

TCB**GRANT OF EQUIPMENT
AUTHORIZATION****TCB****Certification****Issued Under the Authority of the
Federal Communications Commission****By:**

**Timco Engineering, Inc.
849 NW State Road 45
P.O. Box 370,
Newberry, FL 32669
United States**

Date of Grant: 06/06/2003**Application Dated: 06/06/2003**

**ASUSTeK Computer Inc
4 Fl, No 150 Li-Te Road
Peitou, Taipei
Taiwan**

Attention: Jackson Yen ,

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: MSQWL500B

Name of Grantee: ASUSTeK Computer Inc

Equipment Class: Digital Transmission System

Notes: Wireless Router

<u>Grant Notes</u>	<u>FCC Rule Parts</u>	<u>Frequency Range (MHZ)</u>	<u>Output Watts</u>	<u>Frequency Tolerance</u>	<u>Emission Designator</u>
28 CE	15C	2412.0 - 2462.0	0.0463		

Power listed is conducted. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

28: An AC adapter incorporating a ferrite core at the connector end of its DC line must be provided with every unit sold.

CE: This device has shown compliance with the conducted emissions limits in 15.107, 15.207, or 18.307 adopted under FCC 02-157 (ET Docket 98-80). The device may be marketed after July 11, 2005, and is not affected by the 15.37(j) or 18.123 transition provisions.

Item 11. *Application is for: Original Equipment Change in identification of presently authorized equipment:

Original FCC ID

Grant Date (MM/DD/YYYY)

 Class II permissive change or modification of presently authorized equipment Class III permissive change to software defined radio*Note: this may only be filed for applications pertaining to Software Defined Radio***Item 12. Is the equipment in this application:*** **(a)** a composite device subject to an additional equipment authorization? Yes No* **(b)** part of a system that operates with, or is marketed with, another device that requires an equipment authorization? Yes No*If either of the above questions is answered "Yes" complete section 12 (c).***(c) The related application:** has been granted under the FCC ID listed to the right is in the process of being filed under the FCC ID listed to the right is pending with the FCC under the FCC ID listed to the right**Item 13. * Equipment will be operated under FCC Rule Part(s):**

15C

Item 14. EQUIPMENT SPECIFICATIONS: *Where applicable*

Low Freq	High Freq	Frequency range in MHz IN WATTS	Rated RF power output	Frequency tolerance %, Hz, ppm	Emission Designator (See 47 CFR 2.201 and 2.202)	Microprocessor model number
2412	2462	.0463				

Read each certification carefully before answering and signing this application

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312 (a) (1)), AND/OR FORFEITURE (U.S. TITLE 47, SECTION 503).

(Continued on Next Page)

Item 15. APPLICANT/AGENT CERTIFICATION:

I certify that I am authorized to sign this application. All of the statements herein and the exhibits attached hereto are true and correct to the best of my knowledge and belief. In accepting a Grant of Equipment Authorization issued by the TCB, under the authority of the FCC, as a result of the representations made in this application, the applicant is responsible for (1) labeling the equipment with the exact FCC ID specified in this application, (2) compliance statement labeling pursuant to the applicable rules, and (3) compliance of the equipment with the applicable technical rules. If the applicant is not the actual manufacturer of the equipment, appropriate arrangements have been made with the manufacturer to ensure that production units of this equipment will continue to comply with the FCC's technical requirements.

Authorizing an agent to sign this application is done solely at the applicant's discretion; however, the applicant remains responsible for all statements in this application.

If an agent has signed this application on behalf of the applicant, a written letter of authorization which includes information to enable the agent to respond to the above Section 5301 (Anti-Drug Abuse) Certification statement has been provided by the applicant. It is understood that the letter of authorization must be submitted to the FCC upon request, and that the FCC reserves the right to contact the applicant directly at any time.

***Signature of Authorized Applicant:** Lawrence Yu

Title of Authorized Signature: R&D Engineer

NOTE: An asterisk “*” preceding a field indicates it must be completed.

List of Exhibit

EXHIBIT A	<i>Cover Letter</i>
EXHIBIT B	<i>Sample Label</i>
EXHIBIT C	<i>Test Report</i>
EXHIBIT D	<i>Test Setup Photos</i>
EXHIBIT E	<i>User Manual</i>
EXHIBIT F	<i>Schematics</i>
EXHIBIT G	<i>Part List</i>
EXHIBIT H	<i>Block Diagram</i>
EXHIBIT I	<i>Operational Description</i>
EXHIBIT J	<i>Photographs of EUT</i>
EXHIBIT K	<i>RF Exposure Calculations</i>



Training Research Co., Ltd.

1F, No. 255, Nan Yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

TEL: 886-2-26935155 FAX: 886-2-26934440

E-mail: report@trclab.com.tw

EXHIBIT A

Cover Letter

Request for Confidentiality

Federal Communications Commission
Authorization and Evaluation Division

Sub.: Confidentiality Request regarding application for certification of FCC ID: MSQWL500B

Pursuant to Sections 0.457 and 0.459 of the Commission's Rules, we hereby request confidential treatment of information accompanying this application as outlined below:

- Schematics
- Part List
- Block diagram
- Operational description

The above materials contain trade secrets and proprietary information not customarily released to the public. The public disclosure of these materials may be harmful to the applicant and provide unjustified benefits to its competitors.

The applicant understands that pursuant to Section 0.457 of the Rules, disclosure of this application and all accompanying documentation will not be made before the date of the Grant for this application.

Sincerely,



Lawrence Yu, R&D Engineer
ASUSTeK COMPUTER INC.



Training Research Co., Ltd.

1F, No. 255, Nan Yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

TEL: 886-2-26935155 FAX: 886-2-26934440

E-mail: report@trclab.com.tw

EXHIBIT B

Sample Label

ASUS® Wireless Router

Model : WL-500b

DC Input : 5V/2A



Factory Default Settings

IP address: 192.168.1.1

User Name: admin

Password: admin

Change your name and password as soon as possible.

LISTED
I.T.E.
E187242
6G24



Tested To Comply
With FCC Standards
FOR HOME OR OFFICE USE
FCC ID:MSQWL500B

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.

Made in Taiwan CM

39mm





Training Research Co., Ltd.

1F, No. 255, Nan Yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

TEL: 886-2-26935155 FAX: 886-2-26934440

E-mail: report@trclab.com.tw

EXHIBIT C

Test Report

MEASUREMENT REPORT of *Wireless Router*

Applicant : ASUSTek Computer Inc.
EUT : Wireless Router
Model No. : WL-500b
FCC ID : MSQWL500B
Report No. : A5415648

Tested by :

Training Research Co., Ltd.

TEL : 886-2-26935155 FAX : 886-2-26934440
No. 255, Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

CERTIFICATION

We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (1992) as a reference. All test were conducted by **Training Research Co., Ltd.**, 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart B (Declaration of Conformity) and C Section 15.247.

Applicant : ASUSTek Computer Inc.

Applicant address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.

Product Name : Wireless Router

Model Name : WL-500b

FCC ID : MSQWL500B

Report No. : A5415648

Test Date : May 8, 2003

Prepared by:



Jack Tsai

Approved by:



Frank Tsai

Conditions of issue :

- (1) **This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.**
- (2) **This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.**

★ NVLAP LAB CODE: 200174-0

Federal Communications Commission

Declaration of Conformity

(DoC)

For the Following Equipment:

Product name : Wireless Router

Model name : WL-500b

Trade name : ASUS

Is herewith confirmed and found to comply with the requirements of CFR 47 part15 Subpart B - Unintentional Radiators regulation. The results of electromagnetic mission evaluation are shown in the [report number : A5415648](#)

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

<i>Manufacturer</i>	<i>USA local representative</i>
Company name: ASUSTeK Computer Inc.	To be determined
Computer address: 4/F, 150, Li-Te Rd., Peitou, Taipei, Taiwan	
ZIP / Postal code 112	
Contact person: Lawrence Yu	
Title: R & D Engineer	
Internet e-mail address: Lawrence_yu@asus.com.tw	
Tel / Fax: 886-2-28943447 / 886-2-28950113	

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I . GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of applicant in support that the certification in accordance with Part 2 Subpart J and Part 15 Subpart A, B and C of the Commission's Rules and Regulations.

1.2 Description of EUT

Product Name : Wireless Router
Model Name : WL-500b
Granted FCC ID : MSQWL500B
Frequency Range : 2.412 GHz ~ 2.462GHz
Support Channel : 11 Channel
Modulation Skill : DBPSK, DQPSK, CCK
Power Type : Switching power supply
Mfg.: DVE ; M/N: DSA-0101F-05 A
I/P: 100-240Vac, 50/60Hz, 0.3A, 15VA ;
O/P: +5VDC, 2A, 10W
Power Cable : 185cm long, non-shielded, incorporates a ferrite core

1.3 Test method

- 1 The POWER jack of EUT is connected with the AC power source via an AC to DC adaptor
- 2 The LAN-3 jack of EUT is connected with a LAN card of nearby PC, the LAN-4 jack is connected with another LAN card, which install in far-end PC. Than other LAN ports and WAN port each are connected with 100ohm terminal.
- 3 Connected the USB port of EUT with a camera through the USB shield cable.
- 4 Connected the parallel port of EUT with a printer.
- 5 Using the LAN port of computer and software to control the EUT. The software provided by the manufacturer to control the EUT in the continuous transmission mode, the test is performed under those specific conditions.

- 6 Set different channel being tested and repeat the procedures above.
- (a) Radiated for intentional test:
making EUT to the mode of continuous transmission
- (b) Conducted and Radiated for unintentional test:
making EUT to the linking (Rx/Tx) mode with support equipments

1.4 Description of Support Equipment

In order to construct the minimum testing, following equipment were used as the support units.

Printer	: HP
Model No.	: C6464A
Serial No.	: TH16LEB5PK
FCC ID	: N/A, DoC Approved
檢磁	: 3892H381
Power type	: Switching adaptor
Power cord	: Non-shielded, 173cm long, No ferrite core (between adaptor and AC source) Non-shielded, 180cm long, with ferrite core (between printer and adaptor)
Data cable	: Shielded, 1.70m long, No ferrite core
Fax/Modem	: Aceex
Model No.	: DM-1414
Serial No.	: 9010582
FCC ID	: IFAXDM1414
Power type	: 110 VAC / 50 ~ 60 Hz, Switching
Power Cord	: Non-shielded, 1.90m long, Plastic hoods, and no ferrite bead
Data Cable	: RS-232→Shielded, 1.30m long, Metal hoods , No bead RJ-11Cx2→Non-shielded, 7' long, Plastic hoods, No bead
USB Gamepad	: Rockfire
Model No.	: QF-337uv
Serial No.	: 10600545, KR91379759
FCC ID	: None (CE approval)
檢磁	: 3862A574
Power type	: By computer
Data Cable	: Shielded, 1.81m long, Plastic, with ferrite core

Camera : Logitech

Model No. : V-UJ16

Serial No. : LZA30600780

Product No. : 861095-0010

檢磁 : 4912A026

FCC ID : N/A, DoC Approved

Power type : 5V, 300mA

PC : HP Pavilion

Model No. : P8574A

Serial No. : TW21920435

FCC ID : DoC Approved

檢磁 : 3902H097

Power type : 100 ~ 127VAC / 4A, 200 ~ 240VAC/2A, 50 ~ 60Hz, 5A, Switching

Power cord : Non-shielded, 2.33 m length, Plastic hood, No ferrite core

Monitor : HP 15' Color Monitor

Model No. : D2827A

Serial No. : KR91161719

FCC ID : C5F7NFCMC1518X

檢磁 : 3872B039

Power type : 110 ~ 240 VAC / 50 ~ 60 Hz, Switching

Power cord : Shielded, 1.83m long, No ferrite core

Data cable : Shielded, 1.46m long, with two ferrite cores

Keyboard : HP

Model No. : 5187-0343

Serial No. : BE21700404

FCC ID : DoC Approved

檢磁 : 3892C981

Data cable : Shielded, 1.73m length, Plastic hood, No ferrite core

Mouse : **HP**
Model No. : M-S34
Serial No. : LZB90714106
FCC ID : DZL211029
檢磁 : 4862A011
Power cord : Non-shielded, 1.88m long, No ferrite core

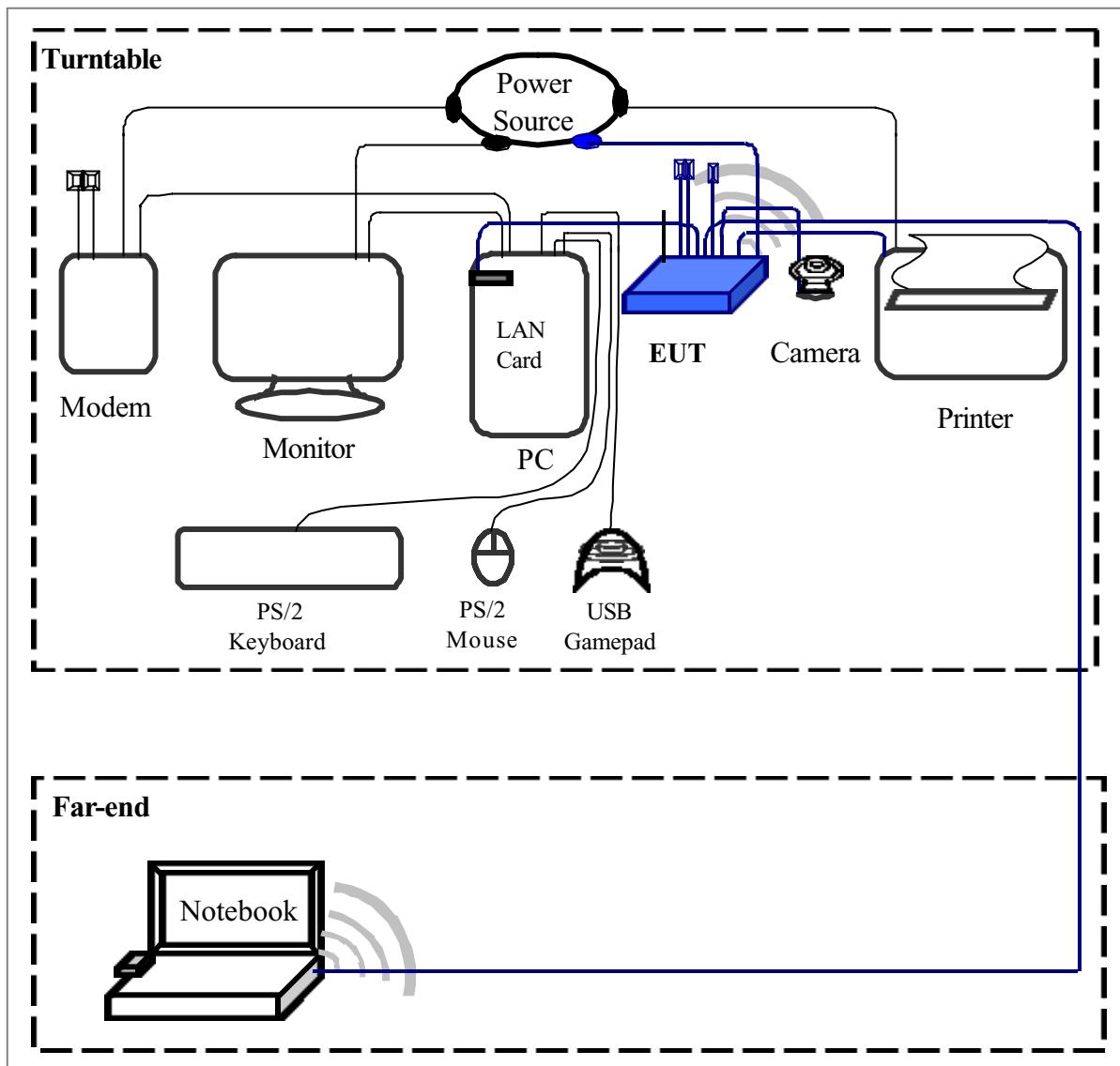
Notebook : **ASUSTek Computer**
Model No. : AB00F
Serial No. : 24NP016361
FCC ID : DoC Approved
BSMI : 41016012
Power type : 100 ~ 240VAC, 1A 50/60 Hz, Switching

Adaptor of PC : **LITE-ON Electronics, Inc.**
Model No. : PA-1530-01
Serial No. : 00151184
FCC ID : Doc Approved
檢磁 : 3882B259
Power cable : Non-shielded, 1.72m length, Plastic hood, No ferrite core
(Between power adaptor and AC power source)
Power cable : Shielded, 1.48m length, Plastic hood, with ferrite core
(Between power adaptor and notebook)

WLAN Card : **Gemtek Technology Co., Ltd.**
Model No. : C911003
FCC ID : MXF-C911003

1.5 Configuration of System Under Test

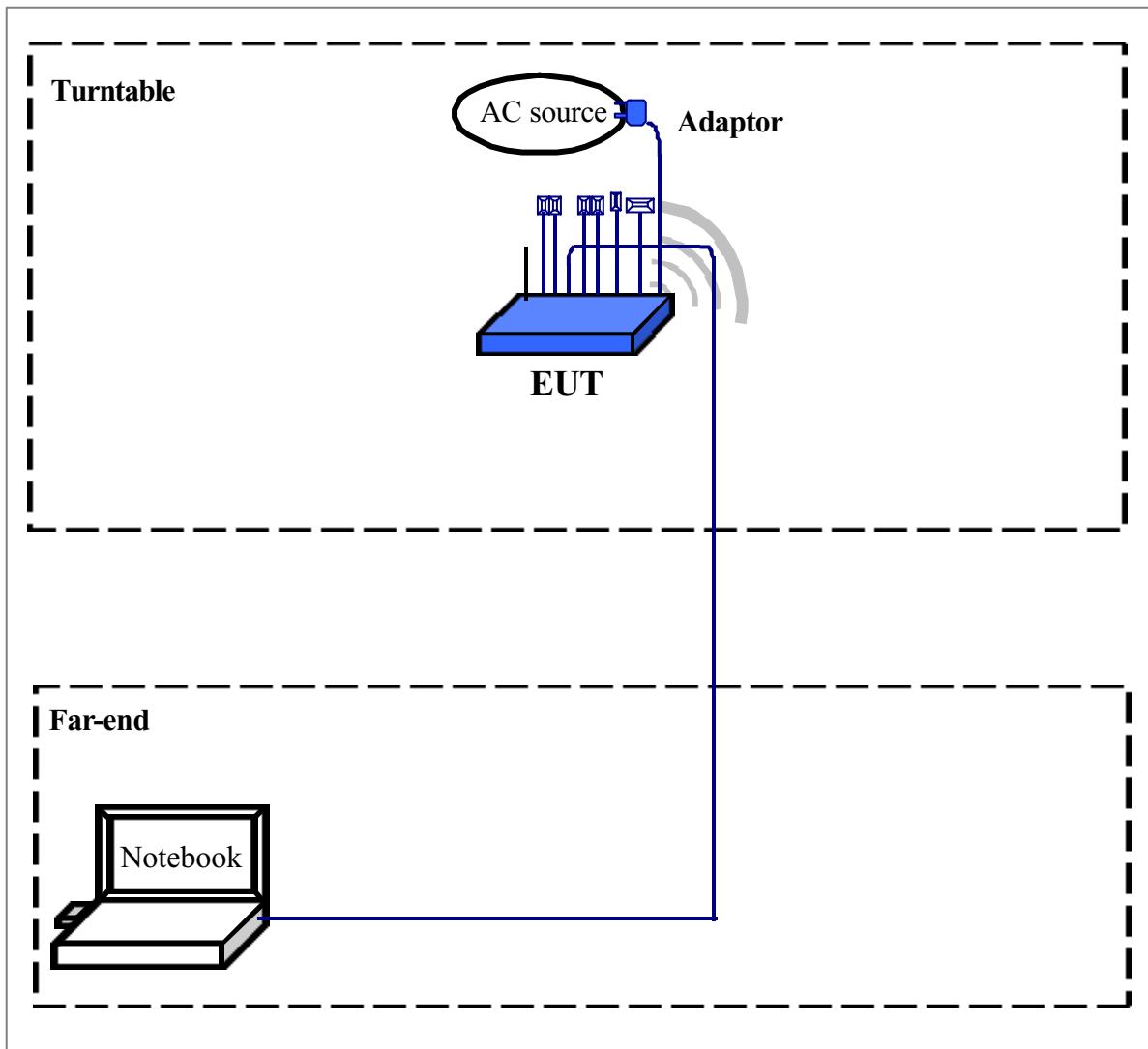
(Conducted and Radiated of unintentional powered by adaptor)



Connections of Equipment

- Router:**
- *RJ45 Cable x 1 --- 30 m length, non-shielded, no ferrite core
 - *RJ45 Cable x 4 --- 120cm length , non-shielded, no ferrite core
 - *Printer Cable x 1 --- 170cm length, shielded, no ferrite core
 - *USB Cable x 1 --- 271cm length, shielded, no ferrite core
- PC:**
- *VGA Port --- a monitor
 - *Serial Port --- an external modem
 - *PS/2 Ports --- a PS/2 keyboard and PS/2 mouse
 - *USB Port --- a USB gamepad
 - *LAN Interface --- EUT

(Radiated or intentional power by adaptor)



The tests below are carried with the EUT transmitter set at high power in TDD mode. The EUT is forced to select of output power level and channel number by notebook computer.

The setting up procedure was recorded in 1.3 test method.

1.6 Verify the Frequency and Channel

Channel	Frequency (GHz)
1	2.412
2	2.417
3	2.422
4	2.427
5	2.432
6	2.437
7	2.442
8	2.447
9	2.452
10	2.457
11	2.462

Note:

1. This is for confirming that all frequencies are in 2.412GHz to 2.462GHz.
2. Section 15.31(m): Measurements on intentional radiators or receivers shall be performed at three frequencies for operating frequency range over 10 MHz.
(The locations of these frequencies one near the top, one near the middle and one near the bottom.)
3. After test, the EUT operating frequencies are in 2.412GHz to 2.462GHz. So all the items as followed in testing report are need to test these three frequencies:
Top: Channel – 1; Middle: Channel – 6; Bottom: Channel – 11.

1.7 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 (1992) and the pre-setup was written on 1.3 test method, the detail setup was written on each test item.

1.8 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter, Anechoic Chamber (Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F, No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in a anechoic chamber also located at Training Research Co., Ltd.

No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.9 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal use were investigated.

In test, they were set in high power and continuously transmitting mode that controlled by computer. The ch01, ch06 and ch11 of EUT were all tested. The setting up procedure is recorded on 1.3 test method.

II. Section 15.101(a): Equipment authorization of unintentional radiators

The EUT equipped with a LAN interface and should be operated with the computer. It was categorized to *Class B personal computers and peripherals* as cannot be operated stand-alone. The authorization requires **Declaration of Conformity (DoC)** and the items required such as Sect.15.107 (Conducted limits) and Sect.15.109 (Radiated emission limits) is same as Sect.15.207 and 15.247(C).

III. Section 15.203: Antenna requirement

The EUT can be equipped with two kind antennas. It has an integral antenna (on Mini PCI Board) and the detachable external antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but does not use a standard antenna jack or electrical connector.

The custom antenna specification of list as below:

(1) External antenna

Manufacturer : NIInput Output Enterprise Corp
Part No : W201-108-D2
Connector : SMA Plug Reverse
Antenna Type : Dipole Antenna
Antenna Gain : 3.52dBi (Max.)

(2) Integral antenna

Manufacturer : ASUSTek Computer Inc.
Antenna Type : Patch antenna
Antenna Gain : 3.34dBi (Max.)

IV. Section 15.207: Power Line Conducted Emissions for AC Powered Units

4.1 Test Condition & Setup

The power line conducted emission measurements were performed in an anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPER quasi-peak and average detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 2.4.

There is a test condition apply in this test item, the test procedure description as <1.3>. Three channels were tested, one in the top (CH01), one in the middle (CH06) and the other in bottom (CH11).

4.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	<u>Calibration Date</u>	
				Last time	Next time
EMI Receiver	8546A	H P	3520A00242	06/28/02	06/28/03
RF Filter Section	85460A	H P	3448A00217	06/28/02	06/28/03
LISN (EUT)	LISN-01	TRC	9912-03,04	06/04/02	06/04/03
LISN (Support E.)	LISN-01	TRC	9912-05	07/15/02	07/15/03
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	11/20/02	11/20/03

The level of confidence of 95%, the uncertainty of measurement of conducted emission is ± 2.02 dB.

4.3 Test Result of Power Line Conducted Emissions

EUT station transmit only

The following table shows a summary of the highest emissions of power line conducted emissions on the LIVE and NETURAL conductors of the EUT power cord. Show as follows.

Test Conditions: Temperature : 24.3 °C Humidity : 43.5 % RH

Table 1 Test mode: External antenna, Channel 1

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	163.630	55.68	52.27	42.55	65.37	55.37	-12.82
	206.000	47.40	---	---	64.40	54.40	-7.00
	405.000	39.92	---	---	58.71	48.71	-8.79
	745.000	33.89	---	---	56.00	46.00	-12.11
	1176.000	34.54	---	---	56.00	46.00	-11.46
	1518.000	35.07	---	---	56.00	46.00	-10.93
	2136.000	36.29	---	---	56.00	46.00	-9.71
	3702.000	35.77	---	---	56.00	46.00	-10.23
Line 2	168.630	58.19	54.22	41.33	65.37	55.37	-11.15
	205.000	48.75	---	---	64.43	54.43	-5.68
	409.000	40.48	---	---	58.60	48.60	-8.12
	781.000	36.58	---	---	56.00	46.00	-9.42
	1017.000	37.34	---	---	56.00	46.00	-8.66
	1503.000	36.74	---	---	56.00	46.00	-9.26
	1748.000	36.65	---	---	56.00	46.00	-9.35
	3477.000	36.06	---	---	56.00	46.00	-9.94

NOTE:

(1) Margin = Peak Amplitude – Limit, The reading amplitudes are all under limit.

(2) A "+" sign in the margin column means the emission is OVER the Class B Limit
and "–" sign of means UNDER the Class B limit

Table 2 Test mode: External antenna, Channel 6

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	164.870	55.40	52.32	42.40	65.60	55.60	-13.20
	206.000	49.17	---	---	64.40	54.40	-5.23
	238.000	43.99	---	---	63.49	53.49	-9.50
	405.000	37.92	---	---	58.71	48.71	-10.79
	1871.000	36.58	---	---	56.00	46.00	-9.42
	2329.000	35.59	---	---	56.00	46.00	-10.41
Line 2	168.750	58.12	54.34	41.53	65.54	55.54	-11.20
	208.000	47.03	---	---	64.34	54.34	-7.31
	409.000	40.50	---	---	58.60	48.60	-8.10
	745.000	38.51	---	---	56.00	46.00	-7.49
	989.000	37.08	---	---	56.00	46.00	-8.92
	1308.000	37.34	---	---	56.00	46.00	-8.66

Table 3 Test mode: External antenna, Channel 11

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	165.000	55.99	52.51	42.66	65.37	55.37	-12.71
	208.000	48.27	---	---	64.34	54.34	-6.07
	405.000	39.51	---	---	58.71	48.71	-9.20
	1924.000	36.88	---	---	56.00	46.00	-9.12
	2558.000	35.52	---	---	56.00	46.00	-10.48
	3702.000	36.26	---	---	56.00	46.00	-9.74
Line 2	166.130	57.96	54.76	44.23	65.54	55.54	-10.78
	405.000	41.22	---	---	58.71	48.71	-7.49
	738.000	39.14	---	---	56.00	46.00	-6.86
	989.000	37.02	---	---	56.00	46.00	-8.98
	1437.000	36.70	---	---	56.00	46.00	-9.30
	3542.000	35.87	---	---	56.00	46.00	-10.13

Table 4 Test mode: External antenna, Standby

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	183.020	55.42	51.06	43.43	64.94	54.94	-11.51
	413.000	39.40	---	---	58.49	48.49	-9.09
	850.000	34.43	---	---	56.00	46.00	-11.57
	1503.000	33.61	---	---	56.00	46.00	-12.39
	2372.000	34.87	---	---	56.00	46.00	-11.13
	3542.000	32.46	---	---	56.00	46.00	-13.54
Line 2	187.690	57.94	56.67	46.73	64.94	54.94	-8.21
	373.000	39.42	---	---	59.63	49.63	-10.21
	456.000	39.83	---	---	57.26	47.26	-7.43
	752.000	36.10	---	---	56.00	46.00	-9.90
	850.000	35.45	---	---	56.00	46.00	-10.55
	1091.000	34.41	---	---	56.00	46.00	-11.59

Table 5 Test mode: Internal antenna, Channel 1

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	155.650	56.67	54.51	43.35	65.77	55.77	-11.26
	154.750	55.80	54.10	43.29	65.54	55.54	-11.44
	205.000	50.10	---	---	64.43	54.43	-4.33
	384.000	40.41	---	---	59.31	49.31	-8.90
	1871.000	37.94	---	---	56.00	46.00	-8.06
	3819.000	37.06	---	---	56.00	46.00	-8.94
Line 2	154.770	59.64	56.66	44.81	65.86	55.86	-9.20
	153.750	57.87	56.42	44.50	65.31	55.31	-8.89
	447.000	39.56	---	---	57.51	47.51	-7.95
	902.000	37.99	---	---	56.00	46.00	-8.01
	1534.000	38.75	---	---	56.00	46.00	-7.25
	3542.000	37.41	---	---	56.00	46.00	-8.59

Table 6 Test mode: Internal antenna, Channel 6

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	155.790	56.29	54.37	43.50	65.63	55.63	-11.26
	205.000	48.08	---	---	64.43	54.43	-6.35
	409.000	40.85	---	---	58.60	48.60	-7.75
	1346.000	35.82	---	---	56.00	46.00	-10.18
	1871.000	36.51	---	---	56.00	46.00	-9.49
	3702.000	37.76	---	---	56.00	46.00	-8.24
Line 2	156.330	58.57	55.56	45.38	65.83	55.83	-10.27
	157.400	59.55	57.27	44.88	65.60	55.60	-8.33
	155.500	53.29	57.09	44.72	64.94	54.94	-7.85
	109.000	40.83	---	---	58.60	48.60	-7.77
	745.000	37.41	---	---	56.00	46.00	-8.59
	1490.000	38.65	---	---	56.00	46.00	-7.35

Table 7 Test mode: Internal antenna, Channel 11

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	154.940	56.47	54.41	43.48	65.54	55.54	-11.13
	206.000	49.24	---	---	64.40	54.40	-5.16
	409.000	40.32	---	---	58.60	48.60	-8.28
	724.000	37.15	---	---	56.00	46.00	-8.85
	1783.000	37.90	---	---	56.00	46.00	-8.10
	2308.000	36.38	---	---	56.00	46.00	-9.62
Line 2	153.310	59.34	57.14	44.98	65.91	55.91	-8.77
	154.680	57.44	56.45	44.58	65.60	55.60	-9.15
	155.870	59.39	56.96	44.71	65.31	55.31	-8.35
	387.000	43.76	---	---	59.23	49.23	-5.47
	1889.000	38.33	---	---	56.00	46.00	-7.67
	3670.000	38.68	---	---	56.00	46.00	-7.32

Table 8 Test mode: Internal antenna, Standby

Power Connected Emissions					FCC Class B		
Conductor	Frequency (KHz)	Peak (dBμV)	QP (dBμV)	Average (dBμV)	QP-limit (dBμV)	AVG-limit (dBμV)	Margin (dB)
Line 1	180.520	53.81	50.79	41.52	65.06	55.06	-13.54
	359.000	39.26	---	---	60.03	50.03	-10.77
	456.000	39.12	---	---	57.26	47.26	-8.14
	824.000	36.49	---	---	56.00	46.00	-9.51
	1113.000	36.49	---	---	56.00	46.00	-9.51
	1198.000	36.84	---	---	56.00	46.00	-9.16
	1346.000	36.86	---	---	56.00	46.00	-9.14
	1713.000	37.29	---	---	56.00	46.00	-8.71
	2136.000	39.12	---	---	56.00	46.00	-6.88
	3819.000	37.24	---	---	56.00	46.00	-8.76
Line 2	159.000	50.81	---	---	65.74	55.74	-4.93
	183.460	56.31	55.26	47.90	65.06	55.06	-7.26
	409.000	40.74	---	---	58.60	48.60	-7.86
	456.000	40.71	---	---	57.26	47.26	-6.55
	832.000	39.60	---	---	56.00	46.00	-6.40
	1198.000	39.14	---	---	56.00	46.00	-6.86
	1477.000	39.78	---	---	56.00	46.00	-6.22
	1748.000	39.64	---	---	56.00	46.00	-6.36
	2115.000	39.37	---	---	56.00	46.00	-6.63
	3670.000	37.94	---	---	56.00	46.00	-8.06

V. Section 15.247 (a): Technical description of the EUT

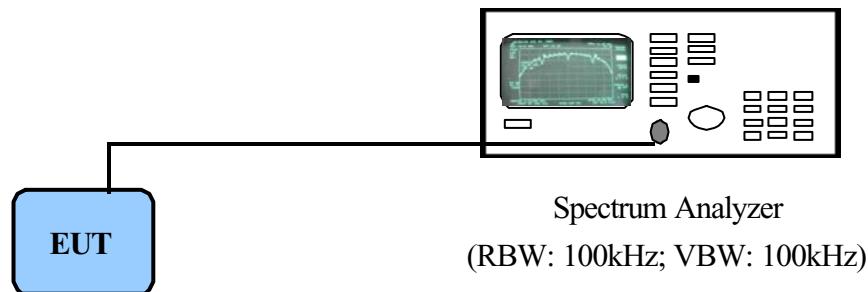
Based on the Section 2.1, *Direct Sequence System* is a spread spectrum system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high speed code sequence dominates the “modulating function” and is the direct cause of the wide spreading of the transmitted signal. In the operational description demonstrates the operation principles of the Baseband processor employed by the EUT, shows that which is a complete DSSS baseband processor and meets the definition of the Direct sequence spread spectrum system.

VI. Section 15.247(a)(2): Bandwidth for Direct Sequence System.

6.1 Test Condition & Setup

The transmitter bandwidth measurements were performed by the contact manner. The EUT was set to transmit continuously, also various channels were investigated to find the maximum occupied bandwidth.. The output of the EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency is observed by the spectrum analyzer with 100kHz RBW and 100kHz VBW.

6.2 Test Instruments Configuration



P.S.: Notebook computer to control the EUT at maximal power output and channel Number and set antenna kit

6.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/11/02	09/11/03

6.4 Test Result of Bandwidth

Bandwidth of Channel 1

Bandwidth : 11.28 MHz
The min. 6dB BW at least : 500 KHz

Bandwidth of Channel 6

Bandwidth : 11.28 MHz
The min. 6dB BW at least : 500 KHz

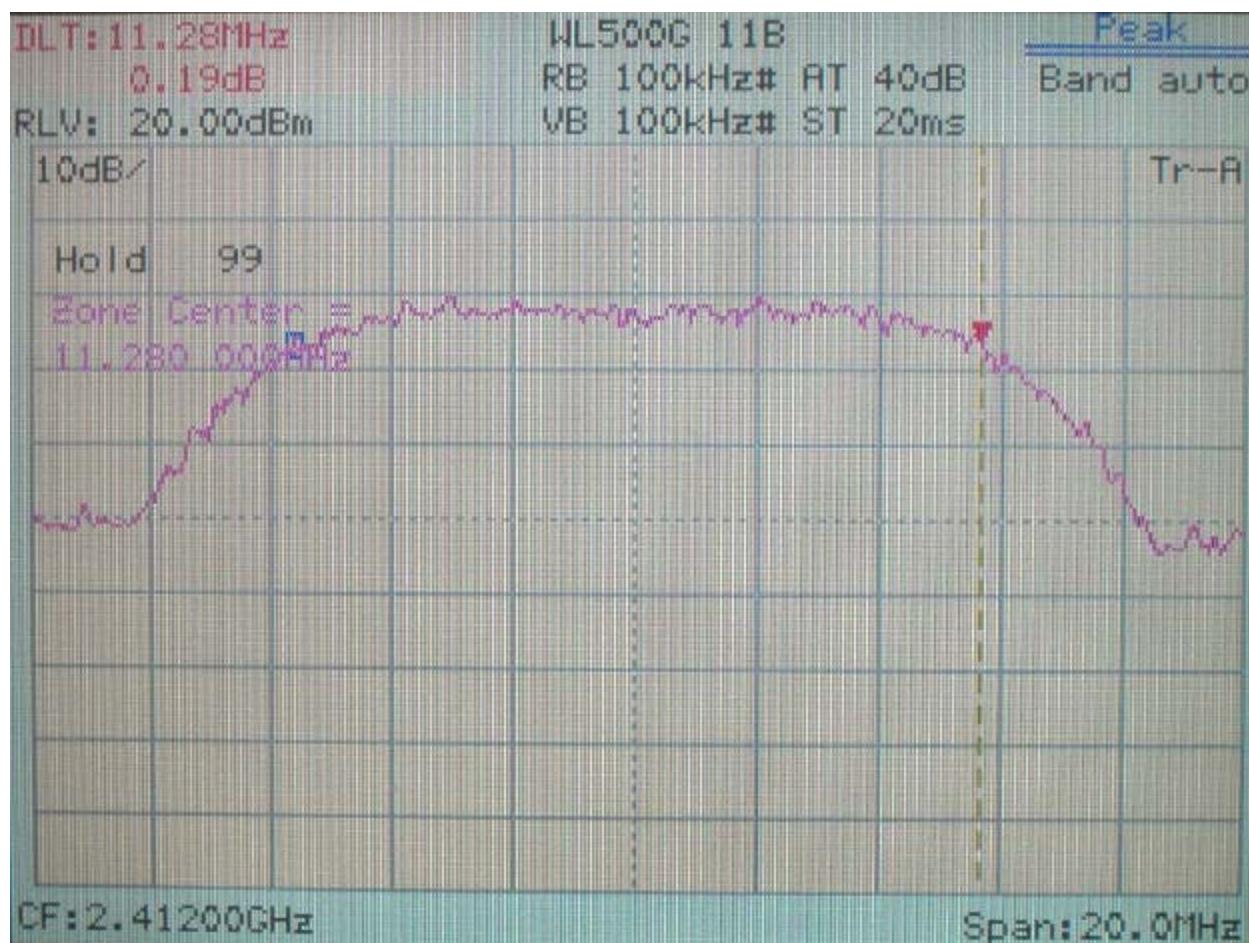
Bandwidth of Channel 11

Bandwidth : 11.28 MHz
The min. 6dB BW at least : 500 KHz

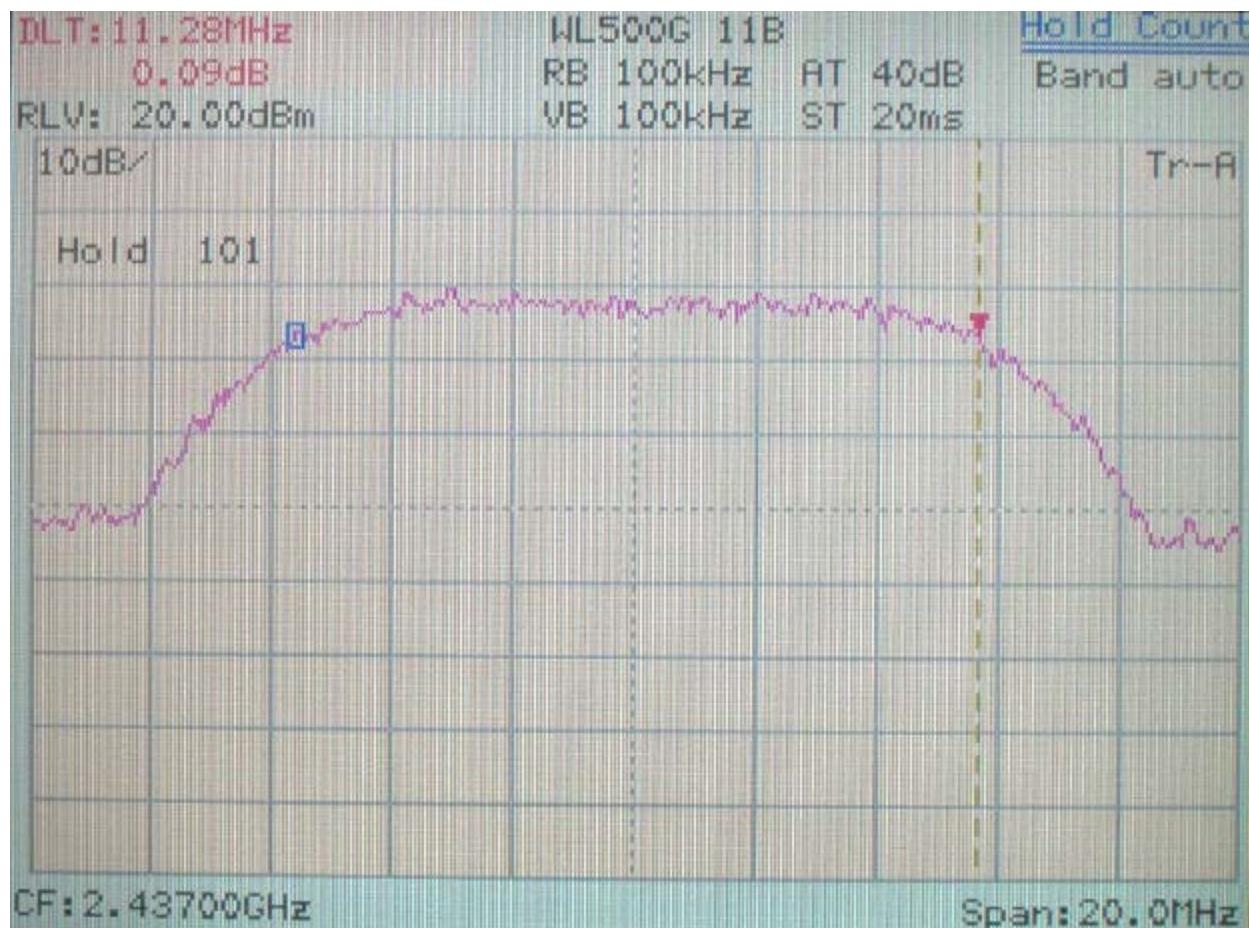
Note:

1. The data in the above table are summarizing the following attachment spectrum analyzer hard copy. According to the guidance, we'd made the measurement with the spectrum analyzer's resolution bandwidth (RBW)=100kHz and set the $span >> RBW$. The results show the measured 6dB bandwidth comply with the minimum 500kHz requirement.
2. The attachments show these on the following pages.

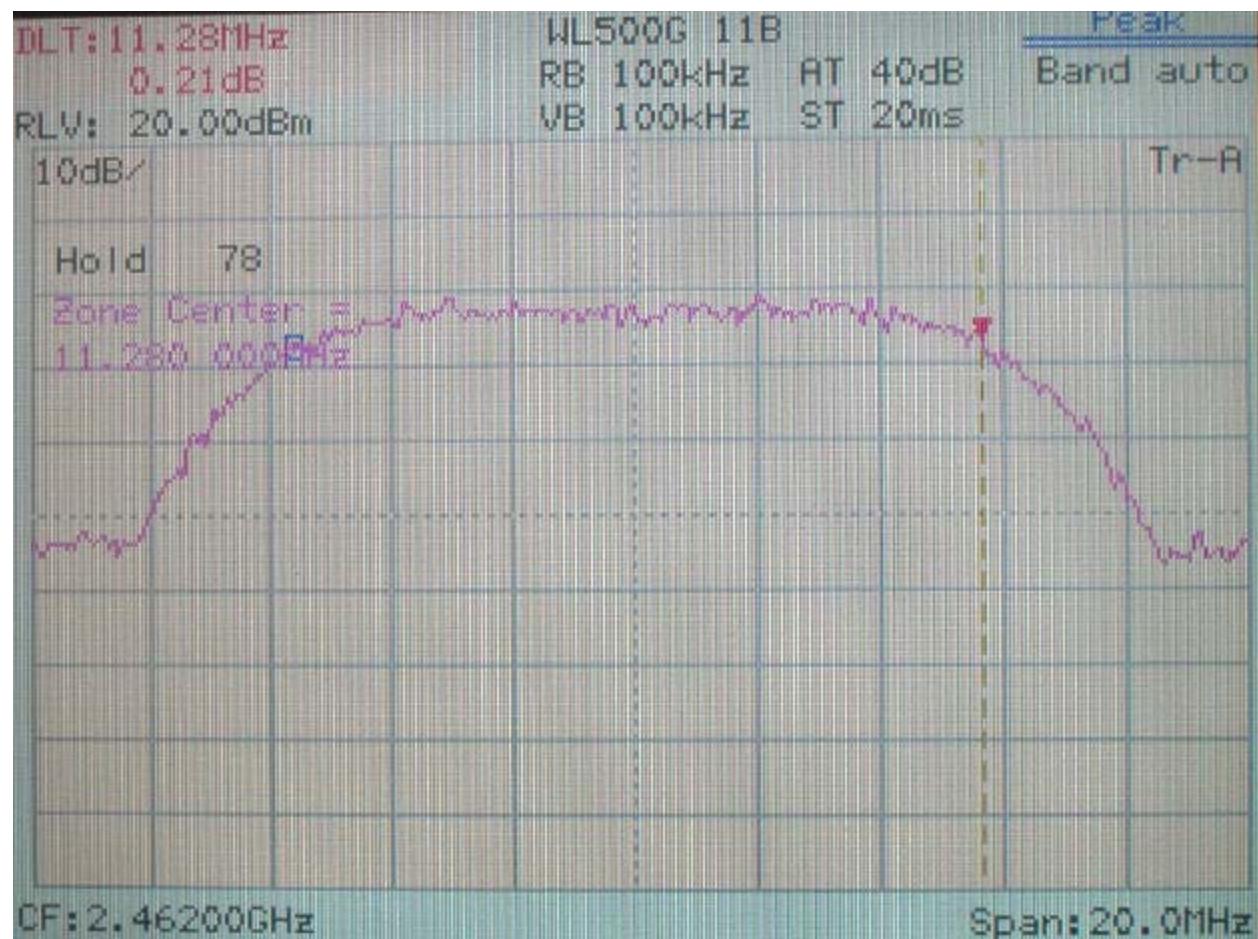
Bandwidth of Channel 1:



Bandwidth of Channel 6:

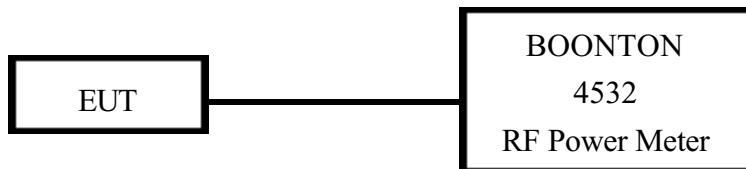


Bandwidth of Channel 11:



VII. Section 15.247(b): Power Output

7.1 Test Condition & Setup



1. The output of the transmitter is connected to the BOONTON RF Power Meter.
2. The calibration is performed before every test. The values of the output power of the EUT will be shown in the dBm directly are the transmitter output peak power. Recording as follows.

7.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.
RF Power Meter	4532	BOONTON	117501

7.3 Test Result

Formula:

$$\text{Signal generator} + |\text{Cable loss}| = \text{Output peak power}$$

Channel	Signal Generator	Cable Loss	Output peak power	
	dBm	dBm	dBm	mW
CH 1	15.95	0.70	16.65	46.238
CH 6	15.88	0.70	16.58	45.499
CH 11	15.61	0.70	16.31	42.756

VIII. Section 15.247 (C): Spurious Emissions (Radiated)

8.1 Test Condition & Setup

We'd performed the test by the *radiated emission* skill: The EUT was placed in an anechoic chamber, and set the EUT transmitting continuously and scanned at 3-meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions was noted so it could be reproduced later during the final tests. For the measurement above 1GHz, according to the guidance we'd set the spectrum analyzer's 6dB bandwidth RBW to 1MHz.

