

TEST REPORT

Test report no.: 1-5865/13-09-02



Testing laboratory

CETECOM ICT Services GmbH

Untertuerkheimer Strasse 6 – 10

66117 Saarbruecken / Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

Internet: <http://www.cetecom.com>

e-mail: ict@cetecom.com

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

RSI Video Technologies

Siège Social -Headquarters

25 rue Jacobi-Netter

67200 Strasbourg / FRANCE

Phone: +33 3 90 20 66 96

Fax: +33 3 88 29 04 00

Contact: Thierry Petri

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 - Licence-exempt Radio Apparatus (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: Centrale d'alarme

Model name: XT-iP630

FCC ID: X46XT03

IC: 8816A-XT03

Frequency: ISM band 902 MHz – 928 MHz
(lowest channel 904.5 MHz; highest channel 926.1 MHz)

Technology tested: Proprietary FHSS system

Antenna: Integrated wire antenna

Power supply: 12.0V DC by Lithium Battery

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:



Stefan Bös
Senior Testing Manager

Test performed:



Tobias Wittenmeier
Expert

1 Table of contents

1	Table of contents	2
2	General information	3
2.1	Notes and disclaimer	3
2.2	Application details	3
3	Test standard/s	3
4	Test environment	4
5	Test item	4
6	Test laboratories sub-contracted	4
7	Description of the test setup	5
7.1	Radiated measurements chamber F	5
7.2	Radiated measurements chamber C	6
7.3	Conducted measurements	7
8	Summary of measurement results	8
8.1	Additional comments	9
8.2	RSP100 test report cover sheet / performance test data	10
9	Measurement results	11
9.1	Antenna gain	11
9.2	Carrier Frequency Separation	12
9.3	Number of Hopping Channels	13
9.4	Average Time of Occupancy	14
9.5	20 dB Bandwidth	16
9.6	Maximum Output Power Radiated	19
9.7	Maximum Output Power Conducted	20
9.8	Band-edge Compliance of conducted and radiated emissions	23
9.9	Spurious Emissions Conducted (Transmitter)	24
9.10	Spurious Emissions Radiated < 30 MHz	28
9.11	Spurious Emissions Radiated (Transmitter) > 30 MHz	30
9.12	RX spurious emissions radiated	42
10	Test equipment and ancillaries used for tests	46
11	Observations	47
Annex A	Photographs of the test setup	48
Annex B	External photographs of the EUT	52
Annex C	Internal photographs of the EUT	55
Annex D	Document history	60
Annex E	Further information	60
Annex F	Accreditation Certificate	61

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.

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

The testing service provided by CETECOM ICT Services GmbH has been rendered under the current "General Terms and Conditions for CETECOM ICT Services GmbH".

CETECOM ICT Services GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.

Under no circumstances does the CETECOM ICT Services GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.

Under no circumstances does the CETECOM ICT Services GmbH test report include or imply any product or service warranties from CETECOM ICT Services GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CETECOM ICT Services GmbH.

All rights and remedies regarding vendor's products and services for which CETECOM ICT Services GmbH has prepared this test report shall be provided by the party offering such products or services and not by CETECOM ICT Services GmbH.

In no case this test report can be considered as a Letter of Approval.

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:	2013-08-14
Date of receipt of test item:	2013-09-17
Start of test:	2013-09-17
End of test:	2013-09-17
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	01.10.2012	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	01.12.2010	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (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}	12.0 V DC by Lithium Battery
	V_{max}	-/- V
	V_{min}	-/- V

5 Test item

Kind of test item	:	Centrale d'alarme
Type identification	:	XT-iP630
S/N serial number	:	No information available
HW hardware status	:	No information available
SW software status	:	No information available
Frequency band [MHz]	:	ISM band 902 MHz – 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	:	12.0 V DC by Lithium Battery
Temperature range	:	-10°C to +40 °C

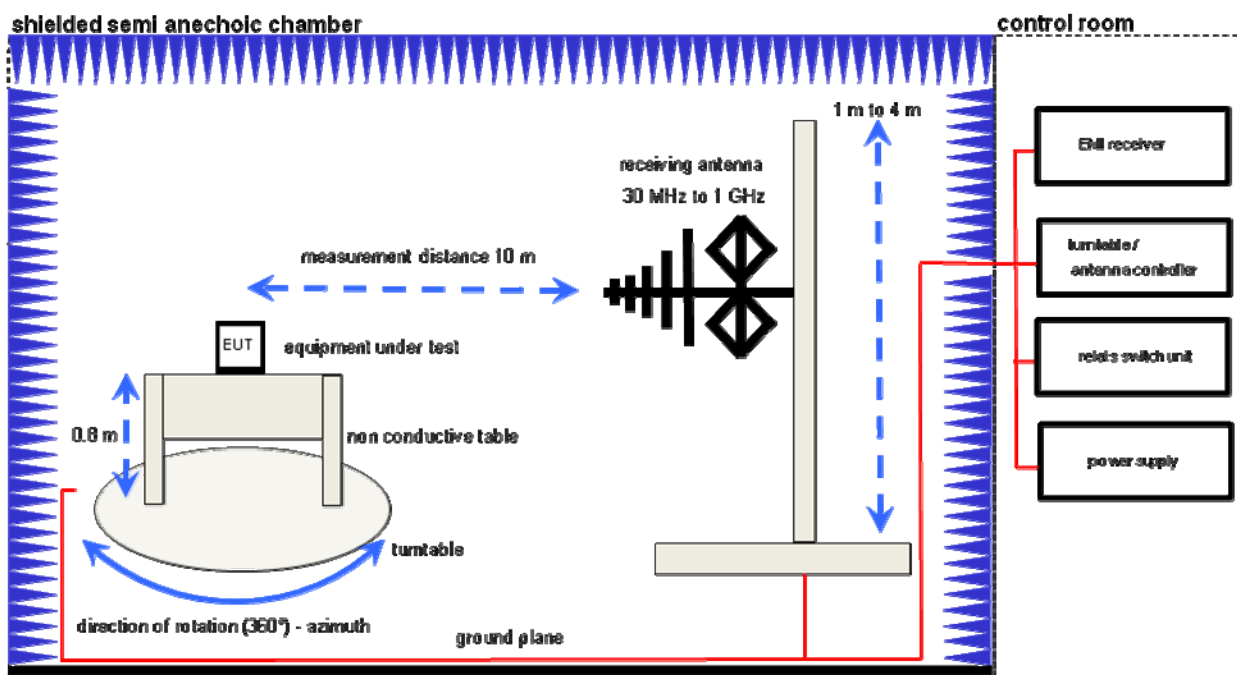
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

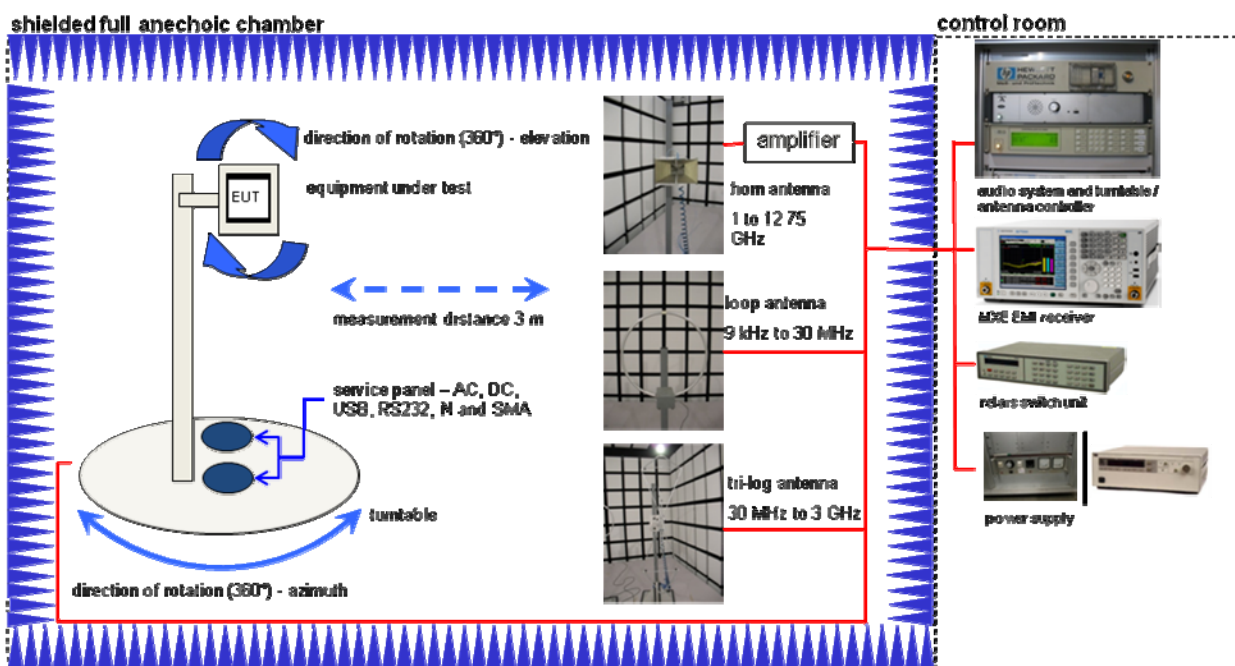
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. 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.



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368
DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580
EMI Test Receiver	ESCI 3	R&S	100083	300003312
Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379
Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745
Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746
Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787

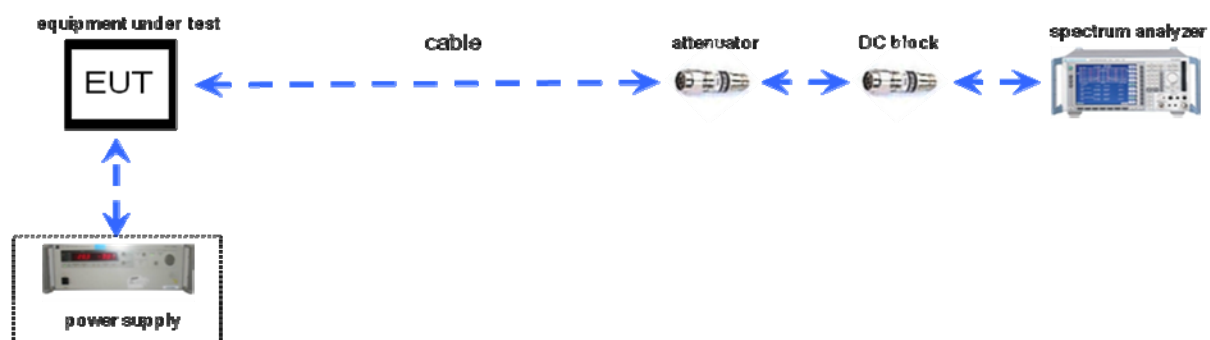
7.2 Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

7.3 Conducted measurements



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Signal Analyzer 26.5 GHz	MXA	Agiland	N9020A	300003805

8 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	2013-10-16	-/-

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) §15.205(a)	Band-edge Compliance	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

8.1 Additional comments

Reference documents: None

Special test descriptions: The EUT has an additional antenna connector on the main board to perform the conducted measurements. This port can be activated by the test software. In normal use this port will be disabled.

