

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

Model number : DICENTIS
Applicant : Bosch Security Systems B.V.
FCC ID : UX8-DCNMDX
IC ID : 1249D-DCNMDX

Test report No. : 160301165 005 Ver 5.00

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. +31889983600 Fax. +31316583189
Test Site FCC	NL0001

Revision History

Version	Date	Remarks	By
v0.50	01-06-2016	First draft	RvB
v0.50	28-06-2016	Changed Product name	RvB
v0.50	30-06-2016	Implemented comments	RvB
V1.00	18-07-2016	Release version	RvB
v1.50	25-07-2016	Implemented comments	RvB
v2.00	28-07-2016	Next release version	RvB
v2.50	23-12-2016	Updated RSS-210, issue 8 to issue 9	RvB
V3.00	23-12-2016	Next release version	RvB
V4.00	01-02-2017	Updated limit lines spur em 9kHz-30MHz	PvW
V5.00	7-11-2017	Measurement software identification added	KR

Table of Contents

Revision History	3
Summary of Test results.....	6
1 General Description.....	7
1.1 Applicant.....	7
1.2 Manufacturer	7
1.3 Tested Equipment Under Test (EUT)	7
1.4 Product specifications of Equipment under test	8
1.5 Modification of the Equipment Under Test (EUT).....	8
1.6 Environmental conditions.....	8
1.7 Measurement standards	8
1.8 Applicable standards	8
1.9 Observation and remarks	8
1.10 Conclusions.....	10
2 Test configuration of the Equipment Under Test	11
2.1 Test mode	11
2.2 Radiated Test setup	12
2.3 Equipment used in the test configuration	13
2.4 Sample calculations	13
3 Test results.....	14
3.1 Field strength of emissions.....	14
3.1.1 Limit.....	14
3.1.2 Measurement instruments	14
3.1.3 Test setup.....	14
3.1.4 Test procedure	14
3.1.5 Test results of Field strength of emissions.....	14
3.1.6 Plots of Field strength of emissions Measurement.....	15
3.2 99% Occupied Bandwidth.....	16
3.2.1 Limit.....	16
3.2.2 Measurement instruments	16
3.2.3 Test setup.....	16
3.2.4 Test procedure	16
3.2.5 Test results of the 99% Occupied Bandwidth Measurement.....	16
3.2.6 Plot of the 99% Occupied Bandwidth Measurement	17
3.3 Field Strength of Unwanted Emissions.....	18
3.3.1 Limit.....	18
3.3.2 Measurement instruments	18
3.3.3 Test setup.....	18

3.3.4	Test procedure	18
3.3.5	Plots of the Field strength of Unwanted Emissions Measurement	19
3.3.6	Measurement Uncertainty	20
3.4	Frequency Tolerance	21
3.4.1	Limit	21
3.4.2	Measurement instruments	21
3.4.3	Test setup	21
3.4.4	Test procedure	21
3.4.5	Test results of Frequency Tolerance Measurements	21
3.4.6	Measurement Uncertainty	21
3.5	Radiated Spurious Emissions	22
3.5.1	Limit	22
3.5.2	Measurement instruments	22
3.5.3	Test setup	22
3.5.4	Test procedure	22
3.5.5	Measurement Uncertainty	22
3.5.6	Plots of the Radiated Spurious Emissions Measurement	23
3.6	Conducted Emission	25
3.6.1	Limit	25
3.6.2	Measurement instruments	25
3.6.3	Test procedure	25
3.6.4	Test results	25
3.6.5	Measurement Uncertainty	25
3.6.6	Conducted Emissions at the host equipment (0.15 – 30 MHz)	26

Summary of Test results

FCC	IC	Description	Paragraph	Verdict
15.225(a),(b),(c)	RSS-210 B.6(a),(b),(c)	Field strength of emissions	3.1	Pass
--	RSS-GEN 4.6.1	99% Bandwidth	3.2	Pass
15.225(d)	RSS-210 B.6(d)	Field strength of unwanted emissions	3.3	Pass
15.225(e)	RSS-210 B.6	Frequency Tolerance	3.4	Pass
15.109	RSS-210 B.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: Bosch Security Systems B.V.
Address: Torenallee 49, Eindhoven, The Netherlands
Zip code: 5617 BA
Telephone: +31 40 2577 030
E-mail: Ruud.leurs@nl.bosch.com
Contact name: R. Leurs

1.2 Manufacturer

Manufacturer name: Bosch Security Systems-Sistemas de Segurança, S.A
Address: EN 109, Lugar da Pardala – São João de Ovar, Zona Industrial de Ovar, Apartado 653, Portugal
Zip code: 3880-728
Telephone: +351 256 596 261
E-mail: Nelson.Abreu@pt.bosch.com
Contact name: N. Abreu

1.3 Tested Equipment Under Test (EUT)

Product name: Discussion device with touchscreen
Brand name: Bosch
FCC ID: UX8-DCNMDX
IC ID: 1249D-DCNMDX
Model number: DICENTIS
Variant Model(s): DCNM-D, DCNM-DE, DCNM-DSL, DCNM-DVT
Software version: 1.80.11825
Hardware version: 01/00
Date of receipt: 19-05-2016
Tests started: 30-05-2016
Testing ended: 03-06-2016

1.4 Product specifications of Equipment under test

Tx Frequency:	13.56 MHz
Rx frequency:	13.56 MHz
Antenna type and gain:	PCB loop Antenna
Type of modulation:	ASK
Emission designator	541KK1D
Id:	045215461922022029

1.5 Modification of the Equipment Under Test (EUT)

None.

