R051-24-10-101516-2/A ED. 0

FCC CERTIFICATION
RADIO Measurement
Technical Report
Limited modular approval

Standard to apply:
FCC Part 15.225

Equipment under test:
PLUGGED HF RFID READER
HF-AM1-Ikôn

FCC ID:
GM3HFAM1NEO

Company:
PSION TEKLOGIX

DISTRIBUTION: Mr FORNIER **Company: PSION TEKLOGIX**

Number of pages: 28 including 3 annexes

Ed.	Date	Modified pages	Written by Name	Visa	Technical Verification Quality Approval Name	Visa
0	1-Jun-10	Creation	M. DUMESNIL	M. D.	P. BONNENFANT	

Duplication of this document is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.
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:	**PLUGGED HF RFID READER**
Reference / model:	HF-AM1-Ikôn (RFID module)
Serial number:	not communicated (radio module) PX0FC8320970 (terminal sample N°1)
MANUFACTURER:	PSION TEKLOGIX

COMPANY SUBMITTING THE PRODUCT:

Company:	PSION TEKLOGIX
Address:	Parc de la Duranne 135 rue René Descartes 13591 AIX EN PROVENCE FRANCE
Responsible:	Mr FORNIER
DATE(S) OF TEST:	2, 3, 6 and 27 April 2010
TESTING LOCATION:	EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE EMITECH ATLANTIQUE open area test site in LA POUEZE (49) FRANCE Registration Number by FCC: 101696/FRN: 0006 6490 08
TESTED BY:	M. DUMESNIL

CONTENTS

TITLE **PAGE**

1. INTRODUCTION

This report presents the results of radio test carried out on the following equipment: PLUGGED HF RFID READER – HF-AM1-Ikôn, in accordance with normative reference.

2. PRODUCT DESCRIPTION

Class: A (industrial environment)

Utilization: RFID reader

Antenna type: incorporated antenna

Operating frequency : 13.56 MHz

Number of channels: 1

Power source: 115 Va.c charging dock + 3.7 Vd.c internal battery.

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 15 (2009)	Code of Federal Regulations Title 47 - Telecommunication Chapter 1 - Federal Communications Commission Part 15 - Radio frequency devices Subpart C - Intentional Radiators
ANSI C63.4 (2009)	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 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 conduction limits for receivers.
Paragraph 203: antenna requirement
Paragraph 207: conducted limits
Paragraph 209: radiated emission limits; general requirements
Paragraph 225: operation within the band 13.110 – 14.010 MHz

5. TESTS RESULTS SUMMARY

5.1. Intentional radiator (subpart C)

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				*Note 1*
FCC Part 15.207	CONDUCTED LIMITS	X				
FCC Part 15.209	RADIATED EMISSION LIMITS, GENERAL REQUIREMENTS	X				
FCC Part 15.225	OPERATION WITHIN THE BAND 13.110 – 14.010 MHz					
	a) 13,553-13,567 MHz, field strength	X				
	b) 13,410-13,553 MHz et 13,567-13,710 MHz, field strength	X				
	c) 13,110-13,410 MHz et 13,710-14,010 MHz, field strength	X				
	d) spurious outside 13,110 MHz and 14,010 MHz	X				See §15.209
	e) frequency tolerance	X				*Note 2*
	f) Tag actif			X		

NAp: Not Applicable NAs: Not Asked

Note 1: incorporated antenna.

Note 2: only a measure of the emission frequency in ambient condition has been realized on the request of applicant.

5.2. Unintentional radiator (subpart B)

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 CONDUCTION LIMITS FOR RECEIVERS			X		

NAp: Not Applicable NAs: Not Asked

5.3. Conclusion:

The sample of PLUGGED HF RFID READER – HF-AM1-Ikôn submitted to the tests complies with the regulations of the standard FCC Part 15 in accordance with the limits or criteria defined in this report.

