

## TEST REPORT

Test report no.: 1-4802/12-01-05



### Testing laboratory

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#### Accredited Testing Laboratory:

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

### Applicant

**Marquardt GmbH**  
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 78604 Rietheim-Wellheim / GERMANY  
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### Manufacturer

**Marquardt GmbH**  
 Schloss-Str. 16  
 78604 Rietheim-Wellheim / GERMANY

### 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.

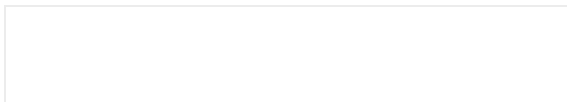
### Test Item

**Kind of test item:** Remote Control Device  
**Model name:** BV01  
**FCC ID:** IYZ-BV01  
**IC:** 2701A-BV01  
 Frequency: ISM band 2400 MHz to 2483.5 MHz  
 Technology tested: proprietary  
 Antenna: Integrated antenna  
 Power Supply: 3.0V DC by battery  
 Temperature Range: -20°C to +55°C



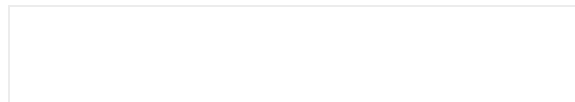
This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

### Test report authorised:



Marco Bertolino  
 Testing Manager

### Test performed:



Christoph Schneider  
 Expert

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## 2 General information

### 2.1 Notes and disclaimer

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

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### 2.2 Application details

Date of receipt of order:	2013-01-09
Date of receipt of test item:	2013-03-20
Start of test:	2013-03-21
End of test:	2013-04-11
Person(s) present during the test:	-/-

## 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:		46 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	3.00 V DC by battery
	$V_{max}$	3.45 V
	$V_{min}$	2.70 V

#### 5 Test item

Kind of test item	:	Remote Control Device
Type identification	:	BV01
S/N serial number	:	Rad. 29 Cond. 6
HW hardware status	:	-/-
SW software status	:	-/-
Frequency band [MHz]	:	ISM band 2400 MHz to 2483.5 MHz
Type of modulation	:	MSK
Number of channels	:	16
Antenna	:	Integrated antenna
Power supply	:	3.0 V DC by battery
Temperature range	:	-20°C to +55 °C

#### 5.1 Additional information

None

#### 6 Test laboratories sub-contracted

None

## 7 Summary of measurement results

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

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8	Passed	2013-04-15	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Pass	Fail	NA	NP	Results (max.)
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	<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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth 6dB bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth 20dB bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	Nominal	Nominal	<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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	<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	<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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

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

## 8 RF measurements

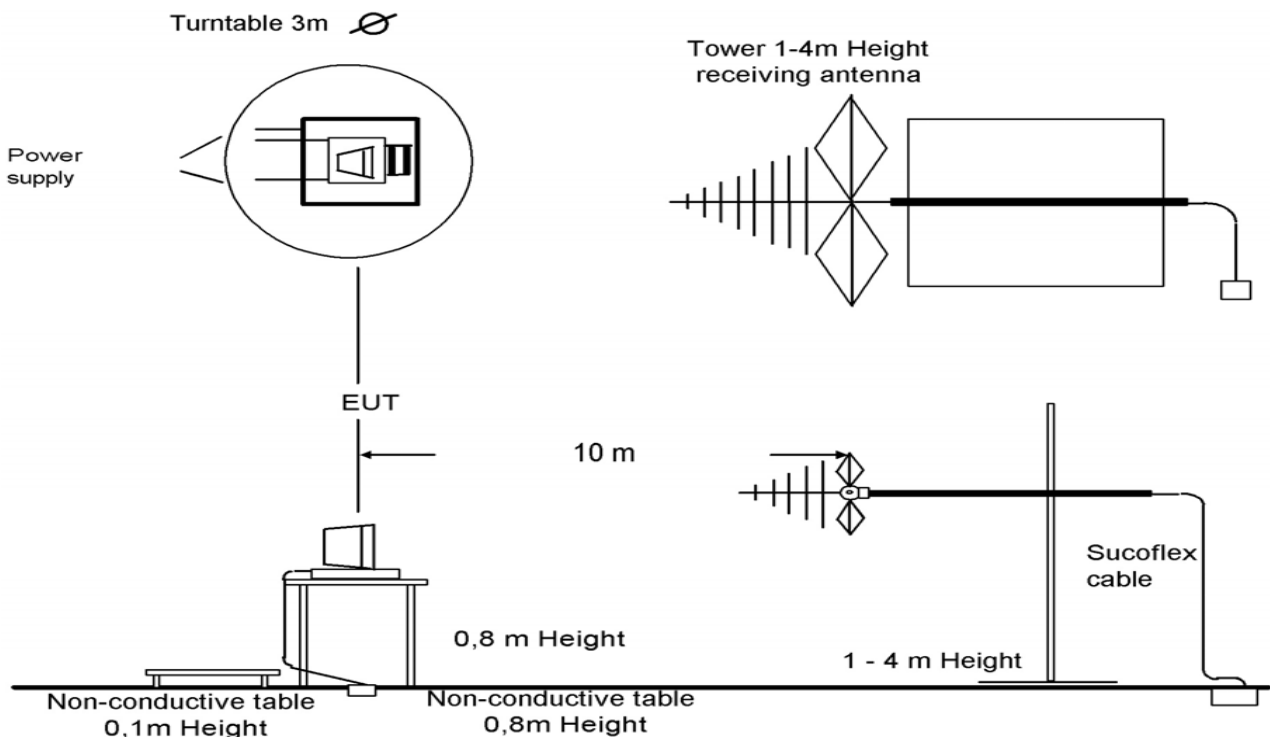
### 8.1 Description of test setup

#### 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



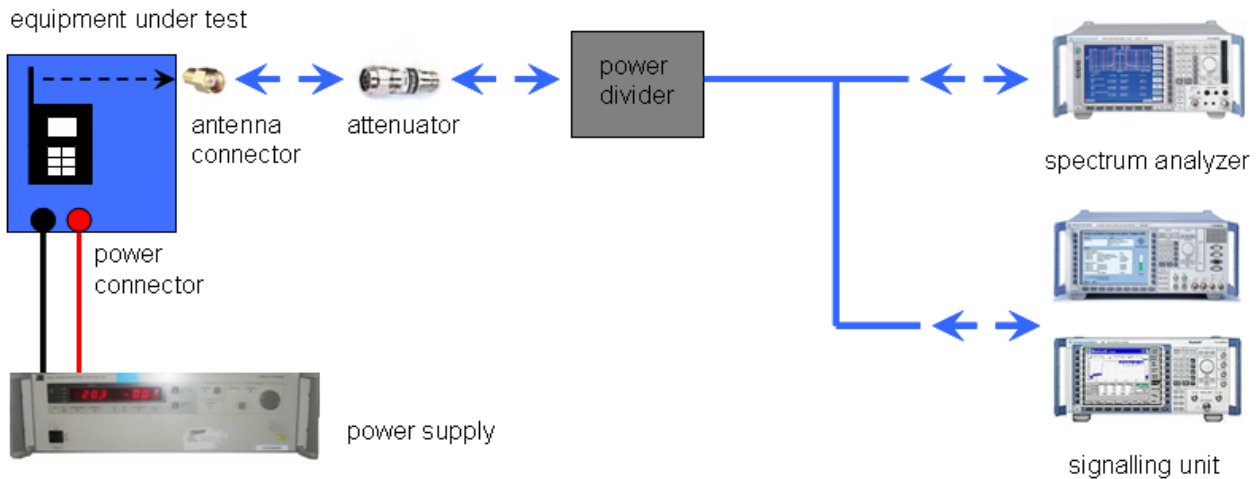
Picture 1: Diagram radiated measurements

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

The EUT is powered by an external power supply with nominal voltage

### 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: None

- Test mode:
- No test mode available.
  - Special software is used.  
EUT is transmitting pseudo random data by itself

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

Test report number	:	1-4802/12-01-05
Equipment model number	:	BV01
Certification number	:	2701A-BV01
Manufacturer (complete address)	:	Marquardt GmbH Schloss-Str. 16 78604 Rietheim-Wellheim / GERMANY
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 2400 MHz to 2483.5 MHz
RF-power [mW] (max.)	:	cond.: 1.32 EIRP: 1.63
Occupied bandwidth (99%-BW) [kHz]	:	2940
Type of modulation	:	MSK
Emission designator (TRC-43)	:	2M94F1D
Antenna information	:	Integrated pcb antenna
Transmitter spurious (worst case)[dB $\mu$ V/m @ 3m]:	:	49 dB $\mu$ V/m @ 12.1 GHz

#### **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:**

2013-04-15

Date

Christoph Schneider

Name

Signature



## 9 Measurement results

### 9.1 Maximum output power

#### Description:

Measurement of the maximum output power conducted and radiated

#### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz / 10 MHz (at least 1 MHz)
Video bandwidth:	≥ 3 x RBW (or maximum of available setting)
Span:	> DTS bandwidth
Trace-Mode:	Max hold (allow trace to fully stabilize)

#### Limits:

FCC	IC
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

**Result:**

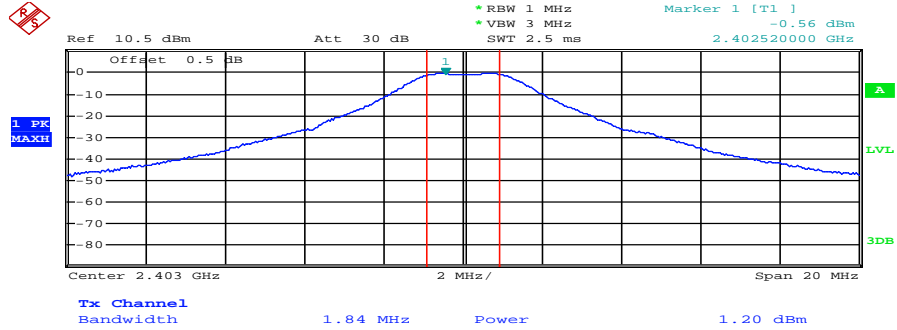
Modulation Channel	Maximum output power conducted [dBm]		
	Lowest	Middle	Highest
	1.20	0.94	0.30
Measurement uncertainty	± 1 dB		

Modulation Channel	Maximum output power radiated - EIRP [dBm]		
	Lowest	Middle	Highest
	1.18	1.90	2.12
Measurement uncertainty	± 3 dB		

**Result: Passed**

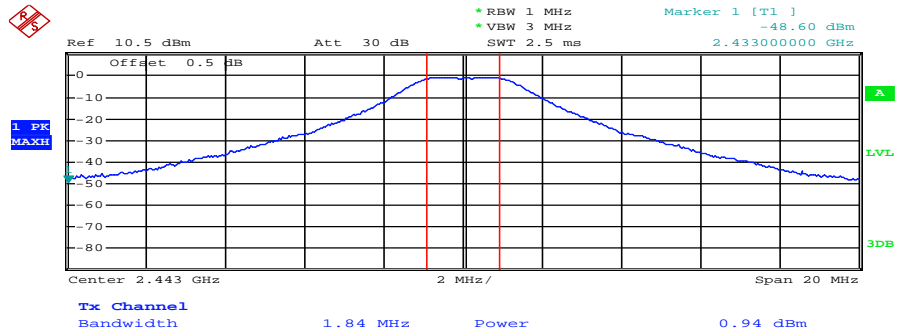
**Plots:**

**Plot 1: lowest channel**



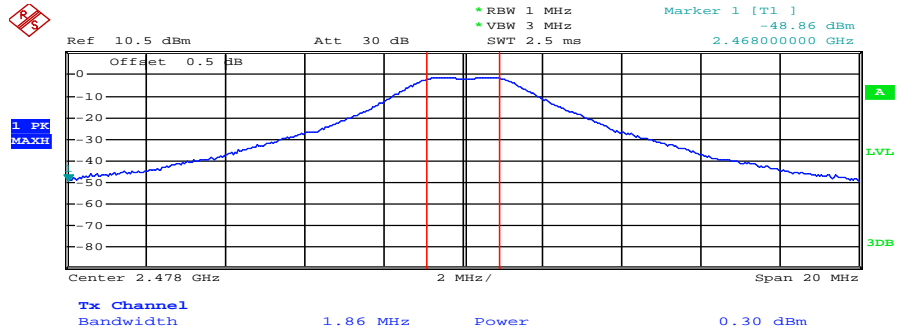
Date: 9.APR.2013 16:03:07

**Plot 2: middle channel**



Date: 9.APR.2013 16:03:51

Plot 3: highest channel



Date: 9.APR.2013 16:04:49

## 9.2 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:	3 MHz
Trace-Mode:	Max hold

### Limits:

FCC	IC
Antenna Gain	
6 dBi	

### Results:

$T_{nom}$	$V_{nom}$	lowest channel	middle channel	highest channel
Conducted power [dBm] Measured		-0.17	-1.28	-1.95
Radiated power [dBm] Measured		-0.19	-0.32	-0.13
Gain [dBi] Calculated		-0.02	0.96	1.82

**Result:** Passed

### 9.3 Power spectral density

**Description:**

Measurement of the power spectral density of a digital modulated system. The measurement is repeated at the lowest, middle and highest channel.

**Measurement:**

Measurement parameter	
Detector:	Peak
Sweep time:	120 s
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	1.5 MHz
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
Power Spectral Density	
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.	

