telefication bv
The Netherlands
Chamber of Commerce
51565536
www.telefication.com

FCC and IC Test Report for Part 15.225, Part 15B and RSS 210, RSS-Gen

Product name	: MultiSmart XS PIN reader
Applicant	: INID B.V.
FCC ID	: YAB-MSXSRDR
IC ID	: 8908A-MSXSRDR

Test report No. : 160301663 001 Ver 1.00

Laboratory information

Accreditation

Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:2005. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie).

Telefication is designated by the FCC as an Accredited Test Firm for compliance testing of equipment subject to Certification under Parts 15 & 18. The Designation number is: NL0001

The Industry Canada registration number for the 3 meter test chamber of Telefication is: 4173A-1.

Documentation

The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 10 years at Telefication Netherlands

Testing Location

Test Site	Telefication BV
Test Site location	Edisonstraat 12a 6902 PK Zevenaar The Netherlands Tel. +31316583180 Fax. +31316583189
Test Site FCC	NL0001

Revision History

Version	Date	Remarks	By
v0.50	13-07-2016	First draft	RVB
v0.50	15-07-2016	Implemented comments from applicant	RVB
v1.00	18-07-2016	Release version	RVB

Table of Contents

Summary of Test results

FCC	IC	Description	Paragraph	Verdict
15.225(a),(b),(c)	RSS-210 A2.6(a),(b),(c) and RSS-Gen A8.9	Field strength of emissions	3.1	Pass
--	RSS-GEN 6.6	99% Bandwidth	3.2	Pass
15.225(d)	RSS-210 A2.6(d)	Field strength of unwanted emissions	3.3	Pass
15.225(e)	RSS-210 A2.6(e)	Frequency Tolerance	3.4	Pass
15.109	RSS-210 A2.6(d)	Radiated Spurious Emissions	3.5	Pass
15.107	RSS-Gen A8.8	Conducted emissions	3.6	Pass

1 General Description

1.1 Applicant

Client name:	INID B.V.
Address	Overweg 5, Obdam, The Netherlands
Zip code:	1713 HX
Telephone:	+31 226 45 00 09
E-mail:	Mark@inid-readers.com
Contact name:	M. de Olde

1.2 Manufacturer

Manufacturer name:	INID B.V.
Address:	Overweg 5, Obdam, The Netherlands
Zip code:	1713 HX
Telephone:	+31 226 45 00 09
E-mail:	Mark@inid-readers.com
Contact name:	M. de Olde

1.3 Tested Equipment Under Test (EUT)

Product name:	MultiSmart XS PIN reader
Brand name:	INID MultiSmart XS PIN reader
FCC ID:	YAB-MSXSRDR
IC ID:	8908A-MSXSRDR
Product type:	RFID Reader
Model(s):	5000C, 5005C, 5200C, 5040C, 5045C, 5240C
Software version:	3.2
Hardware version:	1.04
Date of receipt	29-06-2016
Tests started:	13-07-2016
Testing ended:	14-07-2016

1.4 Product specifications of Equipment under test

Tx Frequency:	13.56 MHz and 134.078 kHz
Rx frequency:	13.56 MHz and 134.078 kHz
Antenna type	PCB loop Antenna
Type of modulation:	ASK
Emission designator	430K1D

1.5 Environmental conditions

Test date	13-07-2016	14-07-2016
Ambient temperature	24°C	24.1°C
Humidity	42.1%	55%

1.6 Measurement standards

- ANSI C63.4:2014
- ANSI C63.10:2013

1.7 Applicable standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.225.
- FCC Part 15 Subpart B §15.109.
- FCC Part 15 Subpart B §15.107.
- RSS-210, issue 8, RSS-GEN Issue 4.

1.8 Observation and remarks

The EUT has 6 variants, the worst case of these 6 variants was determined with pre-scan measurements. The Worst Case was determined to be model number: 5045C. all tests were performed on this model.

Overview of the different models:

MultiSmart XS reader					
Model	HF	LF	Keypad	FCC ID	IC ID
5045C	13.56 MHz	134.078 kHz	Yes	YAB-MSXSRDR	8908A-MSXSRDR
5005C	13.56 MHz	134.078 kHz	X	YAB-MSXSRDR	8908A-MSXSRDR
SmartReader XS reader					
Model	HF	LF	Keypad	FCC ID	IC ID
5040C	13.56 MHz	X	Yes	YAB-SRXSRDR	8908A-SRXSRDR
5000C	13.56 MHz	X	X	YAB-SRXSRDR	8908A-SRXSRDR
SmartProx XS reader					
Model	HF	LF	Keypad	FCC ID	IC ID
5240C	X	134.078 kHz	Yes	YAB-SPXSRDR	8908A-SPXSRDR
5200C	X	134.078 kHz	X	YAB-SPXSRDR	8908A-SPXSRDR

All tests were performed with both radios transmitting.

1.9 Conclusions

The sample of the product showed NO NON-COMPLIANCES to the specifications stated in paragraph 1.7 of this report.

The results of the test as stated in this report, are exclusively applicable to the product items as identified in this report. Telefication accepts no responsibility for any properties of product items in this test report, which are not supported by the tests as specified in paragraph 1.7 *"Applicable standards".*

All conducted tests are performed by:

Name : ing R. van Barneveld

Review of test methods and report by:

Name : ing. P.A. Suringa

The above conclusions have been verified by the following signatory:

Date : 18-07-2016

Name : ing M.T.P.M Wouters v/d Oudenweijer

Function : Director Certification

Signature :