6. MEASUREMENT OF THE CONDUCTED DISTURBANCES

Standard: FCC Part 15

Test procedure: FCC Part 15 Unintentional Radiators: Sec.15.107
Intentional Radiators: Sec.15.207

Limits: Class A

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESH3	1058
Pulse limiter	Rohde & Schwarz ESH3-Z2	976
Artificial main network	PMM L3-25	834
Spectrum analyzer	Rohde & Schwarz FSEA	5071
Transient limiter	Hewlett Packard 11947A	1092
Power source	K-SERRAS ALT 2000	2441

Software used: BAT-EMC V3.5.0.2

Test set up:

The test unit is placed on a wooden table at 0.8 m over a horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an LISN placed on the ground reference plane.

See photos in the annex 1.

Equipment under test operating condition:

The equipment is powered with the AC power operating voltage of 115 V / 60 Hz.
Sec 15.107: the equipment is blocked in standby mode.
Sec 15.207: the equipment is blocked in continuous transmission mode, modulated by internal data signal.

Frequency range: 150 kHz - 30 MHz

Detection mode: Peak

Bandwidth: 10 kHz (Peak)

Results:

Measurement on the mains power supply (in standby mode):

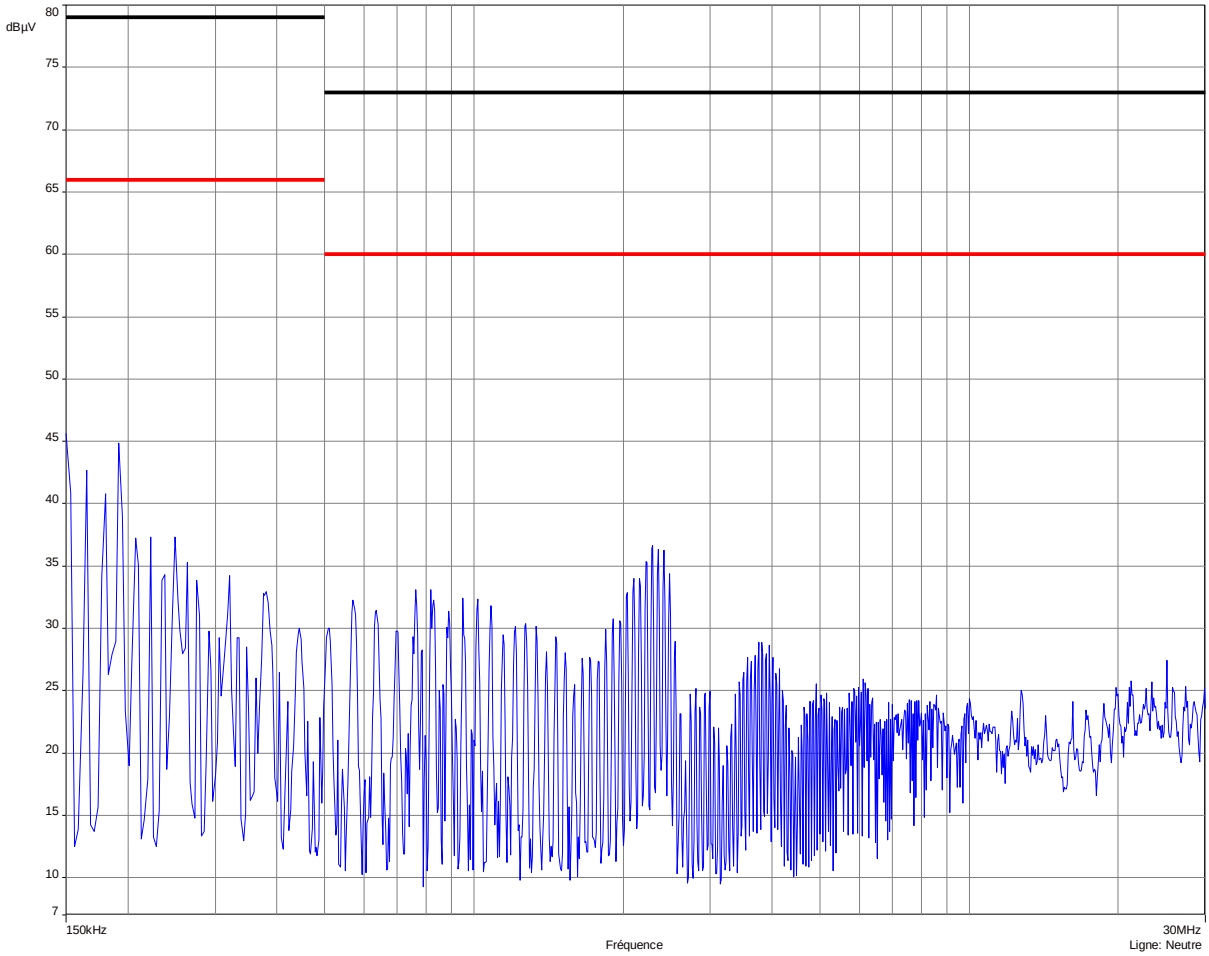
The measurement is made with peak detector.