This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 85460A EMI Receiver, M.E. whole range Bi-log antenna (Model No.: VULB9160) is used to measure frequency from 30 MHz to 1GHz. The final test is used the HP 85460A spectrum and 8564E spectrum was examined from 1GHz to 25GHz using an Hewlett Packard Spectrum Analyzer, EMCO/CMT Horn Antenna (Model 3115 / RA42-K-F-4B-C) for 1G - 25GHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 25GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 25GHz) and the analyzer was operated in the maximum hold mode. There is a test condition applies in this test item, the test procedure description as the following:

Three channels were tested, one in the top (CH01), one in the middle (CH06) and the other in bottom (CH11). The setting up procedure is recorded on <1.3>

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to upper, middle and bottom channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter ($\text{dB}\mu\text{V}/\text{m}$) is determined by algebraically adding the measured reading in $\text{dB}\mu\text{V}$, the antenna factor (dB), and cable loss (dB) at the appropriate frequency. Since the EUT was set to transmit continuously, no *duty cycle* is present.

For frequency between 30MHz to 1000MHz

$$\text{FIa } (\text{dB}\mu\text{V}/\text{m}) = \text{FIr } (\text{dB}\mu\text{V}) + \text{Correction Factors}$$

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

For frequency between 1GHz to 25GHz

$$\text{FIa } (\text{dB}\mu\text{V}/\text{m}) = \text{FIr } (\text{dB}\mu\text{V}) + \text{Correction Factor}$$

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

8.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	06/28/02	06/28/03
RF Filter Section	85460A	H P	3448A00217	06/28/02	06/28/03
Bi-log Antenna	VULB9160	M. E.	3064	07/08/02	07/08/03
Switch/Control Unit (>30MHz)	3488A	HP	N/A	11/20/02	11/20/03
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	11/20/02	11/20/03
Spectrum Analyzer	8564E	HP	US36433002	08/01/02	08/01/03
Microwave Preamplifier	83051A	HP	3232A00347	08/01/02	08/01/03
Horn Antenna	3115	EMCO	9704 – 5178	08/01/02	08/01/03
Horn Antenna	RA42-K-F-4B-C	CMT	961505-003	02/01/03	02/01/04
Anechoic Chamber (cable calibrated together)				05/20/02	05/20/03

The level of confidence of 95% , the uncertainty of measurement of radiated emission is $\pm 3.44\text{dB}$.

8.3 Test Result of Spurious Radiated Emissions

EUT's transmit only

The highest peak values of radiated emissions from the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

Test Conditions: Temperature : 24.3 ° C Humidity : 43.5 % RH

Table 9 Test mode: External antenna for 30MHz to 1GHz [Antenna polarity Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB μ V/m)	FCC Class B (3 m)	
Frequency (MHz)	Amplitude (dB μ V)	Ant. H. (m)	Table (°)			Limit (dB μ V/m)	Margin (dB)
124.80	39.40	2.00	19	-1.47	37.93	43.50	-5.57
220.36	38.94	1.00	78	-2.74	36.20	46.00	-9.80
300.99	38.97	1.00	119	-2.34	36.63	46.00	-9.37
500.05	34.33	1.00	190	4.56	38.89	46.00	-7.11
600.00	30.49	1.00	251	8.71	39.20	46.00	-6.80
750.07	27.08	2.00	252	12.73	39.81	46.00	-6.19

Table 10 Test mode: External antenna for 30MHz to 1GHz [Antenna polarity Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB μ V/m)	FCC Class B (3 m)	
Frequency (MHz)	Amplitude (dB μ V)	Ant. H. (m)	Table (°)			Limit (dB μ V/m)	Margin (dB)
43.83	27.98	1.00	251	5.50	33.48	40.00	-6.52
68.23	27.60	1.00	323	2.30	29.90	40.00	-10.10
121.51	38.45	1.00	142	-1.32	37.13	43.50	-6.37
501.66	32.52	1.00	10	4.64	37.16	46.00	-8.84
601.09	30.26	1.00	217	8.74	39.00	46.00	-7.00
750.07	26.57	1.00	209	12.73	39.30	46.00	-6.70

Note:

1. Margin = Amplitude – limit, if margin is minus means under limit.
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)

Table 11 Test mode: Internal antenna for 30MHz to 1GHz [Antenna polarity Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB μ V/m)	FCC Class B (3 m)	
Frequency (MHz)	Amplitude (dB μ V)	Ant. H. (m)	Table (°)			Limit (dB μ V/m)	Margin (dB)
110.02	33.51	1.00	277	-0.90	32.61	43.50	-10.89
121.51	35.84	2.00	3	-1.32	34.52	43.50	-8.98
300.39	40.73	1.00	47	-2.35	38.38	46.00	-7.62
375.56	37.39	1.00	146	-0.44	36.95	46.00	-9.05
687.17	25.77	1.00	155	11.37	37.14	46.00	-8.86
750.07	26.22	1.00	328	12.73	38.98	46.00	-7.05

Table 12 Test mode: Internal antenna for 30MHz to 1GHz [Antenna polarity Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB μ V/m)	FCC Class B (3 m)	
Frequency (MHz)	Amplitude (dB μ V)	Ant. H. (m)	Table (°)			Limit (dB μ V/m)	Margin (dB)
60.22	28.94	1.00	237	3.10	32.04	40.00	-7.96
70.01	32.73	1.00	274	2.12	34.85	40.00	-5.15
108.77	39.17	1.00	222	-0.82	38.35	43.50	-5.15
121.51	37.65	1.00	282	-1.32	36.33	43.50	-7.17
144.58	37.83	1.00	159	-2.00	35.83	43.50	-7.67
624.01	28.98	1.00	327	9.45	38.43	46.00	-7.57

Table 13 Test mode: Channel 1, External antenna for 1GHz to 25GHz [Horizontal]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
1607.64	1.00	59	3.26	41.59	---	74.00	53.96	-12.37
4823.12	1.00	175	3.76	50.59	---	74.00	53.96	-3.37
7232.15	1.00	62	10.07	57.91	45.74	74.00	53.96	-8.22
9650.42	1.00	114	11.47	44.80	---	74.00	53.96	-9.16

Table 14 Test mode: Channel 1, External antenna for 1GHz to 25GHz [Vertical]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
3215.97	1.00	164	4.67	42.67	---	74.00	53.96	-11.29
4823.12	1.00	118	3.76	50.59	---	74.00	53.96	-3.37
7232.82	1.00	250	10.07	59.11	47.24	74.00	53.96	-6.72

Note:

1. Margin = Corrected - Limit.
2. The EUT utilizes a *permanently attached antenna*. In addition the spurious RF radiated emissions levels do comply with the *20dBc limit* both at its bandedges and other spurious emissions.
3. As stated in Section 15.35(b), for any frequencies above 1000MHz, radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. As the results of our test, the peak amplitudes are already below the FCC limit. Thus the average amplitudes of the rest are omitted.

Table 15 Test mode: Channel 6, External antenna for 1GHz to 25GHz [Horizontal]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
1625.00	1.00	251	3.20	41.86	---	74.00	53.96	-12.10
4874.48	1.00	48	3.96	47.62	---	74.00	53.96	-6.34
7308.84	1.00	160	10.29	55.79	43.96	74.00	53.96	-10.00

Table 16 Test mode: Channel 6, External antenna for 1GHz to 25GHz [Vertical]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
3250.00	1.00	166	4.74	43.91	---	74.00	53.96	-10.05
4874.48	1.00	25	3.96	46.29	---	74.00	53.96	-7.67
7309.68	1.00	98	10.29	56.64	44.79	74.00	53.96	-9.17

Table 17 Test mode: Channel 11, External antenna for 1GHz to 25GHz [Horizontal]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
1641.67	1.00	274	3.14	42.97	---	74.00	53.96	-10.99
4925.83	1.00	296	4.13	44.30	---	74.00	53.96	-9.66
7382.82	1.00	11	10.43	53.26	39.10	74.00	53.96	-14.86

Table 18 Test mode: Channel 11, External antenna for 1GHz to 25GHz [Vertical]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
1640.97	1.00	56	3.14	40.47	---	74.00	53.96	-13.49
3283.33	1.00	178	4.82	42.82	---	74.00	53.96	-11.14
4925.83	1.00	221	4.13	44.46	---	74.00	53.96	-9.50
7382.15	1.00	178	10.43	51.76	40.26	74.00	53.96	-13.70

Table 19 Test mode: Channel 1, Internal antenna for 1GHz to 25GHz [Horizontal]

Radiated Emission				Corrected Amplitude (dB μ V/m)		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Peak	Ave.	Margin (dB)
4825.68	1.00	54	3.77	60.71	50.38	74.00	53.96	-3.58
7233.78	1.00	181	10.07	55.56	45.84	74.00	53.96	-8.12
9650.42	1.00	2	11.47	49.41	---	74.00	53.96	-4.55

Table 20 Test mode: Channel 1, Internal antenna for 1GHz to 25GHz [Vertical]

Radiated Emission				Corrected Amplitude (dB μ V/m)		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Peak	Ave.	Margin (dB)
4825.68	1.00	51	3.77	57.21	47.38	74.00	53.96	-6.58
7238.31	1.00	107	10.10	54.41	45.21	74.00	53.96	-8.75
9650.42	1.00	63	11.47	51.41	---	74.00	53.96	-2.55
14471.67	1.00	258	7.83	47.44	---	74.00	53.96	-6.52
16888.33	1.00	22	12.71	42.81	---	74.00	53.96	-11.15

Table 21 Test mode: Channel 6, Internal antenna for 1GHz to 25GHz [Horizontal]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
2498.96	1.00	25	3.50	42.33	---	74.00	53.96	-11.63
4875.68	1.00	116	3.96	59.73	48.57	74.00	53.96	-5.39
7303.03	1.00	128	10.28	53.89	42.89	74.00	53.96	-11.07
9750.10	1.00	10	11.90	50.67	---	74.00	53.96	-3.29

Table 22 Test mode: Channel 6, Internal antenna for 1GHz to 25GHz [Vertical]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
4875.67	1.00	93	3.96	54.23	44.57	74.00	53.96	-9.39
7308.79	1.00	174	10.29	55.41	45.40	74.00	53.96	-8.56
9750.10	1.00	21	11.90	51.01	---	74.00	53.96	-2.95

Table 23 Test mode: Channel 11, Internal antenna for 1GHz to 25GHz [Horizontal]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
4925.83	1.00	251	4.13	51.07	---	74.00	53.96	-2.89
7382.99	1.00	48	10.43	56.36	44.04	74.00	53.96	-9.92
9849.79	1.00	116	11.93	48.21	---	74.00	53.96	-5.75

Table 24 Test mode: Channel 11, Internal antenna for 1GHz to 25GHz [Vertical]

Radiated Emission				Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
				Peak	Average	Peak	Ave.	
4925.83	1.00	153	4.13	46.07	---	74.00	53.96	-7.89
7388.39	1.00	8	10.42	58.68	44.86	74.00	53.96	-9.10
9849.79	1.00	149	11.93	49.54	---	74.00	53.96	-4.42

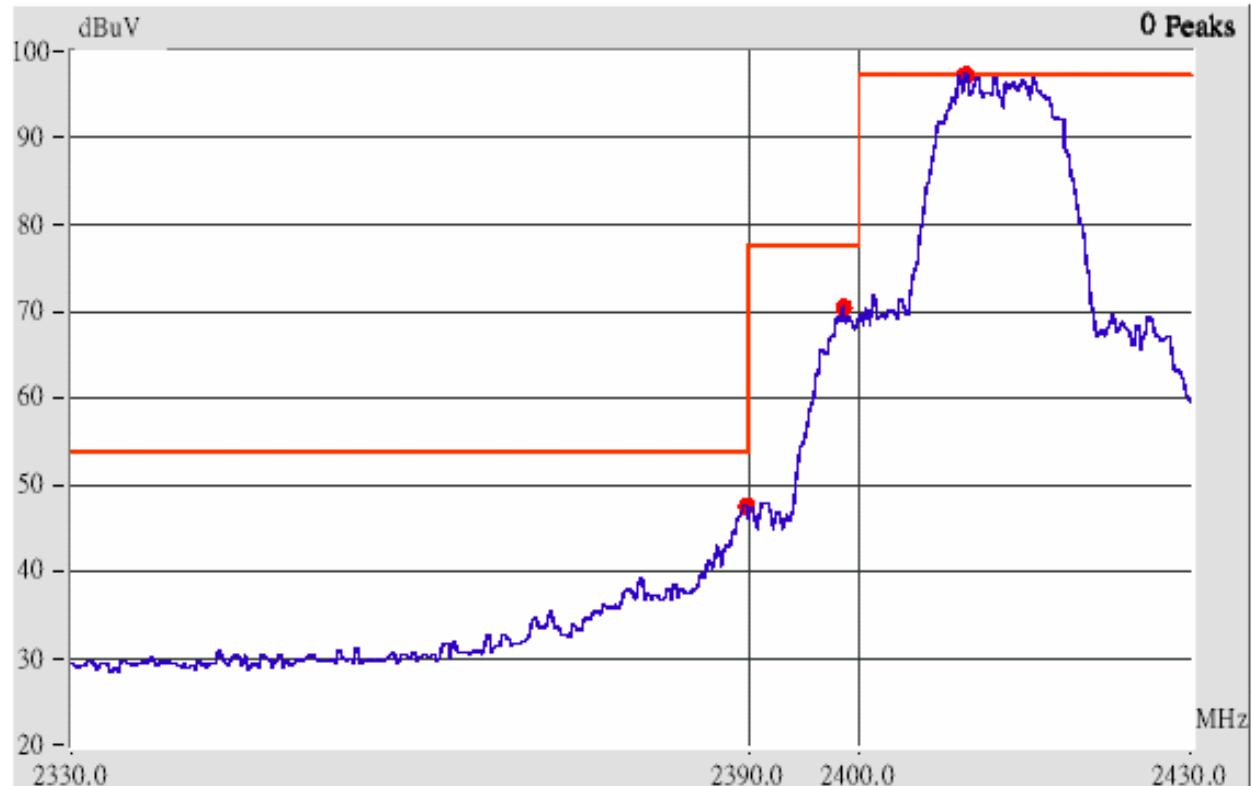
8.4 Test Result of the Bandedge

If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either *at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified id § 15.209(a)*,

We perform this section by the *radiated manner*, the RBW is set to 100kHz and VBW>RBW. We'd made the observation *up to 10th harmonics and the criterion is all the harmonic/spurious emissions must be 20dB below the highest emission level measured.* If the emissions fall in the restricted bands stated in the Part15.205(a) must also *comply with the radiated emission limits specified in Part15.209(a).* (Peak mode: RBW=VBW=1MHz, Average mode: RBW=1MHz; VBW=10Hz)

The following pages show our observations referring to the channel 1 and 11 respectively.

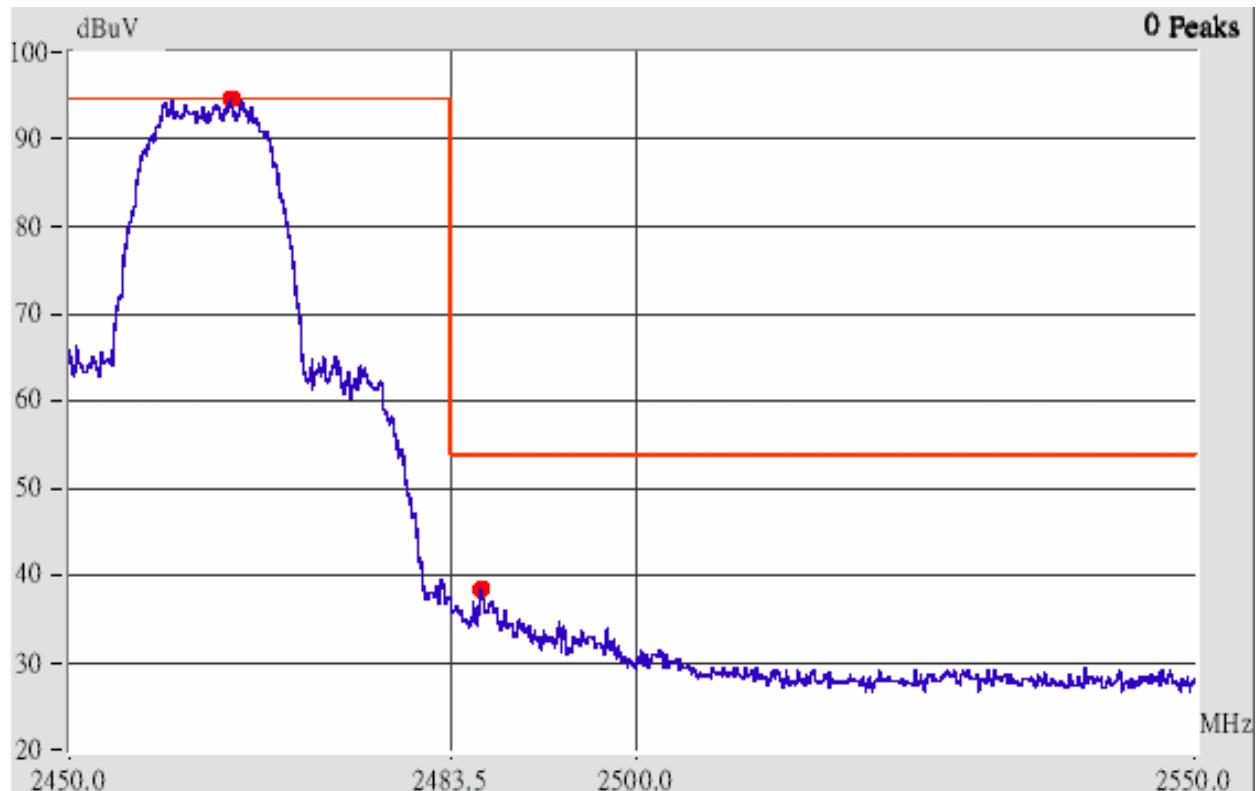
Test Condition & Setup: same as < 8.1 >

Channel 1, External antenna

This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

1. The lobe left by the fundamental side is already 20dB below the highest emission level.
2. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

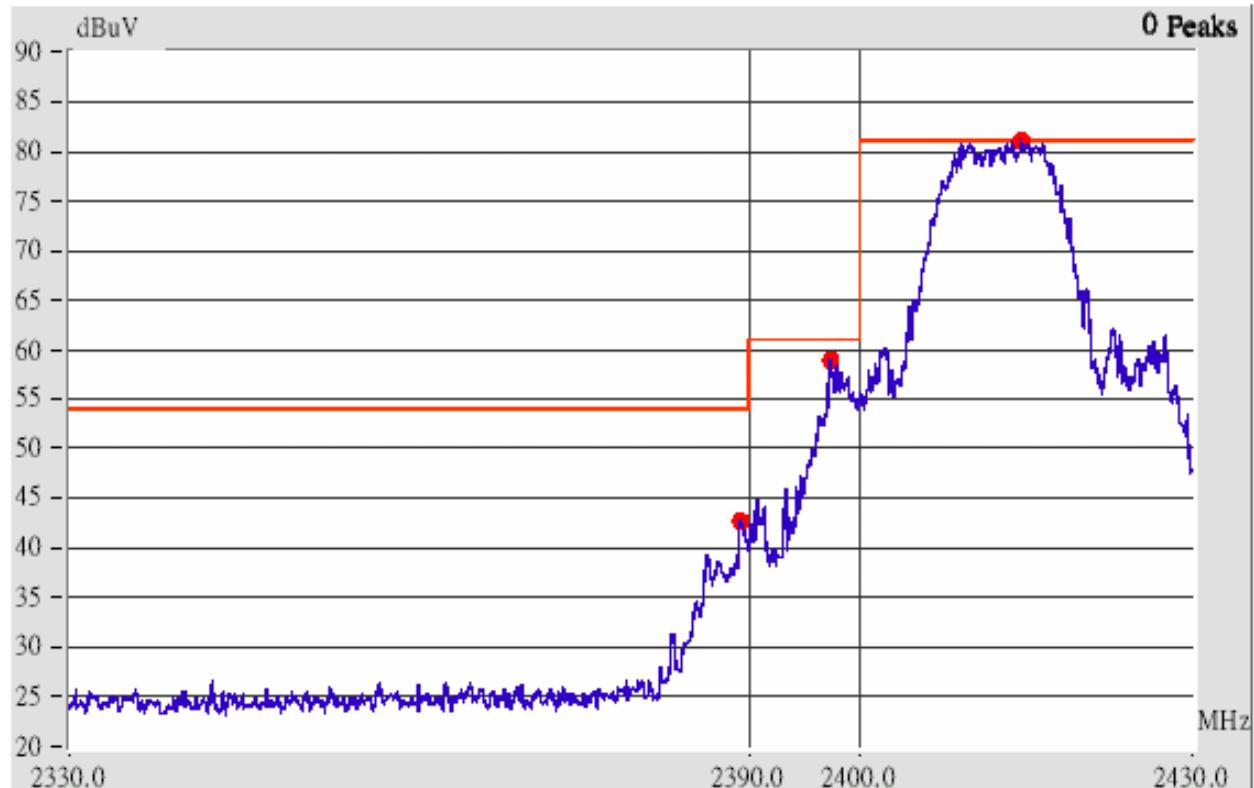
Radiated Emission					Corrected Amplitude		FCC Class B (3m)			
Frequency (MHz)	Ant. P.	Ant. H. (m)	Table (°)	Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)	
					Peak	Average	Peak	Ave.		
2389.10	Hor	1.00	151	3.13	49.47	---	74.00	53.96	-4.49	
2389.96	Hor	1.00	169	3.13	49.97	---	74.00	53.96	-3.99	
2389.10	Ver	1.00	18	3.13	56.97	45.80	74.00	53.96	-8.16	
2390.18	Ver	1.00	204	3.14	57.97	46.25	74.00	53.96	-7.71	

Channel 11, External antenna

This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 11.

3. The lobe right by the fundamental side is already 20dB below the highest emission level.
4. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below

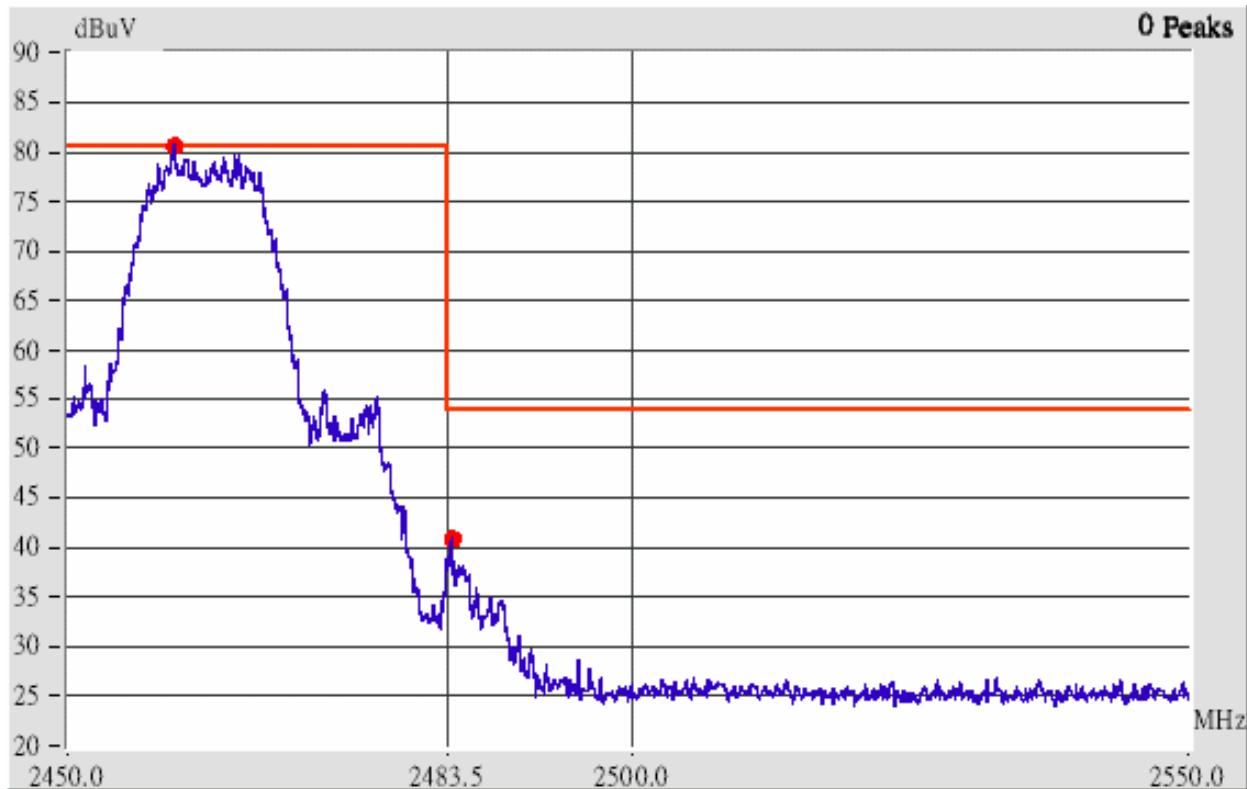
Radiated Emission					Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. P.	Ant. H. (m)	Table (°)	Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)	Margin (dB)	
					Peak	Average			
2483.50	Hor	1.00	265	3.45	39.61	---	74.00	53.96	-14.35
2486.59	Hor	1.00	155	3.46	39.62	---	74.00	53.96	-14.34
2483.50	Ver	1.00	90	3.45	48.45	---	74.00	53.96	-5.51
2486.88	Ver	1.00	287	3.46	49.96	---	74.00	53.96	-4.00
2500.01	Ver	1.00	14	3.50	46.00	---	74.00	53.96	-7.96
2530.05	Ver	1.00	345	3.54	47.87	---	74.00	53.96	-6.09

Channel 1, Internal antenna

This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

1. The lobe left by the fundamental side is already 20dB below the highest emission level.
2. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					Corrected Amplitude		FCC Class B (3m)			
Frequency (MHz)	Ant. P.	Ant. H. (m)	Table (°)	Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)	
					Peak	Average	Peak	Ave.		
2390.07	Hor	1.00	54	3.14	51.14	---	74.00	53.96	-2.82	
2390.18	Hor	1.00	167	3.14	52.30	---	74.00	53.96	-1.66	
2389.20	Ver	1.00	188	3.13	40.63	---	74.00	53.96	-13.33	
2390.07	Ver	1.00	20	3.14	40.47	---	74.00	53.96	-13.49	

Channel 11, Internal antenna

This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 11.

3. The lobe right by the fundamental side is already 20dB below the highest emission level.
4. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below

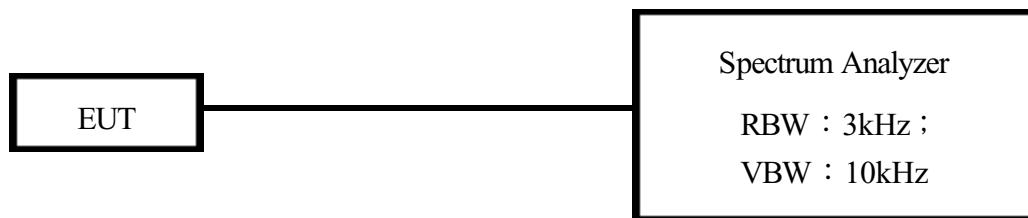
Radiated Emission					Corrected Amplitude		FCC Class B (3m)		
Frequency (MHz)	Ant. P.	Ant. H. (m)	Table (°)	Factors (dB)	(dB μ V/m)		Limit (dB μ V/m)		Margin (dB)
					Peak	Average	Peak	Ave.	
2483.50	Hor	1.00	55	3.45	50.11	---	74.00	53.96	-3.85
2485.89	Hor	1.00	92	3.45	53.29	---	74.00	53.96	-0.67
2521.53	Hor	1.00	177	3.53	47.03	---	74.00	53.96	-6.93
2483.50	Ver	1.00	341	3.45	44.95	---	74.00	53.96	-9.01
2486.07	Ver	1.00	47	3.45	45.95	---	74.00	53.96	-8.01
2522.87	Ver	1.00	63	3.53	46.20	---	74.00	53.96	-7.76

IX. Section 15.247(d): Power Spectral Density

9.1 Test Condition & Setup

The tests below are running with the EUT transmitter set at high power in TDD mode. The EUT is needed to force selection of output power level and channel number. While testing, the EUT was set to transmit continuously and to be tested by the contact manner with the spectrum analyzer.

9.2 Test Instruments Configuration



P.S.: Notebook computer to control the EUT at maximal power output and channel Number and set antenna kit

9.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/11/02	09/11/03

9.4 Test Result of Power spectral density

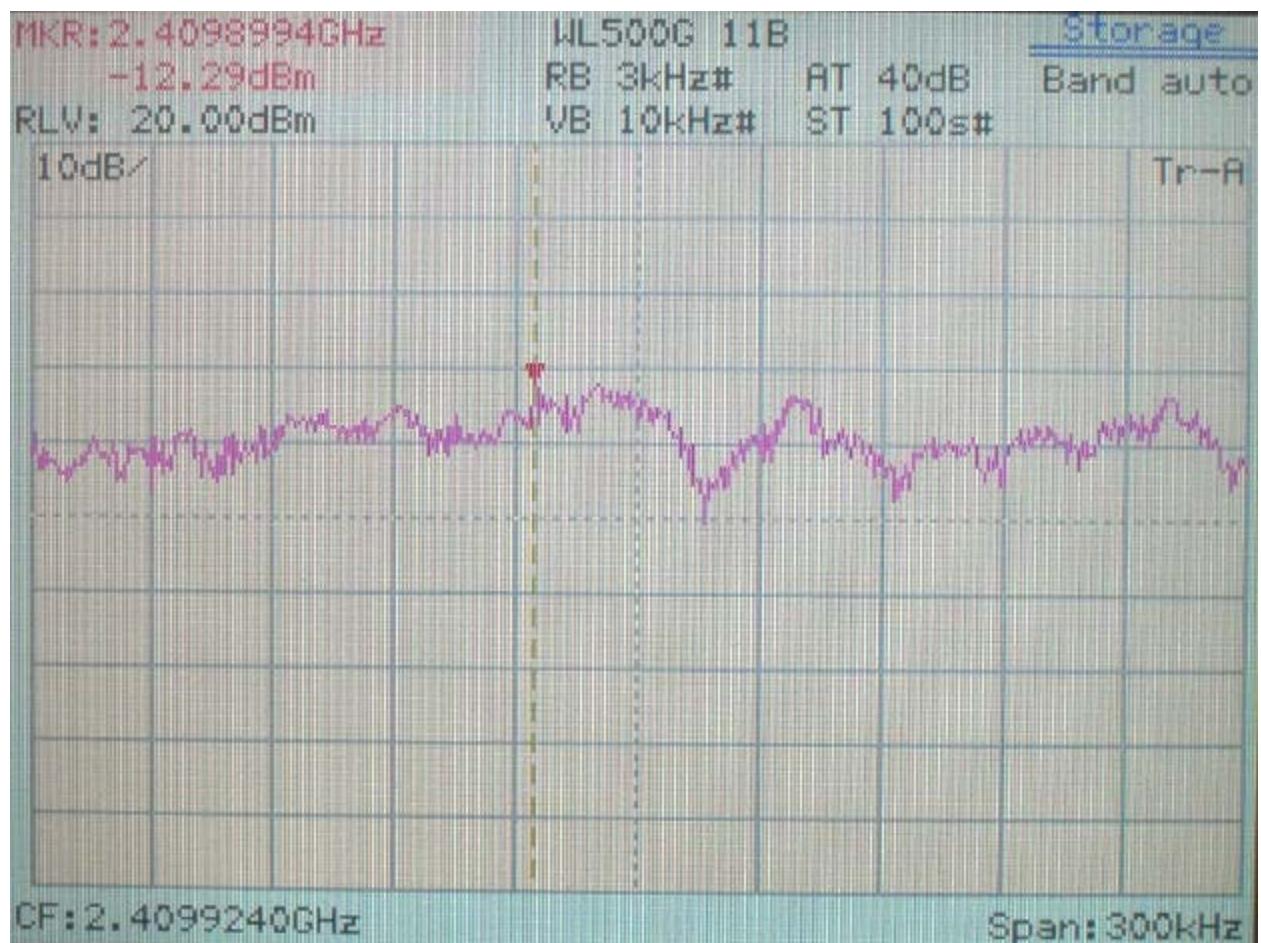
The following table shows a summary of the test results of the Power Spectral Density.

Channel	Frequency (GHz)	Ppr (dBm)	Cable Loss (dB)	Ppq (dBm)	Limit (dB)	Margin (dB)
CH 01	2.412	-12.29	0.70	-11.59	8.00	-19.59
CH 06	2.437	-12.85	0.70	-12.15	8.00	-20.15
CH 11	2.462	-12.98	0.70	-12.28	8.00	-20.28

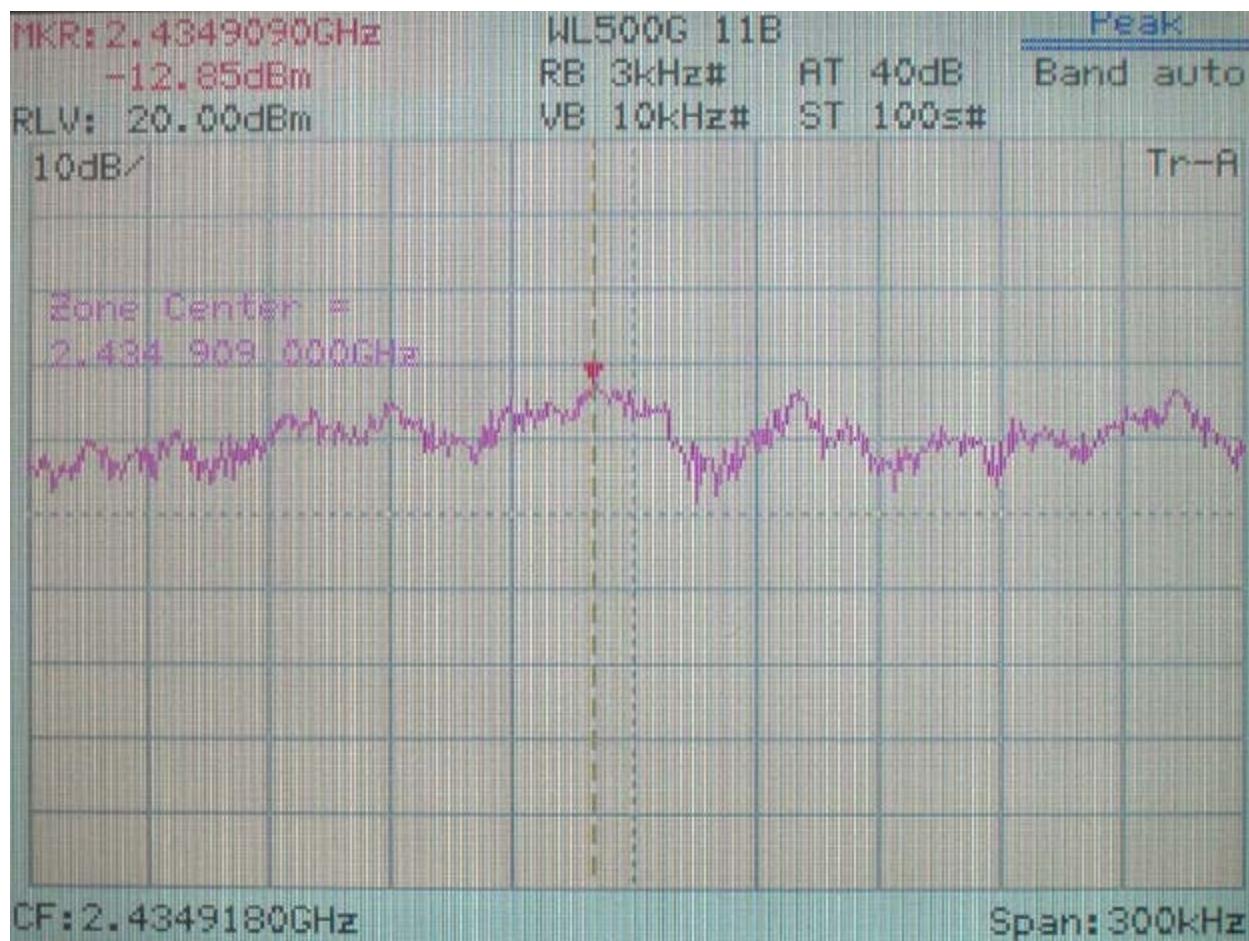
Note:

1. The following pages show the results of spectrum reading.
2. Ppr: spectrum read power density (using peak search mode),
Ppq: actual peak power density in the spread spectrum band.
3. Ppq = Ppr + |Cable Loss|

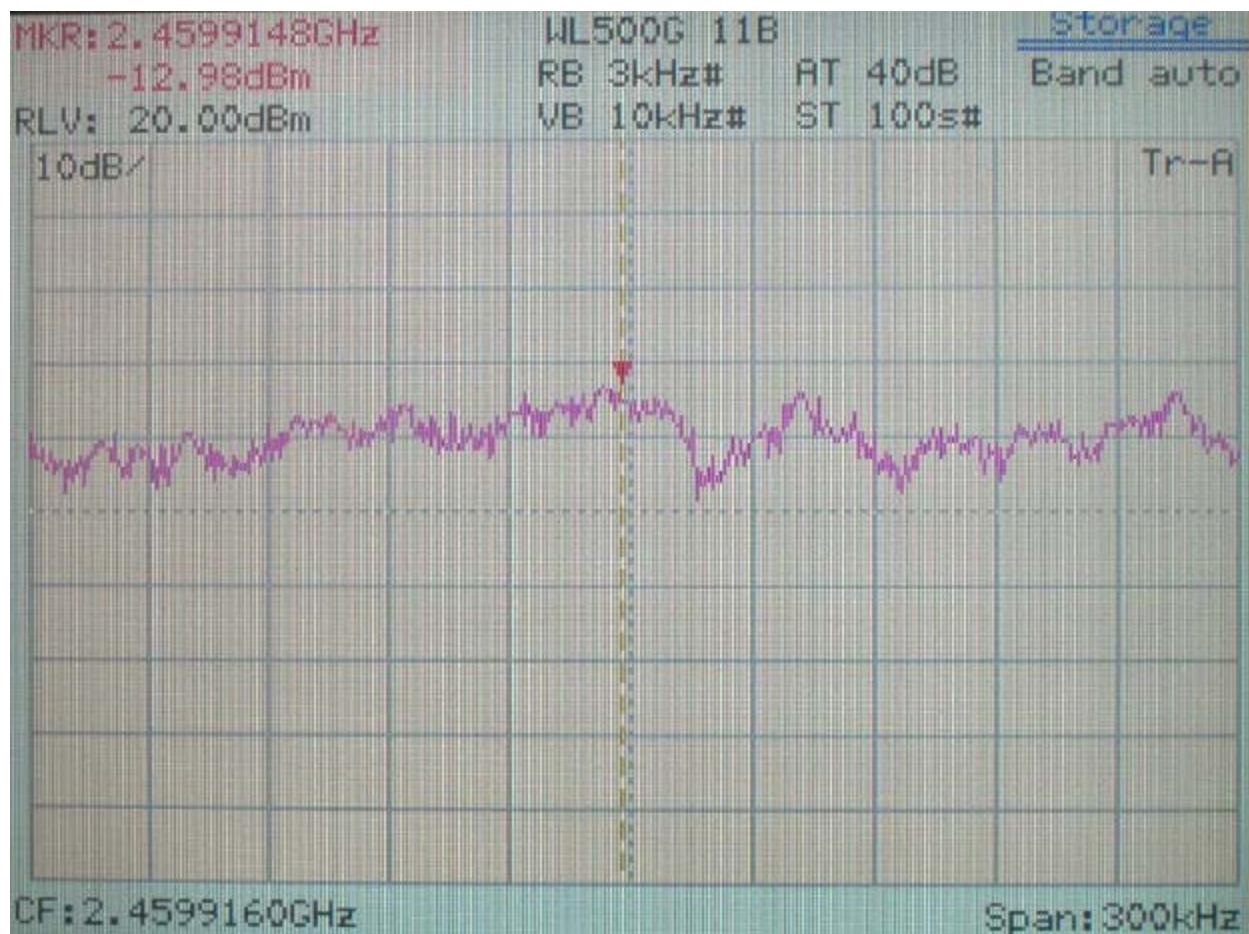
Channel 01



Channel 06



Channel 11





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E-mail: report@trclab.com.tw

EXHIBIT D

Test Set-up Photos

Conducted Test Setup Placement:



Front View of the Test Configuration

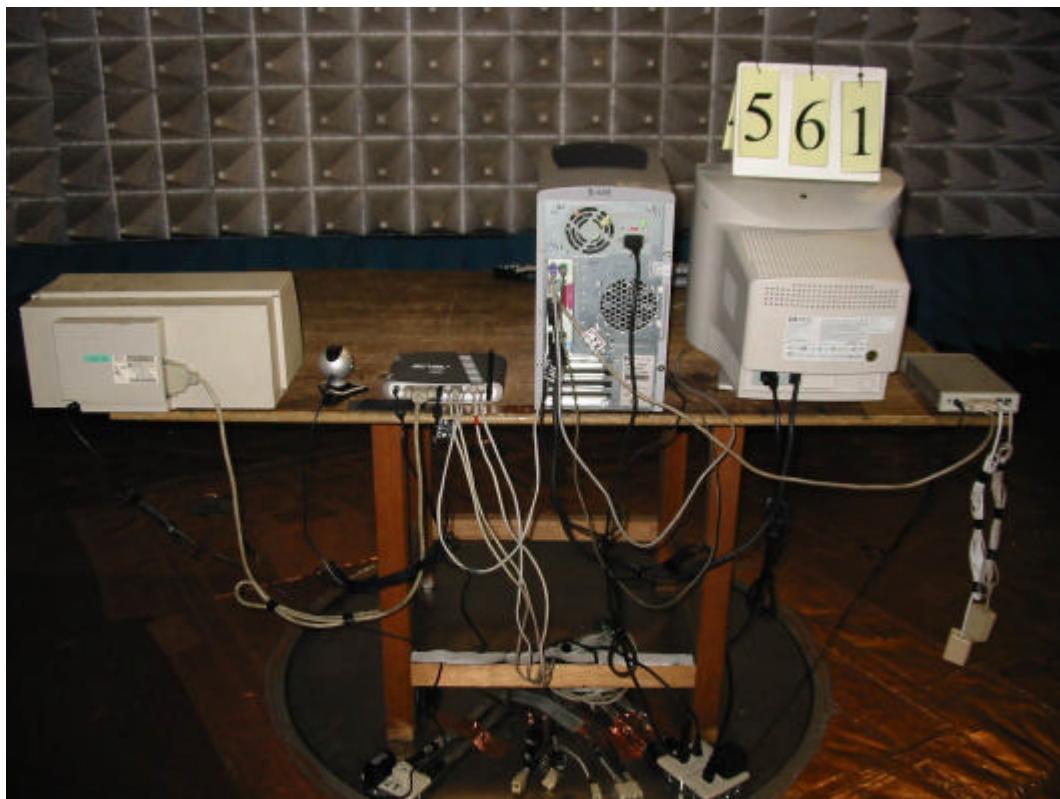


Side View of the Test Configuration

Radiated Test Setup Placement: (Unintentional)

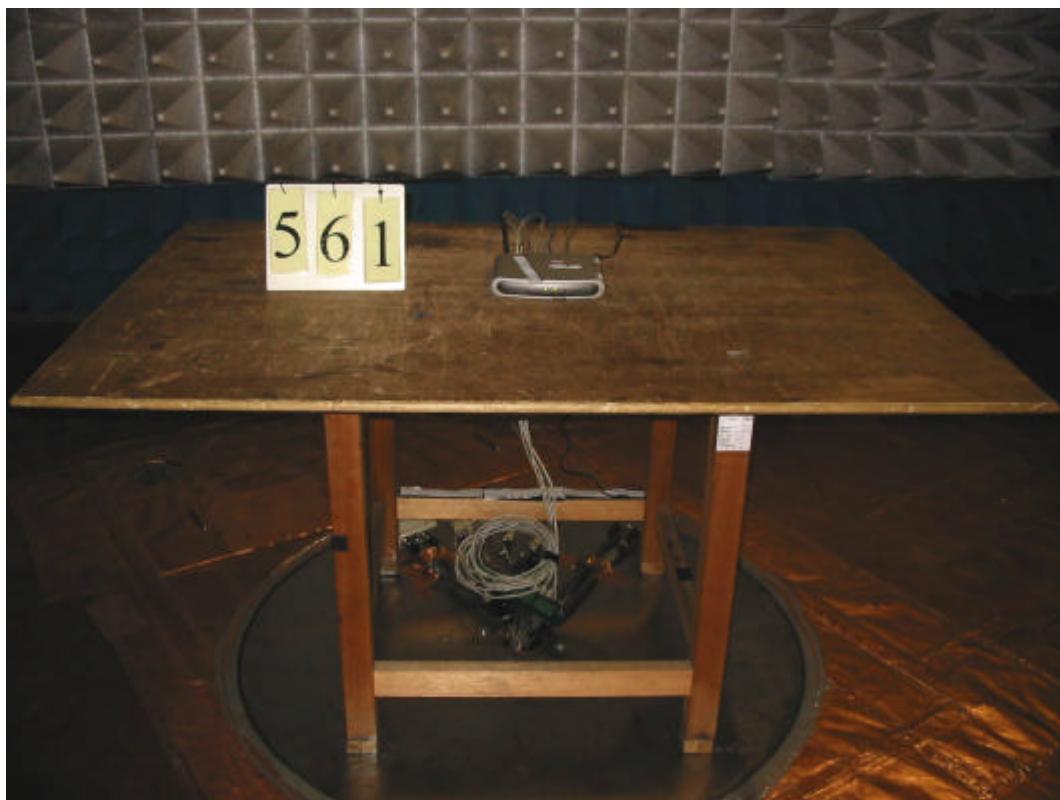


Front View of the Test Configuration of Unintentional

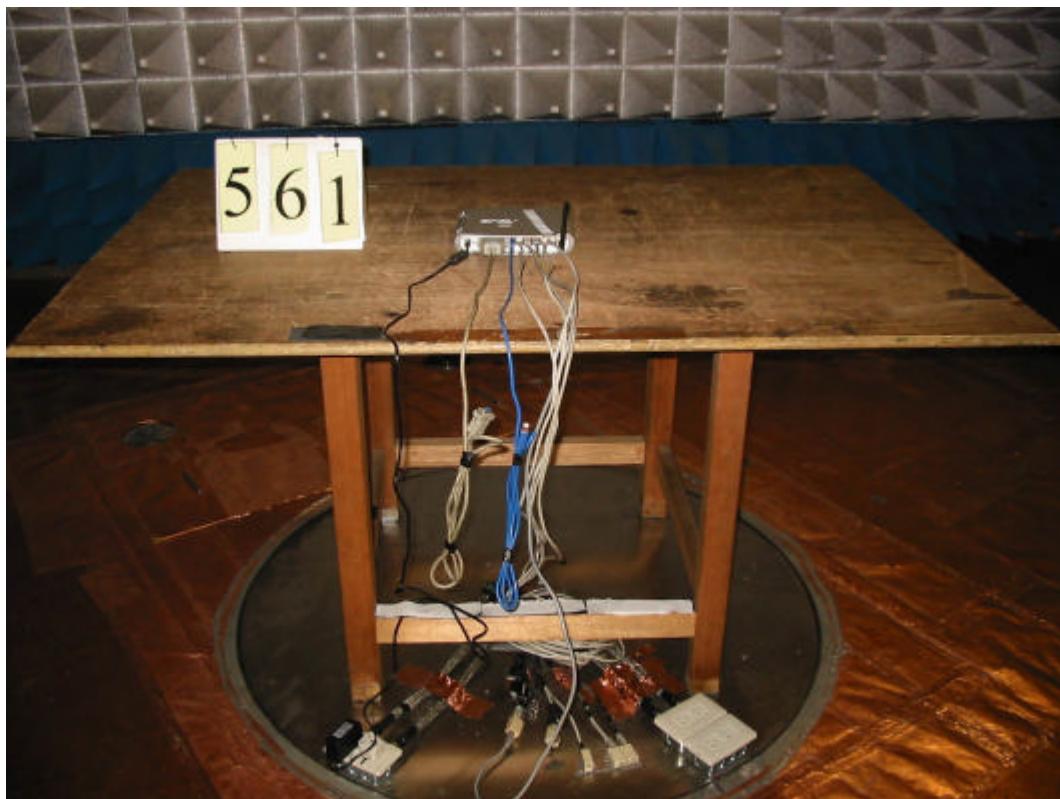


Rear View of the Test Configuration of Unintentional

Radiated Test Setup Placement: (Intentional)



Front View of the Test Configuration of Intentional



Rear View of the Test Configuration of Intentional



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EXHIBIT E

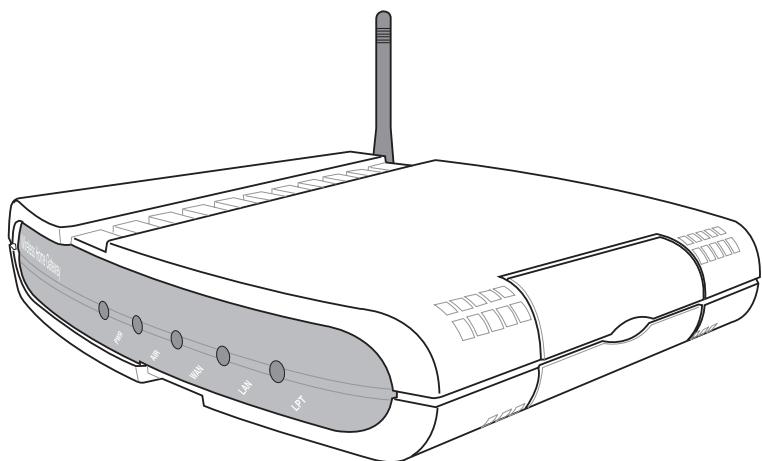
User Manual



SpaceLink Home Gateway

WL-500g

User's Manual



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Web Site: www.asuscom.de

Safety Statements

Federal Communications Commission Statement

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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 to 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.

