

# ***RTTE TCF***

***Product description:***

**Wireless Router**

***Manufacture:***

**ASUSTek Computer Inc.**

***Brand:***

**ASUS**

***Type/model number:***

**WL-500g**

## **Technical Construction file in accordance with R&TTE Annex IV**

Under the provisions if Annex IV point 4 of the **R&TTE directive 1999/5/EC** of the European Parliament and of the council of 9 March on Radio equipment and Telecommunications Terminal Equipment (R&TTE directive) and the mutual recognition of their conformity,

We, the undersigned,

<b>Company</b>	ASUSTeK Computer Inc.
<b>Address, City</b>	4/F, 150, Li-Te Rd., Peitou, Taipei,
<b>Country</b>	Taiwan 112
<b>Phone number</b>	886-2-28943447
<b>Fax number</b>	886-2-28950113
<b>E-mail</b>	lawrence_yu@asus.com.tw

Have established a Technical Construction File as specified below to be presented to the Notified Body for his opinion and to be kept available to the relevant national authorities of any Member State for inspection purpose:

<b>Item number</b>	<b>Technical Document description</b>
01	Technical File in accordance with R&TTE directive Annex II point 4
02	Declaration of conformity to specific test suites described in R&TTE directive Annex III

For the following product:

<b>Product Description / Supplementary Info</b>	Wireless Router
<b>Manufacturer</b>	ASUSTeK COMPUTER INC.
<b>Brand</b>	ASUS
<b>Type</b>	WL-500g

The Technical Construction File as specified above will be kept for a period ending at least 10 years after the last product has been manufactured at the disposal of the relevant national authorities of any Member State for inspection purpose,



<b>Draw up in</b>	Taiwan
<b>Data</b>	2003/5/22
ASUSTek Computer Inc. 4/F, 150, Li-Te Rd., Peitou, Taipei, Taiwan 112	
<b>Signature &amp; company stamp</b>	LawrenceYu / R&D Engineer

## **Technical Construction file in accordance with R&TTE Annex II Point 4**

Under the provisions if Annex II point 4 of the **R&TTE directive 1999/5/EC** of the European Parliament and of the council of 9 March on Radio equipment and Telecommunications Terminal Equipment (R&TTE directive) and the mutual recognition of their conformity,

We, the undersigned,

<b>Company</b>	ASUSTeK Computer Inc.
<b>Address, City</b>	4/F, 150, Li-Te Rd., Peitou, Taipei,
<b>Country</b>	Taiwan 112
<b>Phone number</b>	886-2-28943447
<b>Fax number</b>	886-2-28950113
<b>E-mail</b>	lawrence_yu@asus.com.tw

Have established a Technical Construction File as specified below to enable assessment of the product conformity with the essential requirements of the R&TTE directive:

<b>Item number</b>	<b>Technical Document description</b>
01	Block diagram
02a	Circuit diagram
02b	PCB layout
02c	Part list
02d	Exterior photographs
02e	Interior photographs
02f	Label information
03a	Technical description
03b	User manual
04	R&TTE standard list
05	RF-EMC-LVD test report and corresponding annexes
06	Copy of the R&TTE Declaration of Conformity (DOC)
07	Product Quality Assurance documents

For the following product:

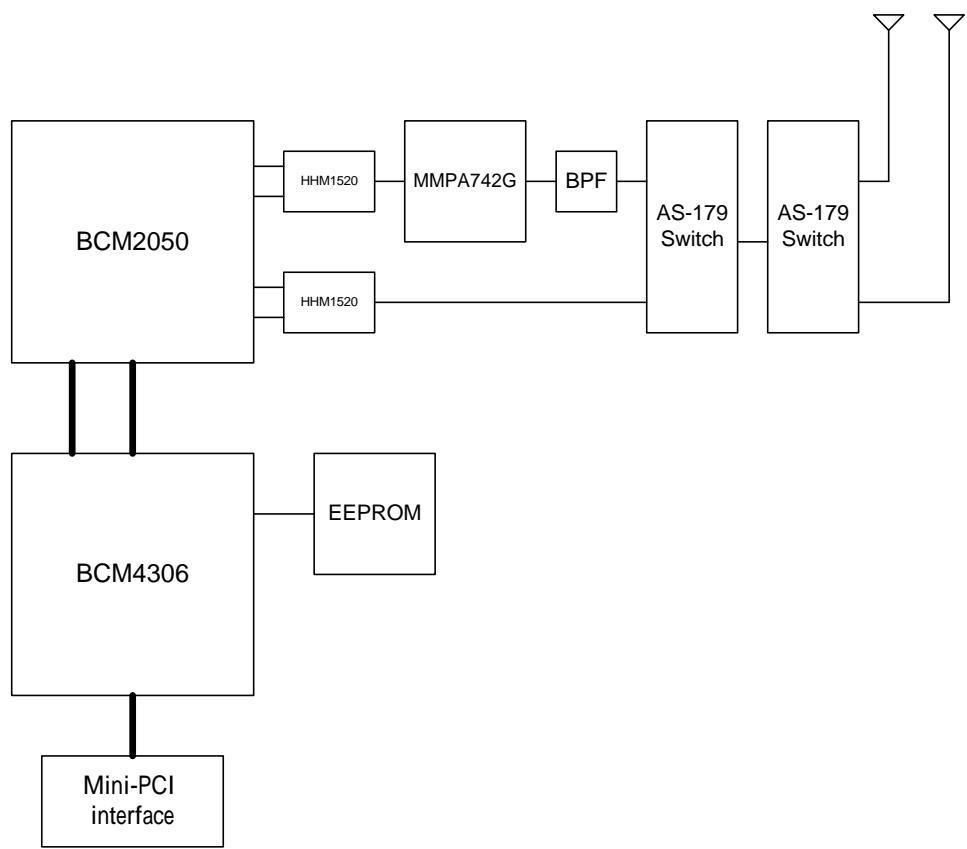
<b>Product Description / Supplementary Info</b>	Wireless Router
<b>Manufacturer</b>	ASUSTeK COMPUTER INC.
<b>Brand</b>	ASUS
<b>Type</b>	WL-500g

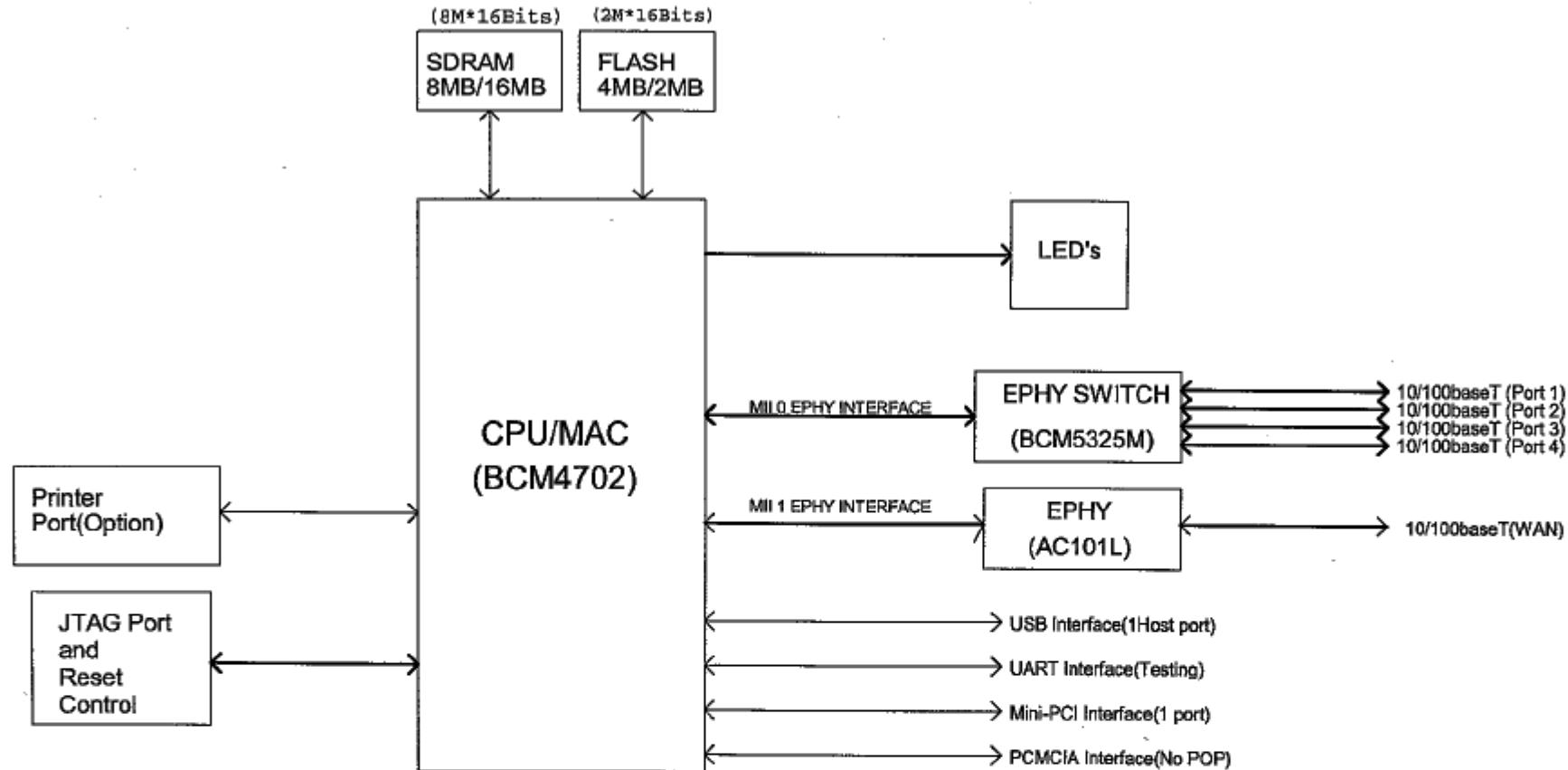
The Technical File as specified above will be kept for a period ending at least 10 years after the last product has been manufactured at the disposal of the relevant national authorities of any Member State for inspection purpose,



<b>Draw up in</b>	Taiwan
<b>Data</b>	2003/5/22
ASUSTek Computer Inc. 4/F, 150, Li-Te Rd., Peitou, Taipei, Taiwan 112	
<b>Signature &amp; company stamp</b>	LawrenceYu / R&D Engineer

# **Block Diagram**



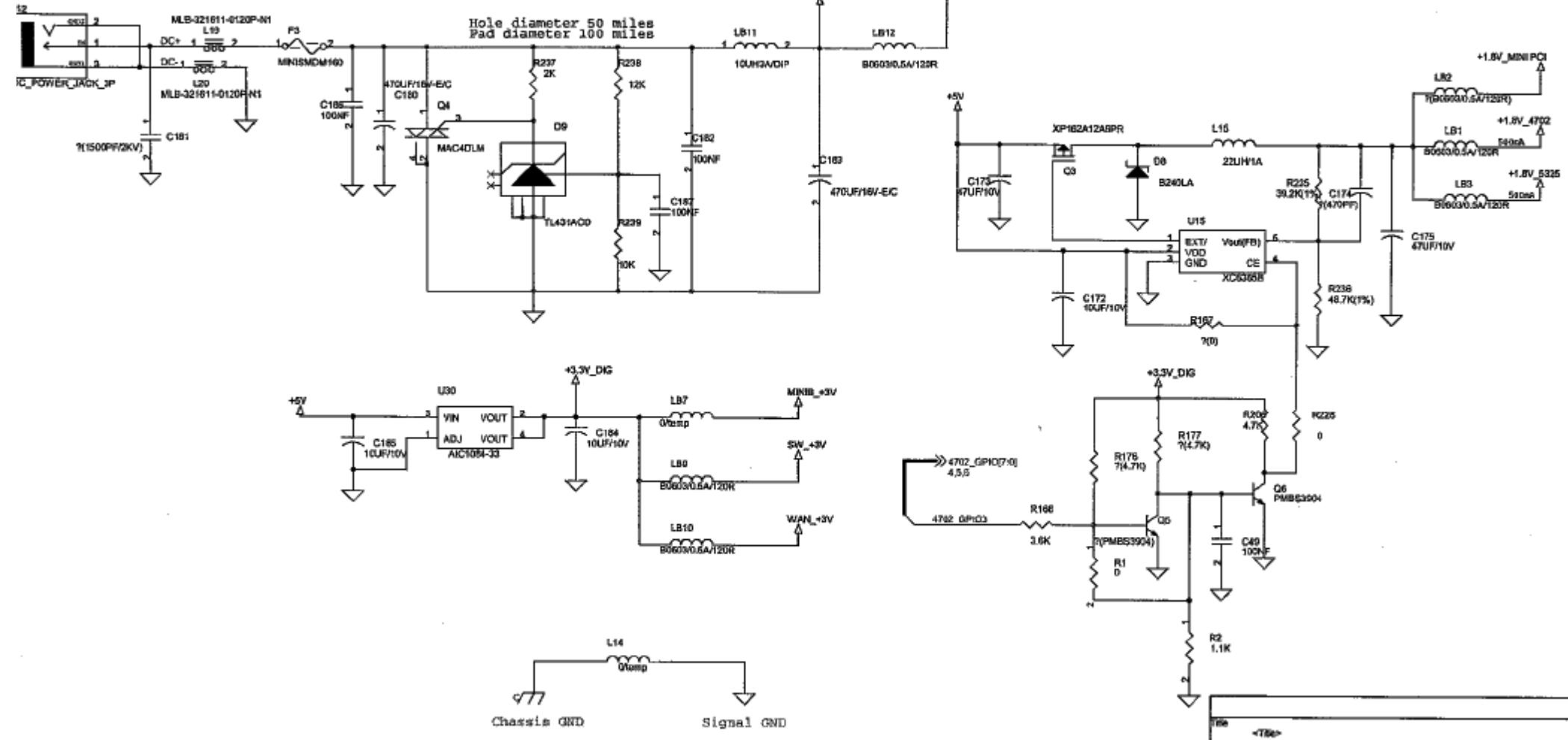


**BCM4702 +802.11b/g  
Gateway Reference  
Design  
Block Diagram**



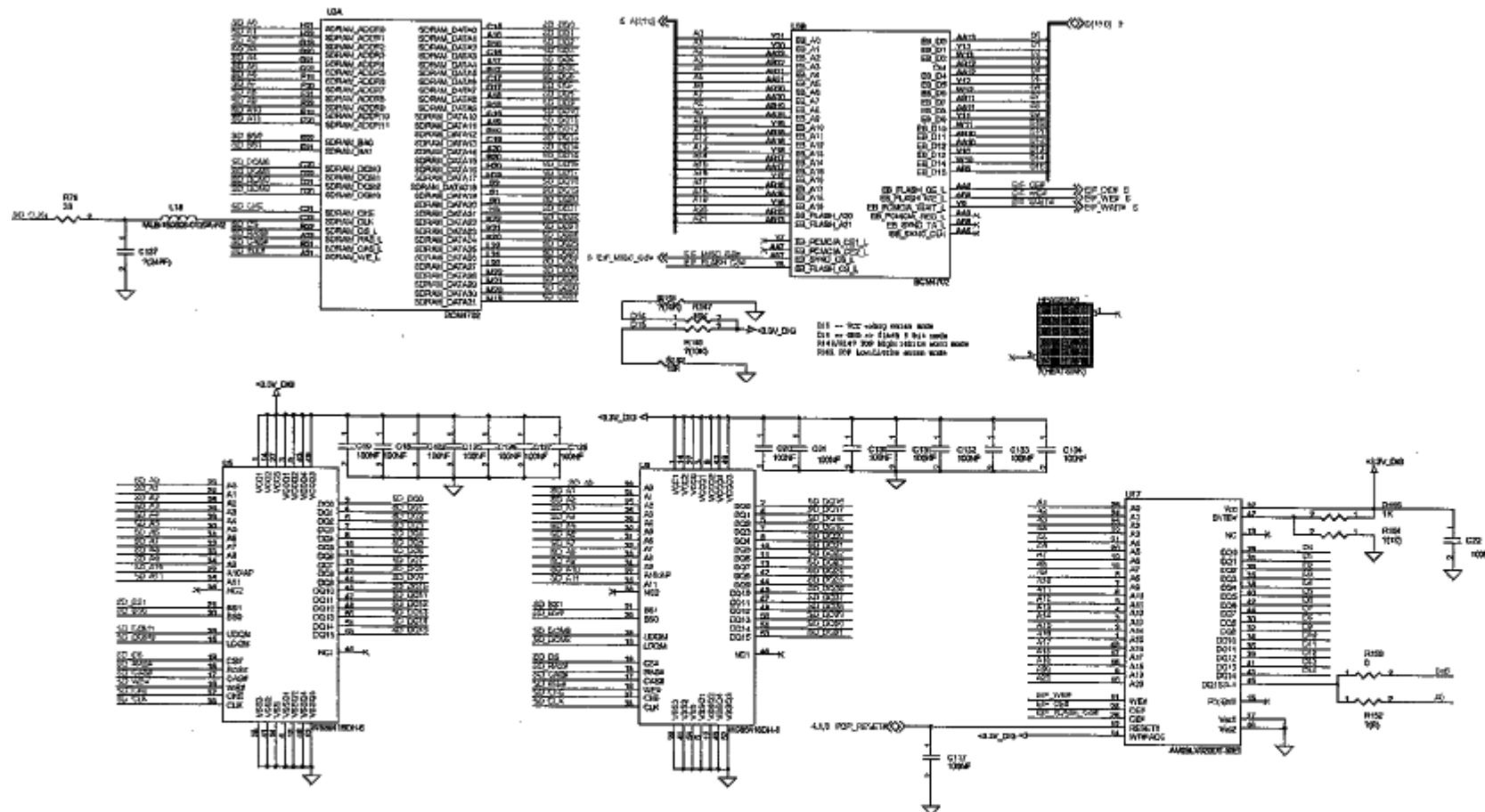
# Circuit Diagram

+5VDC/2A POWER  
CONNECTOR

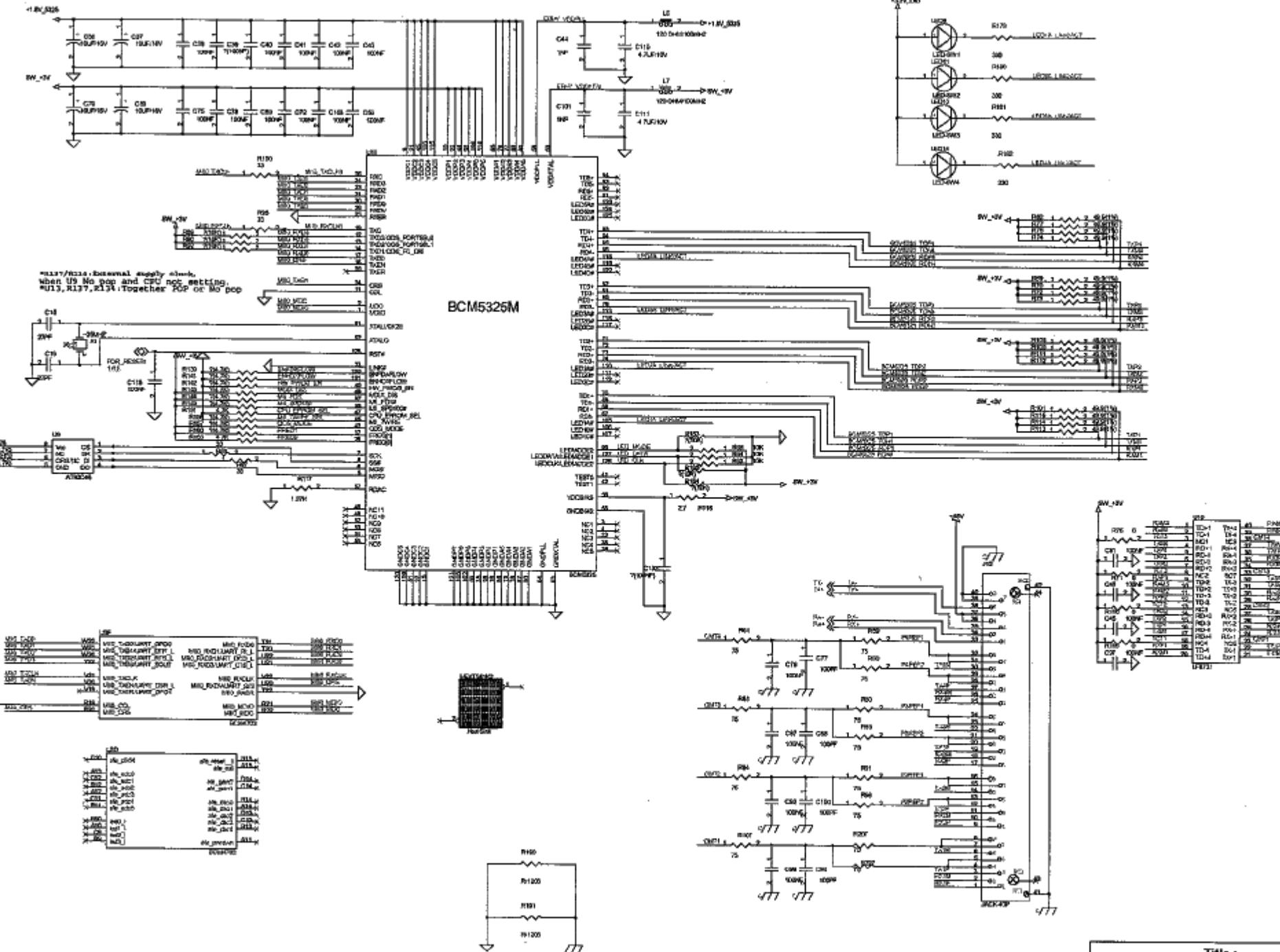


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Date	Tuesday, April 29, 2003

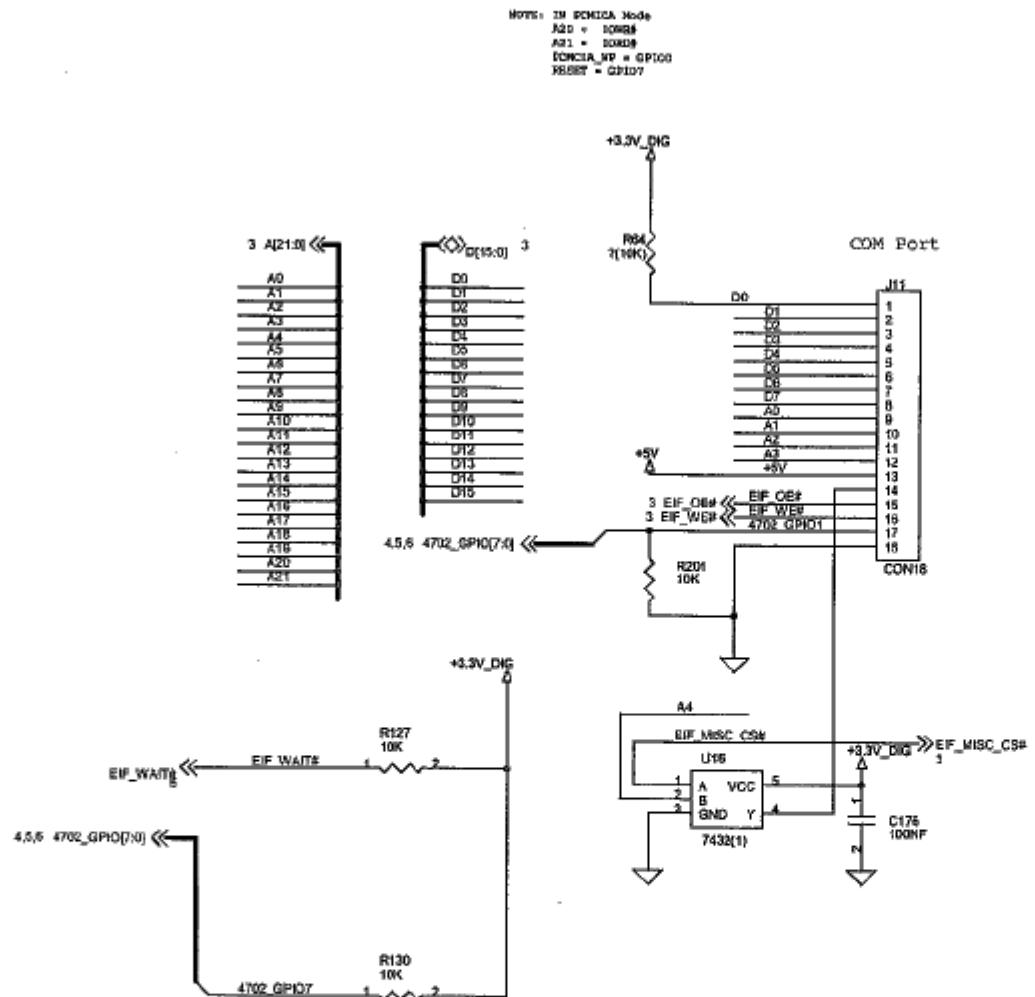
Sheet 2 of 12 Rev R1.0



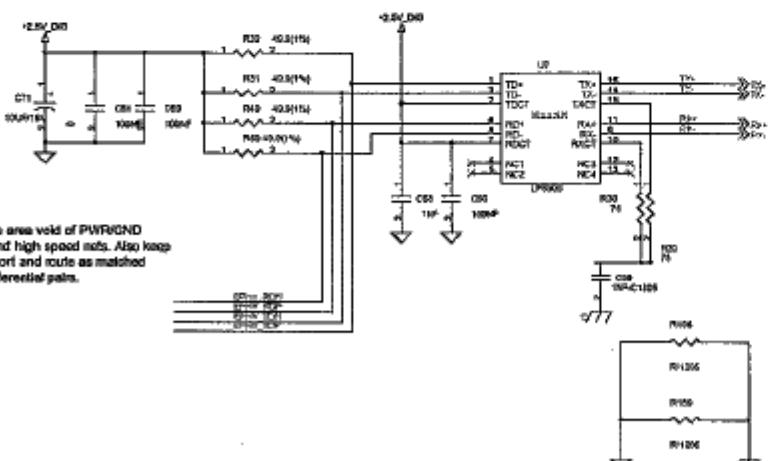
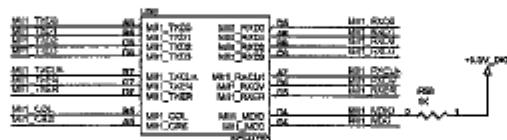
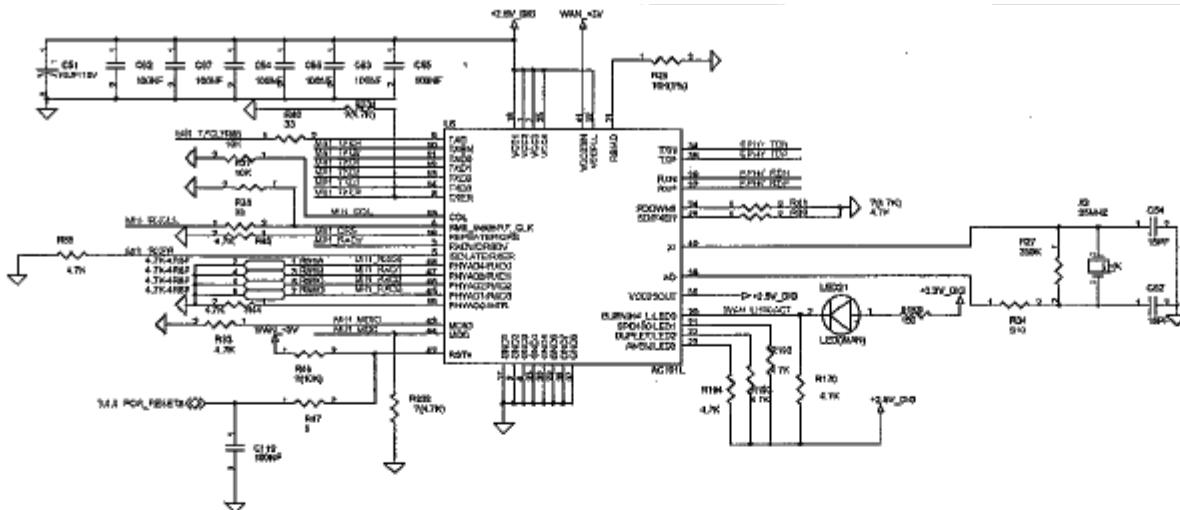
Title :	
DRIVECHIPS	
Ref	Project Name
C	
Rev R0.0	

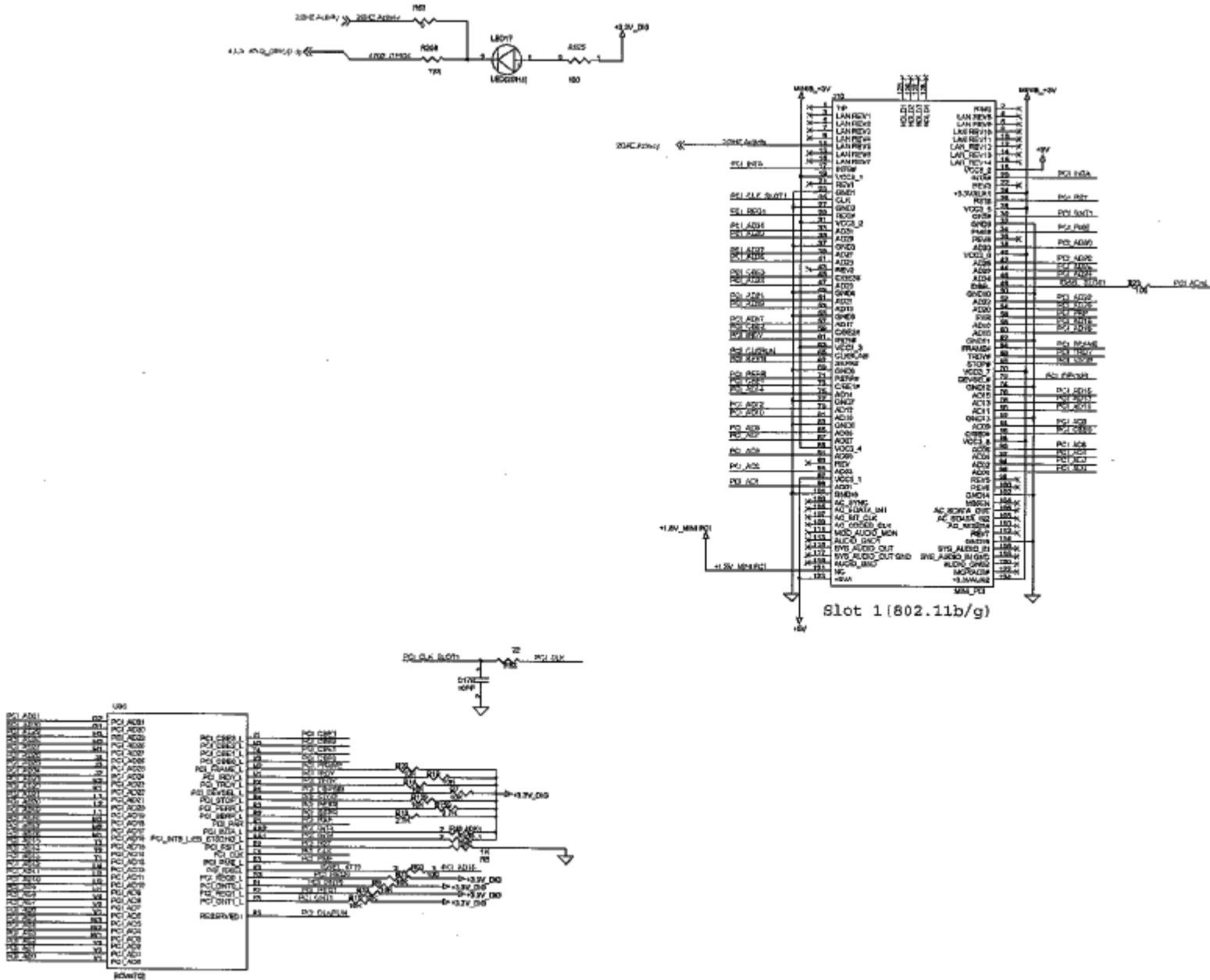


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Engineer:		
Rev		
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Wk	141444.40	2010.05.22

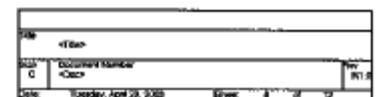
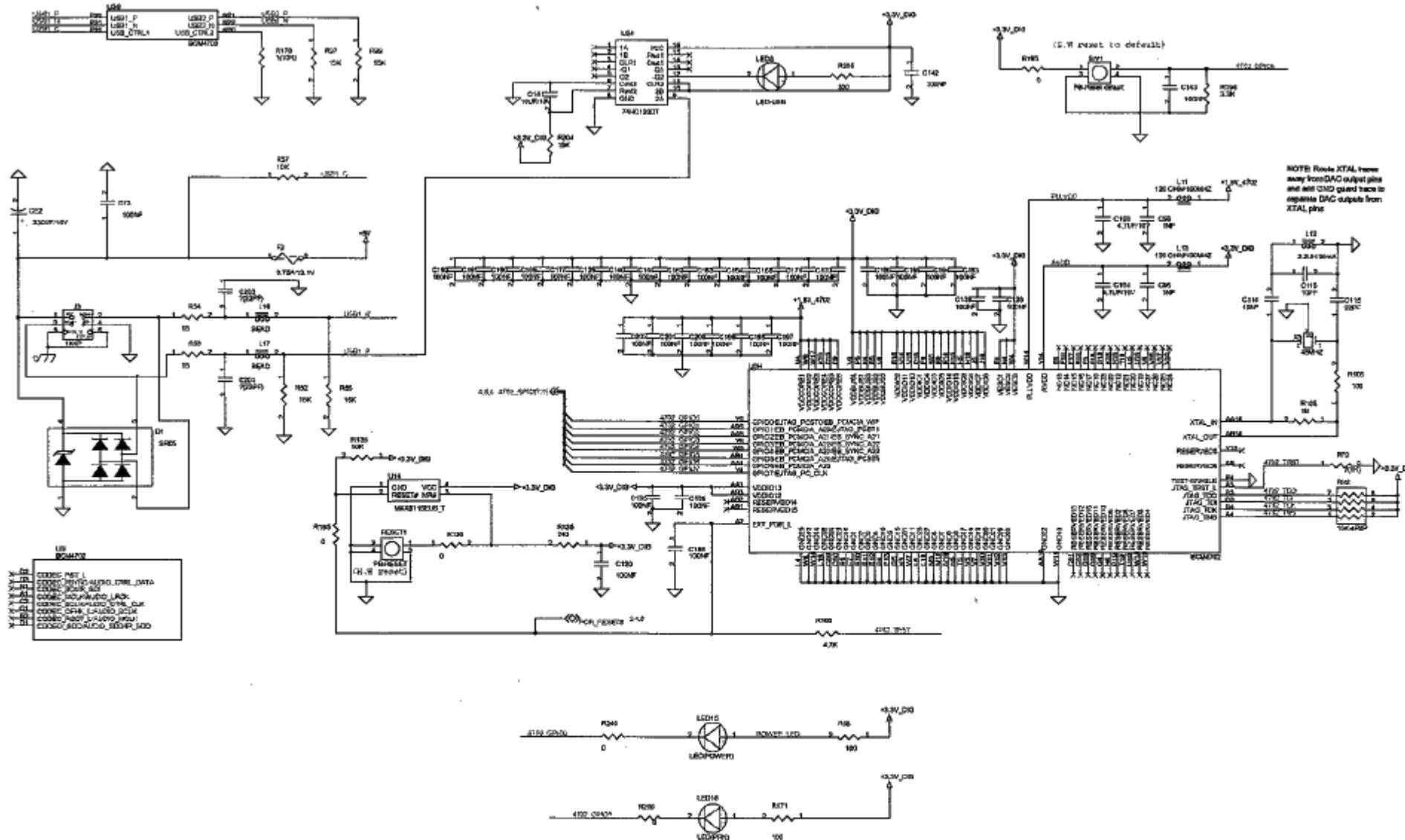


