**CETECOM™****CETECOM ICT Services**  
consulting - testing - certification >>>

## TEST REPORT

Test report no.: 1-3432/11-01-07-C

Deutsche  
Akkreditierungsstelle  
D-PL-12076-01-01

### Testing laboratory

**CETECOM ICT Services GmbH**

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Internet: <http://www.cetecom.com>e-mail: [ict@cetecom.com](mailto: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

**PALFINGER AG**

F.W. Schererstr. 24

5020 Salzburg / AUSTRIA

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### Manufacturer

**PALFINGER AG**

F.W. Schererstr. 24

5020 Salzburg / AUSTRIA

### 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:** RF-module for remote control**Model name:** RCP 915 - RF**FCC ID:** Q68-RCP915RF001**IC:** 10683A-RCP915RF001

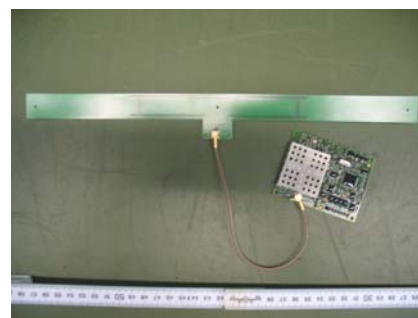
Frequency: 902 MHz – 928 MHz

Technology tested: Proprietary

Antenna: dipol antenna and helix antenna

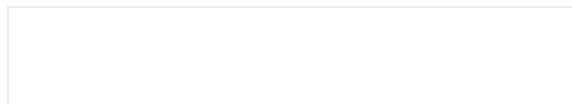
Power Supply: 24 V DC by power supply

Temperature Range: -20°C to +55 °C

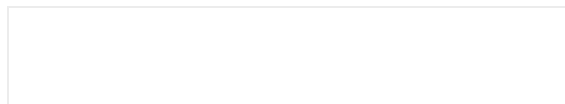


This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

### Test report authorised:

Marco Bertolino  
Testing Manager

### Test performed:



Christoph Schneider

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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:	2012-05-21
Date of receipt of test item:	2012-06-26
Start of test:	2012-06-26
End of test:	2012-06-28
Person(s) present during the test:	Hr. Becker, Hr. Haslauer, Hr. Holztrattner

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	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
	$T_{max}$	+55 °C during high temperature tests
	$T_{min}$	-20 °C during low temperature tests
Relative humidity content:		55 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	24 V DC by power supply
	$V_{max}$	32 V
	$V_{min}$	11 V

#### 5 Test item

Kind of test item	:	Remote control
Type identification	:	RCP 915 - RF
S/N serial number	:	Rad. unknown
	:	Cond. unknown
HW hardware status	:	1A
SW software status	:	1.20
Frequency band [MHz]	:	902 MHz – 928 MHz
Type of radio transmission	:	FHSS
Use of frequency spectrum	:	
Channel access method	:	FDMA
Type of modulation	:	FSK
Number of channels	:	69 (manufacturer declaration)
Antenna	:	Antenna A: Dipol antenna
	:	Antenna B: Helix antenna
Power supply	:	24 V DC by power supply
Temperature range	:	-20°C to +55 °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, Annex 8	Passed	2014-02-10	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	GFSK	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not applicable for FHSS!
§15.247(a)(1) RSS 210 / A8.1(b)	Carrier frequency separation	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1) RSS 210 / A8.1(d)	Number of hopping channels	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1) (iii) RSS 210 / A8.3(1)	Time of occupancy (dwell time)	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(1) RSS-210 / A8.4(2)	Maximum output power	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	GFSK	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	GFSK	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109 RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

**Note:** NA = Not Applicable; NP = Not Performed

## 8 RF measurements

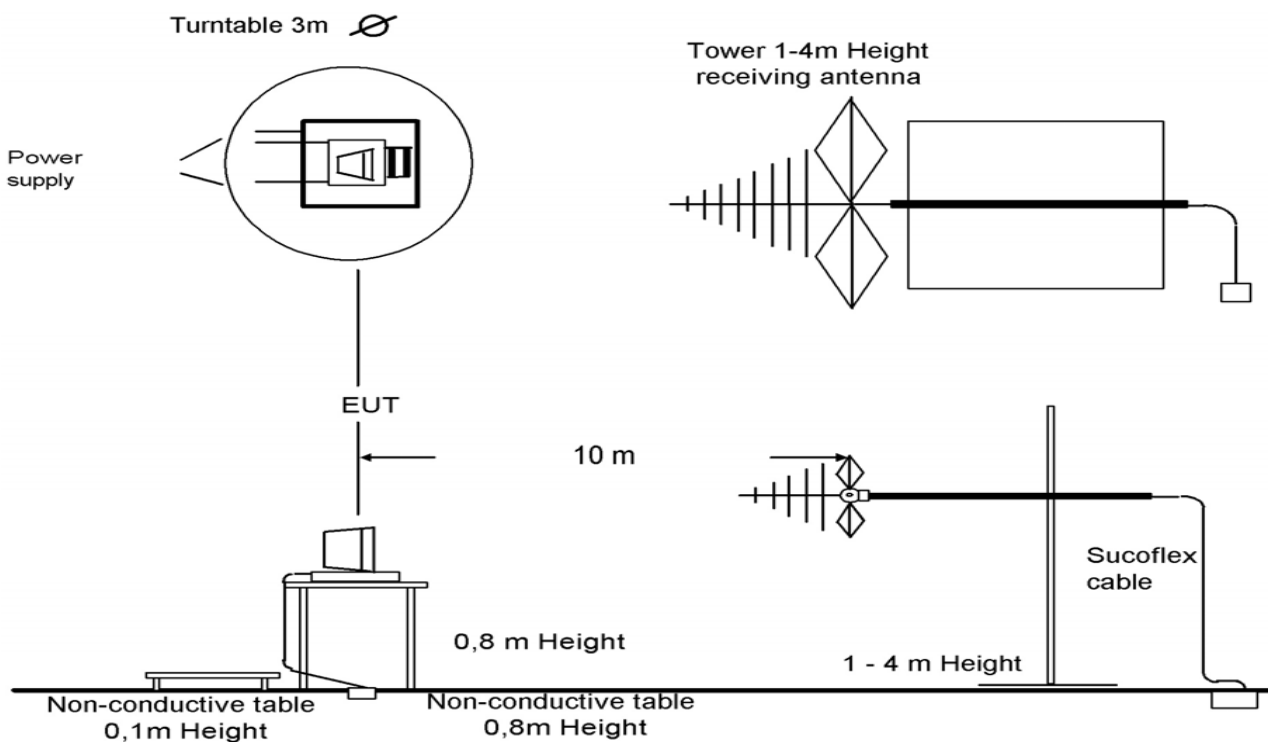
### 8.1 Description of test setup

#### 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 C63.4-2009 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 C63-4-2009 clause 4.2.

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

Semi anechoic chamber



Picture 1: Diagram radiated measurements

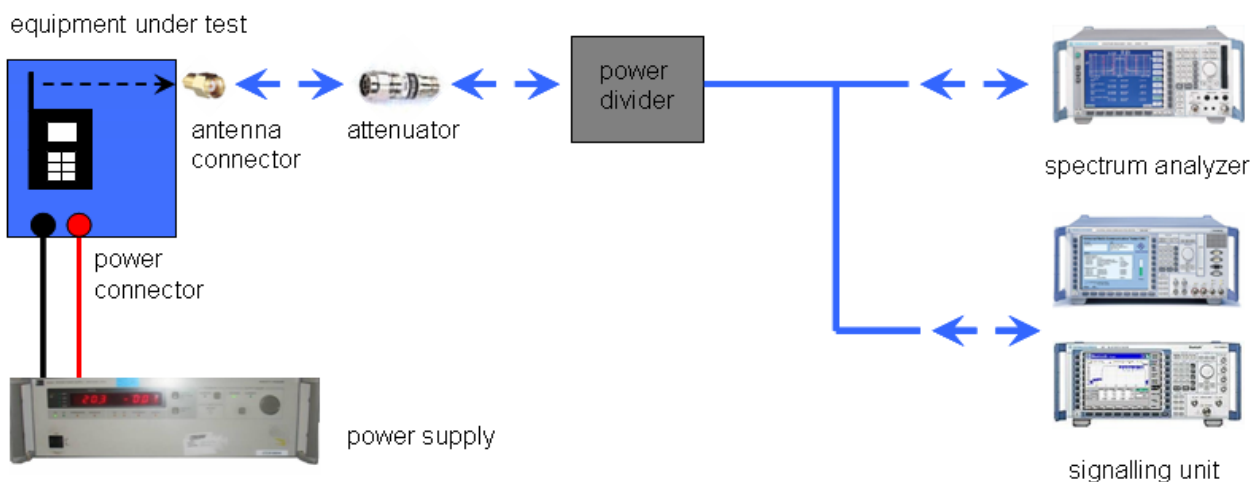
9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

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). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one 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: Tests were performed using special test software.

### 8.3 RSP100 test report cover sheet / performance test data

Test report number	:	1-3432/11-01-07-C
Equipment model number	:	RCP 915-RF
Certification number	:	10683A-RCP915RF001
Manufacturer (complete address)	:	PALFINGER AG F.W. Schererstr. 24 5020 Salzburg / AUSTRIA
Tested to radio standards specification no.	:	RSS 210, Issue 8, Annex 8
Open area test site IC No.	:	IC 3462C-1
Frequency range	:	ISM band 902.2 MHz – 915.6 MHz
RF-power [W] (max.)	:	Cond.: 7.28 Channel 00 EIRP: 5.20 Channel 00 Cond.: 6.97 Channel 34 EIRP: 4.00 Channel 34 Cond.: 6.76 Channel 68 EIRP: 5.12 Channel 68
Occupied bandwidth (99%-BW) [kHz]	:	13.53 kHz Channel 00 13.38 KHz Channel 34 13.53 kHz Channel 68
Type of modulation	:	FHSS technology with GFSK modulation.
Emission designator (TRC-43)	:	13 K5F7D
Antenna information	:	Antenna A: Dipol antenna Antenna B: Helix antenna
Transmitter spurious (worst case) [dBμV/m @ 3m]:		51.8 @ 8117 MHz

#### **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:**

2014-02-10

Christoph Schneider

Date

Name

Signature



## 9 Measurement results

### 9.1 Antenna gain

#### Measurement:

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

#### Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	3 MHz
Resolution bandwidth:	3 MHz
Span:	5 MHz
Trace-Mode:	Max hold

#### Limits:

FCC	IC
CFR Part 15.247 (b)(4)	RSS 210, Issue 8, A 8.4(2)
Antenna Gain	
6 dBi	

**Results:**

Dipole antenna:

$T_{nom}$	$V_{nom}$	lowest channel 902.2 MHz	middle channel 908.8 MHz	highest channel 915.6 MHz
Conducted power [dBm]		8.62	8.43	8.30
Radiated power [dBm]		5.57	6.02	7.09
Gain [dBi] Calculated		-3.05	-2.41	-1.21

Helix antenna:

$T_{nom}$	$V_{nom}$	lowest channel 902.2 MHz	middle channel 908.8 MHz	highest channel 915.6 MHz
Conducted power [dBm]		8.62	8.43	8.30
Radiated power [dBm]		7.16	6.02	6.17
Gain [dBi] Calculated		-1.46	-2.41	-2.13

**Result: Passed**

## 9.2 Power spectral density

### Description:

Measurement of the power spectral density of a digital modulated system. This requirement is only valid for digitally modulated systems without hopping functionality.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	500 s
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	150 kHz
Trace-Mode:	Max Hold

### Limits:

FCC	IC
CFR Part 15.247 (e)	RSS 210, Issue 8, A 8.2(b)
Power Spectral Density	
For digitally modulated systems the transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.	

### Results:

Modulation	Power spectral density [dBm/3kHz]		
	Channel low	Channel middle	Channel high
Frequency			
GFSK	<b>Not required for hopping systems!</b>		
Pi/4 DQPSK			
8DPSK			
Measurement uncertainty	± 1.5 dB		

### 9.3 Carrier frequency separation

#### Description:

Measurement of the carrier frequency separation of a hopping system. The carrier frequency separation is constant for all modulation-modes. EUT in hopping mode.

#### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	500 kHz
Trace-Mode:	Max Hold

#### Limits:

FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.1(b)
Carrier Frequency Separation	
Minimum 25 kHz or two-thirds of the 20 dB bandwidth of the hopping system whichever is greater.	

#### Result:

Carrier frequency separation	~ 200 kHz
------------------------------	-----------

**Result:** **Passed**

**Plot:****Plot 1: Carrier frequency separation (GFSK modulation)**

## 9.4 Number of hopping channels

### Description:

Measurement of the total number of used hopping channels. The number of hopping channels is constant for all modulation-modes. We use GFSK-modulation to show compliance. EUT in hopping mode.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	16 MHz
Trace-Mode:	Max Hold

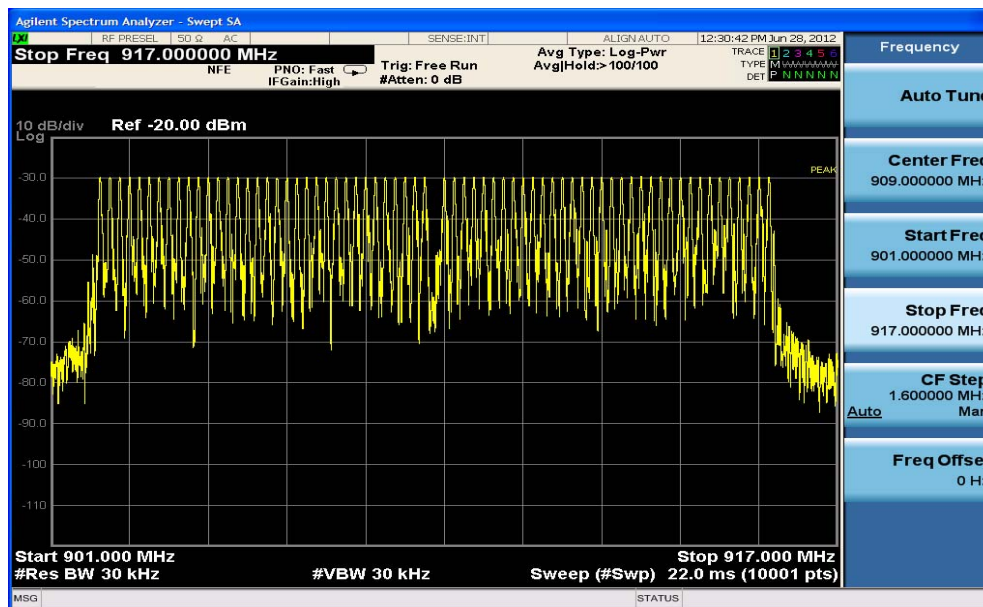
### Limits:

FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.1(d)
Number of hopping channels	
At least 50 non overlapping hopping channels	

### Result:

Number of hopping channels	68
----------------------------	----

Result: **Passed.**

**Plots:****Plot 1: Number of hopping channels**

**9.5 Time of occupancy (dwell time)****Limits:**

FCC	IC
CFR Part 15.247 (a)(1)(iii)	RSS 210, Issue 8, A 8.3(1)
Time of occupancy (dwell time)	
The frequency hopping operation shall have an average time of occupancy on any frequency not exceeding 0.4 seconds within a duration in seconds equal to the number of hopping frequencies multiplied by 0.4.	

