CETECOM Inc.

CETECOM Inc.
411 Dixon Landing Road, Milpitas, CA-95035, USA
Phone: +1 408 586 6200 Fax: +1 408 586 6299
www.cetecom.com

Issued test report consists of 58 Pages

FCC LISTED, REG. NO.: 101450
&
RECOGNIZED BY INDUSTRY CANADA
IC – 3925

Test report no.: 177 FCC/2001
FCC Part 15.247
LAN AP - LW1100AP
(FCC ID:FFMLW1100AP)

Table of Contents

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 Inc. USA 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 Inc. USA.

1.2 Testing laboratory

CETECOM Inc.
411 Dixon Landing Road, Milpitas, CA-95035, USA
Phone: +1 408 586 6200 Fax: +1 408 586 6299
E-mail: lothar.schmidt@cetecomusa.com
Internet: www.cetecom.com

1.3 Details of applicant

Name : LG Electronics Inc.
Street : 60-39 Kasan-dong, Kumchon-gu
City : Seoul 153-023
Country : Korea
Telephone : +82 2 3289 3117
Telefax : +82 2 3289 3200
Contact : Mr. William KS. Oh
e-mail : ksoh@lge.com

1.4 Application details

Date of receipt of application : 2001-08-01
Date of receipt of test item : 2001-08-03
Date of test : 2001-08-08/09

1.5 Test item

Manufacturer : LG Electronics Inc.
Address : See above
Name of EUT : Access Point
Descriptin : LAN Access Point
Model No. : LW1100AP
FCC ID :

Additional informations:

Frequency : 2412 – 2462 MHz
Type of modulation : DBPSK, DQPSK, CCK
Number of channels : 11 Channels in US
Antenna : Internal
Power supply : +5VDC
Temperature range : -10°C - +55°C

1.6 Test standards FCC Part 15 §15.247

The tests were done following the public notice DA 00-705 released March 30, 2000

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

TEST REPORT PREPARED BY: **Harpreet Sidhu**
EMC & Radio Engineer:

Technical responsibility for area of testing :

Date	Section	Name	Signature
2001-10-17	EMC & Radio	Lothar Schmidt	

2.2 Testreport

TEST REPORT

Testreport no. : 177 FCC/2001
LAN AP - LW1100AP

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

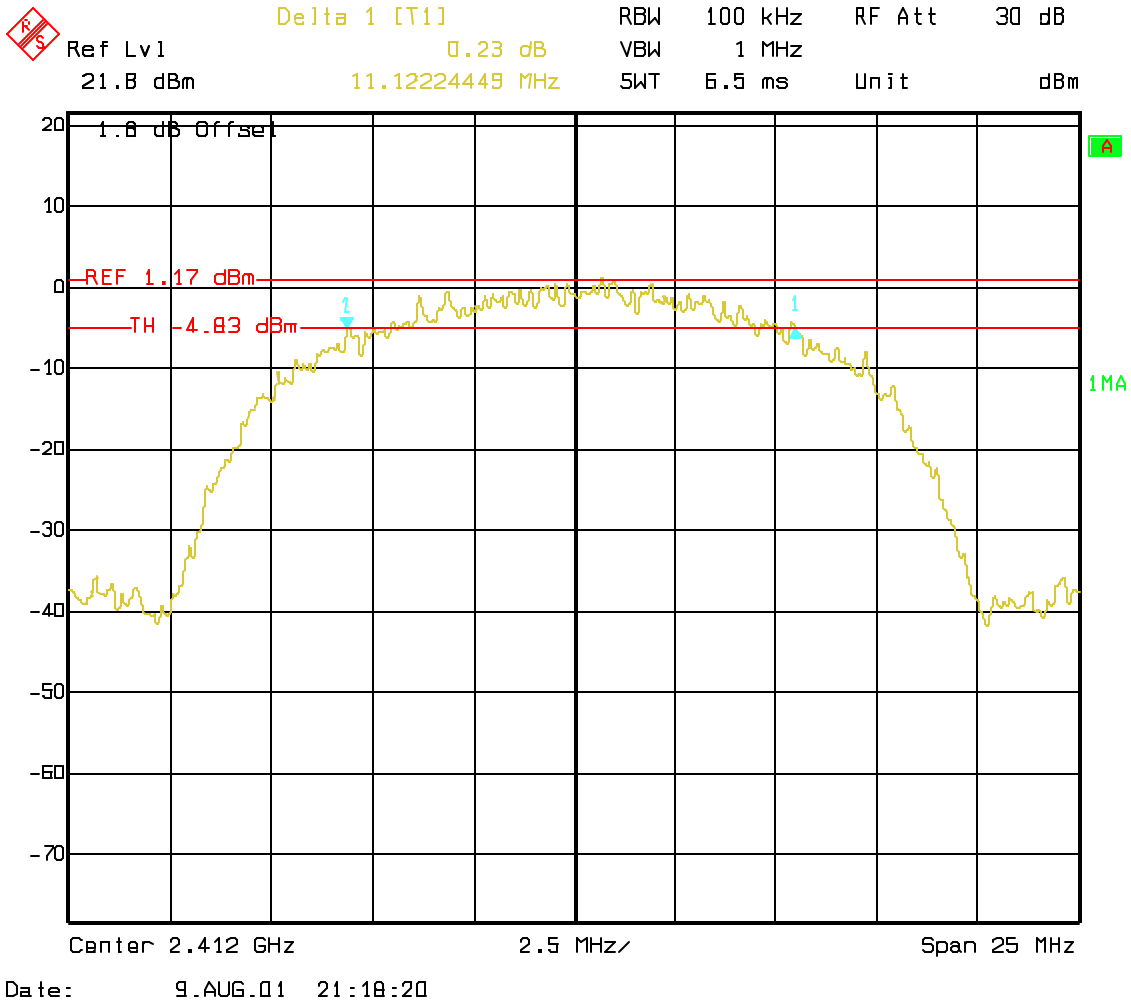
TEST CONDITIONS		6 dB BANDWIDTH (kHz)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)° C	V_{nom}(5.0)V	11122	11122	11122
Measurement uncertainty		±3dB		

LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

Lowest Channel: 2412 MHz

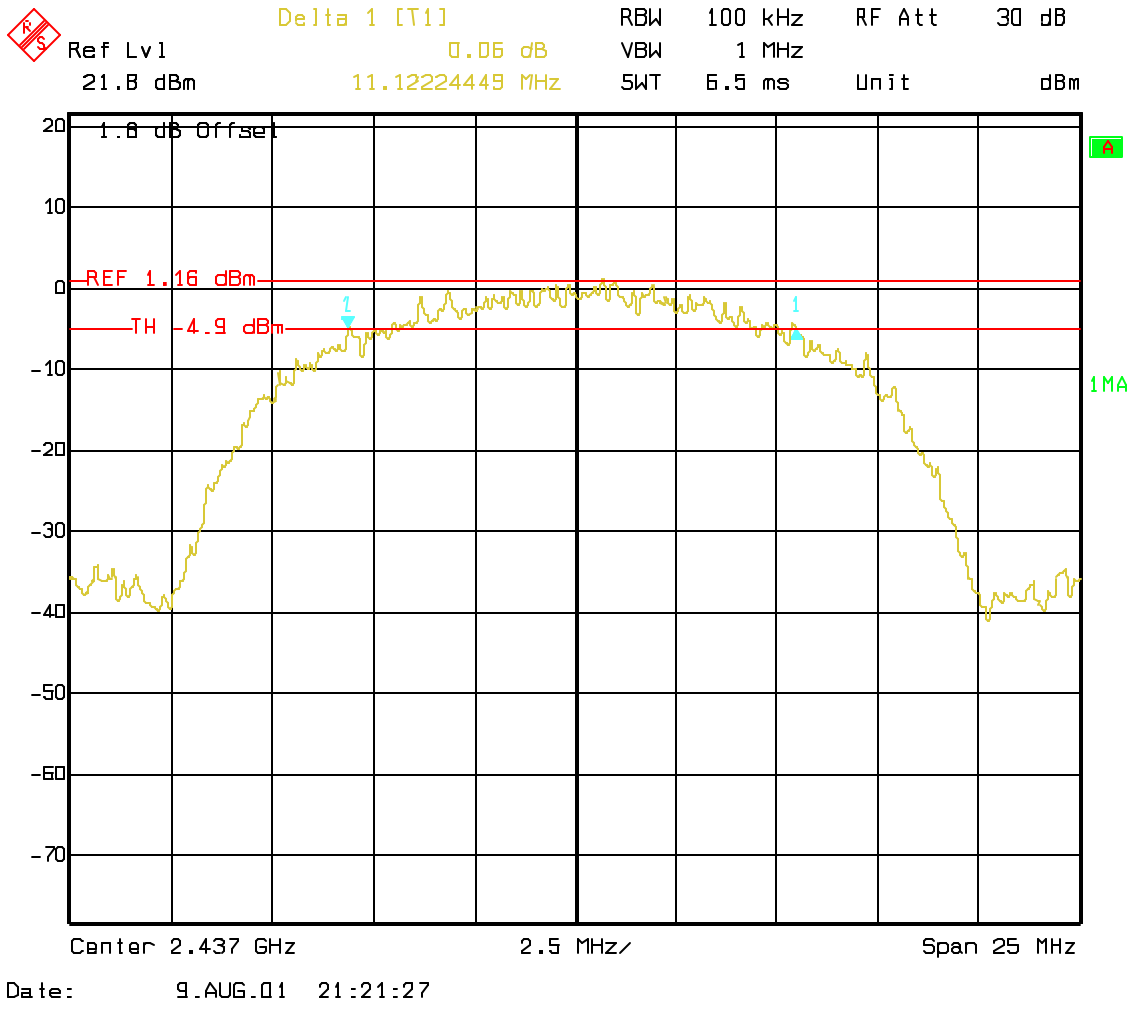


LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz , here 11.122 MHz

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

Mid Channel: 2437 MHz

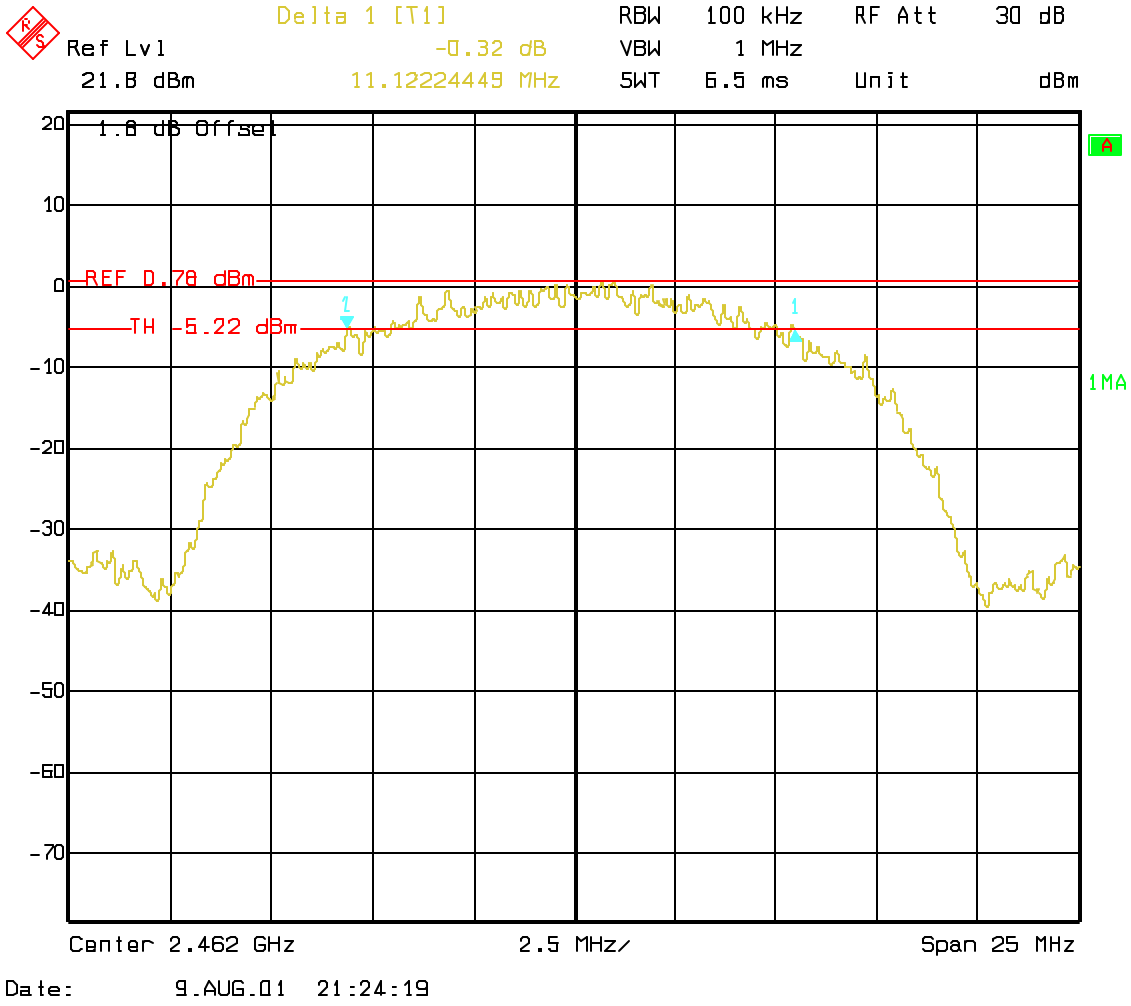


LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz , here 11.122 MHz

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

Highest Channel: 2462 MHz



LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz , here 11.122 MHz

MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)					
Frequency (MHz)		2412		2437		2462	
T_{nom}(23)° C	V_{nom}(5.0)V	Pk	11.69	Pk	11.67	Pk	11.25
		Av	6.56	Av	6.68	Av	6.28
Measurement uncertainty		±3dB					

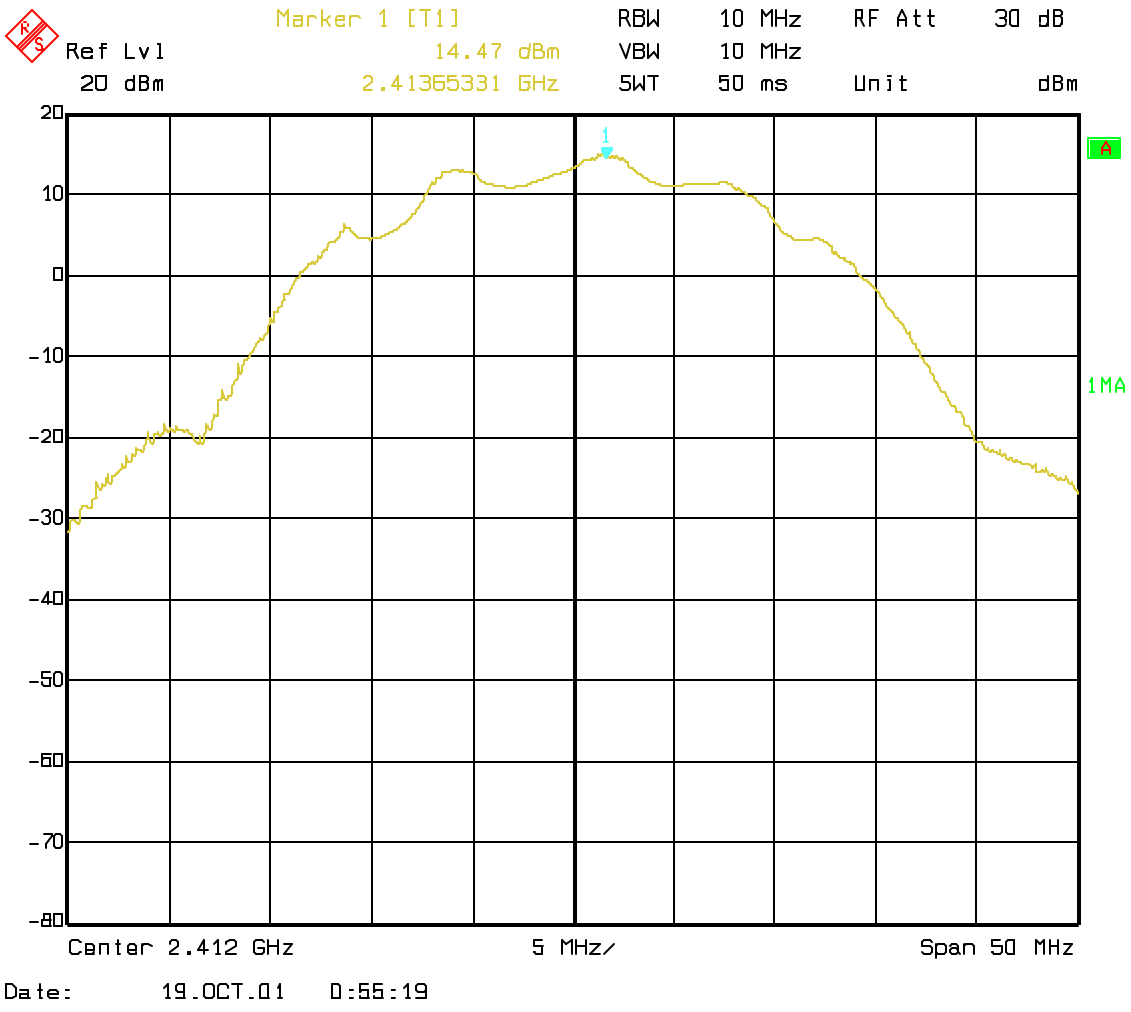
0.5 dB have to added to the values measured and reported in the table.
(due to bandwidth correction by calculated as (10 log 6dB BW/used BW)
10 log 11.12/10 = 0.5 dB)

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

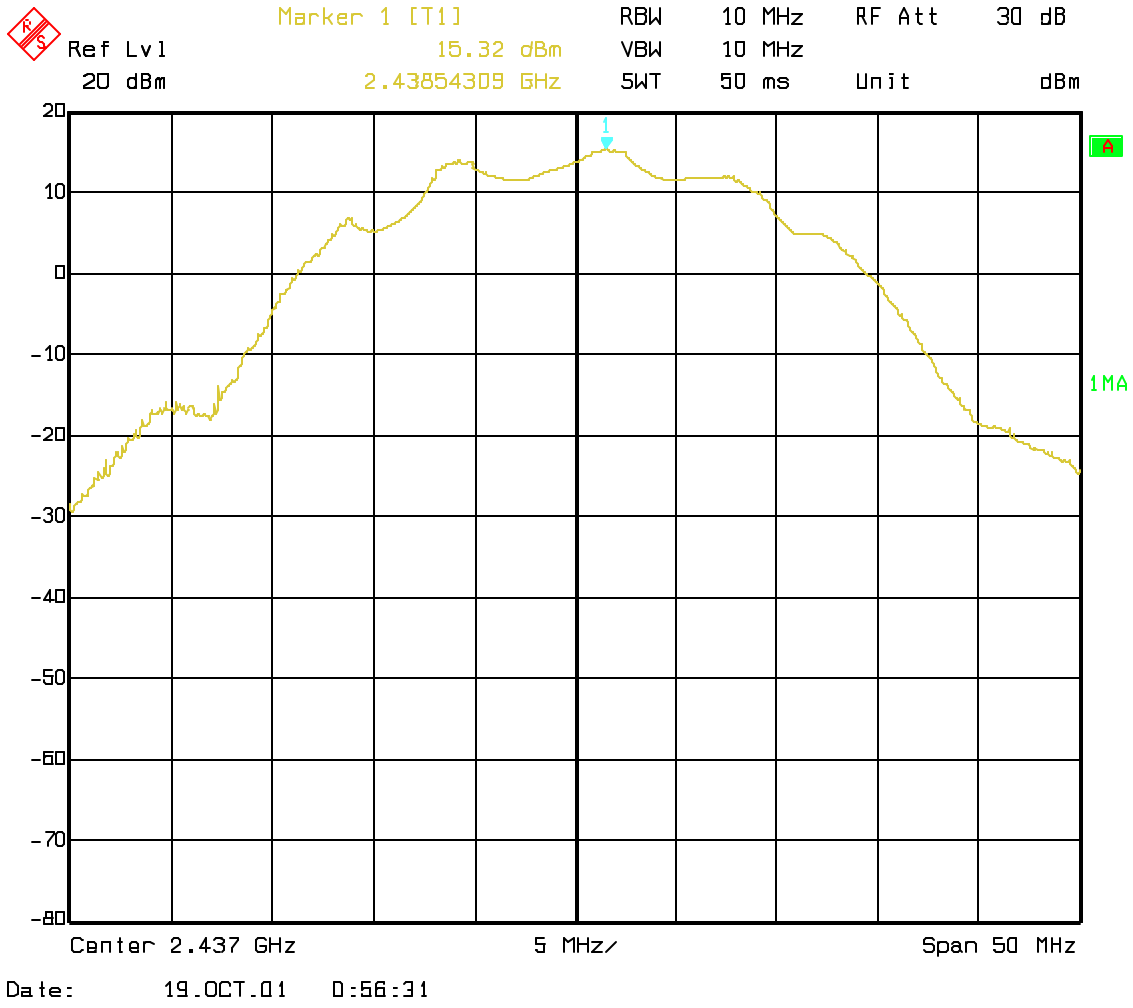
Frequency range	RF power output
2400-2483.5 MHz / 5725 – 5850 MHz	1.0 Watt