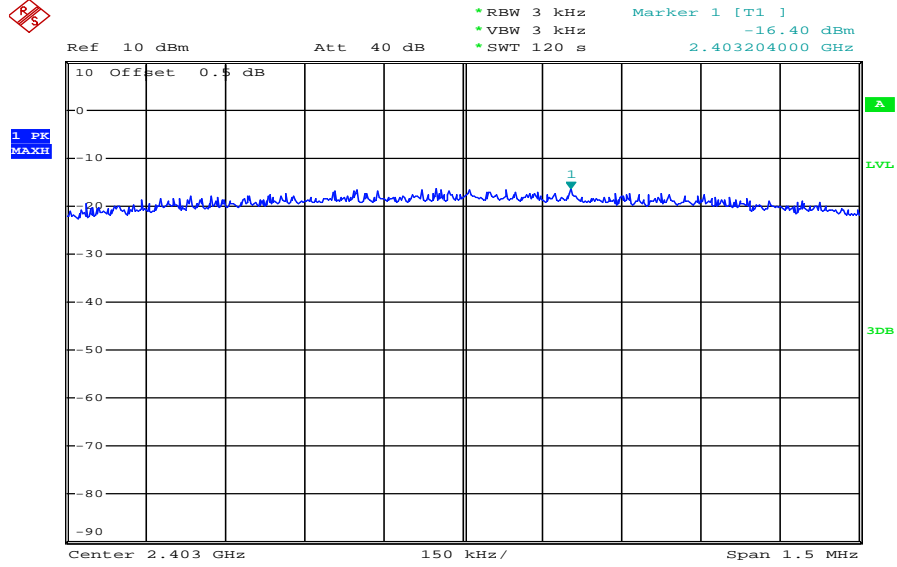
**Results:**

Modulation Channel	Power Spectral density [dBm/3kHz]		
	Lowest	Middle	Highest
	-16.40	-16.76	-17.34
Measurement uncertainty	± 1.5 dB		

**Result:** Passed

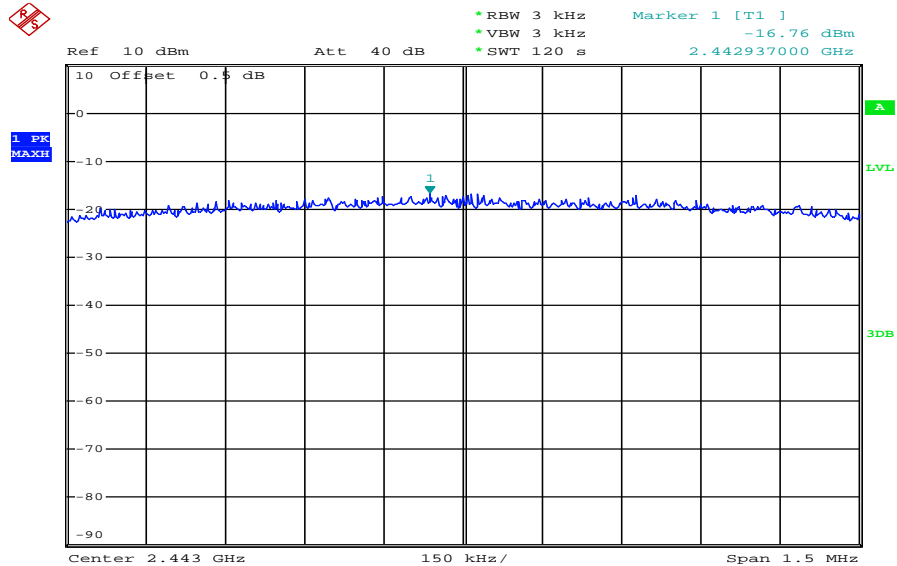
**Plots:**

**Plot 1: lowest channel**



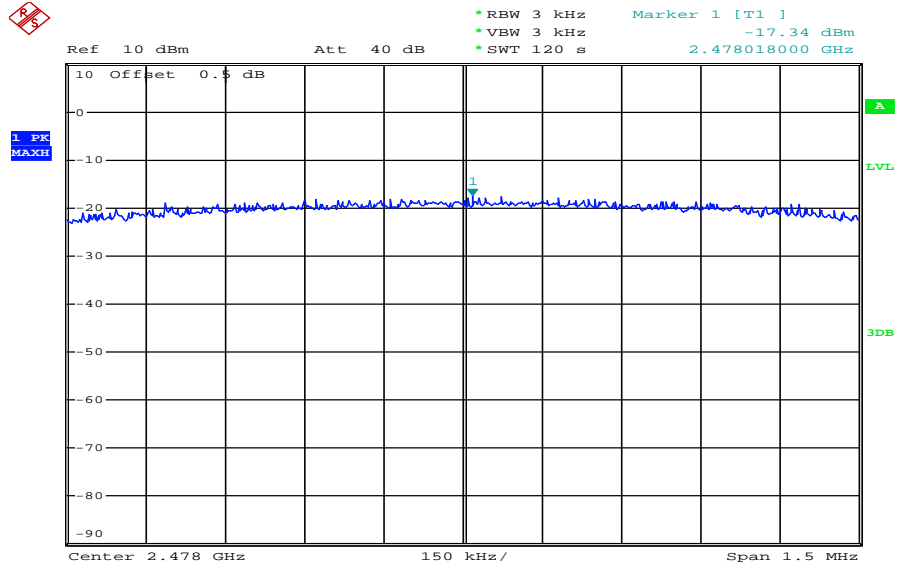
Date: 8.APR.2013 10:59:36

**Plot 2: middle channel**



Date: 8.APR.2013 10:53:37

Plot 3: highest channel



Date: 8.APR.2013 10:47:48



## 9.4 Spectrum bandwidth – 6 dB bandwidth

### Description:

Measurement of the 6 dB bandwidth of the modulated signal.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	See plots
Trace-Mode:	Max Hold

### Limits:

FCC	IC
Spectrum Bandwidth – 6 dB Bandwidth	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

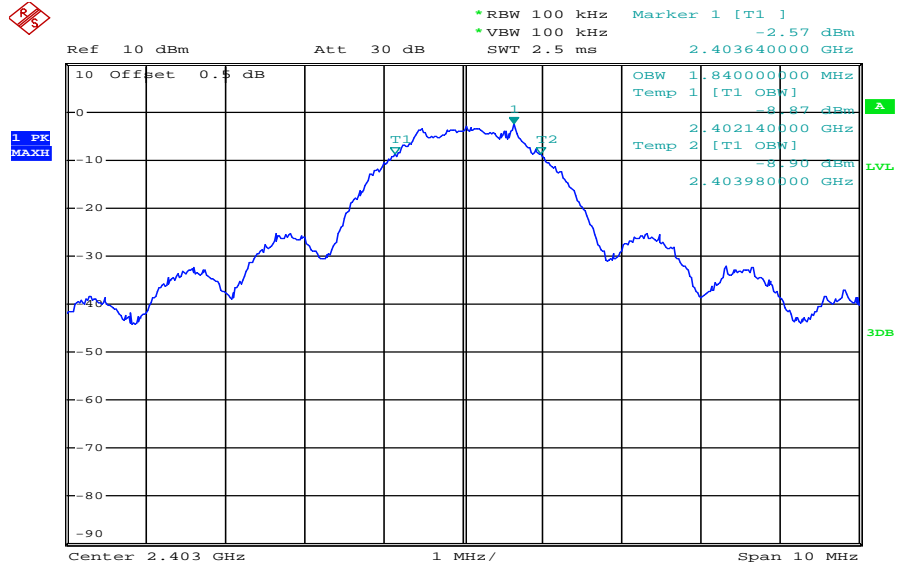
### Results:

Modulation Channel	6 dB BANDWIDTH [MHz]		
	Lowest	Middle	Highest
	1.84	1.84	1.86
Measurement uncertainty	± 100 kHz		

**Result: Passed**

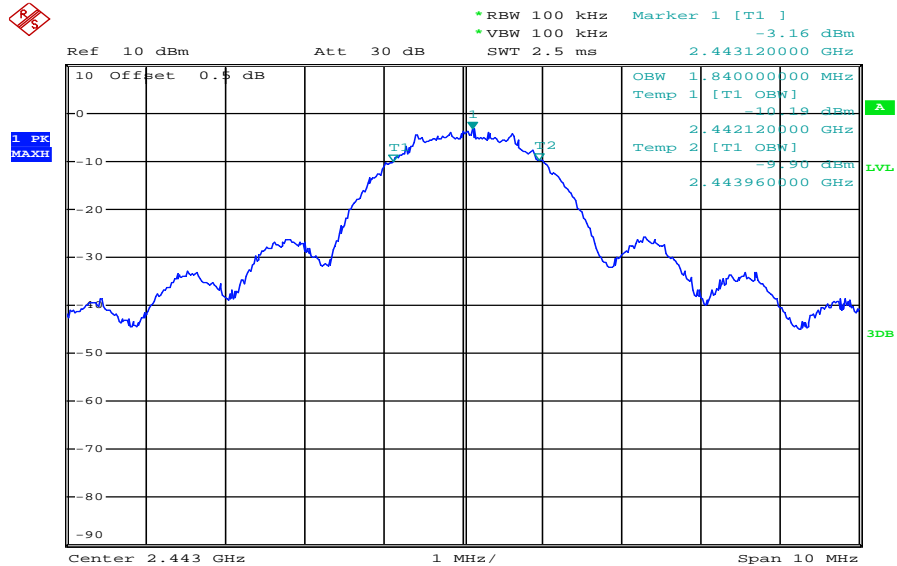
**Plots:**

**Plot 1: lowest channel**



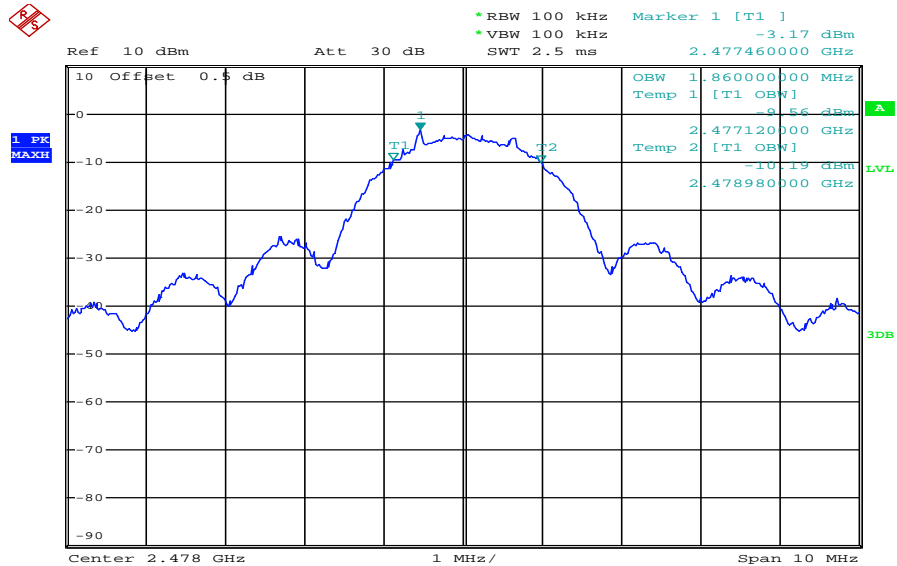
Date: 8.APR.2013 11:09:38

**Plot 2: middle channel**



Date: 8.APR.2013 11:14:37

Plot 3: highest channel



Date: 8.APR.2013 11:12:33

## 9.5 Spectrum bandwidth – 20 dB bandwidth

### Description:

Measurement of the 20 dB bandwidth of the modulated signal.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	8 MHz
Trace-Mode:	Max Hold

### Limits:

FCC	IC
Spectrum Bandwidth – 20 dB Bandwidth	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

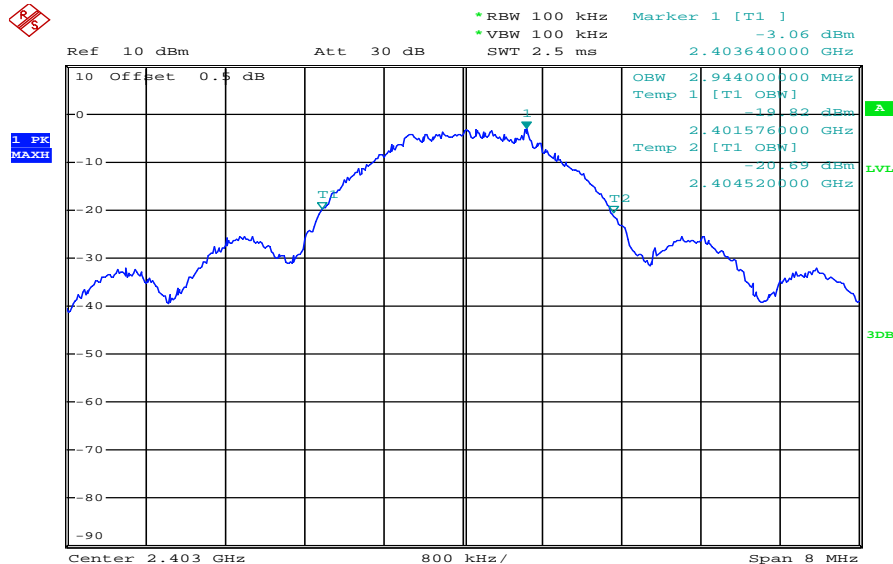
### Results:

Modulation Channel	20 dB BANDWIDTH [MHz]		
	Lowest	Middle	Highest
	2.94	2.94	2.93
Measurement uncertainty	± 100 kHz		

