RC-06-42073-1-A-FL-PH

E.M.C Test Report

According to the standard:

FCC PART 15 Edition 2006

Equipment under test:
NABAZTAG AT 2.4 GHz and 13.56 MHz
Ref.: MAC : 0013D37AD658

Company:
VIOLET

DISTRIBUTION: Mr LEBEDEL

(Company: VIOLET)

Number of pages: 54 with 3 annexes

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EMITECH C129 Rév.0

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TEST CERTIFICATION FOR:	Fcc Certification
NAME OF THE EQUIPMENT UNDER TEST:	NABAZTAG AT 2.4 GHz AND 13.56 GHz Type : MAC : 0013D37AD658
NAME OF THE MANUFACTURER:	VIOLET
ADDRESS OF THE APPLICANT:	
Company:	VIOLET
Address:	8 rue du Dahomey 75011 PARIS FRANCE
Person in charge:	Mr LEBEDEL
Person present during the tests:	Mr LEBEDEL
DATES OF TESTS:	2006, the 14th, 15th, 18th of September 2006, the 03rd of October
TESTS LOCATIONS:	EMITECH laboratory in Montigny le Bretonneux (78) - FRANCE Open area test site in Aunainville (28) - FRANCE
TESTS OPERATORS:	F. LHEUREUX / B. PELLERIN

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Annex 1: Hopping timing measurement
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Annex 3: Test setup photographs

1. *INTRODUCTION*

This document submits the results of Electromagnetic Compatibility tests performed on the equipment «*NABAZTAG AT 2.4 GHz AND 13.56 MHz ref. : MAC : 0013D37AD658*» herein referred to as the EUT, according to the document listed below.

2. *REFERENCE DOCUMENT*

FCC Part 15 Edition 2006:
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 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
Section 15.225 (a)	Intentional radiated emissions in the band 13.110 MHz – 14.010 MHz	X				
Section 15.209	Unintentional radiated emissions in the band 9 kHz-30MHz	X				
Section 15.225 (e)	Frequency drift	X				

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 24.65 ms (see annex n° 1) during 814.1 µs with 15 channels x 0.4 s (part 15) = 6 s.
The transmitter for 6 s transmits 359 times, then 359 x 814.1 µs = 292 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 AND 13.56 MHz ref.: MAC: 0013D37AD658*" complies with the requirements of the standard:

- FCC PART 15 Edition 2006

according to the limits specified in the present report.

5. *INTENTIONAL RADIATED EMISSIONS IN THE BAND 13.110 MHz – 14.010 MHz*

Standard: FCC PART 15 Edition 2006

Section: 15.225 (a)

Equipment under test arrangement

Category of equipment: Table-top equipment

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

Antenna height is 1 m above the ground plane.
For each frequency corresponding to an emission, EUT carried out a rotation through 360° with the aid of the turntable, with the aim to find the maximum of signal.
The test antenna is oriented in all orientations. Only the highest level is recorded.

Frequency range: 13.553 MHz – 13.567 MHz

Detection mode: Quasi-peak.

Resolution bandwidth: 200 Hz

Measurement distance: 30 meters.

Limit:

Frequency range (MHz)	Frequency field strength		Frequency measurement distance (meters)
	µV/m	dBµV/m	
13.593 – 13.567	15848	84.0	30

Operating mode during the test:

EUT is in permanent transmission.

Instrumentation test list:

Meter	Nr Emitech	Category	Mark	Type
181	02/010	Receiver	Rohde & Schwarz	ESH3
315	24/049	Loop antenna	Rohde et Schwarz	HFH2-Z2
2102	14/066	Power supply	Secas	CF1000 50/60
2451	35/071	Cable	Cables&Connectiques	HF 2m
2452	35/072	Cable	Cables&Connectiques	HF 13m
2863	35/240	Cable	Cables&Connectiques	N-7m
3196	26/059	resistor	Emitech	5 kOhms +/-2%
4359	35/588	Cable	Cables&Connectiques	N-2m

Results:

No frequency has been measured above the ambient noise.

The equipment complies with the requirements of the standard.

6. *MAXIMUM PEAK POWER MEASUREMENT*

Standard: FCC PART 15 Edition 2006

Section: 15.247 (b) (1)

Instrumentation test list:

Meter	Nr Emitech	Category	Mark	Type
1097	18/082	High pass filter	Trilithic	6HC1300-2.5-KK
2102	14/066	Power supply	Secas	CF1000 50/60
2205	02/068	Spectrum analyzer	Agilent	E7405A
2864	35/241	Cable	Cables&Connectiques	N-SMA
2896	35/273	Cable	Cables&Connectiques	N-13m
3229	01/127	Preamplifier	Miteq	AMF-6D-010250-70-7P
3374	24/604	Antenna	Emco	3115

Test procedure:

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.

Measure condition:

Ambient temperature (°C): 20
Relative humidity (%): 75

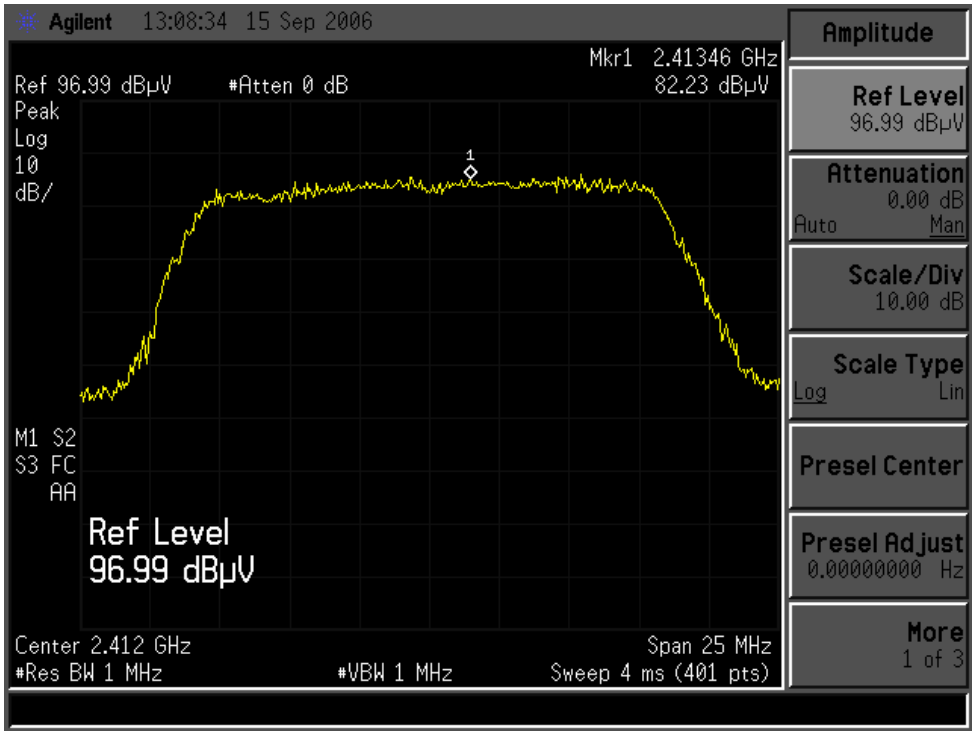
For RF peak level: Resolution bandwidth: 1 MHz
Video bandwidth: 1 MHz

Results:

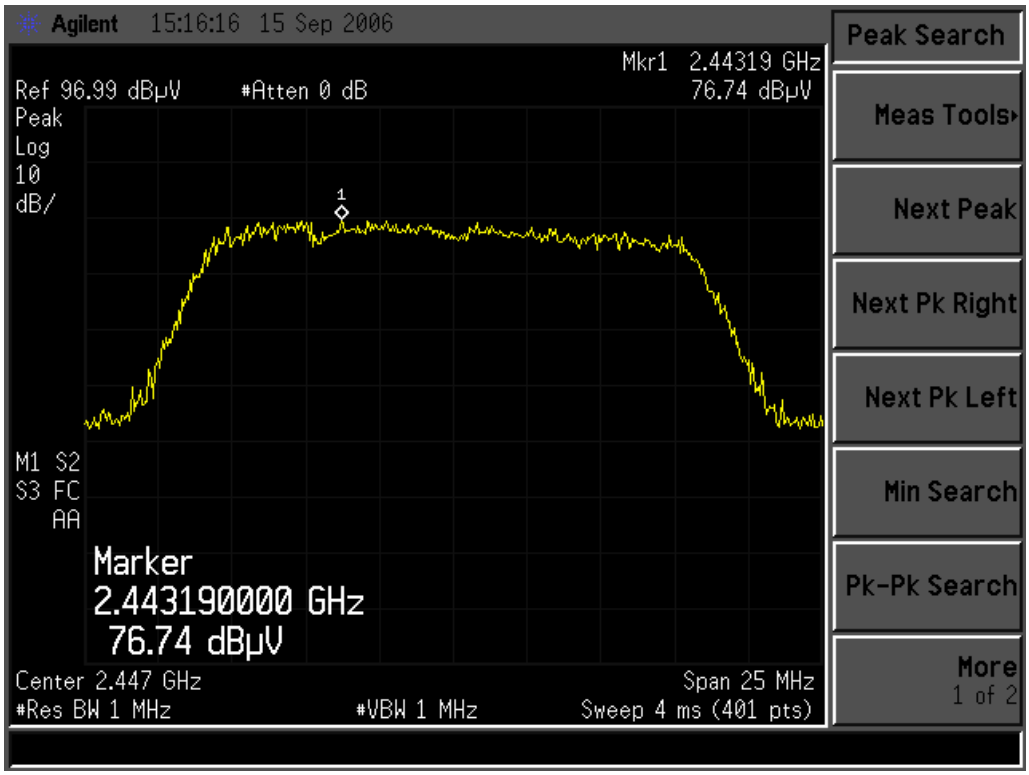
Channel	Channel frequency (MHz)	RF peak level (dBµV/m)	Maximum limit (dBm)
1	2413	88.3 (curve 1)	143
7	2443	82.8 (curve 2)	143
11	2459	90.9 (curve 3)	143

Test conclusion: The equipment complies with the requirements of the standard.