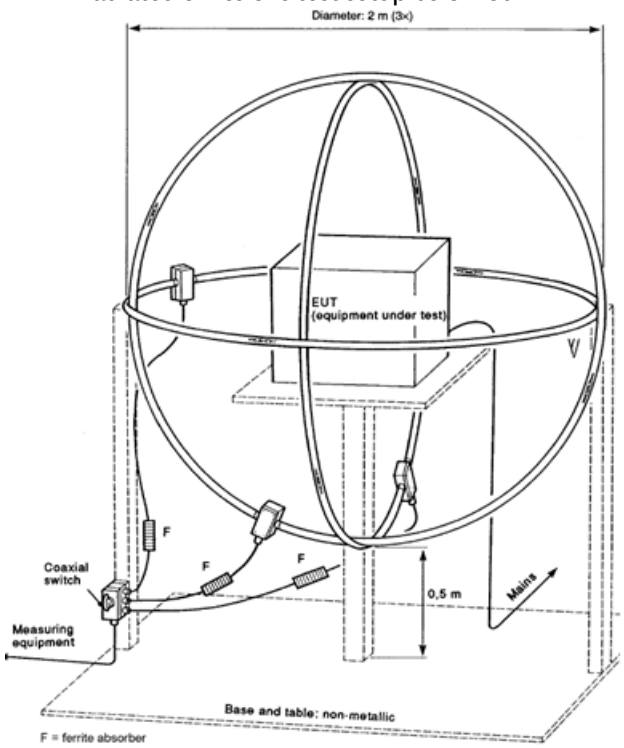
2 Test configuration of the Equipment Under Test

2.1 Test mode

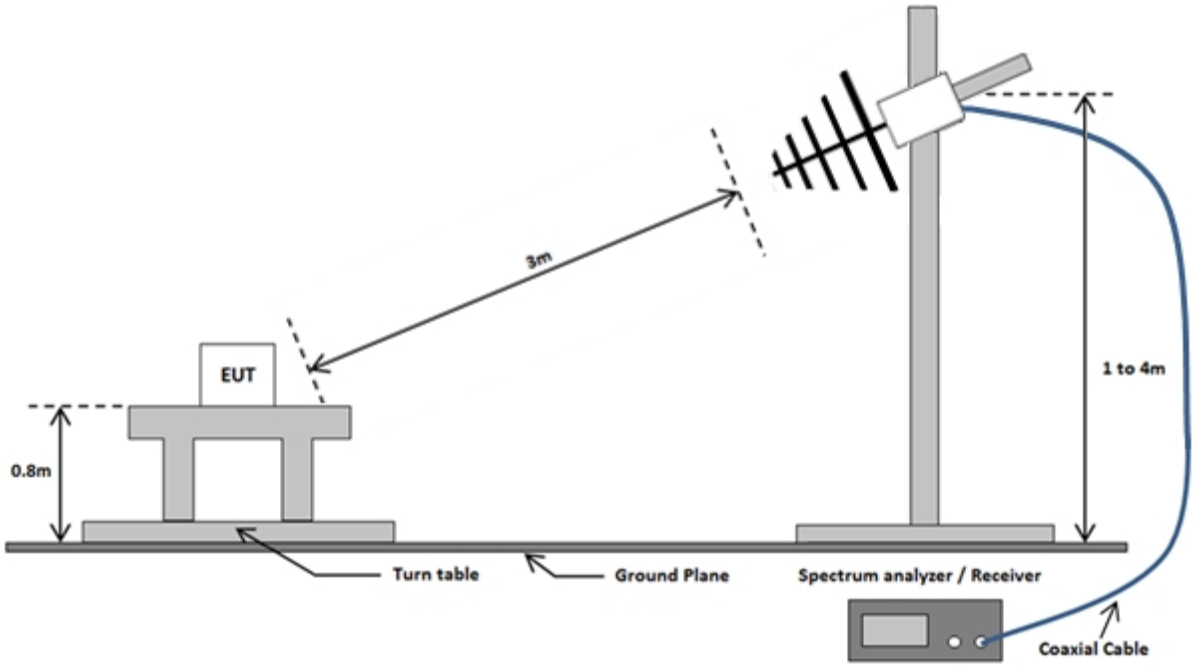
The applicant provided samples which were configured with right test modes. The EUT was connected to 2 different support units. For all intentional radiator tests were performed with a Keyprocessor KP 700. And all non-intentional radiator test were performed with keyprocessor RS485 to RS232 convertor.

2.2 Radiated Test setup

Radiated emissions test setup below 30 MHz



Radiated emissions test setup 30 MHz - 1 GHz



2.3 Equipment used in the test configuration

Description	Manufacturer	Model	ID	Used at Par.
Spectrum Analyzer	Rohde & Schwarz	ESR7	TE01220	3.1 to 3.6
Climate Chamber	TE 00741	CTS	-40/350	3.3, 3.4
Biconilog Antenna	Chase	CBL6112a	TE00967	3.3, 3.5
Horn antenna	EMCO	3115	TE00531	3.5
Pre-amplifier	Miteq	AFS42-041001800-29-OP-42	TE11132	3.5
SAC Chamber	Comtest Engineering BV	-	TE00861	3.3, 3.5
Triple loop antenna	Schwarzbeck	HXYZ 9170	TE01311	3.1 and 3.2
Artificial Mains network (AMN)	Rohde & Schwarz	ESH3-Z5	TE00208	3.6
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	TE00756	3.6

2.4 Sample calculations

Field Strength Measurement example(see chapter 3.3):

Frequency (MHz)	Polarization	Height(m)	Quasi-Peak (dBµV/m)
135,6	Horizontal	1	40,4

The following relation applies:

E (dBµV/m) = U(dBµV) + AF (dB/m) + CL (dB)

Where:

E = Electric field strength
U = Measuring reveiver voltage
AF = Antenna factor
CL = Cable loss

(40.4 = 27.23 + 11.8 + 1.37)

3 Test results

3.1 Field strength of emissions

3.1.1 Limit

15.225(a)

For The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

15.225(b)

Within the band 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 meters.

15.225(c)

Within the band 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 meters.

