

TEST REPORT

Test report no.: 1-5865/13-07-02-B



Testing laboratory

CETECOM ICT Services GmbH
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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01. Area of Testing: Radio/Satellite Communications

Applicant

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67200 Strasbourg / FRANCE
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Fax: +33 3 88 29 04 00
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e-mail: thierry.petri@rsivideotech.com
Phone: +33 3 90 20 66 96

Manufacturer

RSI Video Technologies
Siège Social -Headquarters
25 rue Jacobi-Netter
67200 Strasbourg / FRANCE

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	Motion Detector
Model name:	IMD601
FCC ID:	X46MD00
IC:	8816A-MD00
Frequency:	ISM band 902 MHz to 928 MHz (lowest channel 904.5 MHz, highest channel 926.1 MHz)
Technology tested:	Proprietary FHSS system with FSK modulation
Antenna:	Integrated wire antenna
Power Supply:	3.6 V DC by Lithium Battery Type LS14500
Temperature Range:	-10°C to +40°C



This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorised:

p. o.

Andreas Luckenbill
Expert

Test performed:

p. o.

Tobias Wittenmeier
Expert

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2013-03-18
Date of receipt of test item:	2013-04-22
Start of test:	2013-04-23
End of test:	2013-04-24
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2012-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2012-10	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+40 °C during high temperature tests
	T_{min}	-10 °C during low temperature tests
Relative humidity content:		55 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.6 V DC by Lithium Battery Type LS14500
	V_{max}	3.6 V
	V_{min}	2.7 V

5 Test item

Kind of test item	:	Motion Detector
Type identification	:	IMD601
S/N serial number	:	Unknown
HW hardware status	:	Unknown
SW software status	:	Unknown
Frequency band [MHz]	:	ISM band 902 MHz to 928 MHz (lowest channel 904.5 MHz, highest channel 926.1 MHz)
Type of radio transmission	:	FHSS
Use of frequency spectrum	:	
Type of modulation	:	FSK
Number of channels	:	25
Antenna	:	Integrated wire antenna
Power supply	:	3.6V DC by Lithium Battery Type LS14500
Temperature range	:	-10°C to +40°C

6 Test laboratories sub-contracted

None

7 Summary of measurement results

- No deviations from the technical specifications were ascertained
- There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8	Passed	2013-05-17	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Results (max.)
§15.247(b)(4)	Antenna Gain	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1)(i) RSS-210 A8.1 (b)	Carrier Frequency Separation	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1)(i) RSS-210 A8.1 (c)	Number of Hopping channels	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1)(i) RSS-210 A8.1 (c)	Average Time of Occupancy (Dwell Time)	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1)(i) RSS-210 A8.1 (c)	20dB Bandwidth	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(2) RSS-210 A8.4 (1)	Maximum Output Power Radiated	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(4) RSS-210 A8.4 (1)	Maximum Output Power Conducted	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	TX Spurious Emission Conducted	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a)	TX Spurious Emission Radiated < 30 MHz	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d) §15.209 A8.5	TX Spurious Emission Radiated > 30 MHz	Nominal	Nominal	TX	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109	RX Spurious Emissions Radiated	Nominal	Nominal	Idle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

8 RF measurements

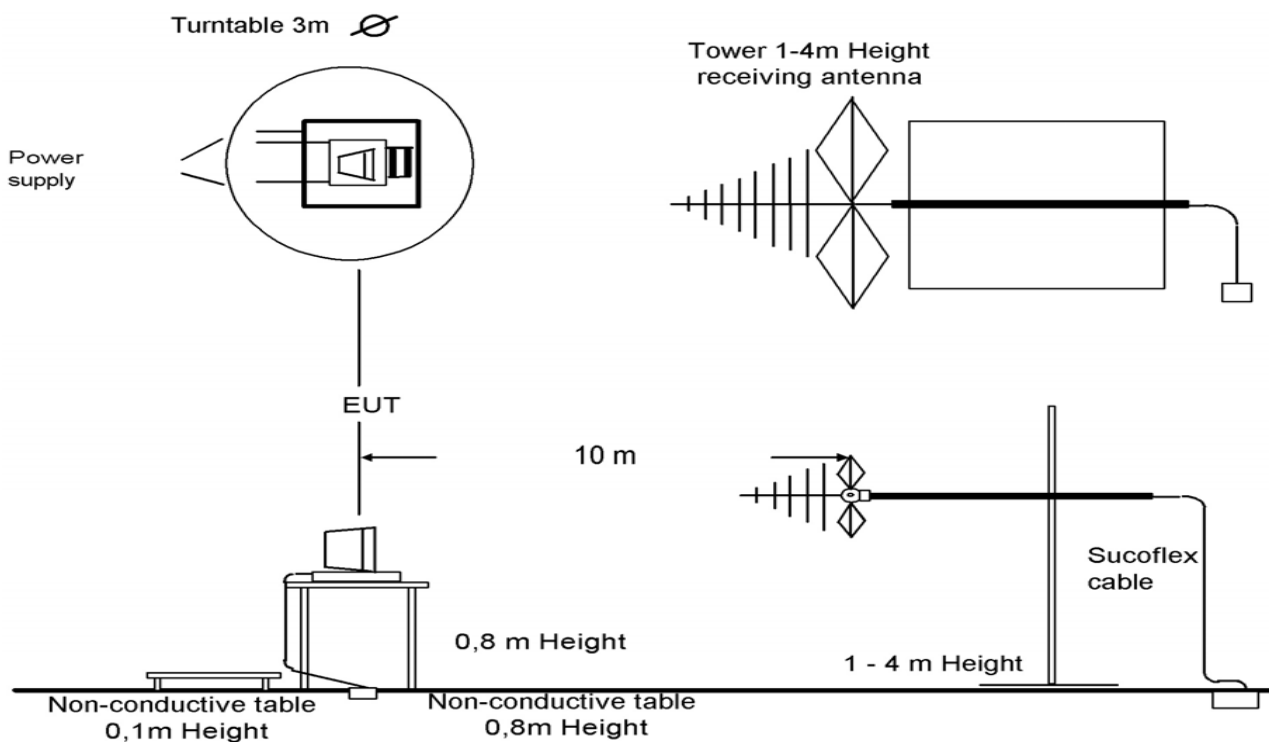
8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2003 clause 4.2.

Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



Picture 1: Diagram radiated measurements

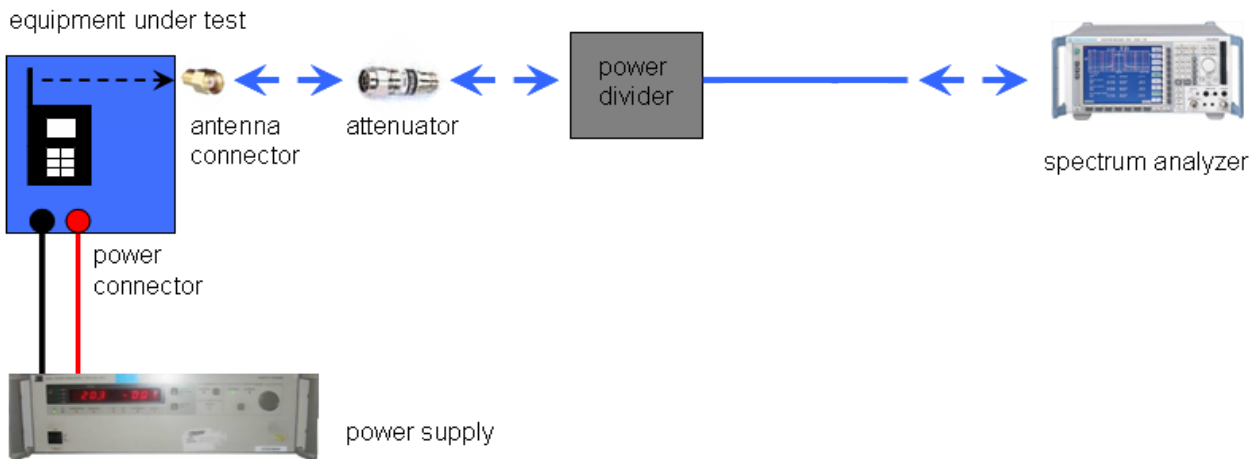
9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A "BLUETOOTH® APPROVALS"

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). The path is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

Test mode: Special software is used.
EUT is transmitting pseudo random data by itself

8.3 RSP100 test report cover sheet / performance test data

Test report number	:	1-5865/13-07-02-B
Equipment model number	:	IMD601
Certification number	:	8816A-MD00
Manufacturer (complete address)	:	RSI Video Technologies Siège Social -Headquarters 25 rue Jacobi-Netter 67200 Strasbourg / FRANCE
Tested to radio standards specification no.	:	RSS 210, Issue 8
Open area test site IC No.	:	IC 3462C-1
Frequency range	:	ISM band 902 MHz to 928 MHz (lowest channel 904.5 MHz, highest channel 926.1 MHz)
RF-power [W] (max.)	:	Cond.: 26.18 mW (FSK modulation) EIRP: 4.81 mW (FSK modulation)
Occupied bandwidth (99%-BW) [kHz]	:	302 (FSK modulation)
Type of modulation	:	FHSS technology with FSK modulation.
Emission designator (TRC-43)	:	302KFXD (FSK modulation)
Antenna information	:	Integrated wire antenna
Transmitter spurious (worst case) [dB μ V/m @ 3m]:		68.26 Pk / 34.94 AVG @ 8238.5 MHz
Receiver spurious (worst case) [dB μ V/m @ 3m]:		21.8 (noise floor)

ATTESTATION:

DECLARATION OF COMPLIANCE:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory manager:

2013-05-17

Date

Tobias Wittenmeier

Name


p. o.

Signature

9 Measurement results

9.1 Antenna gain

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

	Low channel 904.5 MHz	Middle channel 915.3 MHz	High channel 926.1 MHz
Conducted power [dBm]	14.02	14.08	14.18
Radiated power [dBm]	6.68	6.82	6.30
Gain [dBi] Calculated	-7.34	-7.26	-7.88

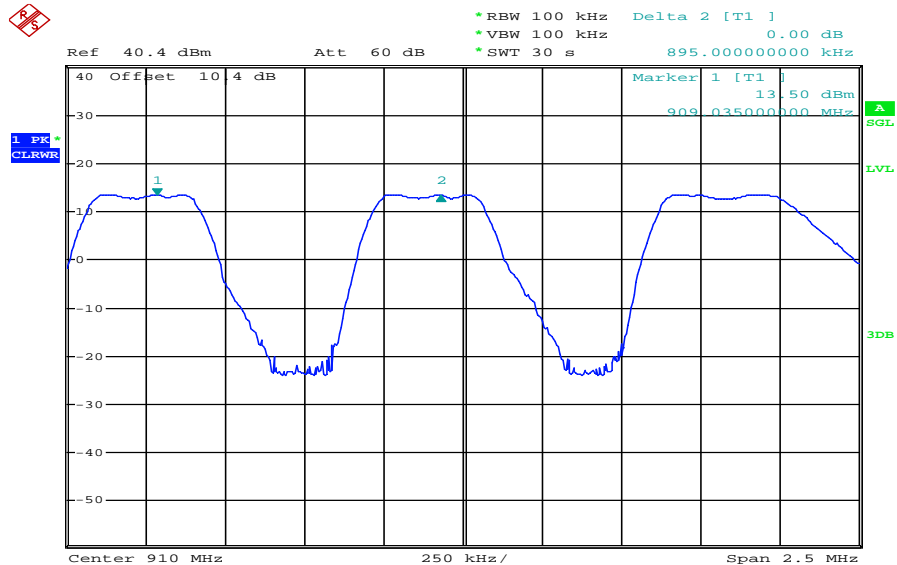
Limits:

FCC	IC
Antenna gain	
<p>The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	

Result: **Passed**

9.2 Carrier Frequency Separation

Plot 1:



Date: 24.APR.2013 10:41:59

Result: The channel separation is: 895 kHz

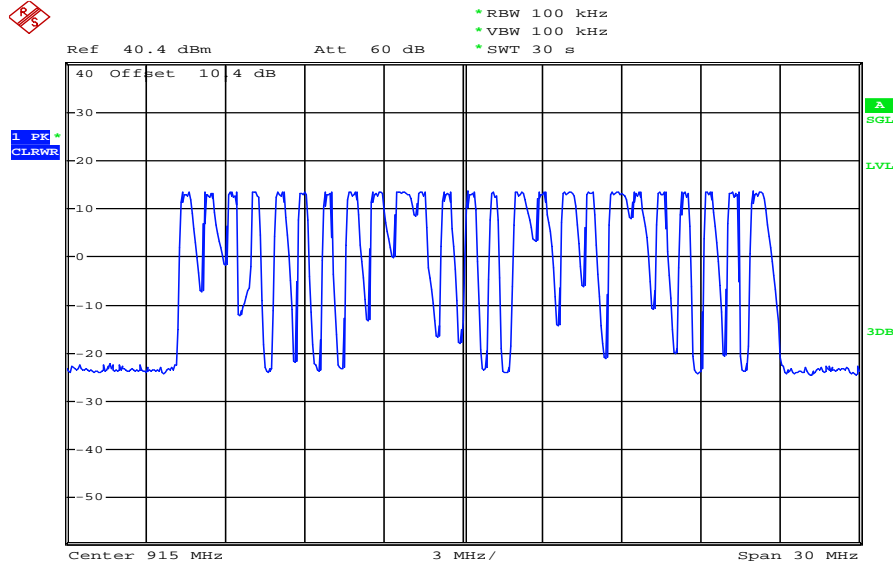
Limits:

FCC	IC
Carrier Frequency Separation	
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	

Result: Passed

9.3 Number of Hopping Channels

Plot 1:



Date: 24.APR.2013 10:39:10

Result: The number of hopping channels is: 25

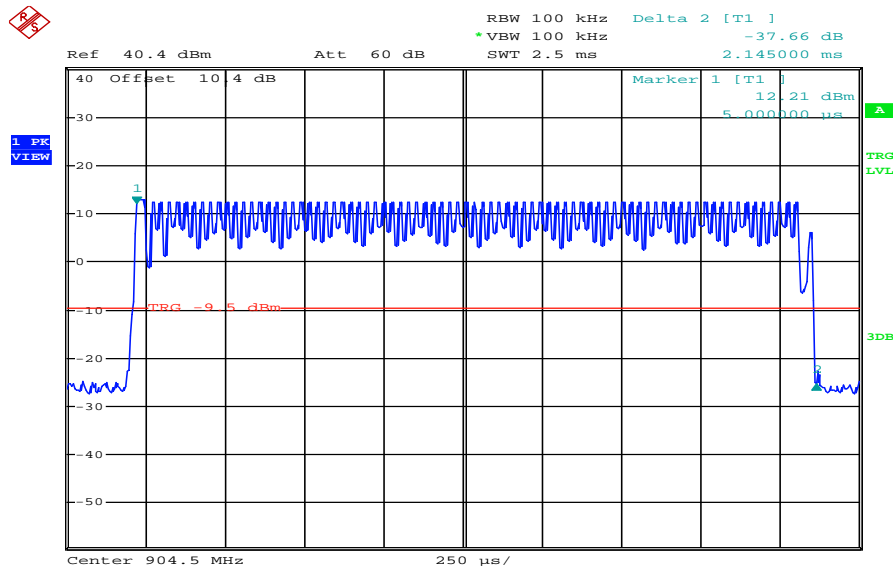
Limits:

FCC	IC
Number of Hopping Channels	
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.	

