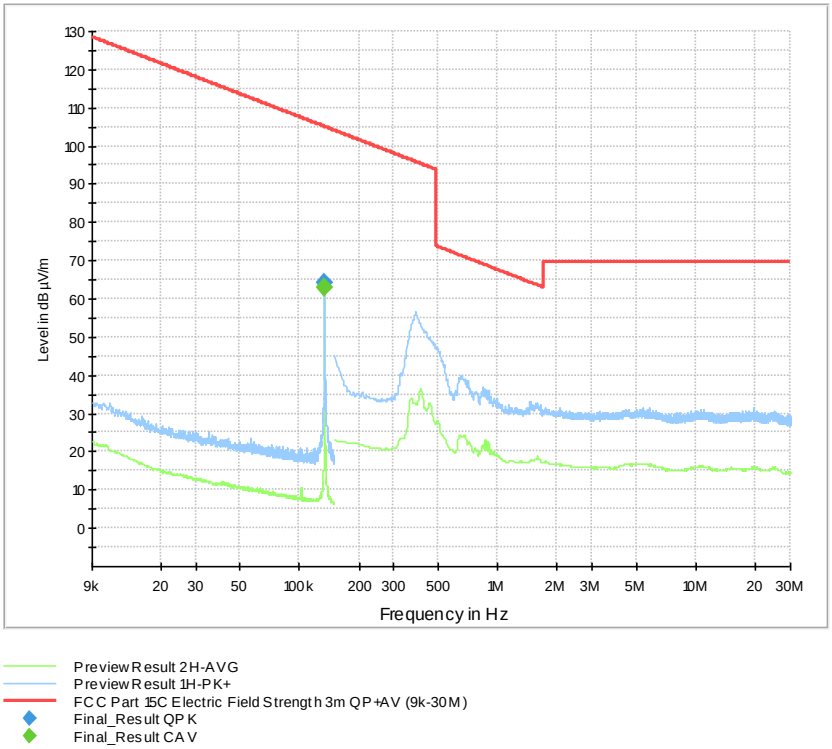


Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
323.040000	40.75	46.02	5.27	1000.0	120.000	100.0	H	-157.0	15.2
341.940000	14.73	46.02	31.29	1000.0	120.000	111.0	H	159.0	16.1

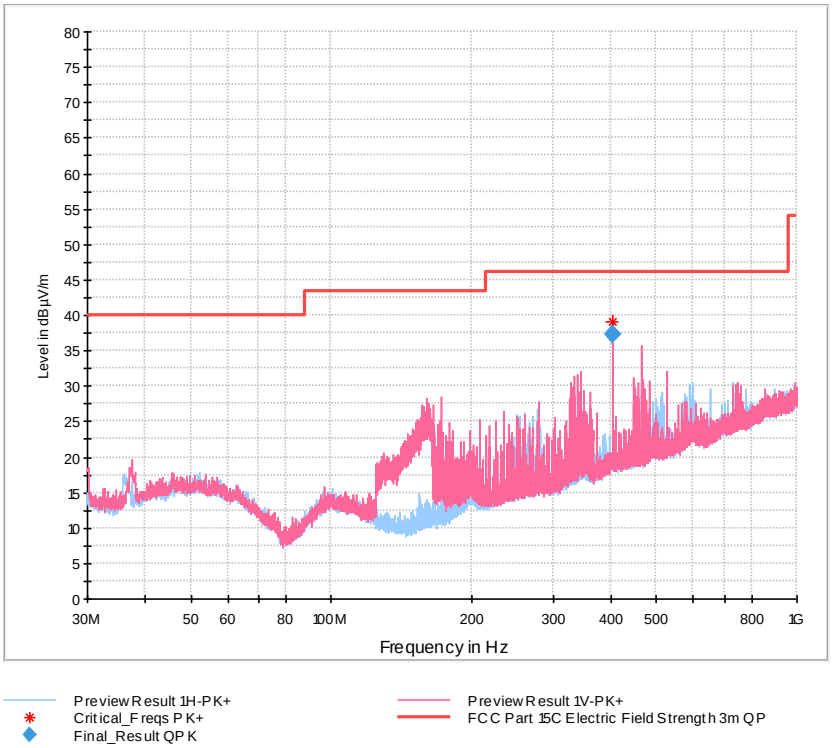
Product Service

3. Orthogonal axis (C)



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*
0.134200	---	62.74	---	---	1000.0	0.200	100.0	H	-70.0	20.0
0.134200	64.02	---	105.05	41.03	1000.0	0.200	100.0	H	-63.0	20.0



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*
402.990000	37.26	46.02	8.76	1000.0	120.000	111.0	V	-60.0	17.2

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
1.705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	3

Table 7 - FCC Limit

NOTE: The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.