1.6 Environmental conditions

Test date	30-06-2016	03-06-2016
Ambient temperature	24°C	24.1°C
Humidity	42.1%	55%

1.7 Measurement standards

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

1.8 Applicable standards

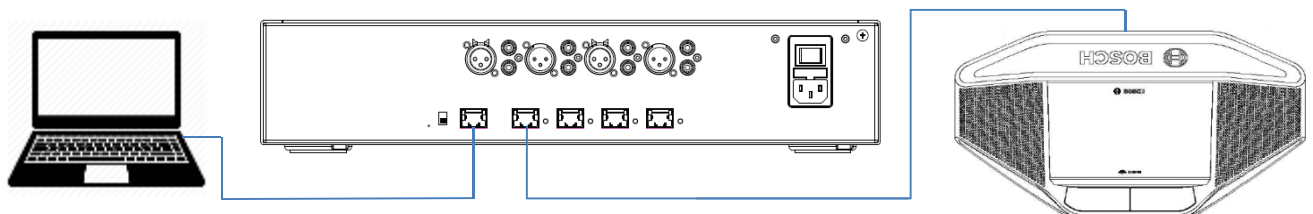
According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.225.
- FCC Part 15 Subpart B §15.109.
- FCC Part 15 Subpart B §15.107.
- RSS-210, issue 9, RSS-GEN Issue 4.

1.9 Observation and remarks

In order to be able to test the DCNM-DE Discussion device with touchscreen the following test setup was supplied and used:

- Bosch DCNM-APS Audio Powering Switch (ID: 045811830314031018)
- Bosch DCNM-CB10 10 meter System Network Cable
- DCNM-DE discussion device with touchscreen (ID: 045215461922022029)
- Laptop computer with "Hosttester" application



There are 4 variants of the Device Under Test all covered under the DICENTIS regulatory model number.

- DCNM-DE: Discussion device with touchscreen

There are 4 variants of the Device Under Test all covered under the DICENTIS regulatory model number.

- DCNM-DE: Discussion device with touchscreen
- DCNM-DVT: Discussion device with voting
- DCNM-DSL: Discussion device with language selector
- DCNM-D: Discussion device

All tests have been performed on the worst case of the 4 devices mentioned above. This device (DCNM-DE) contains all the features of the 4 variants.

1.10 Conclusions

The sample of the product showed NO NON-COMPLIANCES to the specifications stated in paragraph 1.8 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 1.8 "*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 : 07-11-2017

Name : ing K.A. Roes

Function : Coordinator Laboratory

Signature :



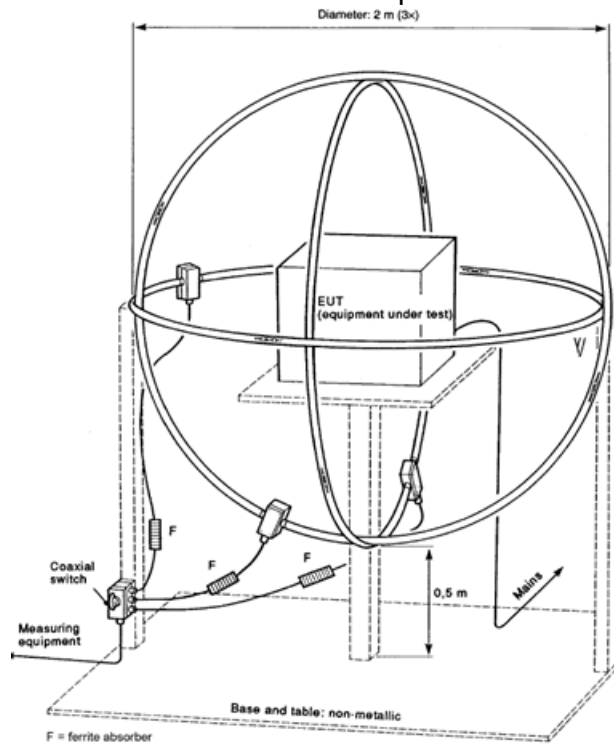
2 Test configuration of the Equipment Under Test