**Result: Passed**

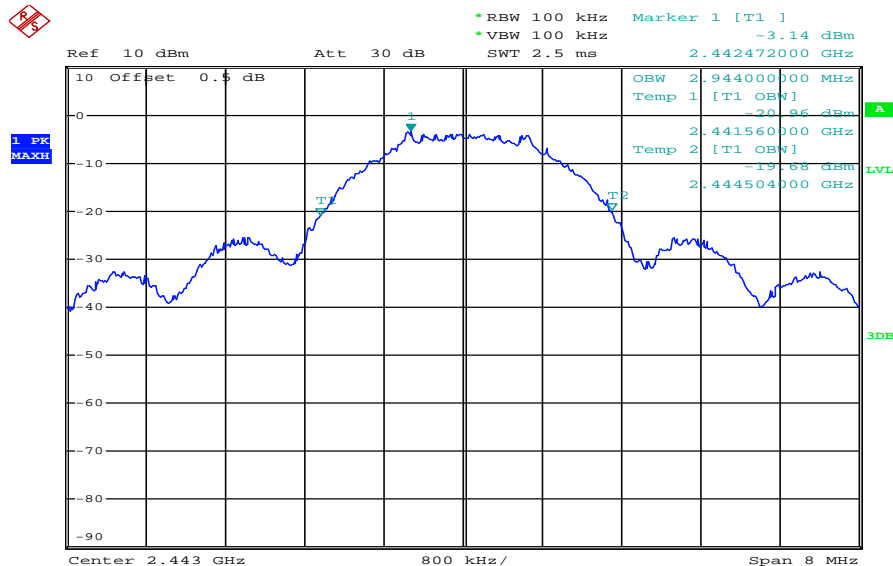
**Plots:**

**Plot 1: lowest channel**



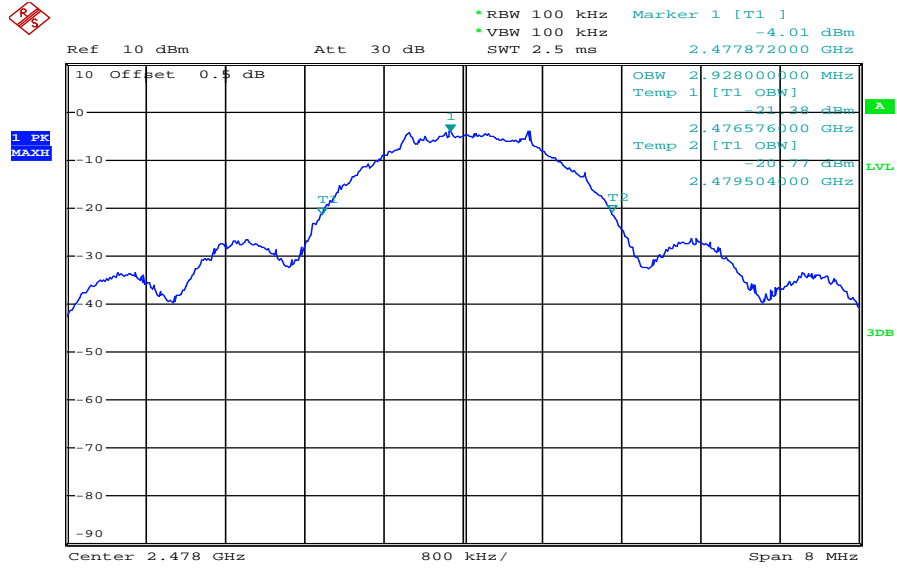
Date: 8.APR.2013 11:25:14

**Plot 2: middle channel**



Date: 8.APR.2013 11:23:05

Plot 3: highest channel



Date: 8.APR.2013 11:24:15

## 9.6 Band edge compliance conducted

### Description:

Measurement of the conducted band edge compliance. EUT is measured at the lower and upper band edge.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	See plots
Trace-Mode:	Max Hold

### Limits:

FCC	IC
Band Edge Compliance 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. Attenuation below the general limits specified in Section 15.209(a) is not required.</p>	

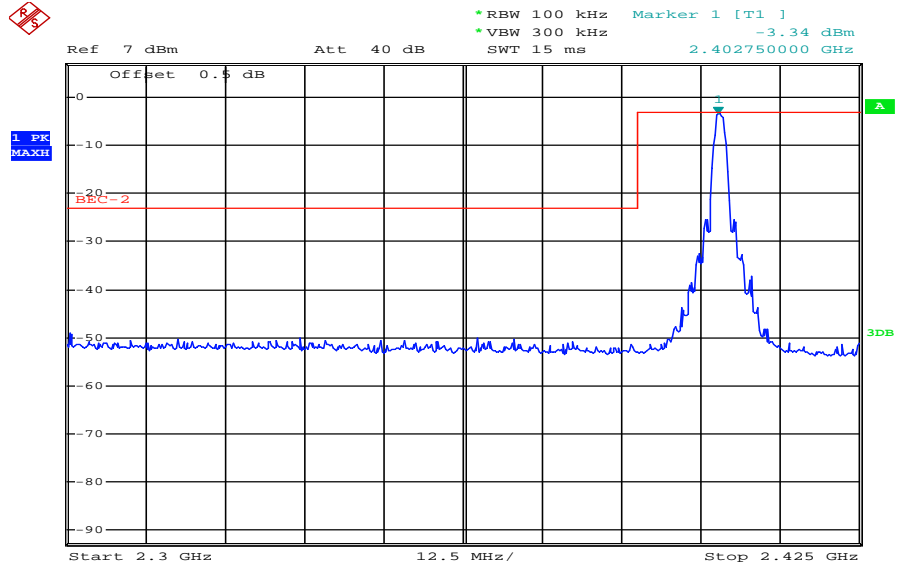
### Result:

Scenario	Band Edge Compliance Conducted [dB]
Lower Band Edge	> 20 dB (see plot 1)
Upper Band Edge	> 20 dB (see plot 2)
Measurement uncertainty	± 1.5 dB

**Result:** [The result of the measurement is passed.](#)

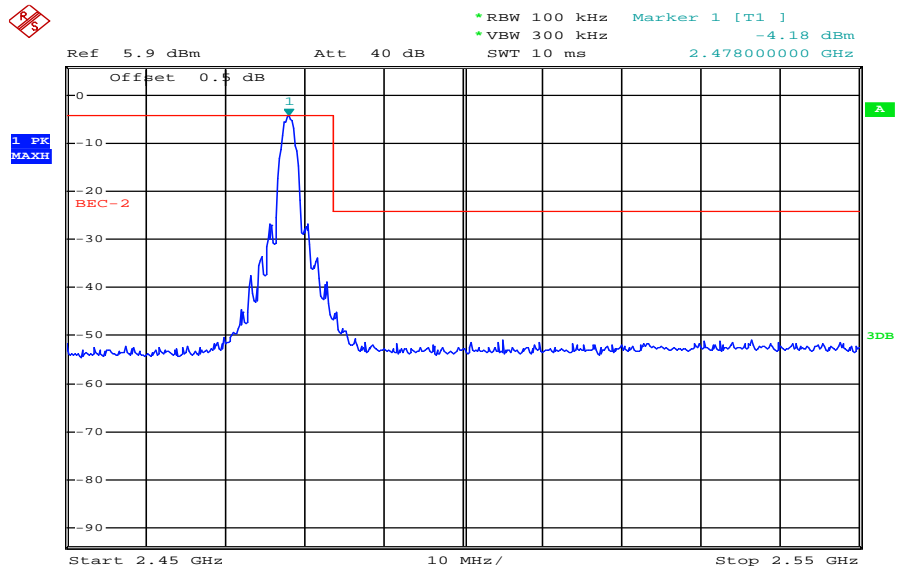
**Plots:**

**Plot 1: lowest channel**



Date: 8.APR.2013 13:15:41

**Plot 2: highest channel**



Date: 8.APR.2013 13:22:55



## 9.7 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 the lowest channel for the lower restricted band and to the highest channel for the upper restricted band. Measurement distance is 3m.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	10 Hz
Resolution bandwidth:	1 MHz
Span:	Lower Band: 2300 – 2400 MHz Upper Band: 2480 – 2500 MHz
Trace-Mode:	Max Hold

### Limits:

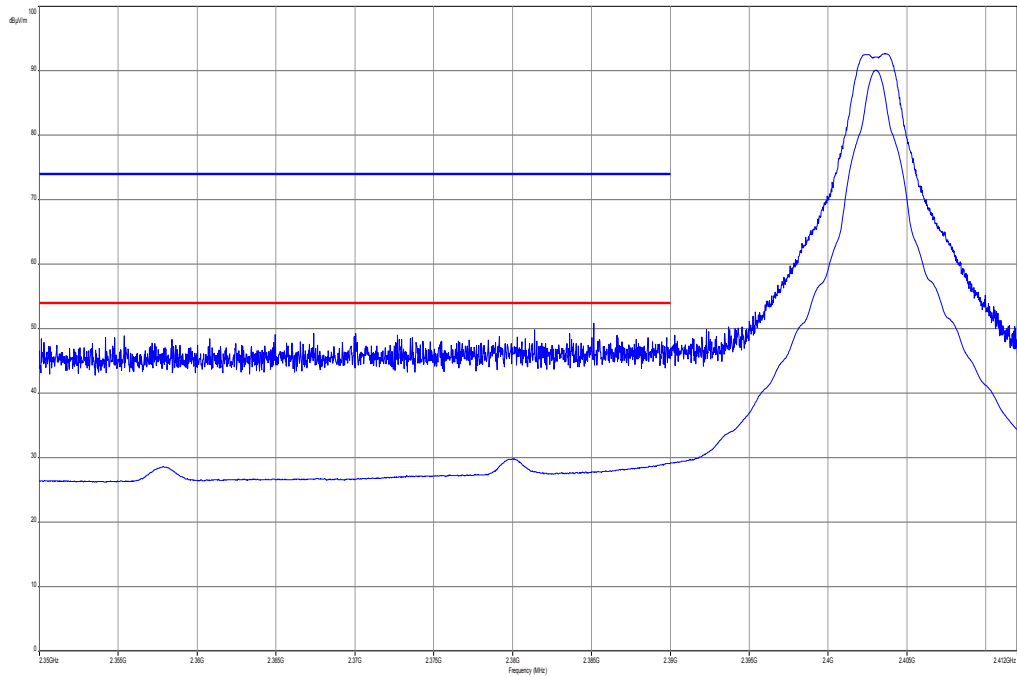
FCC	IC
Band Edge Compliance Radiated	
<p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. 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)).</p>	
54 dB $\mu$ V/m AVG	

### Result:

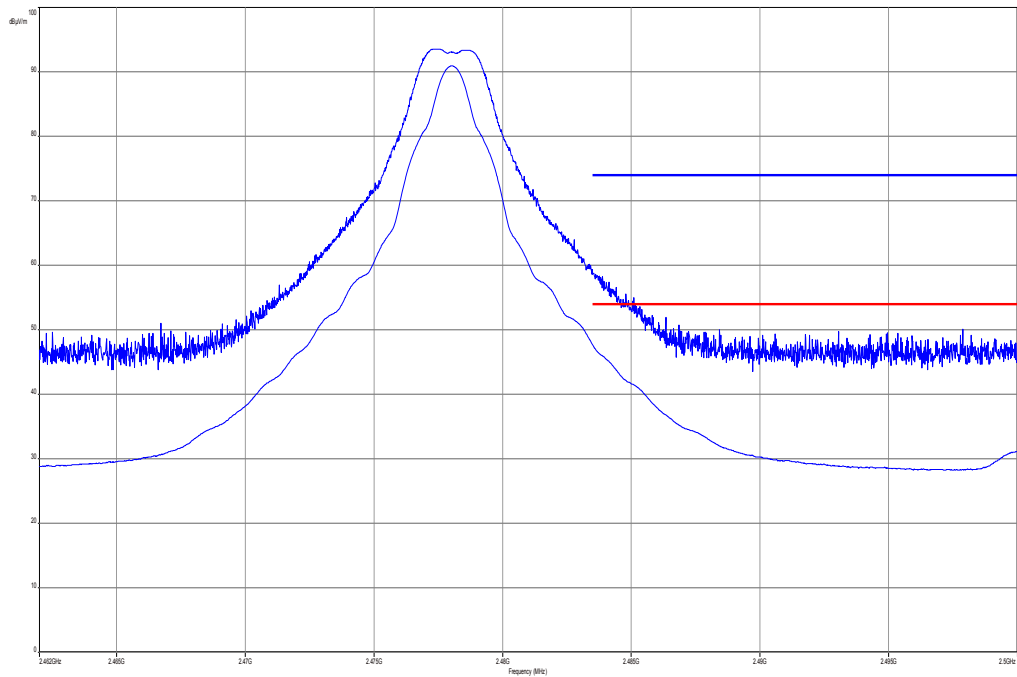
Scenario	Band Edge Compliance Radiated [dB $\mu$ V/m]
Lower Band Edge	< 54 dB $\mu$ V/m (see plots 1/3)
Upper Band Edge	< 54 dB $\mu$ V/m (see plot 2/4)
Measurement uncertainty	$\pm$ 3 dB

**Plots:**

**Plot 1:** lower band edge, vertical and horizontal polarization



**Plot 2:** upper band edge, vertical and horizontal polarization



**Result:** Passed

## 9.8 TX spurious emissions conducted

### Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at lowest, middle and highest channel.

### Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 100 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
TX 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. Attenuation below the general limits specified in Section 15.209(a) is not required</p>	

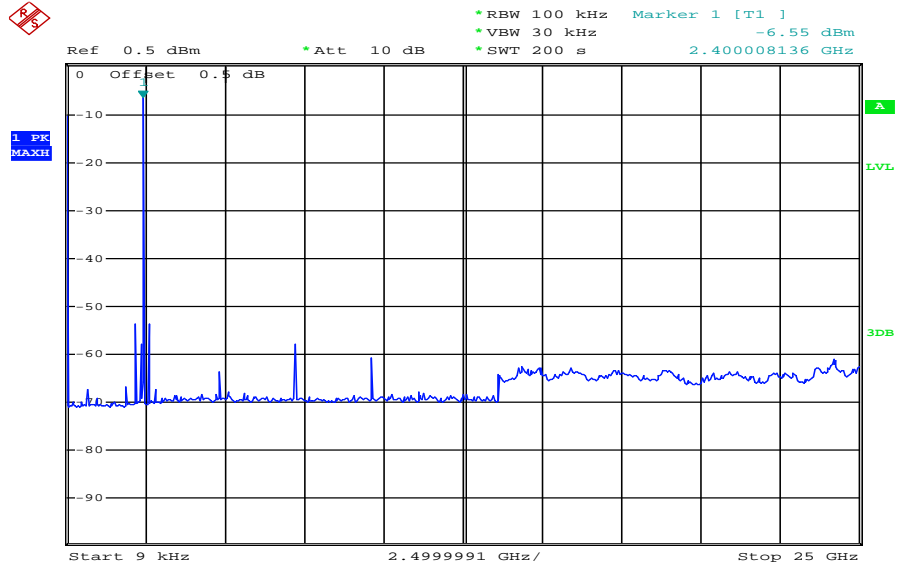
**Results:**

TX Spurious Emissions Conducted					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
Low		-6.55	30 dBm		Operating frequency
No peaks detected closer than 10 dB to the limit!			-20 dBc		complies
Middle		-5.91	30 dBm		Operating frequency
No peaks detected closer than 10 dB to the limit!			-20 dBc		complies
High		-6.22	30 dBm		Operating frequency
No peaks detected closer than 10 dB to the limit!			-20 dBc		complies
Measurement uncertainty			± 3 dB		

