

TEST REPORT

Test report no.: 1-3791/11-01-15-A



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

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Manufacturer

Sennheiser electronic GmbH & Co. KG
Am Labor 1
30900 Wedemark / 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:	Wireless conference system
Model name:	ADN-W C1 / ADN-W D1
FCC ID:	DMOADNWDU
IC:	2099A-ADNWDU
Frequency:	ISM band 2400 MHz to 2483.5 MHz (lowest channel 2412 MHz; highest channel 2472 MHz)
Technology tested:	Proprietary wireless audio transmission system
Antenna:	2 integrated antennas
Power Supply:	7.4 V DC by battery
Temperature Range:	+5°C to +45°C



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

Test report authorised:

p.o.

Marco Bertolino
Testing Manager

Test performed:

Andreas Luckenbill
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:	2011-09-30
Date of receipt of test item:	2013-02-26
Start of test:	2013-02-26
End of test:	2013-03-20
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

3.1 Measurement guidance

DTS : KDB 558074	2012-04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
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4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+45 °C during high temperature tests
	T_{min}	+5 °C during low temperature tests
Relative humidity content:		42 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	7.4 V DC by battery
	V_{max}	7.5 V
	V_{min}	6.2 V

5 Test item

Kind of test item	:	Wireless conference system
Type identification	:	ADN-W C1 / ADN-W D1
S/N serial number	:	Not available!
HW hardware status	:	FPGA : 2_8_5_prod2/ D1w_LX45_PROD_TX_279.bin
SW software status	:	ADNW_TERMINAL.EXE from 16.11.2012 / APP: 001120
Frequency band [MHz]	:	ISM band 2400 MHz to 2483.5 MHz (lowest channel 2412 MHz; highest channel 2472 MHz)
Type of radio transmission	:	OFDM
Use of frequency spectrum	:	
Type of modulation	:	QPSK with coding rate 1/2
Number of channels	:	13
Antenna	:	2 integrated antennas
Power supply	:	7.4 V DC by battery
Temperature range	:	+5°C to +45 °C

5.1 Additional information

Test setup - and EUT - photos are included in the following test reports:

External EUT photos: 1-3791/12-01-29_AnnexA
 Internal EUT photos: 1-3791/12-01-29_AnnexB
 Test setup: 1-3791/12-01-29_AnnexD

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	2013-08-07	-/-

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	OFDM	<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	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	measurement made with antenna module
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth - 6dB bandwidth	Nominal	Nominal	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	measurement made with antenna module
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth - 20dB bandwidth	Nominal	Nominal	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	measurement made with antenna module
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	Nominal	Nominal	OFDM	<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	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	measurement made with antenna module
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	OFDM	<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	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	measurement made with antenna module
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109 RSS-Gen	Unintentional radiator 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	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

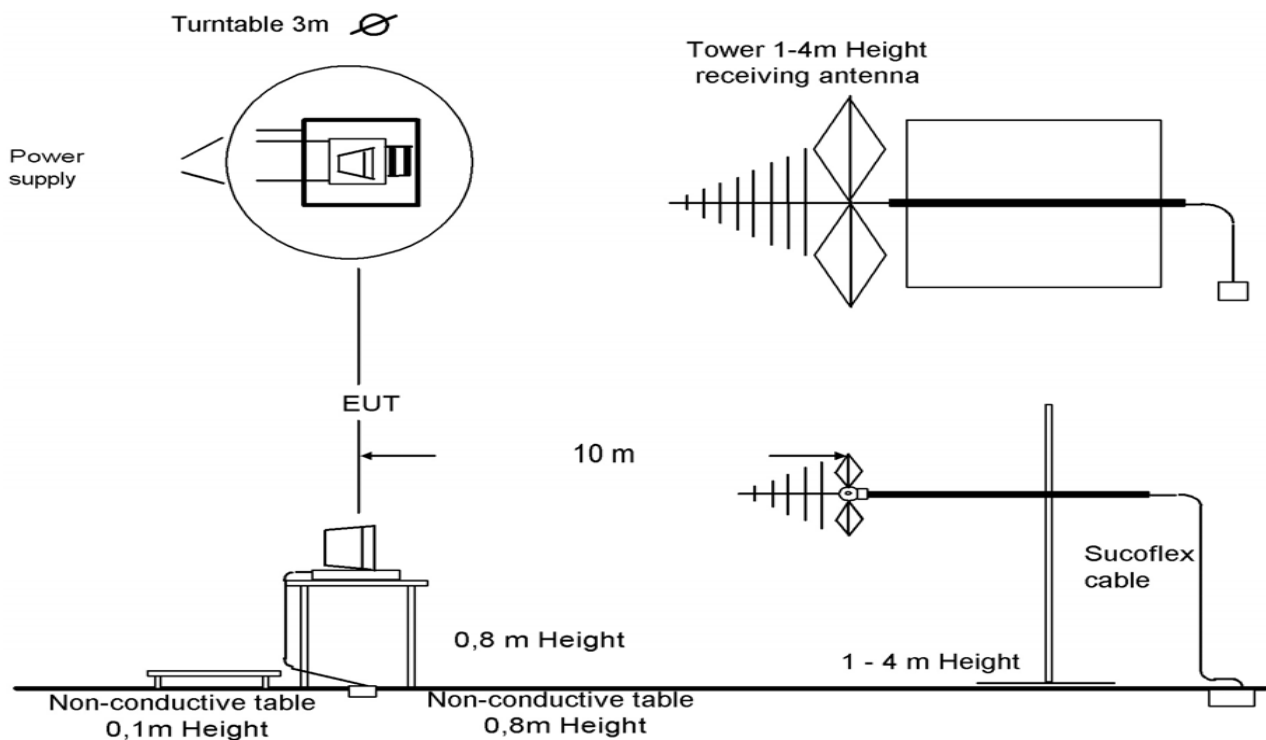
8 RF measurements

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. 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. Antennas are confirmed with ANSI C63.

Semi anechoic chamber



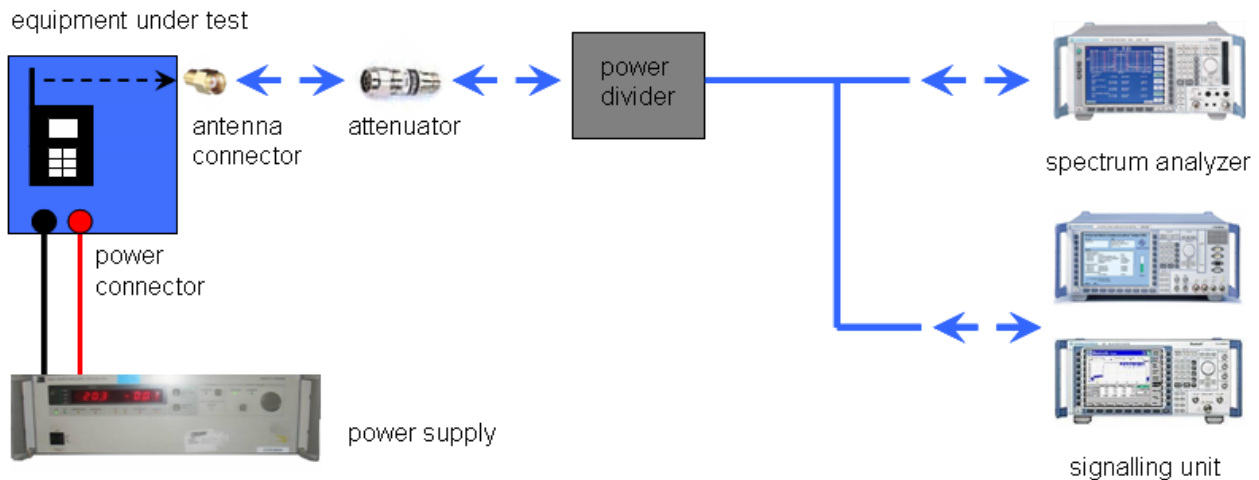
Picture 1: Diagram radiated measurements

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. 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: ANT_D1-W C1-W

Special test descriptions: The antenna port 1 shows the same behaviour as antenna port 2. Antenna port 1 is included to show the fulfilment according to FCC Part 15.247 standard. The conducted measurements are made with Sennheiser ADN-W Antenna Module. The same module is used in the EUT.

The C1 unit and the D1 unit have the same integrated RF electronic part. The C1 unit has an additional electronic part with 2 buttons. The C1 unit is tested a worst case scenario.

Configuration descriptions: None

Test mode:

- No test mode available. Iperf was used to ping another device with the largest support packet size
- 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	:	1-3791/11-01-15-A				
Equipment model number	:	ADN-W C1 / ADN-W D1				
Certification number	:	2099A-ADNWDU				
Manufacturer (complete address)	:	Sennheiser electronic GmbH & Co. KG Am Labor 1 30900 Wedemark / GERMANY				
Tested to radio standards specification no.	:	RSS 210, Issue 8				
Open area test site IC No.	:	IC 3462C-1				
Frequency range	:	ISM band 2400 MHz to 2483.5 MHz				
Conducted values:						
RF-power [W] (max.)	:	Band	OFDM antenna port 1		OFDM antenna port 2	
		2412 – 2472 MHz	13.8 mW		12.0 mW	
		2422 – 2462 MHz	-/-	-/-	-/-	-/-
		Radiated values:				
		Band	OFDM antenna port 1		OFDM antenna port 2	
		2412 – 2472 MHz	52.5 mW		31.6 mW	
2422 – 2462 MHz	-/-	-/-	-/-	-/-		
Occupied bandwidth (99%-BW) [kHz] / Emission designator (TRC-43)	:	Band	OFDM antenna port 1		OFDM antenna port 2	
		2412 – 2472 MHz	16.35 MHz / 16M4G7D		16.35 MHz / 16M4G7D	
		2422 – 2462 MHz	-/-	-/-	-/-	-/-
Type of modulation	:	OFDM technology with QPSK modulation.				
Antenna information	:	2 integrated antennas				
Transmitter spurious (worst case) [dB μ V/m @ 3m]:	:	51.42 @ 12.17 GHz (peak)				

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:

2013-08-07
Date

Andreas Luckenbill
Name

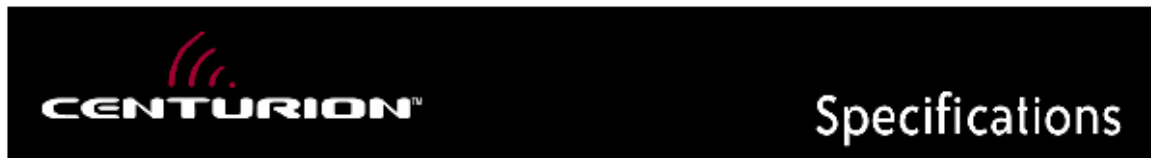
Signature



9 Measurement results

9.1 Antenna gain

Reference document antenna gain:



D-Puck

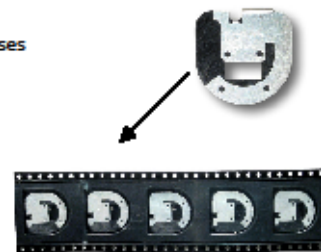
Model Number:
WID2452

Internal Antenna – Surface Mount

Specifications:

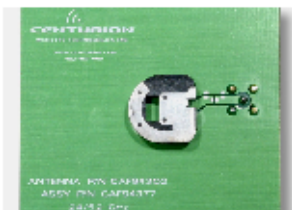
- Tape and reel packaging for high volume pick-and-place manufacturing processes
- Planar Inverted F Antenna (PIFA) requires ground plane to radiate efficiently
- Conformance to European RoHS Directive 2002/95/EC

Frequency Ranges	2.4 - 2.5 GHz	5.15 - 5.875 GHz
Gain	>3 dBi	>4 dBi
Polarization	Linear	
Impedance	50 ohms	
VSWR	<2.5:1	
Dimensions (L x W x H)	16 x 16 x 6 mm	
Weight	2 g	
Carrier Material	Black color resin	

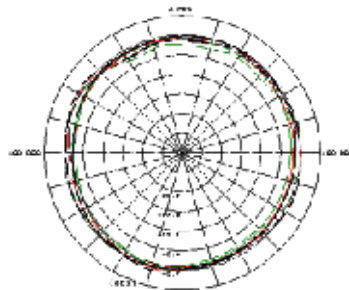


Connectors:

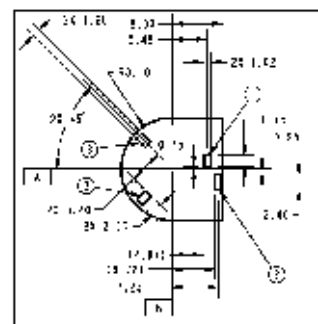
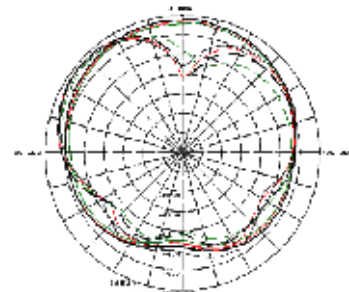
Model #	Part #	Description	Connector
WID2452	CAF94400	Tape and Reel	N/A
WID2452-SM	CAF94377	Eval PCBA	SMA-female Panel



Azimuth:
Total Gain



Elevation:
Total Gain



PCB FOOTPRINT LAYOUT
SCALE: 1
VSWR

1. Feed pad. Provide 50-ohm signal to pad. Isolate feed pad from ground as required to provide 50-ohm signal at top mounting surface. Matching network components (PI or L type) will be required on the input feed line.
2. Ground pad.

Specifications subject to change without notice.

D-Puck a - 12/28/05



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9.2 Maximum output power

Description:

Measurement of the maximum output power conducted and radiated. The measurements are performed using the data rate producing the highest conducted output power. The determination of these data rates was performed at the beginning of the tests.

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)
Analyser mode:	channel power with 6dB DTS bandwidth

Limits:

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

Results: OFDM, antenna port 1

OFDM antenna port 1	Maximum Output Power [dBm]		
	2412 MHz	2442 MHz	2472 MHz
Frequency			
Peak Output Power Conducted	11.2*	11.4*	11.4*
Output Power Radiated – EIRP	16.5	17.2	16.6
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

* Values measured with Sennheiser ADN-W Antenna Module.

Result: Passed

Results: OFDM, antenna port 2

OFDM antenna port 2 Frequency	Maximum Output Power [dBm]		
	2412 MHz	2442 MHz	2472 MHz
Peak Output Power Conducted	10.3*	10.7*	10.8*
Output Power Radiated – EIRP	13.9	15.0	13.4
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

* Values measured with Sennheiser ADN-W Antenna Module.

Result: Passed

9.3 Power spectral density

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	≥ 3 kHz
Video bandwidth:	$\geq 3 \times$ RBW
Span:	1.5 times of the DTS BW
Trace-Mode:	Max hold (allow trace to fully stabilize)

Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

Additional information:

The conducted measurements are made with Sennheiser ADN-W Antenna Module. The same module is used in the EUT.

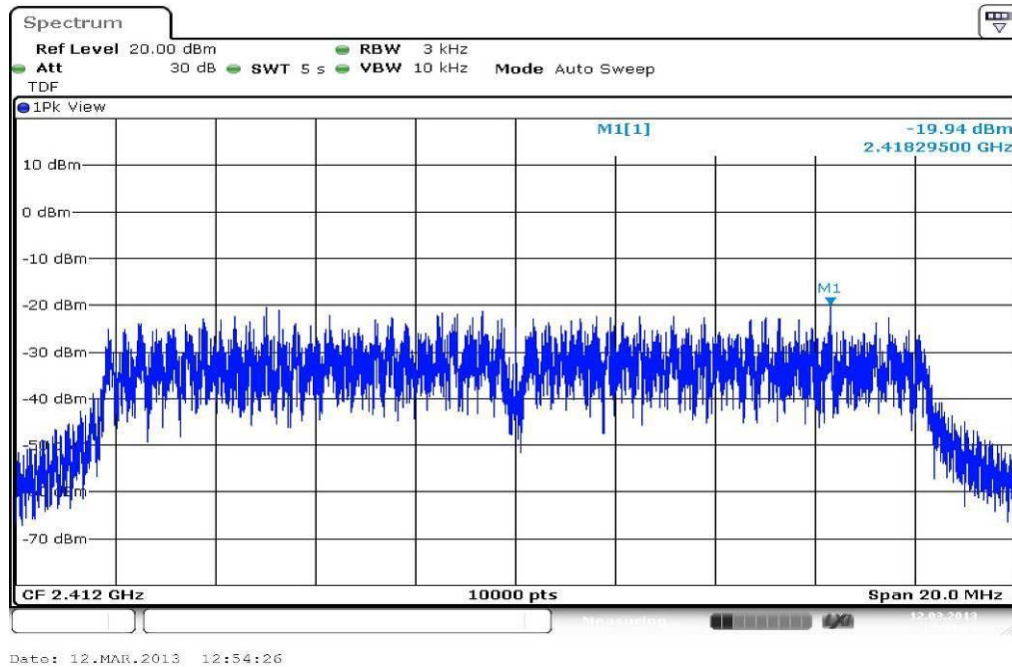
Results:

Modulation Frequency	Power Spectral density [dBm]		
	2412 MHz	2442 MHz	2472 MHz
OFDM - antenna port 1	-19.94	-19.80	-19.82
OFDM - antenna port 2	-20.79	-20.55	-20.43
Measurement uncertainty	± 1.5 dB		

