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RA-06-24065-2/A Ed. 1

"This report cancels and replaces the test report n° RA-06-24065-2/A Edition 0"

FCC CERTIFICATION
RADIO Measurement
Technical Report

standard to apply:
FCC Part 15

Equipment under test:
PAY AND DISPLAY MACHINE
"STRADA RAPIDE TM"

FCC ID:
T2XSTRADA-RAPIDE

Company:
PARKEON

DISTRIBUTION: Mr TREUVEY **Company: PARKEON**

1 | **Number of pages: 30 including 5 annexes**

Ed.	Date	Modified Pages	Written by Name	Visa	Technical Verification Quality Approval Name	Visa
1	16-Feb-07	1 to 4, 6 to 8, 10, 17 to 30	L. BERTHAUD	LB	P. BONNENFANT	

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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: **PAY AND DISPLAY MACHINE**

Reference / model: STRADA RAPIDE TM

Serial number:

Configuration horodateur (Pay & Display machine) :

élément	Symbole	N° série
Boîtier Strada TM	000135684	S01ZW107282
Porte de boîtier	000135010	S01K7004864
Imprimante graphique Stelio	000122510	S007Z139410
Sélecteur	000120346	S0082133114C
Préencaissement	000130550	S017K131625-
Carte principale	404002621	S01IU200852B
Datapack	404001602	002920
Afficheur Neops	000135154	003060
Carte clavier	404001694C	0002010444T soft 6004001694
Rack câblé	000143430	S01UW107223-
Carte modem Wifi	1000000245A	Version présérie
Modem Wifi DPAC	WLNB-AN-DP101	18B3703-11 rev. E soft Airborne Firmware_UART 4.0.1.4
Antenne MA 712Y00		
Batterie FIAMM GS – 12V – 27Ah	404302519A	

Version solaire :

Carte Chargeur solaire	404002394B	13293 0405
Panneau Solaire 5W	000135765	

Version secteur 220V :

Carte chargeur secteur	404001670A	4205
Alimentation 220V	404302296	S008N100455B
Rack secteur	000135280	
Chapeau cache antenne	000135768C	

Version secteur 110V :

Carte chargeur secteur	404001575	0043 0042
Alimentation multi tensions	000129246	
Rack secteur	000135280	
Chapeau cache antenne	000135768C	

MANUFACTURER: not communicated

COMPANY SUBMITTING THE PRODUCT:

Company: PARKEON

Address: Parc La Fayette - 6, rue Isaac Newton
25075 BESANCON CEDEX 9
FRANCE

Responsible: Mr TREUVEY

DATE(S) OF TEST: 14, 15 and 16 February 2006
16 January 2007

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: L. BERTHAUD and C. GREGOIRE

CONTENTS

TITLE **PAGE**

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1.INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: PAY AND DISPLAY MACHINE "STRADA RAPIDE TM" in accordance with normative reference.

2.PRODUCT DESCRIPTION

ITU Emission code: 13M0G7D

Class: B (residential environment)

Utilization: Pay and display machine with WIFI modem

Antenna type: incorporated antenna

Operating frequency range: from 2412 MHz to 2462 MHz

1

Number of channels: 11

Channel spacing: 5 MHz

Frequency generation: O SAW Resonator O Crystal ⊙ Synthetiser

Modulation: Direct sequence spread spectrum

O Amplitude ⊙ Digital O Frequency O Phase

Power source: 115 Va.c. (mains supply) or 12 Vd.c. (battery supply)

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 (2005)	Code of Federal Regulations Title 47 - Telecommunication Chapter 1 - Federal Communications Commission Part 15 - Radio frequency devices Subpart C - Intentional Radiators
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 15:

Paragraph 33: frequency range of radiated measurements
Paragraph 35: measurement detector functions and bandwidths
Paragraph 203: antenna requirement
Paragraph 205: restricted bands of operation
Paragraph 207: conducted limits
Paragraph 209: radiated emission limits; general requirements
Paragraph 247: operation within the bands 2400-2483.5 MHz

5.ADD ATTACHMENTS FILES

"Synoptic"
"Block diagram"
"External photos and Product labeling"
"Assembly of components"
"Internal photos"
"Layout pcb"
"Bil of materials"
"Schematics"
"Product description"
"User guide"

6.TESTS AND CONCLUSIONS

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS	X				
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				*Note 2*
FCC Part 15.247	OPERATION WITHIN THE BAND 2400-2483.5 MHz					
	(a) (1) *hopping systems*			X		
	(a) (2) *digital modulation techniques*	X				*Note 4*
	(b) (3) *max output power*	X				*Note 1*
	(c) *operation with directional antenna gains > 6 dBi*			X		*Note 1*
	(d) *intentional radiator*	X				
	(e) *peak power spectral density*	X				
	(f) *hybrid system*			X		
	(g)			X		
	(h)			X		
	(i) *RF exposure compliance*	X				*Note 3*
	BAND EDGE COMPLIANCE	X				*Note 5*

NAp: Not Applicable NAs: Not Asked

Note 1: the antenna gain is less than 6 dBi.

Note 2: see FCC part 15.247 (d).

Note 3: this type of equipment uses less than 0.5 W of output power with a high signal transmitting duty factor (section 3 from Oet and 65c).

Note 4: the minimum 6 dB bandwidth is 10 MHz (see annex 2).

1

Note 5: see annex 3.

Conclusion:

The sample of PAY AND DISPLAY MACHINE "STRADA RAPIDE TM" 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.

