

EMC

TEST REPORT

Report No.: TS09080097-EME**Model No.:** EchoLife HG556**Issued Date:** Jan. 05, 2010

Applicant: Huawei Technologies Co. Ltd.
Administration Building, Huawei Base, Bantian. Longgang
district, Shenzhen, China

**Test Method/
Standard:** 47 CFR FCC Part 15 Subpart B (2009),
FCC Procedure ANSI C63.4 (2003)
ICES-003

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1. General Information

1.1 General Description of EUT

Product:	Home Gateway
Model No.:	EchoLife HG556
Highest operating frequency:	> 1 GHz
Rated Power:	DC 12 V from adapter model: FM120015-US I/P Voltage: 100-240 Vac, 50-60Hz
Operating Frequency:	1. 2412 MHz ~ 2462 MHz for 802.11b/g/n HT20 2. 2422 MHz ~ 2452 MHz for 802.11n HT40
Channel Number:	1. 11 channels for 802.11b/g/n HT20 2. 7 channels for 802.11n HT40
Frequency of Each Channel:	1. 2412+5 k, k=0~10 for 802.11b/g/n HT20 2. 2422+5 k, k=0~6 for 802.11n HT40
Type of Modulation:	DSSS, OFDM
Power Cord:	N/A
Sample receiving date:	Aug. 25, 2009
Testing date:	Aug. 25, 2009 ~ Jan. 04, 2010

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Note 2: The test report only allows to be revised within three years from its original issued date unless further standard or the requirement was noticed.

Note 3: When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The EUT is a Home Gateway, and was defined as information technology equipment.

For more detail features, please refer to user's Manual.

1.3 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Description of Data Cable
Telephone	TENTEL	K-903S	0514000940	RJ-11 unshielded cable 1.5 meter × 1
Telephone	TENTEL	K-903S	0514000477	RJ-11 unshielded cable 1.5 meter × 1
Notebook PC	DELL	Latitude D610	FXWZK1S	RJ-45 UTP Cat.5 10 meter × 1
Notebook PC	DELL	Latitude D610	3YWZK1S	N/A
C.O. Router	ZyXEL	IES-1000	N/A	N/A
USB Dongle × 2	Transend	TS256MJ2B	N/A	N/A
Wire line simulator	SPIRENT	XPS/26-M24	XPS3863	RJ-11 unshielded cable 10 meter × 1
Dummy Load	N/A	N/A	N/A	RJ-45 UTP Cat.5 10 meter × 3

2. Test Summary

<i>Emission</i>			
Standard	Test Type	Result	Remarks
FCC Subpart B Section 15.107	Conducted Emission Test	PASS	Meet Class B Limit
FCC Subpart B Section 15.109	Radiated Emission Test	PASS	Meet Class B Limit

3. Test Specifications

3.1 Standards

The following standards were applied for testing:

FCC standard: 47 CFR Part 15, Subpart B. Clause 15.107 and 15.109. (The radiated emission was tested at 10m OATS, the limit level of CISPR 22 was applied.)

ICES-003: 2004 These results are deemed satisfactory evidence of compliance with Industry Canada Interference-Causing Equipment Standard ICES-003.

The EUT setup configuration please refer to the photo of test configuration in item.

3.2 Definition of Device Classification

Unintentional radiator:

A device which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:

A digital device which is marketed for use in commercial or business environment.

Class B Digital Device:

A digital device which is marketed for use by the general public or in a residential environment.

Note:

A manufacturer may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, regardless of its intended use.

3.3 EUT Operation Condition

The EUT was supplied with DC 12 V from adapter (Test voltage: 120Vac, 60Hz) and was tested in normal operating mode during all the tests.

4. Conducted Emission Measurements (FCC 15.107)

4.1 Operating environment

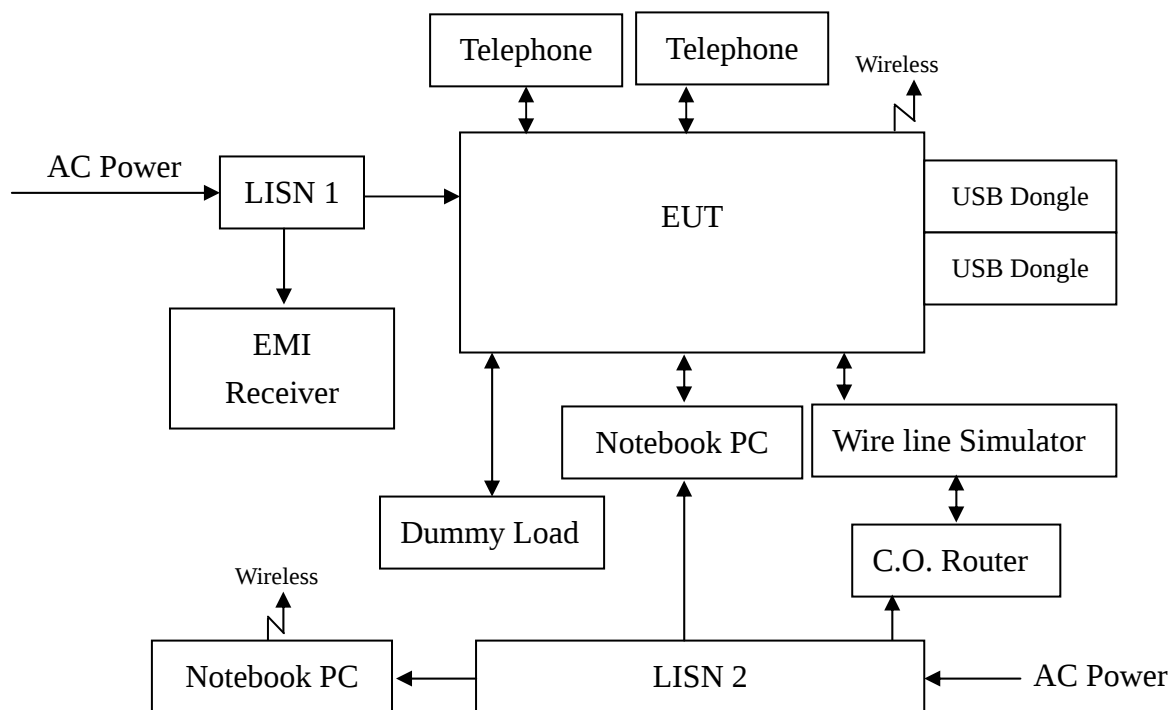
Temperature: 24 °C

Atmospheric Pressure: 1023 hPa

Relative Humidity: 53 %

Test Voltage: 120 Vac, 60 Hz

4.2 Test Setup and procedure



The EUT along with its peripherals were placed on a 1.0 meter(W)×1.5 meter(L) and 0.8 meter in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were moved to find the maximum emission

4.3 Test Equipment

Equipment	Brand	Model No.
EMI Receiver	Rohde & Schwarz	ESCS 30
LISN	Rohde & Schwarz	EHS3-Z5
LISN	Schaffner	MN2050D
Shield Room	N/A	N/A

Note: The above equipments are within the valid calibration period.

4.4 Conducted Emission Limits:

Freq. (MHz)	Maximum RF Line Voltage			
	Class A (dB μ V)		Class B (dB μ V)	
	Q.P.	Avg.	Q.P.	Avg.
0.15~0.50	79	66	66~56	56~46
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

4.5 Uncertainty of Conducted Emission

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.786 dB.

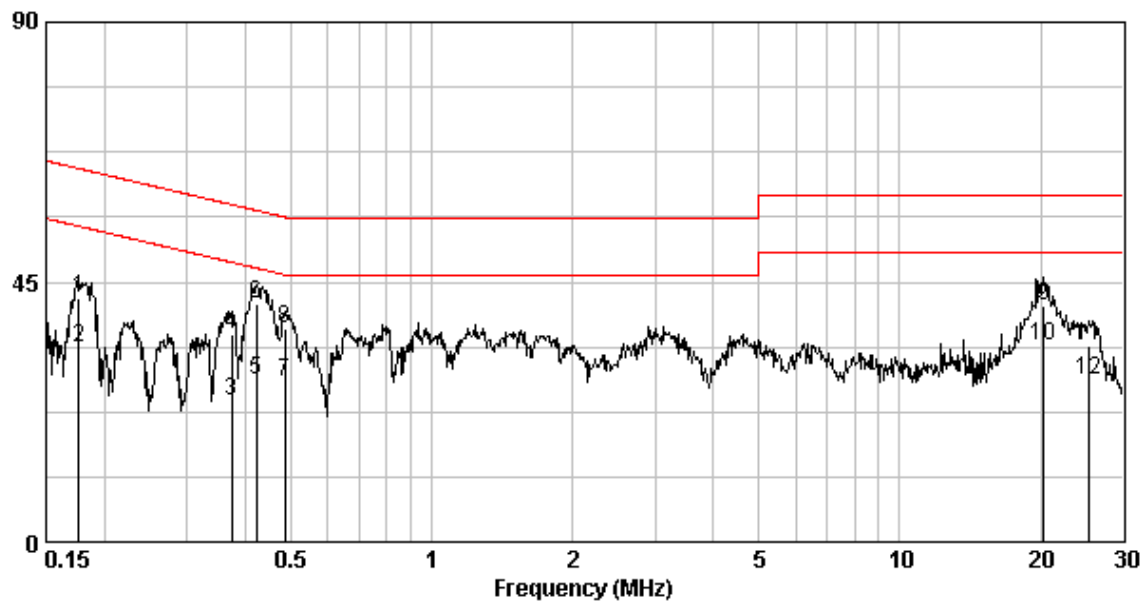
4.6 Conducted Emission Data

Phase: Line
Model No.: EchoLife HG556
Operating mode: Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.18	0.81	42.18	64.68	33.52	54.68	-22.50	-21.16
0.37	0.18	35.84	58.43	24.34	48.43	-22.59	-24.09
0.42	0.11	41.18	57.42	28.11	47.42	-16.24	-19.31
0.49	0.11	37.02	56.23	27.74	46.23	-19.21	-18.49
20.27	0.93	40.77	60.00	33.97	50.00	-19.23	-16.03
25.32	1.13	34.02	60.00	27.94	50.00	-25.98	-22.06

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

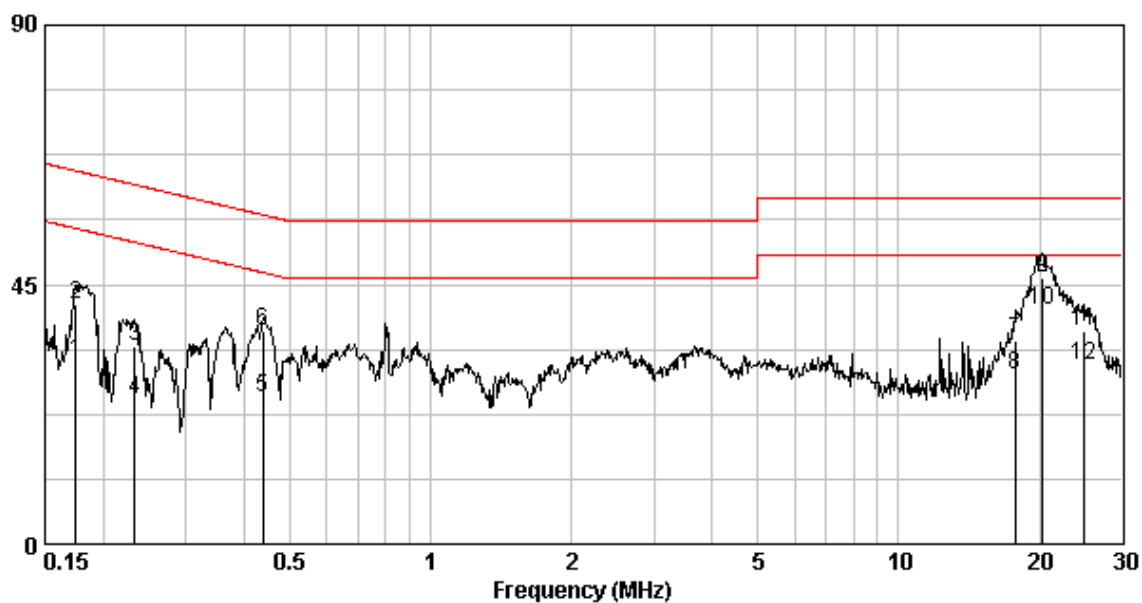


Phase: Neutral
Model No.: EchoLife HG556
Operating mode: Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.17	0.11	41.70	64.72	31.63	54.72	-23.03	-23.10
0.23	0.11	34.41	62.35	24.90	52.35	-27.94	-27.45
0.44	0.11	37.00	57.11	25.28	47.11	-20.11	-21.83
17.75	0.52	35.23	60.00	29.30	50.00	-24.77	-20.70
20.27	0.52	46.19	60.00	40.44	50.00	-13.81	-9.56
24.92	0.62	36.82	60.00	30.91	50.00	-23.18	-19.09

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



5. Radiated Emission Measurements (FCC 15.109)

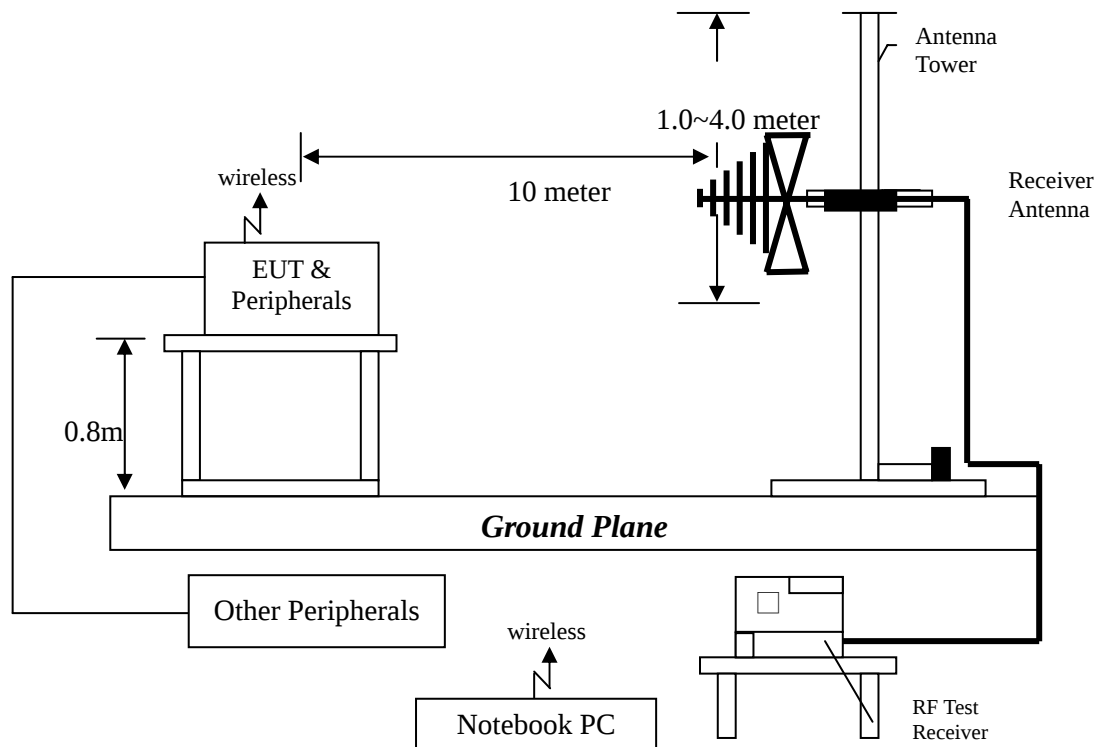
5.1 Operating Environment

Temperature: 25 °C
Relative Humidity: 53 %

Atmospheric Pressure: 1023 hPa
Test Voltage: 120 Vac, 60 Hz

5.2 Test Setup and Procedure

The figure below shows the test setup, which is utilized to make these measurements.



The equipment under test was placed on the top of rotation table 0.8 meter above ground plane.

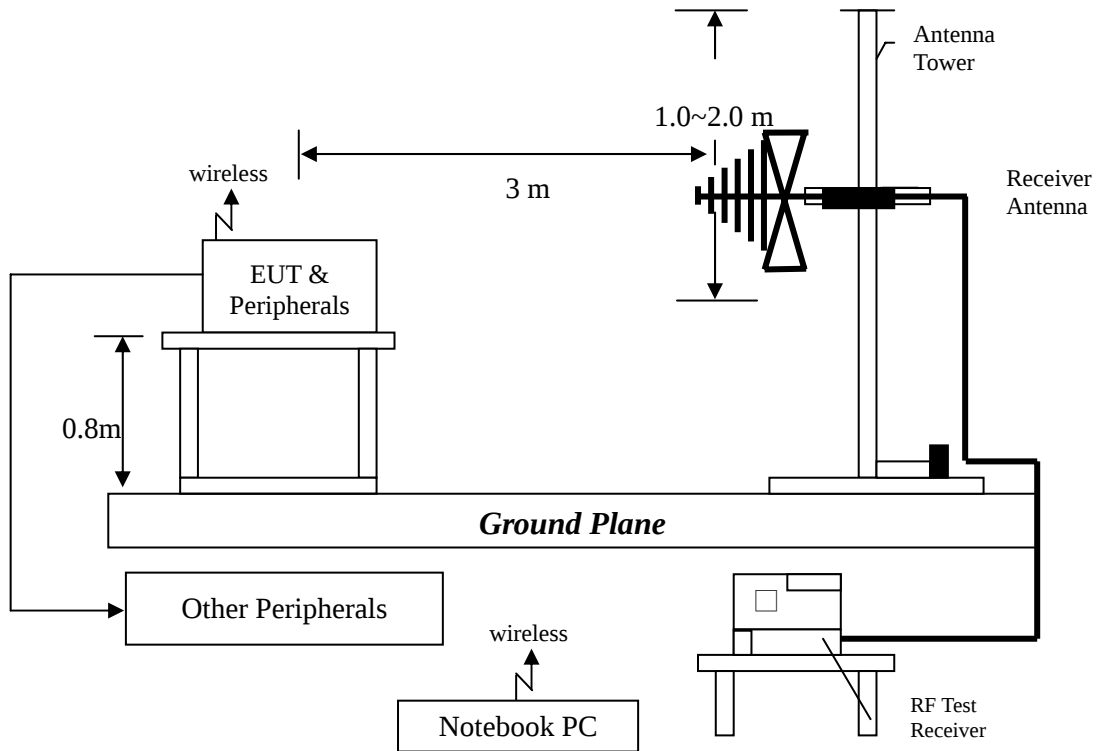
The table was 360 degrees to determine the position of the highest radiation.

EUT is set 10 meters from the EMI receiving antenna, which is mounted on a variable height mast. The antenna height is varied between one meter and four meters above ground to find the maximum value of the field strength. Both horizontal polarization and vertical polarization of the antenna are set to make the measurement. The bandwidth was setting on the EMI meter 120 kHz.

The levels are quasi peak value readings.

The figure below shows the test setup, which is utilized to make these measurements.

The frequency spectrum from 1 GHz to 2 GHz was investigated.



The equipment under test was placed on the top of rotation table 0.8 meter above ground plane.

The table was 360 degrees to determine the position of the highest radiation.

EUT is set 3 meters from the EMI receiving antenna, which is mounted on a variable height mast. The antenna height is varied between one meter and two meters above ground to find the maximum value of the field strength. Both horizontal polarization and vertical polarization of the antenna are set to make the measurement.

5.3 Test Equipment

Equipment	Brand	Model No.
EMI Receiver	Rohde & schwarz	ESCS30
Bilog Antenna	Schaffner	CBL6112B
EMI Test Receiver	Rohde & Schwarz	ESCI
Antenna (TRILOG Super Broadband)	Schwarzbeck	VULB 9160

Note: The above equipments are within the valid calibration period.

5.4 Radiated Emission Limits:

According to FCC 15.109(g), to perform digital device radiated emission using CISPR 22 limits and method, the field strength of radiated emission from unintentional radiators at a distance of 10 meters shall not exceed the following values:

Frequency (MHz)	Distance (meter)	Class A	Class B
30~230	10	40	30
230~1000	10	47	37

Note:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument Antenna and the closet point of EUT.

According to FCC 15.109, except for Class A digital device, the field strength of radiated emission from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Class B Radiated Emission Limits:

Frequency MHz	Field Strength dB μ V/m
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

5.5 Uncertainty of Radiated Emission

Opensite

Expanded uncertainty (k=2) of radiated emission measurement is ± 3.849 dB.

Chamber

Expanded uncertainty (k=2) of radiated emission measurement is ± 5.056 dB.

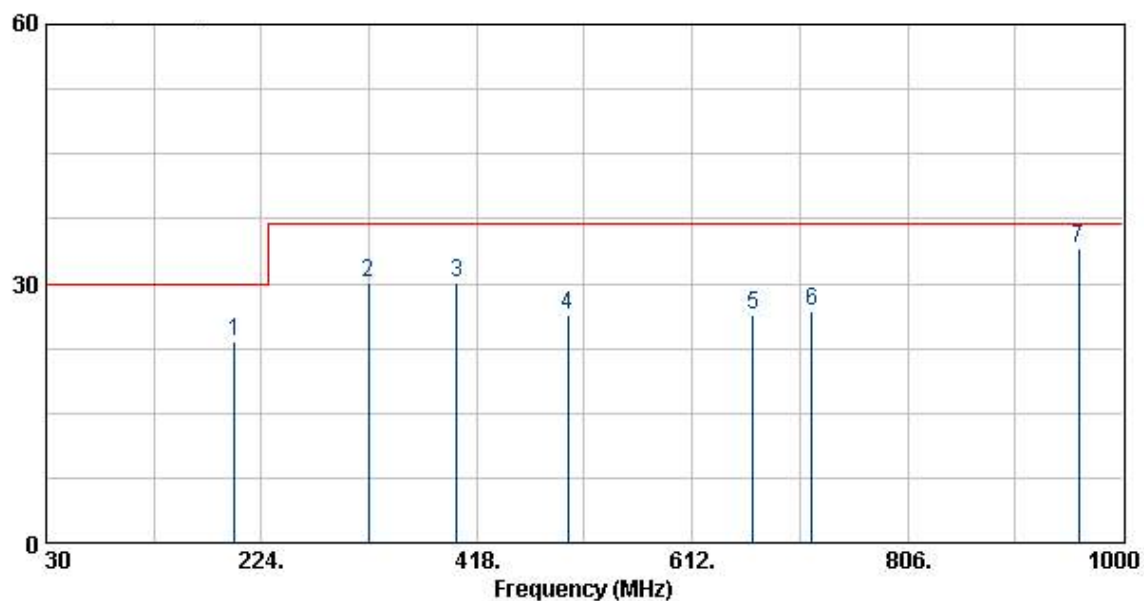
5.6 Radiated Emission Test Data

Polarity: Vertical
Model No.: EchoLife HG556
Operating mode: Normal operating mode
Frequency range: 30 MHz~1 GHz

Freq	Pol/Phase	Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB	dB μ V	dB μ V/m	dB μ V/m	dB	
200.00	VERTICAL	11.10	12.30	23.40	30.00	-6.60	QP
320.00	VERTICAL	16.21	13.80	30.01	37.00	-6.99	QP
399.99	VERTICAL	18.48	11.60	30.08	37.00	-6.92	QP
500.00	VERTICAL	20.78	5.60	26.38	37.00	-10.62	QP
666.66	VERTICAL	22.49	3.80	26.29	37.00	-10.71	QP
720.00	VERTICAL	22.93	3.80	26.73	37.00	-10.27	QP
960.00	VERTICAL	25.29	8.70	33.99	37.00	-3.01	QP

Remark:

1. Level (dB μ V/m) = Factor (dB/m) + Read Level (dB μ V)
2. Factor = Antenna Factor (dB/m) + Cable Loss (dB)
3. Over Limit (Margin) (dB) = Level (dB μ V/m) – Limit Line (dB μ V/m)

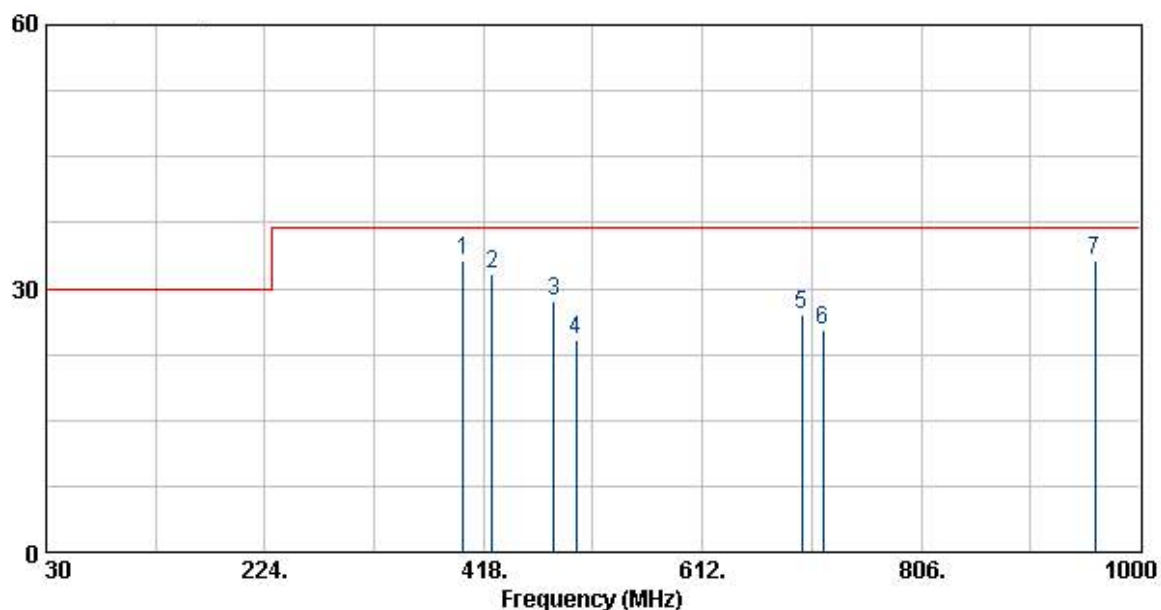


Polarity: Horizontal
Model No.: EchoLife HG556
Operating mode: Normal operating mode
Frequency range: 30 MHz~1 GHz

Freq	Pol/Phase	Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB	dB μ V	dB μ V/m	dB μ V/m	dB	
399.99	HORIZONTAL	18.48	14.80	33.28	37.00	-3.72	QP
425.97	HORIZONTAL	19.18	12.50	31.68	37.00	-5.32	QP
480.00	HORIZONTAL	20.41	8.20	28.61	37.00	-8.39	QP
500.00	HORIZONTAL	20.78	3.30	24.08	37.00	-12.92	QP
700.00	HORIZONTAL	22.53	4.50	27.03	37.00	-9.97	QP
719.25	HORIZONTAL	22.93	2.30	25.23	37.00	-11.77	QP
960.00	HORIZONTAL	25.29	7.80	33.09	37.00	-3.91	QP

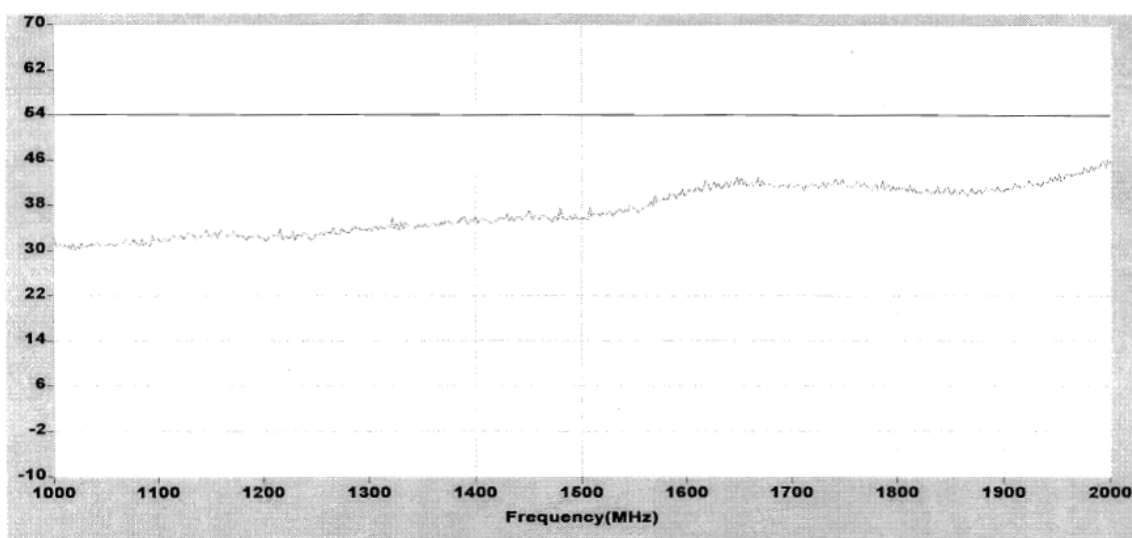
Remark:

1. Level (dB μ V/m) = Factor (dB/m) + Read Level (dB μ V)
2. Factor = Antenna Factor (dB/m) + Cable Loss (dB)
3. Over Limit (Margin) (dB) = Level (dB μ V/m) – Limit Line (dB μ V/m)



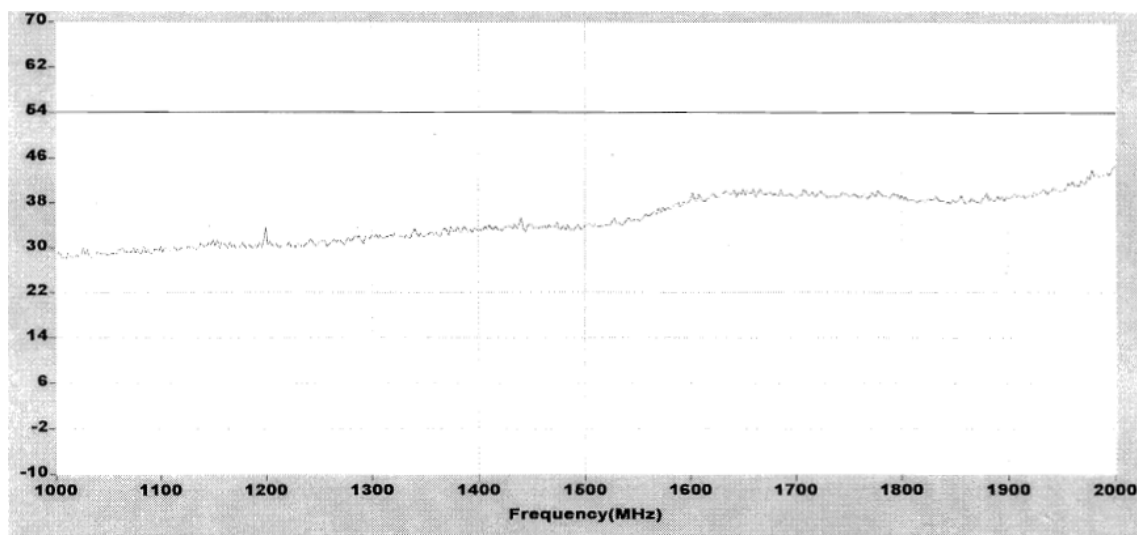
Polarity:	Vertical
Model No.:	EchoLife HG556
Test Condition:	Normal operating mode
Frequency range:	1 GHz~2 GHz (Peak)

The Radiated Emission was very low against the limit in the frequency range 1 GHz ~ 2 GHz.



Polarity:	Horizontal
Model No.:	EchoLife HG556
Test Condition:	Normal operating mode
Frequency range:	1 GHz~2 GHz (Peak)

The Radiated Emission was very low against the limit in the frequency range 1 GHz ~ 2 GHz.



Appendix A1: External photo of EUT



RJ-11 Cable



RJ-45 Cable

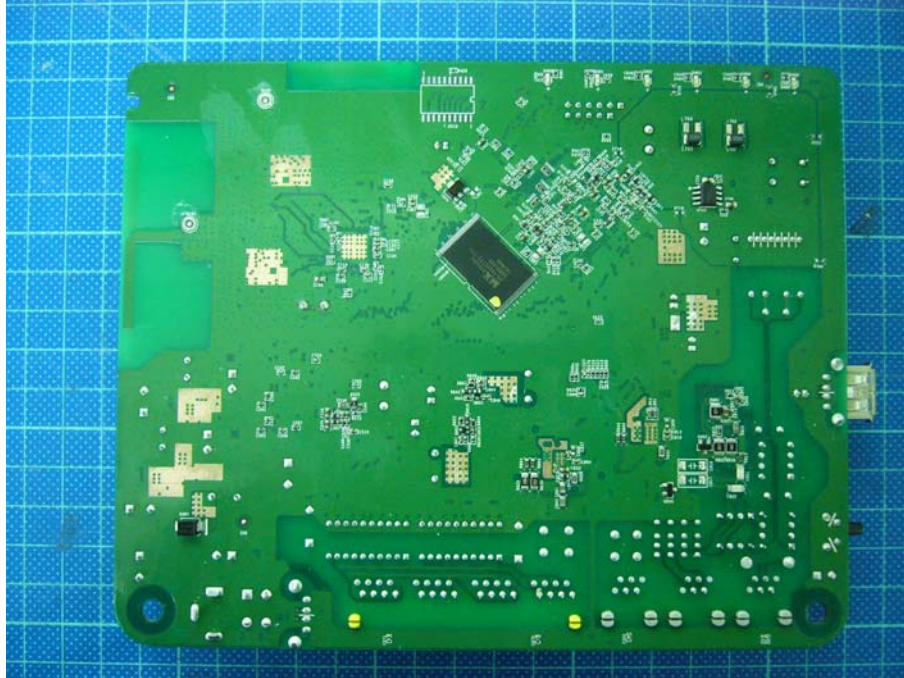


Appendix A2: External photo of adapter



Appendix A3: Internal photo of EUT





Appendix B1: Conducted Emission Test Set-up



Appendix B2: Radiated Emission Test Set-up



