

E.M.C Test Report

According to the standard:

FCC PART 15 Edition 2005

Equipment under test:

NABAZTAG AT 2.4 GHz

Ref. : MAC : 00039D402BCD



Company:

VIOLET SARL

DISTRIBUTION: Mr MEVEL

(Company: VIOLET SARL)

Number of pages: 44 with 4 annexes

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			Name	Visa	Name	Visa	Name	Visa
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EMITECH C129 Rév.0

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TEST CERTIFICATION FOR: Fcc Verification

NAME OF THE EQUIPMENT UNDER TEST: NABAZTAG
Type : MAC : 00039D402BCD

NAME OF THE MANUFACTURER: VIOLET SARL

ADDRESS OF THE APPLICANT:

Company: VIOLET SARL

Address: 8 rue du Dahomey
75011 PARIS
FRANCE

Person in charge: Mr MEVEL

Person present during the tests: Mr MEVEL

DATES OF TESTS: The 27th and 28th October 2005

TESTS LOCATIONS: EMITECH laboratory in Montigny le Bretonneux (78)
Open area test site in Aunainville (28)

TESTS OPERATOR: F. LHEUREUX

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1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment «*NABAZTAG AT 2.4 GHz ref. : MAC : 00039D402BCD*» herein referred to as the EUT, according to the document listed below.

2. REFERENCE DOCUMENT

FCC Part 15 Edition 2005:
Code of Federal Regulations
Title 47 – Telecommunication
Chapter 1 – Federal Communication Commission
Part 15 – Radio frequency devices
Subpart C – Intentional Radiators

3. EQUIPMENT UNDER TEST (EUT) CONFIGURATION

See photographs next page.

See customer's questionnaire in annex.

See antenna factors, insertion losses and amplifier values in annex.

Modification of the equipment during the tests: No.

Photographs of the equipment under test (EUT)



4. SUMMARY OF TEST RESULTS

The following table summarizes test results of the EUT.

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.205 and 15.209	Unintentional radiated emissions in the band 30 MHz – 25 GHz	x				
15.207	Conducted emissions on AC mains ports	x				
15.247 (a) (1)	Hopping mode			x		Note 1
15.247 (a) (1) (iii)	Hopping timing	x				Note 2
15.247 (a) (2)	6 dB bandwidth measurement	x				
15.247 (b) (1)	Maximum peak power measurement	x				Note 3
15.247 (d)	Band edge measurement	x				
15.247 (e)	Power spectral density measurement	x				Note 3
15.247	RF exposure compliance			x		Note 4

N.A.: Not Applicable

N.P.: Not Performed

Note 1: Not applicable for Wifi equipment.

Note 2: The frequency hopping system use more than 15 min overlapping channels.
The transmitter transmits every 16,72 ms (see annex n° 1) during 390 µs with 15 channels x 0.4 s (part 15) = 6 s.
The transmitter for 6 s transmits 359 times, then $359 \times 390 \mu s = 140 \text{ ms}$, thus the average time of occupancy on any channel is less than 400 ms within a period of 0.4 s multiplied by the number of hopping channel employed.

Note 3: Conducted measurement is not possible (integrated antenna) so we used the substitution method in open field.

Note 4: This type of equipment use less than 0.5 W of output power with a high signal transmitting duty factor the SAR measurement is not necessary.

In emission:

The tested sample "*NABAZTAG AT 2.4 GHz ref.: MAC: 00039D402BCD*" complies with the requirements of the standard:

- FCC PART 15 Edition 2005

according to the limits specified in the present report.

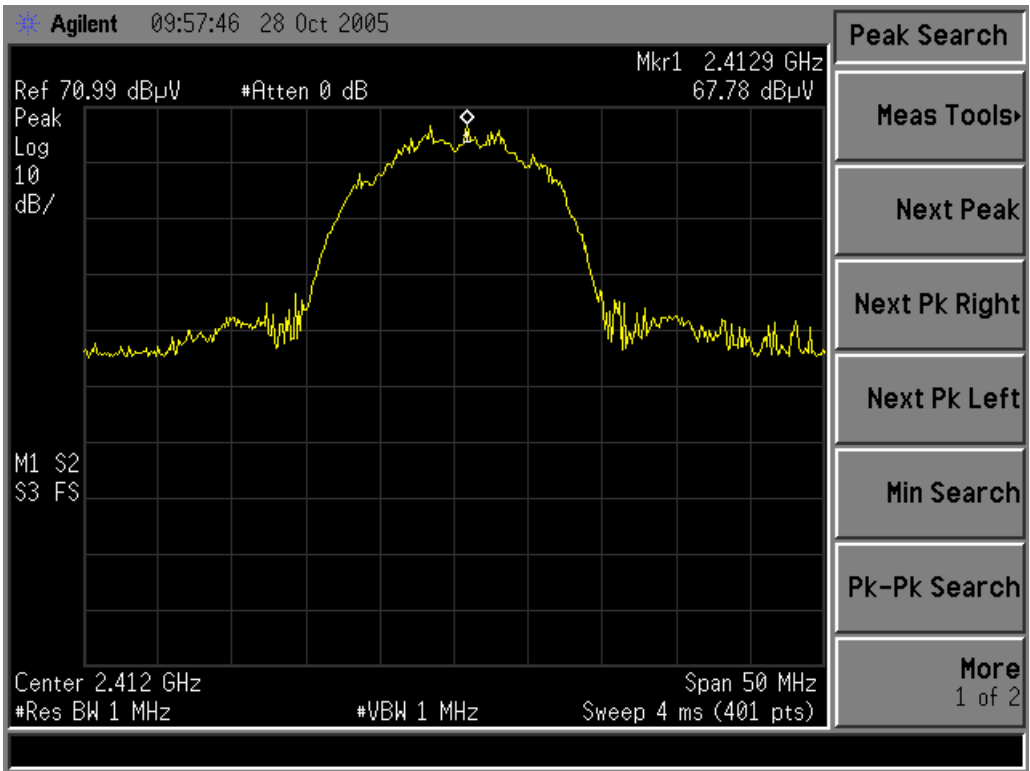
Results:

Channel	Channel frequency (MHz)	RF peak power level (dBm)	RF peak level (dB μ V/m)	RF average level (dB μ V/m)	Maximum limit (dBm)
1	2412	16.1	99.9 (curve 1)	95.2 (curve 4)	30
7	2442	16.0	96.5 (curve 2)	91.2 (curve 5)	30
11	2462	20.2	102.1 (curve 3)	98.4 (curve 6)	30

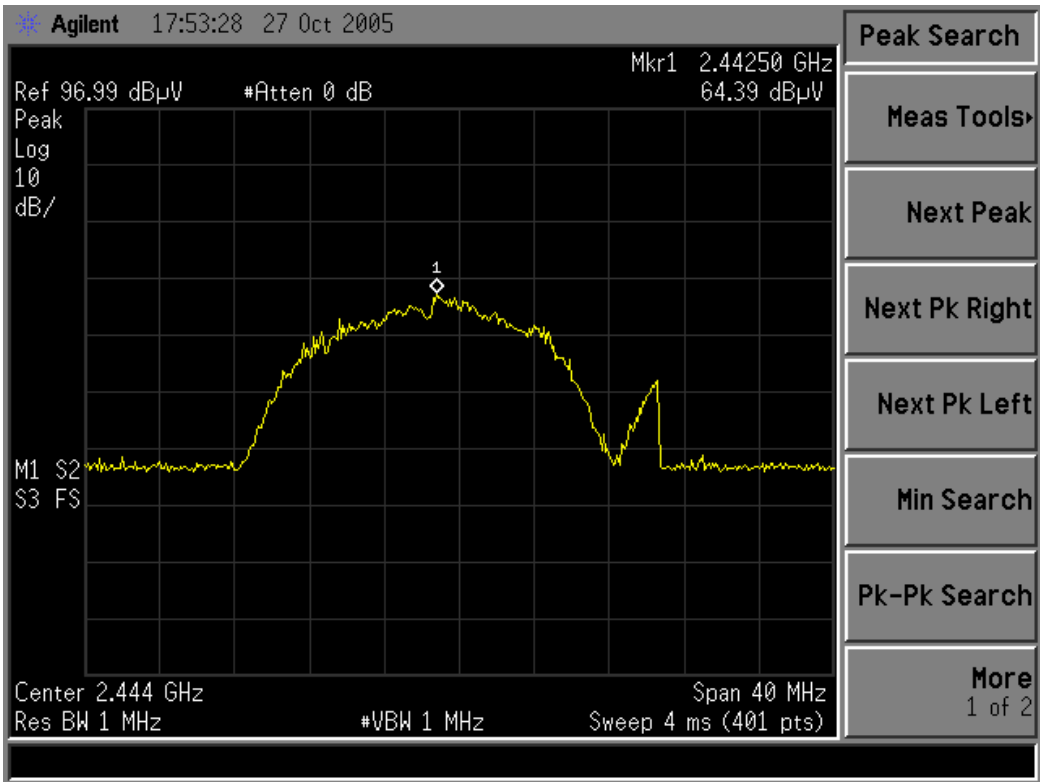
Measurement uncertainties: 4.2 dB

Test conclusion: Respect the standard.

