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

TEST REPORT

Test report no.: 1-2029-02-06/10-A



Testing laboratory

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Accredited test laboratory:

The test laboratory (area of testing) is accredited
according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio/Satellite Communications

Applicant

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78467 Konstanz / Germany
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Phone: +49 7531 36599 -22

Manufacturer

E-Senza Technologies GmbH

Buecklestrasse 82b
78467 Konstanz / Germany

Test standard/s

47 CFR Part 15

Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications
Commission
subchapter A - general, Part 15-Radio frequency devices

For further applied test standards please refer to section 3 of this test report.

Test item

Kind of test item: 2.4 GHz radio module with frequency hopping
Model name: SB100-E
FCC ID: YBSSB100-E
IC: 9026A-SB100E
Frequency [MHz]: 2400 – 2483.5 MHz ISM-band
Ch11 (2405 MHz) to Ch26 (2480 MHz)
Power supply: 3 V DC by battery
Temperature range: -20 °C to 55 °C

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

Test performed:**Test report authorised:**

Stefan Bös

Frank Salvamoser

1 Table of contents

1	Table of contents	2
2	General information	3
2.1	Notes.....	3
2.2	Application details	3
3	Test standard/s	3
4	Test environment	3
5	Test item	4
6	Test laboratories sub-contracted	4
7	Summary of measurement results	5
8	RF measurement testing	6
8.1	Description of test setup.....	6
8.1.1	Radiated measurements.....	6
8.1.2	Conducted measurements	7
8.2	Additional comments	7
8.3	RSP100 test report cover sheet / performance test data	8
9	Measurement results.....	9
9.1	Antenna gain.....	9
9.2	Power spectral density	10
9.3	Carrier frequency separation.....	13
9.4	Number of hopping channels	15
9.5	Time of occupancy (dwell time).....	17
9.6	Spectrum bandwidth of a FHSS system – 20 dB bandwidth.....	19
9.7	Maximum output power.....	22
9.8	Band edge compliance conducted	25
9.9	Band edge compliance radiated	29
9.10	TX spurious emissions conducted	32
9.11	TX spurious emissions radiated	37
9.12	RX spurious emissions radiated	49
9.13	TX spurious emissions radiated < 30 MHz	54
9.14	TX spurious emissions conducted < 30 MHz	56
10	Test equipment and ancillaries used for tests.....	58
Annex A	Photographs of the test setup.....	60
Annex B	Photographs of the EUT.....	61
Annex C	Document history	66
Annex D	Further information.....	66

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.

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.

2.2 Application details

Date of receipt of order:	2010-04-19
Date of receipt of test item:	2010-12-09
Start of test:	2010-12-09
End of test:	2011-02-08
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-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices

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:		53	%
Air pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.0	V DC by battery
	V_{max}	-/-	V
	V_{min}	-/-	V

5 Test item

Kind of test item	:	2.4 GHz radio module with frequency hopping
Type identification	:	SB100-E
S/N serial number	:	-
HW hardware status	:	unknown
SW software status	:	unknown
Frequency band [MHz]	:	2400 – 2483.5 MHz ISM-band Ch11 (2405 MHz) to Ch26 (2480 MHz)
Type of modulation	:	GFSK
Number of channels	:	16
Antenna	:	External Reverse SMA-Antenna -> for more information please see chapter “External Photographs of the EUT”
Power supply	:	3 V DC
Temperature range	:	-20 °C to 55 °C

6 Test laboratories sub-contracted

None

7 Summary of measurement results



No deviations from the technical specifications were ascertained



There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8, Annex 8	Passed	2011-02-18	-/-

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	GFSK	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	GFSK Non hopping	☒	☐	☐	☐	complies
§15.247(a)(1) RSS 210 / A8.1(b)	Carrier frequency separation	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(a)(1) RSS 210 / A8.1(d)	Number of hopping channels	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(a)(1) (iii) RSS 210 / A8.3(1)	Time of occupancy (dwell time)	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(a)(1) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(b)(1) RSS-210 / A8.4(2)	Maximum output power	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	GFSK	☒	☐	☐	☐	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	GFSK	☒	☐	☐	☐	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	-/-	☐	☐	☒	☐	

Note: NA = Not Applicable; NP = Not Performed

8 RF measurement testing

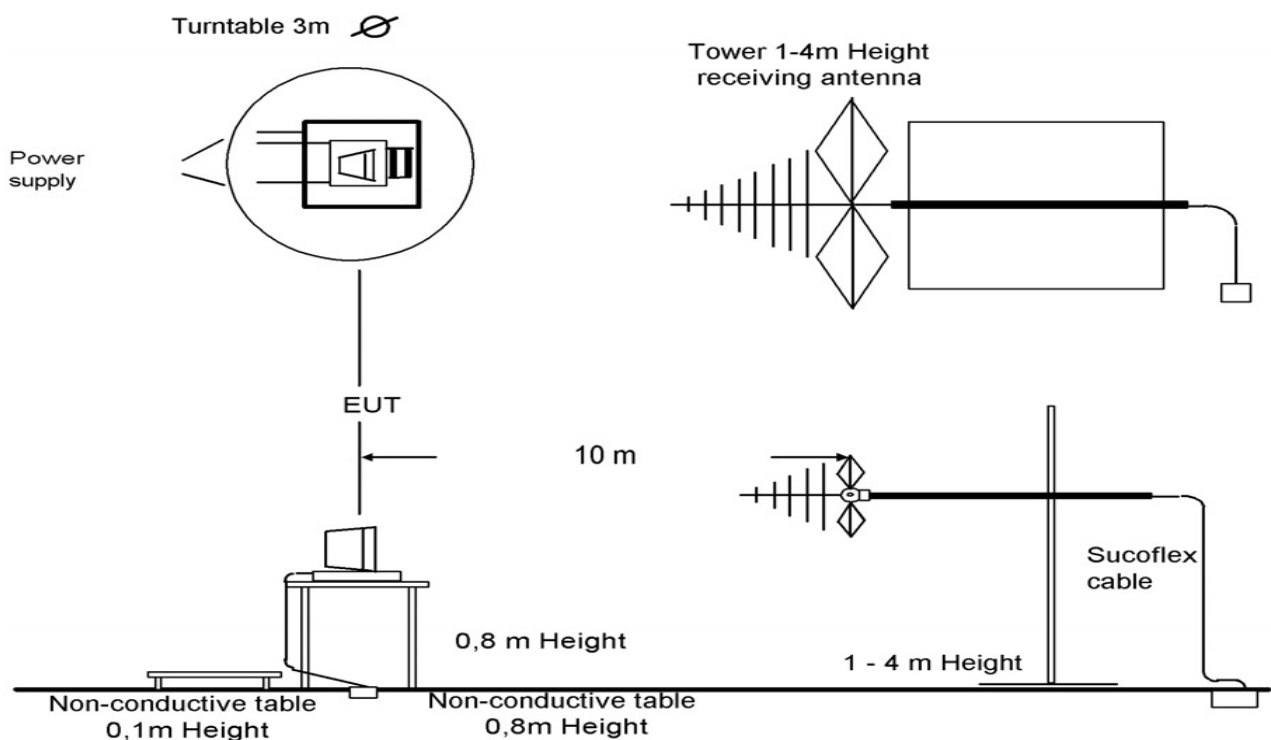
8.1 Description of test setup

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



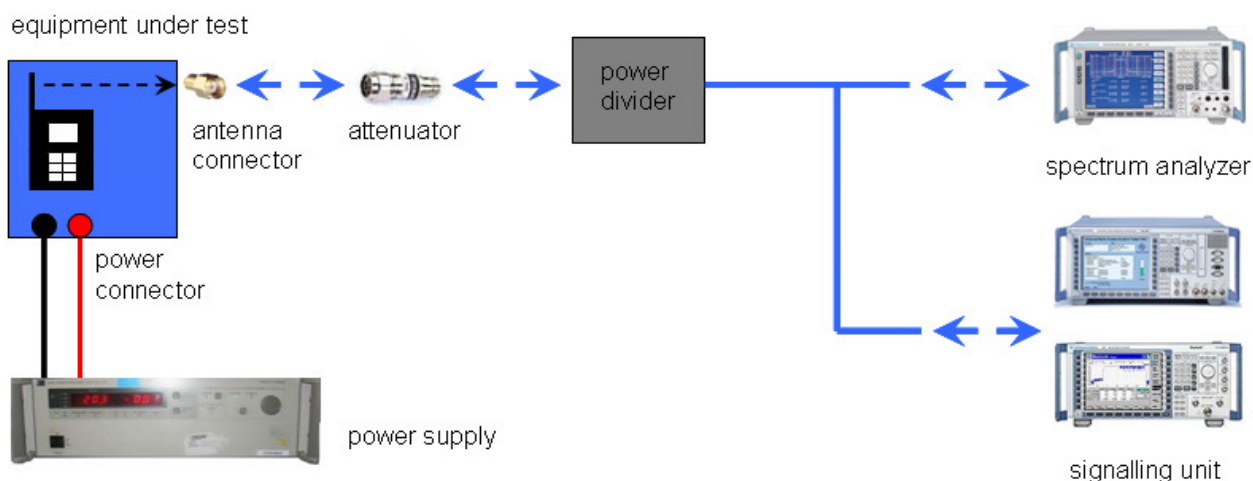
Picture 1: Diagram radiated measurements

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

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705.

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

The Bluetooth[®] word mark and logos are owned by the Bluetooth SIG Inc. and any use of such marks by Cetecom ICT Services GmbH is under license.

Reference documents: None

Special test descriptions: None

Configuration descriptions: TX tests: measurements at dedicated channels were performed with a special test mode supporting a duty cycle of 100%. The maximum duty cycle of the final product is according manufacturer declaration 30%.

Test mode:

- ☐ Bluetooth Test mode loop back enabled (EUT is controlled over CBT/CMU)
- ☒ 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	:	1-2029-02-06/10-A
Equipment model number	:	SB100-E
Certification number	:	9026A-SB100E
Manufacturer (complete address)	:	E-Senza Technologies GmbH Buecklestrasse 82b 78467 Konstanz / Germany
Tested to radio standards specification no.	:	RSS 210, Issue 8, Annex 8
Open area test site IC No.	:	IC 3462C-1
Frequency range	:	2400 – 2483.5 MHz-band (2405 – 2480 MHz)
RF-power [W] (max.)	:	Cond.: 14.1 mW EIRP: 33.1 mW
Occupied bandwidth (99%-BW) [kHz]	:	2584
Type of modulation	:	GFSK
Emission designator (TRC-43)	:	2M58FXD
Antenna information	:	External Reverse SMA-Antenna -> for more information please see chapter "External Photographs of the EUT"
Transmitter spurious (worst case) [µV/m @ 3m]	:	473 µV/m @ 4810 MHz
Receiver spurious (worst case) [µV/m @ 3m]	:	343 µV/m @ 12.5 GHz (noise floor)

ATTESTATION:

DECLARATION OF COMPLIANCE:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory manager:

2011-02-18
Date

Stefan Bös
Name


Signature

9 Measurement results

9.1 Antenna gain

Measurement:

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

Measurement parameters:

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

Limits:

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

Results:

T_{nom}	V_{nom}	lowest channel 2405 MHz	middle channel 2445 MHz	highest channel 2480 MHz
Conducted power [dBm]		11.5	11.2	10.5
Radiated power [dBm]		15.2	14.5	13.4
Gain [dBi] Calculated		3.7	3.3	2.9

Result: The result of the measurement is passed.

9.2 Power spectral density

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	500 s
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	100 kHz
Trace-Mode:	Max Hold

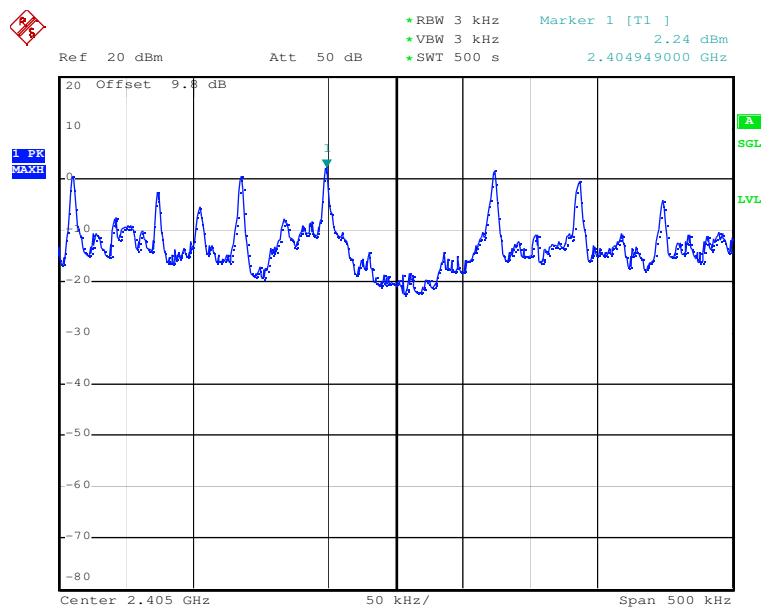
Limits:

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

Result:

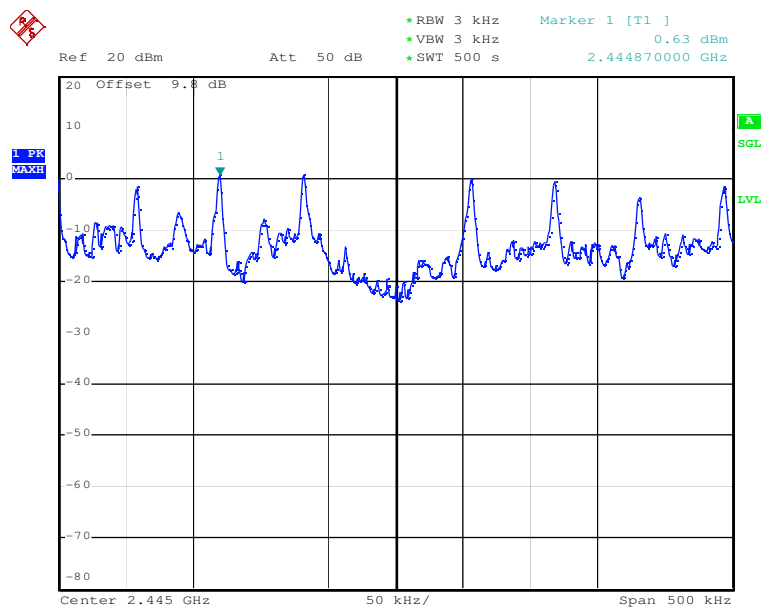
Modulation	Power spectral density [dBm/3kHz]		
Frequency	2405 MHz	2445 MHz	2480 MHz
GFSK	2.24	0.63	0.02
Measurement uncertainty	± 1.5 dB		

Plot 1: Channel 11 (2405 MHz)



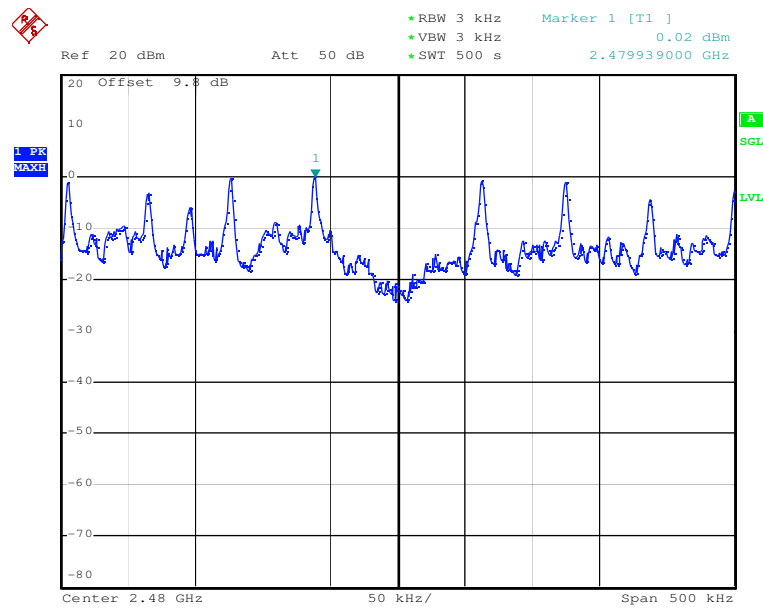
Date: 1.FEB.2011 09:40:34

Plot 2: Channel 19 (2445 MHz)



Date: 1.FEB.2011 09:50:02

Plot 3: Channel 26 (2480 MHz)



Date: 1.FEB.2011 10:00:20

Result: The result of the measurement is passed.

9.3 Carrier frequency separation

Description:

Measurement of the carrier frequency separation of a hopping system. EUT in hopping mode.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	5 MHz
Trace-Mode:	Max Hold

Limits:

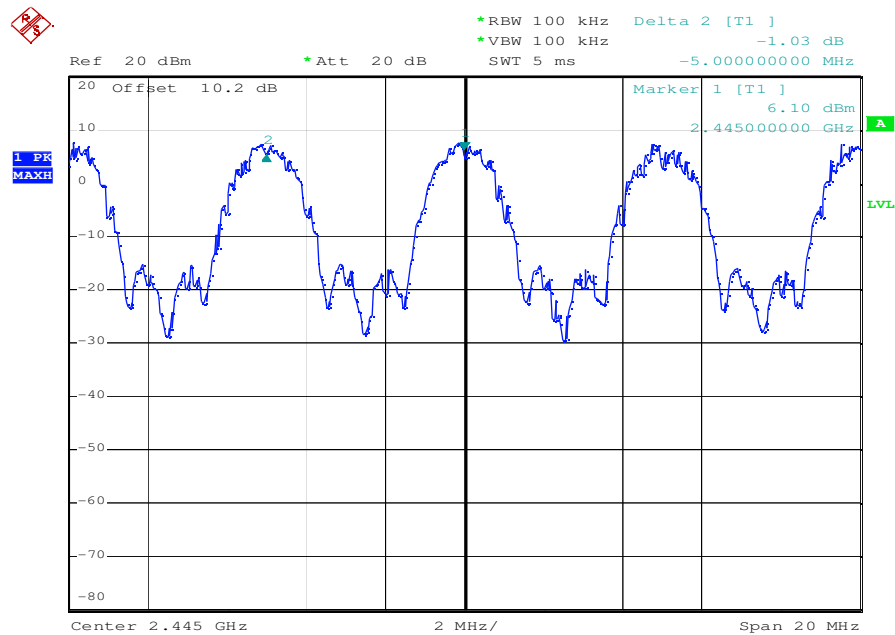
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.1(b)
Carrier Frequency Separation	
Minimum 25 kHz or two-thirds of the 20 dB bandwidth of the hopping system whichever is greater.	

