

# Report on the FCC and IC Testing of the Olympus Soft Imaging Solutions GmbH Laboratory Equipment. Model: OLYMPUS SLIDEVIEW VS200

In accordance with FCC 47 CFR Part 15C and  
ISED Canada RSS-210 and ISED Canada RSS-  
GEN

Prepared for: Olympus Soft Imaging Solutions GmbH  
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Product Service

Choose certainty.  
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FCC ID: 2AUAK-VS200  
IC: 25356-VS200

## COMMERCIAL-IN-CONFIDENCE

Date: 2019-09-24  
Document Number: TR-63812-63812-02 | Issue: 02

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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 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	Martin Steindl	2019-10-01	<i>Stumpe</i>

Laboratory Accreditation

DAkkS Reg. No. D-PL-11321-11-02

DAkkS Reg. No. D-PL-11321-11-03

Laboratory recognition

Registration No. BNetzA-CAB-16/21-15

ISED Canada test site registration

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) and Issue 04 (11-2014).

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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	2019-07-19
2	Added second DAkkS-accreditation number Added FCC- and IC-ID of EUT Added hardware- and software-version(s) and article numbers of parts	2019-10-01

**Table 1**

## 1.2 Introduction

Applicant	Olympus Soft Imaging Solutions GmbH
Manufacturer	Olympus Soft Imaging Solutions GmbH
Model Number(s)	OLYMPUS SLIDEVIEW VS200
Serial Number(s)	VS20-BU-L (E97D31-S101-01): S/N 1906129191; VS20-LOADER (E97D31-S110-01): SN 190718407
Hardware Version(s)	N/A
Software Version(s)	VS200 ASW 3.1
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) and Issue 04 (11-2014)
Test Plan/Issue/Date	---
Order Number	4500099174
Date	2019-07-03
Date of Receipt of EUT	2019-07-15
Start of Test	2019-07-15
Finish of Test	2019-07-18
Name of Engineer(s)	Martin Steindl
Related Document(s)	KDB 447498 D01, RSS-102, SPR-002



### 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 and ISED Canada RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Module Test Configuration Loader				
2.1	15.207, N/A and 8.8	AC Power Line Conducted Emissions	Pass	
2.2	15.215 (c), N/A and 6.6	20 dB Bandwidth	Pass	
2.3	15.209, 4.3 and 6.13	Field Strength of any Emission	Pass	
2.4	15.205, 4.1 and 8.10	Restricted Band Edges	Pass	
Configuration and Mode: Module Test Configuration Scanner				
2.1	15.207, N/A and 8.8	AC Power Line Conducted Emissions	Pass	
2.2	15.215 (c), N/A and 6.6	20 dB Bandwidth	Pass	
2.3	15.209, 4.3 and 6.13	Field Strength of any Emission	Pass	
2.4	15.205, 4.1 and 8.10	Restricted Band Edges	Pass	

**Table 2**



## 1.4 Product Information

### 1.4.1 Technical Description

The VS200 is a virtual-slide-microscope. It allows manual loading and is designed for high throughput research and pathology. It features a side loader for up to 100 slides. The slides are indicated with 125kHz RFID.

The device consists of two parts, called Scanner and Loader including a separate, different RFID module, each. Thus, Scanner and Loader were tested separately.

### 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	Not Applicable	Not Applicable
1	Modification of Loader module according to documentation of applicant	M. Litke	2019-07-17

**Table 3**

### 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: Module Test Configuration Loader	
AC Power Line Conducted Emissions	Martin Steindl
20 dB Bandwidth	Martin Steindl
Field Strength of any Emission	Martin Steindl
Restricted Band Edges	Martin Steindl
Configuration and Mode: Module Test Configuration Scanner	
AC Power Line Conducted Emissions	Martin Steindl
20 dB Bandwidth	Martin Steindl
Field Strength of any Emission	Martin Steindl
Restricted Band Edges	Martin Steindl

**Table 4**

Office Address:

Äußere Frühlingstraße 45  
94315 Straubing  
Germany



## 2 Test Details

### 2.1 AC Power Line Conducted Emissions

#### 2.1.1 Specification Reference

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

#### 2.1.2 Equipment Under Test and Modification State

OLYMPUS SLIDEVIEW VS200, S/N: VS20-BU-L: S/N 1906129191; VS20-LOADER: SN  
190718407 - Modification State 0

#### 2.1.3 Date of Test

2019-07-15

#### 2.1.4 Test Method

The test was performed according to ANSI C63.10:2013, section 6.2

#### 2.1.5 Environmental Conditions

Ambient Temperature	26.0 °C
Relative Humidity	44.0 %



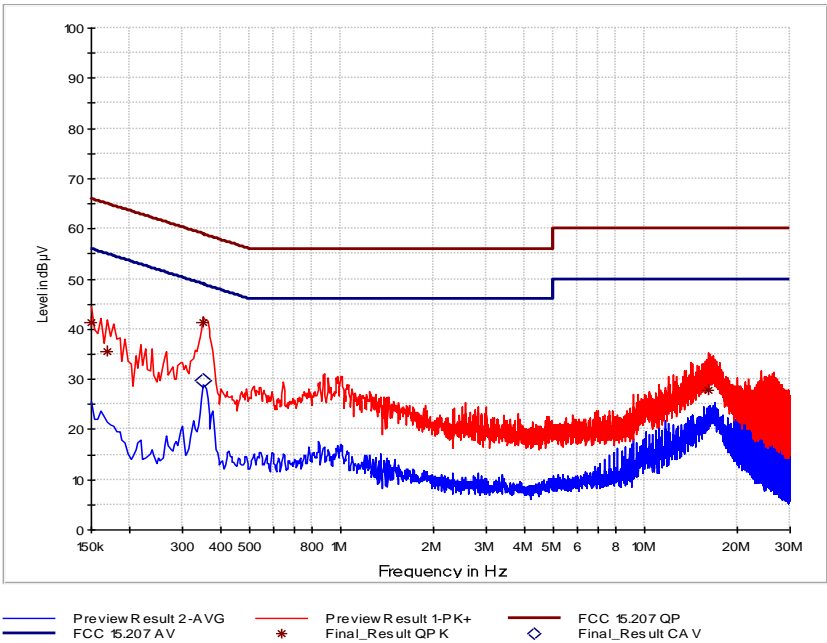
2.1.6 Test Results

Module Test Configuration Scanner

Applied supply Voltage: 120 Vac  
Applied supply frequency: 60 Hz

Test was performed as module test

- Live Line Emissions Results

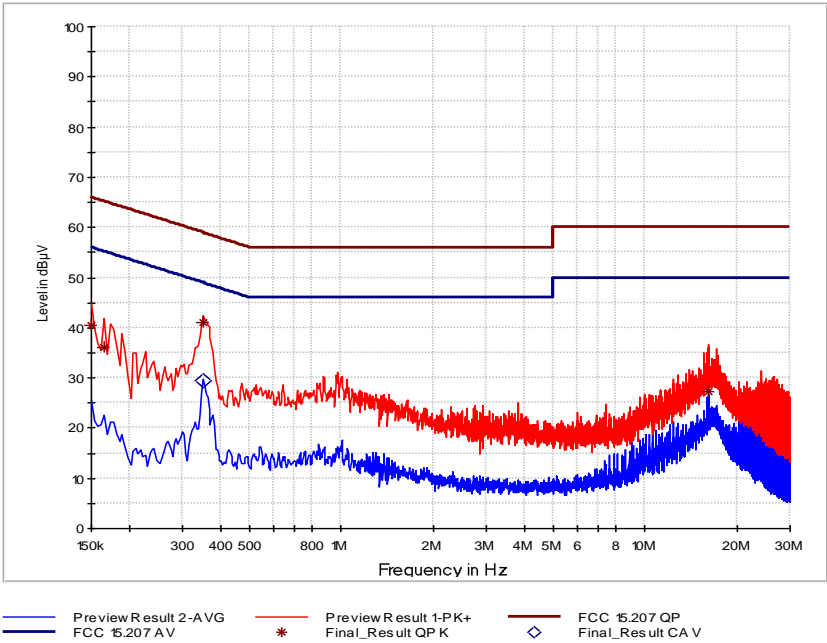


Frequency MHz	QuasiPeak dBµV	CAverage dBµV	Limit dBµV	Margin dB	Meas. Time ms	Bandwidth kHz	Corr. dB
0.150000	41.4		66.0	24.6	1000	9	10.0
0.170000	35.6		65.0	29.4	1000	9	10.0
0.350000		29.7	49.0	19.3	1000	9	10.0
0.350000	41.4		59.0	17.6	1000	9	10.0
16.098000	27.8		60.0	32.2	1000	9	10.4

- Live Line - 150 kHz to 30 MHz



- Neutral Line Emissions Results



Frequency MHz	QuasiPeak dBµV	CAverage dBµV	Limit dBµV	Margin dB	Meas. Time ms	Bandwidth kHz	Corr. dB
0.150000	40.6		66.0	25.4	1000	9	10.0
0.166000	36.1		65.2	29.1	1000	9	10.0
0.350000		29.5	49.0	19.5	1000	9	10.0
0.350000	41.1		59.0	17.9	1000	9	10.0
16.126000	27.4		60.0	32.6	1000	9	10.4