2.1 Test mode

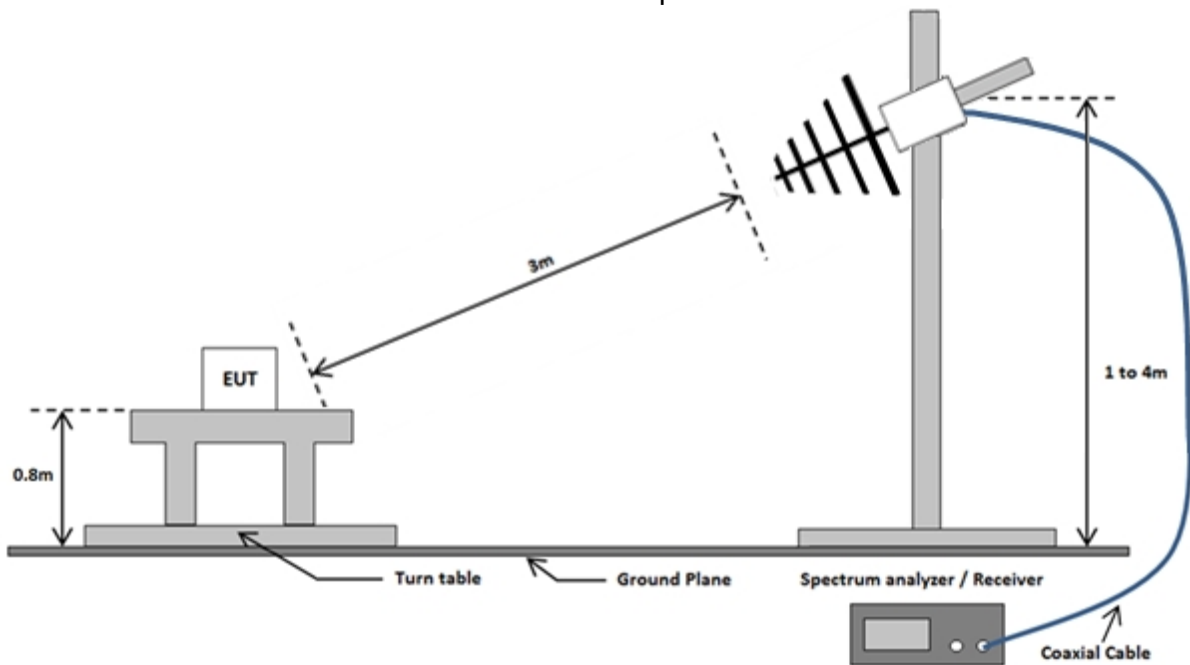
The applicant provided test mode firmware for the EUT, in which it was possible to configure the EUT to transmit continuously.

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, 3.2
Artificial Mains network (AMN)	Rohde & Schwarz	ESH3-Z5	TE00208	3.6
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	TE00756	3.6
Measurement software	DARE!! RadiMation®	Ver. 2016.	--	3.5

2.4 Sample calculations

Field Strength Measurement example(see chapter 3.3):

Frequency (MHz)	Polarization	Height(m)	Quasi-Peak (dB μ V/m)
33	Vertical	1	38,5

The following relation applies:

$$E \text{ (dB}\mu\text{V/m)} = U \text{ (dB}\mu\text{V)} + AF \text{ (dB/m)} + CL \text{ (dB)}$$

Where:

E = Electric field strength

U = Measuring receiver voltage

AF = Antenna factor

CL = Cable loss

$$(38.5 = 19.48 + 18.3 + 0.72)$$

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)	$\mu\text{V}/\text{m}$ at 30 meter	$\text{dB}\mu\text{V}/\text{m}$ at 30 meter	$\text{dB}\mu\text{V}/\text{m}$ 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

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

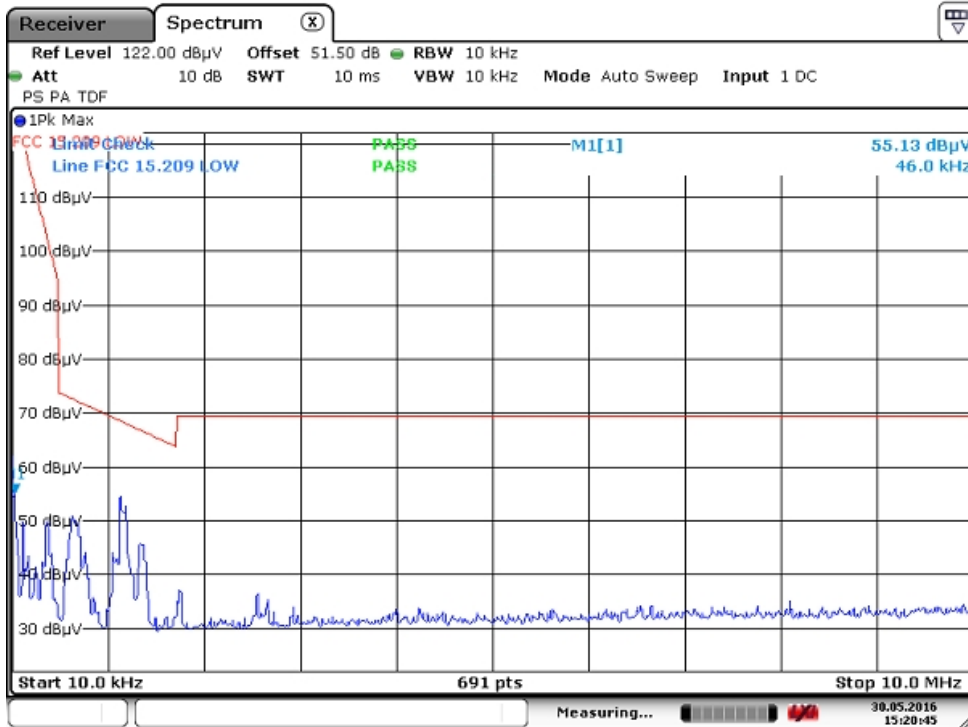
According to ANSI C63.4-2014, section 5.3 and 8.2.1