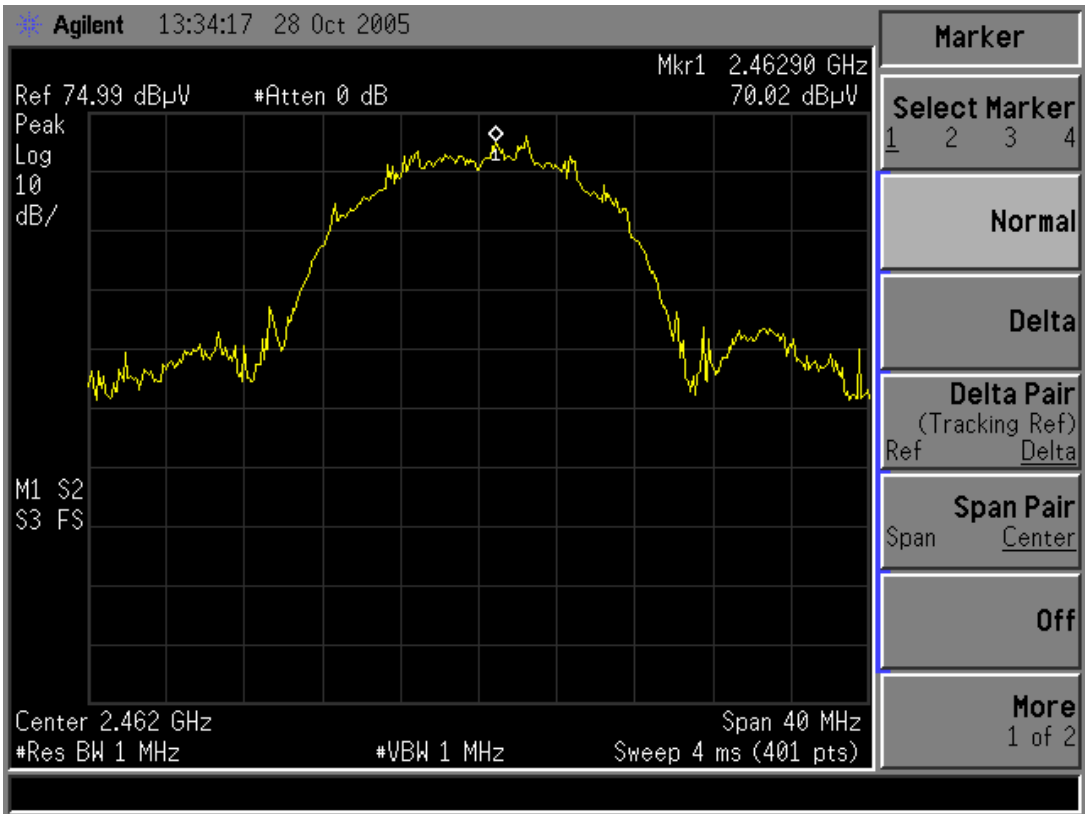
Curve 1



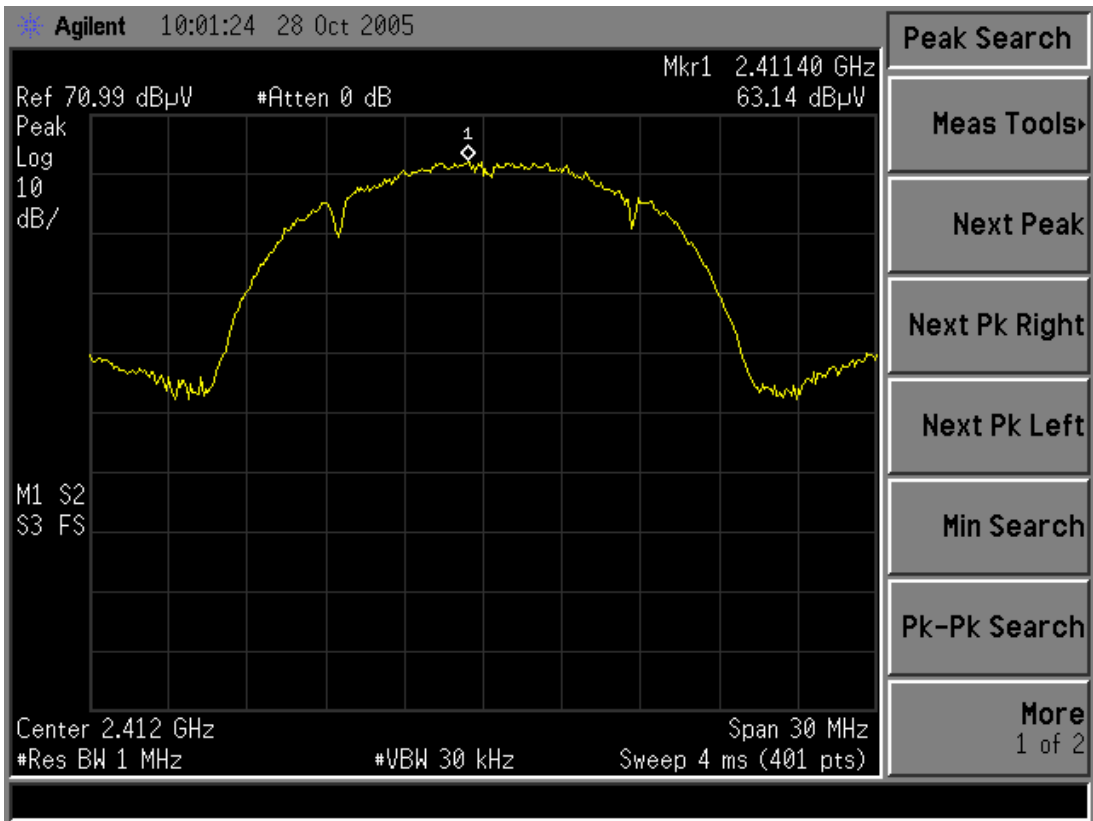
Curve 2



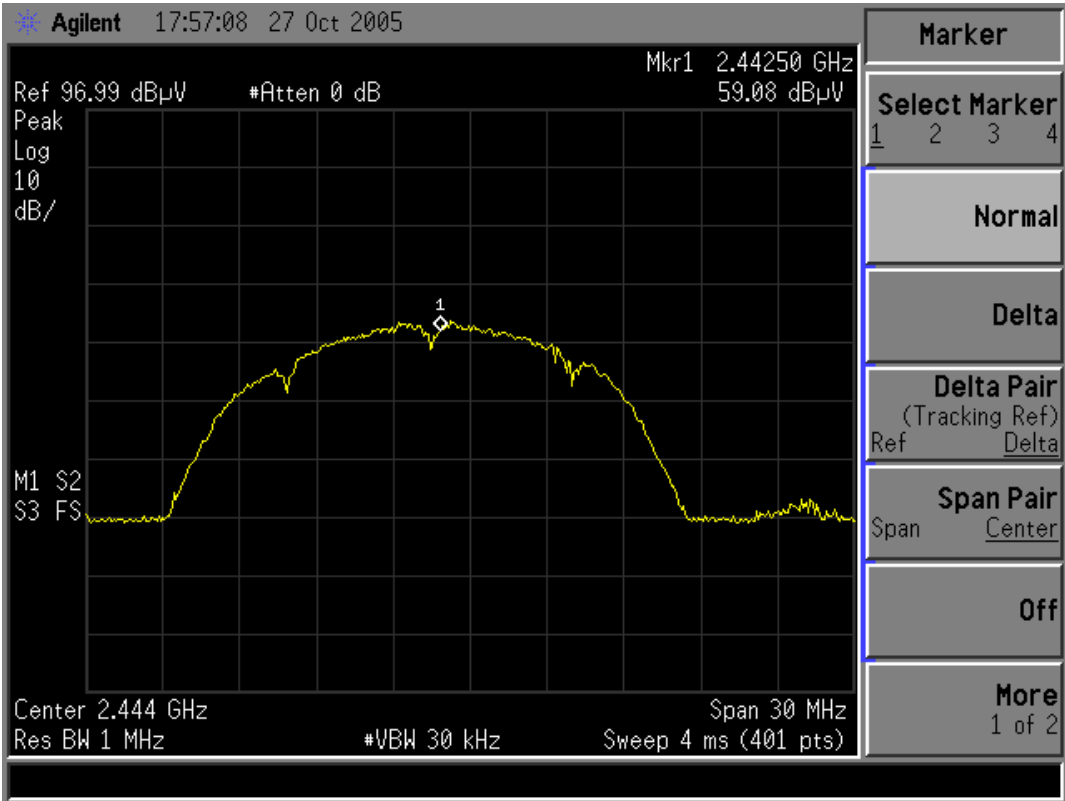
Curve 3



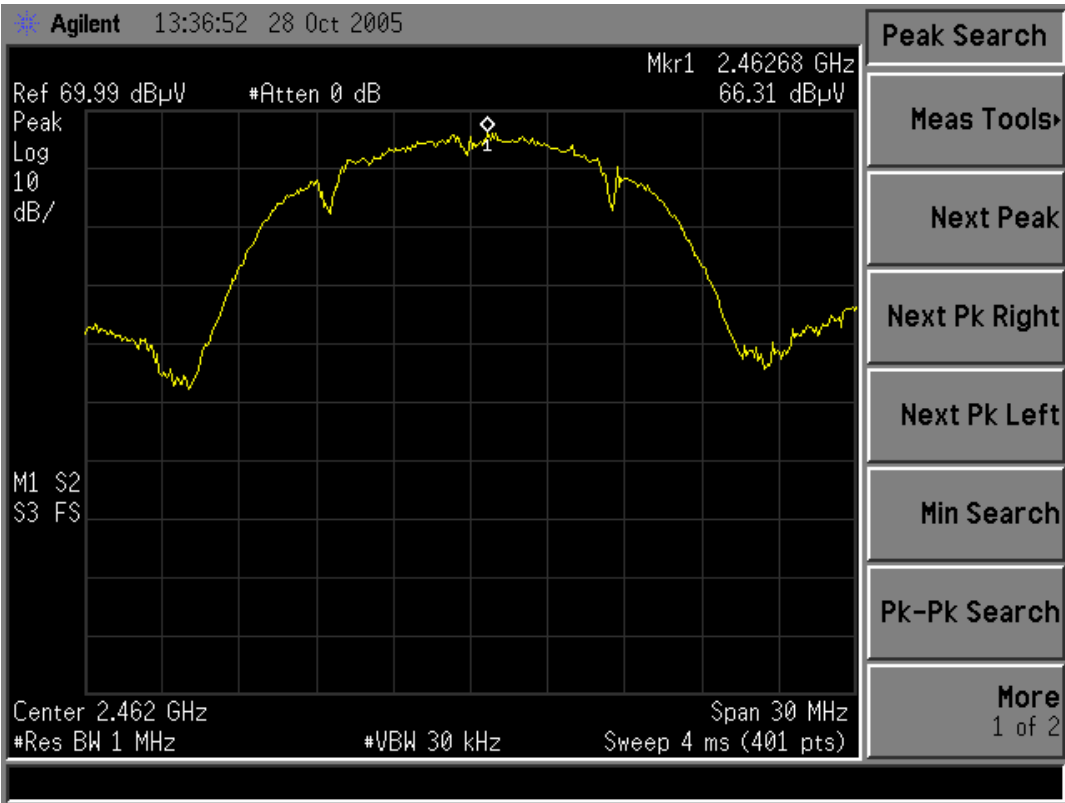
Curve 4



Curve 5



Curve 6



6. POWER SPECTRAL DENSITY MEASUREMENT**Standard:** FCC PART 15 Edition 2005**Section:** 15.247 (e)**Instrumentation test list:**

Meter	NoEmitech	Category	Mark	Type
25	04/003	Synthesizer	Hewlett Packard	8672 A
187	16/004	OATS	Emitech	Site champ libre
941	24/149	Horn antenna	Emco	3115
2185	35/060	Cable	Cable & connectique	4M-18GHz
2205	02/068	Spectrum analyzer	Agilent	E7405A
2896	35/273	Cable	-	N-13M
3374	24/604	Horn antenna	Emco	3115

Test procedure:

The measurement was performed with the substitution method. The measurement antenna was connected to the spectrum analyser.

The level was maximised in antenna hight, azimuth and polarization.

The maximum level measured on the analyser was recorded. Then the product was replaced by a substitution chain to determine the equivalent isotropically radiated power density.

Measured condition: Resolution bandwidth: 3 kHz.

Video bandwidth: 3 kHz.

SPAN: 1.5 MHz.

Sweep: 500 seconds.

Ambiant temperature C°: 22

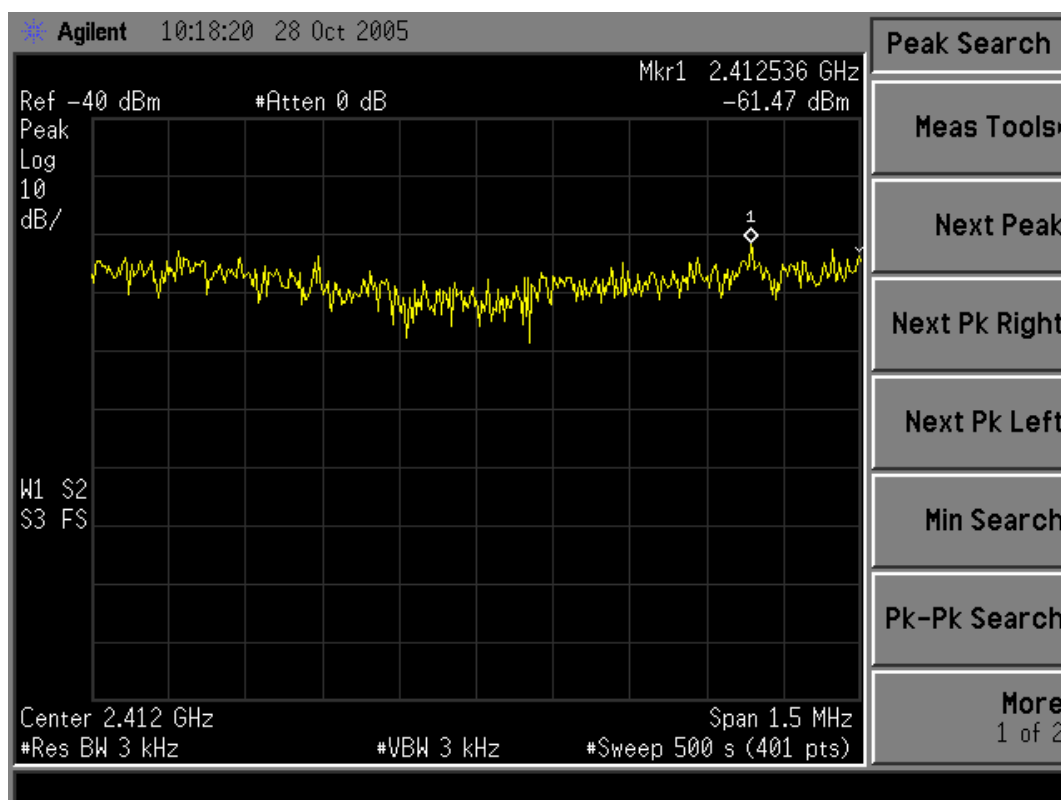
Relative humidity (%): 34

Result:

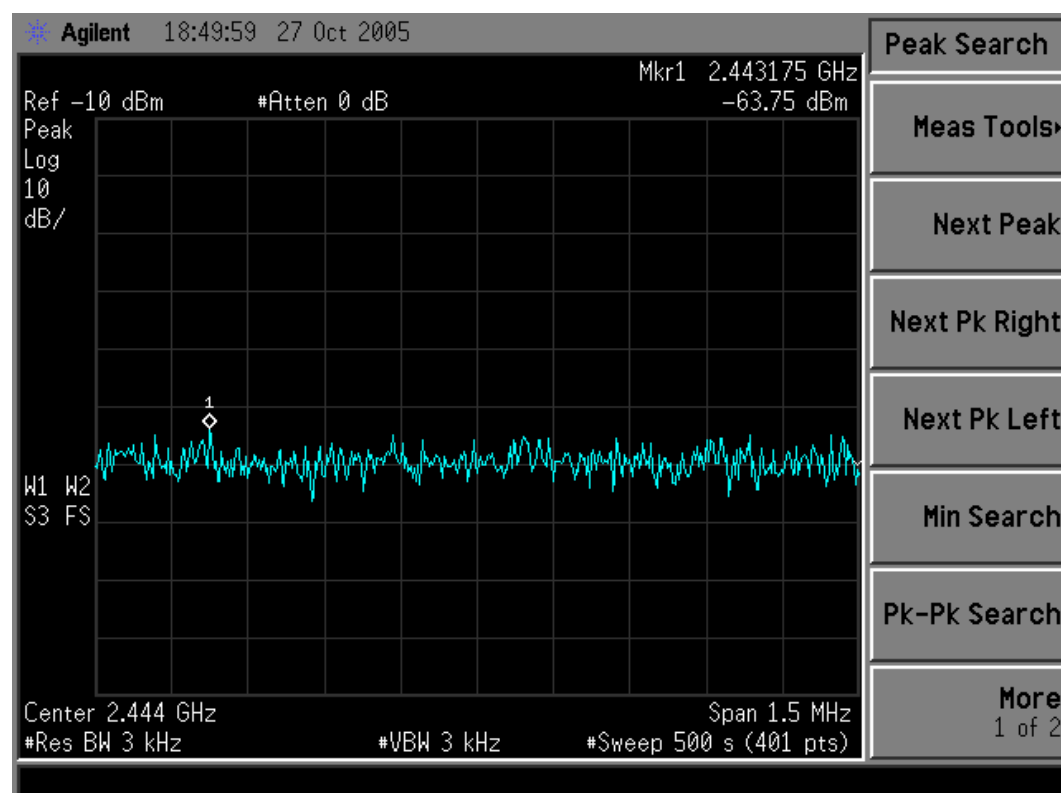
Channel	Channel frequency (MHz)	RF power level (dBm)	Limit (dBm)	Curve reference
1	2412	- 11.7	8.0	Curve 7
7	2442	- 10.6	8.0	Curve 8
11	2462	- 5.4	8.0	Curve 9