Frequency (MHz)	µV/m at 30 meter	dBµV/m at 30 meter	dBµV/m at 3 meter
13.553 – 13.567	15,848	84	124
13.410 – 13.553 and 13.567 – 13.710	334	50.5	90.5
13.110 – 13.410 and 13.710 - 14.010	106	40.5	80.5

15.225(d)

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance(m)
0.009 - 0.490	2400/F(kHz)	67.6-20 log(F(kHz))+80	3
0.490 – 1.705	24000/F(kHz)	87.6-20 log(F(kHz))+40	3

Note:

- *80 dB in the table above is derived from the an inverse linear distance extrapolation factor of 40 dB/decade*

3.1.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.1.3 Test setup

The test setup is as shown in chapter 2.2 of this report.

3.1.4 Test procedure

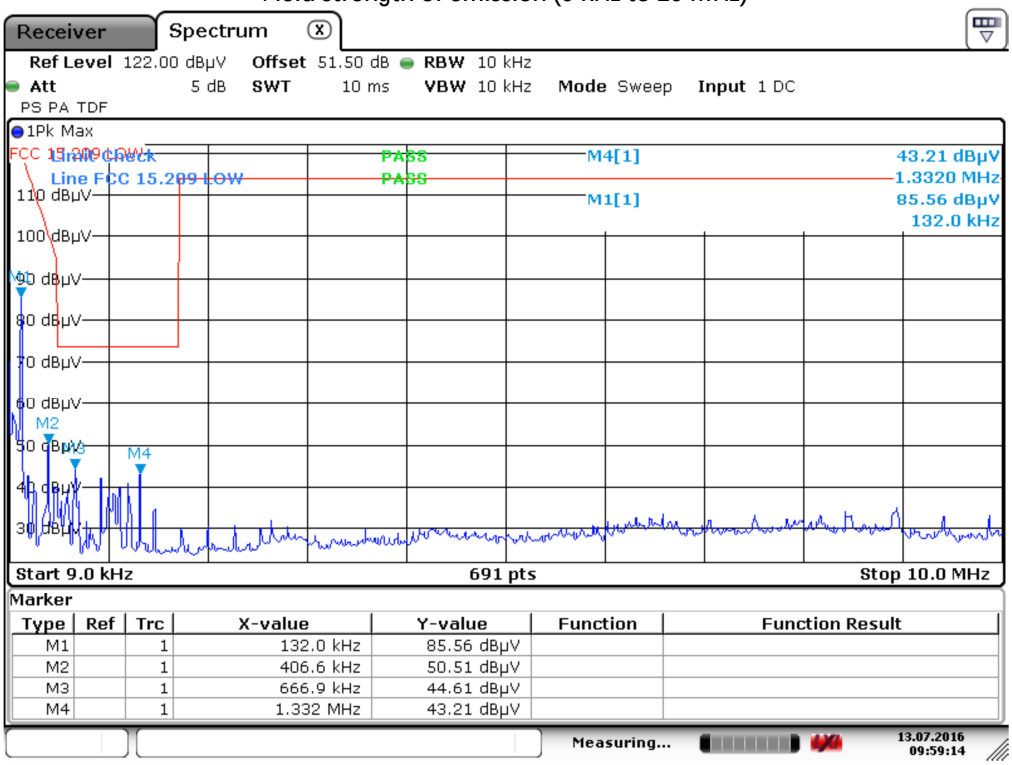
According to ANSI C63.4-2014, section 5.3 and 8.2.1 and RSS-Gen A8.9

3.1.5 Test results of Field strength of emissions

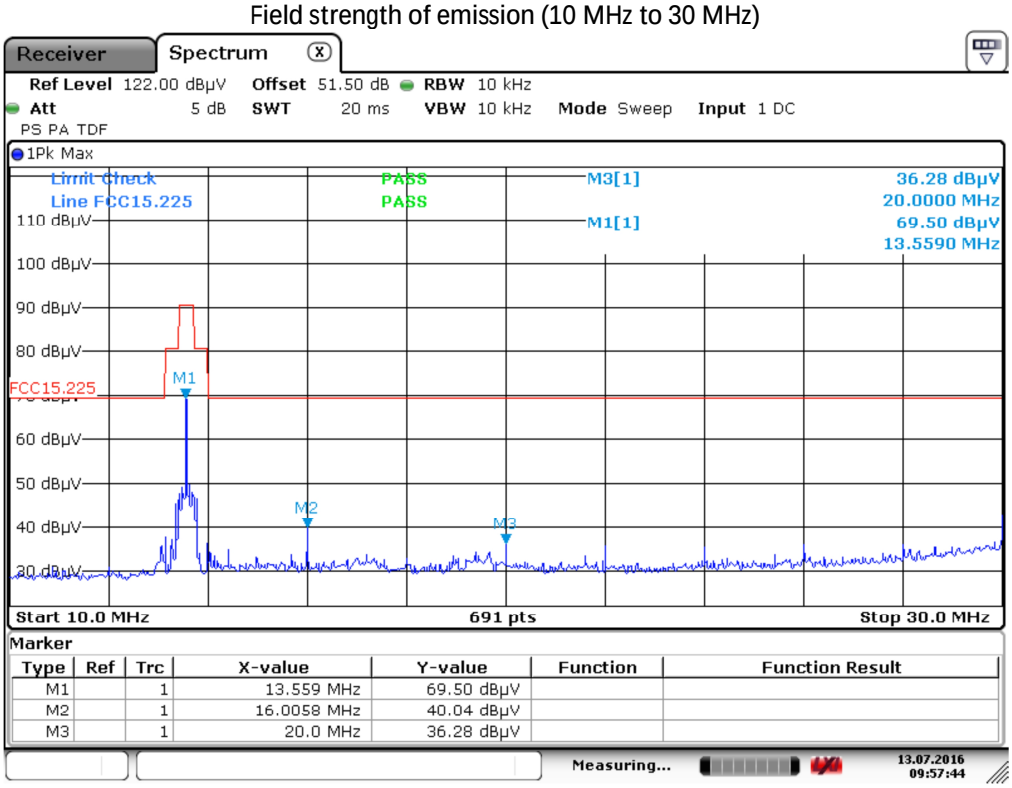
Frequency (MHz)	Max Field strength at 3m (dBµV/m)
13.56	62.41
0.134	82.73
Uncertainty	+3.0 / -2.5 dB

3.1.6 Plots of Field strength of emissions Measurement

Field strength of emission (9 kHz to 10 MHz)



Field strength of emission (10 MHz to 30 MHz)



Remark: in the plot the limit is modified for an inverse linear distance extrapolation factor of 40 dB/decade.

