RADIO TEST REPORT

No. 1405683STO-002 Ed. 3

RF performance

EQUIPMENT UNDER TEST

Equipment :	Remote Terminal Unit with 3G connection
Type / model :	R7-101
Additional model	R7-102
Manufacturer :	Creowave Oy
Tested by request of :	Creowave Oy

SUMMARY

Referring to the emission limits and the operating mode during the tests specified in this report the equipment complies with the requirements according to

47 CFR Part 15, Subpart C, Intentional radiators, section 15.247
RSS-Gen Issue 4 (2014) RSS-210 Issue 8 (2010) (Not in scope of accreditation)
Test methods according to ANSI C63.10-2009 and ANSI C63.4-2009

Date of issue: 2015-02-20

Tested by: Matti Virkki

Approved by: Stefan Andersson

Revision History

Edition	Date	Description
1	2014-10-06	First release
2	2014-11-10	Correction on model names by customer's request
3	2015-02-20	Model name and editorial corrections

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1 CLIENT INFORMATION

The EUT has been tested by request of

Company:	Creowave Oy Yrttipellontie 10H 90230 Oulu Finland
Name of contact:	Taisto Soikkeli

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment:	Remote Terminal Unit
Tested Model:	R7-101
Additional model:	R7-102
Brand name:	Creowave
Serial number:	F9000170ABF0A
Manufacturer:	Creowave Oy
Transmitter frequency range:	2405 –2480 MHz
Receiver frequency range:	2405 – 2480 MHz
Frequency agile or hopping:	☐ Yes ☒ No
Antenna:	☐ Internal antenna ☒ External antenna
Antenna connector:	☐ None, internal antenna ☒ Yes, type N
Antenna gain:	5 dBi, External antenna Extronics iANT200-24-S-1 2 dBi, External antenna Aerial AV1433-24501
Rating RF output power:	(measured conducted)
Type of modulation:	O-QPSK
Temperature range:	☐ Category I (General): -20°C to +55°C ☐ Category II (Portable equipment): -10°C to +55°C ☐ Category III (Equipment for normal indoor use): +5°C to +35°C ☒ Other: <-20°C to +55°C
Power rating:	12V
Transmitter standby mode supported:	☒ Yes ☐ No

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2.2 Additional hardware information about the EUT

The EUT consists of the following units:

Unit	Part number	Serial number
Remote Terminal Unit	R7-101	F9000170ABF0A
3 x Antenna	AV1433-2450FN1	
3 x Antenna	Extronics iANT200-24-S-1	
Antenna	AV1950-1520FN1	

EUT has three identical Zigbee transceivers and contains a GSM / 3G module

2.3 Additional information about the EUT

During the tests the EUT supported the following software:

Software	Version / Release	Comment
	1.0	

2.4 Peripheral equipment

Peripheral equipment is defined as equipment needed for correct operation of the EUT during the tests, but not included as a part of the testing and evaluation of the EUT.

Equipment	Manufacturer / Type	Inventory number
PC	HP / Compaq NC6320	S12913

2.5 Test signals

Continuous signal with O-QPSK modulation on 3 channel 2405, 2440 and 2480 MHz.
Signal with normal duty cycle for duty cycle measurement.

Certified radio module was powered but not transmitting.

Output power was measured from all three Zigbee transceivers to verify that they are identical.
Transmitter 0 was used for all other antenna port measurements.

2.6 Modification during the tests

Band pass filters were added to 2,4 GHz rf outputs to prevent unwanted emissions.
Filter type ACFF-1024 (Avago, FBAR-filter).

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3 TEST SPECIFICATIONS

3.1 Standards

47 CFR Part 15, Subpart B, unintentional radiators, section 15.109
47 CFR Part 15, Subpart C, Intentional radiators, section 15.247
RSS-Gen Issue 4 (2014) RSS-210 Issue 8 (2010)

Test methods in:

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices
ANSI C63.4-2009: American National Standard for Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.2 Additions, deviations and exclusions from standards and accreditation

RSS-GEN issue 4 is not in a scope of accreditation.
No other additions, deviations or exclusions have been made from standards and accreditation.

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913
Intertek Semko AB is a Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
Björk hallen	Semi-anechoic 3m	2042G-1
RADIOHALLEN	Fully-anechoic 3m	--

3.4 Test set-up

Unless otherwise specified EUT antenna port was connected to spectrum analyser via rf-cable and 10 dB attenuator.

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3.5 Test conditions

If not additionally specified, the tests were performed under the following environmental conditions:

Parameter	Normal	Extreme
Supplying voltage, V	3.6	-
Air temperature, ^{o}C	22	-

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4 TEST SUMMARY

The results in this report apply only to the tested sample:

Test	Result	Section in report	Note
Standard test methods			
AC power-line conducted tests	NA		
Radiated test below 30 MHz	NA		
Radiated emissions measurements from 30 to 1000 MHz	Pass	5	Class A
Determination of radiated and antenna conducted emissions above 1 GHz	Pass	6	Class A
Frequency Stability Test	NA		
Occupied bandwidth and band-edge tests	Pass	7	
Output Power average symbol envelope power	NA		
Power Spectral Density < 40 GHz	Pass	9	
Power Spectral Density > 40 GHz	NA		
In-situ measurements	NA		
Polar plot, main lobe and variation on radiated emissions test	NA		
Device-specific tests			
Determining the average value of pulsed emissions per 15.35(c)	Pass	10	
Determination of frequency hopping compliance per 47 CFR 15.247	NA		
Determination of digital modulation compliance per 47 CFR 15.247	Pass	7	
Determination of peak conducted output unlicensed wireless device power [15.247(b), 15.255]	Pass	8	
Determination of antenna gains, including those emitting in multiple directions (15.247)	Pass	6	
Determination of compliance with RF exposure limits	Pass		

NT = Not Tested, by request of the Client
NA = Not Applicable

Notes:

1. The measured result is below the upper limit, but by a margin less than half of the uncertainty interval. It is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance is more probable than non-compliance.

2. The measured result is above the upper limit, but by a margin less than half of the uncertainty interval. It is therefore not possible to state non-compliance based on the 95% level of confidence. However, the result indicates that non-compliance is more probable than compliance.

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5 RADIATED EMISSIONS MEASUREMENTS FROM 30 MHZ TO 1000MHZ

Date of test:	2014-06-19	Test location:	Björkhallen
EUT Serial:	F9000170ABF0A	Ambient temp.	23 °C
Tested by:	Matti Virkki	Relative humidity	35 %
Test result:	Pass	Margin:	6.54 dB

5.1 Requirement

In restricted bands Reference: FCC §15.209, IC RSS-210 Table 3
Outside the restricted bands: FCC 15.247 (d), RSS-210 A8.5

Frequency (MHz)	Field strength (dBμV/m)	Measurement distance (m)
30 – 88	40.0	3
88 – 216	43.5	3
216 – 960	46.0	3
960 –	54.0	3

5.2 Test setup details

EUT was placed on non-conductive table 80 cm above the ground plane.

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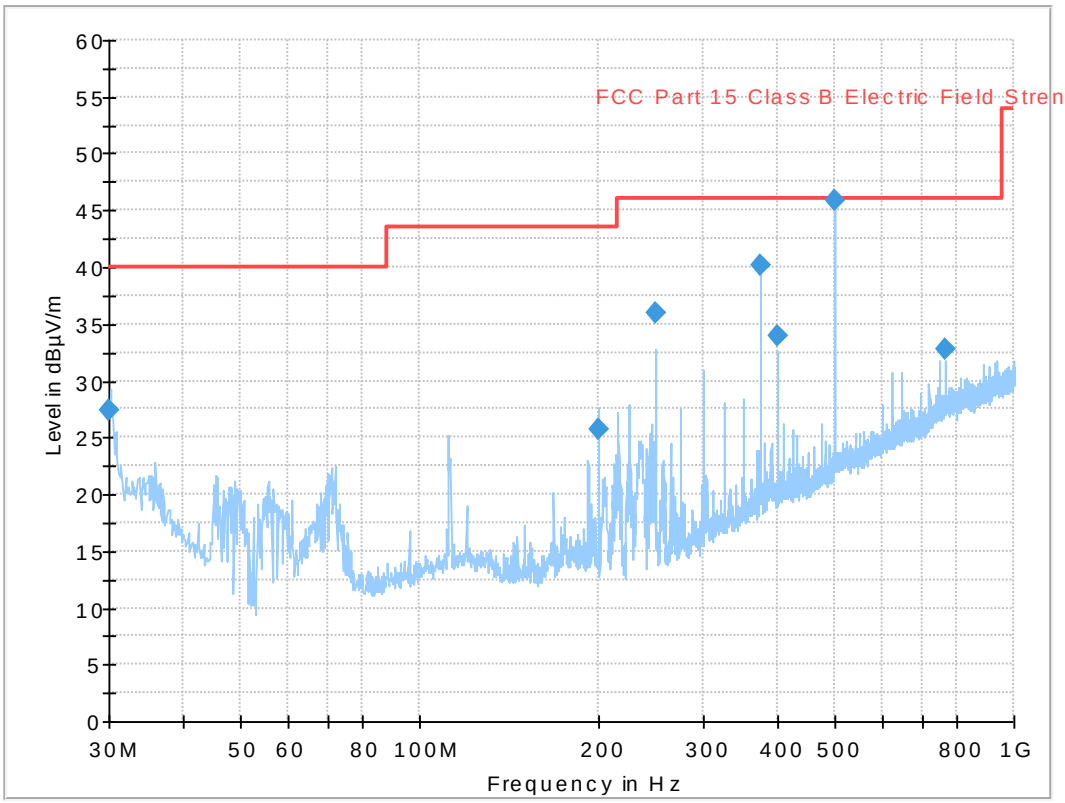
5.3 Test data

Overview sweeps performed with peak detectors, ch 11



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.020000	27.44	40.00	12.56	1000.0	120.000	100.0	V	-96.0
200.000000	25.68	43.52	17.84	1000.0	120.000	115.0	H	-132.0
250.000200	35.99	46.02	10.03	1000.0	120.000	100.0	H	-119.0
375.010301	40.15	46.02	5.87	1000.0	120.000	140.0	V	-88.0
400.020000	33.90	46.02	12.12	100.0	120.000	132.0	V	-78.0
* 500.020000	45.86	46.02	0.16	100.0	120.000	160.0	H	-128.0
767.935872	32.81	46.02	13.21	100.0	120.000	145.0	H	26.0

*500 MHz emission doesn't originate from transmitter circuitry and complies with 15.109 Class A

Measured level [dBµV/m] = Analyser reading [dBµV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [dB/m]

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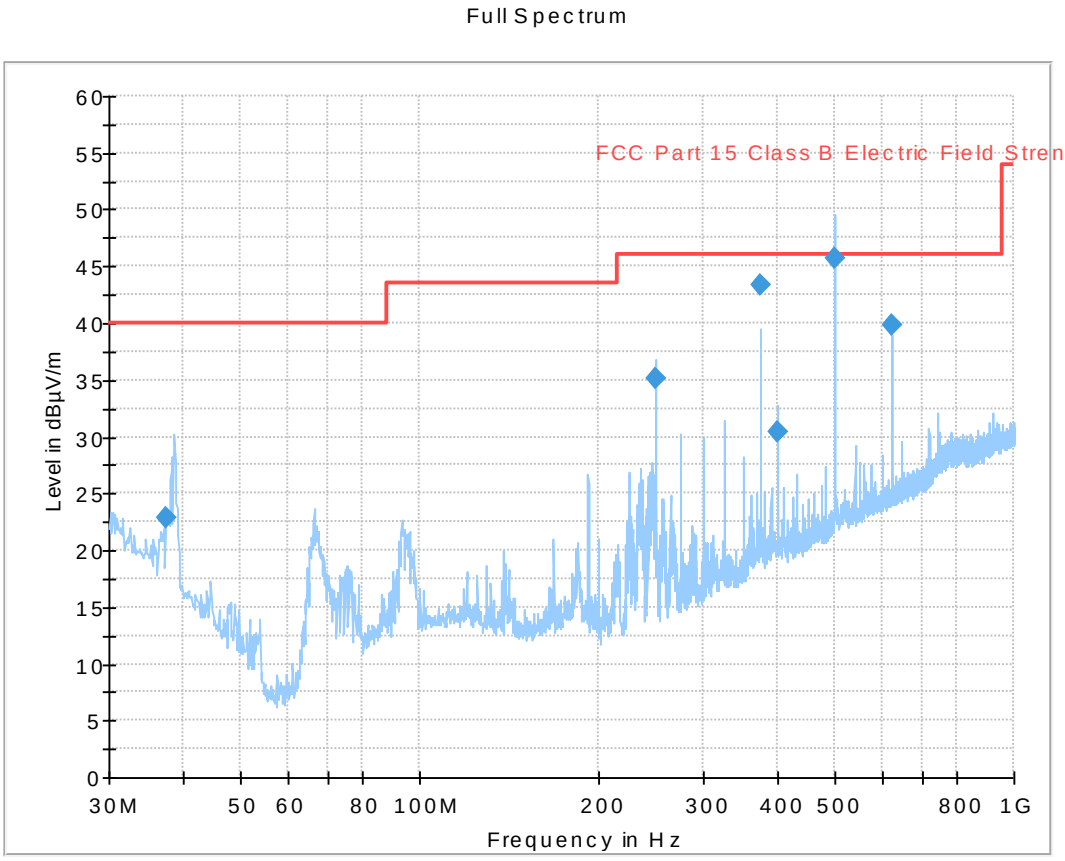
Overview sweeps performed with peak detectors, ch 18



Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
37.537395	22.94	---	40.00	17.06	1000.0	120.000	141.0	V	12.0
250.020200	35.18	---	46.02	10.84	1000.0	120.000	166.0	V	-143.0
375.010301	43.33	---	46.02	2.69	1000.0	120.000	153.0	V	0.0
400.020000	30.48	---	46.02	15.54	100.0	120.000	134.0	V	110.0
*500.020000	45.67	---	46.02	0.35	100.0	120.000	133.0	H	-120.0
625.010100	39.91	---	46.02	6.11	100.0	120.000	115.0	H	-192.0

*500 MHz emission doesn't originate from transmitter circuitry and complies with 15.109 Class A