- Neutral Line - 150 kHz to 30 MHz



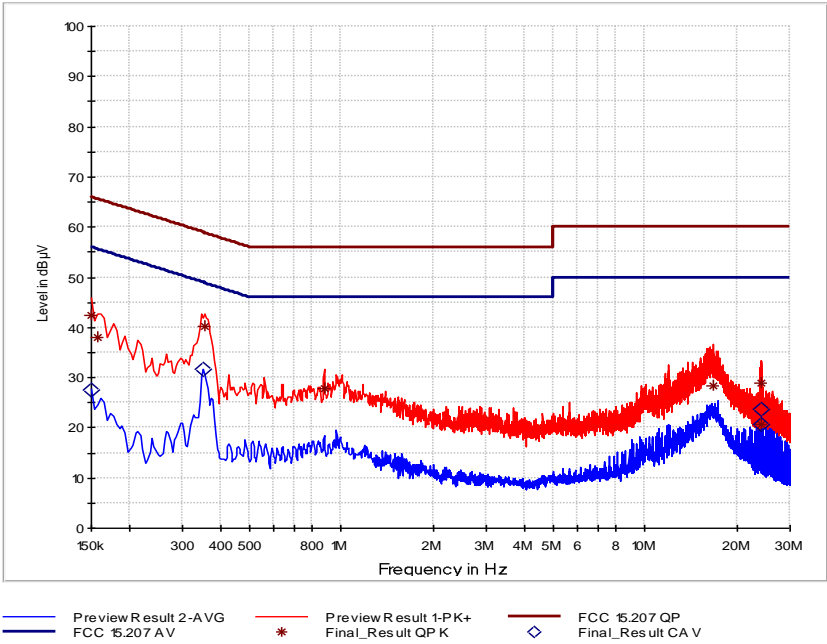


Module Test Configuration Loader

Applied supply Voltage: 120 Vac  
Applied supply frequency: 60 Hz

Test was performed as module test

- Live Line Emissions Results



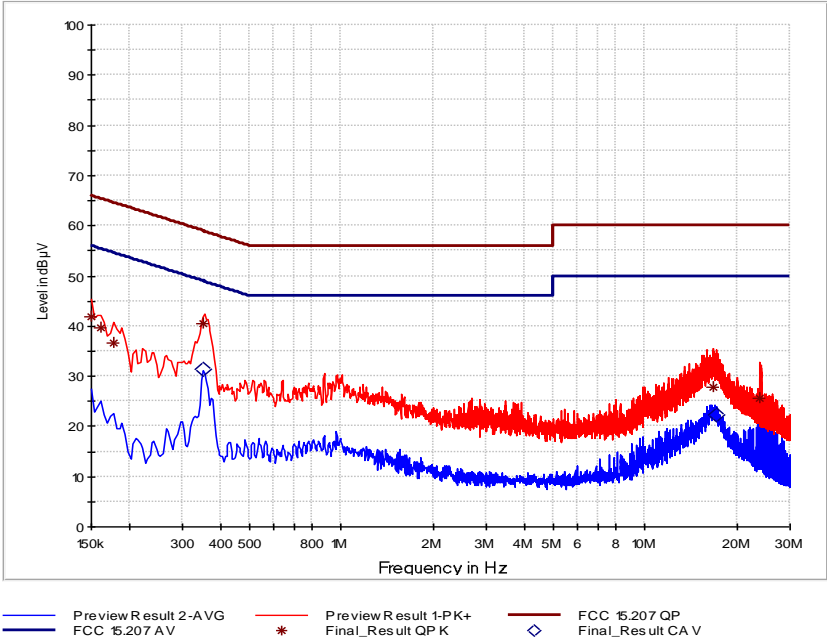
Frequency MHz	QuasiPeak dBµV	CAverage dBµV	Limit dBµV	Margin dB	Meas. Time ms	Bandwidth kHz	Corr. dB
0.150000		27.7	56.0	28.3	1000	9	10.0
0.150000	42.5		66.0	23.5	1000	9	10.0
0.158000	38.2		65.6	27.4	1000	9	10.0
0.350000		31.8	49.0	17.2	1000	9	10.0
0.354000	40.3		58.9	18.6	1000	9	10.0
0.878000	27.9		56.0	28.1	1000	9	10.0
16.758000	28.5		60.0	31.5	1000	9	10.4
24.002000		23.7	50.0	26.3	1000	9	10.3
24.038000	28.9		60.0	31.1	1000	9	10.3
24.118000	20.6		60.0	39.4	1000	9	10.3
24.126000		20.7	50.0	29.3	1000	9	10.3

- Live Line - 150 kHz to 30 MHz



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- Neutral Line Emissions Results



Frequency MHz	QuasiPeak dBµV	CAverage dBµV	Limit dBµV	Margin dB	Meas. Time ms	Bandwidth kHz	Corr. dB
0.150000	41.9		66.0	24.1	1000	9	10.0
0.162000	39.6		65.4	25.8	1000	9	10.0
0.178000	36.6		64.6	28.0	1000	9	10.0
0.350000	40.6		59.0	18.4	1000	9	10.0
0.350000		31.5	49.0	17.5	1000	9	10.0
16.770000	27.8		60.0	32.2	1000	9	10.4
17.222000		22.4	50.0	27.6	1000	9	10.4
23.962000	25.7		60.0	34.3	1000	9	10.3

- Neutral Line - 150 kHz to 30 MHz



FCC 47 CFR Part 15, Limit Clause 15.207 and ISSED 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 5**

\*Decreases with the logarithm of the frequency.

**2.1.7 Test Location and Test Equipment Used**

This test was carried out in Shielded room - cabin no. 9.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESC13	19730	12	2020-11
V-Network	Rohde & Schwarz	ENV216	39908	12	2020-02
V-Network	Rohde & Schwarz	ENV216	39909	12	2020-02
Test software	Rohde & Schwarz	EMC32			

**Table 6**

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable



Product Service

## **2.2 20 dB Bandwidth**

### **2.2.1 Specification Reference**

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

### **2.2.2 Equipment Under Test and Modification State**

OLYMPUS SLIDEVIEW VS200, S/N: VS20-BU-L: S/N 1906129191; VS20-LOADER: SN  
190718407 - Modification State 0