7.PEAK OUTPUT POWER

Standard: FCC Part 15

Test procedure: paragraph 15.247

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Diode detector ODZ0004A	Omniyig	2469
Oscilloscope THS 720	Tektronix	0940
Antenna RGA60	Electrometrics	1938
Antenna RGA60	Electrometrics	1204
Open site	EMITECH	1274
Radio frequency generator SME06	Rohde & Schwarz	1669
High pass filter HPM11630	Micro-tronics	1673
Low-noise amplifier 1 to 18 GHz	ALC	2648
Variac R213	Dereix	1419
Power meter 8541B	Gigatronics	3479
Power sensor 80401A	Gigatronics	3182
Multimeter 77-2	Fluke	812

Test set up:

1

The system is tested in an open area test site (OATS).
The test unit is placed on a rotating table. Zero degree azimuth corresponds to the front of the equipment under test (see photos in annex 4).
We use for this measure outdoor test site, by substitution method. The measuring distance between the equipment and the test antenna is 3 m. The antenna have been oriented in the two polarizations, we have recorded only highest level.
In first the spectrum analyzer is replaced by a calibrated wideband power meter and the level is recorded.
The equipment under test is then substituted by a signal generator with a calibrated double ridged guide antenna, and its level adjusted to obtain the same power level as the E.U.T.
The output power level of the signal generator is finally measured with a calibrated RF power meter.

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

Antenna gain: not communicated (integral antenna).
The equipment is blocked in continuous transmission mode, modulated by internal data signal.

Results:

Ambient temperature (°C): 19
Relative humidity (%): 52

Polarization of test antenna: vertical (height: 192 cm)
Position of equipment: use position (azimuth: 0 degree)

Sample n° 1 Channel 1 (2412 MHz)

		Level (dBµV)	Cable loss (dB)	Antenna factor (dB)	Electromagnetic field (dBµV/m)	P* (W)	Limits (W)
Normal test conditions	Nominal power source (V): 115	79.84	4.31	27.46	111.61	43.46×10^{-3}	1

Sample n° 1 Channel 7 (2442 MHz)

		Level (dBµV)	Cable loss (dB)	Antenna factor (dB)	Electromagnetic field (dBµV/m)	P* (W)	Limits (W)
Normal test conditions	Nominal power source (V): 115	81.31	4.31	27.46	113.08	60.97×10^{-3}	1

Sample n° 1 Channel 11 (2462 MHz)

		Level (dBµV)	Cable loss (dB)	Antenna factor (dB)	Electromagnetic field (dBµV/m)	P* (W)	Limits (W)
Normal test conditions	Nominal power source (V): 115	79.45	4.31	27.46	111.22	39.73×10^{-3}	1

1

* $P = \frac{(E \times d)^2}{30Gp}$ with d = 3 m and Gp = 1

Test conclusion:

RESPECTED STANDARD

8.PEAK POWER DENSITY

Standard: FCC Part 15

Test procedure: paragraph 15.247

Test equipment used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Open site	Emitech	1274
Radiofrequency generator SME06	Rohde & Schwarz	1669
Antenna RGA-60	Electrometrics	1938
Antenna RGA-60	Electrometrics	1204
Variac R213	Dereix	1419
Power meter 8541B	Gigatronics	3479
Power sensor 80401A	Gigatronics	3182

Measured condition:

We used the same method of the peak output power, but the oscilloscope and the diode is replaced by a spectrum analyzer used in combination with an RF power meter.
Resolution bandwidth: 3 kHz
Video bandwidth: 10 kHz

Test operating condition of the equipment:

Antenna gain: not communicated (integral antenna).
The equipment is blocked in continuous transmission mode, modulated by internal data signal.

Results:

Ambient temperature (°C): 19
Relative humidity (%): 52

Power source: 115 Va.c.

Sample n° 1 Channel 1

	Peak power density at frequency: 2412.6 MHz
Normal test conditions	-5.9 dBm
Limits	+8 dBm

Sample n° 1 Channel 7

	Peak power density at frequency: 2442.8 MHz
Normal test conditions	-5.94 dBm
Limits	+8 dBm

Sample n° 1 Channel 11

	Peak power density at frequency: 2462 MHz
Normal test conditions	-7.69 dBm
Limits	+8 dBm

Test conclusion:

RESPECTED STANDARD

9.RADIATED EMISSION

Standard: FCC Part 15

Test procedure: paragraph 15.205
paragraph 15.209
paragraph 15.247

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver ESH3	Rohde & Schwarz	1058
Test receiver ESVS 10	Rohde & Schwarz	1219
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Loop antenna	EMCO	1406
Biconical antenna HP 11966C	Hewlett Packard	728
Log periodic antenna HL 223	Rohde & Schwarz	1999
Open site	Emitech	1274
Antenna RGA-60	Electrometrics	1204
Low-noise amplifier 2 to 18 GHz	Microwave DB	1922
High pass filter HP12/3200-5AA	Filtek	
Antenna WR42	IMC	1939
Variac R213	Dereix	1419
Multimeter 77-2	Fluke	812
Low-noise amplifier 18 to 26 GHz	ALC	3036

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.

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

Detection mode: Quasi-peak (F < 1 GHz)
Average or Peak (F > 1 GHz), following 15.205 or 15.247

Bandwidth: 120 kHz (F < 1 GHz) or 100 kHz, following 15.205 or 15.247
1 MHz (F > 1 GHz) or 100 kHz, following 15.205 or 15.247

Distance of antenna: between 30 m and 3 m according the frequencies and the limits.

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): 19
Relative humidity (%): 52

Power source: 115 Va.c.

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.
The highest power level of the carrier in 100 kHz bandwidth is 90.02 dBµV/m at 3 m.

FREQUENCIES (MHz)	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
77.42	211	92	100	H	37.1	70.02	32.87
143.77	125	179	100	V	36.8	70.02	33.17
165.89	114	190	100	H	43.3	43.52*	0.22

* restricted bands of operation in 15.205, this limit corresponding at the 15.209 section.

Applicable limits: in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

TEST CONCLUSION:

RESPECTED STANDARD

10.MEASUREMENT OF THE CONDUCTED DISTURBANCES

Standard: FCC Part 15

Test procedure: paragraph 15.207

Limits: Class B

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 analyser	Rohde & Schwarz FSBS	3133

Software used: BAT-EMC V3.1.4.9

Test set up:

The test unit is placed on a ground reference plane and 0.4 m from a vertical reference plane and powered by an artificial main network placed on the ground reference plane.

Equipment under test operating condition:

The equipment is powered with the AC power operating voltage of 115V / 60 Hz (KIKUSUI PCR4000L N° 3132).
The Pay and Display machine send 100 bytes to a mirror server through a Wi-fi network, the mirror server send back the data, and the end, the Pay and Display machine checks the conformance of the received data.
This transmission / reception test is repeated continuously.

Frequency range: 150 kHz - 30 MHz

Detection mode: Peak / Average

Bandwidth: 9 kHz

Results:

Measurement on the mains power supply:

The measurement is made in first with peak detector. All the frequencies which aren't 6dB margin under the limits are then analysed with average and noted in the followings tables:

Curve N° 1: measurement on the Neutral, peak detector (see annex 1)
Curve N° 2: measurement on the Line, peak detector (see annex 1)

Measurement on the neutral:

Frequency (MHz)	Average measurement (dBµV)	Average limits (dBµV)
0.198	41.8	53.7

Measurement on the line:

Frequency (MHz)	Average measurement (dBµV)	Average limits (dBµV)
0.198	42.8	53.7
11.07	11.8	50
11.56	12.8	50
11.66	13.7	50
12.06	15.7	50

Test conclusion:

RESPECTED STANDARD

□□□ End of report, 4 annexes to be forwarded □□□

ANNEX 1: CONDUCTED EMISSION

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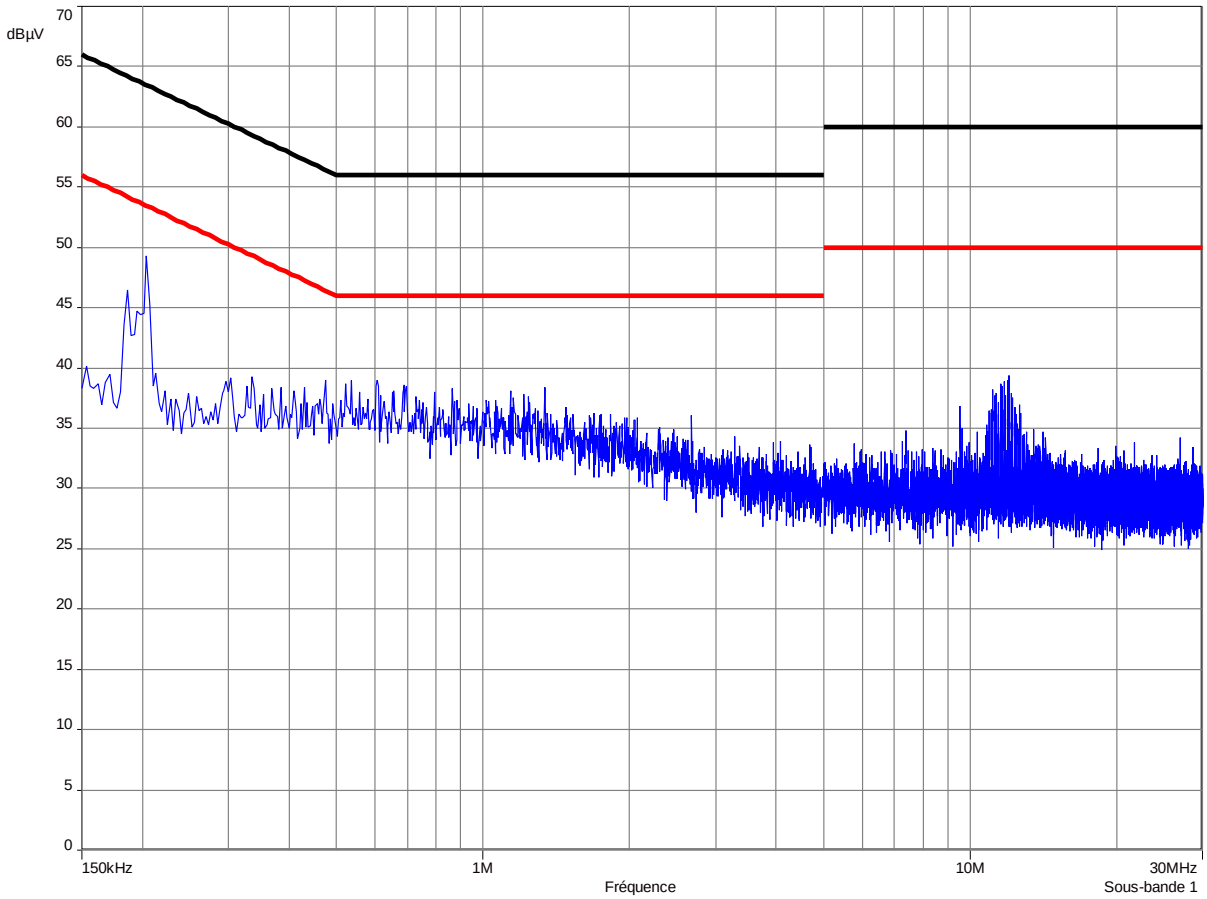
CONDUCTED EMISSION
FCC part 15

Curve N°1: measurement on the neutral with peak detector



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

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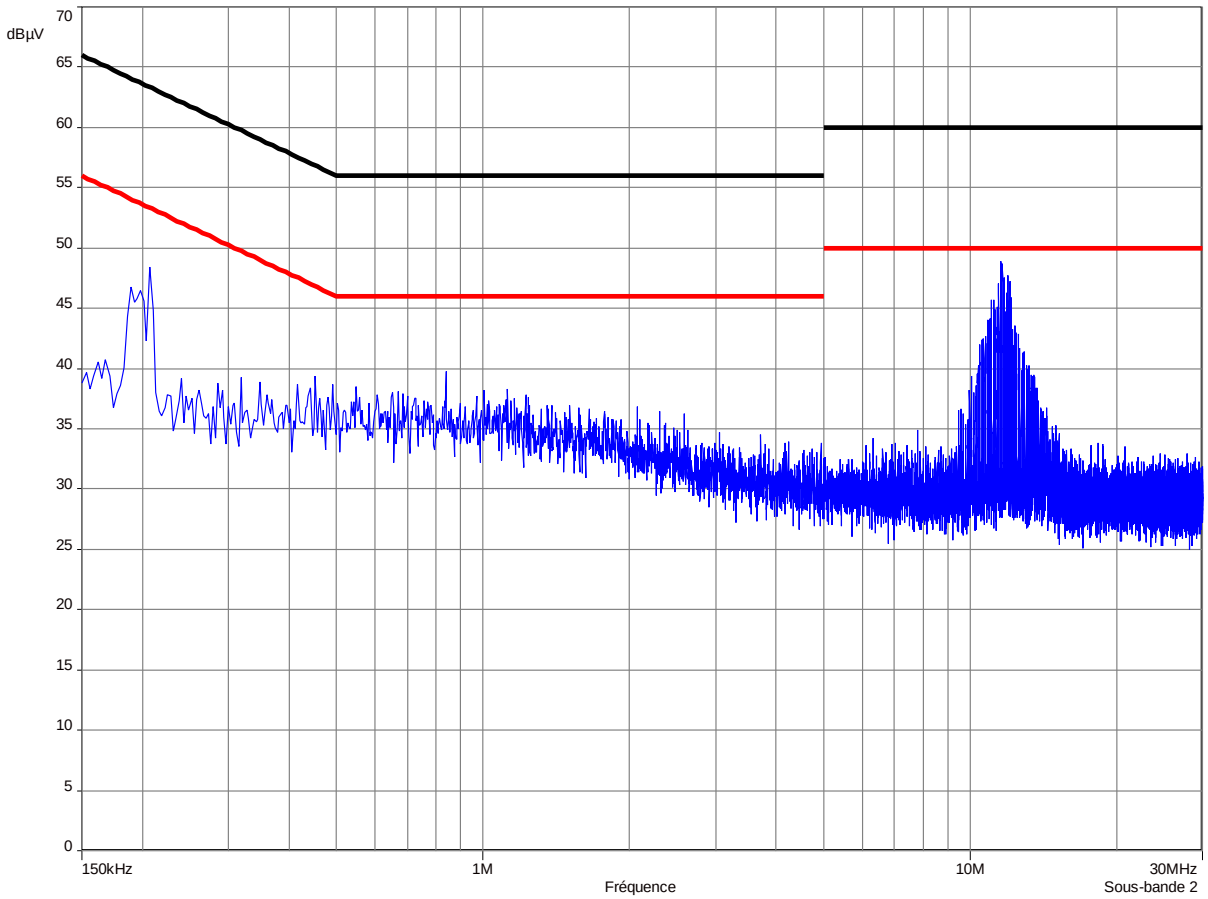
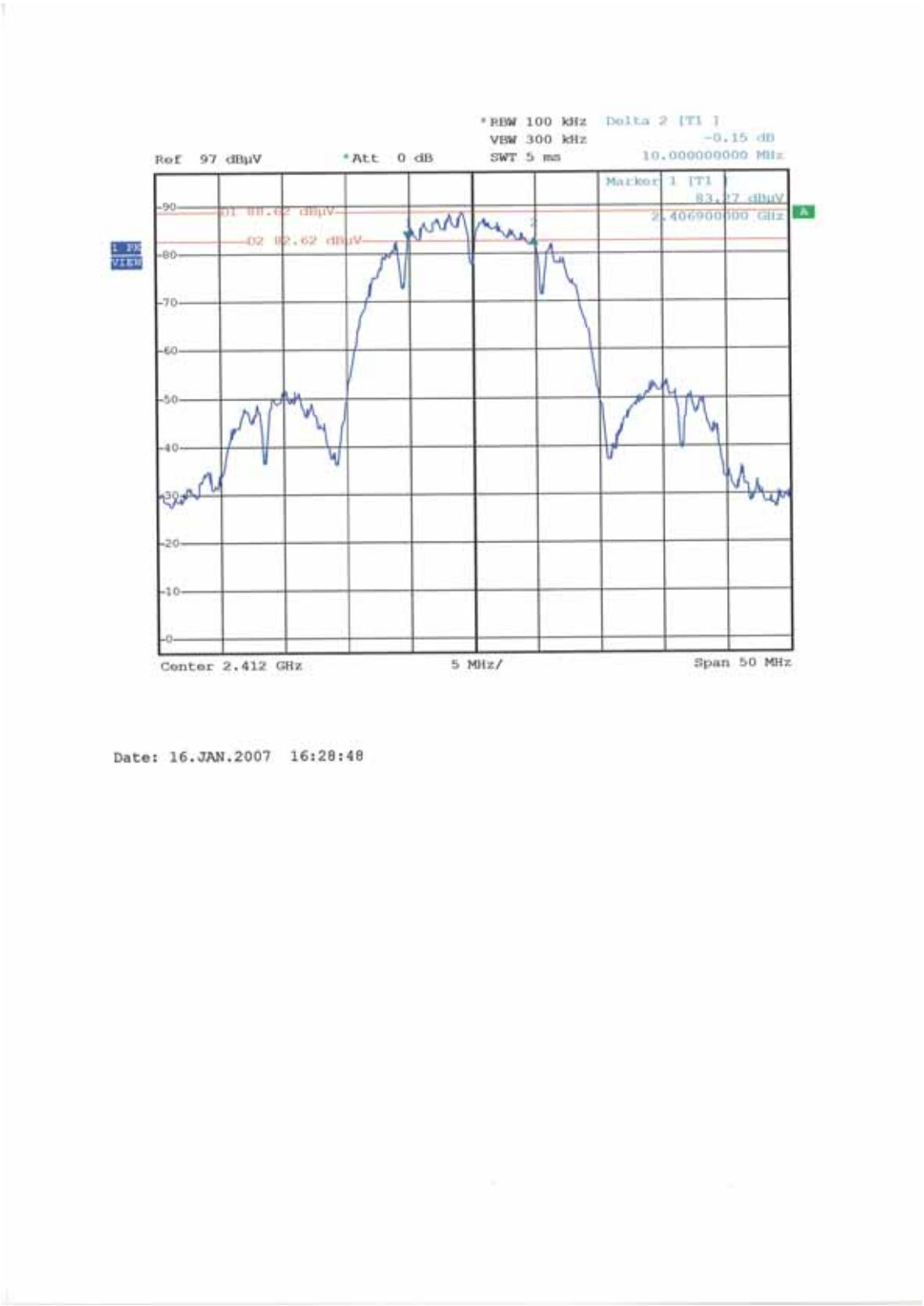
CONDUCTED EMISSION
FCC part 15