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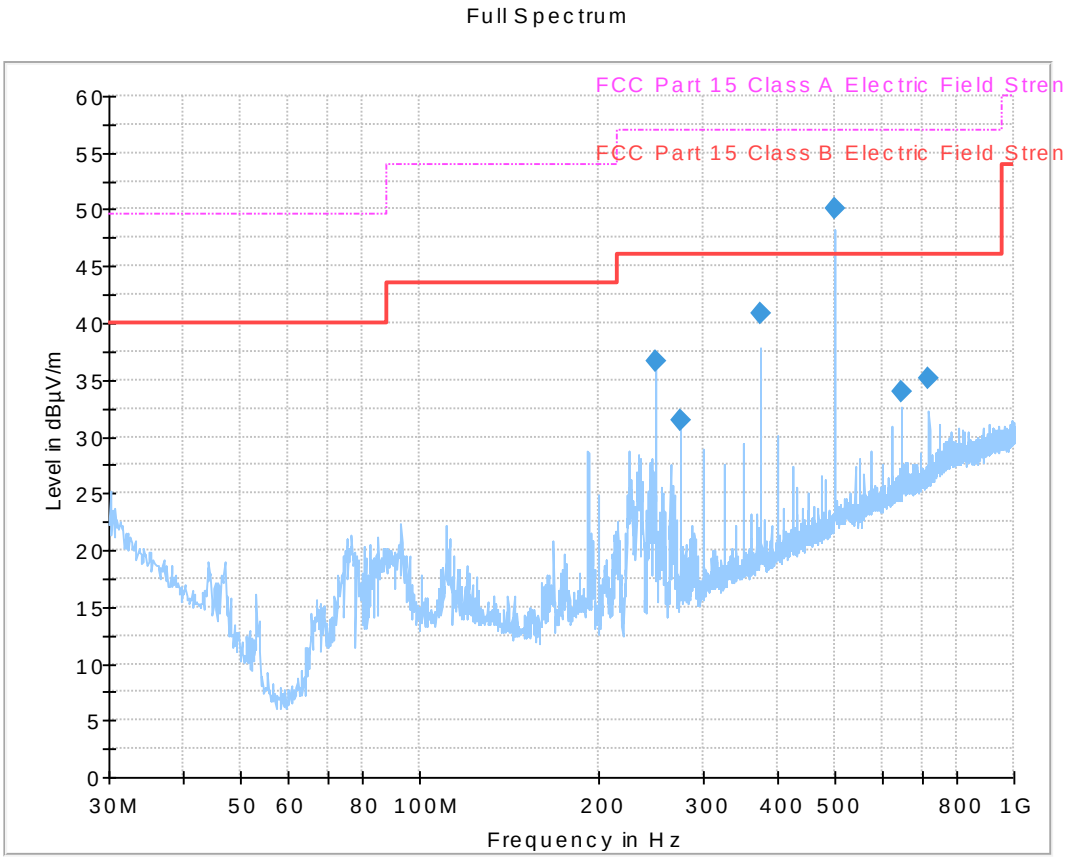
Overview sweeps performed with peak detectors, ch 26



Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
250.020	36.6	---	46.02	9.4	1000.0	120.000	145.0	H	2.0
275.030	31.5	---	46.02	14.5	1000.0	120.000	157.0	V	-138.0
375.010	40.8	---	46.02	5.2	1000.0	120.000	126.0	V	112.0
*500.020	50.1	---	46.02	-4.8	100.0	120.000	155.0	H	-146.0
647.995	33.9	---	46.02	12.2	100.0	120.000	152.0	V	0.0
719.979	35.1	---	46.02	10.9	100.0	120.000	140.0	V	-6.0

*500 MHz emission doesn't originate from transmitter circuitry and complies with 15.109 Class A

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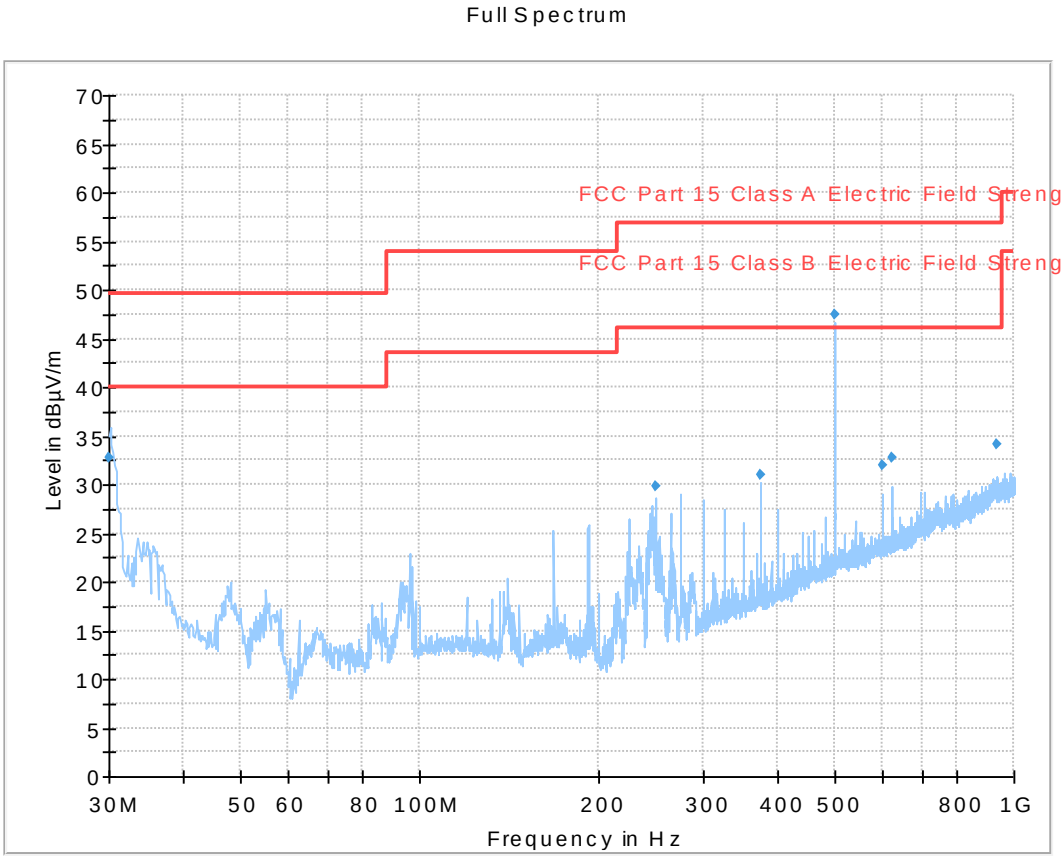
Overview sweeps performed with peak detectors. Transmitter idle



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.020	32.8	49.50	17.2	1000.0	120.000	102	V	327
249.999	29.7	56.02	26.3	1000.0	120.000	137	H	267
375.010	30.9	56.02	25.1	1000.0	120.000	139	V	309
500.000	47.4	56.02	8.6	1000.0	120.000	176	H	145
600.000	31.9	56.02	24.1	1000.0	120.000	156	H	231
624.989	32.7	56.02	23.3	1000.0	120.000	148	H	234
937.2140	34.2	56.02	21.8	1000.0	120.000	113	V	8

5.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC 32	--	--
Receiver	Rohde & Schwarz	ESI	32291	7/2015
UltraLog antenna	Rohde & Schwarz	HL 562	30711	12/2014
Hornantenna	Rohde & Schwarz	HF907	32307	6/2015
Pre amplifier	Rohde & Schwarz	TS-PRE1	32306	7/2015
Switch unit	Rohde & Schwarz	OSP130	32300	7/2015
Filter unit	Rohde & Schwarz	OSP-F7-B	32301	--

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6 RADIATED EMISSIONS MEASUREMENTS ABOVE 1 GHZ

Date of test:	2014-06-19 / 2014-09-10	Test location:	Radio hallen / Björkhallen
EUT Serial:	F9000170ABF0A	Ambient temp.	23 ˚C, 21˚C
Tested by:	Matti Virkki	Relative humidity	35 %, 38%
Test result:	Pass	Margin:	2.2 dB

6.1 Requirement

Reference: FCC §15.209, IC RSS-210 Table 3
In the restricted bands:

Frequency (MHz)	Field strength (dBμV/m)	Measurement distance (m)
30 – 88	40.0	3
88 – 216	43.5	3
216 – 960	46.0	3
960 –	54.0	3

Outside the restricted bands: FCC 15.247 (d), RSS-210 A8.5
Carrier – 20 dB.

6.2 Test setup details

EUT was placed on non-conductive table 80 cm above the ground plane.
Absorbers were placed on floor between EUT and antenna.

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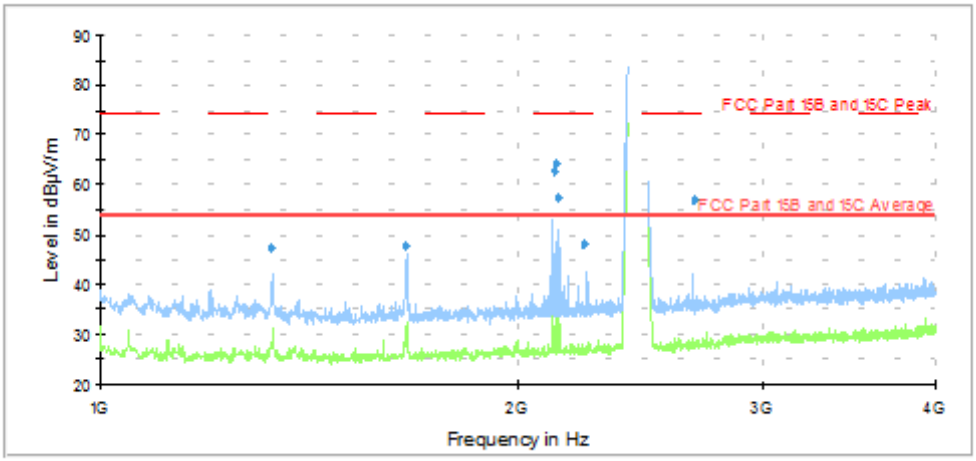
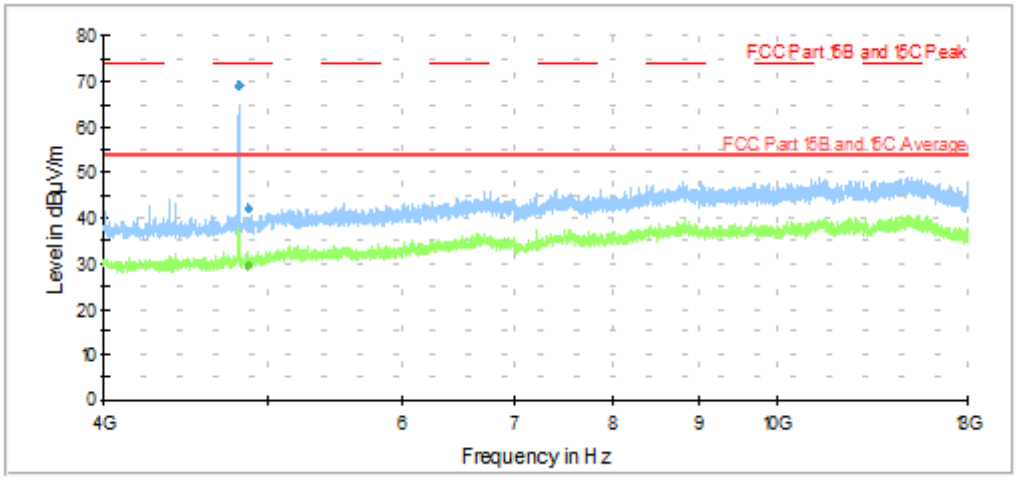
6.3 Test data

Overview sweeps performed with peak and average detectors, ch 11





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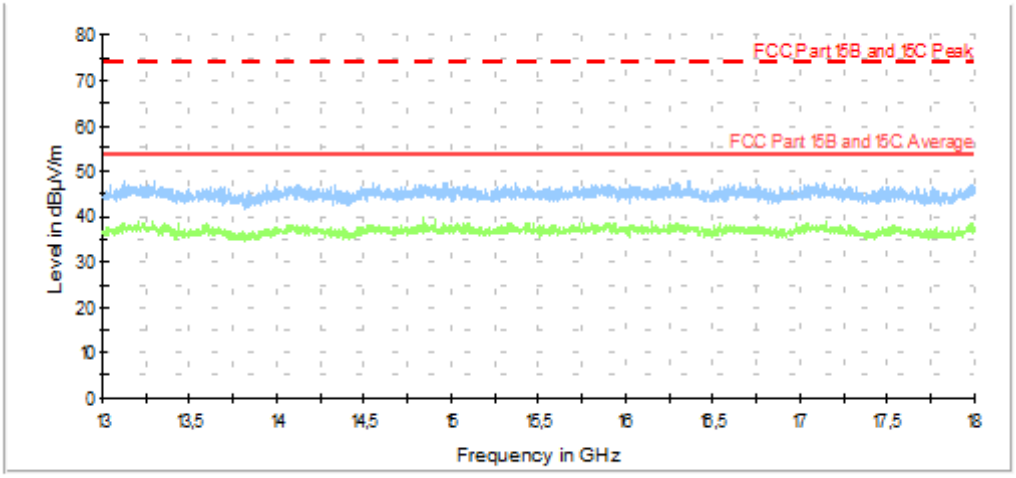

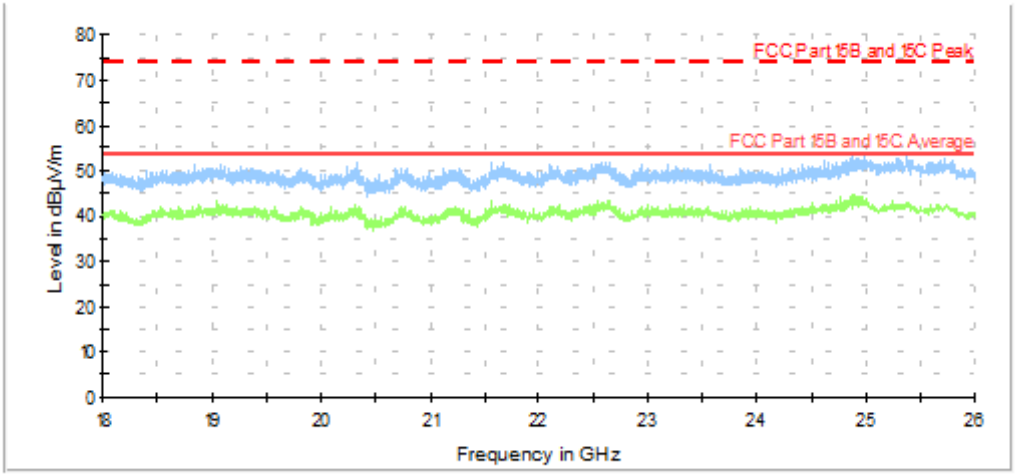

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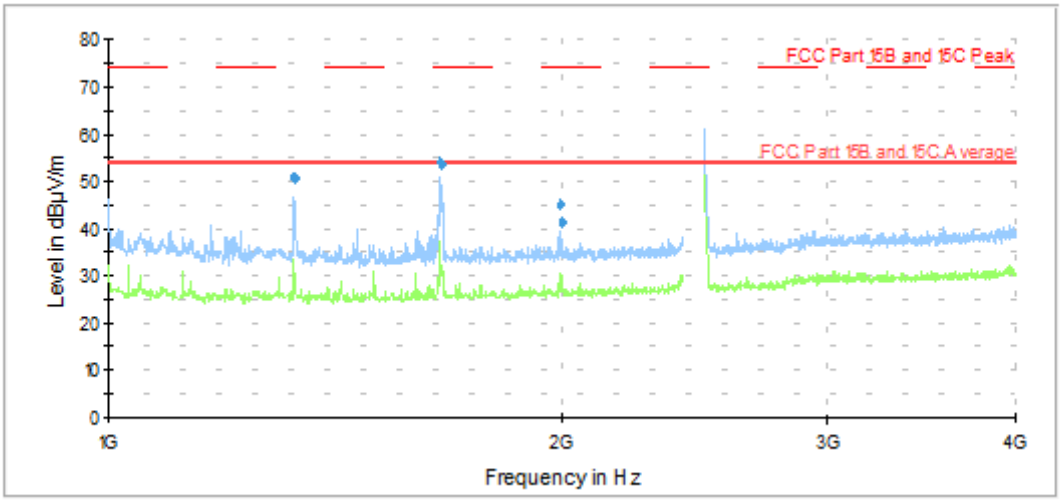
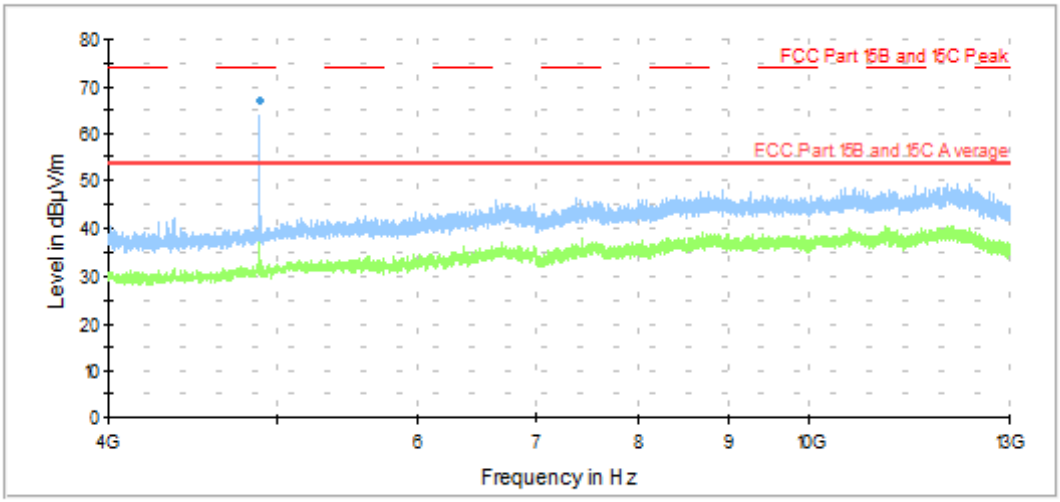
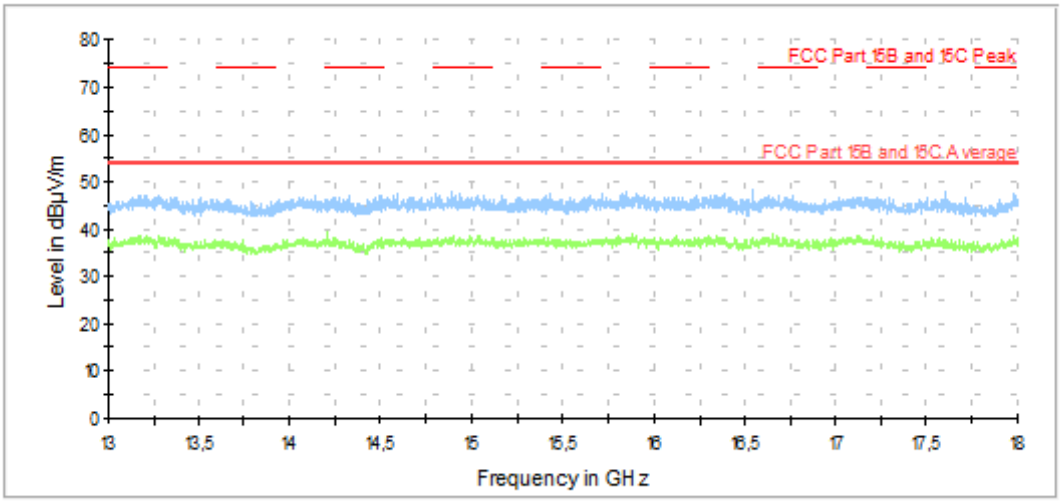
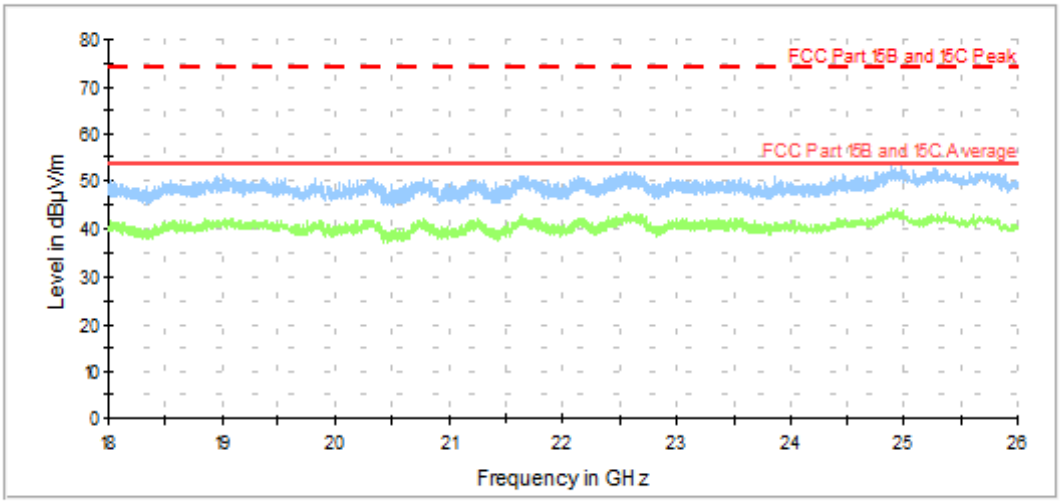
Overview sweeps performed with peak and average detectors, Frequency range Ch. 18

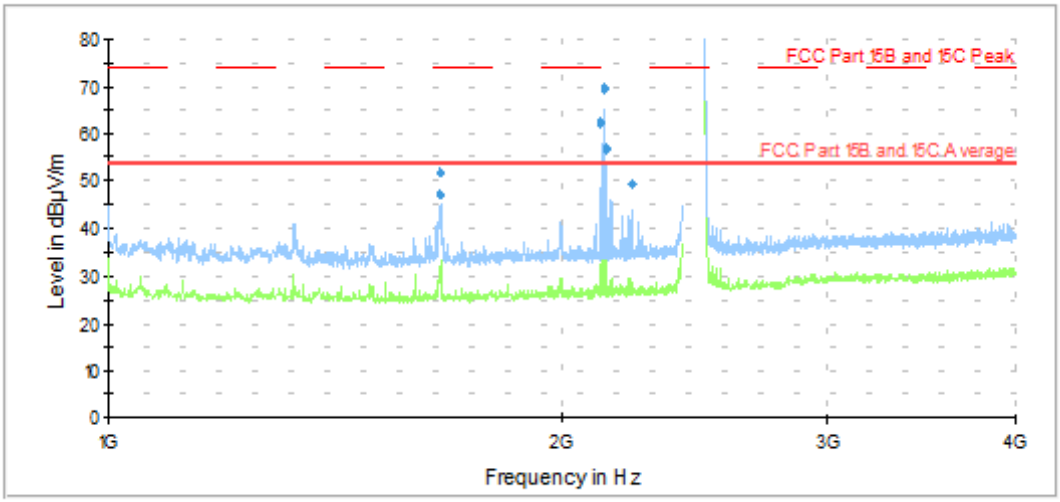


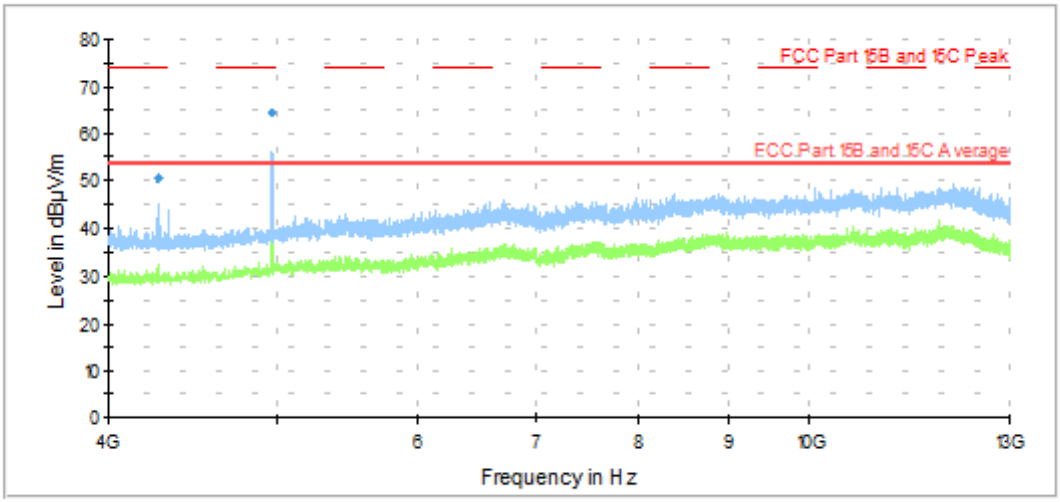






Overview sweeps performed with peak and average detectors, GHz Ch. 26





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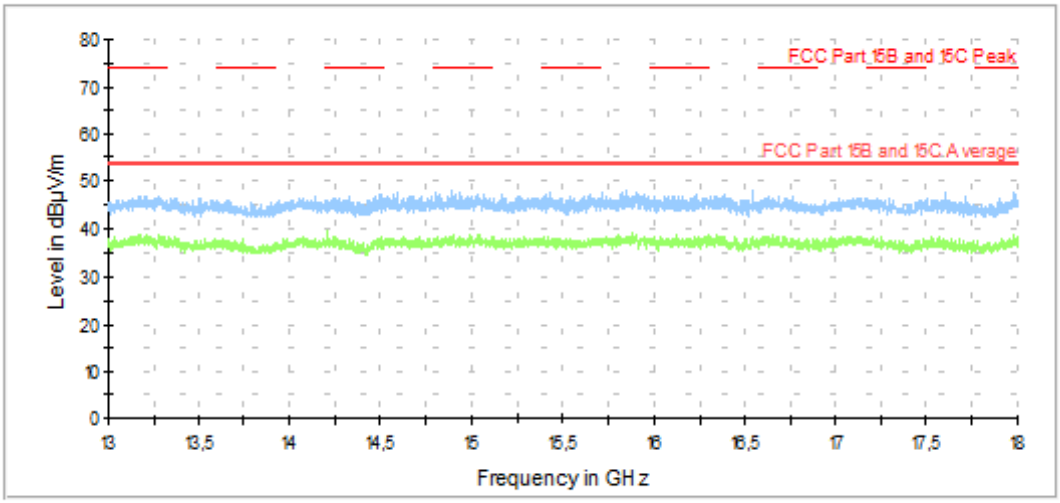

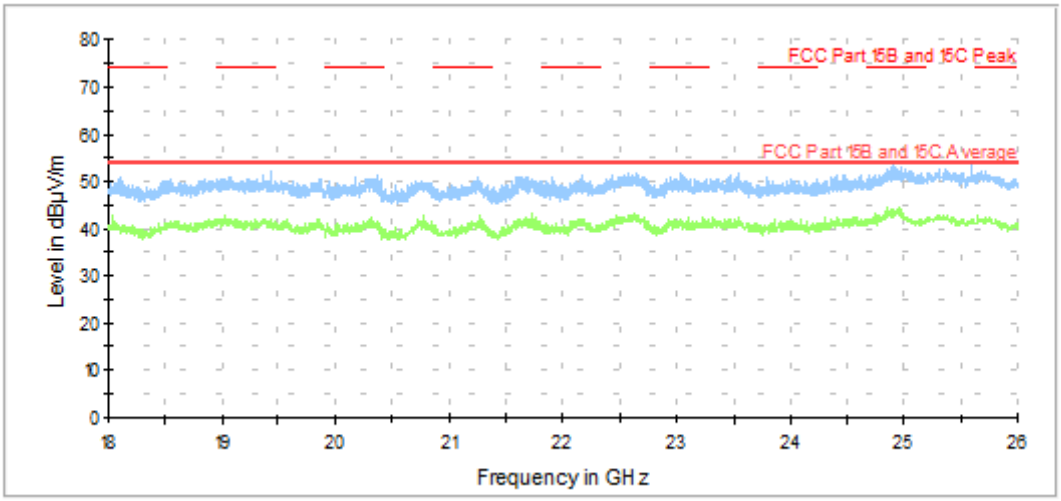

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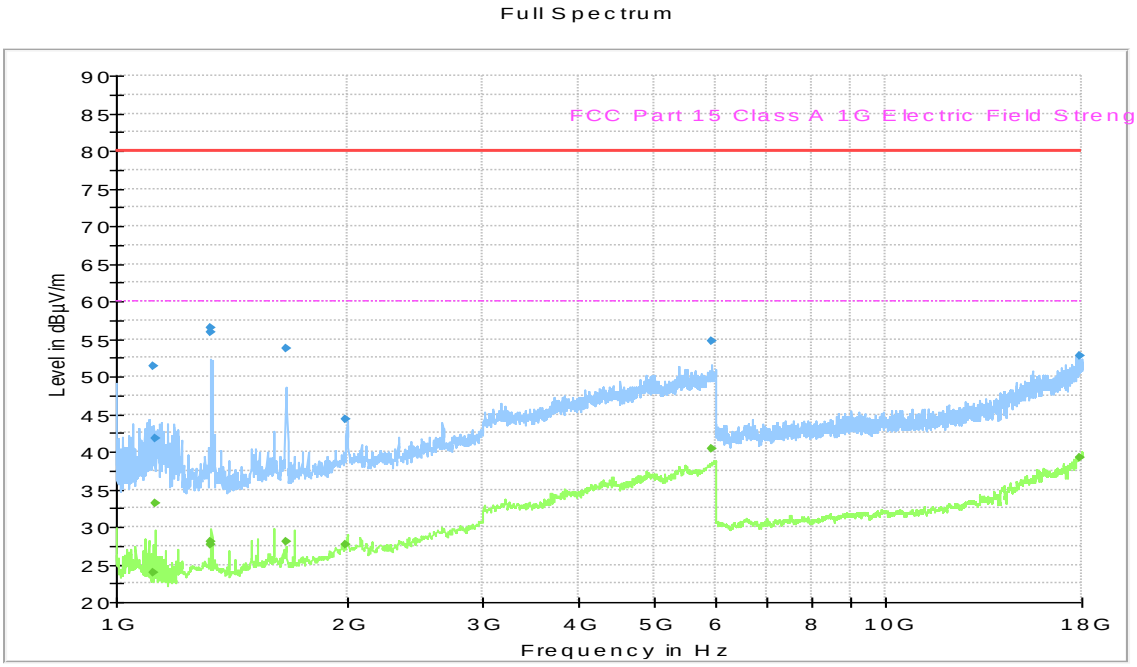
Overview sweeps performed with peak and average detectors Transmitter idle.