### **2.2.3 Date of Test**

2019-07-17

### **2.2.4 Test Method**

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

### **2.2.5 Environmental Conditions**

Ambient Temperature	26.0 °C
Relative Humidity	41.0 %



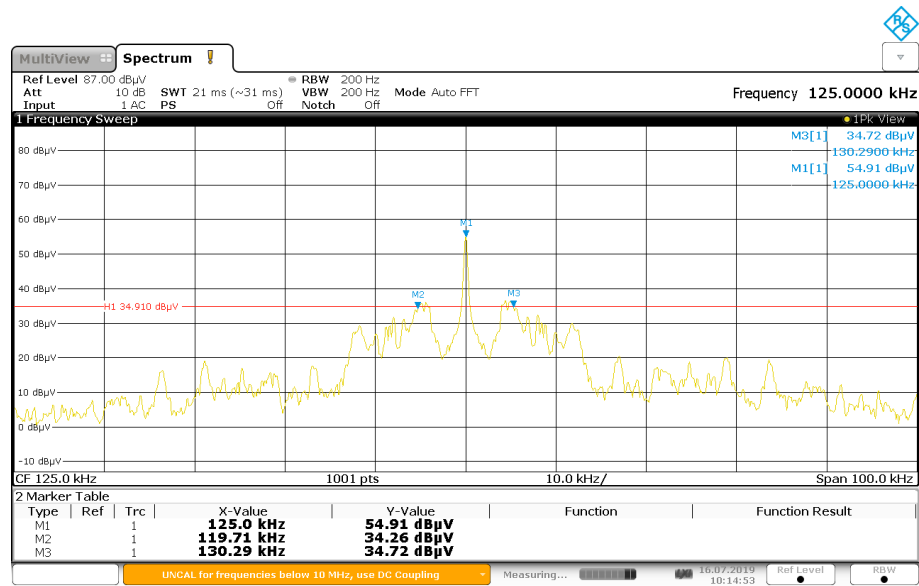
Product Service

2.2.6 Test Results

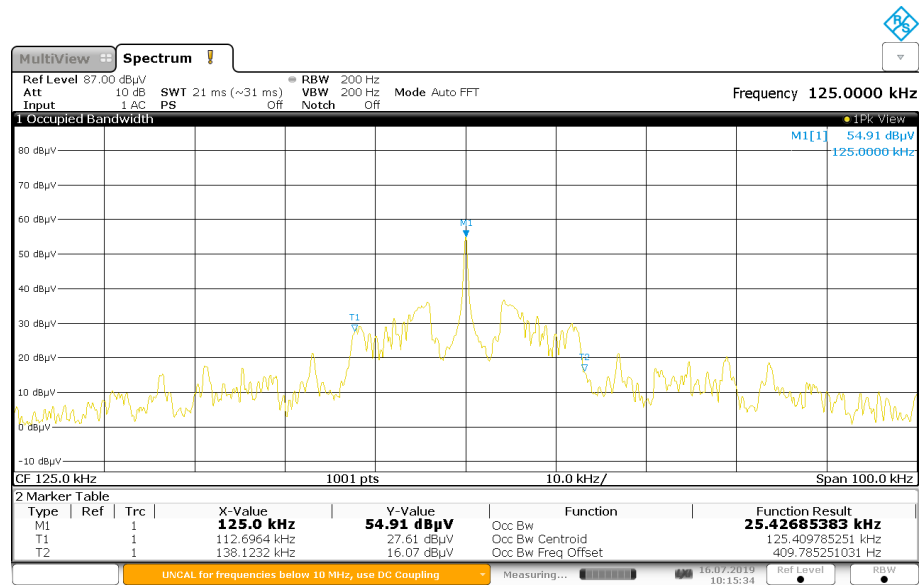
Module Test Configuration

Frequency (kHz)	20 dB Bandwidth (kHz)	99% Occupied Bandwidth (Hz)	F <sub>LOWER</sub> (kHz)	F <sub>UPPER</sub> (kHz)
125	10.58	25.43	112.6964	138.1232

Table 7



- 20 dB Bandwidth



- 99% Occupied 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 Canada RSS GEN, Limit Clause

None specified.

**2.2.7 Test Location and Test Equipment Used**

This test was carried out in Semi anechoic room - cabin no. 8.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Loop antenna	Rohde & Schwarz	FHF2-Z2	18876	36	2019-07
EMI test receiver	Rohde & Schwarz	ESW 26	28268	12	2020-06
Semi anechoic room	Albatross	Cabin No. 8	19917	36	2020-09

**Table 8**

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable



## **2.3 Field Strength of any Emission**

### **2.3.1 Specification Reference**

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

### **2.3.2 Equipment Under Test and Modification State**

OLYMPUS SLIDEVIEW VS200, S/N: VS20-BU-L: S/N 1906129191; VS20-LOADER: SN  
190718407 - Modification State 1

### **2.3.3 Date of Test**

2019-07-18

### **2.3.4 Test Method**

This test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5. and ISED 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.

### **2.3.5 Environmental Conditions**

Ambient Temperature	26.0 °C
Relative Humidity	41.0 %

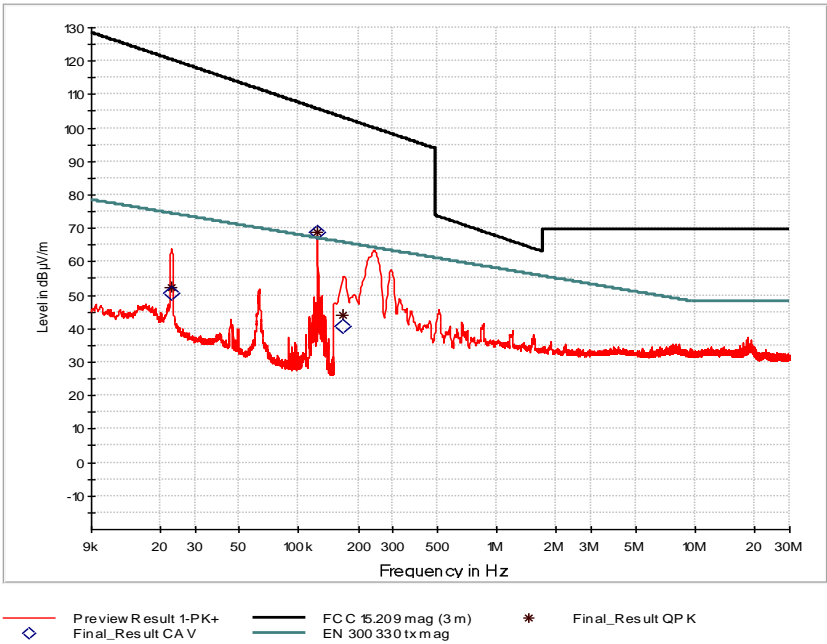


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2.3.6 Test Results

Module Test Configuration Scanner

- Emissions Results – 9 kHz - 30 MHz



Extrapolation factor: -40 dB/decade										
Frequency	Detector	Distance		Reading	Correction	Extrapolation	Pulse Train	Final	Limit	Margin
(MHz)		d1	d	Value	Factor	Factor	Correction	Value	(dBµV/m)	(dB)
		(m)	(m)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)		
0.02290	Quasi-Peak	3	300	32.3	20.0	-80.0		-27.7	40.4	68.1
0.12500	Quasi-Peak	3	300	48.9	20.0	-80.0		-11.1	25.7	36.8
0.16800	Quasi-Peak	3	300	24.1	20.0	-80.0		-35.9	23.1	59.0