Test conclusion: Respect the standard.**Measurement uncertainties:** 4.2 dB

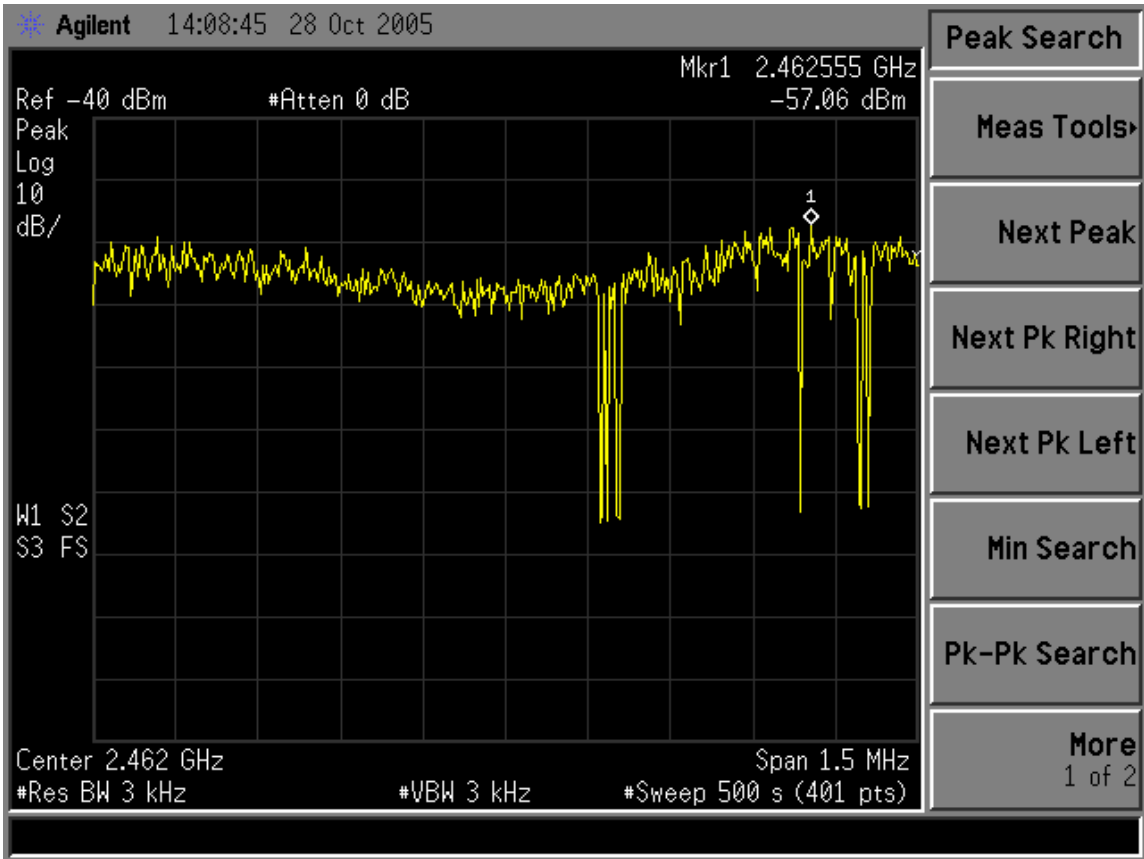
Curve 7



Curve 8



Curve 9



7. 6 dB BANDWIDTH MEASUREMENT

Standard: FCC PART 15 Edition 2005

Section: 15.247 (a) (2)

Instrumentation test list:

Meter	NoEmitech	Category	Mark	Type
187	16/004	OATS	Emitech	Site champ libre
2205	02/068	Spectrum analyzer	Agilent	E7405A
3374	24/604	Horn antenna	Emco	3115

Test procedure:

The level was maximised in antenna hight, azimuth and polarization.
Then the 6 dB bandwidth is measured with the analyser.

Measure condition:

Resolution bandwidth: 100 kHz
Video bandwidth: 100 kHz

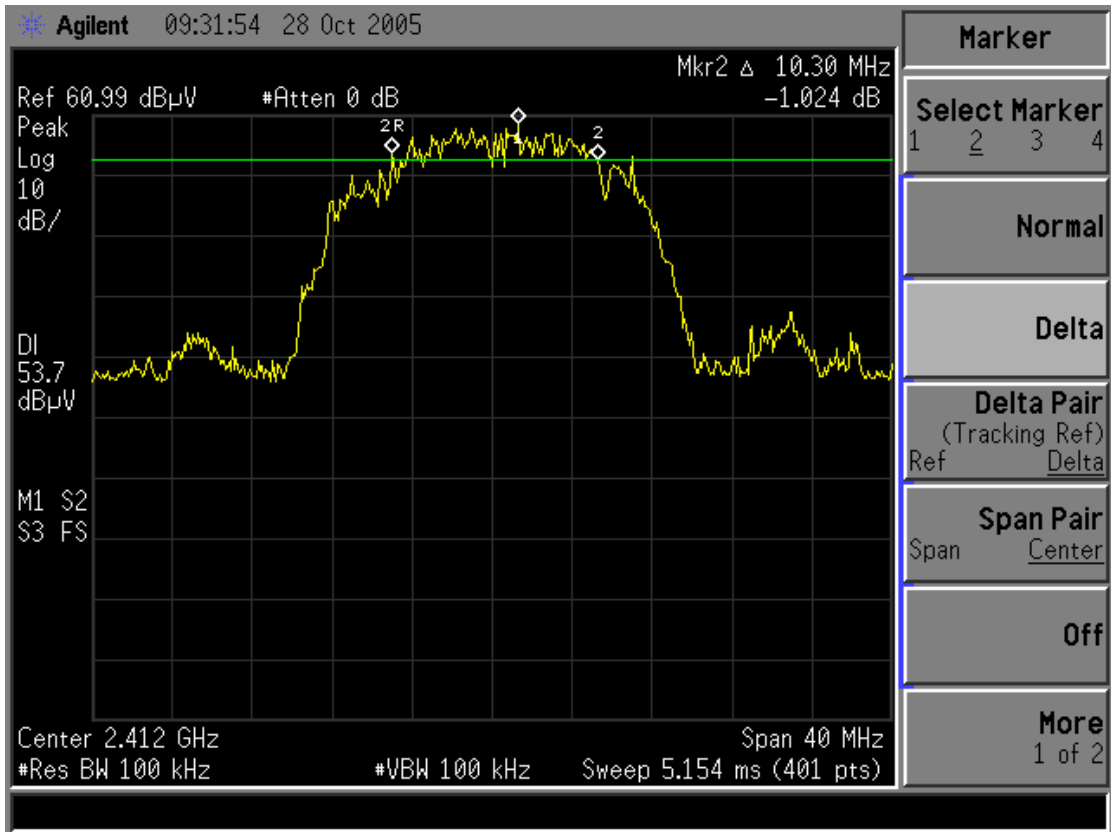
Ambient temperature (°C): 22
Relative humidity (%): 34

Results:

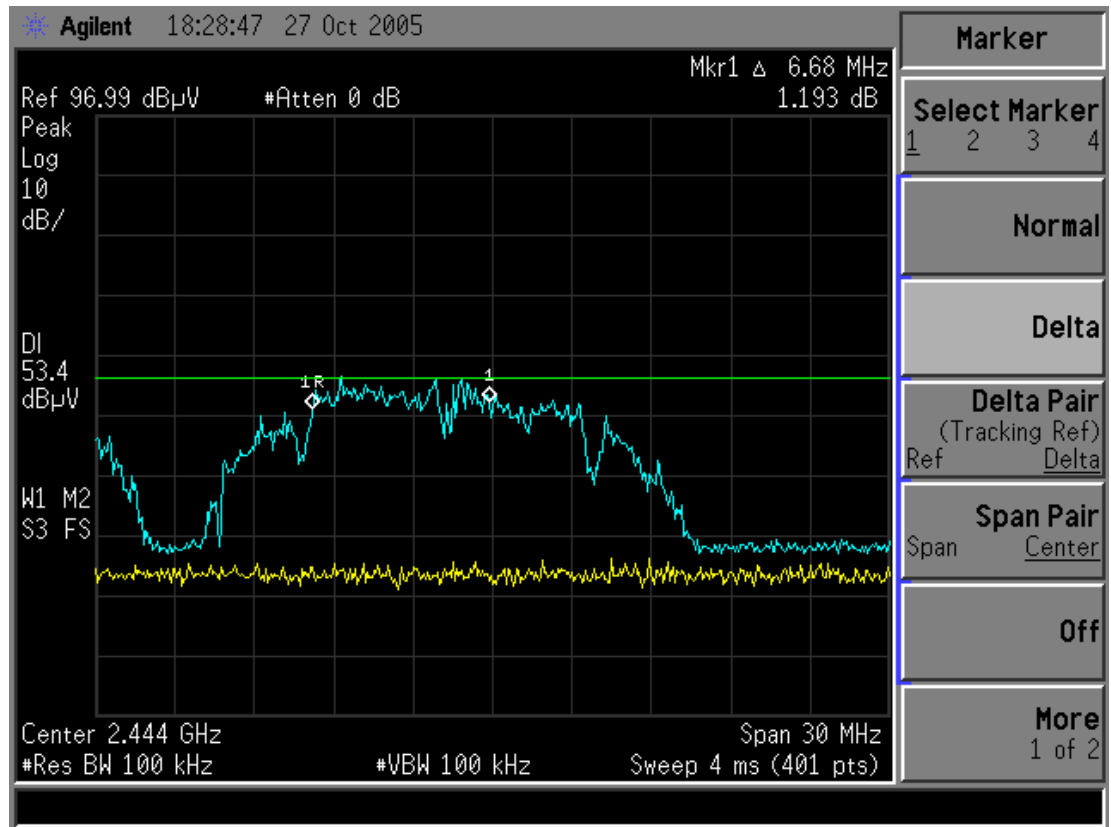
Channel	Channel frequency (MHz)	Limit (kHz)	6 dB bandwidth (MHz)	Curve reference
1	2412	> 500	10.30	Curve 10
7	2442	> 500	6.68	Curve 11
11	2462	> 500	9.30	Curve 12

Test conclusion: Respect the standard.