3.1.5 Test results of Field strength of emissions

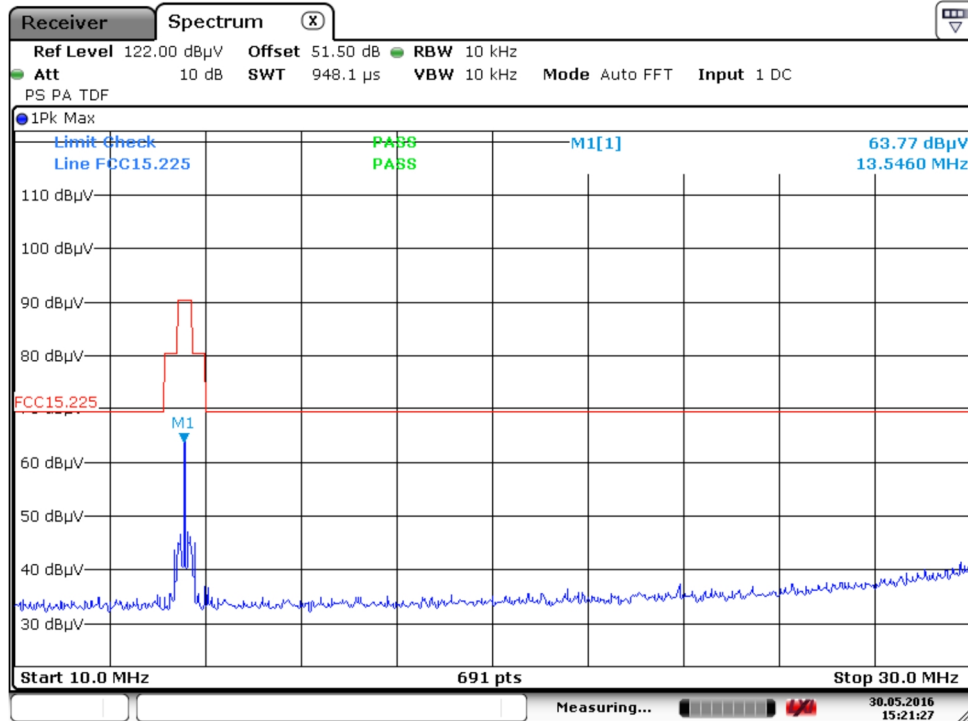
Technology Std.	Frequency (MHz)	Max Field strength at 3m ($\text{dB}\mu\text{V}/\text{m}$)
NFC	13.56	63.77
Uncertainty	+3.0 / -2.5 dB	

3.1.6 Plots of Field strength of emissions Measurement

NFC Field strength of emission (10 kHz to 10 MHz)



NFC 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

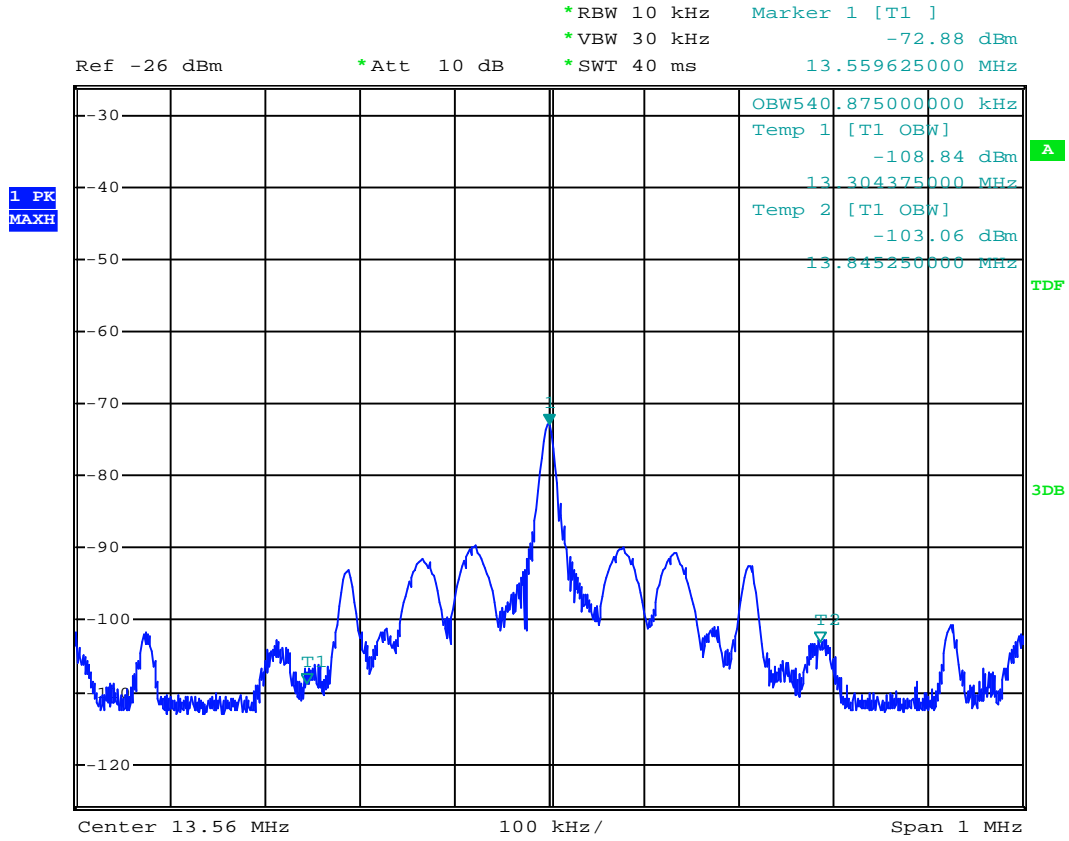
- 1 Set the centre frequency to the nominal EUT channel centre frequency.
- 2 Set span = 1.5 times to 0.5 times the Occupied Bandwidth.
- 3 Set VBW $\geq 3 \times$ RBW.
- 4 Video averaging is not permitted. Where practical detection and single sweep mode shall be used. Otherwise, peak detection and max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

