TEST REPORT

Test report no.: 1-2977-21-06/11-A

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

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Accredited test laboratory:
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAkkS registration number: D-PL-12076-01-01

Area of Testing: Radio/Satellite Communications

Applicant

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / Sweden
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Fax: +46 46 19 32 95
Contact: Johan Wedin
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Manufacturer

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / Sweden

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:	**Mobile Phone GSM/EDGE 850/900/1800/1900/ BT2.1+EDR, WLAN**
Model name:	**AAB-1880031-BV**
FCC ID:	**PY7A1880031**
IC:	**4170B-A1880031**
Frequency:	**2400.00 MHz – 2483.50 MHz** **(lowest channel 2412 MHz – highest channel 2462 MHz)**
Power supply:	**3.7 V DC by Li-Polymer battery (BST-43) / power supply**
Temperature range:	**-20 °C to 55 °C**

Test performed:

2011-05-23 Joerg Warken

Test report authorised:

2011-05-23 Stefan Bös

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2 General information

2.1 Notes

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 generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

2.2 Application details

Date of receipt of order:	2011-03-03
Date of receipt of test item:	2011-03-09
Start of test:	2011-03-09
End of test:	2011-03-24
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Version	Test standard description
47 CFR Part 15	2009-10	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}	+20 °C	during room temperature tests
	T_{max}	+55 °C	during high temperature test
	T_{min}	-20 °C	during low temperature test
Relative humidity content:		54 %	
Air pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.7 V	DC by Li-Polymer battery (BST-43) / power supply
	V_{max}	4.1 V	
	V_{min}	3.4 V	

5 Test item

Kind of test item	:	Mobile Phone GSM/EDGE 850/900/1800/1900/ BT2.1+EDR, WLAN
Type identification	:	AAB-1880031-BV
S/N serial number	:	Rad. WUJ232520A, WUJ232520B Cond. WUJ2325208, WUJ2325216
HW hardware status	:	AP1.2
SW software status	:	R3BA044
Frequency band [MHz]	:	2400.00 MHz – 2483.50 MHz (lowest channel 2412 MHz – highest channel 2462 MHz)
Type of modulation	:	DSSS and OFDM technology with BPSK, QPSK, 16 – & 64 – QAM modulation.
Number of channels	:	11
Antenna	:	Integrated PCB antenna → for more information, please take a look at the annex – internal photos of the EUT.
Power supply	:	3.7 V DC by Li-Polymer battery (BST-43) / power supply
Temperature range	:	-20℃ to 55 ℃

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒	**No deviations from the technical specifications were ascertained**
☐	There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8, Annex 8	Passed	2011-05-23	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Results (max.)
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 6dB bandwidth	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.109 RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies

Note: NA = Not Applicable; NP = Not Performed

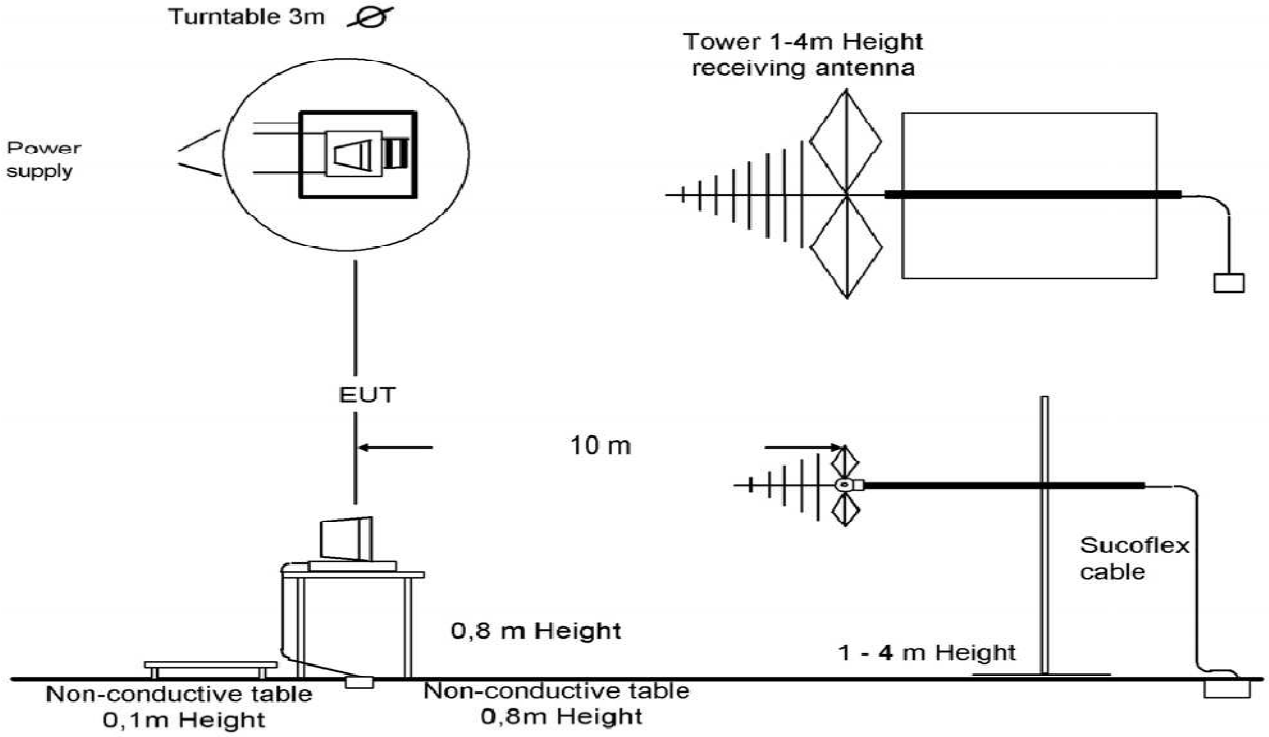
8 RF measurement testing

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



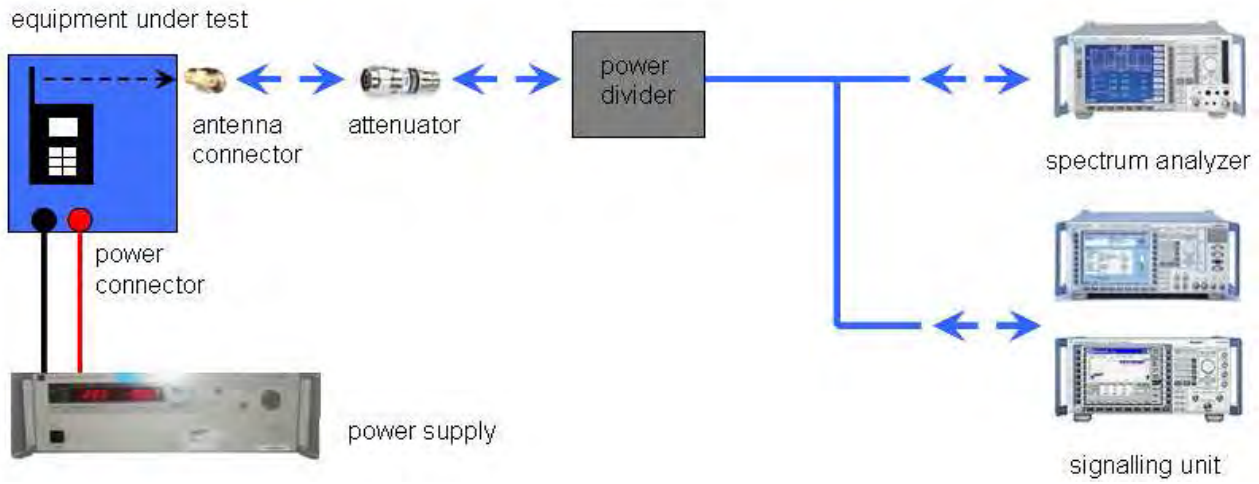
Picture 1: Diagram radiated measurements

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. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: 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	:	1-2977-21-06/11
Equipment model number	:	AAB-1880031-BV
Certification number	:	4170B-A1880031
Manufacturer (complete address)	:	Sony Ericsson Mobile Communications AB Nya Vattentornet 22188 Lund / Sweden
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 (lowest channel 2412 MHz, highest channel 2462 MHz)
RF-power [W] (max.)	:	cond.: 74.13 mW (DSSS) 134.90 mW (OFDM) EIRP: 46.77 mW (DSSS) 89.13 mW (OFDM)
Occupied bandwidth (99%-BW) [kHz]	:	DSSS: 16.47 MHz OFDM: 17.62 MHz
Type of modulation	:	DSSS and OFDM technology with BPSK, QPSK, 16 – & 64 – QAM modulation.
Emission designator (TRC-43)	:	16M5G1D (DSSS) 17M6G7D (OFDM)
Antenna information	:	Integrated PCB antenna → for more information, please take a look at the annex – internal photos of the EUT.
Transmitter spurious (worst case) [dBµV/m @ 3m]	:	44.5 dBµV @ 12 GHz
Receiver spurious (worst case) [dBµV/m @ 3m]	:	44.0 dBµV @ 12 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:

2011-05-23	Joerg Warken	
Date	Name	Signature

9 Measurement results

9.1 Maximum output power (conducted)

Description:

Measurement of the maximum output power conducted. This measurement is performed only at the middle channel in both modes and all data rates to determine the data rate per mode which results in the highest output power. This mode will be selected for all further measurements.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	30 MHz
Resolution bandwidth:	50 MHz
Span:	30 MHz
Trace-Mode:	Max Hold

Results:

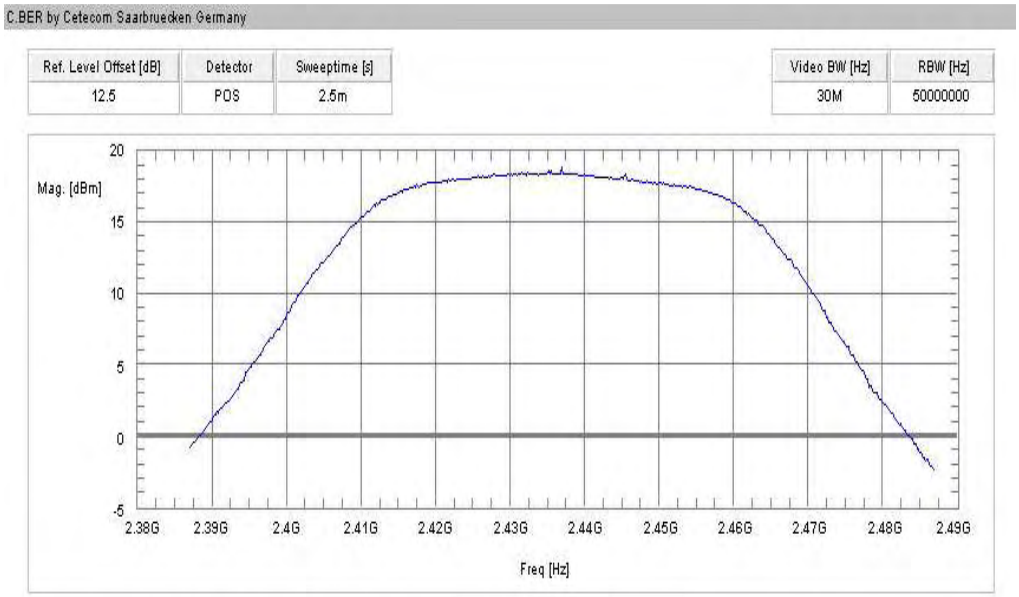
DSSS	**Maximum Output Power Conducted [dBm]**			
Data Rate [MBit/s]	1	**2**	5.5	11
Ch 6 - 2437 MHz	18.54	**18.88**	18.81	18.79
Measurement uncertainty	± 0.5 dB			

OFDM	**Maximum Output Power Conducted [dBm]**							
Data Rate [MBit/s]	**6**	9	12	18	24	36	48	54
Ch 6 - 2437 MHz	**21.88**	21.58	21.78	21.55	21.62	21.61	21.19	21.01
Measurement uncertainty	± 0.5 dB							

Result: **Selected data rate for all measurements:** **DSSS: 2 MBit/s**
OFDM: 6 MBit/s

Plots: DSSS / b – mode

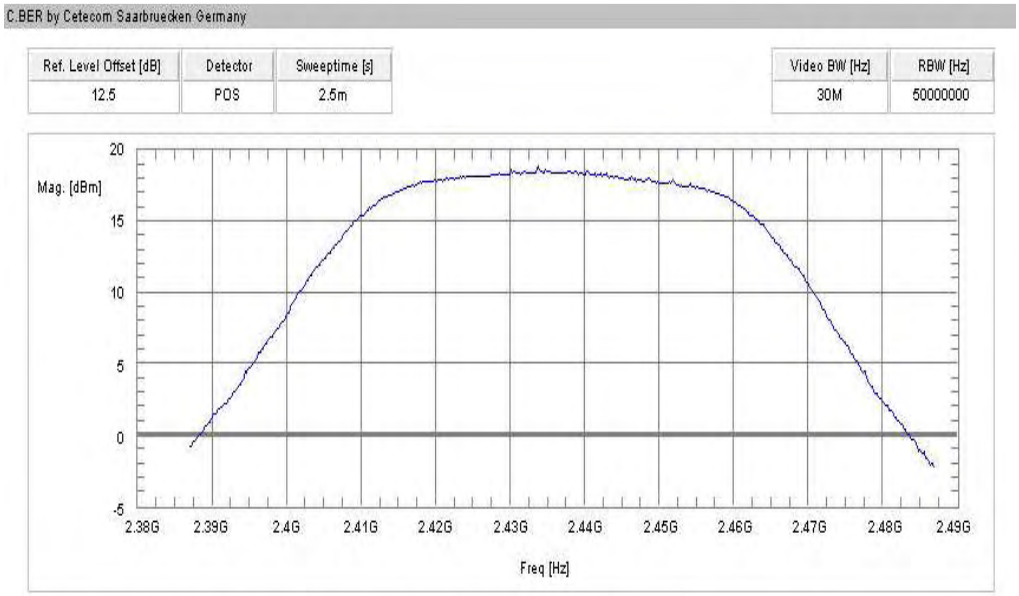
Plot 1: TX mode, middle channel, 1 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	18.54630899	2.4314G

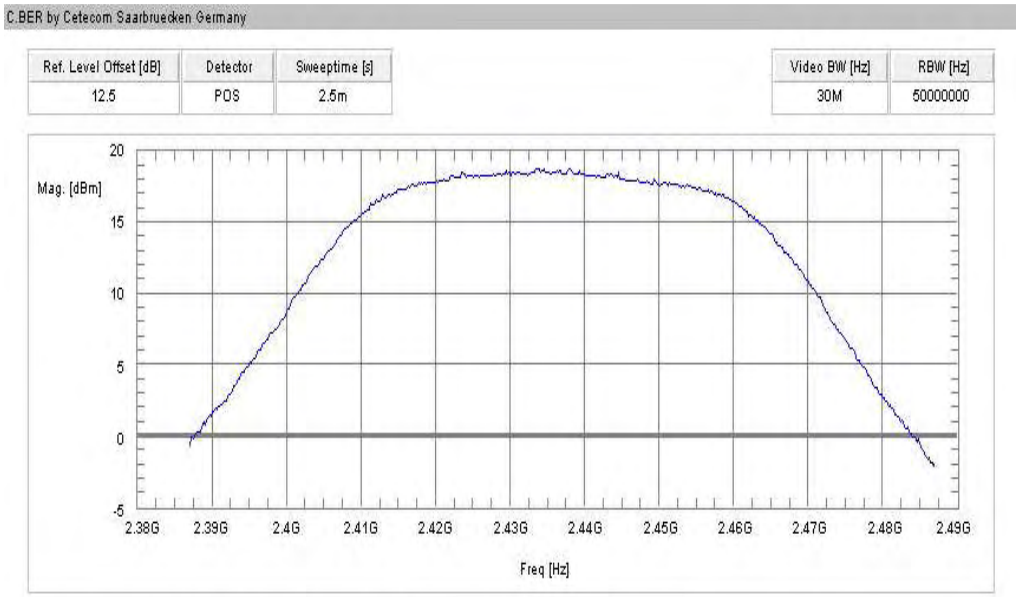
Plot 2: TX mode, middle channel, 2 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	18.88203096	2.4336G

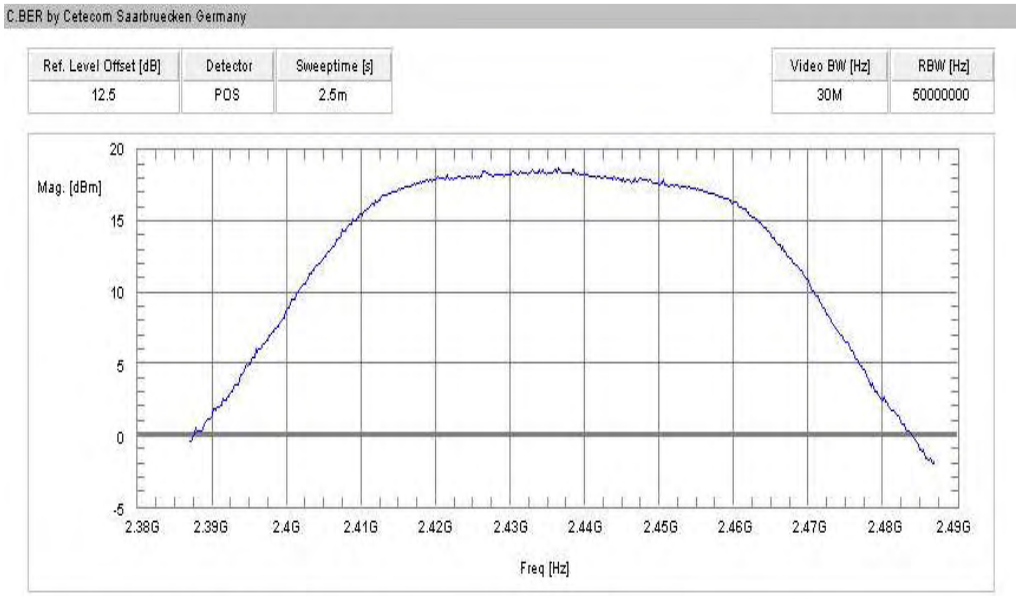
Plot 3: TX mode, middle channel, 5.5 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	18.81568289	2.4378G

Plot 4: TX mode, middle channel, 11 MBit/s

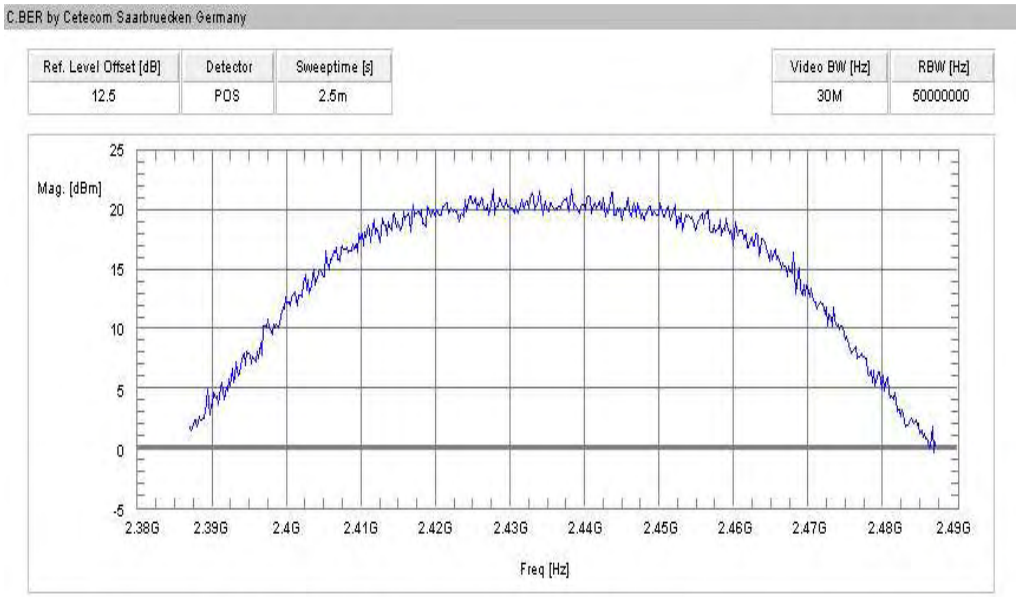


Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	18.7927928	2.4364G

Plots: OFDM / g – mode

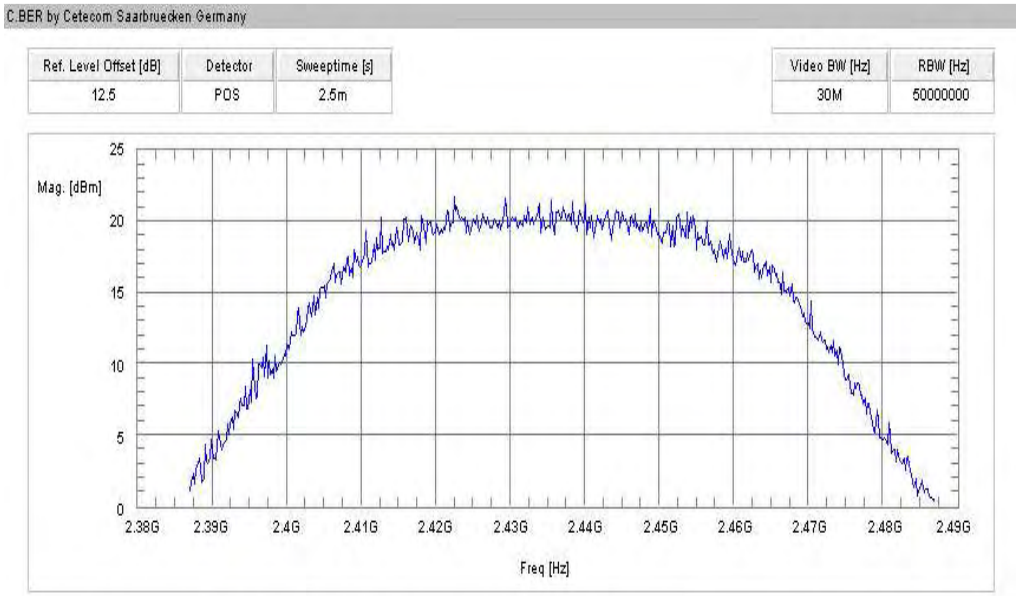
Plot 1: TX mode, middle channel, 6 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.88826752	2.4276G

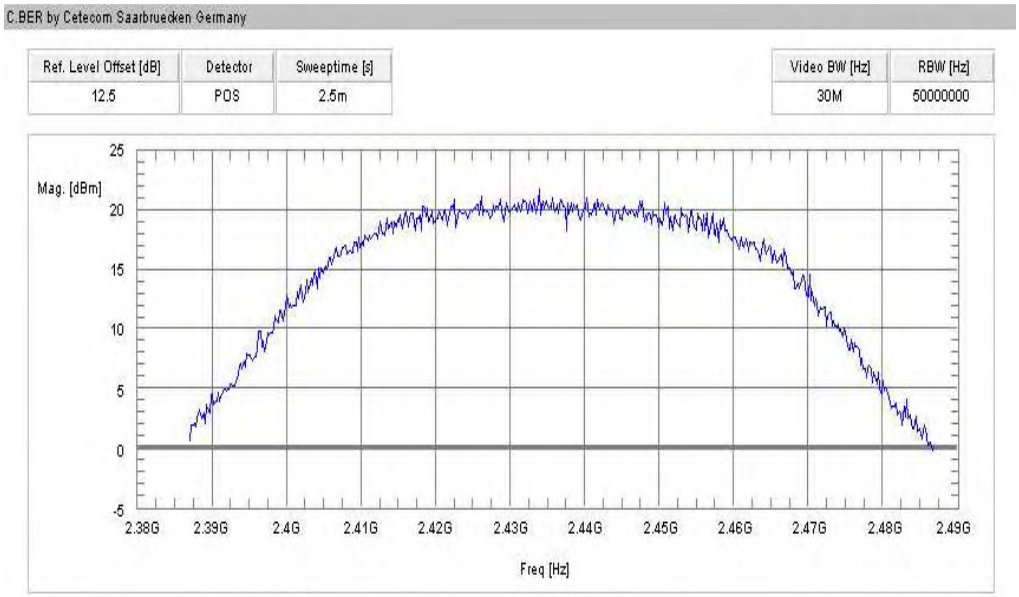
Plot 2: TX mode, middle channel, 9 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.58306599	2.4292G

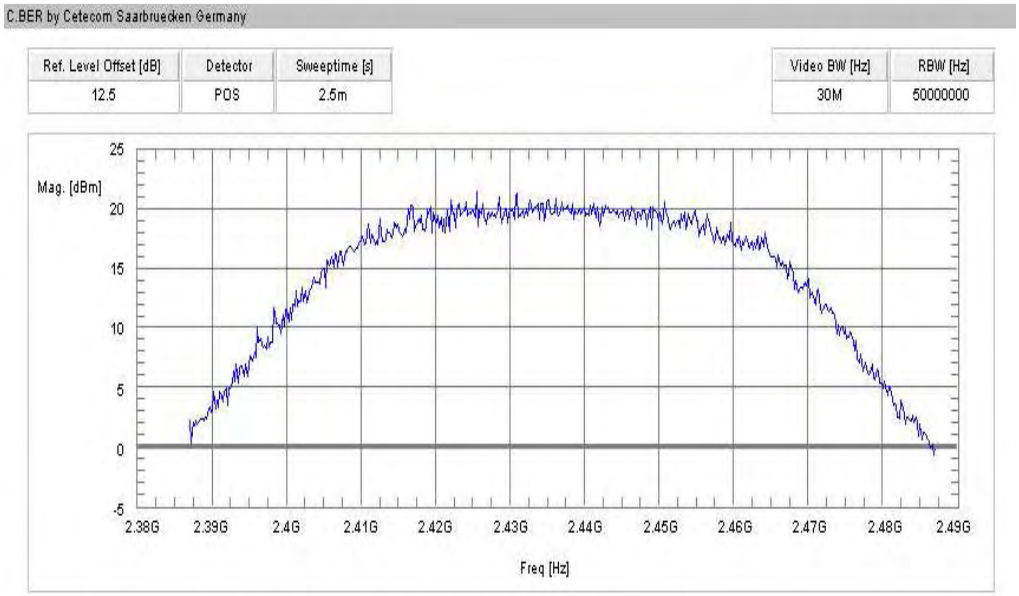
Plot 3: TX mode, middle channel, 12 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.78144646	2.4338G

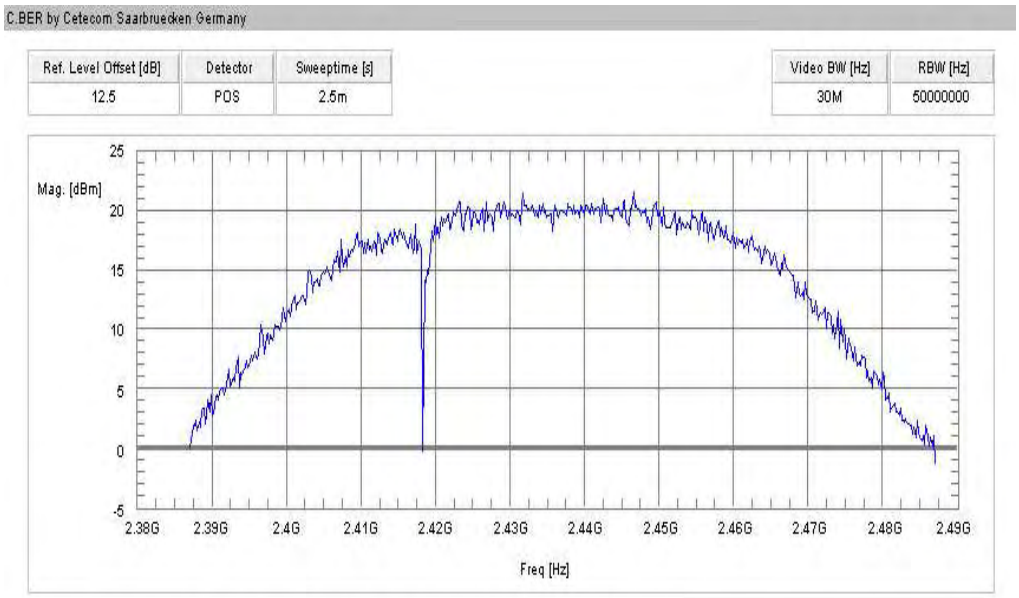
Plot 4: TX mode, middle channel, 18 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

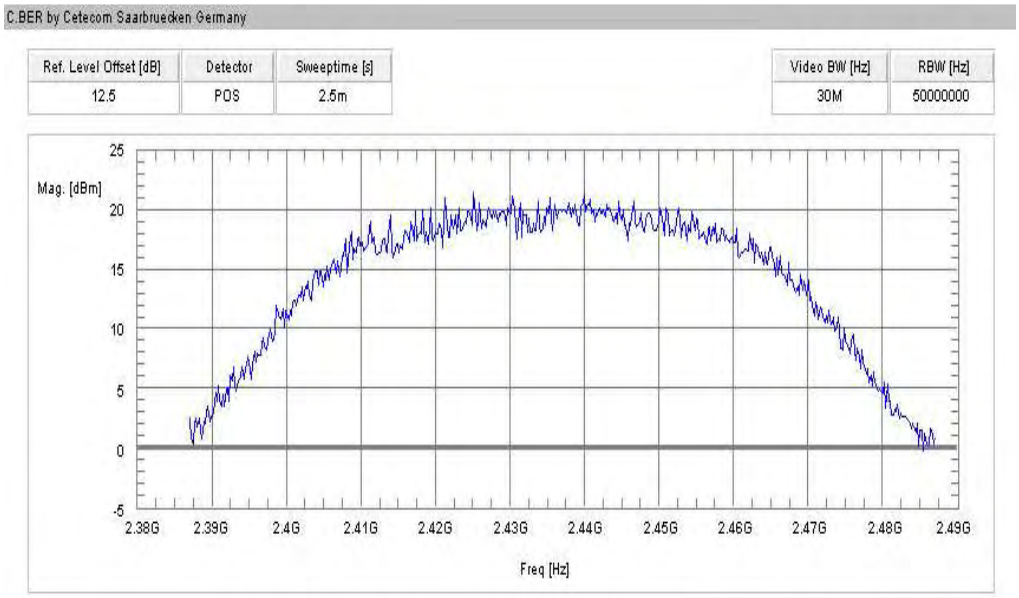
Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.55254555	2.4254G

Plot 5: TX mode, middle channel, 24 MBit/s



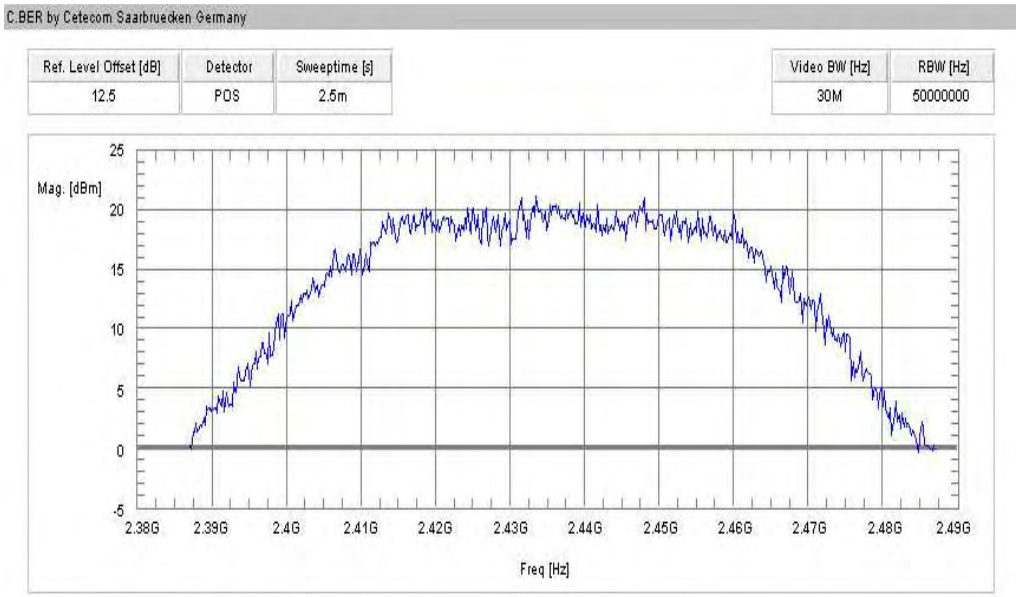
Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.62121582	2.4464G

Plot 6: TX mode, middle channel, 36 MBit/s



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.60595608	2.425G

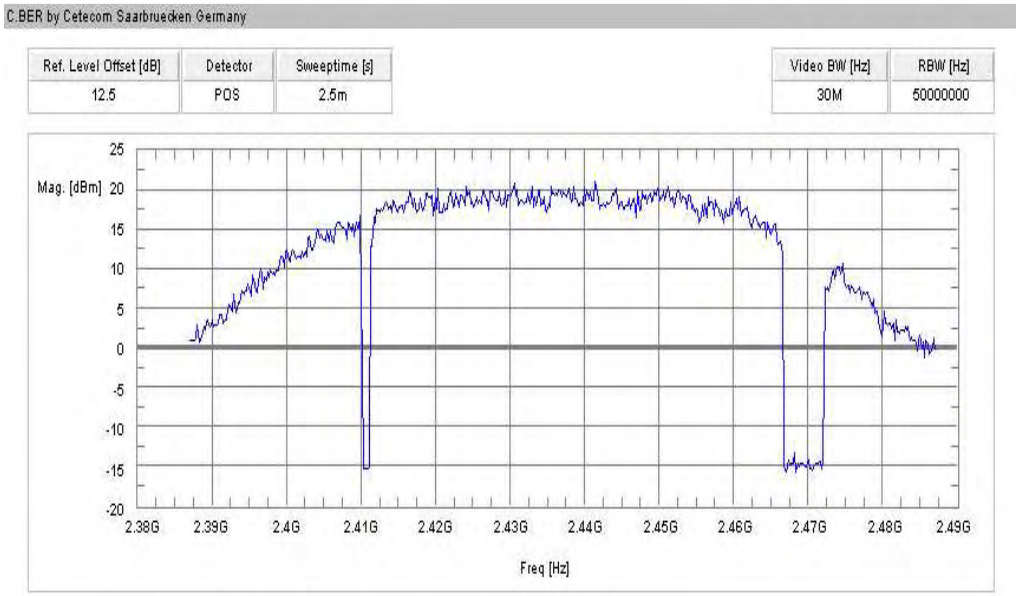
Plot 7: TX mode, middle channel, 48 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.19393349	2.4334G

Plot 8: TX mode, middle channel, 54 MBit/s



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.01081276	2.4412G

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. For normal WLAN devices, the DSSS mode is used.

