



EMC TEST REPORT
The 6 exhibits of this report are not sharable

FCC registration # 90469

Written by : D.RAUD

November 4, 2003

Identification : 195001DK

This report concerns : **Original grant** **Class II change**

Equipment tested : **Reading and Encoding RFID**

Equipment FCC ID : **RPMUSPICC**

Designed by : **SMARTWARE**
49, avenue Aristide Briand
92160 ANTONY – France

Manufactured by : **SMARTWARE**
49, avenue Aristide Briand
92160 ANTONY – France

Deferred grant requested per 47 CFR 0.457 (d)(1)(ii)

YES **NO**

if yes, defer until :

Company Named agrees to notify the Commission by :

of the intended date of announcement of the product so that the grant can be issued on the date

Transition rules requested per 15.37?

YES **NO**

If no, assumed Part 15, Subpart B for intentional or

unintentional radiator

The new 47 CFR [10-1-96 edition] provision



EQUIPMENT FCC ID : RPMUSPICC
INTENTIONAL RADIATOR
GENERAL INFORMATION

Report #
195001 DK

MANUFACTURER	SMARTWARE
PRODUCT DESIGNATION	Smart card decoder / encoder
FREQUENCY RANGE	13.553 – 13.567MHz
CLOCK GENERATOR CRYSTAL	13.56 MHz
NUMBER OF CHANNELS	single
ANTENNA DIMENSIONS	60 by 80 mm
ANTENNA CONNECTING DEVICE	SPECIFIC HE10 CONNECTOR
ANTENNA LOCATION	INSIDE FINAL PRODUCT
RF POWER in Watts	9 nW
FIELD STRENGTH AT 10 meters	35 dB μ V/m
OCCUPIED BANDWITH	350 kHz
TYPE OF MODULATION	Amplitude
EMISSION DESIGNATOR	350KA7DAN
TRANSMITTER SUPRIOUS (worst case)	40.968 MHz
RECEIVER SUPRIOUS (worst case)	None



Exhibit 3

Reading and Encoding RFID

TEST REPORT

According to CFR 47 Part 15

N°195001DK

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Technical control: O.ROY	GYL technologies Parc d'activités de Lanserre 21, rue de la Fuye 49610 Juigné sur Loire Tel. : 02.41.57.57.40 Fax : 02.41.45.25.77	Quality Control: L.MONTIEL
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1 GENERAL INFORMATION

1.1 Applicant:

SMARTWARE

49, avenue Aristide Briand
92160 ANTONY – France

1.2 Manufacturer:

SMARTWARE

49, avenue Aristide Briand
92160 ANTONY - France

1.3 Applicant representative:

Mr Nicolaas Van Klaveren

1.4 Test date:

October 15 to 16, 2003

1.5 Test site:

GYL Technologies
Parc d'activités de Lanserre
49610 Juigné sur Loire – France
FCC registration Number : 90469



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2 INTRODUCTION

The following test report for a 13.56MHz radio frequency identifier (RFID) is written in accordance with Part 15 of the Federal Communications Commissions. The Equipment Under Test (EUT) was US-PICC card . The test results reported in this document relate only to the item that was tested

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions of 2001. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurements were performed manually at GYL TECHNOLOGIES. The radiated emissions measurements required by the rules were performed on the three to ten meters, open field, test site maintained by GYL Technologies Parc d'activités de Lanserre, 49610 Juigné sur Loire , France. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission.

The power line conducted emission measurements were performed in a shielded enclosure also located at the Parc d'activités de Lanserre, 49610 Juigné sur Loire, France facility

3 MEASUREMENT EQUIPMENT LIST

PART TYPE	MANUFACTURER	MODEL	SERIAL NUMBER	CALIBRATION DATE
RECEIVERS				
Receiver	Rohde & Schwarz	ESI 7	M02020	Mar-03
Spectrum analyzer	Rohde & Schwarz	FSEM 30	M02021	Dec-02
ARTIFICIAL MAINS NETWORKS				
LISN (50µH / 5/50Ω)	Rohde & Schwarz	ESH2-Z5	M02034	Oct-02
ANTENNAS				
Bilog (30-2000MHz)	CHASE	CBL-6112	M02031	Aug-03
Horn (1 to 18GHz)	EMCO	3161-01	M01138	
H field probe 1 MHz to 1 GHz	RAM test		M03011	
H field Loop antenna (9 kHz -30MHz)	Rohde & Schwarz	HFH2-Z2	M03013	



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4 TESTED SYSTEM DETAILS

The equipment tested is a radio frequency identifier (RFID) card intended for use in light industry area and providing reading and encoding features for programming smart cards.