Result: Passed

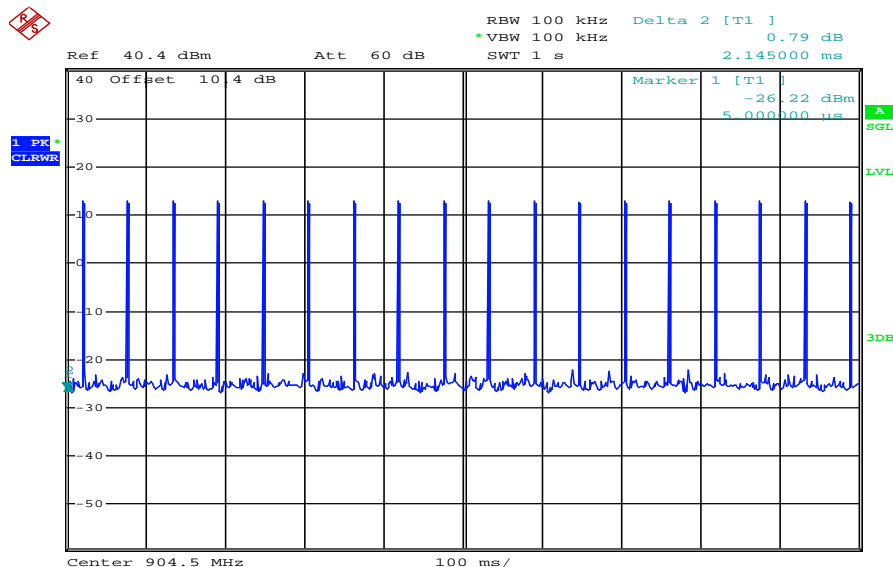
9.4 Average Time of Occupancy

Plot 1: Time slot length = 2.145 ms



Date: 24.APR.2013 10:34:27

Plot 2: hops / channel @ 1s = 18



Date: 24.APR.2013 10:36:23

Result: The time slot length is = 2.145 ms
 Number of hops / channel @ 1s = 18

Within 10 s period, the average time of occupancy = $10 \text{ s} * 18 * 2.145 \text{ ms}$

→ The average time of occupancy = 386.1 ms

Limits:

FCC	IC
Average time of occupancy	
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within 10 second period.	

Result: Passed

9.5 20 dB Bandwidth

Description:

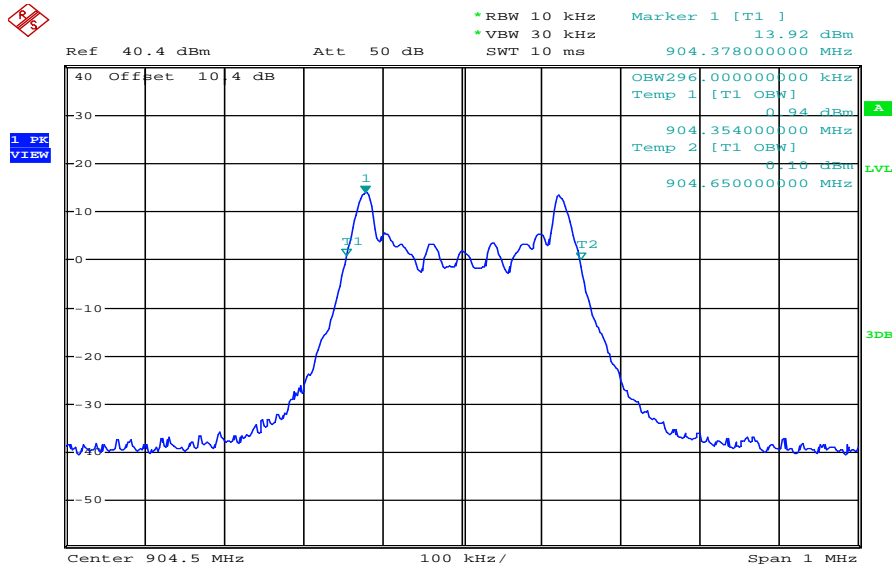
Measurement of the 20 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	10 kHz
Resolution bandwidth:	30 kHz
Span:	See plots
Trace-Mode:	Max Hold

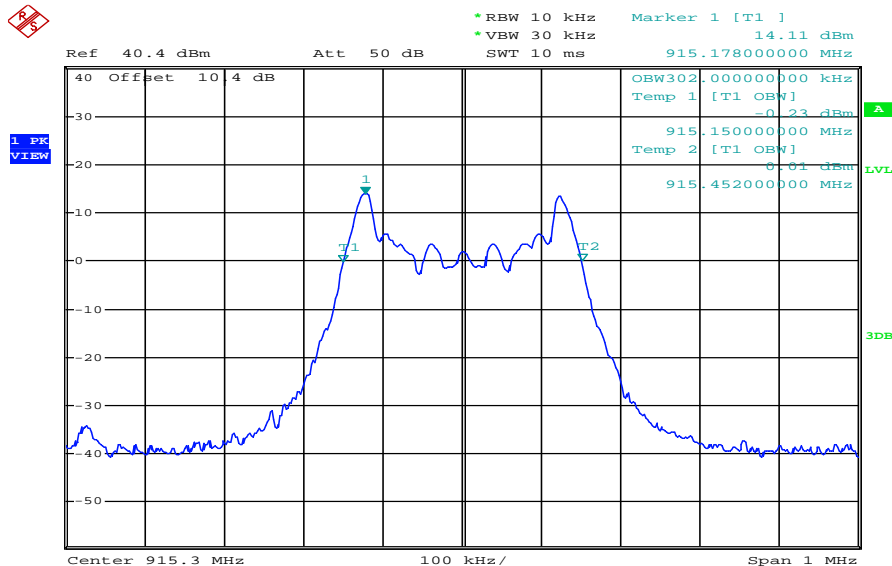
Plots:

Plot 1: Low Channel



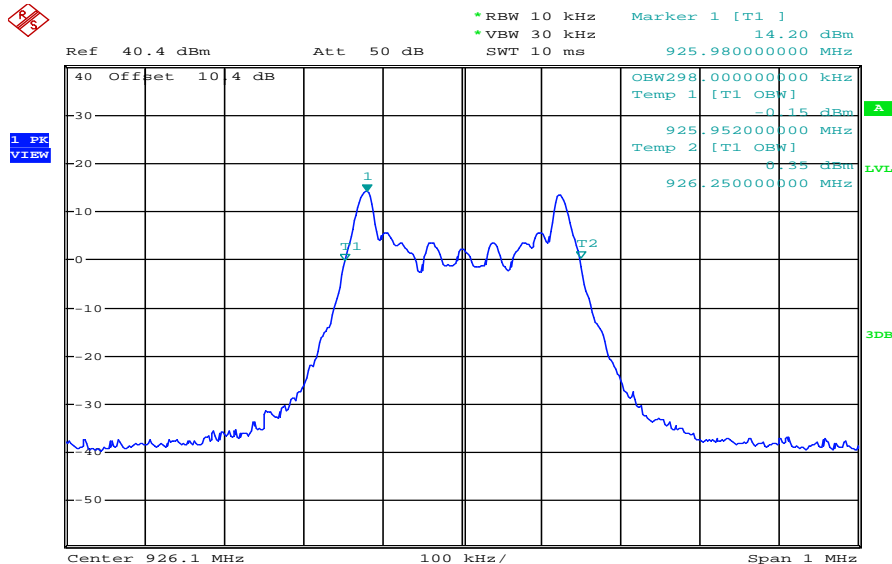
Date: 24.APR.2013 11:07:00

Plot 2: Middle Channel



Date: 24.APR.2013 11:04:55

Plot 3: High Channel



Date: 24.APR.2013 11:10:14

Result:

Test Conditions		20dB BANDWIDTH [kHz]		
		904.5 MHz	915.3 MHz	926.1 MHz
T _{nom}	V _{nom}	296	302	298
Measurement uncertainty		± 30 kHz		

Limits:

FCC	IC
20dB Bandwidth	
The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.	

Result: **Passed**

9.6 Maximum Output Power Radiated

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz
Span:	Zero-Span
Trace-Mode:	Max Hold

Result:

Test Conditions		EIRP [dBm]		
		904.5 MHz	915.3 MHz	926.1 MHz
T_{nom}	V_{nom}	6.68	6.82	6.30
Measurement uncertainty		± 3dB		

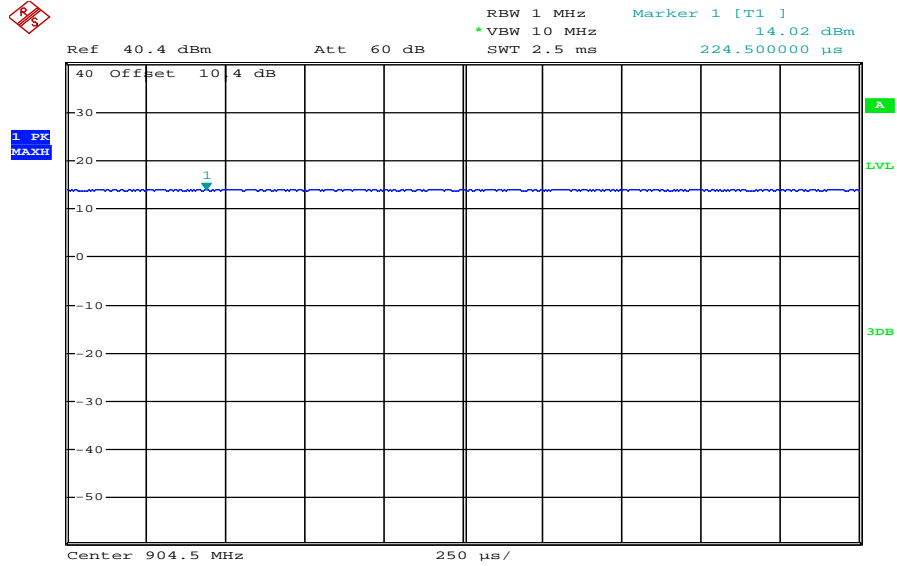
Limits:

FCC	IC
EIRP	
For frequency hopping systems operating in the 902–928 MHz band: 1 watt (30 dBm) for systems employing at least 50 hopping channels; and, 0.25 watts (24 dBm) for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.	