3.2.5 Test results of the 99% Occupied Bandwidth Measurement

Technology Std.	Frequency (MHz)	99% Occupied Bandwidth (kHz)
RFID	13.56	540.87
Uncertainty		± 1 kHz

3.2.6 Plot of the 99% Occupied Bandwidth Measurement

NFC 99% Occupied Bandwidth



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 ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	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.

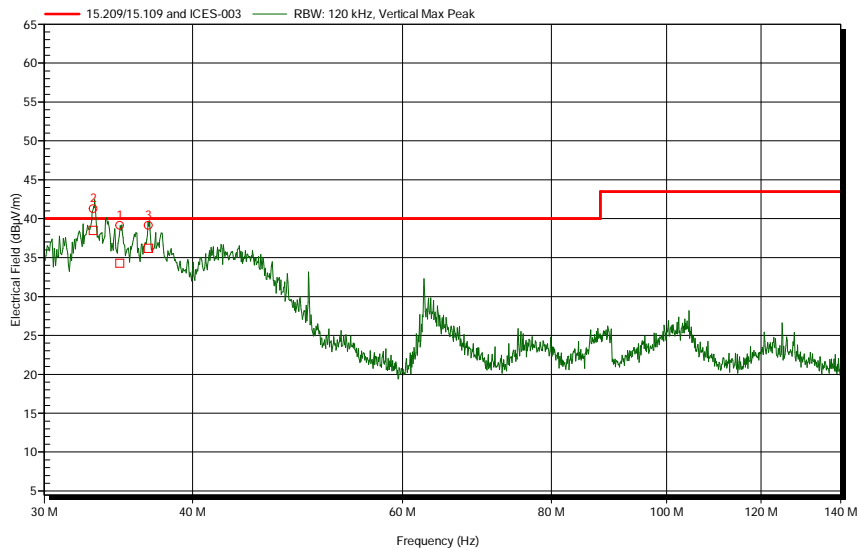
3.3.4 Test procedure

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

3.3.5 Plots of the Field strength of Unwanted Emissions Measurement

30 MHz to 140 MHz

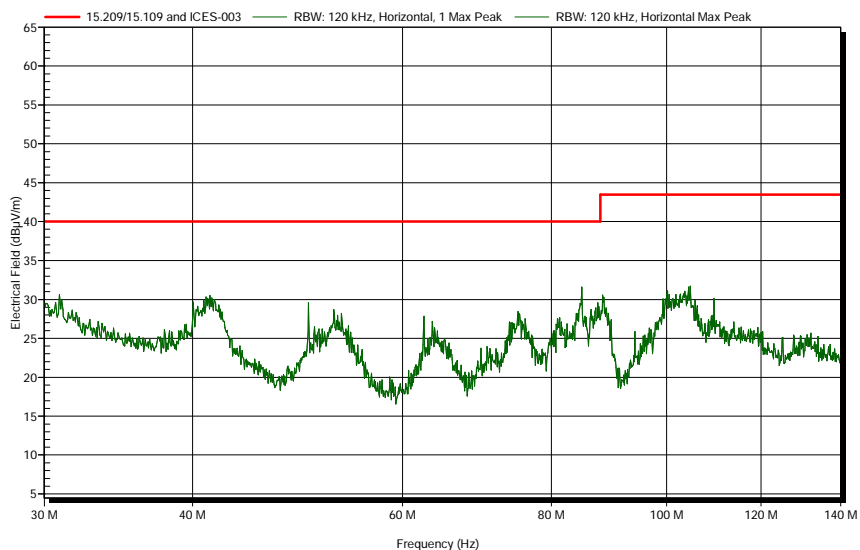
Vertical polarization



Measured peaks Vertical 30 – 140 MHz Low channel

Frequency (MHz)	Polarization	Height (m)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Margin (dB)
34,74	Vertical	1	34,3	40	-5,7
33	Vertical	1	38,5	40	-1,5
36,72	Vertical	1	36,2	40	-3,8

