

Radio test report

20153854300-Ver 1.10

based on:

FCC part 15C; section 15.247 (Ed. 10-1-14); FCC
part 15C, section 15.225 (Ed 10-1-14); RSS-247,
issue 1

XS4 serie Access Control Electronic Lock BLE
capable
SALTO
ABXX; ABXW

Revision history

REVISION	DATE	REMARKS	REVISED BY
Ver 1.10	11 April 2016	• IC ID changed; • ABXW details added; • Last sentence in 'Observations and comments' changed; • Product description changed	ing P.A. Suringa.
Ver 1.00	7 December 2015	Initial release	ing P.A. Suringa.
Ver 0.50	20 November 2015	Release for review	ing P.A. Suringa.

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This report comprises of three modules. The total number of pages is: 23

Main module

1 Introduction

This report contains the result of tests performed by:

Telefication B.V.
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands

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 Registration Number is: 282250.

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

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Ordering party:

Company name	:	Salto Systems, S.L.
Address	:	C/Arkotz 9 Pol. Lanbarren
Zipcode	:	20180
City/town	:	Oiartzun
Country	:	Spain
Date of order	:	19 June 2015

2 Product

A sample of the following product was submitted for testing:

Product description	:	XS4 serie Access Control Electronic Lock BLE capable
Manufacturer	:	Salto systems, S.L.
Trade mark	:	SALTO
Type designation	:	ABXX; ABXW
FCC ID	:	UKCABXX; UKCABXW
IC ID	:	10088A-ABXX; 10088A-ABXW
Hardware version	:	--
Serial number	:	--
Firmware release	:	--

3 Test schedule

Tests are carried out in accordance with the specification detailed in chapter 7 “Summary” of this report.

Tests are carried out at the following location:

- Telefication, Zevenaar

The sample of the product is received on:

- 3 September 2015

Tests are carried out between:

- 12 October and 10 November 2015

4 Product documentation

For production of this report the following product documentation has been used:

Identification	Date
ABXW_Schematic_RF1.PDF	26-11-2208
ABXW Operational Description.pdf, version 2.3	2-9-2015

The above-mentioned documentation will be filed at Telefication for a period of 10 years following the issue of this test report.

5 Observations and comments

The product under test, type ABXX, is a wireless entry system operating on Bluetooth LE and RFID on 13.56 MHz.

A variant, type ABXW, is a wireless entry system containing Bluetooth LE, RFID on 13.56 MHz and ZigBee (IEEE 802.15.4). Additional test results of the variant are contained in additional test report no. 20153854301.

6 Modifications to the sample

No modifications are made to the sample.

7 Summary

The product is intended for use in the following application area(s):

INTENTIONAL RADIATOR OPERATING IN THE FREQUENCY BAND 2400 - 2483.5 MHz

The sample is tested according to the following specification(s):

FCC part 15C; section 15.247 (Ed. 10-1-14); FCC part 15C, section 15.225 (Ed 10-1-14); RSS-247, issue 1

8 Conclusions

The samples of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 7 of this report:

The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication accepts no responsibility for any stated properties of product items in this test report, which are not supported by the tests as specified in section 7 "*Summary*".

All tests are performed by:

name : ing. P.A. Suringa

Review of test methods and report by:

name : ing. J.C. le Clercq

The above conclusions have been verified by the following signatory:

Date : 11 April 2016

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

function : Director Certification

signature :



Test results module

1 General information

1.1 Equipment information

Type of equipment	Wireless entry system using Bluetooth Low Energy (BLE)
Modulation	GFSK
Spreading type	FHSS
Emission designator	1M00G1D (BLE); unknown (RFID)
Bit rate	not specified
Operating frequency range (BLE)	2400 - 2483 MHz
Duty cycle (during testing)	54 %
Operating frequency (RFID)	13.56 MHz

1.2 Tested channels

Ch	Frequency (MHz)
1	2402
2	2440
3	2480

2 Emission tests on Bluetooth LE

2.1 Maximum radiated output power

Compliance standard : FCC part 15, subpart C, section 15.247 (b) (3) (4)
 Method of test : FCC KDB publication No. 558074
 Ambient temperature : 23 °C
 Relative humidity : 47 %

Test results :

Mode	Level (dBm)		
	CH 1	CH 2	CH 3
Continuously transmitting (D = 54 %)	-0.1	-1.9	2.4

Limit:

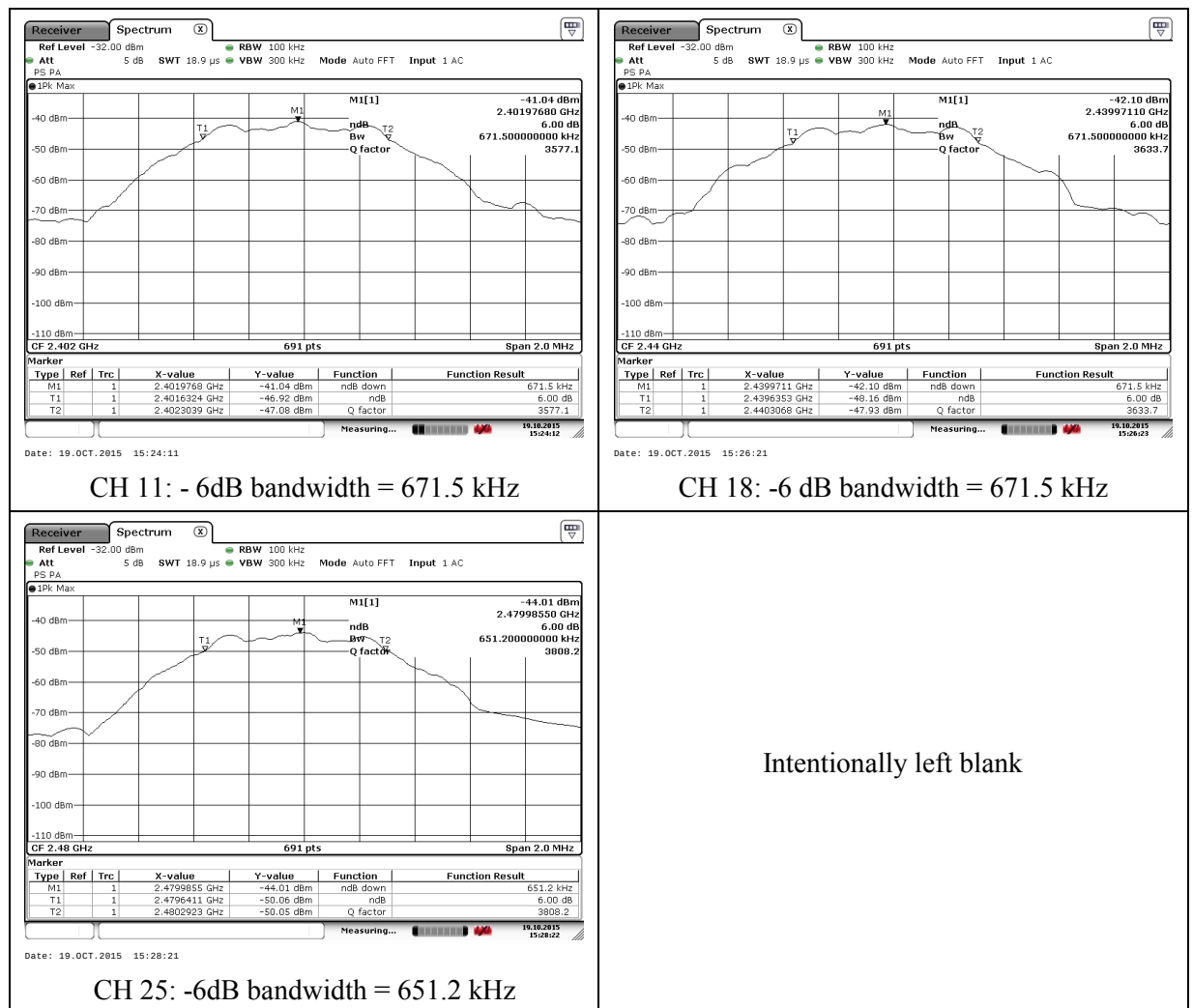
Maximum conducted output power	≤ 30 dBm (with antenna gain < 6 dBi)
<i>De facto</i> maximum radiated output power	≤ 36 dBm e.i.r.p.

Measurement uncertainty: + 1.6 /- 1.9 dB

2.2 Minimum 6 dB bandwidth

Compliance standard : FCC part 15, subpart C, section 15.247 (a) (2)
 Method of test : FCC KDB publication No. 558074
 Ambient temperature : 23 °C
 Relative humidity : 47 %

Test results :



Limit:

Minimum 6 dB bandwidth

at least 500 kHz

Measurement uncertainty: +/- 2 kHz

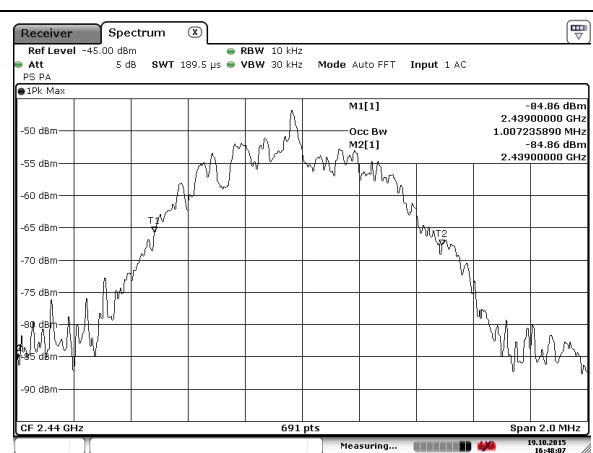
2.3 99% power bandwidth

Compliance standard : IC RSS-Gen, section 4.6.1
Method of test : IC RSS-Gen, section 4.6.1
Ambient temperature : 23 °C
Relative humidity : 47 %

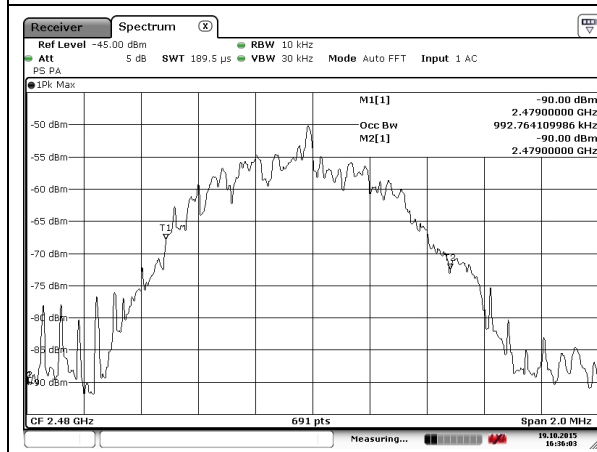
Test results :