Result: Passed

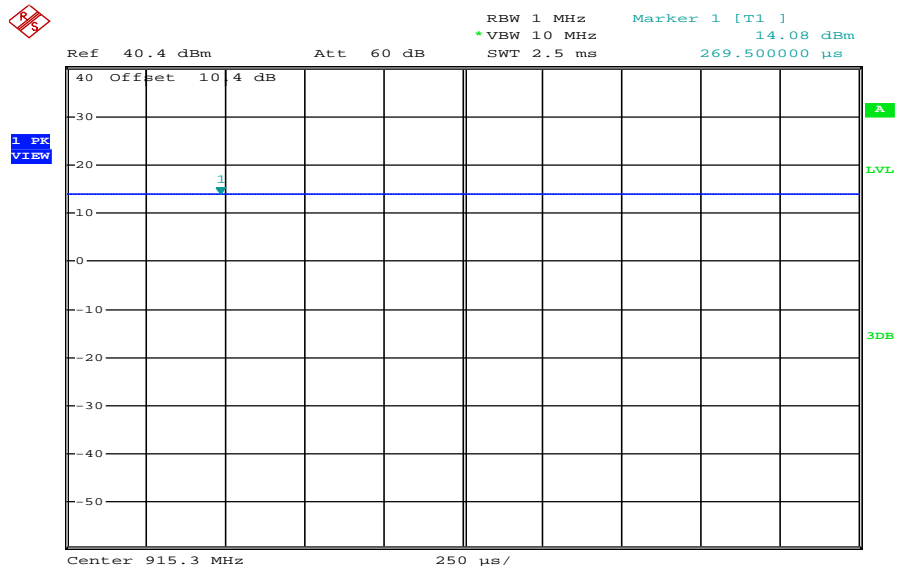
9.7 Maximum Output Power Conducted

Plot 1: Low Channel



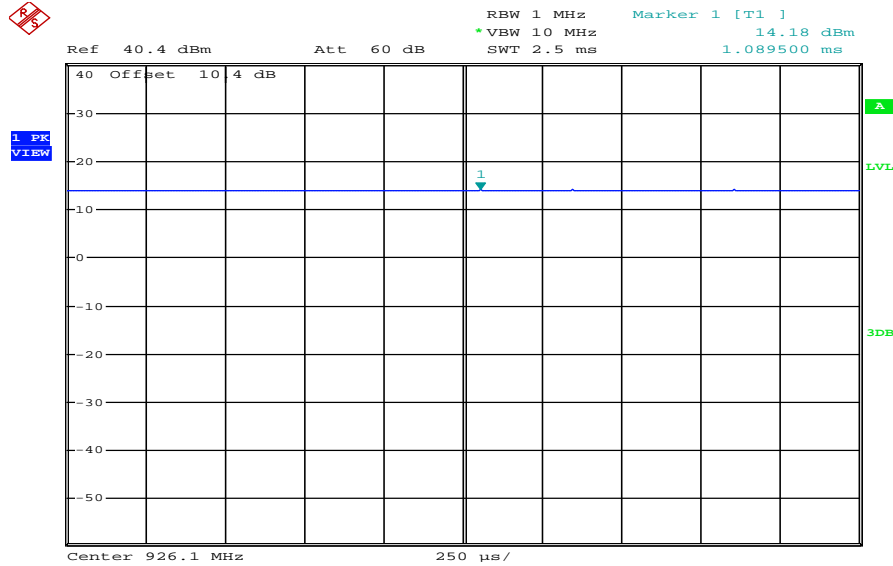
Date: 24.APR.2013 11:18:16

Plot 2: Middle Channel



Date: 24.APR.2013 11:15:14

Plot 3: High Channel



Date: 24.APR.2013 11:13:29

Result:

Test Conditions		Maximum Output Power Conducted [dBm]		
		904.5 MHz	915.3 MHz	926.1 MHz
T _{nom}	V _{nom}	14.02	14.08	14.18
Measurement uncertainty		± 3 dB		

Limits:

FCC	IC
Maximum Output Power Conducted	
For frequency hopping systems operating in the 902–928 MHz band: 1 watt (30 dBm) for systems employing at least 50 hopping channels; and, 0.25 watts (24 dBm) for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.	

Result: Passed

9.8 Spurious Emissions Conducted (Transmitter)

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at channel 00, 12 and 24.

Measurement:

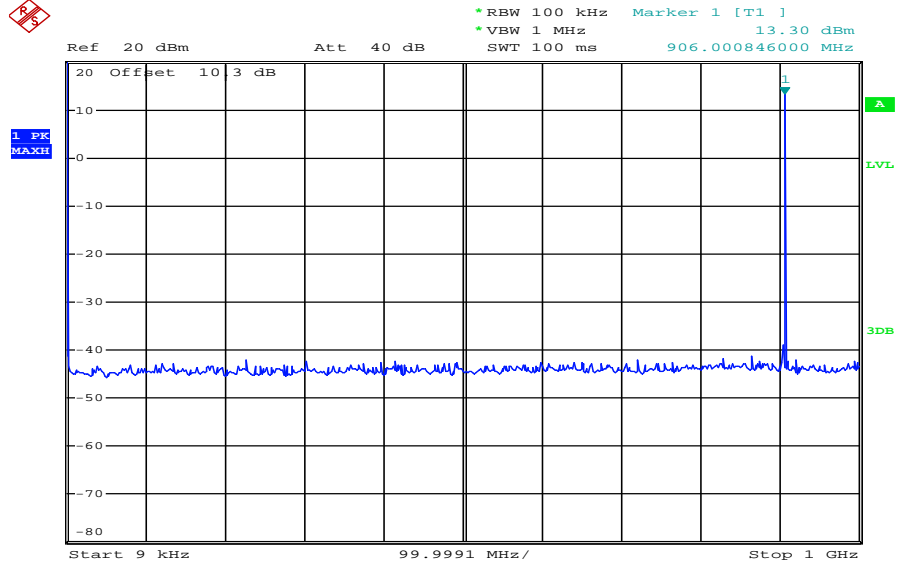
Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	F < 1 GHz: 1 MHz F > 1 GHz: 1 MHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 100 kHz
Span:	9 kHz to 12.75 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
Spurious emissions conducted	
<p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).</p>	

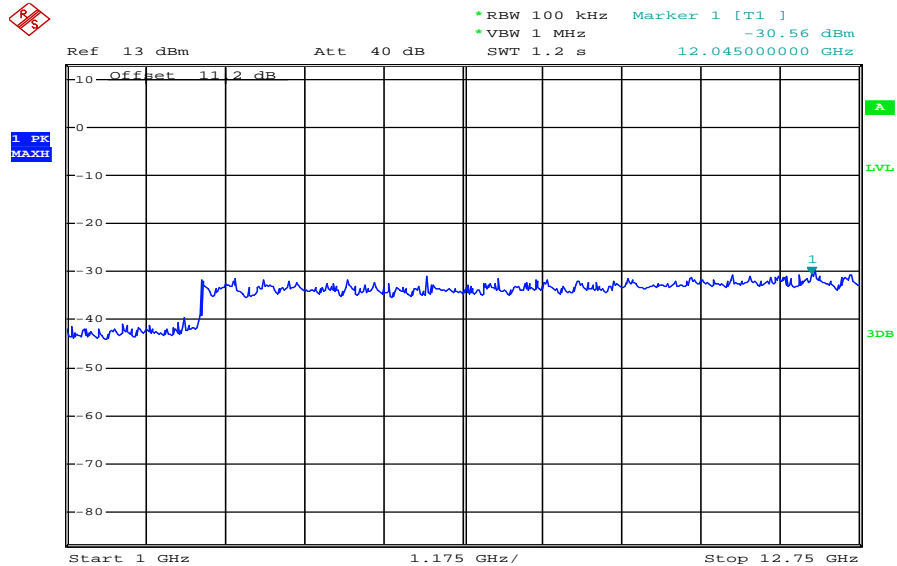
Plots:

Plot 1: Low channel



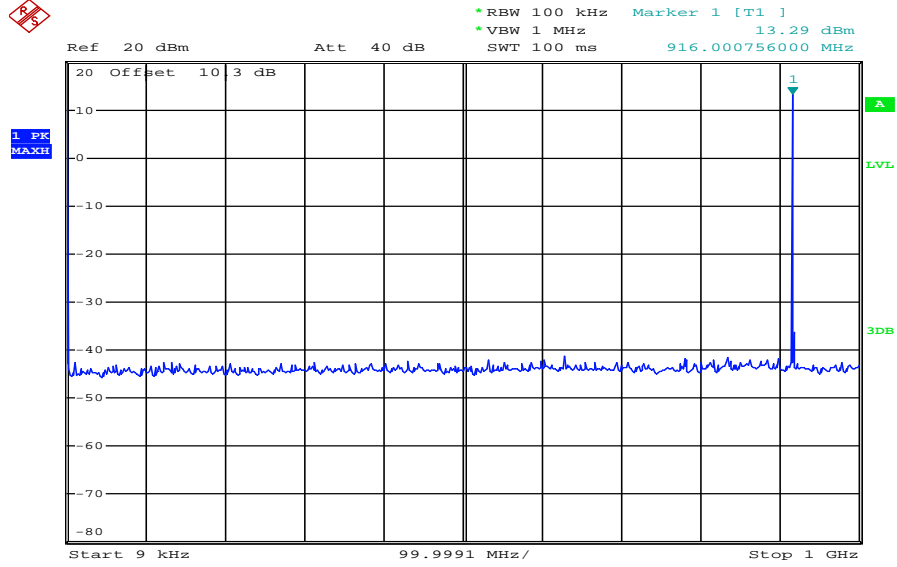
Date: 24.APR.2013 13:33:57

Plot 2: Low channel



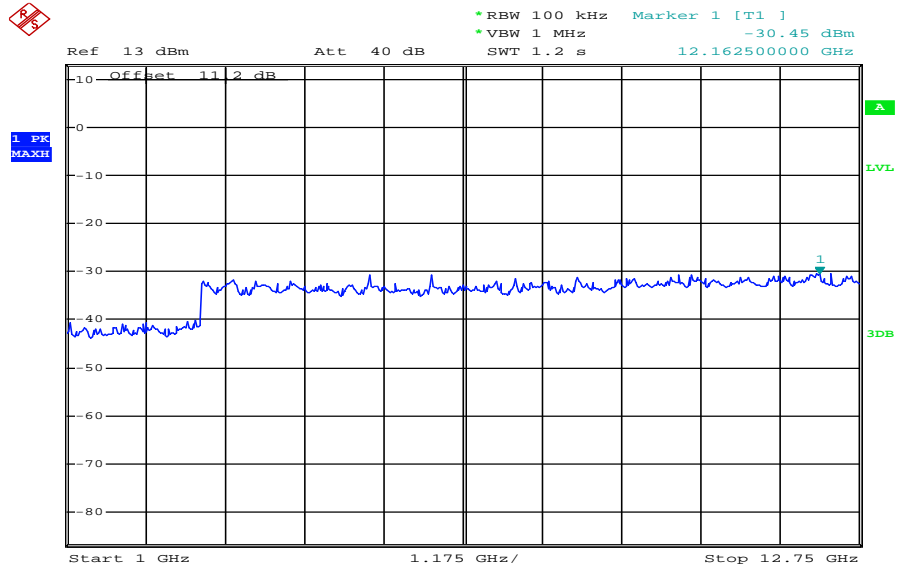
Date: 24.APR.2013 12:01:25

Plot 3: Middle channel



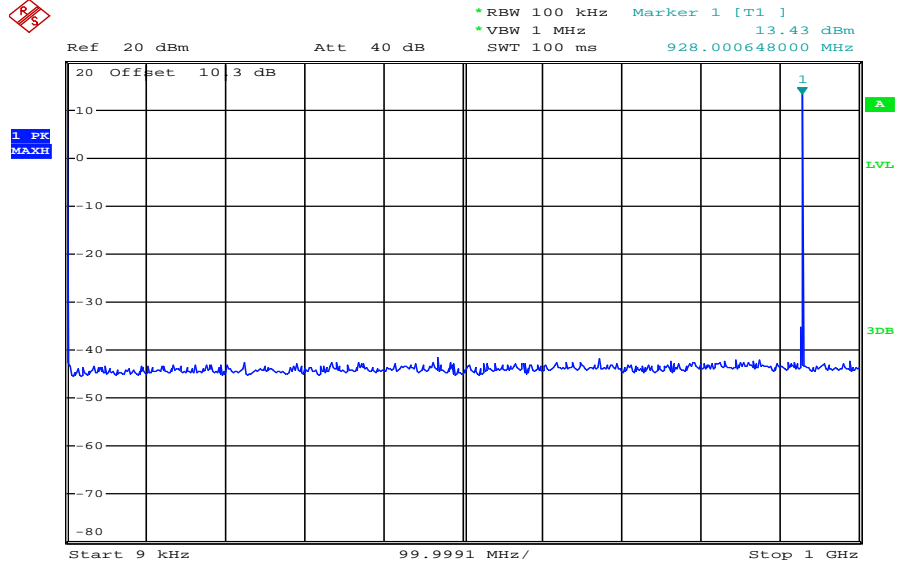
Date: 24.APR.2013 13:34:48

Plot 4: Middle channel



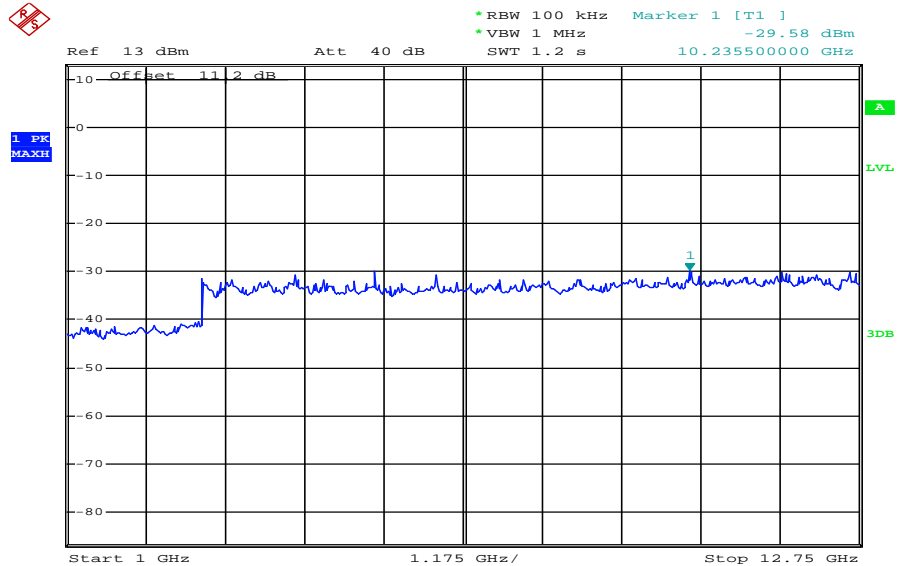
Date: 24.APR.2013 12:02:42

Plot 5: High channel



Date: 24.APR.2013 13:35:54

Plot 6: High channel



Date: 24.APR.2013 12:00:08

Result:

Emission Limitation					
Frequency [MHz]		Amplitude of emission [dBm]	Limit max. allowed emission power	actual attenuation below frequency of operation [dB]	Results
904.5		13.30	24 dBm		Operating frequency
No peaks detected! All detected emissions are more than 20 dB below the limit!			-20 dBc		passed
915.3		13.29	24 dBm		Operating frequency
No peaks detected! All detected emissions are more than 20 dB below the limit!			-20 dBc		passed
926.1		13.43	24 dBm		Operating frequency
No peaks detected! All detected emissions are more than 20 dB below the limit!			-20 dBc		passed
Measurement uncertainty		± 3dB			