5 EQUIPMENT DESCRIPTION

5.1 Product type:

Radio Frequency Identifier (RFID)

Designation	Manufacturer	S/N	Frequency	Modulation	COMMENTS
US-PICC board	SMARTWARE	1030016	13.56 MHz	Amplitude	
Antenna	SMARTWARE	B V1.02			

5.2 Details

Equipment type	I (messages transmission).
Power class	2 (42dB μ A/m at 10m)
Frequency band	13.553 to 13.567 MHz. Modulation : amplitude from 11 to 100%.
Emitter Class	1 (small inductive loop)
Adjustable power	automatic at system configuration.
Fix frequency	single channel.
Duty cycle	100% in a permanent working
Receiver Class	2 (in case of failure: no risks for persons but no way to do the function manually).
Critical components	Quartz 13.56 MHz Antenna: Internal inductive loop of less than 0,1 m ² .

5.3 Ancillary Equipment

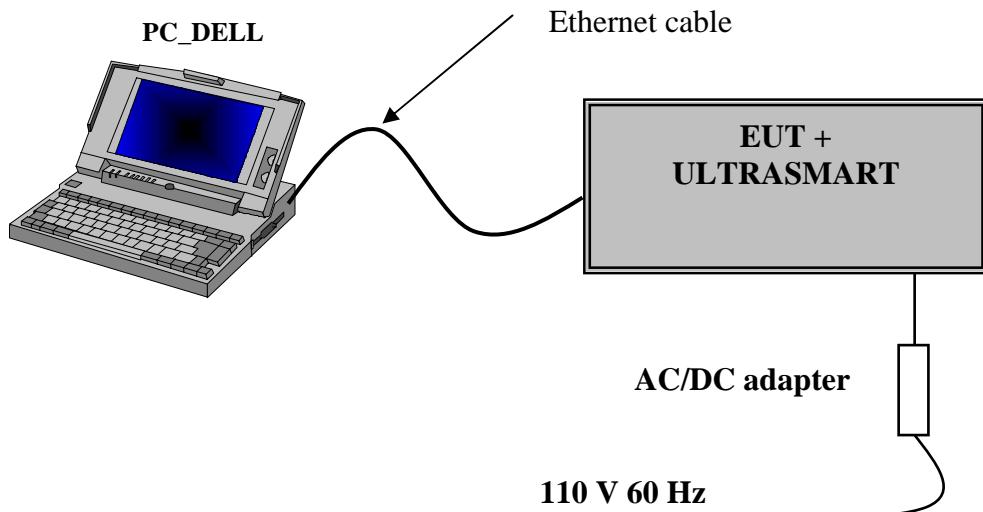
For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide additional operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it.:

Thus, as described in exhibit 3 the used ancillary equipment (named ULTRASMART) is a typical application providing feature to read and encode contact or contactless smartcards

Function	Manufacturer	REFERENCE	SERIAL NUMBER	COMMENTS
Backplane	SMARTWARE	US-DSC		
Motherboard	SMARTWARE	US-CORE	UC#0313AA303004A	
Contact board	SMARTWARE	US-ICC	0323 109AA 001C	
Power supply	MEAN WELL	PSU 15A-3	476581	

➤ PC DELL Inspiron Model PPI ; s/n 0009795D-12961-96N-0001; FCC Doc

5.4 Configuration of tested systems



6 EXERCISING TEST CONDITIONS

The Ultrasmart application was set up to execute permanent reading and encoding smart card and verifying the functionality by means of the Personal computer as shown by the picture below .The used software was "Testgene.mll" MLOSV3 .All test are done with Type B card. Power configuration = 10, Capacity configuration = 6





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7 CONFORMANCE STATEMENT

7.1 Standard reference for this report

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47CFR Part 15 (08-15-2002 Edition)

PART 2: 1999	Frequency allocations and Radio Treaty Matters General Rules and Regulations
Part 2, Subpart J	Equipment Authorization Procedures, Certification Sections
PART 15: 2002	Radio frequency devices
PART 15: Subpart C	Intentional Radiators
ANSI C63.4-2001	Standard format measurements/technical report personal computer and peripherals

7.2 Justification

As mentioned in paragraph 5 of this report, the equipment is an information technology equipment providing features to read and encode smart cards and as it is an intentional radiator the following sections of the standard mentioned above are applicable:

- 15.31 Measurements standards
- Part 15.207 and 15.209 (subpart C) for respectively conducted and radiated emission.
- 15.201 Equipment authorization requirements
- 15.203 Antenna requirements
- 15.205 Restricted bands of operation.
- 15.225 Operation within the band 13.553 - 13.567 MHz

7.3 Modifications required for compliance

No modifications were installed by GYL Technologies during compliance testing in order to bring the EUT into compliance. (This do not includes changes made by Smartware prior to compliance testing)

8 Test results summary:

TEST	Reference	Results
Field strength of fundamental	15. 225 (a)	complies
Radiated emission outside the band	15.225 (b)	complies
Frequency tolerance of the carrier	15.225 ©	complies
Line conducted emissions	15.207	complies
Radiated spurious emissions	15.209	complies
Antenna requirements	15.203	complies



9 TEST ACCORDING TO CFR 47 Part 15 Class B

Tests performed by Daniel RAUD at GYL Technologies laboratories on October 15, 2003.