Configuration descriptions: None

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

8.2 RSP100 test report cover sheet / performance test data

Test report number	:	1-5865/13-09-02
Equipment model number	:	XT-iP630
Certification number	:	8816A-XT03
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.: 20.61 mW (FSK modulation) EIRP: 57.41 mW (FSK modulation)
Occupied bandwidth (99%-BW) [kHz]	:	317.6 (FSK modulation)
Type of modulation	:	FHSS technology with FSK modulation.
Emission designator (TRC-43)	:	318KFXD (FSK modulation)
Antenna information	:	Integrated wire antenna
Transmitter spurious (worst case) [dBμV/m @ 3m]:		69.62 Pk/40.06 AVG @ 3618 MHz
Receiver spurious (worst case) [dBμV/m @ 3m]:		48 dBμV/m @ 12.75 GHz (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:

2013-10-16

Tobias Wittenmeier

Date

Name

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]	13.14	12.65	12.61
Radiated power [dBm]	17.20	17.24	17.59
Gain [dBi] Calculated	+4.06	+4.59	+4.98

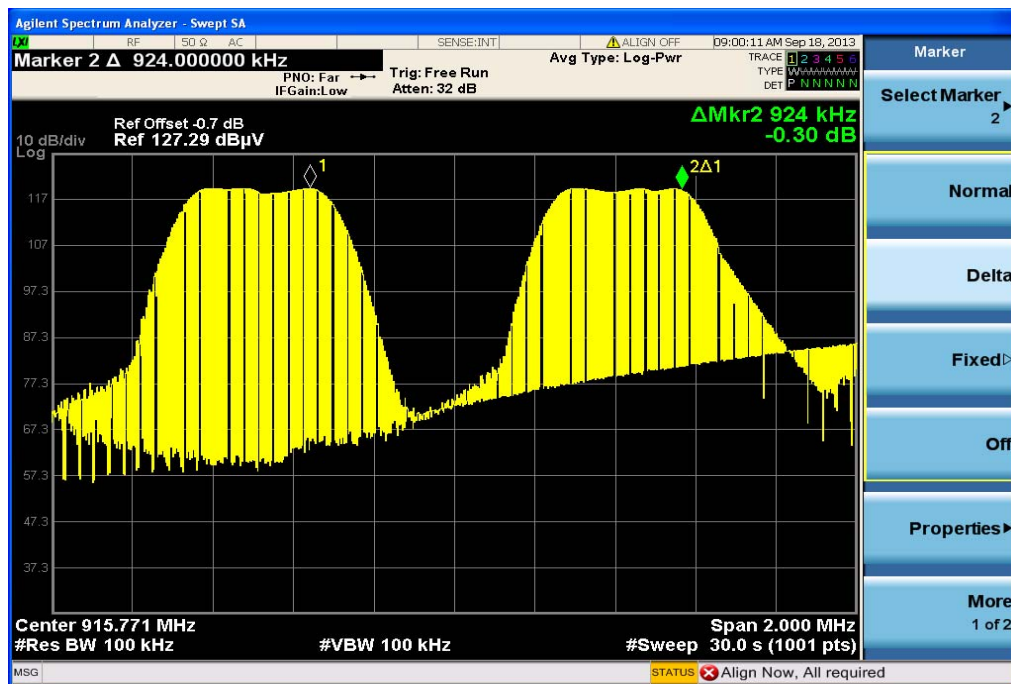
Limits:

FCC	IC
Antenna gain	
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.	

Result: **Passed**

9.2 Carrier Frequency Separation

Plot 1:



Result: The channel separation is: 924 kHz

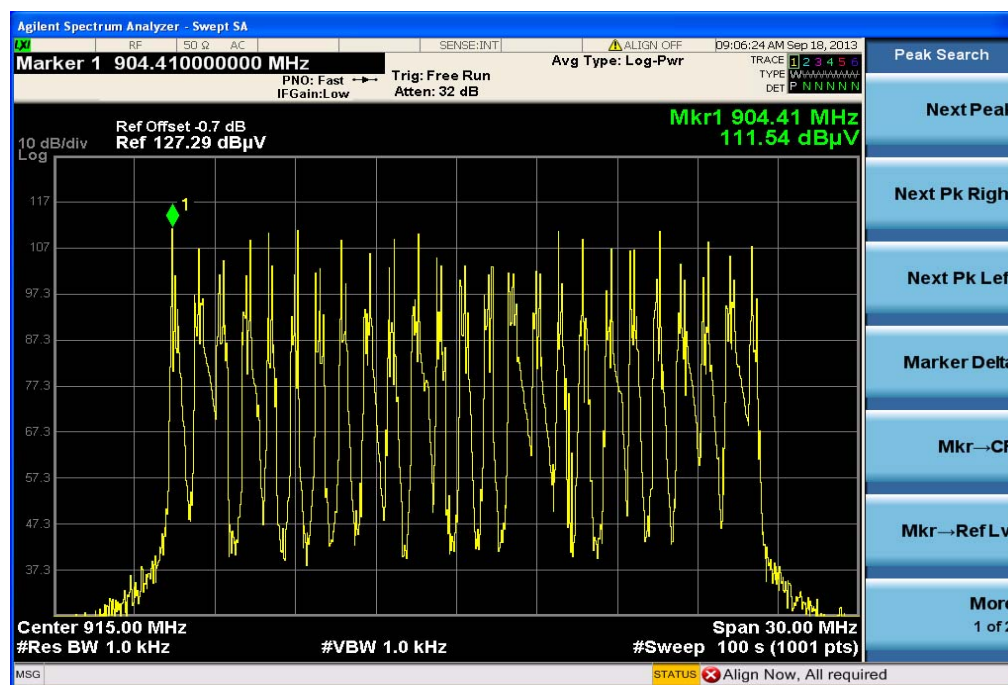
Limits:

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:



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.	

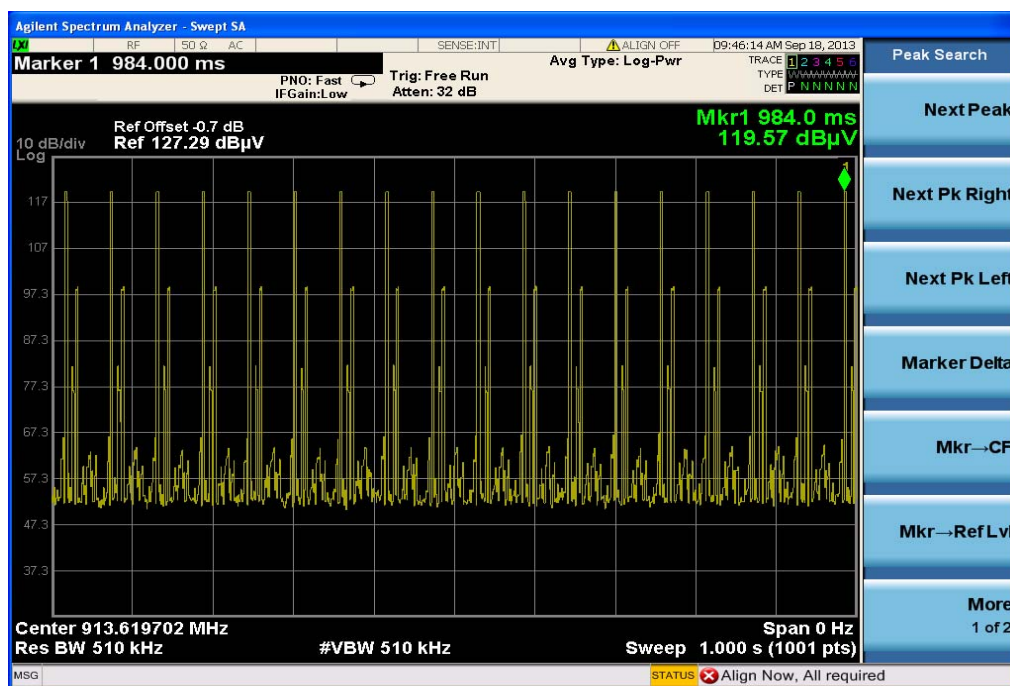
Result: Passed

9.4 Average Time of Occupancy

Plot 1: Time slot length = 2.167 ms



Plot 2: hops / channel @ 1s = 18



Result: The time slot length is = 2.167 ms
Number of hops / channel @ 1s = 18

Within 10 s period, the average time of occupancy = $10 \text{ s} * 18 * 2.167 \text{ ms}$

→ The average time of occupancy = 390.06 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
Resolution bandwidth:	10 kHz
Video bandwidth:	30 kHz
Span:	See plots
Trace-Mode:	Max Hold

Result:

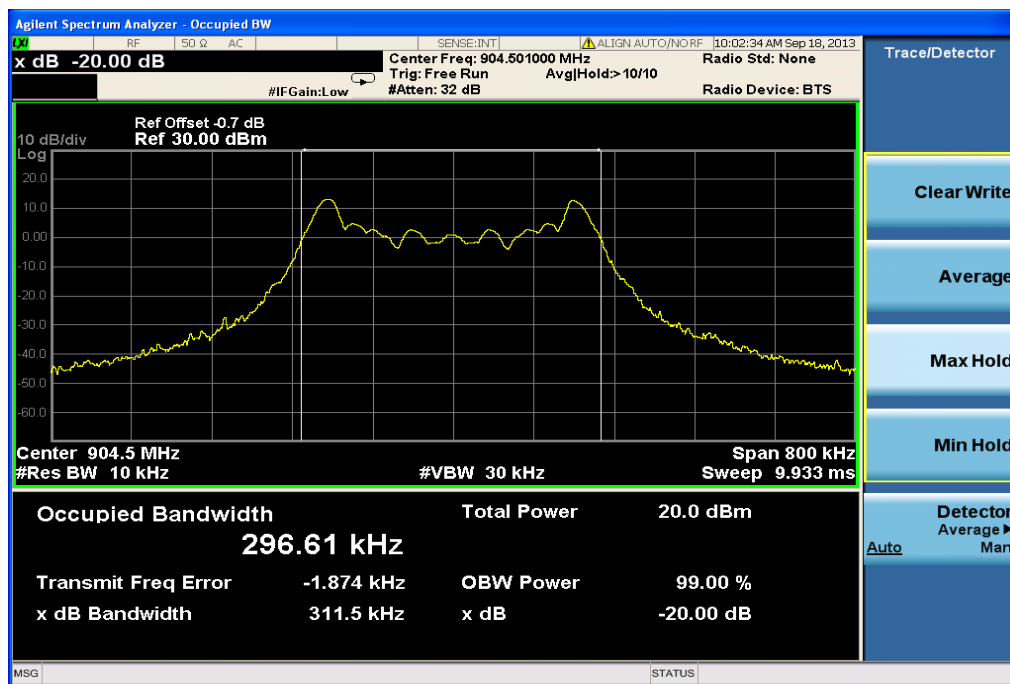
Test Conditions		20dB BANDWIDTH [kHz]		
		904.5 MHz	915.3 MHz	926.1 MHz
T_{nom}	V_{nom}	311.5	317.6	317.1
Measurement uncertainty		± 10 kHz		

Limits:

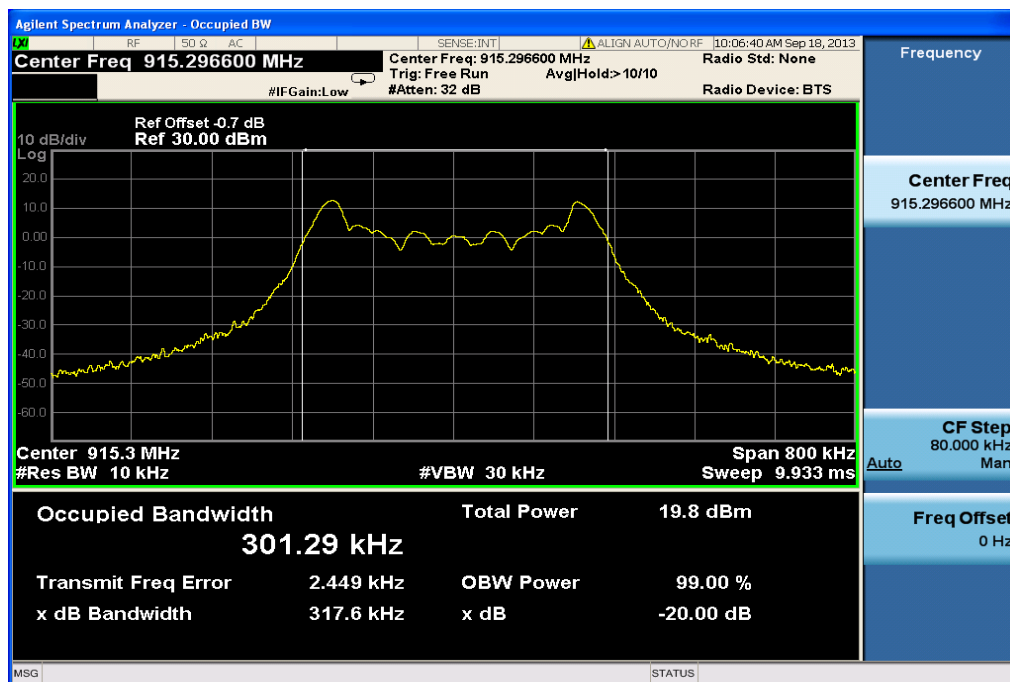
FCC	IC
20dB Bandwidth	
The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.	

Result: **Passed**

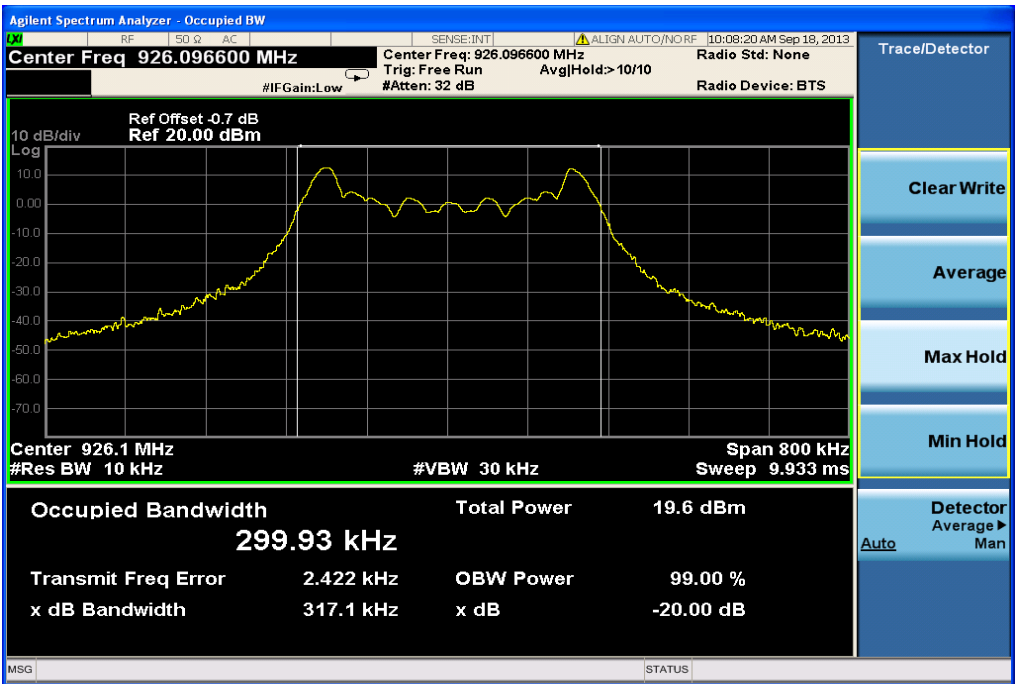
Plot 1: Low Channel



Plot 2: Middle Channel



Plot 3: High Channel



9.6 Maximum Output Power Radiated

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz
Span:	5 MHz
Trace-Mode:	Max Hold

Result:

Test Conditions		EIRP [dBm]		
		904.5 MHz	915.3 MHz	926.1 MHz
T_{nom}	V_{nom}	17.20	17.24	17.59
Measurement uncertainty		$\pm 3\text{dB}$		

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz
Span:	5 MHz
Trace-Mode:	Max Hold

Result:

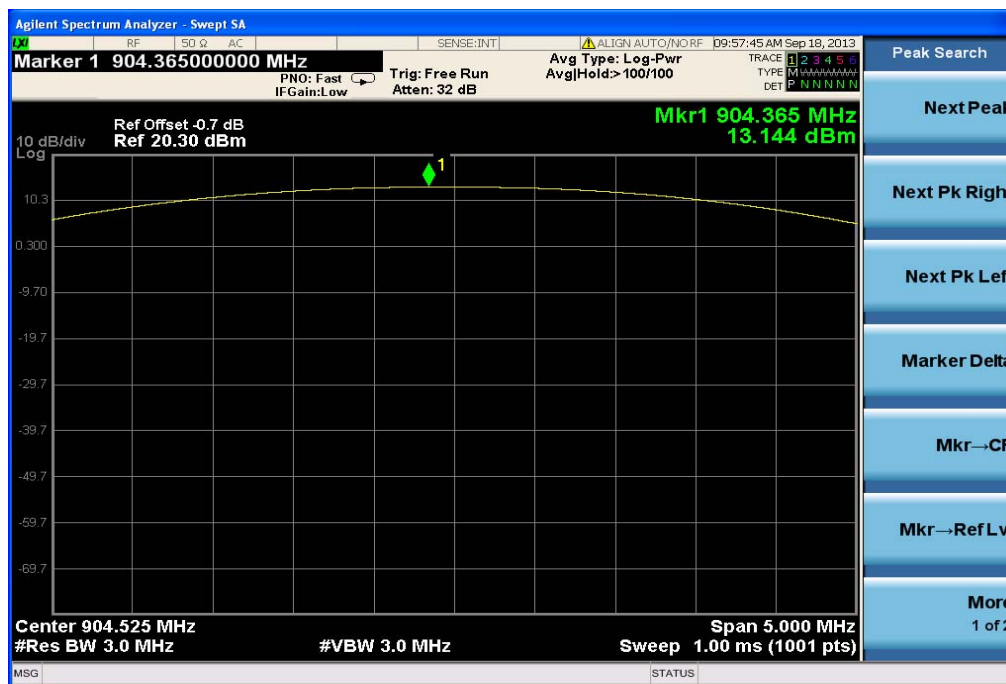
Test Conditions		Maximum Output Power Conducted [dBm]		
		904.5 MHz	915.3 MHz	926.1 MHz
T_{nom}	V_{nom}	13.14	12.65	12.61
Measurement uncertainty		± 3 dB		

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**

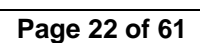
Plot 1: Low Channel



Plot 2: Middle Channel



2013-10-16



9.8 Band-edge Compliance of conducted and radiated emissions

No restricted band in the range ± 2 channel bandwidths of the Band-edges of the specified emission band! (608 MHz – 614 MHz and 960 MHz – 1240 MHz are the nearest restricted bands).

Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

Limits:

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)).	

Result: See Results of spurious emissions conducted and radiated.

Result: Passed

9.9 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>	

Plot 1: Low channel



Plot 2: Middle channel



Plot 3: High channel



Result:

Emission Limitation					
Frequency [MHz]		Amplitude of emission [dBm]	Limit max. allowed emission power	actual attenuation below frequency of operation [dB]	Results
904.5		11.91	24 dBm		Operating frequency
No peaks detected! All detected emissions are more than 20 dB below the limit!			-20 dBc	Noise floor	passed
915.3		11.42	24 dBm		Operating frequency
No peaks detected! All detected emissions are more than 20 dB below the limit!			-20 dBc	Noise floor	passed
926.1		11.33	24 dBm		Operating frequency
No peaks detected! All detected emissions are more than 20 dB below the limit!			-20 dBc	Noise floor	passed
Measurement uncertainty		± 3dB			

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>	

Result: Passed

9.10 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:

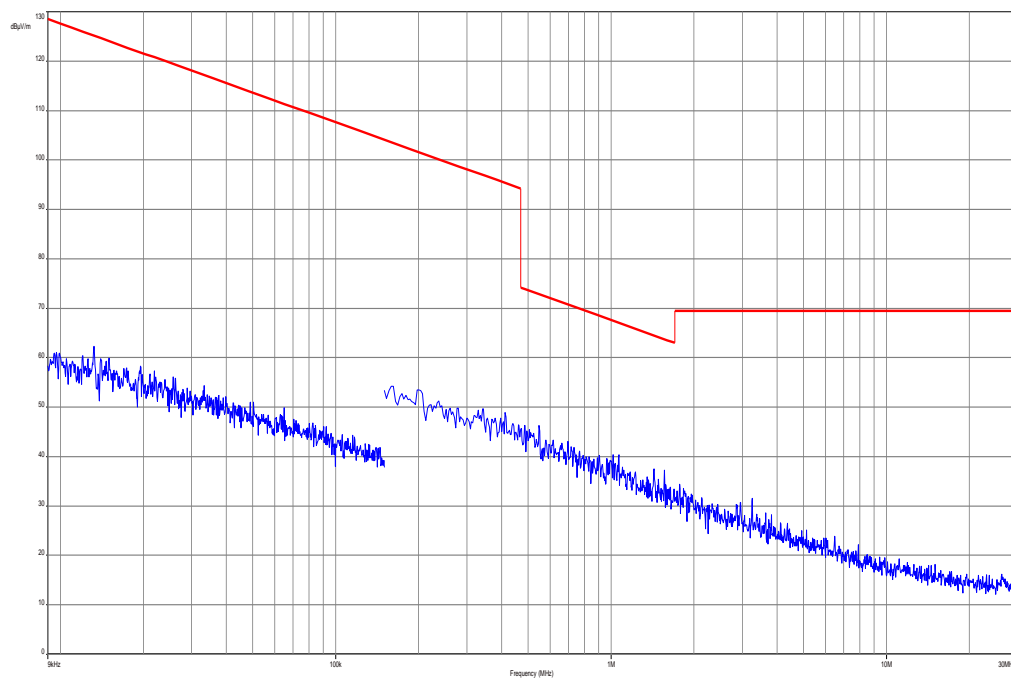
Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