Ch 11

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1330.03	47.3	74.0	27.3	54.0	26.7	193.0	H	41.0	-12.2
1659.60	47.7	74.0	27.7	54.0	26.3	164.0	V	336.0	-11.0
2124.43	62.9	74.0	42.9	54.0	11.1	108.0	V	187.0	-9.7
2132.81	64.2	74.0	44.2	54.0	9.8	130.0	V	56.0	-9.7
2136.12	57.5	74.0	37.5	54.0	16.5	130.0	V	59.0	-9.7
2232.77	48.0	74.0	28.0	54.0	26.0	149.0	V	206.0	-9.5
2680.20	57.0	74.0	37.0	54.0	17.0	142.0	V	129.0	-8.2
4809.22	69.3	74.0	49.3	54.0	4.7	130.0	V	33.0	41.4
4862.79	42.2	74.0	22.2	54.0	11.8	130.0	H	-1.0	41.6

Ch 18

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1330.07	51.1	74.0	11.1	54.0	22.9	157.0	V	74.0	-12.2
1330.11	50.4	74.0	10.4	54.0	23.6	157.0	V	71.0	-12.2
1660.39	54.0	74.0	14.0	54.0	20.0	186.0	V	120.0	-11.0
1666.38	53.4	74.0	13.4	54.0	20.6	171.0	V	122.0	-11.0
1994.33	45.0	74.0	5.0	54.0	29.0	174.0	V	42.0	-10.0
2000.96	41.1	74.0	21.1	54.0	32.9	171.0	H	10.0	-10.0
4878.96	70.5	74.0	50.5	54.0	3.5	321.0	V	82	41.6

Ch 26

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1662.01	52.0	74.0	32.0	54.0	2.0	130.0	V	38.0	-11.0
1662.15	47.4	74.0	27.4	54.0	6.6	130.0	H	175.0	-11.0
2120.21	62.5	74.0	42.5	54.0	11.5	130.0	V	274.0	-9.7
2130.87	69.3	74.0	49.3	54.0	4.7	130.0	V	131.0	-9.7
2138.24	57.0	74.0	37.0	54.0	17.0	130.0	V	196.0	-9.7
2225.18	49.3	74.0	29.3	54.0	4.7	130.0	V	101.0	-9.5
4960.00	71.8	74.0	51.8	54.0	2.2	280.0	V	67.0	42.1

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6.4 Test equipment

Measurement software	Rohde & Schwarz	EMC 32	--	--
Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC 32	--	--
Receiver	Rohde & Schwarz	ESI	32291	7/2015
UltraLog antenna	Rohde & Schwarz	HL 562	30711	12/2014
Hornantenna	Rohde & Schwarz	HF907	32307	6/2015
Pre amplifier	Rohde & Schwarz	TS-PRE1	32306	7/2015
Switch unit	Rohde & Schwarz	OSP130	32300	7/2015
Switch unit	Rohde & Schwarz	OSP-F7-B	32301	--

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7 OCCUPIED BANDWIDTH

Date of test:	2014-07-02	Test location:	EMC Center
EUT Serial:	F9000170ABF0A	Ambient temp.	22°C
Tested by:	Matti Virkki	Relative humidity	39%
Test result:	Pass	Margin:	1023.6 kHz

7.1 Requirement

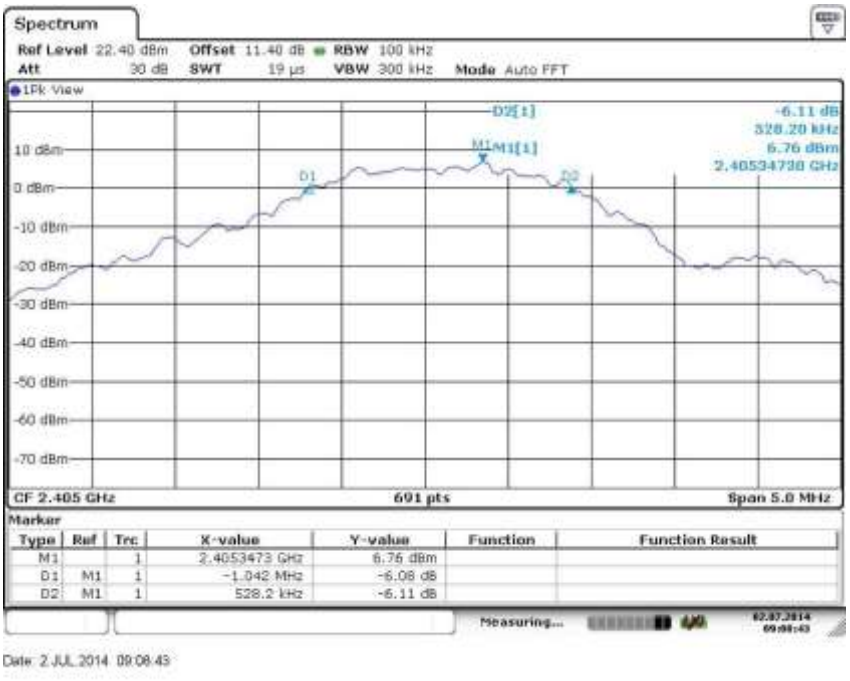
Reference: FCC §15.247(a)(2), RSS-210 A8.2 (a)
Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.2 Test set-up

EUT antenna port was connected to spectrum analyser via rf-cable and 10 dB attenuator. Analyser's Reference level offset was used to compensate cable and attenuator losses.

7.3 Test data

Ch 11



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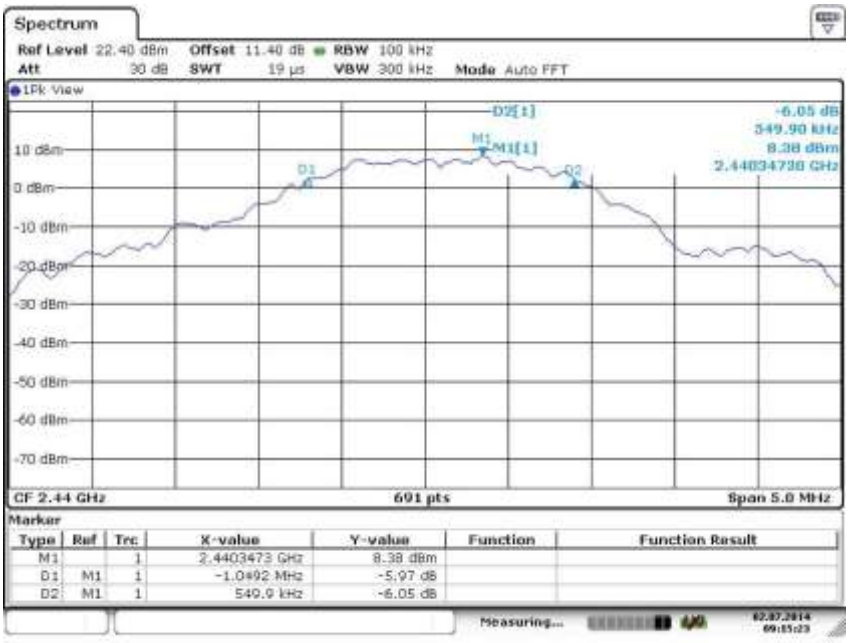
Ch18



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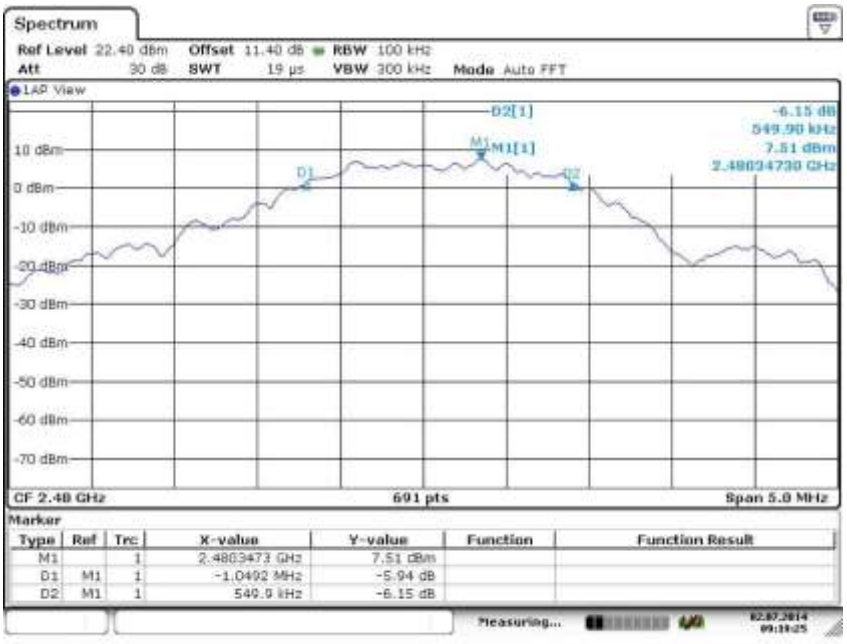
Ch 26



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Frequency MHz	6 dB bandwidth kHz	Limit kHz	Margin kHz
2405	1523.6	500	1023.6
2445	1599.1	500	1099.1
2480	1599.1	500	1099.1

7.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2015
Rf-attenuator	H+S	5910_N-010 10dB	32696	7/2015

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8 CONDUCTED PEAK OUTPUT POWER

Date of test:	2014-09-11	Test location:	EMC Center
EUT Serial:	F9000170ABF0A	Ambient temp.	22°C
Tested by:	Matti Virkki	Relative humidity	39%
Test result:	Pass	Margin:	10.62 dB

8.1 Requirement

Reference: FCC §15.247(b)(3), RSS-210 A8.4.4

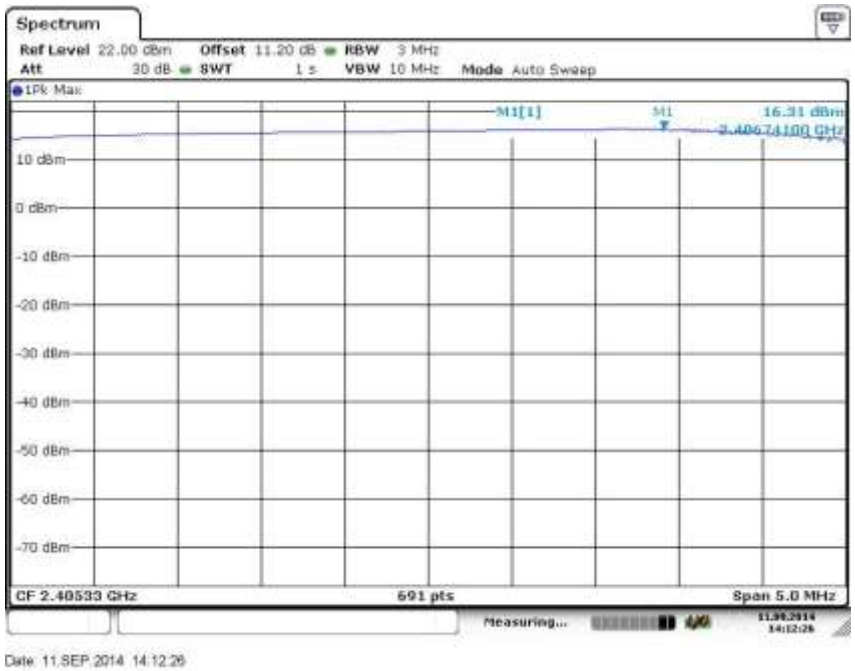
For systems employing digital modulation techniques operating in the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz, the maximum peak conducted output power shall not exceed 1 W.

8.2 Test set-up

EUT antenna port was connected to spectrum analyser via rf-cable and 10 dB attenuator. Analyser's Reference level offset was used to compensate cable and attenuator losses.

8.3 Test data

Ch 11 Transceiver 0



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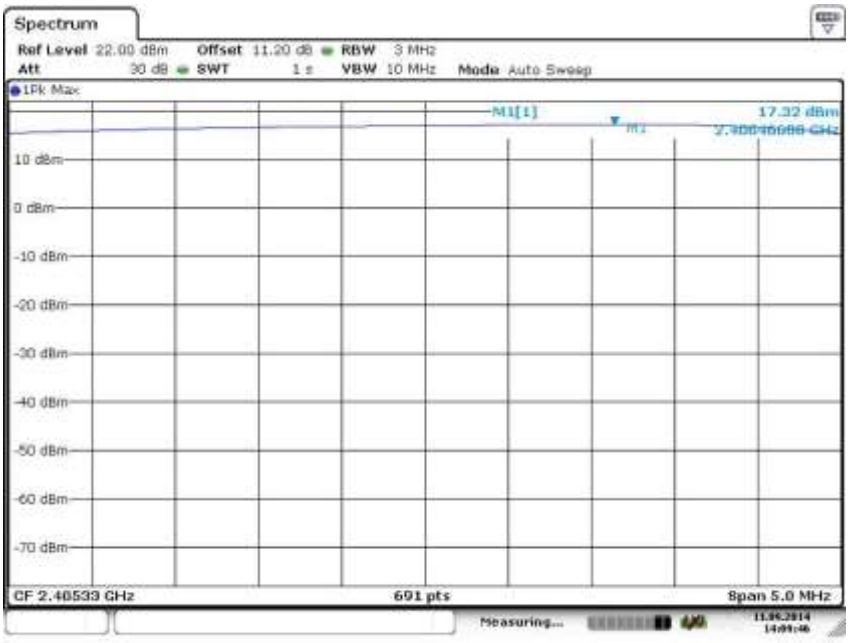

Date: 11.SEP.2014 14:09:46

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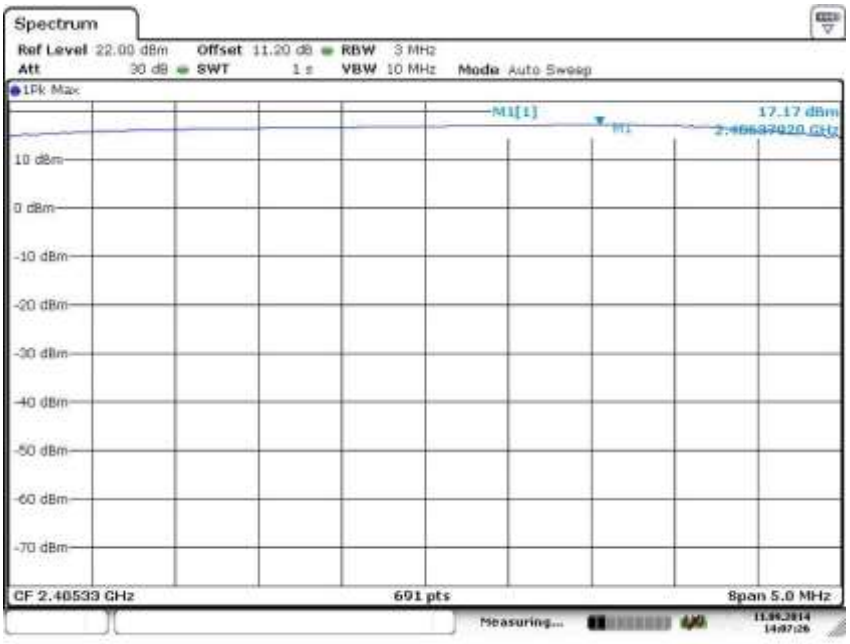