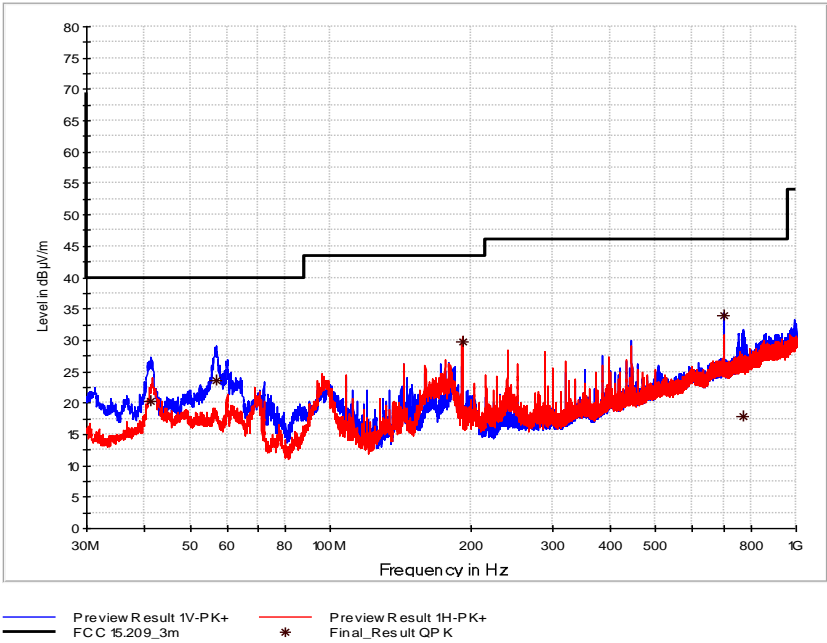
- 9 kHz to 30 MHz





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- Emissions Results - 30 MHz to 1 GHz



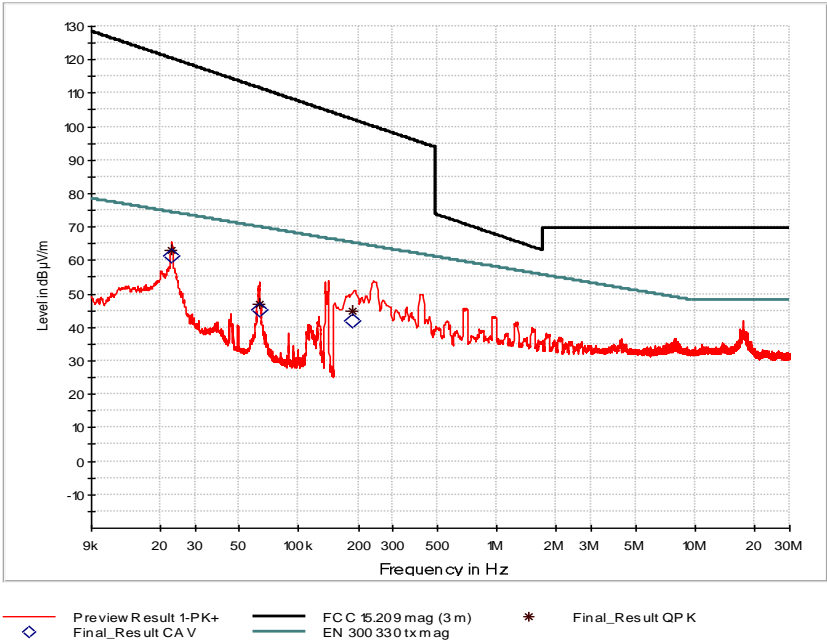
Frequency MHz	QuasiPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
41.255000	20.2	40.0	19.8	1000	120	118	V	26	13.5
56.855000	23.5	40.0	16.5	1000	120	119	V	28	14.1
192.000000	29.9	43.5	13.6	1000	120	145	H	-9	12.3
699.990000	33.9	46.0	12.1	1000	120	165	V	-19	23.6
772.300000	17.8	46.0	28.2	1000	120	100	V	157	24.2