Curve N° 1: measurement on the Neutral with peak detector
Curve N° 2: measurement on the Line with peak detector

The frequencies which aren't 6 dB under the limit are analyzed with Quasi-peak detector and average detector. The results are noted if necessary.

CURVE N° 1:

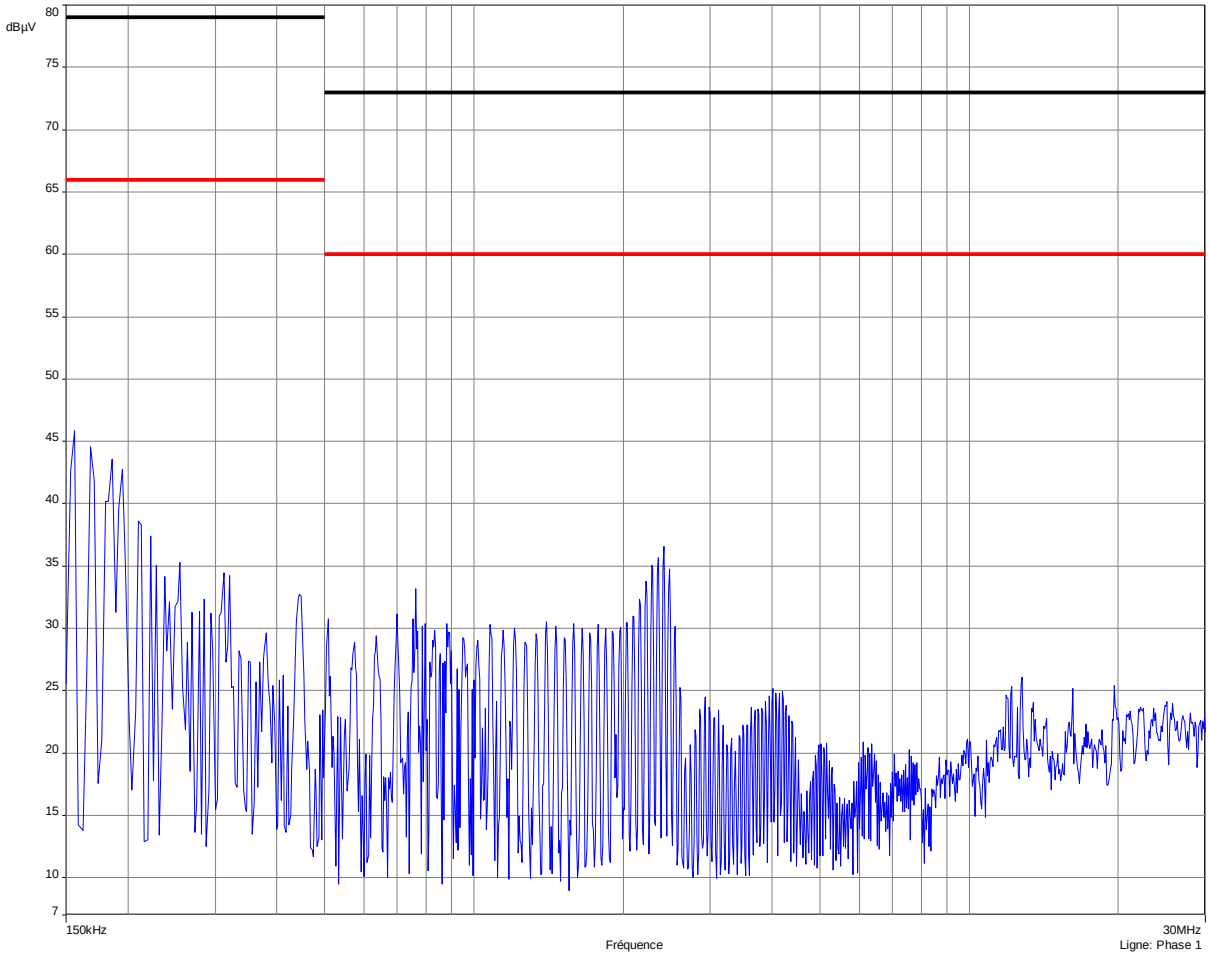
Measurement on the neutral with peak detection



RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

CURVE N° 2:

Measurement on the line with peak detection



RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

Measurement on the mains power supply (in continuous transmission mode modulated):

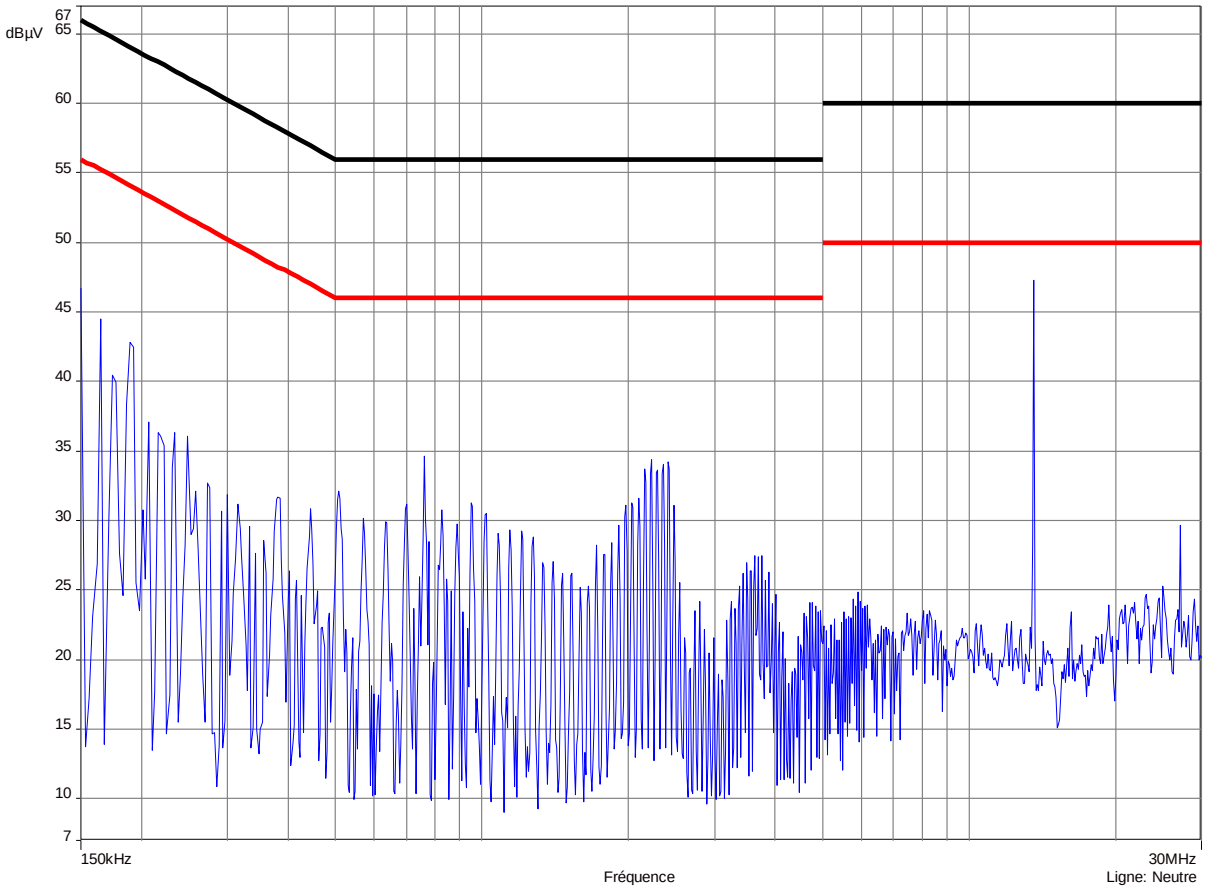
The measurement is made with peak detector.