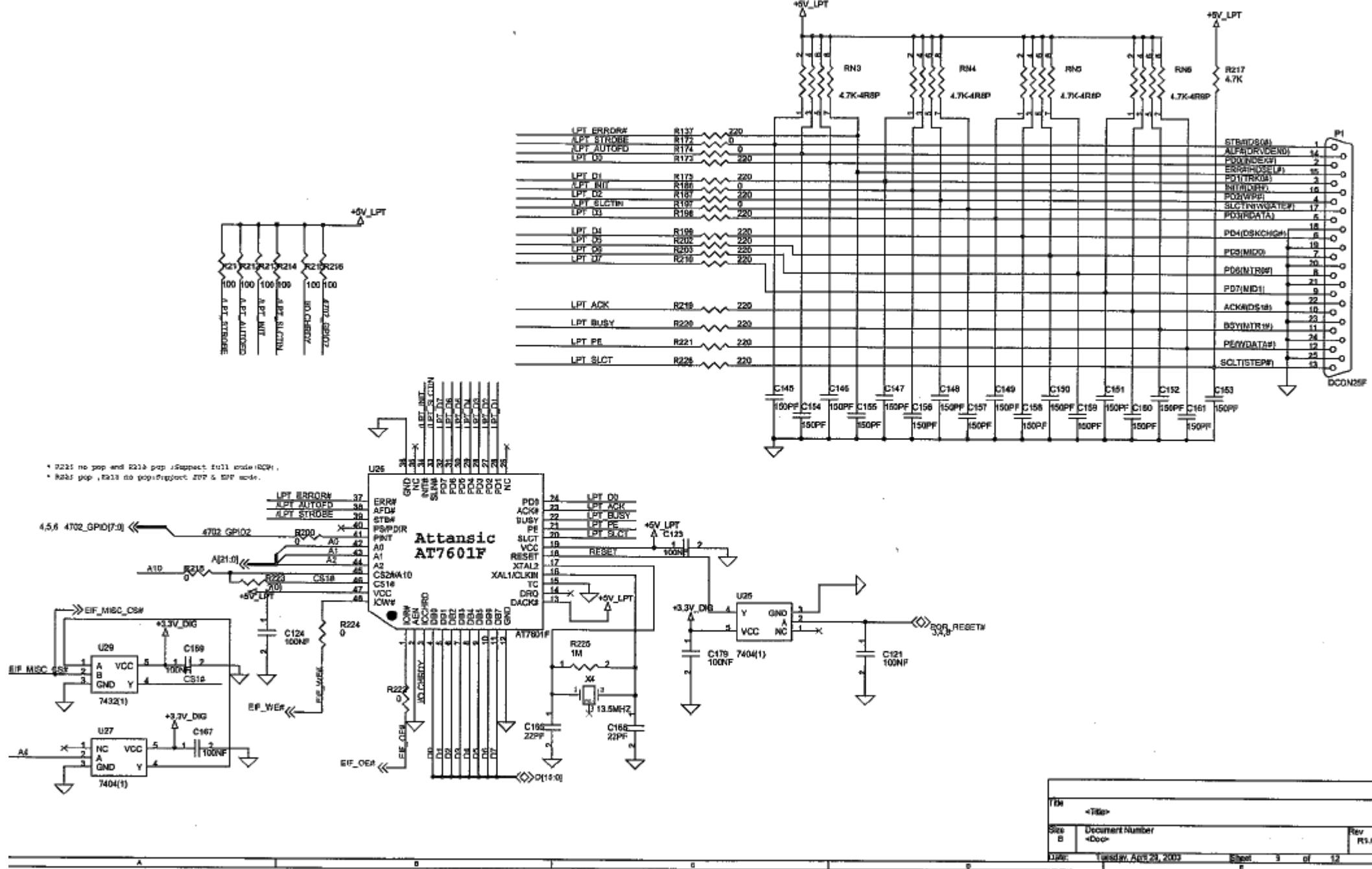
Avantek Corporation	
<OrgAdd1>	<OrgAdd2>
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Block Diagram	
Date: Tuesday, April 29, 2003	Rev: R1.01
Site: E	Document Number: BCM4702
Sheet: 5	of: 12

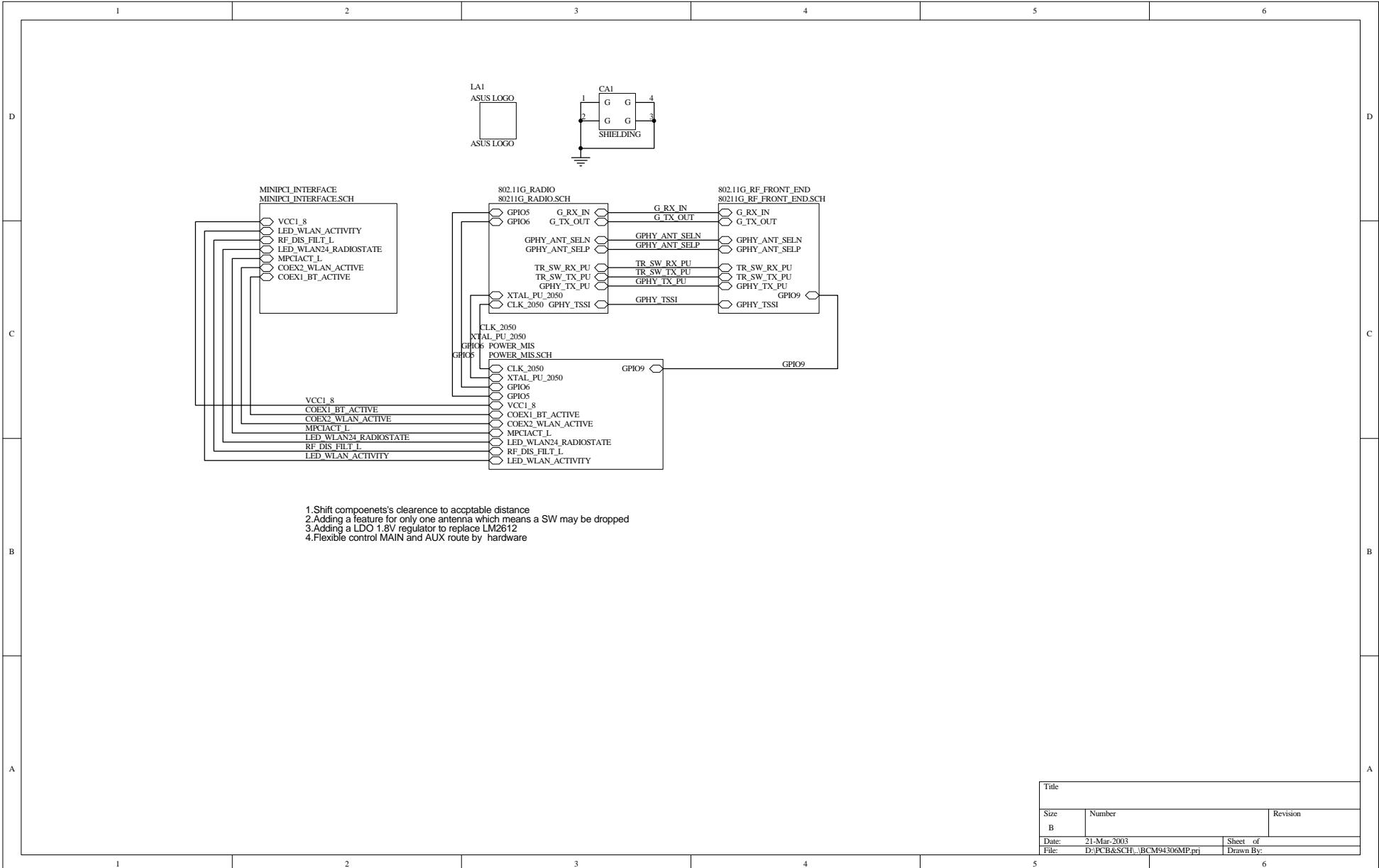


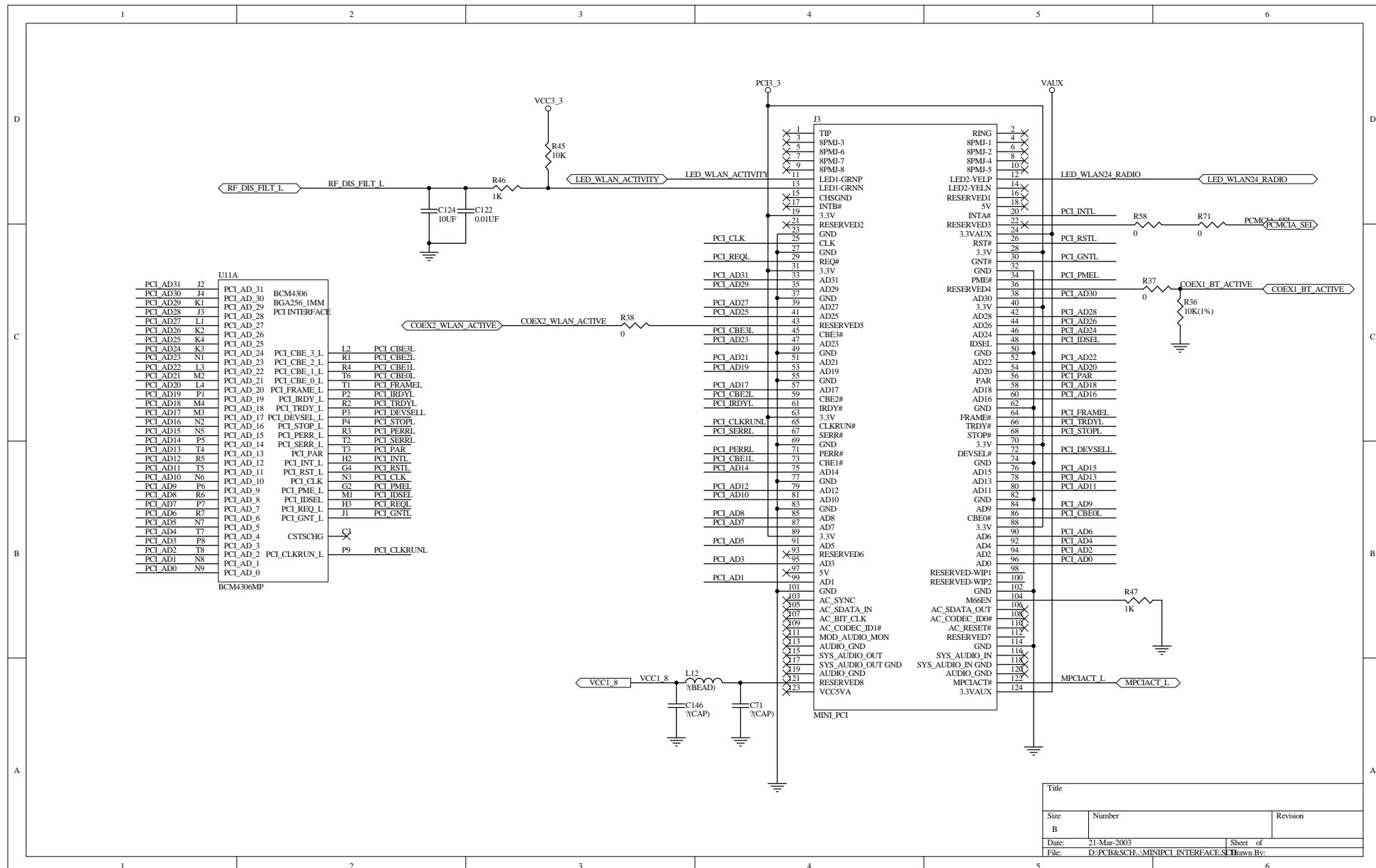


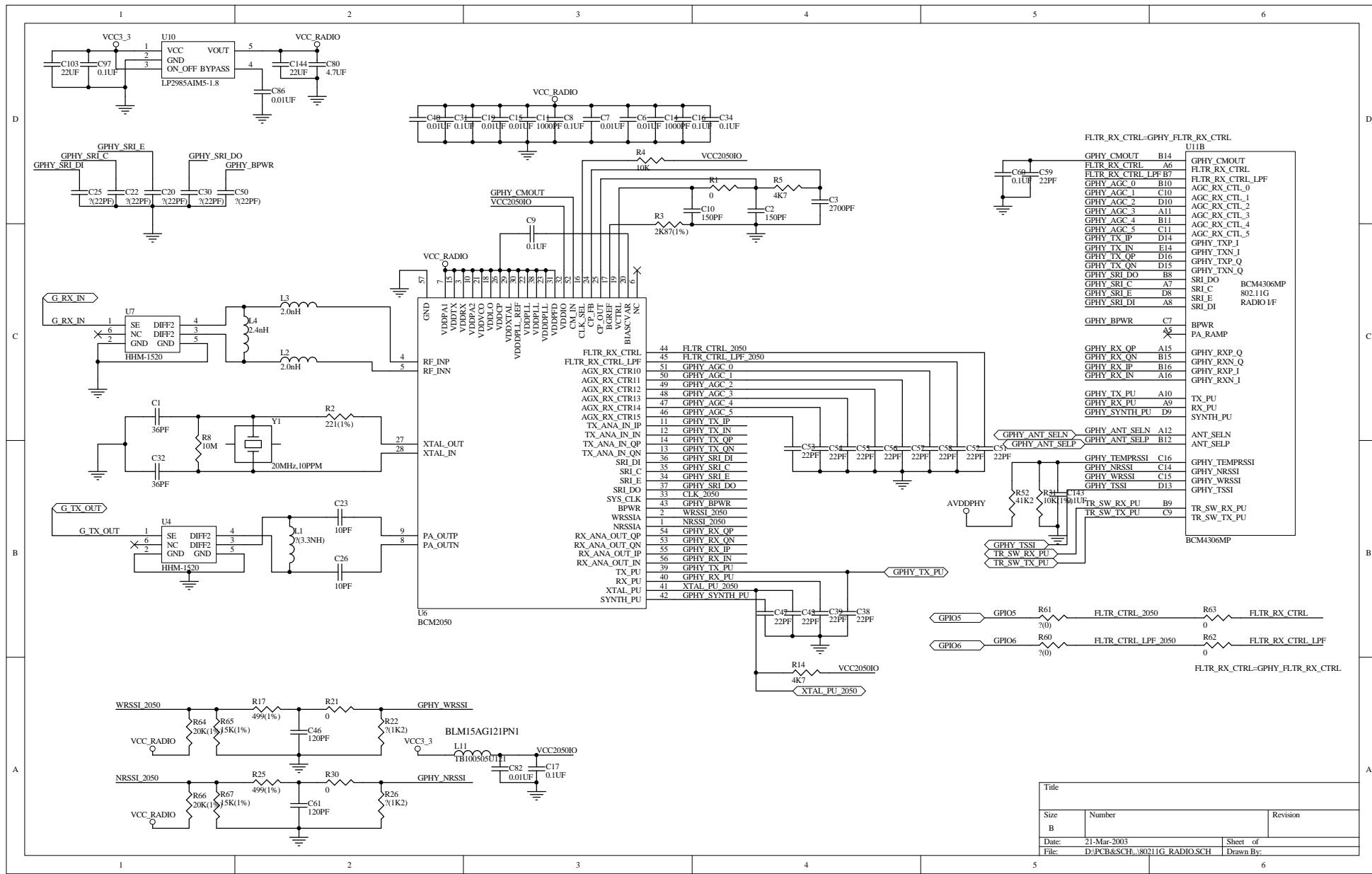
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Engineer: _____		
Date	Project Name	Rev
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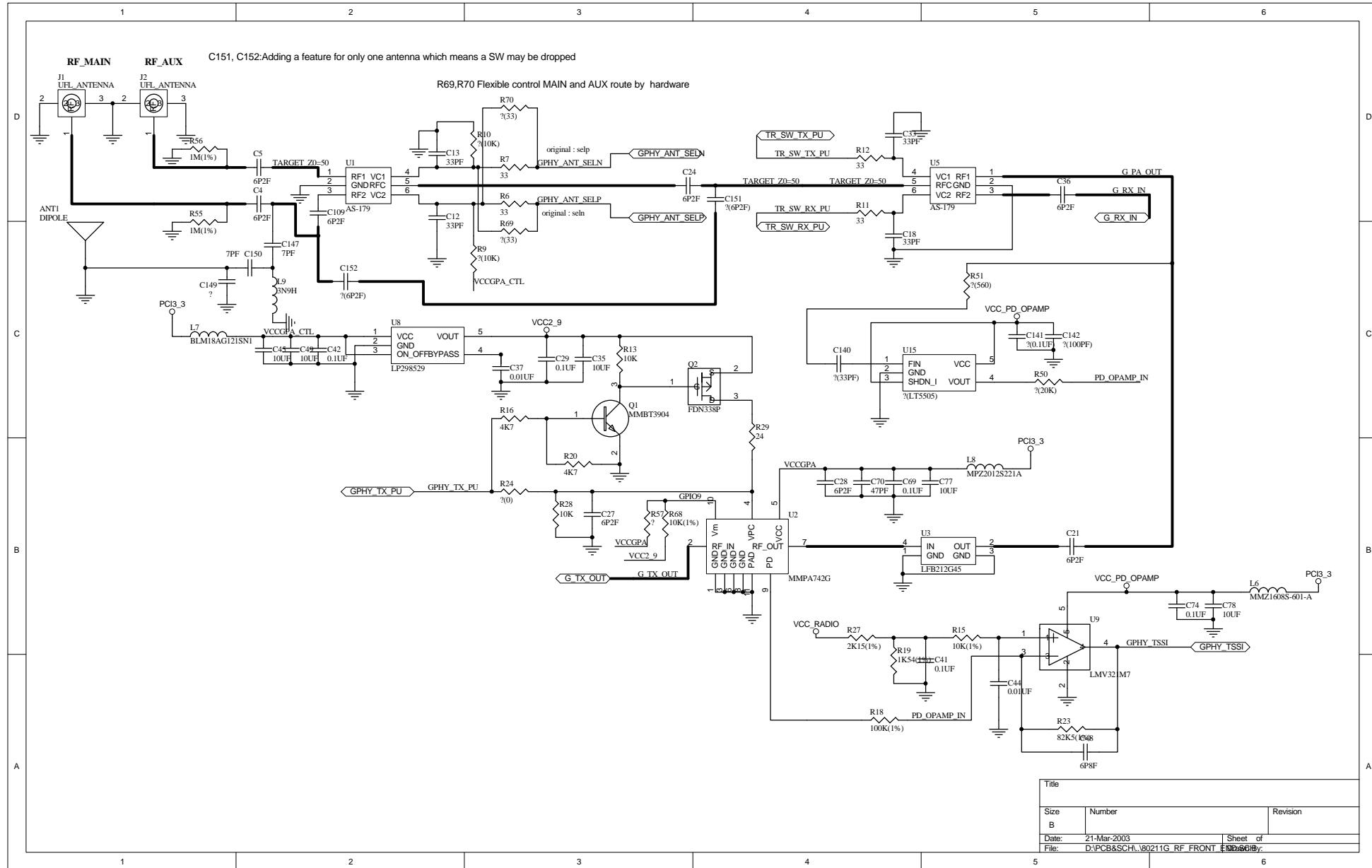