MAXIMUM PEAK OUTPUT POWER (CONDUCTED)
Lowest Channel: 2412 MHz

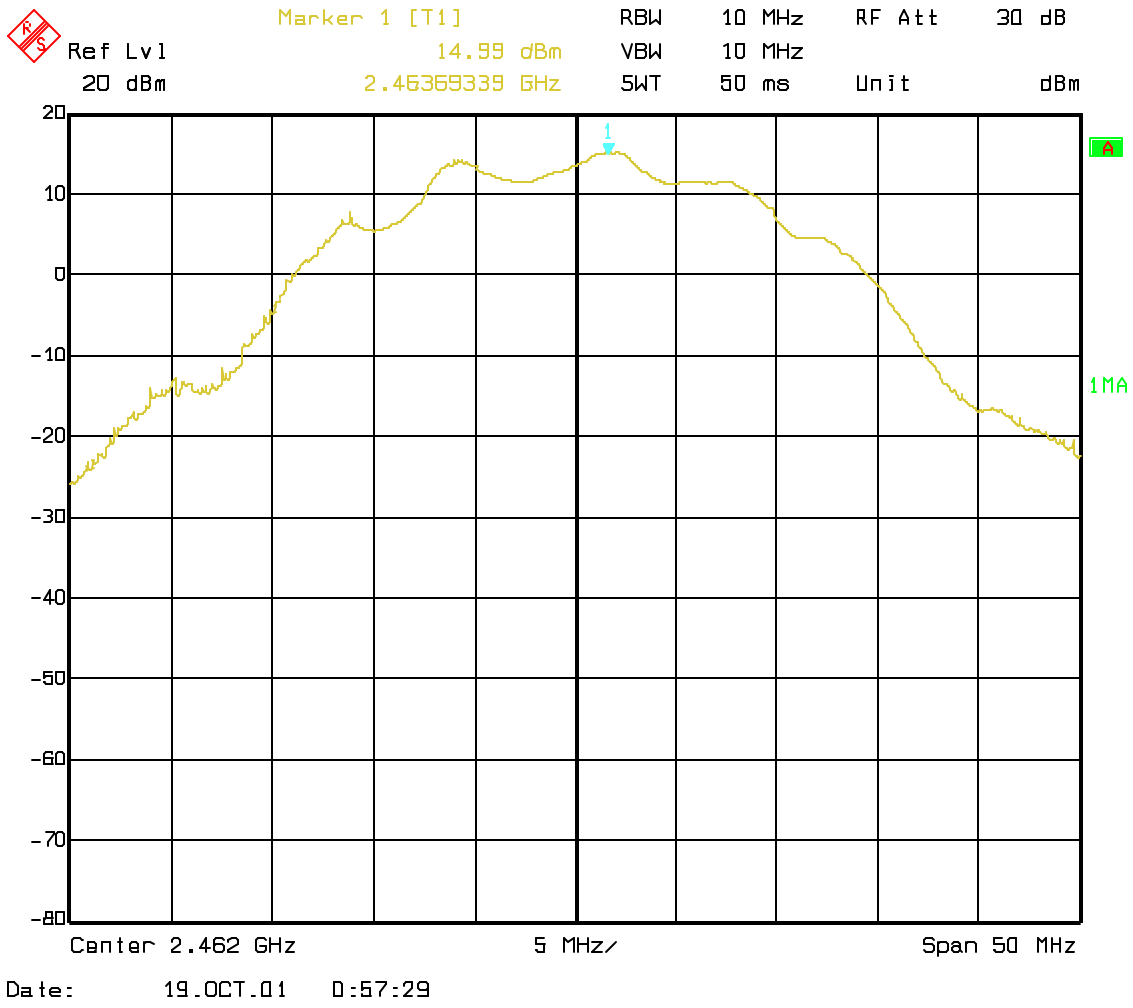
The RBW was set to the maximum available bandwith of the Analyzer (10MHz). This is valid for the conducted output power as well as for the EIRP measurements.



MAXIMUM PEAK OUTPUT POWER (CONDUCTED)
Mid Channel: 2437 MHz



MAXIMUM PEAK OUTPUT POWER (CONDUCTED)
Highest Channel: 2462 MHz



MAXIMUM PEAK OUTPUT POWER (EIRP) (RADIATED) **SUBCLAUSE § 15.247 (b) (1)**

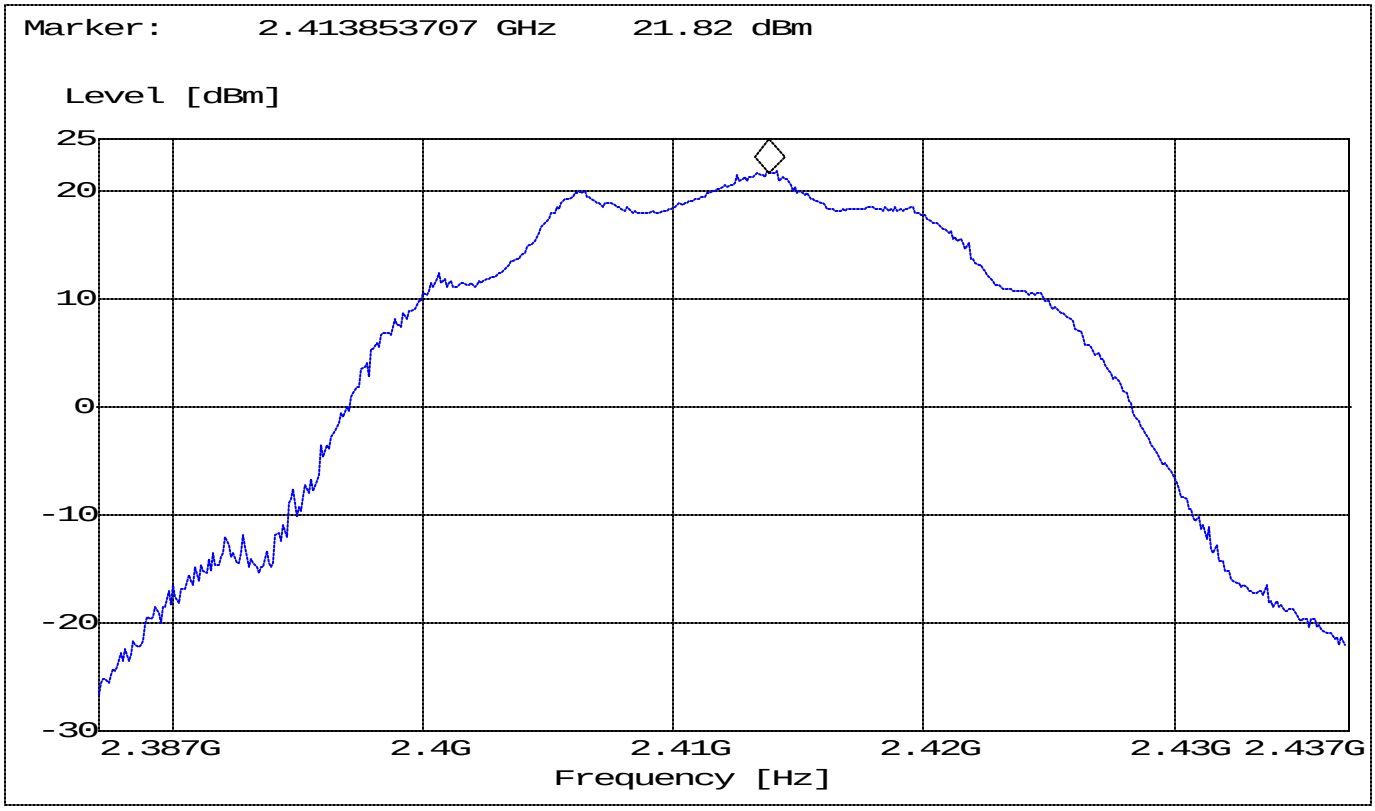
TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)					
Frequency (MHz)		2412		2437		2462	
T_{nom}(23)° C	V_{nom}(5.0)V	Pk	15.61	Pk	14.84	Pk	15.46
		Av	11.12	Av	10.09	Av	10.78
Measurement uncertainty		±3dB					

0.5 dB have to added to the values measured and reported in the table.
(due to bandwidth correction by calculated as (10 log 6dB BW/used BW)
10 log 11.12/10 = 0.5 dB)

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

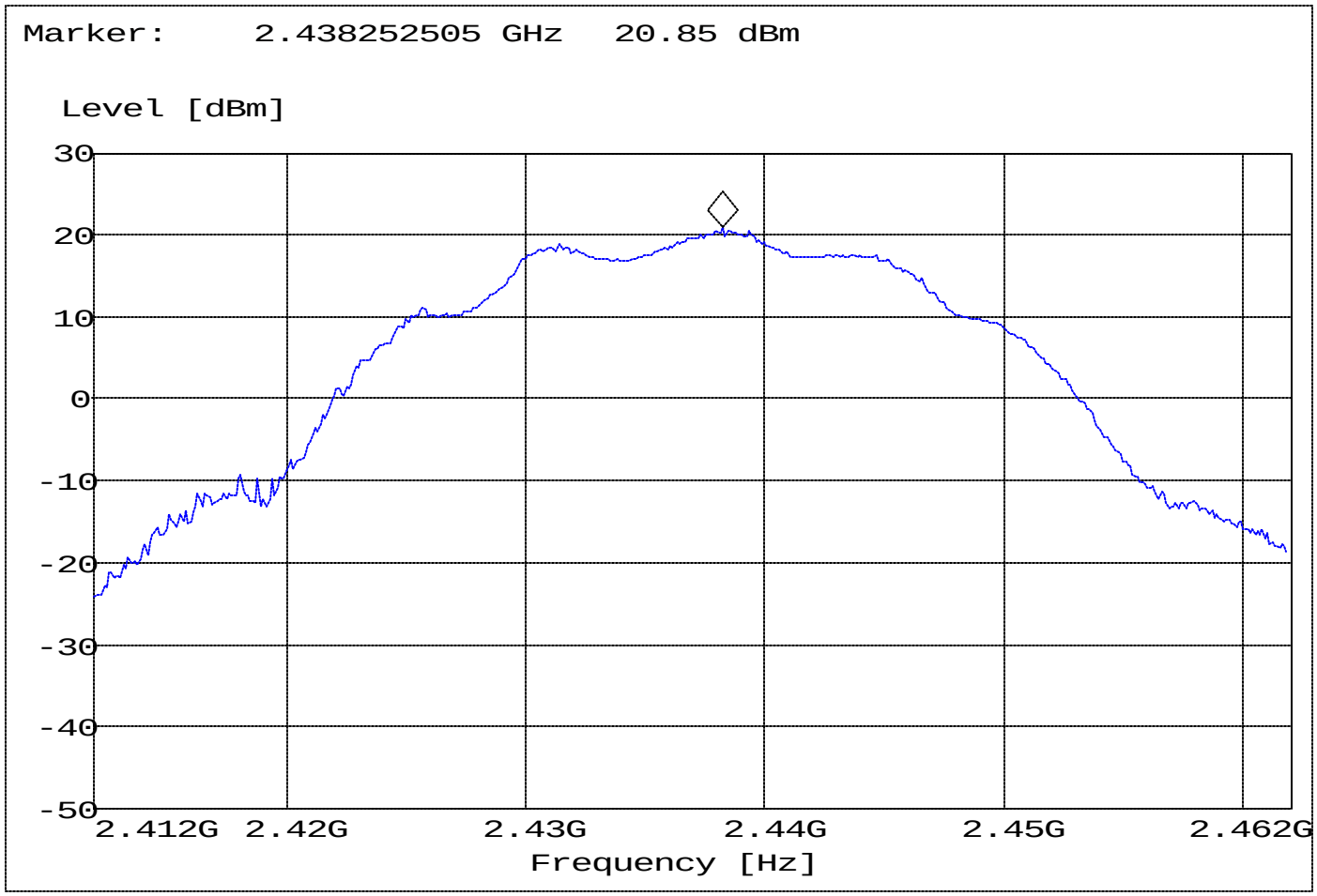
Frequency range	RF power output
2400-2483.5 MHz / 5725 – 5850 MHz	1.0 Watt

EIRP - Lowest Channel: 2412 MHz



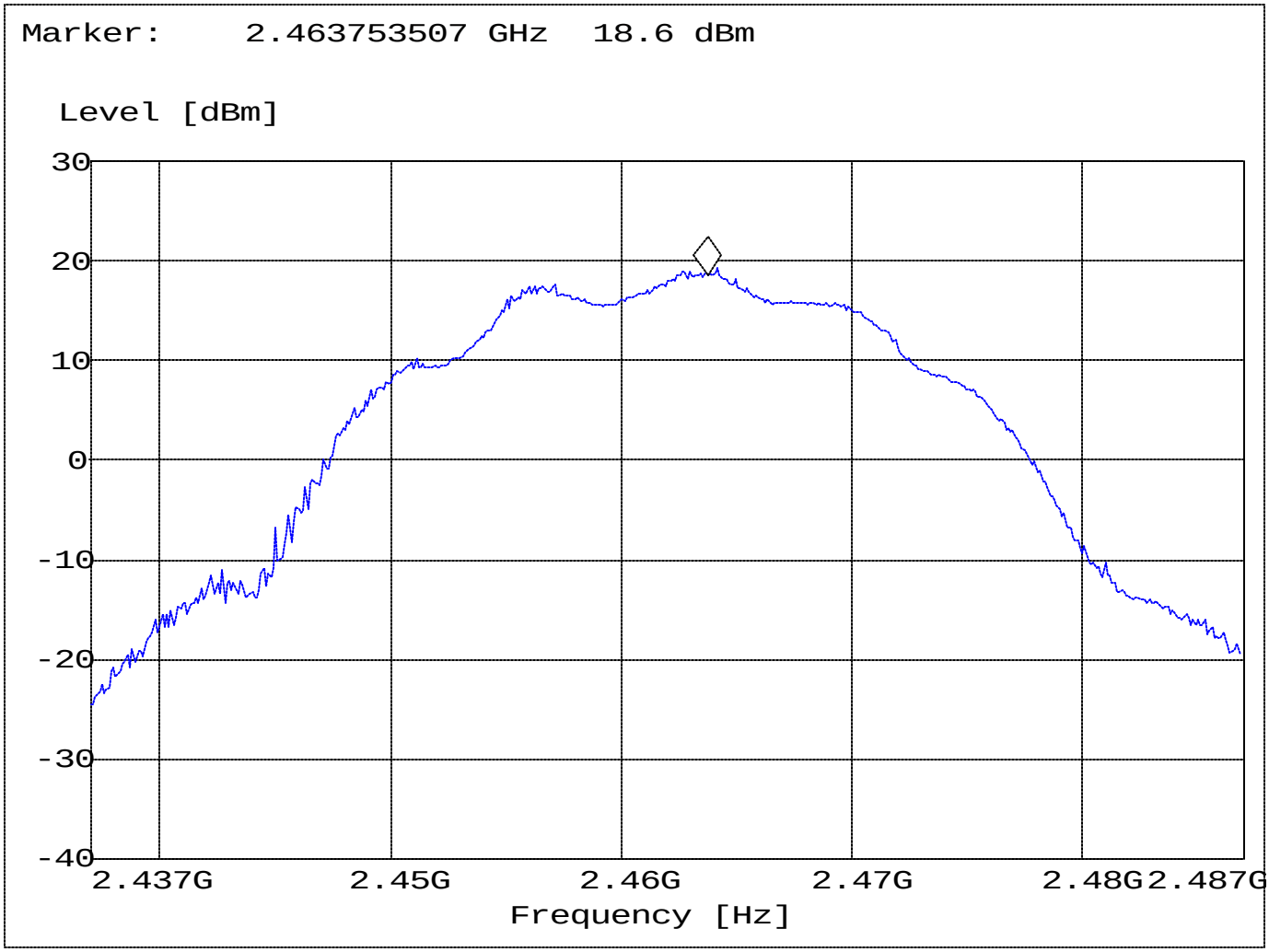
ANALYZER SETTINGS: RBW=10MHz , VBW=10MHz