9.1 Reference documentation:

FCC part 15 (Subpart C) §15.207 and 15.209 of 08-2002

9.2 Conducted emissions measurements

The power line conducted emission measurements were performed in a semi anechoic chamber manufactured by SIDT. The EUT was assembled on a non conductive 10 centimeters high wooden pallet. Power was fed to the EUT through a 50 ohm / 50 micro-Henry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Rohde and Schwartz 150 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 150 kHz. Conducted emission levels were measured on each current-carrying line with the receiver operating in the CISPR quasi-peak mode (or average mode if applicable)

9.3 Results: (§ 15.207 class B)

The following table lists worst-case conducted emission data. Specifically: Emission Frequency, Test Detector, Analyzer Reading, Site Correction Factor, corrected Emission Level, Quasi Peak Limit and Margin, and the Average Limit and Margin.

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and LIVE SIDE, herein referred to as Neutral, and Live respectively.

ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	4KHz
Preamplifier	OFF
Preselector	ON
Resolution, Band With	9 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	1 sec minimum

All readings are quasi-peak unless stated otherwise.

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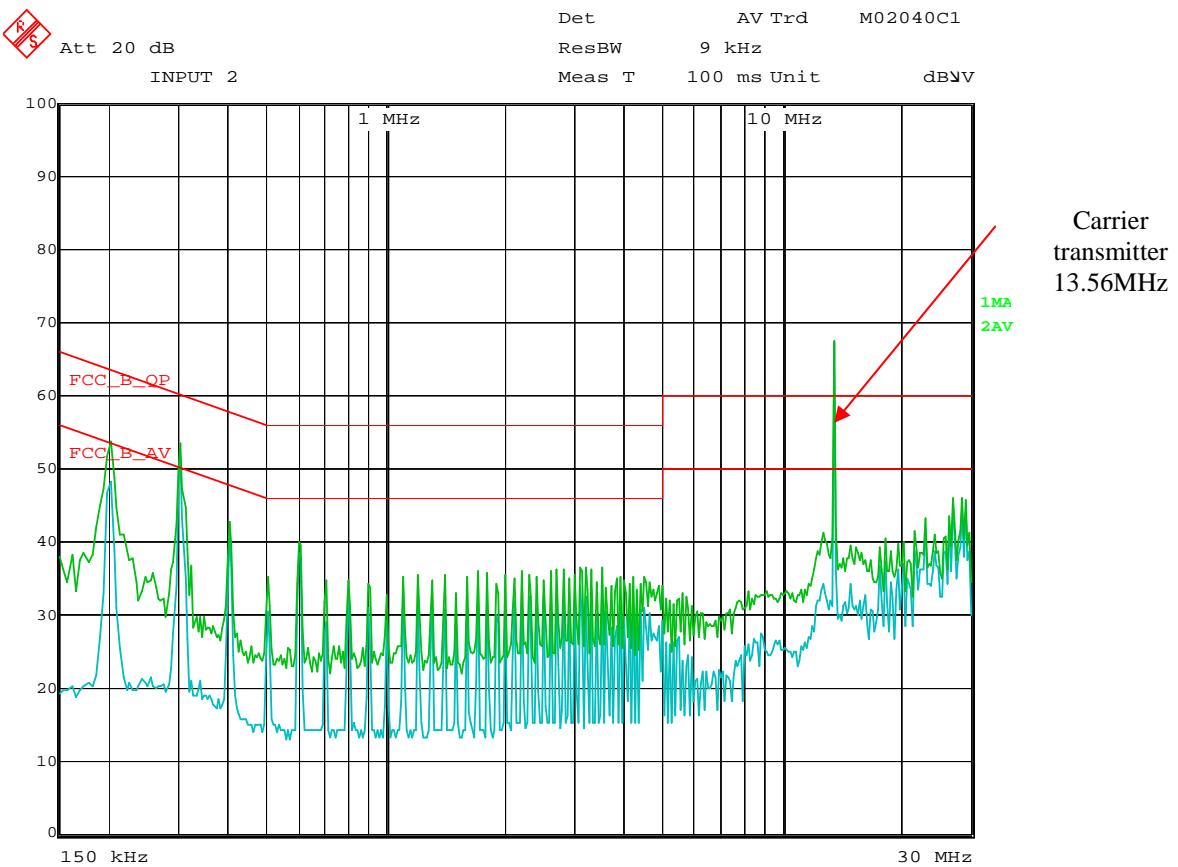
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9.3.1 Neutral (EUT power supply)