CH 11: -6dB bandwidth = 1.12 MHz



CH 18: -6 dB bandwidth = 1.01 MHz



CH 25: -6dB bandwidth = 992.76 kHz

Intentionally left blank

Limit:

99% power bandwidth

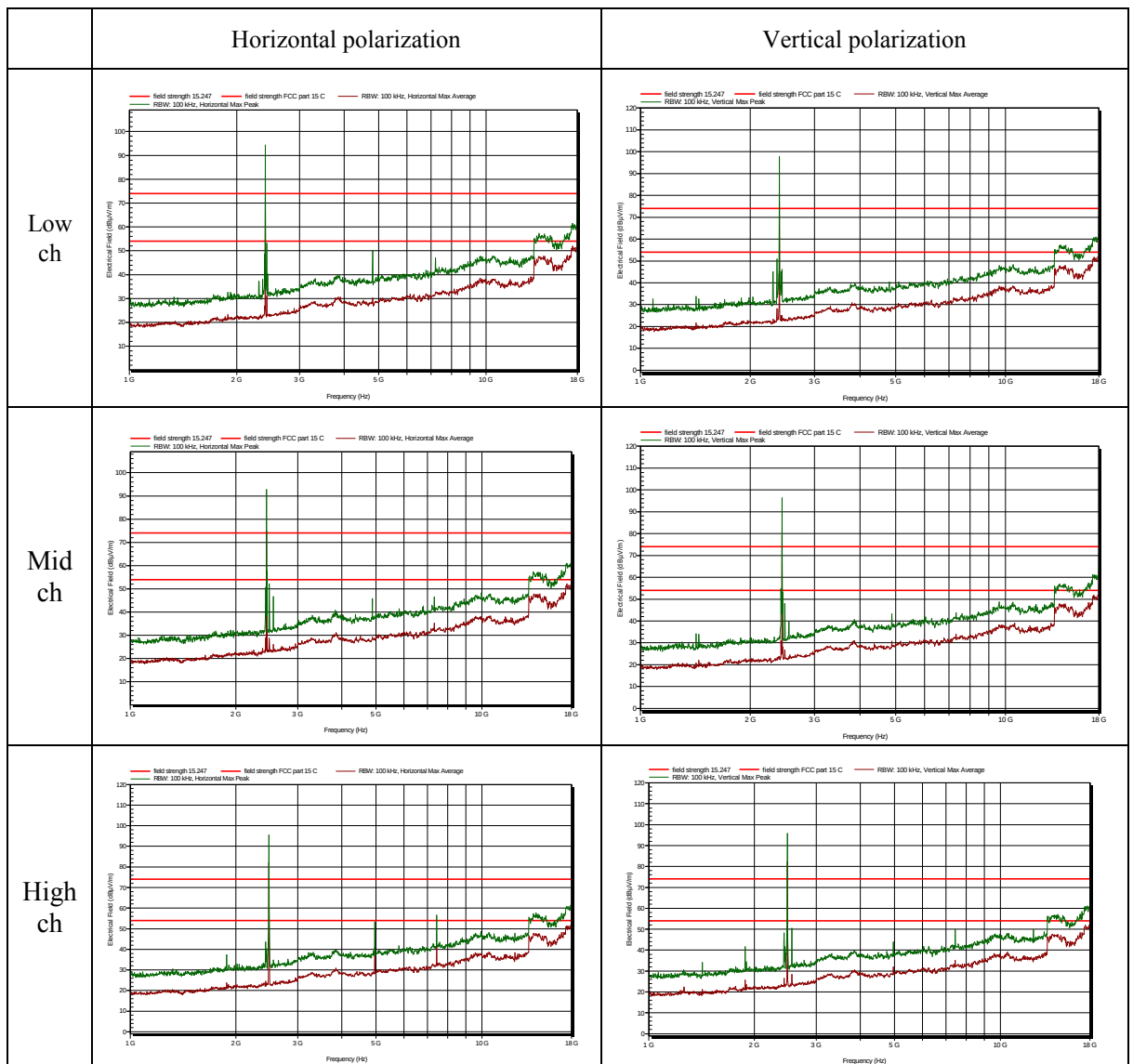
--

Measurement uncertainty: +/- 2 kHz

2.4 TX spurious emissions (radiated, 1 – 18 GHz)

Compliance standard : FCC part 15, subpart C, section 15.247(d)
Method of test : FCC KDB publication No. 558074
Ambient temperature : 23 °C
Relative humidity : 47 %

Test results :



Measurement uncertainty: < 2 GHz: + 1.7/- 1.9 dB; ≥ 2 GHz: +2.4/-2.7 dB

Limit:

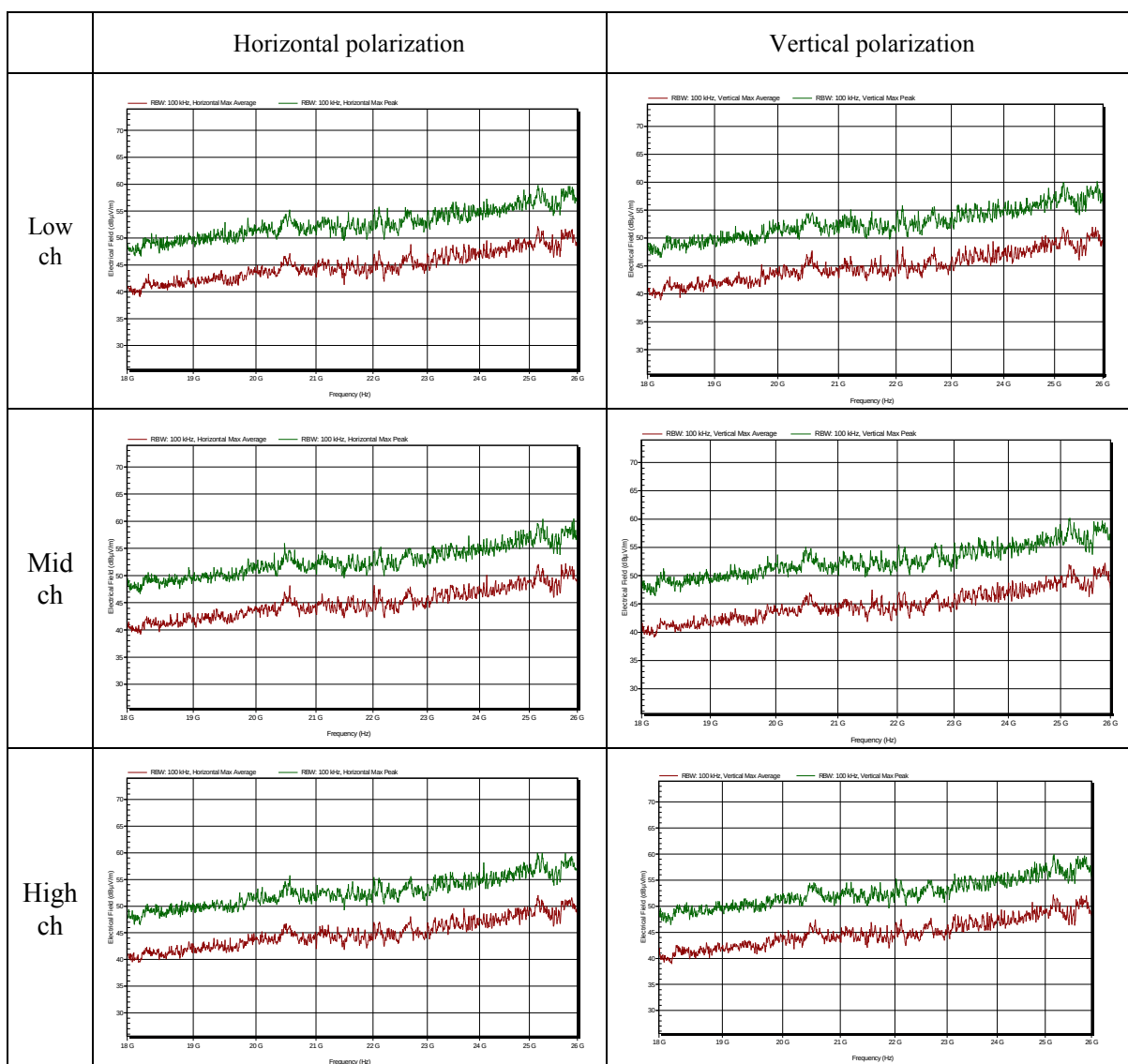
In any 100 kHz bandwidth	at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz bandwidth.
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In restricted bands	≤ 54 dBμV/m
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2.5 TX spurious emissions (radiated, 18 – 26 GHz)

Compliance standard : FCC part 15, subpart C, section 15.247(d)
Method of test : FCC KDB publication No. 558074
Ambient temperature : 23 °C
Relative humidity : 47 %

Test results :



Measurement uncertainty: < 2 GHz: + 1.7/- 1.9 dB; ≥ 2 GHz: +2.4/-2.7 dB

Limit:

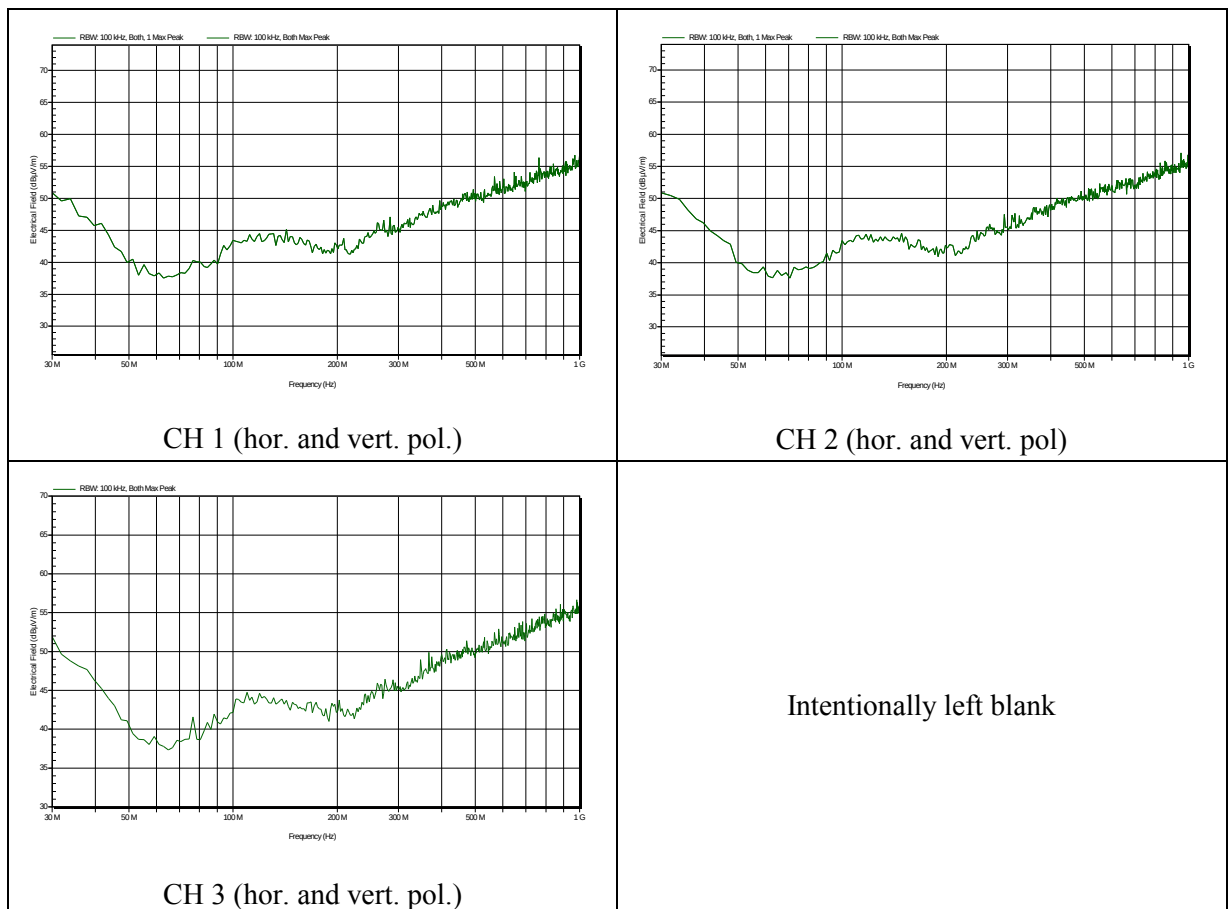
In any 100 kHz bandwidth	at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz bandwidth.
--------------------------	--

In restricted bands	≤ 54 dBµV/m
---------------------	-------------

2.6 TX spurious emissions (radiated, 0.03-1 GHz)

Compliance standard : FCC part 15, subpart C, section 15.247(d)
 Method of test : FCC KDB publication No. 558074
 Ambient temperature : 23 °C
 Relative humidity : 23 %

Test results :



Limit:

Field strength at 3 meter distance	30 – 88 MHz: $\leq 40 \text{ dB}\mu\text{V/m}$; 88 – 216 MHz: $\leq 43.5 \text{ dB}\mu\text{V/m}$; 216 – 960 MHz: $\leq 46 \text{ dB}\mu\text{V/m}$; Above 960 MHz: $\leq 54 \text{ dB}\mu\text{V/m}$
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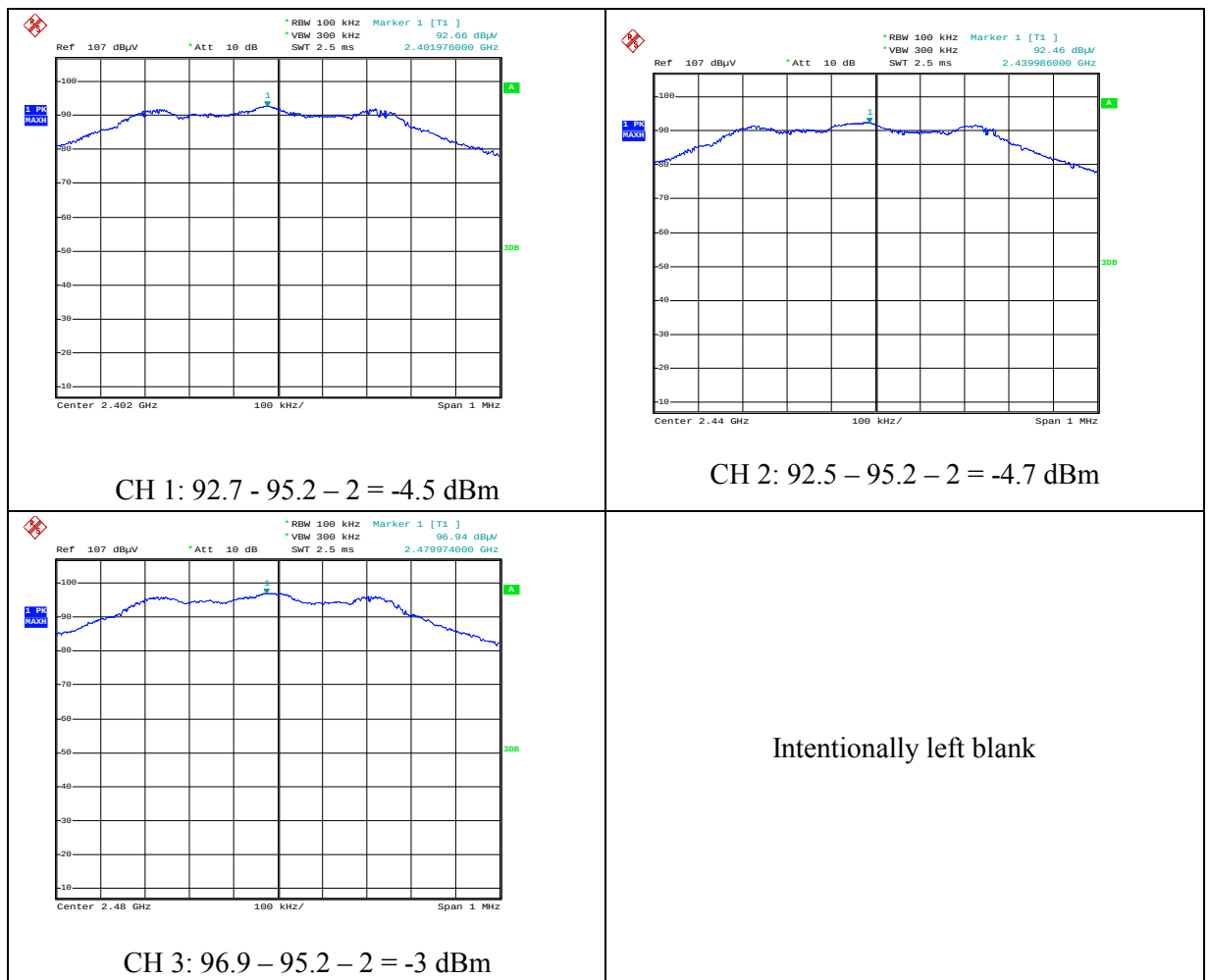
Measurement uncertainty:

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

2.7 Maximum power spectral density conducted to the antenna

Compliance standard : FCC part 15, subpart C, section 15.247(e)
 Method of test : FCC KDB publication No. 558074
 Ambient temperature : 23 °C
 Relative humidity : 23 %

Test results :



Measurement uncertainty: < 2 GHz: + 1.7/- 1.9 dB;
 ≥ 2 GHz: + 2.4/- 2.7 dB

Limit:

In any 3 kHz band	Not greater than 8 dBm during any time of continuous transmission
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3 Emission tests on 13.56 MHz RFID

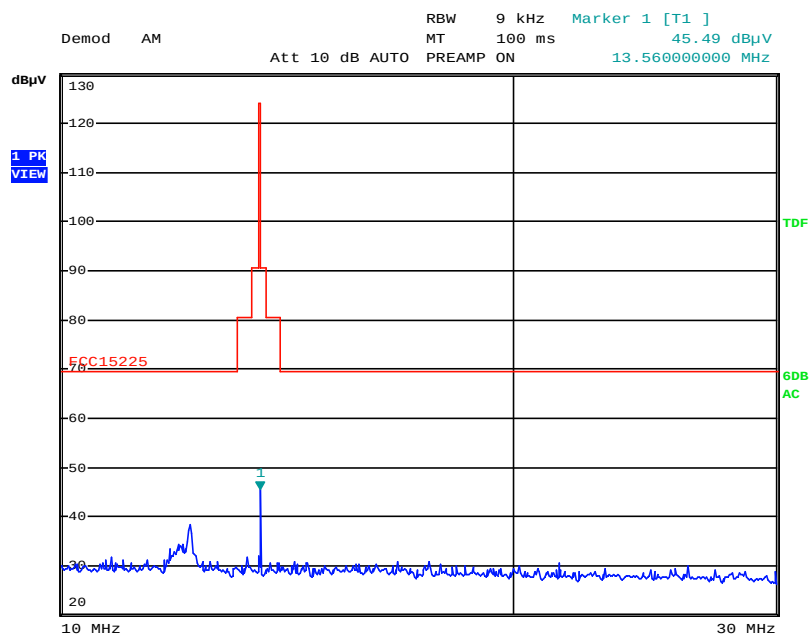
3.1 Field strength of emissions (< 30 MHz)

Compliance standard : FCC part 15, subpart C, section 15.225 (b), (c)
FCC part 15, subpart C, section 15.205;
FCC part 15, subpart B, section 15.209 (a)

Method of test : ANSI C63.4-2003, sections 5.3 & 8.2.1; FCC part 15, subpart A,
section 15.31 (f) (2), 15.33, 15.35.

Test results :

(unit in dB μ V/m)



The maximum field strength at 13.56 MHz is: 45.5 dB μ V/m (3 m distance)

Measurement uncertainty	+1.9 / -2.1 dB
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Remark: in the plot the limit is modified for an inverse linear distance extrapolation factor of 40 dB/decade.

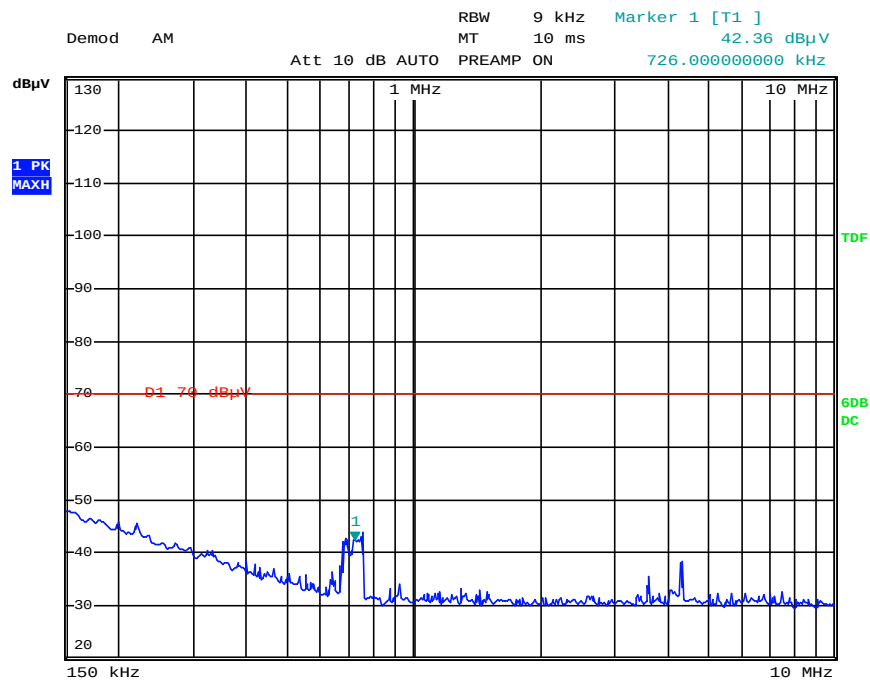
3.2 TX unwanted emissions (radiated, 0.15 - 10 MHz)