EIRP – Mid Channel: 2437 MHz



ANALYZER SETTINGS: RBW=10MHz , VBW=10MHz

EIRP – Highest Channel: 2462 MHz

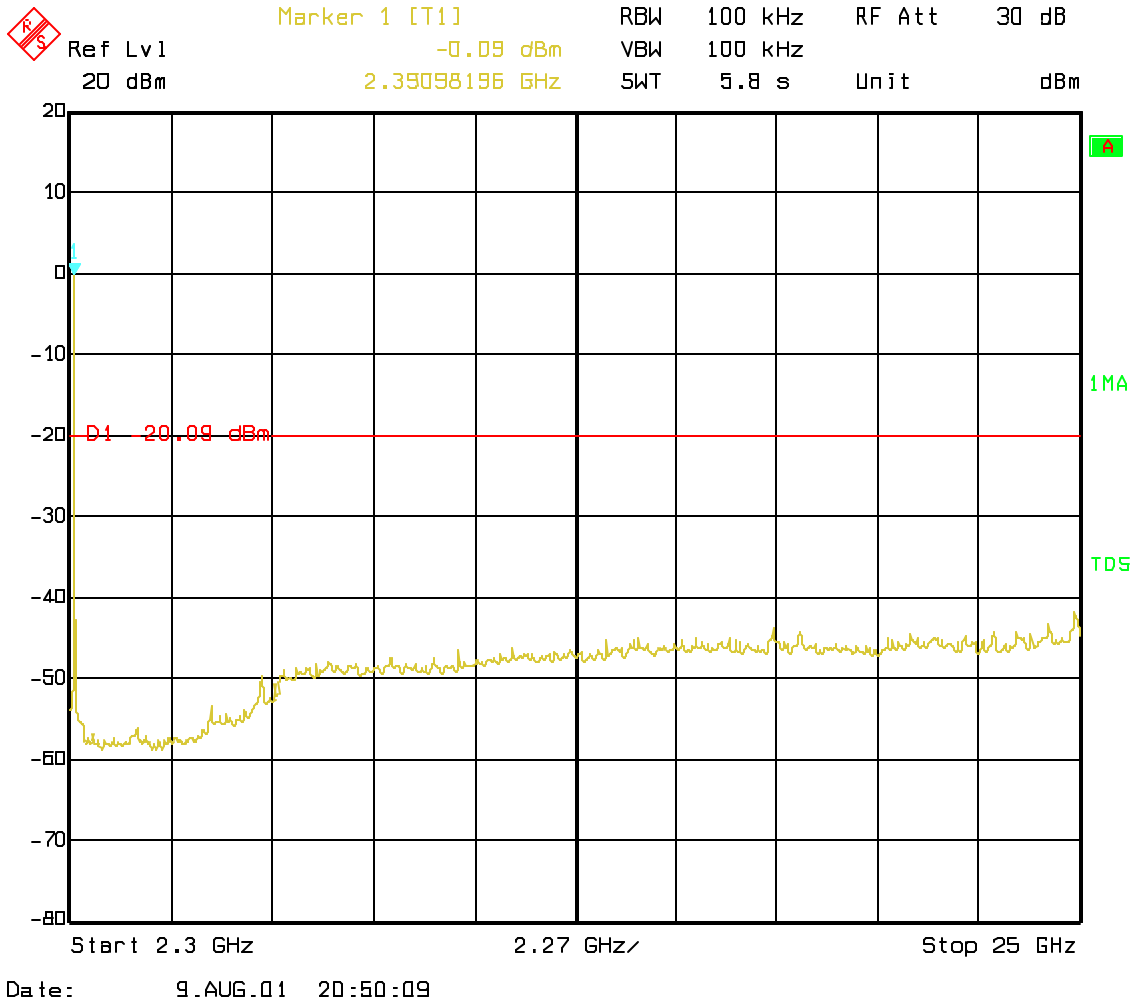


ANALYZER SETTINGS: RBW=10MHz , VBW=10MHz

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

conducted

2412 MHz up to 25 GHz



LIMITS **SUBCLAUSE § 15.247 (c)**

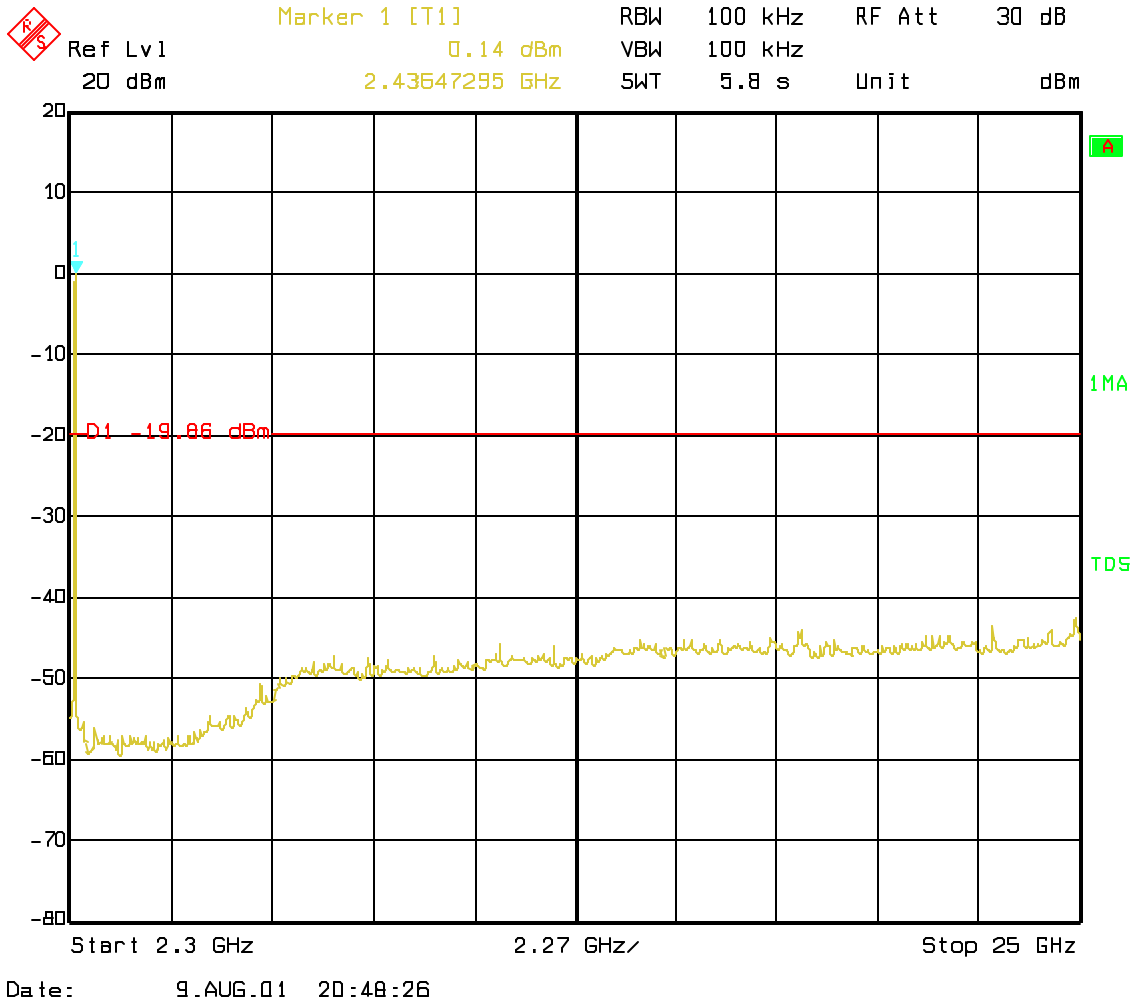
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

NOTE: The marked peak is the carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

conducted

2437 MHz up to 25 GHz



LIMITS SUBCLAUSE § 15.247 (c)

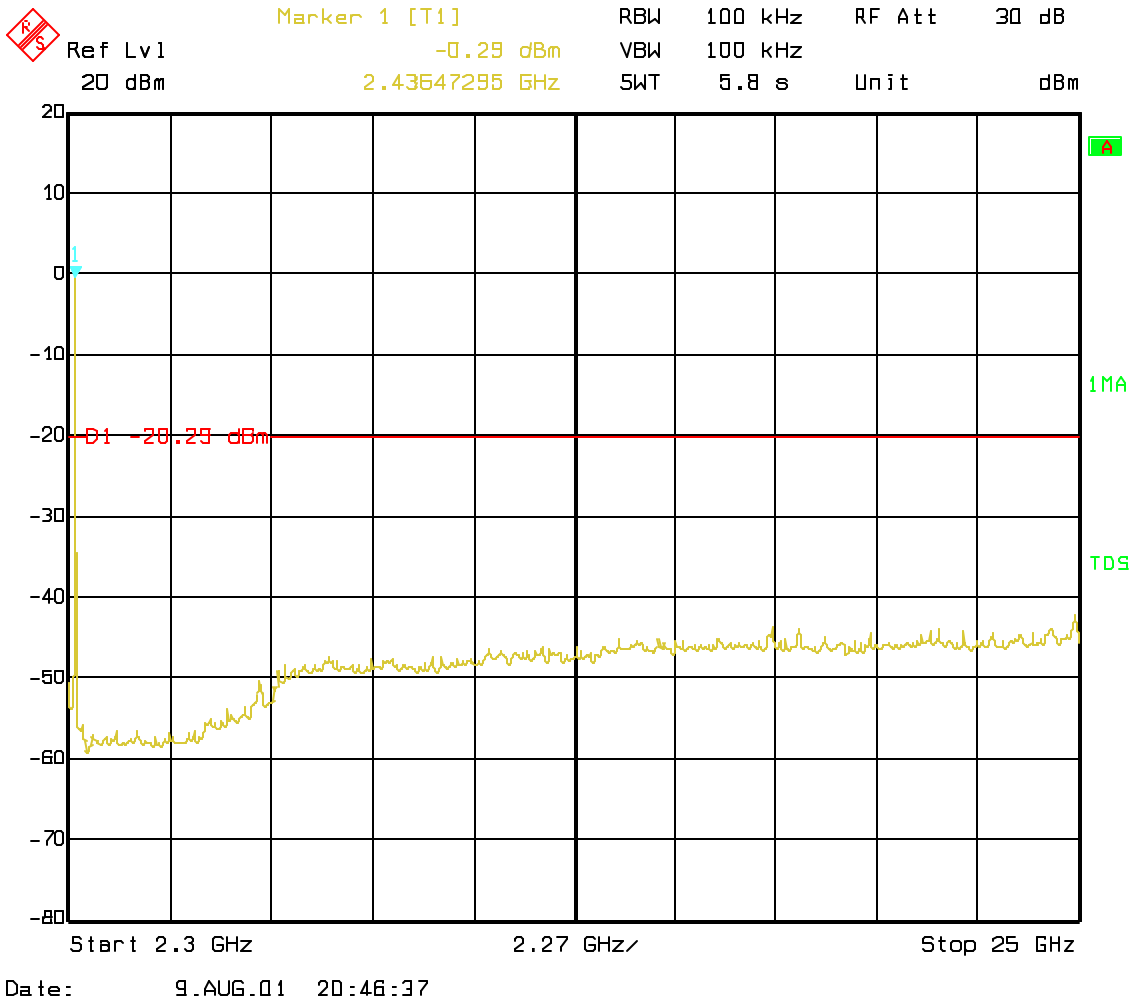
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

NOTE: The marked peak is the carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

conducted

2462 MHz up to 25 GHz



LIMITS SUBCLAUSE § 15.247 (c)

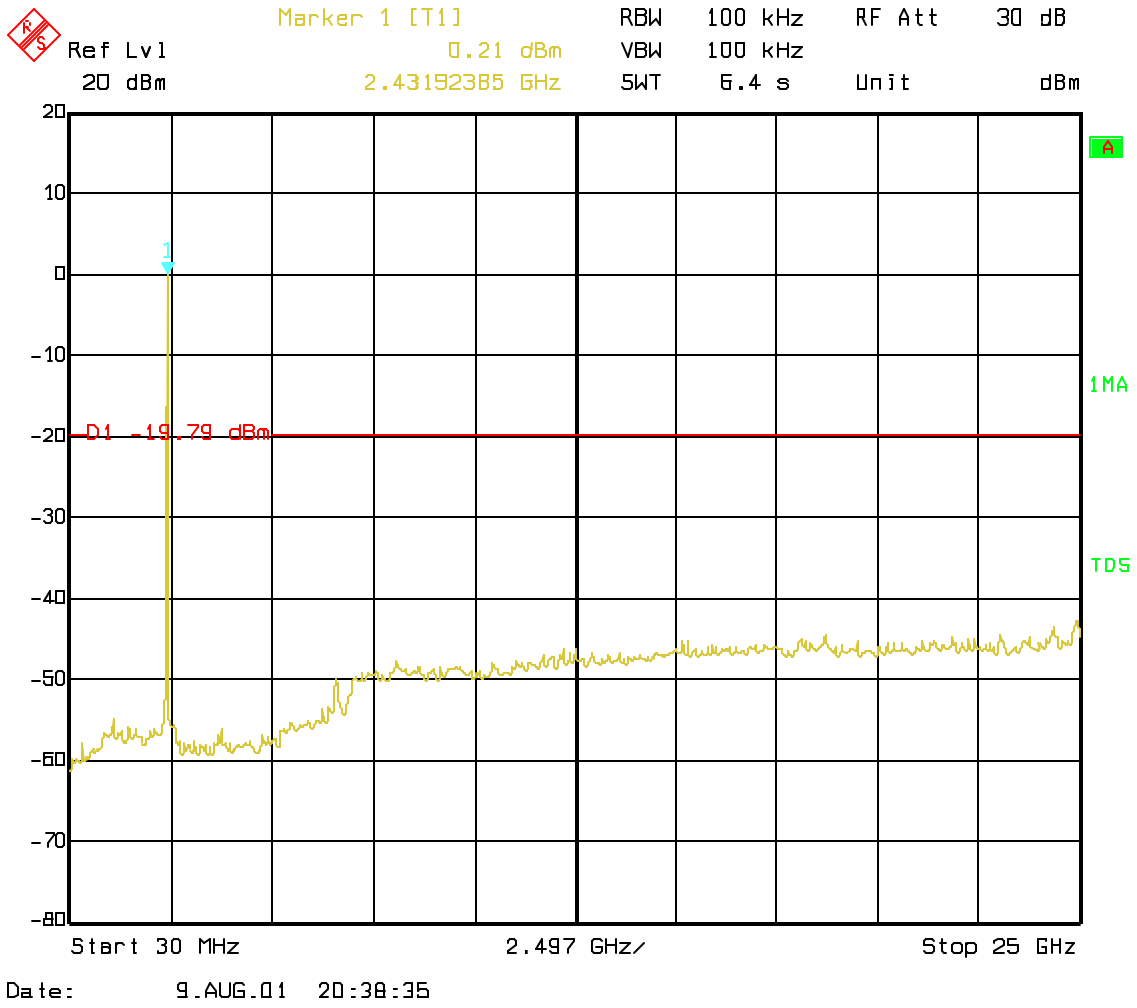
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

NOTE: The marked peak is the carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Conducted

30 MHz up to 25 GHz (This plot is valid for low, mid & high channels)



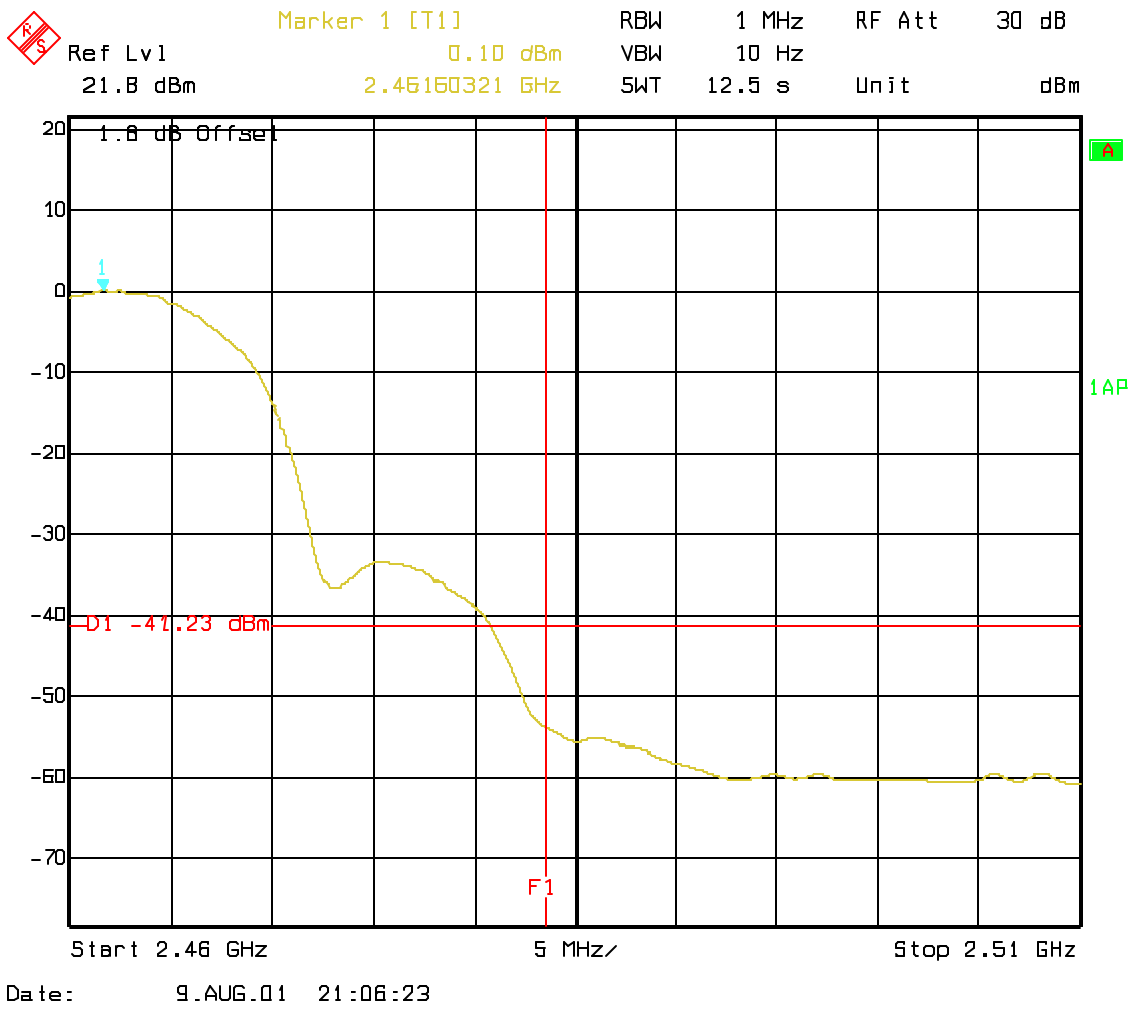
LIMITS SUBCLAUSE § 15.247 (c)

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)).