ISED Canada RSS-210, Limit Clause 4.4

Under no circumstance shall the level of any unwanted emissions exceed the level of the fundamental emissions.

ISED Canada RSS-Gen, Limit Clause 8.9

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

Table 8 - IC Limit, Below 30 MHz

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

Table 9 - IC Limit, Above 30 MHz

Product Service

2.2.7 Test Location and Test Equipment Used

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

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Loop Antenna	Rohde & Schwarz	HFH2-Z2	18876	36	2022-08-31
TRILOG Antenna	Schwarzbeck	VULB 9163	19691	24	2020-12-31
EMI test receiver	Rohde & Schwarz	ESW44	101814	12	2020-02-29
EMC measurement software	Rohde & Schwarz	EMC32-ME+	19719	N/A	N/A

Table 10

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

Product Service

2.3 20 dB Bandwidth

2.3.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN, Clause 15.215 (c), N/A and 6.6

2.3.2 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.3.3 Date of Test

2019-10-10

2.3.4 Test Method

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

2.3.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	52.0 %

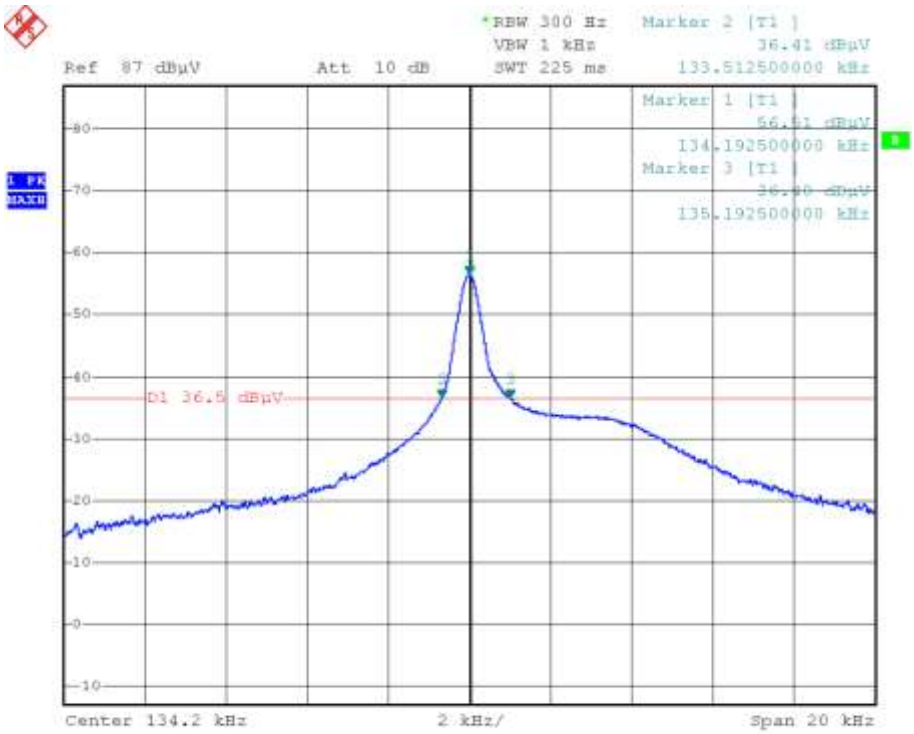
2.3.6 Test Results

3.6 V Battery Supply - Continuously reading RFID Tag

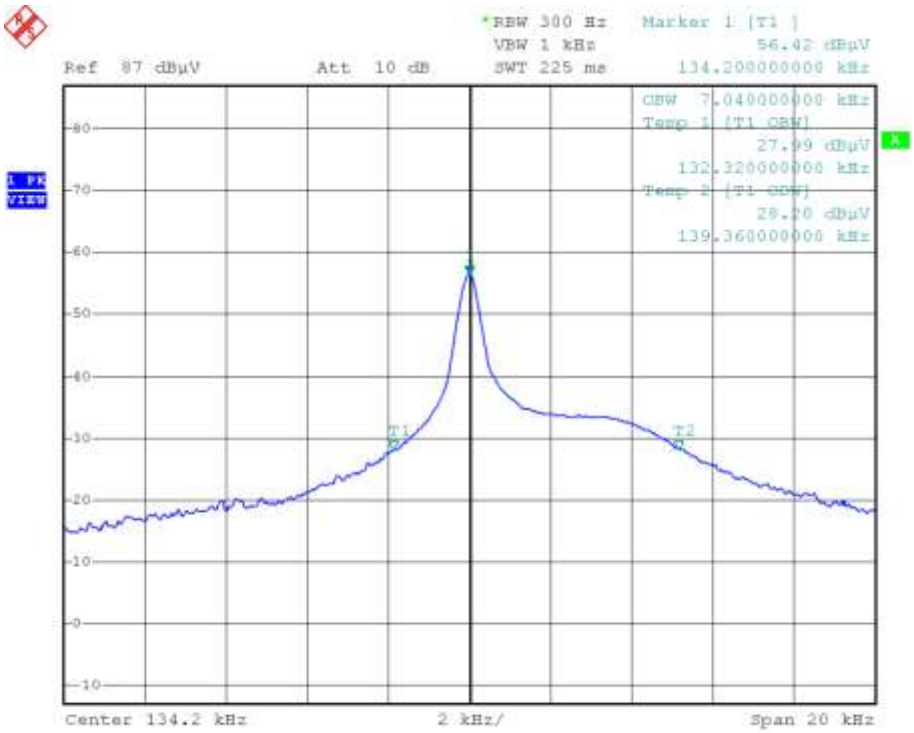
Frequency (kHz)	20 dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	F_{LOWER} (kHz)	F_{UPPER} (kHz)
134.2	1.68	7.04	133.5	135.2