Horizontal polarization



3.3.6 Measurement Uncertainty

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

3.4 Frequency Tolerance

3.4.1 Limit

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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. (°C)	-20	-10	0	10	20	30	40	50
Frequency (MHz)	13.5599	13.5599	13.5600	13.5600	13.5600	13.5600	13.5600	13.5600
Frequency At start-up	13.5599	13.5599	13.5600	13.5600	13.5600	13.5600	13.5600	13.5600
After 2 min	13.5599	13.5599	13.5600	13.5600	13.5600	13.5600	13.5600	13.5600
After 5 min	13.5599	13.5599	13.5600	13.5600	13.5600	13.5600	13.5600	13.5600
After 10 min	13.5599	13.5599	13.5600	13.5600	13.5600	13.5600	13.5600	13.5600
Deviation (%) ^{*)}	0.0001	0.0001	0	0	0	0	0	0
Limit (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

^{*)} w.r.t. nominal frequency of 13.560 MHz

Voltage variation:

Voltage	Frequency (MHz) ^{*)}	Deviation (%) ^{*)}	Limit (%)
40.8 V	13.5600	0	0.01
48 V	13.5600	0	0.01
55.2 V	13.5600	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 ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	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

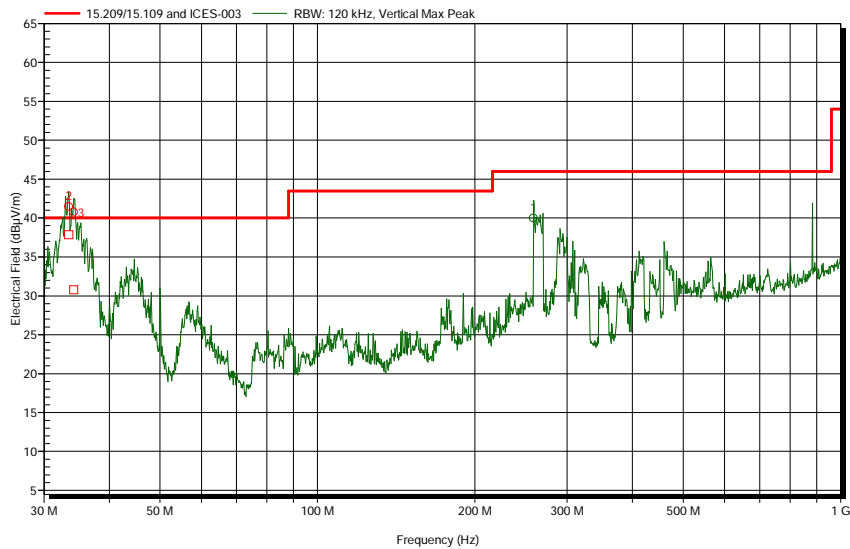
Measurement uncertainty Radiated emissions above 1 GHz

1000- 18000 MHz	+ 5.7/- 5.7dB
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3.5.6 Plots of the Radiated Spurious Emissions Measurement

30 -1000 MHz

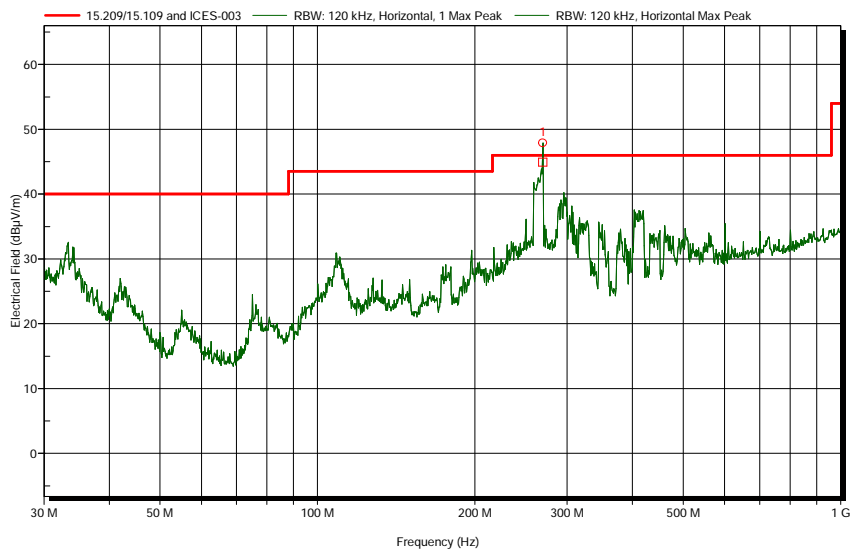
Vertical polarization



Measured peaks Vertical 30 – 1000 MHz

Frequency (MHz)	Polarization	Height (m)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Margin (dB)
33,474	Vertical	1	37,8	40	-2,2
34,2	Vertical	1,5	30,8	40	-9,2