NOTE: The marked peak is the carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

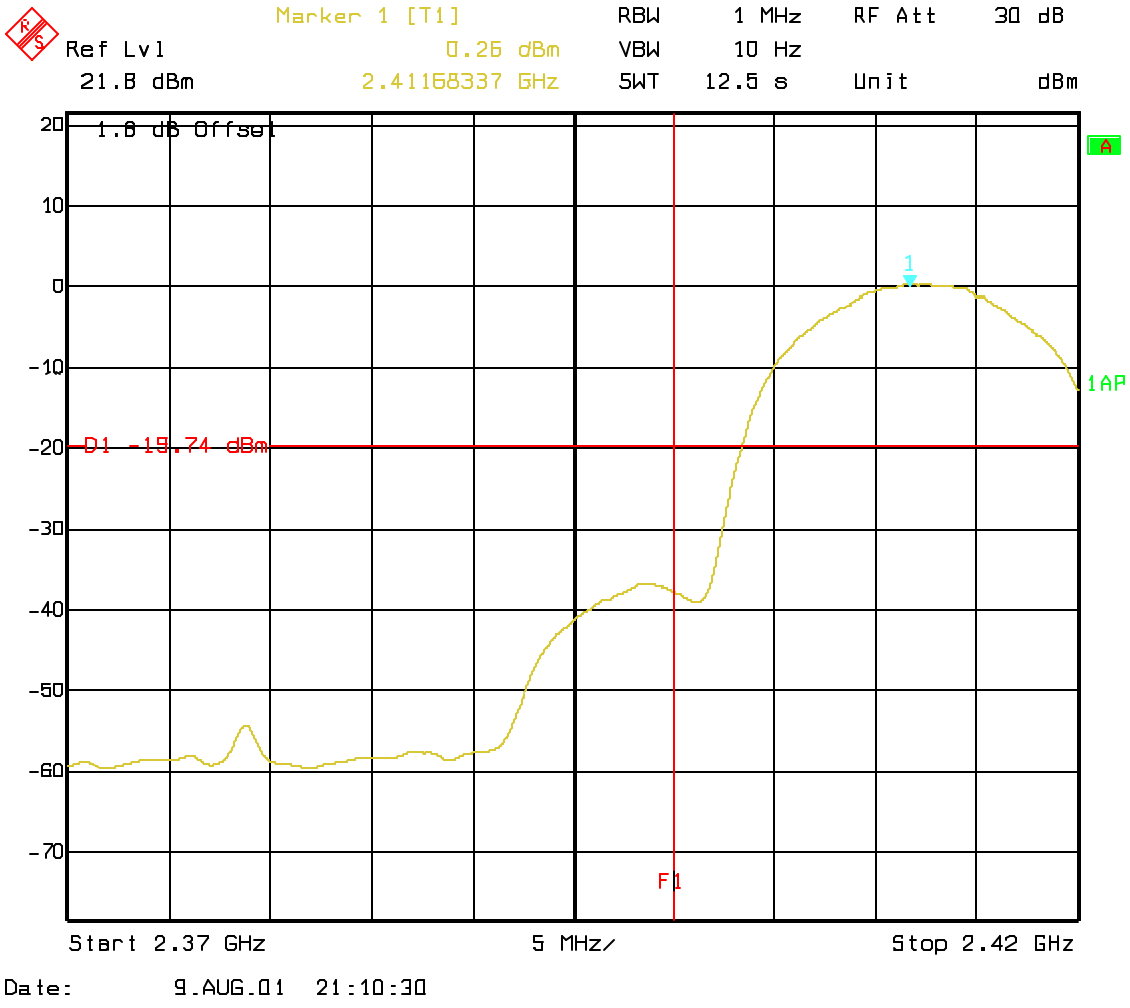
EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (2)

conducted
spurious in the restricted band 2483.5 – 2500 MHz
(Higher Band Edge)



Lower Band Edge

conducted

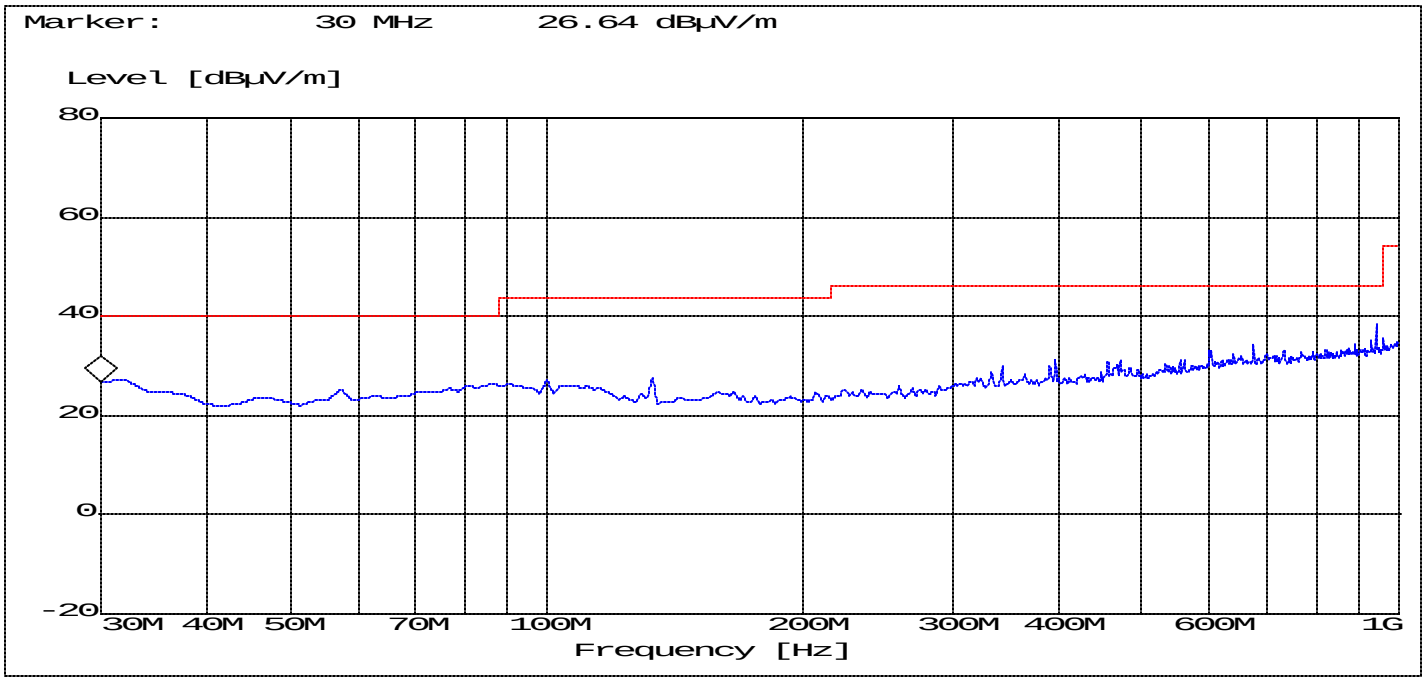


EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

The spurious emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 26 GHz very short cable connections to the antenna was used to minimize the noise level. Channel 1: 2412 MHz; Channel 2: 2437 MHz; Channel 3: 2462 MHz.

All emission measurements were done in Peak mode to reduce measurement time. In case limits are exceeded the measurements will be repeated and documented in the test report either with Quasi Peak ar average detector depending on the frequency range specified in FCC 15 and/or DA00-705. Bandwidth, sweeptime etc. were set according DA00-705 and recorded

Lowest Channel(2412MHz): 30MHz-1GHz



LIMITS SUBCLAUSE § 15.247 (c)

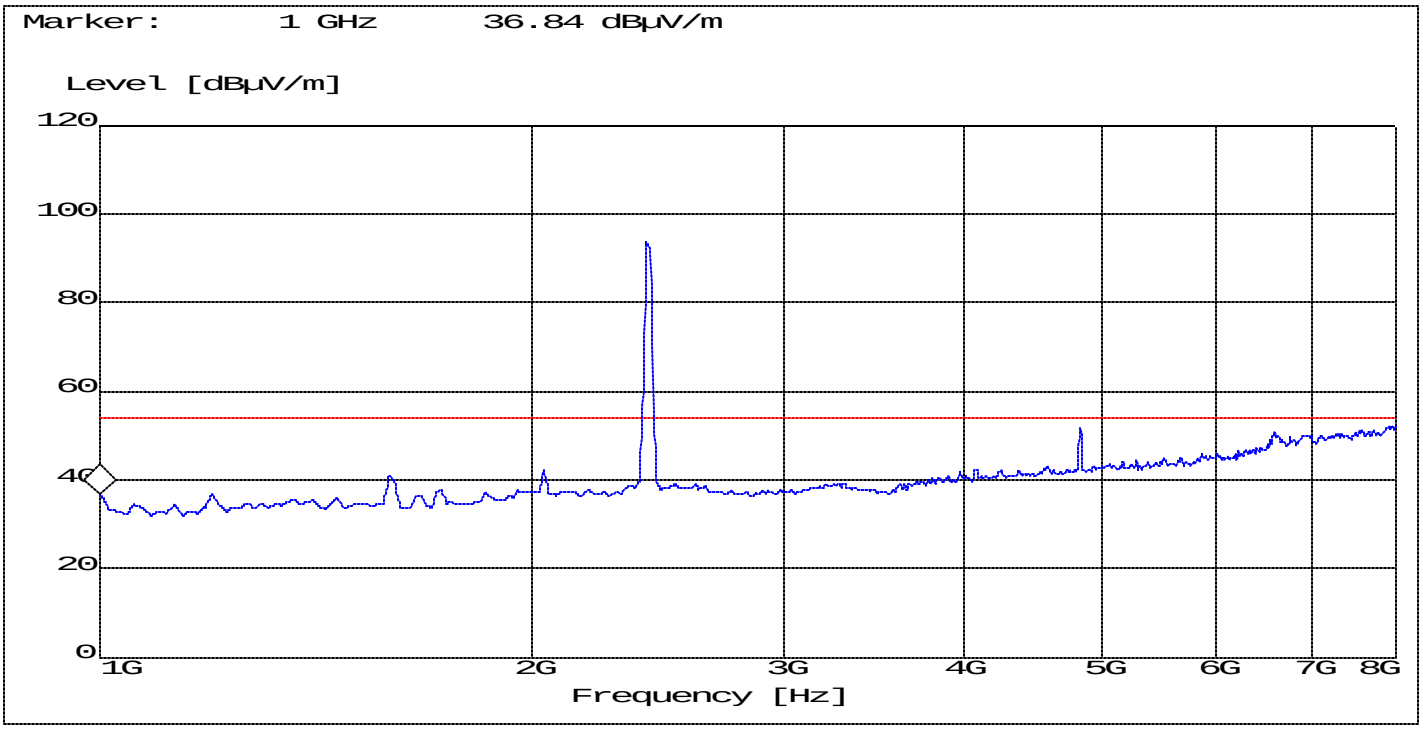
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Lowest Channel(2412MHz): 1GHz-8GHz

NOTE: The peak above the limit is the carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.



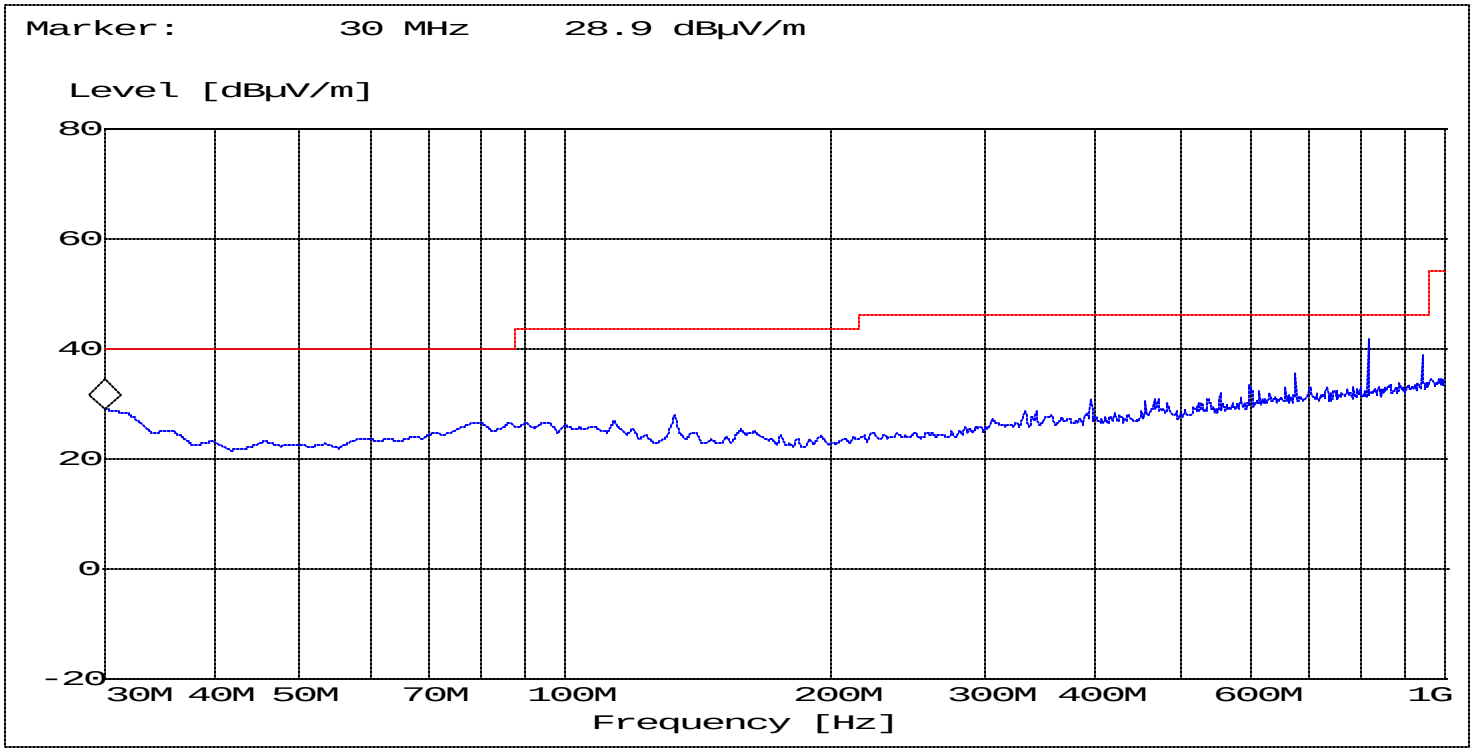
LIMITS SUBCLAUSE § 15.247 (c)

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)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Mid Channel(2437MHz): 30MHz -1GHz



LIMITS SUBCLAUSE § 15.247 (c)

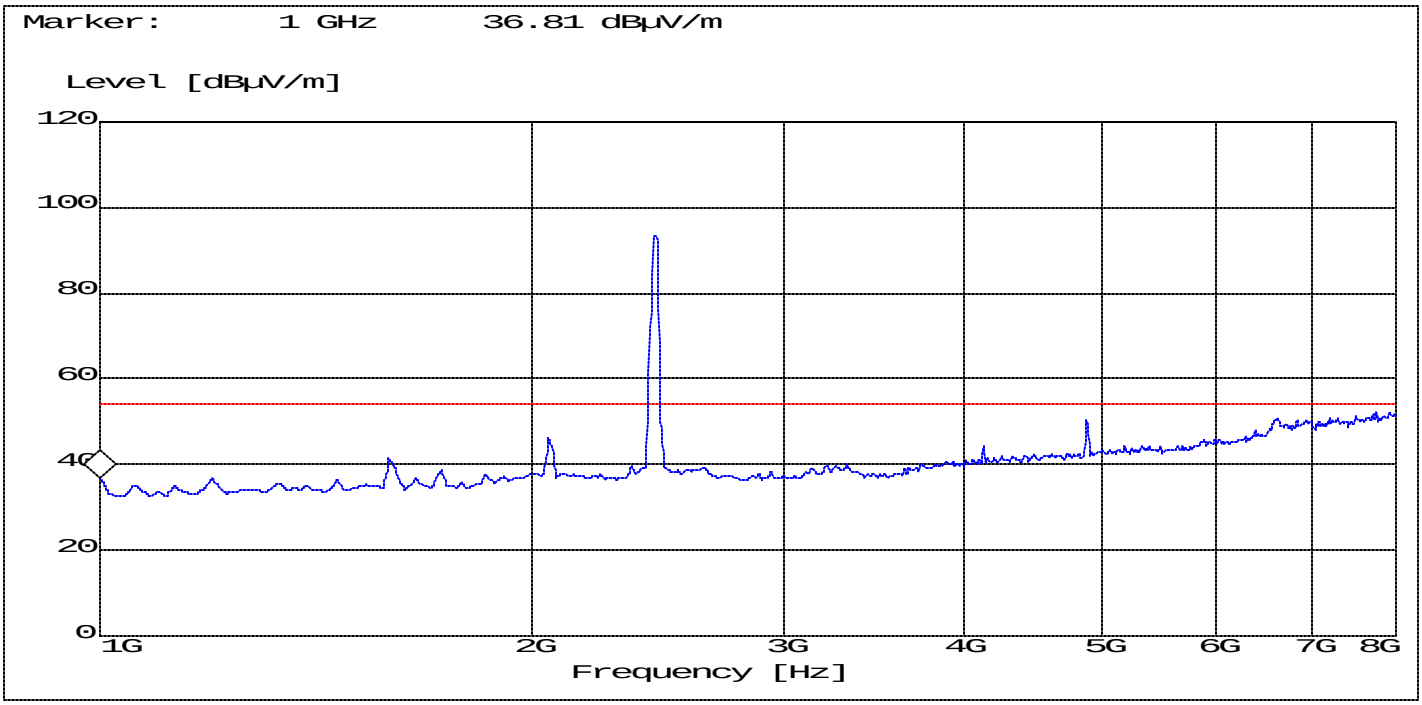
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Mid Channel(2437MHz): 1GHz -8GHz

NOTE: The peak above the limit is the carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.



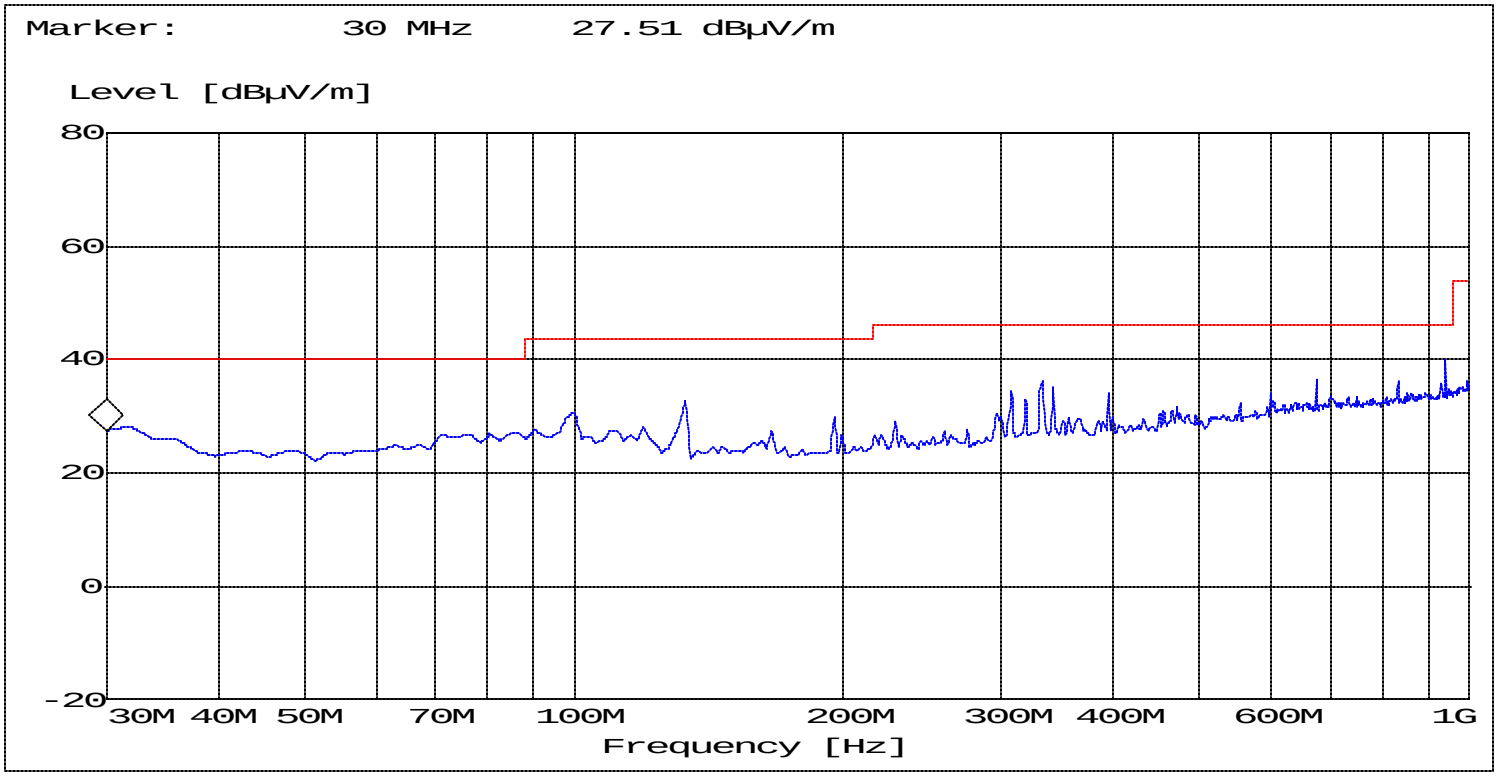
LIMITS SUBCLAUSE § 15.247 (c)

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)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Highest Channel(2462MHz): 30MHz -1GHz



LIMITS SUBCLAUSE § 15.247 (c)