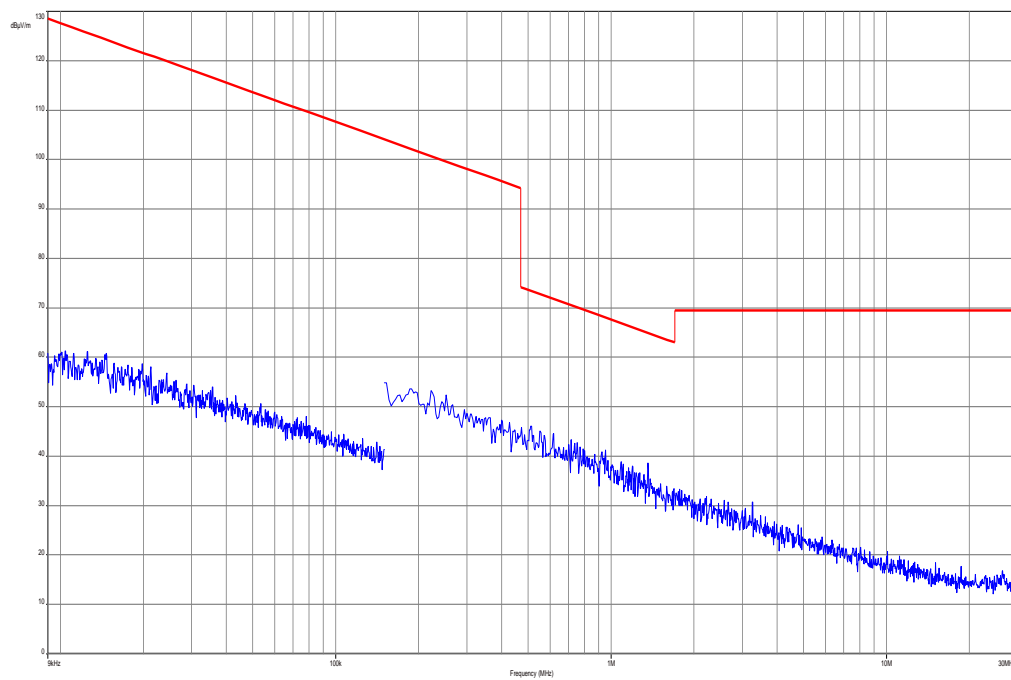
FCC		IC
Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Result: **Passed**

Plot 1: TX-Mode



Plot 2: RX-Mode



9.11 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

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

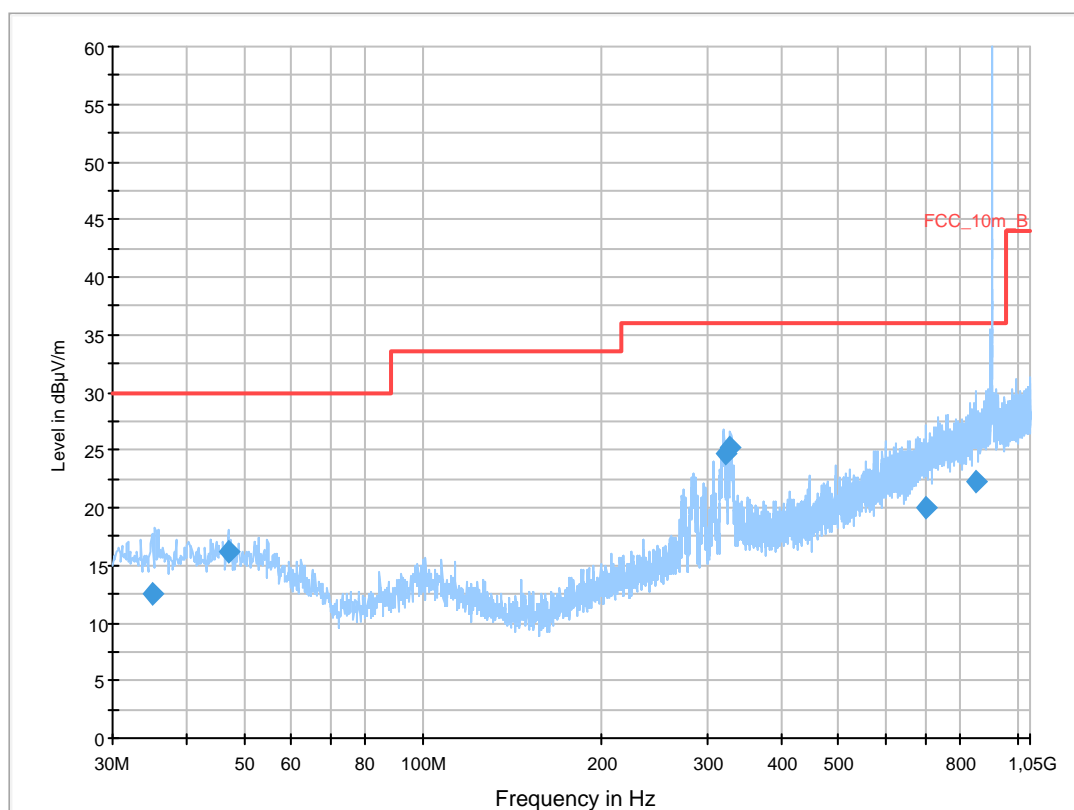
Common Information

EUT: XT-iP630
 Serial Number: F5401813230A02E5
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: TX Ch. 0 (904,5 MHz)
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
35.030850	12.5	1000.0	120.000	123.0	V	260.0	13.0	17.5	30.0	
47.000400	16.1	1000.0	120.000	98.0	V	190.0	13.3	13.9	30.0	
321.769050	24.8	1000.0	120.000	170.0	H	2.0	15.2	11.2	36.0	
328.754250	25.3	1000.0	120.000	170.0	H	182.0	15.4	10.7	36.0	
699.306150	19.9	1000.0	120.000	98.0	V	268.0	22.5	16.1	36.0	
851.541900	22.2	1000.0	120.000	112.0	H	-2.0	24.6	13.8	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

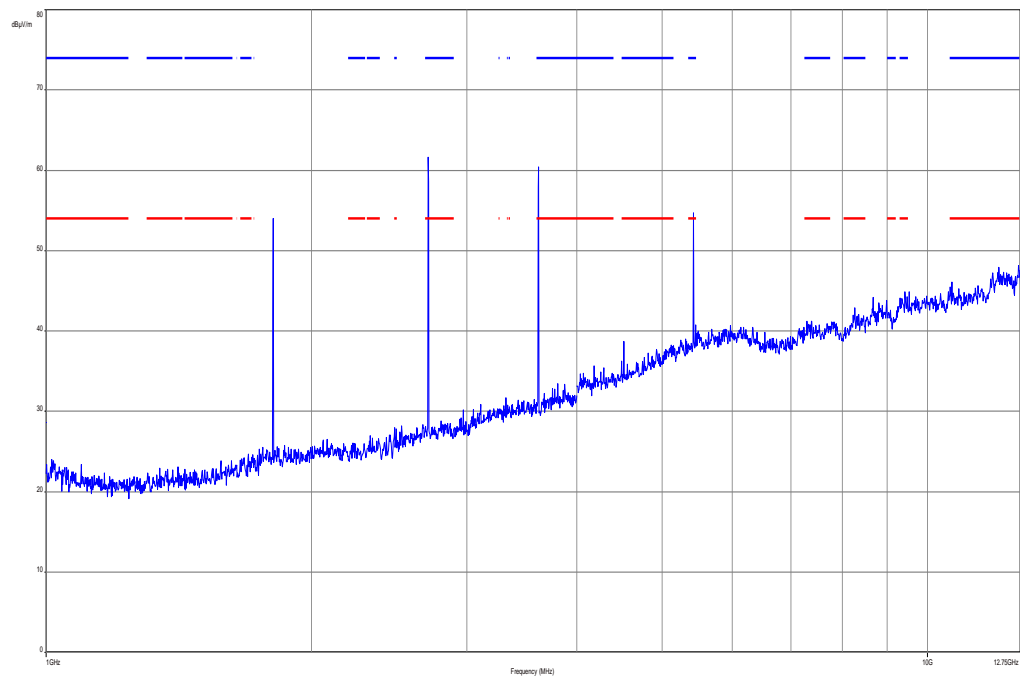
Subrange 1

Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.42Signal Path: without Notch
FW 1.0Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table (vertical): Cable_EN_1GHz (1005)
Correction Table (horizontal): Cable_EN_1GHz (1005)Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.52

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



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

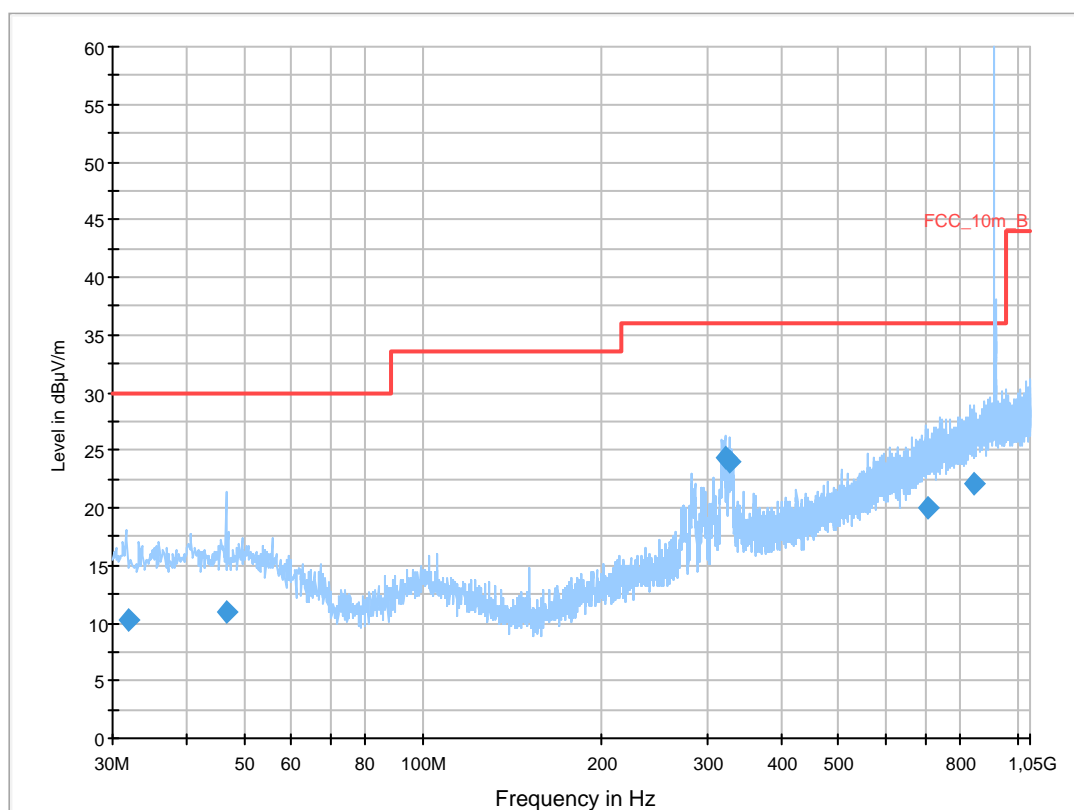
Common Information

EUT: XT-iP630
 Serial Number: F5401813230A02E5
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: TX Ch. 12 (915,3 MHz)
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
31.957500	10.2	1000.0	120.000	170.0	H	268.0	12.7	19.8	30.0	
46.611450	10.9	1000.0	120.000	121.0	V	10.0	13.3	19.1	30.0	
322.031400	24.4	1000.0	120.000	170.0	H	190.0	15.2	11.6	36.0	
328.820400	24.0	1000.0	120.000	170.0	H	10.0	15.4	12.0	36.0	
704.079450	20.0	1000.0	120.000	170.0	H	171.0	22.6	16.0	36.0	
845.326800	22.0	1000.0	120.000	105.0	V	280.0	24.5	14.0	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