Table 11

Product Service



20 dB Bandwidth



99% Occupied Bandwidth

Product Service

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 Canada RSS 210 and ISED Canada RSS GEN, Limit Clause

None specified.

2.3.7 Test Location and Test Equipment Used

This test was carried out in a non-shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSP30	19533	12	2020-08-31
Climatic test chamber	ESPEC	PL-2J	18843	36	2020-03-31

Table 12

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

Product Service

2.4 AC Power Line Conducted Emissions

2.4.1 Specification Reference

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

2.4.2 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.4.3 Date of Test

2019-10-15

2.4.4 Test Method

2.4.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	51.0 %

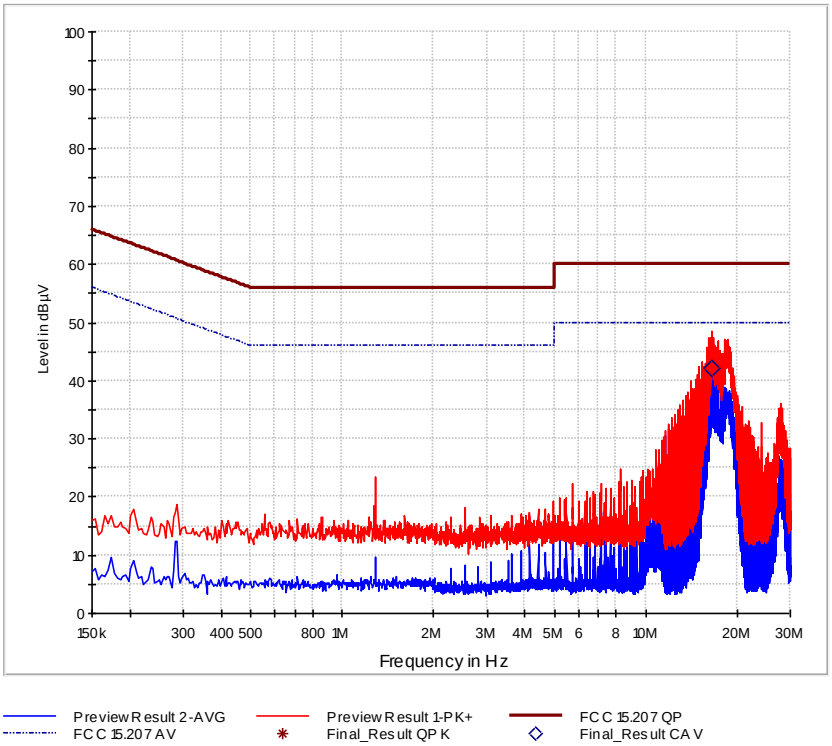
2.4.6 Test Results

External DC power supply - Continuously reading RFID Tag

Applied supply Voltage:	120 V AC
Applied supply frequency:	60 Hz

Product Service

L1-Line – 150 k to 30 MHz

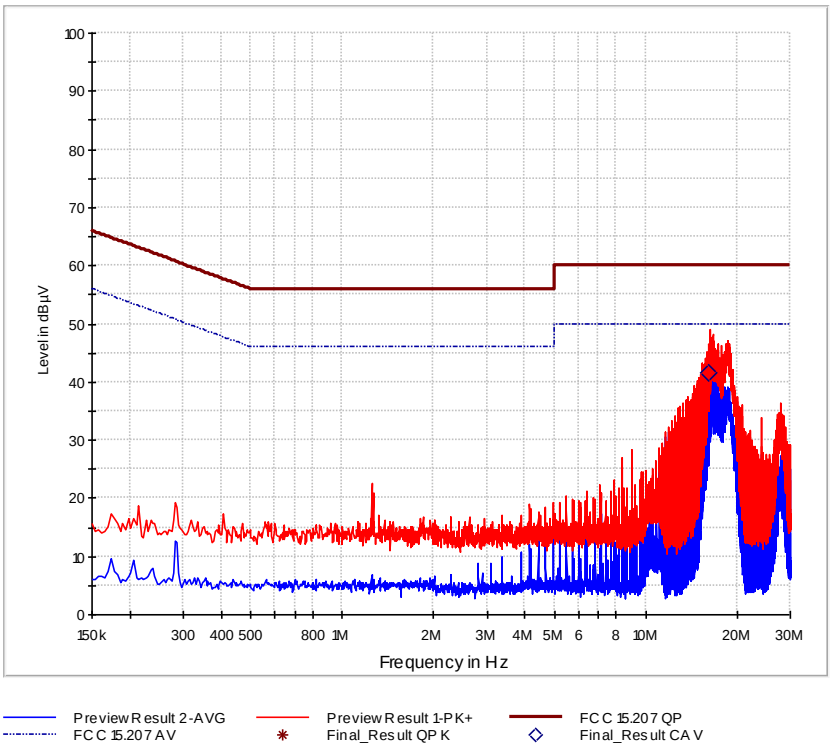


Final Results:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*PE*	*Corr. dB*
16.506000	---	42.19	50.00	7.81	1000.0	9.000	L1	ON	10.4

Product Service

N-Line – 150 k to 30 MHz



Final Results:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*Filter*	*Corr. dB*
16.238000	---	41.70	50.00	8.30	1000.0	9.000	N	ON	10.4

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 13

*Decreases with the logarithm of the frequency.

2.4.7 Test Location and Test Equipment Used

This test was carried out in a non-shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESCI3	19730	18	2020-11-30
V-Network	Rohde & Schwarz	ENV216	39911	12	2020-02-29
EMC measurement software	Rohde & Schwarz	EMC32-MEB	20090	N/A	N/A

Table 14

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

Product Service

2.5 Restricted Band Edges

2.5.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN, Clause 15.205, 4.1 and 8.10

2.5.2 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.5.3 Date of Test

2019-10-07

2.5.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.13.1.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3.

Final average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.2.

2.5.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	52.0 %

2.5.6 Test Results

3.6 V Battery Supply - Continuously reading RFID Tag

See chapter 2.2 for results.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

Table 15

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 16

*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.