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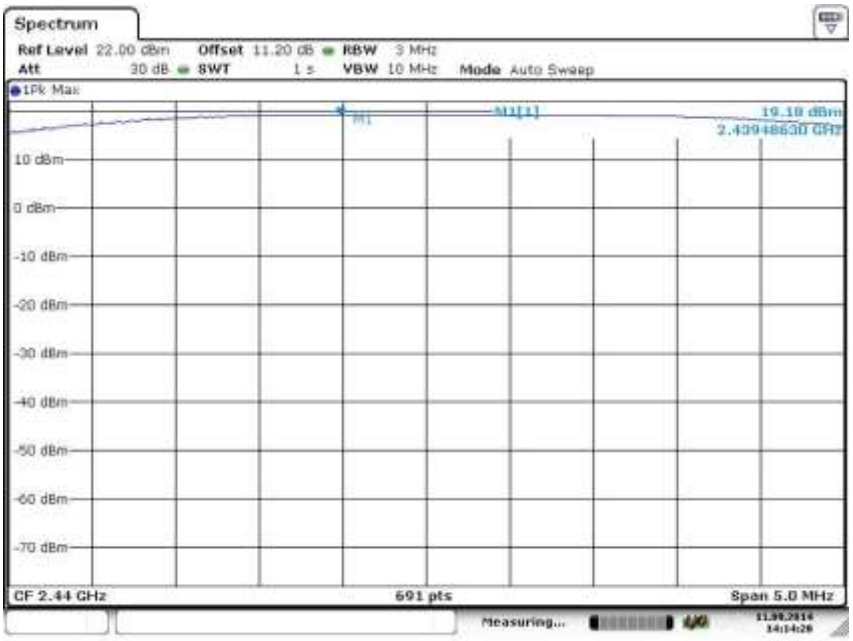
Ch 18 Transceiver 0



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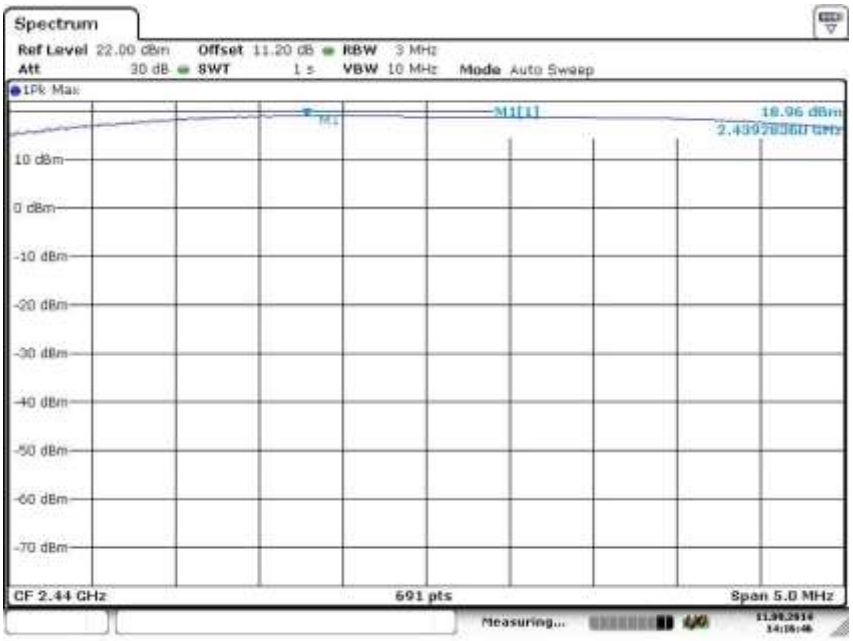

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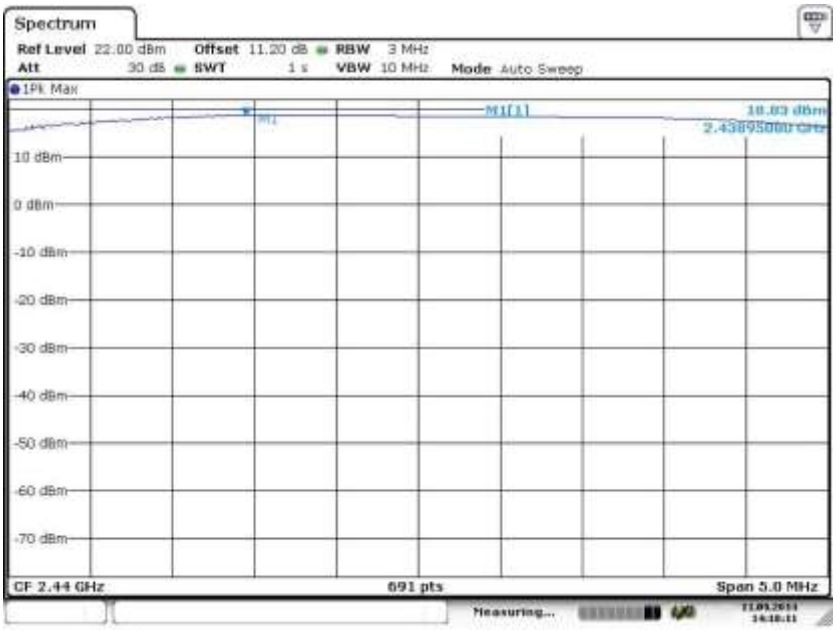
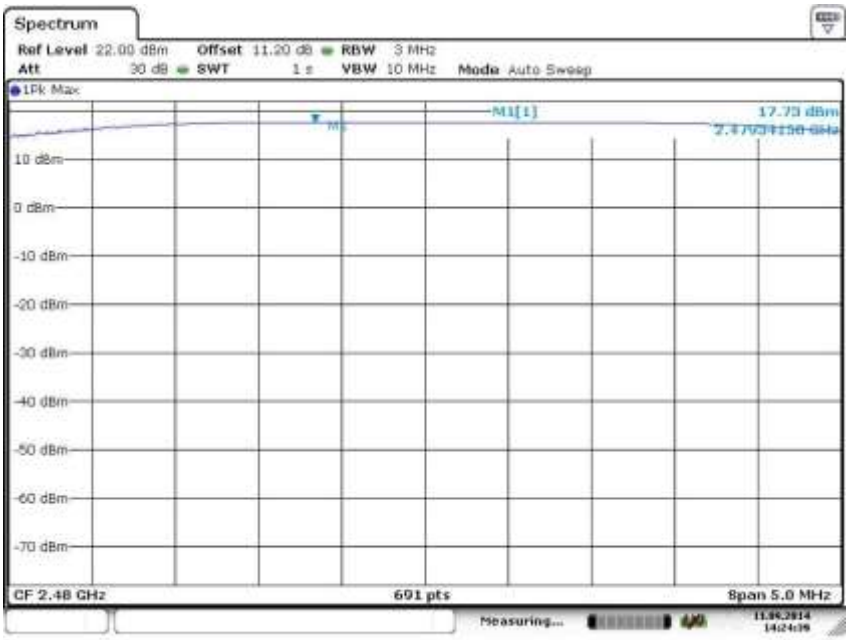


Ch 26 Transceiver 0



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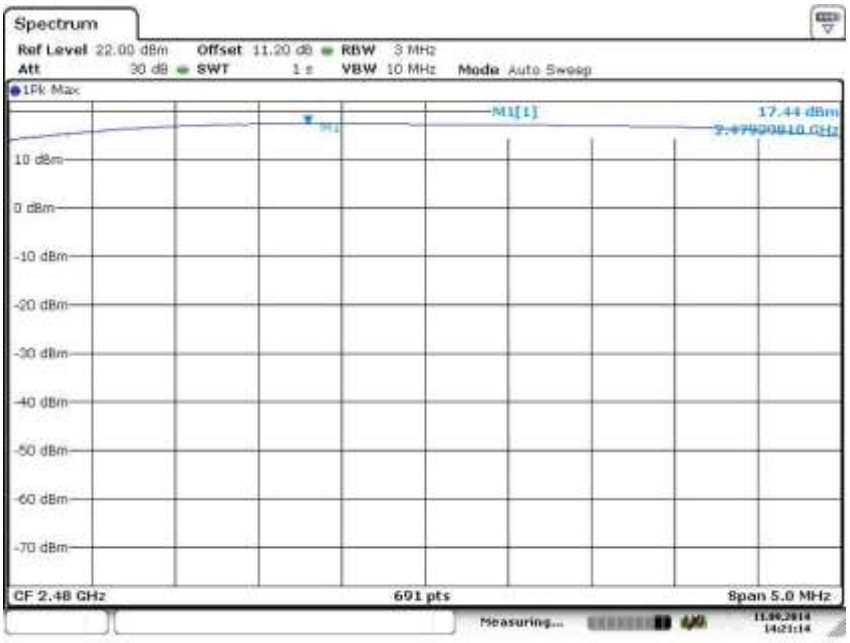
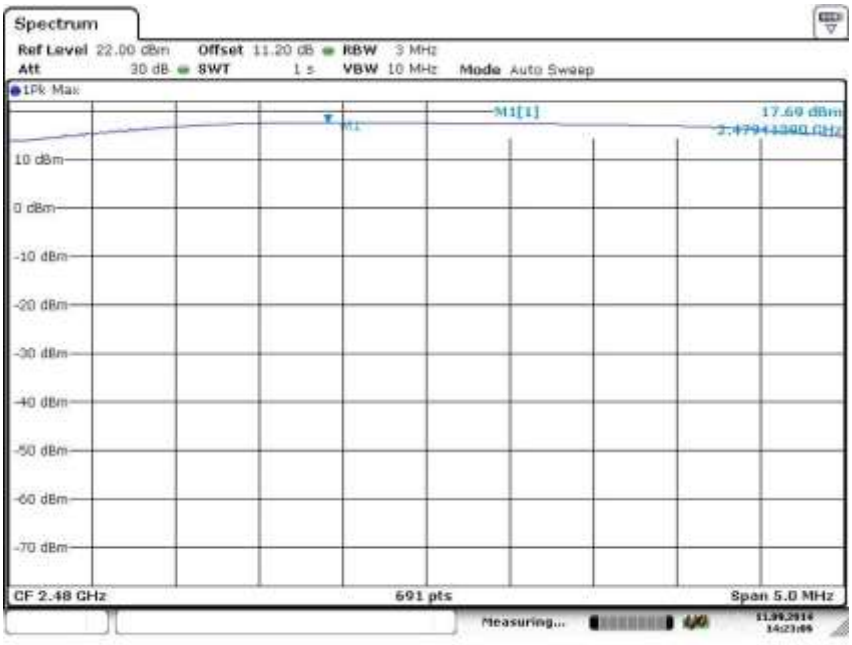
Ch 26 Transceiver 1



Ch 26 Transceiver 2



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Frequency MHz	Peak power Transceiver 0 dBm	Peak power Transceiver 1 dBm	Peak power Transceiver 2 dBm	Limit dBm	Margin dB
2405	16.31	17.32	17.17	30	12.62
2445	19.18	18.96	18.83	30	10.82
2480	17.73	17.69	17.44	30	12.27

8.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2015
Rf-attenuator	H+S	5910_N-010 10dB	32696	7/2015

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9 PEAK POWER SPECTRAL DENSITY

Date of test:	2014-09-11	Test location:	EMC Center
EUT Serial:	F9000170ABF0A	Ambient temp.	22°C
Tested by:	Matti Virkki	Relative humidity	39%
Test result:	Pass	Margin:	0.89

9.1 Requirement

Reference: FCC §15.247(e), RSS-210 A8.2 (b)
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.2 Test set-up

EUT antenna port was connected to spectrum analyser via rf-cable and 10 dB attenuator. Analyser's Reference level offset was used to compensate cable and attenuator losses.

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9.3 Test data

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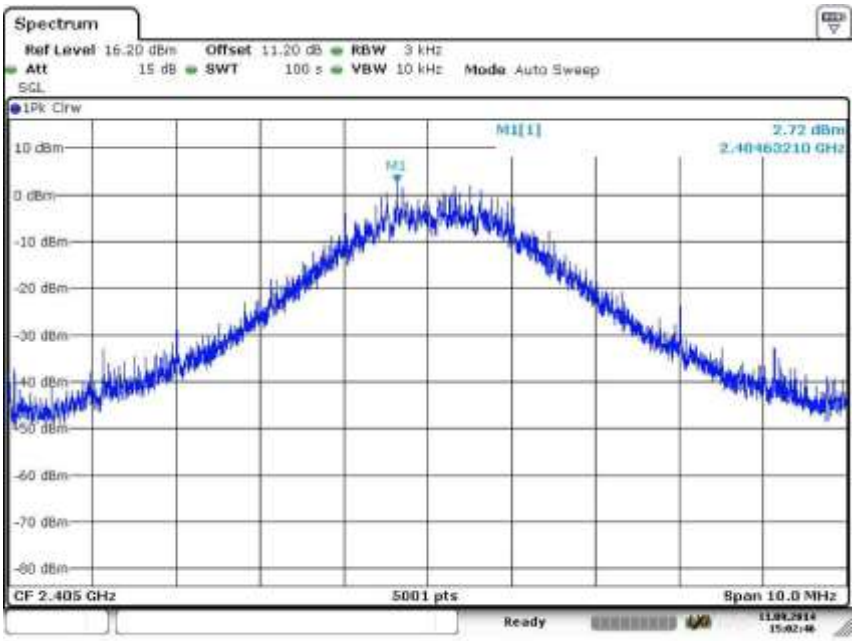

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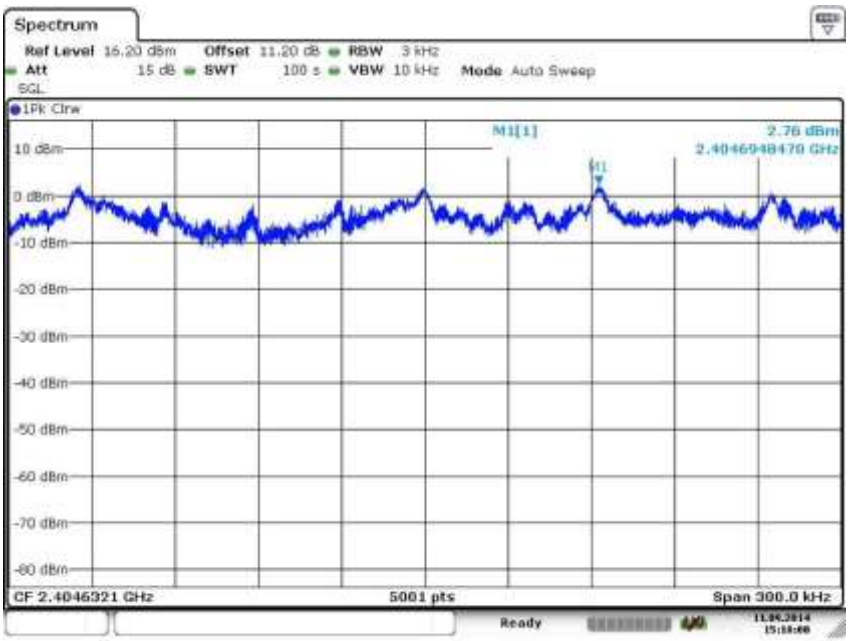

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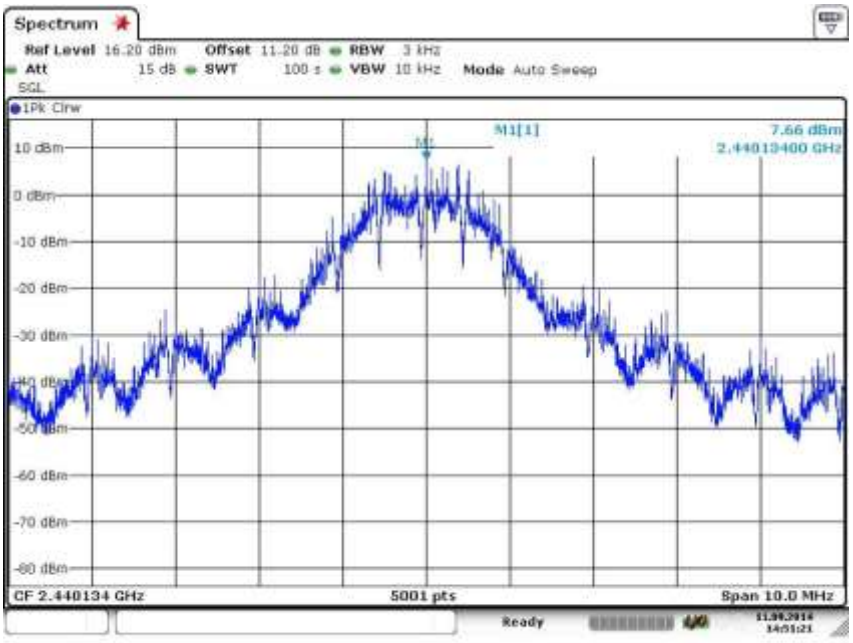
Ch 18