- 30 MHz to 1 GHz



Module Test Configuration Loader

- Emissions Results – 9 kHz - 30 MHz

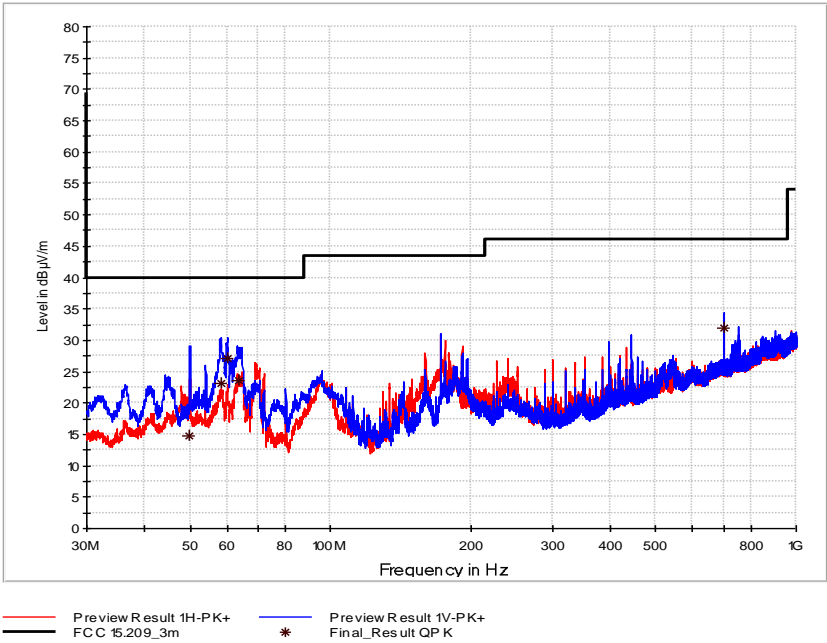


Extrapolation factor: -40 dB/decade										
Frequency	Detector	Distance	Reading	Correction	Extrapolation	Pulse Train	Final	Limit	Margin	
(MHz)		d1   d	Value	Factor	Factor	Correction	Value	(dBµV/m)	(dB)	(dB)
		(m)   (m)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)			
0.02290	Quasi-Peak	3   300	43.1	20.0	-80.0		-16.9	40.4	57.3	
0.06315	Quasi-Peak	3   300	27.1	20.0	-80.0		-32.9	31.6	64.5	
0.18800	Quasi-Peak	3   300	24.9	20.0	-80.0		-35.1	22.1	57.2	

- 9 kHz to 30 MHz



- Emissions Results - 30 MHz to 1 GHz



Frequency MHz	QuasiPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
49.980000	14.8	40.0	25.2	1000	120	125	V	-113	14.6
58.230000	23.0	40.0	17.0	1000	120	158	V	57	14.0
60.025000	27.0	40.0	13.0	1000	120	105	V	20	13.7
63.455000	23.7	40.0	16.3	1000	120	110	V	41	12.9
699.990000	31.9	46.0	14.1	1000	120	103	V	-29	23.6

- 30 MHz to 1 GHz

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 9 - 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 RSS-210, Limit Clause 4.4

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

#### ISED RSS-Gen, Limit Clause 8.9

Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ )	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 10 - ISED Limit, Below 30 MHz**

Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ at 3 metres)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

**Table 11 - ISED Limit, Above 30 MHz**

### 2.3.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 8.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Loop antenna	Rohde & Schwarz	FHF2-Z2	18876	36	2019-07
Trilog broadband antenna	Schwarzbeck	VULB 9163	19918	36	2019-07
EMI test receiver	Rohde & Schwarz	ESW 26	28268	12	2020-06
Semi anechoic room	Albatross	Cabin No. 8	19917	36	2020-09
Test software	Rohde & Schwarz	EMC32			

**Table 12**

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



## **2.4 Restricted Band Edges**

### **2.4.1 Specification Reference**

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

### **2.4.2 Equipment Under Test and Modification State**

OLYMPUS SLIDEVIEW VS200, S/N: VS20-BU-L: S/N 1906129191; VS20-LOADER: SN 190718407 - Modification State 1

### **2.4.3 Date of Test**

2019-07-18

### **2.4.4 Test Method**

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

### **2.4.5 Environmental Conditions**

Ambient Temperature	26.0 °C
Relative Humidity	42.0 %

### **2.4.6 Test Results**

No emissions measured in restricted bands except spurious emissions. See plots in section 2.3.6 for details.



## **2.5 Exposure of Humans to RF Fields**

### **2.5.1 Specification Reference**

ISED Canada RSS-GEN Issue 4, section 3.2

### **2.5.2 Guide**

ISED Canada RSS-102 Issue 5, section 2.5 and  
ISED Canada SPR-002, Issue 1

### **2.5.3 Equipment Under Test and Modification State**

OLYMPUS SLIDEVIEW VS200, S/N: VS20-BU-L: S/N 1906129191; VS20-LOADER: SN  
190718407 - Modification State 1

### **2.5.4 Date of Test**

2019-07-15 and 2019-07-18

### **2.5.5 Test Method**

This test was performed in accordance with ISED Canada RSS-102, Issue 5, chapter 2.5 and ISED  
Canada SPR-002, Issue 1, chapter 6.5

Test according to RSS-102 is based on test results according to section **Fehler! Verweisquelle  
konnte nicht gefunden werden.** of this report.

Test according to SPR-002 was performed as worst case measurement with direct contact to EUT.

### **2.5.6 Environmental Conditions**

Ambient Temperature	26.0 °C
Relative Humidity	42.0 %



## 2.5.7 Test Results

$$EIRP = \frac{(FS \cdot D)^2}{30}$$

In accordance with ISED Canada RSS-102, Issue 5, chapter 2.5:

Maximum Radiated Fields Strength: (Scanner, see chapter <b>Fehler! Verweisquelle konnte nicht gefunden werden.</b> of this test report)	68.9 dBµV/m (at 3 m distance and 125 kHz)
Calculated Equivalent Radiated Power:	2.786 mW (e.i.r.p.)
Minimum separation distance:	≤ 5 mm
SAR Evaluation Exemption Limit:	71 mW

In accordance with ISED Canada SPR-002, Issue 1, chapter 6.5:

Test distance:	Direct contact to EUT	
Tested frequency:	125 kHz	
Measured maximum value (Loader):	1.42 V/m	0.0473 A/m
Measured maximum value (Scanner):	58.18 V/m	0.9319 A/m
Limb Exposure Limit:	83 V/m	90 A/m
Relaxation Factor:	1.0	

## 2.5.8 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 8 and radio lab.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW 26	28268	12	2020-06
Loop antenna	Rohde & Schwarz	HFH2-Z2	18876	36	2019-07-31
Electromagnetic radiation meter	EMR-200	AT-0023	19590	36	2019-10-31
Electric field probe	Type 8.3	AU-0008	19591	36	2019-10-31
Magnetic field probe	Type 12.1	W-0018	19592	36	2019-10-31

**Table 13**

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



## 2.6 SAR exclusion threshold

### 2.6.1 Specification Reference

KDB 447498 D01 V06, section 4.3.1 c) 2)

### 2.6.2 Equipment Under Test and Modification State

Model: DAC Universal; Type: MK IV, S/N: 1044 - Modification State 0

### 2.6.3 Date of Test

2019-04-01

### 2.6.4 Test Method

Carrier level is based on test result according to section **Fehler! Verweisquelle konnte nicht gefunden werden.** of this report.

### 2.6.5 Test Result

Maximum Radiated Fields Strength: 68.9 dB $\mu$ V/m (at 3 m distance and 125 kHz)  
(see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** of this test report)

Calculated Equivalent Radiated Power: 2.786 mW (e.i.r.p.)

Minimum separation distance:  $\leq 5$  mm (50 mm)

1-g numeric threshold:  $(3.0 (1 + \log_{10}(100/0.125)))/2 = 5.85$

SAR test exclusion limit (for 1-g):  $5.85 \cdot 50 / \sqrt{(0.1)} = 925$  mW

Note 1: For test distances below 5 mm according to 4.3.1 a) the test distance is fixed to 5 mm. However, according to 4.3.1 c), the limit is based on a fixed test distance of 50 mm for test distances smaller than 50 mm at frequencies below 100 MHz.

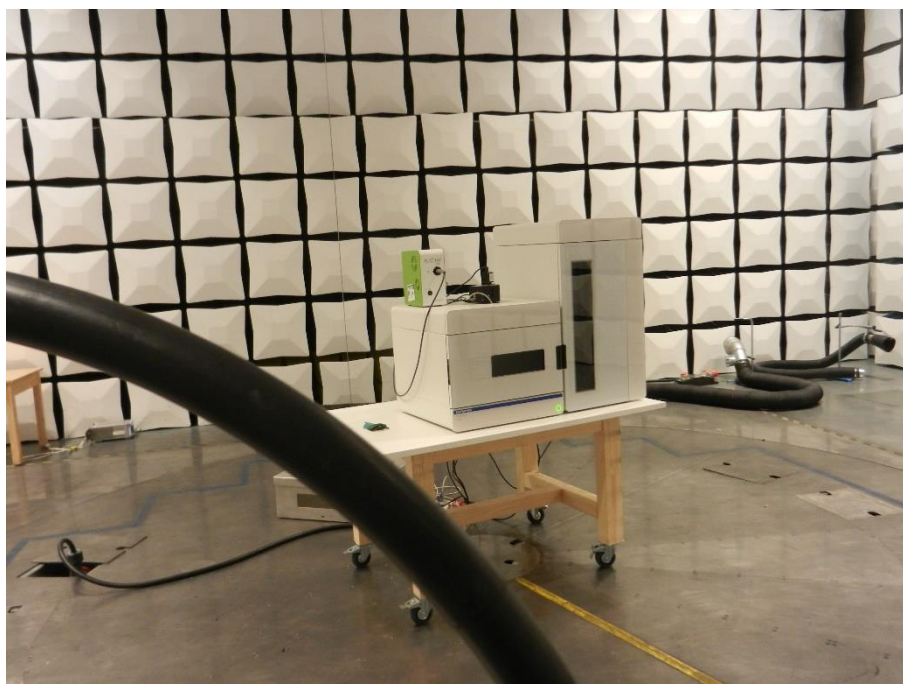
Note 2: The calculation of the power limit is based on  $f = 100$  MHz and  $d = 50$  mm, however, the correction of the numeric threshold is based on the real frequency of  $f = 125$  kHz

$$EIRP = \frac{(FS \cdot D)^2}{30}$$
$$Num.Thresh. (f < 100 MHz, d < 50 mm) = \frac{1}{2} (Num.Thresh. \left( 1 + \log_{10} \frac{100 MHz}{f} \right))$$
$$P_{lim} = (Num.Thresh.) (d \text{ in mm}) / \sqrt{(f \text{ in GHz})}$$

