



R041-12-103505-1A - DM / CHB

⇒ This test report cancels and replaces the report R041-12-103505-1A Ed.0

RADIO TEST REPORT

According to the standard(s):

FCC Part 15 Radio part 15.247

Equipment under test:

WIRELESS MODEMS: ARF7482A, ARF7482B AND ARF7482C

FCC ID: U3Z-ARF7474

Company:

ADEUNIS

Diffusion: Mr SAGUIN (Company: ADEUNIS)

Number of pages: 23 including 1 annex

Ed.	Date	Modified page(s)	Name	Written by	Visa	Technical verification Quality approval Name	Visa
1	19-Sep-12	1, 2, 4, 5, 14 to 19 and 21	1	David MONTAULON	-	Olivier HEYER	

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NAME OF THE EQUIPMENT UNDER TEST (E.U.T.)

WIRELESS MODEM ARF7482A, ARF7482B AND ARF7482C

Serial number : /

P/N : FCC ID : U3Z-ARF7474

Software version : ADEUNIS RF V2.02

MANUFACTURER'S NAME : ADEUNIS-RF

APPLICANT'S ADDRESS:

Company : ADEUNIS

<u>Address</u> : 283 rue Louis Néel

Parc Technologique Pre Roux - 38920 CROLLES

FRANCE

Person(s) present during the

tests

: Mr MONNET

Responsible : Mr SAGUIN

DATE(S) OF TESTS : July 4th of 2012

TESTS LOCATION(S) : Emitech Grand Sud laboratory in Vendargues - FRANCE

TESTS SUPERVISOR(S) : None

TESTS OPERATOR(S) : David MONTAULON



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1. INTRODUCTION

This document submits the results of Radio tests performed on the equipment WIRELESS MODEM ARF7482A, ARF7482B AND ARF7482C (denominated hereafter E.U.T.: equipment under test) according to document(s) listed below.

2. REFERENCE DOCUMENT(S)

FCC part 15 Radio part 15.247 Code of federal regulations. Title 47- Telecommunication Chapter

1- Federal Communication Commission. Part 15- Radio frequency devices Subpart B- Unintentional Radiators. Limits and methods of measurement of radio disturbance. Characteristic of information

technology equipment.

Test report n° 084102-CC-1-a ARF WIRELESS MODEM TEST REPORT from Gyl lab.

FCC CFR 47 part 15

Industry Canada RSS 210 and ICES-003

Radio Part 15.247 and RSS210 Issue 5 Section 6.2.2(o)

3. EQUIPMENT UNDER TEST CONFIGURATION

Equipment under test (E.U.T.) description: Wireless modem (915MHz radio link)

E.U.T. name: WIRELESS MODEM ARF7482A, ARF7482B AND ARF7482C

FCCID: U3Z-ARF7474

Frequency range: 902MHz – 928MHz

RF max power: 1W

The equipment changes are the possibility to use the following antennas:

> ARF7482A: PROCOM ELF900-915 TNC

ARF7482B: LAIRD FG9026ARF7482C: LAIRD FG9023

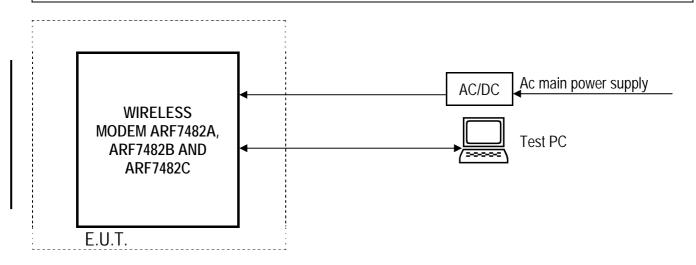
Modulation: FSK

Cycle and operating mode during emission tests: Permanent emission mode on channel 0, 24 or 49

Equipment modifications applied during tests: No



4. EQUIPMENT UNDER TEST CONFIGURATION SCHEME



5. SUMMARY OF TEST RESULTS

Tests designation	Results satisfying?	Comments
Maximum peak conducted	YES	
FCC part 15.247 b)	123	
Intentional radiator	YES	
FCC part 15.247 d)	ILS	
Unwanted emissions outside of §15.247 frequency bands	YES	
FCC part 15.215 b)		

N.P.: Not Performed. N.A.: Not Applicable.

