

CETECOM Inc.



CETECOM Inc.

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Issued test report consists of 61 Pages

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

Test report no.: 180FCC15.247/2001
FCC Part 15.247
FCC ID: NM8ROSELLA
(PE2030)

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM 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.

TEST REPORT PREPARED BY:

EMC & Radio Engineer: Harpreet Sidhu

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 : High Tech Computer Corp.
Street : 9F,6-3, Bau-Chian Rd., Hsin Tien
City : Taipei 231
Country : Taiwan
Contact : Jesse Kuo
Telephone : +886 2 8912 4138 ext. 8391
Telefax : +886 2 8912 4136
e-mail : Jesse_kuo@htc.com.tw

1.4 Application details

Date of receipt of application : 2001-08-01
Date of receipt of test item : 2001-08-16
Date of test : 2001-08-16/17

1.5 Test item

Manufacturer : applicant
Name of EUT : Pocket PC
Description : [Pocket PC with Bluetooth\(TM\) function](#)
Model No. : PE2030
Serial No. : N/A
FCC ID : NM8ROSELLA

Additional informations

Frequency : 2402 – 2480 MHz
Type of modulation : GFSK BT=0.5
Number of channels : 79
Antenna : Internal L Type Antenna
Power supply : 100-240 VAC 0.4A 50/60 Hz
Output power : 0 dBm
Extreme Vol. Limits : 3.8VDC – 4.2VDC
Extreme Temp. Limits : 0°C - +60°C
H/W & S/W : AX01 & 0.89

1.6 Test standards: **FCC Part 15 §15.247**

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.

Technical responsibility for area of testing :

2001-08-23

EMC & Radio

Lothar Schmidt



Date	Section	Name
Signature		

2.2 Testreport

TEST REPORT

**Test report no. : 180FCC15.247/2001
FCC ID: NM8ROSELLA
(PE2030)**

TEST REPORT REFERENCE**LIST OF MEASUREMENTS**

Paragraph	PARAMETER TO BE MEASURED	PAGE
	Transmitter parameters	
§ 15.204	Antenna gain	7
§ 15.247 (a)	Carrier frequency separation	8
§ 15.247 (a)	Number of hopping channels	9
§ 15.247 (a)	Time of occupancy (dwell time)	13
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Antenna Gain

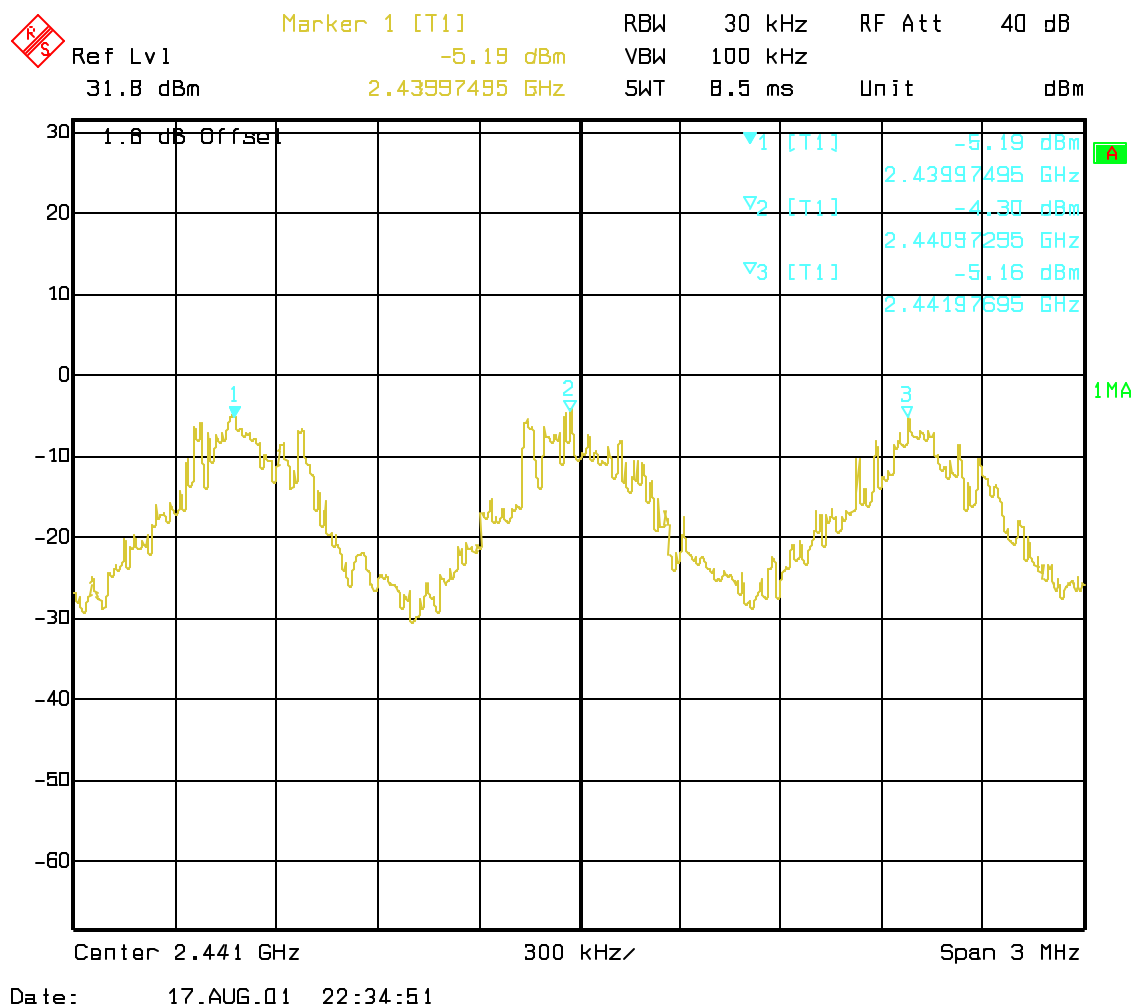
SUBCLAUSE § 15.204

The max gain is +0.773dBi

(measured effective radiated power – measured conducted power with a temporary RF-connector)

CARRIER FREQUENCY SEPERATION

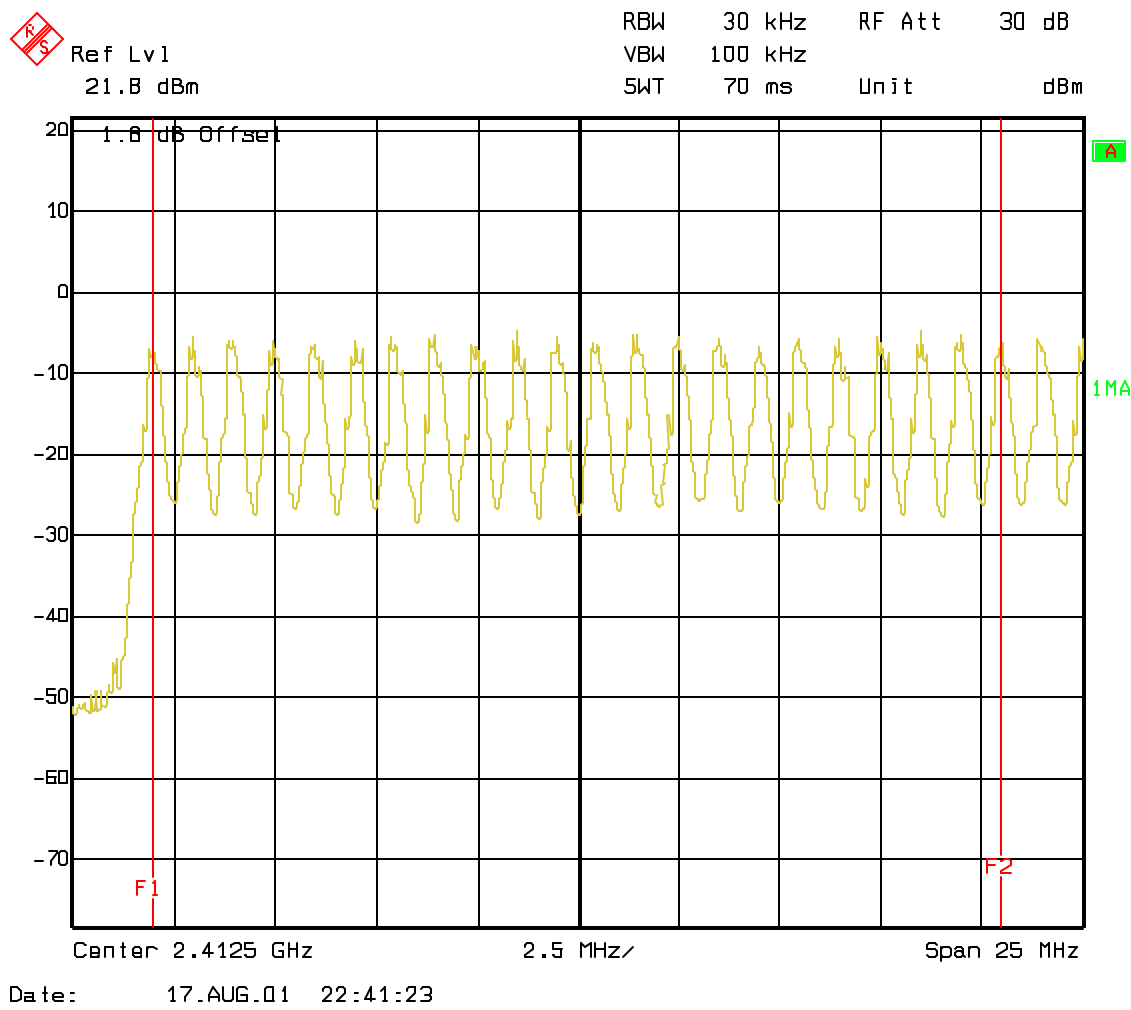
§15.247(a)



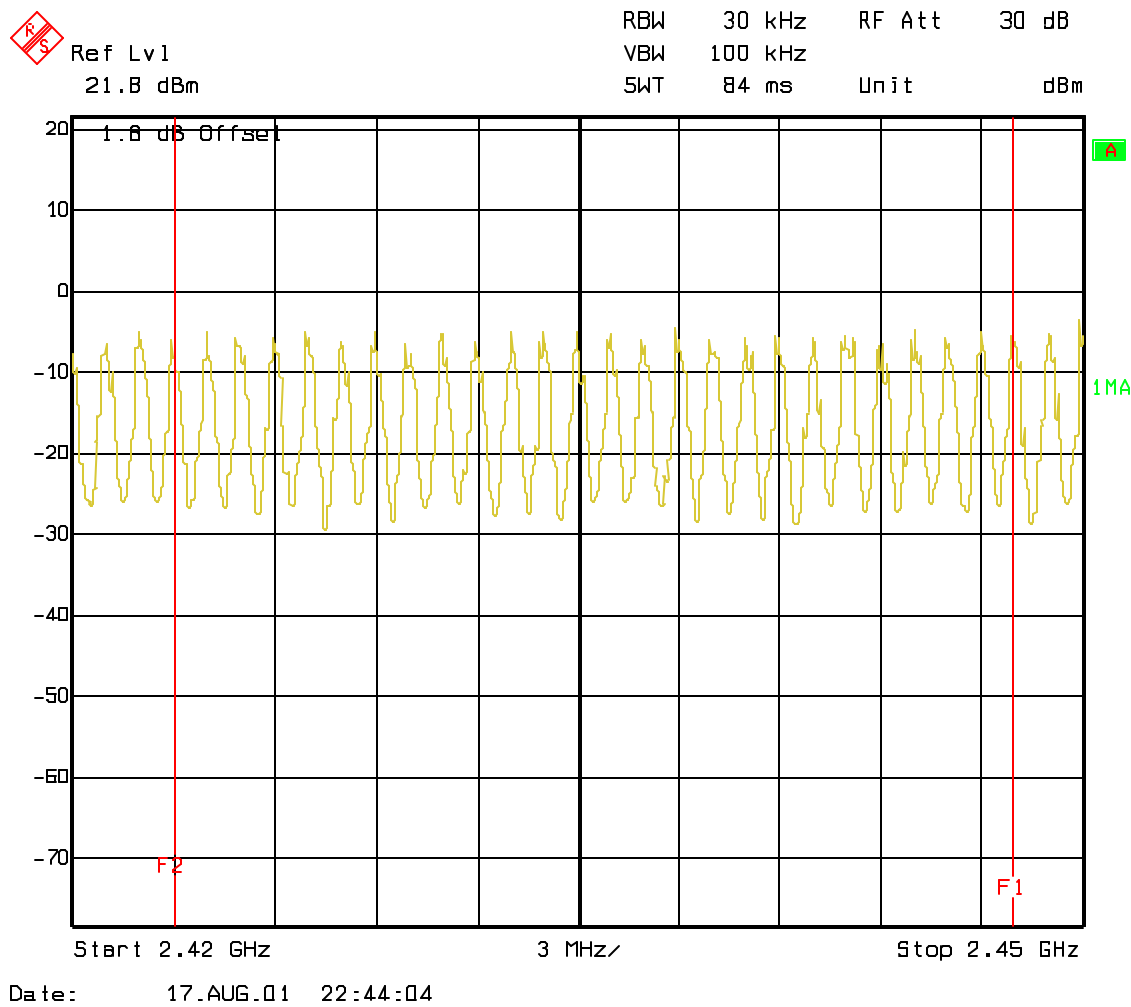
NUMBER OF HOPPING CHANNELS §15.247(a)

The number of hopping channels is 79 (see next 4 plots)
The right red line corresponds to the left red line from the next plot.

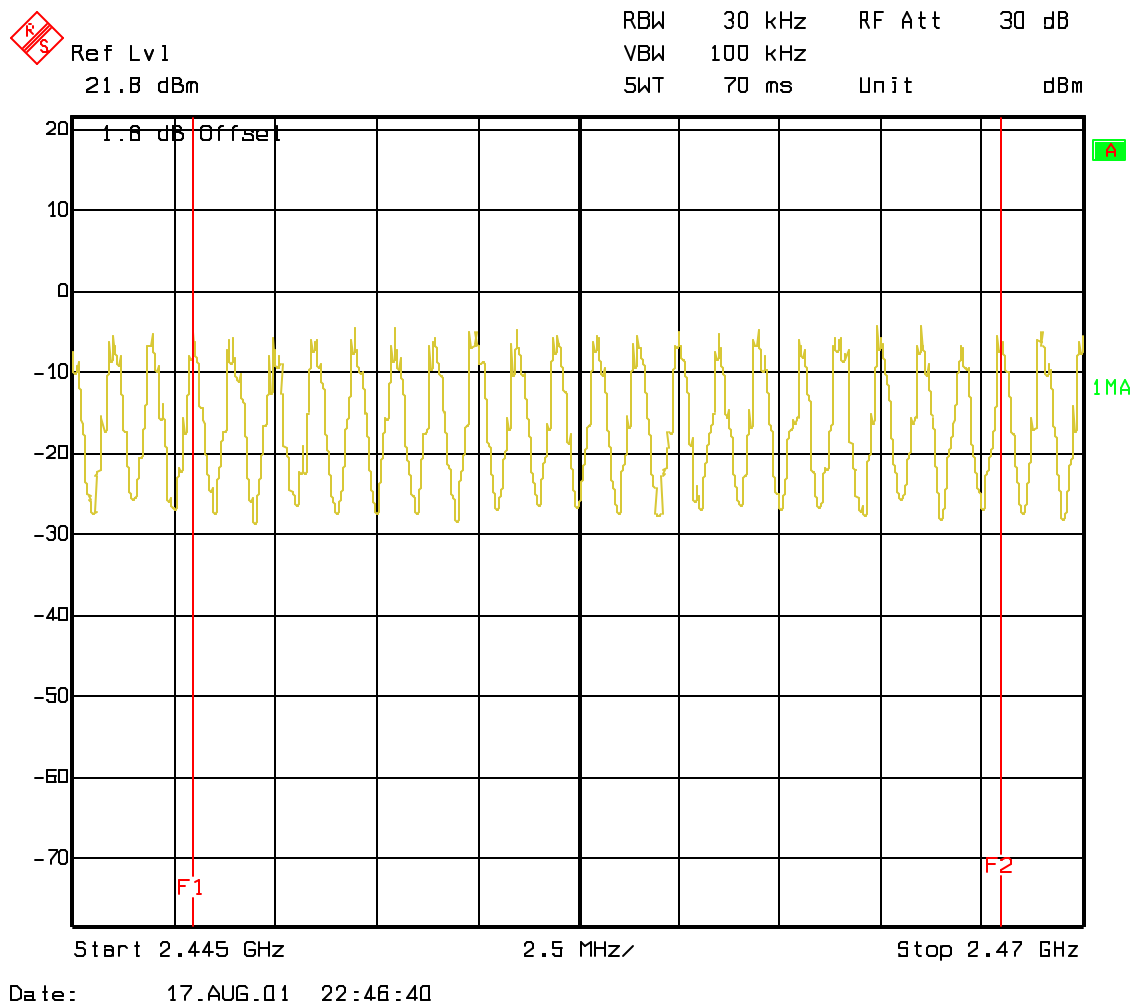
Plot 1:



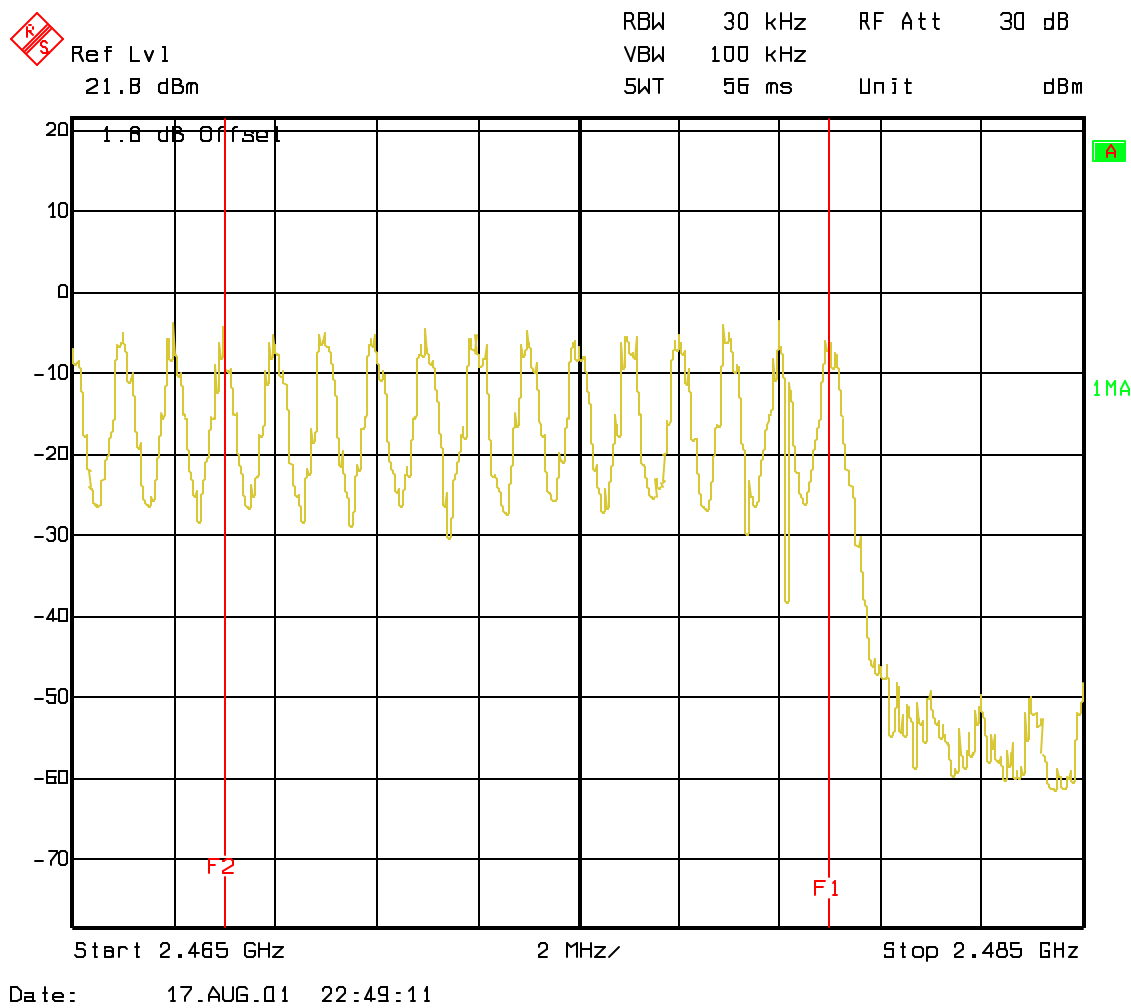
Plot 2:



Plot 3:



Plot 4:



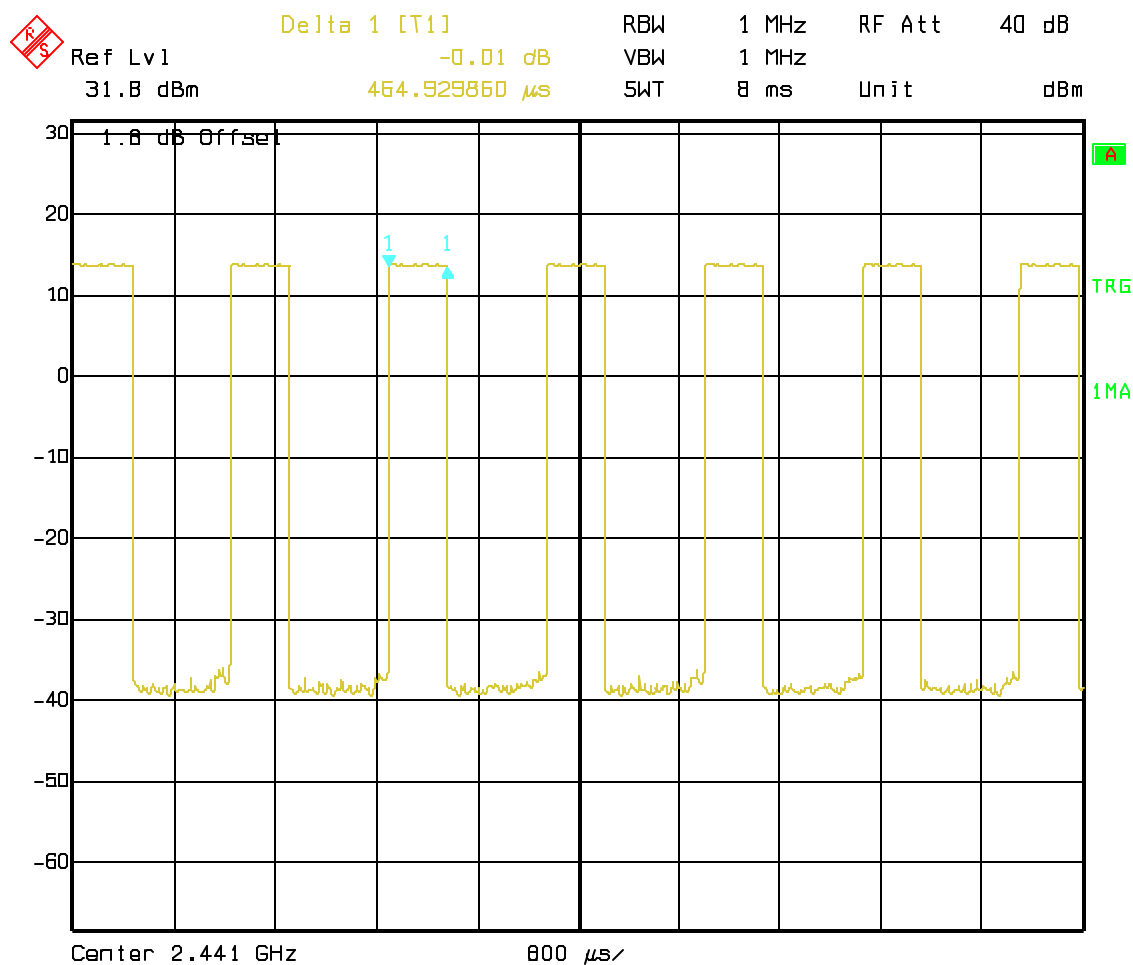
TIME OF OCCUPANCY (DWELL TIME) FOR DH1

§15.247(a)

The system makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So you have each channel 10.13 times per second and so for 30 seconds you have 303.9 times of appearance .

Each Tx-time per appearance is 464.92 µs.

So we have $303.9 * 464.92 \mu s = 141.29 \text{ ms}$ per 30 seconds.



Date: 17.AUG.01 23:11:13

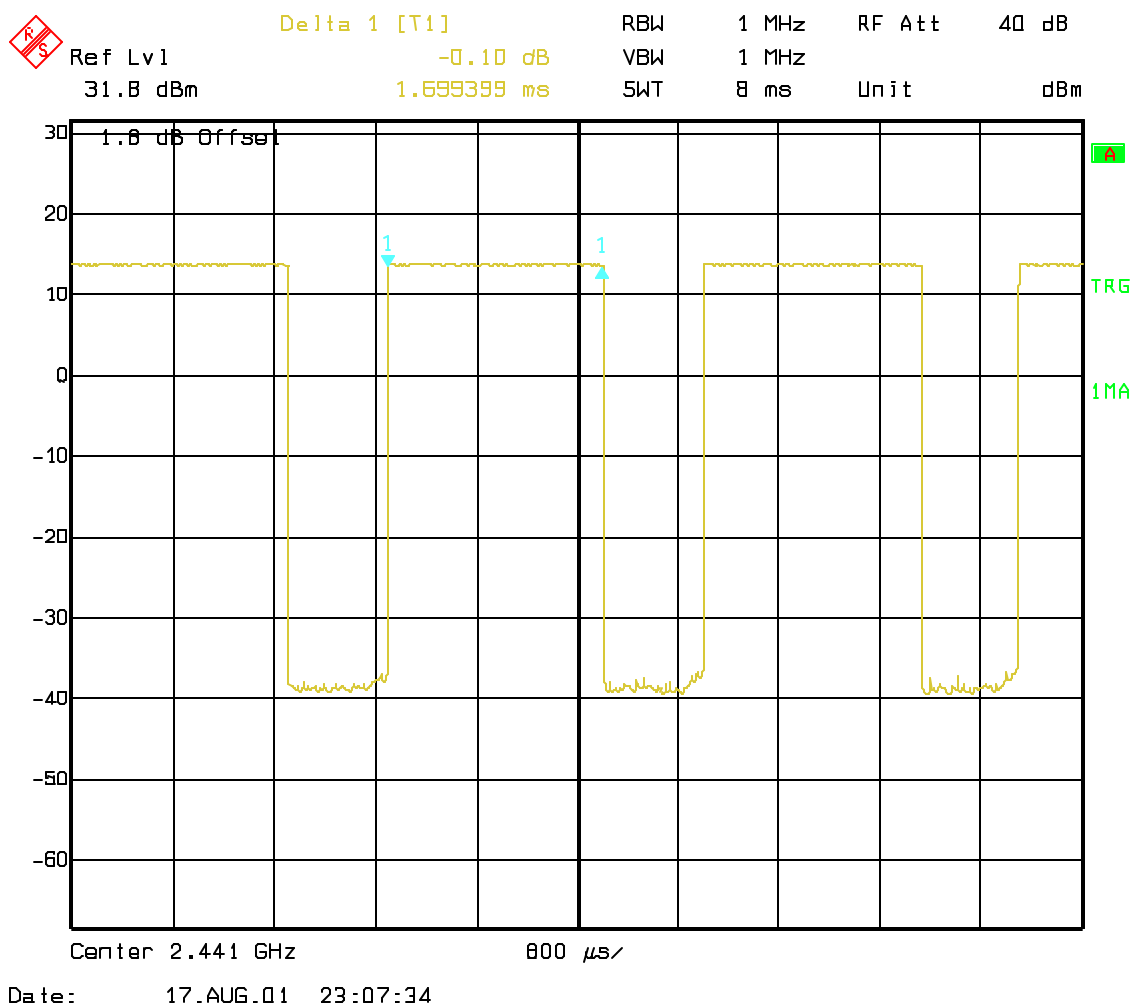
TIME OF OCCUPANCY (DWELL TIME) FOR DH3

§15.247(a)

A DH3 Packets need 3 time slots for transmit and 1 for receicing, then the system makes worst case 400 hops per second with 79 channels. So you have each channel 5.1 times per second and so for 30 seconds you have 153 times of appearance .

Each Tx-time per appearance is 1.7 ms.

So we have $153 * 1.7 \text{ ms} = 260 \text{ ms}$ per 30 seconds.



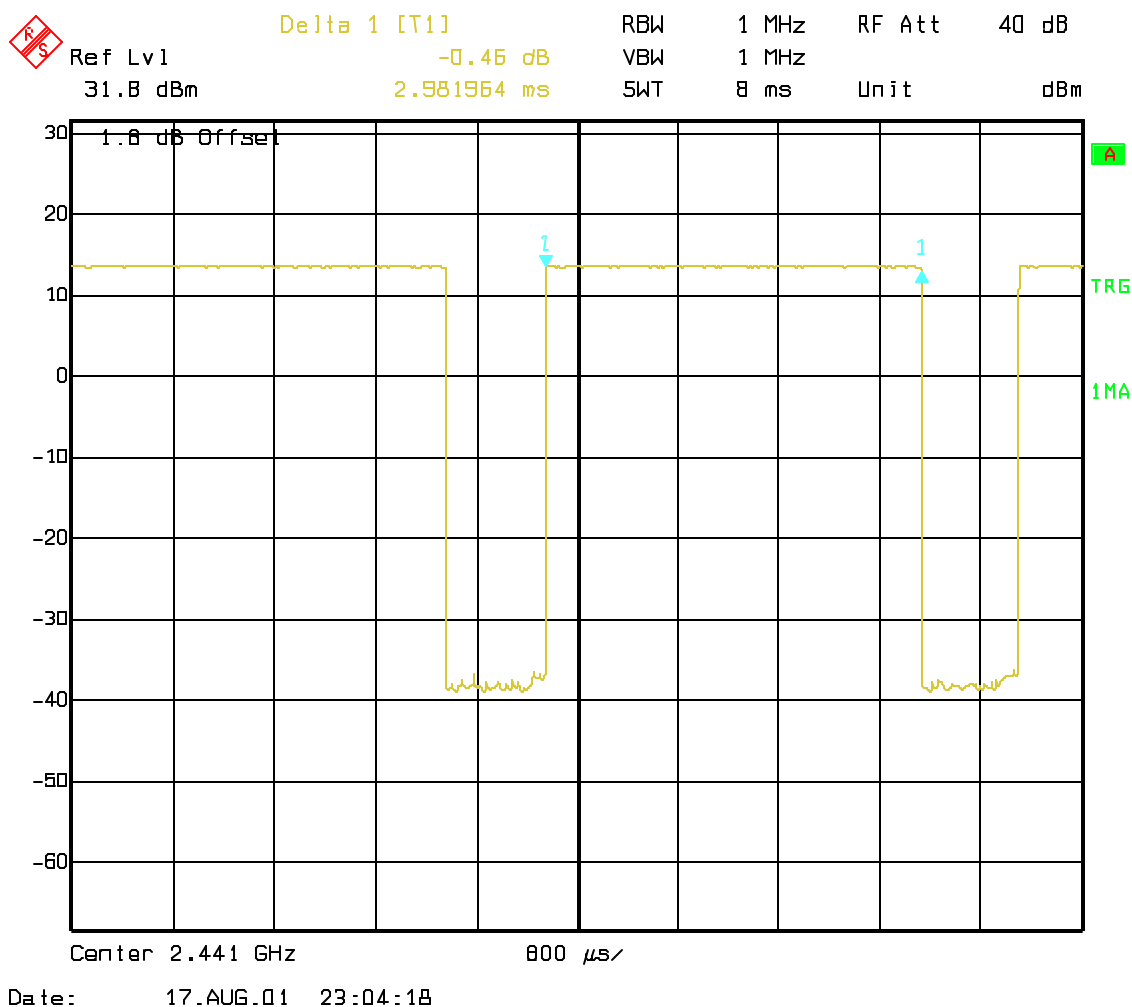
TIME OF OCCUPANCY (DWEELL TIME) FOR DH5

§15.247(a)

At DH5 Packets you need 5 time slots for transmit and 1 for receicing,then the system makes worst case 266,7 hops per second with 79 channels. So you have each channel 3.36 times per second and so for 30 seconds you have 100,8 times of appearance .

Each tx-time per appearance is 2.98 ms.

So we have $100.8 * 2.98\text{ms} = 300.38 \text{ ms}$ per 30 seconds.



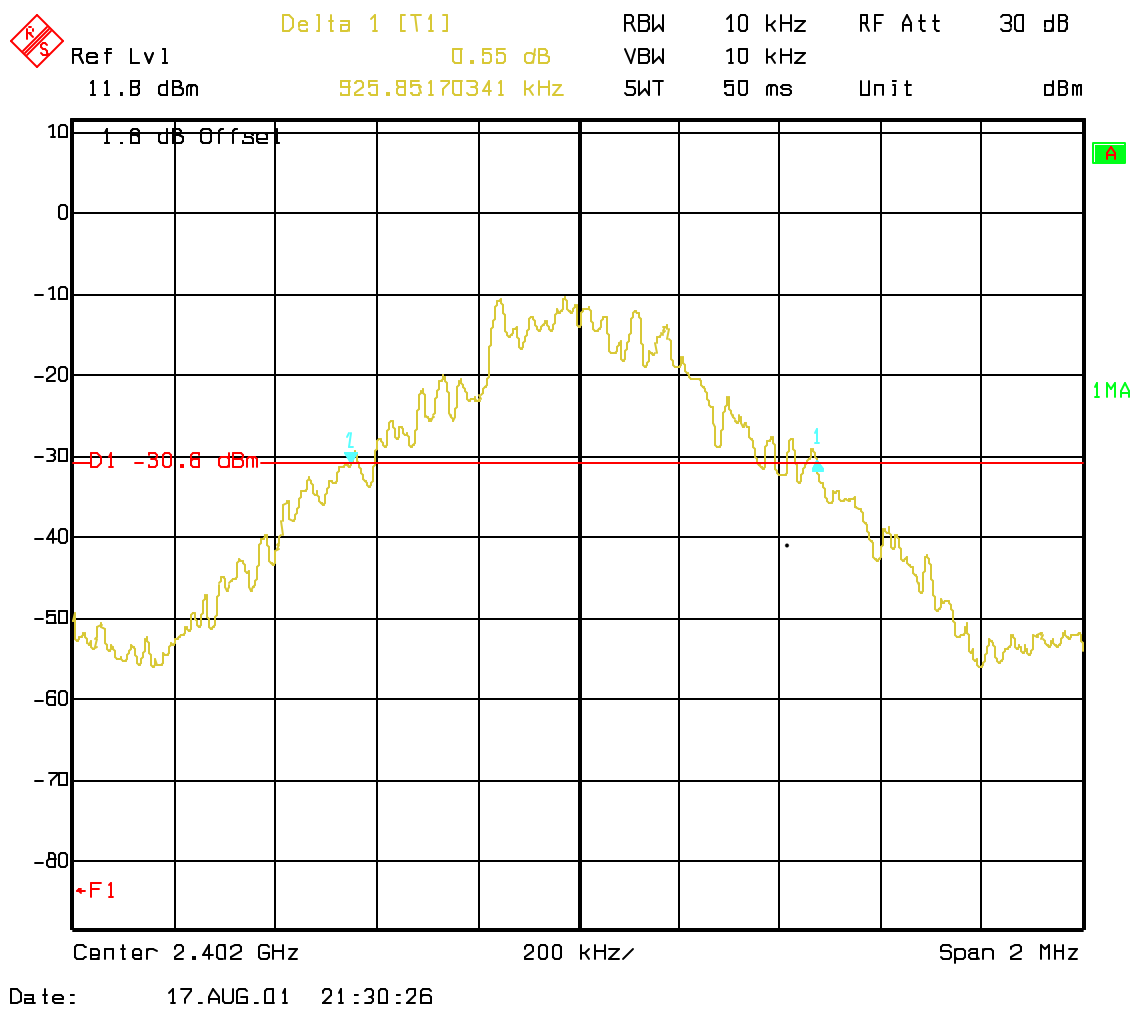
SPECTRUM BANDWIDTH OF FHSS SYSTEM**§15.247(a)****20 dB bandwidth**

TEST CONDITIONS		20 dB BANDWIDTH (kHz)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} (3.85)V	925.85	925.85	941.88
Measurement uncertainty		±3dB		

RBW / VBW as provided in the "Measurement Guidelines" (DA 00-705, March 30, 2000)**LIMIT****SUBCLAUSE §15.247(a) (1)****The maximum 20dB bandwidth shall be at maximum 1000 KHz**