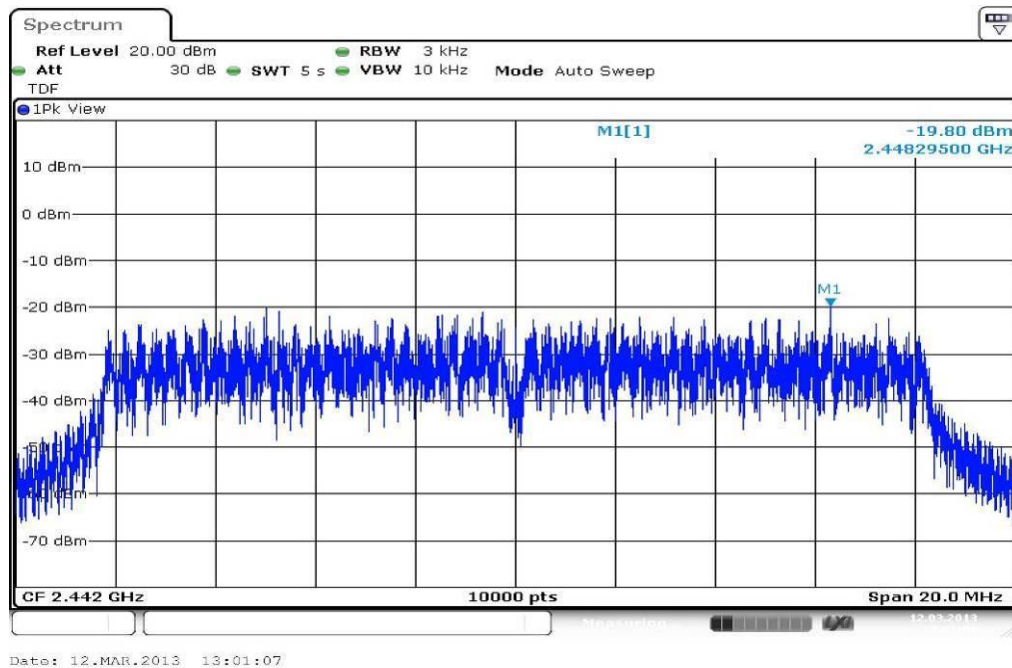
Result: **Passed**

Plots: OFDM, antenna port 1

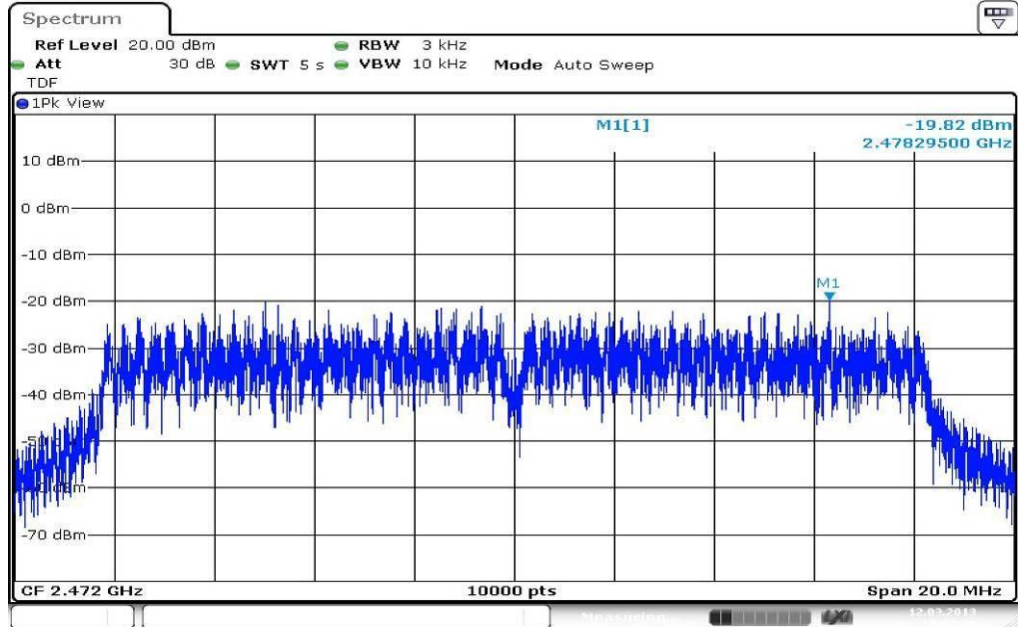
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel

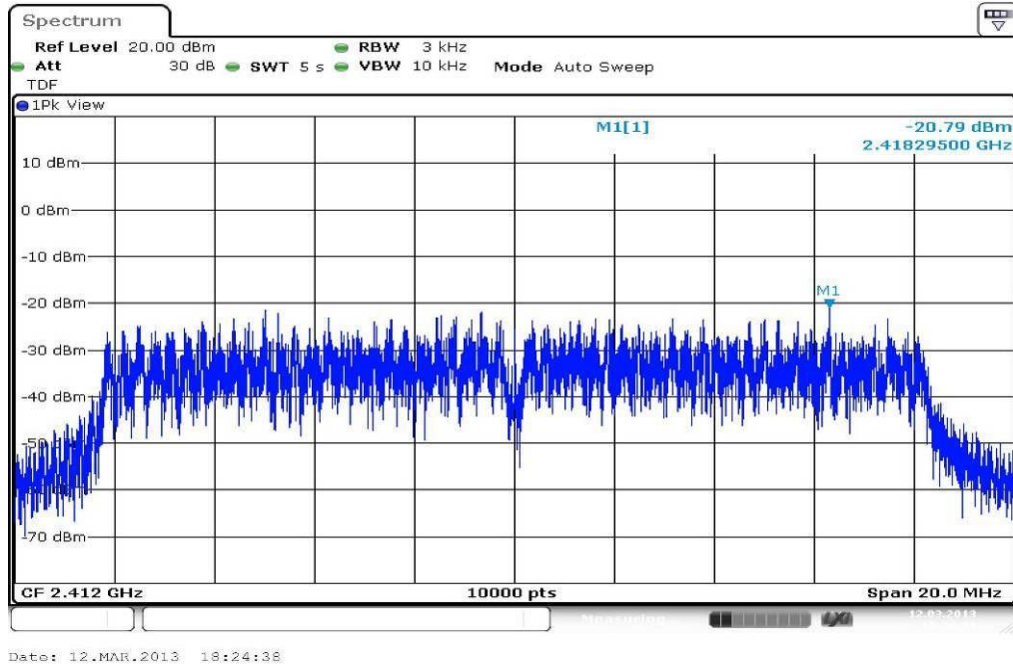


Plot 3: TX mode, highest channel

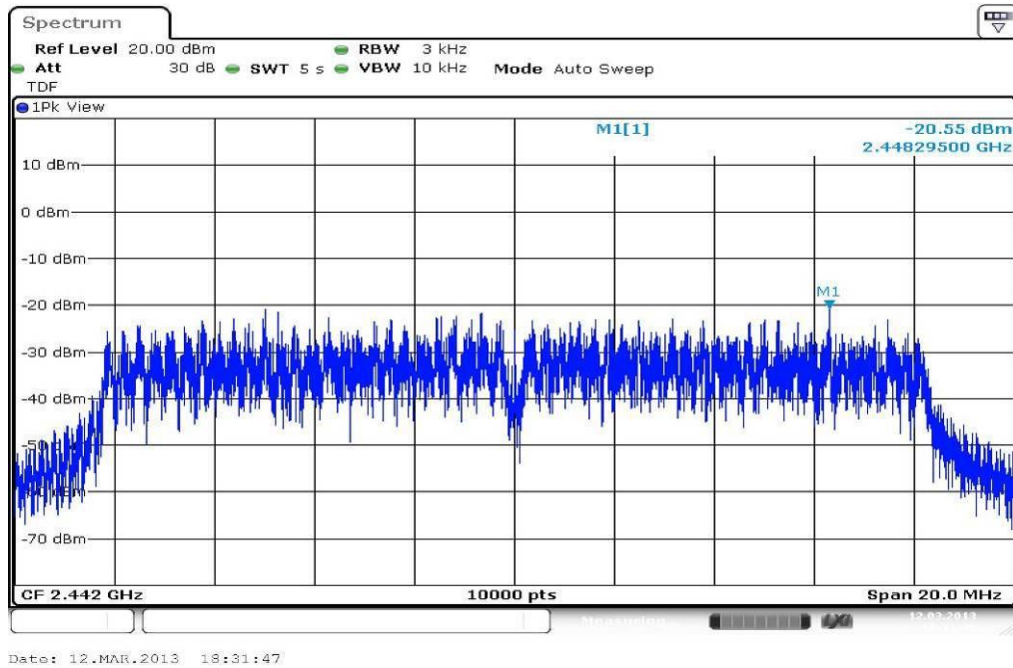


Plots: OFDM, antenna port 2

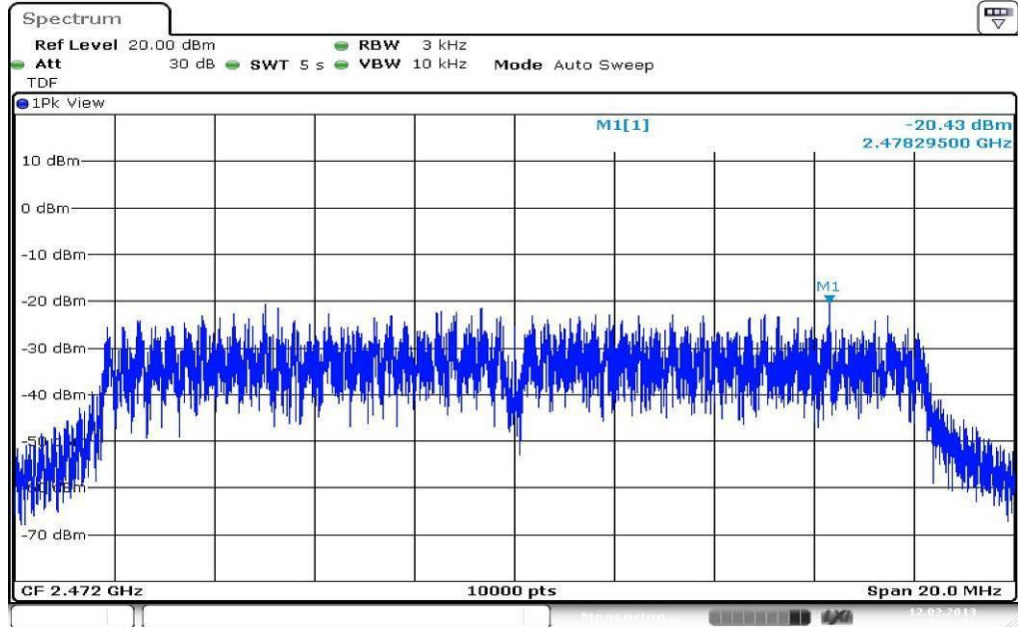
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



Plot 3: TX mode, highest channel



Date: 12.MAR.2013 18:38:01

9.4 Spectrum bandwidth – 6 dB

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of the DTS BW but not exceed 100 kHz
Video bandwidth:	$\geq 3 \times \text{RBW}$
Span:	Complete signal
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

FCC	IC
Spectrum Bandwidth – 6 dB	
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.	

Additional information:

The conducted measurements are made with Sennheiser ADN-W Antenna Module. The same module is used in the EUT.

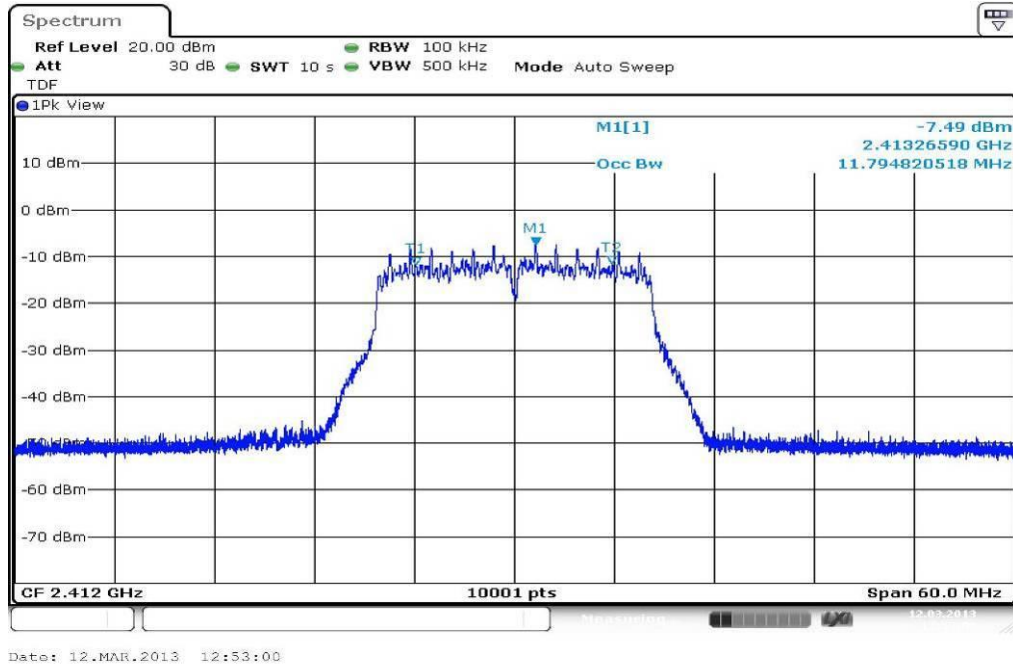
Results:

Modulation Frequency	6 dB bandwidth [MHz]		
	2412 MHz	2442 MHz	2472 MHz
OFDM - antenna port 1	11.79	11.78	11.78
OFDM - antenna port 2	11.79	11.79	11.80
Measurement uncertainty	$\pm \text{RBW}$		

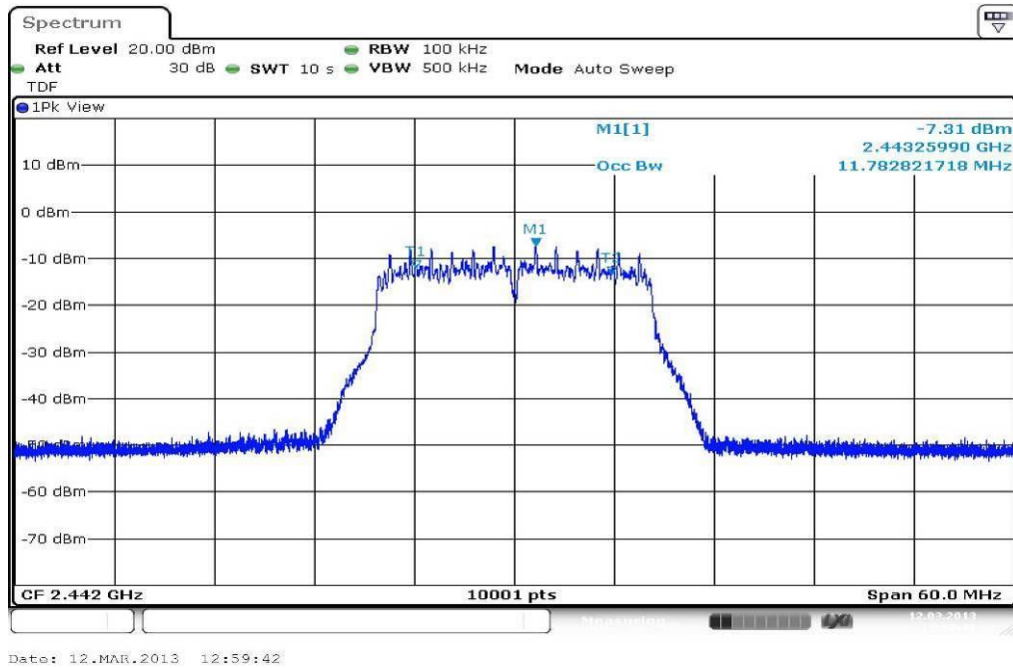
Result: Passed

Plots: OFDM, antenna port 1

Plot 1: TX mode, lowest channel

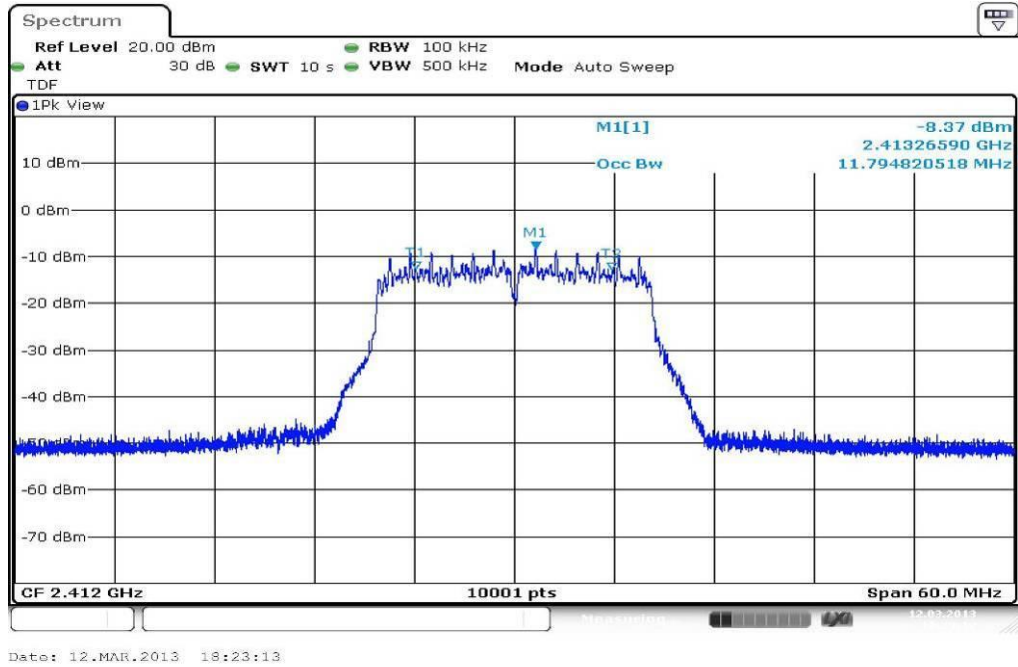


Plot 2: TX mode, middle channel

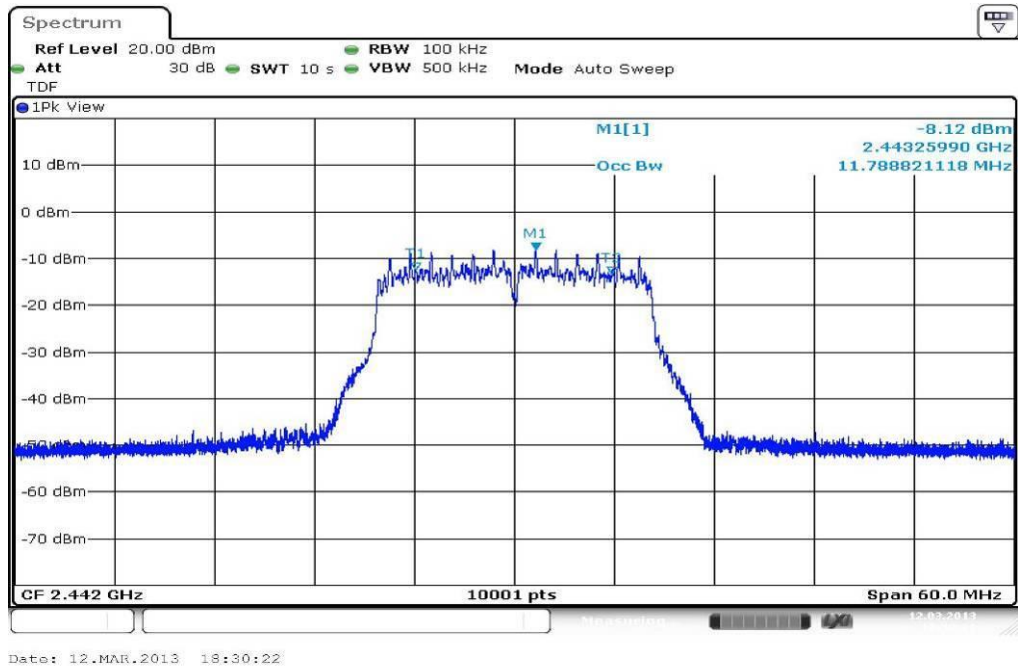


Plots: OFDM, antenna port 2

Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



9.5 Spectrum bandwidth – 20 dB

Description:

Measurement of the 20 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of the DTS BW but not exceed 100 kHz
Video bandwidth:	≥ 3 x RBW
Span:	Complete signal
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

FCC	IC
Spectrum Bandwidth – 20 dB	
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.	

