

FCC LISTED, REGISTRATION

NUMBER: 720267

Informe de ensayo nº: Test report No:

IC LISTED REGISTRATION NUMBER IC 4621A-1

NIE: 44100RRF.005

# Test report

# USA FCC Part 15.249, 15.209 CANADA RSS-210, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

Licence-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment.

General Requirements for Compliance of Radio Apparatus.

General Requirements for Compliance of Radio Apparatus.				
Identificación del objeto ensayado:  Identification of item tested	Wireless hearing instrument			
Marca: Trade	Resound			
Modelo y/o referencia tipo	DA13r			
Other identification of the product:	Commercial name: RESOUND FCC ID: X26DA13r IC: 6941C-DA13r			
Final HW version:	DA13r			
Final SW version:	4.1.1.0			
Serial number:	14003999110, 14039990044			
Características: Features	Bluetooth LE and Proximity radio			
Peticionario: Applicant	GN HEARING A/S Lautrupbjerg 7, 2750 Ballerup. Denmark CVR: 55082715 Contact person: Youssef El Mahdaoui Telephone: +45 2116 6605 e-mail: ymahdaoui@gnresound.com			
Método de ensayo solicitado, norma:  Test method requested, standard	USA FCC Part 15.249 10-1-13 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, 5725–5875 MHz, and 24.0–24.25 GHz.  CANADA RSS-210 Issue 8 (December 2010).  CANADA RSS-Gen Issue 4 (November 2014).  ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.			
Resultado: Summary	IN COMPLIANCE			
Approbado por (nombre / cargo y firma): Approved by (name / position & signature)	A. Llamas RF Lab. Manager			

Page 1 of 48 2014-12-17



Fecha de realización	2014-12-17
Formato de informe No:  Report template No	FDT08_15

Page 2 of 48 2014-12-17



# Index

Competences and guarantees	4
General conditions	
Uncertainty	
Usage of samples	
Test sample description	
Test samples supplier	
Testing period	
Environmental conditions	
Remarks and comments	7
Testing verdicts	
Appendix A – Test result "Bluetooth Low Energy"	9
Appendix B – Test result "Proximity radio"	29



## **Competences and guarantees**

AT4 wireless is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjuction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

AT4 wireless is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621A-1.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

<u>IMPORTANT:</u> No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of AT4 wireless.

#### **General conditions**

- 1. This report is only referred to the item that has undergone the test.
- 2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
- 3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
- 4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

# Uncertainty

Uncertainty (factor k=2) was calculated according to the AT4 wireless internal document PODT000.

# **Usage of samples**

Samples undergoing test have been selected by: the client

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial N°	Date of reception
44100B/073	Wireless hearing instrument with internal antenna	DA13r	14003999110	2014-11-12

1. Sample S/01 has undergone following test(s).

All radiated tests indicated in appendix A and appendix B.



#### Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
44100B/075	Wireless hearing instrument with antenna connector	DA13r	14039990044	2014-11-12

1. Sample S/02 has undergone the test(s) specified in subclause "Test method requested".

All conducted tests indicated in appendix A and appendix B.

## **Test sample description**

The test sample consists of a wireless hearing instrument with Bluetooth Low Energy and Proximity radio.

# **Test samples supplier**

GN HEARING A/S

Lautrupbjerg 7, 2750 Ballerup. Denmark

CVR: 55082715

Contact person: Youssef El Mahdaoui

Telephone: +45 2116 6605

e-mail: ymahdaoui@gnresound.com

# **Testing period**

The performed test started on 2014-11-21 and finished on 2014-12-16.

The tests have been performed at AT4 wireless.



## **Environmental conditions**

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 20.3 °C Max. = 24.2 °C
Relative humidity	Min. = 33.4 % Max. = 55.3 %
Shielding effectiveness	> 100 dB
Electric insulation	$> 10 \text{ k}\Omega$
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 21.9 °C Max. = 24.5 °C
Relative humidity	Min. = 34.7 % Max. = 50.1 %
Air pressure	Min. = 1014 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
<b>Electric insulation</b>	$> 10 \text{ k}\Omega$
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 24.0 °C Max. = 24.4 °C
Relative humidity	Min. = 49.7 % Max. = 52.4 %
Air pressure	Min. = 1010 mbar Max. = 1010 mbar
Shielding effectiveness	> 100 dB
<b>Electric insulation</b>	$> 10 \text{ k}\Omega$
Reference resistance to earth	< 0,5 Ω



# **Remarks and comments**

#### 1: Used instrumentation:

#### **Conducted Measurements**

					Last Cal. date	Cal. due date
1.	Spectrum E4440A	analyser	Agilent	PSA	2014/06	2016/06
2.	DC power s	upply R&S	NGPE 40	/40	2014/11	2017/11

#### **Radiated Measurements**

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber ETS FACT3 200STP	N.A.	N.A.
2.	BiconicalLog antenna ETS LINDGREN 3142E	2014/03	2017/03
3.	Multi Device Controller EMCO 2090	N.A.	N.A.
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2013/11	2016/11
5.	Double-ridge Guide Horn antenna 14- 40 GHz SCHWARZBECK BBHA 9170	2014/03	2017/03
6.	EMI Test Receiver R&S ESU 26	2013/08	2015/08
7.	Spectrum analyser Rohde & Schwarz FSW50	2013/10	2015/10
8.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2014/02	2015/02
9.	RF pre-amplifier 1-18 GHz Schwarzbeck BBV 9718	2014/02	2015/02
10.	RF pre-amplifier BONN BLMA 1840- 1M 18-40 GHz.	2014/02	2016/02

2014-12-17



# **Testing verdicts**

Not applicable:	N/A
Pass:	P
Fail :	F
Not measured:	N/M

### 1. Bluetooth Low Energy

FCC PART 15 PARAGRAPH / RSS-210		VERDICT			
		NA	P	F	NM
FCC 15.249 Subclause (a) / RSS-210 A.2.9. (a)	Field strength of fundamental and harmonics emissions		P		
FCC 15.249 Subclause (d) / RSS-210 A.2.9. (b)	Emissions radiated outside of the specific frequency bands		P		

## 2. Proximity radio

FCC PART 15 PARAGRAPH / RSS-210		VERDICT			
		NA	P	F	NM
FCC 15.249 Subclause (a) / RSS-210 A.2.9. (a)	Field strength of fundamental and harmonics emissions		P		
FCC 15.249 Subclause (d) / RSS-210 A.2.9. (b)	Emissions radiated outside of the specific frequency bands		P		

AT4 wireless, S.A.