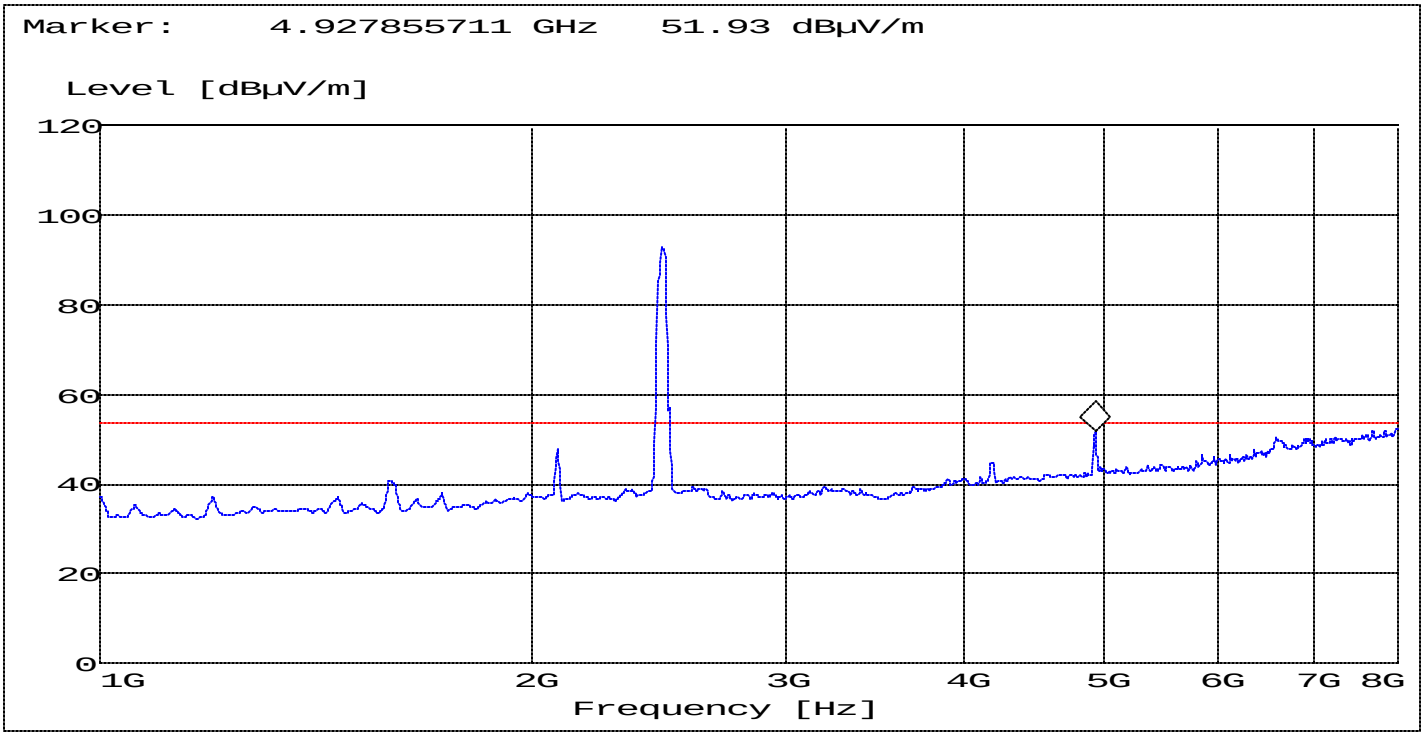
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Highest Channel(2462MHz): 1GHz -8GHz

NOTE: The peak above the limit is the carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.



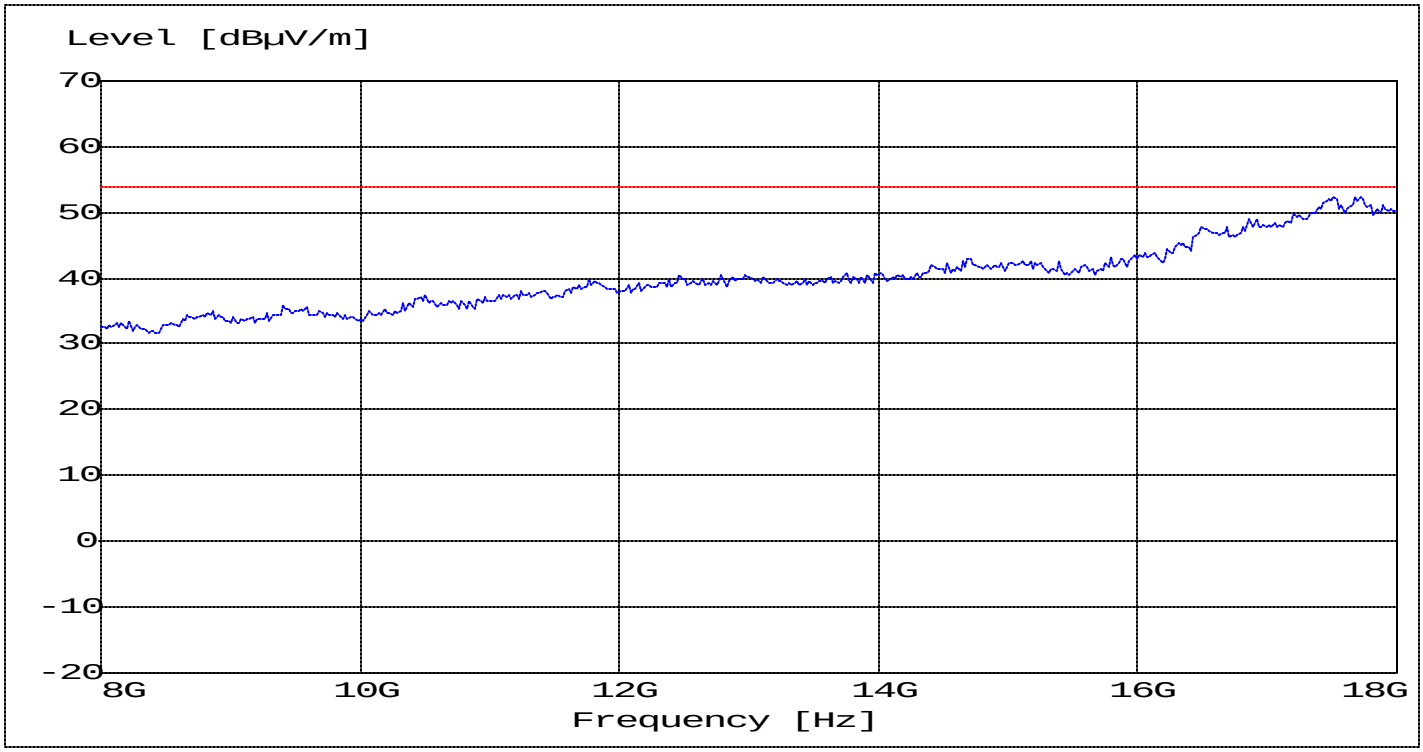
LIMITS SUBCLAUSE § 15.247 (c)

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)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Highest Channel(2462MHz): 8GHz -18GHz
(This plot is valid for low, mid & high channels)



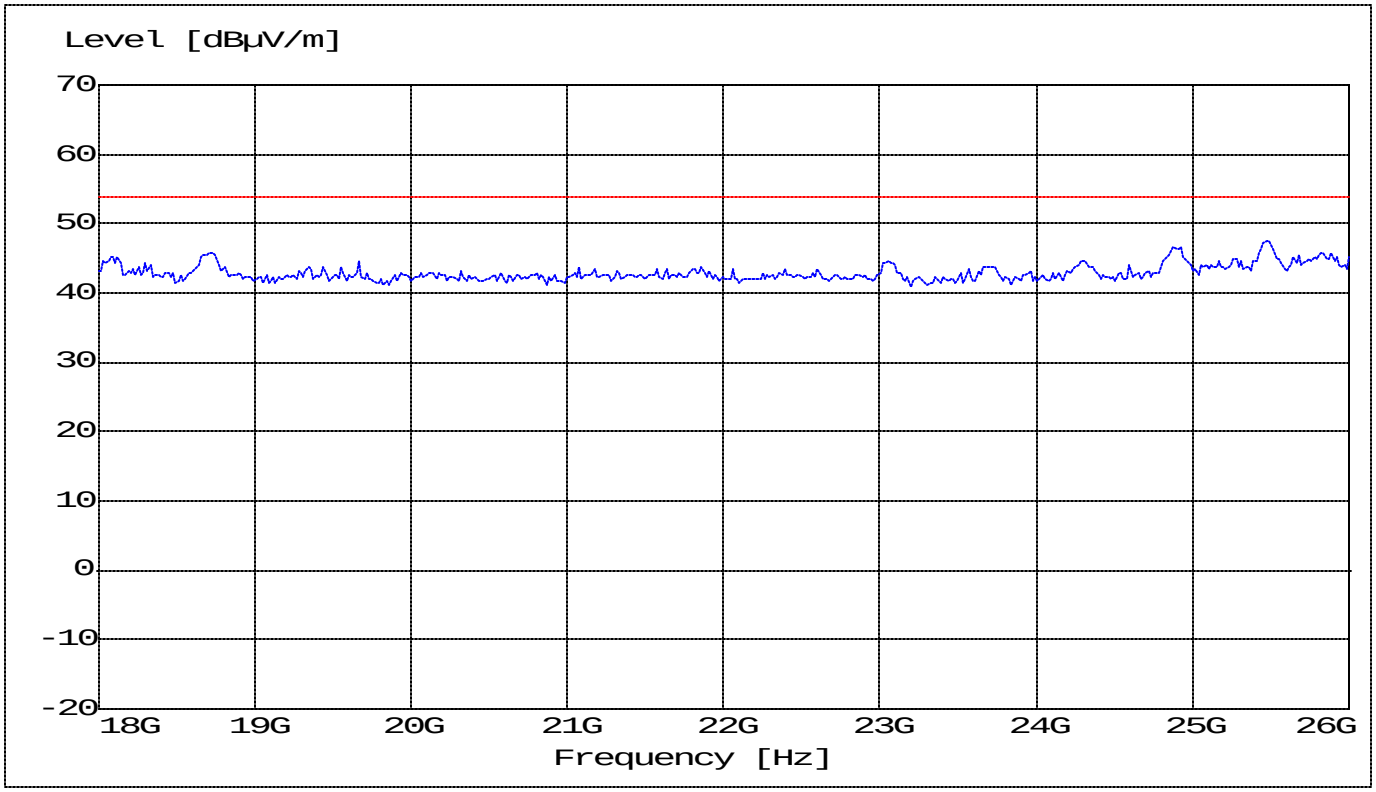
LIMITS SUBCLAUSE § 15.247 (c)

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)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) SUBCLAUSE § 15.247 (c) (1)

Highest Channel(2462MHz): 18GHz -26GHz
(This plot is valid for low, mid & high channels)



LIMITS SUBCLAUSE § 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)).

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

TEST CONDITIONS		RF POWER LEVEL IN 3 kHz BW		
Frequency (MHz)		2412	2437	2462
T_{nom}(23)° C	V_{nom}(5.0)V	-13.05 dBm	-13.11dBm	-13.41 dBm
Measurement uncertainty		±3dB		

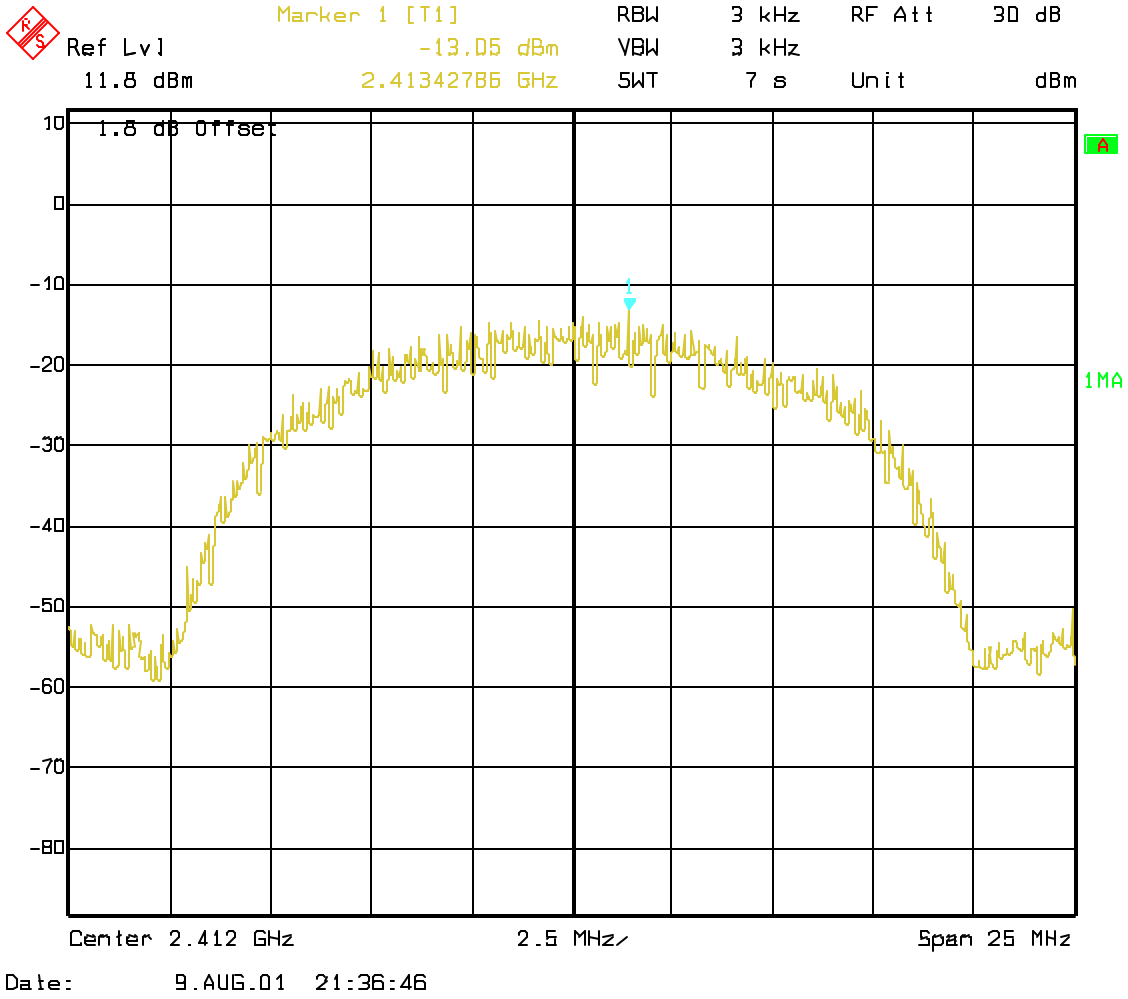
LIMIT **SUBCLAUSE §15.247(d)**

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band

ANALYZER SETTINGS: RBW=3KHz , VBW=3KHz

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

Lowest Channel: 2412 MHz

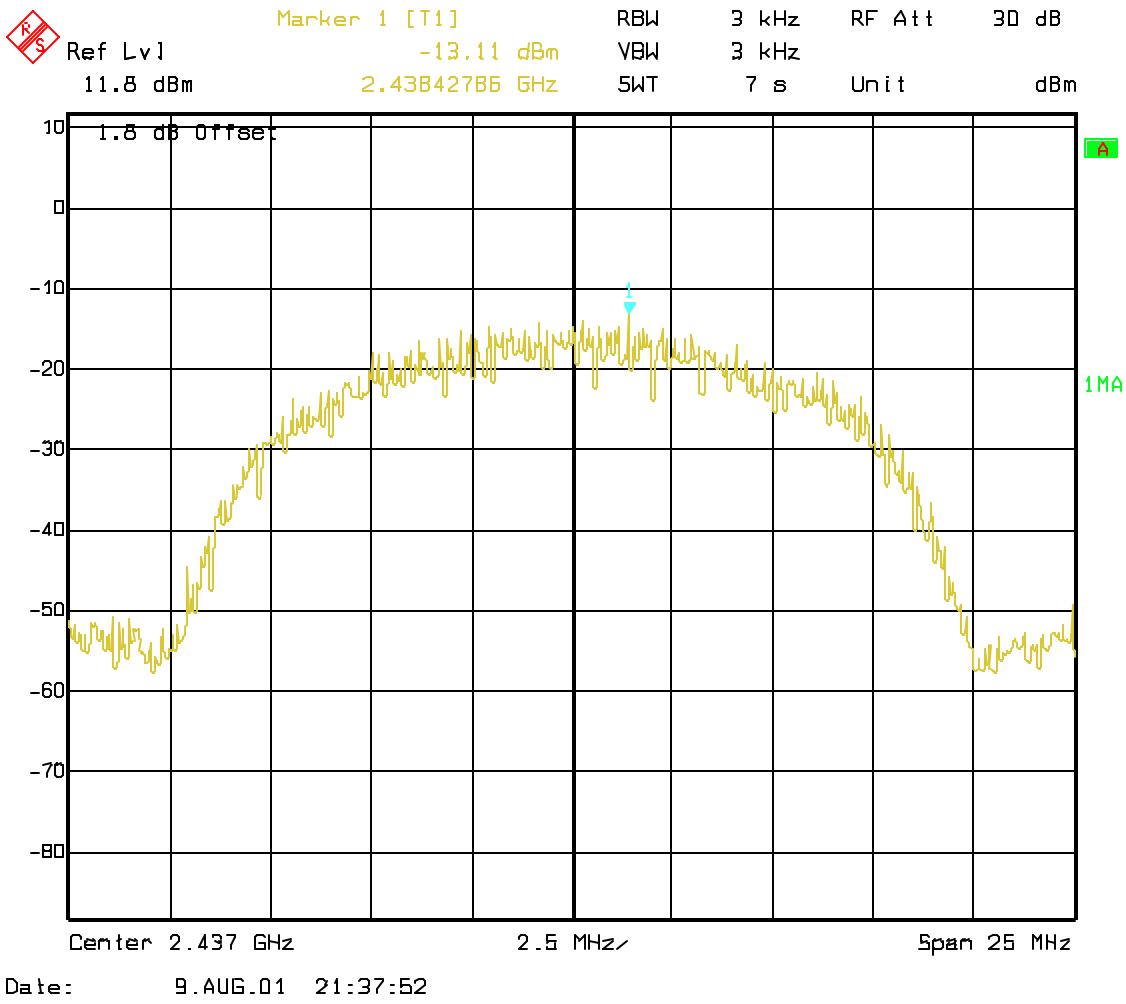


LIMIT **SUBCLAUSE §15.247(d)**

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

Mid Channel: 2437 MHz

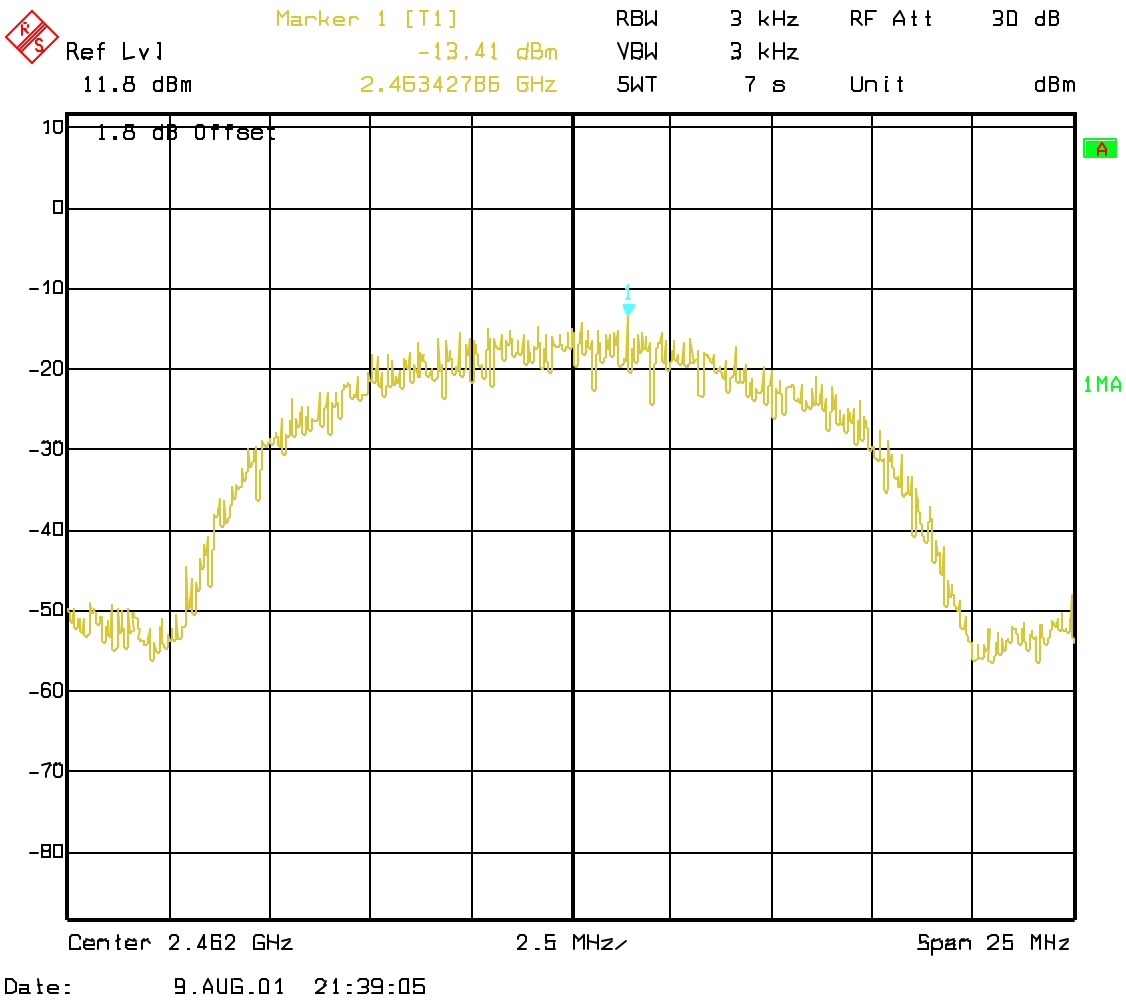


LIMIT **SUBCLAUSE §15.247(d)**

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

Highest Channel: 2462 MHz



LIMIT **SUBCLAUSE §15.247(d)**

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band

PROCESSING GAIN OF DSSS SYSTEMS SUBCLAUSE §15.247 (e)