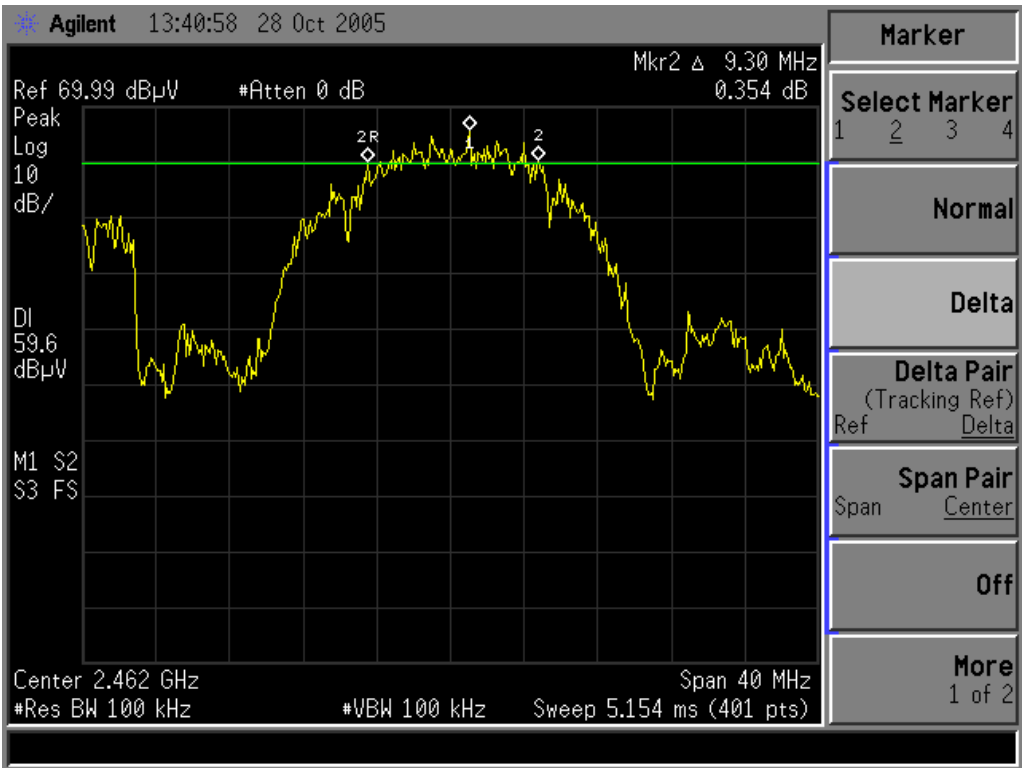
Curve 10



Curve 11



Curve 12



8. BAND EDGE MEASUREMENT

Standard: FCC PART 15 Edition 2005

Section: 15.247 (d)

Instrumentation test list:

Meter	NoEmitech	Category	Mark	Type
187	16/004	OATS	Emitech	Site champ libre
2205	02/068	Spectrum analyzer	Agilent	E7405A
3374	24/604	Horn antenna	Emco	3115

Test procedure:

The level was maximised in antenna height, azimuth and polarization for channel 1 and channel 11. Then the level at 20 dB under the maximum level on the analyser was recorded.

Measure condition:

Resolution bandwidth: 100 kHz
Video bandwidth: 100 kHz

Ambient temperature (°C): 22
Relative humidity (%): 34

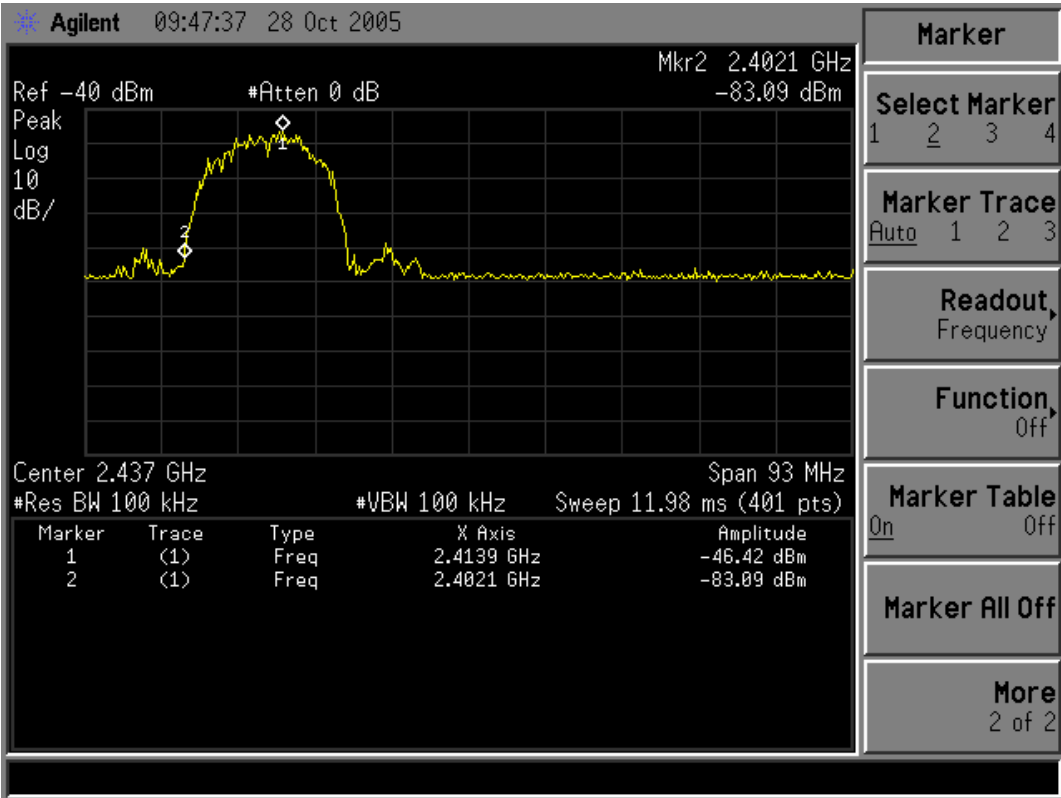
Results:

Lowest frequency limit: Curve 13
Highest frequency limit: Curve 14

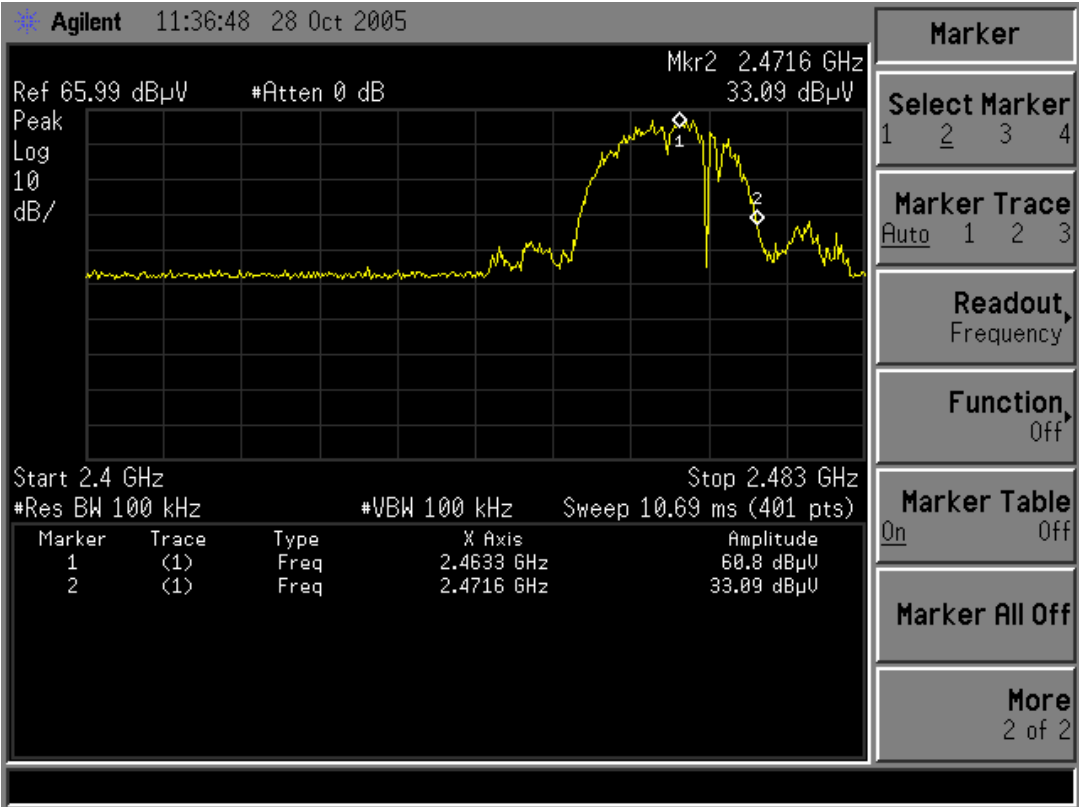
Test conclusion:

Respect the standard.

Curve 13



Curve 14



9. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHz – 25 GHz

Standard: FCC PART 15 Edition 2005

Section: 15.205 and 15.209

Equipment under test arrangement:

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal metal ground plane.

For maximum meter reading at each frequency, the antenna height is adjusted between 1 m and 4 m above the ground plane. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization. The frequency azimuth and antenna height are presented in the tables on the next pages.

Tests are performed with EUT on channel 7.