2.5.7 Test Location and Test Equipment Used

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

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Loop Antenna	Rohde & Schwarz	HFH2-Z2	18876	36	2022-08-31
TRILOG Antenna	Schwarzbeck	VULB 9163	19691	24	2020-12-31
EMI test receiver	Rohde & Schwarz	ESW44	101814	12	2020-02-29
EMC measurement software	Rohde & Schwarz	EMC32-ME+	19719	N/A	N/A

Table 17

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

Product Service

2.6 Exposure of Humans to RF Fields

2.6.1 Specification Reference

IC RSS-GEN Issue 4, section 3.2 and
IC RSS-102, Issue 5, section 2.5
KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

2.6.2 Guide

IC RSS-102 Issue 5, section 2.5

2.6.3 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.6.4 Date of Test

2019-10-07 to 2019-10-17

2.6.5 Test Results

Product Service

RFID Evaluation:

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 = **..... W**			☐	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☐ the numerical antenna gain: G = **.....**		☐		
$EIRP = G \cdot CP \Rightarrow EIRP$ = **..... W**				
☐ the field strength[3] in V/m: FS = **..... V/m**			☐	
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **..... W**				
with:				
Distance between the antennas in m: D = **..... m**			☐	
☒ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by:				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **0.026 mW**				
with:				
Field strength in V/m: FS = **0.00935**			☒	
Distance between the two antennas in m: D = **3**			☒	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = **0.026 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
≤300 [5]	71	101	132	162	193	223	254	284	315	345
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

[4] The exemption 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 alinear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from athird order polynomial fit.

[5] Transmitters operating between 3 kHz and 10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in IC RSS-102, issue 5, section 4.

Product Service

Carrier frequency:	*f*	=	**134.2 kHz**			
Distance:	*d*	=	**5 mm**			
Transmitter output power:	*TP*	=	**0.026 mW**			
Limit:	TP_{limit}	=	**71 mW**			☒
☐ SAR evaluation is documented in test report no. …						

Specifications:	RSS-102, Issue 5, Section 4, Table 4, Uncontrolled Environment SPR-002, Issue 1
Operation mode:	3.6 V Battery Supply - Continuously reading RFID Tag
Comment:	The nerve stimulation exposure limit is defined for the frequency range 3 kHz to 10 MHz, only. Thus, the carrier at 134.2 kHz was evaluated, only.