Compliance standard : FCC part 15, subpart C, section 15.225 (a)

Method of test : ANSI C63.4-2003, sections 5.3 & 8.2.1; FCC part 15, subpart A, section 15.31 (f) (2), 15.33, 15.35.

Test results :

(unit in dB μ V/m)

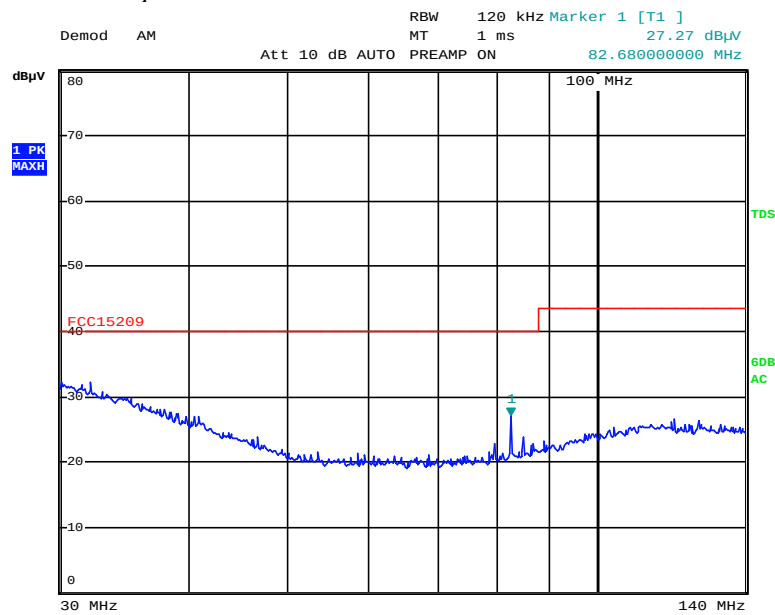


3.3 Field strength of unwanted emissions (radiated, 30 - 140 MHz)

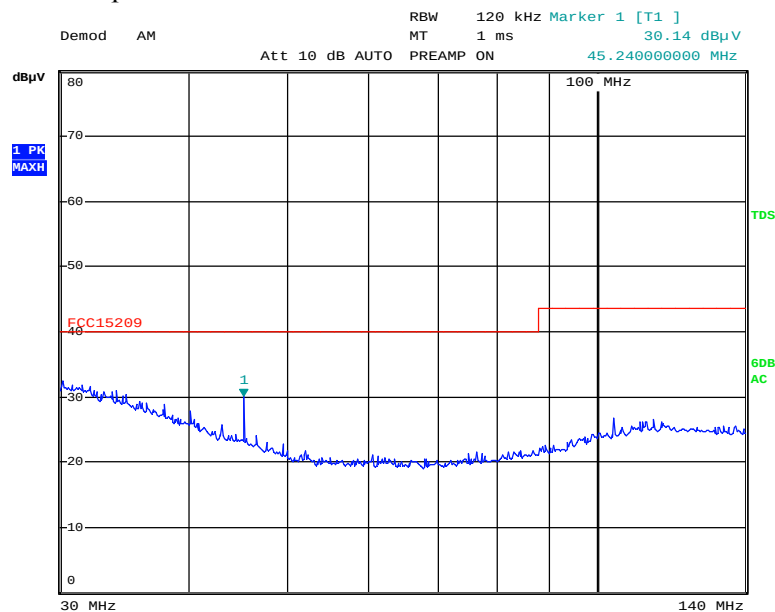
Compliance standard : FCC part 15, subpart C, section 15.225 (d)
FCC part 15, subpart C, section 15.205
FCC part 15, subpart C, section 15.209 (a)
Method of test : ANSI C63.4-2003, sections 5.4.2 & 8.2.3;
FCC part 15, subpart A, sections 15.33, 15.35.