Additional information:

The conducted measurements are made with Sennheiser ADN-W Antenna Module. The same module is used in the EUT.

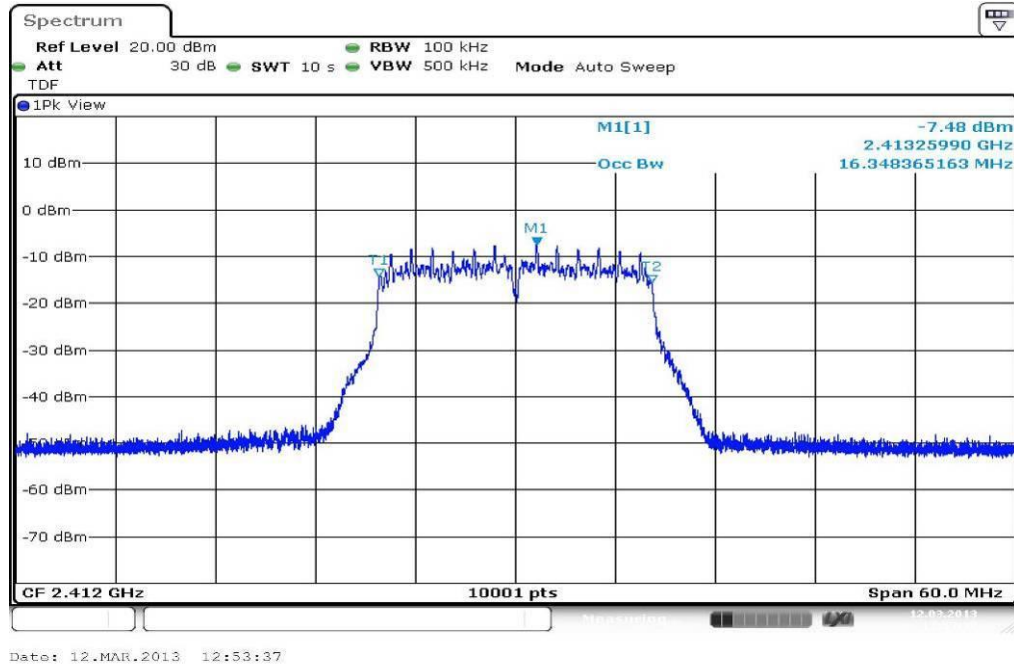
Results:

Modulation Frequency	20 dB bandwidth [MHz]		
	2412 MHz	2442 MHz	2472 MHz
OFDM - antenna port 1	16.35	16.34	16.34
OFDM - antenna port 2	16.35	16.35	16.35
Measurement uncertainty	± RBW		

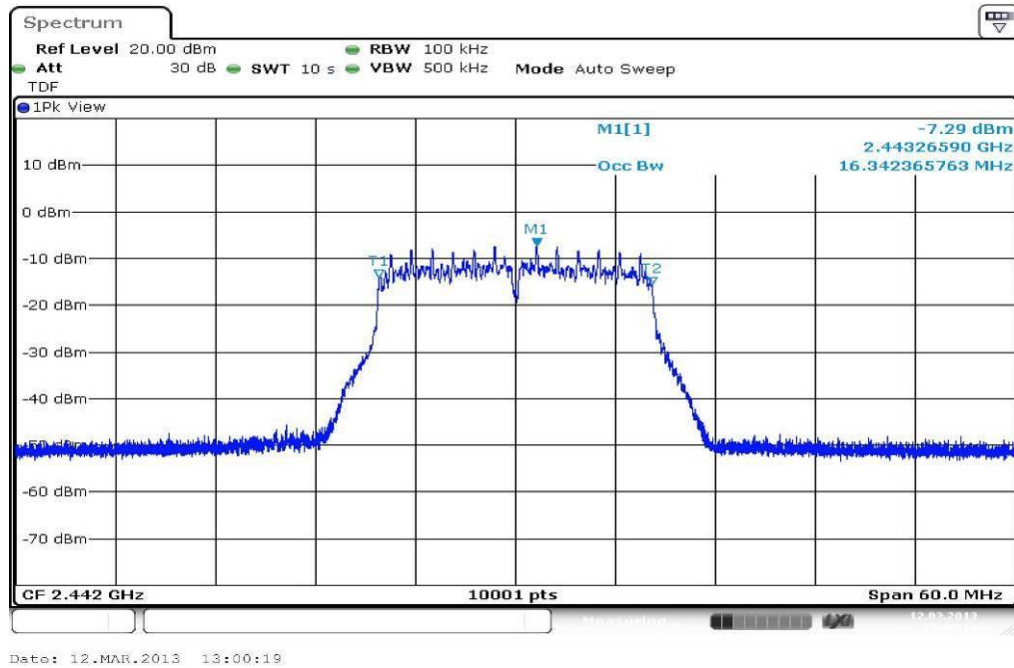
Result: Passed

Plots: OFDM, antenna port 1

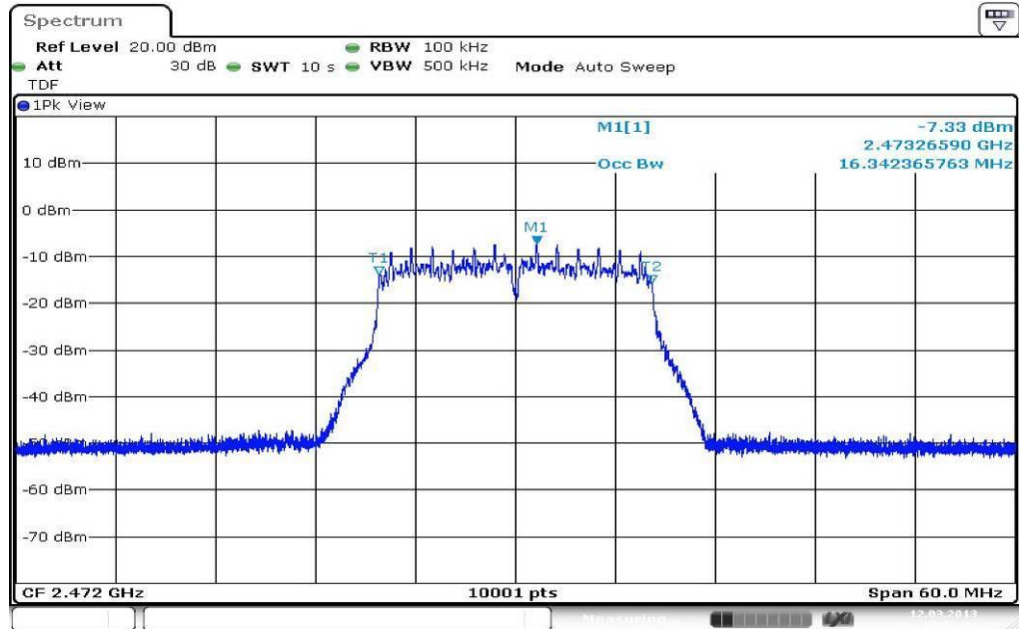
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



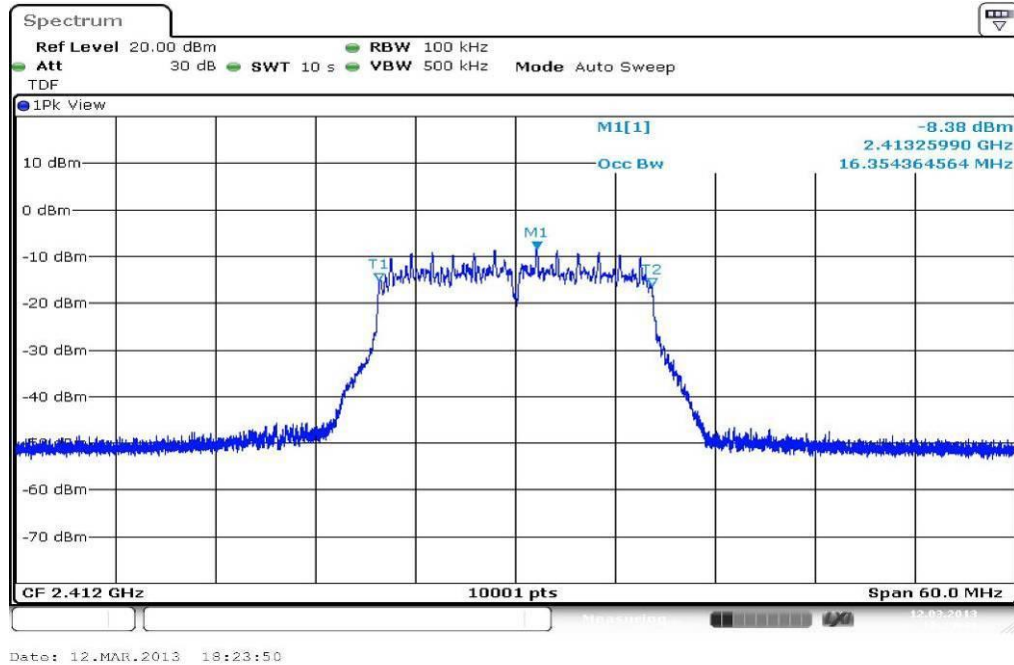
Plot 3: TX mode, highest channel



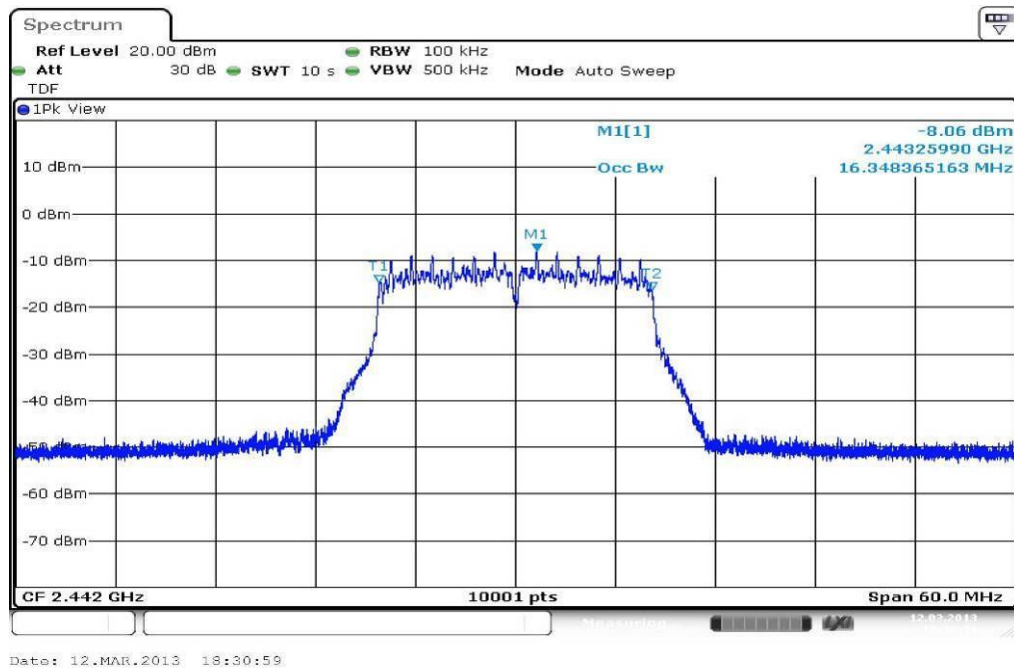
Date: 12.MAR.2013 13:06:48

Plots: OFDM, antenna port 2

Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



9.6 Band edge compliance conducted

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	Lower Band Edge: 2300 – 2425 MHz Upper Band Edge: 2450 – 2550 MHz
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>	

Additional information:

The conducted measurements are made with Sennheiser ADN-W Antenna Module. The same module is used in the EUT.

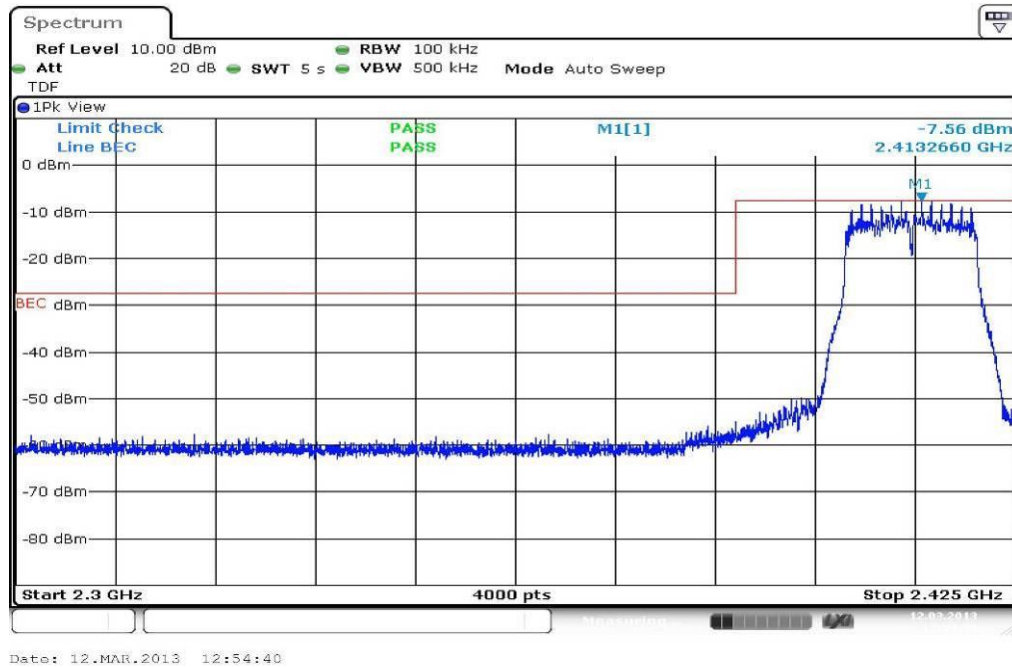
Results:

Scenario Modulation	Band Edge Compliance Conducted [dB]		
	OFDM - antenna port 1	OFDM - antenna port 2	-/-
Lower Band Edge	> 20 dB	> 20 dB	-/-
Upper Band Edge	> 20 dB	> 20 dB	-/-
Measurement uncertainty	± 1.5 dB		

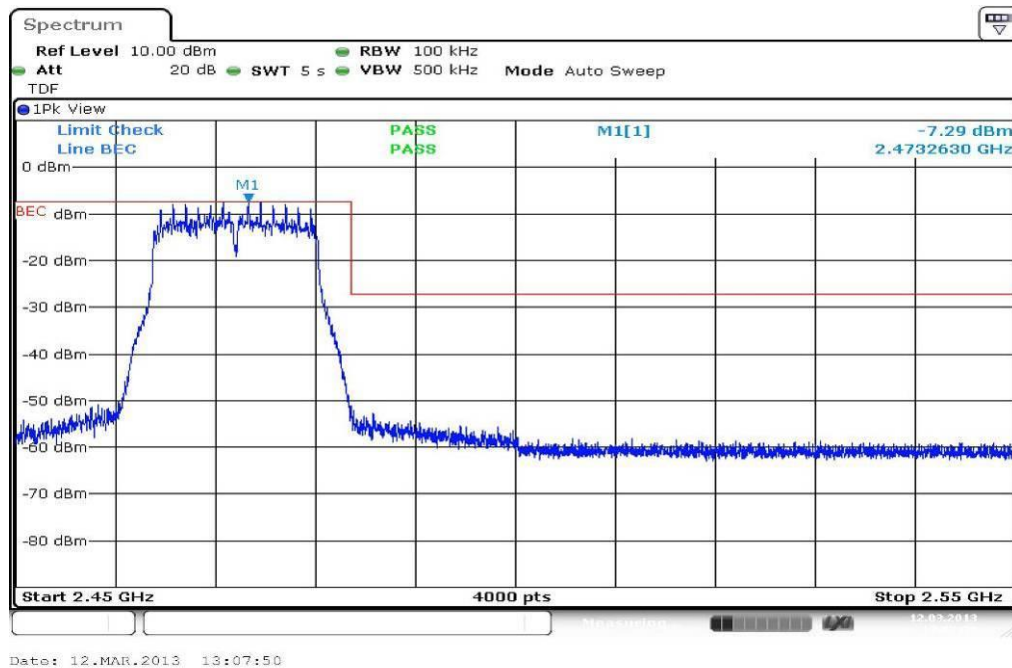
Result: Passed

Plots: OFDM, antenna port 1

Plot 1: TX mode, lower band edge

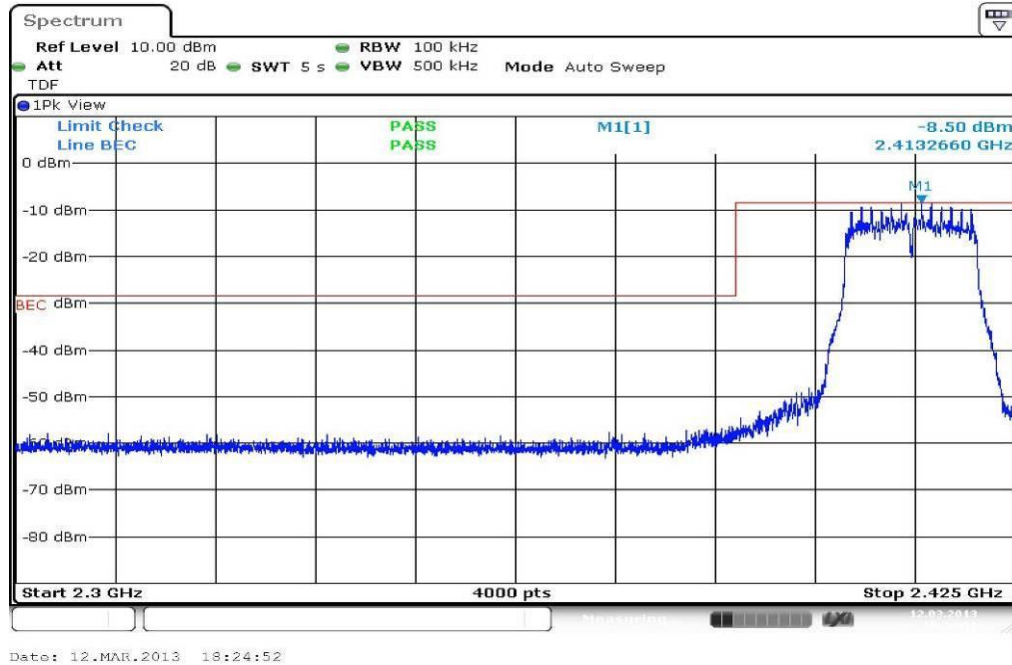


Plot 2: TX mode, upper band edge

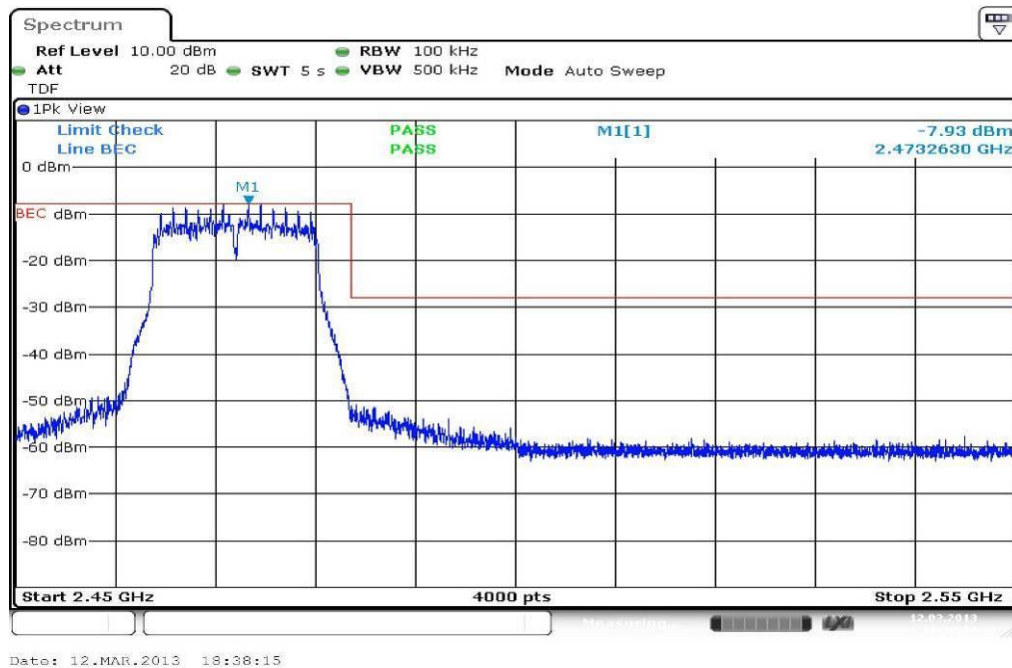


Plots: OFDM, antenna port 2

Plot 1: TX mode, lower band edge



Plot 2: TX mode, upper band edge



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 channel 1 for the lower restricted band and to channel 13 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3 m.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz / 1 MHz
Video bandwidth:	1 MHz / 10 Hz
Span:	See plot!
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 μ V/m AVG	

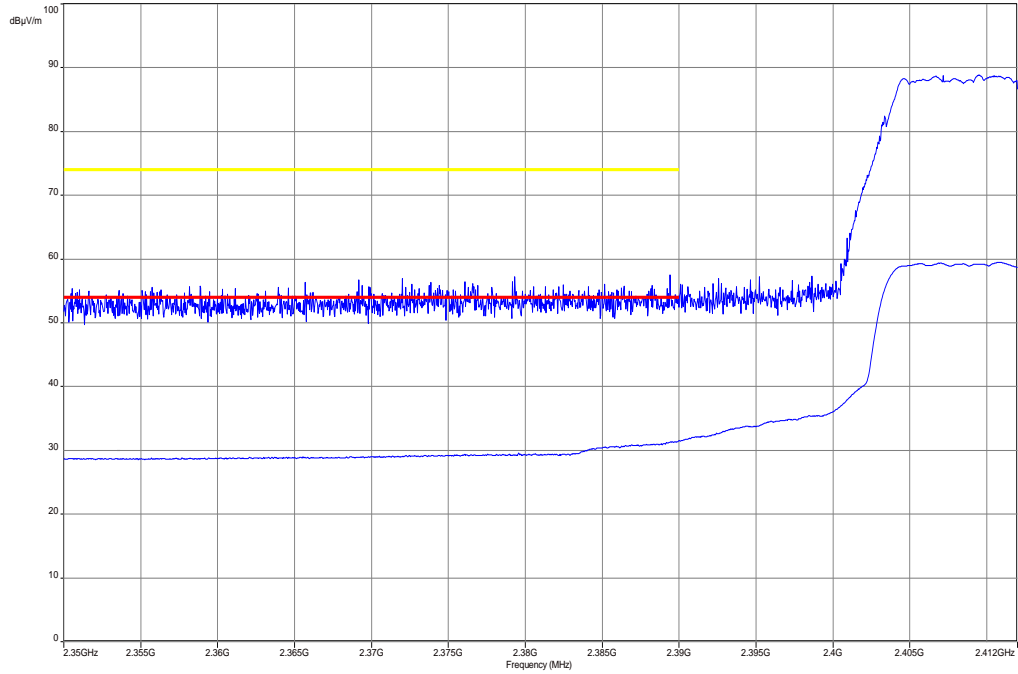
Results:

Scenario Modulation	Band Edge Compliance Conducted [dB]		
	OFDM - antenna port 1	OFDM - antenna port 2	-/-
Lower Band Edge – Channel 1	> 15 dB (Peak) > 15 dB (AVG)	> 15 dB (Peak) > 15 dB (AVG)	-/-
Upper Band Edge – Channel 11	> 15 dB (Peak) > 15 dB (AVG)	> 15 dB (Peak) > 15 dB (AVG)	-/-
Measurement uncertainty	± 3 dB		

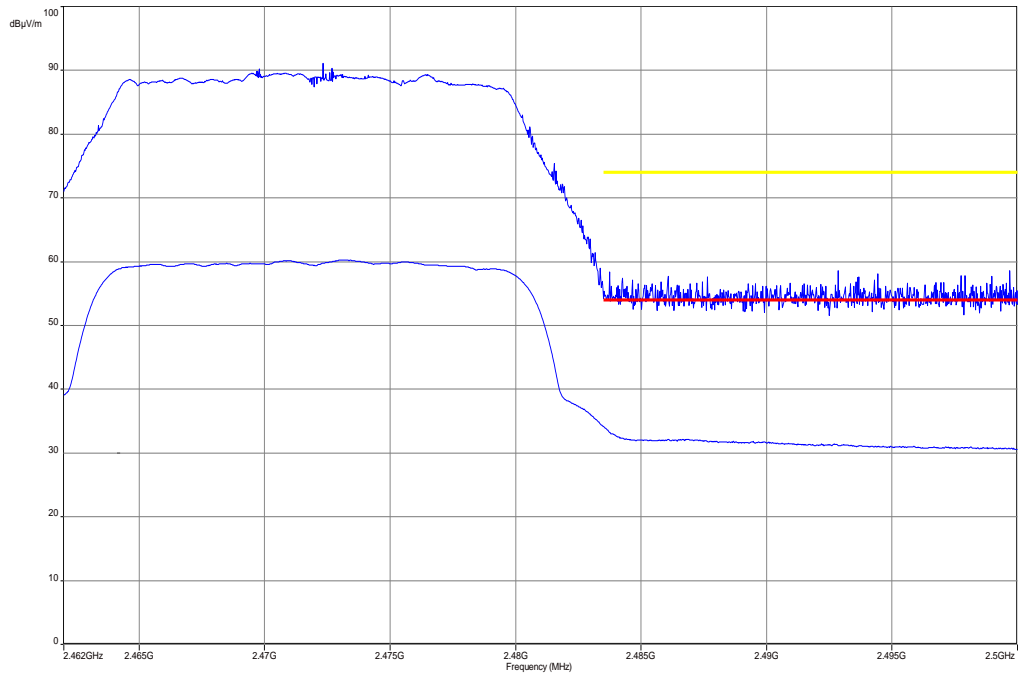
Result: Passed

Plots: OFDM, antenna port 1-2, peak / average

Plot 1: TX mode, lower band edge, vertical & horizontal polarization



Plot 2: TX mode, upper band edge, vertical & horizontal polarization



9.8 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at channel 1, 7 and 13. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	1s / 100 MHz
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

Additional information:

The conducted measurements are made with Sennheiser ADN-W Antenna Module. The same module is used in the EUT.

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>	

Plots: OFDM, antenna port 1

TX Spurious Emissions Conducted					
OFDM antenna port 1					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-7.60	30 dBm		Operating frequency
No spurious emissions detected.			-20 dBc (peak)		complies
			-30 dBc (average)		
2442		-7.31	30 dBm		Operating frequency
No spurious emissions detected.			-20 dBc (peak)		complies
			-30 dBc (average)		
2472		-7.30	30 dBm		Operating frequency
No spurious emissions detected.			-20 dBc (peak)		complies
			-30 dBc (average)		
Measurement uncertainty			± 3 dB		

Result: Passed

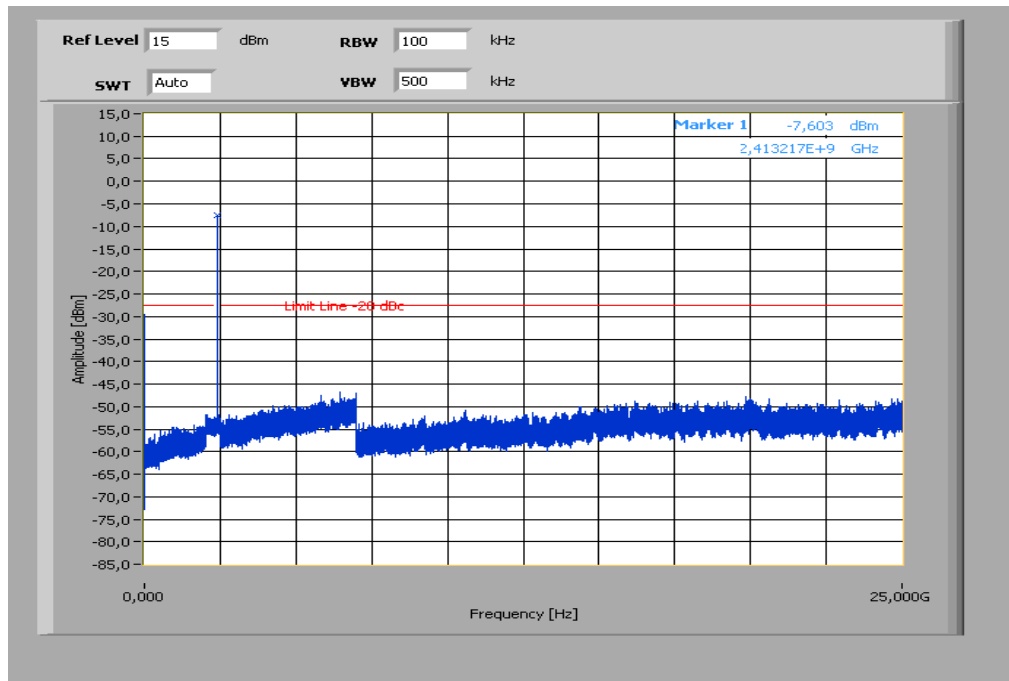
Plots: OFDM, antenna port 2

TX Spurious Emissions Conducted					
OFDM antenna port 2					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-8.44	30 dBm		Operating frequency
No spurious emissions detected.			-20 dBc (peak)		complies
			-30 dBc (average)		
2442		-8.02	30 dBm		Operating frequency
No spurious emissions detected.			-20 dBc (peak)		complies
			-30 dBc (average)		
2472		-8.02	30 dBm		Operating frequency
No spurious emissions detected.			-20 dBc (peak)		complies
			-30 dBc (average)		
Measurement uncertainty			± 3 dB		

Result: Passed

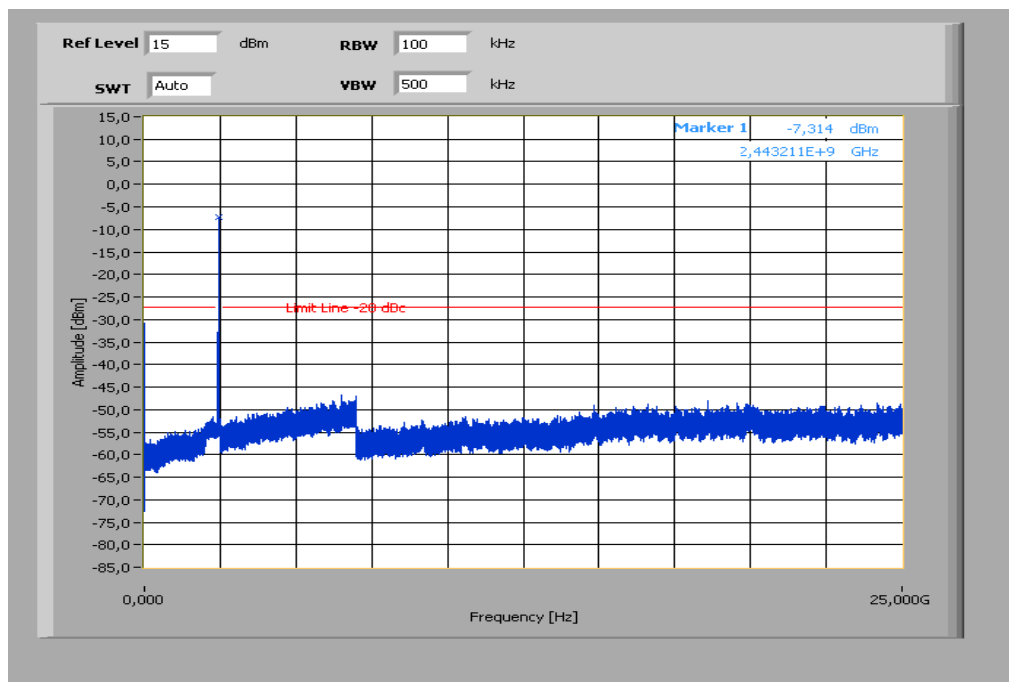
Plots: OFDM, antenna port 1

Plot 1: TX mode, lowest channel, up to 25 GHz



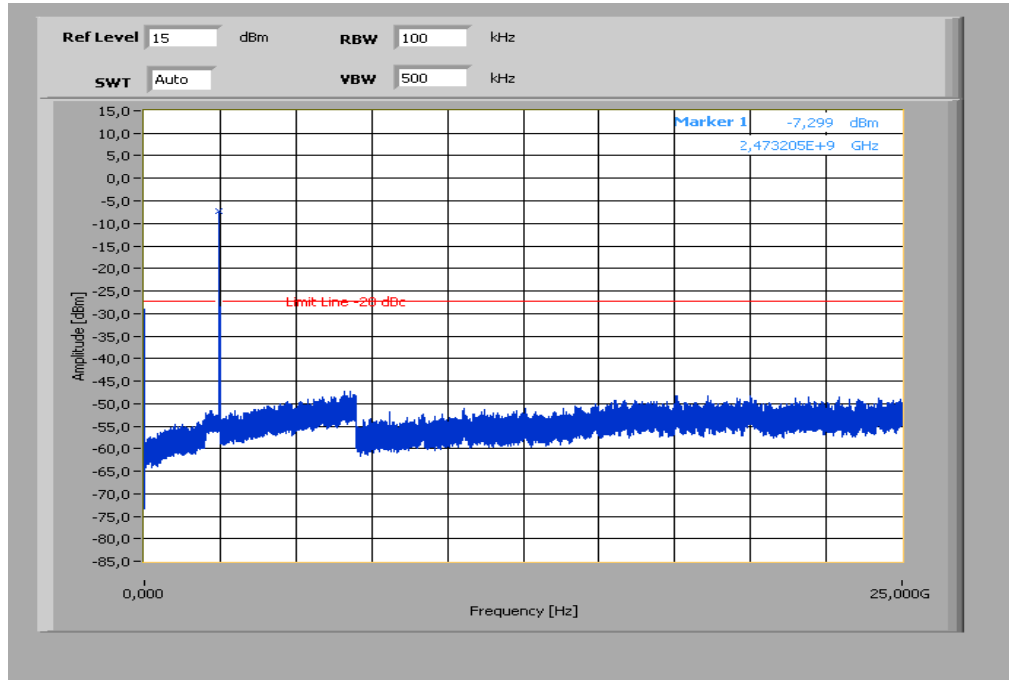
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