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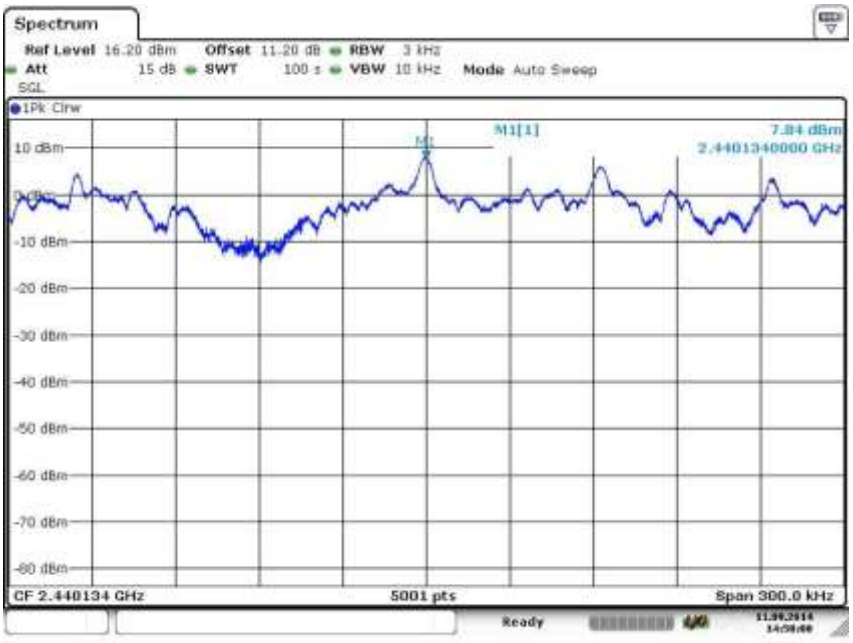

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Ch 26

Date: 11.SEP.2014 15:38:31

Date: 11.SEP.2014 15:46:28

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Frequency MHz	Peak power spectral density dBm/3kHz	Limit dBm/3kHz	Margin dB
2405	2.76	8	5.24
2445	7.84	8	0.16
2480	5.65	8	2.35

9.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2015
Rf-attenuator	H+S	5910_N-010 10dB	32696	7/2015

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10 TRANSMITTER DWELL TIME AND DUTY CYCLE AVERAGING FACTOR

Date of test:	2014-06-25	Test location:	EMC Center
EUT Serial:	1234567893	Ambient temp.	22°C
Tested by:	Matti Virkki	Relative humidity	39%

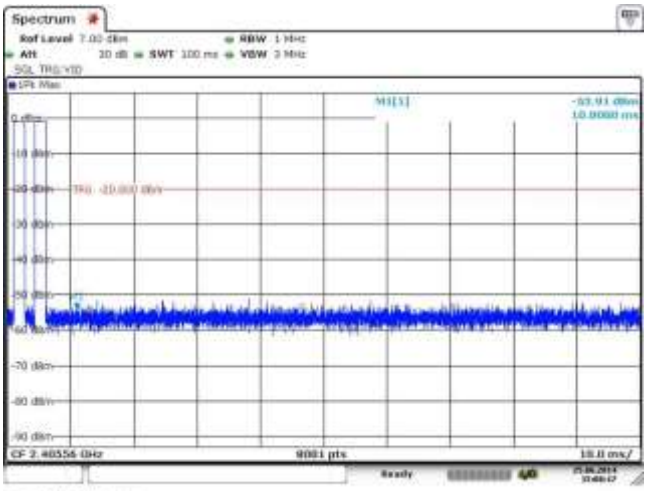
10.1 Requirement

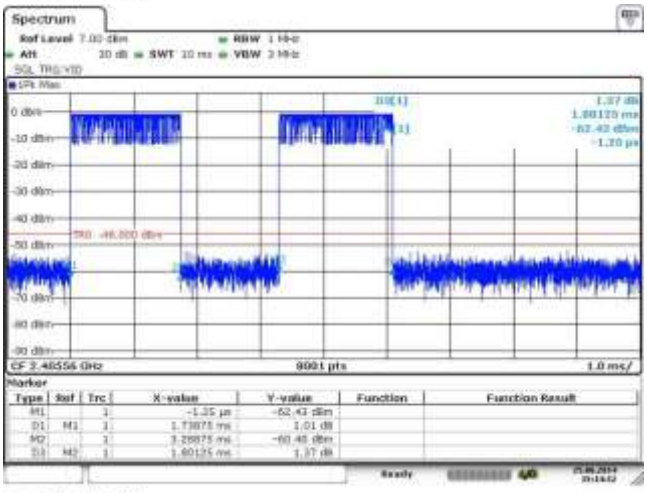
Transmitter dwell time is measured for transmitter spurious emission duty cycle averaging.

10.2 Test set-up

EUT antenna port was connected to spectrum analyser via rf-cable and 10 dB attenuator.

10.3 Test data





Ton/100ms	Duty cycle averaging factor 20LOG(Ton/100ms)	Averaging factor to be used
2.54 ms	-31.90 dB	-20 dB

10.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2015
Rf-attenuator	H+S	5910_N-010 10dB	32696	7/2015

11 BAND EDGE

Date of test:	2014-07-02	Test location:	EMC Center
EUT Serial:	F9000170ABF0A	Ambient temp.	22°C
Tested by:	Matti Virkki	Relative humidity	39%
Test result:	Pass	Margin:	>15 dB

11.1 Requirement

Reference: FCC §15.247(d), RSS-210 A8.5
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

11.2 Test set-up

EUT antenna port was connected to spectrum analyser via rf-cable and 10 dB attenuator. Analyser's Reference level offset was used to compensate cable and attenuator losses.

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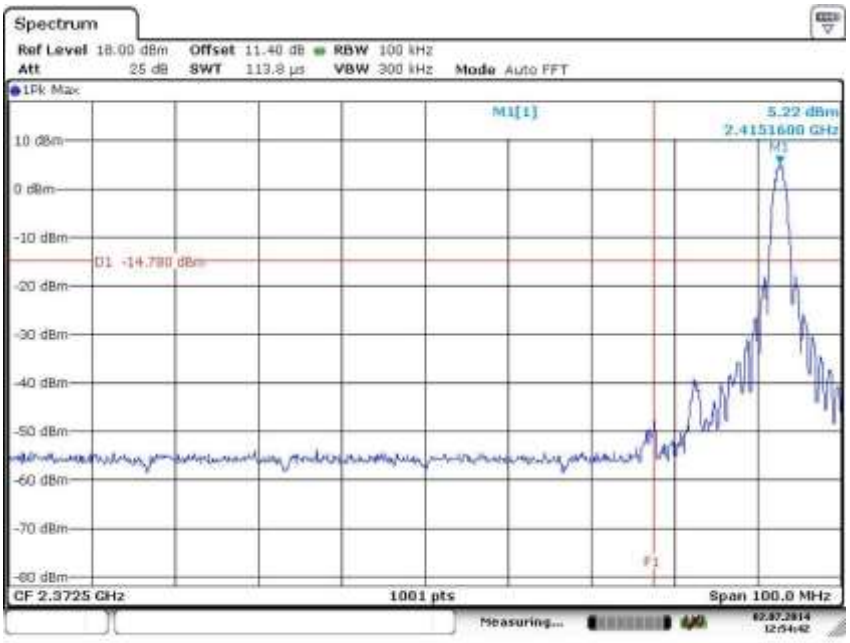
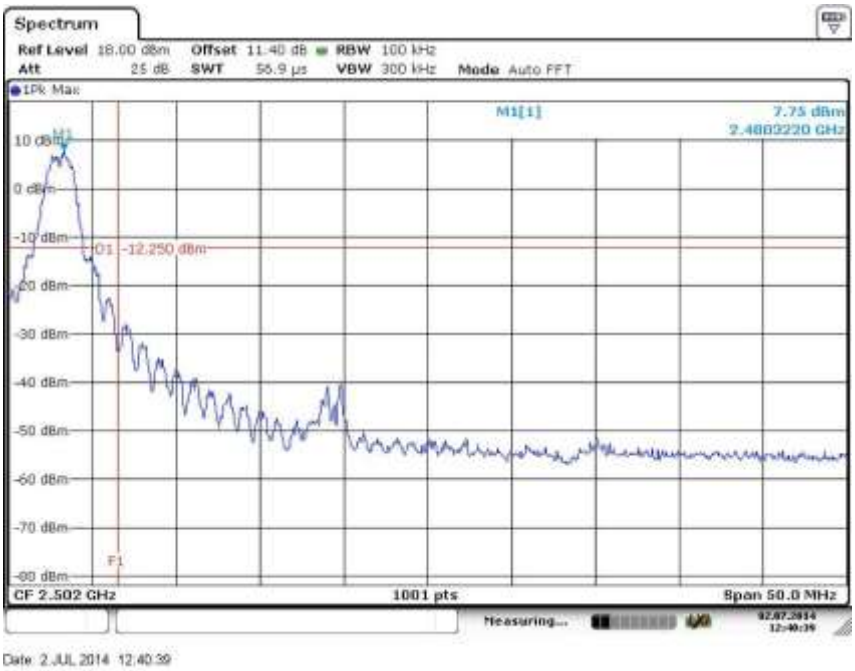
11.3 Test data





11.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2015
Rf-attenuator	H+S	5910_N-010 10dB	32696	7/2014

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12 CONDUCTED SPURIOUS EMISSION

Date of test:	2014-06-17	Test location:	EMC Center
EUT Serial:	1234567893	Ambient temp.	22°C
Tested by:	Matti Virkki	Relative humidity	39%
Test result:	Pass	Margin:	35.2 dB

12.1 Requirement

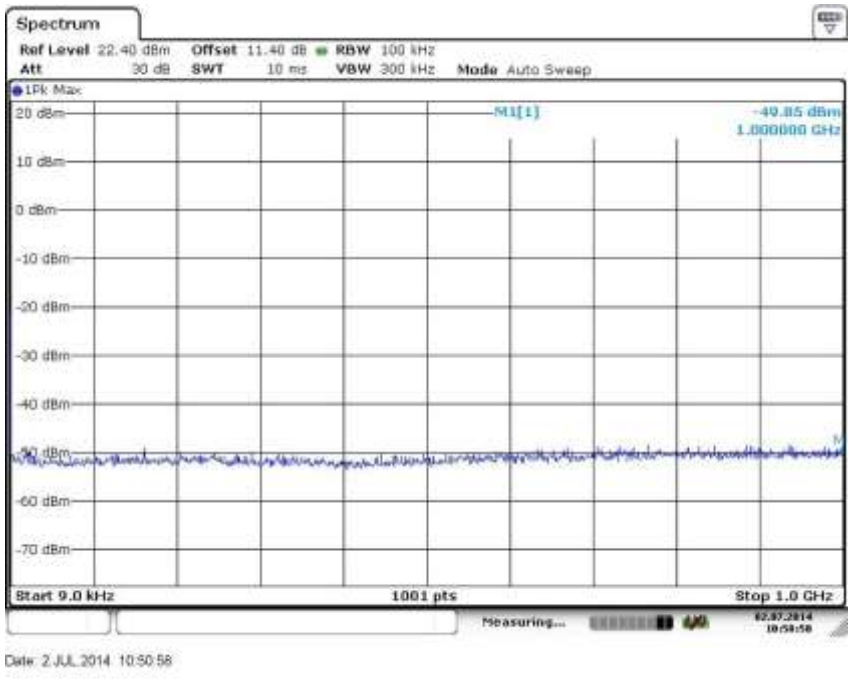
Reference: FCC §15.247(d), RSS-210 A8.5
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

12.2 Test set-up

EUT antenna port was connected to spectrum analyser via rf-cable and 10 dB attenuator.

12.3 Test data

Ch 11



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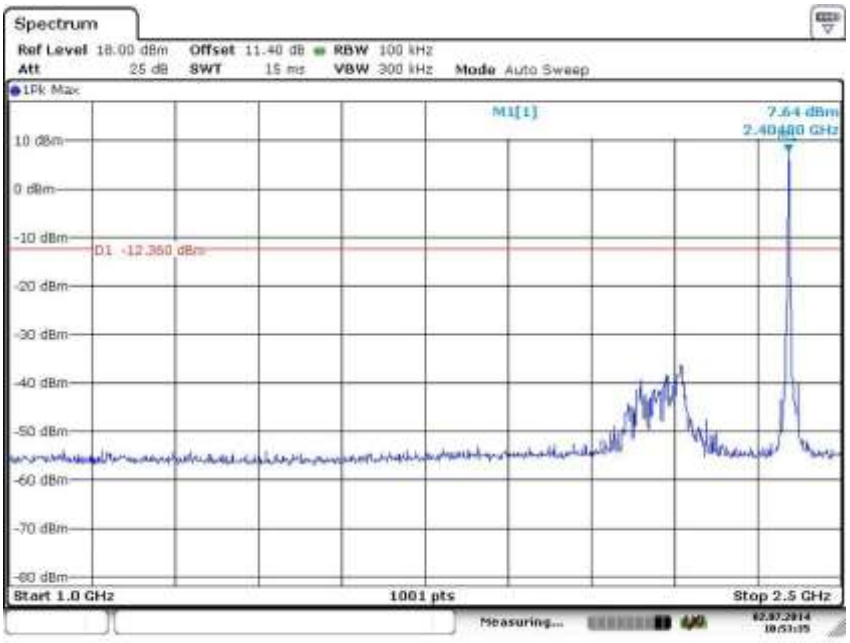

