



Accredited testing-laboratory

DAR registration number: DAT-P-176/94-D1

**Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97**

Recognized by the Federal Communications Commission

Anechoic chamber registration no.: 90462 (FCC)

Anechoic chamber registration no.: 3463A-1 (IC)

Certification ID: DE 0001

Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

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Test report no. : 4-2629-01-02/07
Type identification : Globe Surfer 2
Applicant : Option N.V.Option N.V.
FCC ID : NCMOGS0201
IC Certification No : 2734A-GS0201
Test standards : 47 CFR Part 15
RSS - 210 Issue 7

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

Test laboratory manager:

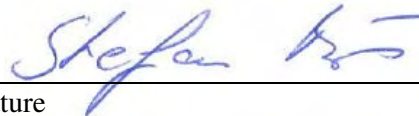
2007-07-18

Stefan Bös

Date

Name

Signature



Technical responsibility for area of testing:

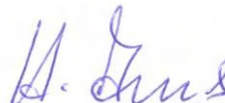
2007-07-18

Harro Ames

Date

Name

Signature



1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10
66117 Saarbrücken
Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

e-mail: info@ICT.cetecom.de

Internet: <http://www.cetecom-ict.de>

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

Accredited by: Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	Option N.V.
Street:	Gaston Geenslaan 14
Town:	3001 Leuven
Country:	Belgium
Telephone:	+32-16-317411
Fax:	
Contact:	Joeri Boeckx
E-mail:	J.Boeckx@option.com
Telephone:	+32 16 317 411

1.4 Application details

Date of receipt of order:	2007-06-28
Date of receipt of test item:	2007-06-27
Date of start test:	2007-06-27
Date of end test	2007-07-18
Persons(s) who have been present during the test:	

2 Test standard/s:

47 CFR Part 15	2006-08	Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices
RSS - 210 Issue 7	2007-06	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

3 Technical tests

3.1 Details of manufacturer

Name:	Option N.V.
Street:	Gaston Geenslaan 14
Town:	3001 Leuven
Country:	Belgium

3.1.1 Test item

Kind of test item :	Globe Surfer 2
Type identification :	Globe Surfer 2
S/N serial number :	-
HW hardware status :	GS 2 HW 3.0
SW software status :	
Frequency Band [MHz] :	ISM 2400 – 2483.5
Type of Modulation :	DSSS / OFDM
Number of channels :	11
Antenna :	Integrated pcb antenna
Power Supply :	230 V AC
Temperature Range :	-20°C to 55°C

Max. power radiated: 27.83 dBm

Max. power conducted: 26.63 dBm

FCC ID: **NCMOGS0201**

IC: **2734A-GS0201**

3.1.2 Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	2734A-GS0201
Model Name:	Globe Surfer 2
Manufacturer (complete Address):	Option N.V. Gaston Geenslaan 14 3001 Leuven Belgium
Tested to Radio Standards Specification (RSS) No.:	RSS-210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3463A-1
Frequency Range (or fixed frequency) [MHz]:	2412 – 2462 MHz
RF: Power [W] (max):	Rad. EIRP: 606.7 mW (OFDM) Rad. EIRP: 400 mW (DSSS) Conducted: 460 mW (OFDM) Conducted : 294 mW (DSSS)
Antenna Type:	Integrated pcb antenna
Occupied Bandwidth (99% BW) [kHz]:	16020 (DSSS) 17820 (OFDM)
Type of Modulation:	DSSS / OFDM
Emission Designator (TRC-43):	16M0G1D (DSSS) 17M8G7D (OFDM)
Transmitter Spurious (worst case) [μ V/m in 3m]:	67.6 (DSSS) 66.1 (OFDM)
Receiver Spurious (worst case) [μ V/m in 3m]:	66

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

Signature:



Date: 2007-07-19

Test engineer:

3.1.3 EUT operating modes

EUT operating mode no. *)	Description of operating modes	Additional information
Op. 0	Normal mode	Normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

*) EUT operating mode no. is used to simplify the test plan

3.1.4 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T _{nom}	°C	23
Nominal Humidity	H _{nom}	%	48
Nominal Power Source	V _{nom}	V	230

Type of power source: **AC**

Deviations from these values are reported in chapter 2

4 Summary of Measurement Results and list of all performed test cases

- No deviations from the technical specifications were ascertained
- There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 15 §15.247 - CANADA RSS-210	PASS	2007-07-19	

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
None	Antenna Gain	Yes			
§15.247 (e)	Peak power spectral density	Yes			
§15.247(a)(2)	Spectrum Bandwidth of a DSSS System / 6dB BW	Yes			
§ 15.247 (b)(3)	Maximum output power (conducted)	Yes			
§ 15.247 (b)(3)	Max. peak output power (radiated)	Yes			
§15.247 (d)	Band-edge compliance of conducted emissions	Yes			
§15.205	Band-edge compliance of radiated emissions	Yes			
§15.247 (d)	Spurious Emission - conducted (Transmitter)	Yes			
§ 15.209	Spurious Emission -radiated (Transmitter)	Yes			
§ 15.109	Spurious Emissions-radiated (Receiver)	Yes			
§ 15.209	Spurious Emissions-radiated <30 MHz	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	Yes			

5 RF measurement testing

5.1 Description of test set-up

5.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 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 set-ups 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 C63.4-2003 clause 4.2.

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

9 kHz - 150 MHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.

150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, biconical antenna

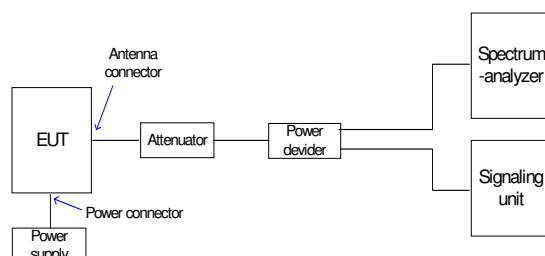
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.209 and 15.207

5.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is connected to the spectrum analyzer. The specific losses for signal path are first checked within a calibration. The measurement readings on the 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.



5.2 Referenced Documents

None

5.3 Additional comments

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5.4 Antenna gain

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

b-mode

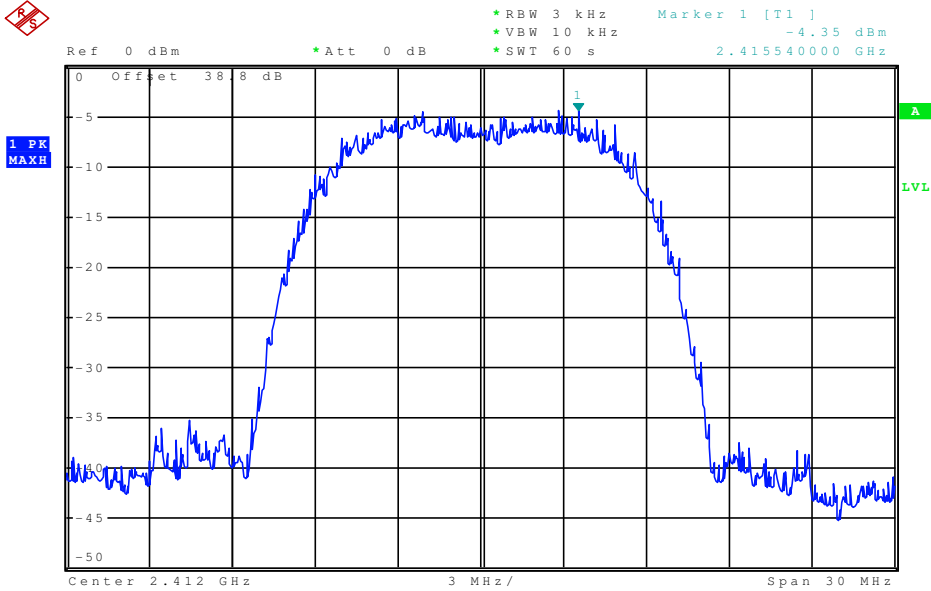
	low channel	mid channel	high channel
Conducted power [dBm]	24.06	24.67	23.45
Radiated power [dBm]	25.82	24.38	23.22
Gain [dBi]	1.76	-0.29	-0.23

g-mode

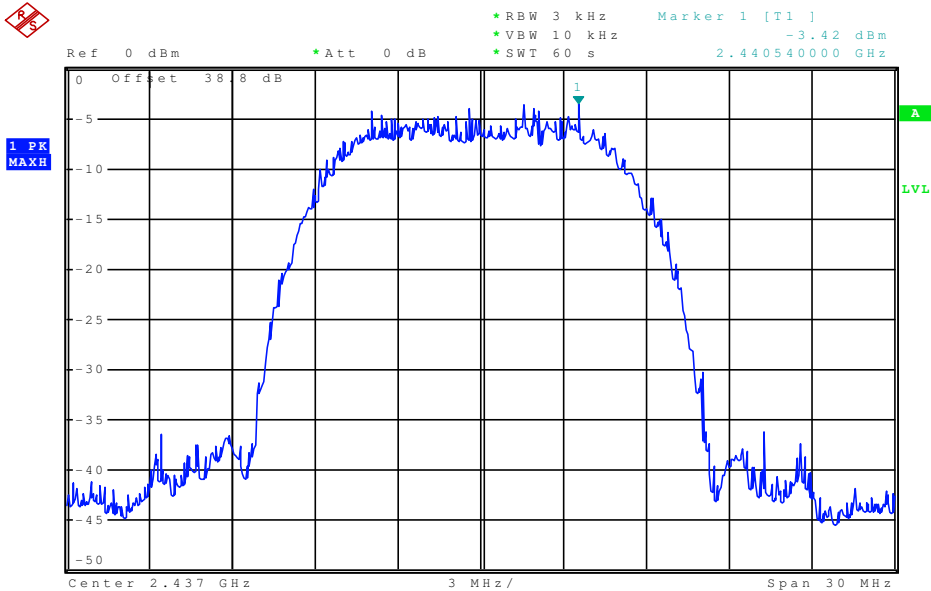
	low channel	mid channel	high channel
Conducted power [dBm]	23.81	24.27	23.08
Radiated power [dBm]	25.82	24.02	23.68
Gain [dBi]	2.01	-0.25	0.60

5.5 Peak Power Spectral density (digitally modulated systems) §15.247(e)

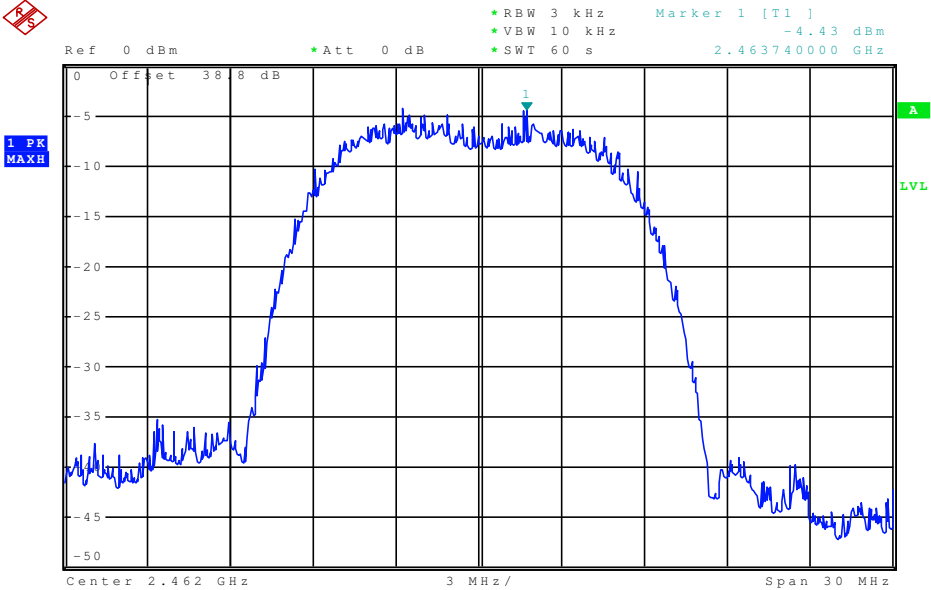
Plot 1: b-Mode (2412 MHz)



Plot 2: b-Mode (2437 MHz)

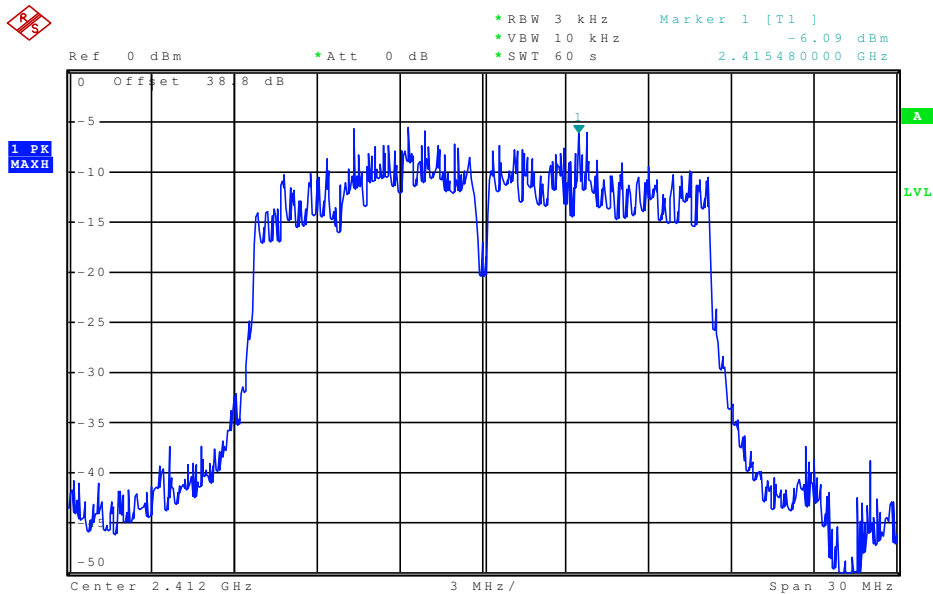


Plot 3: b-Mode (2462 MHz)

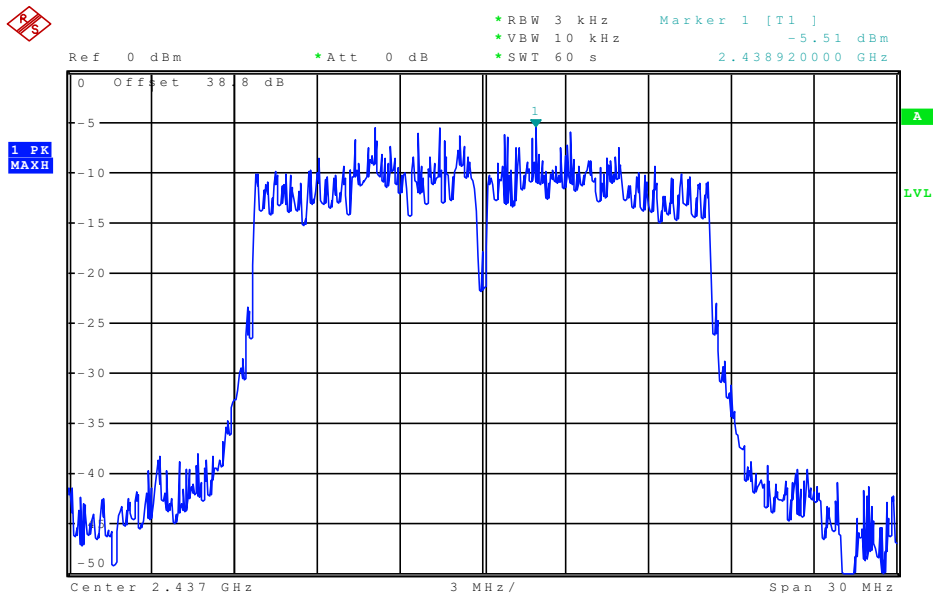


Results: b-Mode:
Plot 1: Power density: - 4.35 dBm / 3 kHz
Plot 2: Power density: - 3.42 dBm / 3 kHz
Plot 3: Power density: - 4.43 dBm / 3 kHz

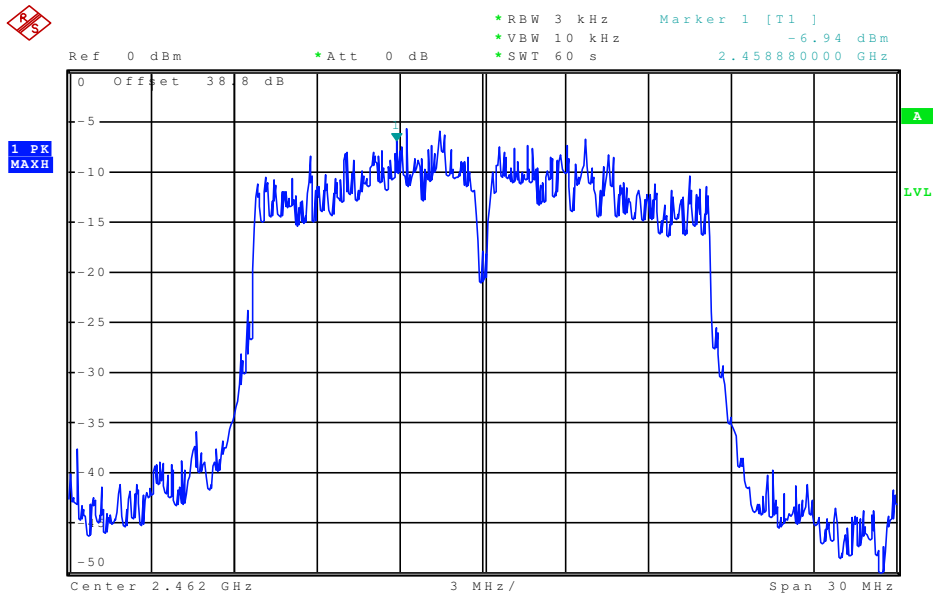
Plot 4: g-Mode (2412 MHz)



Plot 5: g-Mode (2437 MHz)



Plot 6: g-Mode (2462 MHz)



Results: in g-Mode:
 Plot 1: Power density: - 6.09 dBm / 3 kHz
 Plot 2: Power density: - 5.51 dBm / 3 kHz
 Plot 3: Power density: - 6.94 dBm / 3 kHz