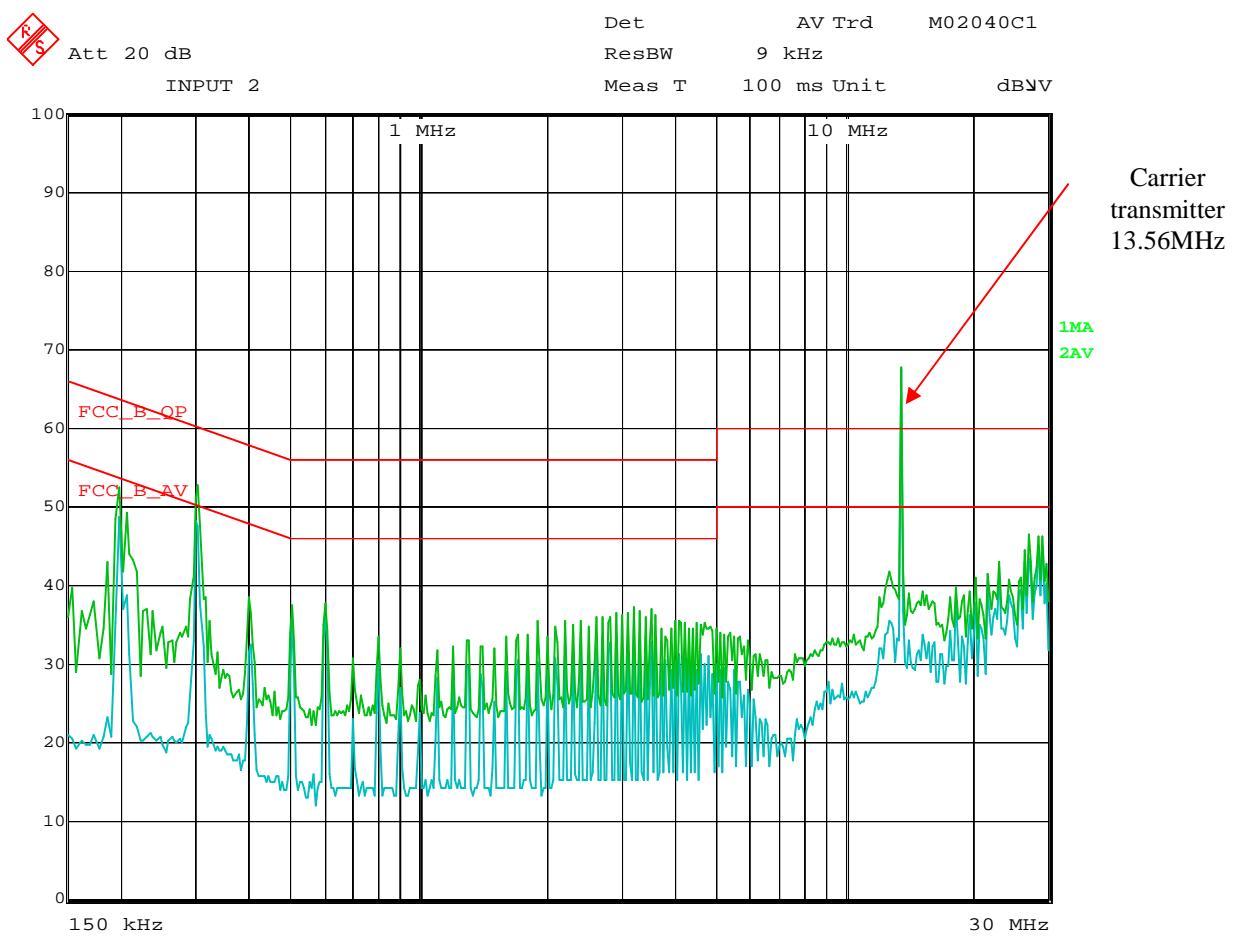
Frequency (MHz)	Average (dB μ V)	Average margin (dB)
0.310	45.97	-4.00
0.414	40.86	-6.71
0.618	42.15	-3.85
27.130	44.17	-5.83
27.158	43.68	-6.32
28.686	44.93	-5.07
29.234	44.87	-5.13

Legend: Blue curve represents average values
 Green curve represents the peak values