Result:

Carrier frequency separation	~ 5 MHz
------------------------------	---------

Result: The result of the measurement is passed.

Plot 1: Carrier Frequency Separation (GFSK)



Date: 20.DEC.2010 09:00:58

9.4 Number of hopping channels

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	2400 – 2485 MHz
Trace-Mode:	Max Hold

Limits:

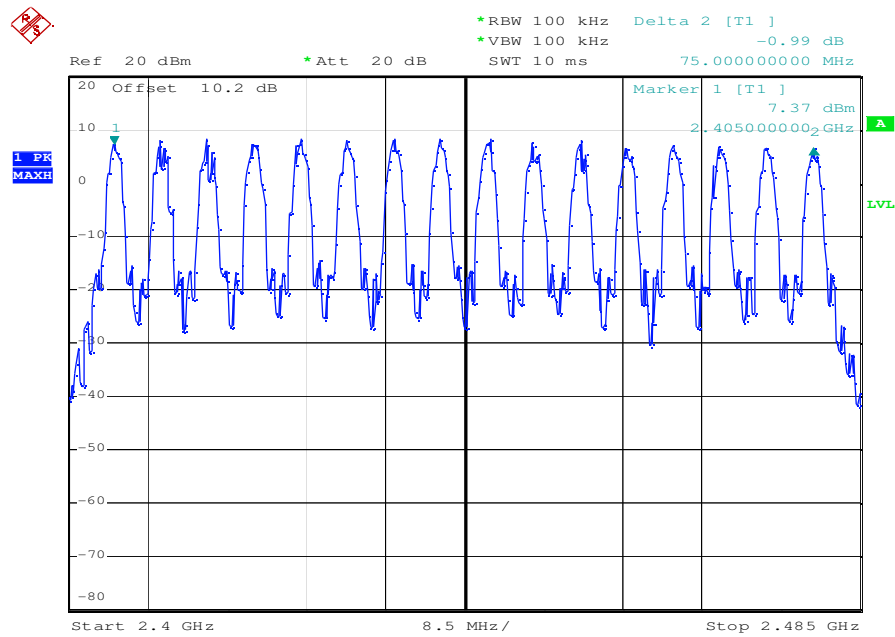
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.1(d)
Number of hopping channels	
At least 15 non overlapping hopping channels	

Result:

Number of hopping channels	16
----------------------------	----

Result: The result of the measurement is passed.

Plot 1: Number of hopping channels (GFSK)



Date: 20.DEC.2010 09:03:23

9.5 Time of occupancy (dwell time)

Measurement:

Max number of transmissions: $(0.4 \text{ sec} * \text{number of hopping channels}) / \text{duration hopping sequence}$
 $= 6.4 \text{ sec} / 2.532 \text{ sec} = 2.53$

Result:

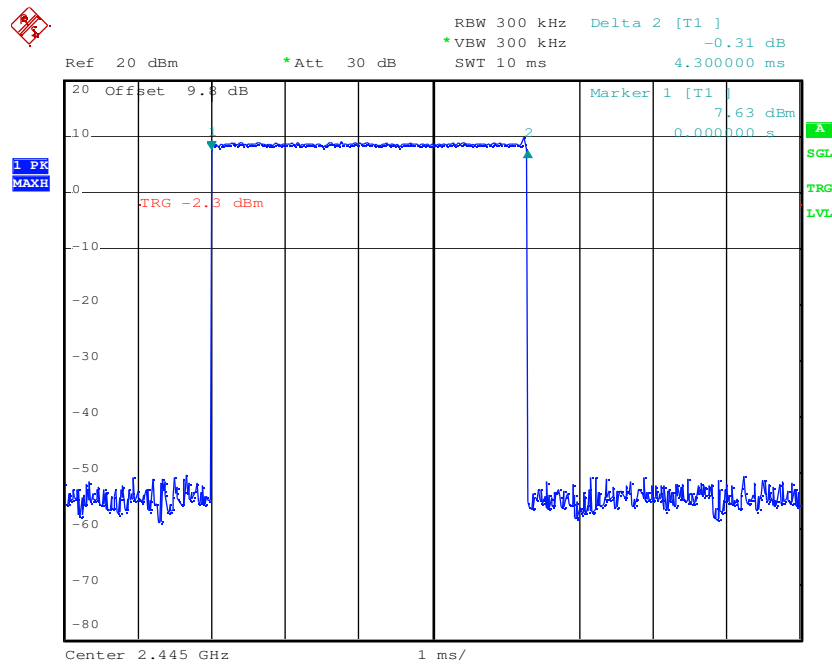
Duty Cycle [%]	Pulse Width [ms]	Max. number of transmissions in 6.4 sec	Dwell time [Pulse width * Number of transmissions]
4.3 (measured)	4.3	3	12.9 ms
10.0 (max declared)	10	3	30.0 ms

Limits:

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

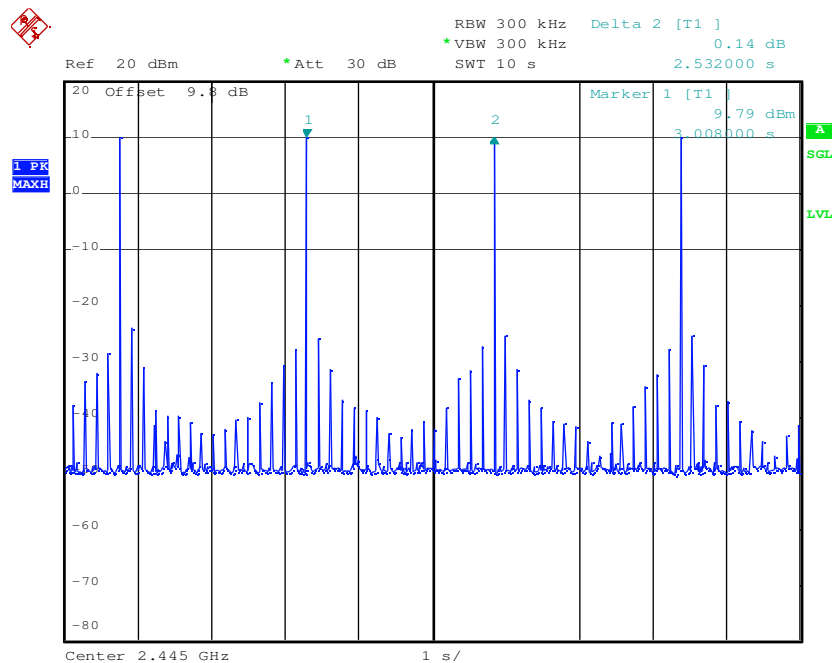
Result: The result of the measurement is passed.

Plot 1: Pulse



Date: 1.FEB.2011 11:04:58

Plot 2: Hopping sequence



Date: 1.FEB.2011 11:03:07

9.6 Spectrum bandwidth of a FHSS system – 20 dB bandwidth

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	60 ms
Video bandwidth:	10 kHz
Resolution bandwidth:	10 kHz
Span:	4 MHz
Trace-Mode:	Max Hold

Limits:

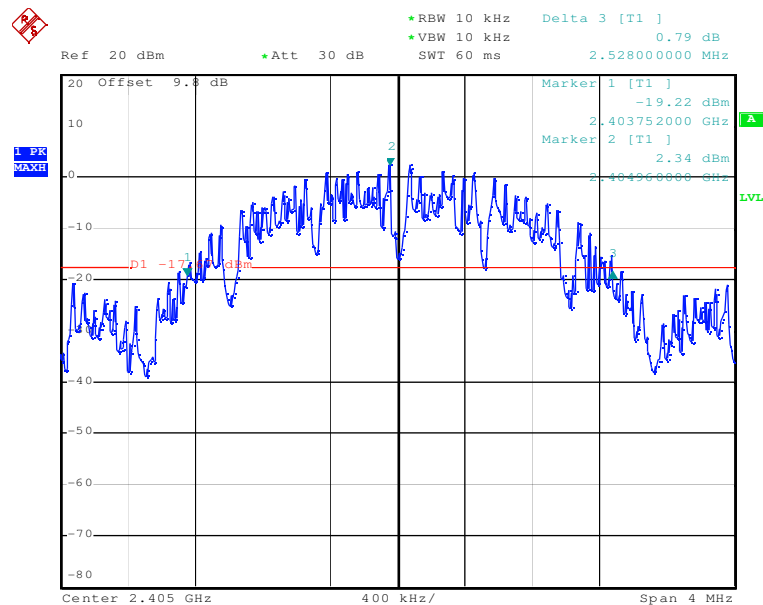
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.2(a)
Spectrum bandwidth of a FHSS system – 20 dB bandwidth	
500 kHz < BW < 1.5 x Channel spacing	

Result:

Modulation	20 dB BANDWIDTH [kHz]		
	2405 MHz	2445 MHz	2480 MHz
Frequency			
GFSK	2528	2584	2584
Measurement uncertainty	± 10 kHz		

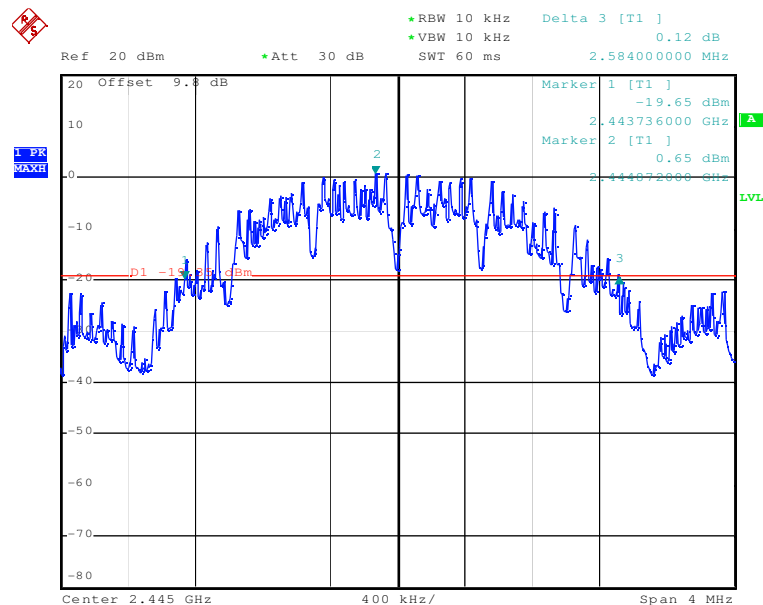
Result: The result of the measurement is passed.

Plot 1: Channel 11



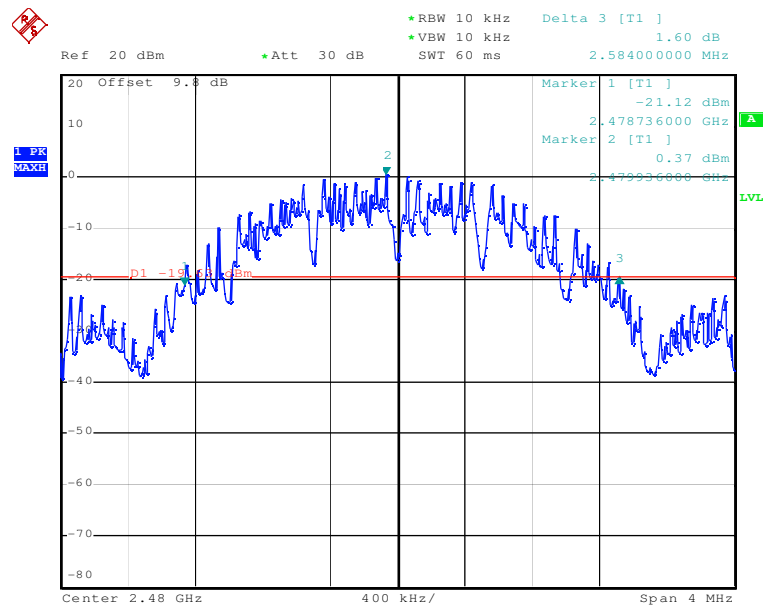
Date: 1.FEB.2011 10:15:40

Plot 2: Channel 19



Date: 1.FEB.2011 10:12:32

Plot 3: Channel 26



Date: 1.FEB.2011 10:09:14

9.7 Maximum output power

Description:

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

Measurement:

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

Limits:

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

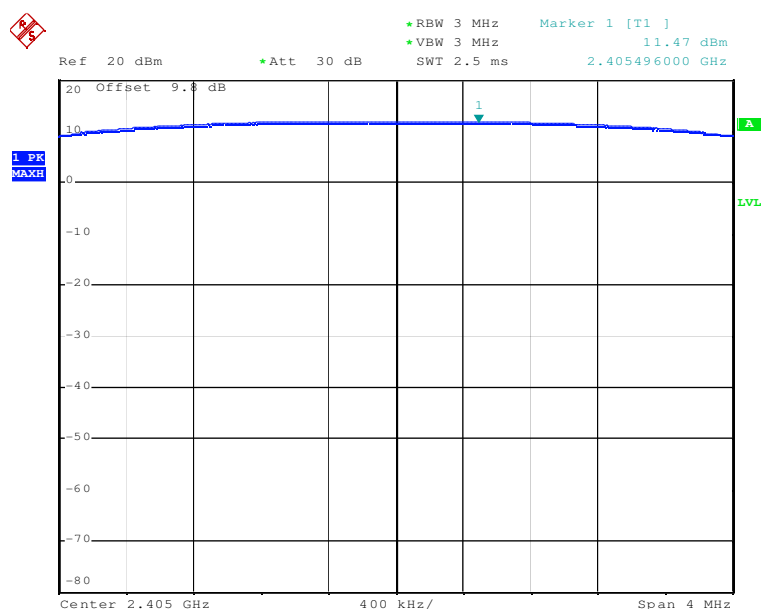
Result:

Modulation	Maximum output power conducted [dBm]		
Frequency	2405 MHz	2445 MHz	2480 MHz
GFSK	11.5	11.2	10.5
Measurement uncertainty	± 1 dB		

Modulation	Maximum output power radiated - EIRP [dBm]		
Frequency	2405 MHz	2445 MHz	2480 MHz
GFSK	15.2	14.5	13.4
Measurement uncertainty	± 3 dB		

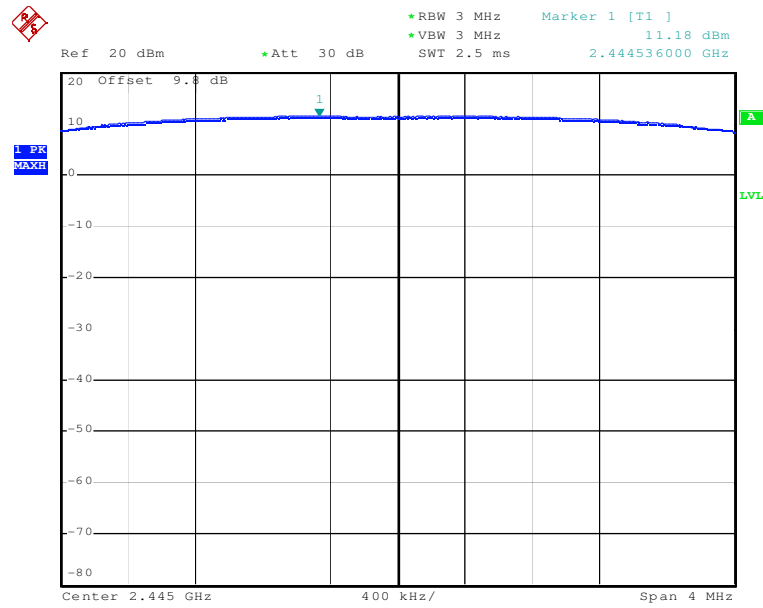
Result: The result of the measurement is passed.