Measurement parameters:

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

Limits:

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

Results:

T_{nom}	V_{nom}	lowest channel 2412 MHz	middle channel 2437 MHz	highest channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		17.2	17.1	17.3
Radiated power [dBm] Measured with DSSS modulation		15.4	15.3	15.3
Gain [dBi] Calculated		-1.8	-1.8	-2.0

Result: **The result of the measurement is passed.**

9.3 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
Video bandwidth:	30 MHz
Resolution bandwidth:	50 MHz
Span:	30 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247 (b)(3)	RSS 210, Issue 8, A 8.4(4)
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Results: DSSS / b – mode

DSSS	Maximum Output Power [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	18.2	18.2	18.7
Output Power Radiated – EIRP*)	16.4	16.4	16.7
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **The result of the measurement is passed.**

Results: OFDM / g – mode

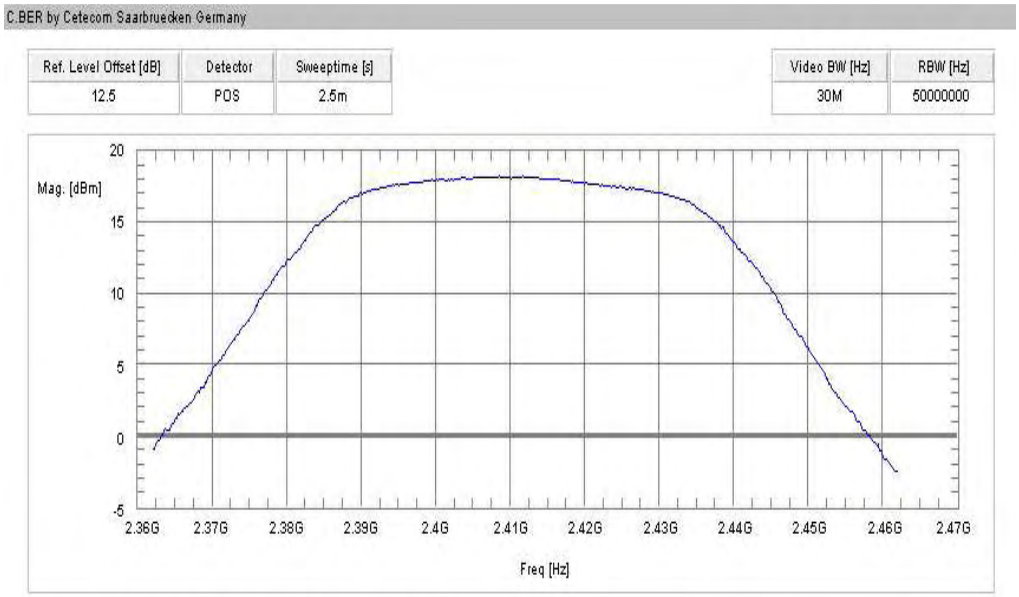
OFDM	Maximum Output Power [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	21.3	21.3	21.2
Output Power Radiated – EIRP*)	19.5	19.5	19.2
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

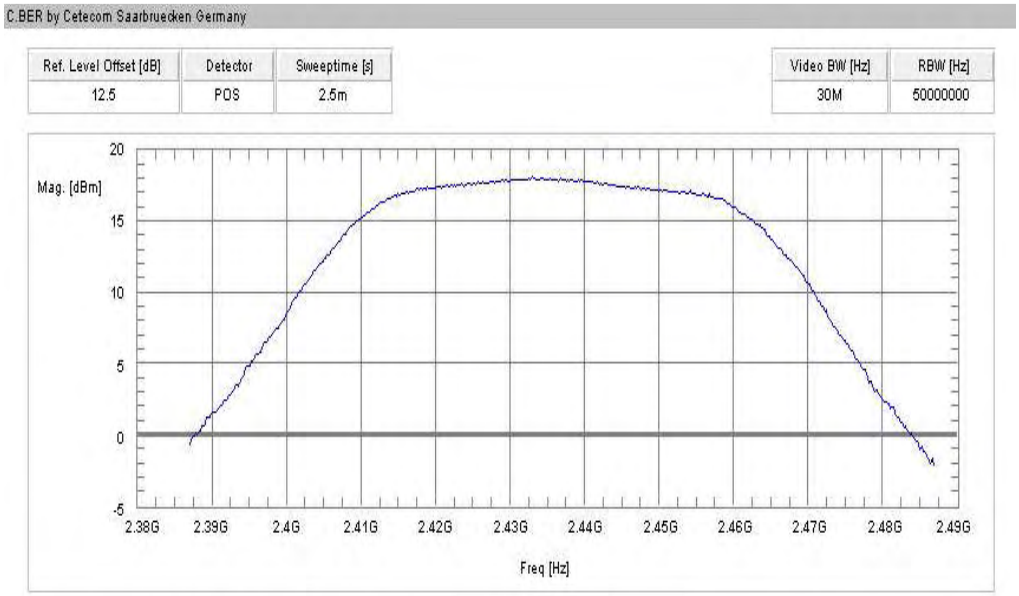
Plot 1: TX mode, lowest channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.362G	2.462G	MAXH	18.23347712	2.4076G

Plot 2: TX mode, middle channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	18.1518693	2.4328G

Plot 3: TX mode, highest channel

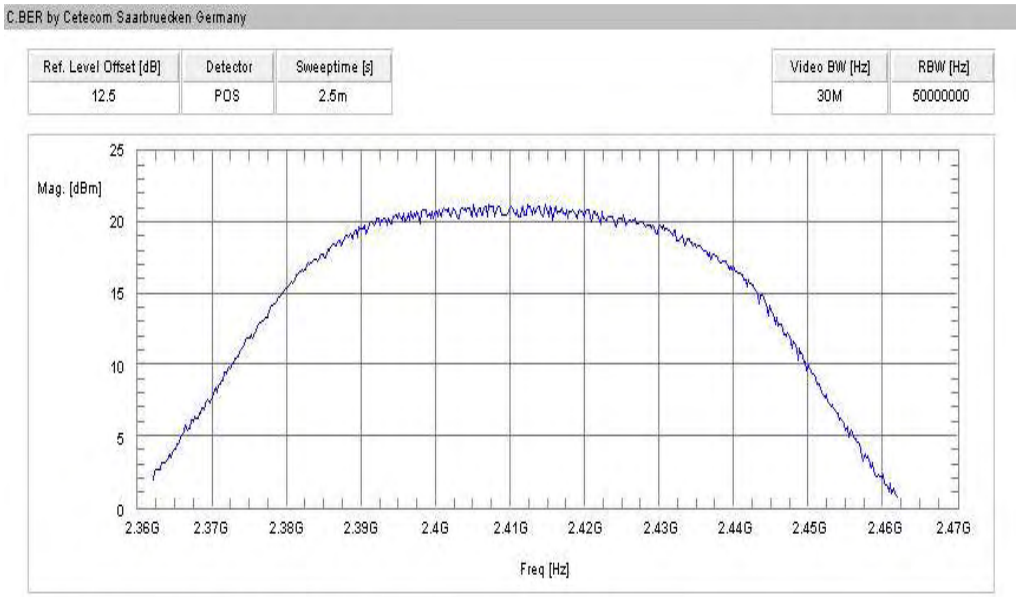
Ref. Level Offset [dB]	Detector	Sweeptime [s]
12.6	POS	2.5m

Video BW [Hz]	RBW [Hz]
30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.412G	2.512G	MAXH	18.6844593	2.4608G

Plots: OFDM / g – mode

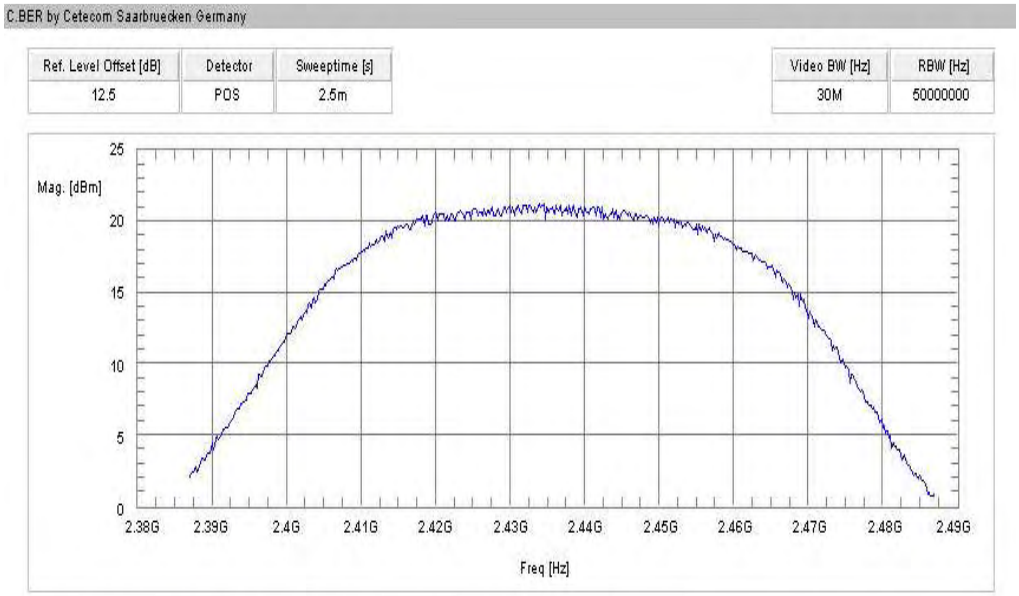
Plot 1: TX mode, lowest channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.362G	2.462G	MAXH	21.27786446	2.4122G

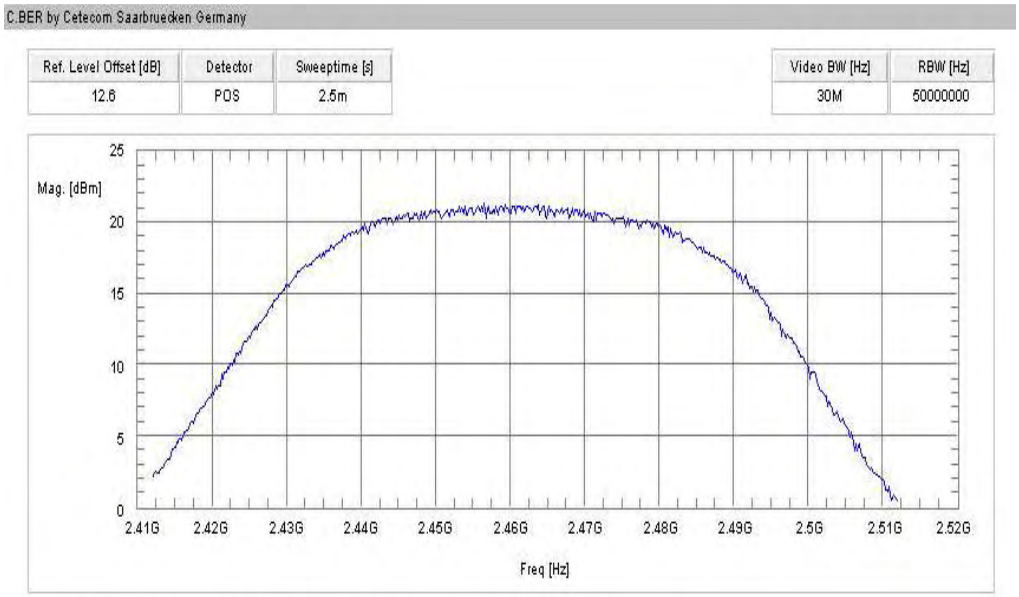
Plot 2: TX mode, middle channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	2.5m	30M	50000000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.387G	2.487G	MAXH	21.27786446	2.4338G

Plot 3: TX mode, highest channel



9.4 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:	500 s
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	1.5 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247 (e)	RSS 210, Issue 8, A 8.2(b)
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.	

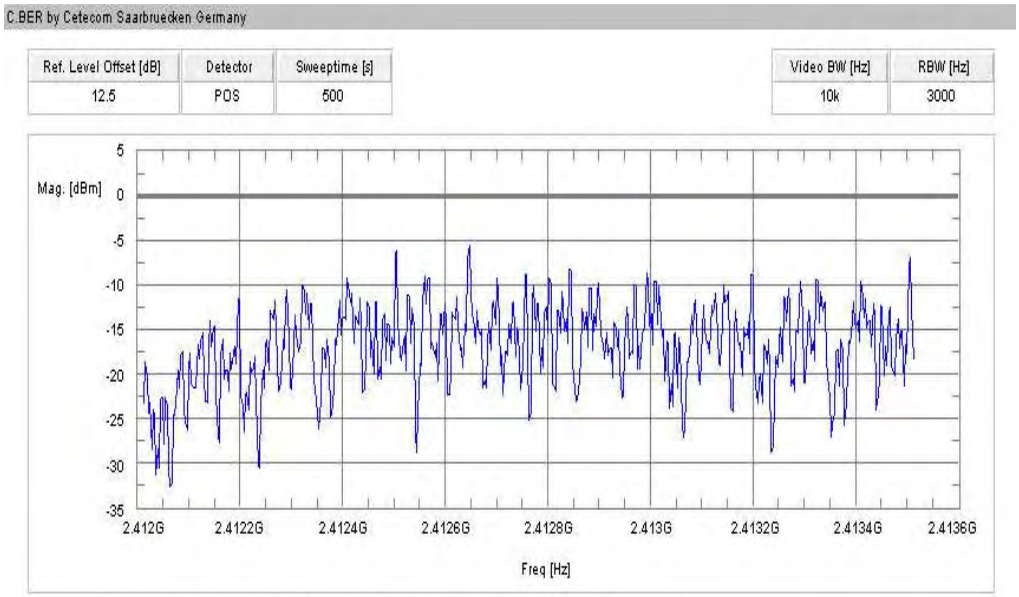
Results:

Modulation	Power Spectral density [dBm/3kHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS	-5.5	-5.4	-6.9
OFDM	-16.7	-16.2	-16.0
Measurement uncertainty	± 1.5 dB		

Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

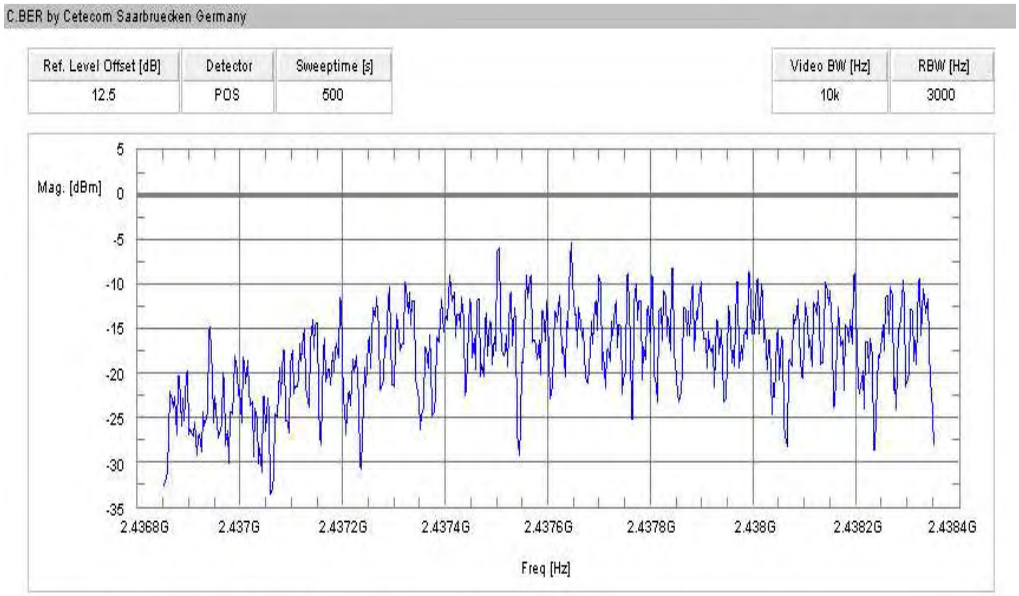
Plot 1: TX mode, lowest channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	500	10k	3000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.412011523G	2.413511523G	MAXH	-5.507171631	2.412645792G

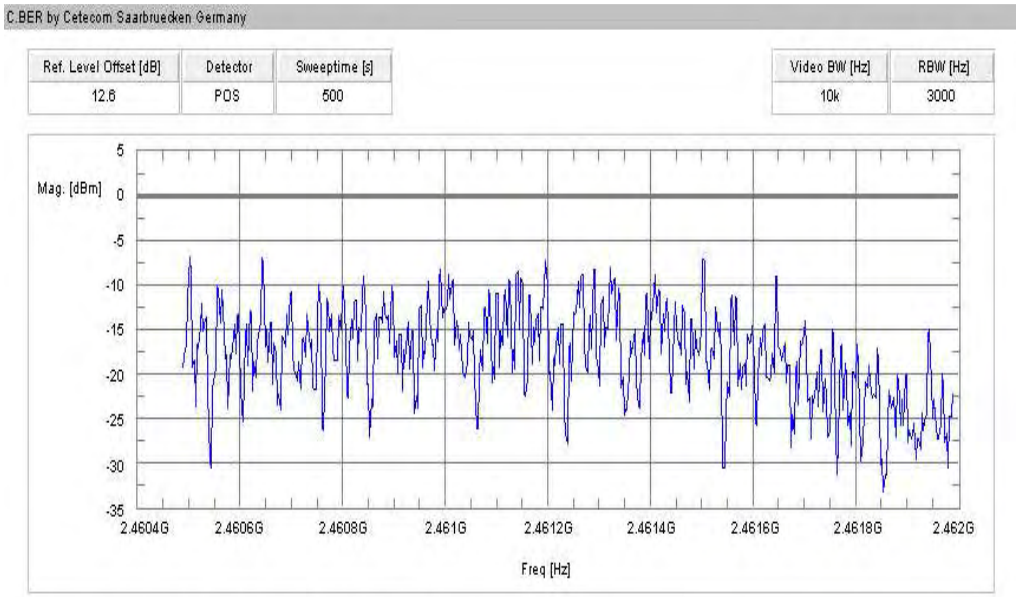
Plot 2: TX mode, middle channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	500	10k	3000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.436851202G	2.438351202G	MAXH	-5.401412964	2.437644479G

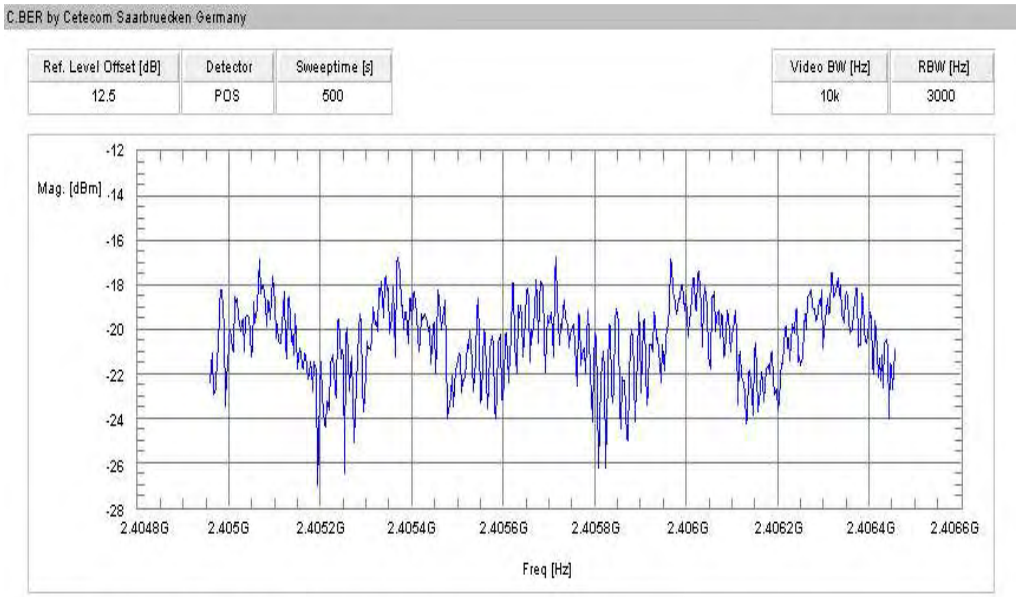
Plot 3: TX mode, highest channel



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.460488477G	2.461988477G	MAXH	-6.884016418	2.460500501G

Plots: OFDM / g – mode

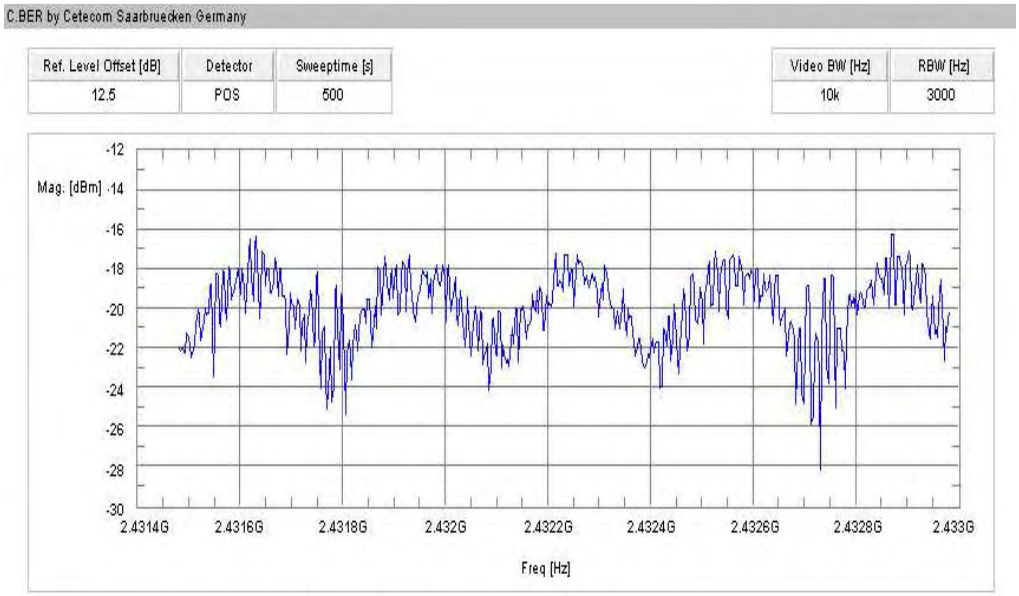
Plot 1: TX mode, lowest channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	500	10k	3000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.404957415G	2.406457415G	MAXH	-16.77819061	2.40571493G

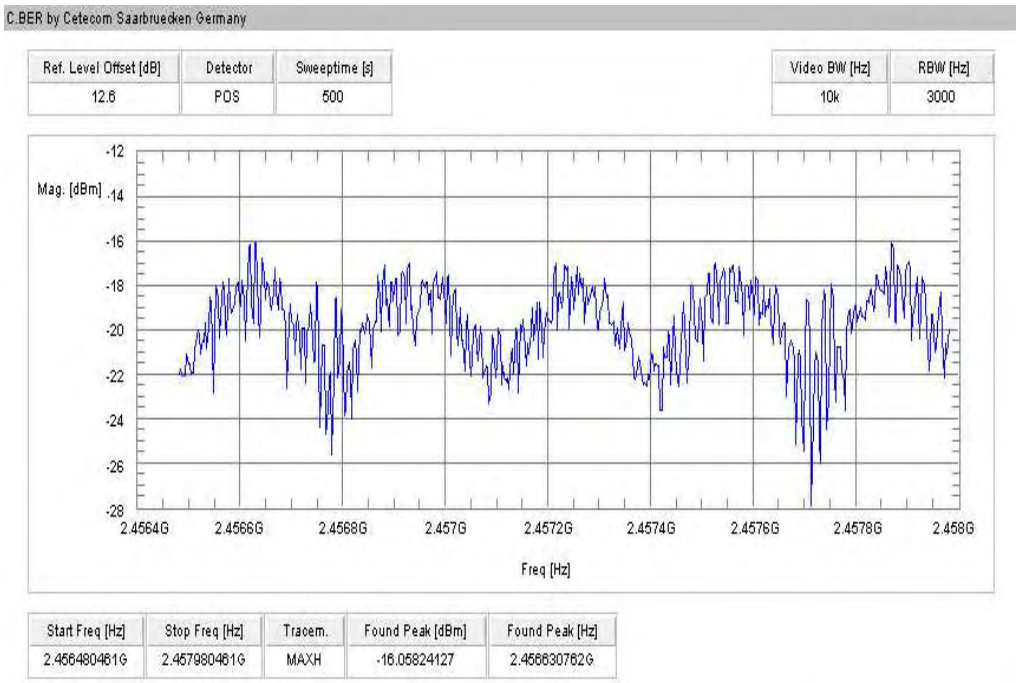
Plot 2: TX mode, middle channel



Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12.5	POS	500	10k	3000

Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.431480461G	2.432980461G	MAXH	-16.22093964	2.432869238G

Plot 3: TX mode, highest channel



9.5 Spectrum bandwidth of a FHSS system – 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
CFR Part 15.247 (a)(2)	RSS 210, Issue 8, A 8.2(a)
Spectrum Bandwidth of a FHSS System – 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.	