Horizontal polarization

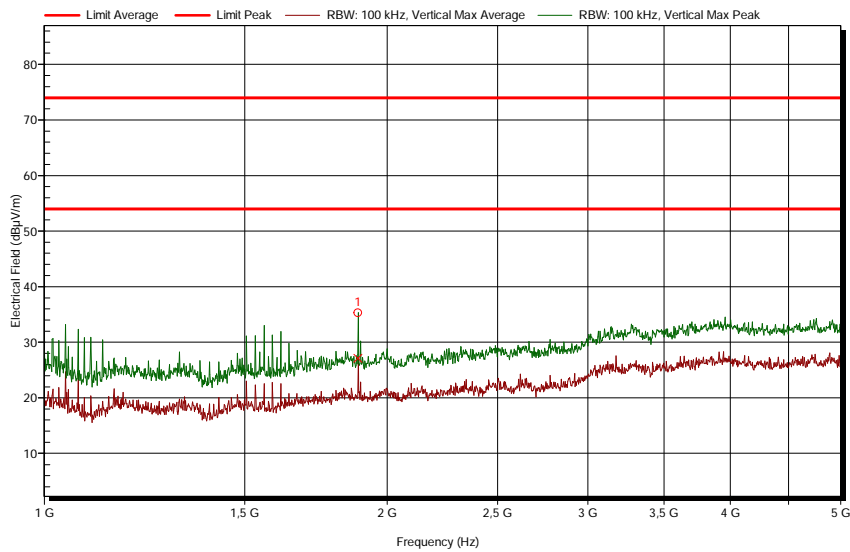


Measured peaks Horizontal 30 – 1000 MHz

Frequency (MHz)	Polarization	Height (m)	Quasi-Peak (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Margin (dB)
269,292	Horizontal	1	44,9	46	-1,1

1 – 5 GHz

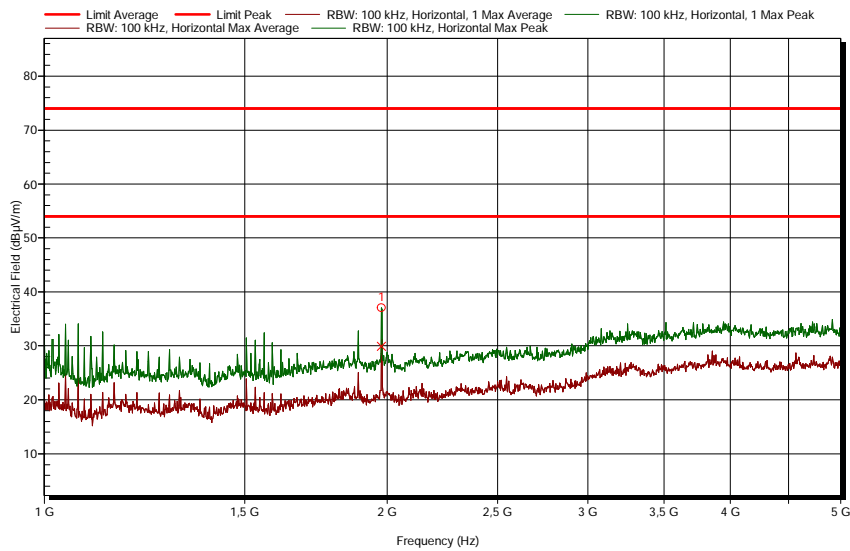
Vertical polarization



Measured peaks Vertical 1 – 18 GHz Middle channel

Frequency (GHz)	Polarization	Height (m)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)
1,885	Vertical	4	35,3	74	-38,7

Horizontal polarization



Measured peaks Horizontal 1 – 18 GHz

Frequency (GHz)	Polarization	Height (m)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)
1,977	Horizontal	3,5	37,1	74	-36,9

3.6 Conducted Emission

3.6.1 Limit

According to 15.107 (a)

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

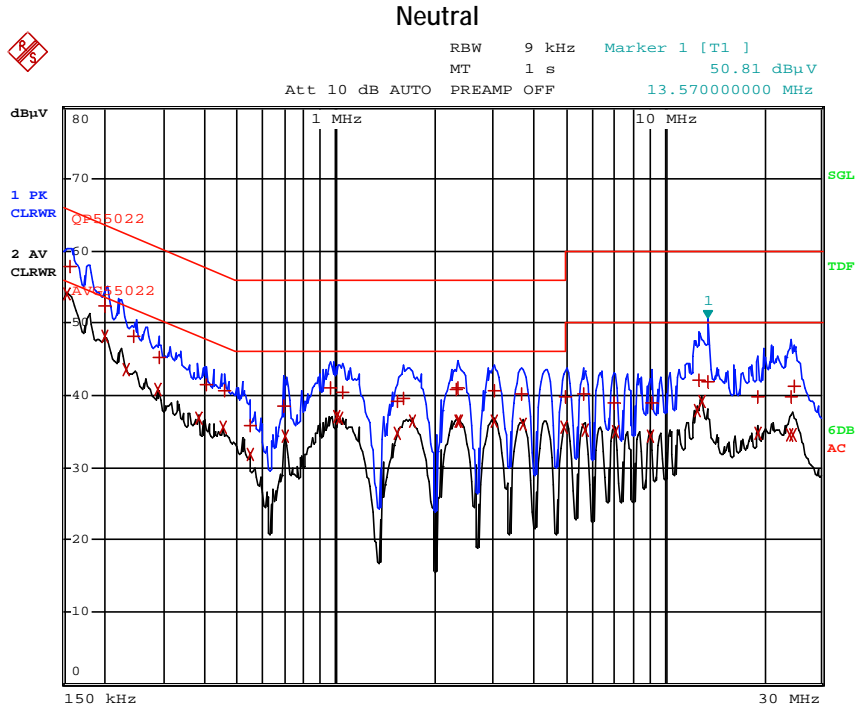
3.6.4 Test results

See next page

3.6.5 Measurement Uncertainty

Measurement uncertainty = + /- 3.6 dB.