Curve N° 3: measurement on the Neutral with peak detector
Curve N° 4: measurement on the Line with peak detector

The frequencies which aren't 6 dB under the limit are analyzed with Quasi-peak detector and average detector. The results are noted if necessary.

CURVE N° 3:

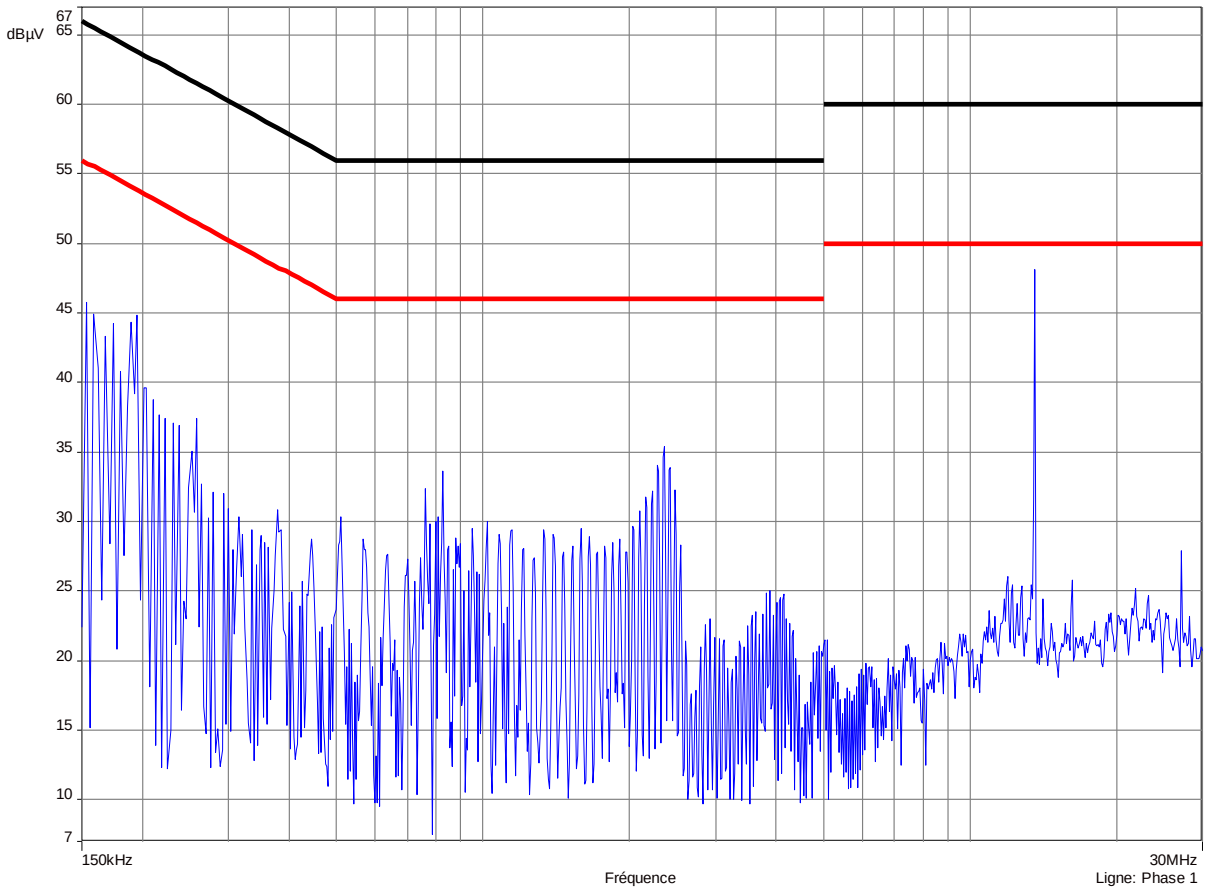
Measurement on the neutral with peak detection



RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

CURVE N° 4:

Measurement on the line with peak detection



RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

Test conclusion:

RESPECTED STANDARD

7. MEASUREMENT OF RADIATED INTERFERENCE FIELD STRENGTH

Standard: FCC Part 15

Test procedure: FCC Part 15 Unintentional Radiators: Sec.15.109

Limits: Class A

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESVS 10	1219
Biconical antenna	Hewlet Packard 11966 C	728
Log periodic antenna	Rohde & Schwarz HL 223	1999
Spectrum analyser	Rohde & Schwarz FSP40	4088
Open area test site	EMITECH	1274
Spectrum analyser	ADVANTEST R3131	1628
Low noise amplifier	Hewlett Packard HP8447D	1181
Variac	Dereix R213	1419
multimeter	Fluke 77-2	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.

Cables disposition of unit under test:

See photos of the test unit configuration in annex 2.

Frequency range: The highest frequency generated in the device is f = 13.56 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 15standard) :

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
1.705 – 108	1000

Detection mode: Quasi-peak for the range 30 MHz - 1 GHz

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

Distance of antenna: class A: 10 meters for the range 30 MHz - 1 GHz

Antenna height: 1 to 4 m

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

The equipment is powered with the AC power operating voltage of 115 V.
The radio module is blocked in standby 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 and noted in the following table.

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

FREQUENCIES (MHz)	Antenna height (cm)	Polarization H: Horizontal V: Vertical	Azimuth (degrees)	Field strength (dBµV/m)	Limits (dBµV/m)
144	100	V	97	31.3	53.52
156	100	V	276	32.3	53.52
239.3	100	V	90	34.5	56.44
251.3	100	V	94	37	56.44
263.3	100	V	164	37.8	56.44
276	100	V	166	45.4	56.44
813.61	126	V	189	48.1	56.44
819.73	121	V	189	44.9	56.44
838.08	126	V	183	46.2	56.44
862.55	107	V	303	49	56.44
887.02	165	V	0	48.6	56.44

- The measurement is carried out at a distance of 3 m instead of 10 m. So, the limit is increased of 10 dB.

Test conclusion:

RESPECTED STANDARD

8. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 209

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESVS 10	1219
Biconical antenna	Hewlet Packard 11966 C	728
Log periodic antenna	Rohde & Schwarz HL 223	1999
Spectrum analyzer	Rohde & Schwarz FSP40	4088
Open area test site	EMITECH	1274
Test receiver	Rohde & Schwarz ESH3	1058
Active loop antenna	EMCO 6502	1406
Meteo station meteostar	Bioblock Scientific	0943
Variac	Dereix R213	1419
multimeter	Fluke 77-2	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 azimuths correspond to the front of the equipment under test.

Frequency range: from 9 kHz to harmonic 10

Detection mode: Quasi-peak (F < 1 GHz)

Bandwidth: 120 kHz (F < 1 GHz)

Distance of antenna: 10 meters for the range 9 kHz-30 MHz
3 meters for the range 30 MHz-harmonic 10

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

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

Results:

Ambient temperature (°C): 16
Relative humidity (%): 73

Power supply: 115 Va.c charging dock + 3.7 Vd.c internal battery

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

FREQUENCIES (MHz)	Antenna height (cm)	Polarization of antenna H: Horizontal V: Vertical	Azimuth (degrees)	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
27.12	100	V //	271	15.54	48.63	33.09
54.24	100	V	305	33.7	40	6.30
108.48	100	V	257	28.6	43.52	14.92

V //: Vertical Parallel

Any radiated emission which has more than 20 dB margin compared to the limit is not necessary reported.