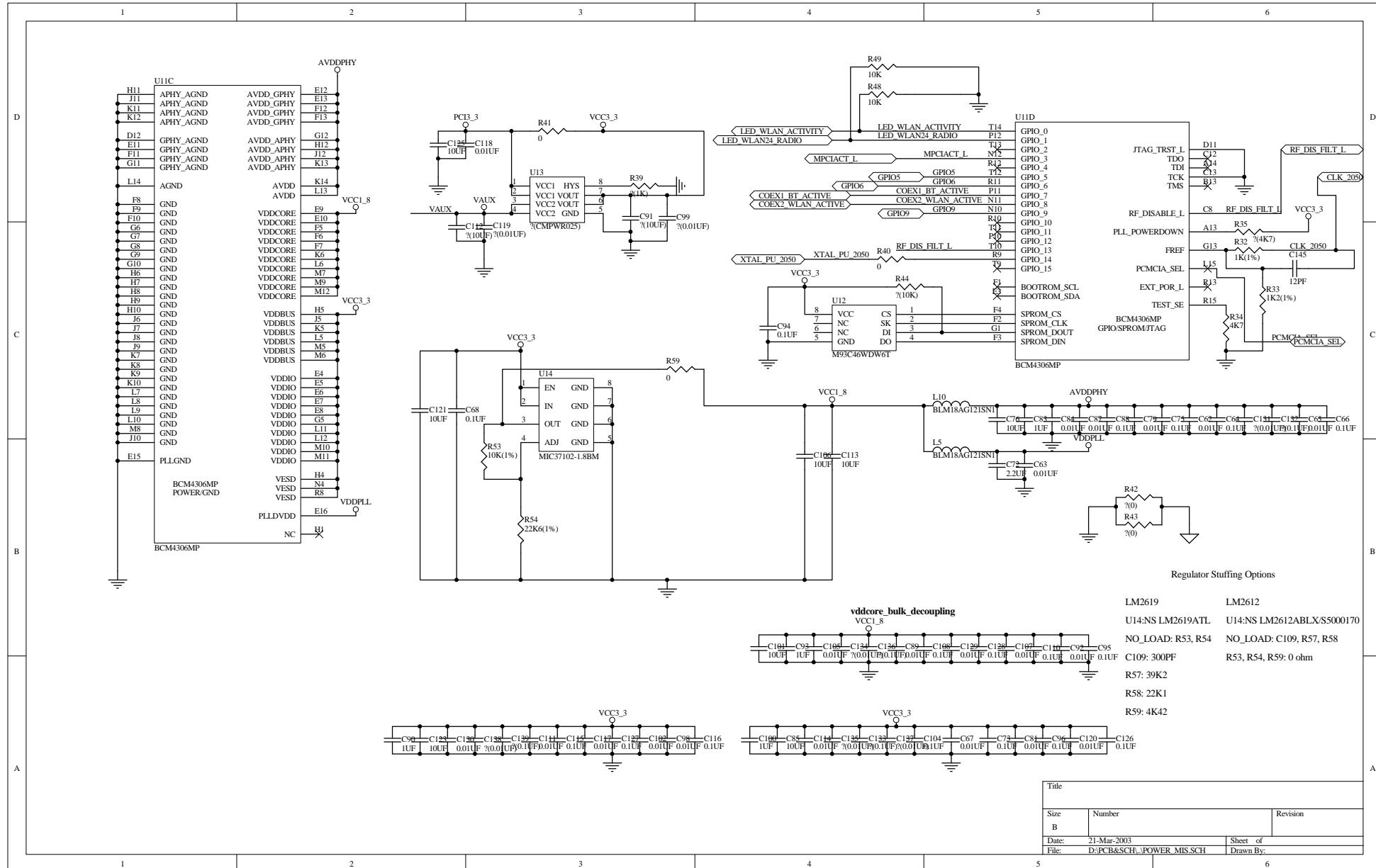




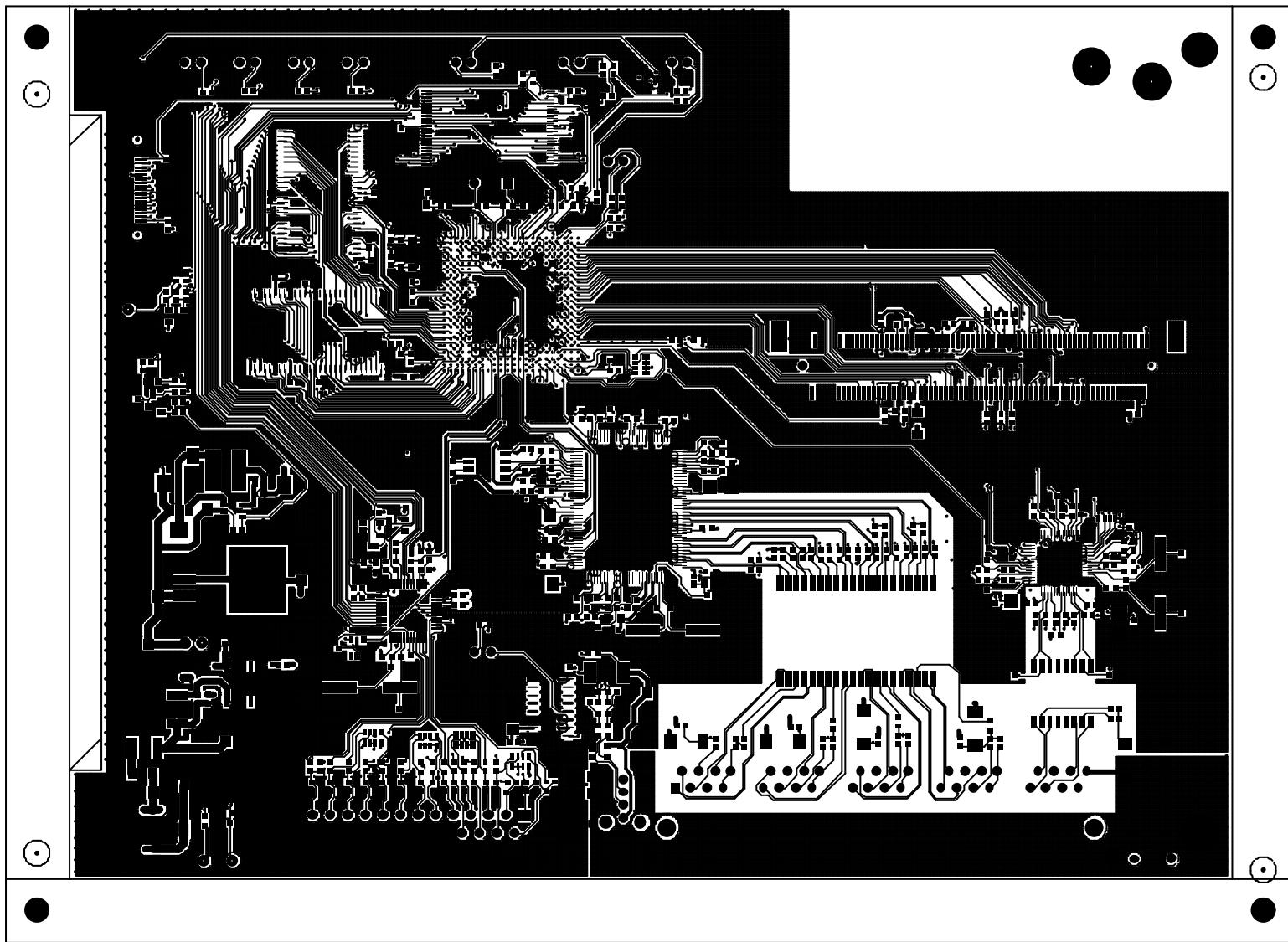








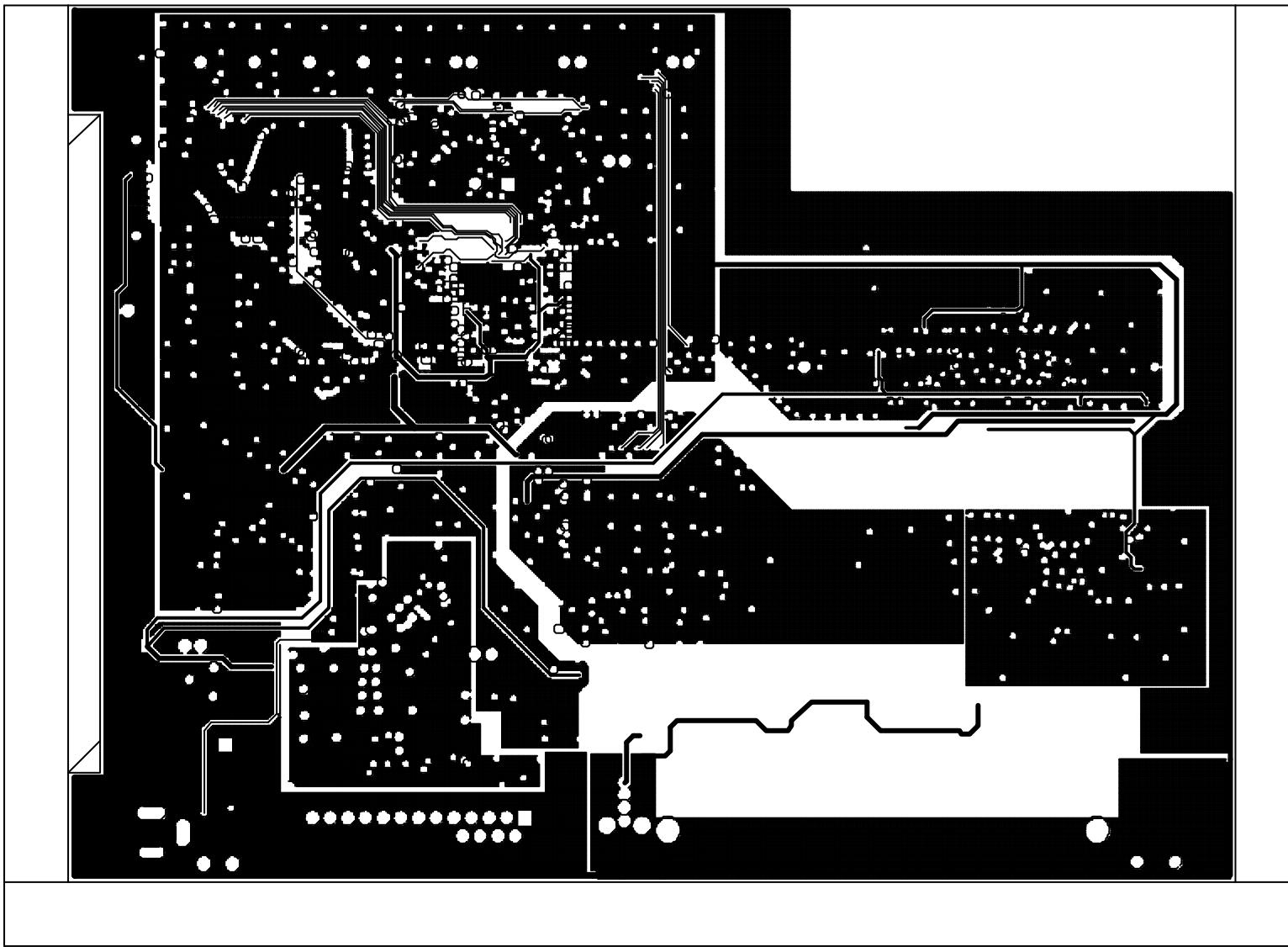
# **PCB Layout**



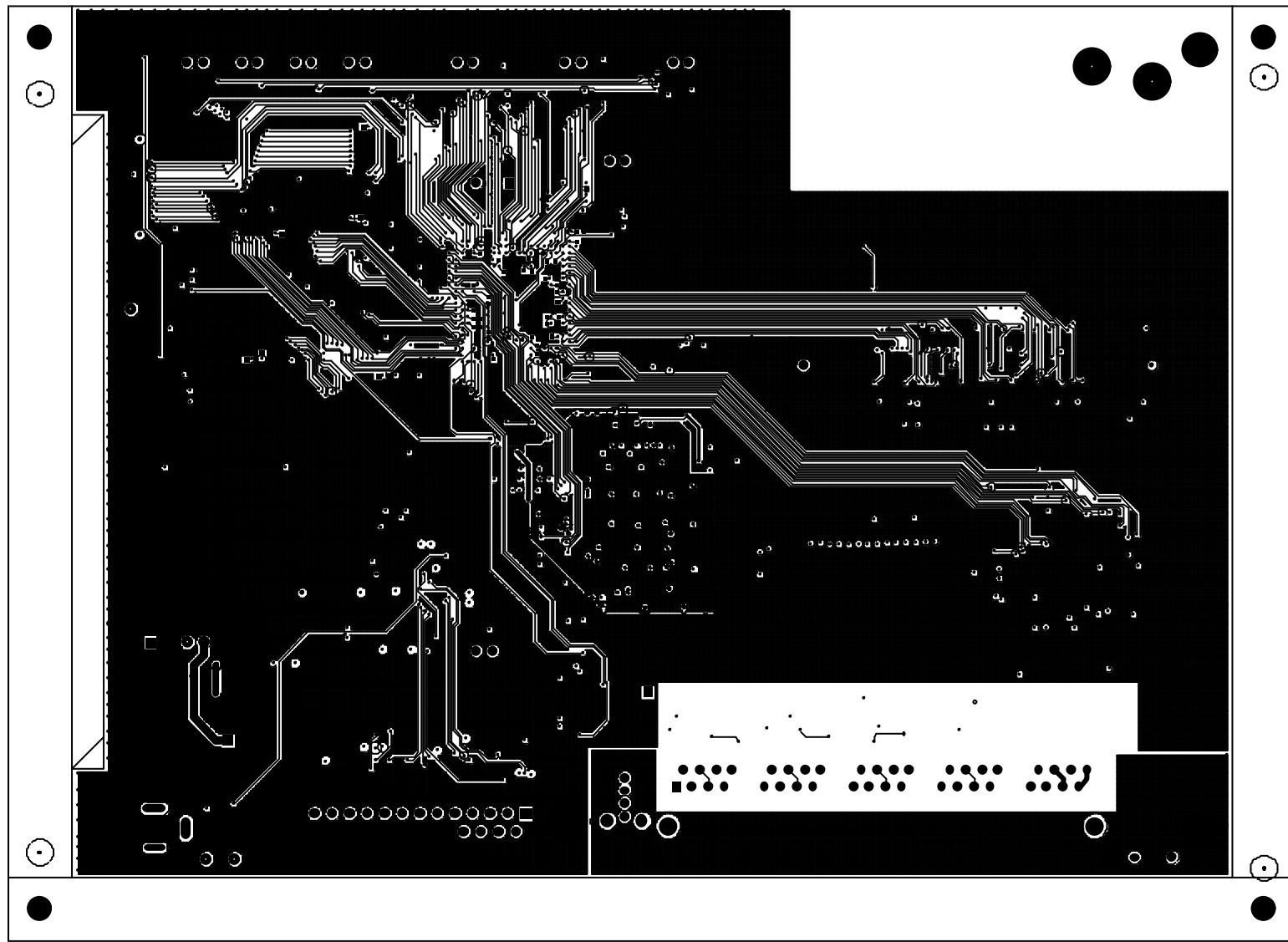
Top Layer



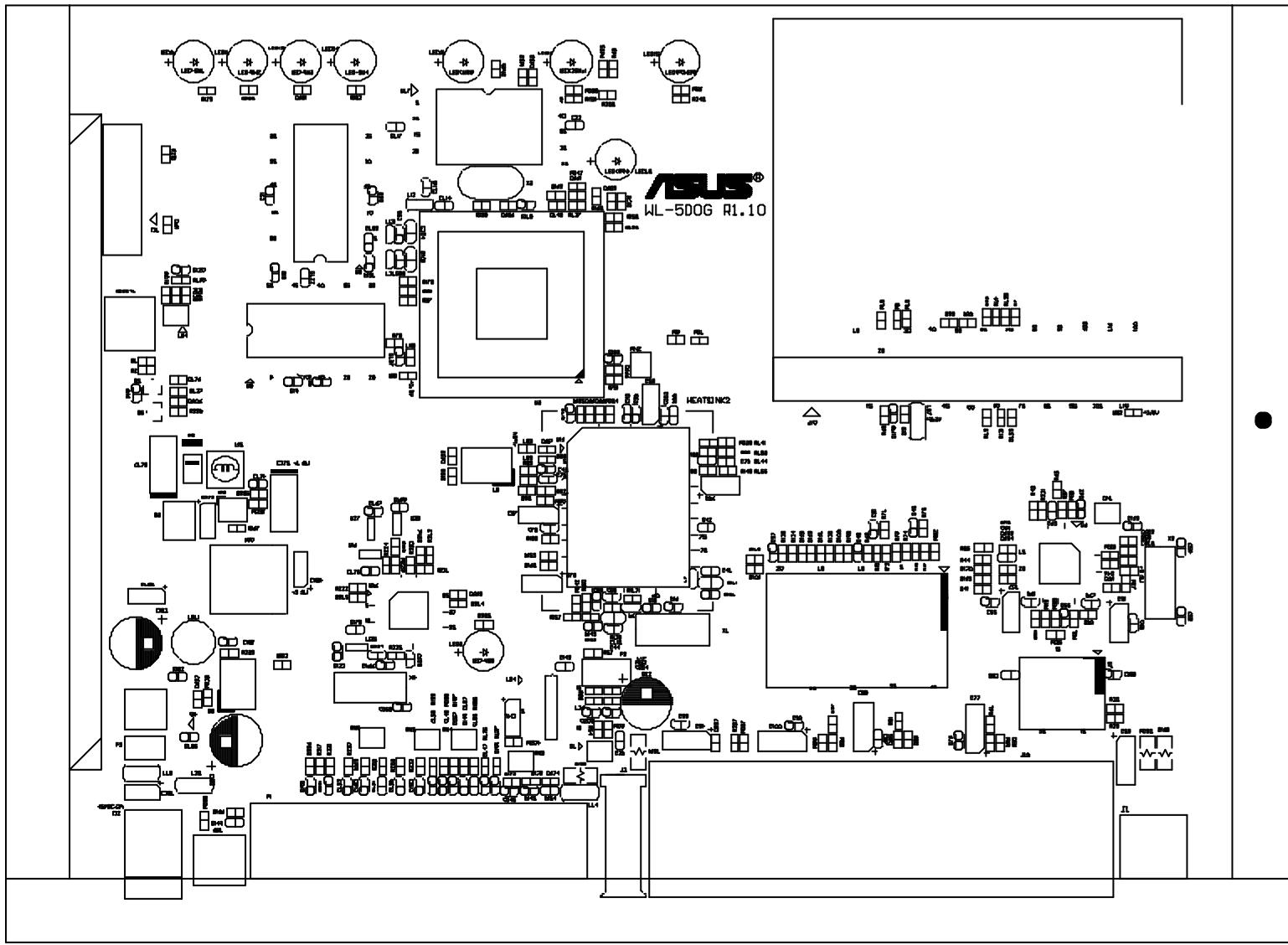
Mid Layer 1



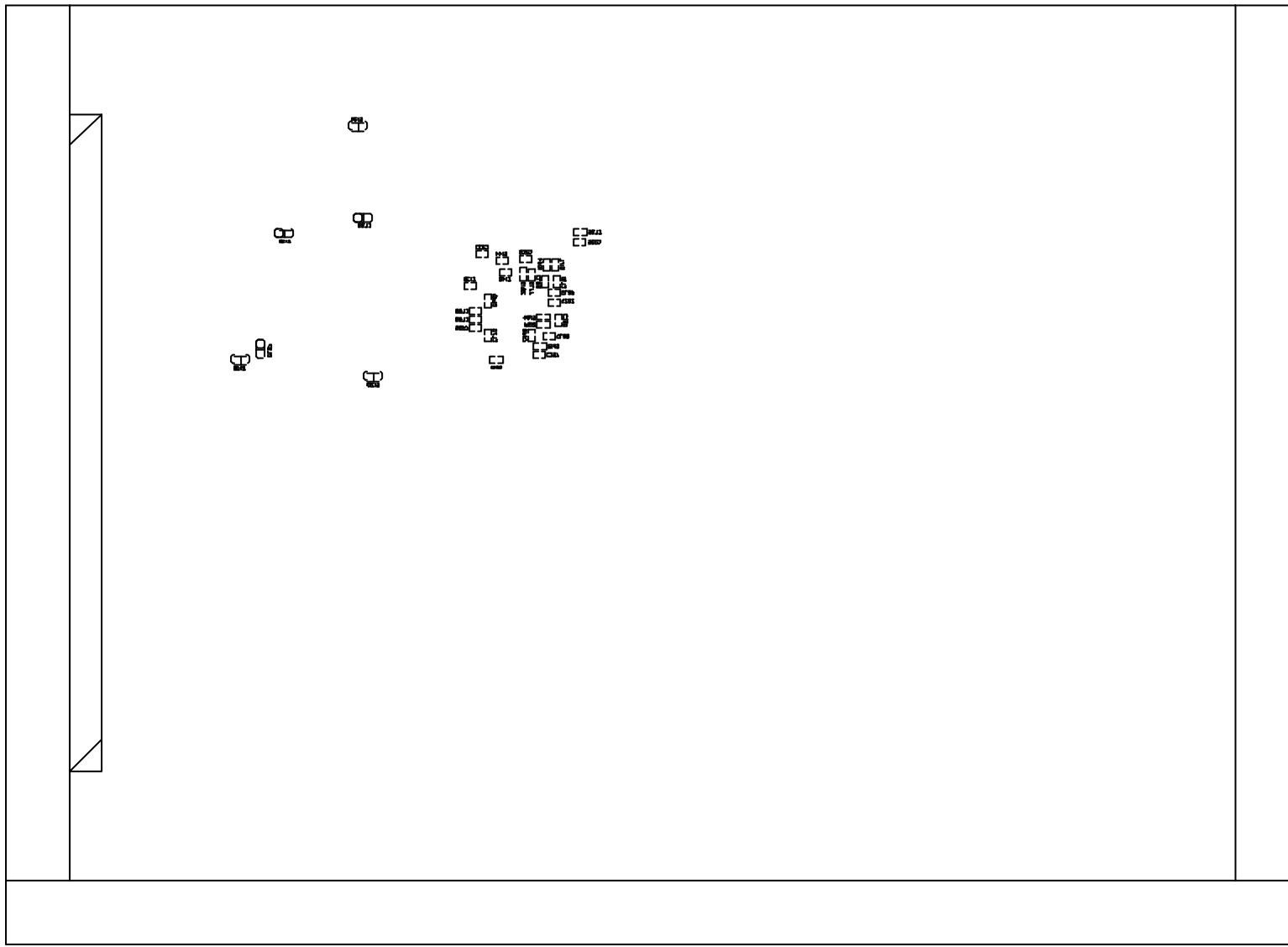
Mid Layer 2



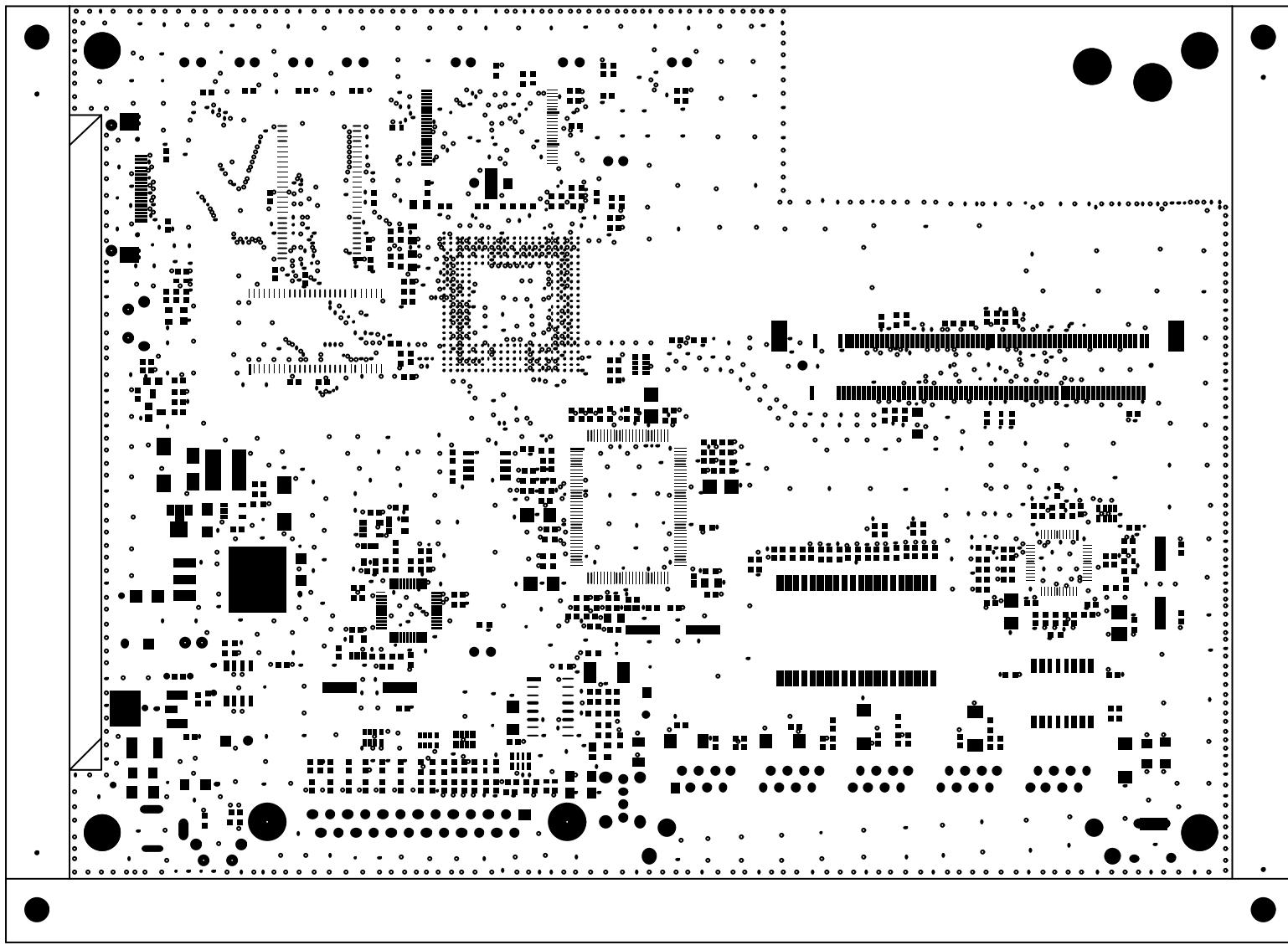
Bottom Layer



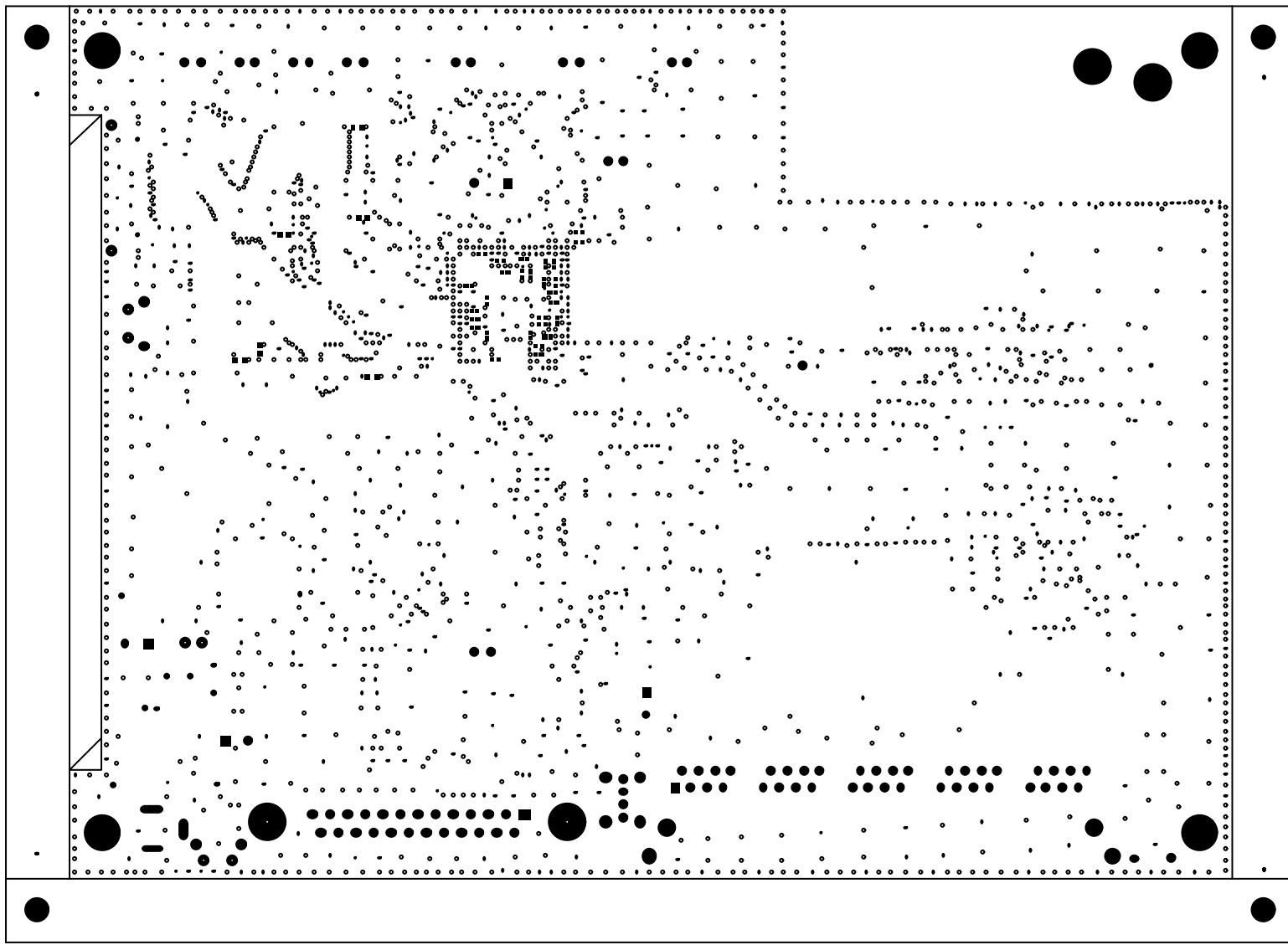
Top Overlay



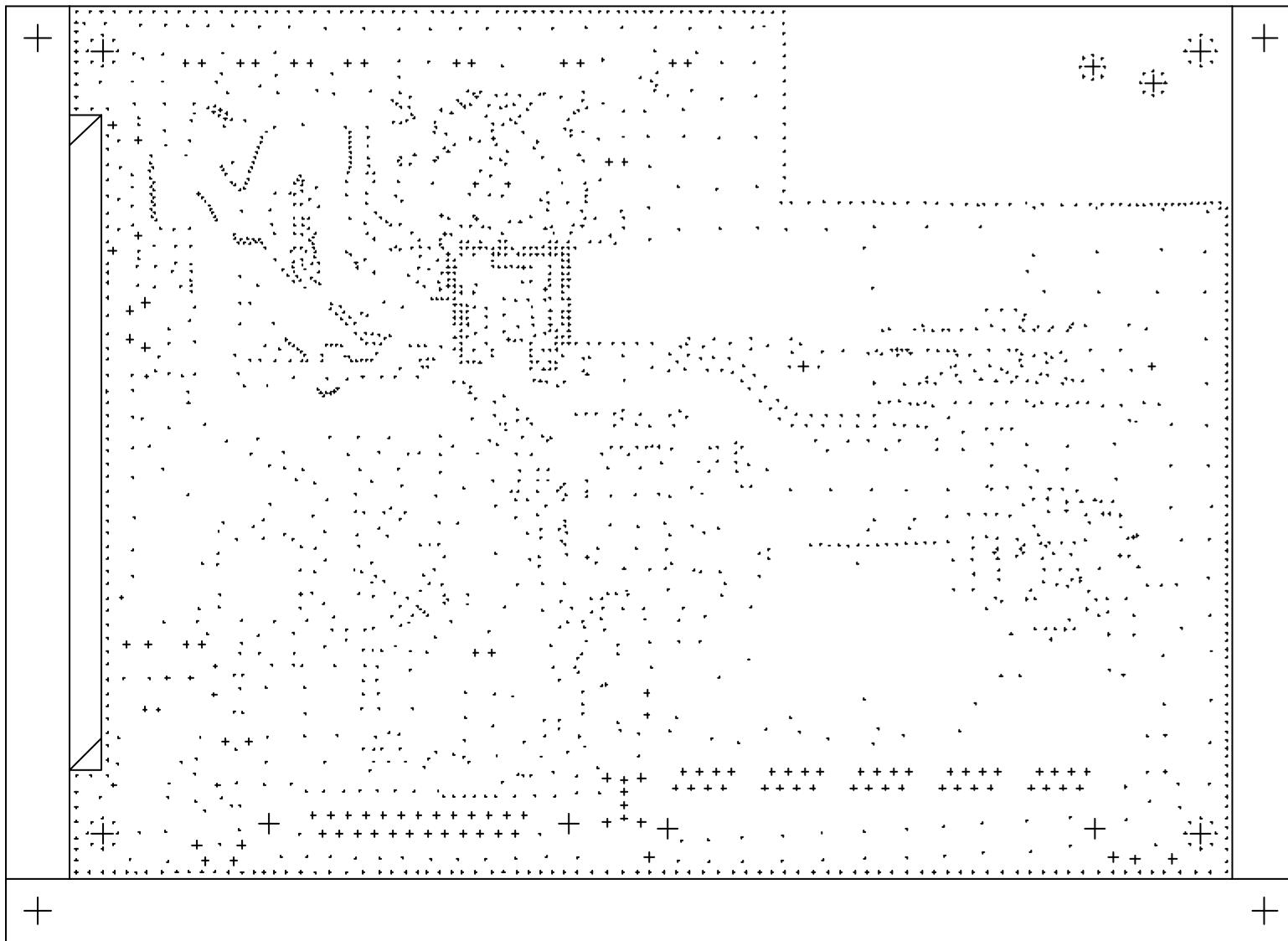
Bottom Overlay



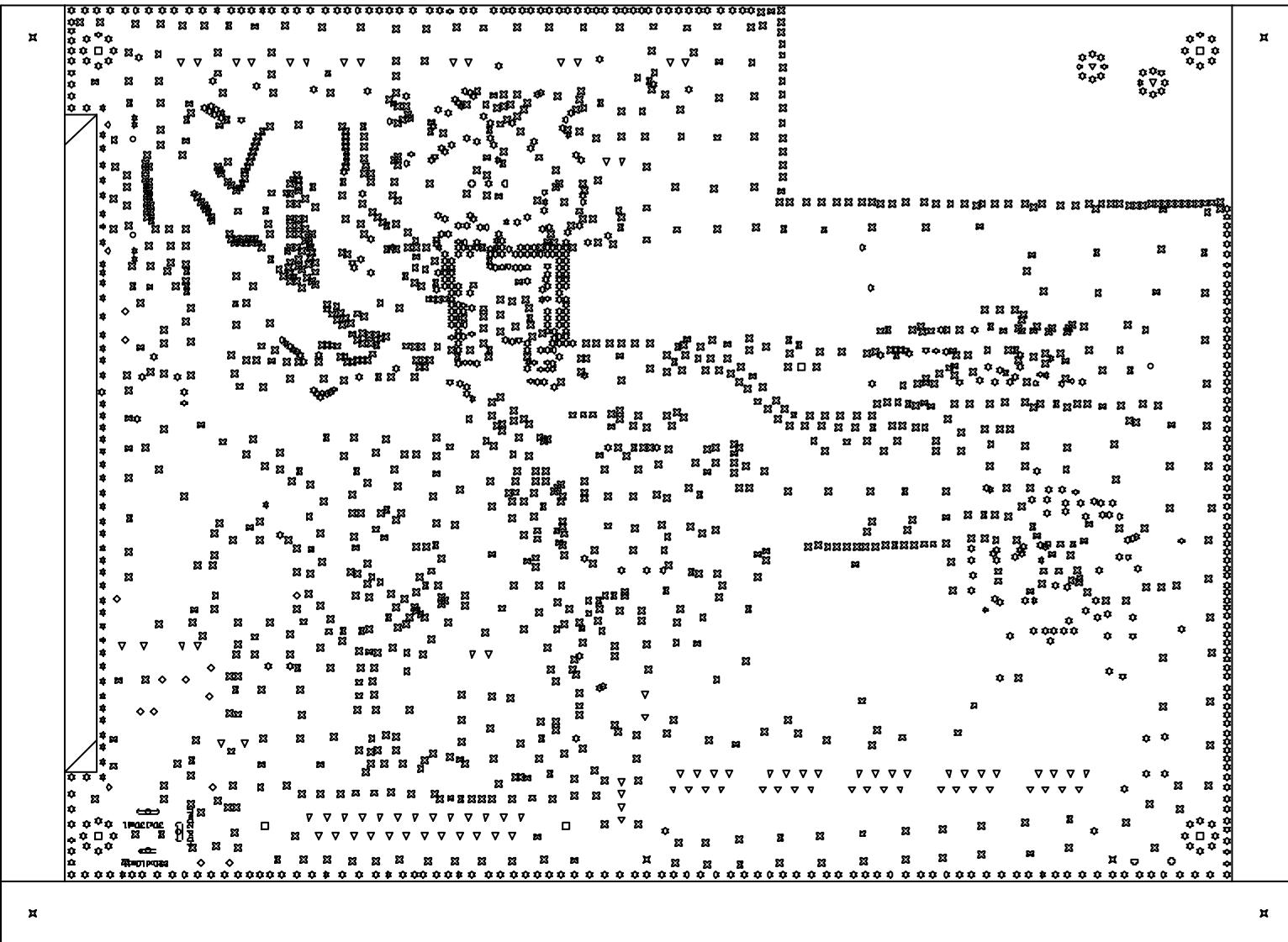
Top Solder Mask



Bottom Solder Mask

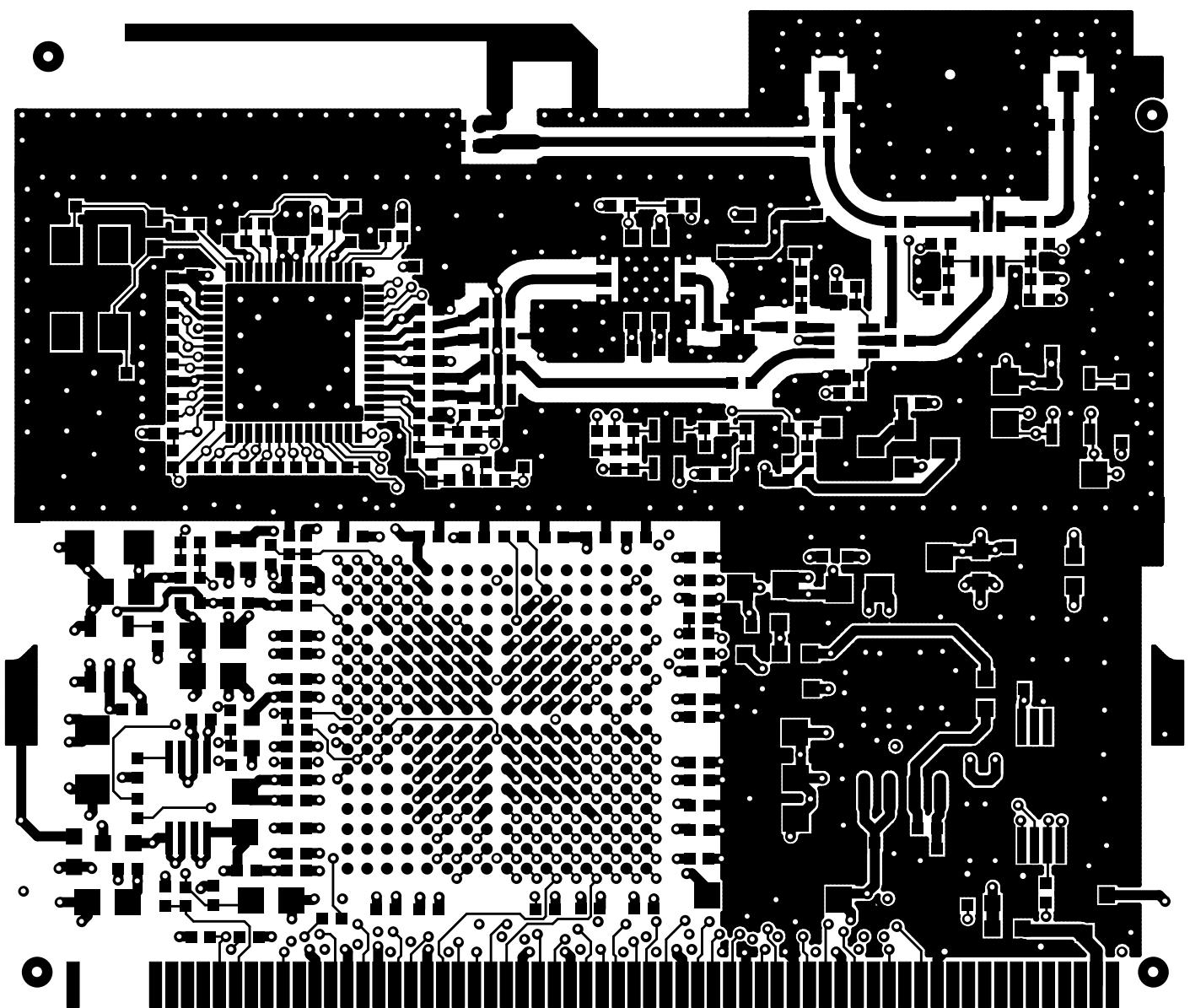


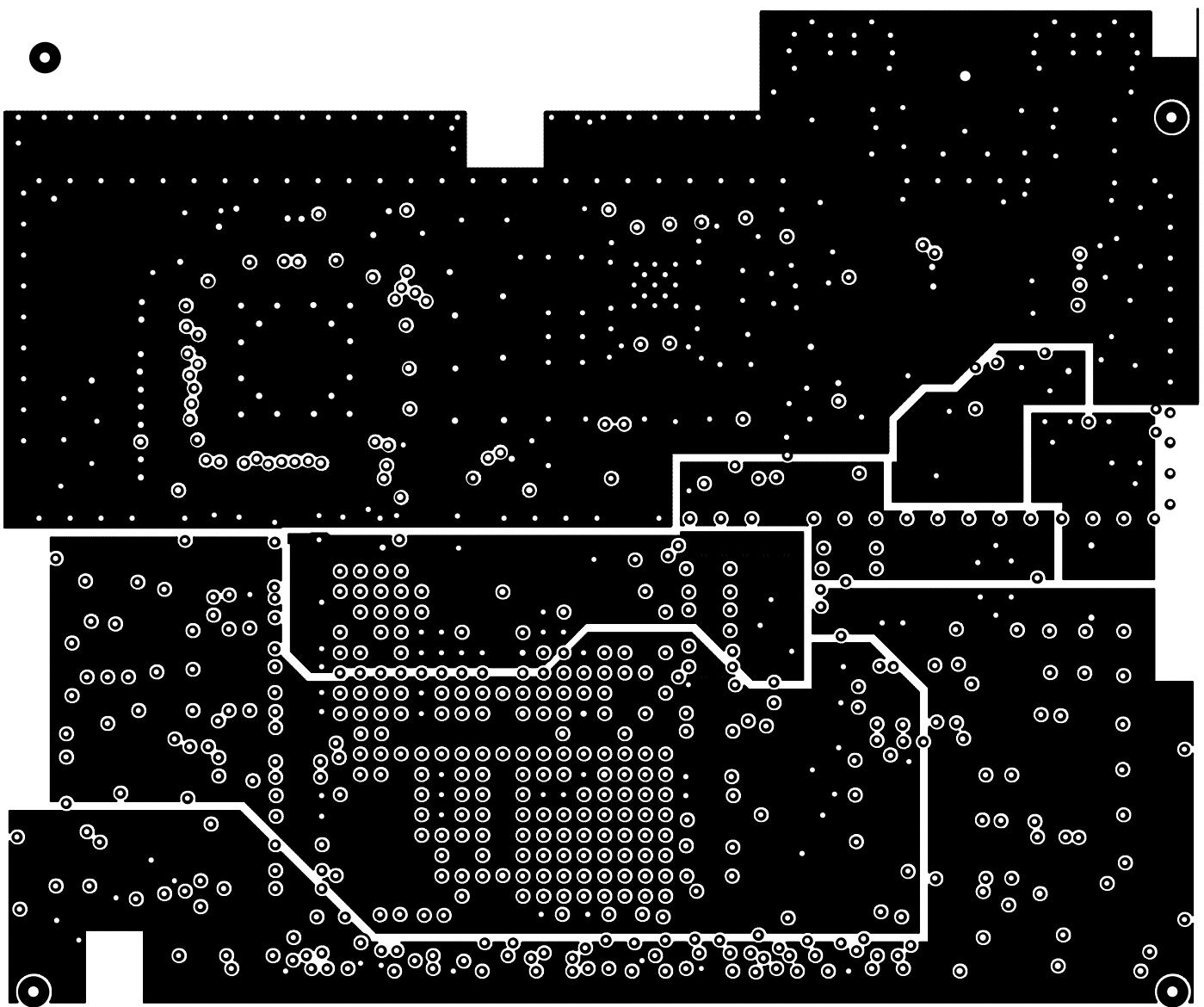
Drill Guide for Through Hole

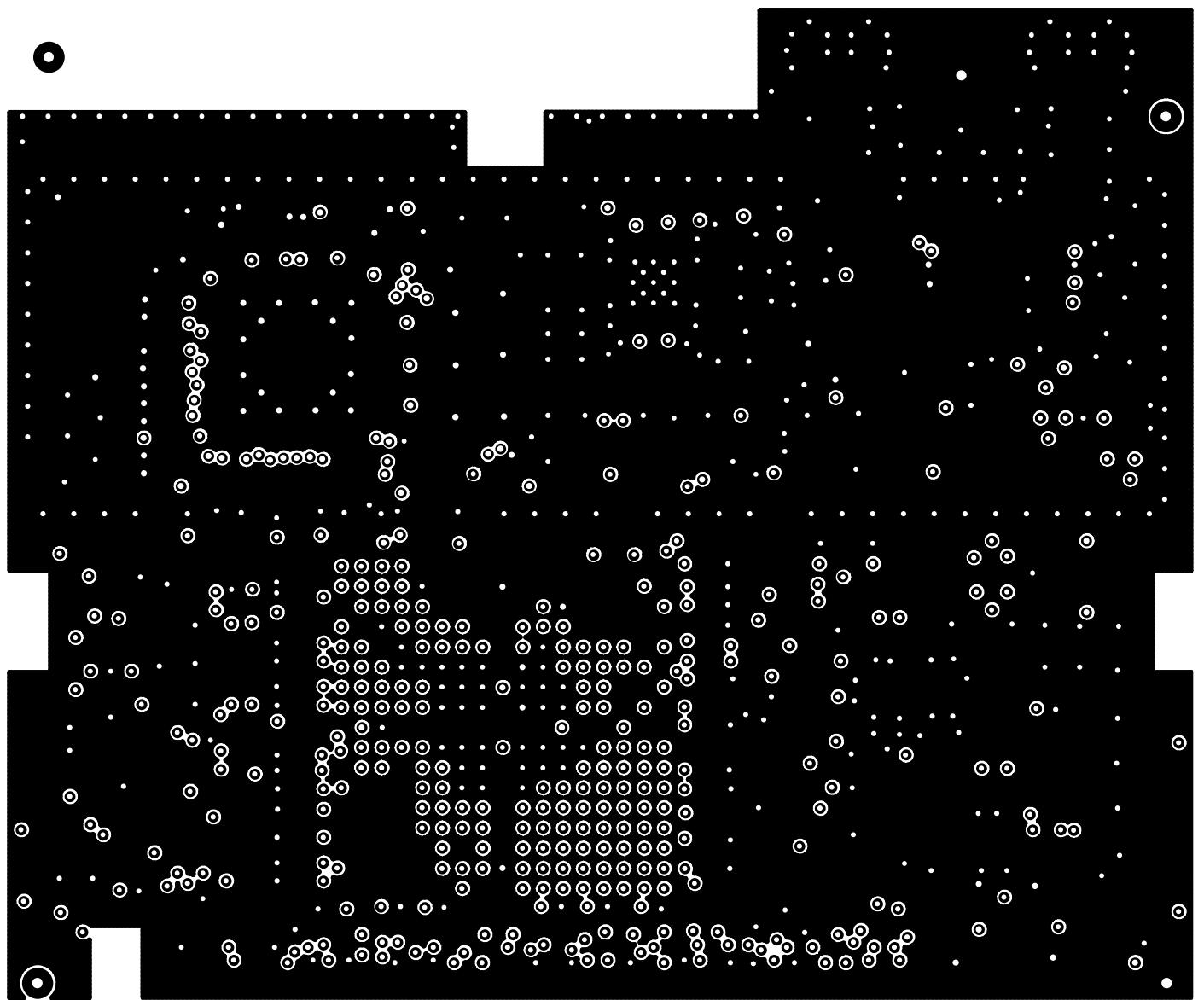


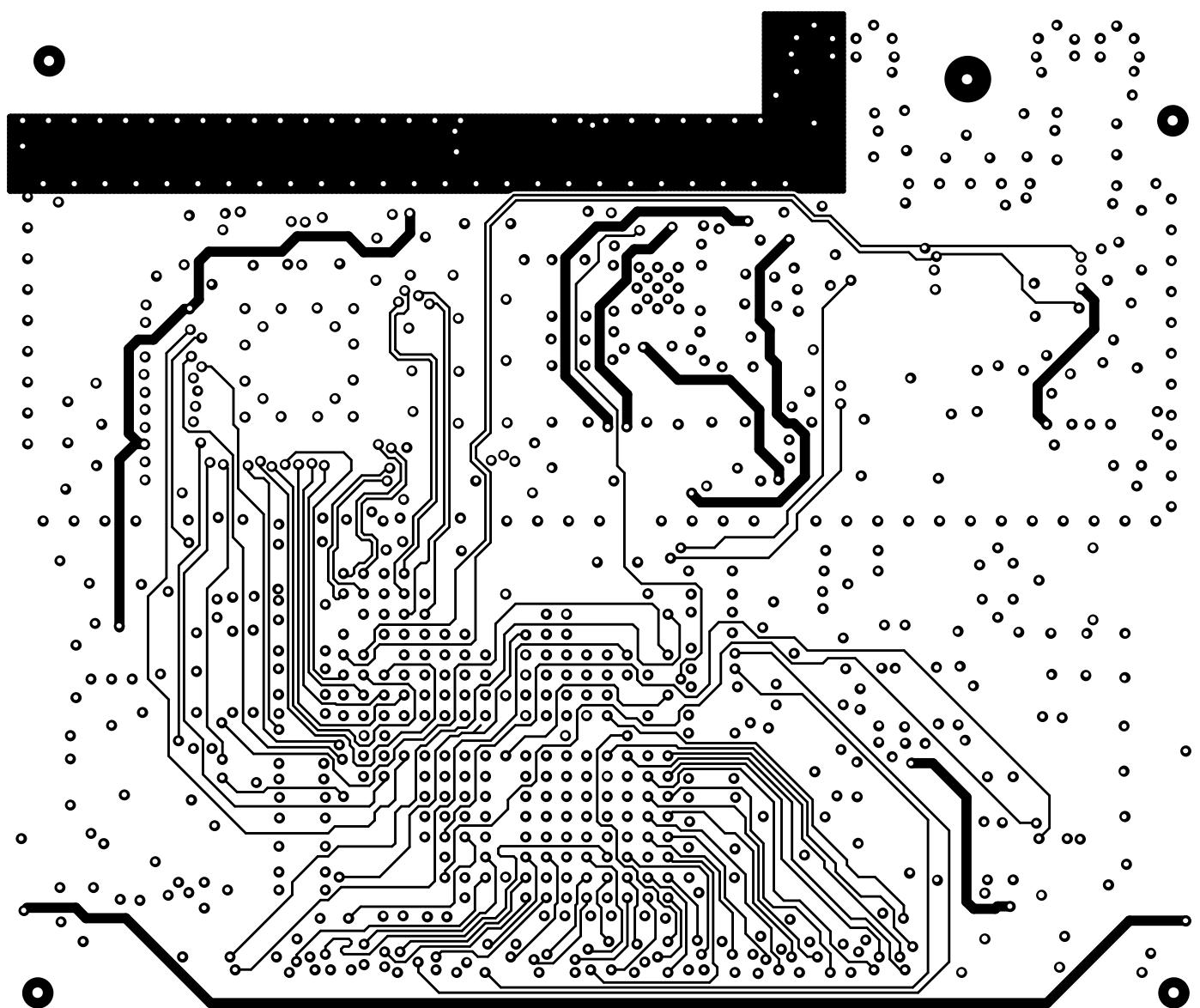
Drill Drawing for Through Hole

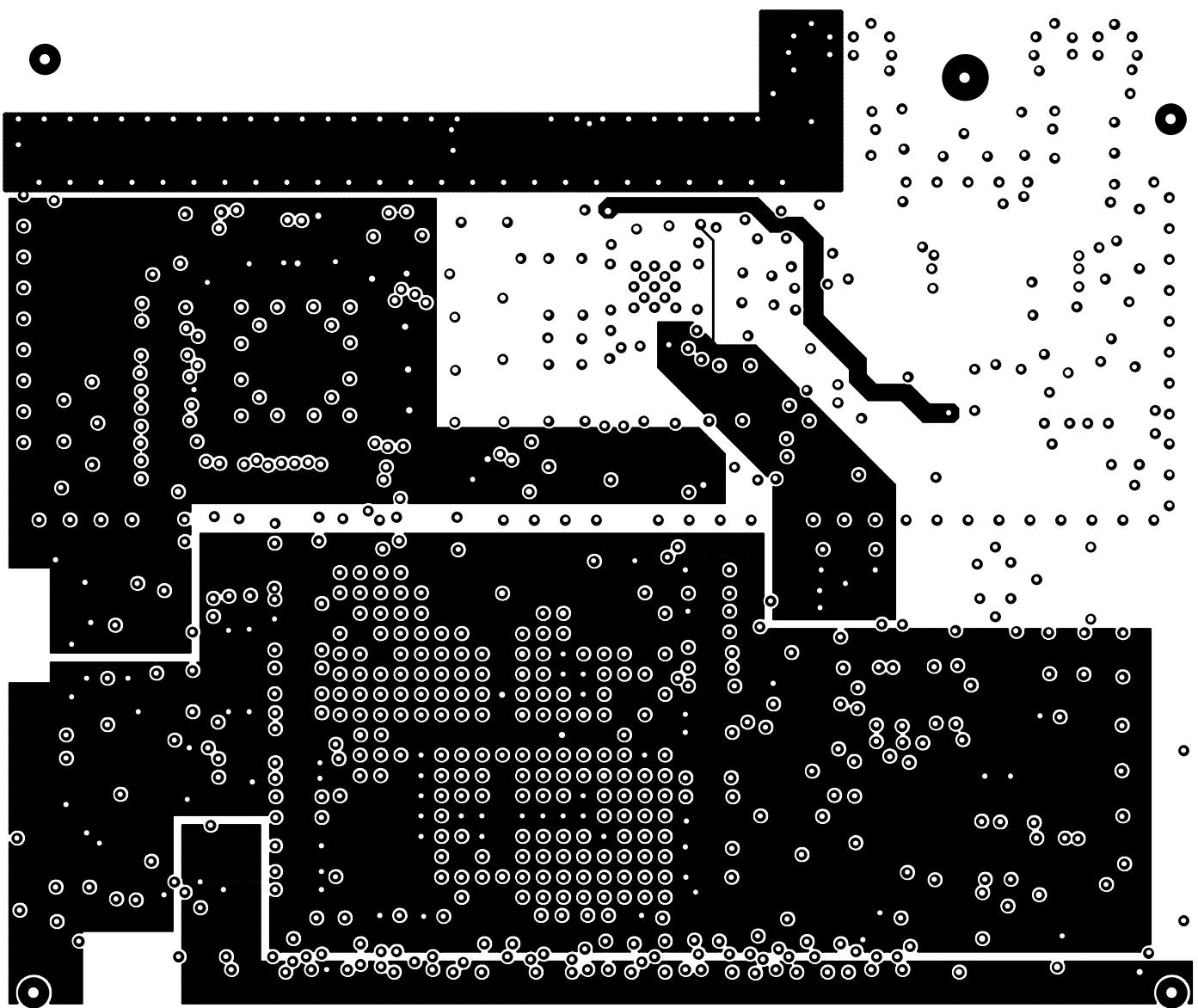
x	4	160mil	4.064mm	NPTH
□	6	129.921mil	3.29999mm	PTH
▽	2	125.984mil	3.19899mm	NPTH
▽	2	98.425mil	2.49999mm	PTH
x	2	66.929mil	1.7mm	PTH
□	1	63mil	1.6002mm	NPTH
○	2	59.055mil	1.5mm	NPTH
◇	8	56.118mil	1.4mm	PTH
◇	6	47.244mil	1.2mm	PTH
○	3	43mil	1.0922mm	NPTH
▽	95	39.37mil	1mm	PTH
○	2	32mil	0.8128mm	PTH
◇	10	24mil	0.6096mm	PTH
◇	718	12mil	0.3048mm	PTH
◇	1253	10mil	0.254mm	PTH
○	3	1mil	0.0254mm	PTH
	2117	Total		

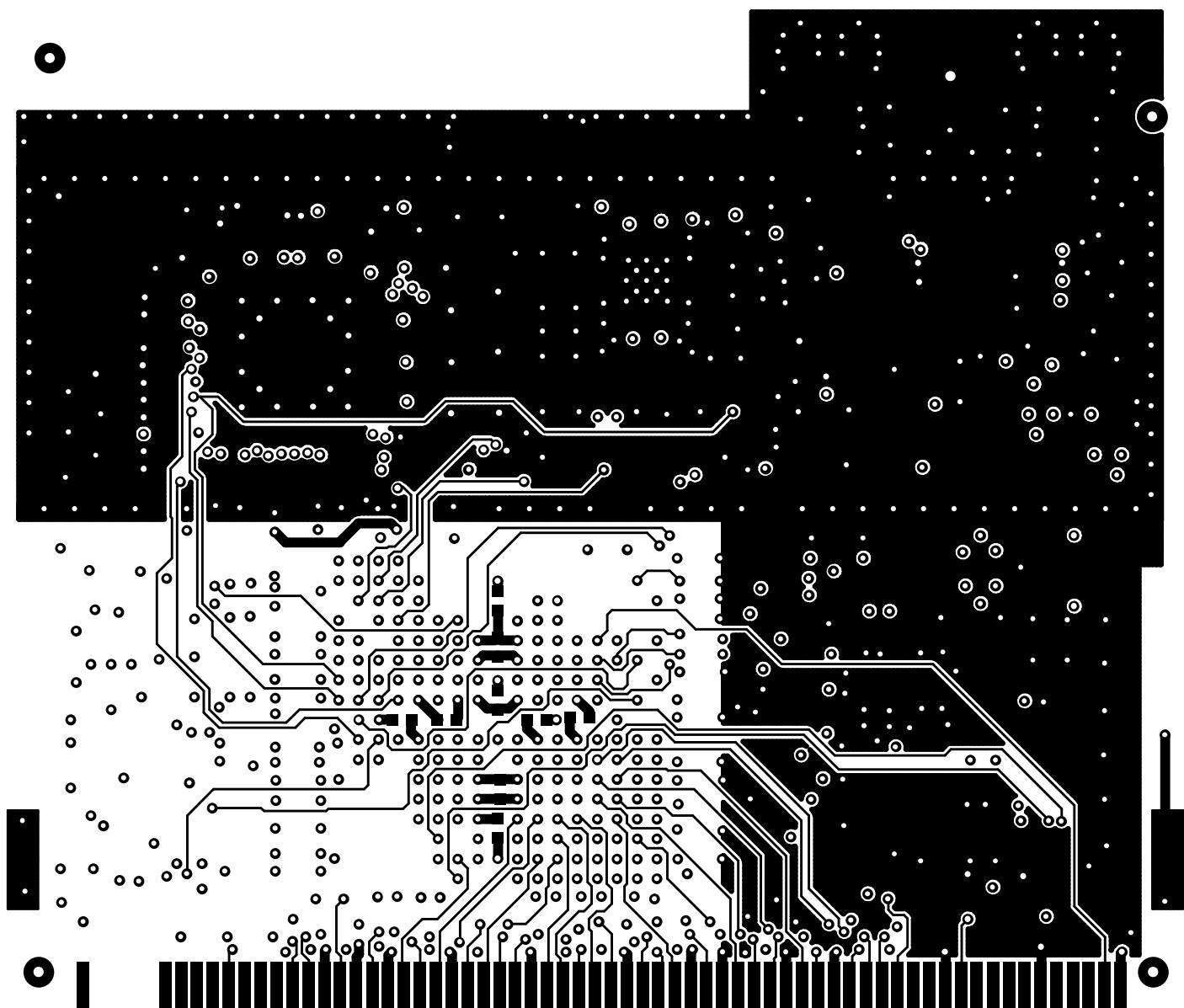


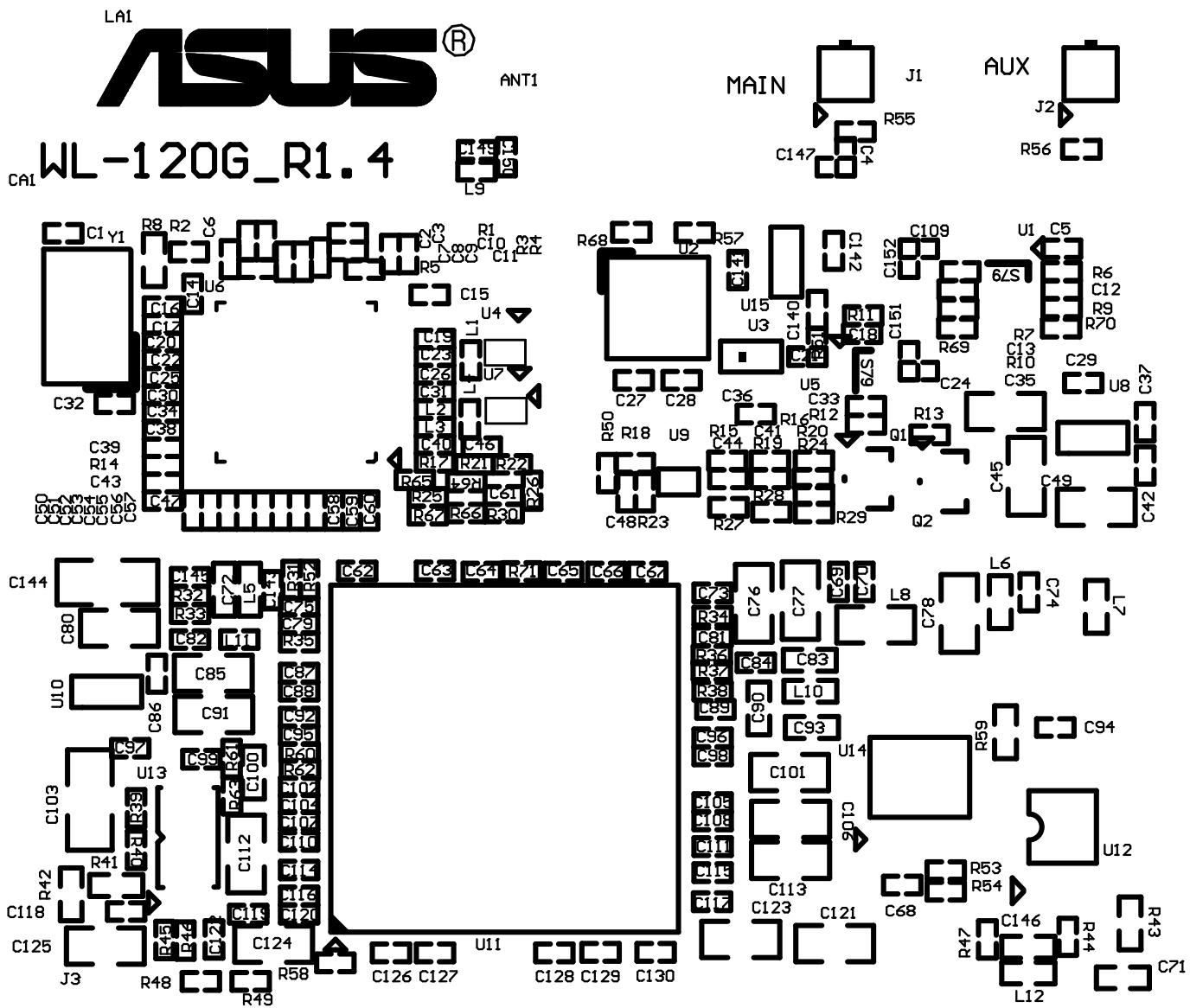




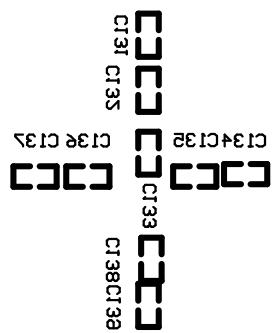


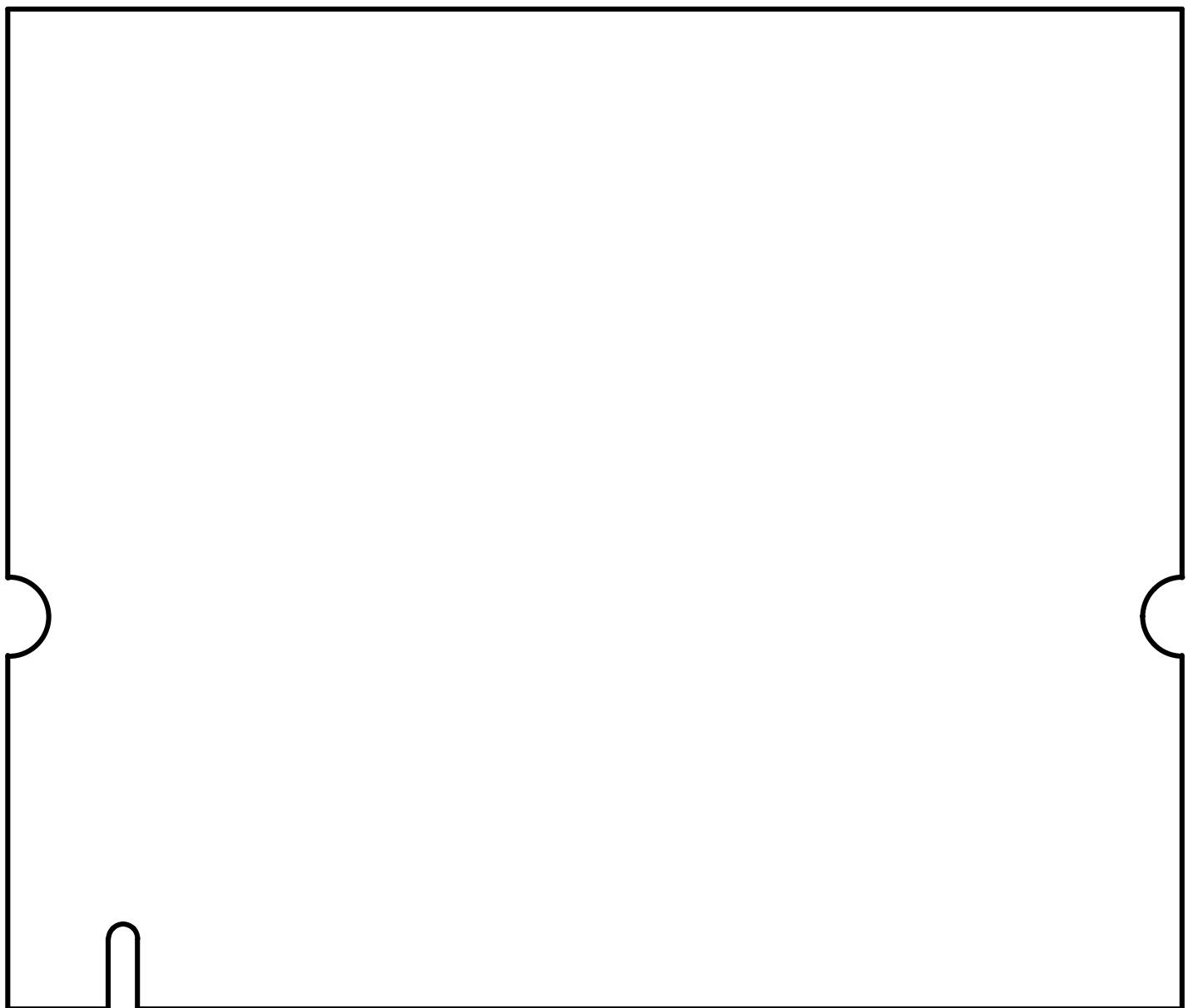






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## **Bill of Materials (Part List)**

## 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 10:44:50 有效日期:03/04/23 列印版本: 頁次:1

主件料號:59-IGB300-A01PB 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

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	11-033410400 CAP 0.1UF/25V (0603) +80%-20%	P PCS Y5V (104)	6.0000	03/04/23		C125,C127,C128,C130, C133,C134,		N N
20	11-034110461 CAP 0.1UF/10V (0402) 10% TAIYO	P PCS X5R (104)	28.0000	03/04/23		C129,C135,C136,C138, C139,C140,C144,C162, C163,C164,C168,C170, C171,C177,C189,C190, C191,C192,C193,C194, C195,C196,C197,C198, C199,C200,C201,C202, QVL:TYIAO,		N N

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: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:1

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

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	10-003400000 RES 0 OHM 1/10W (0603) 5%	P PCS	24.0000	03/04/23	L16,L17,R1,R110, R115,R136,R150,R165, R167,R172,R174,R186, R195,R197,R200,R209, R218,R222,R224,R240, R47,R63,R71,R76,		N N	
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	

QVL:YAGEO,TA-I TECH,COMPSTARS,ROYAL,PHYCOMP,WALSIN,SEI,

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:2

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品名規格:WRT50G 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	插 件 位 置/ ECN	Dis 性 稅 app
70	11-031110100 CAP 100P/2KV (1808) NPO (101) 10%	P PCS	4.0000	03/04/23		C100,C77,C88,C94,	N C	
80	10-003401030 RES 10K OHM 1/10W (0603) 5%	P PCS	25.0000	03/04/23		R10,R11,R12,R127, R129,R130,R138,R14, R147,R158,R162,R18, R19,R20,R201,R204, R239,R37,R57,R66,R7, R83,R84,R86,R9,	N N	
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	

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:3

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 底 插 件 位 置/ ECN	Dis 性 稅 app
	5%				R238,				
170	QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI, XTAL 13.5MHZ SMD 49S TXC 20PF/20PPM MARKING:TXC/13 B x 6 x F QVL:TXC,	P PCS	1.0000	03/04/23			X4,	N N	
180	RES 15 OHM 1/10W (0603)	P PCS	2.0000	03/04/23				N N	
190	5% QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,	P PCS	1.0000	03/04/23			R53, R54,	N N	
200	RES 150 OHM 1/10W (0603)	P PCS	17.0000	03/04/23				N N	
	5%				R169,				
	QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,								
210	CAP 150PF/50V (0603) NPO (151)	P PCS	1.0000	03/04/23			C145, C146, C147, C148, C149, C150, C151, C152, C153, C154, C155, C156, C157, C158, C159, C160, C161,	N N	
	QVL:MURATA, TAIYO, WALSIN, PAN OVERS, PHYCOMP, TDK,								
220	RES 15K OHM 1/10W (0603)	P PCS	4.0000	03/04/23			R52, R55, R97, R99,	N N	
	5% QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,								
230	2.0000	03/04/23						N N	
	CAP 18PF/50V (0603) NPO	P PCS	3.0000	03/04/23			C52, C54,		
	5%								
	QVL:MURATA, TAIYO, WALSIN, PAN OVERS, PHYCOMP, TDK,								
240	RES 1K OHM 1/10W (0603)	P PCS	2.0000	03/04/23			R155, R58, R8,	N N	
	5% QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,								
250	RES 1M OHM 1/10W (0603)	P PCS	5.0000	03/04/23			R105, R225,	N N	
	5% QVL:YAGEO, TA-I TECH, COMPSTARS, ROYAL, PHYCOMP, WALSIN, SEI,								
	CAP 1000PF/50V (0603) X7R (102)	P PCS	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	

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: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

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 10:44:25 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	

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 10:44:25 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, 59-05-020100201 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)

(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 10:44:25 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