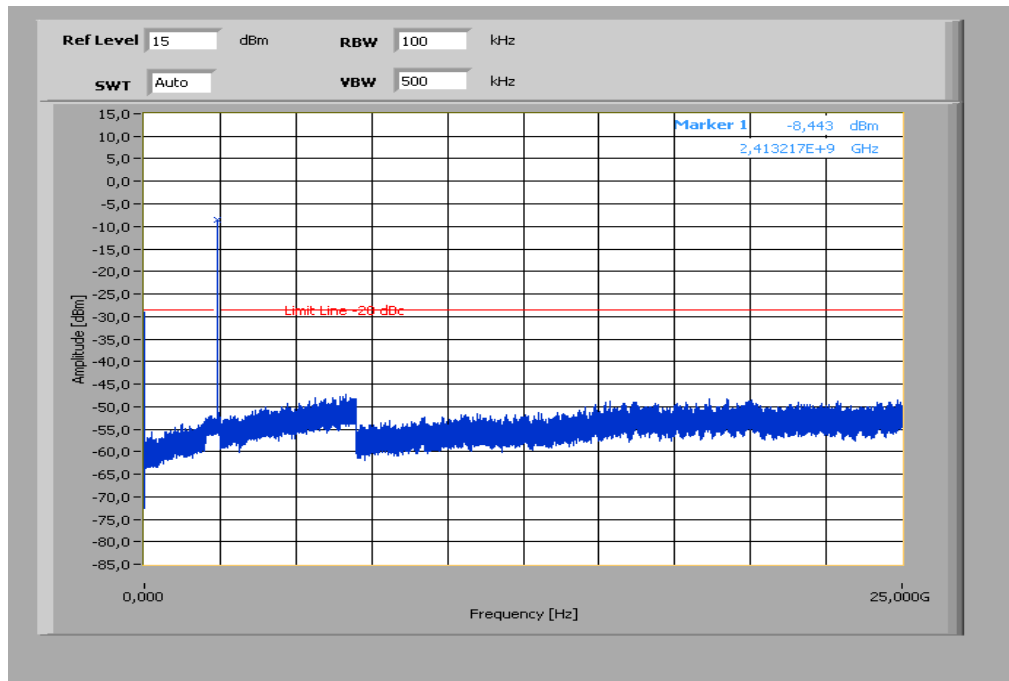
Plot 3: TX mode, highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

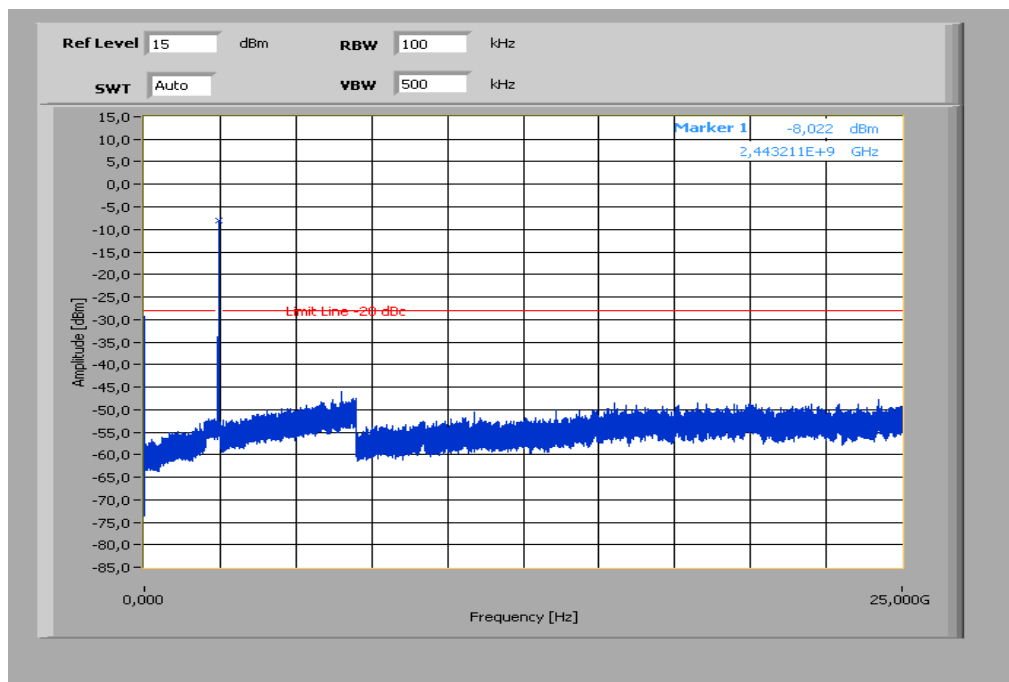
Plots: OFDM, antenna port 2

Plot 1: TX mode, lowest channel, up to 25 GHz



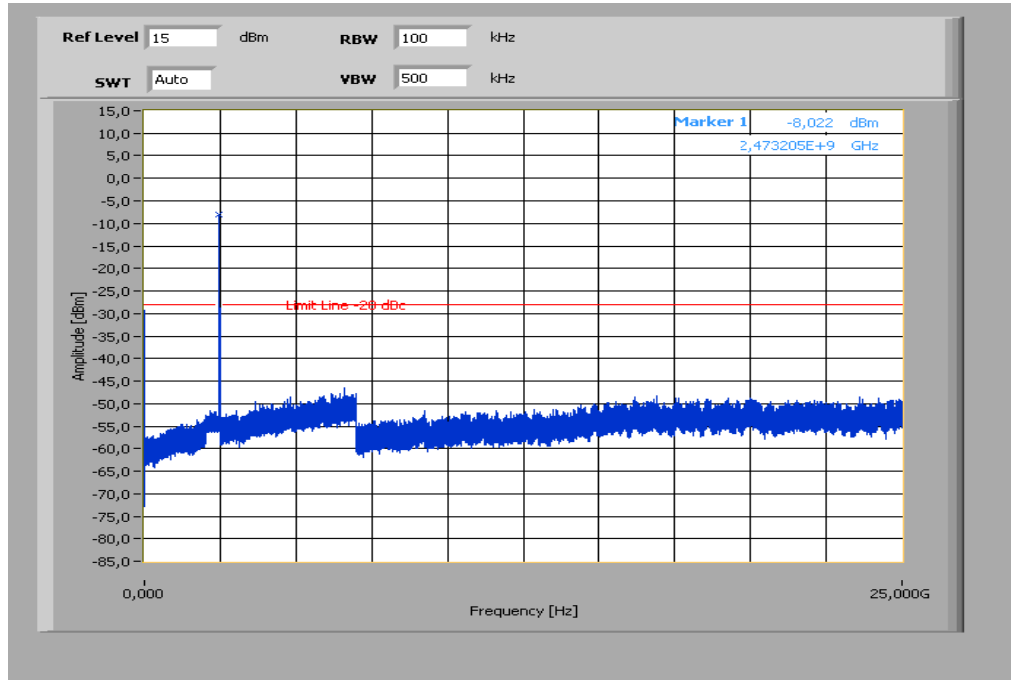
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

Plot 3: TX mode, highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

9.9 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at channel 1, 7 and 13. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold
Measured Modulation	<input checked="" type="checkbox"/> OFDM

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

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>		
Frequency (MHz)	Field Strength (dB μ 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: OFDM, antenna port 1

TX Spurious Emissions Radiated [dBµV/m]								
Antenna port 1								
2412 MHz			2442 MHz			2472 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All detected peak emissions between 1 GHz and 12.75 GHz are more than 10 dB below the average limit.			All detected peak emissions between 1 GHz and 12.75 GHz are more than 10 dB below the average limit.			All detected peak emissions between 1 GHz and 12.75 GHz are more than 10 dB below the average limit.		
For emissions above 12.75 GHz, please take a look at the plots.			For emissions above 12.75 GHz, please take a look at the plots.			For emissions above 12.75 GHz, please take a look at the plots.		
Measurement uncertainty			± 3 dB					

Result: Passed

Results: OFDM, antenna port 2

TX Spurious Emissions Radiated [dBµV/m]								
Antenna port 2								
-/-			2442 MHz			-/-		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
-/-			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			-/-		
-/-			All detected peak emissions between 1 GHz and 12.75 GHz are more than 10 dB below the average limit.			-/-		
-/-			For emissions above 12.75 GHz, please take a look at the plots.			-/-		
Measurement uncertainty			± 3 dB					

Result: Passed

Note:

The long gooseneck is the worst case configuration of all different available microphones. These EUT configurations are added to see the behaviour of the EUT.

The antenna port 1 shows the same behaviour as antenna port 2 and is measured to see the fulfilment according to the FCC Part 15.247 standard.

Plots: OFDM, antenna port 1

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

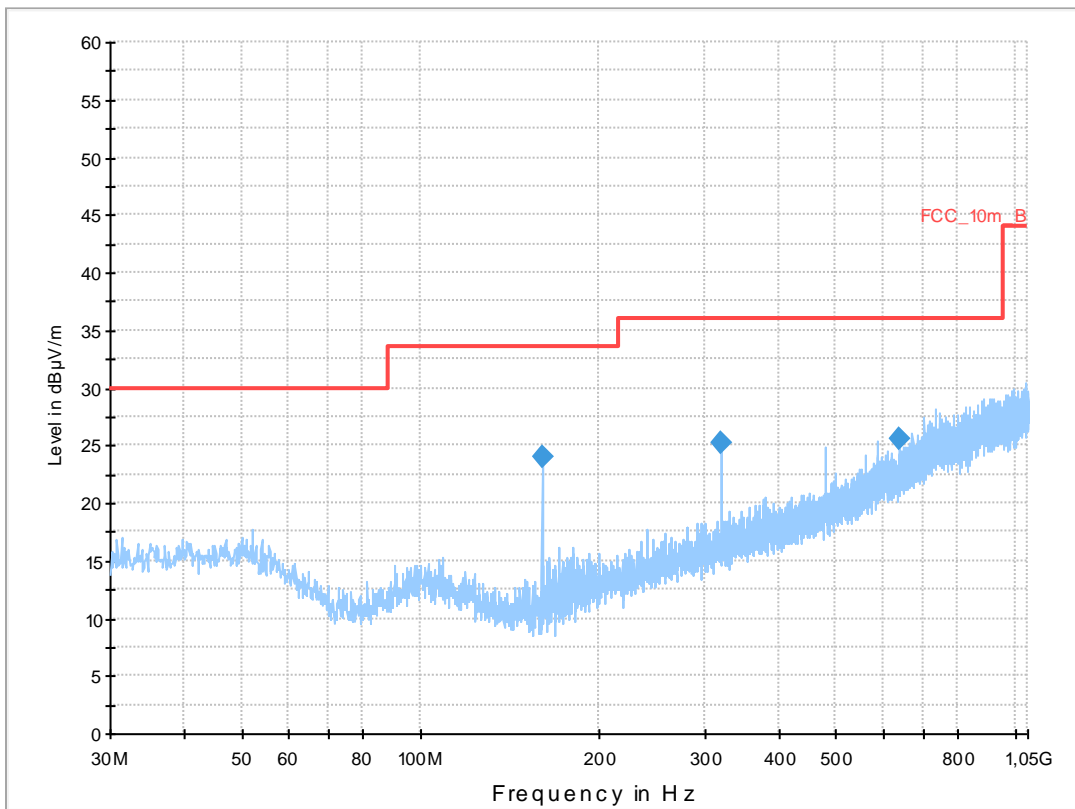
Common Information

EUT: C1W
 Serial Number: prototype
 Test Description: FCC part 15 class B @ 10m
 Operating Conditions: TX 2412 MHz | long gooseneck microphone | Ant. 1
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

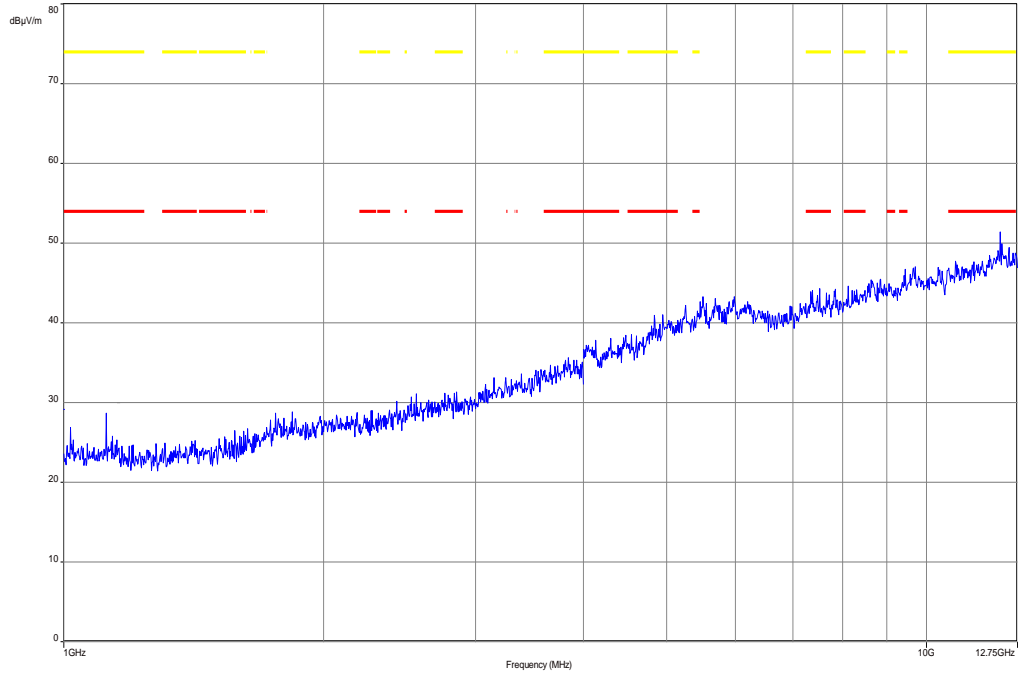
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

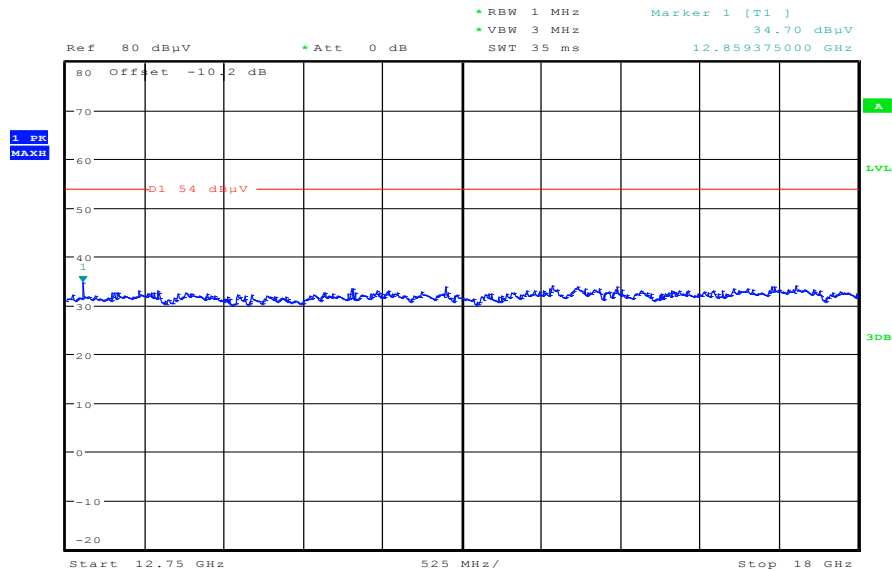
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
160.006350	23.9	1000.0	120.000	98.0	V	100.0	9.2	9.6	33.5	
320.006100	25.1	1000.0	120.000	170.0	H	190.0	15.2	10.9	36.0	
639.989250	25.5	1000.0	120.000	104.0	H	100.0	21.0	10.5	36.0	

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



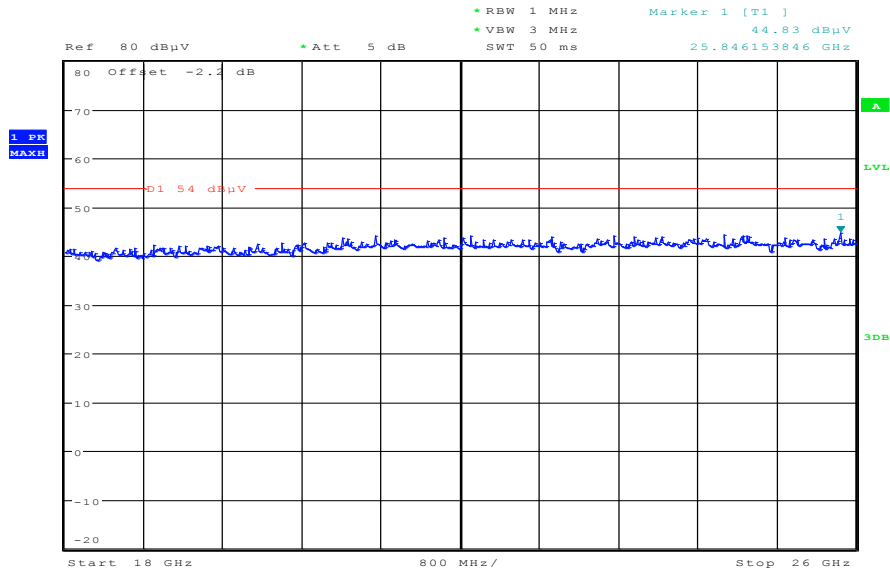
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 09:51:54