Result: Passed

9.9 Spurious Emissions Radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 12. This measurement is representative for all channels and modes. If any peaks are found channel 00 and channel 24 will be measured too. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

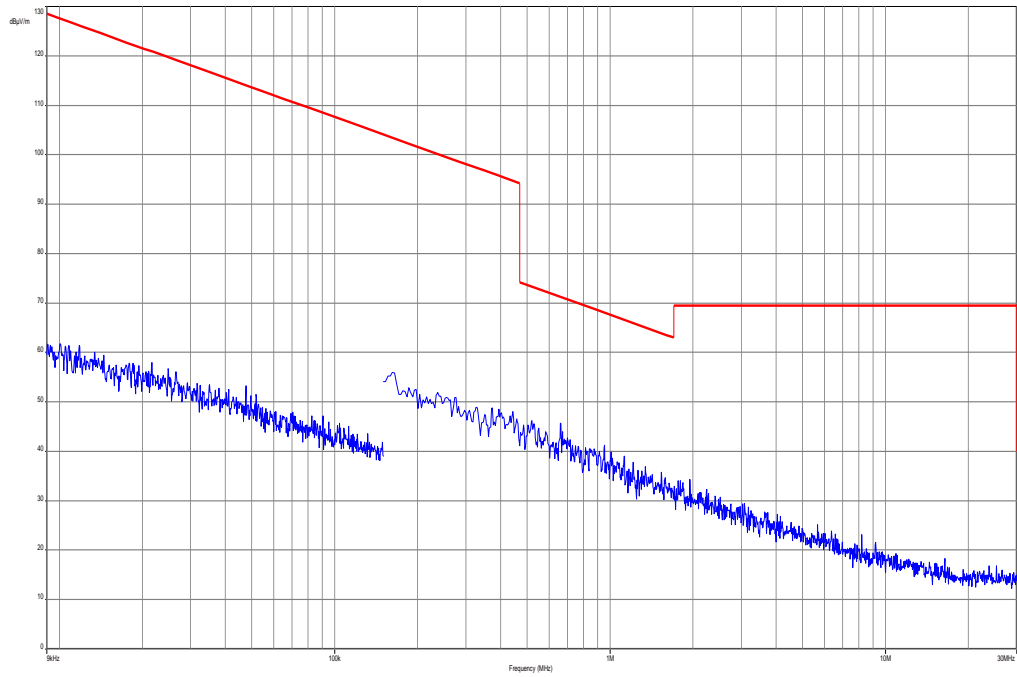
Limits:

FCC		IC
Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

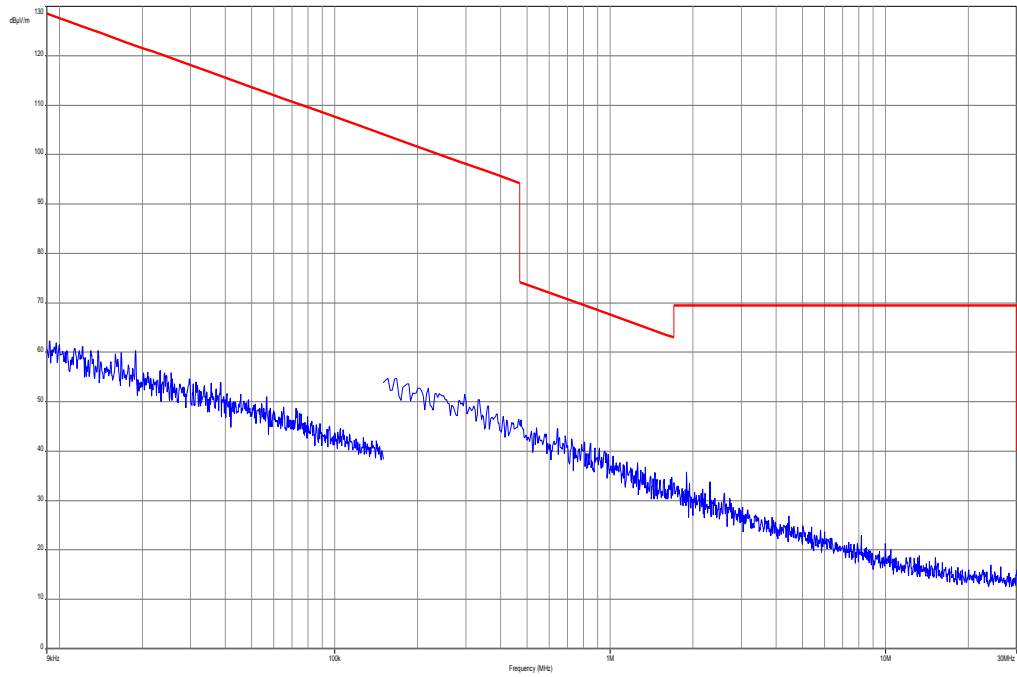
Result: Passed

Plots:

Plot 1: TX-Mode



Plot 2: RX-Mode



9.10 Spurious Emissions Radiated (Transmitter) > 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at channel 00, 12 and 24.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation	FSK

Limits:

ANSI C63.10 – FCC Public Notice DA 00-705

The average emission shall be determined by using Video averaging (VBW = 10 Hz). If the dwell time of the hopping signal is less than 100 ms (per channel), the VBW=10 Hz reading may be adjusted by a factor:
 $F = 20 \log(\text{dwell time}/100 \text{ ms})$

FCC	IC	
Band-edge Compliance of conducted and radiated emissions		
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Plots:

Plot 1: 30 MHz – 1 GHz, horizontal & vertical polarisation (lowest channel)

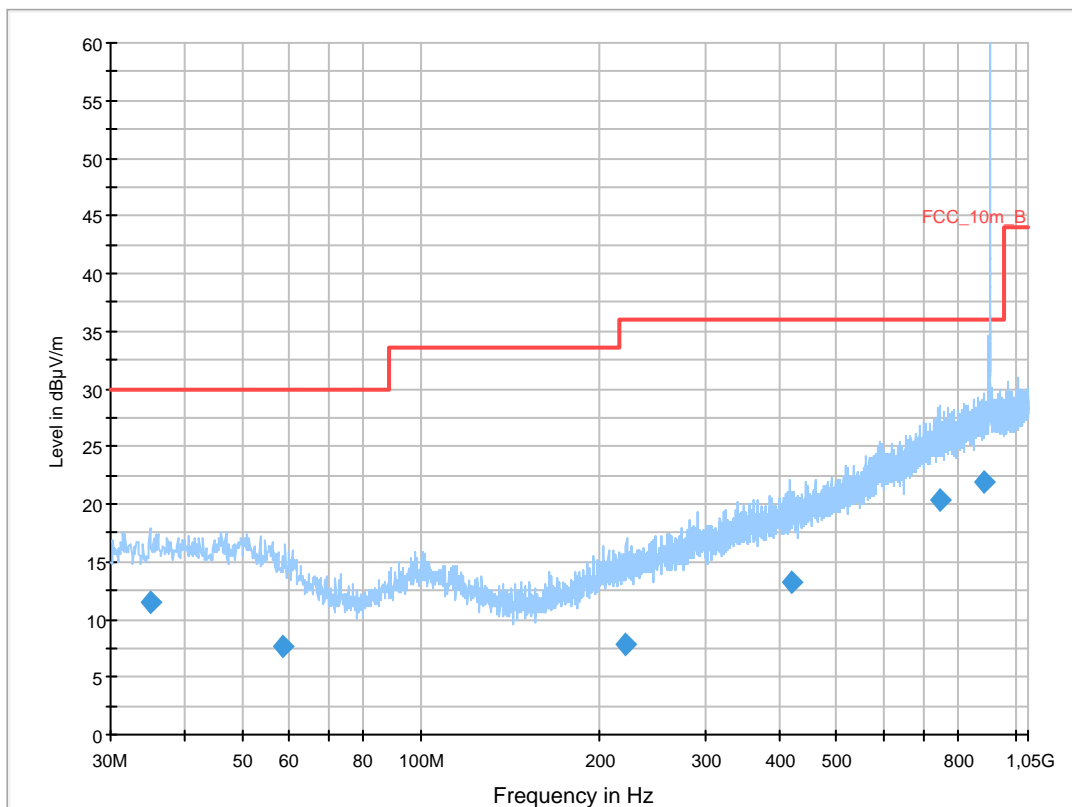
Common Information

EUT: PIR IMD 601
 Serial Number: prototype
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: tx ch 0
 Operator Name: Wolsdorfer
 Comment: battery powered 3.6V

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

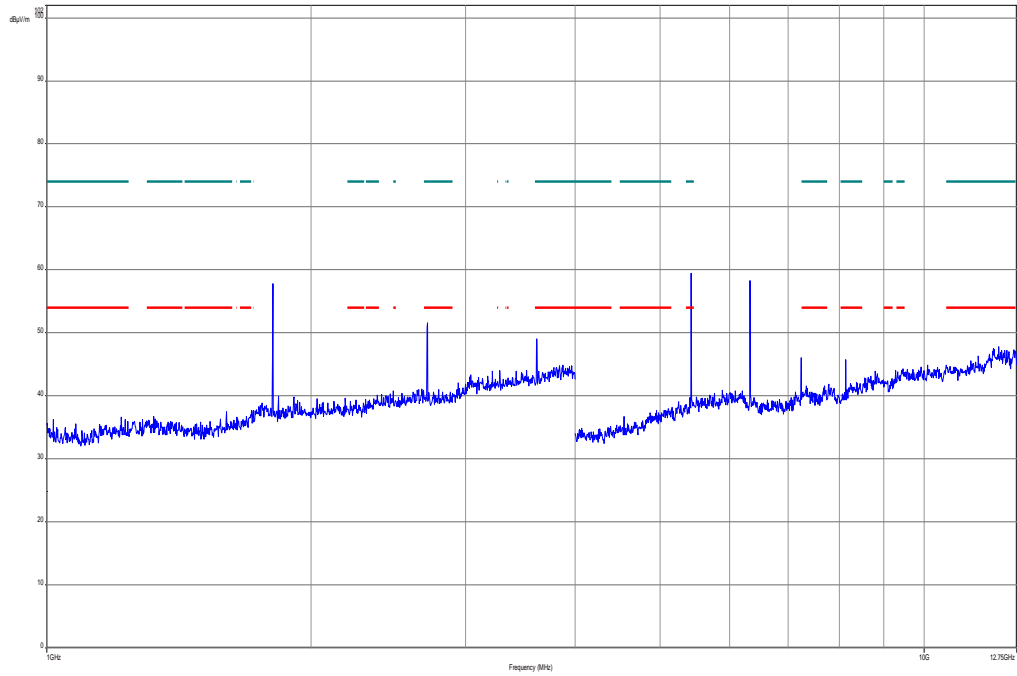
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.018100	11.4	1000.0	120.000	200.0	V	-44.0	13.0	18.6	30.0	
58.691550	7.7	1000.0	120.000	300.0	V	-8.0	11.9	22.3	30.0	
221.235900	7.9	1000.0	120.000	100.0	H	117.0	12.4	28.1	36.0	
418.525050	13.3	1000.0	120.000	400.0	V	100.0	17.2	22.7	36.0	
747.614700	20.3	1000.0	120.000	200.0	H	304.0	23.6	15.7	36.0	
885.856650	22.0	1000.0	120.000	400.0	H	291.0	25.0	14.0	36.0	

Plot 2: 1GHz – 12.75 GHz, horizontal & vertical polarisation (lowest channel)



Plot 3: 30 MHz – 1 GHz, horizontal & vertical polarisation (middle channel)

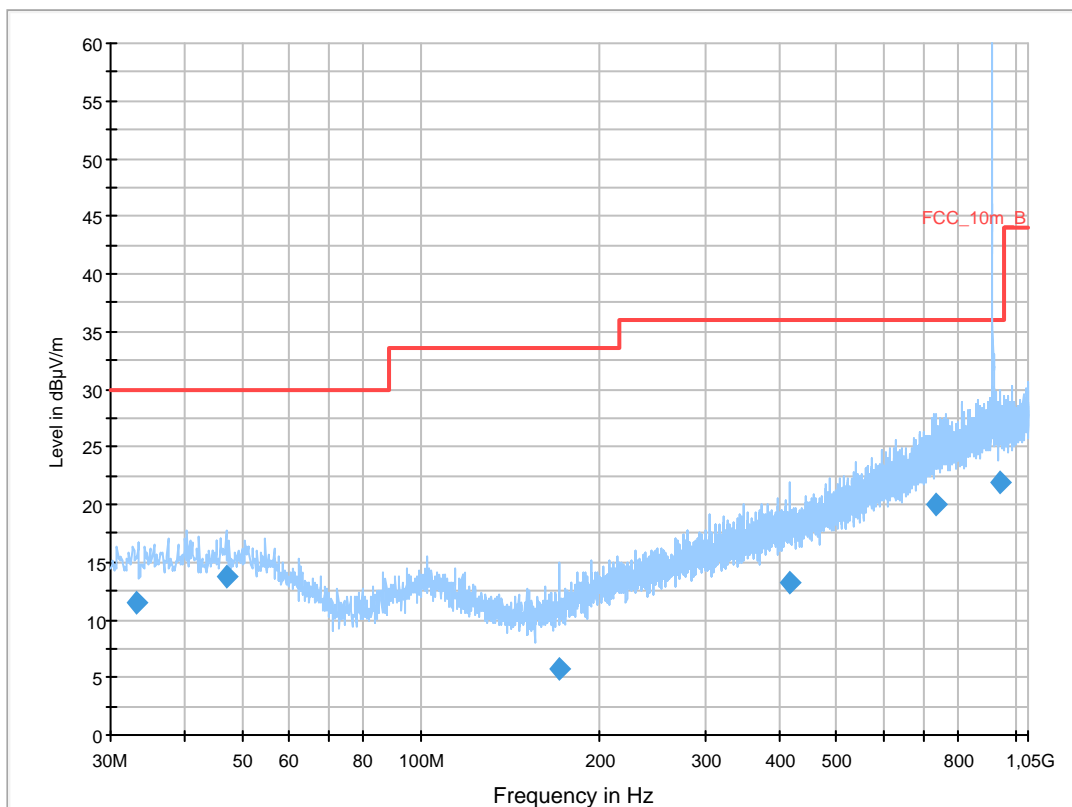
Common Information

EUT: PIR IMD 601
 Serial Number: prototype
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: tx ch 12
 Operator Name: Wolsdorfer
 Comment: battery powered 3.6V