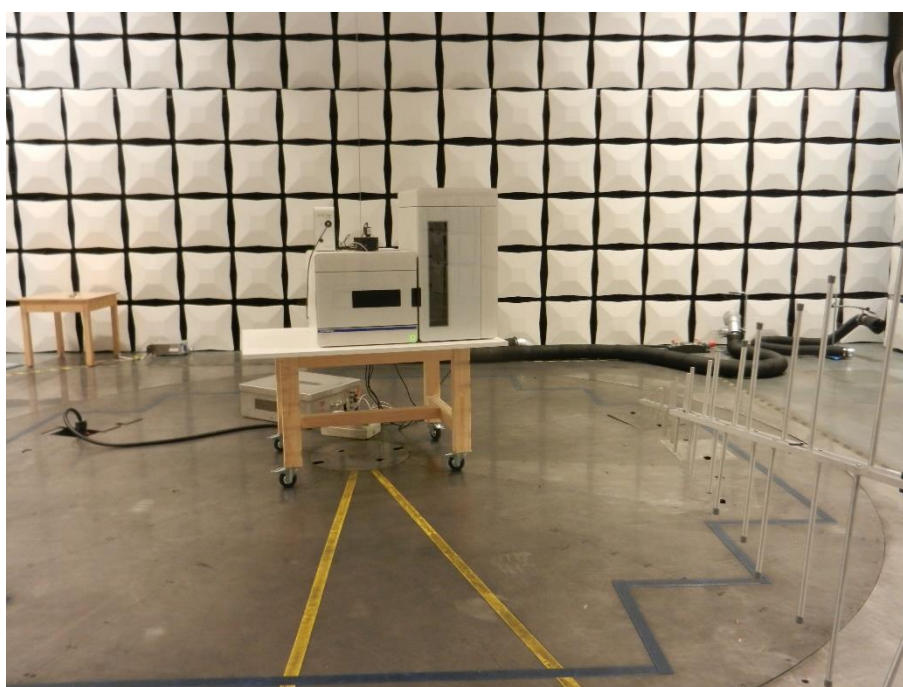


### 3 Photographs

#### 3.1 Equipment Under Test (EUT)



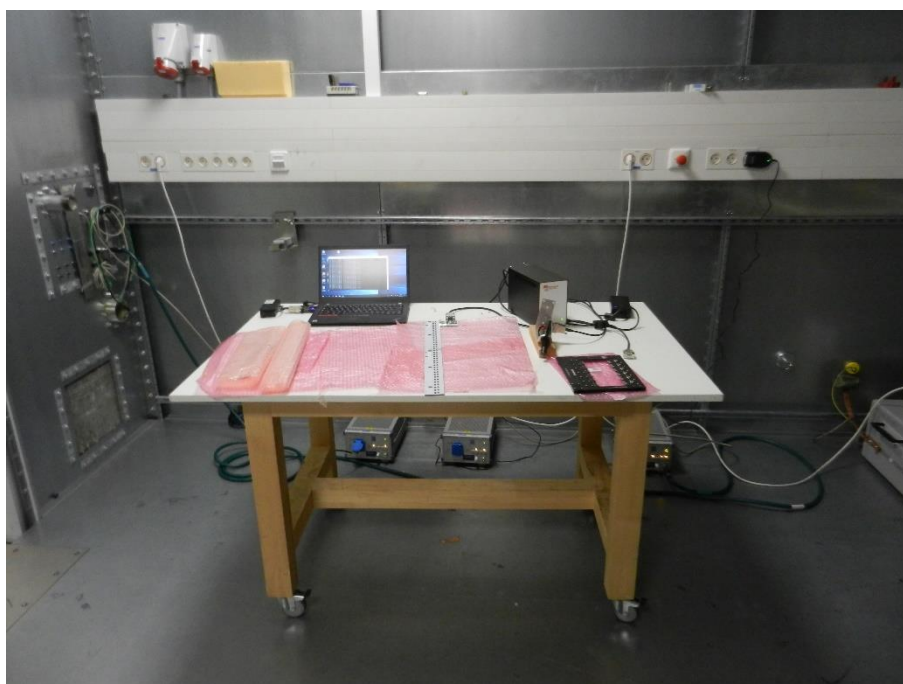
- Radiated emissions 9 kHz – 30 MHz



- Radiated emissions 30 MHz – 1 GHz



**-Conducted AC emissions – Test for Scanner module**



**-Conducted AC emissions – Test for Loader module**



## 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	$\pm 1.14 \%$	2
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	2	$\pm 0.079 \text{ dB}$	2
RF-Power uncertainty for given BER	1.96	$+0.94 \text{ dB} / -1.05$	7
RF power, conducted, spurious emissions	1.96	$+1.4 \text{ dB} / -1.6 \text{ dB}$	7
RF power, radiated			
25 MHz – 4 GHz	1.96	$+3.6 \text{ dB} / -5.2 \text{ dB}$	8
1 GHz – 18 GHz	1.96	$+3.8 \text{ dB} / -5.6 \text{ dB}$	8
18 GHz – 26.5 GHz	1.96	$+3.4 \text{ dB} / -4.5 \text{ dB}$	8
40 GHz – 170 GHz	1.96	$+4.2 \text{ dB} / -7.1 \text{ dB}$	8
Spectral Power Density, conducted	2.0	$\pm 0.53 \text{ dB}$	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	$\pm 2.89 \%$	2
6 kHz – 25 kHz	2	$\pm 0.2 \text{ dB}$	2
Maximum frequency deviation for FM	2	$\pm 2.89 \%$	2
Adjacent channel power 25 MHz – 1 GHz	2	$\pm 2.31 \%$	2
Temperature	2	$\pm 0.39 \text{ K}$	4
(Relative) Humidity	2	$\pm 2.28 \%$	2
DC- and low frequency AC voltage			
DC voltage	2	$\pm 0.01 \%$	2
AC voltage up to 1 kHz	2	$\pm 1.2 \%$	2
Time	2	$\pm 0.6 \%$	2

Table 14



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 15



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 16**

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  $k_p = 2$ , 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  $k_p = 2$ , 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  $k_p = 2.05$ , 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  $k_p = 2$ , 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  $k_p = 2$ , providing a level of confidence of  $p = 95.45\%$

Note 7:

The expanded uncertainty reported according to ETSI TR 100 028 V1.4.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of  $k_p = 1.96$ , providing a level of confidence of  $p = 95.45\%$



Product Service

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  $k_p = 1.96$ , providing a level of confidence of  $p = 95.45\%$