9.3.2 Live (EUT power supply)

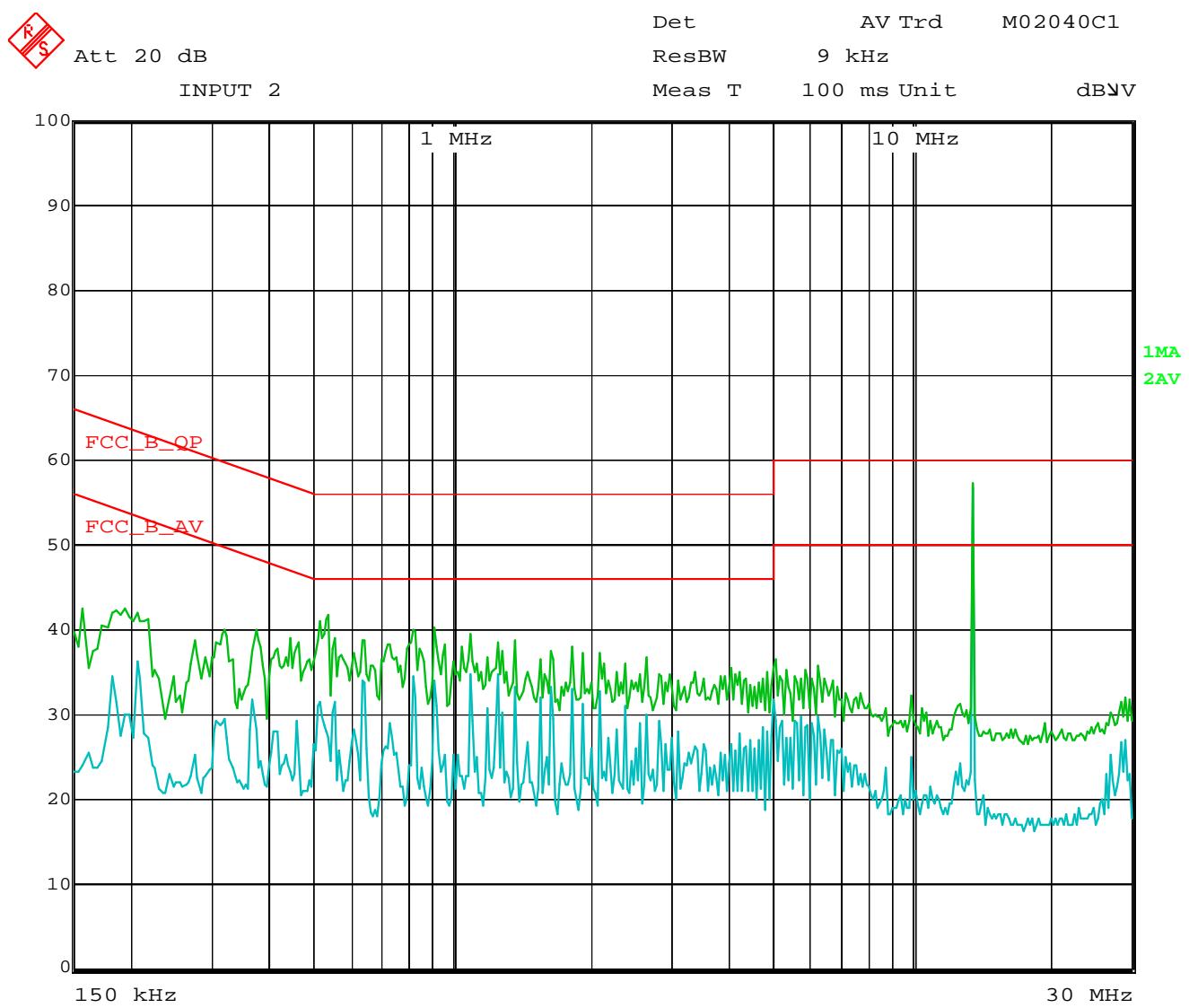
Frequency (MHz)	Average (dB μ V)	Average margin (dB)
0.618	40.39	-5.61
26.486	43.10	-6.90
26.610	43.62	-6.38
27.130	44.68	-5.32
27.158	44.20	-5.80
28.686	45.47	-4.53
29.234	45.30	-4.70



9.3.3 Neutral (PC power supply)

Since no peak emissions were detected above average or quasi-peak limits data collection measurement were not performed on the power supply of the PC .

Legend: Blue curve represents average values
Green curve represents the peak values



Date: 15.OCT.2003 12:04:31

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9.3.4 Live (PC power supply)



Att 20 dB

Det

AV Trd

M02040C1

INPUT 2

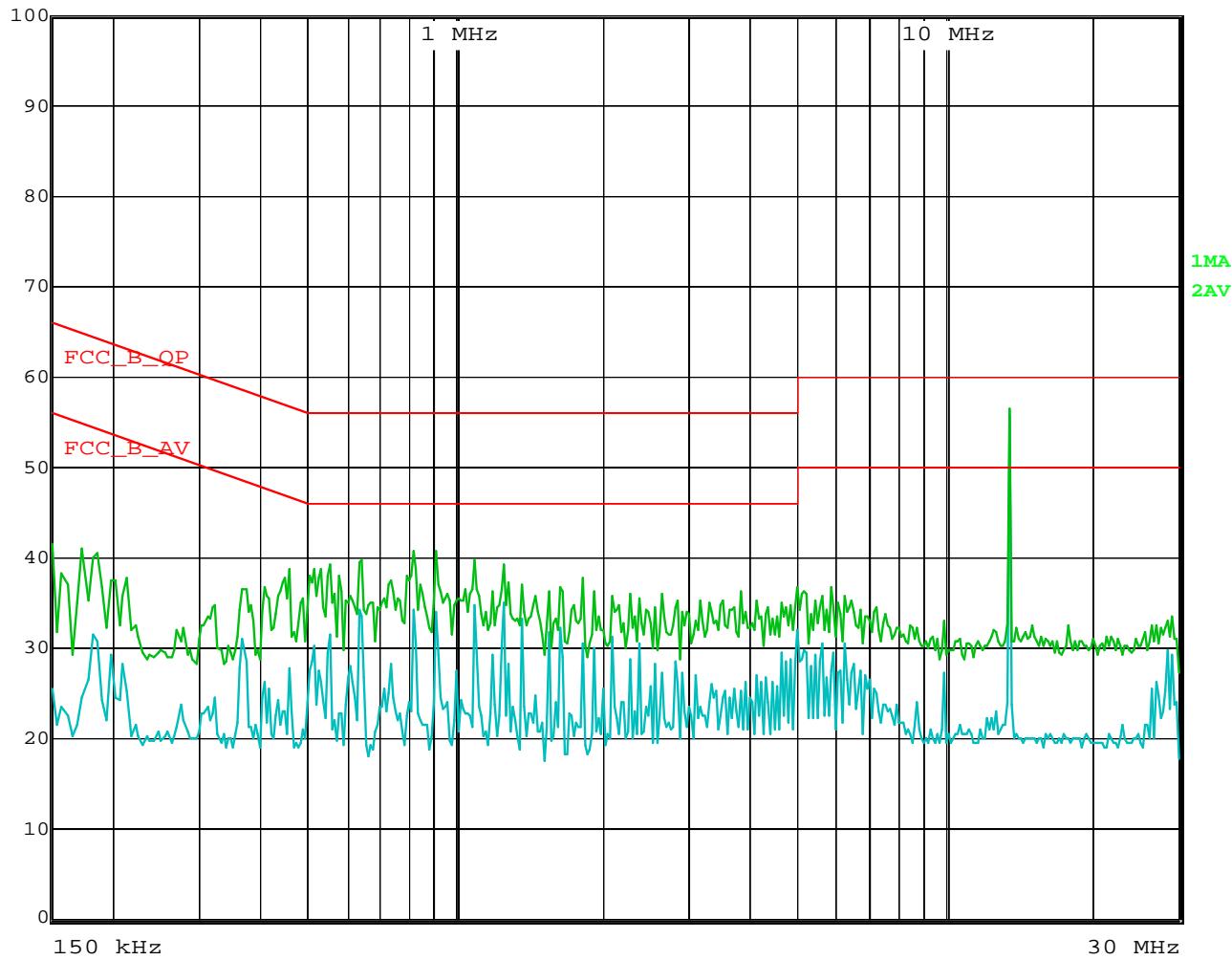
ResBW

9 kHz

Meas T

100 ms Unit

dBuV



Date: 15.OCT.2003 12:02:19

9.4 Interpretations and remarks:

The equipment complies with the §15.207 requirements



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9.5 Radiated emissions measurements

Before final measurements of radiated emissions were made on the open-field three/ten meter range; the EUT was pre-scanned in the semi anechoic at one meter distance. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meter above the ground plane. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Summary of settings

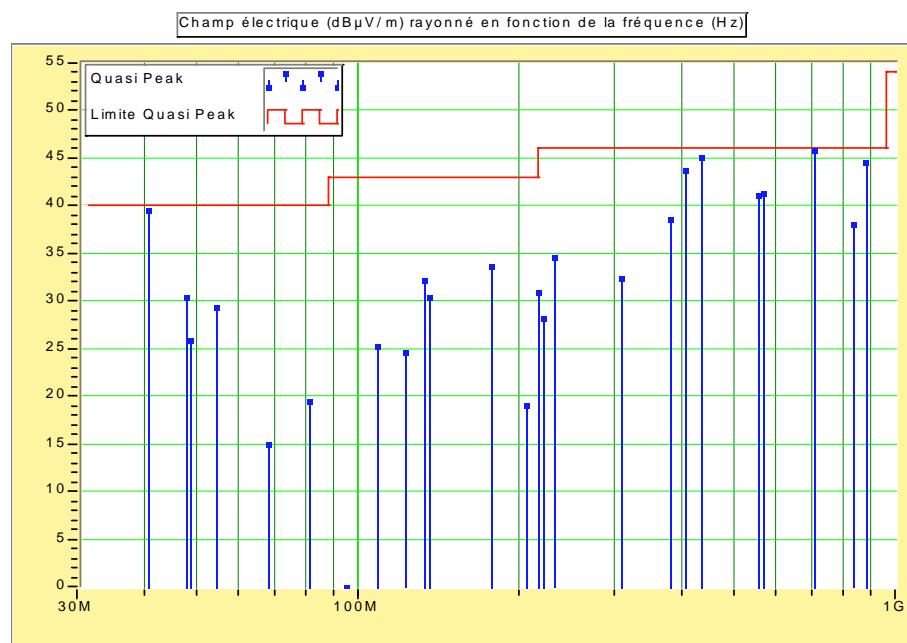
ESI 7 EMI TEST RECEIVER IN RECEIVER MODE	
Peak measurement time	5 ms
step size	40 KHz
Preamplifier	ON
Preselector	ON
Resolution, Band With	120 kHz
Final Quasi Peak measurement time	1 s minimum
Final average measurement time	N/A

All readings are quasi-peak unless stated otherwise.