WARNING! The use of a shielded-type power cord is required in order to meet FCC emission limits and to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used. Use only shielded cables to connect I/O devices to this equipment. You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Reprinted from the Code of Federal Regulations #47, part 15.193, 1993. Washington DC: Office of the Federal Register, National Archives and Records Administration, U.S. Government Printing Office.

Canadian Department of Communications

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

**This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme
NMB-003 du Canada.**

Safety Information

In order to maintain compliance with the FCC RF exposure guidelines, this equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. Use only with supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations. Any changes of modifications not expressly approved by the grantee of this device could void the users authority to operate the equipment.

FCC Radio Frequency Exposure Caution Statement

Installation and use of this Wireless LAN device must be in strict accordance with the instructions included in the user documentation provided with the product. Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. The manufacturer is not responsible for any radio or television interference caused by unauthorized modification of this device, or the substitution or attachment of connecting cables and equipment other than manufacturer specified. It is the responsibility of the user to correct any interference caused by such unauthorized modification, substitution or attachment. Manufacturer and its authorized resellers or distributors will assume no liability for any damage or violation of government regulations arising from failing to comply with these guidelines.

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1. Introduction

Thank you for choosing the SpaceLink Home Gateway, a member of ASUS' SpaceLink wireless infrastructure family. The SpaceLink Home Gateway complies with the IEEE 802.11b wireless standard to provide wireless mobile clients with network connectivity at data rates of up to 11 Mbps. The stand-alone the SpaceLink Home Gateway connects to a small Ethernet network to provide wireless access for wireless mobile clients.

The SpaceLink™ Family

The SpaceLink Home Gateway is a member of a product family that provides a complete wireless networking solution.

- The **SpaceLink Home Gateway (WL-500g)** creates a wireless network using the IEEE 802.11b wireless standard and adds a router, hub, and printer server.
- The **SpaceLink Access Point (WL-300)** creates a wireless network using the IEEE 802.11b wireless standard.
- The **SpaceLink PC Card (WL-100)** is a wireless LAN adapter that fits into a PCMCIA Type II slot in a Notebook PC.
- The **SpaceLink CF Card (WL-110)** is a wireless LAN adapter that fits into a Compact Flash Type II slot in a Portable Digital Assistant (PDA).

System Requirements

To begin using the SpaceLink Home Gateway , you must have the following minimum requirements:

- ADSL/Cable Modem and Broadband Internet Account
- An Ethernet (10Base-T or 10/100Base-TX) adapter for wired client
- At least one 802.11b wireless adapter for a wireless mobile client
- TCP/IP and Internet browser installed
- Printer, which supports standard parallel protocol (SPP) (optional)

Note: The SpaceLink Home Gateway only supports 10Base-T on the WAN port and both 10Base-T and 100Base-TX on the LAN port.

The Product Package

Each the SpaceLink Home Gateway comes with:

- One SpaceLink Home Gateway (WL-500g)
- One power adapter (5 Volts DC, 2 Amp)
- One RJ-45 Ethernet cable (straight-through)
- One SpaceLink Home Gateway (WL-500g) Quick Start Guide
- One support CD (Utilities and User's Manual PDF)

Chapter 1 - Introduction

FEATURES

The SpaceLink Home Gateway features include:

- **Multiple local network ports.** Four 10/100Base-T Ethernet ports, offering either a connection to a hub or switch on the local wired network or a direct connection to multiple Ethernet-enabled computer.
- **Wireless antenna.** The integrated Wireless Access Point allows the SpaceLink Home Gateway to link a broadband Internet connection to your local network of 802.11b (DSSS) wireless mobile clients.
- **Broadband port.** The Broadband port connects the SpaceLink Home Gateway to your cable/DSL modem.
- **Shared Internet access.** All computers on the local network can access the Internet through the SpaceLink Home Gateway, using only a single external IP address.
- **DHCP server support.** DHCP (Dynamic Host Configuration Protocol) support allows the SpaceLink Home Gateway to automatically provide IP addresses to computers on your local network.
- **PPPoE support.** Connect to your DSL provider using PPPoE (PPP over Ethernet), if your ISP uses this method.
- **Easy setup and management.** Use your web browser from any computer on the local network to configure the SpaceLink Home Gateway.
- **Advanced features.** The SpaceLink Home Gateway supports many advanced configuration features including the following: User-defined virtual servers; special Internet applications; exposed computer; password protection and access control.
- **Firewall protection.** The SpaceLink Home Gateway's use of NAT (Network Address Translation) provides firewall protection for your local network. NAT masks the local network's IP Addresses from the Internet. Additional protection can be achieved using the advanced features of the SpaceLink Home Gateway.
- **WEP support.** Supports 64 bit and 128 bit WEP encryption on the wireless network.

The IEEE 802.11b Specification

In 1997, the Institute of Electrical and Electronics Engineers (IEEE) adopted the 802.11 standard for wireless devices operating in the 2.4 GHz frequency band. This standard includes provisions for three radio technologies: direct sequence spread spectrum, frequency hopping spread spectrum, and infrared. Devices that comply with the 802.11 standard operate at a data rate of either 1 or 2 Mbps.

In 1999, the IEEE created the 802.11b standard. 802.11b is essentially identical to the 802.11 standard except 802.11b provides for data rates of up to 11 Mbps for direct sequence spread spectrum devices. Under 802.11b, direct sequence devices can operate at 11 Mbps, 5.5 Mbps, 2 Mbps, or 1 Mbps. This provides interoperability with existing 802.11 direct sequence devices that operate only at 2 Mbps.

Direct sequence spread spectrum devices spread a radio signal over a range of frequencies. The IEEE 802.11b specification allocates the 2.4 GHz frequency band into 14 overlapping operating Channels. Each Channel corresponds to a different set of frequencies. See the Appendix to determine the center frequency used by each Channel.

If operating multiple 802.11b Home Gateways in the same vicinity, the distance between the center frequencies must be at least 25 MHz to avoid interference. Note that the Channels available to an 802.11b Home Gateway will vary from country to country. In the United States, the 802.11b standard allocates 11 operating Channels for direct sequence devices. Channels 1, 6, and 11 are independent and do not overlap with each other. To avoid interference between 802.11b Home Gateways, It is recommended that you configure the Home Gateways using only Channels 1, 6, and 11.

Direct-Sequence Spread Spectrum

Spread spectrum (broadband) uses a narrowband signal to spread the transmission over a segment of the radio frequency band or spectrum. Direct-sequence is a spread spectrum technique where the transmitted signal is spread over a particular frequency range. The Space Link Home Gateway uses Direct-Sequence Spread Spectrum (DSSS) for radio communication.

Direct-sequence systems communicate by continuously transmitting a redundant pattern of bits called a chipping sequence. Each bit of transmitted data is mapped into chips by the Home Gateway and rearranged into a pseudorandom spreading code to form the chipping sequence. The chipping sequence is combined with a transmitted data stream to produce the Home Gateway output signal.

Wireless mobile clients receiving a direct-sequence transmission use the spreading code to map the chips within the chipping sequence back into bits to recreate the original data transmitted by the Home Gateway. Intercepting and decoding a direct-sequence transmission requires a predefined algorithm to associate the spreading code used by the transmitting Home Gateway to the receiving wireless mobile client.

This algorithm is established by IEEE 802.11b specifications. The bit redundancy within the chipping sequence enables the receiving wireless mobile client to recreate the original data pattern, even if bits in the chipping sequence are corrupted by interference. The ratio of chips per bit is called the spreading ratio. A high spreading ratio increases the resistance of the signal to interference. A low spreading ratio increases the bandwidth available to the user. The Home Gateway uses a constant chip rate of 11Mchips/s for all data rates, but uses different modulation schemes to encode more bits per chip at the higher data rates. The Home Gateway is capable of an 11 Mbps data transmission rate, but the coverage area is less than a 1 or 2 Mbps Home Gateway since coverage area decreases as bandwidth increases.

Wireless Operation

The SpaceLink Home Gateway will operate as a MAC layer learning bridge and forward packets between wireless mobile clients and the Ethernet network.

A wireless LAN that uses the SpaceLink Home Gateway generally consists of one or more 802.11b Access Points and one or more wireless mobile clients that have an 802.11b adapter installed.

The SpaceLink Home Gateway maintains a table of MAC addresses, which it has learned are located either on the Ethernet network or on the radio network by monitoring the source address of packets it receives. For example, if the SpaceLink Home Gateway receives a packet over its radio, it creates an entry in its table for the node that sent the packet and labels the entry as a member of the radio network. The SpaceLink Home Gateway removes an entry from the table after five minutes of inactivity.

When the SpaceLink Home Gateway receives a packet from the Ethernet network, it compares the packet's destination address with the node addresses listed in its table. If the packet's destination address is not in the table, the SpaceLink Home Gateway will forward the packet to the wireless mobile clients. If the packet's destination address is listed in the table as a member of the radio network, the SpaceLink Home Gateway will forward the packet to the wireless mobile clients. If the packet's destination address is listed in the table as a member of the Ethernet network, the SpaceLink Home Gateway will not forward the packet to the wireless mobile clients. The SpaceLink Home Gateway applies the same principles to determine if a packet received over its radio should be forwarded to the Ethernet network.

The SpaceLink Home Gateway forwards all broadcast packets to wireless mobile clients. Given this, the SpaceLink Home Gateway can only support 250 nodes.

The speed available to wireless mobile clients depends on the amount of information that each client exchanges with the network because the 11 Mbps wireless bandwidth is shared with all wireless nodes.

Roaming Between SpaceLink™ Gateways or APs

If there are multiple SpaceLink Home Gateways or Access Points on the network, then a wireless mobile client may seamlessly roam from one the SpaceLink Home Gateway or Access Point to another.

Each SpaceLink Home Gateway or Access Point creates its own wireless cell or coverage area. This is also known as a Basic Service Set (BSS). Any wireless mobile client can communicate with a particular SpaceLink Home Gateway or Access Point if it is within the SpaceLink Home Gateway's or Access Point's coverage area.

If the cells of multiple SpaceLink Home Gateways or Access Points overlap, then the wireless mobile client may switch from one SpaceLink Home Gateway or Access Point to another as it travels throughout the facility. During the hand-off from one SpaceLink Home Gateway or Access Point to another, the wireless mobile client maintains an uninterrupted connection to the network. This is known as “roaming.”

Multiple SpaceLink Home Gateways connected to a common Ethernet network form an Extended Service Set (ESS). All members of an Extended Service Set are configured with an ID, known as the SSID or ESSID. Wireless mobile clients must be configured with the same SSID as the SpaceLink Home Gateways or Access Points on the network; a client can only roam between the SpaceLink Home Gateways or Access Points that share the same SSID.

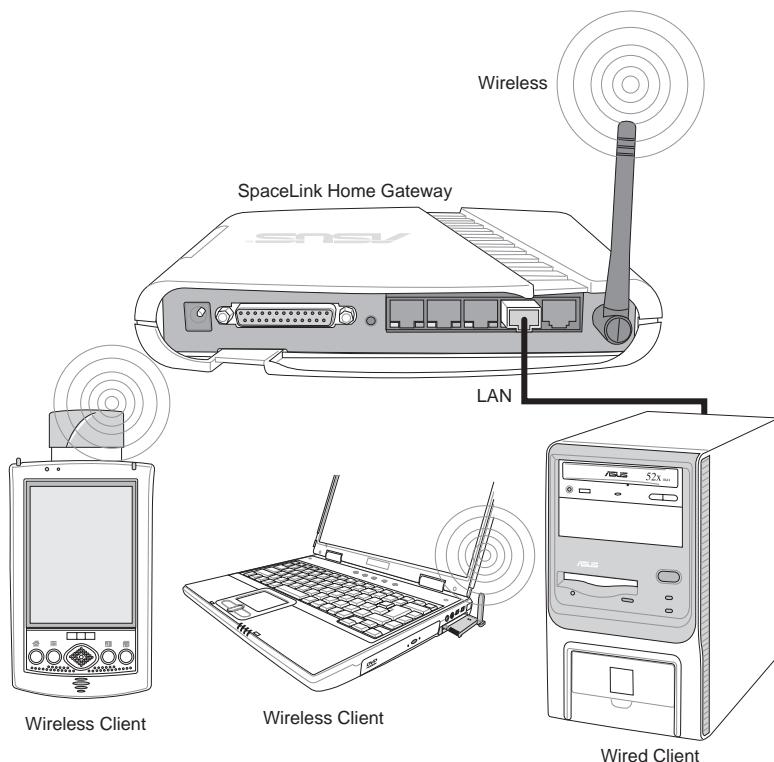
Roaming Guidelines (SpaceLink™ Gateways or APs)

- A 802.11b PC Card can only roam between 802.11b SpaceLink Home Gateways or Access Points.
- All the SpaceLink Home Gateways or Access Points must have the same SSID.
- All computers with SpaceLink PC card or CF card adapters must have the same SSID as the Home Gateways or Access Points that they will roam between.
- If WEP encryption is enabled, then all the SpaceLink Home Gateways or Access Points and client adapters must use the same encryption level and WEP Key(s) to communicate.
- The SpaceLink Home Gateways' or Access Points' cells must overlap to ensure that there are no gaps in coverage and to ensure that the roaming client will always have a connection available.
- The SpaceLink Home Gateways or Access Points that use the same Channel should be installed as far away from each other as possible to reduce potential interference.
- It is strongly recommended that you perform a site survey using the utility provided with the SpaceLink PC card or CF card to determine the best location for each the SpaceLink Home Gateway or Access Points in the facility.

SpaceLink™ Home Gateway Topology

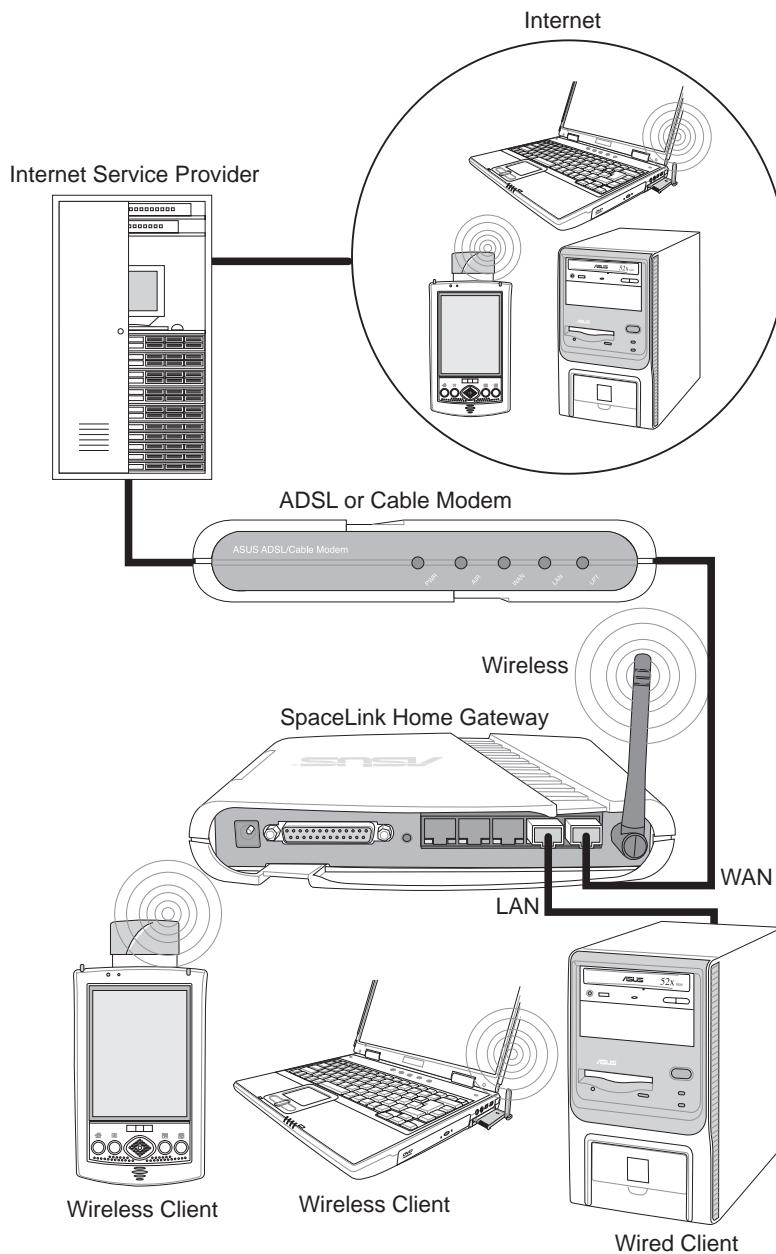
There are three major ways to deploy the home gateway in your local network (I) Network backbone, (II) Agent to ISP and (III) Agent to another network.

Network Backbone



In this topology, the home gateway connects your wired and wireless devices together to form a local area network (LAN), as shown. To connect a computer (or other device) to the SpaceLink Home Gateway, you need a network cable (UTP-Cat5) with one end connected to one of the LAN ports on the back of the SpaceLink Home Gateway and the other in the 10/100 LAN port on that device. For wireless connections, wireless mobile clients must comply with the IEEE 802.11b standard.

Agent to ISP



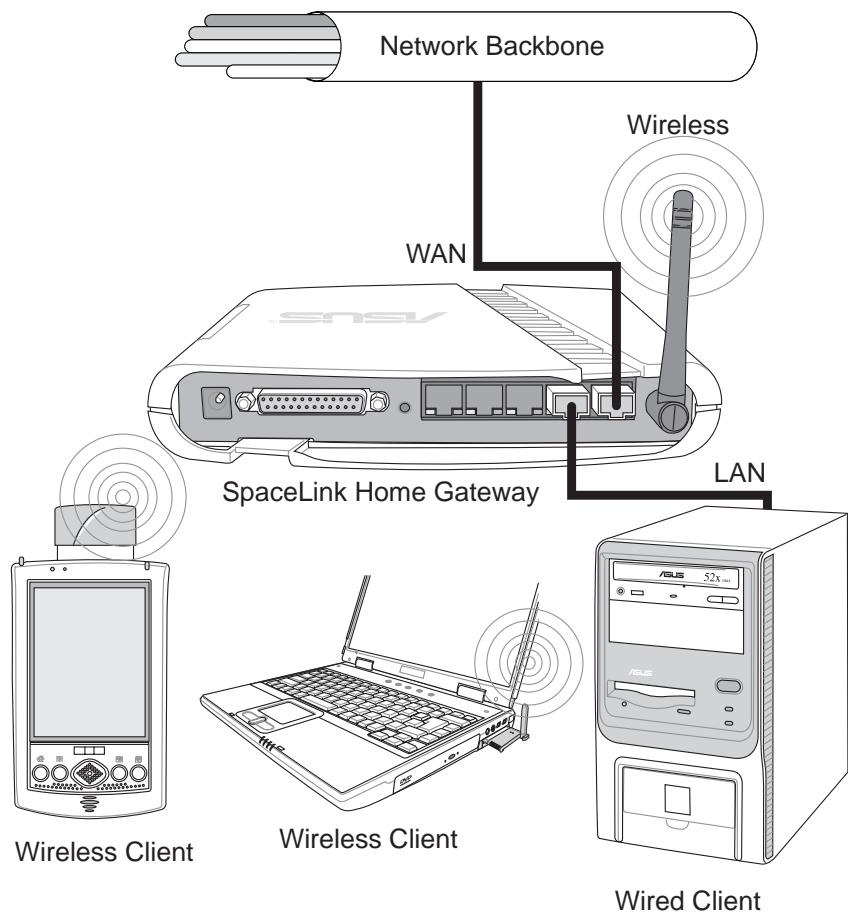
In this topology, the home gateway is not only a backbone of your LAN but also an agent to your Internet Service Provider (ISP). You may use an ADSL or Cable modem to communicate with your ISP. Connect the LAN port on the modem with the WAN port at the back of the SpaceLink Home Gateway using a network cable as shown above.

Note: You also need to make sure that other connections on the ADSL or Cable modem are correct.

Chapter 1 - Introduction

1. Introduction

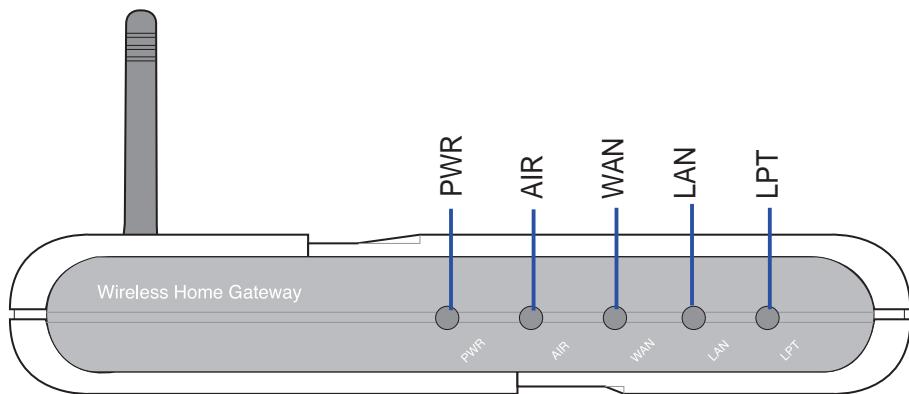
Agent to Another Network



In this topology, the home gateway is an agent between your LAN and another network. Use a network cable with one end connected to the WAN port on the home gateway and the other to the other network as shown above.

SpaceLink Home Gateway LED Indicators

The LEDs on the front of the SpaceLink Home Gateway display the status of the SpaceLink Home Gateway.



PWR (Power)

- | | |
|----------|-----------------------------------------------|
| Off | (1) No power, (2) During boot sequence |
| On | (1) Power ON and system ready |
| Flashing | (1) During boot sequence, (2) Self-test error |

AIR (Wireless)

- | | |
|----------|-------------------------------------------------------------------------|
| Off | (1) No power, (2) No wireless connection |
| On | (1) At least one wireless client is associated |
| Flashing | (1) Wireless traffic through this port is detected, (2) Self-test error |

WAN (Wide Area Network)

- | | |
|----------|----------------------------------------------------------------------|
| Off | (1) No power, (2) No wired connection |
| On | (1) Link to another network device but no traffic |
| Flashing | (1) Wired traffic through this port is detected, (2) Self-test error |

LAN (Local Area Network)

- | | |
|----------|----------------------------------------------------------------------|
| Off | (1) No power, (2) No wired connection |
| On | (1) Link to another network device but no traffic |
| Flashing | (1) Wired traffic through this port is detected, (2) Self-test error |

LPT (Printer)

- | | |
|----------|-------------------------------------------|
| Off | (1) No power, (2) No printer is connected |
| On | (1) The connected printer is switched on |
| Flashing | (1) Send data to a printer |

Note: The SpaceLink Home Gateway only supports 10Base-T on the WAN port and both 10Base-T and 100Base-TX on the LAN port.

2. Installation

This chapter describes the installation procedure for the SpaceLink Home Gateway and includes a description of the LEDs found on the unit.

Installation Procedure

Follow these steps to install the SpaceLink Home Gateway.

1. **Location:** Determine the best location for the SpaceLink Home Gateway. Keep in mind the following considerations:
 - The length of the Ethernet cable that connects the Home Gateway to the network must not exceed 100 meters.
 - For standard placement, try to place the Home Gateway on a flat, sturdy surface as far from the ground as possible, such as on top of a desk or bookcase, keeping clear of metal obstructions and away from direct sunlight.
 - Try to centrally locate the Home Gateway so that it will provide coverage to all of the wireless mobile devices in the area. Orientating the antenna vertically should provide the best reception.
 - Use only the power supply that came with this unit. Other power supplies may fit but the voltage and power may not be compatible.

It is the responsibility of the installer and users of the SpaceLink Home Gateway to guarantee that the antenna is operated at least 20 centimeters from any person. This is necessary to insure that the product is operated in accordance with the RF Guidelines for Human Exposure which have been adopted by the Federal Communications Commission.

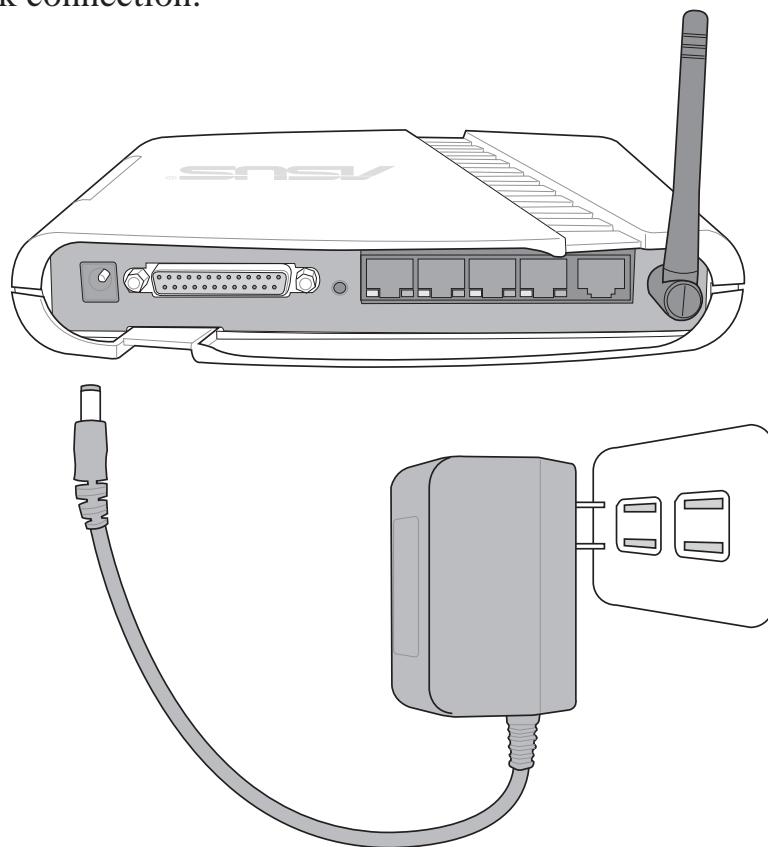
2. **Mounting:** Place the Home Gateway in the desired location. Wall mounting is also possible for the Home Gateway. Refer to the section entitled “Wall Mounting Option” for details.
3. **WAN Connection:** Attach one end of the provided RJ-45 Ethernet cable to the SpaceLink Home Gateway’s WAN port and attach the other end to the RJ-45 Ethernet cable to your ADSL or Cable modem.

The SpaceLink Home Gateway WAN port does not support 100Base-TX; it only supports 10Base-T. The WAN port may be connected to devices that supports both 10/100, but not pure 100Base-TX.

Chapter 2 - Installation

4. **LAN Connection:** Attach one end of an RJ-45 Ethernet cable to the SpaceLink Home Gateway's LAN port (any one of the four) and attach the other end to the RJ-45 Ethernet cable to your desktop computer.
5. **Power Connection:** The SpaceLink Home Gateway requires power from an external power supply. The SpaceLink Home Gateway ships with a UL listed, Class 2 power supply (5V, 2A). Attach one end of the DC power adapter to the back of the SpaceLink Home Gateway and the other end to a power outlet.

The Power LED on the front of the Home Gateway will light up when the unit is powered ON. In addition, the green LAN or WAN LEDs will turn ON to indicate that the Home Gateway has a physical Ethernet network connection.



Note: Use the Home Gateway only with the power adapter supplied in the product package. Using another power supply may damage the Home Gateway.

6. **Printer Connection:** If you plan to use the home gateway as a printing server for your local network, connect a printer to the printer port of the home gateway via a printer cable.

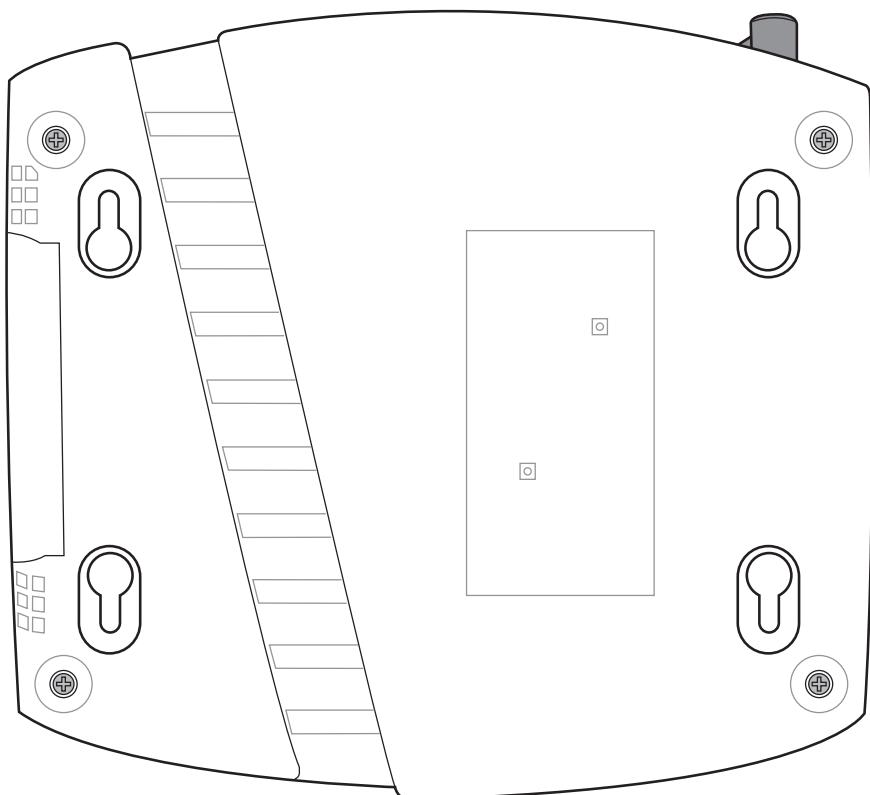
Wall Mounting Option

Out of the box, the SpaceLink Home Gateway is designed to sit on a raised flat surface like a file cabinet or book shelf. The unit may also be converted for mounting to a wall or ceiling.

Follow these steps to mount the Home Gateway to a wall:

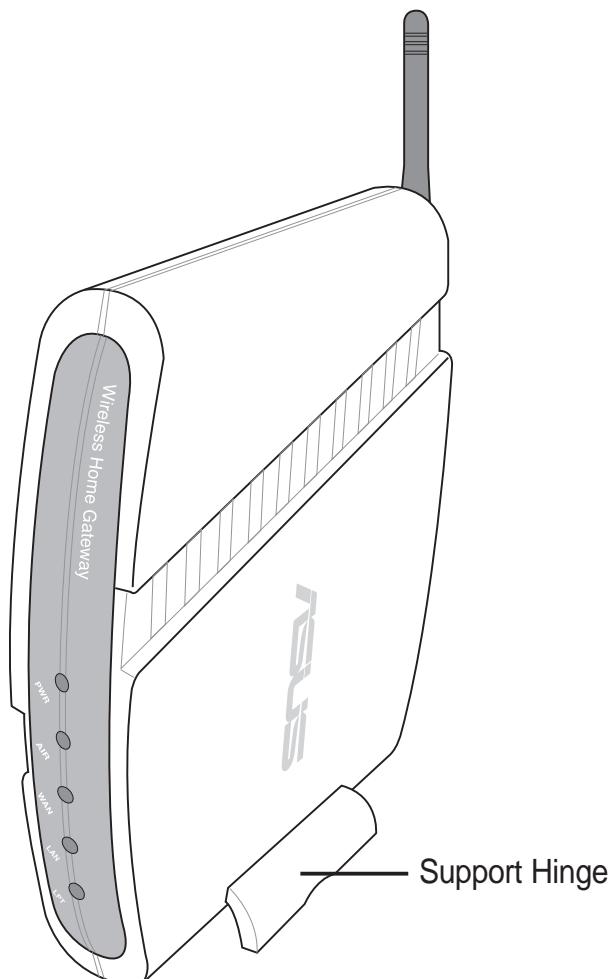
1. Look on the underside for the four mounting hooks.
2. Mark two upper holes in a flat surface using the provided hole template.
3. Tighten two screws until only 1/4" is showing.
4. Latch the upper two hooks of the Home Gateway onto the screws.

Note: Readjust the screws if you cannot latch the Home Gateway onto the screws or if it is too loose.



Vertical Standing Option

The ASUS Home Gateway can also stand on its side to save space. Two hinges can be opened on the right side to support vertical standing. Orientate the antenna so that it points upwards.



Chapter 2 - Installation

Connecting to the SpaceLink Home Gateway

Wired Connection

One RJ-45 cable is supplied with the SpaceLink Home Gateway. Auto crossover function is designed into the SpaceLink Home Gateway so you can use either a straight-through or a crossover Ethernet cable. Plug one end of the cable into the WAN port on the rear of the SpaceLink Home Gateway and the other end into the Ethernet port of your ADSL or Cable modem.

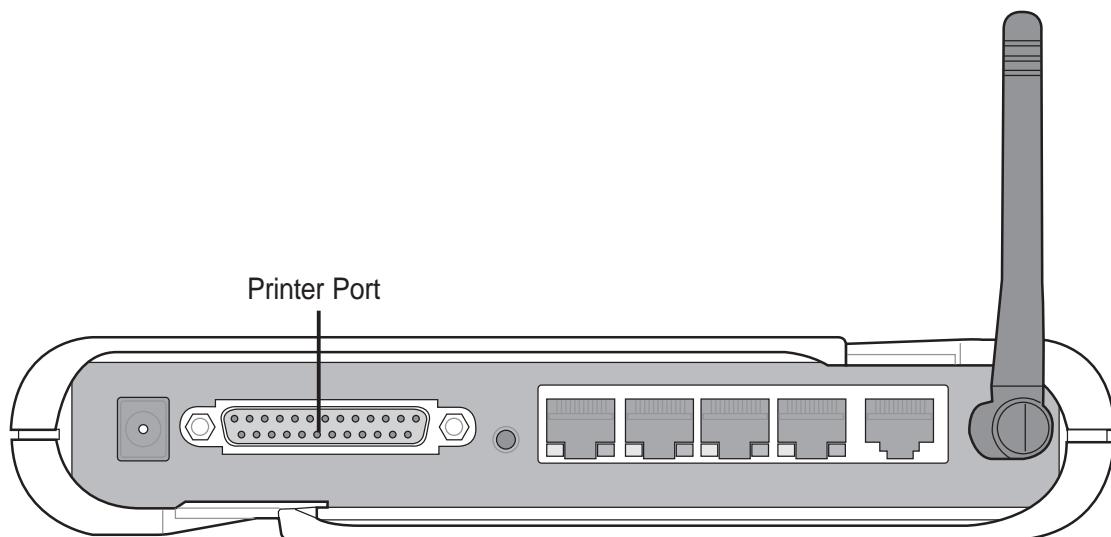
Note: The WAN port only supports 10Base-TX.

Wireless-Connection

Refer to your wireless adapter user's manual on associating with the SpaceLink Home Gateway . The default SSID of the SpaceLink Home Gateway is "default" (lower case), encryption is disabled and open system authentication is used.

Printer Connection

The SpaceLink Home Gateway can be utilized as a printer server to allow many wired or wireless computers to share a standard printer. A DB25 parallel cable should be supplied with your printer. Plug the male connector of this parallel cable into the printer port on the rear of the SpaceLink Home Gateway and the centronics end into your printer.



Configuring the SpaceLink Home Gateway

The home gateway can be configured to meet various usage scenarios. Some of the factory default settings may suit your usage; however, others may need changing. Prior to using the home gateway, you must check the basic settings to guarantee it will work in your environment.

Configuring the SpaceLink Home Gateway is done through a web browser. You need a Notebook PC or desktop PC connected to the SpaceLink Home Gateway and running a web browser as a configuration terminal. The connection can be wired or wireless. For the wireless connection, you need an IEEE 802.11b compatible device, e.g. ASUS SpaceLink PC Card, installed in your Notebook PC. You should also disable WEP and set the SSID to “default” for your wireless LAN device.

If you want to configure the SpaceLink Home Gateway or want to access the Internet through the SpaceLink Home Gateway, TCP/IP settings must be correct. Normally, the TCP/IP setting should be on the IP subnet of the SpaceLink Home Gateway. The SpaceLink Home Gateway incorporates a DHCP server so the easiest method is to set your PC to get its IP address automatically and reboot your computer. So the correct IP address, gateway, DNS (Domain Name System Server) can be obtained from the SpaceLink Home Gateway.

Note: Before rebooting your PC, the SpaceLink Home Gateway should be switched ON and in ready state.

Advanced IP Settings

If you want to set your IP address manually, the following default settings of the SpaceLink Home Gateway should be known:

- IP address 192.168.123.1
- Subnet Mask 255.255.255.0.

If you set your computer’s IP manually, it needs to be on the same segment. For example:

- IP address 192.168.123.xxx (xxx can be any number between 2 and 254 that is not used by another device)
- Subnet Mask 255.255.255.0 (same as the SpaceLink Home Gateway)
- Gateway 192.168.123.1 (this is the SpaceLink Home Gateway IP address)
- DNS 192.168.123.1 (SpaceLink Home Gateway IP address or your own).

Chapter 2 - Installation

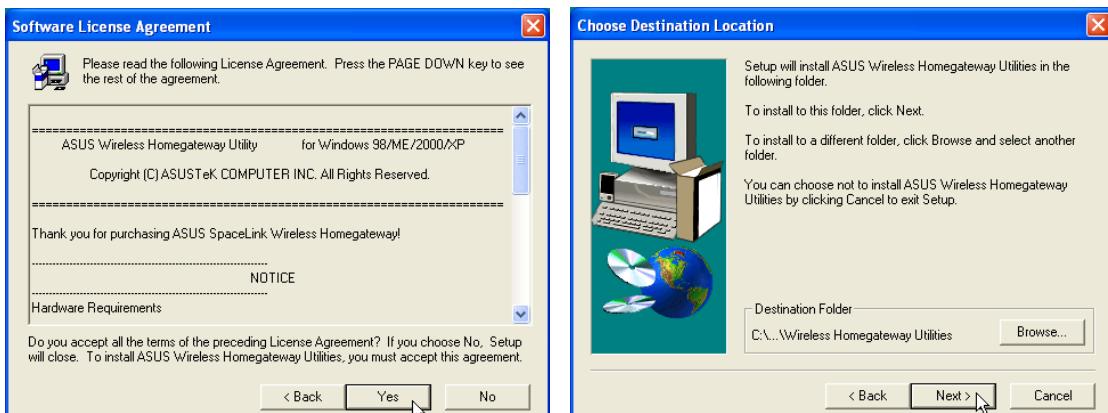
2. Installation

Installing the Homegateway Utilities

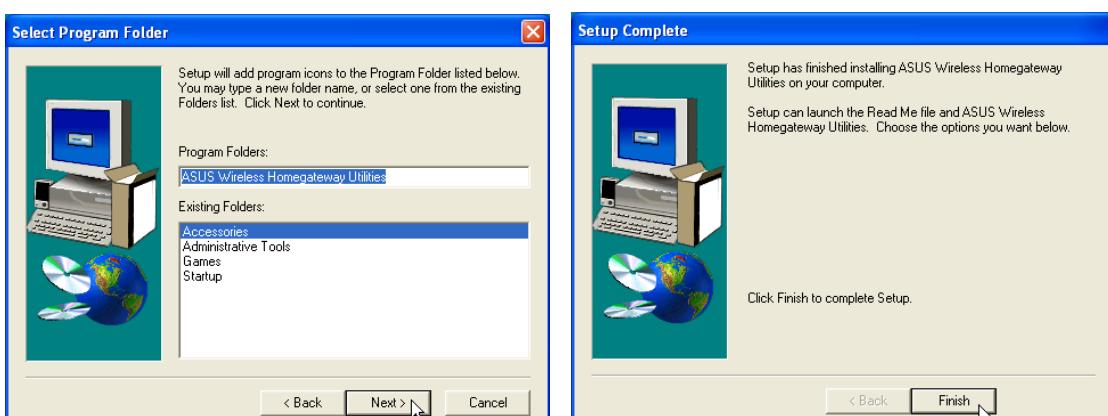
Follow these steps to install the SpaceLink Home Gateway Manager in Microsoft Windows:



- (1) Insert the support CD and the autorun will show. Double-click **setup.exe** if your autorun has been disabled.



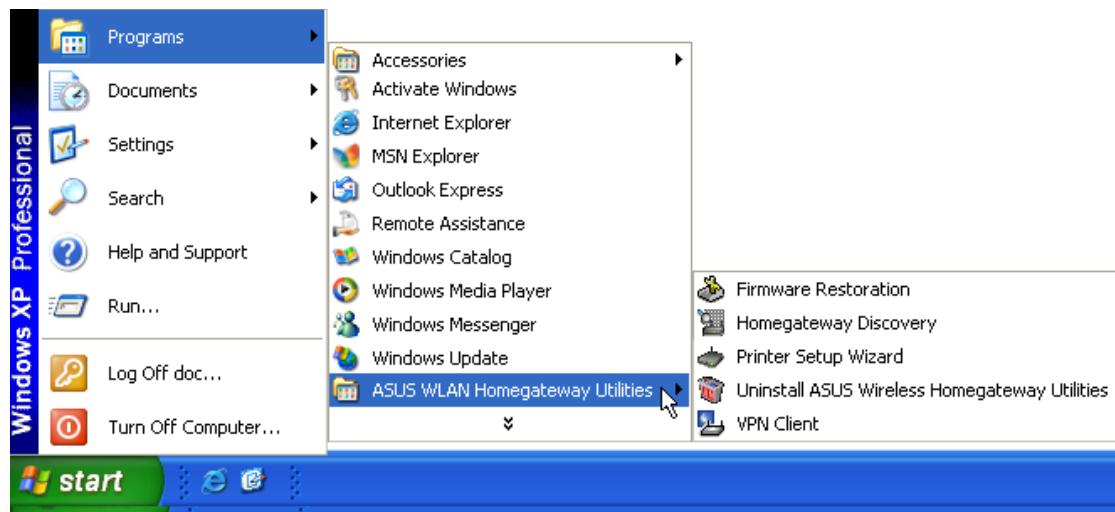
- (3) Click **Yes** after reading the license agreement.



- (5) Click **Next** to accept the default program folder or enter another name.
- (6) Click **Finish** when setup is complete.

3. SpaceLink Home Gateway Utilities

After installation, you can launch the utilities through the Start menu.



Connecting to the SpaceLink Web Manager

Wired Ethernet Connection

Besides using a network hub, you can also connect a LAN cable from your computer's network card to the Home Gateway using either a straight or crossover cable because the SpaceLink Home Gateway LAN and WAN RJ-45 ports have auto-crossover capability.

Wireless Connection

If you are using a Notebook PC with a wireless adapter, you can connect to the SpaceLink Homegateway Web Manager without a wired Ethernet connection.

Home Gateway Discovery

Run the ASUS **Homegateway Discovery** from the Start menu and click **Config** on the device.

Manually Entering the Address

You can also open your PC's web browser and enter the IP address of the ASUS SpaceLink Home Gateway depending on the port you are using.

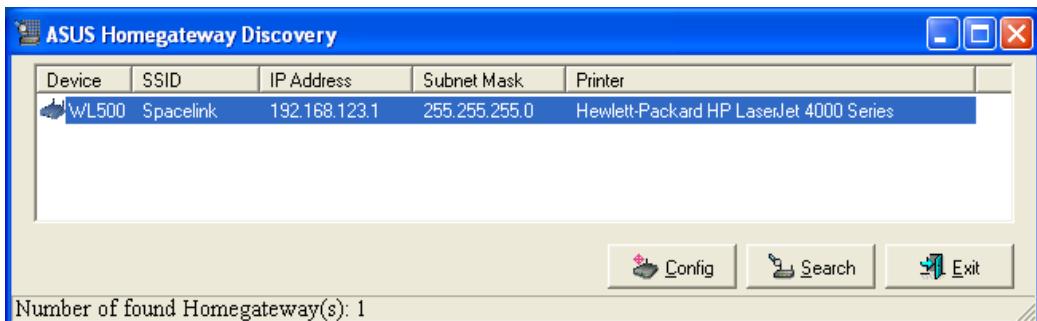
Chapter 3 - Home Gateway Utilities

If your computer is connected to the WAN port use

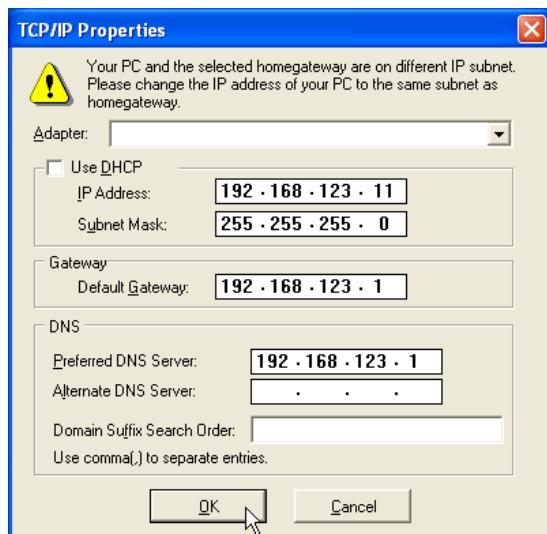
http://(WAN Port IP Address):8080

If your computer is connected to the LAN port use:

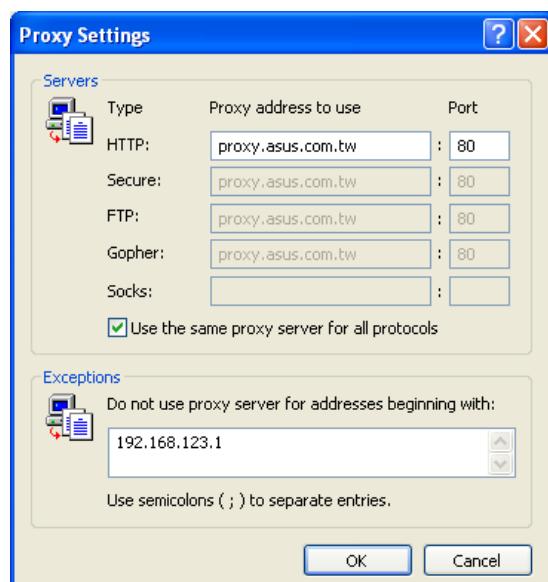
http://192.168.123.1



Web access through the WAN port (over the Internet) is disabled by default so that the above private IP can be used for configuration access. If Internet access through the WAN port is enabled by the user, port 8080 must be used for configuration access. In this case, you would enter the following: **http://(WAN Port IP Address):8080** in your web browser.



If your computer's IP is not on the same subnet as the SpaceLink Home Gateway, you will be asked to change it. The IP address can be any number from 2 to 254 that is not used by another device.



Using a proxy server for your LAN requires that you set an exception for the SpaceLink Home Gateway or else connection will fail.