Frequency range: 30 MHz - 1 GHz
1 GHz - 25 GHz

Detection mode: Quasi-peak for 30 MHz - 1 GHz
Average for 1 GHz - 25 GHz

Resolution bandwidth: 120 kHz for 30 MHz - 1 GHz
1 MHz for 1 GHz - 25 GHz

Measurement distance: 3 meters.

Limit: For restrictives bands (see paragraph 15.205), the EUT must satisfy requirements of the section 15.209 as shown in table below.

Frequency range (MHz)	Limit (dB μ V/m)
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 to 1000	54.0
1000 to 25000	54.0

Out of restrictives bands, the limit is 20 dB under the maximum level of the fundamental (see paragraph 5).

Limit for average detection: 78.4 dB μ V/m.

Limit for peak detection: 82.1 dB μ V/m

Instrumentation test list:

Meter	NoEmitech	Category	Mark	Type
187	16/004	OATS	Emitech	Site champ libre
1045	24/161	Horn antenna	Oritel	CM 42/25
1057	02/045	Receiver	Rohde & Schwarz	ESVP
1097	18/082	Filter	Trilithic	6HC1300-2.5-KK
1144	24/195	Biconical antenna	Schwarzbeck	VHBA 9123
2102	14/066	Power supply	Secas	CF1000 50/60
2205	02/068	Spectrum analyzer	Agilent	E7405A
2341	19/018	Antenna mast	HD GmbH	MA 240
2342	19/019	Mast controller	HD GmbH	HD 100
2450	35/070	Cable	Cables & Connectiques	HF 12m
2452	35/072	Cable	Cables & Connectiques	HF 13m
2643	18/233	High pass filter	Filtek	HP12/3200-5AA
2862	35/239	Cable	Câbles & Connectiques	N-2m
2896	35/273	Cable	-	N-13M
3106	24/571	Log periodic antenna	Schwarzbeck	UHALP 9108
3229	01/127	Preamplifier	Miteq	AMF-6D-010250-70-7P
3374	24/604	Horn antenna	Emco	3115

Results:

Table reference	Comments
Table 1	Measurement in vertical polarization
Table 2	Measurement in horizontal polarization

Observation during the test:

The equipment complies with the requirements of the standard FCC PART 15.205 and 15.209 Edition 2005.

TEST SITE: Open area test site

TABLE 1

RADIATED EMISSION: Electric field

STANDARD: FCC Part 15.209 and 15.205 Edition 2005

TEST DISTANCE: 3 m

POLARIZATION: Vertical

MODEL: NABAZTAG AT 2.4 GHz ref.: MAC: 00039D402BCD

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dB μ V/m)	LIMIT (dB μ V/m)	MARGIN (dB)
30.398	105	30	32.1	82.1	50.0
42.447	100	310	37.2	82.1	44.9
44.109	105	330	36.5	82.1	45.6
118.589	100	230	26.5	43.5	17.0
167.561	105	290	19.0	82.1	63.1
228.212	105	310	26.0	82.1	56.1
339.149	105	30	22.0	82.1	60.1
439.993	160	140	35.0	82.1	47.1
451.187	300	0	22.3	82.1	59.8
483.992	250	0	36.7	82.1	45.4
563.322	105	150	25.1	82.1	57.0
2067.88	153	120	46.2	78.4	32.2
2156.83	221	0	40.4	78.4	38.0

No significant frequency has been found other than those given above between 30 MHz and 25 GHz.

TABLE 2

TEST SITE: Open area test site

RADIATED EMISSION: Electric field

STANDARD: FCC Part 15.209 and 15.205 Edition 2005

TEST DISTANCE: 3 m

POLARIZATION: Horizontal

MODEL: NABAZTAG AT 2.4 GHz ref.: MAC: 00039D402BCD

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
30.000	130	200	33.3	82.1	48.8
42.267	380	300	33.0	82.1	49.1
43.355	350	300	33.5	82.1	48.6
228.020	105	250	32.5	82.1	49.6
341.113	105	220	31.6	82.1	50.5
454.884	400	80	22.3	82.1	59.8

No significant frequency has been found other than those given above between 30 MHz and 25 GHz.

10. MEASUREMENT OF CONDUCTED EMISSION ON AC MAINS PORTS

Standard: FCC Part 15 Edition 2005

Section: 15.207

Equipment under test arrangement:

Category of equipment: Table-top equipment

The equipment under test (EUT) is operating on a non conductive test table at 0.8 m above the horizontal metal ground plane and at 0.4 m above the vertical metal ground plane.

The EUT is supplied through LISN (Line Impedance Stabilization Network) bonded to the ground reference plane.

Test configuration photographs:



Frequency range: 150 kHz - 30 MHz.

Detection mode: Peak / Average

Resolution:

Frequency range	Resolution bandwidth	Video bandwidth
150 kHz - 30 MHz	10 kHz	30 kHz

Limit: The EUT must satisfy requirements of the section 15.207 as shown in table below.

Frequency range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0,15 to 0,5	66 - 56	56 - 46
0,5 to 5	56	46
5 to 30	60	50

Operating mode during the test: In communication Wifi.

Instrumentation test list:

Meter	NoEmitech	Category	Mark	Type
0	34/073	Software	Nexio	V 3.1.7.1
19	02/016	Spectrum analyzer	Hewlett Packard	8568 B
326	24/069	LISN	Rohde et Schwarz	ESH2-Z5
825	02/037	Receiver	Rohde & Schwarz	ESH3
1094	18/080	Transient limiter	Hewlett Packard	11947A
1804	16/020	Test enclosure	Emitech	JD
2808	35/185	Cable	-	N-4m
2881	35/258	Cable	-	N-2m
3771	14/119	Power supply	Kikusui	PCR4000L

Results:

Curve reference	Comments
Curve 15	Measurement of peak detection on wire 1
Curve 16	Measurement of peak detection on wire 2
Curve 17	Measurement of average detection on wire 2

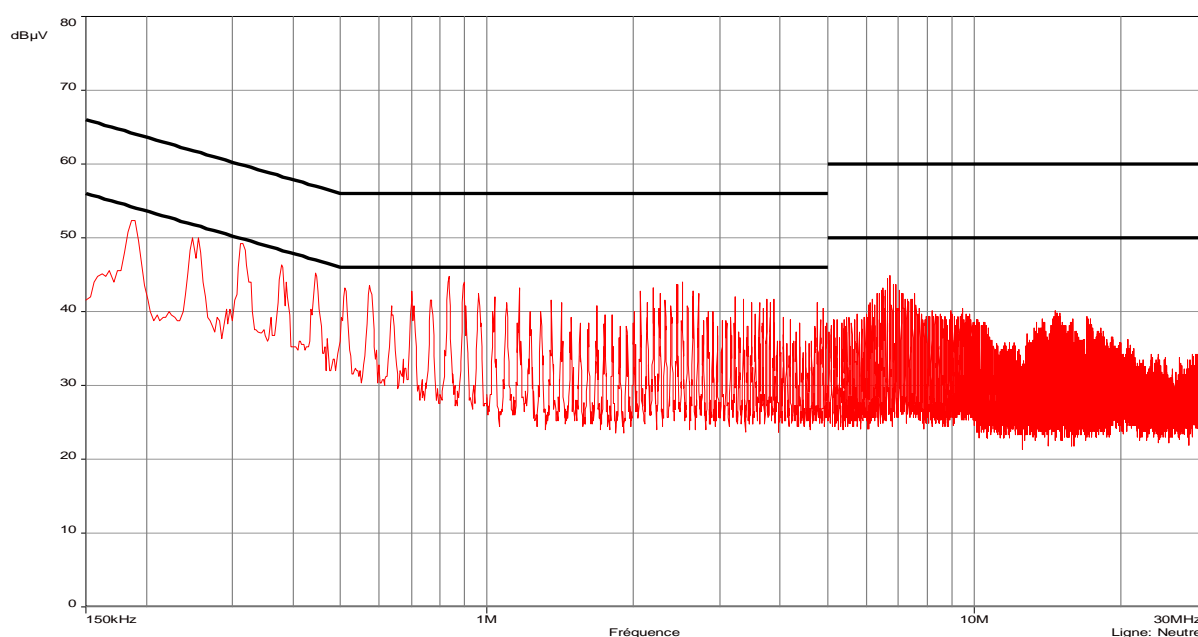
Observation during the test:

The equipment complies with the requirements of the standard FCC PART 15.207 Edition 2005.