SPECTRUM BANDWIDTH OF FHSS SYSTEM §15.247(a)
20 dB bandwidth

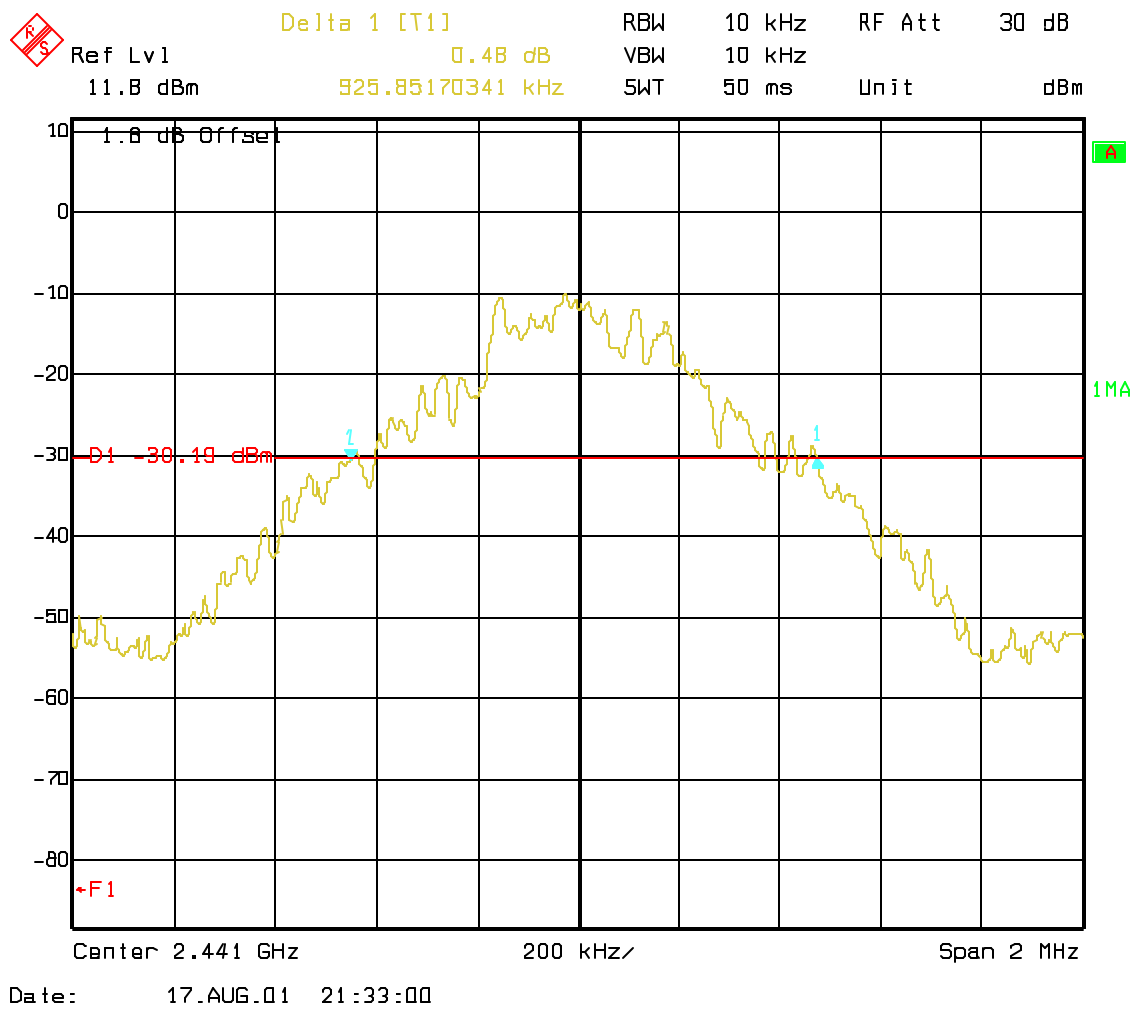
Lowest Channel: 2402MHz



SPECTRUM BANDWIDTH OF FHSS SYSTEM
20 dB bandwidth

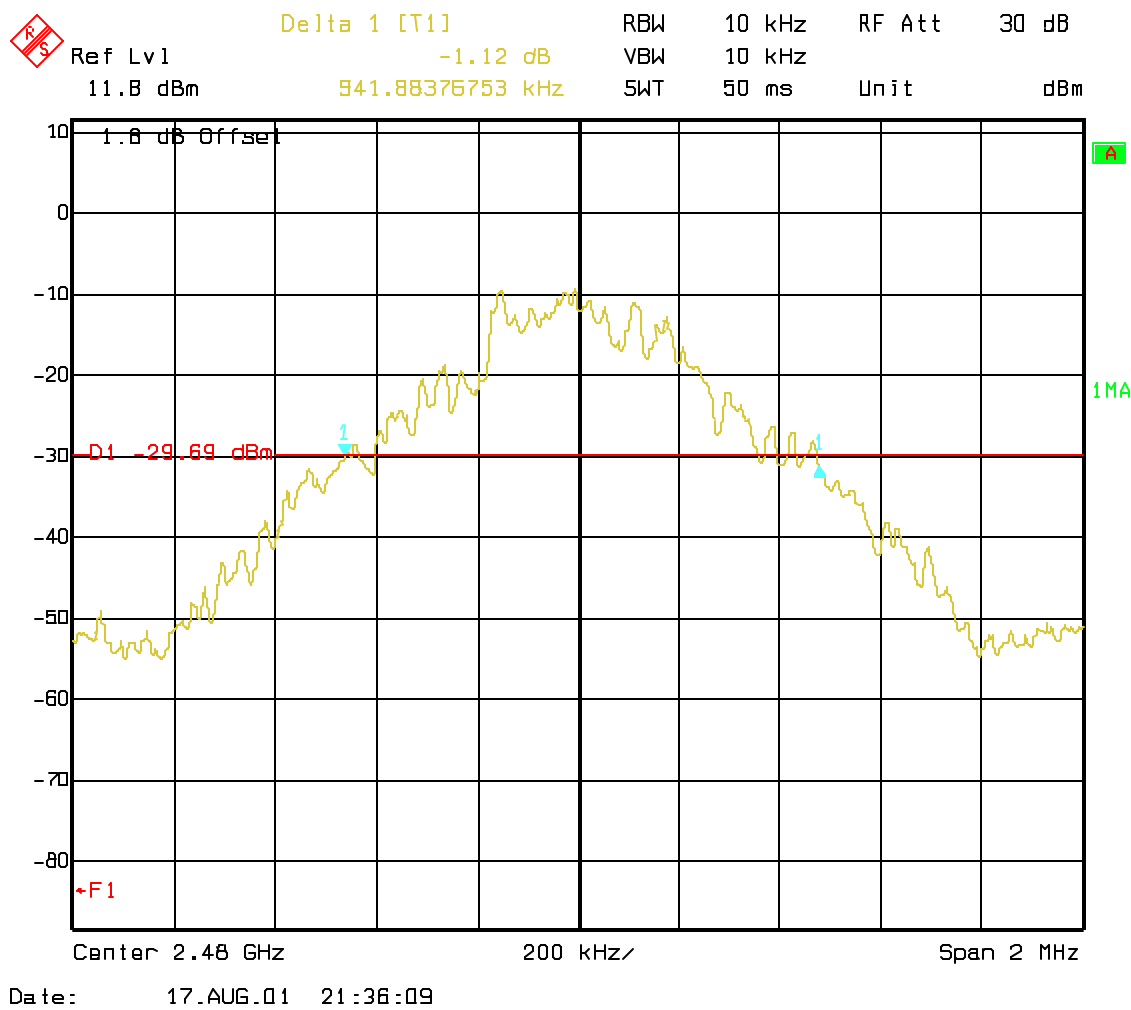
§15.247(a)

Mid Channel: 2441MHz



SPECTRUM BANDWIDTH OF FHSS SYSTEM §15.247(a)
20 dB bandwidth

Highest Channel: 2480MHz



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

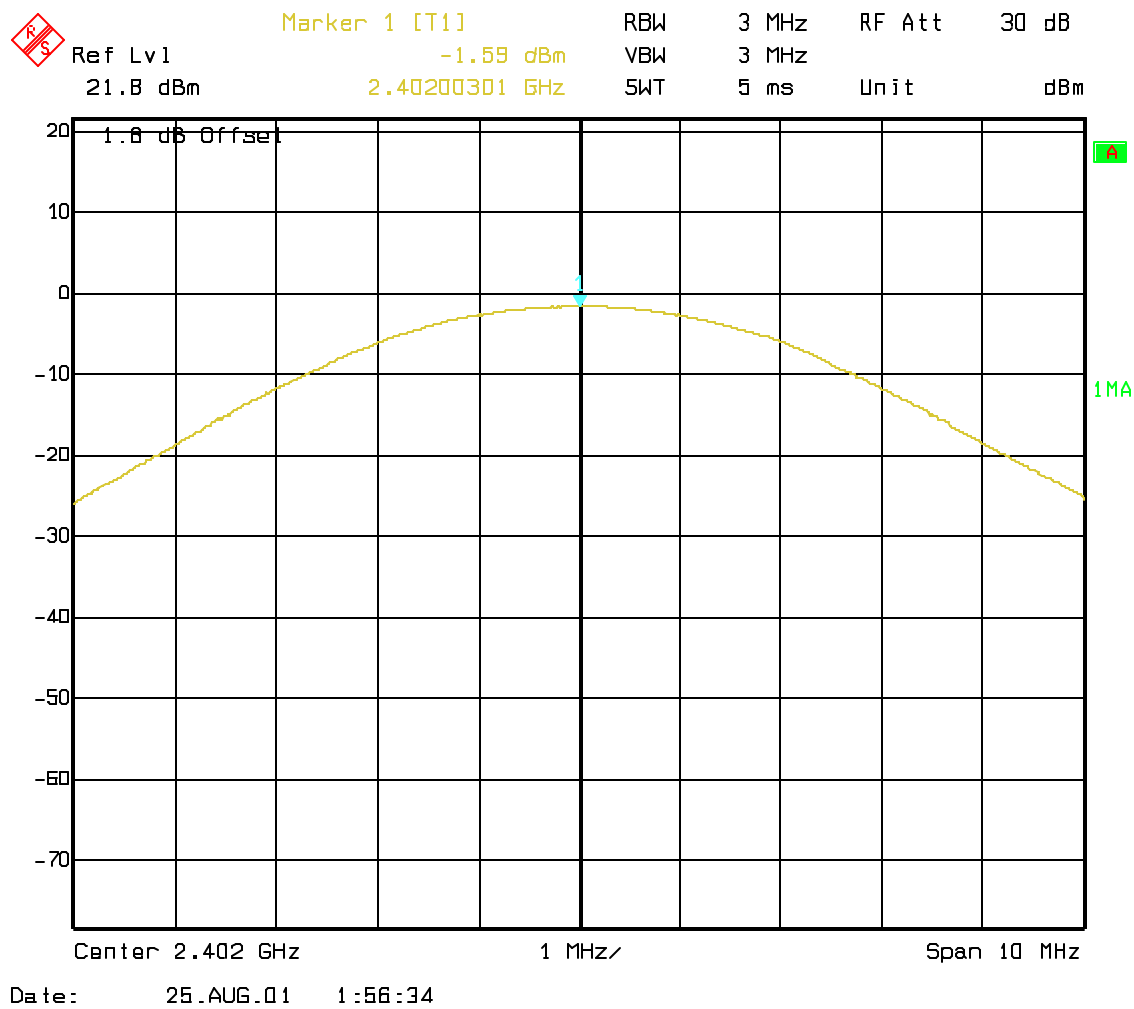
TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)			
Frequency (MHz)		2402		2441	2480
T _{nom} (23)° C	V _{nom} (3.85)V	PK	-1.59	-0.97	-3.01
Measurement uncertainty		±3dB			

RBW / VBW : 3 MHz**LIMIT****SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt

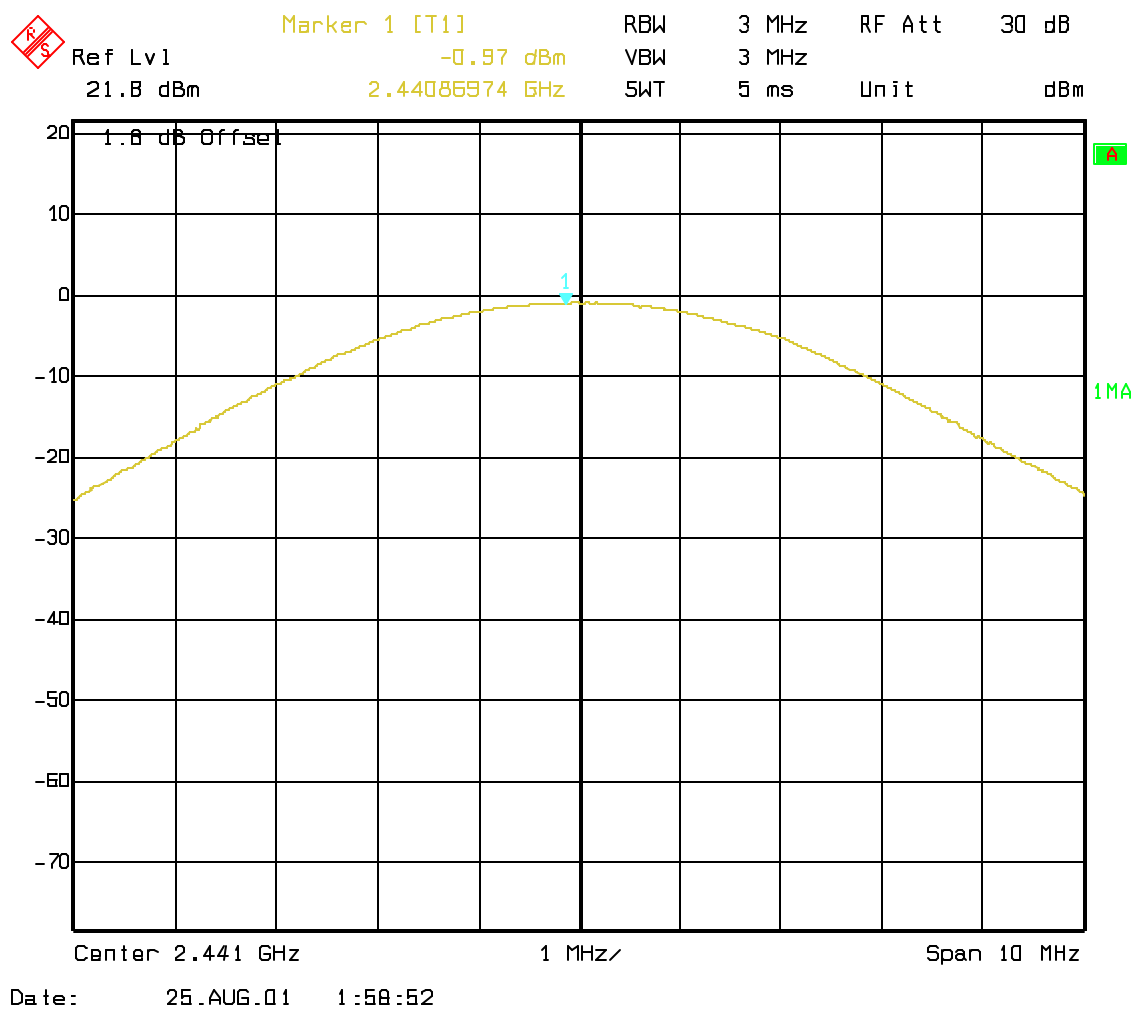
PEAK OUTPUT POWER (CONDUCTED) §15.247 (b)

Lowest Channel: 2402MHz



PEAK OUTPUT POWER (CONDUCTED) §15.247 (b)

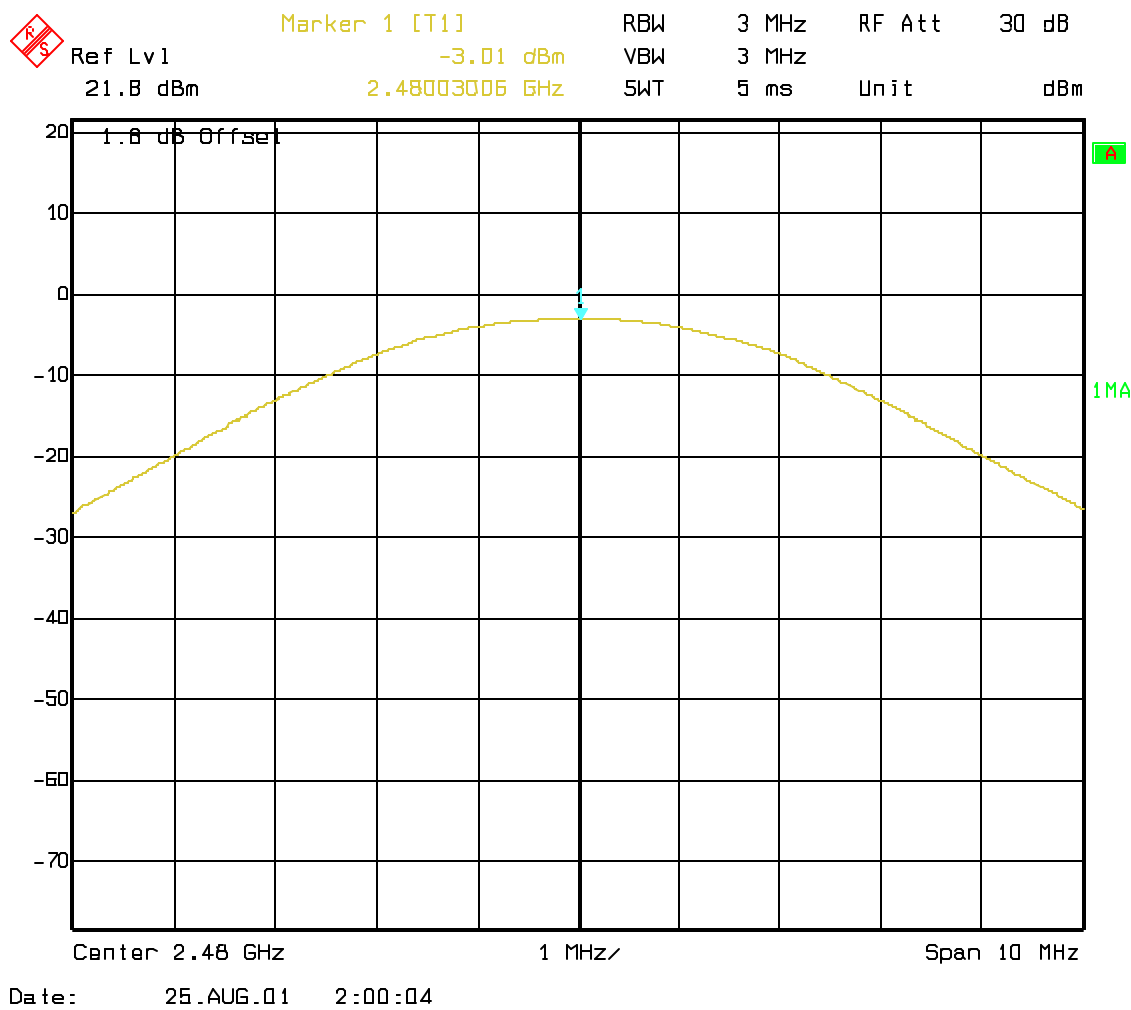
Mid Channel: 2441MHz



PEAK OUTPUT POWER (CONDUCTED)

§15.247 (b)

Highest Channel: 2480MHz



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

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)°C	V _{nom} (3.85)V	-1.27	-0.55	+1.43
Measurement uncertainty		±3dB		

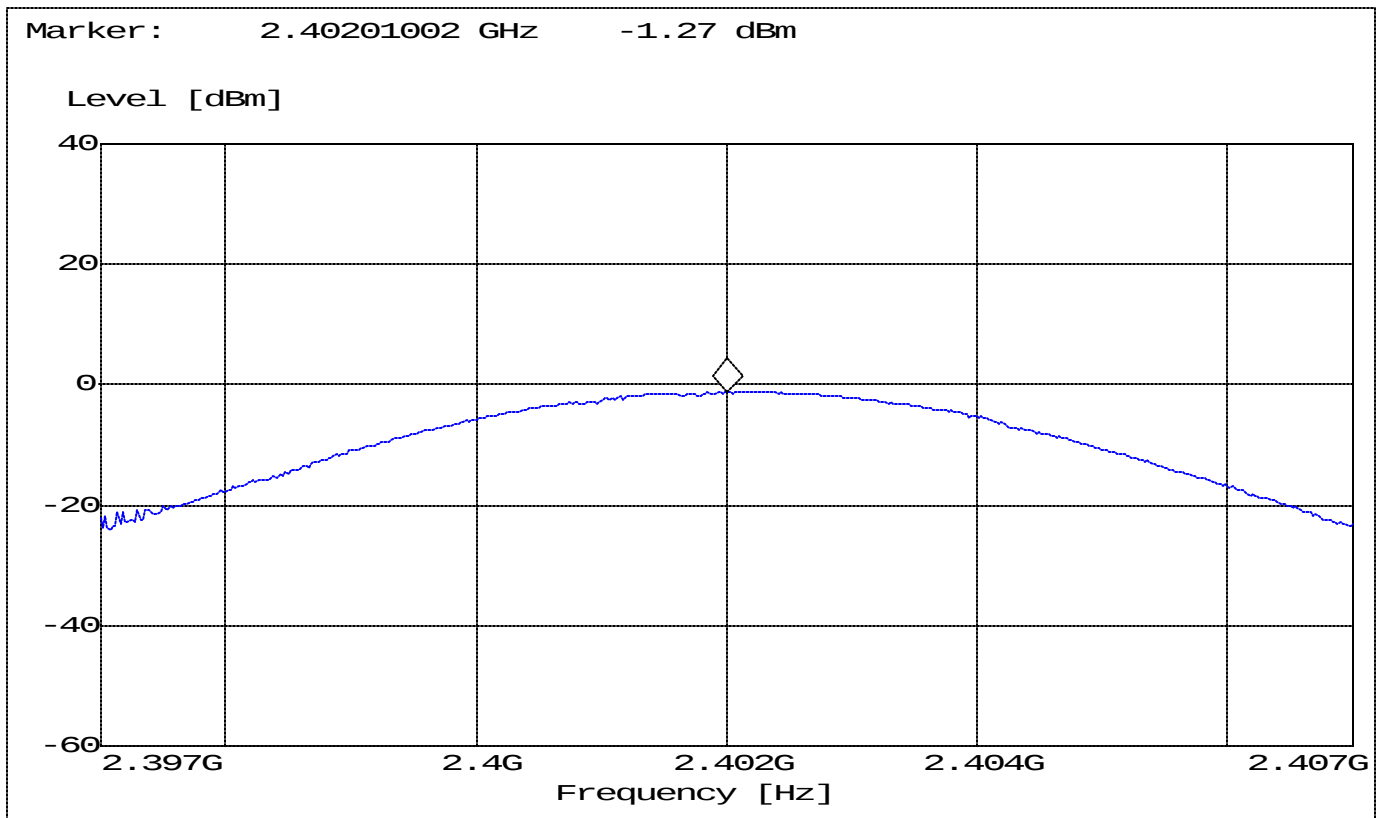
RBW/VBW : 3 MHz**LIMIT****SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt

PEAK OUTPUT POWER (RADIATED)

§15.247 (b) (1)

Lowest Channel: 2402MHz

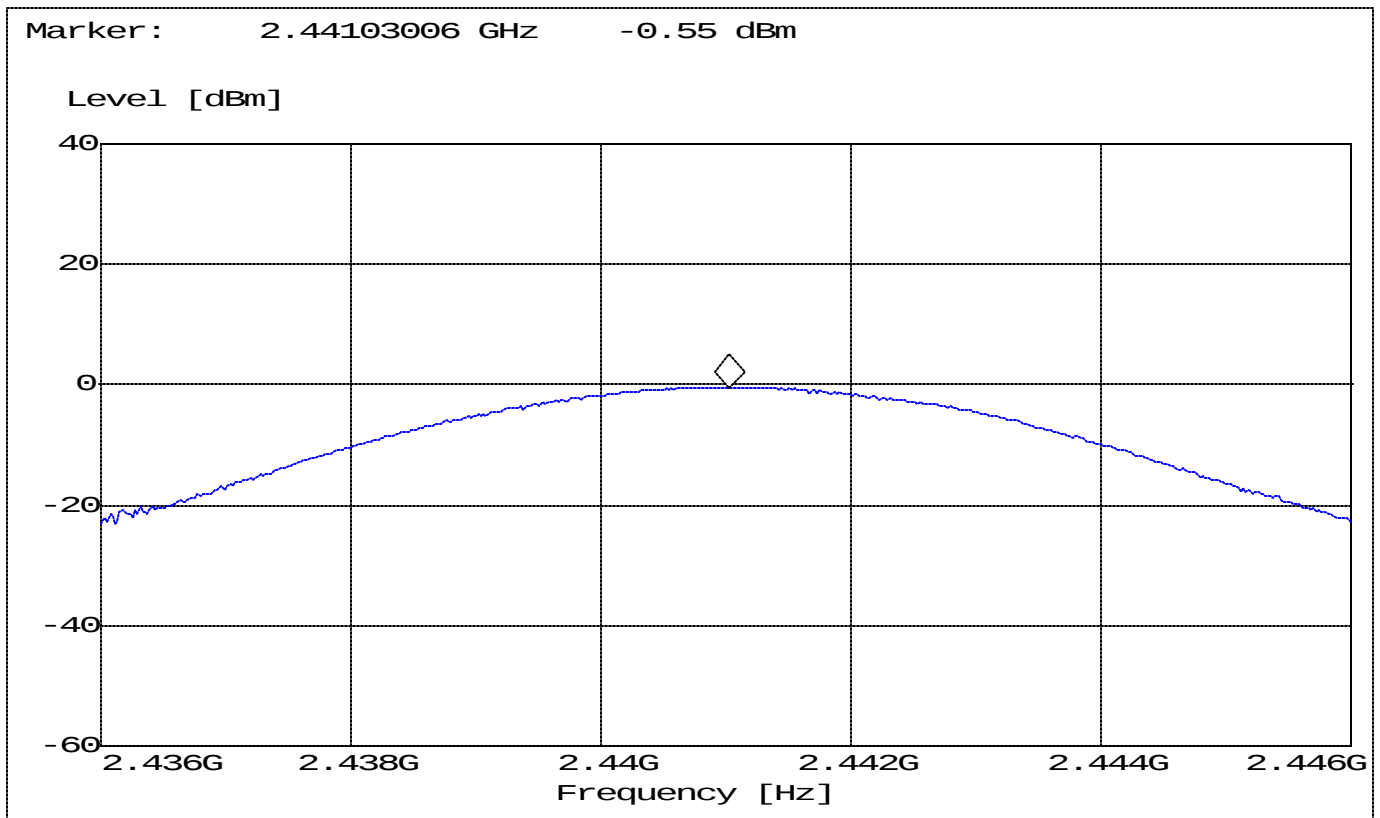


ANALYZER SETTINGS: RBW = 3MHz VBW = 3MHz

PEAK OUTPUT POWER (RADIATED)

§15.247 (b) (1)

Mid Channel: 2441MHz

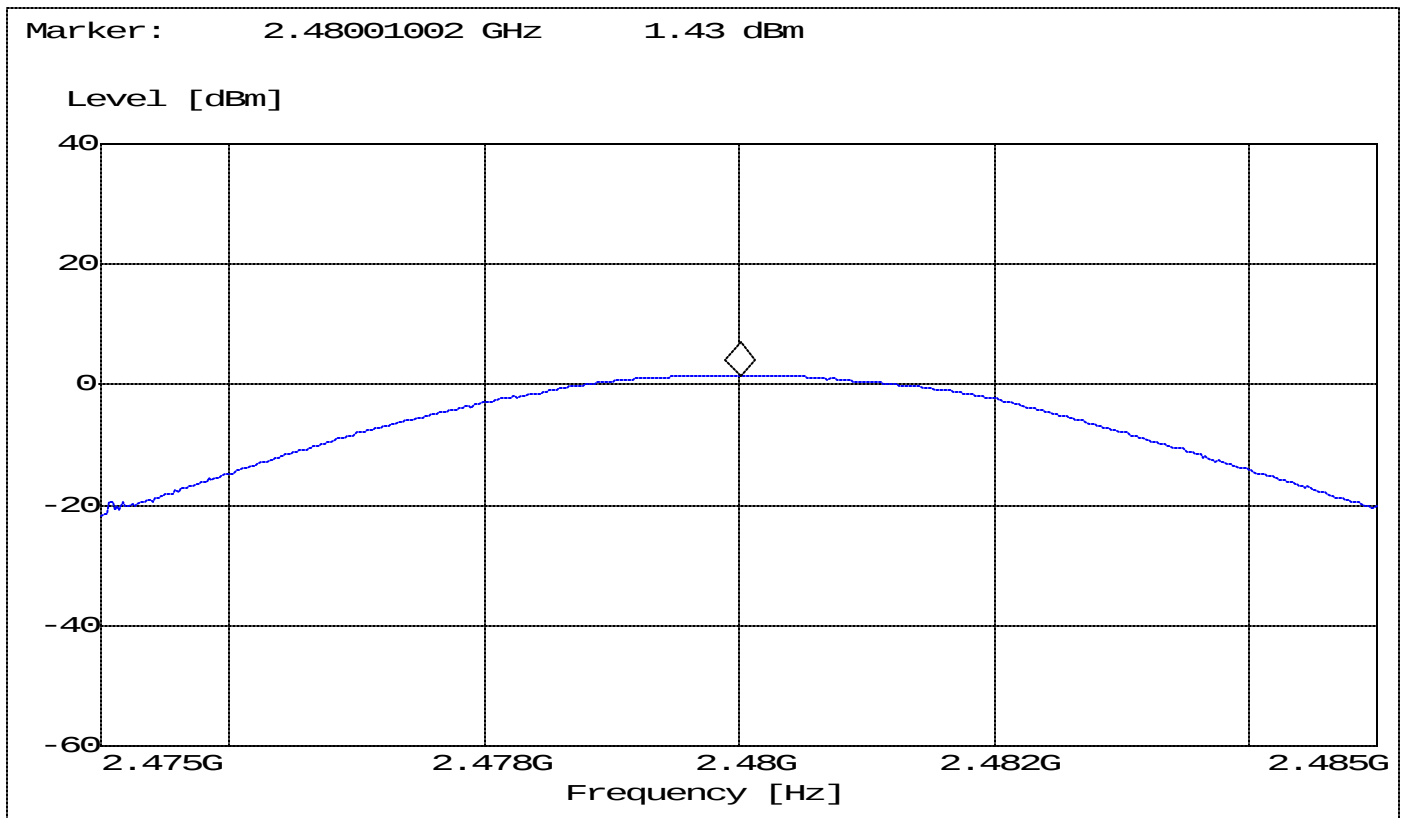


ANALYZER SETTINGS: RBW = 3MHz VBW = 3MHz

PEAK OUTPUT POWER (RADIATED)

§15.247 (b) (1)

Highest Channel: 2480MHz



ANALYZER SETTINGS: RBW = 3MHz VBW = 3MHz

§15.247 (c)

1.8 dB Offset

Marker 1 [T1] -2.86 dBm

Ref Lvl 11.8 dBm

RBW 100 kHz RF Att 30 dB

VBW 200 kHz

5WT 5 ms Unit dBm

-D1 -22.86 dBm

1MA

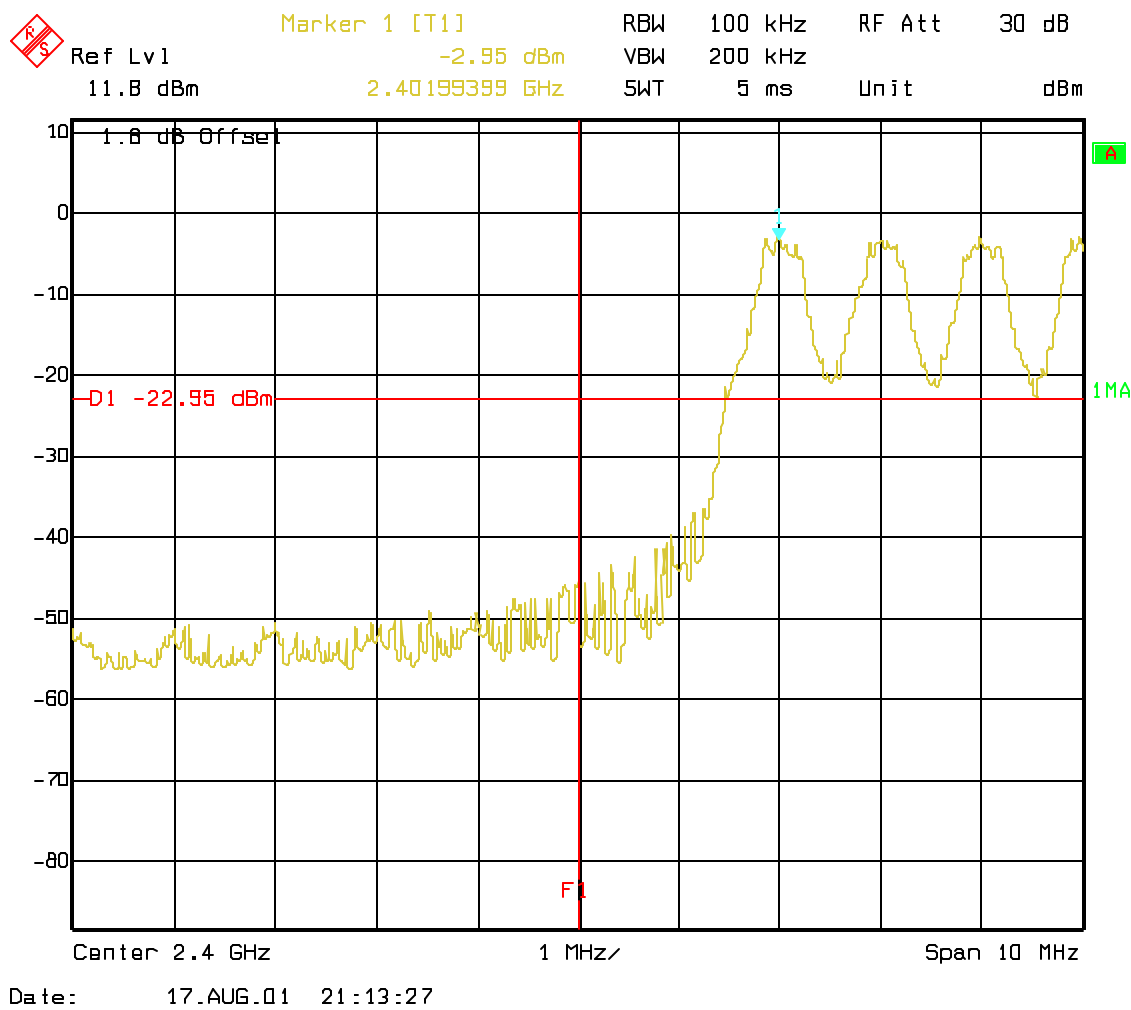
Center 2.4 GHz 1 MHz/ Span 10 MHz

Date: 17.AUG.01 21:19:25

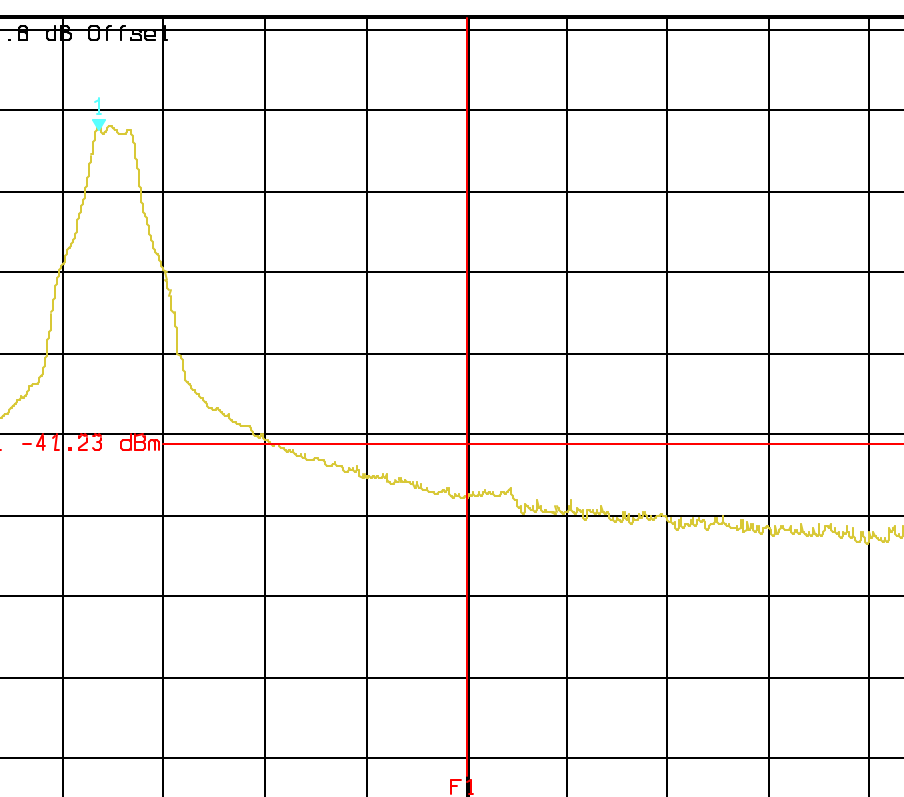
BAND EDGE COMPLIANCE OF CONDUCTED EMISSIONS

§15.247 (c)

Low frequency section (hopping on)



§15.247 (c)

A spectrum analyzer display showing a signal spectrum. The vertical axis represents power in dBm, ranging from -80 to 10. The horizontal axis represents frequency in GHz, with a center frequency of 2.4835 GHz and a span of 10 MHz. A yellow trace shows a signal peak at approximately 2.47985 GHz, marked with a cyan arrow and labeled '1'. A red horizontal line indicates the noise floor at -47.23 dBm. A red vertical line is positioned at the center frequency. The display includes various settings: Ref Lvl 11.8 dBm, Marker 1 [T1] -2.28 dBm, RBW 100 kHz, VBW 200 kHz, RF Att 30 dB, 5WT, 5 ms, and Unit dBm. A green 'A' icon is visible in the top right corner.

Ref Lvl 11.8 dBm

Marker 1 [T1] -2.28 dBm

RBW 100 kHz

VBW 200 kHz

RF Att 30 dB

5WT 5 ms

Unit dBm

1.8 dB Offset

1

D1 -47.23 dBm

F1

Center 2.4835 GHz

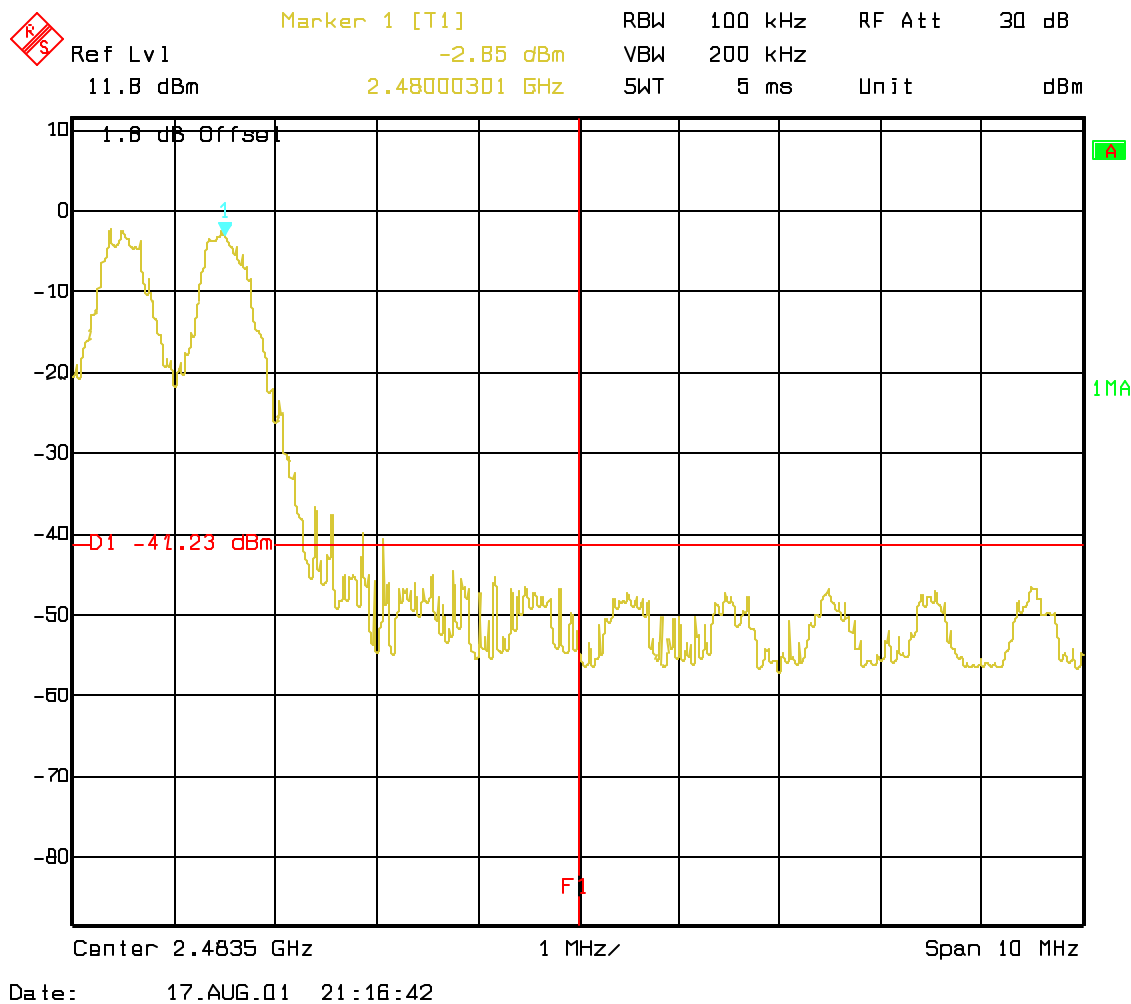
1 MHz

Span 10 MHz

Date: 17.AUG.01 20:58:21

BAND EDGE COMPLIANCE OF CONDUCTED EMISSIONS §15.247 (c)

high frequency section (hopping on)



EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

LIMITS

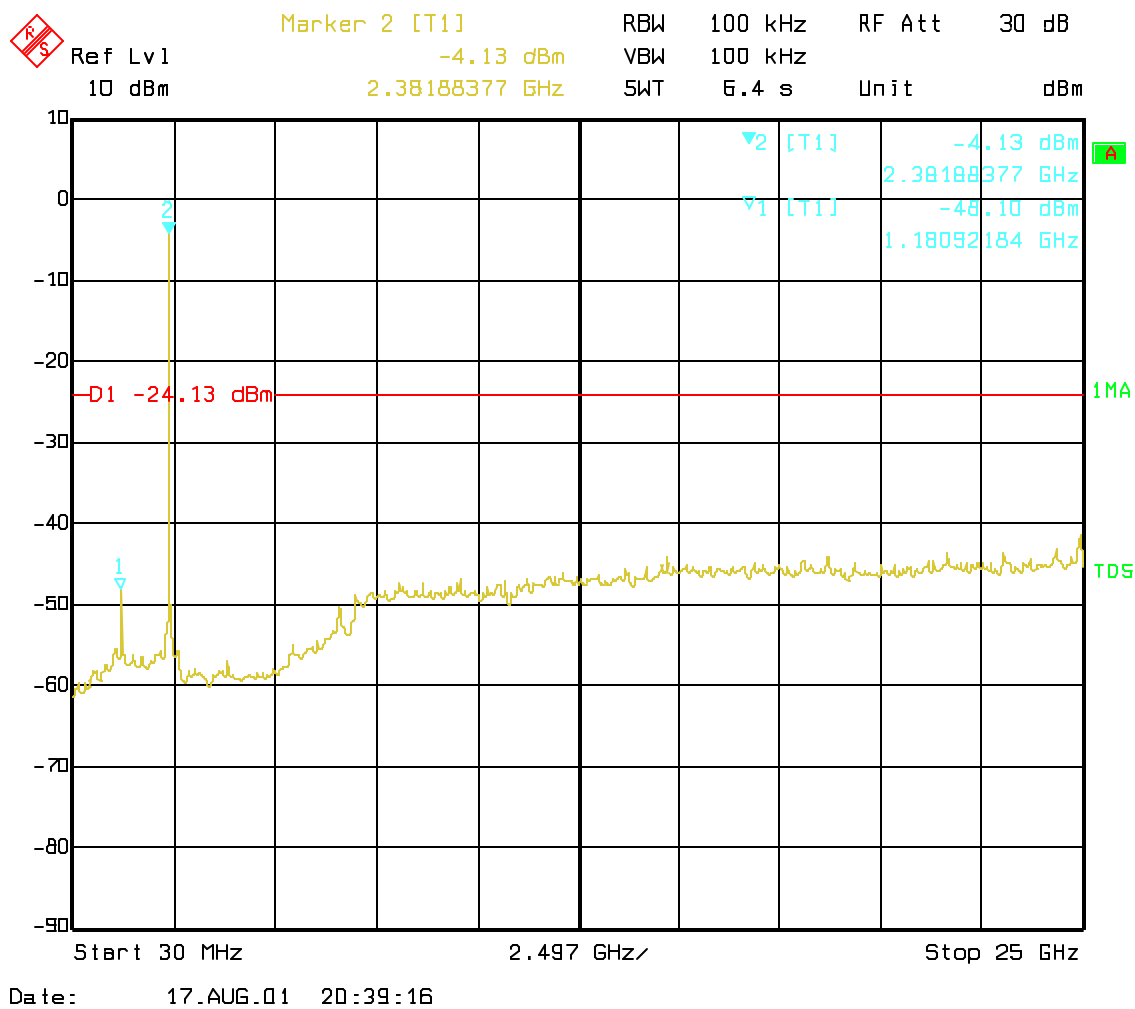
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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

EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Lowest Channel(2402MHz): 30MHz - 25 GHz

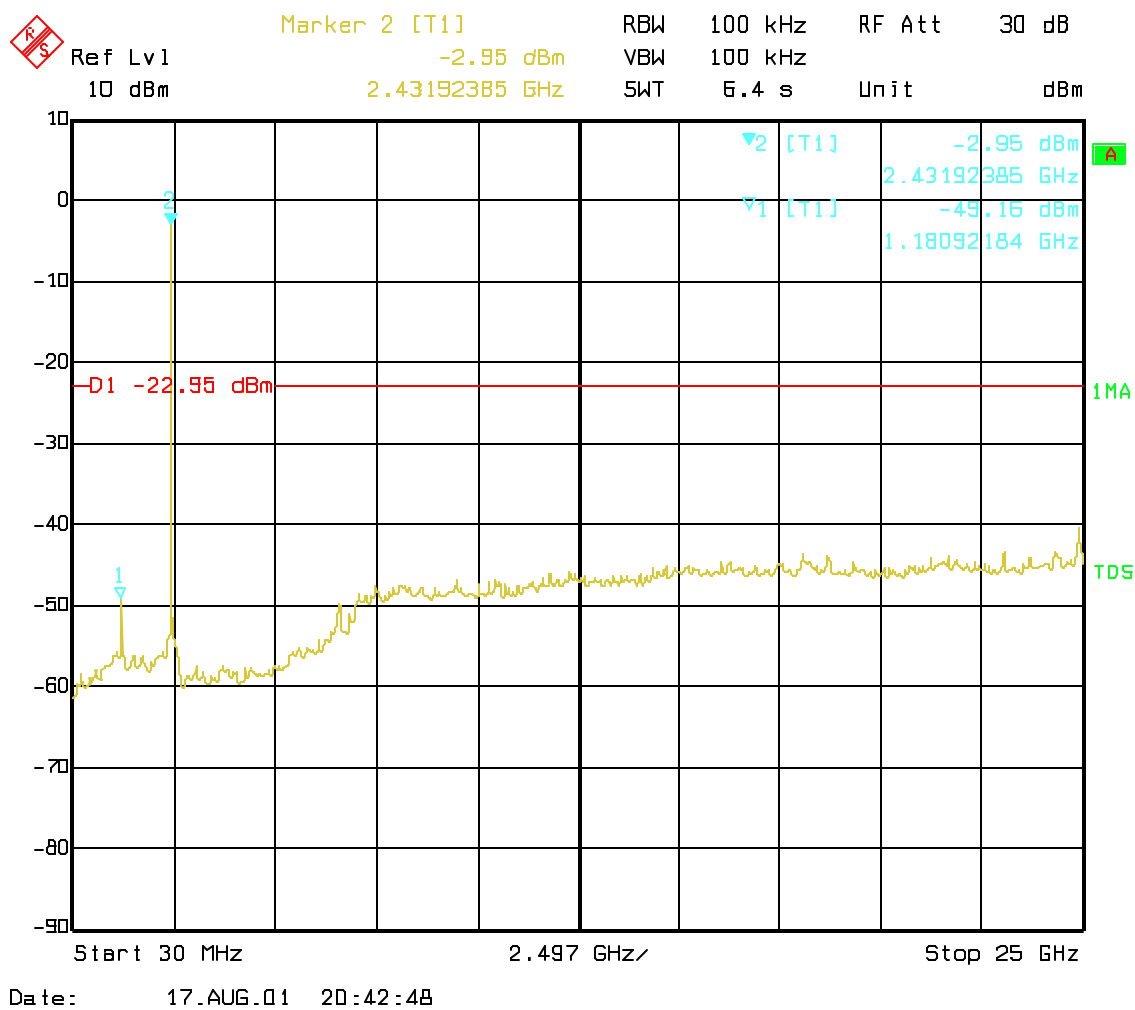


NOTE: The peak above the limit is the carrier frequency.

EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Mid Channel(2441MHz): 30MHz - 25GHz



Start 30 MHz 2.497 GHz/ Stop 25 GHz

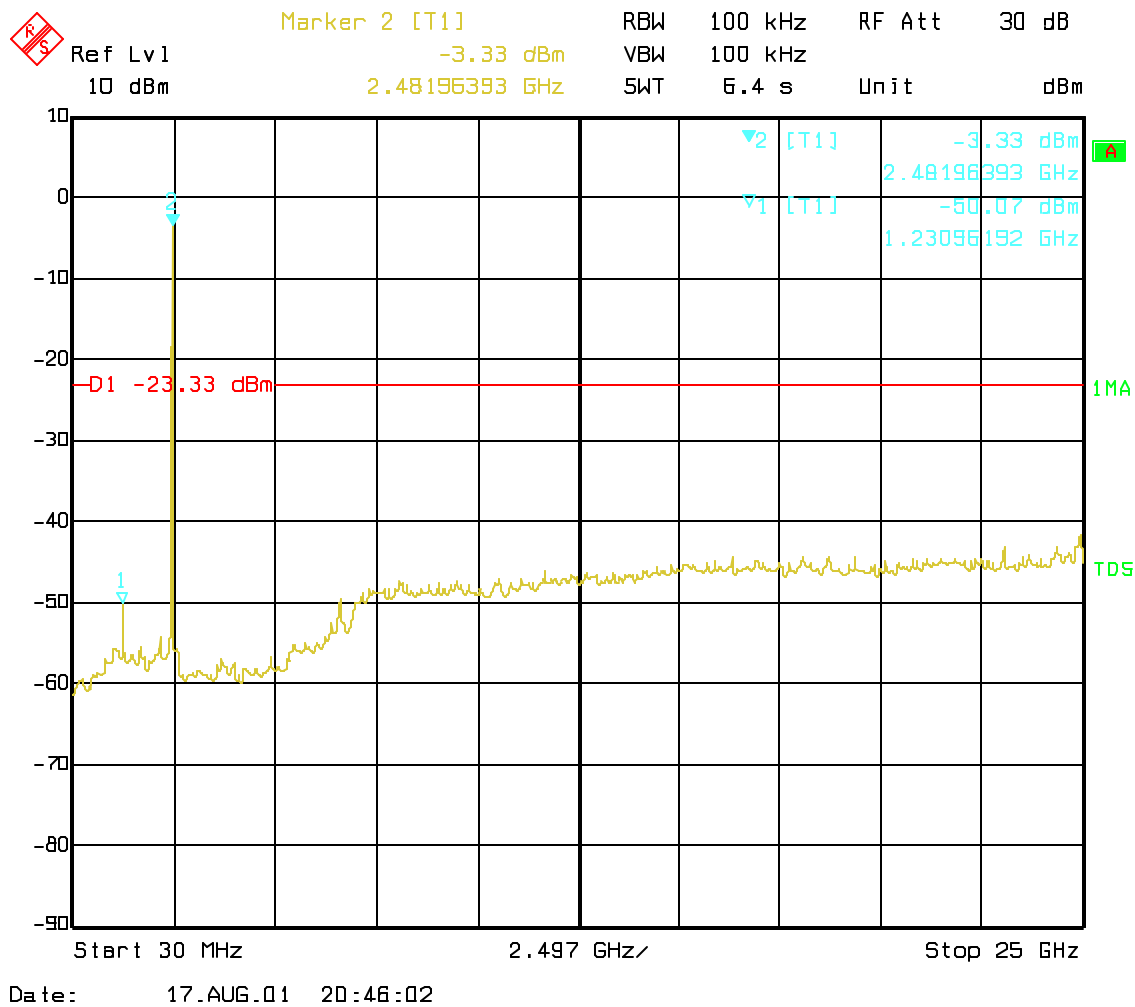
Date: 17.AUG.01 20:42:48

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

EMISSION LIMITATIONS - Conducted (Transmitter)

§ 15.247 (c) (1)

Highest Channel(2480MHz): 30MHz - 25GHz



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

EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

LIMITS

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)).

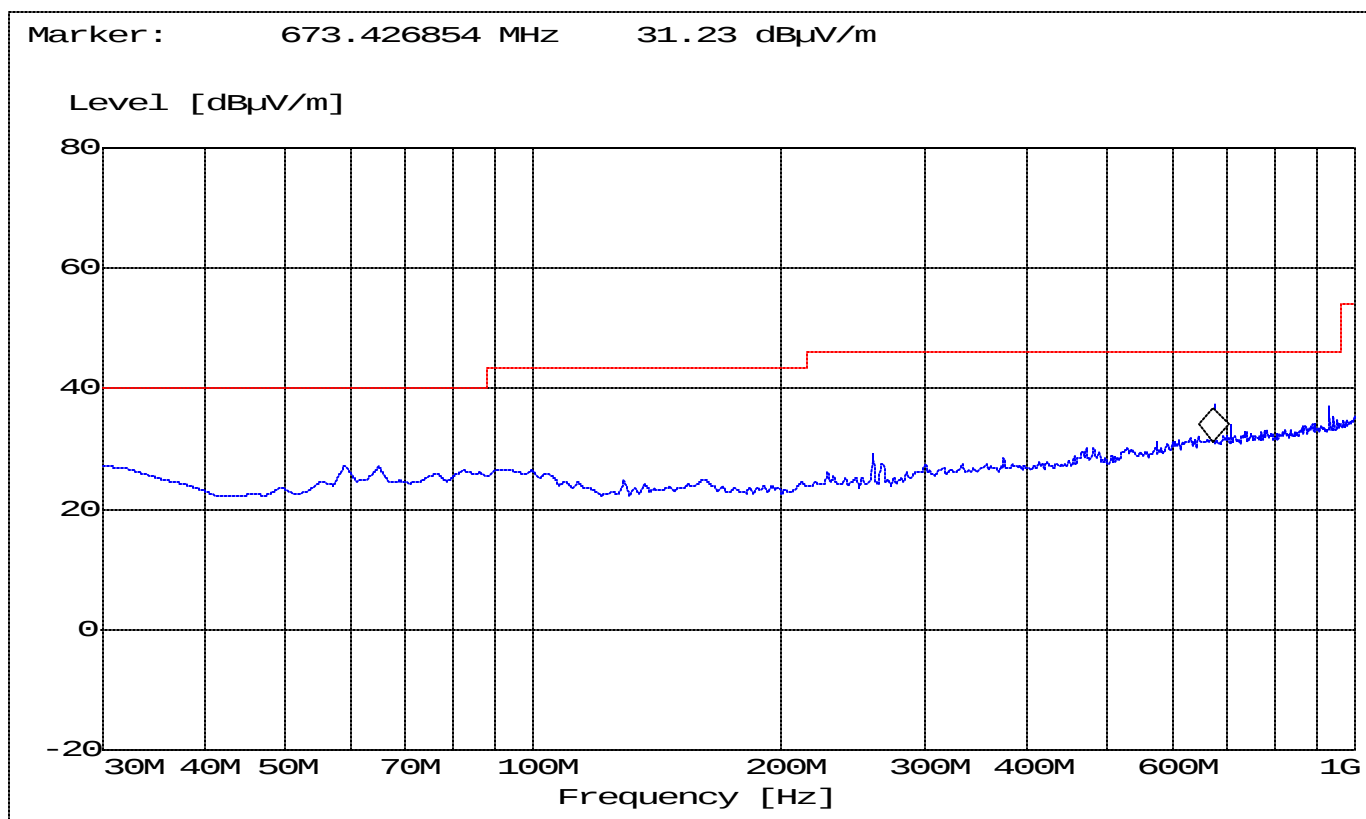
NOTE:

1. The radiated 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.
2. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

Lowest Channel(2402MHz): 30MHz – 1GHz



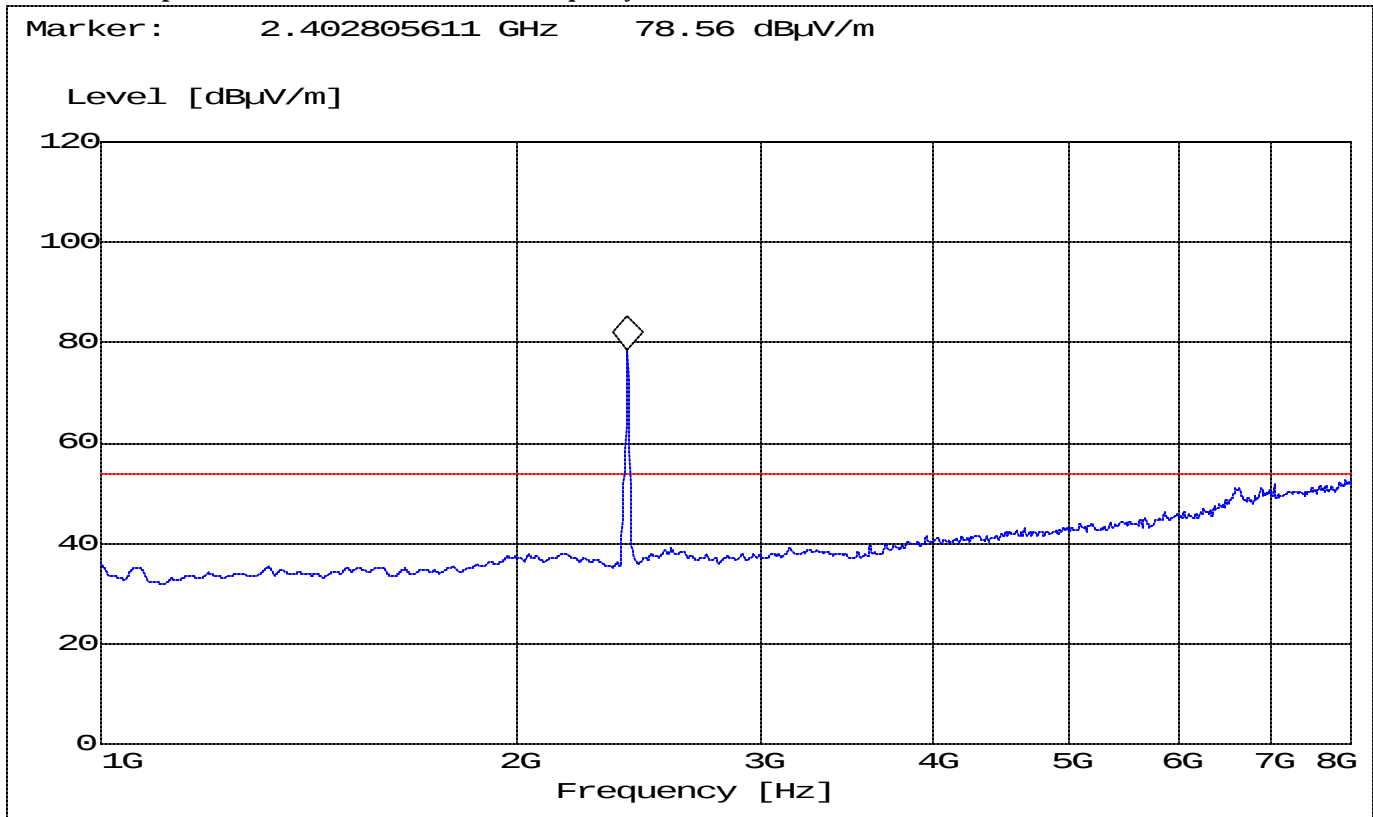
ANALYZER SETTINGS: RBW = 100KHz VBW = 100KHz

EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

Lowest Channel(2402MHz): 1GHz – 8GHz

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

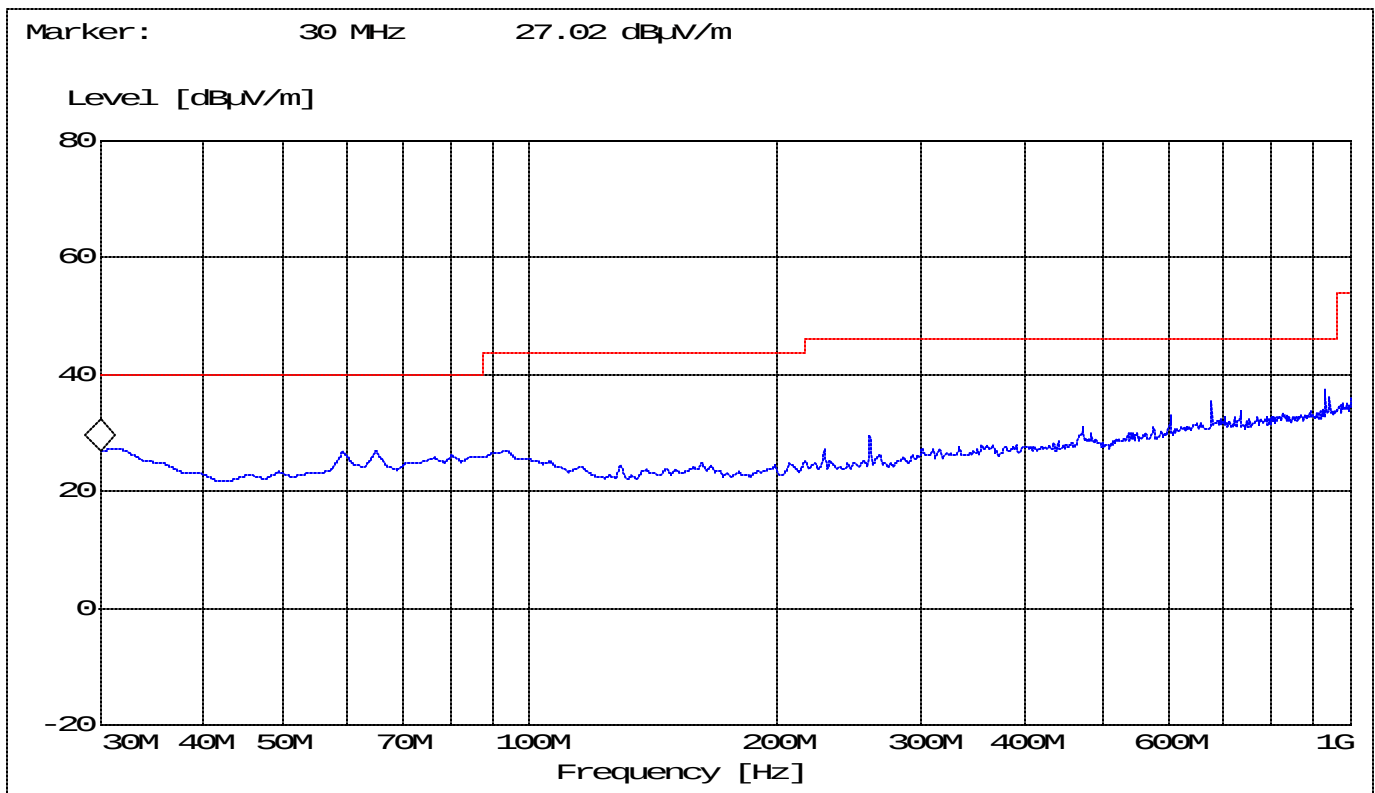


ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz

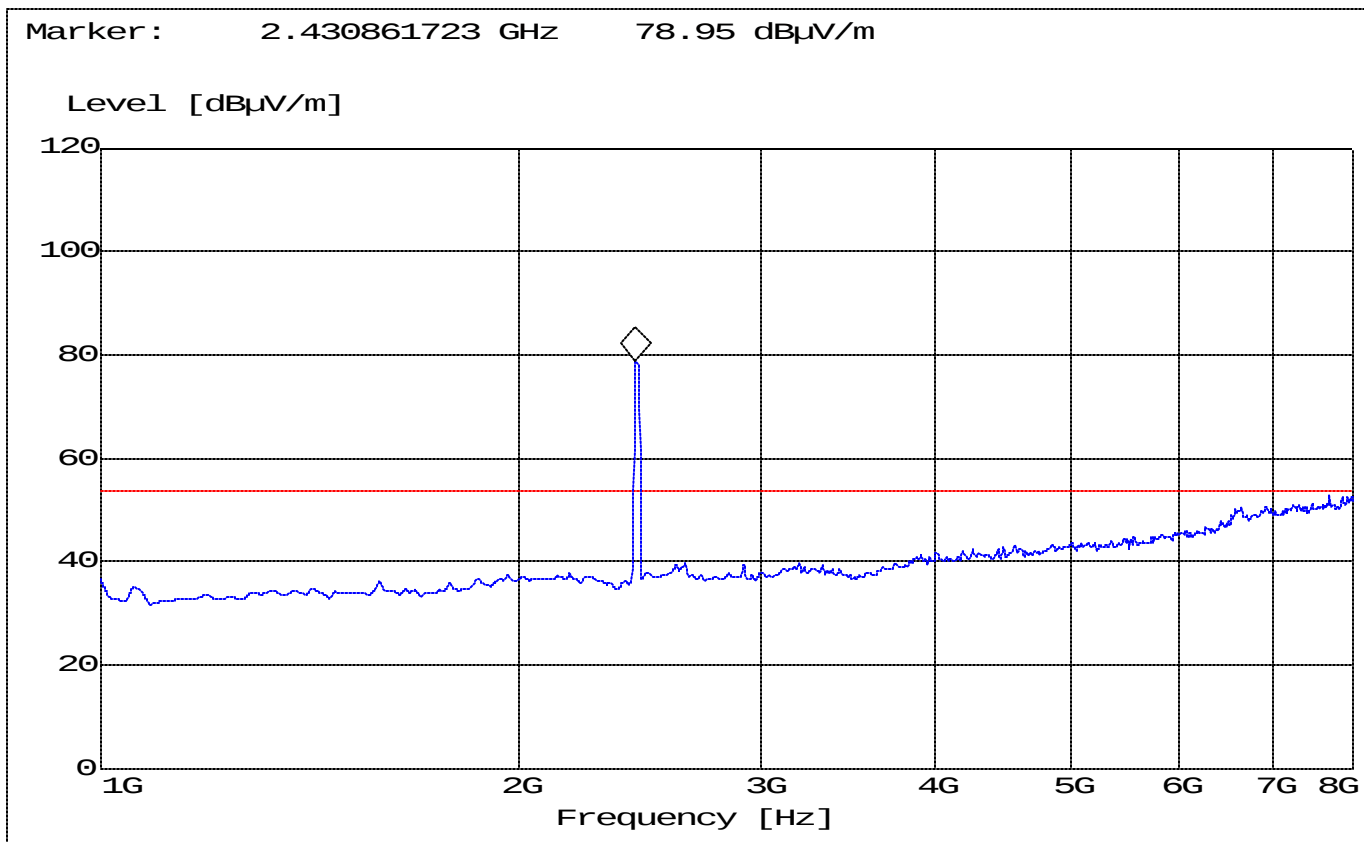
EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

Mid Channel(2441MHz): 30MHz – 1GHz



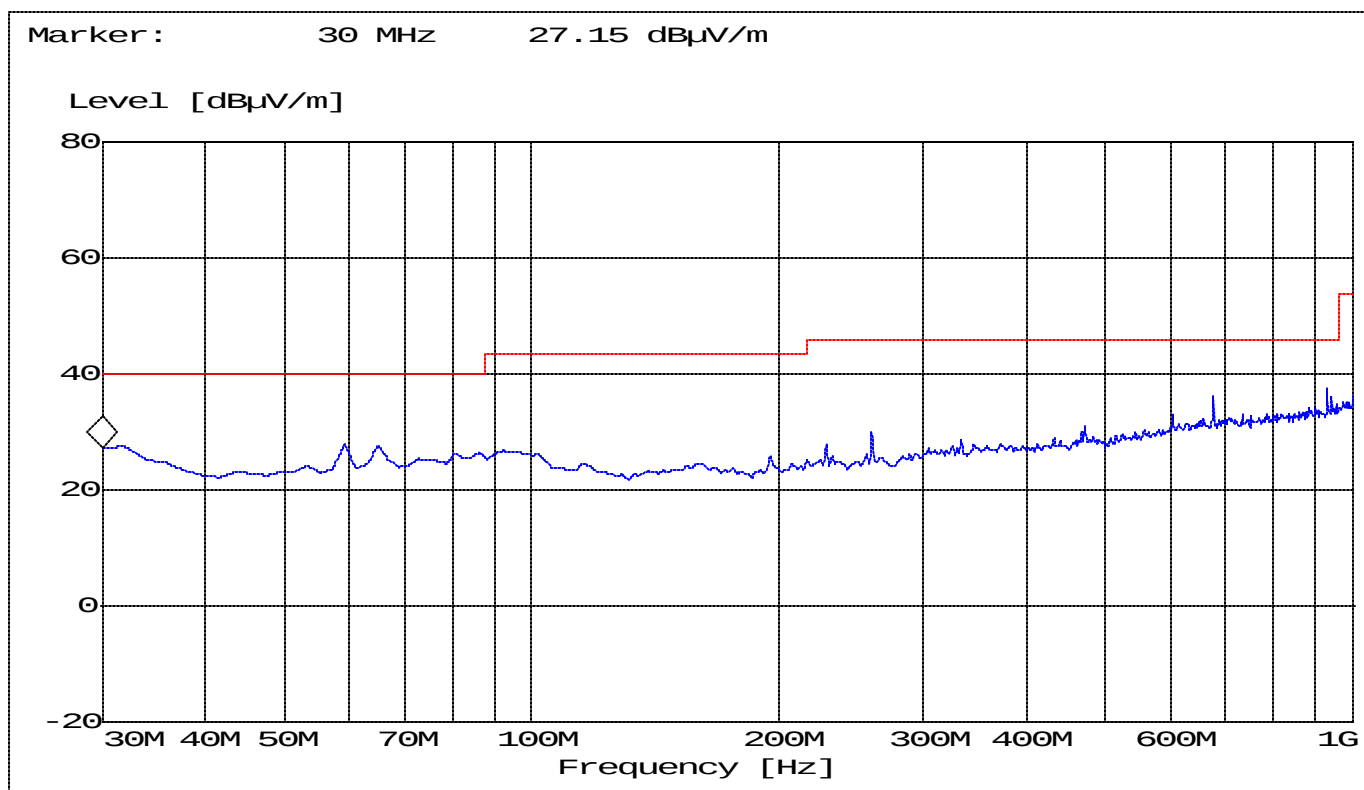
ANALYZER SETTINGS: RBW = 100KHz VBW = 100KHz

EMISSION LIMITATIONS - Radiated (Transmitter)**SUBCLAUSE § 15.247 (c) (1)****Mid Channel(2441MHz): 1GHz – 8GHz****NOTE: The peak above the limit is the carrier frequency.****ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz**

EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

Highest Channel(2480MHz): 30MHz – 1GHz



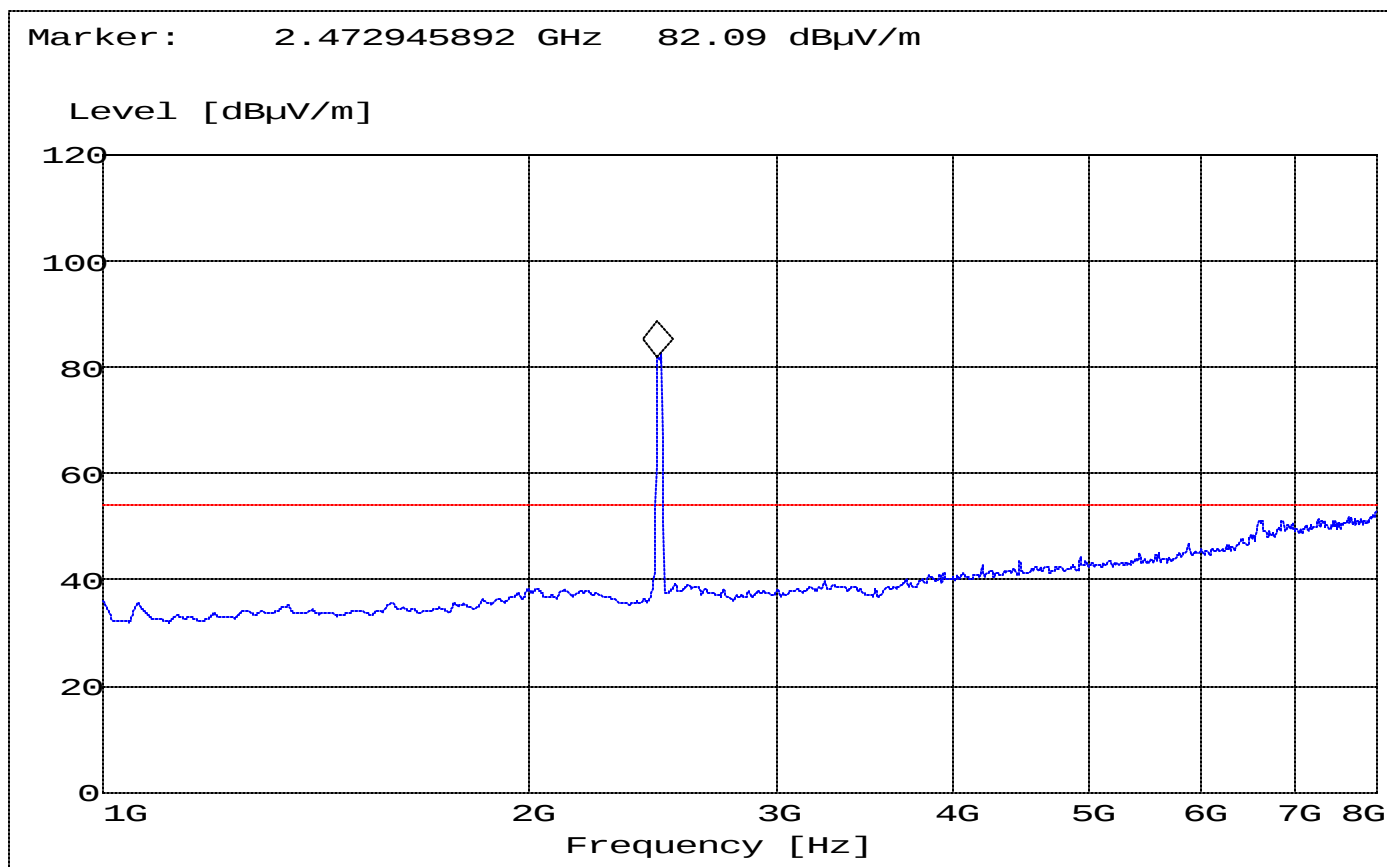
ANALYZER SETTINGS: RBW = 100KHz VBW = 100KHz

EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

Highest Channel: 1GHz – 8GHz

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



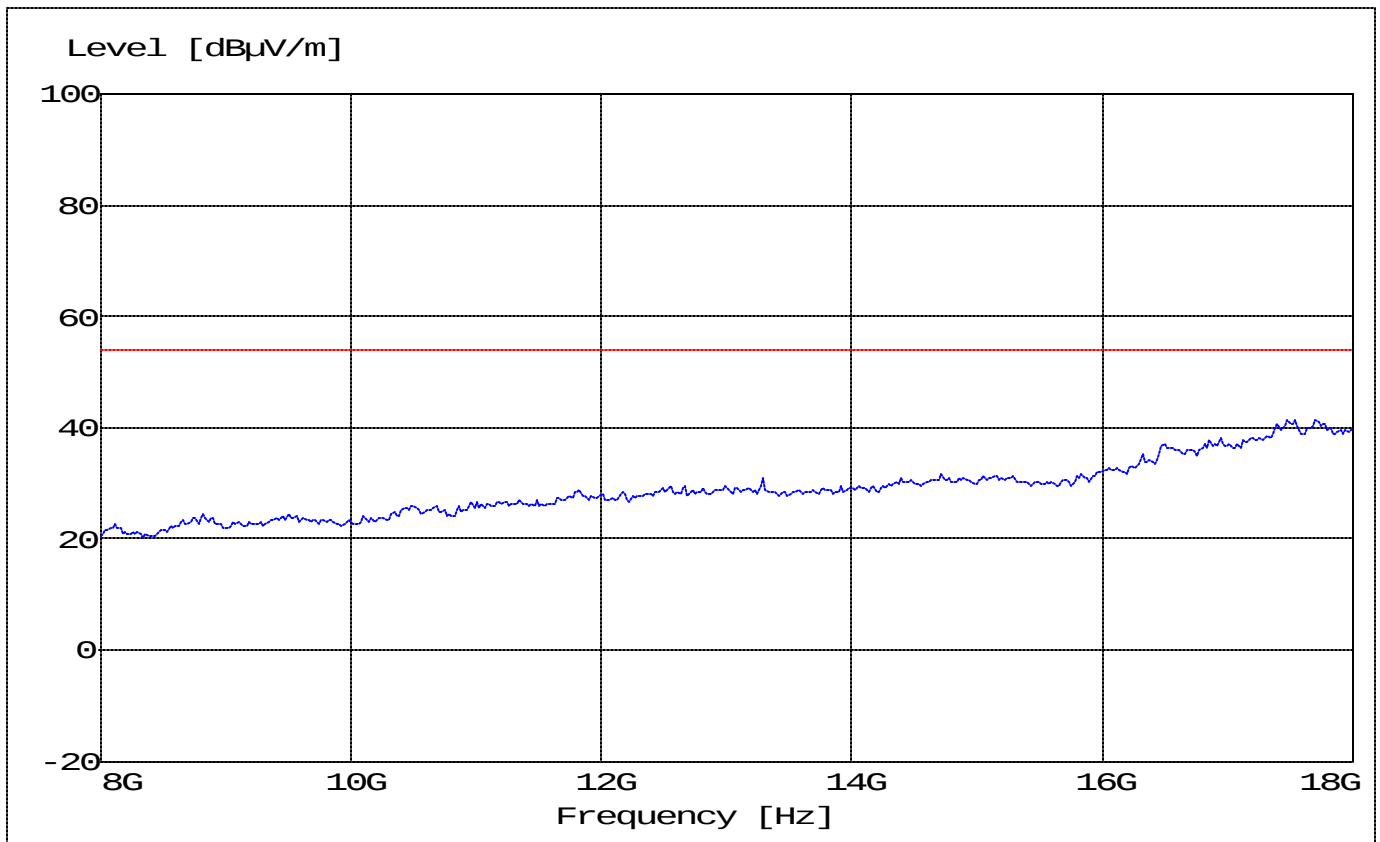
ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz

EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

8GHz – 18GHz

(This plot is valid for all three channels)



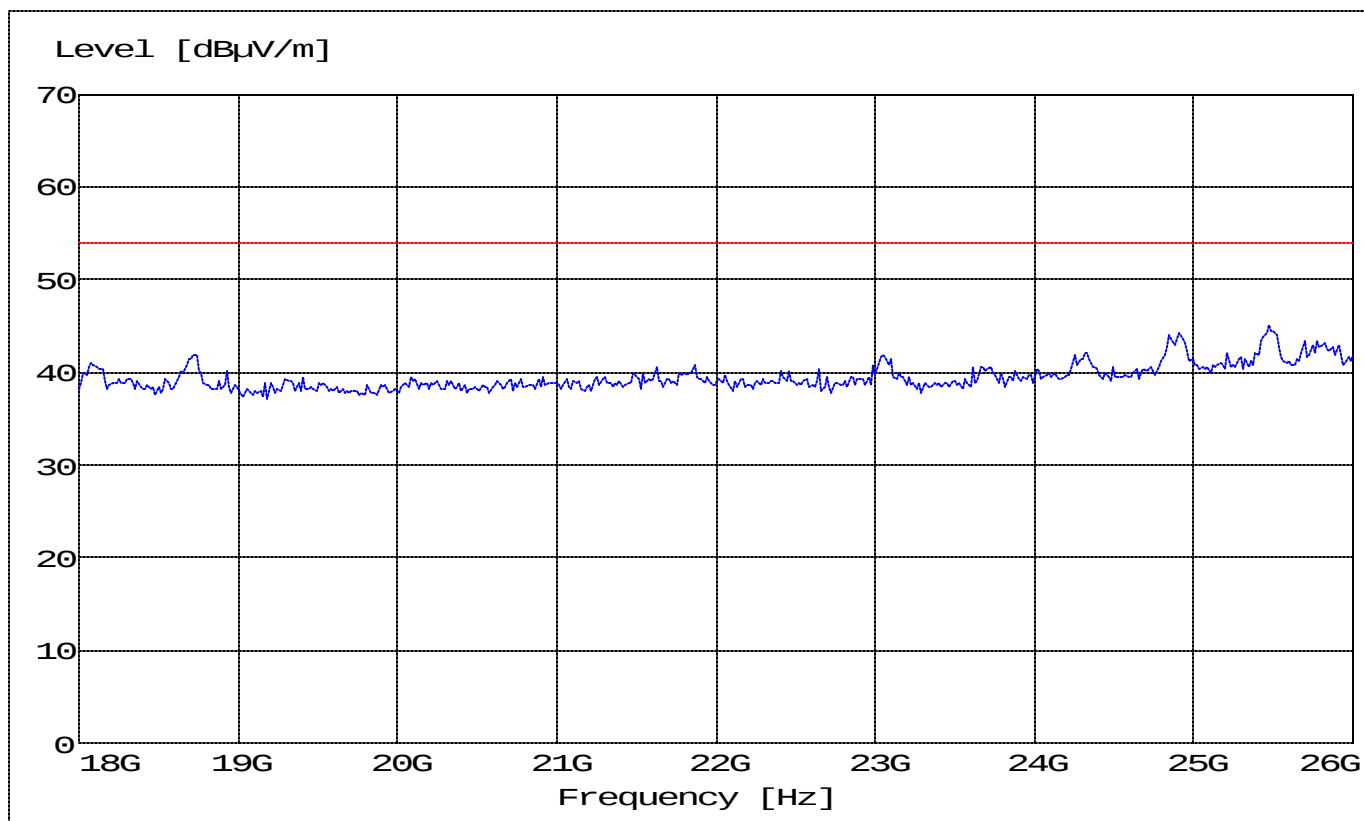
ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz

EMISSION LIMITATIONS - Radiated (Transmitter)

SUBCLAUSE § 15.247 (c) (1)

18GHz – 26GHz

(This plot is valid for all three channels)



ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz

CONDUCTED EMISSIONS

§ 15.107/207

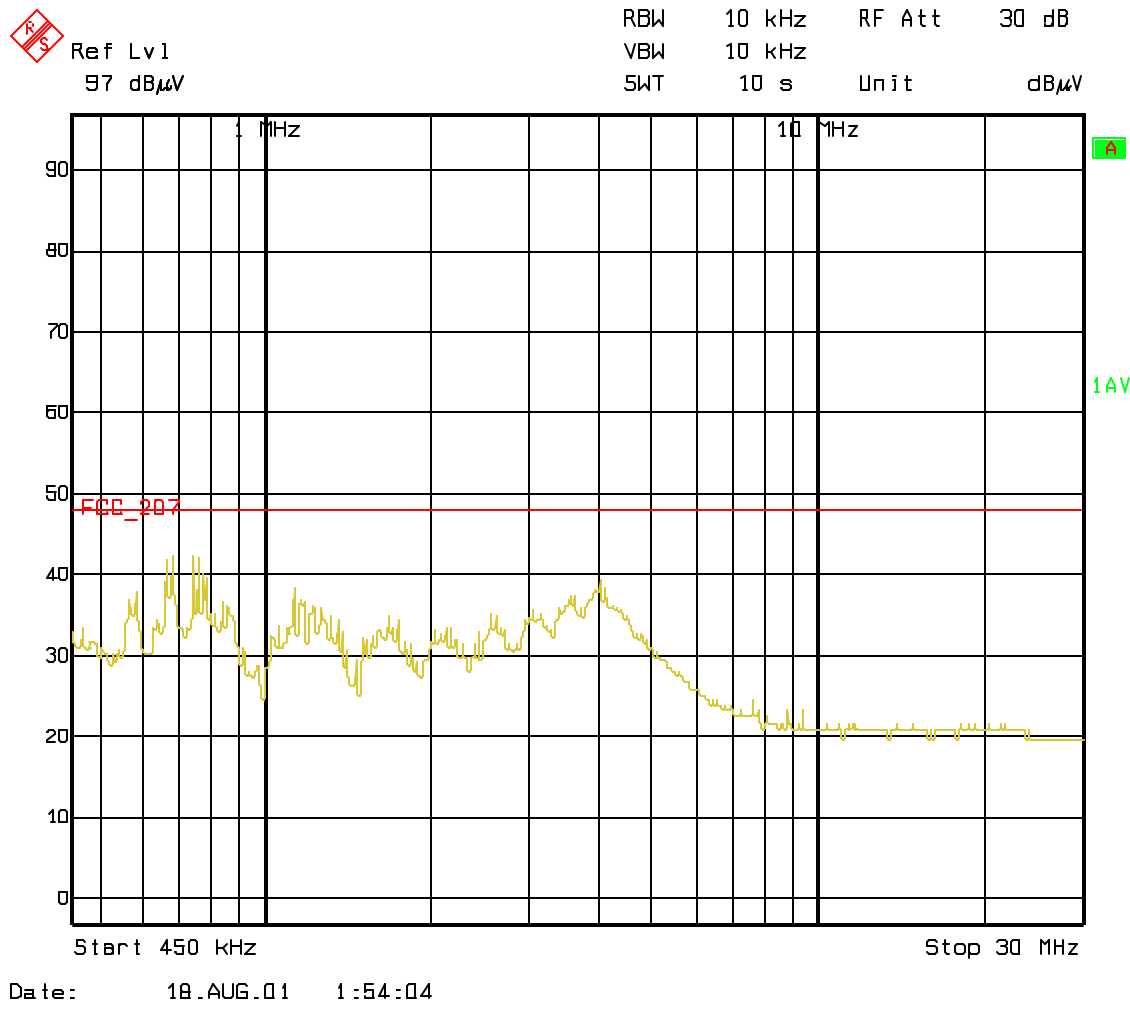
Measured with AC/DC power adapter

Mfg.: PHIHONG

Model: PSC 10A-050

100-240V, 0.3A

Phase: Line



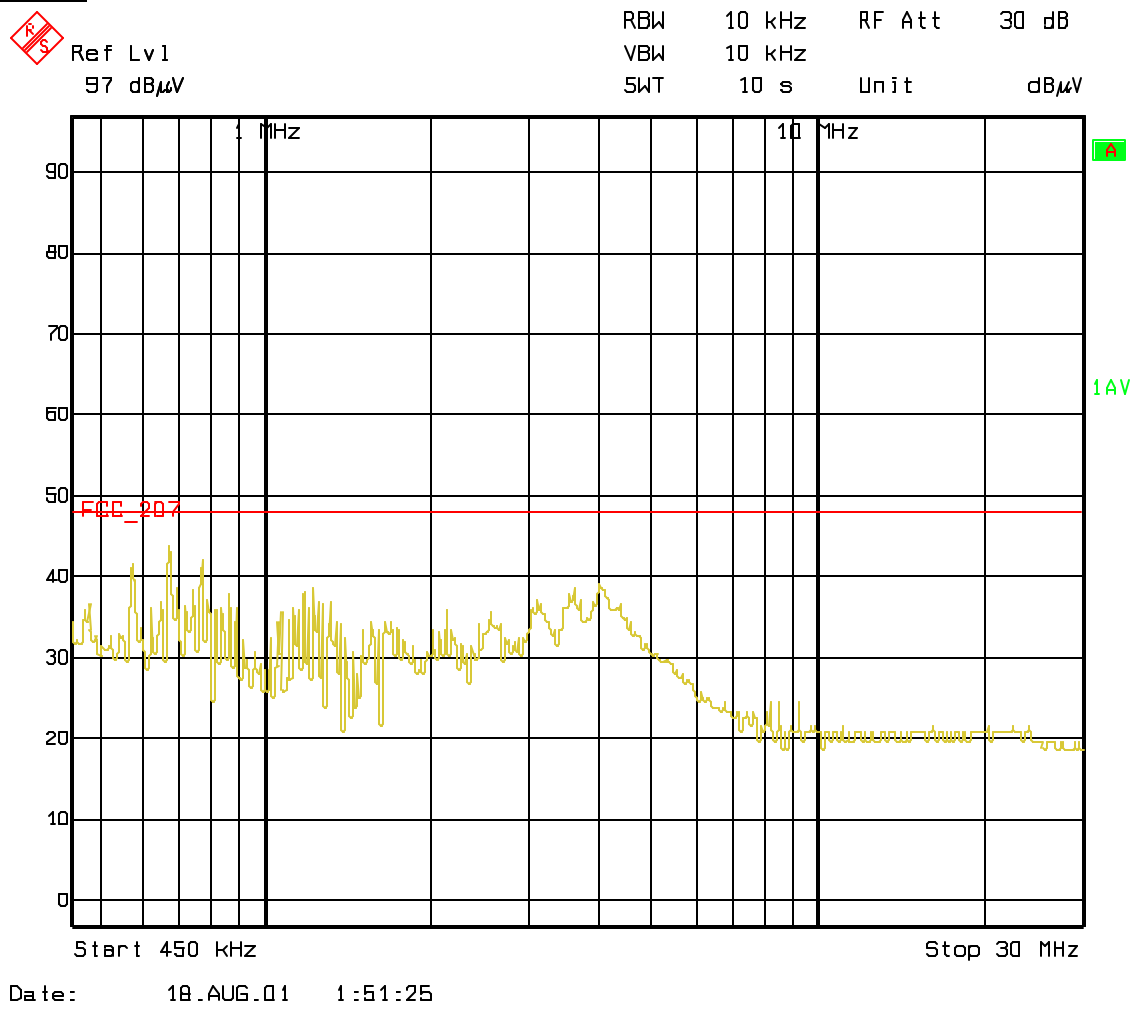
Technical specification: 15.107 / 15.207 (Revised as of October 1, 1991)

Limit

0.45 to 30 MHz	250 μV / 47.96dBμV
----------------	--------------------

ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz

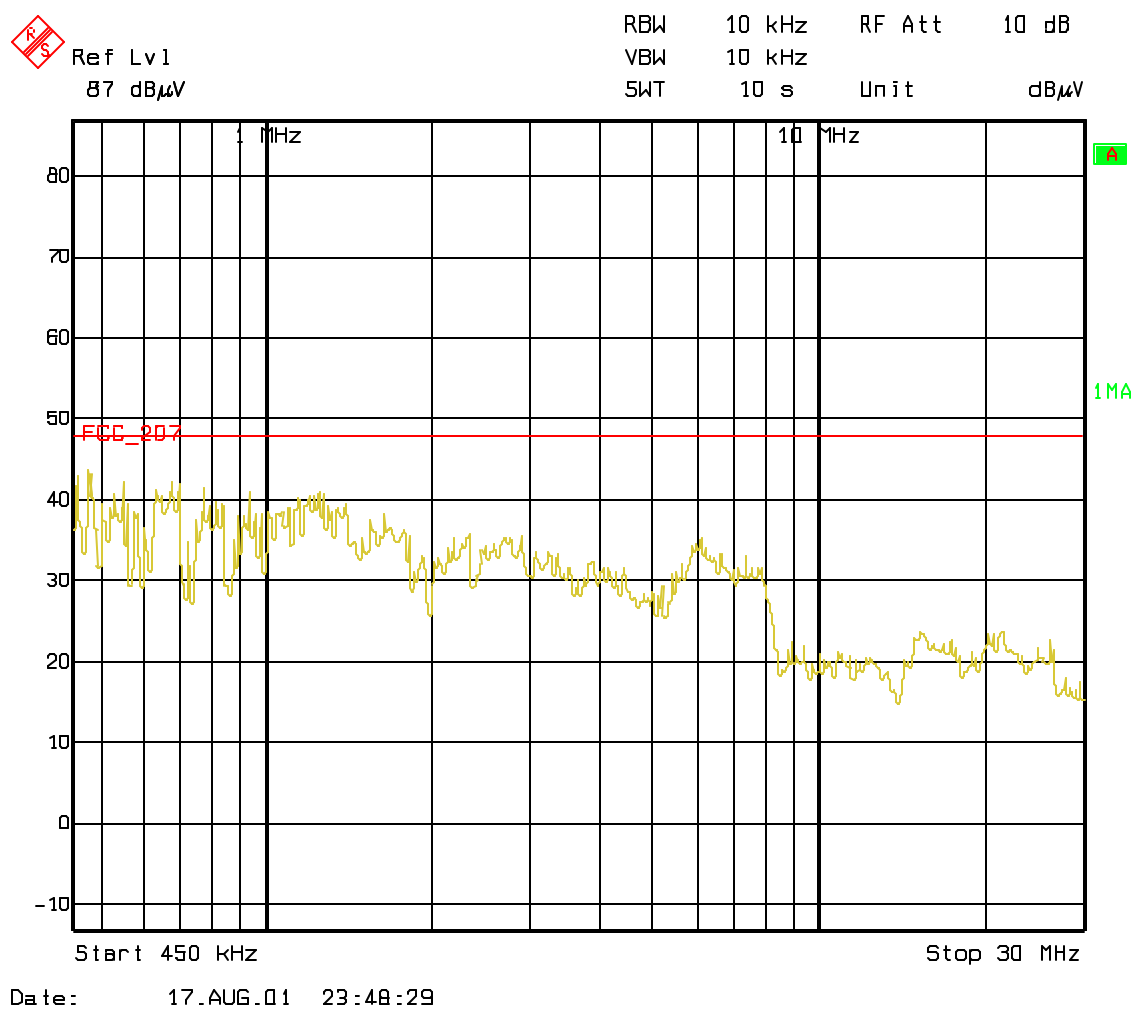
Measured with AC/DC power adapter
Mfg.: **PHIHONG**
Model: PSC 10A-050
100-240V, 0.3A
Phase: Neutral



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

0.45 to 30 MHz	250 μV / 47.96dBμV
ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz	

Measured with AC/DC power adapter
Mfg.: DELTA
Model: ADP-10SB REV.BH
100-240V, 0.4A
Phase: Line



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

Limit

0.45 to 30 MHz	250 μ V / 47.96dB μ V
----------------	-------------------------------

ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz

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Phase: Neutral



RECEIVER SPURIOUS RADIATION**§ 15.209****Limits**

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:

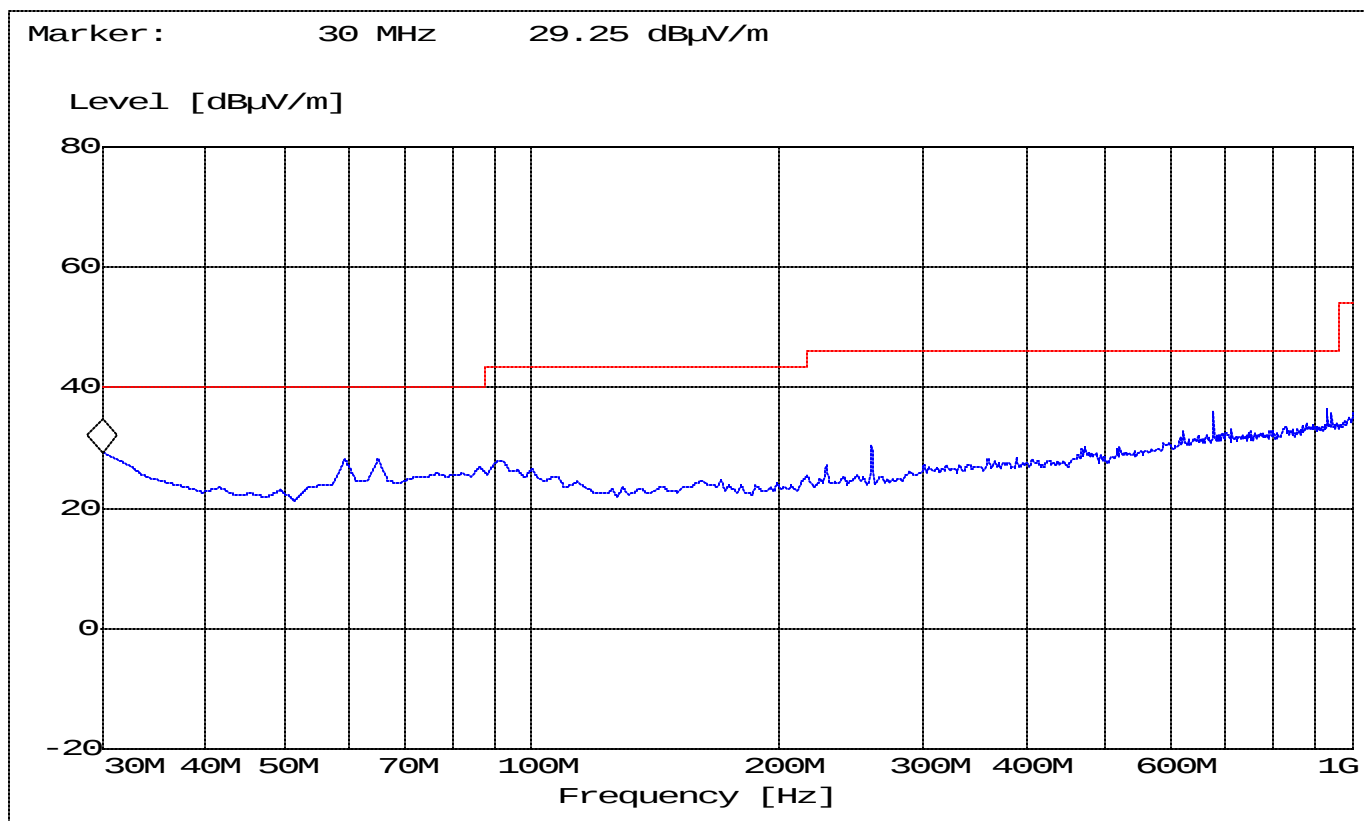
1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 26 GHz very short cable connections to the antenna was used to minimize the noise level.
2. Measurements were done on low, mid & high channels, but plots depicting the worst case are submitted in the test report.

RECEIVER SPURIOUS RADIATION

§ 15.209

30MHz – 1GHz

(This plot is valid for all three channels)



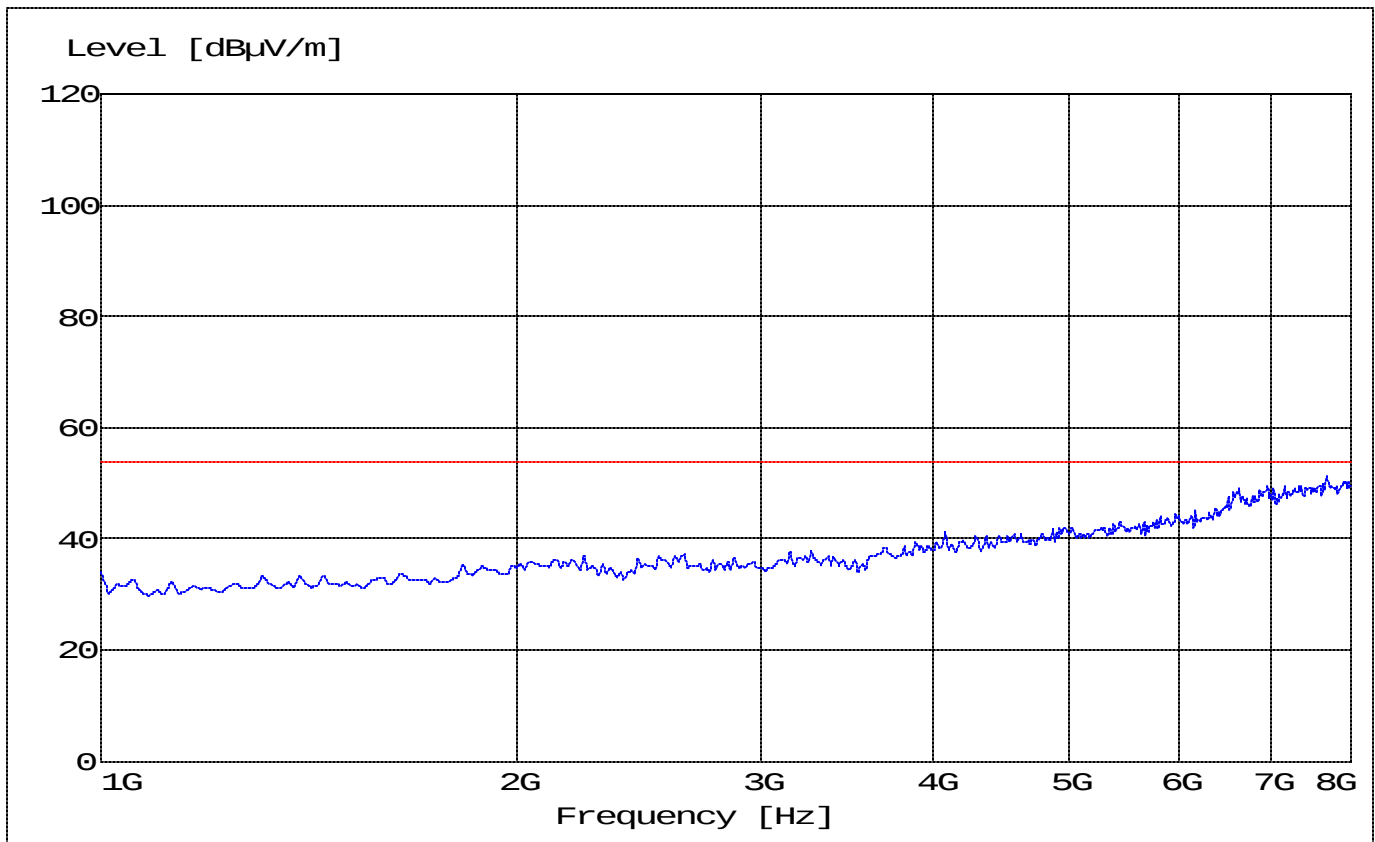
ANALYZER SETTINGS: RBW = 100KHz VBW = 100KHz