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 10:12:09

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

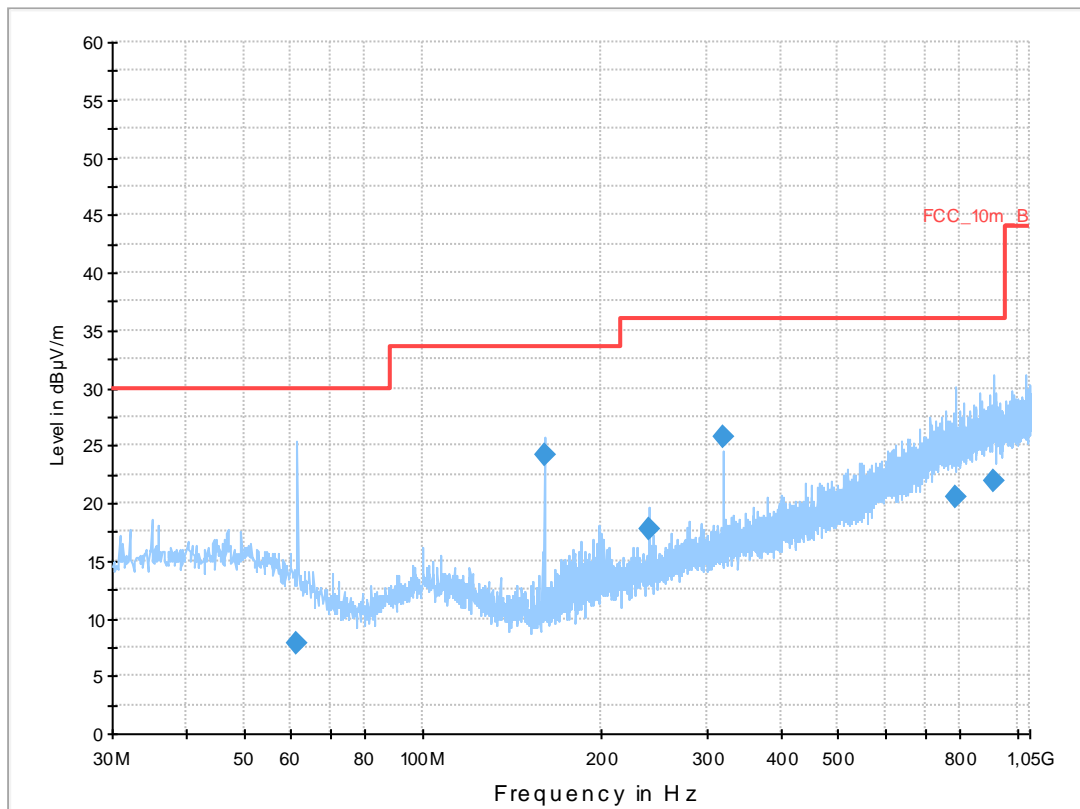
Common Information

EUT: C1W
 Serial Number: prototype
 Test Description: FCC part 15 class B @ 10m
 Operating Conditions: TX 2442 MHz | long gooseneck microphone | Ant. 1
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

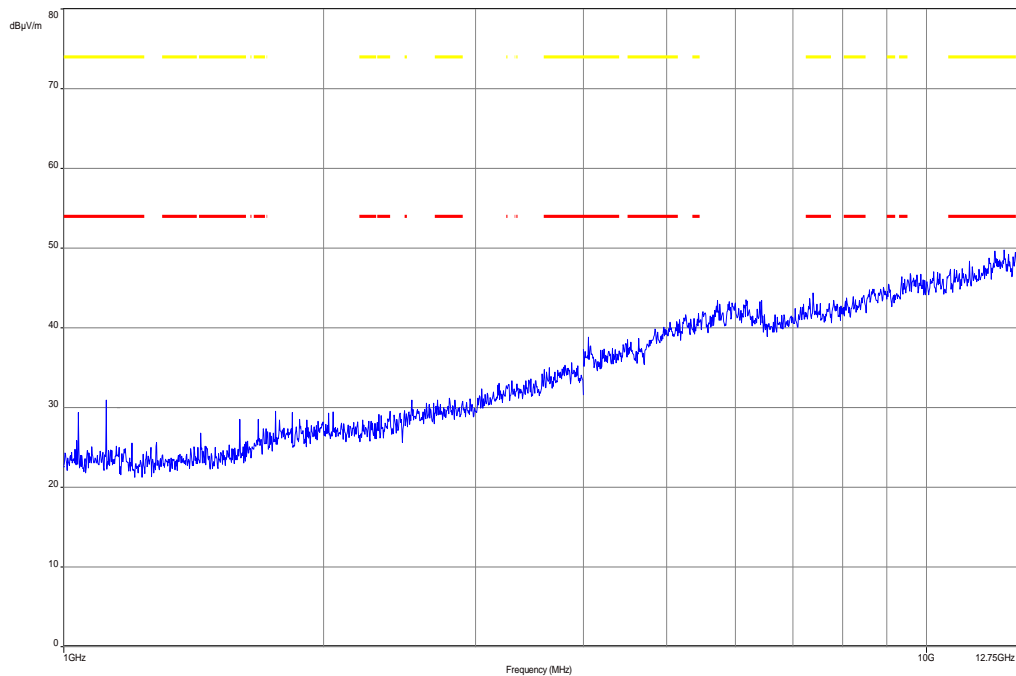
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

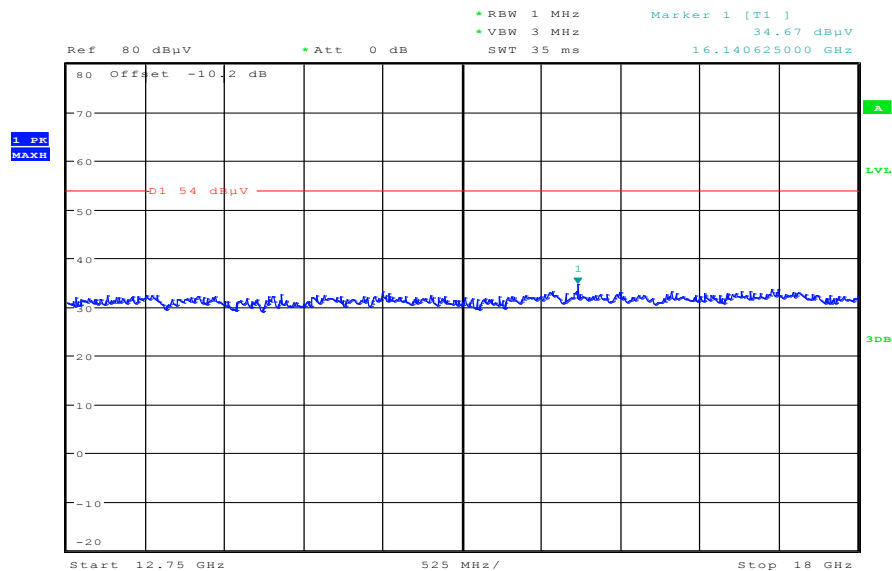
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
61.449900	7.8	1000.0	120.000	159.0	H	-10.0	11.3	22.2	30.0	
159.995550	24.1	1000.0	120.000	170.0	V	10.0	9.2	9.4	33.5	
240.012300	17.7	1000.0	120.000	132.0	V	182.0	13.0	18.3	36.0	
319.996200	25.8	1000.0	120.000	98.0	V	10.0	15.2	10.2	36.0	
787.451250	20.5	1000.0	120.000	120.0	H	10.0	23.8	15.5	36.0	
910.993050	22.0	1000.0	120.000	170.0	H	190.0	25.2	14.0	36.0	

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



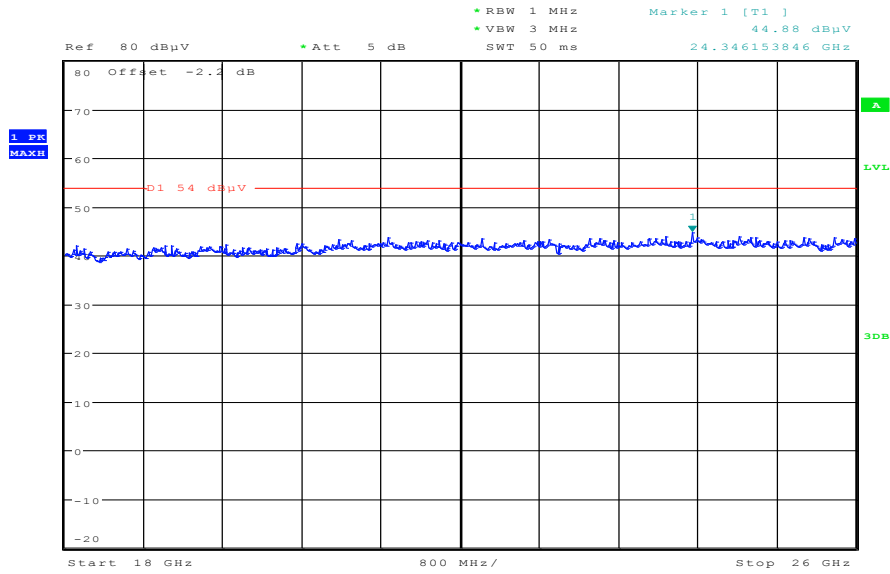
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 09:53:04

Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 10:12:54

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

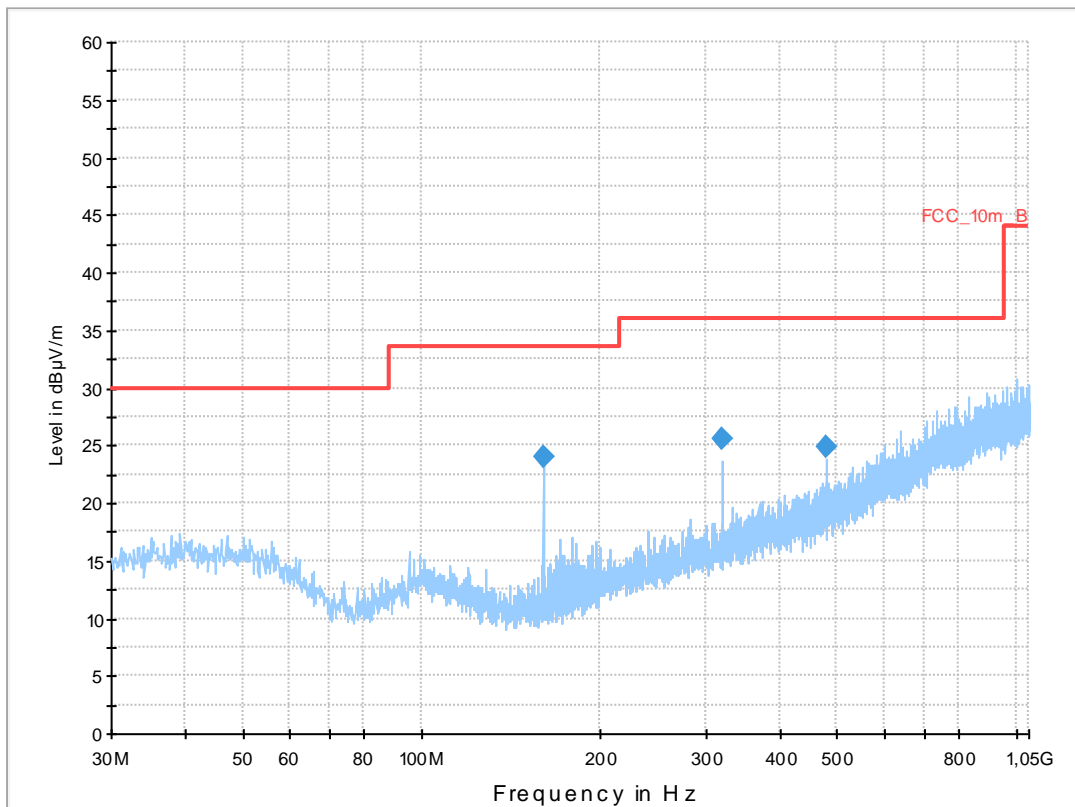
Common Information

EUT: C1W
 Serial Number: prototype
 Test Description: FCC part 15 class B @ 10m
 Operating Conditions: TX 2472 MHz | long gooseneck microphone | Ant. 1
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

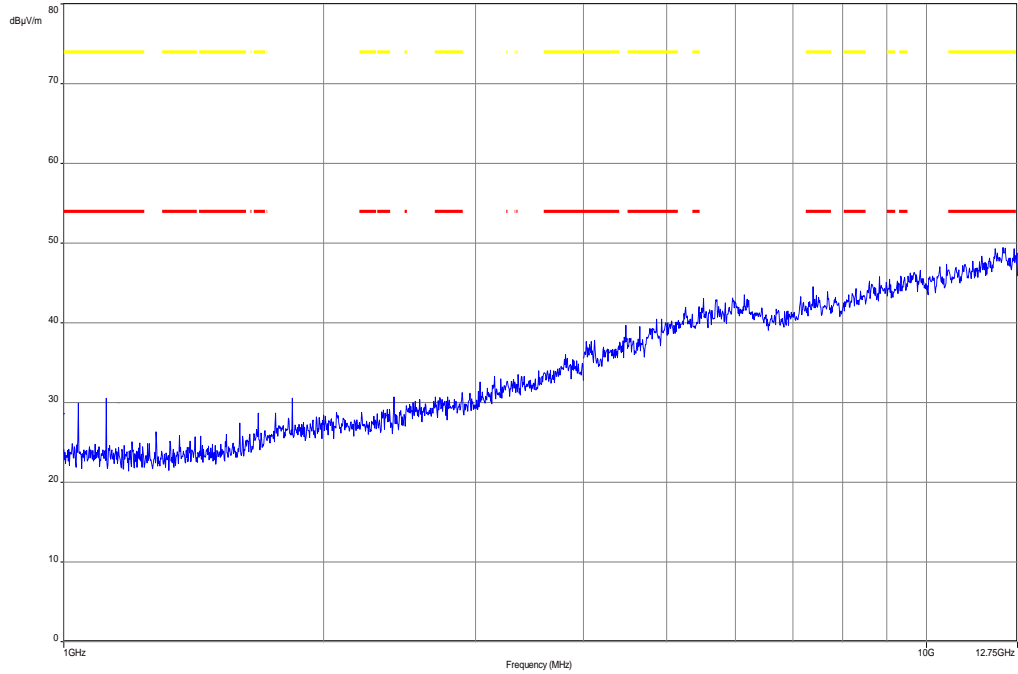
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

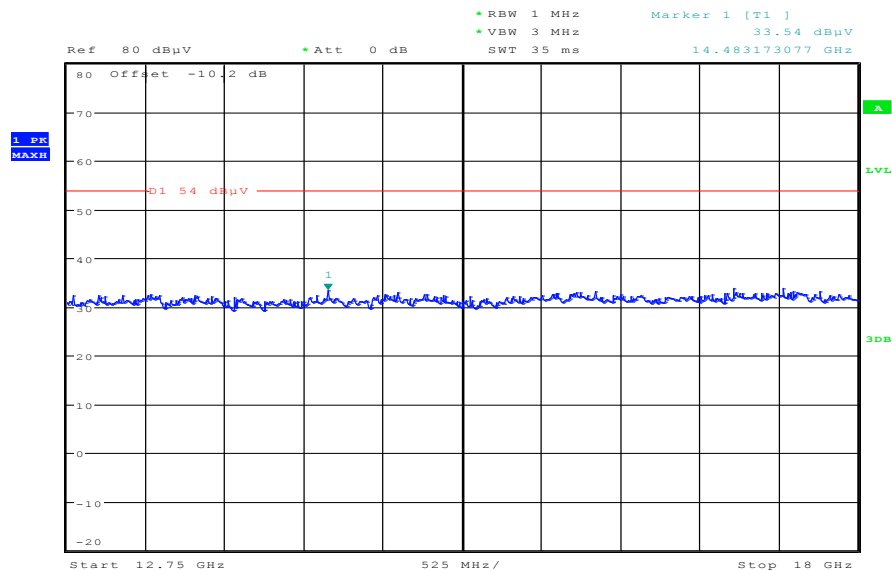
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
159.999450	24.0	1000.0	120.000	111.0	V	280.0	9.2	9.5	33.5	
320.003700	25.5	1000.0	120.000	170.0	H	190.0	15.2	10.5	36.0	
480.013200	24.8	1000.0	120.000	160.0	H	265.0	18.3	11.2	36.0	