**Result:** Passed

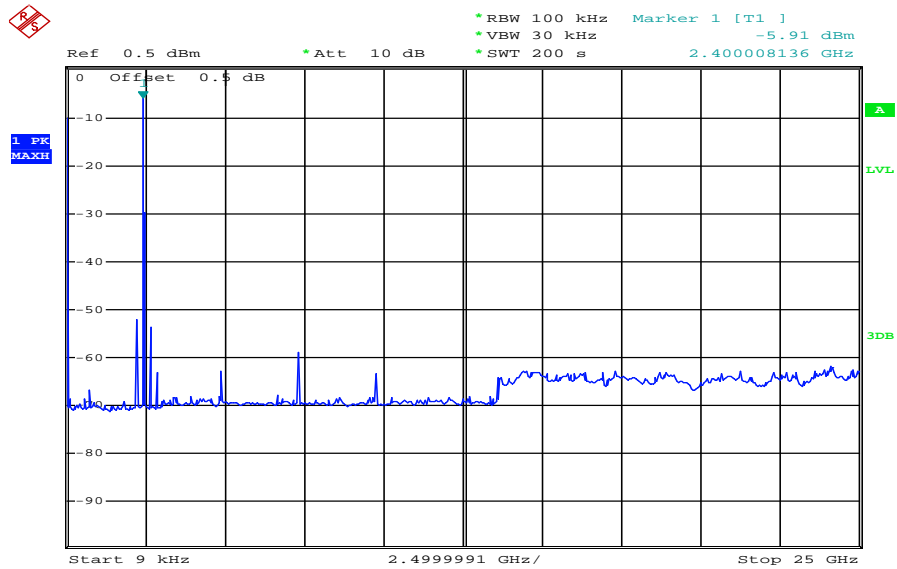
**Plots:**

**Plot 1: lowest channel**



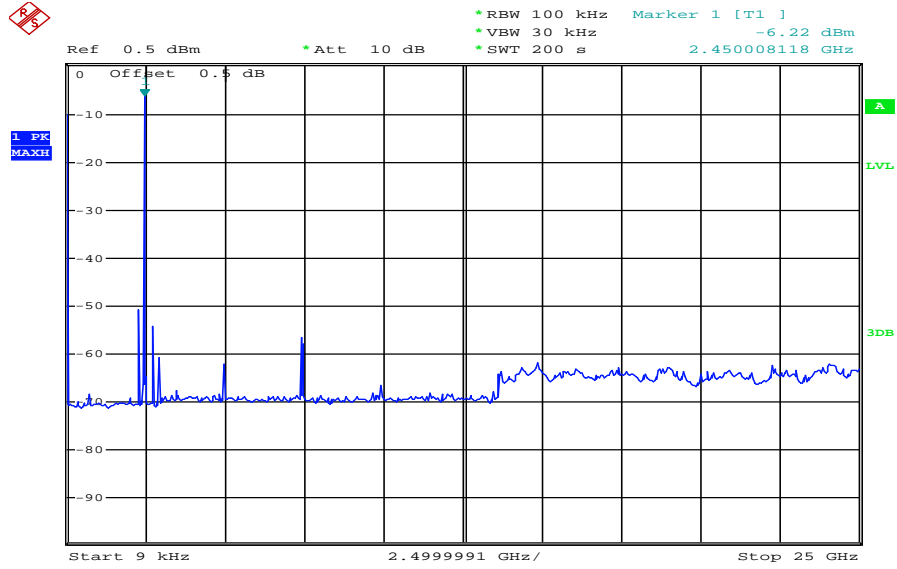
Date: 9.APR.2013 08:03:00

**Plot 2: middle channel**



Date: 9.APR.2013 08:07:57

Plot 3: highest channel



Date: 9. APR. 2013 08:12:38

## 9.9 TX spurious emissions radiated

### Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at lowest, middle and highest channel.

### 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	
TX Spurious Emissions Radiated		
<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. 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)).</p>		
§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]								
Lowest			Middle			Highest		
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 peaks detected closer than 10 dB to the limit!			No peaks detected closer than 10 dB to the limit!			No peaks detected closer than 10 dB to the limit!		
Measurement uncertainty			± 3 dB					

**Result:** Passed



**Plots:**

**Plot 1:** Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

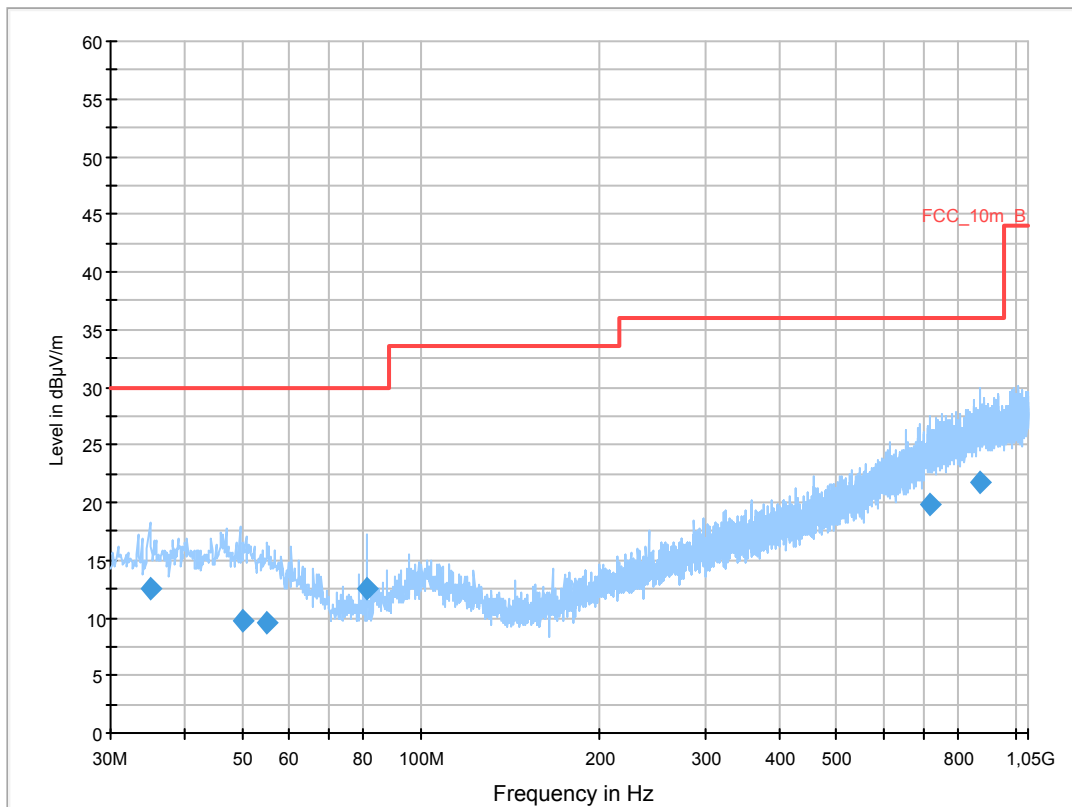
**Common Information**

EUT: BV01  
 Serial Number: #24  
 Test Description: FCC part 15 C class B @ 10 m  
 Operating Conditions: cont. TX Ch. 0 (2403 MHz)  
 Operator Name: Hennemann  
 Comment: battery powered (2x AAA)

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

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

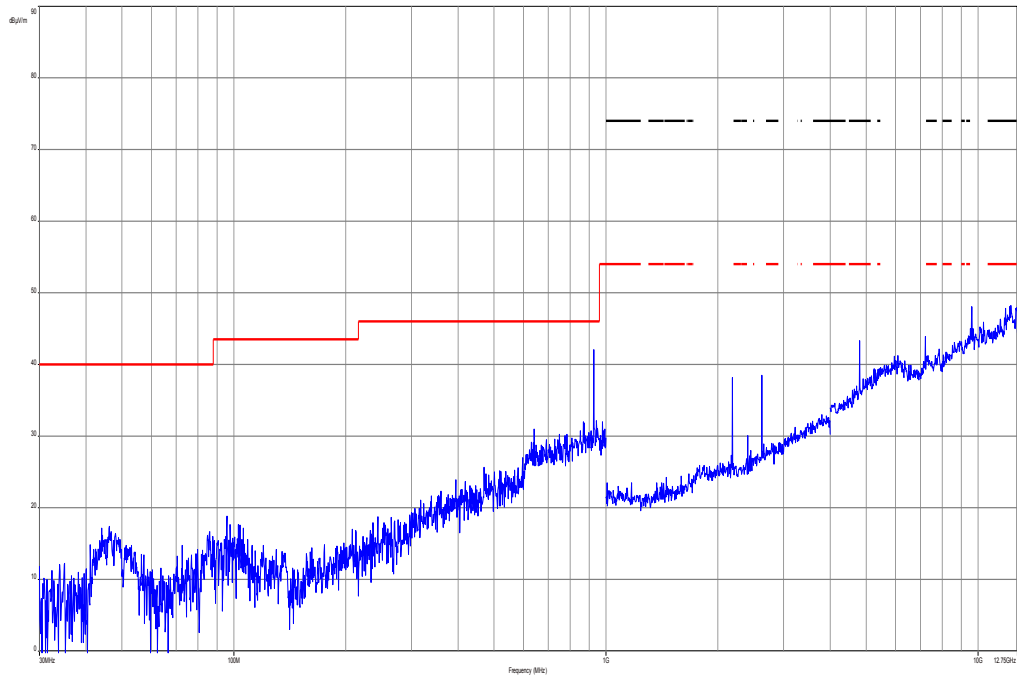
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



**Final Result 1**

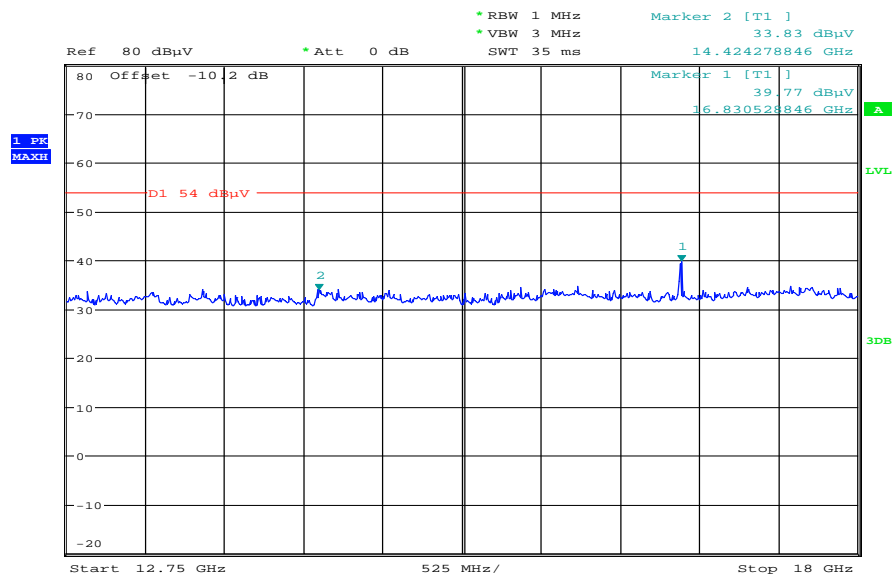
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.007300	12.6	1000.0	120.000	170.0	V	177.0	13.0	17.4	30.0	
50.029950	9.7	1000.0	120.000	170.0	V	280.0	13.4	20.3	30.0	
54.818400	9.5	1000.0	120.000	170.0	V	-5.0	12.9	20.5	30.0	
80.985900	12.5	1000.0	120.000	170.0	V	170.0	9.2	17.5	30.0	
718.861500	19.8	1000.0	120.000	170.0	V	90.0	22.9	16.2	36.0	
870.439050	21.7	1000.0	120.000	146.0	V	268.0	24.8	14.3	36.0	

**Plot 2:** Lowest –channel 1 GHz to 12.75 GHz, vertical & horizontal polarization



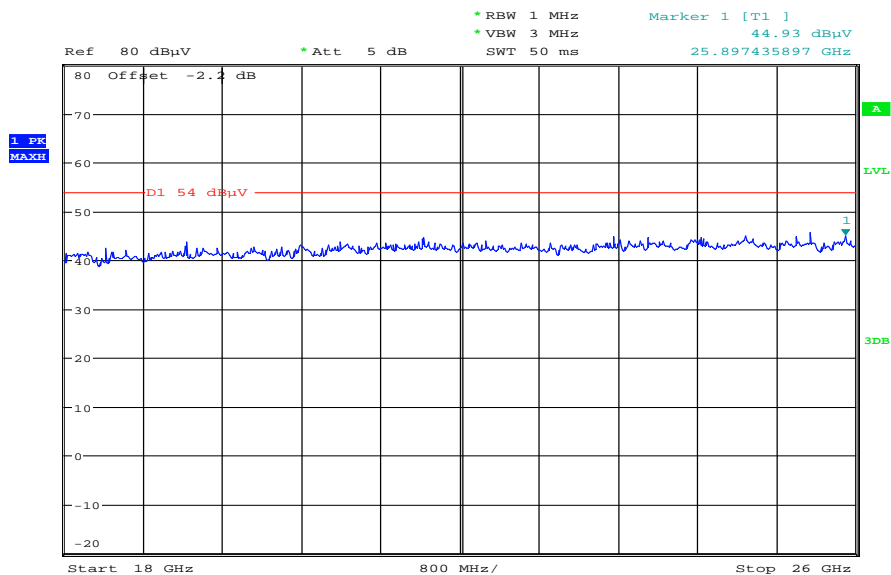
The carrier signal is notched with a 2.4 GHz band rejection filter.  
Peak at 927 MHz is not caused by EUT.