3.2 99% Occupied Bandwidth

3.2.1 Limit

According to RSS-Gen 6.6

3.2.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.2.3 Test setup

The test setup is as shown in chapter 2.2 of this report.

3.2.4 Test procedure

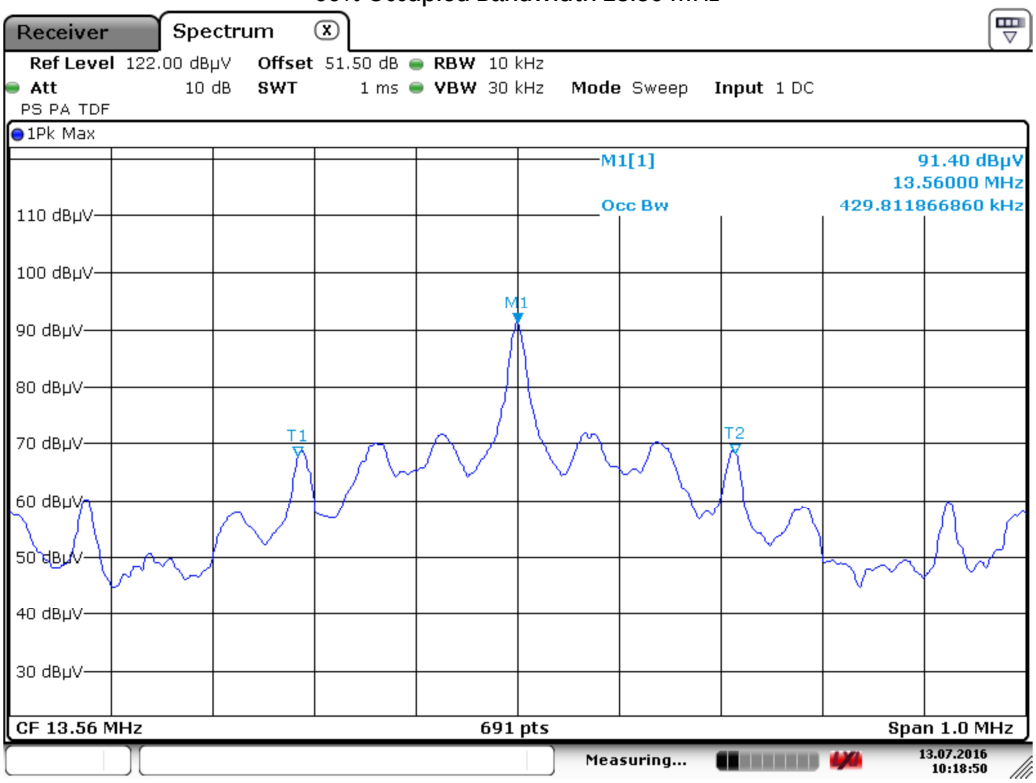
1 Set the centre frequency to the nominal EUT channel centre frequency.
2 Set span = 1.5 times to 0.5 times the Occupied Bandwidth.
3 Set VBW ≥ 3 x RBW.
4 Video averaging is not permitted. Where practical detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode(until the trace stabilizes) shall be used.

3.2.5 Test results of the 99% Occupied Bandwidth Measurement

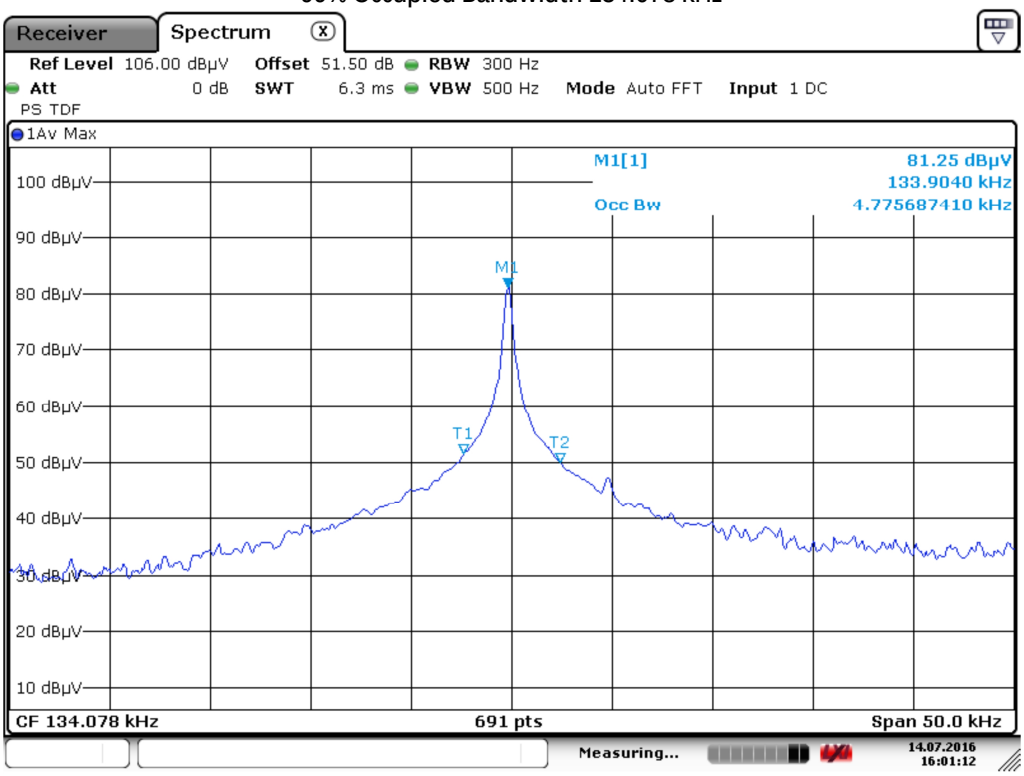
Frequency (MHz)	99% Occupied Bandwidth (kHz)
13.56	429.81
0.134	4.77
Uncertainty	±1 kHz