Test procedure:	IEC 62311, Section 7.2 “Measurement to show accordance to the reference levels”
Test distance:	Direct contact to EUT
Limit:	*f* in MHz
Test positions:	All surfaces: The antenna was moved all over the equipment under test using a test distance as stated above.

Frequency Range (MHz)	*Electric Field (V/m_{rms})*	*Magnetic Field (A/m_{rms})*	*Peference Periode (min)*
0.003 – 10	83	90	Instantaneous
0.1 – 10	---	0.73 / f	6
1.1 - 10	$87/f^{0.5}$	---	6

Measured maximum value (V/m)	*Maximum Limit at 134.2 kHz (V/m)*	*Margin to reference value (V/m)*
51.50	83.00	31.50

Measured maximum value (A/m)	*Maximum Limit at 134.2 kHz (A/m)*	*Margin to reference value (A/m)*
1.88	90.00	88.12

Measured average value (A/m)	*Average Limit at 134.2 kHz (A/m)*	*Margin to reference value (A/m)*
1.46	5.84	4.38

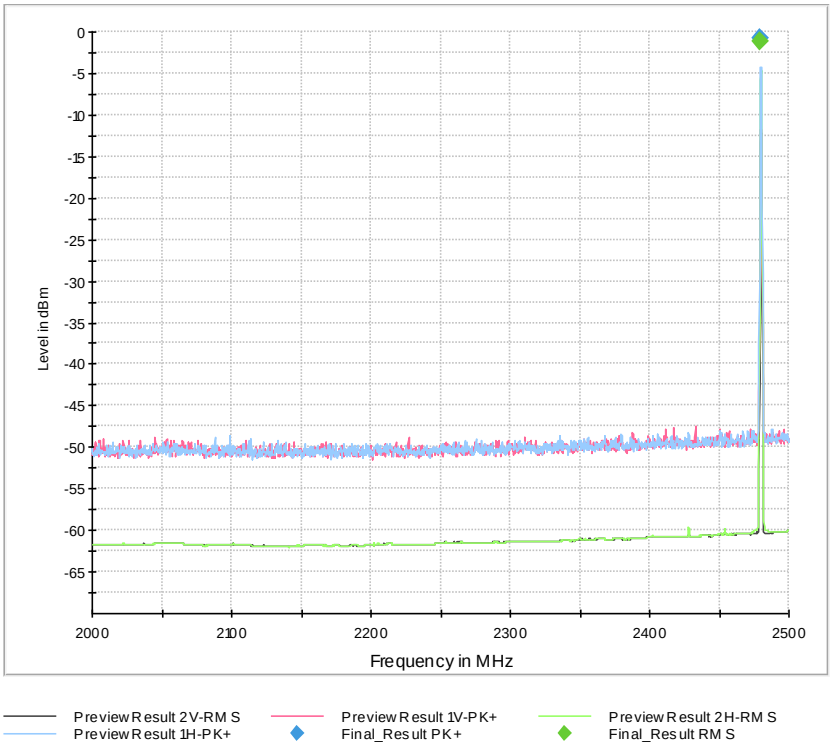
Product Service

Bluetooth Evaluation

acc. to KDB 447498 D01:

Maximum measured Radiated Power (EIRP) Pmax:	- 0.8 dBm = 0.83 mW
Compliance Boundary d:	10 mm
Frequency f:	2480 MHz = 2.480 GHz
Numeric Threshold (Pmax / d) $(f)^{0.5}$	0.13
Numeric Threshold Limit (1 g SAR):	3.0

Transmission on channel 78 has the highest transmitting power of -0.82 dBm:



Final Results:

Frequency MHz	*MaxPeak dBm*	*RMS dBm*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azimuth deg*	*Corr. dB*
2479.850000	---	-1.08	1000.0	50000.000	130.0	H	151.0	-62.3
2479.850000	-0.82	---	1000.0	50000.000	130.0	H	151.0	-62.3

Product Service

acc. to IC RSS-GEN Issue 4, 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[6] in V/m: FS = ... V/m			☐	
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ =				
with:				
Distance between the antennas in m: D =		☐		
☒ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by: $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ (-0.8 dBm measured) = 0.83 mW				
with:				
Field strength in V/m: FS = dBµV/m = mV/m			☐	
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 = 0.83 mW				

[6] 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)[7] 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	=	2480 MHz	
Distance:	d	=	10 mm	☒
Transmitter output power:	TP	=	0.83 mW	
Limit:	TP_{limit}	=	17.5 mW	☒

[7] The exemption 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

2.6.6 Test Location and Test Equipment Used

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

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Electromagnetic radiation meter	Narda Safety	EMR-200	19590	36	2019-10-31
Electric field probe	Narda Safety	Type 8.3	19591	36	2019-10-31
Magnetic field probe	Narda Safety	Type 12.1	19592	36	2019-10-31
Exposure level tester	Narda Safety	ELT-400	19725	24	2020-06-30
Double ridged horn antenna	Rohde & Schwarz	HF907	40089	24	2021-02-28
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2020-02-29
EMC measurement software	Rohde & Schwarz	EMC32-ME+	19719	N/A	N/A

Table 18

Product Service

2.7 Radiated Disturbance

2.7.1 Specification Reference

FCC 47 CFR Part 15B and ICES-003, Clause 15.109 and 6.2

2.7.2 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.7.3 Date of Test

2019-10-14

2.7.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive table 0.8m above a reference ground plane.
A pre-scan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarisation using a peak detector; measurements were taken at a 3m distance. Using the pre-scan list of the highest emissions detected, their bearing and associated antenna polarisation, the EUT was then formally measured using a Quasi-Peak, Peak, Average detector as appropriate. The readings were maximized by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification.

2.7.5 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	51.0 %

2.7.6 Test Results

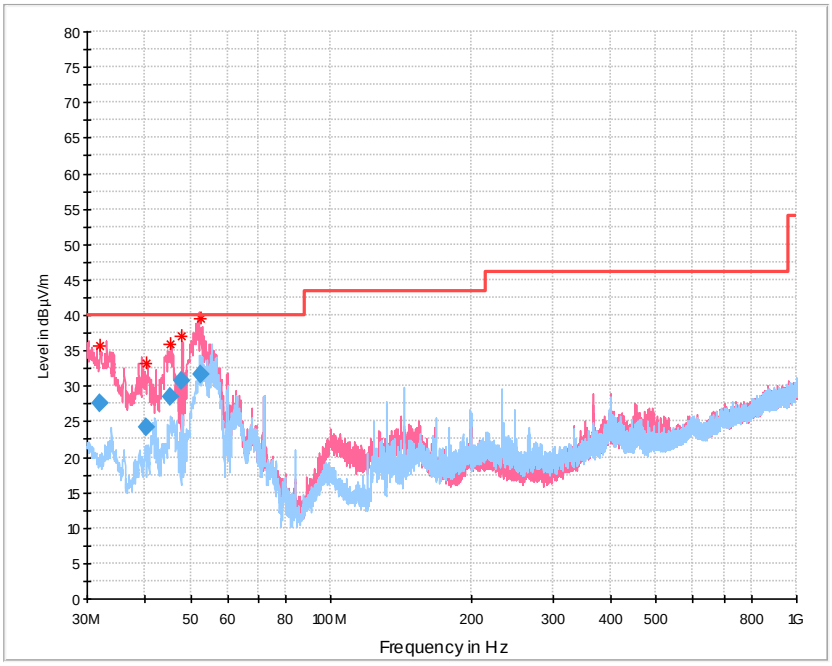
3.6 V Battery Supply - normal operation mode

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

Detailed results are shown below.

Product Service

1. Orthogonal axis (A)

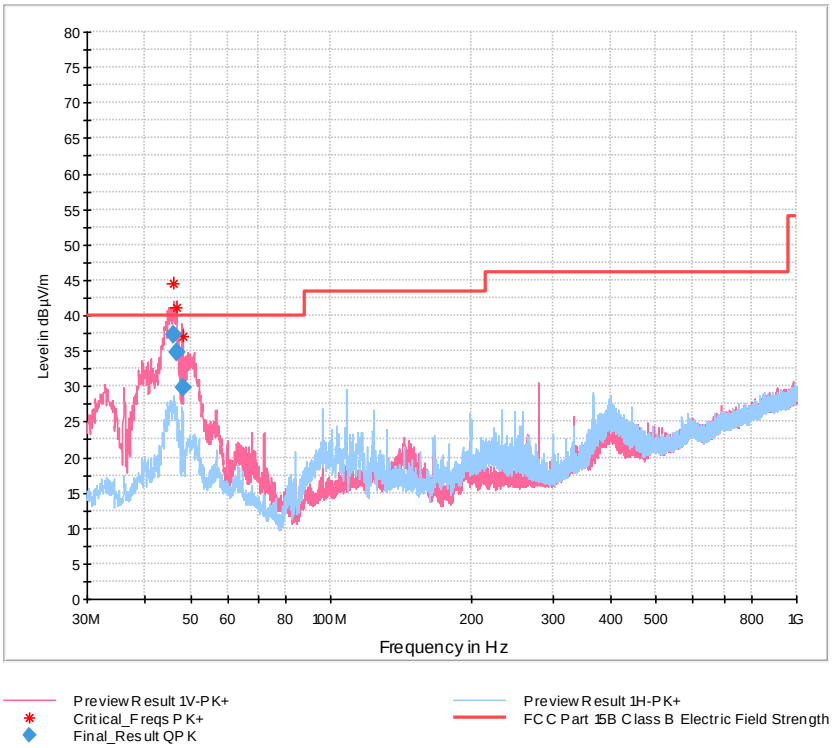


Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
31.950000	27.58	40.00	12.42	1000.0	120.000	100.0	V	20.0	10.1
40.050000	24.20	40.00	15.80	1000.0	120.000	109.0	V	-55.0	12.9
45.240000	28.49	40.00	11.51	1000.0	120.000	103.0	V	159.0	14.1
48.030000	30.66	40.00	9.34	1000.0	120.000	125.0	V	41.0	14.4
52.590000	31.62	40.00	8.38	1000.0	120.000	138.0	V	-12.0	14.4