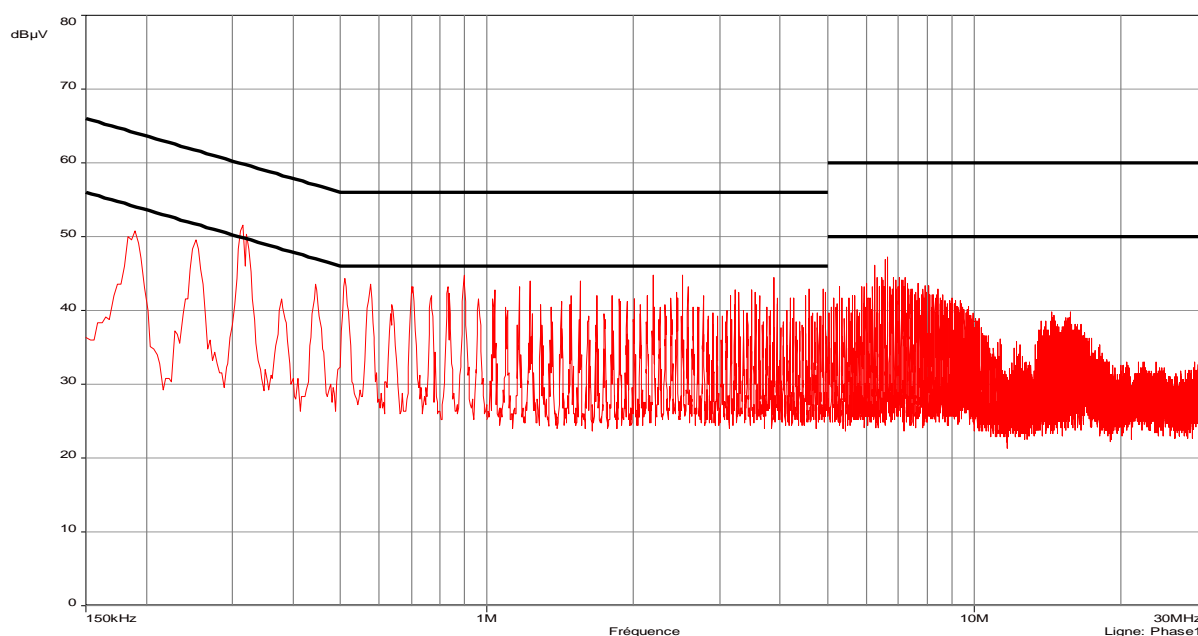
NABAZTAG WIFI AT 2.4 GHz

Conducted emission on power supply
Peak detection
In communication WIFI
27/10/2005

CURVE 15



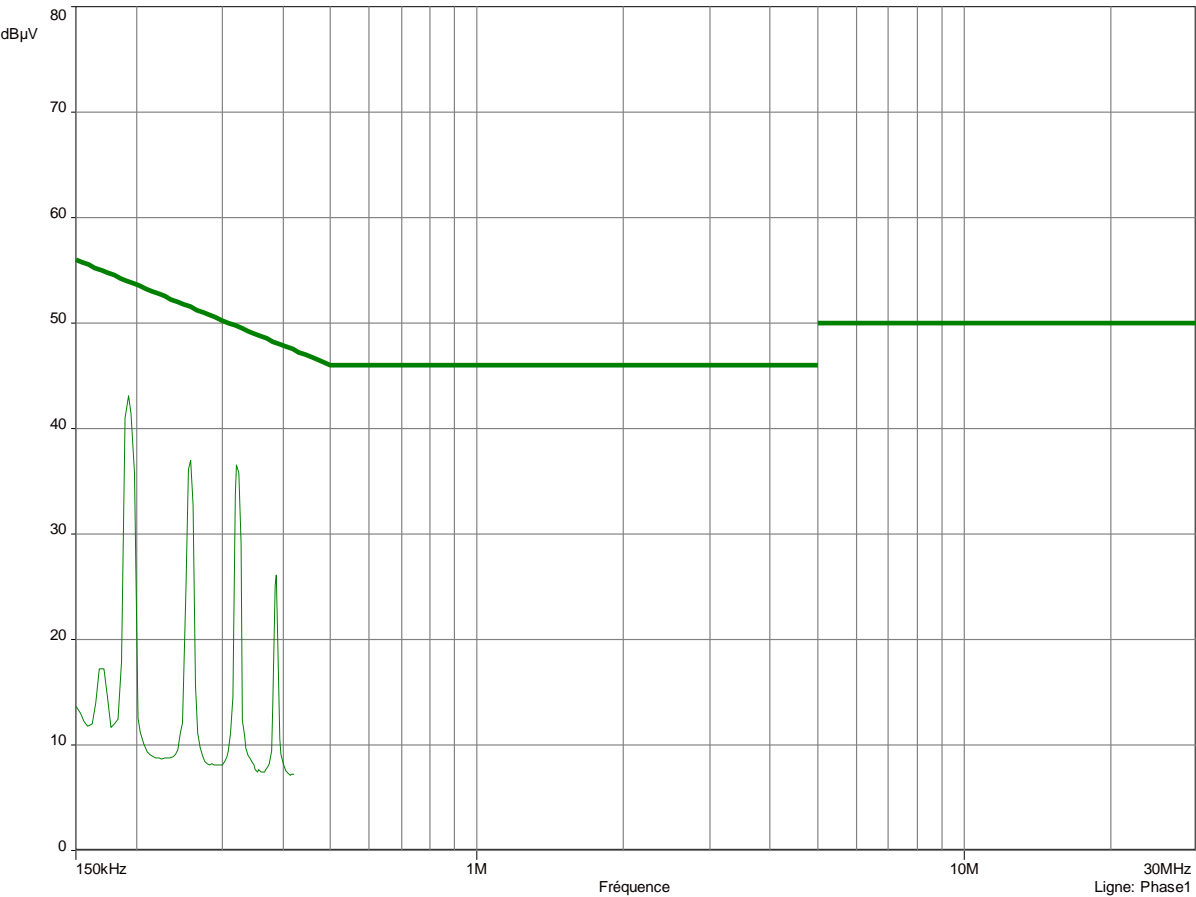
CURVE 16



NABAZTAG WIFI AT 2.4 GHz

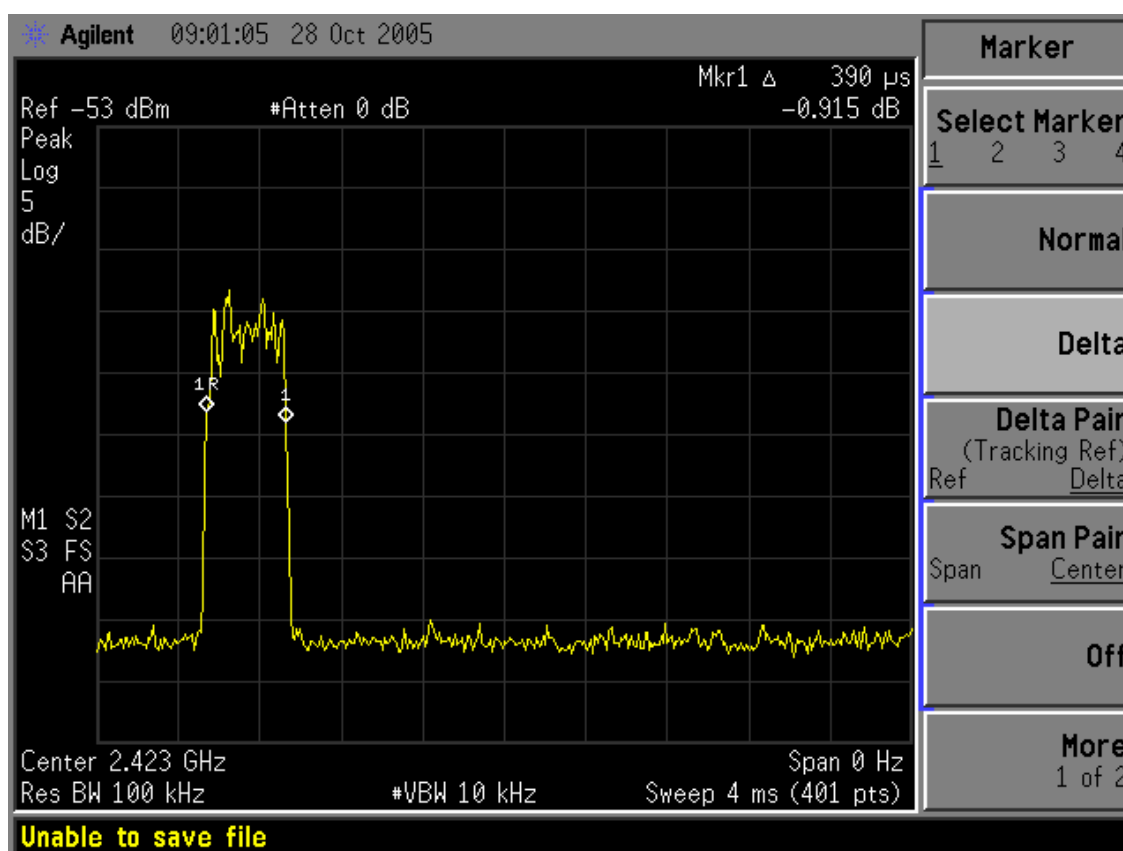
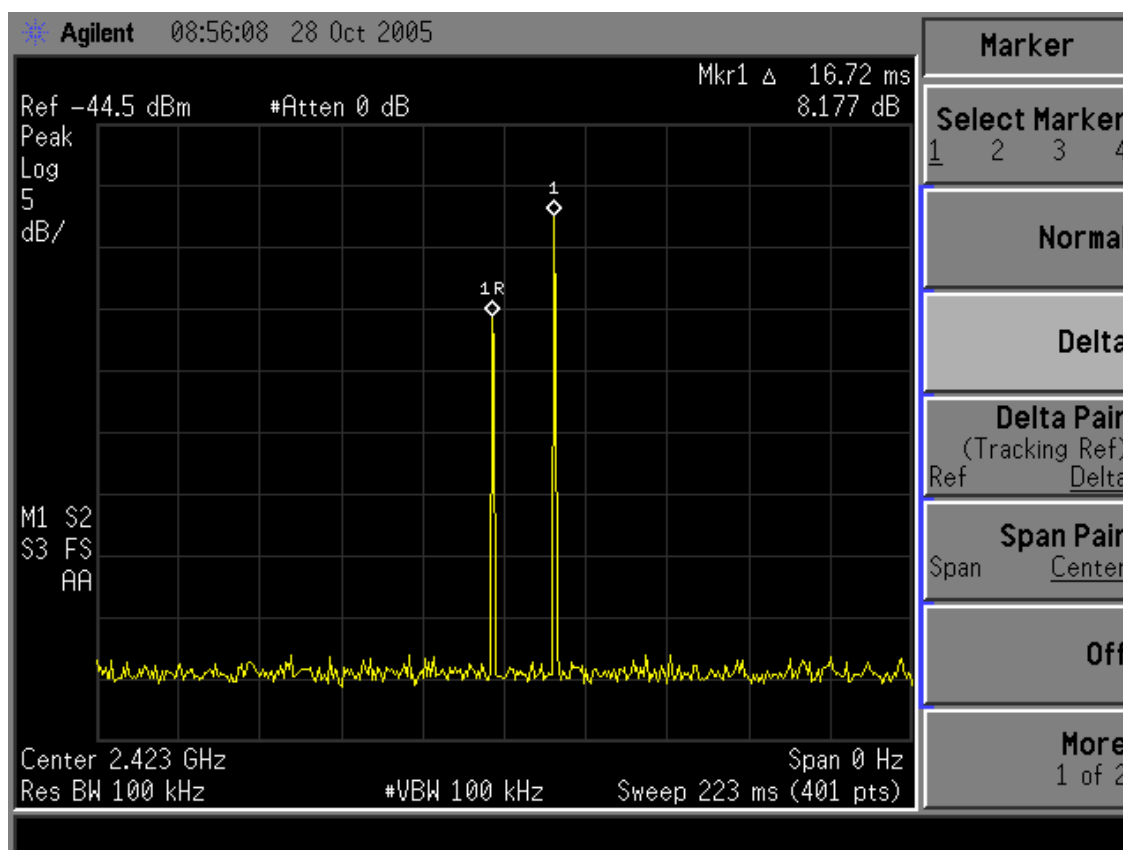
Conducted emission on power supply
Average value detection
In communication WIFI
27/10/2005