RECEIVER SPURIOUS RADIATION

§ 15.209

1GHz – 8GHz

(This plot is valid for all three channels)



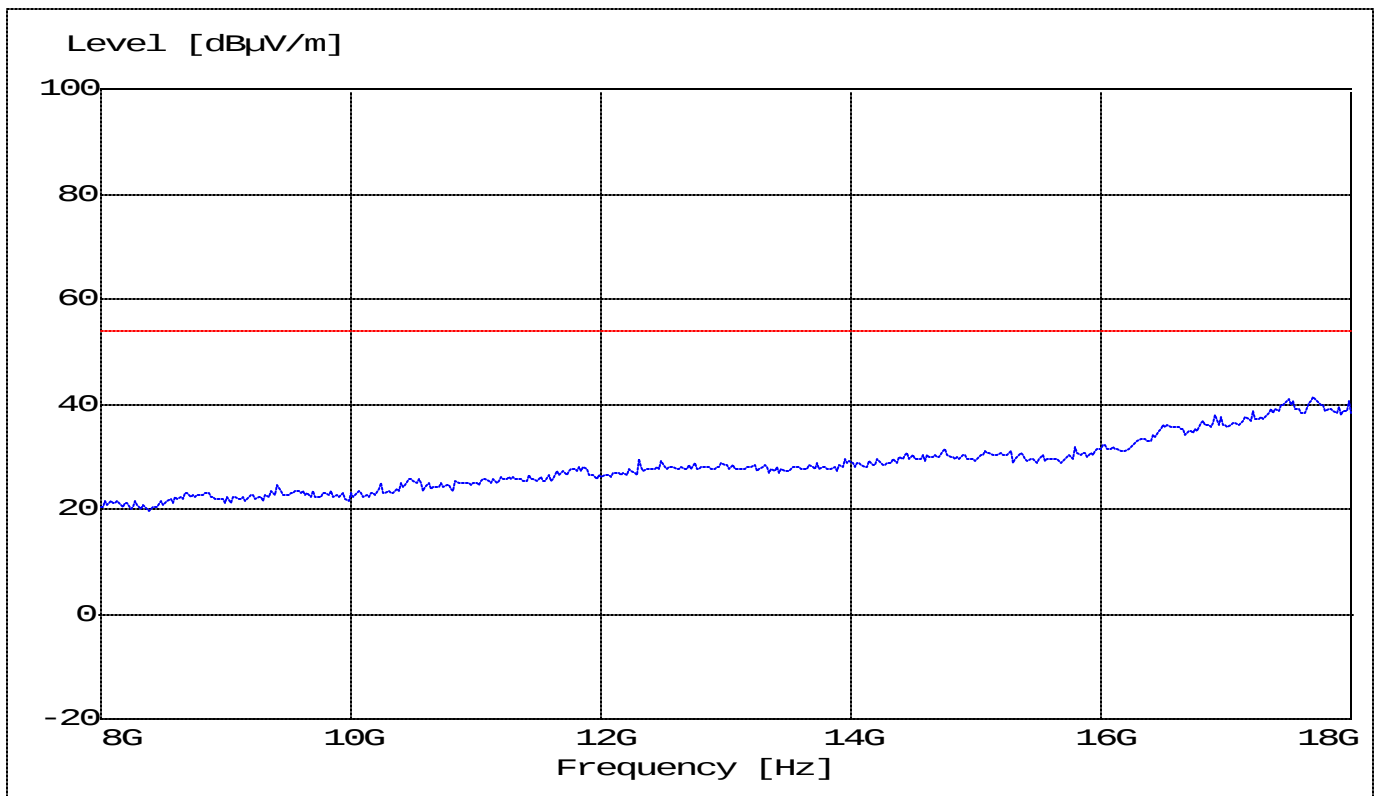
ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz

RECEIVER SPURIOUS RADIATION

§ 15.209

8GHz – 18GHz

(This plot is valid for all three channels)



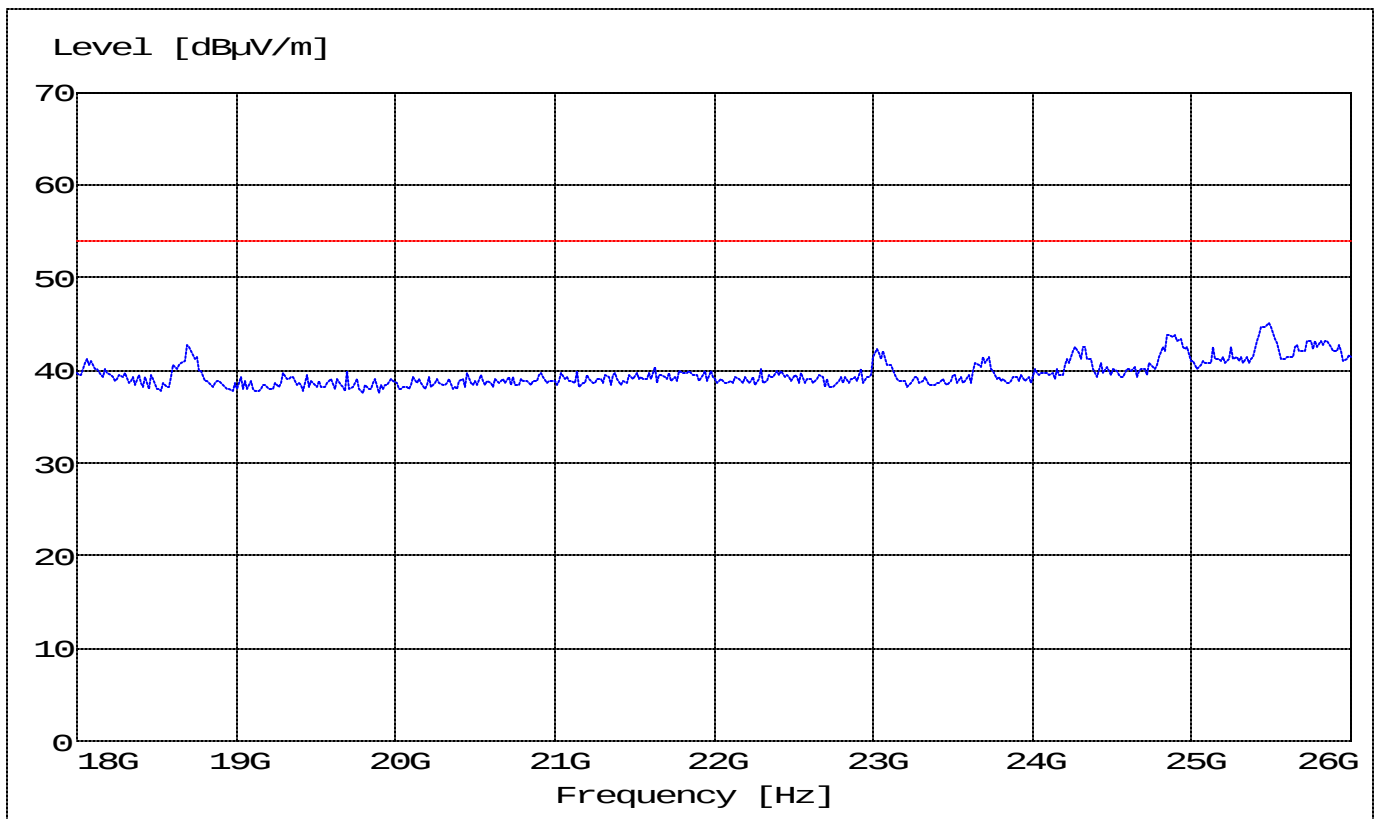
ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz

RECEIVER SPURIOUS RADIATION

§ 15.209

18GHz – 26GHz

(This plot is valid for all three channels)

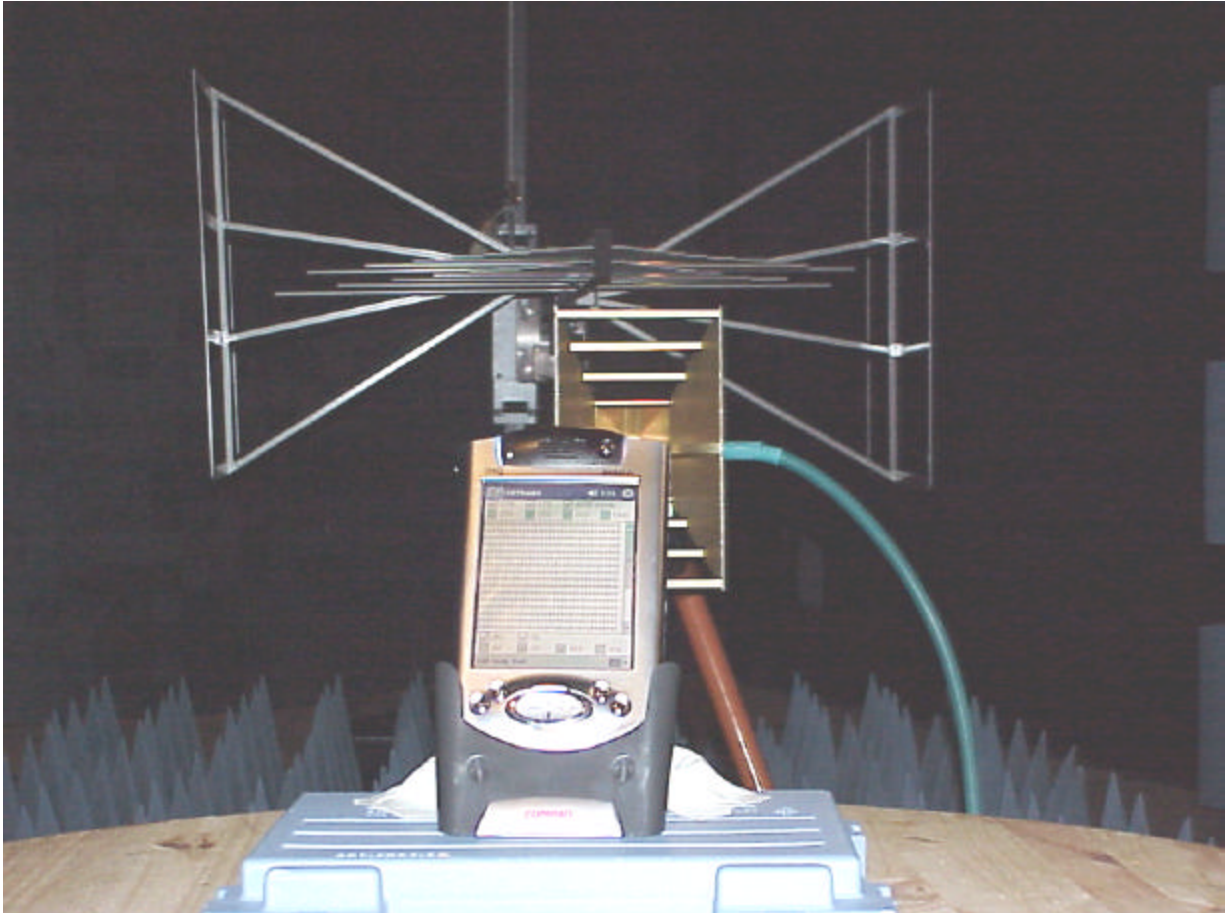


ANALYZER SETTINGS: RBW = 1MHz VBW = 1MHz

[illegible]

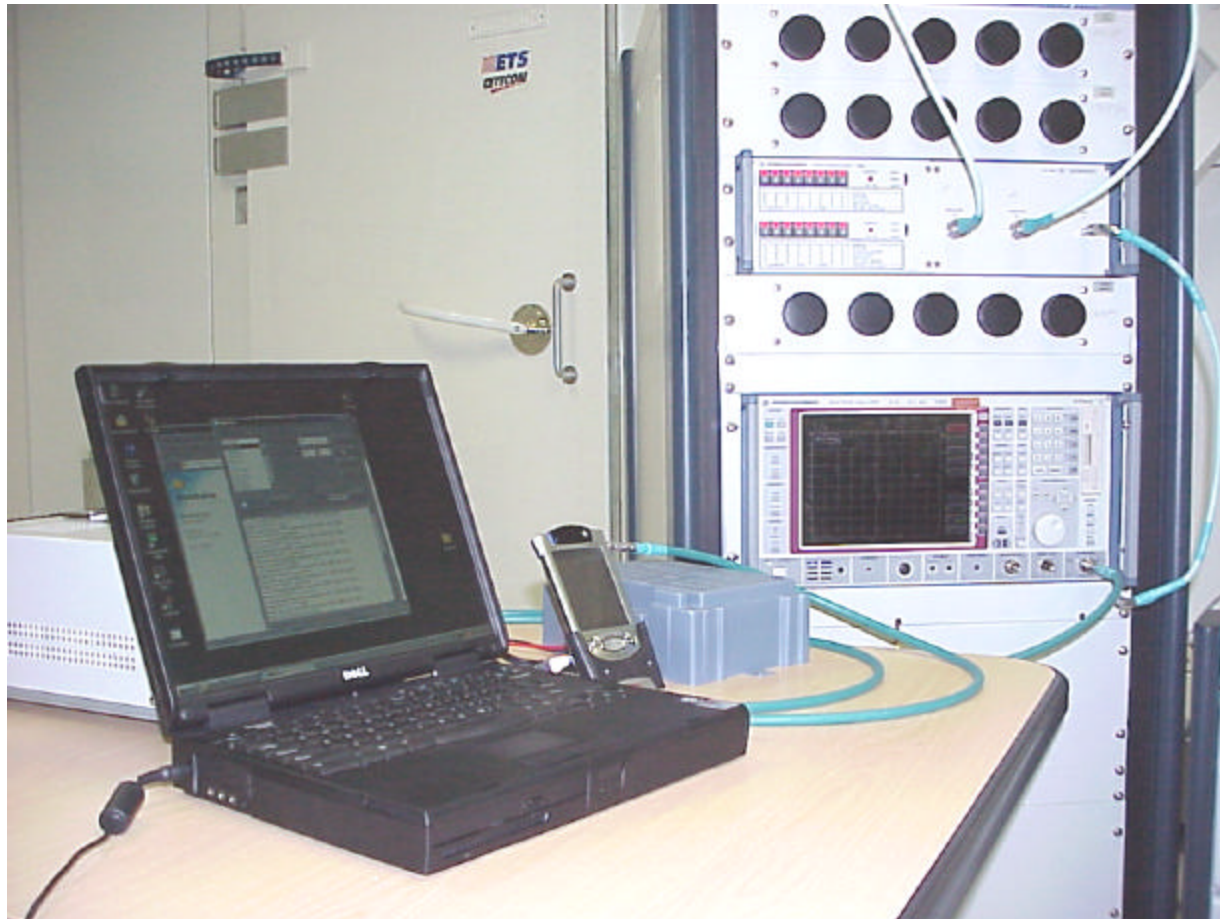
Test site

RADIATED EMISSIONS



Test site

CONDUCTED EMISSIONS



Photographs of the equipment

Photograph no.: 1

(EUT WITH ANTENNA & RF CONNECTOR)

NOTE: RF CONNECTOR is used only for testing purpose



Photographs of the equipment

Photograph no.: 2
(EUT with PCMCIA Jacket)



Photographs of the equipment

Photograph no.: 3
(PCMCIA Jacket)

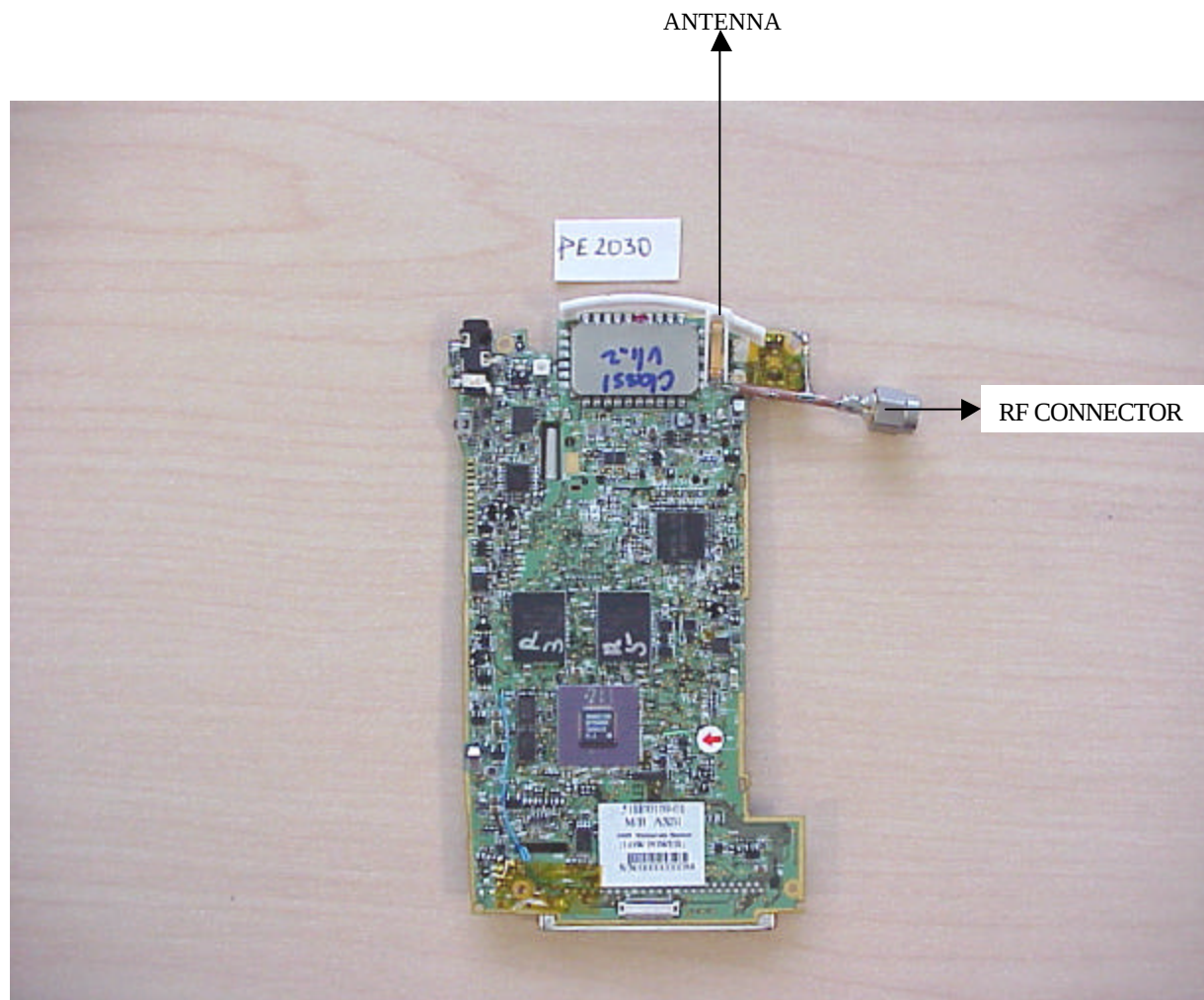


Photographs of the equipment

Photograph no.: 4

(PCB layout – Top View)

NOTE: RF CONNECTOR is used only for testing purpose



Photographs of the equipment

Photograph no.: 5
(PCB layout – Bottom View)

