



Dates of Tests : October 18~22, 2010

Test Report S/N: LR5001901010E

Test Site : LTA CO., LTD

CLASS II PERMISSIVE CHANGE TEST REPORT

FCC ID.

YI7HES10000R1W

APPLICANT

eZEX Corporation

Equipment Class	:	Digital Transmission System (DTS)
Manufacturing Description	:	Home Energy Gateway
Manufacturer	:	eZEX Corporation
Model name	:	HES1E000R0WW
Variant Model name	:	HES1N000R0WW
Test Device Serial No.:	:	Identical prototype
Rule Part(s)	:	FCC Part 15.247 Subpart C; ANSI C-63.4-2003
Frequency Range	:	2412MHz ~ 2462MHz (802.11b/g) 2405MHz ~ 2480MHz (SPI interface) 2405MHz ~ 2470MHz (UART interface)
Max. Output Power	:	Max 14.64dBm - Conducted (802.11b) Max 16.65dBm - Conducted (802.11g) Max 22.80dBm - Conducted (SPI interface) Max 21.41dBm - Conducted (UART interface)
Data of issue	:	October 22, 2010

This test report is issued under the authority of:



Kyung-Taek LEE, Technical Manager

The test was supervised by:



Hyun-Chae You, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.



NVLAP LAB Code.: 200723-0

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1. General information's

1-1 Test Performed

Company name : LTA Co., Ltd.
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 Web site : <http://www.ltalab.com>
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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2011-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2011-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2012-05-14	IC filing

2. Information's about test item

2-1 Applicant & Manufacturer

Company name : eZEX Corporation
 Address : Rm 508, Ssangyong IT Twin-tower 2, 442-5, Sangdaewon-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do, South Korea
 Tel / Fax : TEL No : +82-31 - 608 - 4700 FAX No : +82-31-608 - 4701

2-2 Equipment Under Test (EUT)

Trade name : Home Energy Gateway
 FCC ID : YI7HES10000R1W
 Model name : HES1E000R0WW
 Variant Model name : HES1N000R0WW
 Serial number : Identical prototype
 Date of receipt : October 15, 2010
 EUT condition : Pre-production, not damaged
 Antenna type : Chip antenna with Max. 2.0 dBi gain
 Frequency Range : 2412MHz ~ 2462MHz (802.11b/g)
 2405MHz ~ 2480MHz (SPI interface)
 2405MHz ~ 2470MHz (UART interface)
 RF output power : Max 14.64dBm - Conducted (802.11b)
 Max 16.65dBm - Conducted (802.11g)
 Max 22.80dBm - Conducted (SPI interface)
 Max 21.41dBm - Conducted (UART interface)
 Number of channels : 802.11b/g for 11 and SPI for 16 and UART for 14
 Type of Modulation : CCK, DQPSK, DBPSK for DSSS
 64QAM, 16QAM, QPSK, BPSK for OFDM
 O-QPSK for Zigbee
 Transfer Rate : 11/5.5/2/1Mbps for 802.11b
 54/48/36/24/18/12/9/6Mbps for 802.11g
 Power Source : 120VAC

2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz) for 802.11b/g	2412	2437	2462
Frequency (MHz) for Zigbee(SPI)	2405	2440	2480
Frequency (MHz) for Zigbee(UART)	2405	2440	2470

2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Notebook	SP28-M150	393B93AY200589R	Samsung

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	6 dB Bandwidth	> 500kHz	Conducted	N/A
15.247(b)	Transmitter Peak Output Power	< 1Watt		N/A
15.247(d)	Transmitter Power Spectral Density	< 8dBm @ 3kHz		N/A
15.247(d)	Band Edge & Spurious	> 20 dBc		N/A
15.209	Field Strength of Harmonics	Emission	Radiated	C
15.207	AC Conducted Emissions	Emissions	Conducted	C
15.203	Antenna requirement	-	-	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

Note 3: Class II permissive change

→ Antenna Requirement

The **eZEX Corporation** FCC ID: **YI7HES10000R1W** unit complies with the requirement of §15.203. The antenna is connected to inside of EUT. And type is **Chip antenna**.

The sample was tested according to the following specification:
FCC Parts 15.247; ANSI C-63.4-2003

3.2 Technical Characteristics Test

3.2.1 Field Strength of Harmonics

Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 100 kHz (30MHz ~ 1 GHz)

Peak:VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Average:VBW=10Hz

Span = 100 MHz

Detector function = Peak and Average

Trace = max hold

Sweep = auto

Measurement Data: Complies

- Refer to the next page.
- No other emissions were detected at a level greater than 10dB below limit.
- The three antennas were used with this EUT during the Testing.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

Radiated Emissions – PING +Wireless Mode

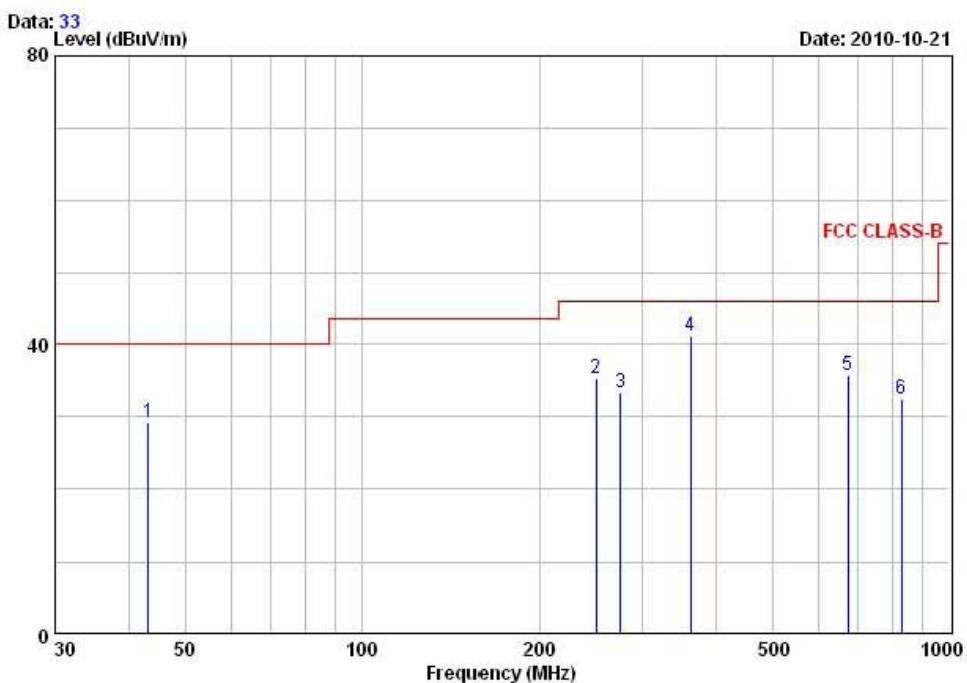
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Tel :+82-31-3236008,9
Fax :+82-31-3236010

EUT/Model No.: HES1E000ROWW

TEST MODE: Wireless+Ping mode

Temp Humi : 22 / 67

Tested by: KIM.K.I



Freq MHz	Reading dBuV/m	C.F dB/m	Result dBuV/m	Limit QP		Margin dB	Height cm	Angle deg	Polarity
				dBuV/m	dB				
1 43.27	43.40	-14.11	29.29	40.00	10.71	100	248	VERTICAL	
2 249.99	45.60	-10.27	35.33	46.00	10.67	173	227	HORIZONTAL	
3 275.00	42.80	-9.35	33.45	46.00	12.55	145	219	HORIZONTAL	
4 361.88	48.50	-7.35	41.15	46.00	4.85	124	293	HORIZONTAL	
5 671.75	37.30	-1.46	35.84	46.00	10.16	100	245	VERTICAL	
6 830.00	31.50	1.03	32.53	46.00	13.47	100	205	VERTICAL	

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

3.2.2 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

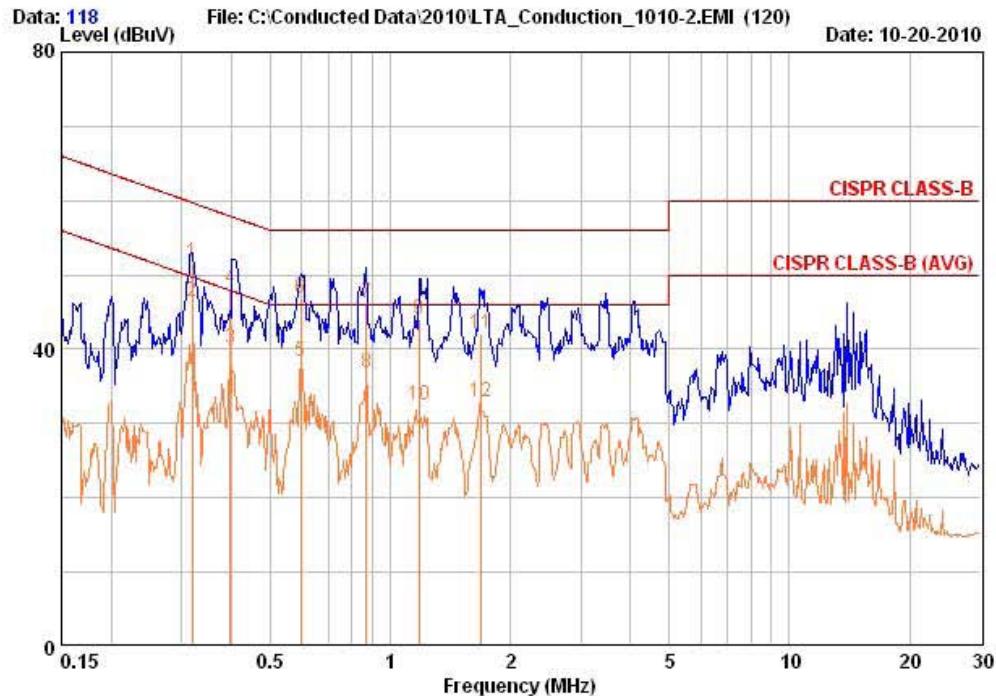
* Decreases with the logarithm of the frequency

AC Conducted Emissions – PING +Wireless – Line

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Tel :+82-31-3236008,9
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EUT / Model No. : HES1E000R0WW Phase : LINE

Test Mode : Wireless+Ping mode Test Power : 120 / 60
Temp./Humi. : 23 / 45 Test Engineer : KIM.K.I



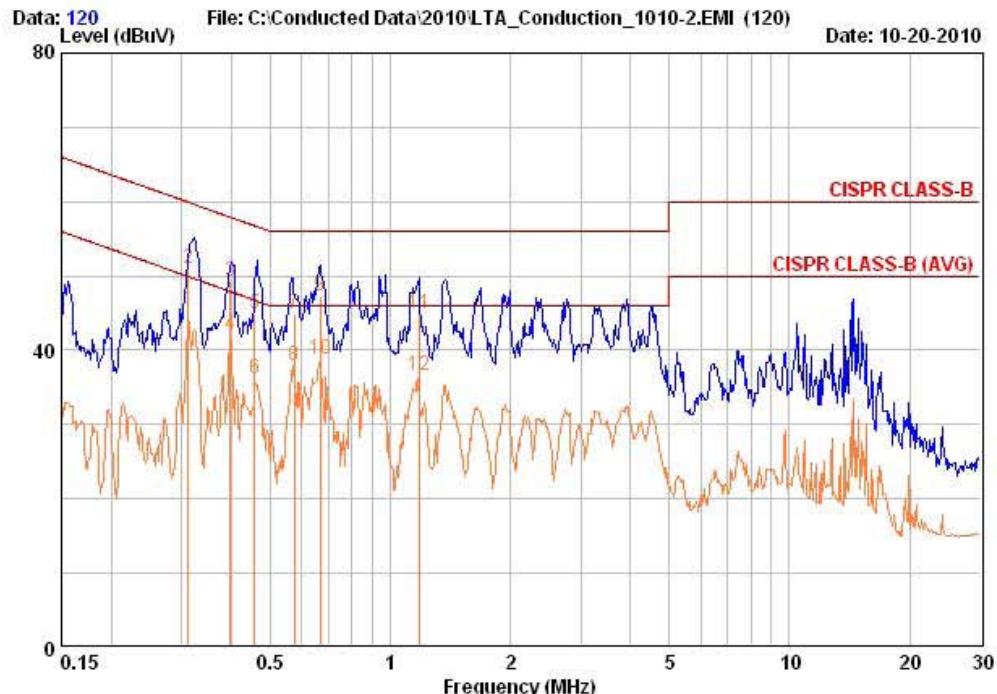
Freq MHz	RD QP dBuV		RD AV dBuV		C. F dB	Result QP dBuV	Result AV dBuV	Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB
	QP	AV	QP	AV							
0.319	42.06	36.86	9.65	51.71	46.51	59.73	49.73	8.02	3.22		
0.398	38.55	30.45	9.67	48.22	40.12	57.90	47.90	9.68	7.78		
0.597	37.06	28.56	9.72	46.78	38.28	56.00	46.00	9.22	7.72		
0.873	36.36	27.06	9.78	46.14	36.84	56.00	46.00	9.86	9.16		
1.180	34.17	22.67	9.79	43.97	32.47	56.00	46.00	12.03	13.53		
1.685	32.31	23.11	9.81	42.11	32.91	56.00	46.00	13.89	13.09		

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

AC Conducted Emissions – PING +Wireless – Neutral

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EUT / Model No. : HES1E000ROWW Phase : NEUTRAL
 Test Mode : Wireless+Ping mode Test Power : 120 / 60
 Temp./Humid. : 23 / 45 Test Engineer : KIM.K.I



Freq MHz	RD QP		RD AV		C. F dB	Result QP		Result AV		Limit QP		Limit AV		Margin dB	Margin dB
	dBuV	dBuV	dBuV	dBuV		dBuV	dBuV	dBuV	dBuV	dBuV	dBuV	dBuV	dBuV		
0.311	41.26	35.76	9.66	50.92	45.42	59.94	49.94	9.02	4.52						
0.397	39.65	32.35	9.66	49.31	42.01	57.92	47.92	8.61	5.91						
0.458	35.25	26.55	9.66	44.91	36.21	56.73	46.73	11.82	10.52						
0.575	35.15	28.25	9.71	44.86	37.96	56.00	46.00	11.14	8.04						
0.667	37.56	28.96	9.75	47.31	38.71	56.00	46.00	8.69	7.29						
1.179	35.17	26.87	9.79	44.96	36.66	56.00	46.00	11.04	9.34						

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	FSV-30	100757	R&S	Feb-11
2	Spectrum Analyzer	8563E	3425A02505	HP	Mar-11
3	Spectrum Analyzer	8594E	3710A04074	HP	Oct-11
4	Signal Generator	8648C	3623A02597	HP	Mar-11
5	Signal Generator	83711B	US34490456	HP	Mar-11
6	Attenuator (3dB)	8491A	37822	HP	Oct-11
7	Attenuator (10dB)	8491A	63196	HP	Oct-11
8	EMI Test Receiver	ESCI7	100722	R&S	Jun-11
9	Horn Antenna(18 ~ 40GHz)	SAS-574	154	Schwarzbeck	Nov-10
10	Horn Antenna(18 ~ 40GHz)	SAS-574	155	Schwarzbeck	Nov-10
11	RF Amplifier	8447D	2949A02670	HP	Oct-11
12	RF Amplifier	8449B	3008A02126	HP	Mar-11
13	Test Receiver	ESHS10	828404/009	R&S	Mar-11
14	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Apr-11
15	Log.-Per. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-11
16	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-11
17	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-11
18	Horn Antenna	BBHA 9120D	9120D122	SCHWARZBECK	Dec-10
19	Dipole Antenna	VHA9103	2116	SCHWARZBECK	Nov-10
20	Dipole Antenna	VHA9103	2117	SCHWARZBECK	Nov-10
21	Dipole Antenna	VHA9105	2261	SCHWARZBECK	Nov-10
22	Dipole Antenna	VHA9105	2262	SCHWARZBECK	Nov-10
23	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Mar-11
24	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-
25	RF Switch	MP59B	6200414971	ANRITSU	-
26	Power Divider	11636A	6243	HP	Oct-11
27	DC Power Supply	6622A	3448A03079	HP	Oct-11
28	Frequency Counter	5342A	2826A12411	HP	Mar-11
29	Power Meter	EPM-441A	GB32481702	HP	Mar-11
30	Power Sensor	8481A	US41030291	HP	Oct-11
31	Audio Analyzer	8903B	3729A18901	HP	Oct-11
32	Modulation Analyzer	8901B	3749A05878	HP	Oct-11
33	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	Oct-11
34	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-11
35	Stop Watch	HS-3	601Q09R	CASIO	Mar-11
36	LISN	ENV216	100408	R&S	Oct-11
37	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	May-12