**Plot 3:** Lowest channel, 12 GHz to 25 GHz



Date: 11.APR.2013 09:25:08

Plot 4: Lowest channel, 18 GHz to 26 GHz



Date: 11.APR.2013 09:30:12

**Plot 5:** Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

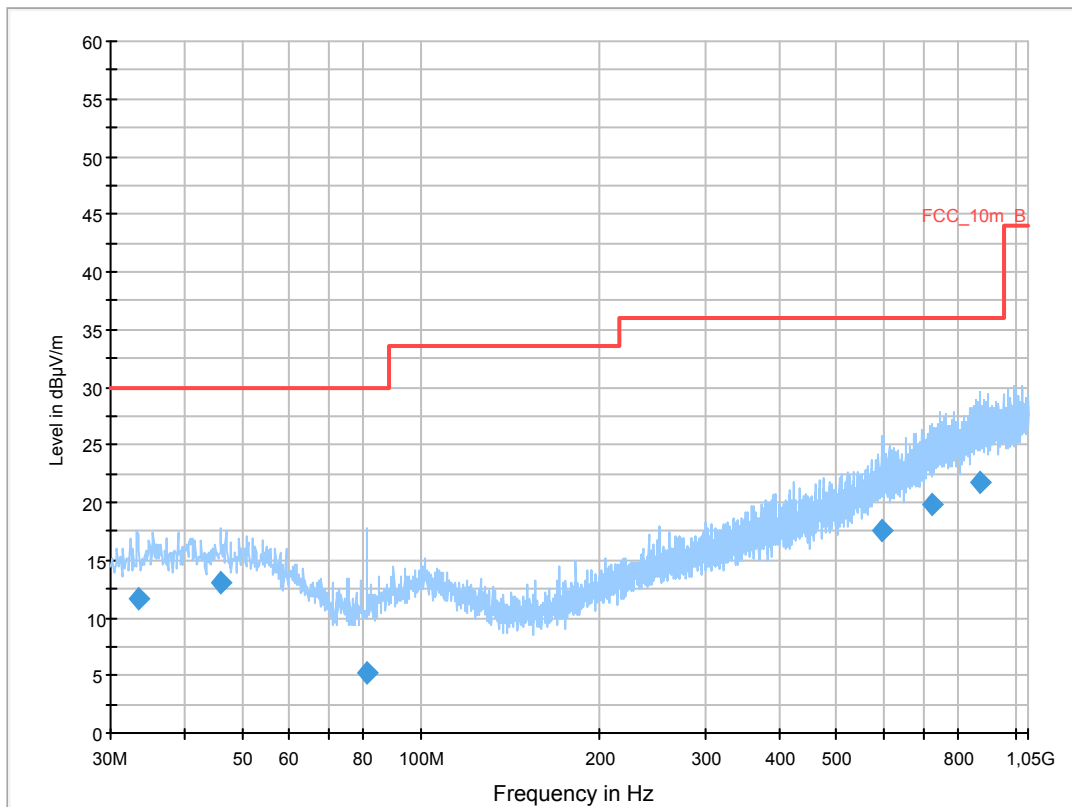
### Common Information

EUT: BV01  
 Serial Number: #24  
 Test Description: FCC part 15 C class B @ 10 m  
 Operating Conditions: cont. TX Ch. 7 (2438 MHz)  
 Operator Name: Hennemann  
 Comment: battery powered (2x AAA)

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

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

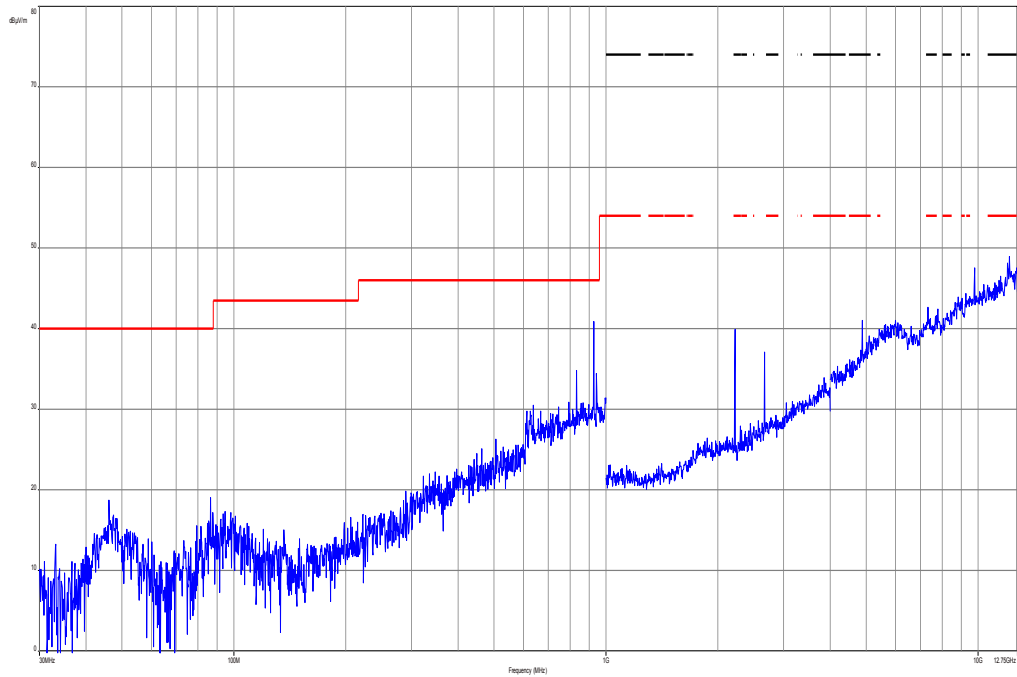
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



### Final Result 1

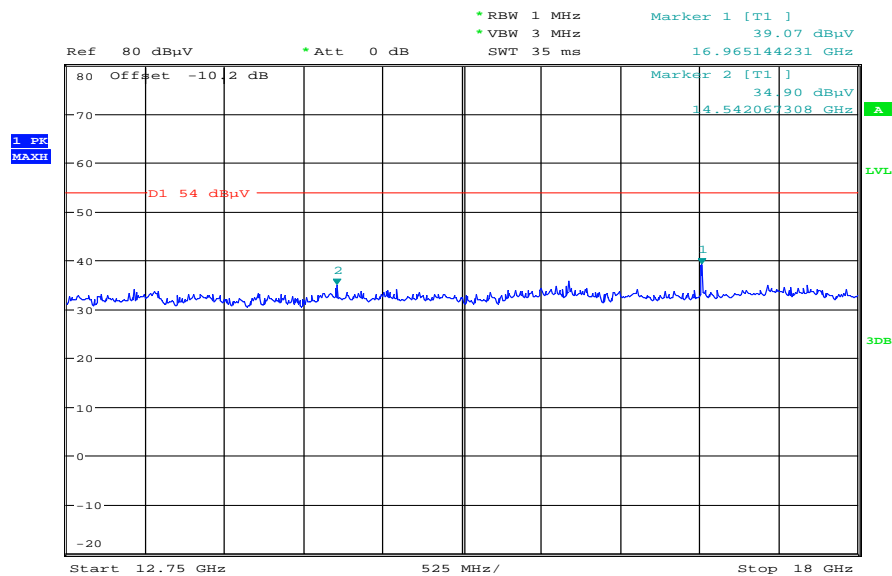
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
33.345750	11.7	1000.0	120.000	153.0	V	10.0	12.9	18.3	30.0	
46.015650	13.1	1000.0	120.000	98.0	V	-1.0	13.3	16.9	30.0	
81.024450	5.2	1000.0	120.000	170.0	V	190.0	9.2	24.8	30.0	
594.602550	17.6	1000.0	120.000	170.0	V	-9.0	20.6	18.4	36.0	
724.782000	19.8	1000.0	120.000	104.0	V	175.0	23.1	16.2	36.0	
873.395550	21.8	1000.0	120.000	170.0	H	100.0	24.9	14.2	36.0	

**Plot 6:** Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



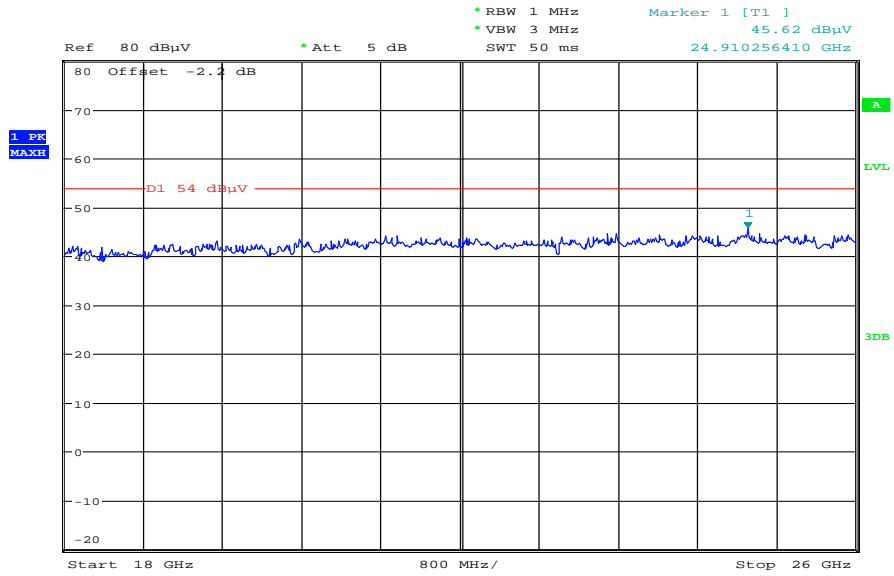
The carrier signal is notched with a 2.4 GHz band rejection filter.  
Peak at 927 MHz is not caused by EUT.

**Plot 7:** Middle channel, 12 GHz to 18 GHz



Date: 11.APR.2013 09:26:44

Plot 8: Middle channel, 18 GHz to 26 GHz



Date: 11.APR.2013 09:30:51

**Plot 9:** Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

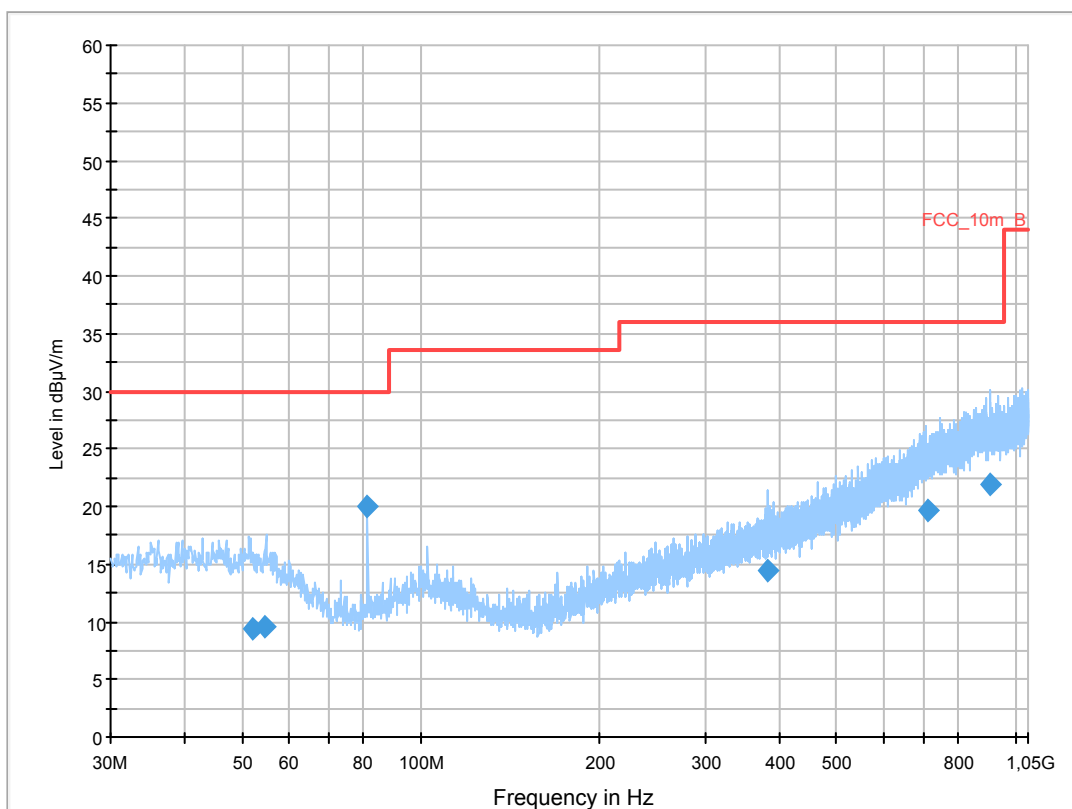
### Common Information

EUT: BV01  
 Serial Number: #24  
 Test Description: FCC part 15 C class B @ 10 m  
 Operating Conditions: cont. TX Ch. 15 (2478 MHz)  
 Operator Name: Hennemann  
 Comment: battery powered (2x AAA)

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

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

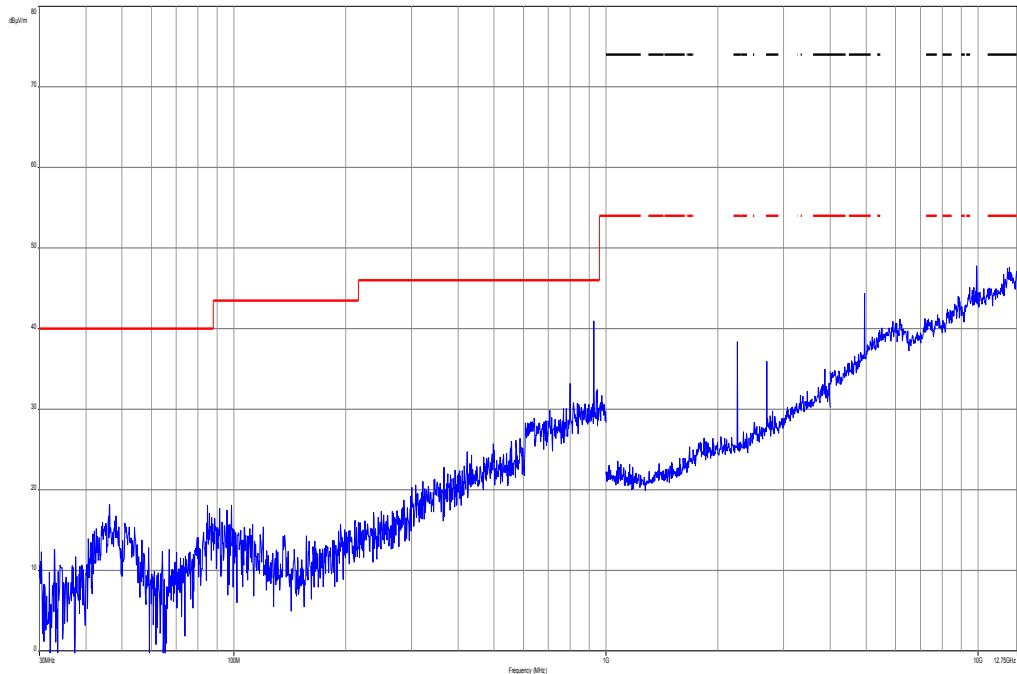
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



### Final Result 1

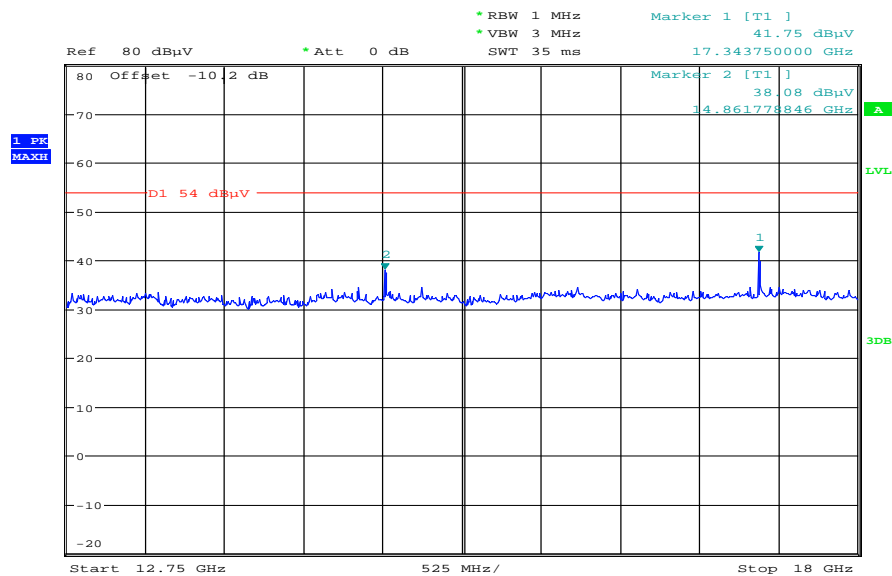
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
51.909750	9.5	1000.0	120.000	170.0	H	100.0	13.2	20.5	30.0	
54.578850	9.6	1000.0	120.000	170.0	V	270.0	12.9	20.4	30.0	
81.200700	20.1	1000.0	120.000	160.0	V	2.0	9.3	9.9	30.0	
383.978400	14.4	1000.0	120.000	170.0	V	272.0	16.6	21.6	36.0	
709.730550	19.6	1000.0	120.000	110.0	H	190.0	22.7	16.4	36.0	
906.390750	21.9	1000.0	120.000	152.0	V	2.0	25.2	14.1	36.0	

**Plot 10:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



The carrier signal is notched with a 2.4 GHz band rejection filter.  
Peak at 927 MHz is not caused by EUT.