**Result:**

Transmitter on time within 27.2 s	< 0.4 s
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**Result:** Passed



## 9.6 Spectrum bandwidth of a FHSS system – 20 dB bandwidth

### Description:

Measurement of the 20dB bandwidth of the modulated signal. The measurement is performed according to the "Measurement Guidelines" (DA 00-705, March 30, 2000). EUT in single channel mode.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	2 s
Video bandwidth:	30 kHz
Resolution bandwidth:	10 kHz
Span:	3 MHz
Trace-Mode:	Max Hold

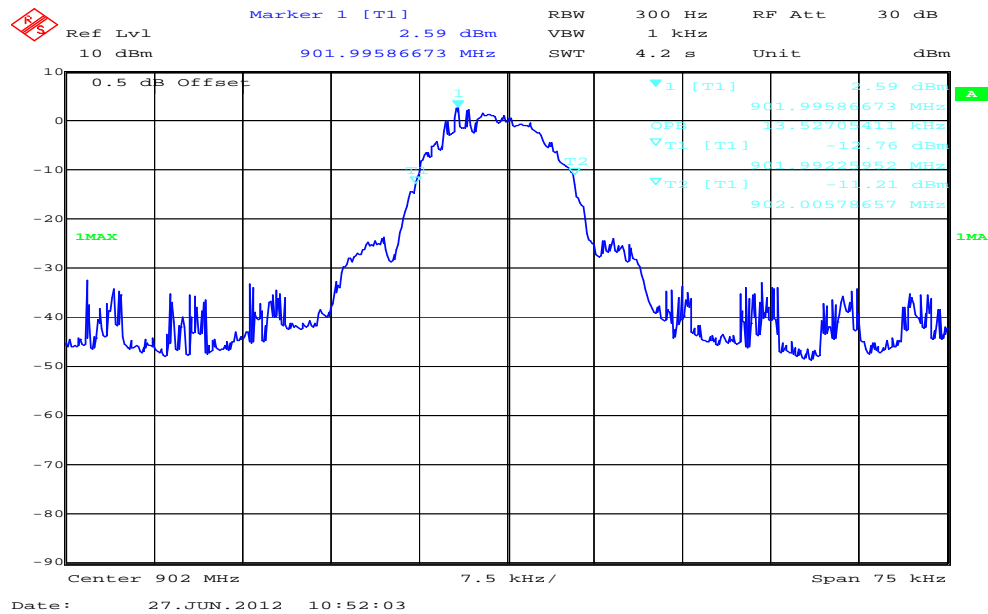
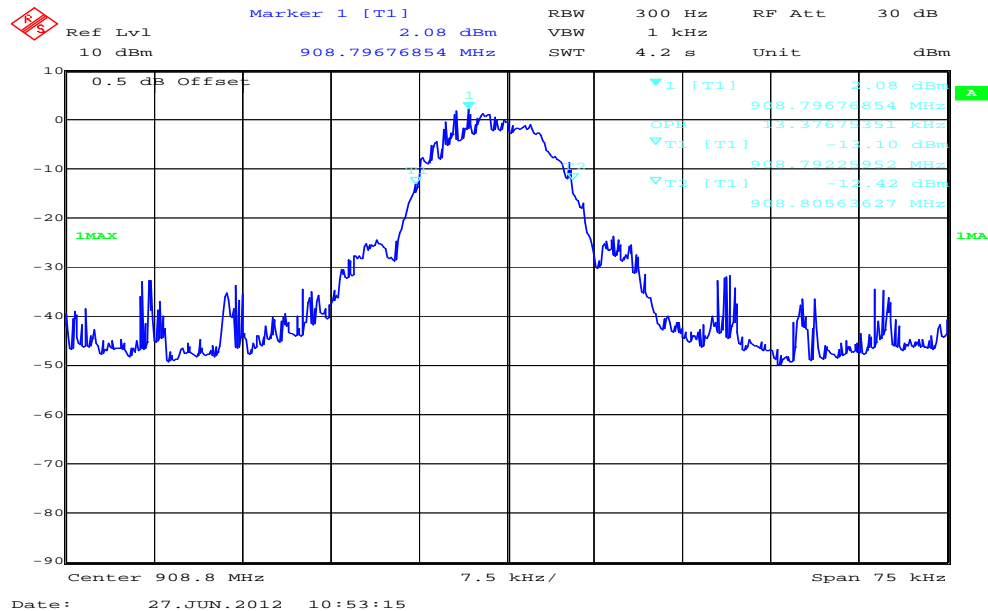
### Limits:

FCC	IC
CFR Part 15.247 (a)(1)(i)	RSS 210, Issue 8, A 8.2(a)
Spectrum bandwidth of a FHSS system – 20 dB bandwidth	
GFSK < 250 kHz	

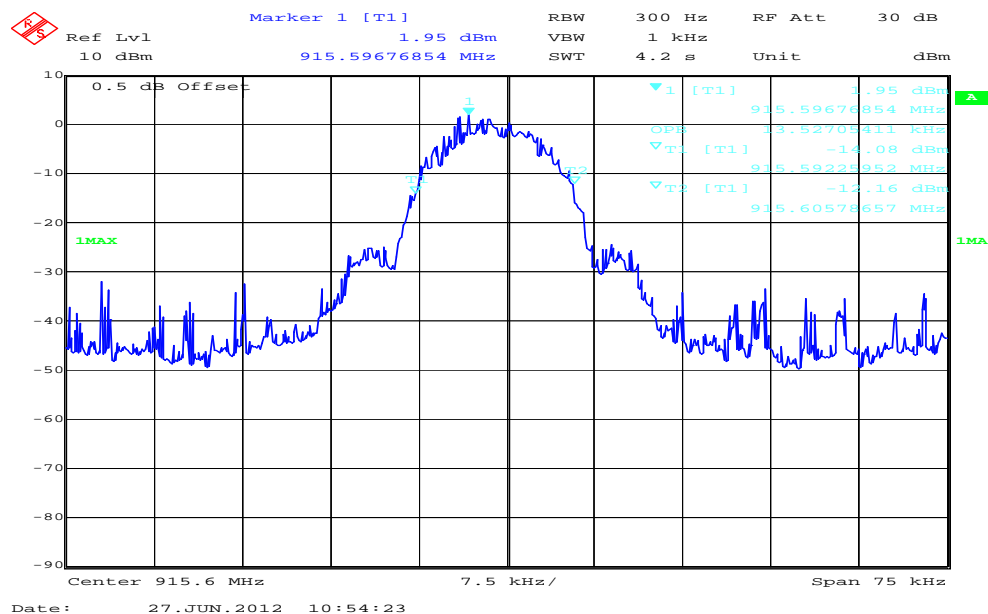
### Results:

Modulation Frequency	20 dB BANDWIDTH [kHz]		
	902.2 MHz	908.8 MHz	915.6 MHz
	13.53	13.38	13.53
Measurement uncertainty	± 10 kHz		

**Result:** Passed

**Plots:****Plot 1: lowest channel – 902.2 MHz****Plot 2: middle channel – 908.8 MHz**

**Plot 3: highest channel – 915.6 MHz**



## 9.7 Maximum output power

### Description:

Measurement of the maximum output power conducted and radiated. EUT in single channel mode.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	3 MHz
Resolution bandwidth:	3 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

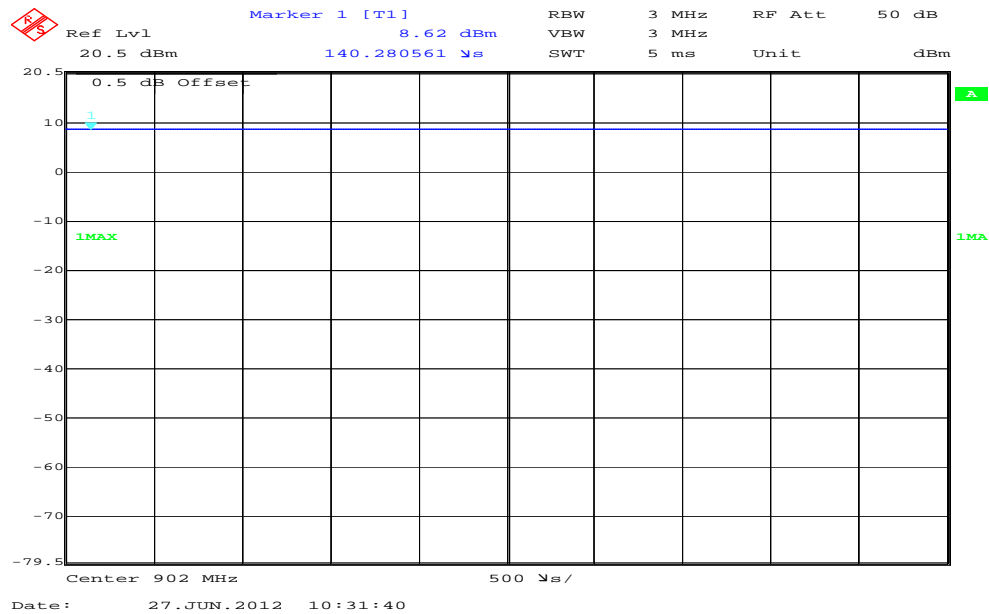
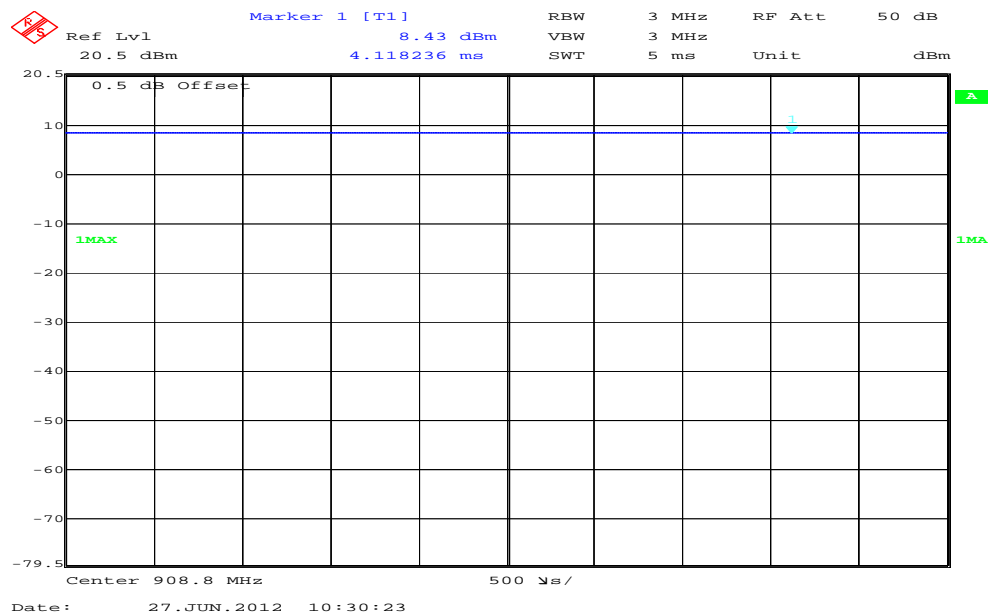
### Limits:

FCC	IC
CFR Part 15.247 (b)(1)	RSS 210, Issue 8, A 8.4(2)
Maximum output power	
[Conducted: 0.125 W – antenna gain max. 6 dBi] Systems using more than 75 hopping channels: Conducted: 1.0 W – antenna gain max. 6 dBi	

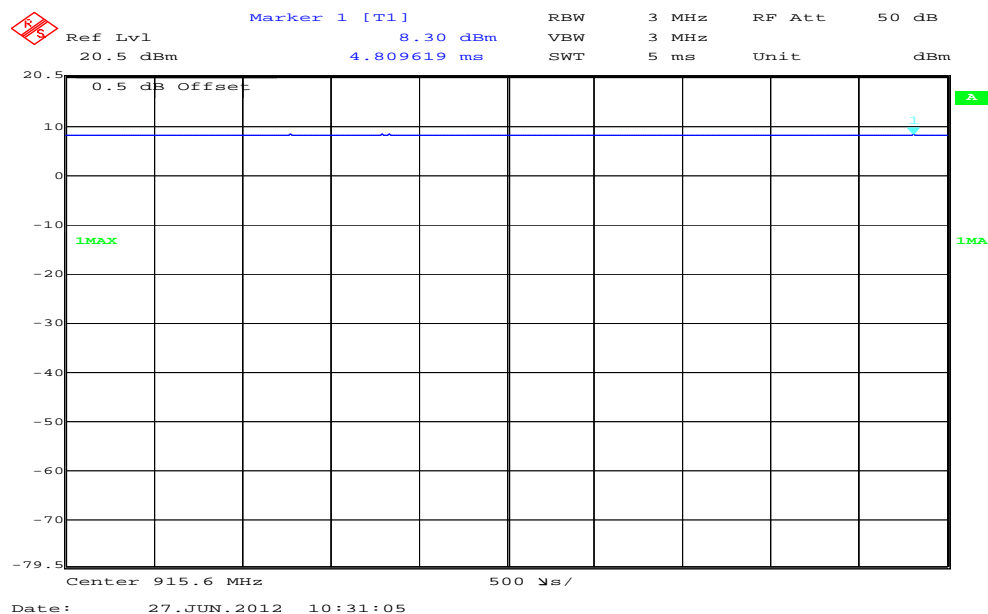
### Results:

Modulation Frequency	Maximum output power conducted [dBm]		
	902.2 MHz	908.8 MHz	915.6 MHz
GFSK	8.62	8.43	8.30
Measurement uncertainty	± 1 dB		

**Result:** Passed

**Plots:****Plot 1: lowest channel - 902.2 MHz****Plot 2: middle channel – 908.8 MHz**

**Plot 3: highest channel – 915.6 MHz**



## 9.8 Band edge compliance conducted

Not applicable due to FCC Public Notice DA 00-705 (released march 30, 2000)

## 9.9 Band edge compliance radiated

### Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to single channel mode and the transmit channel is channel 00 for the lower restricted band and channel 78 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3m.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	1 MHz Peak / 10 Hz AVG
Resolution bandwidth:	1 MHz
Span:	910 – 980 MHz
Trace-Mode:	Max Hold

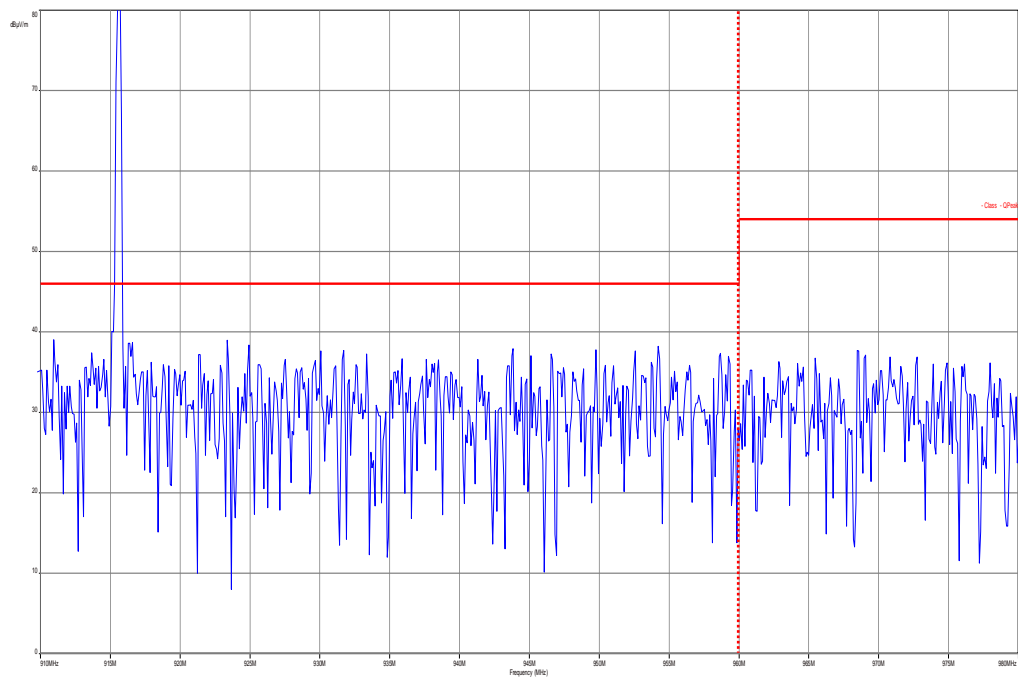
### Limits:

FCC	IC
Band edge compliance radiated	
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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).	
54 dBµV/m AVG 74 dBµV/m Peak	

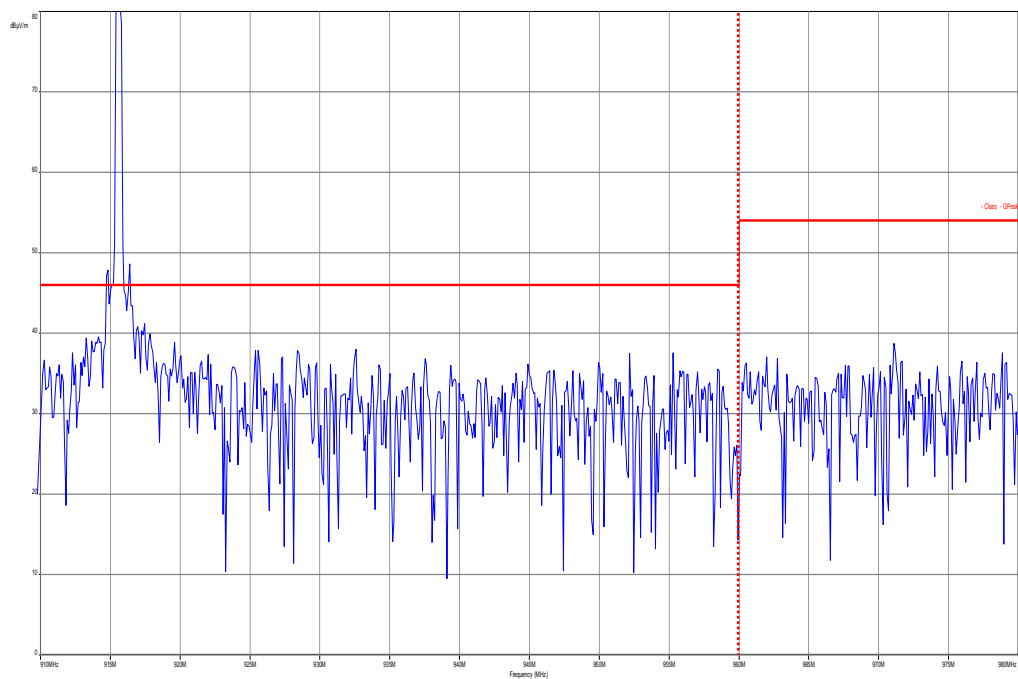
**Results:** see Plot.

**Result:** **Passed**

**Plot 1:** dipole antenna, high channel, vertical and horizontal polarisation



**Plot 2:** helix antenna, high channel, vertical and horizontal polarisation





## 9.10 TX spurious emissions conducted

### Description:

Measurement of the conducted spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 34 and channel 68. The measurement is repeated for all modulations.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	F < 1 GHz: 500 kHz F > 1 GHz: 500 kHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 100 kHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

### Limits:

FCC	IC
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5
TX spurious emissions conducted	
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. Attenuation below the general limits specified in Section 15.209(a) is not required	

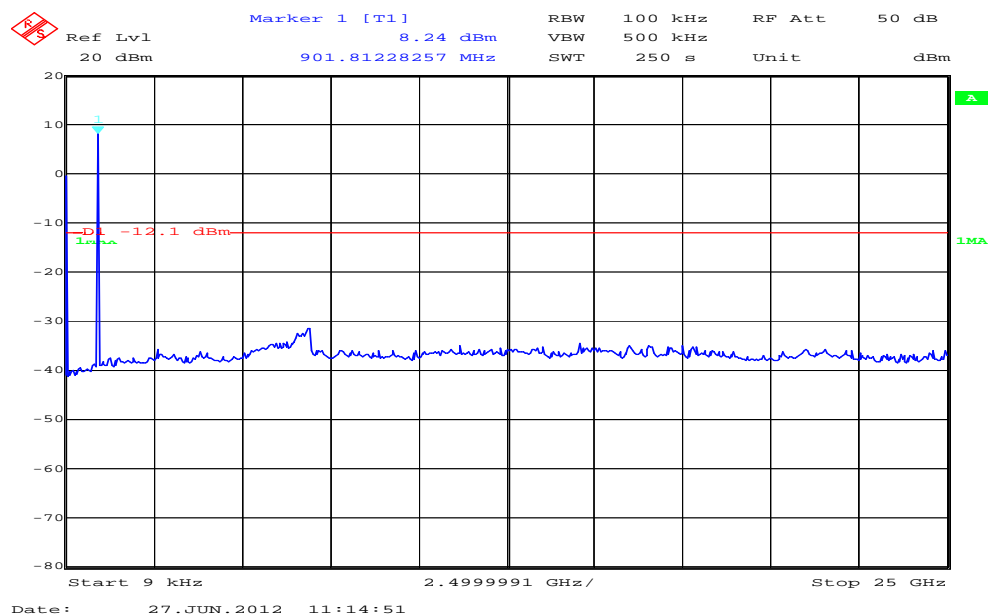
**Results:**

TX spurious emissions conducted					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
902.2			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
908.8			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
915.6			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
Measurement uncertainty		± 3 dB			

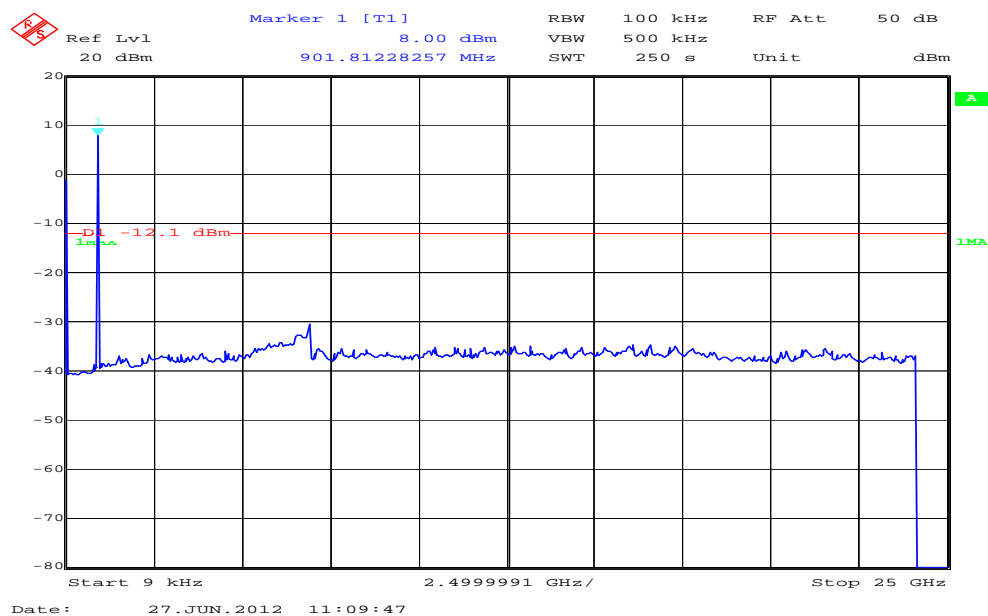
**Result:** Passed

## Plots:

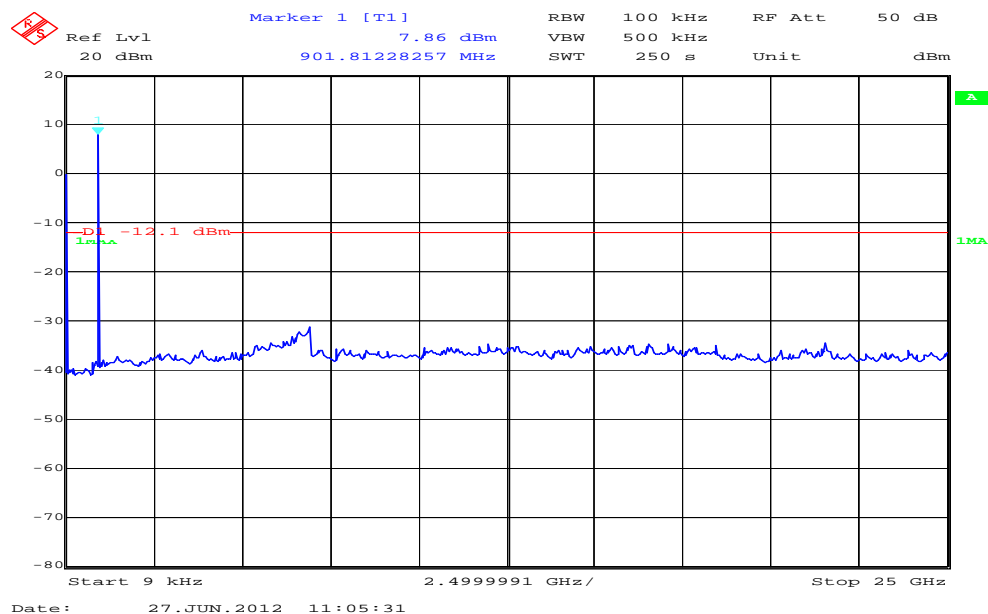
**Plot 1: lowest channel – 902.2 MHz**



**Plot 2: middle channel – 908.8 MHz**



**Plot 3: highest channel – 915.6 MHz**



## 9.11 TX spurious emissions radiated

### Description:

Measurement of the radiated spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 39 and channel 78. The measurement is performed in the mode with the highest output power.