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650	MARKING:LF8505/.DELTA XXXX QVL:DELTA, 09-051024000 TRANSFORMER 100-TX DELTA LF8731	P	PCS	1.0000	03/04/23	U10,		Y	N
660	MARKING:DELTA/LF8731 xxxx QVL:DELTA, 07-001101010 SCR DIODE MAC4DLMT4-1 DPAK369A ON	P	PCS	1.0000	03/04/23	Q4,		N	N
670	MARKING:xxxx/AC/4DLM QVL:ON, 06-017010010 Vcomp. MAX811SEUS-T SOT143-4 MAXIM	P	PCS	1.0000	03/04/23	U14,		Y	N
680	MARKING:AQxx QVL:MAXIM, 07-014160000 POLYSWITCH miniSMDM160	P	PCS	1.0000	03/04/23	F3,		Y	N
690	RAYCHEM 1.6A MARKING:x 160/xxxx QVL:RAYCHEM, 12-023511240 SO DIMM 124P, 3.3V, 5.2mm, SMT		##			J10,		Y	N
700	FOXCONN/ASOA226-S2F QVL:FOXCONN, 09-011120005 FERRITE BEAD (1206) 120 OHM/2A	P	PCS	2.0000	03/04/23	L19,L20,		N	N
710	MAG LAYERS/MLB-321611-0120P-N1 QVL:MAG LAYERS, 07-003000110 TRASIS. PMBS3904,215 SOT23	P	PCS	1.0000	03/04/23	Q6,		N	N
720	PHILIPS,NPN MARKING:.04/.. QVL:PHILIPS, 10-001000000 RES 0 OHM 1/4W (1206)	P	PCS	4.0000	03/04/23	R188,R189,R190,R191,		N	N
730	5% QVL:YAGEO,TA-I TECH,PHYCOMP,WALSIN, 07-001053010 DIODE SR05 SOT-143	P	PCS	1.0000	03/04/23	D1,		Y	N
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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 10:44:25 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%	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)

(abmq600) (結 束)

## 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 10:43:01 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 QVL: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)

(abmq600)

Bill of Material for D:\PCB&SCH\Intersil v25 pcb&sch\20010927\P2d5D0426.Ppj

Used	Part	Type	Designator	Footprint	Description
3	0		RX1 RX2 RX3	0402	
1	OP5F		CD1	0402	
1	10		RP3	0402	
10	100		RD1 RI8 RI9 RS1 RS2	0402	
			RS3 RS4 RY1 RY2 RY3		
51	100NF		CB1 CB10 CB11 CB12	0402	
			CB13 CB14 CB15 CB16		
			CB17 CB18 CB19 CB2		
			CB20 CB21 CB22 CB23		
			CB24 CB25 CB26 CB27		
			CB28 CB4 CB5 CB6 CB7		
			CB8 CB9 CF1 CG1 CG2		
			CG3 CG6 CG7 CG8 CG9		
			CI10 CI11 CI13 CI4		
			CI6 CI7 CI8 CI9 CM1		
			CO1 CO2 CO3 CP10 CP9		
			CX1 CY8		
3	100PF		CD3 CI16 CI17	0402	
5	10K		RB1 RB31 RB35 RB5	0402	
			RD2		
1	10M		RB33	0402	Resistor
14	10NF		CB29 CD6 CD7 CD8 CD9	0402	
			CI5 CU3 CU4 CU5 CU8		
			CU9 CV2 CV3 CW5		
2	10PF		CI1 CI2	0402	
8	10UF/6.3V		CB32 CB33 CB34 CG10	0805	
			CG11 CG4 CG5 CV5		
1	11K		RD4	0402	
4	120		RI4 RI5 RI6 RI7	0402	
1	12K		RB3	0402	Resistor
2	15PF		CW8 CW9	0402	
3	1K		RB20 RO2 RP2	0402	
2	1K1		RW1 RW2	0402	
2	1K5		RD3 RX4	0402	
1	1N5H		LP1	0402	
12	1NF		CI12 CI13 CO4 CP1	0402	
			CP12 CP2 CP4 CV4 CX2		
			CY1 CY6 CY7		
2	1P8F		CP5 CP8	0402	
1	1PF		CD2	0402	
1	20		RD5	0402	
2	20K		RB21 RB22	0402	Resistor
4	220PF		CW3 CW4 CW6 CW7	0402	
1	22NF		CY9	0402	
2	22PF		CB31 CX3	0402	
1	270		RB32	0402	Resistor
1	270PF		CP6	0402	
1	27NH		LW5	0402	
1	2K		RI1	0402	
1	2K2		RO1	0402	
1	2K7		RI10	0402	
2	2N2H		LD2 LP4	0402	
1	2N3904		QB1	SOT-23	
1	300		RO3	0402	
1	32.768KHz		XB1	CRYSTAL4P	
1	330PF		CO8	0402	
4	33NH		LI1 LI2 LW1 LW2	0402	
1	39NH		LW3	0402	
1	3K6		RP1	0402	
1	3P3F		CD10	0402	
1	470		RB30	0402	Resistor

1	470NF	CO7	0402	
1	47K	RB4	0402	Resistor
1	47NF	CO6	0402	
1	4N7F	CB30	0402	
1	4N7H	LD1	0402	
3	4P7F	CD11 CW1 CW2	0402	
3	510	RI2 RI3 RY5	0402	
1	560	RB2	0402	
1	560NH	LX2	0805	
1	620	RB19	0402	Resistor
1	680NF	CY10	0603	
2	68PF	CI14 CI15	0402	
1	6N8F	CO5	0402	
2	6P2F	CP7 CV6	0402	
18	7PF	CD4 CD5 CP11 CS1 CS10 CS11 CS2 CS3 CS4 CS6 CS7 CS8 CS9 CU2 CV1 CY2 CY3 CY4	0402	
1	82	RV3	0402	
1	855898	FL1	SAW5*5	
2	91	RV1 RV2	0402	
2	AS179_92	U10 U9	SC-70-6	SWITCH
2	BLM10A121S	LP2 LP3	0402	
3	BLM21P300S	LB1 LB2 LX1	0805	
11	CON1	TB1 TB10 TB11 TB12 TB2 TB3 TB4 TB6 TB7 TB8 TB9	TP	
1	EM128L16	UM1	BGA-48	
1	F4106-44.000M	U2	44MHZ	
1	HFA3783	U1	HFA3783	
1	INV-F	ANT2	DIPOLE	
1	ISL3183	U4	MLFP-16	IF VCO
1	ISL3685	U5	MLFP44	Intersil v2.5 front-en
1	ISL3873	UB1	BGA-192	
1	ISL3984	U8	MLFP-16	
1	LED(Green)	DB2	LEDSMDL	
1	LED(Yellow)	DB3	LEDSMDL	
1	LFSG20N27C2450B	FL4	LFSG20N27C	BANDPASS FILTER
1	LFSN25N19	FL2	LFSN25N19C	
1	LFSN25N19C2450B	FL6	LFSN25N19C	
1	LFTC15N19E2450B	FL5	LFTC15N19E	
1	MARUWAVCO	U6	MVCO	
2	MAX8867	U15 U3	MAX8867	
1	PCMCIA	JB1	PCM_B	PCMCIA
1	SMAS2	CON1	MMCX_S	
1	SST39VF010B	UF1	TSSOP-32	128K*8 FLASH
1	UPC2745TB	U7	UPC2745	

## **Exterior and Interior Photographs**



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**Model: WL-500g**

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



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**Model: WL-500g**

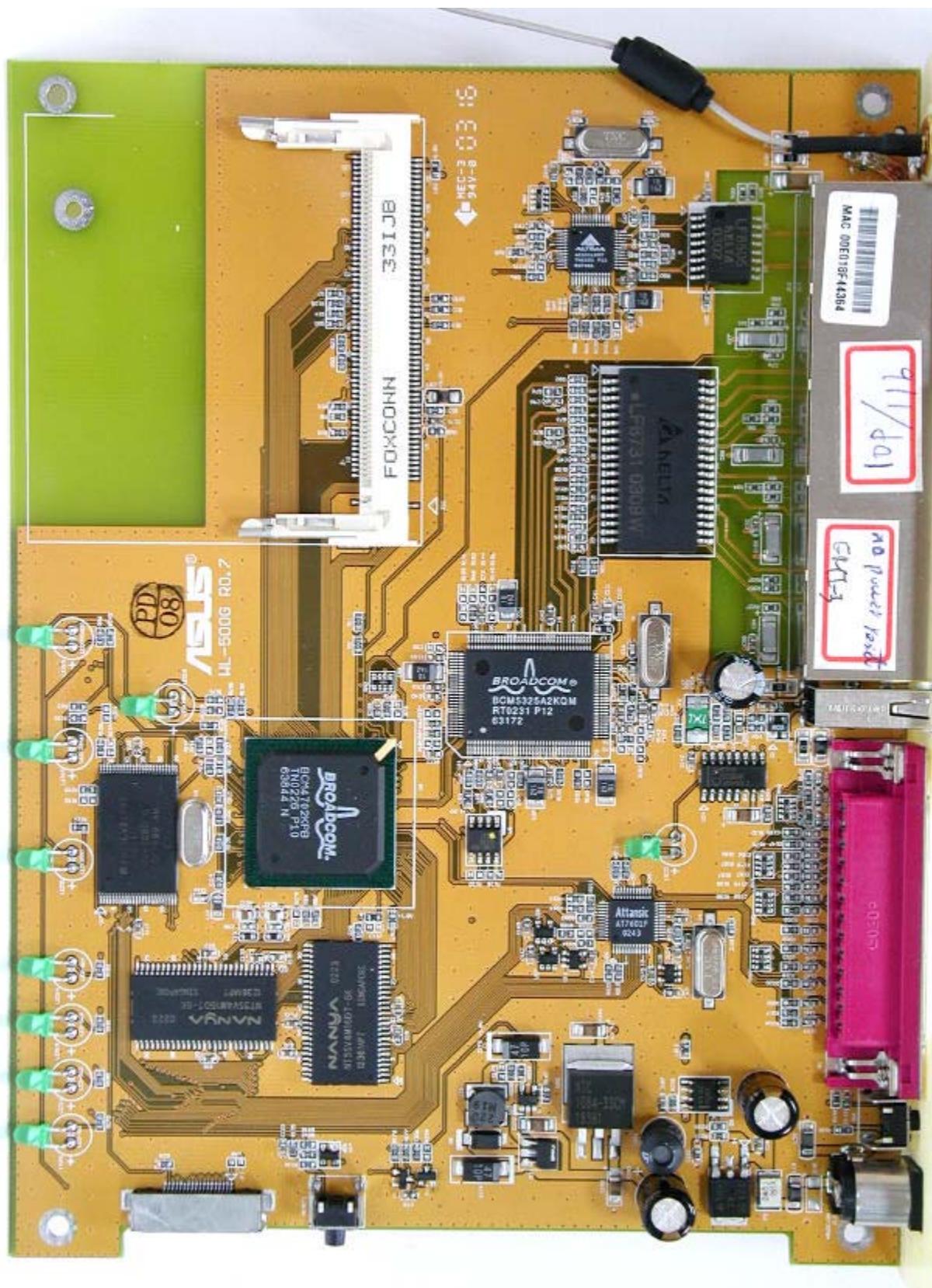
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**Model: WL-500g**

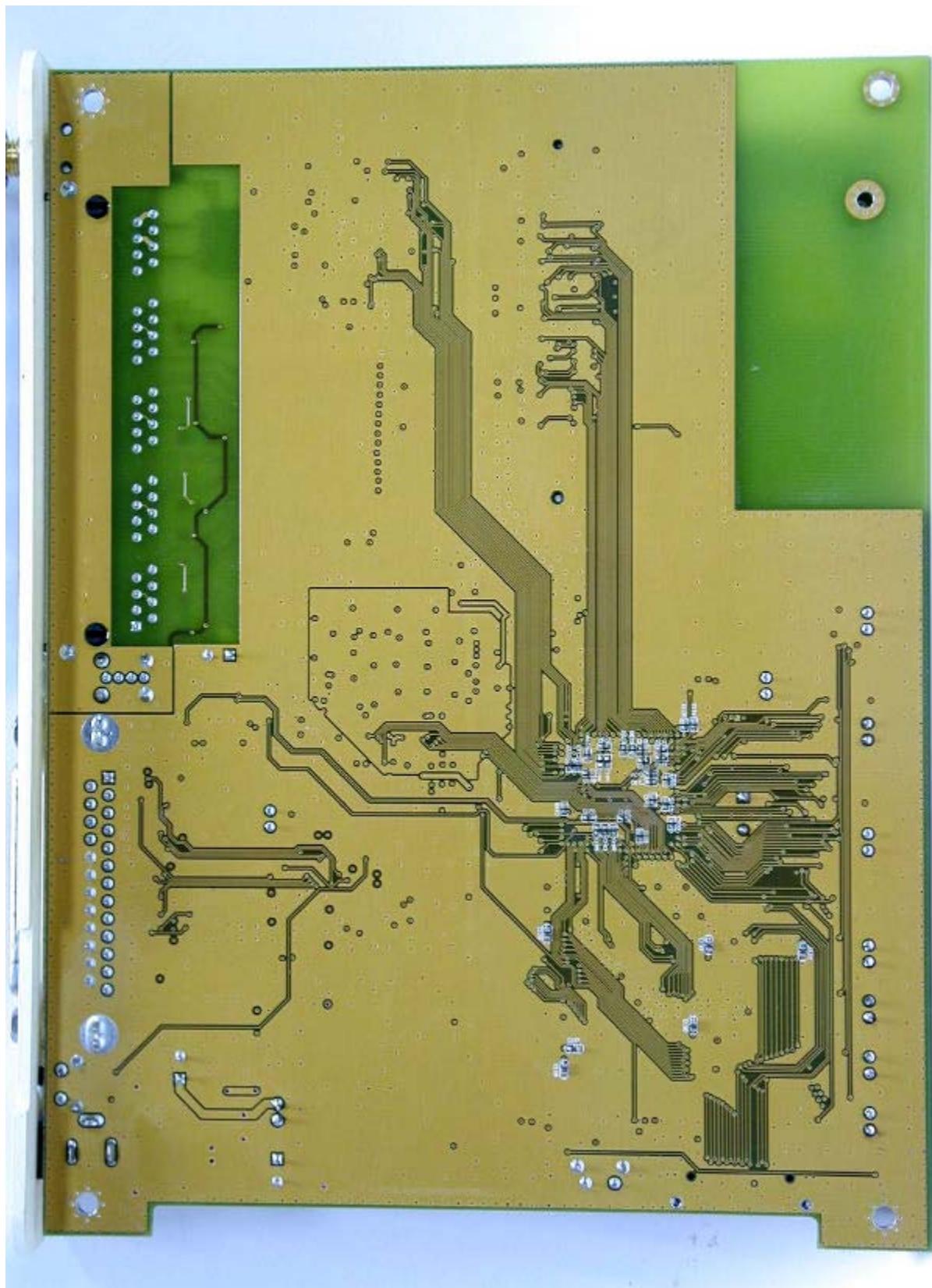
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**Model: WL-500g**

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## **Label Information**

# **ASUS® Wireless Router**

**Model : WL-500g**

**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:MSQWL500G**

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

80mm

# **Technical Description**

# WL500G

---

## IEEE 802.11g 54 Mbps Wireless Router

### Fastest Connectivity And Protect Compatibility

WL-500G Space Link incorporate 802.11g OFDM technology design, that enable fastest 54Mbps IEEE 802.11g wireless transmission and keep compatibility with existing IEEE 802.11b devices.

- Monitor your home anywhere, over the air, over the Internet
  - Plug USB WebCam to WL-500G, 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

- Highest 54Mbps speed over the 2.4 GHz frequency band
- IEEE802.11g and IEEE 802.11b wireless networks operate simultaneously
- Standard 2.4GHz Wi-Fi network to grantee compatible with existing 802.11b WLAN cards
- Auto fall-back algorithm to select transmission rate.
- If there are no 802.11b devices, turn on 802.11g only mode to boost throughput
- 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-500G 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 operated 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
<b>Antenna</b>	Support	2 (one internal Inverted-F antenna and one external dipole antenna)

	Connector	Reverse-SMA antenna connector
<b>USB port</b>	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	ETS; 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	802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 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 (100 m) at 11Mbps Indoor 80 ft (25 m), outdoor (LOS, Light-Of-Sight) 200 ft (60 m) at 54Mbps 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	

## Operation Principles :

**BCM4306** : 802.11g MAC/Baseband.

- ❖ Supports data rate of 1Mbps, 2Mbps, 5.5 Mbps and 11Mbps for b mode and 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps for g mode,
- ❖ Supports Wire Equivalence Privacy (WEP), WEP2 and AES encryption, coupled with TKIP and IEEE 802.11x support.
- ❖ Complete DSSS and OFDM baseband processor.
- ❖ Supporting Differential Binary Phase Shift Keying (DBPSK), Differential Quadrature Phase Shift Keying (DQPSK) and Complementary Code Keying (CCK), 16QAM and 64QAM.

<b>Data Rate (Mbps)</b>	1	2	5.5	11
<b>Modulation</b>	DBPSK	DQPSK	CCK	CCK

<b>Data Rate (Mbps)</b>	6	9	12	18	24	36	48	54
<b>Modulation</b>	BPSK		QPSK		16QAM		64QAM	

- ❖ Transmitter operation : Digital data from MAC layer is modulated to produce analog I/Q baseband signal for transmission. When MAC asserts begin of transmission, bcm4306 generate preamble and header itself. After combining with data sent from MAC, all of the data, depends on different data rate, are modulated by the modulation scheme listed above. The modulated data pass through a digital LPF. At last, a on-chip D/A converter converts digital data to analog data and then outputs balanced differential analog signals  $\text{TXI}^{\pm}$ ,  $\text{TXQ}^{\pm}$
- ❖ Reception operation : Received analog I/Q baseband signal is demodulated into digital data and sent to MAC layer. Baseband spectrum occupies 0~11MHz, for any of the above modulation or data rate.
- ❖ A 20MHz oscillator provides operating clock.

**EEPROM** : Memory resources of CPU.

❖ EEPROM is nonvolatile memory. Firmware program is stored in flash ROM.

**Bcm2050** : Direct conversion transceiver IC.

❖ Integrating all direct conversion transmit and receive functions.

❖ Integrating baseband transmission and reception AGC.

❖ Integrating a receiver DC offset calibration loop.

❖ Baseband I/Q signals are combined and converted to RF (Radio Frequency). Radio center frequency is within ISM band; the exact operating channel depends on channel specified. Bandwidth is about 22MHz. RF signal is sent to or from a balun. For transmission path, the signal is amplified by a power amplifier and then fed into T/R switch. For receive. RF signal is down converted to baseband IQ signals. Baseband I/Q signals are fed from or to the baseband processor, BCM4306.

❖ An on chip frequency synthesizer is used to generate the Local Oscillator frequency required by the up-down mixer. The 20MHz oscillator provides the reference frequency required by the frequency synthesizer.

❖ **MMPA742G** : power amplifier for transmission.

❖ **T/R switch** : Transmission or reception multiplexing switch.

❖ Transmission/reception are half duplex.

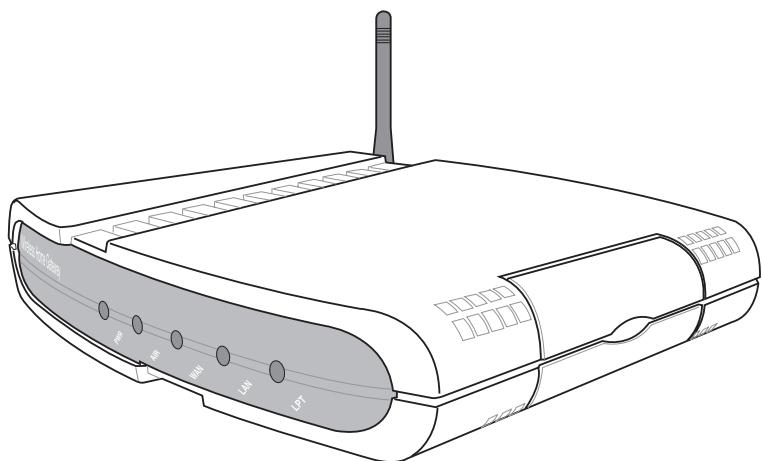
# User Manual



# **SpaceLink Home Gateway**

## **WL-500g**

### **User's Manual**



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**Product Name:** SpaceLink Home Gateway (WL-500g)

**Manual Revision:** 1.00 E1062

**Release Date:** Aug 2002

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Support (Email): www.asuscom.de/de/support (for online support)  
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.**

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## **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.

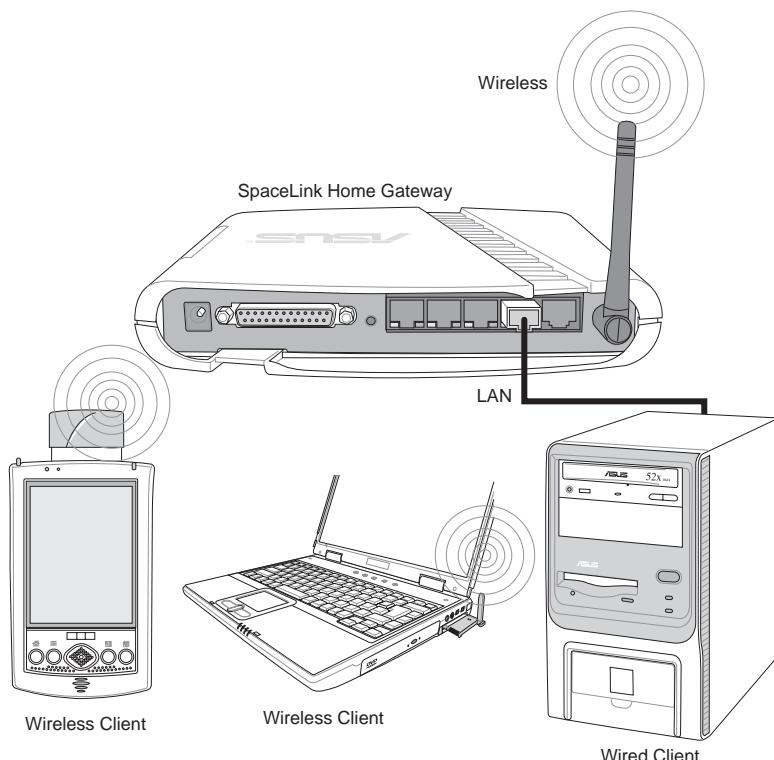
### Roaming Guidelines (SpaceLink™ Gateways or APs)

- 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

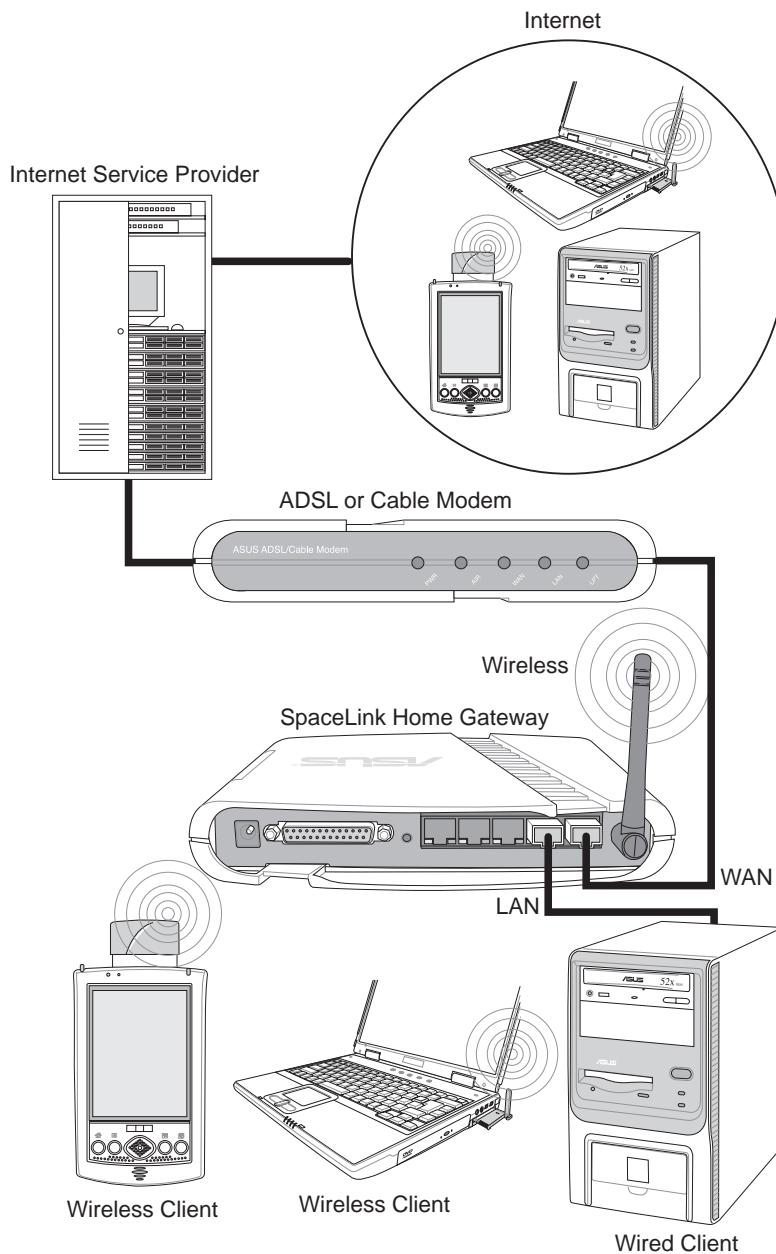
There are three major ways to deploy the home gateway in your local network (I) Network backbone, (II) Agent to ISP and (III) Agent to another network.

#### 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



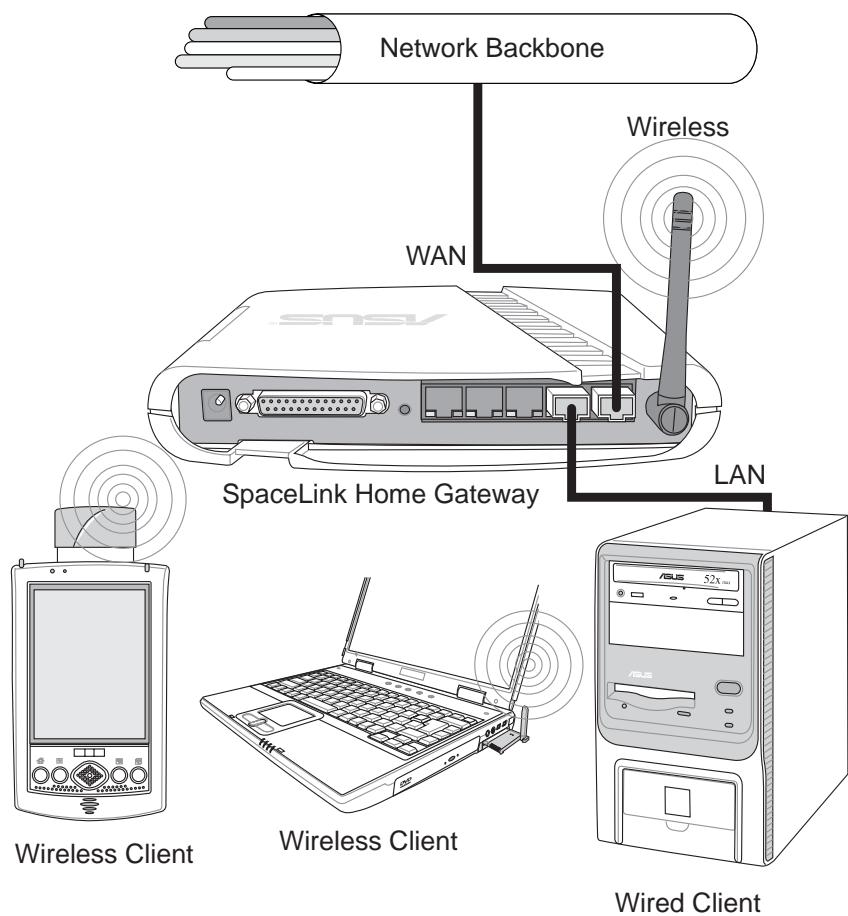
In this topology, the home gateway is not only a backbone of your LAN but also an agent to your Internet Service Provider (ISP). You may use an ADSL or Cable modem to communicate with your ISP. Connect the LAN port on the modem with the WAN port at the back of the SpaceLink Home Gateway using a network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

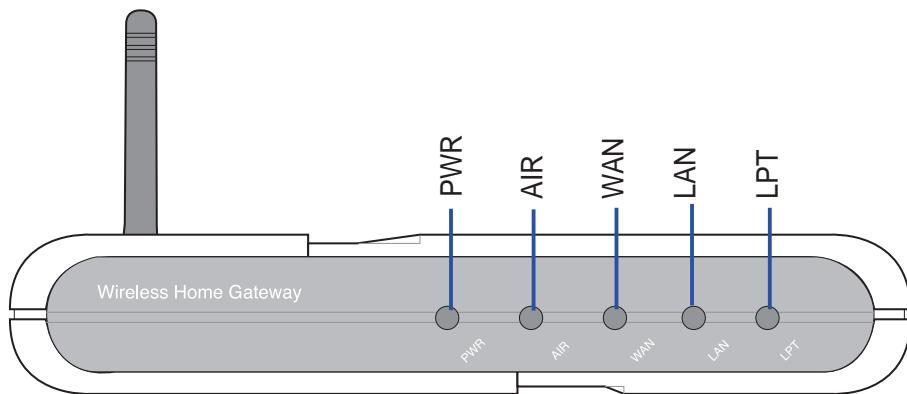
### Agent to Another Network



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.**

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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.

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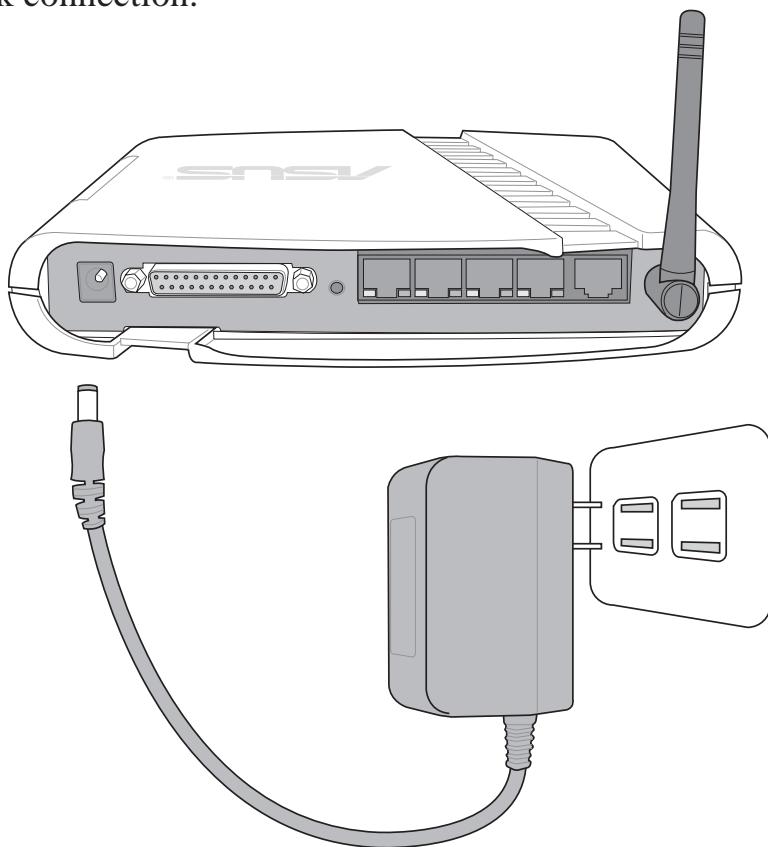
**The SpaceLink Home Gateway WAN port does not support 100Base-TX; it only supports 10Base-T. The WAN port may be connected to devices that supports both 10/100, but not pure 100Base-TX.**

---

## 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.

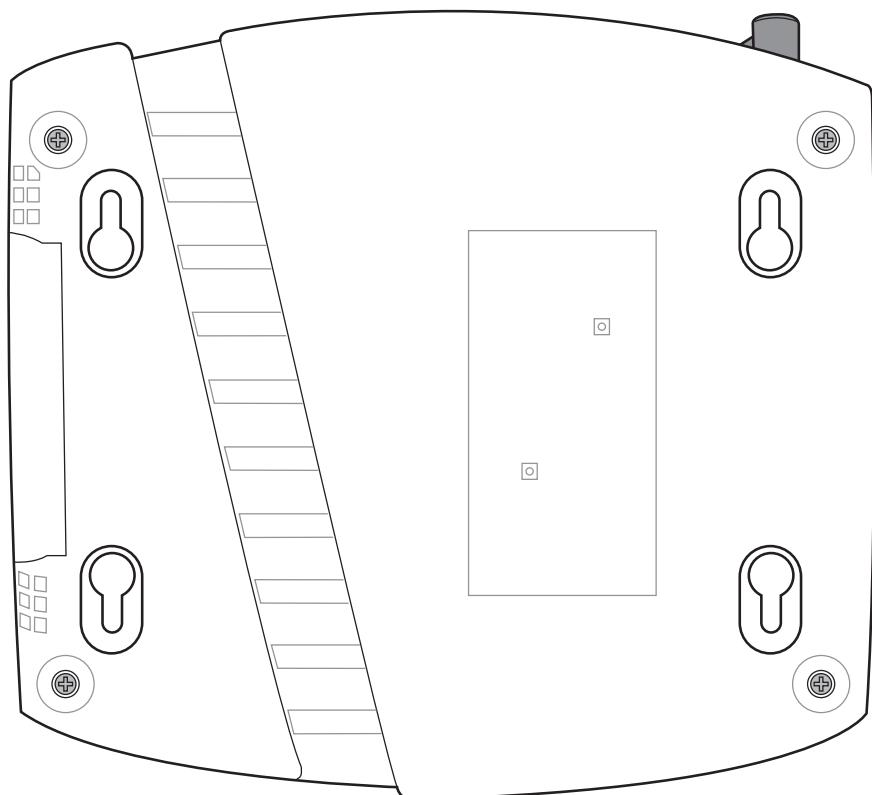
Follow these steps to mount the Home Gateway to a wall:

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.

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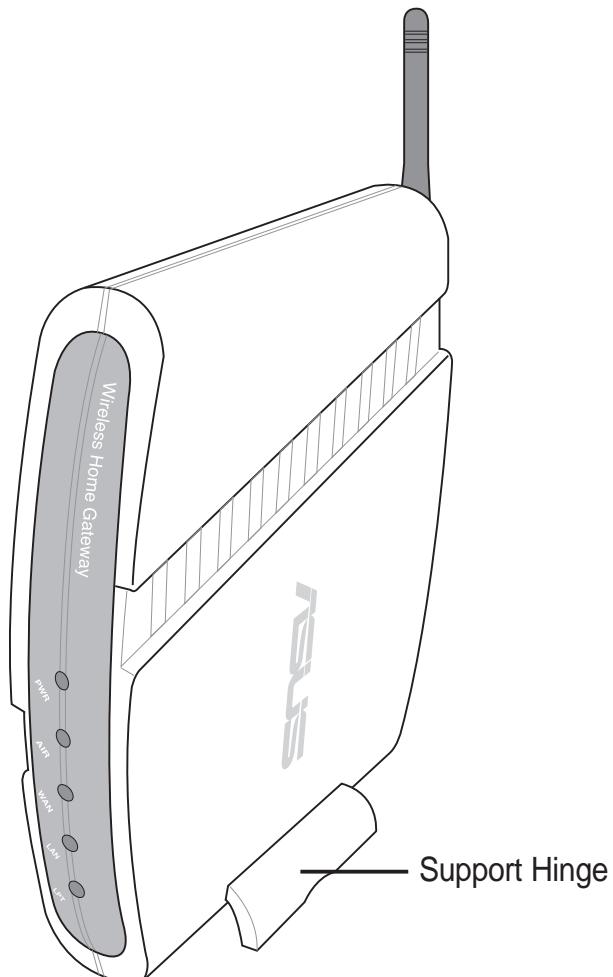
**Note: Readjust the screws if you cannot latch the Home Gateway onto the screws or if it is too loose.**

---



### 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.

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

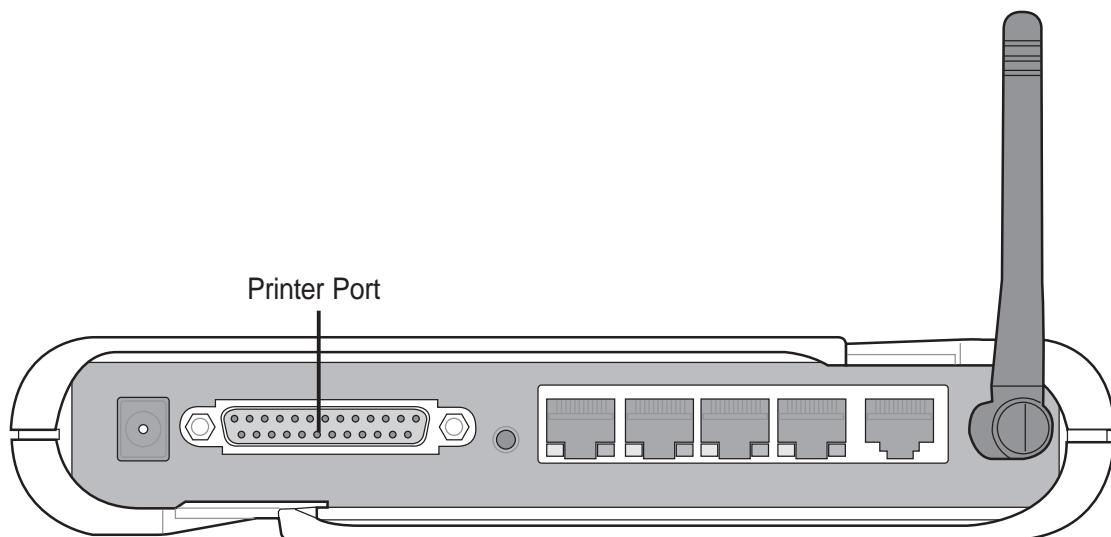
---

### 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

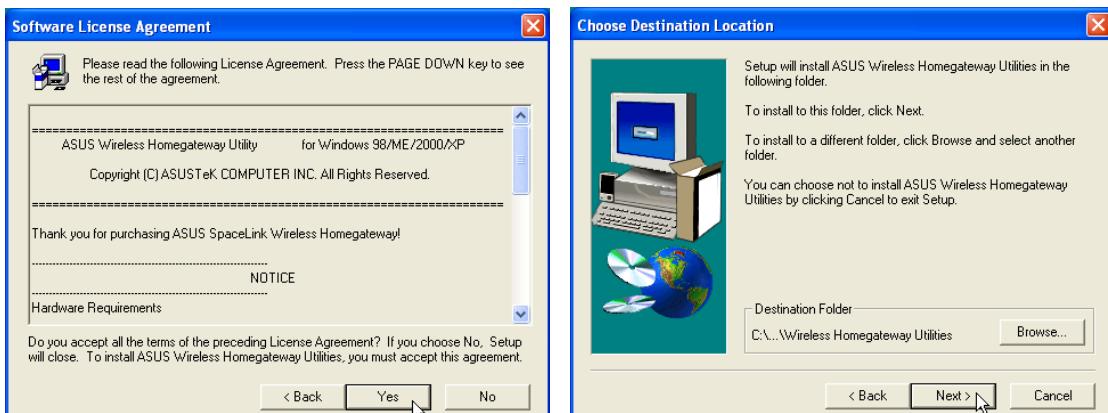
## 2. Installation

### Installing the Homegateway Utilities

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

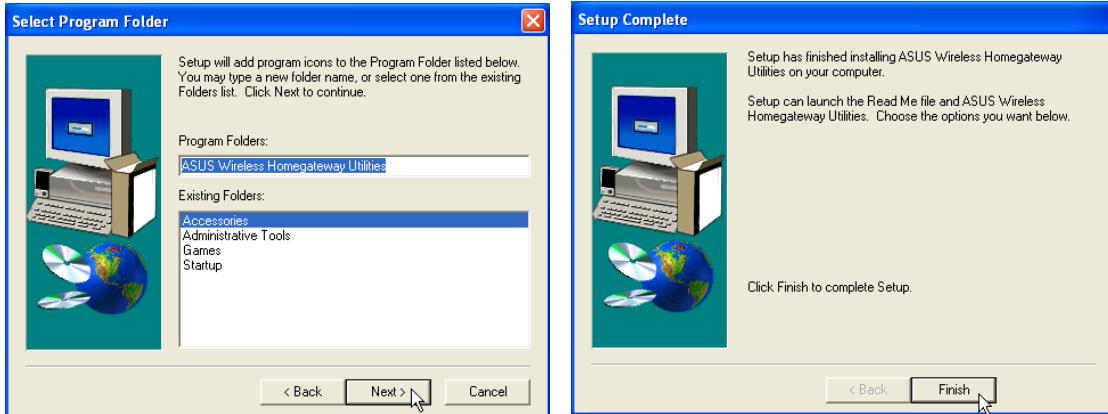


- (1) Insert the support CD and the autorun will show. Double-click **setup.exe** if your autorun has been disabled.



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

- (4) Click **Next** to accept the default destination folder or enter another name.

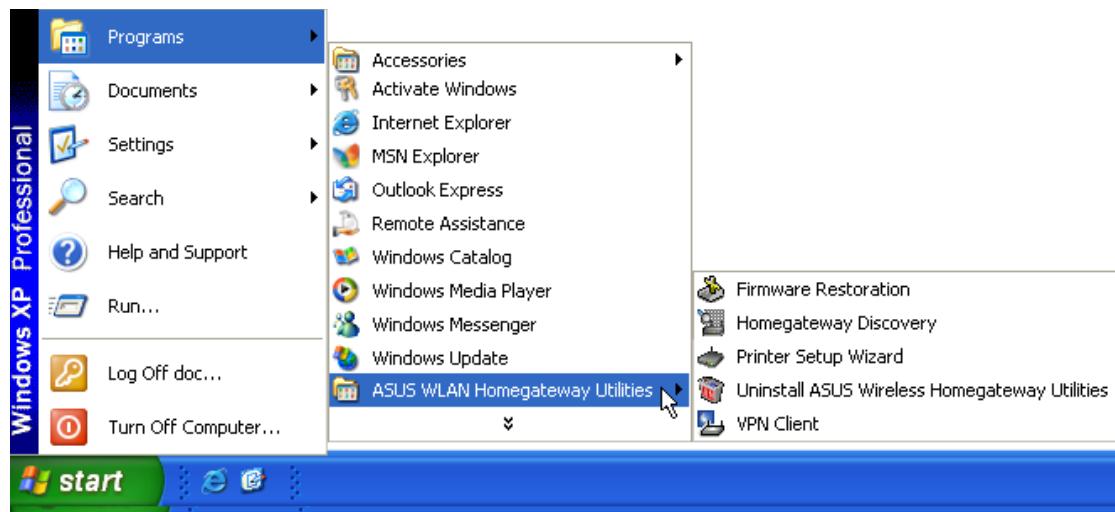


- (5) Click **Next** to accept the default program folder or enter another name.

- (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.

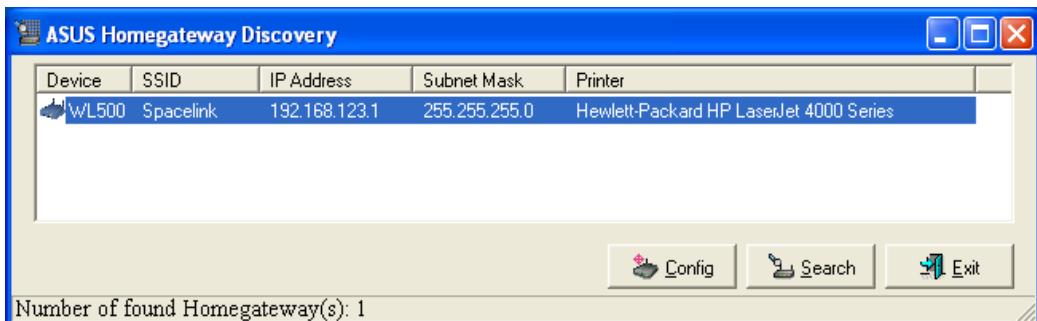
## Chapter 3 - Home Gateway Utilities

If your computer is connected to the WAN port use

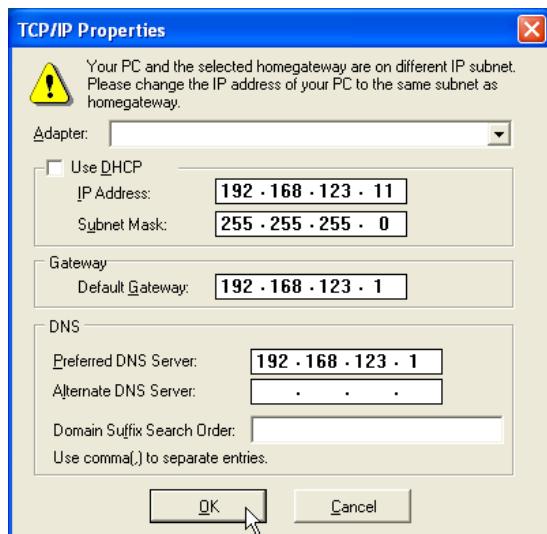
**http://(WAN Port IP Address):8080**

If your computer is connected to the LAN port use:

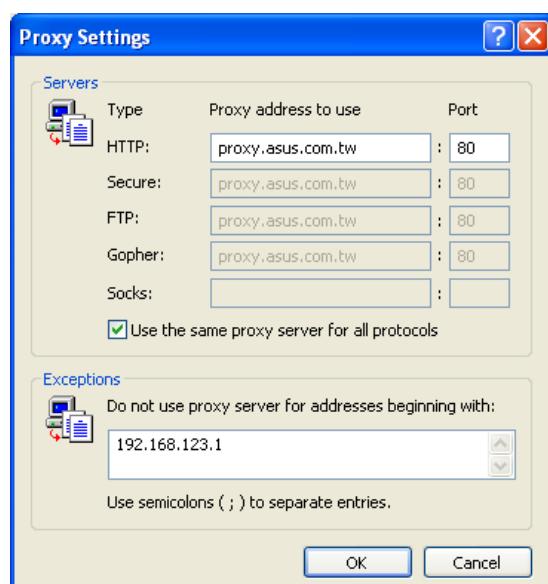
**http://192.168.123.1**



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.**

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# 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.