In emission:

Sample subject to the test complies with prescriptions of the standard(s) FCC Part 15 Radio part 15.247 according to limits, specified in this test report for tests made only (the other tests are shown in test report n°084102-CC-1a form Gyl laboratory – France)



6. MAXIMUM PEAK CONDUCTED POWER

Standard: FCC part 15 Radio part 15.247

Test method: FCC part 15.247 b) (2) (4)

Test configuration:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode
902.25MHz-903.25MHz	RF ON CH0 (902.75MHz)	100kHz	300kHz	Max-hold Peak
914.25MHz-915.25MHz	RF ON CH24 (914.75MHz)	100kHz	300kHz	Max-hold Peak
926.75MHz-927.75MHz	RF ON CH49 (927.25MHz)	100kHz	300kHz	Max-hold Peak

Test is done in max-hold peak detection. E.U.T. output is directly connected to a spectrum analyzer. Measurements are performed on channels 0, 24 and 49.

Test method deviation: No

Measuring distance: 3 meters

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Attenuator	Radiall	R412720124	4391	03-jan-2014	03-mar-2014
Cable		N-1m	2701	11-oct-12	11-dec-12
Receiver	Agilent Technologies	E7405A	2161	7-dec-13	7-feb-14
Software	Nexio	BAT EMC	0000	-	-

BAT-EMC software version: V3.6.0.24

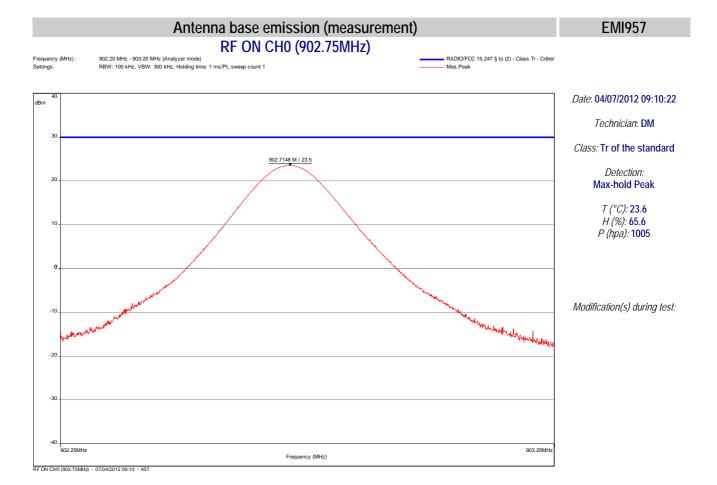
Results:

b) (4) Maximum peak conducted >6 dBi: Antennas provided by the manufacturer are dipoles antennas with gain less than 6dBi.

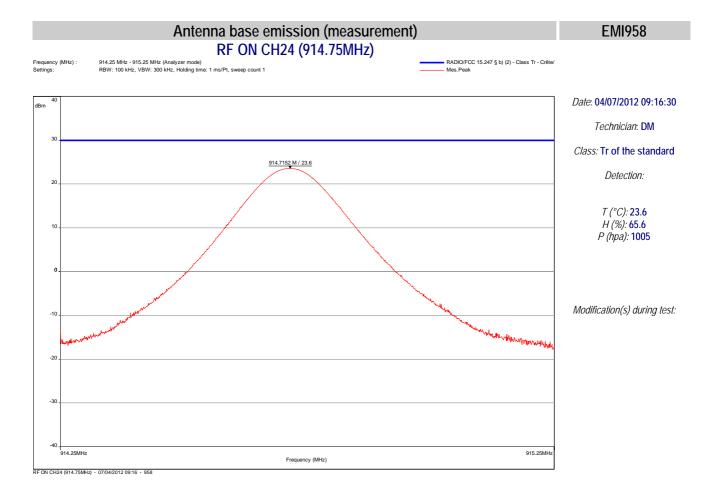
b) (2) Maximum peak conducted: See Board below and Graph(s) hereafter.