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

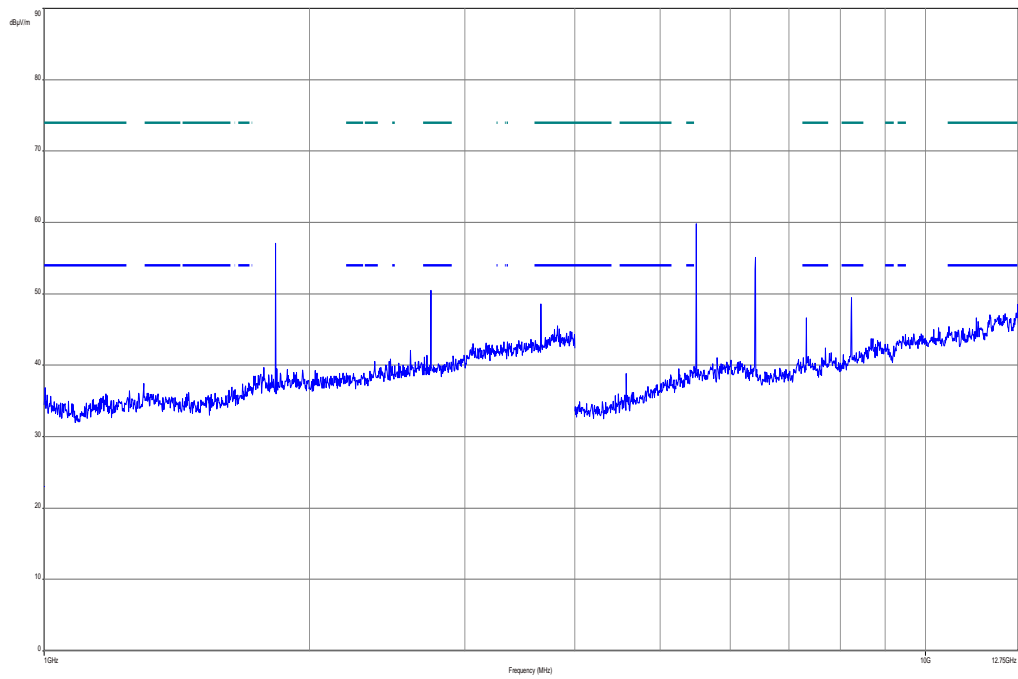
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
33.301200	11.5	1000.0	120.000	170.0	V	280.0	12.9	18.5	30.0	
46.980900	13.8	1000.0	120.000	98.0	V	85.0	13.3	16.2	30.0	
170.300250	5.7	1000.0	120.000	170.0	V	10.0	9.8	27.8	33.5	
416.494200	13.3	1000.0	120.000	170.0	H	100.0	17.2	22.7	36.0	
733.233000	20.1	1000.0	120.000	170.0	V	100.0	23.3	15.9	36.0	
915.301500	598.7	1000.0	120.000	111.0	H	170.0	25.2	-562.7	36.0	
...

Plot 4: 1GHz – 12 GHz, horizontal & vertical polarisation (middle channel)



Plot 5: 30 MHz – 1 GHz, horizontal & vertical polarisation (highest channel)

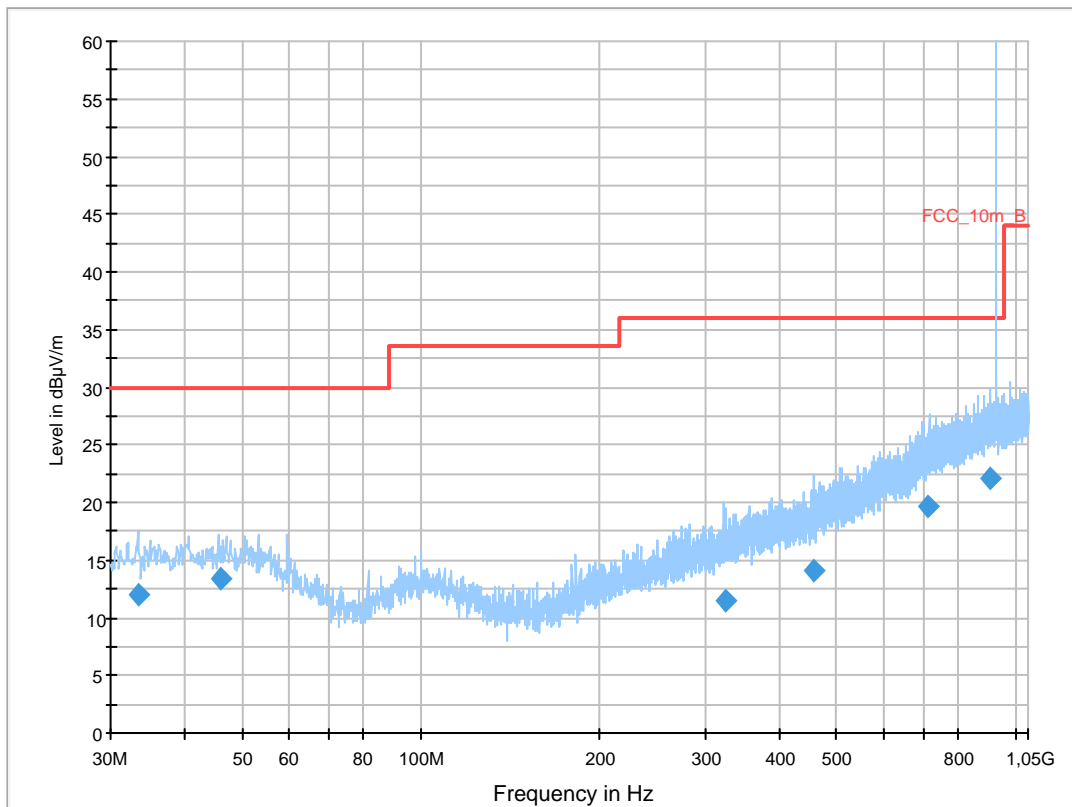
Common Information

EUT: PIR IMD 601
 Serial Number: prototype
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: tx ch 24
 Operator Name: Wolsdorfer
 Comment: battery powered 3.6V

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

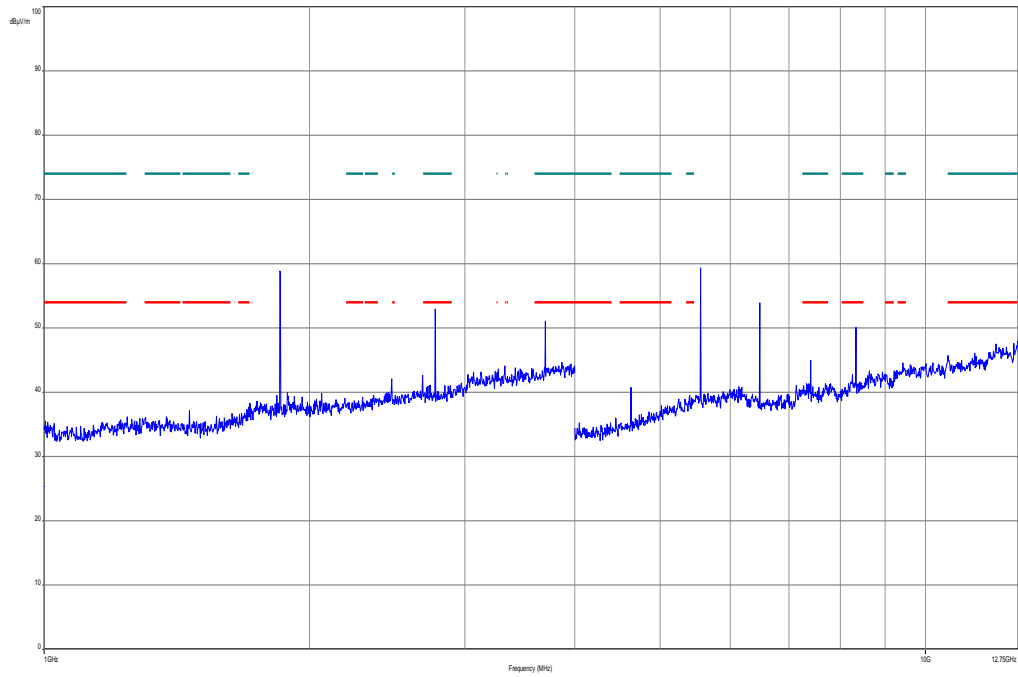
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
33.400500	12.1	1000.0	120.000	134.0	V	100.0	12.9	17.9	30.0	
45.978600	13.4	1000.0	120.000	98.0	V	2.0	13.3	16.6	30.0	
324.101700	11.4	1000.0	120.000	170.0	V	280.0	15.3	24.6	36.0	
457.194450	14.1	1000.0	120.000	111.0	H	272.0	17.8	21.9	36.0	
714.789300	19.6	1000.0	120.000	170.0	H	86.0	22.8	16.4	36.0	
908.211600	22.1	1000.0	120.000	170.0	V	-3.0	25.2	13.9	36.0	

Plot 6: 1GHz – 12 GHz, horizontal & vertical polarisation (highest channel)



Result:

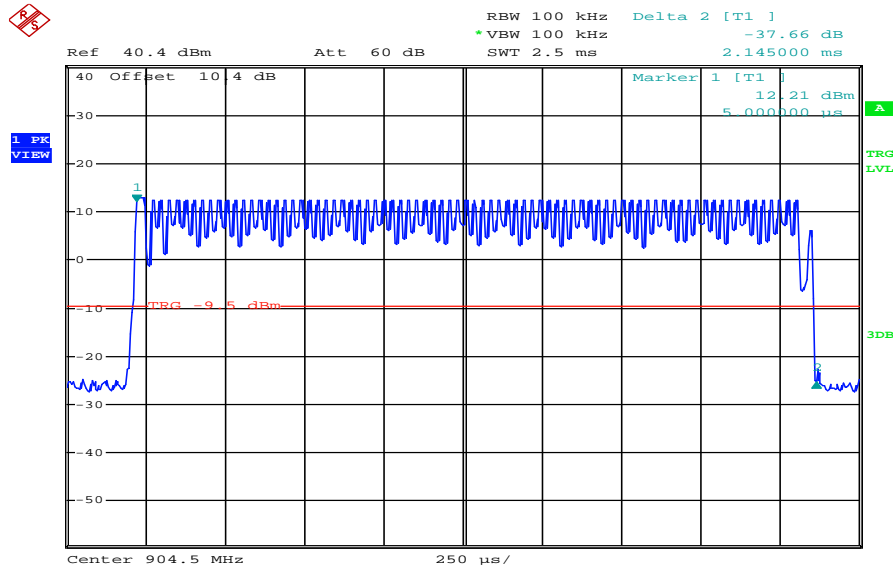
For radiated spurious emission the limits of 15.209 applies for all frequencies mentioned in 15.205. According to FCC Public Notice DA 00-705 (ANSI C63.10) the average emission shall be determined by using Video averaging (VBW = 10 Hz). If the dwell time of the hopping signal is less than 100 ms (per channel), the VBW=10 Hz reading may be adjusted by a factor:

$$F = 20 \cdot \log(\text{dwell time}/100 \text{ ms})$$

In a period of 100 ms, we have a maximum of 2 transmissions and that gives the correction factor for spurious measurement.