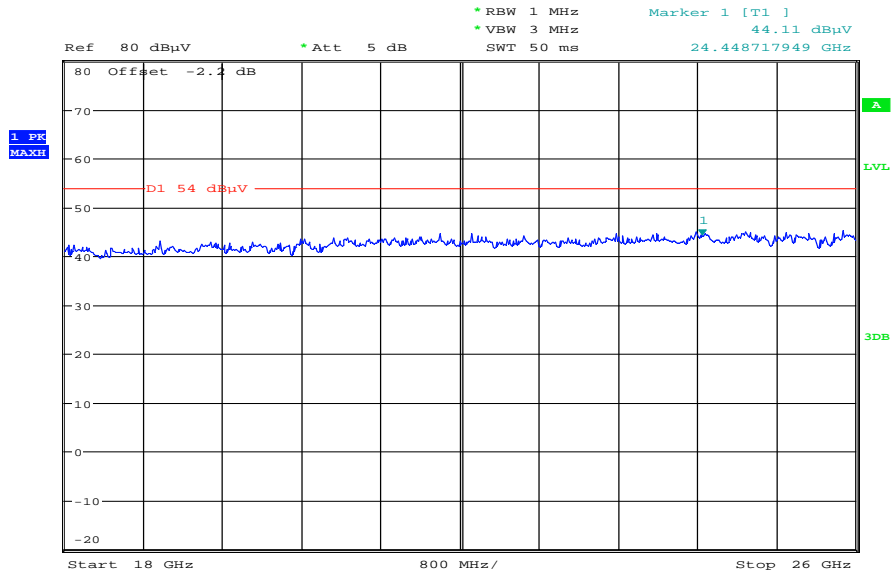
**Plot 11:** Highest channel, 12 GHz to 18 GHz



Date: 11.APR.2013 09:27:55



Plot 12: Highest channel, 18 GHz to 26 GHz



Date: 11.APR.2013 09:29:36

## 9.10 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 25 GHz
Trace-Mode:	Max Hold

### Limits:

FCC		IC
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 peaks detected closer than 10 dB to the limit!		
Measurement uncertainty	± 3 dB	

**Result: Passed**

**Plots: RX / Idle – mode**

**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization

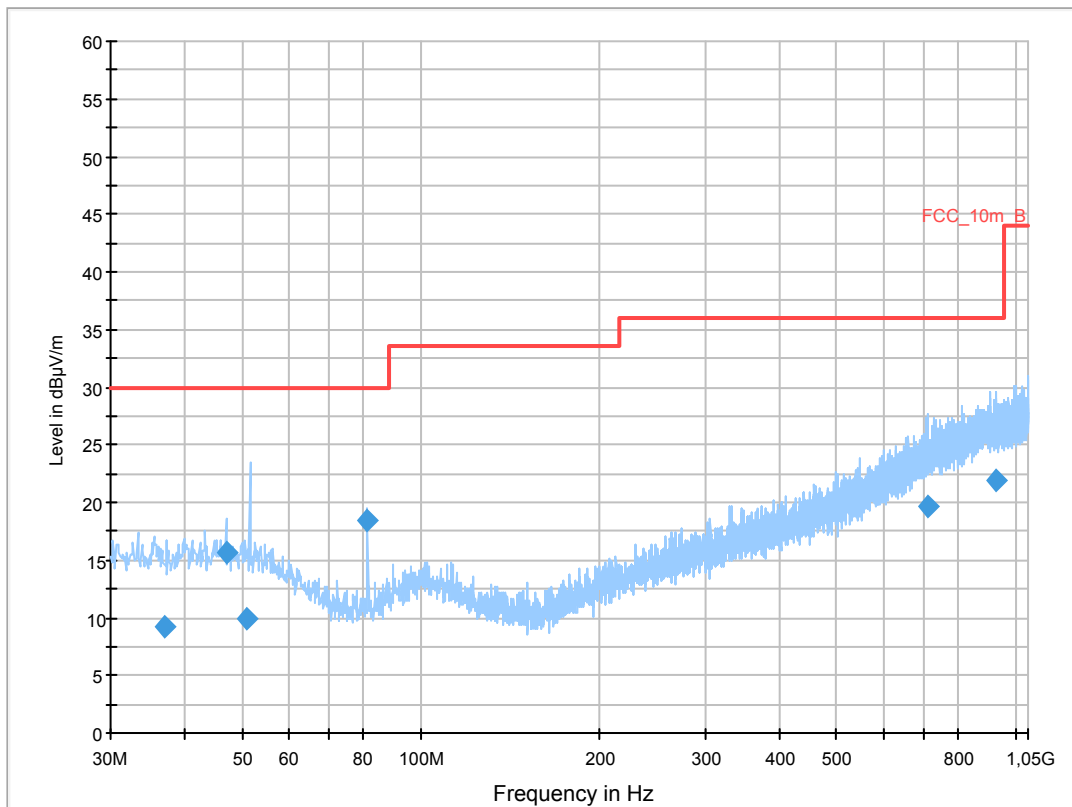
**Common Information**

EUT: BV01  
 Serial Number: #24  
 Test Description: FCC part 15 C class B @ 10 m  
 Operating Conditions: cont. RX  
 Operator Name: Hennemann  
 Comment: battery powered (2x AAA)

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

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

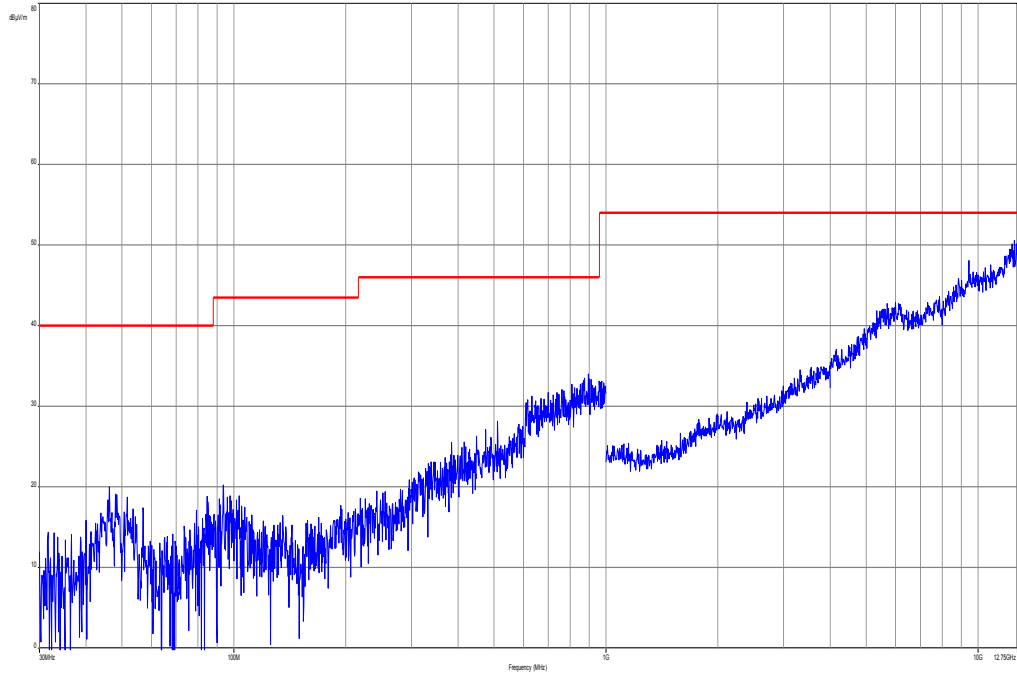
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



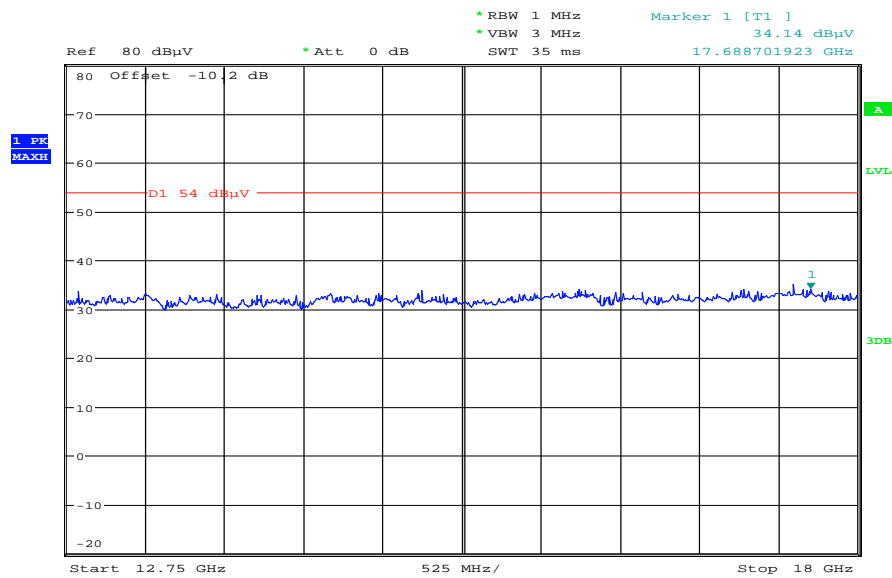
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
37.033800	9.3	1000.0	120.000	170.0	H	10.0	13.2	20.7	30.0	
46.992300	15.6	1000.0	120.000	104.0	V	-10.0	13.3	14.4	30.0	
51.031800	10.0	1000.0	120.000	170.0	V	-10.0	13.3	20.0	30.0	
81.173550	18.5	1000.0	120.000	170.0	V	-3.0	9.3	11.5	30.0	
714.403500	19.7	1000.0	120.000	170.0	H	10.0	22.8	16.3	36.0	
930.132900	21.9	1000.0	120.000	120.0	V	175.0	25.3	14.1	36.0	

Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization

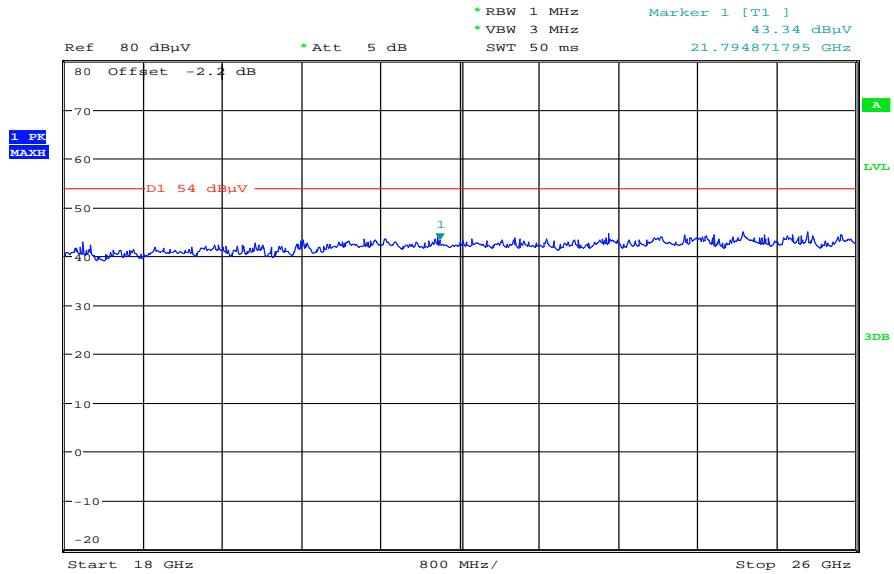


Plot 3: 12 GHz to 18 GHz



Date: 11.APR.2013 09:33:12

Plot 4: 18 GHz to 26 GHz



Date: 11.APR.2013 09:31:56

### 9.11 TX spurious emissions radiated < 30 MHz

**Description:**

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to 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 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
TX Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dBµV/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

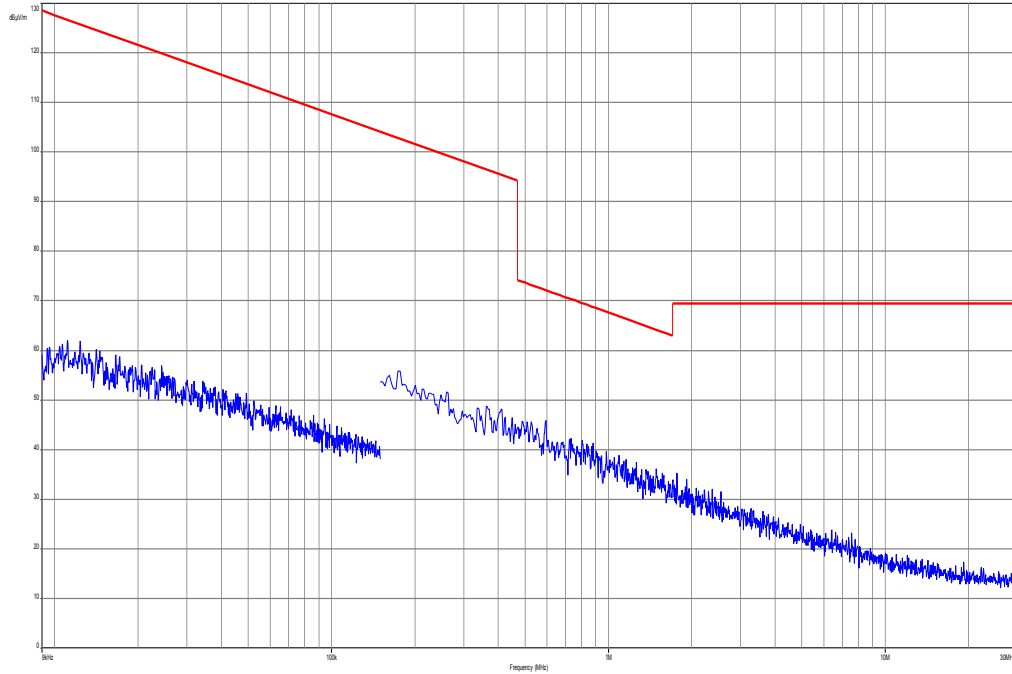
**Results:**

TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks detected!		
Measurement uncertainty	± 3 dB	

**Result: Passed**

**Plot:**

**Plot 1:** 9 kHz to 30 MHz / channel 8 (valid for all channels)



**9.12 TX spurious emissions conducted < 30 MHz**

Not applicable!