Frequency (MHz)	Channel	Maximum peak power (dBm)	Power limit (dBm)
902.7148	0	23.50	30
914.7152	24	23.60	30
927.2137	49	22.90	30

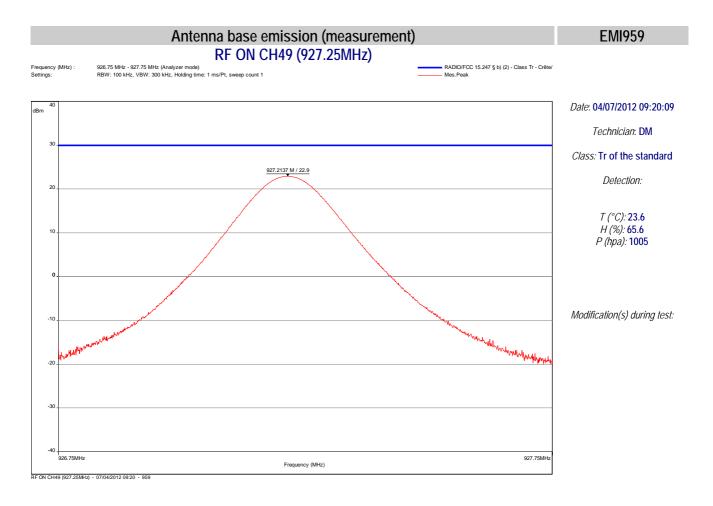












Calculated radiated power on Channel 0 only (maximum conducted power) at 3m distance:

Maximum Radiated field is calculated using the formula:

 $E(V/m) = \sqrt{(30 \times P(W) \times G(dB))} \div d(m)$ where G is the declared antenna gain.

Antenna type	Gain (dB)	Radiated power (dBµV/m)
ELF 900	5	125.82
FG 9023	3	123.60
FG 9026	6	126.61

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7. INTENTIONAL RADIATOR

Standard: FCC part 15 Radio part 15.247

Test method: FCC part 15.247 d)

Test configuration:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
900MHz-905MHz	Band Edge CH0 (902.75MHz)	100kHz	300kHz	Max-hold Peak	0cm
925MHz-930MHz	Band Edge CH49 (927.25MHz)	100kHz	300kHz	Max-hold Peak	0cm

Test is done in max-hold peak detection; transmitter output is directly connected to a spectrum analyzer. Measurements are performed on channels 0 and 49 (lower and upper channels).

The purpose of this test is to demonstrate in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Attenuator	Radiall	R412720124	4391	03-jan-2014	03-mar-2014
Cable		N-1m	2701	11-oct-12	11-dec-12
Receiver	Agilent Technologies	E7405A	2161	7-dec-13	7-feb-14
Software	Nexio	BAT EMC	0000	-	-

BAT-EMC software version: V3.6.0.24

Results: See Graph(s) hereafter.



Modification(s) during test:



Antenna base emission (measurement) Band Edge CH0 (902.75MHz) Frequency (MHz): 900 MHz - 905 MHz (Analyzer mode) Settings: RBW: 100 MHz, VBW: 300 MHz, Holding time: 1 ms/P1, sweep count 1 Date: 04/07/2012 09:44:42 Technician: DM Class: Tr of the standard Detection: Max-hold Peak T (°C): 23.6 H (%): 65.6 P (hpa): 1005

903M

903.5M

904M

904.5M

905MHz

902.5M Frequency (MHz)

