



**Telecommunications & Telematics
for Transports Lab.**

TEST REPORT

Ref. No. ARSH00018b

Date: 2008-04-30

Measurements performed in accordance with:



**FCC Rules : Code of Federal Regulations (CFR) no. 47
PART 15 – RADIO FREQUENCY DEVICES**

PRODUCT : INTRA-ORAL X-RAY UNIT

TESTED MODEL : RX DC MYRAY

FCC ID : UXP70601

APPLICANT : CEFLA S.C. – CEFLA DENTAL GROUP – Via Bicocca 14/C – 40026
IMOLA (BO) - ITALY

MANUFACTURER : CEFLA S.C. – CEFLA DENTAL GROUP – Via Bicocca 14/C – 40026
IMOLA (BO) - ITALY

TRADEMARK : CEFLA S.C.

OTHER INFORMATION

Sample received on : 2008-02-29 (sample sent by applicant)

Testing dates : 2008-02-29 ÷ 2008-04-04

Tested samples No. : 1

Testing Laboratory : IMQ S.p.A. Via Quintiliano, 43 I-20138 MILANO

Tested by : R. Radice

Signature:

Date : 2008-04-30

R. Colombo

Checked by: (EMC and R&TTE Lab. Deputy)

Signature:

Date : 2008-04-30

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2008-04-30	Test Results and Evaluation Report

NOTICE: The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself. This report shall not be reproduced partially or in its entirety without the written approval of IMQ S.p.A.

IMQ S.p.A. - Via Quintiliano, 43 – I-20138 MILANO

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1 GENERAL DESCRIPTION OF EQUIPMENT UNDER TEST

1.1 APPLICANT

NAME	CEFLA S.C. – CEFLA DENTAL GROUP
ADDRESS	Via Bicocca 14/C – 40026 IMOLA (BO)
COUNTRY	ITALY

1.2 MANUFACTURER

NAME	CEFLA S.C. – CEFLA DENTAL GROUP
ADDRESS	Via Bicocca 14/C – 40026 IMOLA (BO)
COUNTRY	ITALY

1.3 EQUIPMENT CLASSIFICATION

According to the definition 15.3 (o) EUT is a **Intentional Radiator operating within the bands 2400-2483,5 MHz** so it shall fulfil provisions of 47CFR Part 15 Subpart C – Intentional radiators – and Section 15.247.

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Parameters	Value
Type of equipment :	▪ INTRA-ORAL X-RAY UNIT
Model :	▪ RX DC MYRAY
FCC ID. :	▪ UXP70601
Trade Name	▪ CEFLA S.C. – CEFLA DENTAL GROUP
Data cable :	▪ /
Telecom cable :	▪ /
Power supply type :	▪ 110 Vac / 60 Hz
AC power input cable :	▪ /
DC power input cable :	▪ /

1.5 FEATURE OF EQUIPMENT UNDER TEST

Power specification	▪ 110 V ac / 50Hz – 10Ampere
Assigned frequency band:	▪ 2400 ÷ 2483,5 MHz
Operating frequency:	▪ 2405 ÷ 2480 MHz (16 Channels)
Maximum RF output power permitted:	▪ 1W
Modulation:	▪ O-QPSK
Antenna:	▪ Integrated Antenna CHIPCOM mod. CC2420
RX sensitivity:	▪ /
Microprocessor:	▪ /
Oscillator:	▪ 16 MHz
Main SW identification	▪ /
Main HW Board identification	▪ /
Peripherals included (for system application)	▪ None
Interfaces :	▪ None
Integrated interfaces :	▪ None
AC adapter:	▪ None

CHANNEL CONFIGURATION

Channel (No.)	Frequency (MHz)
11	2405.00
12	2410.00
13	2415.00
14	2420.00
15	2425.00
16	2430.00
17	2435.00
18	2440.00
19	2445.00
20	2450.00
21	2455.00
22	2460.00
23	2465.00
24	2470.00
25	2475.00
26	2480.00

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST

2.1 ENVIRONMENTAL CONDITIONS

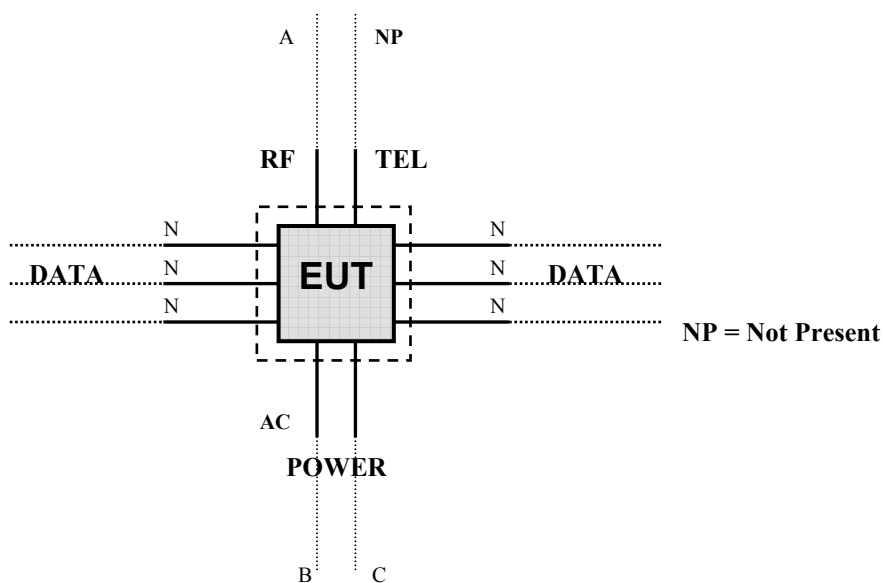
TEST CONDITIONS	MEASURED
Ambient Temperature	20 ÷ 25 °C
Relative Humidity	50 ÷ 60 %
Atmospheric Pressure	900 ÷ 1000 mbar

2.2 DESCRIPTION OF SUPPORT EQUIPMENT

Here following the details concerning equipment needed for correct operation or loading of the EUT:

EQUIPMENT	MANUFACTURER	MODEL
Personal Computer	IBM	-----

2.3 INTERFACE IDENTIFICATION AND CONNECTION DIAGRAM OF TEST SYSTEM



#	Interface	Description	Maximum length	Ref. Document
1	Enclosure	Plastic surface	/	/
2	AC mains power input/output port	Input 110 Vac / 60 Hz (phase-neutral with protective earth)	/	/
3	DC power port	Port not present	/	/
4	Signal / control port	Port not present	/	/
5	Antenna port (RF)	Integrated antenna CHIPCOM 2420	/	CHIPCOM specification Antenna Gain (doc. SWRU120 – Design Note DN0007)

3 OPERATION OF EQUIPMENT UNDER TEST

3.1 OPERATING TEST CONDITIONS

Ref.	Description
#1	Continuous transmission (single channel transmission)

4 TESTS IDENTIFICATION AND RESULTS

TABLE 1 : SUMMARY OF TESTS

CFR47 Part 15 Section	Title	Operating condition	Result	Test No.
15.203 15.247 (b)(4)(i)	Antenna Requirements	/	PASS	1
15.207 (a)	Conducted Emission	#1	PASS	2
15.209 (a) (f)	Radiated Emission	#1	PASS	3
15.247 (a)	Frequency Hopping Spread Spectrum Specifications			
15.247(a)(1)(iii)	Number of Hopping Channels Used	Not applicable		
15.247(a)	20 dB Bandwidth	Not applicable		
15.247(a)(1)	Carrier frequency (Hopping Channel) Separation	Not applicable		
15.247(a)(1)(iii)	Time occupancy (Dwell Time) of Each Channel (ch) within a $0,4 \times N_{ch}$ (sec) Period	Not applicable		
15.247(a)(2)	6dB Minimum Bandwidth	#1	PASS	4
15.247(b)	Maximum Peak Output Power			
15.247(b) (1)	Peak Output Power	#1	PASS	5
15.247(b) (4)	Antenna gain	Not applicable		
15.247(c)	Operation with directional antenna gains greater than 6 dBi	Not applicable		
15.247 (d)	100 kHz Bandwidth of Frequency Band Edges	#1	PASS	6

15.247 (d)	Spurious Conducted Emission	#1	PASS	7
15.247 (e)	Power Spectral Density	#1	PASS	8
15.247 (f)	Hybrid systems	Not applicable		
15.247 (g)	FHSS Transmission characteristics	Not applicable		
15.247 (h)	Recognition of occupied channel and multiple transmission system	Not applicable		
15.247(i) (§ 47CFR 1.1307(b)(1))	RF humane exposure	#1	PASS	9

REMARK: Detail of the result are showed on the next pages.

Test uncertainties are in accordance with document IO-80-U01.

4.1 METHODS OF MEASUREMENT

All compliance measurements have been carried out using the procedures described in the standard ANSI C63.4-2003 (excluding sub-par. 4.1.5.2, 5.7.9 and 14) and Section 15.31 of CFR47 Part 15 – Subpart A (General).

Additional test requirements have been adopted according to the reference Section indicated in the Test Table

4.2 FREQUENCY RANGE INVESTIGATED

- a. Conducted emission tests : from 150 kHz to 30 MHz.
- b. Radiated emission tests : from 30 MHz to tenth harmonic of fundamental

5 MEASUREMENTS AND TESTS DATA

TEST No. 1	Title "Antenna Requirements"	47CFR Part 15 Ref. Section
		15.203 / 15.204
TEST REQUIREMENTS	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.	

Antenna specifications	
N° of authorized antenna types:	▪ 1
Antenna type :	▪ Integrated Antenna CHIPCOM mod CC2420
Total gain :	▪ +3,3 dBi
External power amplifiers:	▪ Not present

Test Result:

The transmitter meets the requirements of section 15.203 and 15.204

TEST No. 2	Title “Conducted emission”	47CFR Part 15 Ref. Section
		15.207
TEST REQUIREMENTS	Test setup	ANSI C63.4
	Limits of mains terminal disturbance voltage	15.207 (a)
	Frequency range	150 kHz – 30 MHz
	IF bandwidth	9 kHz
	EMC class	B

TEST DATA	PORT UNDER TEST	OPERATING CONDITION	RESULT
	AC mains power input port	#1	Complies

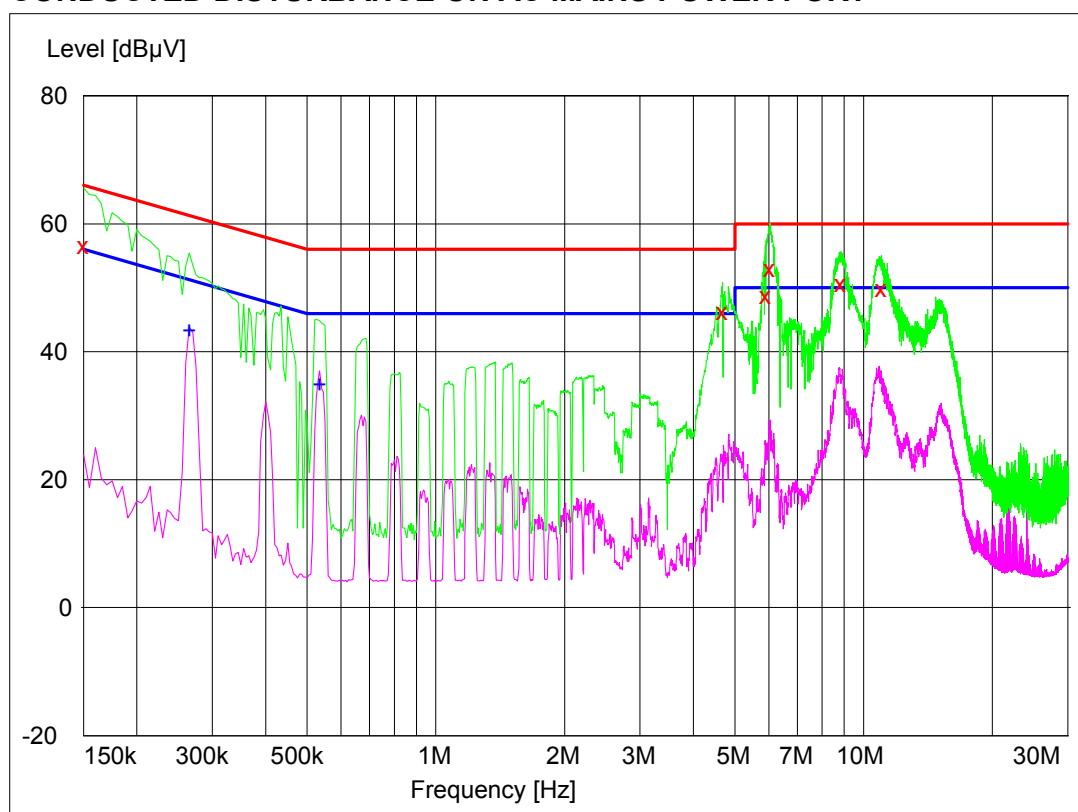
- 1) The EUT was placed on a wooden table of size, 80 cm by 80 cm, raised 80 cm in which is located 40 cm away from the vertical wall the shielded room.
- 2) Each EUT power cord input cord was individually connected through a 50Ω/50μH LISN to the input power source.
- 3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
- 4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
- 5) The measurements were made with the detector set to PEAK and AVAREGE amplitude within a bandwidth of 10 kHz during the measurements.
- 6) The measurements with Quasi-Peak detector are performed only for frequencies for which the Peak values are \geq (Q.P. limit - 6 dB).

Test Result:

Within the specifications

MEASUREMENTS RESULTS

CONDUCTED DISTURBANCE ON AC MAINS POWER PORT



FINAL TEST (QUASI-PEAK DETECTOR)

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBμV	dB	dBμV	dB		
0.150000	56.50	10.00	66.00	9.40	N	GND
	56.10	10.00	66.00	9.90	L	GND
4.675000	46.20	10.00	56.00	9.70	N	GND
	46.20	10.00	56.00	9.70	L	GND
5.895000	48.70	10.00	60.00	11.20	N	GND
	48.50	10.00	60.00	11.50	L	GND
6.035000	52.90	10.00	60.00	7.10	N	GND
	52.90	10.00	60.00	7.10	L	GND
8.850000	50.70	10.00	60.00	9.20	N	GND
	50.60	10.00	60.00	9.30	L	GND
11.01000	49.90	10.00	60.00	10.10	N	GND
	49.40	10.00	60.00	10.50	L	GND

FINAL TEST (AVERAGE DETECTOR)

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBμV	dB	dBμV	dB		
0.265000	43.20	10.00	51.20	8.00	N	GND
	43.10	10.00	51.20	8.10	L	GND
0.535000	34.90	10.00	46.00	11.00	N	GND
	34.35	10.00	46.00	11.65	L	GND

TEST No. 3	Title "Radiated disturbances"	47CFR Part 15 Ref. Section
		15.209
TEST REQUIREMENTS	Test setup	ANSI C63.4
	Test facility	Semi-Anechoic chamber
	Test distance	3 m
	Limits for radiated disturbances	15.209 (a)
	Frequency range	30 MHz to tenth harmonic of the highest fundamental frequency
	IF bandwidth (below 1000 MHz)	100 kHz
	IF bandwidth (above 1000 MHz)	1 MHz
	EMC class	B

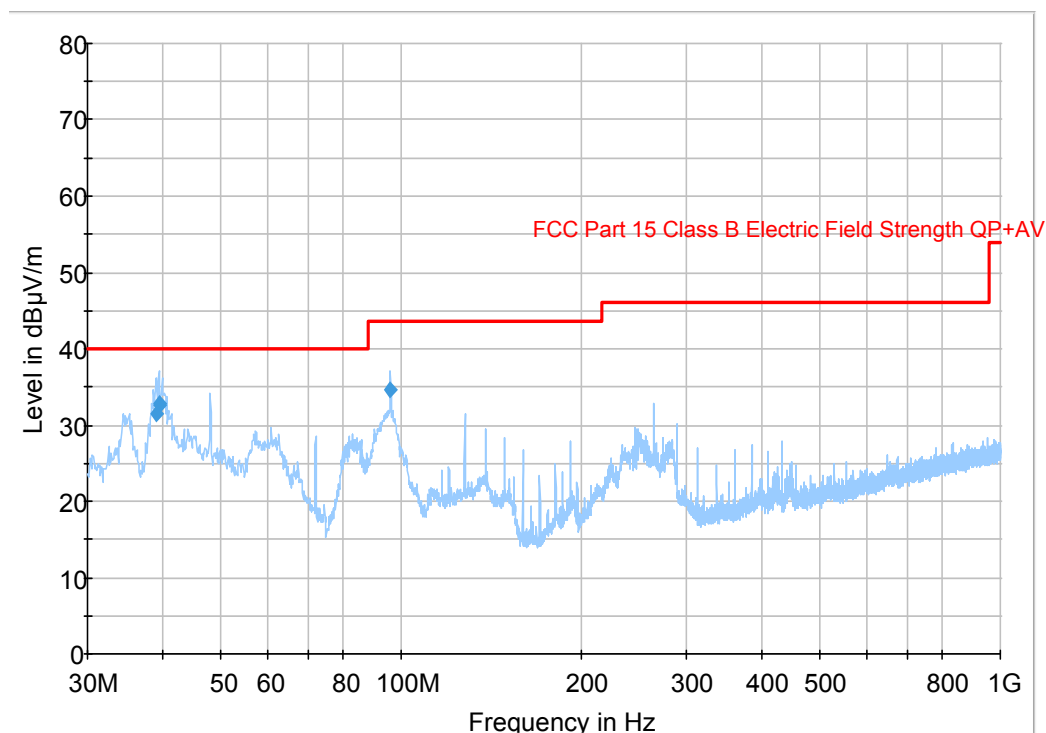
TEST DATA	PORT UNDER TEST	OPERATING CONDITION	RESULT
	Enclosure	#2	Complies

- 1) The EUT was placed on turntable which is 0.8 m above the ground plane
- 2) The turntable shall rotate from 0° to 360° degrees to determine the position of maximum emission level.
- 3) The EUT is positioned 3 m away from the receiving antenna which varied from 1 to 4 m to find the highest emission.
- 4) The measurements were made with the detector set to PEAK and AVERAGE amplitude within a bandwidth of 100 kHz below 1000 MHz and 1 MHz above 1000 MHz.
- 5) The receiving antenna was positioned in both horizontal and vertical polarization.
- 6) The measurements with Quasi-Peak detector, below 1000 MHz are performed only for frequencies for which the Peak values are \geq (Q.P. limit - 6 dB).

LIMITS FOR SPURIOUS

Band of operations	Peak (dB μ V/m)	Average Limit (dB μ V/m)
Restricted bands (par. 15.205)	74,00	54,00
Other bands	According to 15.209 or fundamental -20dB (which is greater)	According to 15.209 or fundamental -20dB (which is greater)

MEASUREMENTS RESULTS (below 1000 MHz)



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity
38.992500	31.4	1000.000	120.000	106.0	V
39.643750	32.6	1000.000	120.000	106.0	V
39.678750	32.7	1000.000	120.000	105.2	V
96.252500	34.6	1000.000	120.000	106.0	V

(continuation of the "Final Measurement Detector 1" table from column 6 ...)

Frequency (MHz)	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
38.992500	-174.0	17.4	9.1	40.5	
39.643750	-180.0	17.4	7.9	40.5	
39.678750	-180.0	17.3	7.8	40.5	
96.252500	2.0	11.0	5.9	40.5	

MEASUREMENTS RESULTS (1000 MHz to 24800 MHz)

Channel n°11: 2405,00 MHz

PEAK (PEAK DETECTOR WITH RBW=1MHz; VBW=1MHz)

Frequency (MHz)	Measured Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)	Pol.
2405,36 (fundamental)	92,02	-----	-----	-----	Horizontal
4809,04	55,88	5000	74,00	18,12	Horizontal
7216,28	54,32	5000	74,00	19,68	Vertical
9621,44	43,26	5000	74,00	30,74	Horizontal
12026,80	<40	5000	74,00	>34	Horizontal
f>12030	No spurious				

AVERAGE (PEAK DETECTOR WITH RBW=1MHz; VBW=10Hz) - duty cycle: 100%

Frequency (MHz)	Measured Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)	Pol.
2405,36 (fundamental)	89,13	-----	-----	-----	Horizontal
4809,04	47,10	500	54,00	6,9	Horizontal
7216,28	40,75	500	54,00	13,25	Vertical

Channel n°19: 2445,00 MHz

PEAK (PEAK DETECTOR WITH RBW=1MHz; VBW=1MHz)

Frequency (MHz)	Measured Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)	Pol.
2444,36 (fundamental)	89,91	-----	-----	-----	Horizontal
4889,74	53,18	5000	74,00	20,82	Horizontal
7333,08	<40	5000	74,00	>34	Horizontal
9777,44	<42	5000	74,00	>32	Horizontal
12221,80	<42	5000	74,00	>32	Horizontal
f>12300	No spurious				

**AVERAGE (PEAK DETECTOR WITH RBW=1MHz; VBW=10Hz)
- duty cycle: 100%**

Frequency (MHz)	Measured Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)	Pol.
2444,36 (fundamental)	87,37	-----	-----	-----	Horizontal
4889,74	47,64	500	54,00	6,36	Vertical

Channel n°26: 2480,00 MHz

PEAK (PEAK DETECTOR WITH RBW=1MHz; VBW=1MHz)

Frequency (MHz)	Measure Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)	Pol.
2479,36 (fundamental)	89,01	-----	-----	-----	Horizontal
4959,04	54,86	5000	74,00	19,14	Vertical
7438,08	<40	5000	74,00	>34	Horizontal
9917,44	<42	5000	74,00	>32	Horizontal
12396,80	<42	5000	74,00	>32	Horizontal
f>12400	No spurious				

AVERAGE (PEAK DETECTOR WITH RBW=1MHz; VBW=10Hz)
- duty cycle: 100%

Frequency (MHz)	Measured Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)	Pol.
2479,36 (fundamental)	86,11	-----	-----	-----	Horizontal
4959,04	47,96	500	54,00	6,04	Vertical

TEST No.4	Title "6 dB Bandwidth"	47CFR Part 15 Ref. Section
		15.247 (a) (2)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings	
	Span	3 MHz
	Resolution (or IF) Bandwidth (RBW)	100 kHz
	Video (or Average) Bandwidth (VBW)	100 kHz
	Sweep time	2,5 ms
	Detector function	Peak
	Trace	max hold
	Attenuator	/
	LIMIT	-----

The EUT is set to transmit has its maximum data rate.

The transmitter output was connected to the spectrum analyzer through a test fixture (radio frequency coupling device associated with the dedicated antenna of the equipment under test)

The Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

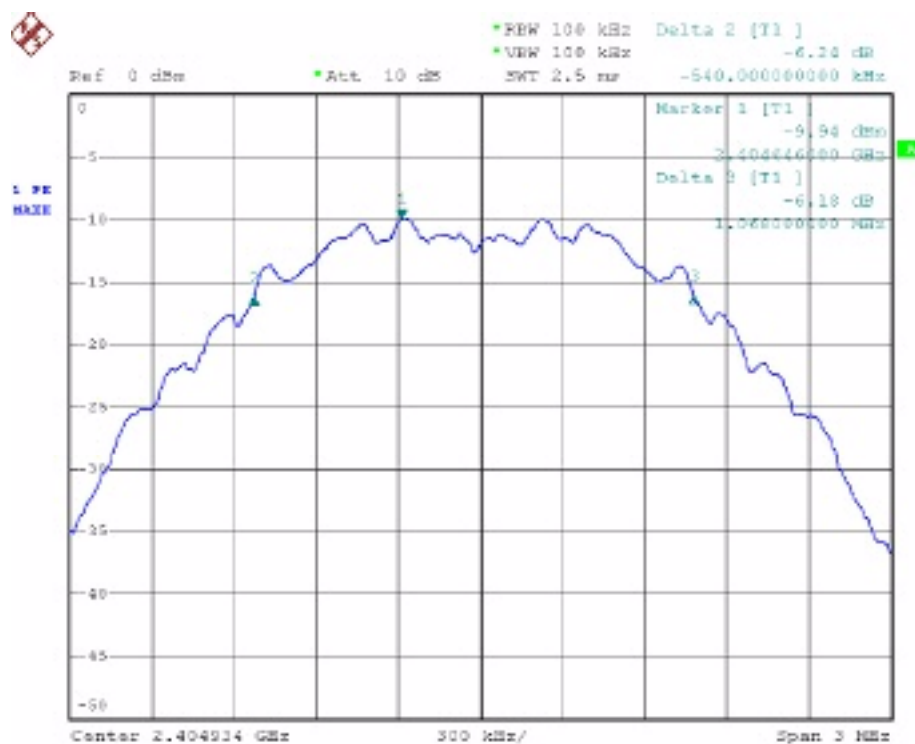
Test Result:

Channel (No.)	Frequency (MHz)	6 dB Bandwidth (kHz)	Plot (No.)
11	2405,00	1608	1
19	2445,00	1608	2
26	2480,00	1608	3

Modification during the test:

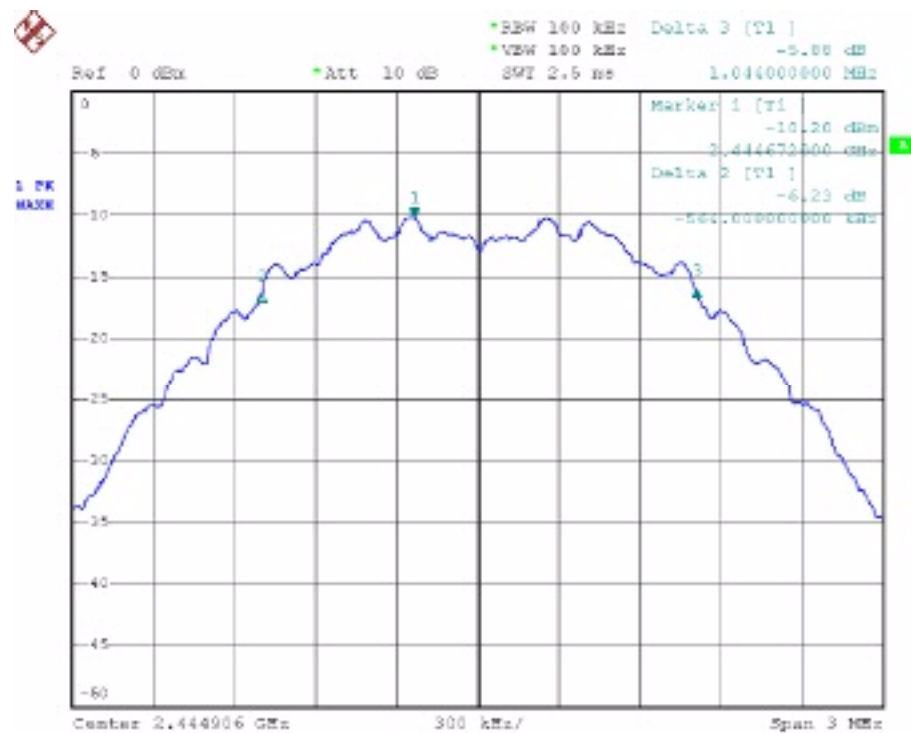
- none

Plot No. 1

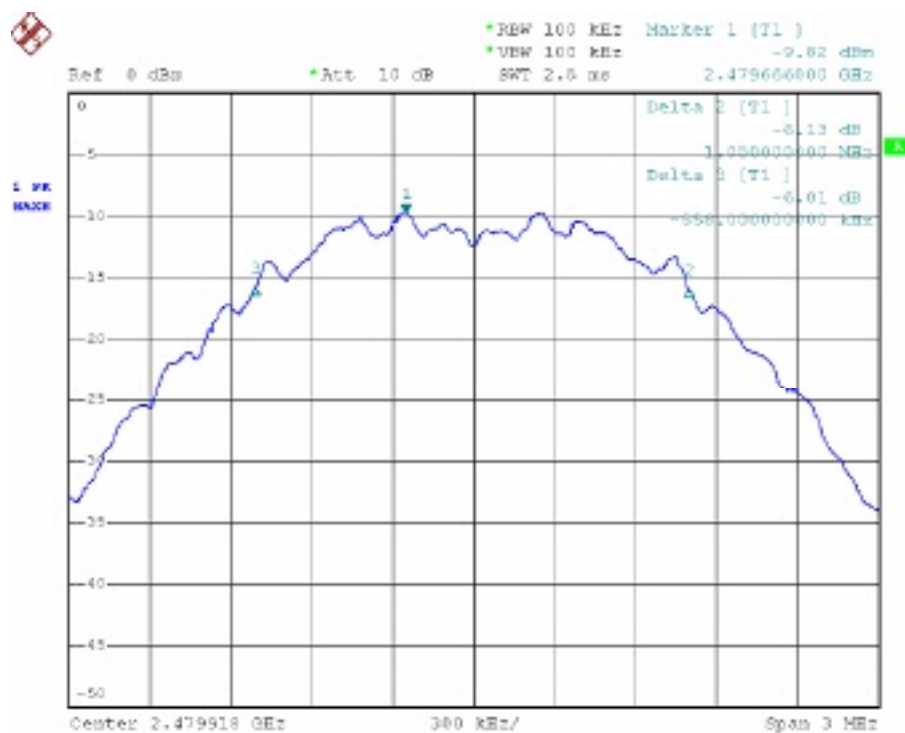


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Plot No. 2



Plot No. 3



TEST No.5	Title		47CFR Part 15 Ref. Section
	“ Maximum Peak Output Power with External Antenna (De Facto EIRP)”		15.247 (b) (3)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings		
	Span	40 MHz	
	Resolution (or IF) Bandwidth (RBW)	10 MHz	
	Video (or Average) Bandwidth (VBW)	10 MHz	
	Sweep time	2,5 ms	
	Detector function	Peak	
	Trace	max hold	
	Attenuator	/	
	LIMIT	1 Watt (30dBm)	

Conducted measurements:

The transmitter output was connected to the spectrum analyzer via a low loss cable.

Radiated measurements:

As the EUT is supplied with a dedicated antenna, the effective radiated power is measured in a 3 m anechoic chamber with the substitution antenna method.

Test Result

Conducted measure (Peak detector)

Channel (No.)	Frequency (MHz)	Measured Output Power (dBm)	Cable loss (dB)	Conducted Output Power (dBm)	Gain (dB)	Calculated Radiated Output Power (dBm)
11	2405,00	-5,55	none	-5,55	+3.3	-2,25
19	2445,00	-5,92		-5,92		-2,62
26	2480,00	-5,40		-5,40		-2,10

TEST No. 6	Title “Band-edge Compliance of RF Conducted Emissions “		47CFR Part 15 Ref. Section
			15.247 (d)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings		
	Span	Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation	
	Resolution (or IF) Bandwidth (RBW)	100 kHz	
	Video (or Average) Bandwidth (VBW)	300 kHz	
	Sweep time	Auto	
	Detector function	Peak	
	Trace	Max hold	
	Attenuator	/	
	LIMIT	> 20 dB below that in the 100 kHz bandwidth within the assigned band	

Only for measuring emissions up to 2 MHz removed from the band-edge the "delta" technique for Radiated emissions was used.

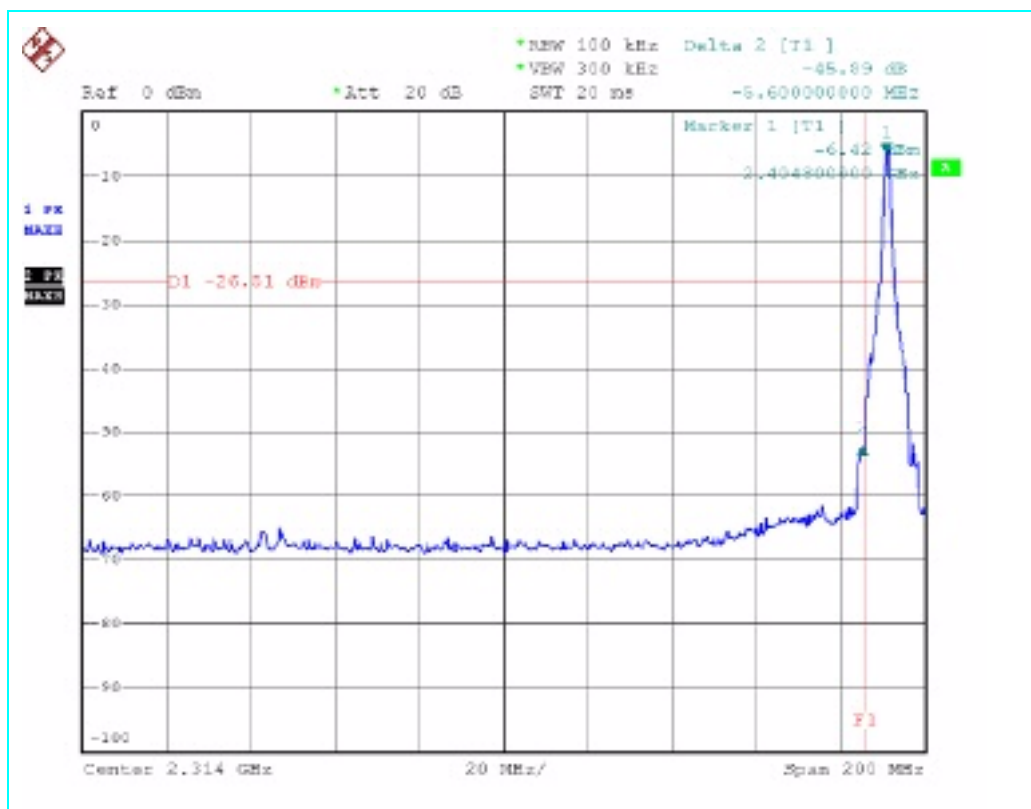
Delta technique: The transmitter output was connected to the spectrum analyzer through a test fixture (radio frequency coupling device associated with the dedicated antenna of the equipment under test)

Once the trace is stabilized, by the marker the emission at the band edge (or on the highest modulation product outside of the band, if this level is greater than that at the band edge) was set.

The “n” by the marker-delta function and the marker-to-peak function the peak of the in-band emission was selected. The marker-delta value displayed was compared with the limit specified in this Section.

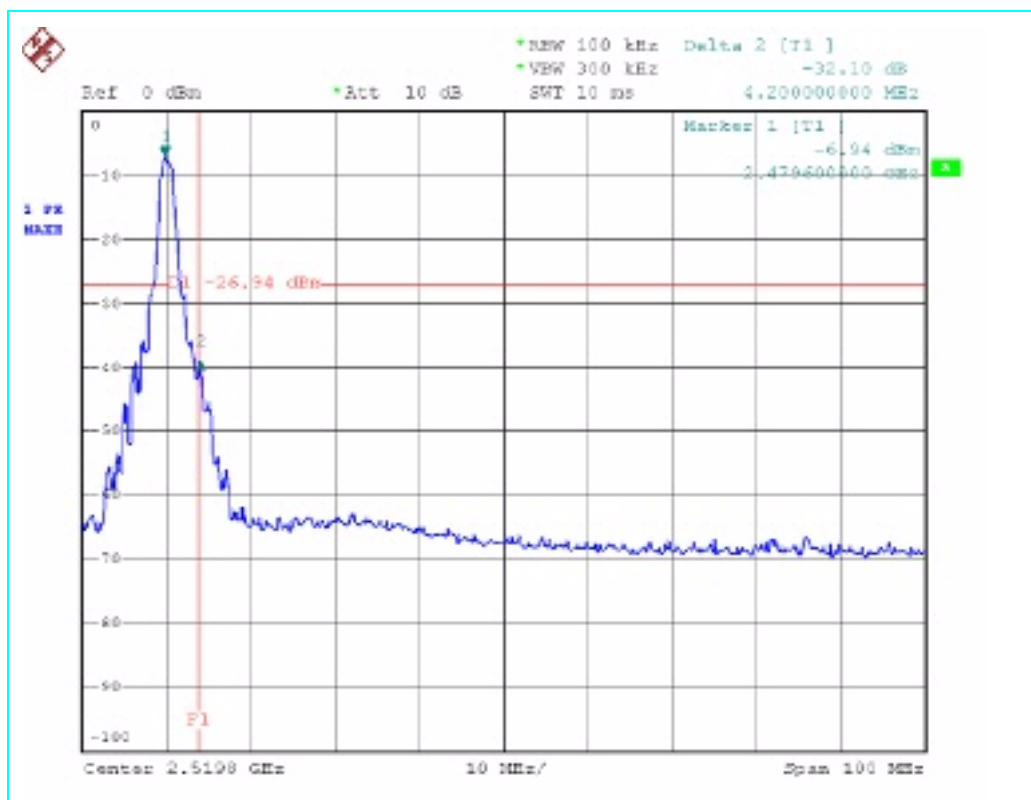
Test Result:

Within the specifications

Test Result:**Band-edge compliance, lower band edge (PEAK DETECTOR)**

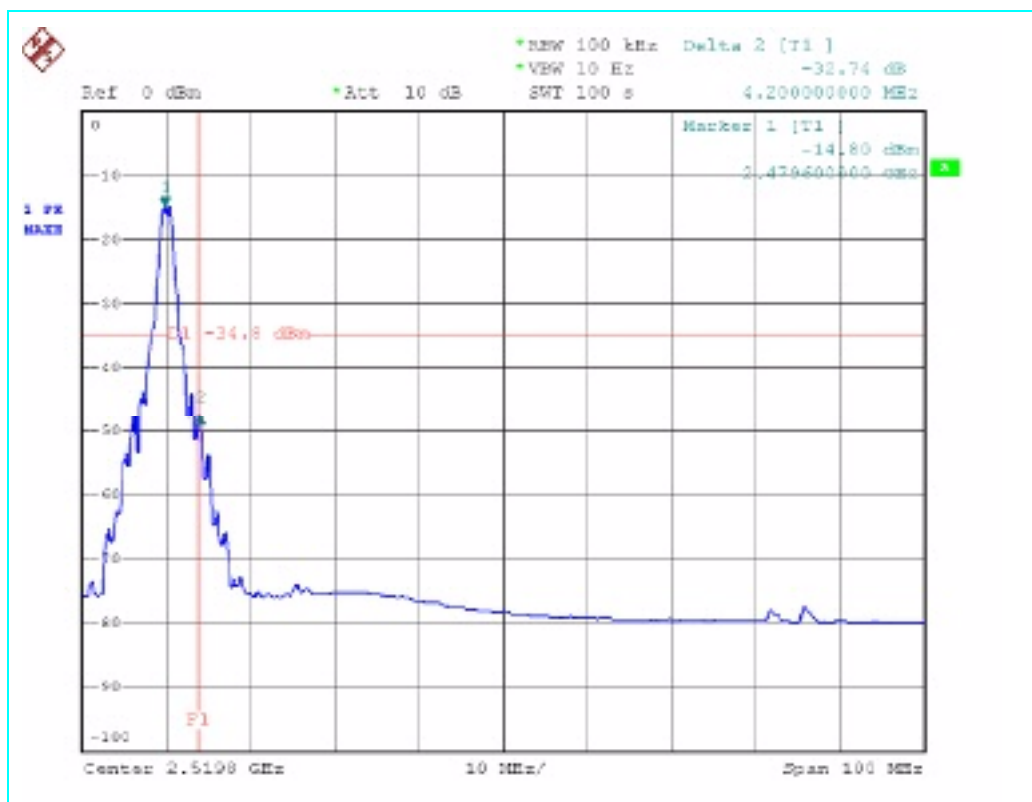
All out of band spurious emissions are more 20dB below the in band power of the fundamental.

Band-edge compliance to radiated emission test				
Band edge	Different to the signal peak (dB) (Marker 2)	Field strength measured (dB μ V/m)	Field strength at the band-edge (peak detector) (dB μ V/m)	Average Limit at the band-edge (dB μ V/m)
Lower	45,89	92,02	46,13	54,00
Within the Average limit				

Band-edge compliance, upper band edge (PEAK DETECTOR)

All out of band spurious emissions are more 20dB below the in band power of the fundamental.

Band-edge compliance to radiated emission test				
Band edge	Different to the signal peak (dB) (Marker 2)	Field strength measured (dB μ V/m)	Field strength at the band-edge (peak detector) (dB μ V/m)	Peak Limit at the band-edge (dB μ V/m)
Upper	32,10	89,01	56,91	74,00
Within the Peak limit				

Band-edge compliance, upper band edge (AVERAGE DETECTOR)

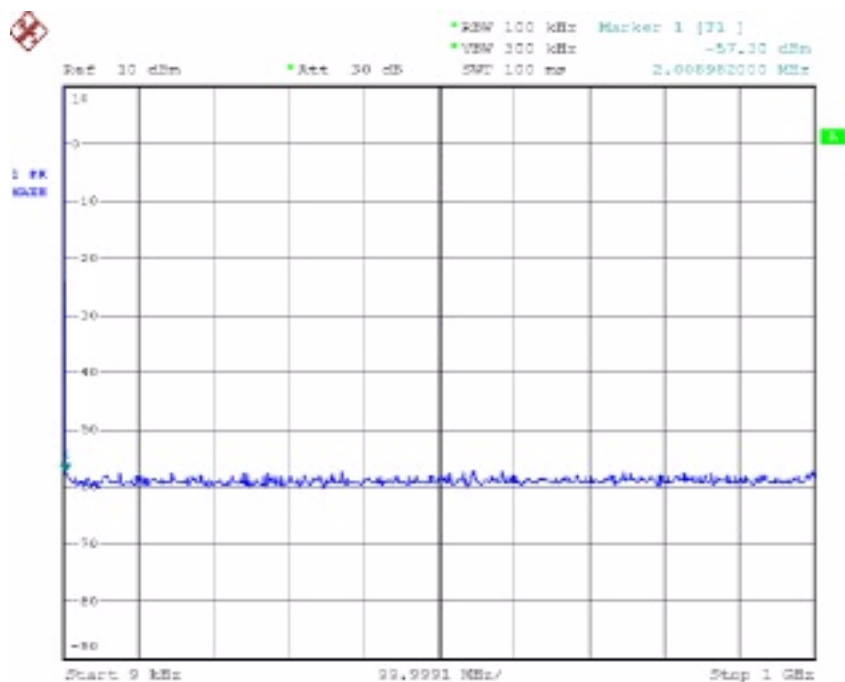
Band-edge compliance to radiated emission test				
Band edge	Different to the signal peak (dB) (Marker 2)	Field strength measured (dB μ V/m)	Field strength at the band-edge (average detector) (dB μ V/m)	Average Limit at the band-edge (dB μ V/m)
Upper	32,74	86,11	53,37	54,00
Within the Average limit				

TEST No.7	Title “ Conducted emission”		47CFR Part 15 Ref. Section
			15.247 (d)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings		
	Span	/	
	Resolution (or IF) Bandwidth (RBW)	100 kHz	
	Video (or Average) Bandwidth (VBW)	300 kHz	
	Sweep time	as necessary to capture the entire dwell time per hopping channel	
	Detector function	Peak	
	Trace	max hold	
	Attenuator	/	
	LIMIT	20 dB below from Conducted peak of RF or limit specified in section 15.209 for Restricted Band.	

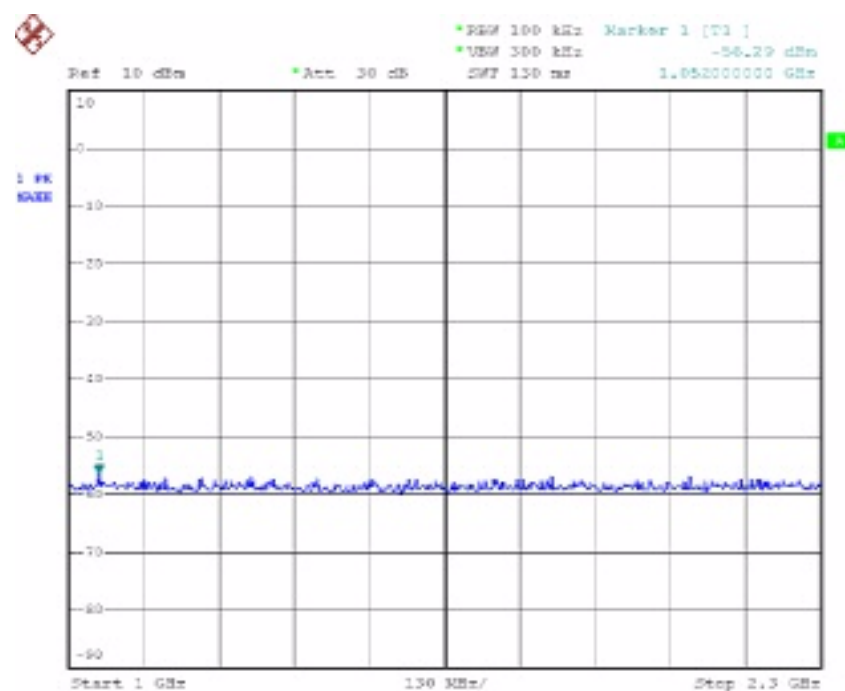
The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be disenabled.

Test Result: Conducted measure (channel 11)

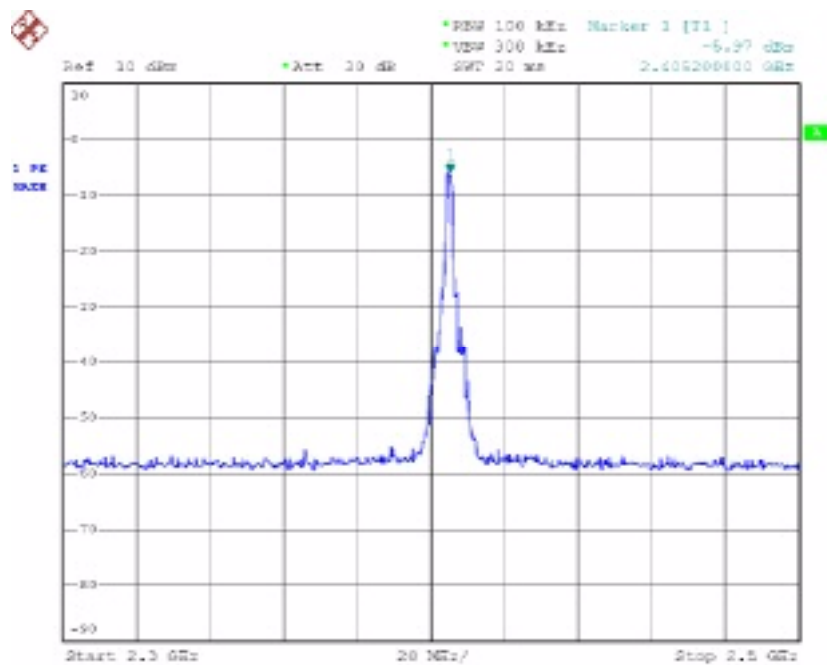
9kHz to1 GHz



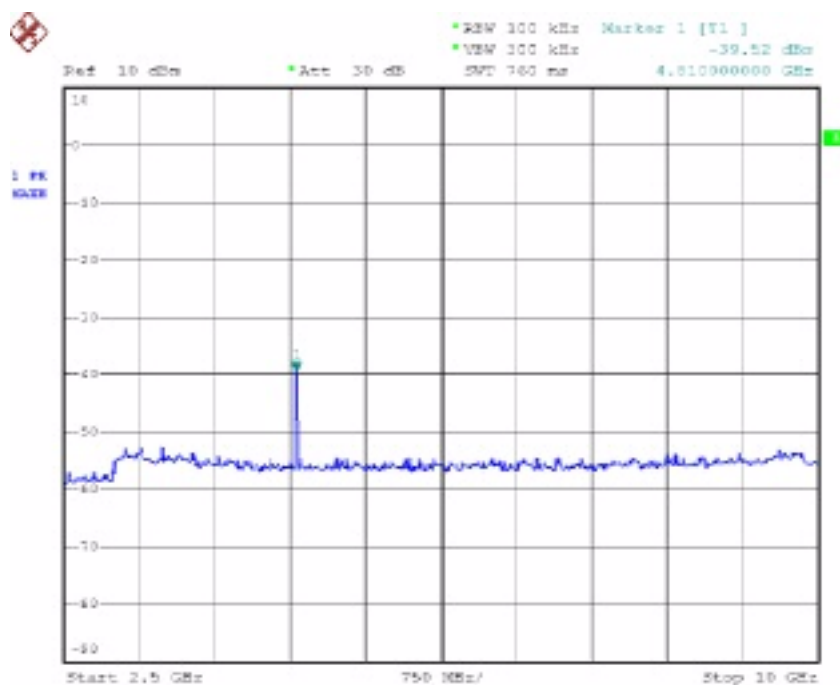
1 GHz to 2,3 GHz



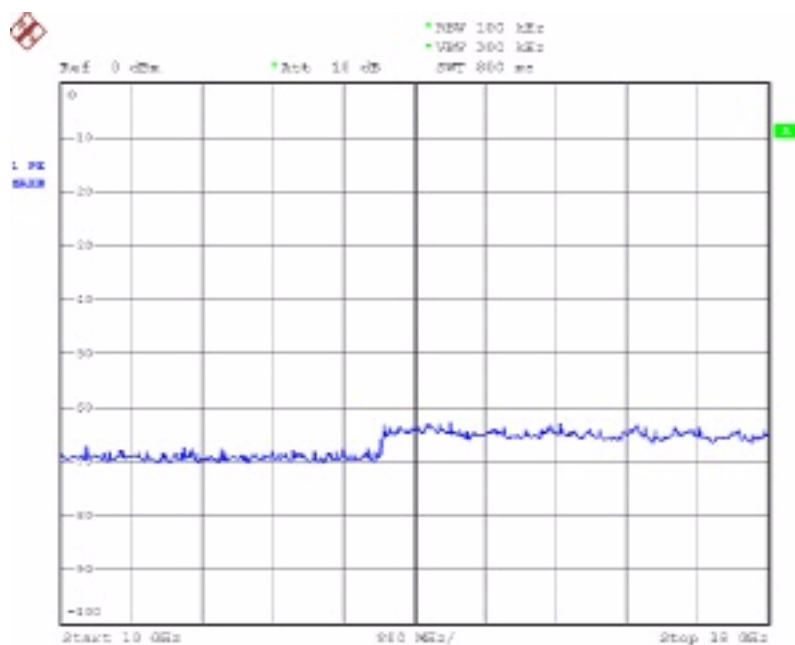
2,3 GHz to 2,5 GHz



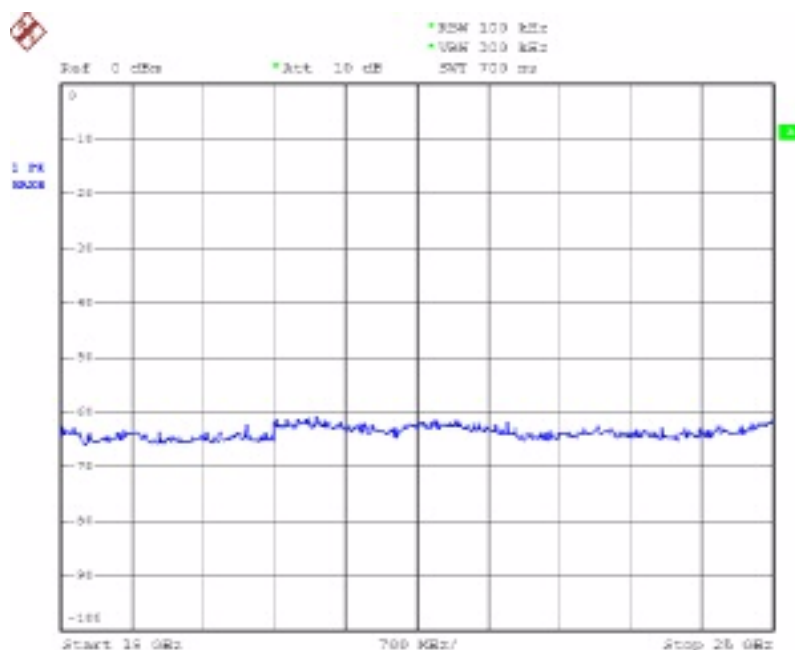
2,5 GHz to 10 GHz



10 GHz to 18 GHz



18 GHz to 25 GHz



All out of band spurious emissions are more 20dB below the in band power of the fundamental.

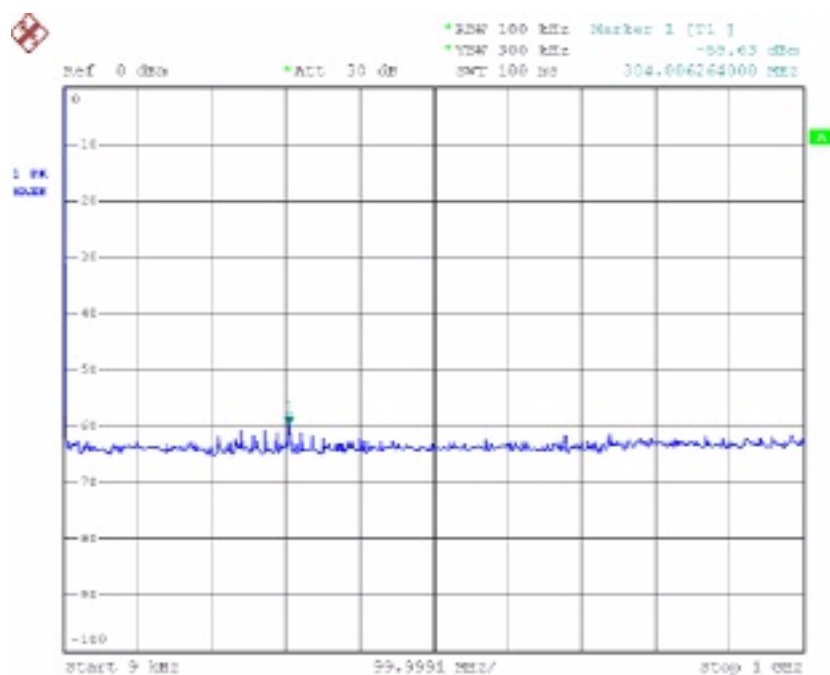
Channel n°11: 2405,00 MHz

PEAK RESULT

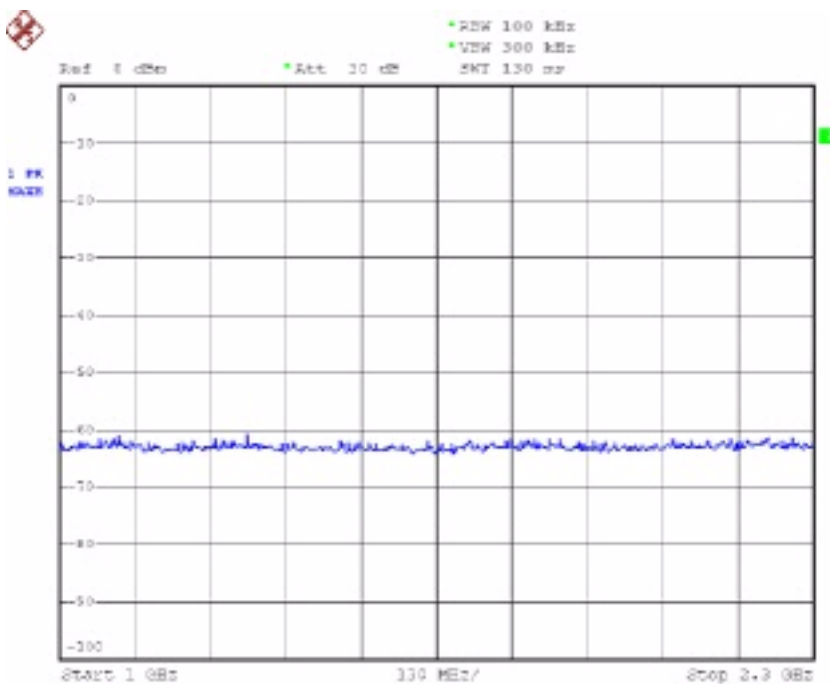
Frequency (MHz)	Measured Level (dBm)	Limit (dBm) Fundamental value – 20dB	Margin (dB)
1052,00	-56,29	-25,97	30,32
2405,20 (fundamental)	-5,97	-----	-----
4810,00	-39,52	-25,97	13,55

Test Result: Conducted measure (channel 19)

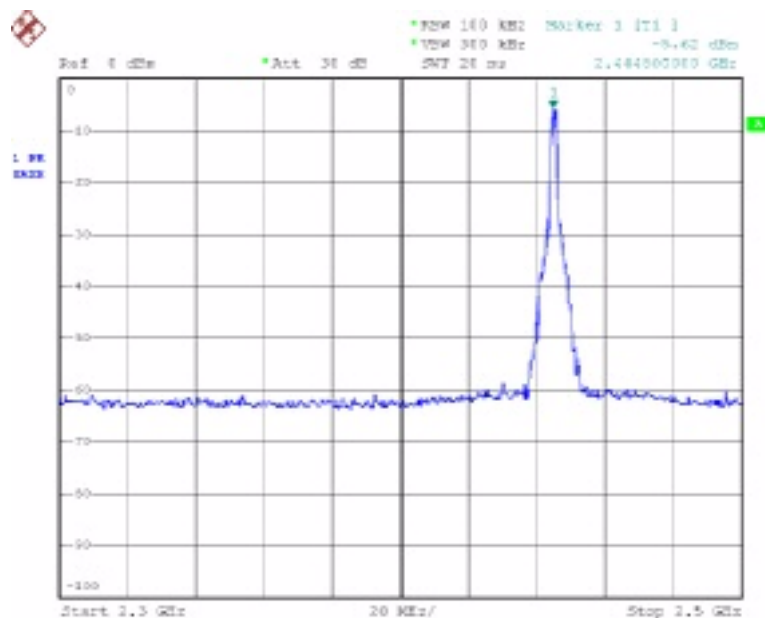
9kHz to 1 GHz



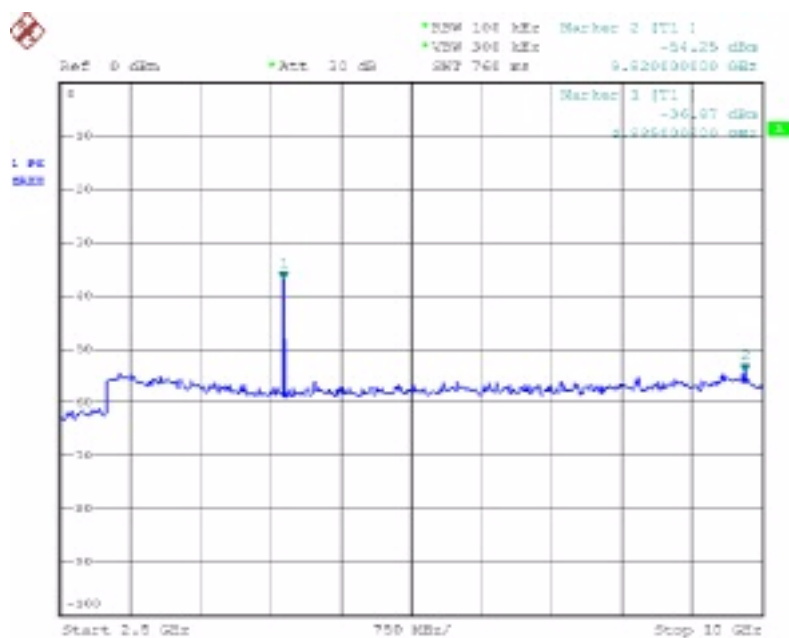
1 GHz to 2,3 GHz



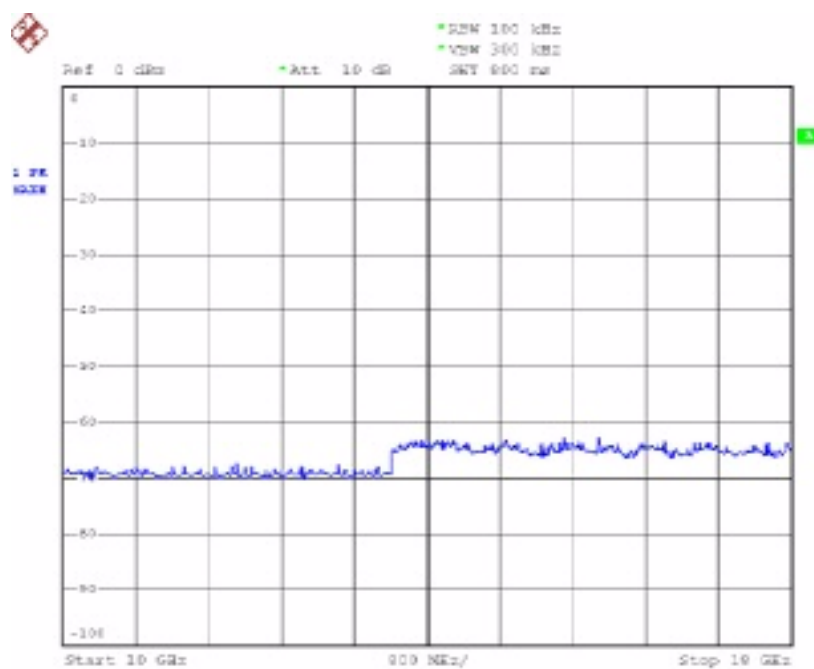
2,3 GHz to 2,5 GHz



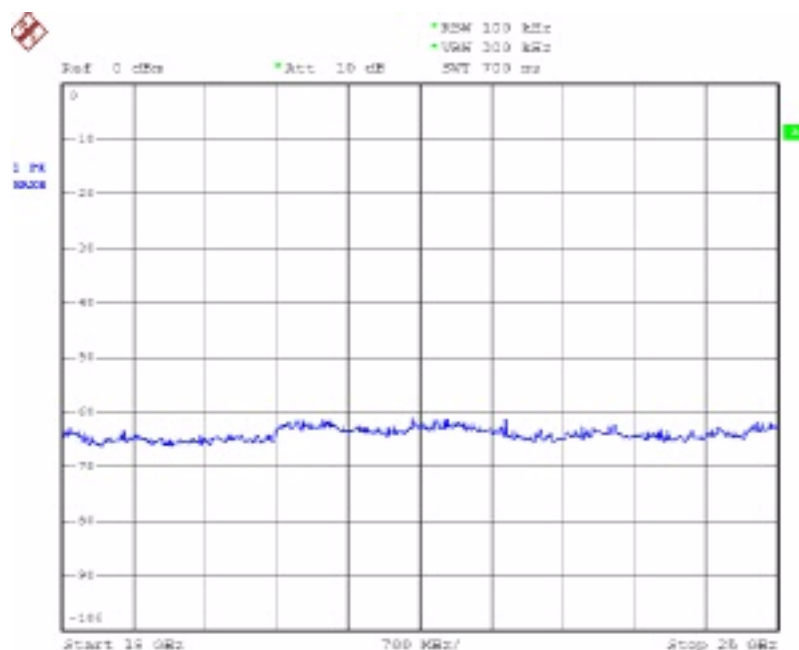
2,5 GHz to 10 GHz



10 GHz to 18 GHz



18 GHz to 25 GHz



All out of band spurious emissions are more 20dB below the in band power of the fundamental.

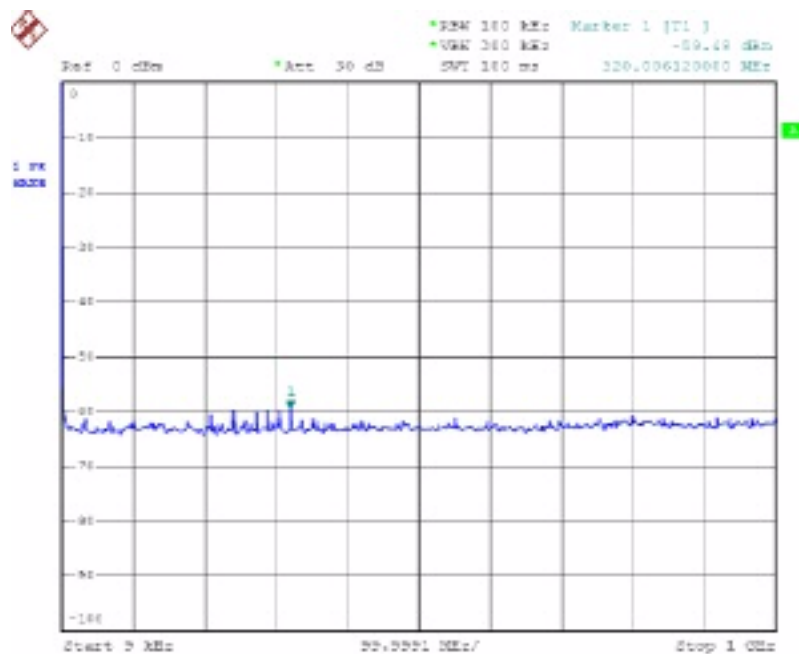
Channel n°19: 2445,00 MHz

PEAK RESULT

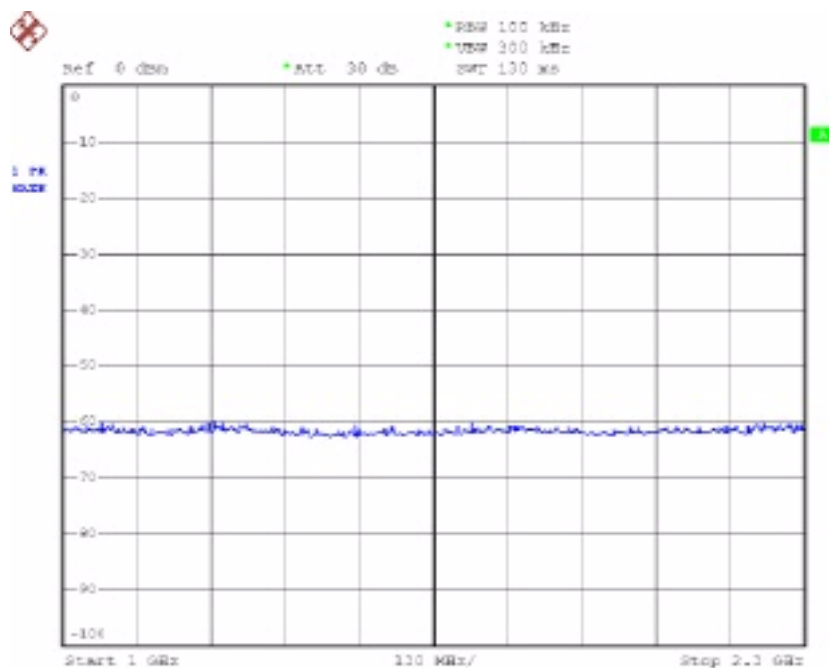
Frequency (MHz)	Measured Level (dBm)	Limit (dBm) Fundamental value – 20dB	Margin (dB)
304,00	-59,63	-25,62	34,01
2444,80 (fundamental)	-5,62	-----	-----
4885,00	-36,87	-25,62	11,25
9820,00	-54,24	-25,62	28,62

Test Result: Conducted measure (channel 26)

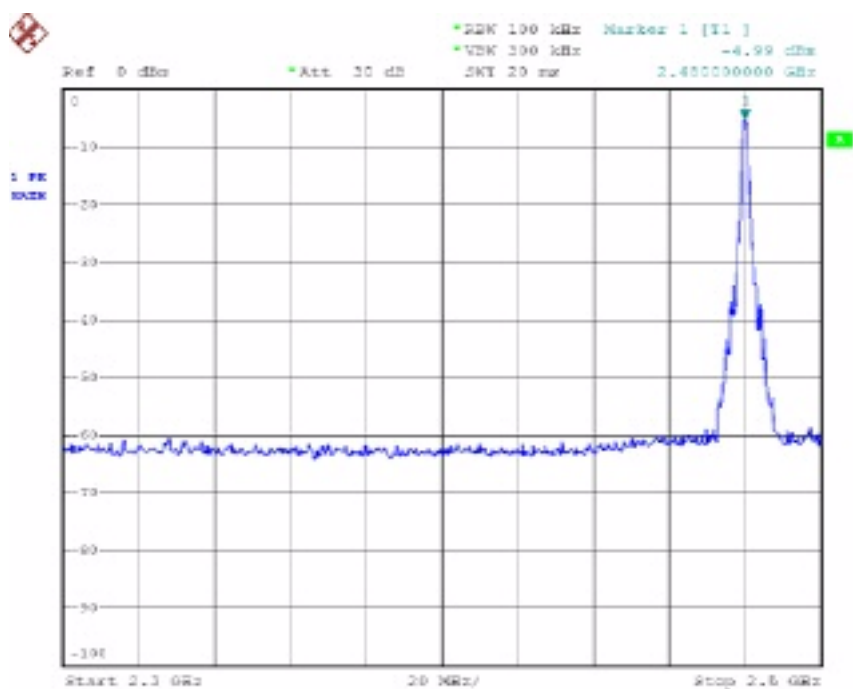
9kHz to 1 GHz



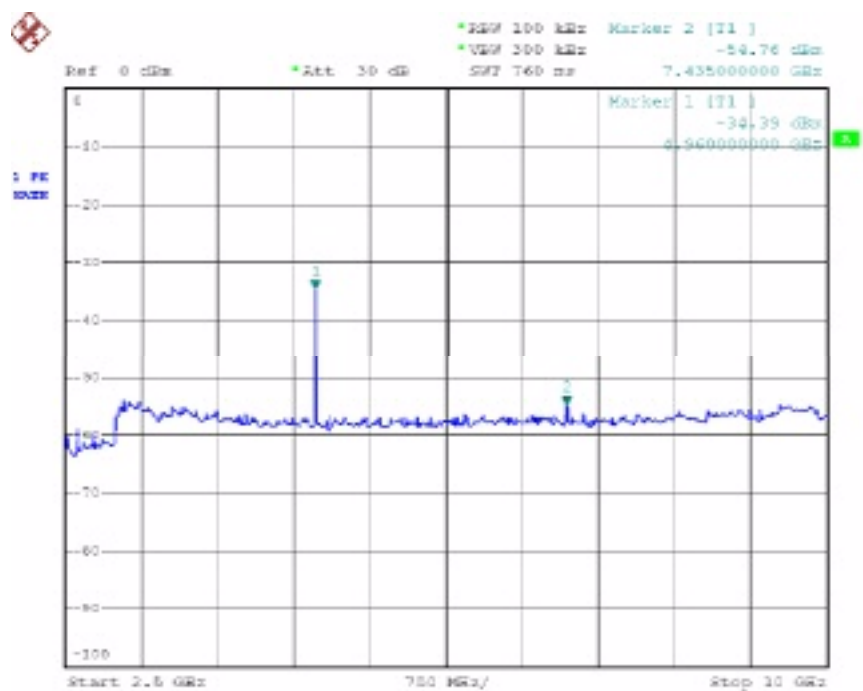
1 GHz to 2,3 GHz



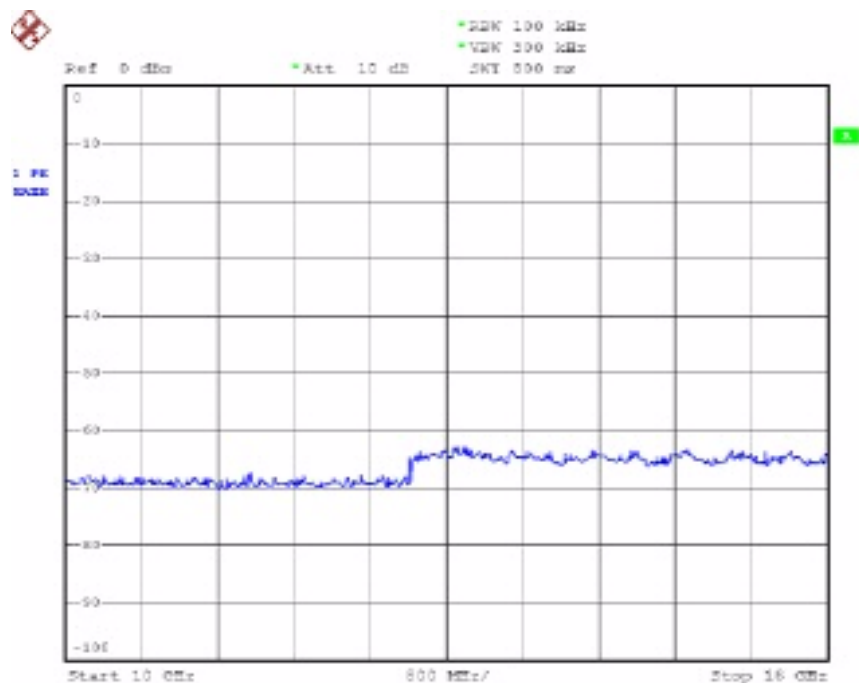
2,3 GHz to 2,5 GHz



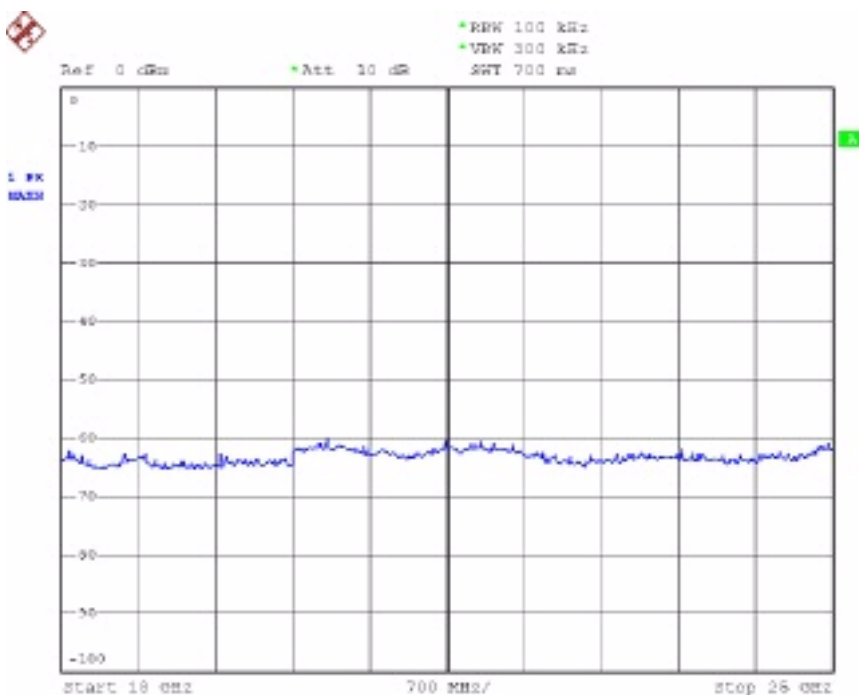
2,5 GHz to 10 GHz



10 GHz to 18 GHz



18 GHz to 25 GHz



All out of band spurious emissions are more 20dB below the in band power of the fundamental.

Channel n°26: 2480,00 MHz

PEAK RESULT

Frequency (MHz)	Measured Level (dBm)	Limit (dBm) Fundamental value – 20dB	Margin (dB)
320,00	-59,48	-24,99	34,49
2480,00 (fundamental)	-4,99	-----	-----
4960,00	-34,39	-24,99	9,4
7435,00	-54,76	-24,99	29,77

TEST No.8	Title “ Transmitter Power Spectral Density”	47CFR Part 15 Ref. Section
		15.247 (e)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings	
	Span	3 MHz
	Resolution (or IF) Bandwidth (RBW)	3 kHz
	Video (or Average) Bandwidth (VBW)	30 kHz
	Sweep time	60 s.
	Detector function	Peak
	Trace	max hold
	Attenuator	/
	LIMIT	8 dBm

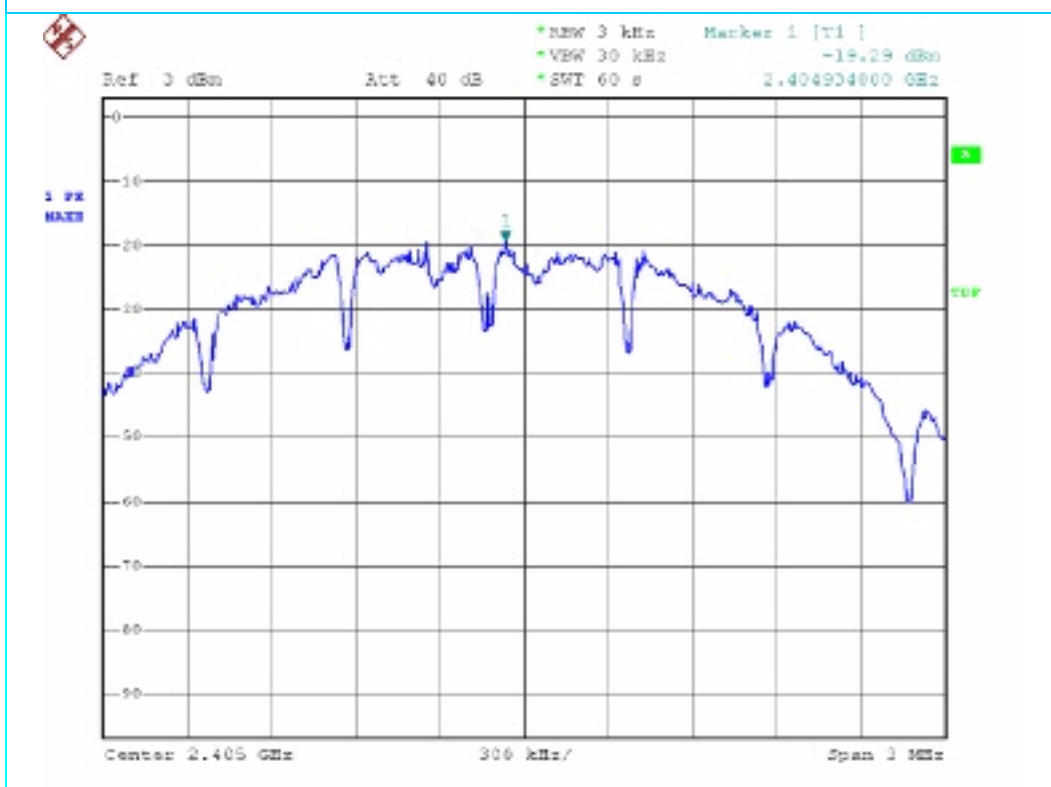
The transmitter output was connected to the spectrum analyzer through a test fixture (radio frequency coupling device associated with the dedicated antenna of the equipment under test)

After trace stabilisation the marker shall be set on the signal peak. The indicated level is the power spectral density.

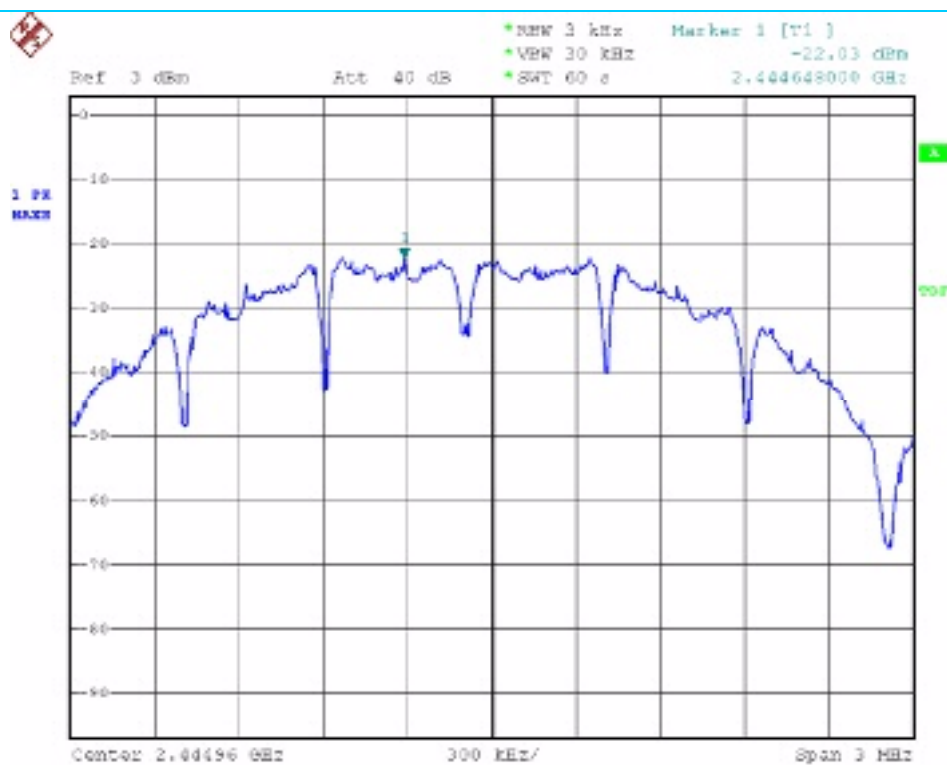
Test Result:

Channel (No.)	Measured Power spectral density (dBm)	Cable loss (dB)	Total Power spectral density (dBm)	Plot (No.)
11	-19,29	none	-19,29	1
19	-22,03	none	-22,03	2
26	-23,70	none	-23,70	3

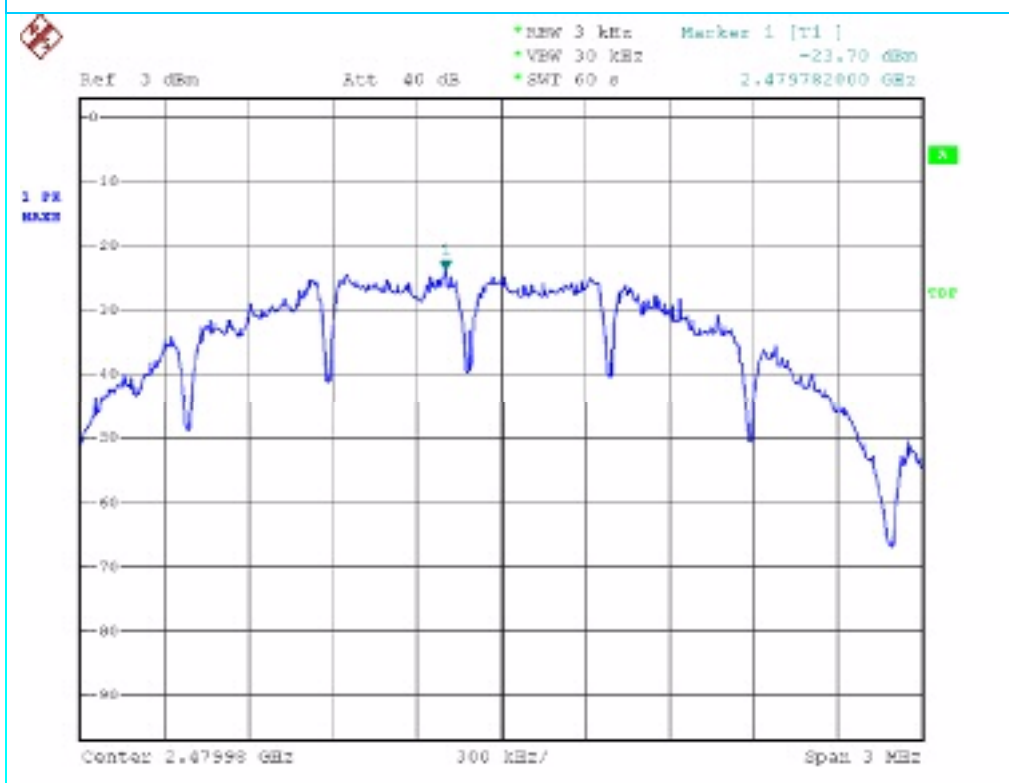
Plot No. 1



Plot No. 2



Plot No. 3



TEST No. 9	Title “RF Exposure Evaluation”	47CFR Part 15 Ref. Section
		15.247 (i)
TEST SET-UP & REQUIREMENTS	Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.	
	EUT classification (fixed, mobile or portable devices)	Fixed, mobile or portable
	LIMITS	See table below

Limit for maximum permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Avarage Time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3÷3.0	614	1.63	(100)*	6
3.0÷30	1842/f	4.89/f	(900/f ²)*	6
30÷300	61.4	0.163	1.0	6
300÷1500	--	--	f/300	6
1500÷100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3÷3.0	614	1.63	(100)*	30
3.0÷30	824/f	2.19/f	(180/f ²)*	30
30÷300	27.5	0.073	0.2	30
300÷1500	--	--	f/1500	30
1500÷100,000	--	--	1.0	30
F = Frequency in MHz *Plane-wave equivalent power density				

The distance from the device's transmitting antenna where the exposure level reaches the maximum permitted limit is calculated using the general equation:

$$S = P \cdot G / 4\pi R^2$$

Where:

S = Power Density (mW/cm²)

P = Conducted power (mW)

G = Linear power gain relative to isotropic radiator (numeric gain)

R = Distance (cm)

RF Exposure evaluation Distance:

Channel (No.)	Frequency (MHz)	Output power to antenna (dBm)	Power density @ 20 cm (mW/cm ²)	Distance where the exposure level reaches the limit (cm)	Limits (mW/cm ²)
11	2405,00	-5,55	0,001	0,219	1
19	2445,00	-5,92	0,001	0,211	1
26	2480,00	-5,40	0,001	0,223	1

Test Result:

The EUT operates at low power level so it does not exceed the Commission's RF exposure guidelines limits; furthermore, Spread spectrum transmitters operate according to the Section 15.247 are categorically excluded from routine environmental evaluation.
RF exposure limit warning or SAR test are not required.

6 ADDITIONAL TECHNICAL INFORMATION

6.1 ELECTROMAGNETICALLY RELEVANT COMPONENTS:

Components	N°	Manufacturer	Type – Technical data
Radio Module			
See Technical document			
Host Equipment			
/		/	/

6.2 RFI SUPPRESSION DEVICES:

Components	N°	Manufacturer	Type – Technical data
EMI Filter on AC main power supply	1	EPCOS	B84112-B-B110

6.3 EMI PROTECTION DEVICES:

Components	N°	Manufacturer	Type – Technical data
None			

7 TECHNICAL DOCUMENTATION

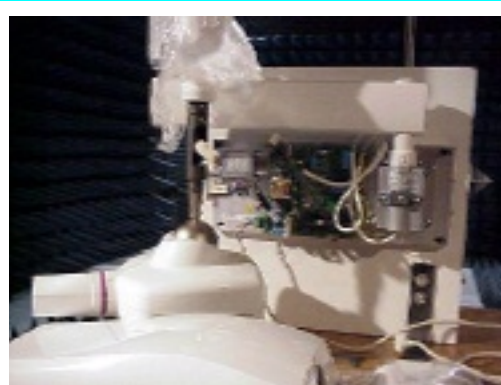
DOCUMENT	REFERENCE
Electronic diagram	Sch 97660514-4 – 15/01/2008
User Manual	97050096 rev.00 00/2007
Installation Manual	97070012 rev.001 07/2007

8 PHOTOGRAPHIC DOCUMENTATION

8.1 EUT IDENTIFICATION



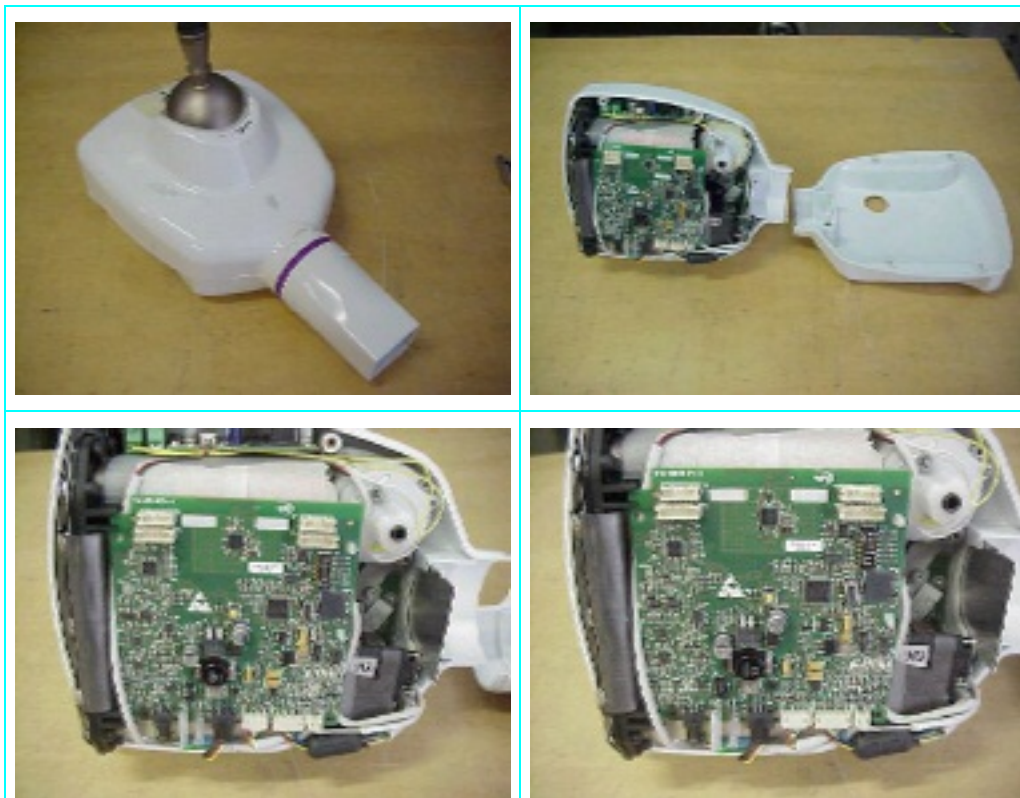
Equipment under test identification



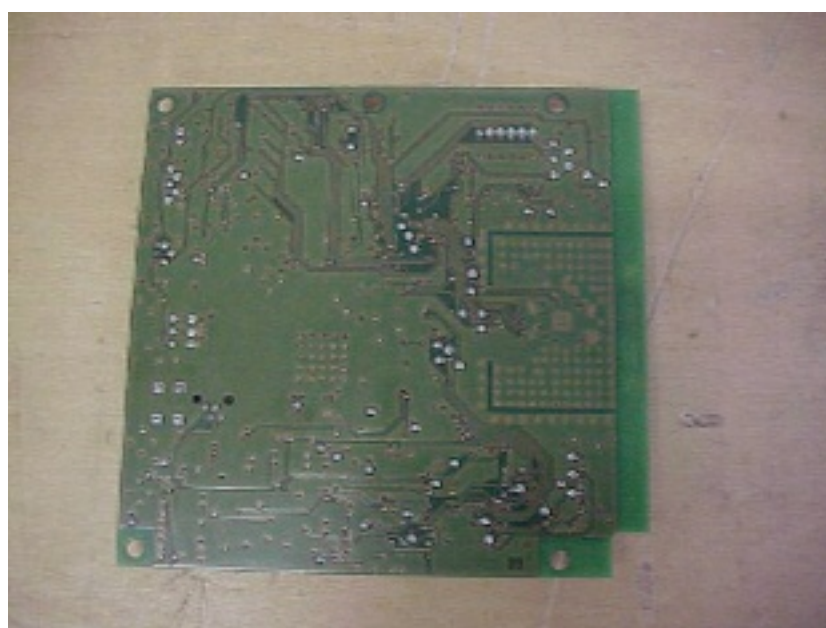
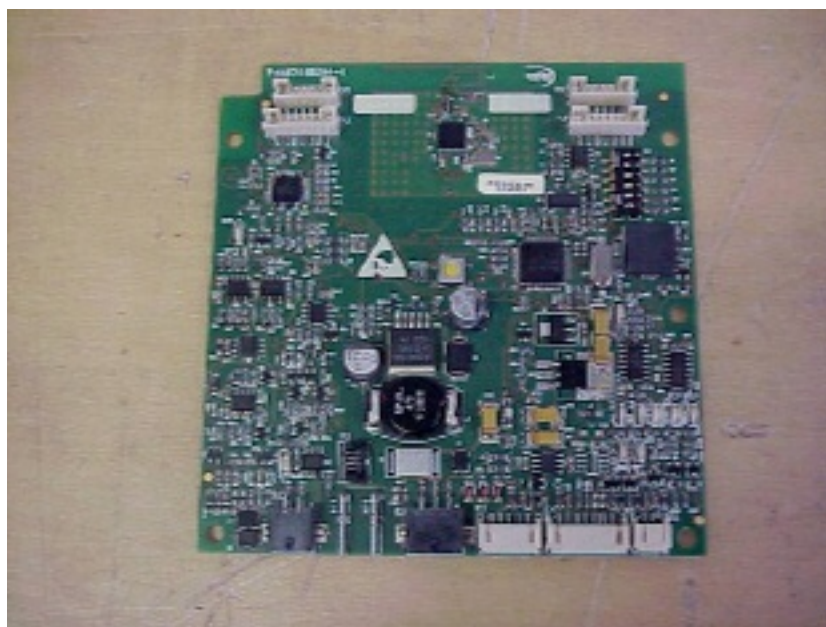
Internal view: Main Board



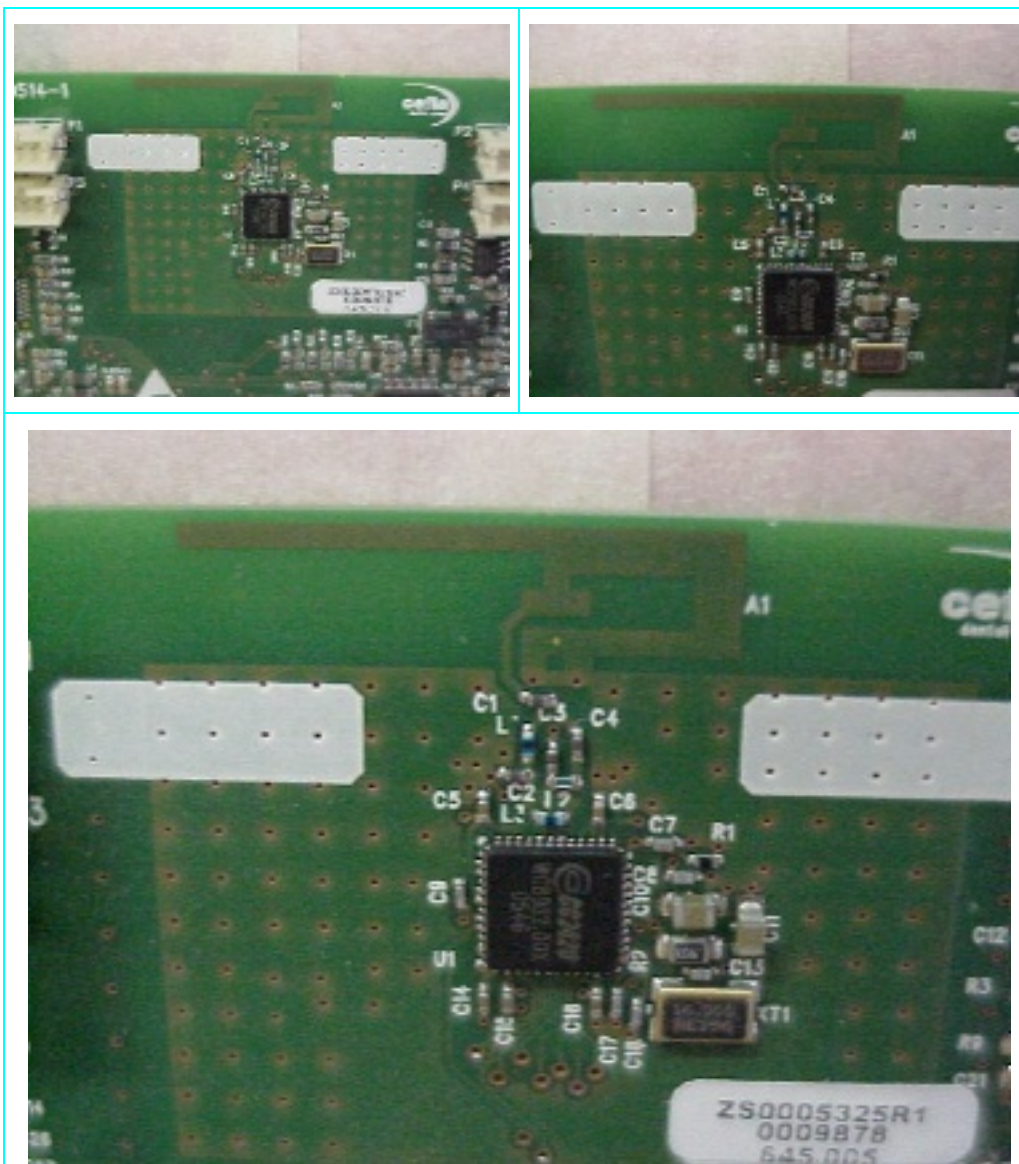
Internal view: Main Board



Internal view: Board with Radio Module



Board with Radio Module



Radio Module



Radio module + antenna connector (for conducted test)

8.2 TEST SET-UP



Set up of Radiated emission test



Set-up for conducted emission test

9 MEASUREMENT AND TEST EQUIPMENT INSTRUMENTATION

Instruments	Manufacturer	Model	IMQ serial number	Calibration data	Calibration interval (Month)
Emi Receiver	Rohde & Schwarz	ESHS 10	S-03494	02/2008	18
Receiver/Spectrum analyzer	Rohde & Schwarz	ESCI	S-04355	04/2007	18
Artificial Mains V-network	Rohde & Schwarz	ESH3-Z5	S-02122	11/2006	18
Spectrum Analyzer	Rohde & Schwarz	FSP40	S-03629	07/2007	24
Antenna Bilog	ARA	LPD-2513	S-02385	05/2007	24
Antenna ridged horn 1÷18 GHz	Schwarzbeck	BBHA9120D	S-03464	02/2007	24
Antenna ridged horn 15÷40 GHz	Schwarzbeck	BBHA9170	S-03668	02/2008	24
Pre-amplifier 1-26.5 GHz	HP	HP 8449 B	S-03542	07/2006	24
Band Reject Filter 2400÷2483 MHz	Wainwright	WRCG2400 / 2483	S-04308	/	/
Highpass Filter 3.4÷18 GHz	Wainwright	WHK3.4/18	S-04309	/	/
Crystal Detector	Agilent	8472B	S-04467	/	/
Software for test automation	Rohde & Schwarz	ES-K1 V.1.60	/	/	/

The IMQ instruments are tested and calibrated according to UNI EN 45001, the IMQ procedure IP-037 "Calibration test equipment and measurement" and according to plans set on IMQ operating instruction IO-FT-034 "Criteria for the calibration of test equipment and measurement" which are an integral part of the Quality Manual of IMQ.