### 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

### Limits:

FCC	IC	
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5	
TX spurious emissions radiated		
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. Attenuation below the general limits specified in Section 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)).		
§15.209		
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

**Results:**

TX spurious emissions radiated [dB $\mu$ V/m]								
902.2 MHz			908.8 MHz			915.6 MHz		
F [MHz]	Detector	Level [dB $\mu$ V/m]	F [MHz]	Detector	Level [dB $\mu$ V/m]	F [MHz]	Detector	Level [dB $\mu$ V/m]
No critical peaks detected			No critical peaks detected			No critical peaks detected		
Measurement uncertainty			$\pm 3$ dB					

**Result:** **Passed**

**Plots:**

**Plot 1:** 30 MHz – 1 GHz, TX mode, channel 0, dipole antenna

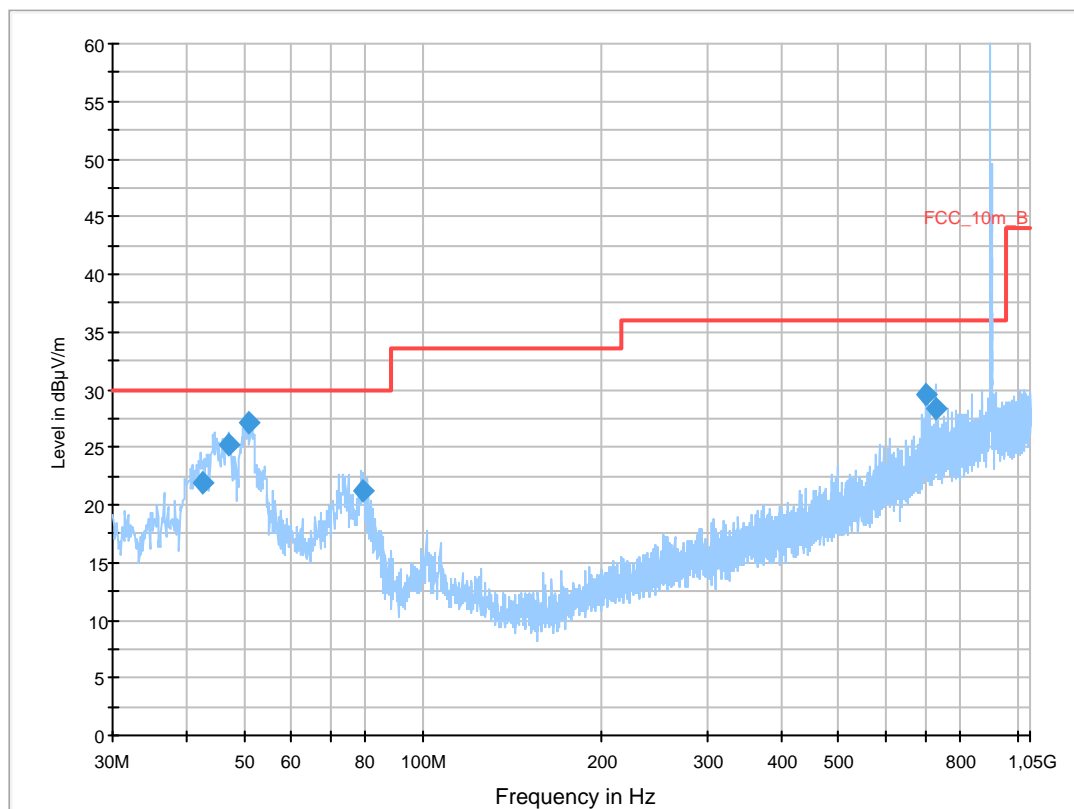
**Common Information**

EUT: RCP915HF + Dipol  
 Serial Number: prototype  
 Test Description: FCC part 15  
 Operating Conditions: TX Channel 0  
 Operator Name: Kraus  
 Comment: 3,3V via RCP915

**Scan Setup: STAN\_Fin [EMI radiated]**

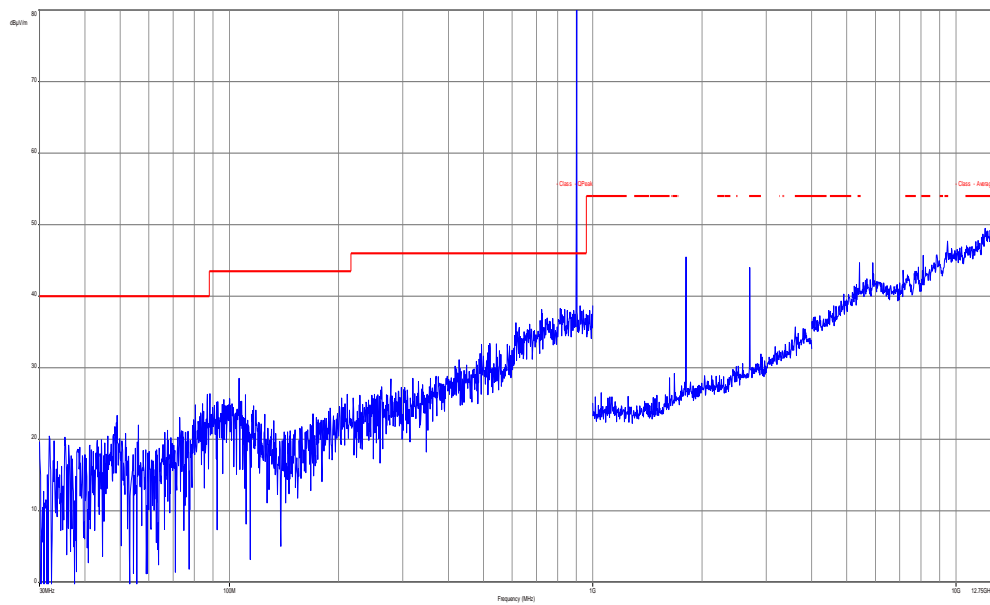
Hardware Setup: Electric Field (NOS)  
 Receiver: [ESC1 3]  
 Level Unit: dB $\mu$ V/m

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 $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
42.393450	22.0	1000.0	120.000	122.0	V	-3.0	13.4	8.0	30.0	
46.902750	25.2	1000.0	120.000	104.0	V	88.0	13.3	4.8	30.0	
50.938800	27.1	1000.0	120.000	98.0	V	280.0	13.3	2.9	30.0	
79.426950	21.2	1000.0	120.000	170.0	V	10.0	9.1	8.8	30.0	
703.989000	29.5	1000.0	120.000	98.0	H	270.0	22.6	6.5	36.0	
729.595050	28.3	1000.0	120.000	170.0	H	261.0	23.2	7.7	36.0	

**Plot 2:** 30 MHz to 12.75 GHz, TX mode, channel 0, vertical & horizontal polarization, dipole antenna





**Plot 3:** 30 MHz – 1 GHz, TX mode, channel 34, dipole antenna

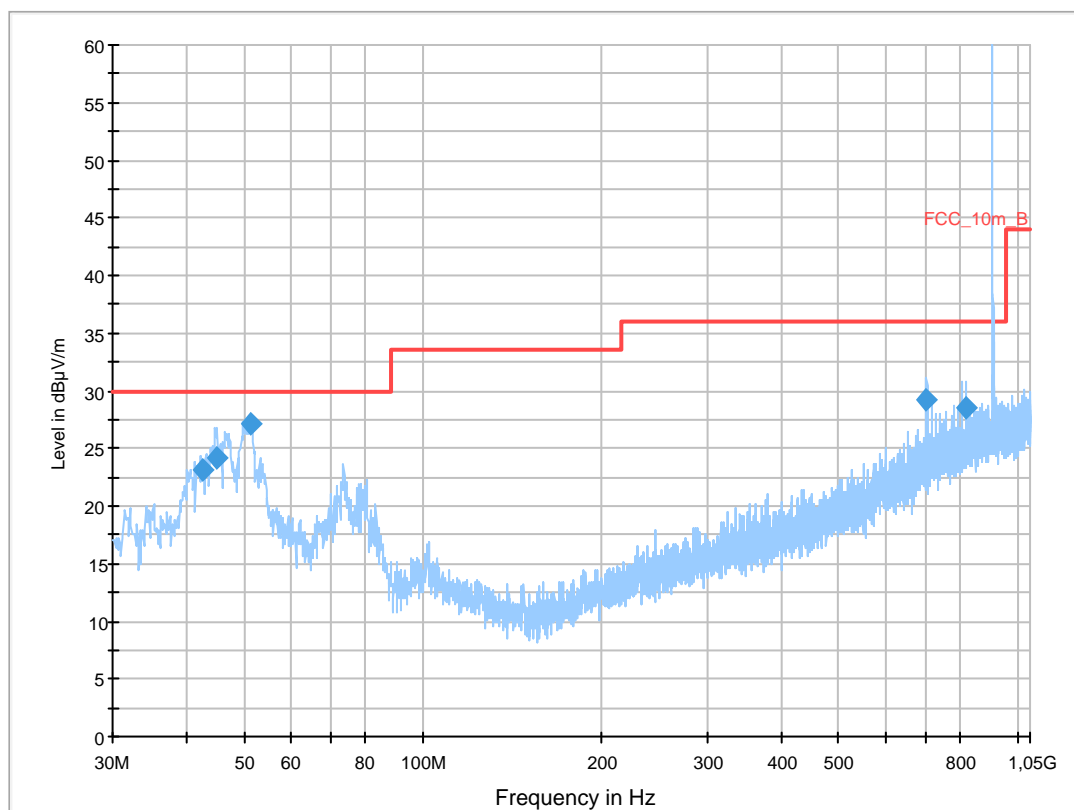
## Common Information

EUT: RCP915HF + Dipol  
 Serial Number: prototype  
 Test Description: FCC part 15  
 Operating Conditions: TX Channel 34  
 Operator Name: Kraus  
 Comment: 3,3V via RCP915

## Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dB $\mu$ V/m

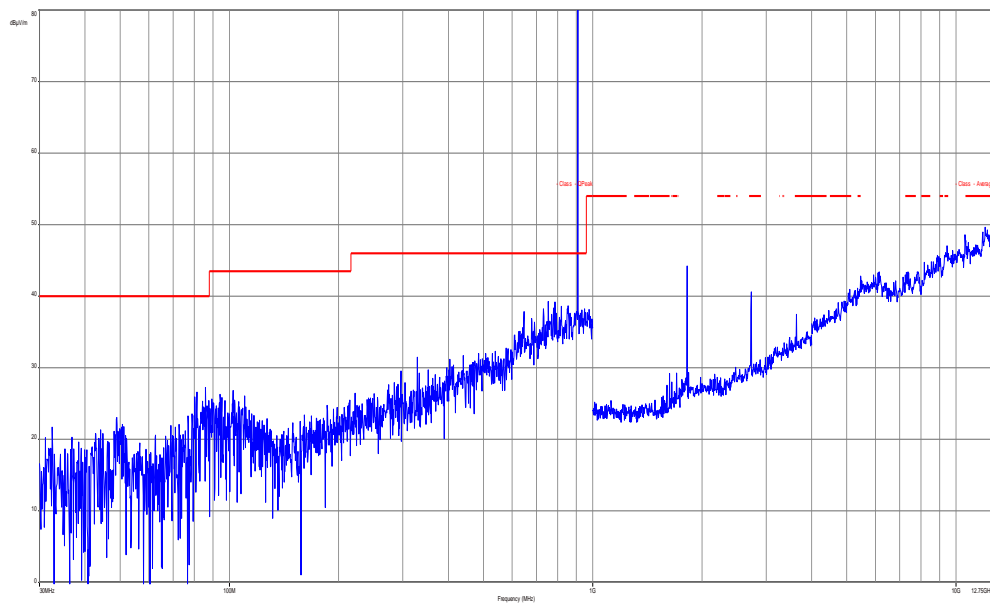
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



## Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
42.428250	23.1	1000.0	120.000	98.0	V	3.0	13.3	6.9	30.0	
44.931150	24.2	1000.0	120.000	170.0	V	-5.0	13.3	5.8	30.0	
51.125550	27.2	1000.0	120.000	98.0	V	280.0	13.3	2.8	30.0	
703.969200	29.2	1000.0	120.000	98.0	H	261.0	22.6	6.8	36.0	
819.204300	28.6	1000.0	120.000	98.0	H	-10.0	24.1	7.4	36.0	

**Plot 4:** 30 MHz to 12.75 GHz, TX mode, channel 34, vertical & horizontal polarization, dipole antenna



**Plot 5:** 30 MHz – 1 GHz, TX mode, channel 68, dipole antenna

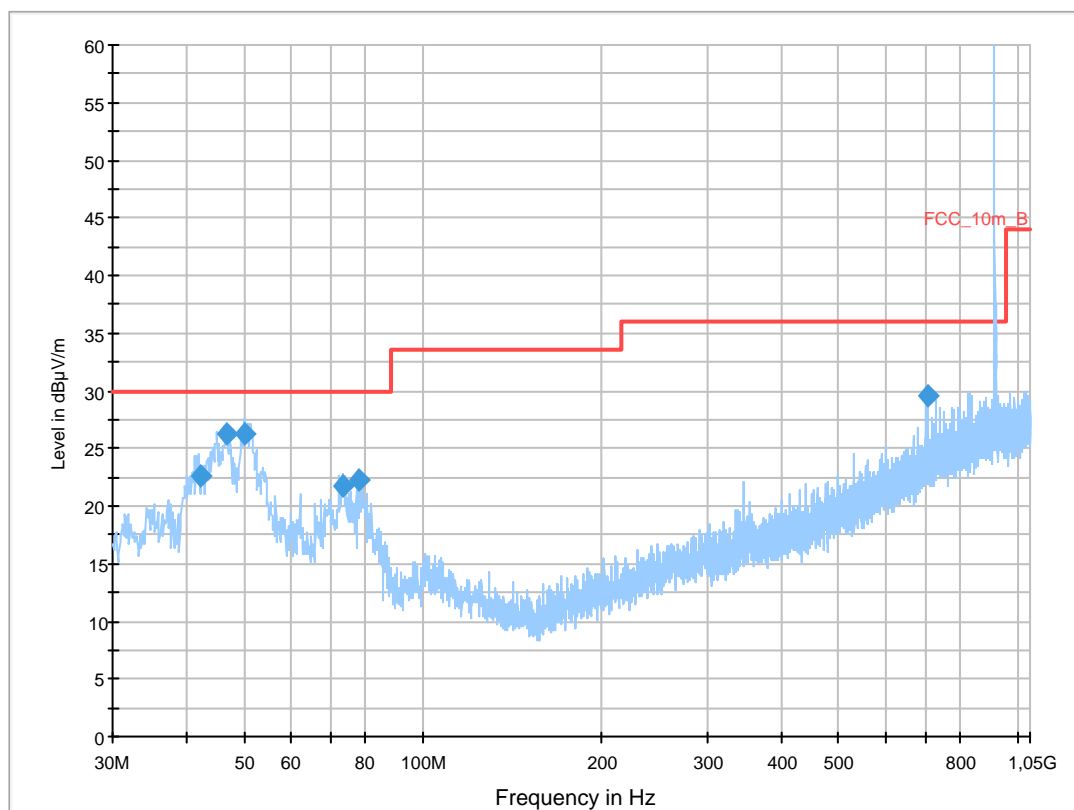
## Common Information

EUT: RCP915HF + Dipol  
 Serial Number: prototype  
 Test Description: FCC part 15  
 Operating Conditions: TX Channel 68  
 Operator Name: Kraus  
 Comment: 3,3V via RCP915

## Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dB $\mu$ V/m

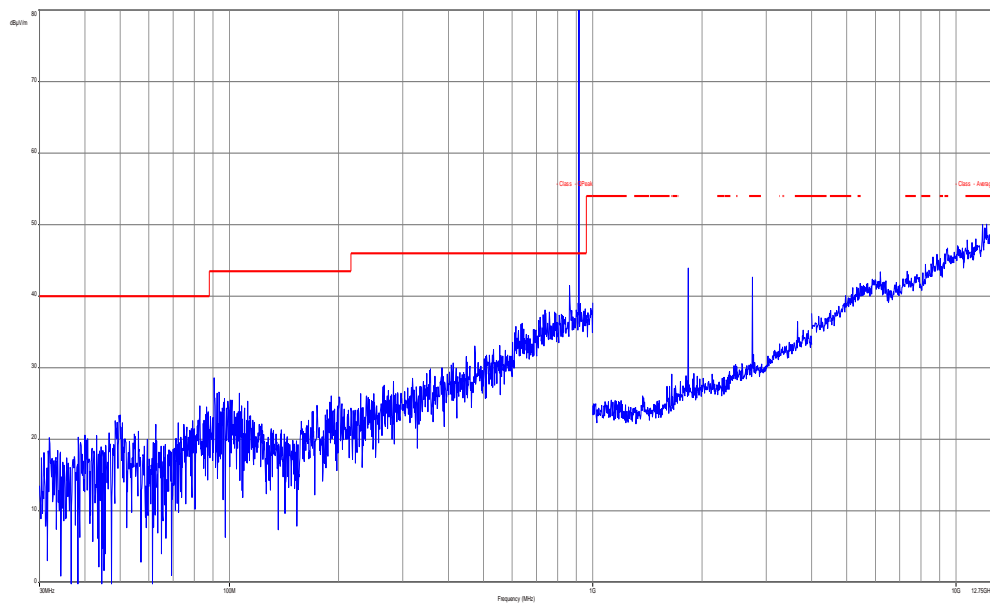
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamplifier
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



## Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
42.231450	22.6	1000.0	120.000	134.0	V	268.0	13.4	7.4	30.0	
46.668300	26.2	1000.0	120.000	98.0	V	280.0	13.3	3.8	30.0	
50.168700	26.2	1000.0	120.000	105.0	V	10.0	13.4	3.8	30.0	
73.217400	21.8	1000.0	120.000	170.0	V	10.0	9.2	8.2	30.0	
78.237450	22.3	1000.0	120.000	170.0	V	87.0	9.1	7.7	30.0	
703.996650	29.6	1000.0	120.000	143.0	H	270.0	22.6	6.4	36.0	

**Plot 6:** 30 MHz to 12.75 GHz, TX mode, channel 68, vertical & horizontal polarization, dipole antenna



**Plot 7:** 30 MHz – 1 GHz, TX mode, channel 0, helix antenna

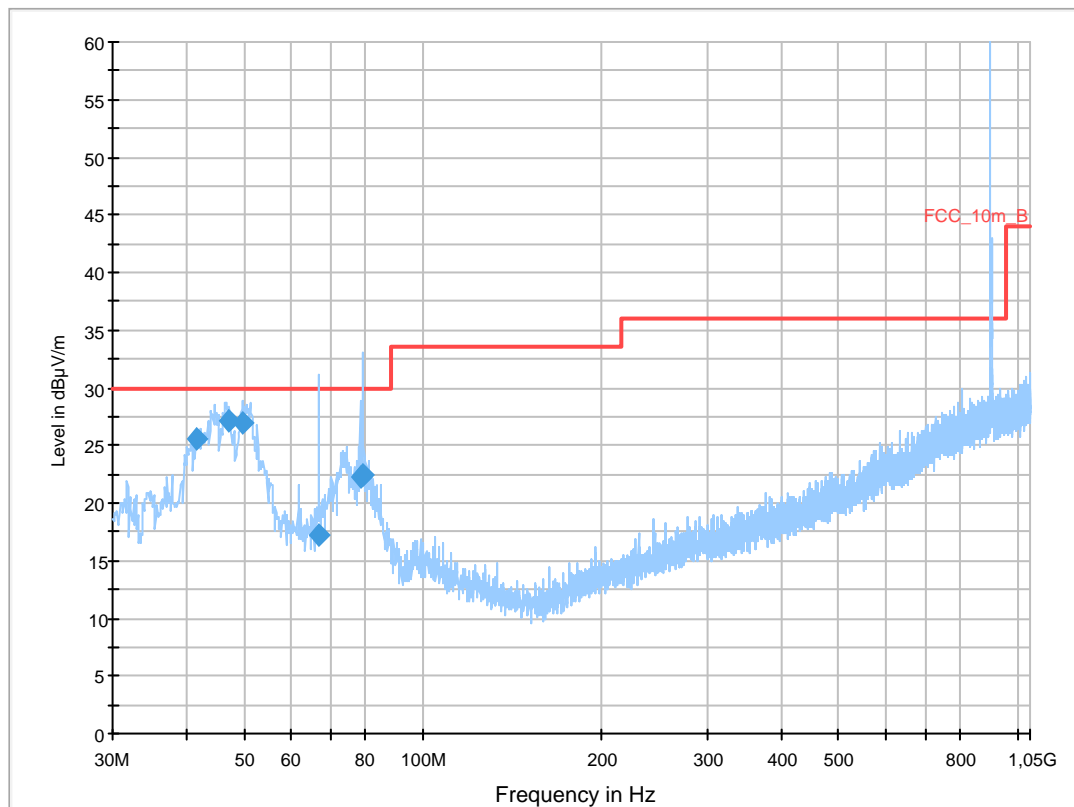
## Common Information

EUT: RCP915HF + Helix Ant  
 Serial Number: prototype  
 Test Description: FCC part 15  
 Operating Conditions: TX Channel 0  
 Operator Name: Kraus  
 Comment: 3,3V via RCP915

## Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dB $\mu$ V/m

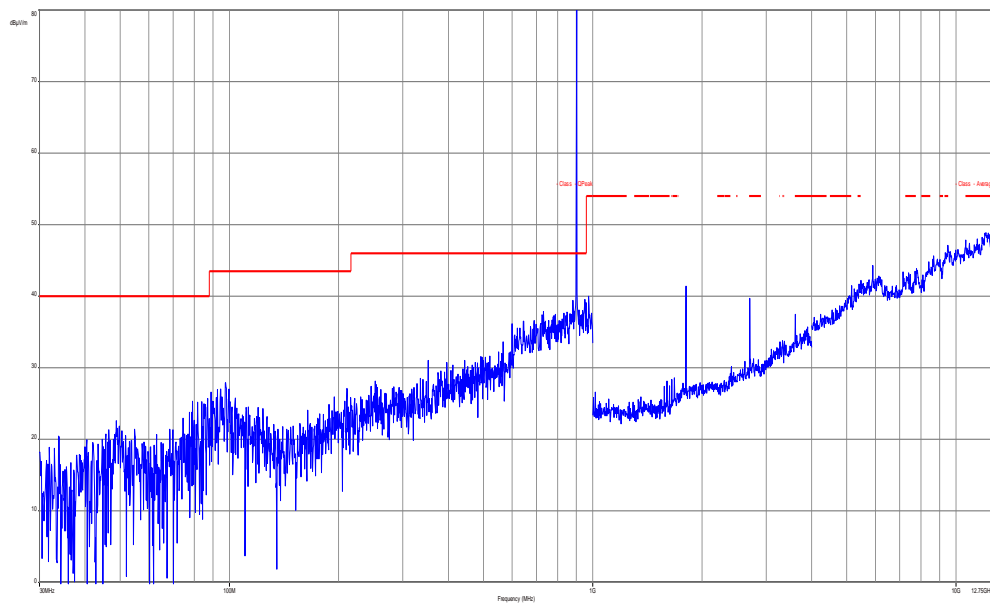
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



## Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
41.656200	25.6	1000.0	120.000	100.0	V	282.0	13.4	4.4	30.0	
46.891650	27.2	1000.0	120.000	100.0	V	221.0	13.3	2.8	30.0	
49.611450	26.9	1000.0	120.000	100.0	V	289.0	13.4	3.1	30.0	
66.643050	17.2	1000.0	120.000	200.0	V	219.0	10.0	12.8	30.0	
78.633000	22.3	1000.0	120.000	200.0	V	185.0	9.1	7.7	30.0	
78.866400	22.5	1000.0	120.000	213.0	V	185.0	9.1	7.5	30.0	

**Plot 8:** 30 MHz to 12.75 GHz, TX mode, channel 0, vertical & horizontal polarization, helix antenna



**Plot 10:** 30 MHz – 1 GHz, TX mode, channel 34, helix antenna

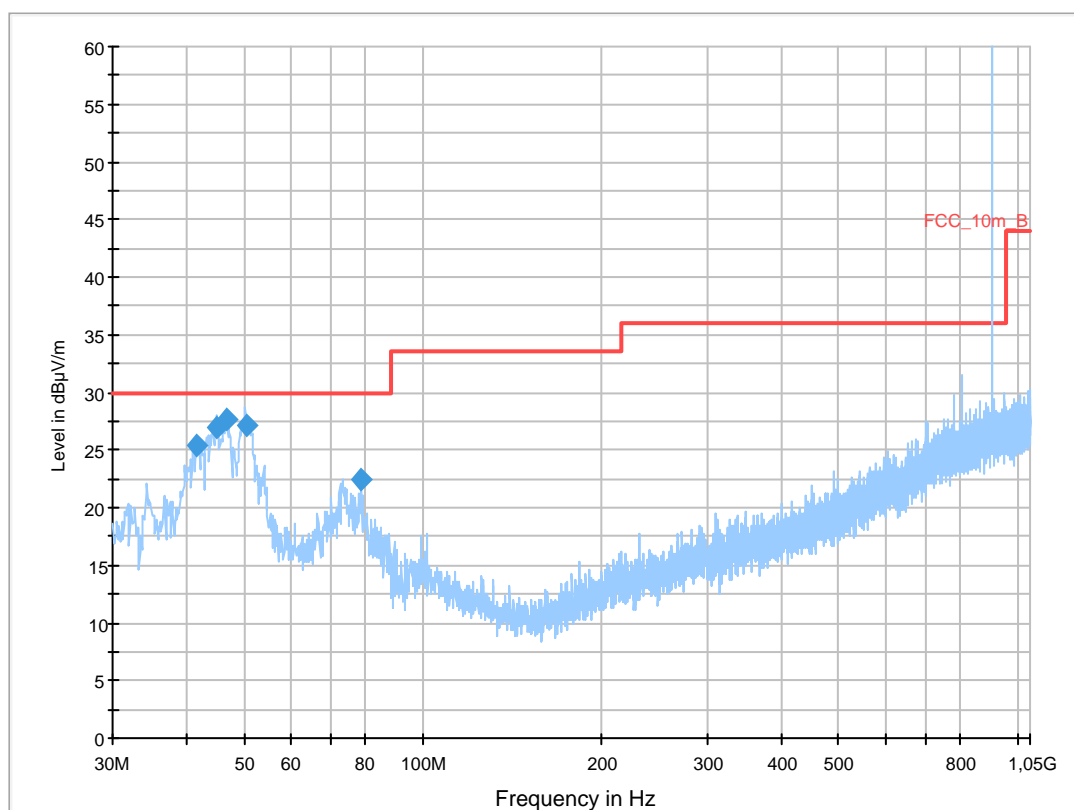
## Common Information

EUT: RCP915HF + Helix\_Ant  
 Serial Number: prototype  
 Test Description: FCC part 15  
 Operating Conditions: TX Channel 34  
 Operator Name: Kraus  
 Comment: 3,3V via RCP915

## Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dB $\mu$ V/m

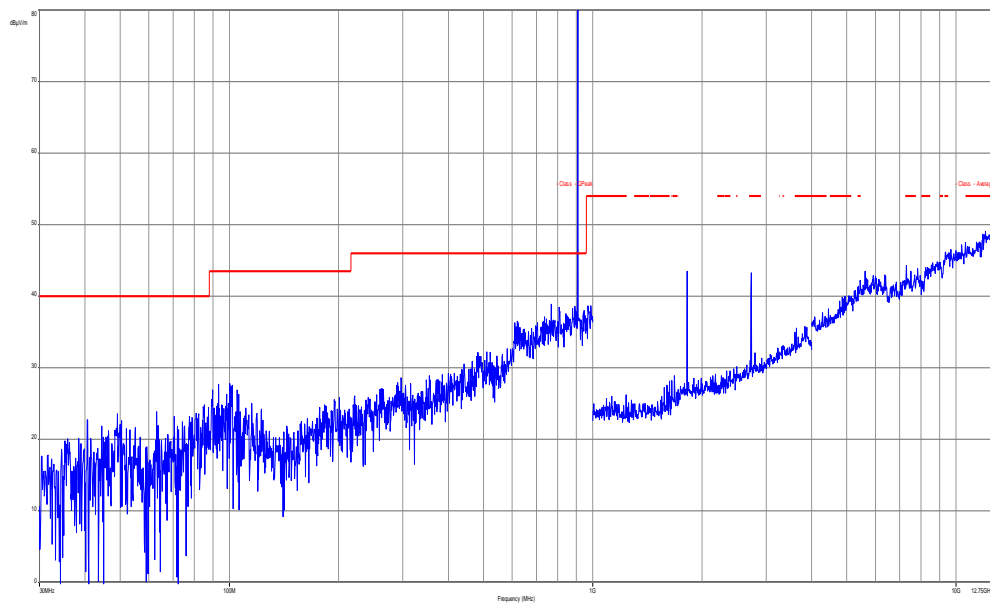
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamplifier
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



## Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
41.640000	25.4	1000.0	120.000	98.0	V	270.0	13.4	4.6	30.0	
44.747700	27.0	1000.0	120.000	98.0	V	280.0	13.3	3.0	30.0	
46.681650	27.6	1000.0	120.000	98.0	V	180.0	13.3	2.4	30.0	
50.375850	27.2	1000.0	120.000	98.0	V	100.0	13.3	2.8	30.0	
78.257700	22.5	1000.0	120.000	170.0	V	178.0	9.1	7.5	30.0	