Test results: :

Horizontal polarization



Vertical polarization



Measurement uncertainty

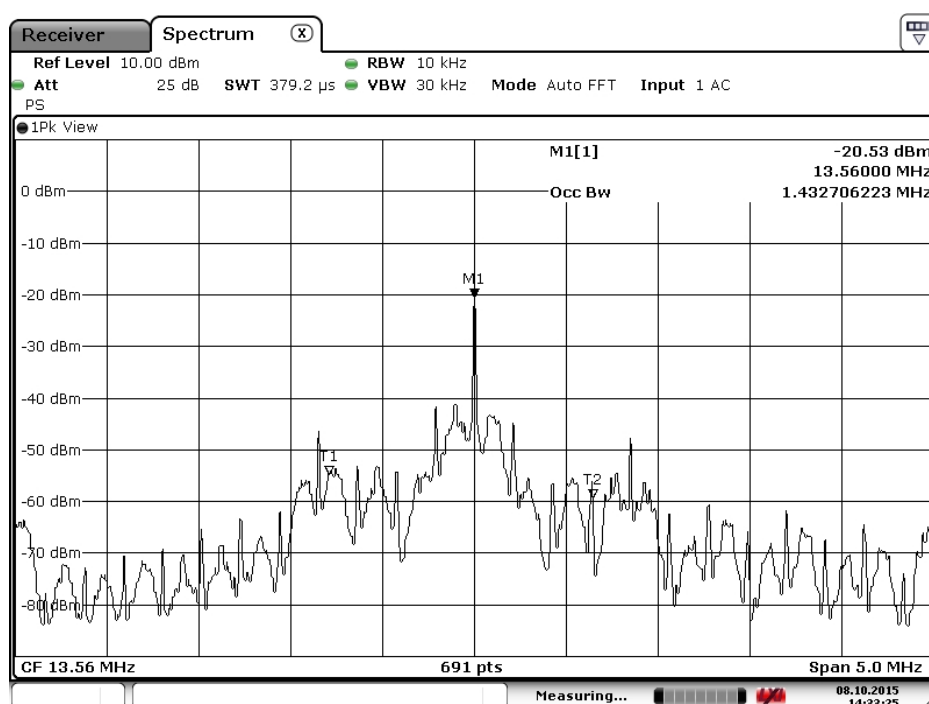
Horizontal polarization	
30 – 200 MHz	4.5 dB
200 – 1000 MHz	3.6 dB
Vertical polarization	
30 – 200 MHz	5.4 dB
200 – 1000 MHz	4.6 dB

3.4 99% power bandwidth

Compliance standard : ICC RSS 210

Method of test : Occupied bandwidth 99 %

Test results: :



Measurement uncertainty

1 kHz

3.5 Frequency tolerance

Compliance standard : FCC part 15, subpart C, section 15.225 (e)

Method of test : ANSI C63.10-2009, clause 6.8

Test results: :

Temperature variation:

Temp. (°C)	-20	-10	0	10	20	30	40	50
Frequency (MHz)	13.5601	13.5602	13.5602	13.5602	13.5601	13.5601	13.5601	13.5600
Deviation (%)*)	0.0007	0.0015	0.0015	0.0015	0.0007	0.0007	0.0007	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 (%)
3.825 V	13.5601	0.0007	0.01
4.5 V	13.5601	0.0007	0.01
5.175 V	13.5601	0.0007	0.01

*) w.r.t. nominal frequency of 13.560 MHz

Measurement uncertainty	+ /- 16 Hz
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Used test equipment module

Description	ID	Manufacturer	Model	Used at par.
Spectrum Analyzer	TE 11125	Rohde & Schwarz	FSP 40	2.1, 2.6, 2.7
Spectrum Analyzer	TE 01220	Rohde & Schwarz	ESR7	2.2, 2.3, 3.5
Thermometer	TE 00388	Fluke	51	3.5
Pre amplifier	TE 11132	Miteq	AFS42-041001800-28-OP-42	2.1, 2.4, 2.7
Horn antenna	TE 00531	EMCO	3115	2.1, 2.2, 2.3, 2.4, 2.7
Semi Anechoic Room	TE 00861	Comtest	--	2.1, 2.4, 2.6, 3.1, 3.2, 3.3
EMI test receiver	TE 11128	Rohde & Schwarz	ESCI	3.1, 3.2, 3.3
Biconilog antenna	TE 00967	Chase	CBL6112A	2.6
Active loop antenna	TE 00746	Rohde & Schwarz	HFH2-Z2	3.1, 3.2
Pre amplifier	TE 11131	Miteq	JS4-18004000	2.5
Digital Multi Meter	TE 01305	Fluke	87 V	3.5
Climate Chamber	TE 00741	CTS	-40/350	3.5

Cross References

FCC	IC RSS	Description	Section in report
15.247(a) (2)	247 §5.2.1	6dB Bandwidth	2.2
§2.1049(h)	GEN §4.6.1	99% Bandwidth	2.3
15.247(b)	247§ 5.4.4	RF Output Power	2.1
15.247(e)	247 §5.2.2	Power Spectral Density	2.7
15.247(d)	247 §5.5	Conducted Band edges	--
15.247(d)	247 §5.5	Conducted Spurious Emissions	--
15.247(d)	247 §5.5	Radiated Band edges	--
15.247(d)	247 §5.5	Radiated Spurious Emissions	2.4, 2.5, 2.6
15.203	-	Antenna Requirements	--

IC RSS-210 Issue 8	FCC 47 CFR Part 15, subpart C (1-Oct-14 Edition)	Section in report
Section 2.5	§ 15.209	
Section 2.5	§ 15.205	2.7
IC RSS-210 Issue 8, Annex 2	FCC 47 CFR Part 15, subpart C (1-Oct-14 Edition)	
Annex A2.6 (a)	§ 15.225 (a)	3.2
Annex A2.6 (b)	§ 15.225 (b)	3.1
Annex A2.6 (c)	§ 15.225 (c)	3.1
Annex A2.6 (d)	§ 15.225 (d)	3.3
Annex A2.6	§ 15.225 (e)	3.5