Chapter 3 - Home Gateway Utilities

If you cannot find any the SpaceLink Home Gateways due to a problem in the IP settings, push and hold the “Restore” button over five seconds to restore factory default settings.

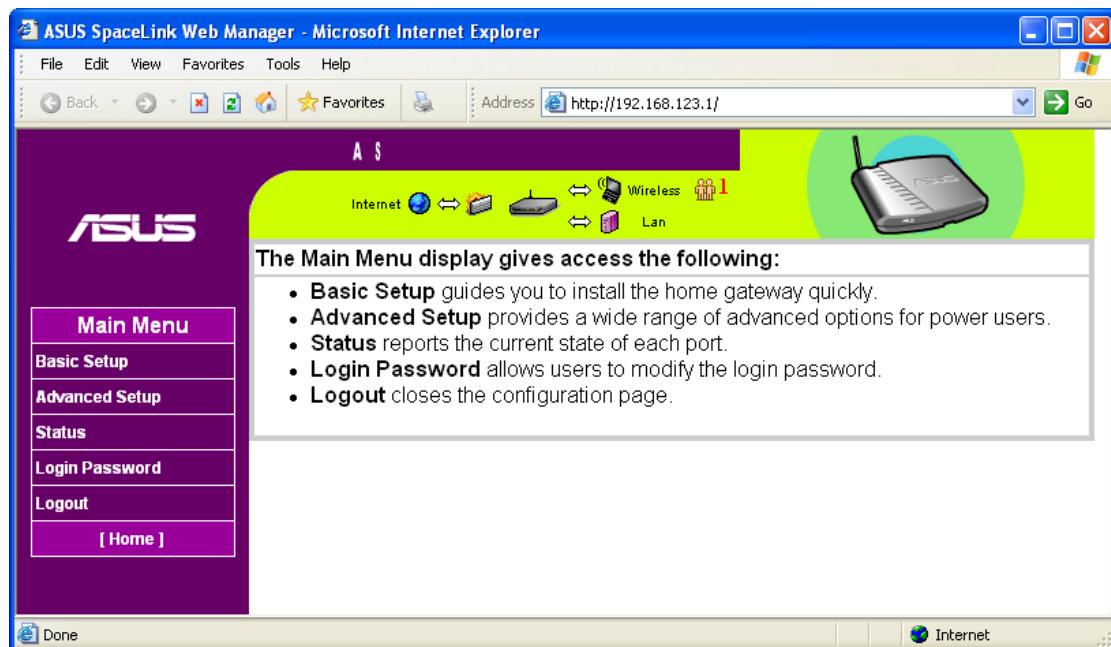
User Name and Password

Once connected, a window will ask for the User name and Password in order to log in. The factory default values are “admin” and “admin”.



Home Page

After logging in, you will see the ASUS HomeGateway home page.

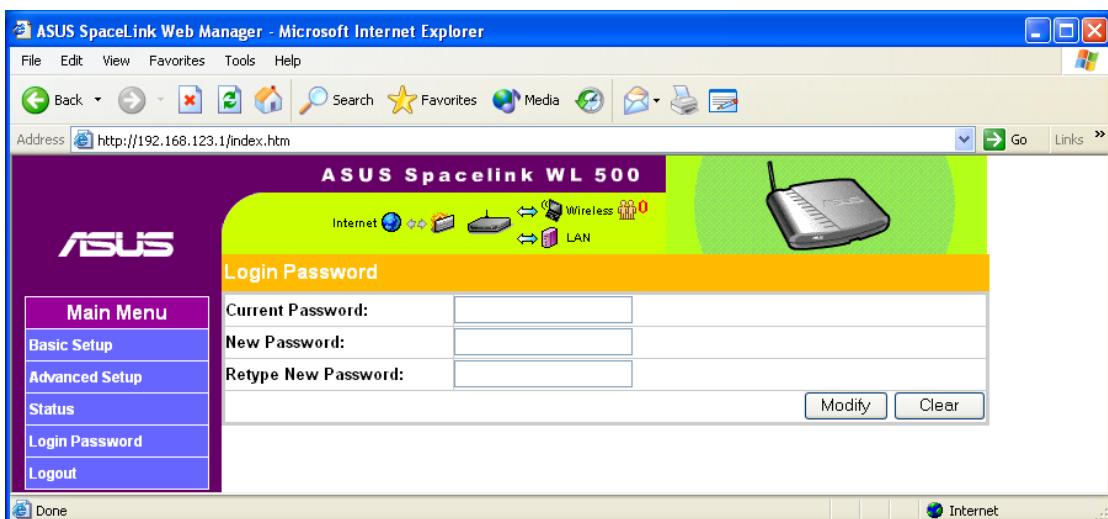


Chapter 3 - Home Gateway Utilities

Login Password

You can find “Login Password” on the Main Menu. This page will allow you to change the default password “admin” (lower case) to any password of your choice. You can enter any usable characters between 1-16 characters long (cannot be left blank). Click **Modify** button to save your new password. If you forget the SpaceLink Home Gateway’s password, you can reset the SpaceLink Home Gateway to its factory settings (see troubleshooting).

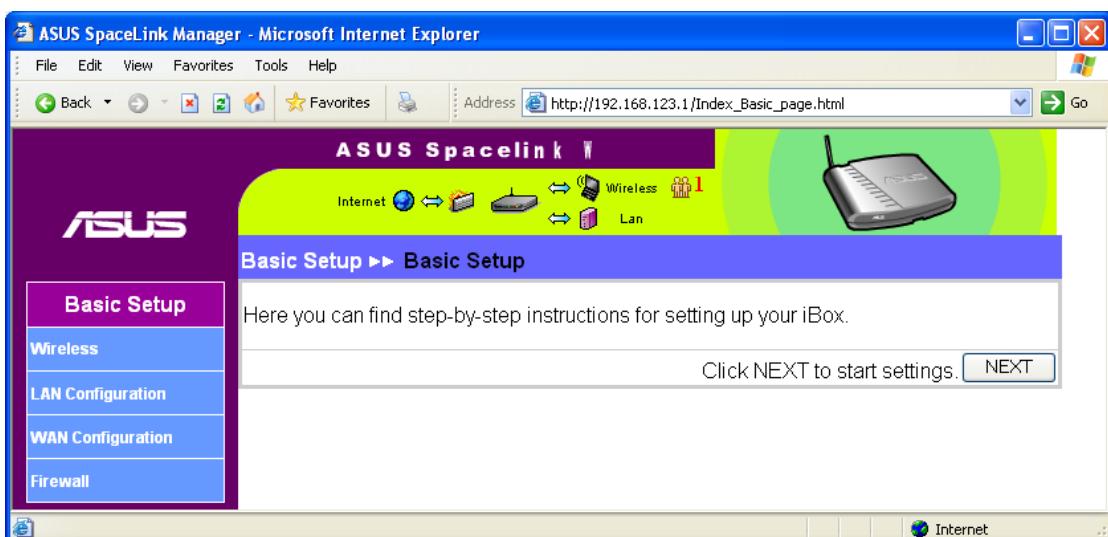
Note: The password is case sensitive.



3. Utilities

Basic Setup

Select **Basic Setup** from the menu on the left.



Click **Next** to enter the wireless configuration page.

Chapter 3 - Home Gateway Utilities

Status

The Status page available from the Main Menu gives you all the necessary information for monitoring the SpaceLink Home Gateway's condition.

The screenshot shows the ASUS SpaceLink Web Manager interface in Microsoft Internet Explorer. The title bar reads "ASUS SpaceLink Web Manager - Microsoft Internet Explorer". The left sidebar has a "Main Menu" with options: Basic Setup, Advanced Setup, Status (which is selected), Login Password, Logout, and [Home]. The main content area is titled "ASUS SpaceLink" and shows a diagram of a router with "Internet", "Wireless", and "LAN" ports. Below this, the "Status" section displays the following information:

ELAPSED TIME SINCE BOOT	0 Day : 0 Hour : 9 Min : 22 Sec
Wireless	
SSID:	Spacelink
Channel:	6
Encryption (WEP):	Off
Number of Associated Stations:	1
LAN	
IP Address:	192.168.123.1
Subnet Mask:	255.255.255.0
DHCP Server:	Enabled
LAN Port Link State:	Linked
WAN	
IP Addressing Method:	PPPoE
IP Address:	61.230.105.240
Subnet Mask:	0.0.0.0
Gateway:	61.230.96.254
DNS Server 1:	168.95.1.1
DNS Server 2:	
WAN Port Link State:	Linked
WAN Port Connection State:	OK
Printer Server	
Connected Printer Status:	on-line
User in service:	

A "Refresh" button is located at the bottom right of the status table. The status bar at the bottom of the browser window shows "Opening page http://192.168.123.1/index_title.html..." and "Internet".

See next page for information on this page.

Chapter 3 - Home Gateway Utilities

Status Details

Details of the Status page items are described in the configuration pages following this page.

Wireless

Number of Associated Stations - Tells you how many wireless mobile clients are connected to the SpaceLink Home Gateway.

LAN

DHCP Server - This shows either Enabled or Disabled.

LAN Port Link State - Linked or Not Linked (indicates whether the cable is plugged in or not).

WAN

WAN Port Link State - Linked or Not Linked (indicates whether the cable is plugged in or not).

WAN Port Connection State: Disconnected, Connecting, OK (OK indicates that the IP address is working).

Printer Server

Connected Printer Status: There are five possible statuses: Off-Line (no printer), On-Line (ready), Error (problem), Out of Paper, Busy (someone is printing).

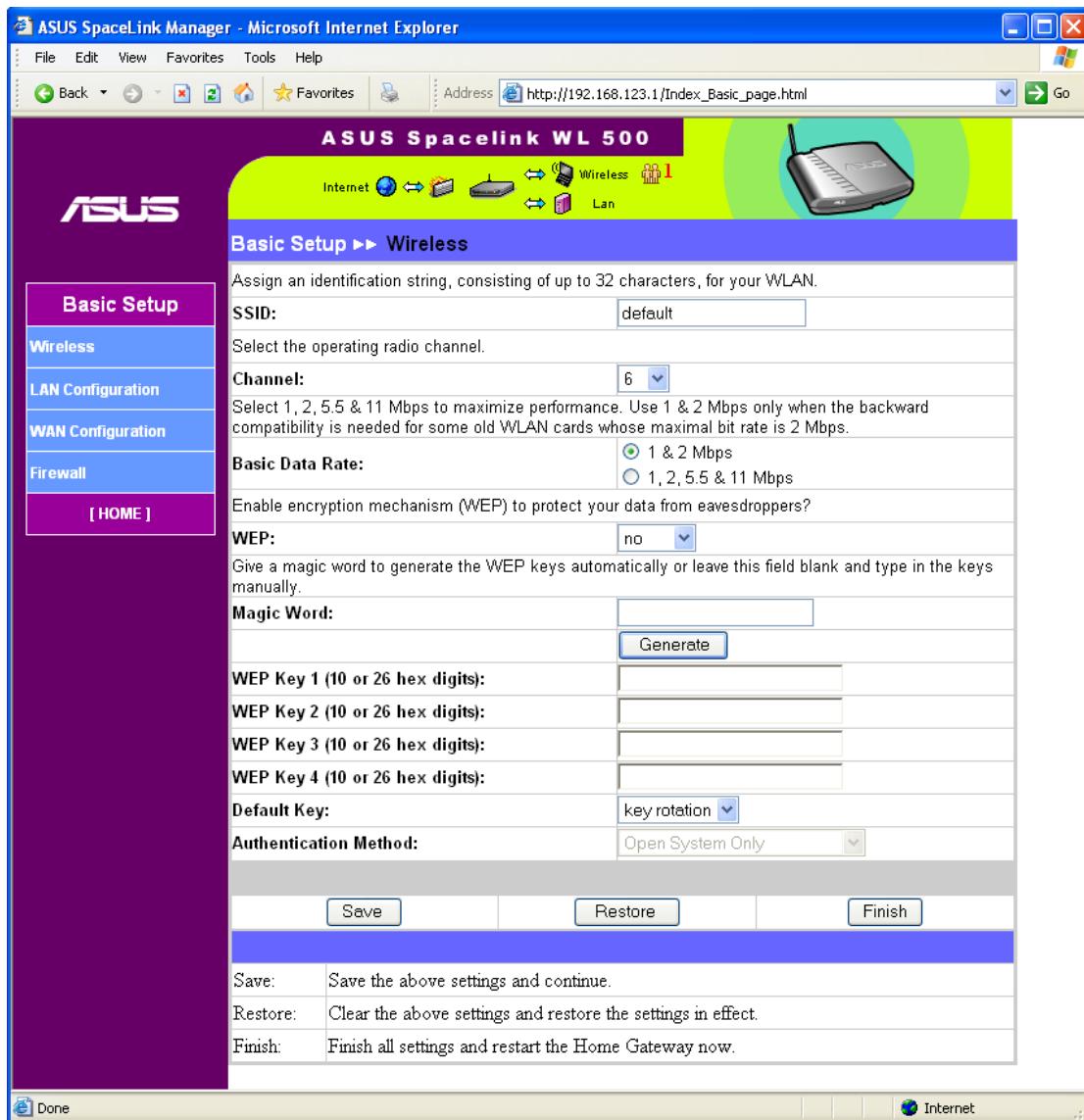
User in Service: Shows the IP address of the user when the status is busy.

Chapter 3 - Home Gateway Utilities

3. Utilities

Basic Setup - Wireless

This page allows you to configure the wireless settings. See next page for descriptions on each setting.



IMPORTANT: New settings will only take effect after clicking the “Finish” button and waiting for the SpaceLink Home Gateway to restart.

Chapter 3 - Home Gateway Utilities

SSID & Channel

The SSID is an identification string of up to 32 ASCII characters that differentiate one SpaceLink Home Gateway or Access Point from another. The SSID is also referred to as the “ESSID” or “Extended Service Set ID.” You can use the default SSID and radio channel unless more than one SpaceLink Home Gateway or Access Point is deployed in the same area. In that case, you should use a different SSID and radio channel for each SpaceLink Home Gateway or Access Point. All the SpaceLink Home Gateways and SpaceLink 802.11b client adapters must have the same SSID to allow a wireless mobile client to roam between the SpaceLink Home Gateways. By default, the SSID is set to “default”.

Channel

IEEE 802.11b devices are direct sequence spread spectrum devices that spread a radio signal over a range of frequencies. The range of frequencies used by a direct sequence device is called a Channel.

The IEEE 802.11b specification supports up to 14 overlapping Channels for radio communication. But only 11 Channels are supported in the United States and therefore on the SpaceLink Home Gateway. To minimize interference, configure each the SpaceLink Home Gateway to use Non-overlapping channels. Non-overlapping channels have 25Mhz separation beginning at the first allowed channel for the country (for the US and most of Europe, channels 1, 6 & 11 are used).

Make sure that the SpaceLink Home Gateways sharing the same Channel (or Channels close in number) are as far away from each other as possible, based on the results of your site survey of the facility. You can find the site survey utility in the SpaceLink PC card or CF card setup CD.

Basic Data Rate

Select “1, 2, 5.5 & 11Mbps” to maximize performance. Use “1 & 2 Mbps” only when backward compatibility is needed for some older wireless LAN cards with a maximum bit rate of 2Mbps.

The IEEE 802.11b specification supports four data rates: 11 Mbps, 5.5 Mbps, 2 Mbps, and 1 Mbps. As a wireless mobile client travels further and further away from the SpaceLink Home Gateway, the data rate automatically decreases in order to maintain a usable radio connection. Therefore, a client that is close to an the SpaceLink Home Gateway may operate at 11 Mbps, but a client that is far away from the SpaceLink Home Gateway may operate at 2 Mbps.

Supported Clients

802.11b products can operate at 11 Mbps, 5.5 Mbps, 2 Mbps or 1 Mbps. This allows 802.11b devices to communicate with any existing 802.11 direct sequence devices that operate only at 1 or 2 Mbps. By default, the SpaceLink Home Gateway will support both 802.11b and 2 Mbps 802.11 direct sequence clients.

WEP

The IEEE 802.11b standard specifies an optional encryption feature, known as Wired Equivalent Privacy or WEP, that is designed to provide a wireless LAN with a security level equal to what is found on a wired Ethernet network.

WEP encrypts the data portion of each packet exchanged on the 802.11b network using either a 64-bit or 128-bit encryption algorithm. In addition, WEP is also used in conjunction with the optional Shared Key Authentication algorithm to prevent unauthorized devices from associating with an 802.11b network.

Enabling WEP can protect your data from eavesdroppers. If you do not need this feature, select “no” to skip the following setting. The SpaceLink Home Gateway supports both 64-bit and 128-bit encryption using the Wired Equivalent Privacy (WEP) algorithm. Select the type of encryption you want to use (64 or 128 bit) and configure one to four WEP Keys. The “128-bit” method is more secure than the “64-bit”.

64/128bits versus 40/104bits

You may be confused about configuring WEP encryption, especially when using multiple wireless LAN products from different vendors. There are two levels of WEP Encryption: 64 bits and 128 bits.

Firstly, 64 bit WEP and 40 bit WEP are the same encryption method and can interoperate in the wireless network. This lower level of WEP encryption uses a 40 bit (10 Hex character) as a “secret key” (set by user), and a 24 bit “Initialization Vector” (not under user control). This together makes 64 bits (40 + 24). Some vendors refer to this level of WEP as 40 bits and others refer to this as 64 bits. ASUS SpaceLink products use the term 64 bits when referring to this *lower* level of encryption.

Secondly, 104 bit WEP and 128 bit WEP are the same encryption method and can interoperate in the wireless network. This higher level of WEP encryption uses a 104 bit (26 Hex character) as a “secret key” (set by user), and a 24 bit “Initialization Vector” (not under user control). This together

Chapter 3 - Home Gateway Utilities

makes 128 bits ($104 + 24$). Some vendors refer to this level of WEP as 104 bits and others refer to this as 128 bits. ASUS SpaceLink products use the term 128 bits when referring to this *higher* level of encryption.

Magic Word & Generate

Automatically generate four WEP keys. A WEP key is either 10 or 26 hexadecimal digits (0~9, a~f, and A~F) based on whether you select 64 bit or 128 bit in the WEP pull-down menu. Type a combination of up to 64 letters, numbers, or symbols in the Magic Word column, then the SpaceLink Home Gateway Manager uses an algorithm to generate four WEP keys for encryption. If you want to type in the keys manually, leave this field blank.

The SpaceLink family of products all use the same algorithm to generate the keys so that they can all use the same WEP key.

Note: This function eases users from having to remember their passwords and is compatible to ASUS SpaceLink family of products. But this is not as secure as manual assignment.

WEP Key

At most four keys can be set. A WEP key is either 10 or 26 hexadecimal digits (0~9, a~f, and A~F) based on whether you select 64 bit or 128 bit in the WEP pull-down menu. The home gateway and ALL of its wireless clients MUST have at least the same default key.

Default Key

The Default Key field lets you specify which of the four encryption keys you use to transmit data on your wireless LAN. As long as the SpaceLink Home Gateway or wireless mobile client with which you are communicating has the same key in the same position, you can use any of the keys as the default key. If the home gateway and ALL of its wireless clients use the same four WEP keys, select “key rotation” to maximize security. Otherwise, choose one key in common as the default key.

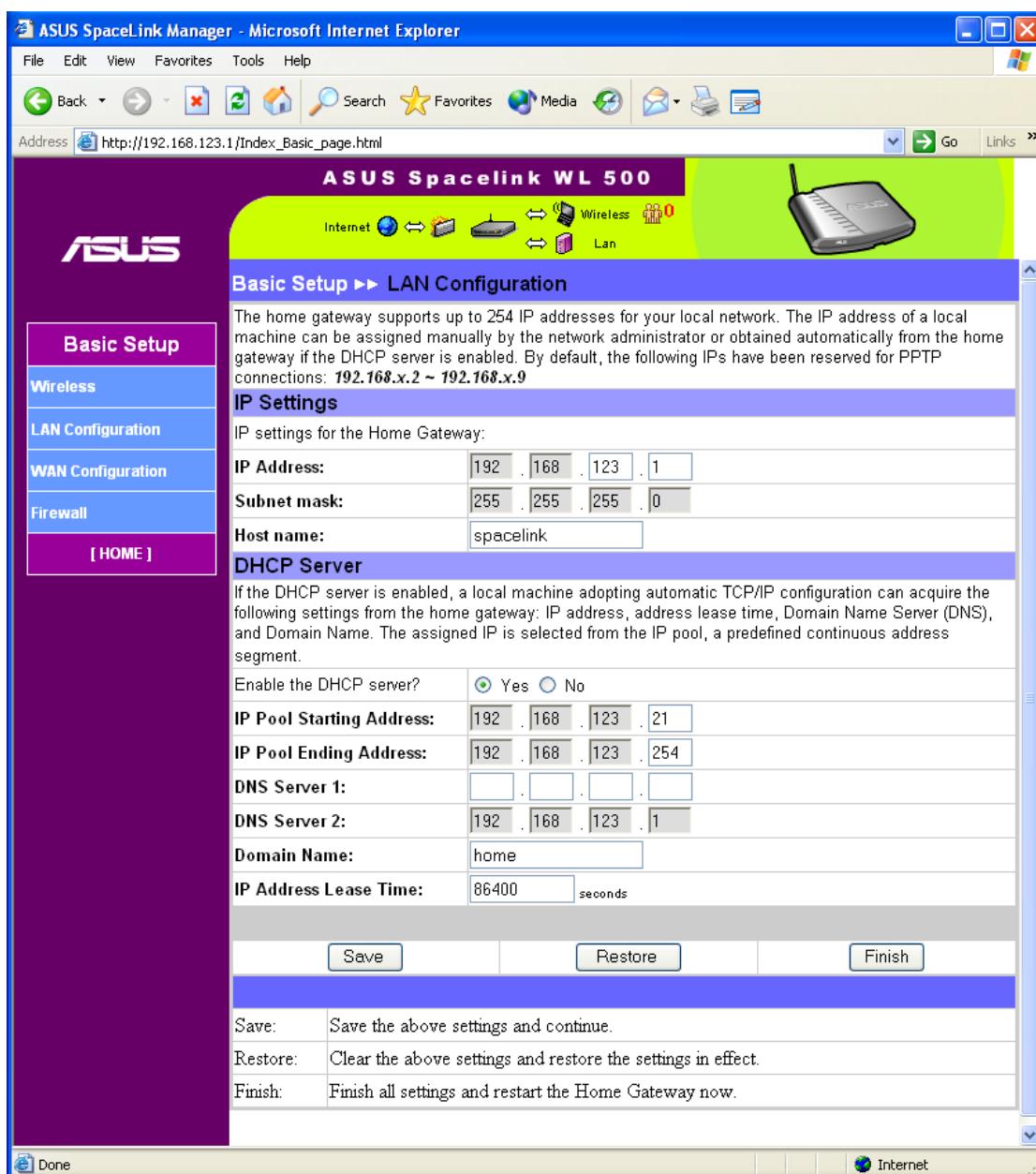
Authentication Method

It is suggested to select “Shared Key Only”. If “Open System Only” or “Shared Key and Open System” is used, the home gateway may accept connection requests from unauthorized wireless clients.

Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

Basic Setup - LAN Configuration

This page does not require any settings for general use.



Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

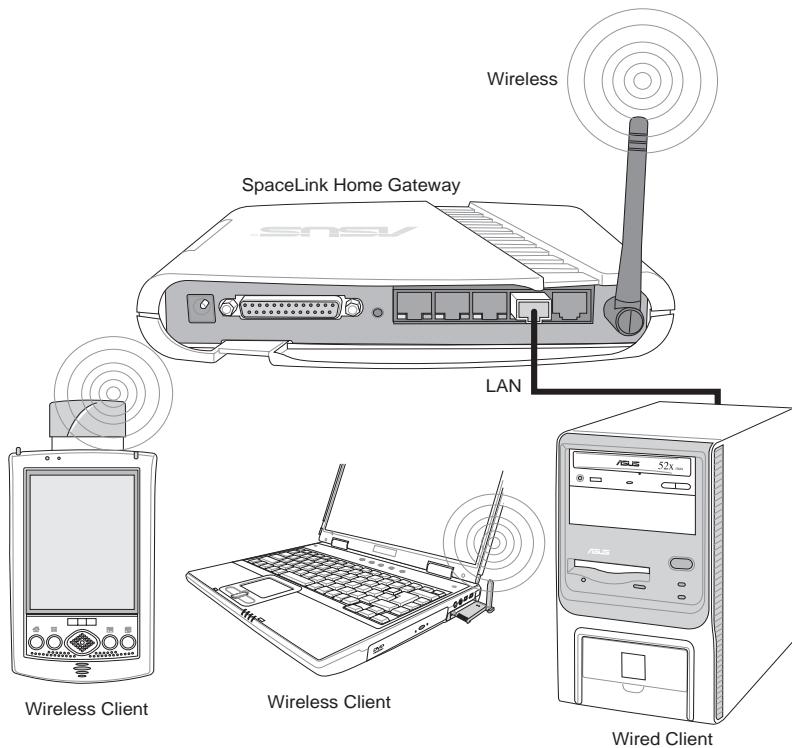
Chapter 3 - Home Gateway Utilities

Basic Setup - WAN Configuration

The settings that you need to perform will vary depending on the role that your SpaceLink Home Gateway will play.

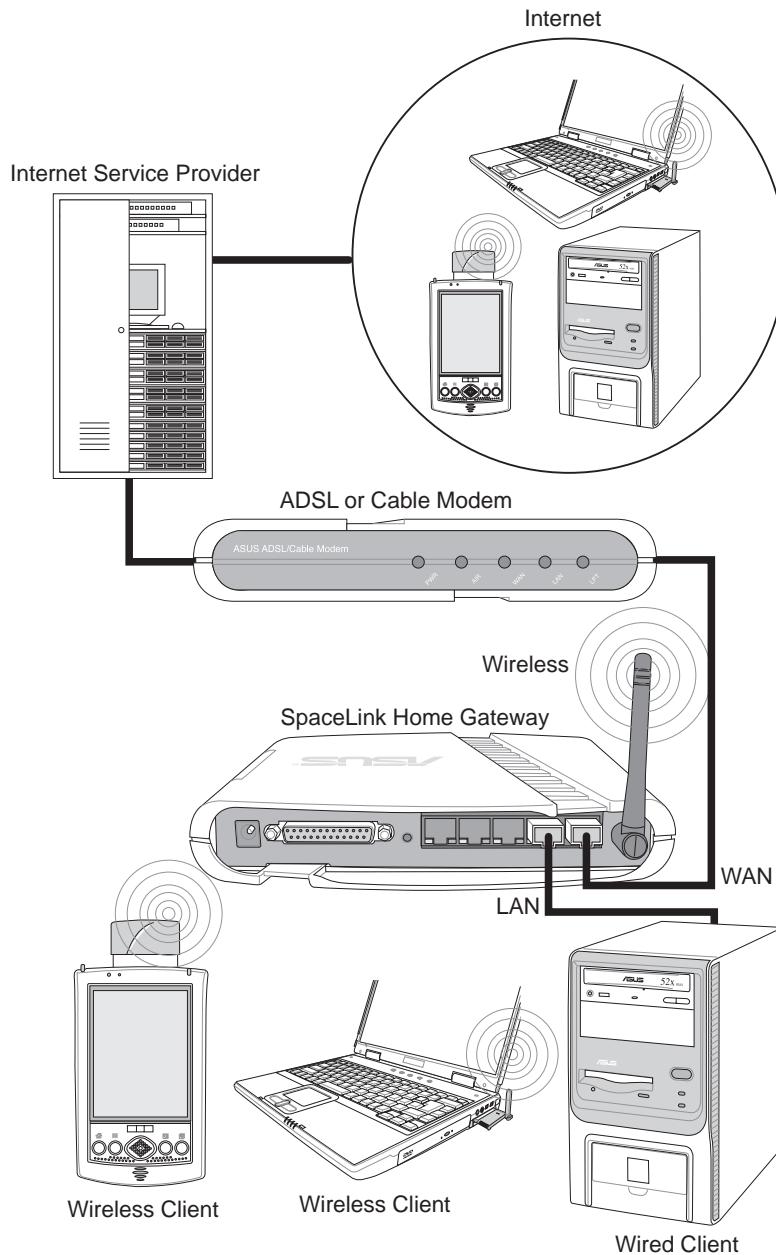
Network Backbone

No software setting is necessary in the SpaceLink Home Gateway.



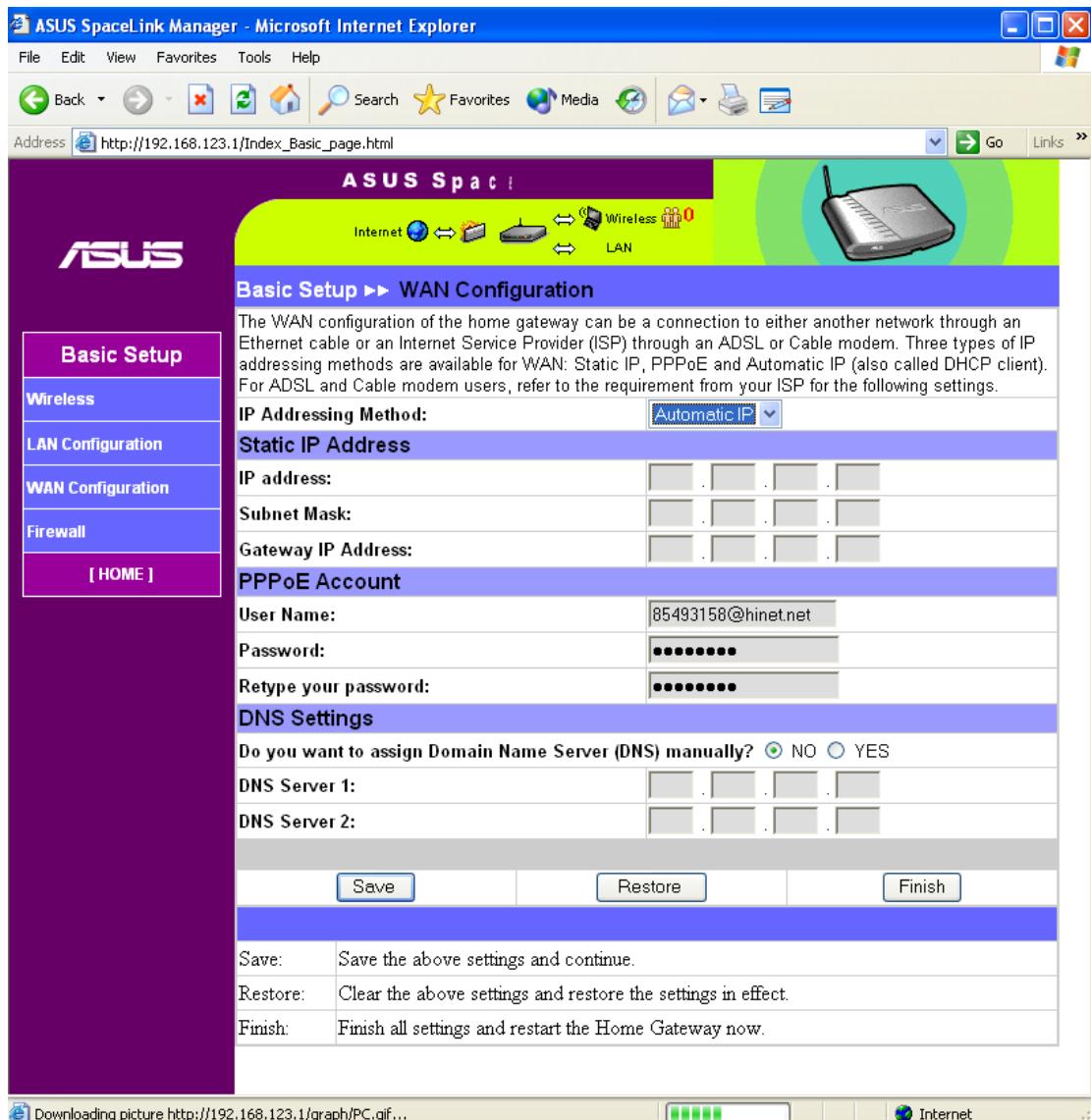
Chapter 3 - Home Gateway Utilities

Agent to an ISP



Chapter 3 - Home Gateway Utilities

Agent to an ISP (Cont.)



Static IP Address

IP Address - Normally, this is Dynamic (because fixed IP accounts cost more) and should be set to Automatic IP. Do not use “Static IP” if your ISP’s documentation does not mention an IP Address. If your ISP provided an IP Address with instructions to use it, select Static IP from “IP Addressing Method” and enter the address into the provided field.

PPPoE Account

User Name - The name of your Internet account provided by your ISP. Some ISPs work with the entire account name along with the hosting domain (such as `yourname@yourdomain.com`) and others require that you enter only the account name (`yourname`). See the example above.

Chapter 3 - Home Gateway Utilities

Agent to an ISP (Cont.)

Password - Enter the password for your Internet account.

Retype your password - Re-enter the password for confirmation.

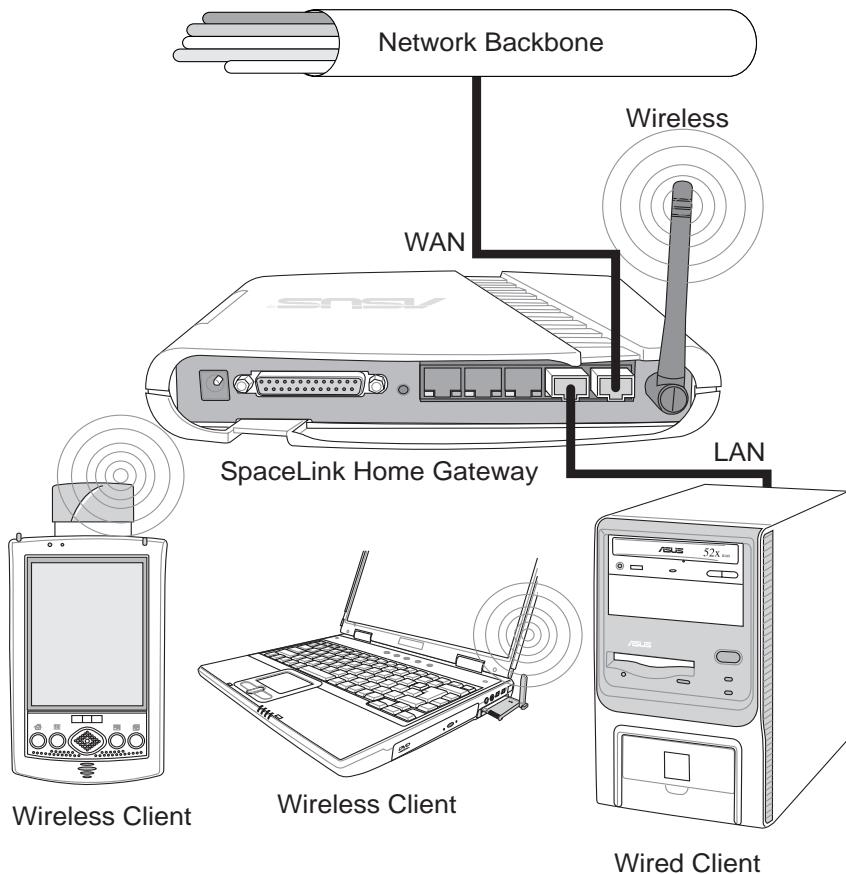
DNS Settings

DNS Server - Normally this is automatic and you would answer “NO” to the question about manually assigning DNS. If you are given instructions from your ISP to enter DNS addresses, select “YES” to manually assigning DNS and enter the IP addresses here. You can set the DNS server anytime using any connection type (Static IP, PPPoE, or Automatic IP).

Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

Chapter 3 - Home Gateway Utilities

Agent to Another Network



3. Utilities

To connect to an existing network, the IP address of the home gateway can be assigned manually or automatically obtained from a DHCP server. In the first case, fill in the IP address and the DNS address(es).

Automatic IP

This parameter determines if the SpaceLink Home Gateway will send out a DHCP request during bootup. If you have a DHCP server on the network, set this option so that the SpaceLink Home Gateway can receive an automatic IP address assignment.

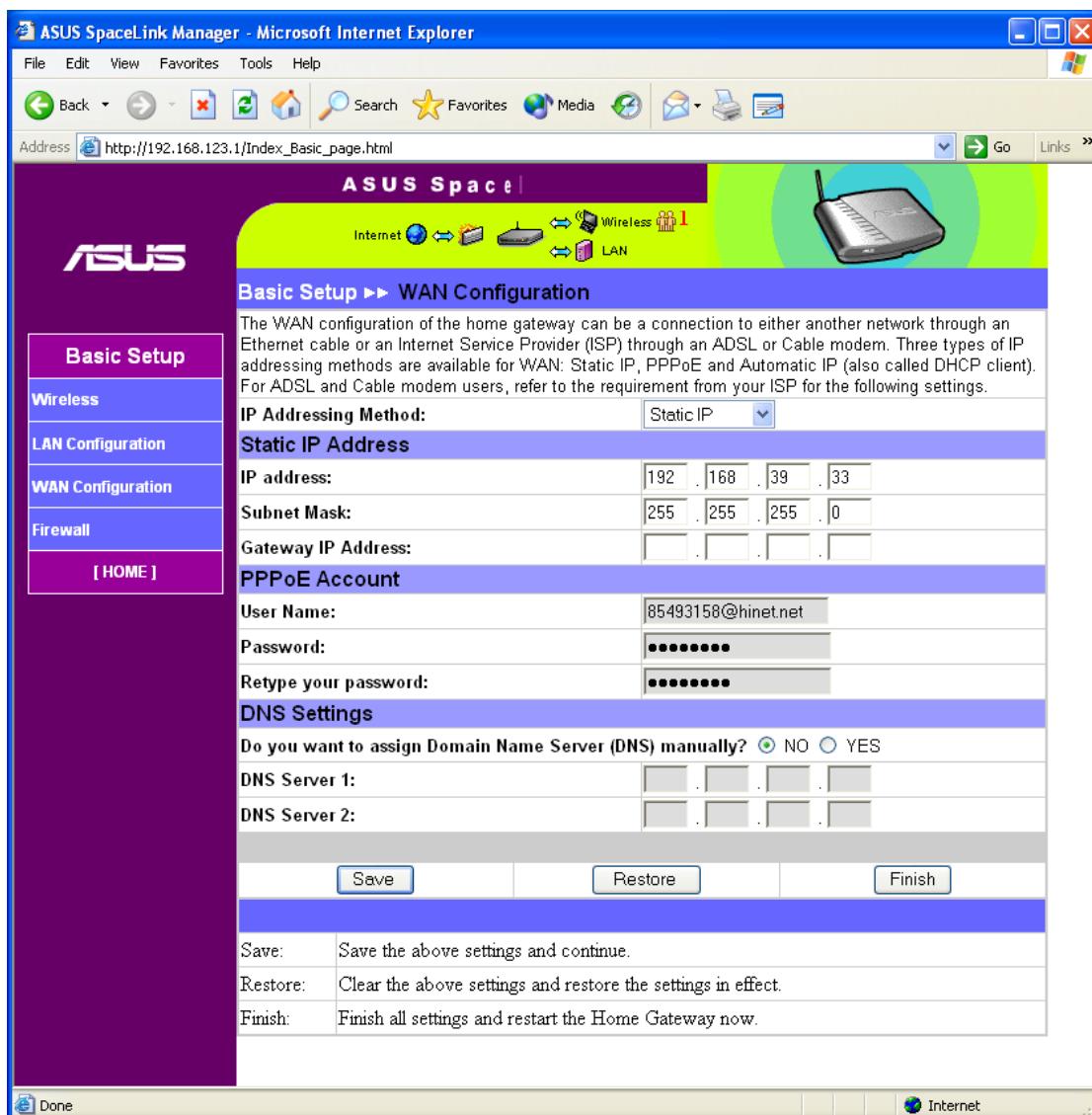
If you have a DHCP (Dynamic Host Configuration Protocol) server on the network, then the DHCP server will automatically assign the SpaceLink Home Gateway an IP address when the SpaceLink Home Gateway is powered up. To determine what IP address has been assigned to the SpaceLink Home Gateway, review the IP address on the “Status” page available on the “Main Menu”.

Chapter 3 - Home Gateway Utilities

3. Utilities

Static IP

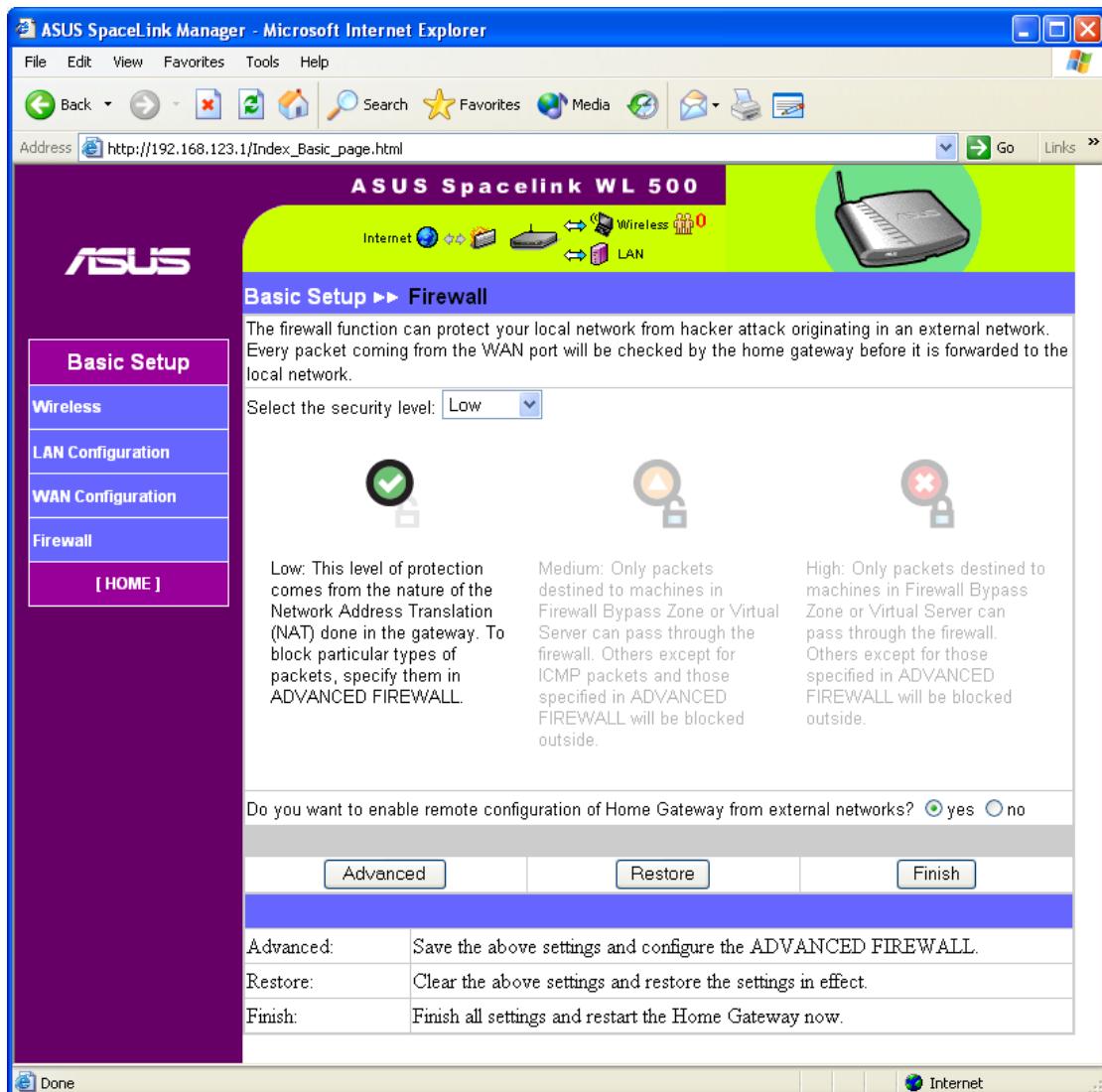
The SpaceLink Home Gateway also accepts a static IP address. You may manually configure the IP address and subnet mask on the “IP Config” page. Enter an IP address and a subnet mask in the field provided to assign the SpaceLink Home Gateway a static IP address. If you don’t know your Gateway setting, leave it empty (not 0.0.0.0).



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Firewall

The SpaceLink Home Gateway does not only use basic NAT to protect your local network. The SPI (Stateful Packet Inspection) firewall filters out advanced forms of attacks from the Internet. A SPI firewall remembers the context of connections and continuously updates this information in dynamic connection tables.

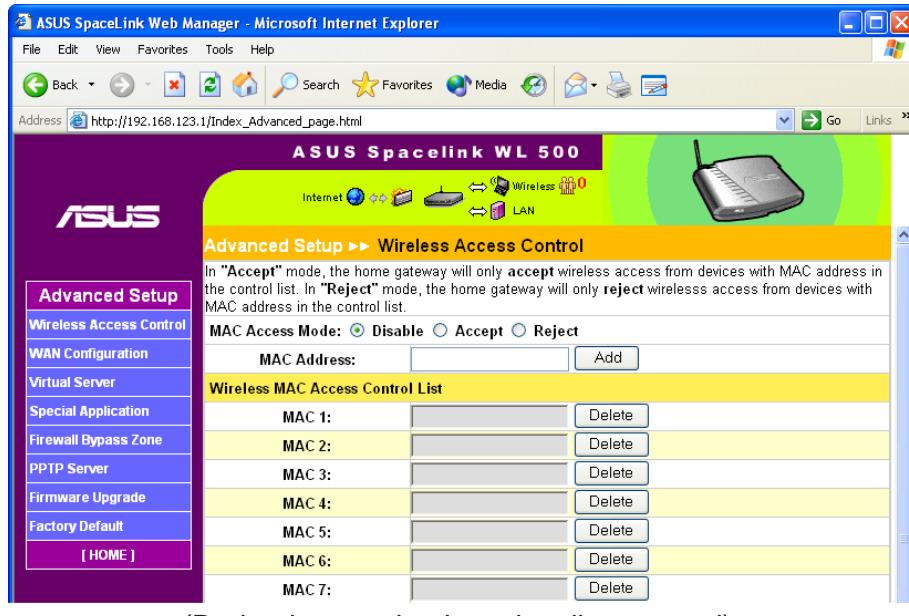


Select the security level for the firewall that you require. “Low” should be good enough for most home users. “Medium” and “High” levels can provide more protection for your local network but they may also stop you from executing some Internet applications. These problems can be overcome through advanced configuration options by clicking on the **Advanced** button.

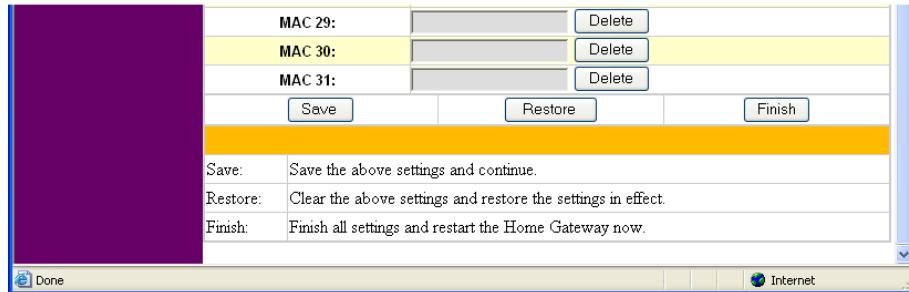
Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

Chapter 3 - Home Gateway Utilities

Wireless Access Control



(Redundant portion intentionally removed)



To add security, the SpaceLink Home Gateway has the ability to only associate with or not associate with wireless mobile clients that have their MAC address entered into this page.

The default setting of “Disable” will allow any wireless mobile client to connect. “Accept” will only allow those entered into this page to connect. “Reject” will prevent those entered into this page from connecting.