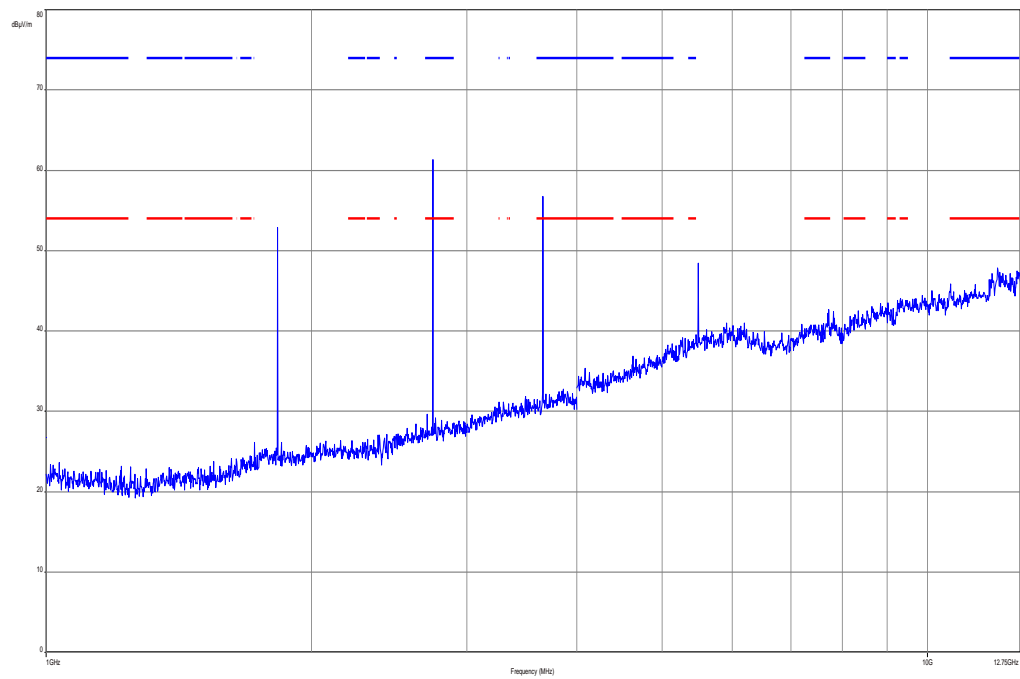
Subrange 1

Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.42Signal Path: without Notch
FW 1.0Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table (vertical): Cable_EN_1GHz (1005)
Correction Table (horizontal): Cable_EN_1GHz (1005)Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.52

Plot 4: 1 GHz – 12.75 GHz, horizontal & vertical polarisation (middle channel)



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

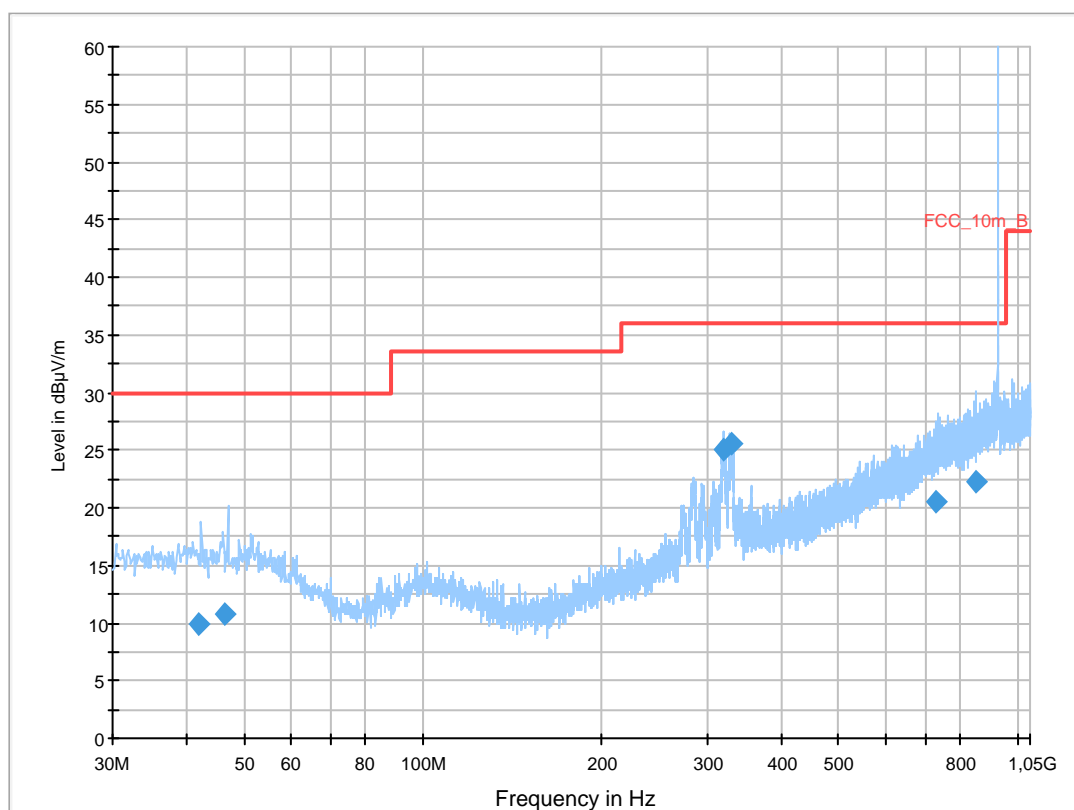
Common Information

EUT: XT-iP630
 Serial Number: F5401813230A02E5
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: TX Ch. 24 (926,1 MHz)
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
41.896800	9.9	1000.0	120.000	170.0	H	178.0	13.4	20.1	30.0	
46.363950	10.8	1000.0	120.000	104.0	V	87.0	13.3	19.2	30.0	
320.029800	25.0	1000.0	120.000	170.0	H	183.0	15.2	11.0	36.0	
329.088600	25.5	1000.0	120.000	170.0	H	171.0	15.4	10.5	36.0	
726.751500	20.5	1000.0	120.000	170.0	H	170.0	23.1	15.5	36.0	
848.393850	22.2	1000.0	120.000	170.0	V	280.0	24.5	13.8	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

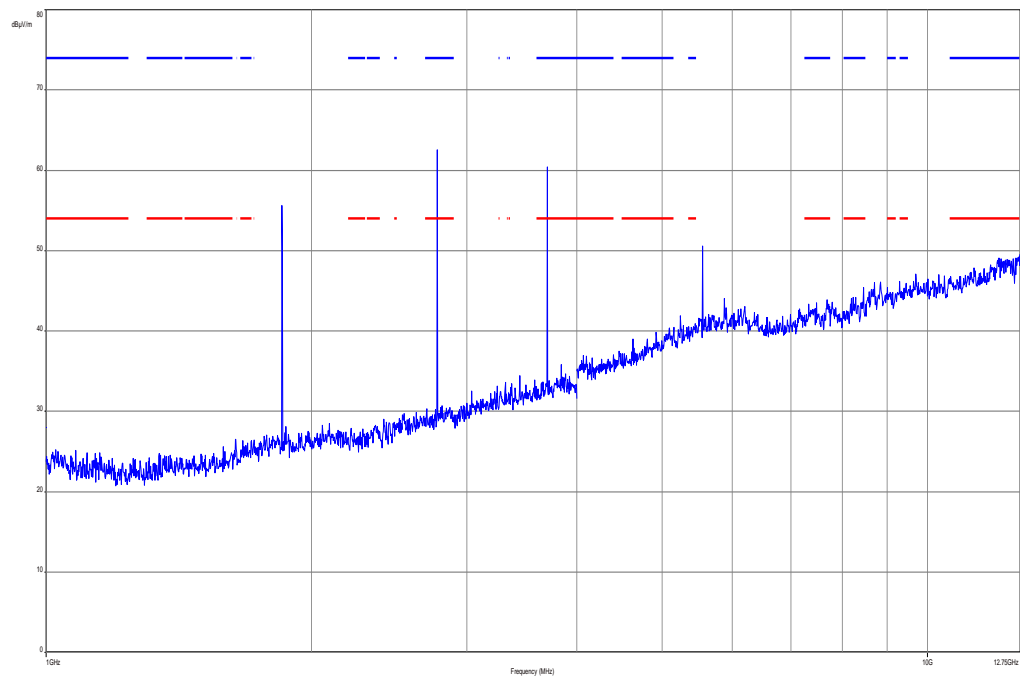
Subrange 1

Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.42Signal Path: without Notch
FW 1.0Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table (vertical): Cable_EN_1GHz (1005)
Correction Table (horizontal): Cable_EN_1GHz (1005)Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.52

Plot 6: 1 GHz – 12.75 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:

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

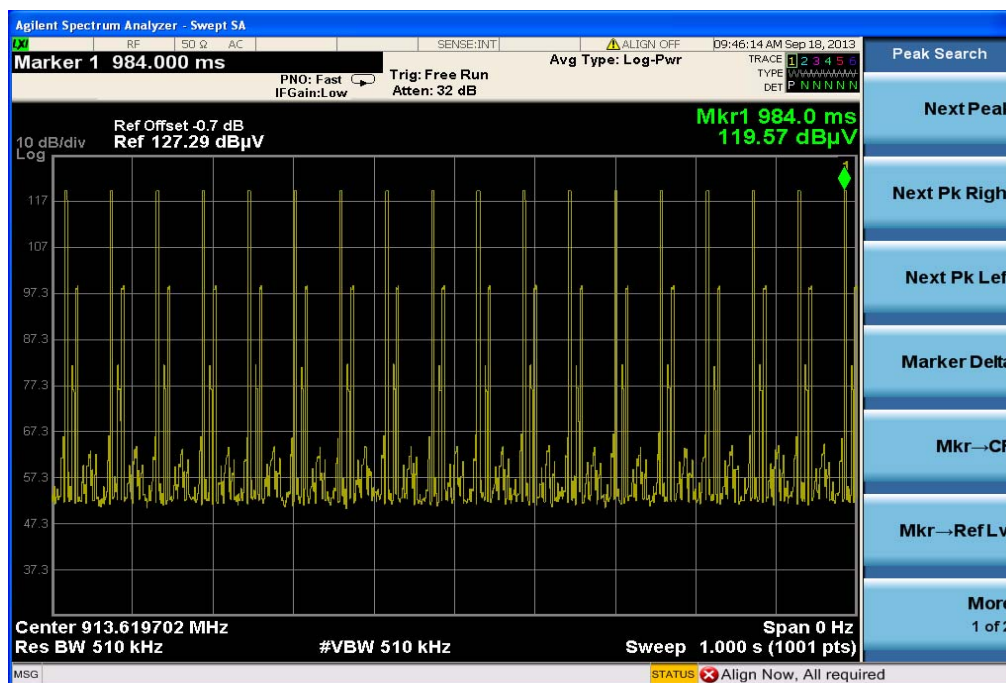
In a period of 100 ms, we have a maximum of 2 transmissions and that gives the correction factor for spurious measurement.