Product Service

2. Orthogonal axis (B)

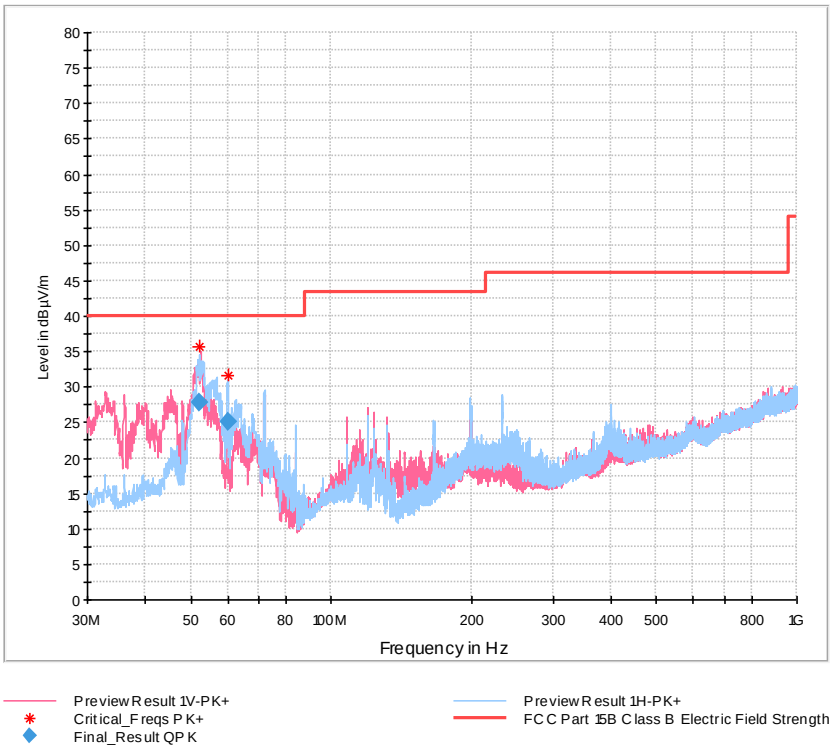


Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
46.080000	37.28	40.00	2.72	1000.0	120.000	103.0	V	114.0	14.2
46.770000	34.75	40.00	5.25	1000.0	120.000	103.0	V	-18.0	14.4
48.180000	29.72	40.00	10.28	1000.0	120.000	136.0	V	-49.0	14.4

Product Service

3. Orthogonal axis (C)



Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
52.140000	27.87	40.00	12.13	1000.0	120.000	107.0	V	63.0	14.4
60.000000	25.15	40.00	14.85	1000.0	120.000	387.0	H	176.0	13.4

Product Service

2.7.7 Test Location and Test Equipment Used

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

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Double ridged waveguide horn antenna	Rohde & Schwarz	3115	19383	36	2020-02-29
TRILOG Antenna	Schwarzbeck	VULB 9163	19691	24	2020-12-31
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2020-02-29
EMC measurement software	Rohde & Schwarz	EMC32-ME+	19719	N/A	N/A

Table 19

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

Product Service

2.8 Conducted Disturbance at Mains Terminals

2.8.1 Specification Reference

FCC 47 CFR Part 15B and ICES-003. Clause 15.107 and 6.1

2.8.2 Equipment Under Test and Modification State

AWR250, S/N: 1246000703 - Modification State 0

2.8.3 Date of Test

2019-10-15

2.8.4 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.