Band Edge CH0 (902.75MHz) - 07/04/2012 09:44 - 960

900.5M

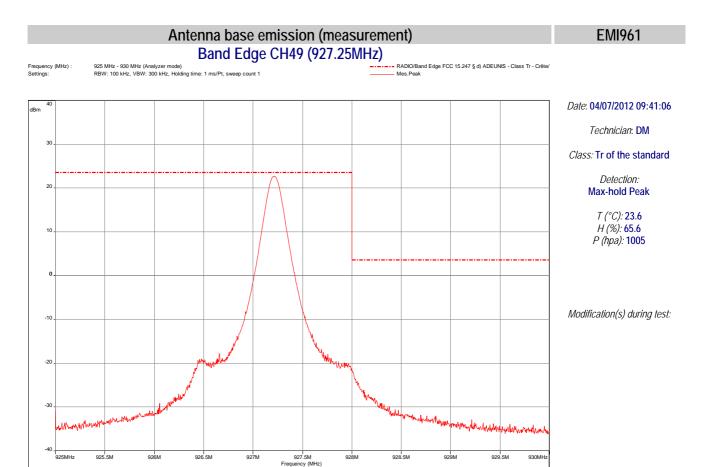
901.5M

900MHz





Band Edge CH49 (927.25MHz) - 07/04/2012 09:41 - 96





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8. UNWANTED EMISSIONS OUTSIDE OF §15.247 FREQUENCY BANDS

Standard: FCC part 15 Radio part 15.247

Test method: FCC part 15.215 b)

Test configuration:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
1GHz-10GHz	Front side / CH0 / ELF 900	100kHz	300kHz	Peak	80cm
1GHz-10GHz	Front side / CH0 / FG 9023	100kHz	300kHz	Peak	80cm
1GHz-10GHz	Front side / CH0 / FG 9026	100kHz	300kHz	Peak	80cm

Measurements are done in semi anechoic chamber at 3m. E.U.T. is set on a wooden table with 3 kinds of antennas (ELF 900, FG 9023 and FG 9026).

Measurements are done in max-hold peak detection. Tests are done on Channel 0 only.

<u>Limits:</u> Average limit in restricted bands §15.205 is $54dB\mu V/m$. Otherwise, the limit is 20dB under carrier emission level at 3m (105.82dB $\mu V/m$ for ELF 900; 103.60dB $\mu V/m$ for FG 9023; 106.61 for FG 9026) without averaging with duty cycle factor.

The averaging correction factor(*) of -13.4dB is used only when necessary (margin lower than 10dB) in restricted bands as defined in 15.205.

(*) See test report N°084102-CC-1-a

Test method deviation: No

Measuring distance: 3 meters

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Antenna	Emco	3115	1053	04-mar-2012	04-may-2012
Cable	C&C	N-1.5m	5016	05-dec-2013	05-fev-2014
Cable		N-1m	2701	11-oct-12	11-dec-12
Cable	C&C	N-6m	5015	11-oct-12	11-dec-12
Filter	Filtek	HP12/1200-5AA	7310	01-dec-2013	01-fev-2014
Preamplifier	Microwave	C005180F-4B1	2165	06-oct-2012	06-dec-2012
Receiver	Agilent Technologies	E7405A	2161	07-dec-2013	07-fev-2014
Shielded enclosure	RAY PROOF	C.GS3	1123	-	-
Software	Nexio	BAT EMC	0000	-	-

BAT-EMC software version: V3.6.0.24

Results: See Boards and Graphs hereafter.

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Front side / CH0 / ELF 900 - 04/07/2012 10:54 - 965