9.6 Results (§ 15.209 class B):

The following data table lists the most significant emission frequencies, measured level, correction factor (includes cable and antenna corrections), corrected reading and the limit. The highest peaks are measured in quasi-peak detection mode at 3 meters distance.

Frequency (MHz)	Peak (dB μ V/m)	Quasi peak (dB μ V/m)	Margin (dB)	Polar.	Height (cm)	Angle (°)	Facteur Corr. (dB)	Comments
40,698	40,99	39,57	-0,43	V	105	268	13,56	
47,801	32,69	30,44	-9,56	V	103	348	10,78	
54,261	27,65	29,30	-10,70	V	100	3	9,11	
132,478	36,94	32,32	-10,68	V	107	127	13,30	
135,648	33,02	30,35	-12,65	V	112	241	13,48	
176,689	34,93	33,70	-9,30	H	164	276	11,59	
230,619	35,83	34,68	-11,32	H	127	298	14,06	
379,800	39,76	38,58	-7,42	H	241	345	18,68	
406,965	43,96	43,62	-2,38	H	218	8	19,35	
434,079	45,48	45,09	-0,91	H	199	333	19,86	
556,146	41,53	41,07	-4,93	H	170	305	21,97	
569,753	42,13	41,39	-4,61	V	137	172	22,19	
706,571	47,96	45,97	-0,03	H	129	323	24,89	
839,056	39,25	38,05	-7,95	H	116	263	24,67	
883,189	44,97	44,53	-1,47	H	105	208	25,17	



9.7 Interpretations and remarks:

The equipment complies with the §15.209 requirements



10 INTENTIONAL RADIATOR VERSUS PART 15 SUBPART C § 15.203, 15.205, 15.225

10.1 Antenna requirements (§15.203)

The antenna that uses a unique coupling to the intentional radiator by means of HE10 specific connector and it is clearly stated in the user notice (see exhibit 4) that the antenna must be replaced by an antenna provided by the manufacturer.

10.2 Restricted band operations (§15.205)

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209.

As demonstrated by the results given in paragraph 9.6 of this report no emissions or spurious were observed or exceed the limits of the restricted band of operations

10.3 Measurement of frequency stability §15.225 (c)

The frequency tolerance of the carrier signal shall be maintained within +0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

So the frequency limits of the radiator are $13.5632 < F_p > 13.5660$ MHz

Results of measurements are done with a 300 Hz RBW

Temperature	20°C	-20°C	55°C	
Power Supply	12 V	10 V	14 V	10 V
Level at F_l^* (dB μ V)	-7.5	-6.8	-7.7	-8.8
Equivalence at 10m (dB μ V/m)	-53.8	-53.1	-54.0	-55.1
Margin / limit (dB)	<-40dB	<-40dB	<-40dB	<-40dB
Level at F_h^* (dB μ V)	-6.4	-8.8	-6.4	-5.9
Equivalence at 10m (dB μ V/m)	-52.7	-55.1	-52.7	-52.2
Margin / limit (dB)	<-40dB	<-40dB	<-40dB	<-40dB
RF carrier (MHz)	13.5646	13.5646	13.5646	13.5647
Level at F_c^* (dB μ V)	81.3	80.4	81.8	80.2
Measurement at 3m(dB μ V/m)	45			
Equivalence at 10m (dB μ V/m)	35	34.4	35.8	34.2
Margin / limit (dB)	-58,5	-59.3	-57.7	-59.1
Margin / limit (dB)	-57.9			

The frequency stability is better than ± 100 ppm

*With F_l : lowest frequency of permitted range : 13.553 MHz

*With F_h : highest frequency of permitted range : 13.567 MHz

*With F_c : carrier frequency.

The limit of 42dB μ A/m at 10 m is equivalent to 103,5 dB μ V/m at 3 m or 93,5 dB μ V/m at 10 m

The spurious limit of -3,5 dB μ A/m is equivalent to 48dB μ V/m at 10m.



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10.4 Harmonics radiated emissions**Standard FCC Part 15, Subpart C, 08/20/2002**

Measurements were performed on fundamental frequency h1 until the 10th harmonic. Preliminary spectrum signature was conducted at 1 meter from EUT, final measurement being conducted at 3 meters distance from EUT according to ANSIC63.4 measurement method described in §8.