3.2.6 Plot of the 99% Occupied Bandwidth Measurement

99% Occupied Bandwidth 13.56 MHz



99% Occupied Bandwidth 134.078 kHz



3.3 Field Strength of Unwanted Emissions

3.3.1 Limit

15.225(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 part 15.209.

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance(m)
1.705 - 30	30	69.5	3
30 -88	100	40	3
88 - 216	150	43,5	3
216-960	200	46	3
Above 960	500	54	3

3.3.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.3.3 Test setup

The test setup is as shown in chapter 2.2 of this report.

3.3.4 Test procedure

According to ANSI C63.4-2014, section 5.4.2 and 8.2.3

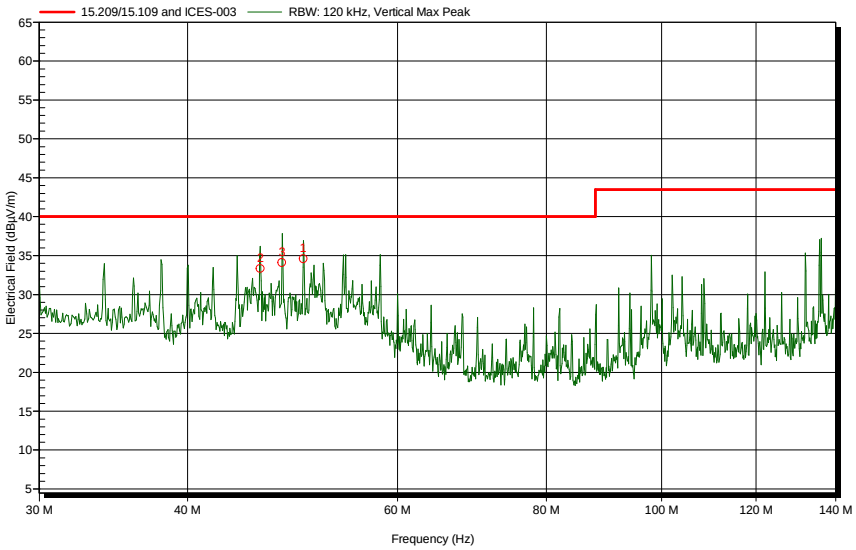
3.3.5 Measurement Uncertainty

Horizontal polarization	
30 – 200 MHz	4.5 dB
Vertical polarization	
30 – 200 MHz	5.4 dB

3.3.6 Plots of the Field strength of Unwanted Emissions Measurement

30 MHz to 140 MHz

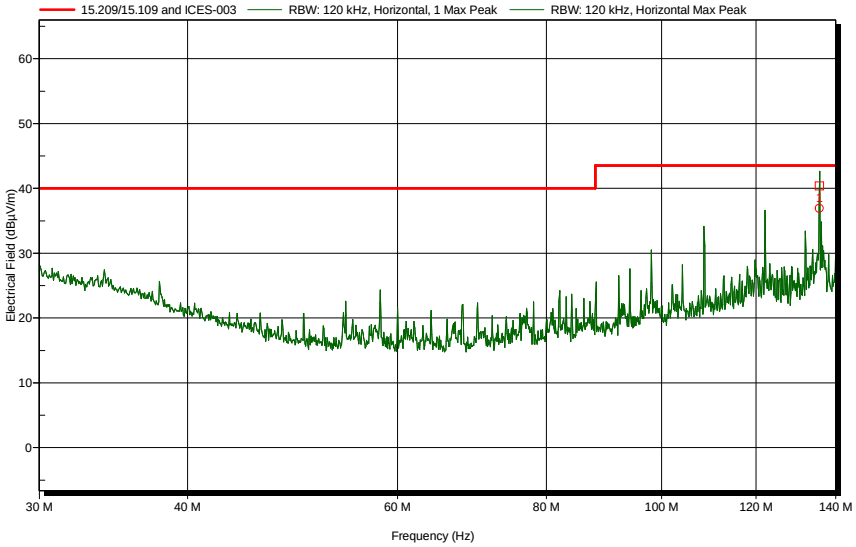
Vertical polarization



Measured peaks Vertical 30 – 1000 MHz Low channel

Frequency (MHz)	Polarization	Height (m)	Peak (dBµV/m)
50,016	Vertical	1	34,6
46,014	Vertical	1	33,3
47,994	Vertical	1	34,1

Horizontal polarization



Measured peaks Horizontal 30 – 1000 MHz

Frequency (MHz)	Polarization	Height (m)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Margin (dB)
135,6	Horizontal	3	40,4	43,5	-3,1

3.4 Frequency Tolerance

3.4.1 Limit

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

3.4.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.4.3 Test setup

The test has been performed in a climatic chamber using a test fixture

3.4.4 Test procedure

According to ANSI C63.10-2013, section 6.8

3.4.5 Test results of Frequency Tolerance Measurements

Temperature variation:

Temp. (ºC)	-20	-10	0	10	20	30	40	50
Frequency (MHz)	13.56058	13.56058	13.56058	13.56058	13.56058	13.56058	13.56029	13.56029
Frequency At start-up	13.56058	13.56058	13.56058	13.56058	13.56058	13.56058	13.56029	13.56029
After 2 min	13.56058	13.56058	13.56058	13.56058	13.56058	13.56058	13.56029	13.56029
After 5 min	13.56058	13.56058	13.56058	13.56058	13.56058	13.56058	13.56029	13.56029
After 10 min	13.56058	13.56058	13.56058	13.56058	13.56058	13.56058	13.56029	13.56029
Deviation (%)*)	0	0	0	0	0	0	0.0022	0.0022
Limit (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

*) w.r.t. nominal frequency of 13.56058 MHz

Voltage variation:

Voltage	Frequency (MHz)*)	Deviation (%)*)	Limit (%)
10.2 V	13.56058	0	0.01
12 V	13.56058	0	0.01
13.8 V	13.56058	0	0.01

3.4.6 Measurement Uncertainty

Measurement uncertainty = + /- 16 Hz

3.5 Radiated Spurious Emissions

3.5.1 Limit

15.109(a)

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance(m)
30 -88	100	40	3
88 - 216	150	43,5	3
216-960	200	46	3
Above 960	500	54	3

3.5.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.5.3 Test setup

The test setup is as shown in chapter 2.2 of this report.

3.5.4 Test procedure

According to ANSI C63.4-2014, section 8.3

3.5.5 Measurement Uncertainty

Measurement uncertainty Radiated emissions below 1 GHz

Horizontal polarization	
30 – 200 MHz	4.5 dB
200 – 1000 MHz	3.6 dB
Vertical polarization	
30 – 200 MHz	5.4 dB
200 – 1000 MHz	4.6 dB

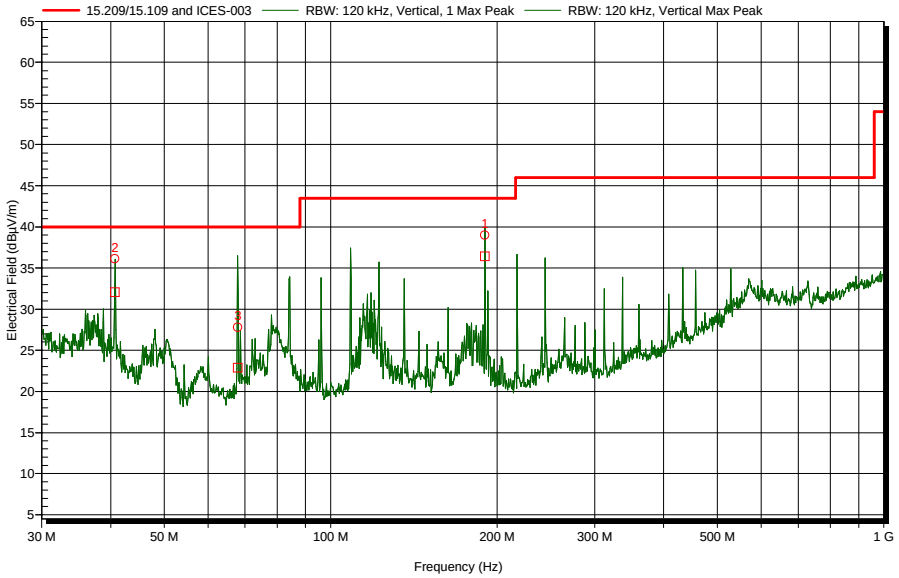
Measurement uncertainty Radiated emissions above 1 GHz

1000- 18000 MHZ	+ 5.7/- 5.7dB

3.5.6 Plots of the Radiated Spurious Emissions Measurement(data communication)

30 -1000 MHz

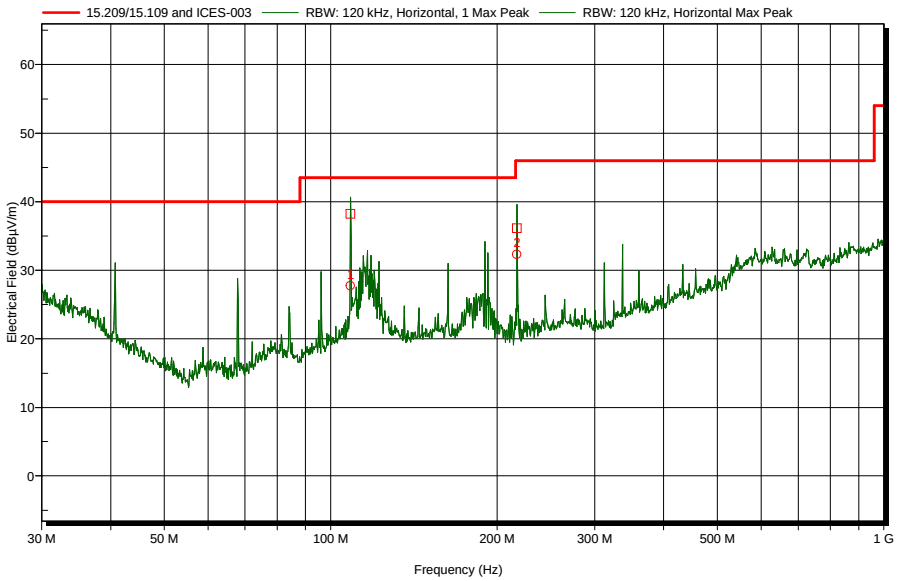
Vertical polarization



Measured peaks Vertical 30 – 1000 MHz

Frequency (MHz)	Polarization	Height(m)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Margin (dB)
189,816	Vertical	1,5	36,4	43,5	-7,1
40,68	Vertical	2	32,1	40	-7,9
67,908	Vertical	2,5	22,9	40	-17,1