Radiated electric emission (measurement) **EMI965** Front side / CH0 / ELF 900 (ARF7482A) 1 GHz - 10 GHz (Mode analyseur) RBW: 100 kHz, VBW: 300 kHz, Temps de mesure : 1 ms/Pts, nombre de Balayages 2 Horizontale C.E.M. (civil)/FCC Part.15 - Classe:B - Moyenne/3.0m/
C.E.M. (civil)/FCC Part.15 - Classe:B - Ocrête/3.0m/
C.E.M. (civil)/FCC Part.15 - Classe:B - Crête/3.0m/ Réglage: Polarisation Distance: 3 m Mes.Peak (Horizontale) Peak/LimAvg (Horizontale) Date: 04/07/2012 10:54:00 dBµV/m Technician: DM Class: B of the standard Detection: Peak 1.8055 G / 55.9 T (°C): 24 H (%): 56 _9.0271 P (hpa): 1005 8.1244 G / 46.2 4.5136 G / 42.5 6.319 G / 37/38/41/37 37.5 Frequencies without markers (around 1840MHz) are due to ambient DCS "Mayor portugation and the contraction of the contr Modification(s) during test: 0 H 10GHz Fréquence (MHz) Front side / CH0 / ELF 900 - 04/07/2012 10:54 - 965 1 GHz - 10 GHz (Mode analyseur) RBW: 100 kHz, VBW: 300 kHz, Temps de mesure : 1 ms/Pts, nombre de Balayages 2 C.E.M. (civil)/FCC Part.15 - Classe:B - Moyenne/3.0m/
C.E.M. (civil)/FCC Part.15 - Classe:B - QCrête/3.0m/
C.E.M. (civil)/FCC Part.15 - Classe:B - Crête/3.0m/ Fréquence (MHz) : Réglage: Verticale Distance: 3 m Mes.Peak (Verticale) Peak/LimAvg (Verticale) dΒμV/m 1.8055 G / 60.3 3.6109 G / 57.4 9.028 G / 55.6 2.7082 G / 51.6 4.5136 G / 46.2 wheter and the same himself "halfed annul de segment de segme

Fréquence (MHz)





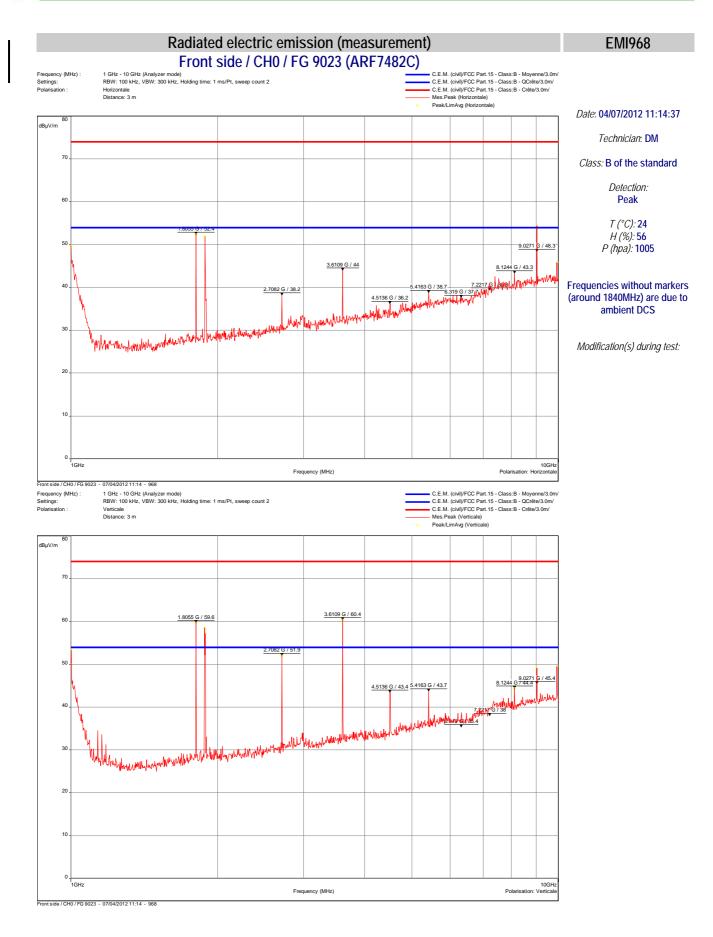
Front side / CH0 / ELF 900 (ARF7482A)