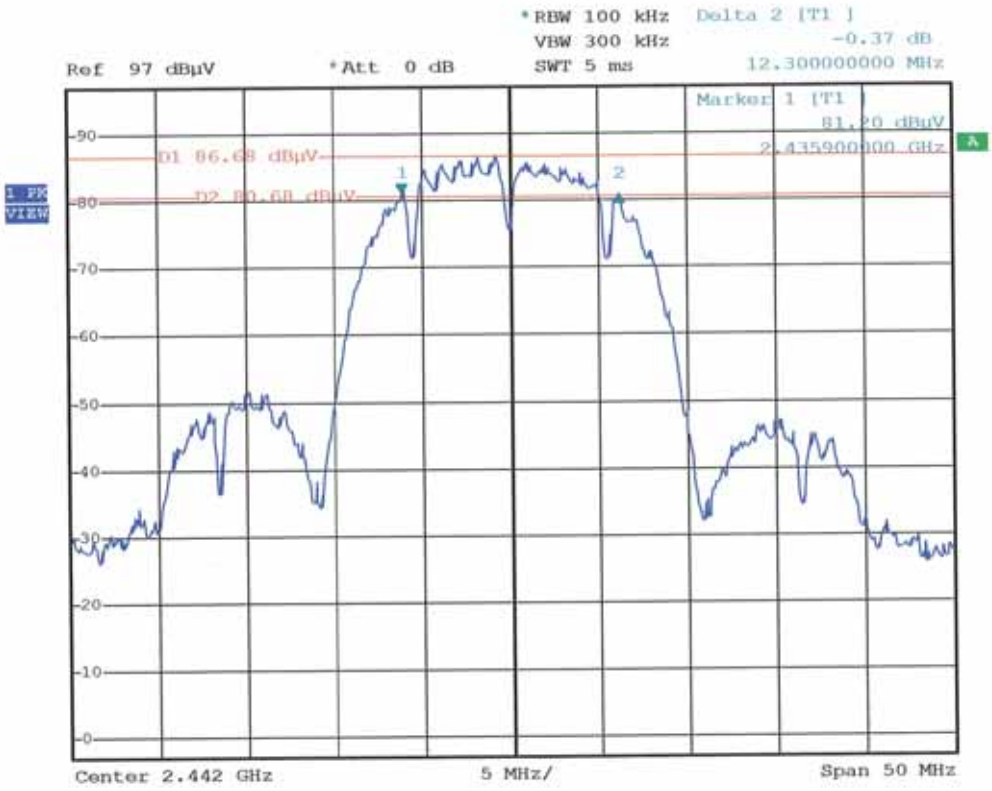
Curve N°1: measurement on the line with peak detector



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

ANNEX 2: MINIMUM 6 DB BANDWIDTH





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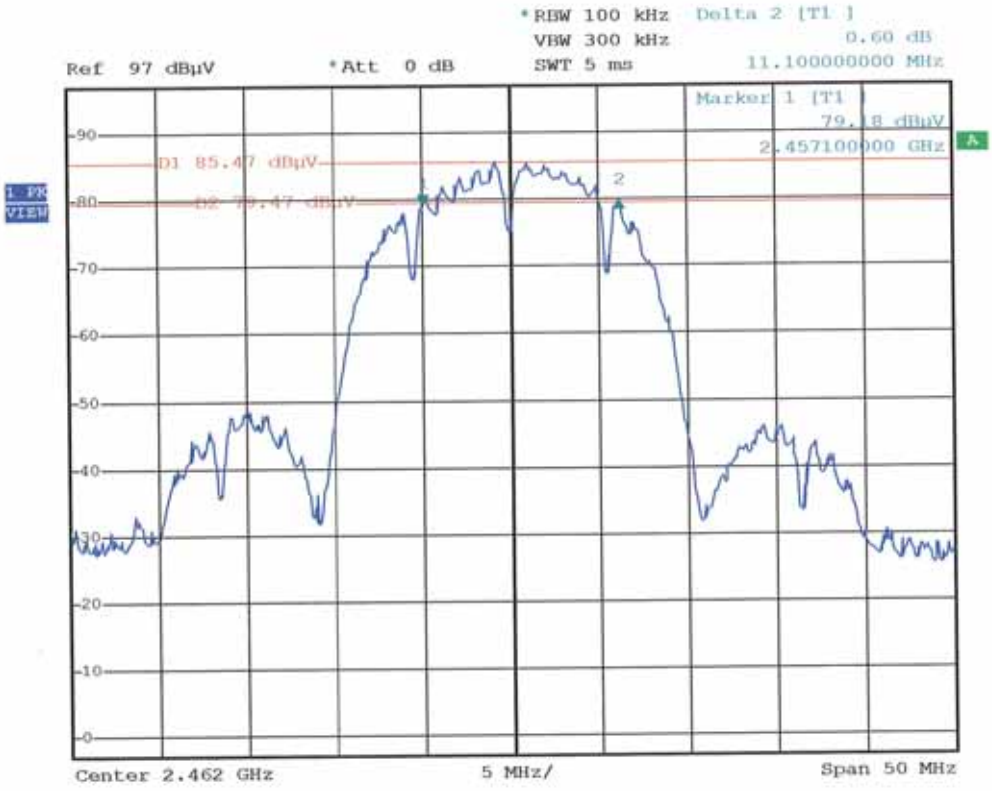


Date: 16.JAN.2007 16:37:45

1 ANNEX 3: BAND EDGE COMPLIANCE

Standard: FCC part 15.247

Test procedure: Public Notice DA 00-705, Delta Marker method.

Test equipment used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Antenna RGA-60	Electrometrics	1206
Power source E3610A	Hewlett Packard	4195

Measured condition:

Requirements: Emissions that fall in the restricted bands (part 15.205). These emissions must be less than or equal to 500 µV/m (54 dBµV/m). Part 15.35b applies in the restricted bands.
Test procedure: An in band field strength measurement of the fundamental Emission using the RBw and detector function required by C63.4-2003 and FCC Rules.

Test operating condition of the equipment:

The equipment is blocked in continuous modulated transmission mode.

Results:

Lower Band Edge: from 2310 MHz to 2390 MHz (curves n° 3 and 4)
Upper Band Edge: from 2483.5 MHz to 2500 MHz (curves n° 5 and 6)

Sample n° 1:

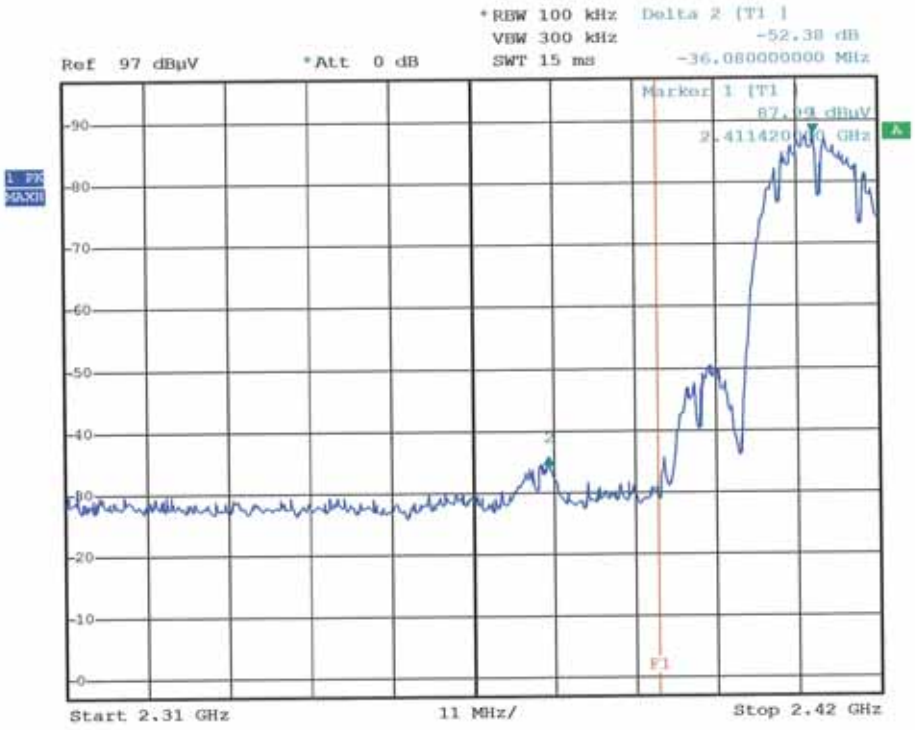
Fundamental Frequency (MHz)	Field Strength Level of fundamental (dBµV/m)	Peak Or Average	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out of Band Emission Level (dBµV/m)**	Limit (dBµV/m)	Margin (dB)
2412	111.61	Peak	2375.34	-52.38	59.23	74	14.77
2412	103.5	Average	2374.46	-54.59	48.91	54	5.09
2462	111.22	Peak	2498.92	-53.43	57.79	74	16.21
2462	104.24	Average	2499.73	-56.42	47.82	54	6.18

