

## CERTIFICATE OF COMPLIANCE

(CLASS B)

CERTIFICATION OF COMPLIANCE is hereby issued to the named Applicant and is VALID ONLY for the equipment identified below:

Date of Tested : Oct. 29. 2003

Applicant's Name : **JOOHONG Information & Communications Ltd.**

Applicant's Address : 14F, IT Venture Tower East Wing 78 Karak-Dong, Songpa-Gu, Seoul,  
Korea (138-016)

Manufacturer's Name : **JOOHONG Information & Communications Ltd.**

Manufacturer's Address : 14F, IT Venture Tower East Wing 78 Karak-Dong, Songpa-Gu, Seoul,  
Korea (138-016)

Declares that the product

Product Description : Cable Modem

Brand Name : JOOHONG

Model Number : SL-2810

FCC ID : QG7-SL2810-001-03

Conforms to FCC Rules and Regulations Part 15 Subpart B requirements.

This product herewith complies with the requirements of the FCC Rules and Regulations as listed below:

Part 15.107: Conducted Emissions.

Part 15.109: Radiated Spurious Emissions.

TESTED and CERTIFIED by:

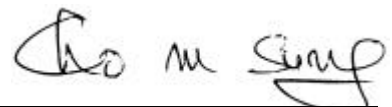
### KOREA EMC LABORATORY

352 Youngduk-Ri, Kihung-Eup,  
Yongin-Si, Kyunggi-Do,  
449-908, KOREA

Date : Oct. 30. 2003

Report No : KEL02-F10027

Authorized Signature :



M. S. CHO / President

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## 0 . VERIFICATION OF COMPLIANCE

Equipment Under Test : Cable Modem

Model Number : SL-2810

Serial Number : Prototype

Manufacturer : JOOHONG Information & Communications Ltd.  
14F, IT Venture Tower East Wing, 78 Karak-Dong, Songpa-Gu, Seoul, Korea (138-016)

Type of Test : FCC CLASS B

Report Number : KEL02-F10027

Date Tested : Oct. 29. 2003

Tested By : S. J. LEE

The results show that the sample equipment tested as described in this reports is in compliance with the CLASS B conducted and radiated emission limits of FCC Rules Part 15, Subpart B.

## 1. GENERAL INFORMATION

### 1.1 PRODUCT DESCRIPTION

The SL-2810 is a Cable Modem made by JOOHONG Information & Communications Ltd. in Korea. Refer to the user's manual for more information.

ITEM	SPECIFICATION	
	DOWNSTREAM	UPSTREAM
Frequency Range	88 MHz to 860 MHz (edge-to-edge) in 62.5 kHz steps	5 to 42 MHz (edge-to-edge) in 1 Hz steps
Data Rate	30.34 Mbps (64QAM) 42.88 Mbps(256QAM)	160,320,640,1280,2560 ksym/sec
Modulation	64QAM / 256QAM	QPSK / 16QAM
Power	DC 9 V/1.2 A	
Dimension	150(W) X 150(D) X 34(H) mm	

### 1.2 Related Submittal(s)/Grant(s)

N/A

### 1.3 Tested System Details

Type	Model Name	FCC ID	Serial NO	Manufacturer
Cable Modem	SL-2810	QG7-SL2810-001-03	Prototype	JOOHONG Information & Communications Ltd. Seung Jin Electronics Co., Ltd.
Adapter	SJ-09120U	Verification	NONE	SAMBO
Desk Book	TGIC-NP2400PA	DoC	NP2400PA3070014	Delta Electronics Inc.
Adapter	ADP-150BB B	Verification	VBT0317010252	HP
Printer	2225C	DSI6XU2225	3119S96116	HANSUNG
Adapter	0912-TY	Verification	NONE	SAMBO
Speaker	TGX-100	-	NONE	HANIL
MIC	RM-1000	-	NONE	HP
USB Mouse	U813LO	DoC	K020803612	HANIL
Serial Mouse	MT-900	DoC	NONE	KYE Systems Corp.
Mouse	NetScroll+	DoC	CE0503602405	

#### 1.3.1 Operated System

Type	Model Name	FCC ID	Serial NO	Manufacturer
CMTS	Cisco uBR7223	-	3872B884	Cisco System, Inc.
Converter	DUAL4040	-	NONE	WareCom Electronics Inc.
ATT I	ATT-10dB	-	NONE	TAEWHA TELECOM
ATT IV	ATT-10dB	-	NONE	TAEWHA TELECOM
ATT II	VSSA-42	-	NONE	Viewsonics Inc.
ATT III	VSSA-42	-	NONE	Viewsonics Inc.
2-Way Distributor	SFK2	-	NONE	AJIN

\* CMTS which can operate Cable Modem was equipped out of testing room.

### 1.4 System Configuration

Type	Model Name	Serial NO	Manufacturer	Remark
MAIN B/D	SL2810C	NONE	JOOHONG Information & Communications Ltd.	Korea

## 1.5 General Set-up of the Test Shielded Room

The EUT was set up in accordance with the suggested configuration given in FCC measurement Procedure ANSI C63.4 2000. The measurement are performed in the shielded room which dimension is 3.0\*7.0\*2.5(m). The EUT was placed on a non conductive table which is 1.0\*1.5(m), 80 cm above an earthed ground plane and is kept at least 1m from any other earthed ground plane except the rear of table top being removed 40 cm from a vertical conducting plane.

Power to the EUT was provided through the LISN(NSLK8128, SCHWARZBECK) which has the Impedance vs Frequency Characteristic in accordance with the conducted setup photographs in Appendix-A Impedance Characteristic of LISN. Peripheral equipment required to provide a functional system(support equipment) for EUT testing was powered through another LISN(KNW-407, KYORITSU).

Power to the LISN was filtered to eliminate ambient signal interference. A coaxial type connector which provides a 50 Ohm terminating impedance was provided for the test instrument. The excess length of the power cord was wrapped in the two non metallic pegs attached to the top of the LISN. The two pegs are 9 cm high, approximately 2.0 cm in diameter and that are spaced 6 cm on the center apart.

## 1.6 Test Facility

Location: Korea EMC Laboratory  
352 Yungduck-Ri  
Kihung-Eup, Yongin-City  
Kyungki-Do, Korea

Site : - 3/10 m Open Fielded Radiated  
- Indoor Line Conducted Room(Shielded)

The Open Field Radiated and Indoor Line Conducted sites are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 2000. Korea EMC Lab. was refilled in FCC in Feb. 2001.

### INSTRUMENTATION

Description	Model	Manufacturer	Serial No	Due Cal.
TESTRECEIVER	ESVS10	Rohde & Schwarz	825120006	2004.10.11
TESTRECEIVER	ESCS30	Rohde & Schwarz	100054	2003.10.11
TESTRECEIVER	ESH-2	Rohde & Schwarz	893268004	2004.06.13
TESTRECEIVER	ESPC	Rohde & Schwarz	844006038	-
SPECTRUM ANALYZER	8566B	Hewlett-Packard	2421A00473	2004.03.19
BICONICAL	VHA9103	SCHWARZBECK	1271	2004.06.13
LOGPERIODIC	3146	EMCO	9012-2960	2004.06.13
BHLOG	VULB9160	SCHWARZBECK	3049	2003.10.04
LISN(for E.U.T)	NSLK 8128	SCHWARZBECK	8128144	2003.11.07
AMPLIFIER	8447D	Hewlett-Packard	2944A06481	2003.12.04
LISN(for Peripheral)	KNW-407	KYORITSU	8-8833-14	2003.12.05
PLOTTER	7550A	Hewlett-Packard	2407A00471	-

The calibration of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors are applied in accordance with instruments contained in the manual for the measuring instrument.

## 2. MEASUREMENT PROCEDURES

### 2.1 System Test Configuration

#### 2.1.1 Video mode Justification

N/A

#### 2.1.2 EUT Exercise Software

Call Cable Modem's IP Address and CMTS's IP Address in Desk Book after composes net by Cable Modem between Desk Book with CMTS and measures doing Display.

### 2.2 Special Accessories

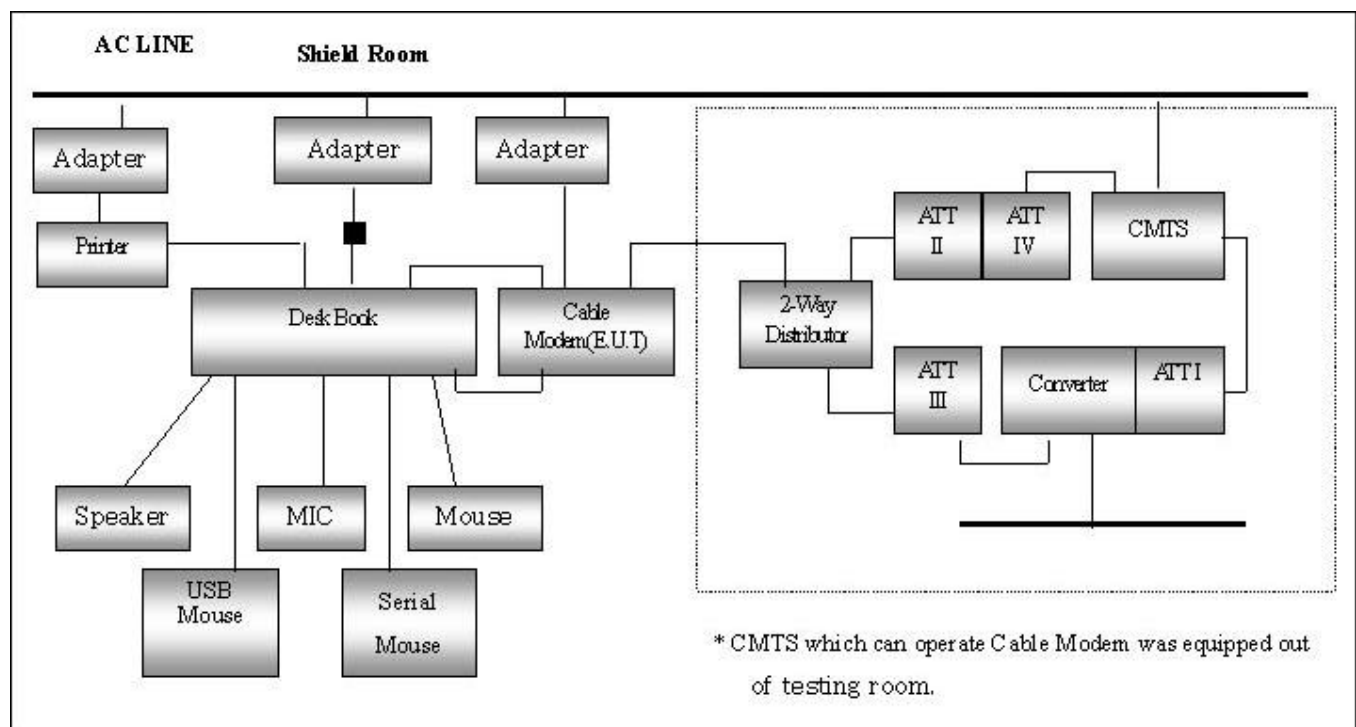
### 2.3 Equipment Modifications

No equipment modifications were performed during testing.

### 2.4 Connected cable

Beginning device		Last device		Standard of cable	
Type	I/O Port	Type	I/O Port	length (m)	shielding
Cable Modem	RJ-45	Desk Book	RJ-45	1.2	
"	F connector	2-Way Distributor	F connector	10.0	Shielded
"	USB	Desk Book	USB	1.2	Shielded
"	Power	Adapter		1.8	
Desk Book	Power	Adapter		1.5	Shielded(Core)
"	Parallel	Printer		1.5	Shielded
"	Speaker	Speaker		1.0	
"	MIC	MIC		1.0	
"	USB	USB Mouse		1.5	Shielded
"	Serial	Serial Mouse		1.5	Shielded
"	Mouse	Mouse		1.5	Shielded
Printer	Power	Adapter		1.5	
2-Way Distributor	F connector	ATT II	F connector	0.1	Shielded
"	F connector	ATT III	F connector	0.1	Shielded
ATT II	F connector	ATT IV	F connector	-	
CMTS	F connector(US3)	ATT IV	F connector	1.0	Shielded
"	F connector(DS)	ATT I	F connector	1.0	Shielded
Converter	F connector input	ATT I	F connector	-	
"	F connector out	ATT III	F connector	1.0	Shielded

### 2.5 System Configuration Diagram



## 2.6 PRELIMINARY TESTING

It is often valuable to performing preliminary radiated measurements at a closer distance than specified for compliance to determine the emission characteristics of the EUT. At close-in distance, it is easier to determine the spectrum signature of EUT, and if applicable, the EUT configuration that emanate the maximum level of emissions. The data may not be precisely correlatable results.

## 2.7 SHIELDED ENCLOSURE

To search the Radiated frequency outline of an EUT a shielded screen room may be used. If the shielded room is used for radiated data, the data page will state that the EUT was in a shielded enclosure. All data collected in a screen room for radiated emissions is for frequency outline only. If an EUT is placed in screen room for Line Conducted Data, the data page will show that a screen room was used and data frequencies and levels will be correct and used for test data.

## 2.8 DATA REPORTING FORMAT

The measurement results expressed in accordance with C63.4 and specified limits where applicable are presented in tabular or graphical form, or alternatively as recorder charts or photographs of a spectrum analyzer display, showing the level vs. frequency.

## 2.9 OPERATING CONDITIONS

The EUT was operated at the specified load conditions(mechanical and/or electrical)for which it was designed.

## 2.10 CONDITIONING OF THE EUT

The EUT was operated for a sufficient period of time to approximate normal operating conditions.

## 2.11 Power line Conducted Emissions

The EUT is set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4 2000. The measurements are performed in a 3m x 6m x 2.5m shielded room. A wooden table which height is 80 cm is located at the center of the shielded room; desktop EUTs are placed on top of this table. The rear of the EUT and table are placed 40 cm apart from the shielded room wall. All items on the table (or test-table) were placed at least 10 cm apart each other. Excess EUT power cord is folded back and forth to form a 30 cm by 40 cm bundle. Interconnecting cables which hang closer than 40 cm to the ground plane are folded back and forth to form a 30 cm by 40 cm long bundle, hanging approximately in the middle between the ground plane and table. The EUT power cord was plugged into a LISN 80 cm away, while all other devices were plugged into a second LISN, also 80 cm away.

The highest emissions were also analyzed in detail by operating the spectrum analyzer in fixed tuned mode to determine the precise amplitude of the emissions. On the other hand, the interconnecting cables were moved around the table to maximize the emissions, and the position of the peripheral devices were interchanged to check whether there is any changes in emissions.

NOTE : The resolution bandwidth and video bandwidth of test receiver is 10 kHz for Quasi-peak detection (QP) at frequency below 30 MHz. Q.P value A.V limit when do over by A.V mode conversion after measure .

## 2.12 Open field Radiated Emissions Tests

The EUT and support equipment are set up on the turntable in an open field site. Desktop EUTs are set up on a wooden stand (test-table), 80 cm above the ground plane. All items on the table were placed at least 10 cm apart each other. Interconnecting cables which hang closer than 40 cm to the ground plane are folded back and forth to form a 30 cm by 40 cm long bundle, hanging approximately between the ground plane and table. The highest emissions were also analyzed, in detail, with the tuned aerial to search the precise amplitude of the emissions. On the other hand, the interconnecting cables were moved around the table and if the highest amplitudes is observed, the EUT is rotated in the horizontal plane while changing the antenna polarization to the vertical plane to maximize the field strength. Once the maximum field strength is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings. The position of the peripheral devices are interchanged to check for any changes in emissions. In rare instances, the maximum field strength may occur with the antenna polarized between vertical and horizontal.

NOTE : The resolution bandwidth and video bandwidth of test receiver is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz



### 3. Measurement Data

#### 3.1 CONDUCTED EMISSION DATA

TEST : Cable Modem; SL-2810

DATE : Oct. 29. 2003

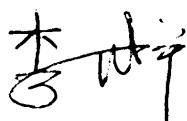
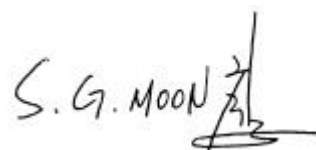
Freq. (MHz)	EUT State	Polarity (H/N)	Level (Q.P/A.V) dB(uV)	LIMIT (Q.P/A.V) dB(uV)	Margin for(Q.P/A.V) dB(uV)
0.151	Refer to Note	L1	44.8	66.0	21.2
0.171		L1	39.4	65.4	26.0
0.231		L2	34.9	63.7	28.8
0.261		L2	31.1	62.8	31.7
0.356		L2	32.8	60.1	27.3
0.534		L2	36.2	56.0	19.8
0.712		L1	36.5	56.0	19.5
1.248		L1	36.3	56.0	19.7
1.387		L1	43.6	56.0	12.4
1.431		L1	43.0	56.0	13.0
1.960		L1	32.8	56.0	23.2
2.139		L2	32.8	56.0	23.2
3.209		L1	33.3	56.0	22.7
5.169		L1	32.3	60.0	27.7
17.624		L1	30.4	60.0	29.6
18.366		L1	28.4	60.0	31.6
21.113		L1	24.6	60.0	35.4
25.126		L2	26.9	60.0	33.1

Notes: The test is implemented in a shielded room in accordance with ANSI C63.4

L1 : HOT LINE , L2 : NEUTRAL LINE

Test Engineer.

Reviewed by.

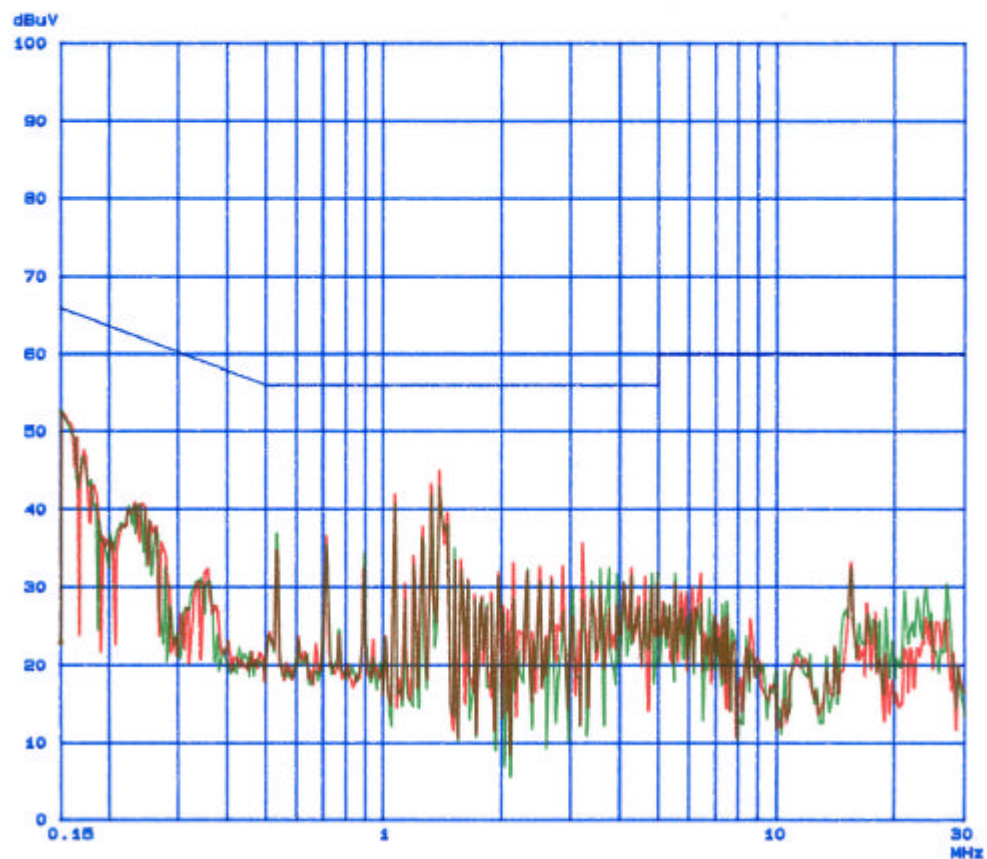



### 3.2 Conducted Emission Graph

#### KOREA EMC Laboratory Conducted Emission

Comment: L1 : RED L2: GREEN

Scan Settings (1 Range)			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten
150k	30M	0.2%	10k	PK	1ms	AUTO LN



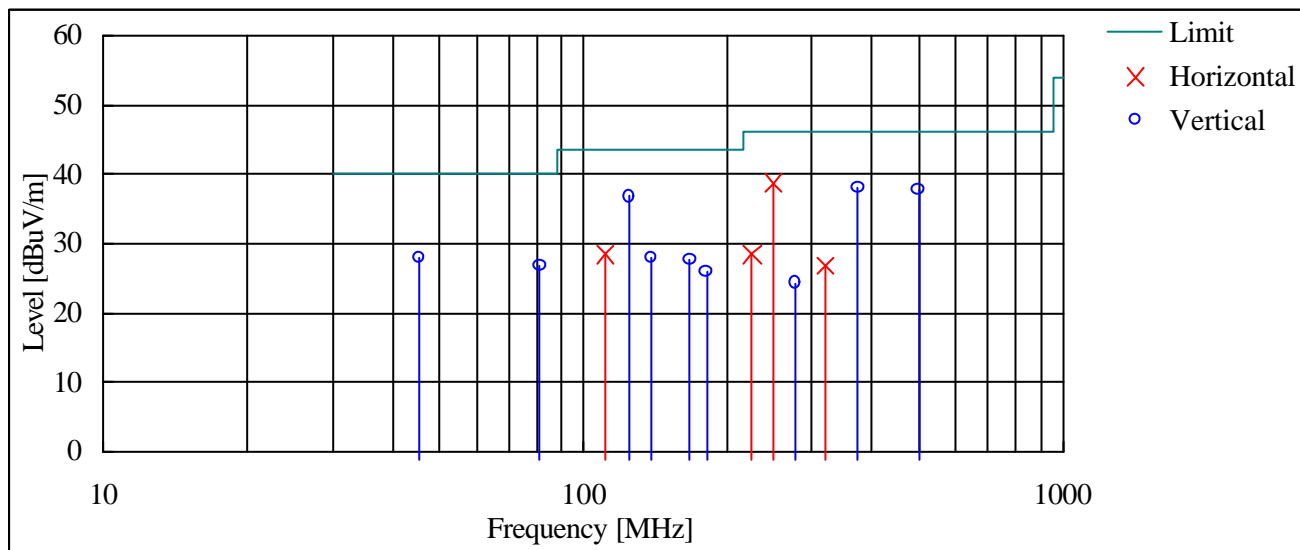
Red : HOT LINE, Green : Neutral LINE  
LINE EMISSION GRAPH

## 3.2 RADIATED EMISSION DATA

TEST : Cable Modem: SL-2810

DATE: Oct. 29. 2003

Freq. (MHz)	EUT State	Level (dBuV)	Preamp -Pads (dB)	Af (dB/m)	Cl (dB)	Hor. /Ver	ha(m) Azimuth	Total Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)
45.561	Refer to note	35.84	21.30	12.36	1.1	V	1.0/180	28.0	40.0	12.0
81.201		36.89	21.30	8.51	2.6	V	1.1/210	26.7	40.0	13.3
111.337		38.83	21.30	8.37	2.5	H	1.3/180	28.4	43.5	15.1
124.994		47.23	21.30	8.37	2.5	V	1.2/0	36.8	43.5	6.7
138.154		37.59	21.30	9.41	2.3	V	1.0/110	28.0	43.5	15.5
166.882		34.91	21.30	11.09	3.0	V	1.0/160	27.7	43.5	15.8
180.827		34.05	21.30	10.15	3.1	V	1.0/90	26.0	43.5	17.5
225.015		38.78	21.30	7.22	3.7	H	1.5/270	28.4	46.0	17.6
250.005		47.67	21.30	9.03	3.3	H	1.4/310	38.7	46.0	7.3
276.694		33.27	21.30	9.03	3.3	V	1.6/120	24.3	46.0	21.7
319.785		31.72	21.30	11.58	4.8	H	1.0/340	26.8	46.0	19.2
374.999		42.92	21.30	11.58	4.8	V	1.2/180	38.0	46.0	8.0
500.008		37.89	21.30	15.31	5.9	V	1.0/210	37.8	46.0	8.2



Notes: The test is performed in a distance of 3m. Af : Antenna factor, Cl : Cable loss

The test is performed in accordance with ANSI C63.4

Test Engineer.

Reviewed by.

*[Handwritten signature]*

*S. G. MOON*

### 3.3 SUMMARY

Company	: JOOHONG Information & Communications Ltd.	
Equipment Under Test	: Cable Modem	
Model Number	: SL-2810	Serial Number: Prototype
Type of Test	: FCC CLASS B	Passed/Failed: PASSED

The Equipment Under Test(EUT) was configured and operated in a manner which tends to maximize its emission characteristics in a typical application. Power and signal distribution, ground, interconnecting cabling, and physical placement of equipment were simulating the typical application and usage in so far as practicable.

LINE CONDUCTED TEST: An unshielded power cord was used to connect the EUT to a LISN Box which supplied 120 VAC/60 Hz power. The EUT was tested according to C63.4 test specifications. Line conductance scanned from 150 kHz to 30 MHz range on both Line 1(hot side) and Line 2(neutral side). ***The highest emission was observed at 1.387 MHz on Line 1 with a margin of 12.4 dB(uV) from the limit.*** All line conductance emissions were within the FCC CLASS B requirements for compliance.

RADIATED TEST: The EUT was placed on a three meter open field test site according to C63.4 test specifications. Preliminary scans ranged from 30 MHz to 1 GHz in both vertical and horizontal polarizations in all possible modes of operation. The highest six point of emission levels were recorded as data each ranges of limit.

***The highest emission was observed at 124.994 MHz(Vertical) with margin of 6.7 dB from the limit.*** All radiated emissions were within the FCC CLASS B requirements for compliance.

## 4. LABELING REQUIREMENT

Section 15.19 of the Code of Federal Regulation

- 1) A CLASS B computing device subject to certification by the Commission shall be identified pursuant to par. 2.925 et Seq of this chapter. In addition, the label shall include the following statement:

This device complies with Part 15 of the FCC Rules.  
Operation is subject to the following two conditions:  
(1) This Device may not cause harmful interference, and  
(2) This device must accept any interference received,  
including interference that may cause undesired  
operation.

Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified in this Section is required to be affixed only to the main control unit.

The users manual or instruction manual for the EUT shall contain the following statement or equivalent.

Caution: Changes or Modifications not expressly approved by the party responsible for compliance could void the users authority to operate the equipment.

If the EUT requires accessories such as special shielded cables and/or connectors to enable compliance with emission limits, the instruction manual for the EUT shall include appropriate instructions on the first page of the text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

For a CLASS B digital device or peripheral, the instructions furnished the user shall include the following or similar statement placed in a prominent location in the text of the manual.

Note: This equipment has been tested and found to comply with the limits for a CLASS B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.