Test conclusion:

RESPECTED STANDARD

9. OPERATION WITHIN THE BAND 13.110 – 14.010 MHz

Standard: FCC Part 15

Test procedure: paragraph 15.225

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESH3	1058
Active loop antenna	EMCO 6502	1406
Open area test site	EMITECH	1274
Modulation analyzer	Hewlett Packard HP8901B	1211
Variac	Dereix R213	1419
Multimeter	Fluke 77-2	0812
Meteo station meteostar	Bioblock Scientific	0943
Meteo station AB888	Oregon Scientific	1539

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.
The frequency tolerance measure is realized in near-field.

Distance of antenna: 10 meters

Antenna height: 1 meter

Antenna polarization: oriented in the vertical plane. The lowest point of the loop is 1 m above ground level.

Equipment under test operating condition:

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

Results:

Carrier field strength

Ambient temperature (°C): 17
Relative humidity (%): 73

Sample N° 1

Power supply: 115 Va.c charging dock + 3.7 Vd.c internal battery.

	Field strength (dBµV/m) at frequency: 13.56 MHz
Normal test conditions	43.12
Limits	103.08

Polarization of test antenna: perpendicular at the equipment at 0 degree.
Position of equipment: vertical position (azimuth: 90 degrees)

Frequency stability

Sample N° 1

Power supply: 115 Va.c charging dock + 3.7 Vd.c internal battery

Normal test conditions	Temperature (°C): 20 Humidity (%): 34	Nominal power source (V): 115 Va.c + 3.7 Vd.c	**Frequency: 13.559836 MHz**

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

Test conclusion:

RESPECTED STANDARD

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

ANNEX 1: TEST SET UP AND OPEN AREA TEST SITE

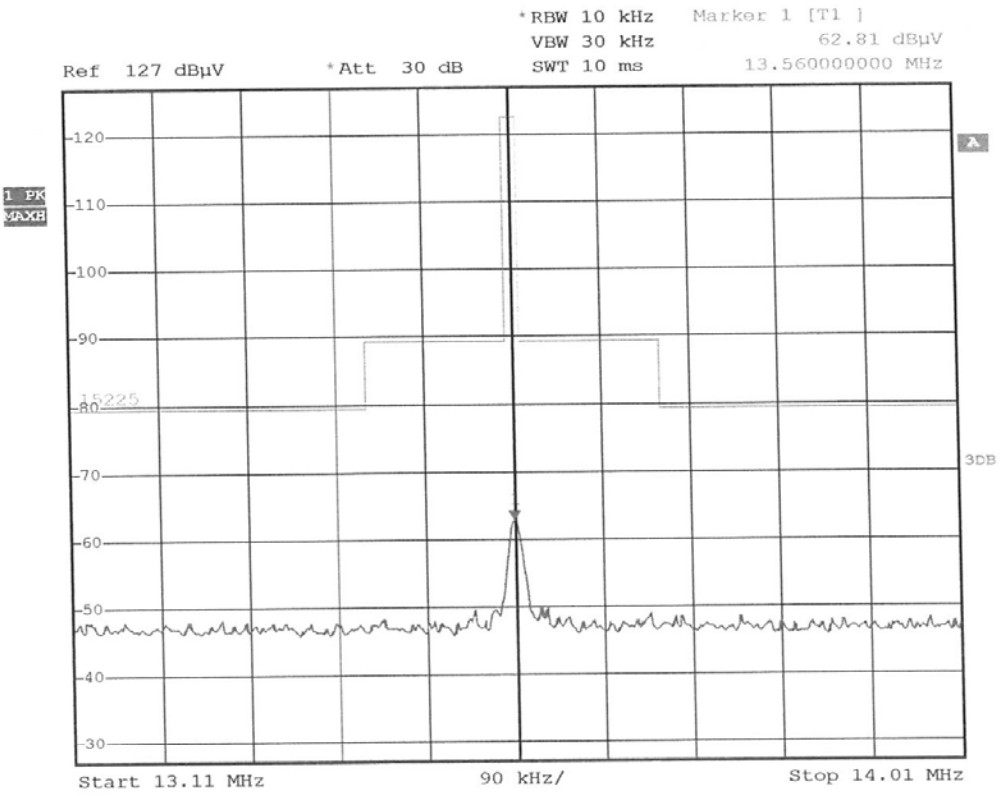
RADIATED MEASUREMENTS

RADIATED MEASUREMENTS

CONDUCTED MEASUREMENTS

OPEN AREA TEST SITE

ANNEX 2: RADIATED EMISSION PLOT



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ANNEX 3: RADIO APPLICATION FORM

EMITECH

Questionnaire de demande de prestation

Version française tapez 1 :
English version tape 2: 1

A - PARTIE ADMINISTRATIVE

Il est important de remplir complètement les questionnaires car ils sont nécessaires à l'établissement de notre proposition technique et financière ainsi qu'au bon déroulement de la prestation.