(NOTE:The processing gain data is provided by Chip Set Manufacturer)

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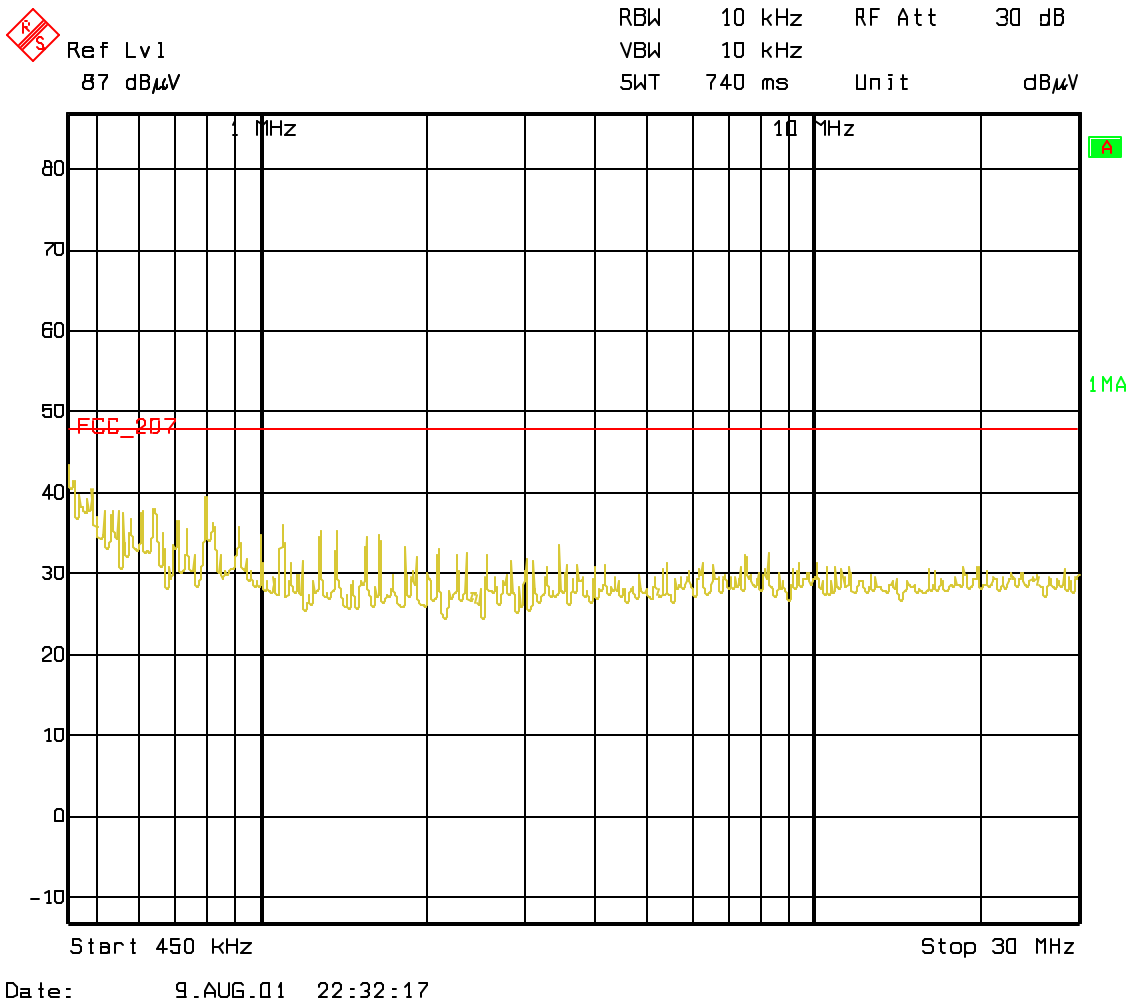
CONDUCTED EMISSIONS § 15.107/207

Measured with AC/DC power adapter plugged in LISN

Phase: Line



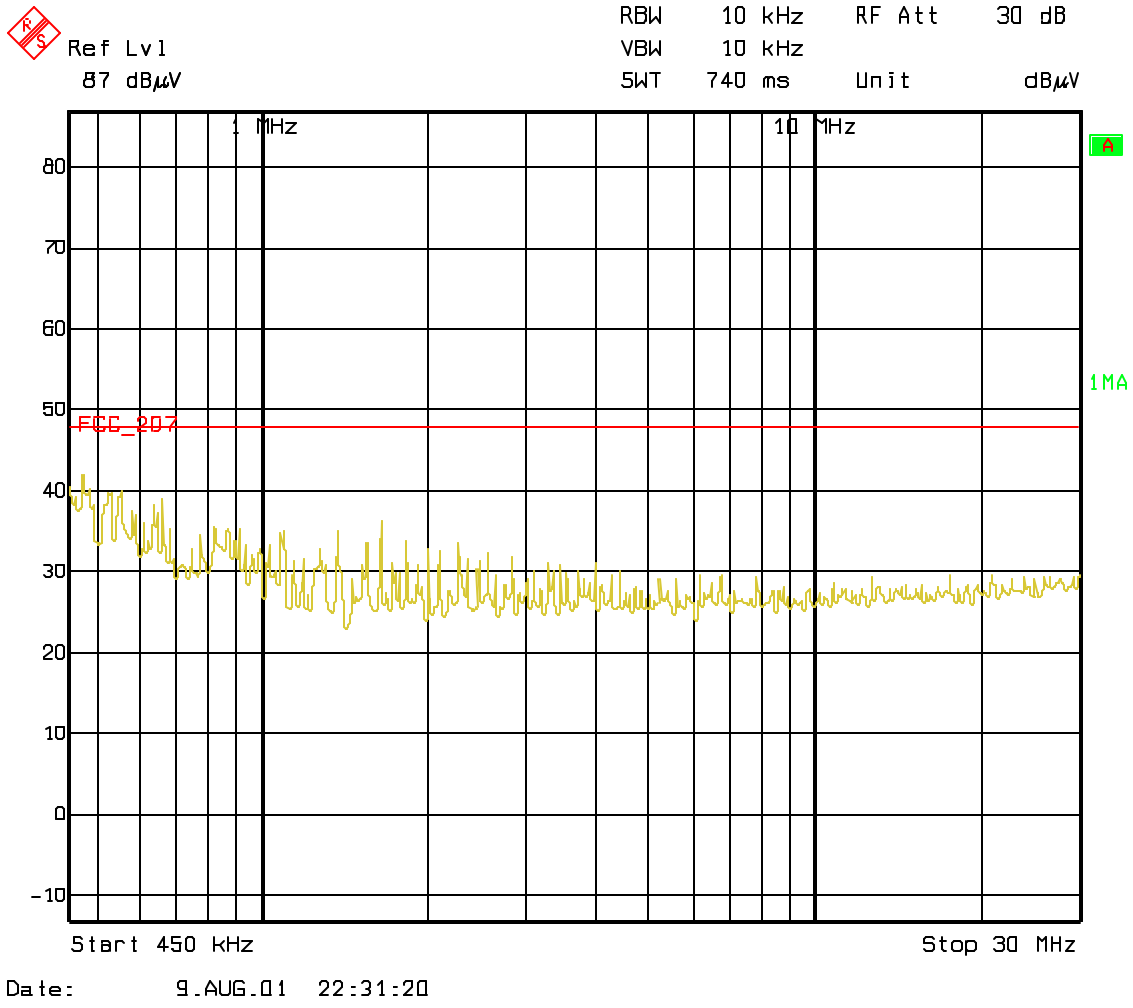
Technical specification : 15.107 / 15.207 (Revised as of October 1, 1991)

Limit

0.45 to 30 MHz	250 µV / 47.96 dBµV

-

Phase: Neutral



Technical specification : 15.107 / 15.207 (Revised as of October 1, 1991)

Limit

0.45 to 30 MHz	250 µV / 47.96 dBµV

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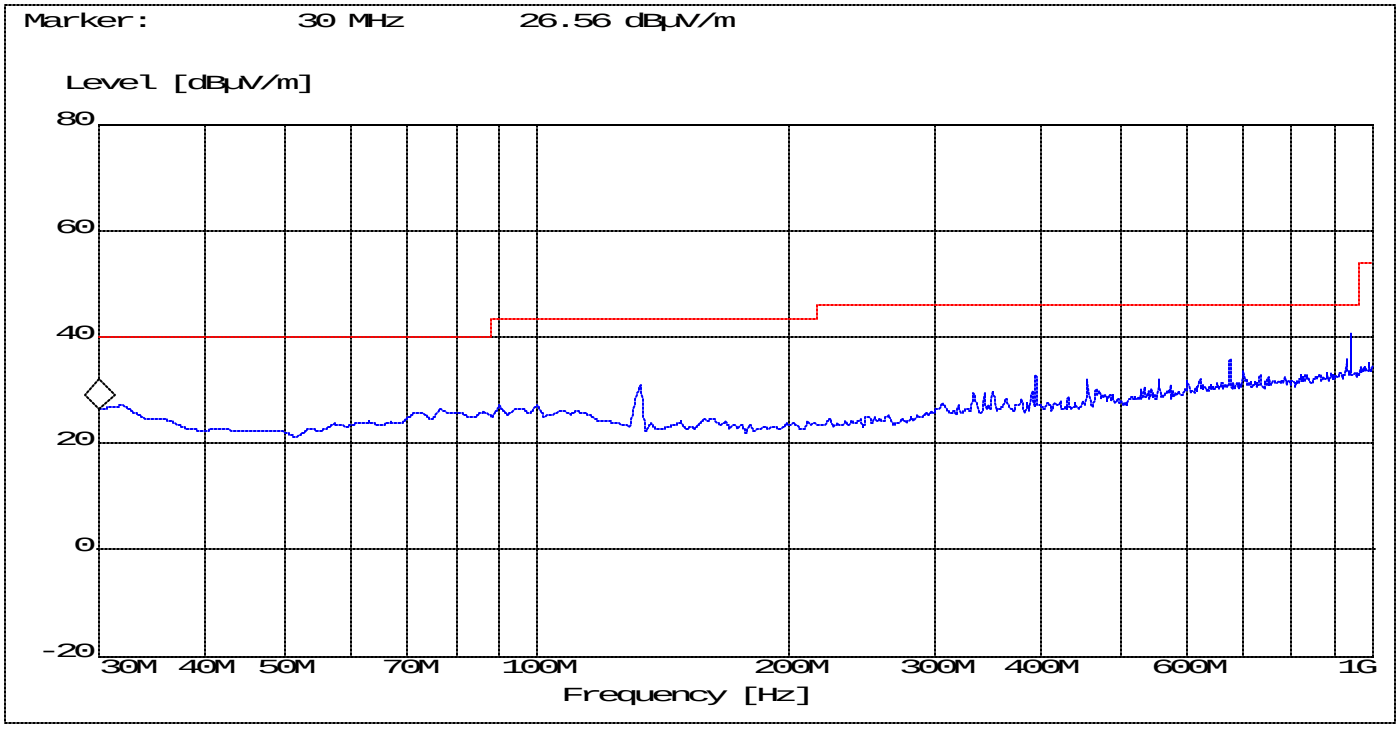
RECEIVER SPURIOUS RADIATION **§ 15.209**

Lowest Channel(2412MHz): 30MHz – 1GHz



Limits **SUBCLAUSE § 15.209**

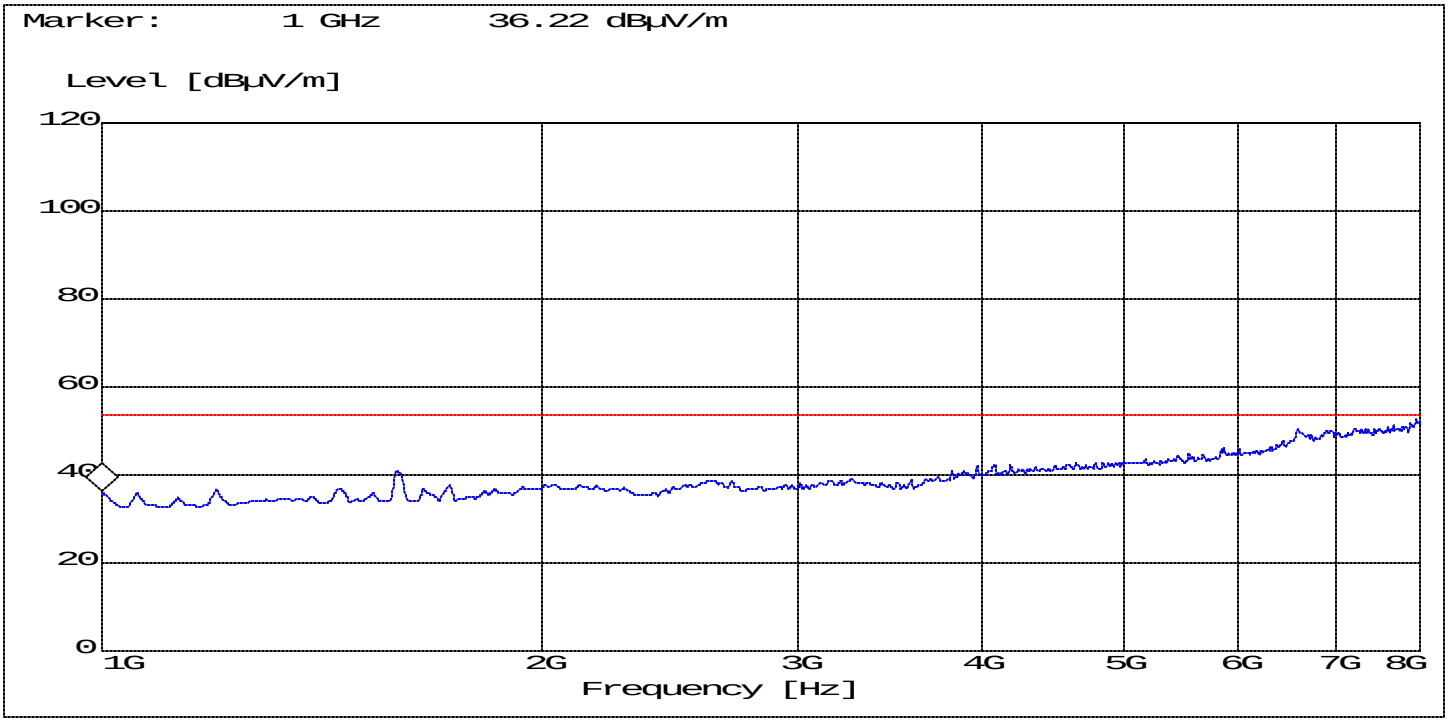
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

(NOTE: All measurements were done in peak mode)
ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

RECEIVER SPURIOUS RADIATION **§ 15.209**

Lowest Channel(2412MHz): 1GHz – 8GHz

NOTE: The peak above the limit is the carrier frequency.