* According to step 2 of Marker-Delta Method DA 00-705
** According to step 3 of Marker-Delta Method:
Calculated Emission Level = Field Strength Level – Delta Marker Level

Test conclusion:

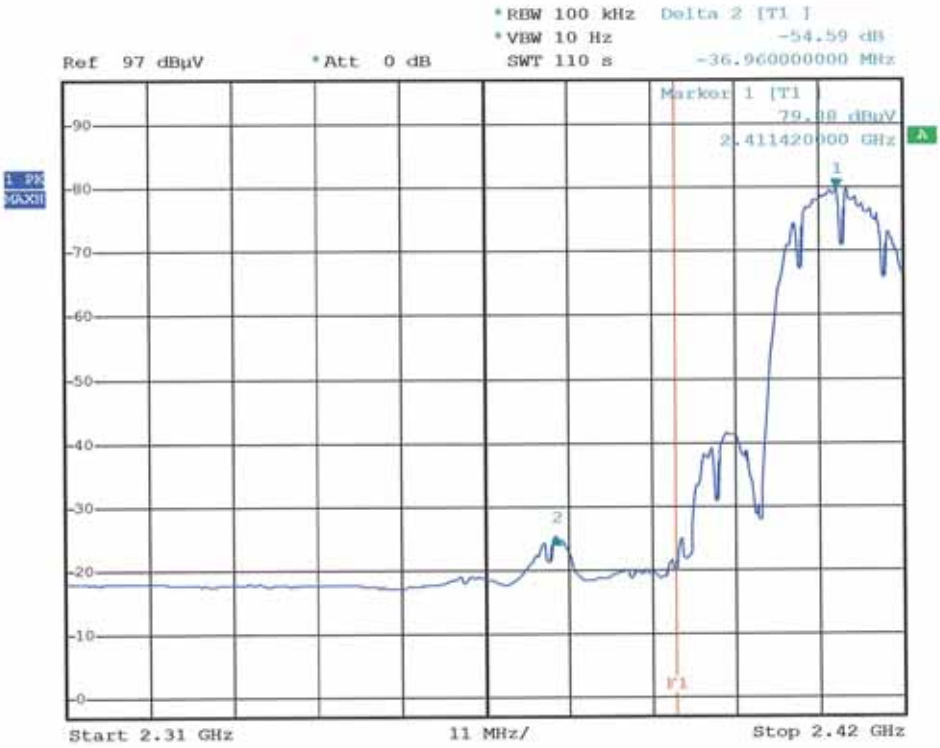
RESPECTED PUBLIC NOTICE

Curve n° 3:

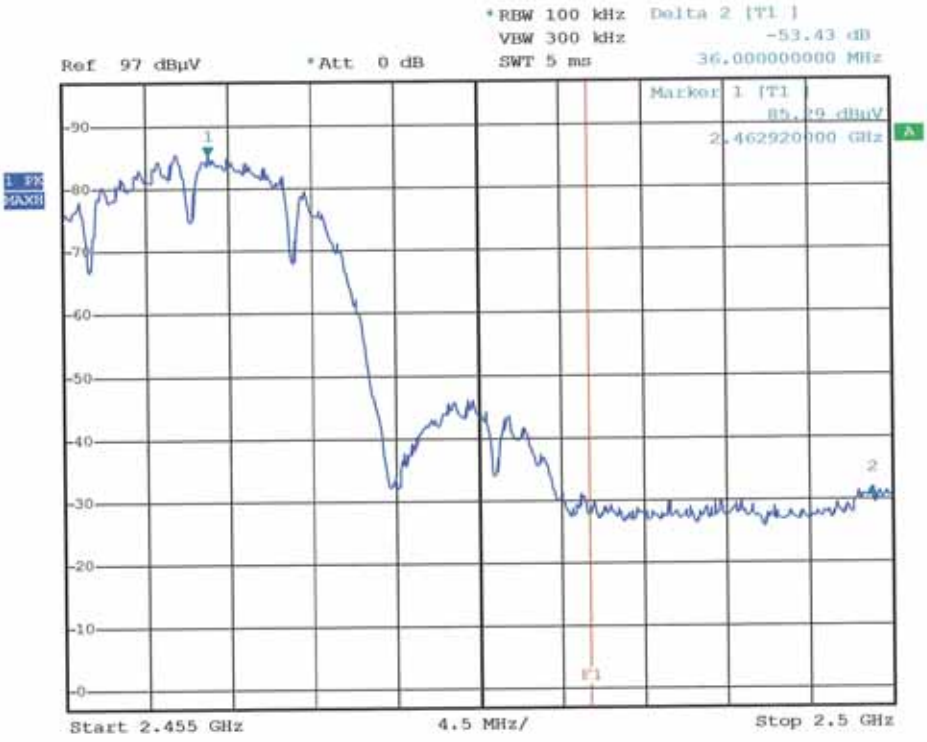


Date: 16.JAN.2007 16:33:45

Curve n° 4:

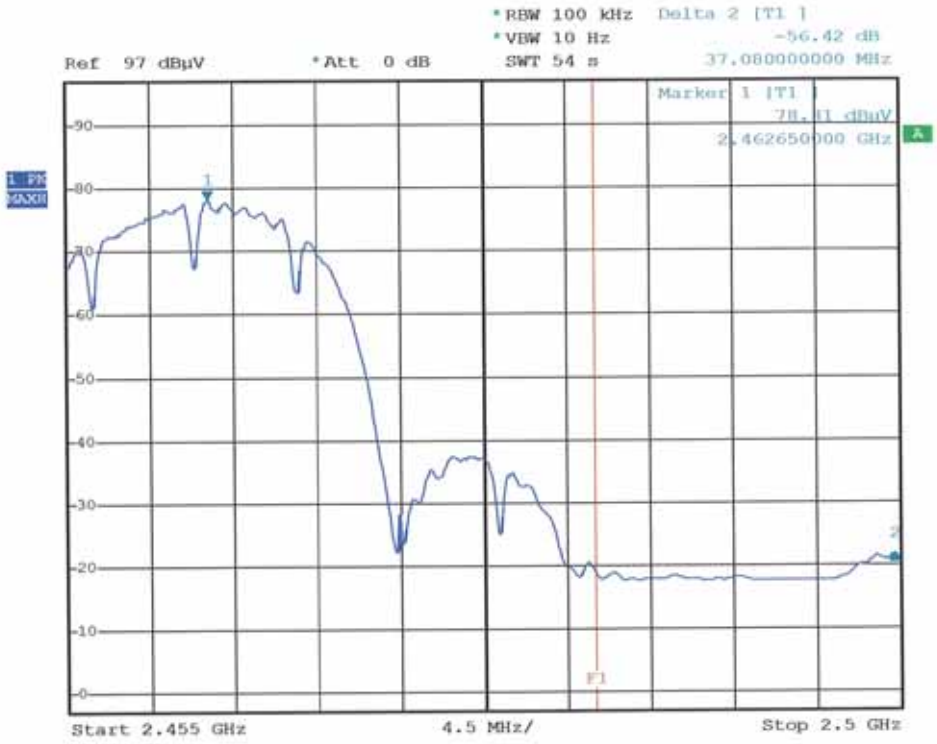

*RBW 100 kHz
*VBW 10 Hz
SWT 110 s
Delta 2 [T1]
-54.59 dB
-36.960000000 MHz
Ref 97 dBµV
*Att 0 dB
Marker 1 [T1
79.88 dBµV
2.411420000 GHz
1
2
F1
90
80
70
60
50
40
30
20
10
0
Start 2.31 GHz
11 MHz/
Stop 2.42 GHz
Date: 16.JAN.2007 16:50:57

Curve n° 5:



Date: 16.JAN.2007 16:39:24

Curve n° 6:



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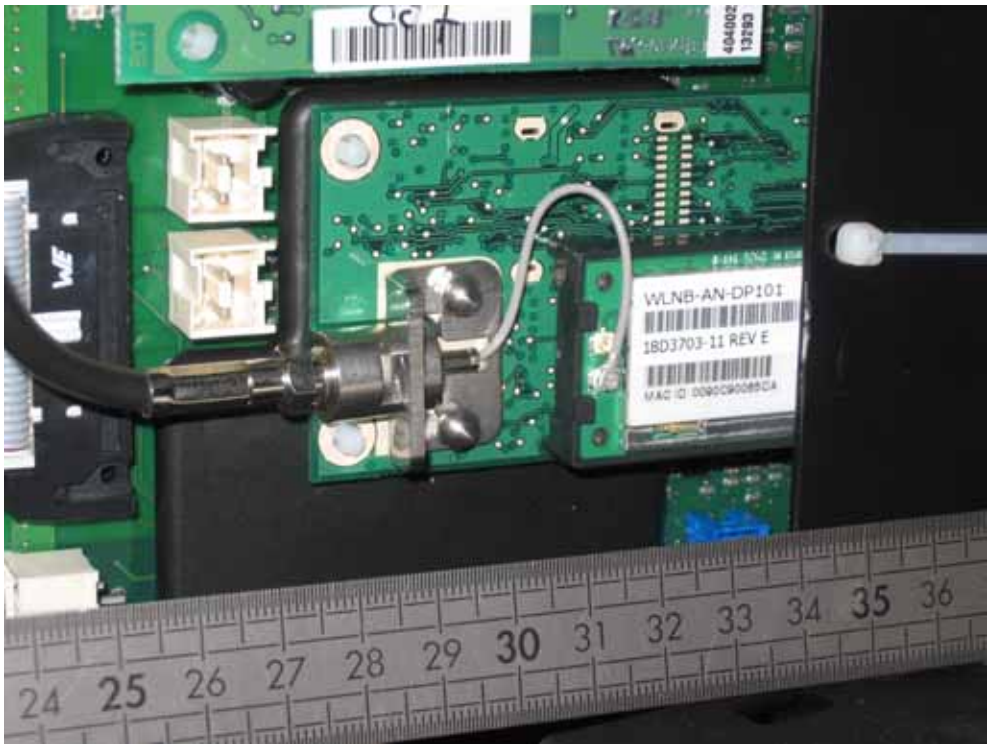
1 | ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

GENERAL VIEW

GENERAL VIEW

Internal view

Radio module



1 | ANNEX 5: OPEN AREA TEST SITE, TEST SET UP

TEST SET UP

CONDUCTED MEASUREMENT SET UP