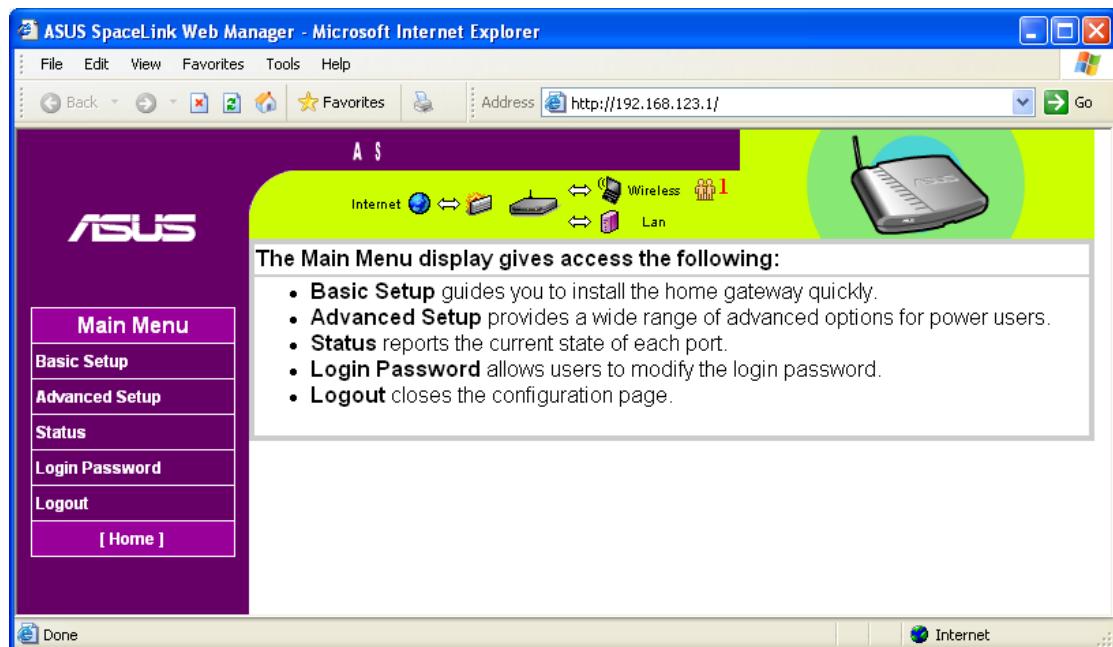
## User Name and Password

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.

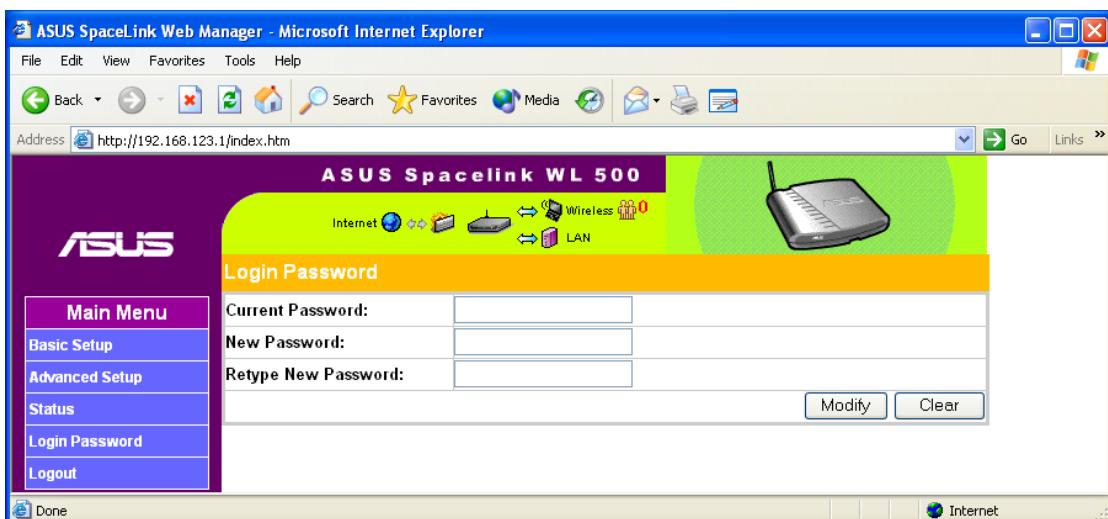


## Chapter 3 - Home Gateway Utilities

### 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).

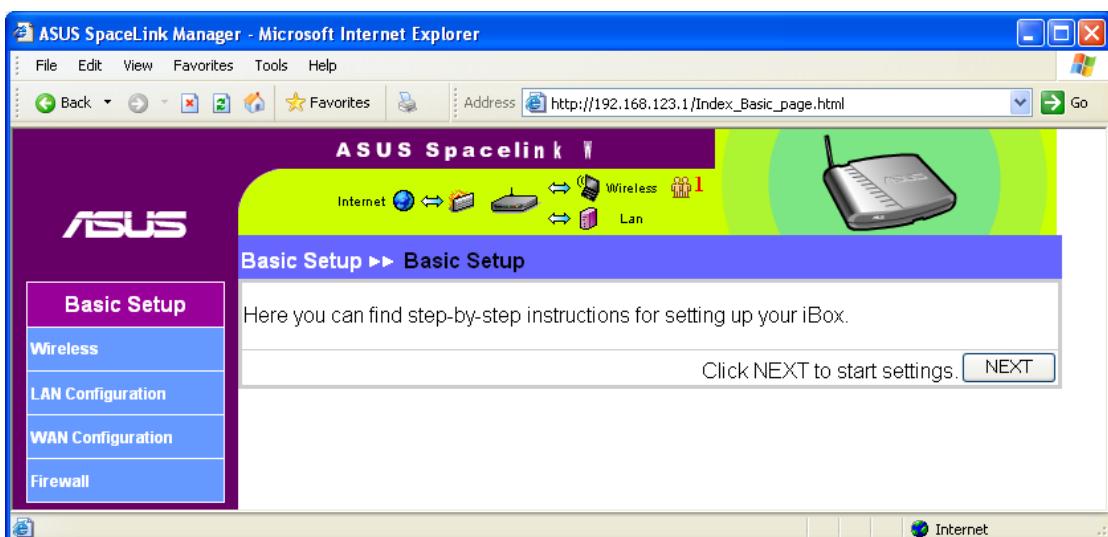
**Note:** The password is case sensitive.



### 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
<b>Wireless</b>	
SSID:	Spacelink
Channel:	6
Encryption (WEP):	Off
Number of Associated Stations:	1
<b>LAN</b>	
IP Address:	192.168.123.1
Subnet Mask:	255.255.255.0
DHCP Server:	Enabled
LAN Port Link State:	Linked
<b>WAN</b>	
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
<b>Printer Server</b>	
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

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### 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).

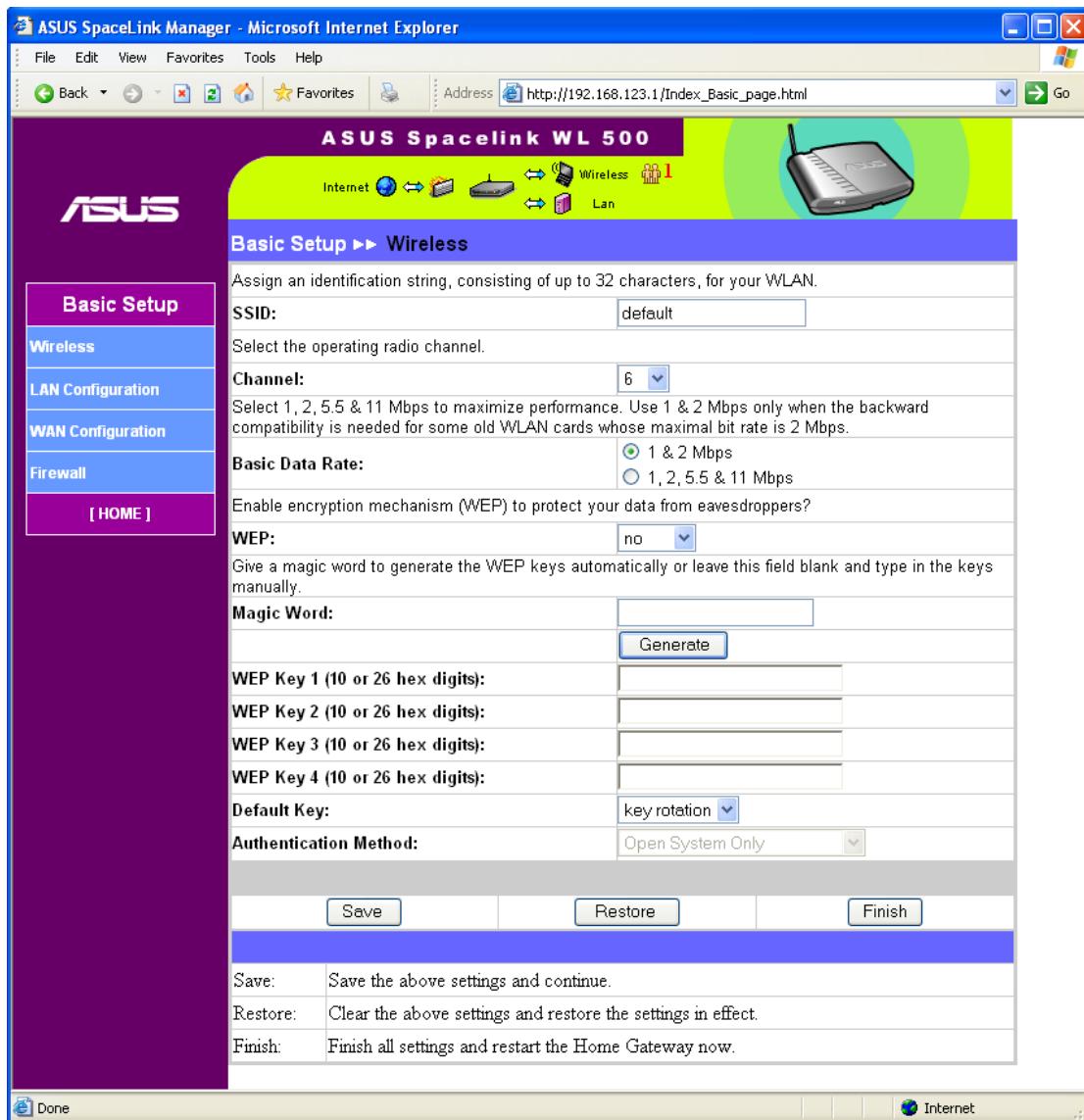
**User in Service:** Shows the IP address of the user when the status is busy.

# 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

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## 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

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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.

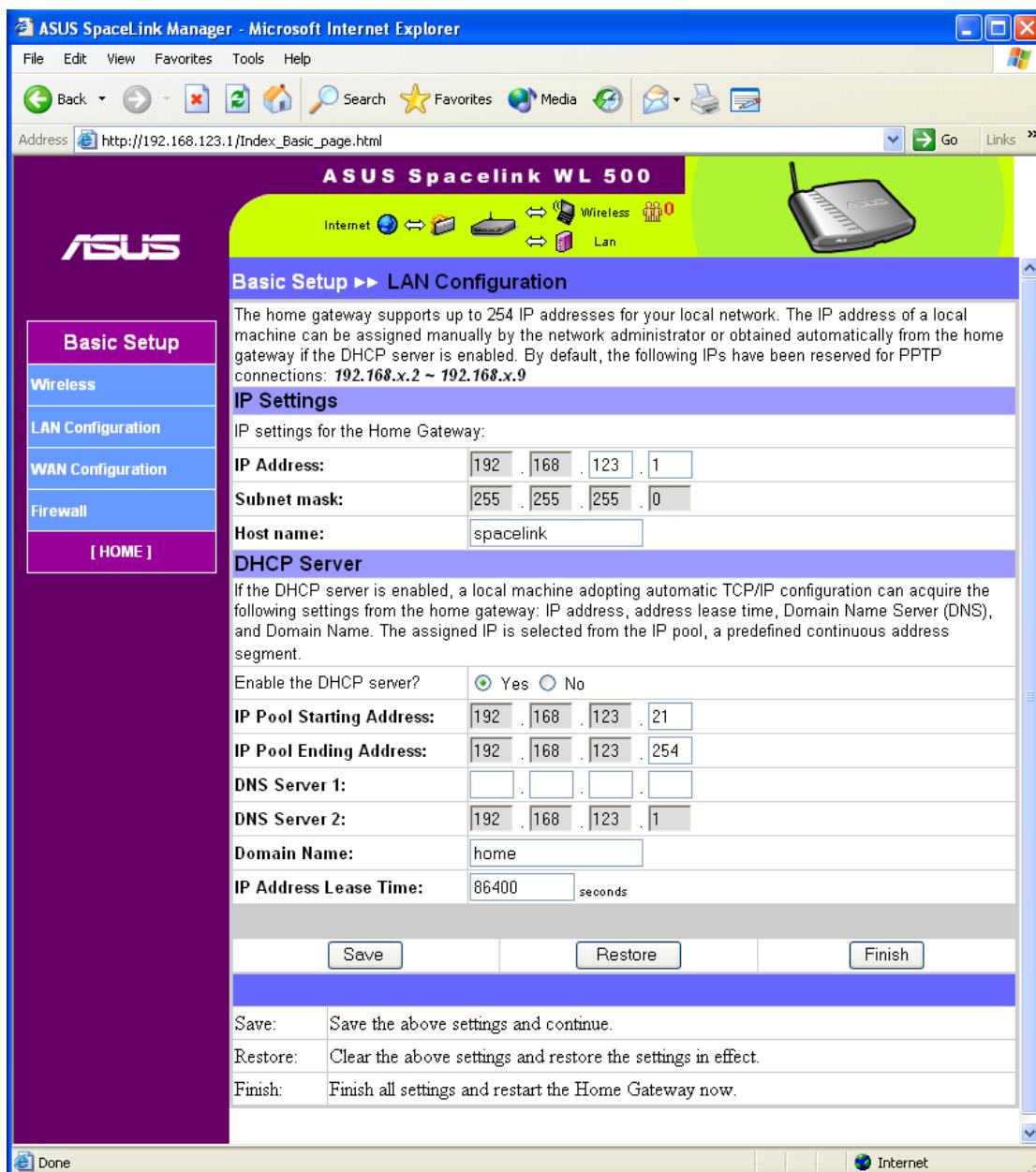
---

**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.**

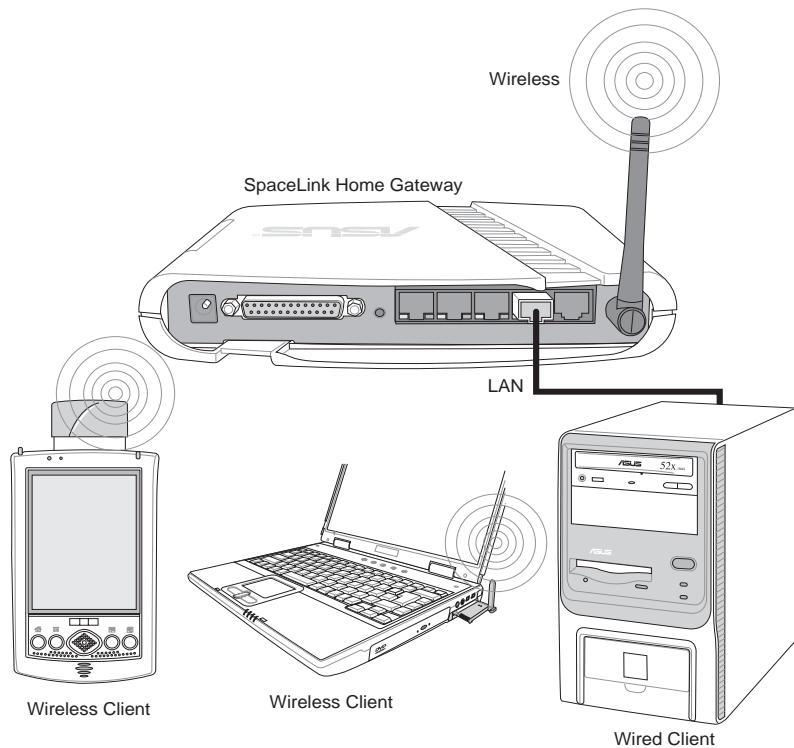
## Chapter 3 - Home Gateway Utilities

### Basic Setup - WAN Configuration

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

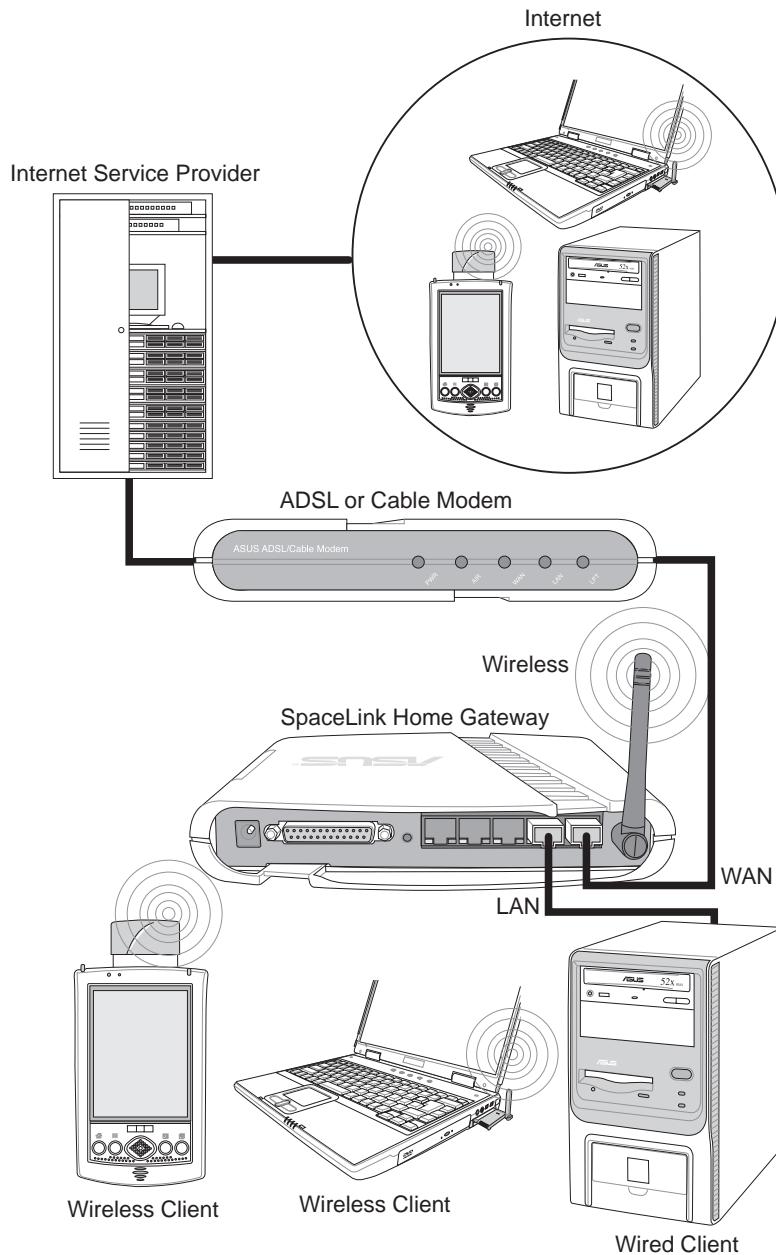
#### Network Backbone

No software setting is necessary in the SpaceLink Home Gateway.



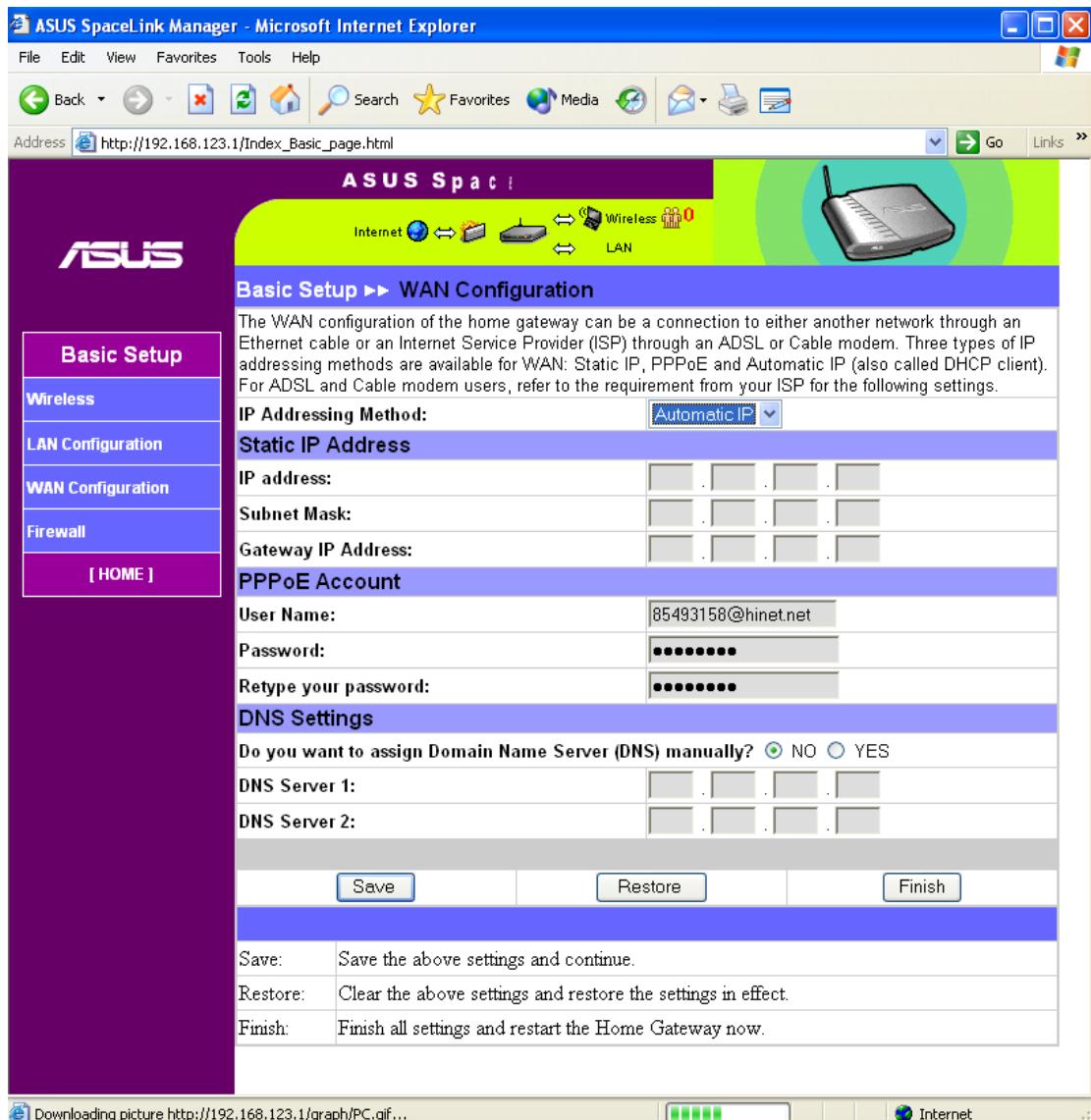
# Chapter 3 - Home Gateway Utilities

## 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).

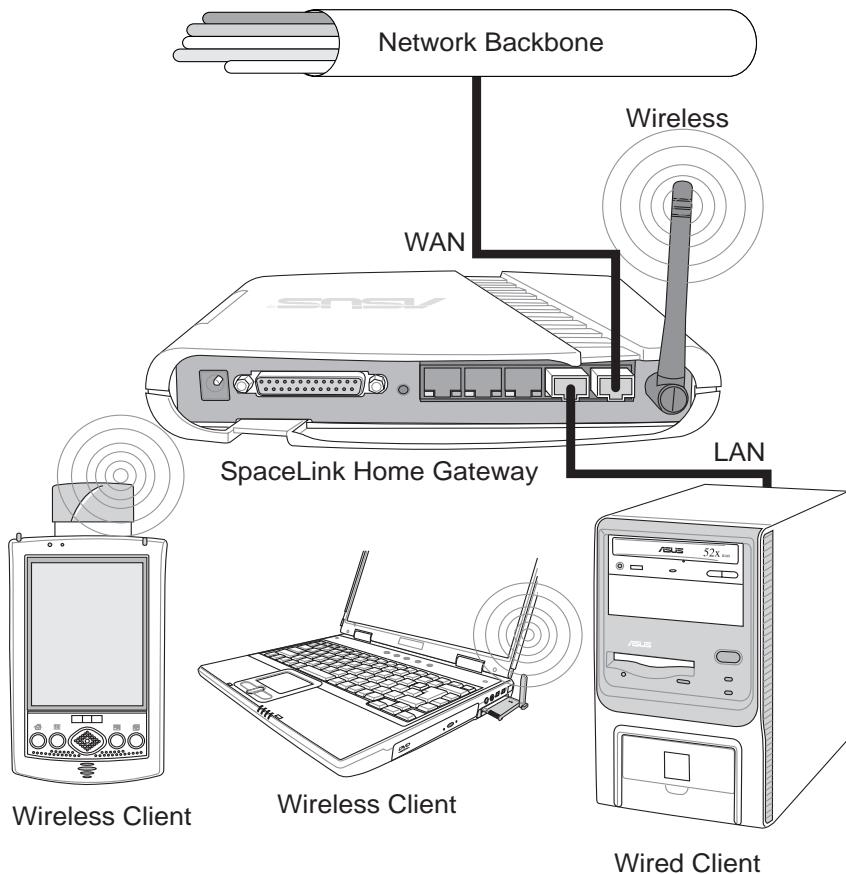
---

**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.

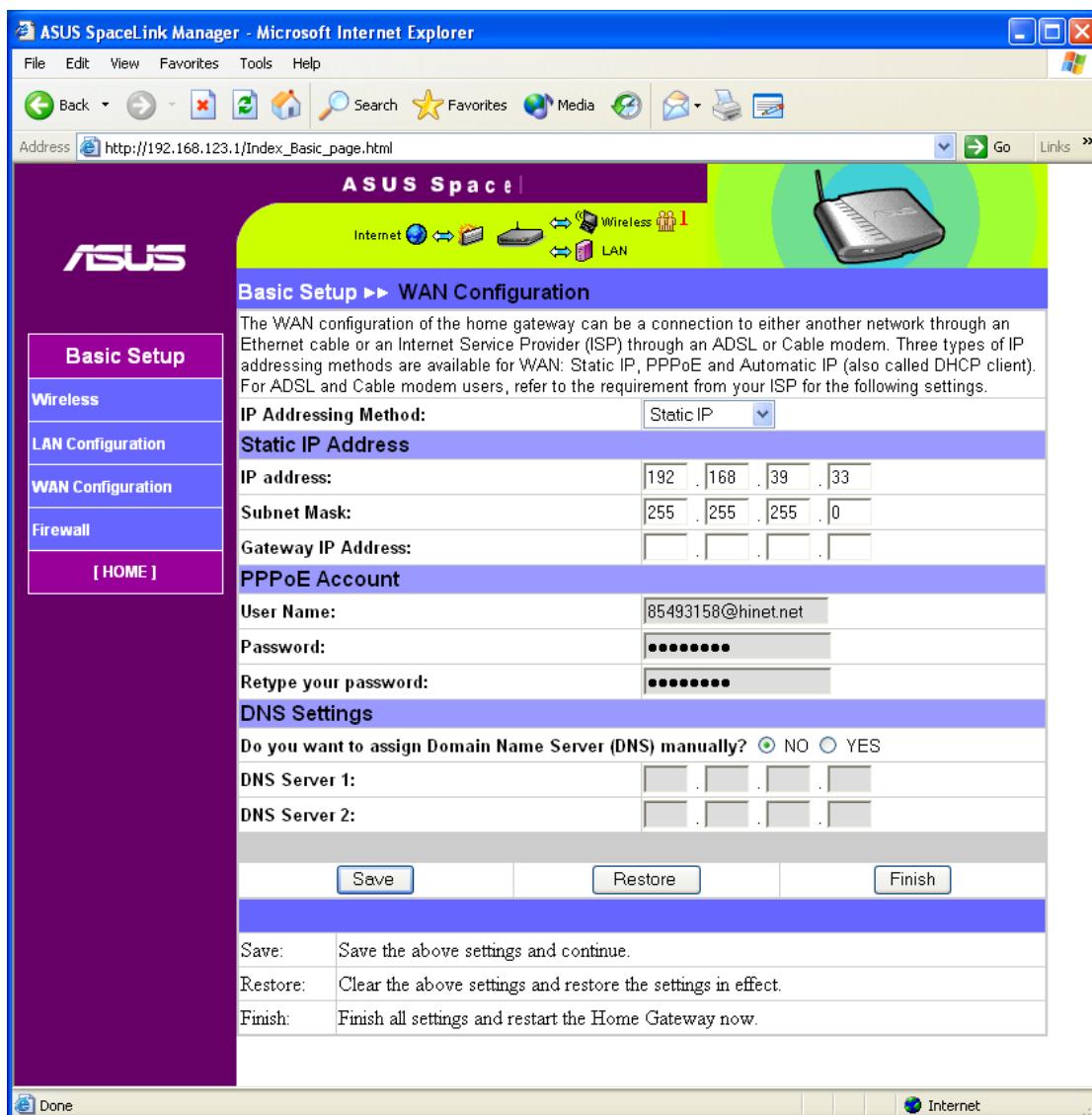
If you have a DHCP (Dynamic Host Configuration Protocol) server on the network, then the DHCP server will automatically assign the SpaceLink Home Gateway an IP address when the SpaceLink Home Gateway is powered up. To determine what IP address has been assigned to the SpaceLink Home Gateway, review the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

# Chapter 3 - Home Gateway Utilities

## 3. Utilities

## Static IP

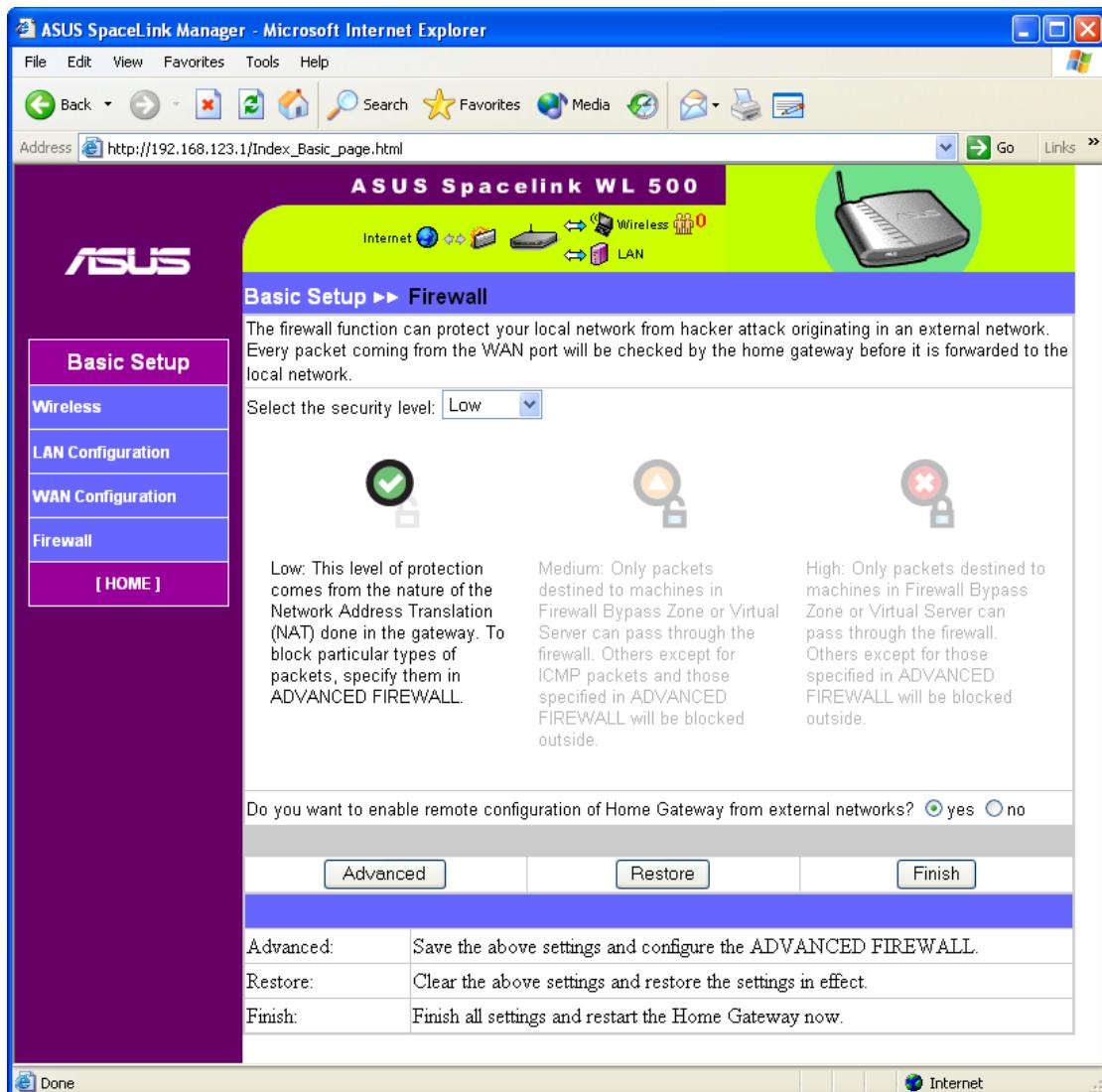
The SpaceLink Home Gateway also accepts a static IP address. You may manually configure the IP address and subnet mask on the “IP Config” page. Enter an IP address and a subnet mask in the field provided to assign the SpaceLink Home Gateway a static IP address. If you don’t know your Gateway setting,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



## Chapter 3 - Home Gateway Utilities

### 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.

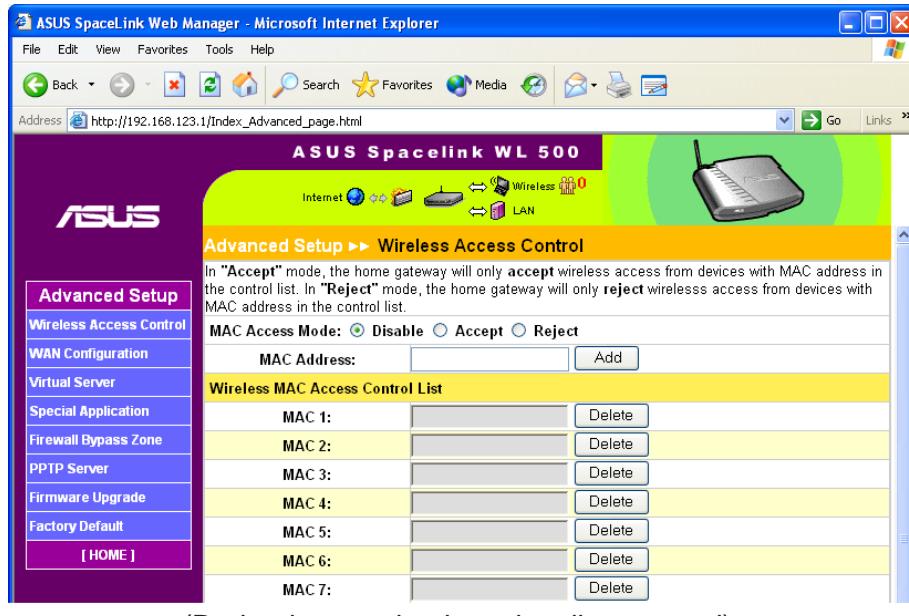


Select the security level for the firewall that you require. “Low” should be good enough for most home users. “Medium” and “High” levels can provide more protection for your local network but they may also stop you from executing some Internet applications. These problems can be overcome through advanced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

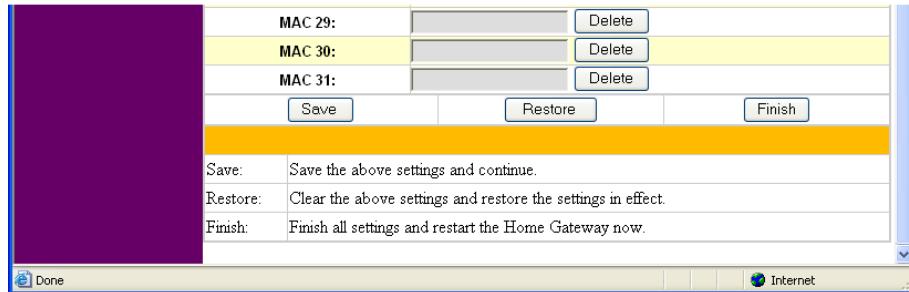
**Click the “Finish” button to save your new settings and restart the SpaceLink Home Gateway or click “Save” and restart later.**

# 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.

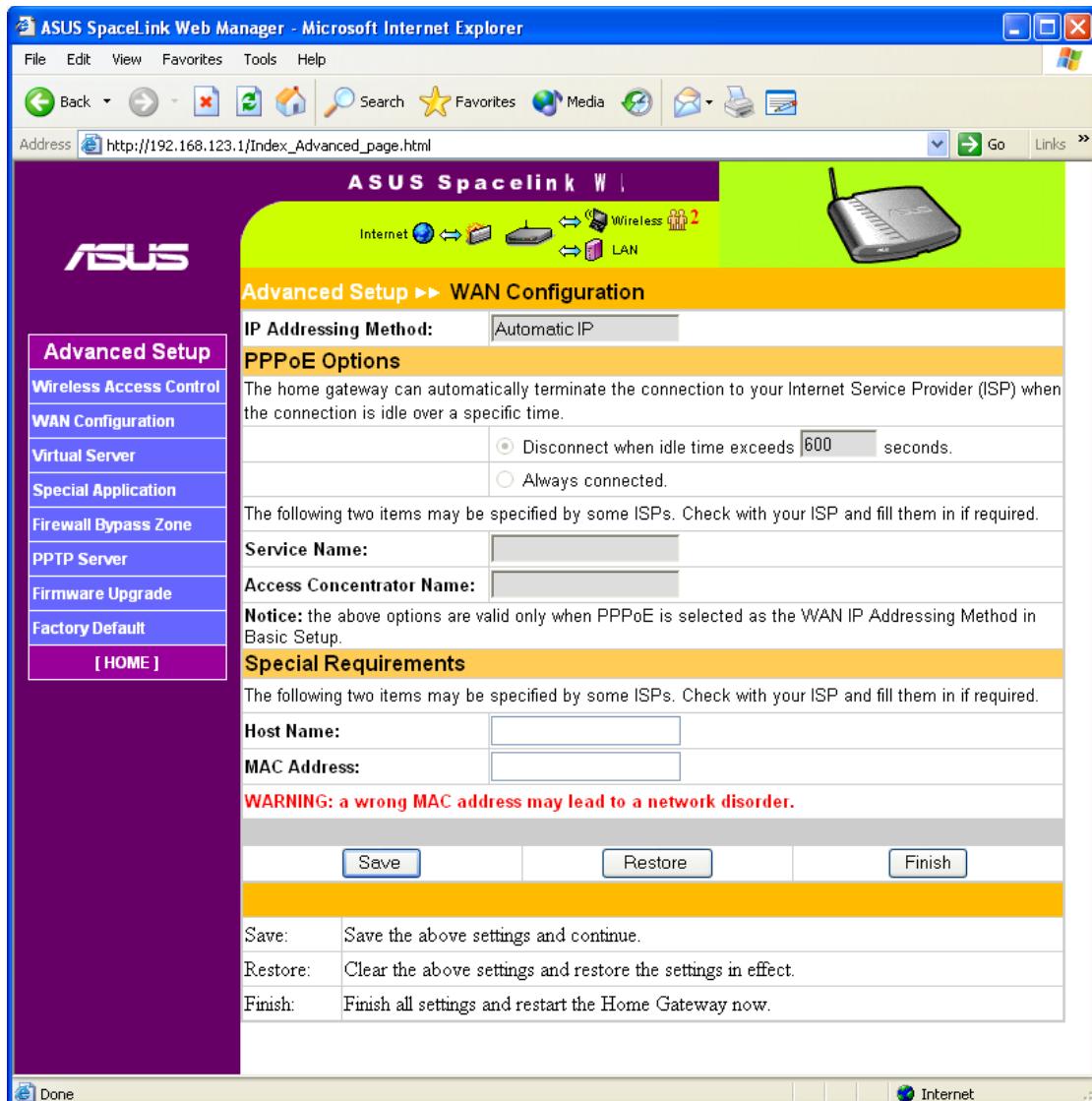
### Adding a MAC Address

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.