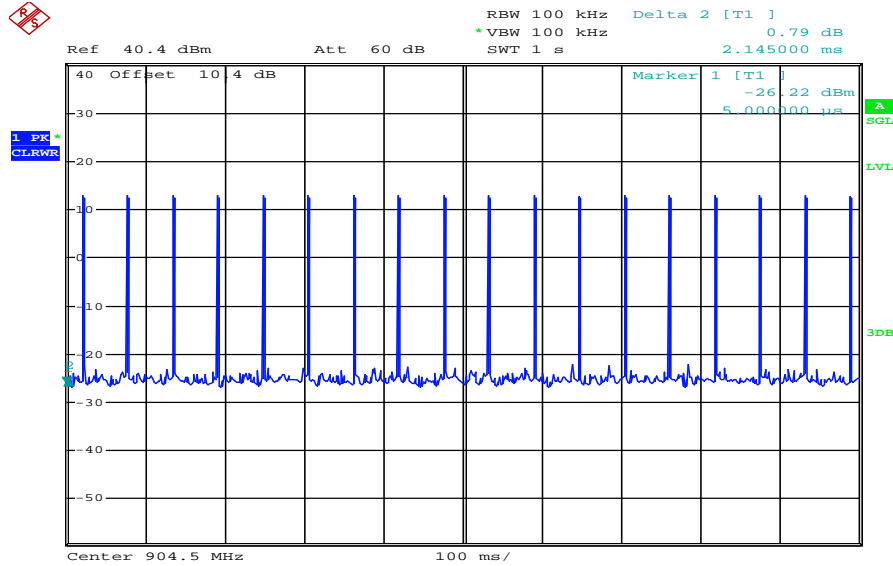
$$F = 20 \cdot \log(2 \cdot 2.145/100) = -27.35 \text{ dB}$$

Plot 1: Time slot length = 2.145 ms



Date: 24.APR.2013 10:34:27

Plot 2: Number of hopping channels in 1s = 18



Date: 24.APR.2013 10:36:23

SPURIOUS EMISSIONS LEVEL [dBμV/m]								
904.5 MHz			915.3 MHz			926.1 MHz		
Frequency [MHz]	Detector	Level [dBμV/m]	Frequency [MHz]	Detector	Level [dBμV/m]	Frequency [MHz]	Detector	Level [dBμV/m]
2714	Pk/AVG*	58.96/ 26.84	2745.4	Pk/AVG*	58.85/ 26.97	2778.7	Pk/AVG*	55.19/ 24.82
3617.5	Pk/AVG*	61.00/ 28.89	3661.6	Pk/AVG*	62.27/ 29.47	3704.8	Pk/AVG*	55.17/ 24.73
5426.3	Pk/AVG*	63.79/ 32.89	7321.5	Pk/AVG*	65.01/ 35.00	7408.1	Pk/AVG*	50.63/ 21.56
8139.6	Pk/AVG*	54.71/ 22.92	8238.5	Pk/AVG*	68.26/ 34.94	8335.6	Pk/AVG*	56.77/ 26.83
For all other emissions see plots from 9 kHz – 1 GHz								
Measurement uncertainty			±3 dB					

*AVG: Detector Average corrected with the correction factor F = -27.35 dB

Result: **Passed**

9.11 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	40	3
88 – 216	43.5	3
216 – 960	46.0	3
Above 960	54.0	3

Result: Passed

Plots:

Plot 1: 30 MHz – 1 GHz, horizontal & vertical polarisation

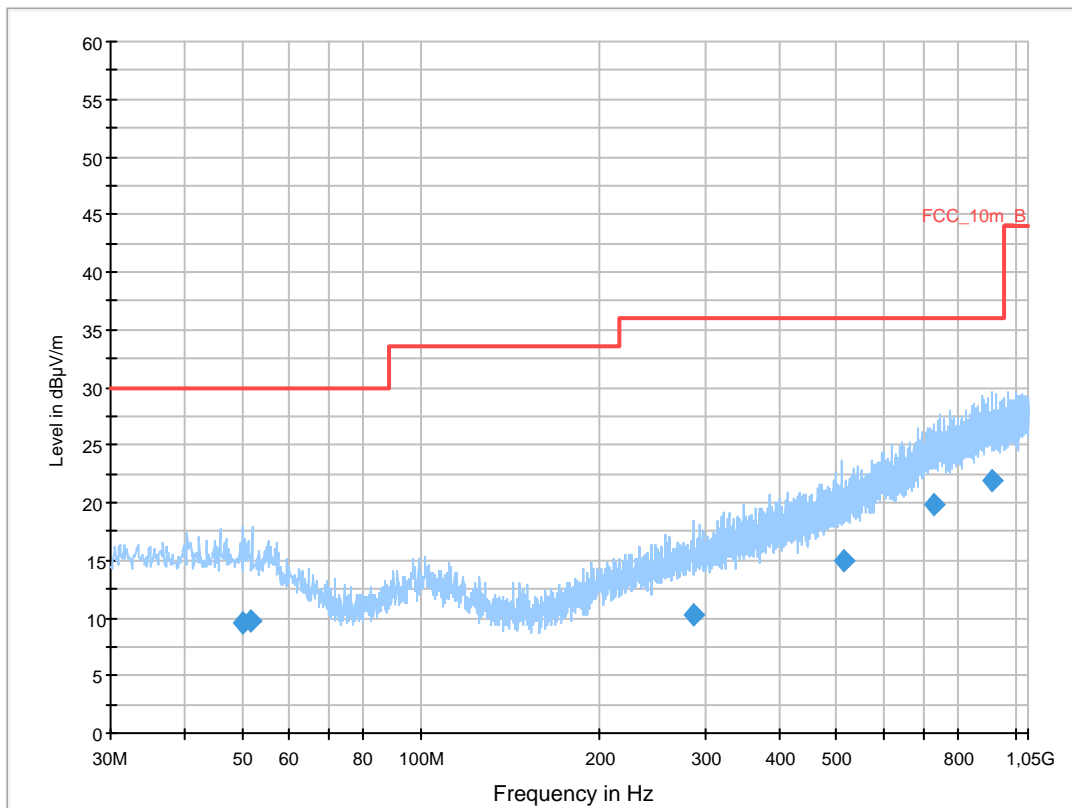
Common Information

EUT: PIR IMD 601
 Serial Number: prototype
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: rx
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

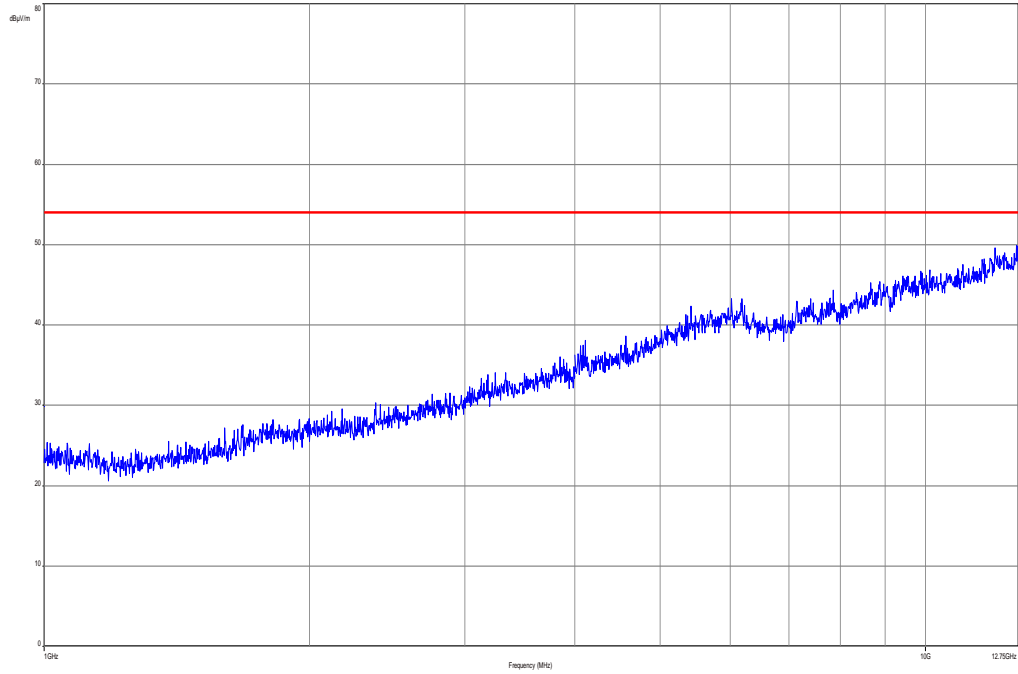
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
50.085300	9.6	1000.0	120.000	170.0	H	265.0	13.4	20.4	30.0	
51.474300	9.7	1000.0	120.000	170.0	V	190.0	13.2	20.3	30.0	
287.354100	10.2	1000.0	120.000	170.0	V	190.0	14.2	25.8	36.0	
512.535900	15.0	1000.0	120.000	98.0	H	0.0	18.9	21.0	36.0	
727.049400	19.9	1000.0	120.000	170.0	H	81.0	23.1	16.1	36.0	
910.307400	21.8	1000.0	120.000	155.0	H	88.0	25.2	14.2	36.0	

Plot 2: 1 – 12 GHz, RX-Mode, horizontal & vertical polarisation



10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	11.05.2011	11.05.2013
2	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
3	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
4	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
5	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
6	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
7	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
8	n. a.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
9	n. a.	Band Reject filter	WRCG240 0/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
10	n. a.	Highpass Filter	WHKX7.0/1 8G-8SS	Wainwright	18	300003789	ne		
11	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
12	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
13	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm	FSP30	R&S	100886	300003575	k	22.08.2012	22.08.2014

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vIKI!	Attention: extended calibration interval	*	next calibration ordered / currently in progress
NK!	Attention: not calibrated		

11 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A Photographs of the test setup

Photo documentation:

Photo 1:

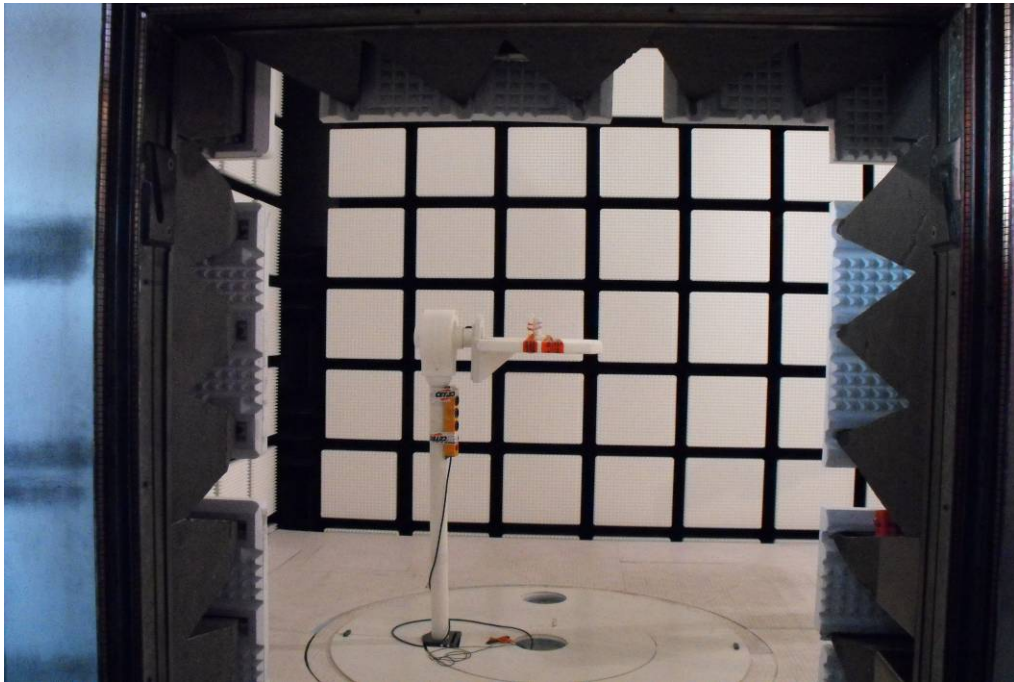


Photo 2:

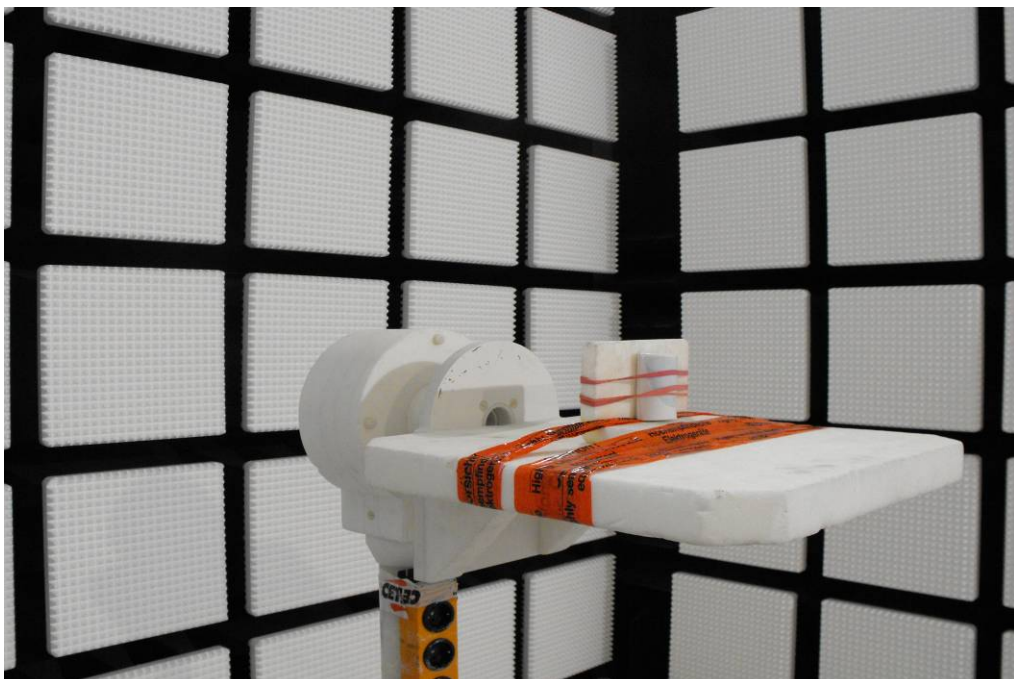


Photo 3:

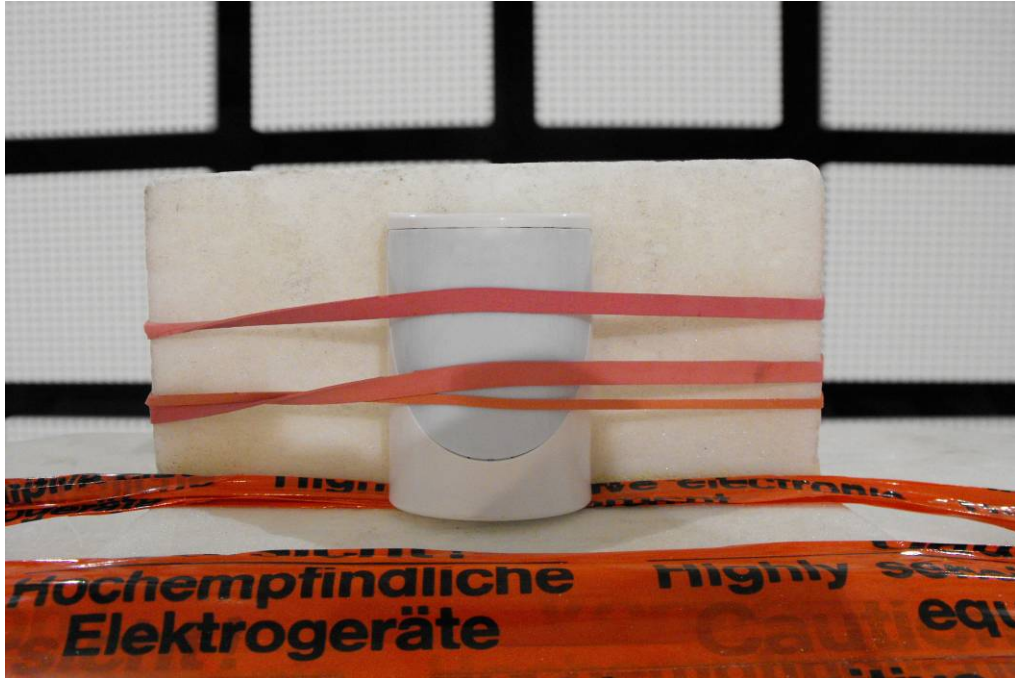


Photo 4:

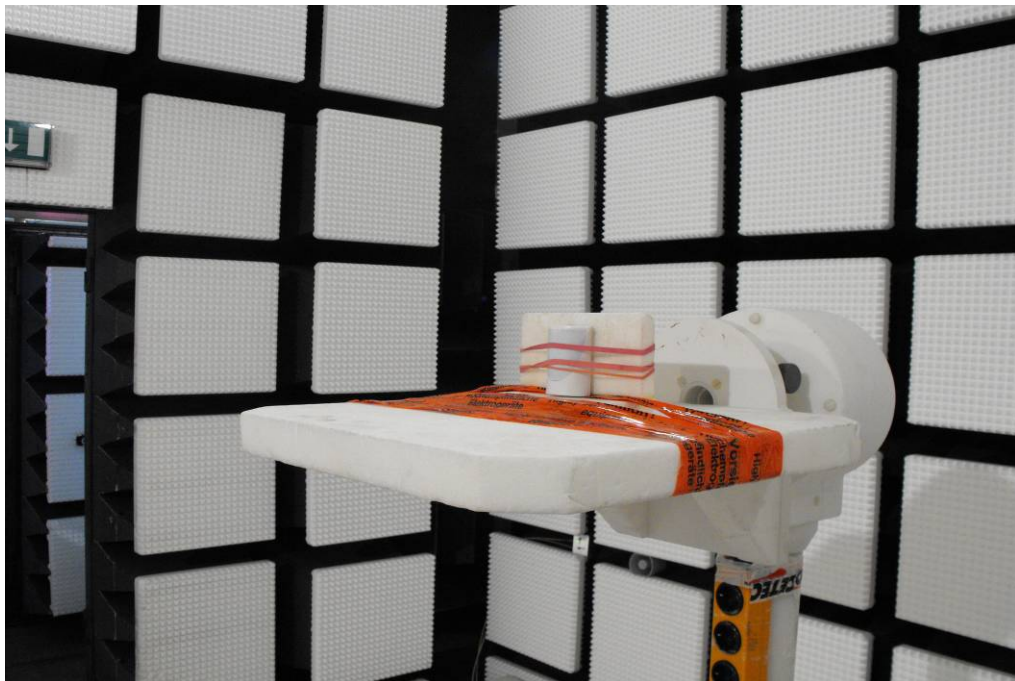


Photo 5:



Photo 6:

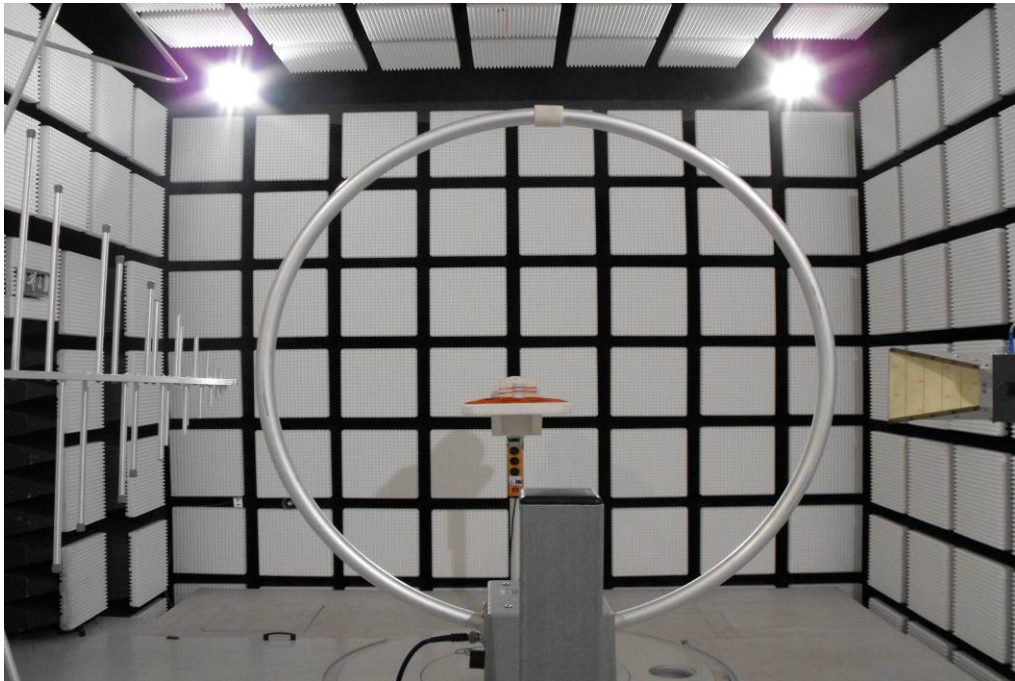
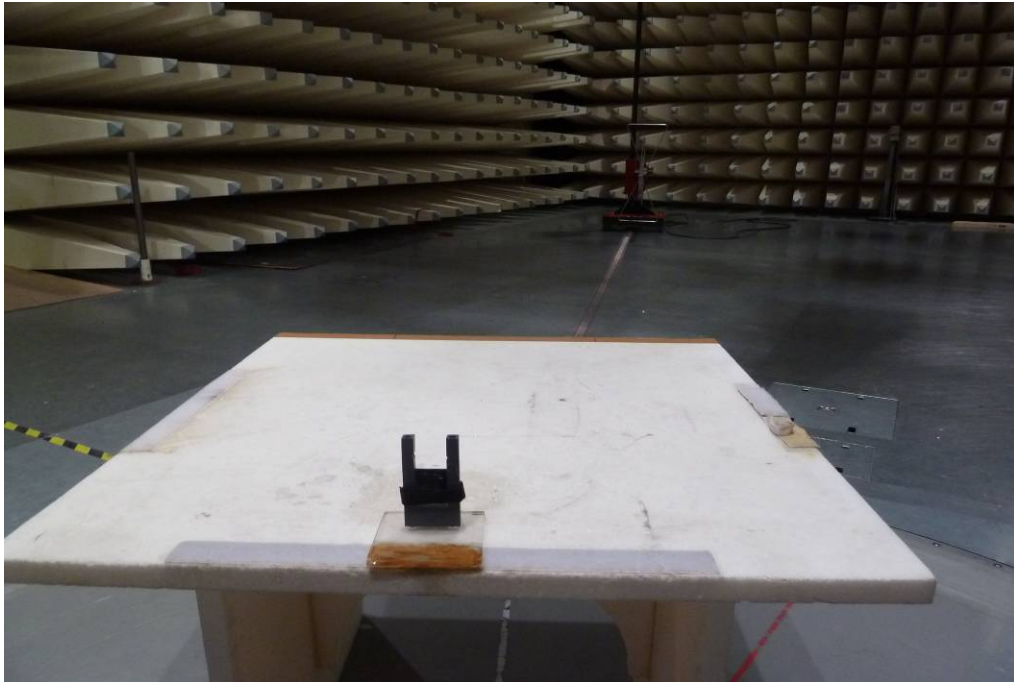


Photo 7:



Annex B External photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:



Photo 5:



Photo 6:



Photo 7:



Annex C Internal photographs of the EUT

Photo documentation:

Photo 1:

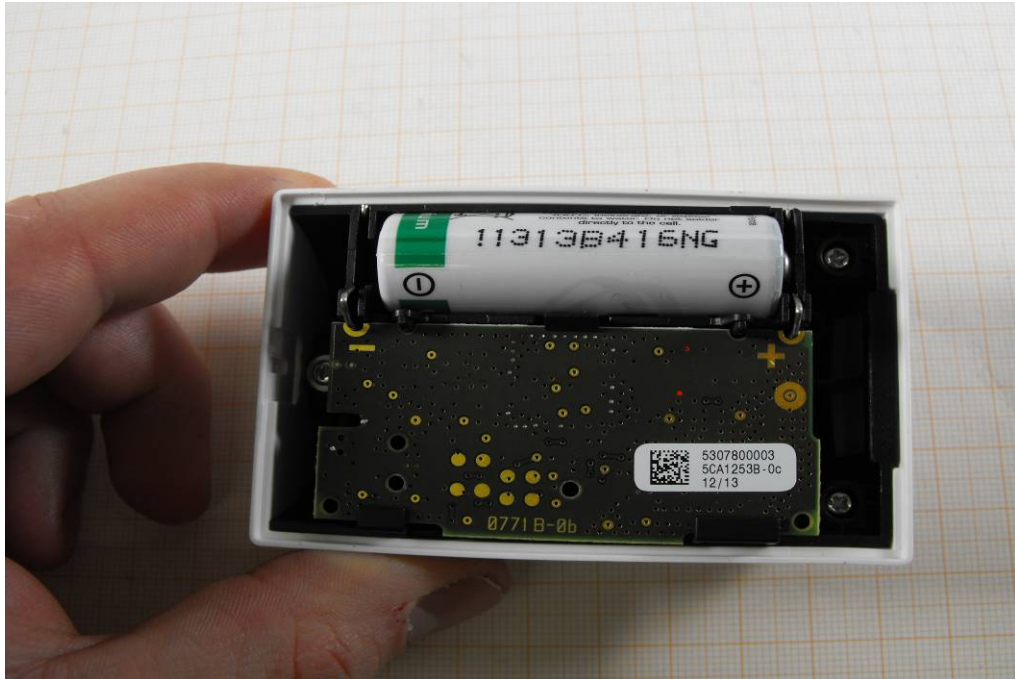


Photo 2:

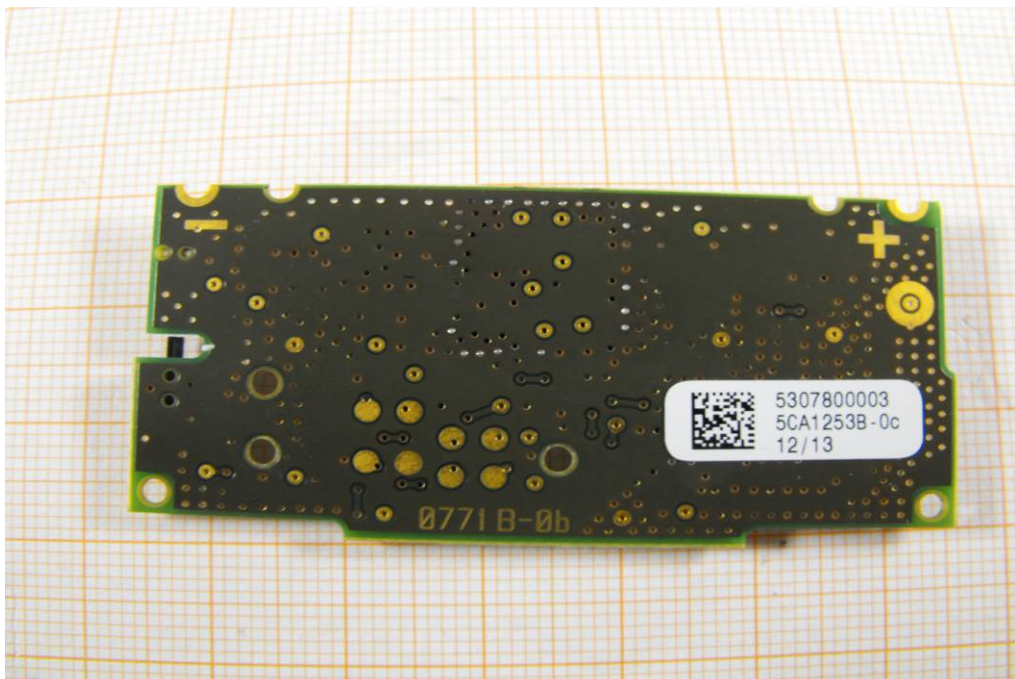


Photo 3:

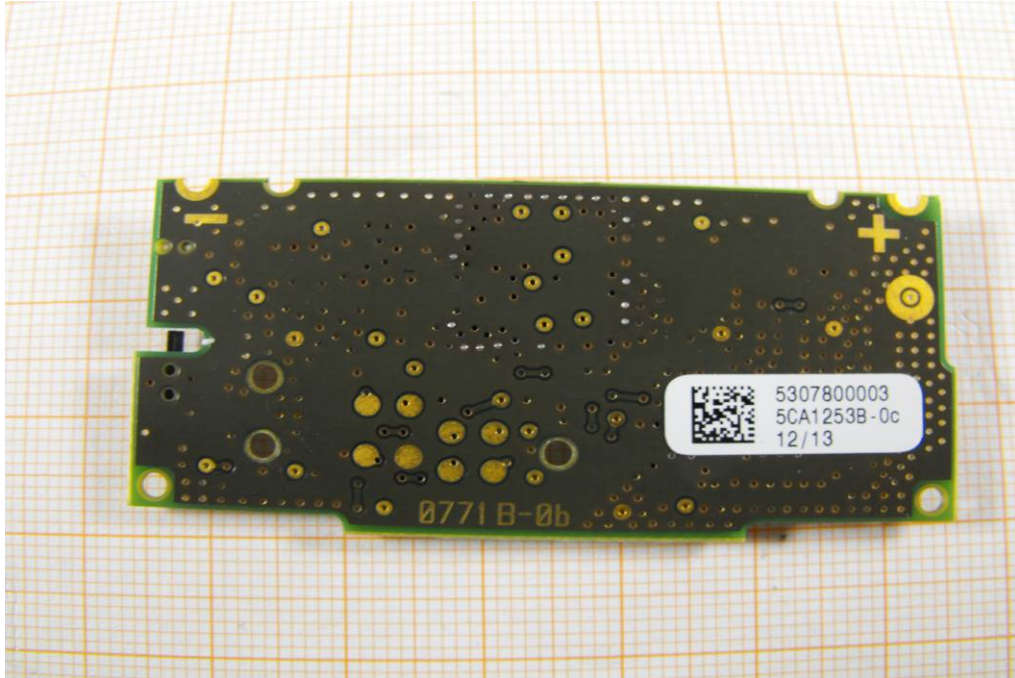


Photo 4:

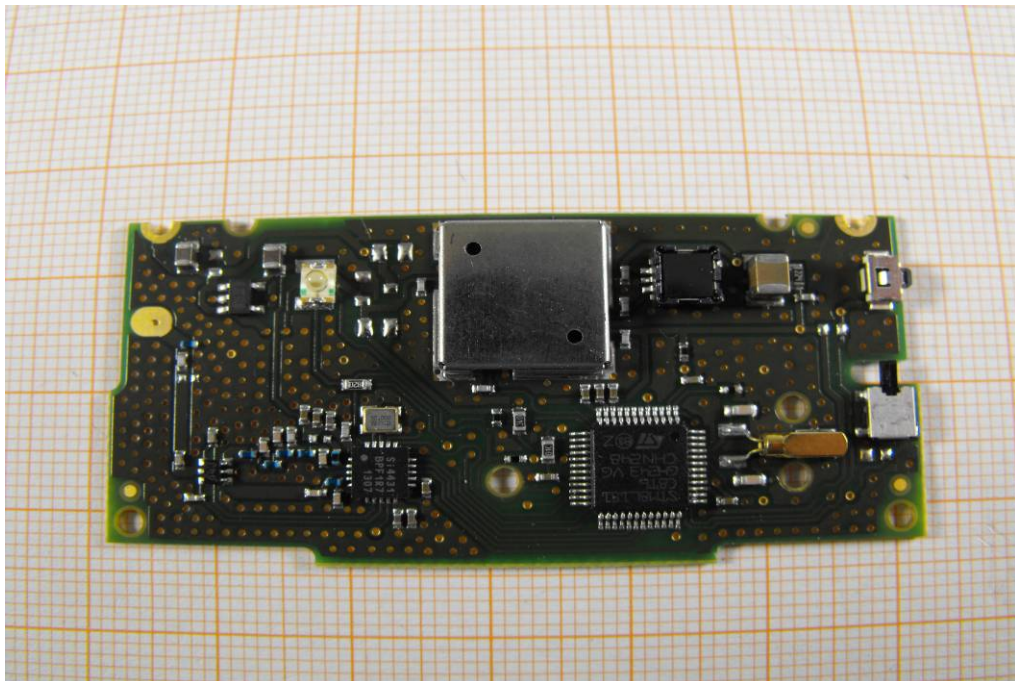


Photo 5:

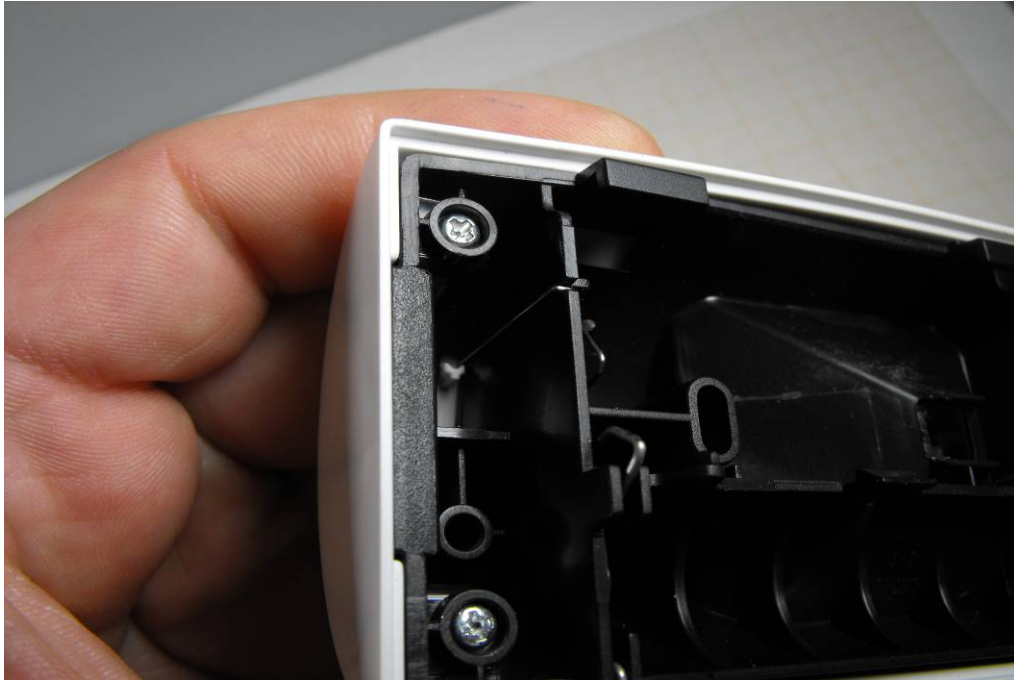


Photo 6:

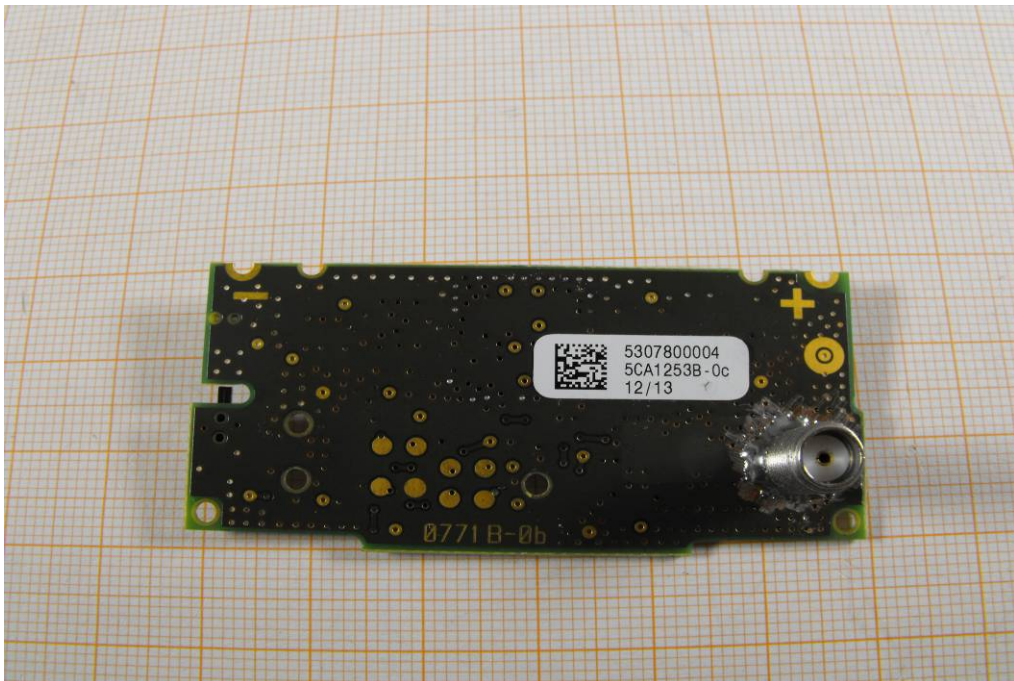


Photo 7:

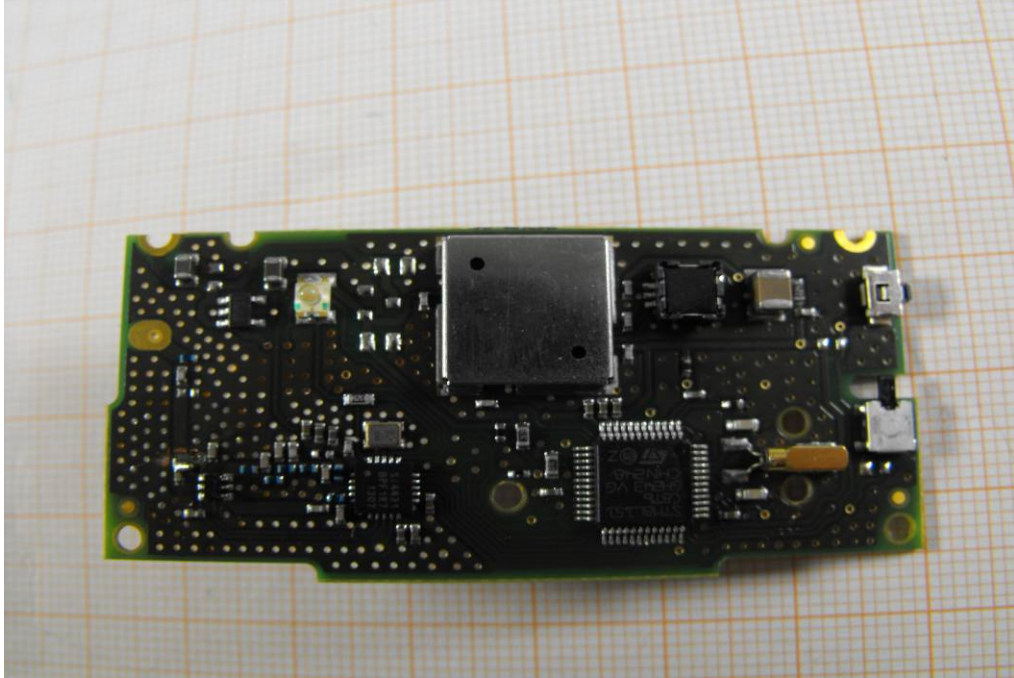
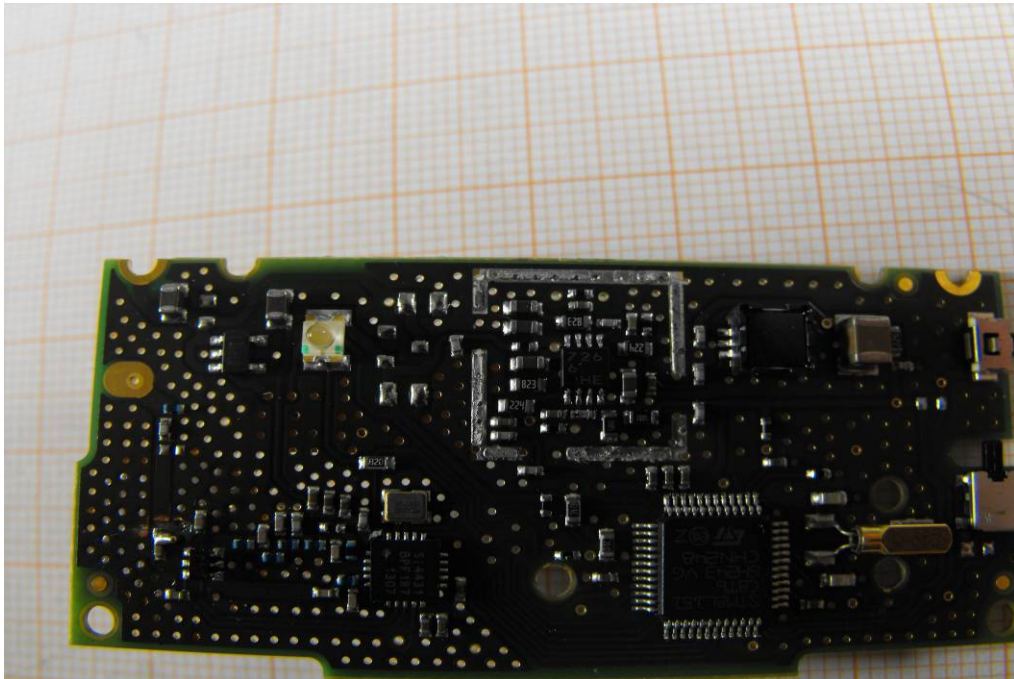


Photo 8:



Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-05-03
-A	Correction of model name and editorial changing	2013-05-08
-B	Editorial changes	2013-05-16

Annex E Further information

Glossary

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex F Accreditation Certificate

Front side of certificate



Deutsche Akkreditierungsstelle GmbH

Befehlene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
 Unterzeichnerin der Multilateralen Abkommen
 von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
 Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

- Drahtgebundene Kommunikation einschließlich xDSL**
- VoIP und DECT
- Akustik
- Funk einschließlich WLAN
- Short Range Devices (SRD)
- RFID
- WiMax und Richtfunk
- Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
- Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
- Produktsicherheit
- SAR und Hearing Aid Compatibility (HAC)
- Umweltsimulation
- Smart Card Terminals
- Bluetooth
- Wi-Fi- Services

Die Akkreditierungskurde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-01

Frankfurt am Main, 18.01.2013
Siehe Hinweis auf der Rückseite

Im Auftrag
 Dr. Ingrid Röhler
 Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
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 10117 Berlin

Standort Frankfurt am Main
 Gartenstraße 6
 60594 Frankfurt am Main

Standort Braunschweig
 Bundesallee 100
 38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungskurde bedarf der vorherigen schriftlichen Zustimmung der Deutschen Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblatts durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30). Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:

- EA: www.european-accreditation.org
- ILAC: www.ilac.org
- IAF: www.iaf.nu

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>