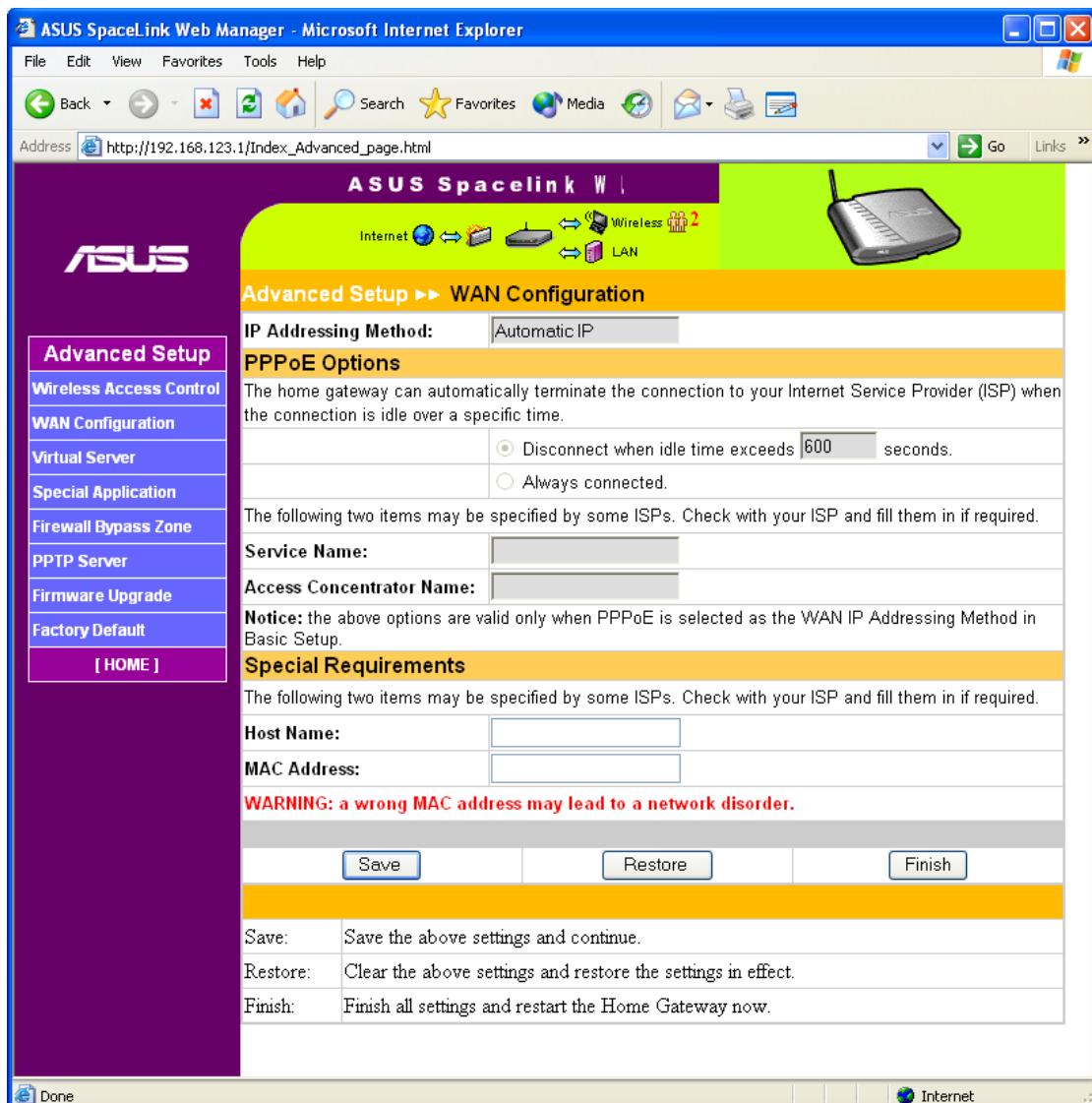
Adding a MAC Address

To add a MAC address, enter the 12 hexadecimal characters into the white box next to “MAC Address:” and click the **Add** button. The MAC address will be placed in the control list below. Only a total of 31 MAC addresses can be entered into this page so determine which will be the lesser; those you wish to accept or those you wish to reject and click the appropriate “MAC Access Mode”.

Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

Chapter 3 - Home Gateway Utilities

Advanced WAN Configuration



IP Addressing Method - This displays the current selection in the Basic Setup WAN Configuration.

PPPoE Options

The SpaceLink Home Gateway can automatically terminate the connection to your Internet Service Provider (ISP) when the connection is idle over a specific time.

Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

Chapter 3 - Home Gateway Utilities

Disconnect when idle time exceeds seconds - Enter the number of seconds of inactivity to disconnect you from your ISP.

Always connected - This will always keep you connected to your ISP and reconnect if connection fails.

The following two items may be specified by some ISPs. Check with your ISP and fill them in if required.

Service Name - Fill this in if required by your ISP.

Access Concentrator Name - Fill this in if required by your ISP.

Note: The above options are valid only when PPPoE is selected as the WAN IP Addressing Method in Basic Setup. Otherwise they will be grayed out.

Special Requirements

The following two items may be specified by some ISPs. Check with your ISP and fill them in if required.

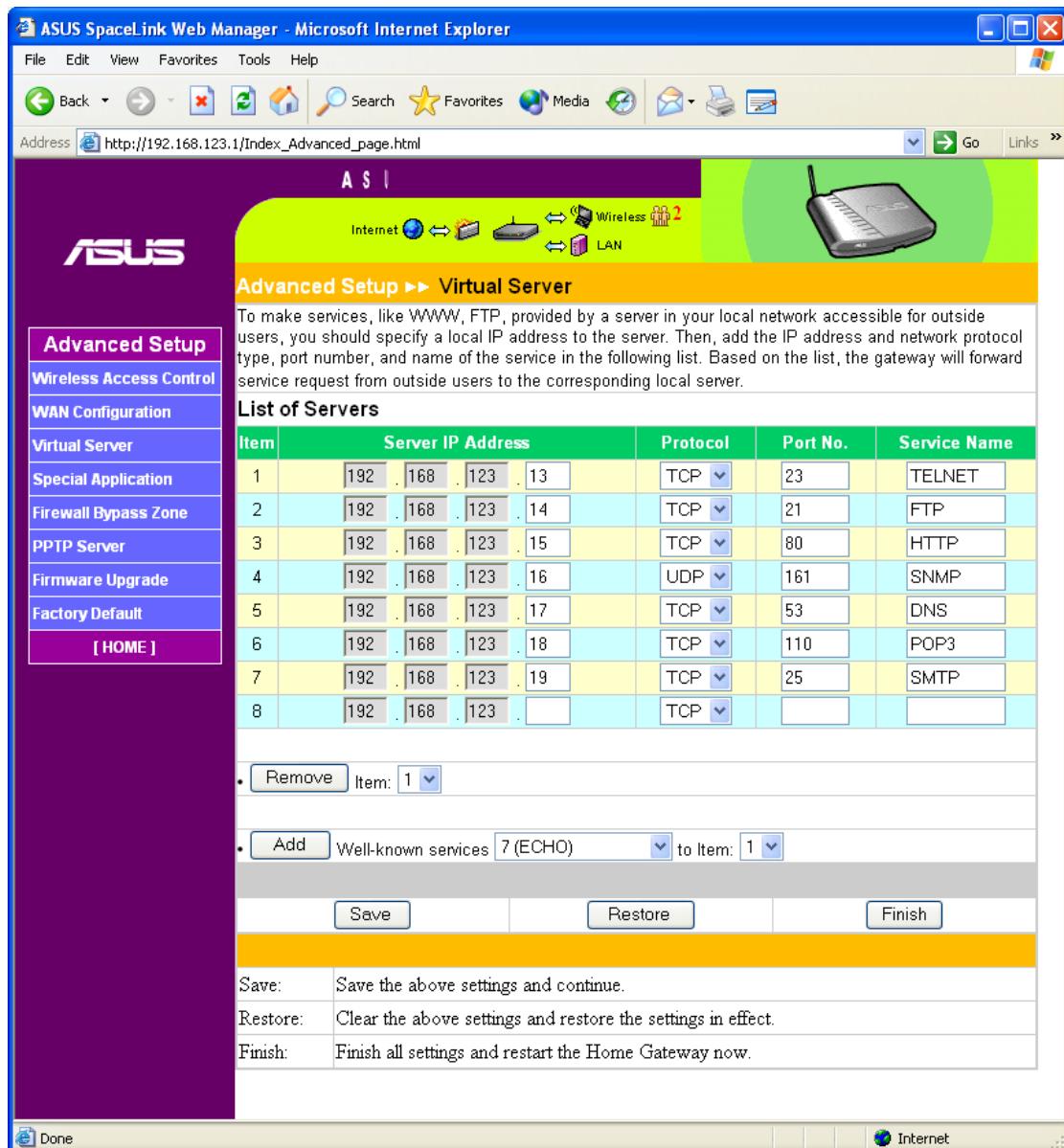
Host Name - Fill this in if required by your ISP.

MAC Address - Fill this in if required by your ISP.

WARNING: A wrong MAC address may lead to a network disorder.

Chapter 3 - Home Gateway Utilities

Virtual Server



To make services, like WWW, FTP, provided by a server in your local network accessible for outside users, you should specify a local IP address to the server. Then, add the IP address and network protocol type, port number, and name of the service in the following list. Based on the list, the gateway will forward service request from outside users to the corresponding local server.

Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

Chapter 3 - Home Gateway Utilities

List of Servers

Enter the IP address of the servers under the SpaceLink Home Gateway. Select a protocol, port number, and enter any description you want for the service name.

Removing an Entry

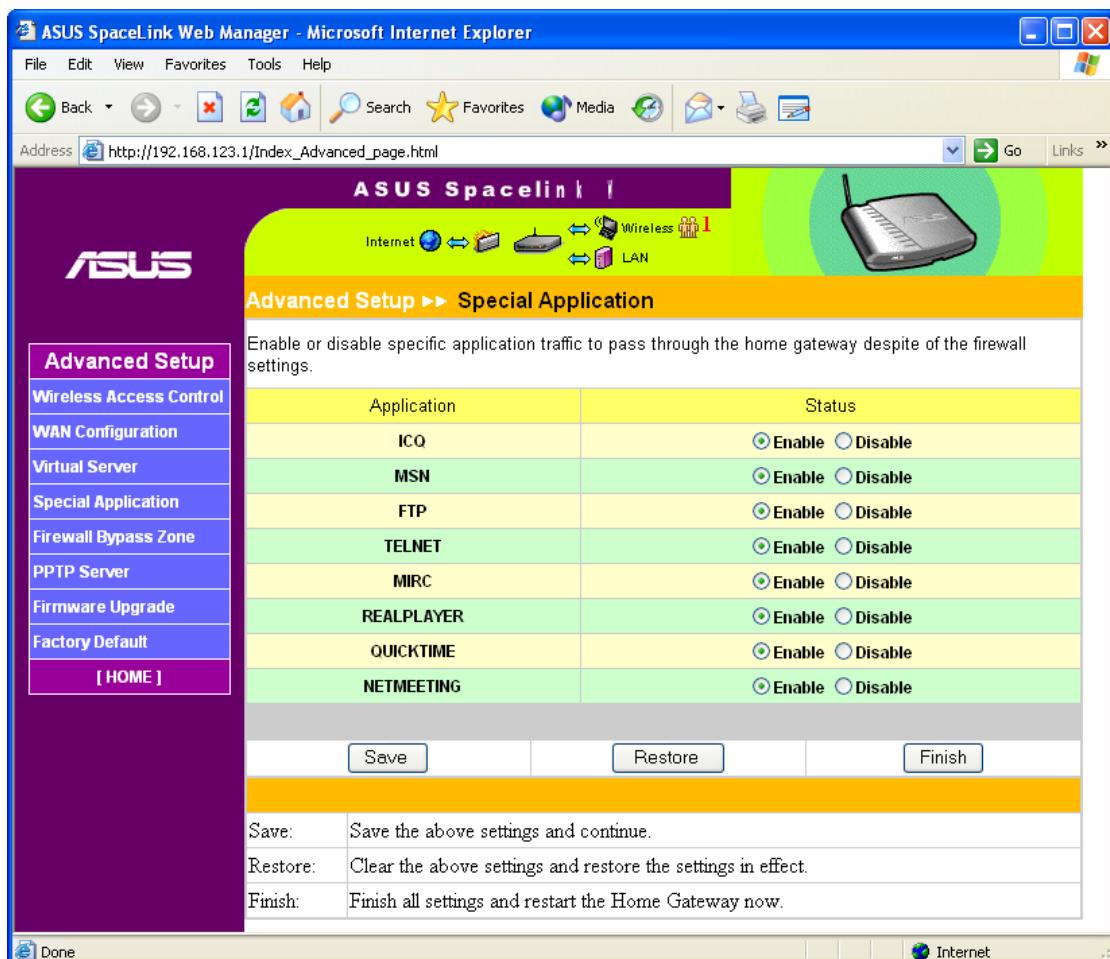
To remove one of the 8 entries, select the “Item” (1 2 3 4 5 6 7 8) number and click the **Remove** button.

Adding an Entry

Besides entering the data manually, you can also select from a commonly used entries. To add an often used service to one of the 8 entries, select the service {7 (ECHO) 21 (FTP) 23 (TELNET) 25 (SMTP) 53 (DNS) 79 (FINGER) 80 (HTTP) 110 (POP3) 161 (SNMP) 162 (SNMP TRAP)} and select the “Item” (12 3 4 5 6 7 8). Click the **Add** button to replace the entry that you have selected.

Chapter 3 - Home Gateway Utilities

Special Application



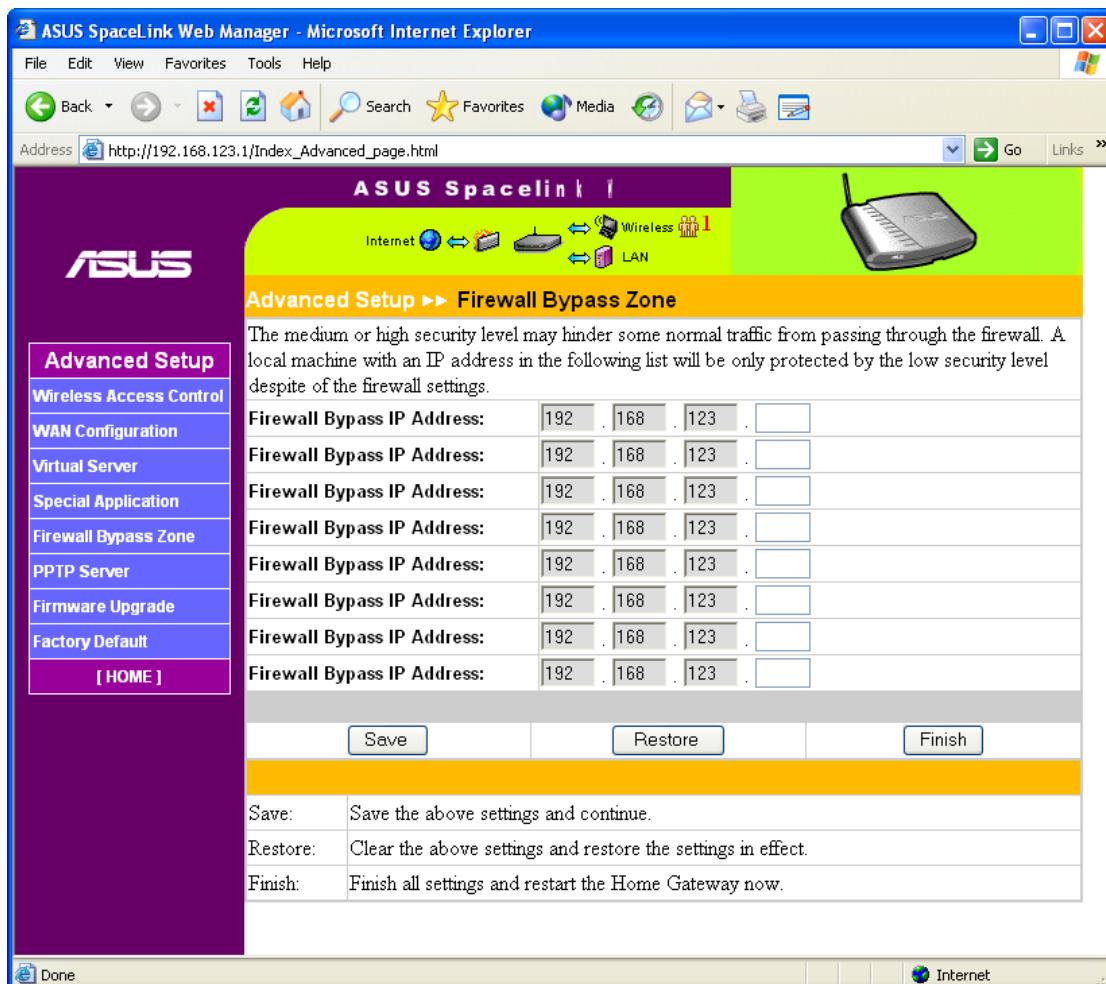
Enable or disable specific application traffic to pass through the home gateway despite any firewall settings in the SpaceLink Home Gateway.

Application Status - These commonly used applications are normally allowed to pass through the firewall. Choose Disable if you do not want users to use the following applications:

ICQ, MSN, FTP, TELNET, MIRC, REALPLAYER, QUICKTIME, NETMEETING.

Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.

Firewall Bypass Zone

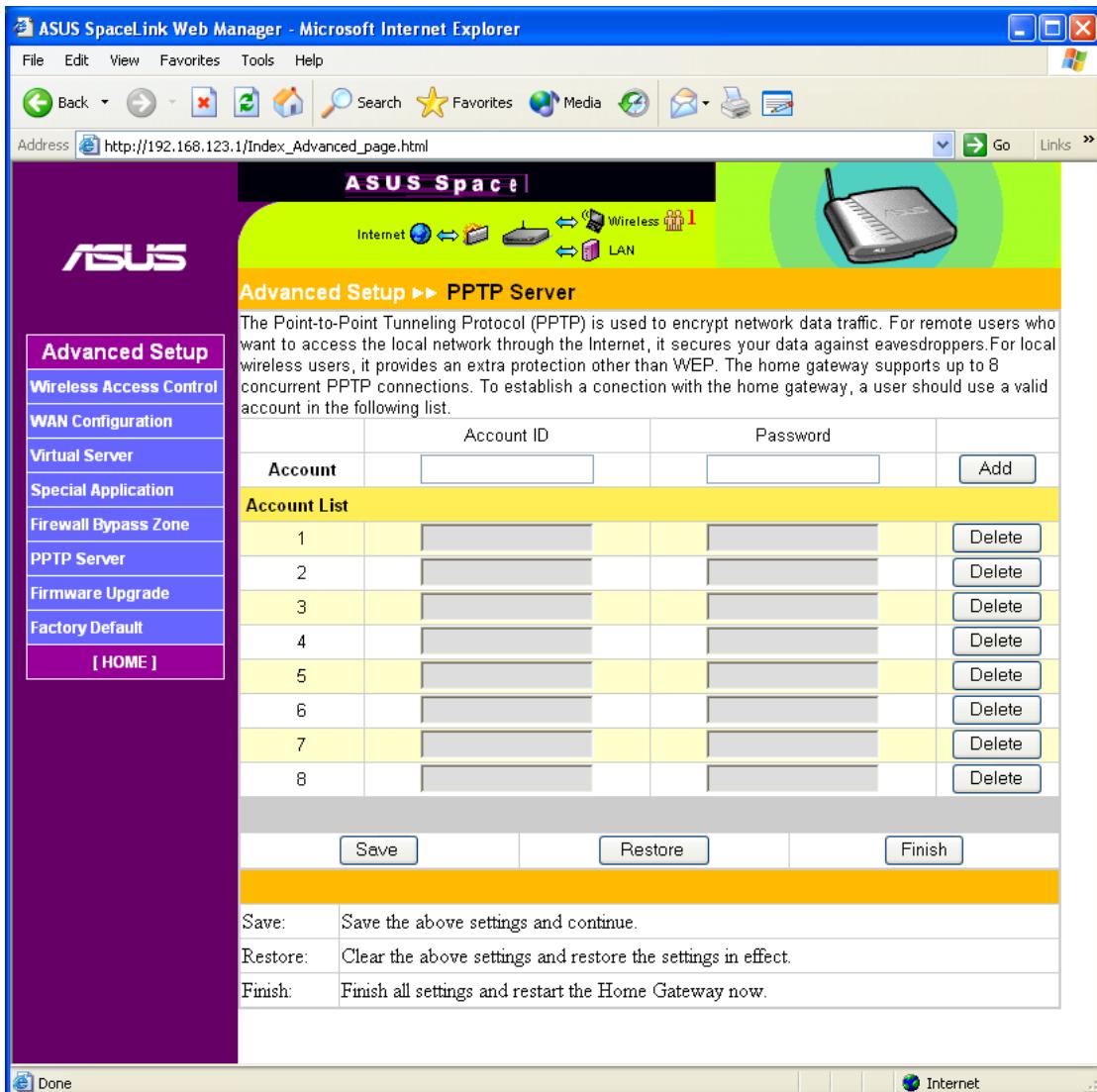


The medium or high security level may hinder some normal traffic from passing through the firewall. A local machine with an IP address in the following list will be only protected by the low security level despite of the firewall settings.

Firewall Bypass IP Address - Enter the IP address of the computer you wish to have access through the firewall.

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PPTP Server



The Point-to-Point Tunneling Protocol (PPTP) is used to encrypt network data traffic. For remote users who want to access the local network through the Internet, it secures your data against eavesdroppers. For local wireless users, it provides an extra protection other than WEP. The home gateway supports up to 8 concurrent PPTP connections. To establish a connection with the home gateway, a user should use a valid account in the following list.

Account

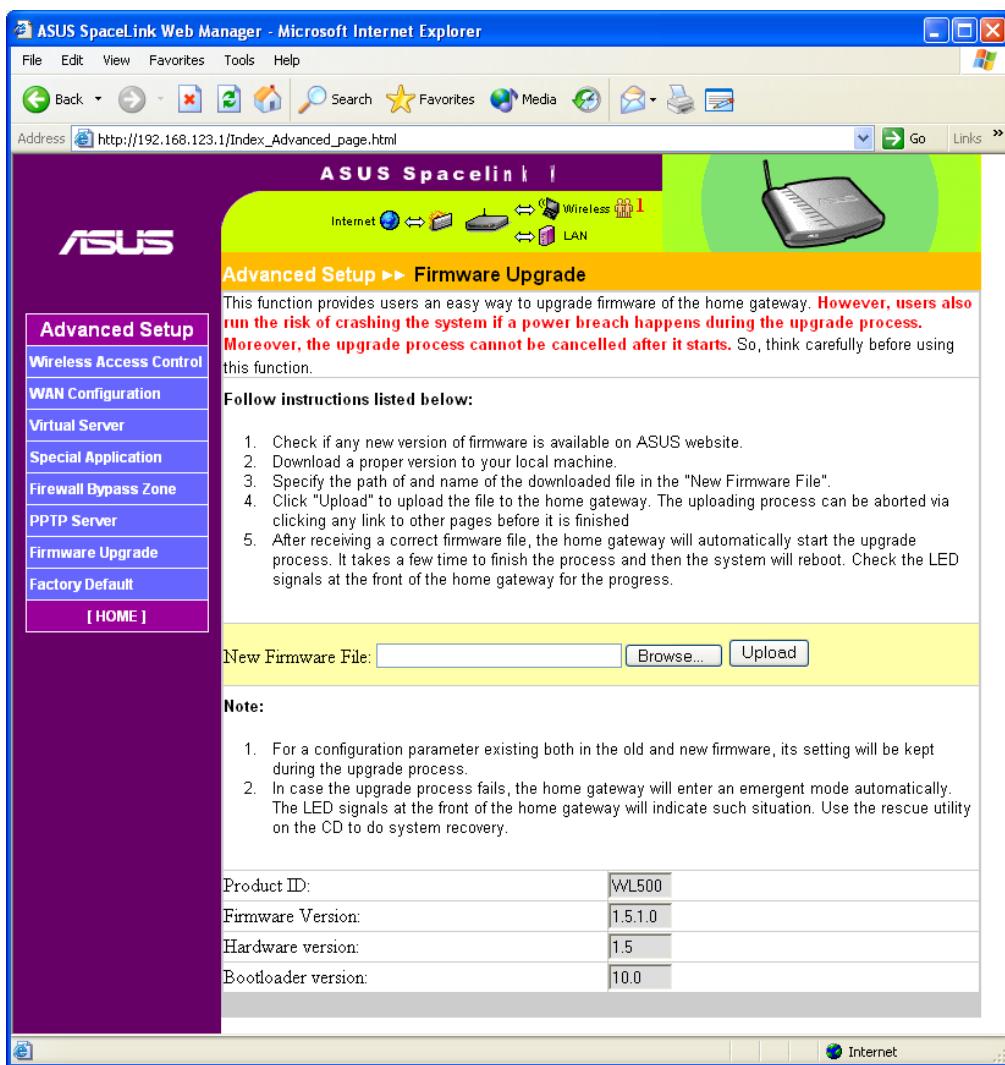
Account ID - Enter name or ID number.

Password - Enter password.

Account List - Click the Add button to move the Account ID and Password entries into this list.

Firmware Upgrade

This page reports the Flash Code (Firmware) version installed in the SpaceLink Home Gateway. Periodically, a new Flash Code is available for the SpaceLink Home Gateways on ASUS's Web site. You can update the SpaceLink Home Gateway's Flash Code using the Firmware Upgrade page under the Advanced Setup menu of the Web Manager. If you are experiencing a problem with your SpaceLink equipment, a Technical Support representative may ask you to report the device's Flash Code (Firmware) version.



The firmware upgrade takes approximately 60 to 90 seconds. When the firmware upgrade is completed, you will be directed to the home page.

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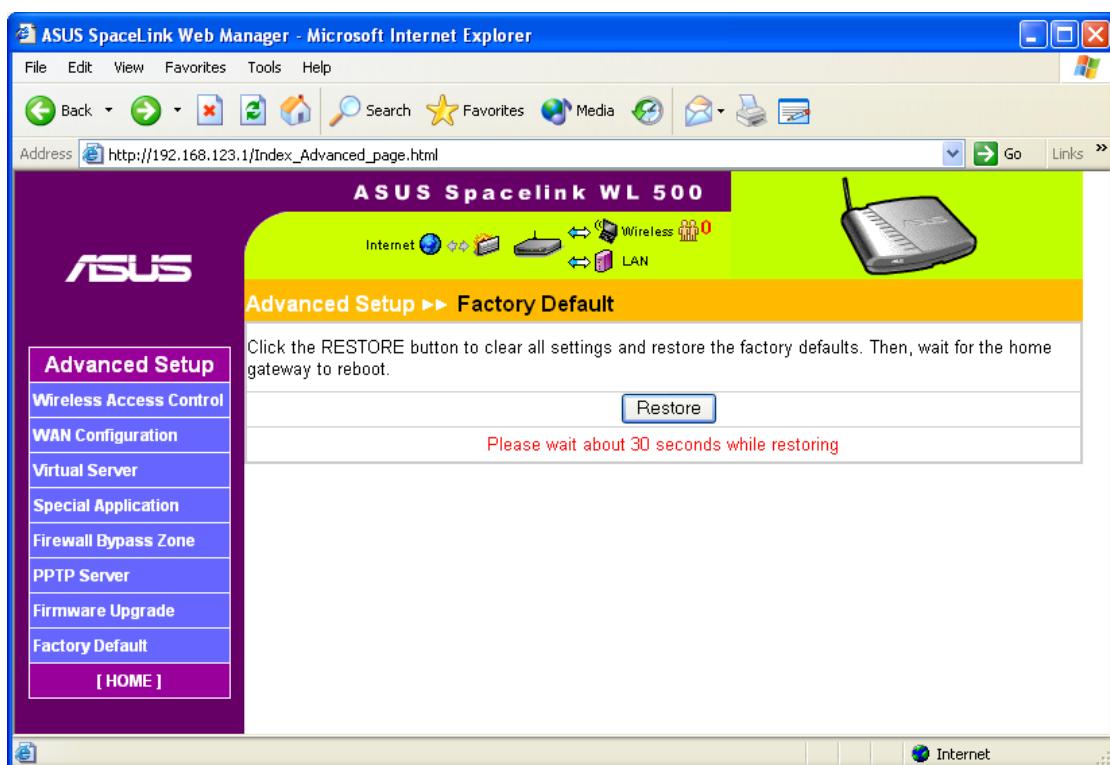
Restoring Factory Default Settings

Web Manager

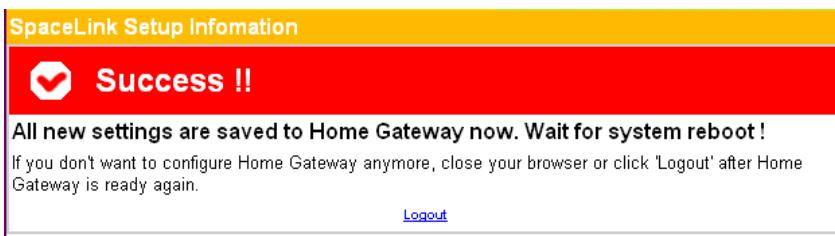
You can reset all settings to their factory defaults through the web manager using the “Factory Default” page in “Advanced Setup”. Click the **Restore** button and wait about 30 seconds before trying to access the SpaceLink Home Gateway.

Hardware

You can reset all settings to their factory defaults manually by pushing the “Restore” button in a hole on the back of the SpaceLink Home Gateway while it is ON. Use a pen or straightened paper clip to hold the “Restore” button depressed over 5 seconds until all the LEDs on the front of the SpaceLink Home Gateway start blinking. Release the button and the SpaceLink Home Gateway will reboot.



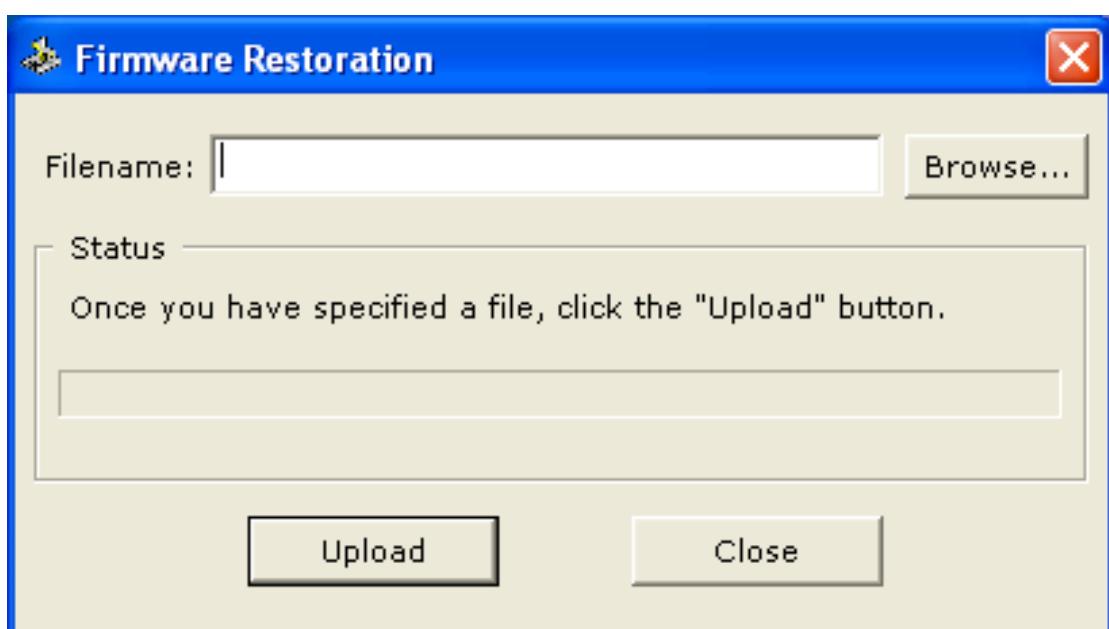
You will be notified when factory default settings are restored while using the web manager.



Firmware Restoration

This utility will automatically search out failed SpaceLink Home Gateways and upload a firmware that you specify. The process takes about 3 to 4 minutes and during this process the PWR, AIR, and WAN LEDs will remain lit while the LAN LED will flash slowly.

The Firmware Restoration utility is an emergency rescue tool to restore a SpaceLink Home Gateway which has failed during a previous firmware upgrade. A failed firmware upgrade will cause the SpaceLink Home Gateway to enter a failure mode, waiting for the user to use the Firmware Restoration utility to find and upload a new firmware. This is not a firmware upgrade utility and cannot be used on a working SpaceLink Home Gateway. Normal firmware upgrades must be done through the web manager.



Using a Hub

If you have problems upload a firmware while using a network hub, try connecting your computer directly to the LAN port. Either 10Base-T or 100Base-TX connections will work.

Chapter 3 - Home Gateway Utilities

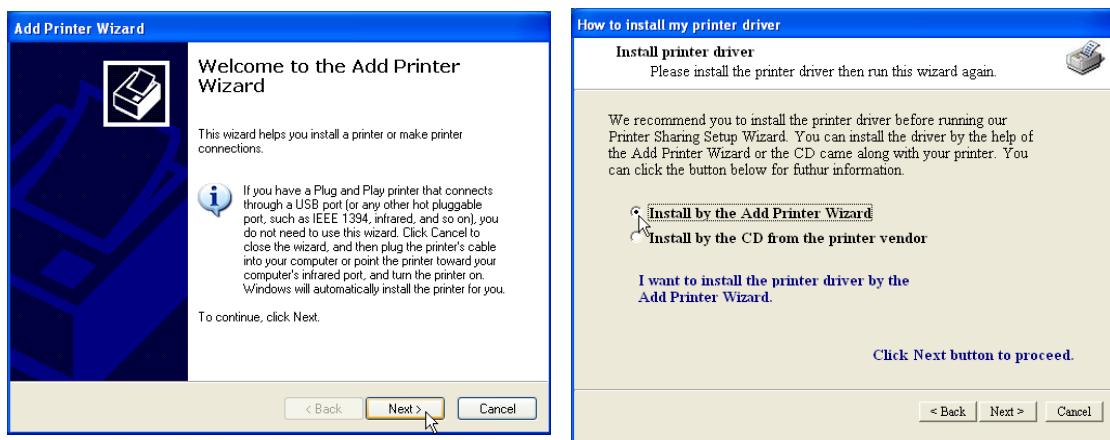
Printer Setup Wizard

This utility helps you setup your computers to utilize the printer server function of the SpaceLink Home Gateway.

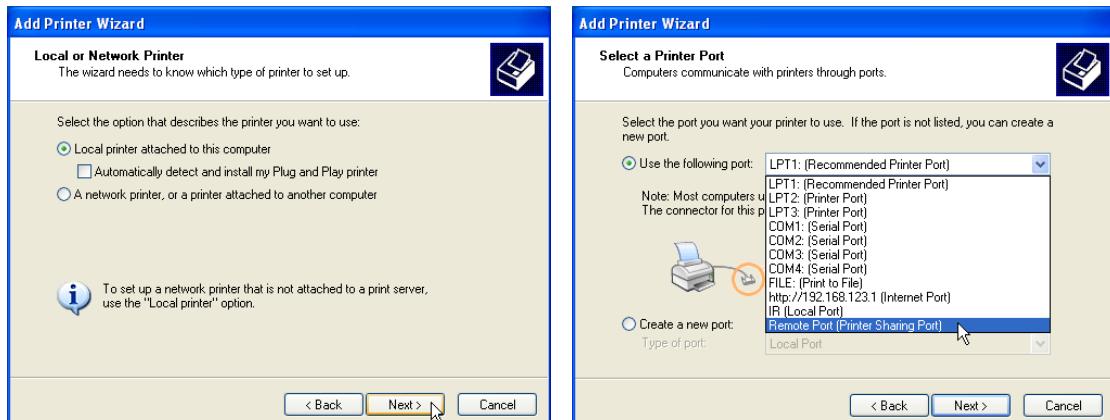
Add Printer Wizard

You should add your printer to your computer to simplify the SpaceLink Home Gateway Printer Setup Wizard. If you run the “Printer Setup Wizard” without your printer driver installed, it will direct you to the “Add Printer Wizard”.

3. Utilities



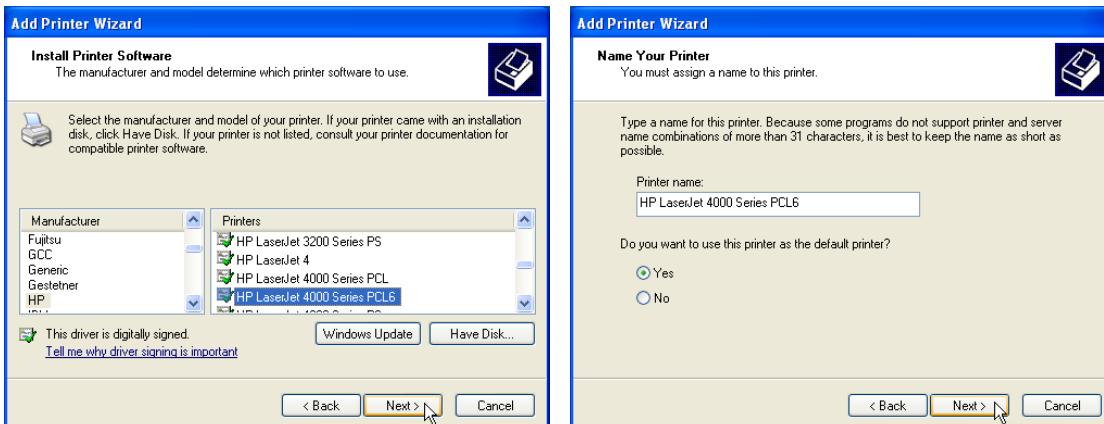
- (1) Run the “Add Printer Wizard” from **Start | Printers and Faxes | Add Printer**.
- (2) Choose “Install by the Add Printer Wizard”.



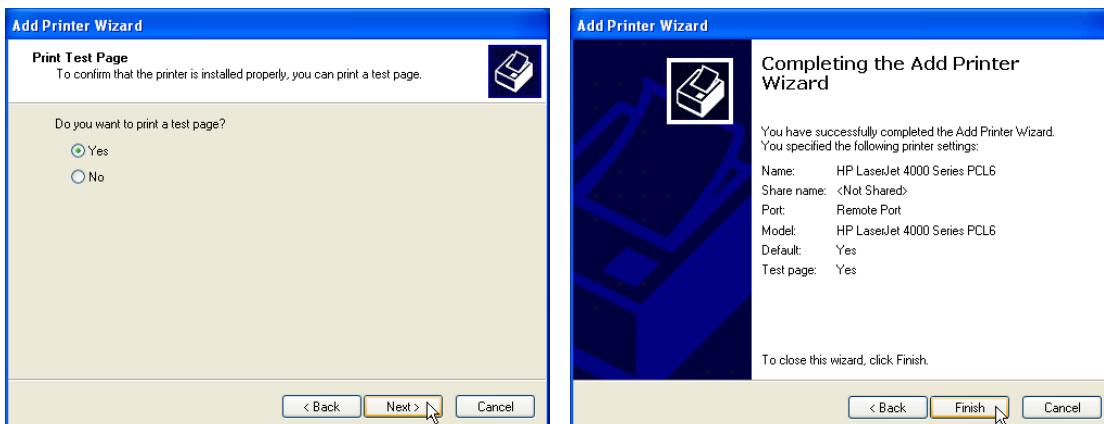
- (3) Choose “Local printer attached to this computer”.
- (4) Choose “Remote Port (Printer Sharing Port)”. If this is not available, select LPT1.

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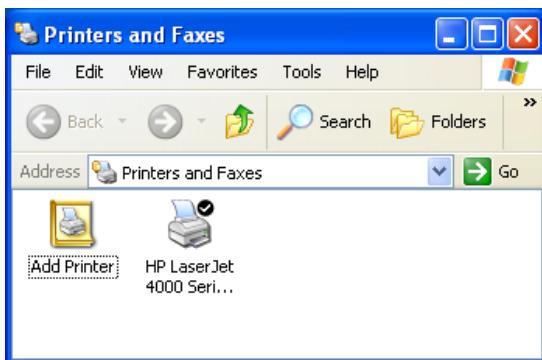
3. Utilities



- (5) Find your manufacturer and model. Click **Have Disk** if you cannot find it in the list and use the driver provided with your printer.
- (6) Click **Next** to set this as your default printer.



- (7) You can print a test page.
- (8) Click **Finish** to close the wizard.



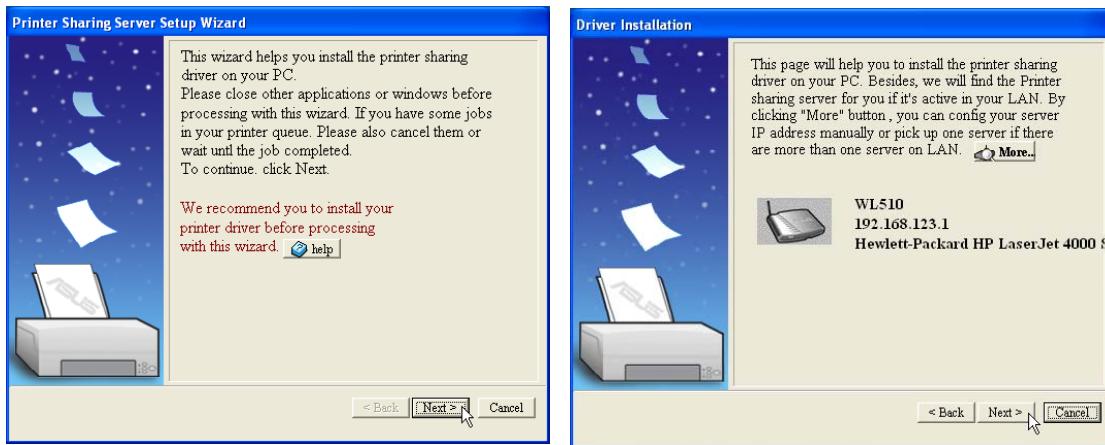
Your printer will show in the "Printers and Faxes" window and the check mark shows that it is set as your default printer.

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Printer Setup Wizard

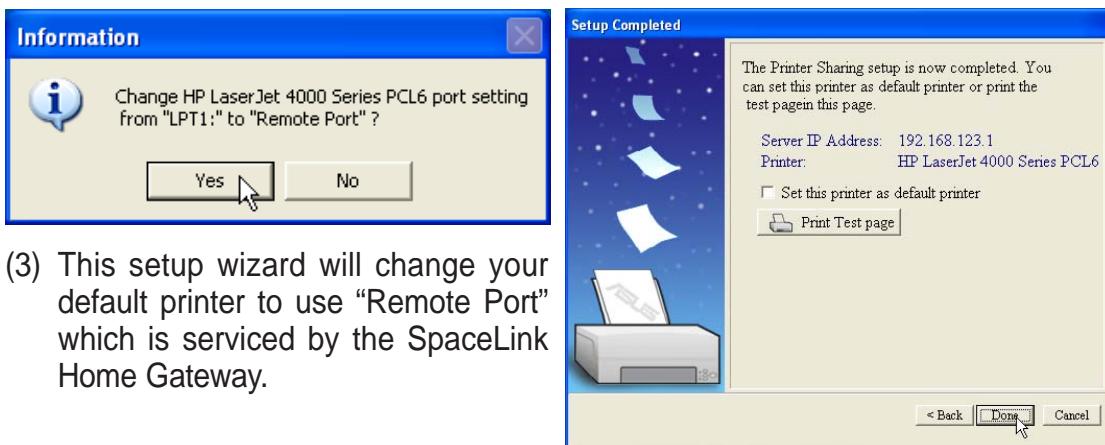
The wizard will explore all available SpaceLink Home Gateways and model information of the printers attached to them in your local network.

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- (1) If you already have your printer installed on your printer port (LPT1), it will make this setup process much easier. See next page for instructions. Run the Printer Setup Wizard from the Windows Start menu.
- (2) If the printer is found, the name of the printer will be shown on this screen.
Note: If there is an error communicating with the printer, you will get this message. Make sure that the printer is ON, ready, and connected. Click **Back** and **Next**.

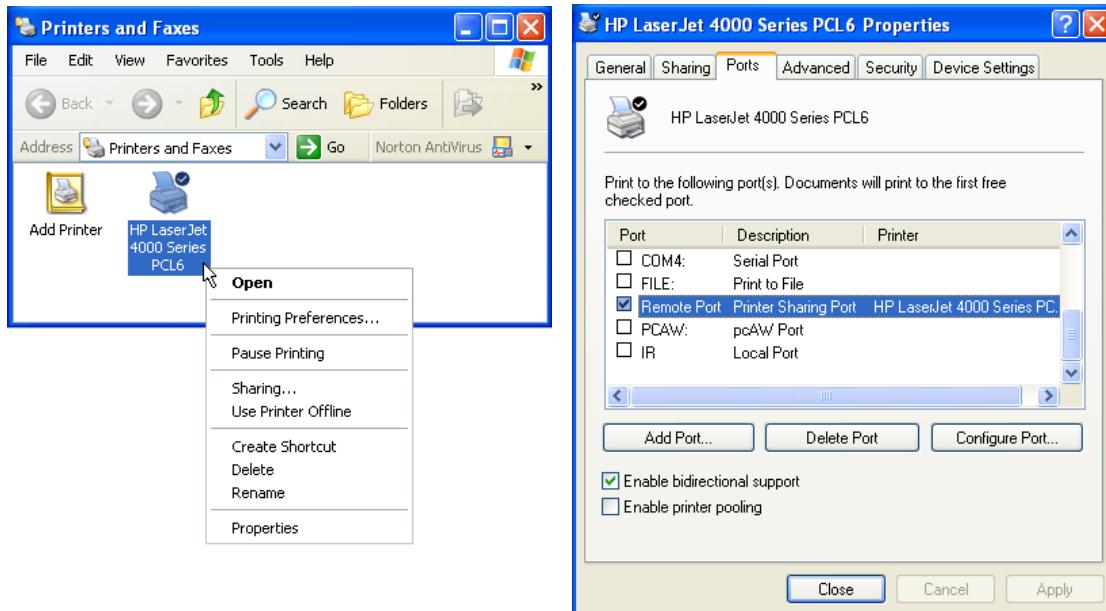
If you can see this message , this means no Server found during this search. Please click "More" to search again after checking all the settings.



- (3) This setup wizard will change your default printer to use "Remote Port" which is serviced by the SpaceLink Home Gateway.
- (4) Click **Done** when setup is complete.

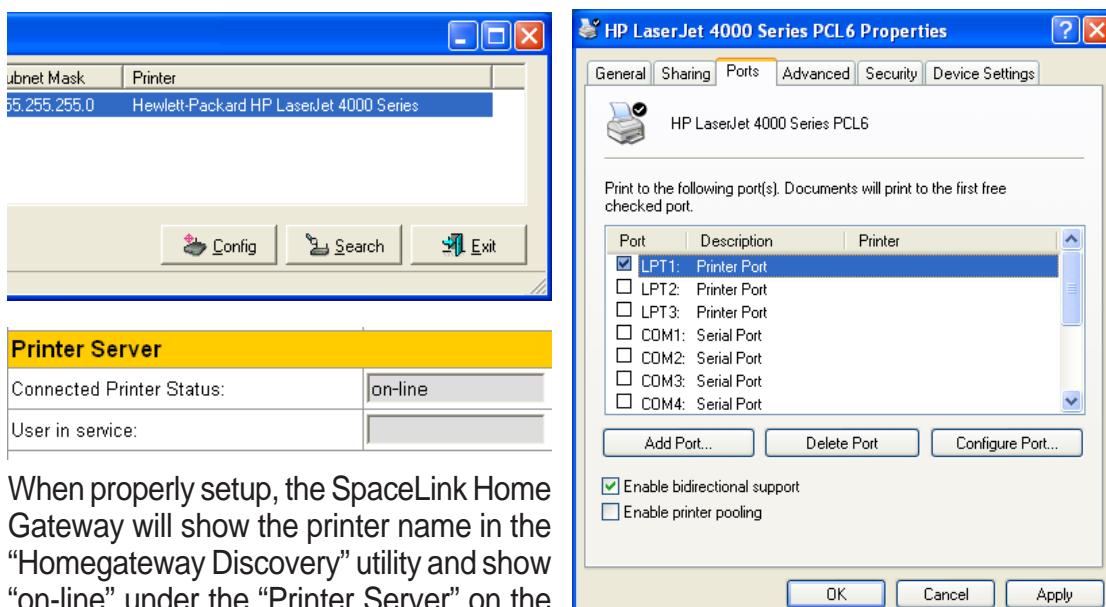
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Verifying Your Printer



After setting up the printer, a printer icon will appear in Windows' "Printers and Faxes". Right click the printer icon and choose **Properties** to configure the printer.

If your printer was previously setup, the SpaceLink Home Gateway printer setup wizard will change your printing port from your local LPT1 (parallel) port to "Remote Port". If necessary, you can change this back at anytime or use Windows "Add Printer" to setup another printer on whatever port you require.



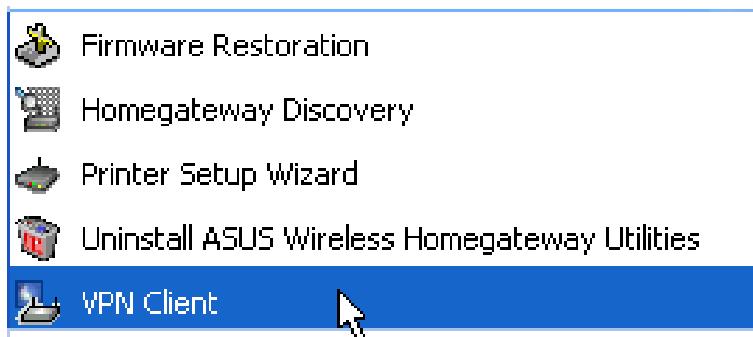
When properly setup, the SpaceLink Home Gateway will show the printer name in the "Homegateway Discovery" utility and show "on-line" under the "Printer Server" on the "Status" page of the web manager.

VPN Client

A virtual private network (VPN) is the extension of a private network that encompasses links across shared or public networks like the Internet. A VPN enables you to send data between two computers across a shared or public intranet in a manner that emulates the properties of a point-to-point private link. The VPN Client utility help you to create and configure the VPN connections.

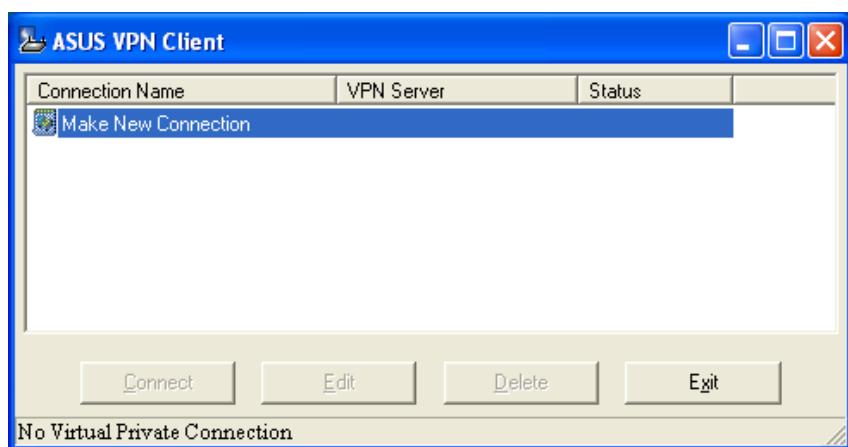
Starting VPN Client

Click the Windows Start button, point to Programs, point to ASUS Wireless Homegateway Utilities, and then click VPN Client.



Main Window

The main windows shows all the available VPN connections on your system. Click **Make New Connection** to open the VPN Connection Wizard. Follow the instructions on the next page to create a new VPN connection. When you finish, the VPN connection name will appear in the list box.

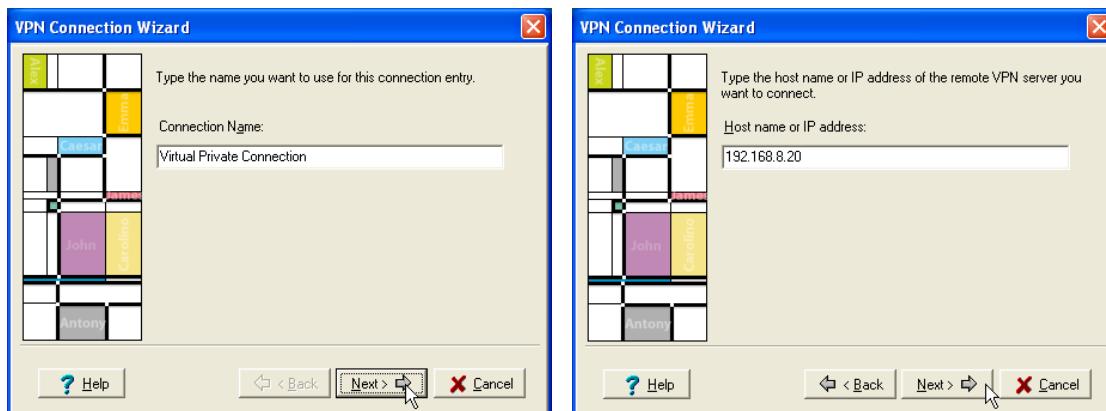


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3. Utilities

VPN Connection Wizard

The VPN Connection Wizard helps you create a new virtual private network (VPN) connection. On the main window, double-click **Make New Connection** from the connections list box, then the VPN Connection Wizard dialog box appears. Follow the on-screen instructions to specify settings for your connection.



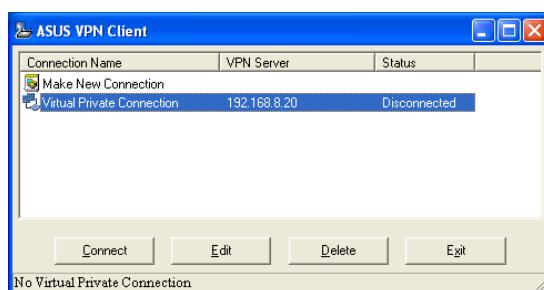
Enter a unique name for this new connection entry. The name is used to identify this connection. This name is not case-sensitive. Click **Next**.

Enter the host name or IP address of the remote VPN server to which you wish to connect, and then click **Next**.



Enter the user name/password for this connection, and then click **Next**.

If you want to connect now, check **Connect Now** and then click **Finish**.



After the VPN Connection Wizard dialog box closes, your new connection entry appears in the ASUS VPN Client's main window. Select a connection name and click **Edit** to view the properties.

Connection Properties

Select a connection name in the VPN Client window and click **Edit**.

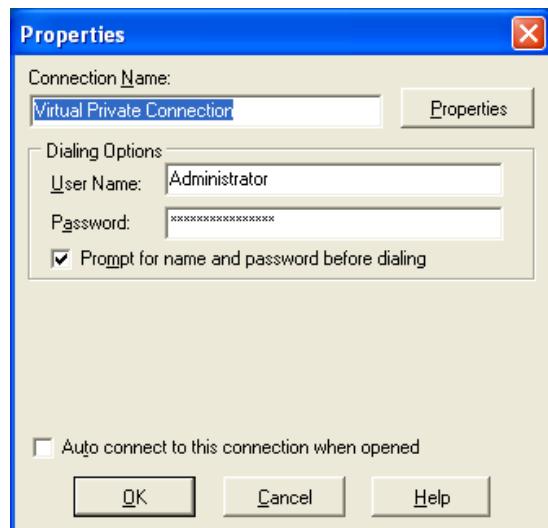
Connection Name

Types the name you want to use for this connection entry in the Name field. The name is used to identify this connection. This name is not case-sensitive.

Properties

Opens the standard DUN properties dialog for the currently selected connection. Let user to change or set parameters for a connection entry.

When you finished setting parameters, click **OK** to close Properties dialog box and save your changes. To discard your changes, click **Cancel** to close Properties dialog box without saving your changes.



Dialing Options

User Name: Provides a space for you to type your user name for this connection.

Password: Provides a space for you to type your password for this connection. The password will be shown as asterisks for security.

Prompt for name and password before dialing: Specifies whether to request identity authentication information before attempting to connect. This information can include a user name and password. If this option is checked then a dialog box will be displayed before the connection is dialed, prompting for the user name and password. If you have already entered the user name and/or password in the edit boxes described above, then you should uncheck this box. If you want to leave the password blank on this properties page and enter your password every time you use this connection, then you should check this box.

Auto connect to this connection when opened: When this feature is enabled, it will automatically start connecting to this VPN connection when the VPN client utility opens.

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Advanced Properties

Host name or IP address of destination

Enter the host name or IP address of the remote VPN server to which you are connecting, and then click **Next**.

Dial another connection first

Check this checkbox if you want the VPN connection to first make a call to an ISP. You must then select a dial-up connection from the drop-down list box.

Dialing a Connection

To dial a VPN connection, select a connection name from the connections list box and click the **Connect** button. The Connect... window will show. If you only see the “Hang Up” button on the main window, that means you are already connected to the selected VPN connection. Click **Hang Up** to disconnect from the currently connected remote server.



Buttons

Connect - Connect to remote server.

Hang Up - Disconnect from remote server.

Edit - Displays the standard Dial-Up Networking properties dialog for the currently selected connection entry.

Delete - Deletes the selected connection entry.

Exit (or press Esc) - Closes VPN Client utility.

4. Wireless Performance

This section provides the user with ideas for how to improve the performance of a SpaceLink 802.11b network.

Site Topography

For optimal performance, locate wireless mobile clients and the SpaceLink Home Gateways away from transformers, heavy-duty motors, fluorescent lights, microwave ovens, refrigerators, and other industrial equipment. Signal loss can occur when metal, concrete, walls or floors block transmission. Locate the SpaceLink Home Gateways in open areas or add the SpaceLink Home Gateways as needed to improve coverage.

Microwave ovens operate in the same frequency band as the SpaceLink Home Gateway. Therefore, if you use a microwave within range of the SpaceLink Home Gateway you may notice network performance degradation. However, both your microwave and your the SpaceLink Home Gateway will continue to function.

Site Surveys

A site survey (utility provided with the SpaceLink PC card and CF card) analyzes the installation environment and provides users with recommendations for equipment and its placement. The optimum placement of 11 Mbps Home Gateways differs for 1 or 2 Mbps Home Gateways, because the locations and number of Home Gateways required are different.

Range

Every environment is unique with different obstacles, barriers, materials, etc. and, therefore, it is difficult to determine the exact range that will be achieved without testing. However, has developed some guidelines to estimate the range that users will see when the product is installed in their facility, but there are no hard and fast specifications.

Radio signals may reflect off of some obstacles or be absorbed by others depending on their construction. For example, with two 802.11b radios, you may achieve up to 1000' in open space outdoors where two devices have a line of sight, meaning they see each other with no obstacles. However, the same two units may only achieve up to 300' of range when used indoors.

The IEEE 802.11b specification supports four data rates: 11 Mbps, 5.5 Mbps, 2 Mbps, and 1 Mbps. Operation at 1 Mbps provides greater range than operation at 11 Mbps. The SpaceLink Home Gateway will automatically adjust the data rate to maintain a usable radio connection.

Therefore, a client that is close to the SpaceLink Home Gateway may operate at 11 Mbps while a client that is on the fringe of coverage may operate at 1 Mbps. As mentioned earlier, you can configure the data rates that the SpaceLink Home Gateway will use. Note that if you limit the range of data rates available to the SpaceLink Home Gateway, you may reduce the effective wireless range of the SpaceLink 802.11b products.

5. Troubleshooting

The SpaceLink Home Gateway is designed to be very easy to install and operate. However, if you experience difficulties, use the information in this chapter to help diagnose and solve problems. If you cannot resolve a problem, contact Technical Support, as listed on the front of this manual.

Common Problems and Solutions

Problem

SpaceLink Home Gateway does not power up:

Solution

- Check for faulty the SpaceLink Home Gateway power supply by measuring the output voltage with an electrical test meter.
- Check failed AC supply (power outlet)

Problem

Cannot communicate with the SpaceLink Home Gateway through a wired network connection.

Solution

- Verify network configuration by ensuring that there are no duplicate IP addresses. Power down the device in question and ping the assigned IP address of the device. Ensure no other device responds to that address.
- Check that the cables used have proper pin outs and connectors or use another LAN cable.
- Check that the hub, switch, computer, or modem connected to the WAN port of the SpaceLink Home Gateway supports 10Mbps speed.

This is the LED result if you connect the SpaceLink Home Gateway to a(n):

	Auto 10/100 Mbps Hub	Pure 100 Mbps Hub
Hub LED	ON	OFF
Home Gateway WAN LED	ON	OFF

So you will not know if the connection is bad from the SpaceLink Home Gateway Link LED alone, you will have to look at the Hub LED if you are not sure what kind of hub the SpaceLink Home Gateway is attached to.

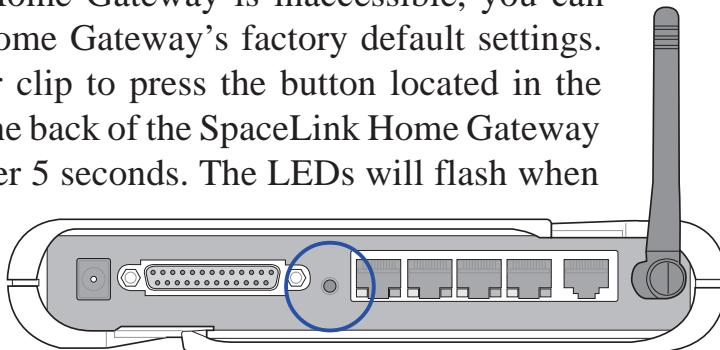
Chapter 5 -Troubleshooting

Problem

The SpaceLink Home Gateway Web Manager still cannot find or connect to the SpaceLink Home Gateway after verifying the IP address and LAN cable, changes cannot be made, or password is lost.

Solution

In case the SpaceLink Home Gateway is inaccessible, you can restore the SpaceLink Home Gateway's factory default settings. Use a straightened paper clip to press the button located in the hole labeled "Reset" on the back of the SpaceLink Home Gateway and keep it depressed over 5 seconds. The LEDs will flash when reset is successful.



Reset to Defaults

The following are factory default values. These values will be present when you first receive your the SpaceLink Home Gateway, if you push the reset button on the back of the SpaceLink Home Gateway over 5 seconds, or if you click the "Restore" button on the "Factory Default" page under "Advanced Setup".

Name	Default Value
User Name	admin
Password	admin
Enable DHCP	Yes
IP Address	192.168.123.1
Subnet Mask	255.255.255.0
DNS Server 1	(blank)
DNS Server 2	192.168.123.1
SSID	default
Domain Name	home

Chapter 5 -Troubleshooting

Problem

My 802.11b PC Card will not associate with the SpaceLink Home Gateway.

Solution

Follow these steps:

1. Try to bring the devices closer together; the PC Card may be out of range of the SpaceLink Home Gateway.
2. Confirm that the SpaceLink Home Gateway and PC Card have the same SSID.
3. Confirm that the SpaceLink Home Gateway and PC Card have the same Encryption settings, if enabled.
4. Confirm that the SpaceLink Home Gateway's Air and Link LEDs are solid green.
5. Confirm that the authorization table includes or excludes the MAC address of the SpaceLink PC card if "Wireless Access Control" is enabled.

Problem

The throughput seems slow.

Solution

To achieve maximum throughput, verify that your antennas are well-placed, not behind metal, and do not have too many obstacles between them. If you move the client closer to the SpaceLink Home Gateway and throughput increases, you may want to consider adding a second the SpaceLink Home Gateway and implementing roaming.

- Check antenna, connectors and cabling.
- Verify network traffic does not exceed 37% of bandwidth.
- Check to see that the wired network does not exceed 10 broadcast messages per second.
- Verify wired network topology and configuration.

Chapter 5 -Troubleshooting

Problem

I cannot find the SpaceLink Home Gateways using the SpaceLink Home Gateway Discovery.

Solution

To configure the SpaceLink Home Gateway through a wireless LAN card, your computer must be in the same subnet of the SpaceLink Home Gateway. You cannot find the SpaceLink Home Gateways with subnet different from your computer within the same gateway. You must change your computer to the same subnet as the SpaceLink Home Gateway. The factory default subnet of the SpaceLink Home Gateway is "192.168.123.1".

In Windows NT/2000/XP, you must login with Administrator privileges so that all functions of the SpaceLink Home Gateway Manager can function correctly. If you do not login as a member of the Administrator group, you cannot change IP settings but can still run the Discovery utility if the original IP setting is correct.

Problem

How do I upgrade the firmware on the SpaceLink Home Gateway?

Solution

Periodically, a new Flash Code is available for the SpaceLink Home Gateways on the ftp site at <ftp://ftp.asus.com>. Ideally, you should update the SpaceLink Home Gateway's Flash Code using "Firmware Upgrade" on the "Advanced Setup" menu of the web manager.

Appendix

6. Appendix

Operating frequency range

The DSSS PHY shall operate in the frequency range of 2.4 GHz to 2.4835 GHz as allocated by regulatory bodies in the USA and Europe or in the 2.471 GHz to 2.497 GHz frequency band as allocated by regulatory authority in Japan.

Number of operating channels

The channel center frequencies and CH ID numbers shall be as shown below. The FCC (US), IC (Canada), and ETSI (Europe) specify operation from 2.4 GHz to 2.4835 GHz. For Japan, operation is specified as 2.471 GHz to 2.497 GHz. France allows operation from 2.4465 GHz to 2.4835 GHz, and Spain allows operation from 2.445 GHz to 2.475 GHz. For each supported regulatory domain, all channels marked with “Yes” shall be supported.

In a multiple cell network topology, overlapping and/or adjacent cells using different channels can operate simultaneously without interference if the distance between the center frequencies is at least 30 MHz. Channel 14 shall be designated specifically for operation in Japan.

DSSS PHY frequency channel plan

CH ID	Frequency	(Regulatory Domains)					
		X'10' FCC	X'20' IC	X'30' ETSI	X'31' Spain	X'32' France	X'40' MKK
1	2412 MHz	Yes	Yes	Yes	-	-	Yes
2	2417 MHz	Yes	Yes	Yes	-	-	Yes
3	2422 MHz	Yes	Yes	Yes	-	-	Yes
4	2427 MHz	Yes	Yes	Yes	-	-	Yes
5	2432 MHz	Yes	Yes	Yes	-	-	Yes
6	2437 MHz	Yes	Yes	Yes	-	-	Yes
7	2442 MHz	Yes	Yes	Yes	-	-	Yes
8	2447 MHz	Yes	Yes	Yes	-	-	Yes
9	2452 MHz	Yes	Yes	Yes	-	-	Yes
10	2457 MHz	Yes	Yes	Yes	Yes	Yes	Yes
11	2462 MHz	Yes	Yes	Yes	Yes	Yes	Yes
12	2467 MHz	-	-	Yes	-	Yes	Yes
13	2472 MHz	-	-	Yes	-	Yes	Yes
14	2484 MHz	-	-	-	-	-	Yes

SpaceLink Home Gateway Specifications

The following technical specification is for reference purposes only. Actual product's performance and compliance with local telecommunications regulations may vary from country to country. ASUS will only ship products that are type approved in the destination country.

WAN Ethernet Port Support: Both Ethernet and 802.3 with Max. Bit Rate 10 Mbps
 Auto crossover function (MDI-X)
Connector: RJ45 for 10Base-T

LAN Ethernet Port Support: Both Ethernet and 802.3 with Max. Bit Rate 100Mbps
 Four Port Switch with Auto crossover function (MDI-X)
Connector: Four RJ45 for 10Base-T or 100Base-TX

Wireless Freq. Band: 2400-2497 MHz
 Antenna: 2 Diversity Antennas
Modulation: Direct Sequence Spread Spectrum (CCK, DQPSK, DBPSK)
Data rate: 1, 2, 5.5, 11 Mbps
Output Power: 15 dBm

Printer port Support: Standard Print Port (SPP)
Connector: 25 PIN D-SUB FEMALE

DC Power Adapter AC Input: 100V~240V(50~60HZ)
DC Output: 5V with max. 2A current

Visible LEDs PWR (Power), AIR, WAN, LAN,
 LPT, 10/100 indication for LAN Ports

Reset button Push for 5 seconds to restore factory setting

Environment Operating Temp.: 0 to 50 °C with 1 meter/sec airflow
 Storage Temp.: -20 to 70 °C
Operating Humidity: 0 to 95% (Non-condensing)
Storage Humidity: 0 to 95%

Regulation Certification EMI: FCC Part 15 Class B; VCCI Class B;
 ETSI 300 328; CISPR 22 Class B , CE Mark,
 FCC Part 68, UL1950, CSA22.2, EN60950

MTBF More than 10,000 hrs/failure

Appendix

Glossary

Access Point - An access point is a device that allows wireless clients to connect to other wireless clients and it acts as a bridge between wireless clients and a wired Ethernet network.

Broadband - A type of data transmission in which a single medium (such as cable) carries several channels of data at once.

Channel - Wireless access points allows you to choose different radio channels in the wireless spectrum. A wireless LAN device operates within the 2.4 GHz spectrum and a channel is within a FCC specified range, similar to any radio channel.

Client - A client is the desktop or mobile PC that is connected to your network.

Device name - Also known as DHCP client ID or network name. Sometimes provided by an ISP when using DHCP to assign addresses.

DHCP (Dynamic Host Configuration Protocol) - This protocol allows a computer (or many computers on your network) to be automatically assigned a single IP address from a DHCP server.

DNS Server Address (Domain Name System) - DNS allows Internet host computers to have a domain name and one or more IP addresses. A DNS server keeps a database of host computers and their respective domain names and IP addresses, so that when a user enters a domain name into the Internet browser, the user is sent to the proper IP address. The DNS server address used by the computers on your home network is the location of the DNS server your ISP has assigned.

DSL Modem (Digital Subscriber Line) - A DSL modem uses your existing phone lines to transmit data at high speeds.

Encryption - This provides wireless data transmissions with a level of security.

ESSID (Extended Service Set Identifier) - You must have the same ESSID entered into the gateway and each of its wireless clients. The ESSID is a unique identifier for your wireless network.

Ethernet - Ethernet networks are connected by cables and hubs, and move data around. This is a standard for computer networks.

Appendix

Firewall - A firewall determines which information passes in and out of a network. NAT can create a natural firewall by hiding a local network's IP addresses from the Internet. A Firewall prevents anyone outside of your network from accessing your computer and possibly damaging or viewing your files.

Gateway - A network point that manages all the data traffic of your network, as well as to the Internet and connects one network to another.

IEEE - The Institute of Electrical and Electronics Engineers. The IEEE sets standards for networking, including Ethernet LANs. IEEE standards ensure interoperability between systems of the same type.

IP Address (Internet Protocol) - An IP address consists of a series of four numbers separated by periods, that identifies a unique Internet computer host, allowing messages intended for that computer to be delivered to the correct destination.

ISP (Internet Service Provider) - An ISP is a business that allows individuals or businesses to connect to the Internet. Users log on to the Internet using an account with an ISP or Internet Service Provider. ISPs can serve IP addresses dynamically, or assign static (fixed) IP addresses to individual computers.

ISP Gateway Address - The ISP Gateway Address is an IP address for the Internet router. This address is only required when using a cable or DSL modem.

LAN (Local Area Network) - A LAN is a group of computers and devices connected together in a relatively small area (such as a house or an office). Your home network is considered a LAN.

MAC Address (Media Access Control) - A MAC address is the hardware address of a device connected to a network.

NAT (Network Address Translation) - NAT masks a local network's group of IP addresses from the external network, allowing a local network of computers to share a single ISP account. This process allows all of the computers on your home network to use one IP address. This will enable access to the Internet from any computer on your home network without having to purchase more IP addresses from your ISP.

PC Card - This is an Ethernet card that connects to the PCMCIA slot on your Notebook PC. This enables the computer to communicate with wireless access points.

Appendix

PPP (Point-to-Point Protocol) - PPP is a protocol for communication between computers using a serial interface, typically a personal computer connected by phone line to a server.

PPPoE (Point-to-Point Protocol over Ethernet) - Point-to-Point Protocol is a method of secure data transmission. PPP using Ethernet to connect to an ISP.

Subnet Mask - A subnet mask is a set of four numbers configured like an IP address. It is used to create IP address numbers used only within a particular network.

TCP/IP (Transmission Control Protocol/Internet Protocol) - This is the standard protocol for data transmission over the Internet. Protocols used to connect hosts on the Internet.

WAN (Wide Area Network) - A system of LANs, connected together. A network that connects computers located in separate areas, (i.e., different buildings, cities, countries). The Internet is a wide area network.

WECA (Wireless Ethernet Compatibility Alliance) - An industry group that certifies cross-vender interoperability and compatibility of IEEE 802.11b wireless networking products and to promote that standard for enterprise, small business, and home environments.

WLAN (Wireless Local Area Network) - This is a group of computers and other devices connected wirelessly in a small area. A wireless network is referred to as LAN or WLAN.



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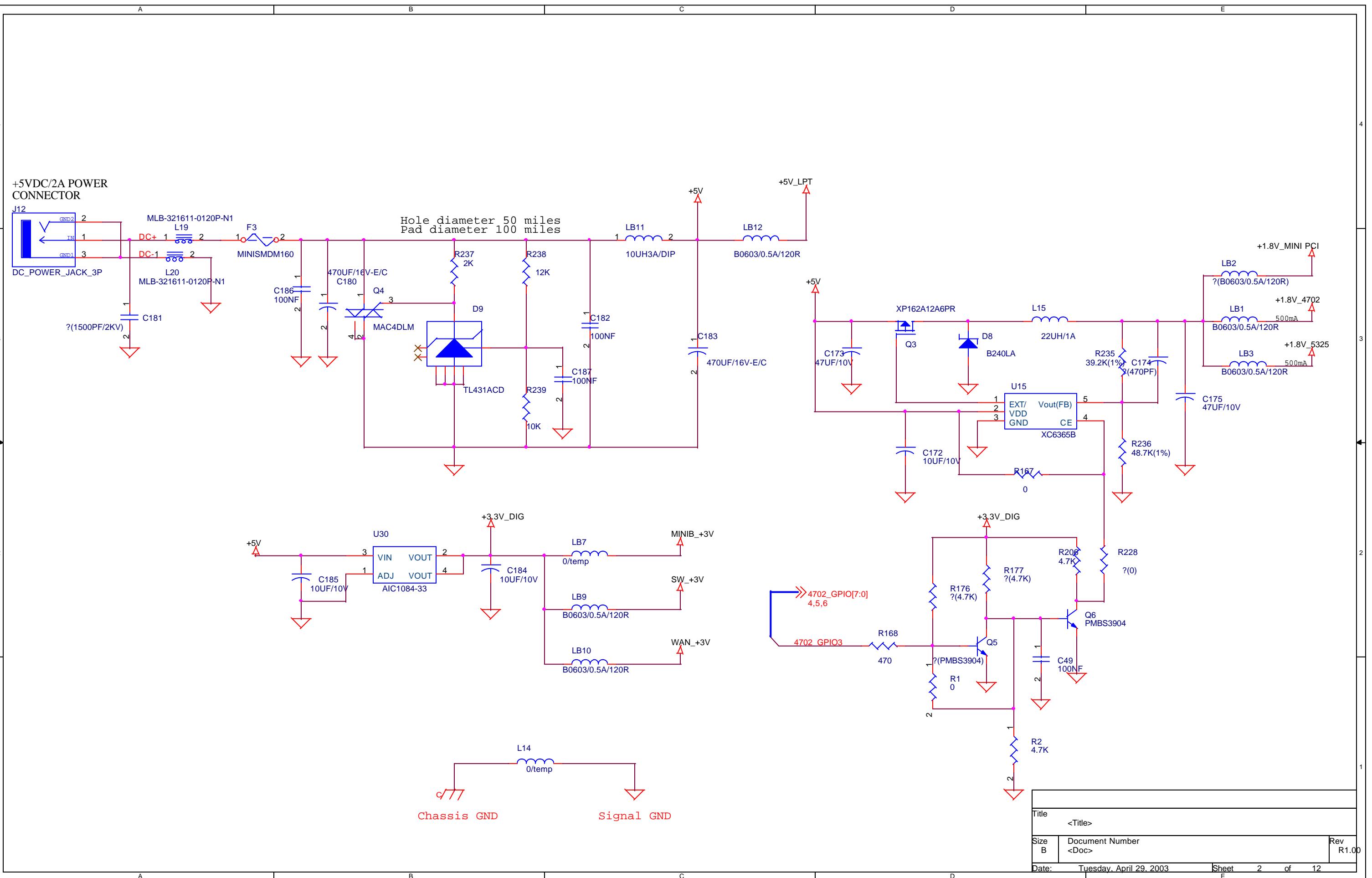
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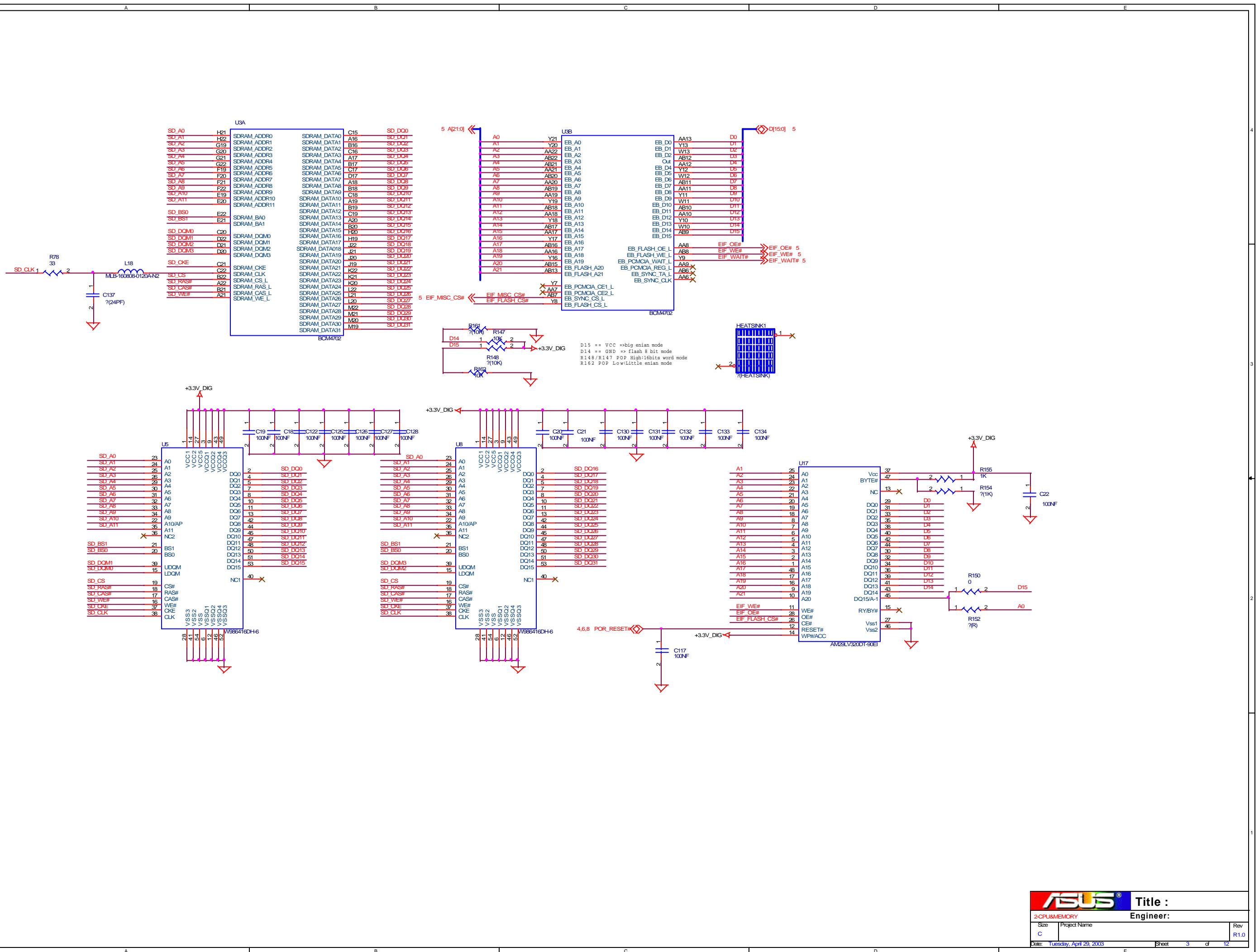
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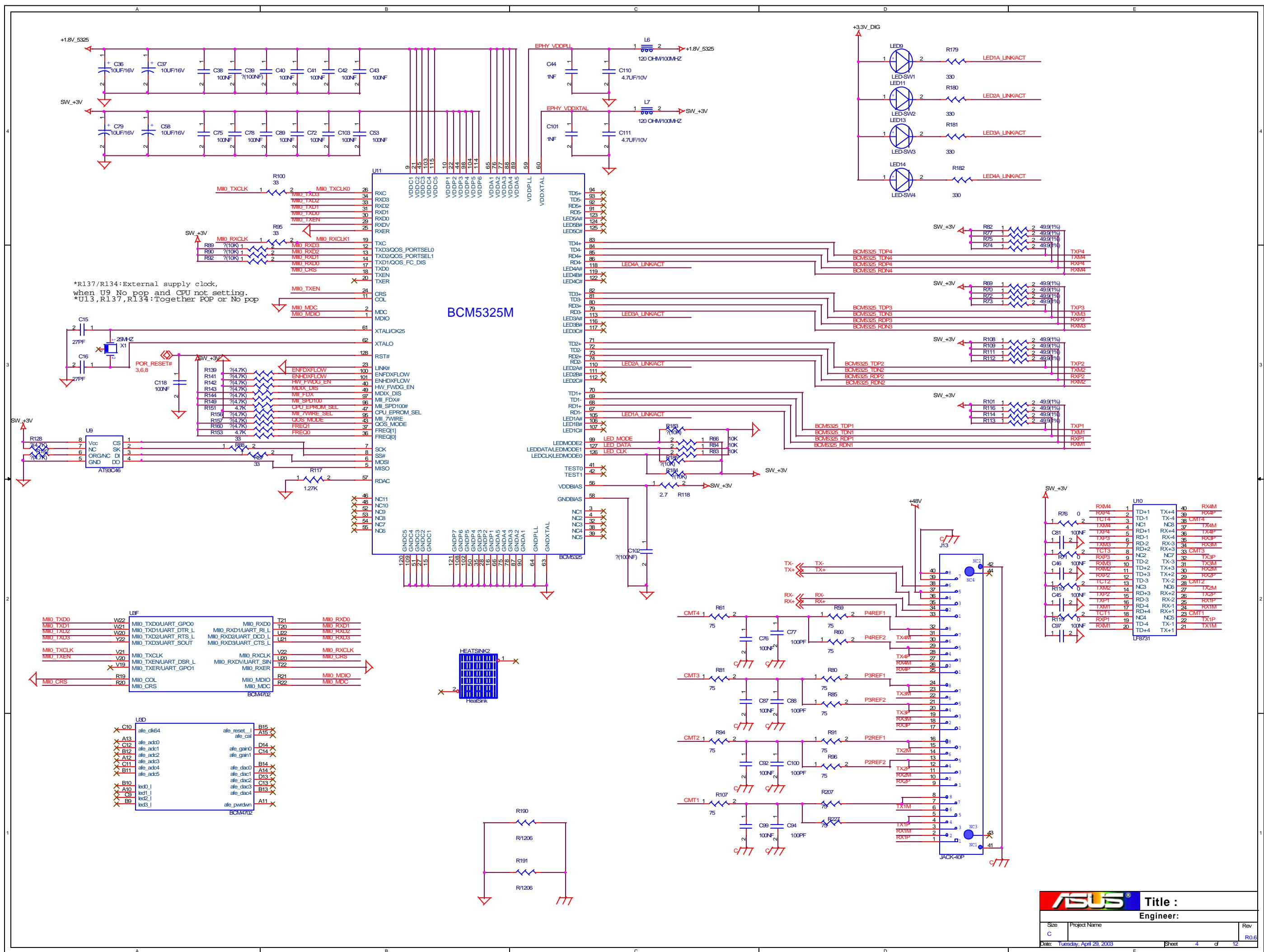
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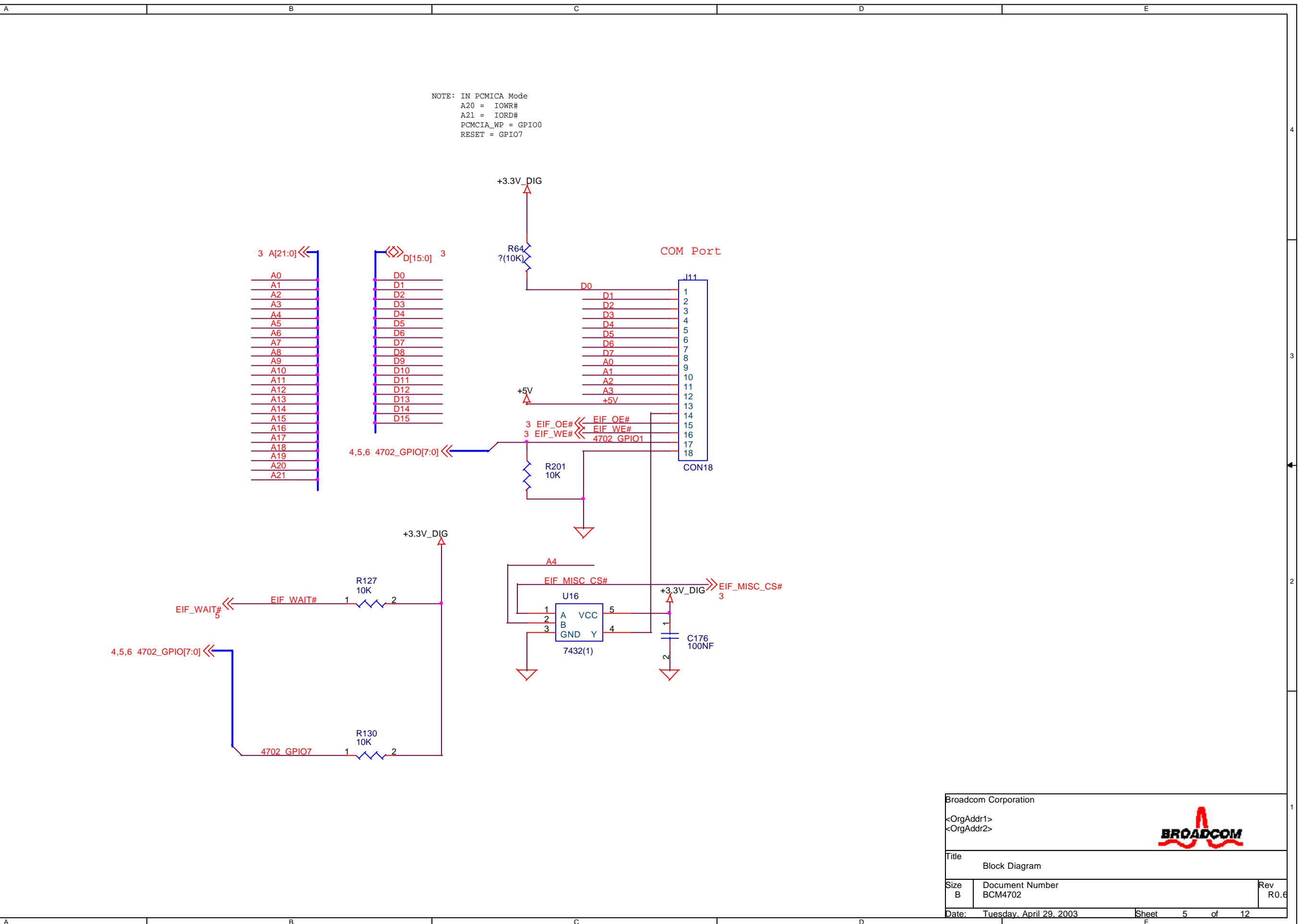
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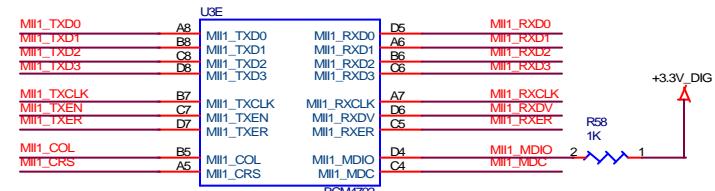
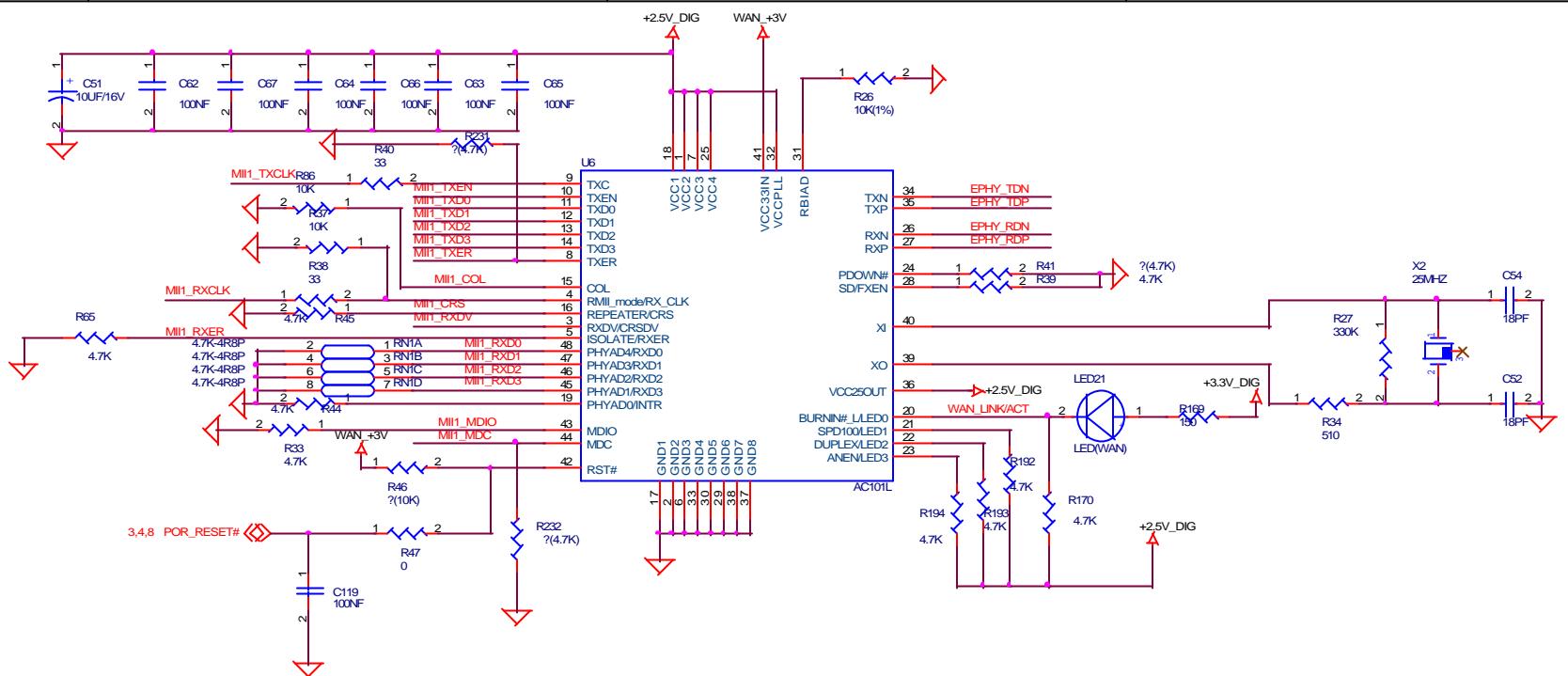
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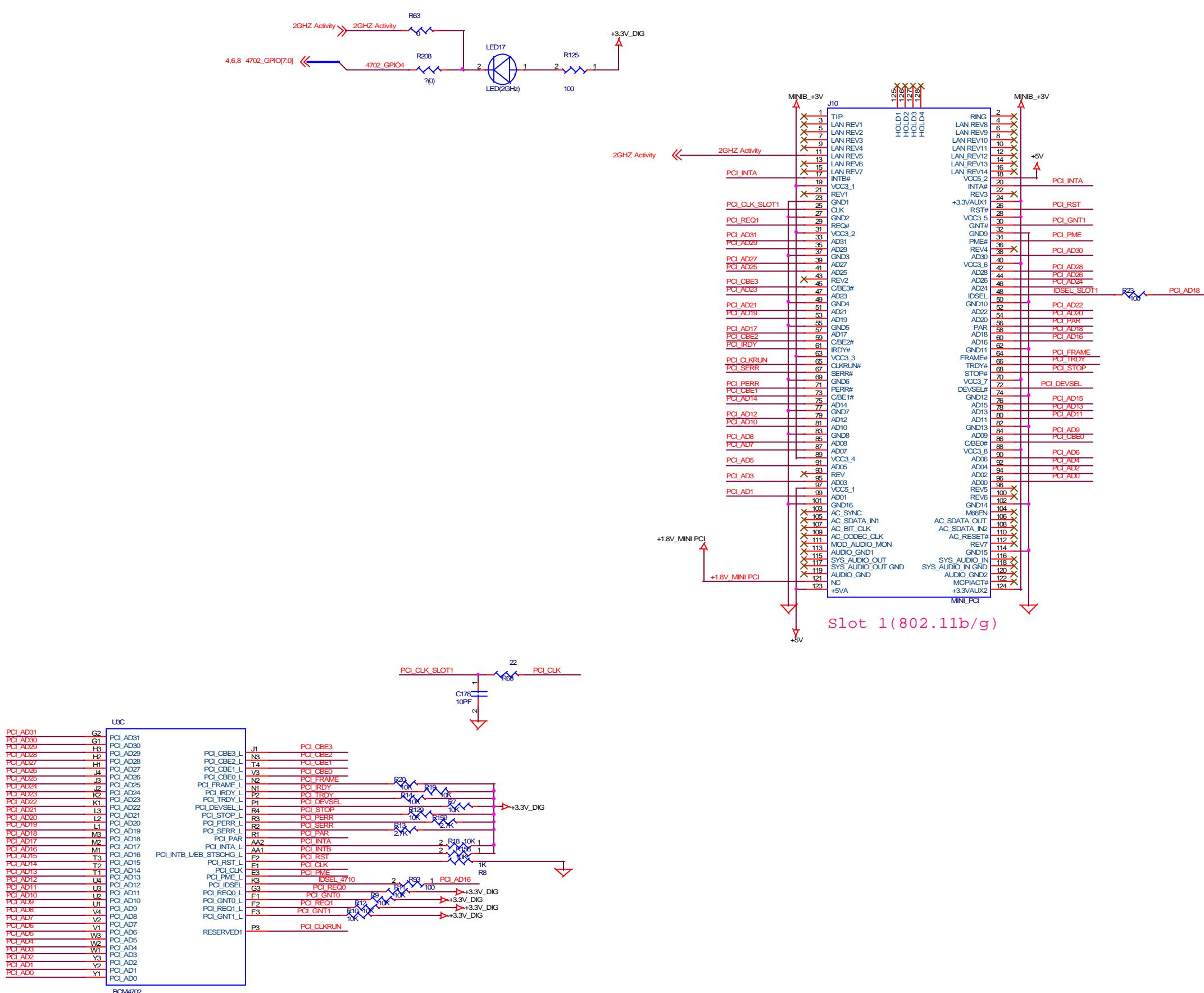


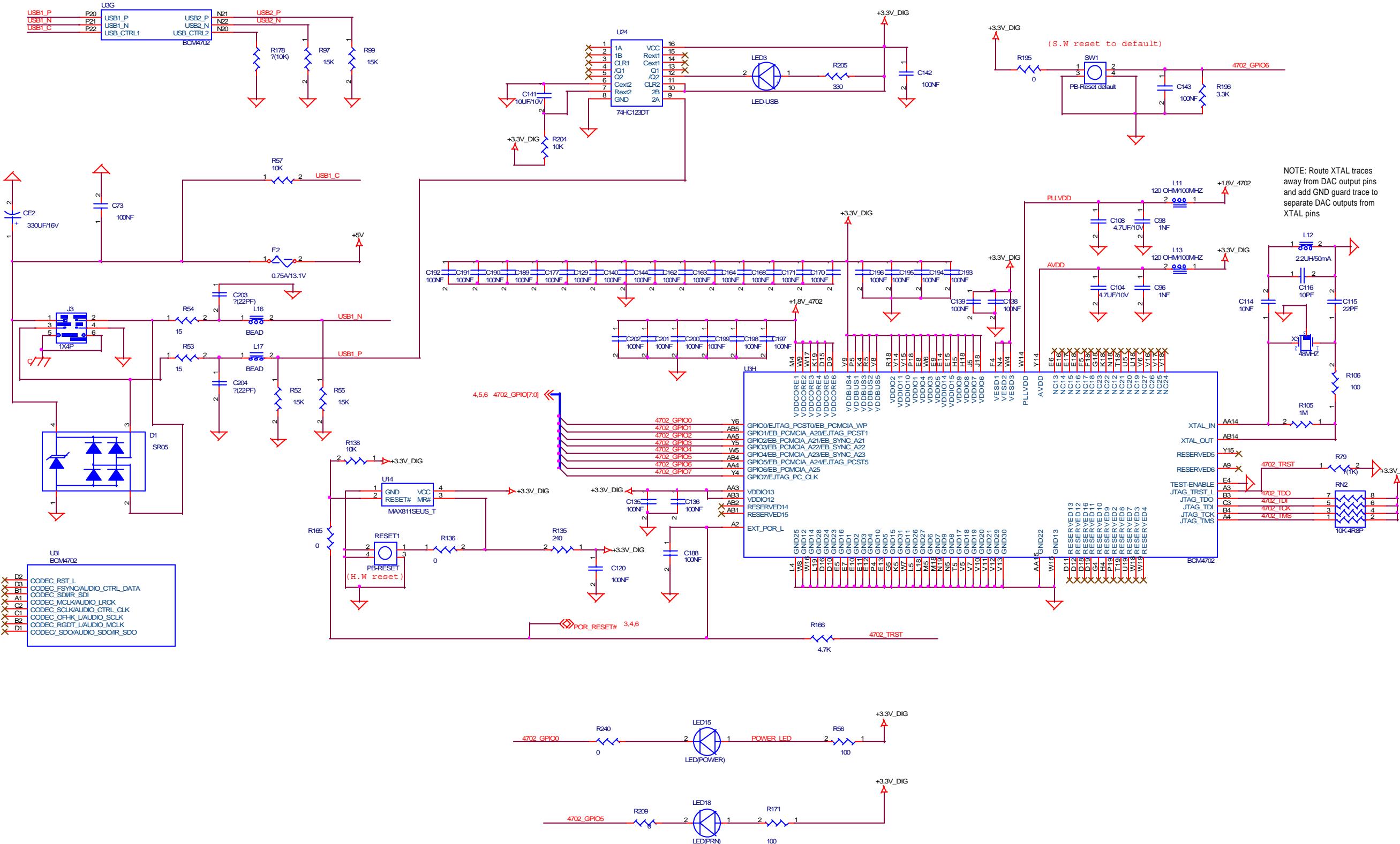




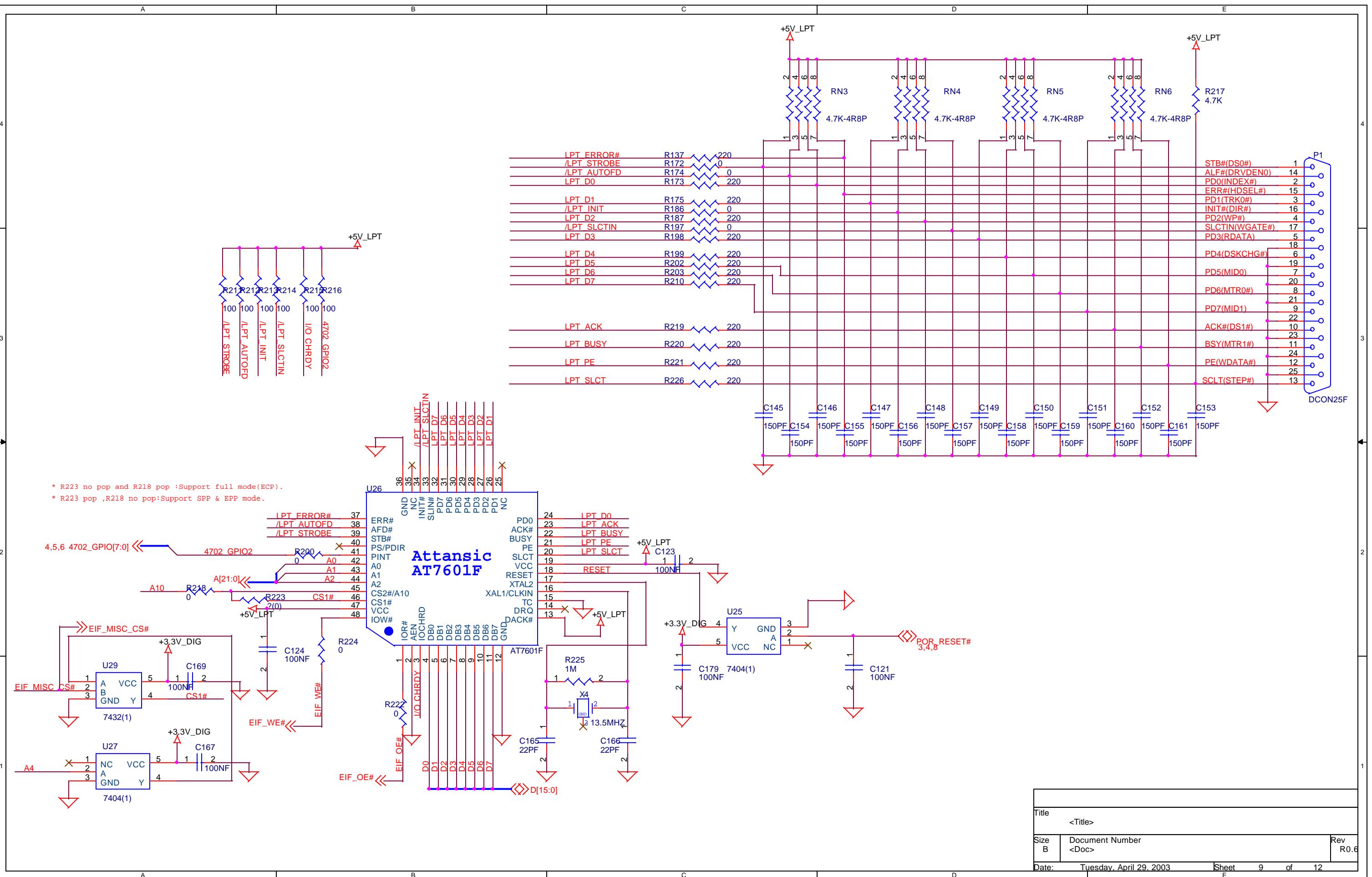


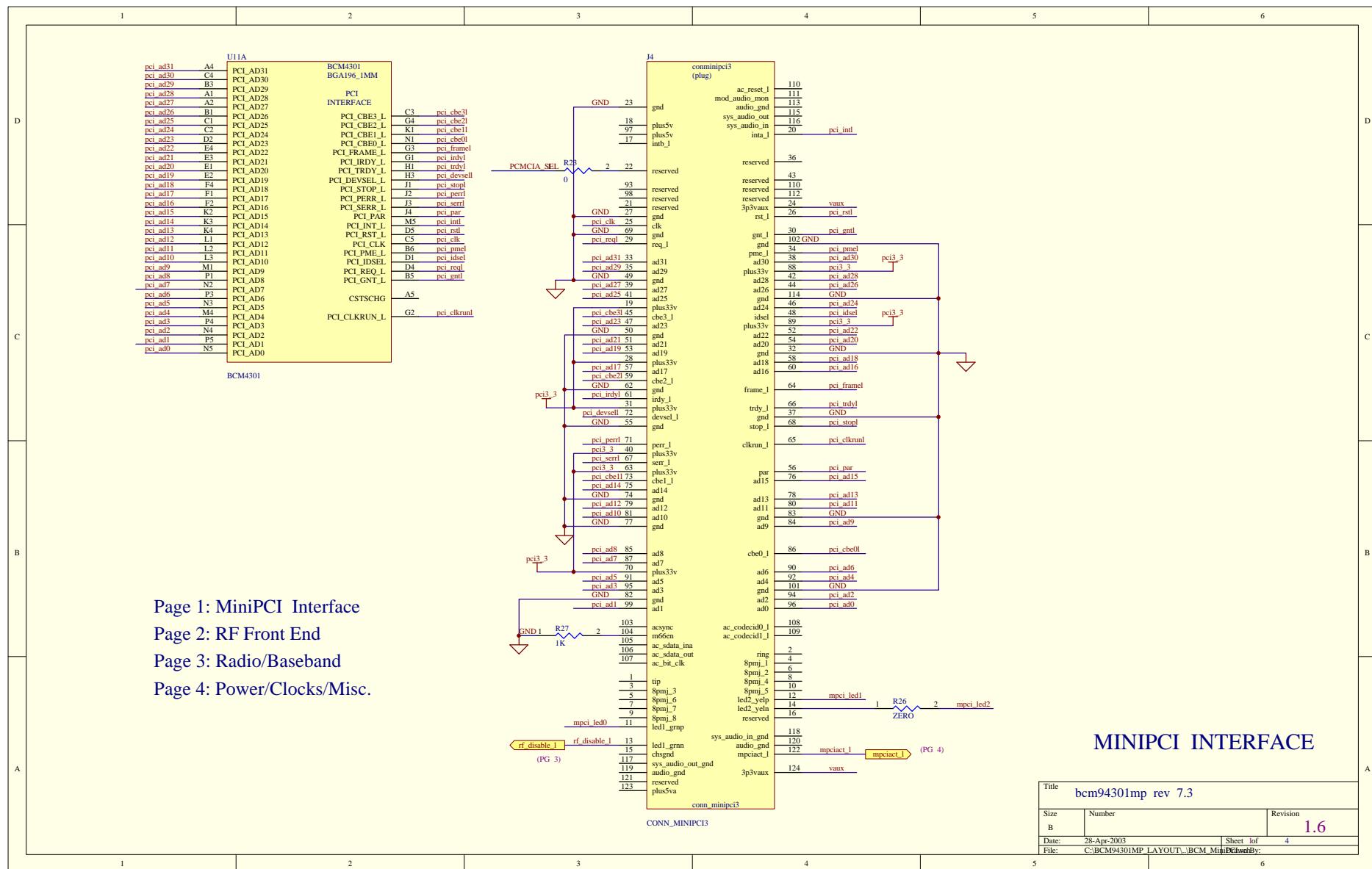


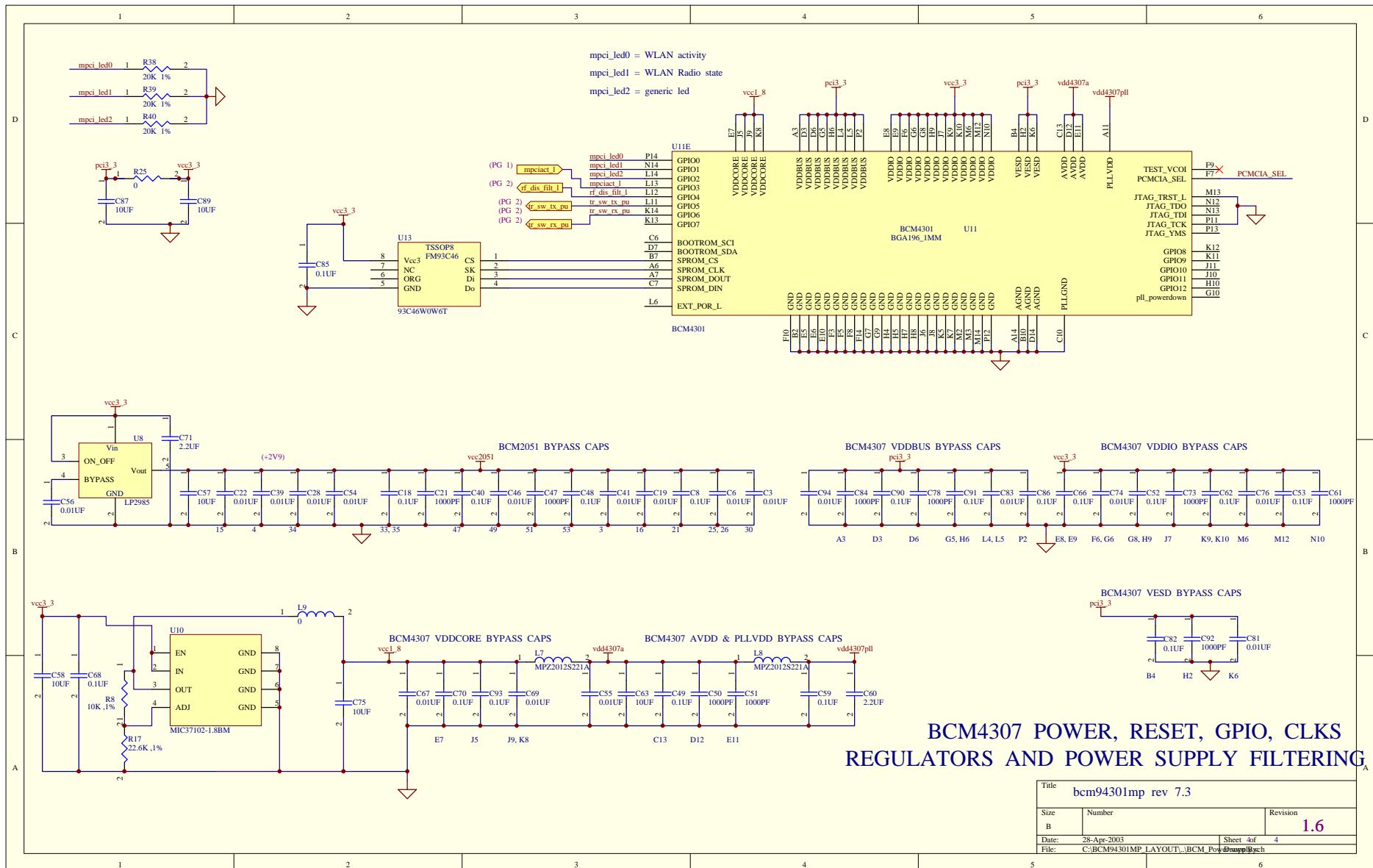


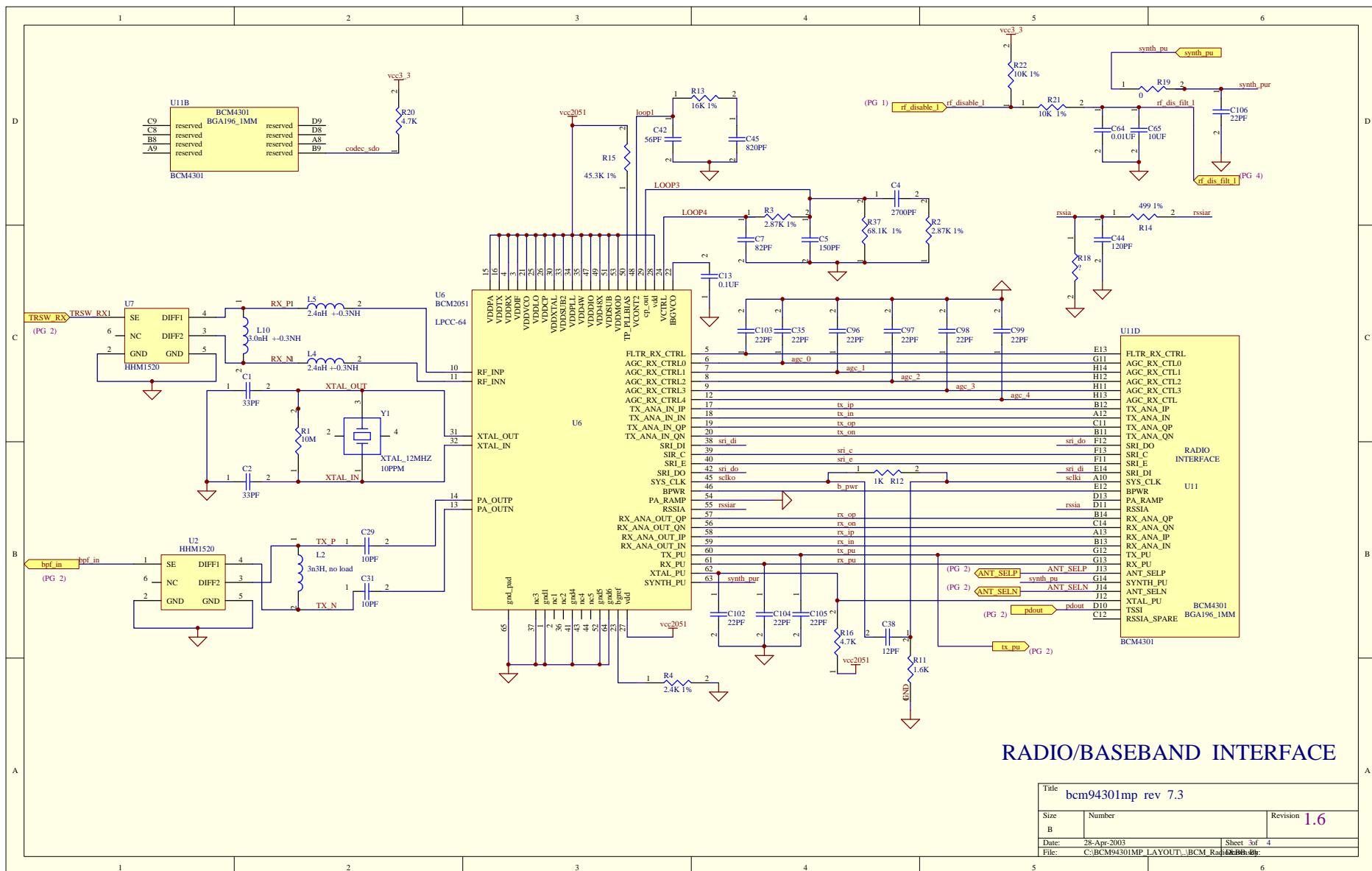


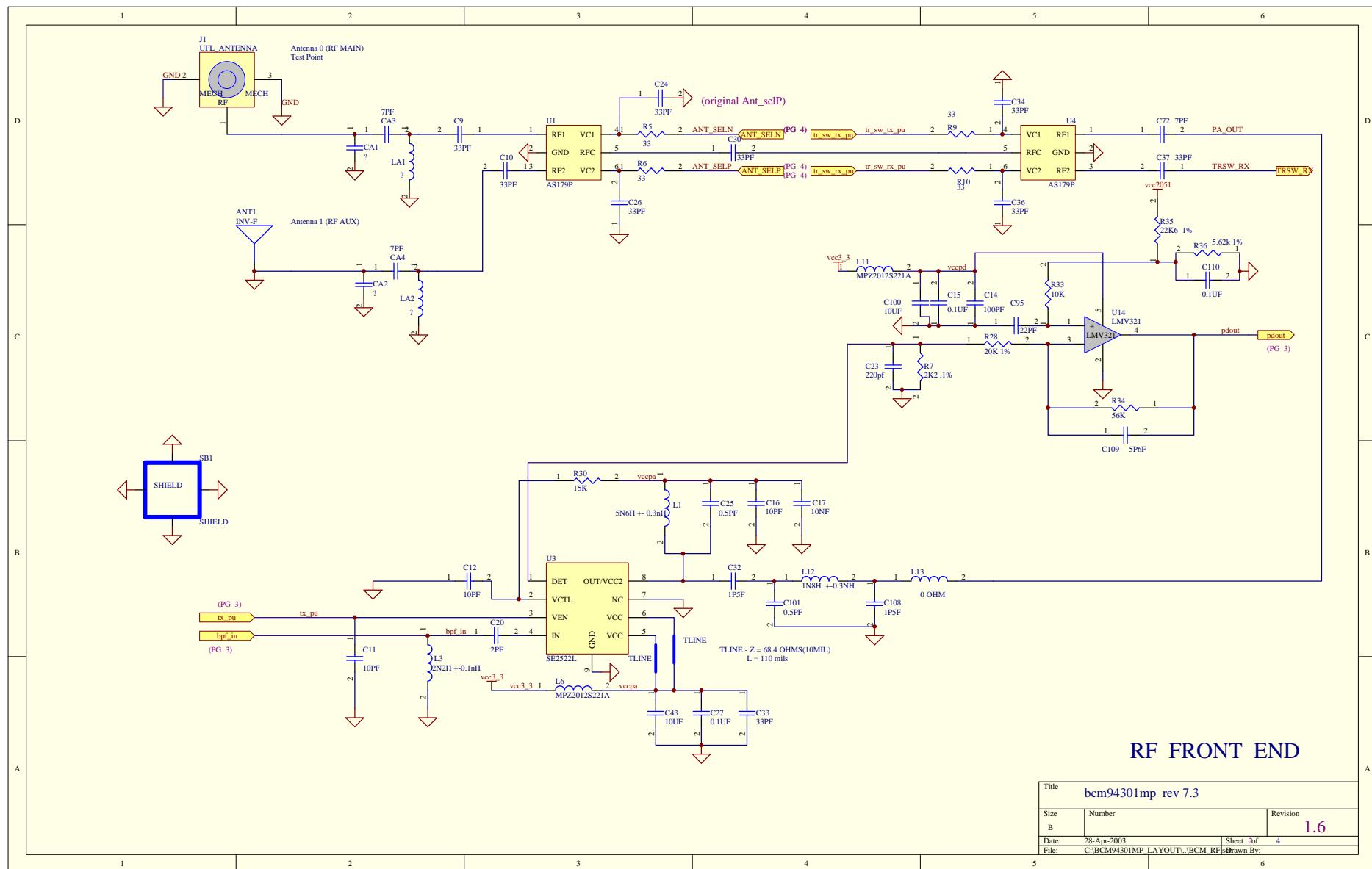
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EXHIBIT G

Part List

華碩電腦股份有限公司

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品名規格:WRT50G WIRELESS ROUTER 主件數量:1

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20	07-014000002 POLYSWITCH miniSMDC075-2 750mA RAYCHEM MARKING:7 x 7	P PCS	1.0000	03/04/23	F2,		N N	
30	09-010070100 FERRITE BEAD SMD(1206)700HM/3A A TYPE	P PCS	2.0000	03/04/23	L14,LB7,		Y N	
40	10-003411227 RES 1.27K OHM 1/10W(0603) 1%	P PCS	1.0000	03/04/23	R117,		N N	
50	10-003401010 RES 100 OHM 1/10W (0603) 5%	P PCS	12.0000	03/04/23	R106,R125,R171,R211, R212,R213,R214,R215, R216,R23,R56,R93,		N N	
60	11-033410400 CAP 0.1UF/25V (0603) Y5V (104) +80%-20%	P PCS	56.0000	03/04/23	C103,C117,C118,C119, C120,C121,C122,C123, C124,C126,C131,C132, C142,C143,C167,C169, C176,C179,C18,C182, C186,C187,C188,C19, C20,C21,C22,C38,C40, C41,C42,C43,C45,C46, C49,C53,C60,C61,C62, C63,C64,C65,C66,C67, C69,C72,C73,C75,C76, C78,C81,C87,C89,C92, C97,C99,		N N	

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90	10-003411030 RES 10K OHM 1/10W (0603) 1%	P PCS	1.0000	03/04/23		R26,		N N
100	10-063301030 CHIP RES. ARRAY 10K OHM (0603) 4R8P YCN/AB TYPE	P PCS	1.0000	03/04/23		RN2,		N N
110	11-033110300 CAP 0.01UF/50V (0603)X7R (103) 10%	P PCS	1.0000	03/04/23		C114,		Y N
120	11-033010000 CAP 10PF/50V (0603) NPO 5%	P PCS	2.0000	03/04/23		C116,C178,		Y N
130	11-031310660 CAP 10UF/10V (1206) Y5V (106) +80-20% TAYIO/LMK316F106ZF-T	P PCS	4.0000	03/04/23		C141,C172,C184,C185,		N N
140	11-015000100 CAP TAN 10U/16V (3528) SMD MARKING:10/16;106C	P PCS	6.0000	03/04/23		C36,C37,C51,C58,C71, C79,		N N
150	09-013120400 FERRITE BEAD(0603)120OHM/400mA A TYPE	P PCS	5.0000	03/04/23		L11,L13,L18,L6,L7,		N N
160	10-003401230 RES 12K OHM 1/10W (0603)	P PCS	1.0000	03/04/23				N N

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	TXC 20PF/20PPM							
	MARKING:TXC/13 B x 6 x F							
	QVL:TXC,							
180	10-003401500	P PCS	2.0000	03/04/23			N N	
	RES 15 OHM 1/10W (0603)							
	5%			R53, R54,				
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190	10-003401510	P PCS	1.0000	03/04/23			N N	
	RES 150 OHM 1/10W (0603)							
	5%			R169,				
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200	11-033015100	P PCS	17.0000	03/04/23			N N	
	CAP 150PF/50V (0603) NPO (151)							
	5%			C145, C146, C147, C148, C149, C150, C151, C152, C153, C154, C155, C156, C157, C158, C159, C160, C161,				
	QVL:MURATA, TAIYO, WALSIN, PAN OVERS, PHYCOMP, TDK,							
210	10-003401530	P PCS	4.0000	03/04/23			N N	
	RES 15K OHM 1/10W (0603)							
	5%			R52, R55, R97, R99,				
	QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,							
220	11-033018000	P PCS	2.0000	03/04/23			N N	
	CAP 18PF/50V (0603) NPO							
	5%			C52, C54,				
	QVL:MURATA, TAIYO, WALSIN, PAN OVERS, PHYCOMP, TDK,							
230	10-003401020	P PCS	3.0000	03/04/23			N N	
	RES 1K OHM 1/10W (0603)							
	5%			R155, R58, R8,				
	QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,							
240	10-003401050	P PCS	2.0000	03/04/23			N N	
	RES 1M OHM 1/10W (0603)							
	5%			R105, R225,				
	QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,							
250	11-033110200	P PCS	5.0000	03/04/23			Y N	
	CAP 1000PF/50V (0603) X7R (102)							
	10%			C101, C44, C68, C96, C98,				
	QVL:MURATA, TAIYO, WALSIN, PAN OVERS, PHYCOMP, TDK,							

特性 ('U':有取代料件 'S':有替代料件)

(abmq600) (接下頁)

華碩電腦股份有限公司

FROM:P7868

單階材料用量明細表

製表日期:03/04/23 10:44:24 有效日期:03/04/23 列印版本: 頁次:4

主件料號:59-IGB300-A01PT 目前版本: 來源:X 發料單位:PCS 生產單位:PCS
 品名規格:WRT50G WIRELESS ROUTER 主件數量:1

項 次	元件料號/品名規格	燒 來 源 單 位	發 料 底 數	組成用量	生 效 日 期	圖 號	特 保 失 效 日 期	保 存 插 件 位 置/ ECN	Dis 性 稅 app
260	11-031110210 CAP 1000P/3KV (1808) X7R (102) 10%HEC QVL: HOLY STONE,	P PCS	1.0000	03/04/23		C59,		N N	
270	09-022202050 INDUCTOR 2.2UH(0805)50mA MAG LAYERS QVL:MAG LAYERS,	P PCS	1.0000	03/04/23		L12,		N N	
280	10-003400207 RES 2.7 OHM 1/10W (0603) 5% QVL: YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,	P PCS	1.0000	03/04/23		R118,		N N	
290	10-003402720 RES 2.7K OHM 1/10W(0603) 5% QVL: YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,	P PCS	2.0000	03/04/23		R13, R159,		N N	
300	10-003402210 RES 220 OHM 1/10W (0603) 5% QVL: YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,	P PCS	13.0000	03/04/23		R137, R173, R175, R187, R198, R199, R202, R203, R210, R219, R220, R221, R226,		N N	
310	11-033022000 CAP 22PF/50V (0603) NPO 5% QVL: MURATA, TAIYO, WALSIN, PAN OVERS, PHYCOMP, TDK,	P PCS	3.0000	03/04/23		C115, C165, C166,		Y N	
320	09-02X224011 POWER CHOKE 22U 0.9A SUMIDA/CDRH5D28-220NC QVL: SUMIDA,	P PCS	1.0000	03/04/23		L15,		N N	
330	10-003402410 RES 240 OHM 1/10W (0603) 5% QVL: YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,	P PCS	1.0000	03/04/23		R135,		N N	
340	07-010232501 XTAL 25MHZ 49US SMD TXC 20PF/25PPM/50OHM MARKING: TXC/25.0x6xF QVL: TXC,	P PCS	2.0000	03/04/23		X1, X2,		N N	
350	11-033027000 CAP 27PF/50V (0603) NPO 5% QVL: MURATA, TAIYO, WALSIN, PAN OVERS, PHYCOMP, TDK,	P PCS	2.0000	03/04/23		C15, C16,		Y N	

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單階材料用量明細表

製表日期:03/04/23 10:44:24 有效日期:03/04/23 列印版本: 頁次:5

主件料號:59-IGB300-A01PT 目前版本: 來源:X 發料單位:PCS 生產單位:PCS
 品名規格:WRT50G WIRELESS ROUTER 主件數量:1

項 次	元件料號/品名規格	燒來 源	發料 單位	組成用量 底數	生效日期 失效日期	圖號 插件位置/ECN	特保 性	Dis app
360	10-003402020 RES 2K OHM 1/10W (0603) 5%	P	PCS	1.0000	03/04/23	R237,	N	N
370	10-003403320 RES 3.3K OHM 1/10W(0603) 5%	P	PCS	1.0000	03/04/23	R196,	N	N
380	10-003403300 RES 33 OHM 1/10W (0603) 5%	P	PCS	7.0000	03/04/23	R100,R38,R40,R78, R87,R88,R95,	N	N
390	10-003403310 RES 330 OHM 1/10W (0603) 5%	P	PCS	5.0000	03/04/23	R179,R180,R181,R182, R205,	N	N
400	10-003403340 RES 330K OHM 1/10W(0603) 5%	P	PCS	1.0000	03/04/23	R27,	N	N
410	10-003413932 RES 39.2K OHM 1/10W(0603) 1%	P	PCS	1.0000	03/04/23	R235,	N	N
420	10-003404720 RES 4.7K OHM 1/10W(0603) 5%	P	PCS	15.0000	03/04/23	R151,R153,R166,R170, R192,R193,R194,R2, R206,R217,R33,R39, R44,R45,R65,	N	N
430	10-063304720 CHIP RES ARRAY 4.7K OHM (0603) 4R8P YCN/AB TYPE	P	PCS	5.0000	03/04/23	RN1,RN3,RN4,RN5,RN6,	N	N
440	11-032447500 CAP 4.7UF/10V (0805) Y5V (475) +80%-20%	P	PCS	4.0000	03/04/23	C104,C108,C110,C111,	N	N
450	10-003404710 RES 470 OHM 1/10W (0603) 5%	P	PCS	1.0000	03/04/23	R168,	N	N

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單階材料用量明細表

製表日期:03/04/23 10:44:25 有效日期:03/04/23 列印版本: 頁次:6

主件料號:59-IGB300-A01PT 目前版本: 來源:X 發料單位:PCS 生產單位:PCS
 品名規格:WRT50G WIRELESS ROUTER 主件數量:1

項 次	元件料號/品名規格	燒來發料 源單位	組成用量 底數	生效日期 失效日期	圖號 插件位置/ECN	特保 性	Dis 稅 app
460	R1.00 TEST QLV:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI, CAP TAN 47U/10V (6032) SMD	P PCS	2.0000	03/04/23	C173,C175,	N N	
470	QVL:NEC, SPRAGUE, AVX, NIPPON.C.C, VISHAY, RES 48.7K OHM 1/10W(0603) 1%	P PCS	1.0000	03/04/23	R236,	N N	
480	QVL:YAGEO, TA-I TECH, COMPSTARS, PHYCOMP, ROYAL, WALSIN, SEI, RES 49.9 OHM 1/10W(0603) 1%	P PCS	20.0000	03/04/23	R101,R108,R109,R111, R112,R113,R114,R116, R31,R32,R49,R50,R69, R70,R72,R73,R74,R75, R77,R82,	N N	
490	QVL:YAGEO, TA-I TECH, COMPSTARS, PHYCOMP, ROYAL, WALSIN, SEI, RES 510 OHM 1/10W (0603) 5%	P PCS	1.0000	03/04/23	R34,	N N	
500	QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI, LOGIC GATE NC7SZ04M5 SOT23-5 FAIRCHILD MARKING:7Z04D	P PCS	2.0000	03/04/23	U25,U27,	N N	
510	QVL:FAIRCHILD, LOGIC GATE NC7SZ32M5 SOT23-5 FAIRCHILD MARKING:7Z32X	P PCS	2.0000	03/04/23	U16,U29,	N N	
520	QVL:FAIRCHILD, LOGIC 74HC123DT S-16 PHILIPS	P PCS	1.0000	03/04/23	U24,	N N	
530	QVL:PHILIPS, RES 75 OHM 1/10W (0603) 5%	P PCS	14.0000	03/04/23	R107,R207,R227,R29, R30,R59,R60,R61,R80, R81,R85,R91,R94,R96,	N N	
540	QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI, TRANSCEIVER AC101LKQT TQFP-48 BROADCOM	P PCS	1.0000	03/04/23	U6,	Y N	

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FROM:P7868

單階材料用量明細表

製表日期:03/04/23 10:44:25 有效日期:03/04/23 列印版本: 頁次:7

主件料號:59-IGB300-A01PT 目前版本: 來源:X 發料單位:PCS 生產單位:PCS
 品名規格:WRT50G WIRELESS ROUTER 主件數量:1

項 次	元件料號/品名規格	燒 來 發 料 源 單 位	組成用 量 底 數	生效日期 失效日期	圖 號	特 保 失 效 期 限 插 件 位 置 /ECN	Dis 性 稅 app
550	QVL:BROADCOM, 59-007184010 LIN REG. AIC1084-33CMTR TO-263 AIC	P PCS	1.0000	03/04/23			N N
560	QVL:AIC, 59-001606114 FLASH AMD AM29LV320DT90EI 32M-90(WL-500G-BOOT-R2D0.BIN)	P PCS	1.0000	03/04/23	U30,		N N
570	QVL:AMD, 59-02-720000100 C.S AT7601F LQFP48PIN ATTANSIC 2PRINTER PORT CONT.	P PCS	1.0000	03/04/23	U17,		N N
580	QVL:鈺碩, 59-020100201 EEPROM AT93C46-10SC-2.7 SO 8P ATMEL	燒 P PCS	1.0000	03/04/23	U26,		N N
590	MARKING:ATMEL xxx/93C46/.... QVL:ATMEL, 59-09-013060500 FERRITE BEAD (0603) 500mA	P PCS	6.0000	03/04/23	U9,	Y N	
600	60 OHM/100MHZ BLM18PG600SN1D QVL:MURATA, 59-07-004064120 SCHOTTKY B240LA	P PCS	1.0000	03/04/23	LB1,LB10,LB12,LB2, LB3,LB9,		N N
610	QVL:DII, 59-02-561270200 BROADCOM BCM4702 PBGA-340 INTEGRATED RESIDENTIAL GATEWAY	P PCS	1.0000	03/04/23	U3,		N N
620	MARKING:BROADCOM / BCM4702KPB / TN0210 P10 / 15138 N QVL:BROADCOM, 59-02-561132510 BROADCOM BCM5325	P PCS	1.0000	03/04/23	U11,		N N
630	10/100 BASE-T/TX 6 PORT SWITCH MARKING:BROADCOM / BCM5325A2KOM QVL:BROADCOM, 59-12-191301800 DOCKING 18P,0.6mm,F,R/A,SMT	P PCS	1.0000	03/04/23	J11,		N N
640	JAE/DA1R018H91-E1500 QVL:JAE, 59-09-051001311 TRANSFORMER 10/100MB DELTA/LF8505	P PCS	1.0000	03/04/23	U7,	Y N	

特性('U':有取代料件 'S':有替代料件)

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單階材料用量明細表

製表日期:03/04/23 10:44:25 有效日期:03/04/23 列印版本: 頁次:8

主件料號:59-IGB300-A01PT 目前版本: 來源:X 發料單位:PCS 生產單位:PCS
 品名規格:WRT50G WIRELESS ROUTER 主件數量:1

項 次	元件料號/品名規格	燒來 源	發料 單位	組成用 量 底數	生效日期	圖號	特 性	保 底 位 置/ ECN	Dis app
<hr/>									
MARKING:LF8505/.DELTA XXXX									
QVL:DELTA,									
650	09-051024000	P	PCS	1.0000	03/04/23		Y	N	
TRANSFORMER 100-TX									
DELTA LF8731									
MARKING:DELTA/LF8731 xxxx									
QVL:DELTA,									
660	07-001101010	P	PCS	1.0000	03/04/23		N	N	
SCR DIODE MAC4DLMT4-1 DPAK369A									
ON									
MARKING:xxx/AC/4DLM									
QVL:ON,									
670	06-017010010	P	PCS	1.0000	03/04/23		Y	N	
Vcomp. MAX811SEUS-T SOT143-4									
MAXIM									
MARKING:AQxx									
QVL:MAXIM,									
680	07-014160000	P	PCS	1.0000	03/04/23		Y	N	
POLYSWITCH miniSMDM160									
RAYCHEM 1.6A									
#									
MARKING:x 160/xxxx									
QVL:RAYCHEM,									
690	12-023511240	P	PCS	1.0000	03/04/23		Y	N	
SO DIMM 124P, 3.3V, 5.2mm, SMT									
FOXCONN/ASOA226-S2F									
QVL:FOXCONN,									
700	09-011120005	P	PCS	2.0000	03/04/23		N	N	
FERRITE BEAD (1206) 120 OHM/2A									
MAG LAYERS/MLB-321611-0120P-N1									
QVL:MAG LAYERS,									
710	07-003000110	P	PCS	1.0000	03/04/23		N	N	
TRASIS. PMBS3904, 215 SOT23									
PHILIPS, NPN									
MARKING:.04/..									
QVL:PHILIPS,									
720	10-001000000	P	PCS	4.0000	03/04/23		N	N	
RES 0 OHM 1/4W (1206)									
5%									
QVL:YAGEO, TA-I TECH, PHYCOMP, WALSHIN,									
730	07-001053010	P	PCS	1.0000	03/04/23		Y	N	
DIODE SR05 SOT-143									
SEMTECH									
MARKING:R05									
QVL:SEMTECH,									

特性 ('U':有取代料件 'S':有替代料件)

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FROM:P7868

單階材料用量明細表

製表日期:03/04/23 10:44:25 有效日期:03/04/23 列印版本: 頁次:9

主件料號:59-IGB300-A01PT 目前版本: 來源:X 發料單位:PCS 生產單位:PCS
 品名規格:WRT50G WIRELESS ROUTER 主件數量:1

項 次	元件料號/品名規格	燒 來 源	發 料 單 位	組成用 量 底 數	生 效 日 期	圖 號	特 保 失 效 日 期	保 存 插 件 位 置/ ECN	Dis 性 稅 app
740	06-006001610 Vref. TL431 ON MARKING:431AC/.. QVL:ON,	P	PCS	1.0000	03/04/23			N N	
750	03-12083C220 4M*16-6 NANYA TSOP SDRAM NT5SV4M16DT-6K MARKING:NT5SV4M16DT-6K QVL:NAN YA,	P	PCS	2.0000	03/04/23			N N	
760	06-008212010 SW REG. XC6365B103MR TOREX QVL:TOREX,	P	PCS	1.0000	03/04/23			N N	
770	07-005268010 P-MOSFET XP162A12A6PR TOREX(0.17 OHM/-2.5V) MARKING:21/26 QVL:TOREX,	P	PCS	1.0000	03/04/23			N N	
780	10-003402200 RES 22 OHM 1/10W (0603) 5% QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,	P	PCS	1.0000	03/04/23			N N	
790	ESD		PCS	1.0000	03/04/23				

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特性('U':有取代料件 'S':有替代料件)

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FROM:P7868

單階材料用量明細表

製表日期:03/04/23 10:43:01 有效日期:03/04/23 列印版本: 頁次:1

主件料號:70-IGB300-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS

品名規格:WL-500G WIRELESS ROUTER 主件數量:1

R1.00 TEST

項 次	元件料號/品名規格	燒 來 發 料 源 單 位	組成用 量 底 數	生 效 日 期	圖 號	特 保 失 效 日 期	保 存 插 件 位 置/ ECN	Dis 性 稅 app
10	09-020224007 INDUCTOR 22UH DIP MAGIC/DR0608-220K+UL QVL:MAGIC,	P PCS	1.0000	03/04/23			N N	
20	12-130000040 USB CON 1X4P DIP M S/T FOXCONN/UB311C-K1 QVL:FOXCONN,	P PCS	1.0000	03/04/23	LB11, J3,		N N	
30	11-040233710 CAP EL 330U/16V ZL 8*11.5 RUBYCON/16ZL330 QVL:RUBYCON,	P PCS	1.0000	03/04/23		CE2,	Y N	
40	11-040004700 CAP EL 470UF/16V 8x12 105d OST QVL:OST,	P PCS	2.0000	03/04/23		C180,C183,	N N	
50	12-101100258 D-SUB 25P F,R/A,PC99 FOXCONN/DT11321-P5T QVL:FOXCONN,	P PCS	1.0000	03/04/23		P1,	Y N	
60	12-145011032 DC POWER JACK 3P SHIELD :2.0 SINGATRON/2DC-S005D100 QVL:SINGATRON,	P PCS	1.0000	03/04/23		J12,	N N	
70	12-142020050 MODULAR JACK RJ45 1*5PORT CHAN SINCERE/415B-083150113 QVL:SINCERE,	P PCS	1.0000	03/04/23		J13,	N N	
80	07-015020003 LED GREEN 3 R/A KINGBRIGHT QVL:KINGBRIGHT,	P PCS	7.0000	03/04/23		LED11,LED13,LED14, LED15,LED17,LED21, LED9,	N N	
90	12-090030042 T.P SWITCH 4P,DIP,L:5.85 QVL:HUA JIE,	P PCS	2.0000	03/04/23		RESET1,SW1,	N N	
100	07-009004800 XTAL 48MHZ DIP 49US TXC 20PF	P PCS	1.0000	03/04/23		X3,	N Y	
110	60-IGB300-A01P WL-500G WIRELESS ROUTER R1.00 TEST	M PCS	1.0000	03/04/23			Y N	

特性 ('U':有取代料件 'S':有替代料件)

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單階材料用量明細表

製表日期:03/04/28 14:23:21 有效日期:03/04/28 列印版本: 頁次:1

主件料號:60-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS
 品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

項 次	元件料號/品名規格	R2.00 TEST 燒來發料 源單位	組成用量 底數	生效日期 失效日期	圖號 插件位置/ECN	特保 性	Dis app
10	02-561000700 C.S BCM4301 802.11B BASEBAND/MAC MARKING:BROADCOM/BCM4301xxx/xxxxxx xxx/xxxxxx QVL:BROADCOM,	P PCS PBGA196	1.0000	03/04/24	U11 ,	Y N	
20	02-561000800 C.S BCM2051 802.11B RF IC 3.3V MARKING:BROADCOM/BCM2051KML/TSxxxxx xxx/xxxxxx QVL:BROADCOM,	P PCS LPCC64	1.0000	03/04/24	U6 ,	Y N	
30	05-020100021 EEPROM 93C46WDW6T ST 1K(WL-120B_4E8E.BIN) MARKING:C46W6 xxxx QVL:ST ,	P PCS TSSOP8	1.0000	03/04/24	U13 ,	N N	
40	06-007144010 LIN REG. AME8816CEHAADJ AME QVL:AME , (06-007134010) LIN REG. MIC37102BM MICREL MARKING:MIC37102 QVL:MICREL ,	P PCS SO8	1.0000	03/04/24	U10 ,	S N N	
			1.0000	03/04/26		N	
50	06-007168010 LIN REG.LP2985AIM5-2.9 SOT23-5 NS MARKING:LAXA QVL:NS , (06-007197010) LIN REG. NJM2872F29-TE1 MTP-5 NJRC QVL:NJRC ,	P PCS	1.0000	03/04/24	U8 ,	S N N	
60	06-010090010 OP AMP. LMV321M7 NS MARKING:Axx QVL:NS ,	P PCS SC70-5	1.0000	03/04/24	U14 ,	N N	
70	06-053011010 POWER AMP.SE2522L SIGE MARKING:2522L/xxxxxx QVL:SIGE ,	P PCS LPCC 8PIN	1.0000	03/04/24	U3 ,	N N	
80	06-055001010	P PCS	2.0000	03/04/24		N N	

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FROM:P7868

單階材料用量明細表

製表日期:03/04/28 14:23:21 有效日期:03/04/28 列印版本: 貨次:2

主件料號:60-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS
 品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

項 次	元件料號/品名規格	燒 來 源	發料 單 位	組成用 量 底數	生效日期 失效日期	圖號 插件位置/ ECN	特 保 性	Dis app
	GAAS IC PDT SW AS179-92 SC-70							
	ALPHA					U1,U4,		
	MARKING:S79							
	QVL:APLHA,							
90	07-010811200 XTAL 12MHZ SMD 3.5*6	P	PCS	1.0000	03/04/24		S	N N
	TQG 18PF/10PPM					Y1,		
	MARKING:12.000/TQG							
	QVL:TQG,							
	(07-010Q01201)			1.0000	03/04/24			N
	XTAL 12.00MHZ SMD 3.5*6							
	ECERA/FX1200033 18PF/10PPM							
	QVL:ECERA,							
100	08-531300040 WL-120 PCB R2.00	P	PCS	1.0000	03/04/26		N	Y
	金像5.703*4.408,6L(4)							
110	09-012220001 FERRITE BEAD (0805) 3A	P	PCS	4.0000	03/04/24		Y	N
	220OHM/100MHZ TDK/MPZ2012S221A					L11,L6,L7,L8,		
	QVL:TDK,							
120	09-02C180200 INDUCTOR 1.8NH (0402)	P	PCS	1.0000	03/04/24		Y	N
	MURATA/LQG15HN1N8S02					L12,		
	QVL:村田,							
130	09-02C220001 INDUCTOR 2.2NH (0402)	P	PCS	1.0000	03/04/24		Y	N
	MURATA/LQP15MN2N2B00					L3,		
	QVL:村田,							
140	09-02C240000 INDUCTOR 2.4NH (0402)	P	PCS	2.0000	03/04/24		N	N
	MURATA/LQG15HN2N4S02					L4,L5,		
	QVL:村田,							
150	09-02C300000 INDUCTOR 3.0NH (0402)	P	PCS	1.0000	03/04/24		N	N
	MURATA/LQG15HN3N0S02					L10,		
	QVL:村田,							
160	09-02C560010 INDUCTOR 5.6NH (0402) ± 0.3NH	P	PCS	1.0000	03/04/24		N	N
	TAIYO/HK1005 5N6S-T					L1,		
	QVL:太誘,							
170	09-051040004 TRANSFORMER BALUN(0805)	P	PCS	2.0000	03/04/24		Y	N
	TDK/HHM1520 2400-2500MHZ					U2,U7,		
	QVL:TDK,							

特性 ('U':有取代料件 'S':有替代料件)

(abmq600)

(接下頁)

華碩電腦股份有限公司

FROM:P7868

單階材料用量明細表

製表日期:03/04/28 14:23:21 有效日期:03/04/28 列印版本: 頁次:3

主件料號:60-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS
 品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

項 次	元件料號/品名規格	R2.00 TEST	燒 來 源	發料 單 位	組成用 量 底數	生效日期 失效日期	圖號 插件位置/ ECN	特 保 性	Dis app
180	10-003400000 RES 0 OHM 1/10W (0603) 5%		P	PCS	3.0000	03/04/24	L13,L9,R25,	N	N
190	QVL:國巨,大毅,華亞,厚聲,飛元,華新,新典, 10-003401060 RES 10M OHM 1/10W(0603) 5%		P	PCS	1.0000	03/04/24	R1,	N	N
200	QVL:國巨,大毅,華亞,厚聲,飛元,華新,新典, 10-004400000 RES 0 OHM 1/16W (0402) 5%		P	PCS	4.0000	03/04/24	L100,R19,R23,R26,	N	N
210	QVL:大毅,國巨,華新, 10-004401020 RES 1K OHM 1/16W (0402) 5%		P	PCS	2.0000	03/04/24	R12,R27,	N	N
220	QVL:大毅,國巨,華新, 10-004401030 RES 10K OHM 1/16W (0402) 5%		P	PCS	1.0000	03/04/24	R33,	N	N
230	QVL:大毅,國巨,華新, 10-004401530 RES 15K OHM 1/16W (0402) 5%		P	PCS	1.0000	03/04/24	R30,	N	N
240	QVL:大毅,國巨,華新, 10-004401620 RES 1.6K OHM 1/16W (0402) 5%		P	PCS	1.0000	03/04/24	R11,	N	N
250	QVL:國巨,大毅,華新, 10-004403300 RES 33 OHM 1/16W (0402) 5%		P	PCS	4.0000	03/04/24	R10,R5,R6,R9,	N	N
260	QVL:大毅,國巨,華新, 10-004404720 RES 4.7K OHM 1/16W(0402) 5%		P	PCS	2.0000	03/04/24	R16,R20,	N	N
270	QVL:大毅,國巨,華新, 10-004415630 RES 56K OHM 1/16W (0402) 1%		P	PCS	1.0000	03/04/24	R34,	N	N
280	QVL:大毅,國巨,華新, 10-004411030 RES 10K OHM 1/16W (0402) 1%		P	PCS	3.0000	03/04/24	R21,R22,R8,	N	N