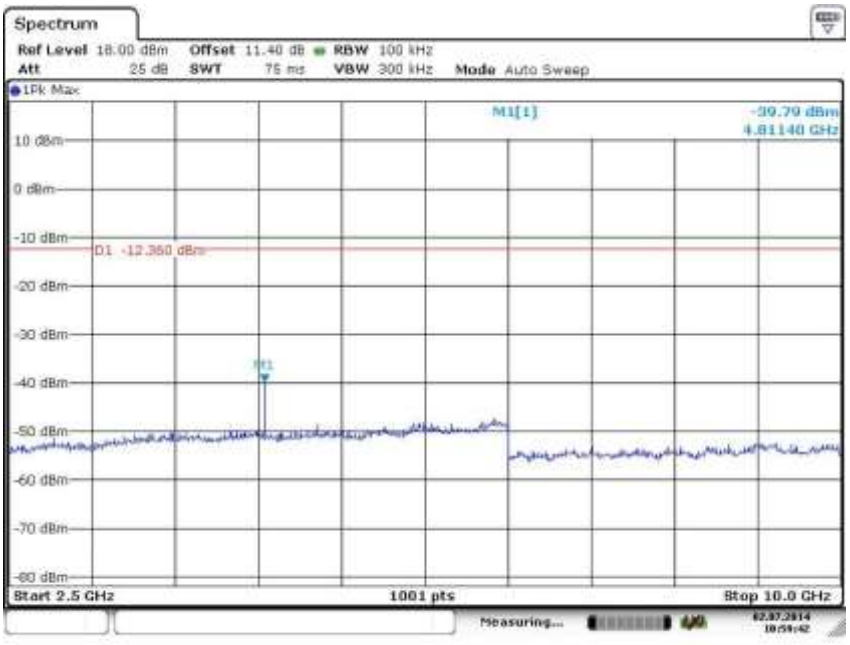

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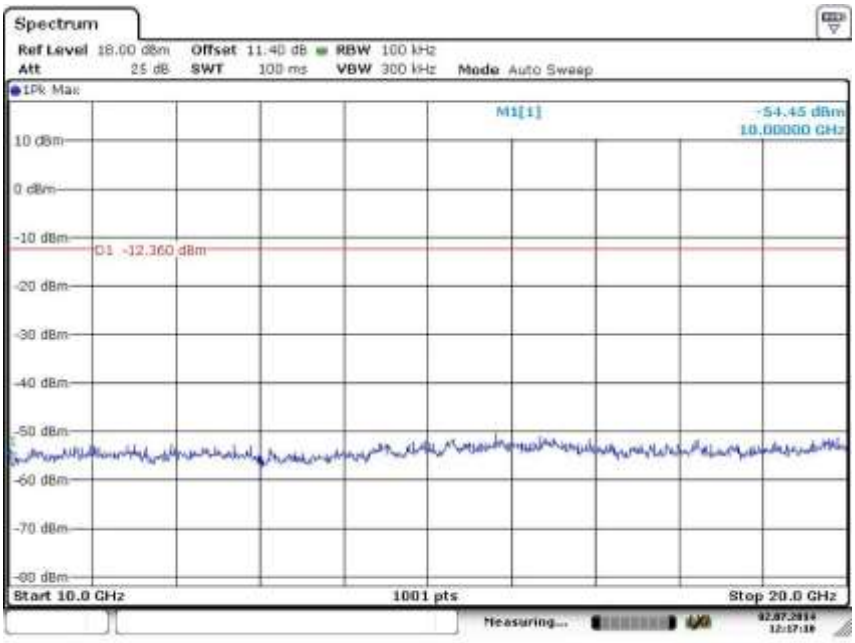

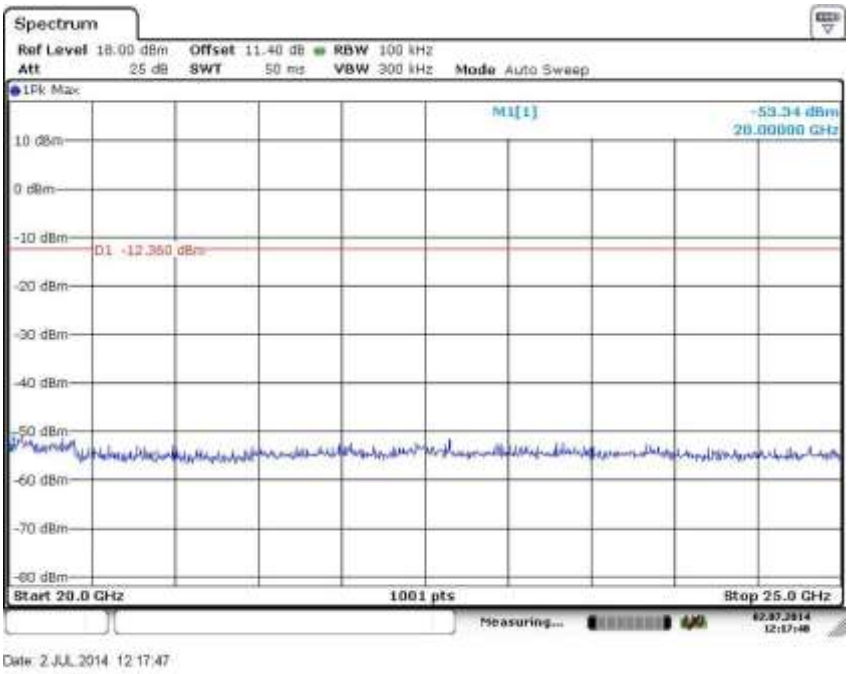

Frequency MHz	Level dBm/100kHz	Attenuation from carrier dB	Margin dB
2404.8	7.64	Carrier	
4811.4	-39.79	47.43	27.43

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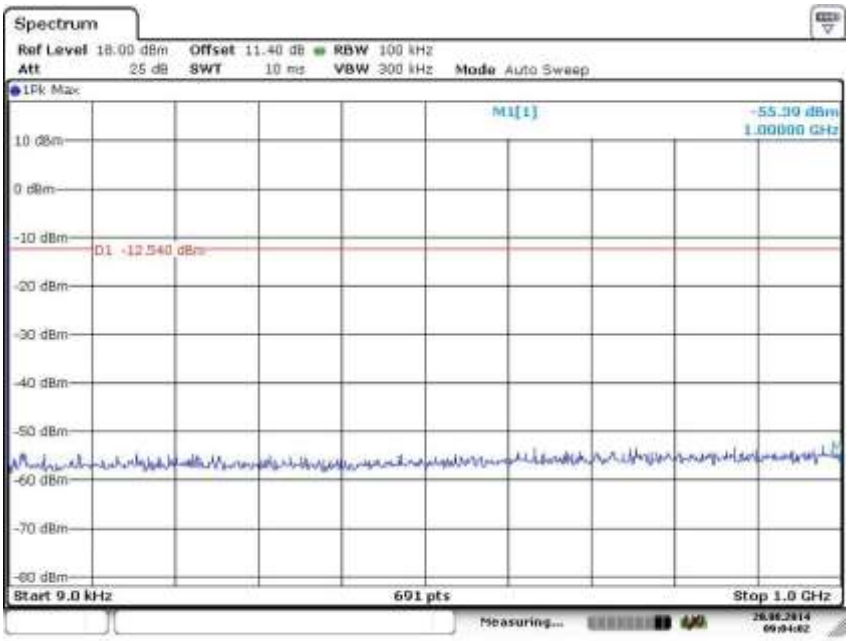
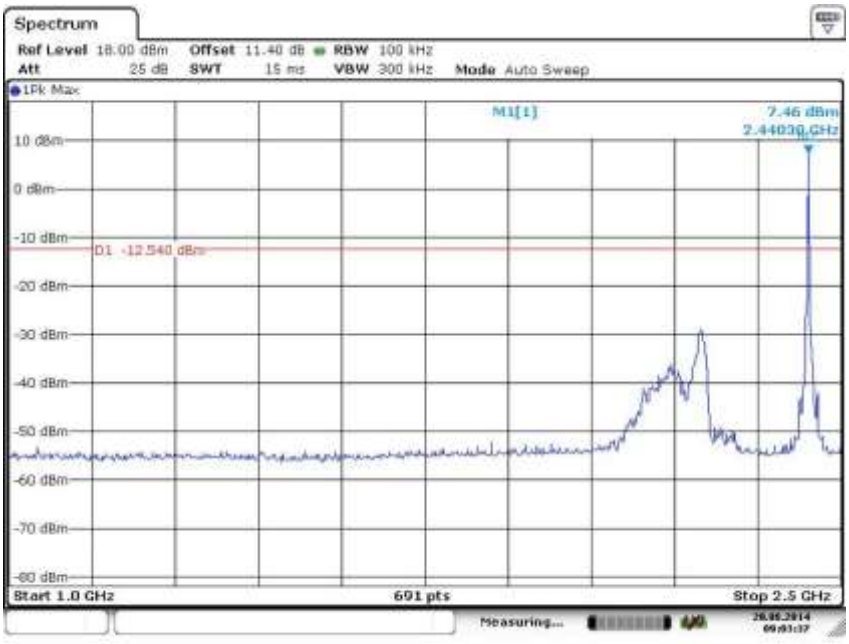
Ch 18





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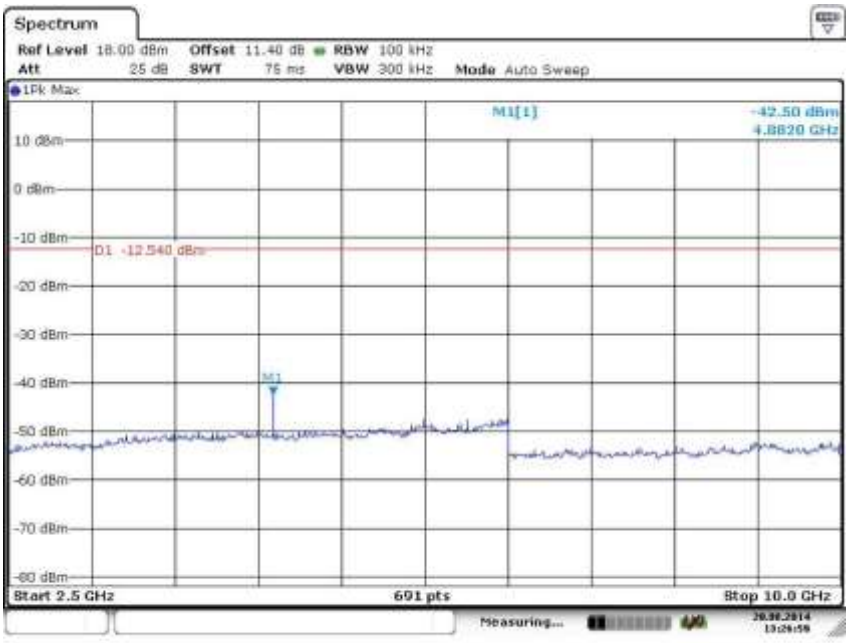

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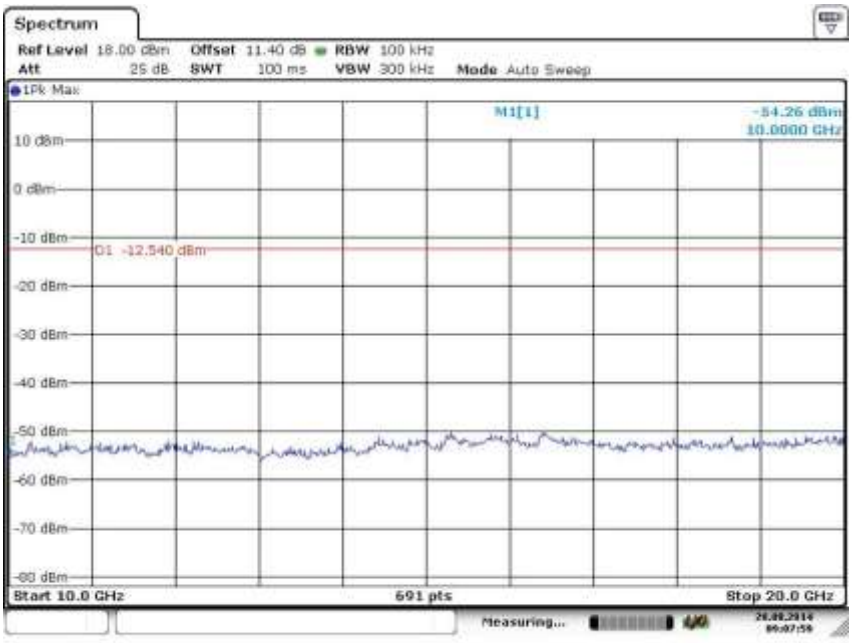

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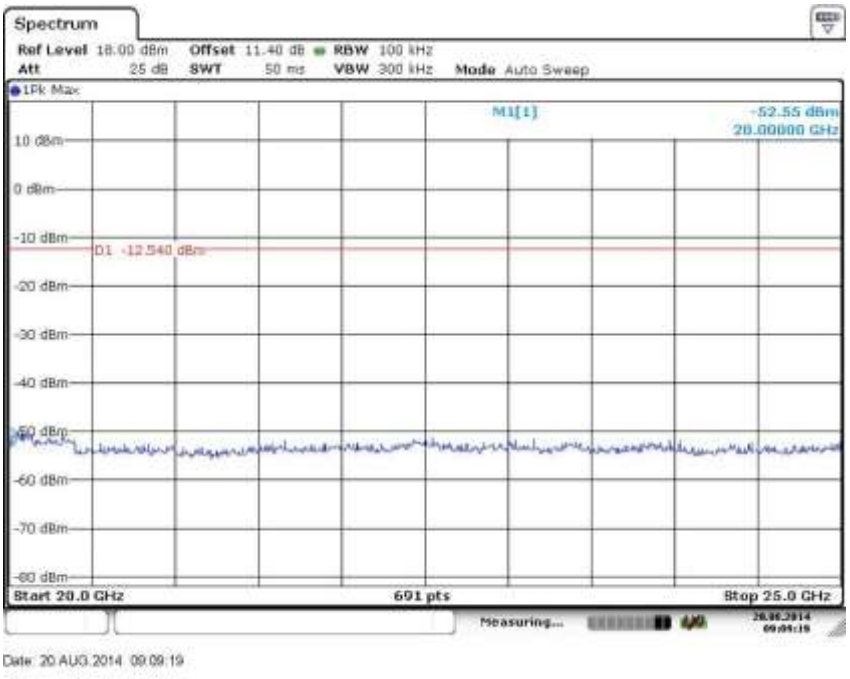

Frequency MHz	level dBm / 100 kHz	Spurious emission attenuation from carrier dB	Margin dB
2440	7.46	carrier	
4882	-42.5	49.95	29.96

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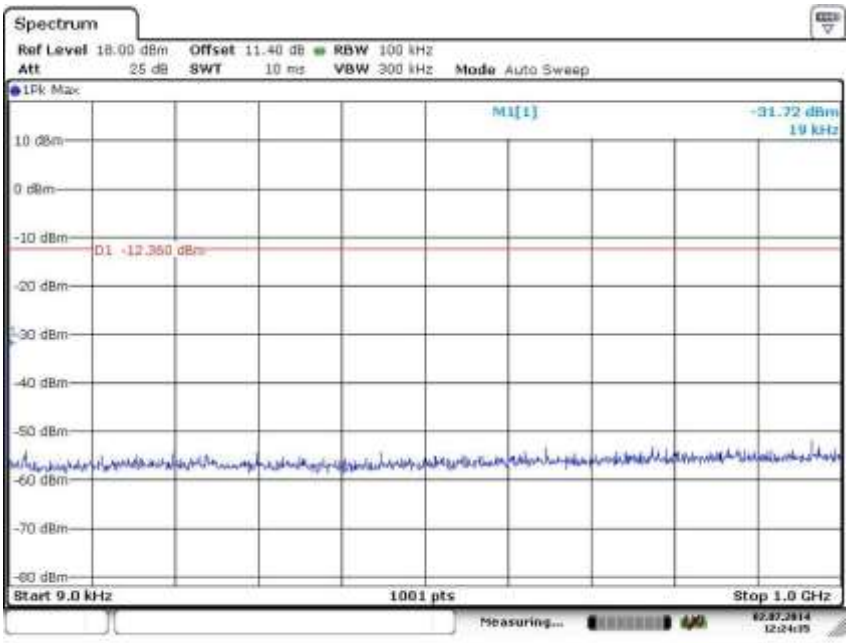