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



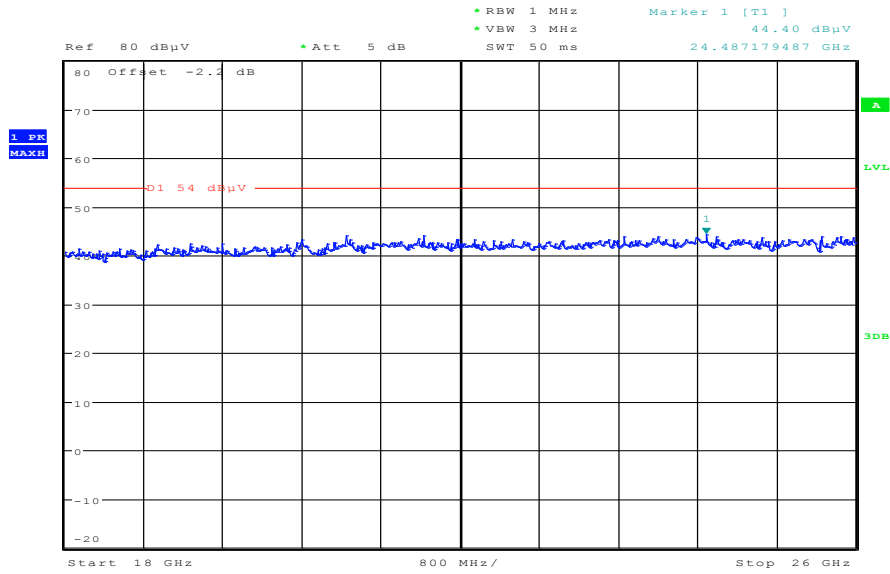
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 09:54:13

Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 10:13:41

Plots: OFDM, antenna port 2

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

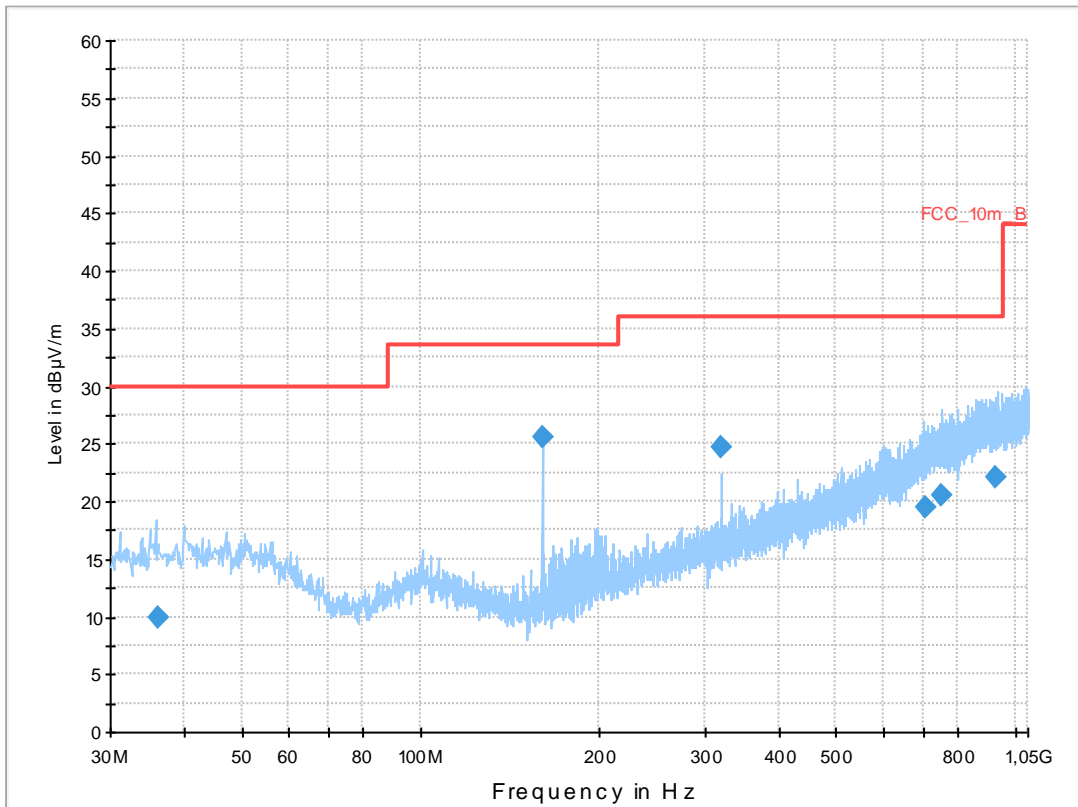
Common Information

EUT: C1W
 Serial Number: prototype
 Test Description: FCC part 15 class B @ 10m
 Operating Conditions: TX 2442 MHz | long gooseneck microphone | Ant. 2
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

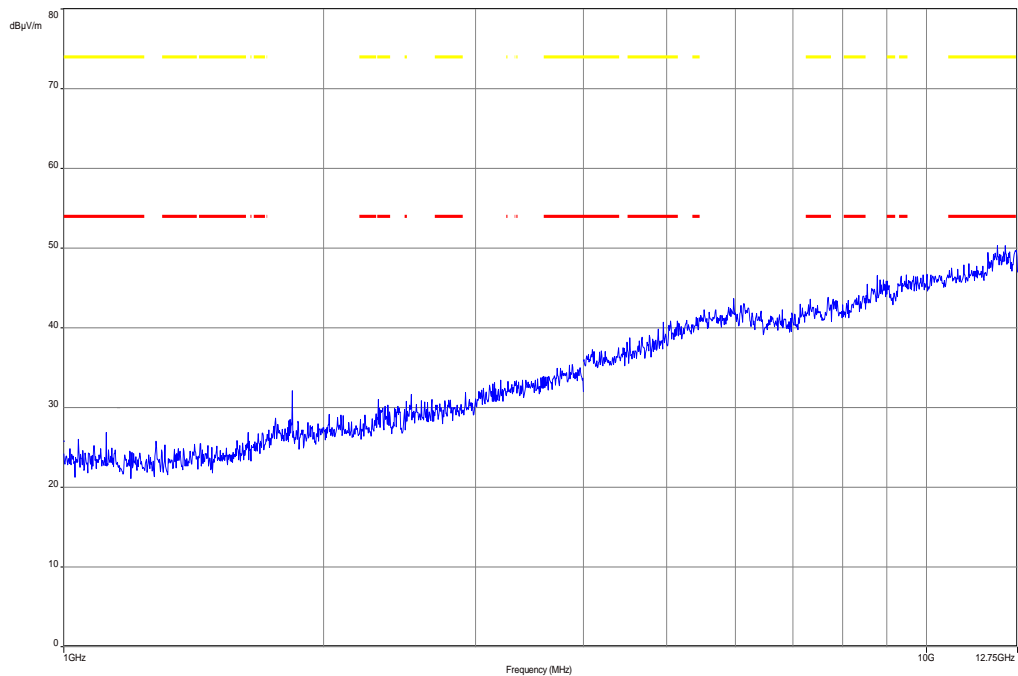
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

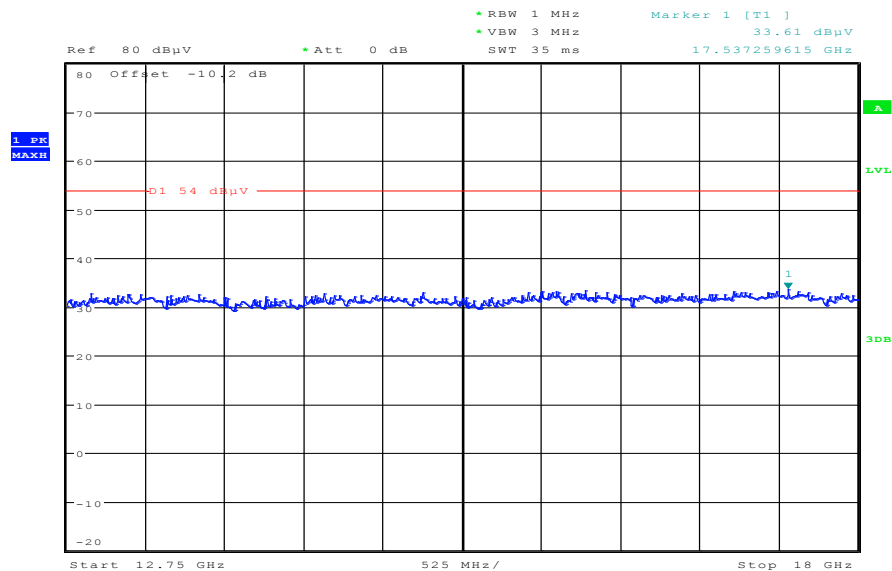
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.257550	9.9	1000.0	120.000	111.0	H	10.0	13.1	20.1	30.0	
160.004850	25.5	1000.0	120.000	98.0	V	80.0	9.2	8.0	33.5	
319.999350	24.7	1000.0	120.000	170.0	H	190.0	15.2	11.3	36.0	
704.246850	19.5	1000.0	120.000	170.0	V	182.0	22.6	16.5	36.0	
752.027850	20.4	1000.0	120.000	170.0	H	178.0	23.7	15.6	36.0	
930.706200	22.0	1000.0	120.000	152.0	V	190.0	25.3	14.0	36.0	

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



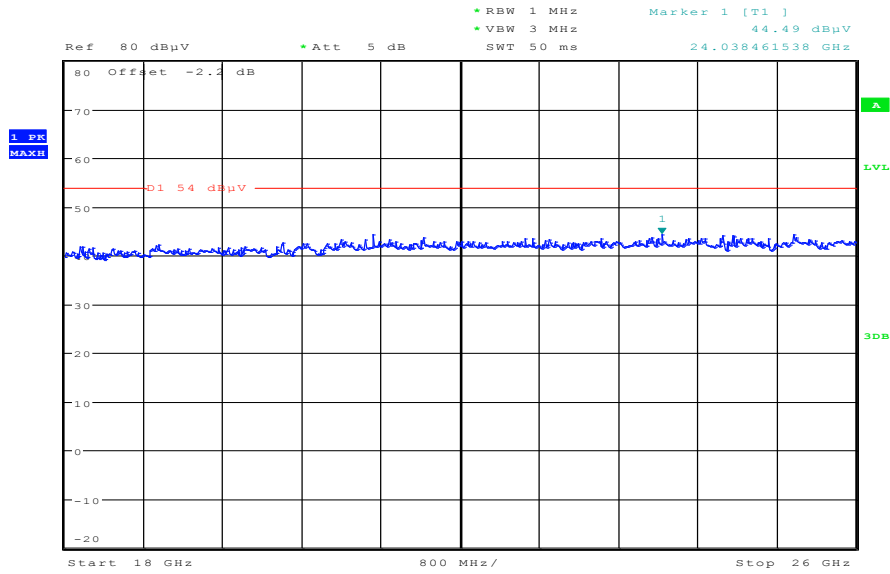
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 10:06:20

Plot 4: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 10:28:02

9.10 Unintentional radiator spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for both modes.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
Unintentional radiator spurious emissions radiated		
Frequency (MHz)	Field Strength (dB μ 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:

Unintentional radiator spurious emissions radiated [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All detected peak emissions between 1 GHz and 12.75 GHz are more than 10 dB below the average limit.		
For emissions above 12.75 GHz, please take a look at the plots.		
Measurement uncertainty	± 3 dB	

Result: Passed.

Plots:

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

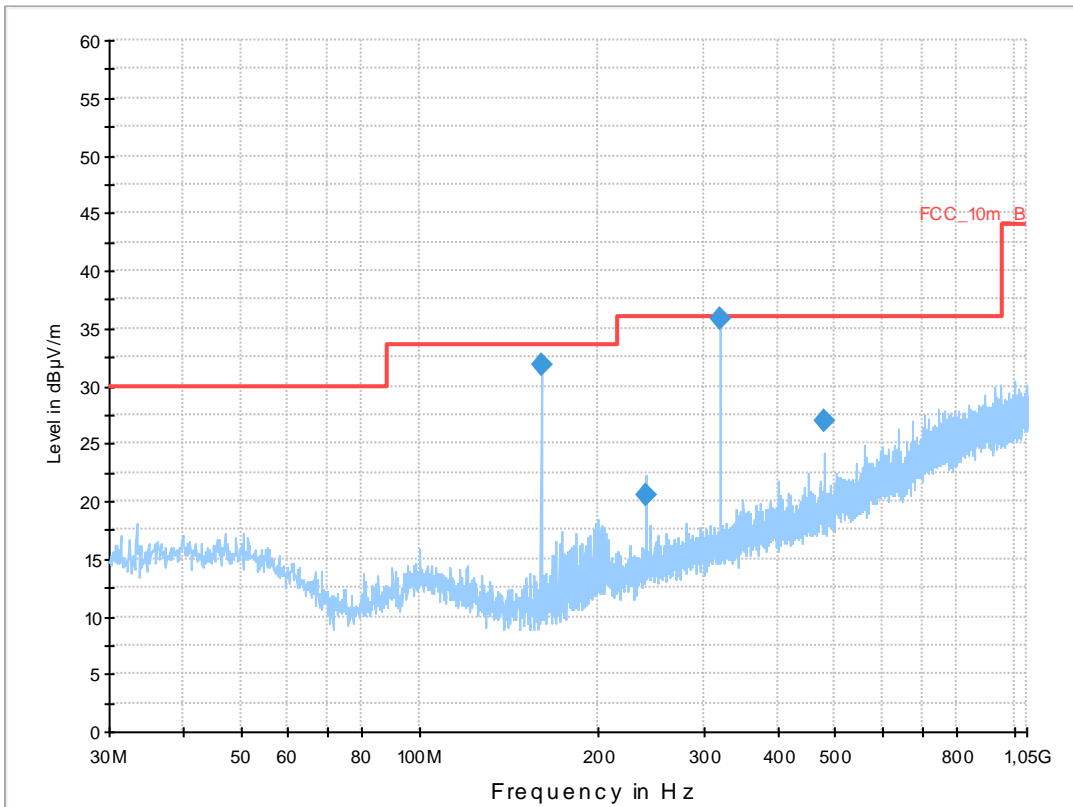
Common Information

EUT: C1W
 Serial Number: prototype
 Test Description: FCC part 15 class B @ 10m
 Operating Conditions: RX | long gooseneck microphone
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

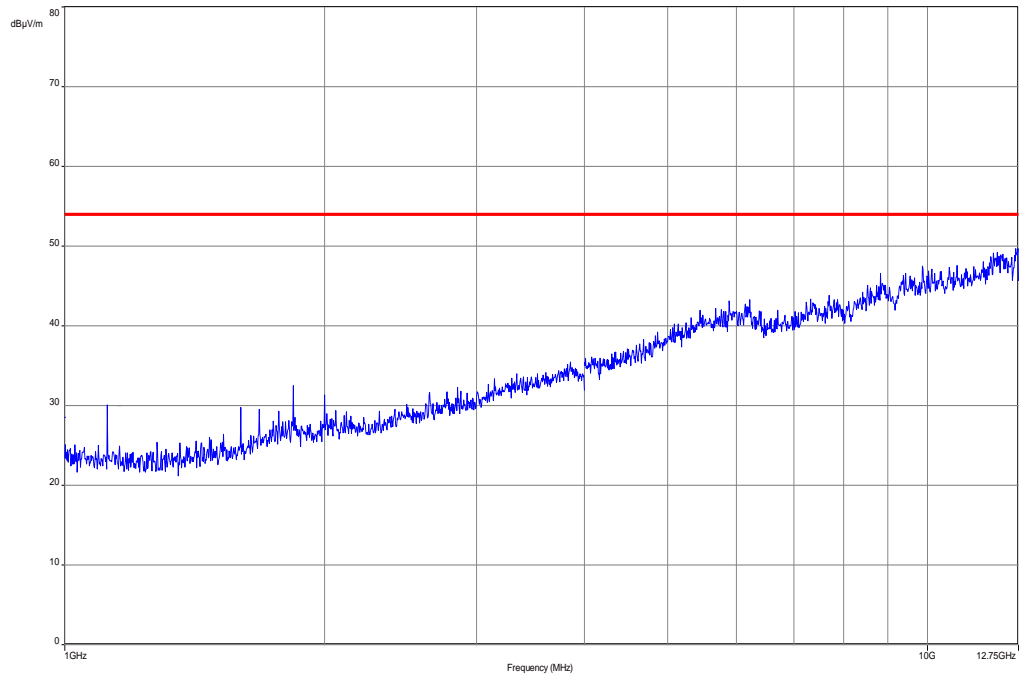
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



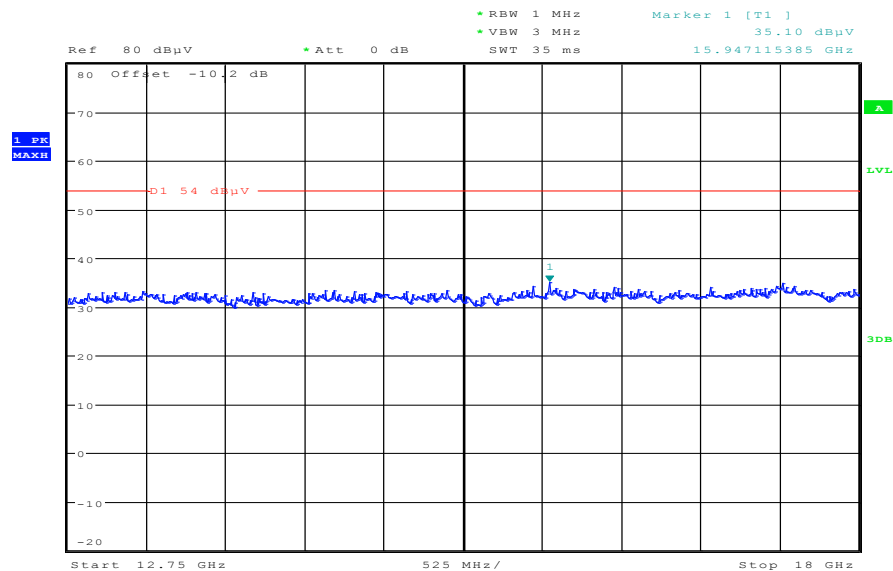
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
159.999900	31.8	1000.0	120.000	98.0	V	-5.0	9.2	1.7	33.5	
240.034350	20.5	1000.0	120.000	98.0	V	87.0	13.0	15.5	36.0	
319.997400	35.8	1000.0	120.000	170.0	H	10.0	15.2	0.2	36.0	
479.984400	26.9	1000.0	120.000	170.0	H	260.0	18.3	9.1	36.0	

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

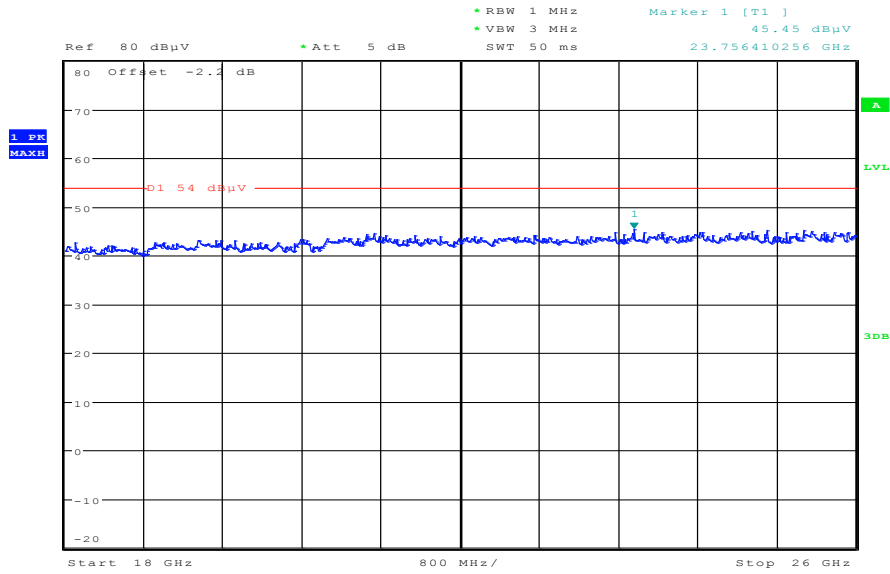


Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 10:53:28

Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 20.MAR.2013 10:51:54

9.11 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is representative for all channels and modes. If critical peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing 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
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

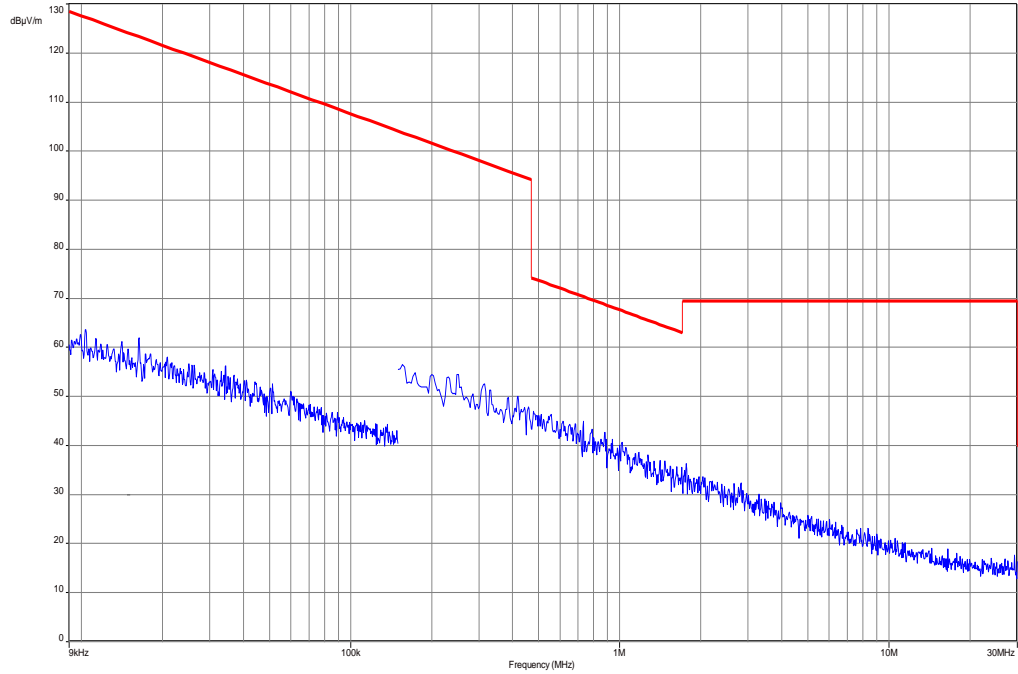
Results:

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

Result: Passed

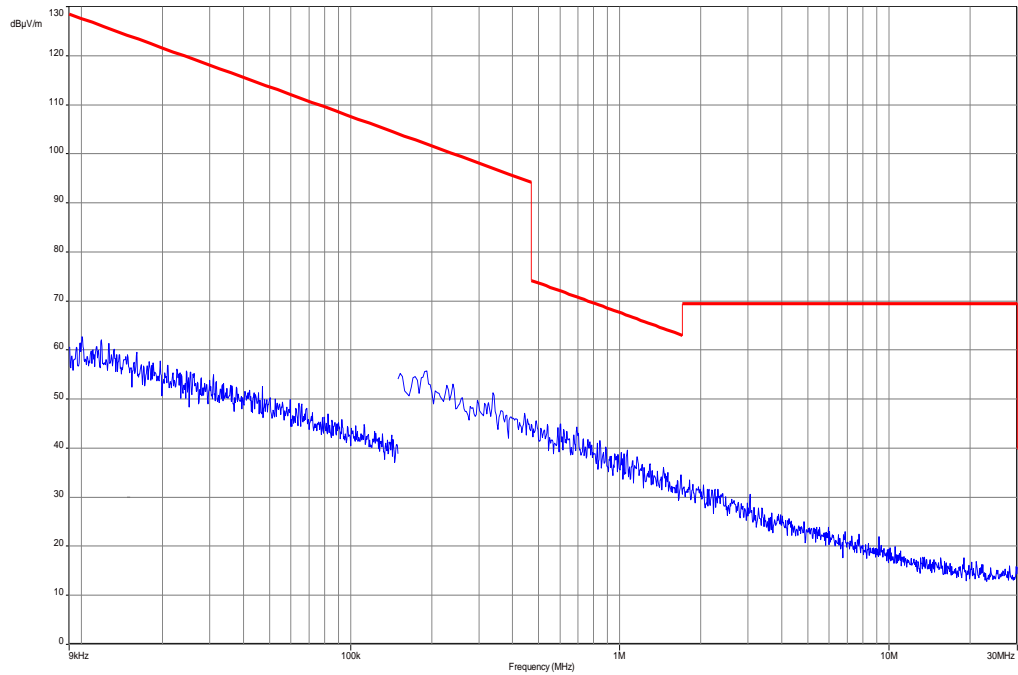
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



9.12 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 7. If critical peaks are found channel 1 and channel 13 will be measured too. The measurement is performed with the data rate producing 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	
TX Spurious Emissions Conducted < 30 MHz			
Frequency (MHz)	Quasi-Peak (dB μ V/m)	Average (dB μ 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

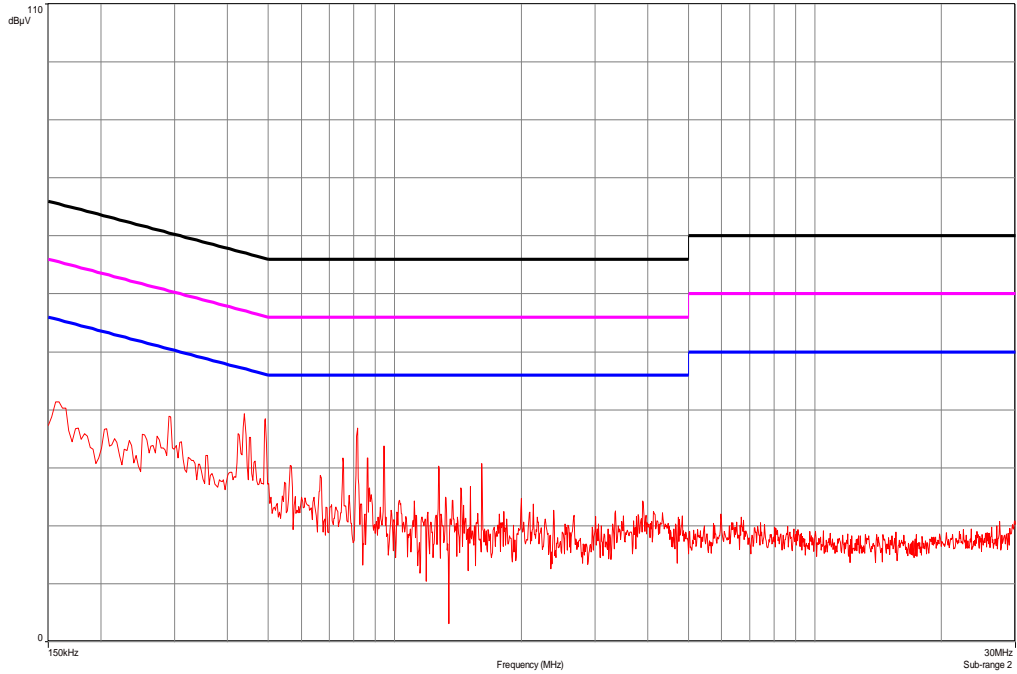
Results:

TX Spurious Emissions Conducted < 30 MHz [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

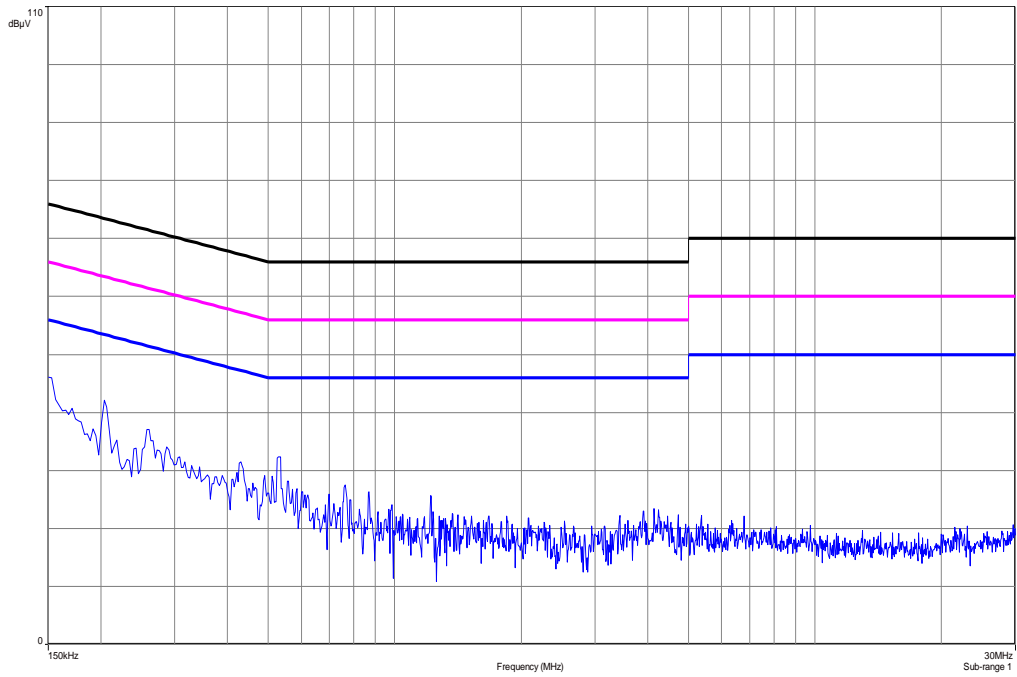
Result: Passed

Plots:

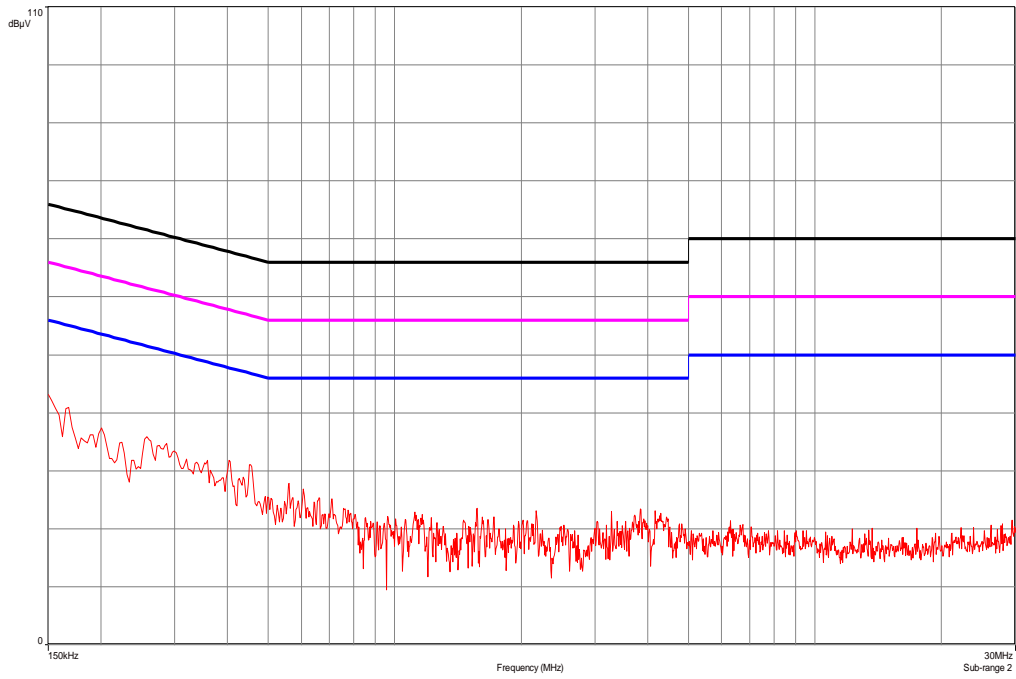
Plot 1: TX mode, 150 kHz to 30 MHz, phase line



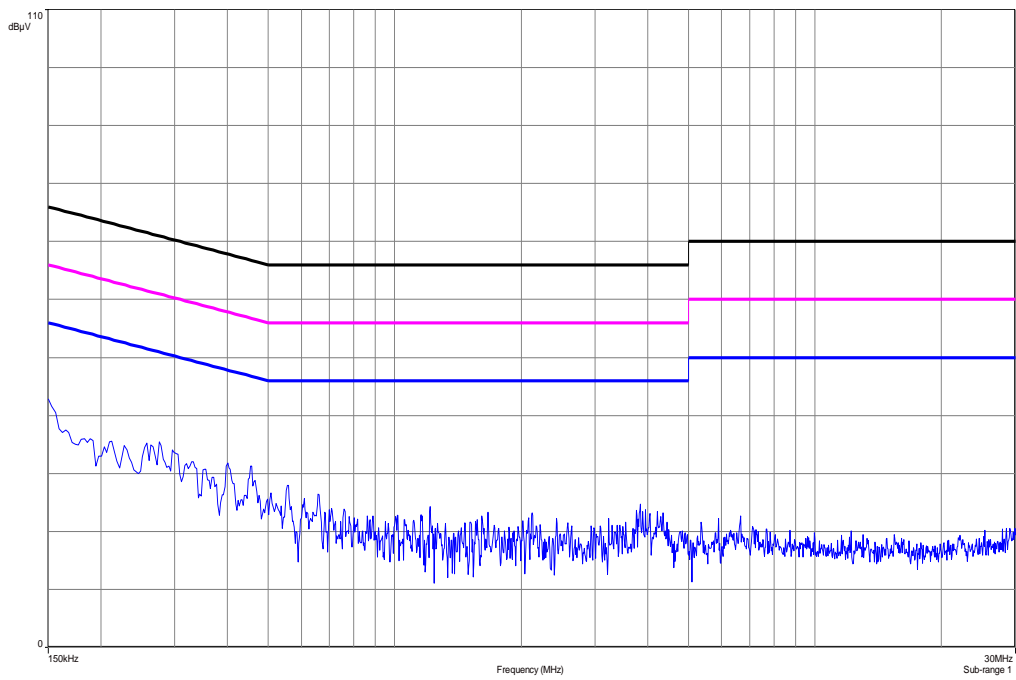
Plot 2: TX mode, 150 kHz to 30 MHz, neutral line



Plot 3: RX / Idle – mode, 150 kHz to 30 MHz, phase line



Plot 4: RX / Idle – mode, 150 kHz to 30 MHz, 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	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B597 9	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	09.01.2013	09.01.2014
5	n. a.	Analyzer- Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	14.07.2011	14.07.2013
6	n. a.	Amplifier	JS42- 00502650- 28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS- LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS- LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS- LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	295	300003787	k	12.04.2012	12.04.2014
11	n. a.	Spectrum- Analyzer	FSU26	R&S	200809	300003874	k	16.01.2013	16.01.2015
12	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
13	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	viKI!	11.05.2011	11.05.2013
14	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
15	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
16	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
17	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
18	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
19	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
20	n. a.	Amplifier	js42- 00502650- 28-5a	Parzich GMBH	928979	300003143	ne		
21	n. a.	Band Reject filter	WRCG240 0/2483- 2375/2505- 50/10SS	Wainwright	11	300003351	ev		
22	n. a.	TRILOG Broadband Test-Antenna	VULB9163	Schwarzbe ck	371	300003854	viKI!	14.10.2011	14.10.2014

		30 MHz - 3 GHz							
23	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
24	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
25	A025	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786	ne		
26	A027	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000486	ne		
27	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004xxx	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
vk!	Attention: extended calibration interval	*)	next calibration ordered / currently in progress
NK!	Attention: not calibrated		

11 Observations

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

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-03-20
-A	Correction of output power values. Add conducted measurements.	2013-08-07

Annex B 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 C Accreditation Certificate

Front side of certificate



Deutsche Akkreditierungsstelle GmbH

Befähigung 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 Akkreditierungsurkunde 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

Bitte Hinweise auf der Rückseite

Im Auftrag
 Dr. Ingrid (FH) von Eger
 Abteilungsleiter

Back side of certificate

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 Rundesallee 100
 38116 Braunschweig

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Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
 EA: www.european-accreditation.org
 ILAC: www.ilac.org
 IAF: www.iaf.nu

Note:

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

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