特性 ('U':有取代料件 'S':有替代料件)

(abmq600) (接下頁)

華碩電腦股份有限公司

FROM:P7868

單階材料用量明細表

製表日期:03/04/28 14:23:22 有效日期:03/04/28 列印版本: 頁次:4

主件料號:60-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS
 品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

項 次	元件料號/品名規格	燒 來 發料 源 單位	組成用 量 底數	生效日期 失效日期	圖號 插件位置/ ECN	特 保 性 狀 態 Dis app
290	10-004411630 RES 16K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	1.0000	03/04/24	R13,	N N
300	10-004412030 RES 20K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	4.0000	03/04/24	R28,R38,R39,R40,	N N
310	10-004412220 RES 2.2K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	1.0000	03/04/26	R7,	N N
320	10-004412236 RES 22.6K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	2.0000	03/04/24	R17,R35,	N N
330	10-004412420 RES 2.4K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	1.0000	03/04/24	R4,	N N
340	10-004412827 RES 2.87K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	2.0000	03/04/24	R2,R3,	N N
350	10-004414533 RES 45.3K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	1.0000	03/04/24	R15,	N N
360	10-004414919 RES 499 OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	1.0000	03/04/24	R14,	N N
370	10-004415622 RES 5.62K OHM 1/16W(0402) 1% QVL:WALSIN,	P PCS	1.0000	03/04/24	R36,	N N
380	10-004416831 RES 68.1K OHM 1/16W (0402) 1% QVL:大毅,國巨,華新,	P PCS	1.0000	03/04/24	R37,	N N
390	11-032110651 CAP 10UF/6.3V (0805)X5R 10% TAIYO	P PCS	9.0000	03/04/24	C100,C43,C57,C58, C63,C65,C75,C87,C89,	N N

特性 ('U':有取代料件 'S':有替代料件)

(abmq600) (接下頁)

華碩電腦股份有限公司

FROM:P7868

單階材料用量明細表

製表日期:03/04/28 14:23:22 有效日期:03/04/28 列印版本: 頁次:5

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 主件料號:60-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS
 品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

項 次	元件料號/品名規格	燒 來 源	發料 單 位	組成用 量 底數	生效日期 失效日期	圖號 插件位置/ ECN	特 保 性	Dis app
400	11-033122550 QVL:太誘, CAP 2.2UF/6.3V(0603) X5R (225) 10% AVX	P	PCS	2.0000	03/04/24	C60,C71,	N	N
410	11-034002041 QVL:AVX, CAP 2PF/50V (0402) NPO 5PF TAIYO	P	PCS	1.0000	03/04/24	C20,	N	N
420	11-034010140 QVL:太誘, CAP 100PF/50V (0402) NPO (101) 5%	P	PCS	1.0000	03/04/24	C14,	Y	N
430	11-034012041 QVL:WALSIN, CAP 12PF/50V (0402) NPO 5% TAIYO/UMK105CH120JW-F	P	PCS	1.0000	03/04/24	C38,	N	N
440	11-034012121 QVL:TAIYO, CAP 120PF/50V (0402) NPO 5% TAIYO/UMK105CH121JW	P	PCS	1.0000	03/04/24	C44,	N	N
450	11-034015141 QVL:太誘, CAP 150PF/50V (0402) NPO (151) 5% TAIYO/UMK105SL151JW-F	P	PCS	1.0000	03/04/24	C5,	N	N
460	11-034022041 QVL:太誘, CAP 22PF/50V (0402) NPO 5% TAIYO	P	PCS	11.0000	03/04/24	C102,C103,C104,C105, C106,C35,C95,C96, C97,C98,C99,	N	N
470	11-034022120 QVL:SKYWELL, CAP 220PF/25V (0402) NPO 5%	P	PCS	1.0000	03/04/24	C23,	N	N
480	11-034033040 QVL:SKYWELL, CAP 33PF/50V (0402) NPO 5%	P	PCS	11.0000	03/04/24	C1,C10,C2,C24,C26, C30,C33,C34,C36,C37, C9,	Y	N
490	11-034056221 QVL:WALSIN, CAP 56PF/50V (0402) NPO 5% TAIYO/UMK105CH560JW	P	PCS	1.0000	03/04/24	C42,	N	N

特性 ('U':有取代料件 'S':有替代料件)

(abmq600) (接下頁)

華碩電腦股份有限公司

FROM:P7868

單階材料用量明細表

製表日期:03/04/28 14:23:23 有效日期:03/04/28 列印版本: 頁次:6

主件料號:60-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS
 品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

項 次	元件料號/品名規格	燒 來 發料 源 單位	組成用 量 底數	生效日期 失效日期	圖號 插件位置/ ECN	特 保 性 狀 態 Dis app
500	QVL:TAIYO, 11-034082042 CAP 82PF/50V (0402) NPO 5% TAIYO/UMK105CH820JW-F	P PCS	1.0000	03/04/24	C7,	N N
510	QVL:TAIYO, 11-034110241 CAP 1000PF/50V (0402)X7R (102) 10% TAIYO/UMK105BJ102KV-F	P PCS	9.0000	03/04/24	C21,C47,C50,C51,C61, C73,C78,C84,C92,	N N
520	QVL:TYIAO, 11-034110311 CAP 0.01U/16V (0402) X7R(103) 10% TAIYO	P PCS	20.0000	03/04/24	C17,C19,C22,C28,C3, C39,C41,C46,C54,C55, C56,C6,C64,C67,C69, C74,C76,C81,C83,C94,	N N
530	QVL:TYIAO, 11-034110461 CAP 0.1UF/10V (0402) X5R (104) 10% TAIYO	P PCS	22.0000	03/04/24	C110,C13,C15,C18, C27,C40,C48,C49,C52, C53,C59,C62,C66,C68, C70,C8,C82,C85,C86, C90,C91,C93,	N N
540	QVL:TYIAO, 11-034127240 CAP 2700PF/50V (0402) X7R 10%	P PCS	1.0000	03/04/24	C4,	N N
550	QVL:華新科 ,TDK, 11-034182140 CAP 820PF/50V (0402) X7R (821) 10%	P PCS	1.0000	03/04/24	C45,	N N
560	QVL:華新科 ,TDK, 11-034600541 CAP 0.5PF/50V (0402) NPO 0.25PF TAIYO	P PCS	2.0000	03/04/24	C101,C25,	Y N
570	QVL:太誘, 11-034601541 CAP 1.5PF/50V (0402) NPO 0.25PF TAIYO	P PCS	2.0000	03/04/24	C108,C32,	N N
580	QVL:太誘, 11-034605641 CAP 5.6PF/50V (0402) NPO 0.25PF TAIYO/UMK105CH5R6CW-F	P PCS	1.0000	03/04/24	C109,	N N

特性 ('U':有取代料件 'S':有替代料件)

(abmq600) (接下頁)

華碩電腦股份有限公司

FROM:P7868

單階材料用量明細表

製表日期:03/04/28 14:23:23 有效日期:03/04/28 列印版本: 頁次:7

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 主件料號:60-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS
 品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

R2.00 TEST

項 次	元件料號/品名規格	燒 來 源	發料 單 位	組成用 量 底數	生效日期 失效日期	圖號	特 性 插件位置/ ECN	保 稅 Dis app
590	QVL: TAIYO, 11-034607041	P	PCS	3.0000	03/04/24	C72, CA3, CA4,	N N	
	CAP 7PF/50V (0402) NPO 0.25PF TAIYO/UMK105CH070DW-F							
600	QVL: TAIYO, 11-034610041	P	PCS	5.0000	03/04/24	C11, C12, C16, C29, C31,	N N	
	CAP 10PF/50V (0402) NPO 0.5PF TAIYO							
610	QVL: 太誘, 12-310003000	P	PCS	1.0000	03/04/24	J1,	N N	
	RF CONNECTOR HRS/CL331-0471/U.FL-R-SMT							
620	QVL: HIROSE, 13-I0C10M020	P	PCS	1.0000	03/04/24	SB1,	N N	
	WL-120 BOTTOM SHIELDING BRKT							
	QVL: 及成,							

特性 ('U':有取代料件 'S':有替代料件)

(abmq600)

(結 束)

華碩電腦股份有限公司

FROM:P7867

單階材料用量明細表

製表日期:03/04/26 10:03:02 有效日期:03/04/26 列印版本: 頁次:1

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主件料號:70-I11000-A01P 目前版本: 來源:M 發料單位:PCS 生產單位:PCS

品名規格:WL-121 WLAN MINI PCI CARD 主件數量:1

R1.00 TEST

項 次	元件料號/品名規格	燒 來 發 料 源 單 位	組成用 量 底 數	生 效 日 期	圖 號	特 保 失 效 日 期	插 件 位 置/ ECN	Dis 性 稅 app
10	13-I0C10M010 WL-120 TOP SHIELDING BRKT	P PCS	1.0000	03/04/24			N N	
20	60-I11000-A01P WL-121 WLAN MINI PCI CARD R1.00 TEST	M PCS	1.0000	03/04/24			Y N	

QVL:及成,

=====

20 60-I11000-A01P M PCS 1.0000 03/04/24 Y N

WL-121 WLAN MINI PCI CARD

R1.00 TEST

特性(U:有取代料件 S:有替代料件)

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(abmq600)

(結 束)



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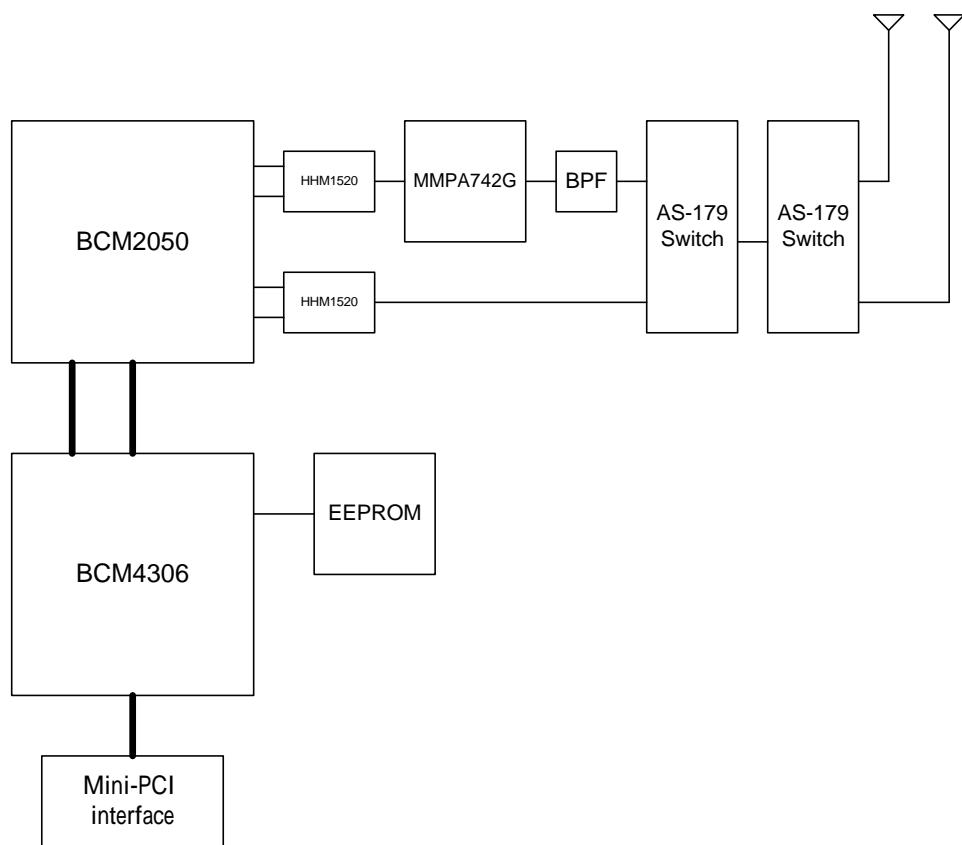
1F, No. 255, Nan Yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

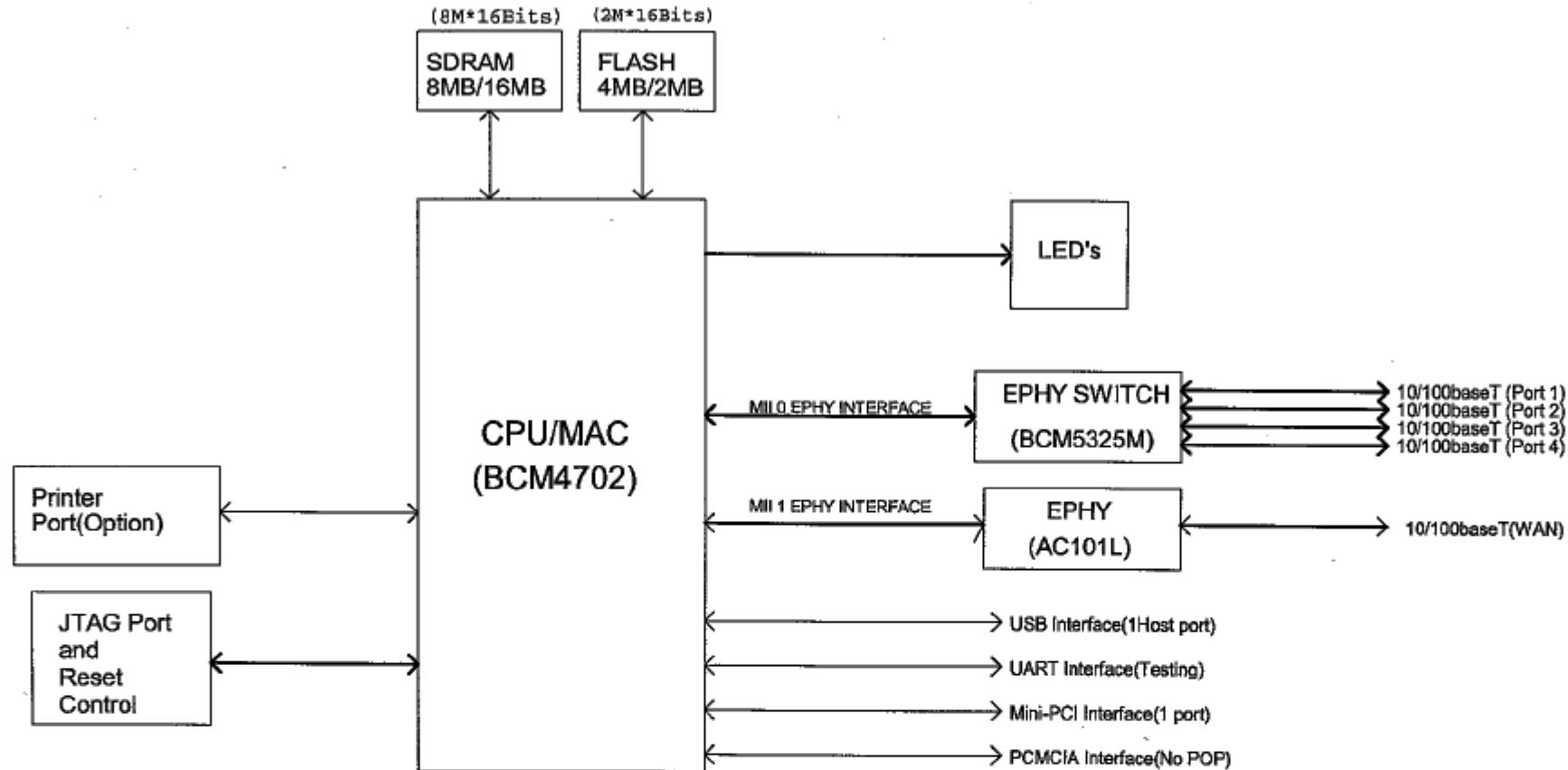
TEL: 886-2-26935155 FAX: 886-2-26934440

E-mail: report@trclab.com.tw

EXHIBIT H

Block Diagram





**BCM4702 +802.11b/g
Gateway Reference
Design
Block Diagram**





Training Research Co., Ltd.

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E-mail: report@trclab.com.tw

EXHIBIT I

Operational Description

WL500b

IEEE 802.11b 11 Mbps Wireless Router

- Monitor your home anywhere, over the air, over the Internet
 - Plug USB WebCam to WL-500b, users can check his home status through the Web page
- Share broadband Internet around the home
 - Connect to external ADSL / cable modem via one 10/100Base-T auto-crossover (MDI/MDI-X) Ethernet port
 - Four port switch with 10/100Base-T auto-crossover (MDI/MDI-X) Ethernet port connect to local PC
 - 802.1H translation mechanism bridging Ethernet and wireless traffics
 - IP sharing (NAT)
 - PPPoE client to connect remote ISP PPPoE server
 - DHCP server / client and DNX Proxy
 - DDNS

High Performance Wireless LAN Access

- 11 Mbps speed over the 2.4 GHz frequency band
 - Standard 2.4GHz Wi-Fi network to guarantee compatible with existing 802.11b WLAN cards
 - Auto fall-back algorithm to select transmission rate.
 - One internal Inverted-F antenna and one external dipole antennas; support diversity
 - Reverse-SMA antenna connector to support external high gain antenna
 - Support roaming to other Wi-Fi compliant Access Points connected by local Ethernet to extend the SOHO network coverage
- Wireless Firewall
 - Wireless firewall to secure traffic over the air.
 - Not only able to build up the conventional firewall to block the traffic from Internet, WL-500b can also setup another firewall to protect the **traffic** from the air.
By checking any traffic between wireless and wired local area networks

- Firewall

- Not only basic NAT natural firewall, SPI firewall will filter out the possible advanced forms of attacks from the Internet.
- DMZ

- Secure wireless connectivity
 - 128-bit and 64-bit WEP; firmware upgradeable to support WPA
 - Only the wireless clients' MAC address appear in the Access Control List (ACL) can be allowed to enter the network

- Easy installation, management and maintenance
 - Web-based management can easily be operate by users with popular Internet browser such as IE, Netscape.
 - UPnP Internet Gateway Device
 - Upgrade firmware through Ethernet or wireless

- VPN support
 - VPN pass through for PPTP, L2TP and IPSec protocol.
- Printer sharing
 - Support bi-directional printers
 - Support standard printer port and USB port printers

Specification

WAN Ethernet Port	Support	Both Ethernet and 802.3 with Max. Bit Rate 10/100 Mbps with auto cross-over function (MDI-X)
	Connector	RJ45 for 10/100 BaseT
LAN Ethernet Port	Support	Both Ethernet and 802.3 with Max. Bit Rate 10/100Mbps with Auto cross-over function (MDI-X), 4 port switch
	Connector	4 x RJ45 for 10/100BaseT
Antenna	Support	2 (one internal Inverted-F antenna and one external dipole antenna)
	Connector	Reverse-SMA antenna connector
USB port	Support	USB 1.1 host
	Connector	USB type A
Printer Port	Support	SPP, ECP
	Connector	25 PIN D-SUB FEMALE
Reset button	Push for 5 seconds to restore factory setting	
Management	Web-based manager UPnP Internet Gateway Device	
Firewall	NAT and SPI Can built extra one firewall to protect Internet traffic and another one for wireless	

DC Power Adapter	AC Input: 100V~240V(50~60HZ); DC Output: 5V with max. 2 A current
Emissions	ETSI; CE Mark; FCC Part 15
Size	142 mm (L)* 205 mm (W)* 36 mm (H) excluding one external antennas
Weight	600 g excluding power supply
Operating Frequency	2.4 - 2.5 GHz
Spreading	Direct Sequence Spread Spectrum
Modulation	OFDM, CCK , DQPSK, DBPSK
Data Rate	802.11b:1, 2, 5.5, 11Mbps
Operation Channels	11 for N. America, 14 Japan, 13 Europe(ETSI) 3 (non-overlapping)
Range	Outdoor (LOS, Light-Of-Sight) 300 ft (90 m) at 11Mbps The range may vary by different environment
Output Power	12 ~ 15 dBm (at nominal temp. range)
Encryption	40/128-bit WEP WPA
Authentication	MAC address, 802.1x



Training Research Co., Ltd.

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EXHIBIT J

Photographs of EUT



FCC ID: MSQWL500B

Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440



FCC ID: MSQWL500B

Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440





FCC ID: MSQWL500B

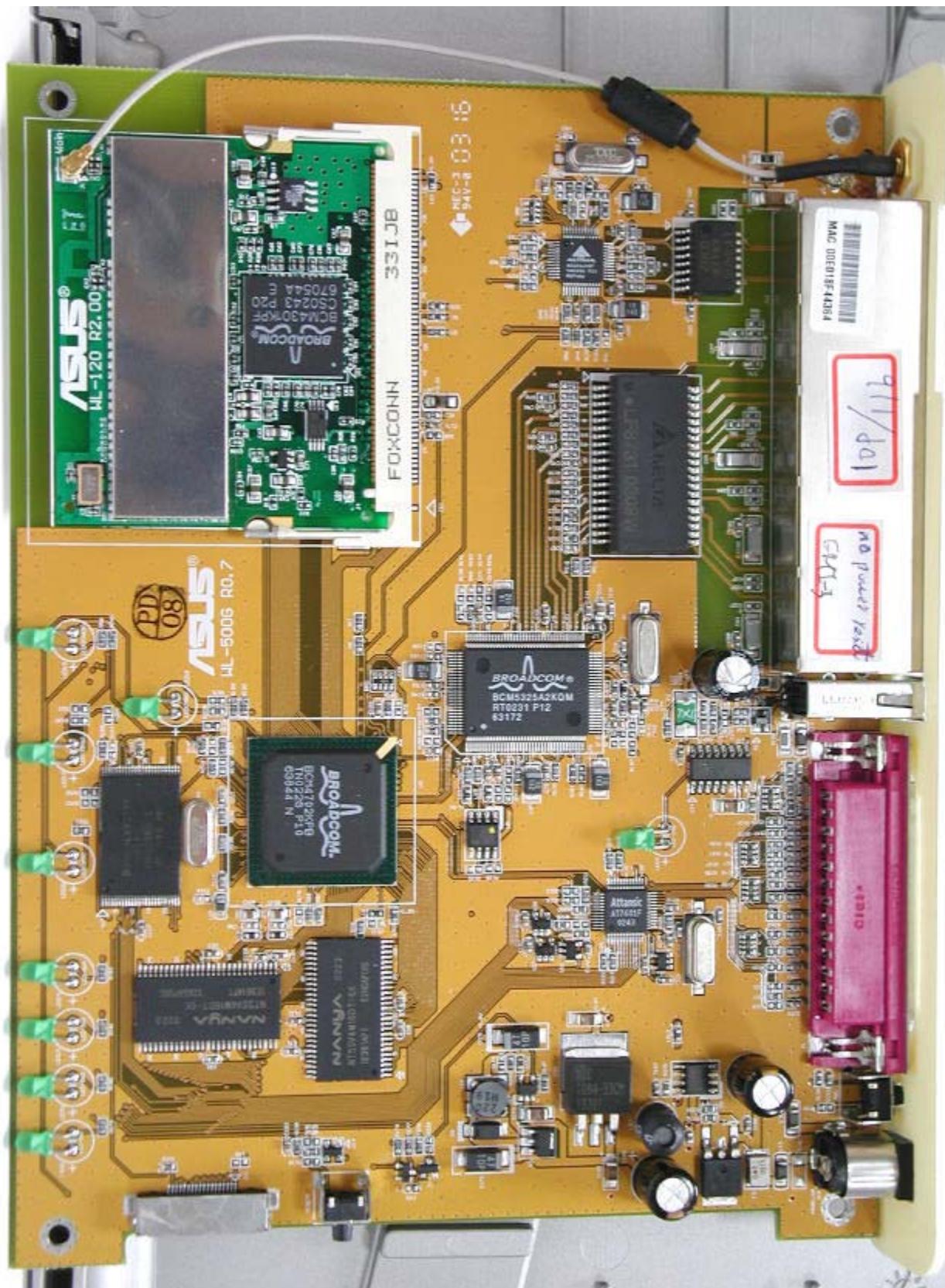
Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440





FCC ID: MSQWL500B

Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440



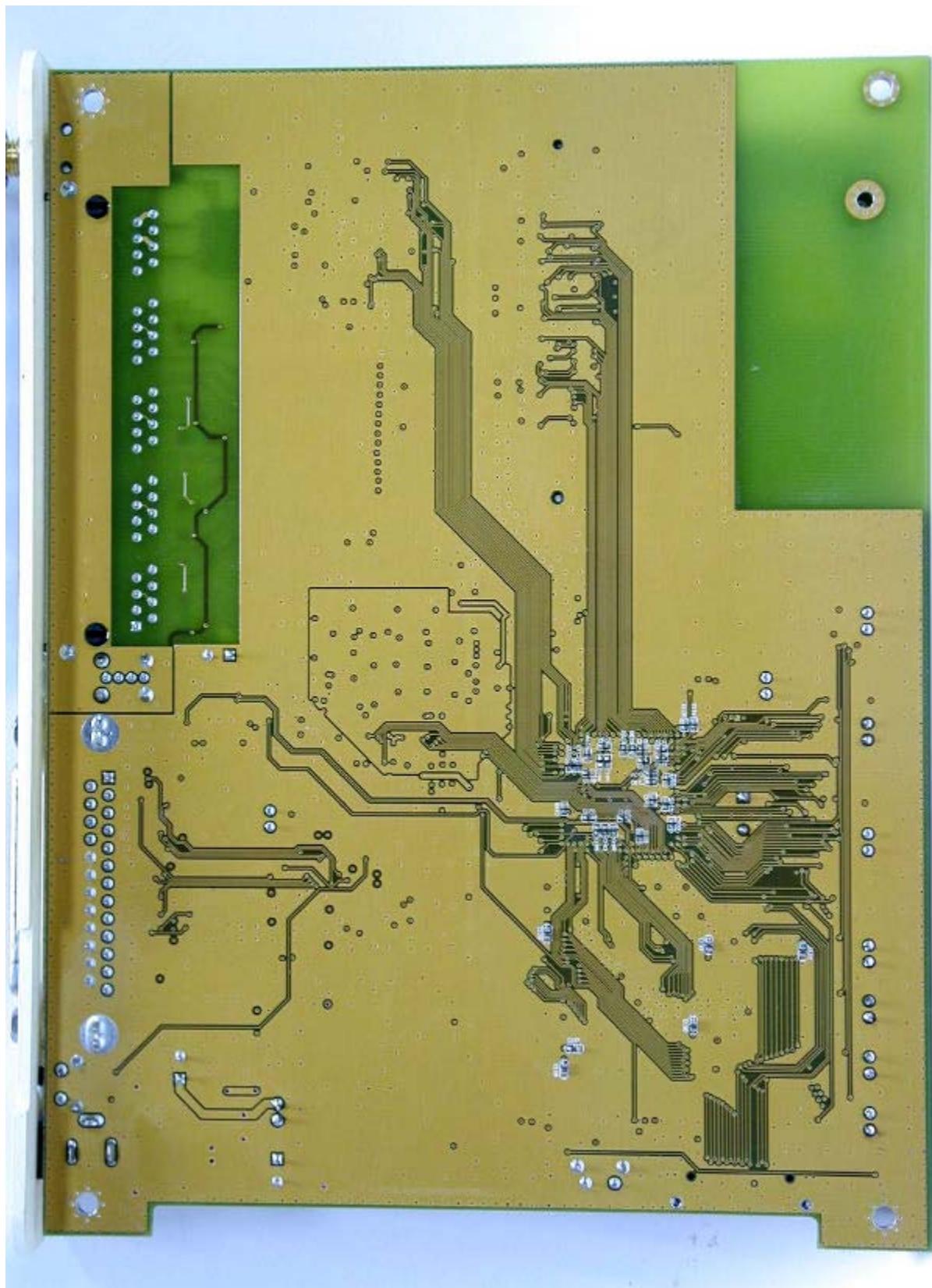
FCC ID: MSQWL500B

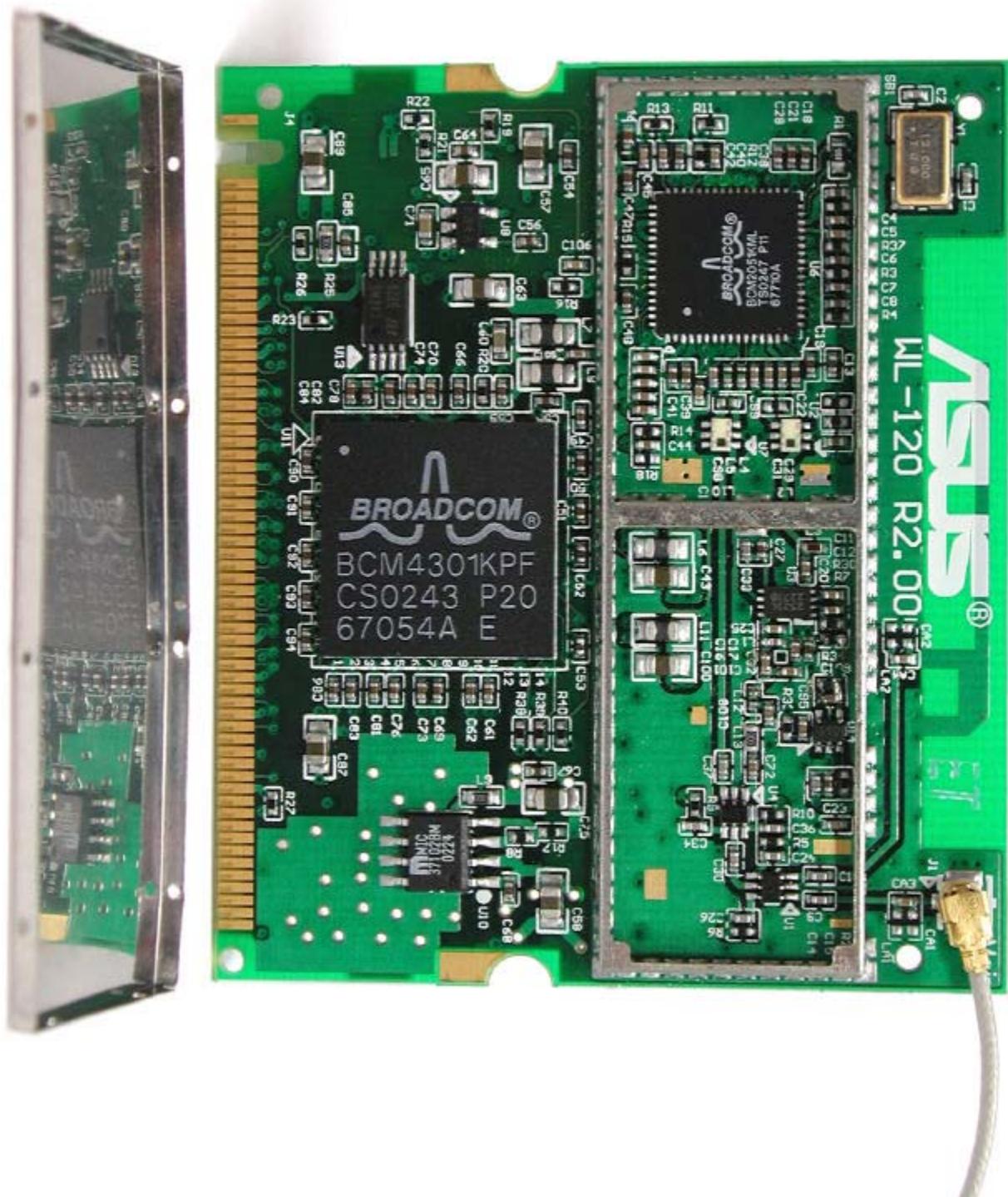
Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440

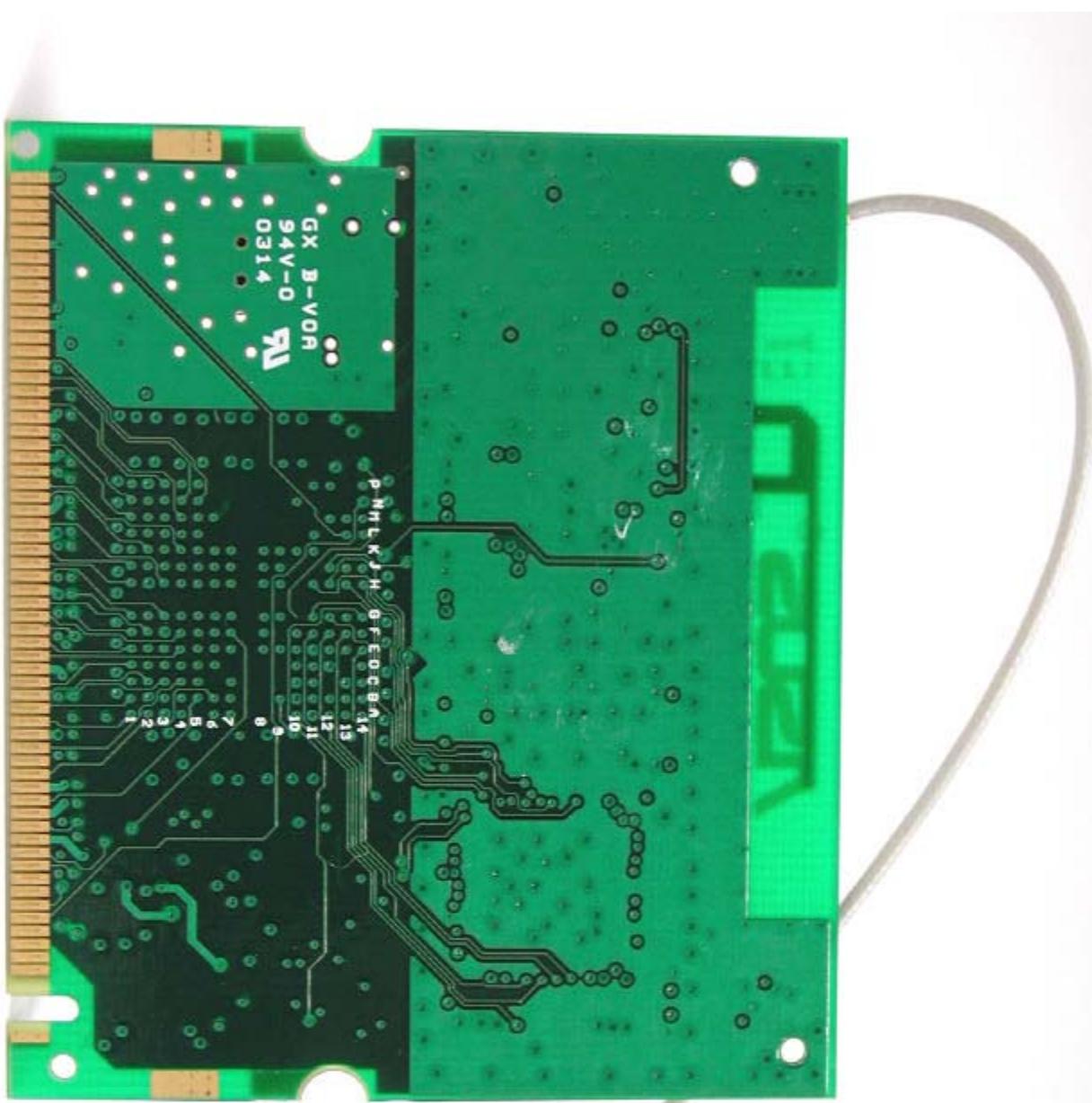


FCC ID: MSQWL500B

Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440









Training Research Co., Ltd.

1F, No. 255, Nan Yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

TEL: 886-2-26935155 FAX: 886-2-26934440

E-mail: report@trclab.com.tw

EXHIBIT K

RF Exposure Calculations

Measurement of MPE

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

Granted FCC ID : MSQWL500B

Product name : Wireless Router

Model name : WL-500b

Classification : Mobile Device

(i) Under normal use condition, the antenna is at least 20cm away from the user;

(ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user's manual

Frequency Range : 2.412 GHz ~ 2.462GHz

Supported Channel : 11 Channel

Modulation Skill : DBPSK, DQPSK, CCK

Power Type : Powered by Switching Power Adaptor
Manufacturer: DVE

Model: DSA-0101F-05 A

I/P: AC 100-240V, 50-60Hz, 0.3A, 10VA

O/P: +5VDC, 2A, 10W

Power Cable : 185cm long, non-shielded, incorporates a ferrite core

3. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Filed Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to **OET BULLETIN 56 Fourth Edition/August 1999**, Equation for Predicting RF Fields:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4\pi R^2} = \frac{46.238 \times 2.249}{4\pi(20)^2} = 2.069 \times 10^{-2} \text{ mW/cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4P}} = \sqrt{\frac{46.238 \times 2.249}{4P}} = 2.877 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 2.877 cm."

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \log^{-1} (\text{dBi antenna gain} / 10)$$

$$G = \log^{-1} (3.52 / 10) = 2.249$$

NInput Output Enterprise Corp.	PRODUCT SPECIFICATION	DOC. No: WL-TL-17 DATE: 25-MAR-02 REV. : C
------------------------------------------	----------------------------------	--------------------------------------------------

PRODUCT NAME

2.4G ANTENNA WITH RP SMA

PART NUMBER

■ W201-108-D2

Signed By Customers

Approved By:

供應商： 垦 旺 精 密 股 份 有 限 公 司

TEL:02-2917-7528;FAX:02-2912-1659

台北縣新店市寶興路 37 號 3 樓

NInput Output

Enterprise Corp.

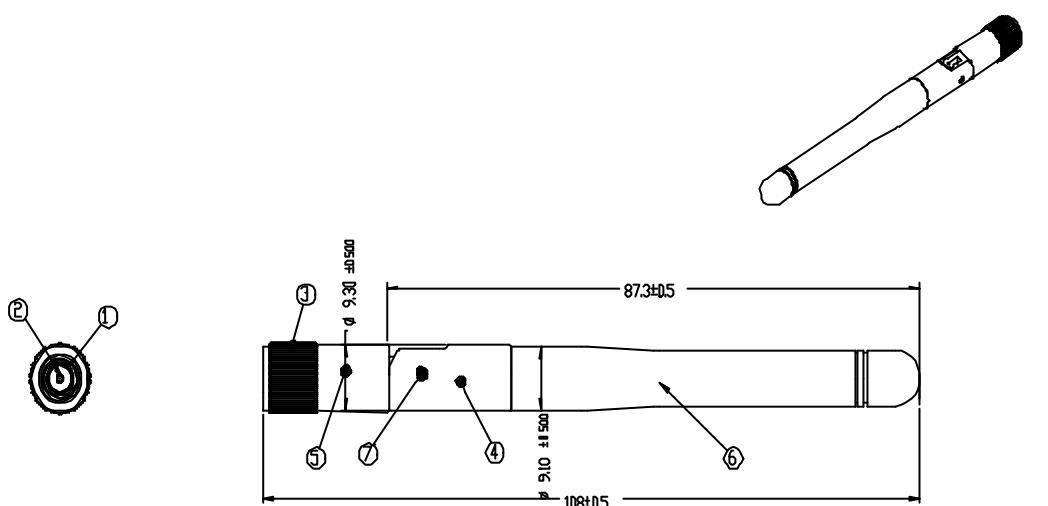
PRODUCT SPECIFICATION

2.4 G ANTENNA WITH RP-SMA PLUG

DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C



ELECTRICAL PERFORMANCE :

- 1.Impedance : 50 ohms
- 2.Frequency Range : 2.4—2.5 GHz
- 3.VSWR : 2.0 maximum
- 4.Gain:1.5dBi

ITEM	DESCRIPTION	MATERIALS	FINISHED
7	銷子	Brass	鍍銀
6	帽蓋	TPR	Black
5	底座	ABS	Black
4	天線座	ABS	Black
3	RP SMA 打設	Brass	鍍黑銘
2	接触器端子	Be.Copper	鍍金30μ
1	RP SMA 主體	Brass	鍍金4μ

REV.	DESCRIPTION	ECN	DRAWN	DATE	REMOVED	FILE				INPUT	OUTPUT
						DESIGNED	DRAWN	REV.	NAME		
A	Sample		Yang	07/30/2002		Yang	Yang	F	15/1		
1						CHARGE	APPROVAL		W201-108-D2		
	REVISIONS					GIVEN	REV.	1	W201-108-D2		

NInput Output

Enterprise Corp.

PRODUCT SPECIFICATION

RP-SMA R/A JACK
PCB RECEPTACLE

DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C

HILTRON

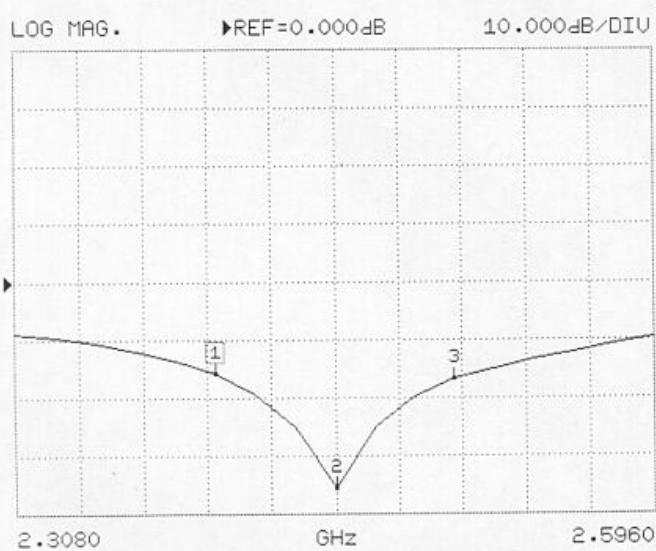
360 NETWORK ANALYZER

MODEL: W201_108_D2 DATE: 07/30/2002 Page 1
DEVICE ID: OPERATOR:

SWEET DATA
START: 2.3080 GHz GATE START: - ERROR CORR: REFL ONLY
STOP: 2.5960 GHz GATE STOP: - AVERAGING: 1 PTS
STEP: 0.0180 GHz GATE: - IF BNDWDTH: REDUCED
WINDOW: -

-----CH1-----
PARAMETER: S11
NORMALIZATION: OFF
REFERENCE PLANE: 0.0000 mm
SMOOTHING: 0.0 PERCENT
DELAY APERTURE: -

S11 FORWARD REFLECTION



CH 1 - S11
REF. PLANE
0.0000 mm

►MARKER 1
2.3980 GHz
-15.709 dB

MARKER TO MAX
MARKER TO MIN

2 2.4520 GHz
-35.396 dB

3 2.5060 GHz
-16.577 dB

NInput Output Enterprise Corp.	PRODUCT SPECIFICATION 2.4 G ANTENNA WITH RP-SMA PLUG	DOC. No: WL-TL-17 DATE: 25-MAR-02 REV. : C
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W201-108-D2 2.4G ANTENNA

SPECIFICATION

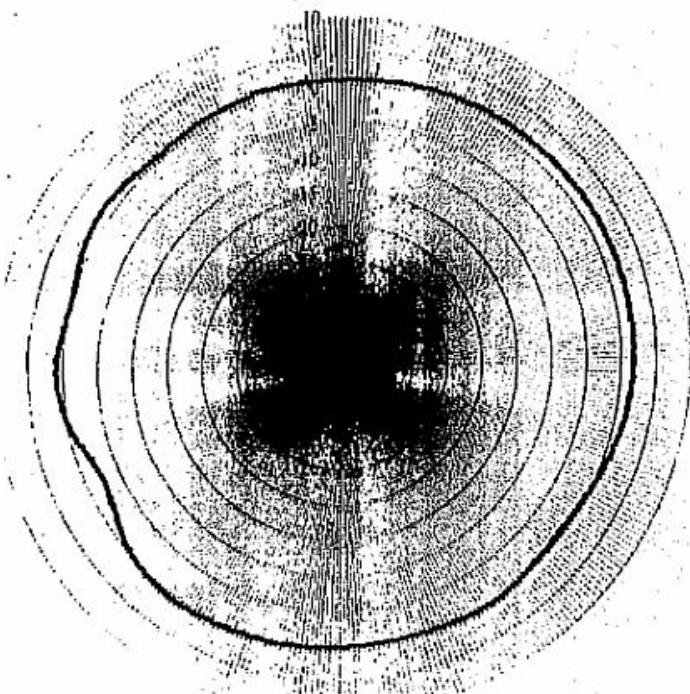
1. Electrical Properties

- 1-1 Frequency Range 2.4~2.5GHz
- 1-2 Impedance 50 Ohms nominal
- 1-3 V.S.W.R 2.0 (Max.)
- 1-4 Return Loss -10.0 dB(Max.)
- 1-5 Max. Gain 3.52dBi
- 1-6 Polarization Vertical
- 1-7 Admitted Power 1 W
- 1-8 Electrical Wave 1/4 à Dipole

2. Mechanical Properties

- 2-1 Connector Reverse SMA Plug
- Cable RG178
- 2-3 Antenna Body T.P.R.
- 2-4 Operating Temperature Range.. -20 ~ +50
- 2-5 Storage Temperature Range -20 ~ +50

IO ANTENNA PATTERN



ANTENNA TEST NO.

TEST DATE: 10/10/02

TEST FREQUENCY: 2450GHz

TEST POLARIZATION: VERTICAL
(H-PLANE)

TEST ANTENNA: HORN ANTENNA

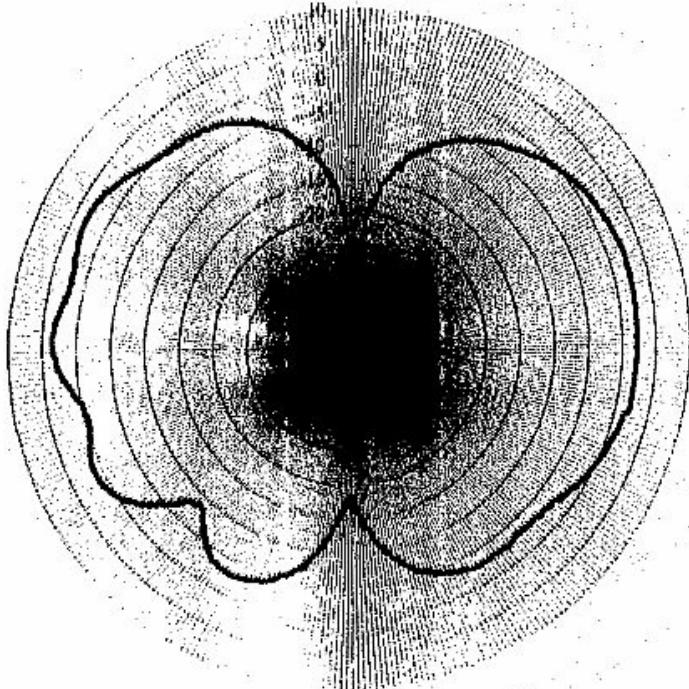
TEST CHAMBER: RF CHAMBER

TEST PERSONNEL: Yang

MAX GAIN: 1.93 dBi

MIN GAIN: -2.54 dBi

AVE GAIN: 0.64 dBi



10 ANTENNA PATTERN

ANTENNA TEST NO.

TEST DATE:2002/06/20

TEST FREQUENCY:2450MHz

TEST POLARIZATION: HORIZONTAL
(E-PLANE)

TEST ANTENNA:HORN ANTENNA

TEST CHAMBER:RF CHAMBER

TEST PERSONNEL: Yang

MAX GAIN: 3.52 dBi

MIN GAIN: -35.06 dBi

AVE GAIN: -3.38 dBi