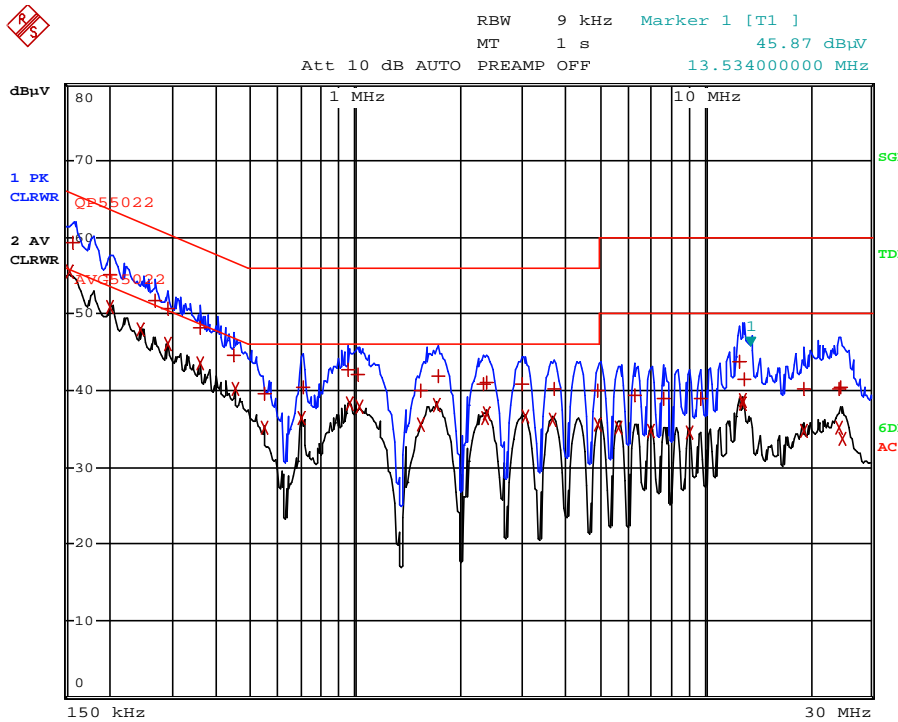
3.6.6 Conducted Emissions at the host equipment (0.15 – 30 MHz)



EDIT PEAK LIST (Final Measurement Results)			
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
Trace1:	QP55022		
Trace2:	AVG55022		
Trace3:	---		
2 Average	154 kHz	54.04	-1.73
2 Average	202 kHz	48.14	-5.38
1 Quasi Peak	158 kHz	57.86	-7.70
2 Average	230 kHz	43.56	-8.88
2 Average	1.002 MHz	37.03	-8.96
2 Average	1.026 MHz	36.77	-9.22
2 Average	1.718 MHz	36.39	-9.60
2 Average	2.37 MHz	36.36	-9.63
2 Average	3.03 MHz	36.34	-9.65
2 Average	2.35 MHz	36.32	-9.67
2 Average	286 kHz	40.75	-9.88
2 Average	3.722 MHz	36.06	-9.93
2 Average	4.99 MHz	35.64	-10.35
2 Average	12.922 MHz	39.11	-10.88
1 Quasi Peak	202 kHz	52.45	-11.07
2 Average	450 kHz	35.64	-11.22
2 Average	382 kHz	36.93	-11.30
2 Average	1.542 MHz	34.64	-11.35
2 Average	698 kHz	34.39	-11.60
2 Average	12.594 MHz	37.86	-12.13

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	154 kHz	55.45	-0.32	
2 Average	202 kHz	50.96	-2.56	
2 Average	242 kHz	47.91	-4.11	
2 Average	290 kHz	46.02	-4.49	
2 Average	358 kHz	43.47	-5.29	
1 Quasi Peak	158 kHz	59.42	-6.14	
2 Average	450 kHz	40.25	-6.61	
2 Average	962 kHz	38.38	-7.62	
2 Average	1.718 MHz	38.11	-7.88	
2 Average	1.026 MHz	37.84	-8.15	
1 Quasi Peak	202 kHz	55.19	-8.32	
2 Average	2.39 MHz	36.96	-9.03	
2 Average	3.058 MHz	36.54	-9.45	
1 Quasi Peak	266 kHz	51.76	-9.48	
2 Average	698 kHz	36.49	-9.50	
2 Average	2.358 MHz	36.40	-9.59	
2 Average	3.682 MHz	36.27	-9.72	
1 Quasi Peak	290 kHz	50.77	-9.75	
2 Average	4.994 MHz	35.69	-10.30	
2 Average	1.542 MHz	35.60	-10.39	

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