Detector: Peak

RBW = VBW = 100 kHz,

Harmonic number	Frequency (MHz)	Corrected value at D= 3m dB μ V/m	Limit (D=3m) dB μ V/m	Margin	Results
Fundamental	13.56	45	103.5	-58.5	Pass
H2	27.12	20	40	-20	Pass
H3	40.692	38,57	40	-1.43	Pass
H4	54.256	29,30	40	-10.7	Pass
H5	67.820	14,89	43	-28.11	Pass
H6	81.384	19,41	43	-23.59	Pass
H7	94.948	12.3	43	-30.7	Pass
H8	108.512	25,35	43	-17.65	Pass
H9	122.076	24,62	43	-18.38	Pass
H10	135.640	30,35	43	-12.65	Pass

10.5 Occupied Bandwidth

FCC Part 15, Subpart C

The test was performed according to: ANSI C63.4

The test set-up was made in accordance to the general provisions of ANSI C63.4-1992.

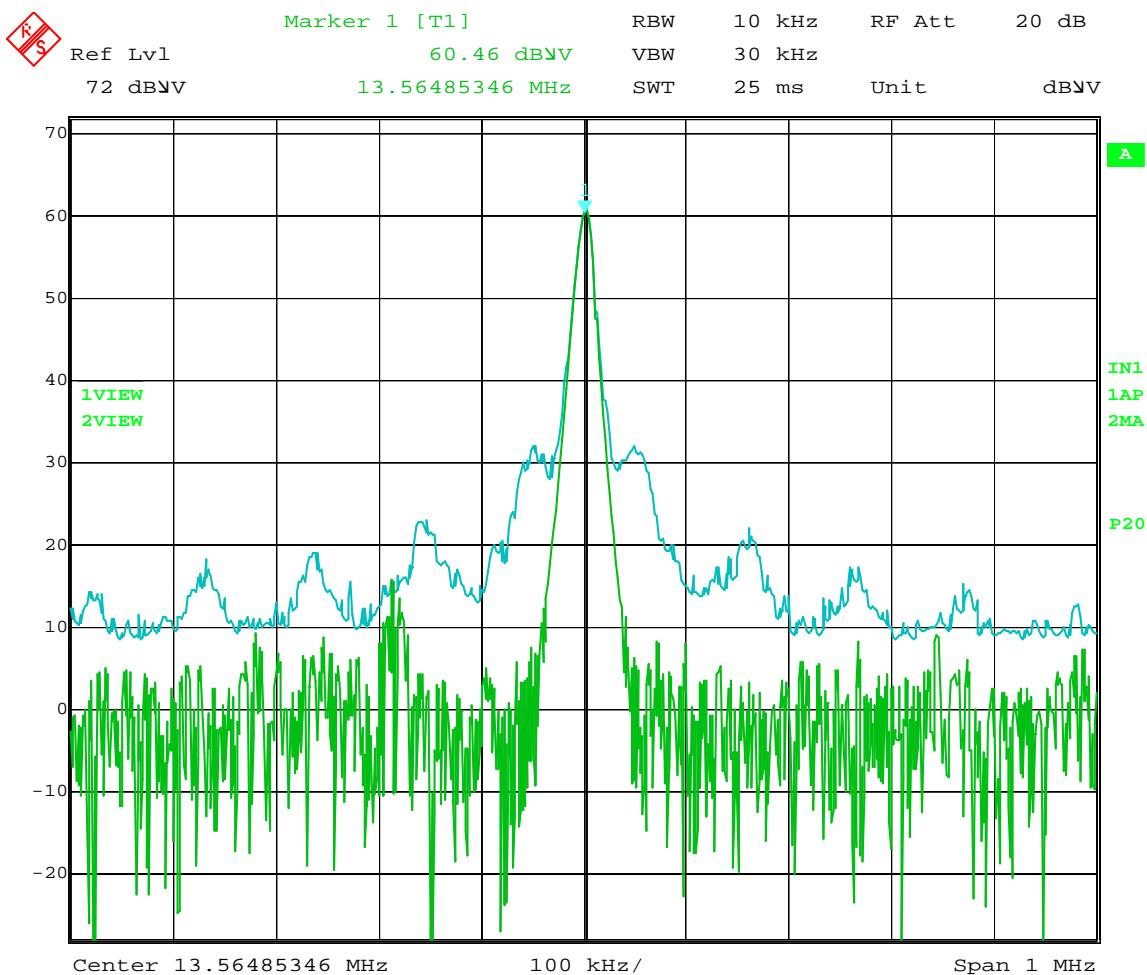
The Equipment Under Test (EUT) was setup in a shielded room to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency in typical mode of operation. The results recorded were measured with the modulation which produces the worst-case (widest) occupied bandwidth. The resolution bandwidth for measuring the reference level and the occupied bandwidth was 100 kHz.

The reference level of the spectrum analyser was set equal to the reference level of the EUT.

The maximum - 20 dB bandwidth of the channel is 50 kHz.

The blue curve is the max hold measurement and the green curve is the peak value





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11 Compliance to Human Exposure to Radiofrequency Electromagnetic Fields

As per OET Bulletin 65 Edition 97-01 table 2 of the appendix A and due to the field strength of the emitter

35 dB μ V/m at 10 meters, the product complies with the requirements regarding exposure to radiofrequency electromagnetic field