



**Telecommunications & Telematics
for Transports Lab.**

TEST REPORT

Ref. No. ARSH00182/1

Date: 2007-10-26

Measurements performed in accordance with:



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

PRODUCT : ELECTROMYOGRAPH

TESTED MODEL : ZEROWIRE

FCC ID. : VH6ZWRX07

APPLICANT : AURION S.r.l. – Viale Certosa, 191– 20151 MILANO

MANUFACTURER : AURION S.r.l. – Viale Certosa, 191– 20151 MILANO

TRADEMARK : AURION

OTHER INFORMATION Testing dates : 2007-09-24 ÷ 2007-10-10

 Tested samples No. : 1

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

Tested by : R. Radice Signature: *Roberto Radice* Date : 2007-10-26

R. Colombo

Checked by: (EMC and R&TTE Lab. deputy) Signature: *Roberto Colombo* Date : 2007-10-26

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2007-10-26	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	AURION S.r.l.
ADDRESS	Viale Certosa, 191– 20151 MILANO
COUNTRY	Italy

1.2 MANUFACTURER

NAME	AURION S.r.l.
ADDRESS	Viale Certosa, 191– 20151 MILANO
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 :	▪ ELECTROMYOGRAPH
Model :	▪ ZEROWIRE
FCC ID. :	▪ VH6ZWRX07
Trade Name	▪ AURION
Data cable :	▪ /
Telecom cable :	▪ /
Power supply type :	▪ 1/N AC 100-240 V Power supply
AC power input cable :	▪ /
DC power input cable :	▪ /

1.5 FEATURE OF EQUIPMENT UNDER TEST

Power specification	▪ 3 V dc
Operating frequency:	▪ 2402 ÷ 2480 MHz (125 Channels)
Maximum RF output power:	▪ < 1W
Modulation:	▪ FSK
Bitrate	▪ 1M bps
Main SW identification	▪ /
Main HW Board identification	▪ /
Peripherals included (for system application)	▪ None
Interfaces :	▪ None
Integrated interfaces :	▪ None
AC adapter:	▪ None

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST

2.1 ENVIRONMENTAL CONDITIONS

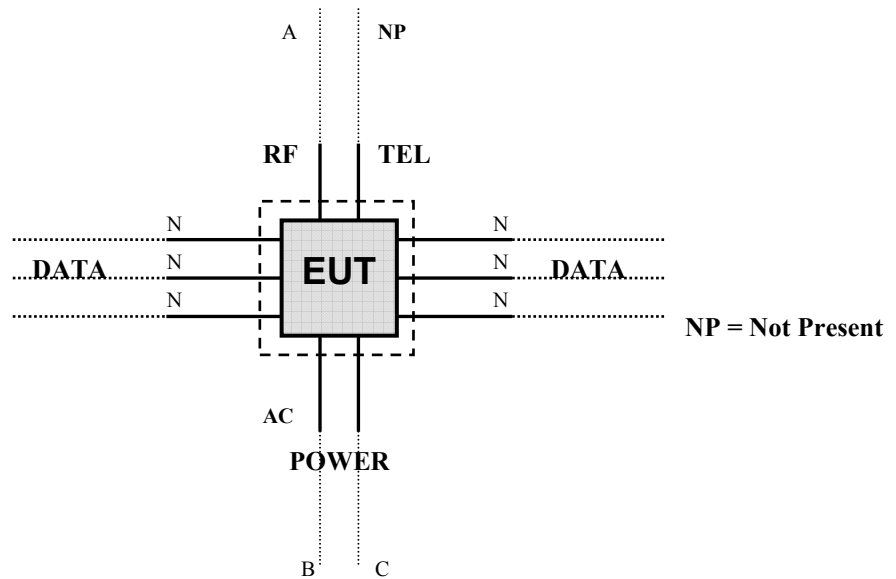
TEST CONDITIONS	MEASURED
Ambient Temperature	20 ÷ 25 °C
Relative Humidity	50 ÷ 60 %
Atmospheric Pressure	900 ÷ 1000 mbar

2.2 DESCRIPTION OF SUPPORT EQUIPMENT

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

EQUIPMENT	MANUFACTURER	MODEL
None	-----	-----

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	AC/DC Power adapter: Input 100÷240Vac 50÷60Hz – Output 9V 1,5A	/	/
3	DC power port	None	/	/
4	Signal / control port	USB port Analog output External trigger	/	/
5	Antenna port (RF)	External antenna	/	/

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

CFR47 Part 15 Section	Title	Operating condition	Result	Test No.
15.247 (d)	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

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. Radiated emission tests : from 30 MHz to tenth harmonic of the highest fundamental frequency.

5 MEASUREMENTS AND TESTS DATA

TEST No. 1	Title "Antenna Requirements"	47CFR Part 15 Ref. Section
		15.203 / 15.204
TEST REQUIREMENTS	<p>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.</p>	

Antenna specifications	
N° of authorized antenna types:	▪ 1 (No. 2)
Antenna type :	▪ External dedicated antenna CONNEXWIRELESS type RD2458-5
Total gain :	▪ +3 dBi
External R.F. power amplifiers:	▪ Not present
Note: Only one antenna is used for transmission. Both antenna is used for receiver.	

Test Result:

Within the specifications

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

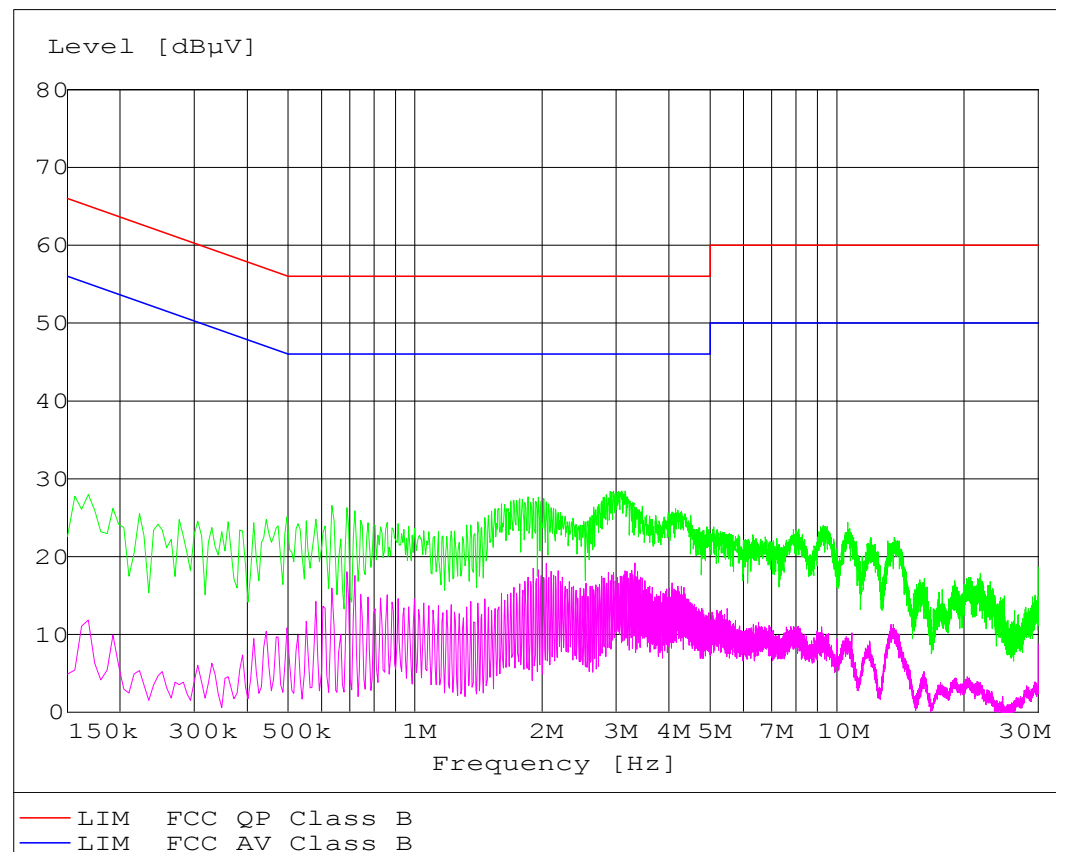
TEST DATA	PORT UNDER TEST	OPERATING CONDITION	RESULT
	AC mains power input port USB port	#1	Complies
	Note: In search of max noise (phase(s) and neutral). The measurements with Quasi-Peak detector are performed only for frequencies for which the Peak values are \geq (Q.P. limit - 6 dB).		

Test Result:

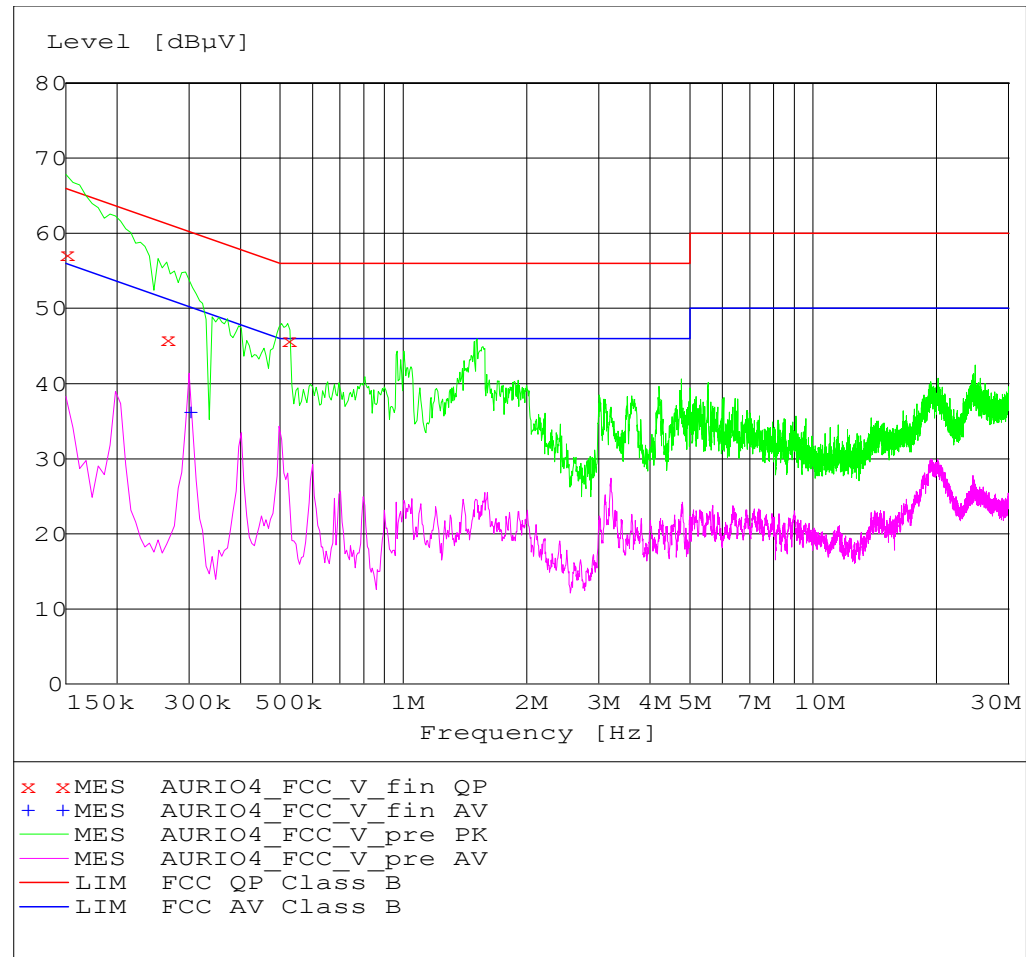
Within the specifications

MEASUREMENTS RESULTS

CONDUCTED DISTURBANCE ON AC MAINS POWER PORT OF AC/DC ADAPTER



CONDUCTED DISTURBANCE on 230 Vac of PC with USB line of equipment under test connected to this Personal Computer



FINAL TEST (QUASI-PEAK DETECTOR)

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dB μ V	dB	dB μ V	dB		
0.150000	57.30	0.10	66.00	8.70	N	GND
0.264000	45.90	0.10	61.30	15.40	N	GND
0.522000	45.80	0.10	56.00	10.20	N	GND

FINAL TEST (AVERAGE DETECTOR)

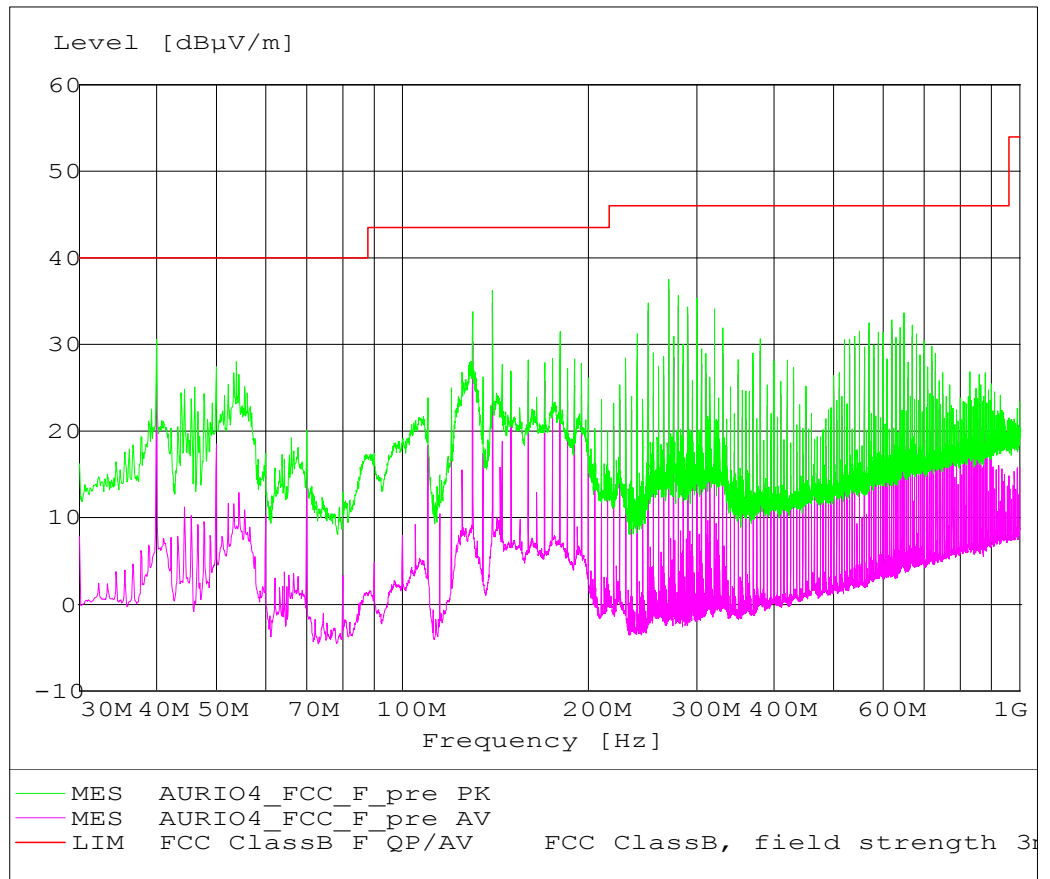
Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dB μ V	dB	dB μ V	dB		
0.300000	36.20	0.10	50.20	14.00	N	GND

TEST No. 3	Title "Radiated disturbances"	47CFR Part 15 Ref. Section
		15.205 / 15.209
TEST REQUIREMENTS	Test setup	ANSI C63.4
	Test facility	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

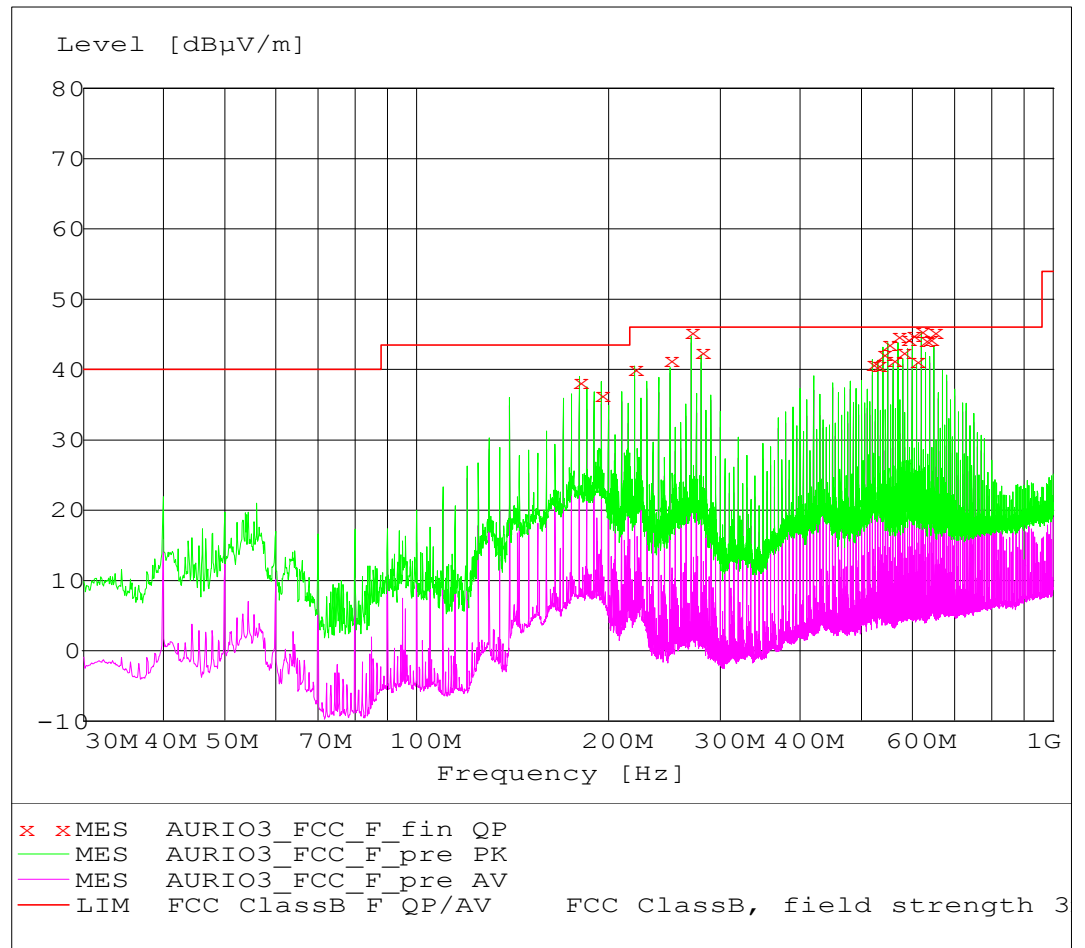
TEST DATA	PORT UNDER TEST	OPERATING CONDITION	RESULT
	Enclosure	#1	Complies
	Note: In search of max noise (EUT rotation: from 0° to 360°; receiving antenna height: from 1 to 4m; receiving antenna polarization: horizontal and vertical).		

LIMITS FOR SPURIOUS

Band of operations	Peak (dBμV/m)	Average Limit (dBμV/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) – Vertical polarization

MEASUREMENTS RESULTS (below 1000 MHz) – Horizontal polarization



FINAL TEST (QUASI-PEAK DETECTOR)

Frequency	Level	Transd	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
180.000	38.30	-32.40	43.50	5.20	100.0	214.00	HORIZONTAL
195.000	36.50	-30.40	43.50	7.00	100.0	198.00	HORIZONTAL
220.000	40.20	-30.60	46.00	5.80	100.0	213.00	HORIZONTAL
250.000	41.40	-29.30	46.00	4.60	100.0	225.00	HORIZONTAL
270.000	45.30	-28.70	46.00	0.70	100.0	225.00	HORIZONTAL
280.000	42.60	-29.20	46.00	3.40	100.0	223.00	HORIZONTAL
520.000	40.90	-23.30	46.00	5.10	100.0	85.00	HORIZONTAL
530.000	40.60	-22.90	46.00	5.40	100.0	88.00	HORIZONTAL
540.000	42.30	-23.00	46.00	3.70	100.0	92.00	HORIZONTAL
550.000	43.70	-23.10	46.00	2.30	100.0	101.00	HORIZONTAL
560.000	41.40	-23.20	46.00	4.60	100.0	119.00	HORIZONTAL
570.000	44.80	-22.70	46.00	1.20	100.0	326.00	HORIZONTAL
580.000	42.50	-22.10	46.00	3.50	100.0	315.00	HORIZONTAL
590.000	44.40	-22.20	46.00	1.60	100.0	315.00	HORIZONTAL
600.000	45.00	-22.30	46.00	1.00	100.0	315.00	HORIZONTAL
610.000	41.20	-22.40	46.00	4.80	100.0	302.00	HORIZONTAL
620.000	45.50	-22.50	46.00	0.50	100.0	305.00	HORIZONTAL
630.000	44.30	-22.10	46.00	1.70	100.0	310.00	HORIZONTAL
640.000	44.40	-21.70	46.00	1.60	100.0	311.00	HORIZONTAL
650.000	45.40	-21.40	46.00	0.60	100.0	308.00	HORIZONTAL

MEASUREMENTS RESULTS (1000 MHz to 25000 MHz)

SPURIOUS EMISSION channel n°00: 2402,00 MHz

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

Frequency (MHz)	Measured Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)
2402,00 (fundamental)	96,00	-----	-----	-----
4804,28	58,98	5000	74,00	15,02
7206,02	60,37	5000	74,00	13,63
f>7300	No spurious detected			

AVERAGE (RBW= 1MHz; VBW=10Hz)

Frequency (MHz)	Measured Level (dBμV/m)	Limit (μVolt/meter)	Limit (dBμV/m)	Margin (dB)
2402,00 (fundamental)	69,20	-----	-----	-----
4804,28	36,75	500	54,00	17,25
7206,02	41,73	500	54,00	12,27
f>7300	No spurious detected			

SPURIOUS EMISSION channel n°62: 2440 MHz

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

Frequency (MHz)	Measured Level (dB μ V/m)	Limit (μ Volt/meter)	Limit (dB μ V/m)	Margin (dB)
2440,00 (fundamental)	95,98	-----	-----	-----
4880,40	58,66	5000	74,00	15,34
7320,50	60,30	5000	74,00	13,70
f>7400	No spurious detected			

AVERAGE (RBW= 1MHz; VBW=10Hz)

Frequency (MHz)	Measured Level (dB μ V/m)	Limit (μ Volt/meter)	Limit (dB μ V/m)	Margin (dB)
2440,00 (fundamental)	68,64	-----	-----	-----
4880,40	36,93	500	54,00	17,07
7320,50	41,68	500	54,00	12,32
f>7400	No spurious detected			

SPURIOUS EMISSION channel n°124: 2480 MHz

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

Frequency (MHz)	Measured Level (dB μ V/m)	Limit (μ Volt/meter)	Limit (dB μ V/m)	Margin (dB)
2480,00 (fundamental)	96,90	-----	-----	-----
4960,32	58,69	5000	74,00	15,31
7440,53	59,50	5000	74,00	14,50
9920,00	< 40	5000	74,00	> 34
12400,00	44,98	5000	74,00	29,02
f>12400	No spurious detected			

AVERAGE (RBW= 1MHz; VBW=10Hz)

Frequency (MHz)	Measured Level (dB μ V/m)	Limit (μ Volt/meter)	Limit (dB μ V/m)	Margin (dB)
2480,00 (fundamental)	69,10	-----	-----	-----
4960,32	37,18	500	54,00	16,82
7440,53	41,24	500	54,00	12,76
9920,00	< 40	500	54,00	> 14
12400,00	< 40	500	54,00	> 14
f>12400	No spurious detected			

TEST No.3	Title "6 dB Bandwidth"	47CFR Part 15 Ref. Section
		15.247 (a) (2)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings	
	Span	1,5 MHz
	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	> 500 kHz

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)

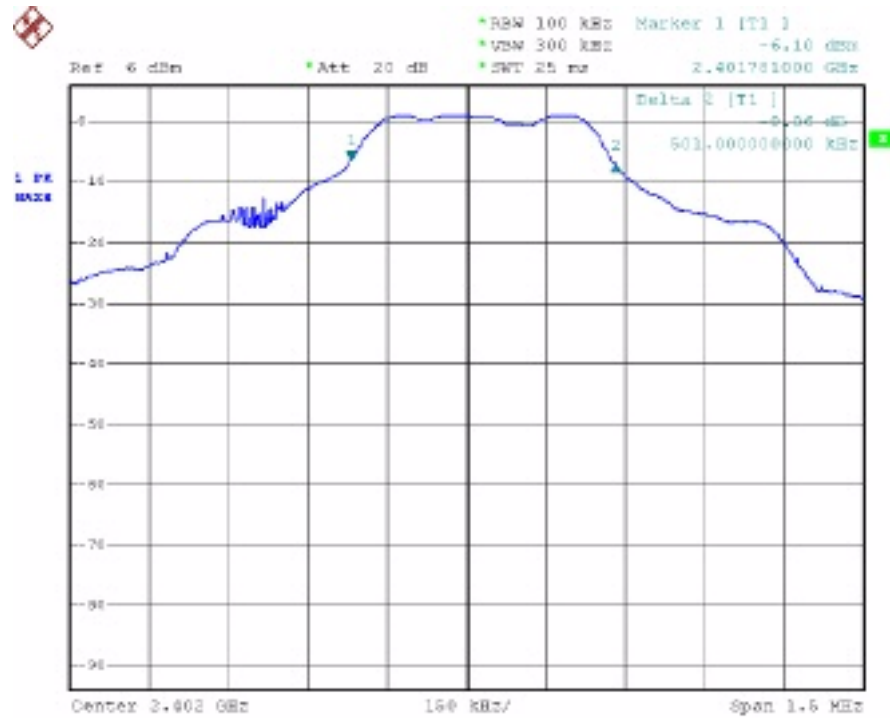
Test Result:

Channel (No.)	Frequency (MHz)	Channel Bandwidth (kHz)	Plot (No.)
00	2402,00	501	1
62	2440,00	501	2
124	2480,00	501	3

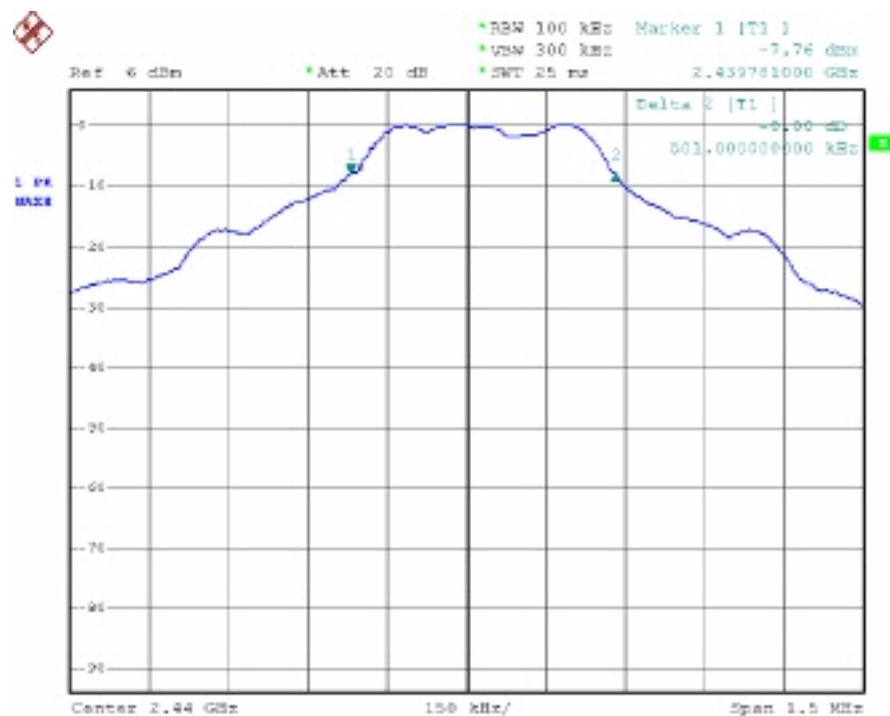
Modification during the test:

- none

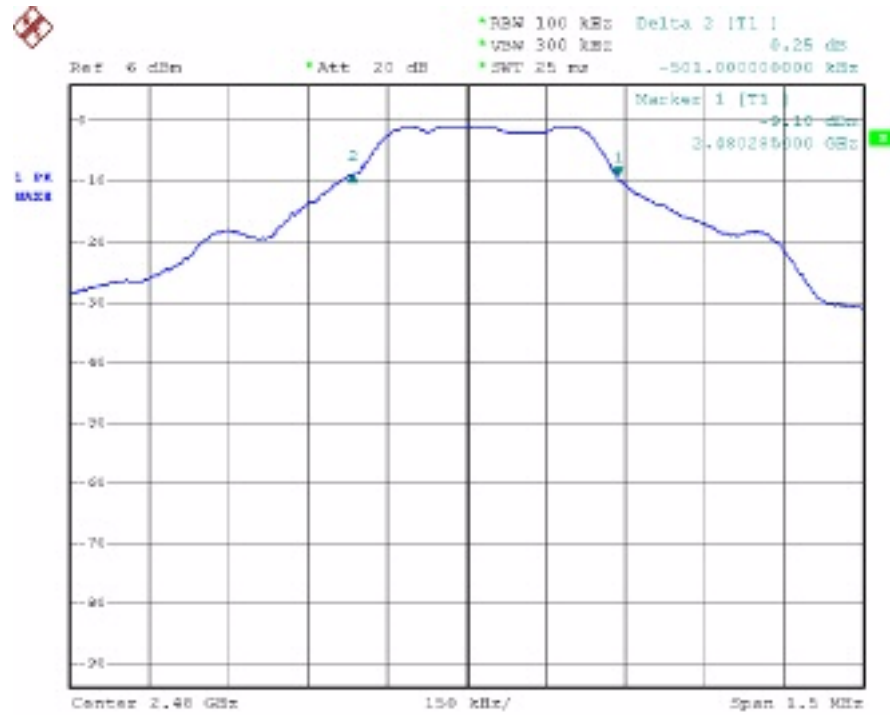
Plot No. 1:



Plot No. 2:



Plot No. 3:



TEST No.4	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	30 MHz	
	Resolution (or IF) Bandwidth (RBW)	3 MHz	
	Video (or Average) Bandwidth (VBW)	10 MHz	
	Sweep time	as necessary to capture the entire dwell time per hopping channel	
	Detector function	Peak	
	Trace	max hold	
	Attenuator	/	
	LIMIT	1 Watt (30dBm)	

Conducted measurements:

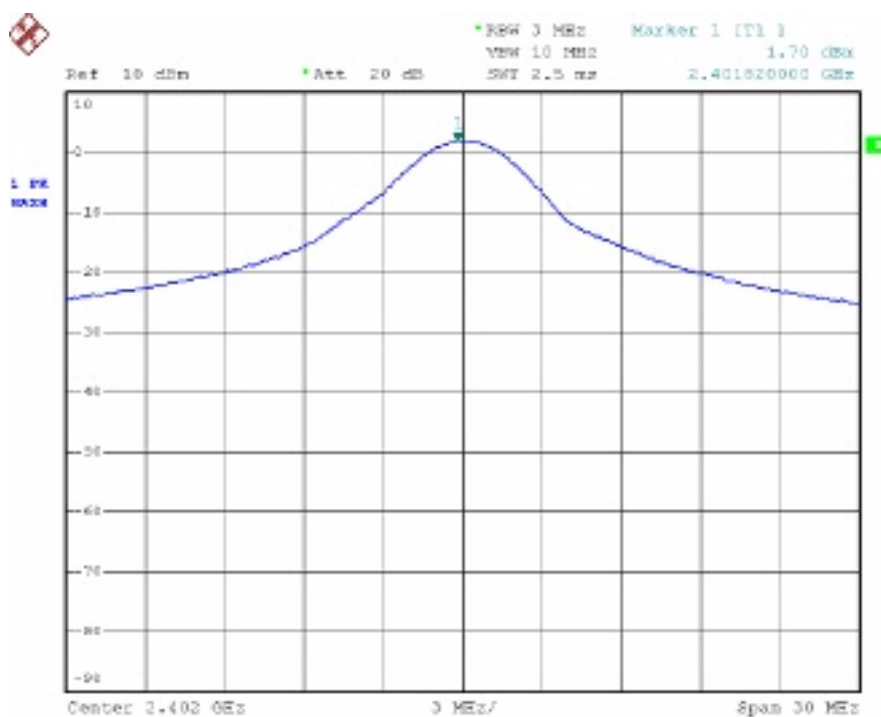
The transmitter output was connected to the spectrum analyzer via a low loss cable.

Radiated measurements:

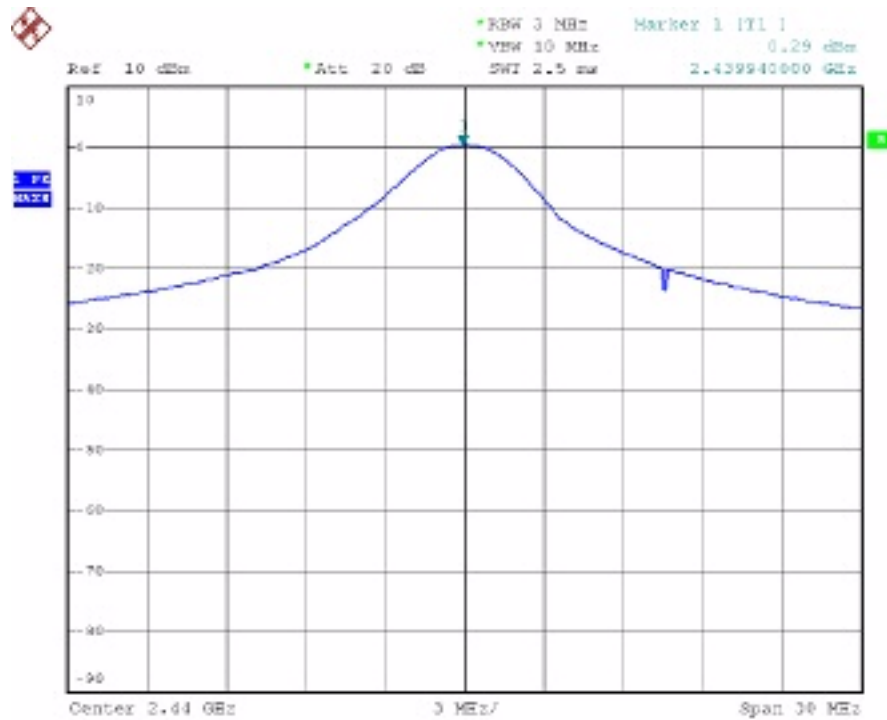
As the EUT is supplied with a dedicated antenna, the effective radiated power is measured in a 3 m anechoic chamber with the substitution antenna method.

Test Result:**Conducted measure (Peak detector)**

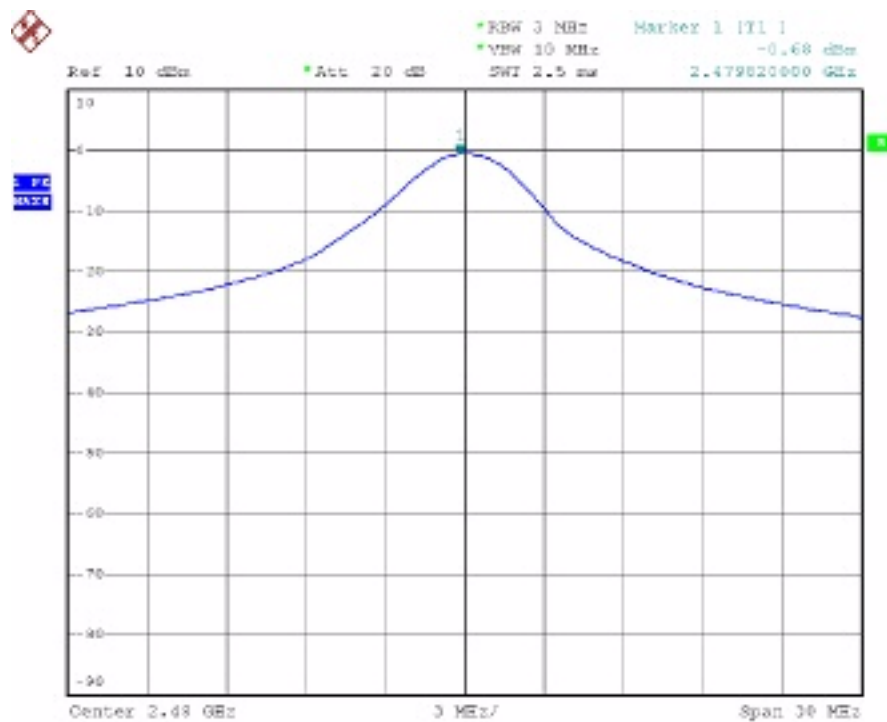
Channel (No.)	Frequency (MHz)	Measured Output Power (dBm)	Cable loss (dB)	Conducted Output Power (dBm)	Antenna Gain (dB)	Calculated Radiated Output Power (dBm)
00	2402,00	1,70	+0,50	2,20	+3	+5,20
62	2440,00	0,29		0,79		+3,79
124	2480,00	-0,68		-0,18		+2,82

Channel No. 00

Channel No. 62



Channel No. 124



TEST No. 5	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)	100 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	

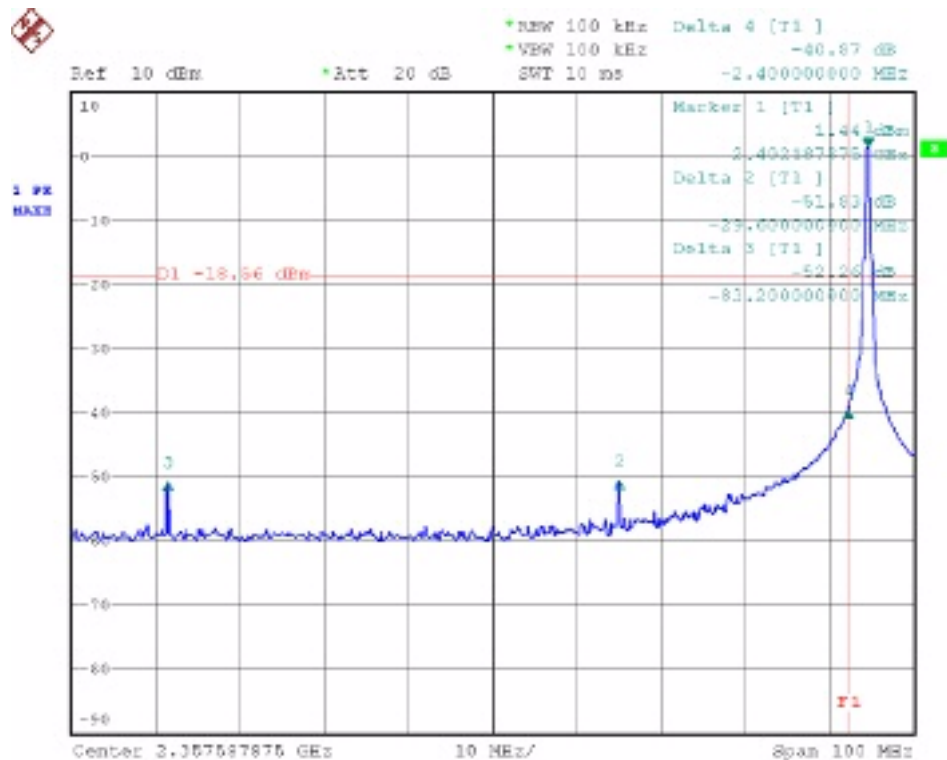
The transmitter output was connected to the spectrum analyzer through a test fixture (radio frequency coupling device associated with the dedicated antenna of the equipment under test)

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:

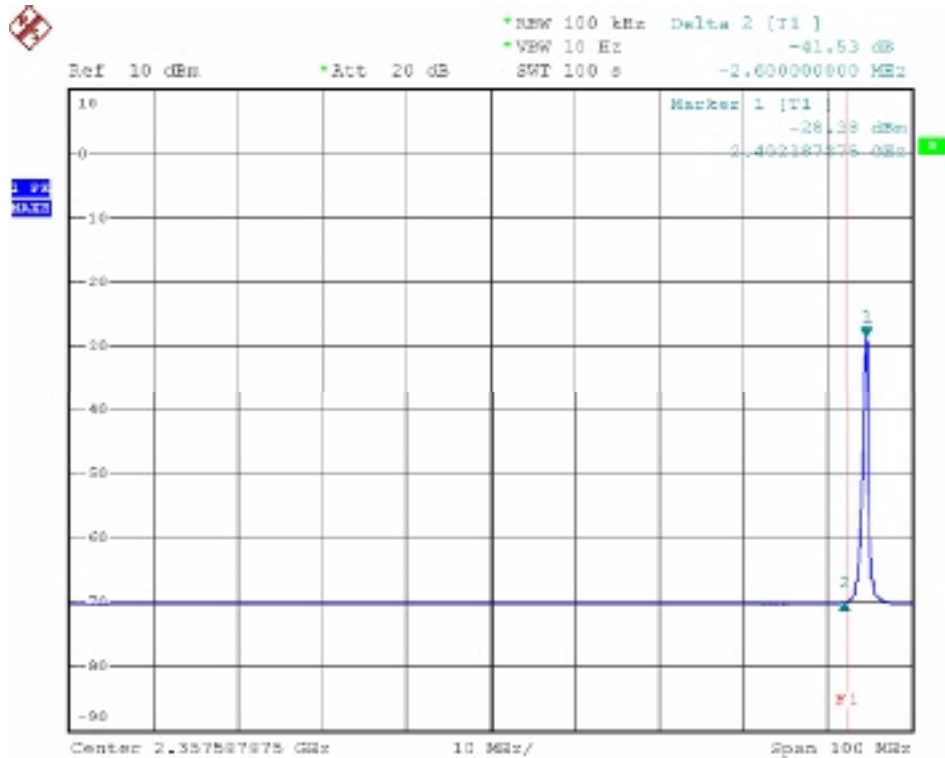
Within the specifications

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

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

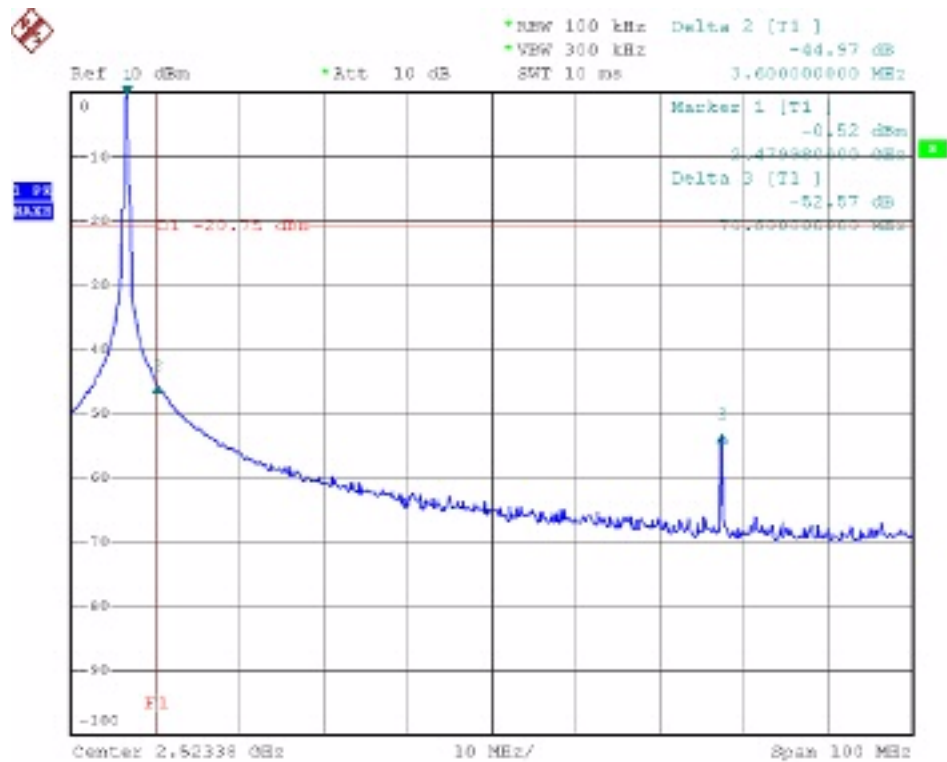
Band-edge compliance to radiated emission test				
Band edge	Different to the signal peak (dB) (Marker 4)	Field strength measured (dB μ V/m)	Field strength at the band-edge (peak detector)	Peak Limit at the band-edge
Lower	40,87	96,00	55,13	74,00
Within the limit				

Band-edge compliance, lower band edge (Average)



Band-edge compliance to radiated emission test

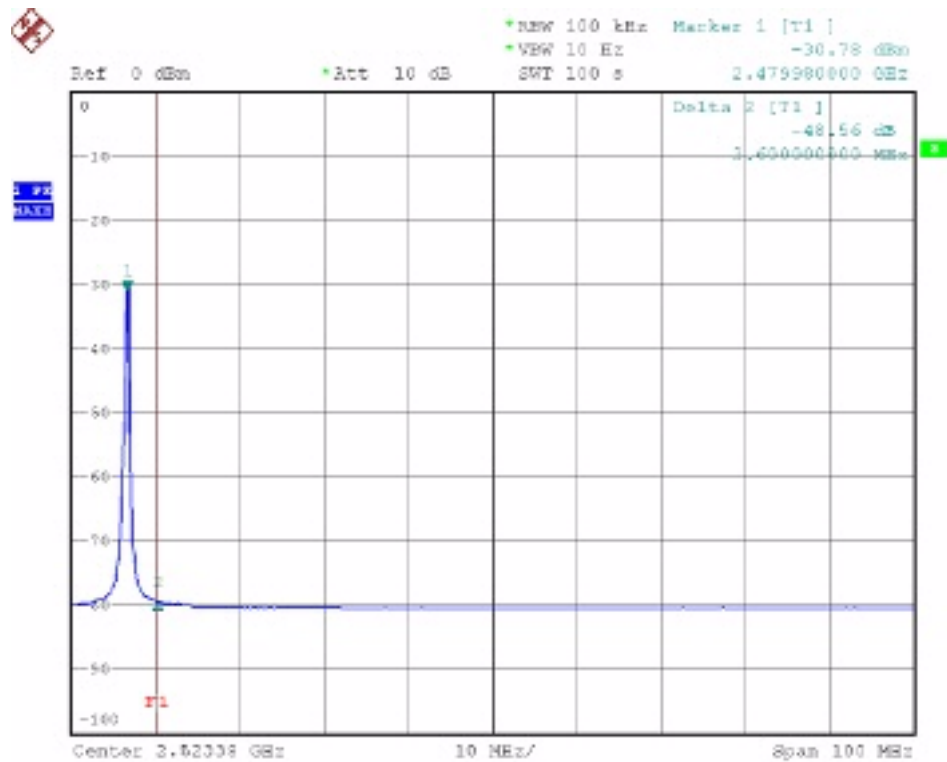
Band edge	Different to the signal peak (dB) (Marker 2)	Field strength measured (dB μ V/m)	Field strength at the band-edge (average detector)	Average Limit at the band-edge
Lower	41,53	69,20	27,67	54,00
Within the limit				

Band-edge compliance, upper band edge (Peak)

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)	Peak Limit at the band-edge
Lower	44,97	96,90	51,93	74,00
Within the limit				

Band-edge compliance, upper band edge (Average)



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)	Average Limit at the band-edge
Lower	48,56	69,10	20,54	54,00
Within the limit				

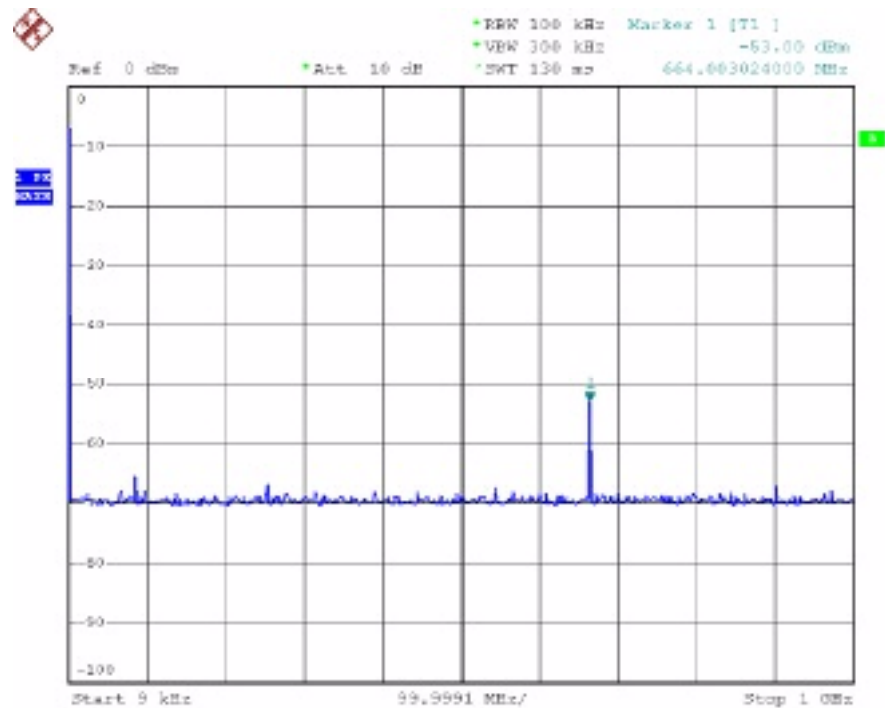
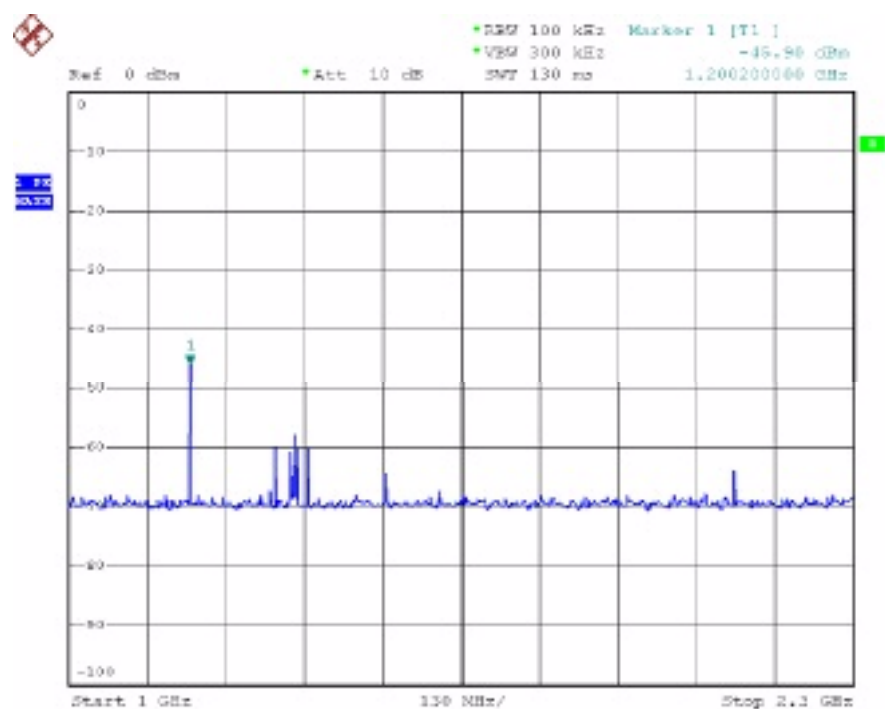
TEST No. 6	Title “Conducted Emissions outside the band 2400-2483.5 MHz”		47CFR Part 15 Ref. Section
			15.247 (d)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings		
	Span	9kHz to 10 th harmonic of fundamental frequency	
	Resolution (or IF) Bandwidth (RBW)	100 kHz	
	Video (or Average) Bandwidth (VBW)	300 kHz	
	Sweep time	Auto	
	Detector function	Peak	
	Trace	Max hold	
	Attenuator	/	
	LIMIT	20 dB below from Conducted peak of RF or limit specified in section 15.209 for Restricted Band.	

The transmitter output was connected to the spectrum analyzer through an opportune RF attenuator.

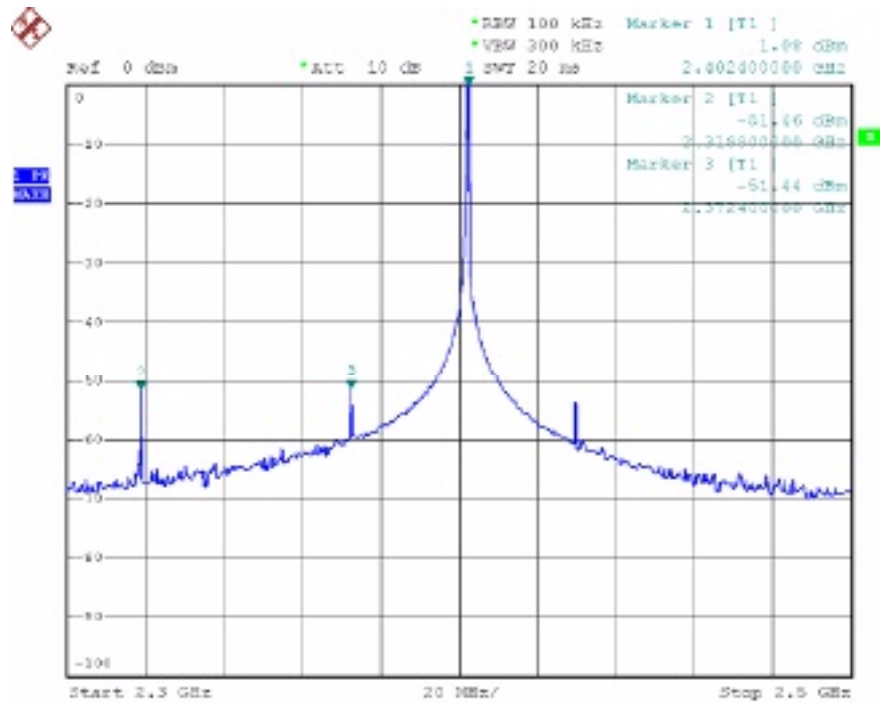
The measure has been executed with the lowest transmit channel, the highest transmit channel and one located somewhere in the middle of the band.

Test Result:

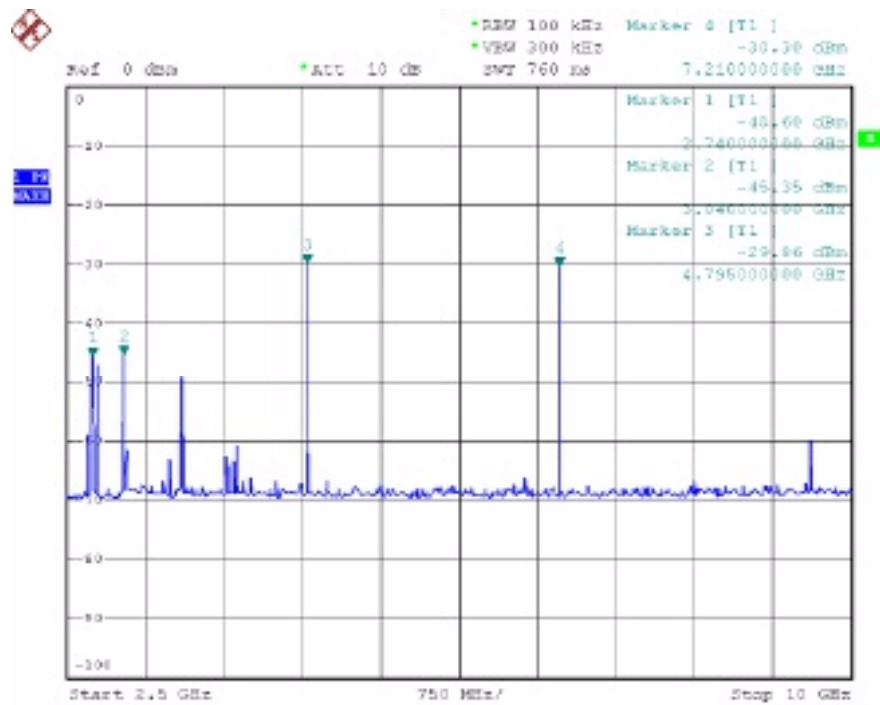
Within the specifications

Test Result:**Lowest transmit channel (00)****9kHz to 1 GHz**

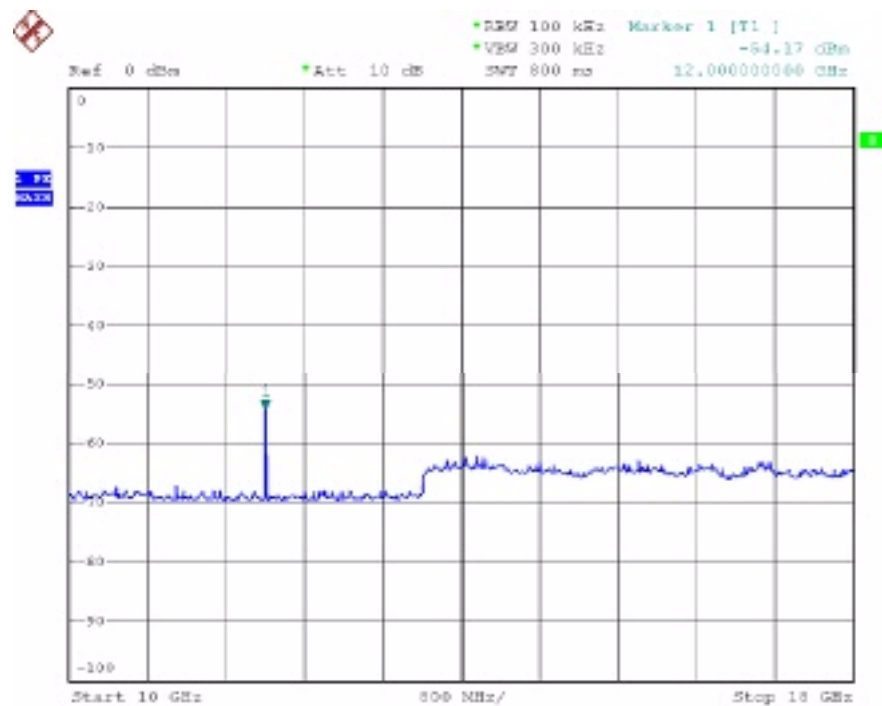
1 GHz to 2,3GHz



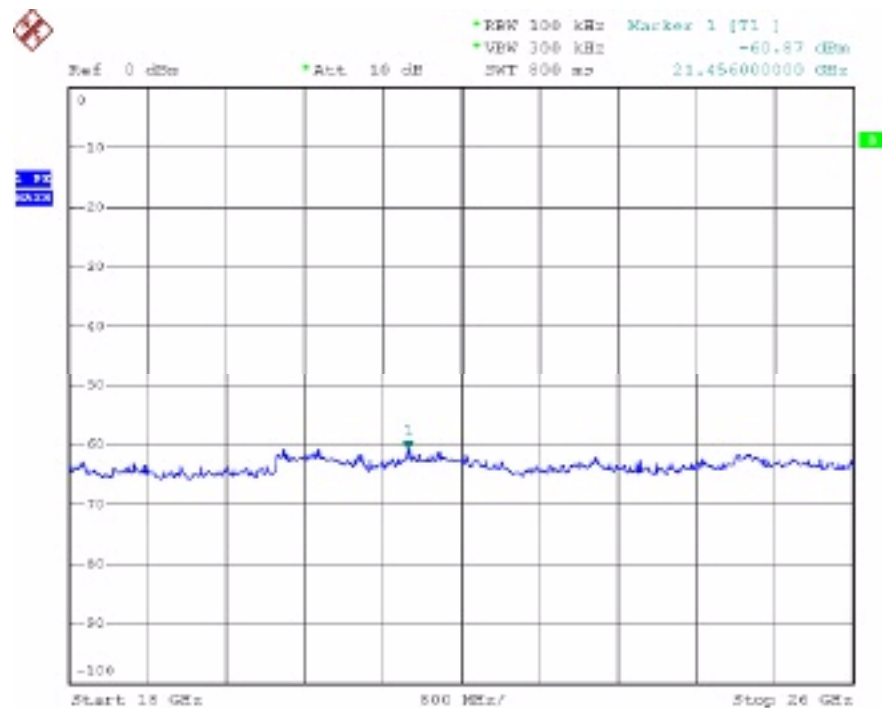
2,3 GHz to 2,5 GHz



2,5 GHz to 10 GHz



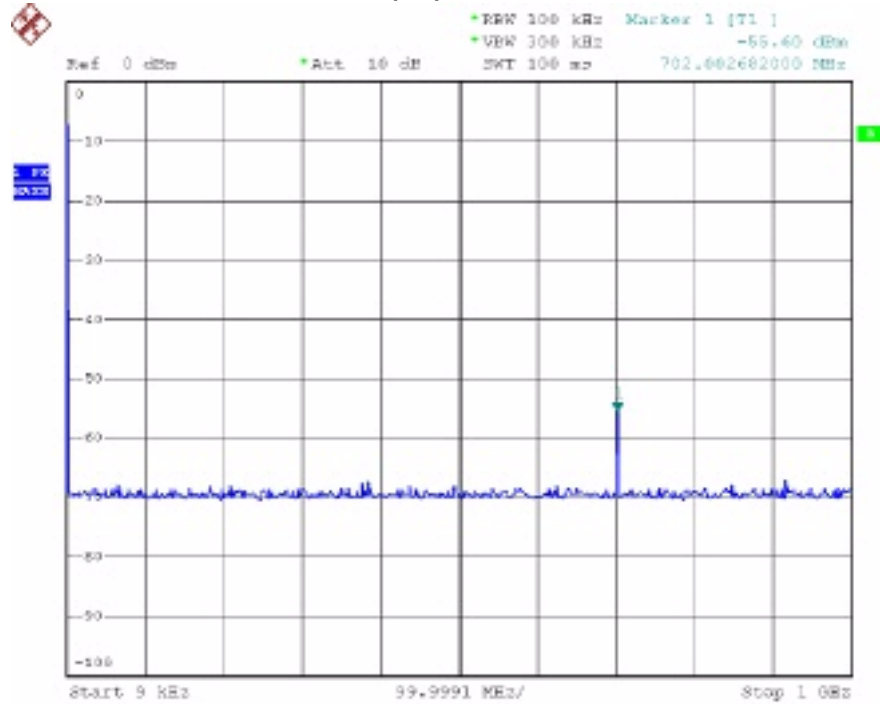
10 GHz to 18 GHz



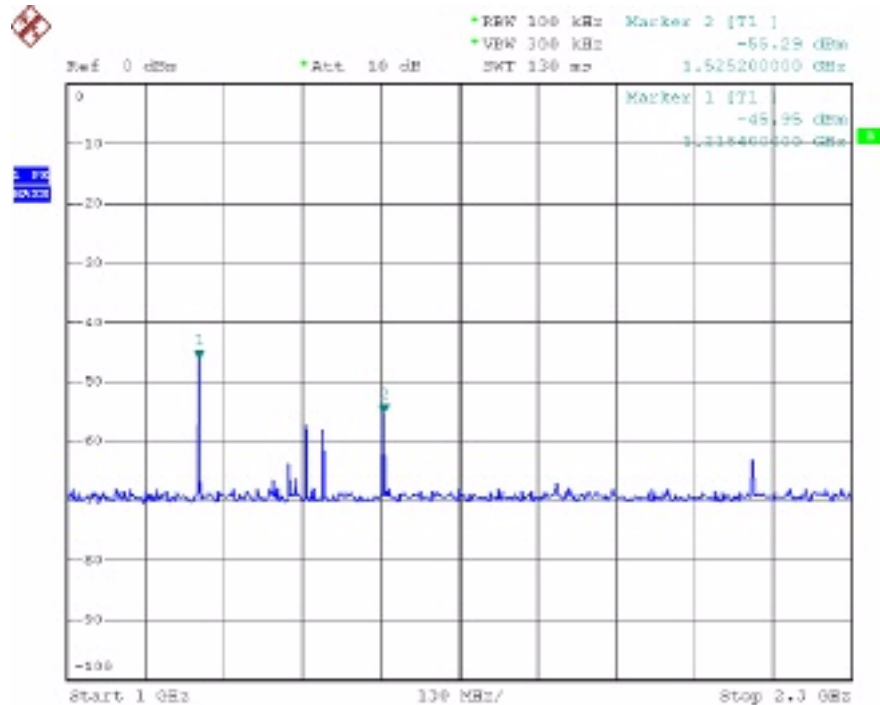
18 GHz to 26 GHz

Frequency (MHz)	Measured Level (dBm)	Limit (dBm) Fundamental value – 20dB	Margin (dB)
664,00	-53,00	-18,92	34,08
1200,20	-45,90	-18,92	26,98
2318,80	-51,46	-18,92	32,54
2372,40	-51,44	-18,92	32,52
2402,40 (fundamental)	+1,08	-----	-----
2740,00	-45,60	-18,92	26,68
3040,00	-45,35	-18,92	26,43
4795,00	-29,86	-18,92	10,94
7210,00	-30,30	-18,92	11,38
12000,00	-54,17	-18,92	35,25
21456,00	-60,87	-18,92	41,95

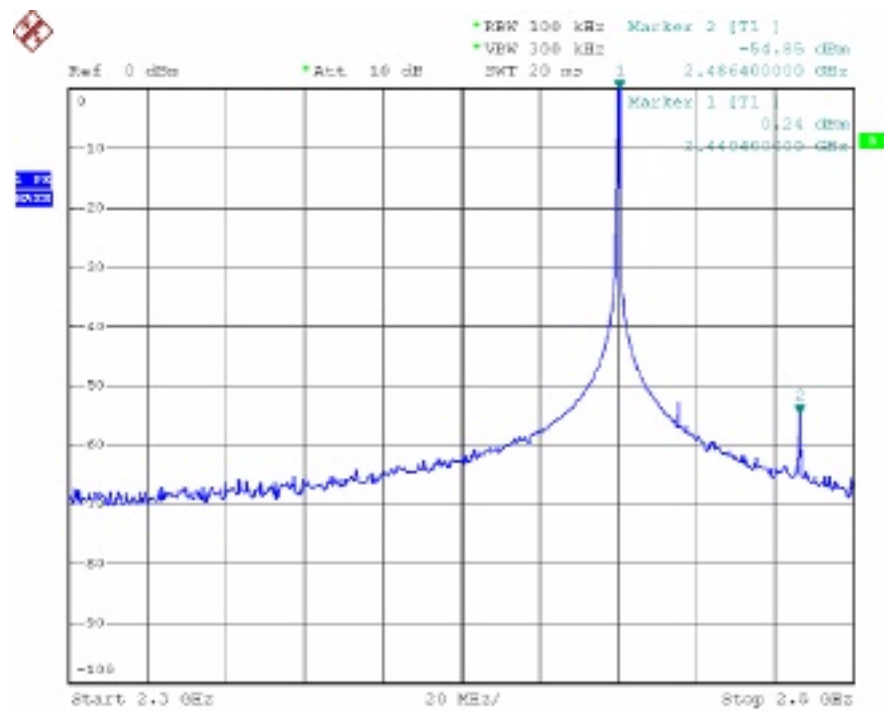
Middle transmit channel (62)



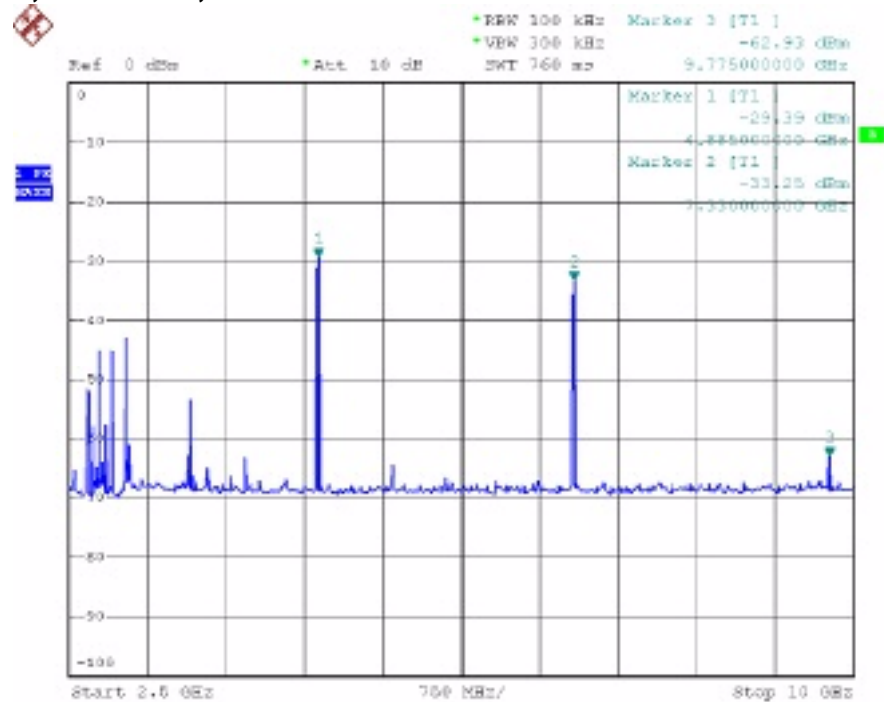
9kHz to 1 GHz



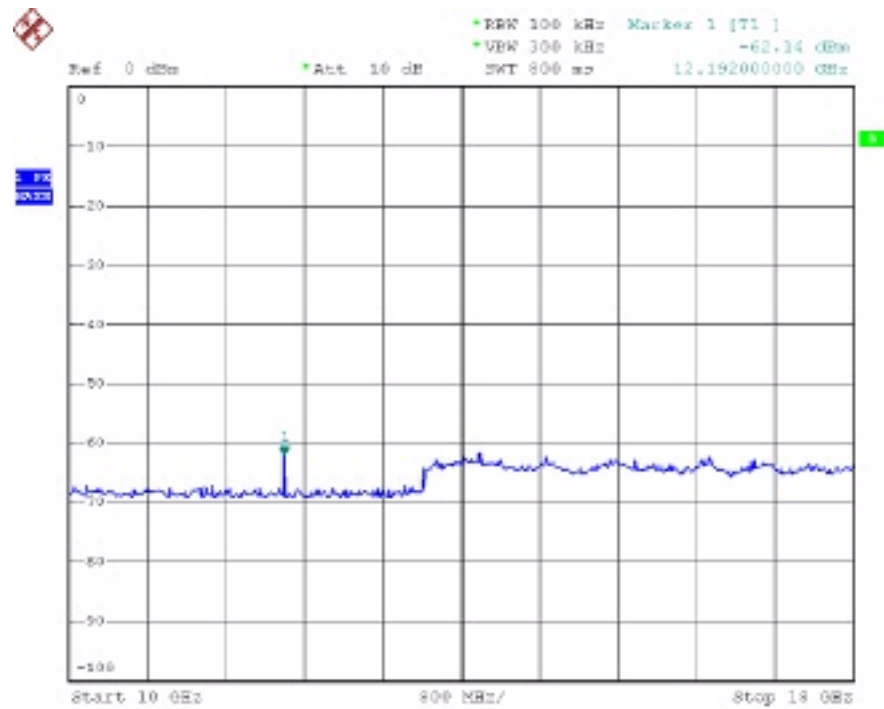
1 GHz to 2,3GHz



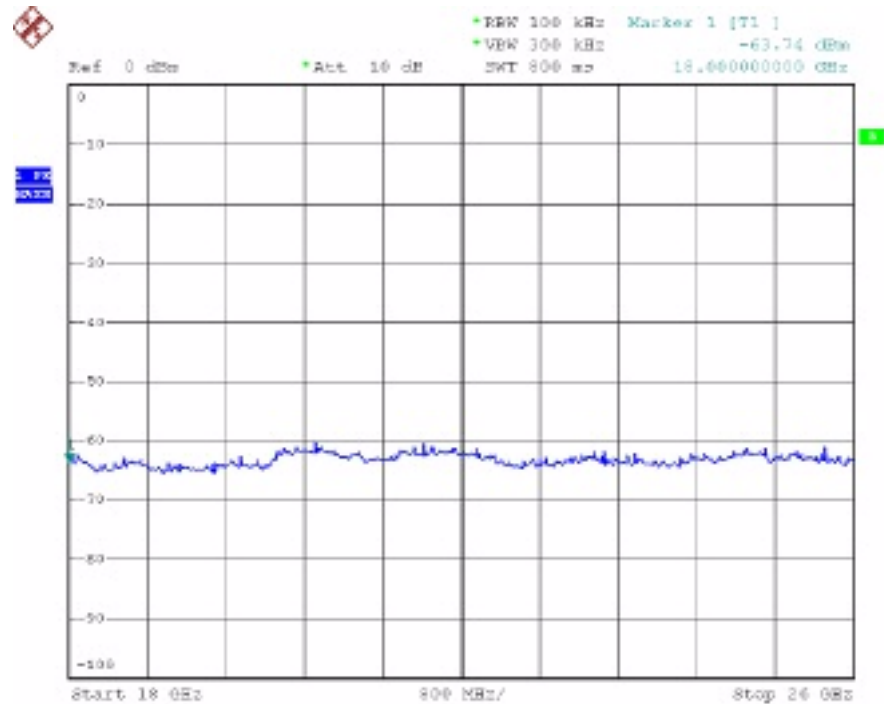
2,3 GHz to 2,5 GHz



2,5 GHz to 10 GHz

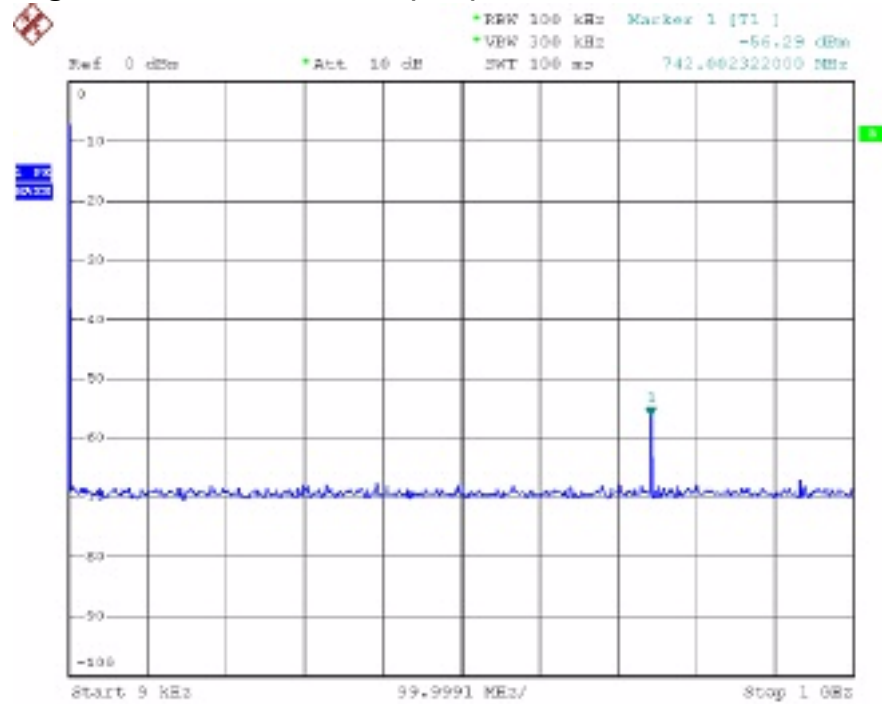
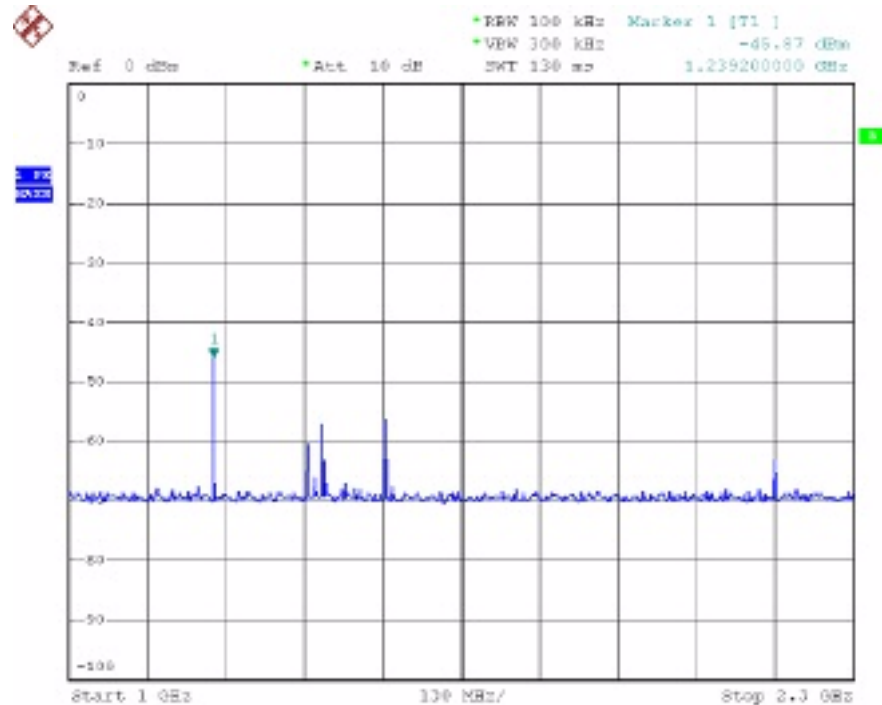


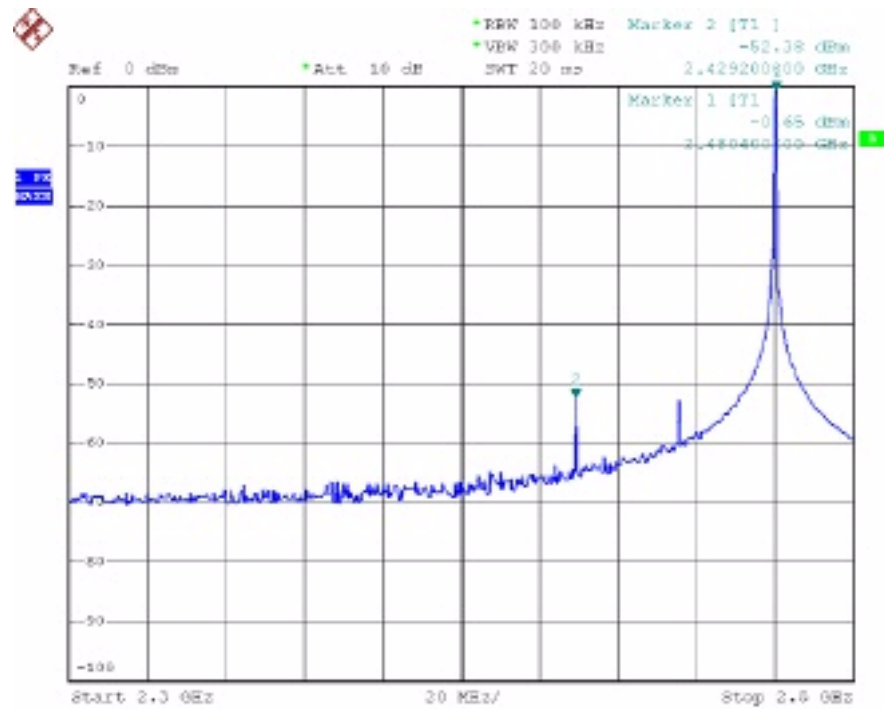
10 GHz to 18 GHz



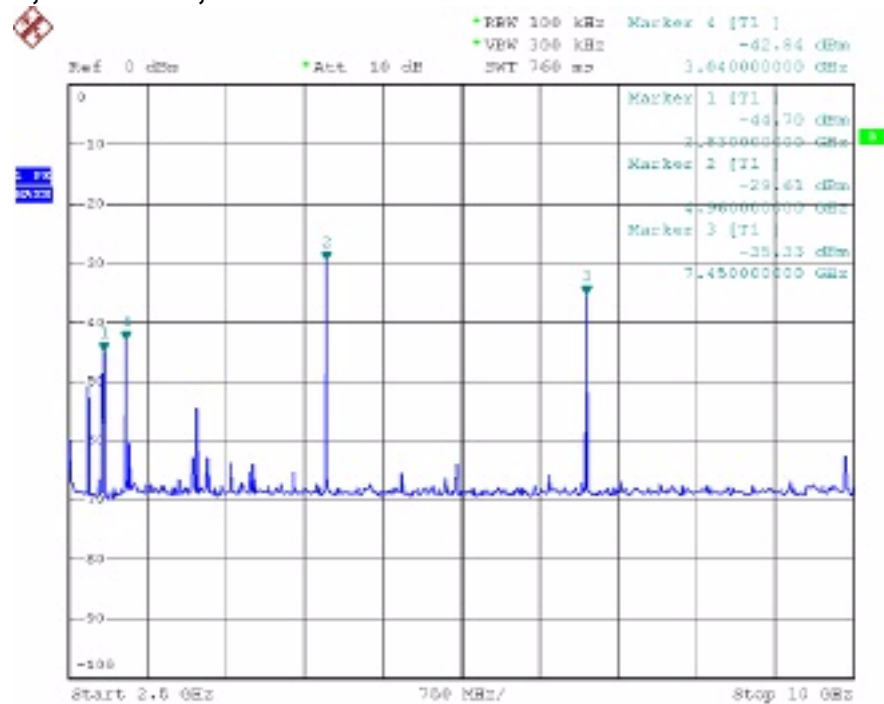
18 GHz to 26 GHz

Frequency (MHz)	Measured Level (dBm)	Limit (dBm) Fundamental value – 20dB	Margin (dB)
702,00	-55,60	-19,76	35,84
1218,40	-45,95	-19,76	26,19
1525,20	-55,29	-19,76	35,53
2440,04 (fundamental)	+0,24	-----	-----
2486,40	-54,85	-19,76	35,09
4885,00	-29,39	-19,76	9,63
7330,00	-33,25	-19,76	13,49
9775,00	-62,93	-19,76	43,17
12192,00	-62,14	-19,76	42,38
18000,00	-63,74	-19,76	43,98

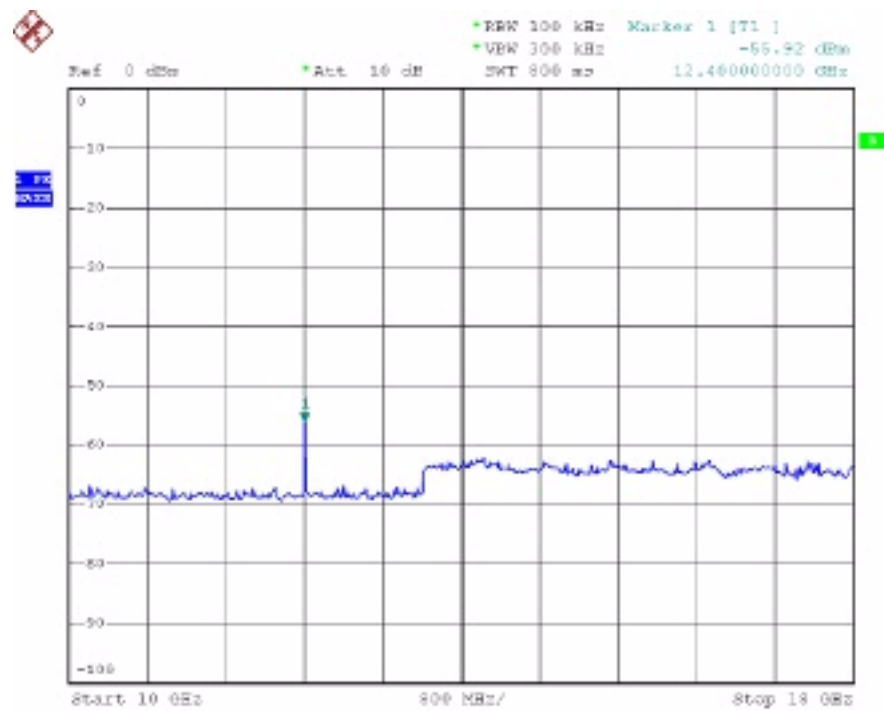
Highest transmit channel (124)**9kHz to 1 GHz****1 GHz to 2,3GHz**



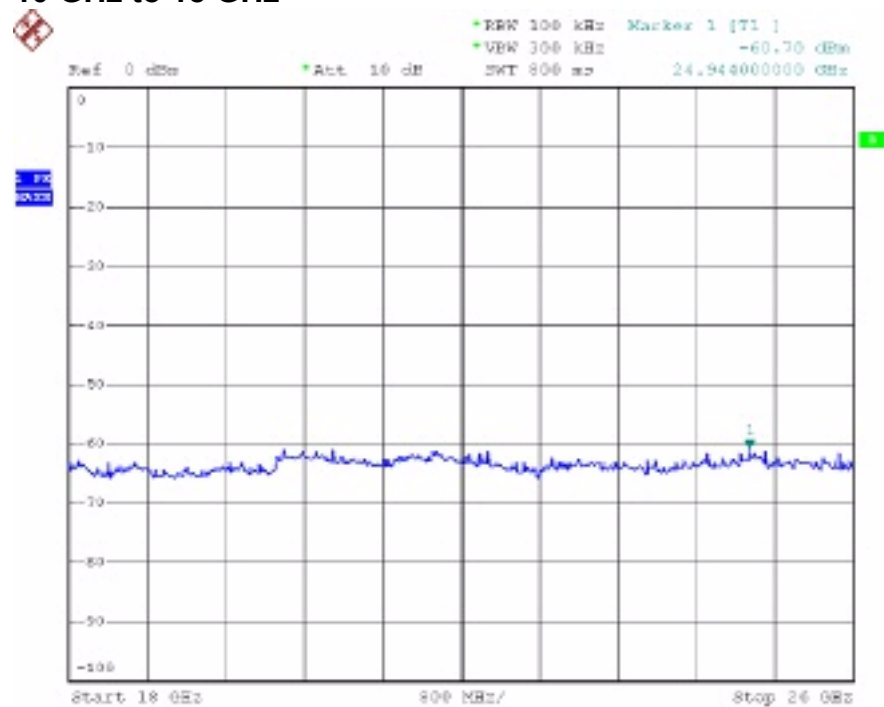
2,3 GHz to 2,5 GHz



2,5 GHz to 10 GHz



10 GHz to 18 GHz



18 GHz to 26 GHz

Frequency (MHz)	Measured Level (dBm)	Limit (dBm) Fundamental value – 20dB	Margin (dB)
742,00	-56,29	-20,65	35,64
1239,20	-45,87	-20,65	25,22
2429,20	-52,38	-20,65	31,73
2480,40 (fundamental)	-0,65	-----	-----
2830,00	-44,70	-20,65	24,05
3040,00	-42,84	-20,65	22,19
4960,00	-29,61	-20,65	8,96
7450,00	-35,33	-20,65	14,68
12400,00	-55,92	-20,65	35,27
24944,00	-60,70	-20,65	40,05

TEST No.7	Title “ Transmitter Power Spectral Density”	47CFR Part 15 Ref. Section
		15.247 (e)
TEST SET-UP & REQUIREMENTS	Spectrum analyzer settings	
	Span	1,5 MHz
	Resolution (or IF) Bandwidth (RBW)	3 kHz
	Video (or Average) Bandwidth (VBW)	30 kHz
	Sweep time	Auto
	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.

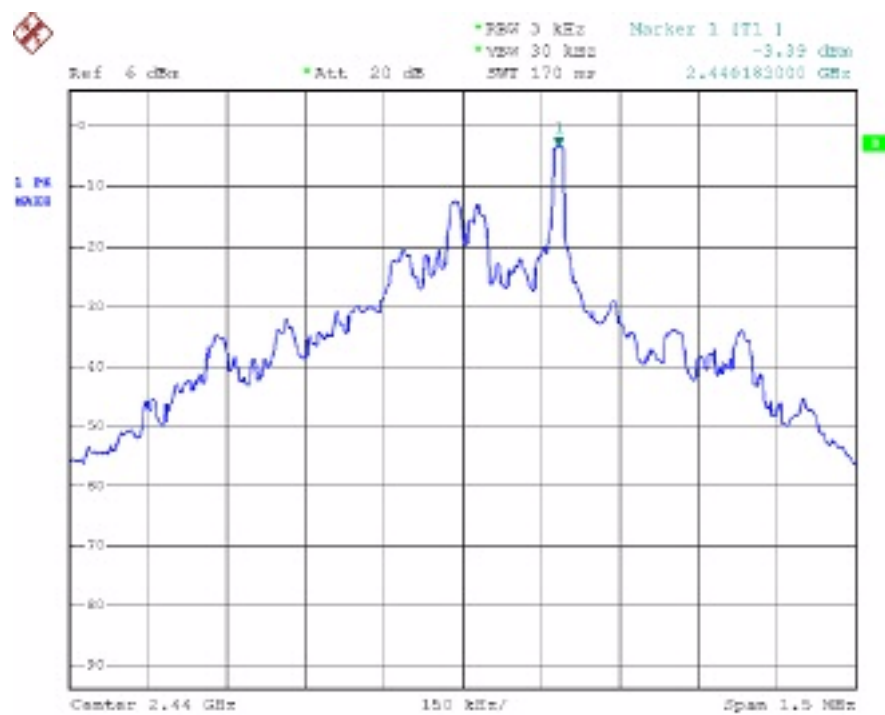
Test Result:

Channel (No.)	Power spectral density (dBm)	Plot (No.)
00	-2,64	1
62	-3,39	2
124	-4,24	3

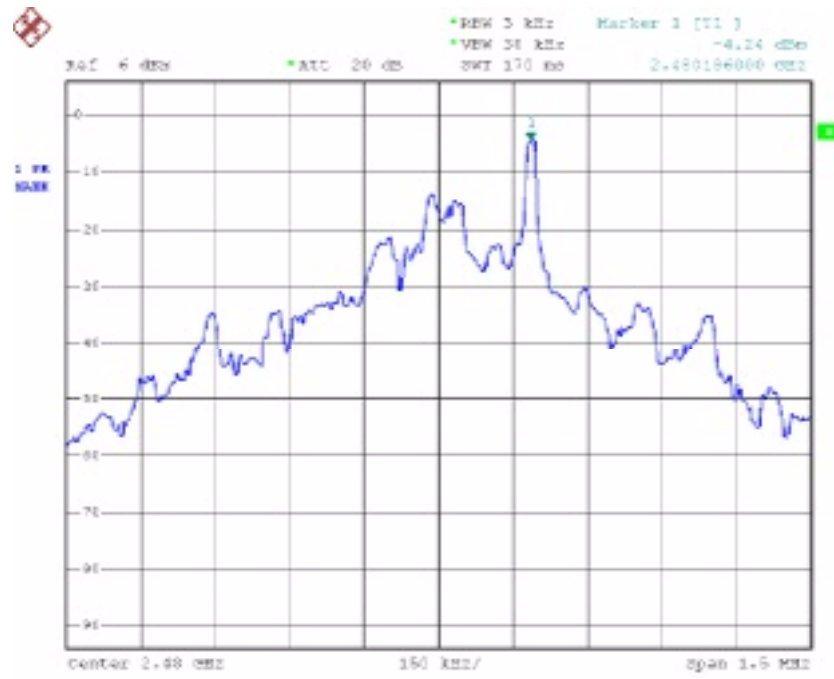
Plot No. 1:



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)	Average 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	Frequency	Output power to antenna (Erp)	Power density @ 20 cm	Distance where the exposure level reaches the limit	Limits
(No.)	(MHz)	(dBm)	(mW/cm ²)	(cm)	(mW/cm ²)
00	2402,00	2,20	0,001	0,513	1
62	2440,00	0,79	0,001	0,437	1
124	2480,00	-0,18	0,001	0,39	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			
none			

6.2 RFI SUPPRESSION DEVICES:

Components	N°	Manufacturer	Type – Technical data
None			

6.3 EMI PROTECTION DEVICES:

Components	N°	Manufacturer	Type – Technical data
None			

7 TECHNICAL DOCUMENTATION

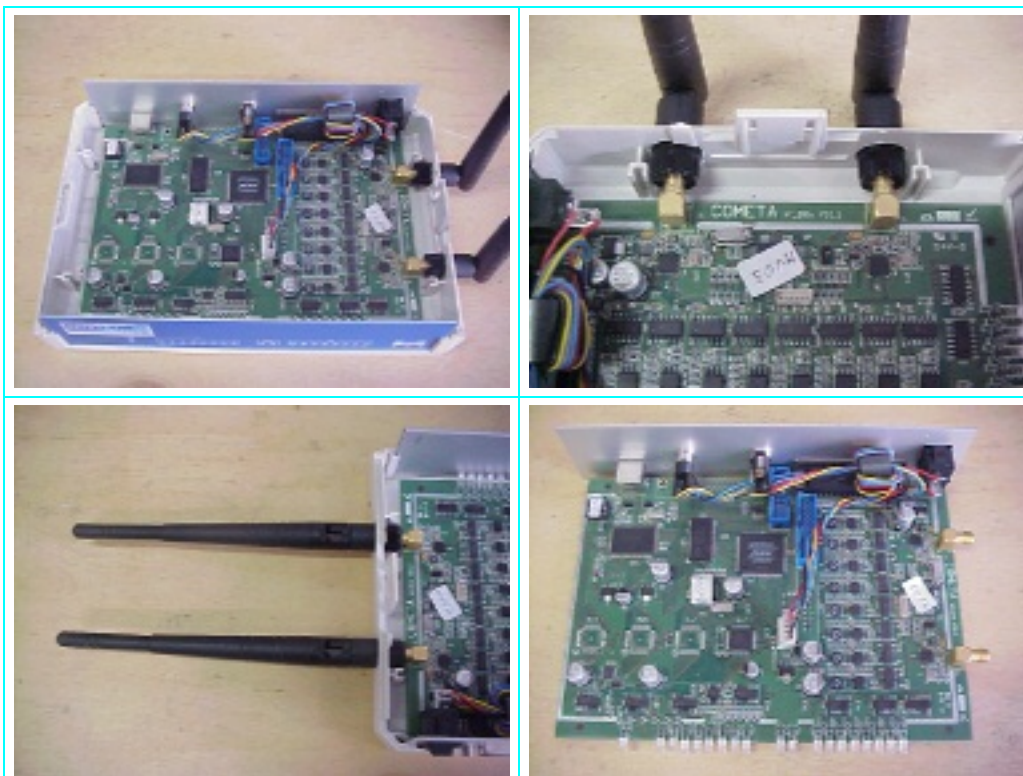
DOCUMENT	REFERENCE
Bill of materials	<p>WLBMA V01 – Controller USB – 21/07/07 - DWS004 2006/01 Rev. 05</p> <p>WLFSW V02 – RF e Micro - DWS015 2006/01 Rev. 01</p> <p>WLIND V02 – Scheda Mos e Induttanze – DWS019 2006/01 Rev. 03</p> <p>WLGEN V02 – Alimentatore e Pulse Generator – DWS018 2006/01 Rev. 03</p>
Electronic diagram	<p>WLBMAV01 – Drawing n° DWS001...019 2006/01 Date : 10/09/2007</p>
Layout	<p>WLBMA V01.tss Date : 07/18/2005</p> <p>WLGEN V02.tss Date : 11/07/2005</p>
Zerowire multichannel electromyograph – Operational description	<p>Rev. 1 – 21/09/07</p>

8 PHOTOGRAPHIC DOCUMENTATION

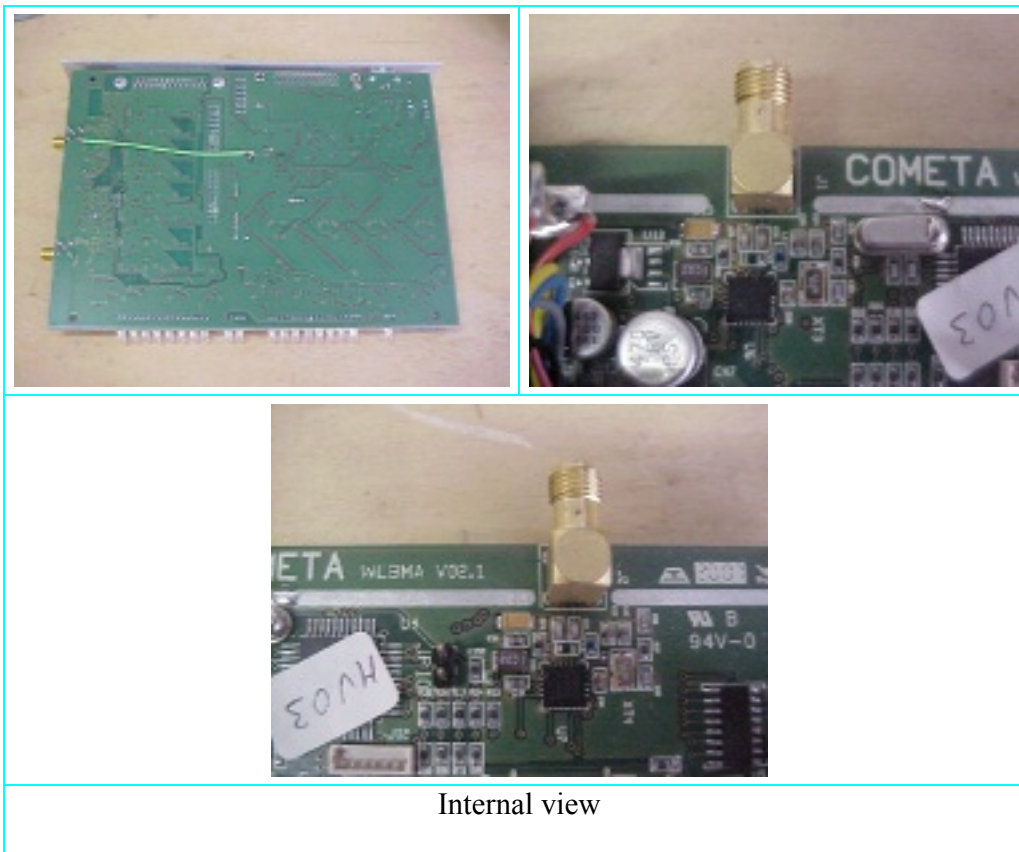
8.1 EUT IDENTIFICATION



Equipment under test identification



Internal view



8.2 TEST SET-UP



Set up of Radiated emission test



Set up of Conducted emission test

9 MEASUREMENT AND TEST EQUIPMENT INSTRUMENTATION

INSTRUMENTS	MANUFACTURER	MODEL	IMQ SERIAL NUMBER	Ref. TEST
Spectrum Analyzer	Rohde & Schwarz	FSP40	S-03629	2÷8
Antenna BilogP	ARA	LPD-2513	S-02385	2
Antenna ridged horn	Schwarzbeck	BBHA9120D	S-03464	2
Pre-amplifier 30-1000 MHz	BONN Elektronik	BLNA 0110-15C35	S-04193	2
Pre-amplifier 1-26GHz	HP	HP 8449 B	S-03542	2
Band Reject Filter 2400÷2483 MHz	Wainwright	WRCG2400/2483	S-04308	2
Highpass Filter 3.4÷18 GHz	Wainwright	WHK3.4/18	S-04309	2