CURVE 17



□□□ End of report, 3 annexes to be forwarded □□□

ANNEX 1



ANNEX 2

Customer's questionnaire

- A - PARTIE ADMINISTRATIVE
Administrative Part

Formulaire à retourner par courriel au :

Please, return this form by e-mail to:

Nom contact EMITECH :

EMITECH contact's name :

(Il est important de remplir complètement les questionnaires dans chaque langue du rapport désiré, car ils sont nécessaires à l'établissement de notre proposition technique et financière ainsi qu'au bon déroulement de la prestation).

(It's very important to fill in properly the forms in every language of required report, because they are necessary for the quotation and for a good progress of tests).

A 1- Client (pour lequel l'essai ou la certification est demandé) :

Client (for whom the testing/certification is requested)

Société/Company :VIOLET SARL

Contact/Contact name : OLIVIER MEVEL

Adresse/Address : 8 RUE DU DAHOMEY - 75011 PARIS - FRANCE

Tél : 0155255250

Fax : 0155255251

Email :OMEVEL@VIOLET.NET

A 2- Représentant ou Mandataire (pour le client ci-dessus si différent du client) :

Authorised Representative (if different than client)

Société/Company :

Contact/Contact name :

Adresse/Adress :

Tél :

Fax :

Email :

A 3- Fabricant (si différent du client) :

Manufacturer (if different than client)

Société/Company :ROOTLAND

Contact/Contact name :

Adresse/Adress : CHINE

Tél :

Fax :

Email :

Nota important : *Ce formulaire A (administratif) ainsi que le formulaire B (parties techniques) et les questionnaires spécifiques CEM & Radio seront intégrés dans le rapport d'essai*

Important notice: *This form A (administrative) and the form B (technical part) and the specific EMC & Radio forms will be integrate in the test report.*

-B - PARTIE TECHNIQUE*Technical part (for all types of equipment)***Descriptif de la configuration à tester (joindre des photos et/ou des schémas)***Equipment's specification to test (join photos and/or schemes)***Désignation/fonction : OBJET COMMUNICANT***Designation/function:***Marque commerciale/Trade mark : NABAZTAG***Référence/Modèle/Type :***Produit/product :** ☒ OUI ☐ NON **Système/system :** ☐ OUI ☐ NON**Nbre d'éléments (si système)/Nb of element (if system) :****Gamme de produits/product's range :**série/serial : ☒ OUI ☐ NONprésérie/pilot run : ☐ OUI ☐ NONprototype/prototype : ☐ OUI ☐ NON**Alimentation/supply :** mono : Vac tri : Vac avec ou sans neutre :**with or without neutral:**

Batterie/battery : Vdc adaptateur secteur/adaptor :

*autre/other :**préciser/specify :***Plage de tension/voltage range : 110-230V****Fréquence ou plage de fréquence/frequency range : 50-60Hz****Courant nominal/nominal current : 1 A****Puissance/power :** W ou/or VA**Si le produit est embarqué/has the equipment been fitted :****Type de véhicule/kind of vehicle :****Connexion à un réseau de télécommunication/connection to telecom network :**RTC/CRT : ☐ OUI ☐ NONRNIS/ISDN : ☐ OUI ☐ NONADSL : ☐ OUI ☐ NONEthernet : ☐ OUI ☐ NON**Fonction/liaison radio/function/radio link :** ☒ OUI ☐ NON**Autres/others :****Poids/weight : 1 Kg** **Taille/size : (L x l x h): 10x10x20****Température max. d'utilisation/max. temperature use :****Présence de liquide (ou produit dangereux)/liquid's presence (or dangerous product) :****Connexions particulières (eau, gaz...)/specific connection (water,gas...) :****Legende/legend :** ☐ **cocher la case appropriée/put a cross if appropriate****OUI for YES****NON for NO**

Technical part (continued)

[illegible]

ANNEX 3

Antenna factors, insertion losses and amplifier values

BILL OF MATERIAL

The test antenna used for the radiated emission between 30 MHz and 300 MHz is the biconical antenna n° 1144. Antenna factors are given in table 1.

The test antenna used for the radiated emission between 300 MHz and 1 GHz is the log-periodic antenna n° 3106. Antenna factors are given in table 2.

The measuring receiver n° 1057 used in the frequency range 30 MHz to 1 GHz has an integrated preamplifier.

The test cable used between 9 kHz and 1 GHz to connect the antennas to the receiver/analyzer for measurements at a distance of 3 meters.

The test antennas used for the radiated emission between 1 GHz and 24 GHz are the horn antenna n° 3374 and 1045. Antenna factors are given in table 3.

The amplifier n° 3229 and its cable used to connect the spectrum analyzer to the test cable has gain values given in the table 4.

The test cable used between 1 GHz and 24 GHz to connect the horn antenna to the amplifier for measurements at a distance of 3 meters has losses given in table 5.

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
30	12.6	120	12.3
35	10.7	125	12.3
40	10.5	140	13.1
45	9.1	150	13.8
50	9.0	160	14.5
60	9.8	175	15.9
70	10.1	180	16.4
80	10.7	200	17.6
90	10.6	250	21.3
100	11.6	300	24.6
TABLE 1: BICONICAL ANTENNA WITH LOSS CABLE			

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
300	18.6	700	25.0
400	19.7	800	26.1
500	21.6	900	27.5
600	23.7	1000	29.2
TABLE 2: LOG-PERIODIC ANTENNA WITH LOSS CABLE			

Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)
1.0	24.2	7.0	35.4	14	40.8
1.5	25.4	7.5	36.6	15	40.8
2.0	27.3	8.0	36.8	16	38.4
2.5	28.6	8.5	37.5	17	39.7
3.0	30.1	9.0	37.8	18	45.2
3.5	31.3	9.5	37.9	18	31.2
4.0	32.7	10.0	38.0	19	31.8
4.5	32.8	10.5	38.1	20	31.7
5.0	33.4	11.0	38.3	21	31.2
5.5	34.2	11.5	38.6	22	31.4
6.0	34.4	12.0	39.0	23	31.0
6.5	34.4	13.0	39.5	24	31.1
TABLE 3 : HORN ANTENNA 3374 (1 to 18 GHz) and 1045 (18 to 25 GHz)					

Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)
1.0	30.4	7.0	31.8	14	32.6
1.5	30.9	7.5	31.8	15	30.5
2.0	30.6	8.0	31.2	16	27.4
2.5	30.1	8.5	30.2	17	27.9
3.0	29.3	9.0	29.3	18	28.3
3.5	29.0	9.5	29.0	20	27.6
4.0	28.7	10.0	29.1	22	28.4
4.5	28.5	10.5	29.4	24	29.2
5.0	29.0	11.0	29.7	26	30.7
5.5	29.5	11.5	30.1		
6.0	30.5	12.0	31.2		
6.5	31.4	13.0	32.9		
TABLE 4: AMPLIFIER (1 – 26 GHz)					

Frequency (GHz)	Loss (dB)	Frequency (GHz)	Loss (dB)	Frequency (GHz)	Loss (dB)
1.0	2.5	4.5	5.2	18	11.3
1.5	3.0	5	5.6	21	13.0
2.0	3.5	6	6.2	24	14.1
2.5	3.9	8	7.3		
3.0	4.2	10	8.1		
3.5	4.5	12	8.9		
4.0	5.0	15	10.0		
TABLE 5: TEST CABLE FOR 3 M MEASUREMENT					

ANNEX 4

Test setup photographs