2.8.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	51.0 %

2.8.6 Test Results

Power Supply via Switching Adapter (XP05U-0501000) - normal operation mode

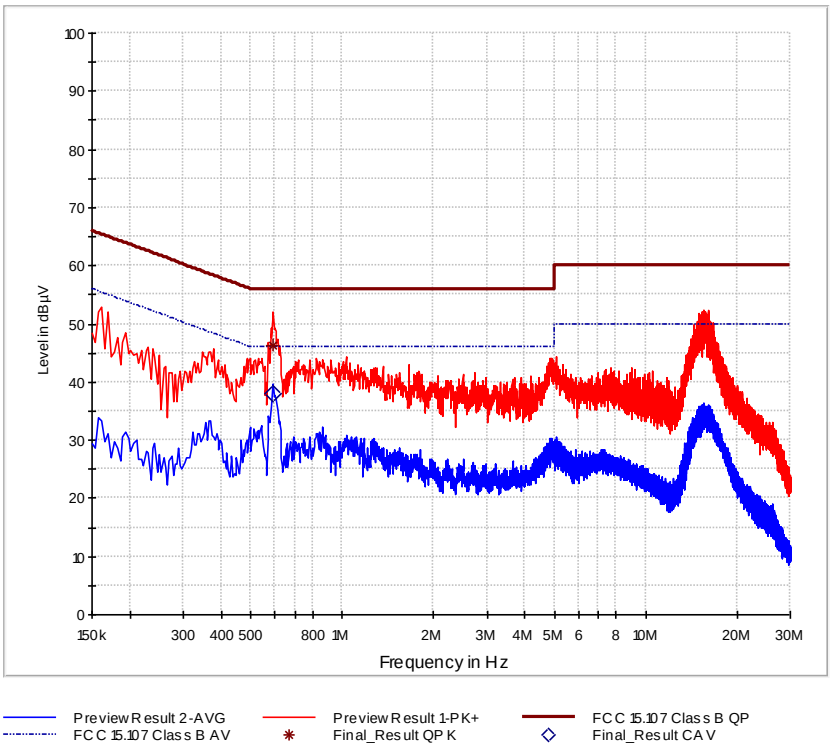
Performance assessment of the EUT made during this test: Pass.

Applied supply Voltage:	120 V AC
Applied supply frequency:	60 Hz

Detailed results are shown below.

Product Service

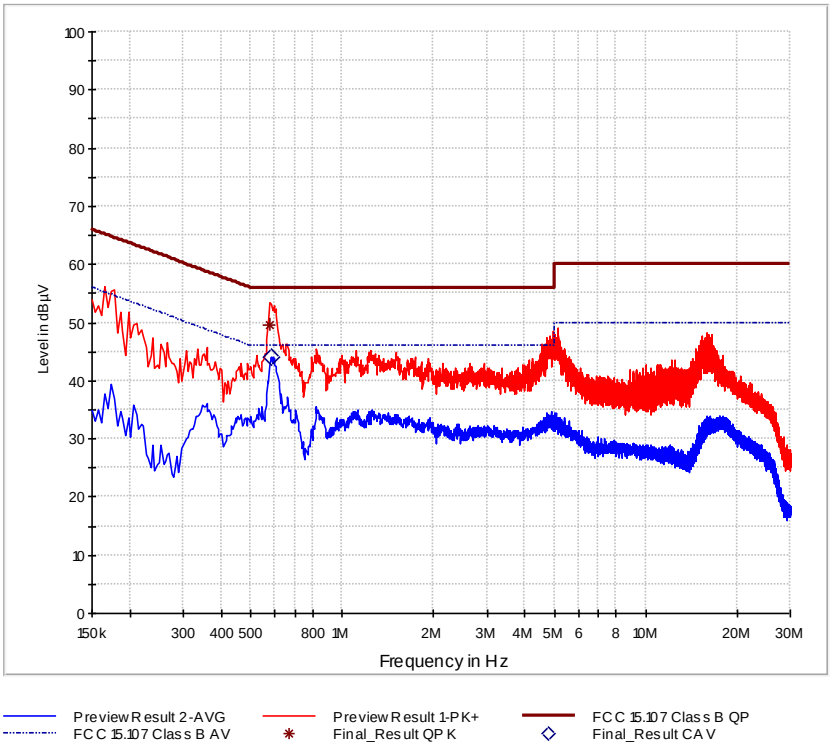
L1-Line - 150 k to 30 MHz



Final Results:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*Filter*	*Corr. dB*
0.594000	---	38.06	46.00	7.94	1000.0	9.000	L1	ON	10.0
0.594000	46.36	---	56.00	9.64	1000.0	9.000	L1	ON	10.0

N-Line - 150 k to 30 MHz



Final Results:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*Filter*	*Corr. dB*
0.578000	49.59	---	56.00	6.41	1000.0	9.000	N	ON	10.0
0.582000	---	44.10	46.00	1.90	1000.0	9.000	N	ON	10.0

2.8.7 Test Location and Test Equipment Used

This test was carried out in Shielded room - cabin no. 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESCI3	19730	18	2020-11-30
V-Network	Rohde & Schwarz	ENV216	39911	12	2020-02-29
EMC measurement software	Rohde & Schwarz	EMC32-MEB	20090	N/A	N/A

Table 20

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

Product Service

3 Photographs

See Annex A.

Product Service

4 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 21

Product Service

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 22

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 23

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%