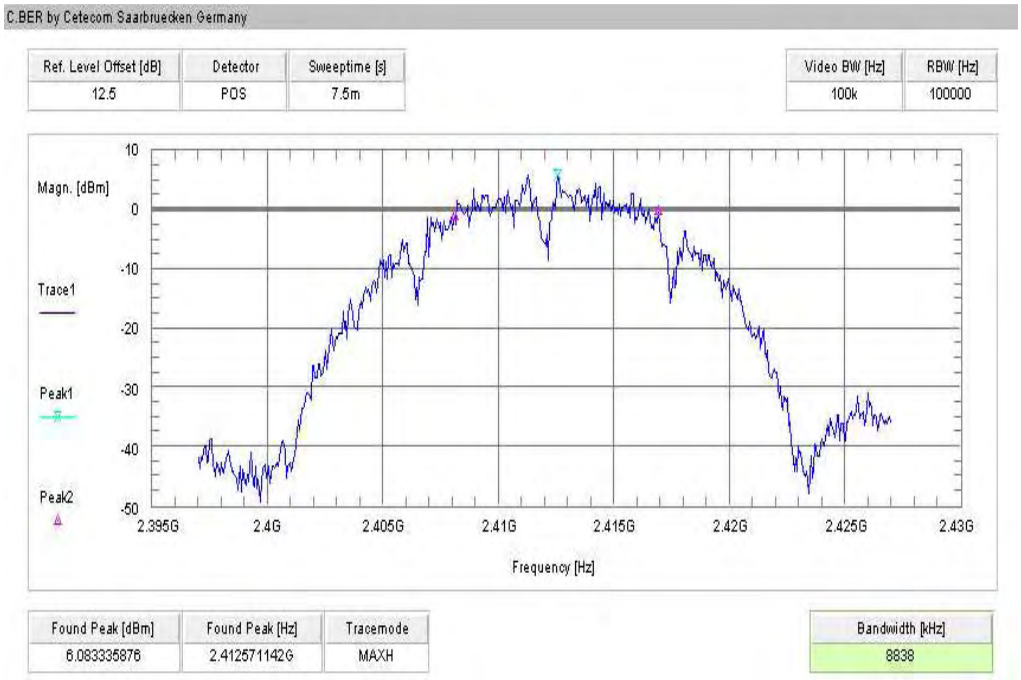
Results:

Modulation	6 dB BANDWIDTH [MHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS	8.838	9.800	9.980
OFDM	16.535	16.413	16.533
Measurement uncertainty	± 100 kHz		

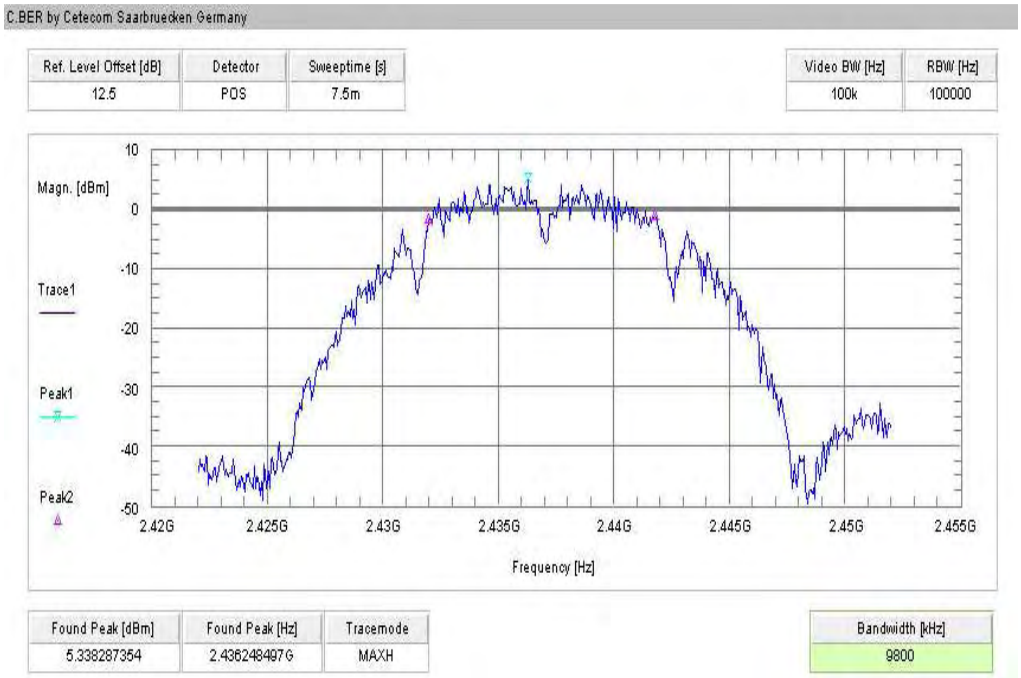
Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

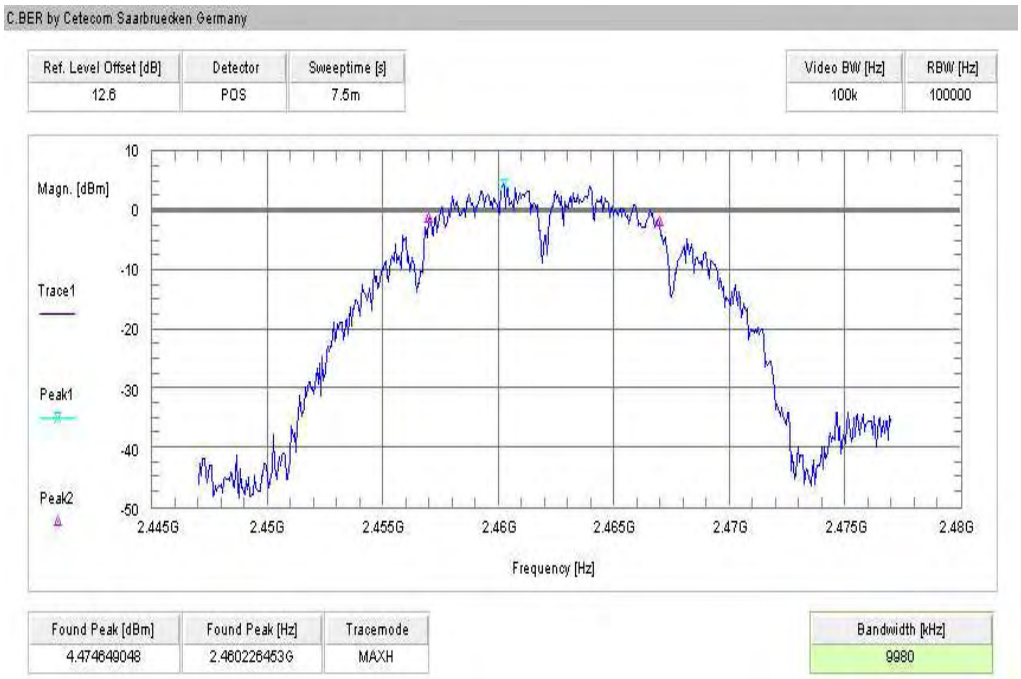
Plot 1: TX mode, lowest channel, 6 dB bandwidth



Plot 2: TX mode, middle channel, 6 dB bandwidth

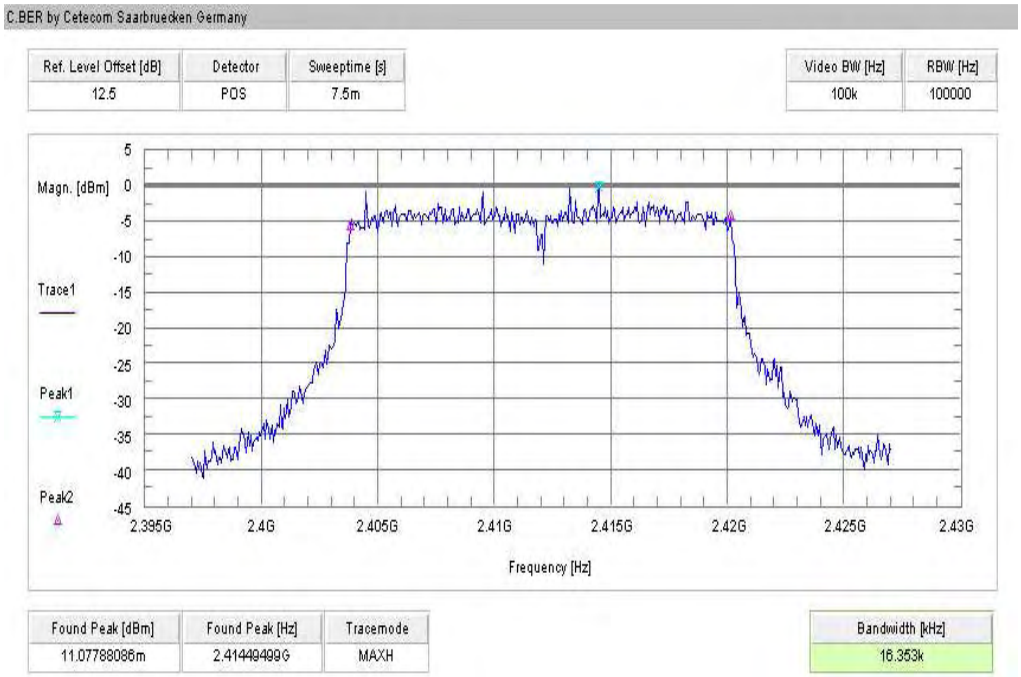


Plot 3: TX mode, highest channel, 6 dB bandwidth

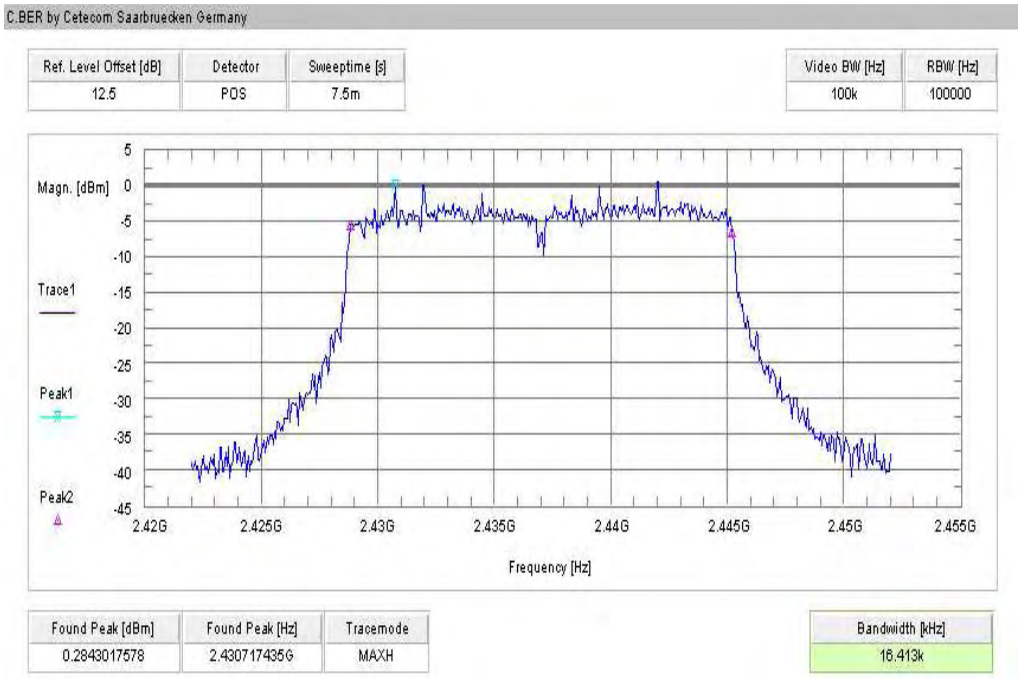


Plots: OFDM / g – mode

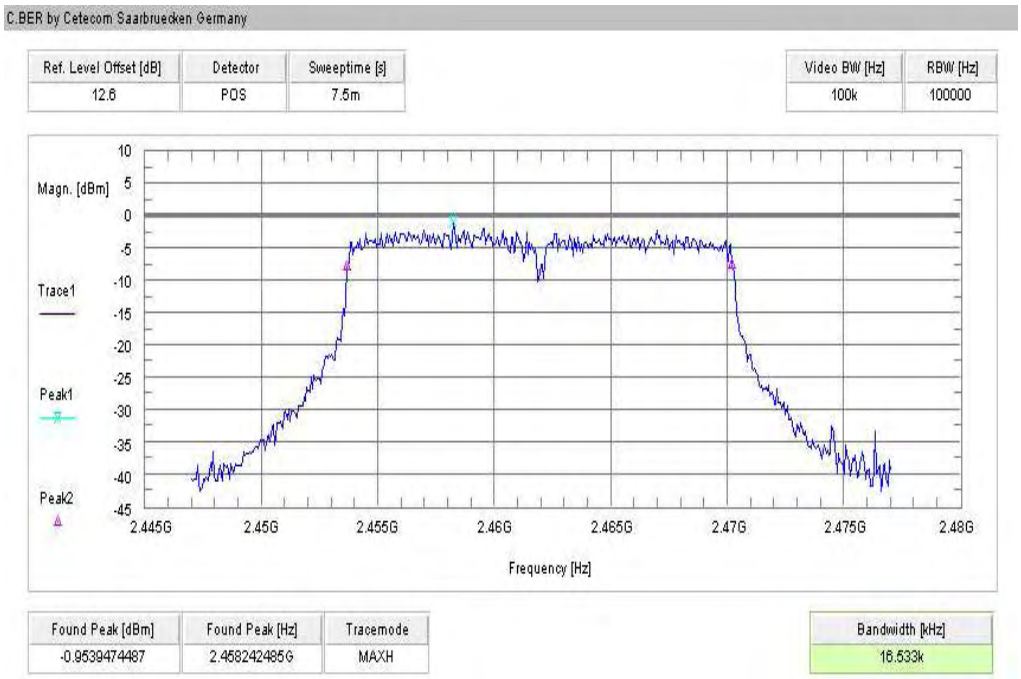
Plot 1: TX mode, lowest channel, 6 dB bandwidth



Plot 2: TX mode, middle channel, 6 dB bandwidth



Plot 3: TX mode, highest channel, 6 dB bandwidth



9.6 Spectrum bandwidth of a FHSS system – 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:	See plots
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247 (a)(2)	RSS 210, Issue 8, A 8.2(a)
Spectrum Bandwidth of a FHSS System – 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.	

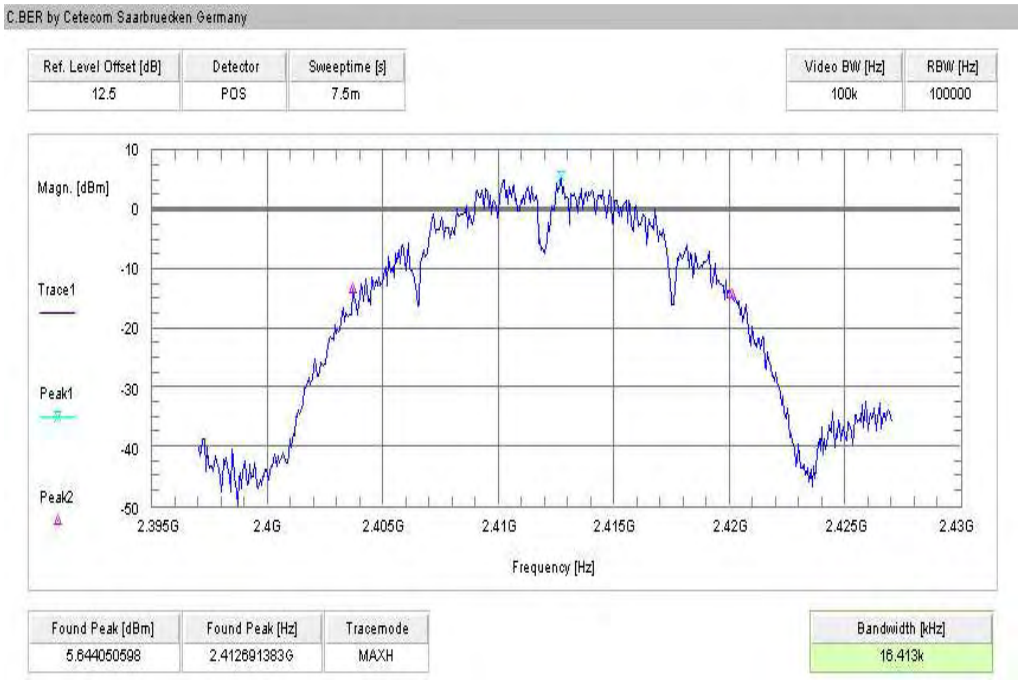
Results:

Modulation	20 dB BANDWIDTH [MHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS	16.416	16.052	16.473
OFDM	17.615	17.555	17.435
Measurement uncertainty	± 100 kHz		

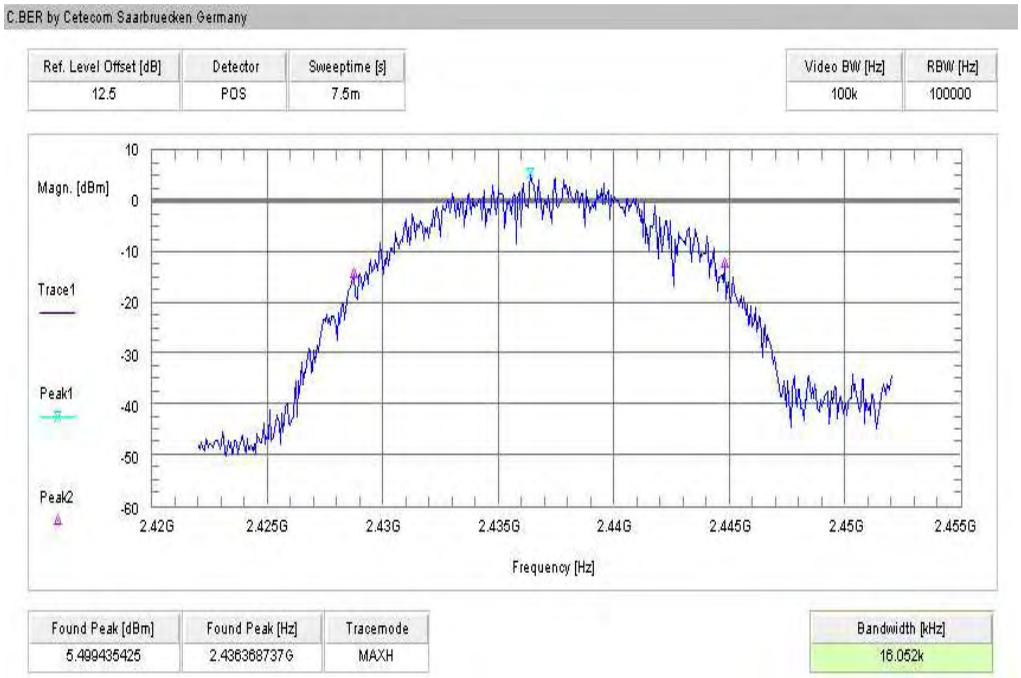
Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

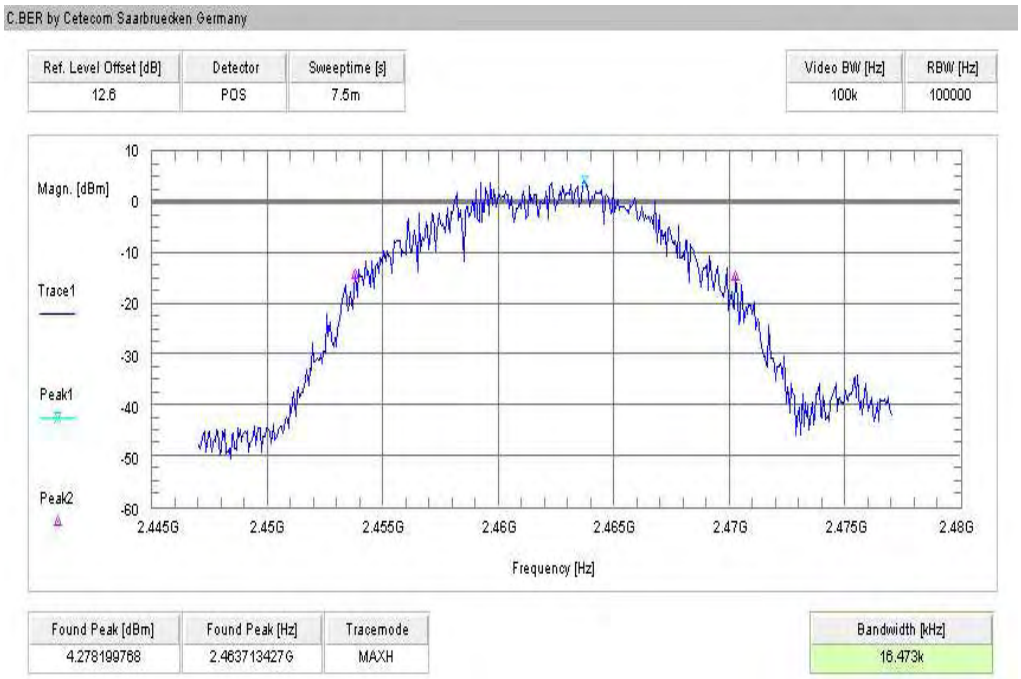
Plot 1: TX mode, lowest channel, 20 dB bandwidth



Plot 2: TX mode, middle channel, 20 dB bandwidth

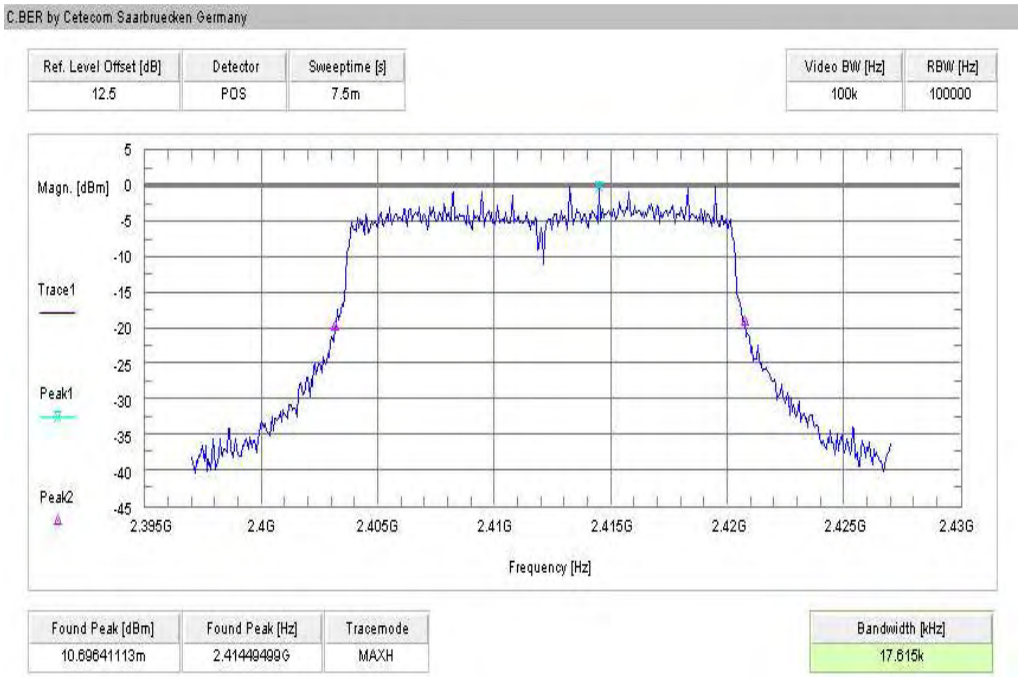


Plot 3: TX mode, highest channel, 20 dB bandwidth

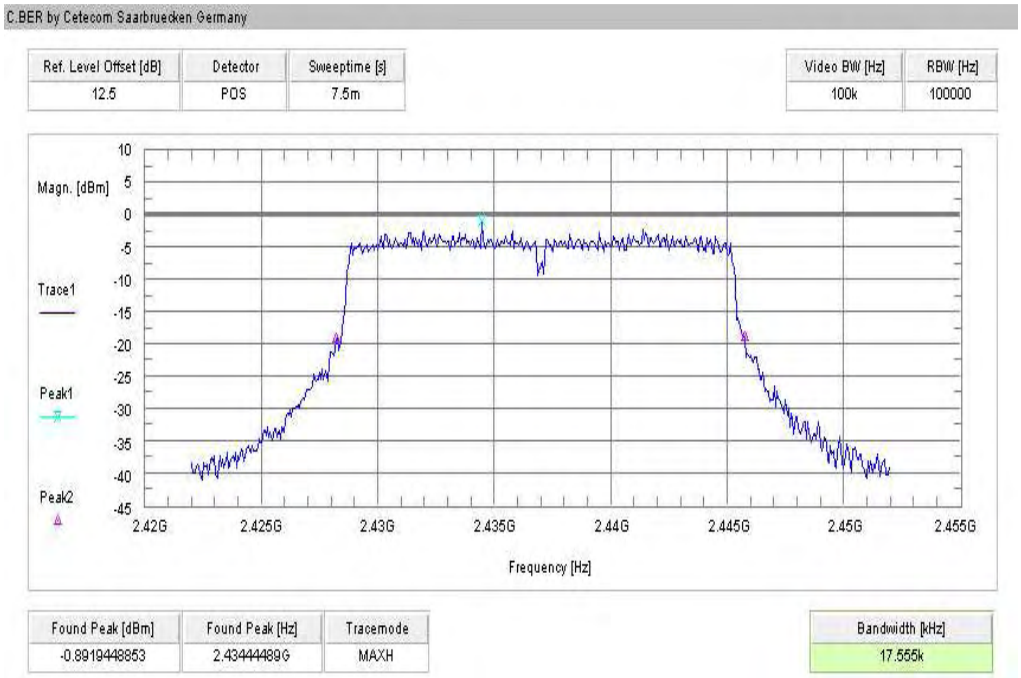


Plots: OFDM / g – mode

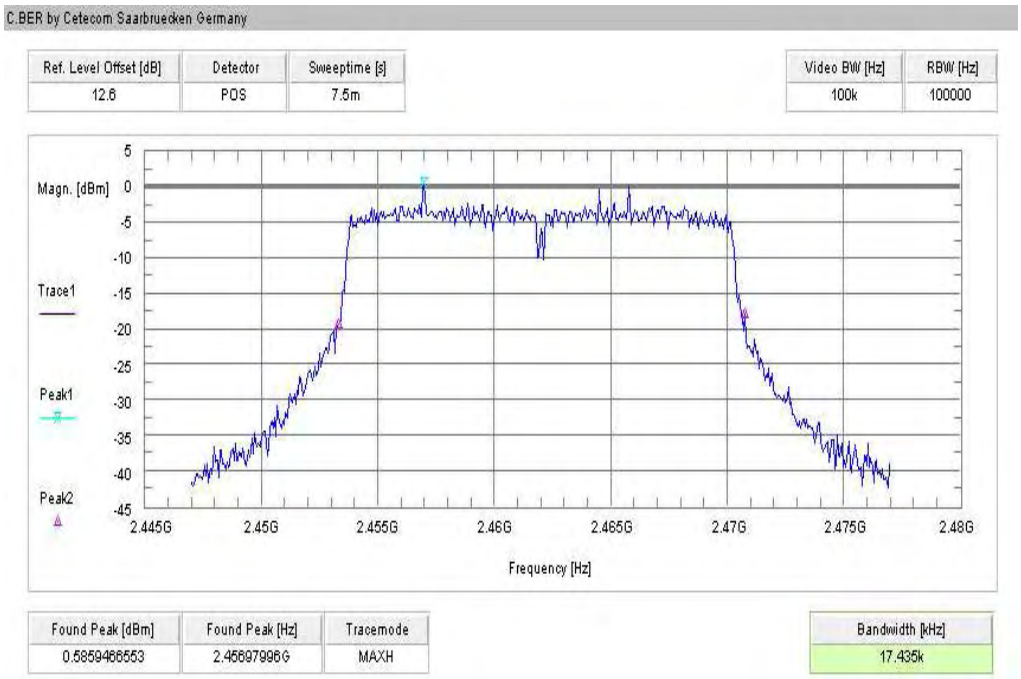
Plot 1: TX mode, lowest channel, 20 dB bandwidth



Plot 2: TX mode, middle channel, 20 dB bandwidth



Plot 3: TX mode, highest channel, 20 dB bandwidth



9.7 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
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	Lower Band Edge: 2300 – 2425 MHz Upper Band Edge: 2450 – 2500 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247 (d)	RSS 210, Issue 8, A 8.5
Band Edge Compliance Conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.	

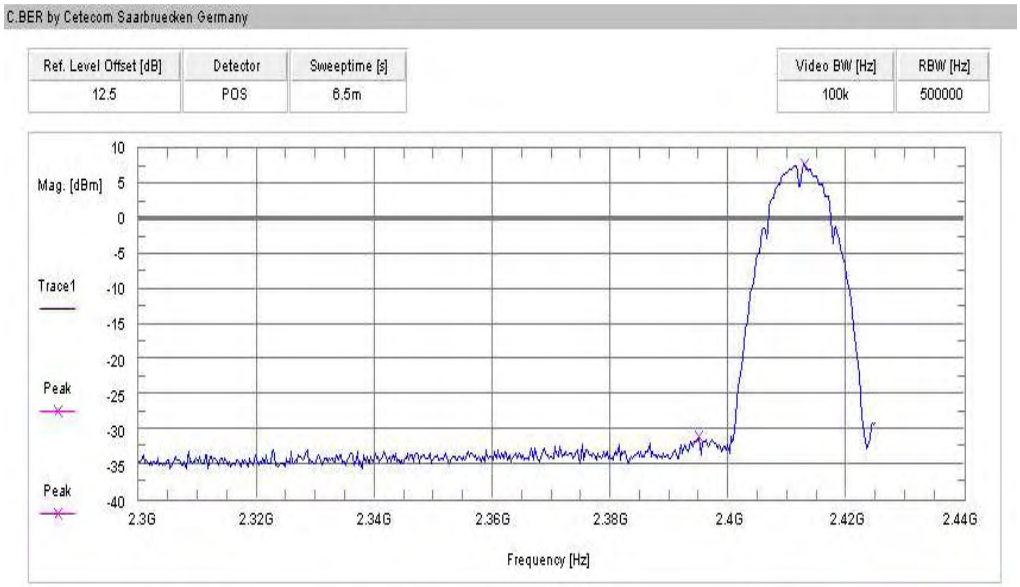
Result:

Szenario	Band Edge Compliance Conducted [dB]	
Modulation	DSSS	OFDM
Lower Band Edge – Channel 1	> 20 dB (see plot 1)	> 20 dB (see plot 3)
Upper Band Edge – Channel 11	> 20 dB (see plot 2)	> 20 dB (see plot 4)
Measurement uncertainty	± 1.5 dB	

Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

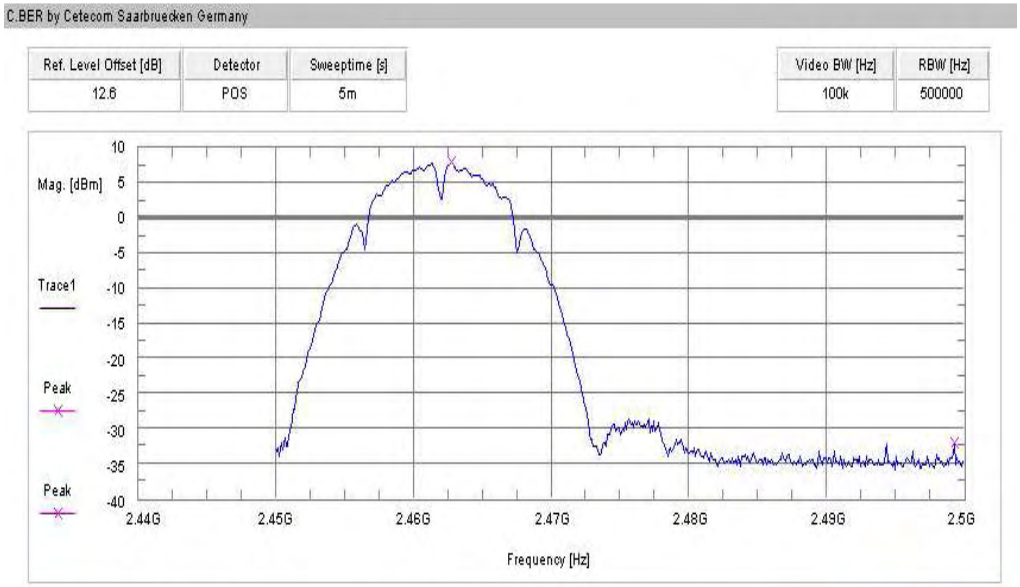
Plot 1: TX mode, lower band edge



Found Peak [dBm]	Found Peak [Hz]	Tracemode
7.905387878	2.412975894G	MAXH

Delta [dB]
39.03

Plot 2: TX mode, upper band edge

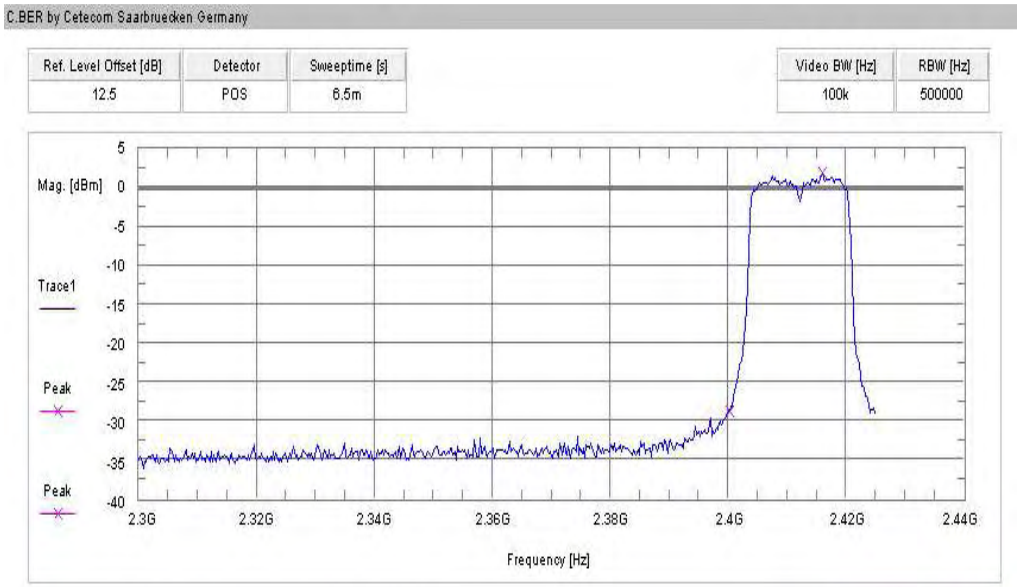


Found Peak [dBm]	Found Peak [Hz]	Tracemode
7.966401672	2.462725355G	MAXH

Delta [dB]
40.04

Plots: OFDM / g – mode

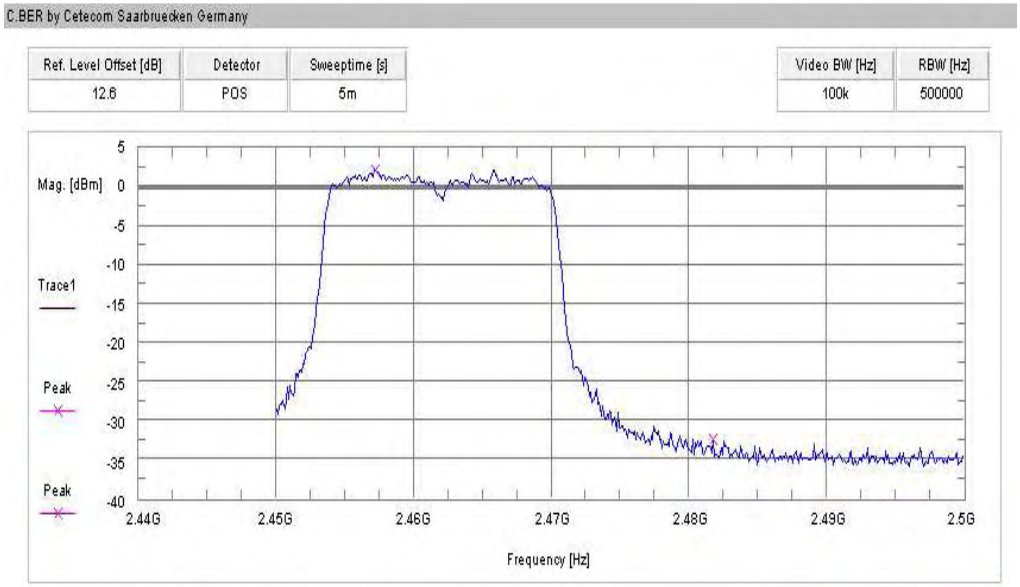
Plot 1: TX mode, lower band edge



Found Peak [dBm]	Found Peak [Hz]	Tracemode
1.922103882	2.415981905G	MAXH

Delta [dB]
30.76

Plot 2: TX mode, upper band edge



Found Peak [dBm]	Found Peak [Hz]	Tracemode
2.182427979	2.457214319G	MAXH

Delta [dB]
34.67

9.8 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 11 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3m.