Horizontal polarization

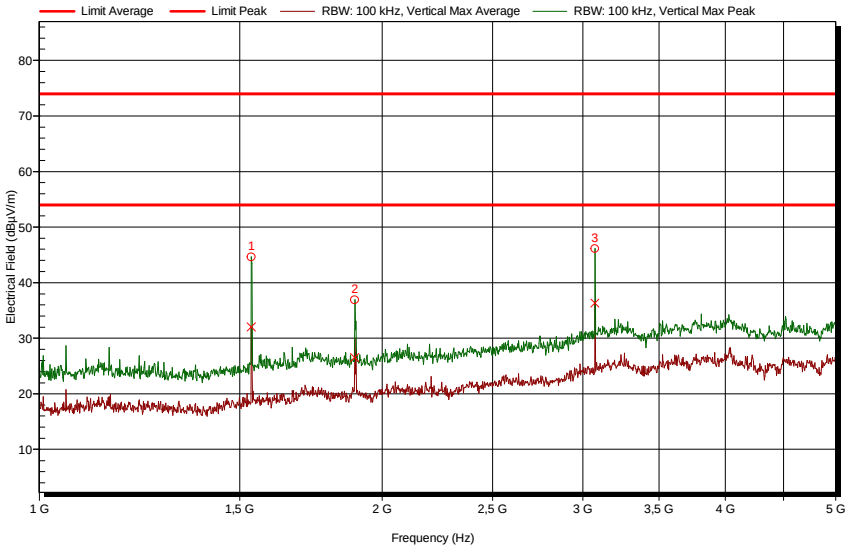


Measured peaks Horizontal 30 – 1000 MHz

Frequency (MHz)	Polarization	Height(m)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Margin (dB)
108,486	Horizontal	2,5	38,2	43,5	-5,3
216,966	Horizontal	1,5	36,1	46	-9,9

1 – 5 GHz

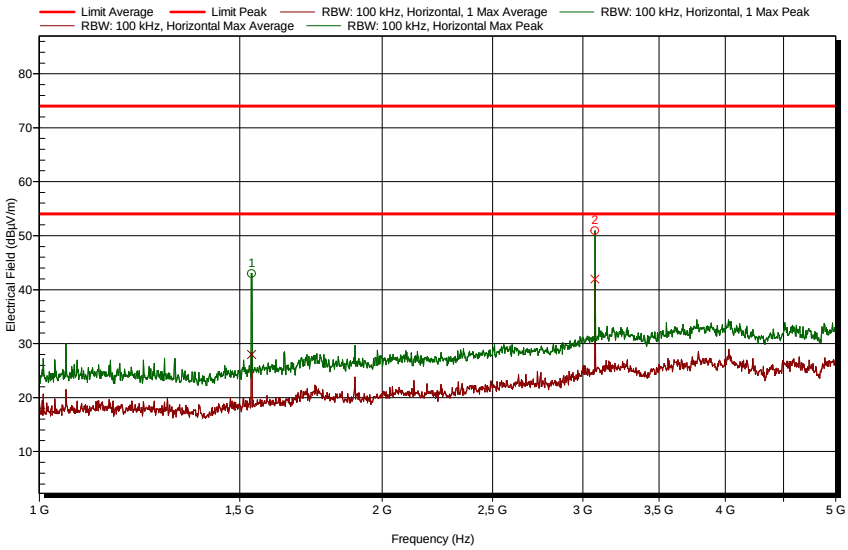
Vertical polarization



Measured peaks Vertical 1 – 18 GHz

Frequency (GHz)	Polarization	Height(m)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)
1,536	Vertical	2,5	44,6	74	-29,4
1,892	Vertical	2,5	36,9	74	-37,1
3,073	Vertical	3,5	46,1	74	-27,9

Horizontal polarization



Measured peaks Horizontal 1 – 18 GHz

Frequency (GHz)	Polarization	Height(m)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)
1,536	Horizontal	2,5	43	74	-31,0
3,073	Horizontal	3	50,9	74	-23,1

3.6 Conducted Emission

3.6.1 Limit

According to 15.107

3.6.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.6.3 Test procedure

According to ANSI C63.4-2014, section 5.2

3.6.4 Test results

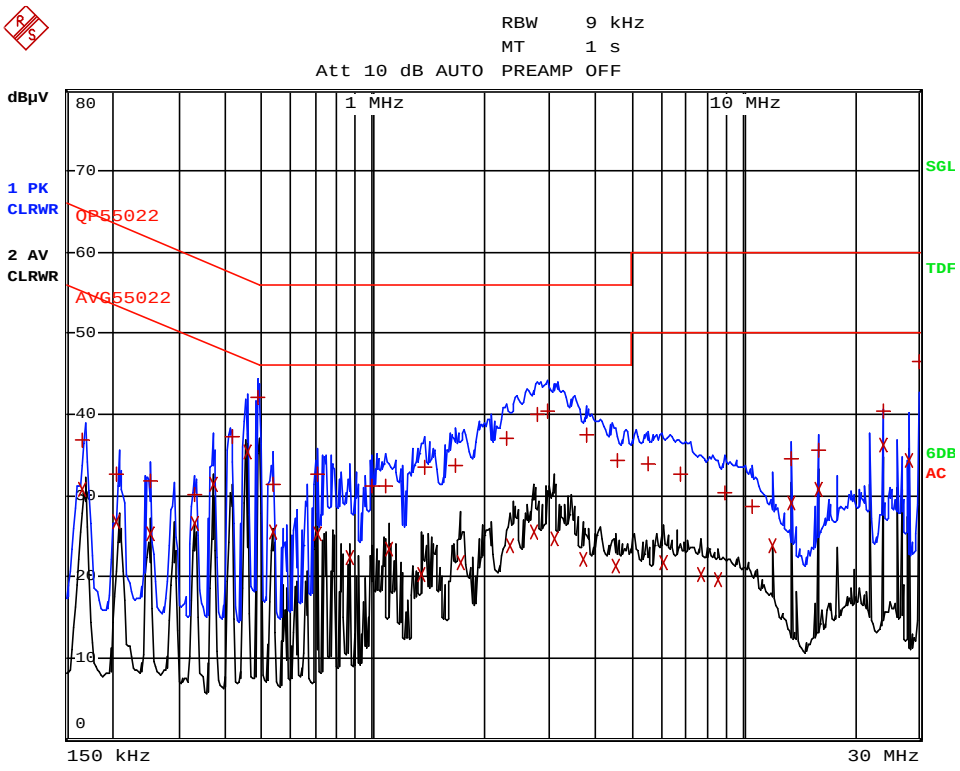
See next page

3.6.5 Measurement Uncertainty

Measurement uncertainty = + /- 3.6 dB.