$$F = 20 \cdot \log(2 \cdot 2.167/100) = -27.26 \text{ dB}$$

Plot 7: Time slot length = 2.167 ms



Plot 8: Number of hopping channels in 1s = 18



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]
2713	Pk/ *AVG	66.12/37.33	2745	Pk/ *AVG	67.60/38.72	2778	Pk/ *AVG	66.91/38.45
3618	Pk/ *AVG	69.62/40.06	3660	Pk/ *AVG	66.83/37.13	3703	Pk/ *AVG	65.91/35.93
For all other emissions see result tables below the 30 MHz to 1 GHz plots.								
Measurement uncertainty			±3 dB					

*AVG: Detector Average corrected with the correction factor $F = -27.26$ dB

Result: **Passed**

9.12 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 (dB μ V/m)	Measurement distance
30 - 88	40	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

Result:

SPURIOUS EMISSIONS LEVEL [dB μ V/m]								
RX			-/-			-/-		
Frequency [MHz]	Detector	Level [dB μ V/m]	Frequency [MHz]	Detector	Level [dB μ V/m]	Frequency [MHz]	Detector	Level [dB μ V/m]
No emissions detected!								
Measurement uncertainty			±3 dB					

Result: **Passed**

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

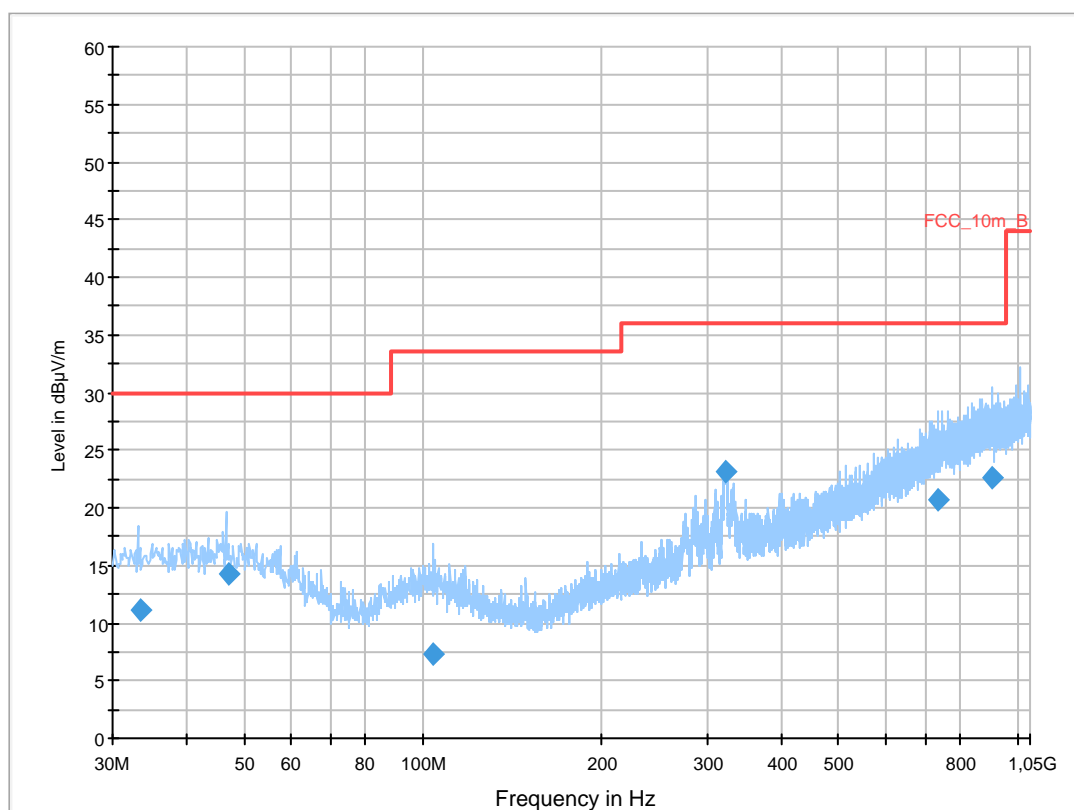
Common Information

EUT: XT-iP630
 Serial Number: F5401813230A02E5
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: RX
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
33.324150	11.1	1000.0	120.000	152.0	V	280.0	12.9	18.9	30.0	
47.033550	14.3	1000.0	120.000	98.0	V	182.0	13.3	15.7	30.0	
104.213250	7.3	1000.0	120.000	170.0	V	190.0	11.5	26.2	33.5	
323.123400	23.2	1000.0	120.000	170.0	H	-3.0	15.3	12.8	36.0	
735.719250	20.7	1000.0	120.000	170.0	V	270.0	23.3	15.3	36.0	
908.798850	22.6	1000.0	120.000	170.0	H	265.0	25.2	13.4	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

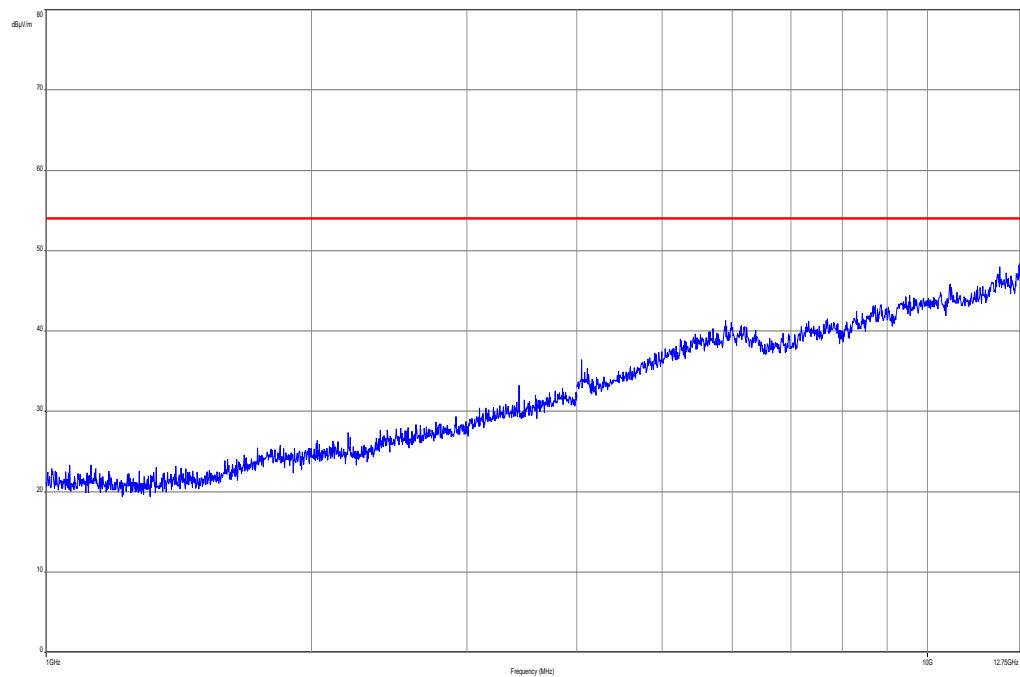
Subrange 1

Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.42Signal Path: without Notch
FW 1.0Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table (vertical): Cable_EN_1GHz (1005)
Correction Table (horizontal): Cable_EN_1GHz (1005)Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.52

Plot 2: 1GHz – 12.75 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.	Spectrum Analyzer 9kHz to 30GHz - 140...+30dBm	FSP30	R&S	100886	300003575	k	22.08.2012	22.08.2014
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	11.11.2011	11.11.2013
3	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
4	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
5	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
6	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
7	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
8	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
9	n. a.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
10	n. a.	Band Reject filter	WRCG240 0/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
11	n. a.	Highpass Filter	WHKX7.0/1 8G-8SS	Wainwright	18	300003789	ne		
12	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
13	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
14	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
15	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
16	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081; B5979	300000210	ne		
17	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	04.01.2012	04.01.2014
18	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	14.07.2012	14.07.2014
19	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
20	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		

21	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
22	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
23	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k		

Agenda: Kind of Calibration

k calibration / calibrated
 ne not required (k, ev, izw, zw not required)
 ev periodic self verification
 Ve long-term stability recognized
 vki! Attention: extended calibration interval
 NK! Attention: not calibrated

EK limited calibration
 zw cyclical maintenance (external cyclical maintenance)
 izw internal cyclical maintenance
 g blocked for accredited testing
 *) next calibration ordered / currently in progress

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:

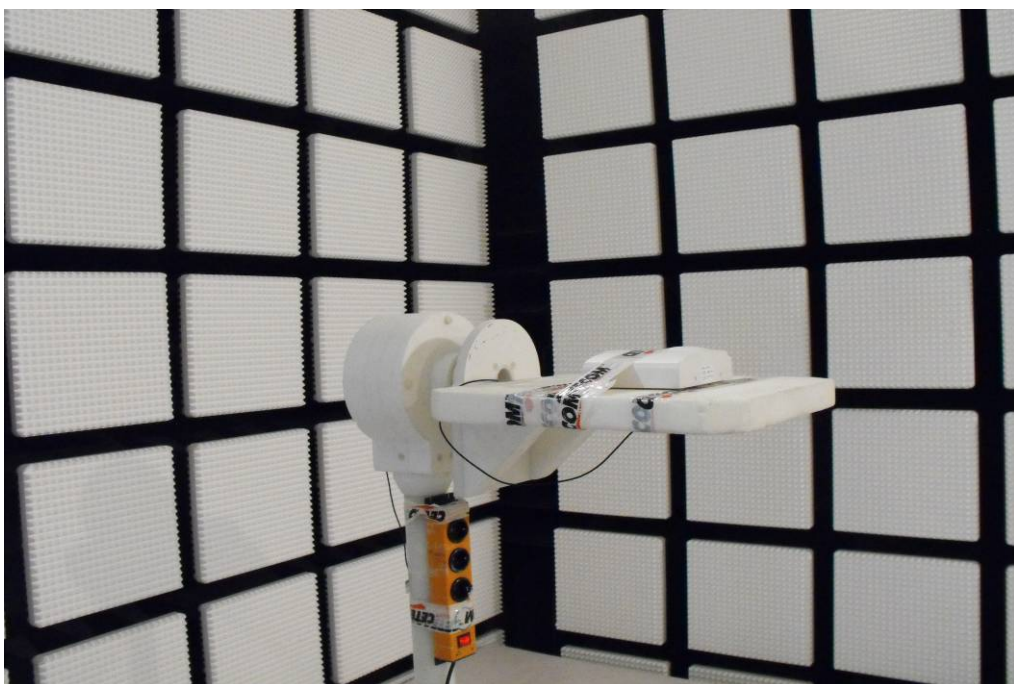


Photo 3:



Photo 4:

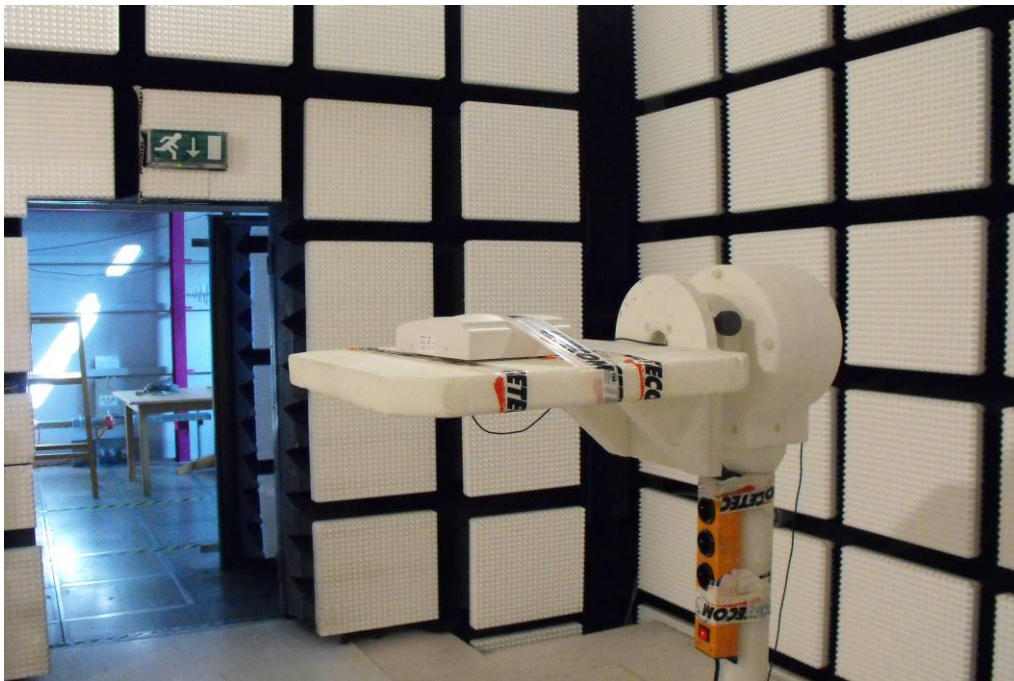


Photo 5:

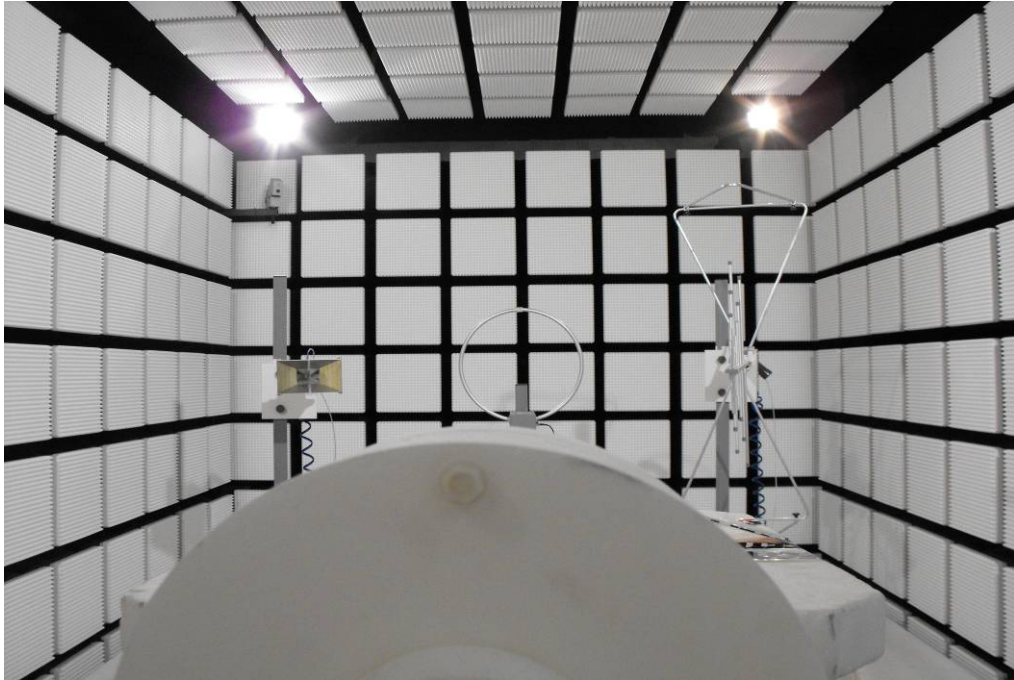


Photo 6:

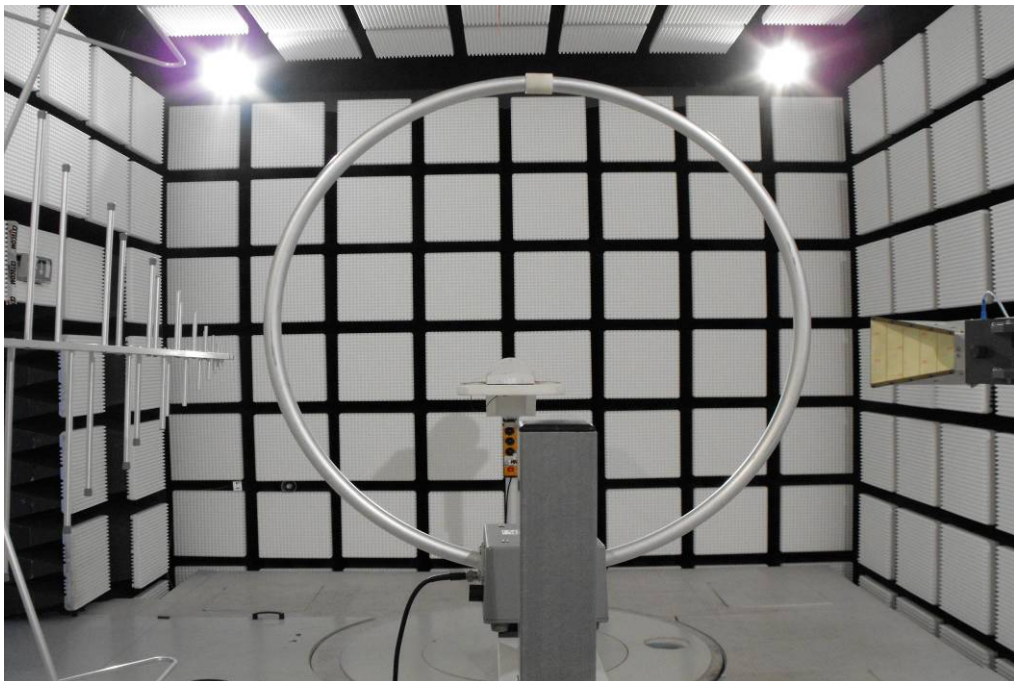


Photo 7:



Annex B External photographs of the EUT

Photo documentation:

Photo 1:

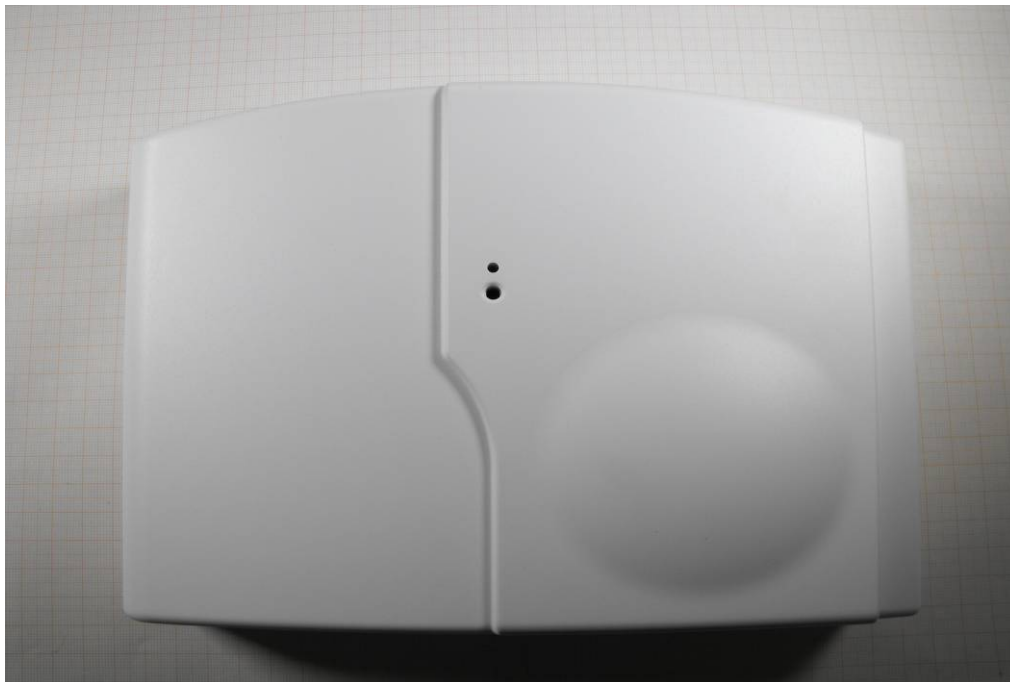


Photo 2:

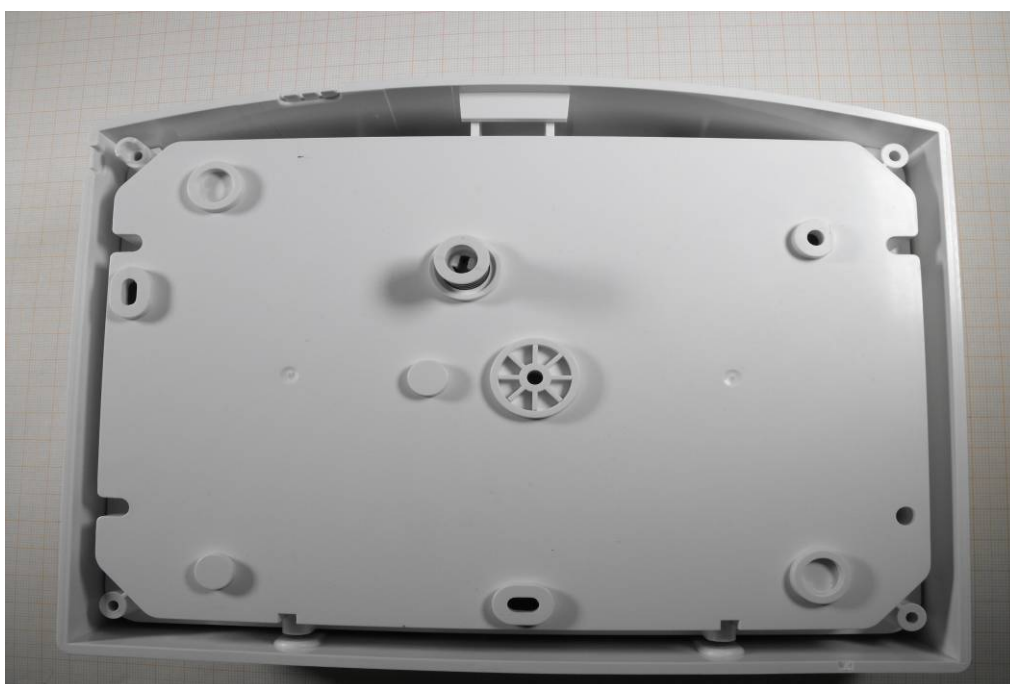


Photo 3:



Photo 4:



Photo 5:



Photo 6:



Annex C Internal photographs of the EUT

Photo documentation:

Photo 1:

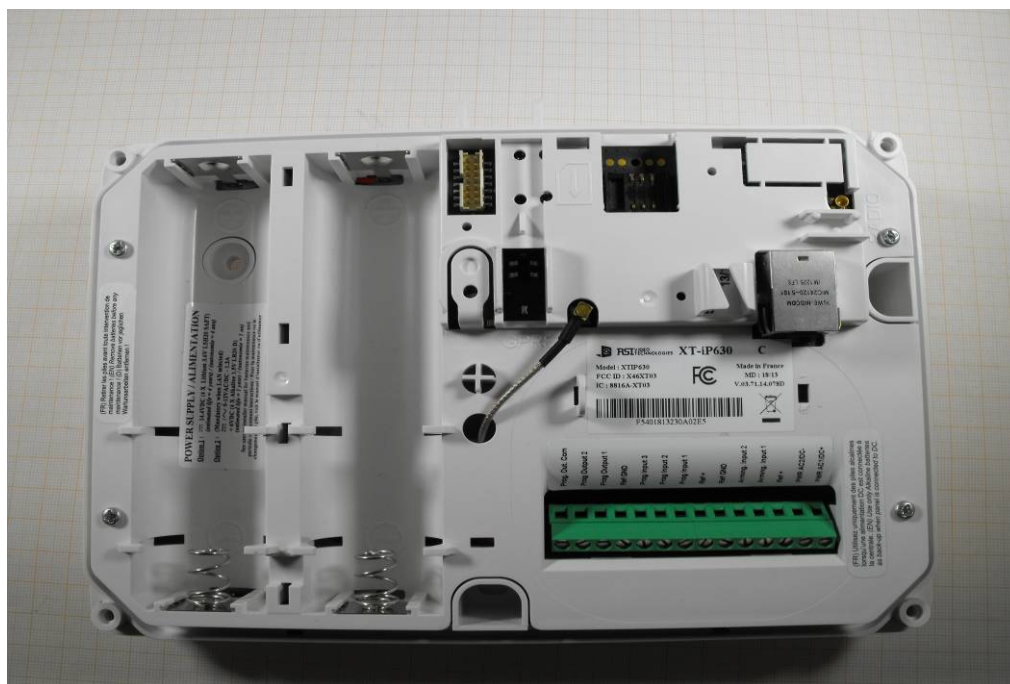


Photo 2:



Photo 3:

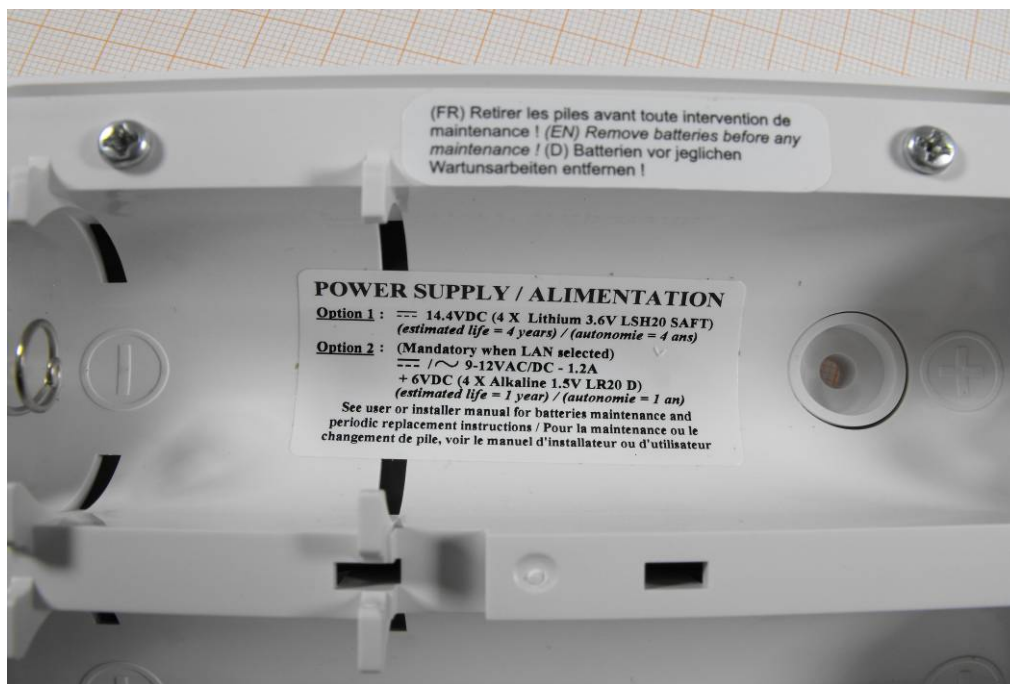


Photo 4:



Photo 5:

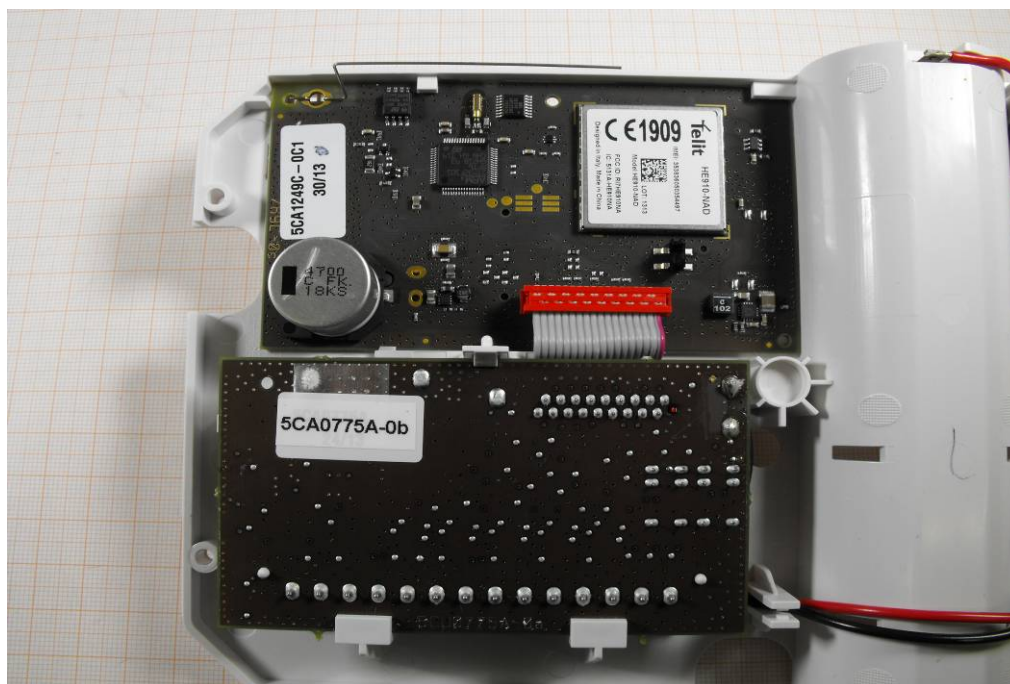


Photo 6:



Photo 7:



Photo 8:

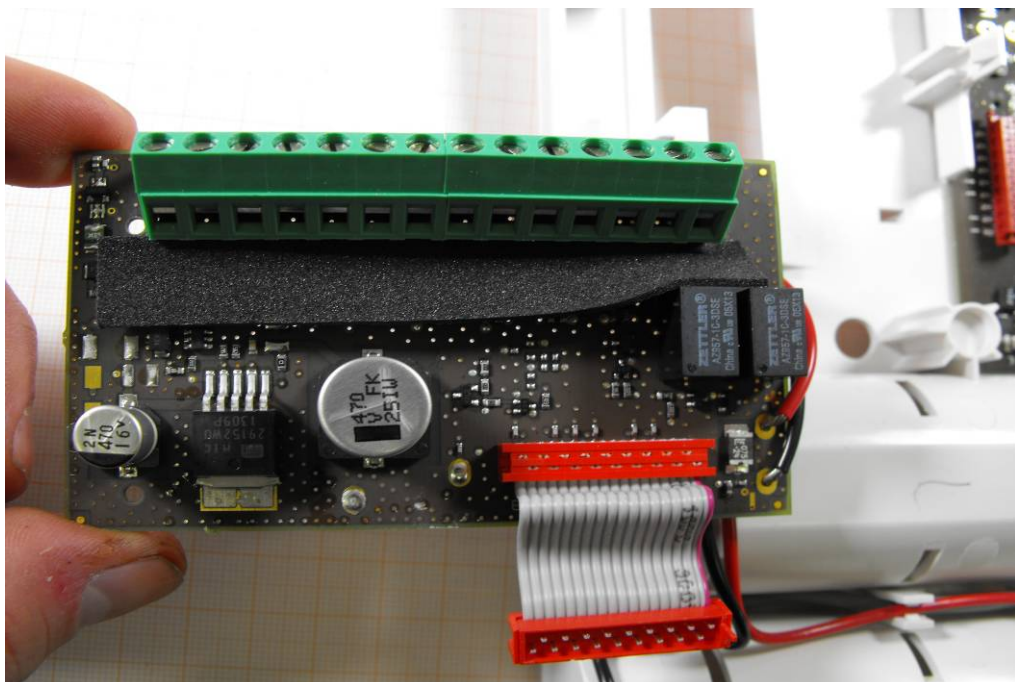


Photo 9:



Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-10-16

Annex E Further information**Glossary**

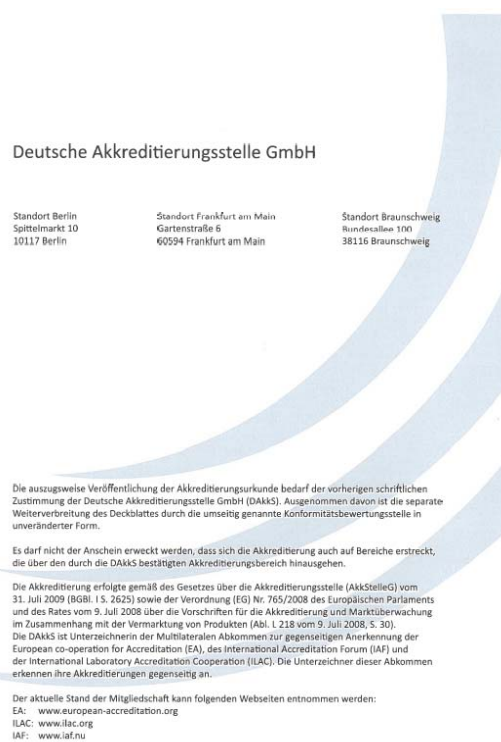
AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory 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



Back side of certificate



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>