Plot 1: Channel 11 (conducted)



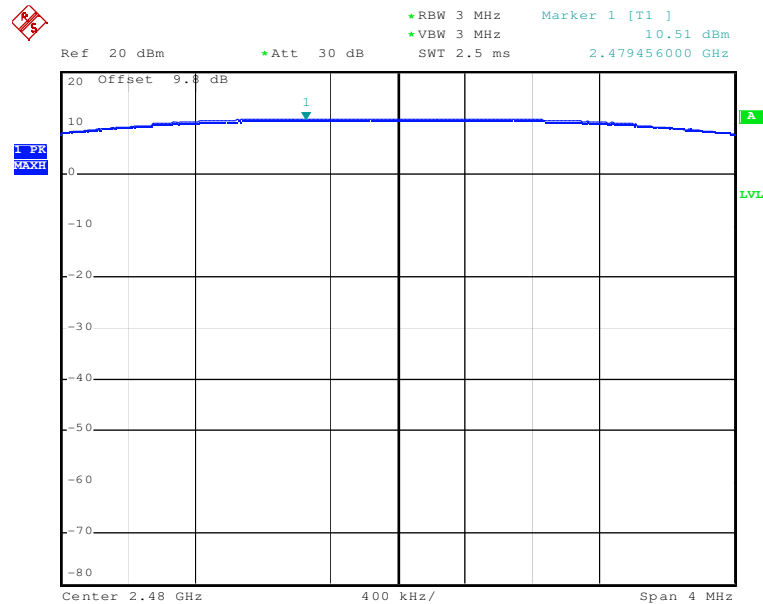
Date: 1.FEB.2011 10:17:40

Plot 2: Channel 19 (conducted)



Date: 1.FEB.2011 10:18:46

Plot 3: Channel 26 (conducted)



Date: 1.FEB.2011 10:19:41

9.8 Band edge compliance conducted

Description:

Measurement of the conducted band edge compliance. EUT is measured at the lower and upper band edge in single channel and hopping mode. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	Lower Band Edge: 2395 – 2405 MHz Higher Band Edge: 2478 – 2489 MHz
Trace-Mode:	Max Hold

Limits:

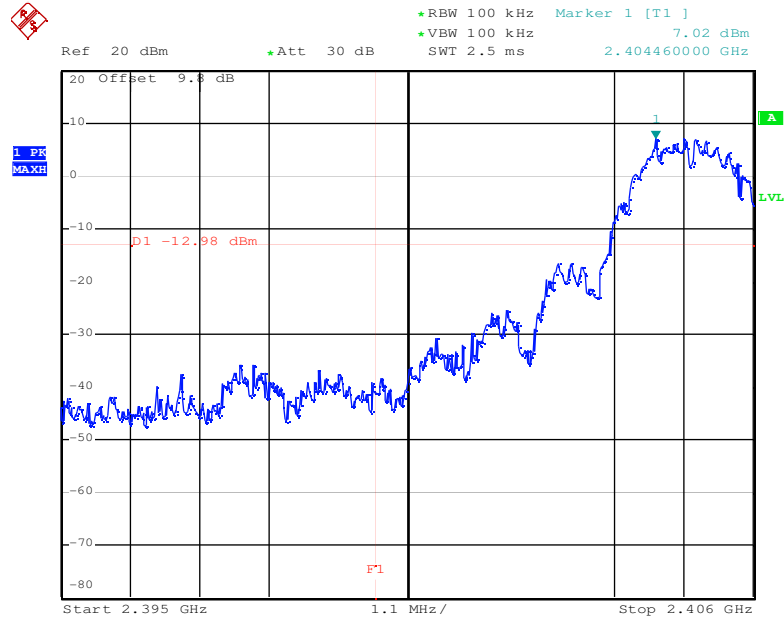
FCC	IC
CFR Part 15.247 (d)	RSS 210, Issue 8, A 8.5
Band edge compliance conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be 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: Also see plots

Szenario	Band edge compliance conducted [dB]
Modulation	GFSK
Lower band edge – hopping off	> 20 dB
Lower band edge – hopping on	> 20 dB
Upper band edge – hopping off	> 20 dB
Upper band edge – hopping on	> 20 dB
Measurement uncertainty	± 1.5 dB

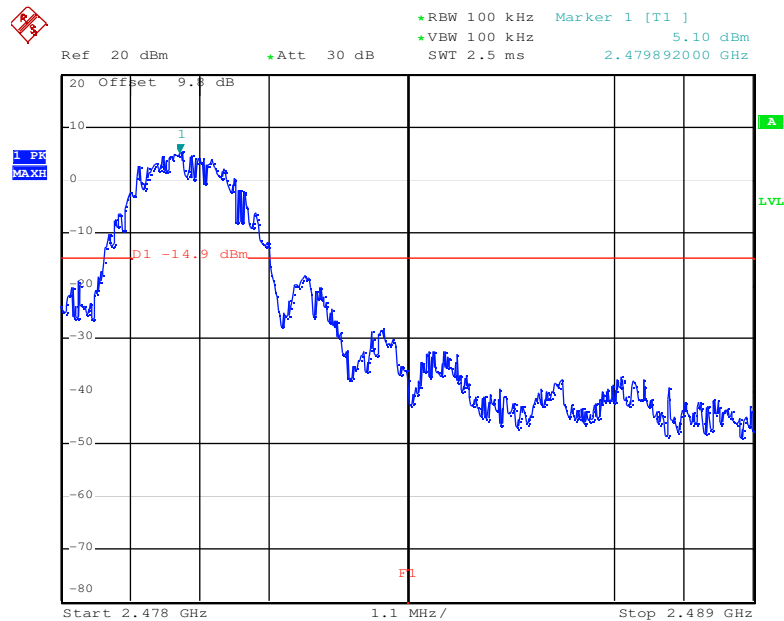
Result: The result of the measurement is passed.

Plot 1: Lower band edge – hopping on / GFSK (conducted)



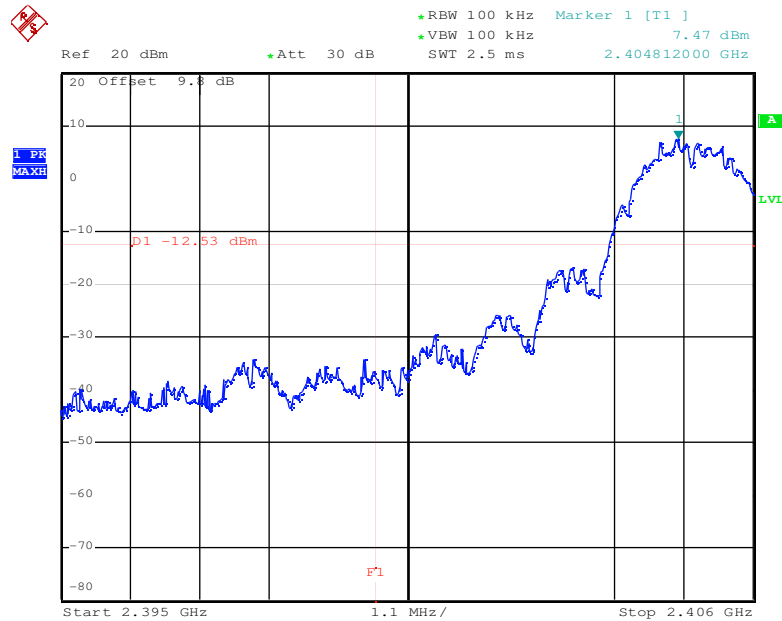
Date: 1.FEB.2011 10:28:07

Plot 2: Upper band edge – hopping on / GFSK (conducted)



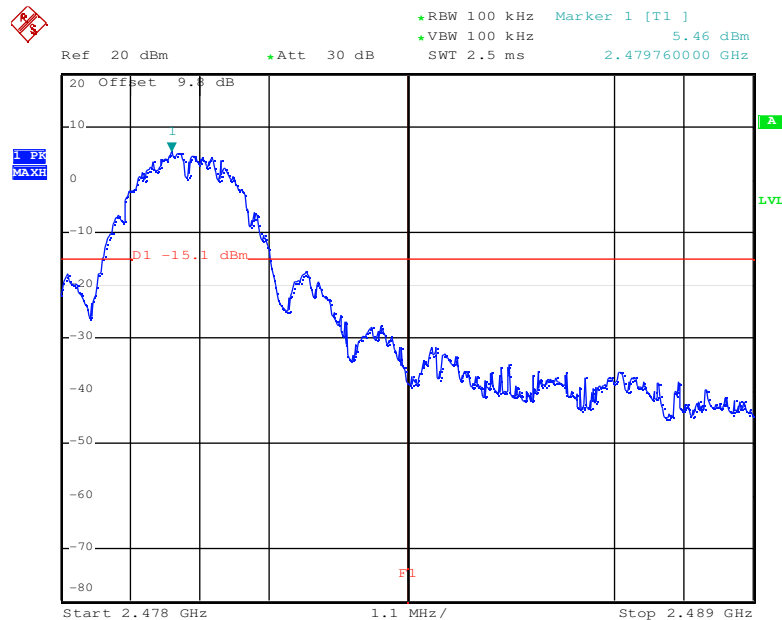
Date: 1.FEB.2011 10:29:46

Plot 3: Lower band edge – hopping off / GFSK (conducted)



Date: 1.FEB.2011 10:23:50

Plot 4: Upper band edge – hopping off / GFSK (conducted)



Date: 1.FEB.2011 10:22:00

9.9 Band edge compliance radiated

Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to single channel mode and the transmit channel is channel 11 for the lower restricted band and channel 26 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:

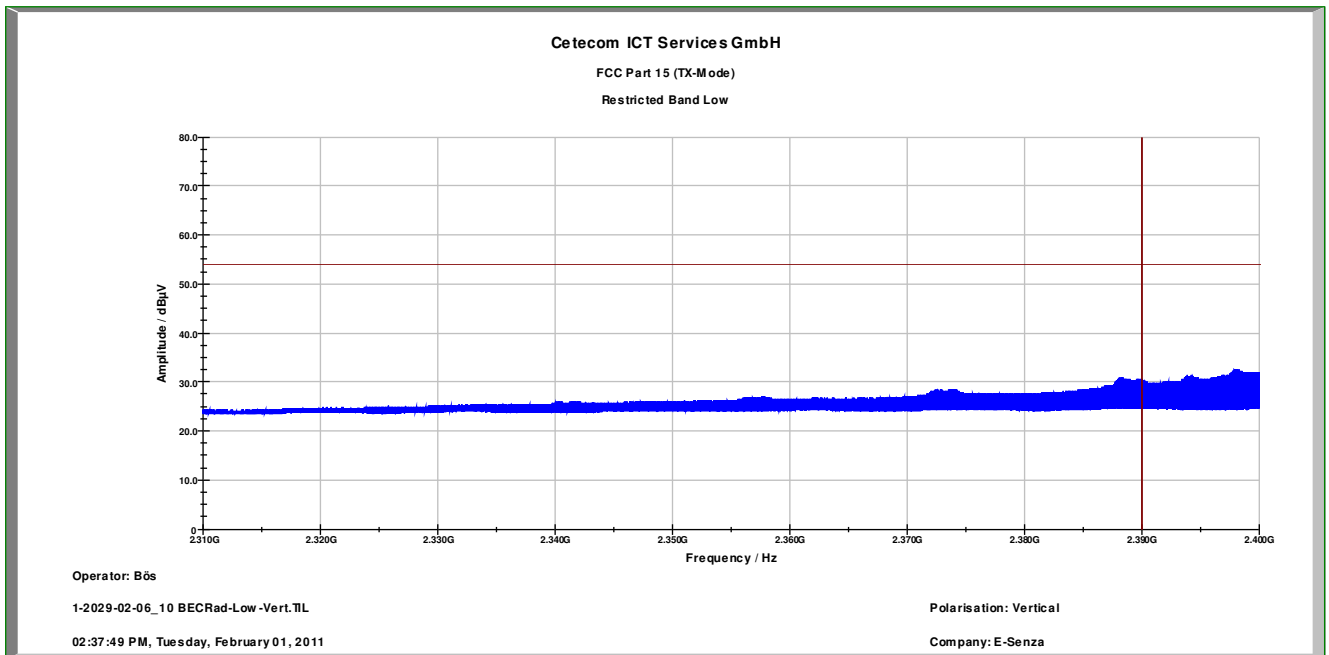
FCC	IC
CFR Part 15.205	RSS 210, Issue 8, A 8.5
Band edge compliance radiated	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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: Also see plots

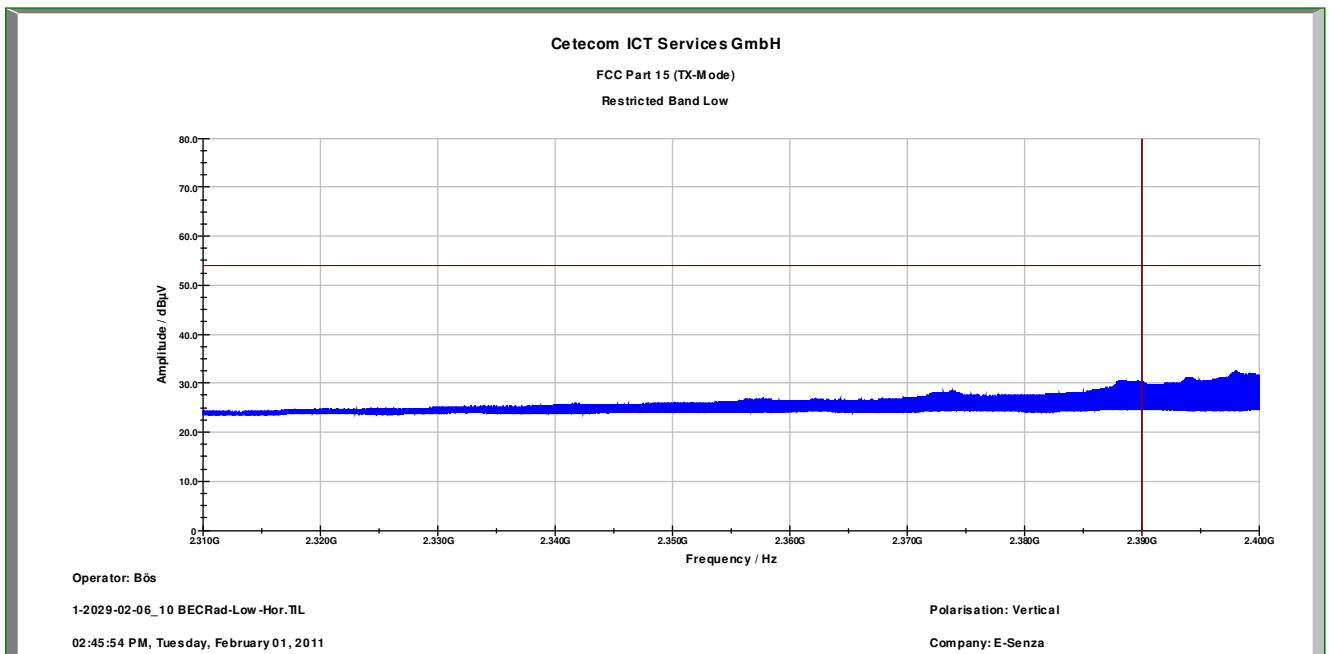
Szenario Modulation	Band edge compliance radiated [dBμV/m]		
	GFSK	Pi/4 DQPSK	8DPSK
Lower restricted band	< 54 (see plot 1/2)	-	-
Upper restricted band	< 54 (see plot 3/4)	-	-
Measurement uncertainty	± 3 dB		

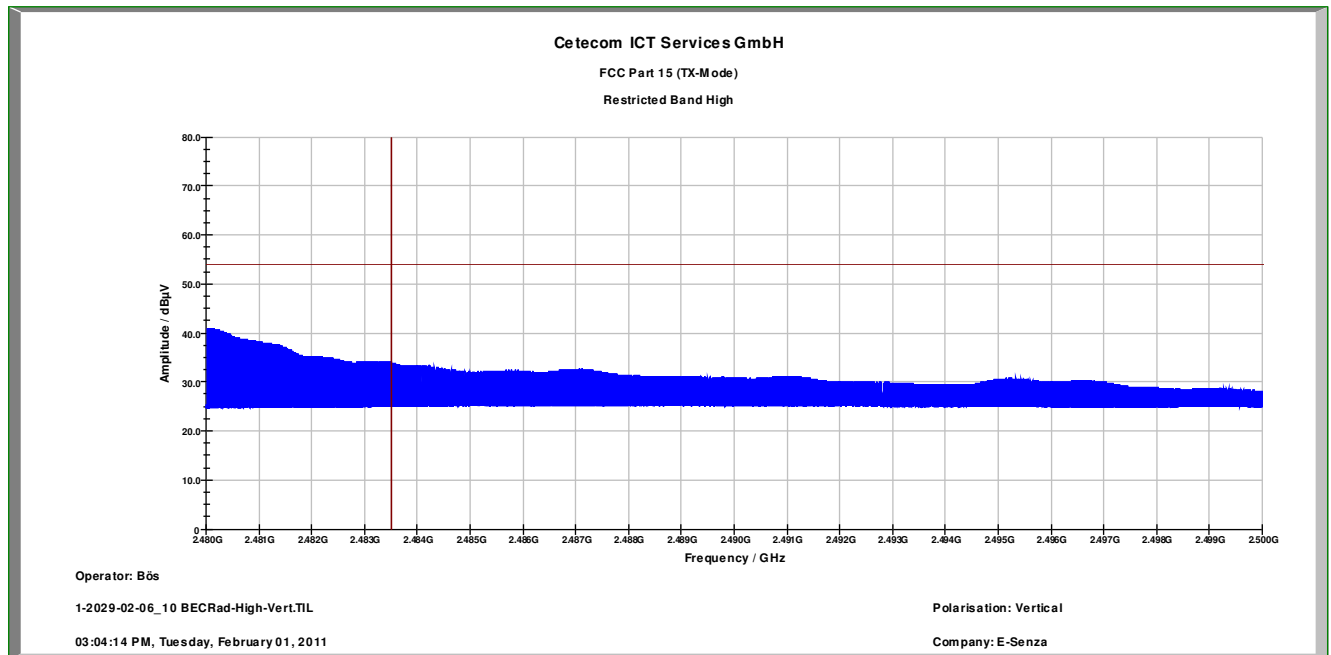
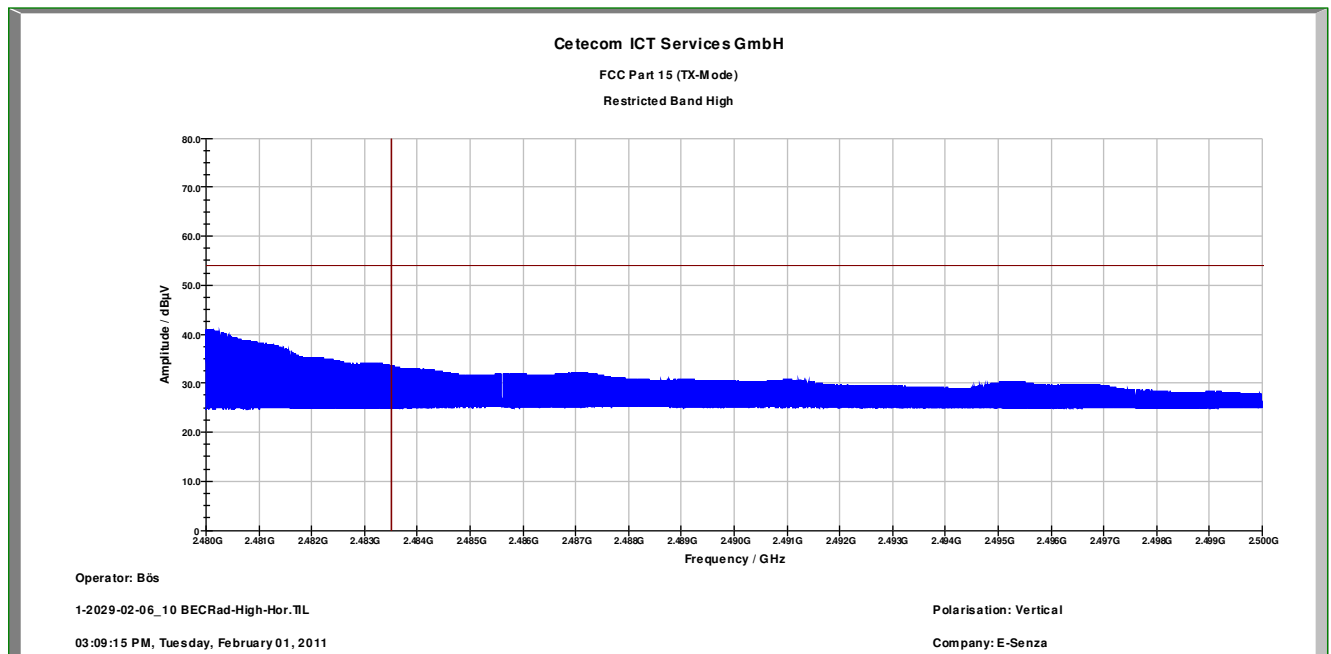
Result: The result of the measurement is passed.