**Plot 11:** 30 MHz to 12.75 GHz, TX mode, channel 34, vertical & horizontal polarization, helix antenna





**Plot 12:** 30 MHz – 1 GHz, TX mode, channel 68, helix antenna

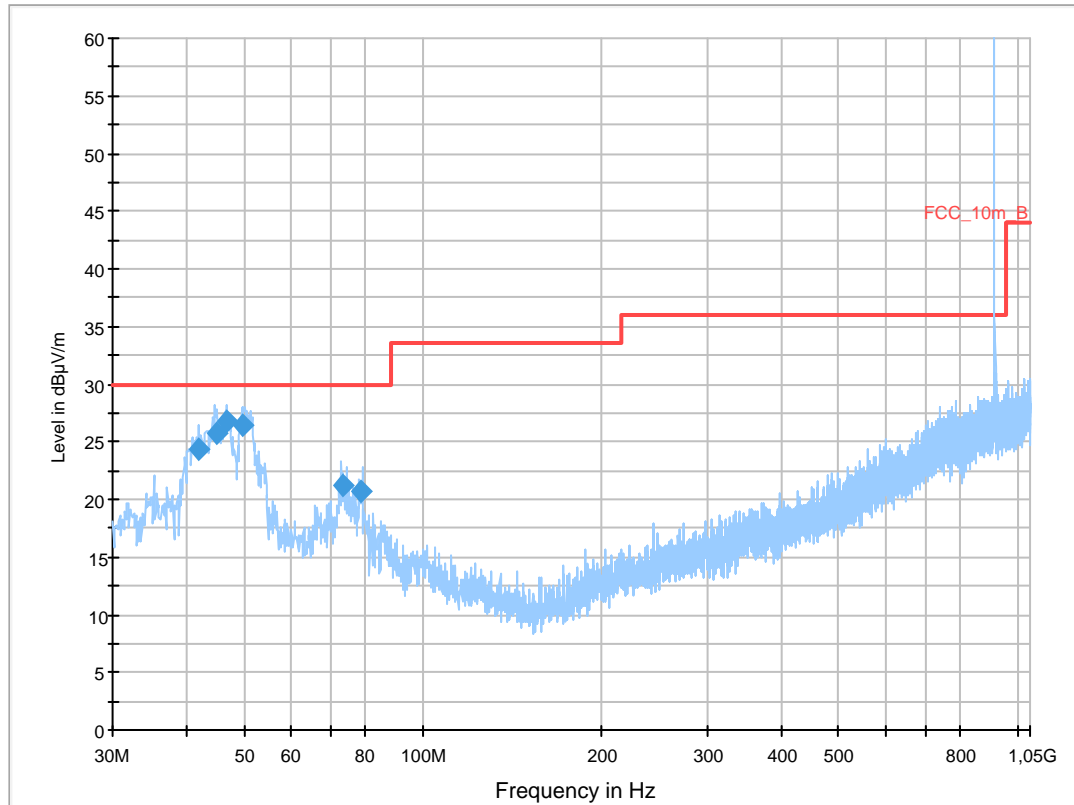
## Common Information

EUT: RCP915HF + Helix\_Ant  
 Serial Number: prototype  
 Test Description: FCC part 15  
 Operating Conditions: TX Channel 68  
 Operator Name: Kraus  
 Comment: 3,3V via RCP915

## Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dB $\mu$ V/m

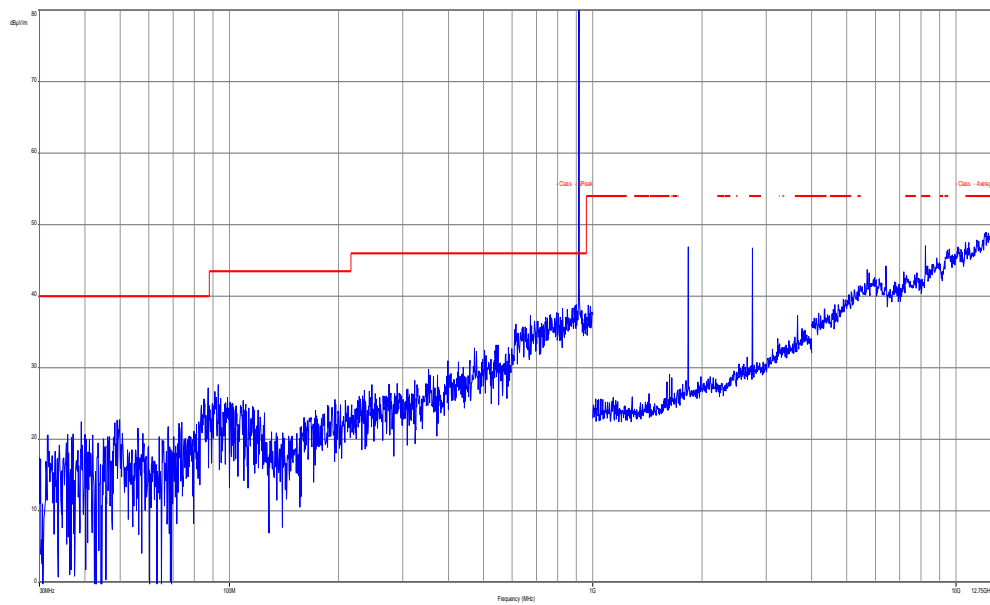
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



## Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
42.019350	24.3	1000.0	120.000	98.0	V	-9.0	13.4	5.7	30.0	
44.918250	25.7	1000.0	120.000	98.0	V	88.0	13.3	4.3	30.0	
46.671150	26.8	1000.0	120.000	98.0	V	10.0	13.3	3.2	30.0	
49.599300	26.4	1000.0	120.000	98.0	V	-9.0	13.4	3.6	30.0	
73.203150	21.2	1000.0	120.000	170.0	V	171.0	9.2	8.8	30.0	
78.686550	20.7	1000.0	120.000	170.0	V	270.0	9.1	9.3	30.0	

**Plot 13:** 30 MHz to 12.75 GHz, TX mode, channel 68, vertical & horizontal polarization, helix antenna



## 9.12 RX spurious emissions radiated

### Description:

Measurement of the radiated spurious emissions in idle/receive mode. The EUT is detached so all oscillators are active.

### 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

### Limits:

FCC		IC
CFR Part 15.109		RSS Gen, Issue 2, 4.10
RX Spurious Emissions Radiated		
Frequency (MHz)	Field strength (dB $\mu$ V/m)	Measurement distance
30 - 88	30.0	10
88 - 216	33.5	10
216 - 960	36.0	10
Above 960	54.0	3

### Results:

RX spurious emissions radiated [dB $\mu$ V/m]		
F [MHz]	Detector	Level [dB $\mu$ V/m]
No critical peaks detected		
Measurement uncertainty	$\pm 3$ dB	

**Result:** Passed

**Plots:**

**Plot 1:** 30 MHz – 1 GHz, RX mode (valid for all channels and antennas)

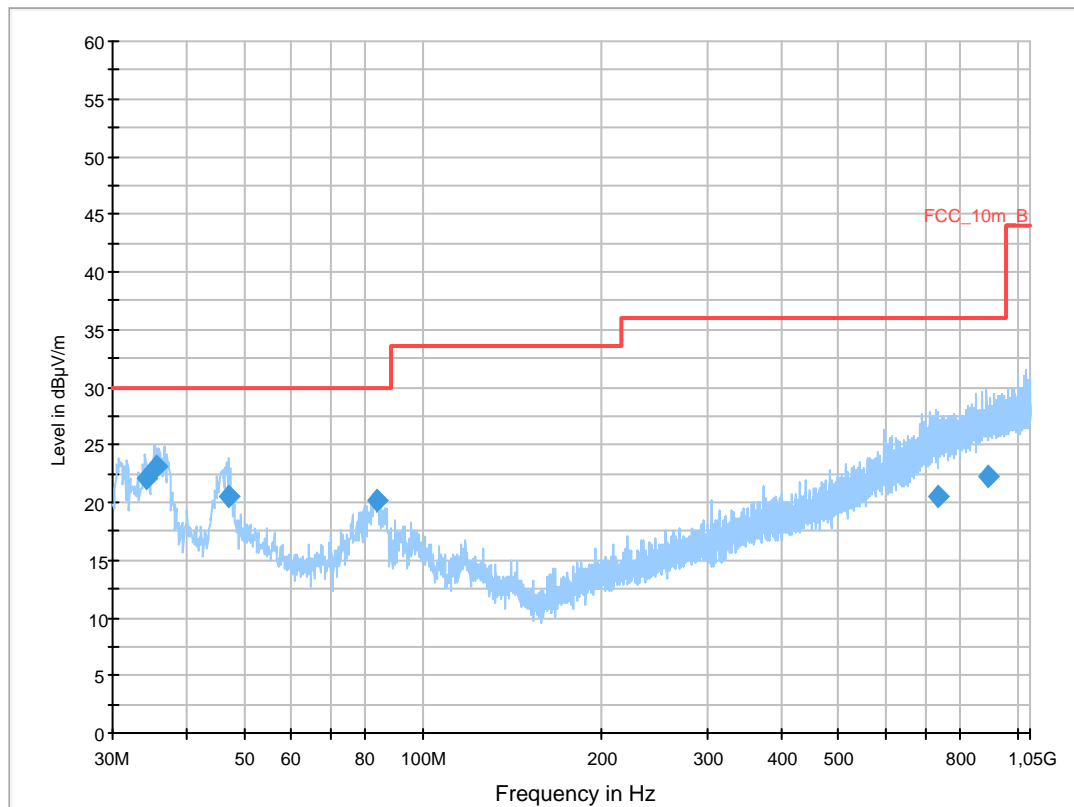
**Common Information**

EUT: RCP915\_Base  
 Serial Number: prototype  
 Test Description: EN 55022 class B  
 Operating Conditions: RX Channel 34  
 Operator Name: Kraus  
 Comment: DC: 24V

**Scan Setup: STAN\_Fin [EMI radiated]**

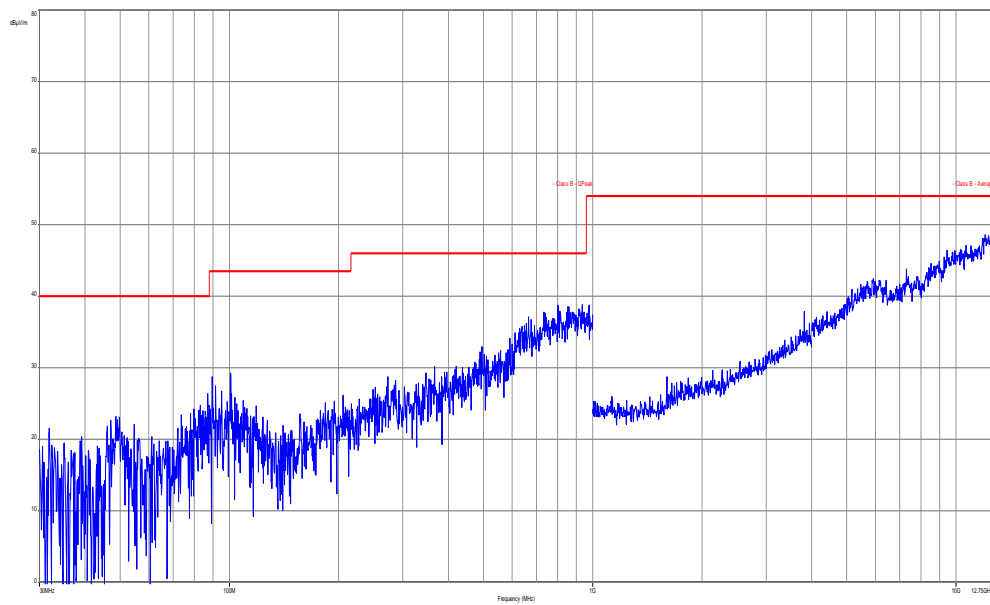
Hardware Setup: Electric Field (NOS)  
 Receiver: [ESC1 3]  
 Level Unit: dB $\mu$ V/m

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 $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
34.284000	22.0	1000.0	120.000	100.0	V	46.0	13.0	8.0	30.0	
35.650950	23.1	1000.0	120.000	194.0	V	72.0	13.1	6.9	30.0	
46.932450	20.5	1000.0	120.000	100.0	V	-5.0	13.3	9.5	30.0	
83.333850	20.1	1000.0	120.000	322.0	V	90.0	9.6	9.9	30.0	
732.225450	20.5	1000.0	120.000	200.0	H	259.0	23.3	15.5	36.0	
888.669750	22.3	1000.0	120.000	400.0	H	294.0	25.1	13.7	36.0	

**Plot 1:** 30 MHz to 12.75 GHz, RX mode, vertical & horizontal polarization (valid for all channels and antennas)



### 9.13 TX spurious emissions radiated < 30 MHz

#### Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 39. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 78 will be measured too. The measurement is performed in the mode with the highest output power. 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
CFR Part 15.209(a)		RSS 210, Issue 8, 2.2
TX spurious emissions radiated < 30 MHz		
Frequency (MHz)	Field strength (dB $\mu$ 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

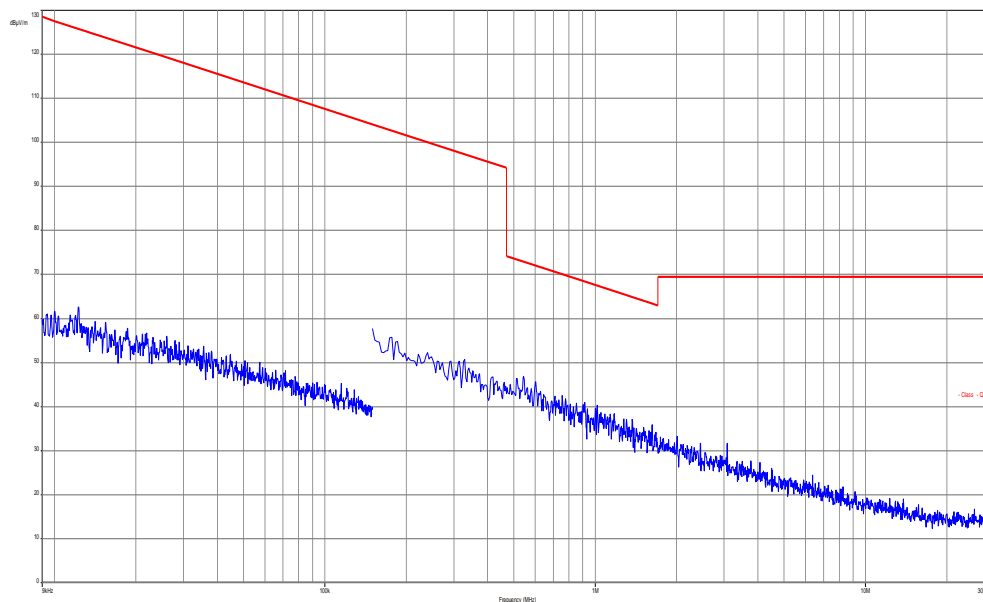
#### Results:

TX spurious emissions radiated < 30 MHz [dB $\mu$ V/m]		
F [MHz]	Detector	Level [dB $\mu$ V/m]
No critical peaks detected		
Measurement uncertainty	$\pm 3$ dB	

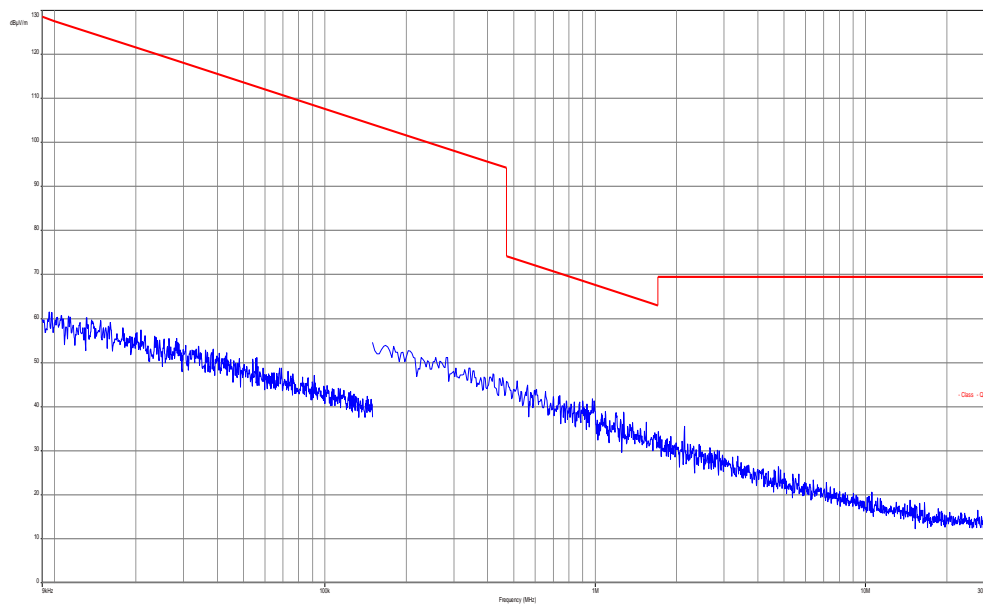
**Result:** Passed

**Plots:**

**Plot 1:** 9 kHz to 30 MHz, TX mode, channel 39 (valid for all channels and antennas)



**Plot 4:** 9 kHz to 30 MHz, RX mode (valid for all channels and antennas)



## 9.14 TX spurious emissions conducted < 30 MHz

### Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 34. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 68 will be measured too. The measurement is performed in the mode with the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

### Measurement:

Measurement parameter	
Detector:	Peak - Quasi peak / average
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
CFR Part 15.107(a)		ICES-003, Issue 4
TX spurious emissions conducted < 30 MHz		
Frequency (MHz)	Quasi-peak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

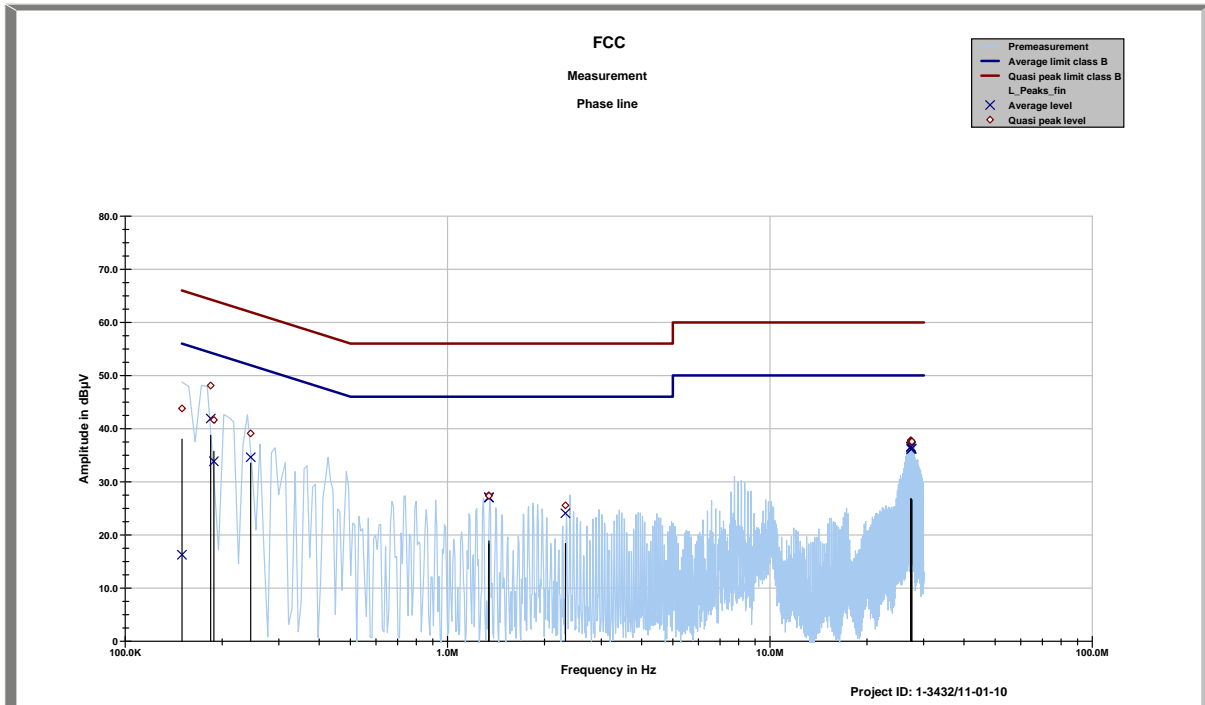
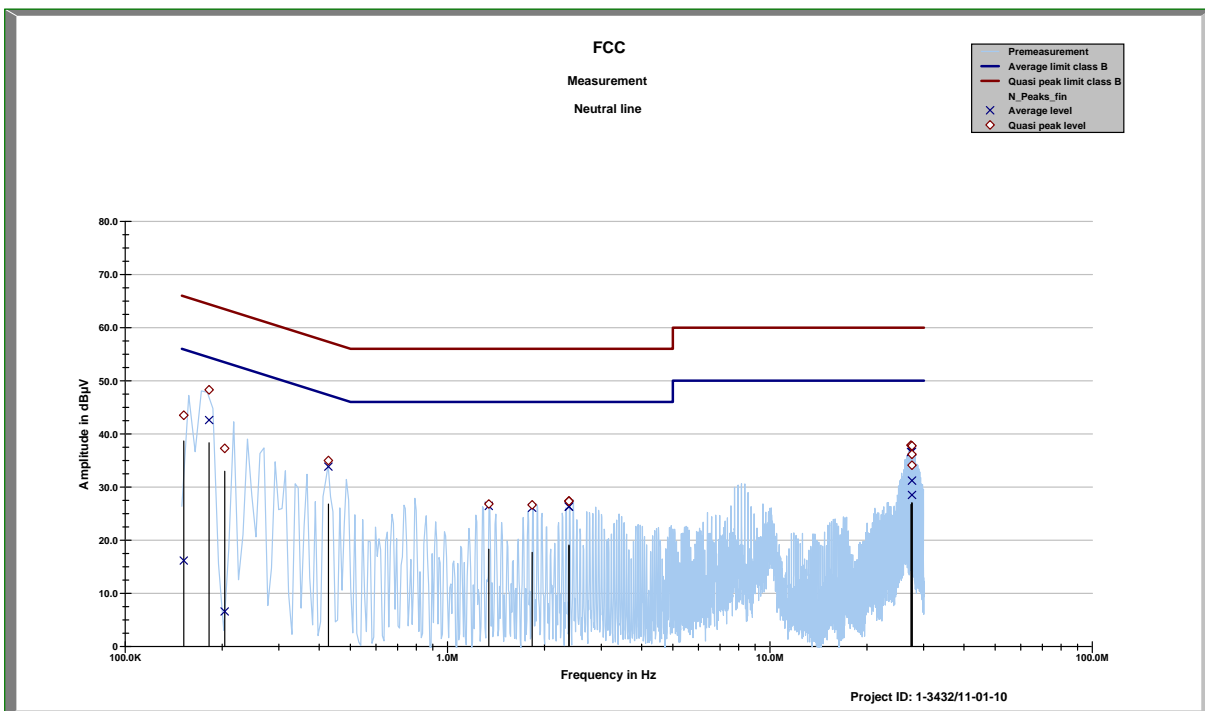
\*Decreases with the logarithm of the frequency

### Results:

TX spurious emissions conducted < 30 MHz [dB $\mu$ V/m]		
F [MHz]	Detector	Level [dB $\mu$ V/m]
No critical peaks detected		
Measurement uncertainty	$\pm 3$ dB	

**Result: Passed**



**Plots:****Plot 1:** 9 kHz to 30 MHz, TX mode, phase line**Plot 2:** 9 kHz to 30 MHz, TX mode, neutral line

## 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.	Isolating Transformer	RT5A	Grundig	8041	300001626	g		
2	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
3	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	11.05.2011	11.05.2013
4	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
5	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
6	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
7	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
8	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
9	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
10	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
11	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
12	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
13	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
14	n. a.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
15	n. a.	Band Reject filter	WRCG240 0/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
16	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
17	n. a.	Highpass Filter	WHKX2.9/1 8G-12SS	Wainwright	1	300003492	ev		
18	n. a.	Highpass Filter	WHK1.1/15 G-10SS	Wainwright	3	300003255	ev		
19	n. a.	Highpass Filter	WHKX7.0/1 8G-8SS	Wainwright	18	300003789	ne		
20	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	13.09.2010	13.09.2012
21	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vk	08.09.2010	
22	n. a.	TRILOG Broadband	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014

		Test-Antenna 30 MHz - 3 GHz							
23	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologi es	MY51210197	300004405	k	19.12.2011	19.12.2012
24	19	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9107-3697	300001605	Ve	19.10.2010	19.10.2012
25	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04590	300001041	Ve	12.01.2012	12.01.2015
26	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
27	n. a.	Signal Analyzer 20Hz-26,5GHz- 150 to + 30 DBM	FSiQ26	R&S	835111/0004	300002678	Ve	04.11.2010	04.11.2012

**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  
 vlkl! 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 1:



Photo 2:

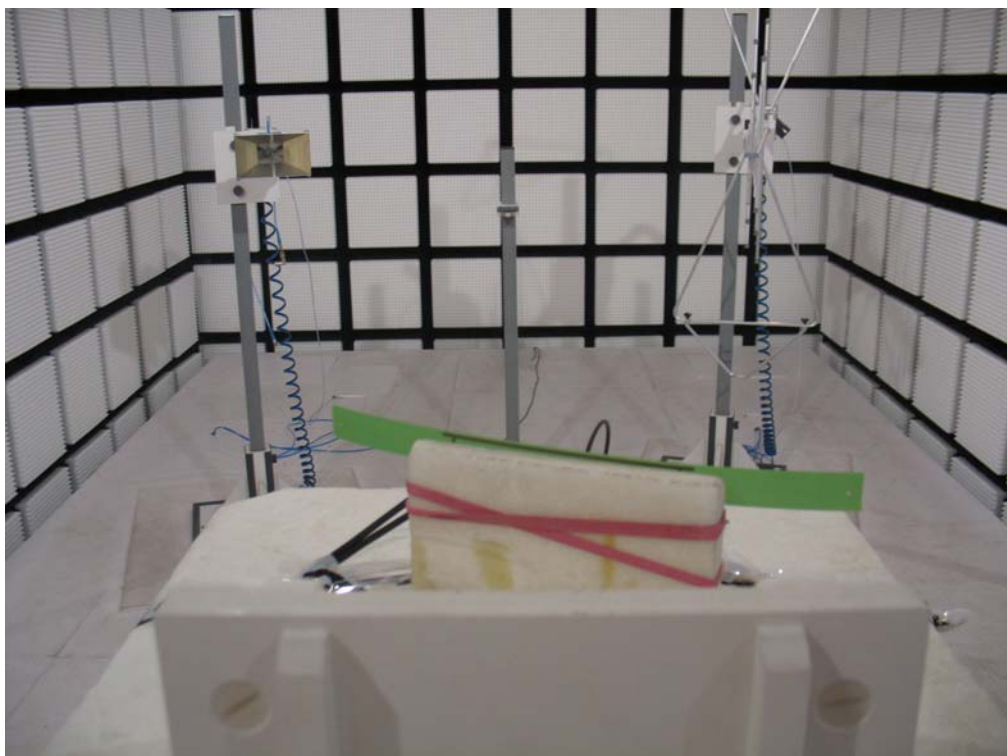


Photo 3:



Photo 4:

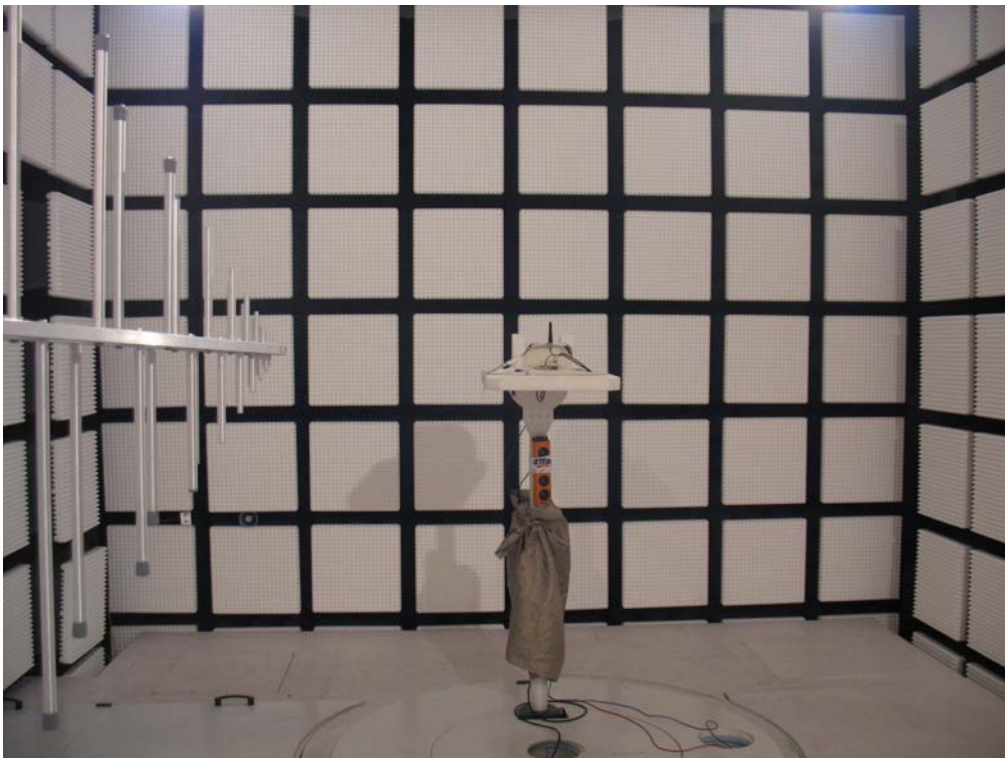




Photo 5:



Photo 6:



## Annex B Photographs of the EUT

Photo 1:

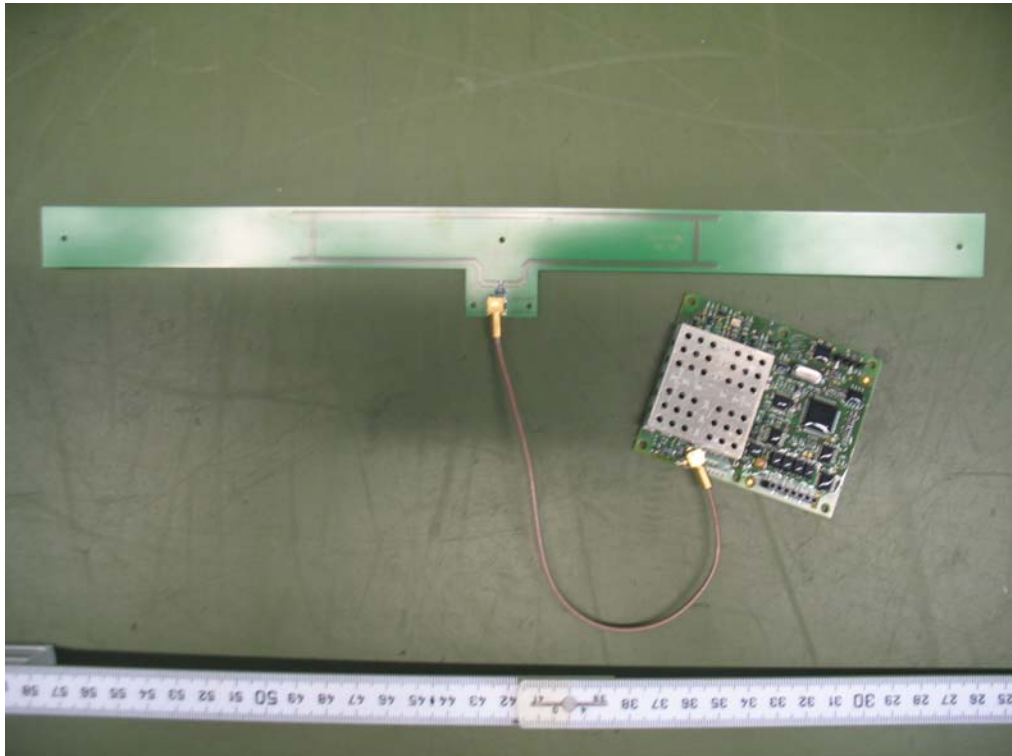


Photo 2:



Photo 3:

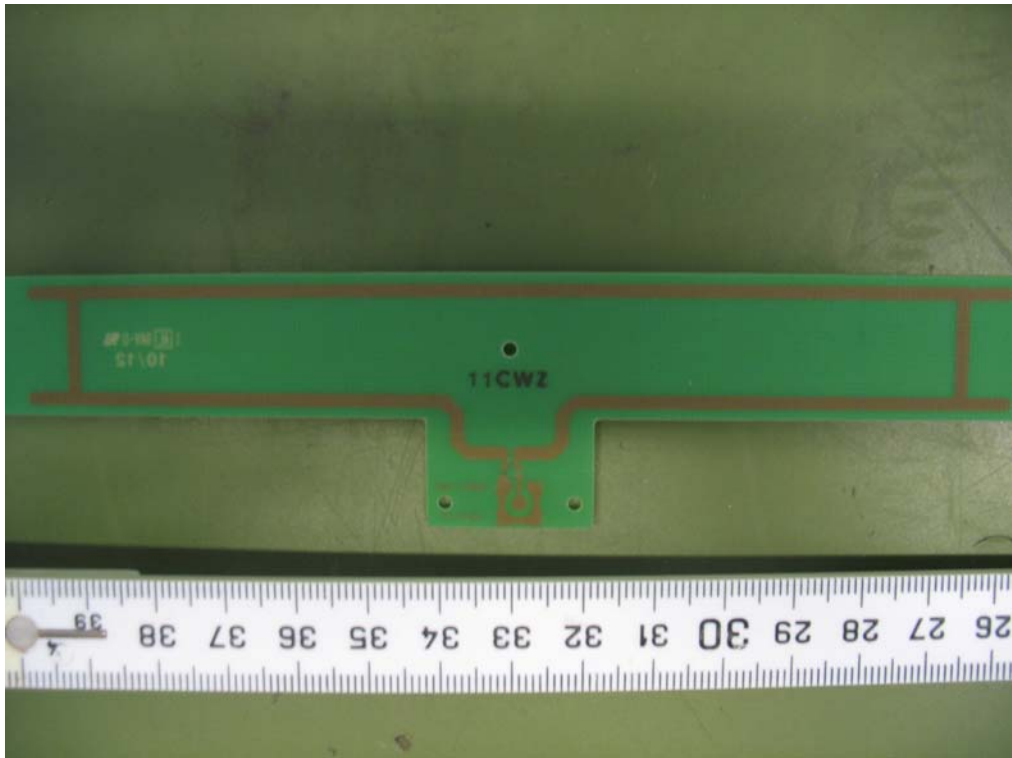


Photo 4:

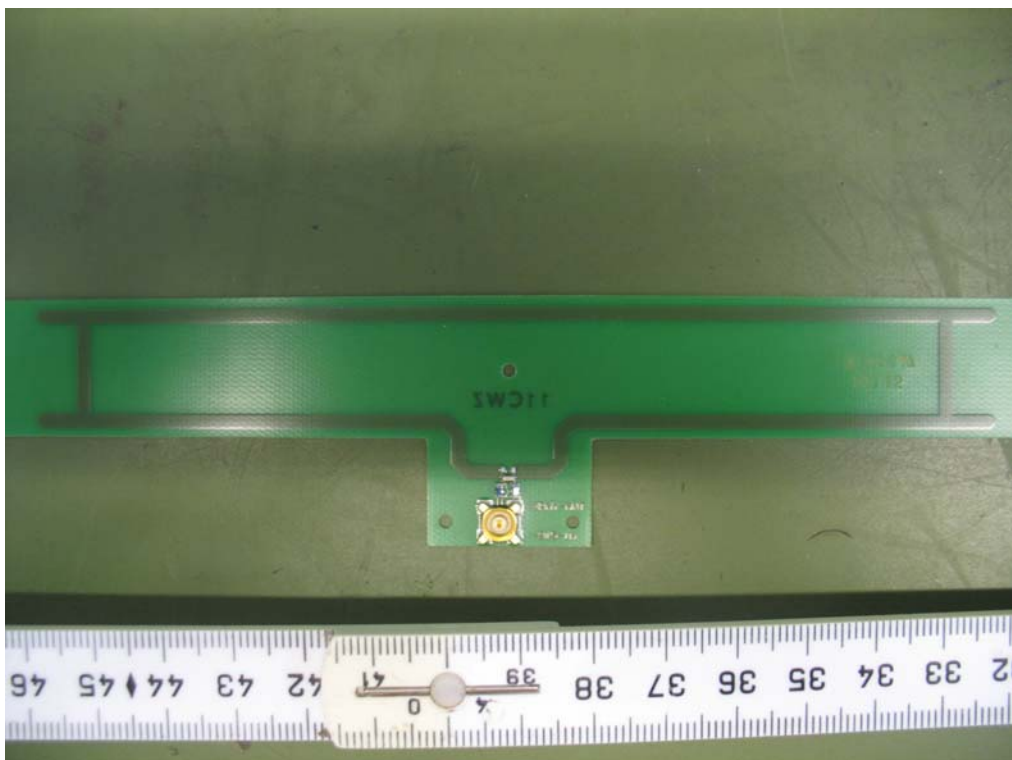




Photo 5:

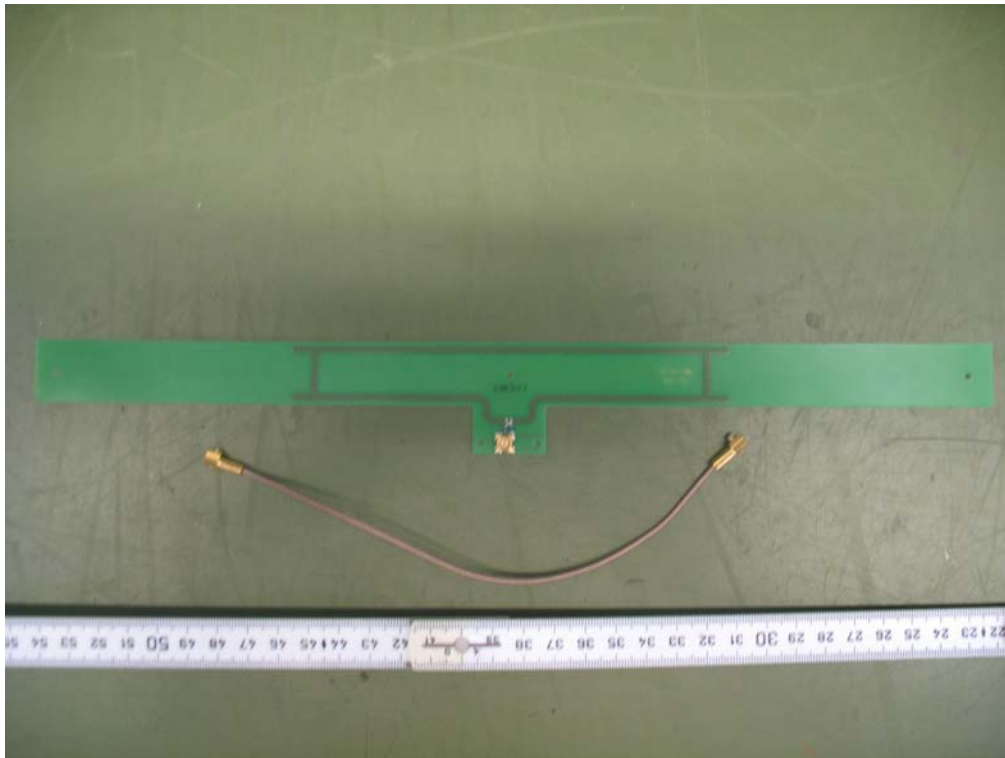
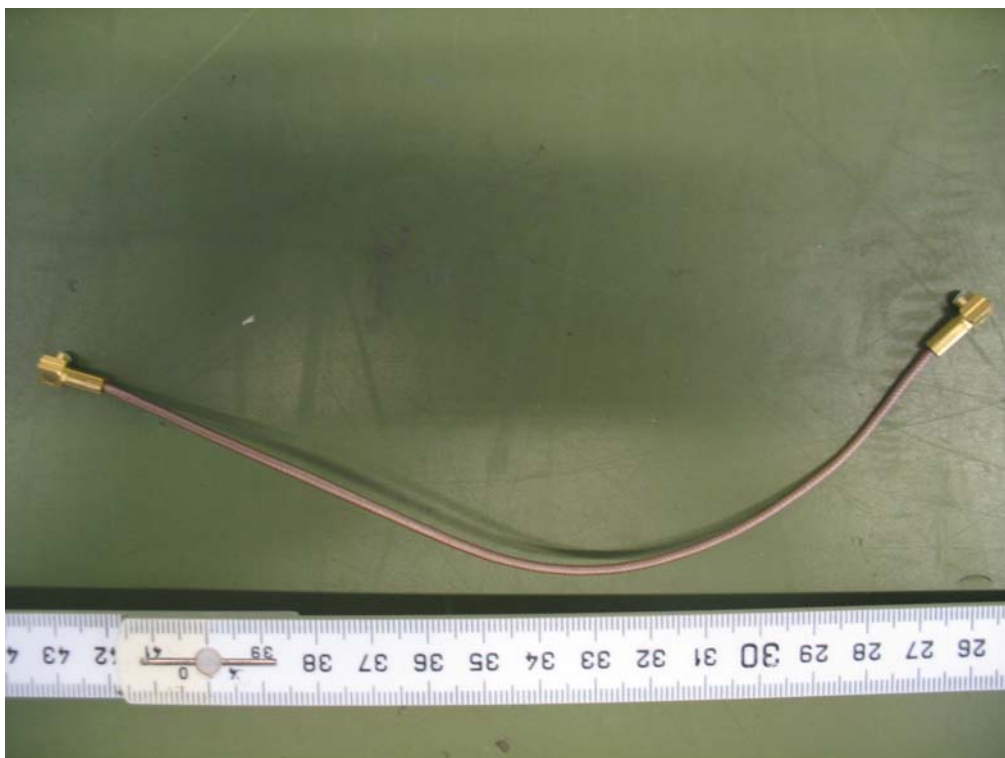


Photo 6:



**Annex C Document history**

Version	Applied changes	Date of release
1.0	Initial release	2012-11-07
A	Plot names corrected, reference to standard added	2013-01-18
B	Applicant and Manufacturer address changed	2013-03-22
C	Model name in RSP100 corrected, values converted from dBm to W	2014-02-07

**Annex D 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 E 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/fileadmin/de/CETECOM\\_D\\_Saarbruecken/accreditations\\_Jan\\_2010/DAKKS\\_Akkredi\\_Urk\\_EN17025-En\\_incl\\_Annex.pdf](http://www.cetecom.com/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKS_Akkredi_Urk_EN17025-En_incl_Annex.pdf)