Parque Tecnológico de Andalucía, c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España www.at4wireless.com · C.I.F. A29 507 456



# **Appendix A** – Test result "Bluetooth Low Energy"



#### **INDEX**

TEST CONDITIONS	11
Occupied Bandwidth	12
Section 15.249 Subclause (a) / RSS-210 A2.9. (a) Field strength of Fundamental	15
Section 15 249 Subclause (a) and (d) / RSS-210 A2 9 (b) Emissions limitations radiated (Transmitter)	18



#### **TEST CONDITIONS**

Power supply (V):

 $V_{nominal} = 1.45 \text{ Vdc}$ 

Type of power supply = DC Voltage from rechargeable battery

Type of antenna = Integral antenna

Declared Gain for antenna = -1.36 dBi

TEST FREQUENCIES:

Lowest channel: 2402 MHz

Middle channel: 2440 MHz

Highest channel: 2480 MHz

#### CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and connected directly to the spectrum analyzer.

#### RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.



# **Occupied Bandwidth**

### **RESULTS**

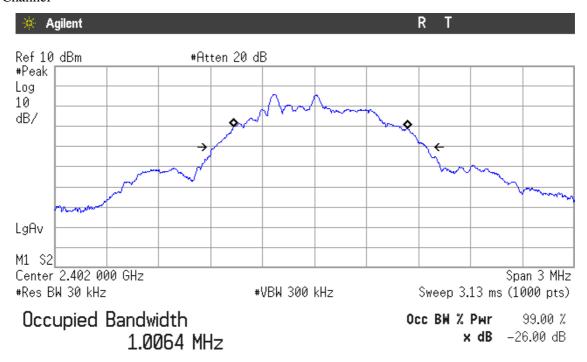
(see next plots).

	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
99% bandwidth (MHz)	1.006	1.008	1.003
-26 dBc bandwidth (MHz)	1.216	1.214	1.206
Measurement uncertainty (kHz)		±7	

2014-12-17

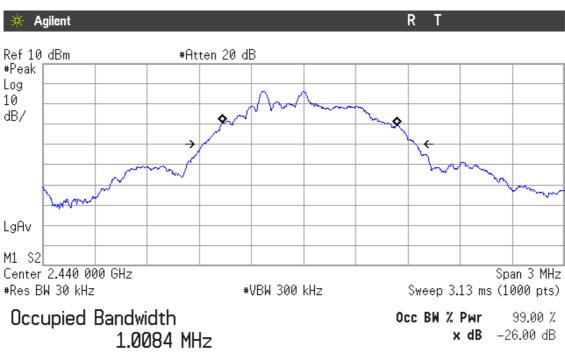


#### Lowest Channel



Transmit Freq Error 34.846 kHz x dB Bandwidth 1.216 MHz

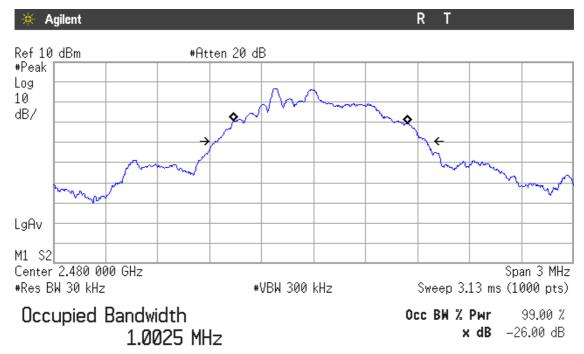
#### Middle Channel



Transmit Freq Error 36.082 kHz x dB Bandwidth 1.214 MHz



#### Highest channel



Transmit Freq Error 41.731 kHz x dB Bandwidth 1.206 MHz



### Section 15.249 Subclause (a) / RSS-210 A2.9. (a) Field strength of Fundamental

#### **SPECIFICATION**

The field strength of emissions from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 – 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000-24250	250	107.96	3

for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### **RESULTS**

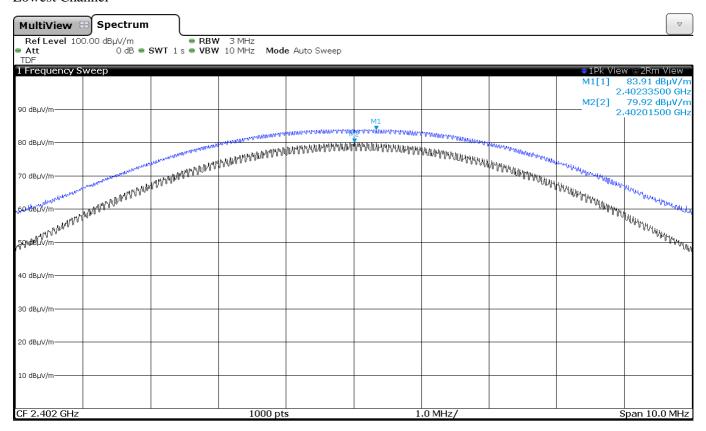
	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
Field strength (dBµV/m) average	79.92	81.10	80.86
Field strength (dBµV/m) peak	83.91	85.06	84.83
Measurement uncertainty (dB)		±4.0	

Verdict: PASS

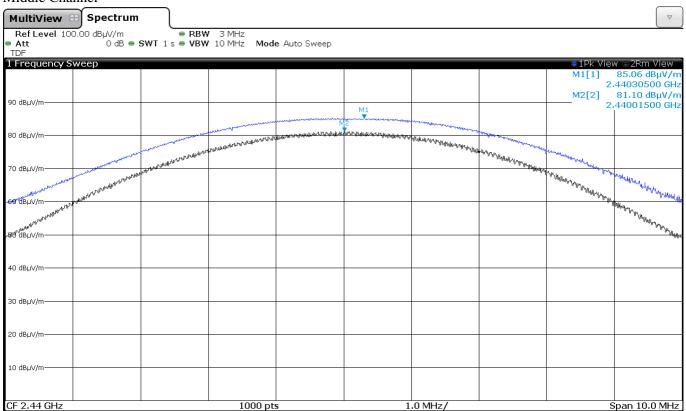


#### FIELD STRENGTH

#### Lowest Channel



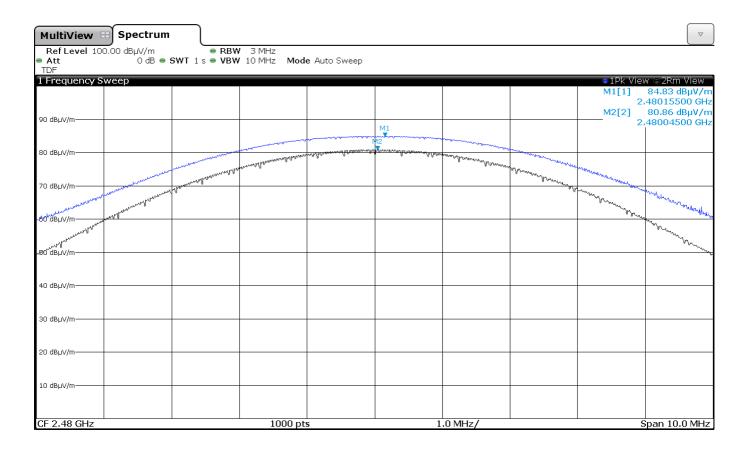
#### Middle Channel



Page 16 of 48 2014-12-17



### Highest Channel





#### Section 15.249 Subclause (a) and (d) / RSS-210 A2.9. (b). Emissions limitations radiated (Transmitter)

#### **SPECIFICATION**

The field strength of harmonics from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 – 2483.5	500	54	3
5725 - 5875	500	54	3
24000-24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

Whichever is the lesser attenuation.