Measurement:

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

Limits:

FCC	IC
CFR Part 15.205	RSS 210, Issue 8, A 8.5
Band Edge Compliance Radiated	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).	
54 dBµV/m AVG	

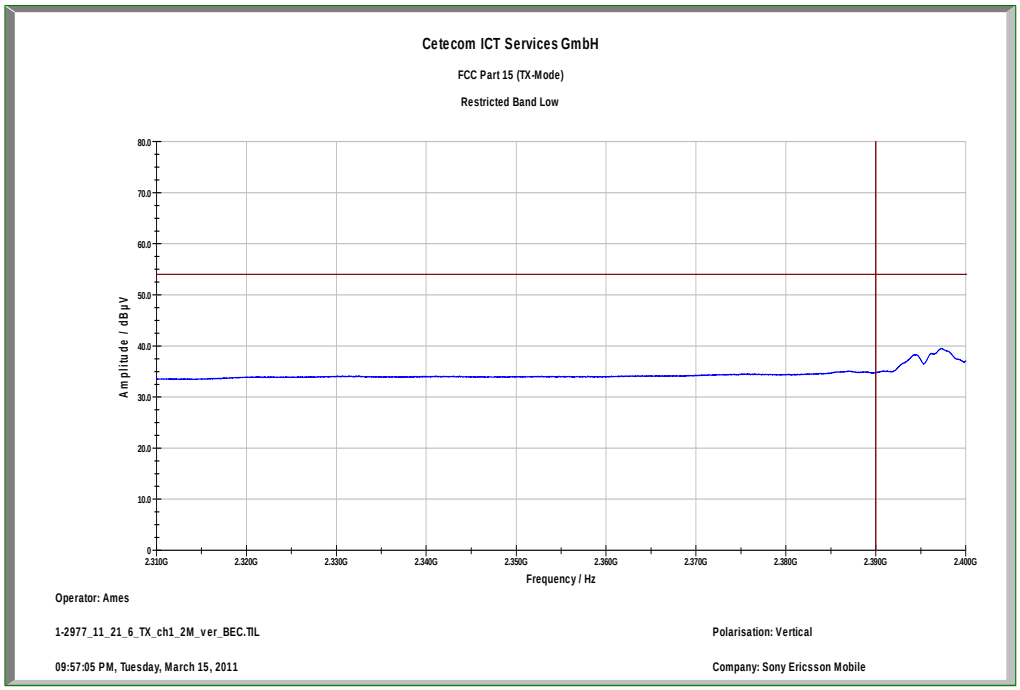
Result:

Szenario	Band Edge Compliance Radiated [dBµV/m]	
Modulation	DSSS	OFDM
Lower Band Edge – Channel 1	< 54 dBµV/m (see plot 1/3)	< 54 dBµV/m (see plot 5/7)
Upper Band Edge – Channel 11	< 54 dBµV/m (see plot 2/4)	< 54 dBµV/m (see plot 6/8)
Measurement uncertainty	± 3 dB	

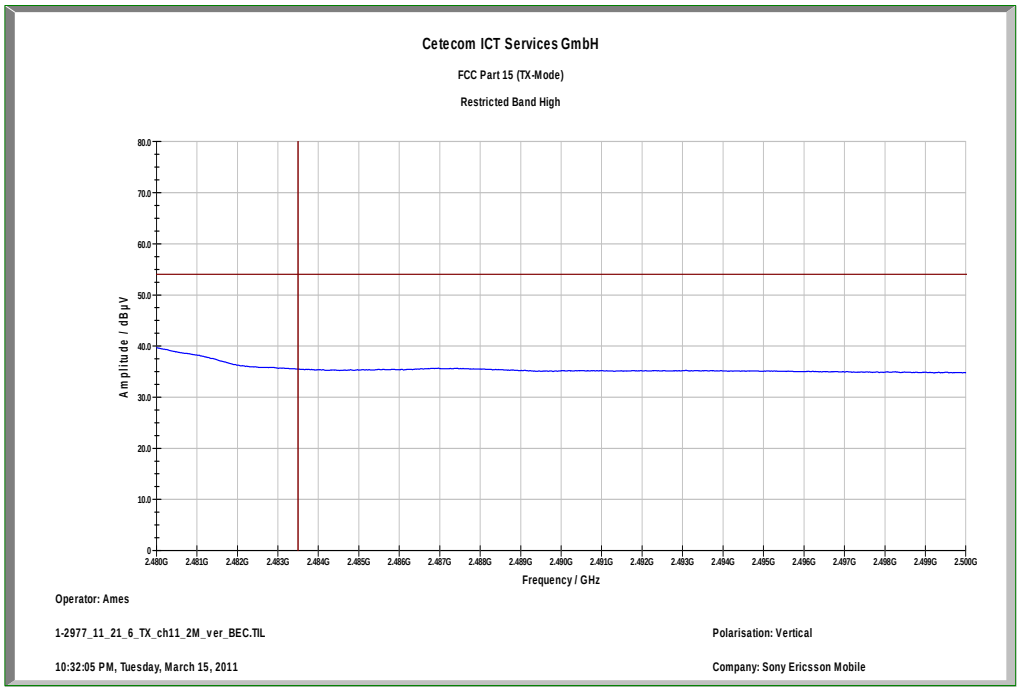
Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

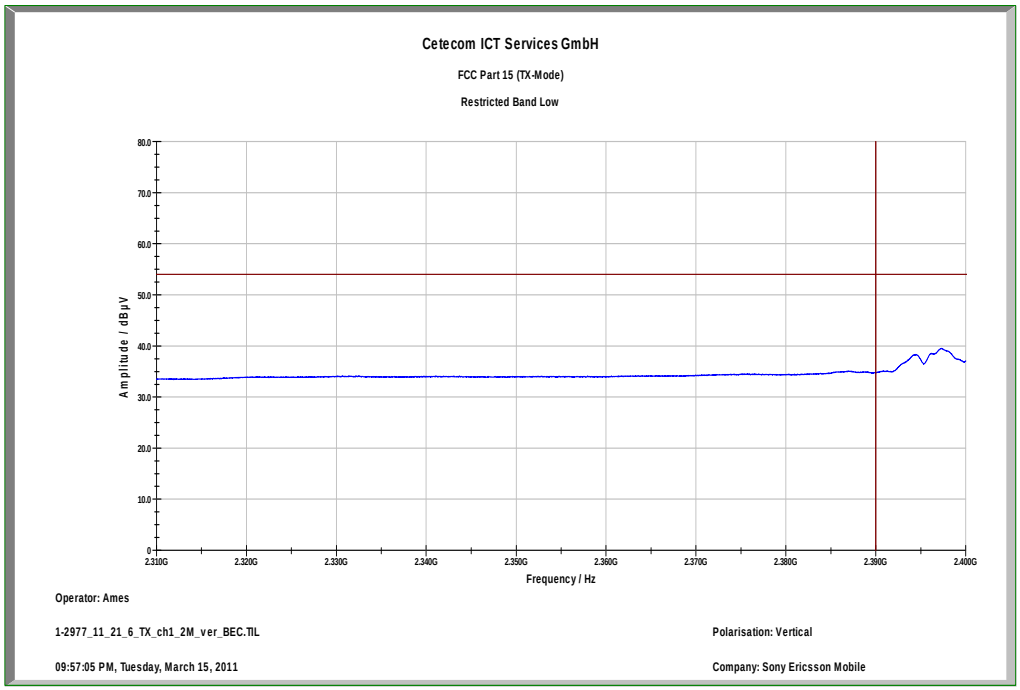
Plot 1: TX mode, lower band edge, vertical polarization



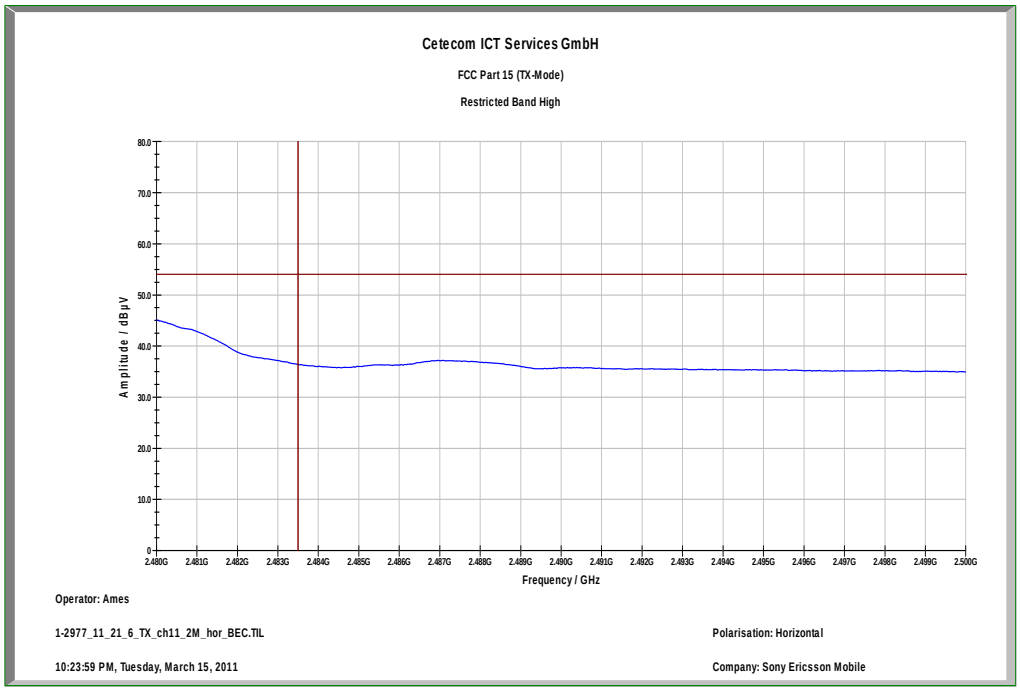
Plot 2: TX mode, upper band edge, vertical polarization



Plot 3: TX mode, lower band edge, horizontal polarization

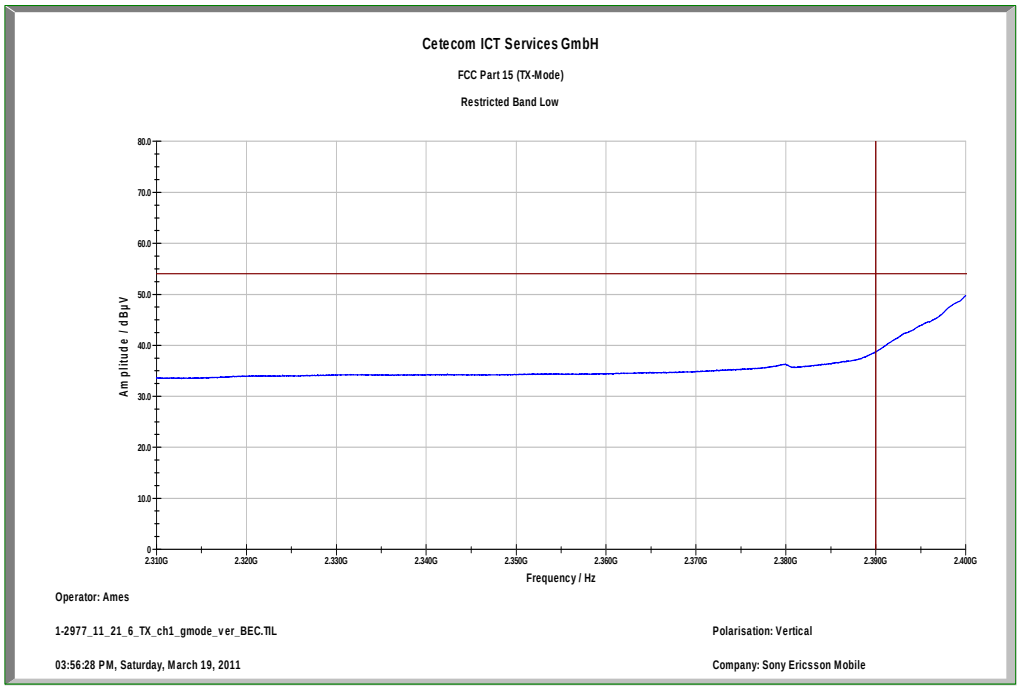


Plot 4: TX mode, upper band edge, horizontal polarization

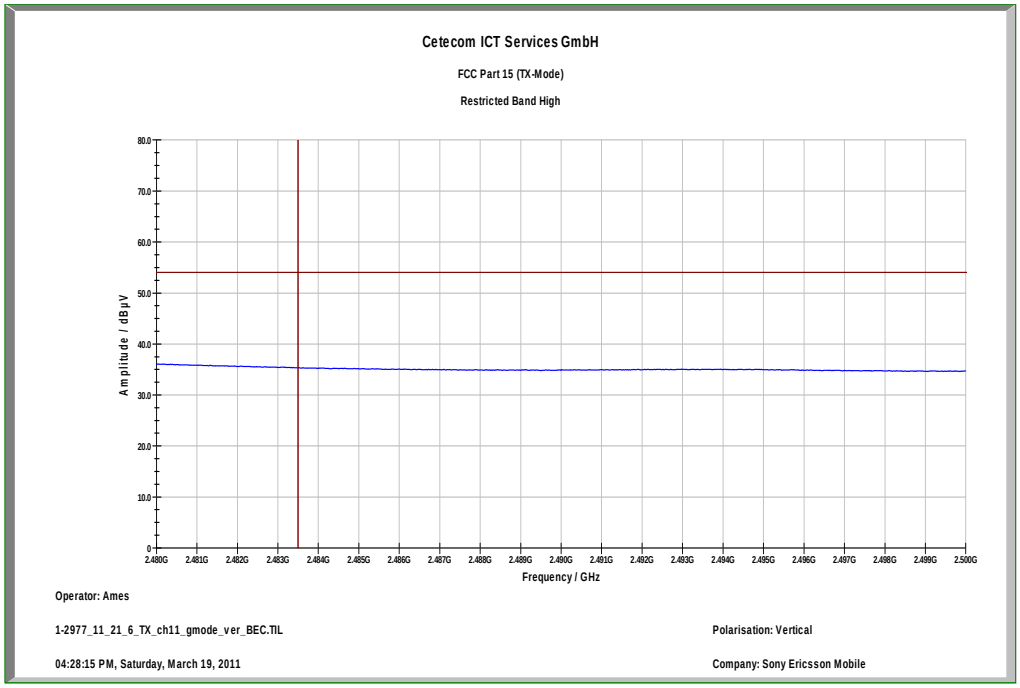


Plots: OFDM / g – mode

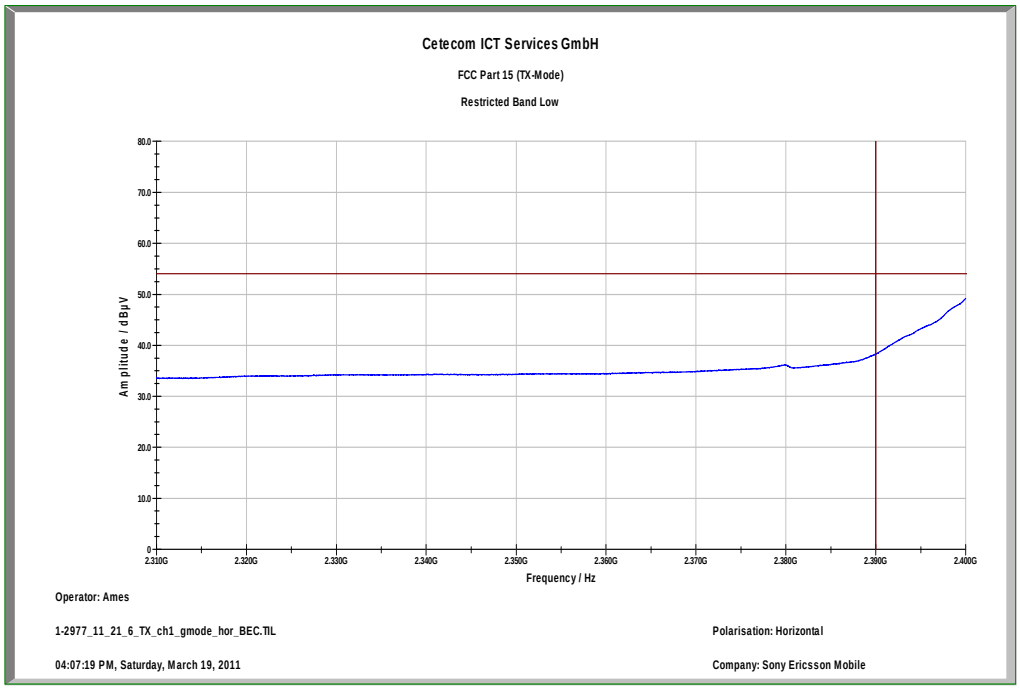
Plot 5: TX mode, lower band edge, vertical polarization



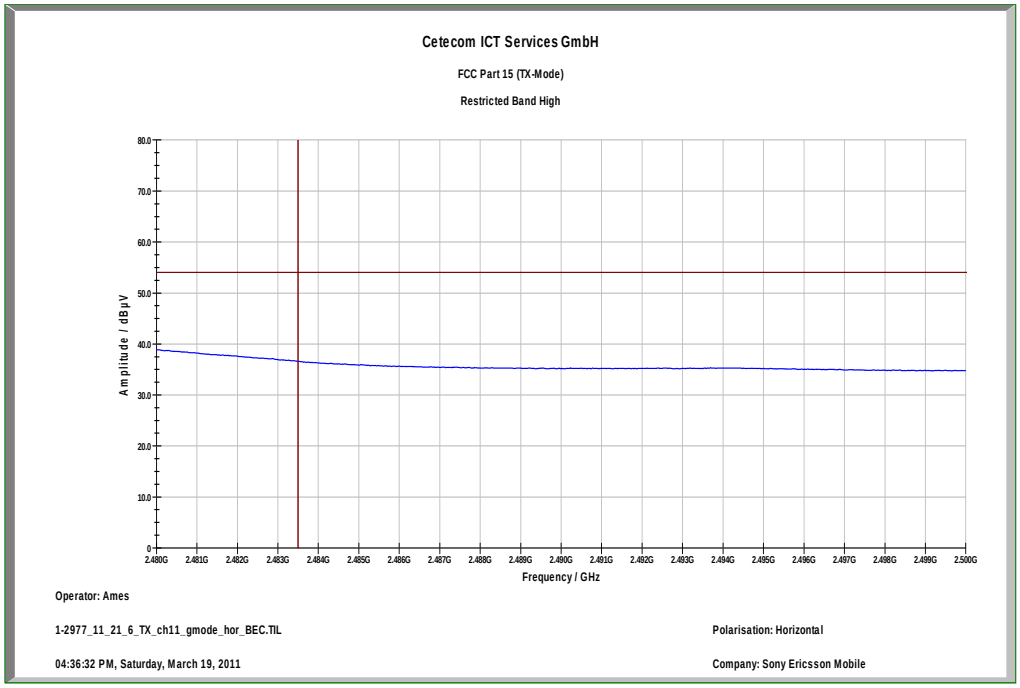
Plot 6: TX mode, upper band edge, vertical polarization



Plot 7: TX mode, lower band edge, horizontal polarization



Plot 8: TX mode, upper band edge, horizontal polarization



9.9 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. The measurement is repeated for all modulations.

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
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5
TX Spurious Emissions Conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required	

Results: DSSS / b – mode

TX Spurious Emissions Conducted					
DSSS - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		7.1	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc		complies
2437		7.1	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc		complies
2462		7.4	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc		complies
Measurement uncertainty		± 3 dB			

Result: **The result of the measurement is passed.**

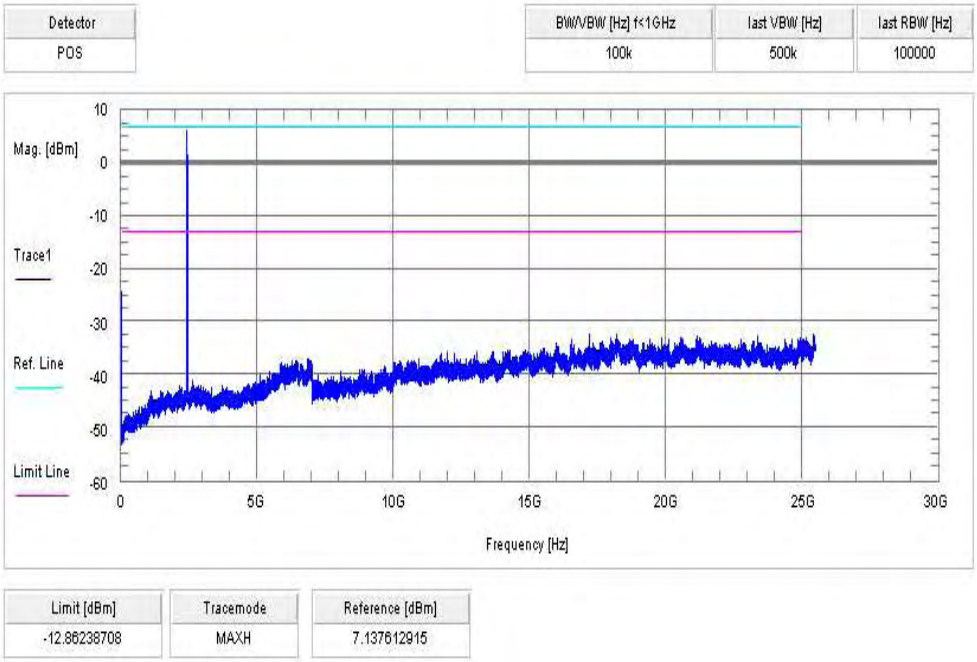
Results: OFDM / g – mode

TX Spurious Emissions Conducted					
OFDM - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		1.2	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc		complies
2437		1.4	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc		complies
2462		1.4	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc		complies
Measurement uncertainty		± 3 dB			

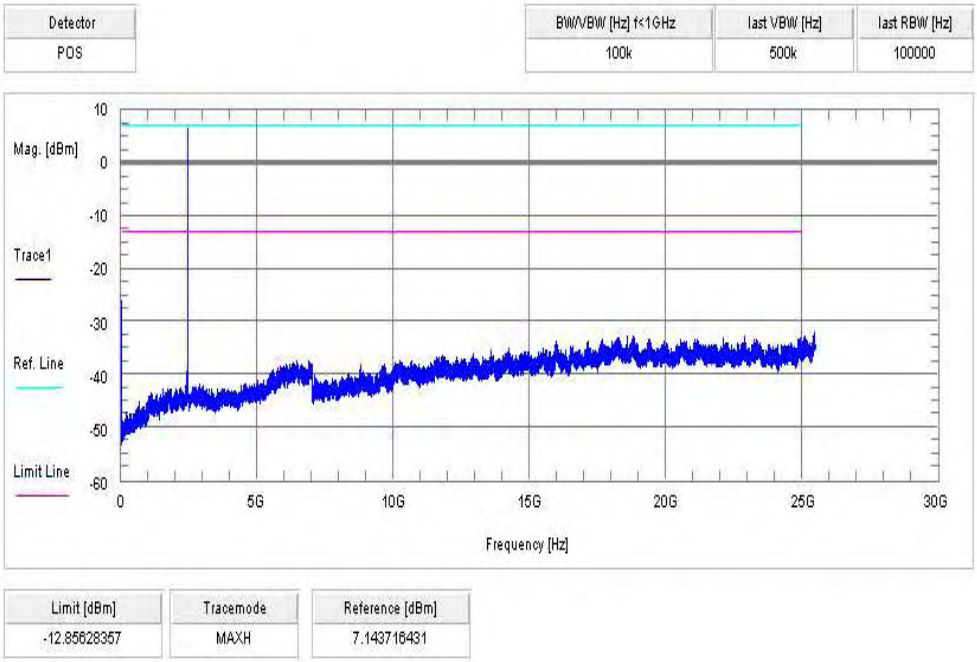
Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