Plot 1: Lower Restricted Band / GFSK – vertical (radiated)



Plot 2: Lower Restricted Band / GFSK – horizontal (radiated)



Plot 3: Higher Restricted Band / GFSK – vertical (radiated)**Plot 4: Higher Restricted Band / GFSK – horizontal (radiated)**

9.10 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 11, channel 19 and channel 26. 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: 1 MHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

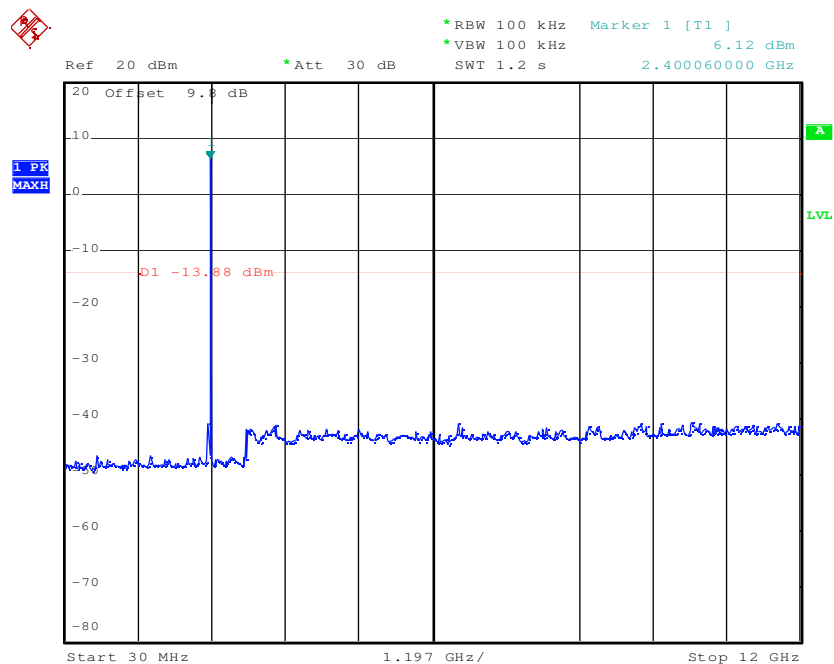
FCC	IC
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5
TX spurious emissions conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be 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	

Result: Also see plots

TX spurious emissions conducted					
GFSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2405		6.12	30 dBm		Operating frequency
No peaks found			-20 dBc		complies
2445		6.02	30 dBm		Operating frequency
No peaks found			-20 dBc		complies
2480		3.46	30 dBm		Operating frequency
No peaks found			-20 dBc		complies
Measurement uncertainty		± 3 dB			

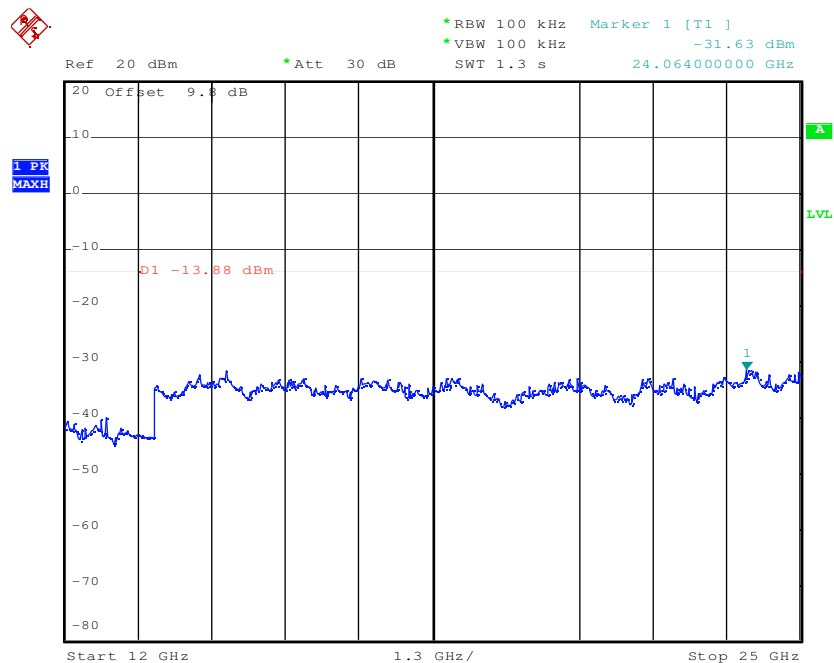
Result: The result of the measurement is passed.

Plot 1: Channel 11 / GFSK



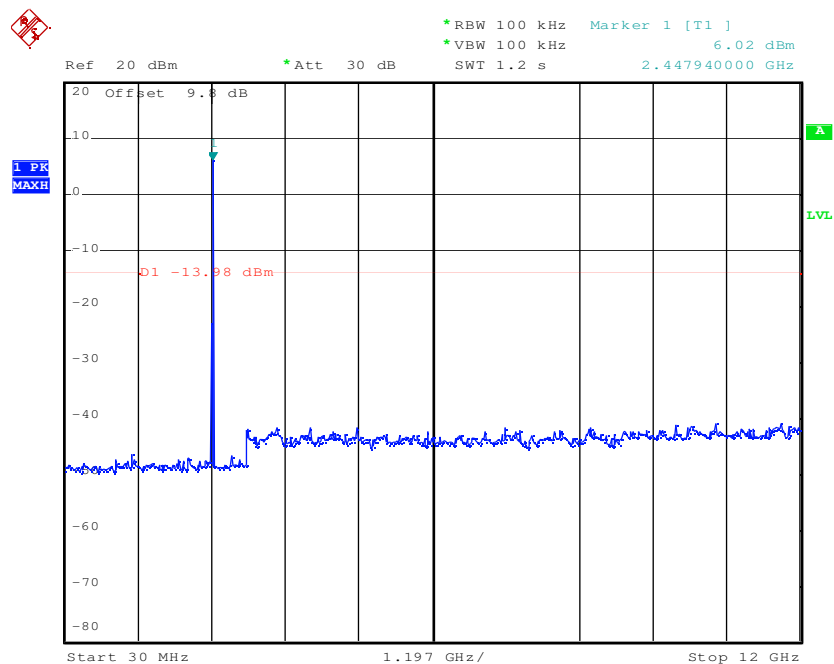
Date: 1.FEB.2011 10:49:44

Plot 2: Channel 11 / GFSK



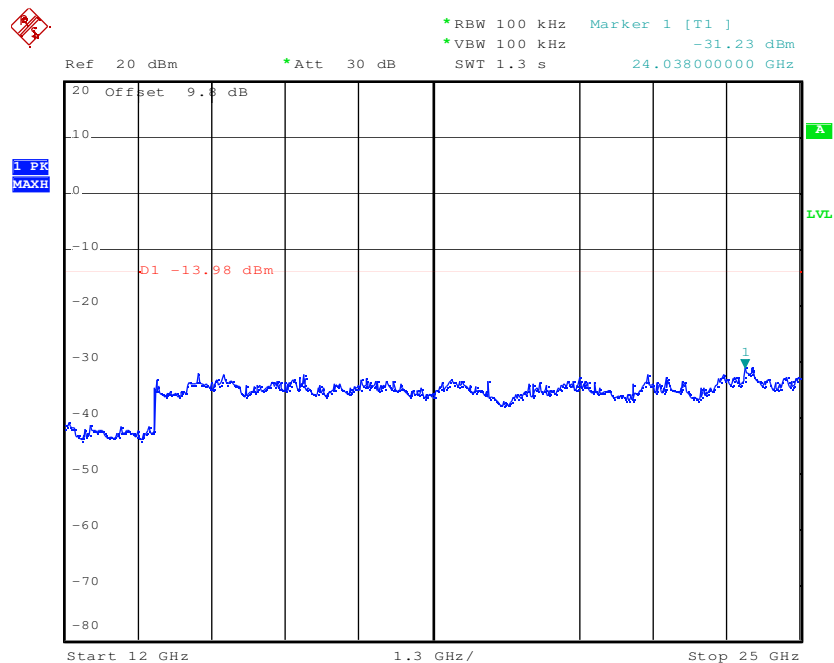
Date: 1.FEB.2011 10:50:25

Plot 3: Channel 19 / GFSK



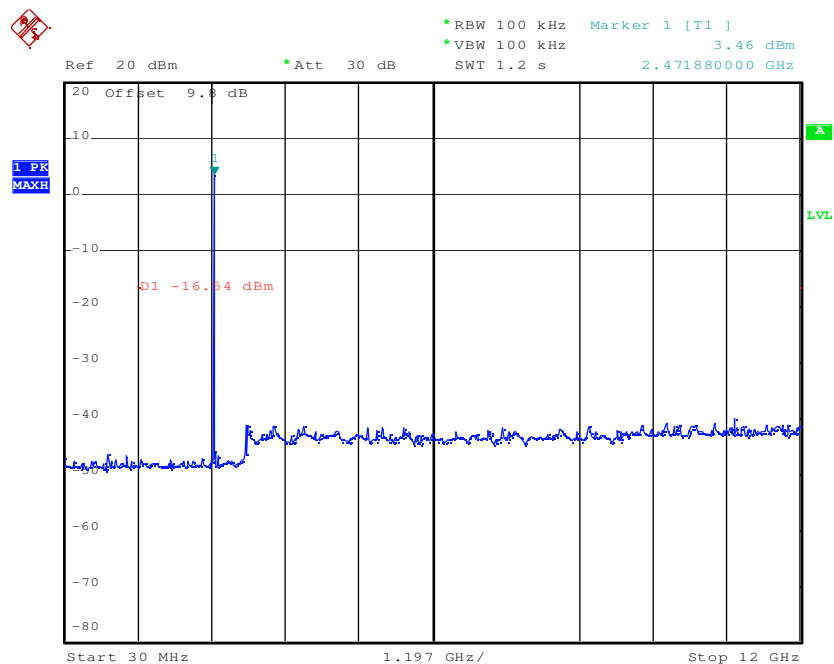
Date: 1.FEB.2011 10:51:55

Plot 4: Channel 19 / GFSK



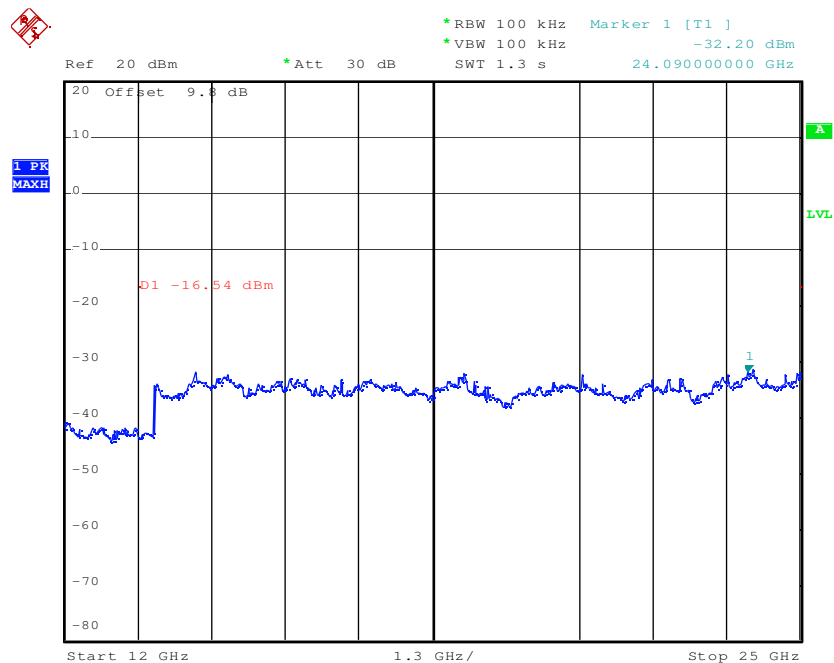
Date: 1.FEB.2011 10:52:34

Plot 5: Channel 26 / GFSK



Date: 1.FEB.2011 10:55:09

Plot 6: Channel 26 / GFSK



Date: 1.FEB.2011 10:55:47

9.11 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 11, channel 19 and channel 26. The measurement is performed in the mode with the highest output power.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Measurement distance:	F < 1 GHz: 10 m F > 1 GHz: 3 m
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation:	☒ GFSK ☐ Pi/4 DQPSK ☐ 8DPSK

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.

For radiated spurious emissions the limit of 15.209 applies for all frequencies mentioned in 15.205. The average emission shall be determined by using video averaging (VBW = 10 Hz). If the dwell time of the hopping signal is less than 100 ms (per channel), the VBW = 10 Hz reading may be adjusted by a factor:

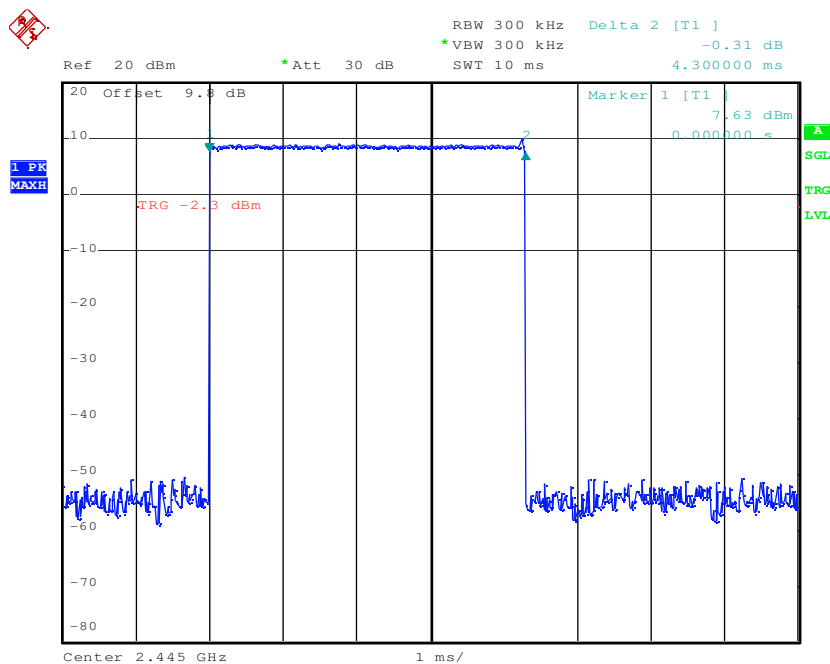
$$F = 20 * \log(\text{dwell time} / 100 \text{ ms})\text{dB}$$

According manufacturer declaration the maximum transmit time during a period of 100 ms is 10 ms. This results in the following correction factor:

$$F = 20 * \log(10 \text{ ms} / 100 \text{ ms})\text{dB}$$

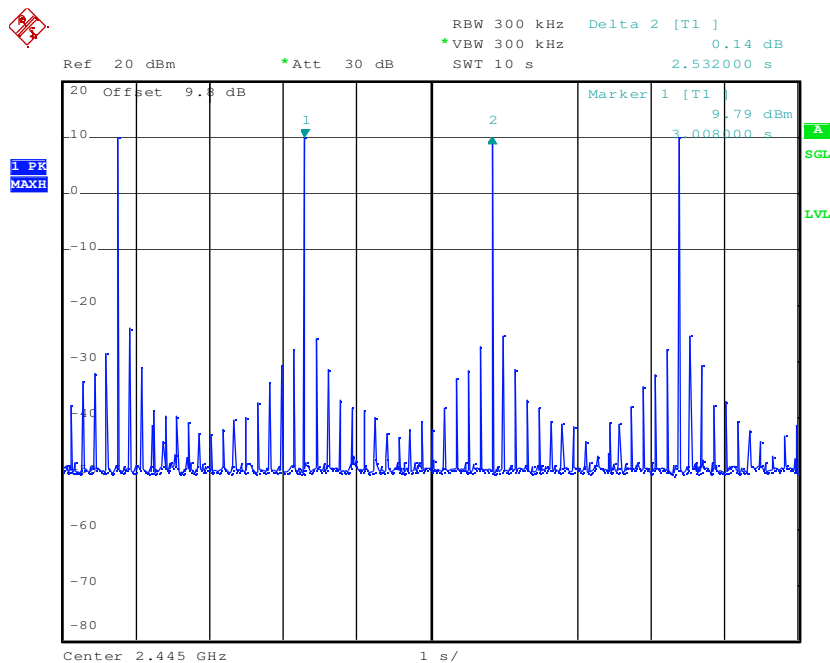
$$\mathbf{F = - 20.0 \text{ dB}}$$

Plot 1: Pulse



Date: 1.FEB.2011 11:04:58

Plot 2: Hopping sequence



Date: 1.FEB.2011 11:03:07

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 (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

Result: Also see plots

TX spurious emissions radiated [dB μ V/m] Corrected with duty cycle correction factor F								
2405 MHz			2445 MHz			2480 MHz		
F [MHz]	Detector / VBW	Level [dB μ V/m]	F [MHz]	Detector / VBW	Level [dB μ V/m]	F [MHz]	Detector / VBW	Level [dB μ V/m]
4810	Pk / 10 Hz	53.5	4890	Pk / 10 Hz	52.0	4960	Pk / 10 Hz	48.0
7215	Pk / 10 Hz	41.9	7335	Pk / 10 Hz	38.3	7440	Pk / 10 Hz	36.2
9620	Pk / 10 Hz	32.8	14671	Pk / 10 Hz	26.1	14881	Pk / 10 Hz	22.6
12025	Pk / 10 Hz	28.8	19554	Pk / 10 Hz	29.7	19834	Pk / 10 Hz	25.6
14430	Pk / 10 Hz	29.3						
19232	Pk / 10 Hz	28.0						
Measurement uncertainty			± 3 dB					

Result: The result of the measurement is passed.