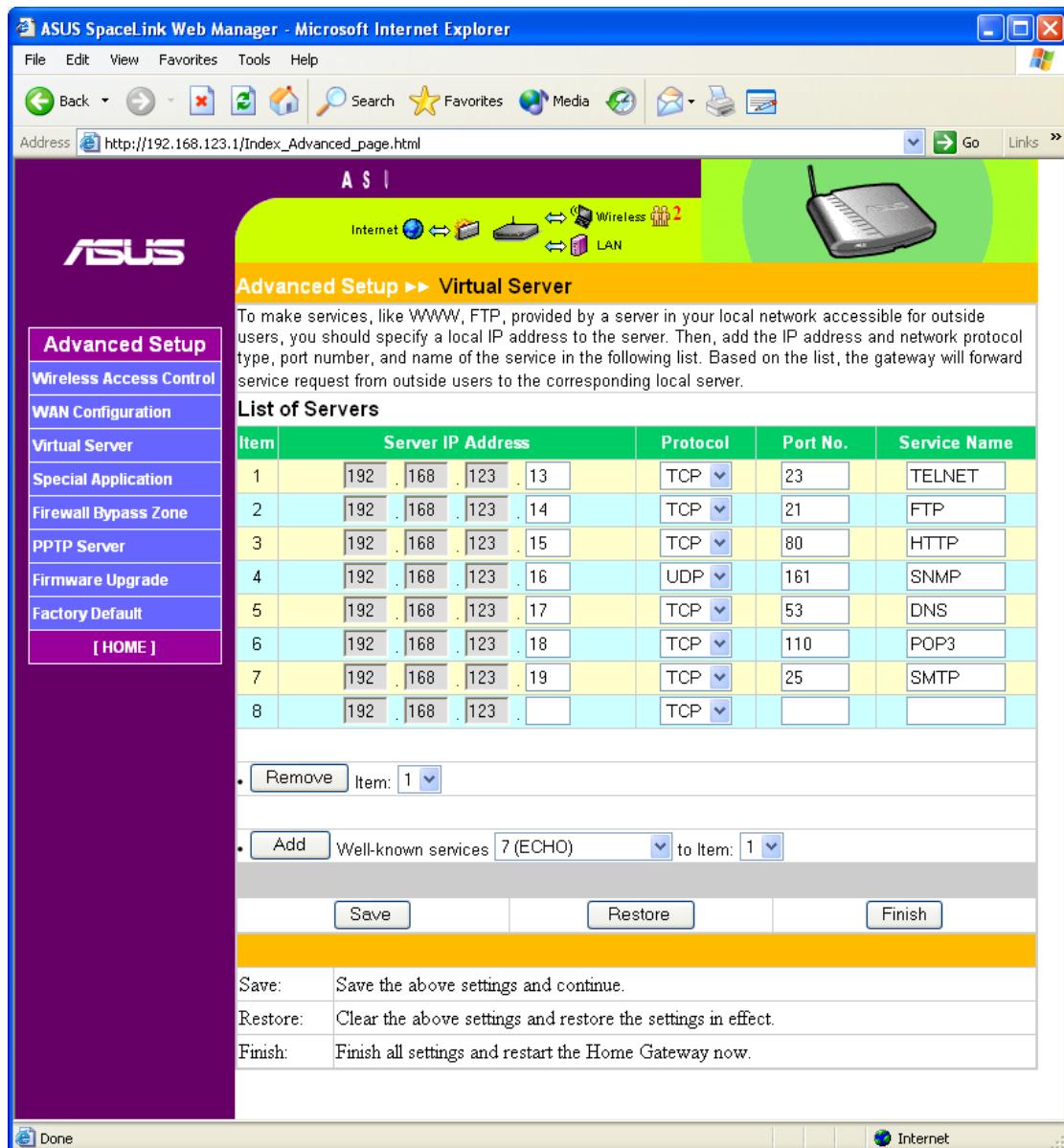
---

**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

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## 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

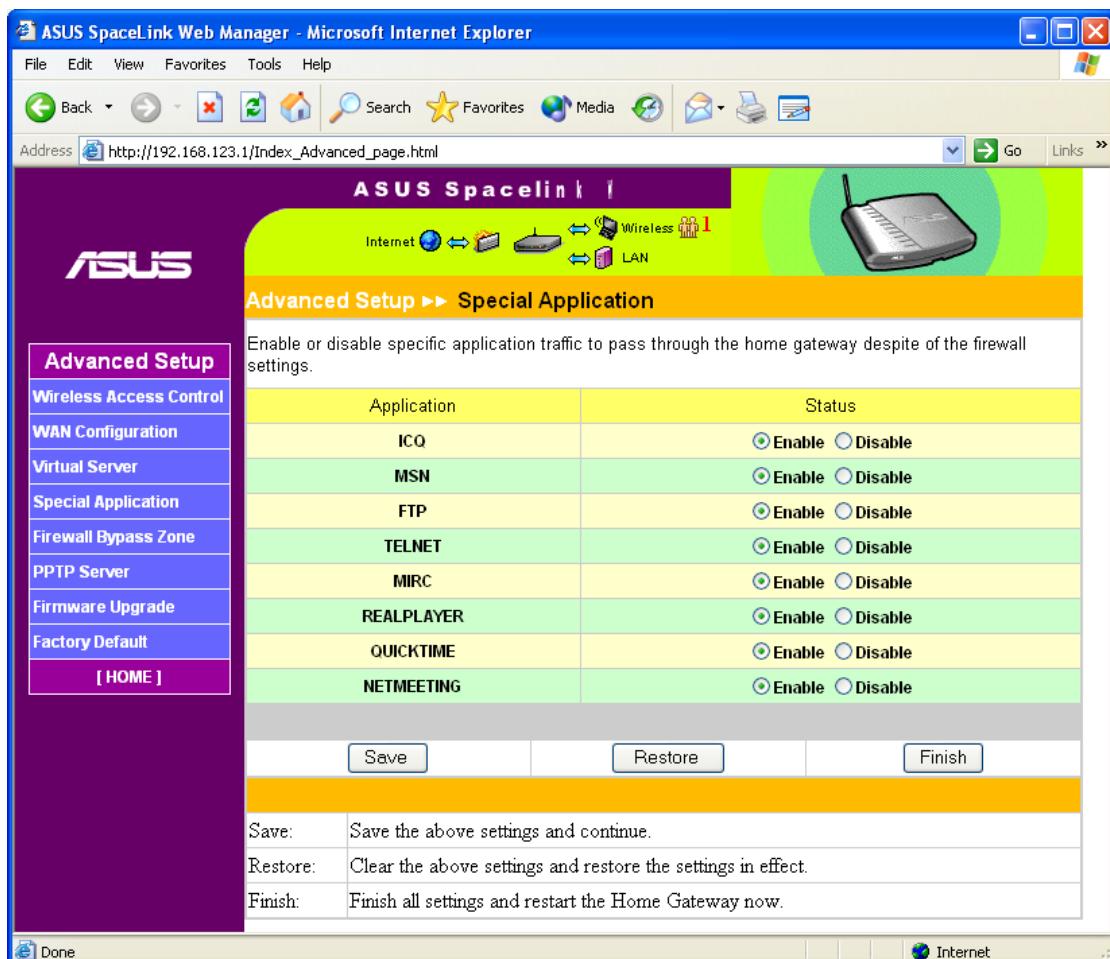
To remove one of the 8 entries, select the “Item” (1 2 3 4 5 6 7 8) number and click the **Remove** button.

## 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:

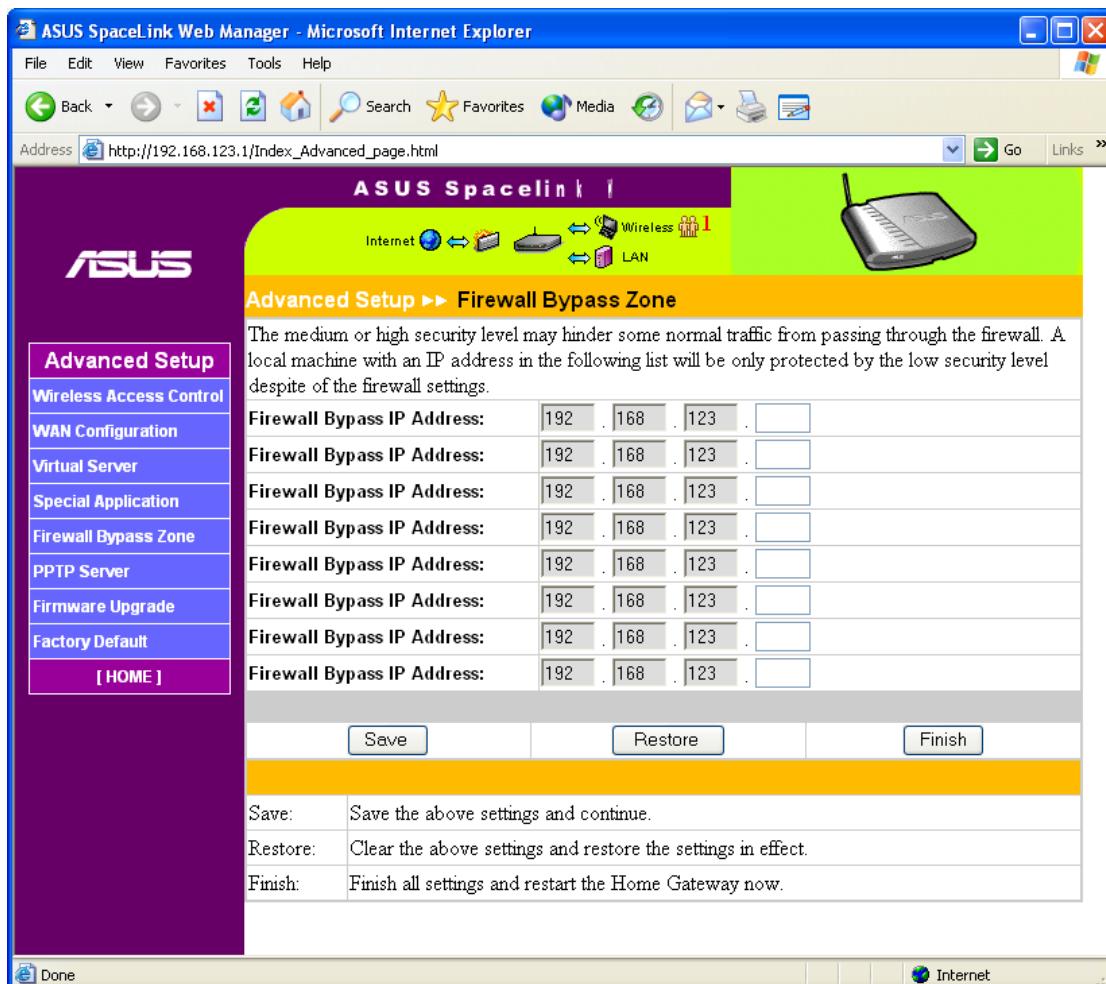
ICQ, MSN, FTP, TELNET, MIRC, REALPLAYER, QUICKTIME, NETMEETING.

---

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

---

## Firewall Bypass Zone

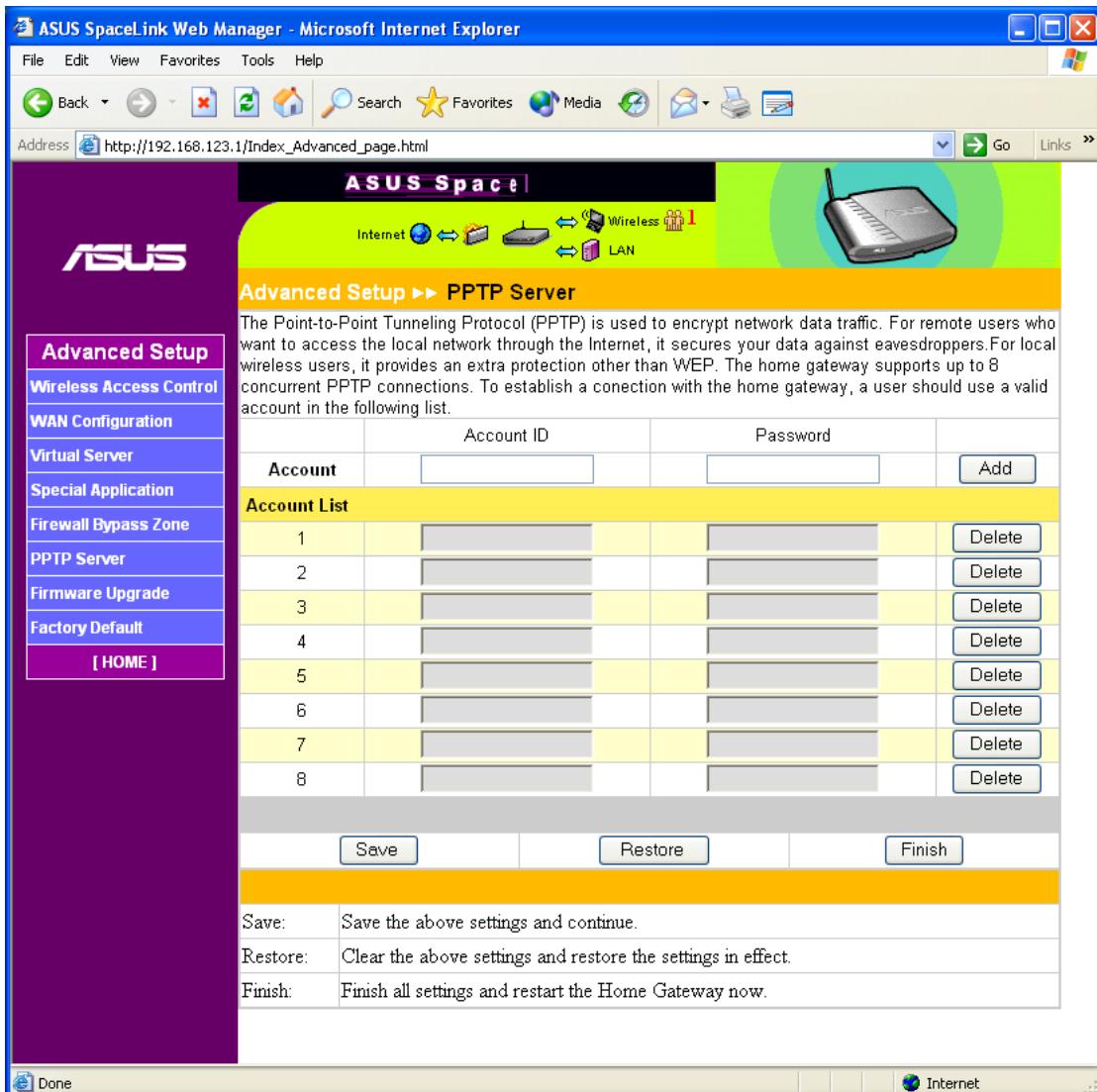


The medium or high security level may hinder some normal traffic from passing through the firewall. A local machine with an IP address in the following list will be only protected by the low security level despite of the firewall settings.

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

# Chapter 3 - Home Gateway Utilities

## 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

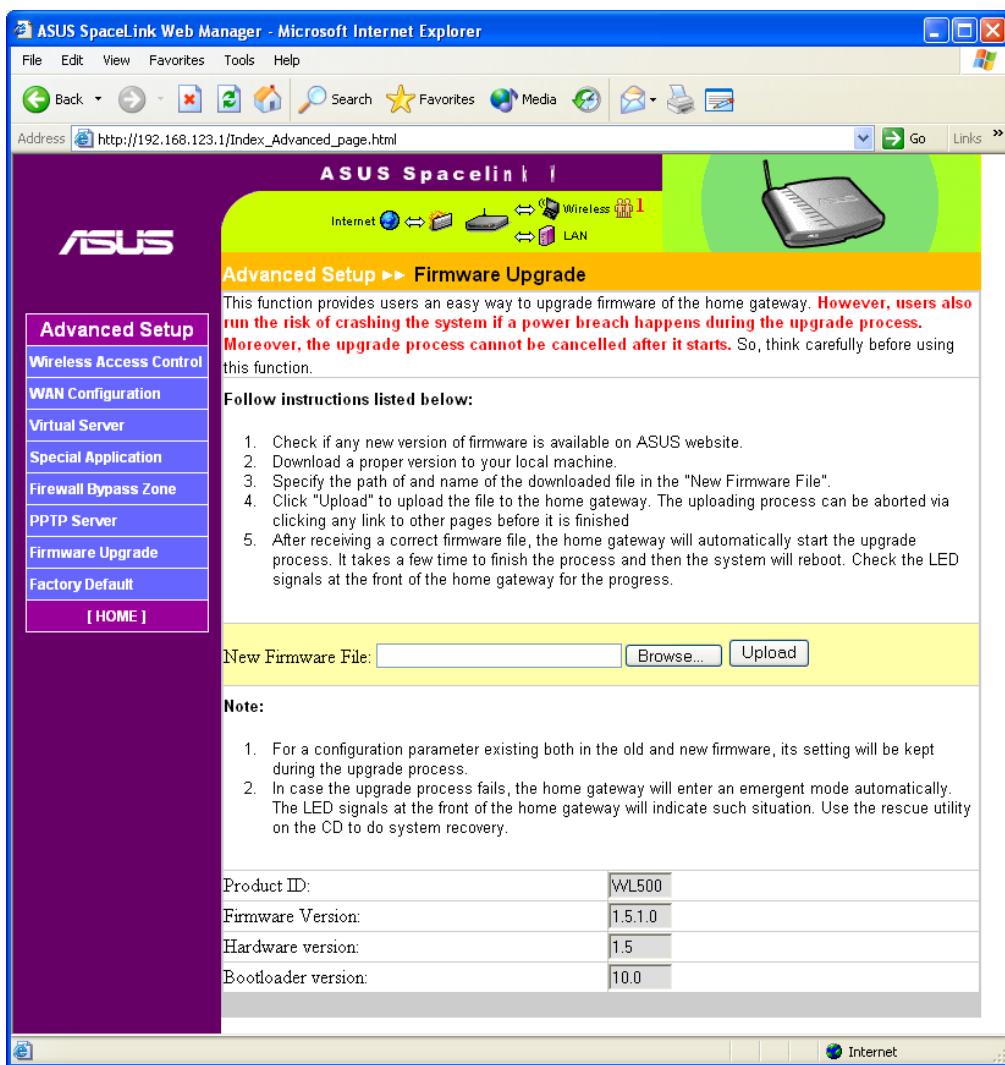
**Account ID** - Enter name or ID number.

**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.

# Chapter 3 - Home Gateway Utilities

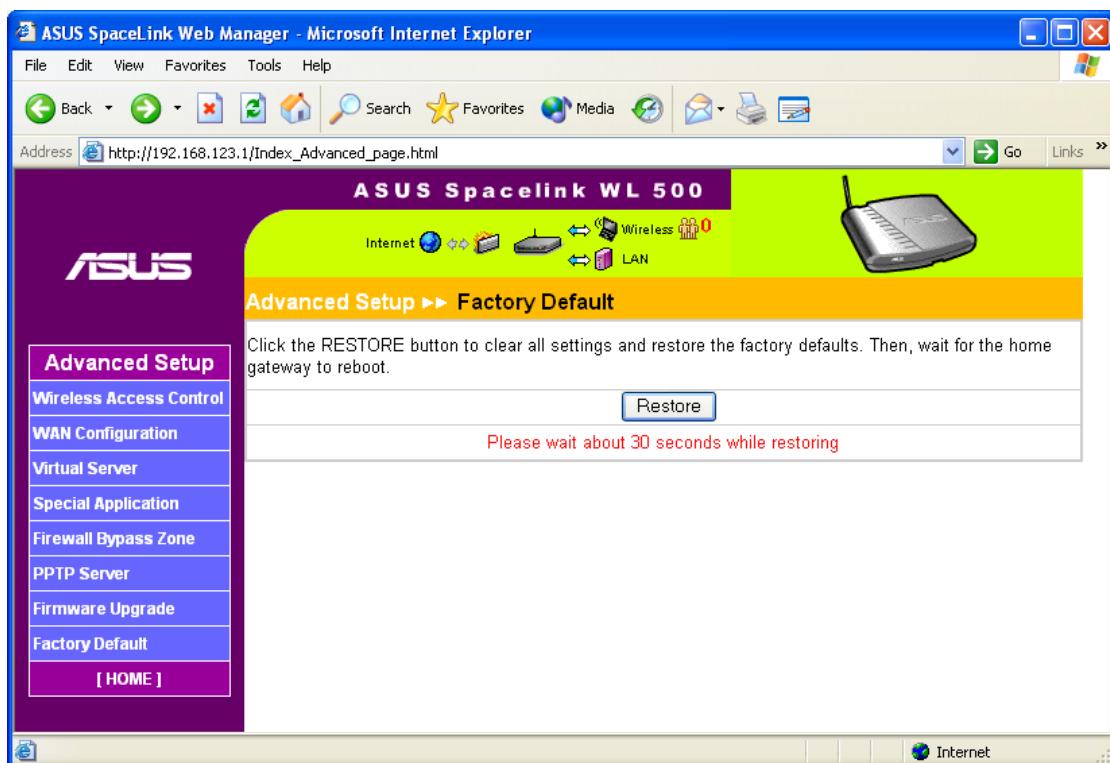
## Restoring Factory Default Settings

### Web Manager

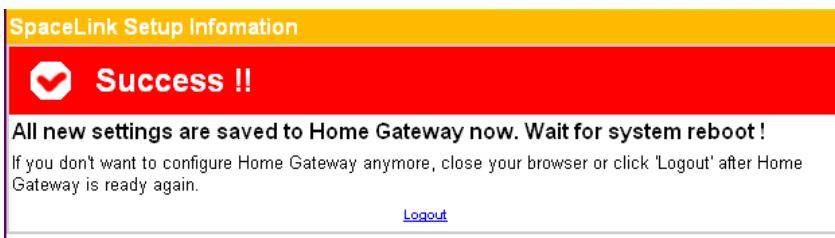
You can reset all settings to their factory defaults through the web manager using the “Factory Default” page in “Advanced Setup”. Click the **Restore** button and wait about 30 seconds before trying to access the SpaceLink Home Gateway.

### 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.



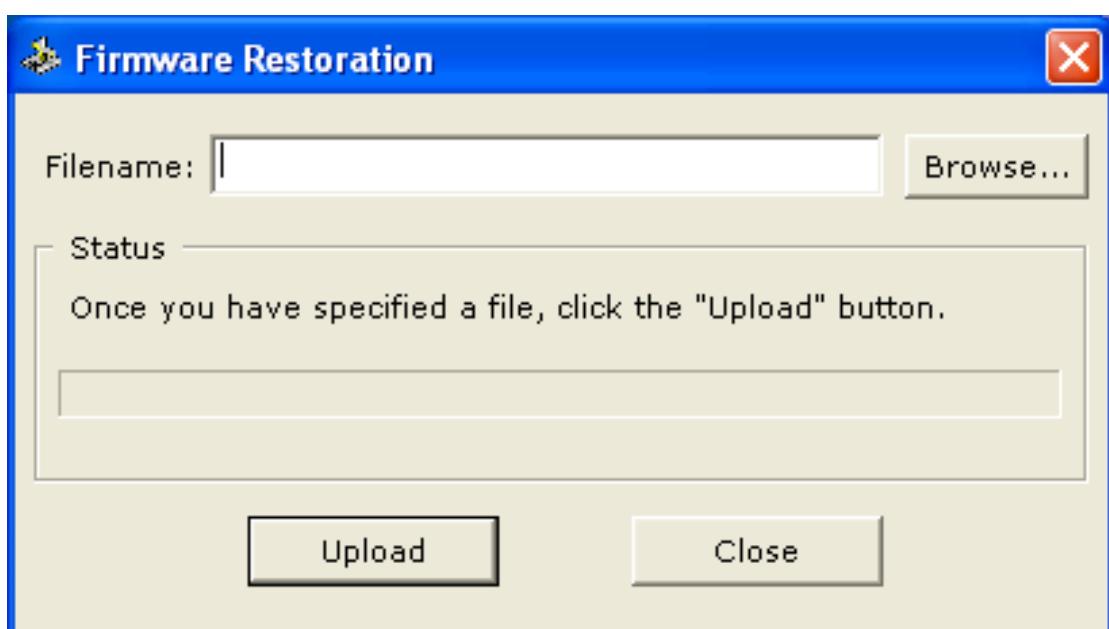
You will be notified when factory default settings are restored while using the web manager.



### 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

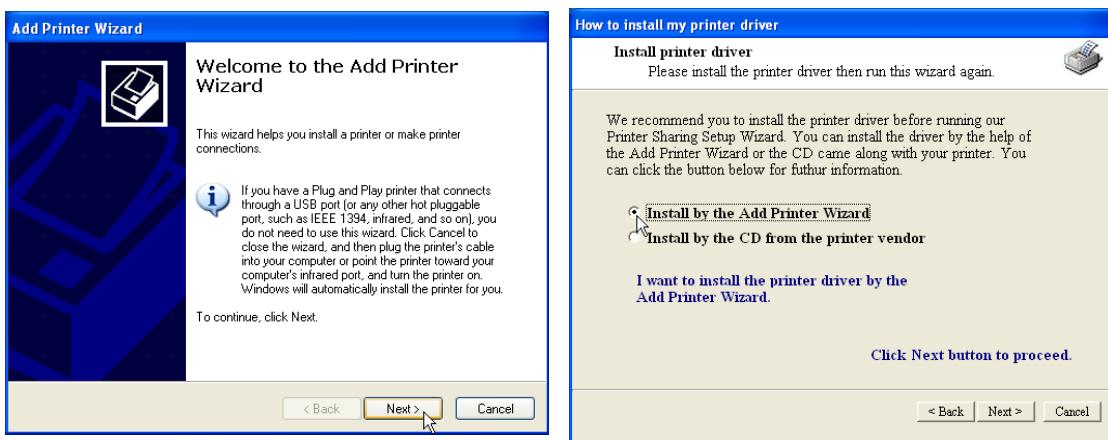
## Printer Setup Wizard

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

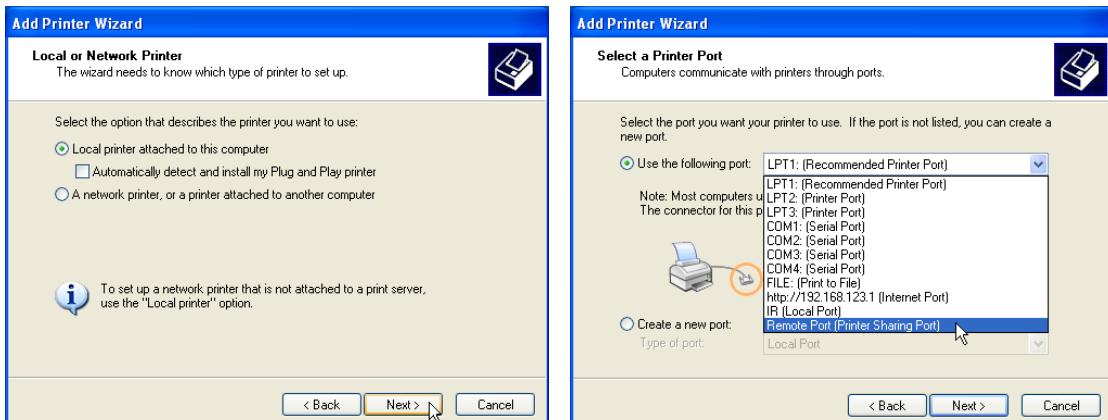
## Add Printer Wizard

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



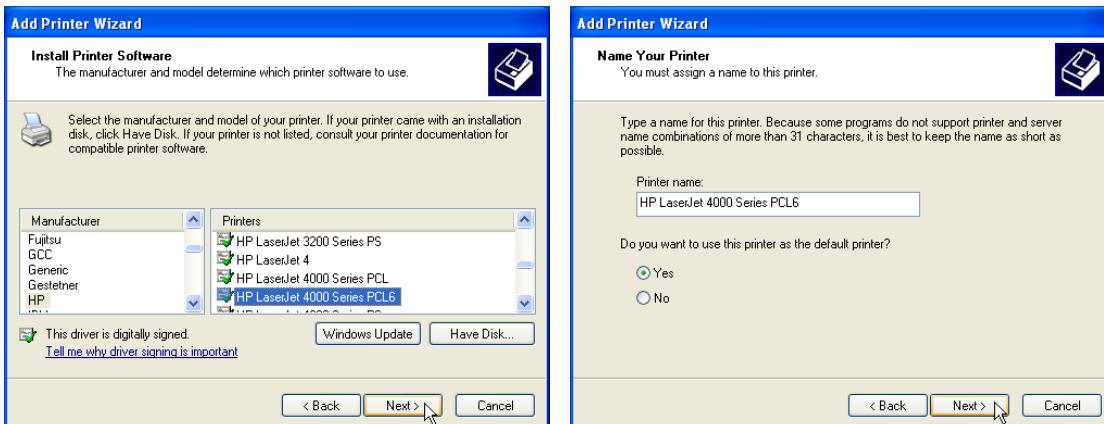
- (1) Run the “Add Printer Wizard” from **Start | Printers and Faxes | Add Printer**.
- (2) Choose “Install by the Add Printer Wizard”.



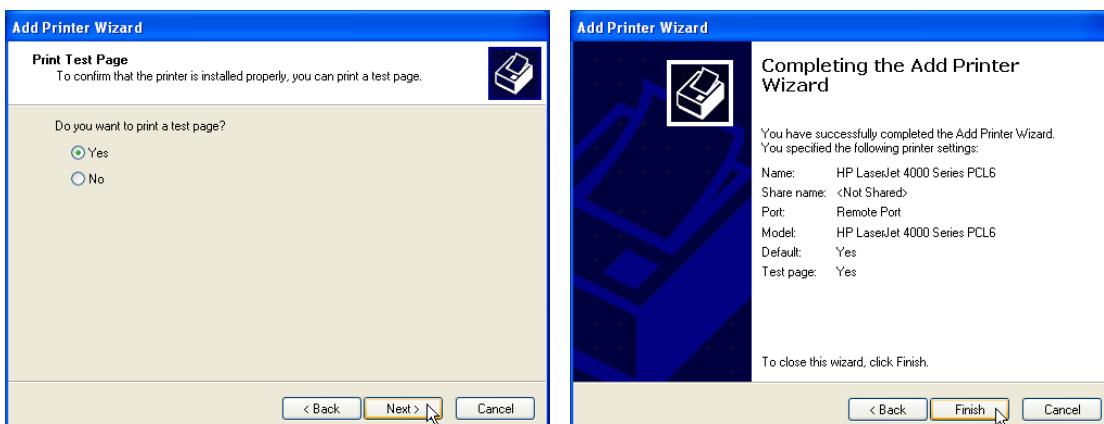
- (3) Choose “Local printer attached to this computer”.
- (4) Choose “Remote Port (Printer Sharing Port)”. If this is not available, select LPT1.