3.6.6 Conducted Emissions on support equipment (0.15 – 30 MHz)

Neutral



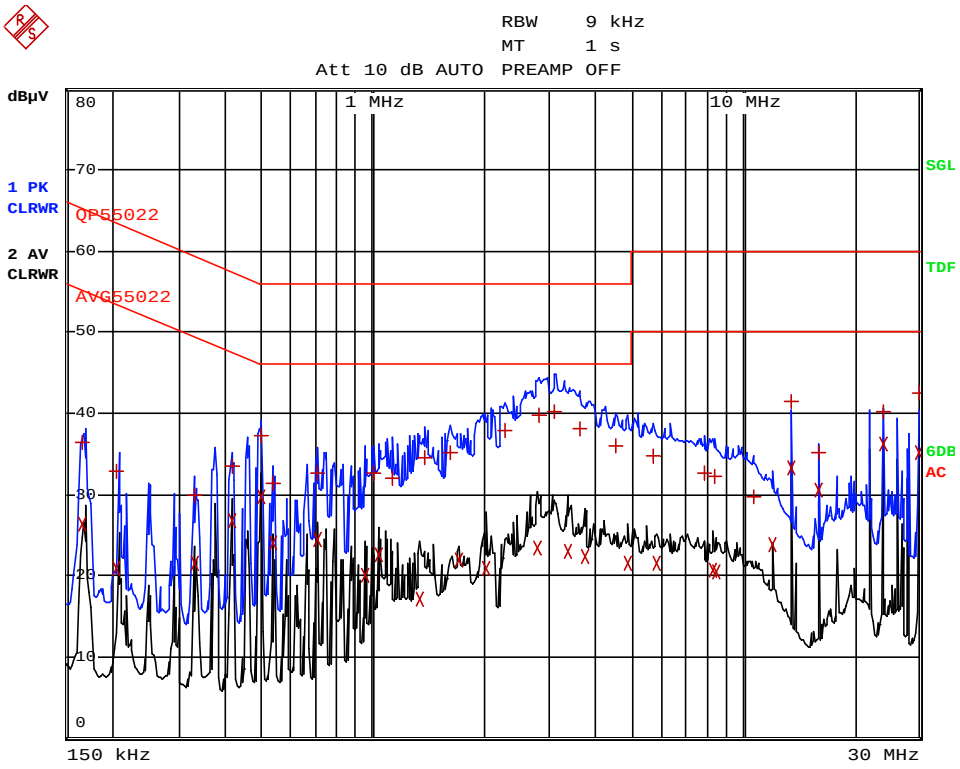
EDIT PEAK LIST (Final Measurement Results)

Trace1: QP55022
Trace2: AVG55022
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	458 kHz	35.37	-11.35
1 Quasi Peak	30 MHz	46.43	-13.56
2 Average	24.002 MHz	36.19	-13.80
1 Quasi Peak	486 kHz	42.00	-14.22
1 Quasi Peak	2.958 MHz	40.32	-15.67
2 Average	28.002 MHz	34.23	-15.76
1 Quasi Peak	2.798 MHz	40.03	-15.96
2 Average	370 kHz	31.36	-17.13
1 Quasi Peak	3.794 MHz	37.58	-18.41
1 Quasi Peak	2.302 MHz	37.10	-18.89
2 Average	16.002 MHz	30.67	-19.32
1 Quasi Peak	24.002 MHz	40.47	-19.52
1 Quasi Peak	414 kHz	37.17	-20.39
2 Average	538 kHz	25.51	-20.49
2 Average	2.722 MHz	25.43	-20.56
2 Average	706 kHz	25.37	-20.62
2 Average	13.562 MHz	29.02	-20.97
2 Average	3.102 MHz	24.60	-21.39
1 Quasi Peak	4.59 MHz	34.29	-21.70
2 Average	2.358 MHz	23.77	-22.22

Note: the EUT is connected to a host, which is AC powered.

Phase



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	QP55022		
Trace2:	AVG55022		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	24.002 MHz	36.21	-13.78
2 Average	30 MHz	35.15	-14.84
1 Quasi Peak	3.106 MHz	40.16	-15.83
1 Quasi Peak	2.83 MHz	39.81	-16.18
2 Average	498 kHz	29.77	-16.26
2 Average	13.562 MHz	33.32	-16.67
1 Quasi Peak	30 MHz	42.41	-17.58
1 Quasi Peak	3.654 MHz	38.09	-17.90
1 Quasi Peak	2.286 MHz	37.81	-18.18
1 Quasi Peak	13.562 MHz	41.46	-18.53
1 Quasi Peak	498 kHz	37.24	-18.79
2 Average	16.002 MHz	30.53	-19.46
1 Quasi Peak	24.002 MHz	40.18	-19.81
1 Quasi Peak	4.534 MHz	35.92	-20.07
1 Quasi Peak	1.622 MHz	35.17	-20.82
2 Average	414 kHz	26.69	-20.86
1 Quasi Peak	1.382 MHz	34.55	-21.44
2 Average	706 kHz	24.40	-21.59
2 Average	538 kHz	24.08	-21.91
2 Average	2.794 MHz	23.41	-22.58

Note: the EUT is connected to a host, which is AC powered.