Plot 1: 30 MHz to 1 GHz / channel 11 (horizontal/vertical)**Common Information**

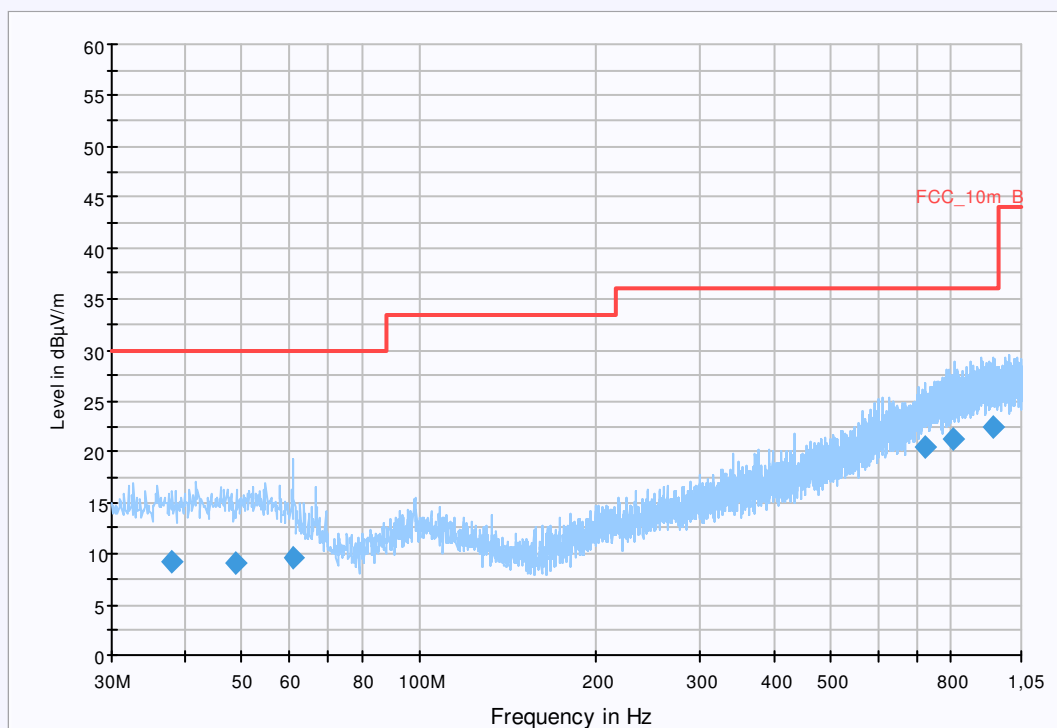
EUT: SB100-E
 Serial Number: unknown
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: TX Ch. 11
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

FCC_10m(B)_3

**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
37.991850	9.2	15000.000	120.000	220.0	H	43.0	13.3	20.8	30.0	
48.585000	9.0	15000.000	120.000	193.0	V	325.0	13.3	21.0	30.0	
61.006950	9.7	15000.000	120.000	98.0	V	12.0	11.4	20.3	30.0	
721.511400	20.4	15000.000	120.000	143.0	V	38.0	23.0	15.6	36.0	
807.484350	21.2	15000.000	120.000	220.0	H	156.0	23.9	14.8	36.0	
943.575450	22.4	15000.000	120.000	164.0	V	61.0	25.3	13.6	36.0	

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

Subrange 1

Frequency Range: 30 MHz - 2 GHz

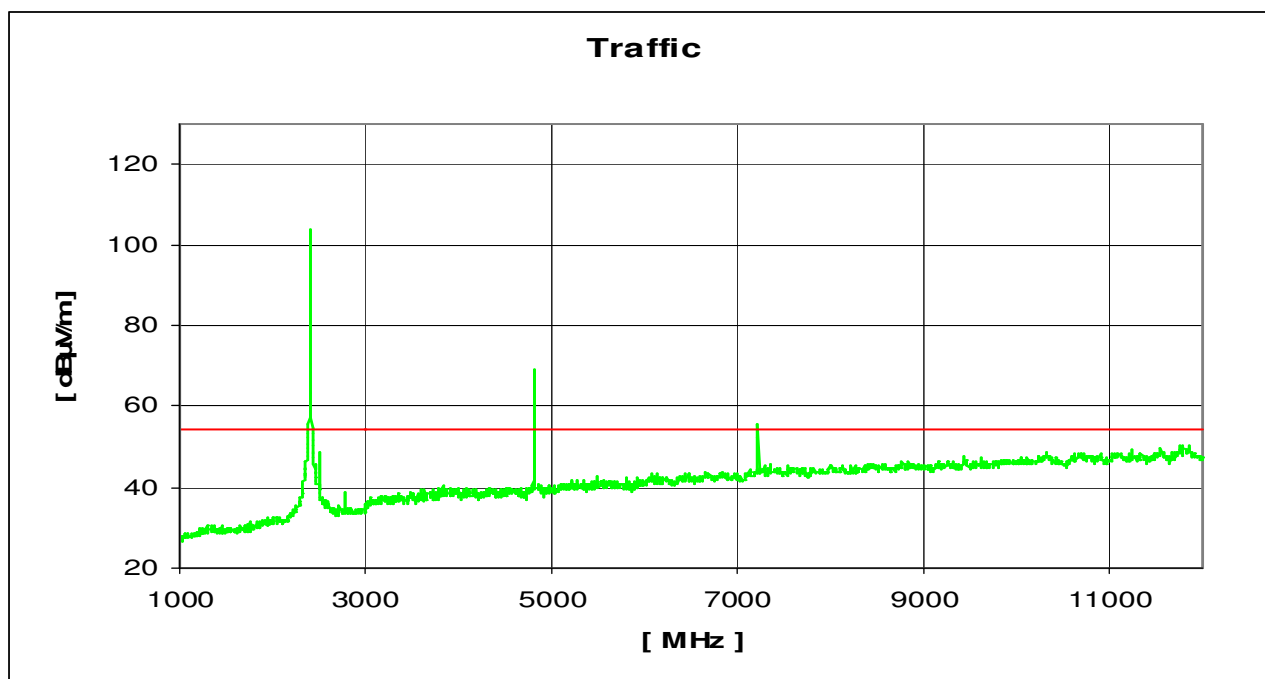
Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32

Signal Path: without Notch

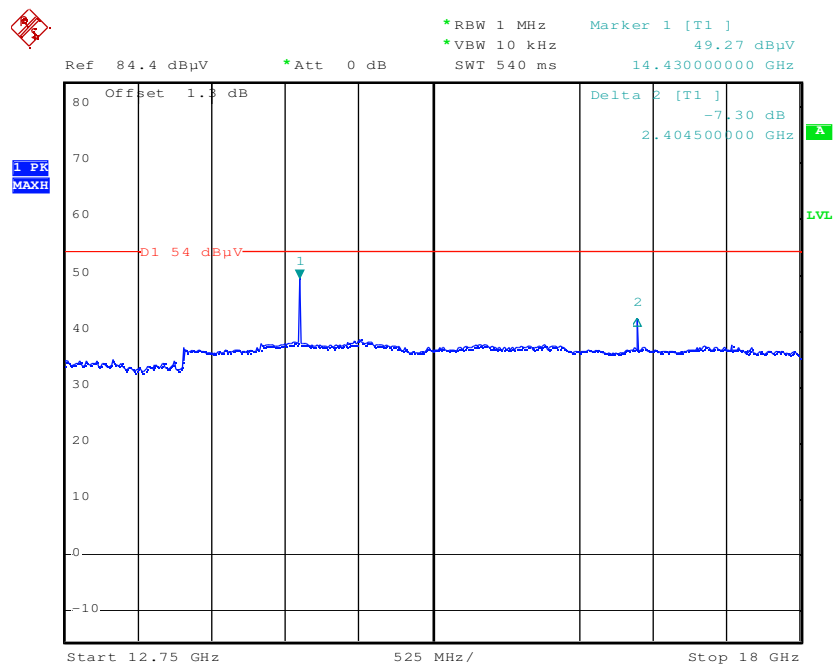
FW 1.0

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 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

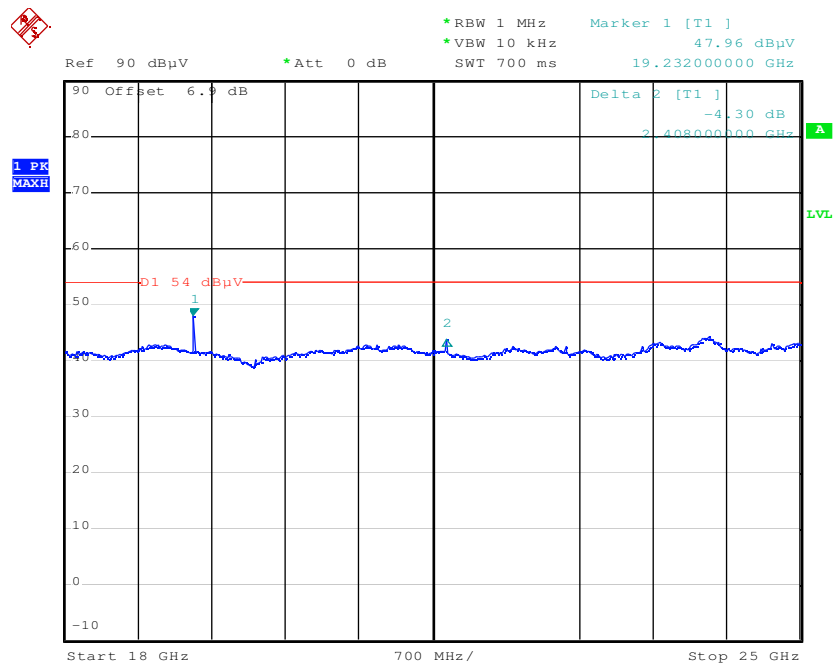
Plot 2: 1 GHz to 12.75 GHz / channel 11 (horizontal/vertical)

Plot 3: 12 GHz to 18 GHz / channel 11 (horizontal/vertical)



Date: 20.DEC.2010 09:44:30

Plot 4: 18 GHz to 25 GHz / channel 11 (horizontal/vertical)



Date: 20.DEC.2010 09:40:11

Plot 5: 30 MHz to 1 GHz / channel 19 (horizontal/vertical)**Common Information**

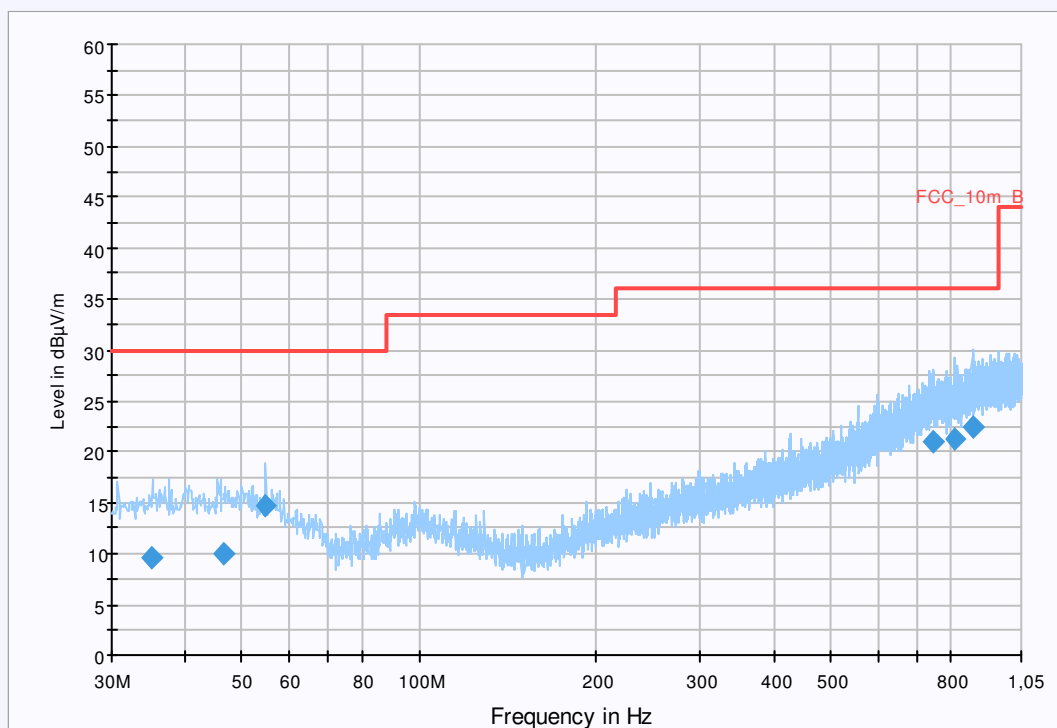
EUT: SB100-E
 Serial Number: unknown
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: TX Ch. 19
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

FCC_10m(B)_3

**Final Result 1**

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
35.177100	9.6	15000.000	120.000	172.0	V	25.0	13.0	20.4	30.0	
46.611300	10.1	15000.000	120.000	205.0	V	187.0	13.3	19.9	30.0	
55.005000	14.7	15000.000	120.000	105.0	V	50.0	12.9	15.3	30.0	
744.504600	21.1	15000.000	120.000	142.0	H	-5.0	23.5	14.9	36.0	
808.519050	21.3	15000.000	120.000	139.0	V	194.0	23.9	14.7	36.0	
872.078850	22.4	15000.000	120.000	147.0	H	20.0	24.8	13.6	36.0	

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

Subrange 1

Frequency Range: 30 MHz - 2 GHz

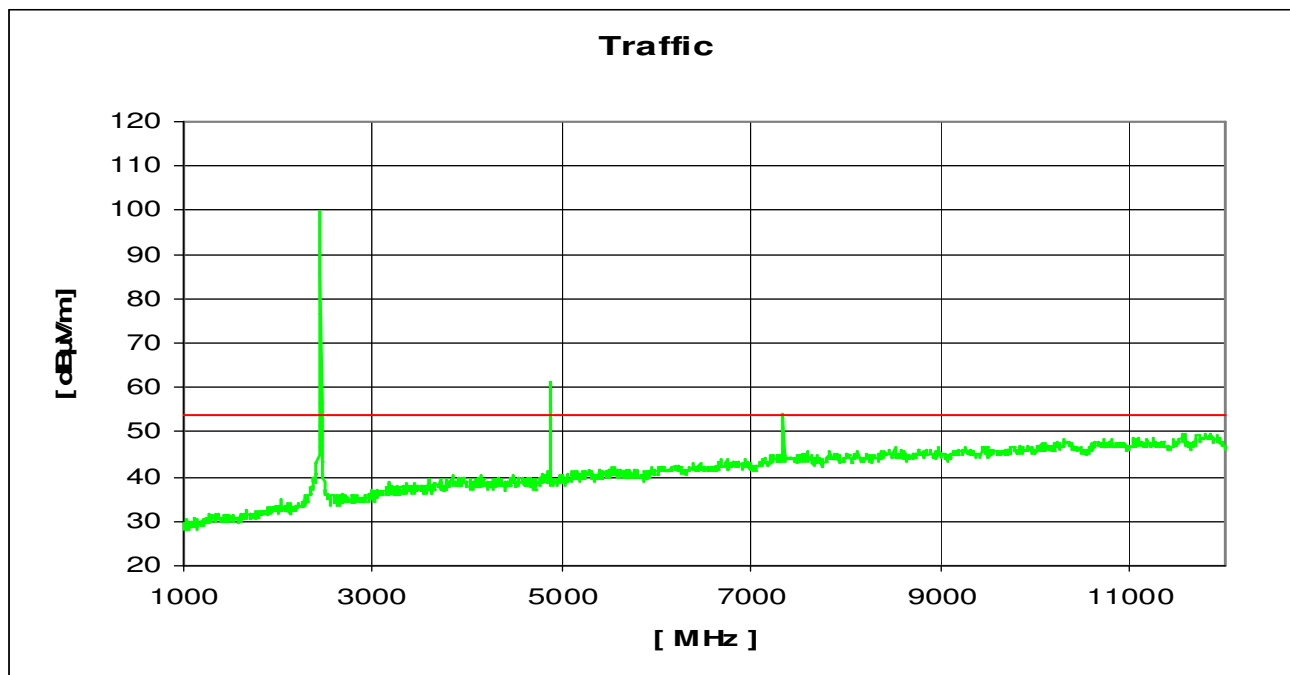
Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32

Signal Path: without Notch

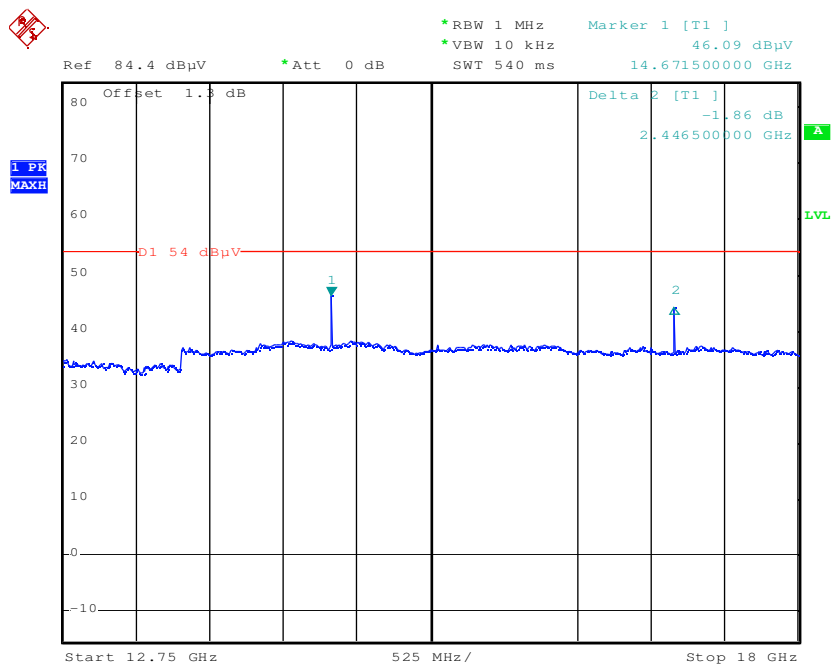
FW 1.0

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 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

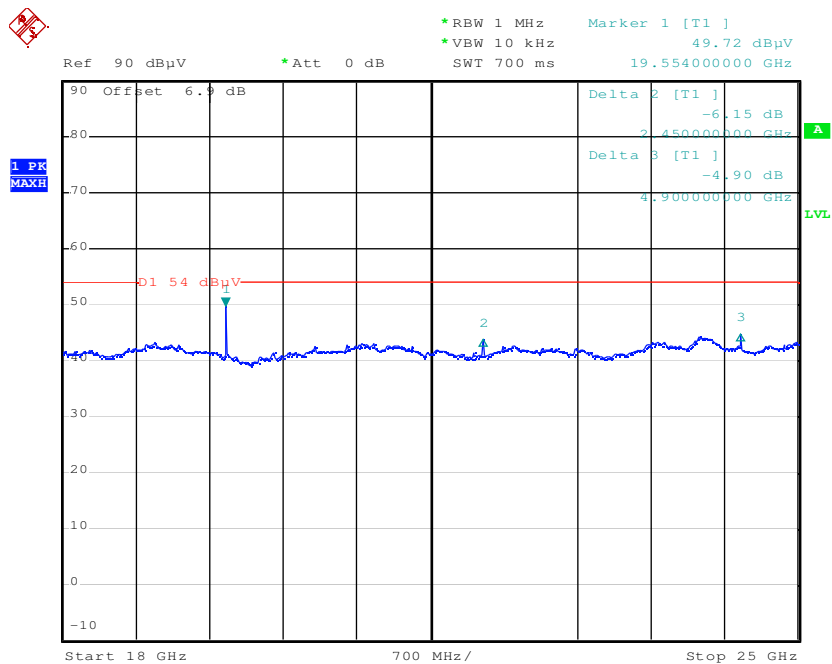
Plot 6: 1 GHz to 12.75 GHz / channel 19 (horizontal/vertical)

Plot 7: 12 GHz to 18 GHz / channel 19 (horizontal/vertical)



Date: 20.DEC.2010 09:45:34

Plot 8: 18 GHz to 25 GHz / channel 19 (horizontal/vertical)



Date: 20.DEC.2010 09:39:14

Plot 9: 30 MHz to 1 GHz / channel 26 (horizontal/vertical)

Common Information

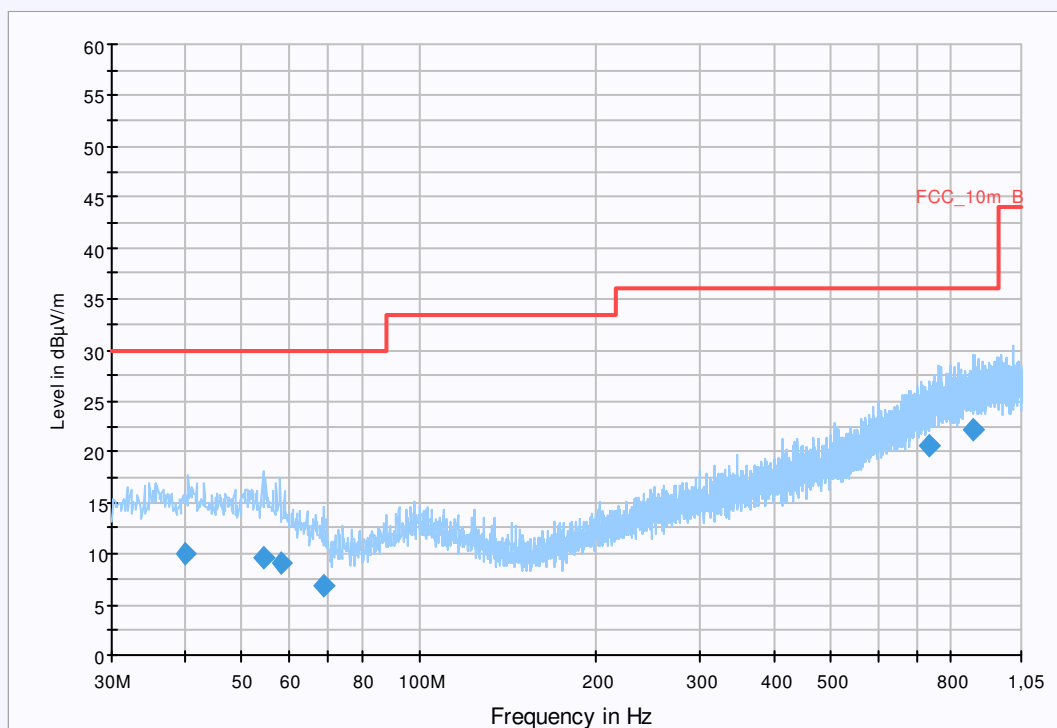
EUT: SB100-E
 Serial Number: unknown
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: TX Ch. 26
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

FCC_10m(B)_3



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
40.209600	10.1	15000.000	120.000	220.0	V	40.0	13.4	19.9	30.0	
54.318150	9.6	15000.000	120.000	220.0	V	146.0	13.0	20.4	30.0	
58.482000	9.1	15000.000	120.000	167.0	V	324.0	12.0	20.9	30.0	
68.547000	6.9	15000.000	120.000	105.0	V	60.0	9.6	23.1	30.0	
734.887350	20.7	15000.000	120.000	220.0	V	111.0	23.3	15.3	36.0	
868.499250	22.2	15000.000	120.000	98.0	V	294.0	24.8	13.8	36.0	

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

Subrange 1

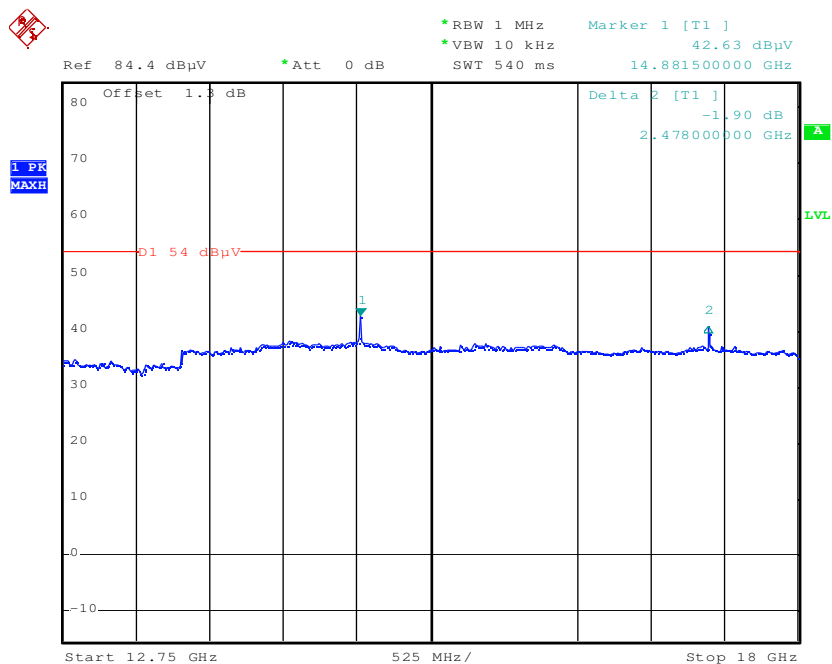
Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32Signal Path: without Notch
FW 1.0Antenna: 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 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

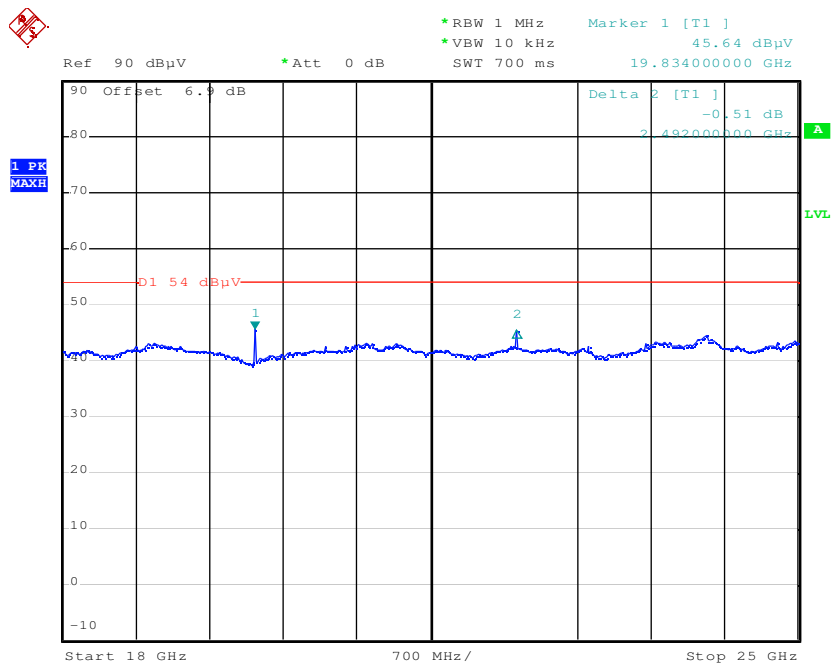
Plot 10: 1 GHz to 12.75 GHz / channel 26 (horizontal/vertical)

Plot 11: 12 GHz to 18 GHz / channel 26 (horizontal/vertical)



Date: 20.DEC.2010 09:46:58

Plot 12: 18 GHz to 25 GHz / channel 26 (horizontal/vertical)



Date: 20.DEC.2010 09:38:12

9.12 RX spurious emissions radiated

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

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

Result: Also see plots

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.

Plot 1: 30 MHz to 1 GHz / idle-mode (horizontal/vertical)

Common Information

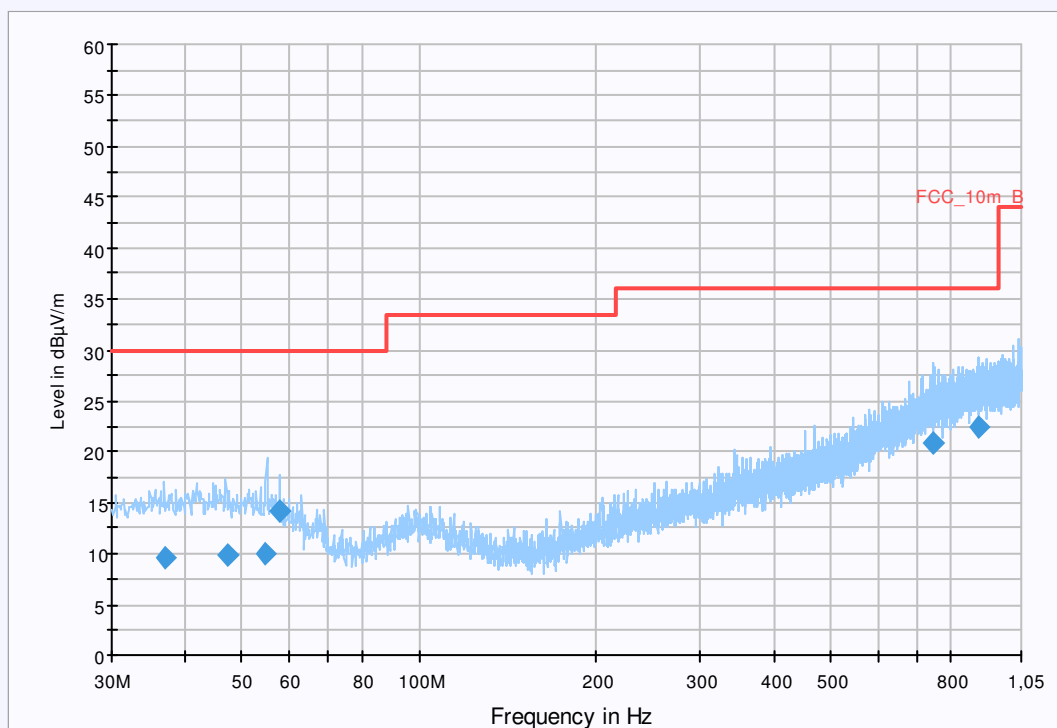
EUT: SB100-E
 Serial Number: unknown
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: idle
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

FCC_10m(B)_3



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
36.964050	9.7	15000.000	120.000	190.0	H	210.0	13.2	20.3	30.0	
47.132400	9.8	15000.000	120.000	105.0	V	19.0	13.3	20.2	30.0	
54.627150	10.1	15000.000	120.000	220.0	V	41.0	12.9	19.9	30.0	
57.999150	14.2	15000.000	120.000	220.0	V	287.0	12.1	15.8	30.0	
746.275350	20.9	15000.000	120.000	207.0	V	236.0	23.6	15.1	36.0	
887.382600	22.4	15000.000	120.000	220.0	H	195.0	25.0	13.6	36.0	

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

Subrange 1

Frequency Range: 30 MHz - 2 GHz

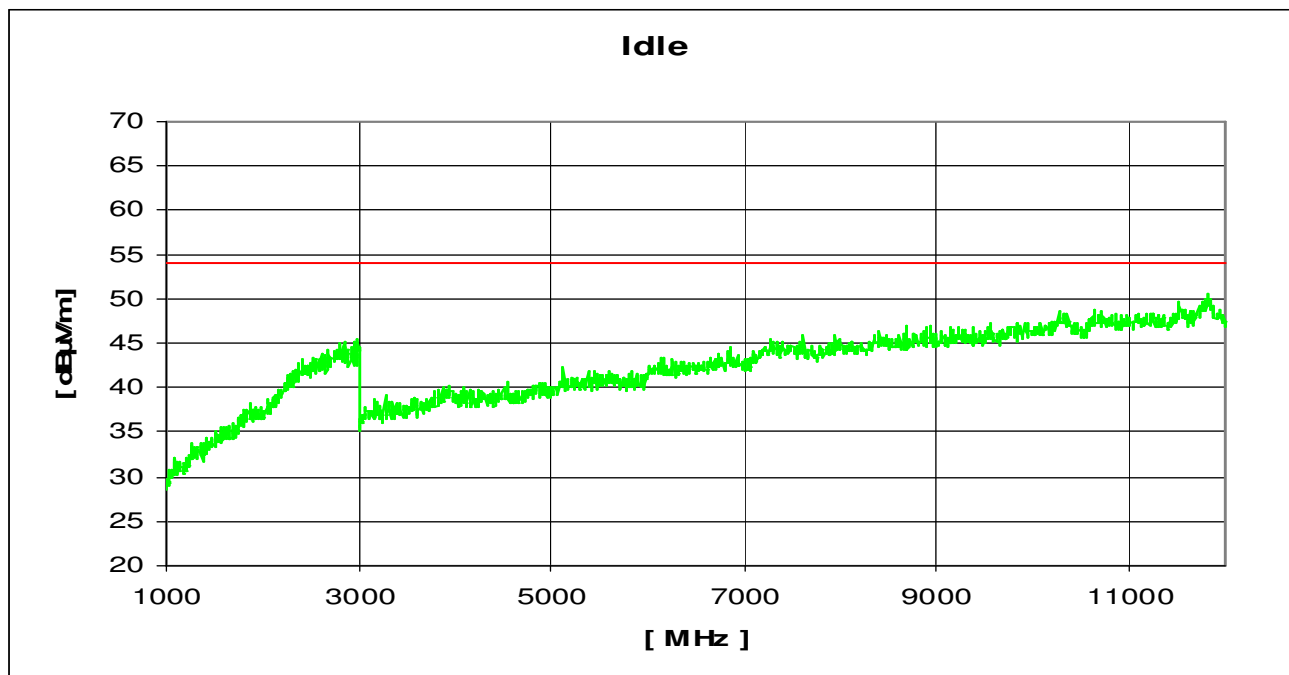
Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32

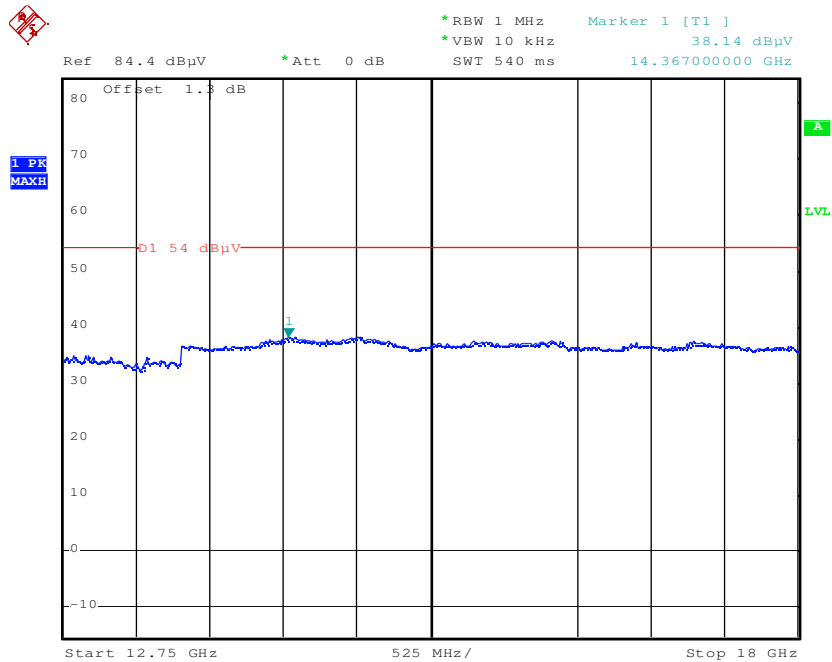
Signal Path: without Notch

FW 1.0

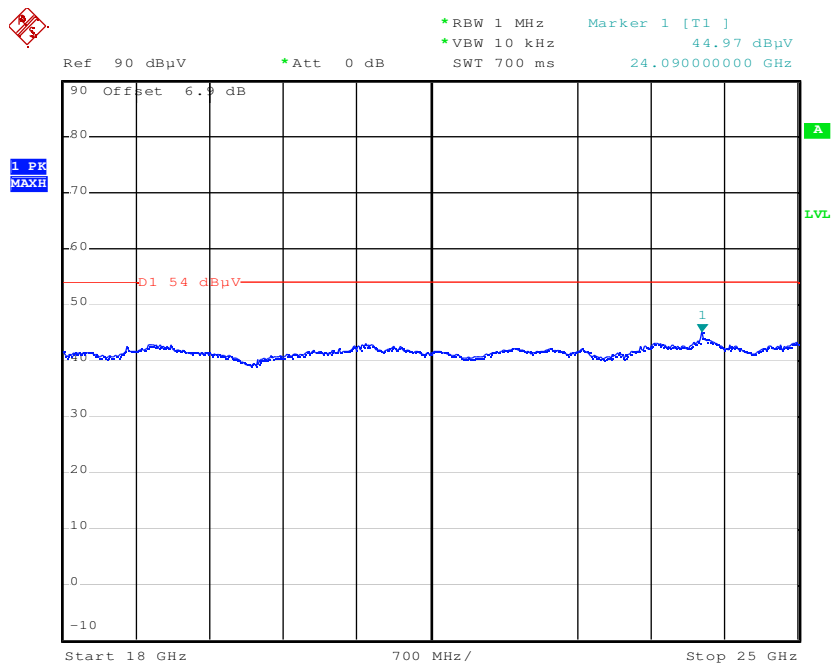
Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table: Cable_EN_1GHz (1005)Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

Plot 2: 1 GHz to 12.75 GHz / idle-mode (horizontal/vertical)

Plot 3: 12 GHz to 18 GHz / Idle (horizontal/vertical)

Date: 20.DEC.2010 09:48:34

Plot 4: 18 GHz to 25 GHz / Idle (horizontal/vertical)

Date: 20.DEC.2010 09:50:01

9.13 TX spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 19. This measurement is representative for all channels and modes. If critical peaks are found channel 11 and channel 26 will be measured too. The measurement is performed in the mode with the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

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

Limits:

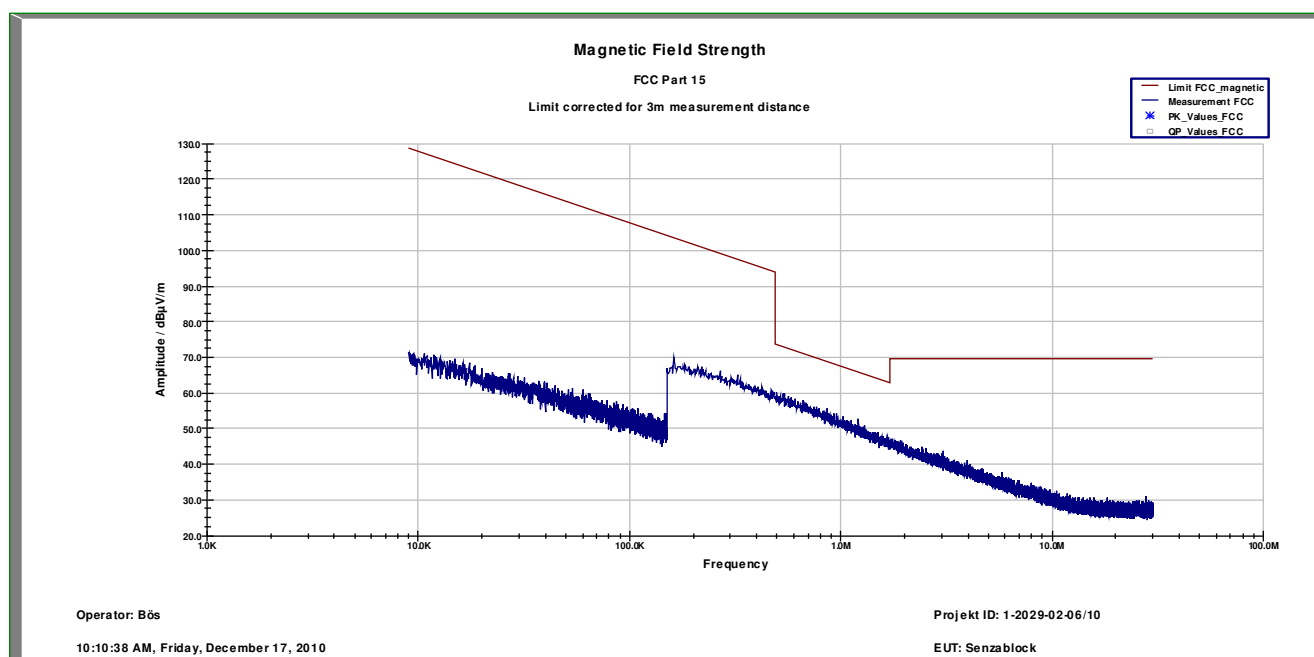
FCC		IC
CFR Part 15.209(a)		RSS 210, Issue 8, 2.2
TX spurious emissions radiated < 30 MHz		
Frequency (MHz)	Field strength (dBμV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Result: Also see plot

TX spurious emissions radiated < 30 MHz [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
No critical peaks found		
Measurement uncertainty	± 3 dB	

Result: The result of the measurement is passed.

Plot 1: 9 kHz to 30 MHz / channel 19 (valid for all channels)



9.14 TX spurious emissions conducted < 30 MHz

Not applicable

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 19. This measurement is representative for all channels and modes. If critical peaks are found channel 11 and channel 26 will be measured too. The measurement is performed in the mode with the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

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

Limits:

FCC		IC	
CFR Part 15.107(a)		ICES-003, Issue 4	
TX spurious emissions conducted < 30 MHz			
Frequency (MHz)	Quasi-peak (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

Result: Also see plots

TX spurious emissions conducted < 30 MHz [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
Measurement uncertainty	± 3 dB	

Result: -/-.

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
11	n. a.	Horn Antenne 1-26.5GHz	3115	EMCO	9005-3440	300002190			
2	n. a.	Horn Antenne 1-26.5GHz	3115	EMCO Elektronik	9709-5290	300000212			
3	n. a.	Ultra Stable Notch Filter	WRCD1887.82/1889.55-5EE	Wainwright	1	300000115	ne		
4	n. a.	HF-Schaltmatrixgrundgerät	TS-RSP 1144.1500K03	R&S	100300	300003556	ev		
5	n. a.	Spiral Antenne	3102L	EMCO	51924	300003385	ne		
6	n. a.	Spiral Antenne	3102L	EMCO	51918	300003384	k		
7	n. a.	Signalgenerator 1-20 GHz	SMR20	R&S	101697/020	300003593	k	08.01.2010	08.01.2012
8	n. a.	Turnable Band Reject	WRCT1850/2170-5/40-10EEK	Wainwright	7	300003386	ev		
9	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	318	300003696	k	01.10.2007	01.10.2011
10	n. a.	Tunable Band Reject	WRCT1850/2170-5/40-10EEK	Wainwright	40	300003872	ev		
11	n. a.	Tunable Band Reject	WRCT824/894-5/40-8EEK	Wainwright	27	300003873	ev		
12	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
13	n. a.	PowerAttenuator	8325	Byrd	1530	300001595	ev		
14	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	05.03.2009	05.03.2011
15	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
16	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
17	Spec. A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
18	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
19	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
20	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
21	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
22	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
23	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
24	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
25	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
26	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
27	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
28	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
29	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
30	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
31	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
32	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	13.09.2010	13.09.2012
33	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vIKI!	08.09.2010	08.09.2012
34	n. a.	TRILOG Broadband Test-Antenna 30 MHz -	VULB9163	Schwarzbeck	371	300003854	vIKI!	17.12.2008	17.12.2011

		3 GHz							
35	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
36	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
37									
38	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
39	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
40	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
41	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
42	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
43	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
44	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
45	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012

Agenda: Kind of Calibration

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

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

Annex A Photographs of the test setup

Photo documentation

Photo 1

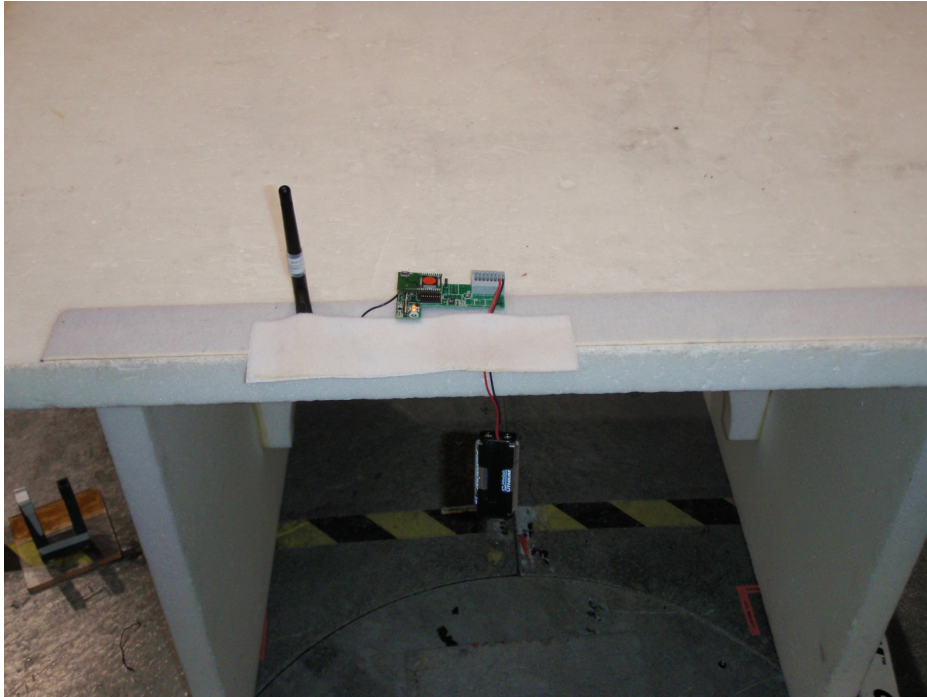
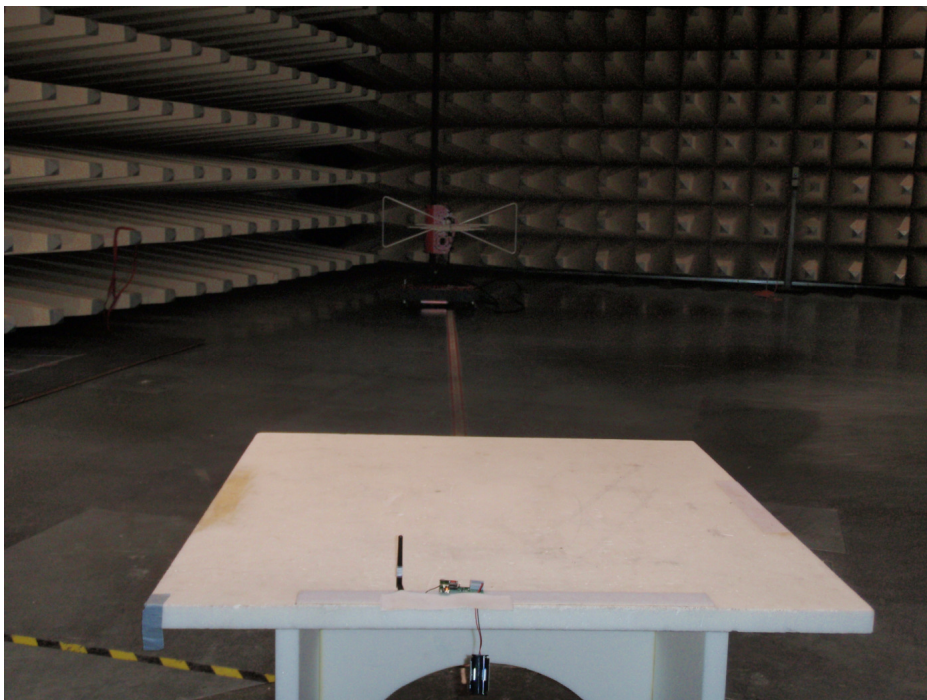


Photo 2



Annex B Photographs of the EUT

Photo documentation

Photo 1

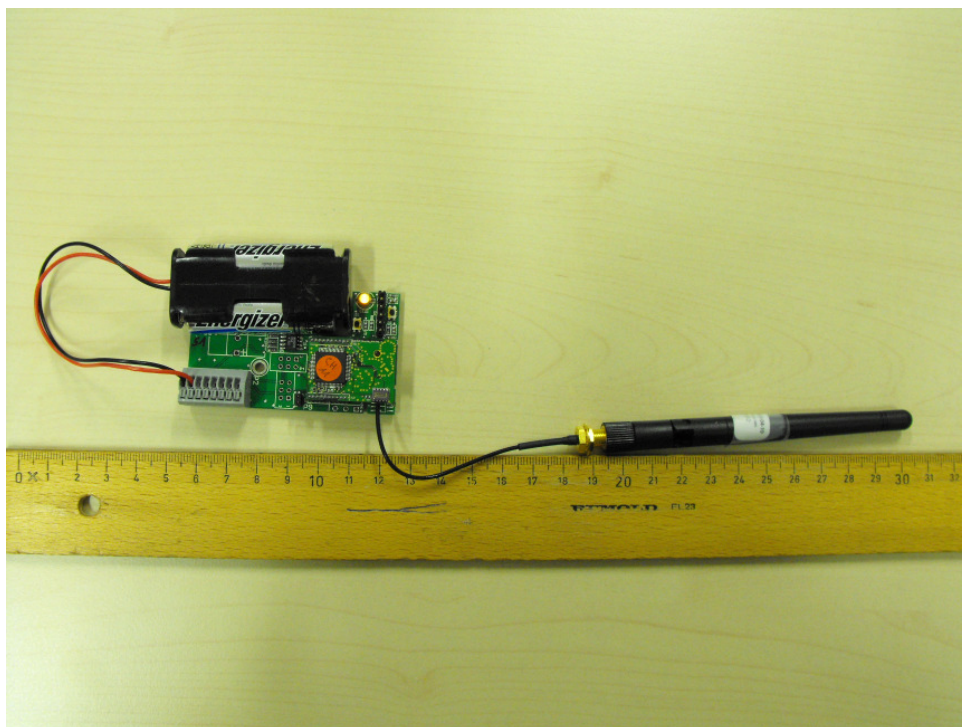


Photo 2

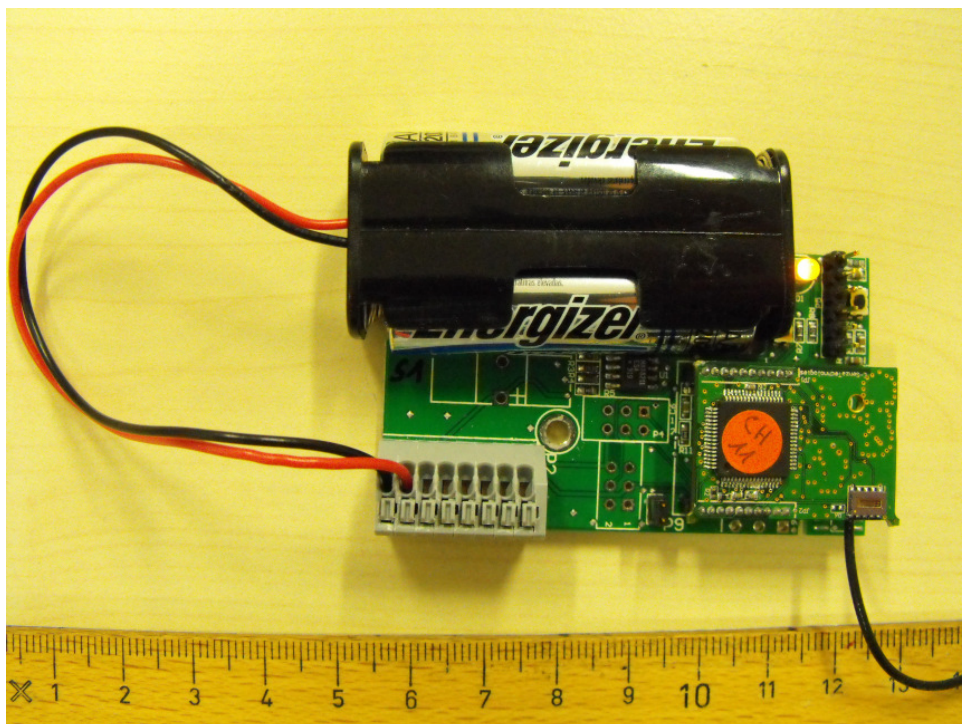


Photo 3



Photo 4

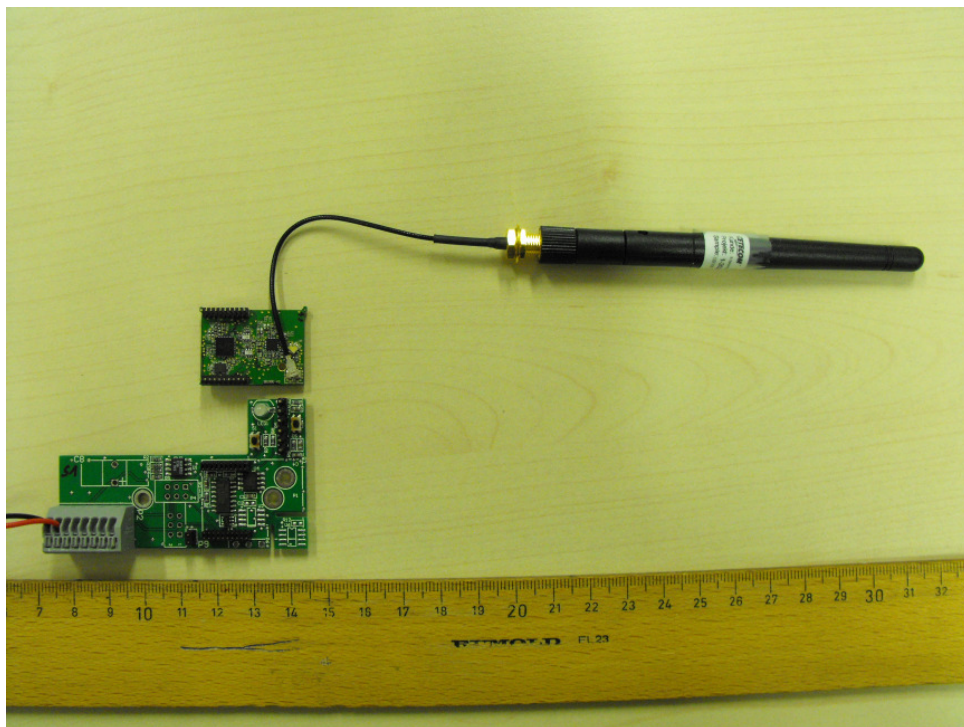


Photo 5

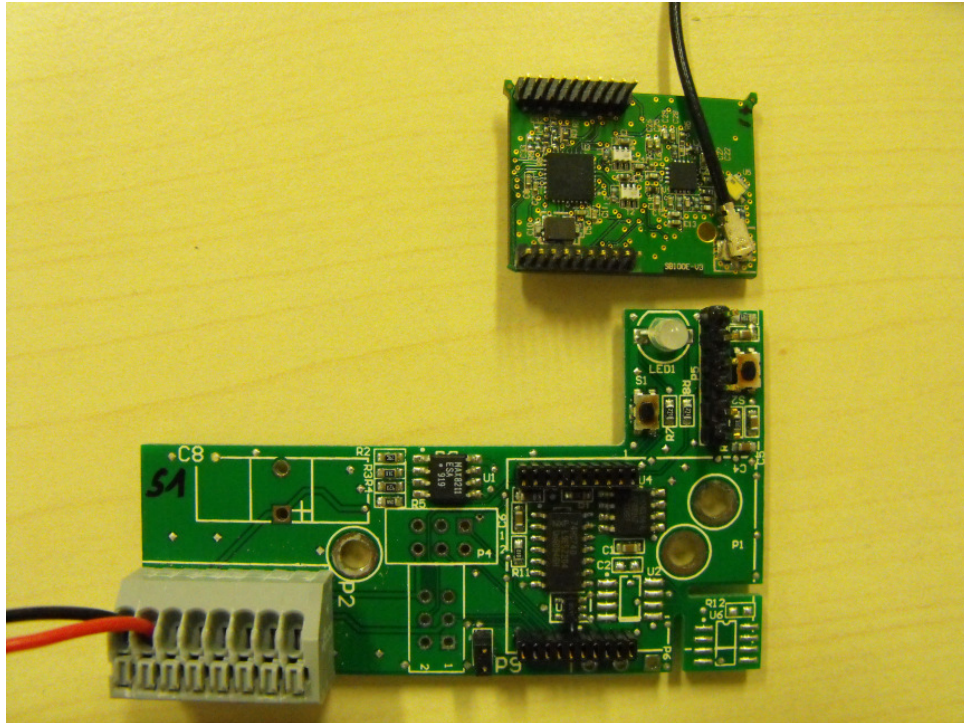


Photo 6

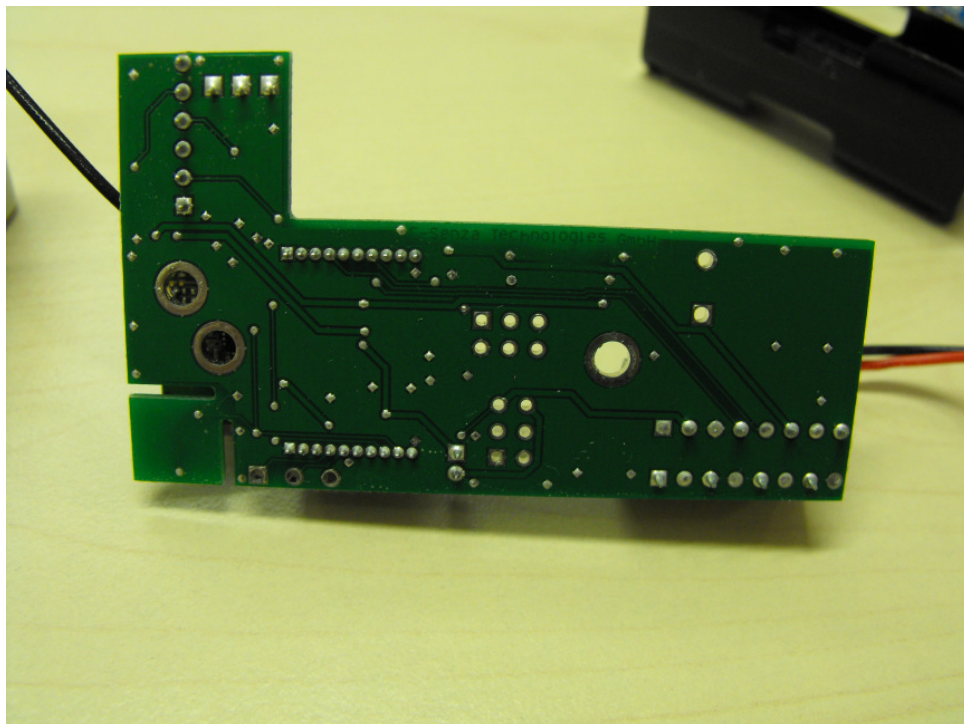


Photo 7

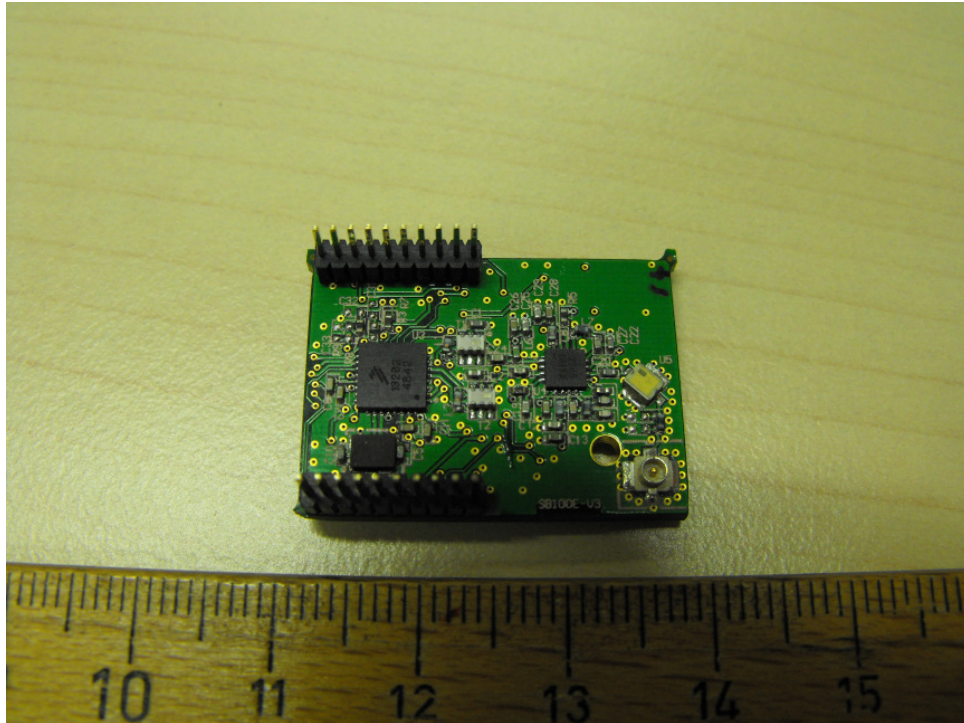


Photo 8

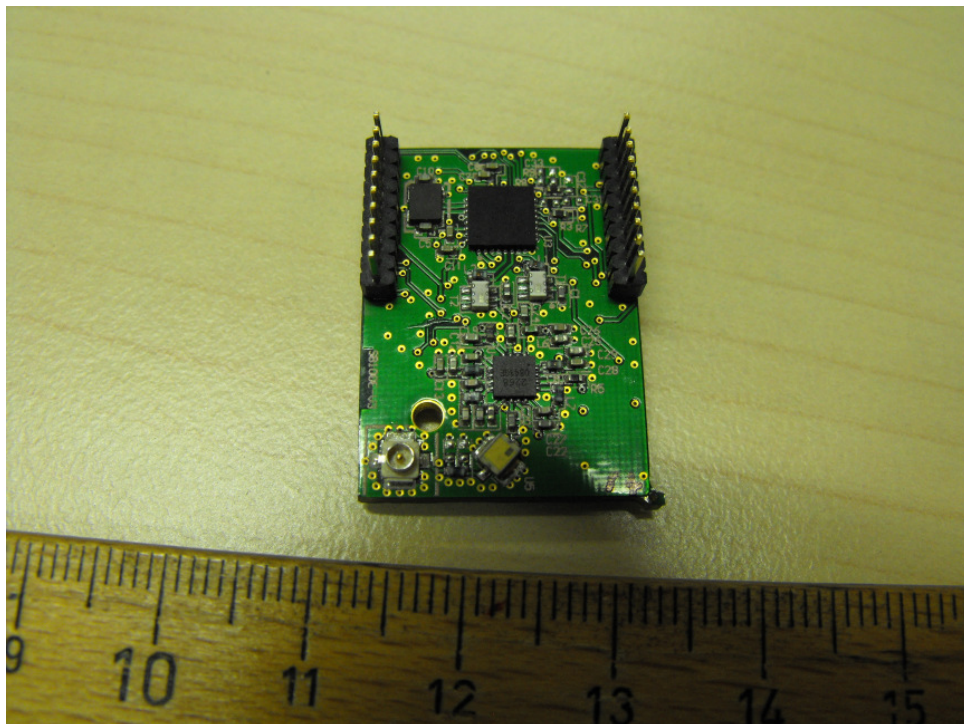


Photo 9

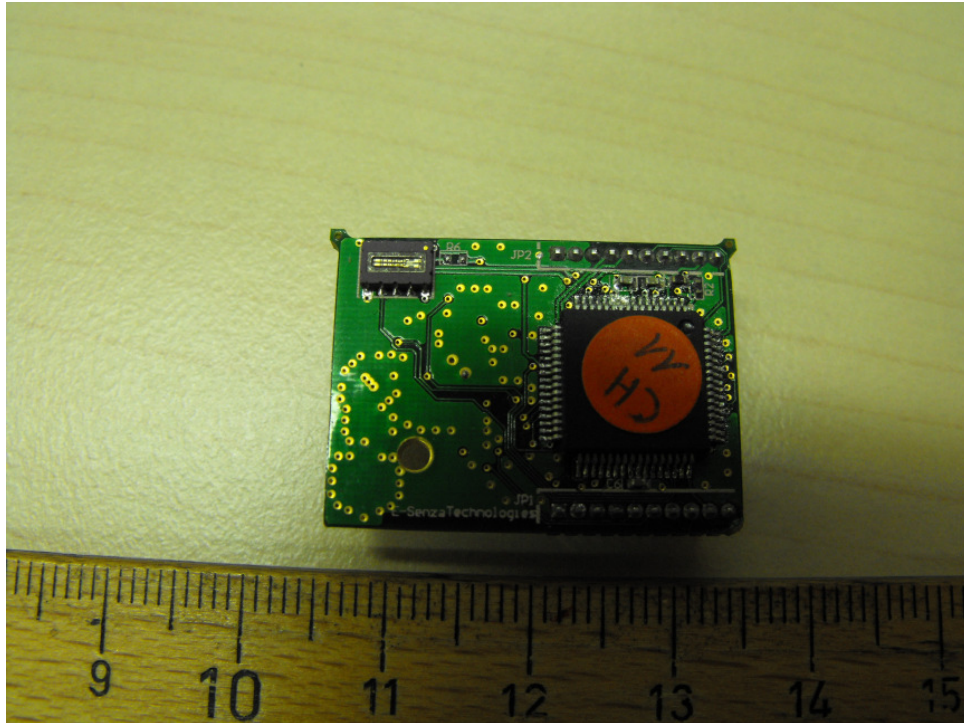
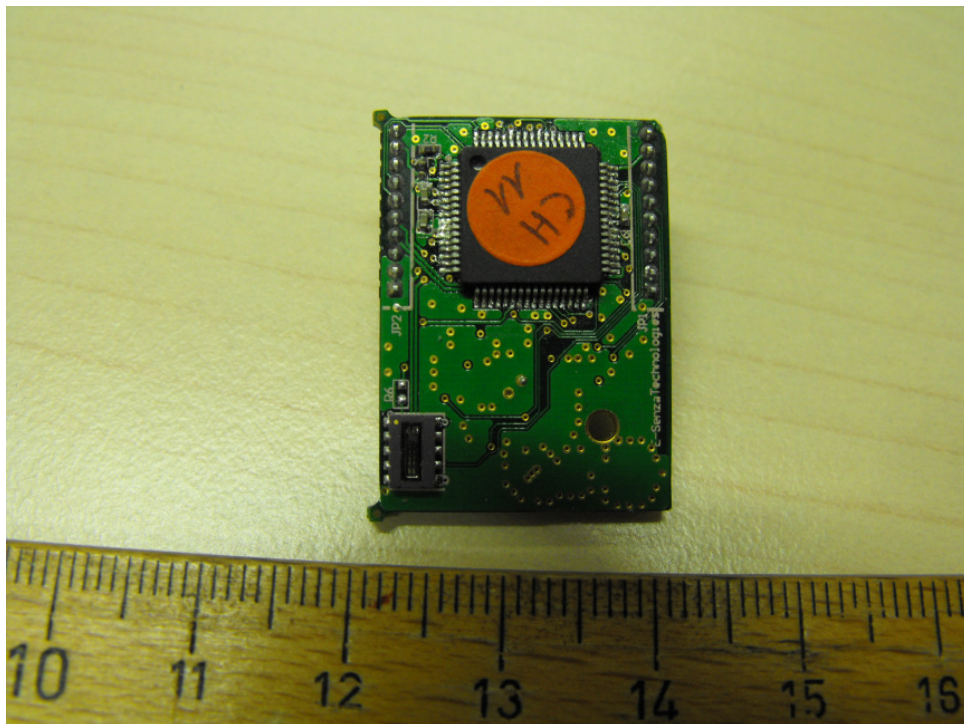


Photo 10



Annex C Document history

Version	Applied changes	Date of release
1.0	Initial release	2011-02-15
-A	Photos added	2011-02-18

Annex D Further information**Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software