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TEST REPORT

Test report no.: 1-3325/11-02-05-A



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

Testing laboratory

CETECOM ICT Services GmbH
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Accredited Testing Laboratory:

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

Applicant

FLIR Systems AB
Rinkebyvägen 19
SE-182 11 Danderyd / SWEDEN
Phone: +46 (0) 8 753 27 50
Fax: -/-
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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:	Infrared Camera
Model name:	FLIR-T55901
FCC ID:	ZLV-FLIRT55901
IC:	5306A-FLIRT55901
Frequency [MHz]:	ISM band 2400 MHz to 2483.5 MHz (lowest channel 2412 MHz, highest channel 2462 MHz)
Technology tested:	WLAN (b & g – mode)
Antenna:	Integrated antenna
Power Supply:	3.7 V DC by Li-polymer battery
Temperature Range:	-20°C to +55 °C



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

Test report authorised:

Marco Bertolino
Testing Manager

Test performed:

Andreas Luckenbill

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2 General information

2.1 Notes and disclaimer

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

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

2.2 Application details

Date of receipt of order:	2012-01-24
Date of receipt of test item:	2012-01-24
Start of test:	2012-01-26
End of test:	2012-01-26
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:		37 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by Li-polymer battery
	V_{max}	-/-
	V_{min}	-/-

5 Test item

Kind of test item :	Infrared Camera
Type identification :	FLIR-T55901
S/N serial number :	55800032
HW hardware status :	T197516 rev 01
SW software status :	version 1.18.10
Frequency band [MHz] :	ISM-band 2400 MHz to 2483.5 MHz lowest channel 01 – 2412 MHz, highest channel 11 – 2462 MHz
Type of modulation :	DSSS & OFDM technology with BPSK, QPSK, 16- and 64 QAM
Number of channels :	11
Antenna :	Integrated antenna
Power supply :	3.7 V DC by Li-polymer 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	2012-02-23	-/-

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	DSSS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 6dB bandwidth	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.109 RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	DSSS OFDM g & n	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.207(a)	Conducted emissions < 30 MHz	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

8 RF measurements

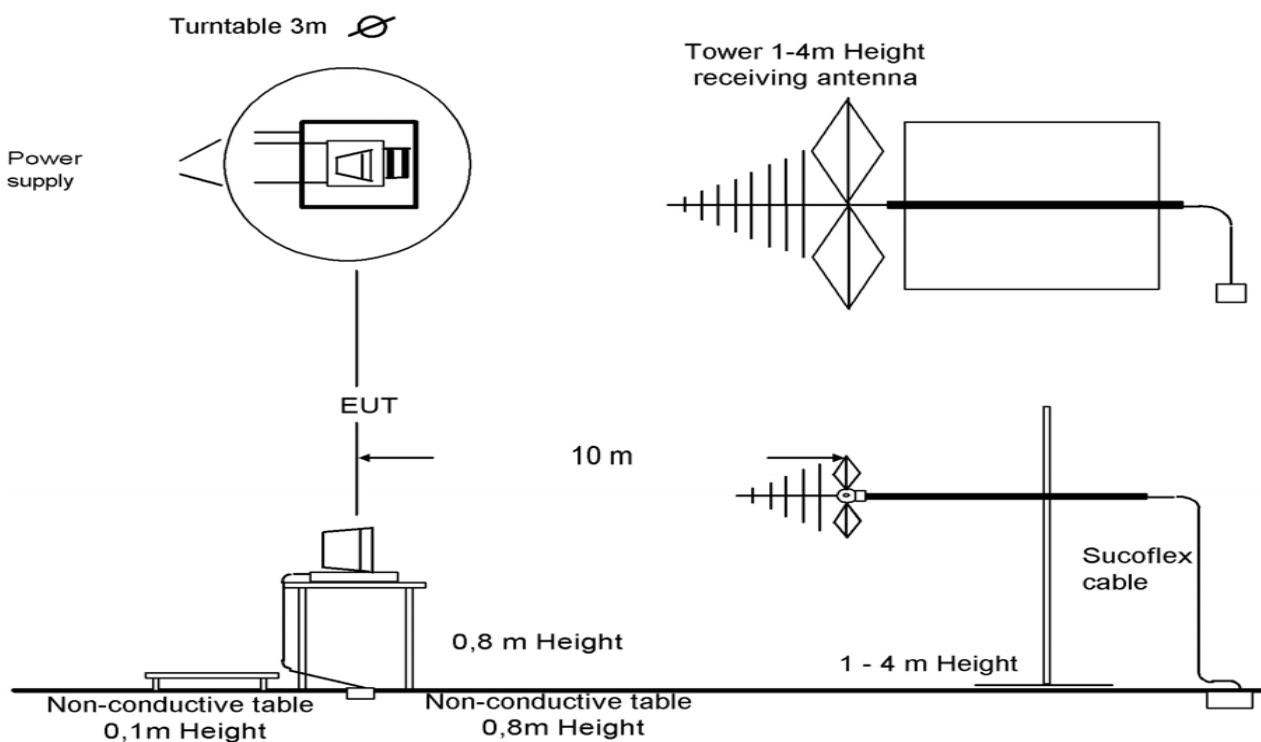
8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 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 analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-2003 clause 4.2.

Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



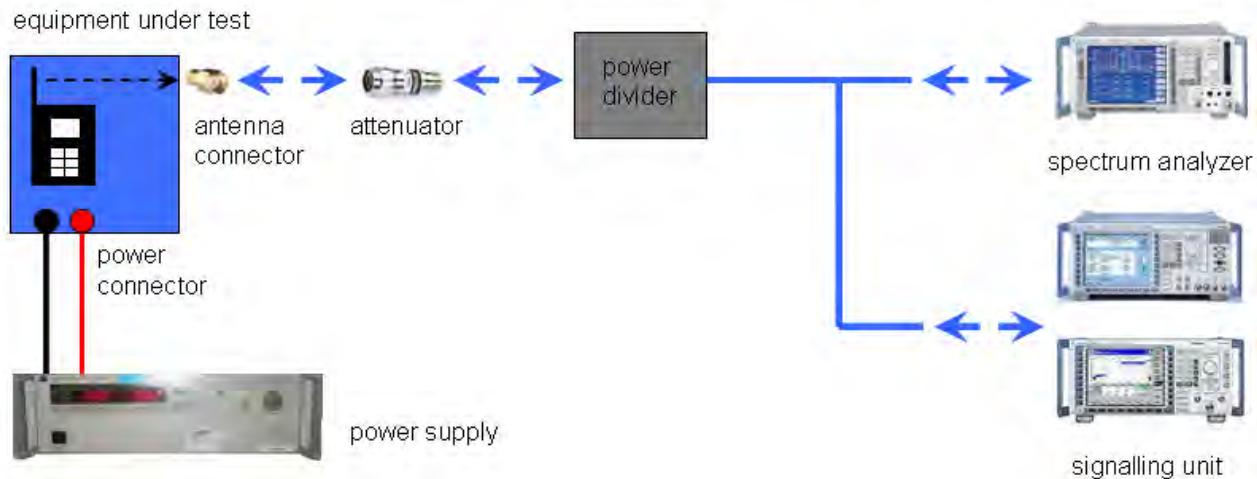
Picture 1: Diagram radiated measurements

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

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

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



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

- Test mode:
- No test mode available.
Iperf was used to ping another device with the largest support packet size
 - Special software is used.
EUT is transmitting pseudo random data by itself

8.3 RSP100 test report cover sheet / performance test data

Test report number	:	1-3325/11-02-05-A
Equipment model number	:	FLIR-T55901
Certification number	:	5306A-FLIRT55901
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 2412 MHz, highest channel 2462 MHz)
RF-power [W] (max.)	:	cond.: 35.97 mW (DSSS) 39.63 mW (OFDM) EIRP: 73.62 mW (DSSS) 77.27 mW (OFDM)
Occupied bandwidth (99%-BW)	:	DSSS: 16.35 MHz OFDM: 18.37 MHz
Type of modulation	:	DSSS & OFDM technology with BPSK, QPSK, 16- and 64 QAM modulation.
Emission designator (TRC-43)	:	16M4G1D (DSSS) 18M4G7D (OFDM)
Antenna information	:	Integrated antenna
Transmitter spurious (worst case) [dBµV/m @ 3m]:		47.8 @ 9848 MHz
Receiver spurious (worst case) [dBµV/m @ 3m]:		40.55 @ 17.01 GHz (noise floor)

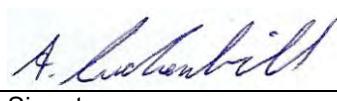
ATTESTATION:

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:

2012-02-23 Andreas Luckenbill
Date Name



Signature

9 Measurement results

9.1 Maximum output power (conducted)

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	30 MHz
Resolution bandwidth:	20 MHz
Span:	50 MHz
Trace-Mode:	Max Hold

Results:

DSSS / b – mode	Maximum Output Power Conducted [dBm]			
	1	2	5.5	11
Ch 6 - 2437 MHz	15.35	15.18	15.45	15.43
Measurement uncertainty	± 1.5 dB			

OFDM / g – mode	Maximum Output Power Conducted [dBm]							
	6	9	12	18	24	36	48	54
Ch 6 - 2437 MHz	15.40	15.26	15.31	15.98	15.18	15.44	15.62	10.54
Measurement uncertainty	± 1.5 dB							

Result: Selected data rate for all measurements:

DSSS / b – mode:

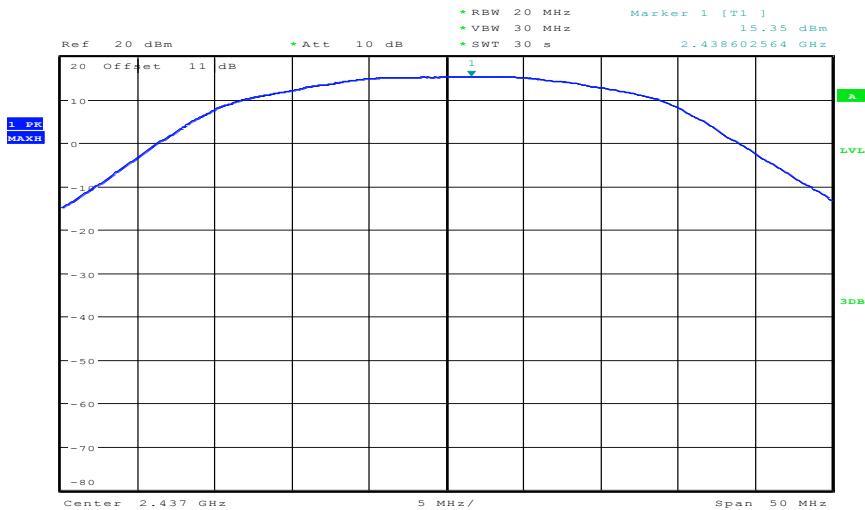
1 MBit/s

OFDM / g – mode:

18 MBit/s

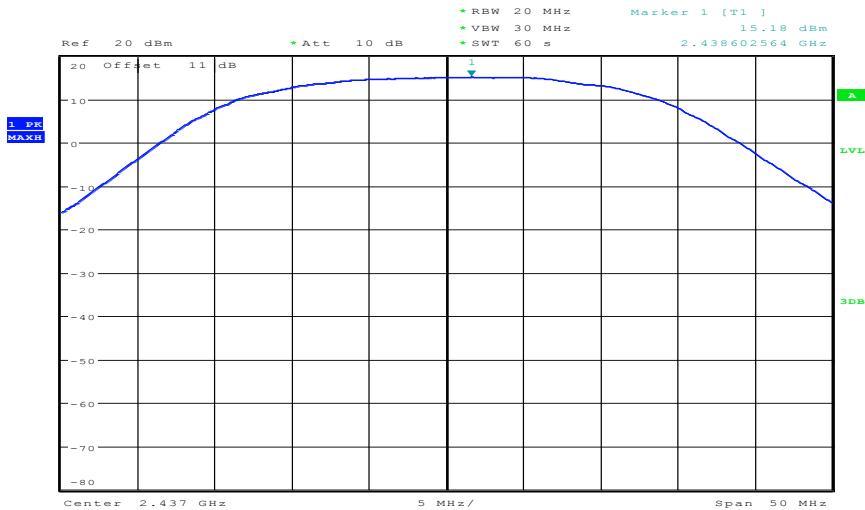
Plots: DSSS / b – mode

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

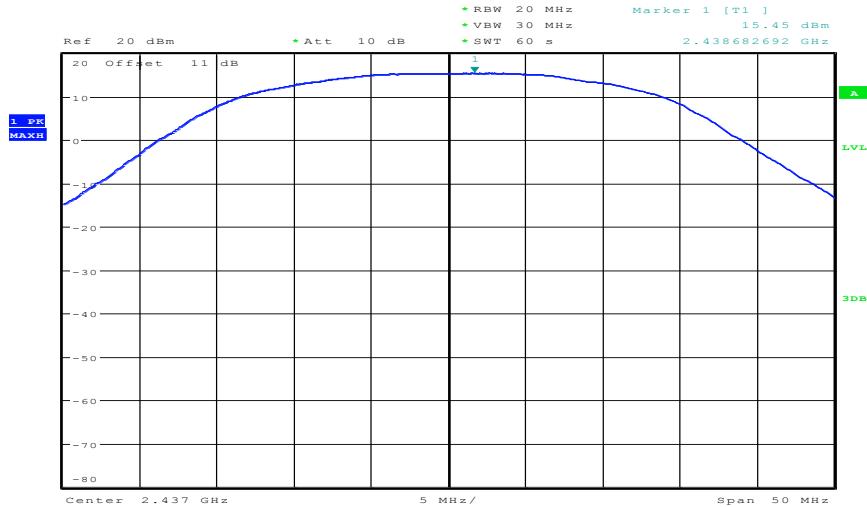


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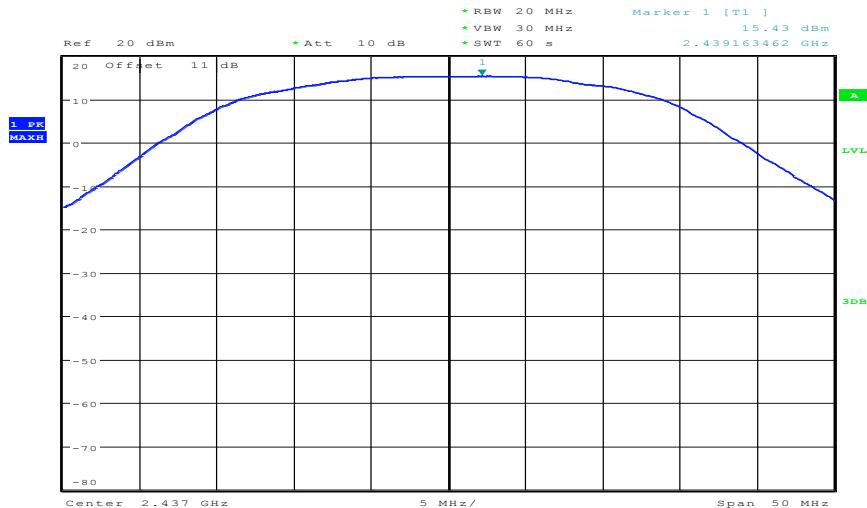
Plot 2: TX mode, middle channel, 2 MBit/s



Date: 24.JAN.2012 16:15:23

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

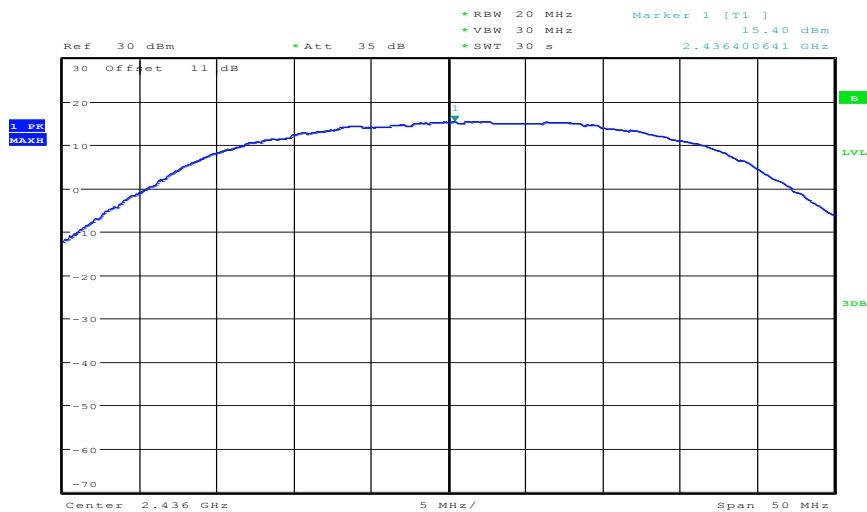
Date: 24.JAN.2012 16:16:54

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

Date: 24.JAN.2012 16:18:18

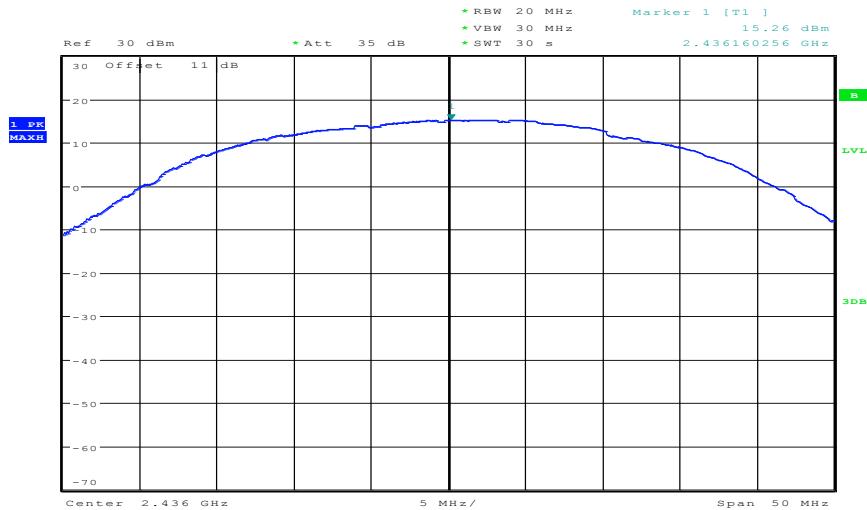
Plots: OFDM / g – mode

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

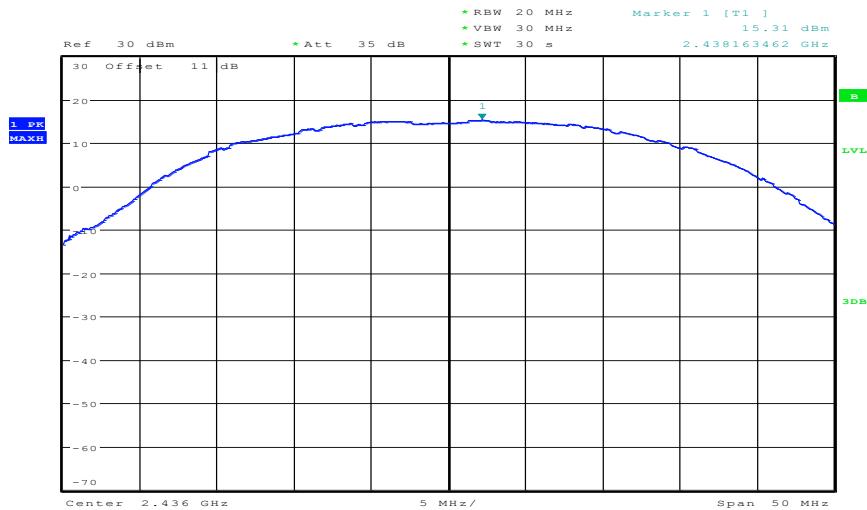


Date: 24.JAN.2012 14:25:25

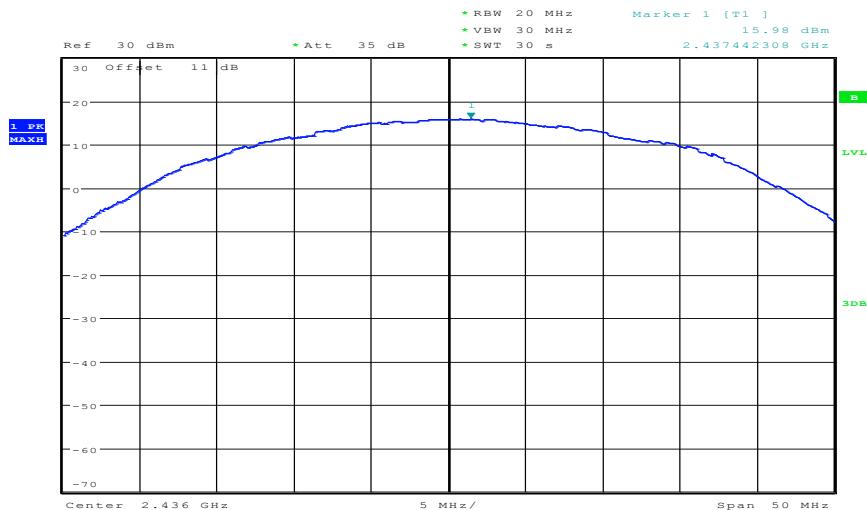
Plot 2: TX mode, middle channel, 9 MBit/s



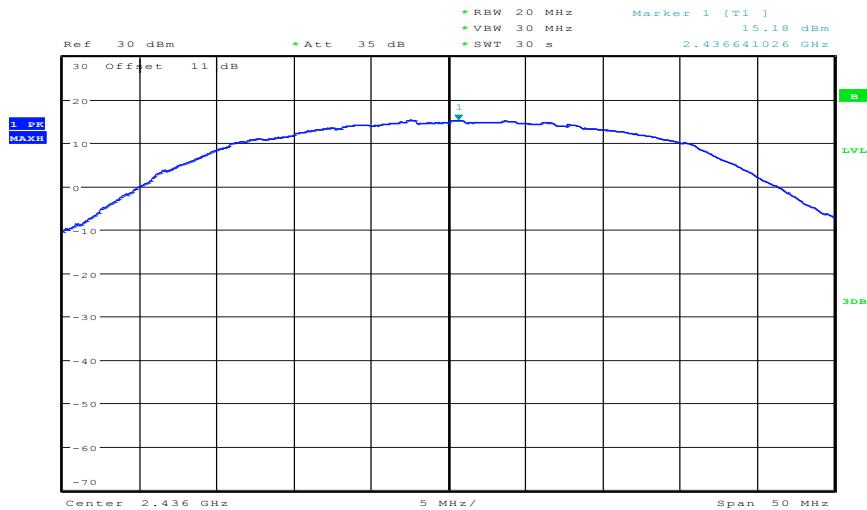
Date: 24.JAN.2012 14:26:28

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

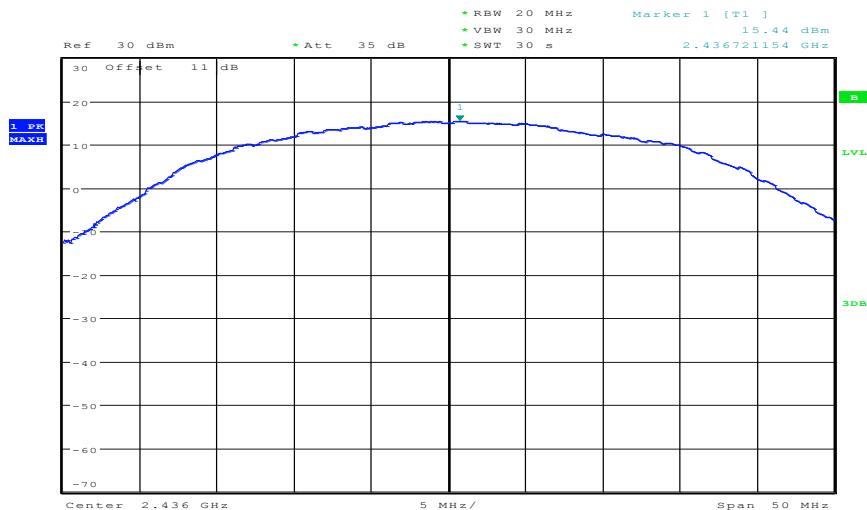
Date: 24.JAN.2012 14:27:24

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

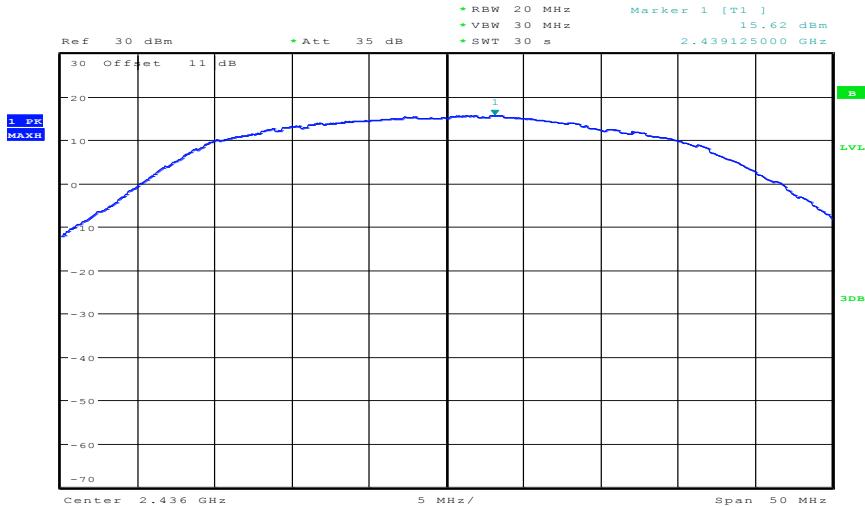
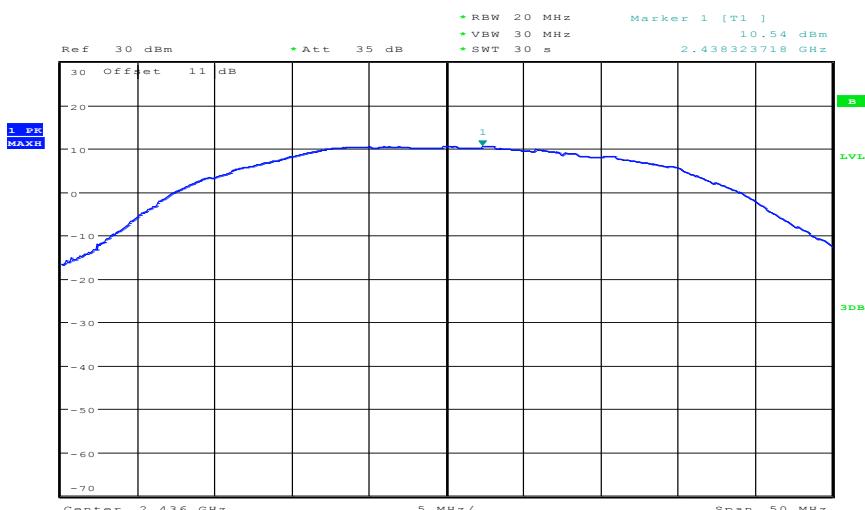
Date: 24.JAN.2012 14:28:25

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

Date: 24.JAN.2012 14:29:15

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

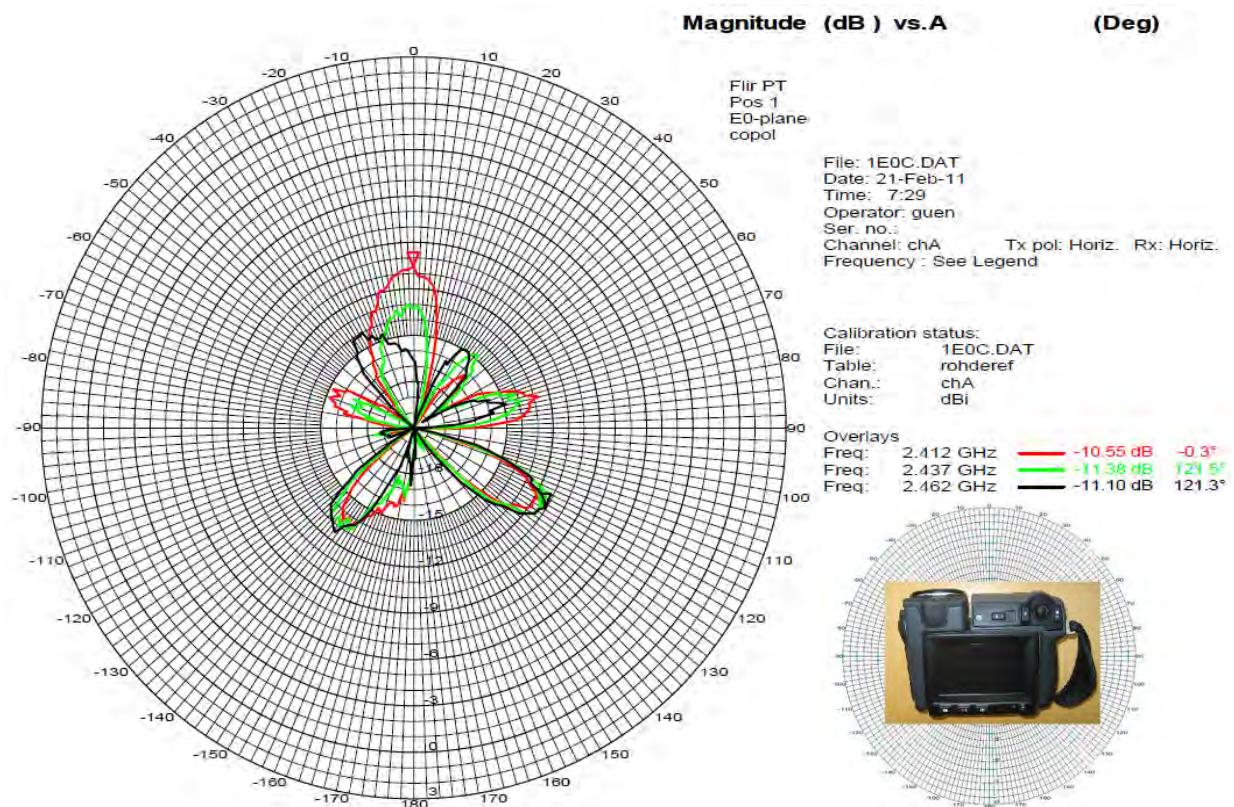
Date: 24.JAN.2012 14:30:13

Plot 7: TX mode, middle channel, 48 MBit/s**Plot 8:** TX mode, middle channel, 54 MBit/s

9.2 Antenna gain

The following data of antenna measurements were supplied by the applicant:

Lens position 1



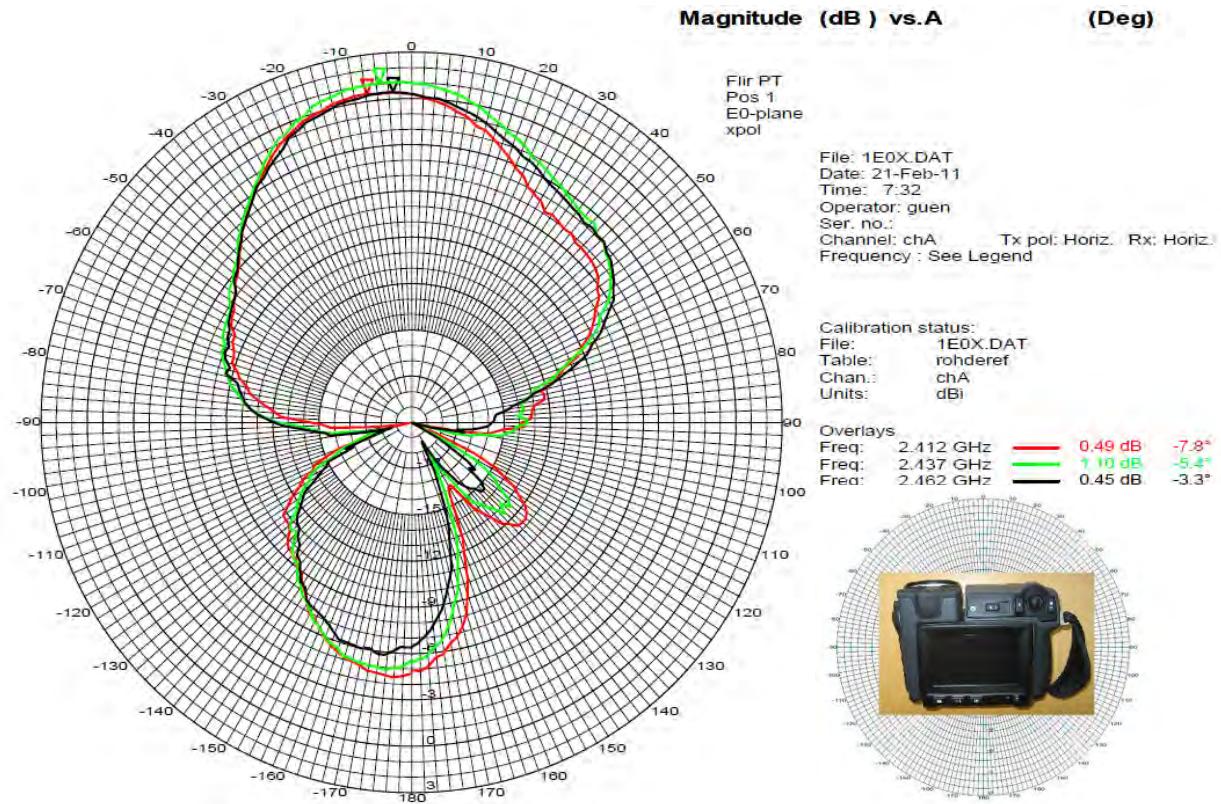


Fig 2: Lens position 1. E0-plane, vertical polarization.

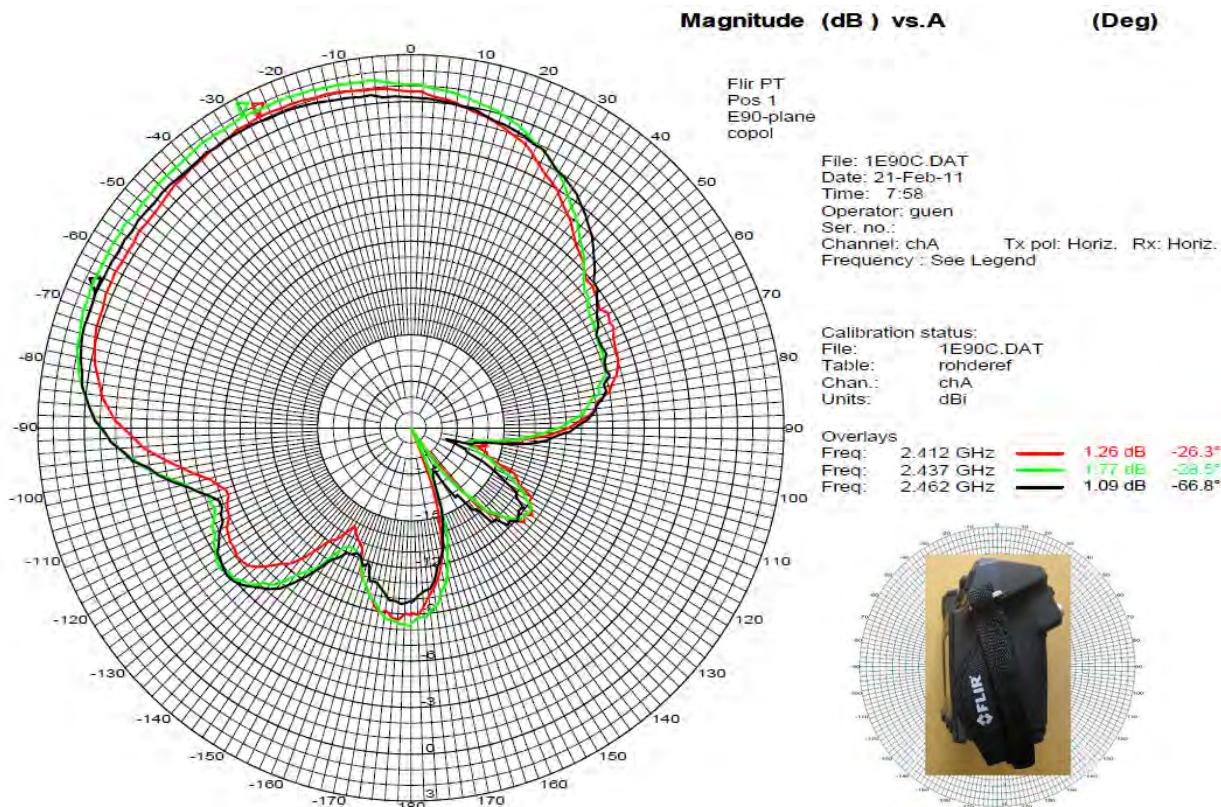


Fig 3: Lens position 1. E90-plane, horizontal polarization.

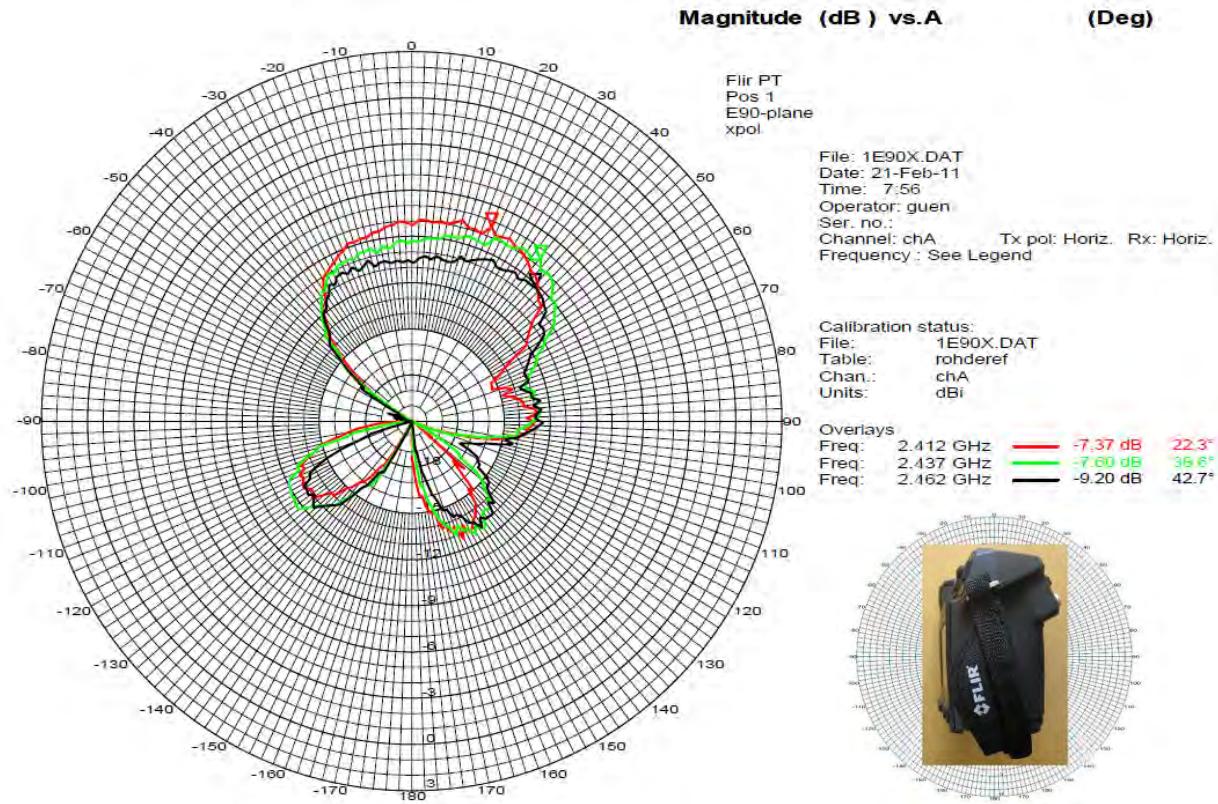


Fig 4: Lens position 1. E90-plane, vertical polarization.

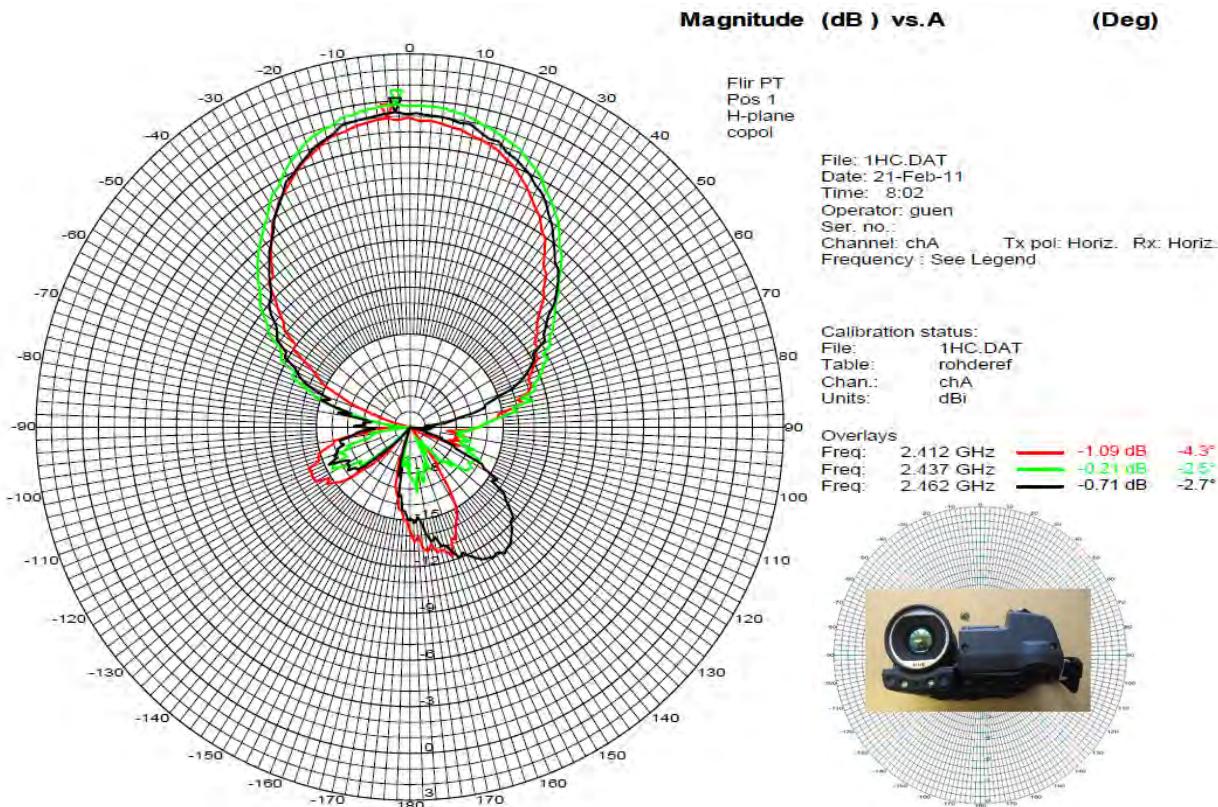


Fig 5: Lens position 1. H-plane, vertical polarization.

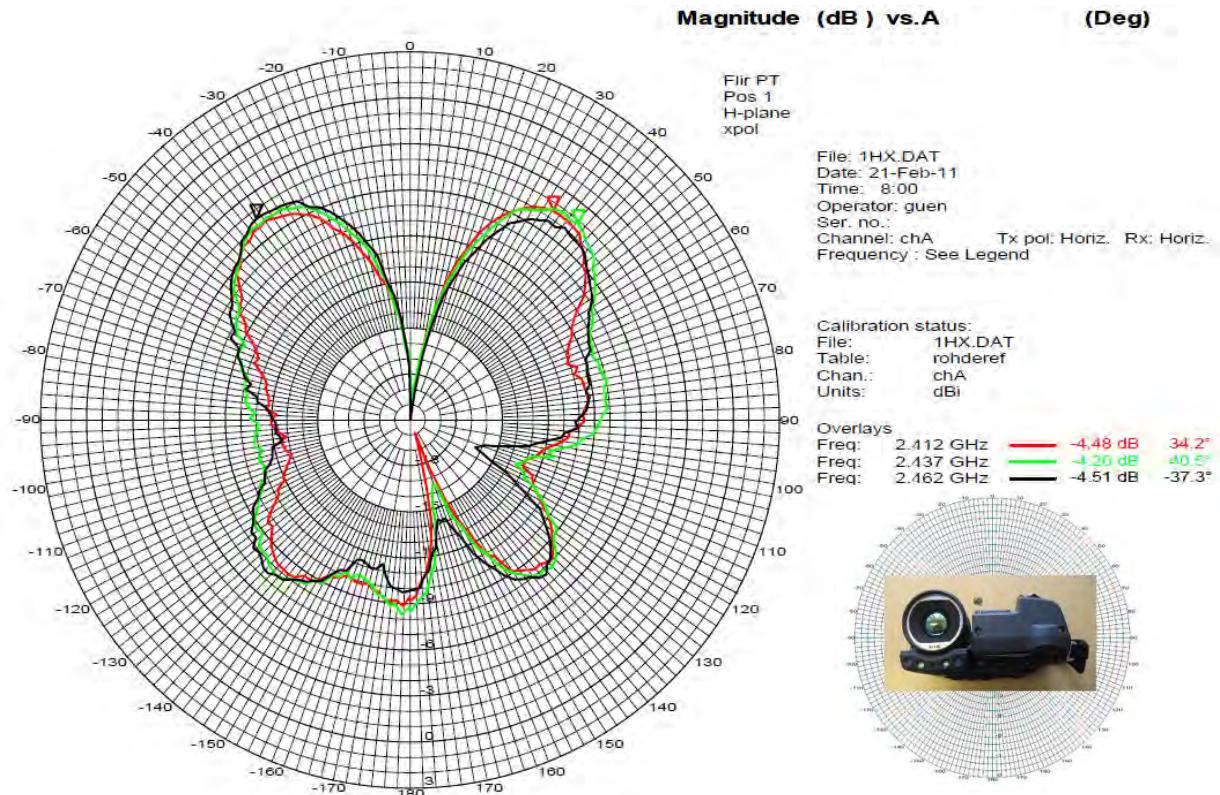


Fig 6: Lens position 1. H-plane, horizontal polarization.

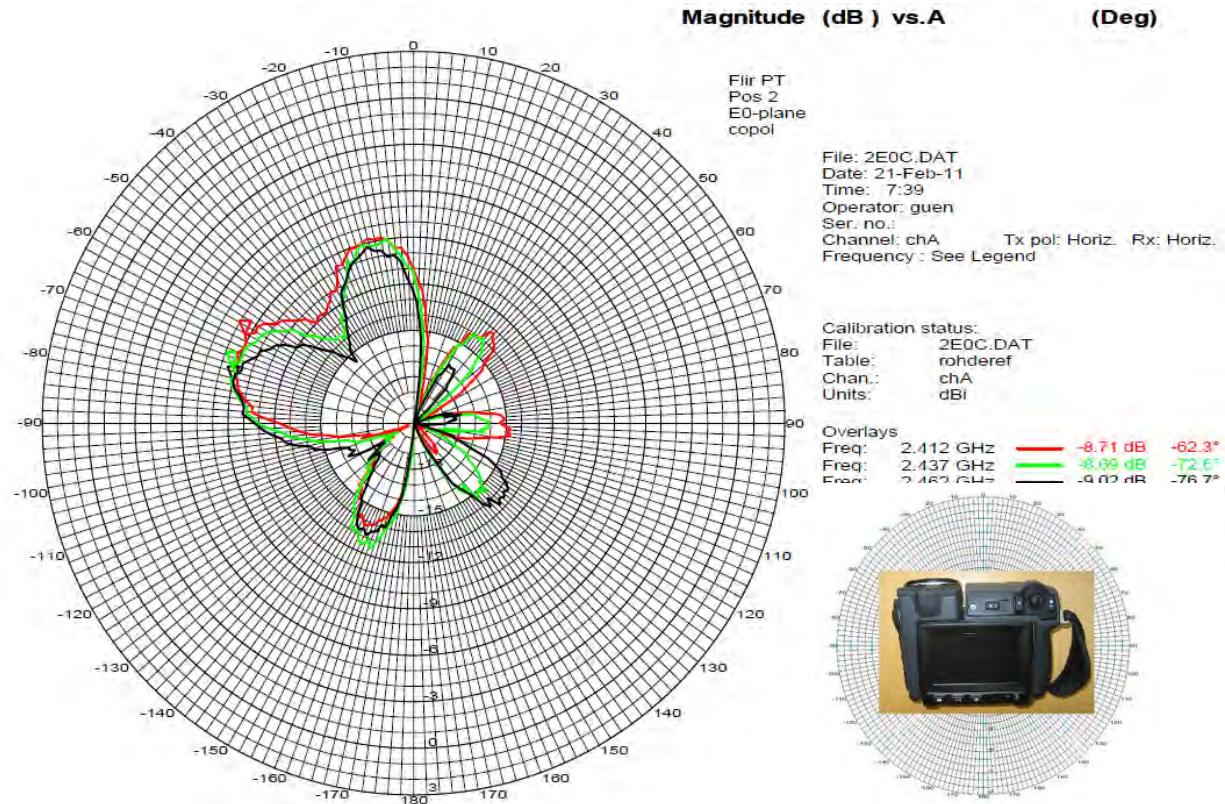
Lens position 2

Fig 7: Lens position 2. E0-plane, horizontal polarization.

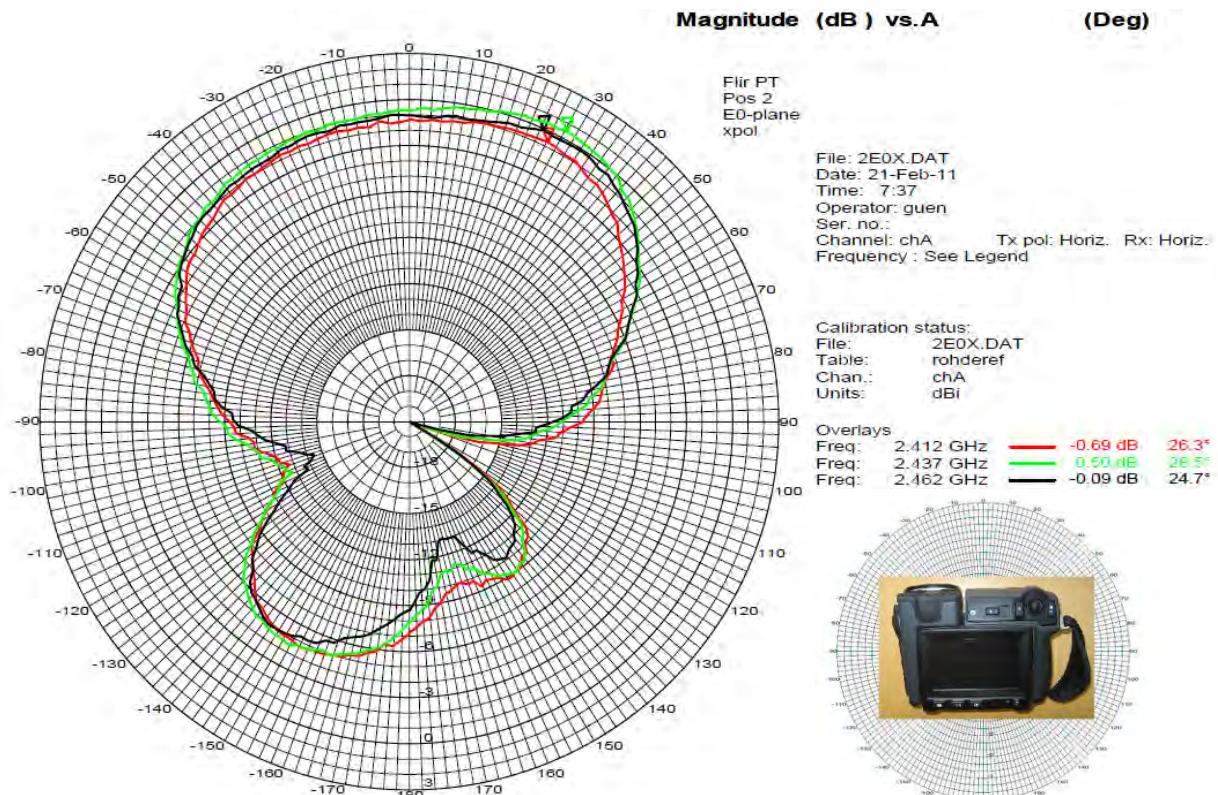


Fig 8: Lens position 2. E0-plane, vertical polarization.

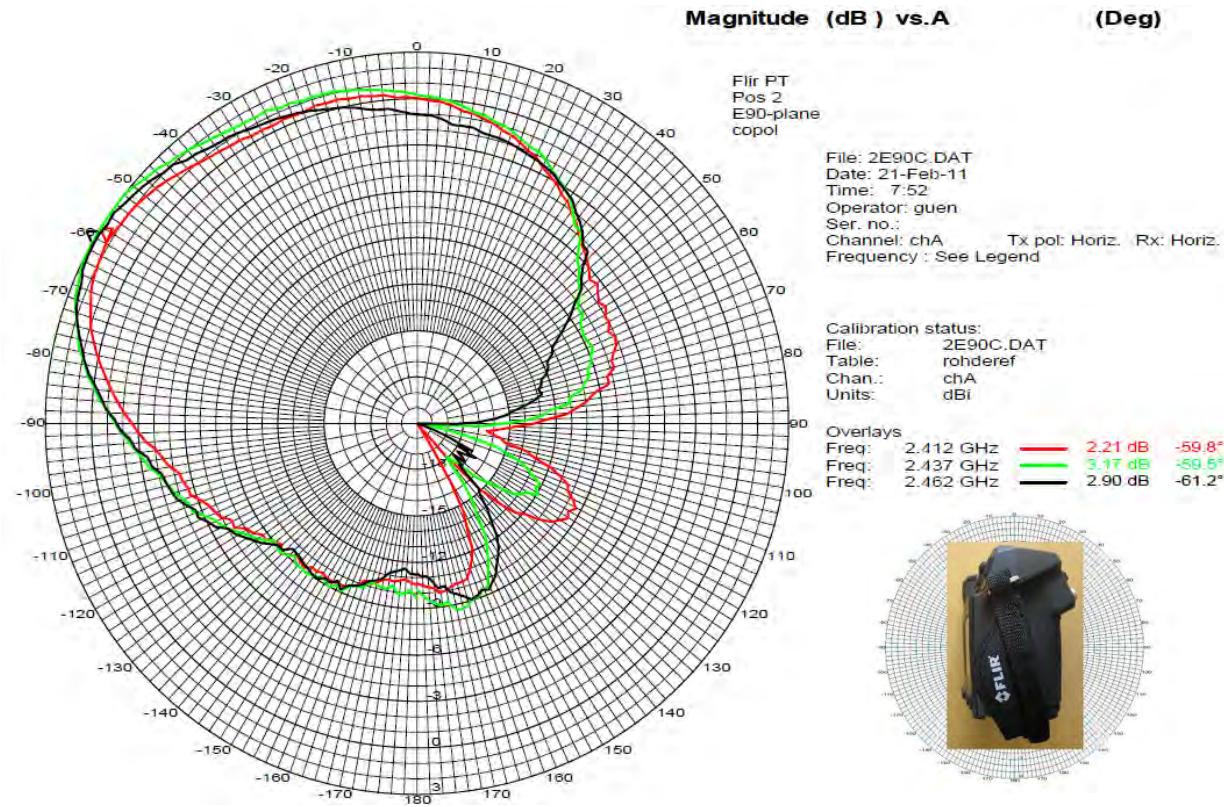


Fig 9: Lens position 2. E90-plane, horizontal polarization.

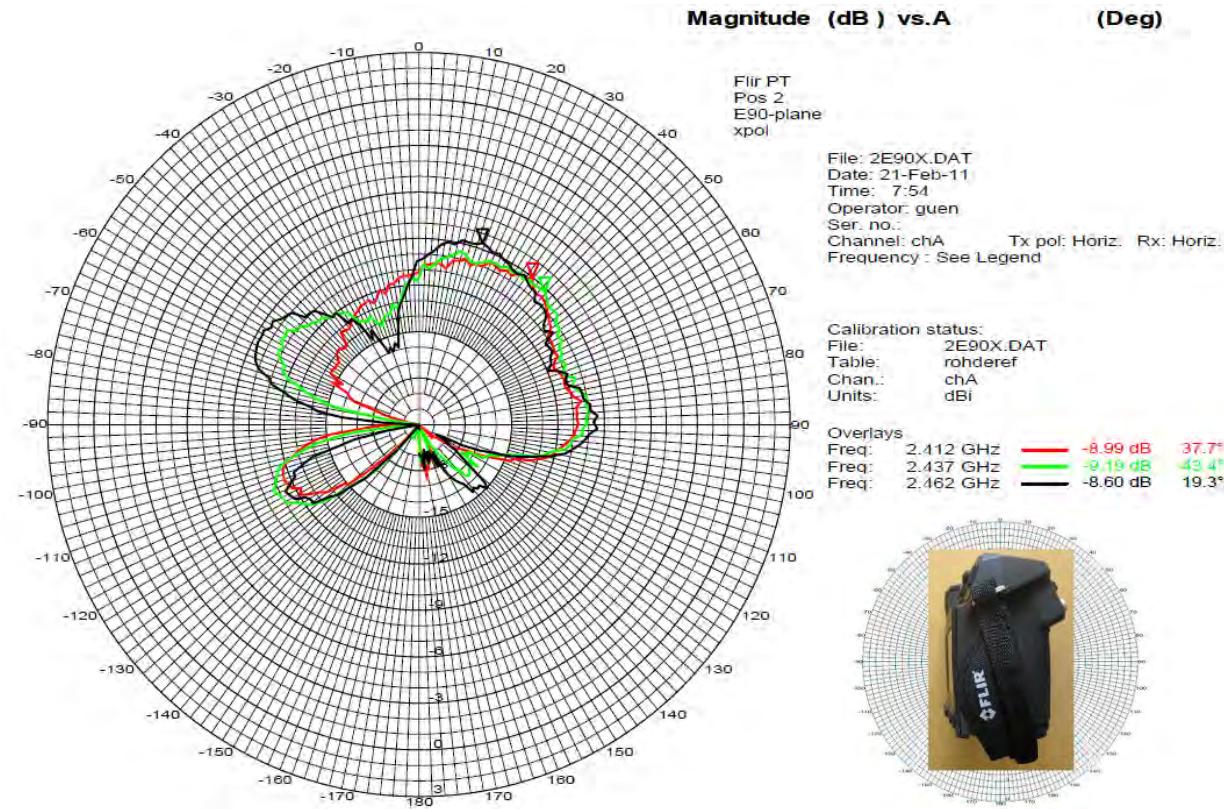


Fig 10: Lens position 2. E90-plane, vertical polarization.

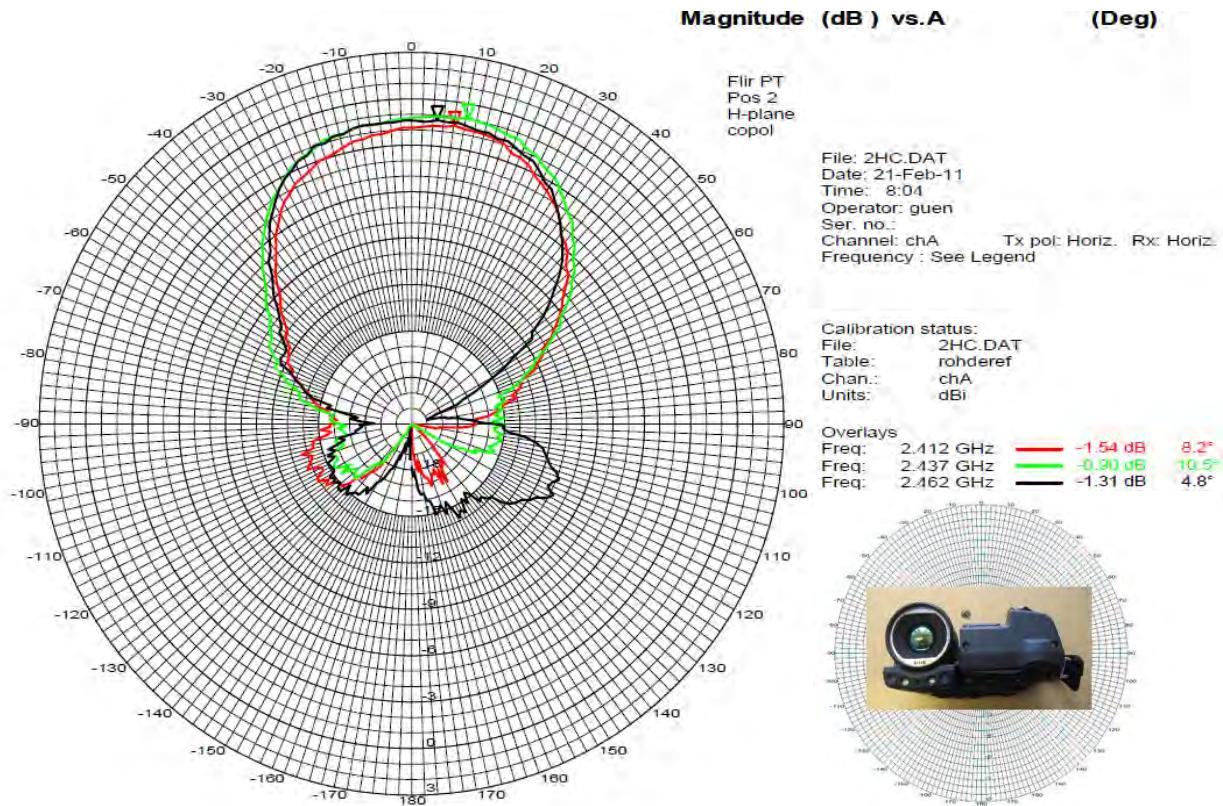


Fig 11: Lens position 2. H-plane, vertical polarization.

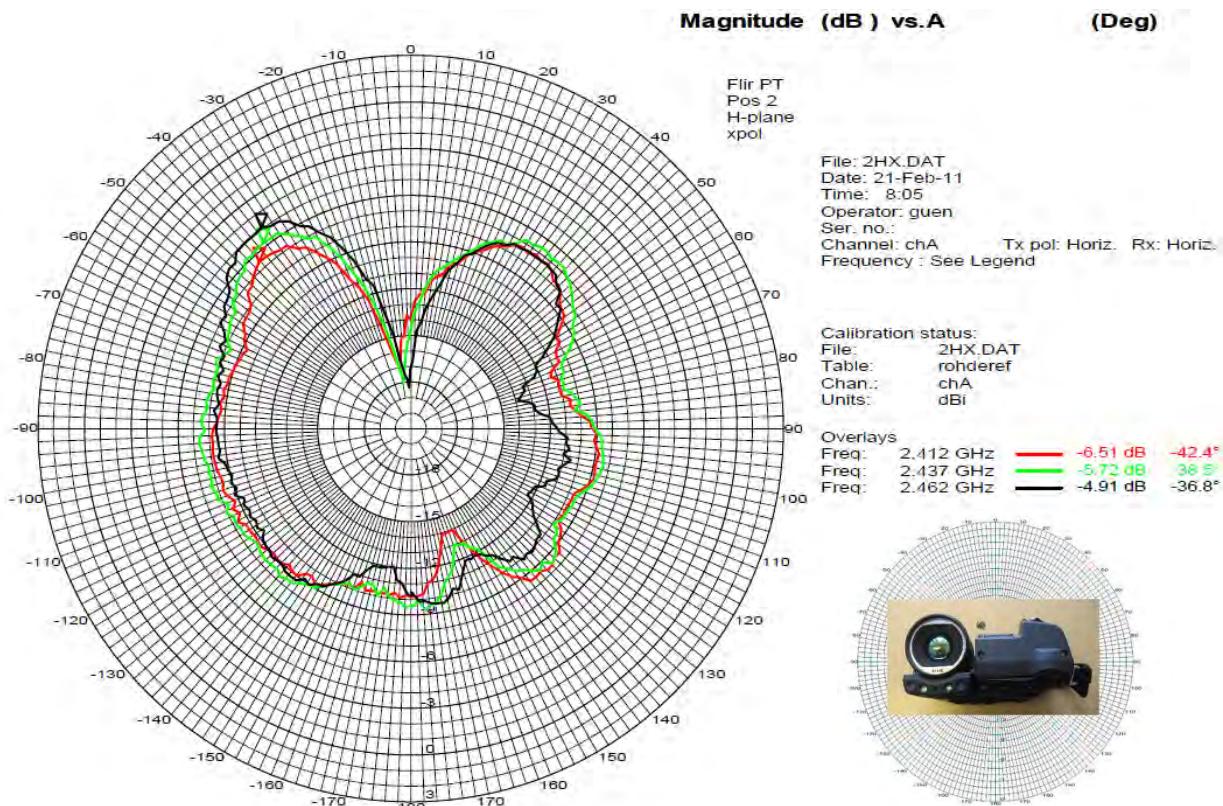


Fig 12: Lens position 2. H-plane, horizontal polarization.

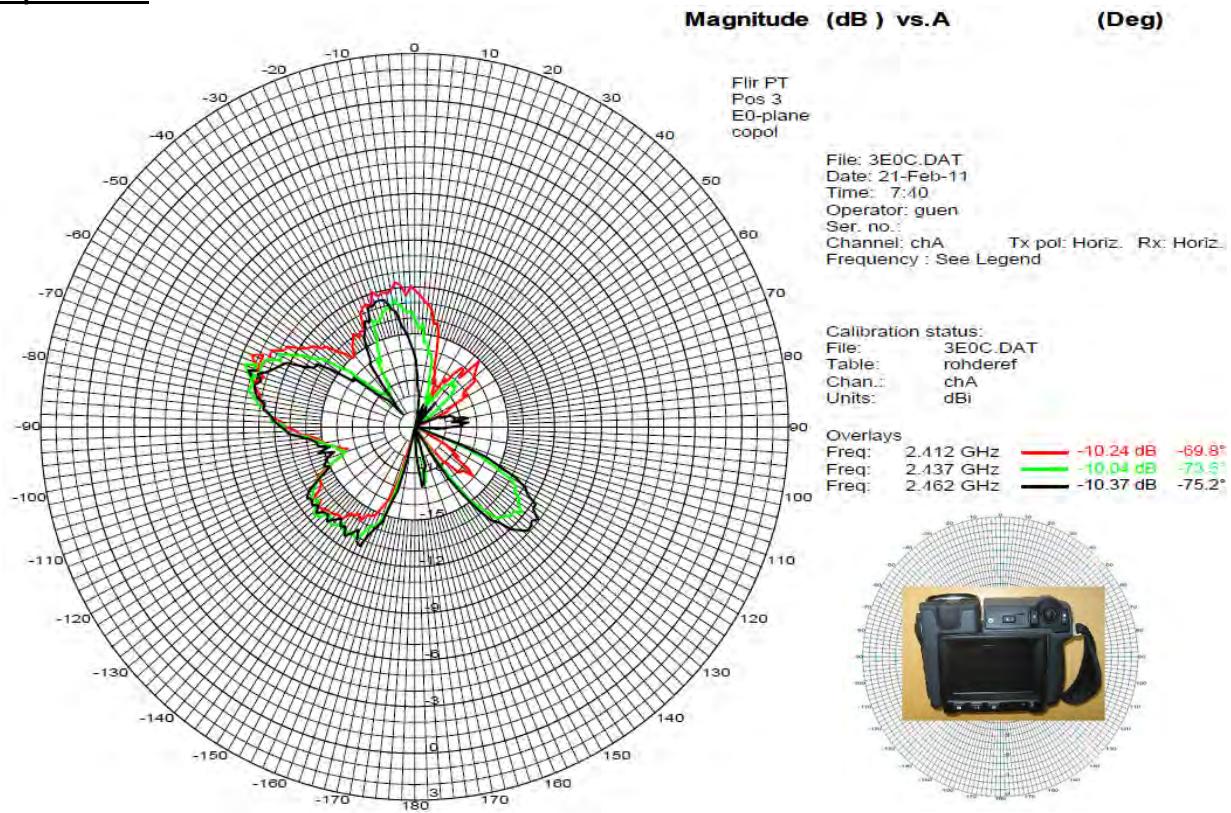
Lens position 3

Fig 13: Lens position 3. E0-plane, horizontal polarization.

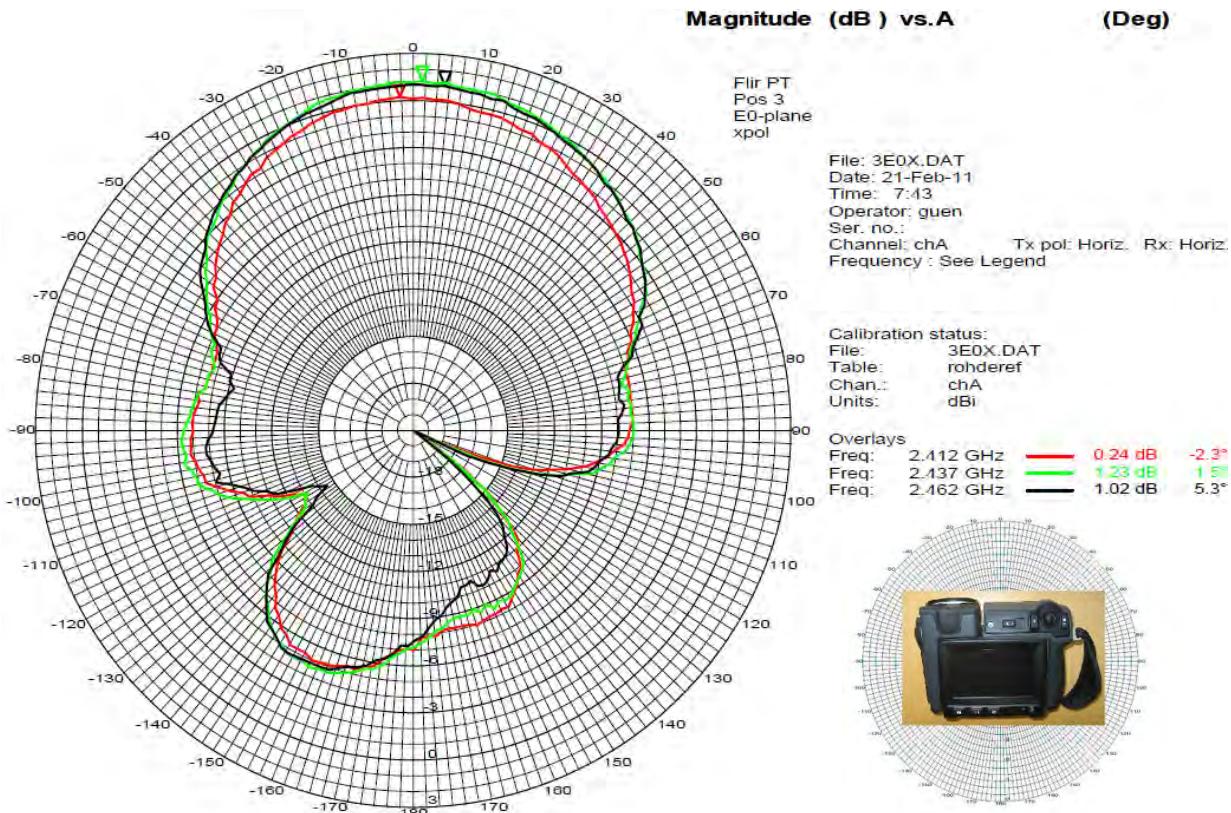


Fig 14: Lens position 3. E0-plane, vertical polarization.

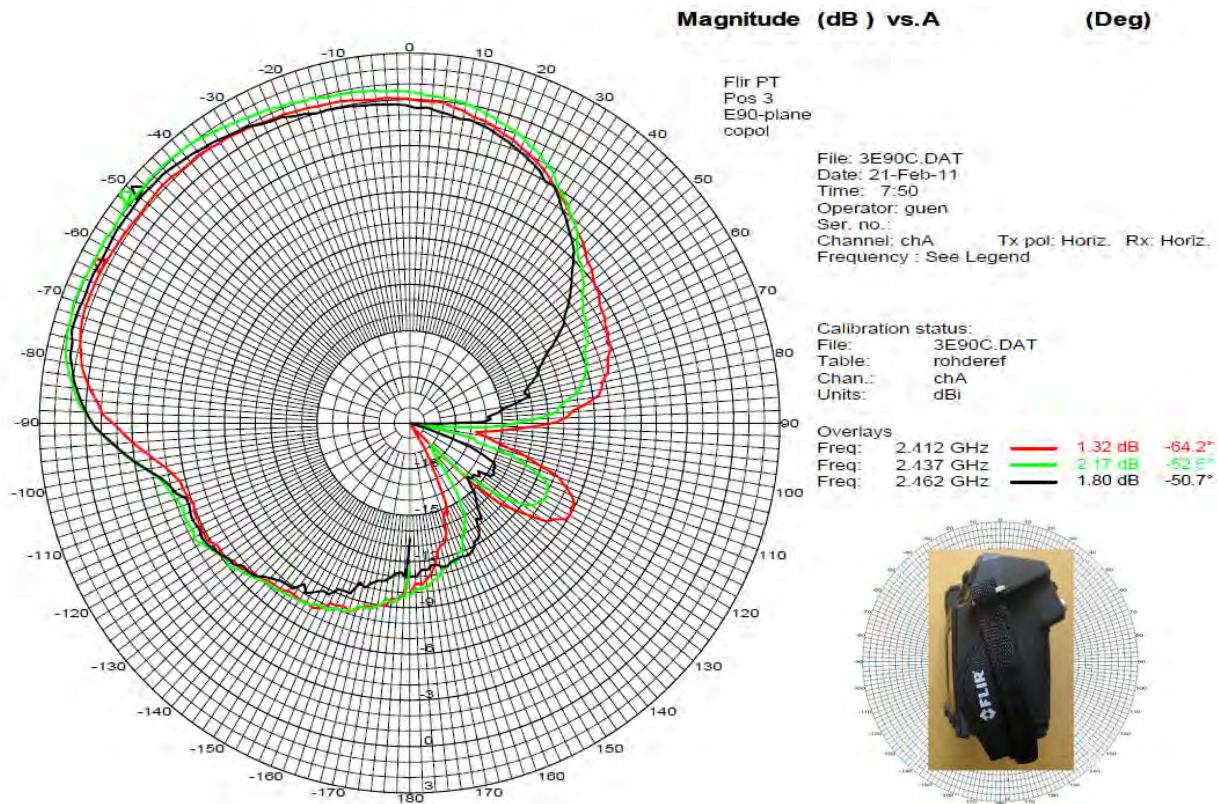


Fig 15: Lens position 3. E90-plane, horizontal polarization.

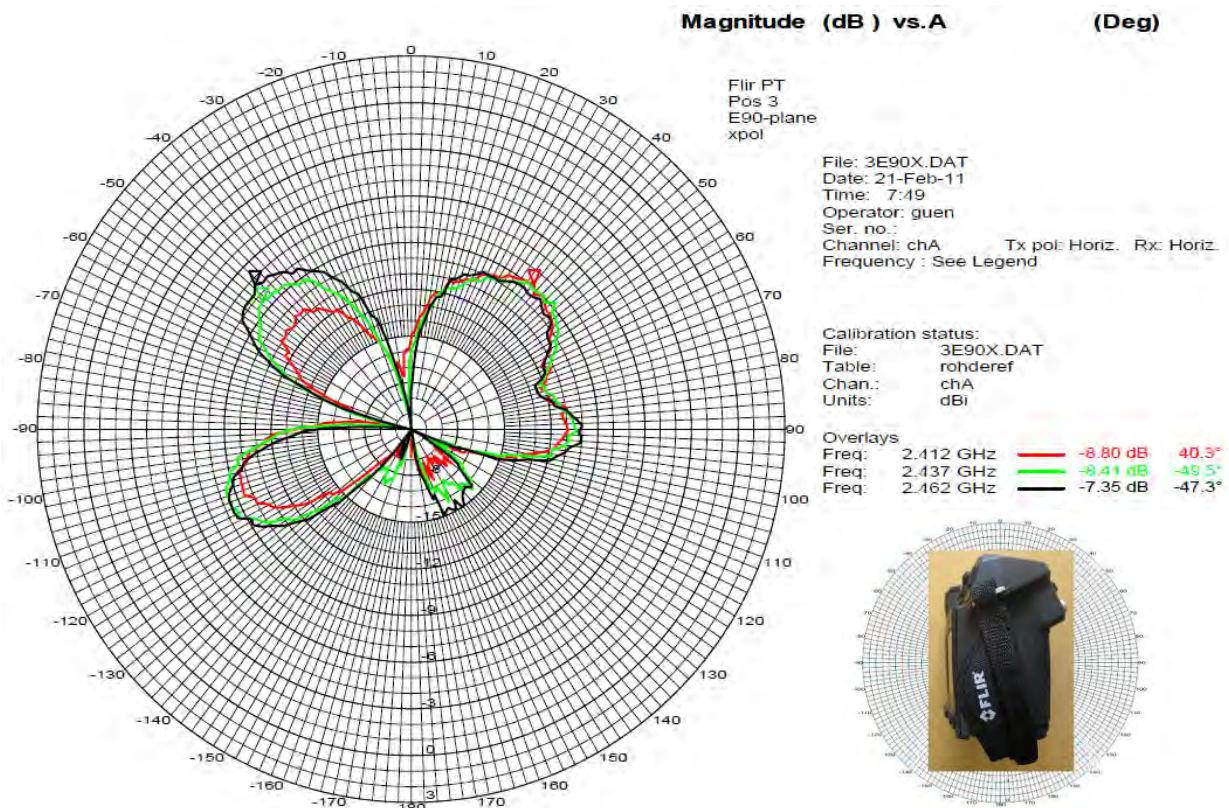


Fig 16: Lens position 3. E90-plane, vertical polarization.

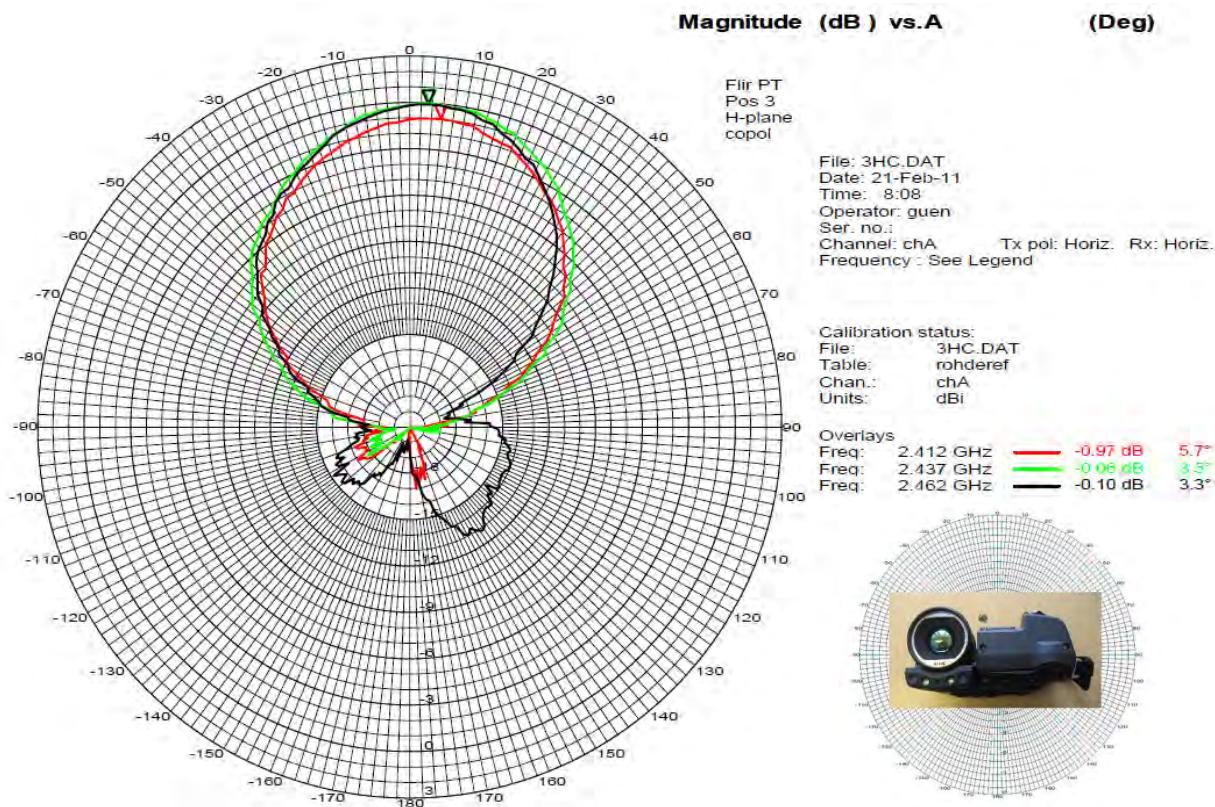


Fig 17: Lens position 3. H-plane, vertical polarization.

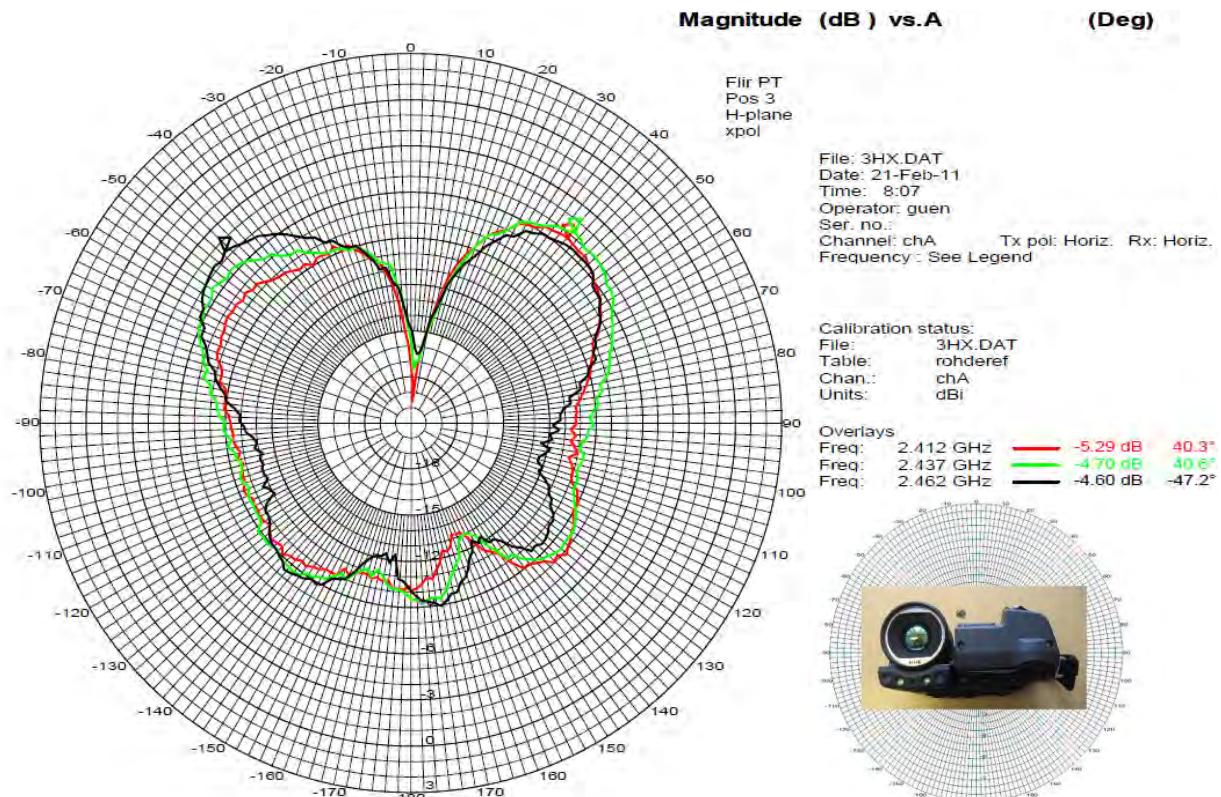


Fig 18: Lens position 3. H-plane, horizontal polarization.

9.3 Maximum output power

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	30 MHz
Resolution bandwidth:	20 MHz
Span:	50 MHz
Trace-Mode:	Max Hold

Limits:

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

Results: DSSS / b – mode

DSSS / b – mode	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Frequency			
Peak Output Power Conducted	15.18	15.56	15.38
Output Power Radiated – EIRP*)	17.94	18.52	18.67
Measurement uncertainty	$\pm 1.5 \text{ dB (cond.)} / \pm 3 \text{ dB (rad.)}$		

*) calculated with Antenna gain

Result: The measurement is passed.

Results: OFDM / g – mode

OFDM / g – mode	Maximum Output Power [dBm]			
	Frequency	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted		15.25	15.98	15.54
Output Power Radiated – EIRP*)		18.10	18.85	18.88
Measurement uncertainty	$\pm 1.5 \text{ dB (cond.)} / \pm 3 \text{ dB (rad.)}$			

*)calculated with Antenna gain

Result: The measurement is passed.

9.4 Power spectral density

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	500 s
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	1.5 MHz
Trace-Mode:	Max Hold

Limits:

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

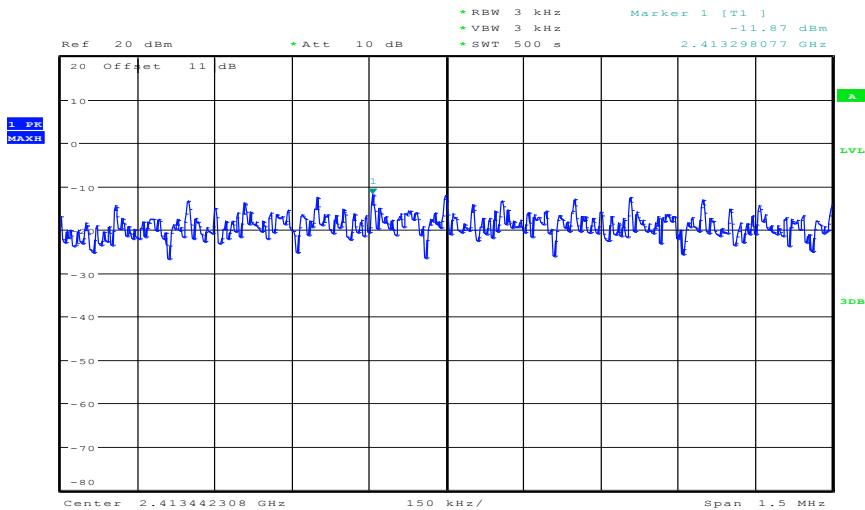
Results:

Modulation Frequency	Power Spectral density [dBm/3kHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	-11.87	-11.61	-11.71
OFDM / g – mode	-20.79	-21.84	-15.12
Measurement uncertainty	± 1.5 dB		

Result: The measurement is passed.

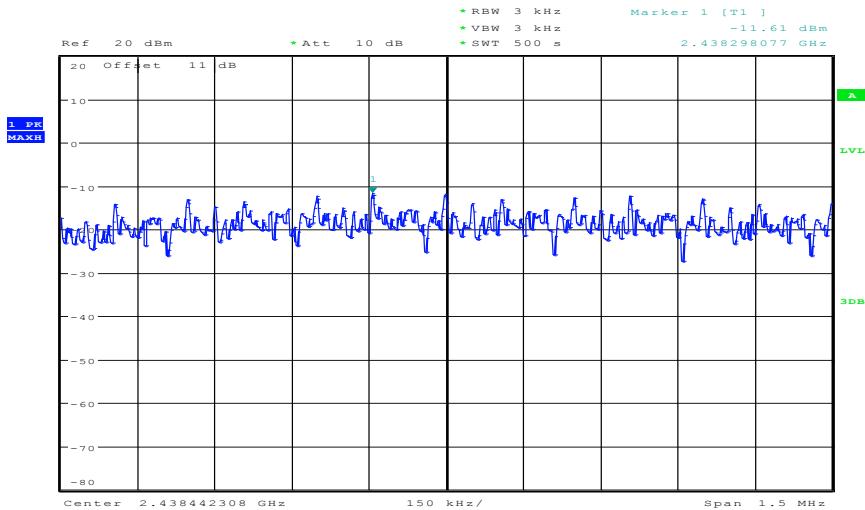
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel

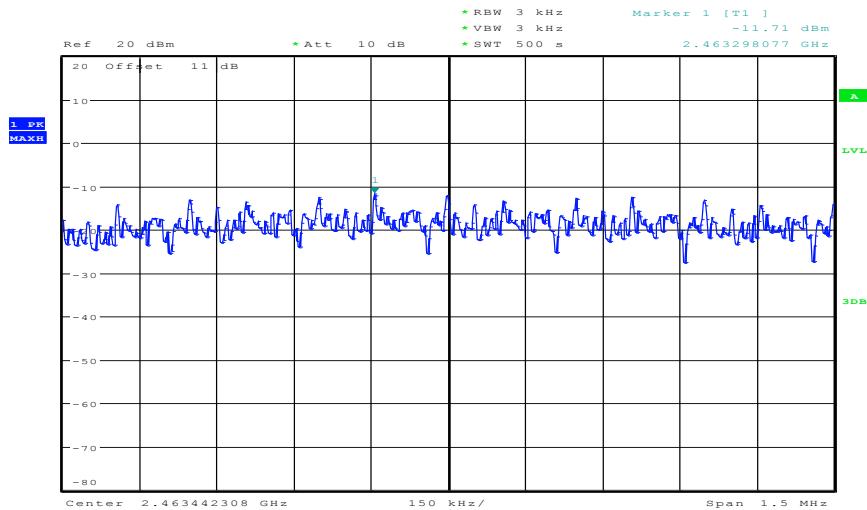


Date: 24.JAN.2012 17:19:28

Plot 2: TX mode, middle channel



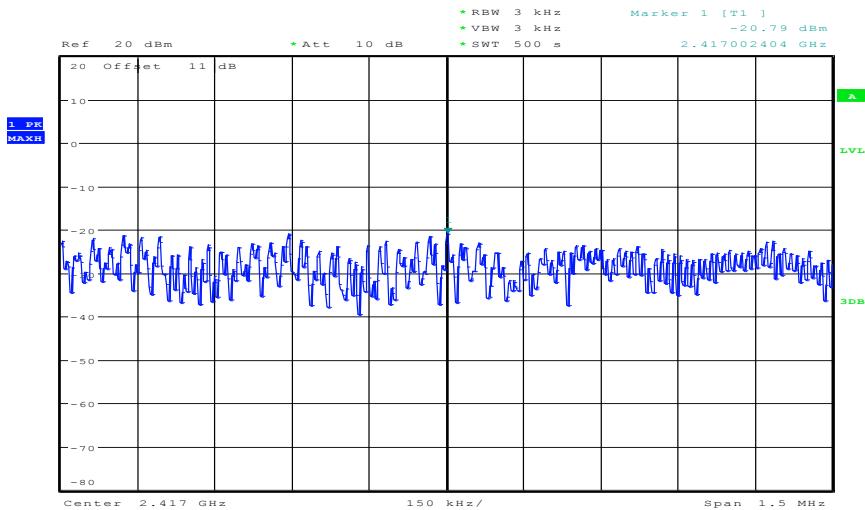
Date: 24.JAN.2012 16:59:43

Plot 3: TX mode, highest channel

Date: 24.JAN.2012 16:49:41

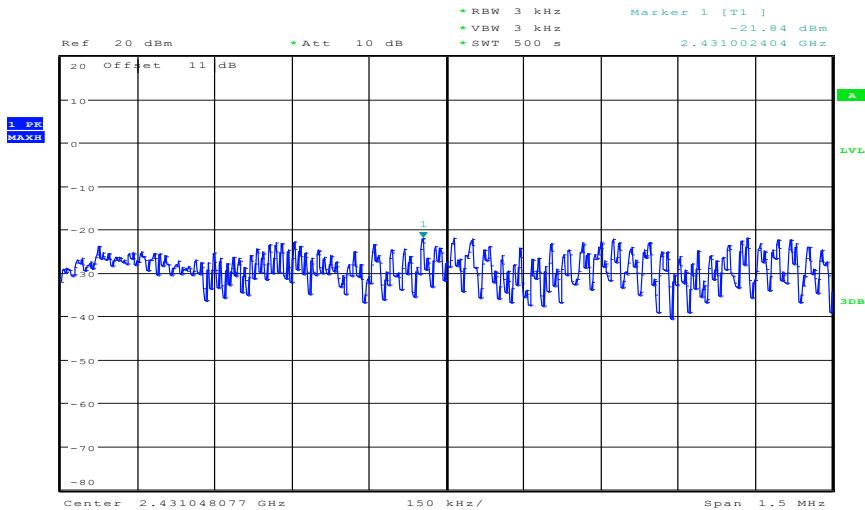
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel

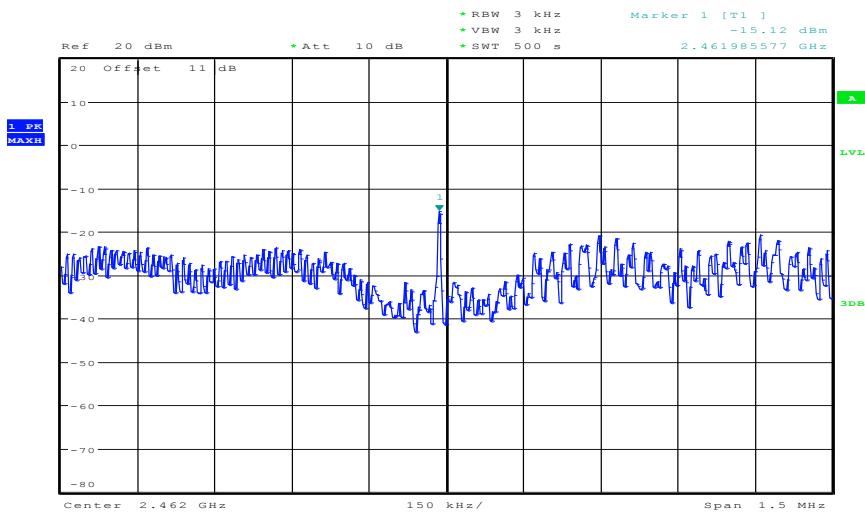


Date: 24.JAN.2012 15:56:57

Plot 2: TX mode, middle channel



Date: 24.JAN.2012 16:10:53

Plot 3: TX mode, highest channel

Date: 24.JAN.2012 15:08:12

9.5 Spectrum bandwidth of a FHSS system – 6 dB bandwidth

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

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

Limits:

FCC	IC
CFR Part 15.247 (a)(2)	RSS 210, Issue 8, A 8.2(a)
Spectrum Bandwidth of a FHSS System – 6 dB Bandwidth	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

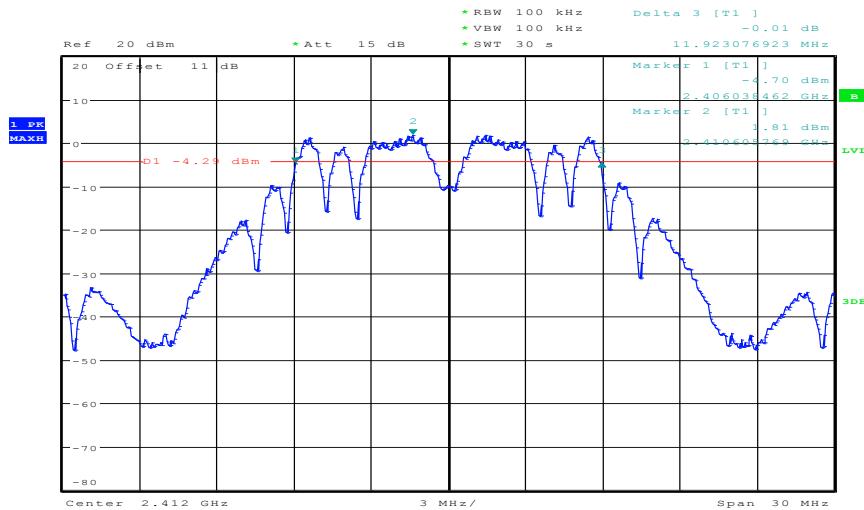
Results:

Modulation	6 dB BANDWIDTH [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	11.92	11.88	11.88
OFDM / g – mode	16.65	16.63	16.57
Measurement uncertainty	± 100 kHz		

Result: The measurement is passed.

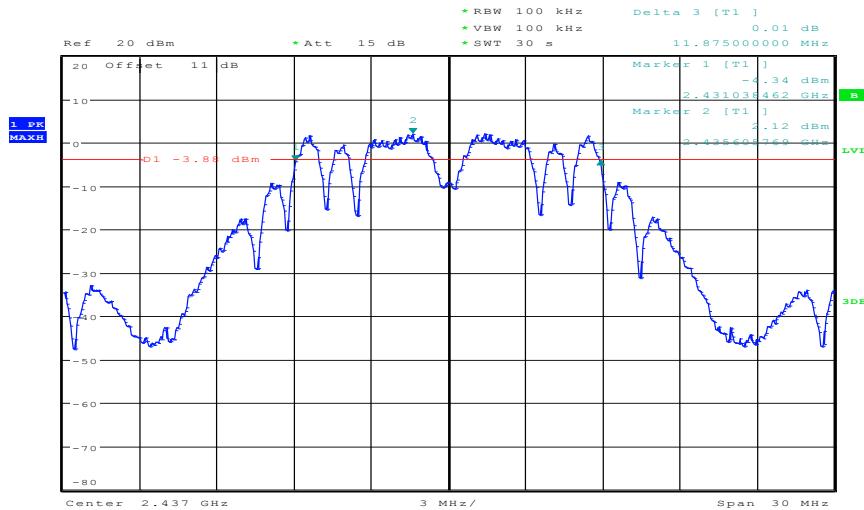
Plots: DSSS / b – mode

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

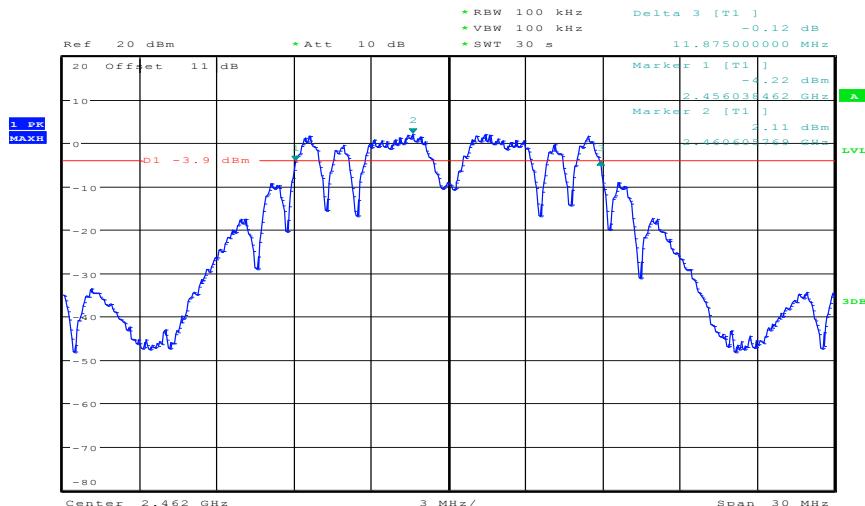


Date: 24.JAN.2012 17:05:31

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



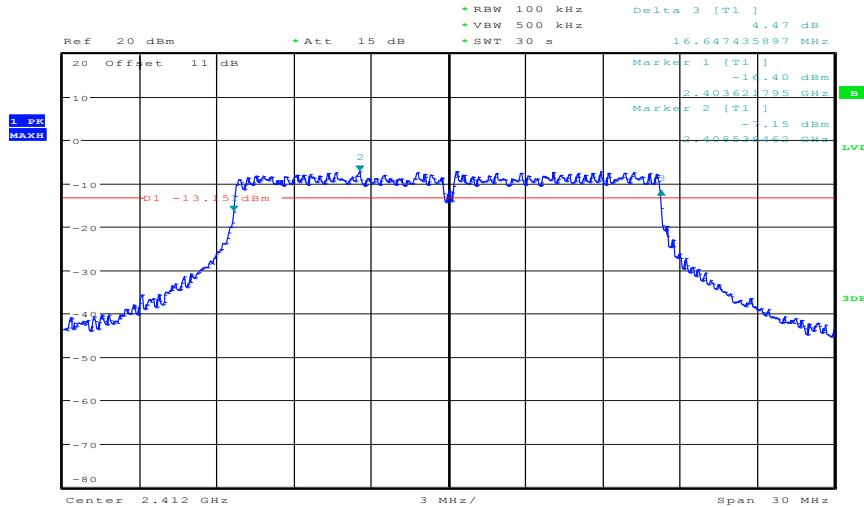
Date: 24.JAN.2012 17:03:38

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

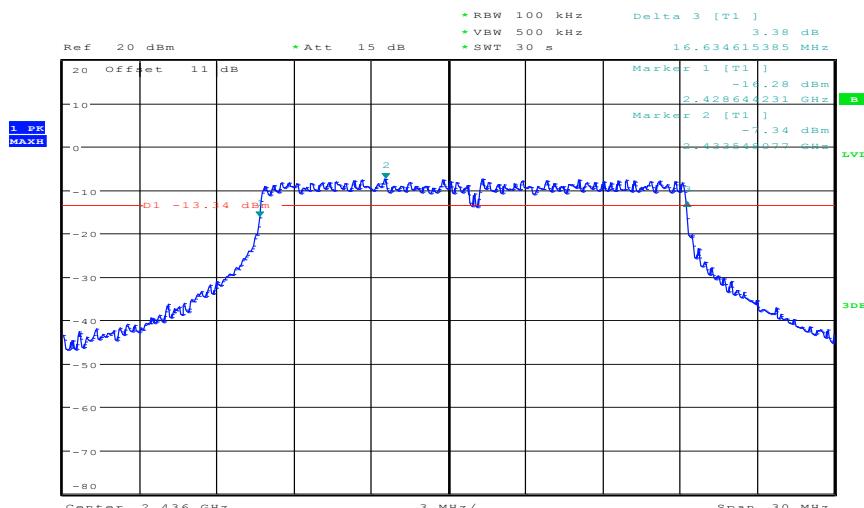
Date: 24.JAN.2012 17:32:55

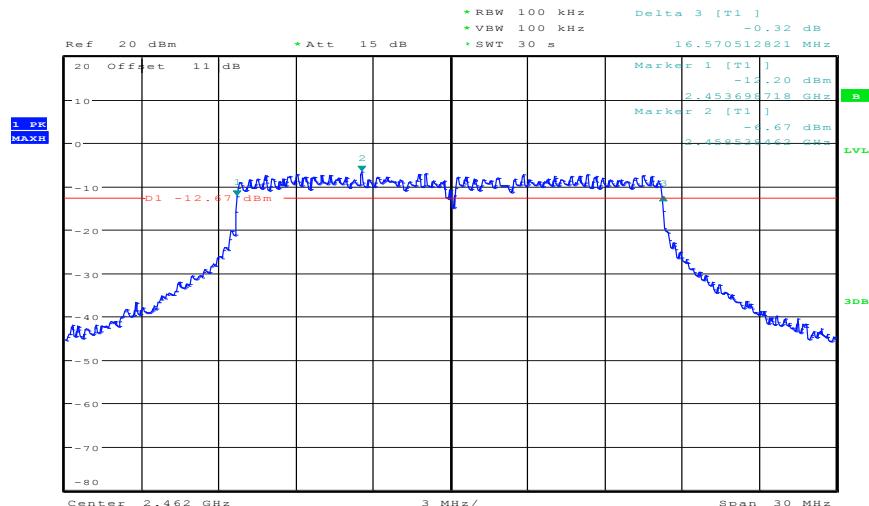
Plots: OFDM / g – mode

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



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



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

Date: 24.JAN.2012 15:14:57

9.6 Spectrum bandwidth of a FHSS system – 20 dB bandwidth

Description:

Measurement of the 20 dB bandwidth of the modulated signal.

Measurement:

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

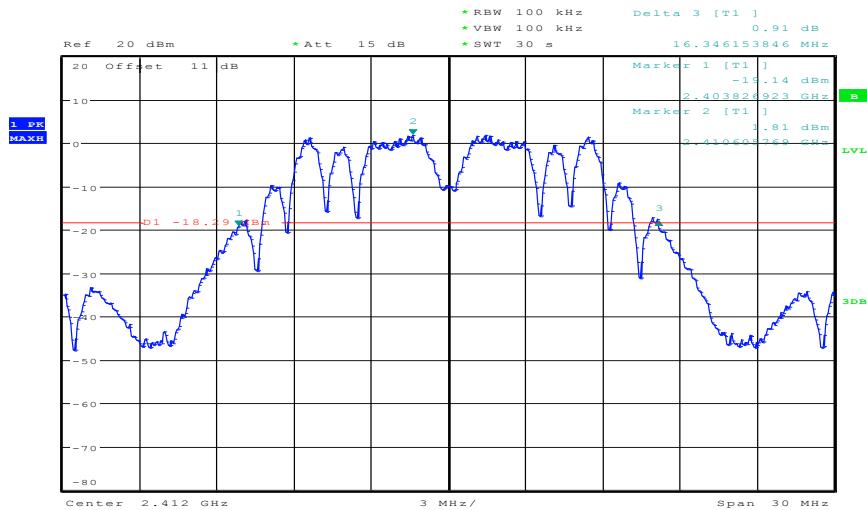
Limits:

FCC	IC
CFR Part 15.247 (a)(2)	RSS 210, Issue 8, A 8.2(a)
Spectrum Bandwidth of a FHSS System – 20 dB Bandwidth	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

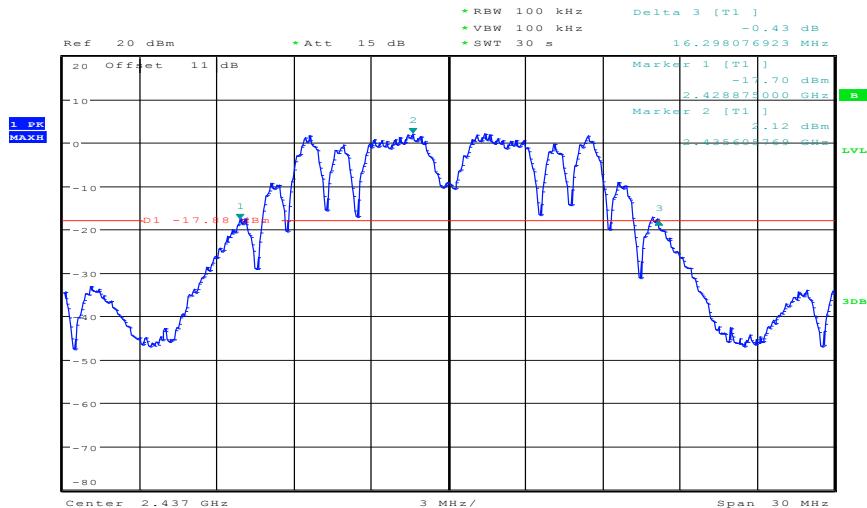
Results:

Modulation	20 dB BANDWIDTH [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	16.35	16.30	16.35
OFDM / g – mode	18.28	18.37	18.16
Measurement uncertainty	± 100 kHz		

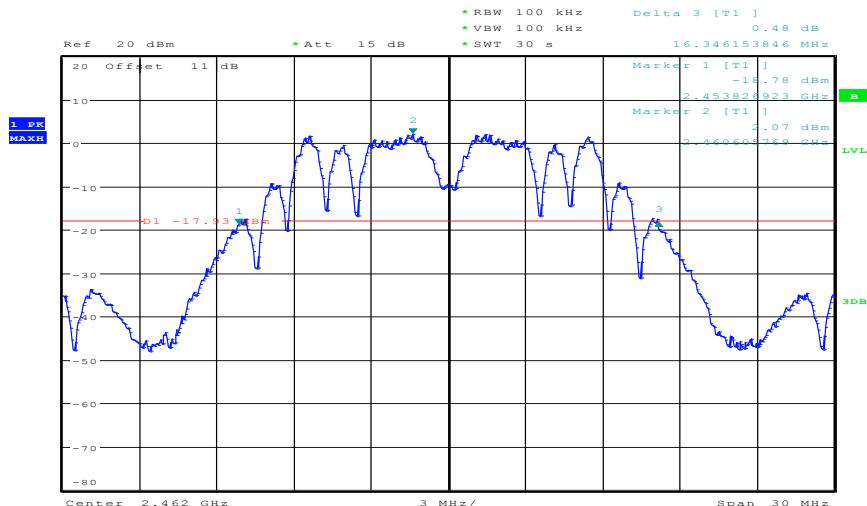
Result: The measurement is passed.

Plots: DSSS / b – mode**Plot 1: TX mode, lowest channel, 20 dB bandwidth**

Date: 24.JAN.2012 17:07:09

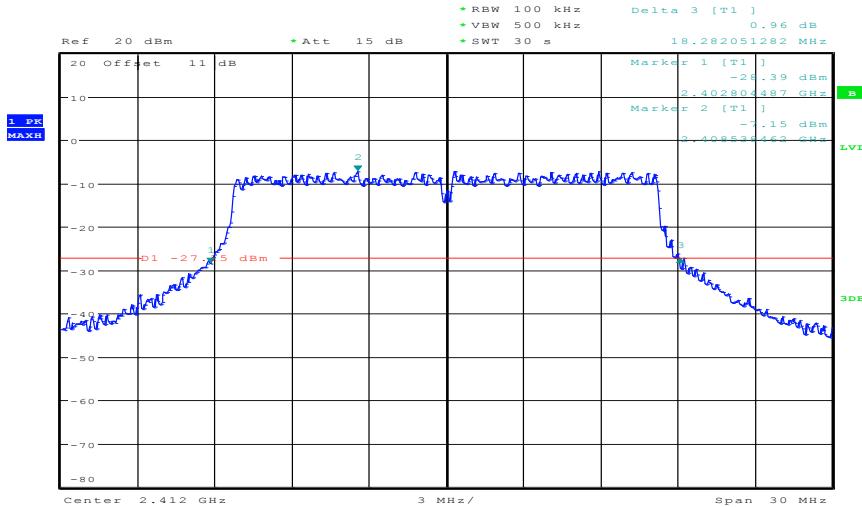
Plot 2: TX mode, middle channel, 20 dB bandwidth

Date: 24.JAN.2012 17:02:11

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

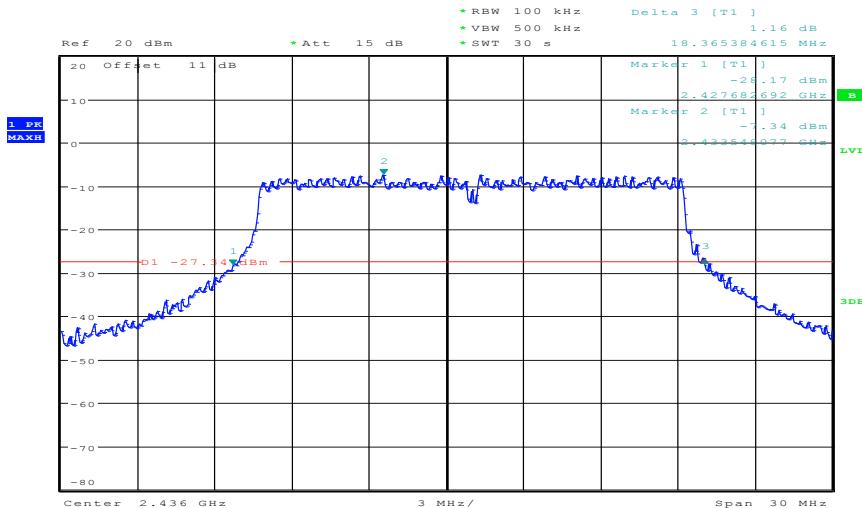
Plots: OFDM / g – mode

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

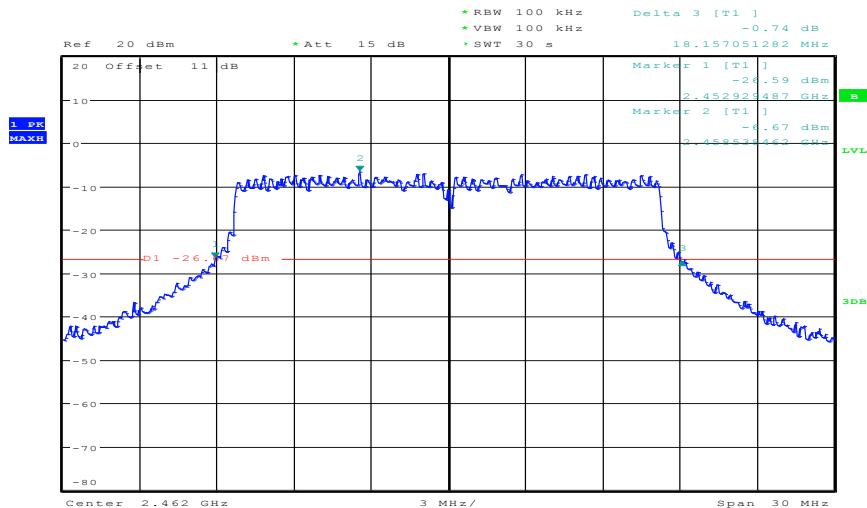


Date: 24.JAN.2012 15:36:33

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



Date: 24.JAN.2012 16:00:49

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

Date: 24.JAN.2012 15:13:41

9.7 Band edge compliance conducted

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	500 kHz / 100 kHz
Resolution bandwidth:	100 kHz
Span:	Lower Band Edge: 2300 – 2425 MHz Upper Band Edge: 2450 – 2500 MHz
Trace-Mode:	Max Hold

Limits:

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

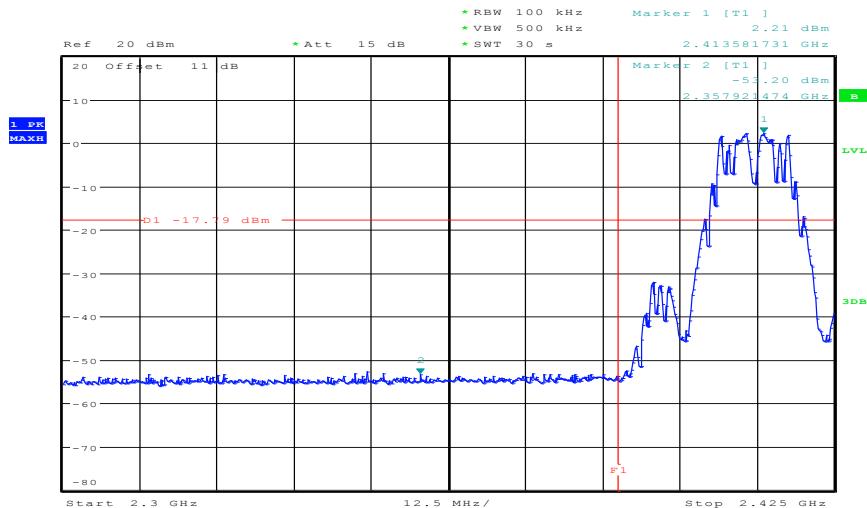
Results:

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

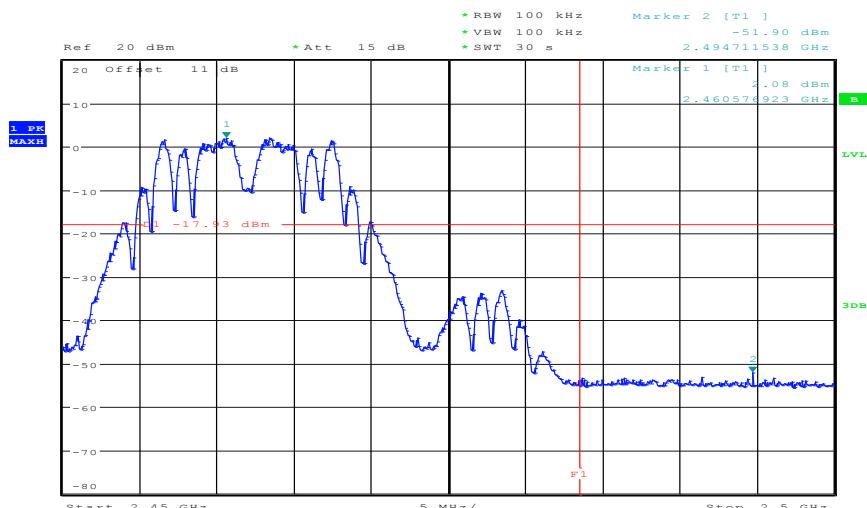
Result: The measurement is passed.

Plots: DSSS / b – mode

Plot 1: TX mode, lower band edge

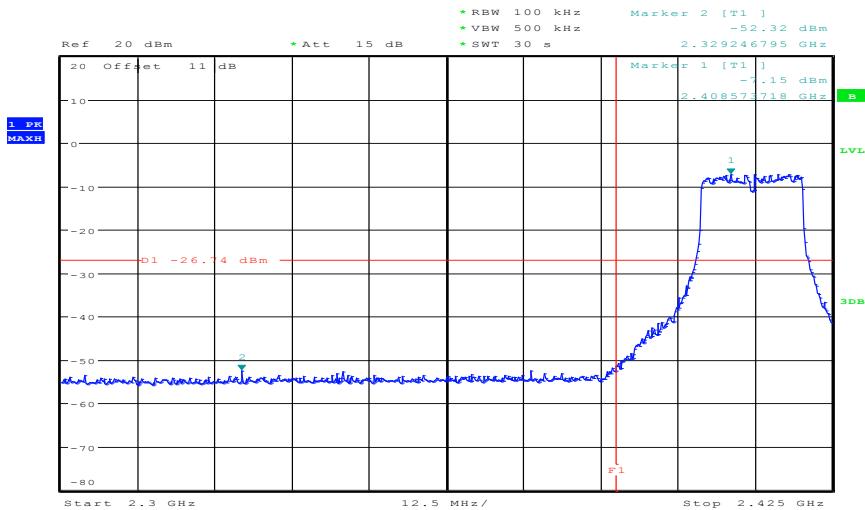


Plot 2: TX mode, upper band edge



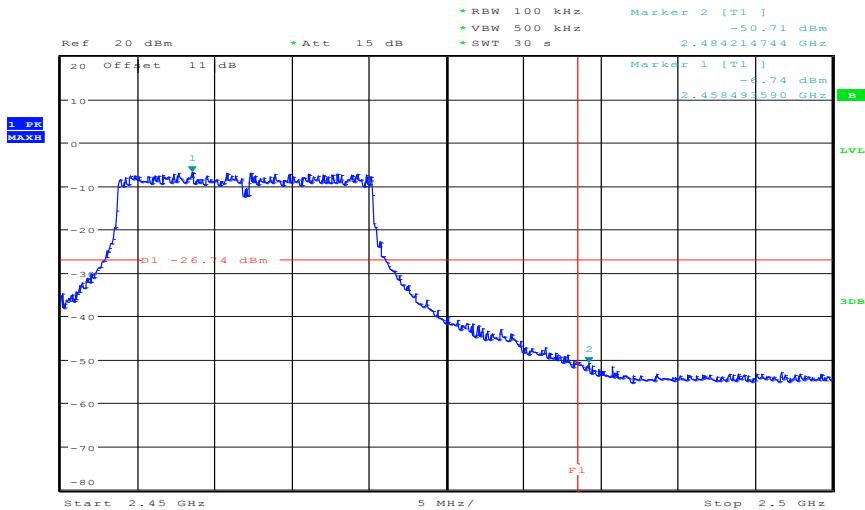
Plots: OFDM / g – mode

Plot 1: TX mode, lower band edge



Date: 24.JAN.2012 15:34:19

Plot 2: TX mode, upper band edge



Date: 24.JAN.2012 15:29:34

9.8 Band edge compliance radiated

Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to channel 1 for the lower restricted band and to channel 11 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3m.

Measurement:

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

Limits:

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

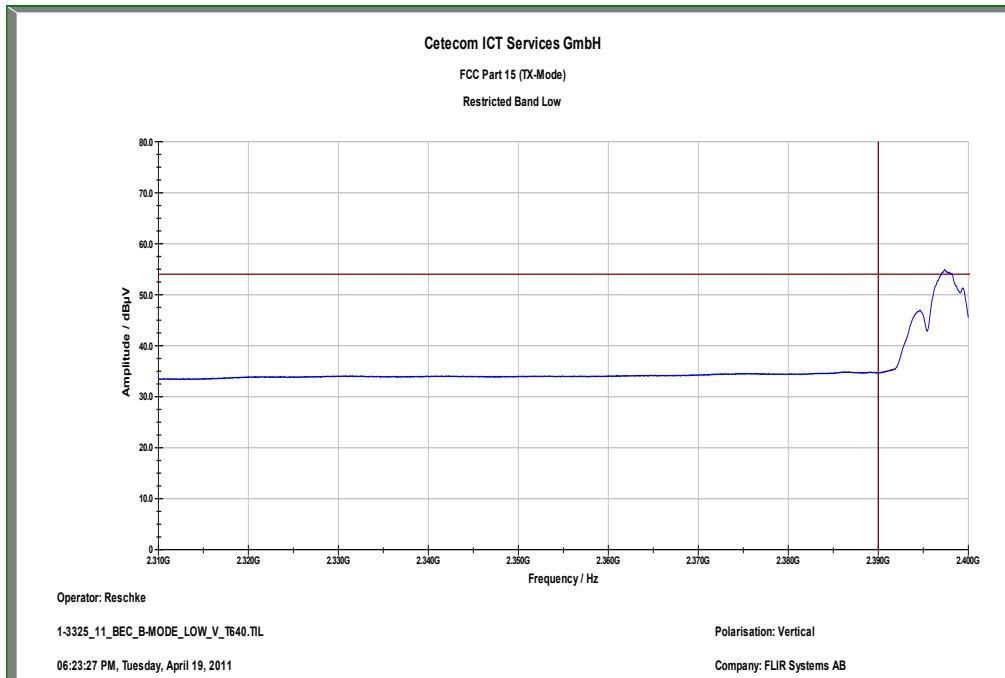
Results:

Scenario	Band Edge Compliance Radiated (also see plots)	
	Modulation	OFDM / g – mode
Lower Band Edge – Channel 1	< 54 dB μ V/m	< 54 dB μ V/m
Upper Band Edge – Channel 11	< 54 dB μ V/m	< 54 dB μ V/m
Measurement uncertainty	± 3 dB	

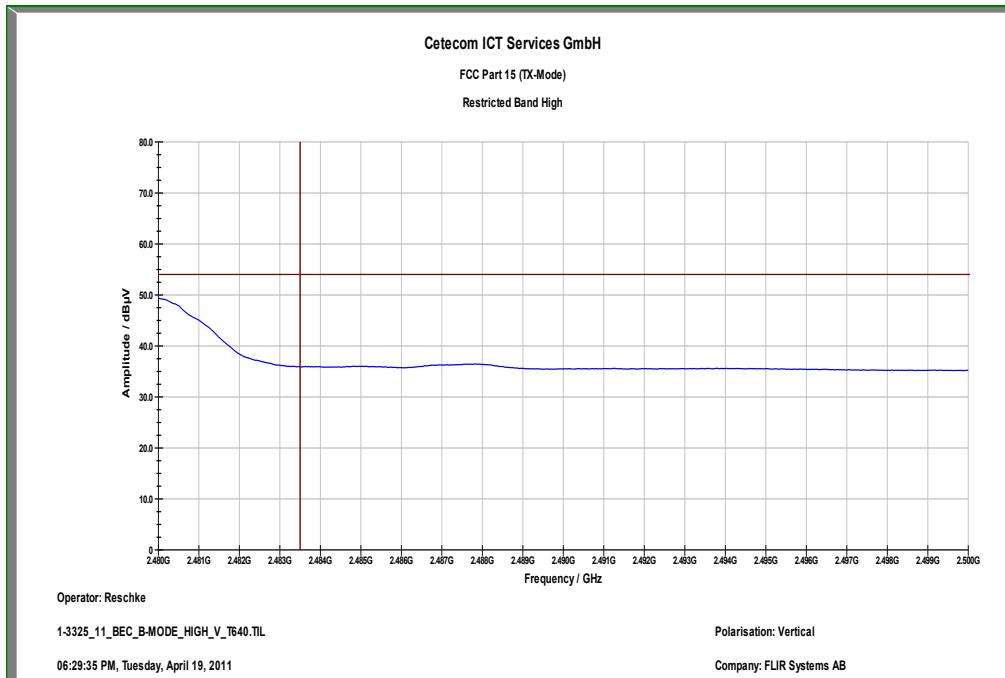
Result: The result of the measurement is passed.

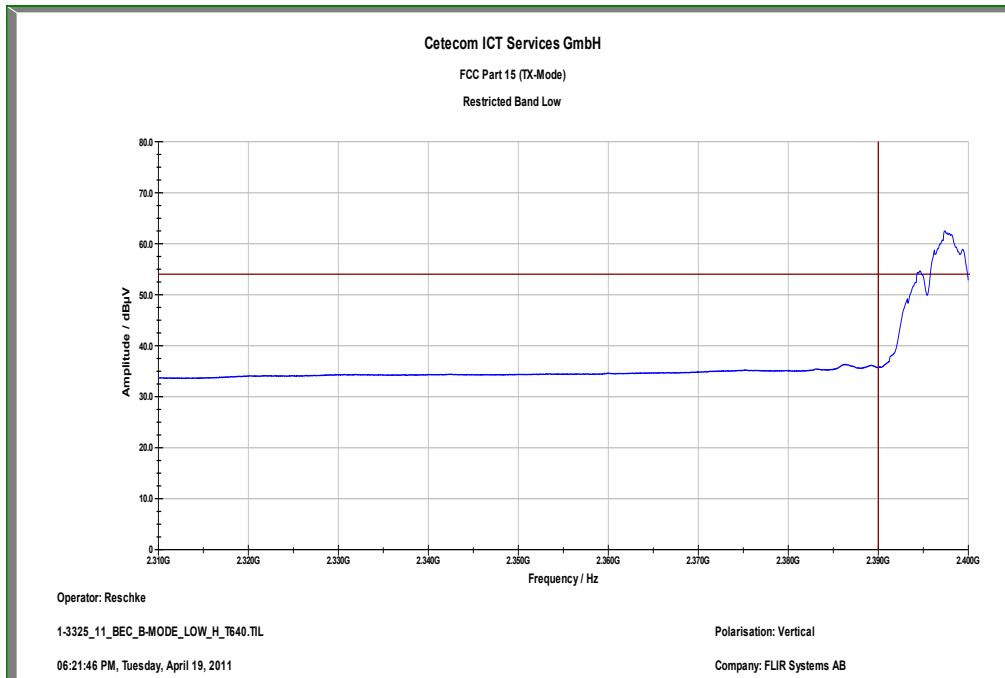
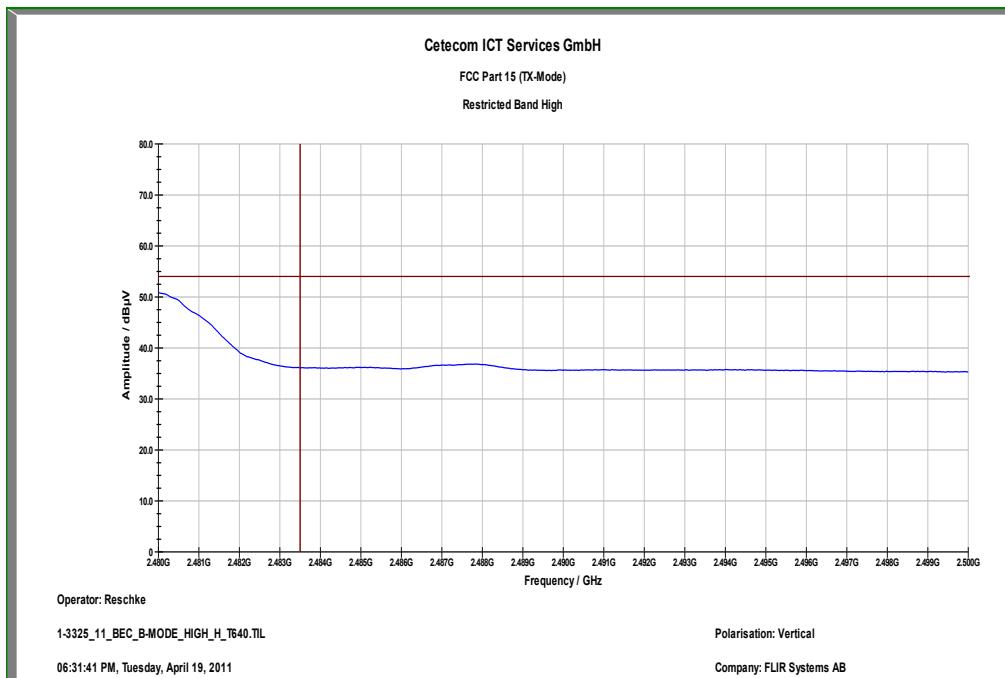
Plots: DSSS / b – mode

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



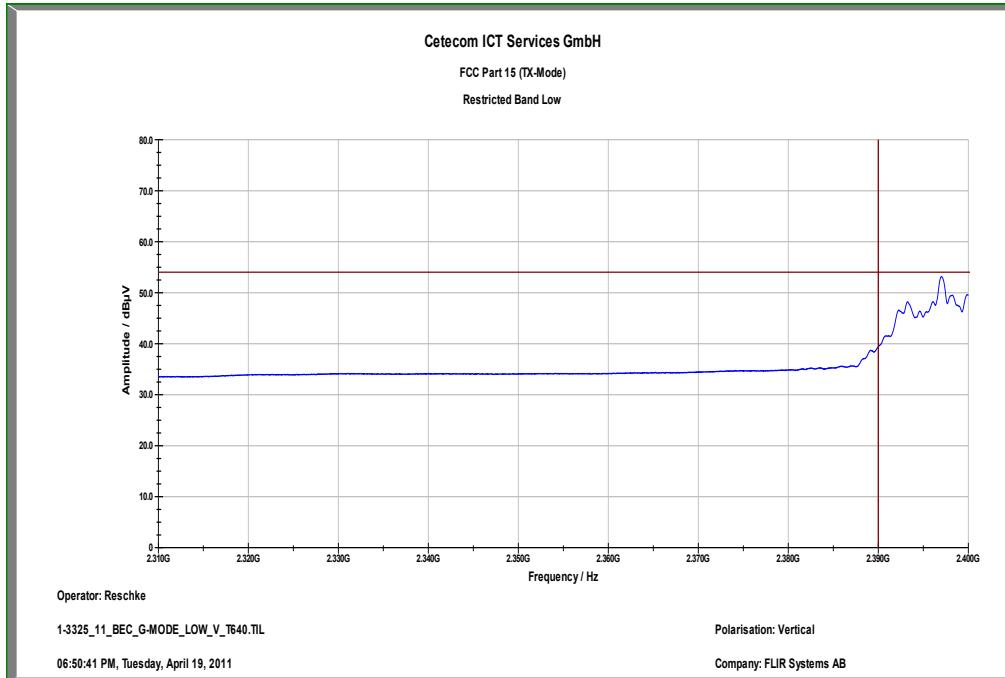
Plot 2: TX mode, upper band edge, vertical polarization



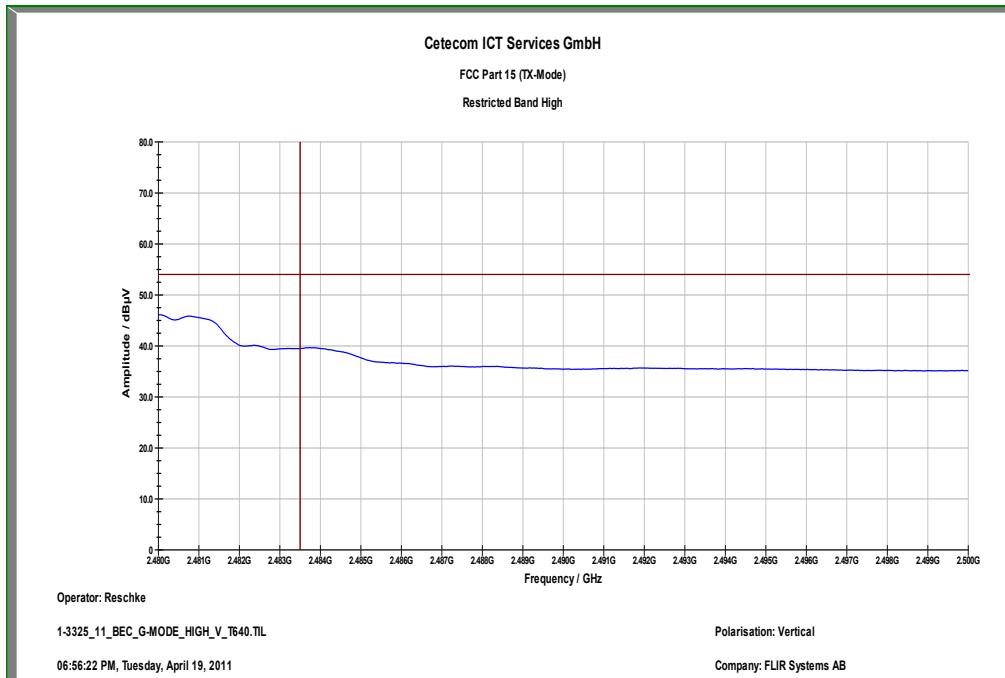
Plot 3: TX mode, lower band edge, horizontal polarization**Plot 4:** TX mode, upper band edge, horizontal polarization

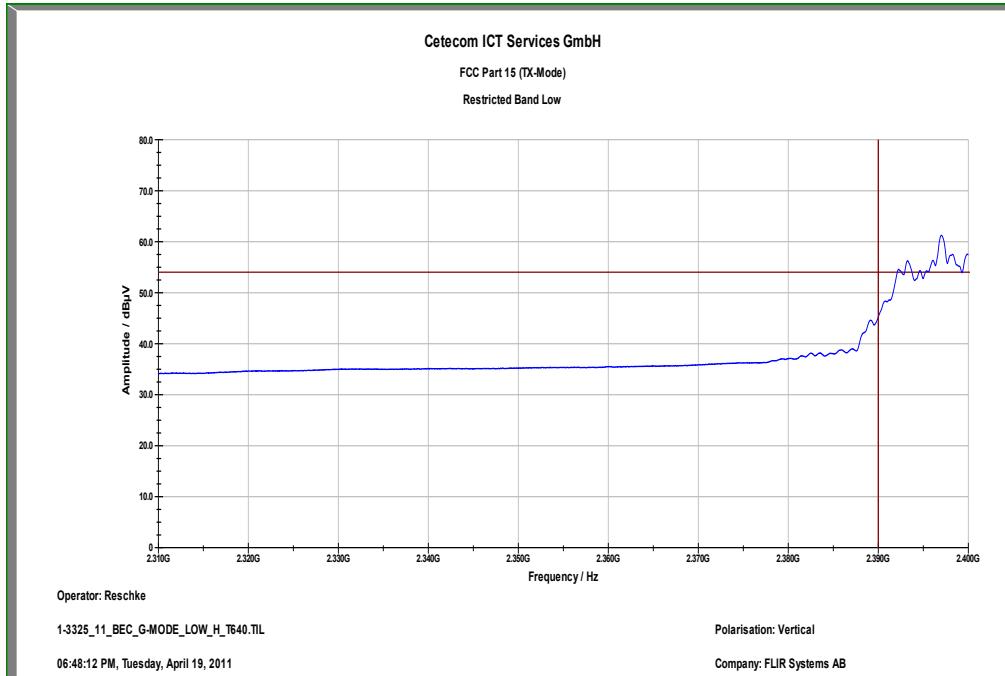
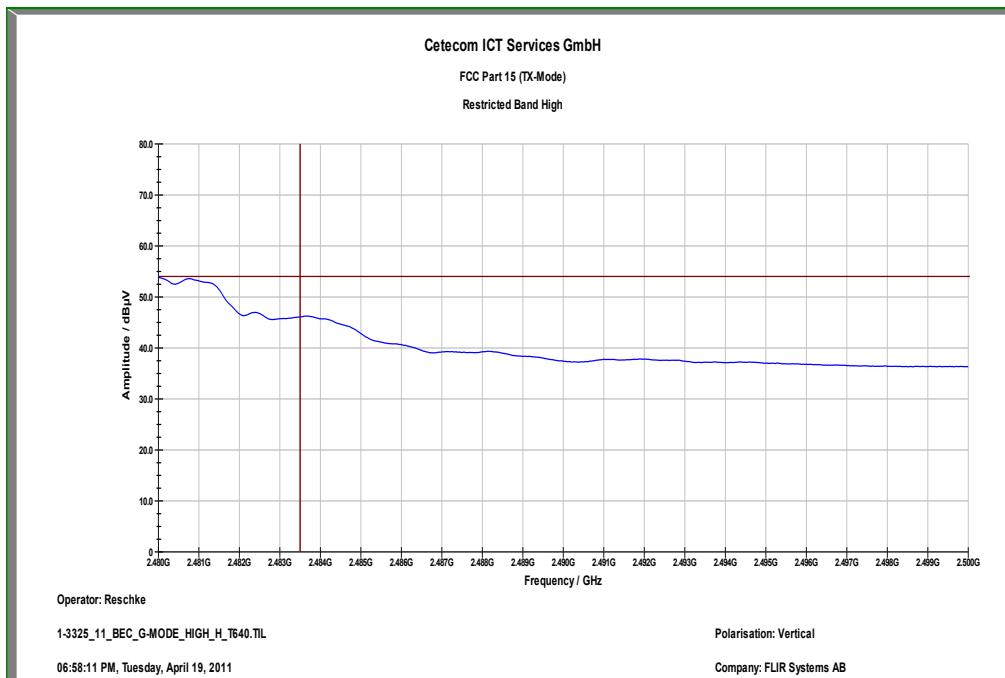
Plots: OFDM / g – mode

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



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



Plot 7: TX mode, lower band edge, horizontal polarization**Plot 8:** TX mode, upper band edge, horizontal polarization

9.9 TX spurious emissions conducted

Description:

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

Measurement:

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

Limits:

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

Results: DSSS / b – mode

TX Spurious Emissions Conducted DSSS - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		2.04	30 dBm		Operating frequency complies
		<i>No critical peaks detected</i>			
			-20 dBc		
2437		2.25	30 dBm		Operating frequency complies
		<i>No critical peaks detected</i>			
			-20 dBc		
2462		2.00	30 dBm		Operating frequency complies
		<i>No critical peaks detected</i>			
			-20 dBc		
Measurement uncertainty				± 3 dB	

Result: The measurement is passed.

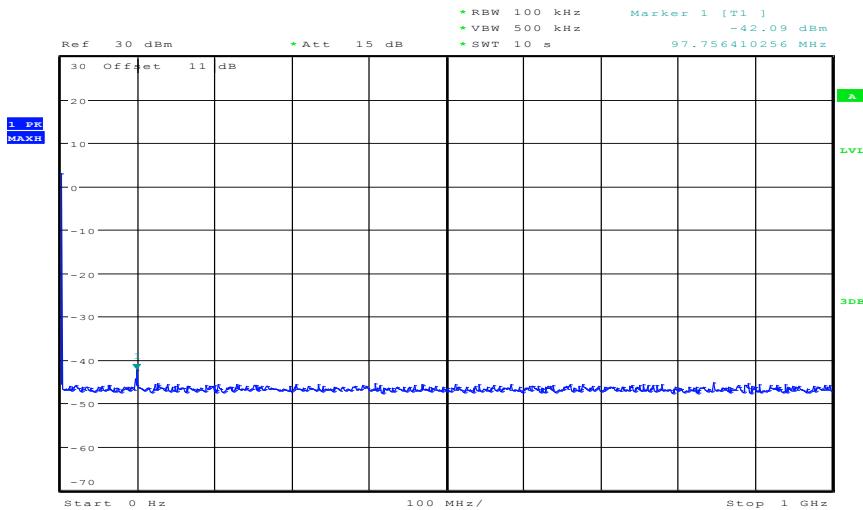
Results: OFDM / g – mode

TX Spurious Emissions Conducted OFDM - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-7.92	30 dBm		Operating frequency complies
		<i>No critical peaks detected</i>			
			-20 dBc		
2437		-8.42	30 dBm		Operating frequency complies
		<i>No critical peaks detected</i>			
			-20 dBc		
2462		-7.84	30 dBm		Operating frequency complies
		<i>No critical peaks detected</i>			
			-20 dBc		
Measurement uncertainty				± 3 dB	

Result: The measurement is passed.

Plots: DSSS / b – mode

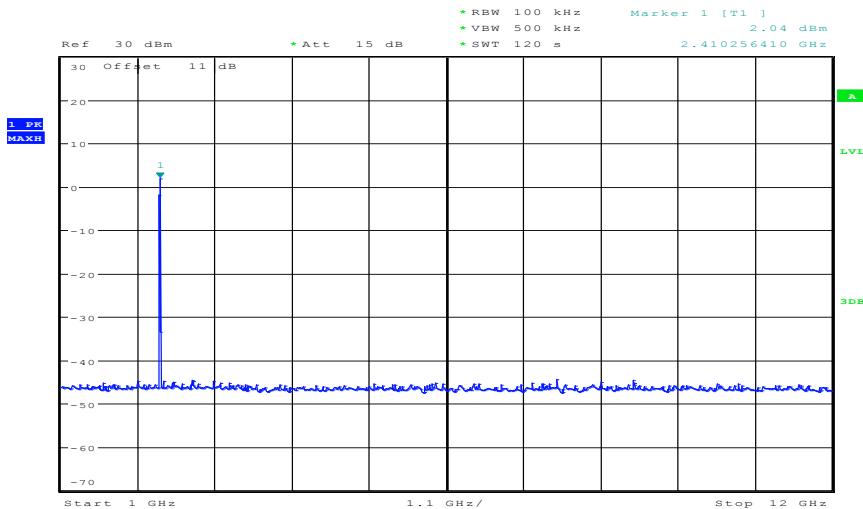
Plot 1: TX mode, lowest channel, up to 1 GHz



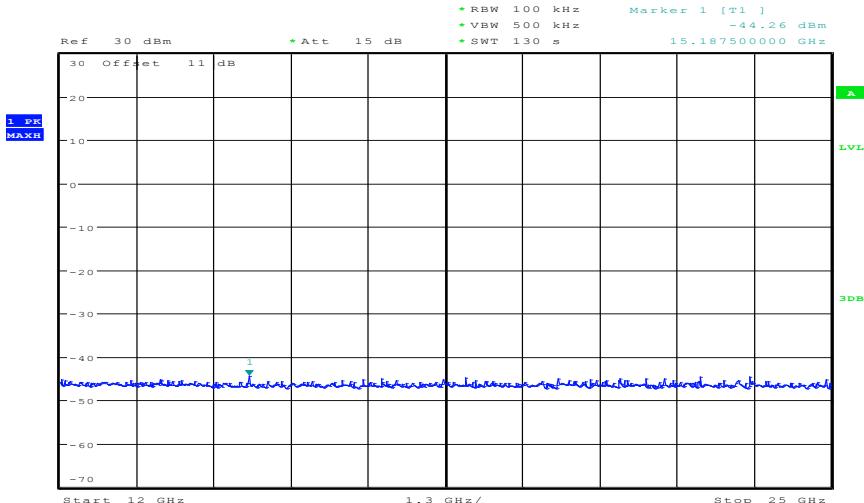
Date: 25.JAN.2012 07:44:07

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

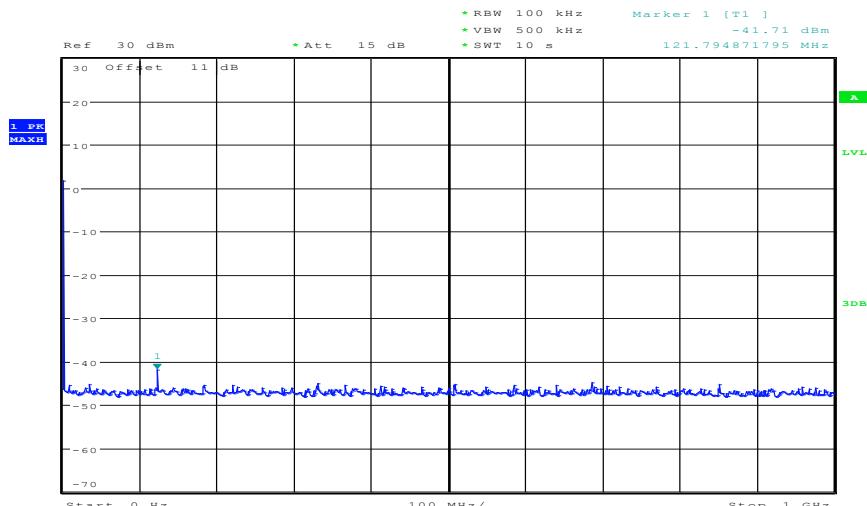
Plot 2: TX mode, lowest channel, 1 GHz to 12 GHz



Date: 25.JAN.2012 07:47:12

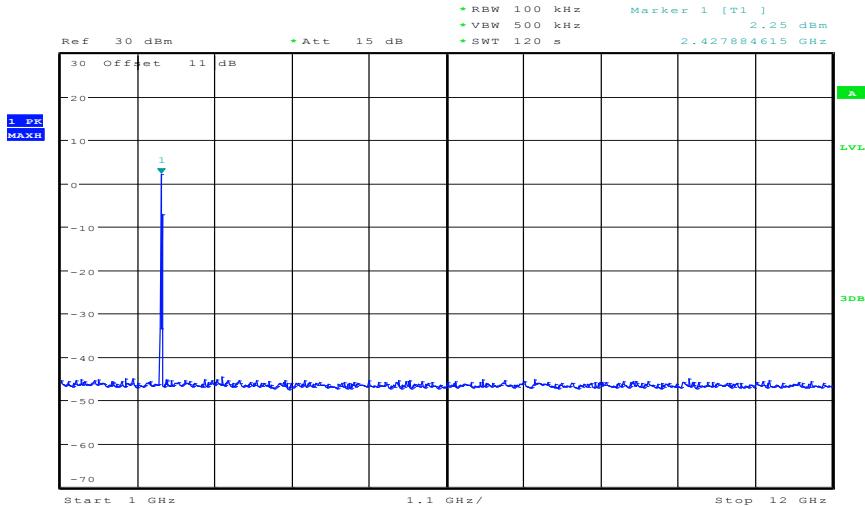
Plot 3: TX mode, lowest channel, 12 GHz to 25 GHz

Date: 25.JAN.2012 07:50:07

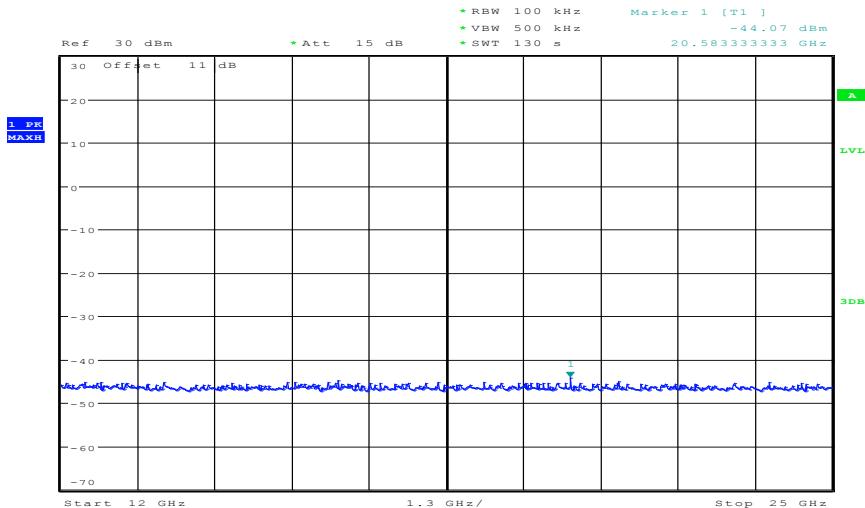
Plot 4: TX mode, middle channel, up to 1 GHz

Date: 25.JAN.2012 07:56:14

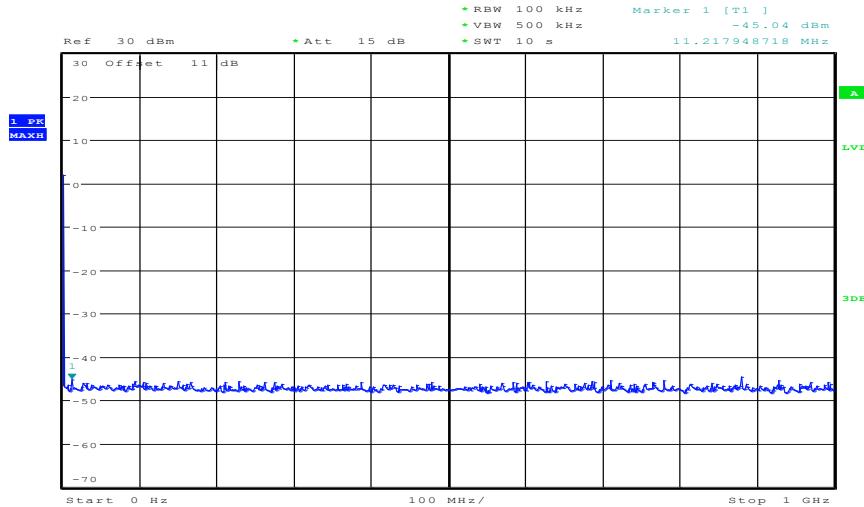
The peak at the beginning of the plot is the LO from the SA.

Plot 5: TX mode, middle channel, 1 GHz to 12 GHz

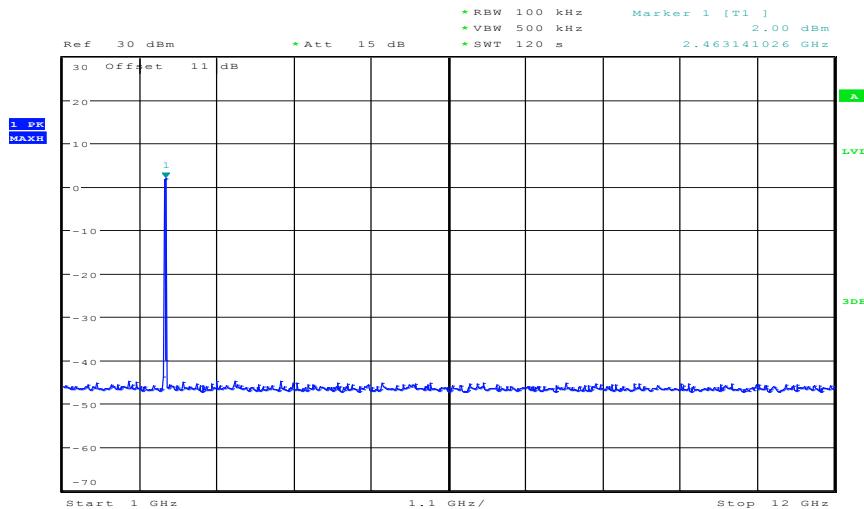
Date: 25.JAN.2012 07:55:28

Plot 6: TX mode, middle channel, 12 GHz to 25 GHz

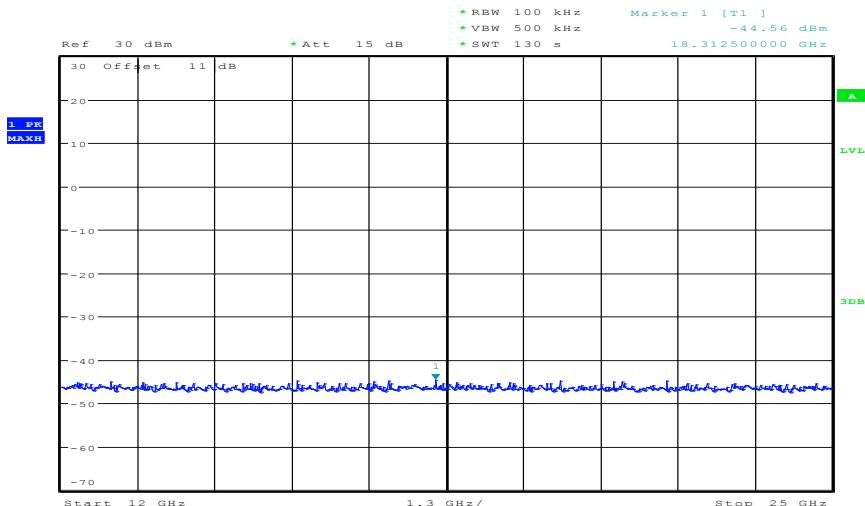
Date: 25.JAN.2012 07:52:54

Plot 7: TX mode, highest channel, up to 1 GHz

Date: 25.JAN.2012 07:56:56

*The peak at the beginning of the plot is the LO from the SA.***Plot 8:** TX mode, highest channel, 1 GHz to 12 GHz

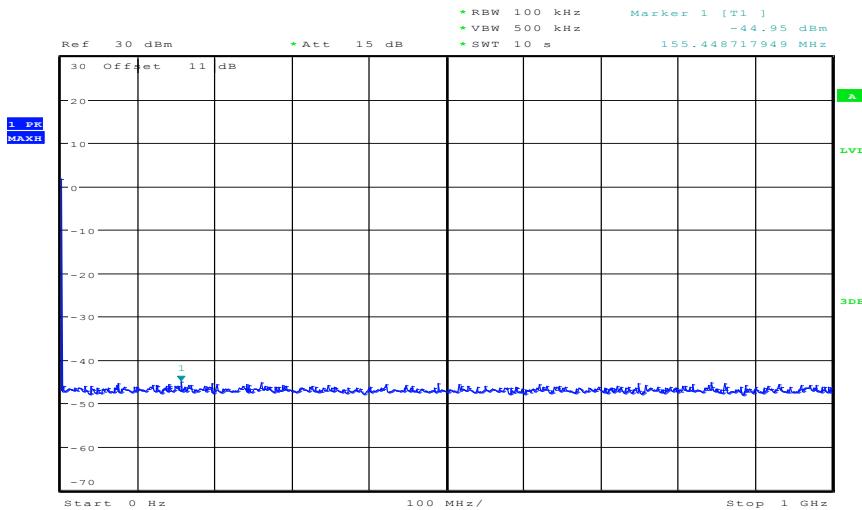
Date: 25.JAN.2012 07:59:25

Plot 9: TX mode, highest channel, 12 GHz to 25 GHz

Date: 25.JAN.2012 08:02:06

Plots: OFDM / g – mode

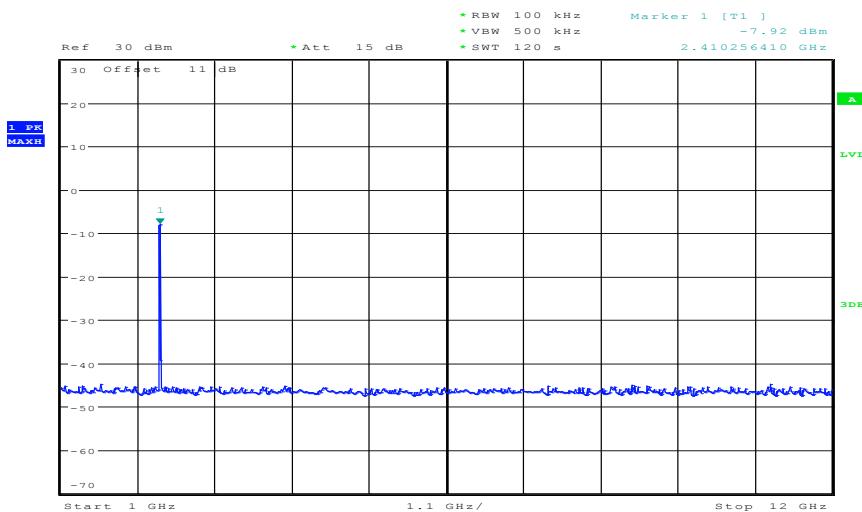
Plot 1: TX mode, lowest channel, up to 1 GHz



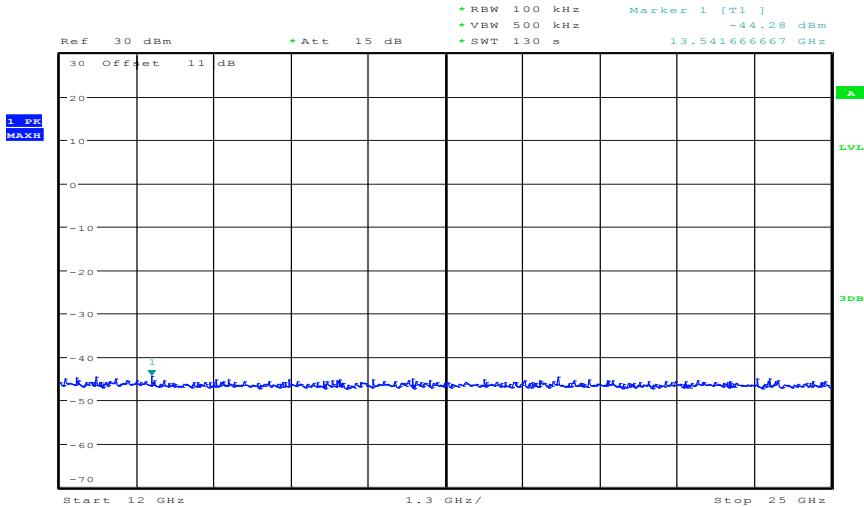
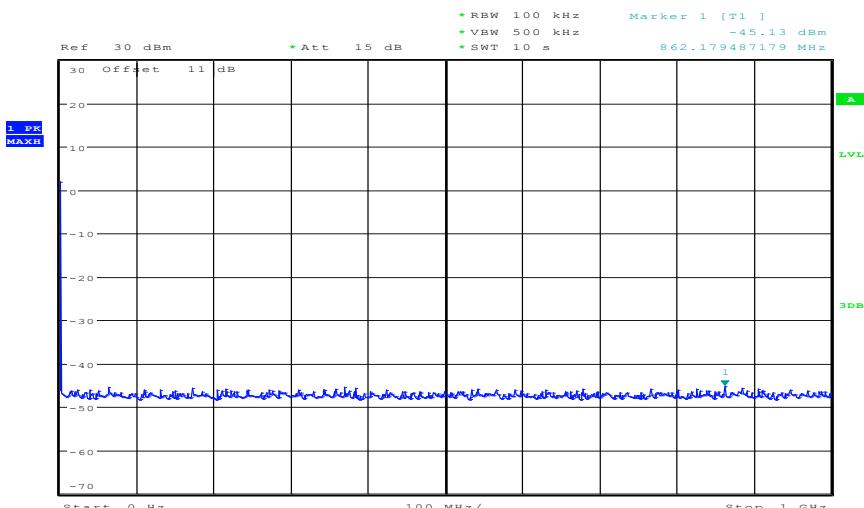
Date: 25.JAN.2012 08:10:53

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

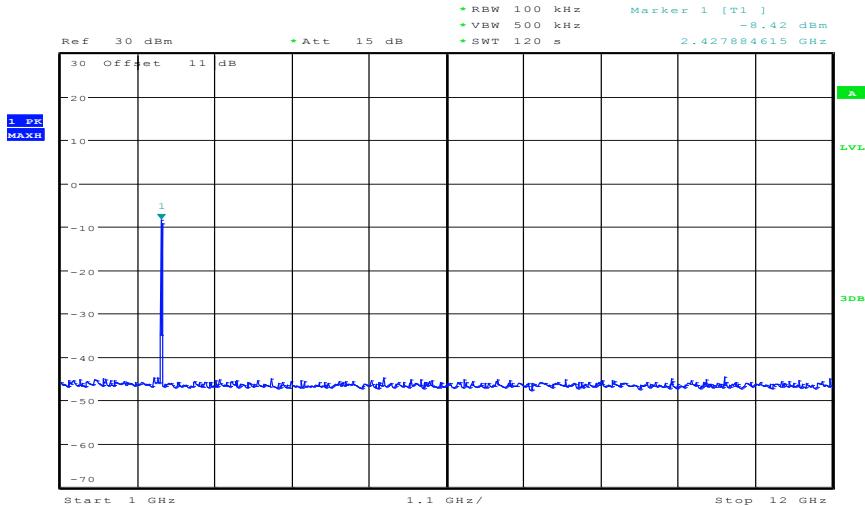
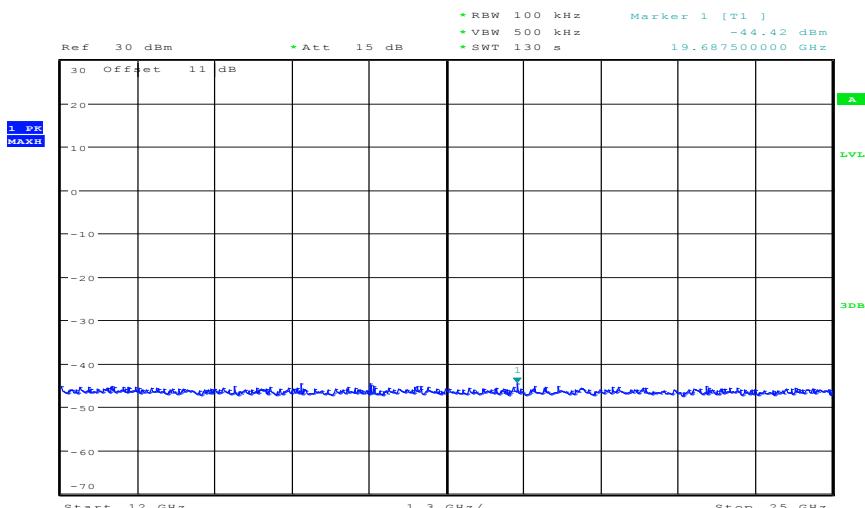
Plot 2: TX mode, lowest channel, 1 GHz to 12 GHz

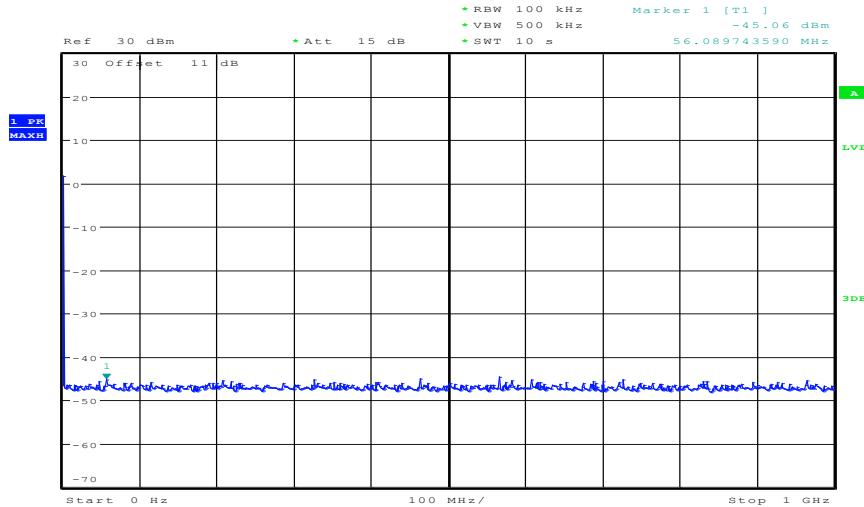


Date: 25.JAN.2012 08:09:45

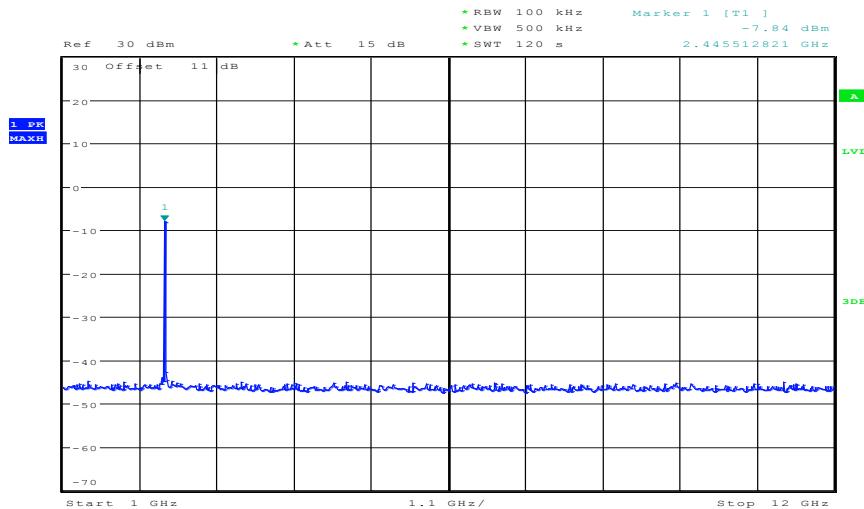
Plot 3: TX mode, lowest channel, 12 GHz to 25 GHz**Plot 4:** TX mode, middle channel, up to 1 GHz

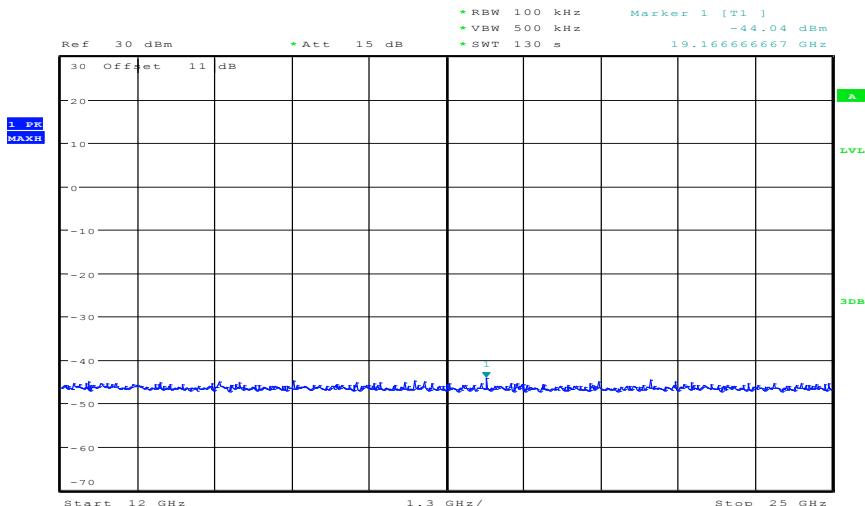
The peak at the beginning of the plot is the LO from the SA.

Plot 5: TX mode, middle channel, 1 GHz to 12 GHz**Plot 6:** TX mode, middle channel, 12 GHz to 25 GHz

Plot 7: TX mode, highest channel, up to 1 GHz

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

Plot 8: TX mode, highest channel, 1 GHz to 12 GHz

Plot 9: TX mode, highest channel, 12 GHz to 25 GHz

Date: 25.JAN.2012 08:19:06

9.10 TX spurious emissions radiated

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation	<input checked="" type="checkbox"/> DSSS b – mode <input checked="" type="checkbox"/> OFDM g – mode

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 (dB μ V/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results: DSSS / b – mode

TX Spurious Emissions Radiated [dBµV/m]								
DSSS – mode								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 10 GHz, please take a look at the table below the plots.			For emissions below 10 GHz, please take a look at the table below the plots.			For emissions below 10 GHz, please take a look at the table below the plots.		
For emissions above 10 GHz, please take a look at the plots.			For emissions above 10 GHz, please take a look at the plots.			For emissions above 10 GHz, please take a look at the plots.		
Measurement uncertainty			± 3 dB					

Result: The result of the measurement is passed.

Results: OFDM / g – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM – mode								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 10 GHz, please take a look at the table below the plots.			For emissions below 10 GHz, please take a look at the table below the plots.			For emissions below 10 GHz, please take a look at the table below the plots.		
For emissions above 10 GHz, please take a look at the plots.			For emissions above 10 GHz, please take a look at the plots.			For emissions above 10 GHz, please take a look at the plots.		
Measurement uncertainty			± 3 dB					

Result: The result of the measurement is passed.

Plots: DSSS / b – mode (These plots are also valid for g-mode and represent the worst case results)

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

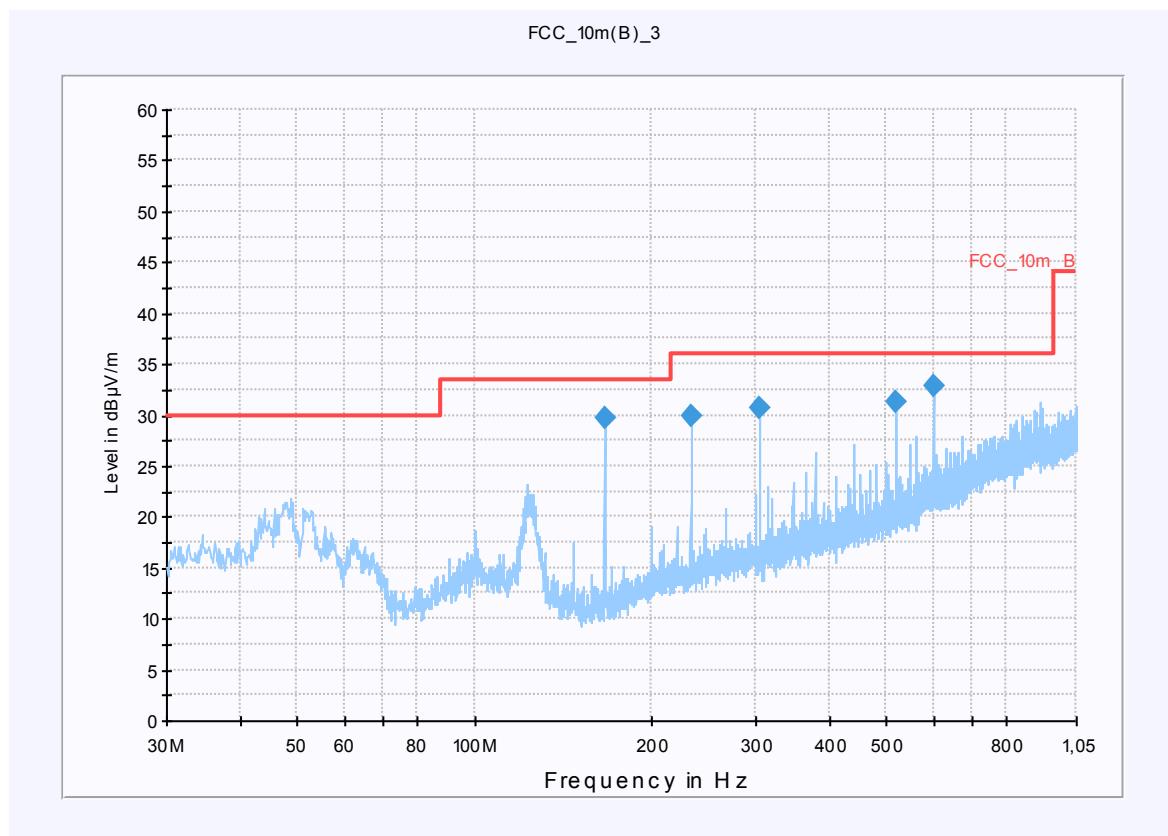
Common Information

EUT:	T640
Serial Number:	55800032
Test Description:	FCC 15
Operating Conditions:	TX Low_channel, charging
Operator Name:	Kraus
Comment:	Power 115V/60Hz

Scan Setup: STAN_Fin [EMI radiated]

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

Subrange 30 MHz - 2 GHz	Detectors QuasiPeak	IF Bandwidth 120 kHz	Meas. Time 15 s	Receiver Receiver
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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
166.260600	29.7	15000.000	120.000	98.0	V	106.0	9.6	3.8	33.5	
232.725300	29.9	15000.000	120.000	116.0	V	195.0	12.8	6.1	36.0	
304.772550	30.7	15000.000	120.000	350.0	H	174.0	14.7	5.3	36.0	
520.010400	31.2	15000.000	120.000	319.0	V	174.0	19.0	4.8	36.0	
599.971650	32.9	15000.000	120.000	250.0	V	181.0	20.8	3.1	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

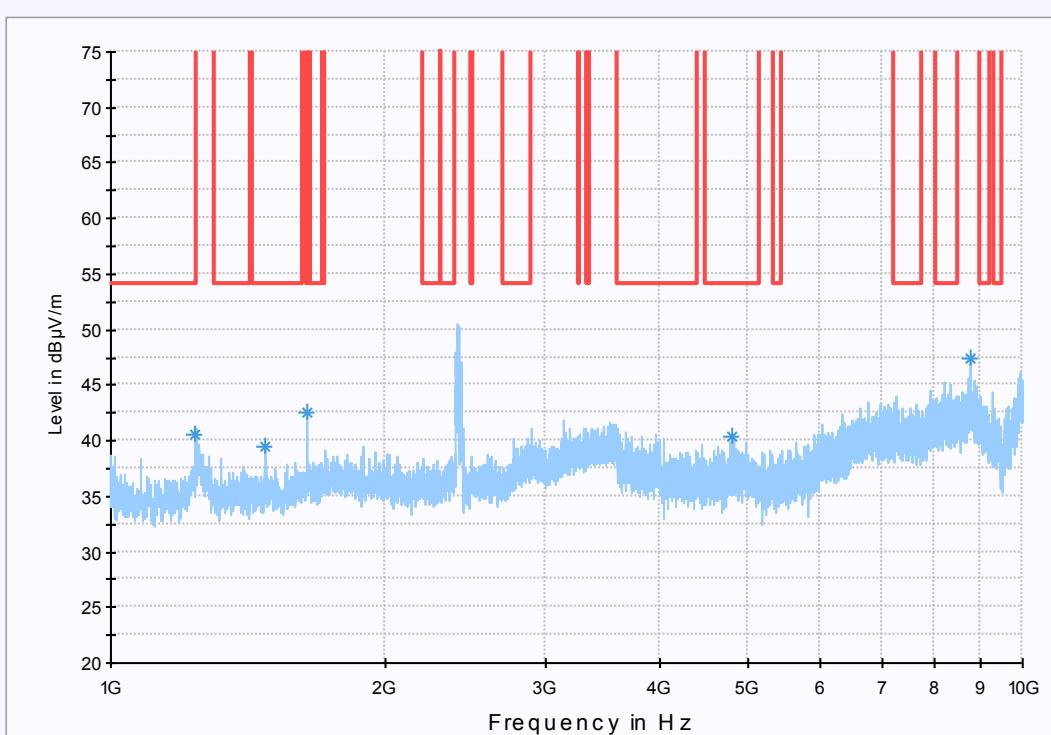
Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

Plot 2: Lowest channel, 1 GHz to 10 GHz, vertical & horizontal polarization

Common Information

EUT: T640
 Serial Number: 55800032
 Test Description: FCC 15
 Operating Conditions: TX Low_channel, charging
 Operator Name: Kraus
 Comment: Power 115V/60Hz



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

Data Reduction 1 [1]

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1239.700000	40.5	98.0	V	92.0	-1.9	
1479.700000	39.5	98.0	V	302.0	-3.5	
4789.000000	40.3	98.0	V	62.0	0.7	
1639.900000	42.5	98.0	V	302.0	-2.7	
8746.600000	47.5	98.0	H	2.0	7.4	

Hardware Setup: EMI radiated\C_MATRIX - [EMI radiated]

Subrange 1

Frequency Range: 1 GHz - 4 GHz

Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_NOTCH
FW 1.0
Correction Table: LNA_EN (Notch)
Correction Table: 3_5m

Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Subrange 2

Frequency Range: 4 GHz - 10 GHz

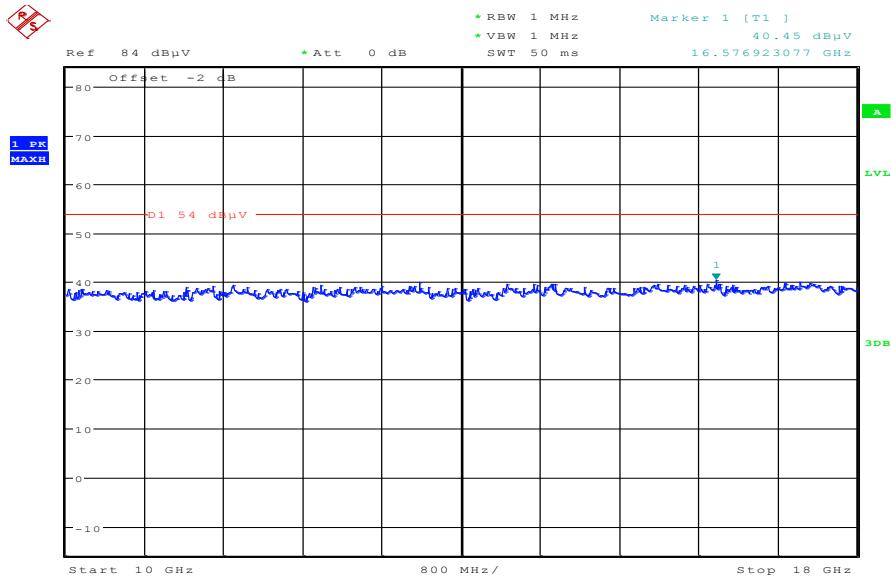
Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_HP
Correction Table: 3_5m
Correction Table: LNA_EN (HP)

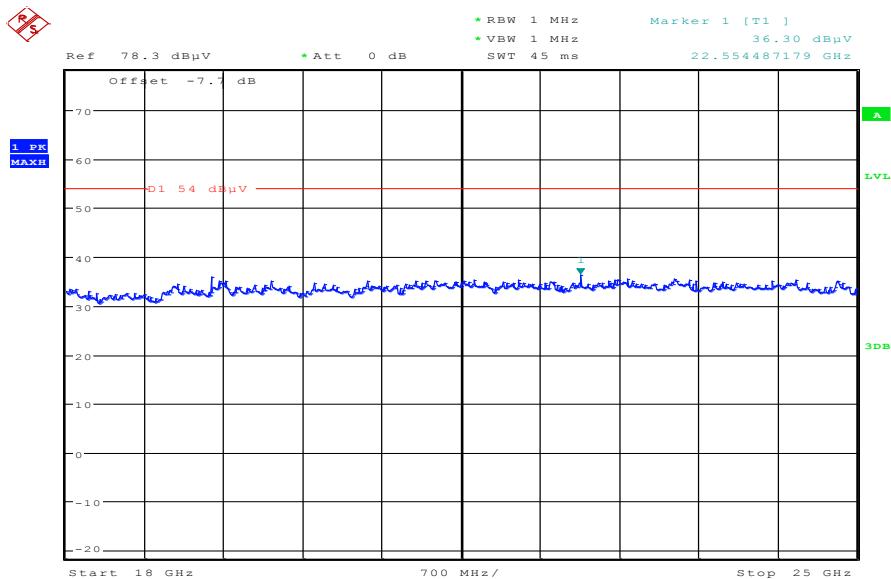
Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Plot 3: Lowest channel, 10 GHz to 18 GHz, vertical & horizontal polarization

Date: 20.APR.2011 18:33:17

Plot 4: Lowest channel, 18 GHz to 25 GHz, vertical & horizontal polarization

Date: 20.APR.2011 18:56:02

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

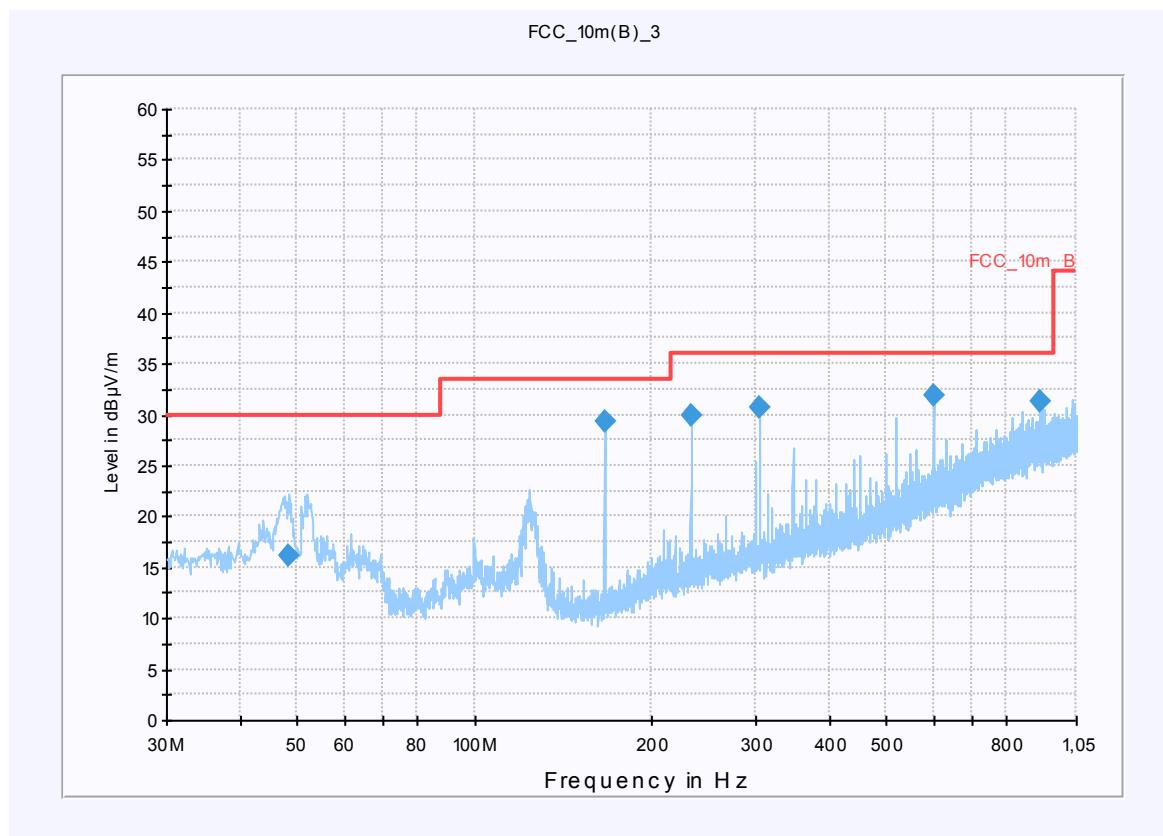
Common Information

EUT: T640
 Serial Number: 55800032
 Test Description: FCC 15
 Operating Conditions: TX Channel 6, charging
 Operator Name: Kraus
 Comment: Power 115V/60Hz

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 - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



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
48.512100	16.1	15000.000	120.000	117.0	V	181.0	13.3	13.9	30.0	
166.263450	29.4	15000.000	120.000	100.0	V	106.0	9.6	4.1	33.5	
232.746900	29.9	15000.000	120.000	150.0	V	186.0	12.8	6.1	36.0	
304.767300	30.7	15000.000	120.000	350.0	H	176.0	14.7	5.3	36.0	
600.000150	32.0	15000.000	120.000	150.0	H	83.0	20.8	4.0	36.0	
914.254950	31.2	15000.000	120.000	124.0	H	264.0	25.2	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

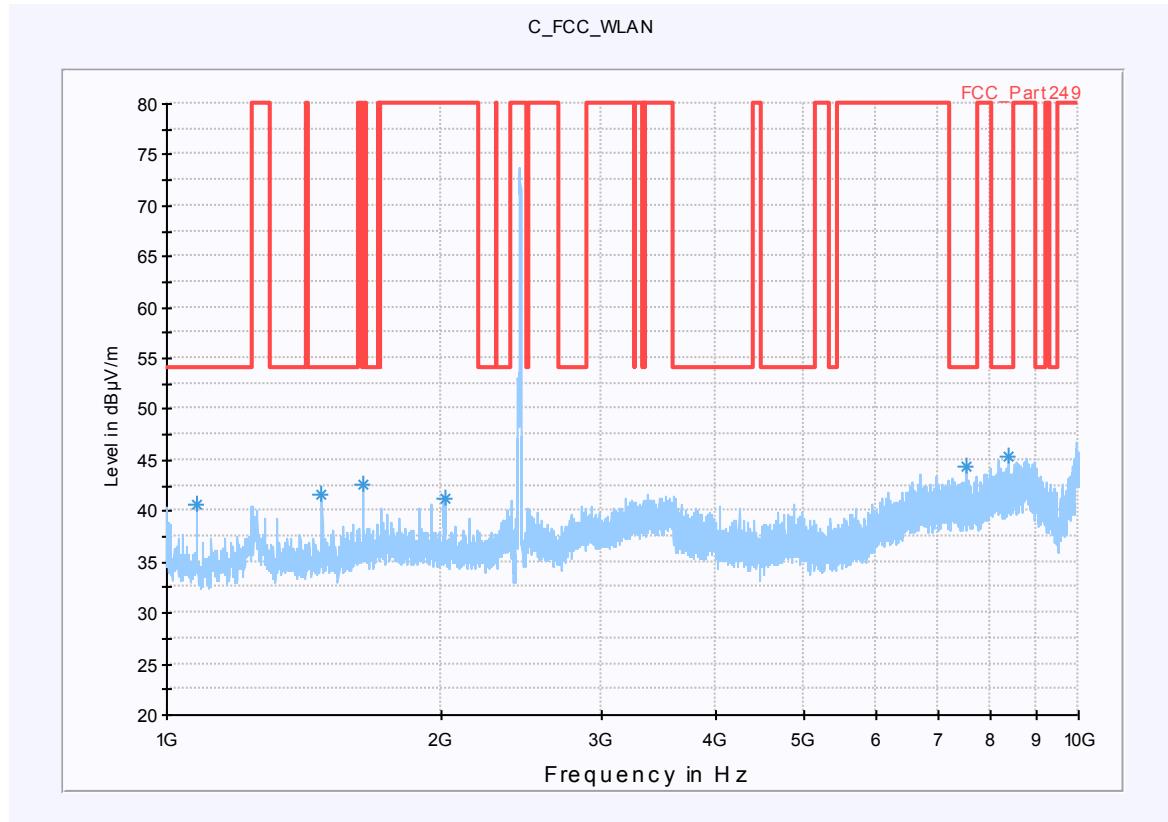
Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

Plot 6: Middle channel, 1 GHz to 10 GHz, vertical & horizontal polarization

Common Information

EUT: T640
 Serial Number: 55800032
 Test Description: FCC 15
 Operating Conditions: TX Channel 6, charging
 Operator Name: Kraus
 Comment: Power 115V/60Hz



Data Reduction 1 [1]

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1080.100000	40.7	100.0	H	88.0	-4.7	
1480.000000	41.7	200.0	V	88.0	-3.5	
7525.000000	44.4	100.0	V	-2.0	5.8	
1639.900000	42.6	100.0	V	47.0	-2.7	
8376.400000	45.3	100.0	V	271.0	6.9	
2016.400000	41.2	100.0	V	92.0	-2.2	

Hardware Setup: EMI radiated\C_MATRIX - [EMI radiated]

Subrange 1

Frequency Range: 1 GHz - 4 GHz

Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_NOTCH
FW 1.0
Correction Table: LNA_EN (Notch)
Correction Table: 3_5m

Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Subrange 2

Frequency Range: 4 GHz - 10 GHz

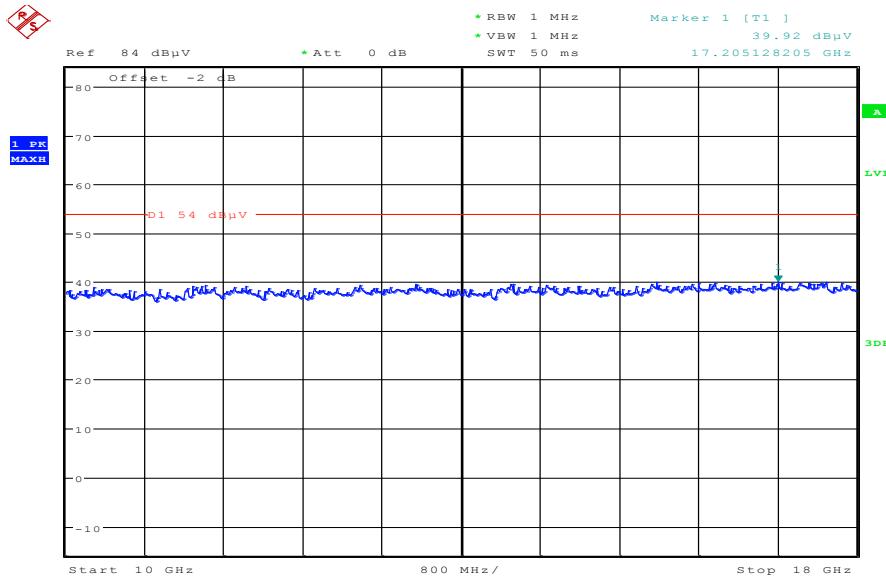
Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_HP
Correction Table: 3_5m
Correction Table: LNA_EN (HP)

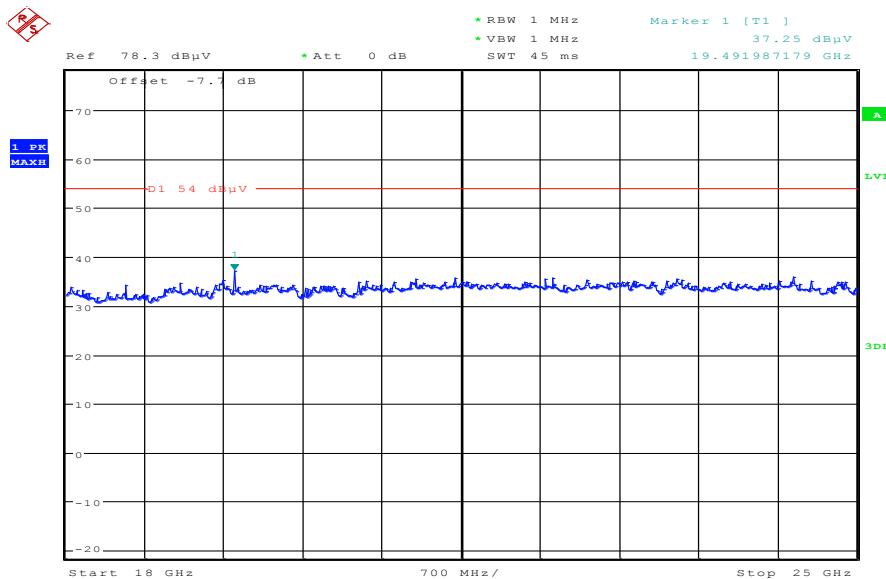
Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Plot 7: Middle channel, 10 GHz to 18 GHz, vertical & horizontal polarization

Date: 20.APR.2011 18:35:23

Plot 8: Middle channel, 18 GHz to 25 GHz, vertical & horizontal polarization

Date: 20.APR.2011 18:57:49

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

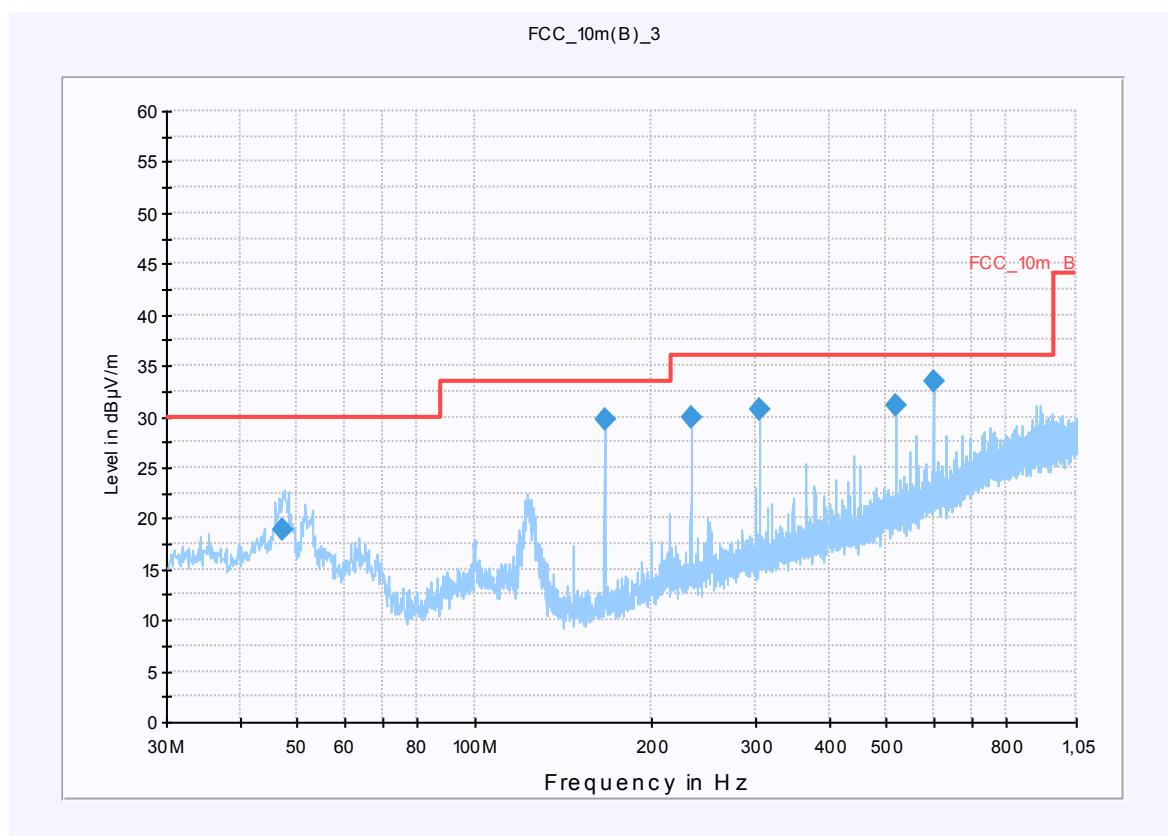
Common Information

EUT: T640
 Serial Number: 55800032
 Test Description: FCC 15
 Operating Conditions: TX Channel 11, charging
 Operator Name: Kraus
 Comment: Power 115V/60Hz

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 - 2 GHz	QuasiPeak	120 kHz	15 s	Receiver



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
47.250300	18.9	15000.000	120.000	98.0	V	196.0	13.3	11.1	30.0	
166.234350	29.6	15000.000	120.000	98.0	V	106.0	9.6	3.9	33.5	
232.726500	29.8	15000.000	120.000	113.0	V	182.0	12.8	6.2	36.0	
304.746450	30.8	15000.000	120.000	350.0	H	176.0	14.7	5.2	36.0	
519.991500	31.0	15000.000	120.000	321.0	V	184.0	19.0	5.0	36.0	
599.994300	33.4	15000.000	120.000	250.0	V	185.0	20.8	2.6	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 4.42

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

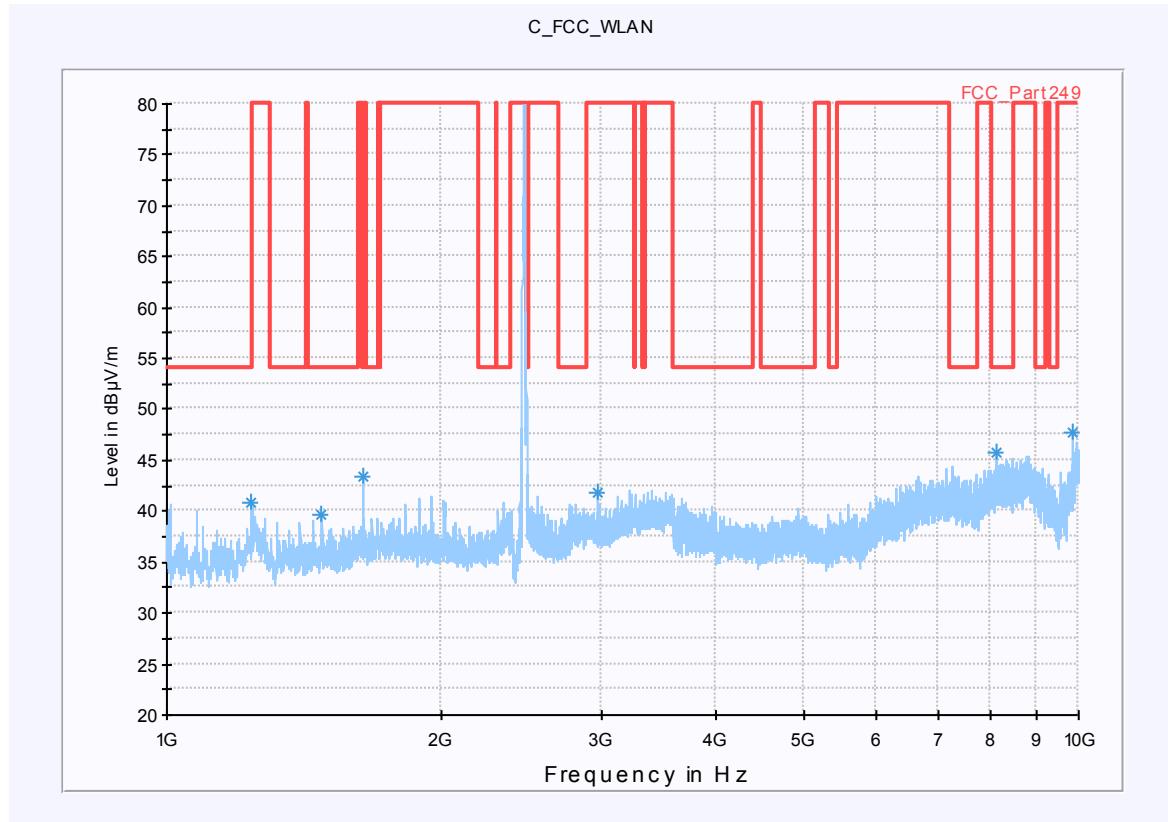
Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

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

Common Information

EUT: T640
 Serial Number: 55800032
 Test Description: FCC 15
 Operating Conditions: TX Channel 11, charging
 Operator Name: Kraus
 Comment: Power 115V/60Hz



Data Reduction 1 [1]

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1239.700000	40.9	100.0	V	92.0	-1.9	
1479.700000	39.8	100.0	V	302.0	-3.5	
9848.200000	47.8	100.0	H	59.0	7.3	
1639.900000	43.5	200.0	H	182.0	-2.7	
2975.200000	41.8	100.0	V	32.0	-0.8	
8123.800000	45.8	200.0	V	2.0	6.8	

Hardware Setup: EMI radiated\C_MATRIX - [EMI radiated]

Subrange 1

Frequency Range: 1 GHz - 4 GHz

Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_NOTCH
FW 1.0
Correction Table: LNA_EN (Notch)
Correction Table: 3_5m

Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Subrange 2

Frequency Range: 4 GHz - 10 GHz

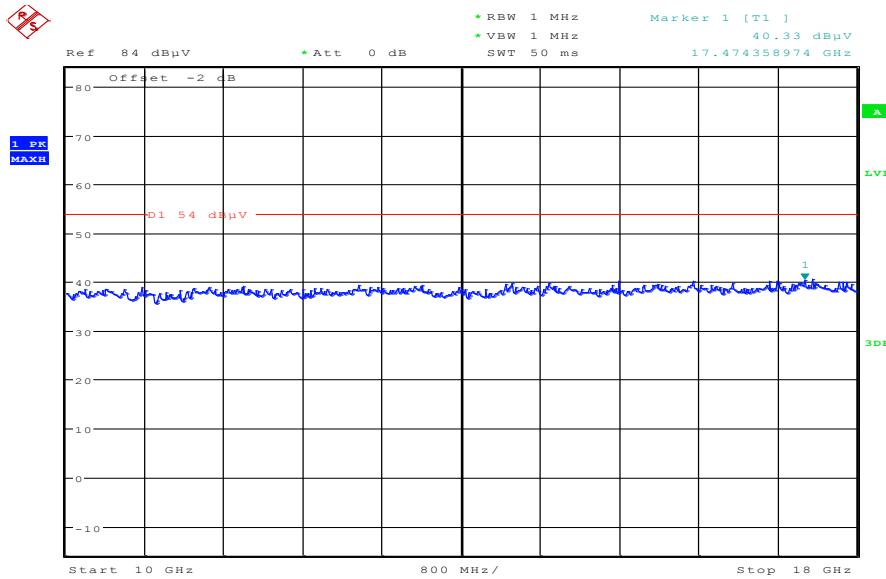
Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_HP
Correction Table: 3_5m
Correction Table: LNA_EN (HP)

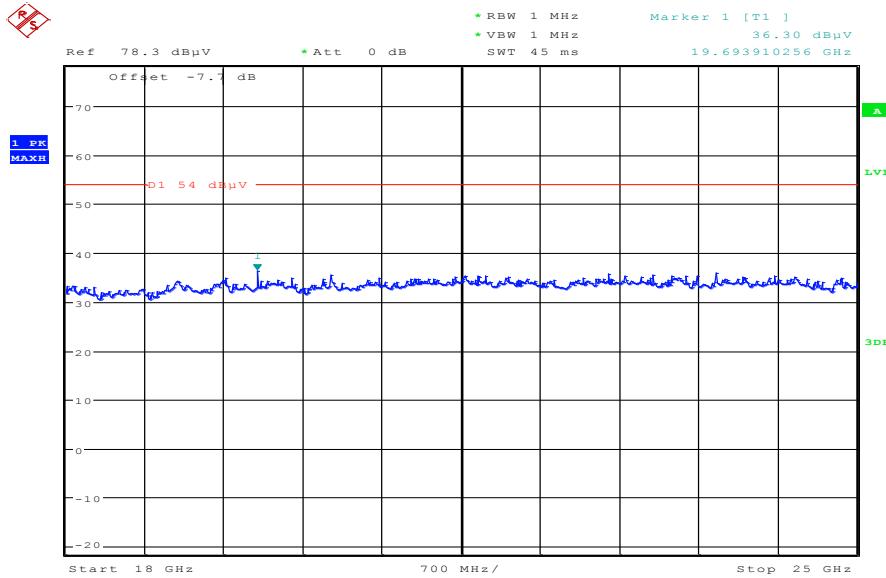
Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Plot 11: Highest channel, 10 GHz to 18 GHz, vertical & horizontal polarization

Date: 20.APR.2011 18:39:04

Plot 12: Highest channel, 18 GHz to 25 GHz, vertical & horizontal polarization

Date: 20.APR.2011 18:59:09

9.11 RX spurious emissions radiated

Description:

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

Measurement:

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

Limits:

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

Results:

RX Spurious Emissions Radiated [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
For emissions below 10 GHz, please take a look at the table below the plots.	For emissions below 10 GHz, please take a look at the table below the plots.	For emissions below 10 GHz, please take a look at the table below the plots.
For emissions above 10 GHz, please take a look at the plots.	For emissions above 10 GHz, please take a look at the plots.	For emissions above 10 GHz, please take a look at the plots.
Measurement uncertainty		± 3 dB

Result: The result of the measurement is passed.

Plots: RX / Idle – mode

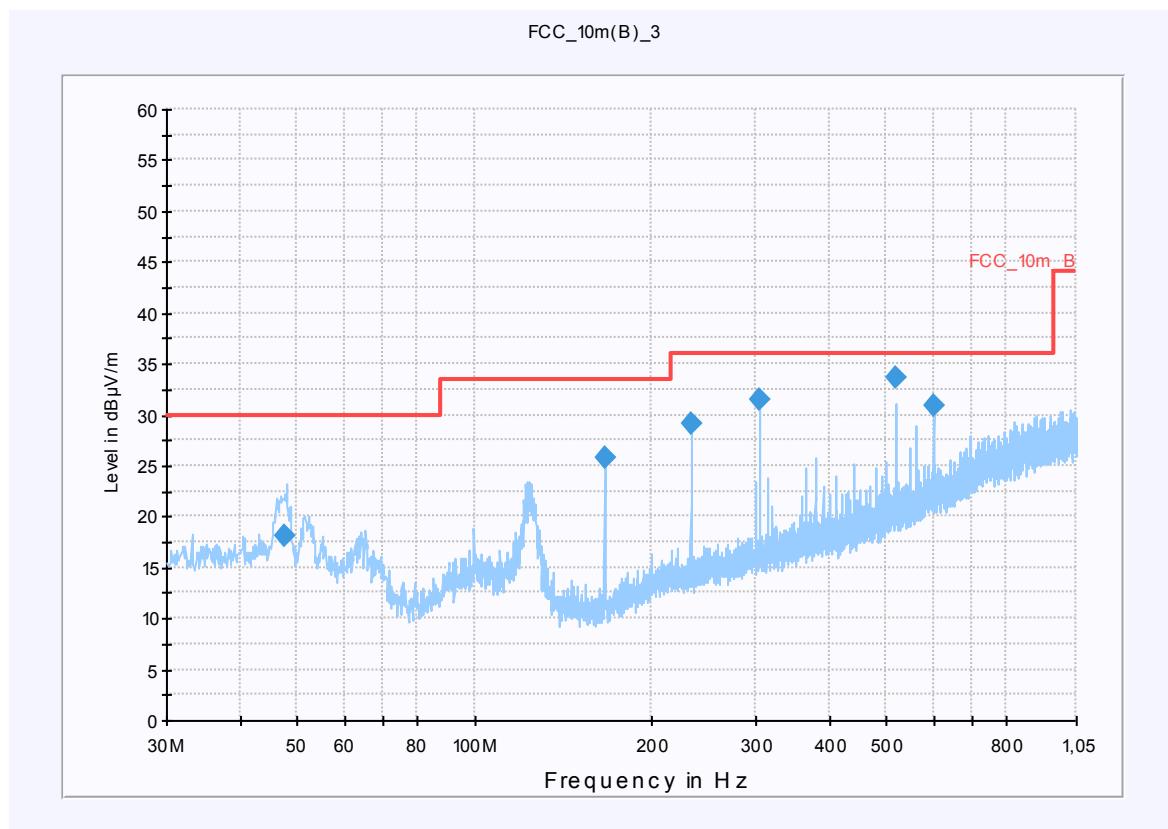
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization

Common Information

EUT: T640
 Serial Number: 55800032
 Test Description: FCC 15
 Operating Conditions: RX + charging
 Operator Name: Hennemann
 Comment: Power 115V/60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)		
Level Unit:	dB μ V/m		
Subrange	Detectors	IF Bandwidth	Meas. Time
30 MHz - 2 GHz	QuasiPeak	120 kHz	15 s
Receiver			
Receiver			



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
47.592750	18.2	15000.000	120.000	100.0	V	196.0	13.3	11.8	30.0	
166.228950	25.7	15000.000	120.000	100.0	V	106.0	9.6	7.8	33.5	
232.741050	29.0	15000.000	120.000	108.0	V	179.0	12.8	7.0	36.0	
304.748700	31.5	15000.000	120.000	350.0	H	166.0	14.7	4.5	36.0	
519.995100	33.7	15000.000	120.000	150.0	H	83.0	19.0	2.3	36.0	
599.991600	31.0	15000.000	120.000	150.0	H	-6.0	20.8	5.0	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

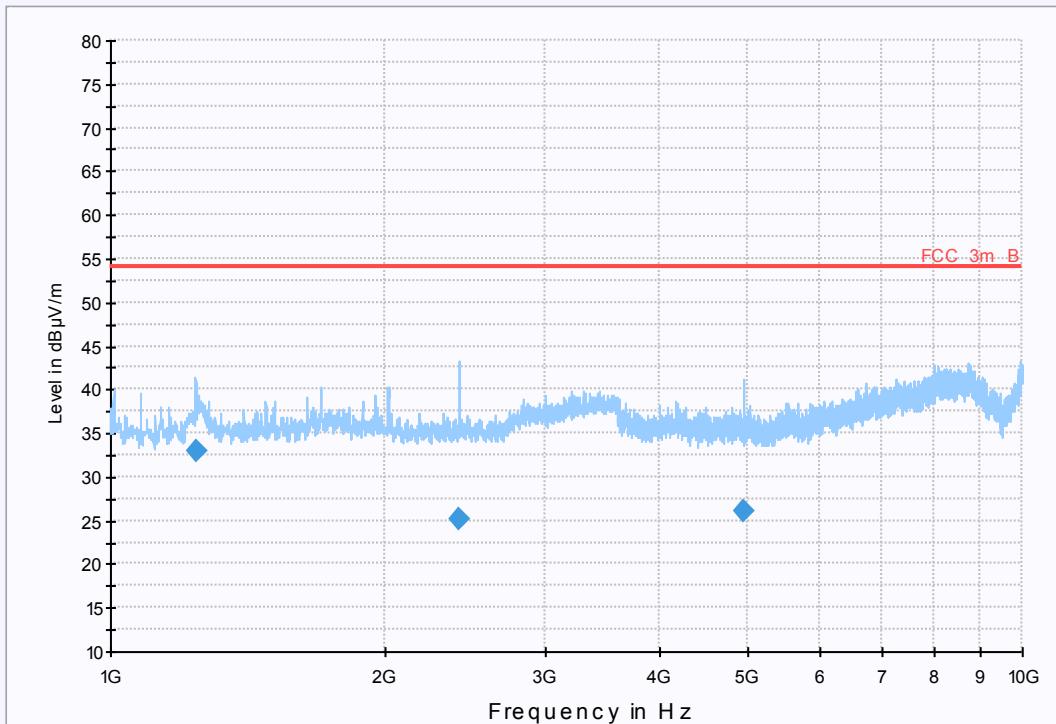
EMC 32 Version 8.10.00

Plot 2: 1 GHz to 10 GHz, vertical & horizontal polarization

Common Information

EUT: T640
 Serial Number: 55800032
 Test Description: FCC 15
 Operating Conditions: RX + charging
 Operator Name: Hennemann
 Comment: Power 115V/60Hz

FCC_1_10_B_5m



Final Result 1

Frequency (MHz)	Average (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
1240.156654	32.9	100.000	1000.000	100.0	V	97.0	-2.8	21.1	54.0	
2412.169948	25.1	100.000	1000.000	100.0	V	259.0	-4.1	28.9	54.0	
4941.370448	26.0	100.000	1000.000	100.0	V	54.0	-1.3	28.0	54.0	

Hardware Setup: EMI radiated\C_MATRIX - [EMI radiated]

Subrange 1

Frequency Range: 1 GHz - 4 GHz

Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_NOTCH
FW 1.0
Correction Table: LNA_EN (Notch)
Correction Table: 3_5m

Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Subrange 2

Frequency Range: 4 GHz - 10 GHz

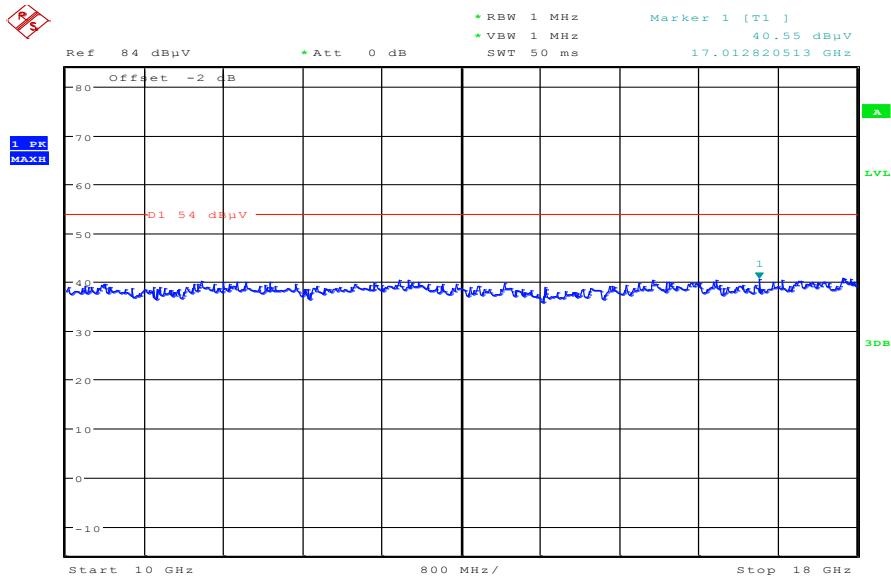
Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: EN_HP
Correction Table: 3_5m
Correction Table: LNA_EN (HP)

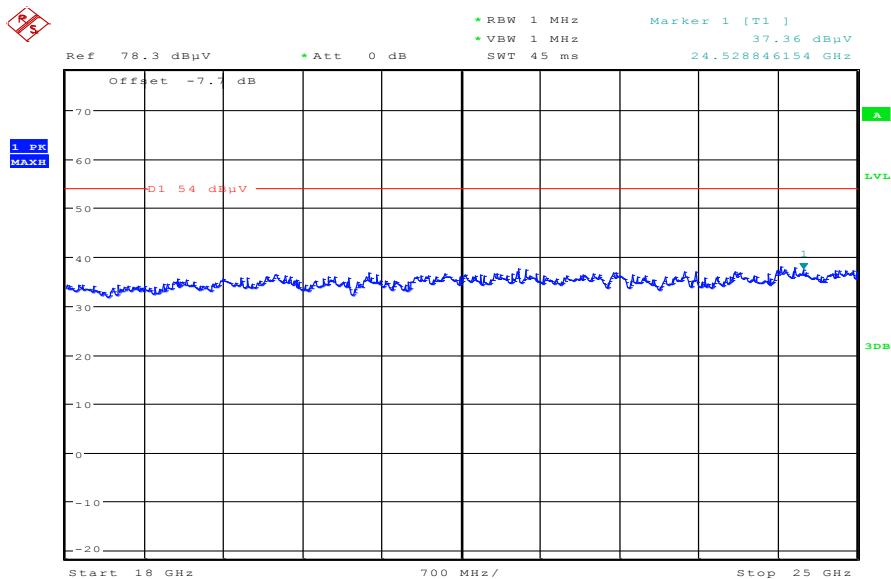
Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table: Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

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

Plot 3: 10 GHz to 18 GHz, vertical & horizontal polarization

Date: 21.APR.2011 16:00:13

Plot 4: 18 GHz to 25 GHz, vertical & horizontal polarization

Date: 21.APR.2011 15:59:09

9.12 TX spurious emissions radiated < 30 MHz

Not performed!

9.13 TX spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If critical peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are re-measured 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:

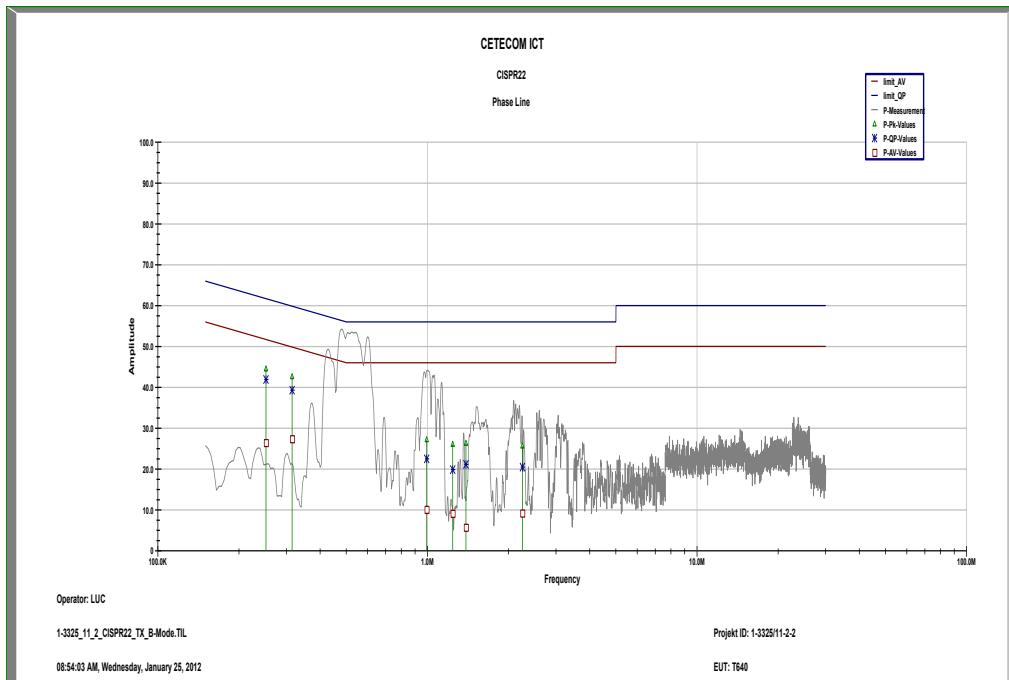
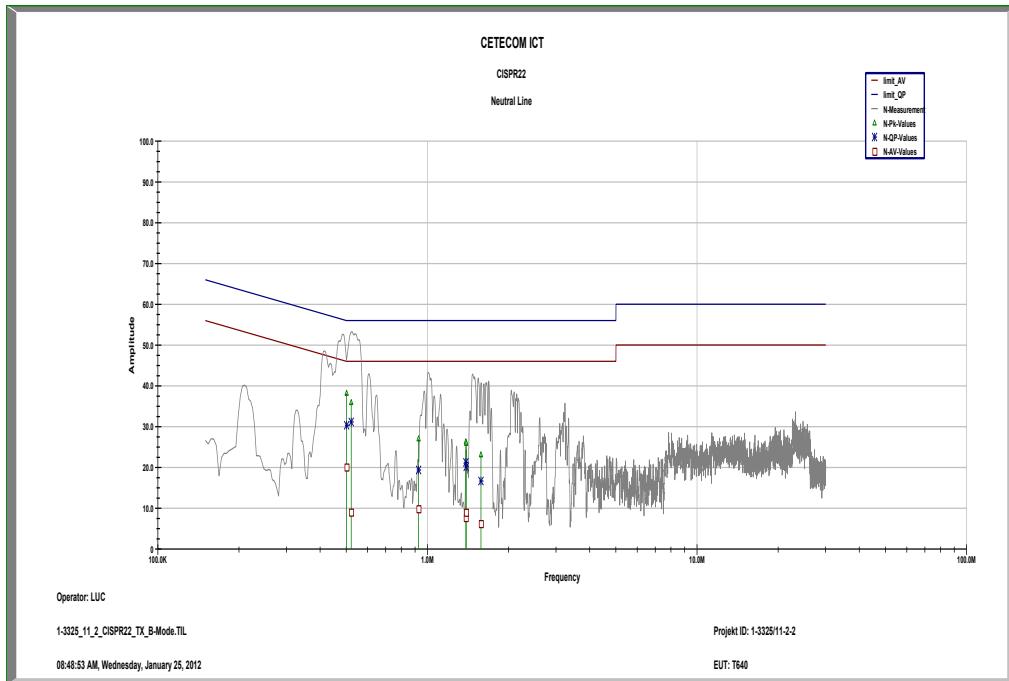
FCC	IC	
CFR Part 15.207(a)	ICES-003, Issue 4	
TX Spurious Emissions Conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dB μ V/m)	Average (dB μ V/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

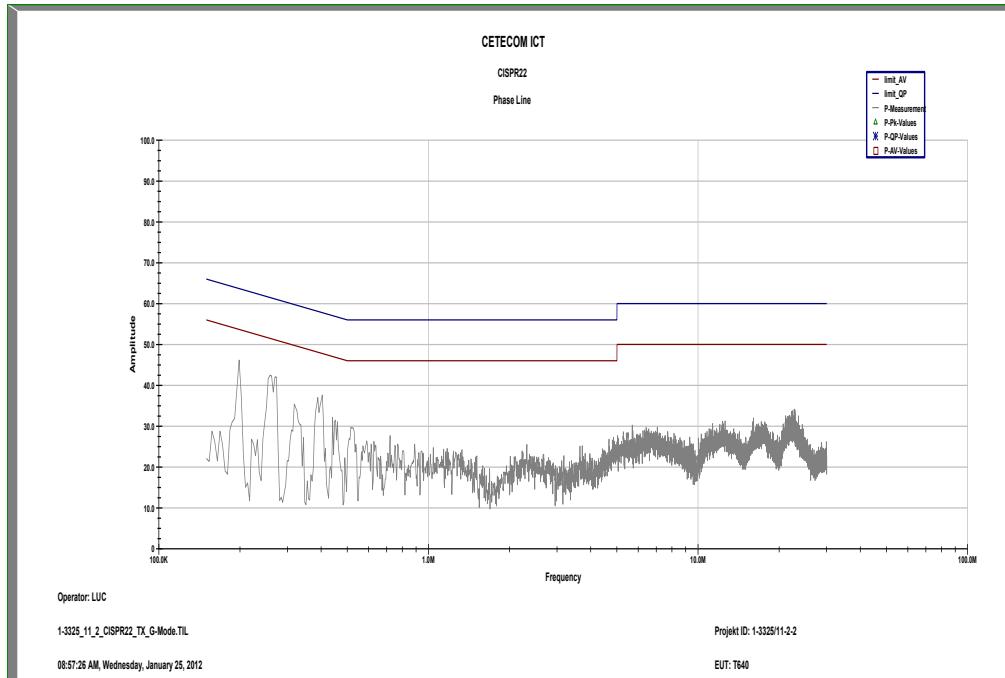
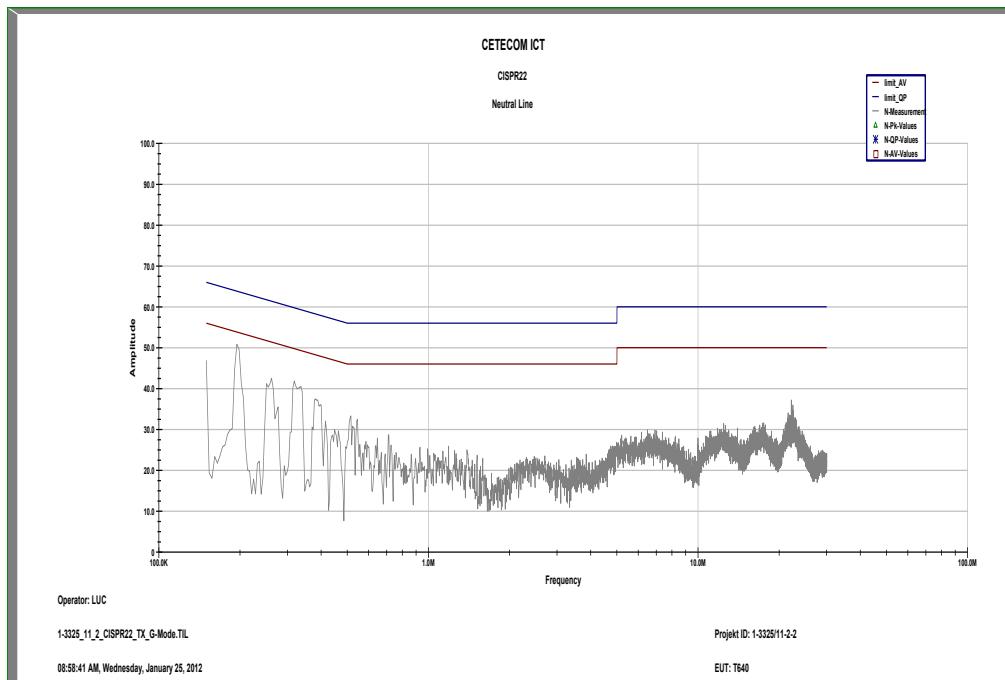
*Decreases with the logarithm of the frequency

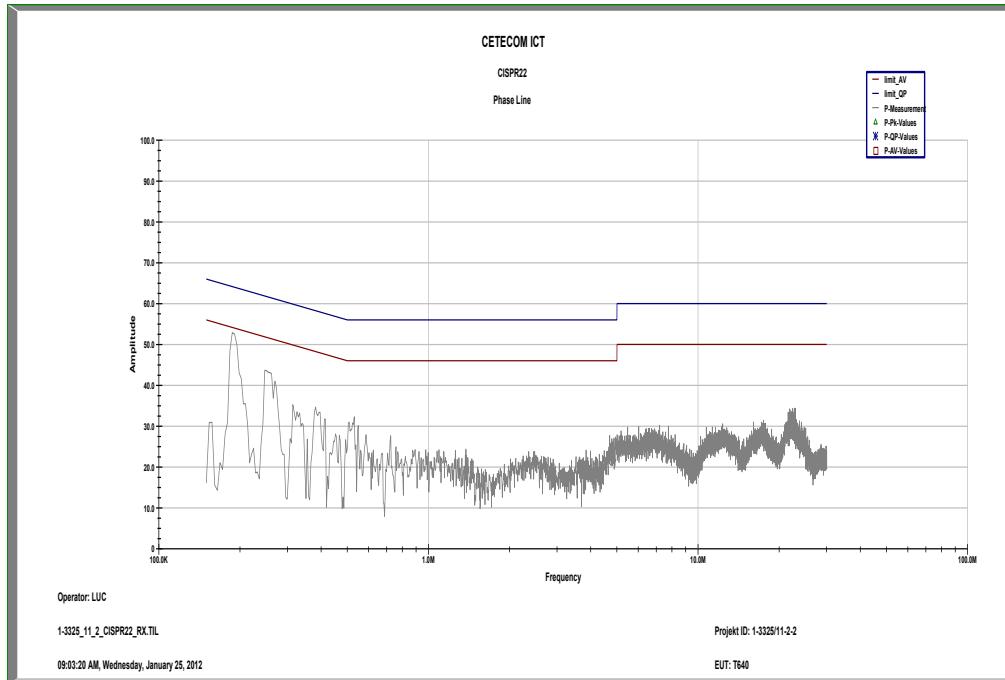
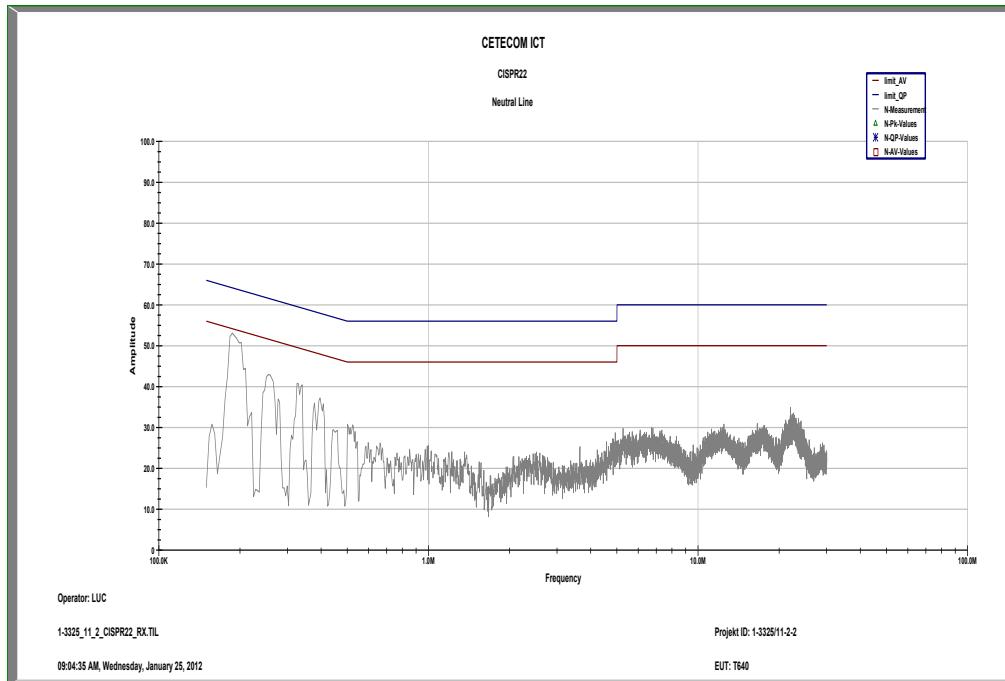
Results:

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

Result: The measurement is passed.

Plots:**Plot 1: DSSS / b – mode, 9 kHz to 30 MHz, phase line****Plot 2: DSSS / b – mode, 9 kHz to 30 MHz, neutral line**

Plot 3: OFDM / g – mode, 9 kHz to 30 MHz, phase line**Plot 4:** OFDM / g – mode, 9 kHz to 30 MHz, neutral line

Plot 7: RX / Idle – mode, 9 kHz to 30 MHz, phase line**Plot 8:** RX / Idle – mode, 9 kHz to 30 MHz, neutral line

10 Test equipment and ancillaries used for tests

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

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

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve	01.07.2010	01.07.2012
2	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
3	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
4	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
5	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
6	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vIKI!	08.09.2010	08.09.2012
7	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
8	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
9	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
10	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	05.01.2011	05.01.2013
11	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
12	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
13	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
14	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
15	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
16	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
17	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	10.01.2011	10.01.2013
18	n. a.	Isolating Transformer	RT5A	Grundig	8041	300001626	g		
19	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
20	n. a.	Coaxial Attenuator 30dB/500W	8325	Bird	1530	300001595	ev		
21	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	05.03.2009	05.09.2011
22	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
23	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	

24	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
25	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
26	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
27	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
28	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
29	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
30	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
31	n. a.	Amplifier	js42-00502650- 28-5a	Parzich GMBH	928979	300003143	ne		
32	n. a.	Band Reject filter	WRCG1855/1910- 1835/1925- 40/8SS	Wainwright	7	300003350	ev		
33	n. a.	Band Reject filter	WRCG2400/2483- 2375/2505- 50/10SS	Wainwright	11	300003351	ev		
34	n. a.	Highpass Filter	WHKX2.9/18G- 12SS	Wainwright	1	300003492	ev		
35	n. a.	Highpass Filter	WHK1.1/15G- 10SS	Wainwright	3	300003255	ev		
36	n. a.	Highpass Filter	WHKX7.0/18G- 8SS	Wainwright	18	300003789	ne		
37	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	13.09.2010	13.09.2012
38	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKI!	17.12.2008	17.12.2011
39	A014	Std. Gain Horn Antenna 9.84- 15.0 GHz	1724-20	Flann	89	300001957	ne		
40	A016	Std. Gain Horn Antenna 14.5- 22.0 GHz	1924-20	Flann	33	300001963	ne		
41	A019	Std. Gain Horn Antenna 17.6- 26.7 GHz	2024-20	Flann	156	300001968	ne		

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
 vkl!! 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

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:

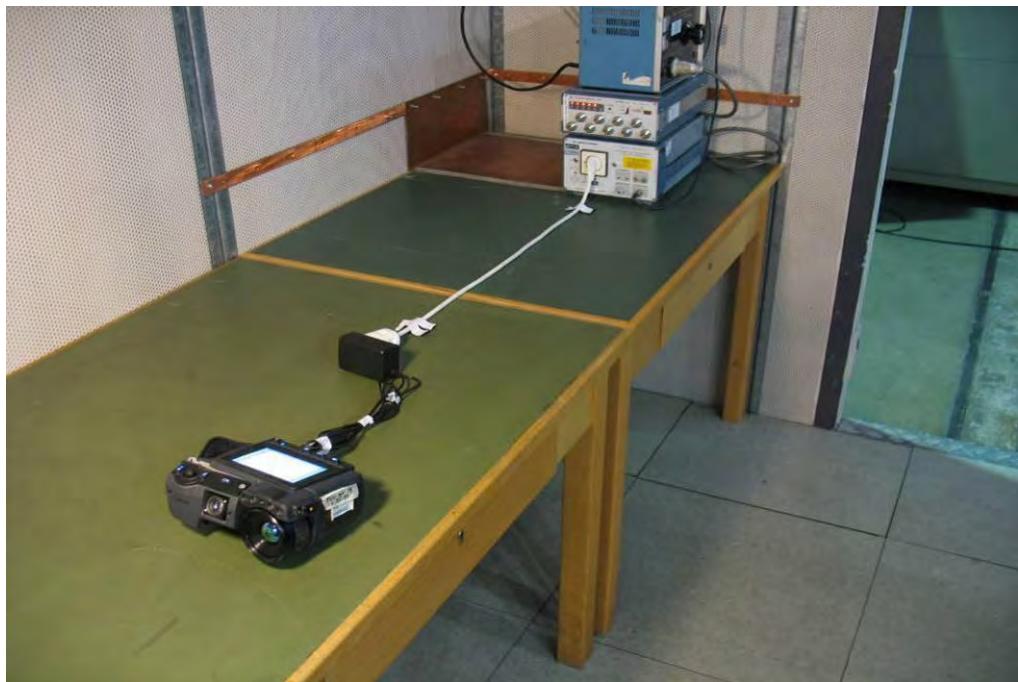


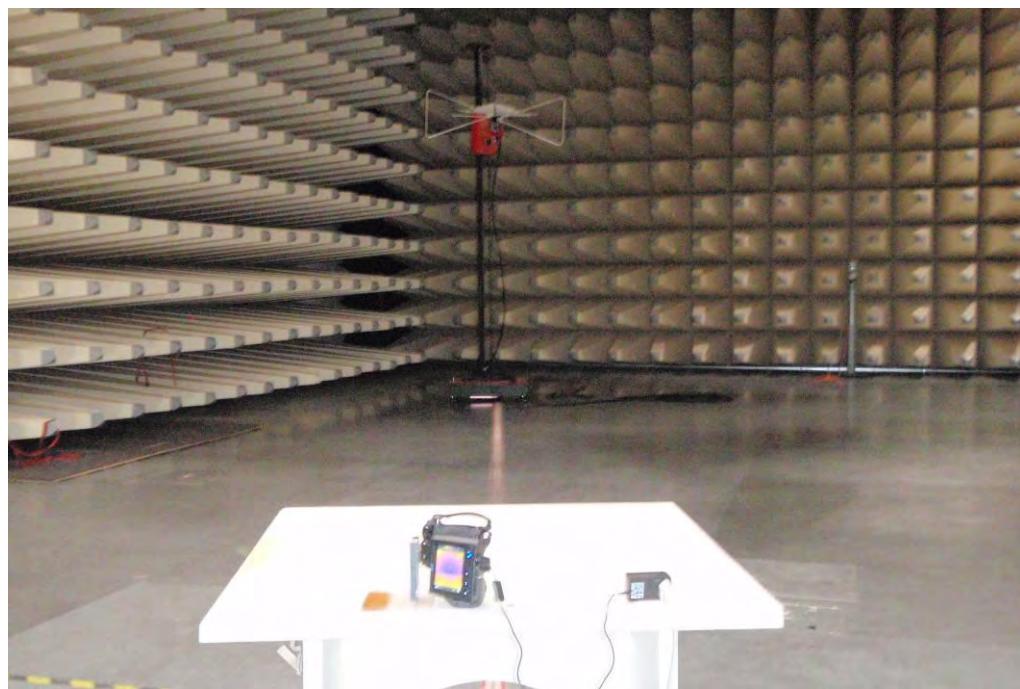
Photo 2: (Chamber F)



Photo 3: (Chamber F)



Photo 4: (Chamber F)



Annex B External photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:

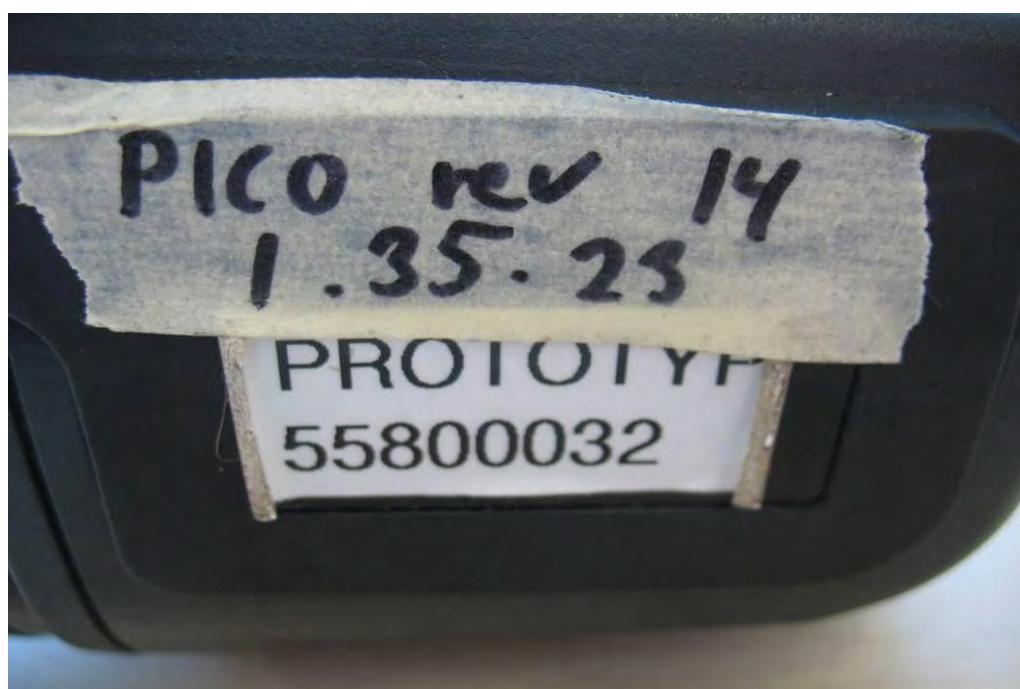


Photo 5:



Photo 6:



Photo 7:



Photo 8:



Photo 9:



Photo 10:



Photo 11:



Annex C Internal photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:

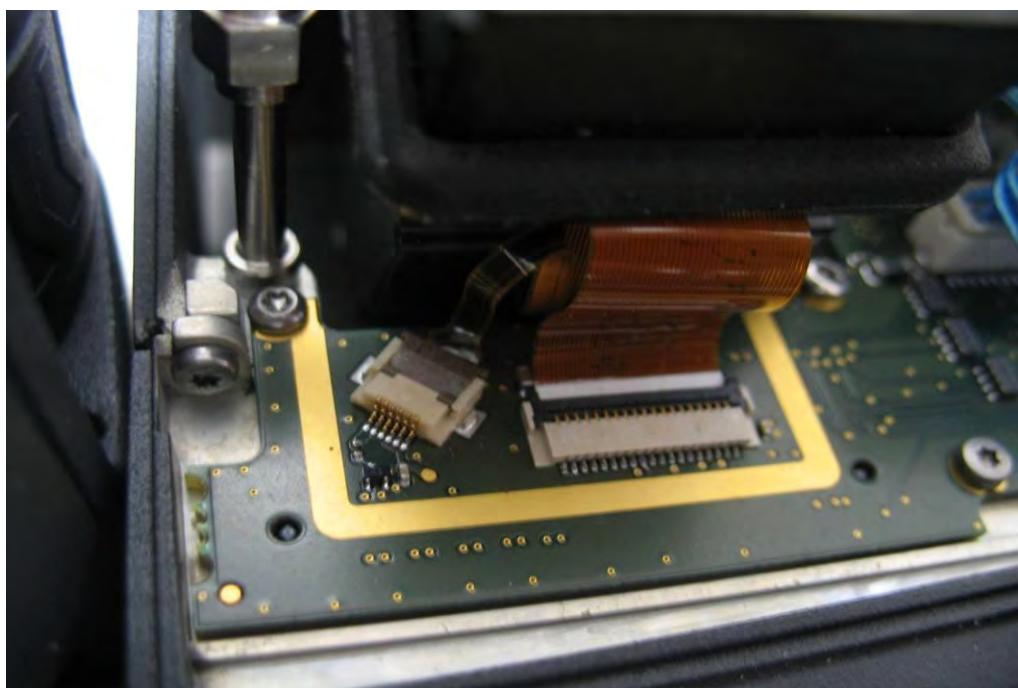


Photo 4:



Photo 5:



Photo 6:



Photo 7:



Photo 8:



Photo 9:



Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-02-06
-A	Editorial change	2012-02-21

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



Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Intrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 2 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

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 dissemination 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, 2009) 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

Frankfurt am Main, 13.04.2011

Dipl.-Ing. (FH) Jörg Eigner

Head of Division 2

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

See notes overleaf.

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_Akkreditierung_EN17025-En_incl_Annex.pdf