Frequency (MHz)	Polarization	Peak (dBµV/m)	Averaging (with duty cycle correction factor of -13.4dB)	Limit (dBµV/m)	Margin (dB)
1805.50	Vertical	60.30	-	105.82	-45.52
2708.20	Vertical	51.60	38.20	54	-15.80
3610.90	Vertical	57.40	44.00	54	-10.00
4513.60	Vertical	46.20	32.80	54	-21.20
5416.30	Vertical	47.90	34.50	54	-19.50
6319.00	Vertical	(*)	-	105.82	-
7221.70	Vertical	(*)	-	105.82	-
8124.40	Vertical	(*)	-	54	-
9028.00	Vertical	55.60	42.20	54	-11.80
1805.50	Horizontal	55.90	-	105.82	-
2708.20	Horizontal	45.00	31.60	54	-22.40
3610.90	Horizontal	47.50	34.10	54	-19.90
4513.60	Horizontal	42.50	29.10	54	-24.90
5416.30	Horizontal	43.60	30.20	54	-23.80
6319.00	Horizontal	(*)	-	105.82	-
7221.70	Horizontal	(*)	-	105.82	-
8124.40	Horizontal	46.20	32.80	54	-21.20
9028.00	Horizontal	54.10	40.70	54	-13.30

(*) Background noise << limit
Italic values: Restricted bands of operation defined in §15.205











Front side / CH0 / FG 9023 (ARF7482C)

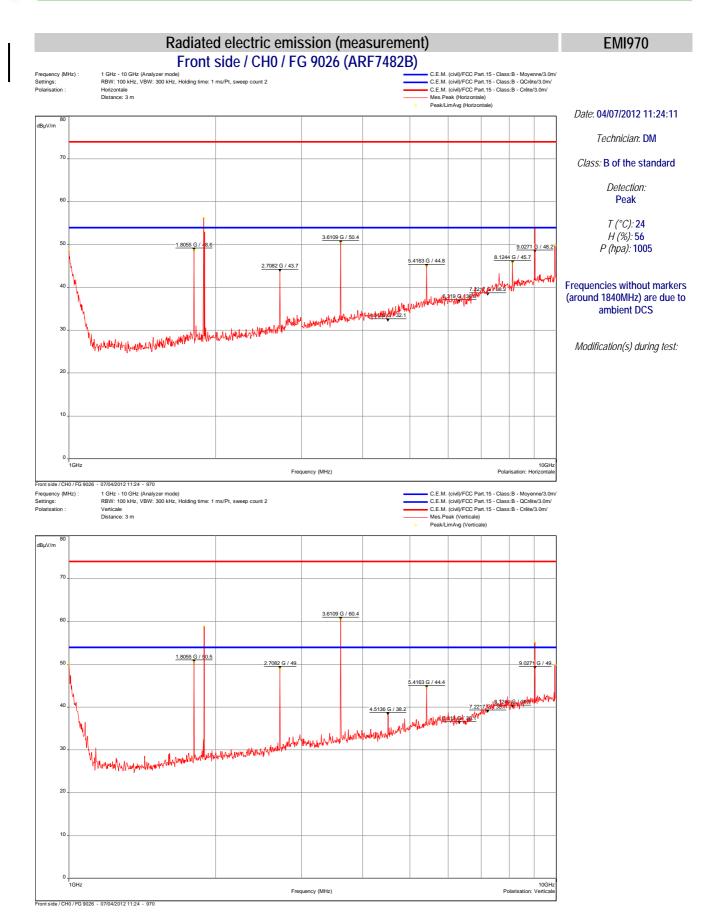
Frequency (MHz)	Polarization	Peak (dBµV/m)	Averaging (with duty cycle correction factor of -13.4dB)	Limit (dBµV/m)	Margin (dB)
1805.50	Vertical	59.6	-	103.60	-44.00
2708.20	Vertical	51.90	38.50	54	-15.50
3610.90	Vertical	60.40	47.00	54	-7.00
4513.60	Vertical	43.40	30.00	54	-24.00
5416.30	Vertical	43.70	30.30	54	-23.70
6319.00	Vertical	(*)	-	103.60	-
7221.70	Vertical	(*)	-	103.60	-
8124.40	Vertical	44.40	31.00	54	-23.00
9028.00	Vertical	48.40	35.00	54	-19
9931.60	Vertical	49.30	-	103.60	-54.30
1805.50	Horizontal	52.40	-	103.60	-51.20
2708.20	Horizontal	38.20	24.80	54	-29.20
3610.90	Horizontal	44.00	30.60	54	-23.40
4513.60	Horizontal	36.20	22.80	54	-31.20
5416.30	Horizontal	38.70	<i>25.30</i>	54	-28.70
6319.00	Horizontal	(*)	-	103.60	-
7221.70	Horizontal	(*)	-	103.60	-
8124.40	Horizontal	43.30	29.90	54	-24.10
9028.00	Horizontal	54.30	40.90	54	-13.10
9931.60	Horizontal	45.10	31.70	103.60	-71.90