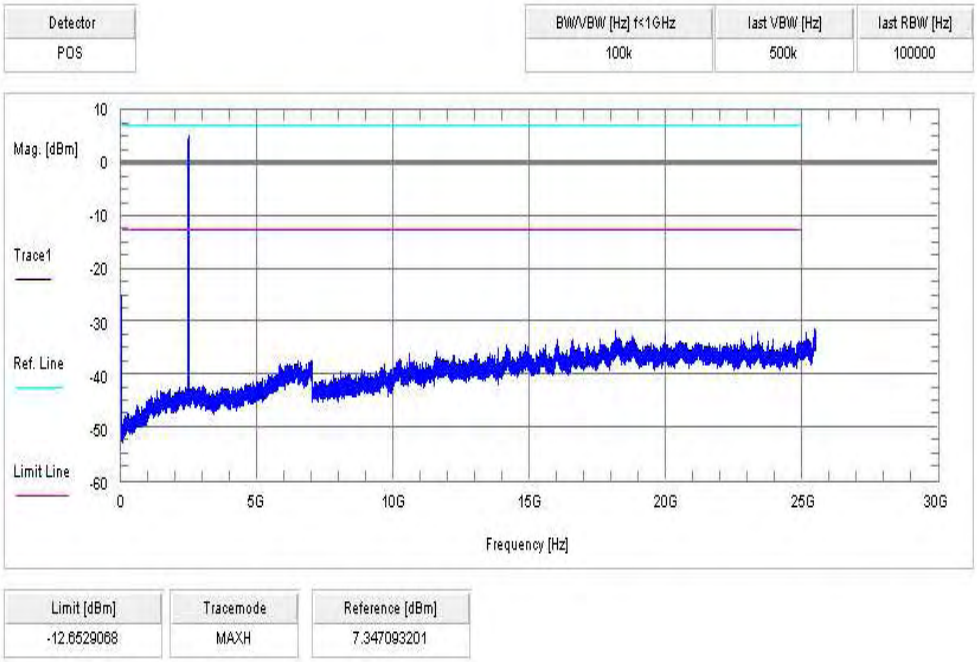
Plot 1: low channel



Plot 2: mid channel

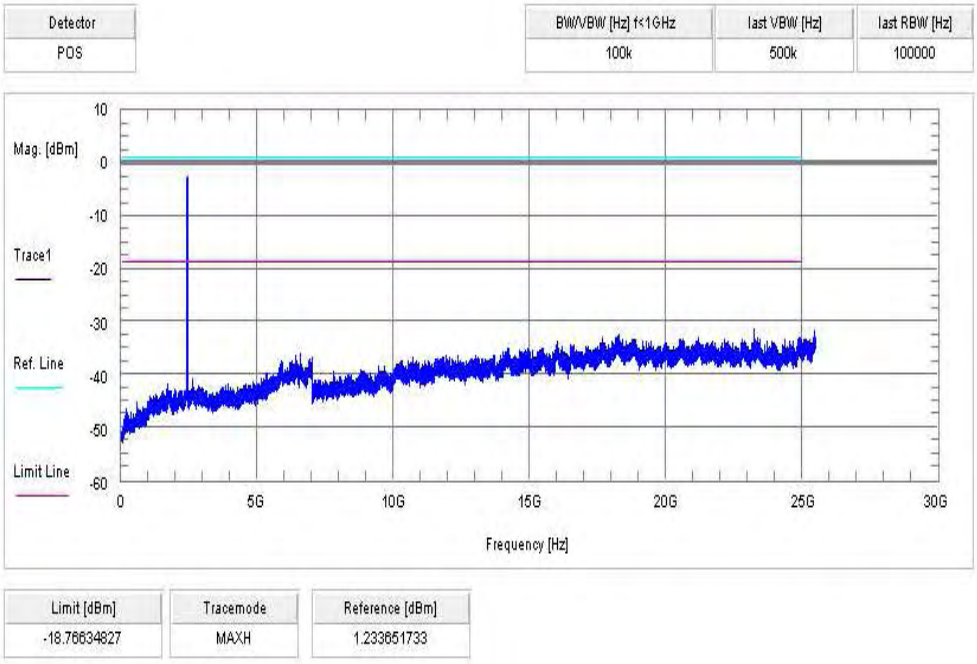


Plot 3: high channel

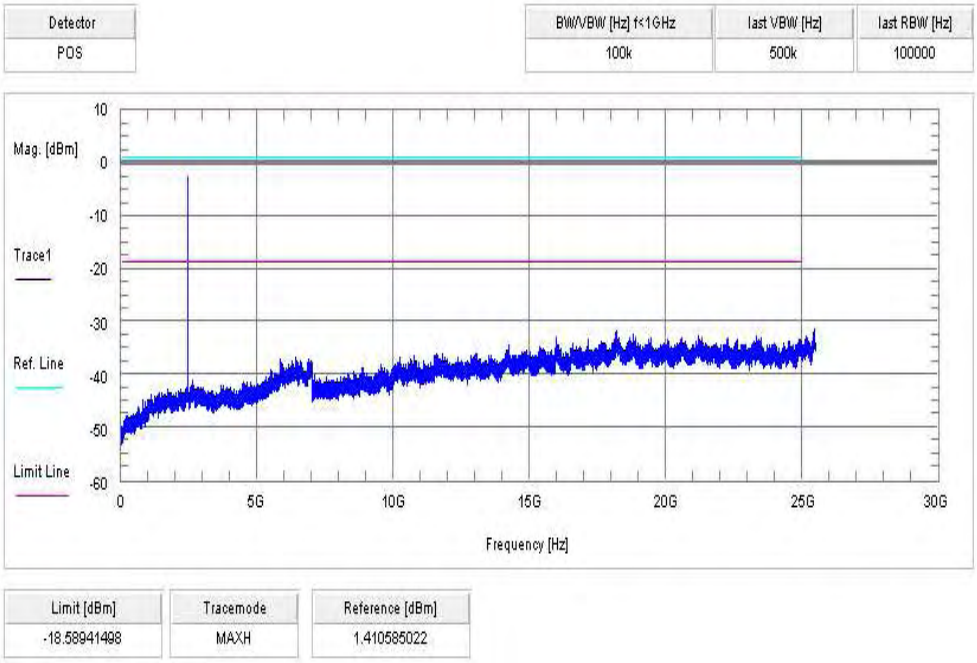


Plots: OFDM / g – mode

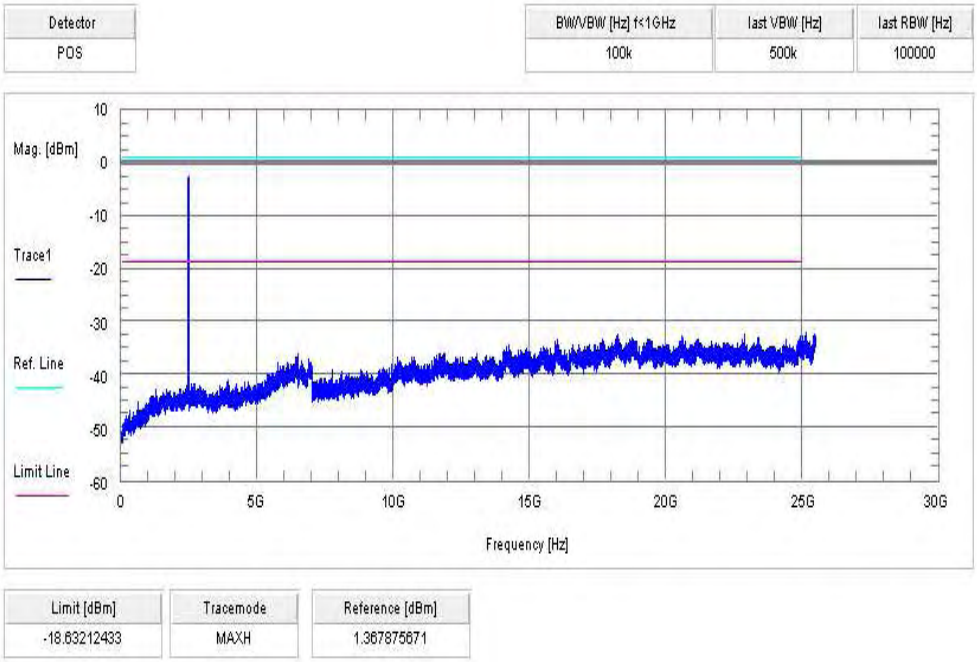
Plot 1: low channel



Plot 2: mid channel



Plot 3: high channel



9.10 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold
Measured Modulation	☒ DSSS ☒ 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
CFR Part 15.247(d)		RSS 210, Issue 8, A 8.5
TX Spurious Emissions Radiated		
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
§15.209		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results: DSSS / b – mode

TX Spurious Emissions Radiated [dBµV/m]								
DSSS – mode								
2412 MHz			2437 MHz			2462 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.		
No peaks detected between 1 GHz and 12.75 GHz.			No peaks detected between 1 GHz and 12.75 GHz.			No peaks detected between 1 GHz and 12.75 GHz.		
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: **The result of the measurement is passed.**

Results: OFDM / g – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM – mode								
2412 MHz			2437 MHz			2462 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.		
No peaks detected between 1 GHz and 12.75 GHz.			No peaks detected between 1 GHz and 12.75 GHz.			No peaks detected between 1 GHz and 12.75 GHz.		
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: **The result of the measurement is passed.**

Plots: DSSS / b – mode

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

CETECOM ICT Services GmbH

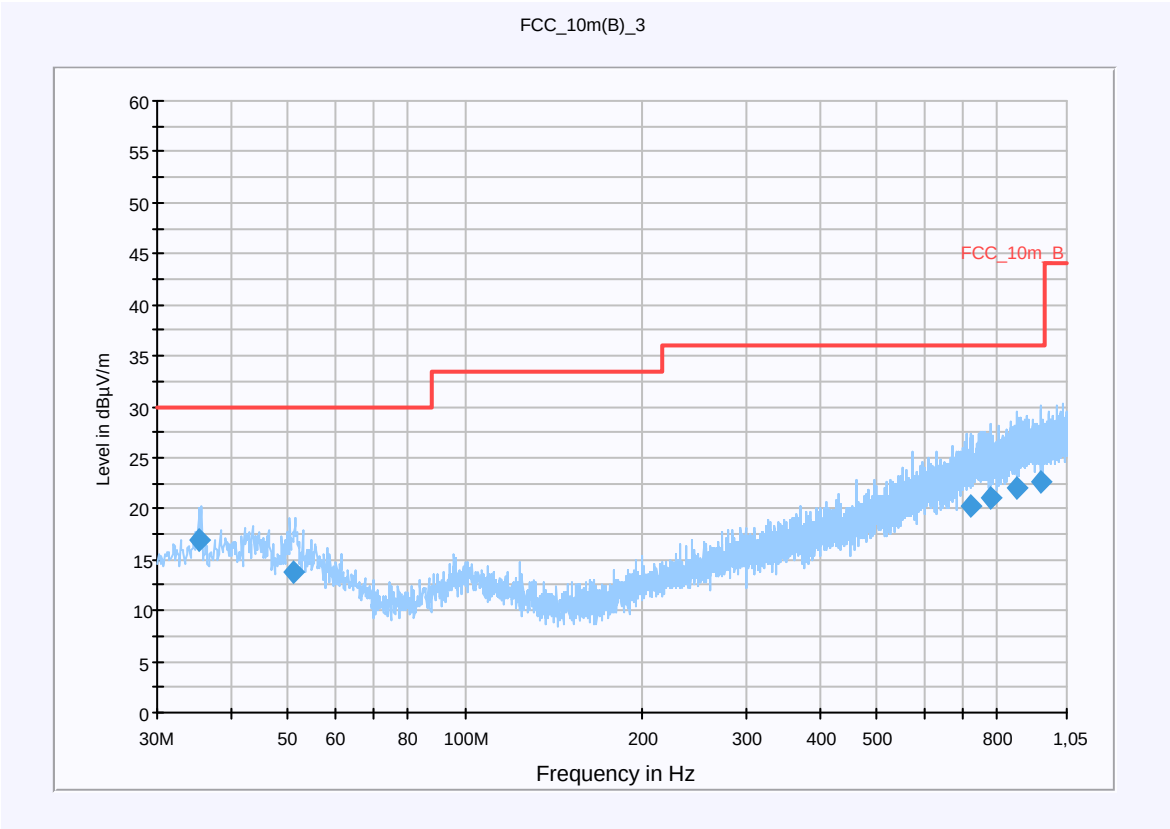
Common Information

EUT:	AAB-1880031-BV
Serial Number:	WUJ232520A
Test Description:	FCC Part 15B Class B < 1GHz @ 10m
Operating Conditions:	WLAN B-mode 2Mbit/s CH:1
Operator Name:	LANGER
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.358750	17.0	15000.000	120.000	120.0	V	17.0	13.1	13.0	30.0	
50.959350	13.8	15000.000	120.000	98.0	V	146.0	13.3	16.2	30.0	
720.461550	20.4	15000.000	120.000	175.0	H	55.0	23.0	15.6	36.0	
780.966600	21.0	15000.000	120.000	220.0	H	193.0	23.7	15.0	36.0	
861.257400	22.1	15000.000	120.000	220.0	H	178.0	24.7	13.9	36.0	
946.050900	22.6	15000.000	120.000	115.0	V	134.0	25.3	13.4	36.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	ESU [ESU 26] @ GPIB0 (ADR 20), SN 100037/026, FW 4.43
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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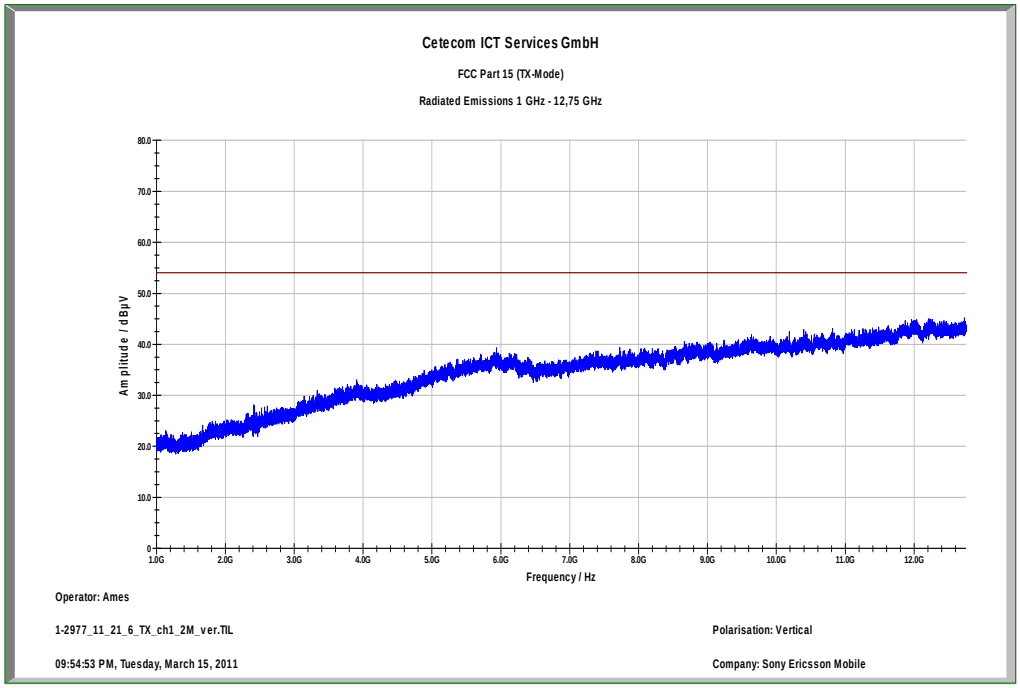
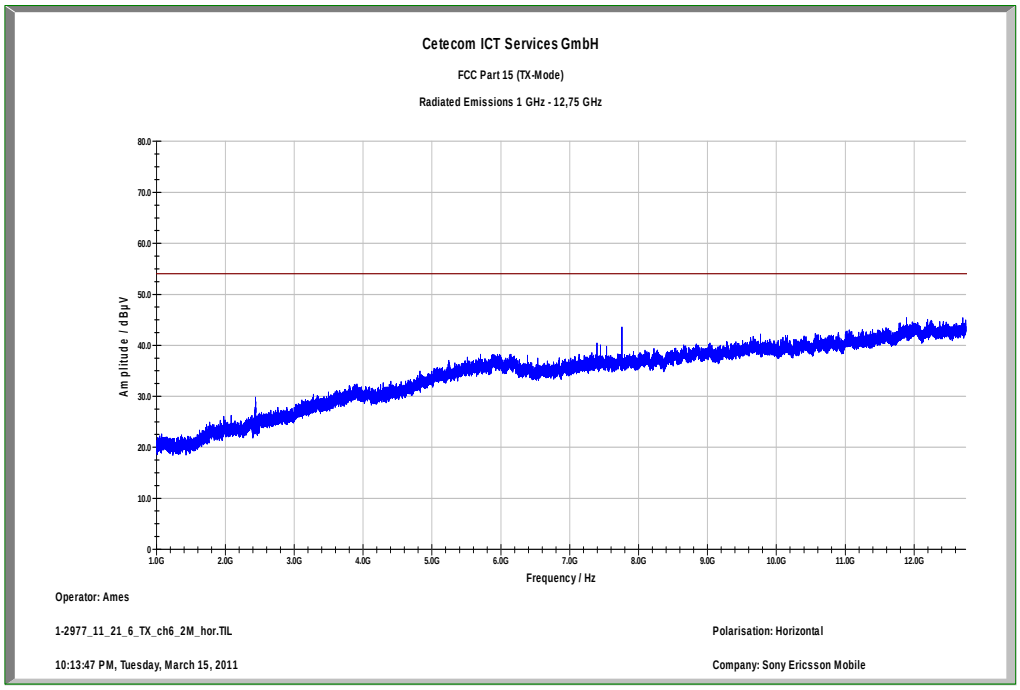
Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical polarization



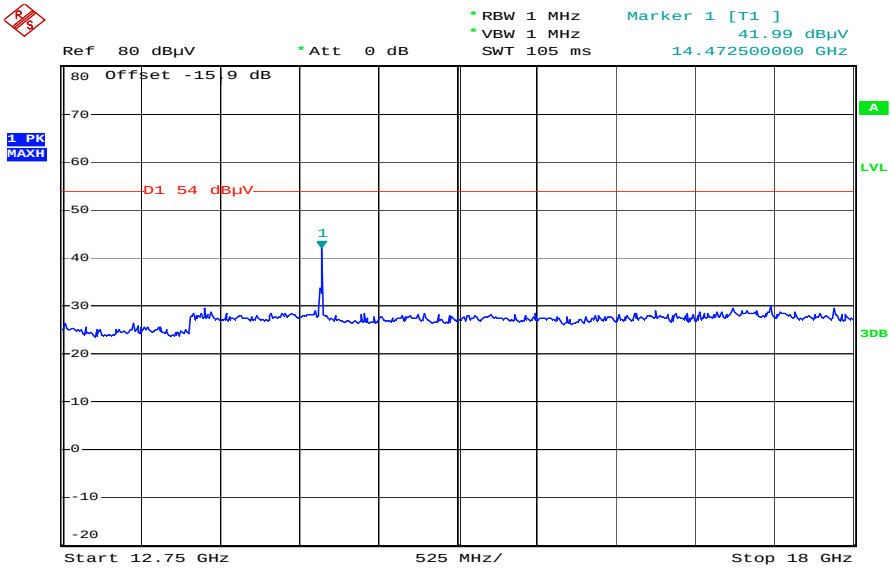
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 1 GHz to 12.75 GHz, horizontal polarization



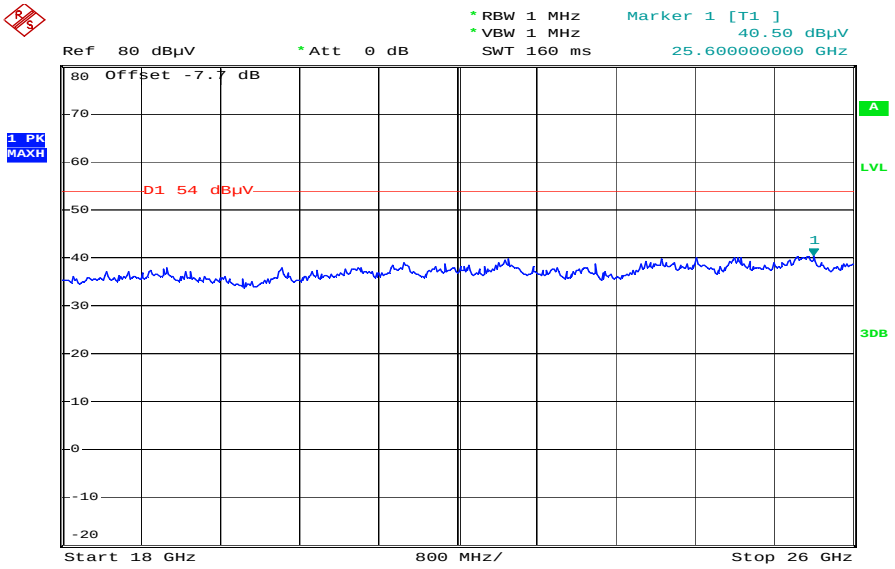
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 21.MAR.2011 13:16:33

Plot 5: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 21.MAR.2011 13:26:12

Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

CETECOM ICT Services GmbH

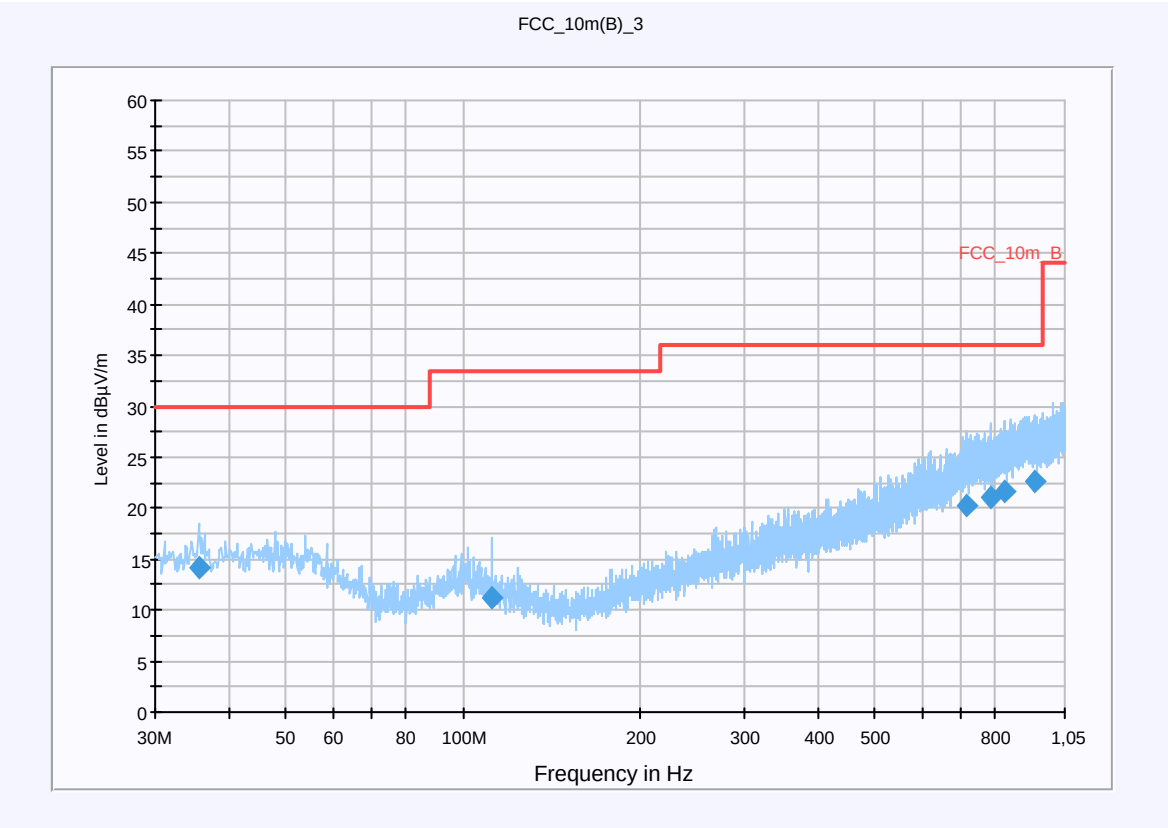
Common Information

EUT:	AAB-1880031-BV
Serial Number:	WUJ232520A
Test Description:	FCC Part 15B Class B < 1GHz @ 10m
Operating Conditions:	WLAN B-mode 2Mbit/s CH:6
Operator Name:	LANGER
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.727750	14.1	15000.000	120.000	113.0	V	236.0	13.1	15.9	30.0	
112.011000	11.2	15000.000	120.000	148.0	V	43.0	10.9	22.3	33.5	
715.308600	20.3	15000.000	120.000	156.0	H	177.0	22.9	15.7	36.0	
784.754100	21.0	15000.000	120.000	220.0	V	22.0	23.8	15.0	36.0	
832.147050	21.7	15000.000	120.000	220.0	V	325.0	24.3	14.3	36.0	
935.356200	22.5	15000.000	120.000	167.0	H	248.0	25.3	13.5	36.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	ESU [ESU 26] @ GPIB0 (ADR 20), SN 100037/026, FW 4.43
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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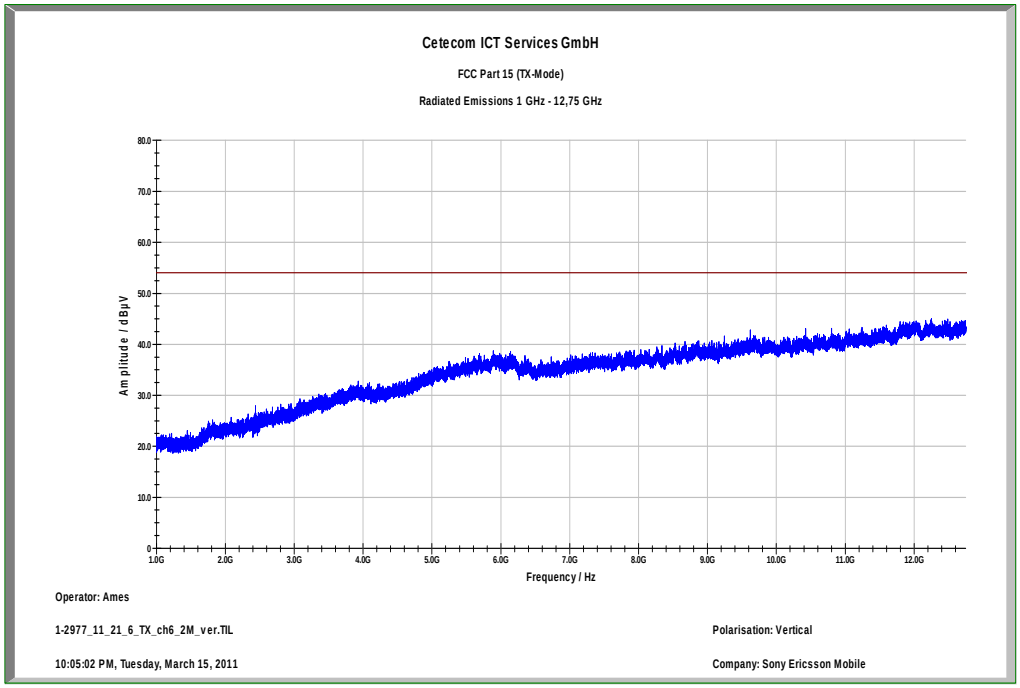
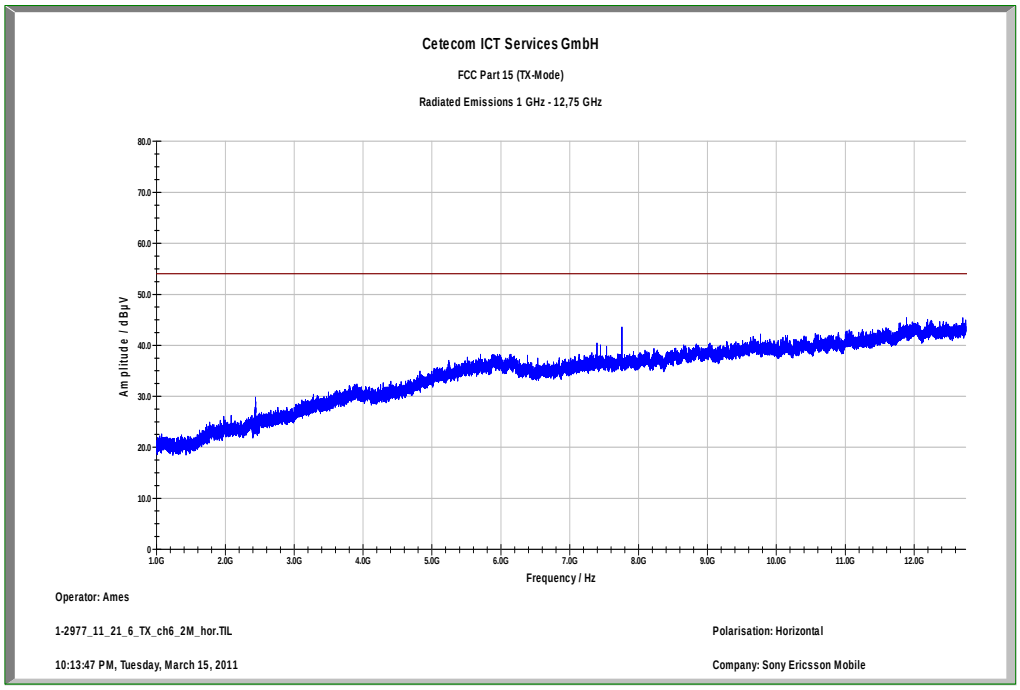
Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical polarization



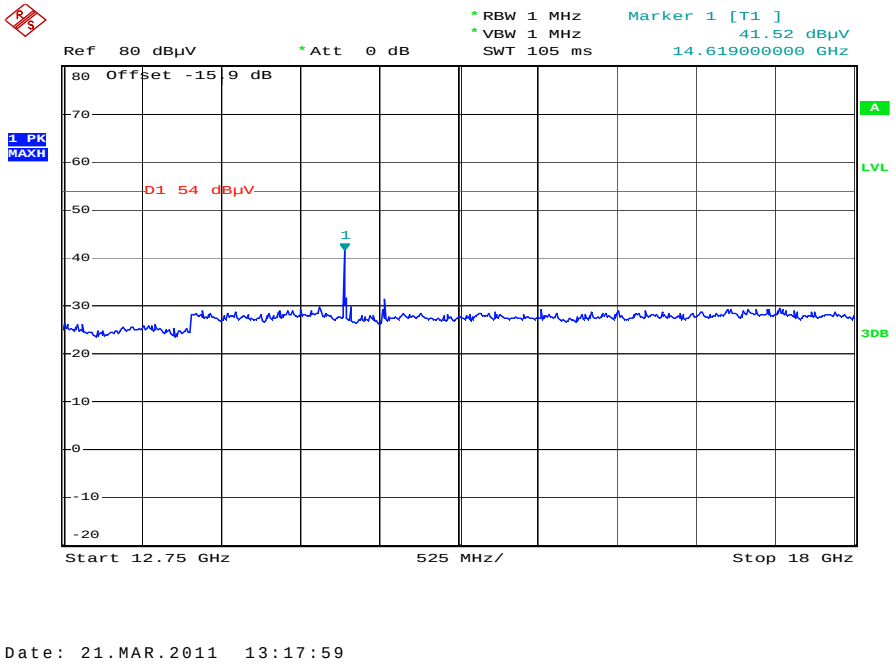
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 8: Middle channel, 1 GHz to 12.75 GHz, horizontal polarization

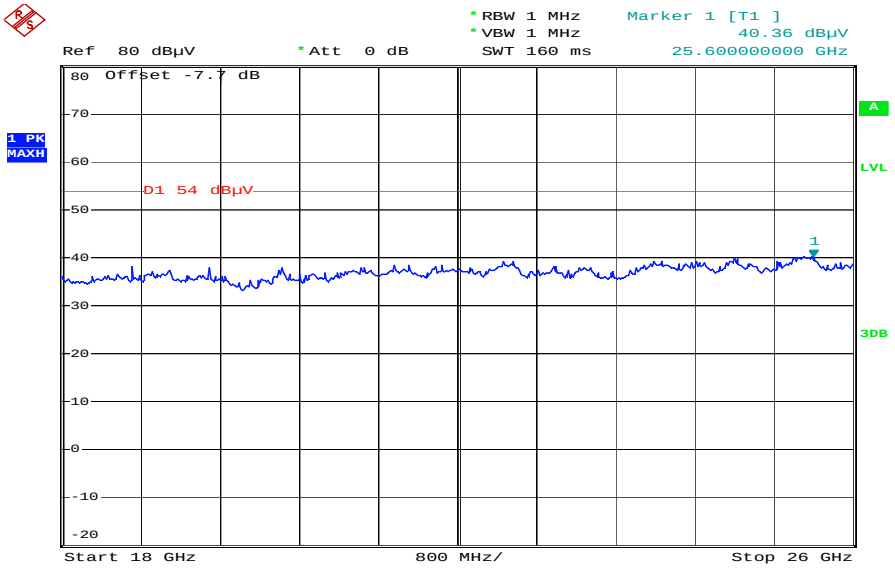


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 9: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 10: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 21.MAR.2011 13:27:26

Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

CETECOM ICT Services GmbH

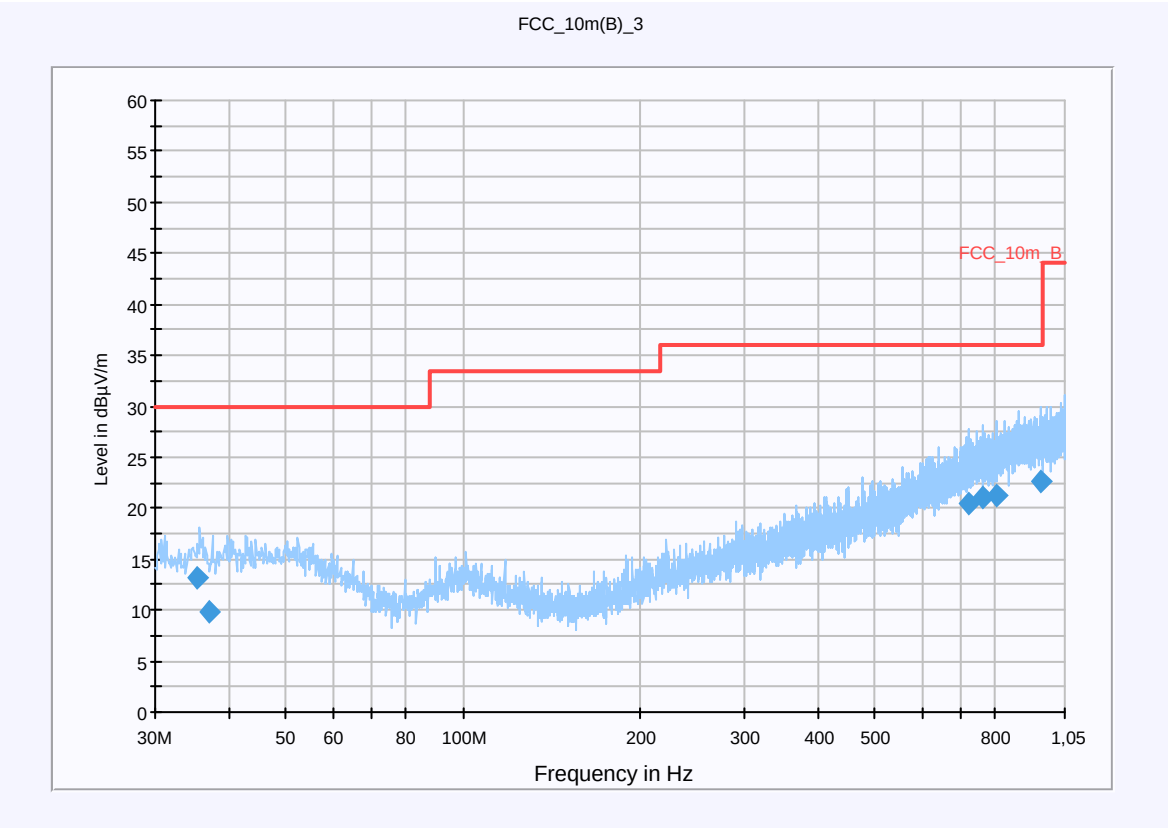
Common Information

EUT:	AAB-1880031-BV
Serial Number:	WUJ232520A
Test Description:	FCC Part 15B Class B < 1GHz @ 10m
Operating Conditions:	WLAN B-mode 2Mbit/s CH:11
Operator Name:	LANGER
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

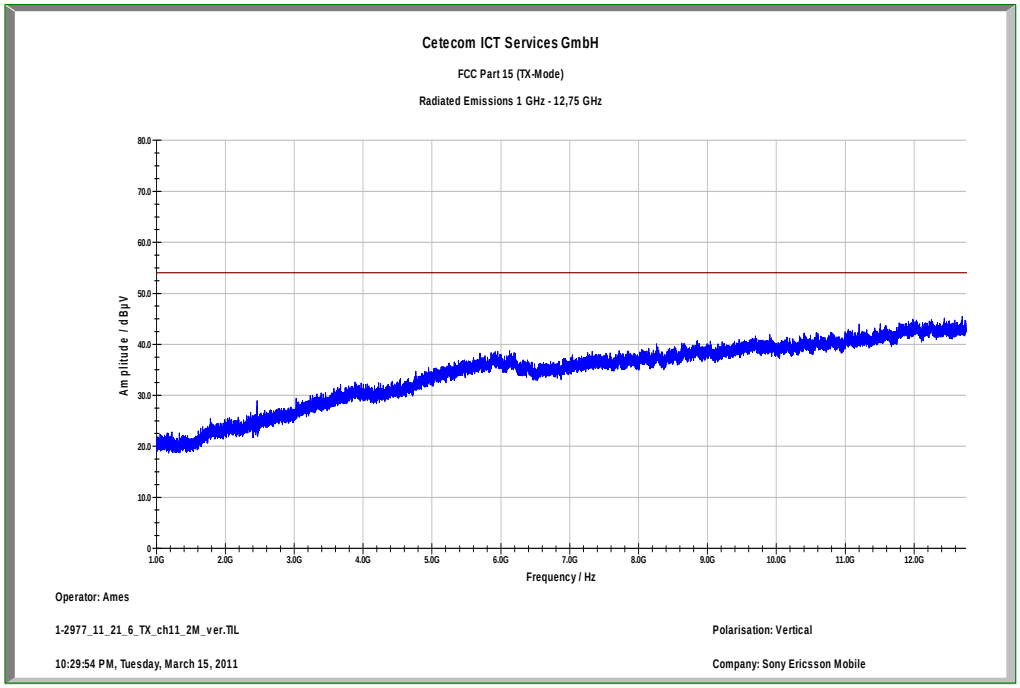
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.377200	13.1	15000.000	120.000	113.0	H	326.0	13.1	16.9	30.0	
36.966600	9.8	15000.000	120.000	220.0	H	33.0	13.2	20.2	30.0	
719.390100	20.4	15000.000	120.000	220.0	H	33.0	23.0	15.6	36.0	
761.318100	21.1	15000.000	120.000	220.0	H	302.0	23.7	14.9	36.0	
806.374350	21.2	15000.000	120.000	220.0	V	146.0	23.9	14.8	36.0	
952.497750	22.6	15000.000	120.000	220.0	V	248.0	25.4	13.4	36.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	ESU [ESU 26] @ GPIB0 (ADR 20), SN 100037/026, FW 4.43
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

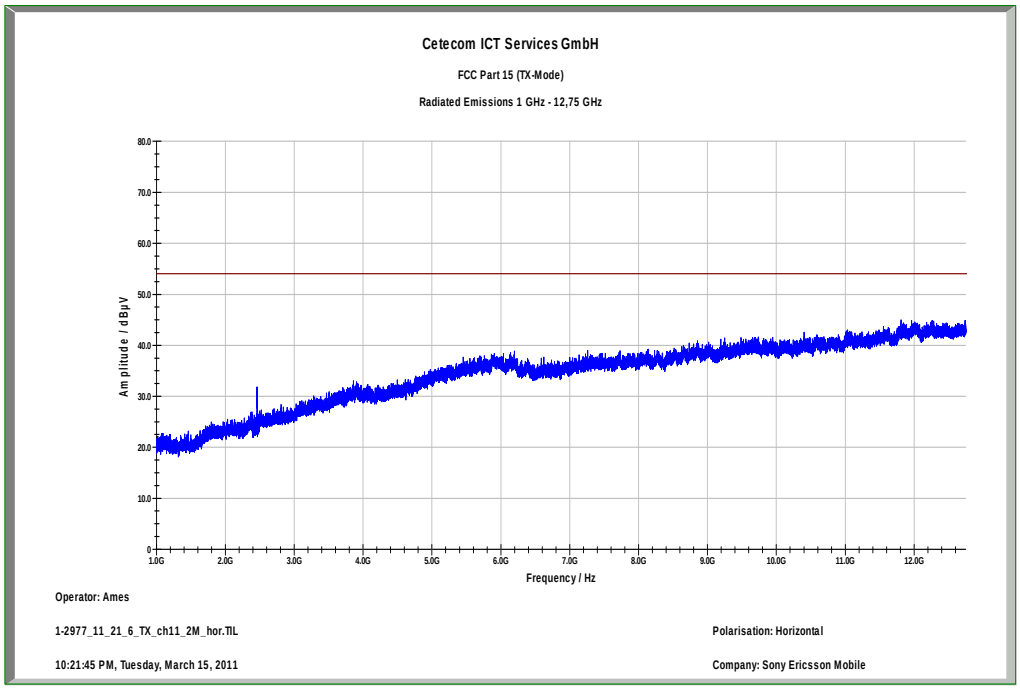
EMC 32 Version 8.10.00

Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical polarization



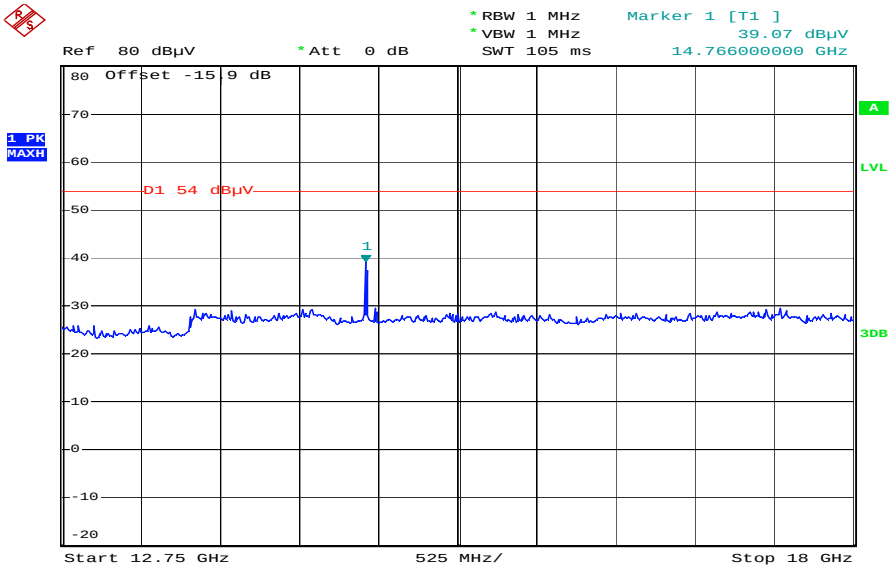
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 13: Highest channel, 1 GHz to 12.75 GHz, horizontal polarization



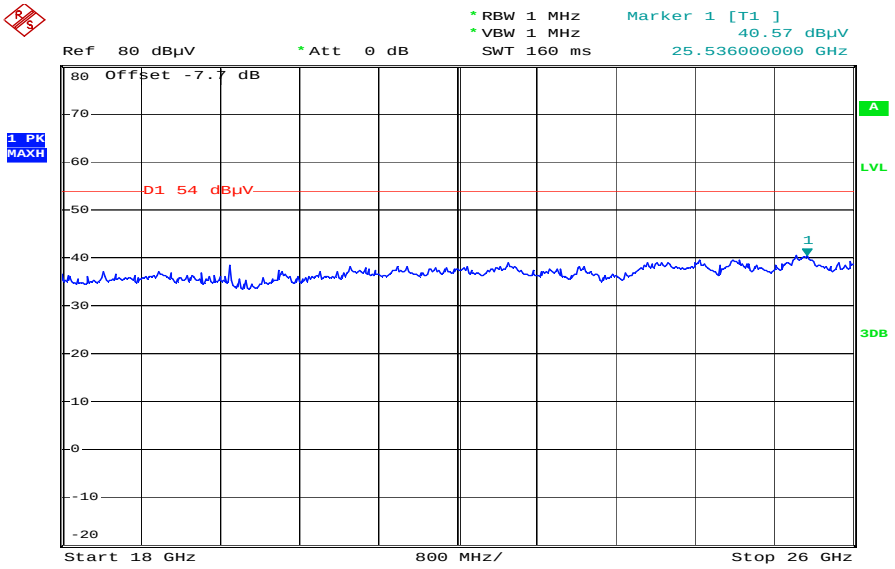
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 14: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 21.MAR.2011 13:19:00

Plot 15: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 21.MAR.2011 13:28:28

Plots: OFDM / g – mode

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

CETECOM ICT Services GmbH

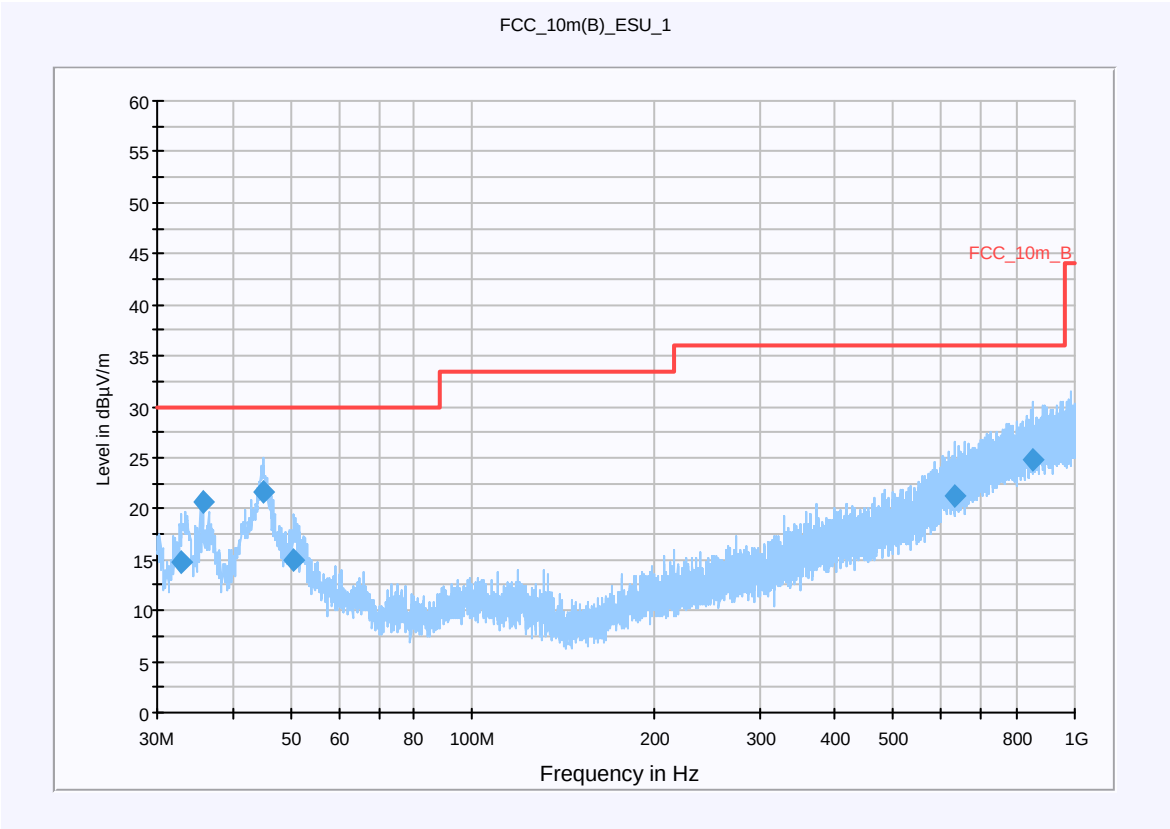
Common Information

EUT:	AAB-1880031-BV
Serial Number:	
Test Description:	FCC Partt 15 B Class B < 1GHz @ 10m
Operating Conditions:	WLAN TX CH: 1
Operator Name:	LAN
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

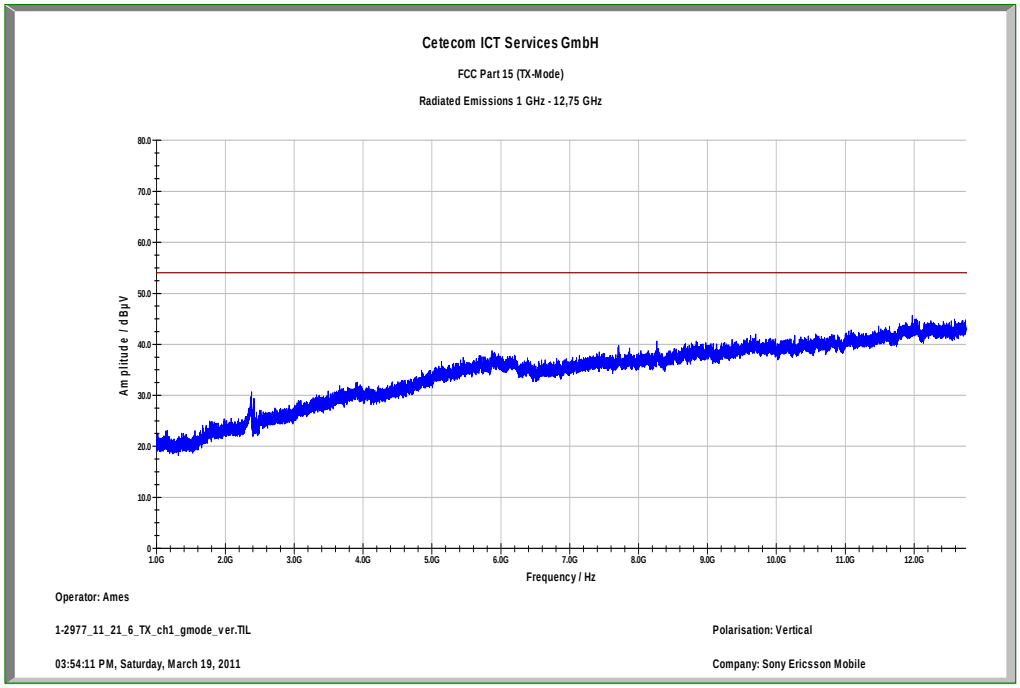
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
32.779520	14.7	15000.000	120.000	98.0	V	76.0	12.8	15.3	30.0	
35.753020	20.7	15000.000	120.000	98.0	V	8.0	13.1	9.3	30.0	
45.017100	21.7	15000.000	120.000	98.0	V	76.0	13.3	8.3	30.0	
50.504880	14.9	15000.000	120.000	98.0	V	316.0	13.3	15.1	30.0	
631.819620	21.2	15000.000	120.000	157.0	V	255.0	21.0	14.8	36.0	
851.495140	24.9	15000.000	120.000	220.0	V	-5.0	24.6	11.1	36.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	ESU [ESU 26] @ GPIB0 (ADR 20), SN 100037/026, FW 4.43
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

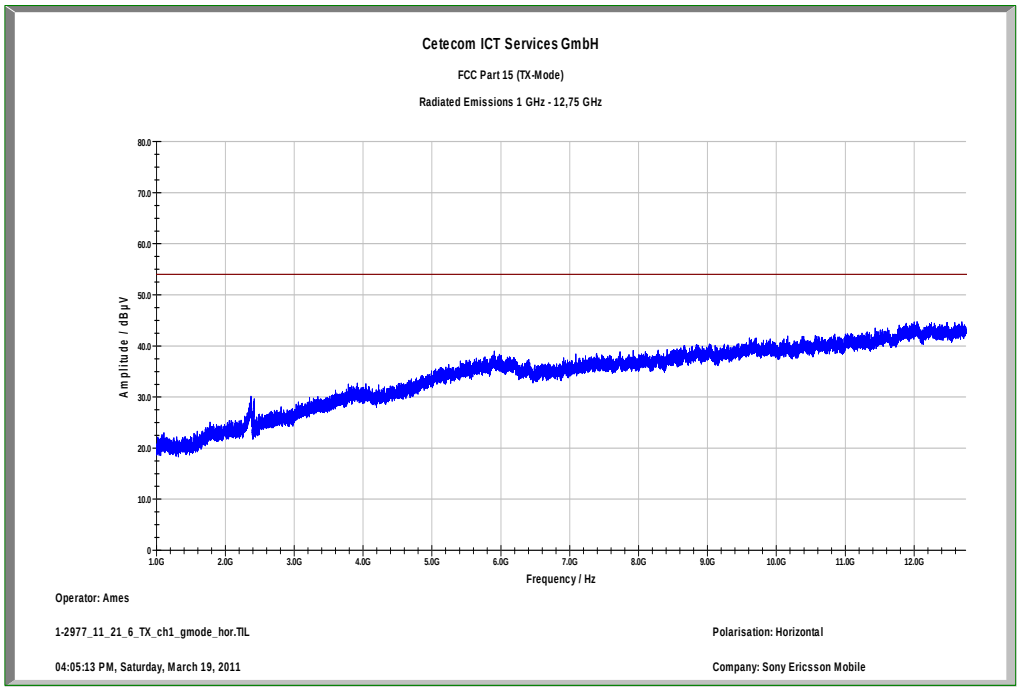
EMC 32 Version 8.10.00

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



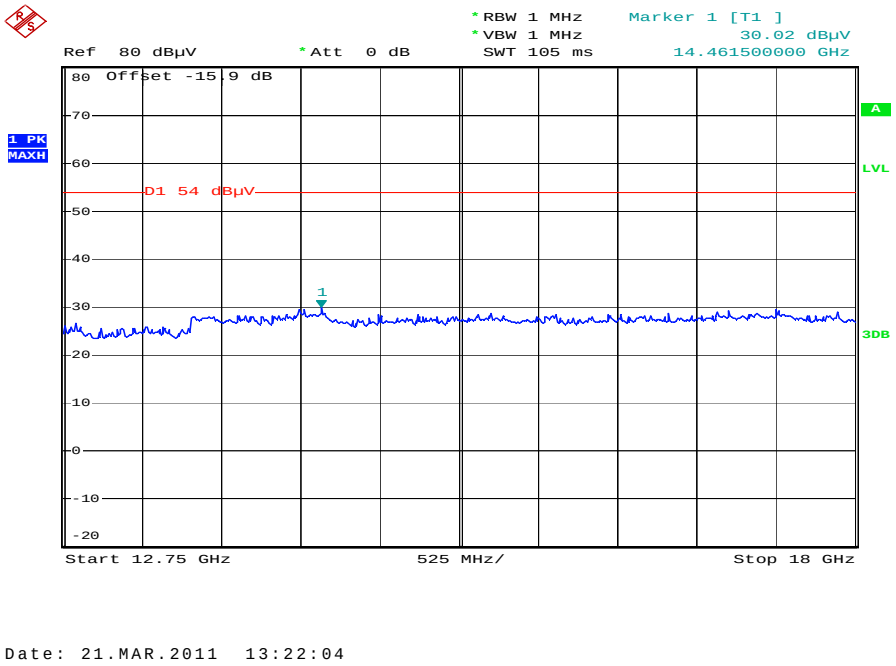
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 1 GHz to 12.75 GHz, horizontal polarization

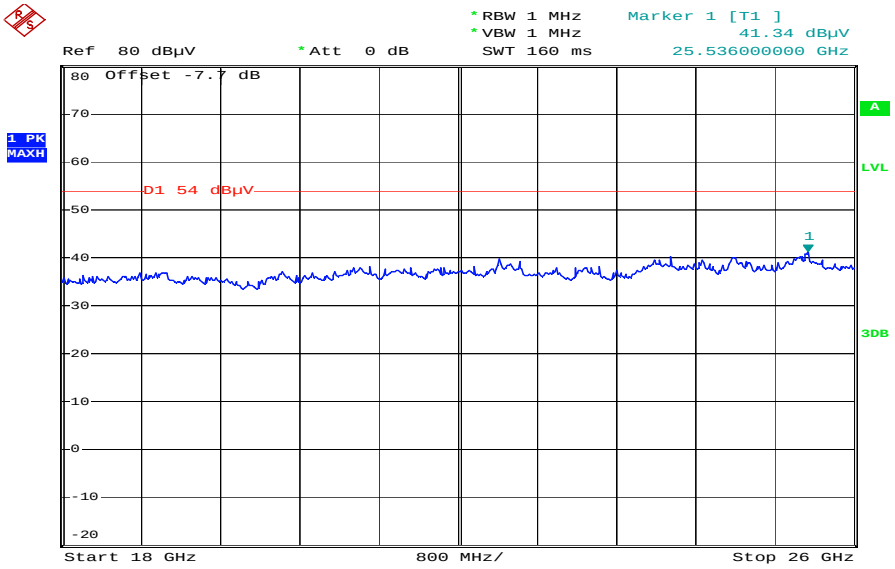


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 5: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



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Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

CETECOM ICT Services GmbH

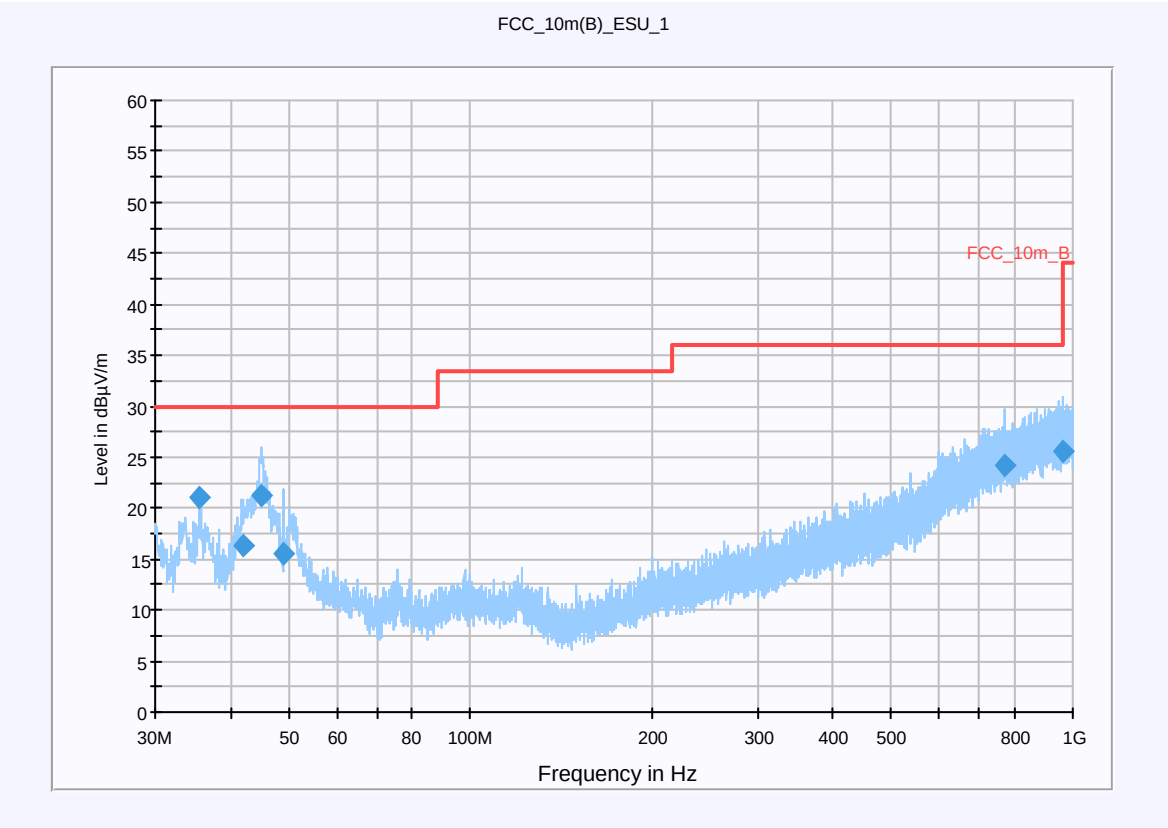
Common Information

EUT:	AAB-1880031-BV
Serial Number:	SNr.: WUJ232520A
Test Description:	FCC Part 15 B Class B < 1GHz @ 10m
Operating Conditions:	WLAN TX CH: 6
Operator Name:	LAN
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.455780	21.0	15000.000	120.000	112.0	V	53.0	13.1	9.0	30.0	
41.947400	16.3	15000.000	120.000	213.0	V	13.0	13.4	13.7	30.0	
44.881060	21.3	15000.000	120.000	107.0	V	3.0	13.3	8.7	30.0	
48.975720	15.5	15000.000	120.000	120.0	V	255.0	13.4	14.5	30.0	
770.697620	24.1	15000.000	120.000	206.0	H	182.0	23.7	11.9	36.0	
963.134900	25.6	15000.000	120.000	220.0	V	75.0	25.5	18.4	44.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	ESU [ESU 26] @ GPIB0 (ADR 20), SN 100037/026, FW 4.43
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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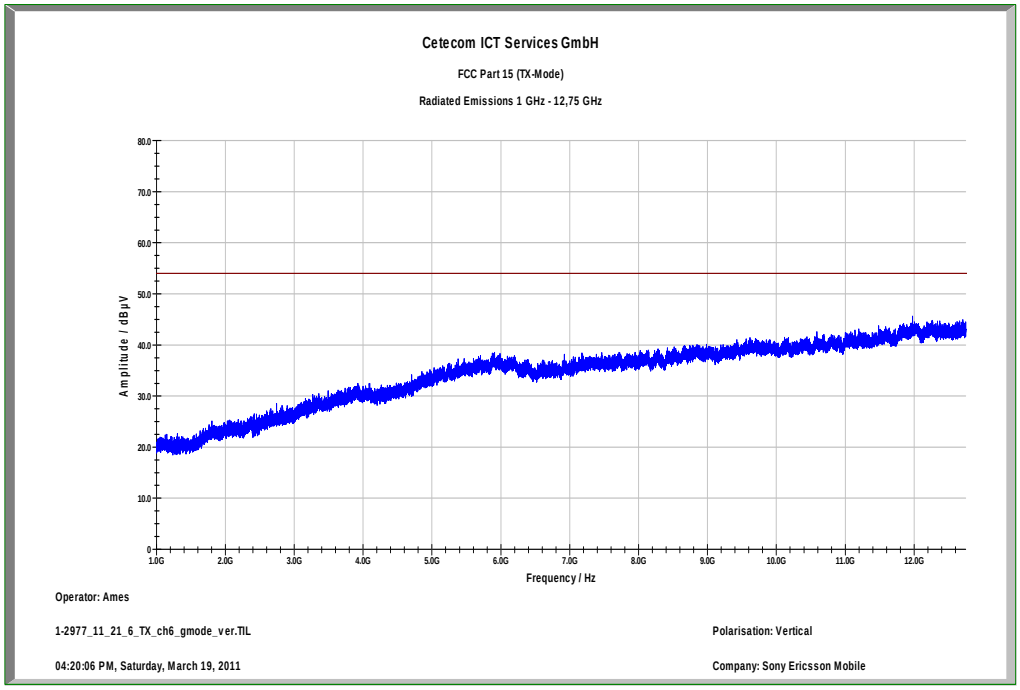
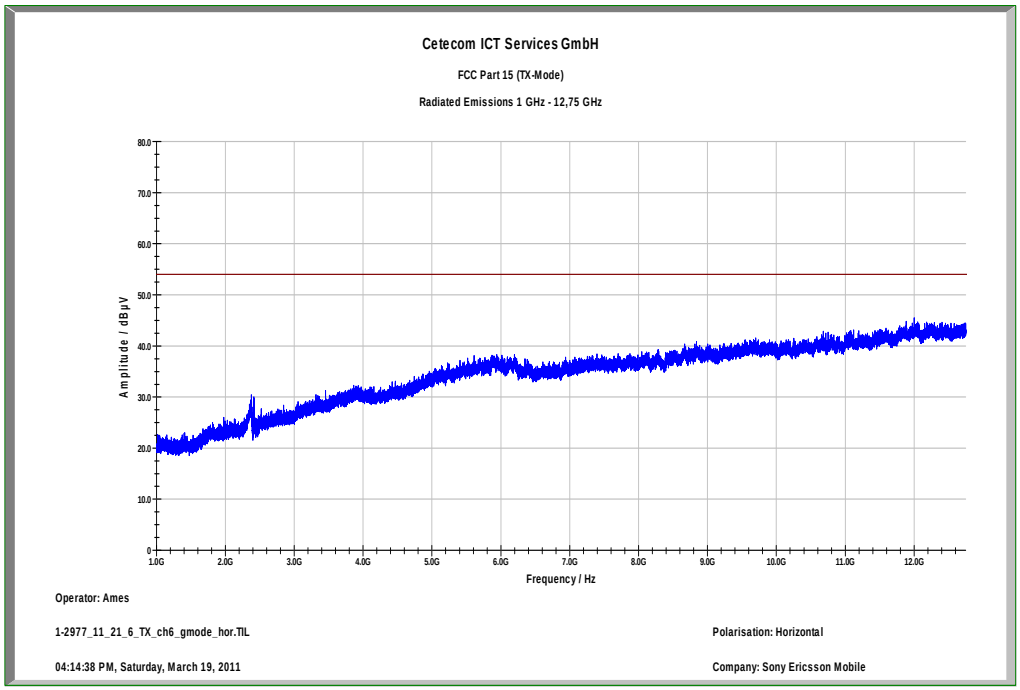
Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical polarization