Limits **SUBCLAUSE § 15.209**

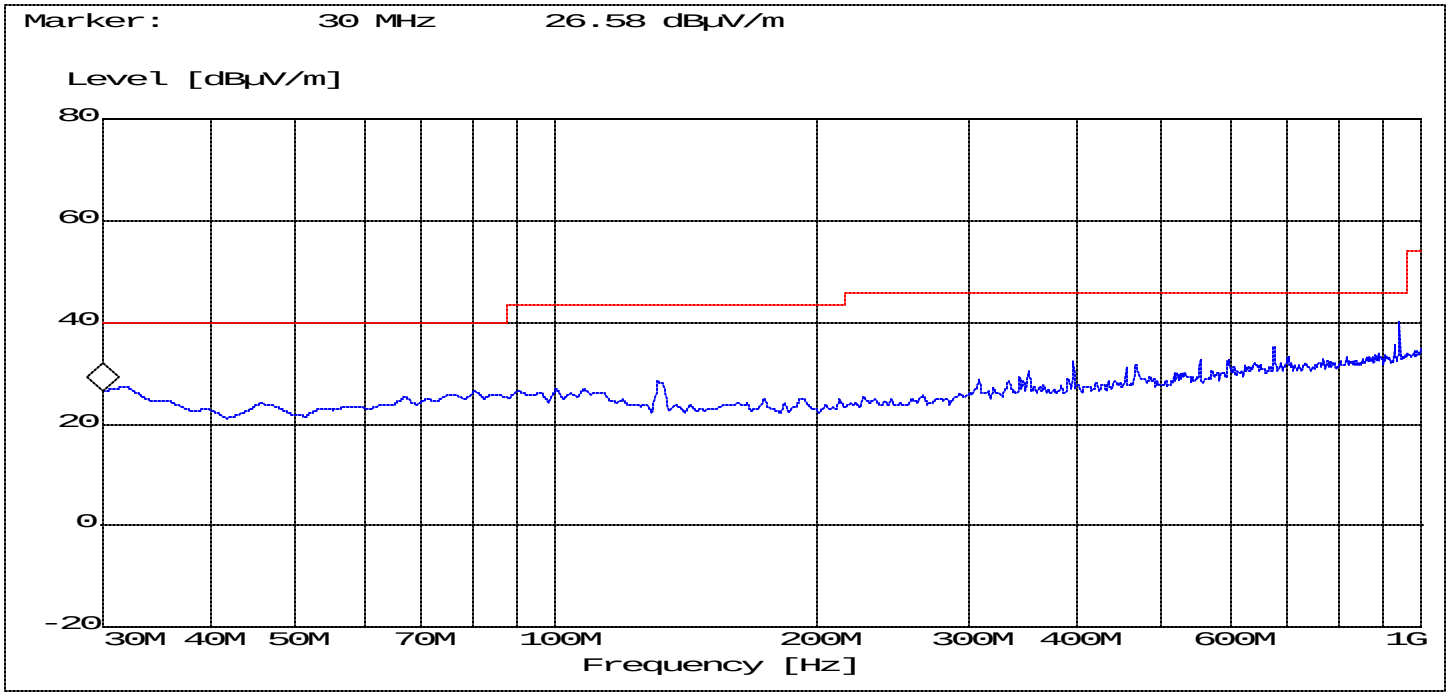
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

(NOTE: All measurements were done in peak mode)

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

RECEIVER SPURIOUS RADIATION **§ 15.209**

Mid Channel(2437MHz): 30MHz – 1GHz



Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/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	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

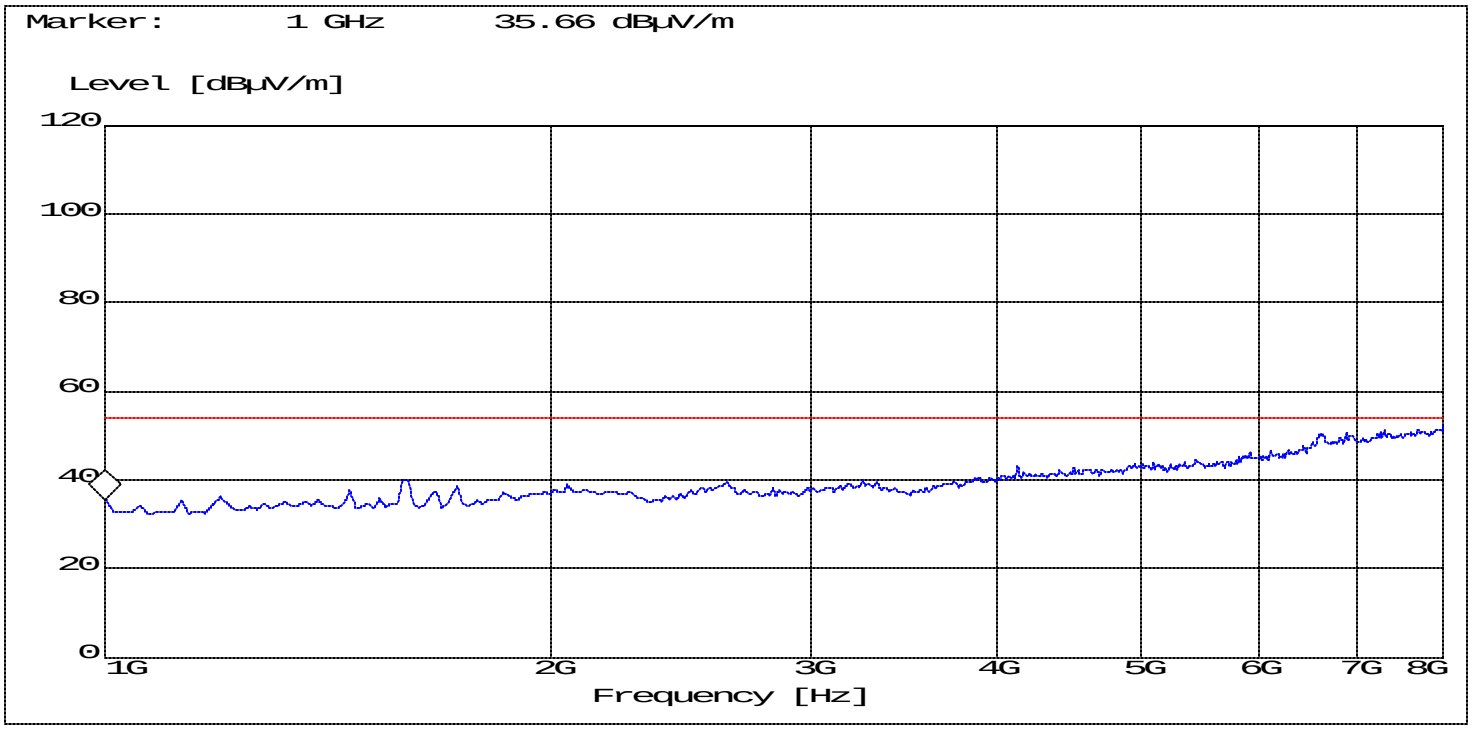
(NOTE: All measurements were done in peak mode)

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

RECEIVER SPURIOUS RADIATION **§ 15.209**

Mid Channel(2437MHz): 1GHz – 8GHz

NOTE: The peak above the limit is the carrier frequency.



Limits **SUBCLAUSE § 15.209**

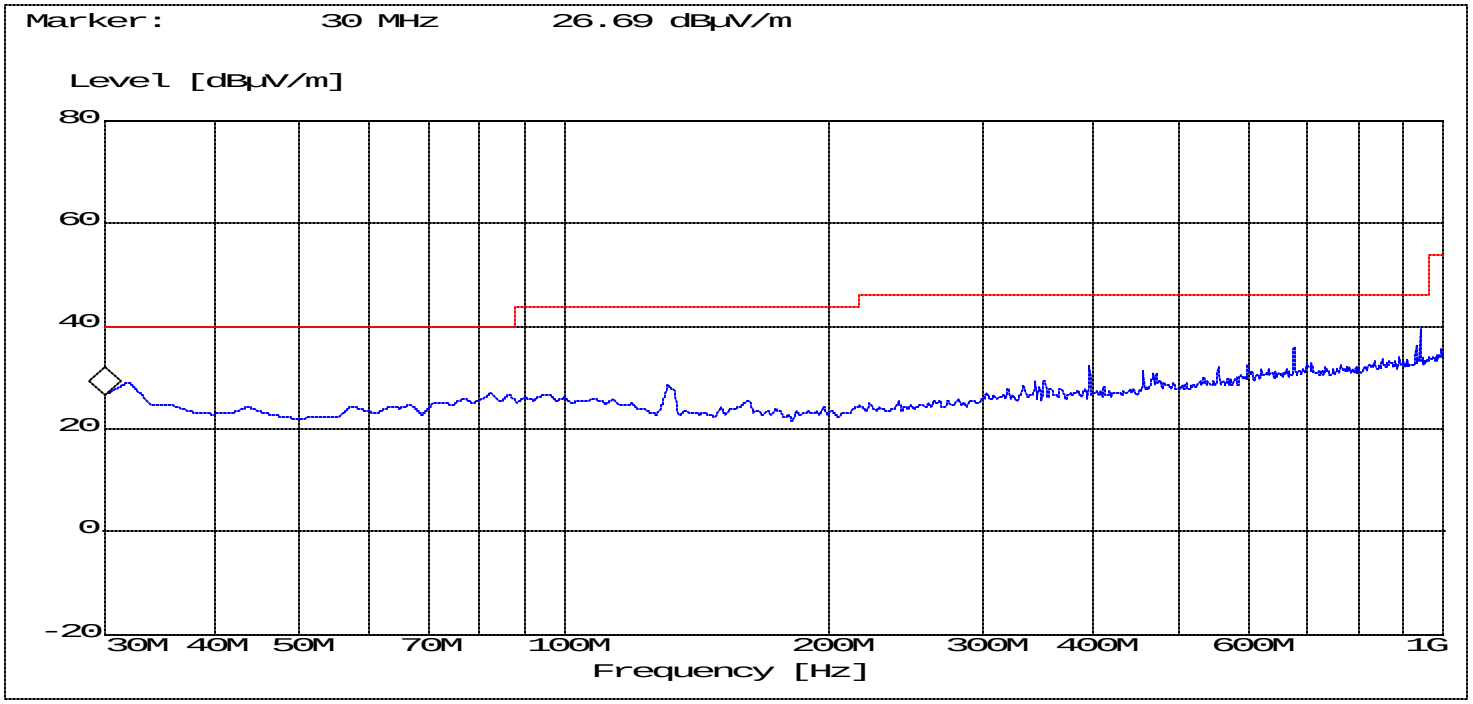
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

(NOTE: All measurements were done in peak mode)

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

RECEIVER SPURIOUS RADIATION **§ 15.209**

Highest Channel(2462MHz): 30MHz – 1GHz



Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/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	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

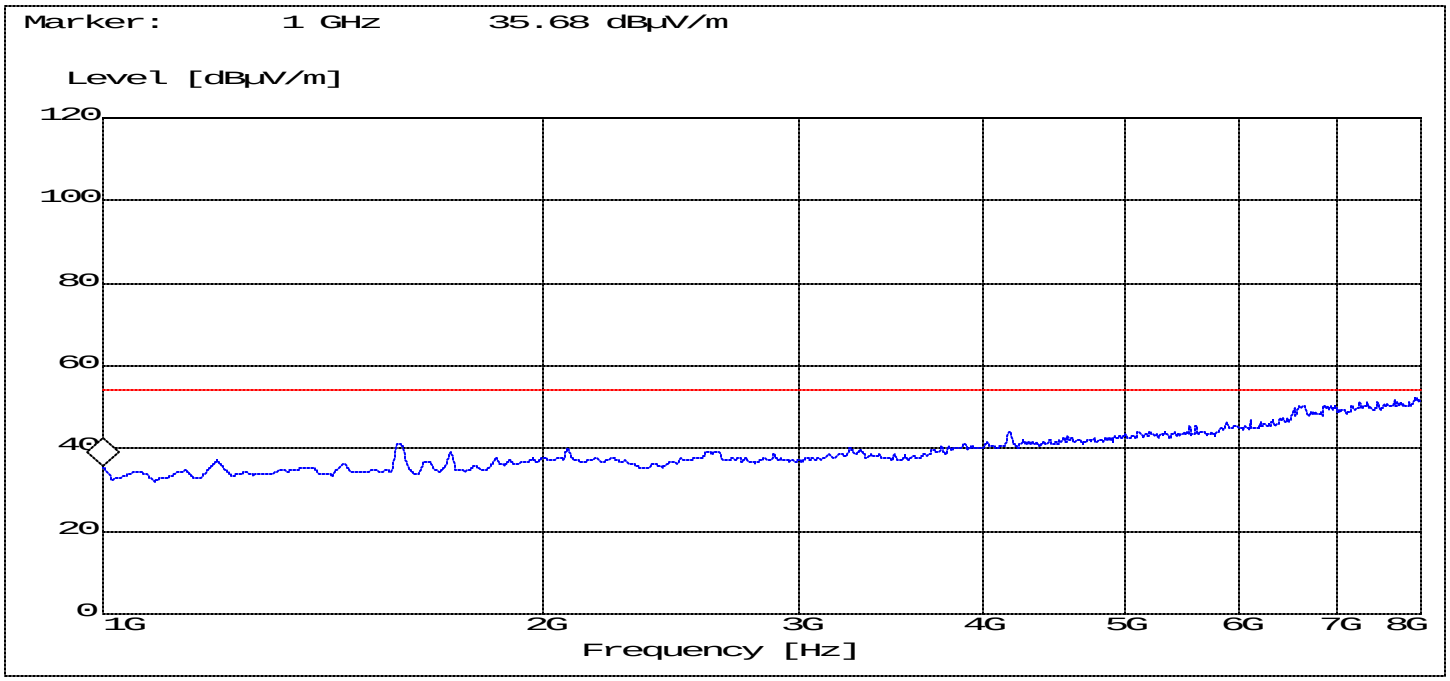
(NOTE: All measurements were done in peak mode)

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

RECEIVER SPURIOUS RADIATION **§ 15.209**

Highest Channel(2462MHz): 1GHz – 8GHz

NOTE: The peak above the limit is the carrier frequency.



Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/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	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

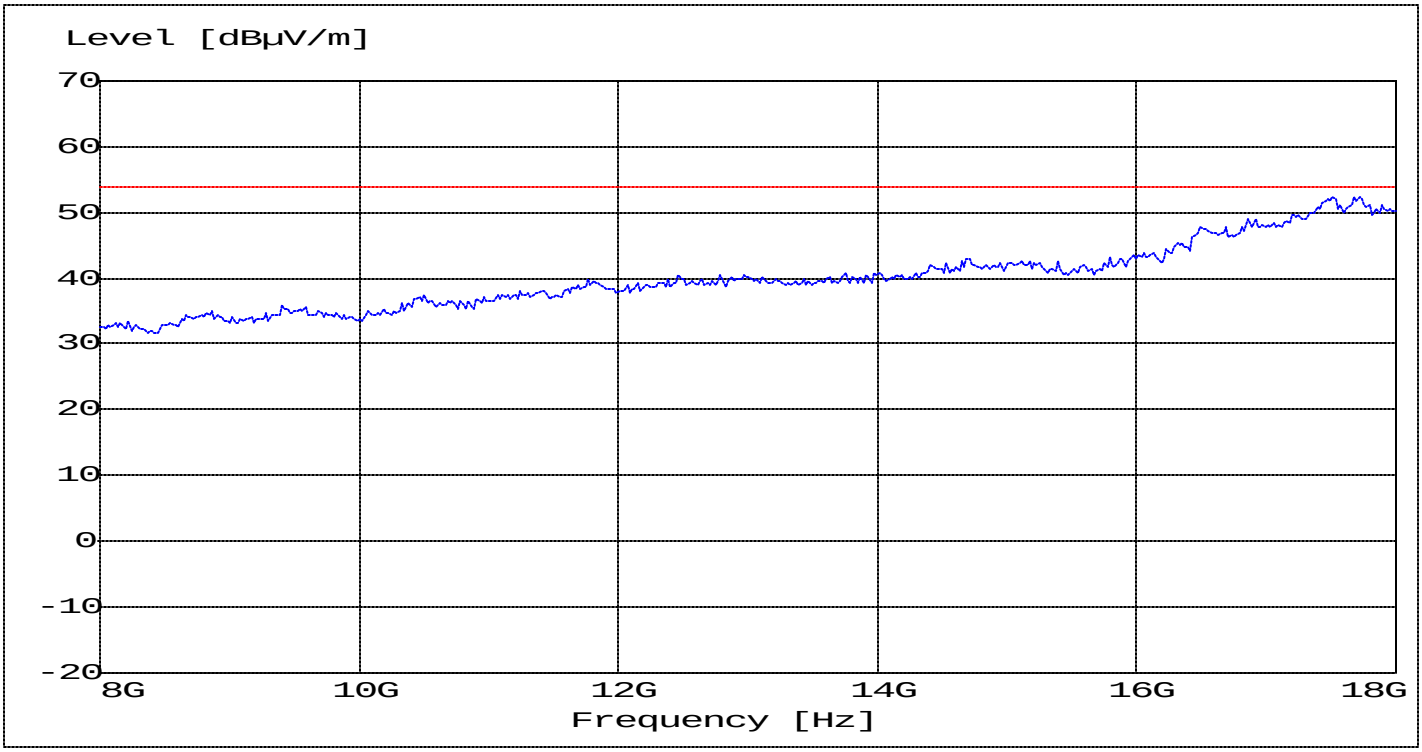
(NOTE: All measurements were done in peak mode)

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

RECEIVER SPURIOUS RADIATION **§ 15.209**

8GHz – 18GHz

(NOTE: This plot is applicable for all three channels)



Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/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	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

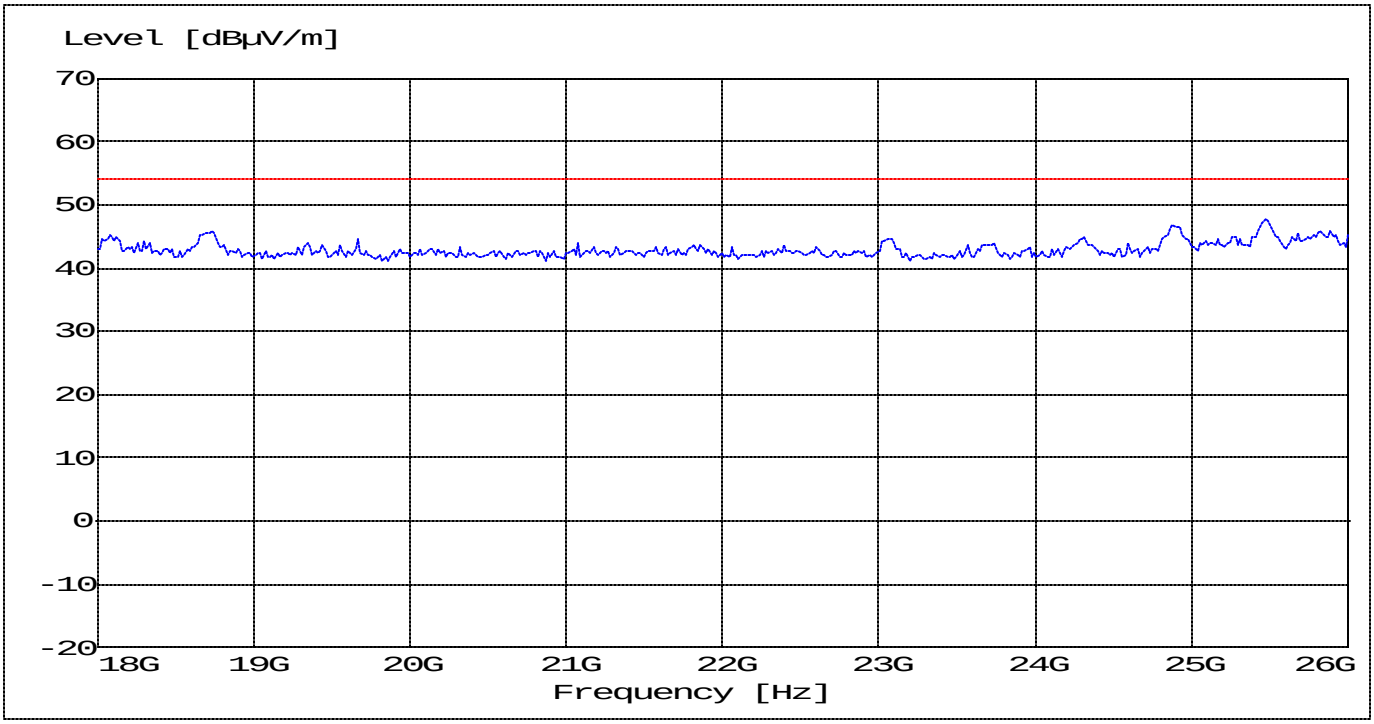
(NOTE: All measurements were done in peak mode)

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

RECEIVER SPURIOUS RADIATION **§ 15.209**

18GHz – 26GHz

(NOTE: This plot is applicable for all three channels)



Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/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	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

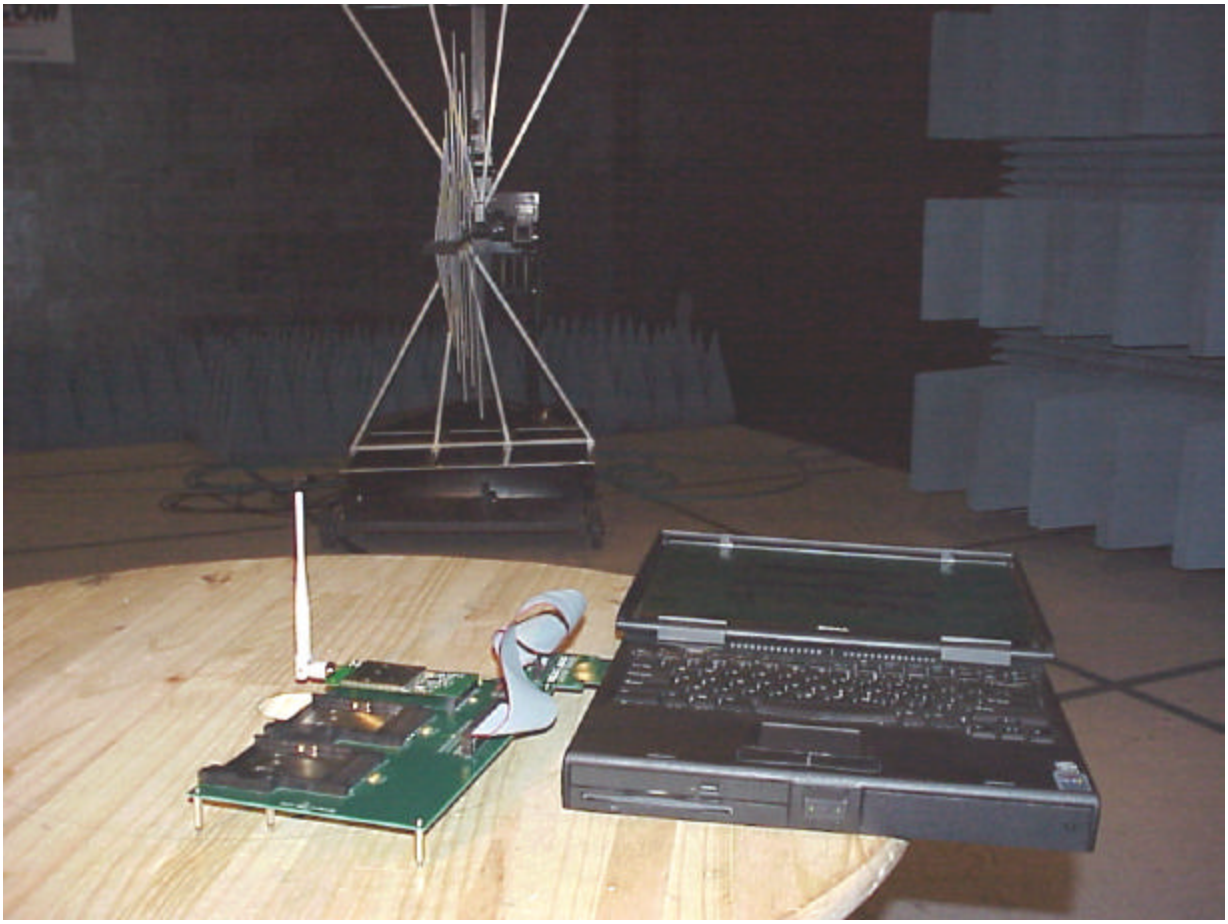
(NOTE: All measurements were done in peak mode)

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

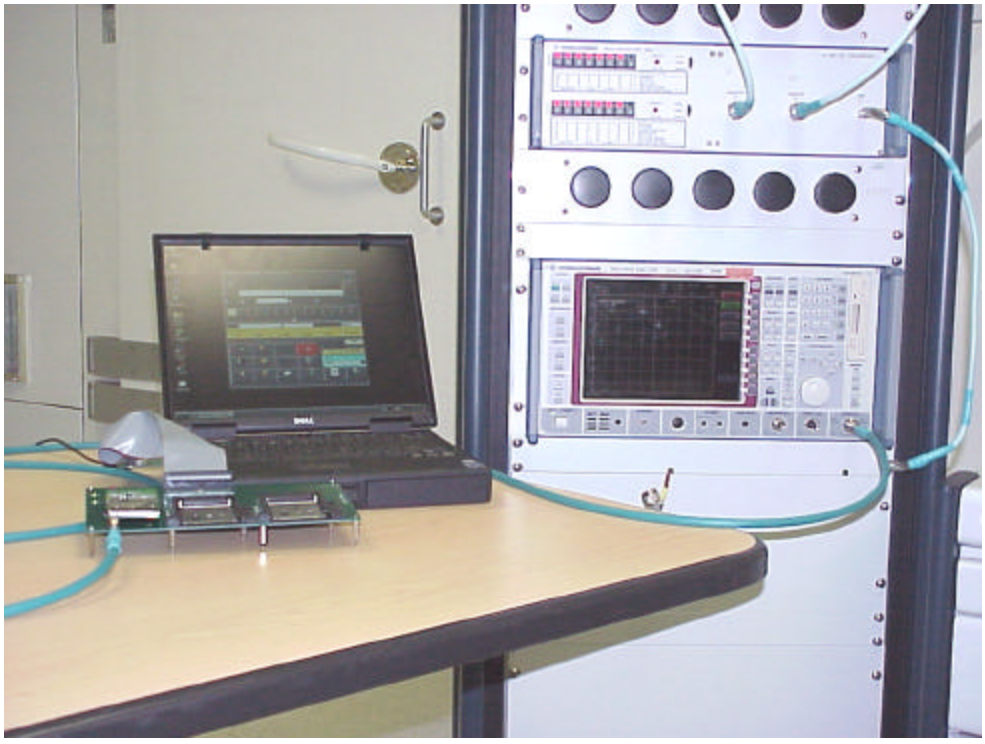
TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

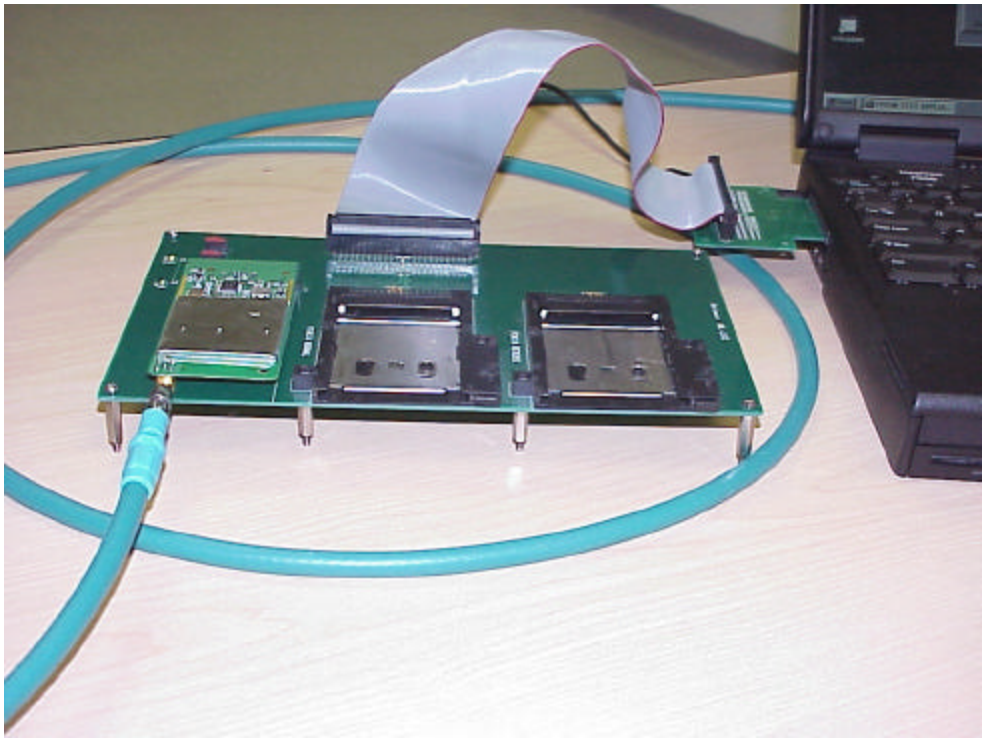
No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
02	Signal Generator	SMY0	Rohde & Schwarz	836878/011
03	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
04	Power Amlifier	250W1000	Amplifier Research	300031
05	Biconilog Antenna	3141	EMCO	0005-1186
06	Horn Antenna	SAS-200/571	AH Systems	325
07	Power Splitter	11667B	Hewlett Packard	645348
08	Climatic Chamber	VT4004	Votch	G1115
09	Pre-Amplifier	JS4-00102600	Miteq	00616
10	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807
11	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30808

TEST SITE
Radiated Emissions



Conducted Emissions

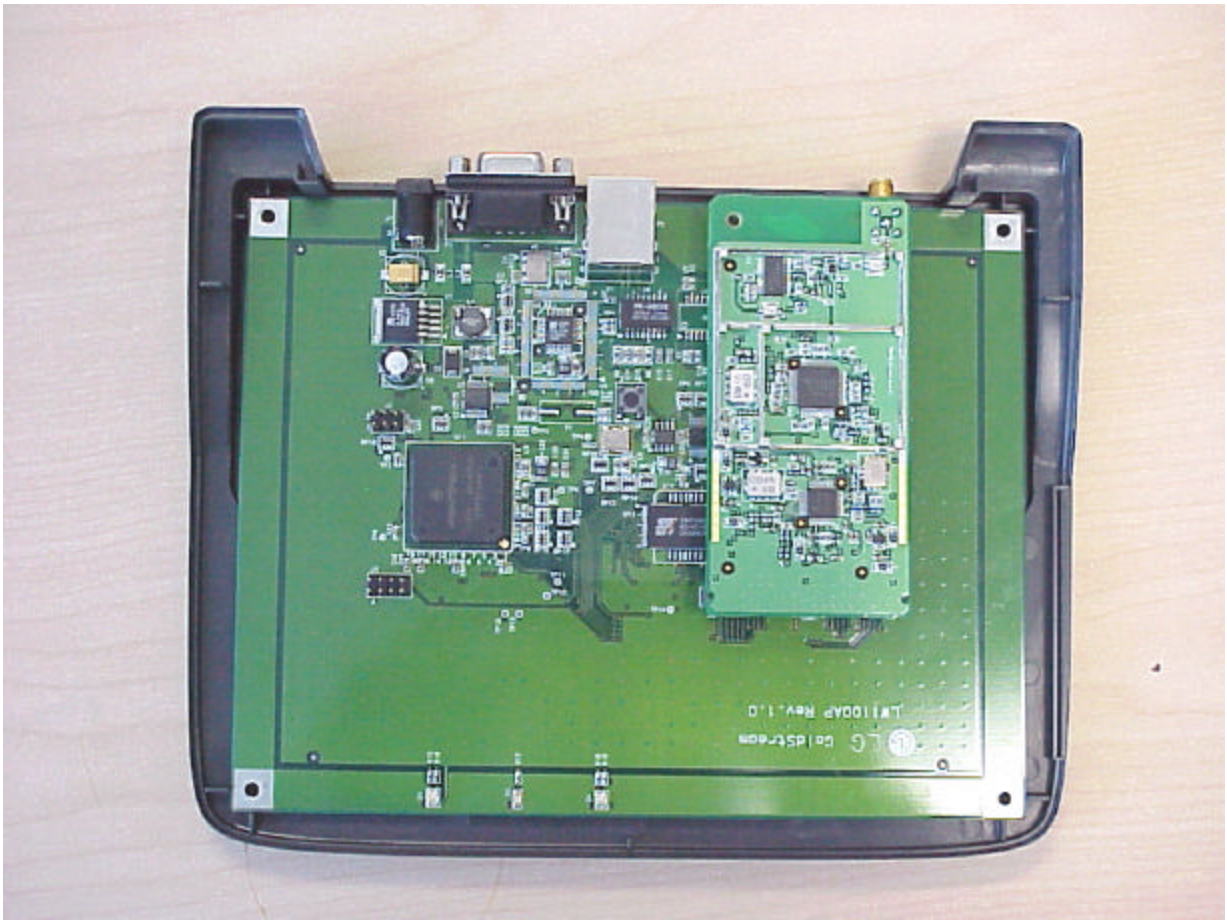




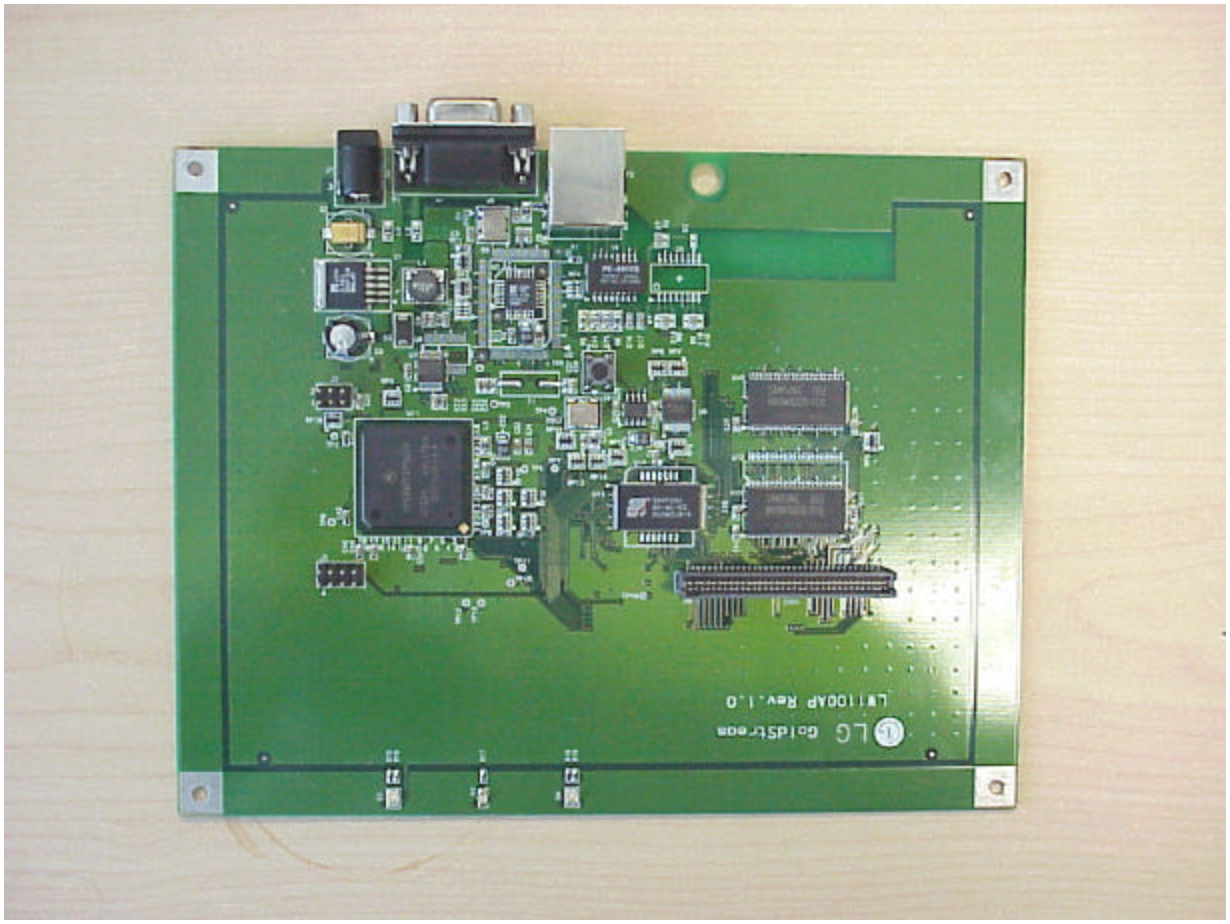
PHOTOGRAPHS OF THE EQUIPMENT

Photograph No.1: (Top View)

Photograph No.2: Top(substance with AP-RF)

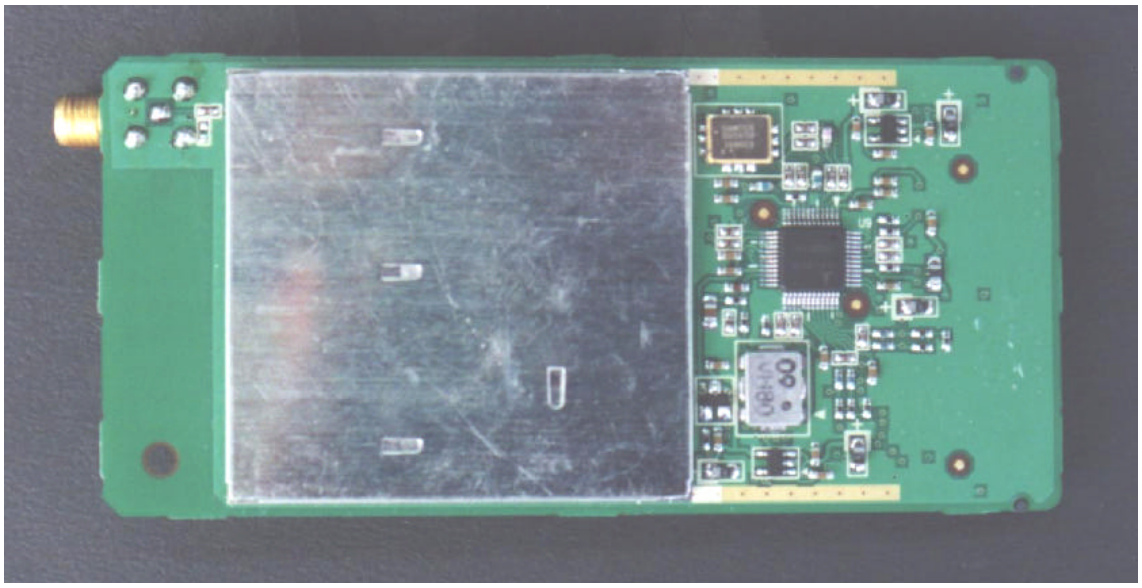


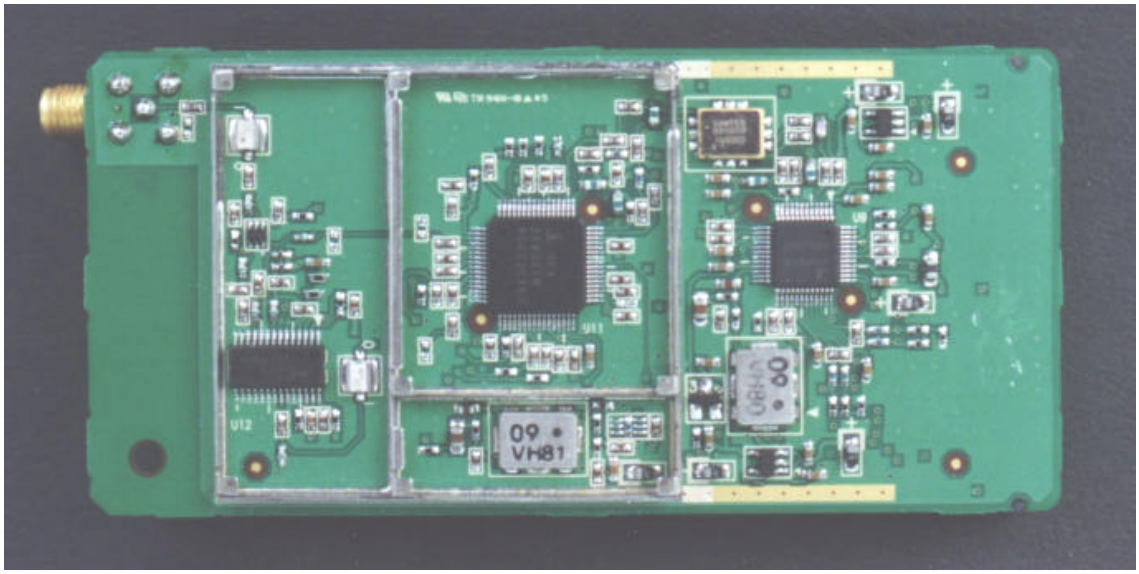
Photograph No.3: Top(substance without AP-RF)



Photograph No.4: (Rear View)

Photograph No.5: RF Board Top Side





Photograph No.6: RF Board Bottom Side