

R051-24-09-100903-1/A Ed. 1

“this report cancels and replaces the test report N° R051-24-09-100903-1/A Edition 0”

RADIO test report

according to standard:

FCC Part 2

FCC Part 15

FCC Part 101

Equipment under test:

EVODRIVE MOBILE TRANSCEIVER

evoDrive

FCC ID:

S28-EVODRIVE

Company:

CORONIS S.A.S

DISTRIBUTION: Mr BEKKOUCH

Company: CORONIS S.A.S

FOR TRANSMISSION TO: Mr BHARAT

Company: ELSTER AMCO WATER

1 |

Number of pages: 49 including 3 annexes

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This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.



PRODUCT: EVODRIVE MOBILE TRANSCEIVER

Reference / model: evoDrive

Trade mark: Elster evolution

Serial number: not communicated

MANUFACTURER: CORONIS S.A.S.

COMPANY SUBMITTING THE PRODUCT:

Company: ELSTER AMCO WATER

Address: 1100 sw 38 th ave.
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Responsible: Mr BHARAT

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FRANCE

Responsible: Mr BEKKOUCH

DATE(S) OF TEST: 18, 19, 20, 21 and 24 march 2009

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE
EMITECH ATLANTIQUE open area test site in LA POUEZE (49)
FRANCE

TESTED BY: M. DUMESNIL

TUTOR: P. BONNENFANT

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1. INTRODUCTION

This report presents the results of radio test carried out on the following equipment: EVO DRIVE MOBILE TRANSCEIVER evoDrive, in accordance with normative reference.

2. PRODUCT DESCRIPTION

Class: B (residential environment)

Utilization: measurement of meter

Antenna type: RF 50 ohms standard TNC male connector.

Power level, frequency range and channels characteristics are not user adjustable.

The details pictures of the product and the circuit boards are joined with this file.

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below. They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

FCC Part 2 (2008)	Frequency allocations and radio treaty matters; general rules and regulations.
FCC Part 15 (2008)	Code of Federal Regulations Title 47 - Telecommunication Chapter 1 - Federal Communications Commission Part 15 - Radio frequency devices Subpart C - Intentional Radiators
FCC Part 101 (2008)	Fixed microwave services
ANSI C63.4 (03)	American National Standard for Methods of measurement of Radio-Noise from low-voltage. Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

4. TEST METHODOLOGY

Radio performance tests procedures given in part 2:

- Paragraph 1033: Application for certification
- Paragraph 1046: Measurements required: RF power output
- Paragraph 1049: Measurements required: Occupied bandwidth
- Paragraph 1051: Measurements required: Spurious emissions at antenna terminals
- Paragraph 1053: Measurements required: Fields strength of spurious radiation
- Paragraph 1055: Measurements required: Frequency stability

Radio performance tests procedures given in part 15:

- Paragraph 33: Frequency range of radiated measurements
- Paragraph 35: Measurement detector functions and bandwidths
- Paragraph 107: Conducted limits
- Paragraph 109: Radiated emission limits
- Paragraph 111: Antenna power conducted limits for receivers

Radio performance tests procedures given in part 101:

- Paragraph 101: Frequency availability
- Paragraph 105: Interference protection criteria
- Paragraph 107: Frequency tolerance
- Paragraph 109: Bandwidth
- Paragraph 111: Emission limitations
- Paragraph 113: Transmitter power limitations
- Paragraph 147: Frequency assignments

5. FREQUENCY IDENTIFICATION

Equipment characteristics:

Band of frequencies used by the transmitter: band from 952.00625 MHz to 956.44375 MHz.

Band of frequencies used by the receiver: band from 952.00625 MHz to 956.44375 MHz.

Number of channels which it can operate: 84

Channel separation: 12.5 kHz.

Choice of frequency:

- Sample n°1 ⇨ 952.00625 MHz (channel 00)
- Sample n°1 ⇨ 952.51875 MHz (channel 41)
- Sample n°1 ⇨ 956.44375 MHz (channel 83)

Type of antenna connector used for conducted test: RF50 ohms standard TNC female connector.

6. TESTS RESULTS SUMMARY

6.1 Intentional radiator

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 2.1046	RF POWER OUTPUT	X				
FCC Part 2.1049	OCCUPIED BANDWIDTH	X				
FCC Part 2.1051	SPURIOUS EMISSIONS AT ANTENNA TERMINALS	X				
FCC Part 2.1053	FIELD STRENGTH OF SPURIOUS RADIATION	X				
FCC Part 2.1055	FREQUENCY STABILITY	X				
FCC Part 101.101	FREQUENCY AVAILABILITY	X				Note 1
FCC Part 101.107	FREQUENCY TOLERANCE	X				Note 2
FCC Part 101.109	BANDWIDTH	X				Note 3
FCC Part 101.111	EMISSION LIMITATIONS	X				Note 4
FCC Part 101.113	TRANSMITTER POWER LIMITATIONS	X				Note 5
FCC Part 101.147	FREQUENCY ASSIGNMENTS					Note 6

NAp: Not Applicable

NAs: Not Asked

Note 1: 952 to 958 MHz

Note 2: $\pm 0.00015 \%$

Note 3: 12.5 kHz maximum bandwidth

Note 4: mask described in § 101.111 (a) (5). See curves in annex 1

Note 5: 14 dBW max for mobile equipment

Note 6: licensed on a site-by-site basis and used for terrestrial point-to-point and point-to-multipoint fixed and limited mobile operations.

6.2 Unintentional radiator (for reference only)

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.107	CONDUCTED LIMITS			X		
FCC Part 15.109	RADIATED EMISSION LIMITS	X				
FCC Part 15.111	ANTENNA POWER CONDUCTED LIMITS FOR RECEIVERS	X				

NAP: Not Applicable

NAs: Not Asked

Conclusion:

The sample EVODRIVE MOBILE TRANSCEIVER evoDrive submitted for testing complies with the standard prescriptions FCC Part 2, PART 15 and Part 101 according to limits or criteria defined in this report.

7. RF POWER OUTPUT

Standard: FCC Part 2
FCC Part 101

Test procedure: § 1046
§ 113; § 147

Test equipments used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Test receiver ESVS 10	Rohde & Schwarz	1219
Power meter 8541B	Gigatronics	3479
Power sensor 80401A	Gigatronics	3182
Multimeter 77-2	Fluke	812
Power source 6303DS	FI	4363
Meteo station Meteostar	Bioblock Scientific	943
20 dB attenuator 8491A	Hewlett Packard	2507
Power source E3610A	Hewlett Packard	4195
Log periodic antenna HL223	Rohde & Schwarz	1999
Open site	Emitech	1274
Dipole antenna DB4	EMCO	1640
Meteo station AB 888	Oregon scientific	1539

Measurement conditions:

Conducted mode :

The equipment under test is connected to the measuring equipment via a 50 Ω attenuator.

Radiated mode :

The measure applies to outdoor test site.

Measuring distance between the equipment and the test antenna is 3 m.

The test antenna have been oriented in the two polarizations (vertical and horizontal), we have recorded only the highest level.

Height support of the equipment: 0.8 m.

Resolution bandwidth: 120 kHz (Quasi-Peak)

A measurement of the electro-magnetic field is realized, with a resolution bandwidth of 120 kHz.

Test operating condition of the equipment:

The equipment is blocked in continuous modulated transmission mode by internal data signal.

The measurement is realized in conducted mode and repeated in radiated mode.

Results (conducted mode):

Declared power by the applicant (mW): 1990

Sample N° 1 channel 00

			Measured levels (mW) at frequencies: 952.00625 MHz	Limits (mW)
Normal test conditions	Temperature (°C): 24 Humidity (%): 32	Nominal power source (V): 12	529.66	25118

Sample N° 1 channel 41

			Measured levels (mW) at frequency: 952.51875 MHz	Limits (mW)
Normal test conditions	Temperature (°C): 24 Humidity (%): 32	Nominal power source (V): 12	537.03	25118

Sample N° 1 channel 83

			Measured levels (mW) at frequency: 956.44375 MHz	Limits (mW)
Normal test conditions	Temperature (°C): 24 Humidity (%): 32	Nominal power source (V): 12	578.10	25118

Measurement uncertainty: ± 0.75 dB

Results: (radiated mode)

Ambient temperature (°C): 23.5
Relative humidity (%): 25
Declared power by the applicant (mW): 5000

Sample N° 1 channel 00

Power supply: 12 Vdc by an external power source

	Measured levels at frequencies 952.00625 MHz:		Limits (mW)
	dBµV/m	mW	
Normal test conditions	123,3	641,39	25118

Polarization of test antenna: vertical (height: 148 cm)
Position of equipment: in dish position (azimuth: 127 degrees)

Sample N° 1 channel 41

Power supply: 12 Vdc by an external power source

	Measured levels at frequencies 952.00625 MHz :		Limits (mW)
	dBµV/m	mW	
Normal test conditions	123,4	656,33	25118

Polarization of test antenna: vertical (height: 149 cm)
Position of equipment: in dish position (azimuth: 129 degrees)

Sample N° 1 channel 83

Power supply: 12 Vdc by an external power source

	Measured levels at frequencies 952.00625 MHz :		Limits (mW)
	dBµV/m	mW	
Normal test conditions	123,6	687,26	25118

Polarization of test antenna: vertical (height: 148 cm)
Position of equipment: in dish position (azimuth: 129 degrees)

Measurement uncertainty: $62.5 \text{ MHz} \leq \text{Frequencies} \leq 1000 \text{ MHz}$: $\pm 2.6 \text{ dB}$

Test conclusion:

RESPECTED STANDARD

8. OCCUPIED BANDWIDTH

Standard: FCC Part 2
FCC Part 101

Test procedure: § 1049
§109

Test equipments used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Multimeter 77-2	Fluke	812
Power source E3610A	Hewlett Packard	4195
Meteo station	Bioblock Scientific Meteostar	943
20 dB attenuator 8491A	Hewlett Packard	2507
10 dB attenuator 8491A	Hewlett Packard	2505

Measurement conditions:

The equipment under test is connected to the measuring equipment via a 50 Ω attenuator.

Test operating condition of the equipment:

The equipment is blocked in continuous modulated transmission mode by internal data signal.

Results :

Sample N°1 :

Power supply : 12 vdc by an external power source.
Channel 00 : 6,45 kHz (see curve n°1)
Channel 41 : 6,45 kHz (see curve n°2)
Channel 83 : 6,45 kHz (see curve n°3)

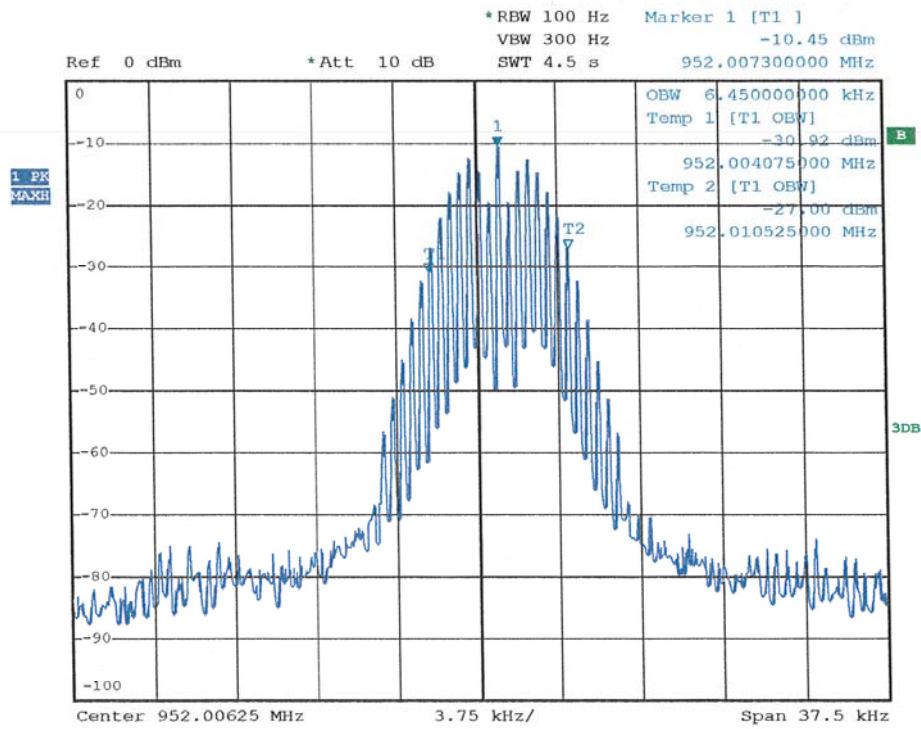
Applicable limits : 12,5 kHz maximum bandwidth.

Test conclusion:

RESPECTED STANDARD

CURVE N°1.

Channel 00

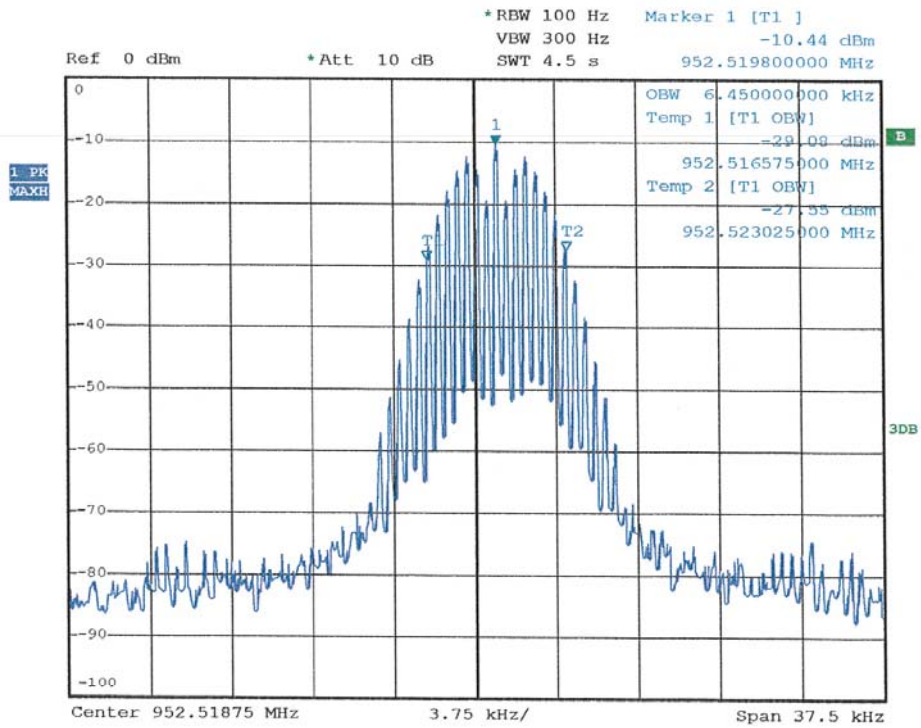


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CURVE N°2.

Channel 41

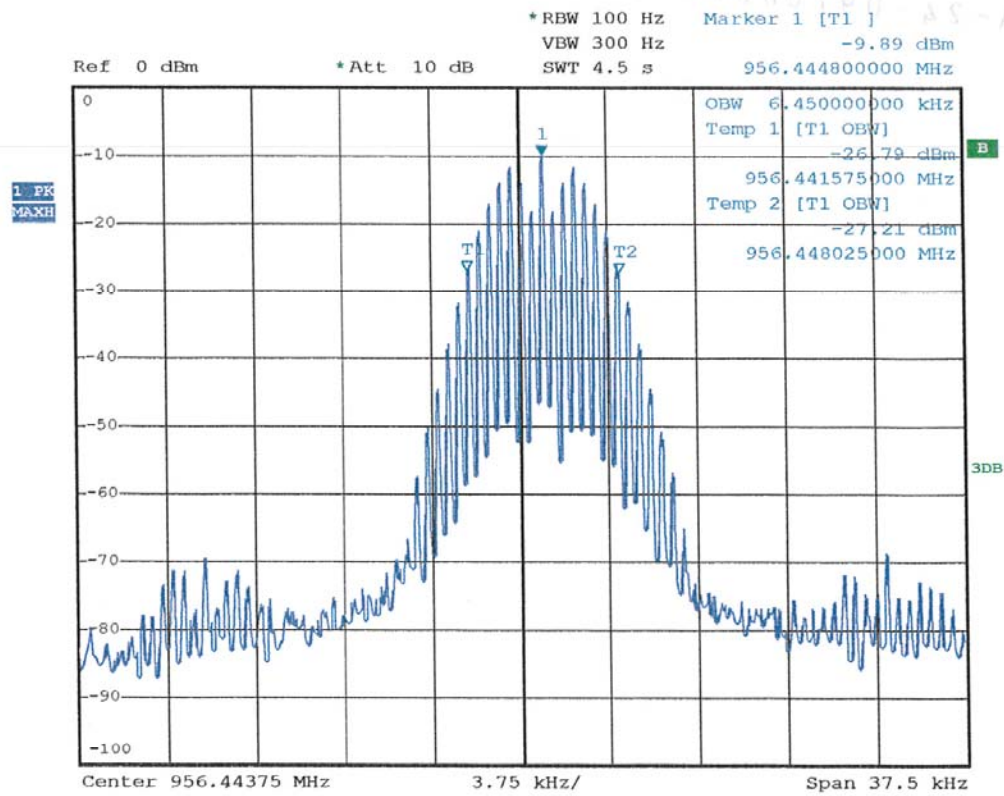


223

Date: 20.MAR.2009 10:46:08

CURVE N°3.

Channel 83



223

Date: 20.MAR.2009 11:02:53

9. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard: FCC Part 2
FCC Part 101

Test procedure: § 1051
§ 111

Test equipments used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Test receiver ESVS 10	Rohde & Schwarz	1219
Power source EX354D	TTI	2148
Variac R213	Dereix	1419
Power source 6303DS	FI	4363
Meteo station	Bioblock Scientific Meteostar	943
20 dB attenuator 8491A	Hewlett Packard	2507
10 dB attenuator 8491A	Hewlett Packard	2505
Low pass filter WLJS800-C11/60EE	Wainwright	4393
Hight pass filter HPM 11630	Micro-tronics	4392
Multimeter 77-2	fluke	0812

Measurement conditions:

The measure applies from 9 kHz to the tenth harmonic.

The equipment under test is connected to the measuring equipment via a 50 Ω attenuator.

The limit at -20 dBm (EIRP) is correlated with the level of power.

Resolution bandwidth: $9 \text{ kHz} \leq F \leq 1 \text{ GHz}$: 100 kHz

$F > 1 \text{ GHz}$: 1 MHz

Detector: Peak.

Test operating condition of the equipment:

The equipment is blocked in continuous modulated transmission mode by internal data signal.

Results :

Ambient temperature (C°): 23

Relative humidity (%): 24

Power supply: 12 vdc by an external power source.

Calculation of limit:

Channel	F (MHz)	Level (W)	Require attenuation ($50 + 10 \log P_{(w)}$) (dB)	Relative level (dBm)	Limit corresponding to - 20 dBm (dBm)
00	952,00625	0,64139	- 48,07	- 3,78	- 51,85
41	952,51875	0,65633	- 48,17	- 3,70	- 51,87
83	956,44375	0,68726	- 48,37	- 3,28	- 51,65

For the relative levels see curves N° 4 to 6

Channel 1 (F = 952.00625 MHz)

F (MHz)	Relative level (dBm)	Limit corresponding to - 20 dBm (dBm)	Value corrected (dBm)	Limit (dBm)	Margin (dB)
1904	- 68.59	- 51.85	- 36.74	- 20	16.74

For the results see curves N° 7 to 10

Channel 41 (F= 952.51875 MHz)

F (MHz)	Relative level (dBm)	Limit corresponding to - 20 dBm (dBm)	Value corrected (dBm)	Limit (dBm)	Margin (dB)
1904	- 69	- 51.87	- 37.13	- 20	17.13

For the results see curves N° 11 to 14

Channel 83 (956.44375 MHz)

F (MHz)	Relative level (dBm)	Limit corresponding to - 20 dBm (dBm)	Value corrected (dBm)	Limit (dBm)	Margin (dB)
1912	- 66.92	- 51.65	- 35.27	- 20	15.27

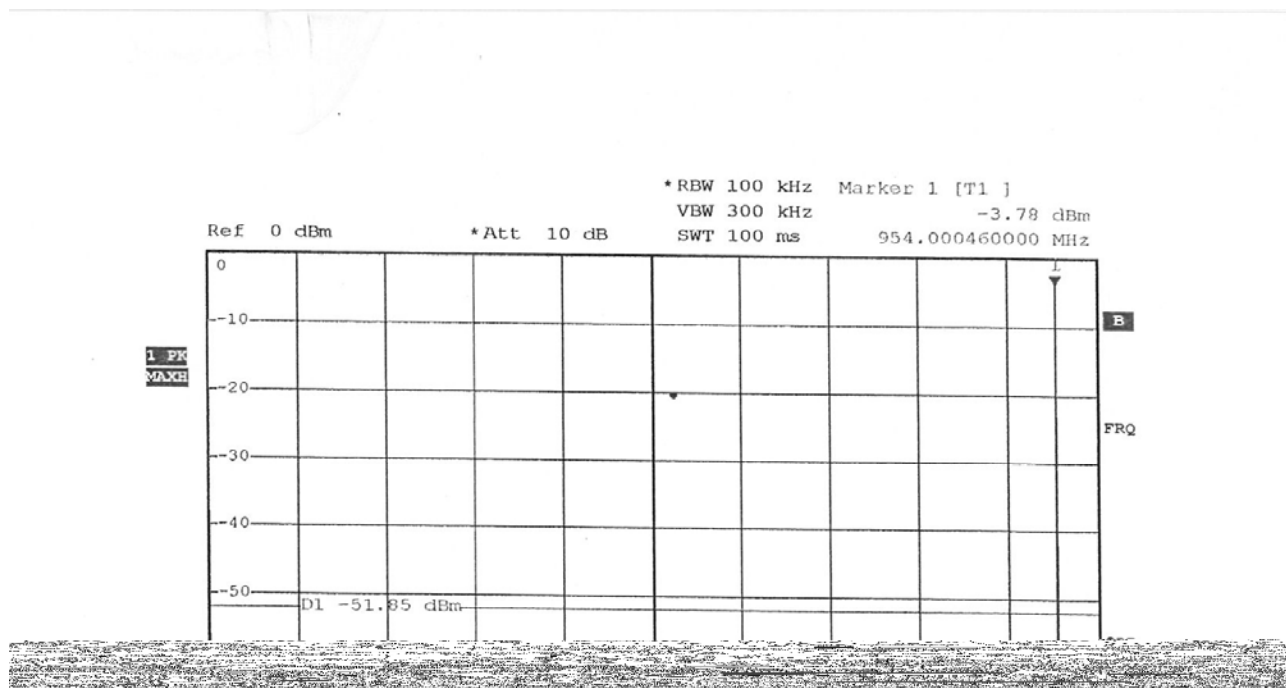
For the results see curves N° 15 to 18

Measurement uncertainty: ± 0.75 dB

Test conclusion:

RESPECTED STANDARD

CURVE N° 4.

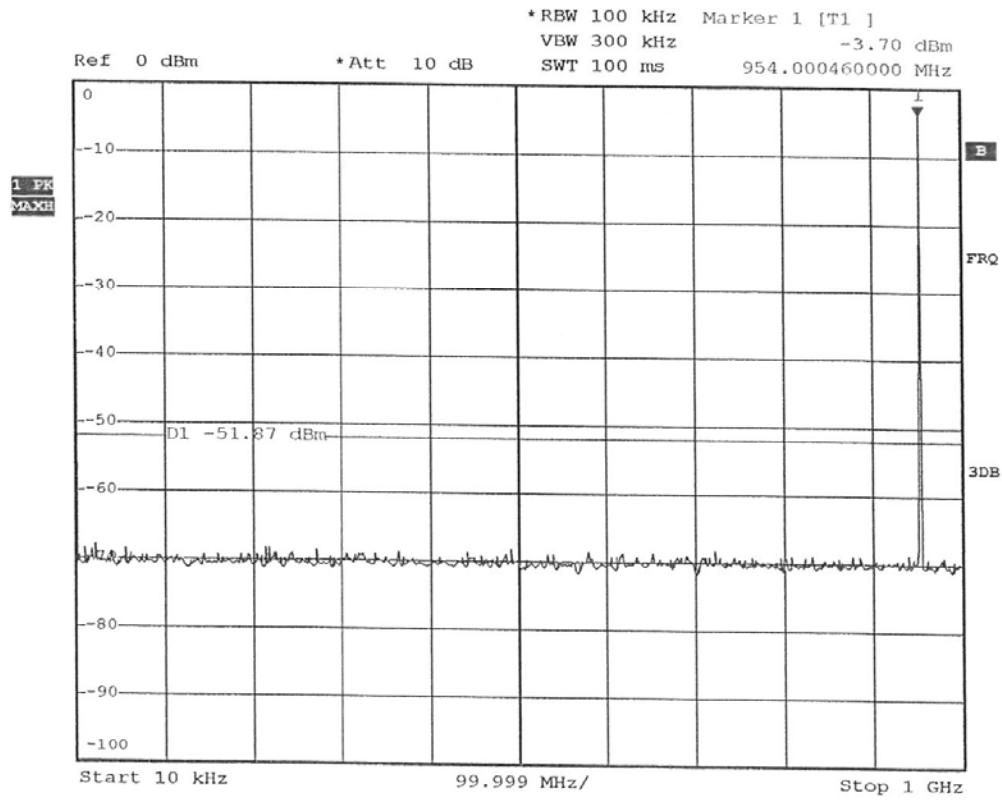


Start 10 kHz 99.999 MHz/ Stop 1 GHz

223

Date: 21.MAR.2009 06:39:45

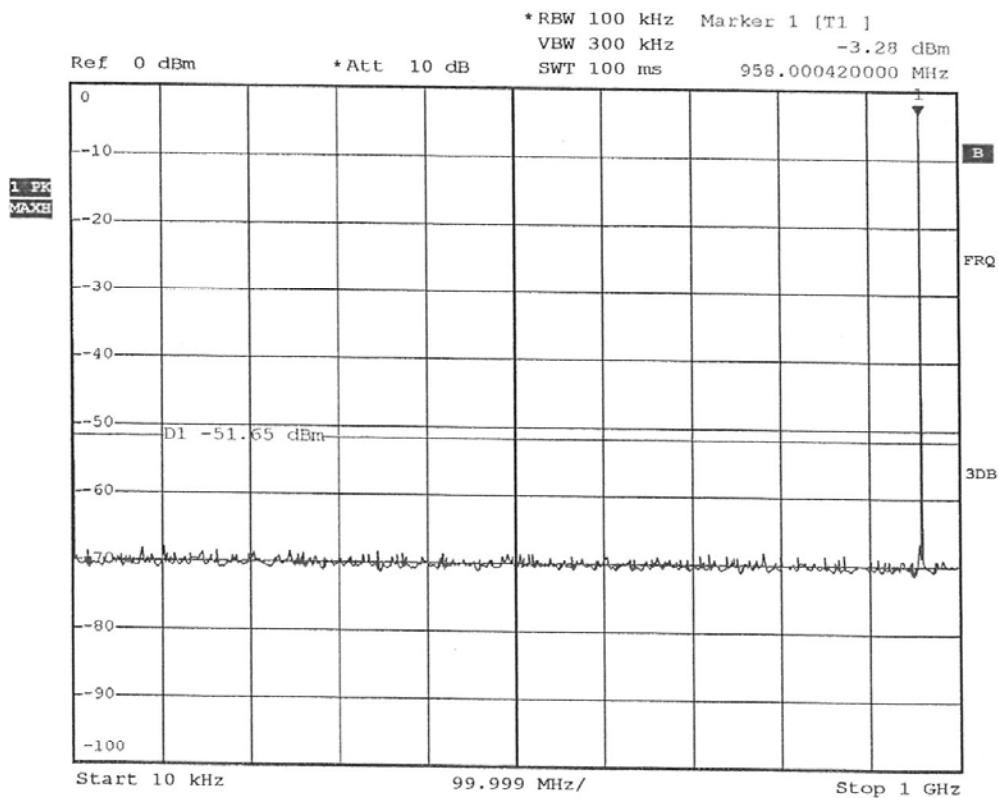
CURVE N° 5.



223

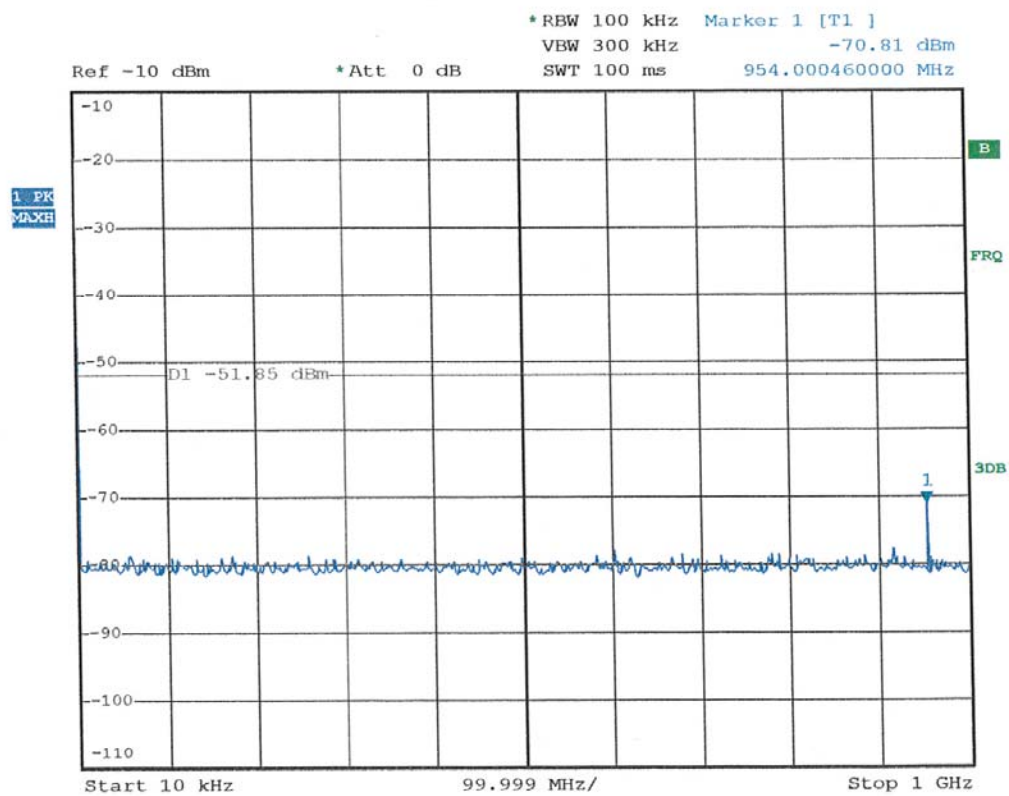
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CURVE N° 6.



223

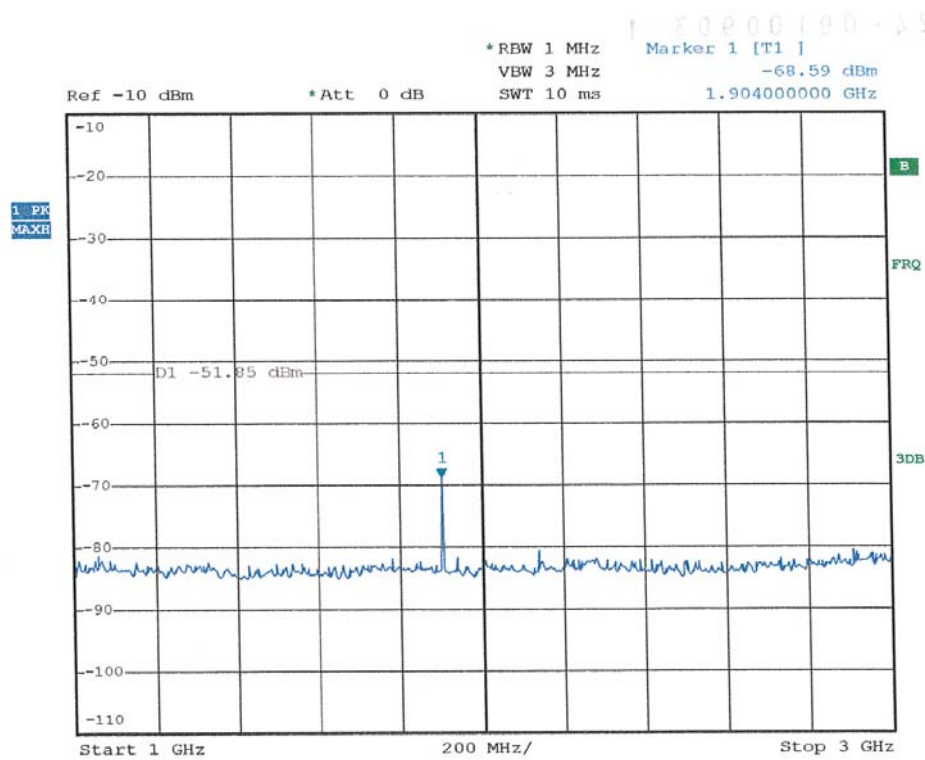
Date: 21.MAR.2009 06:09:09

CURVE N° 7.


223

Date: 21.MAR.2009 06:41:34

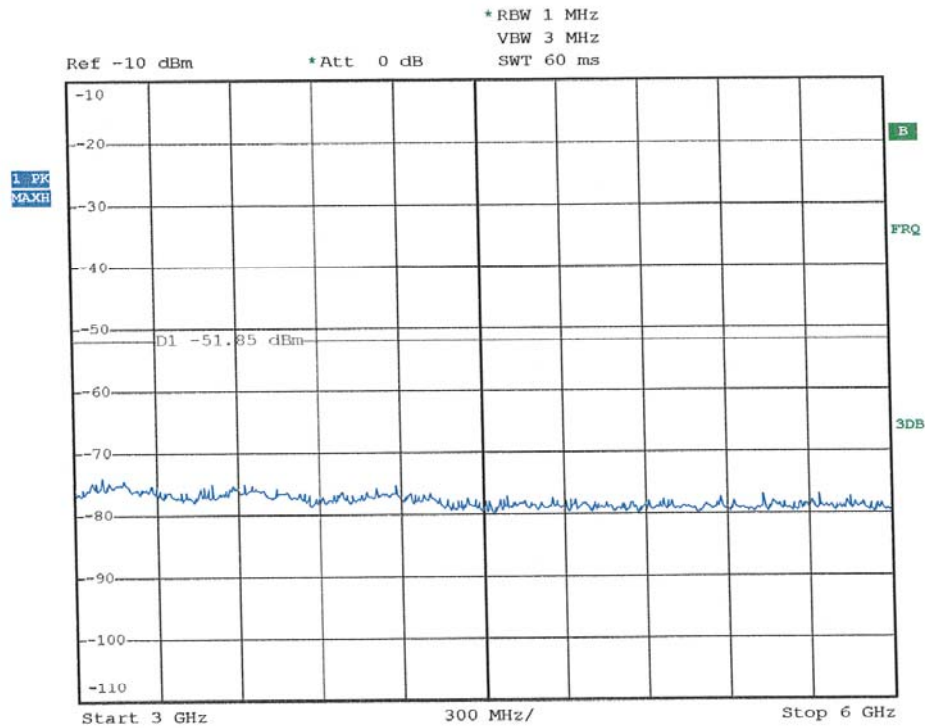
CURVE N° 8.



223

Date: 21.MAR.2009 06:44:55

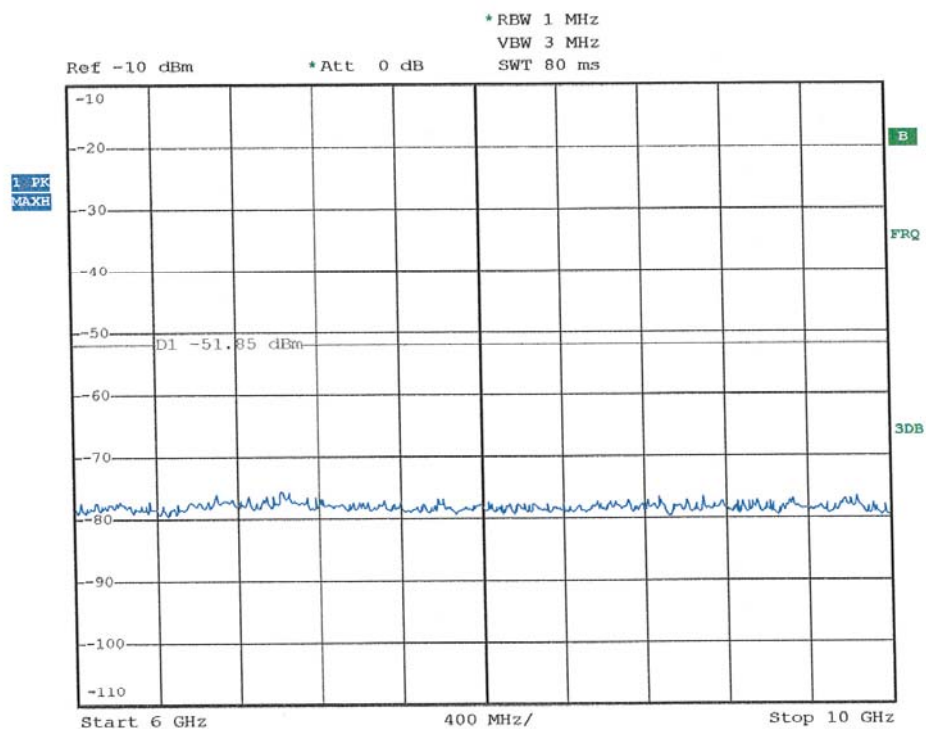
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223

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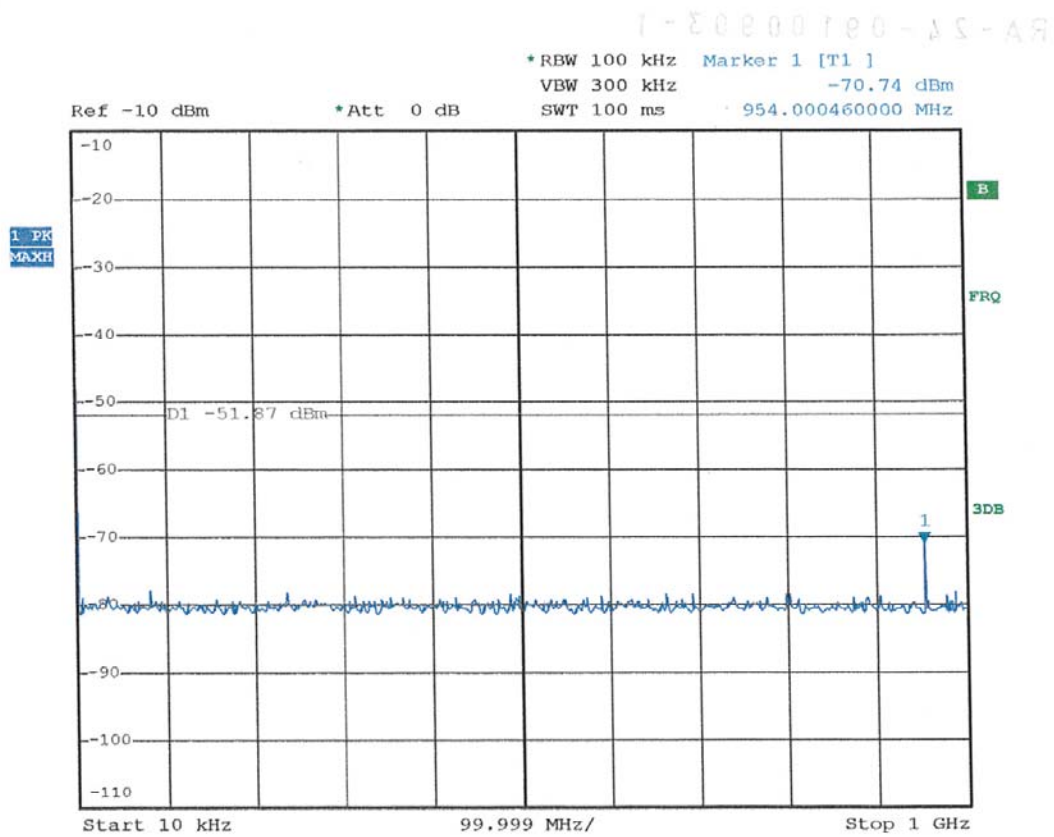
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223

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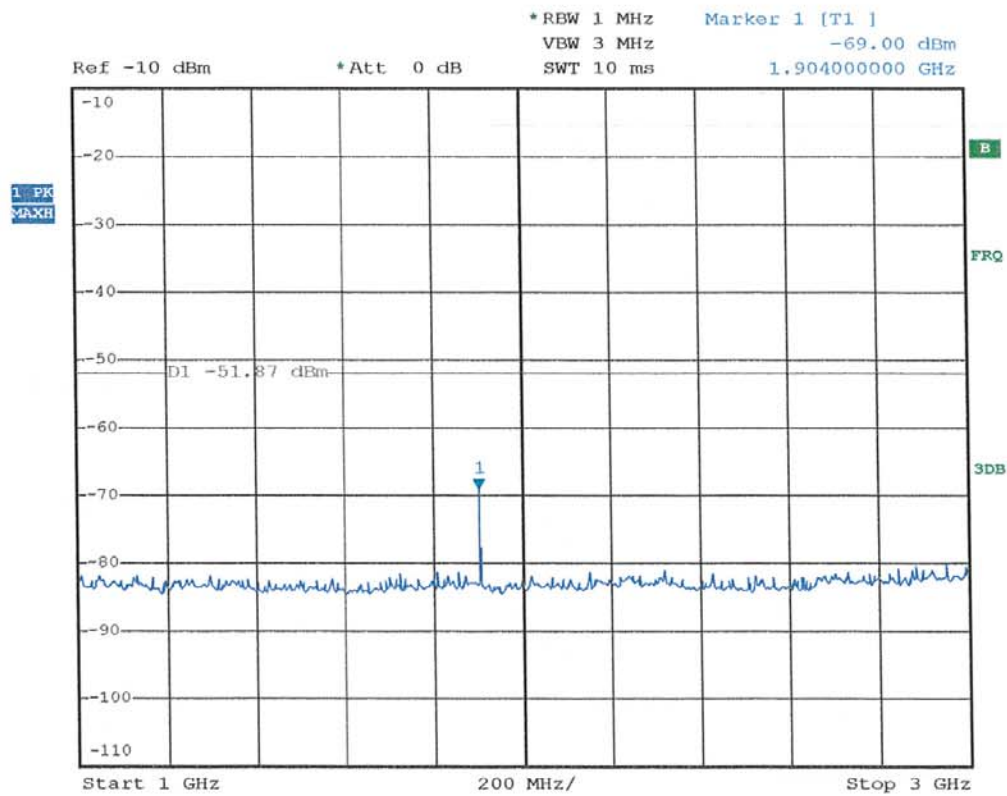
CURVE N° 11.



223

Date: 21.MAR.2009 06:27:12

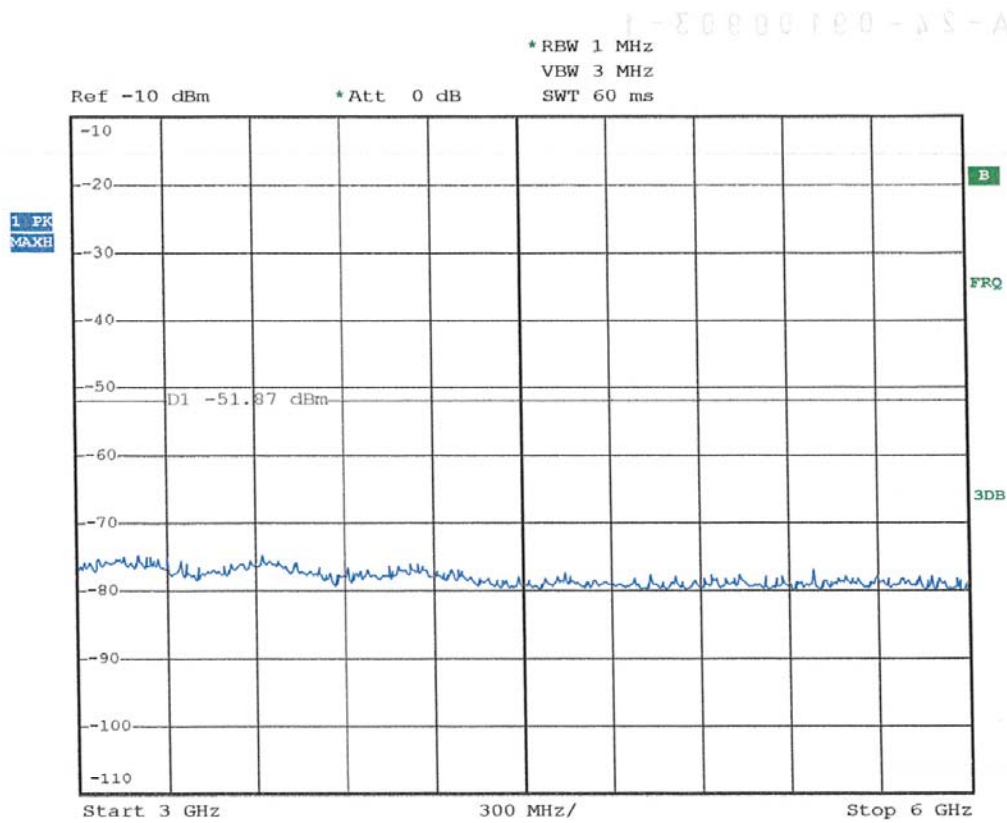
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223

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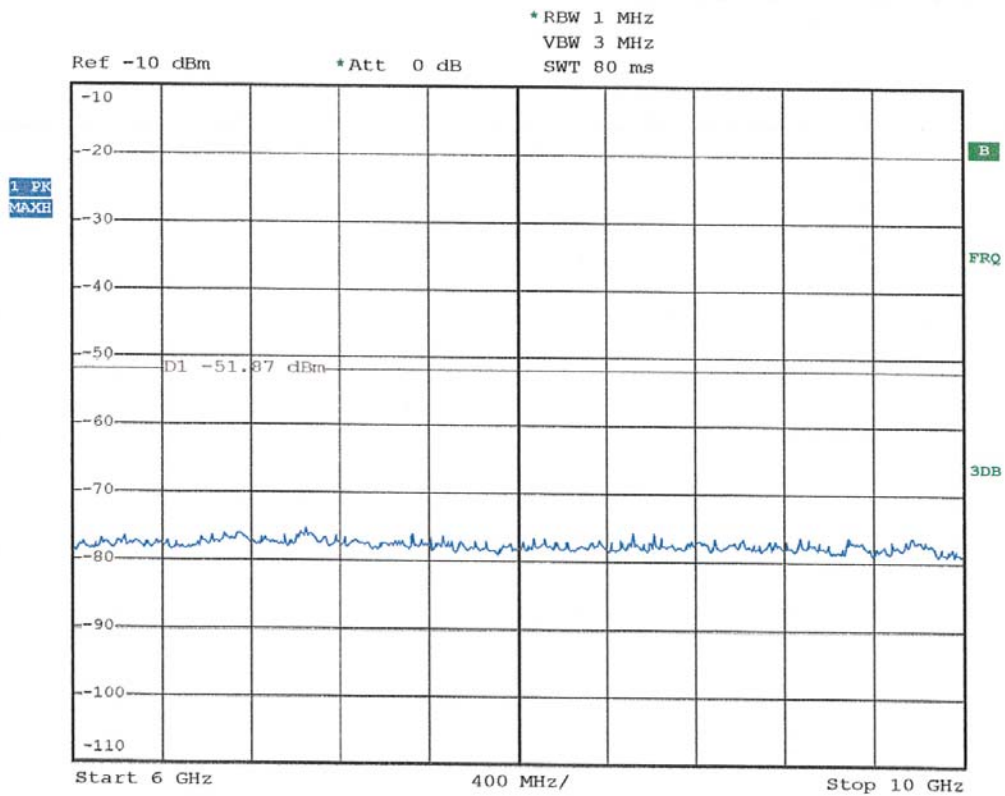
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223

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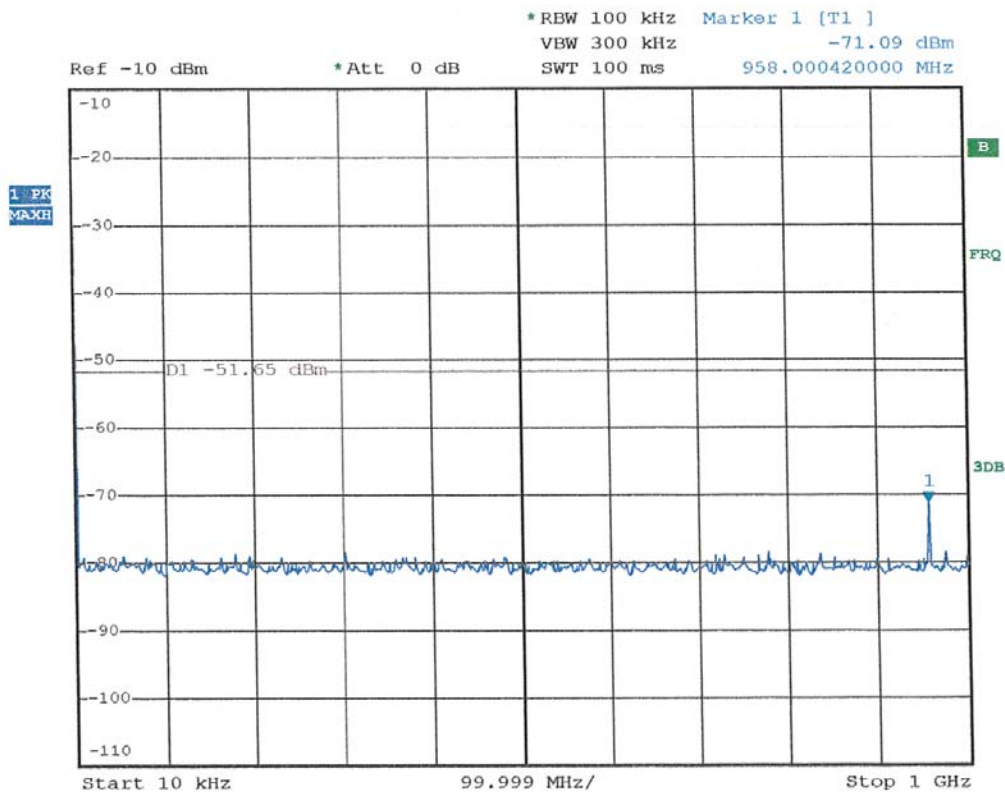
CURVE N° 14.



223

Date: 21.MAR.2009 06:33:45

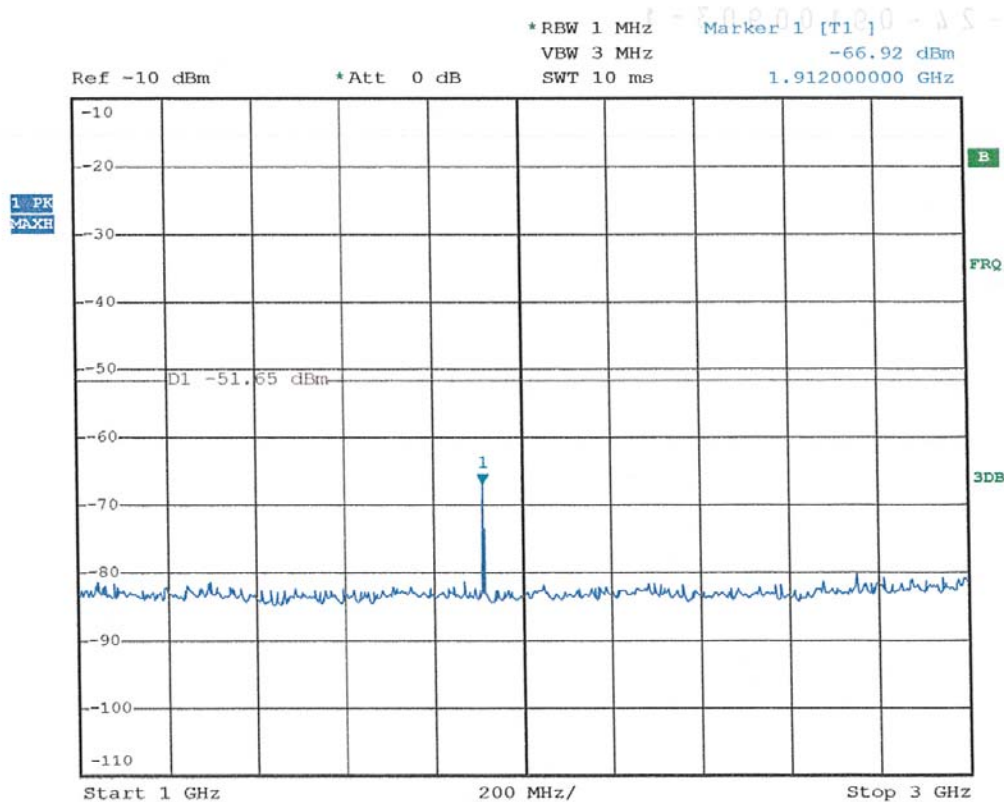
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223

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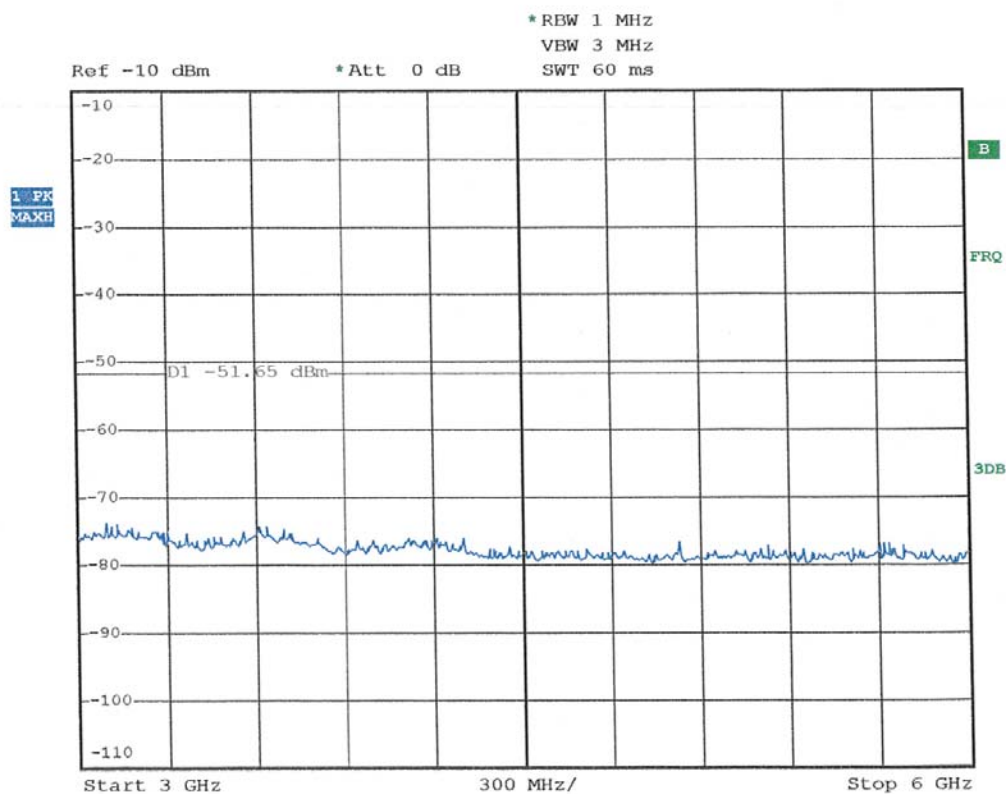
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223

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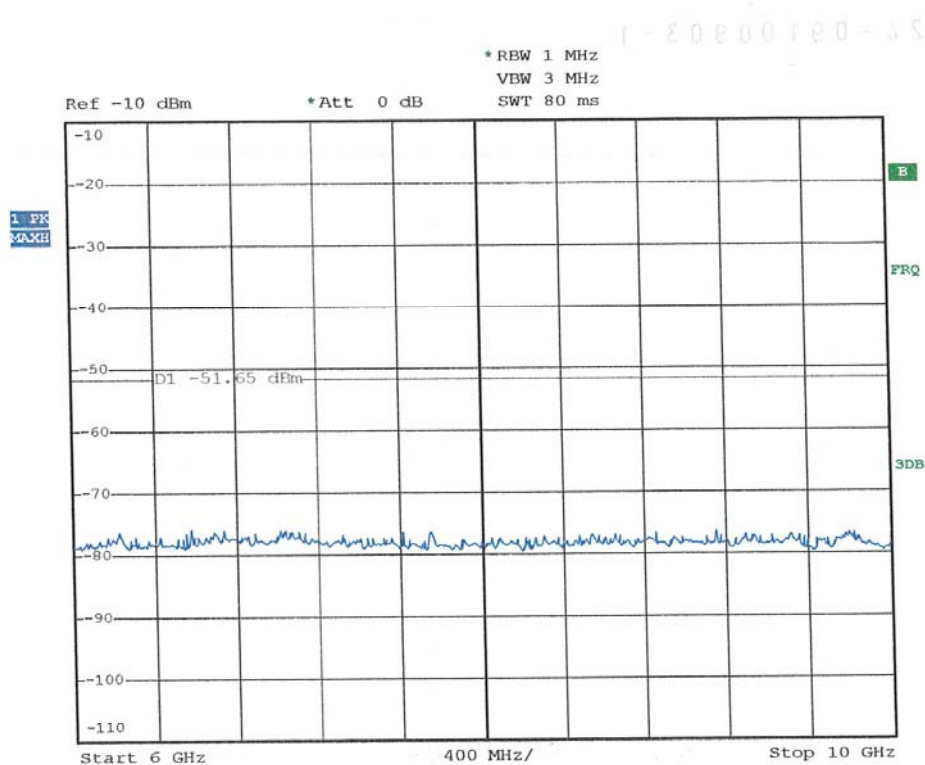
CURVE N° 17.



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Date: 21.MAR.2009 06:17:55

CURVE N° 18.



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Date: 21.MAR.2009 06:20:33

10. FIELD STRENGTH OF SPURIOUS RADIATION

Standard: FCC Part 2
FCC Part 101

Test procedure: § 1053
§ 111

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver ESVS10	Rohde & Schwarz	1219
Biconical antenna 11966C	Hewlett Packard	728
Log periodic antenna HL223	Rohde & Schwarz	1999
Double ridged guide antenna EM6961	Electrometrics	1204
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Open area test site	EMITECH	1274
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	Fluke	0812
Low noise amplifier 2 to 18 GHz	Microwave DB	1922
High pass filter HP 12/3200-5 AA	Filtek	
Test receiver ESH3	Rohde & Schwarz	1058
Meteo station AB 888	Oregon scientific	1539
Active loop antenna	EMCO	1406
Signal generator 68369B	Anritsu	4648

Test set up:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuths correspond to the front of the equipment under test.

The equipment under test is substituted by a signal generator and a calibrated antenna. The equivalent radiated power is calculated with the formula $P_d \text{ (dBA)} = P_g \text{ (dBA)} - \text{cable loss (dB)} + \text{antenna gain (dB)}$ where P_d is the dipole equivalent power, P_g the generator output power and antenna gain the corrected gain to an ideal half wave dipole.

Only the emissions radiated by the cabinet and the structure are checked.

Frequency range: from 9 kHz to harmonic 10 ($F_{\text{carrier}} \leq 1 \text{ GHz}$)

Detection mode: Quasi-peak ($F < 1 \text{ GHz}$)
Peak ($F > 1 \text{ GHz}$)

Bandwidth: 120 kHz ($F < 1 \text{ GHz}$)
1 MHz ($F > 1 \text{ GHz}$)

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment is blocked in continuous modulated transmission mode, by internal signal.

Results:

Ambient temperature (°C): 22.5

Relative humidity (%): 29

Power source: 12 Vdc by an external power source

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Channel 00 Emission (F=952.00625 MHz)

FREQUENCIES (MHz)	Detector	E.U.T. orientation	Antenna height (cm)	Polarization of antenna H: Horizontal V: Vertical	Azimuth (degrees)	Substitution level (dBm)	Limits (dBm)
1904.013	Peak	X	119	V	355	-24.37	-18.8
2856.019	Peak	X	142	V	173	-26.89	
3808.025	Peak	X	240	V	175	-30.53	
4760.031	Peak	X	137	H	175	-30.75	
5712.038	Peak	X	230	V	321	-27.65	
6664.044	Peak	X	150	H	223	-26.28	
7616.050	Peak	X	210	V	174	-37.23	
8568.056	peak	X	100	H	211	-31.41	

E.U.T. orientation

X: to put flat

Y: on the edge

Z: up right

Applicable limits:

P_{measured}: 29.27 dBm

Mask attenuation: $50 + 10 \log P(w) = 48.07 \text{ dB} < 70 \text{ dB}$

Limit: $29.27 \text{ dBm} - 48.07 = -18.8 \text{ dBm}$

Ambient temperature (°C): 24.5
Relative humidity (%): 25

Power source: 12 Vdc by an external power source

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Channel 41 Emission (F=952.51875 MHz)

FREQUENCIES (MHz)	Detector	E.U.T. orientation	Antenna height (cm)	Polarization of antenna H: Horizontal V: Vertical	Azimuth (degrees)	Field strength (dBm)	Limits (dBm)
1905.038	Peak	X	118	V	355	-21.77	-19.1
2857.556	Peak	X	142	V	175	-25.03	
3810.075	Peak	X	237	V	175	-29.85	
4762.594	Peak	X	135	H	169	-29.79	
5715.113	Peak	X	229	V	317	-27.22	
6667.631	Peak	X	152	H	210	-26.58	
7620.150	Peak	X	149	H	133	-38.14	
8572.669	peak	X	100	H	205	-31.01	

E.U.T. orientation

X: to put flat

Y: on the edge

Z: up right

Applicable limits: P_{measured}: 29.07 dBm
Mask attenuation: $50 + 10 \log P(w) = 48.17 \text{ dB} < 70 \text{ dB}$
Limit: $29.07 \text{ dBm} - 48.17 = -19.1 \text{ dBm}$

Ambient temperature (°C): 24.5
Relative humidity (%): 24

Power source: 12 Vdc by an external power source

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Channel 83 Emission (F=956.44375 MHz)

FREQUENCIES (MHz)	Detector	E.U.T. orientation	Antenna height (cm)	Polarization of antenna H: Horizontal V: Vertical	Azimuth (degrees)	Field strength (dBm)	Limits (dBm)
1912.888	Peak	X	112	V	349	-20.1	-19.3
2869.331	Peak	X	137	V	174	-22.81	
3825.775	Peak	X	227	V	173	-31.79	
4782.219	Peak	X	152	H	175	-32.25	
5738.663	Peak	X	187	H	171	-26.44	
6695.106	Peak	X	149	H	231	-28.51	
7651.550	Peak	X	172	V	183	-37.77	
8607.994	peak	X	171	V	224	-32.83	

E.U.T. orientation

X: to put flat

Y: on the edge

Z: up right

Applicable limits: P_{measured}: 29.07 dBm
Mask attenuation: $50 + 10 \log P(w) = 48.37 \text{ dB} < 70 \text{ dB}$
Limit: $29.07 \text{ dBm} - 48.37 = -19.3 \text{ dBm}$

TEST CONCLUSION:

RESPECTED STANDARD

11. FREQUENCY STABILITY

Standard: FCC Part 2
FCC Part 101

Test procedure: § 1055
§ 107

Test equipments used:

TYPE	MANUFACTURER	EMITECH NUMBER
Modulation analyzer HP 8901B	Hewlett Packard	1211
Climatic chamber	MPC	2593
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	Fluke	812
Meteo station	Bioblock Scientific Meteostar	943
10 dB attenuator 8491A	Hewlett Packard	2505

Measurement conditions:

This test is realized in near field.

Test operating condition of the equipment:

The transmitter is modulated.

Results:

Ambient temperature (°C): 22

Relative humidity (%): 37

Sample N°1

Power source: 12 Vdc by an external power source

Channel 00 Emission (F=952.00625 MHz)

Temperature (°C)	Voltage (V)	Frequency (MHz)	Frequency error (ppm)	Limits (ppm)
-30	12	952.006329	+0.08	±1.5
-20	12	952.006407	+0.16	±1.5
-10	12	952.006339	+0.09	±1.5
0	12	952.006294	+0.05	±1.5
10	12	952.006294	+0.05	±1.5
20	12	952.006392	+0.15	±1.5
20	10.2	952.006294	+0.05	±1.5
20	13.8	952.006285	+0.04	±1.5
30	12	952.006219	-0.03	±1.5
40	12	952.006182	-0.07	±1.5
50	12	952.006188	-0.07	±1.5

Channel 41 Emission (F=952.51875 MHz)

Temperature (°C)	Voltage (V)	Frequency (MHz)	Frequency error (ppm)	Limits (ppm)
-30	12	952.518791	+0.04	±1.5
-20	12	952.518873	+0.13	±1.5
-10	12	852.518850	+0.10	±1.5
0	12	952.518740	-0.01	±1.5
10	12	952.518757	+0.01	±1.5
20	12	952.518770	+0.02	±1.5
20	10.2	952.518771	+0.02	±1.5
20	13.8	952.518777	+0.03	±1.5
30	12	952.518701	-0.05	±1.5
40	12	952.518653	-0.10	±1.5
50	12	952.518653	-0.10	±1.5

Channel 83 Emission (F=956.44375 MHz)

Temperature (°C)	Voltage (V)	Frequency (MHz)	Frequency error (ppm)	Limits (ppm)
-30	12	956.443871	+0.13	±1.5
-20	12	956.443909	+0.17	±1.5
-10	12	956.443908	+0.17	±1.5
0	12	956.443769	+0.02	±1.5
10	12	956.443784	+0.04	±1.5
20	12	956.443795	+0.05	±1.5
20	10.2	956.443805	+0.06	±1.5
20	13.8	956.443799	+0.05	±1.5
30	12	956.443732	-0.02	±1.5
40	12	956.443674	-0.08	±1.5
50	12	956.443671	-0.08	±1.5

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

Test conclusion:

RESPECTED STANDARD

12. MEASUREMENT OF RADIATED INTERFERENCE FIELD STRENGTH

Standard: FCC Part 15

1| **Test procedure:** FCC Part 15 subpart B: Unintentional Radiators: §15.109

Limits: Class B

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESVS 10	1219
Biconical antenna	Hewlett Packard 11966 C	728
Log periodic antenna	Rohde & Schwarz HL 223	1999
Double ridged guild antenna	Electrometrics EM 6961	1204
Spectrum analyser	Rohde & Schwarz FSP40	4088
Open area test site	EMITECH	1274
Preamplifier	ALC ALN02	2648
High pass filter	MICROTRONICS HPM11630	6609
Spectrum analyser	ADVANTEST R3131	1628
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	fluke	0812

Test set up:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

1| The equipment is tested following the verification procedure.

Cables disposition of unit under test:

See photos of the test unit configuration in annex 3.

Frequency range: The highest frequency generated in the device is $f = 956.44375$ MHz
According the Sec.15.33 of the FCC Part 15 standard, the frequency range measured is indicated in the following table:

For unintentional radiator, including a digital device (Sec.15.33, §(b)(1) of the FCC Part 15 standard) :

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
500 – 1000	5000

Detection mode: Quasi-peak for the range 30 MHz - 1 GHz
Average for $f > 1$ GHz

Bandwidth: 120 kHz for the range 30 MHz - 1 GHz
1 MHz for $f > 1$ GHz

Distance of antenna: class B: 3 meters

Antenna height: 1 to 4 m

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

The equipment is blocked in continuous reception mode.

Results:

For the range 30 MHz - 1 GHz, the initial measurements are made in Peak detection mode with a spectrum analyser. Emissions with peak levels within 6 dB of the prescribed limits are re-measured using a Quasi-peak detector.

For $f > 1$ GHz, the measurements are made only with average detector with a spectrum analyser.

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Remark: for this test, the equipment is powered in 12 Vdc by an external power source.

Not any spurious has been detected during this test.

Applicable limits: for $30 \text{ MHz} \leq F < 88 \text{ MHz}$: 40 dB μ /m
 for $88 \text{ MHz} \leq F < 216 \text{ MHz}$: 43.52 dB μ /m
 for $216 \text{ MHz} \leq F \leq 960 \text{ MHz}$: 46.02 dB μ /m
 Above 960 MHz: 53.98 dB μ /m

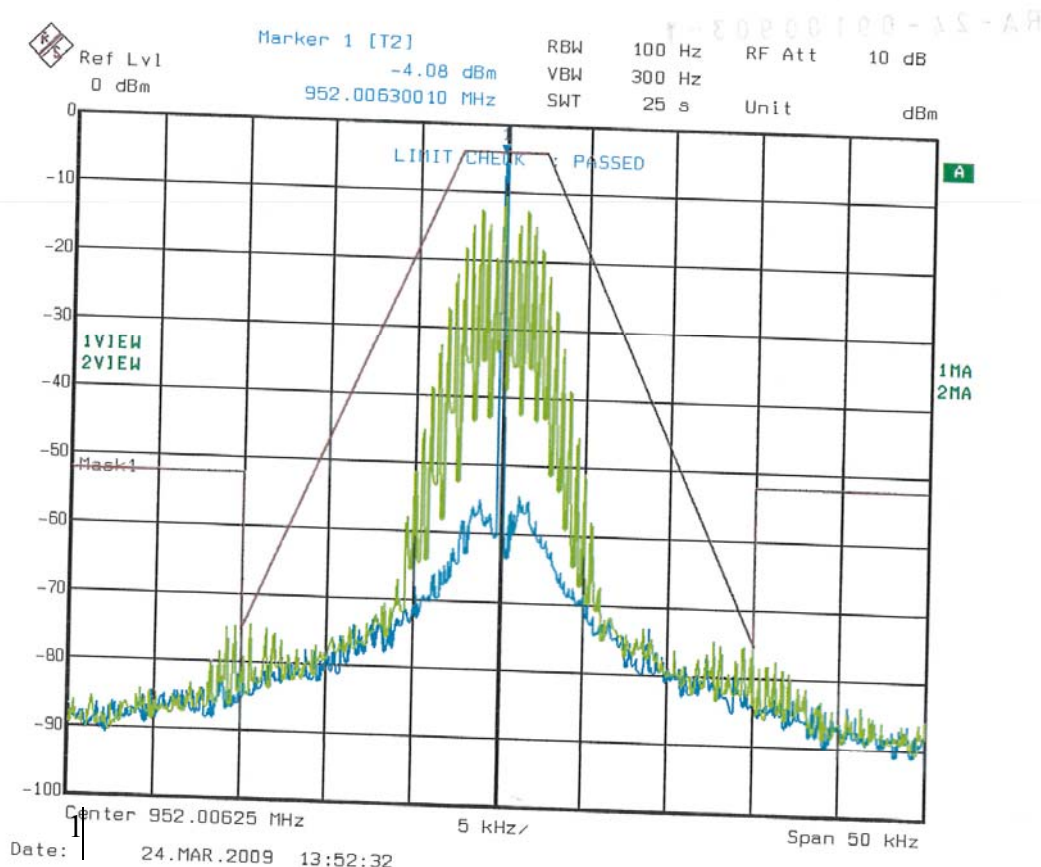
Test conclusion:

RESPECTED STANDARD

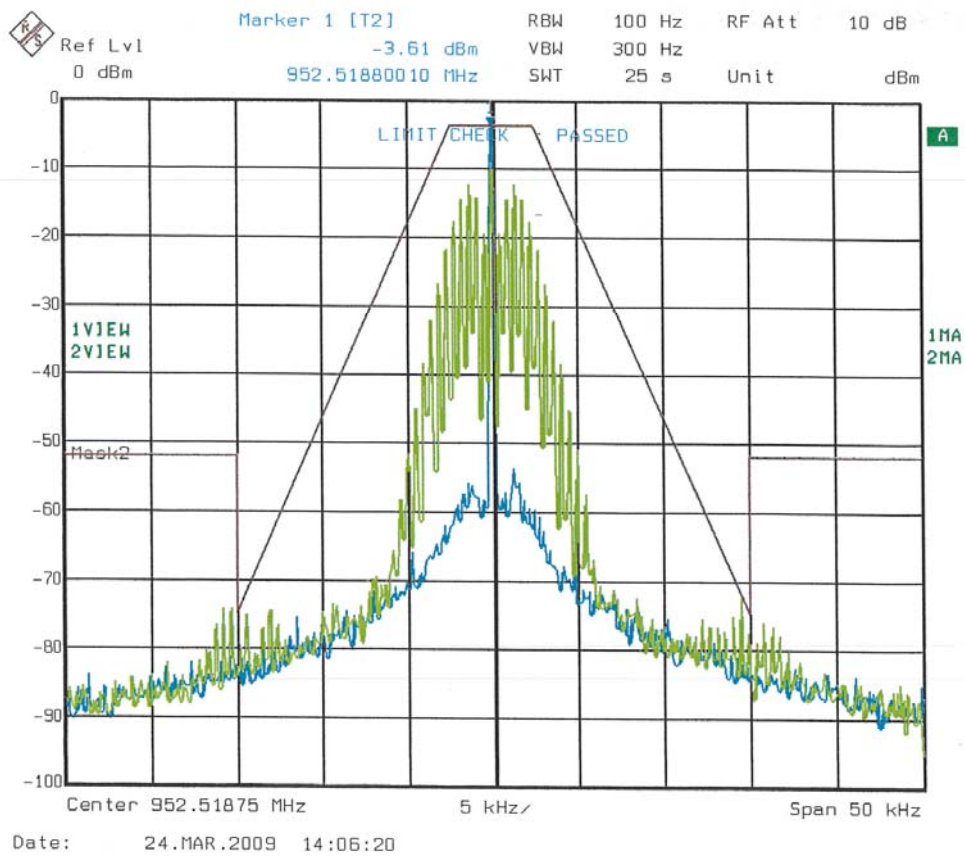
□□□ End of report, 3 annexes to be forwarded □□□

ANNEX 1: EMISSION MASK (MASK DESCRIBED IN § 101.111 (a) (5))

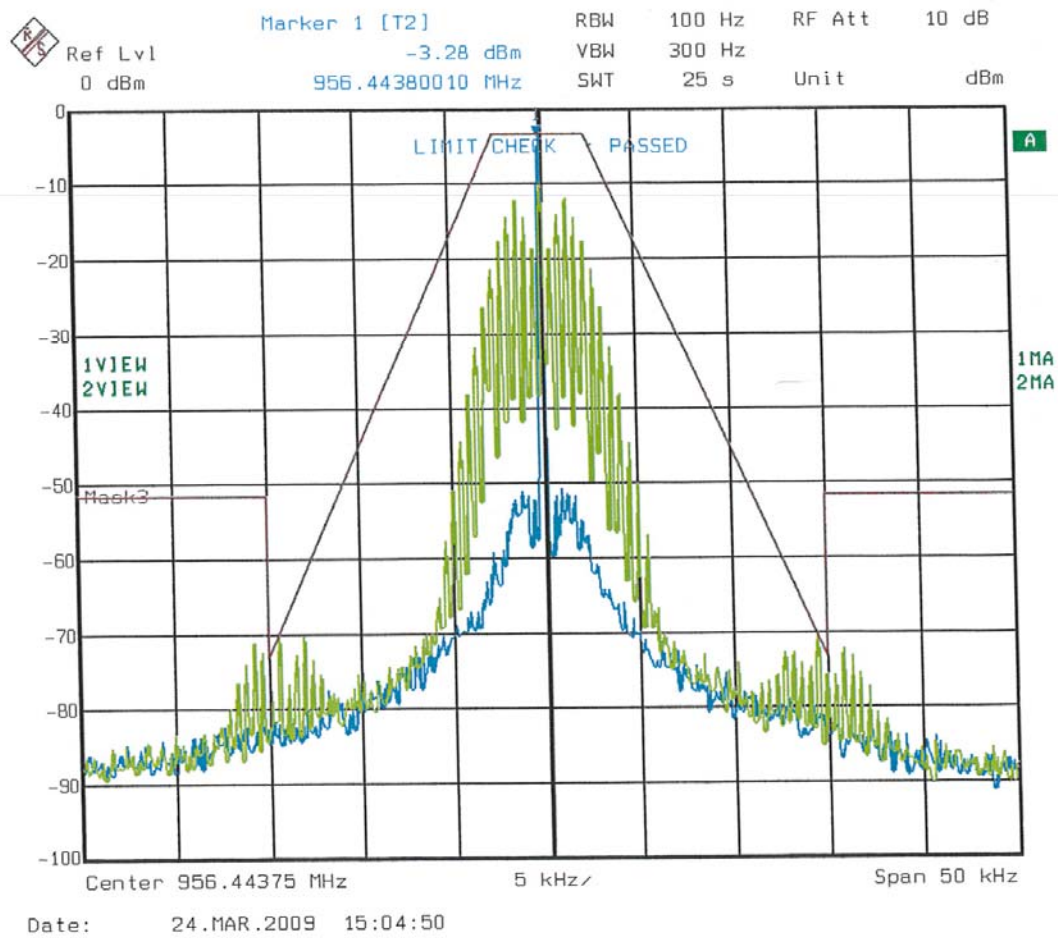
Channel 00



Channel 41



Channel 83



ANNEX 2: PHOTOS OF THE EQUIPMENT UNDER TEST

GENERAL VIEW





ANNEX 3: TEST SET UP AND OPEN AREA TEST SITE

TEST SET UP FOR RADIATED MEASUREMENT PART 101





TEST SET UP FOR RADIATED MEASUREMENT PART 15





OPEN AREA TEST SITE