(*) Background noise << limit

Italic values : Restricted bands of operation defined in §15.205











Front side / CH0 / FG 9026 (ARF7482B)

Frequency (MHz)	Polarization	Peak (dBµV/m)	Averaging (with duty cycle correction factor of -13.4dB)	Limit (dBµV/m)	Margin (dB)
1805.50	Vertical	50.50	-	106.61	-56.11
2708.20	Vertical	49.00	35.60	54	-18.40
3610.90	Vertical	60.40	47.00	54	-7.00
4513.60	Vertical	38.20	24.80	54	-29.20
5416.30	Vertical	44.40	31	54	-23.00
6319.00	Vertical	(*)	-	106.61	-
7221.70	Vertical	(*)	-	106.61	-
8124.40	Vertical	(*)	-	54	-
9028.00	Vertical	<i>55.10</i>	41.70	54	-12.30
9931.60	Vertical	49.90	-	106.61	-56.71
1805.50	Horizontal	48.60	-	106.61	-58.01
2708.20	Horizontal	43.70	30.30	54	-23.70
3610.90	Horizontal	50.40	37.00	54	-17
4513.60	Horizontal	(*)	-	54	ı
5416.30	Horizontal	44.80	31.40	54	-22.60
6319.00	Horizontal	(*)	-	106.61	-
7221.70	Horizontal	(*)	-	106.61	-
8124.40	Horizontal	45.70	32.30	54	-21.70
9028.00	Horizontal	54.00	40.60	54	-13.40
9931.60	Horizontal	50.00	-	106.61	-56.61

^(*) Background noise << limit

Italic values: Restricted bands of operation defined in §15.205

☐☐☐ End of report – 1 annex to be forwarded ☐☐☐☐



ANNEX: PHOTOGRAPH(S)



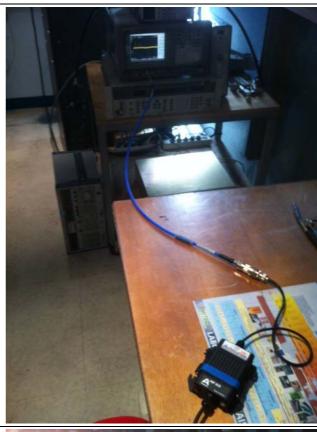
EQUIPMENT UNDER TEST (E.U.T.) PHOTOGRAPH(S)

WIRELESS MODEMS ARF7482A, ARF7482B AND ARF7482C

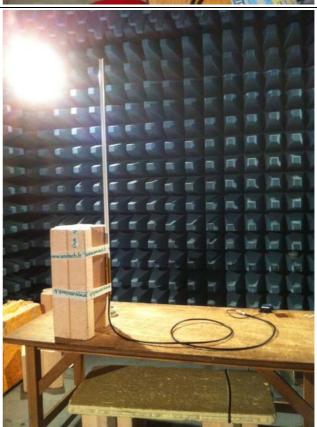




Conducted emissions



Unwanted emissions







Unwanted emissions