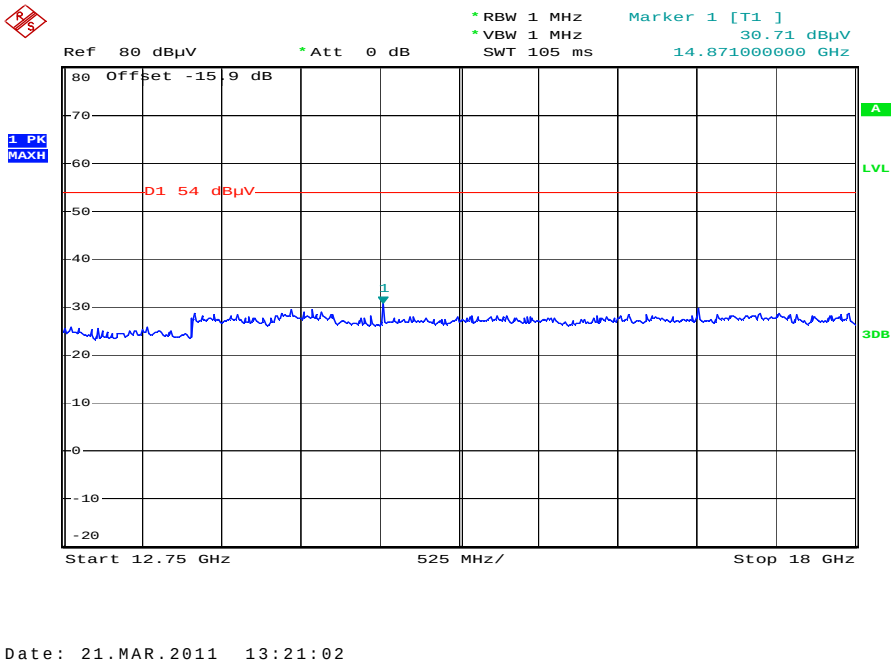
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 8: Middle channel, 1 GHz to 12.75 GHz, horizontal polarization

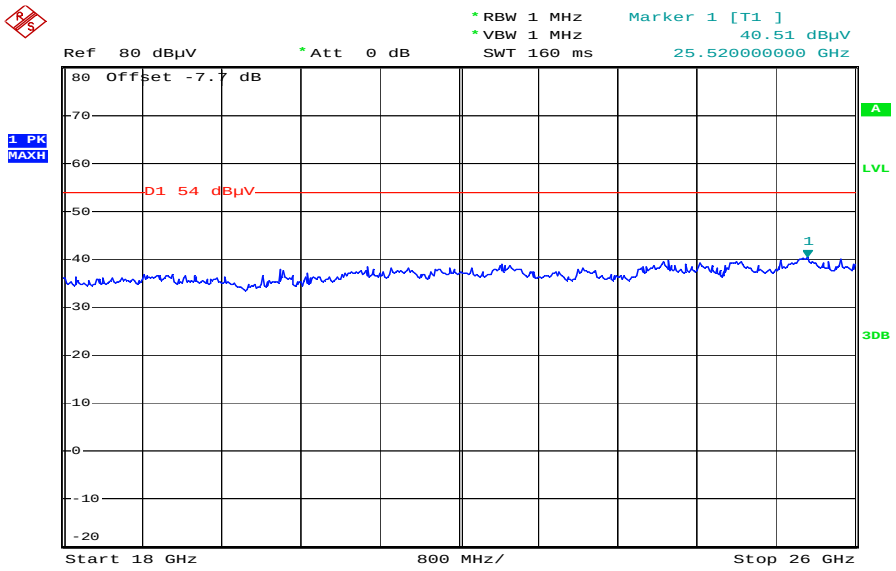


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 9: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 10: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



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Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

CETECOM ICT Services GmbH

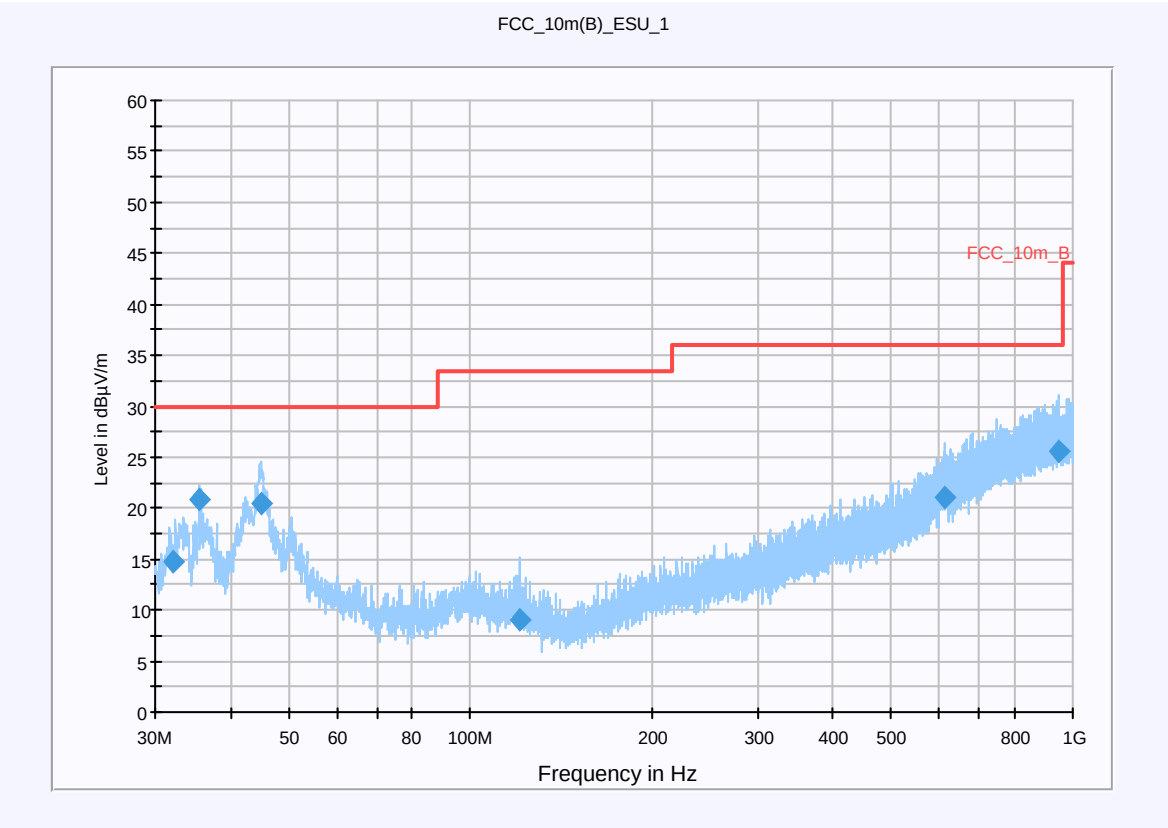
Common Information

EUT:	AAB-1880031-BV
Serial Number:	SNr.: WUJ232520A
Test Description:	FCC Partt 15 B Class B < 1GHz @ 10m
Operating Conditions:	WLAN TX CH: 11
Operator Name:	LAN
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
32.043300	14.7	15000.000	120.000	98.0	V	134.0	12.7	15.3	30.0	
35.470820	20.8	15000.000	120.000	106.0	V	10.0	13.1	9.2	30.0	
44.916080	20.4	15000.000	120.000	134.0	V	307.0	13.3	9.6	30.0	
121.124640	9.0	15000.000	120.000	220.0	V	303.0	10.1	24.5	33.5	
612.352880	21.0	15000.000	120.000	182.0	H	236.0	20.9	15.0	36.0	
950.477880	25.5	15000.000	120.000	220.0	H	134.0	25.4	10.5	36.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	ESU [ESU 26] @ GPIB0 (ADR 20), SN 100037/026, FW 4.43
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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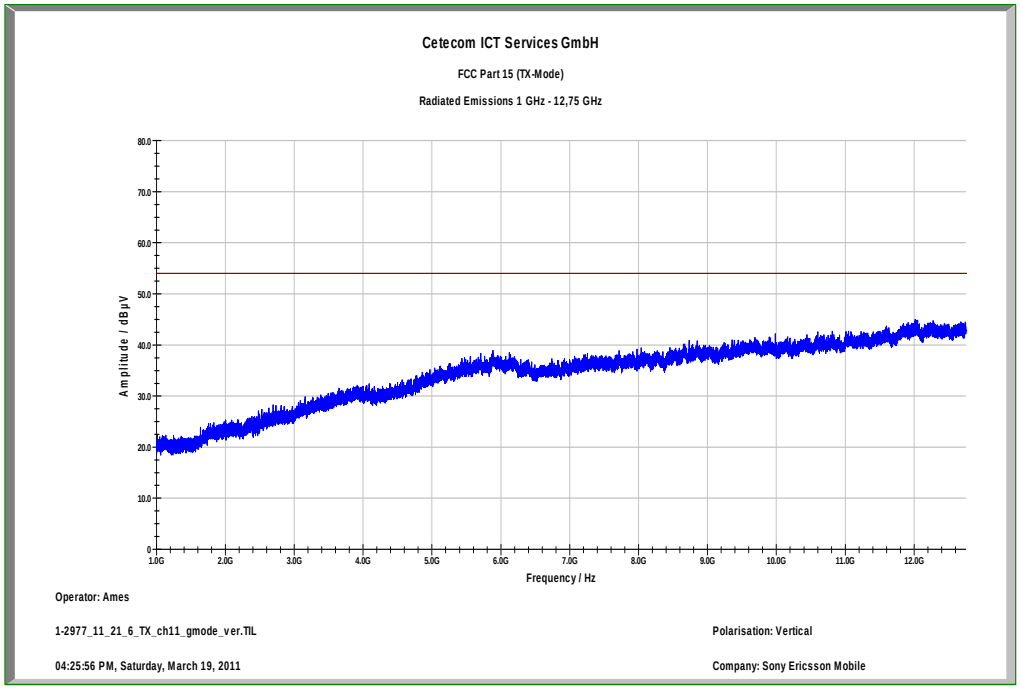
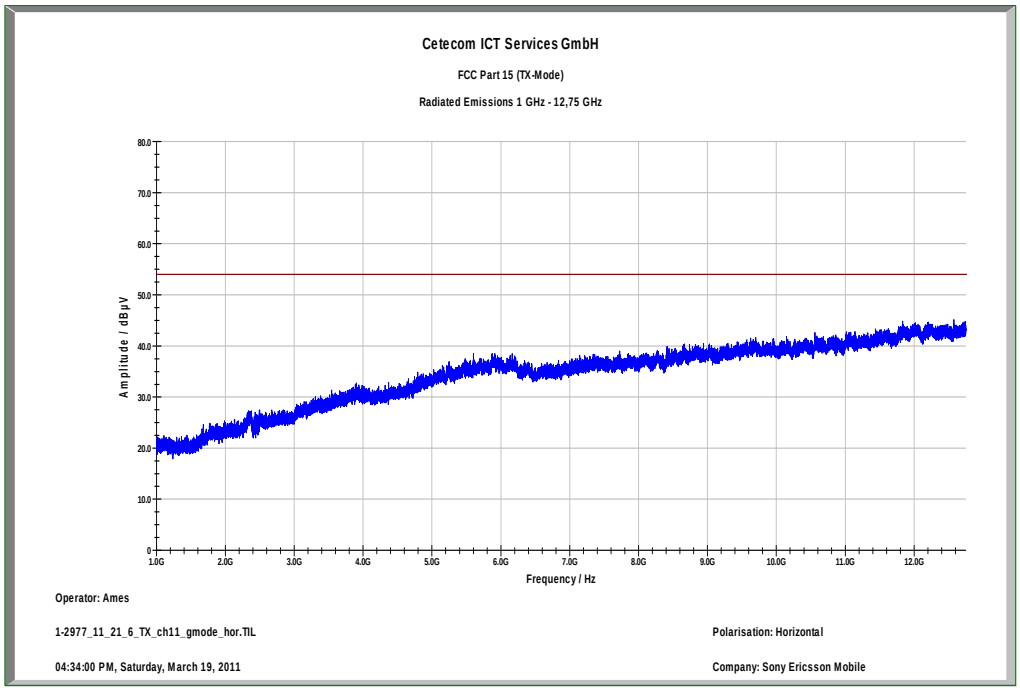
Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical polarization



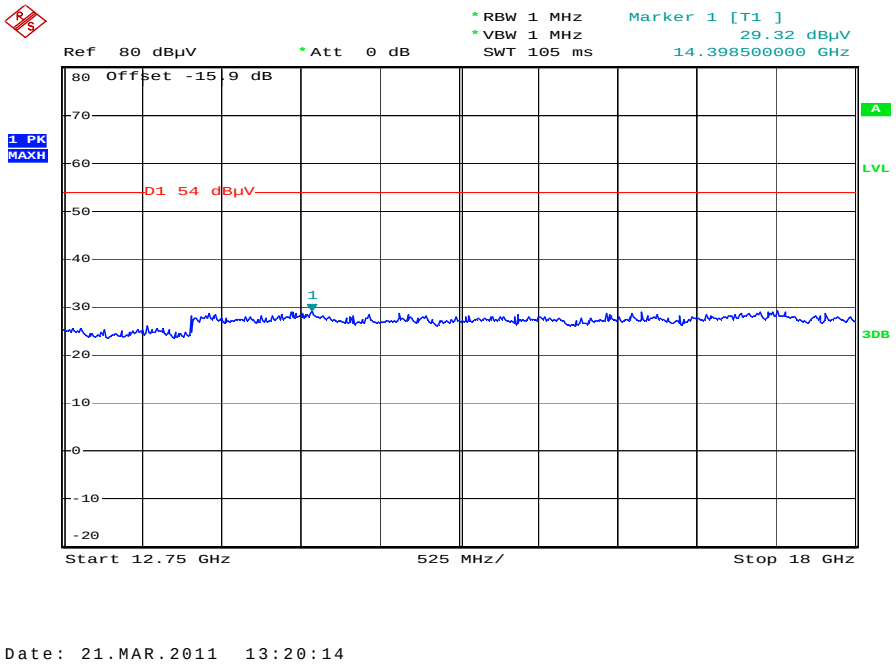
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 13: Highest channel, 1 GHz to 12.75 GHz, horizontal polarization

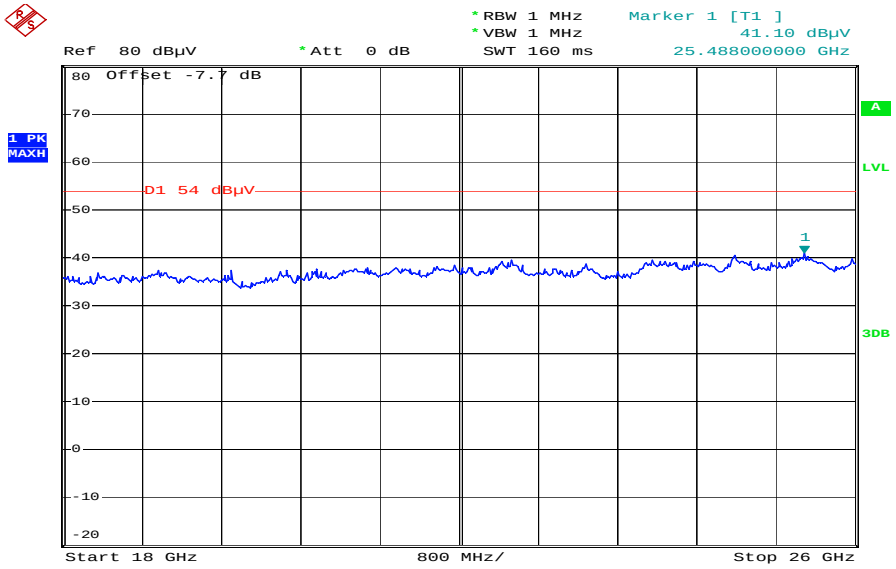


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 14: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 15: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



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9.11 RX 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
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
CFR Part 15.109		RSS Gen, Issue 2, 4.10
RX Spurious Emissions Radiated		
Frequency (MHz)	Field Strength (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:

RX Spurious Emissions Radiated [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks found		
Measurement uncertainty	± 3 dB	

Result: **The result of the measurement is passed.**

Plots: RX / Idle – mode

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

CETECOM ICT Services GmbH

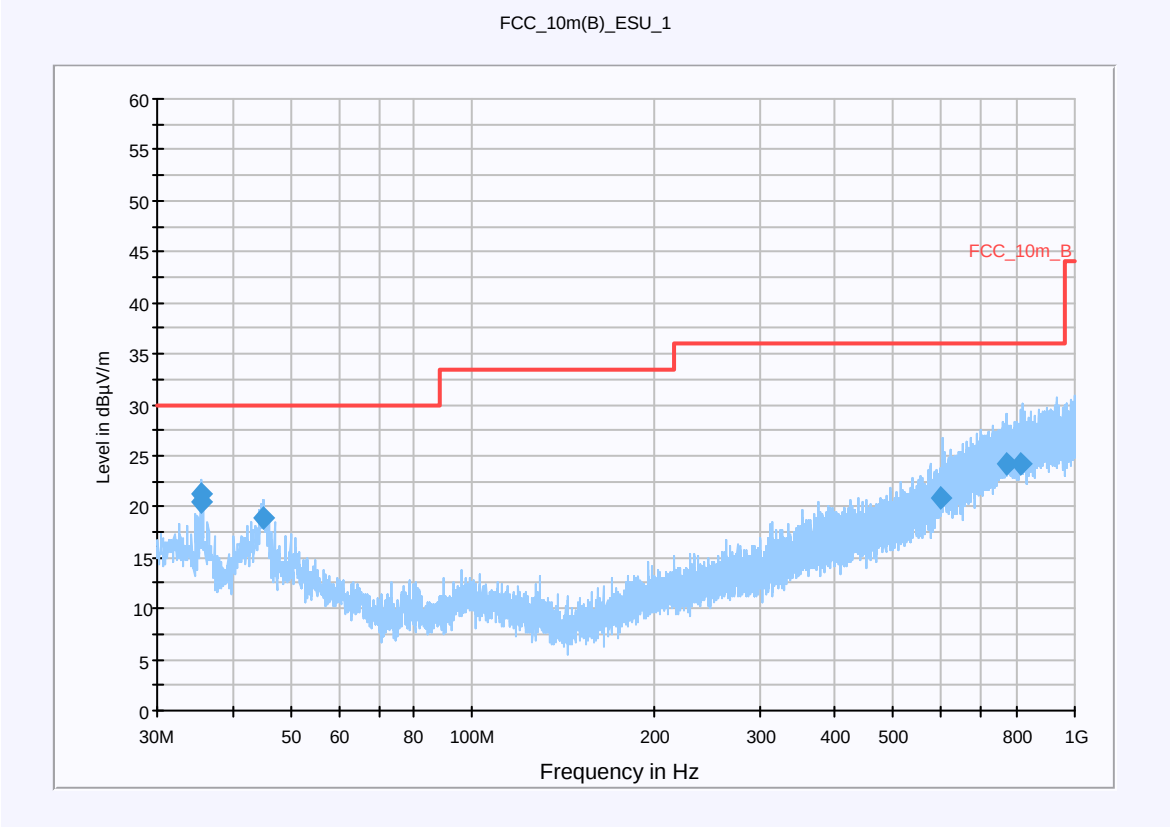
Common Information

EUT:	AAB-1880031-BV
Serial Number:	SNr.: WUJ232520A
Test Description:	FCC Partt 15 B Class B < 1GHz @ 10m
Operating Conditions:	WLAN RX
Operator Name:	LAN
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

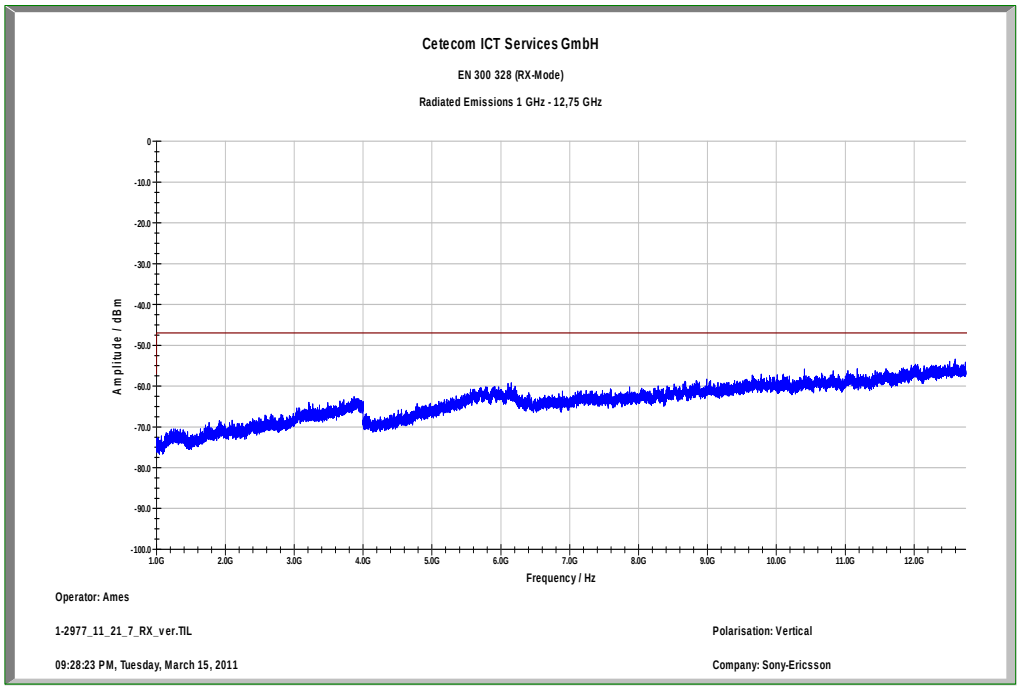
Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



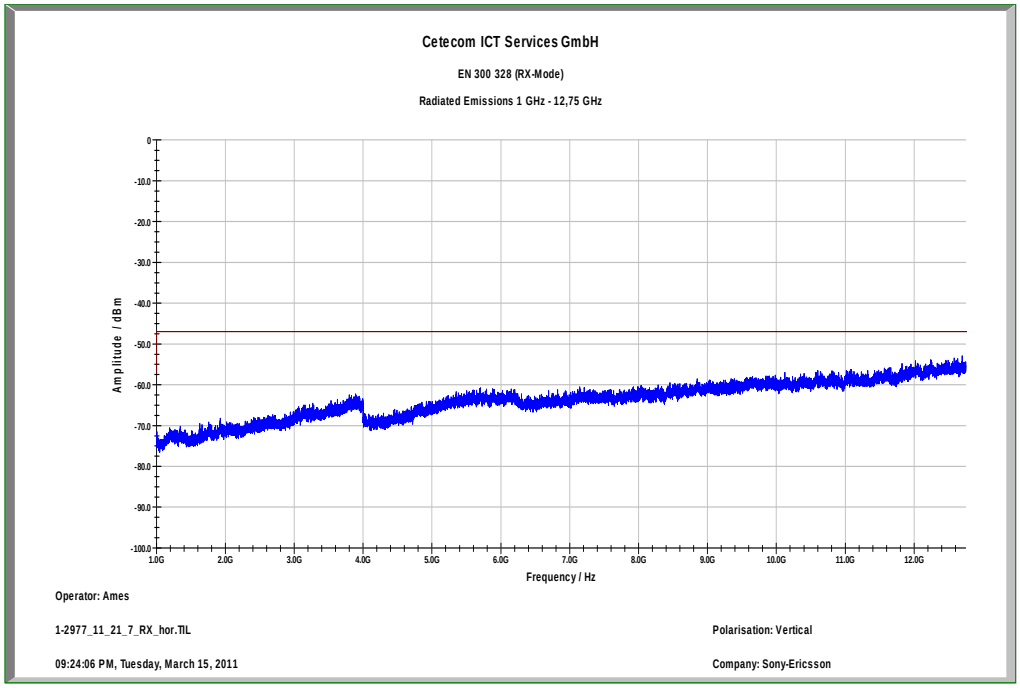
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.428040	20.5	15000.000	120.000	98.0	V	65.0	13.1	9.5	30.0	
35.434860	21.3	15000.000	120.000	106.0	V	173.0	13.1	8.7	30.0	
44.996340	19.0	15000.000	120.000	98.0	V	111.0	13.3	11.0	30.0	
600.598820	20.9	15000.000	120.000	220.0	H	12.0	20.8	15.1	36.0	
768.694820	24.1	15000.000	120.000	186.0	H	294.0	23.7	11.9	36.0	
813.321460	24.2	15000.000	120.000	171.0	V	196.0	24.0	11.8	36.0	

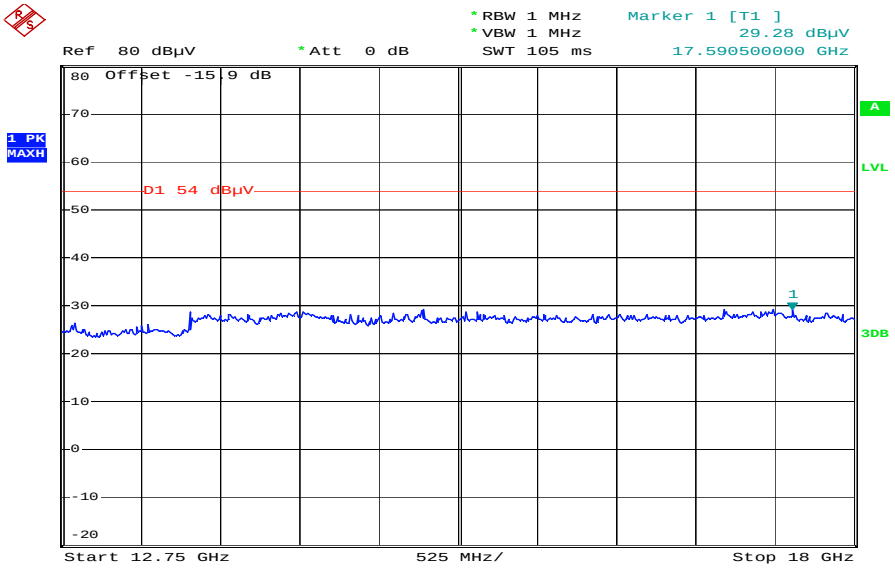
Plot 2: 1 GHz to 12.75 GHz, vertical polarization



Plot 3: 1 GHz to 12.75 GHz, horizontal polarization



Plot 4: 12.75 GHz to 18 GHz, vertical & horizontal polarization



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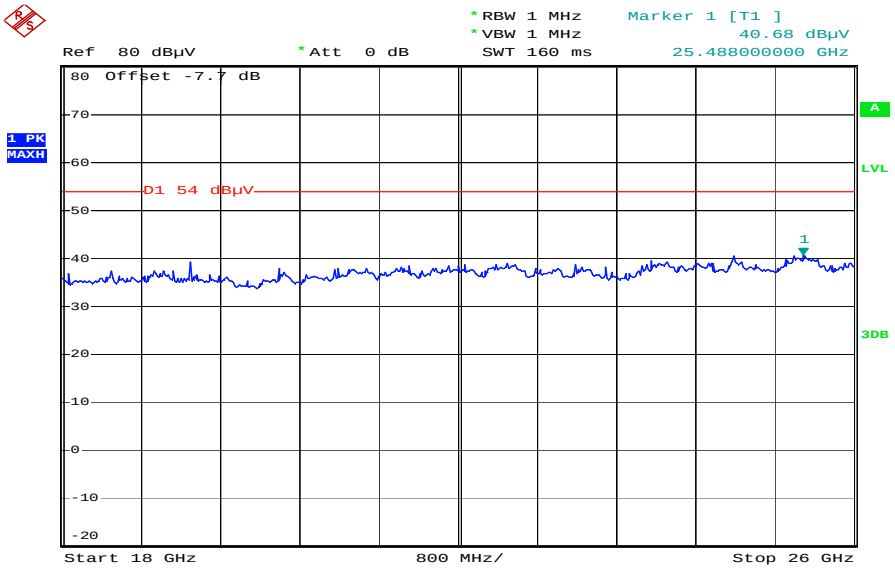
Plot 5: 18 GHz to 26 GHz, vertical & horizontal polarization



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9.12 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 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
CFR Part 15.209(a)		RSS –Gen
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

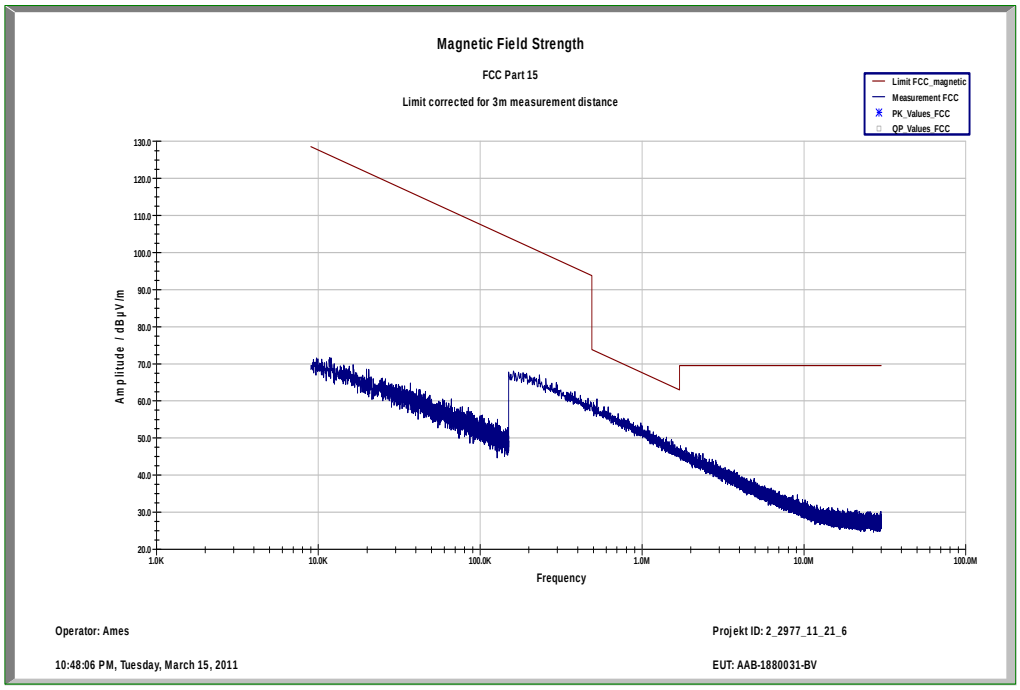
Results:

TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
No peaks detected between 1 GHz and 12.75 GHz.		
For emissions above 12.75 GHz, please take a look at the plots.		
Measurement uncertainty	± 3 dB	