#### **RESULTS**:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.



#### Frequency range 30 MHz-1000 MHz.

No spurious signals were found at less than 20 dB respect to the limit.

#### Frequency range 1 GHz-25 GHz

The results in the next tables show the maximum measured levels in the 1-25 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

#### 1. CHANNEL: LOWEST (2402 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2 222107		Peak	48.09	± 4.00
2.332105	V	RMS	36.02	± 4.00
2 40 7 400		Peak	46.68	± 4.00
2.495480	V	RMS	37.31	± 4.00
1001070		Peak	49.05	± 4.00
4.804250	V	RMS	47.47	± 4.00

#### 2. CHANNEL: MIDDLE (2440 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
• • • • • • • • • • • • • • • • • • • •	••	Peak	48.11	± 4.00
2.336809	V	RMS	36.75	± 4.00
2 202200	**	Peak	49.90	± 4.00
2.393300	V	RMS	39.45	± 4.00
		Peak	48.89	± 4.00
2.495676	V	RMS	37.12	± 4.00
		Peak	48.91	± 4.00
4.879250	V	RMS	45.45	± 4.00



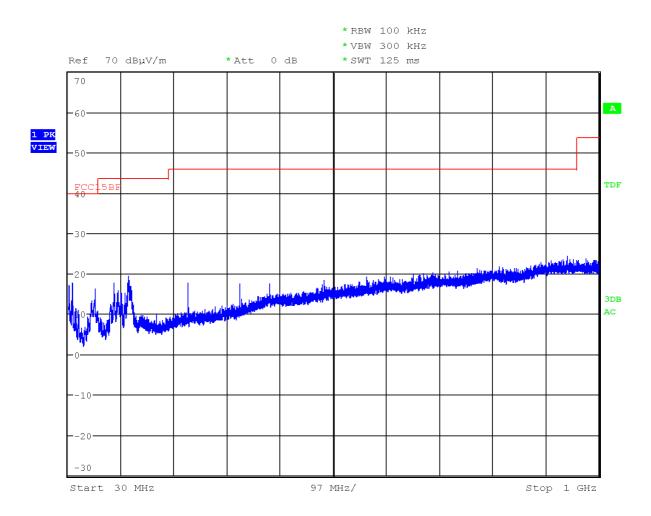
### 3. CHANNEL: HIGHEST (2480 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2 222 424		Peak	47.62	± 4.00
2.320631	V	RMS	36.25	± 4.00
2 40 4202	**	Peak	50.67	± 4.00
2.484203	V	RMS	41.88	± 4.00
2 7 1 7 1 2 2		Peak	51.30	± 4.00
2.517433	V	RMS	41.64	± 4.00
2 700100		Peak	50.82	± 4.00
2.588100	V	RMS	40.78	± 4.00
		Peak	46.75	± 4.00
4.959750	V	RMS	44.04	± 4.00

Verdict: PASS



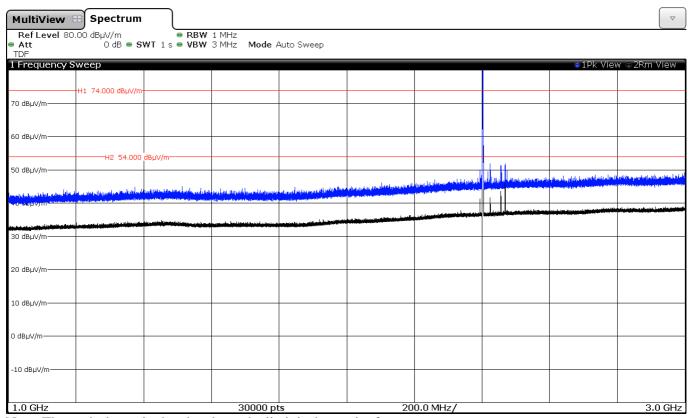
### FREQUENCY RANGE 30 MHz-1000 MHz.



(This plot is valid for all three channels).

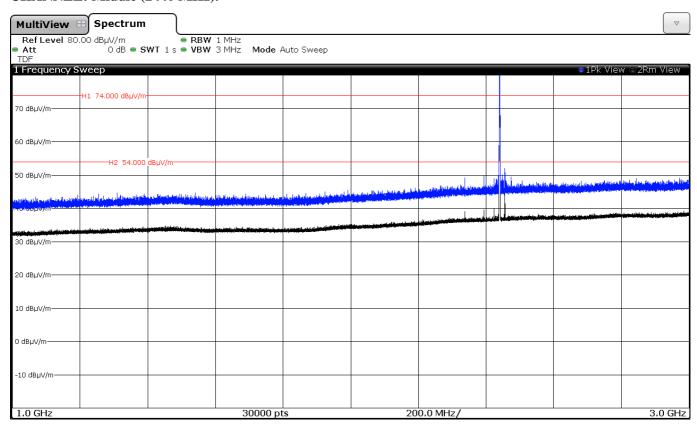


# FREQUENCY RANGE 1 GHz to 3 GHz. CHANNEL: Lowest (2402 MHz).



Note: The peak shown in the plot above the limit is the carrier frequency.

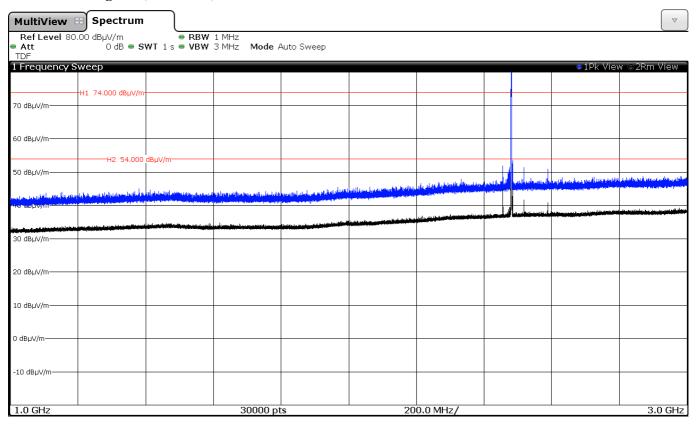
#### CHANNEL: Middle (2440 MHz).



Note: The peak shown in the plot above the limit is the carrier frequency.



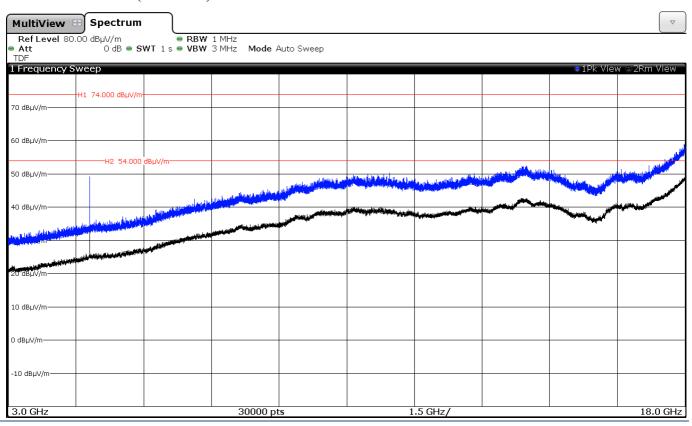
### CHANNEL: Highest (2480 MHz).



Note: The peak shown in the plot above the limit is the carrier frequency.

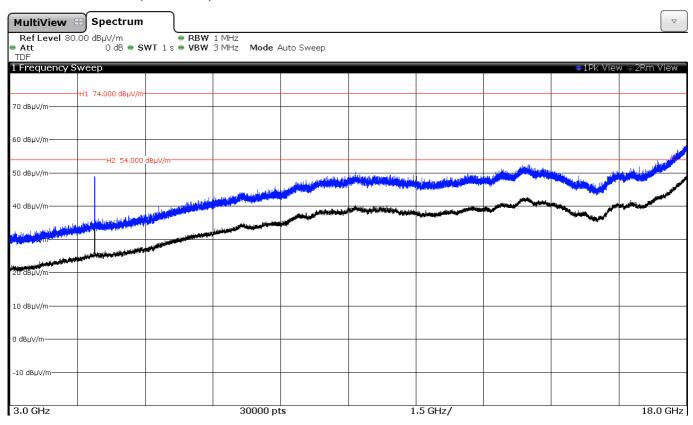
#### FREQUENCY RANGE 3 GHz to 18 GHz.

#### CHANNEL: Lowest (2402 MHz).

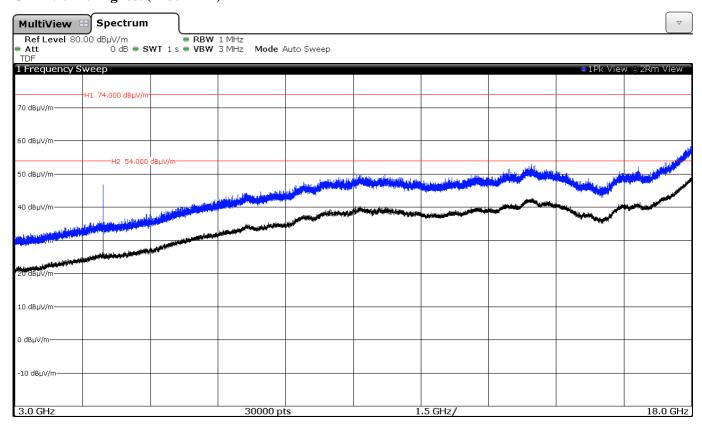




#### CHANNEL: Middle (2440 MHz).



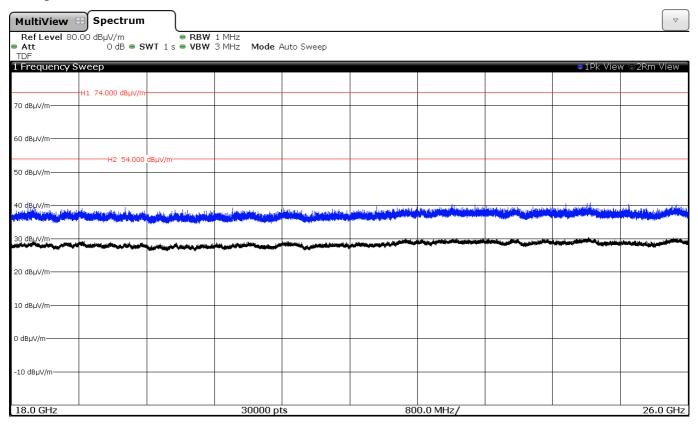
## CHANNEL: Highest (2480 MHz).



Page 24 of 48 2014-12-17



#### FREQUENCY RANGE 18 GHz to 26 GHz.

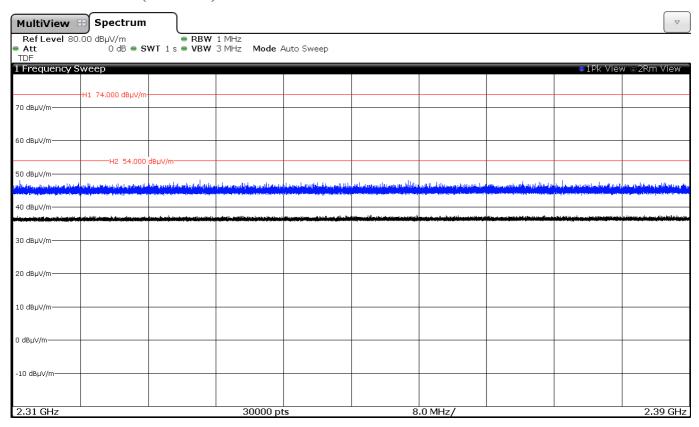


(This plot is valid for all three channels).

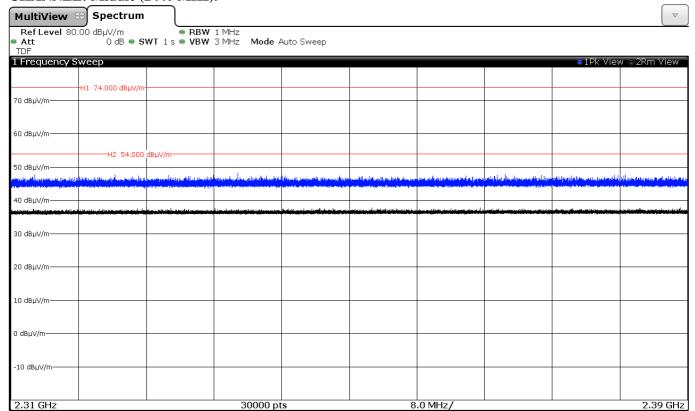


#### FREQUENCY RANGE 2.31 GHz to 2.39 GHz. (RESTRICTED BAND)

#### CHANNEL: Lowest (2402 MHz).

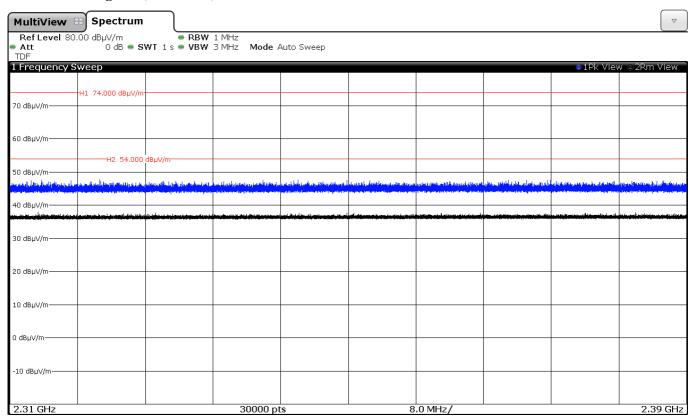


#### CHANNEL: Middle (2440 MHz).



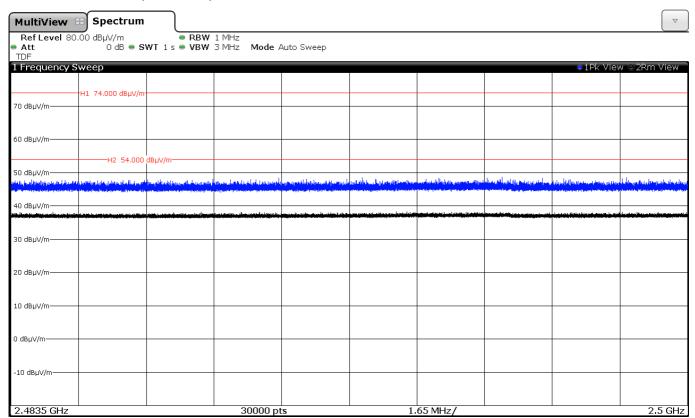


#### CHANNEL: Highest (2480 MHz).



#### FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND)

#### CHANNEL: Lowest (2402 MHz).

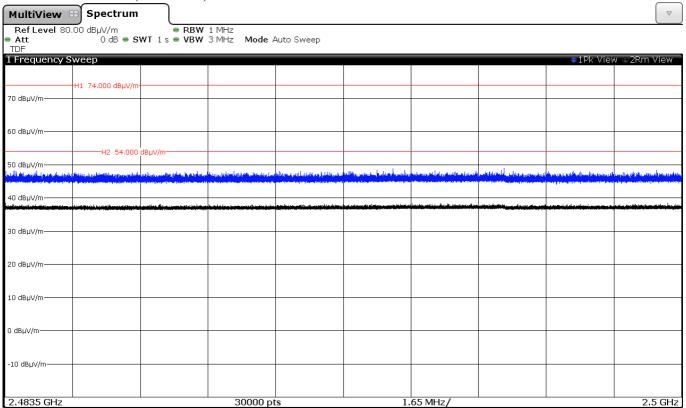


#### AT4 wireless, S.A.

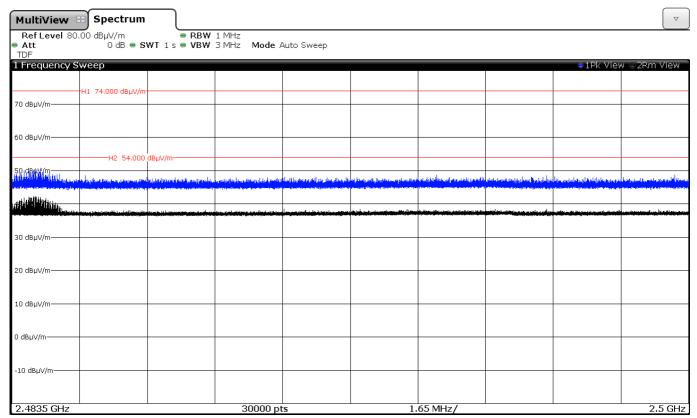
Parque Tecnológico de Andalucía, c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España www.at4wireless.com · C.I.F. A29 507 456



#### CHANNEL: Middle (2440 MHz).



#### CHANNEL: Highest (2480 MHz).



Page 28 of 48 2014-12-17

AT4 wireless, S.A.

Parque Tecnológico de Andalucía, c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España www.at4wireless.com · C.I.F. A29 507 456



# Appendix B – Test result "Proximity radio"



#### **INDEX**

TEST CONDITIONS	31
Occupied Bandwidth	32
Section 15.249 Subclause (a) / RSS-210 A2.9. (a) Field strength of Fundamental	35
Section 15 249 Subclause (a) and (d) / RSS-210 A2 9 (b) Emissions limitations radiated (Transmitter)	38



#### **TEST CONDITIONS**

Power supply (V):

 $V_{nominal} = 1.45 \text{ Vdc}$ 

Type of power supply = DC Voltage from rechargeable battery

Type of antenna = Integral antenna

Declared Gain for antenna = -1.36 dBi

**TEST FREQUENCIES:** 

Lowest channel: 2404 MHz

Middle channel: 2440 MHz

Highest channel: 2478 MHz

#### CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and connected directly to the spectrum analyzer.

#### RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.



# **Occupied Bandwidth**

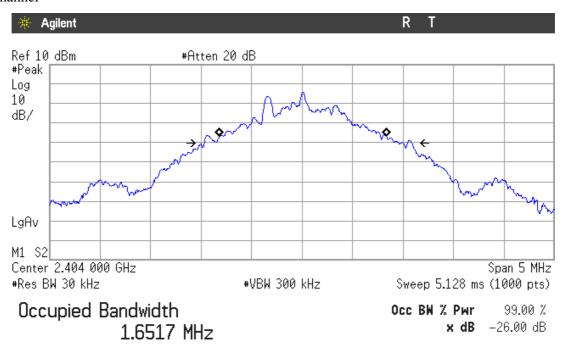
### **RESULTS**

(see next plots).

	1	I	ı
	Lowest frequency	Middle frequency	Highest frequency
	2404 MHz	2440 MHz	2478 MHz
99% bandwidth (MHz)	1.652	1.644	1.624
-26 dBc bandwidth (MHz)	2.056	2.053	2.045
Measurement uncertainty (kHz)		±7	

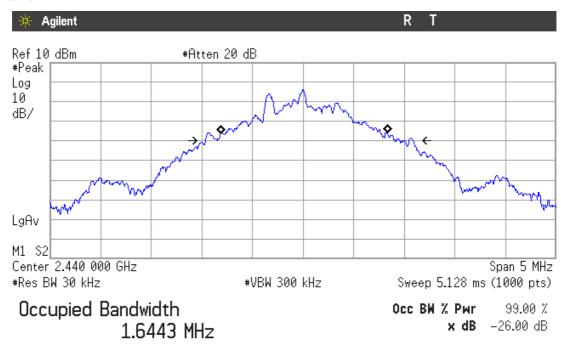


#### Lowest Channel



Transmit Freq Error 9.799 kHz x dB Bandwidth 2.056 MHz

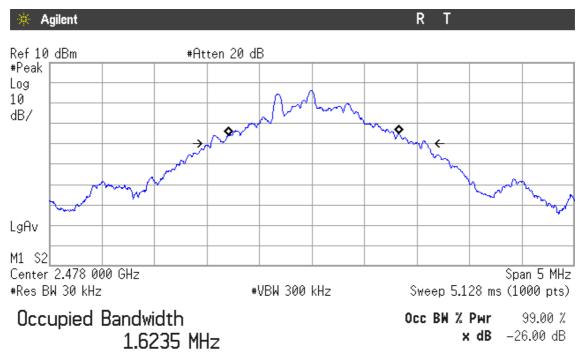
#### Middle Channel



Transmit Freq Error 10.191 kHz x dB Bandwidth 2.053 MHz



#### Highest channel



Transmit Freq Error 17.742 kHz x dB Bandwidth 2.045 MHz



#### Section 15.249 Subclause (a) / RSS-210 A2.9. (a) Field strength of Fundamental

#### **SPECIFICATION**

The field strength of emissions from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 – 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000-24250	250	107.96	3

for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### **RESULTS**

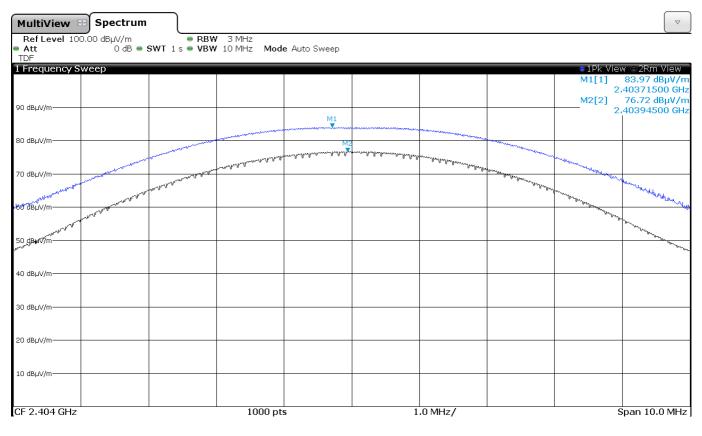
	Lowest frequency	Middle frequency	Highest frequency
	2404 MHz	2440 MHz	2478 MHz
Field strength (dBµV/m) average	76.72	77.77	77.57
Field strength (dBµV/m) peak	83.97	85.03	84.79
Measurement uncertainty (dB)	±4.0		

Verdict: PASS

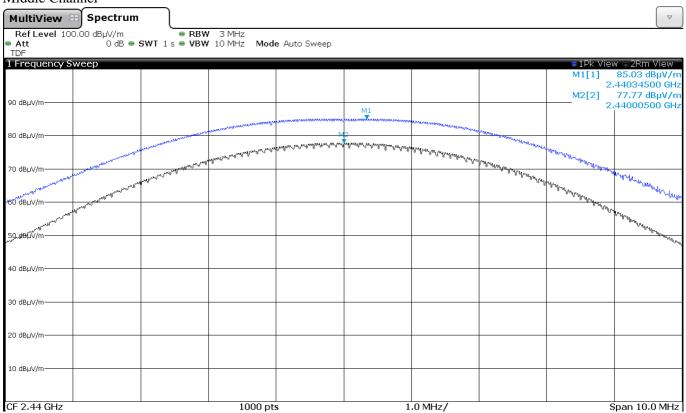


#### FIELD STRENGTH

#### Lowest Channel



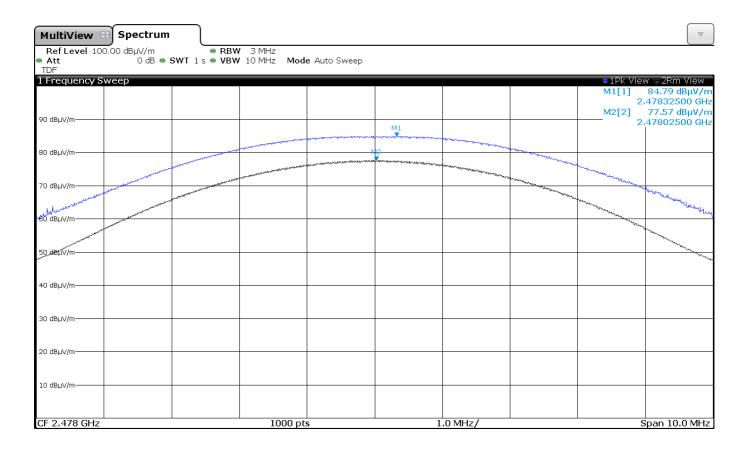
#### Middle Channel



Page 36 of 48 2014-12-17



## Highest Channel





#### Section 15.249 Subclause (a) and (d) / RSS-210 A2.9. (b) Emissions limitations radiated (Transmitter)

#### **SPECIFICATION**

The field strength of harmonics from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 – 2483.5	500	54	3
5725 - 5875	500	54	3
24000-24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

Whichever is the lesser attenuation.

#### **RESULTS**:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.



## Frequency range 30 MHz-1000 MHz.

No spurious signals were found at less than 20 dB respect to the limit.

## Frequency range 1 GHz-25 GHz

The results in the next tables show the maximum measured levels in the 1-25 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

## 1. CHANNEL: LOWEST (2404 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2 22 57 57		Peak	50.55	± 4.00
2.336767	V	RMS	39.77	± 4.00
2.371681	V	Peak	47.75	± 4.00
		RMS	36.45	± 4.00
		Peak	48.74	± 4.00
2.497757	V	RMS	36.91	± 4.00
4.807250	V	Peak	50.20	± 4.00
		RMS	44.26	± 4.00

## 2. CHANNEL: MIDDLE (2440 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2 22 24 42	••	Peak	47.71	± 4.00
2.328148	V	RMS	36.54	± 4.00
		Peak	49.13	± 4.00
2.494762	V	RMS	37.35	± 4.00
		Peak	51.61	± 4.00
2.544900	V	RMS	44.63	± 4.00
4.880750	V	Peak	48.81	± 4.00
		RMS	44.08	± 4.00



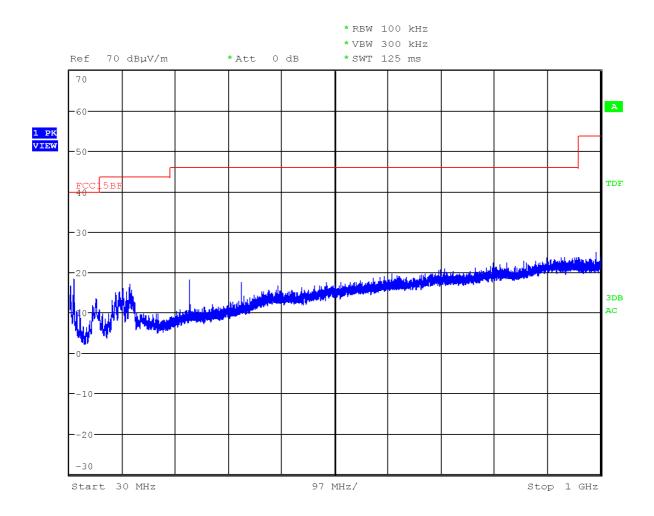
## 3. CHANNEL: HIGHEST (2478 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2 202502	**	Peak	48.26	± 4.00
2.382503	V	RMS	36.47	± 4.00
2 40 44 20		Peak	51.57	± 4.00
2.484139	V	RMS	42.71	± 4.00
2 - 1 - 2		Peak	51.31	± 4.00
2.517367	V	RMS	40.72	± 4.00
		Peak	42.09	± 4.00
4.956750	V	RMS	36.35	± 4.00

Verdict: PASS



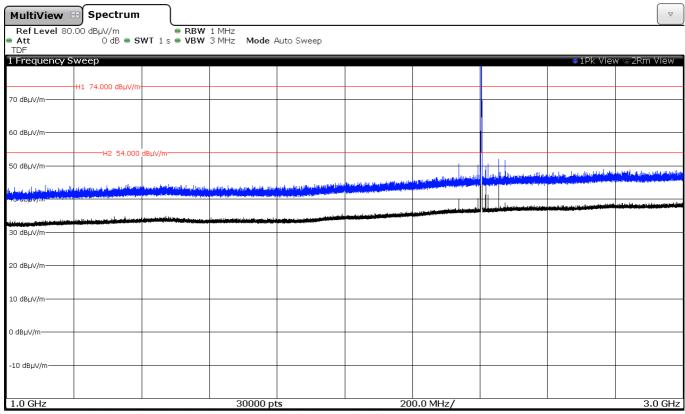
## FREQUENCY RANGE 30 MHz-1000 MHz.



(This plot is valid for all three channels).

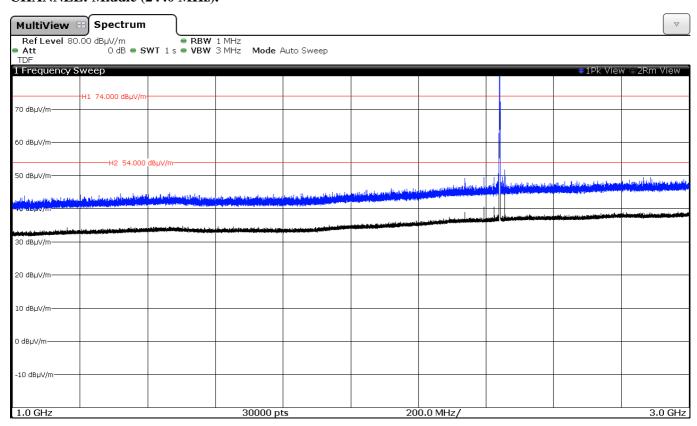


# FREQUENCY RANGE 1 GHz to 3 GHz. **CHANNEL: Lowest (2404 MHz).**



Note: The peak shown in the plot above the limit is the carrier frequency.

## CHANNEL: Middle (2440 MHz).

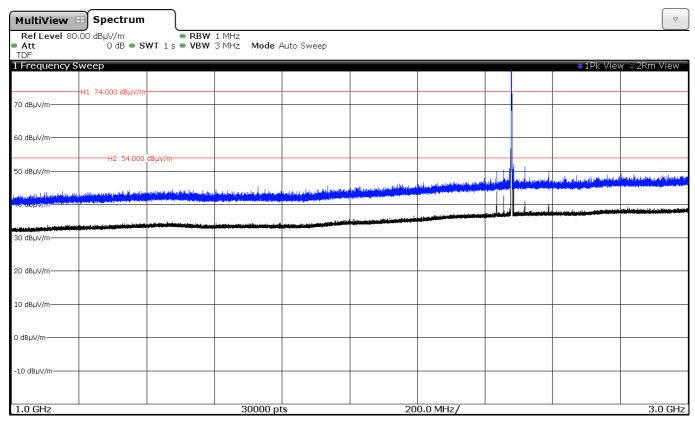


Note: The peak shown in the plot above the limit is the carrier frequency.

**Report No:** (NIE) 44100RRF.005



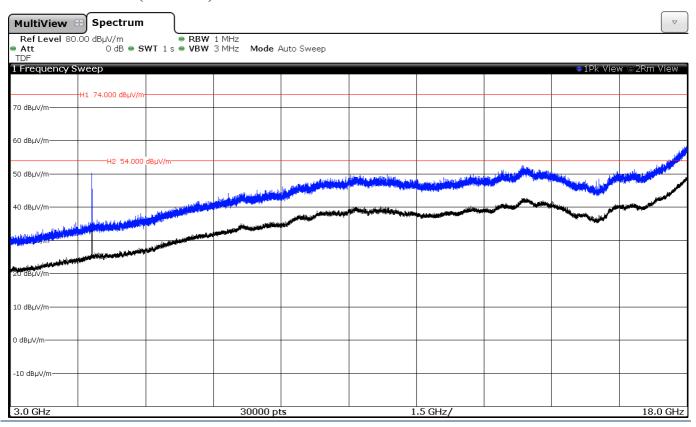
# CHANNEL: Highest (2478 MHz).



Note: The peak shown in the plot above the limit is the carrier frequency.

## FREQUENCY RANGE 3 GHz to 18 GHz.

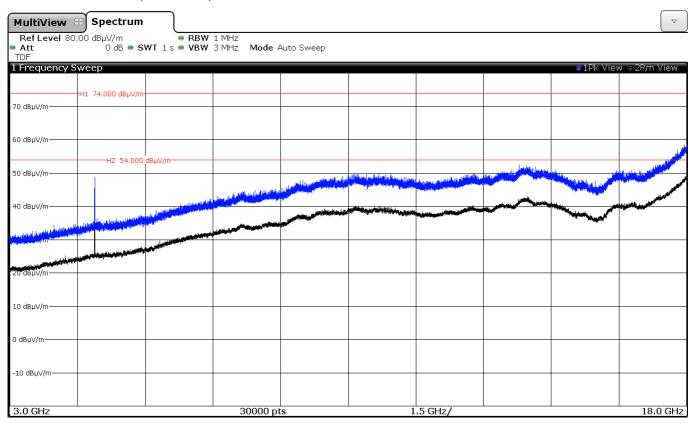
#### CHANNEL: Lowest (2404 MHz).



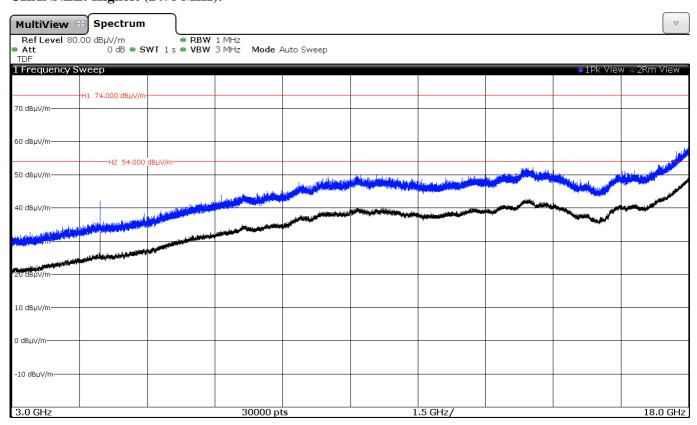
Report No: (NIE) 44100RRF.005



#### CHANNEL: Middle (2440 MHz).

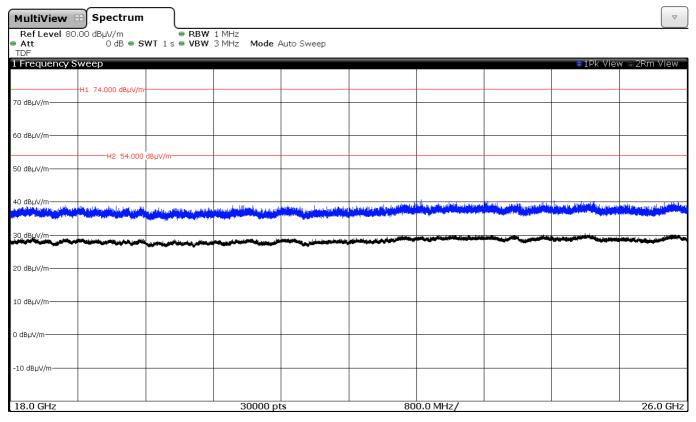


## CHANNEL: Highest (2478 MHz).





## FREQUENCY RANGE 18 GHz to 26 GHz.

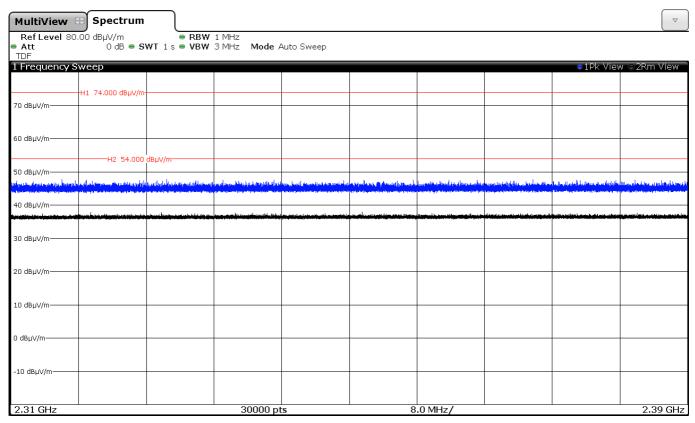


(This plot is valid for all three channels).

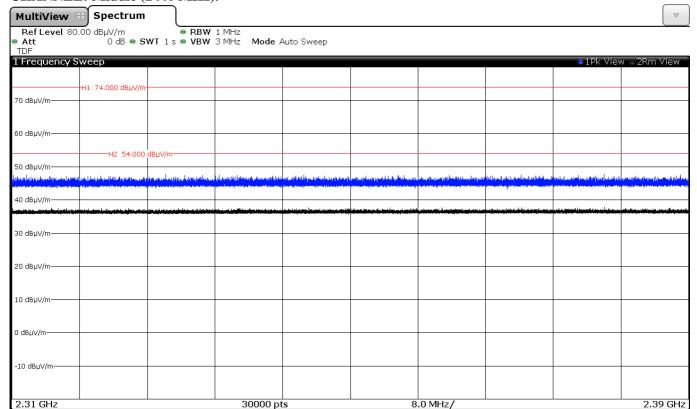


## FREQUENCY RANGE 2.31 GHz to 2.39 GHz. (RESTRICTED BAND)

#### CHANNEL: Lowest (2404 MHz).

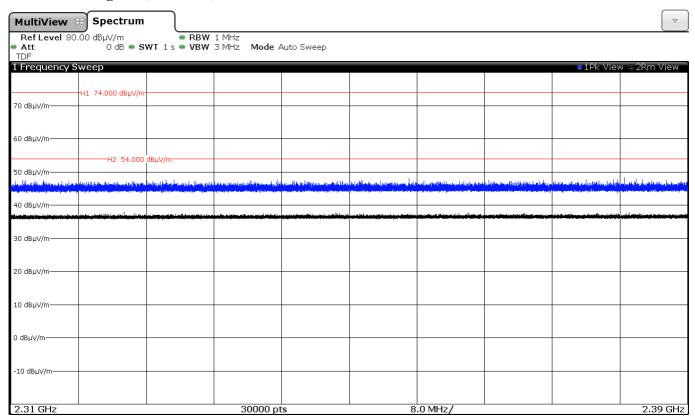


#### CHANNEL: Middle (2440 MHz).



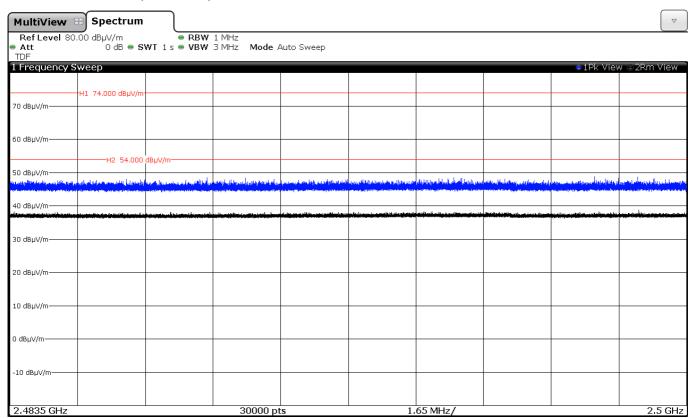


## CHANNEL: Highest (2478 MHz).



## FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND)

#### CHANNEL: Lowest (2404 MHz).

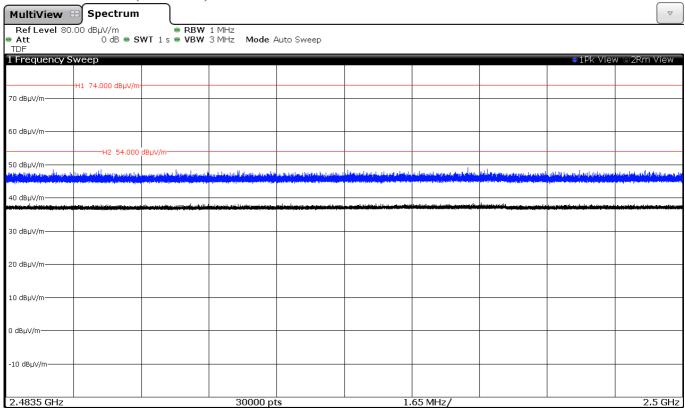


#### AT4 wireless, S.A.

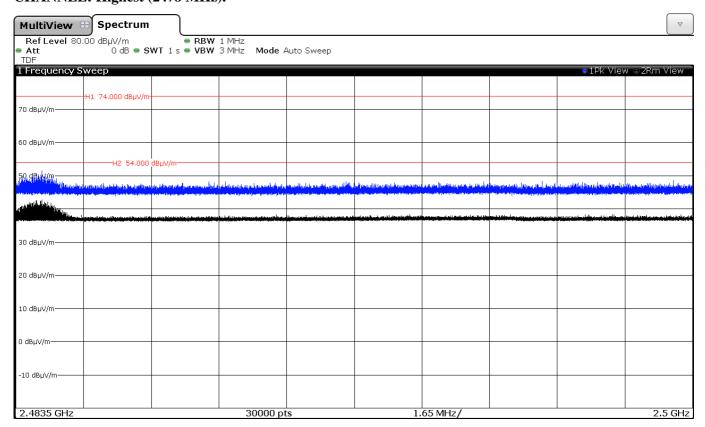
Parque Tecnológico de Andalucía, c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España www.at4wireless.com · C.I.F. A29 507 456



#### CHANNEL: Middle (2440 MHz).



## CHANNEL: Highest (2478 MHz).



Page 48 of 48 2014-12-17