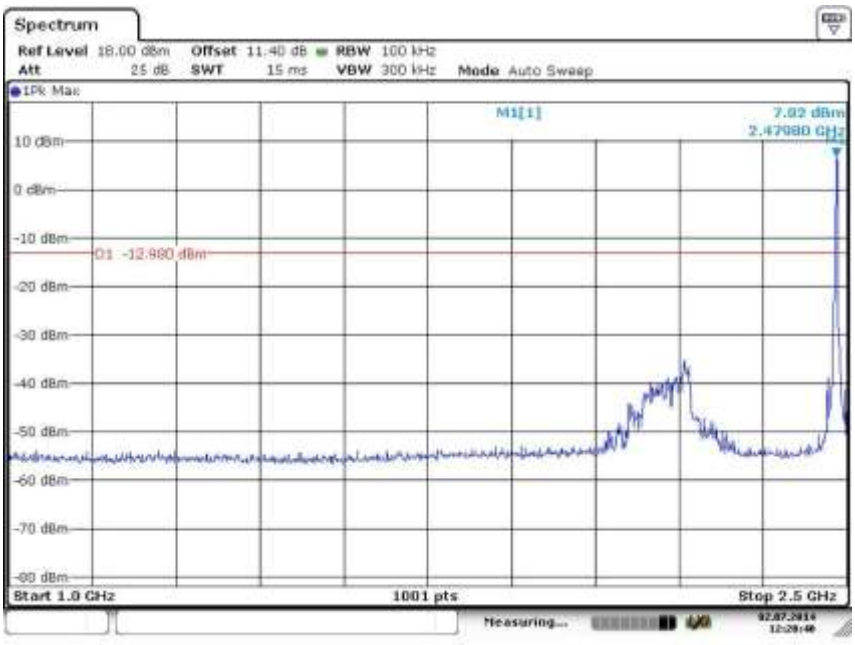

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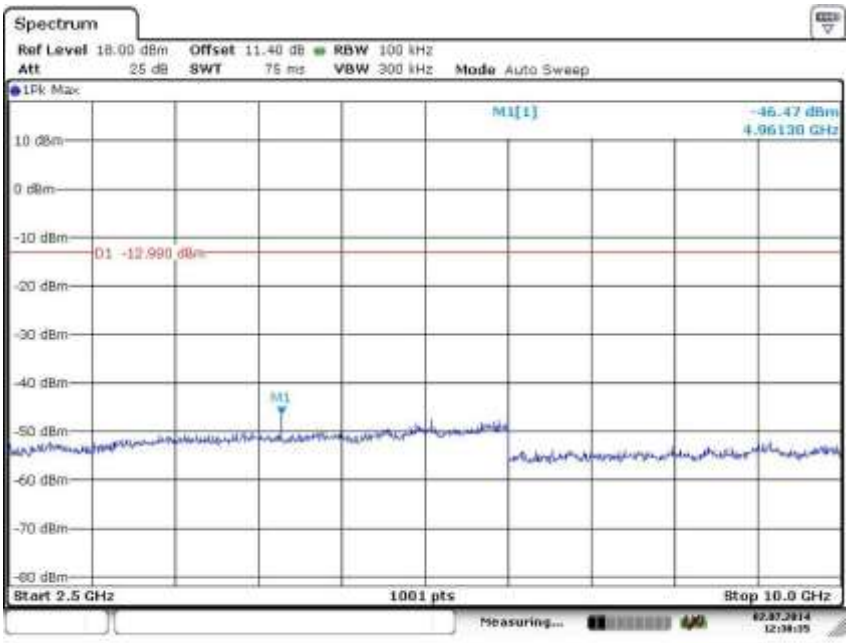

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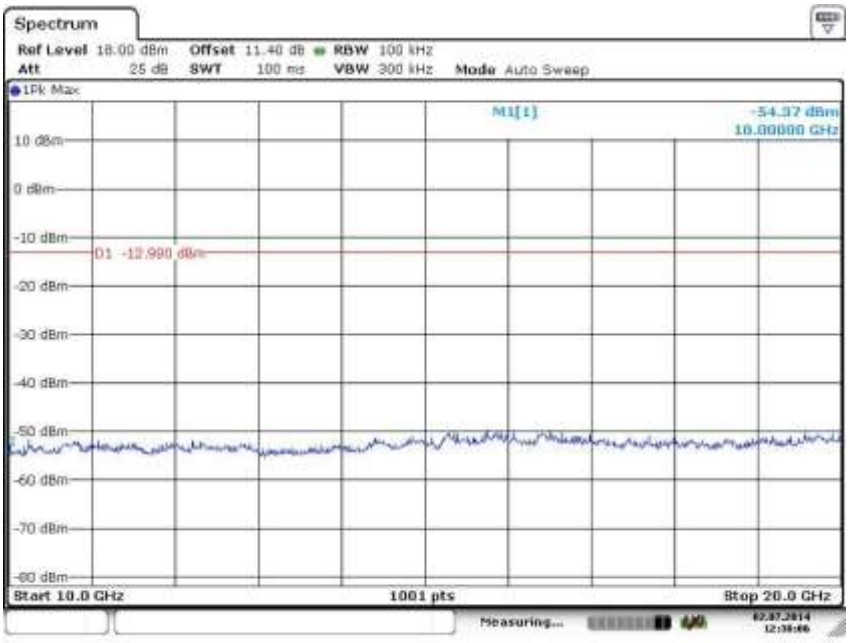

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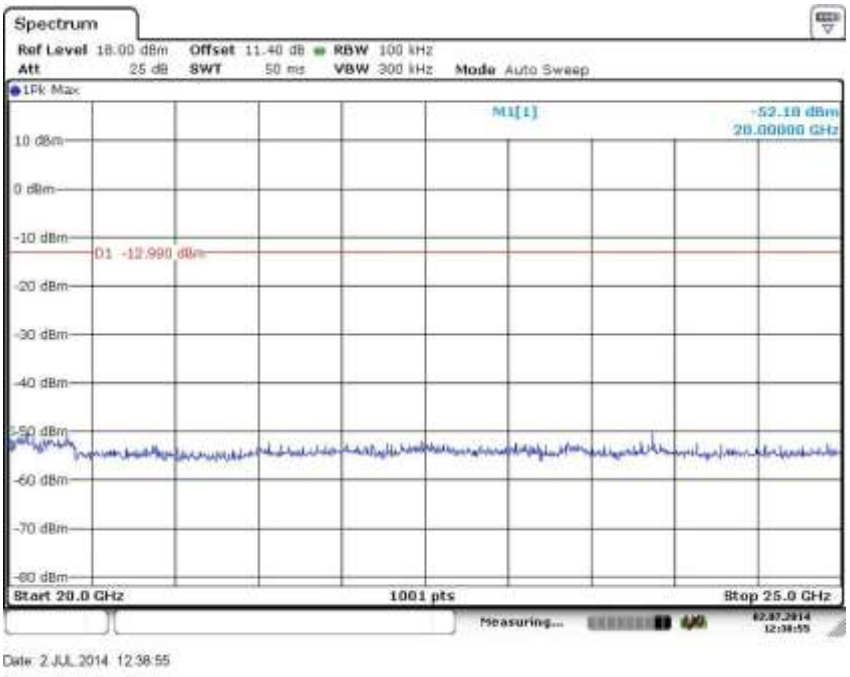

Frequency MHz	level dBm / 100 kHz	Spurious emission attenuation from carrier	Margin dB
2480	7.02	carrier	
4961	-46.47	53.49	33.49

12.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2015
Rf-attenuator	H+S	5910_N-010 10dB	32696	7/2015

13 UNCERTAINTIES SUMMARY

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.
Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95% (k=2).

Radiated disturbance, field strength, 30 MHz - 1000 MHz	
30 to 300 MHz at 3 m	± 4,7 dB
200 to 1000 MHz at 3 m	± 4,8 dB
Radiated disturbance, field strength, 1 to 40 GHz in Semi Anechoic Chambers "Stora Hallen"and "Björkhallen"	
1 to 18 GHz with filter or attenuator	± 5,4 dB
1 to 18 GHz without filter or attenuator	± 5,2 dB
18 to 26 GHz without filter or attenuator	± 5,5 dB
Conducted disturbances at the antenna port on radio equipment	
Frequency range 9 kHz – 1 GHz	± 0,9 dB
Frequency range 1 GHz – 7 GHz	± 1,4 dB
Frequency range 7 GHz -18GHz	± 2,4 dB
Frequency range 18 GHz -26,5GHz	± 3,0 dB
Output power	
Digital signals, conducted	± 0,6 dB
Peak power density	
Conducted:	
Spectrum analyser	± 2,5 dB

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14 PHOTO OF THE EUT

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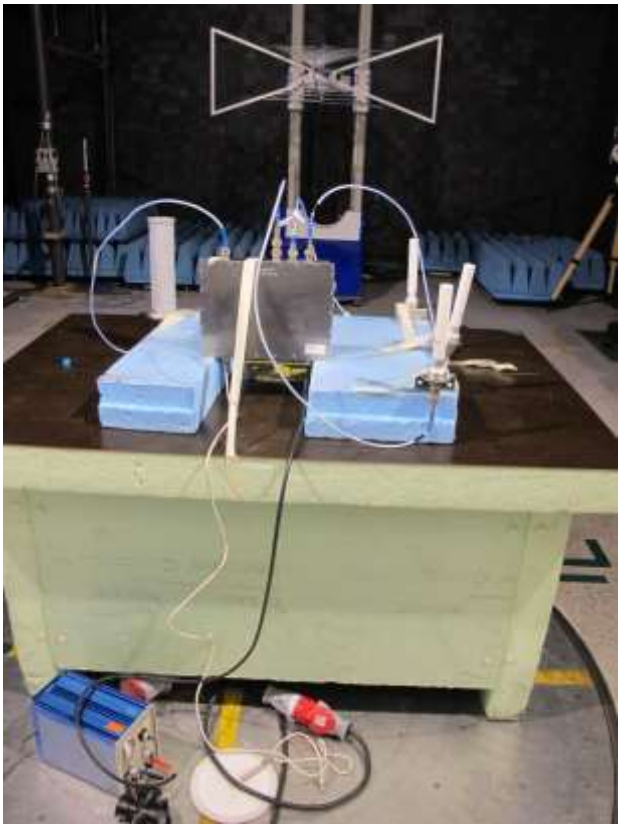
15 TEST SETUP PICTURES

Radiated emissions 30 MHz – 1GHz



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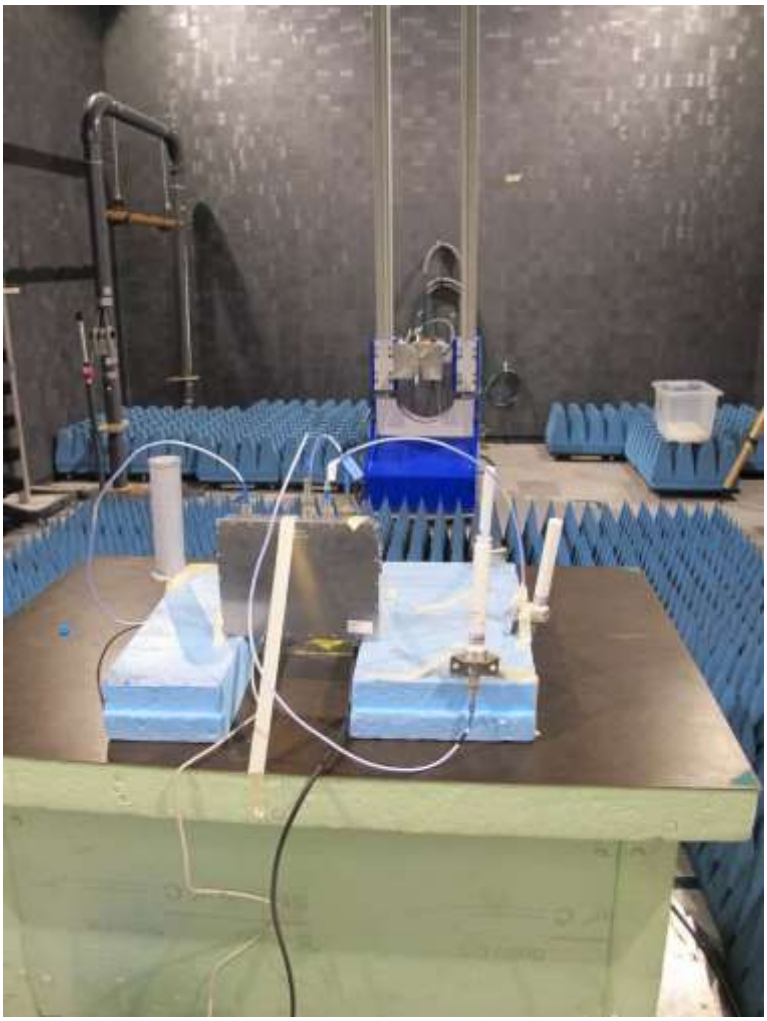
Radiated emission 1 – 18 GHz



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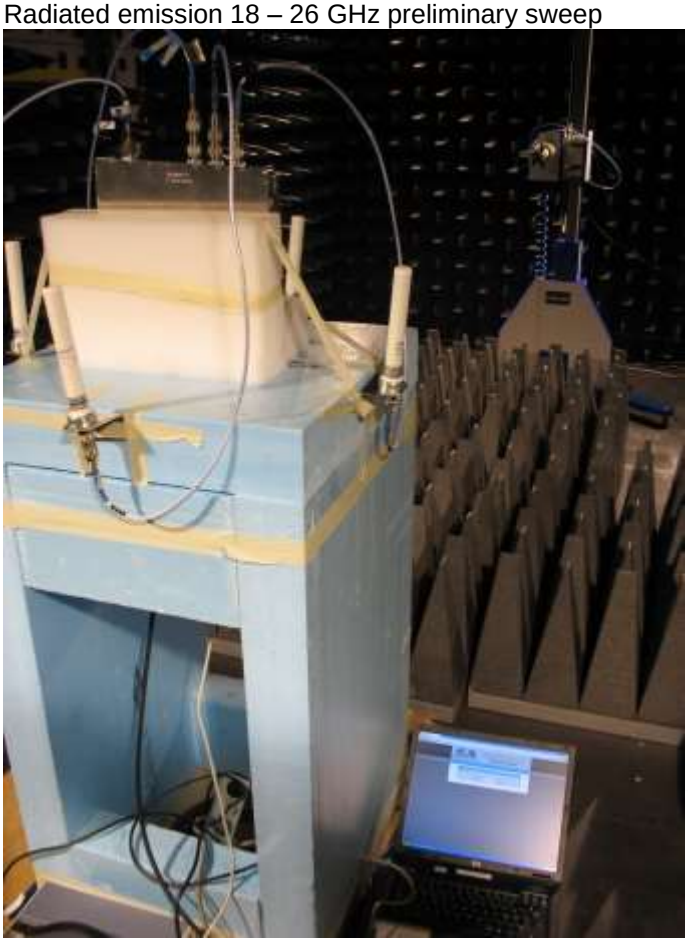
Radiated emission 18 – 26 GHz preliminary sweep



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