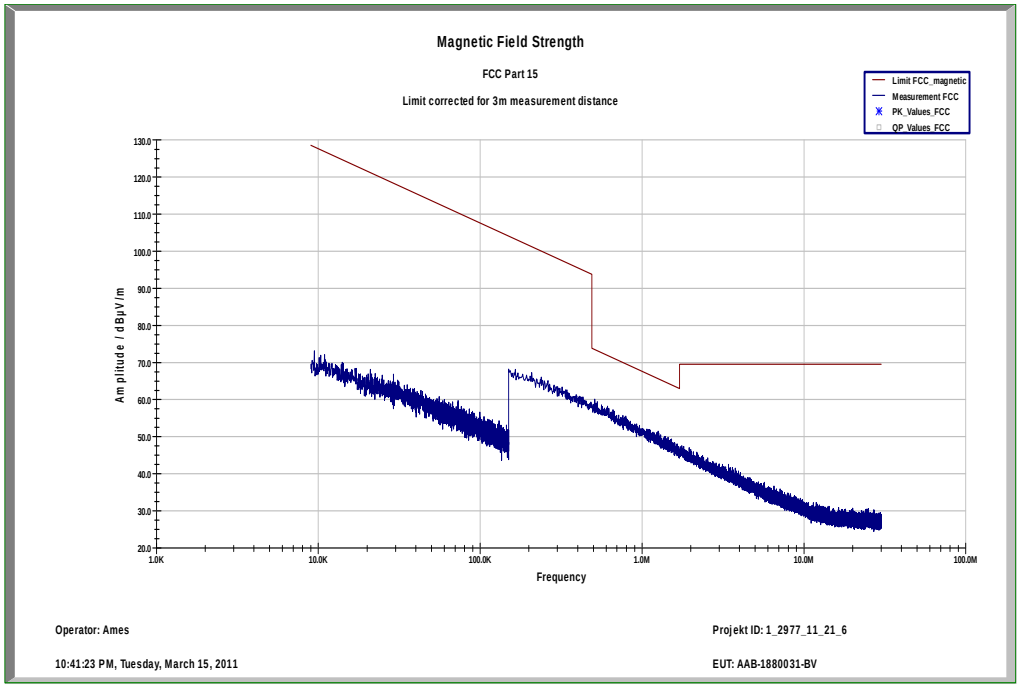
Result: **The result of the measurement is passed.**

Plots: DSSS / b – mode

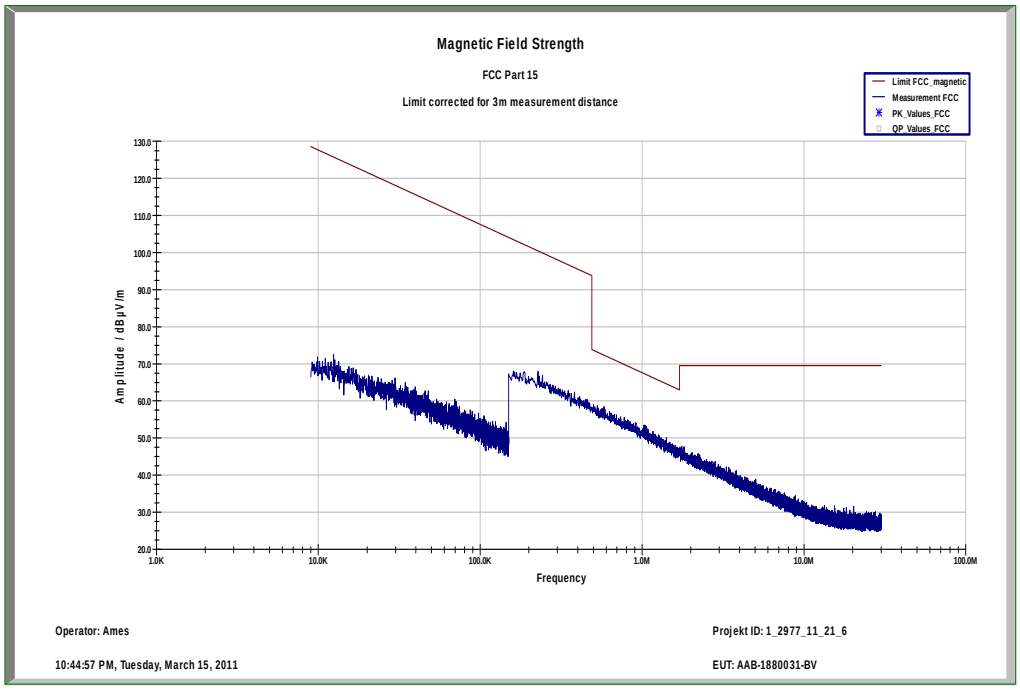
Plot 1: Lowest channel, 9 kHz to 30 MHz



Plot 2: Middle channel, 9 kHz to 30 MHz

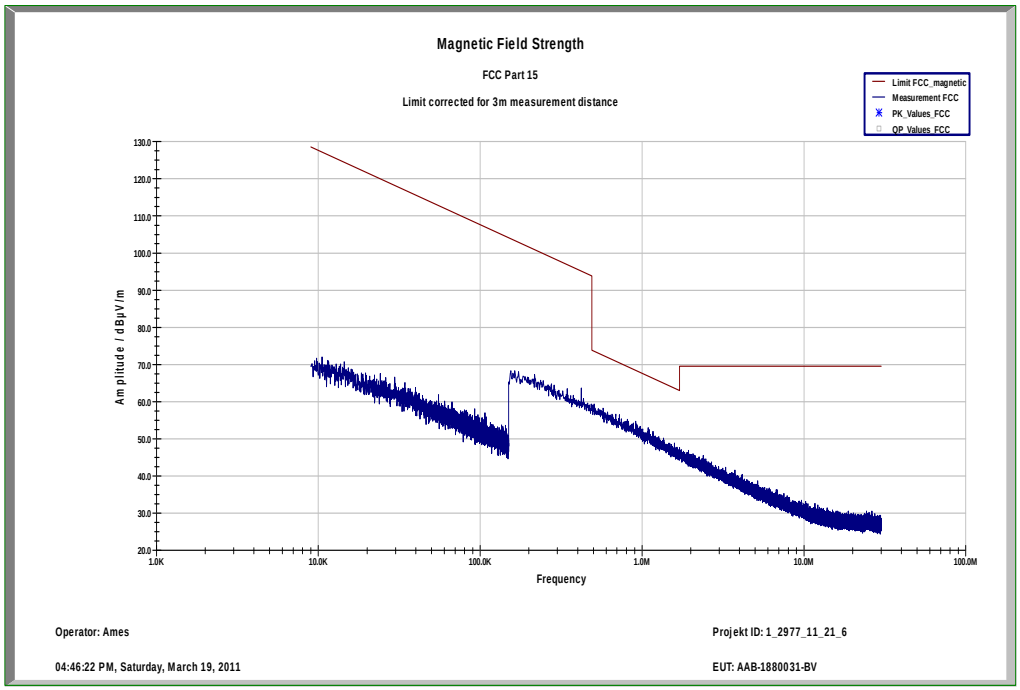


Plot 3: Highest channel, 9 kHz to 30 MHz

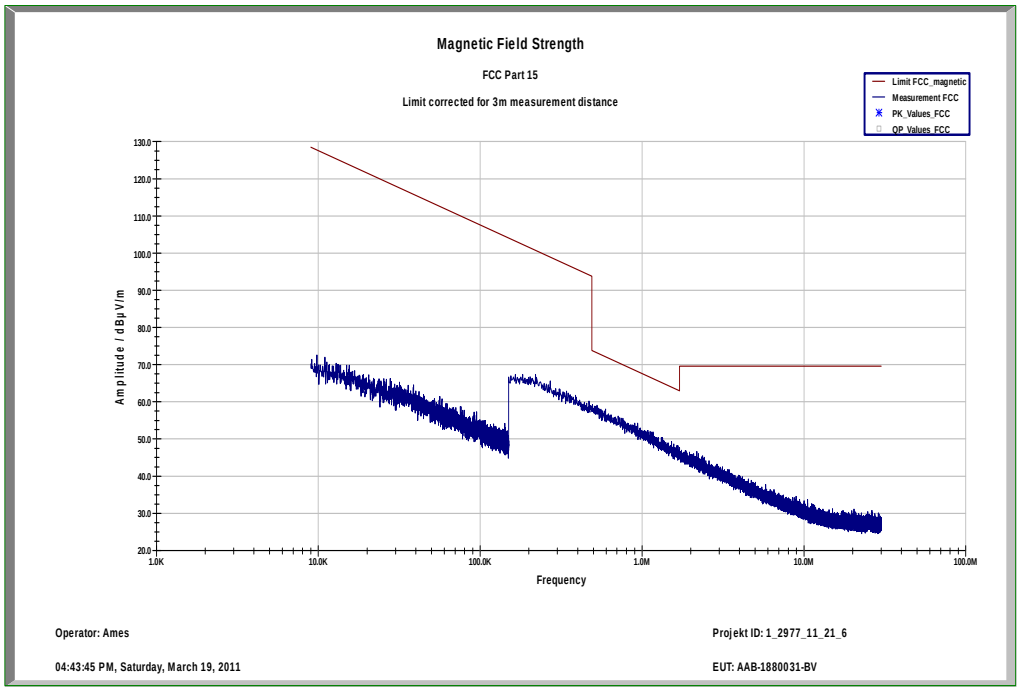


Plots: OFDM / g – mode

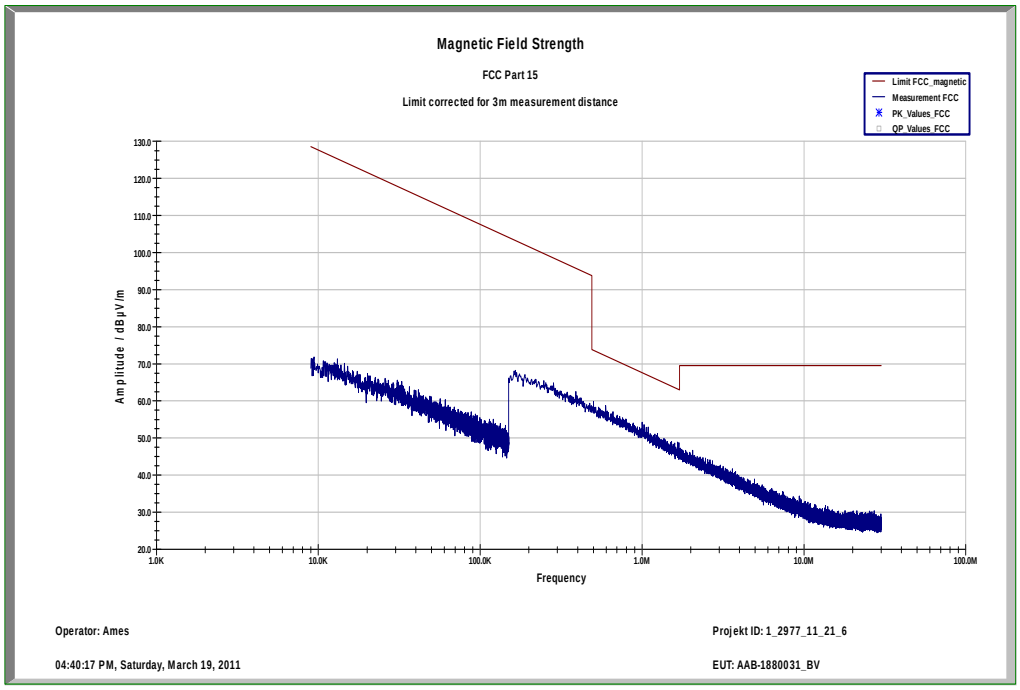
Plot 1: Lowest channel, 9 kHz to 30 MHz



Plot 2: Middle channel, 9 kHz to 30 MHz

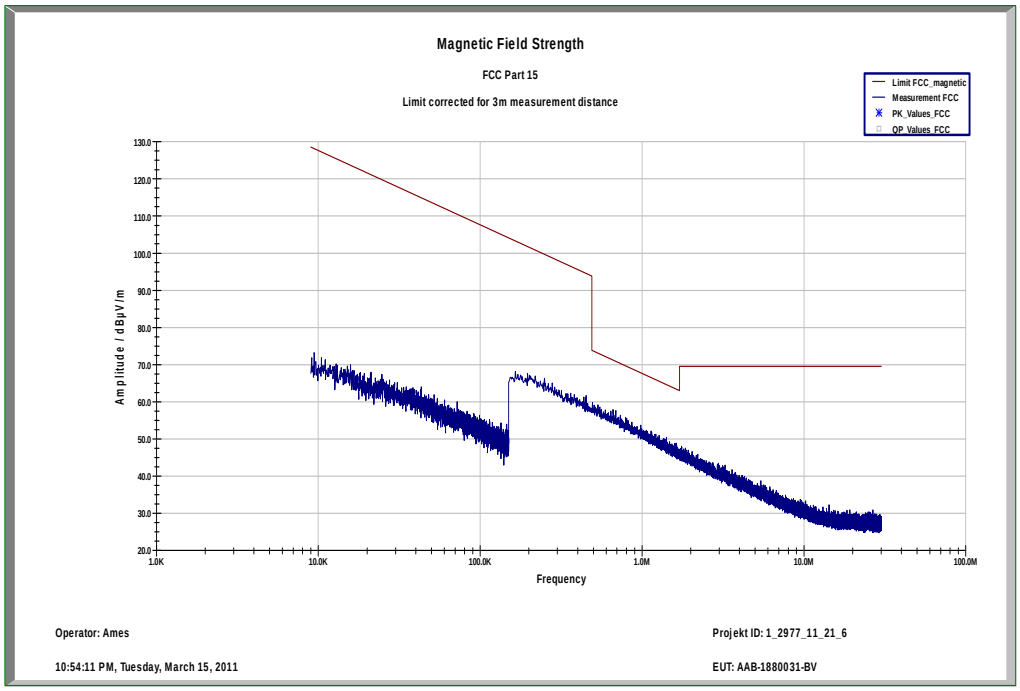


Plot 3: Highest channel, 9 kHz to 30 MHz



Plots: Idle / RX mode

Plot 1: 9 kHz to 30 MHz



9.13 TX spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. 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. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

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

Limits:

FCC		IC
CFR Part 15.107(a)		ICES-003, Issue 4
TX Spurious Emissions Conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/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

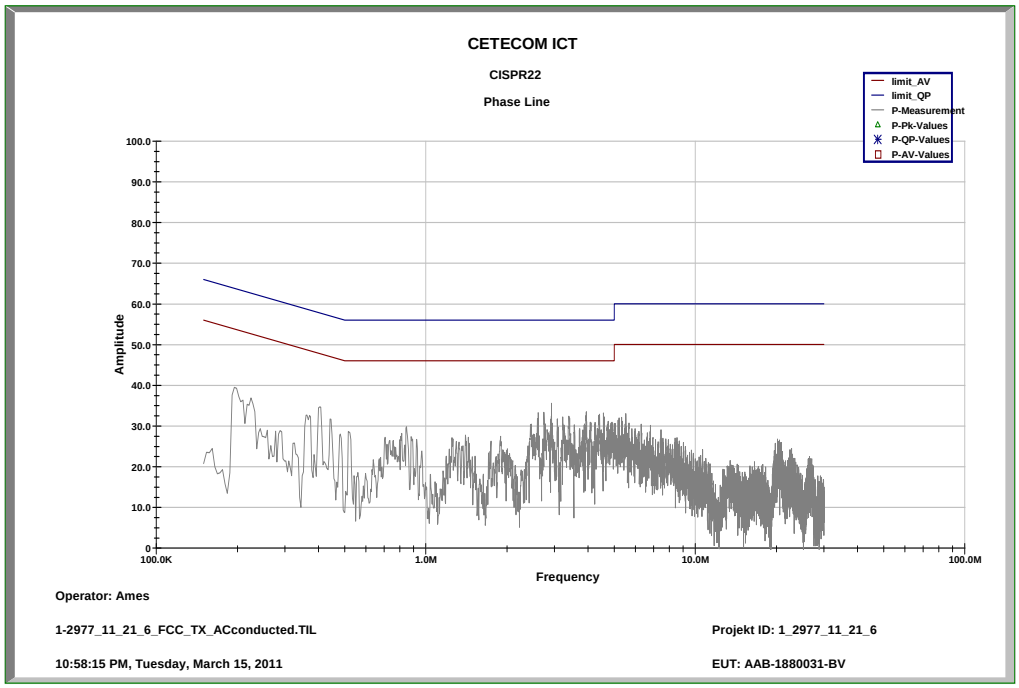
Results:

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

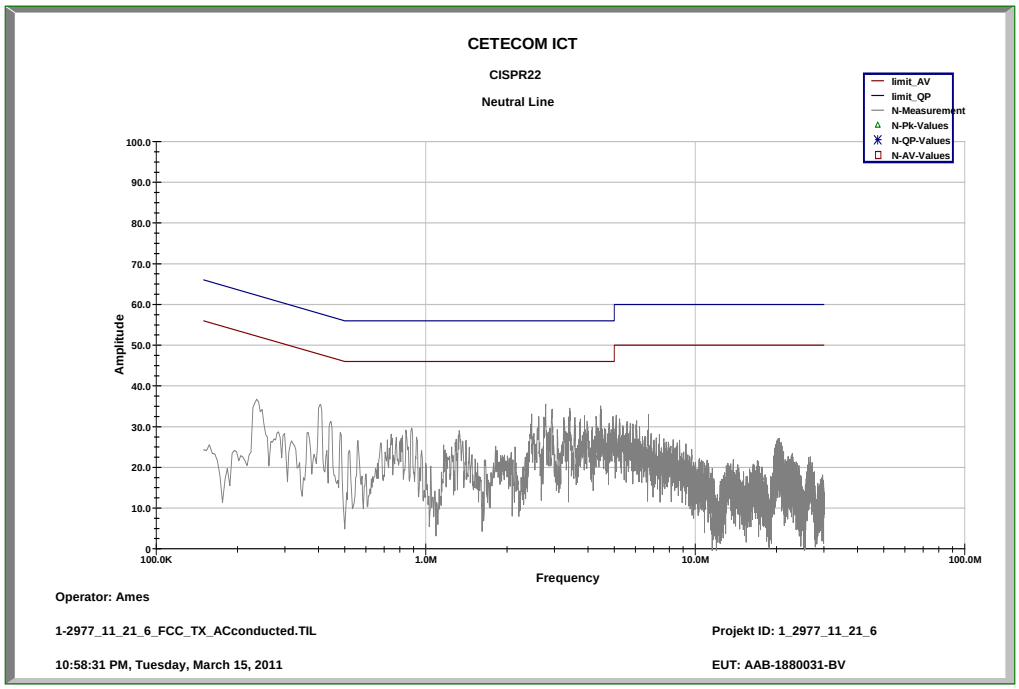
Result: **The result of the measurement is passed.**

Plots:

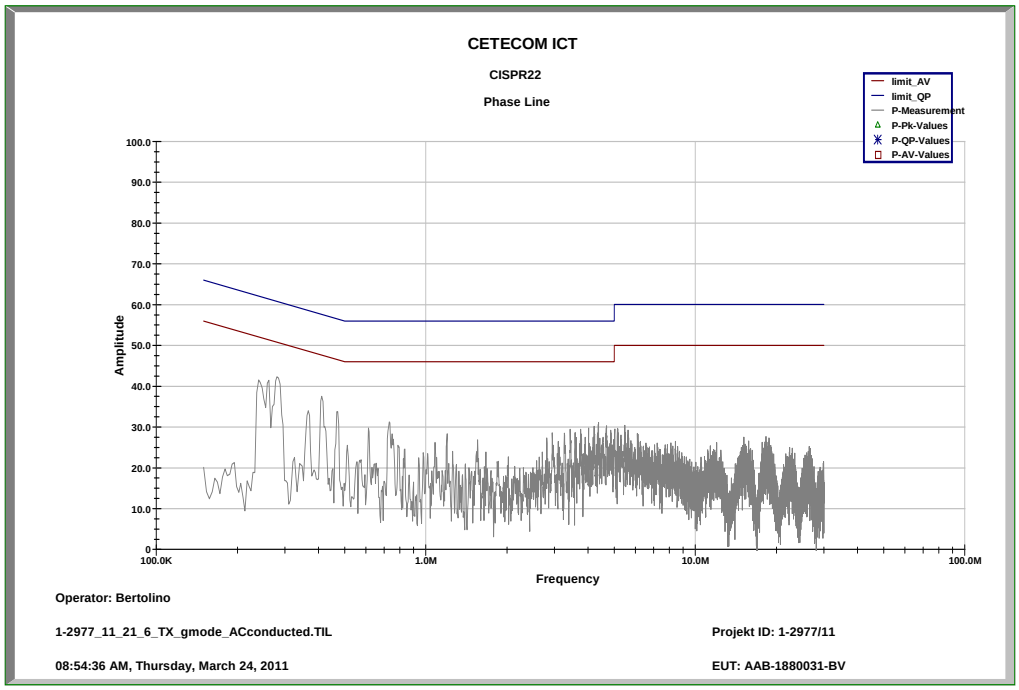
Plot 1: DSSS / b – mode, 9 kHz to 30 MHz, phase line



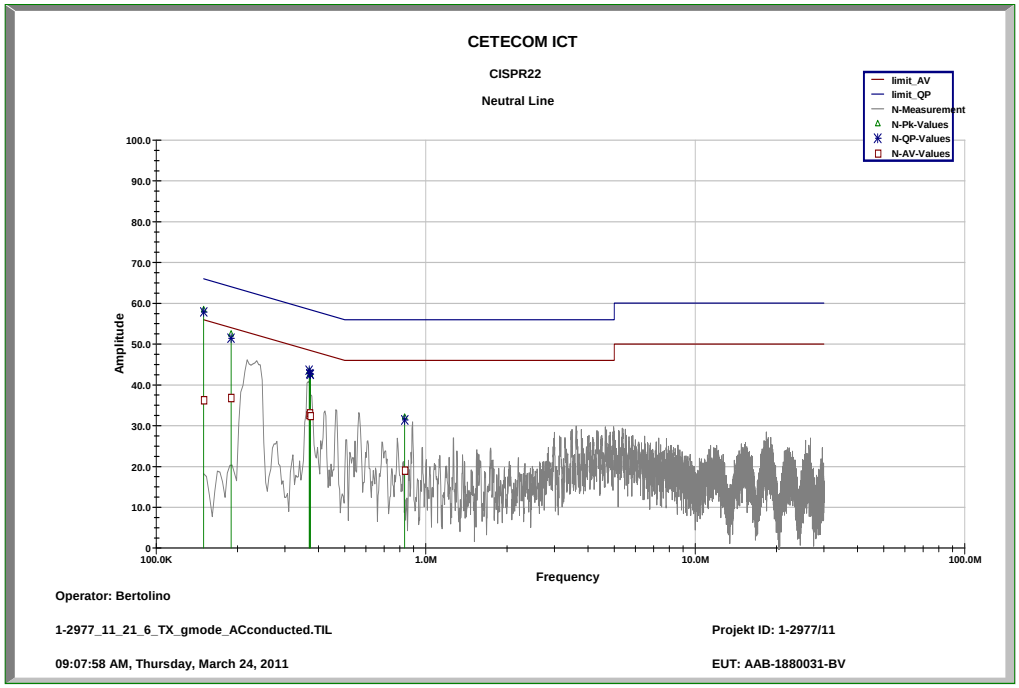
Plot 2: DSSS / b – mode, 9 kHz to 30 MHz, neutral line



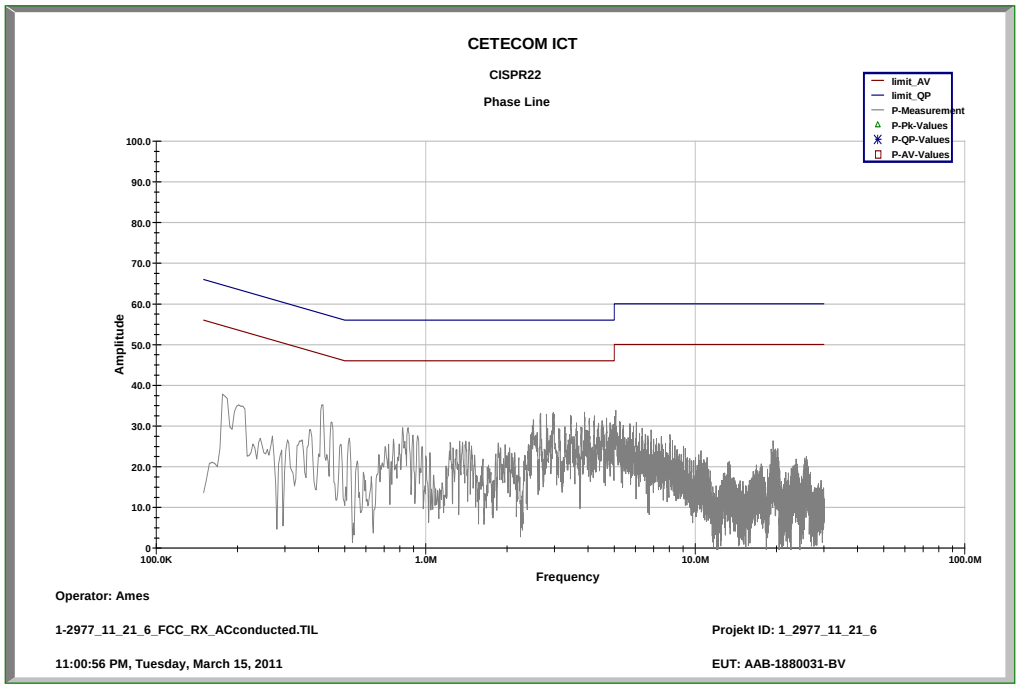
Plot 3: OFDM / g – mode, 9 kHz to 30 MHz, phase line



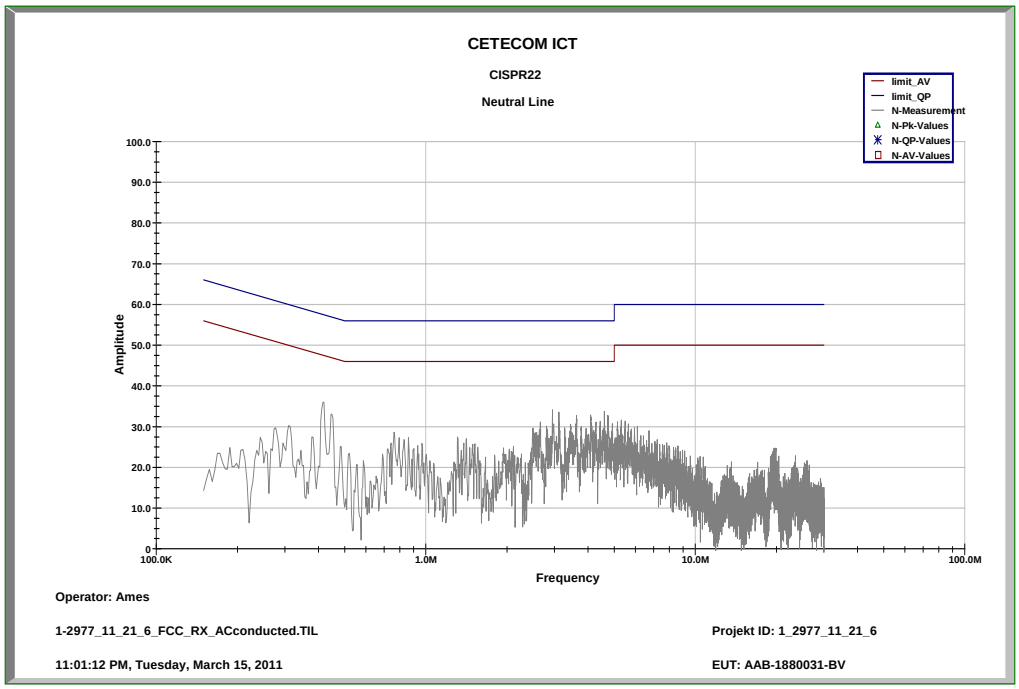
Plot 4: OFDM / g – mode, 9 kHz to 30 MHz, neutral line



Plot 5: RX / Idle – mode, 9 kHz to 30 MHz, phase line



Plot 6: RX / Idle – mode, 9 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	n. a.	Switch / Control Unit	3488A	HP Meßtechnik		300001691	ne		
2	n. a.	Power Supply DC	NGPE 40/40	R&S	388	400000078	vIKI!	13.09.2010	13.09.2012
3	n. a.	Power Sensor 50 Ohms, 10 MHz - 18 GHz, 1 nW - 20 mW	NRV-Z1	R&S	833894/011	300002681-0010	k	09.09.2010	09.09.2012
4	n. a.	Hygro-Thermometer	-/-, 5-45°C, 20-100%rF	Thies Clima	-/-	400000080	k	04.05.2010	04.05.2011
5	n. a.	Vector Signal Generator, 300 kHz to 2.2 GHz	SMIQ03B	R&S	835541/055	300002681-0001	k	25.08.2008	25.08.2011
6	n. a.	Vector Signal Generator, 300 kHz to 2.2 GHz	SMIQ03B	R&S	835541/056	300002681-0002	k	26.08.2008	26.08.2011
7	n. a.	Signal Generator 0.01/2 - 20 GHz, Frequ. Resol. 0.1Hz	SMP02	R&S	835133/011	300002681-0003	k	26.08.2008	26.08.2011
8	n. a.	Dual Channel Power Meter	NRVD	R&S	835430/044	300002681-0004	k	13.09.2010	13.09.2012
9	n. a.	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSIQ26	R&S	835540/018	300002681-0005	k	07.01.2010	07.01.2012
10	n. a.	Frequency Standard (Rubidium Frequency Standard)	MFS (Rubidium)	R&S (Datum)	002	300002681-0009	Ve	13.09.2010	13.09.2012
11	n. a.	Directional Coupler	101020010	Krytar	70215	300002840	ev		
12	n. a.	DC-Blocker	8143	Inmet Corp.	none	300002842	ne		
13	n. a.	Powersplitter	6005-3	Inmet Corp.		300002841	ev		
14	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	58566046820010	300003019	Ve	28.05.2009	28.05.2011
15	n. a.	CBT (Bluetooth Tester + EDR Signalling)	CBT 1153.9000K35	R&S	100185	300003416	vIKI!	13.09.2010	13.09.2012
16	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm	FSP30	R&S	100886	300003575	k	07.09.2010	07.09.2012
17	n. a.	CBT-K57 Software-Option for CBT/CBT32	CBT-K57	R&S	101051	300003910	ne		
18	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
19	n. a.	PowerAttenuator	8325	Byrd	1530	300001595	ev		
20	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	05.03.2009	05.09.2011
21	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
22	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
23	Spec.A. 2_2e	System rack for EMI measurement	85900	HP I.V.	*	300000222	ne		

		solution							
24	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
25	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
26	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
27	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
28	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
29	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
30	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
31	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
32	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
33	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
34	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
35	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
36	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
37	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
38	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	13.09.2010	13.09.2012
39	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vlKl!	08.09.2010	08.09.2012
40	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	17.12.2008	17.12.2011
41	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
42	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
43	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
44	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
45	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
46	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
47	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
48	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
49	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
50	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012

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
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress