
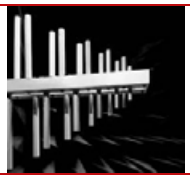
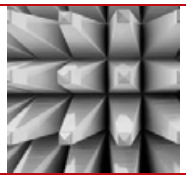

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-4025/11-01-04-A

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

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
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e-mail: ict@cetecom.com

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

Applicant

FLIR Systems AB
Rinkebyvägen 19
SE-182 11 Danderyd / SWEDEN
Phone: +46 (0) 8 753 27 50
Fax:
Contact: Göran Skedung
e-mail: goran.skedung@flir.se
Phone: +46 87 53 27 59

Manufacturer

FLIR Systems AB
Rinkebyvägen 19
SE-182 11 Danderyd / 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:	**Camera**
Model name:	**FLIR-T62101**
FCC ID:	**ZLV-FLIRT62101**
IC:	**5306A-FLIRT62101**
Frequency:	ISM band 2400 MHz to 2483.5 MHz Lowest channel 00: 2402 MHz Highest channel 78: 2480 MHz
Technology tested:	Bluetooth®, +EDR
Antenna:	Integrated antenna
Power Supply:	7.4 V DC by Li-Ion battery
Temperature Range:	-20°C to +55 °C

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

Test report authorised:

cn=Stefan Boes, o=CETECOM ICT Services GmbH, ou=BOE-111011, email=Stefan.Boes@cetecom.com, c=DE
2012.11.06 06:43:42 +01'00'

Stefan Bös
Senior Testing Manager

Test performed:

cn=Andreas Luckenbill, o=CETECOM ICT Services GmbH, ou=LUC-111202, email=andreas.luckenbill@cetecom.com, c=DE
2012.11.06 10:59:23 +01'00'

Andreas Luckenbill

1 Table of contents

2 General information

2.1 Notes and disclaimer

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In no case this test report can be considered as a Letter of Approval.

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

2.2 Application details

Date of receipt of order:	2012-03-05
Date of receipt of test item:	2012-03-07
Start of test:	2012-03-07
End of test:	2012-06-28
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+22 °C	during room temperature tests
	T_{max}	+55 °C	during high temperature tests
	T_{min}	-20 °C	during low temperature tests
Relative humidity content:		52 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	7.4 V	DC by Li-Ion battery
	V_{max}	8.4 V	
	V_{min}	6.9 V	

5 Test item

Kind of test item	**:**	**Camera**
Type identification	**:**	**FLIR-T62101**
S/N serial number	**:**	**Radiated unit: 62000140** **Conducted unit: 62000142**
HW hardware status	**:**	**Please take a look at the PCB!**
SW software status	**:**	**1.9.5**
Frequency band [MHz]	**:**	**ISM band 2400 MHz to 2483.5 MHz** **Lowest channel 00: 2402 MHz** **Highest channel 78: 2480 MHz**
Type of radio transmission **Use of frequency spectrum**	**:** **:**	**FHSS**
Channel access method	**:**	**FDMA**
Type of modulation	**:**	**GFSK, Pi/4 DQPSK, 8DPSK**
Number of channels	**:**	**79**
Antenna	**:**	**Integrated antenna**
Power supply	**:**	**7.4 V DC by Li-Ion battery**
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	2012-11-06	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☐	☐	☒	☐	Not applicable for FHSS!
§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 Pi/4 DQPSK 8 DPSK	☒	☐	☐	☐	complies
§15.247(a)(1) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(b)(1) RSS-210 / A8.4(2)	Maximum output power	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	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	GFSK	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

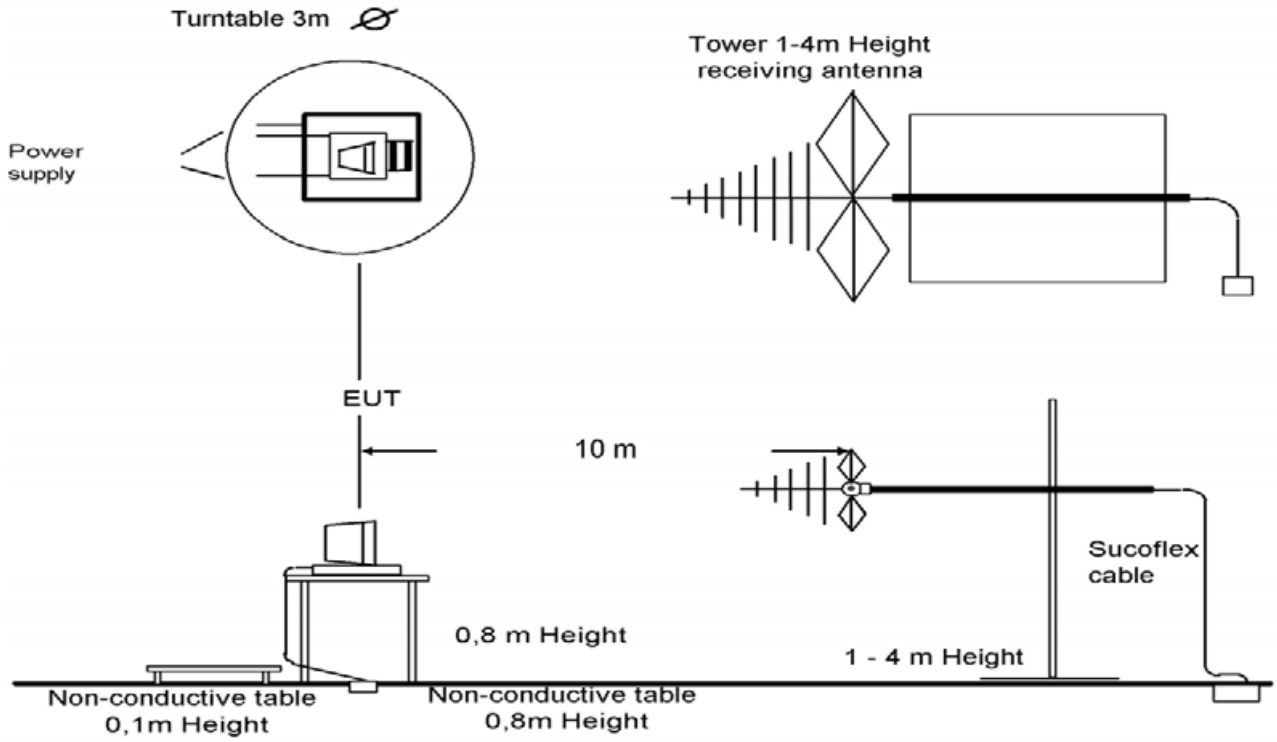
8 RF measurements

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2009 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2009 clause 4.2.
Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



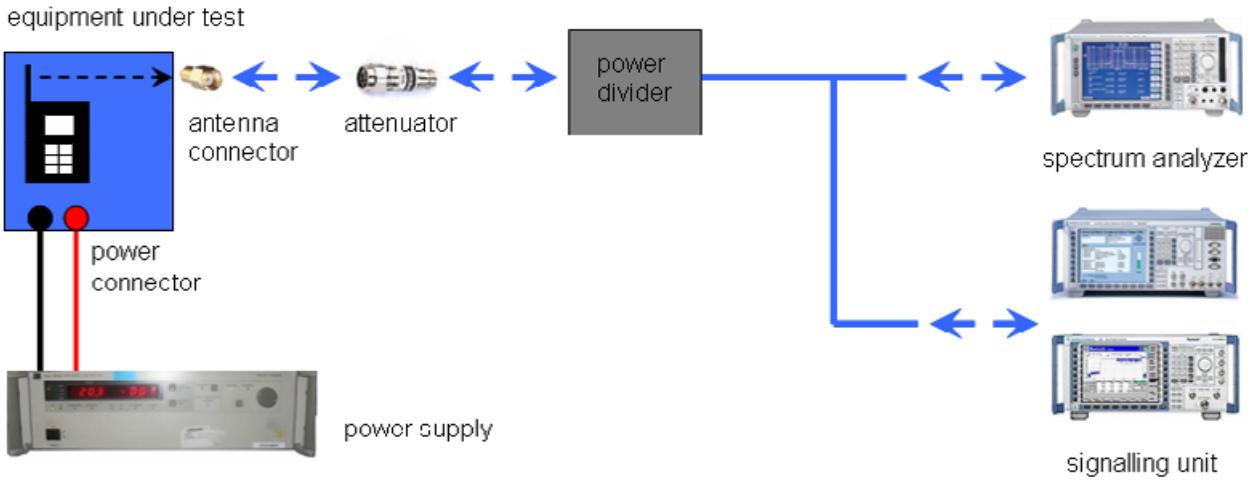
Picture 1: Diagram radiated measurements

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

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A "BLUETOOTH® APPROVALS"
The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

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



Picture 2: Diagram conducted measurements

8.2 Additional comments

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: were performed with x-DH5 packets and static PRBS pattern payload.
RX/Standby tests: BT test mode enabled, scan enabled, TX Idle

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	:	**1-4025/11-01-04-A**
Equipment model number	:	**FLIR-T62101**
Certification number	:	**5306A-FLIRT62101**
Manufacturer (complete address)	:	**FLIR Systems AB Rinkebyvägen 19 SE-182 11 Danderyd / 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 2402 MHz, highest channel 2480 MHz)**
RF-power [W] (max.)	:	**Cond.: 0.35 mW (GFSK modulation) EIRP: 0.29 mW (GFSK modulation) Cond.: 0.23 mW (Pi/4-DQPSK modulation) EIRP: 0.19 mW (Pi/4-DQPSK modulation) Cond.: 0.23 mW (8DPSK modulation) EIRP: 0.19 mW (8DPSK modulation)**
Occupied bandwidth (99%-BW) [kHz]	:	**944 (GFSK modulation) 1269 (Pi/4-DQPSK modulation) 1199 (8DPSK modulation)**
Type of modulation	:	**FHSS technology with GFSK, Pi/4 DQPSK and 8 DPSK modulation.**
Emission designator (TRC-43)	:	**944 KFXD (GFSK modulation) 1M27GXD (Pi/4-DQPSK modulation) 1M20GXD (8DPSK modulation)**
Antenna information	:	**Integrated antenna**
Transmitter spurious (worst case) [dBµV/m @ 3m]:		**52.73 @ 4.96 GHz**
Receiver spurious (worst case) [dBµV/m @ 3m]:		**45 (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:

2012-11-06	Andreas Luckenbill	
Date	Name	Signature

9 Measurement results

9.1 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal Bluetooth® devices, the GFSK modulation is used.

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 2402 MHz	middle channel 2441 MHz	highest channel 2480 MHz
Conducted power [dBm] Measured with GFSK modulation		-5.95	-5.00	-4.53
Radiated power [dBm] Measured with GFSK modulation		-6.19	-5.34	-5.60
Gain [dBi] Calculated		-0.24	-0.34	-1.07

Result: **Passed**

9.2 Power spectral density

Description:

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

Measurement:

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

Limits:

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

Results:

Modulation	Power spectral density [dBm/3kHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
GFSK	**Not required for hopping systems!**		
Pi/4 DQPSK			
8DPSK			
Measurement uncertainty	± 1.5 dB		

9.3 Carrier frequency separation

Description:

Measurement of the carrier frequency separation of a hopping system. The carrier frequency separation is constant for all modulation-modes. 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:	4 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.	

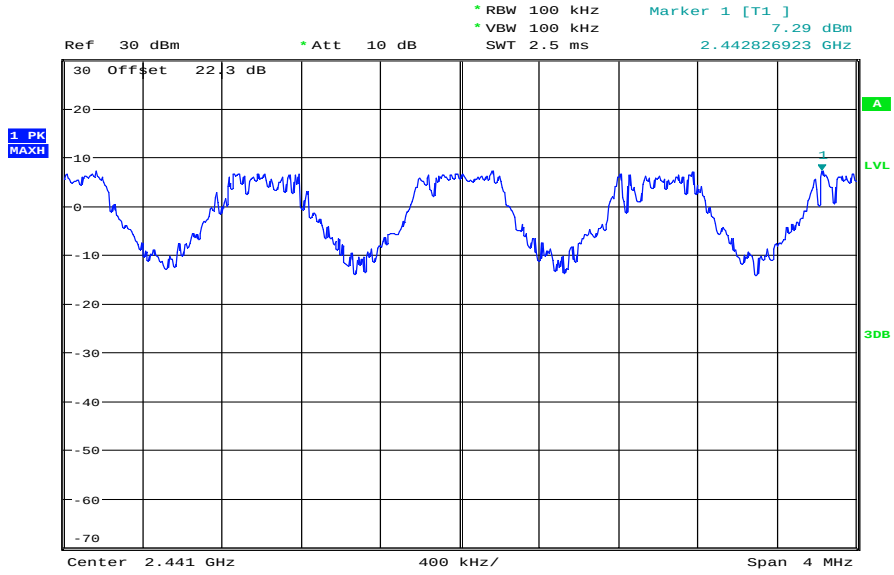
Result:

Carrier frequency separation	~ 1 MHz

Result: Passed

Plot:

Plot 1: Carrier frequency separation (GFSK modulation)



9.4 Number of hopping channels

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	500 kHz
Resolution bandwidth:	500 kHz
Span:	Plot 1: 2400 – 2445 MHz Plot 2: 2445 – 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	

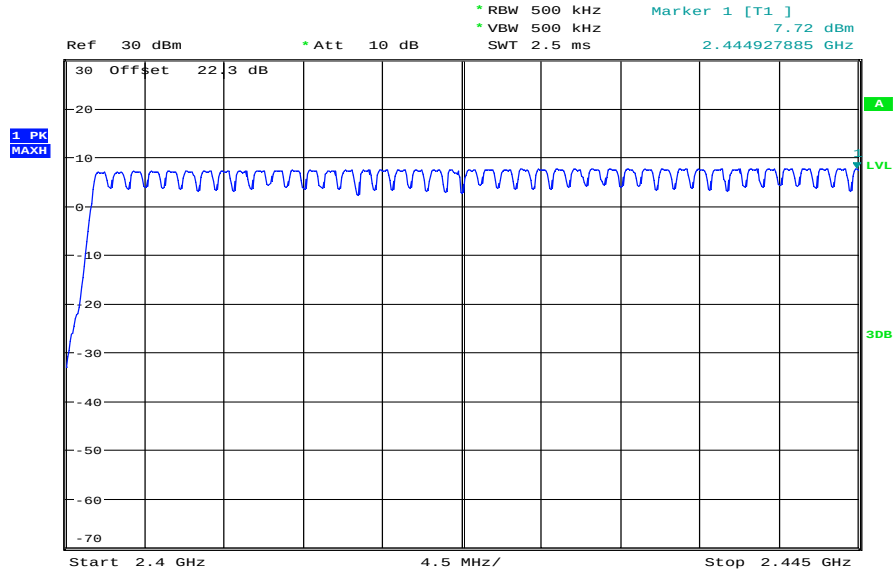
Result:

Number of hopping channels	79

Result: **Passed.**

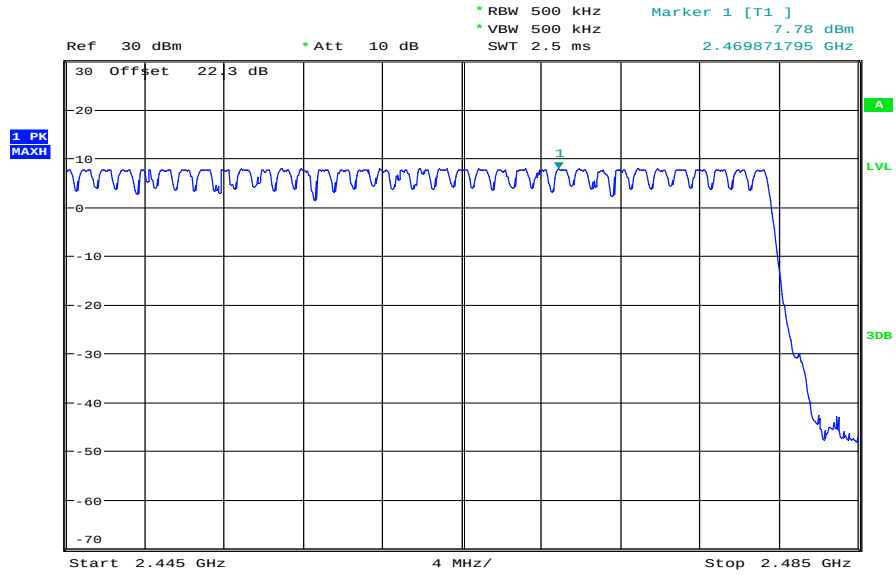
Plots:

Plot 1: Number of hopping channels (GFSK modulation)



Date: 5.MAR.2012 11:06:17

Plot 2: Number of hopping channels (GFSK modulation)



Date: 5.MAR.2012 11:07:41

9.5 Time of occupancy (dwell time)

Measurement:

For Bluetooth® devices no measurements mandatory depending on the fixed requirements according to the Bluetooth® Core Specifications!

For Bluetooth® devices:

The channel staying time of 0.4 s within a 31.6 second period in data mode is constant for Bluetooth® devices and independent from the packet type (packet length). The calculation for a 31.6 second period is a follows:

Channel staying time = time slot length * hop rate / number of hopping channels * 31.6 s

Example for a DH1 packet (with a maximum length of one time slot)
Channel staying time = 625 µs * 1600*1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

For multi-slot packets the hopping is reduced according to the length of the packet.

Example for a DH3 packet (with a maximum length of three time slots)
Channel staying time = 3 * 625 µs * 1600/3 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

Example for a DH5 packet (with a maximum length of five time slots)
Channel staying time = 5 * 625 µs * 1600/5 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

This is according the Bluetooth® Core Specification V2.0 & V2.1 & V3.0 & V4.0 (+ critical errata) for all Bluetooth® devices.

The following table shows the relations:

Packet Size	Pulse Width [ms] *	Max. number of transmissions per channel in 31.6 sec
DH1	0.366	640
DH3	1.622	214
DH5	2.870	128

* according Bluetooth® specification

Results:

Packet Size	Pulse Width [ms]*	Max. number of transmissions in 31.6 sec	Dwell time [Pulse width * Number of transmissions]
DH1	0.366	640	234.2 ms
DH3	1.622	214	347.1 ms
DH5	2.870	128	367.4 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: Passed

9.6 Spectrum bandwidth of a FHSS system – 20 dB bandwidth

Description:

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

Measurement:

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

Limits:

FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.2(a)
Spectrum bandwidth of a FHSS system – 20 dB bandwidth	
GFSK < 1500 kHz Pi/4 DQPSK < 1500 kHz 8DPSK < 1500 kHz	

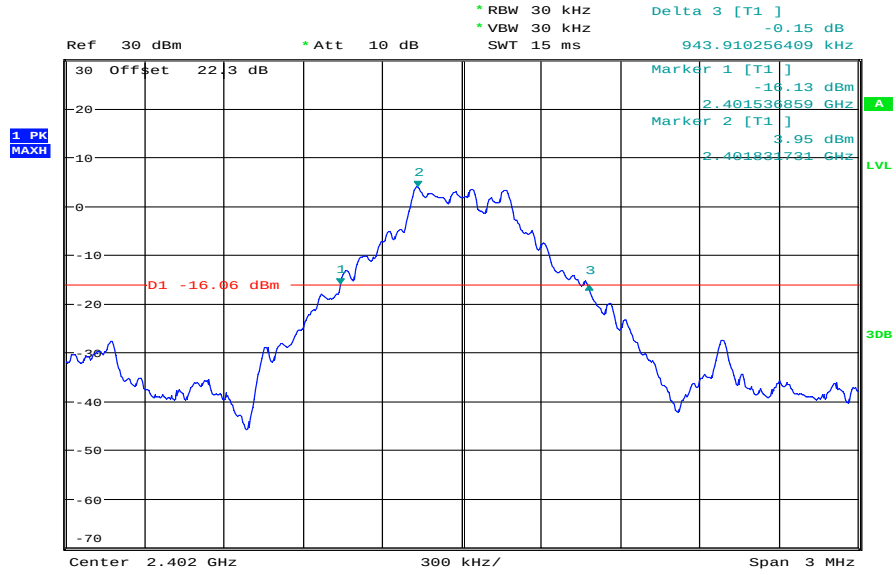
Results:

Modulation	20 dB BANDWIDTH [kHz]		
Frequency	2402 MHz	2441 MHz	2480 MHz
GFSK	943.9	942.3	942.3
Pi/4 DQPSK	1204	1269	1197
8DPSK	1199	1192	1197
Measurement uncertainty	± 10 kHz		

Result: Passed

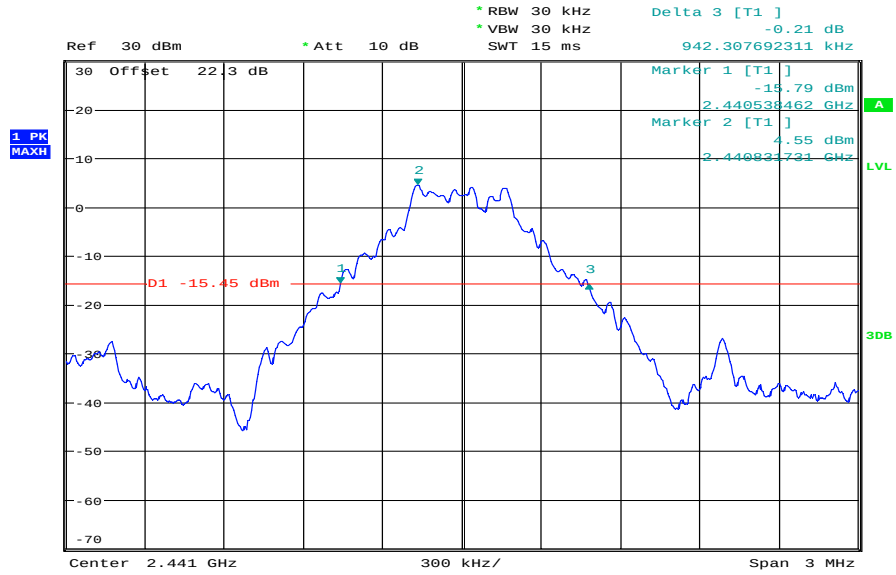
Plots:

Plot 1: lowest channel – 2402 MHz, GFSK modulation



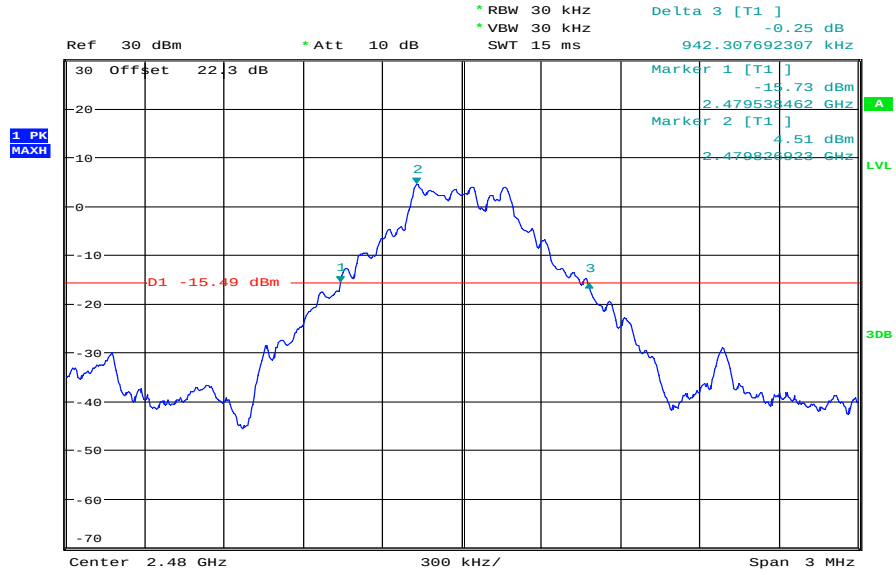
Date: 5.MAR.2012 12:29:46

Plot 2: middle channel – 2441 MHz, GFSK modulation



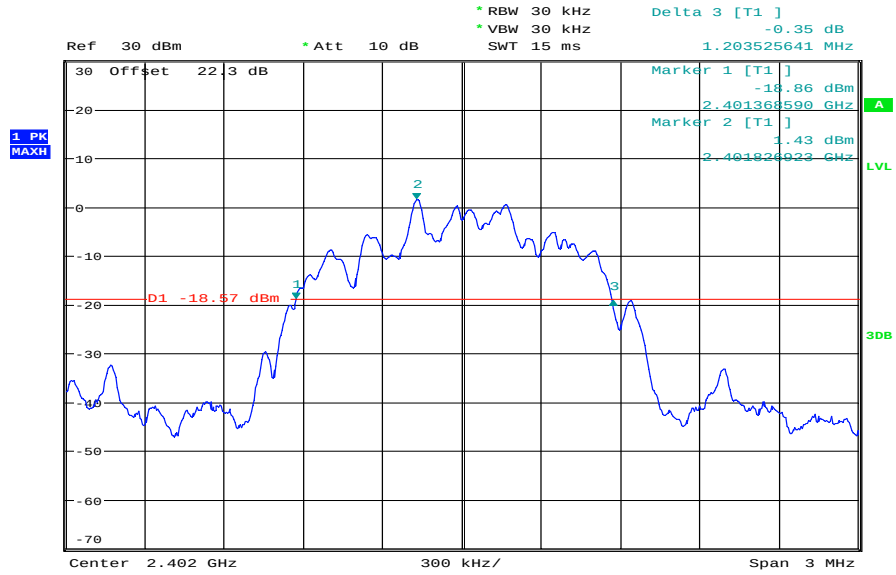
Date: 5.MAR.2012 12:32:40

Plot 3: highest channel – 2480 MHz, GFSK modulation



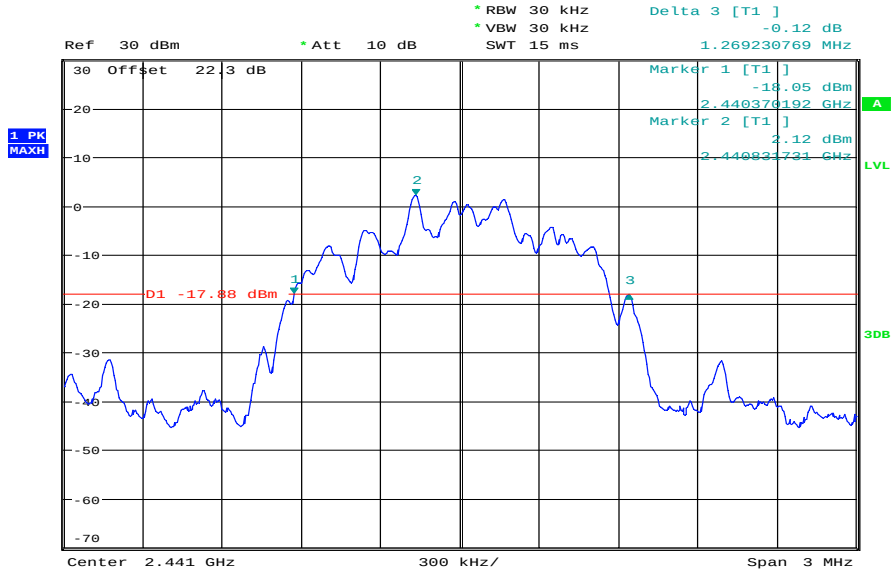
Date: 5.MAR.2012 12:41:19

Plot 4: lowest channel – 2402 MHz, Pi / DQPSK modulation



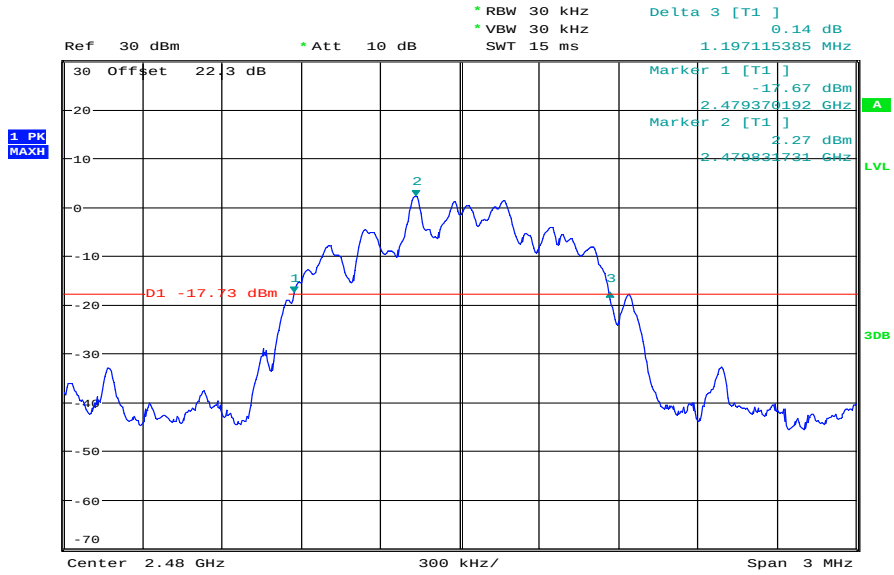
Date: 5.MAR.2012 12:27:44

Plot 5: middle channel – 2441 MHz, Pi / DQPSK modulation



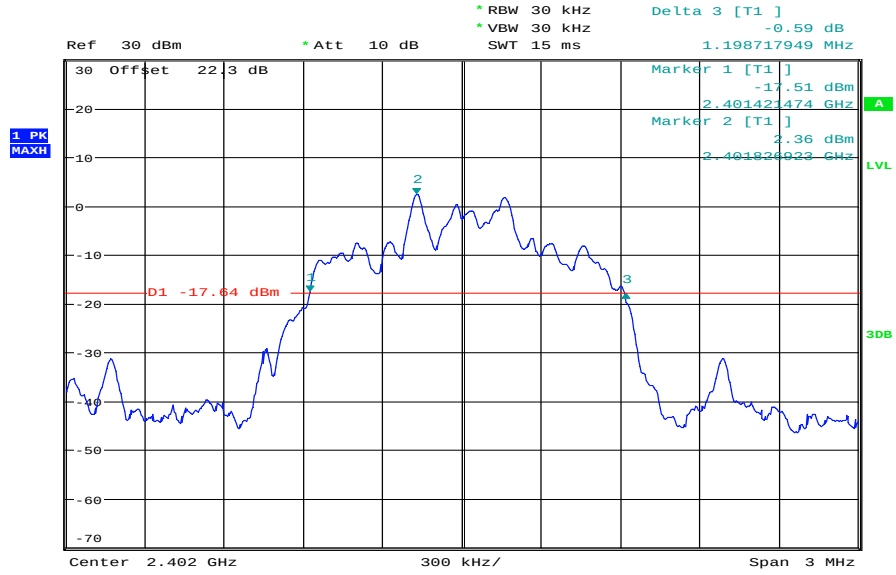
Date: 5.MAR.2012 12:35:06

Plot 6: highest channel – 2480 MHz, Pi / DQPSK modulation



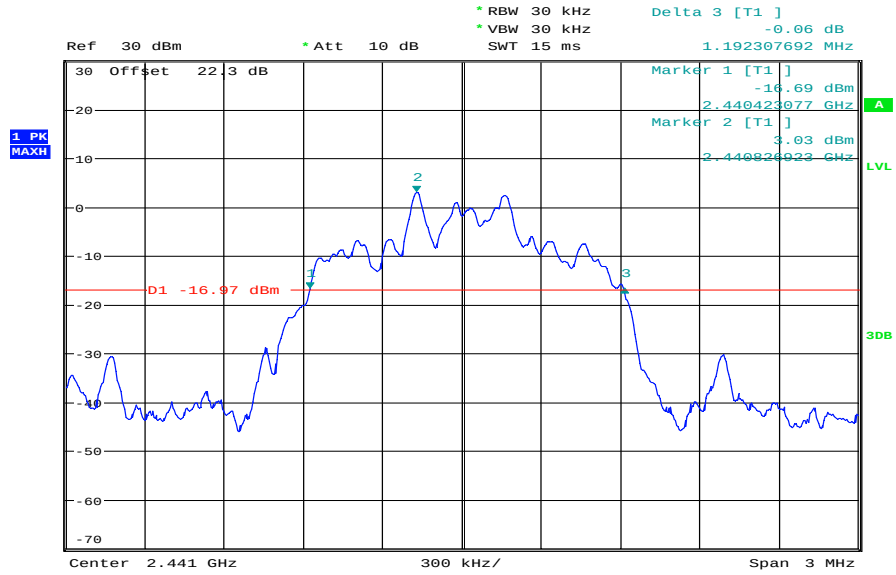
Date: 5.MAR.2012 12:39:52

Plot 7: lowest channel – 2402 MHz, 8 DPSK modulation



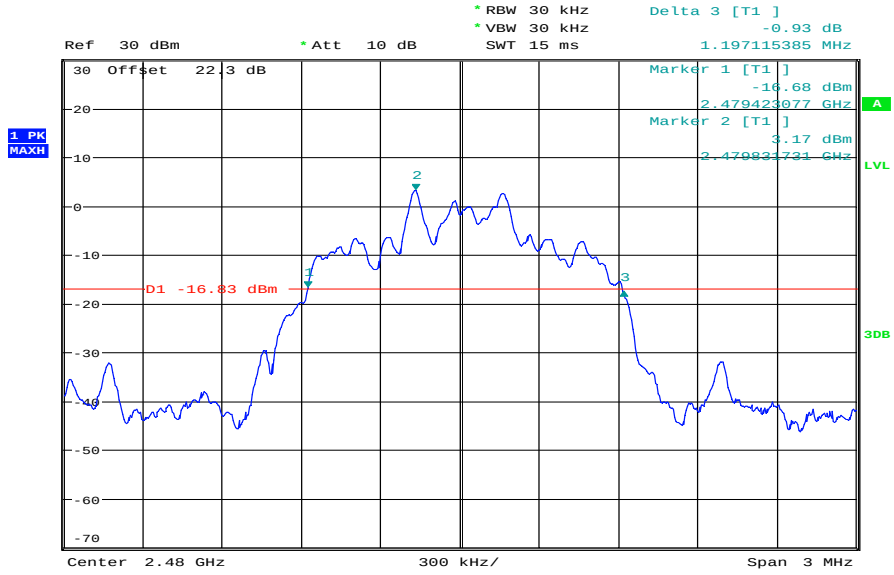
Date: 5.MAR.2012 12:24:16

Plot 8: middle channel – 2441 MHz, 8 DPSK modulation



Date: 5.MAR.2012 12:36:32

Plot 9: highest channel – 2480 MHz, 8 DPSK modulation



9.7 Maximum output power

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	3 MHz
Resolution bandwidth:	3 MHz
Span:	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	

Results:

Modulation / Frequency	Maximum output power conducted [dBm]		
	2402 MHz	2441 MHz	2480 MHz
GFSK	-5.95	-5.00	-4.53
Pi/4 DQPSK	-7.70	-6.79	-6.29
8DPSK	-7.80	-6.84	-6.36
Measurement uncertainty	± 1 dB		

Result: **Passed**

Results:

Modulation / Frequency	Maximum output power radiated - EIRP [dBm]		
	2402 MHz	2441 MHz	2480 MHz
GFSK	-6.19	-5.34	-5.60
Pi/4 DQPSK *)	-7.94	-7.13	-7.36
8DPSK *)	-8.04	-7.18	-7.43
Measurement uncertainty	± 3 dB		

*) - Values calculated with antenna gain

Result: **Passed**

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 Upper 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.	

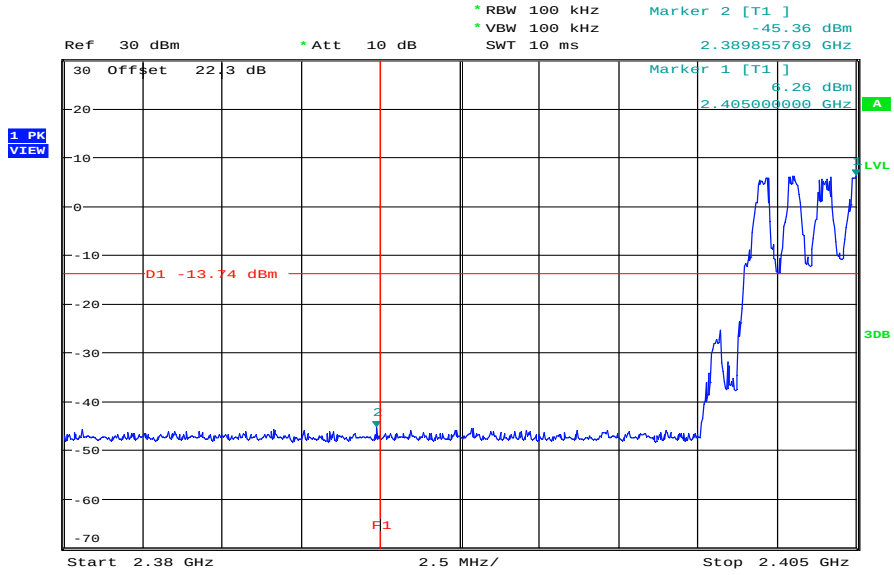
Results:

Scenario	Band edge compliance conducted [dB]		
Modulation	GFSK	Pi/4 DQPSK	8DPSK
Lower band edge – hopping off	> 20 dB	> 20 dB	> 20 dB
Lower band edge – hopping on	> 20 dB	> 20 dB	> 20 dB
Upper band edge – hopping off	> 20 dB	> 20 dB	> 20 dB
Upper band edge – hopping on	> 20 dB	> 20 dB	> 20 dB
Measurement uncertainty	± 1.5 dB		

Result: Passed

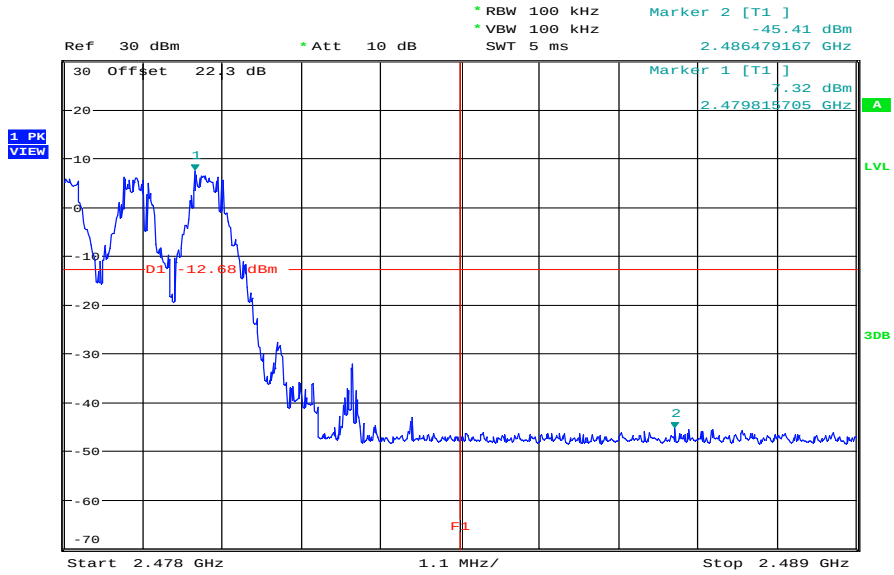
Plots:

Plot 1: Lower band edge – hopping on, GFSK modulation



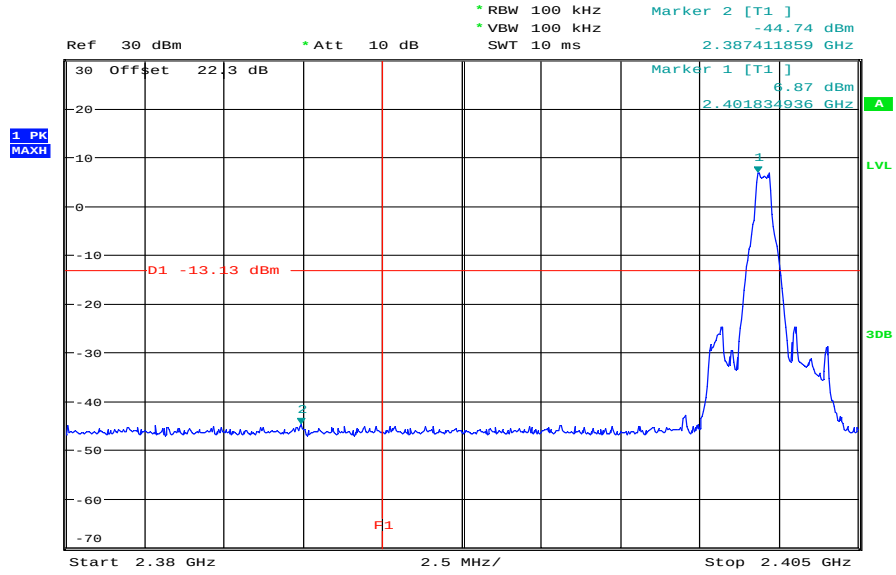
Date: 5.MAR.2012 11:13:11

Plot 2: Upper band edge – hopping on, GFSK modulation



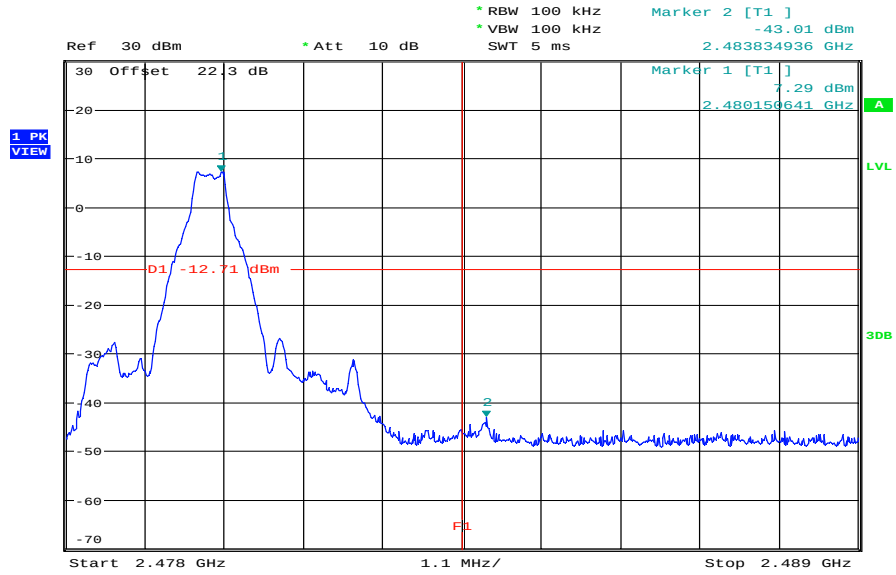
Date: 5.MAR.2012 11:47:23

Plot 3: Lower band edge – hopping off, GFSK modulation



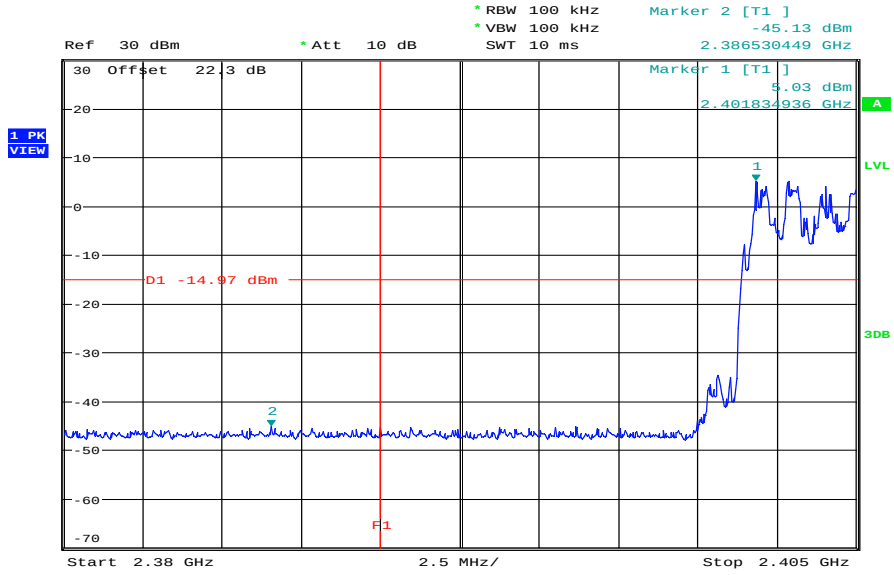
Date: 5.MAR.2012 12:16:59

Plot 4: Upper band edge – hopping off, GFSK modulation



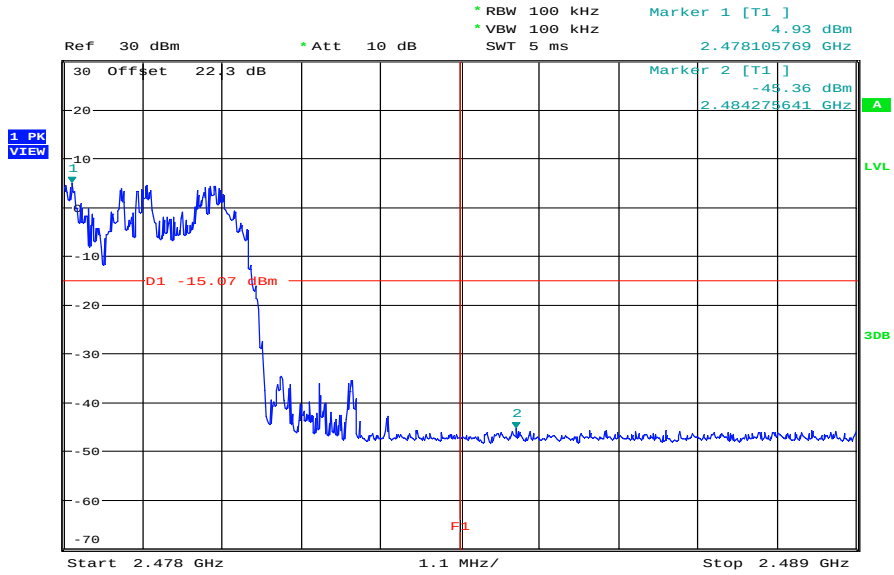
Date: 5.MAR.2012 11:32:13

Plot 5: Lower band edge – hopping on, Pi/4 DQPSK modulation



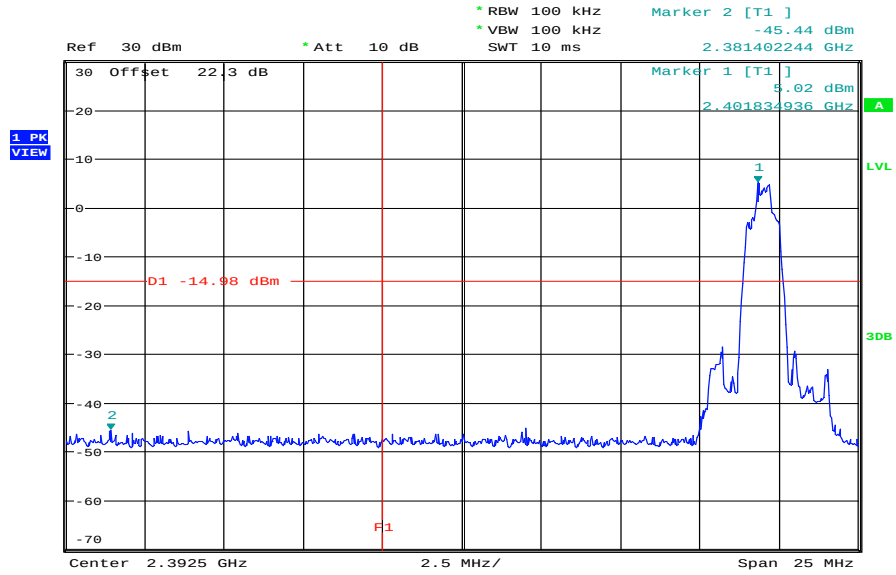
Date: 5.MAR.2012 11:19:40

Plot 6: Upper band edge – hopping on, Pi/4 DQPSK modulation



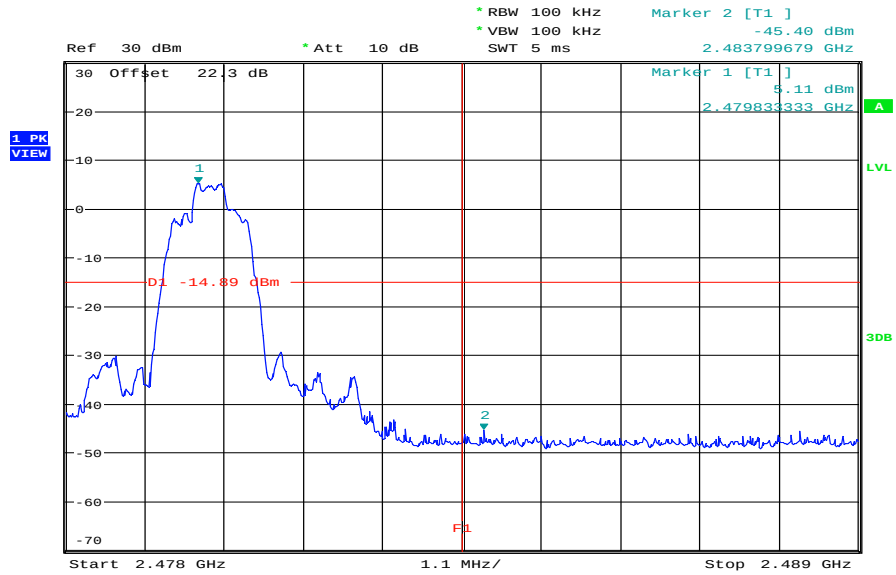
Date: 5.MAR.2012 11:44:21

Plot 7: Lower band edge – hopping off, Pi/4 DQPSK modulation



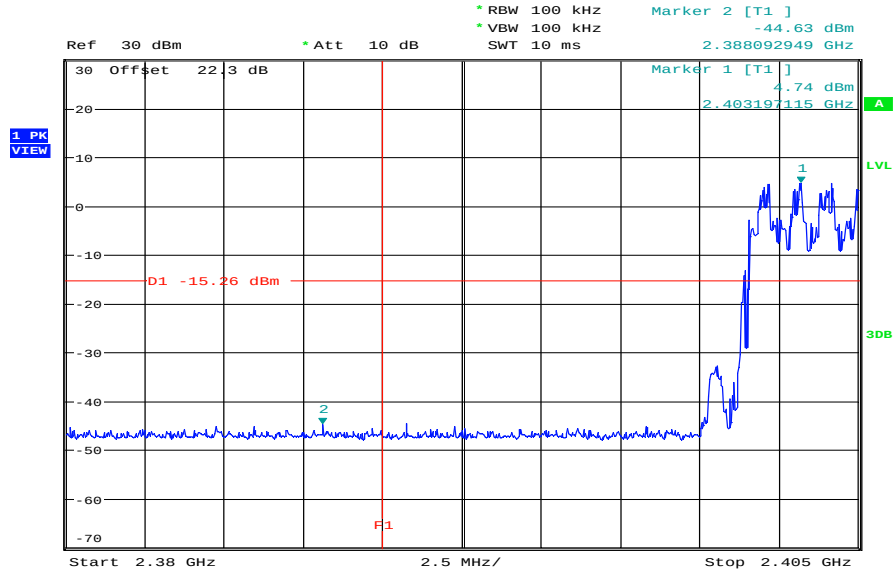
Date: 5.MAR.2012 12:18:14

Plot 8: Upper band edge – hopping off, Pi/4 DQPSK modulation



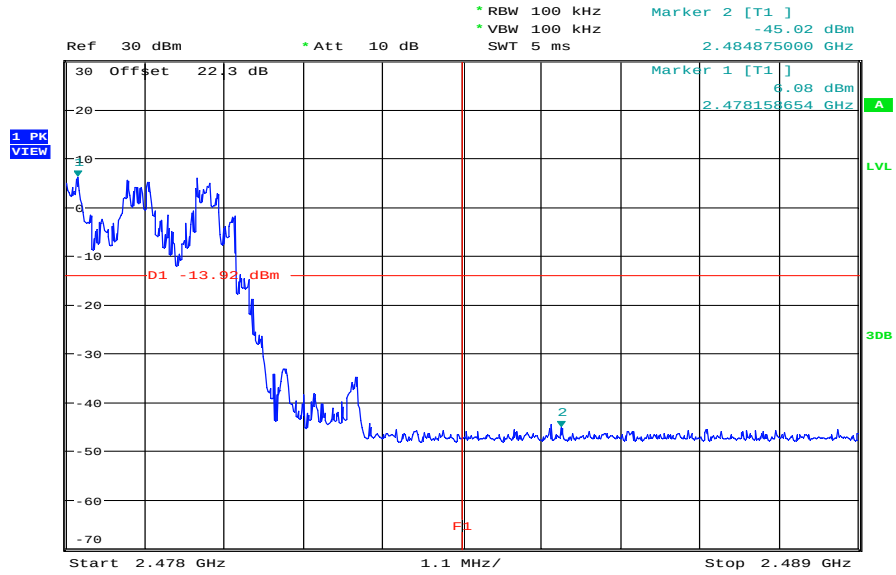
Date: 5.MAR.2012 11:33:53

Plot 9: Lower band edge – hopping on, 8DPSK modulation



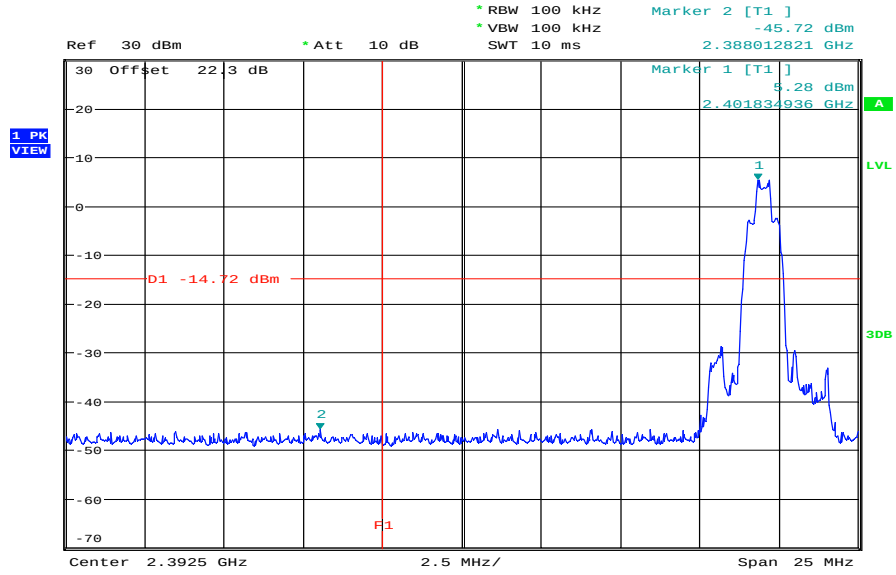
Date: 5.MAR.2012 11:24:46

Plot 10: Upper band edge – hopping on, 8DPSK modulation



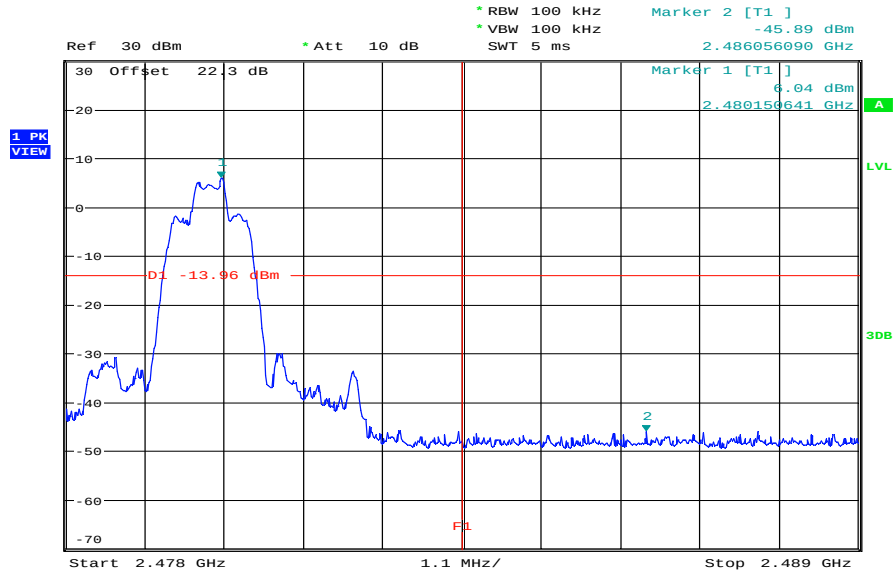
Date: 5.MAR.2012 11:40:17

Plot 11: Lower band edge – hopping off, 8DPSK modulation



Date: 5.MAR.2012 12:19:38

Plot 12: Upper band edge – hopping off, 8DPSK modulation



Date: 5.MAR.2012 11:35:12

9.9 Band edge compliance radiated

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	10 Hz
Resolution bandwidth:	1 MHz
Span:	Lower Band: 2300 – 2400 MHz Upper 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	

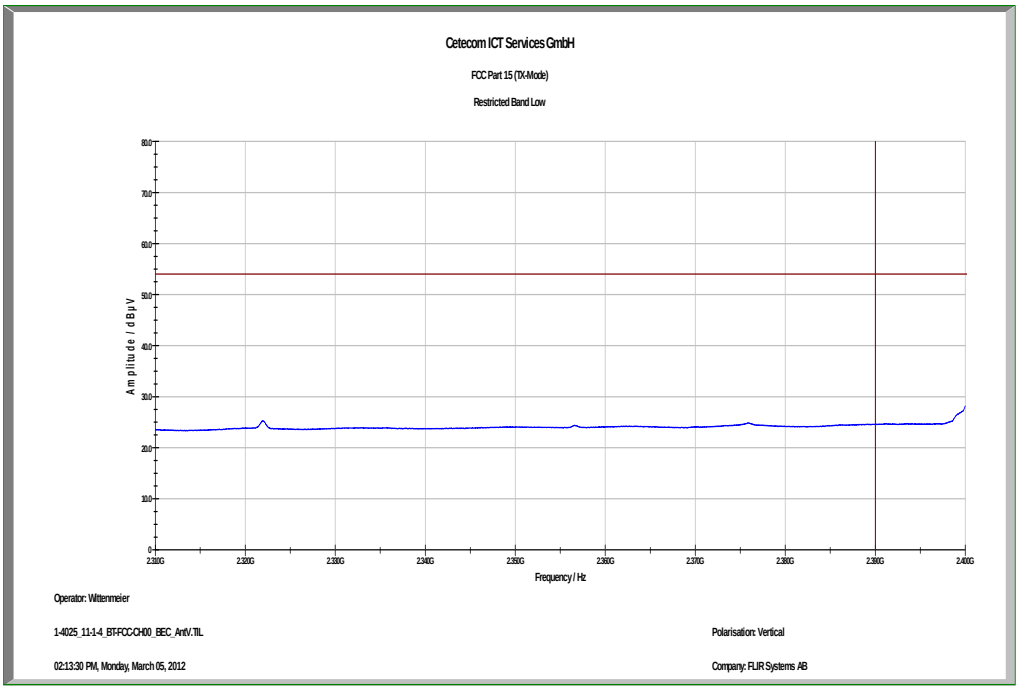
Results:

Scenario	Band edge compliance radiated [dBµV/m]		
Modulation	GFSK	Pi/4 DQPSK	8DPSK
Lower restricted band	< 54	< 54	< 54
Upper restricted band	< 54	< 54	< 54
Measurement uncertainty	± 3 dB		

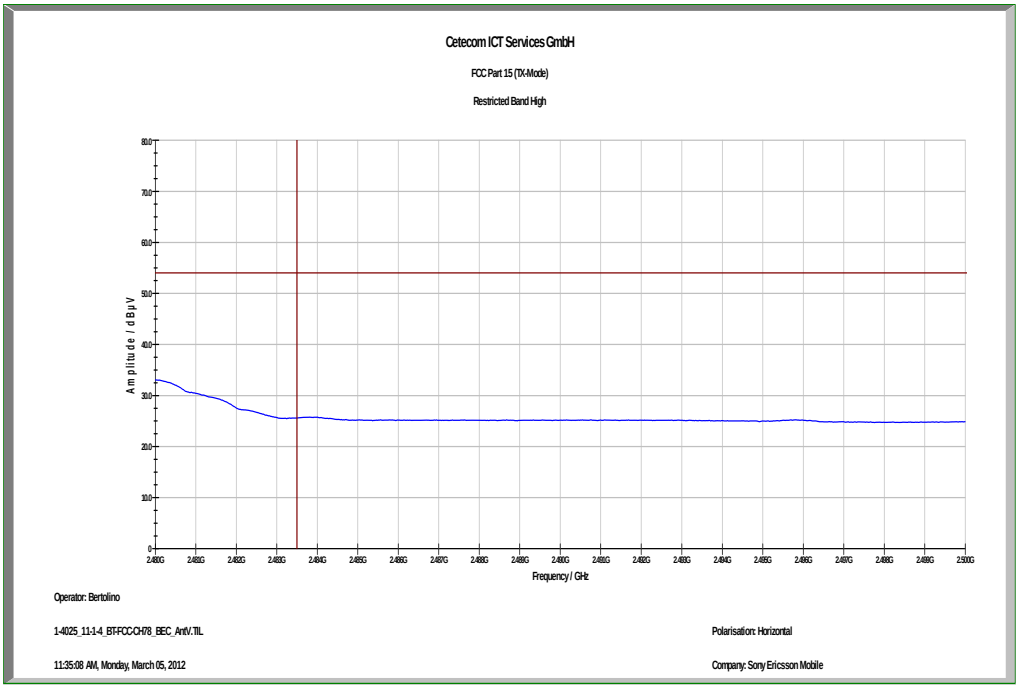
Result: Passed

Plots: Worst case

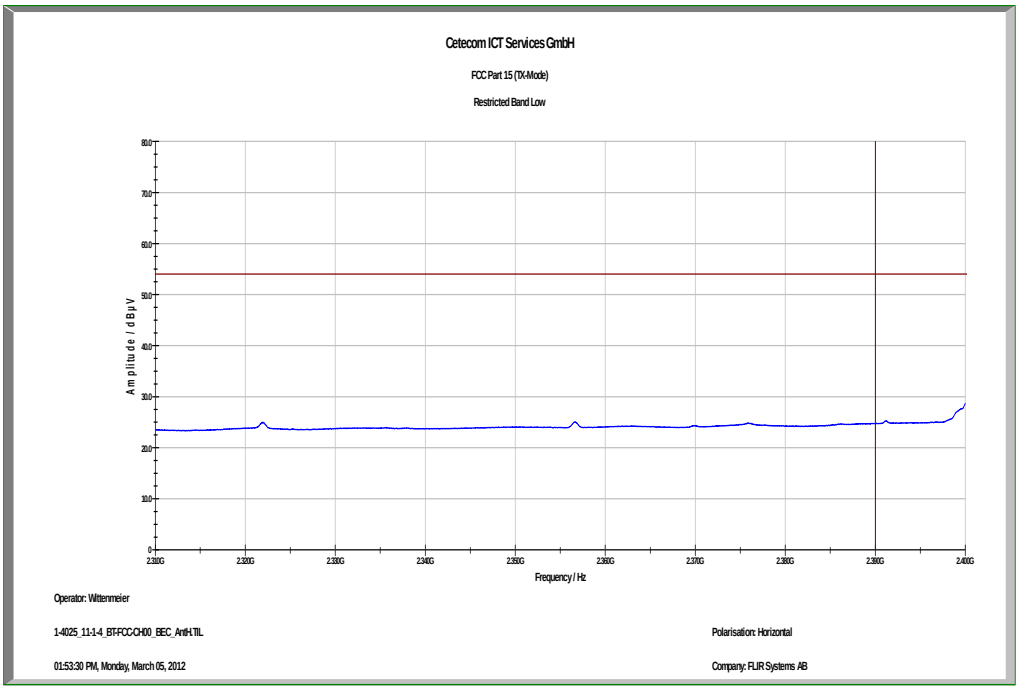
Plot 1: Lower band edge, GFSK modulation, vertical polarization



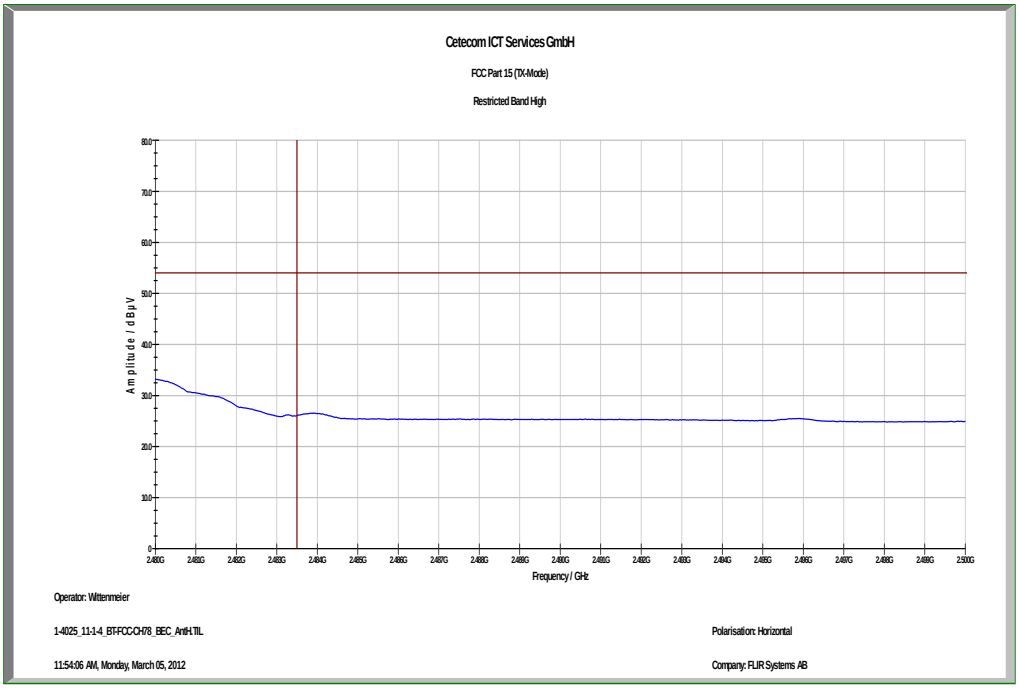
Plot 2: Upper band edge, GFSK modulation, vertical polarization



Plot 3: Lower band edge, GFSK modulation, horizontal polarization



Plot 4: Upper band edge, GFSK modulation, horizontal polarization



9.10 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 39 and channel 78. The measurement is repeated for all modulations.

Measurement:

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

Limits:

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

Results:

TX spurious emissions conducted					
GFSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
2441			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
2480			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

Results:

TX spurious emissions conducted					
Pi/4-DQPSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
2441			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
2480			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
Measurement uncertainty		± 3dB			

Result: **Passed**

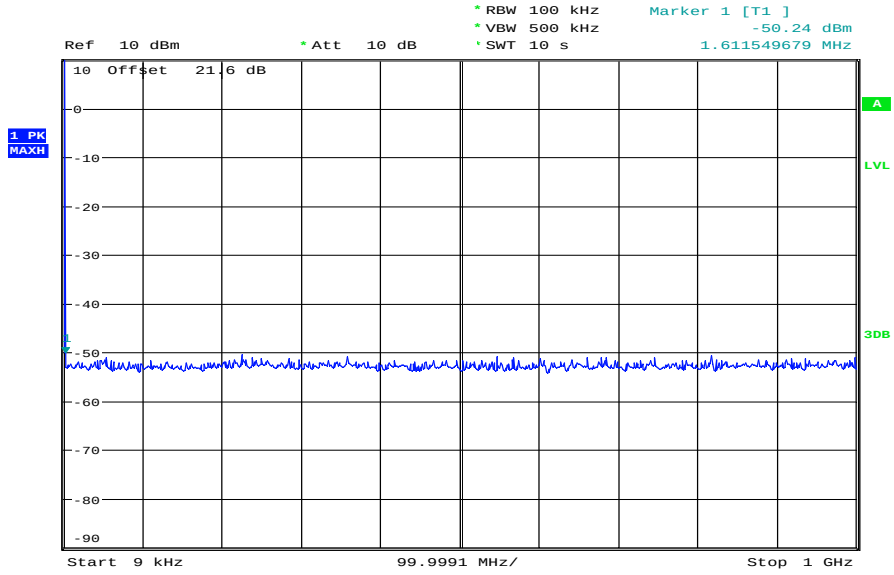
Results:

TX spurious emissions conducted					
8DPSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
2441			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
2480			30 dBm		Operating frequency
No critical peaks detected			-20 dBc		complies
Measurement uncertainty		± 3dB			

Result: **Passed**

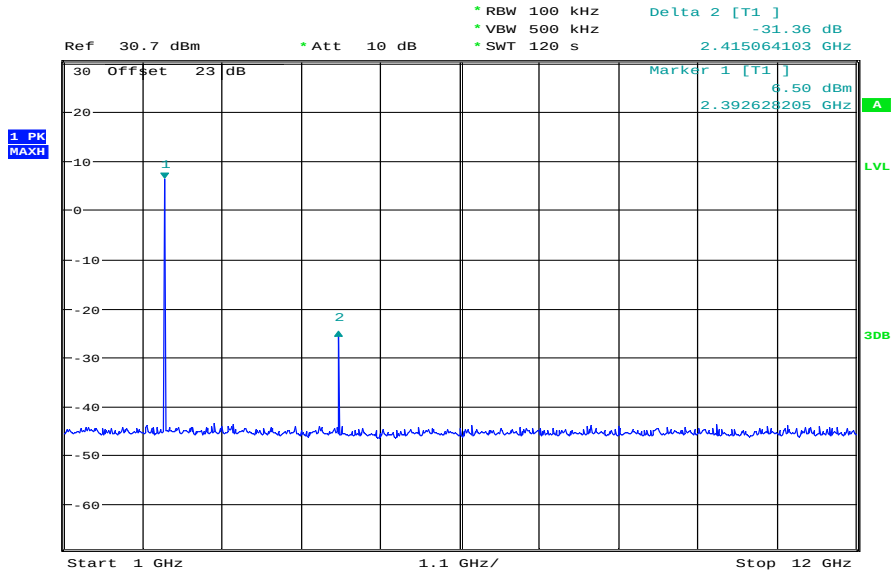
Plots: GSFK

Plot 1: lowest channel – 2402 MHz, GFSK modulation, 9 kHz to 1 GHz



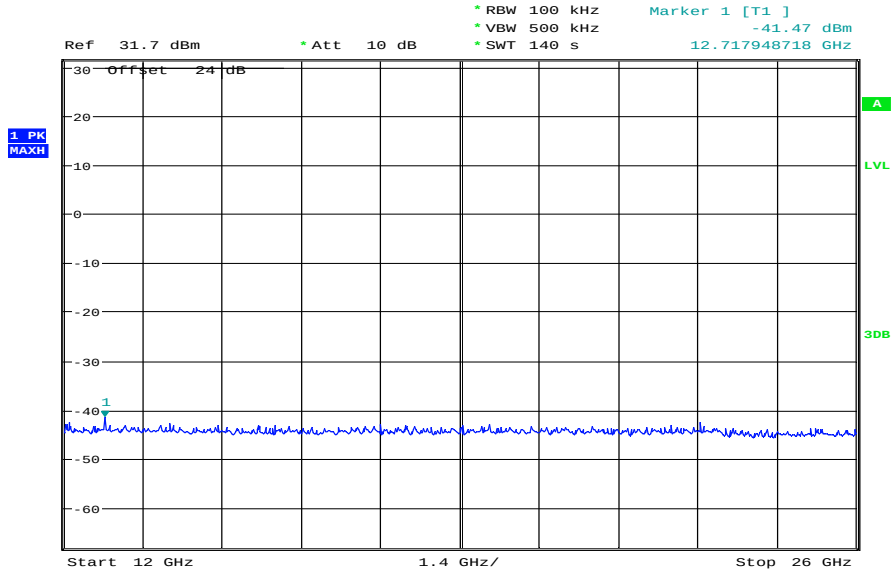
Date: 28.JUN.2012 12:34:29

Plot 2: lowest channel – 2402 MHz, GFSK modulation, 1 GHz to 12 GHz



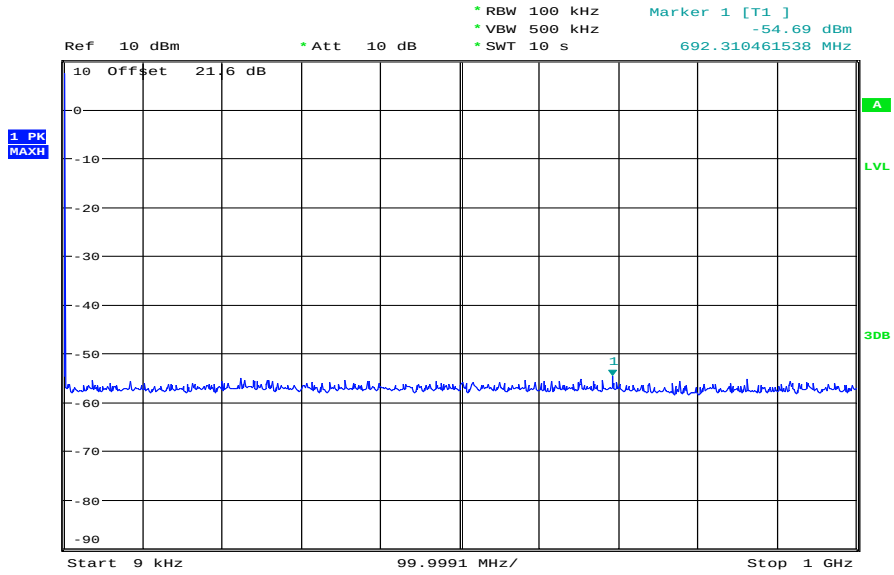
Date: 5.MAR.2012 12:57:11

Plot 3: lowest channel – 2402 MHz, GFSK modulation, 12 GHz to 26 GHz



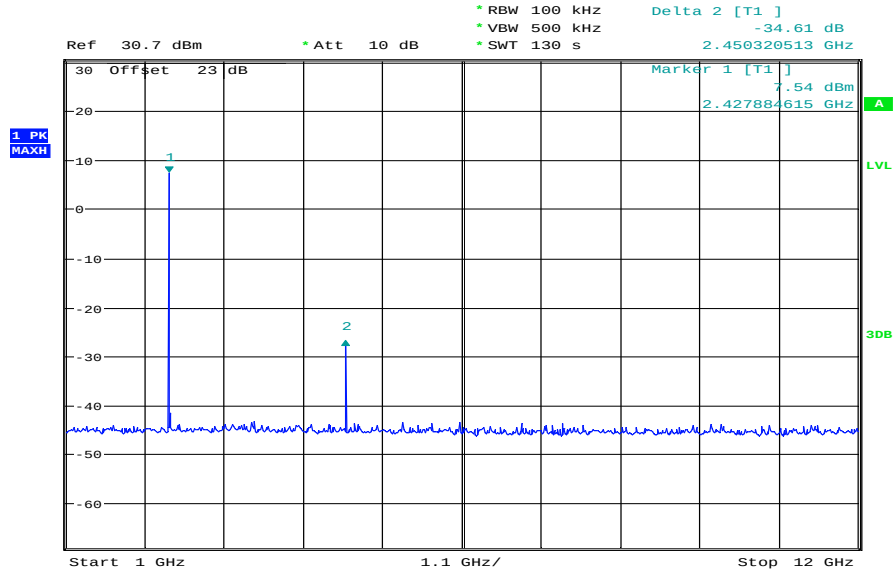
Date: 5.MAR.2012 13:00:46

Plot 4: middle channel – 2441 MHz, GFSK modulation, 9 kHz to 1 GHz



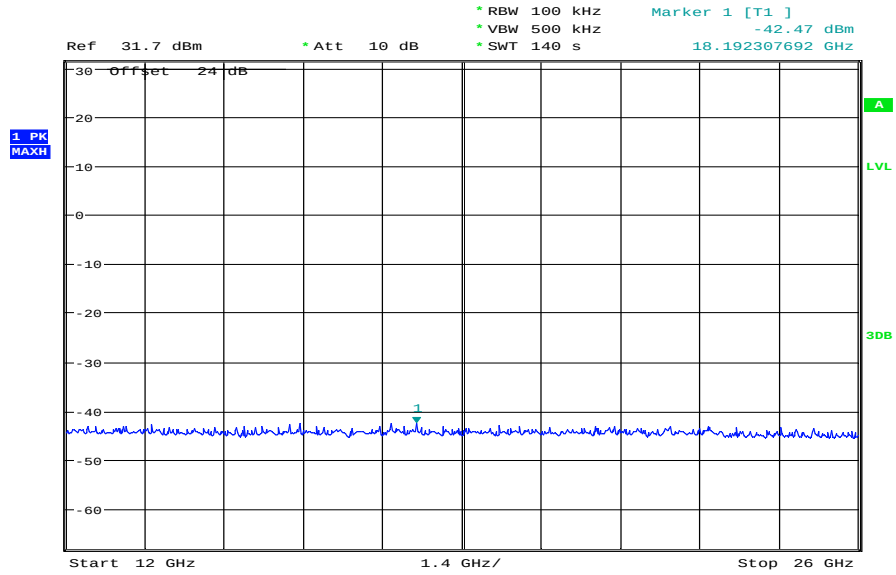
Date: 28.JUN.2012 12:34:58

Plot 5: middle channel – 2441 MHz, GFSK modulation, 1 GHz to 12 GHz



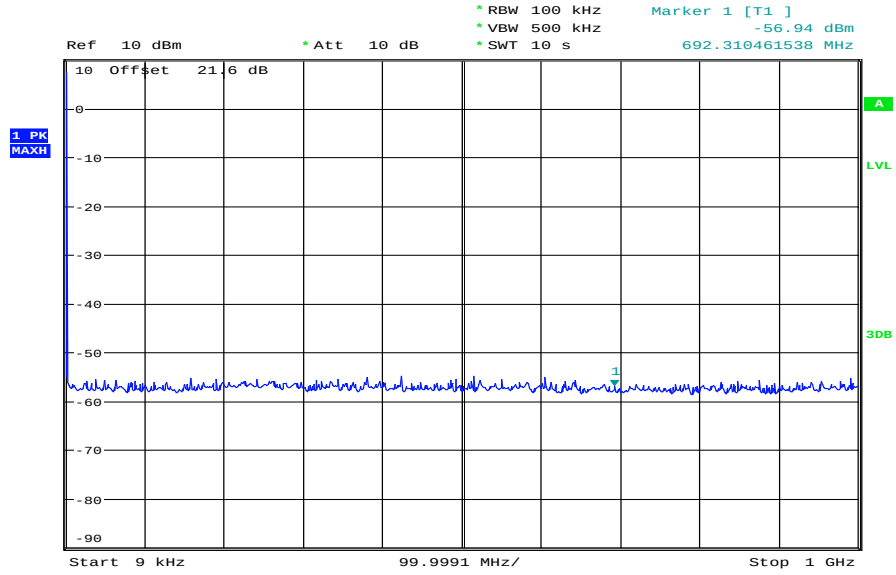
Date: 5.MAR.2012 13:57:16

Plot 6: middle channel – 2441 MHz, GFSK modulation, 12 GHz to 26 GHz



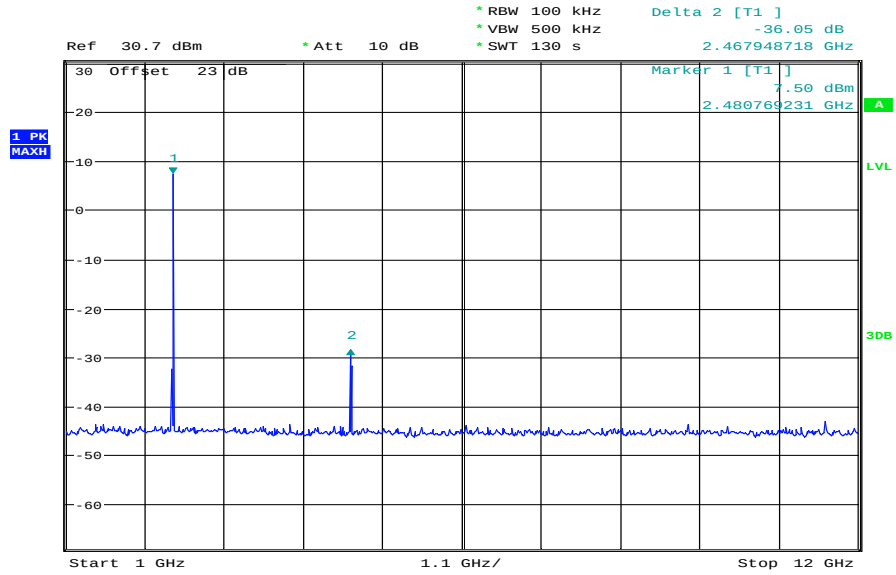
Date: 5.MAR.2012 14:16:21

Plot 7: highest channel – 2480 MHz, GFSK modulation, 9 kHz to 1 GHz



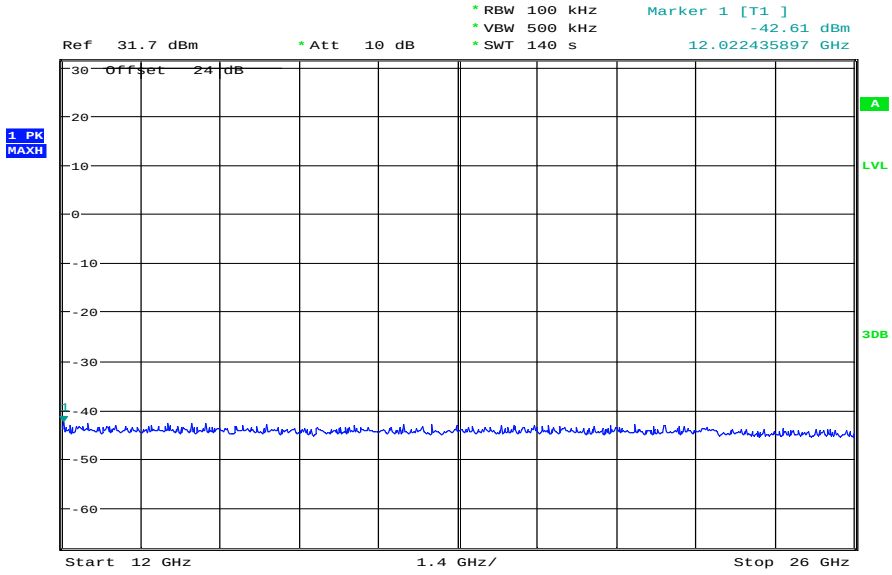
Date: 28.JUN.2012 12:35:25

Plot 8: highest channel – 2480 MHz, GFSK modulation, 1 GHz to 12 GHz



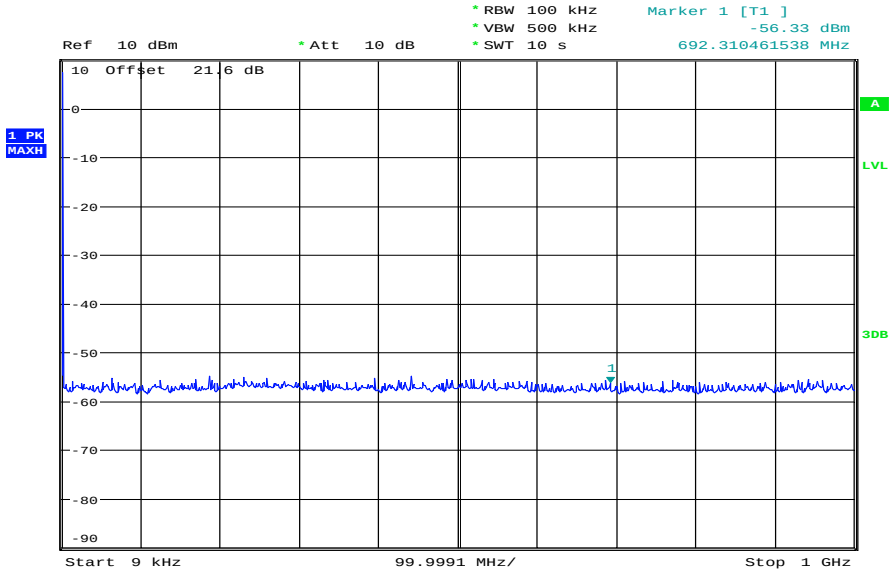
Date: 5.MAR.2012 13:53:40

Plot 9: highest channel – 2480 MHz, GFSK modulation, 12 GHz to 26 GHz



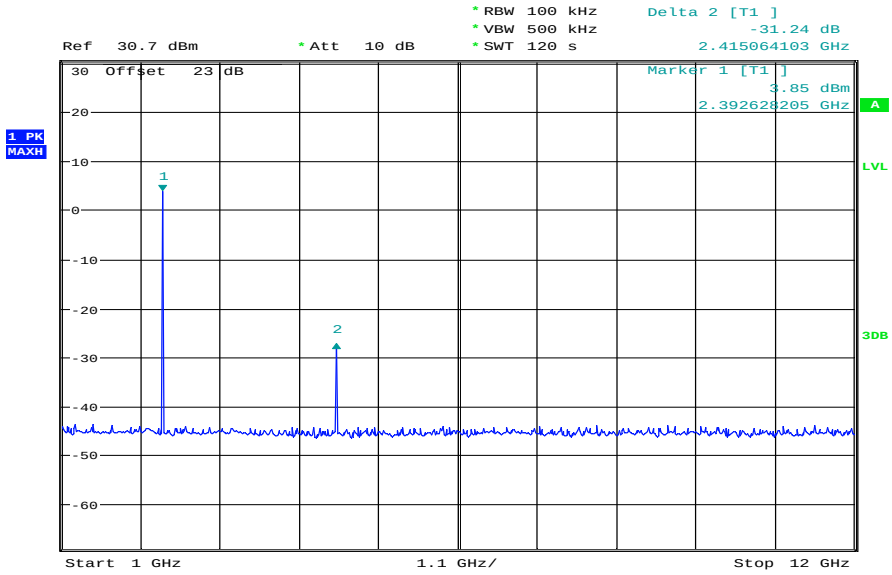
Plots: Pi/4-DQPSK

Plot 1: lowest channel – 2402 MHz, Pi/4-DQPSK modulation, 9 kHz to 1 GHz



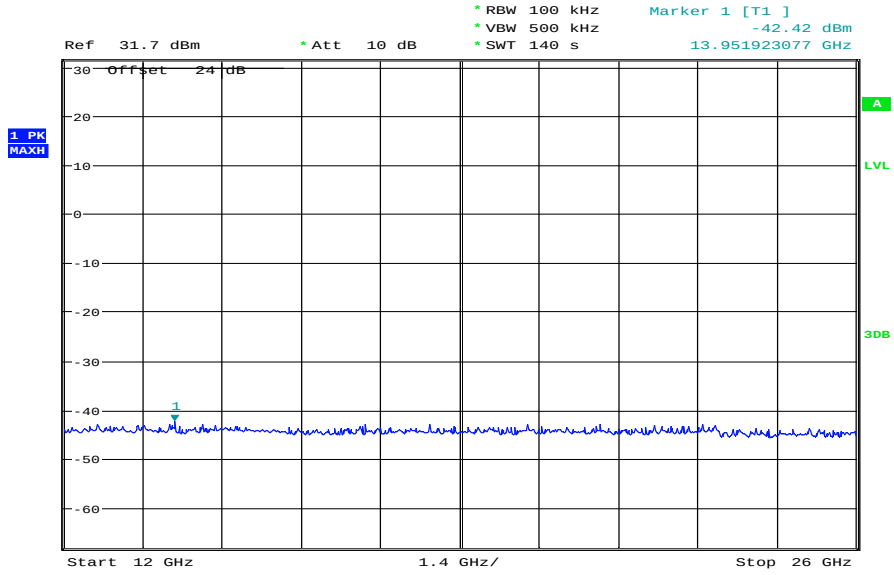
Date: 28.JUN.2012 12:35:56

Plot 2: lowest channel – 2402 MHz, Pi/4-DQPSK modulation, 1 GHz to 12 GHz



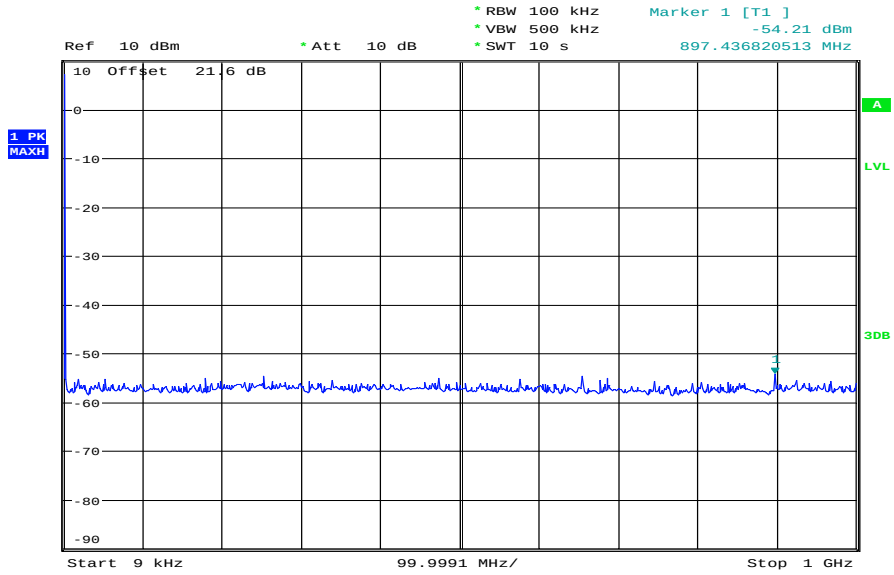
Date: 5.MAR.2012 13:12:51

Plot 3: lowest channel – 2402 MHz, Pi/4-DQPSK modulation, 12 GHz to 26 GHz



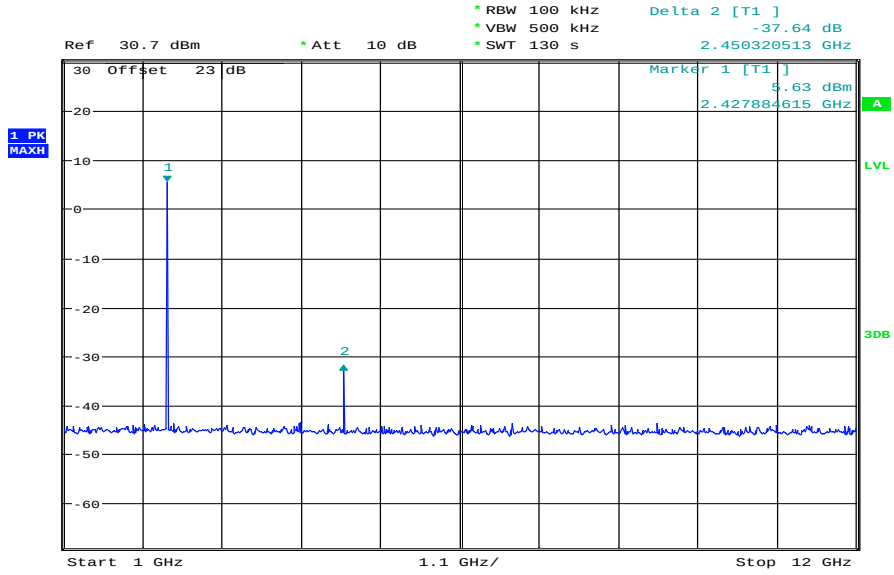
Date: 5.MAR.2012 13:04:16

Plot 4: middle channel – 2441 MHz, Pi/4-DQPSK modulation, 9 kHz to 1 GHz



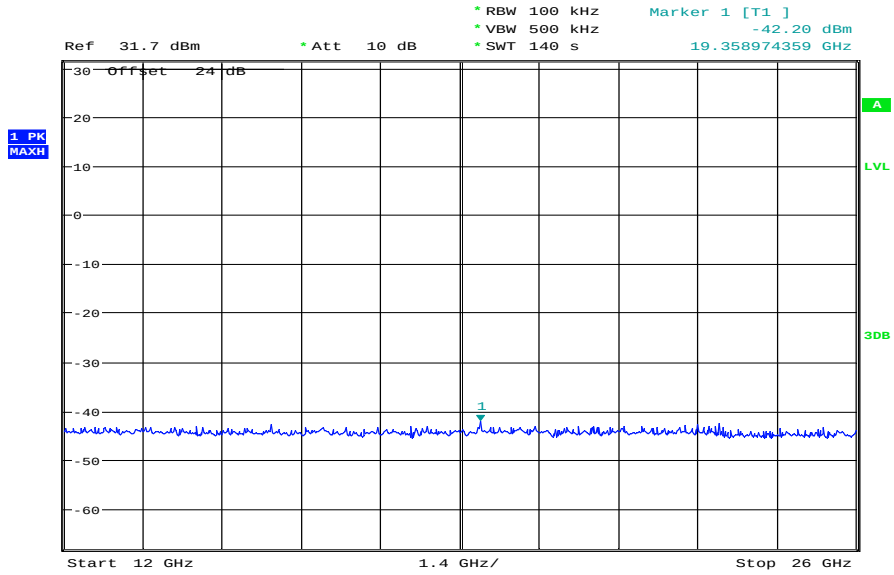
Date: 28.JUN.2012 12:36:21

Plot 5: middle channel – 2441 MHz, Pi/4-DQPSK modulation, 1 GHz to 12 GHz



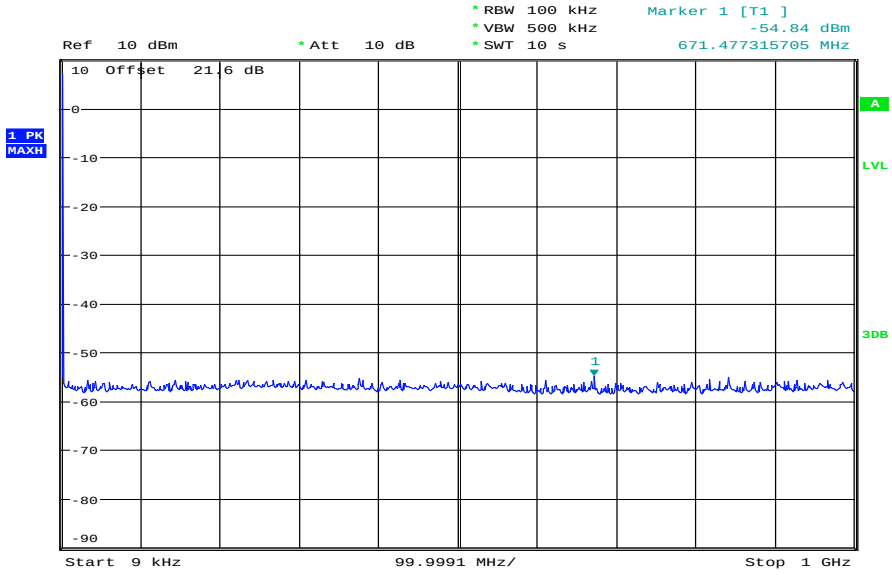
Date: 5.MAR.2012 14:00:20

Plot 6: middle channel – 2441 MHz, Pi/4-DQPSK modulation, 12 GHz to 26 GHz

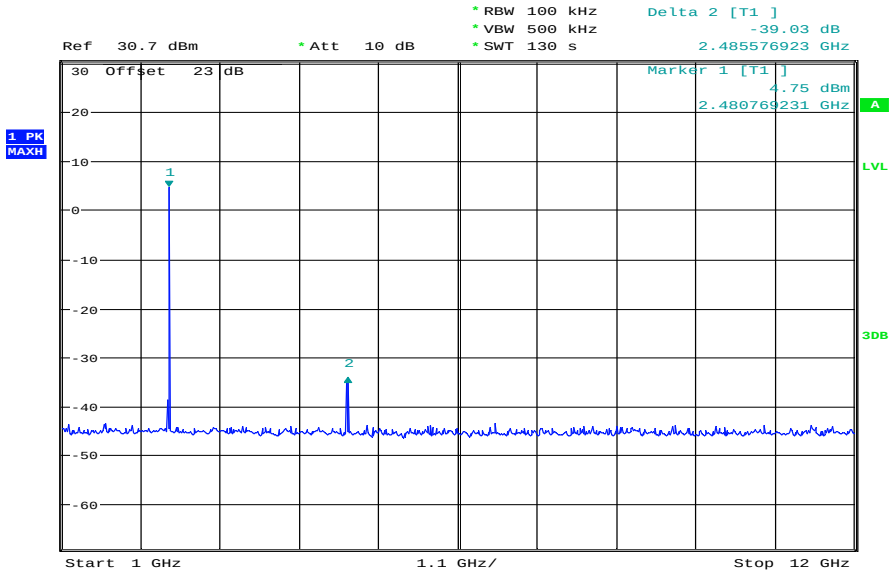


Date: 5.MAR.2012 14:13:30

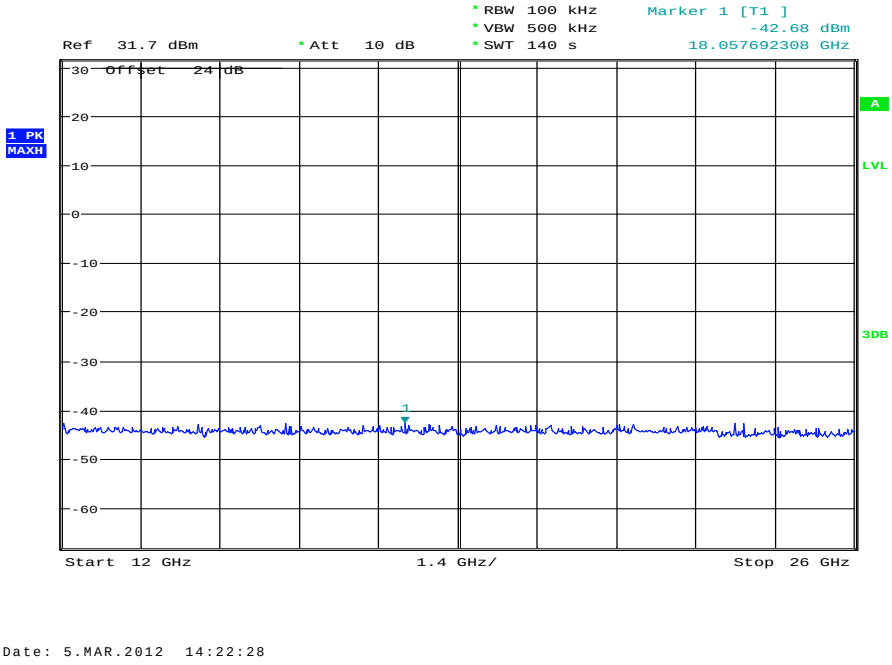
Plot 7: highest channel – 2480 MHz, Pi/4-DQPSK modulation, 9 kHz to 1 GHz



Plot 8: highest channel – 2480 MHz, Pi/4-DQPSK modulation, 1 GHz to 12 GHz

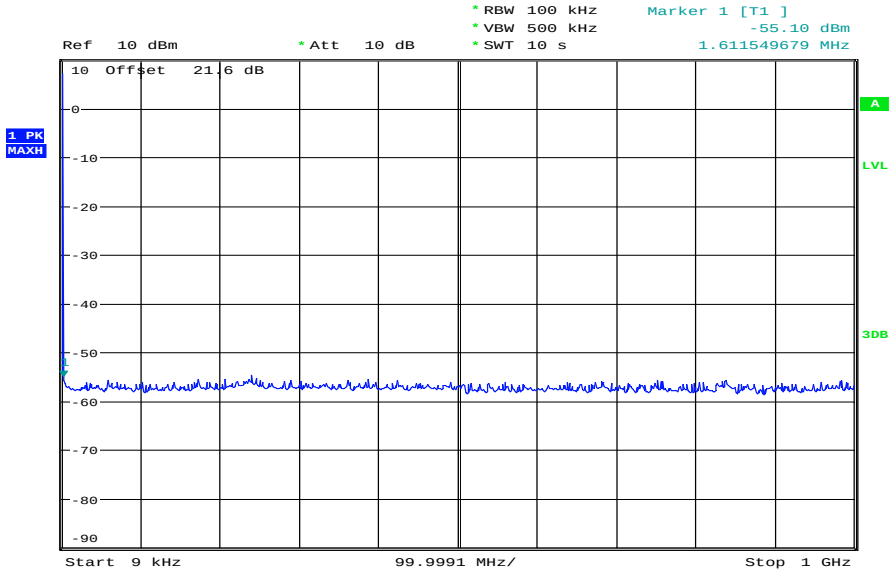


Plot 9: highest channel – 2480 MHz, Pi/4-DQPSK modulation, 12 GHz to 26 GHz



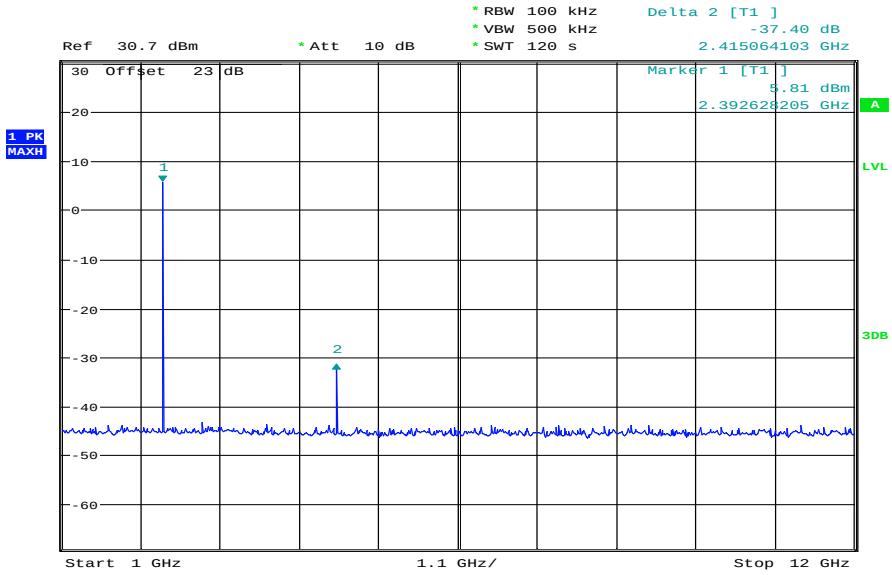
Plots: 8-DPSK

Plot 1: lowest channel – 2402 MHz, 8-DPSK modulation, 9 kHz to 1 GHz



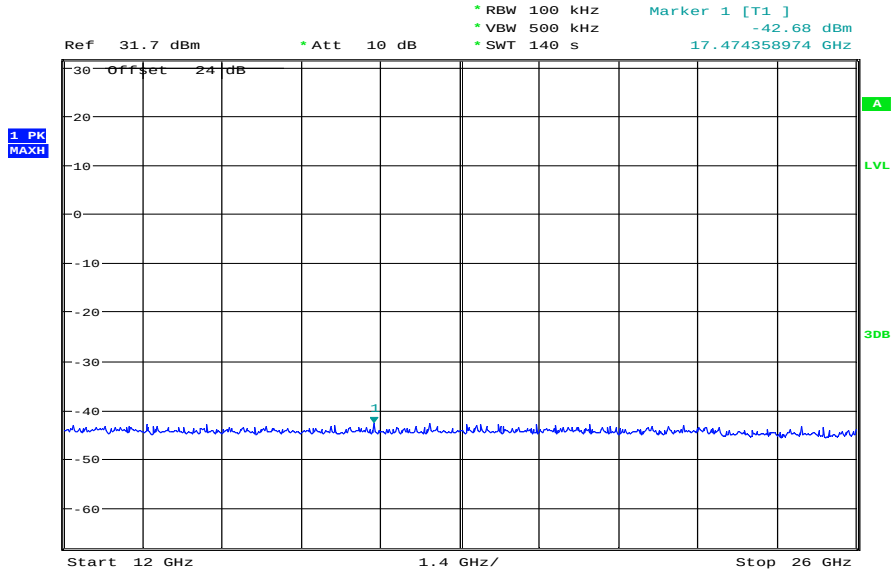
Date: 28.JUN.2012 12:37:14

Plot 2: lowest channel – 2402 MHz, 8-DPSK modulation, 1 GHz to 12 GHz



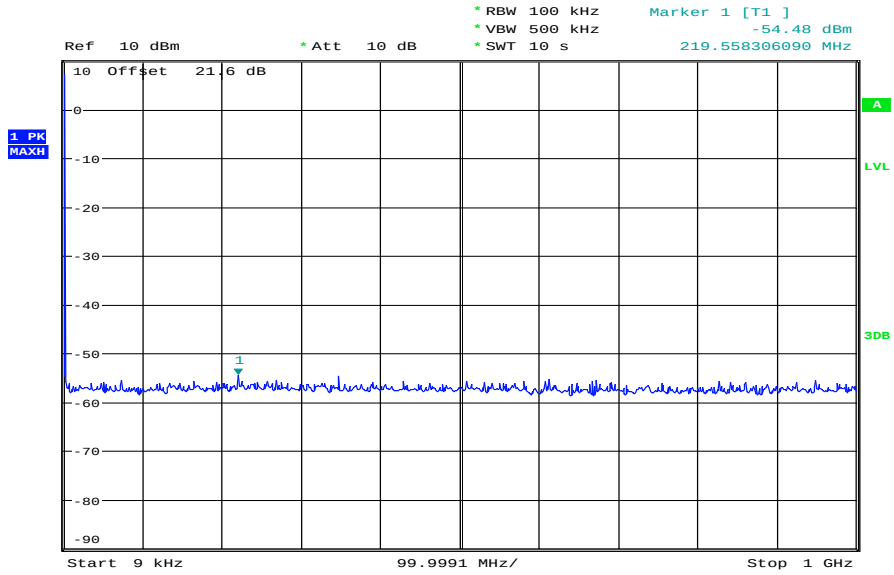
Date: 5.MAR.2012 13:10:12

Plot 3: lowest channel – 2402 MHz, 8-DPSK modulation, 12 GHz to 26 GHz



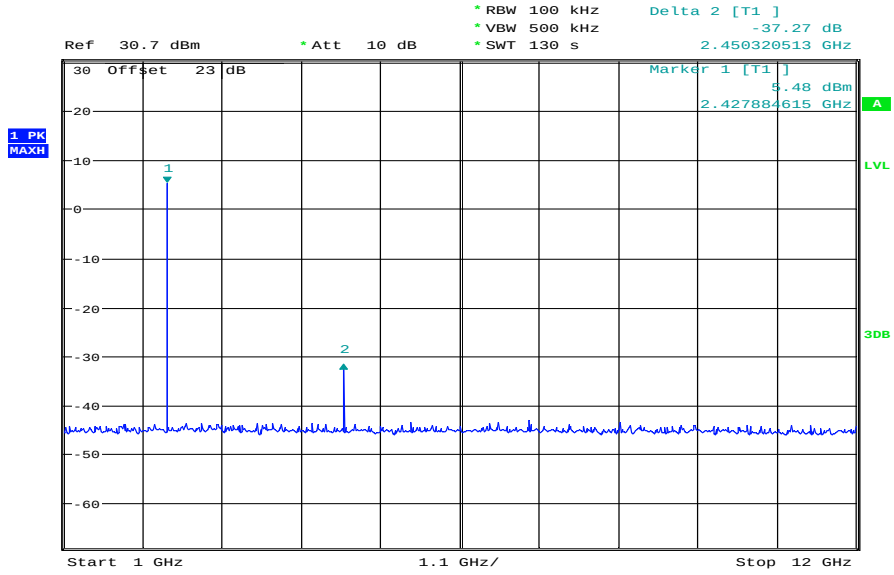
Date: 5.MAR.2012 13:07:16

Plot 4: middle channel – 2441 MHz, 8-DPSK modulation, 9 kHz to 1 GHz



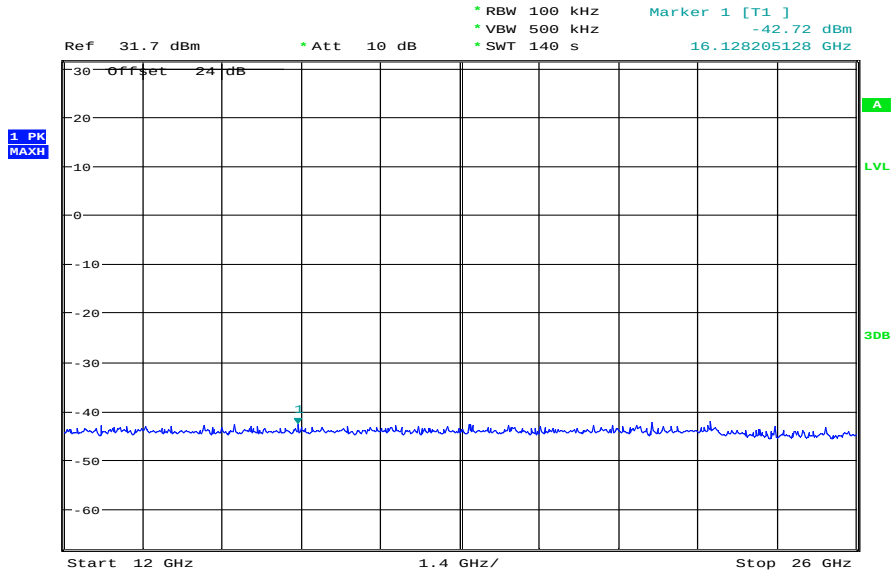
Date: 28.JUN.2012 12:37:40

Plot 5: middle channel – 2441 MHz, 8-DPSK modulation, 1 GHz to 12 GHz



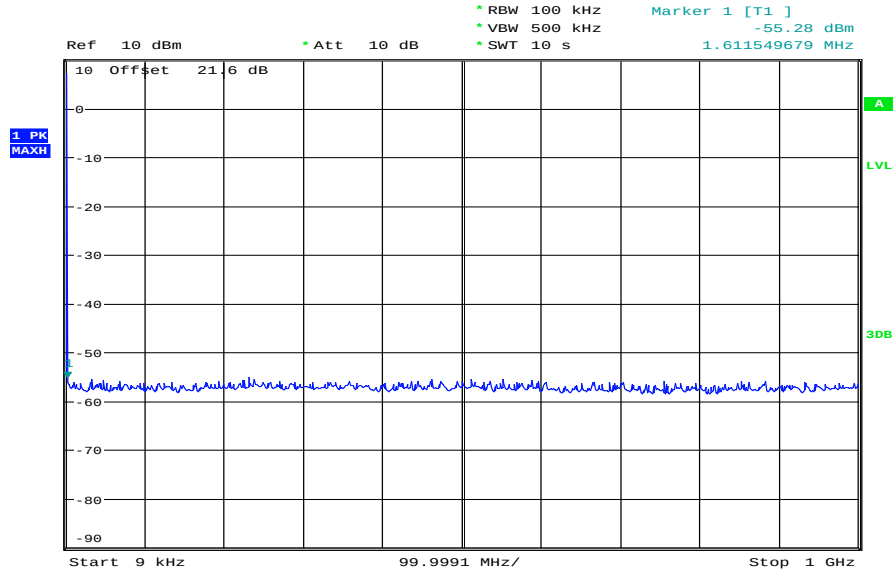
Date: 5.MAR.2012 14:04:41

Plot 6: middle channel – 2441 MHz, GFSK modulation, 12 GHz to 26 GHz



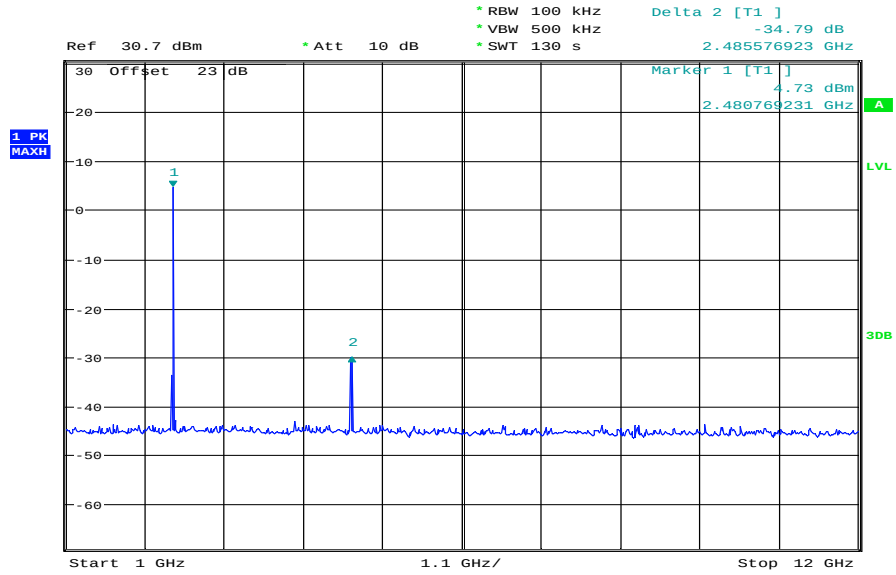
Date: 5.MAR.2012 14:10:39

Plot 7: highest channel – 2480 MHz, 8-DPSK modulation, 9 kHz to 1 GHz



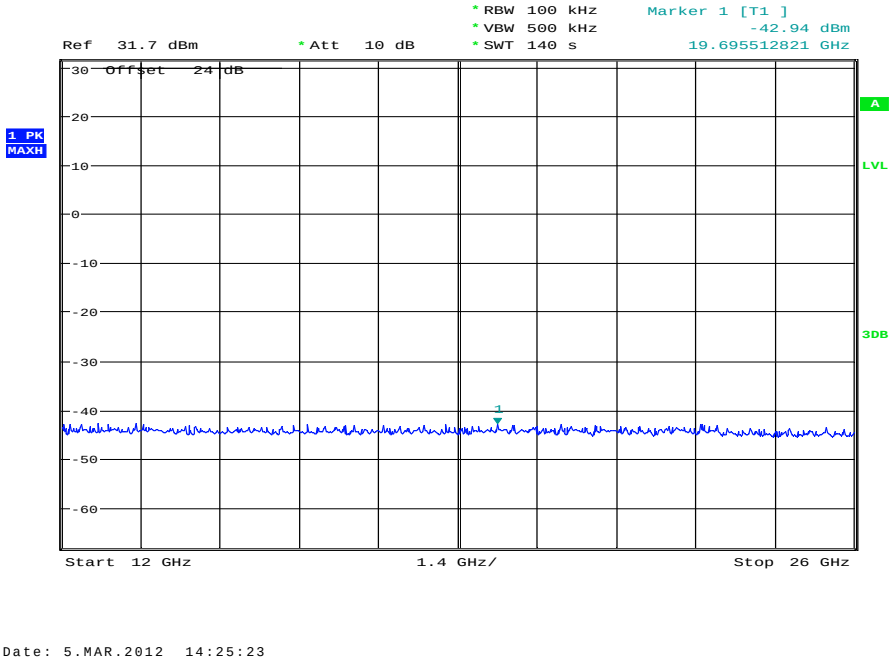
Date: 28.JUN.2012 12:38:08

Plot 8: highest channel – 2480 MHz, 8-DPSK modulation, 1 GHz to 12 GHz



Date: 5.MAR.2012 13:47:37

Plot 9: highest channel – 2480 MHz, 8-DPSK modulation, 12 GHz to 26 GHz



9.11 TX spurious emissions radiated

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
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:	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.

Limits:

FCC	IC	
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5	
TX spurious emissions radiated		
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
§15.209		
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results:

TX spurious emissions radiated [dBµV/m]								
2402 MHz			2441 MHz			2480 MHz		
F [GHz]	Detector	Level [dBµV/m]	F [GHz]	Detector	Level [dBµV/m]	F [GHz]	Detector	Level [dBµV/m]
1.46	RMS	41.00	4.88	RMS	44.06	1.24	RMS	40.18
4.8	RMS	47.02				1.62	RMS	40.91
						4.96	RMS	52.73
Measurement uncertainty			± 3 dB					

Result: **Passed**

Plots:

Plot 1: 30 MHz to 1 GHz, TX mode, channel 00, vertical & horizontal polarization

Common Information

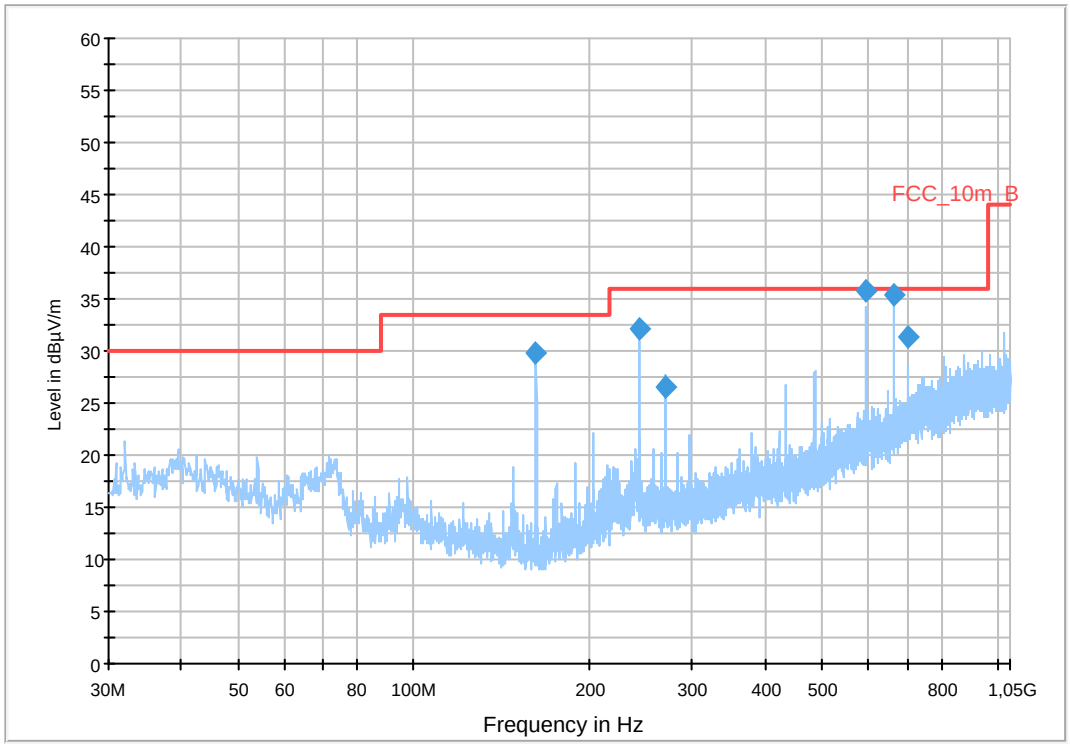
EUT:	T4xx Core (T198200)
Serial Number:	62000140
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	BT TX Ch. 0 + charging
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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

FCC_10m(B)_3



Final Result 1

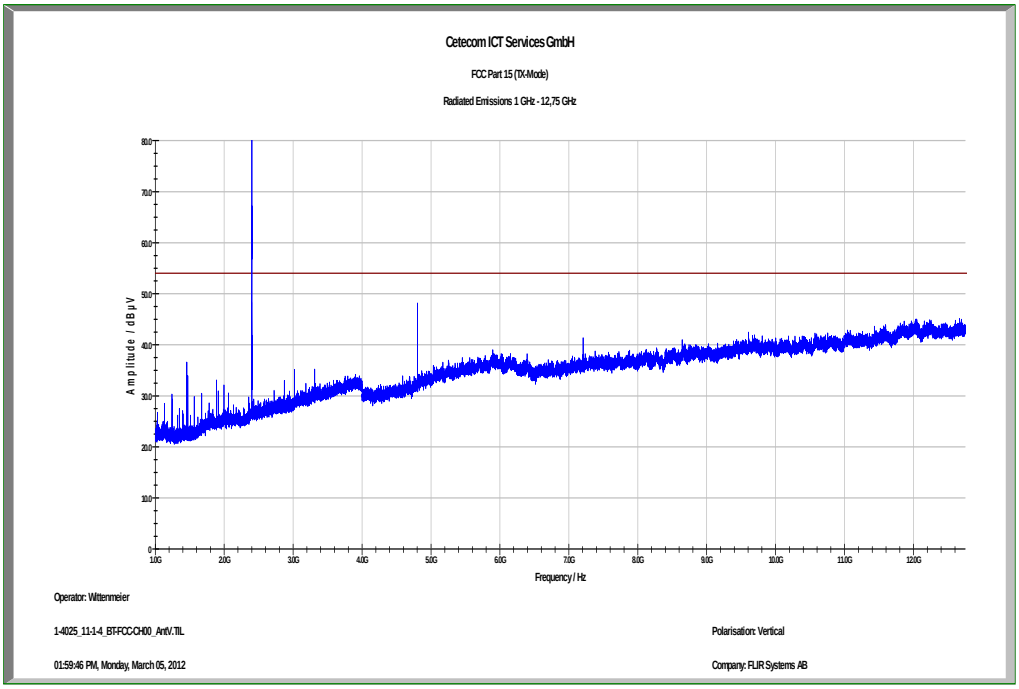
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
162.008850	29.8	1000.0	120.000	105.0	V	266.0	9.3	3.7	33.5	
242.997000	32.2	1000.0	120.000	124.0	V	-7.0	13.1	3.8	36.0	
269.990700	26.5	1000.0	120.000	98.0	V	273.0	13.8	9.5	36.0	
593.999100	35.7	1000.0	120.000	98.0	V	-7.0	20.6	0.3	36.0	
662.816400	35.3	1000.0	120.000	141.0	H	196.0	21.5	0.7	36.0	
702.005700	31.3	1000.0	120.000	145.0	H	-7.0	22.5	4.7	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 4.42
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

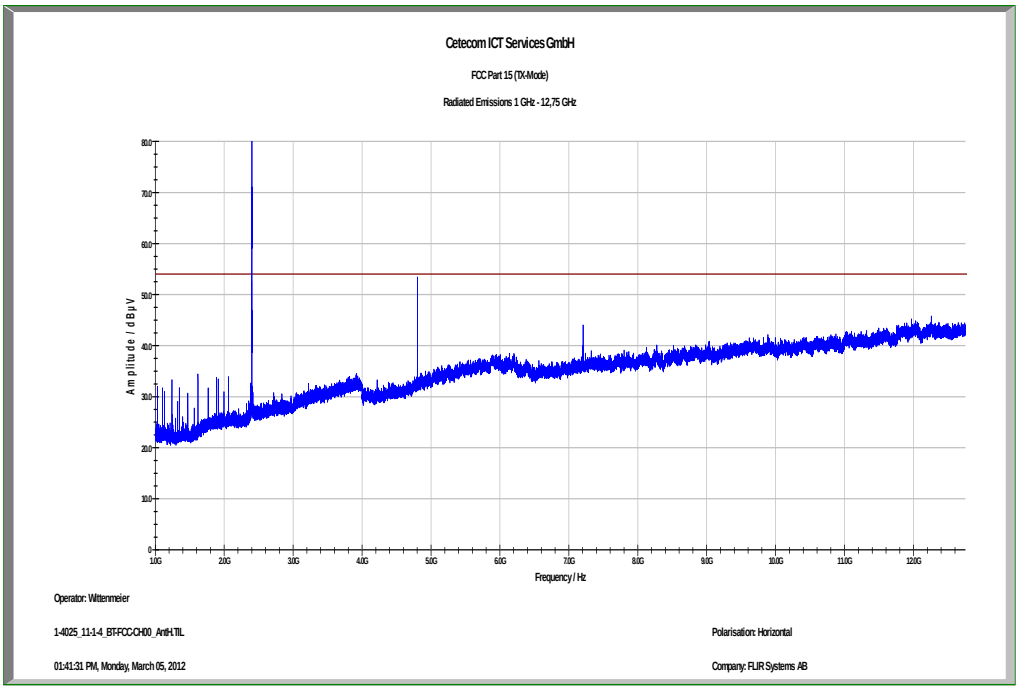
EMC 32 Version 8.10.00

Plot 2: 1 GHz to 12.75 GHz, TX mode, channel 00, vertical polarization



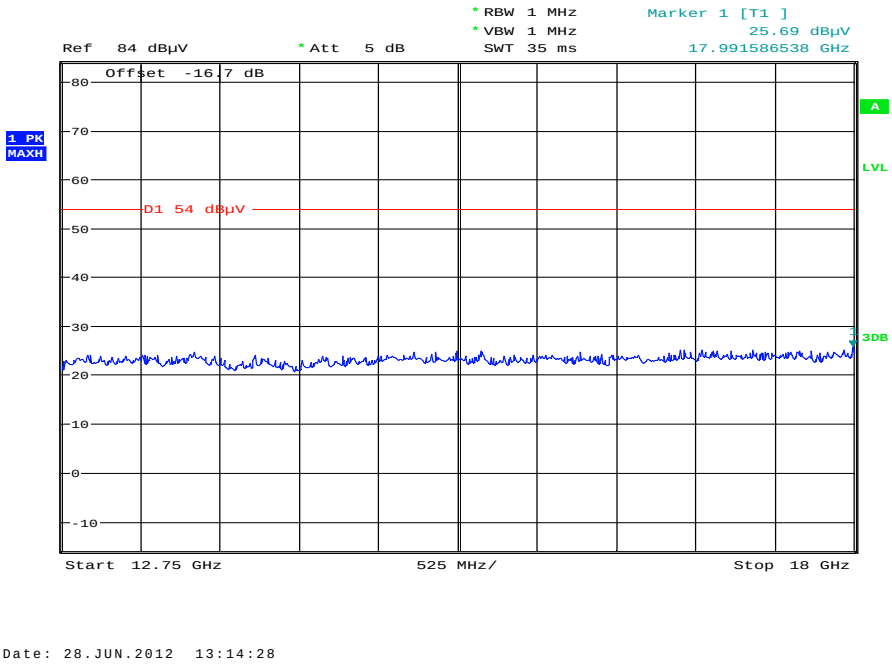
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 1 GHz to 12.75 GHz, TX mode, channel 00, horizontal polarization

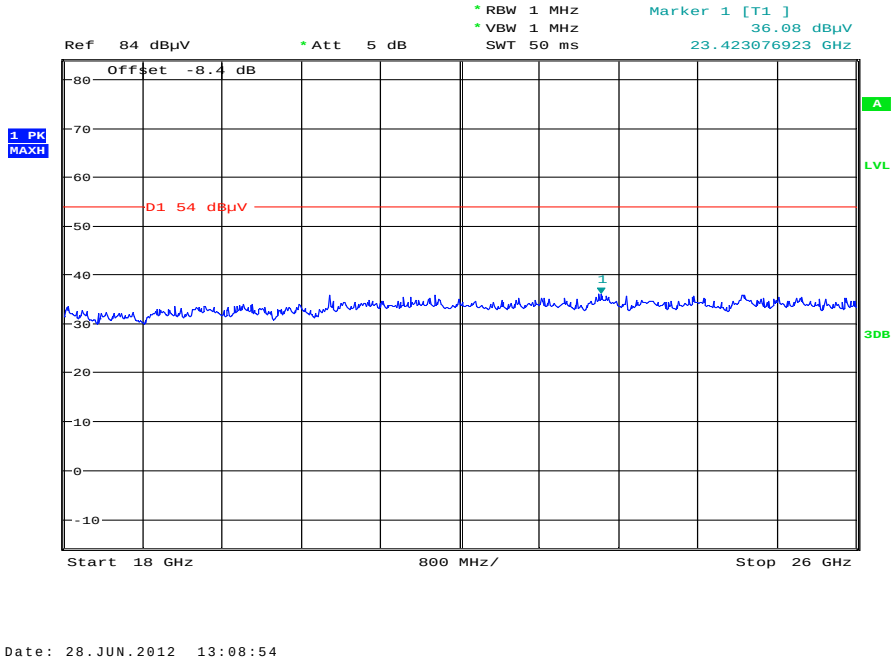


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: 12.75 GHz to 18 GHz, TX mode, channel 00, vertical & horizontal polarization



Plot 5: 18 GHz to 26 GHz, TX mode, channel 00, vertical & horizontal polarization



Plot 6: 30 MHz to 1 GHz, TX mode, channel 39, vertical & horizontal polarization

Common Information

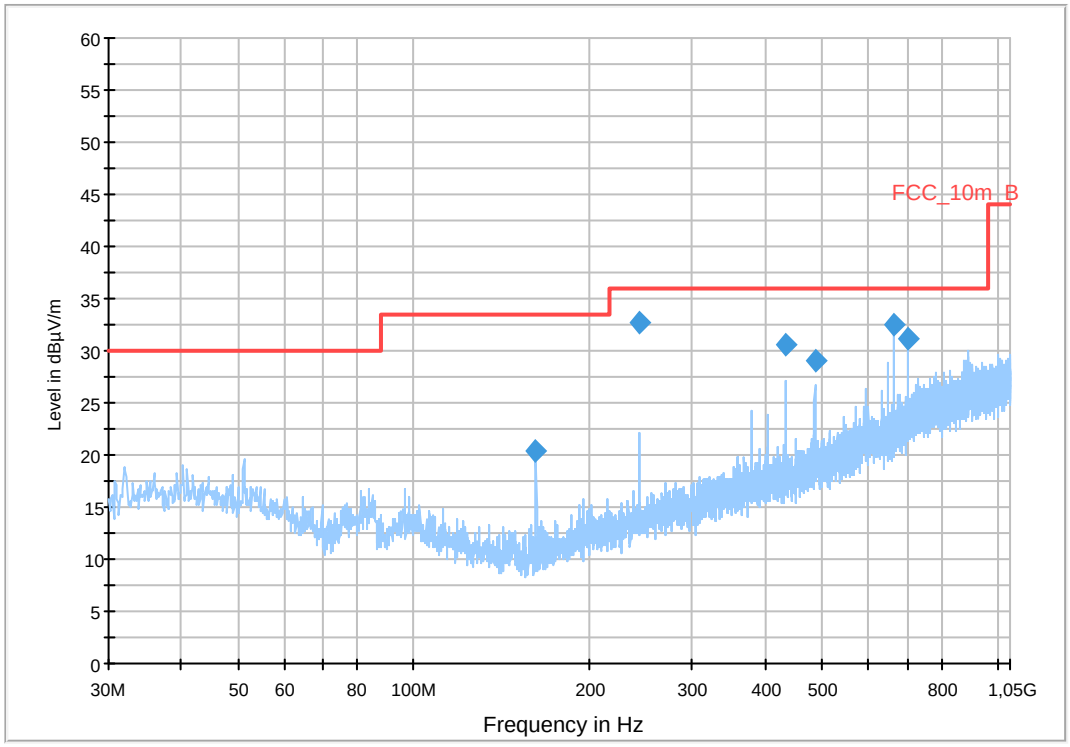
EUT:	T4xx Core (T198200)
Serial Number:	62000140
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	BT TX Ch. 39 + charging
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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

FCC_10m(B)_3



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
161.999700	20.4	1000.0	120.000	124.0	V	82.0	9.3	13.1	33.5	
242.997000	32.7	1000.0	120.000	106.0	V	283.0	13.1	3.3	36.0	
432.006600	30.5	1000.0	120.000	170.0	H	8.0	17.4	5.5	36.0	
486.006900	29.1	1000.0	120.000	170.0	H	8.0	18.4	6.9	36.0	
662.833800	32.5	1000.0	120.000	164.0	H	-6.0	21.5	3.5	36.0	
701.977800	31.2	1000.0	120.000	134.0	H	-6.0	22.5	4.8	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 4.42
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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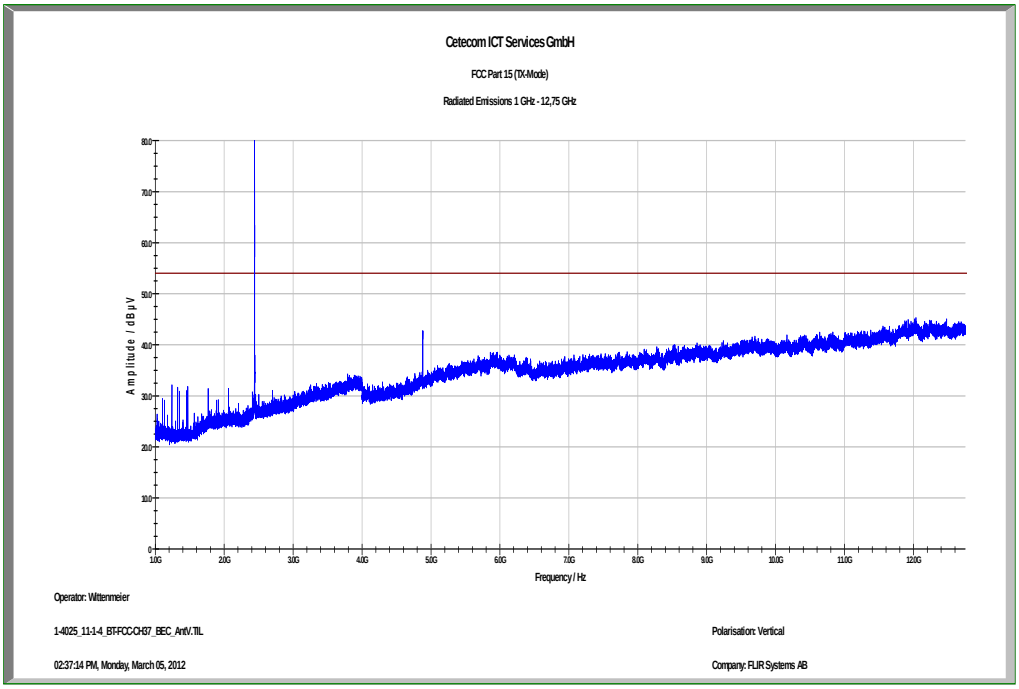
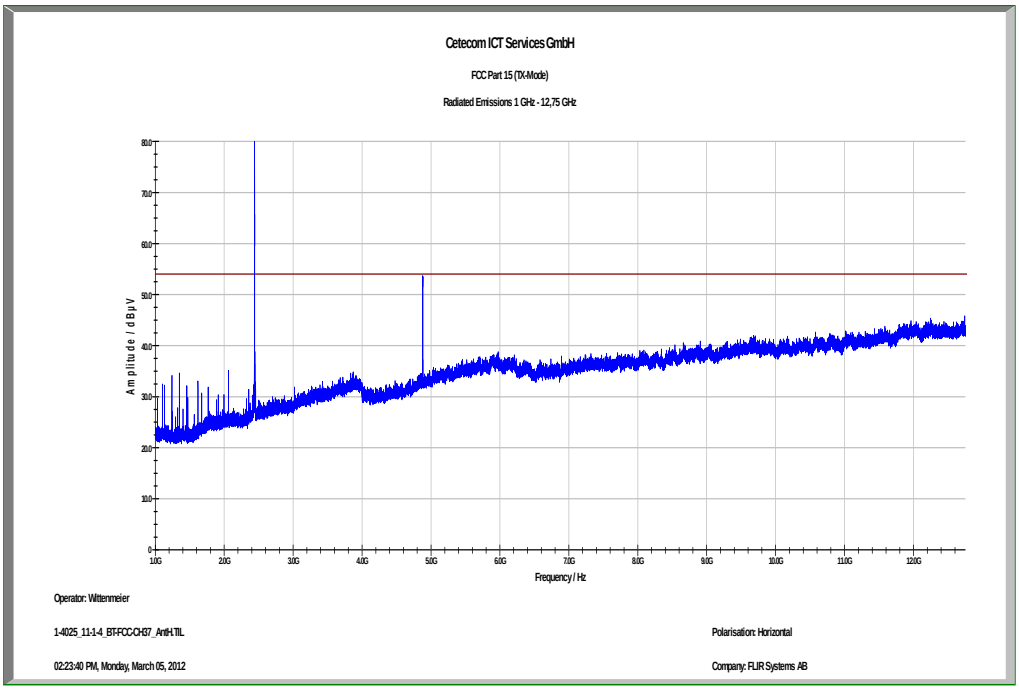
Plot 7: 1 GHz to 12.75 GHz, TX mode, channel 39, vertical polarization



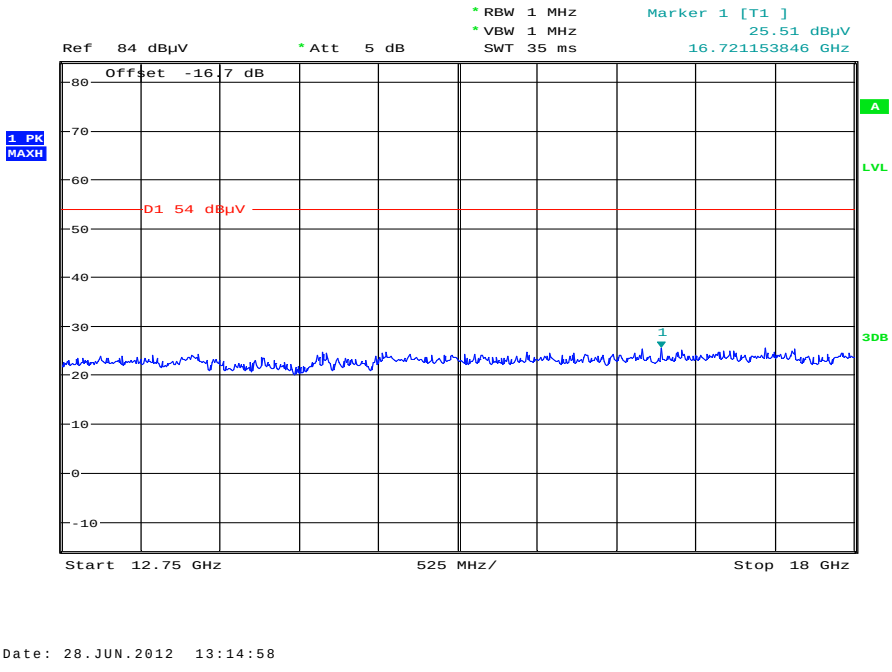
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 8: 1 GHz to 12.75 GHz, TX mode, channel 39, horizontal polarization

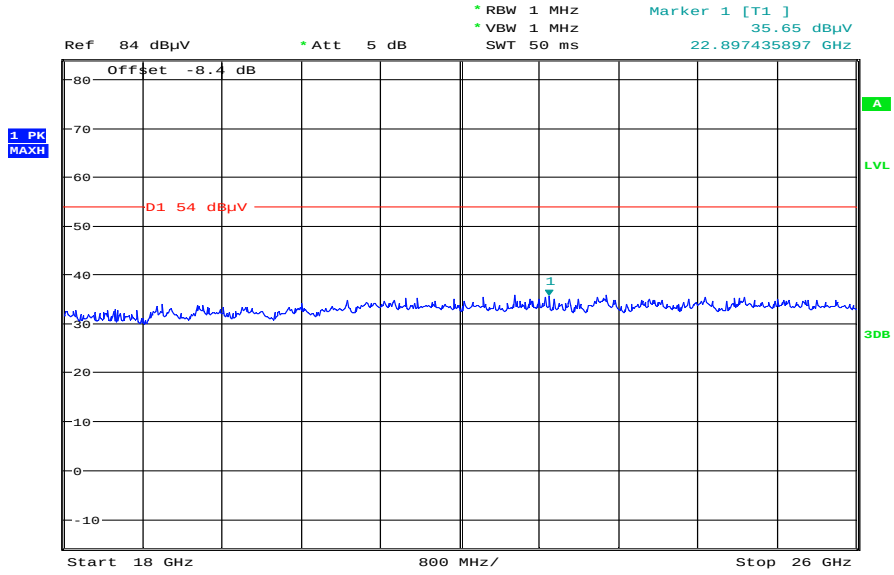


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 9: 12.75 GHz to 18 GHz, TX mode, channel 39, vertical & horizontal polarization



Plot 10: 18 GHz to 26 GHz, TX mode, channel 39, vertical & horizontal polarization



Plot 11: 30 MHz to 1 GHz, TX mode, channel 78, vertical & horizontal polarization

Common Information

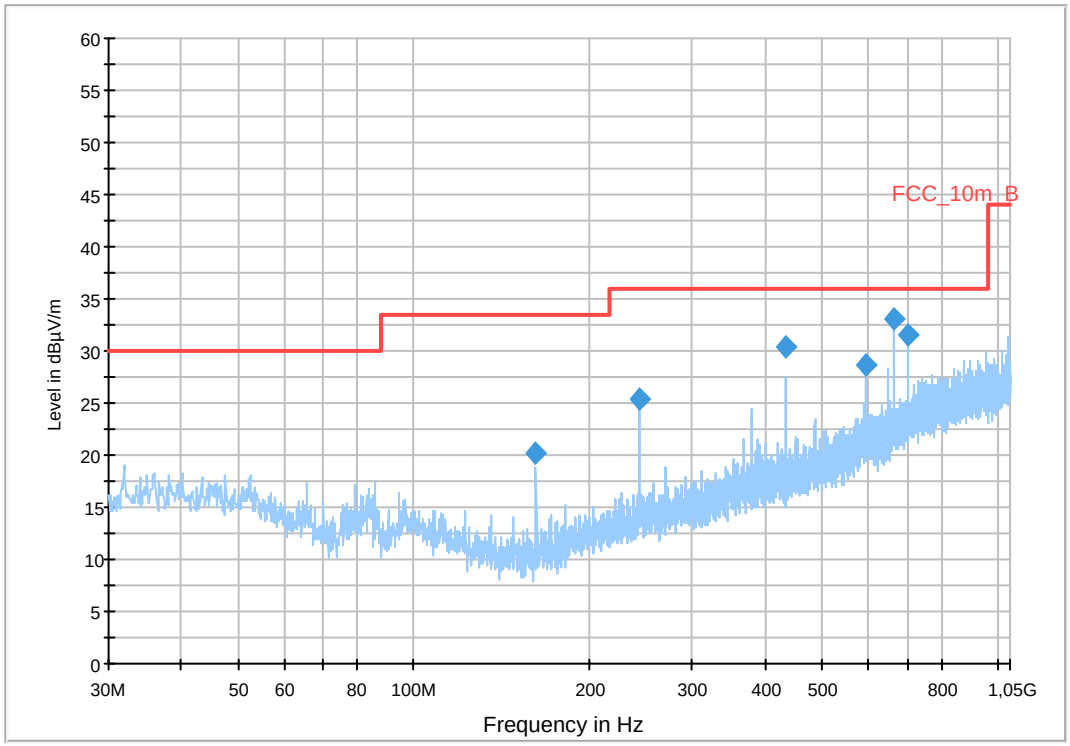
EUT:	T4xx Core (T198200)
Serial Number:	62000140
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	BT TX Ch. 78 + charging
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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

FCC_10m(B)_3



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
161.991450	20.3	1000.0	120.000	115.0	V	94.0	9.3	13.2	33.5	
242.990550	25.5	1000.0	120.000	98.0	V	-4.0	13.1	10.5	36.0	
432.000150	30.4	1000.0	120.000	170.0	H	0.0	17.4	5.6	36.0	
593.986800	28.6	1000.0	120.000	106.0	V	-6.0	20.6	7.4	36.0	
662.817150	33.2	1000.0	120.000	157.0	H	-2.0	21.5	2.8	36.0	
701.996850	31.5	1000.0	120.000	142.0	H	-4.0	22.5	4.5	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 4.42
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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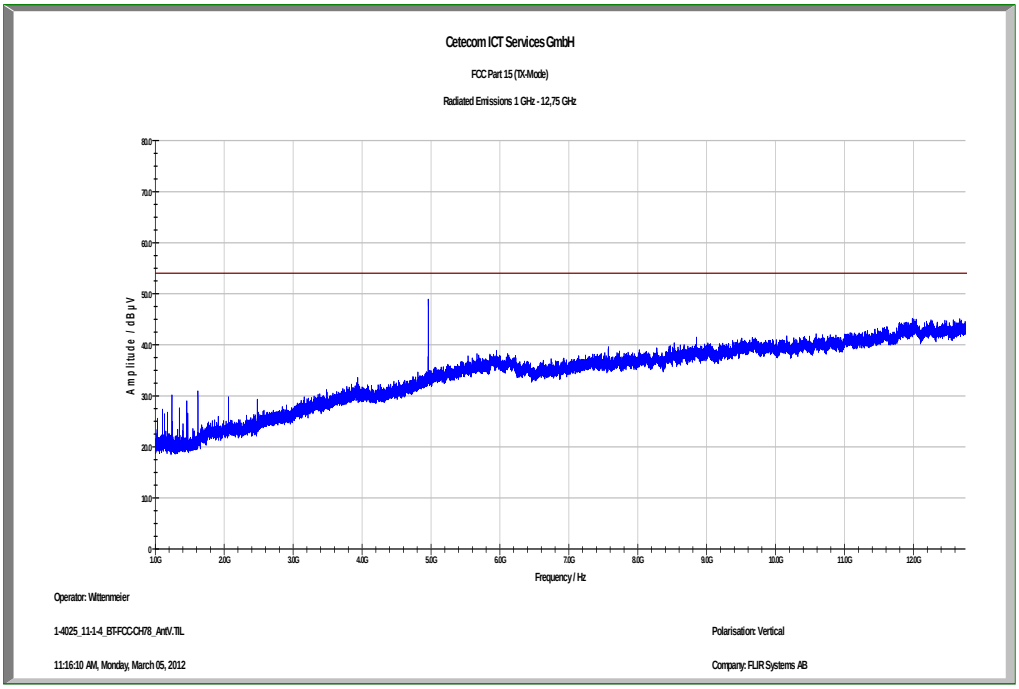
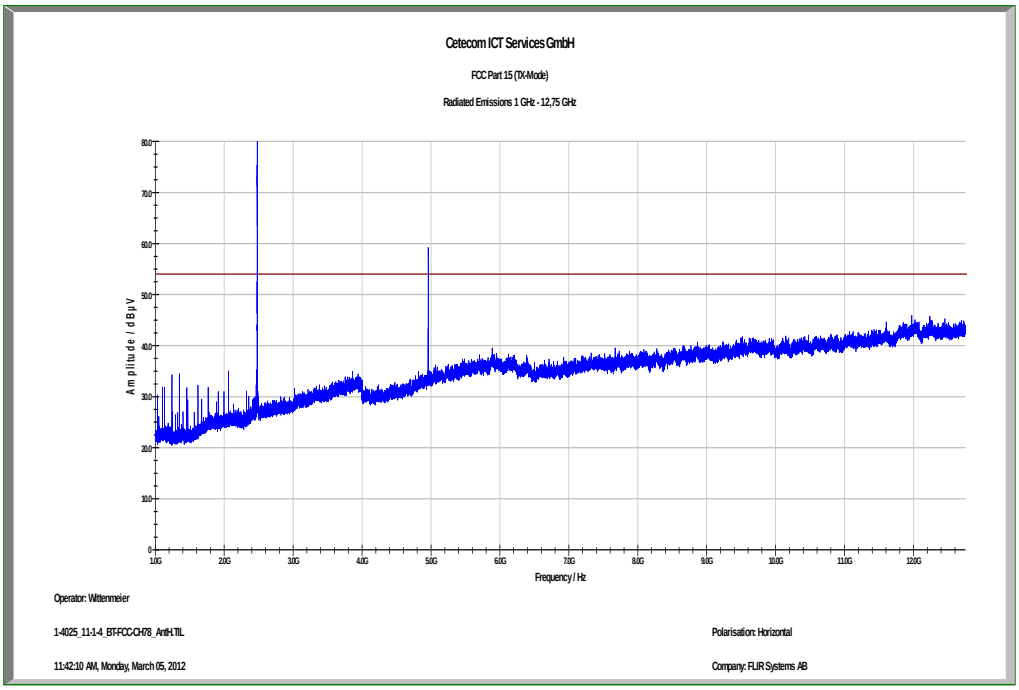
Plot 12: 1 GHz to 12.75 GHz, TX mode, channel 78, vertical polarization



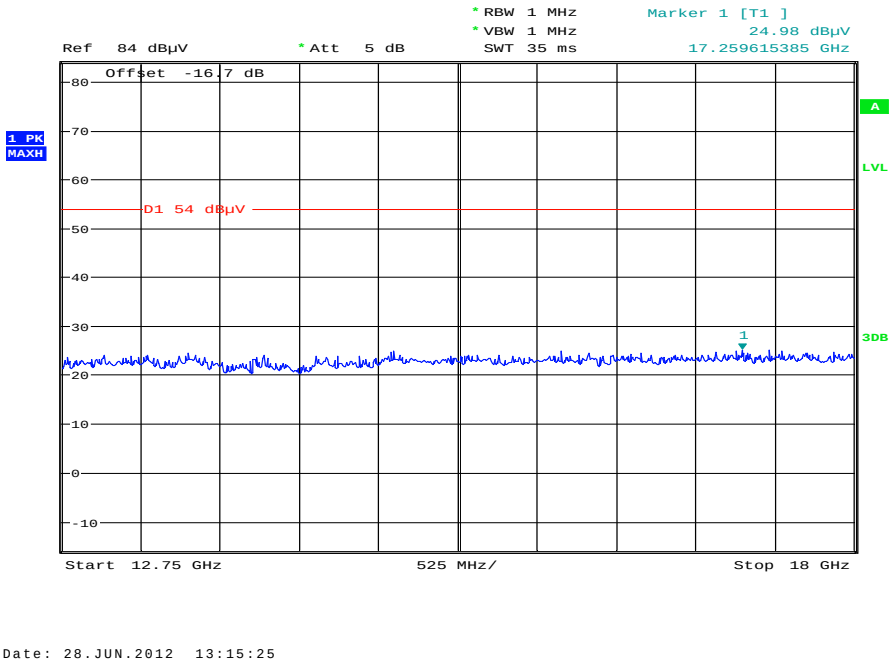
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 13: 1 GHz to 12.75 GHz, TX mode, channel 78, horizontal polarization

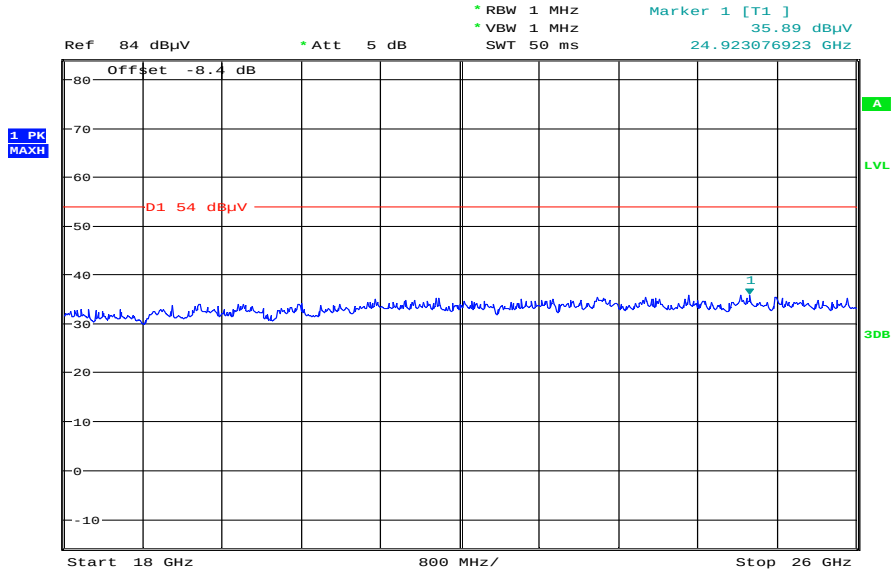


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 14: 12.75 GHz to 18 GHz, TX mode, channel 78, vertical & horizontal polarization



Plot 15: 18 GHz to 26 GHz, TX mode, channel 78, vertical & horizontal polarization



Date: 28.JUN.2012 13:09:43

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

Results:

RX spurious emissions radiated [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks detected		
Measurement uncertainty	±3 dB	

Result: Passed

Plots:

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

Common Information

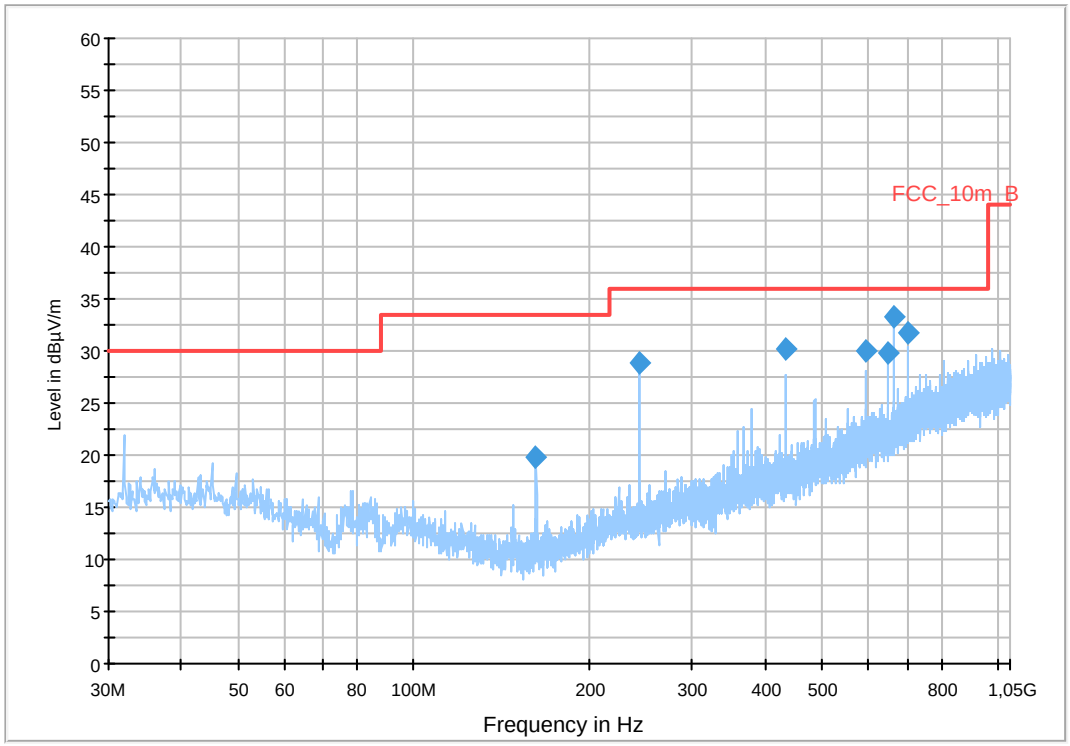
EUT:	T4xx Core (T198200)
Serial Number:	62000140
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	BT RX + charging
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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

FCC_10m(B)_3



Final Result 1

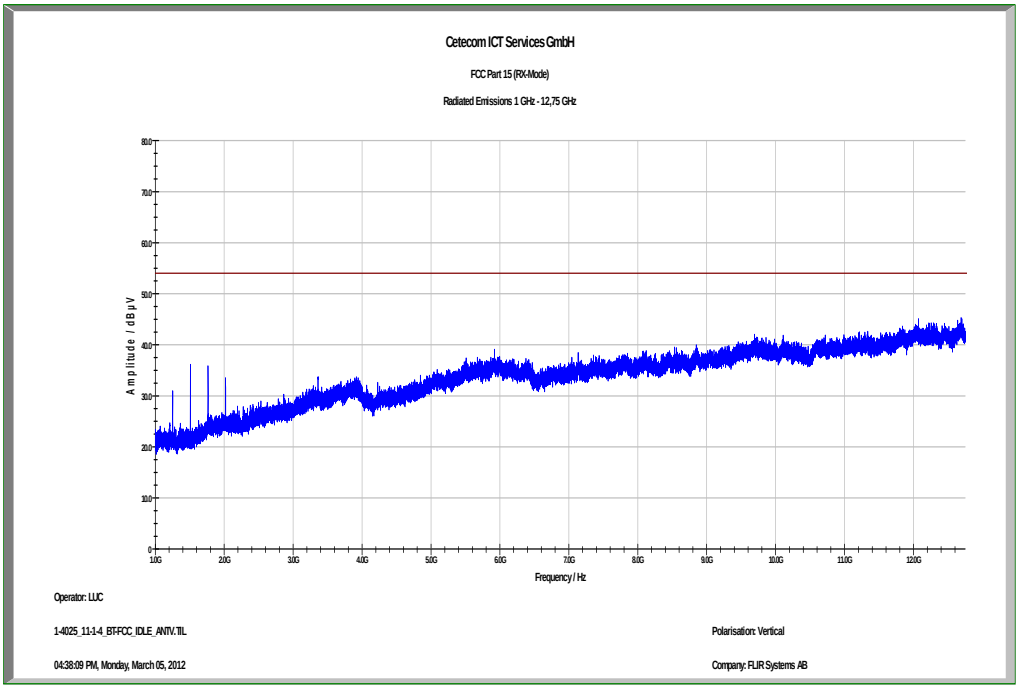
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
162.020850	19.9	1000.0	120.000	98.0	V	106.0	9.3	13.6	33.5	
242.948250	28.8	1000.0	120.000	98.0	V	283.0	13.1	7.2	36.0	
431.985450	30.2	1000.0	120.000	170.0	H	8.0	17.4	5.8	36.0	
593.991750	30.0	1000.0	120.000	154.0	H	273.0	20.6	6.0	36.0	
648.006300	29.8	1000.0	120.000	170.0	H	-7.0	21.1	6.2	36.0	
662.824050	33.3	1000.0	120.000	146.0	H	-7.0	21.5	2.7	36.0	
701.992500	31.7	1000.0	120.000	143.0	H	-7.0	22.5	4.3	36.0	

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

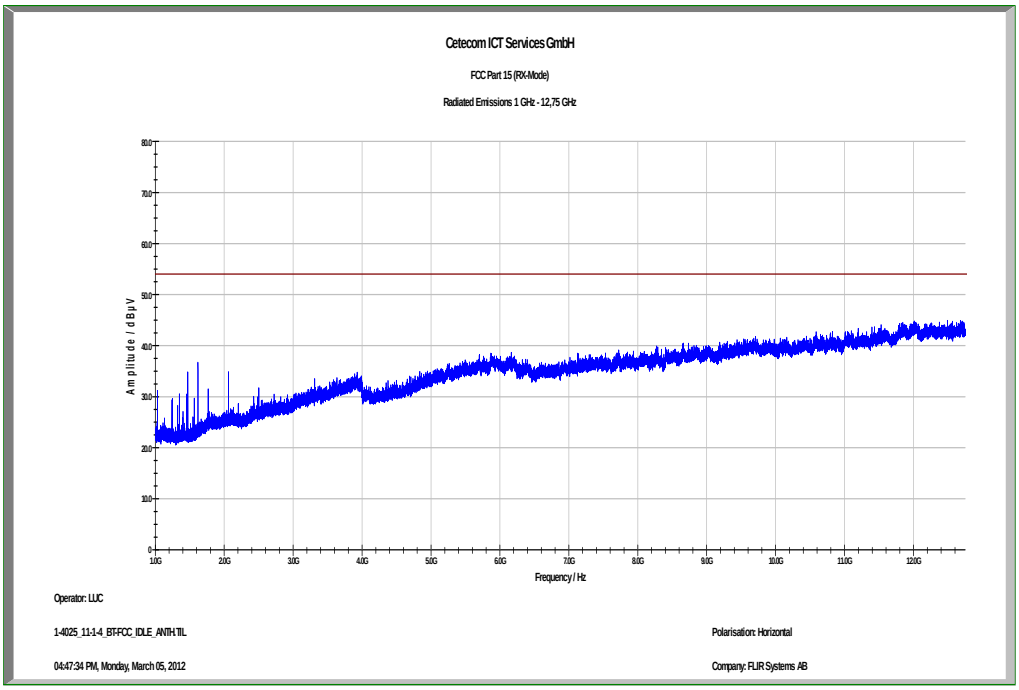
	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.42
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
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 8.52

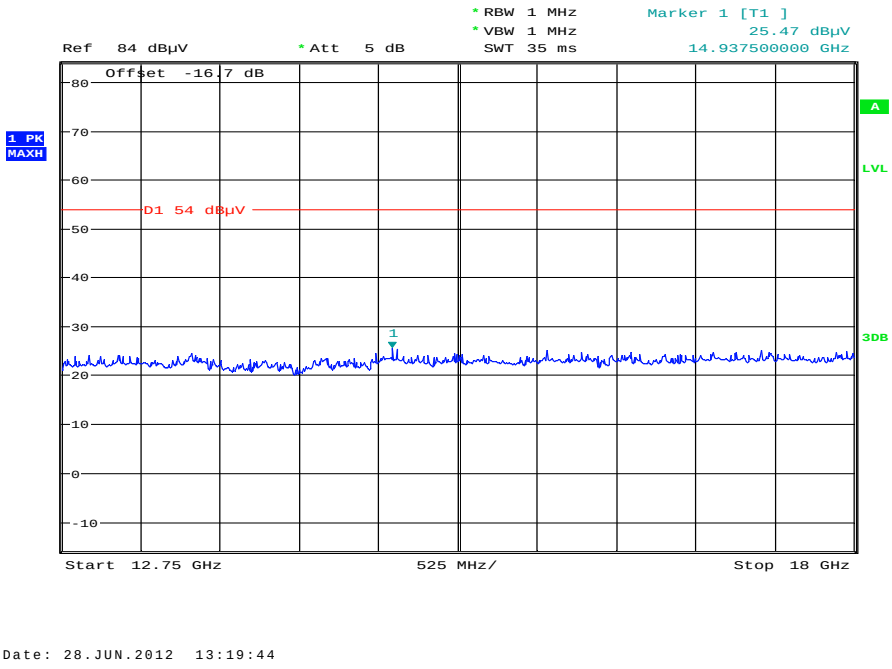
Plot 2: 1 GHz to 12.75 GHz, RX mode, vertical polarization



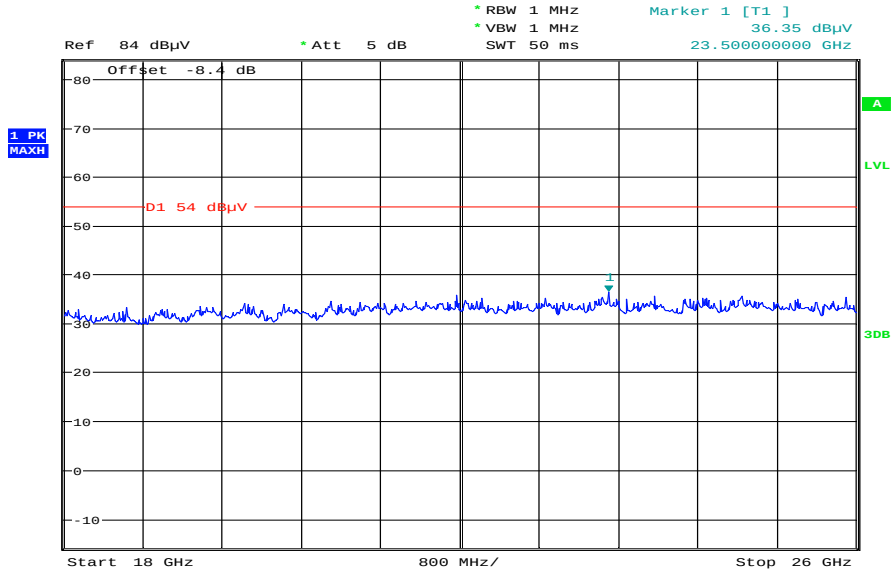
Plot 3: 1 GHz to 12.75 GHz, RX mode, horizontal polarization



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



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



9.13 TX spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 39. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 78 will be measured too. The measurement is performed in the mode with the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

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

Limits:

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

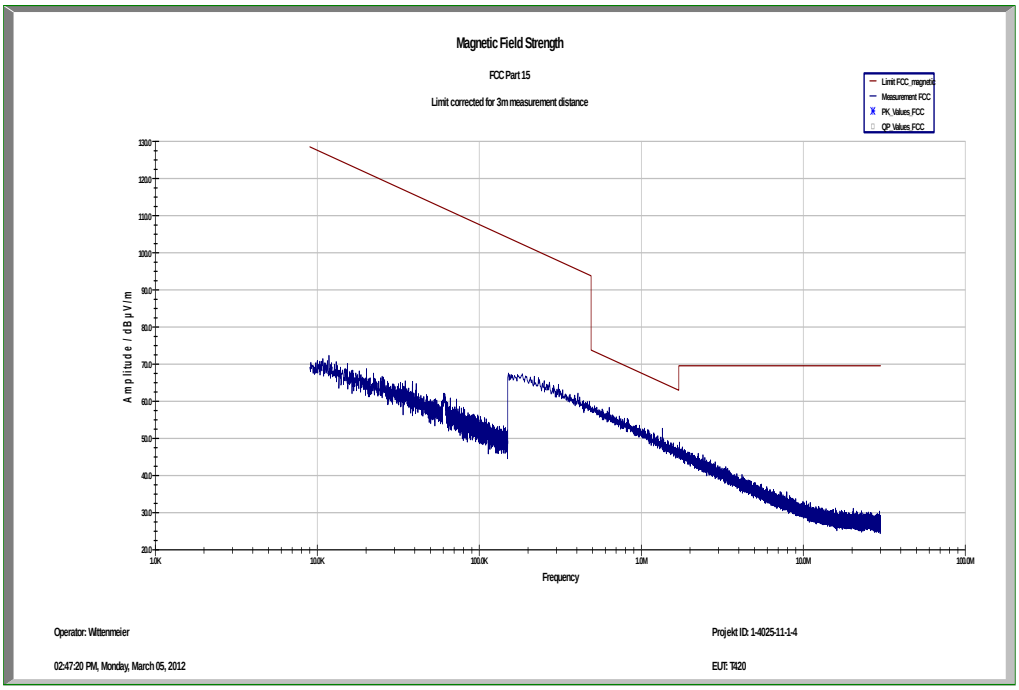
Results:

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

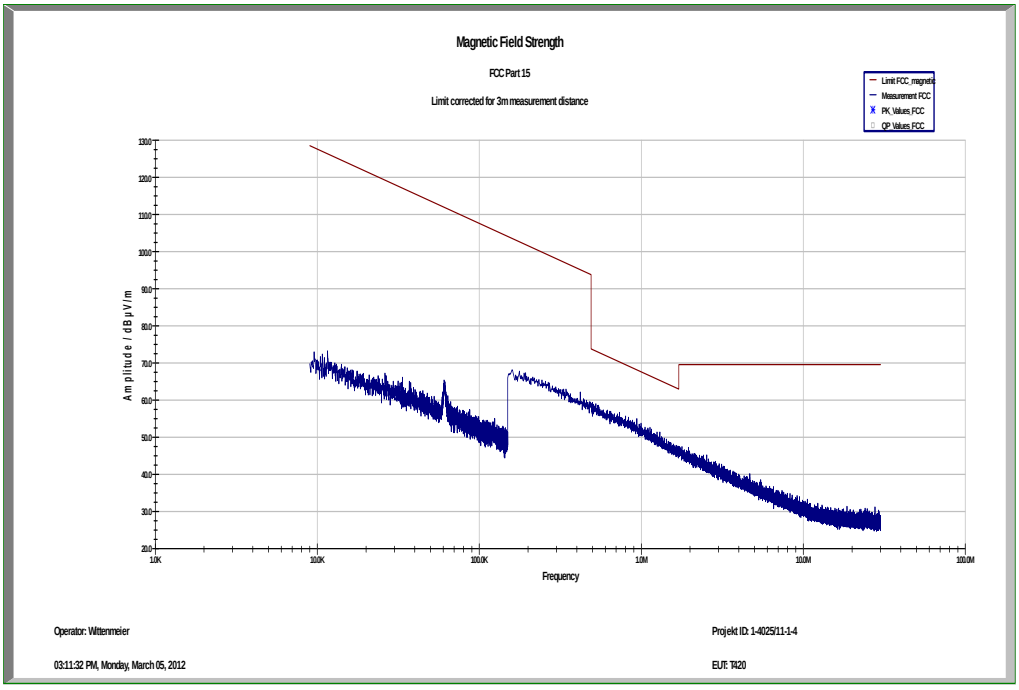
Result: Passed

Plots:

Plot 1: 9 kHz to 30 MHz, TX mode, channel 39



Plot 2: 9 kHz to 30 MHz, RX mode



9.14 TX spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 39. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 78 will be measured too. The measurement is performed in the mode with the highest output power. 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

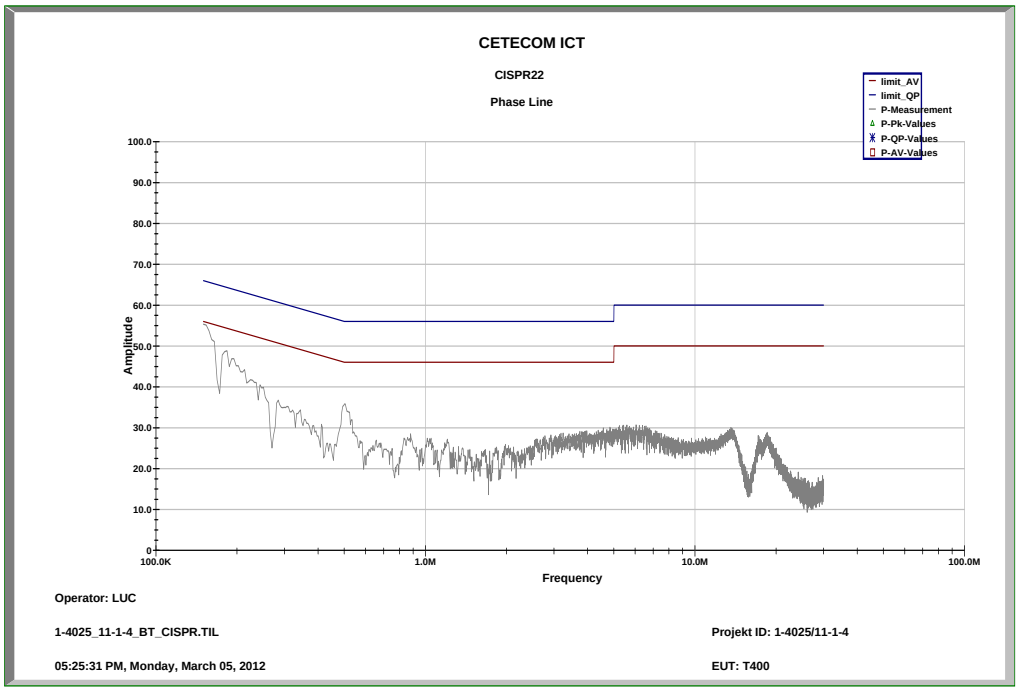
Results:

TX spurious emissions conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks detected		
Measurement uncertainty	± 3 dB	

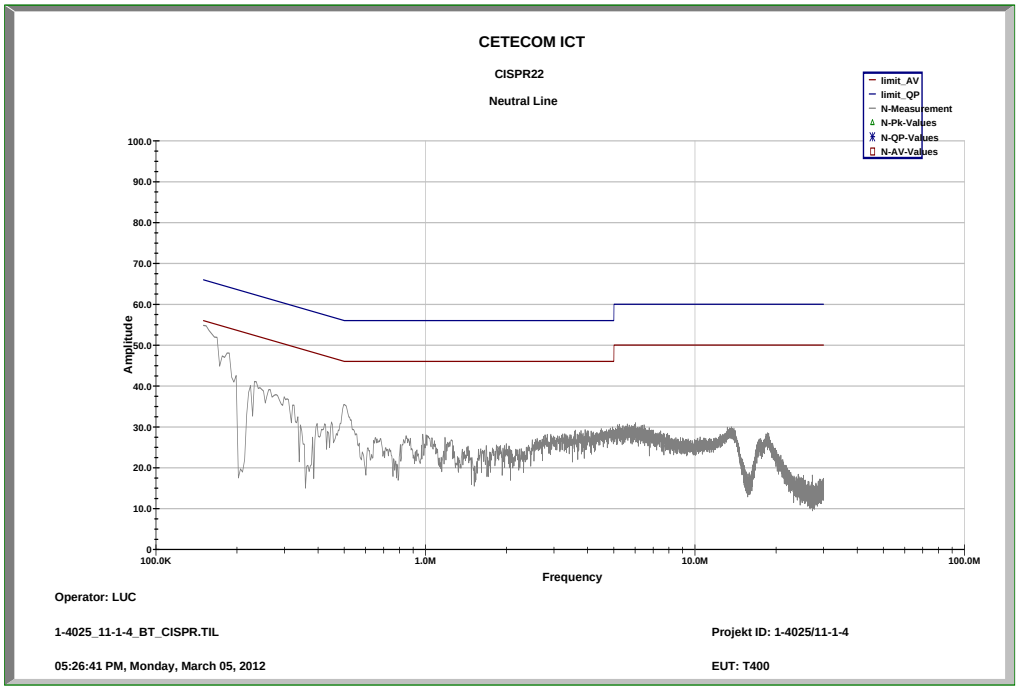
Result: Passed

Plots:

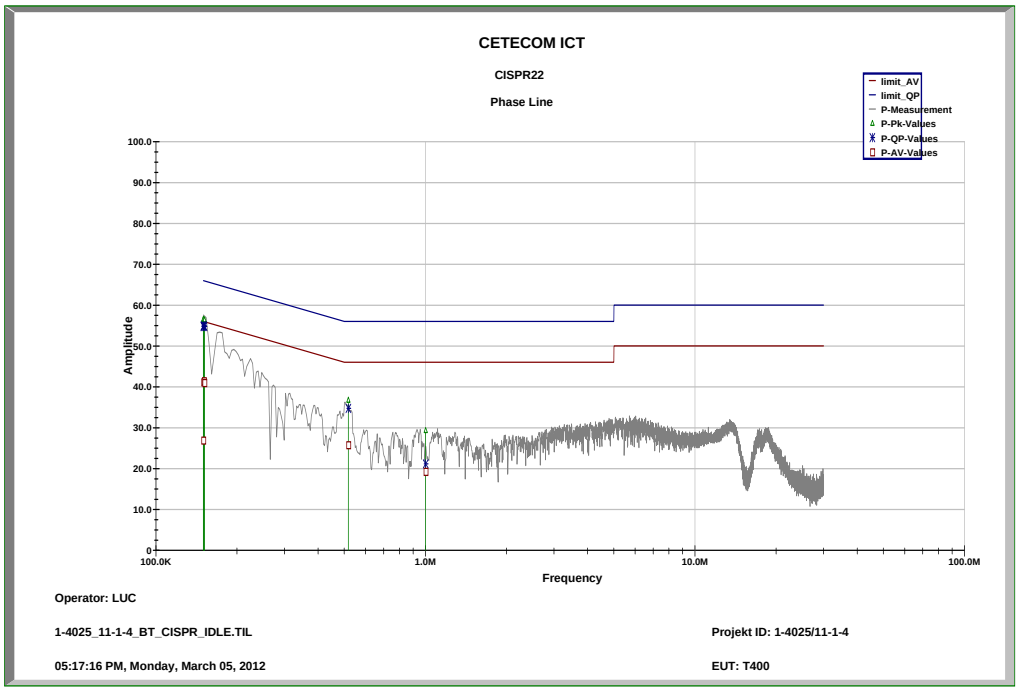
Plot 1: 9 kHz to 30 MHz, TX mode, phase line



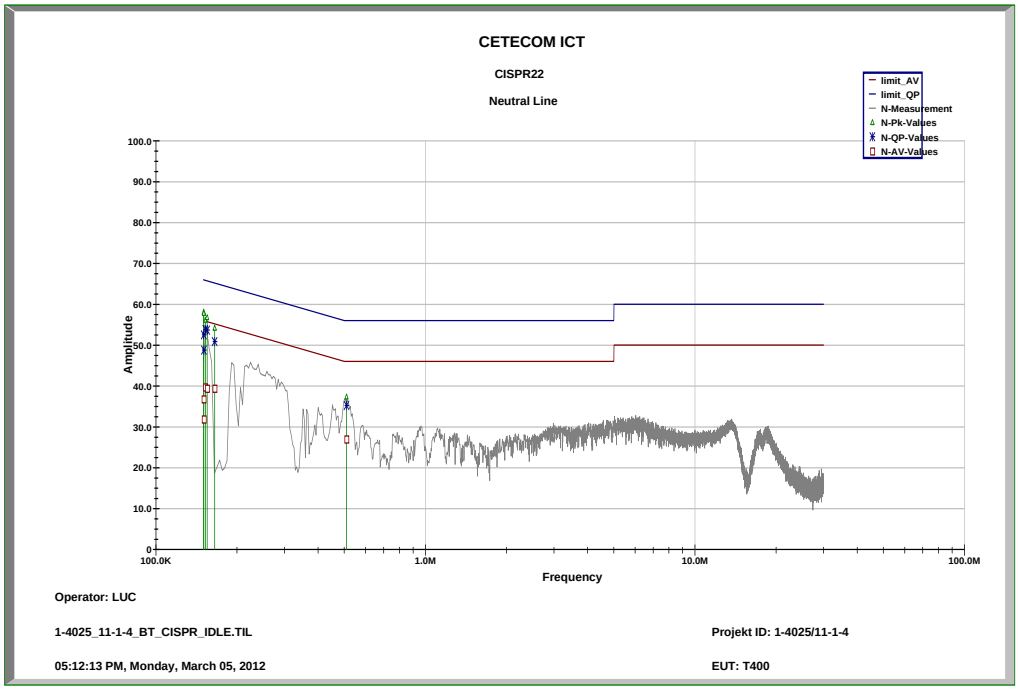
Plot 2: 9 kHz to 30 MHz, TX mode, neutral line



Plot 3: 9 kHz to 30 MHz, RX mode, phase line



Plot 4: 9 kHz to 30 MHz, RX mode, neutral line



10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKI!	11.05.2011	11.05.2013
2	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
3	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
4	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
5	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
6	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
7	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
8	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKI!	14.10.2011	14.10.2014
9	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	19.12.2011	19.12.2012
10	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve	01.07.2010	01.07.2012
11	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/84193	300003889	vlKI!	20.09.2011	20.09.2013

Agenda: Kind of Calibration

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

11 Observations

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

Annex A Photographs of the test setup

Photo documentation:

Photo 1:

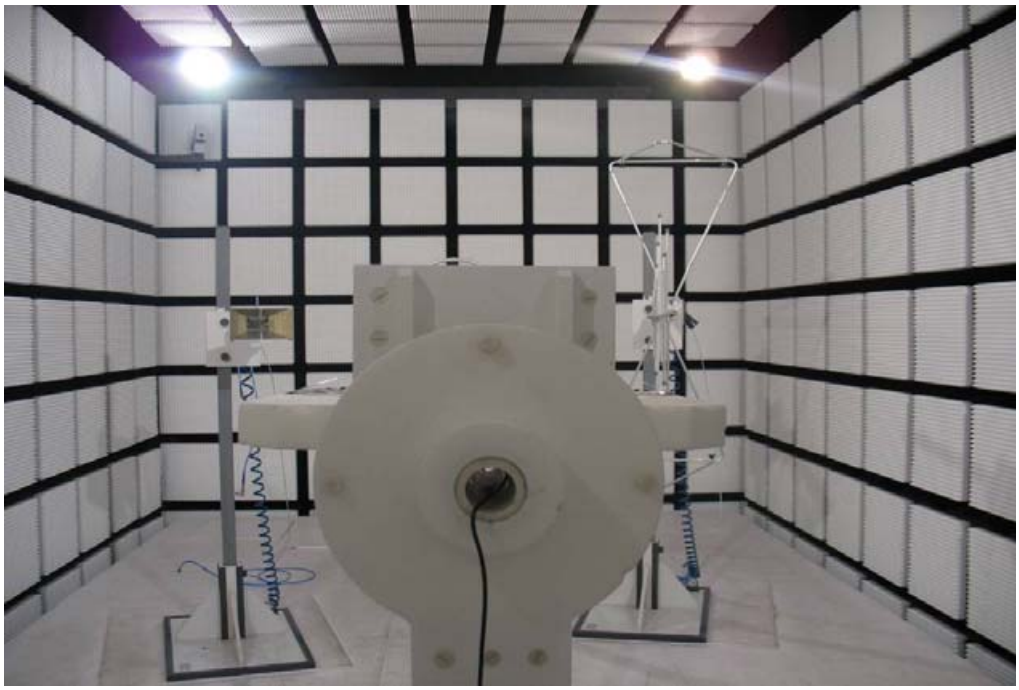


Photo 2:

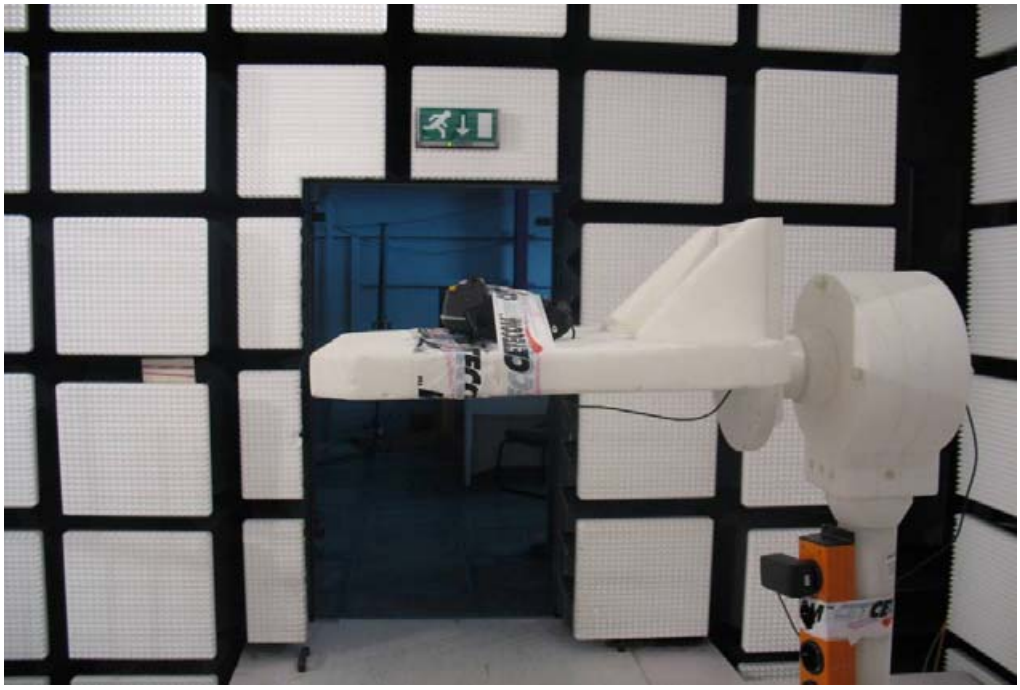


Photo 3:

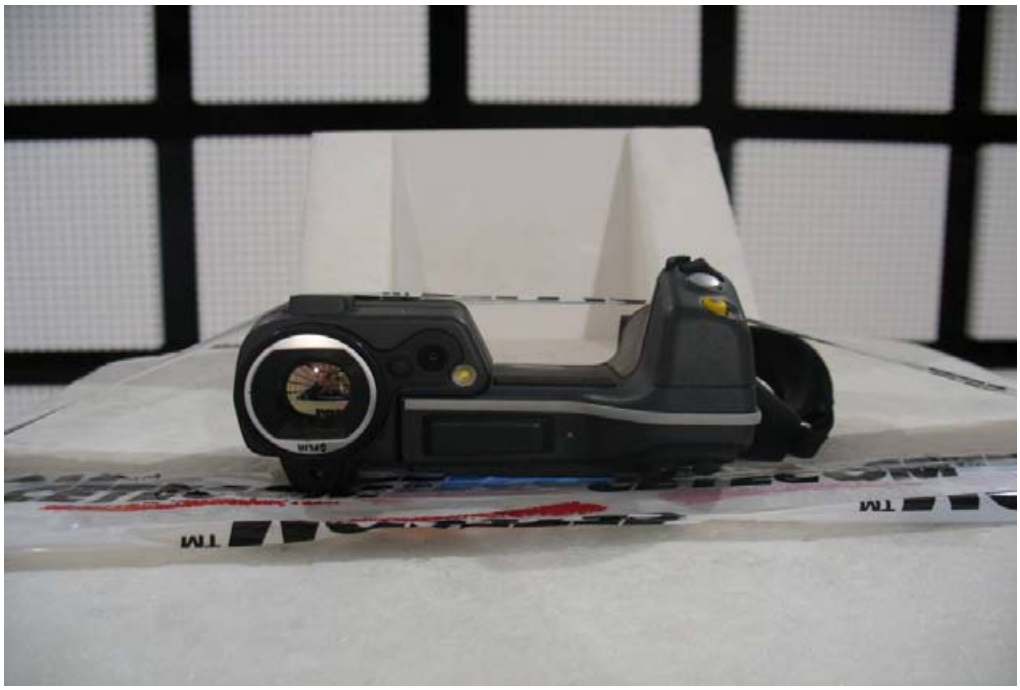
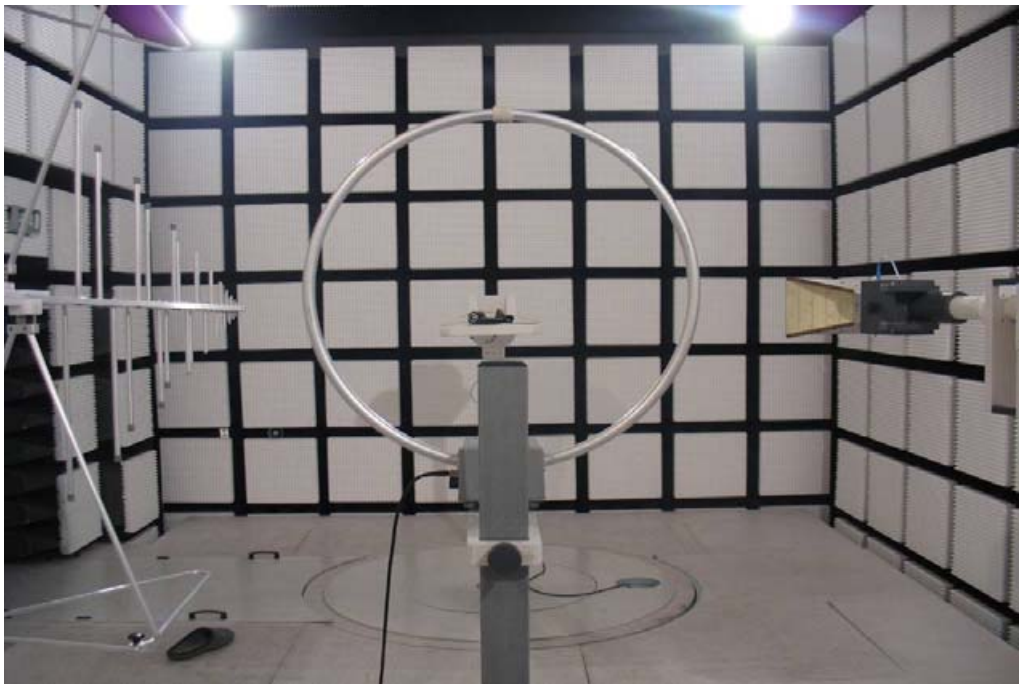


Photo 4:

Photo 5:



Annex B External photographs of the EUT

Photo documentation:

Photo 1:

Photo 2:

Photo 3:

Photo 4:

Photo 5:

Photo 6:

Photo 7:

Photo 8:

Photo 9:

Annex C Internal photographs of the EUT

Photo documentation:

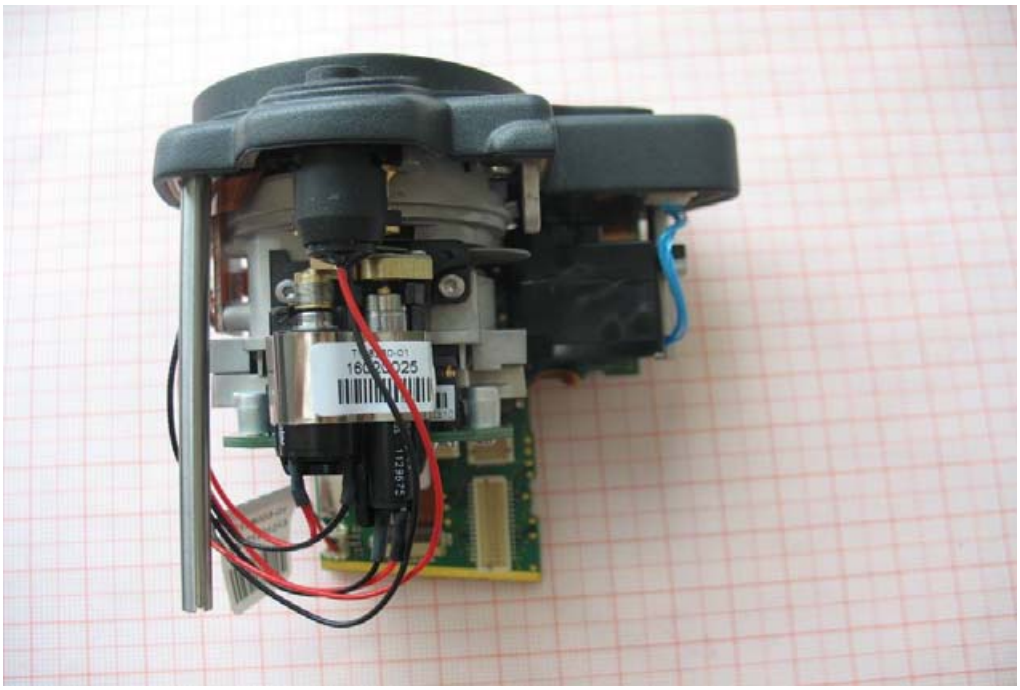
Photo 1:

Photo 2:

Photo 3:

Photo 4:

Photo 5:



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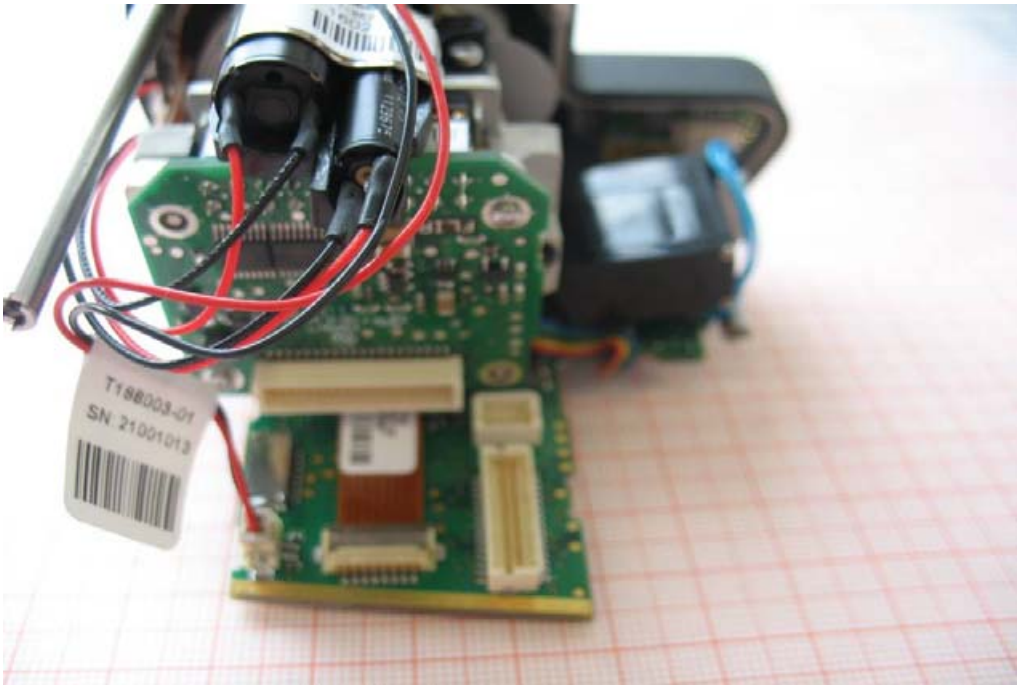

Photo 7:

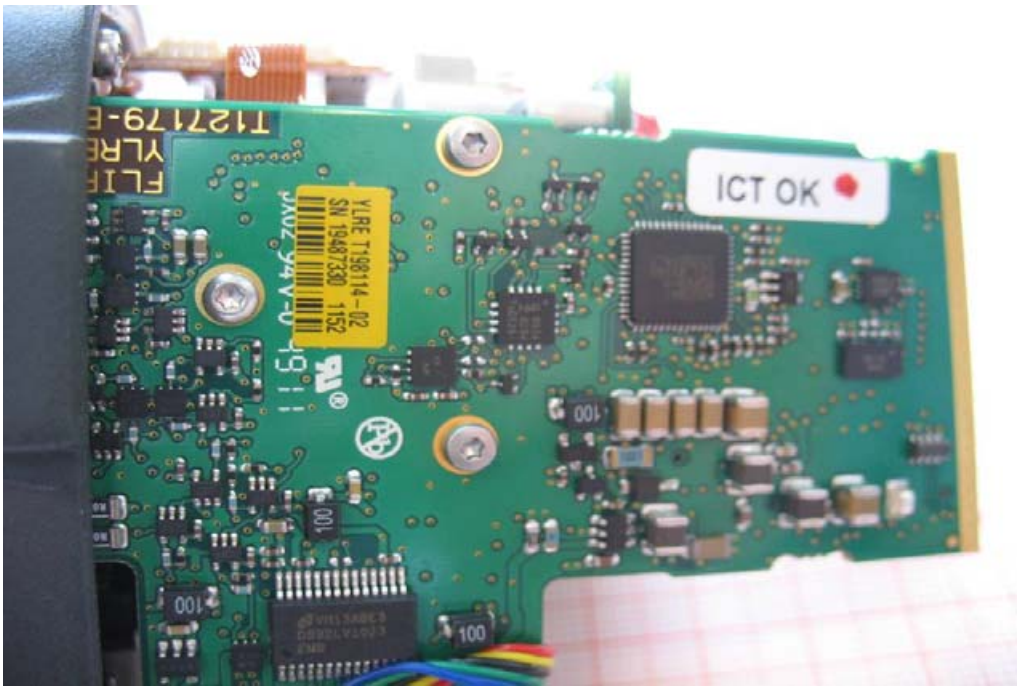

Photo 8:

Photo 9:

Photo 10:

Photo 11:

Photo 12:

Photo 13:

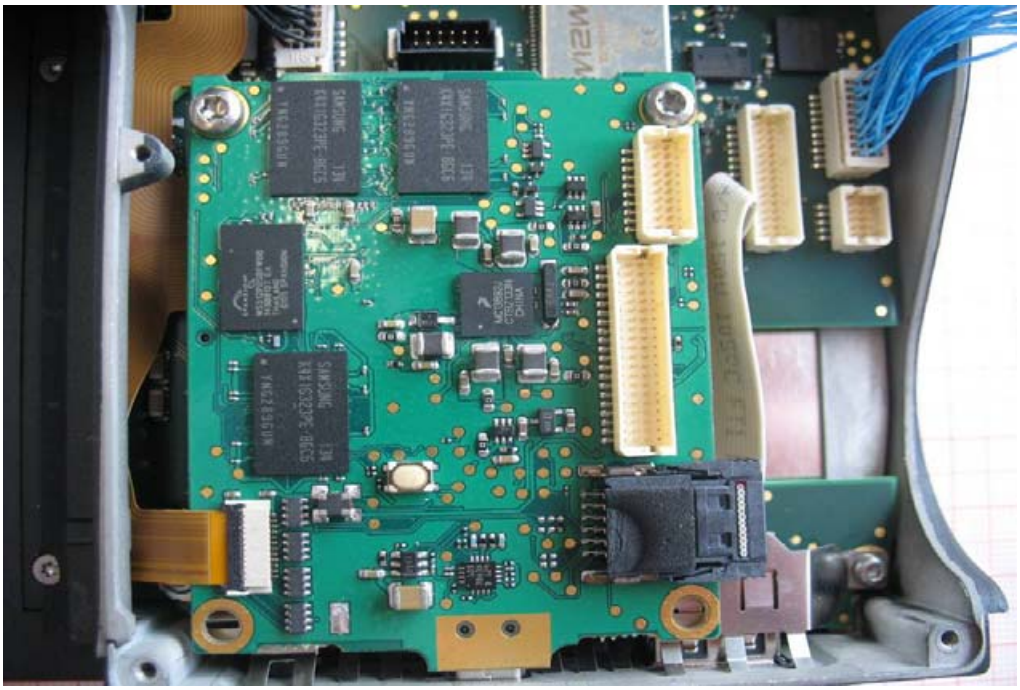

Photo 14:

Photo 15:

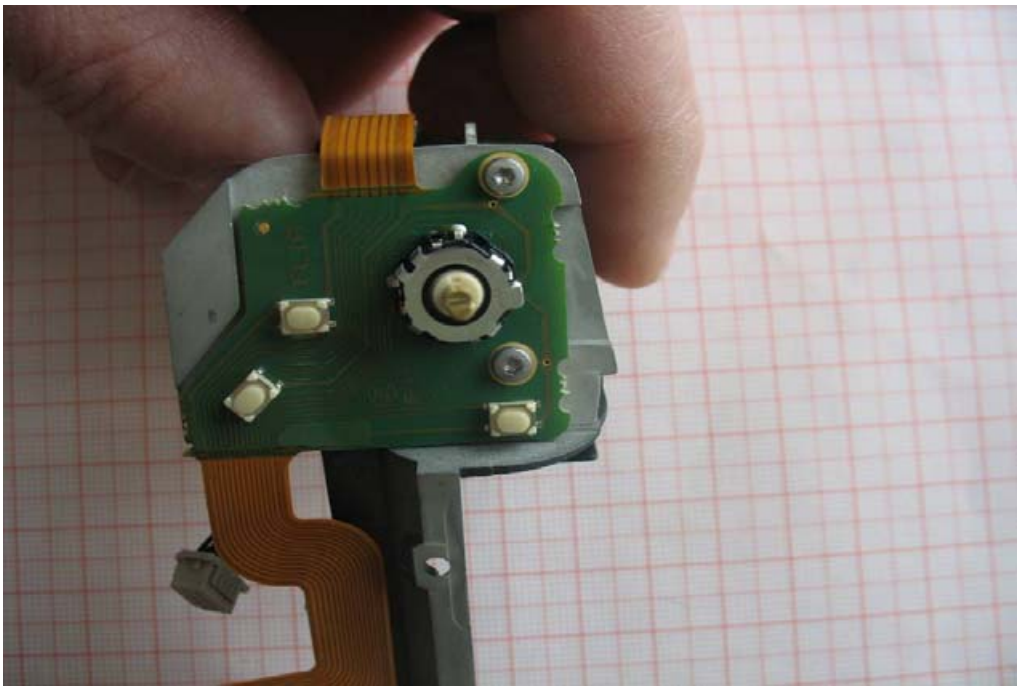

Photo 16:

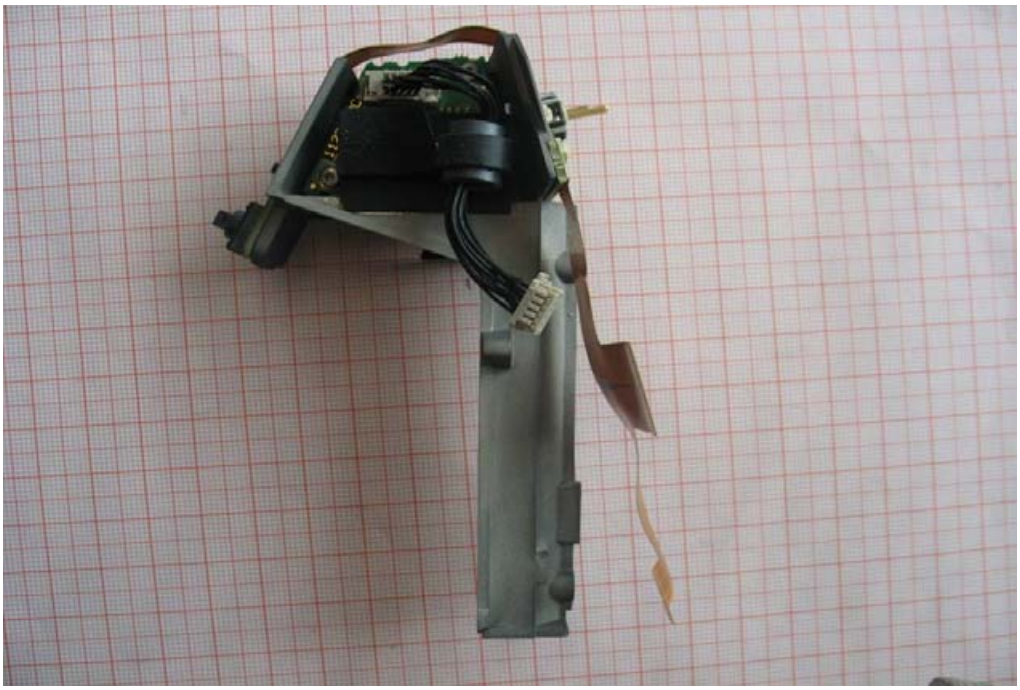

Photo 17:

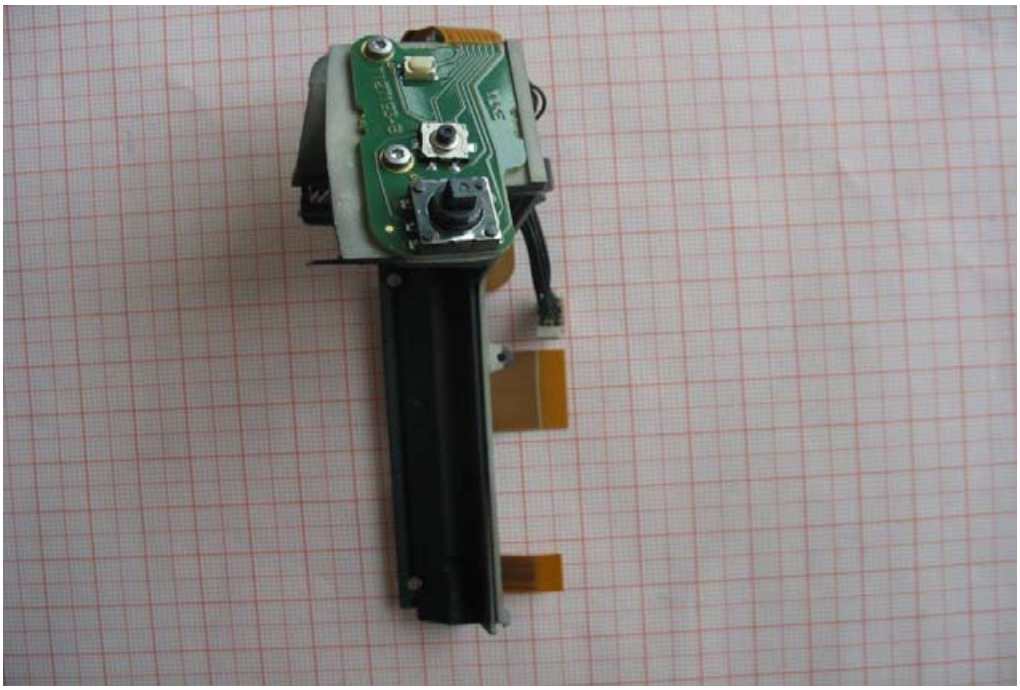

Photo 18:

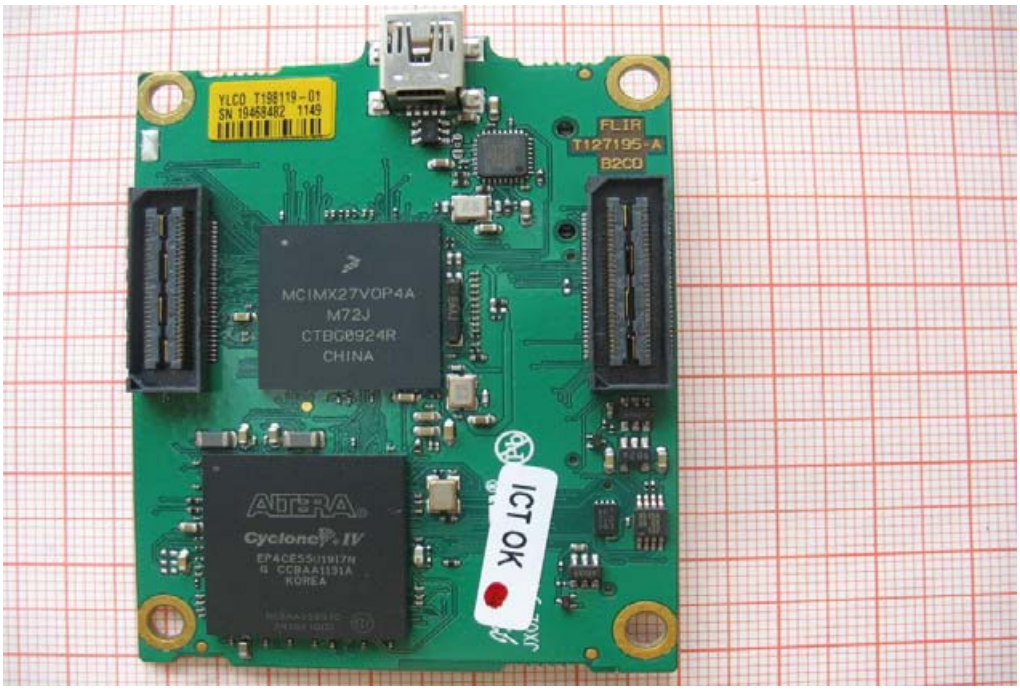

Photo 19:

Photo 20:

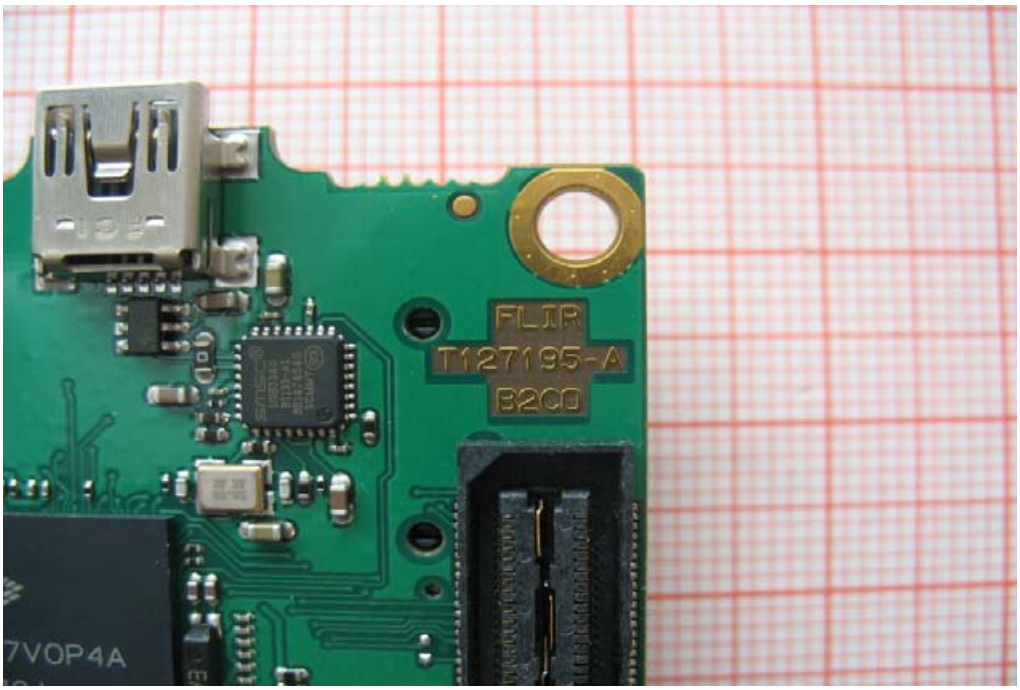

Photo 21:

Photo 22:

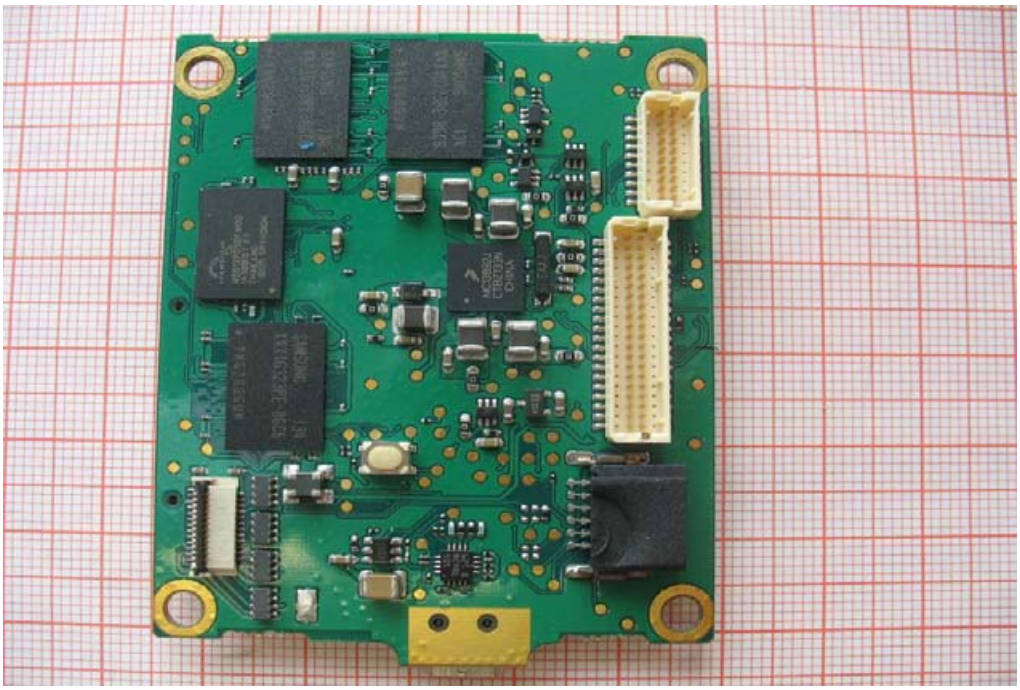

Photo 23:

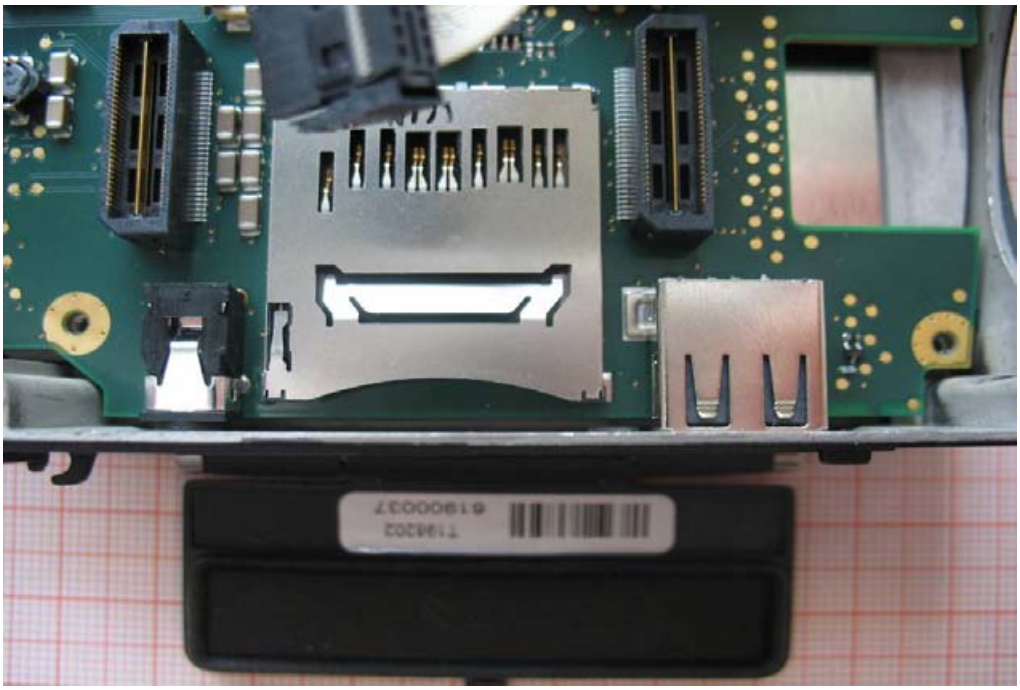

Photo 24:

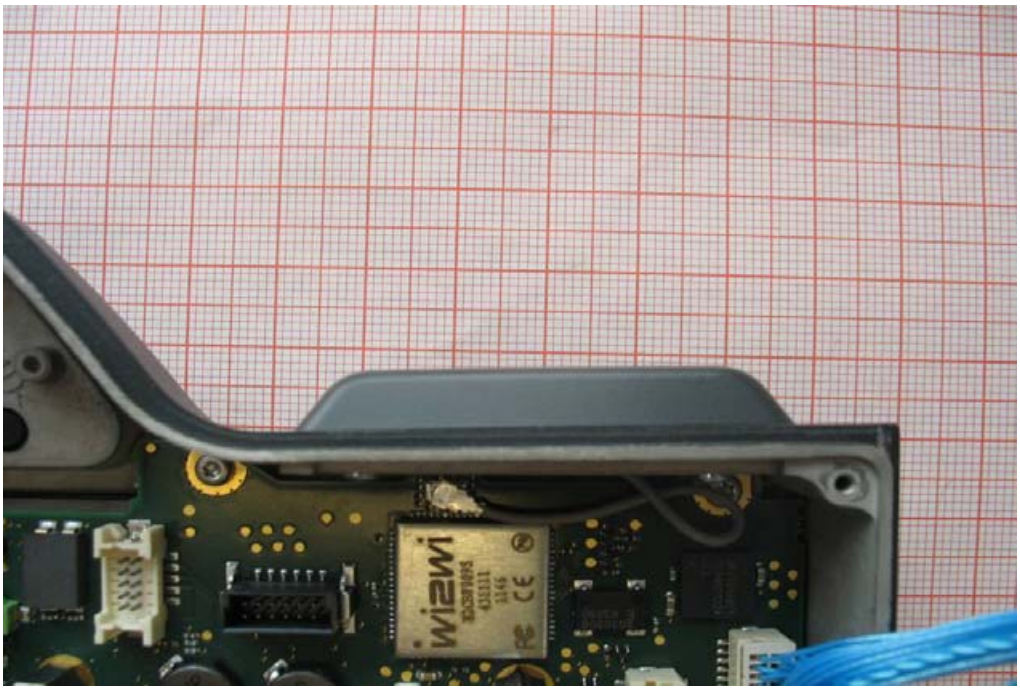

Photo 25:

Photo 26:

Photo 27:

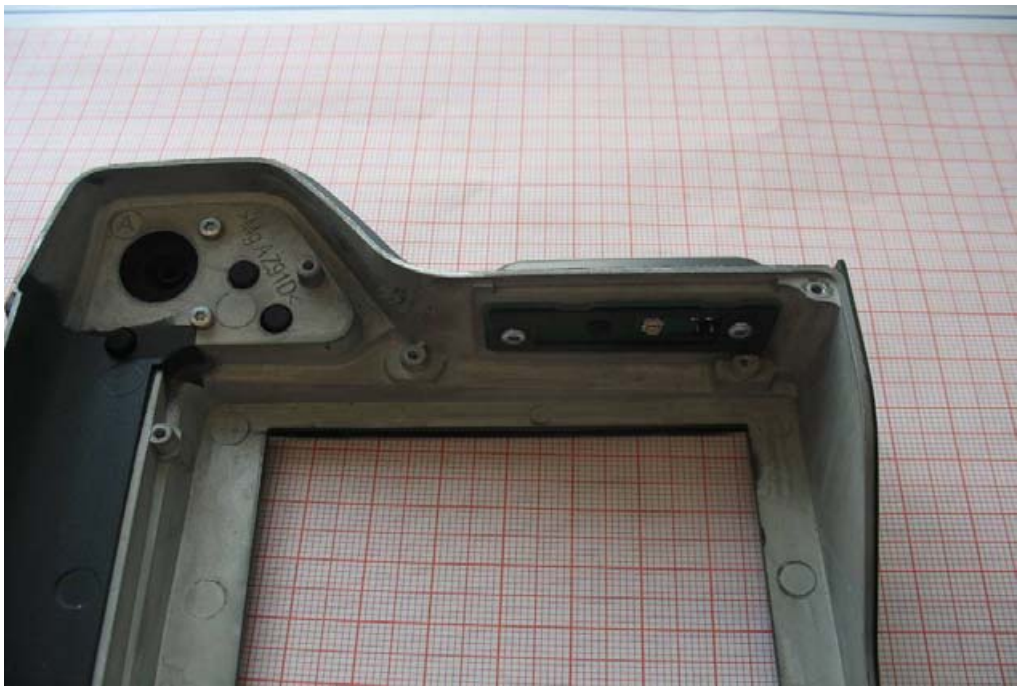

Photo 28:

Photo 29:

Photo 30:

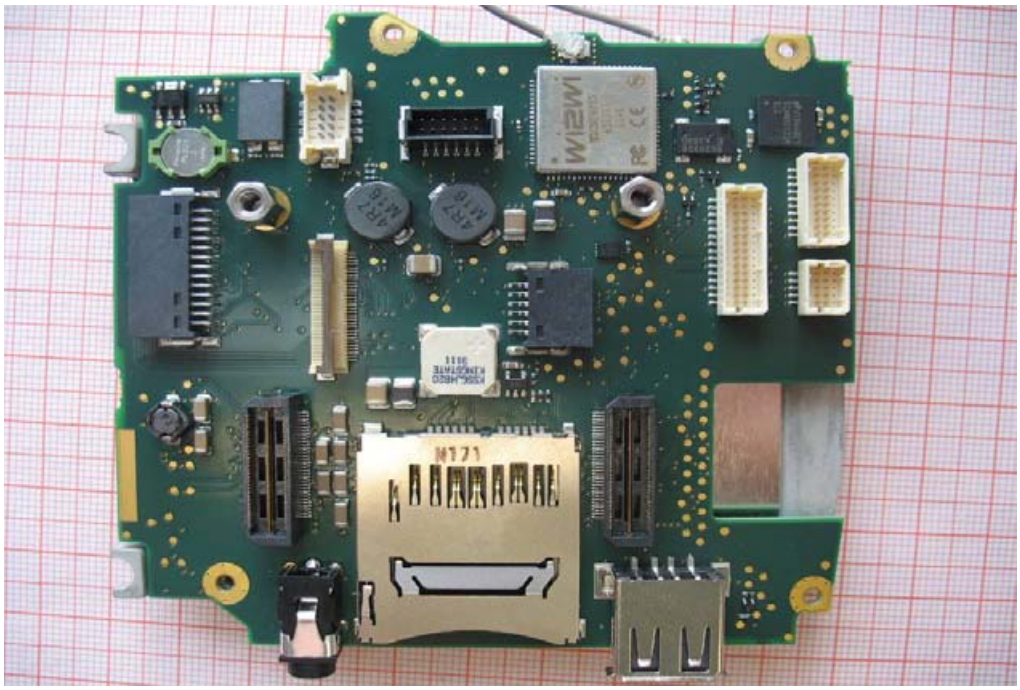

Photo 31:

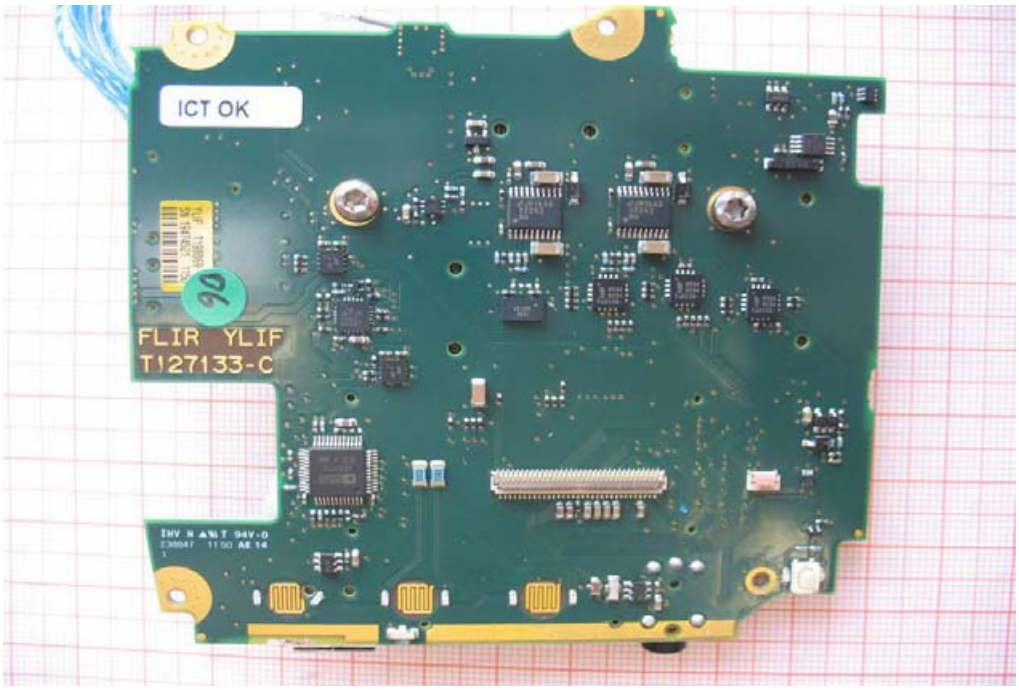

Photo 32:

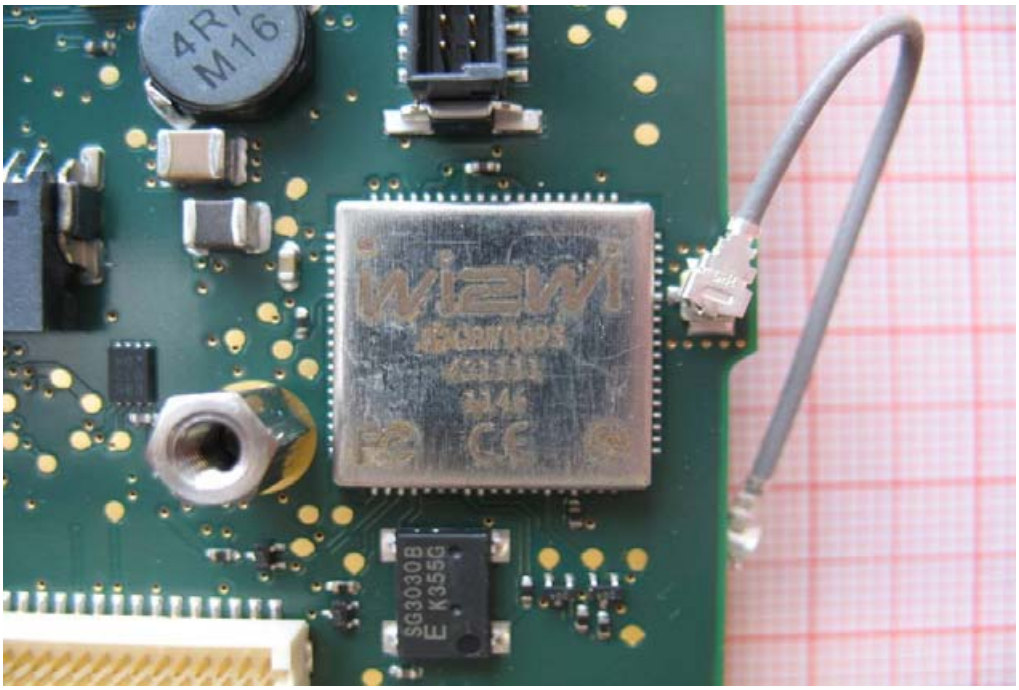

Photo 33:


2WCRW009-5
RF
5345
BOOW
88W8688-BFL2
N1H6190.3
1015 B1P
TW
Wi2Wi

Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-07-02
-A	editorial changes	2012-11-06

Annex E Further information

Glossary

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

Annex F Accreditation Certificate

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10
66117 Saarbrücken

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

Wired communications and DECT
Acoustic
Radio
Short Range Devices (SRD)
RFID
WiMax and Richtfunk
Mobile radio (GSM / DCS), Over the Air (OTA) Performance
Electromagnetic Compatibility (EMC) incl. Automotive
Product safety
SAR and Hearing Aid Compatibility (HAC)
Environmental simulation
Smart Card Terminals
Bluetooth
Wi-Fi-Services

The accreditation certificate shall only apply in connection with the notice of accreditation of 13.04.2011 with the accreditation number D-PL-12076-01 and is valid until 03.09.2014. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 82 pages.

Registration number of the certificate: **D-PL-12076-01-01**

Frankfurt am Main, 13.04.2011

This document is a translation. The definitive version is the original German accreditation certificate.

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkkS.

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Front side of certificate

Back side of certificate

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

http://www.cetecom.com/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKS_Akkredi_Urk_EN17025-En_incl_Annex.pdf