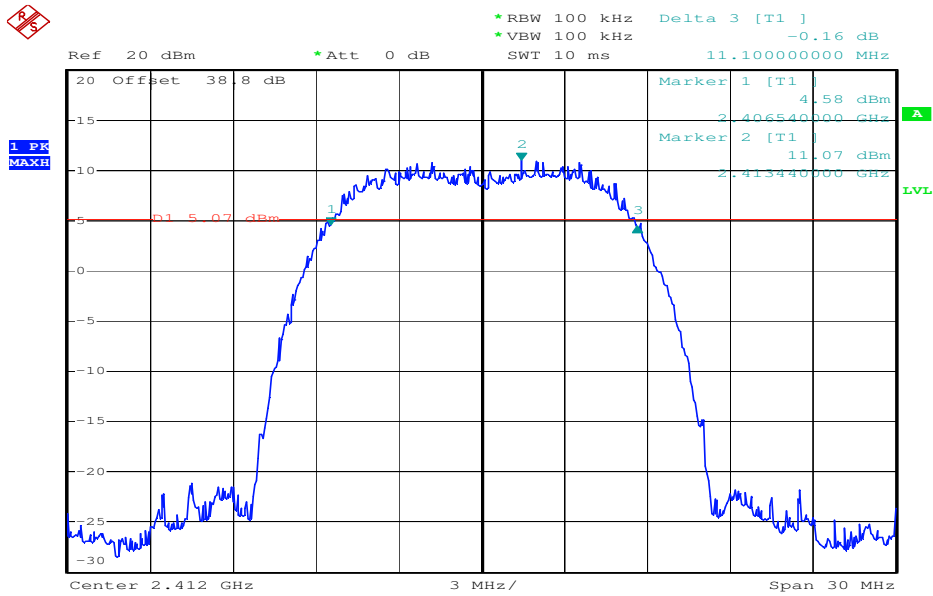
Limits :

<p>Under normal test conditions only</p>	<p>For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission</p>
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5.6 Spectrum Bandwidth of a DSSS System / 6 dB Bandwidth §15.247(a)(2)

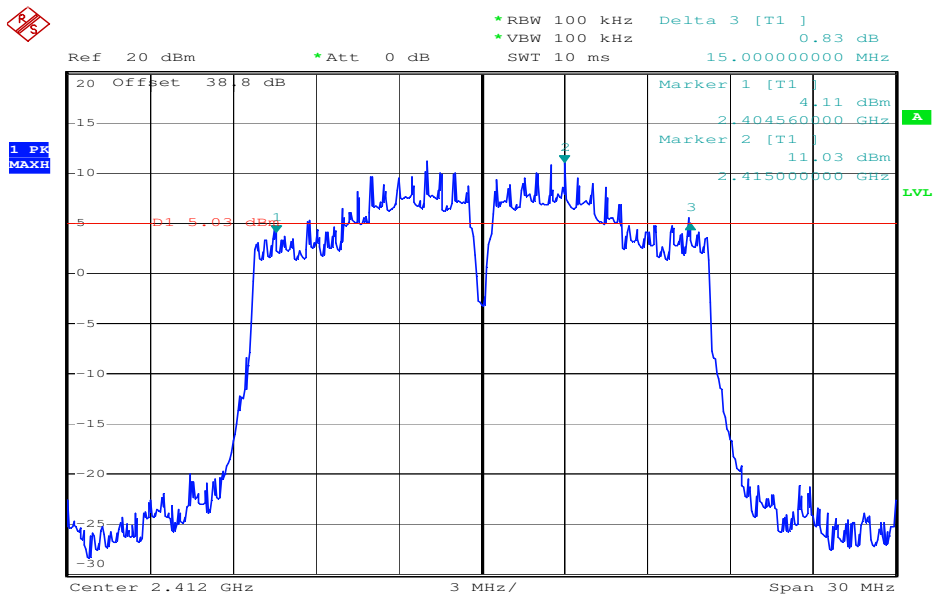
2412 MHz:

b-Mode:



Date: 5.JUL.2007 14:34:51

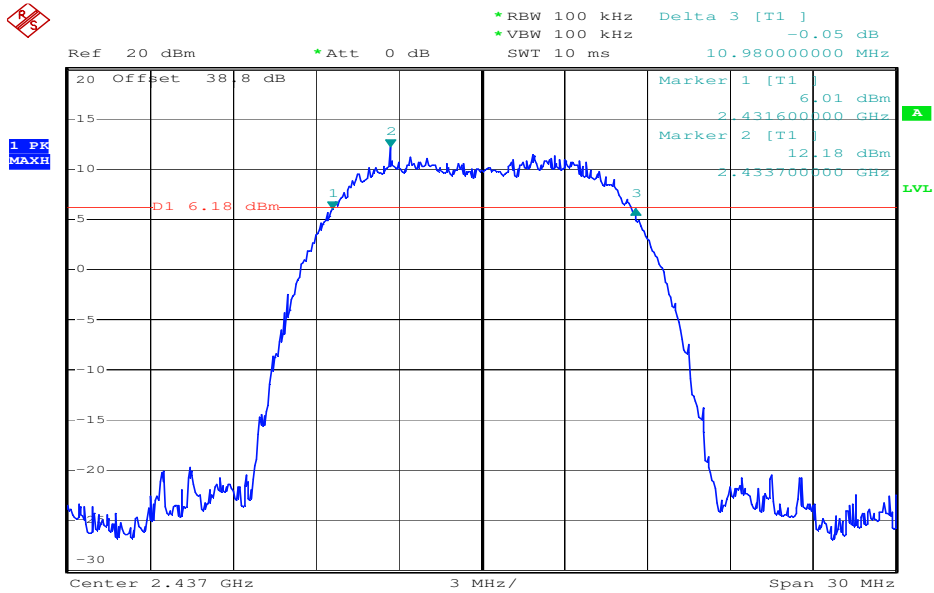
g-Mode:



Date: 5.JUL.2007 14:44:31

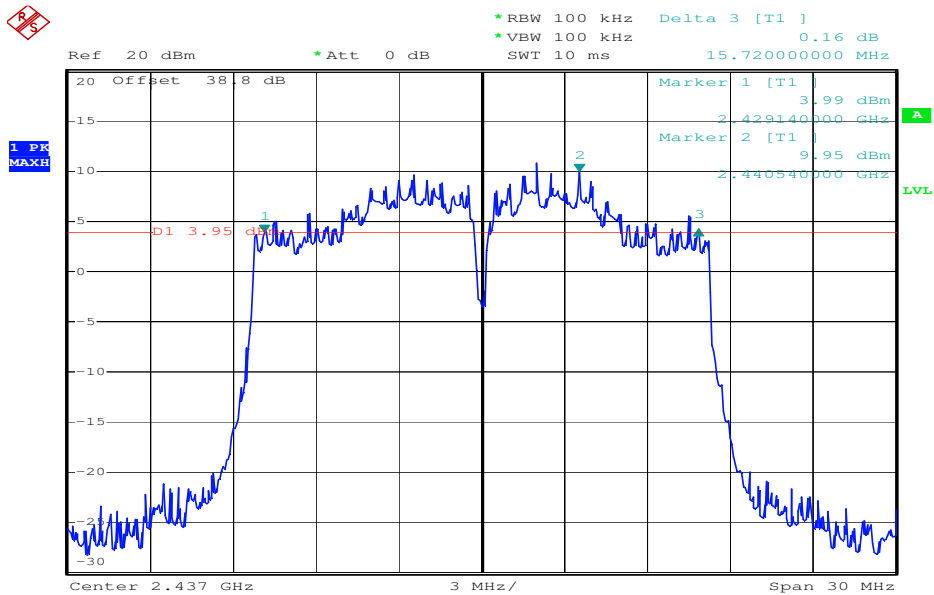
2437 MHz:

b-Mode:



Date: 5.JUL.2007 14:56:43

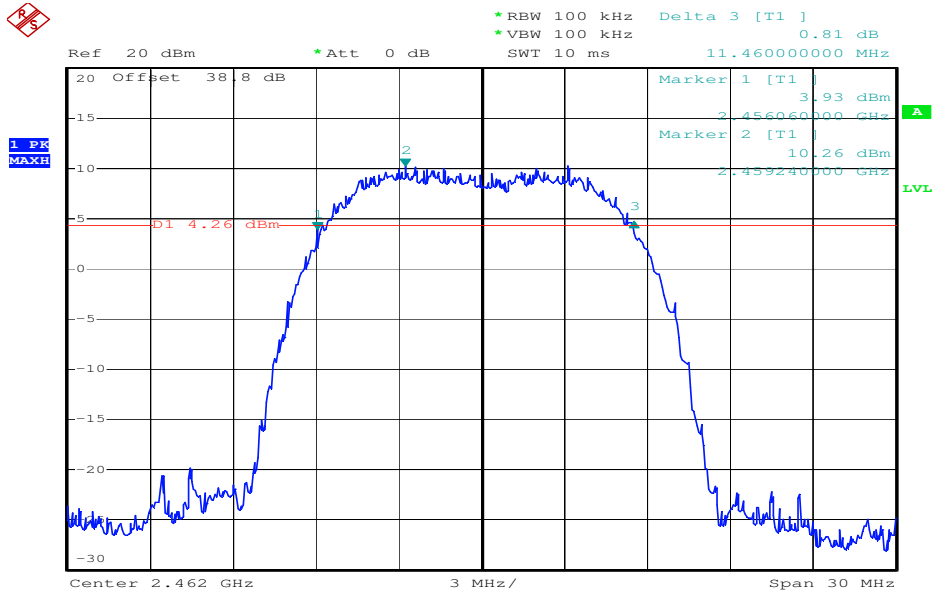
g-Mode:



Date: 5.JUL.2007 14:48:07

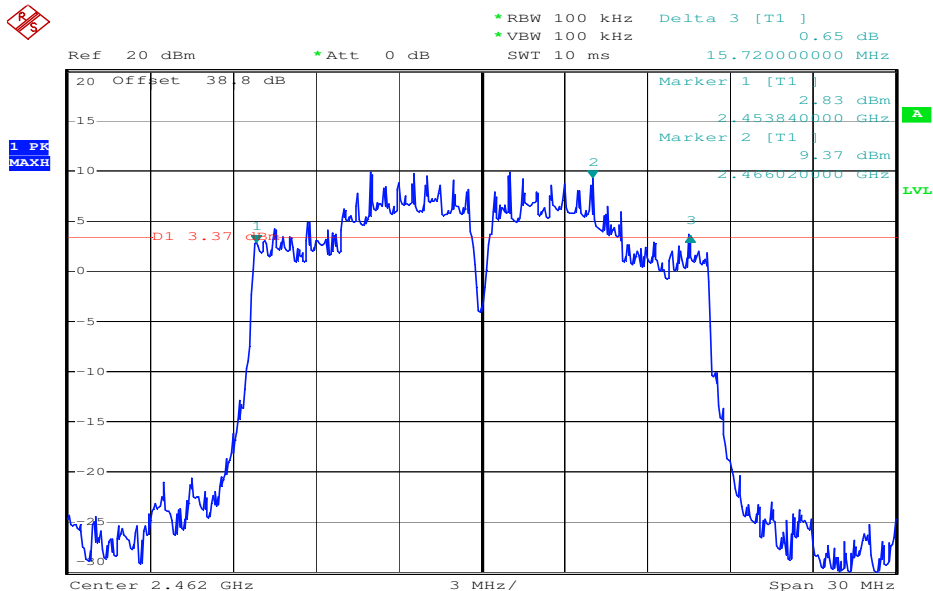
2462 MHz:

b-Mode:



Date: 5.JUL.2007 14:59:35

g-Mode:



Date: 5.JUL.2007 15:06:20

Results:

Test conditions		6 dB BANDWIDTH [MHz]		
Frequency [MHz]		2412	2437	2462
T _{nom}	V _{nom}	b) 11.10 MHz g) 15.00 MHz	b) 10.98 MHz g) 15.72 MHz	b) 11.46 MHz g) 15.72 MHz
Measurement uncertainty		±100 kHz		

RBW: 100 kHz / VBW 100 kHz

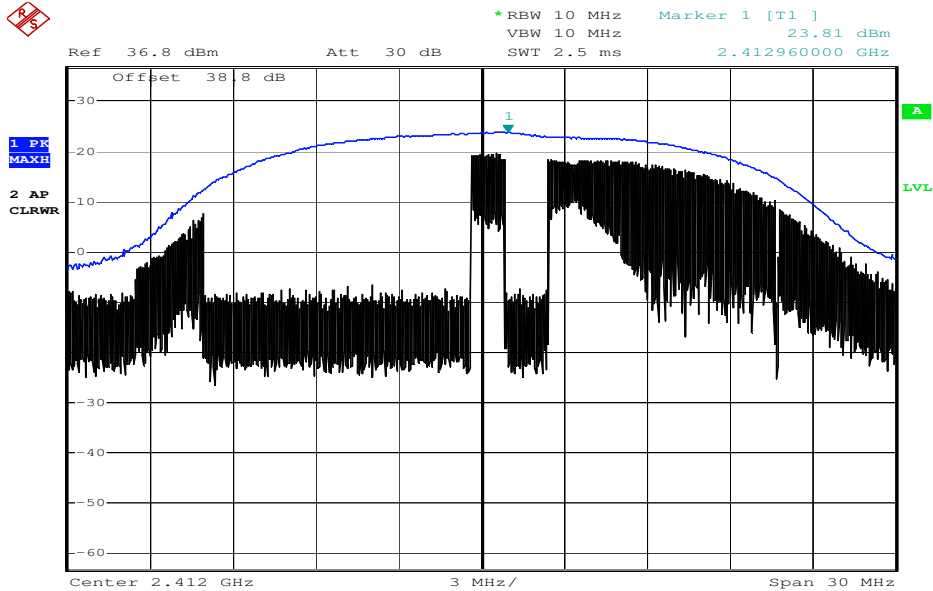
Limits:

Under normal test conditions only	> 500 kHz
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5.7 Maximum output power (conducted) §15.247 (b)(3)

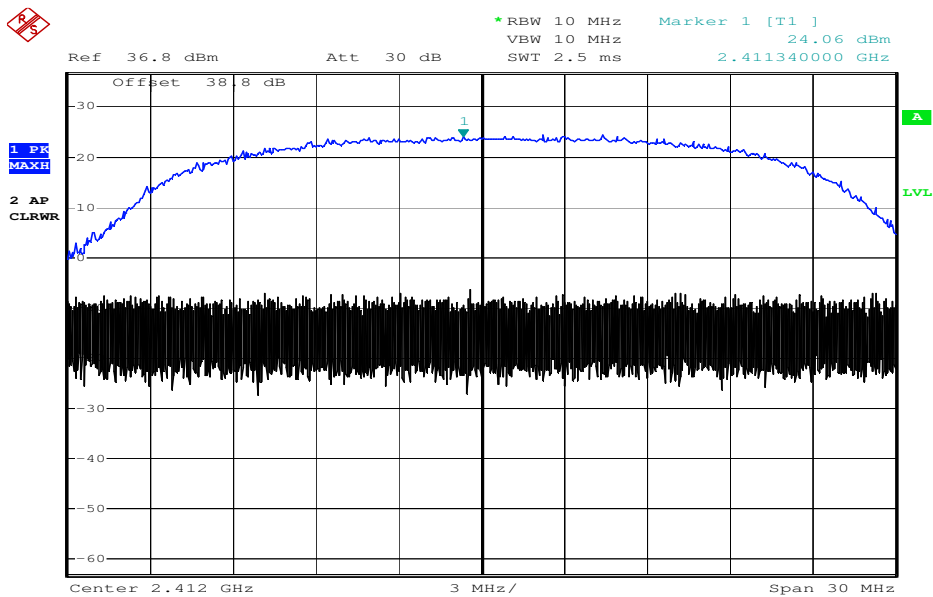
2412 MHz:

b-Mode:



Date: 5.JUL.2007 14:29:31

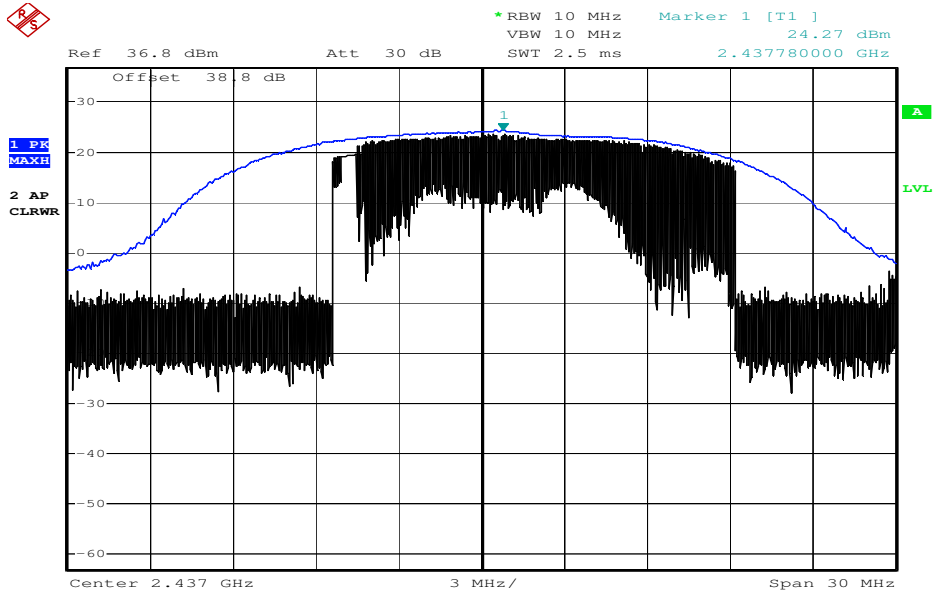
g-Mode:



Date: 5.JUL.2007 14:18:29

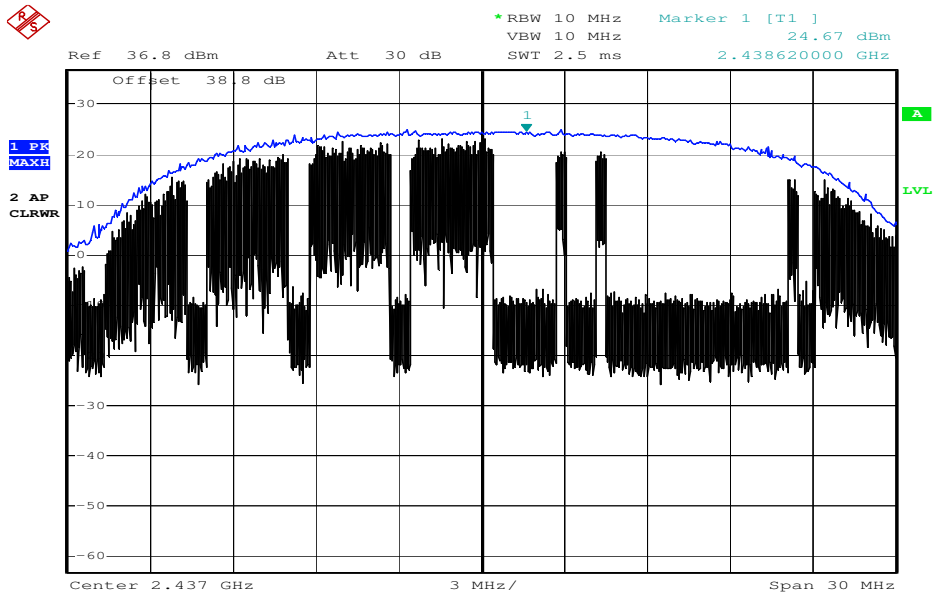
2437 MHz:

b-Mode:



Date: 5.JUL.2007 14:27:44

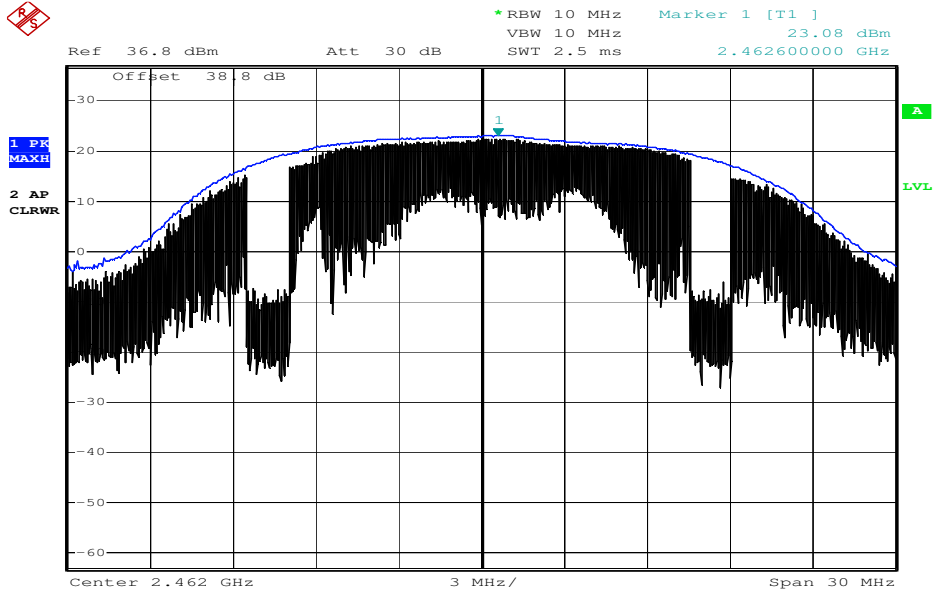
g-Mode:



Date: 5.JUL.2007 14:21:12

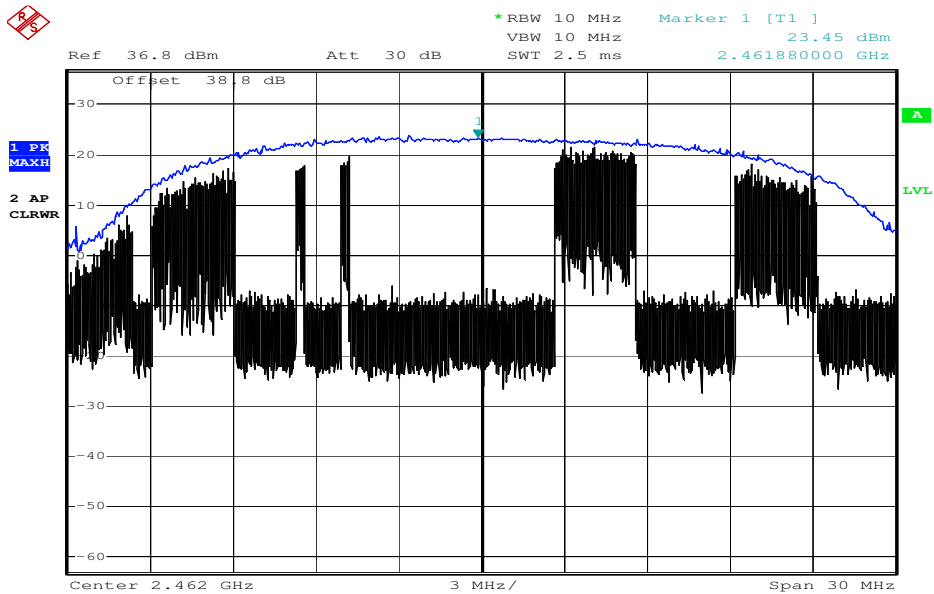
2462 MHz:

b-Mode:



Date: 5.JUL.2007 14:26:08

g-Mode:



Date: 5.JUL.2007 14:23:55

Results:

b-mode

Test conditions		Max. peak output power [dBm]			
Frequency [MHz]		2412		2437	2462
T _{nom}	V _{nom}	PK	23.81	24.27	23.08
		PK corrected	24.26	24.68	23.67
De facto EIRP (Peak) [dBm]		26.02		24.39	23.44
Antenna gain: [dBi]		1.76		-0.29	-0.23
Measurement uncertainty		±3dB			

RBW / VBW: 10 MHz

Results:

g-mode

Test conditions		Max. peak output power [dBm]			
Frequency [MHz]		2412		2437	2462
T _{nom}	V _{nom}	PK	24.06	24.67	23.45
		PK corrected	25.82	26.63	25.41
De facto EIRP (Peak) [dBm]		27.83		26.38	26.01
Antenna gain: [dBi]		2.01		-0.25	0.60
Measurement uncertainty		±3dB			

RBW / VBW: 10 MHz

Remark: The correction factor is calculated by $10 \times \log(\text{measured BW} / \text{used BW})$ [dB]

Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt / 30 dBm
--	------------------------

MPE calculation

These equations are generally accurate in the far field of an antenna but will over predict power density in the near field, where they could be used for making a “worst case” prediction.

$$S = PG/4\pi R^2$$

where S = power density (in appropriate units, e.g. mW/cm²)
 P = power input to the antenna (in appropriate units e.g. mW)
 G = power gain of the antenna in the direction of interest relative to the isotropic radiator
 R = distance to the centre of radiation of the antenna (appropriate units e.g. cm)

Or

$$S = EIRP/4\pi R^2$$

where EIRP = equivalent isotropically radiated power

Calculation:

(Calculated for max. EIRP)

EIRP: 27.83 dBm (= 606.74 mW)

calculated at distance of 20 cm:

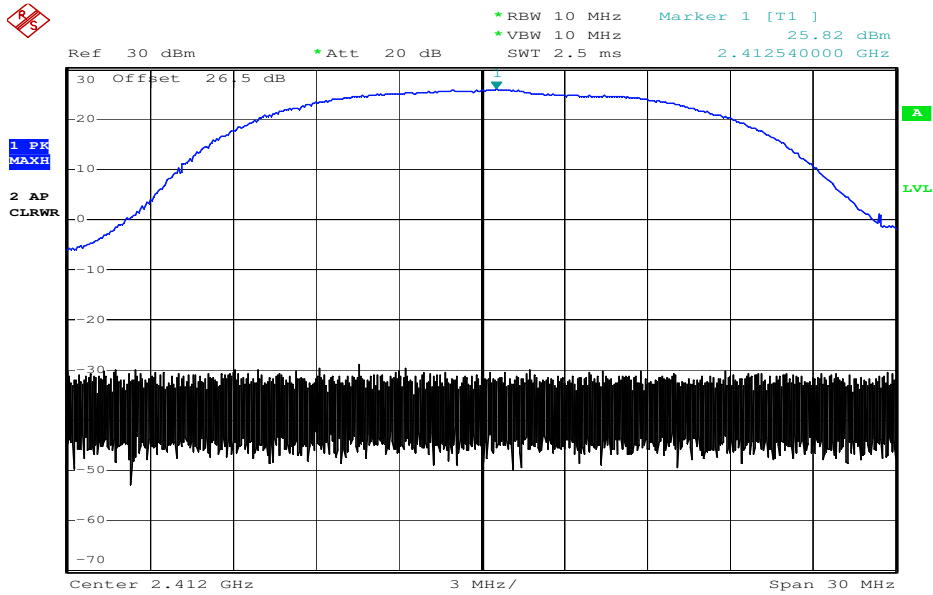
$$\text{power density} = 606.74 \text{ mW} / 4\pi 20^2 \text{ cm}^2 = 0.121 \text{ mW/ cm}^2$$

Limit:

1mW/ cm² is the reference level for general public exposure according to the OET Bulletin 65, Edition 97-01 Table 1.

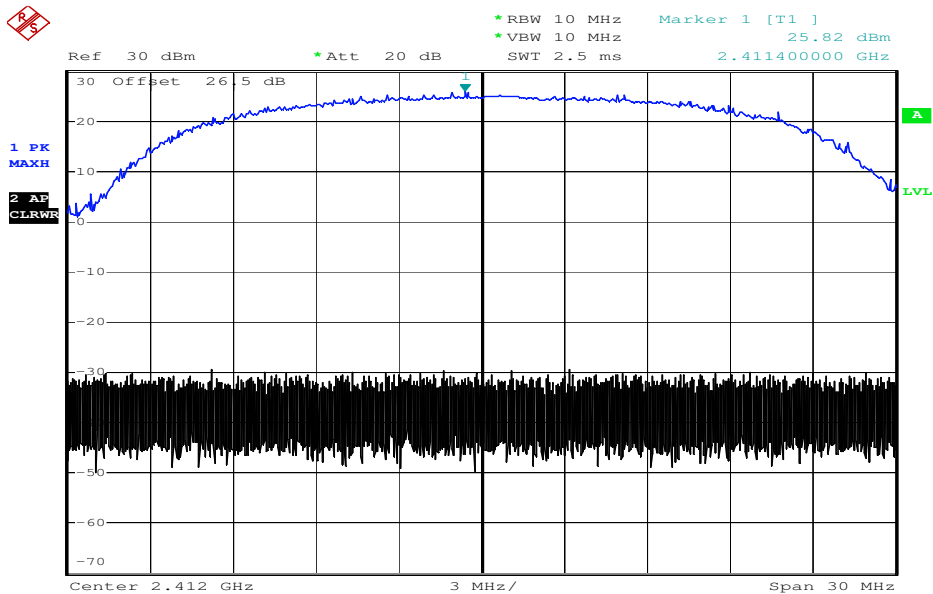
5.8 Max. peak output power (radiated) §15.247 (b)(3)

b-Mode: (2412 MHz)



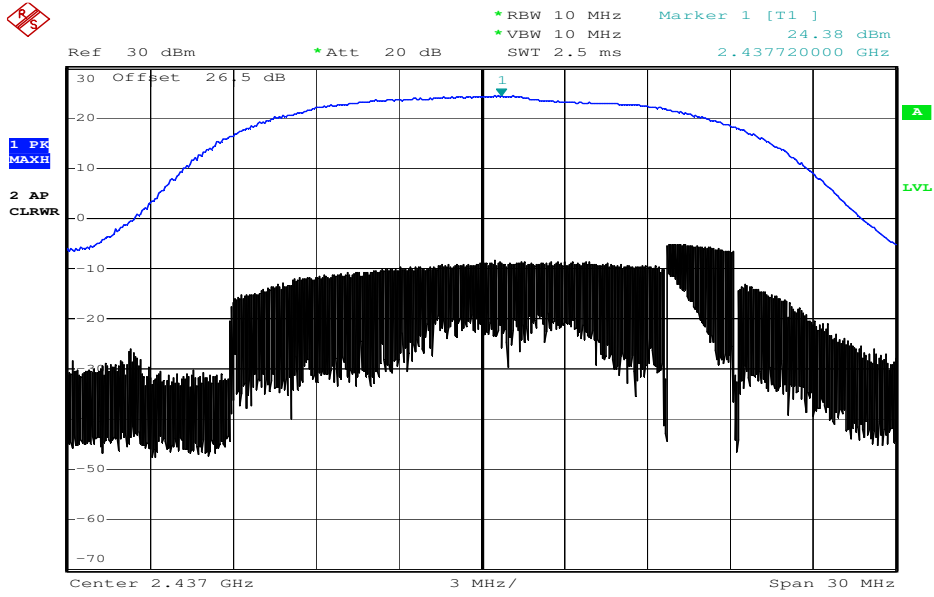
Date: 6.JUL.2007 08:45:11

g-Mode: (2412 MHz)



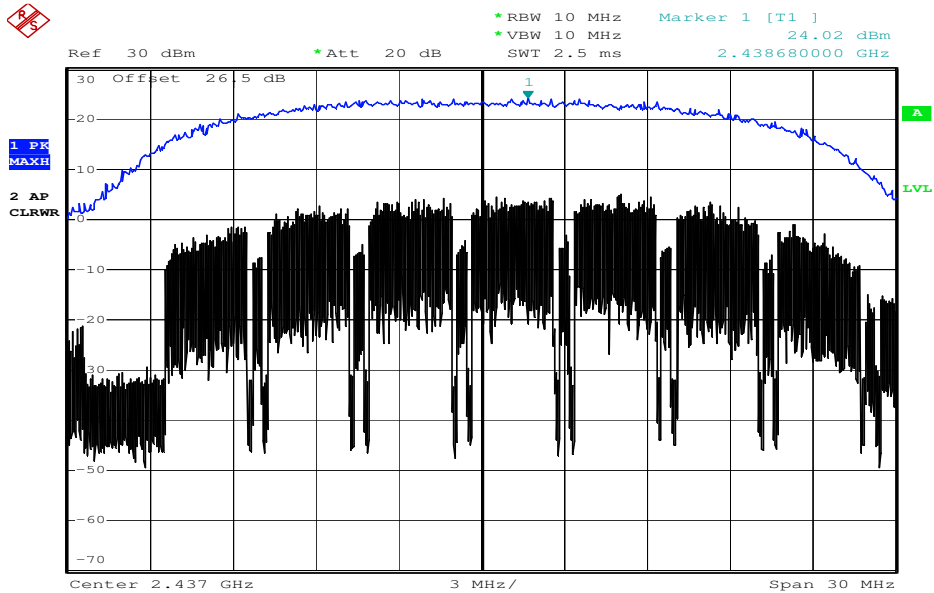
Date: 6.JUL.2007 08:40:58

b-Mode: (2437 MHz)



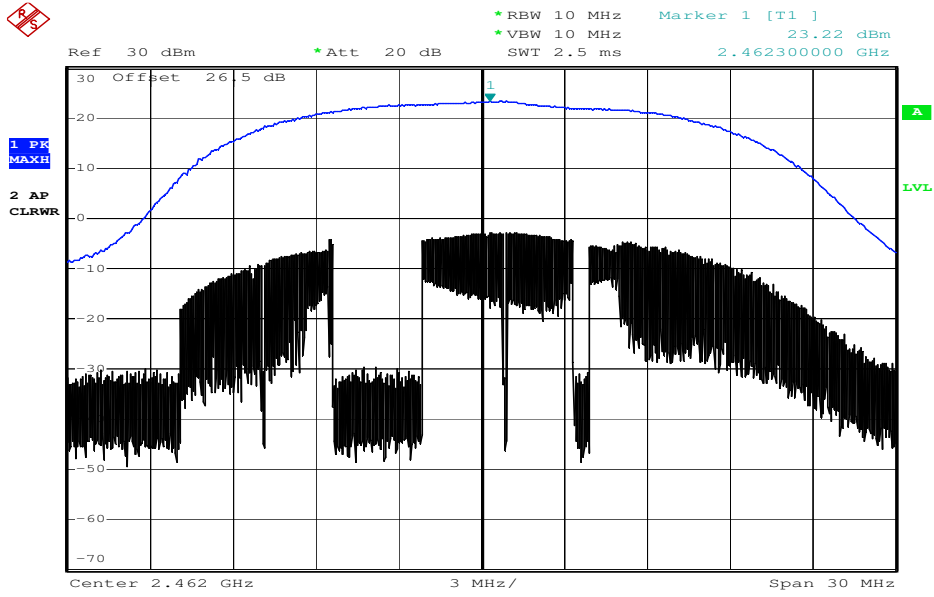
Date: 6.JUL.2007 08:47:17

g-Mode: (2437 MHz)



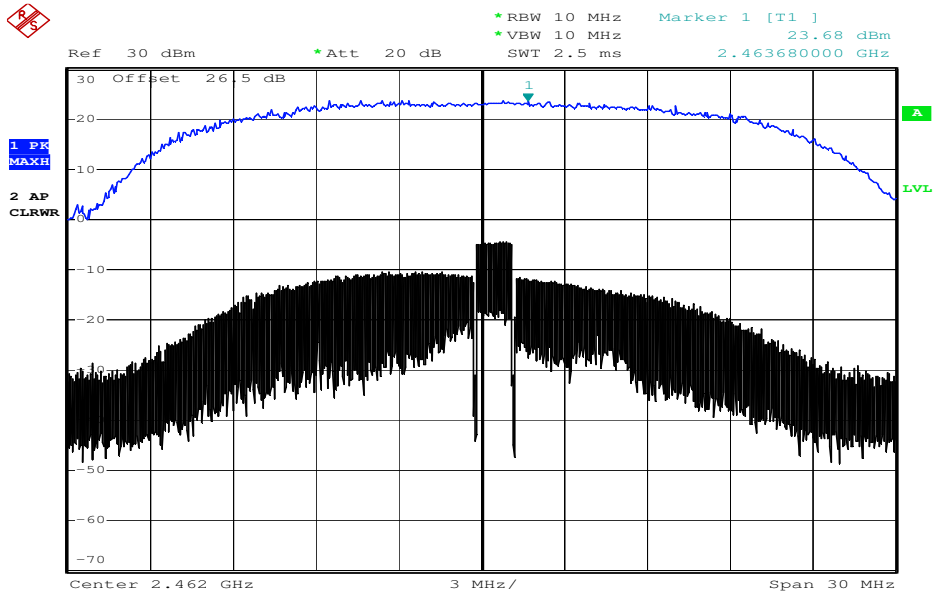
Date: 6.JUL.2007 08:50:37

b-Mode: (2462 MHz)



Date: 6.JUL.2007 08:56:59

g-Mode: (2462 MHz)



Date: 6.JUL.2007 08:54:44

Results:

b-mode

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2412	2437	2462
T _{nom}	V _{nom}	25.82	24.38	23.22
Measurement uncertainty		±3dB		

RBW / VBW: 10 MHz

Measured at a distance of 3m

g-mode

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2412	2437	2462
T _{nom}	V _{nom}	25.82	24.02	23.68
Measurement uncertainty		±3dB		