## 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.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	11.05.2011	11.05.2013
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	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
8	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
9	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
10	n. a.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
11	n. a.	Band Reject filter	WRCG240 0/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
12	n. a.	Highpass Filter	WHKX7.0/1 8G-8SS	Wainwright	18	300003789	ne		
13	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
14	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
15	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04590	300001041	Ve	12.01.2012	12.01.2015
16	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
17	n. a.	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSiQ26	R&S	835111/0004	300002678	Ve	15.01.2013	15.01.2015
18	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.10.2013

**Agenda:** Kind of Calibration

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

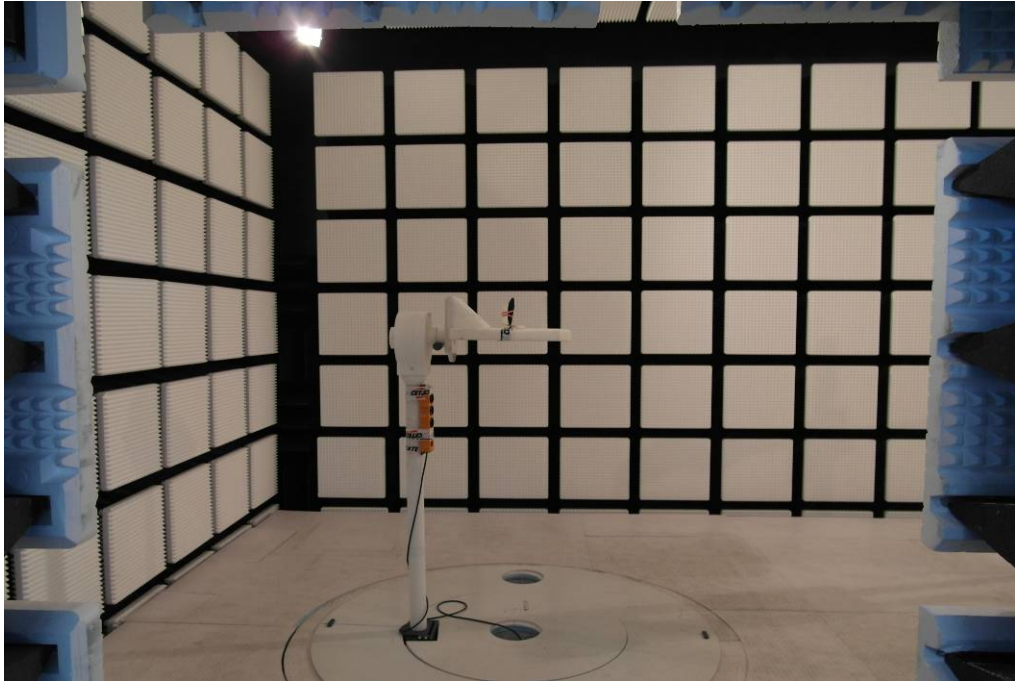


Photo 2:

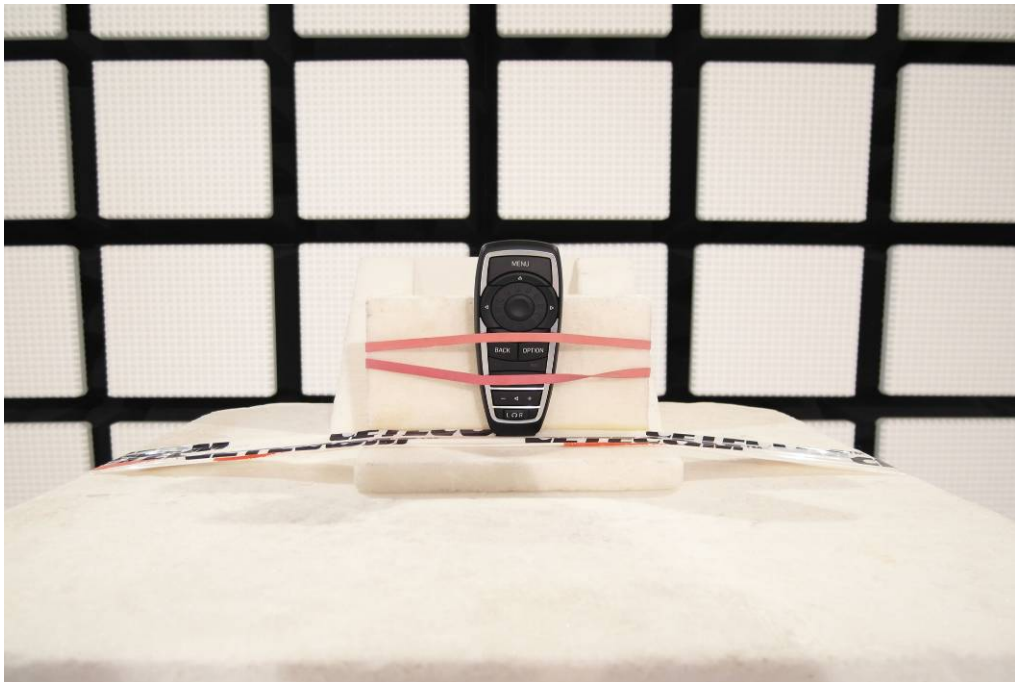


Photo 3:



Photo 4:

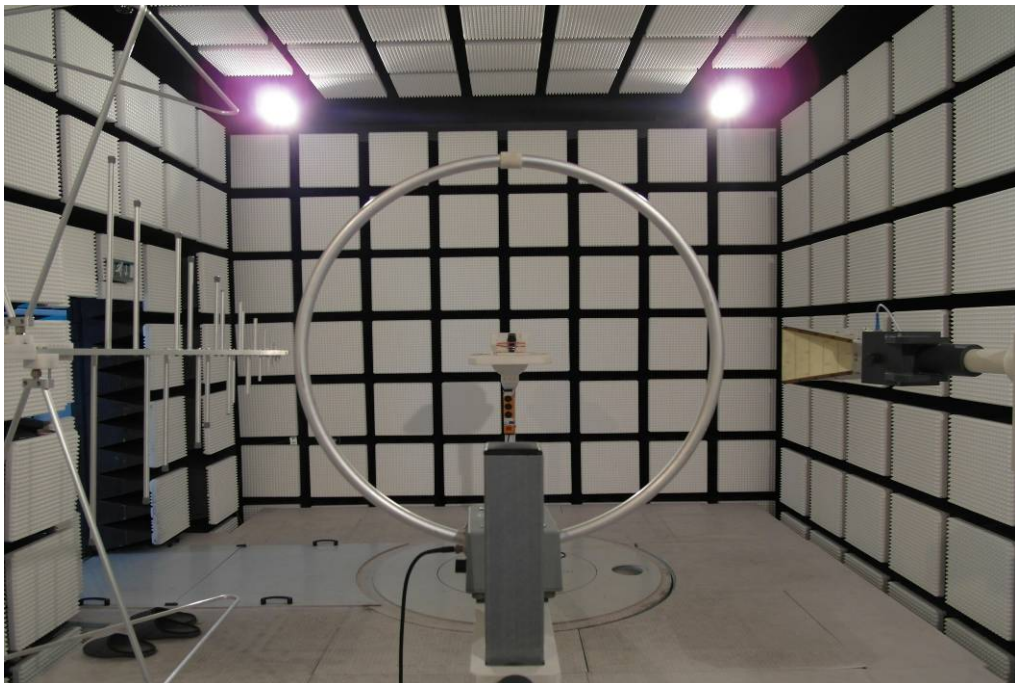




Photo 5:

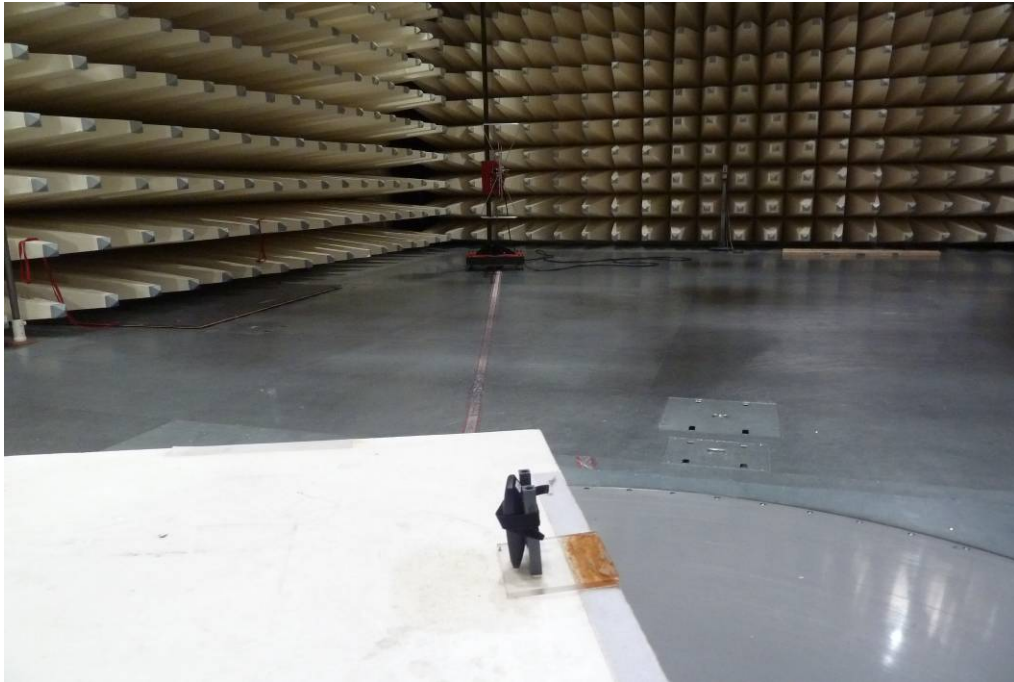


Photo 6:



**Annex B External photographs of the EUT**

Photo 1:



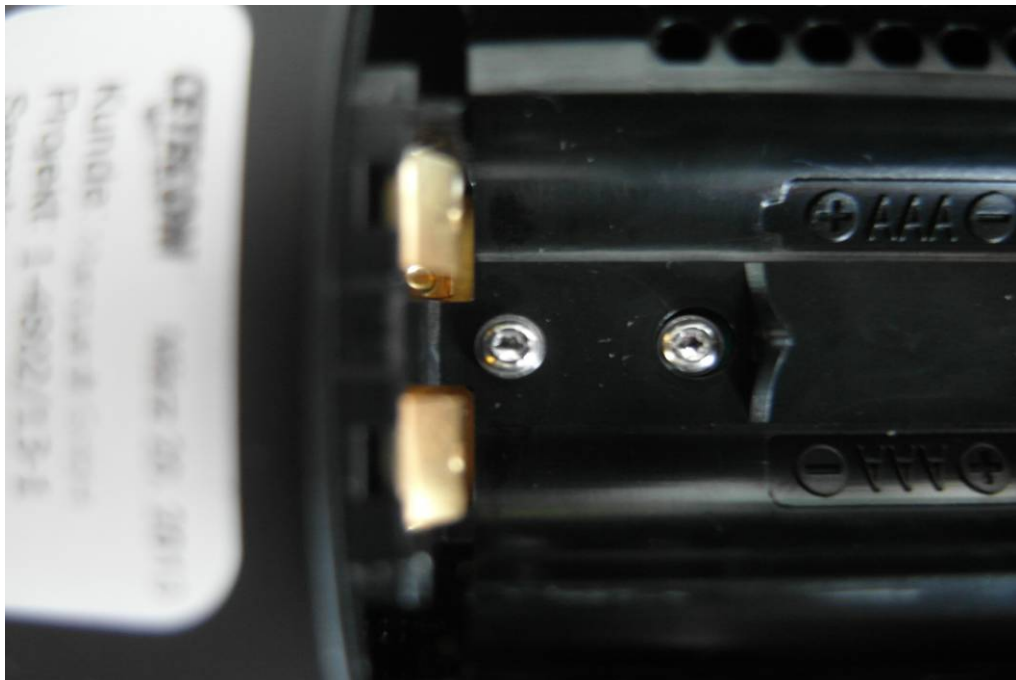
Photo 2:



Photo 3:



Photo 4:



**Annex C Internal photographs of the EUT**

Photo 1:

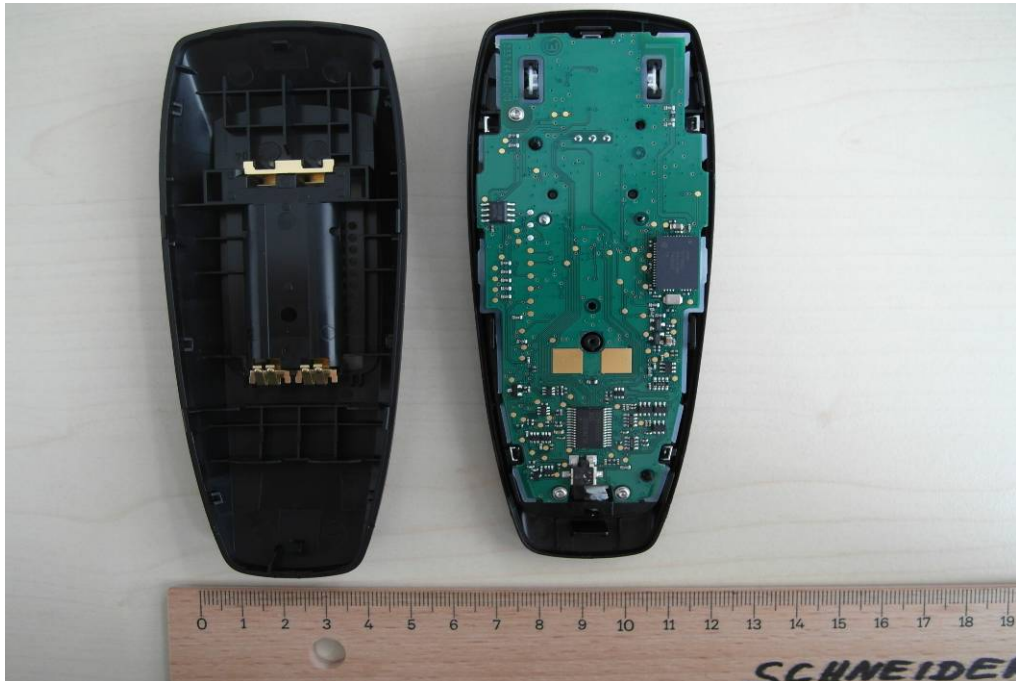


Photo 2:

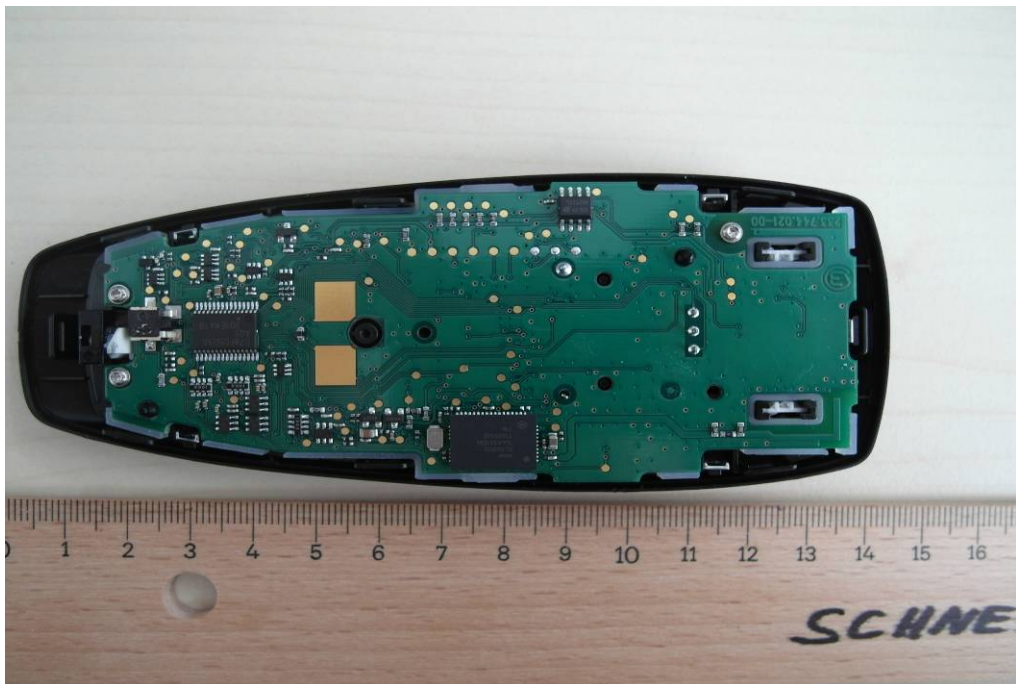




Photo 3:

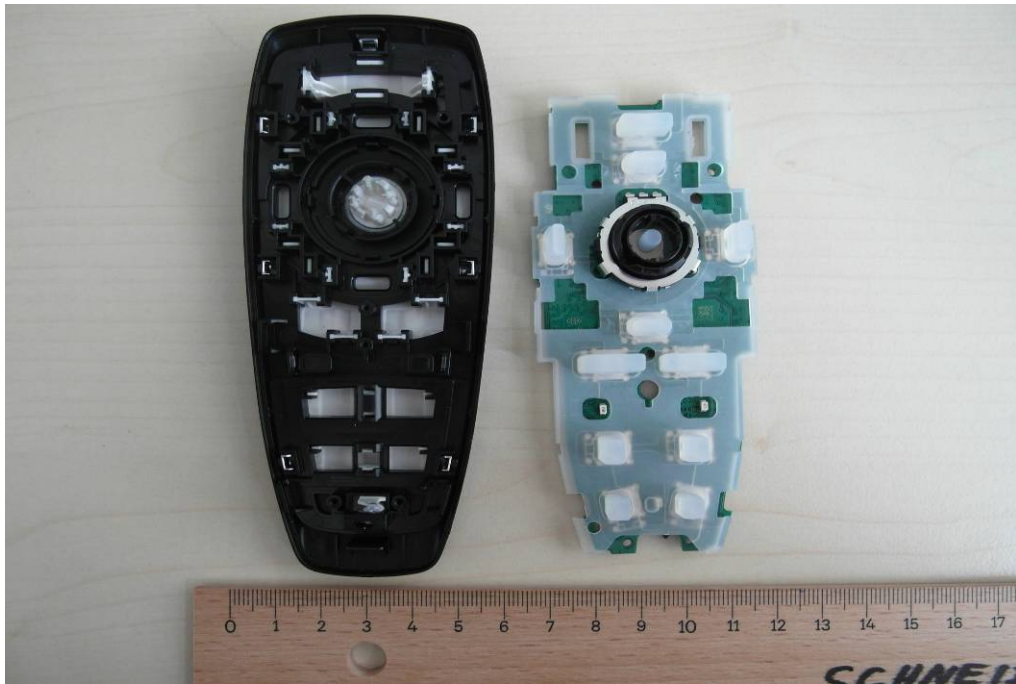


Photo 4:

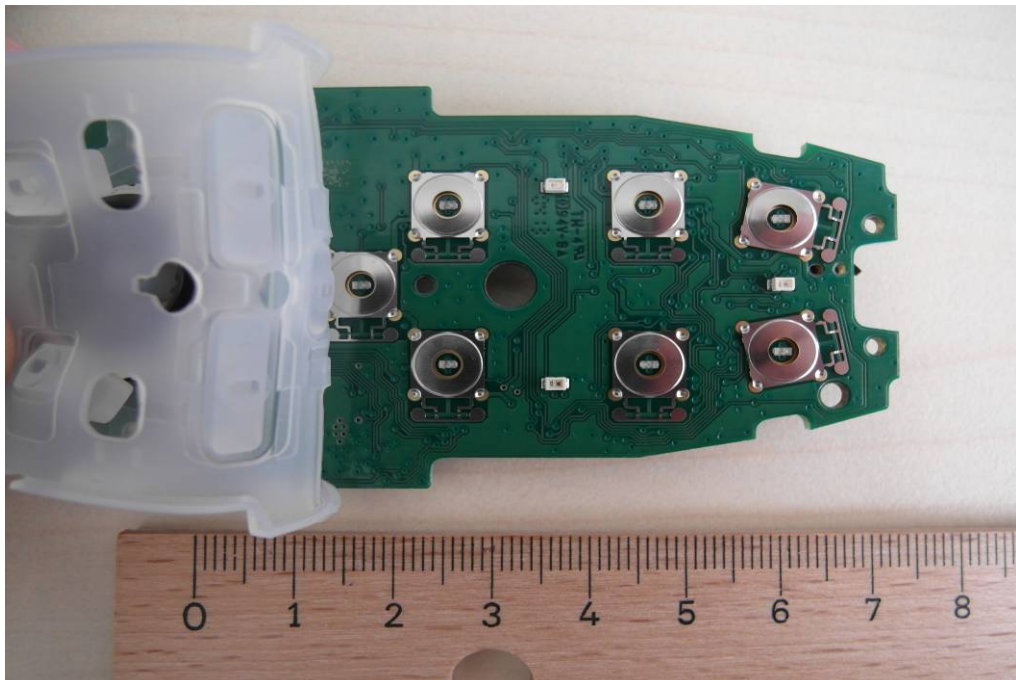


Photo 5:

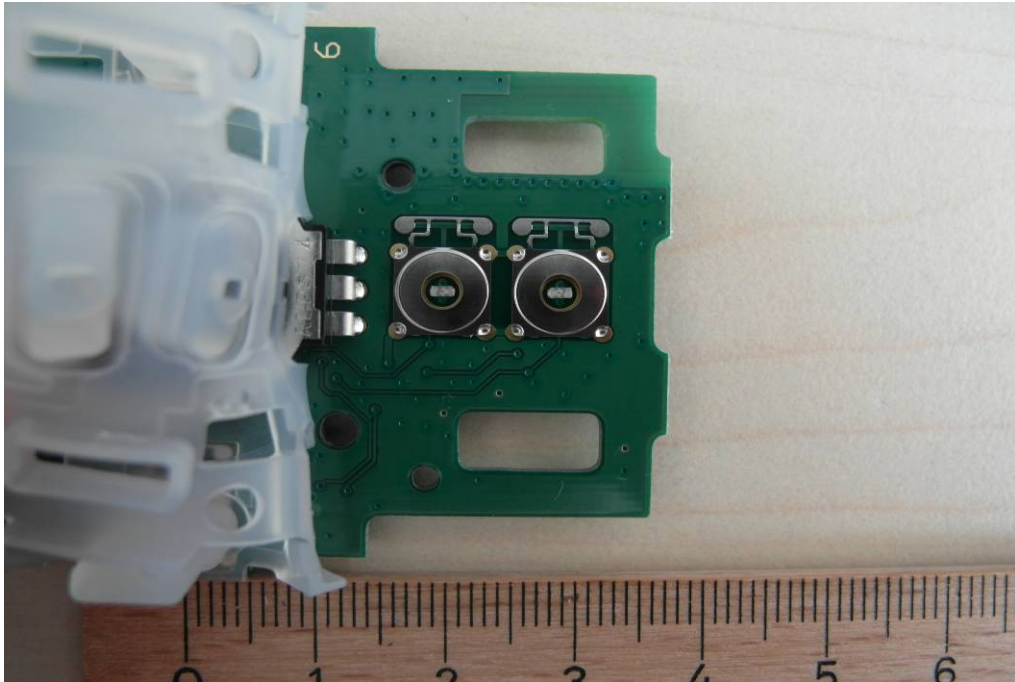
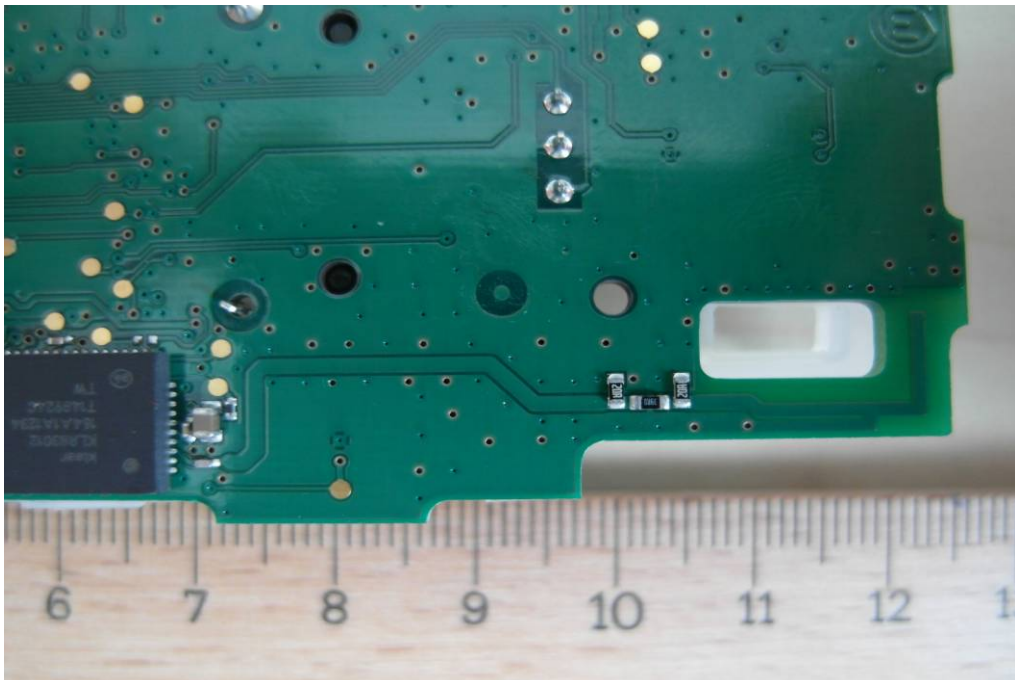


Photo 6:



**Annex D Document history**

Version	Applied changes	Date of release
1.0	Initial release	2013-04-15

**Annex E Further information****Glossary**

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

**Annex F Accreditation Certificate**

Front side of certificate



Deutsche Akkreditierungsstelle GmbH

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

**Akkreditierung**



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

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

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

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

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

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

Frankfurt am Main, 18.01.2013  
 Seite 11/12 weiter auf der Rückseite

Im Auftrag  
 Dr. Ingrid Pflüger  
 Abteilungsleiter

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Deutsche Akkreditierungsstelle GmbH

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 Spittelmarkt 10  
 10117 Berlin

Standort Frankfurt am Main  
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 60594 Frankfurt am Main

Standort Braunschweig  
 Bundesallee 100  
 38116 Braunschweig

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

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

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

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:  
 EA: [www.european-accreditation.org](http://www.european-accreditation.org)  
 ILAC: [www.ilac.org](http://www.ilac.org)  
 IAF: [www.iaf.nu](http://www.iaf.nu)

**Note:**

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

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