A1 - Client demandeur de la prestation (qui sera destinataire du rapport en diffusion)

Société :	PSION TEKLOGIX				
Contact :	Nicolas FORNIER				
Adresse :	135 rue René Descartes, Parc de la Duranne 13591 Aix en Provence				
Tél :	04.42.908.809	Fax :	04.42.908.888	e-mail :	nicolas.fornier@psiontekl

A2 - Représentant ou Mandataire (à remplir si différent du demandeur)

Société :					
Contact :					
Adresse :					
Tél :		Fax :		e-mail :	

A3 - Constructeur (à remplir si différent du demandeur)

Société :					
Contact :					
Adresse :					
Tél :		Fax :		e-mail :	

A4 - Description du produit / système

Désignation :	Plugged HF RFID Reader
Référence :	RFID module HF-AM1-Ikôn
Type :	
Fonction :	
Autre :	

DQS S41 000 FOR 00001-01

B - PARTIE TECHNIQUE

Description du produit / système

Désignation :	Plugged HF RFID Reader
Référence :	RFID module HF-AM1-Ikôn
Numéro de série :	
Fonction :	0
Si le produit est embarqué sur véhicule, type de véhicule :	
Autre :	0

Equipement de série ☐ présérie ☑ prototype ☐

Alimentation

Monophasé :		Vac	Fréquence ou plage de fréquence :	
Triphasé :		Vac	Présence neutre (oui / non) :	
Batterie :	3.7	Vdc	Autres renseignements :	
Alimentation DC :		Vdc		
Adaptateur secteur : ☐				
Puissance :		W		
Courant nominal :	0.2	A		

Autres

Poids (kg) :		Taille (L x l x h) (m) :	75X40X15 mm
Température d'utilisation min :			
Température d'utilisation max :	50°C		
Liquide ou produit dangereux * :			
Connexions spécifiques (eau, gaz, *) :			

* fournir les consignes de sécurité appropriées

Câbles d'entrées / sorties

	Désignation (préciser le type : RTC, RNIS, ADSL, Ethernet, RS 232, ... et quantité)	Blindé (O/N)	Long. déclarée
Cable :	Docking connector	N	
Cable :			
Cable :			
Cable :			
Cable :			
Cable :			
Cable :			
Cable :			
Cable :			
Cable :			

Autre :

B3 - Partie spécifique RADIO

A renseigner impérativement si votre besoin concerne la RADIO

Emetteur / Récepteur

Type : ☐ Emetteur ☐ Recepteur ☑ Emetteur/Récepteur

☑ Mono freq. ☐ Bi freq. ☐ Multi freq. Nbr de canaux :

Fréquence d'émission :	13,56 MHZ	Puissance :	1 W
Modulation :	Amplitude modulation		
Niveau du signal modulant :			
Rapport cyclique d'émission :	continous		
Fréquence de réception :	13,56 MHZ		
Classe du récepteur :	1		

Autre :

Antenne

Type : ☑ Intégrée ☐ Externe fixe (1) ☐ Externe détachable (1)

(1) décrire le type d'antenne, sa longueur et le type de connecteur :

Antenna loop (55 X 30 mm)

Gain d'antenne : dBi

Autres

Destination de l'équipement : ☐ Transm. data ☐ Télémesure ☐ Télécommande ☐ Téléalarme ☐ Phonie ☑ Autre :

Possibilité de bloquer l'émetteur en ém. permanente : ☑ ☑ Modulé ☑ Non modulé

Possibilité de bloquer le récepteur en réc. permanente : ☐

Autres informations :

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