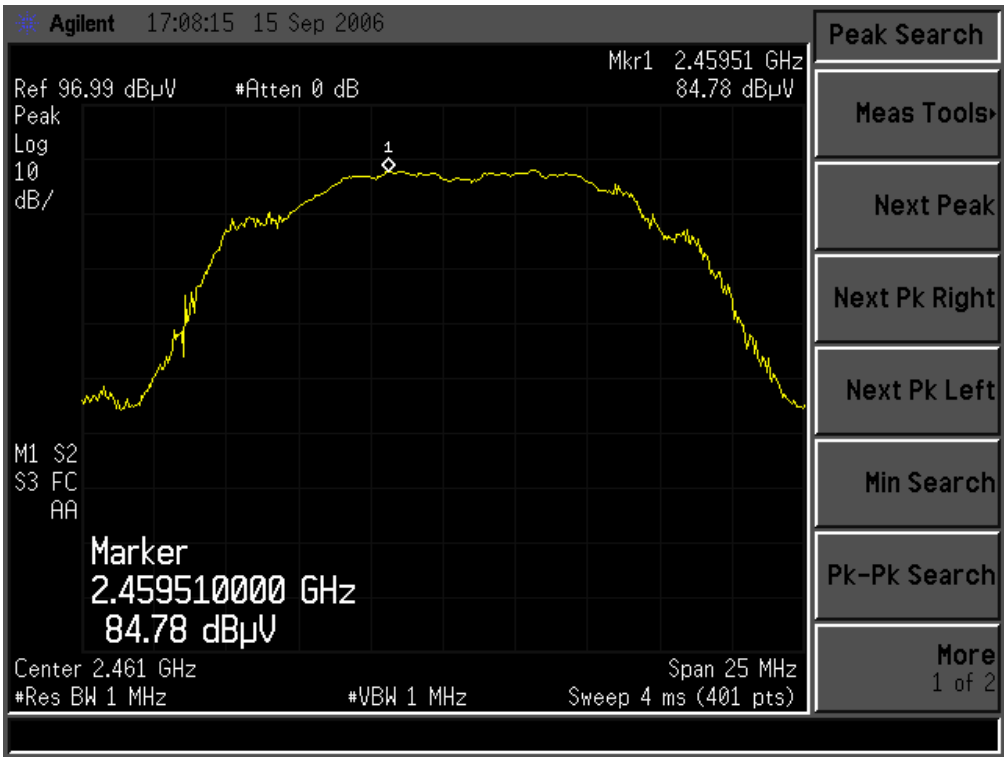
Curve 1



Curve 2



Curve 3


Agilent 17:08:15 15 Sep 2006
Mkr1 2.45951 GHz
Ref 96.99 dBµV #Atten 0 dB
84.78 dBµV
Peak
Log
10
dB/
1
M1 S2
S3 FC
AA
Marker
2.459510000 GHz
84.78 dBµV
Center 2.461 GHz
Span 25 MHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

7. *POWER SPECTRAL DENSITY MEASUREMENT*

Standard: FCC PART 15 Edition 2006

Section: 15.247 (e)

Instrumentation test lis:

Meter	Nr Emitech	Category	Mark	Type
1097	18/082	High pass filter	Trilithic	6HC1300-2.5-KK
2102	14/066	Power supply	Secas	CF1000 50/60
2205	02/068	Spectrum analyzer	Agilent	E7405A
2864	35/241	Cable	Cables&Connectiques	N-SMA
2896	35/273	Cable	Cables&Connectiques	N-13m
3229	01/127	Preamplifier	Miteq	AMF-6D-010250-70-7P
3374	24/604	Antenna	Emco	3115

Test procedure:

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 degres rotation of the EUT is performed in vertical and horizontal polarization.

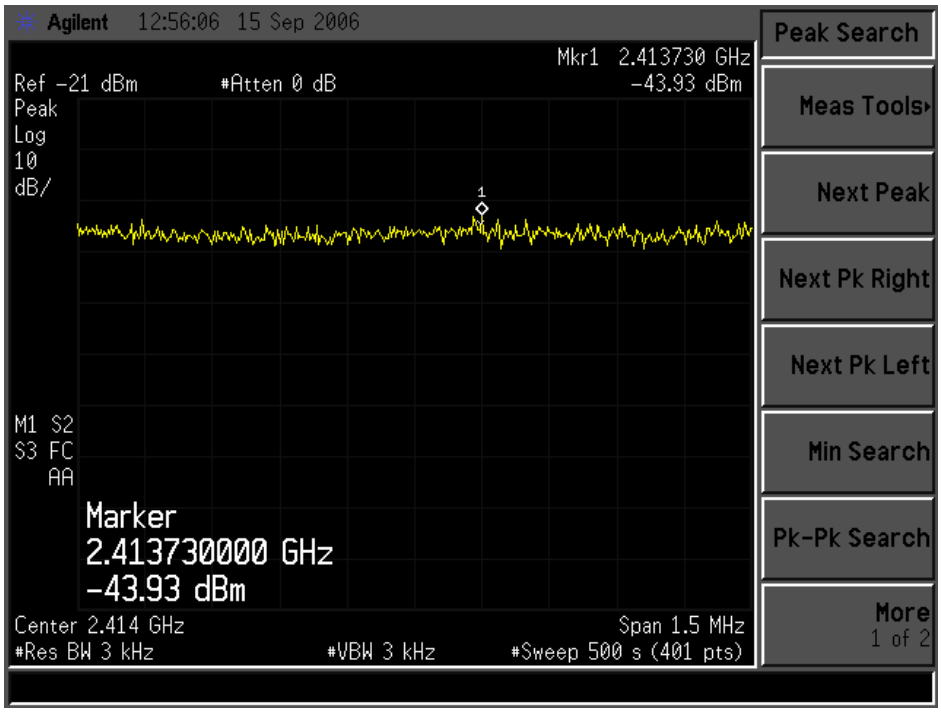
Measured condition: Resolution bandwidth: 3 kHz.
Video bandwidth: 3 kHz.
SPAN: 1.5 MHz.
Sweep: 500 seconds.
Ambiant temperature C°: 20
Relative humidity (%): 75

Result:

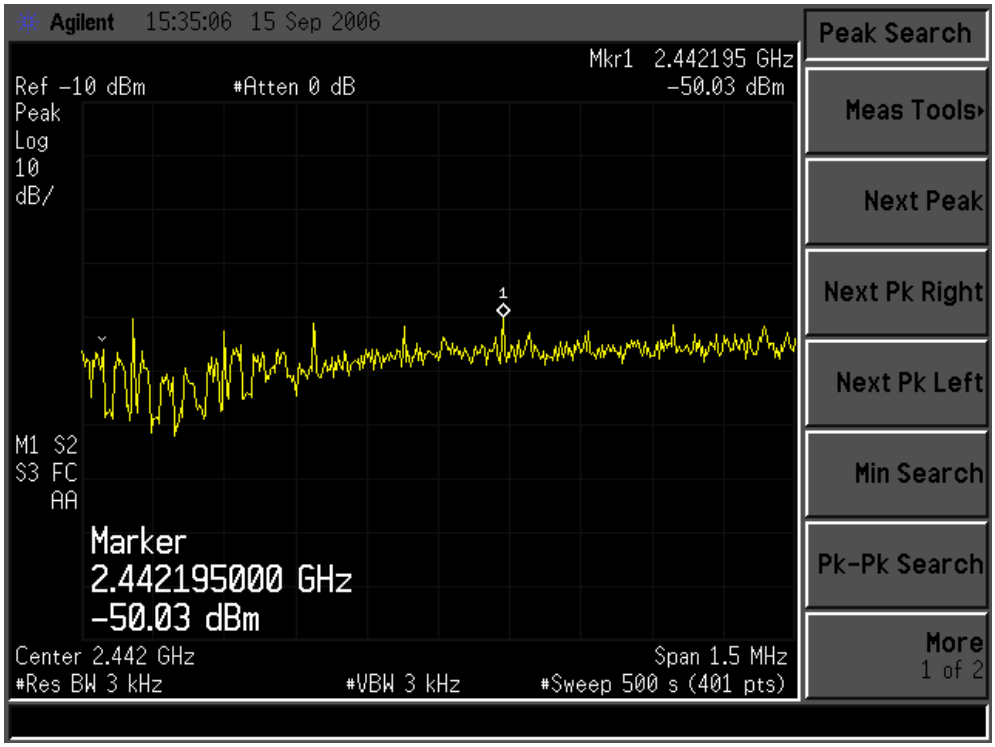
Channel	Channel frequency (MHz)	RF power level (dBµV/m)	Limit (dBµV/m)	Curve reference
1	2413	69.2	121	Curve 4
7	2443	63.1	121	Curve 5
11	2459	70.7	121	Curve 6

Test conclusion: The equipment complies with the requirements of the standard.

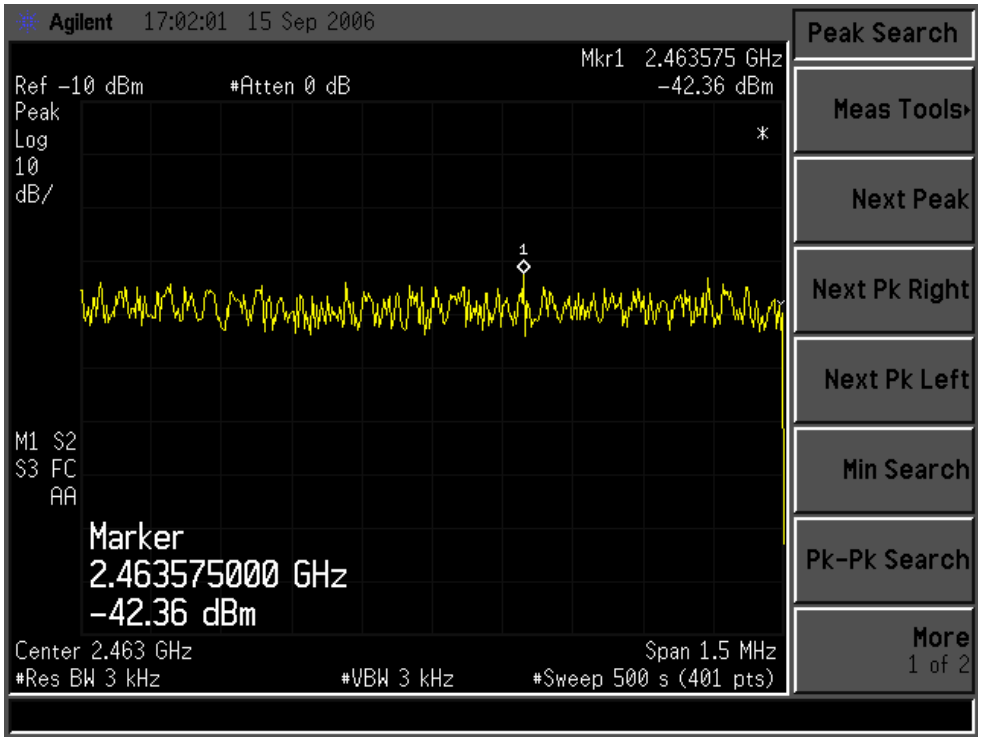
Curve 4



Curve 5



Curve 6


Agilent 17:02:01 15 Sep 2006
Mkr1 2.463575 GHz
Ref -10 dBm #Atten 0 dB -42.36 dBm
Peak
Log
10
dB/
1
M1 S2
S3 FC
AA
Marker
2.463575000 GHz
-42.36 dBm
Center 2.463 GHz
Span 1.5 MHz
#Res BW 3 kHz
#VBW 3 kHz
#Sweep 500 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

8. *6 dB BANDWIDTH MEASUREMENT*

Standard: FCC PART 15 Edition 2006

Section: 15.247 (a) (2)

Instrumentation test list:

Meter	Nr Emitech	Category	Mark	Type
187	16/004	OATS	Emitech	Site champ libre
2102	14/066	Power supply	Secas	CF1000 50/60
2205	02/068	Spectrum analyzer	Agilent	E7405A
2864	35/241	Cable	Cables&Connectiques	N-SMA
2896	35/273	Cable	Cables&Connectiques	N-13m
3229	01/127	Preamplifier	Miteq	AMF-6D-010250-70-7P
3374	24/604	Antenna	Emco	3115

Test procedure:

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

Measure condition:

Resolution bandwidth: 100 kHz
Video bandwidth: 100 kHz

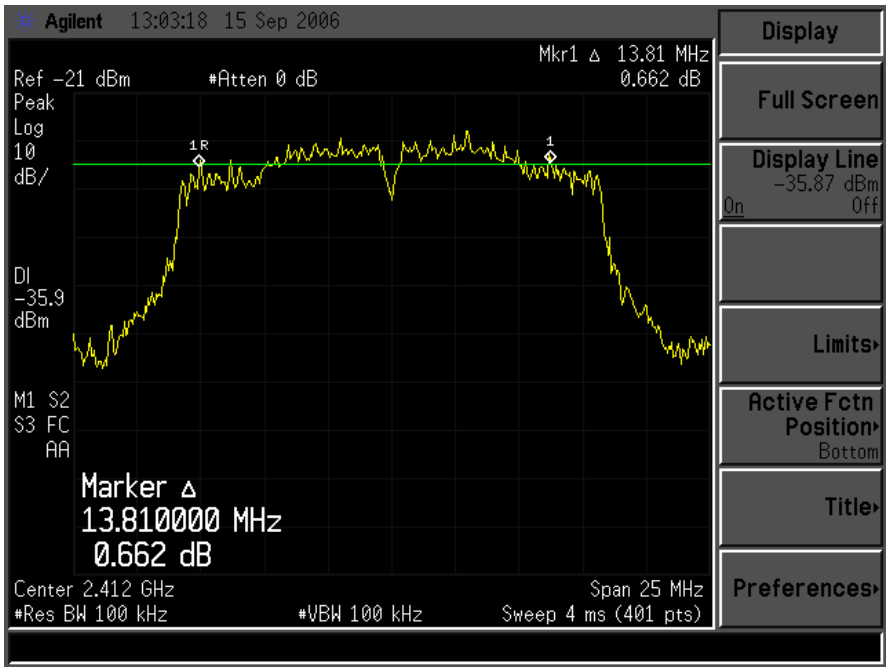
Ambient temperature (°C): 20
Relative humidity (%): 75

Results:

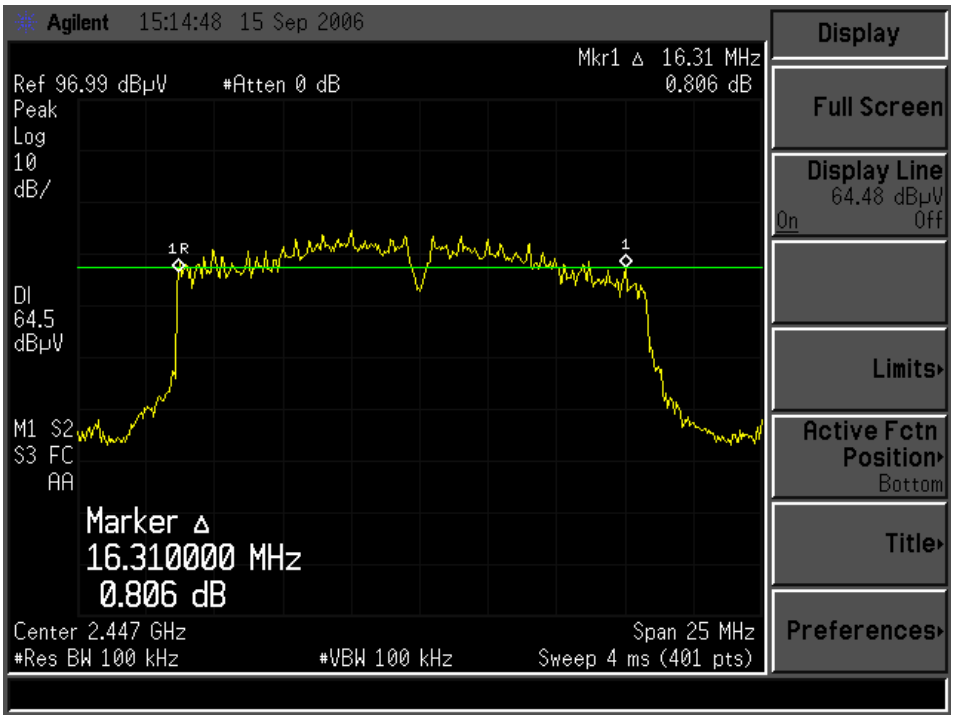
Channel	Channel frequency (MHz)	Limit (kHz)	6 dB bandwidth (MHz)	Curve reference
1	2412	> 500	13.81	Curve 7
7	2447	> 500	16.31	Curve 8
11	2462	> 500	12.63	Curve 9

Test conclusion: The equipment complies with the requirements of the standard.

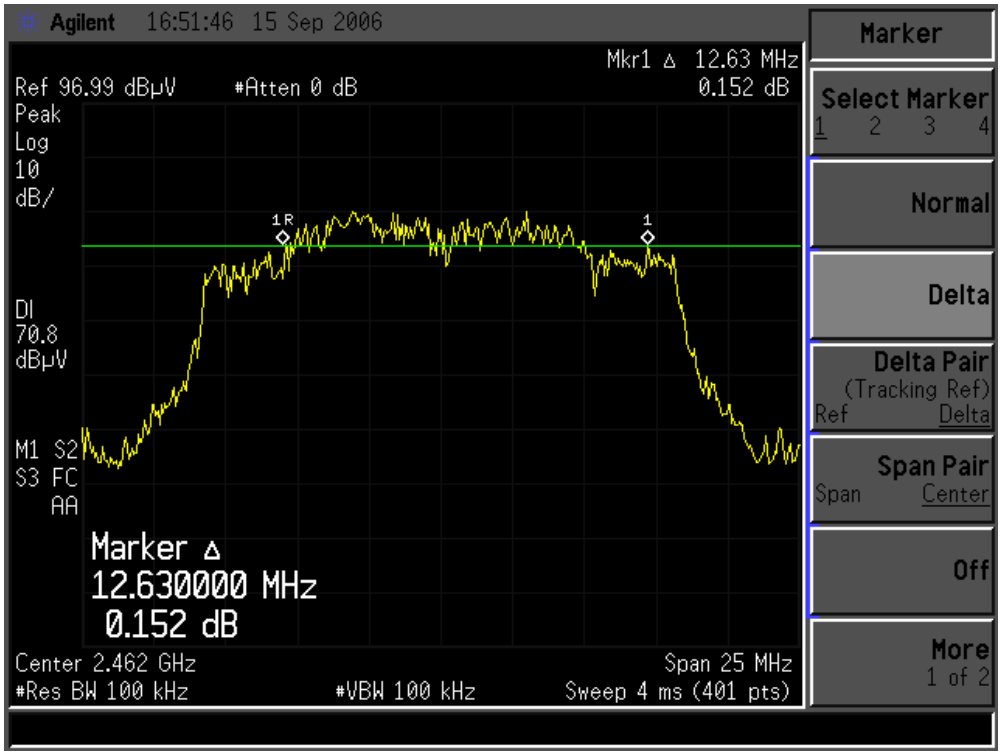
Curve 7



Curve 8



Curve 9


Agilent 16:51:46 15 Sep 2006
Mkr1 Δ 12.63 MHz
0.152 dB
Ref 96.99 dBµV
#Atten 0 dB
Peak
Log
10
dB/
DI
70.8
dBµV
M1 S2
S3 FC
AA
Marker Δ
12.630000 MHz
0.152 dB
Center 2.462 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 25 MHz
Sweep 4 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

9. *BAND EDGE MEASUREMENT*

Standard: FCC PART 15 Edition 2006

Section: 15.247 (d)

Instrumentation test list:

Meter	Nr Emitech	Category	Mark	Type
187	16/004	OATS	Emitech	Site champ libre
1097	18/082	High pass filter	Trilithic	6HC1300-2.5-KK
2102	14/066	Power supply	Secas	CF1000 50/60
2205	02/068	Spectrum analyzer	Agilent	E7405A
2864	35/241	Cable	Cables&Connectiques	N-SMA
2896	35/273	Cable	Cables&Connectiques	N-13m
3229	01/127	Preamplifier	Miteq	AMF-6D-010250-70-7P
3374	24/604	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: 1 MHz
Video bandwidth: 1 MHz

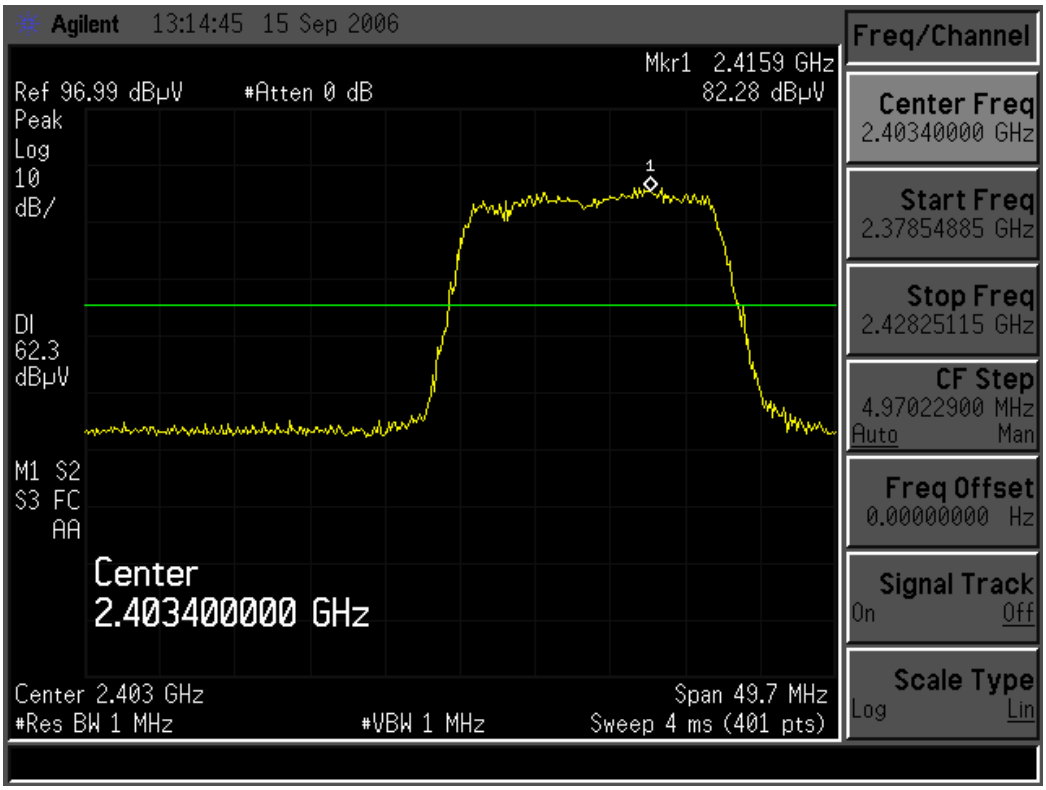
Ambient temperature (°C): 20
Relative humidity (%): 75

Results:

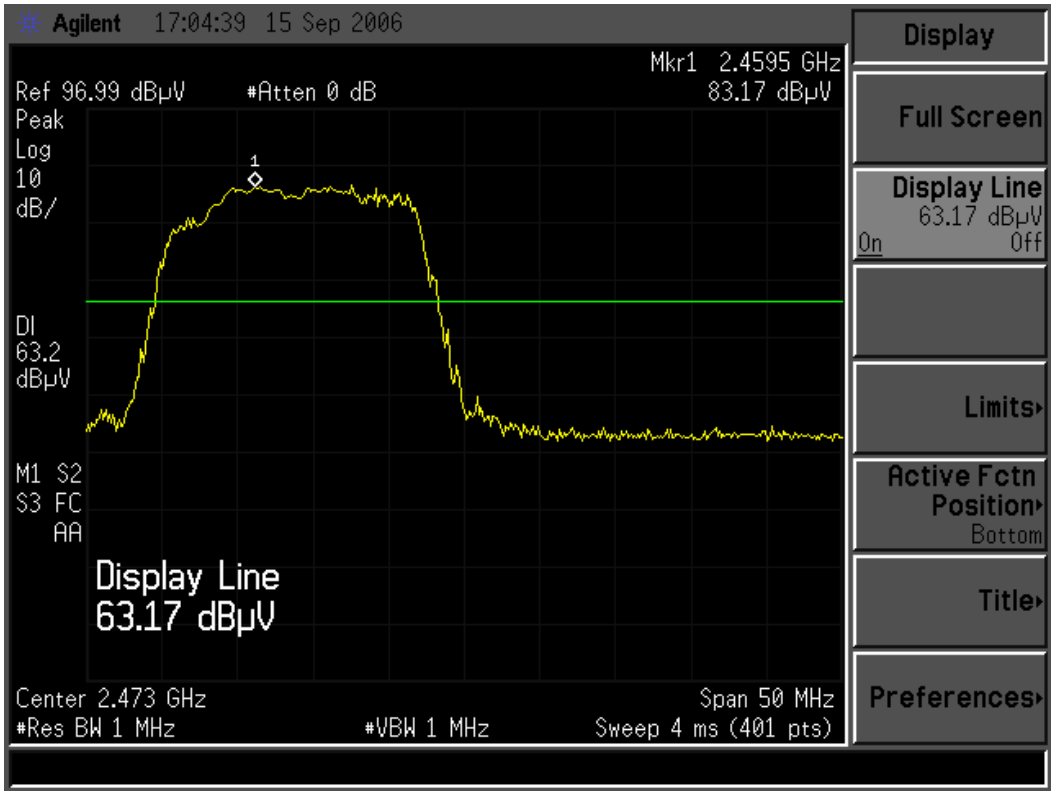
Lowest frequency limit: Curve 10
Highest frequency limit: Curve 11

Test conclusion: The equipment complies with the requirements of the standard.

Curve 10



Curve 11



10. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 9 KHZ – 30 MHZ

Standard: FCC PART 15 Edition 2006

Section: 15.205 and 15.209

Equipment under test arrangement

Category of equipment: Table-top equipment

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

Antenna height is 1 m above the ground plane.

For each frequency corresponding to an emission, EUT carried out a rotation through 360° with the aid of the turntable, with the aim to find the maximum of signal.

The test antenna is oriented in two orientations (perpendicular or parallel). Only the highest level is recorded.

Frequency range: 9 kHz - 30 MHz.

Detection mode: Quasi-peak except frequency bands 9-90 kHz and 110-490 kHz (average).

Resolution bandwidth: 200 Hz from 9 kHz to 150 kHz.
9 kHz from 150 kHz to 30 MHz

Measurement distance: 30 meters.

Limit:

Frequency range (MHz)	Frequency field strength (µV/m)	Frequency measurement distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30

Limits in dBµV/m can be extrapolated to 10 m using 40 dB / decade.

Operating mode during the test: RFID mode. EUT is in permanent transmission.

Instrumentation test list:

Meter	Nr Emitech	Category	Mark	Type
187	16/004	OATS	Emitech	Site champ libre
315	24/049	Loop antenna	Rohde et Schwarz	HFH2-Z2
2102	14/066	Power supply	Secas	CF1000 50/60
2205	02/068	Spectrum analyzer	Agilent	E7405A
2451	35/071	Cable	Cables&Connectiques	HF 2m
2452	35/072	Cable	Cables&Connectiques	HF 13m
2863	35/240	Cable	Cables&Connectiques	N-7m
4359	35/588	Cable	Cables&Connectiques	N-2m

Results:

No frequency has been measured above the ambient noise.

Test conclusion: The equipment complies with the requirements of the standard.

11. *UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHZ – 25 GHZ*

Standard: FCC PART 15 Edition 2006

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.

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 (dBµV/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.

Limit for peak detection: 90.9 dBµV/m

Instrumentation test list:

Meter	Nr Emitech	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	High pass 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
2451	35/071	Cable	Cables&Connectiques	HF 2m
2452	35/072	Cable	Cables&Connectiques	HF 13m
2643	18/233	High pass filter	Filtek	HP12/3200-5AA
2896	35/273	Cable	Cables&Connectiques	N-13m
3106	24/571	Antenna	Schwarzbeck	UHALP 9108
3229	01/127	Preamplifier	Miteq	AMF-6D-010250-70-7P
3374	24/604	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.

TEST SITE: Open area test site TABLE 1

RADIATED EMISSION: Electric field

STANDARD: FCC Part 15.209 and 15.205 Edition 2006

TEST DISTANCE: 3 m

POLARIZATION: Vertical

MODEL: NABAZTAG AT 2.4 GHz AND 13.56 MHz ref.: MAC: 0013D37AD658

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
35.022	388	20	30.0	70.9	40.9
40.694	117	0	35.2	70.9	35.7
54.264	100	300	28.0	70.9	42.9
64.001	100	20	30.0	70.9	40.9
67.824	134	190	34.3	70.9	36.6
108.524	100	170	38.1	43.5	5.4
135.654	100	0	23.1	43.5	20.4
176.348	100	0	30.2	70.9	40.7
189.914	100	10	32.0	70.9	38.9
203.477	120	10	36.7	70.9	34.2
217.045	100	60	32.5	70.9	38.4
230.610	100	10	31.9	70.9	39.0
298.438	180	60	36.2	70.9	34.7
325.568	160	110	33.8	46.0	12.2
339.133	150	110	32.8	70.9	35.1
420.522	150	40	32.1	70.9	38.8
456.019	100	350	31.2	70.9	39.7
501.917	100	340	28.7	70.9	42.2

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 2006

TEST DISTANCE: 3 m

POLARIZATION: Horizontal

MODEL: NABAZTAG AT 2.4 GHz AND 13.56 MHz ref.: MAC: 0013D37AD658

FREQUENCY (MHz)	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dBµV/m)	LIMIT (dBµV/m)	MARGIN (dB)
40.695	120	220	26.5	70.9	44.4
54.261	180	260	22.7	70.9	48.2
108.519	367	260	29.3	43.5	14.0
217.042	100	80	34.8	70.9	36.1
230.609	246	110	36.4	70.9	34.5
256.001	140	290	32.4	46.0	13.6
288.008	100	0	28.0	70.9	42.9
325.565	290	0	27.1	46.0	18.9
384.010	100	40	28.8	46.0	17.2

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

12. *MEASUREMENT OF CONDUCTED EMISSION ON AC MAINS PORTS*

Standard: FCC Part 15 Edition 2006

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 (dBµV)	
	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 + RFID.

Instrumentation test list:

Meter	Nr Emitech	Category	Mark	Type
000	34/073	Software	Nexio	V 3.1.7.1
758	18/054	Transient limiter	Hewlett Packard	11947 A
813	24/129	LISN	PMM	L3 - 25
1804	16/020	Test enclosure	Emitech	JD
2812	35/189	Cable	Cables&Connectiques	N-2m
2814	35/191	Cable	Cables&Connectiques	N-2m
3771	14/119	AC power source	Kikusui	PCR4000L
4112	02/105	voltmeter	Rohde & Schwarz	ESH3

Results:

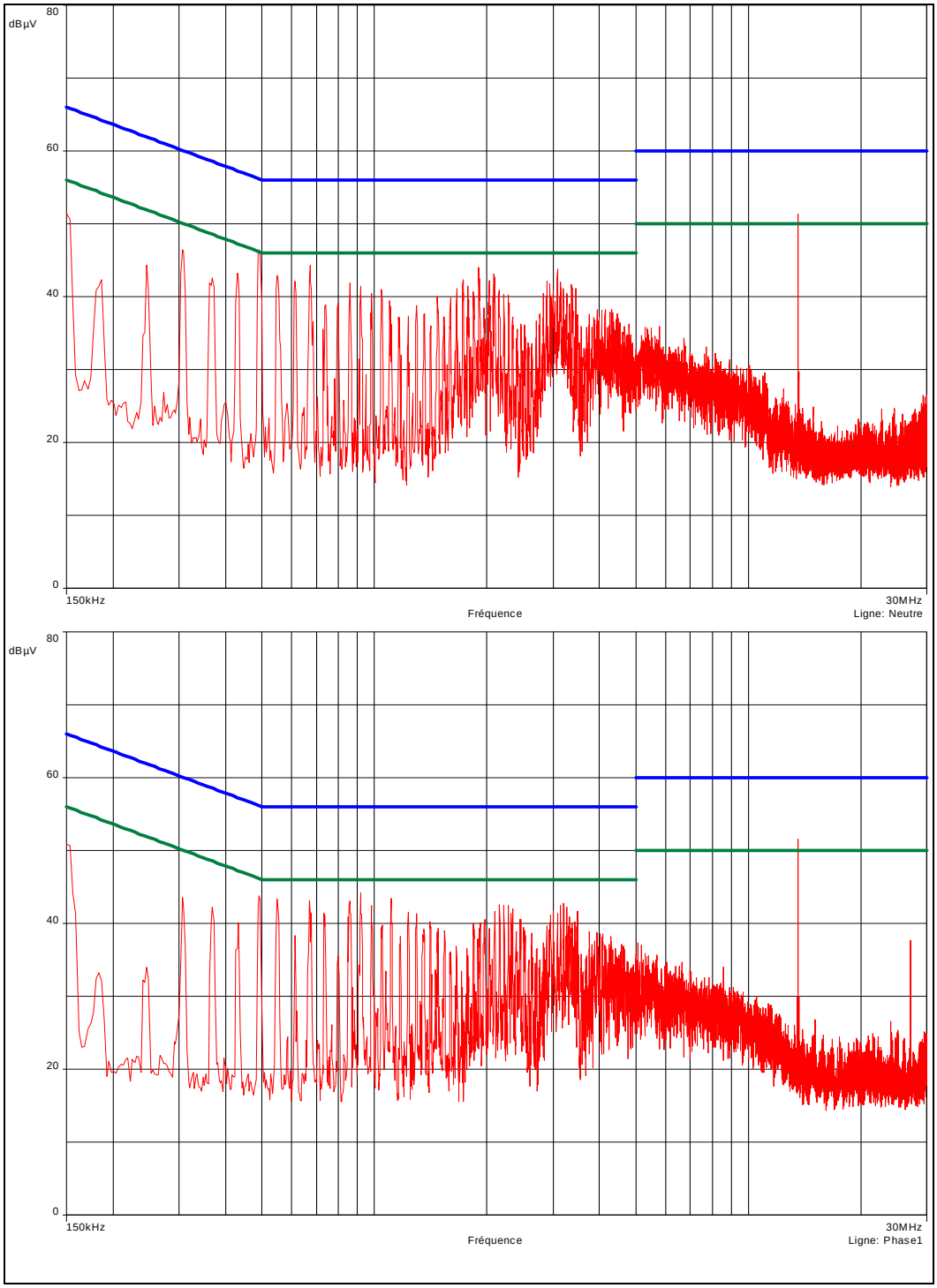
Curve reference	Comments
Curve 12	Measurement of peak detection on wire 1
Curve 13	Measurement of peak detection on wire 2
Curve 14	Measurement of average detection on wire 2

Test conclusion: The equipment complies with the requirements of the standard.

NABAZTAG AT 2.4 GHz and 13.56 MHz
Ref.: MAC : 0013D37AD658

CONDUCTED EMISSION ON POWER SUPPLY
110V-60Hz / Peak detection
18/09/2006

CURVE 12 and 13

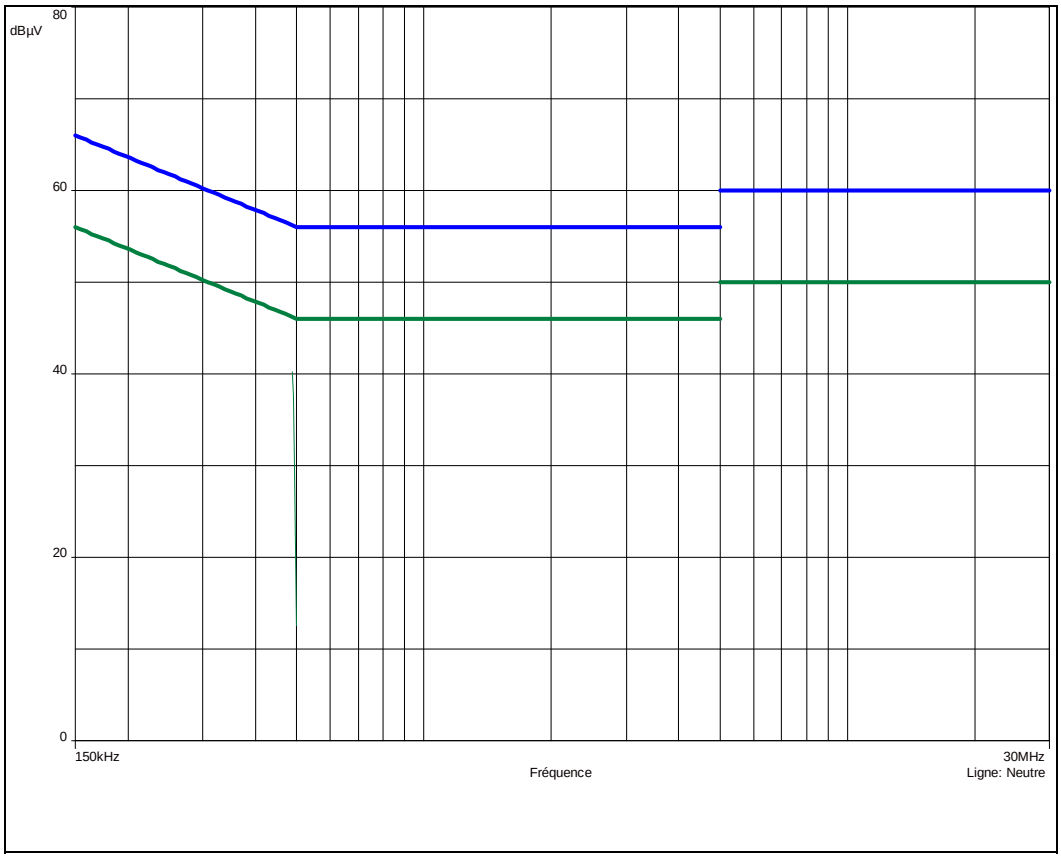


Class : B of the standard

NABAZTAG AT 2.4 GHz and 13.56 MHz
Ref.: MAC : 0013D37AD658

CONDUCTED EMISSION ON POWER SUPPLY
110V-60Hz / Average value detection
18/09/2006

CURVE 14



Class : B of the standard

13. *FREQUENCY DRIFT*

Standard: FCC Part 15 Edition 2006

Section: 15.225 (e)

Test equipment used:

Meter	Nr Emitech	Category	Mark	Type
2205	02/068	Spectrum analyzer	Agilent	E7405A
2694	07/111	Climatic enclosure	Flonic Schlumberger	200P
3771	14/119	AC power source	Kikusui	PCR4000L

Measurement conditions:

Resolution bandwidth: 9 kHz

Video bandwidth: 30 kHz

Test operating conditions of the equipment:

The transmitter is in transmission with modulation.

Results:

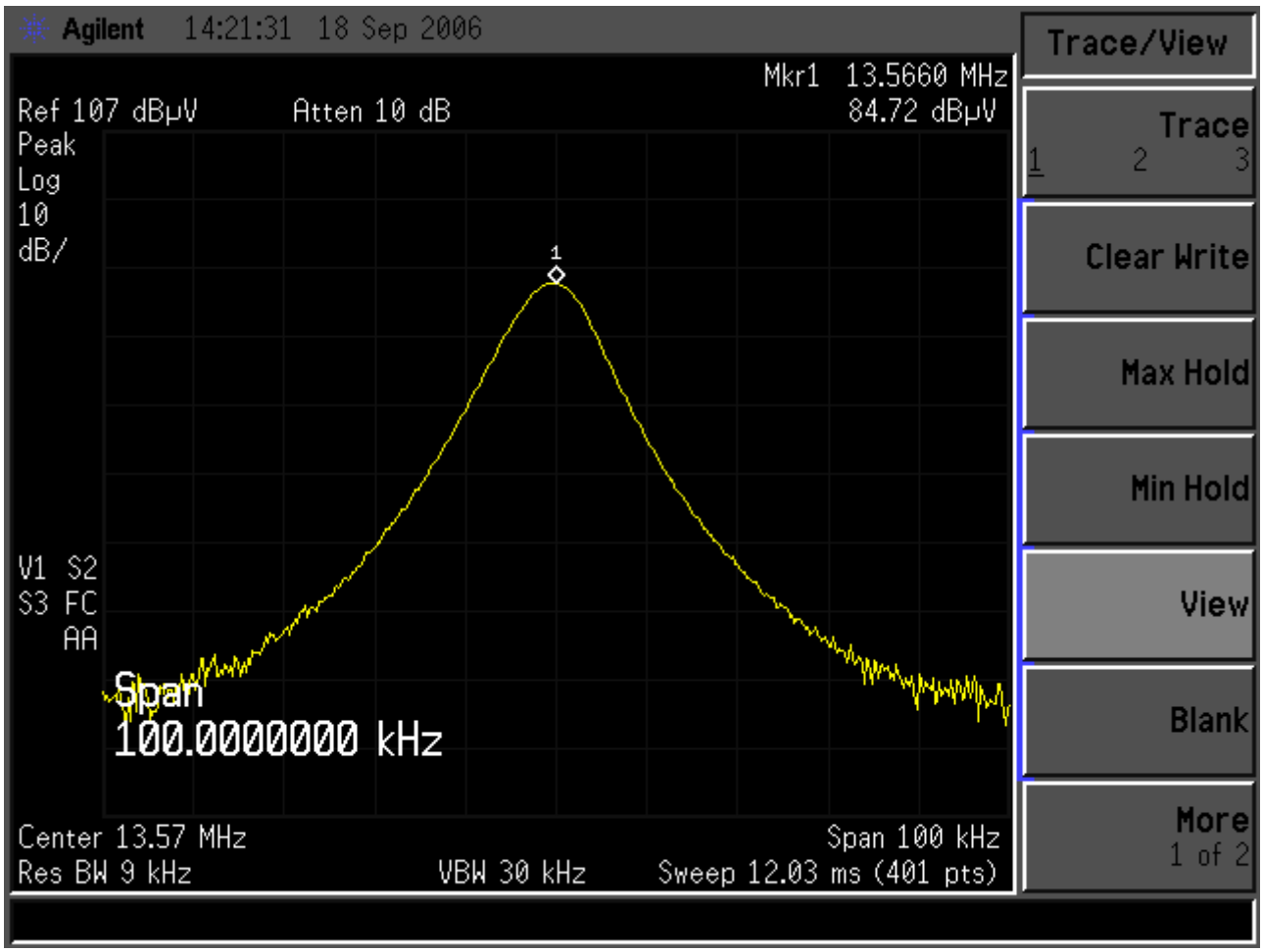
			F (MHz)	Deviation (kHz)	Curve	Limit (1)
Normal test conditions	Nominal power source (115 V)	Temperature (+20°C) Humidity (50%)	13.5660	0	15	+/- 1.356 kHz
	Minimal power source (97.7 V)		13.5660	0	16	
	Maximal power source (132.2 V)		13.5658	-0.02	17	
Extreme test conditions	Minimal temperature (-20°C)	Nominal power source (115 V)	13.5658	-0.02	18	
	Maximal temperature (+50°C)		13.5655	-0.05	19	

(1) +/- 0.01 % of the operating frequency.

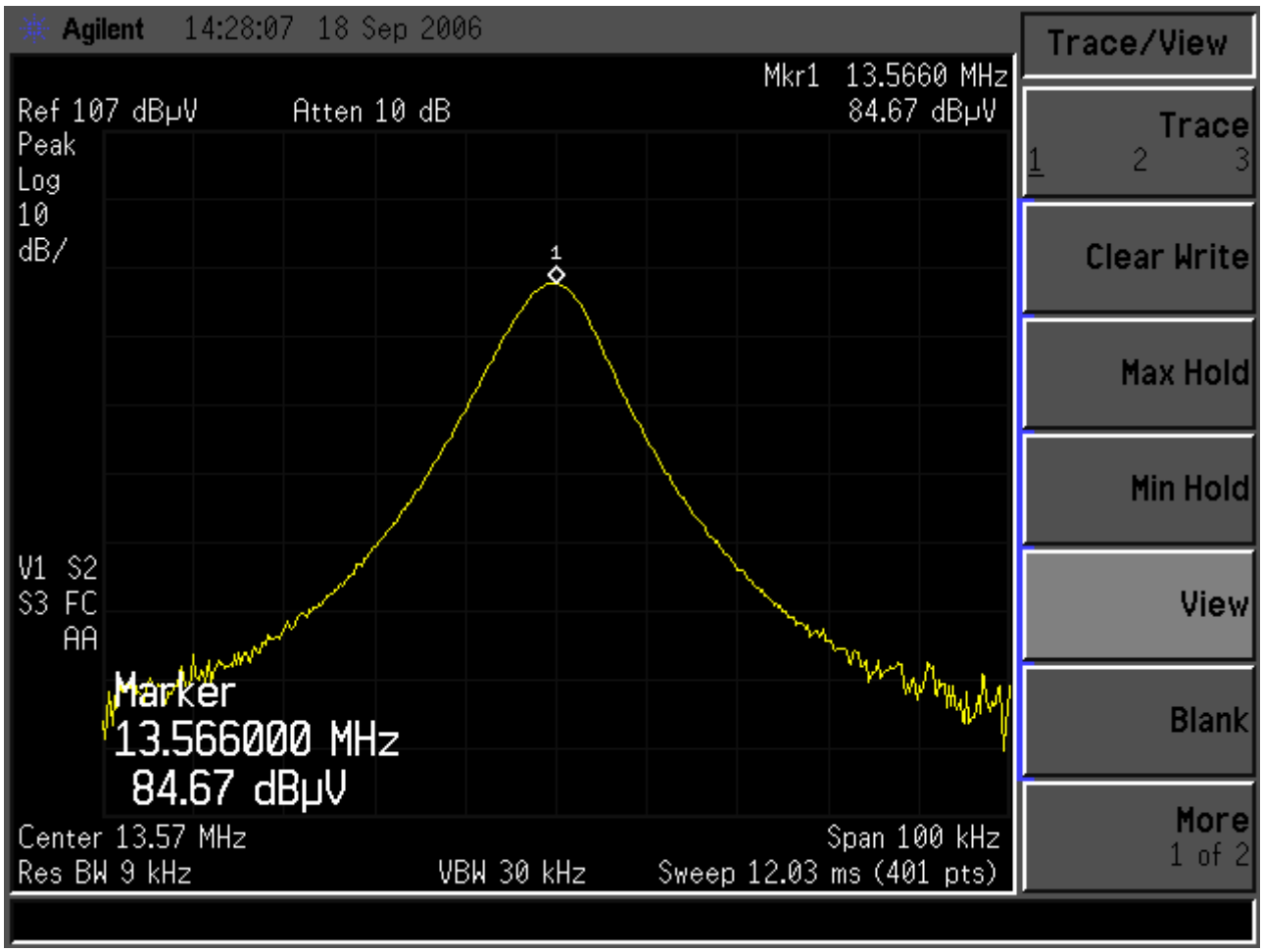
Measurement uncertainty: $\pm 1 \times 10^{-7}$

Test conclusion: The equipment complies with the requirements of the standard.

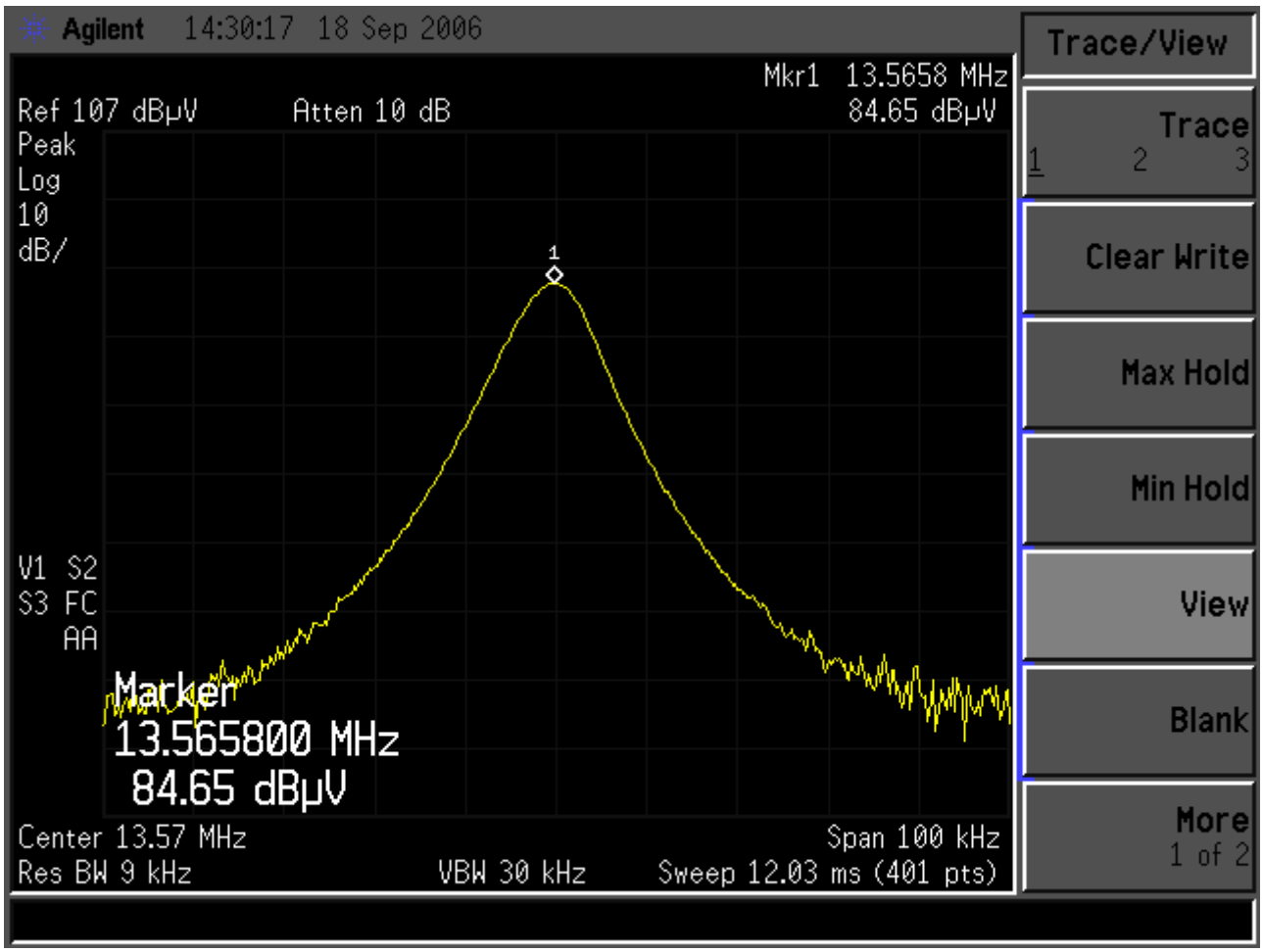
Curve 15


Agilent 14:21:31 18 Sep 2006
Mkr1 13.5660 MHz
Ref 107 dBµV Atten 10 dB 84.72 dBµV
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Span
100.0000000 kHz
Center 13.57 MHz
Span 100 kHz
Res BW 9 kHz
VBW 30 kHz
Sweep 12.03 ms (401 pts)
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

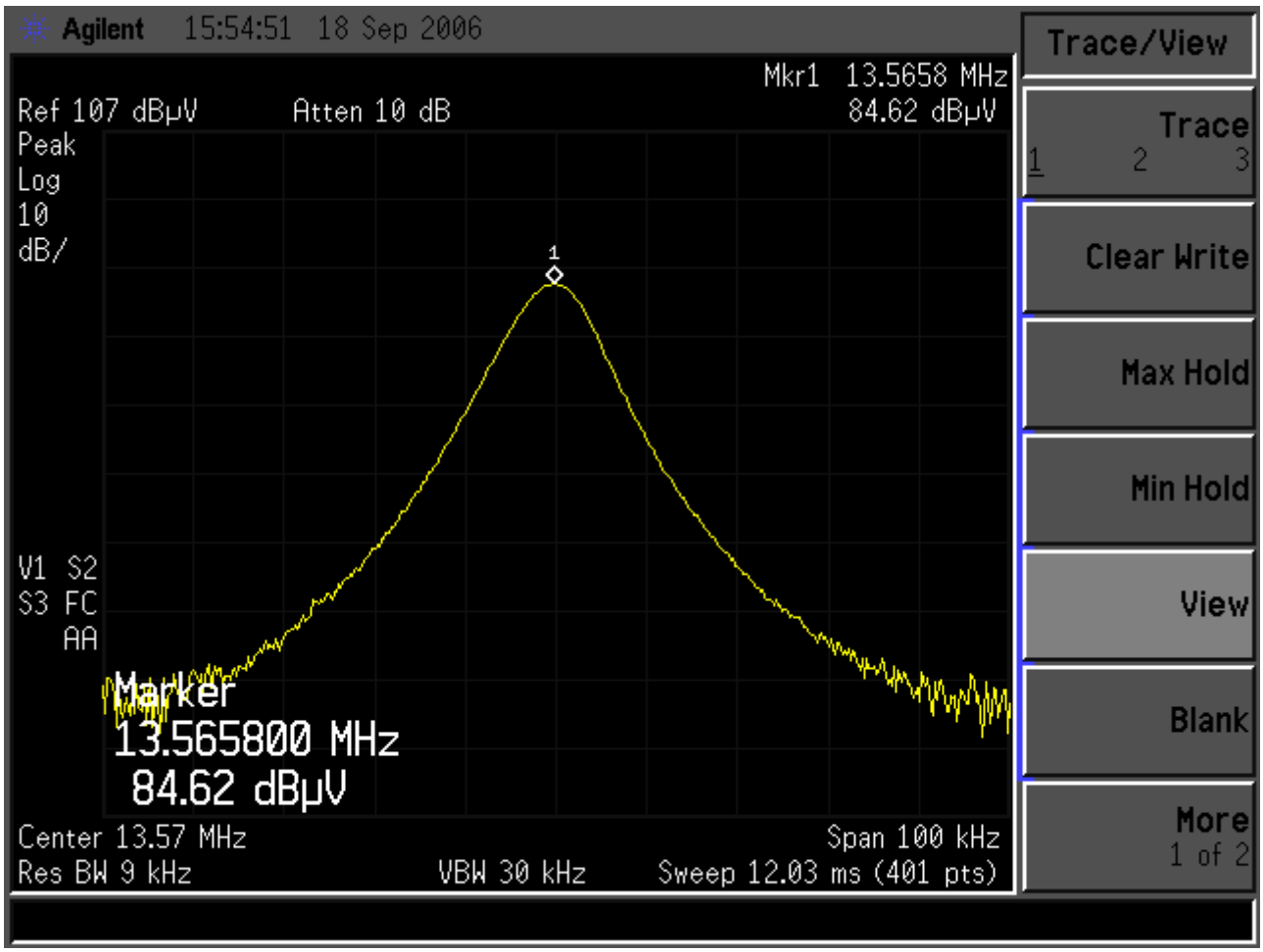
Curve 16


Agilent 14:28:07 18 Sep 2006
Mkr1 13.5660 MHz
84.67 dBµV
Ref 107 dBµV
Atten 10 dB
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Marker
13.566000 MHz
84.67 dBµV
Center 13.57 MHz
Span 100 kHz
Res BW 9 kHz
VBW 30 kHz
Sweep 12.03 ms (401 pts)
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

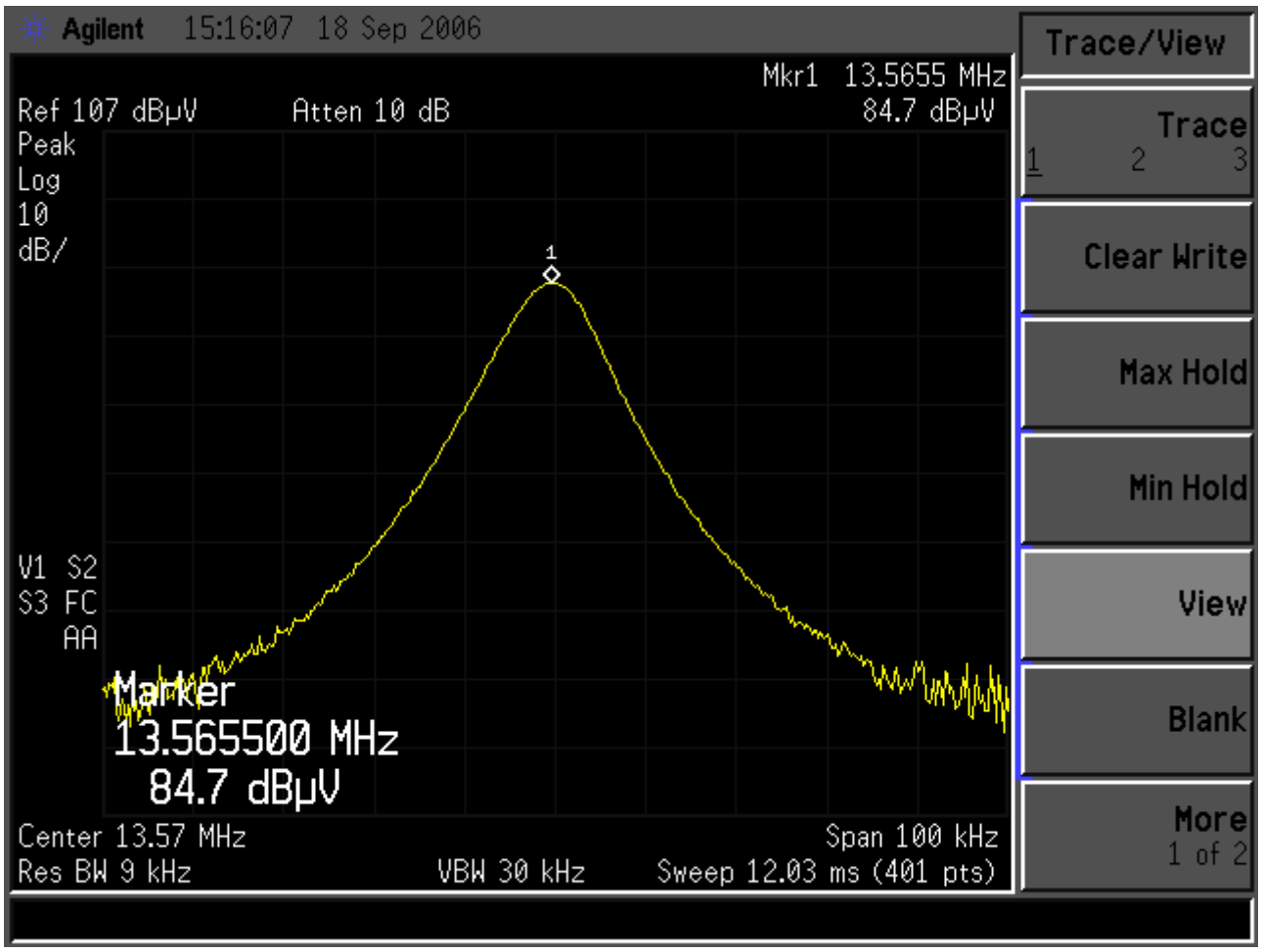
Curve 17


Agilent 14:30:17 18 Sep 2006
Mkr1 13.5658 MHz
84.65 dBµV
Ref 107 dBµV
Atten 10 dB
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Marker
13.565800 MHz
84.65 dBµV
Center 13.57 MHz
Span 100 kHz
Res BW 9 kHz
VBW 30 kHz
Sweep 12.03 ms (401 pts)
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

Curve 18

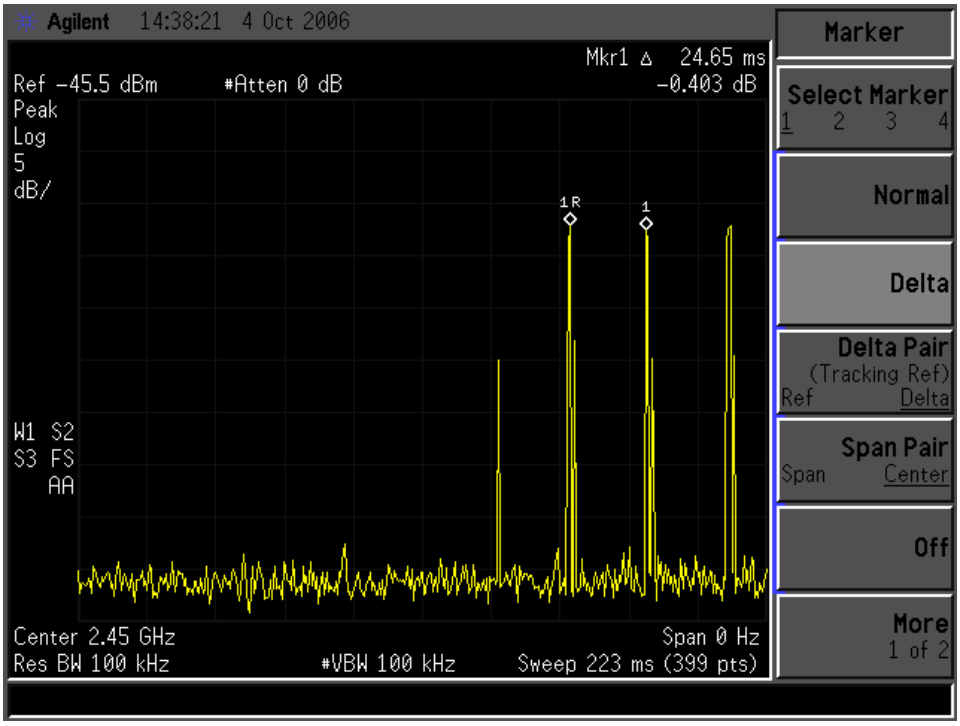

Agilent 15:54:51 18 Sep 2006
Mkr1 13.5658 MHz
84.62 dBµV
Ref 107 dBµV
Atten 10 dB
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Marker
13.565800 MHz
84.62 dBµV
Center 13.57 MHz
Span 100 kHz
Res BW 9 kHz
VBW 30 kHz
Sweep 12.03 ms (401 pts)
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

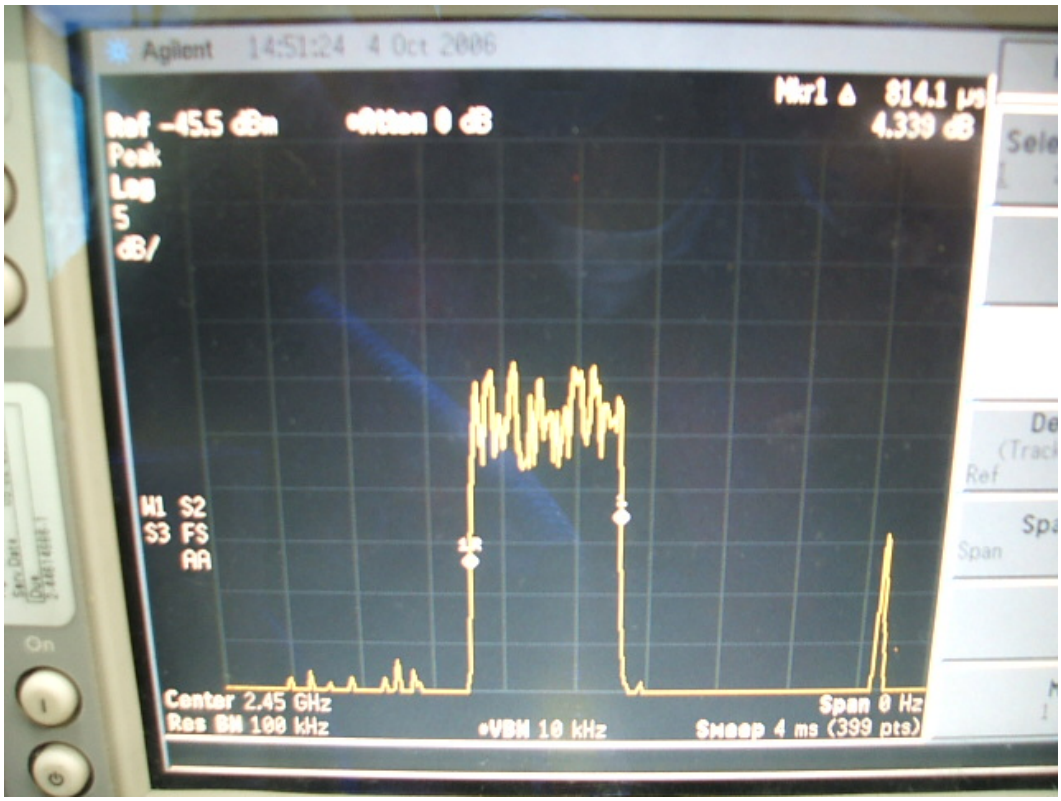
Curve 19



□□□ *End of report, 3 appendixes to be forwarded* □□□

ANNEX 1


Agilent 14:38:21 4 Oct 2006
Mkr1 Δ 24.65 ms
-0.403 dB
Ref -45.5 dBm
#Atten 0 dB
Peak
Log
5
dB/
1R
1
W1 S2
S3 FS
AA
Center 2.45 GHz
Span 0 Hz
Res BW 100 kHz
#VBW 100 kHz
Sweep 223 ms (399 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent 14:51:24 4 Oct 2006
Mkr1 Δ 814.1 µs
4.339 dB
Ref -45.5 dBm
#Atten 0 dB
Peak
Log
5
dB/
W1 S2
S3 FS
AA
Center 2.45 GHz
Span 0 Hz
Res BW 100 kHz
#VBW 10 kHz
Sweep 4 ms (399 pts)

ANNEX 2

Antenna factors, insertion losses and amplifier values

BILL OF MATERIAL

The test antenna resed for the radiated emission between 9 kHz and 30 MHz is the loop antenna nr 3105.

Antenna factors are given in table 1.

The test antenna used for the radiated emission between 30 MHz and 300 MHz is the biconical antenna nr 1144. Antenna factors are given in table 2.

The test antenna used for the radiated emission between 300 MHz and 1 GHz is the log-periodic antenna nr 3106. Antenna factors are given in table 3.

The measuring receiver nr 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 art the horn antenna nr 3374 and 1045. Antenna factors are given in table 3.

The amplifier nr 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)
0.009	30.2
0.01	29.1
0.02	22.9
0.05	20.5
0.1	20.3
0.2	20.0
0.5	20.2
1	19.9
2	19.4
5	19.0
10	20.3
15	19.2
20	16.3
25	20.0
30	22.1

TABLE 1: Loop antenna with loss cable

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 2: 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 3: 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	23.4	7.0	35.3	14	41.6
1.5	25.5	7.5	36.5	15	40.9
2.0	26.8	8.0	36.7	16	37.3
2.5	29.0	8.5	37.5	17	39.9
3.0	29.9	9.0	37.8	18	47.4
3.5	31.1	9.5	37.7	18	31.2
4.0	32.6	10.0	37.8	19	31.8
4.5	32.3	10.5	37.9	20	31.7
5.0	33.3	11.0	38.2	21	31.2
5.5	34.1	11.5	38.6	22	31.4
6.0	34.1	12.0	39.1	23	31.0
6.5	33.9	13.0	39.6	24	31.1

TABLE 4 : 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 5: AMPLIFIER (1 – 26 GHz)

Frequency (GHz)	Loss (dB)	Frequency (GHz)	Loss (dB)	Frequency (GHz)	Loss (dB)
1.0	2.4	4.5	5.2	18	11.2
1.5	2.9	5	5.6	21	13.3
20.	3.5	6	6.2	24	14.9
2.5	3.8	8	7.2		
3.0	4.2	10	8.2		
3.5	4.5	12	9.0		
4.0	5.0	15	10.2		

TABLE 6: TEST CABLE FOR 3 M MEASUREMENT

ANNEX 3

Test setup photographs