RBW / VBW: 10 MHz

Measured at a distance of 3m

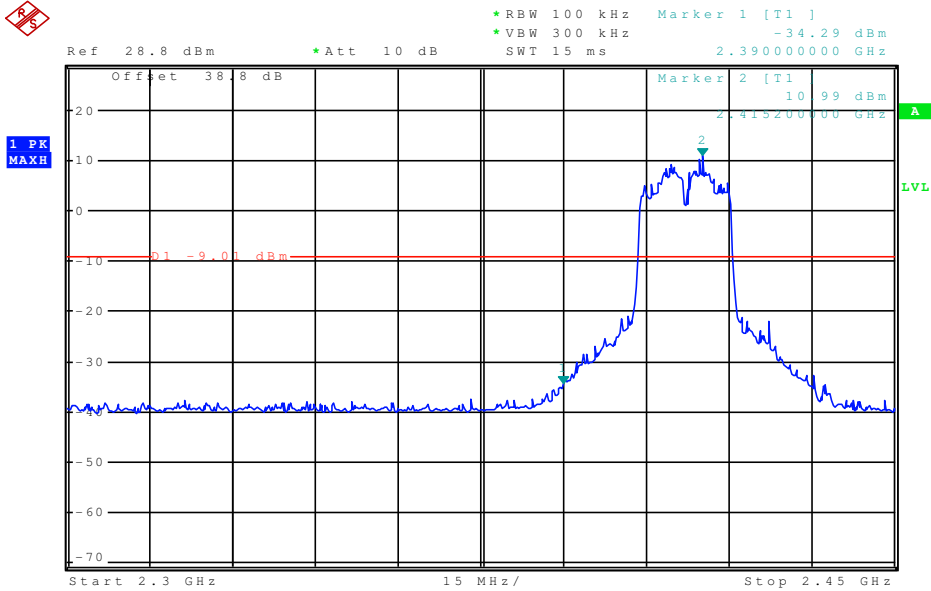
Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt (30 dBm)
--	------------------------

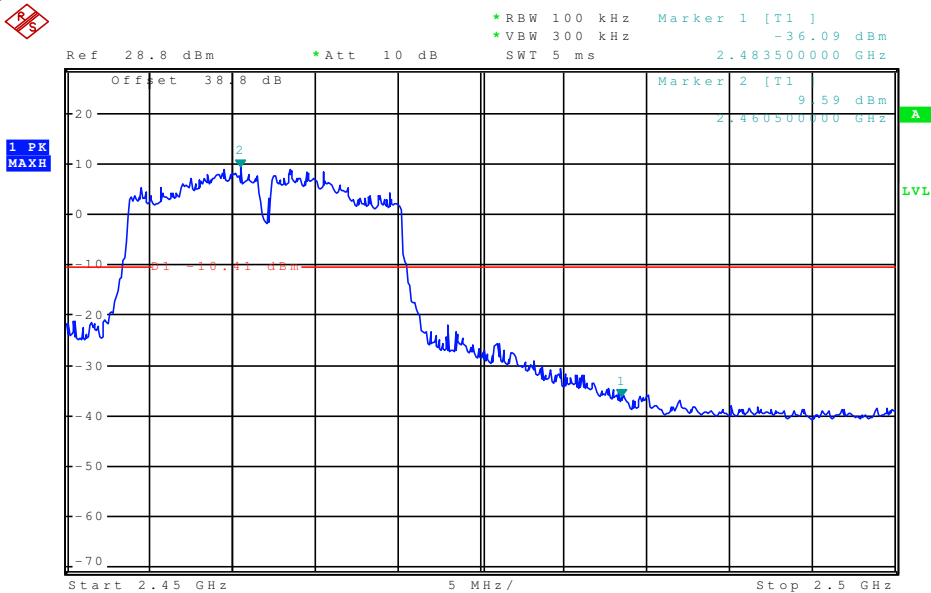
5.9 Band-edge compliance of conducted emissions §15.247 (d)

Measured only in g-Mode because this mode has the largest bandwidth.

Plot 1, lowest channel



Plot 2, highest channel

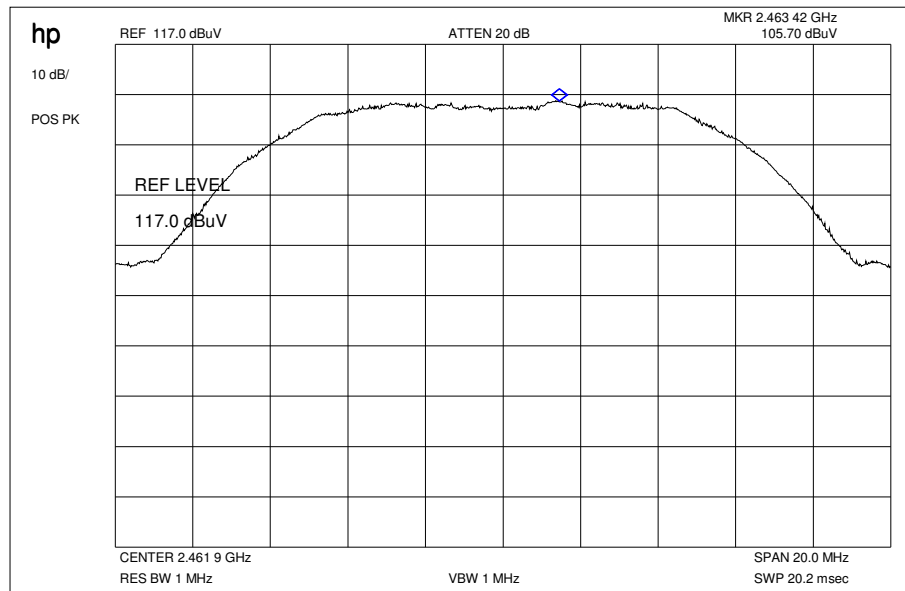


Limits:

Under normal test conditions only	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)).
-----------------------------------	--

5.10 Band-edge compliance of radiated emissions §15.205

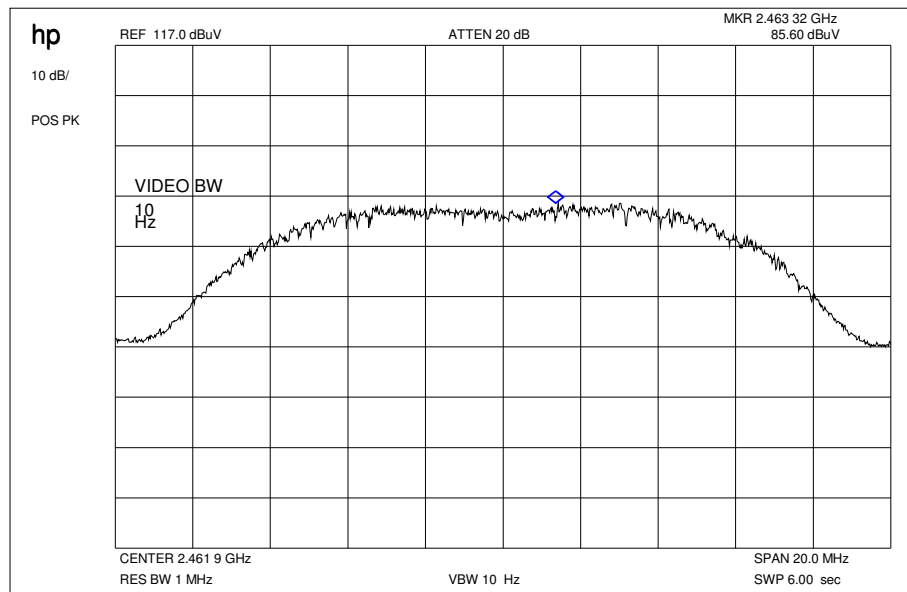
Plot 1: Max field strength in 3m distance (single frequency) peak (b-Mode)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	105.70 dB μ V	-3.2 dB	102.50 dB μ V

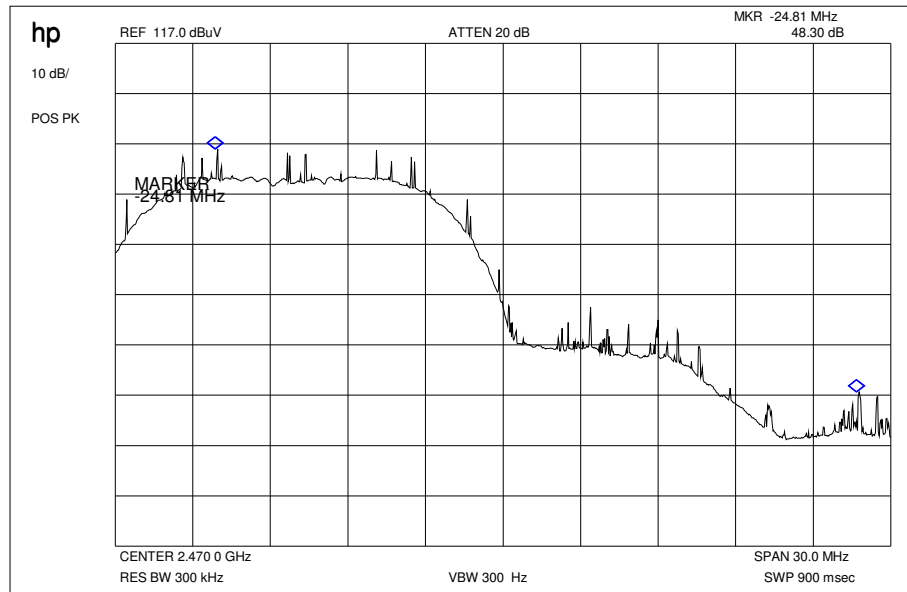
Plot 2: Max field strength in 3m distance (single frequency) average (b-Mode)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	85.60 dB μ V	-3.2 dB	82.40 dB μ V

Plot 3: Marker-Delta Method RBW/VBW = 1% of span (b-Mode)



Result: Marker-Delta-Value: 48.30dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands)

Results & Limits:

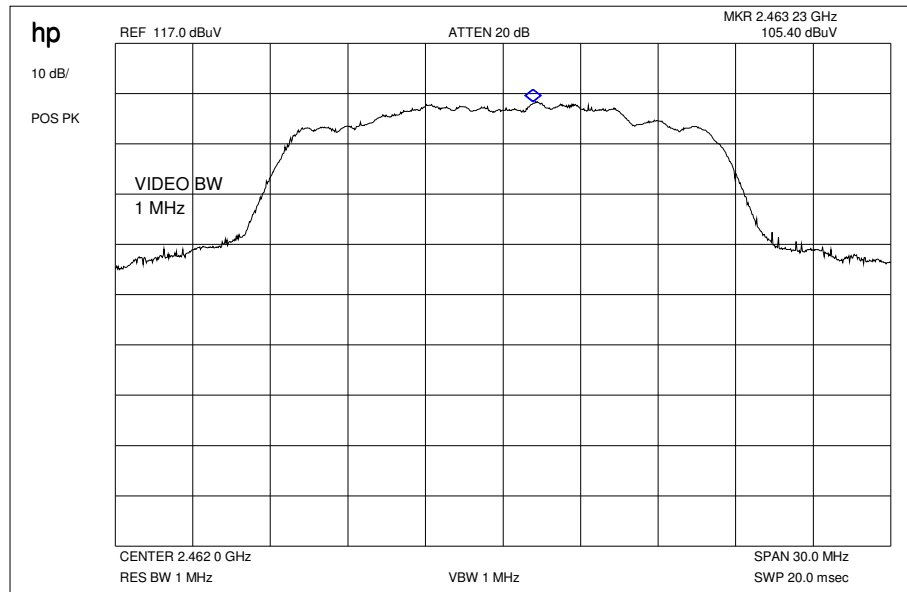
Radiated field strength

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

b-mode

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	105.70 dB μ V/m	-3.2 dB	102.50 dB μ V/m
Max. average value	1 MHz RBW 10 Hz VBW	85.60 dB μ V/m	-3.2 dB	82.40 dB μ V/m
Delta value	Peak 300 kHz RBW/VBW	48.30 dB		
Value at band edge	limit 54 dB μ V/m			34.10 dB μ V/m
Statement:	passed			Complies

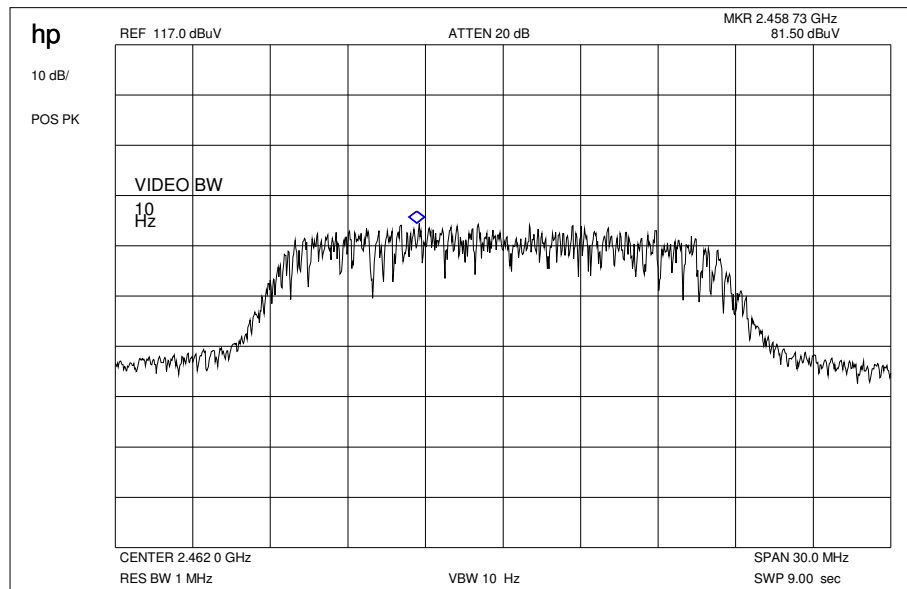
Plot 4: Max field strength in 3m distance (single frequency) peak (g-Mode)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	105.40 dB μ V	-3.2 dB	102.20 dB μ V

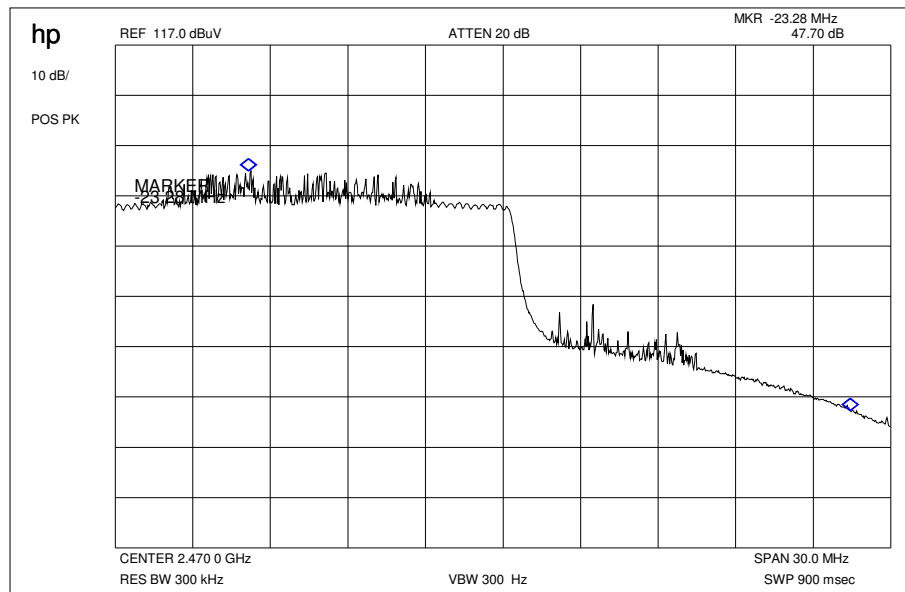
Plot 5: Max field strength in 3m distance (single frequency) average (g-Mode)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	81.50 dB μ V	-3.2 dB	78.30 dB μ V

Plot 6: Marker-Delta Method RBW/VBW = 1% of span (g-Mode)



Result: Marker-Delta-Value: 47.70 dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands)

Results & Limits:

Radiated field strength

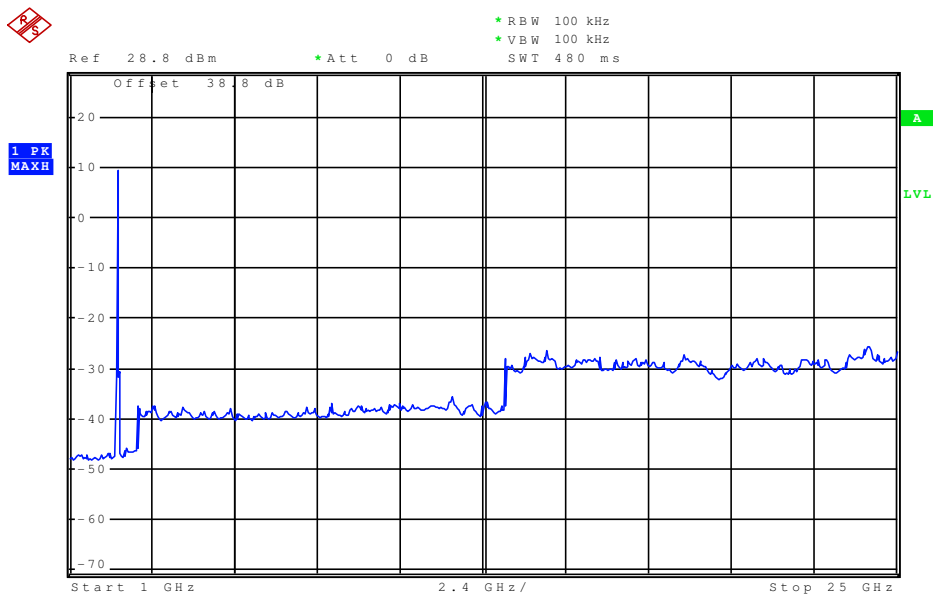
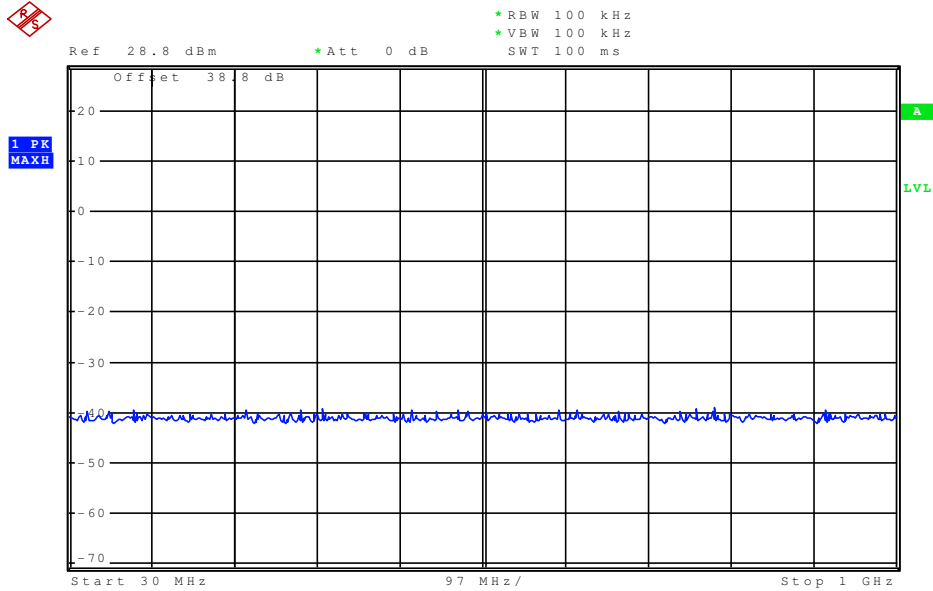
The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

g-mode:

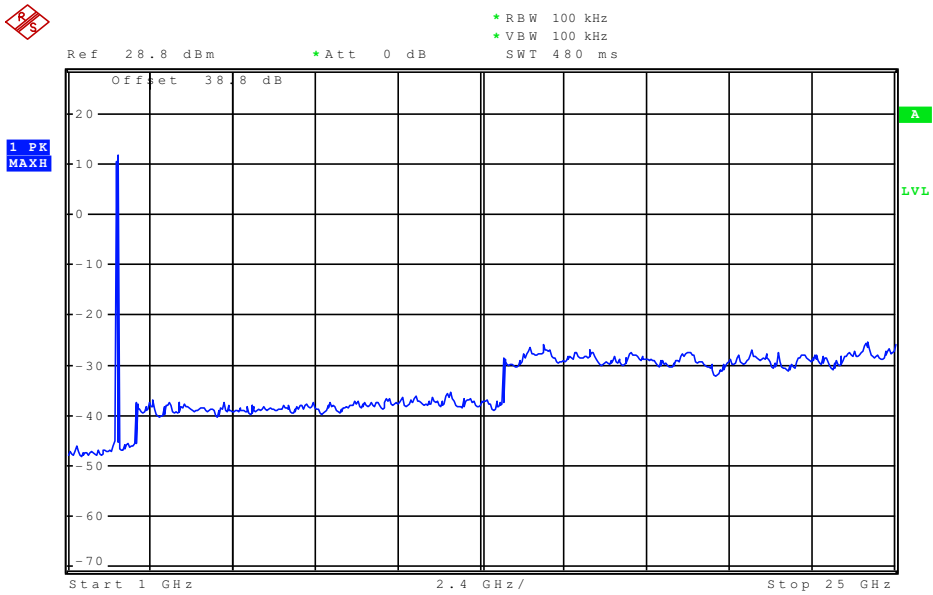
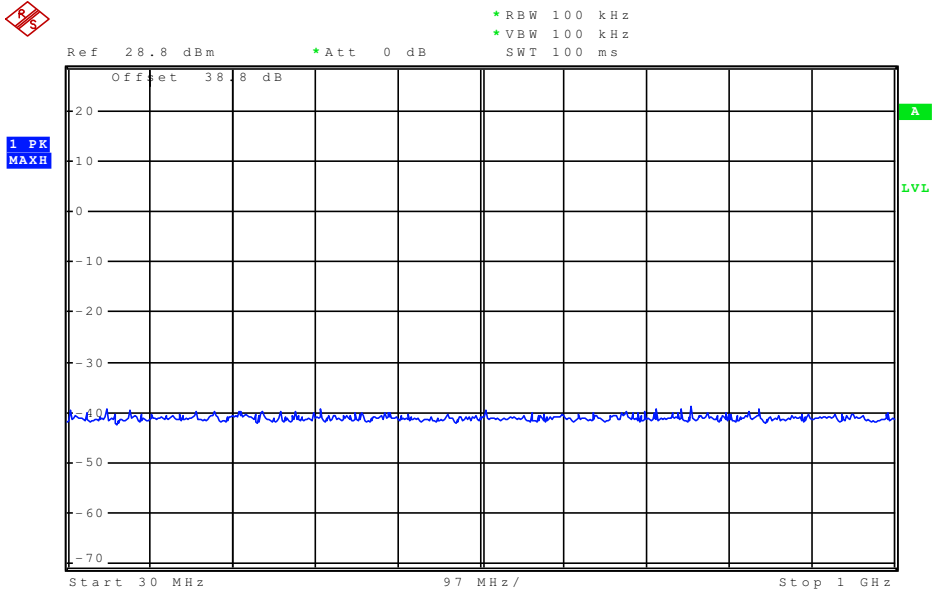
high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	105.40 dB μ V/m	-3.2 dB	102.20 dB μ V/m
Max. average value	1 MHz RBW 10 Hz VBW	81.50 dB μ V/m	-3.2 dB	78.30 dB μ V/m
Delta value	Peak 300 kHz RBW/VBW	47.7 dB		
Value at band edge	limit 54 dB μ V/m			30.60 dB μ V/m
Statement:	passed			Complies

5.11 Spurious Emissions - conducted (Transmitter) §15.247 (c)

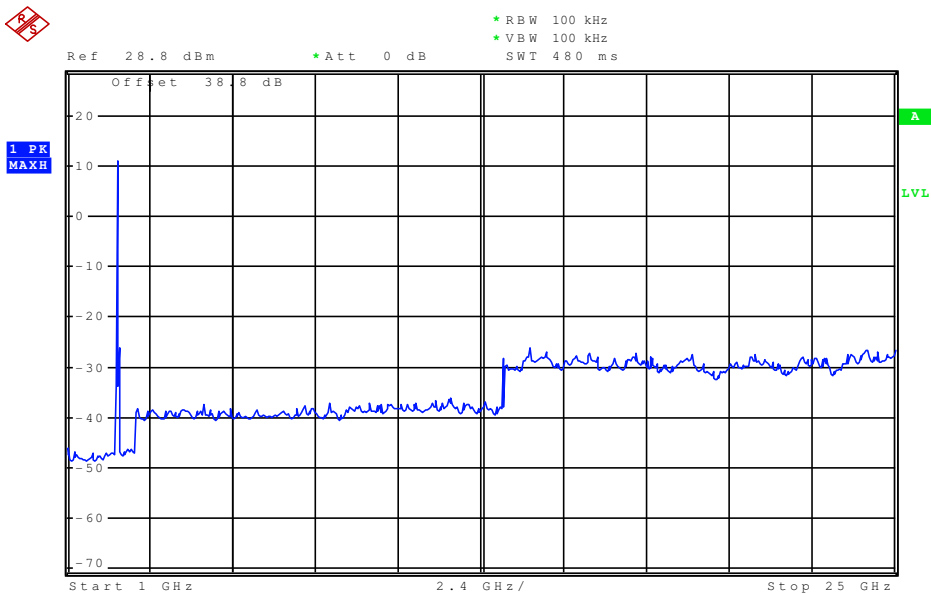
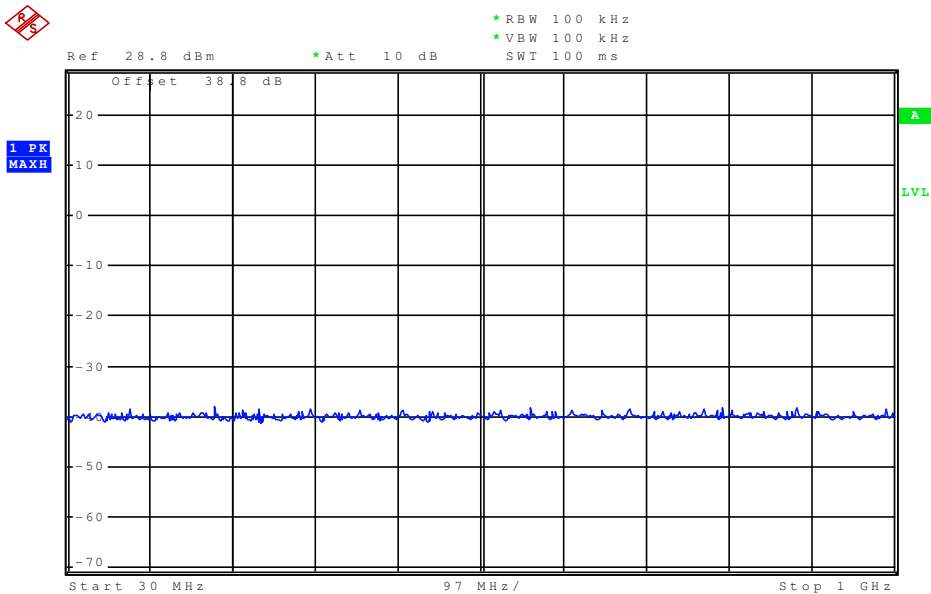
2412 MHz (valid for both modes)



2437 MHz (valid for both modes)



2462 MHz (valid for both modes)



Result & Limits:

Emission Limitations					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		9.72	30 dBm		Operating frequency
No critical peaks found			-20 dBc		
2437		12.27	30 dBm		Operating frequency
No critical peaks found			-20 dBc		
2462		11.07	30 dBm		Operating frequency
No critical peaks found			-20 dBc		
Measurement uncertainty		± 3dB			

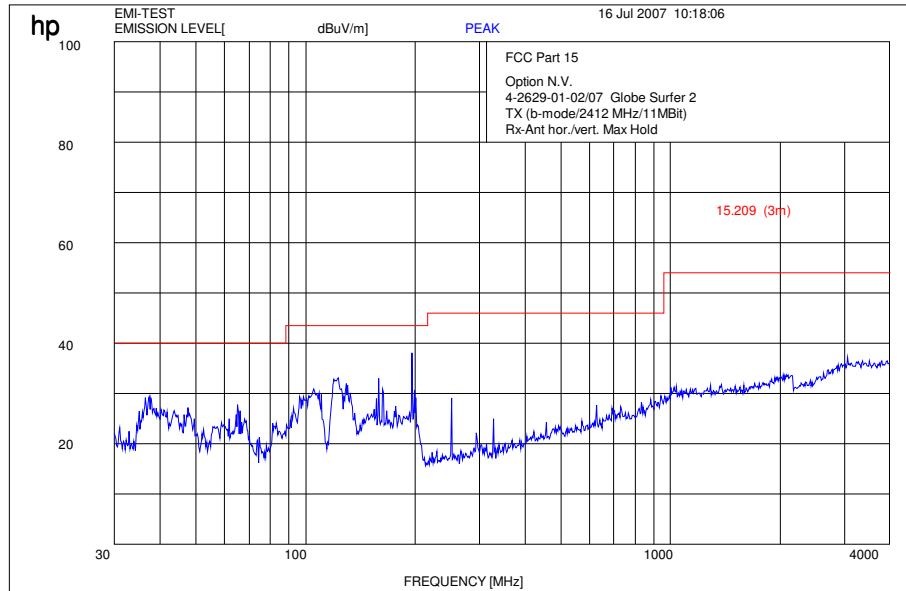
RBW: 100 kHz VBW: 100 kHz

Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. 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)).
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Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

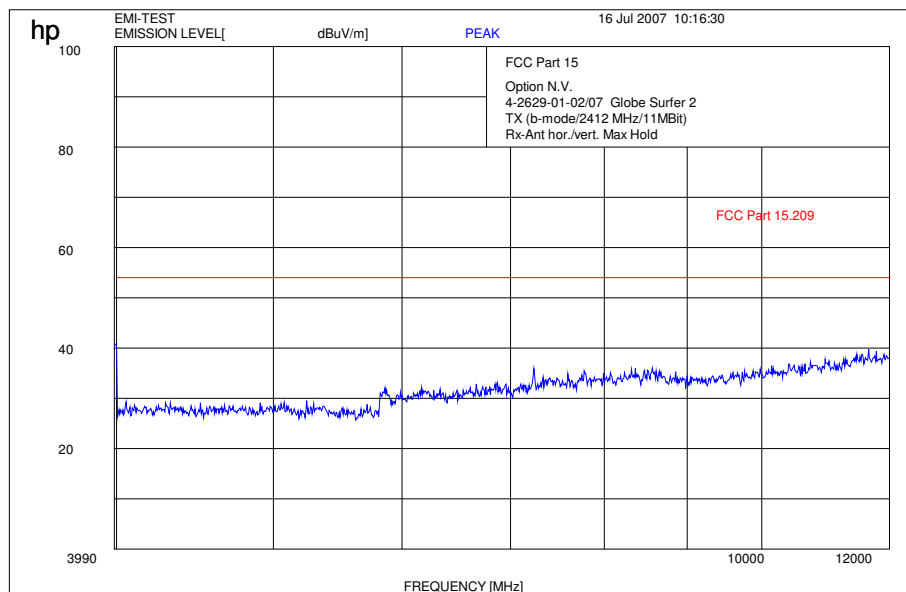
5.12 Spurious Emissions - radiated (Transmitter) §15.209

Plot 1: 0.03 - 4 GHz (b-mode / 2412 MHz)

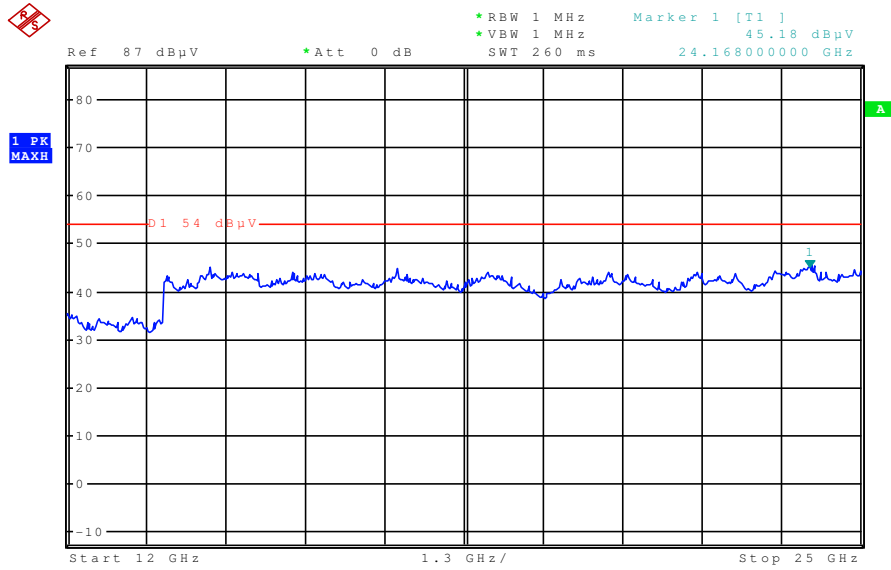


Carrier suppressed with a rejection filter

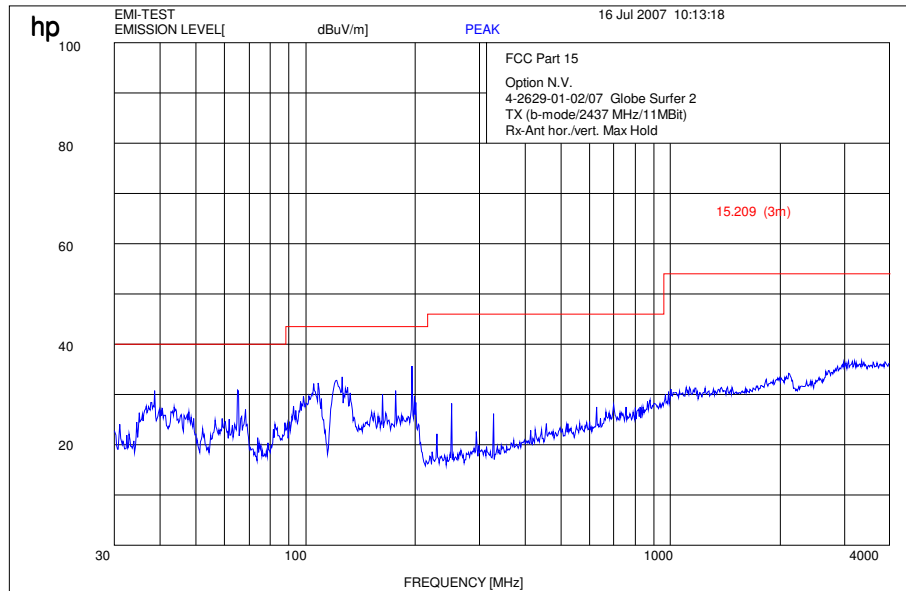
Plot 2: 4- 12 GHz (b-mode / 2412 MHz)



Plot: 12- 25 GHz (valid for all channels and both modes)

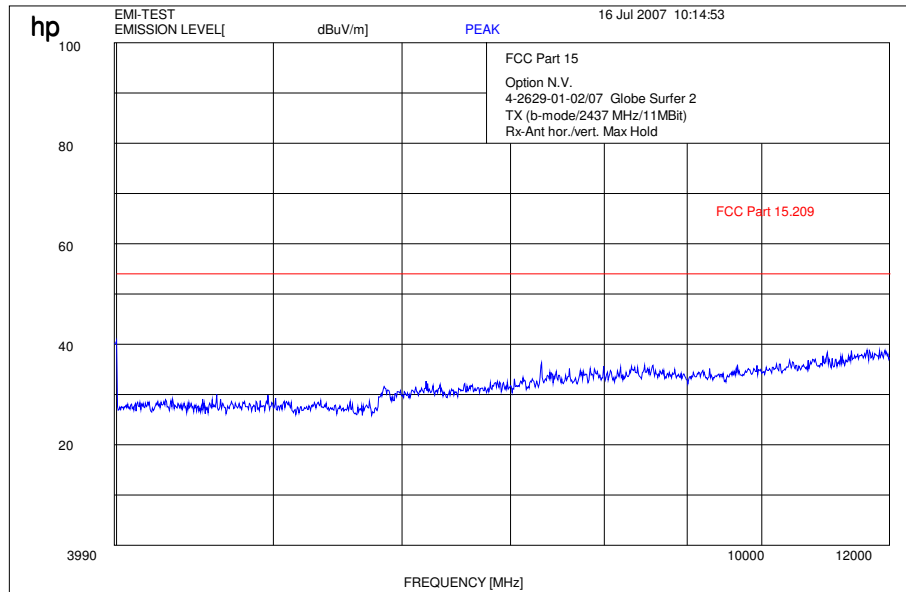


Plot 4: 0.03 - 4 GHz (b-mode / 2437 MHz)

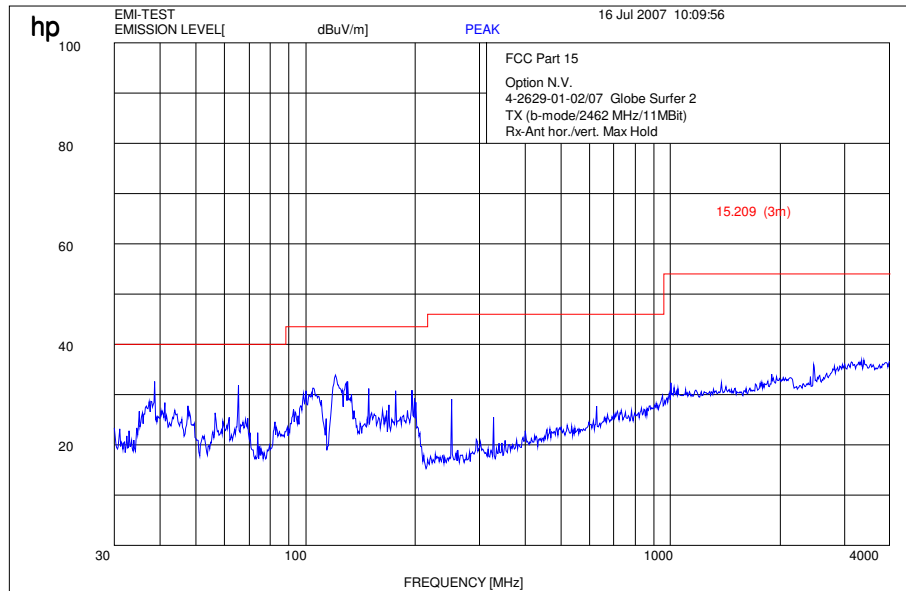


Carrier suppressed with a rejection filter

Plot 5: 4- 12 GHz (b-mode / 2437 MHz)

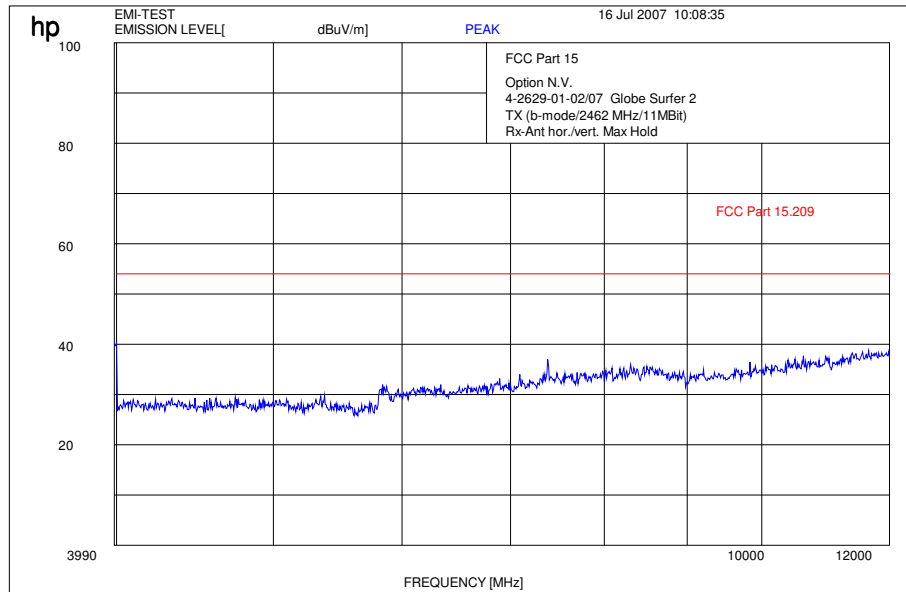


Plot 6: 0.03 - 4 GHz (b-mode / 2462 MHz)



Carrier suppressed with a rejection filter

Plot 7: 4- 12 GHz (b-mode / 2462 MHz)



Results:

b-mode

SPURIOUS EMISSIONS LEVEL §15.209								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
37.38	Pk	29.4	37.38	Pk	30.8	37.38	Pk	32.6
65.26	Pk	27.8	65.26	Pk	30.9	47.73	Pk	27.8
105.36	Pk	30.9	105.36	Pk	32.3	65.26	Pk	31.9
123.20	Pk	33.1	123.20	Pk	33.5	104.85	Pk	31.3
158.86	Pk	33.0	162.79	Pk	30.1	123.20	Pk	33.9
162.79	Pk	30.9	176.89	Pk	30.8	149.08	Pk	31.2
196.01	Pk	38.1	196.01	Pk	35.7	176.89	Pk	30.8
251.50	Pk	29.1	251.50	Pk	28.2	196.01	Pk	30.9
			327.48	Pk	26.2	251.50	Pk	29.1
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

g-mode

SPURIOUS EMISSIONS LEVEL §15.209								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
35.77	Pk	27.8	35.77	Pk	28.6	38.68	Pk	32.6
47.96	Pk	36.6	48.20	Pk	35.9	47.73	Pk	27.8
49.15	Pk	33.2	52.12	Pk	27.3	65.58	Pk	31.9
52.12	Pk	27.4	60.65	Pk	25.3	104.85	Pk	31.3
56.08	Pk	27.0	65.26	Pk	30.1	120.82	Pk	33.9
60.35	Pk	26.5	77.82	Pk	27.0	149.08	Pk	31.2
64.94	Pk	31.6	90.99	Pk	26.1	176.89	Pk	30.8
77.44	Pk	27.7	201.85	Pk	27.8	196.01	Pk	30.9
90.55	Pk	26.3				251.5	Pk	29.1
203.83	Pk	28.4				327.48	Pk	25.5
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limits: § 15.247 (c)

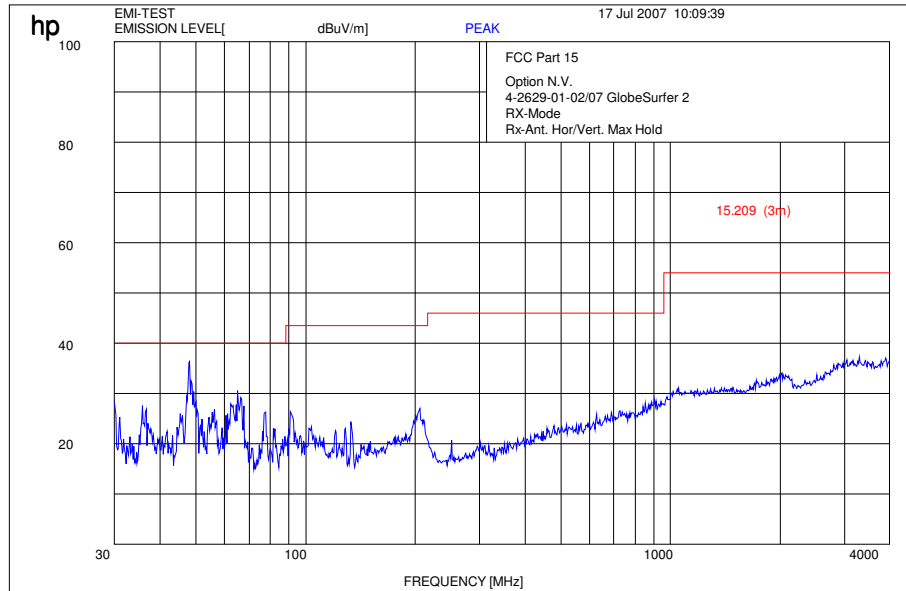
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Limits: § 15.209

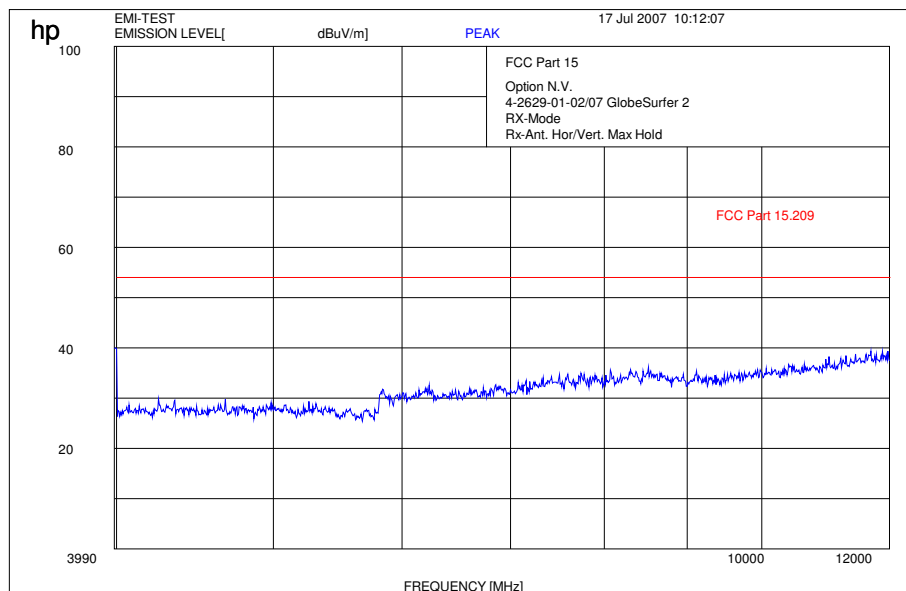
Frequency [MHz]	Field strength [μ V/m]	Measurement distance (m)
30 - 88	100 (40 dB μ V/m)	3
88 - 216	150 (43.5 dB μ V/m)	3
216 - 960	200 (46 dB μ V/m)	3
above 960	500 (54 dB μ V/m)	3

5.13 Spurious Emissions - radiated (Receiver) §15.109 / 209

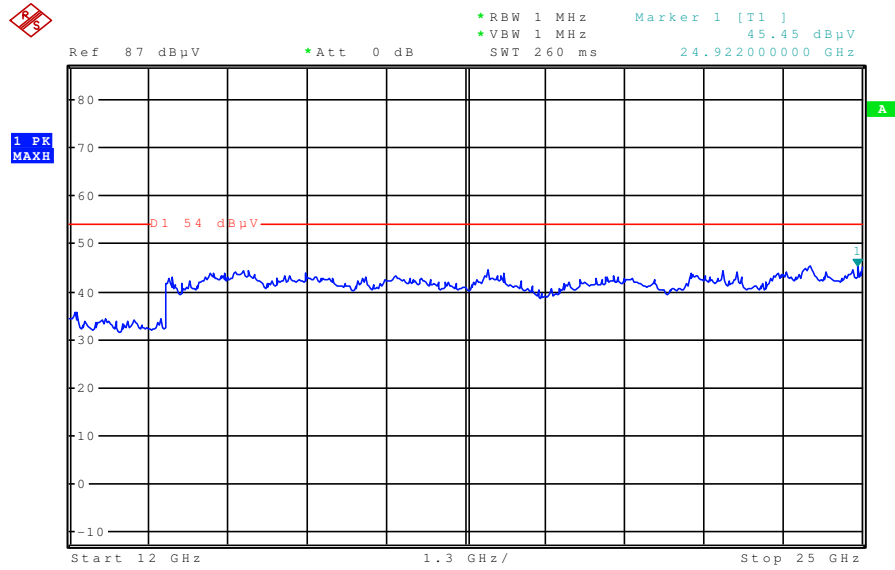
Plot 1: 0.03 - 4 GHz vertical / horizontal (receiver)



Plot 2: 4- 12 GHz (receiver)



Plot 3: 12- 25 GHz (receiver)



Results:
(valid for both modes)

Spurious Emissions level [dBμV/m]		
f[MHz]	Detector	Level [dBμV/m]
31.04	Pk	25.3
35.77	Pk	27.6
48.20	Pk	36.4
56.36	Pk	26.9
65.26	Pk	30.6
77.82	Pk	26.3
90.99	Pk	26.4
205.83	Pk	27.0
Measurement uncertainty		±3 dB

f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz

See above plots

Measurement distance see table

Limits: § 15.109 / 209

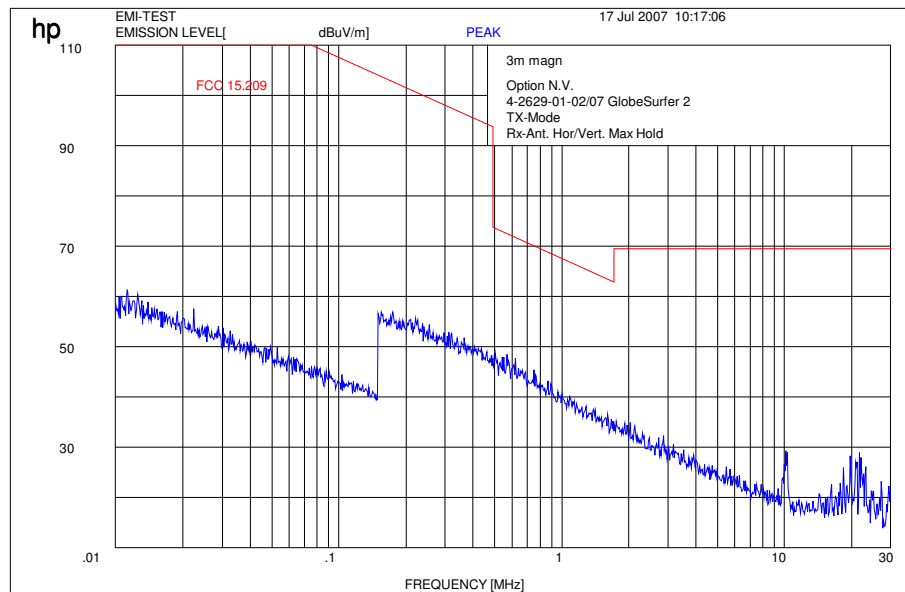
Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
30 - 88	100 (40 dBμV/m)	3
88 - 216	150 (43.5 dBμV/m)	3
216 - 960	200 (46 dBμV/m)	3
above 960	500 (54 dBμV/m)	3

5.14 Spurious Emissions - radiated <30 MHz §15.209

Measured at 10 m distance.

Values recalculated with 40 dB/decade according to FCC rules.

Plot 1:

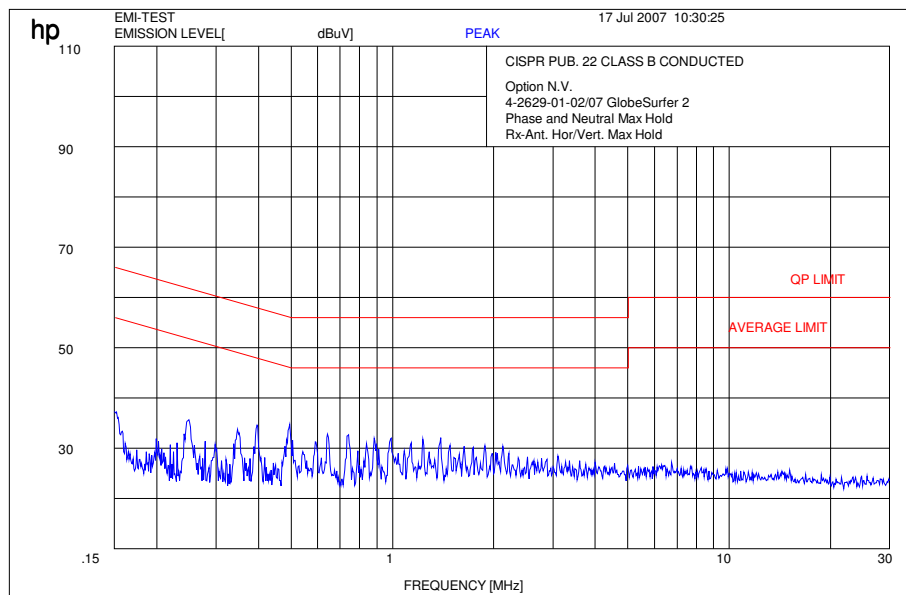


Limits:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dB $\mu\text{V/m}$	30
30 - 88	100 / 40 dB $\mu\text{V/m}$	3
88 - 216	150 / 43.5 dB $\mu\text{V/m}$	3
216 - 960	200 / 46 dB $\mu\text{V/m}$	3
above 960	54 dB $\mu\text{V/m}$	3

5.15 Conducted Emissions <30 MHz §15.107/207

Plot 1: CISPR 22



We measured in b- and g-mode TX and RX, L1 and N floating and grounded, max value was hold.

Limits:

Under normal test conditions only	See plots
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6 Test equipment and ancillaries used for tests

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	26.10.2006	12	26.10.2007
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

Bluetooth Rack:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S		300003575	02.04.2007	24	02.04.2009
2	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

Signaling Units:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
2	CBT	R&S	100185	300003416	21.02.2006	24	21.02.2008
3	CMU-200	R&S	103992	300003231	27.04.2007	12	27.04.2008
4	CMU-200	R&S	106240	300003321	02.05.2006	24	02.05.2008

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219	08.11.2006	24	08.11.2008
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	08.11.2006	24	08.11.2008
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	08.11.2006	24	08.11.2008
4	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
5	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010

7 Photographs of the Test Set-up

Photo 1: Radiated

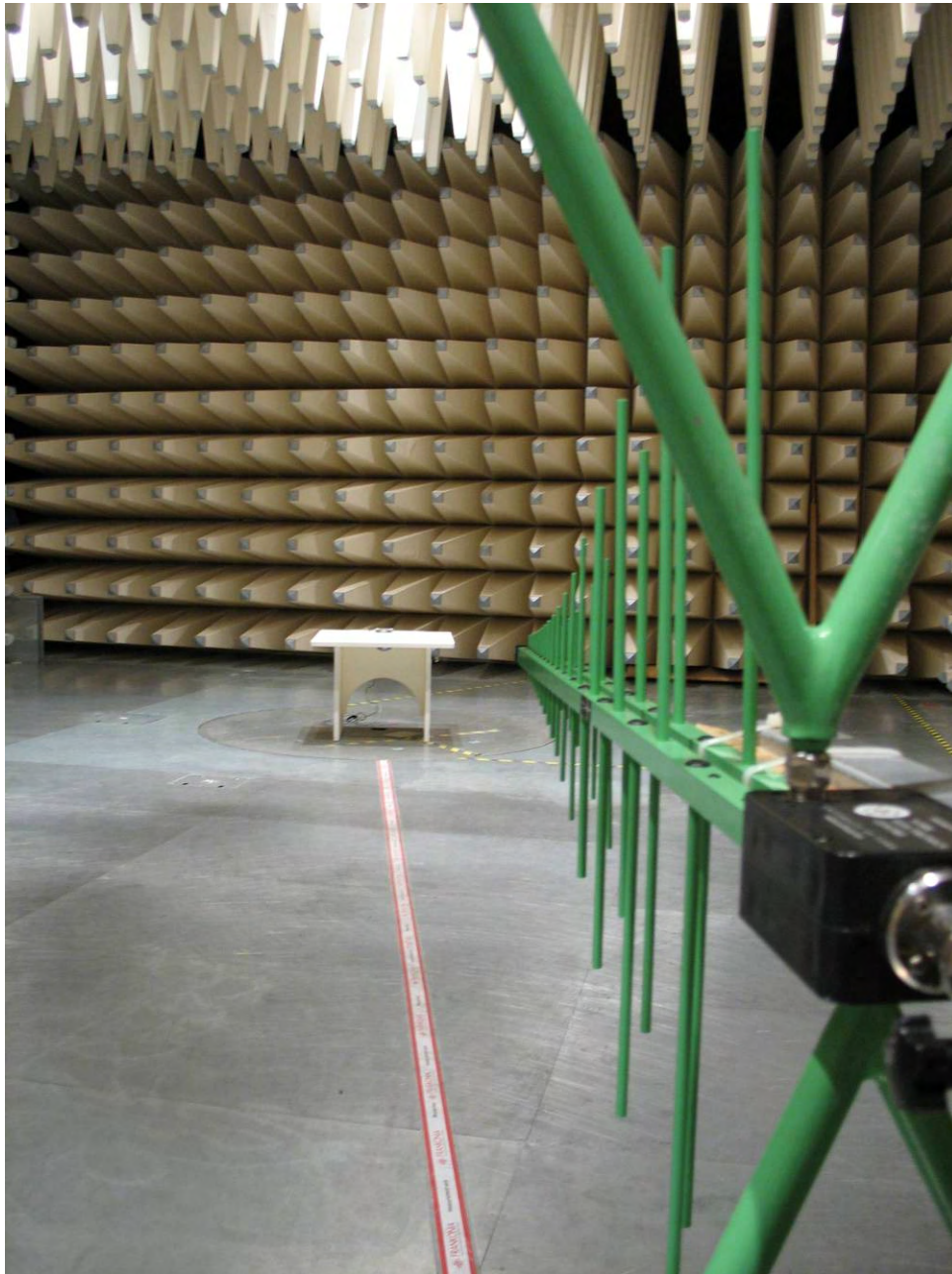


Photo 2: Radiated

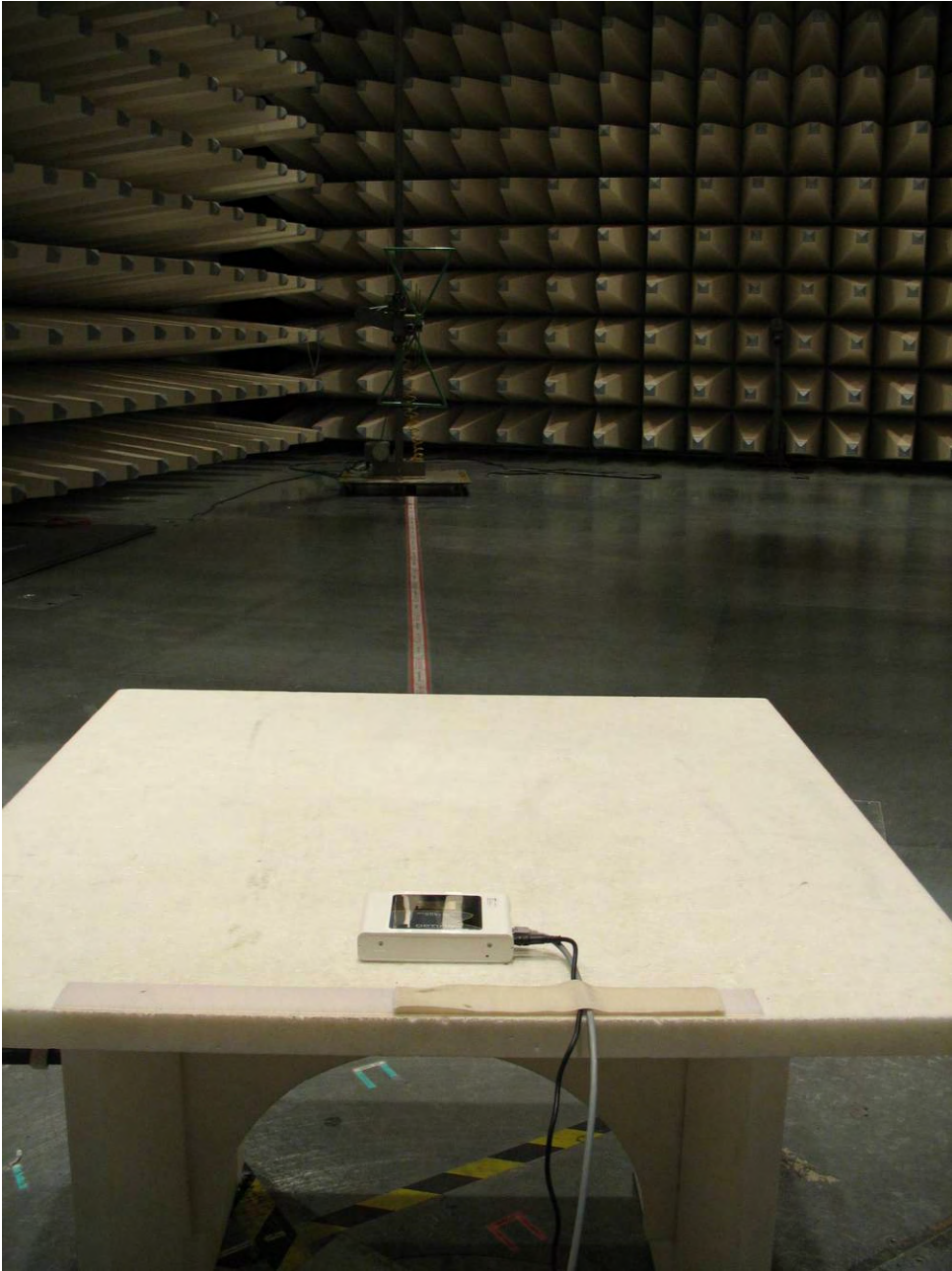


Photo 3: Radiated



Photo 4: Conducted



8 Photographs of the EUT

Photo 1:



Photo 2:

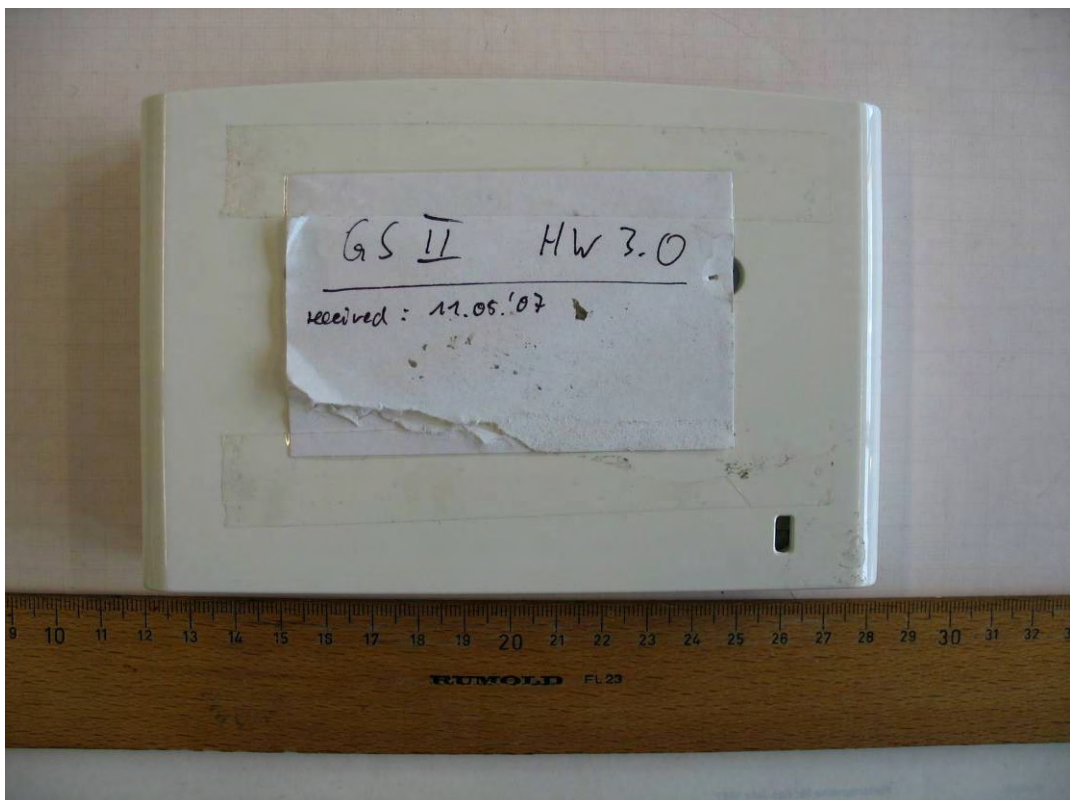


Photo 3:

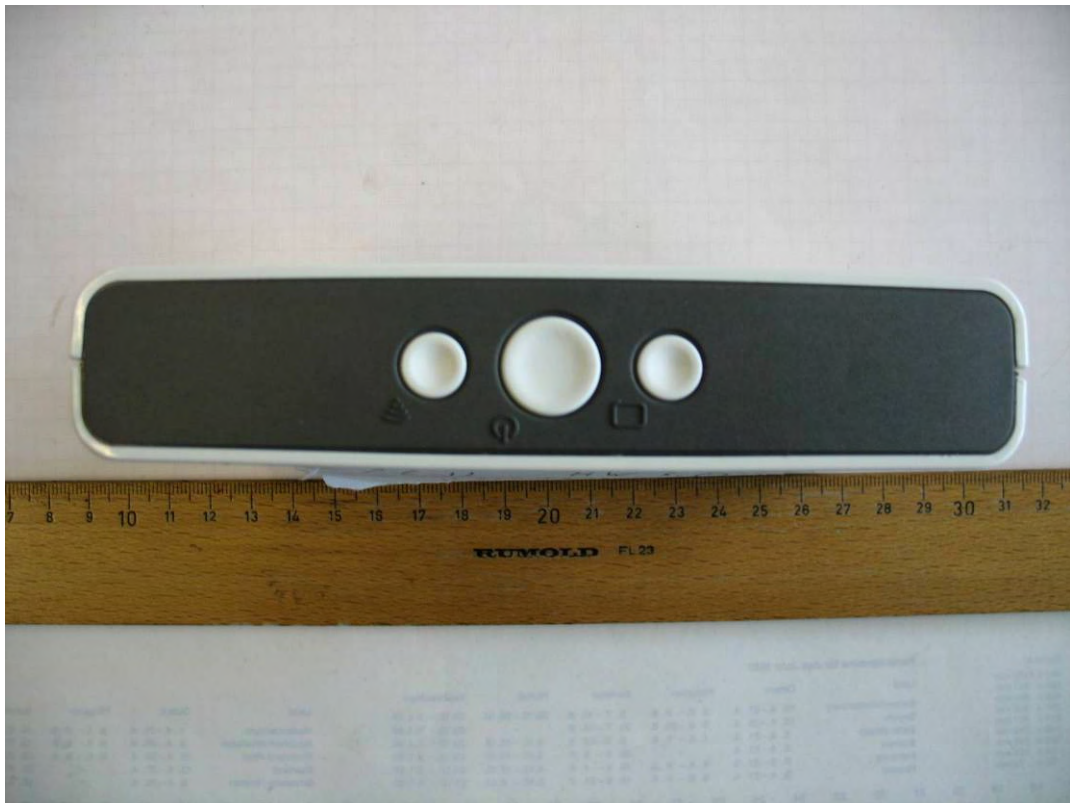


Photo 4:



Photo 5:



Photo 6:



Photo 7:

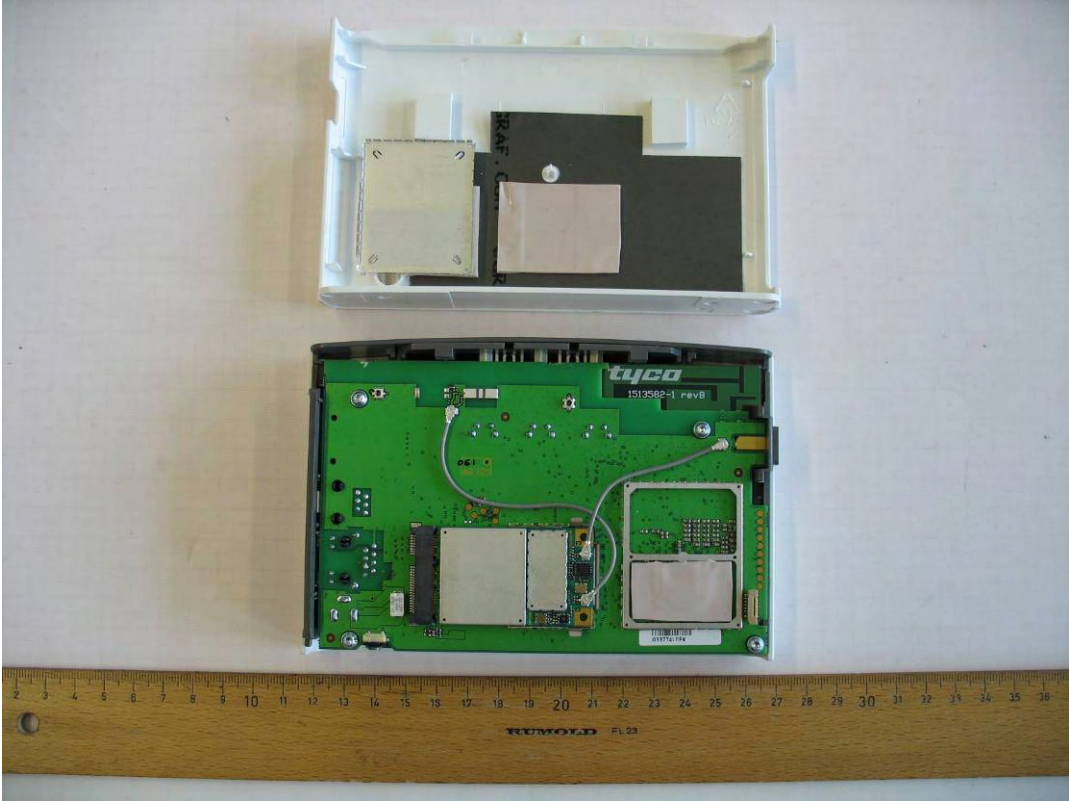


Photo 8:

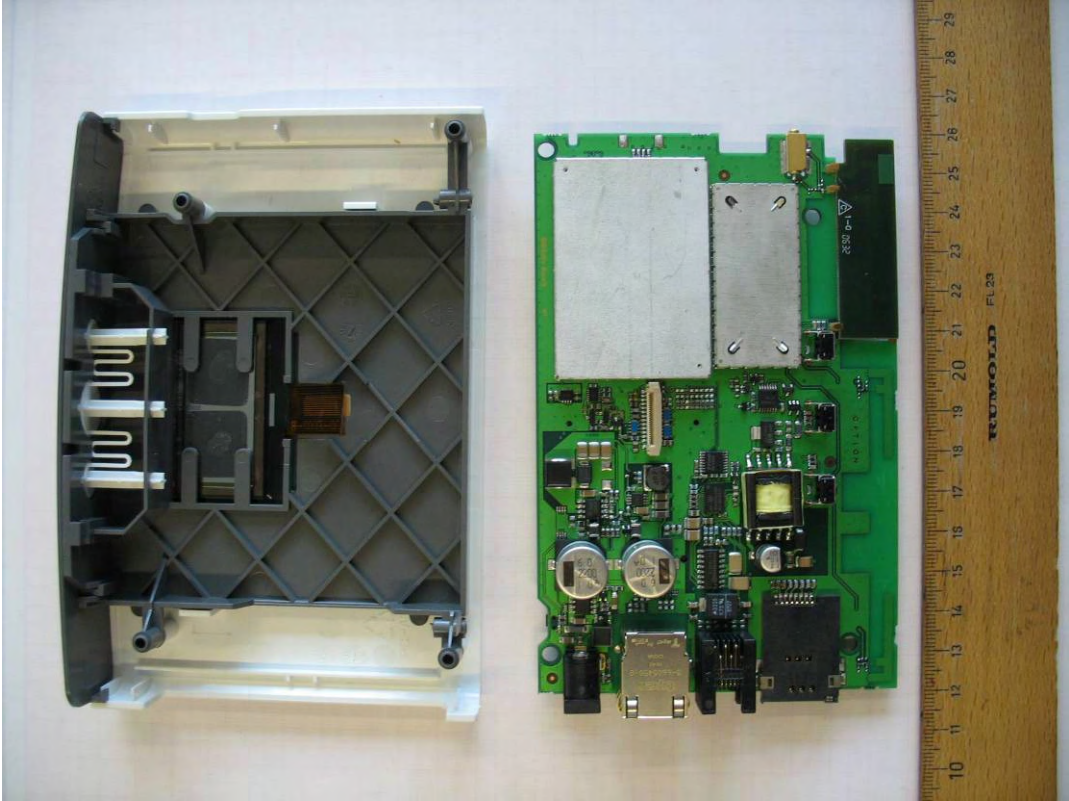


Photo 9:

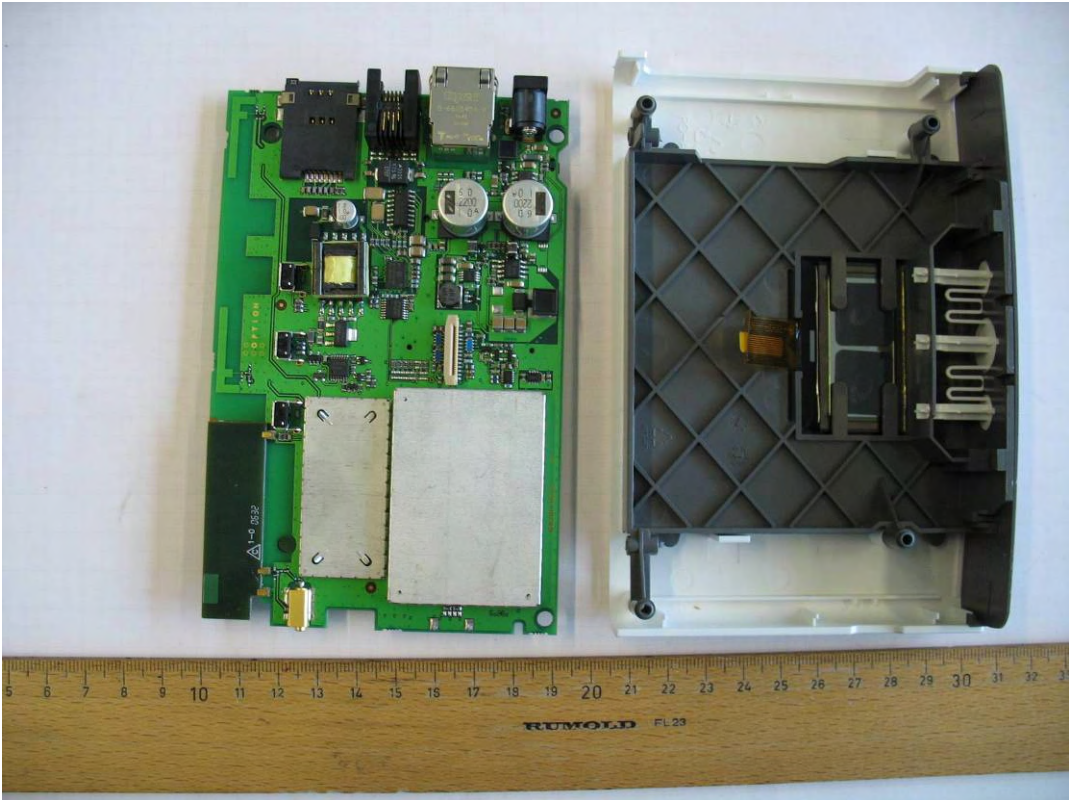


Photo 10:

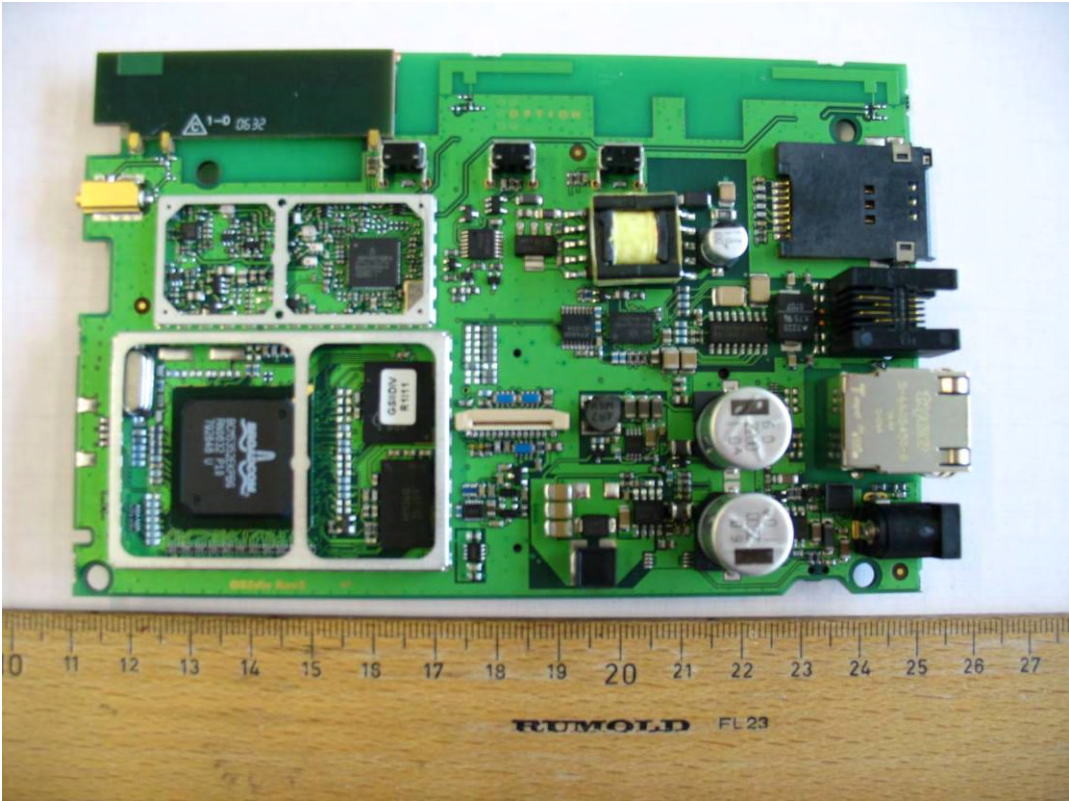


Photo 11:

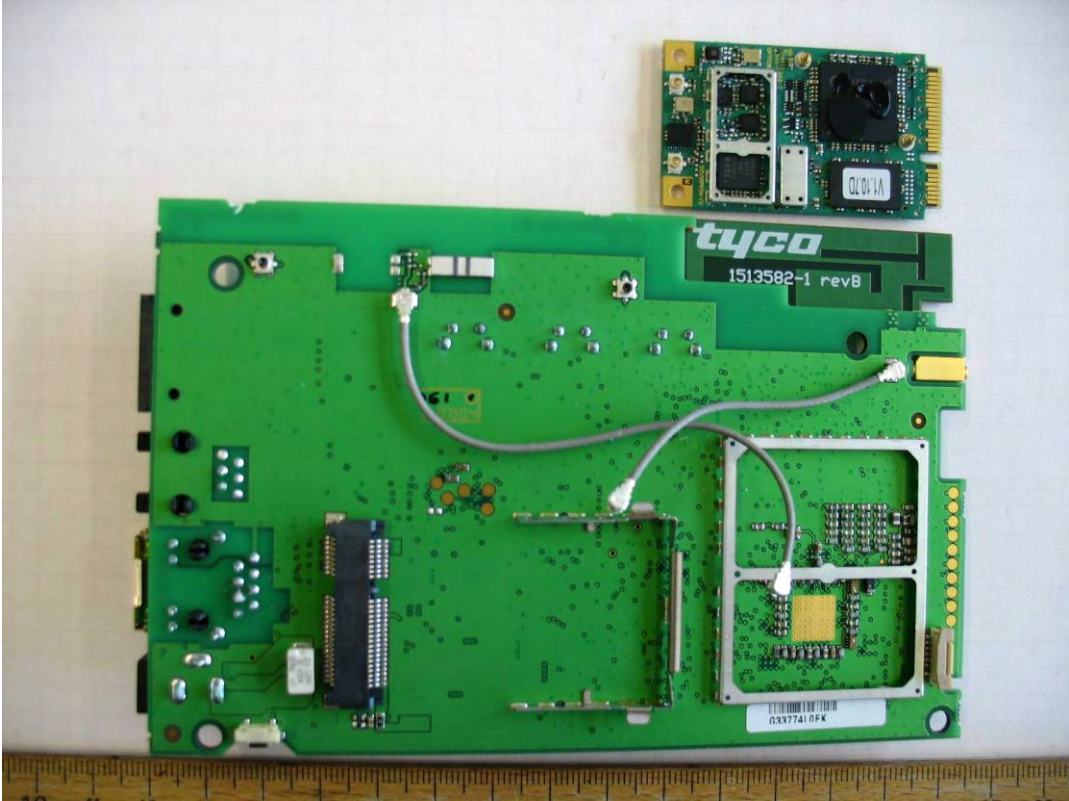


Photo 12:

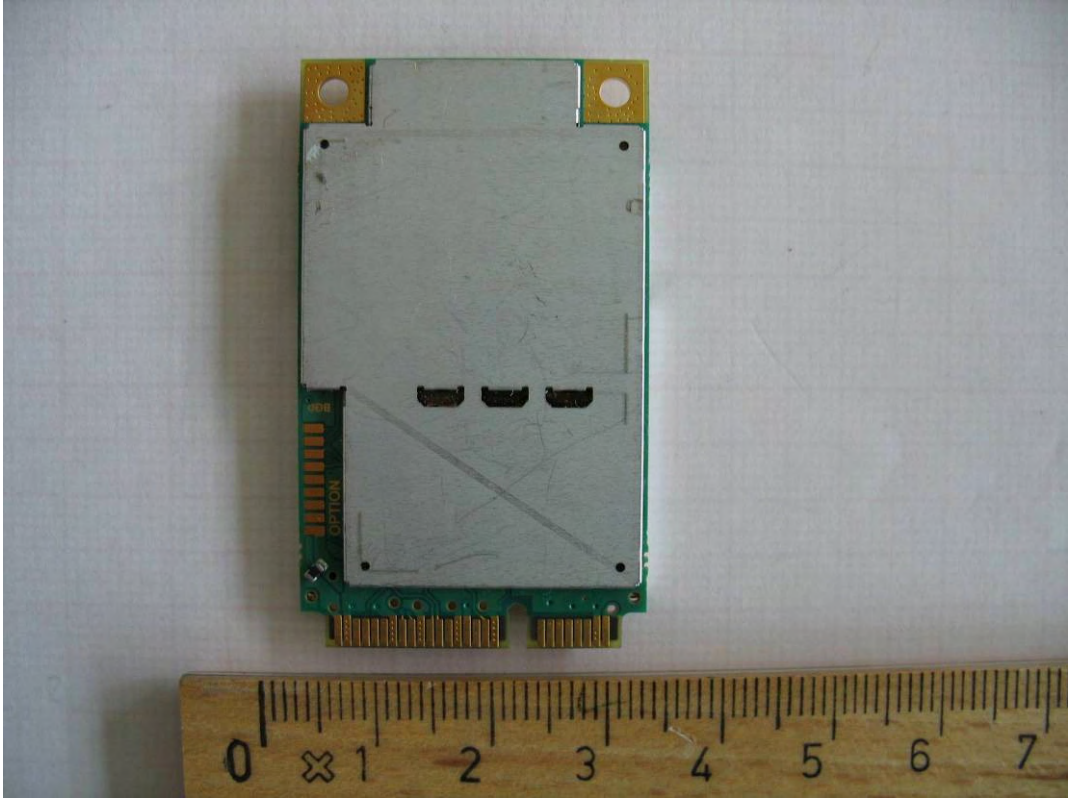


Photo 13:

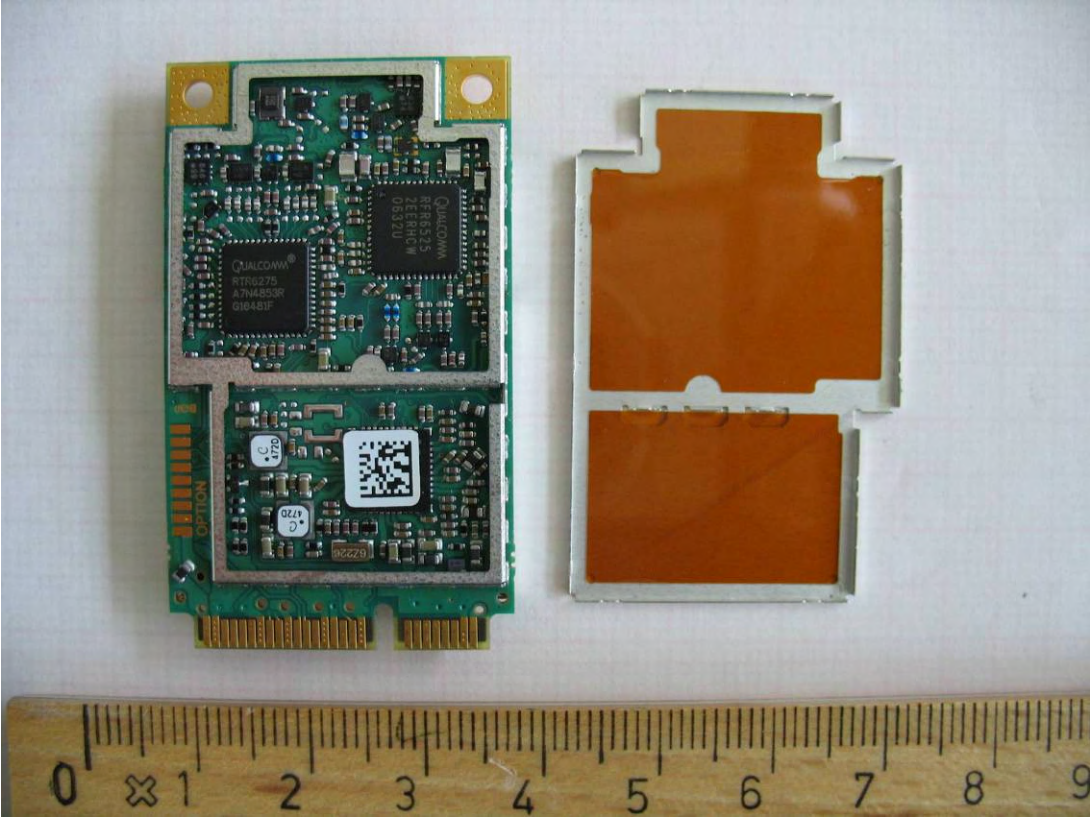


Photo 14:

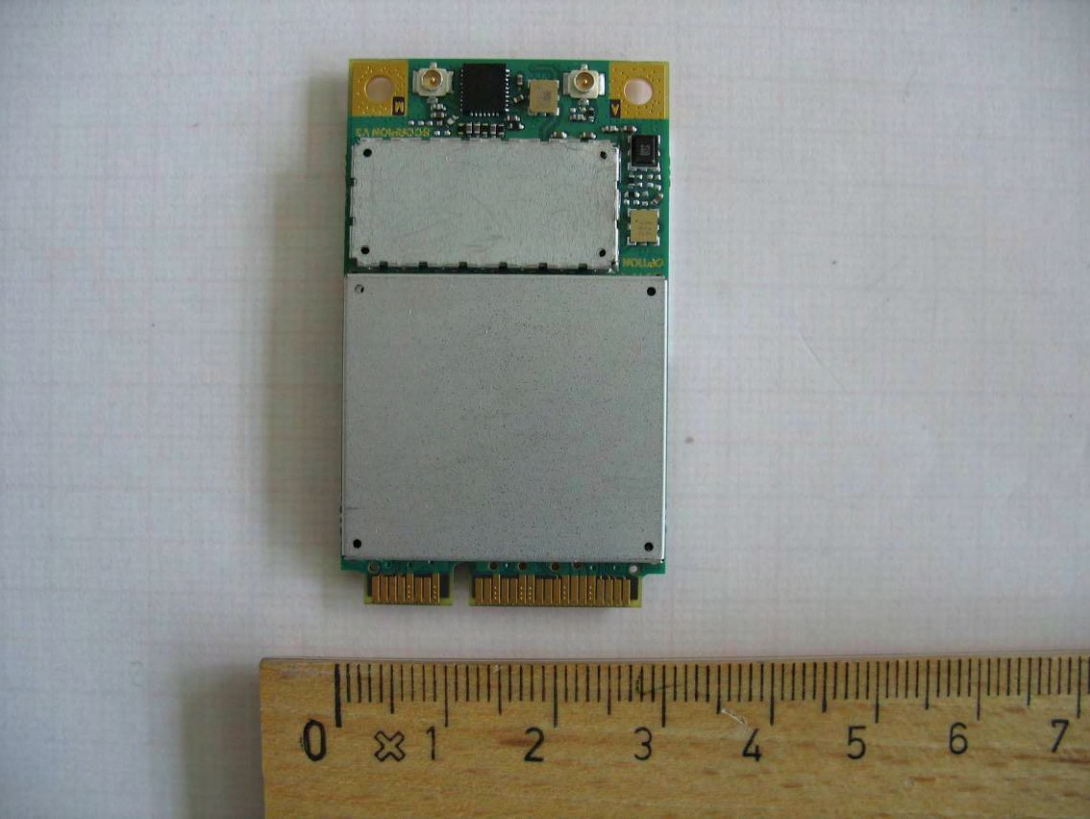


Photo 15:

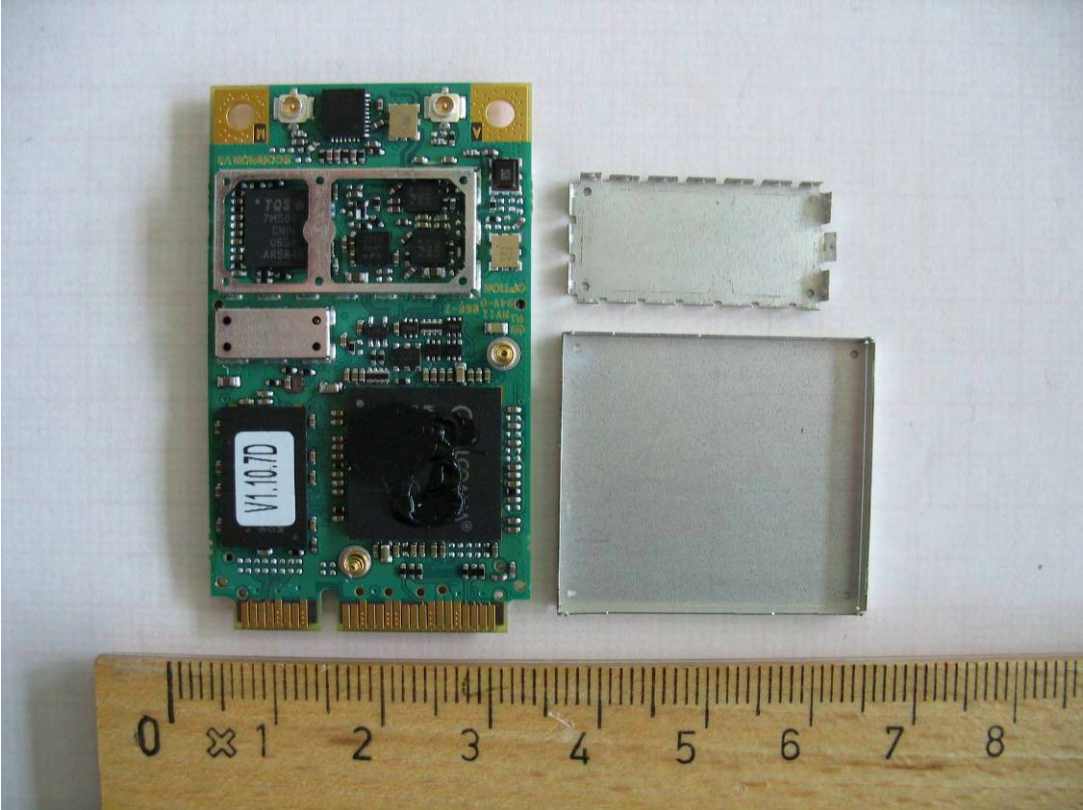


Photo 16:

