TEST REPORT CONCERNING THE COMPLIANCE OF AN ENERGY MANAGEMENT SYSTEM, ZIGBEE DEVICE BRAND PLUGWISE, MODEL STICK.

WITH 47 CFR PART 15 (10-1-09).

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Industry Canada : 2932G-1
VCCI Registered : R-1518, C-1598
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MEASUREMENT/TECHNICAL REPORT

ENERGY MANAGEMENT SYSTEM, ZIGBEE DEVICE
BRAND PLUGWISE, MODEL STICK

FCC ID: ZB9-STICK

This report concerns: Original grant/certification ~~Class 2 change~~ ~~Verification~~

Equipment type: Class-B Digital device

Report prepared by:

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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-09 edition) and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: August 02, 2011

Signature:

O. Hoekstra
Senior Engineer Telecom TÜV Rheinland EPS B.V.

Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

Description of test item

Test item	:	Energy Management System, ZigBee device
Manufacturer	:	Applied Micro Electronics "AME" BV
Brand	:	Plugwise
Model(s)	:	Stick
Serial number(s)	:	--
MAC		000D6F0000C3CEE2
Revision	:	n.a.
Receipt date	:	June 01, 2011

Applicant information

Applicant's representative	:	Mr. E. Vroege
Company	:	Plugwise B.V.
Address	:	Wattstraat 56
Postal code	:	2171TR
City	:	Sassenheim
Country	:	The Netherlands
Telephone number	:	+31 252433070
Telefax number	:	+31 252433079

Test(s) performed

Location	:	Niekerk
Test(s) started	:	June 01, 2011
Test(s) completed	:	June 07, 2011
Purpose of test(s)	:	Verification
Test specification(s)	:	47 CFR Part 15 (10-1-09 Edition)
Test engineer(s)	:	R. van der Meer
Report written by	:	R. van der Meer
Report date	:	August 02, 2011

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The brand Plugwise model Stick, hereafter refered to as EUT, is a digitally modulated transmitter intended to be used in an energy management system using a wireless ZigBee-mesh network. It operates in the 2400 – 2483.5 frequency band (it actually uses the frequency range of 2405 – 2480 MHz). This report deals with the Class-B Digital devices section of the EUT.

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report supports the verification of compliance of the EUT with the FCC regulations for computers and other digital devices.

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Energy Management System, ZigBee device
Manufacturer	:	Applied Micro Electronics "AME" BV
Brand	:	Plugwise
Model	:	Stick
Serial number	:	--
MAC	:	000D6F0000C3CEE2
Voltage input rating	:	4.4 – 5.25 Vdc (USB-powered)
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	Integral, integrated on the PCB
Operating frequency	:	2405 – 2480 MHz
Modulation	:	O-QPSK
Remarks	:	EUT is a digital device/ peripheral which can be connected to a computers USB port

AUX	:	Personal Computer
Manufacturer	:	Lenovo
Brand	:	Lenovo
Model	:	9456-HTG
Serial number	:	L3-BF847 07/02
Voltage input rating	:	100 – 240Vac
Voltage output rating	:	--
Remark	:	property TR-EPS, host for testsoftware and EUT

1.4 Test Summary

The EUT was tested in accordance with the specifications given in the table below.

Test Standard		Description		Pass / Fail
47 CFR Part 15 (10-1-09 Edition)			Page	
15.107		Conducted emissions	11	Pass
15.109		Radiated emissions	10	Pass

Table : testspecifications

Testmethods: ANSI C63:2009 .

1.4.1 Description of input and output ports.

Number	Terminal	From	To	Remarks	
1	Mains	Mains	AUX	--	
2	USB	AUX	EUT	--	

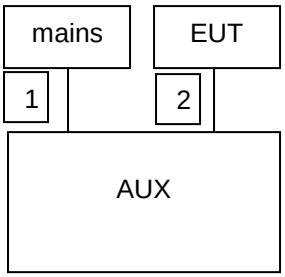

Figure 1. Basic set-up

1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-09 Edition), sections 15.31, 15.107, 15.109.

The test methods, which have been used, are based on ANSI C63.4: 2009.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.6 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948 (10-1-06 edition).

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-1. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.7 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120VAC/60Hz to the AC/DC Power Supply of AUX
Air pressure	: 950 – 1050 hPa

When is was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical situation as a customer would normally use it.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2009.

2.2 EUT mode of operation.

The EUT has been tested in normal use (as a customer would normally use it). The tests have been performed with a complete functioning EUT and interconnections. The EUT was provided by the manufacturer with suitable software to allow operation in all the required modes.

Software used for testing: Plugwise Easy Tool Build date: 5/27/2011.

This software was running on a laptop computer (AUX). It was used to enable the test operation modes listed in section **Fout! Verwijzingsbron niet gevonden.** as appropriate.

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

2.5 Product Labelling

The product labeling information is available in the technical documentation package.

2.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

2.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

2.8 Part list of the EUT.

The part list is available in the technical documentation package.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

Frequency [MHz]	Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit QP [dBµV/m]	Margin QP [dB]
48.000	Vertical	9.4	9.9	19.3	40.0	20.7
48.925	Vertical	7.4	9.9	17.3	40.0	22.7
52.525	Vertical	8.1	8.6	16.7	40.0	23.3
65.175	Vertical	14.5	7.1	21.6	40.0	18.4
72.350	Vertical	10.0	7.8	17.8	40.0	22.2
149.50	Vertical	8.7	13.7	22.4	43.5	21.1
152.25	Vertical	9.0	13.6	22.6	43.5	20.9
259.50	Vertical	8.9	16.7	25.6	46.0	20.4

Table 1 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.109 with the EUT are depicted in Table 1. The system is tested as in whole, so with all equipment as shown in Figure.1 in place and functioning. Being the worst case situation.

Notes:

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ±5.0dB
3. The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in three positions, the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. A Quasi-peak detector was used with a resolution bandwidth of 120 kHz.

Used test equipment and ancillaries:

99580	99070	99071	99107	99608	99609	99699	99547	15633

Test engineer

Signature :

Name : Richard van der Meer
Date : June 06, 2011

4 Conducted emission data.

4.1 Conducted emission data of the EUT

Freq. [MHz]	Level L1 QP [dBµV]	Level L1 AV [dBµV]	Level N(L2) QP [dBµV]	Level N(L2) AV [dBµV]	Limit QP [dBµV]	Limit AV [dBµV]	Margin QP [dB]	Margin AV [dB]
0.210	49.2	38.6	46.9	37.4	63.2	53.2	16.3	14.6
0.274	30.6	8.5	39.0	31.1	61.1	51.1	22.1	20.0
0.418	29.0	2.7	30.3	23.3	57.4	47.4	27.1	24.1
0.554	34.7	27.1	31.4	26.3	56.0	46.0	21.3	18.9
3.322	22.7	15.3	26.8	24.2	56.0	46.0	29.2	21.8
5.122	24.3	24.3	13.6	26.9	60.0	50.0	35.7	23.1
5.398	25.2	17.6	28.6	18.3	60.0	50.0	31.4	31.7
20.414	25.7	18.4	13.9	18.3	60.0	50.0	34.3	31.6

Table 2 Conducted emission measurements

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.107, at the 120 Volts AC mains connection terminals of AUX, are depicted in Table 2. Maximum values recorded.

Notes:

1. Measurement uncertainty is ±3.5dB
2. The resolution bandwidth used was 9 kHz.
3. Margin is given in the worst case situation (L compared to N).

Used test equipment and ancillaries:

99548	99161	12512	99699			

Test engineer

Signature : 

Name : R. van der Meer

Date : June 07, 2011

5 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12512	LISN	EMCO	3625/2	01/2010	01/2012
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2011	02/2012
99070	Coax 15m RG213 OATS	NMi Certin B.V.	KABEL 15M OATS	10/2010	10/2011
99071	Coax OATS ground	NMi Certin B.V.	KABEL GROND OATS	10/2010	10/2011
99107	Controller OATS	Heinrich Deisel	4630-100	NA	NA
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99547	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2010	10/2011
99580	OATS	Comtest	FCC listed: 90828	08/2008	08/2011
99608	Controller (OATS)	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99699	Measuring receiver	R&S	ESCI	02/2011	02/2012

NA= Not Applicable