

**FCC LISTED, REGISTRATION
NUMBER: 905266**

AT4 wireless, S.A.

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TEST REPORT

REFERENCE STANDARD:

USA FCC Part 15.249 and 15.209

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

NIE :	38918RRF.002
Approved by (name / position & signature)	A. Llamas/RF Lab. Manager
Elaboration date	2013-10-28
Identification of item tested	WIRELESS THERMOSTAT
Trademark	AIRZONE
Model and/or type reference	AZDZKZTS1W
Serial number	F002E84, 009M1L
Other identification of the product	FCC ID: SVS-DZK-ZTS HW version: 1.0 / SW version: 1.0
Features	915 MHz frequency band, DC power supply batteries "2x1.5AA", GFSK modulation
Description	This is a backlighted monochrome LCD touchpad digital thermostat to control the zone temperature. It is battery powered.
Applicant	CORPORACION EMPRESARIAL ALTRA, S.L.
Address..... :	C/ Marie Curie, 21 PTA 29.590 – Málaga ESPAÑA
CIF/NIF/Passport..... :	B92611102
Contact person:	Matilde García
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Test samples supplier	Same as test sample supplier
Manufacturer	Same as test sample supplier

Test method requested

Standard: USA FCC Part 15.249 (10–1–11 Edition).
 USA FCC Part 15.209 (10–1–11 Edition).
 ANSI C63.10-2009: American National Standard for Testing Unlicensed
 Wireless Devices.

Test procedure: PERF018

Non-standardized test method: N/A

Used instrumentation

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber IR 11. BS	N.A.	N.A.
2.	Control Chamber IR 12.BC	N.A.	N.A.
3.	Hybrid Bilog antenna Sunol Sciences Corporation JB6	2011/05	2014/05
4.	Antenna mast EM 1072 NMT	N.A.	N.A.
5.	Rotating table EM 1084-4. ON	N.A.	N.A.
6.	Double-ridge Guide Horn antenna 1-18 GHz HP 11966E	2011/09	2014/09
7.	EMI Test Receiver R&S ESIB26	2011/11	2013/11
8.	Multi Device Controller EMCO 2090	N.A.	N.A.
9.	RF pre-amplifier Miteq AFS5-04001300-15-10P-6.	2012/07	2014/07
10.	RF pre-amplifier Schaffner CPA 9232.	2013/06	2015/06
11.	Antenna tripod EMCO 11968C.	N.A.	N.A.
12.	Spectrum analyser Agilent PSA E4440A	2012/02	2014/02

Report template No.: FDT08_14

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Competences and guarantees

Centro de Tecnología de las Comunicaciones (AT4 wireless), S.A. 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 conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 905266.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme 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.

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:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
38918/05	Touch radio zone thermostat with integral antenna	AZDZKZTS1W	F002E84	22/03/2013

Sample S/02 is composed of the following elements:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
38918/10	Touch radio zone thermostat with antenna connector	AZDZKZTS1W	009M1L	09/04/2013

1. Sample S/01 has undergone following test(s).
Radiated tests for transmitter indicated in appendix A.
2. Sample S/02 has undergone following test(s).
99 % and -26 dBc Bandwidth indicated in appendix A.

Testing period

The performed test started on 2013-04-03 and finished on 2013-04-10.

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. = 22.3 °C Max. = 23.5 °C
Relative humidity	Min. = 47.3 % Max. = 50.2 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
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. = 19.7 °C Max. = 20.1 °C
Relative humidity	Min. = 47 % Max. = 49 %
Air pressure	Min. = 1020 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
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. = 23.3 °C Max. = 24.5 °C
Relative humidity	Min. = 37.7 % Max. = 40.8 %
Air pressure	Min. = 1016 mbar Max. = 1016 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Summary

Considering the results of the performed test according to standard USA FCC Part 15.249, Part 15.209 the item/s under test is **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

Remarks and comments

None.

Testing verdicts

Not applicable: NA
 Pass.....: P
 Fail: F
 Not measured.....: NM

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

APPENDIX A: Test result

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TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 3 \text{ Vdc}$$

Type of power supply = DC voltage supplied by the internal batteries "2 x 1.5Vdc AA".

Type of antenna = Integral antenna

TEST FREQUENCIES:

Transmitter channel: 915 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyser.

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-10 GHz (1 GHz-18 GHz Double ridge horn antenna).

For radiated emissions in the range 1 GHz-10 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.

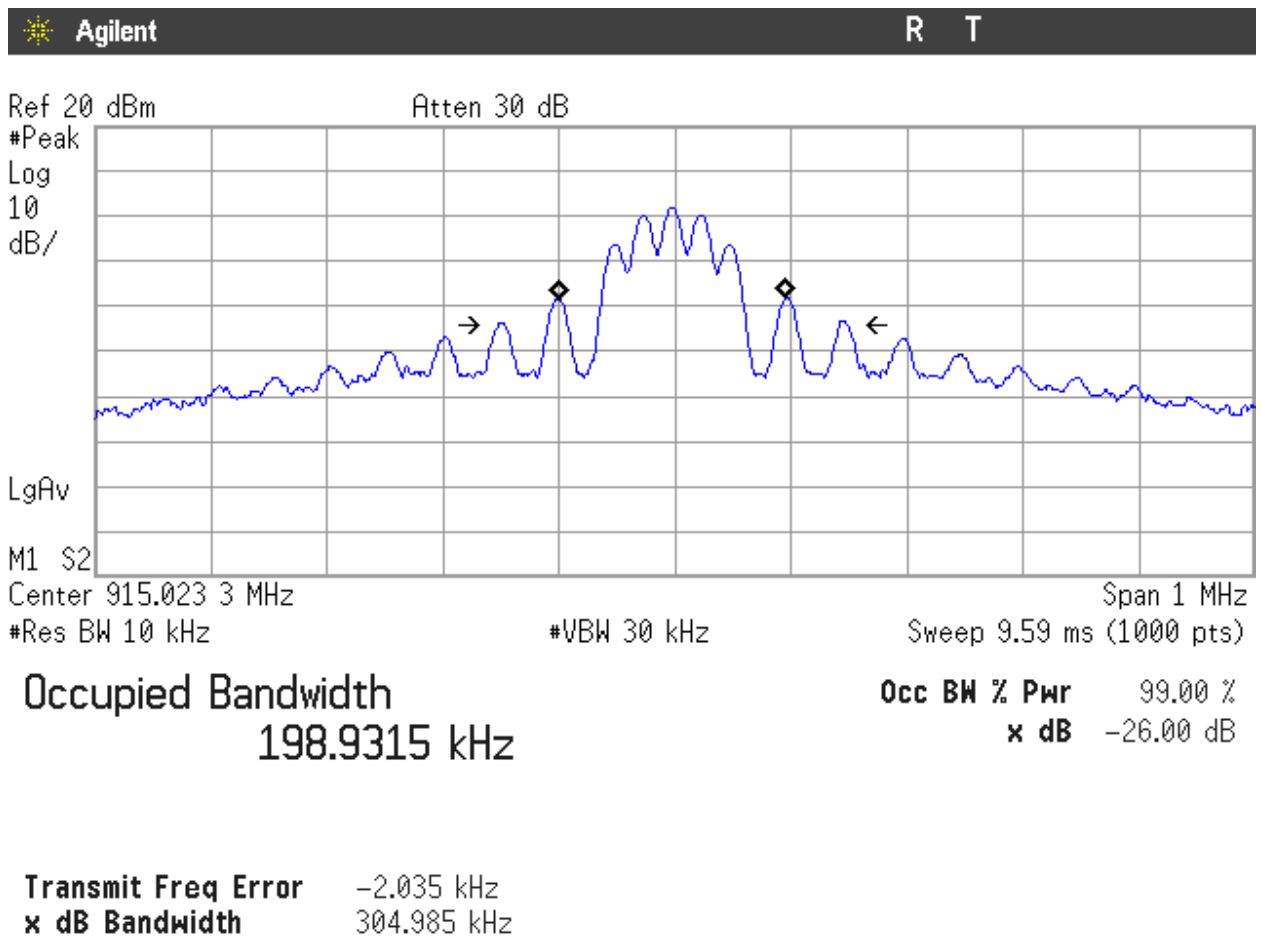
Measurements were made in both horizontal and vertical planes of polarization.

Occupied Bandwidth

RESULTS

99% occupied bandwidth (KHz)	198.9315
-26 dBc Spectrum bandwidth (KHz)	304.985
Measurement uncertainty (kHz)	±11

99% OCCUPIED BANDWIDTH & -26dBc SPECTRUM BANDWIDTH



Section 15.249 Subclause (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 (dB μ V/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.

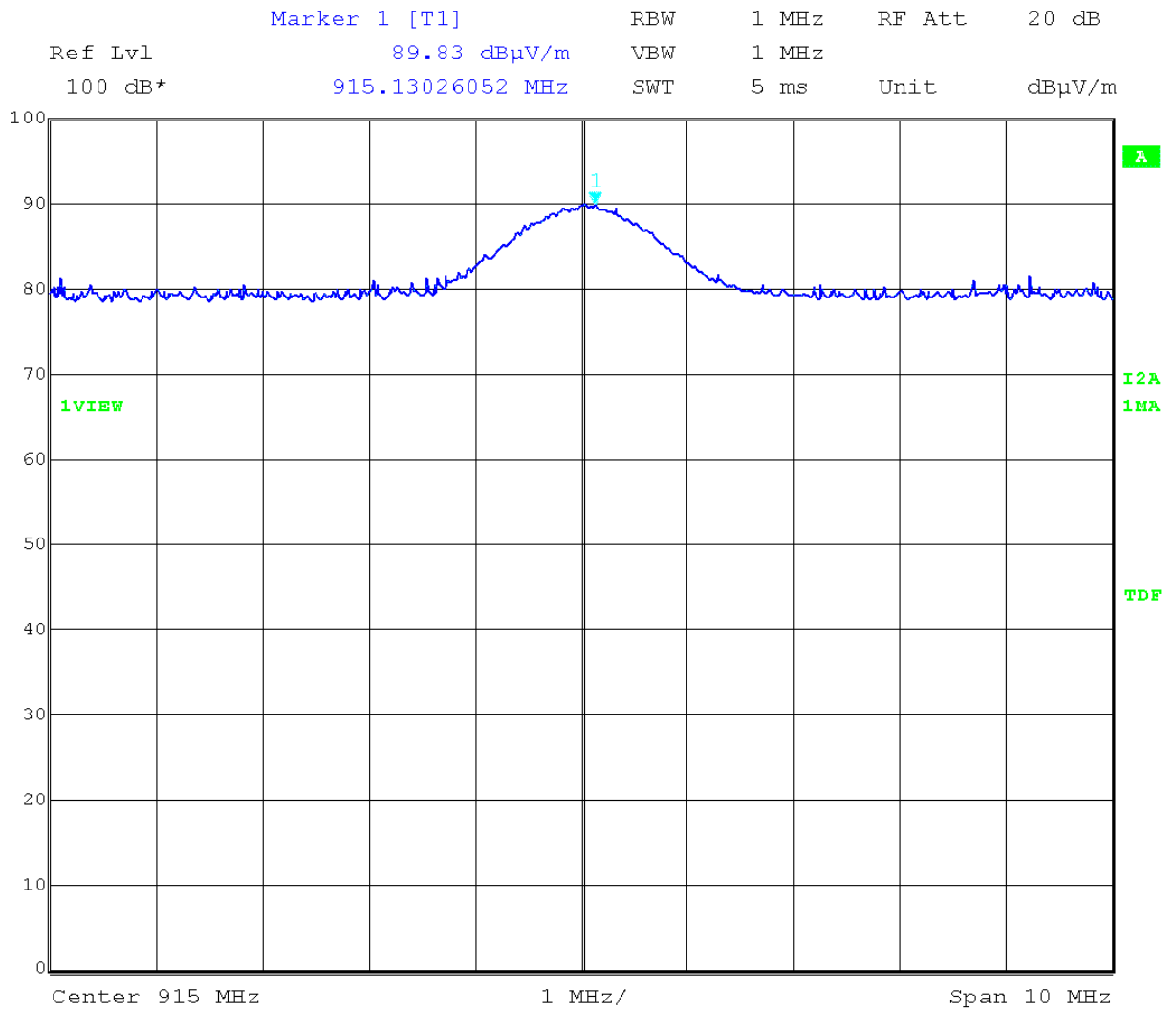
RESULTS

(see next plot).

Maximum Field strength (dB μ V/m) peak	89.83
Maximum Field strength (dB μ V/m) quasi-peak	86.38
Measurement uncertainty (dB)	± 3.8

Verdict: PASS

FIELD STRENGTH (peak value)



Section 15.249 Subclause (a) and (d). Radiated emissions (Transmitter)

SPECIFICATION

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

Fundamental frequency (MHz)	Field strength of harmonics ($\mu\text{V/m}$)	Field strength of harmonics ($\text{dB}\mu\text{V/m}$)	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 ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	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-10 GHz.

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

Frequency range 30 MHz-1000 MHz.

Highest spurious levels:

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
811.4429	V	Quasi-Peak	30.08	± 3.8

Frequency range 1 GHz-10 GHz

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
1830.005	H	Peak	47.50	± 4.0
	H	Average	45.85	± 4.0
2745.047	H	Peak	41.68	± 4.0
	H	Average	39.62	± 4.0
3666.0105	H	Peak	49.35	± 4.0
	H	Average	47.76	± 4.0
4575.078	V	Peak	49.85	± 4.0
	V	Average	48.35	± 4.0
5490.144	H	Peak	51.93	± 4.0
	H	Average	49.83	± 4.0
6405.115	V	Peak	49.05	± 4.0
	V	Average	47.06	± 4.0
7320.205	V	Peak	50.22	± 4.0
	V	Average	49.26	± 4.0
8235.196	H	Peak	48.05	± 4.0
	H	Average	46.87	± 4.0

Verdict: PASS

FREQUENCY RANGE 1 GHz to 10 GHz.