# Chapter 3 - Home Gateway Utilities

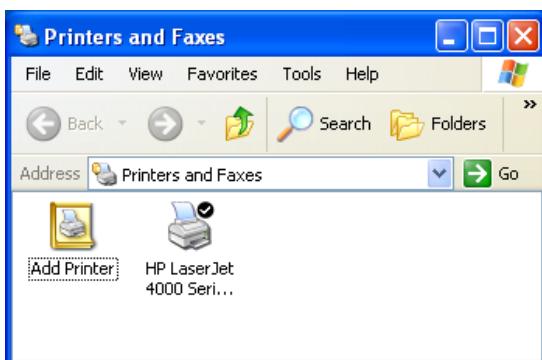
## 3. Utilities



- (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.



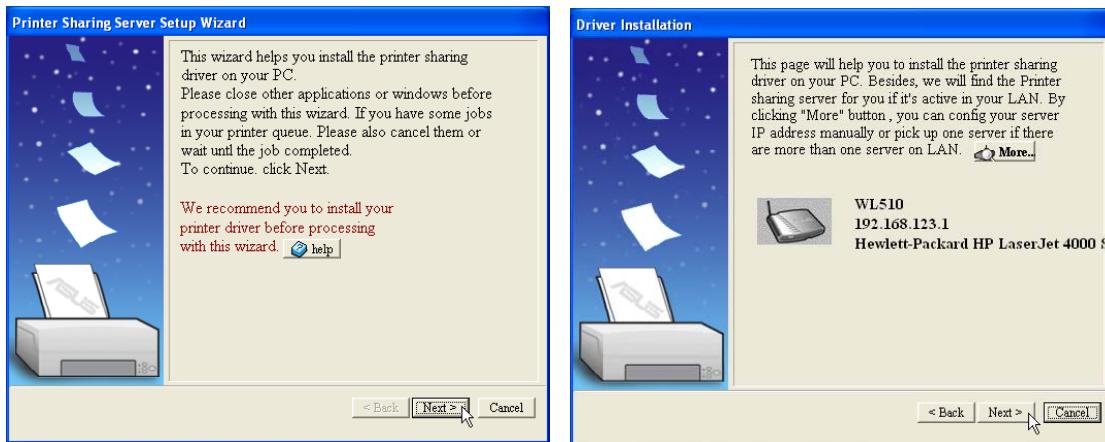
Your printer will show in the "Printers and Faxes" window and the check mark shows that it is set as your default printer.

# Chapter 3 - Home Gateway Utilities

## Printer Setup Wizard

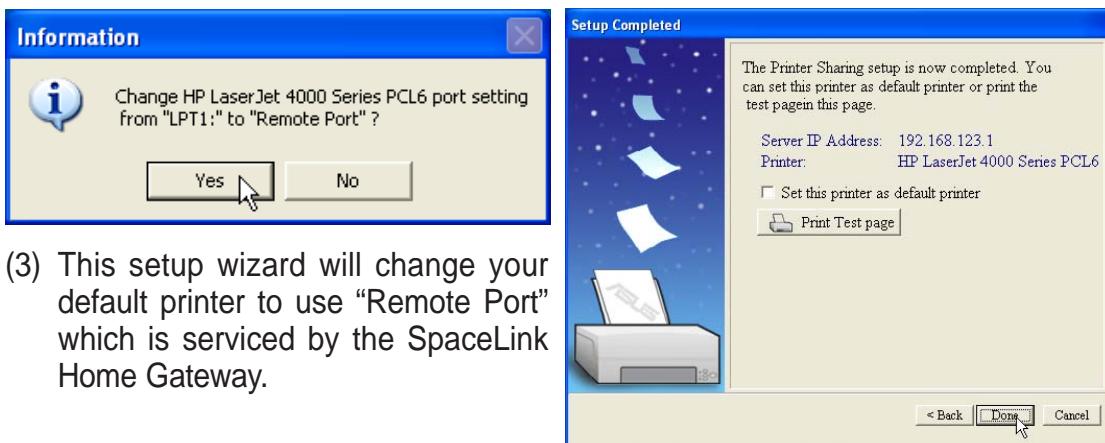
The wizard will explore all available SpaceLink Home Gateways and model information of the printers attached to them in your local network.

### 3. Utilities



- (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**.

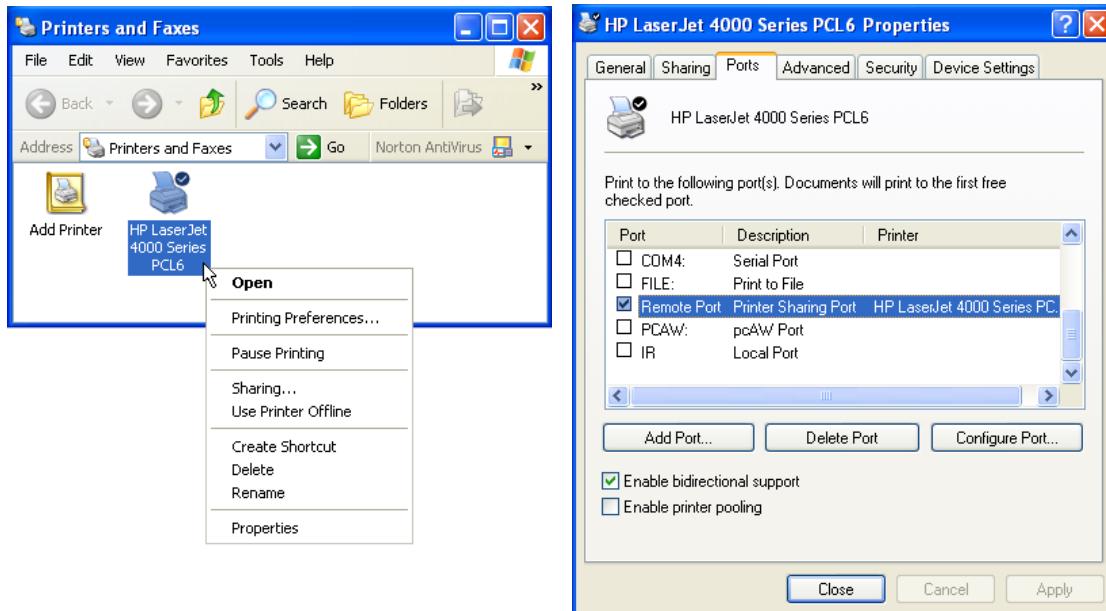
If you can see this message , this means no Server found during this search. Please click "More" to search again after checking all the settings.



- (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.

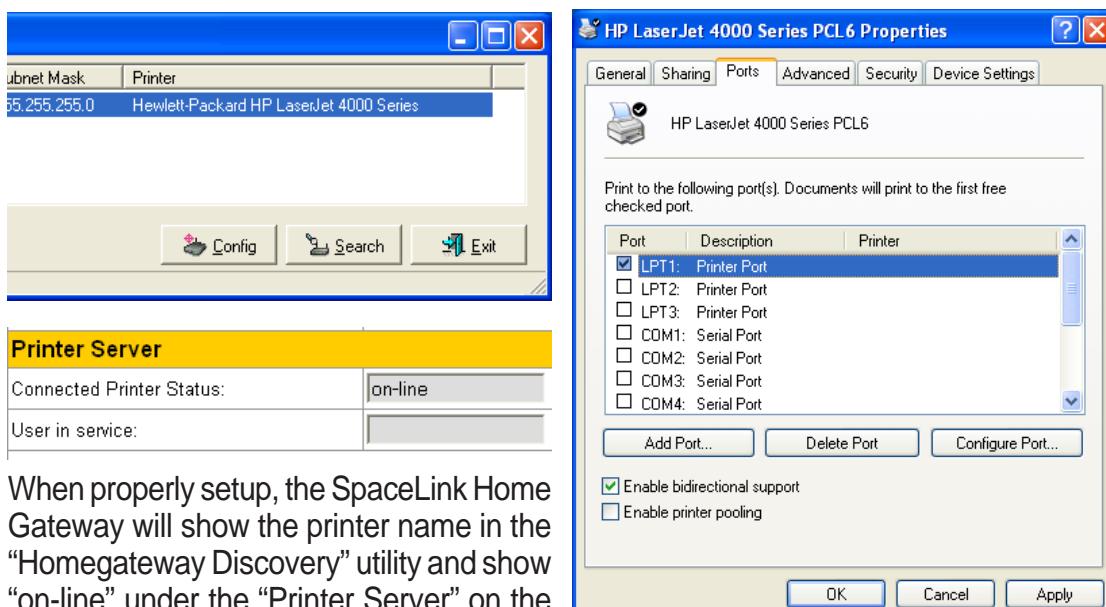
# Chapter 3 - Home Gateway Utilities

## 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.



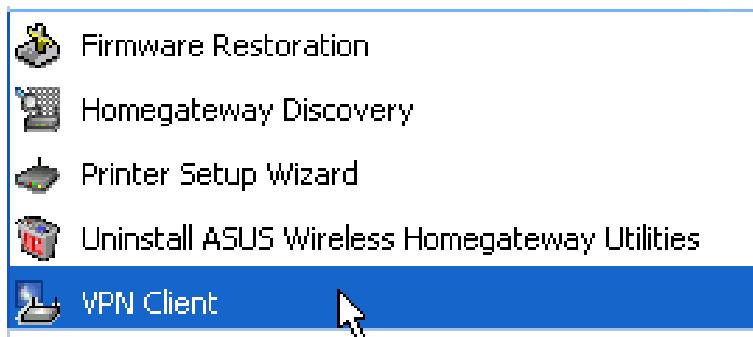
When properly setup, the SpaceLink Home Gateway will show the printer name in the "Homegateway Discovery" utility and show "on-line" under the "Printer Server" on the "Status" page of the web manager.

### 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.

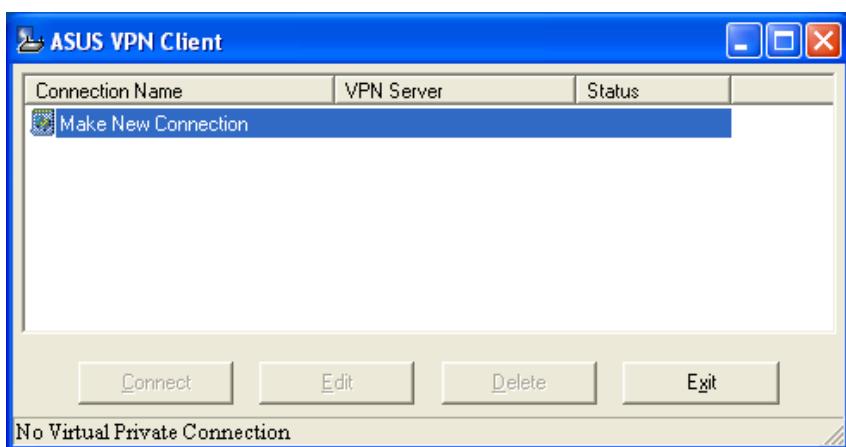
### Starting VPN Client

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.

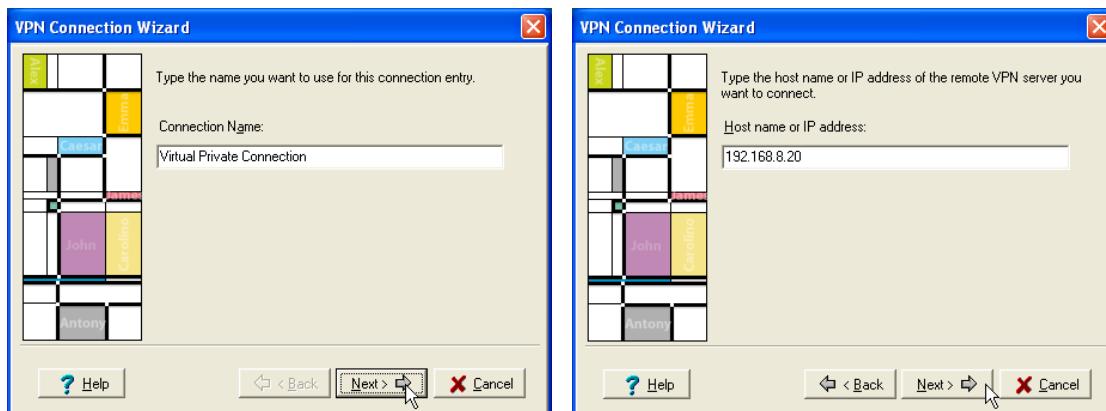


# Chapter 3 - Home Gateway Utilities

## 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.



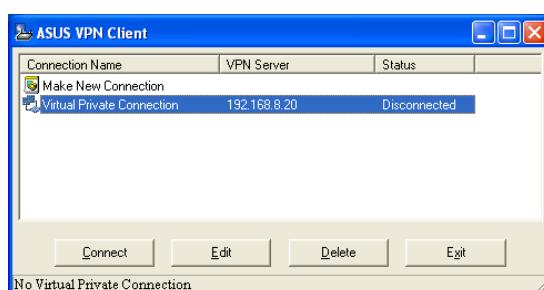
Enter a unique name for this new connection entry. The name is used to identify this connection. This name is not case-sensitive. Click **Next**.

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**.

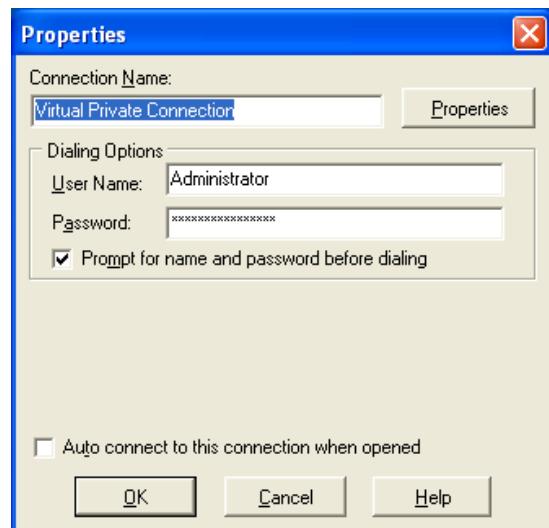
#### Connection Name

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.

# Chapter 3 - Home Gateway Utilities



## 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.

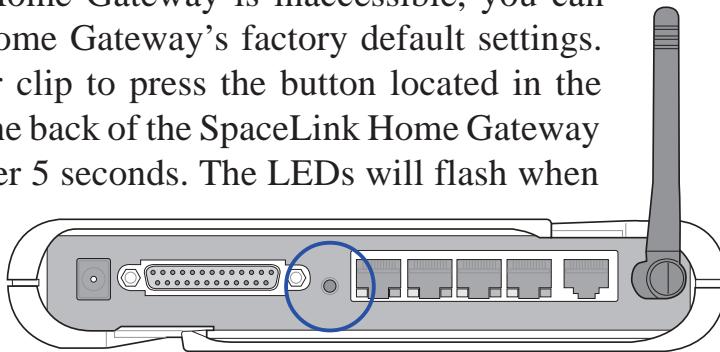
# Chapter 5 -Troubleshooting

## 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.**

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### 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

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### 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

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### 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

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**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

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**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.

# **R&TTE Standards List**

# R&TTE List of Standard

With referring to the article of the directive of **R&TTE 1999/5/EC**, the following equipment:

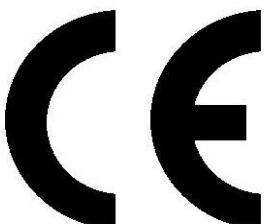
<b>Product Description / Supplementary Info</b>	Wireless Router
<b>Manufacturer</b>	ASUSTeK COMPUTER INC.
<b>Brand</b>	ASUS
<b>Type</b>	WL-500g

has been tested to and conforms with the following **List of R&TTE Harmonized standards:**

<b>Standard</b>	<b>Issue date</b>
ETSI EN 300 328-2 ETSI RF Specification	V1.2.1 Dec. 2001 <i>Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2,4GHz ISM band and using spread spectrum modulation techniques; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&amp;TTE Directive.</i>  Meets R&TTE directive art. 3.2.a on effective use of radio frequency spectrum so as to avoid harmful interference.
ETSI EN 301 489-17 ETSI EMC Specification	V1.2.1 Aug. 2002 <i>Electromagnetic compatibility and Radio spectrum Matters(ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17 : Specific conditions for Wideband data and HIPERLAN equipment.</i>  Meets R&TTE directive art. 3.1.b of essential requirements on protection with respect to Electro Magnetic Compatibility.

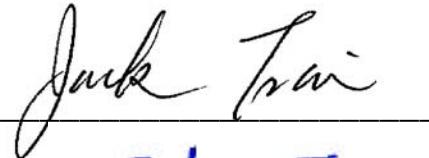
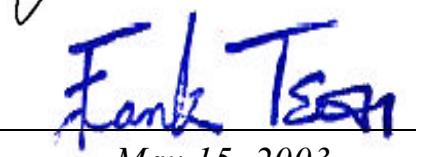
As such standards referred to in Article 5 of the directive have not been applied or do not exist, the following **Adopted solutions with descriptions and explanations** as listed below, have been applied in full or in part, to meet the essential requirements of the directive:

<b>Standard</b>	<b>Issue date</b>
EN 60950 LVD specification	2000 <i>Safety of information technology equipment, including electrical business equipment.</i>  Meets R&TTE directive art. 3.1.a of essential requirements on protection of the health and safety of the user.
ETSI EN 301 489-1 ETSI EMC Specification	V1.4.1 Aug. 2002 <i>Electromagnetic compatibility and Radio spectrum Matters(ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.</i>  Meets R&TTE directive art. 3.1.b of essential requirements on protection with respect to Electro Magnetic Compatibility.



<b>Draw up in</b>	Taiwan, R.O.C.
<b>Data</b>	2003/5/22
ASUSTek Computer Inc. 4/F, 150, Li-Te Rd., Peitou, Taipei, Taiwan 112	
<b>Signature &amp; company stamp</b>	LawrenceYu / R&D Engineer

# **RF-EMC-LVD Test Reports and Corresponding Annexes**

Report No.	A54ET560
Specifications	ETSI EN 300 328-1 (V.1.3.1) / December, 2001 ETSI EN 300 328-2 (V.1.2.1) / December, 2001
Applicant	ASUSTek Computer Inc.
Applicant address	4Fl., No. 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.
Items tested	Wireless Router
Model No.	WL-500g (Sample # A54560)
Results	<b>Compliance</b> (As detailed within this report)
Date	04/04/2003 (month / day / year) (Sample received) 04/24/2003 (month / day / year) (Test)
Prepared by	 _____ <b>Jack Tsai</b> Project Engineer ( <b>Jack Tsai</b> )
Authorized by	 _____ <b>Frank Tsai</b> General Manager ( <b>Frank Tsai</b> ) (month / day / year)
Issue date	May 15, 2003
Modifications	None
Tested by	Training Research Co., Ltd.
Office at	No. 255, Nan Yang Street, Shijr City, Taipei Hsien 221, Taiwan
Laboratory at	1F, No. 255, Nan Yang Street, Shijr City, Taipei Hsien 221, Taiwan
Open site at	No. 15, Lane 530, Balian Rd., Sec. 1, Shijr City, Taipei Hsien 221, Taiwan

**Conditions of issue:**

**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.**

★ Aut. No. ELA 131

**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 ETSI EN 300328-2 (V.1.2.1) 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 second edition in the European Telecommunication Standard ETSI EN 300328-2 (V.1.2.1).

**Reservation:**

The test results herein refer only to the tested sample. Training Research Co., Ltd. is not responsible for any generalizations or conclusions draw from these test results and concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report.

**Test 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.

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## I. GENERAL

### 1.1. Introduction

The following measurement report is submitted on behalf of Applicant in support of a wireless LAN measurement in accordance with ETSI EN 300328-2 (V.1.2.1) (Dec. 2001) of the European Telecommunication Standard.

### 1.2. Description of EUT

<b>Product Name</b>	:	Wireless Router
<b>Model No.</b>	:	WL-500g
<b>Frequency Range</b>	:	2.412 GHz ~ 2.472GHz
<b>Support Channel</b>	:	13 Channel
<b>Modulation Skill</b>	:	DBPSK, DQPSK, CCK, OFDM
<b>Power Type</b>	:	Switching Power Adaptor Mfg.: DVE M/N: DSA-0101F-05 A I/P: 100-240Vac, 50-60Hz; 0.3A, 15VA O/P: 5Vdc, 2.0A, 10W
<b>Power Cable</b>	:	185cm long, non-shielded, with ferrite core
<b>Data Cable</b>	:	RJ45 cable x 4: 1.2m, non-shielded, no ferrite core RJ45 cable x 1: 30m, non-shielded, no ferrite core USB cable x 1: 271cm, shielded, no ferrite core Parallel data cable x 1: 170cm, shielded, no ferrite core

### 1.3. Description of Support Equipment

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

**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.**

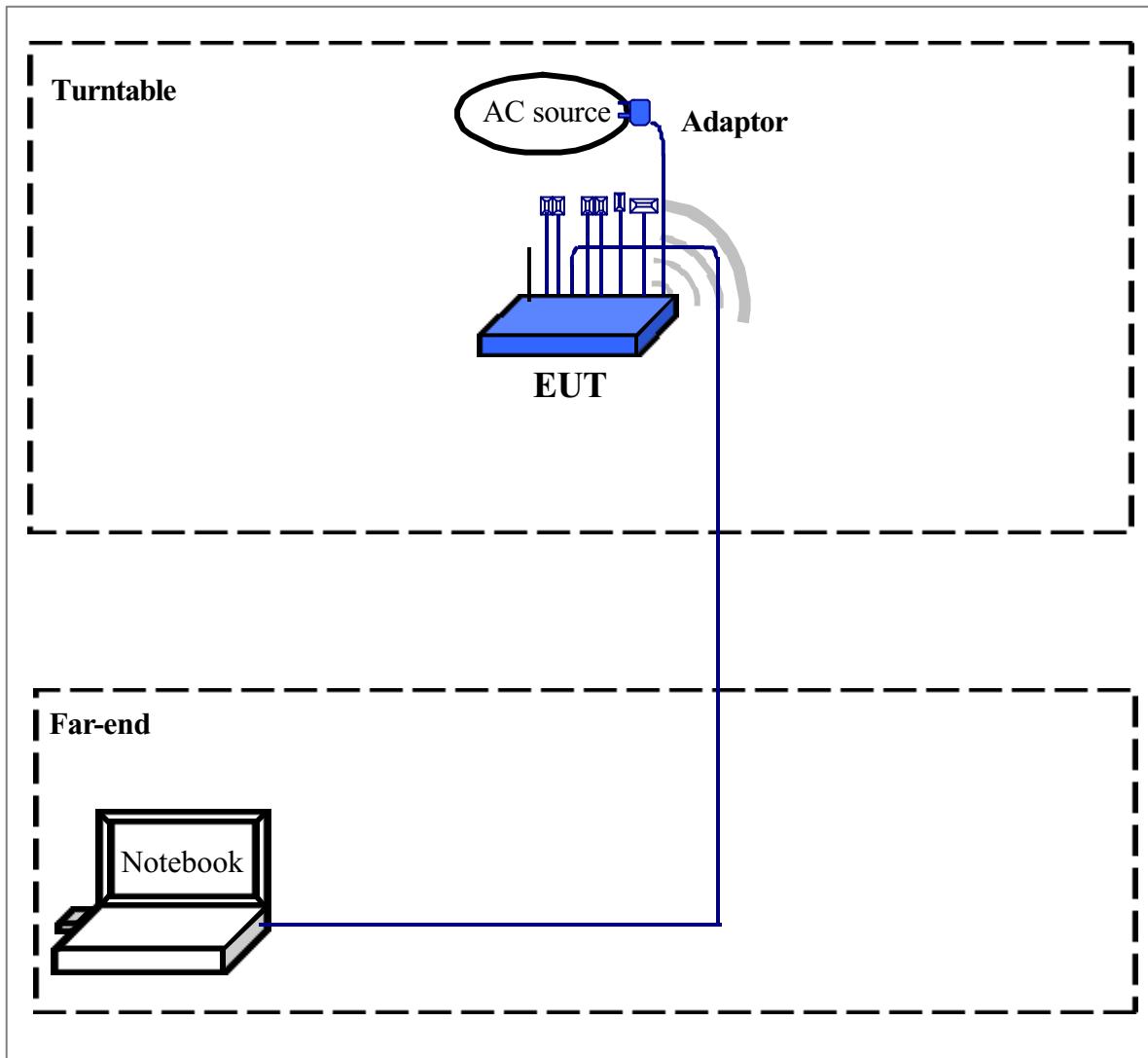
Model No. : C911003

FCC ID : MXF-C911003

### 1.4. Test Method

1. Using the LAN port of far-end computer and software provided by the manufacturer to control the EUT. The test is performed under those specific conditions.
2. Set different channel being tested and making EUT to the mode of continuous transmission received.

## 1.5. Configuration of System Under Test



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 1.4 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
12	2.467
13	2.472

Note:

- (1) This is for sure that all frequencies are in 2.4GHz – 2.4835 GHz.
- (2) After test, the EUT operating frequencies are in 2.412GHz to 2.472GHz. So all the item as followed in testing report are need to test these three frequencies:  
channel 1, channel 7, and channel 13.
- (3) E.T.S.I 2.412GHz – 2.4835GHz , France 2.4465GHz – 2.4835GHz

### 1.7. Test Procedure

All measurements performed in this report were performed mainly according to the techniques described in ETSI EN 300328-2 (Dec., 2001) and the pre-setup was written on 1.4 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 test condition shall be as follows: (See Clause 6)

The NORMAL temperature and humidity conditions for tests shall be any convenient combination of temperature and humidity within the following ranges:

-temperature: +15°C to +35°C;

-relative humidity: 20% to 75%.

The normal test voltage for equipment to be connected to the main shall be the nominal mains voltage.

For purpose of this ETS, the normal voltage shall be the declared voltage or any of the declared voltages for which the equipment was designed.

The frequency of the test power source corresponding to the AC mains shall be between 49Hz and 51Hz. When radio equipment is intended for operation from the usual, alternator fed lead-acid battery power source used on vehicles, then the normal test voltage shall be 1.1 times the nominal voltage of the battery (6V, 12V, etc.)

For operation from other power sources or types of battery (primary or secondary), the nominal test voltage shall be as declared by the equipment manufacturer. This shall be recorded in the test report.

For tests at EXTREME temperatures, measurements shall be made in accordance with the procedures specified in subclause 6.4.3, at the upper and lower temperatures of the range as follows:

- temperature: -20°C to +55°C;

Where the manufacturer's declared operating range does not include the range of -20°C to +55°C, the equipment shall be tested over the following temperature ranges:

a) 0°C to +35°C for equipment intended for INDOOR use only, or intended for use in areas where the temperature is controlled within this range;

b) Over the extremes of the operating temperature range(s) of the declared host equipment(s) in case of plug-in radio devices.

The frequency range as in subclause 5.2.3 and the e.i.r.p. Limit in subclause 5.2.1 shall not be exceeded.

Tests at extreme power source voltages specified below are not required when the equipment under test is designed for operation as part of and powered by another system or piece of equipment. Where this is the case, the limit values of the host system or host equipment shall apply. The appropriate limit values shall be declared by the manufacturer and recorded in the test report.

The EXTREME TEST VOLTAGE for equipment to be connected to an AC mains source shall be the nominal mains voltage  $\pm 10\%$ .

When radio equipment is intended for operation from the usual type of alternator fed lead-acid battery power source used on vehicles, then extreme test voltage shall be 1.3 and 0.9 times the nominal voltage of the battery (6V, 12V, etc.).

The lower extreme test voltage for equipment with power source using the following type of battery, shall be:

- for the Leclanche' or lithium type battery: 0.85 times the nominal voltage of the battery;
- for the mercury or nickel-cadmium type of battery: 0.9 times the nominal voltage of the battery.

In both cases, the upper extreme test voltage shall be 1.15 times the nominal voltage of the battery.

For equipment using other power sources, or capable of being operated from a variety of power sources (primary or secondary), the extreme test voltages shall be those declared by the manufacturer; these shall be recorded in the test report. Before measurements are made the equipment shall have reached thermal balance in the test chamber.

## II. Section 5.2.1: Effective Radiated Power

### 2.1 Test Result of Effective Radiated Power for 802.11b

Power level at which the measurement has been performed 15.02 dBm

TEST CONDITION		TRANSMITTER	PEAK	POWER
		Tx Peak (dBm)	Tx Ave. (dBm)	Cable Loss (dB)
Channel 1	25 °C	5.21	4.58	5.80
	0 °C	5.70	4.95	
	35 °C	5.27	4.55	
Channel 7	25 °C	4.58	3.90	5.80
	0 °C	4.88	4.15	
	35 °C	4.81	4.18	
Channel 13	25 °C	4.86	4.24	5.90
	0 °C	4.54	3.90	
	35 °C	4.63	4.04	
Limit		Tx Peak : 23dBm / -7dBW Tx Ave. : 20dBm / -10dBW		

NOTE:

- (1) The E.U.T is a stand-alone radio device (see the clause 6.2.2). The powered by the adaptor. So, the AC power is used as the extreme voltage source. (See clause 6.3.2.1)
- (2) The value of table is worst case during test condition, includes different combinations of transmitter rate antenna polarity and temperature
- (3) TX PEAK: Max Peak Power, TX Ave.: Average Peak.  
Actually Peak Power = Tx Peak + Cable Loss,  
E.R.P. = Actually Peak Power + Antenna Gain (11.5dBm + 3.52dBi = 15.02 dBm)
- (4) ETSI (2400MHz ~ 2483.5MHz), FRANCE (2446.5 MHz ~ 2483.5MHz)

## 2.2 Test Result of Effective Radiated Power for 802.11g

Power level at which the measurement has been performed 19.02 dBm

TEST CONDITION	TRANSMITTER PEAK POWER		
	Tx Peak (dBm)	Tx Ave. (dBm)	Cable Loss (dB)
Channel 1	25 °C	9.06	5.07
	0 °C	8.43	4.12
	35 °C	9.70	5.28
Channel 7	25 °C	8.89	4.57
	0 °C	8.37	3.93
	35 °C	9.05	4.71
Channel 13	25 °C	8.48	4.20
	0 °C	7.97	3.62
	35 °C	8.71	4.45
Limit	Tx Peak : 23dBm / -7dBW Tx Ave. : 20dBm / -10dBW		

NOTE:

- (1) The E.U.T is a stand-alone radio device (see the clause 6.2.2). The powered by the adaptor. So, the AC power is used as the extreme voltage source. (See clause 6.3.2.1)
- (2) The value of table is worst case during test condition, includes different combinations of transmitter rate antenna polarity and temperature
- (3) TX PEAK: Max Peak Power, TX Ave.: Average Peak.  
Actually Peak Power = Tx Peak + Cable Loss,  
E.R.P. = Actually Peak Power + Antenna Gain ( $15.5\text{dBm} + 3.52\text{dBi} = 19.02 \text{ dBm}$ )
- (4) ETSI (2400MHz ~ 2483.5MHz), FRANCE (2446.5 MHz ~ 2483.5MHz)

### III. Section 5.2.2: Peak Power Density

#### 3.1 Test Result of Peak Power Density for 802.11b

Channel	Frequency (MHz)	Rate (Mbps)	Ppr (dBm)	CF (dB)	Ppq (dBm)	Limit (dBm)	Margin (dB)
CH 1	2412	11	-0.80	6.60	5.80	10.00	-4.20
CH 7	2442	11	-1.08	6.60	5.52	10.00	-4.48
CH 11	2472	11	-1.03	6.70	5.67	10.00	-4.33

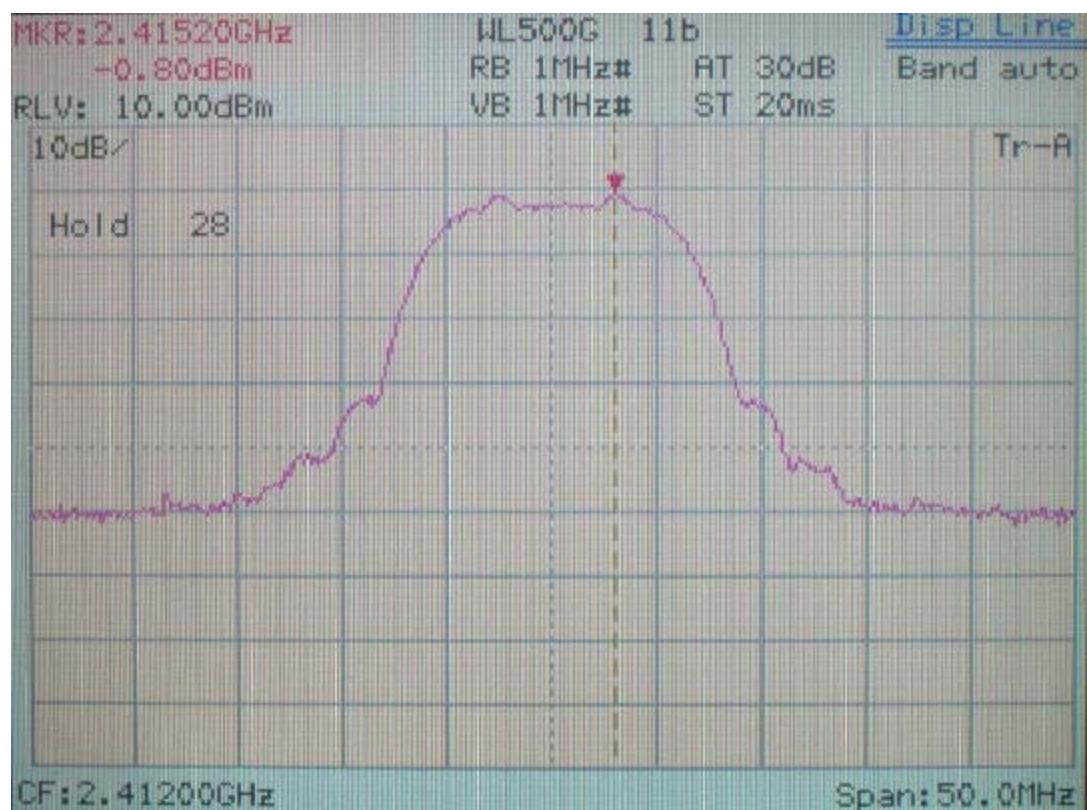
#### 3.2 Test Result of Peak Power Density for 802.11g

Channel	Frequency (MHz)	Rate (Mbps)	Ppr (dBm)	CF (dB)	Ppq (dBm)	Limit (dBm)	Margin (dB)
CH 1	2412	54	-0.05	6.60	6.55	10.00	-3.45
CH 7	2442	54	-1.08	6.60	5.52	10.00	-4.48
CH 11	2472	54	-1.33	6.70	5.37	10.00	-4.63

NOTE:

- (1)For equipment using FHSS modulation, the peak power density shall be limit to  
-10dBW(100mW) per 100kHz E.I.R.P.
- (2)For equipment using other types modulation, the peak power density shall be limit  
-20dBW(10mW) per MHz E.I.R.P.
- (3)Ppr: spectrum read power density (using peak search mode), CF: correct factor,  
Ppq: actual peak power density in the spread spectrum band.  $Ppq = Ppr + CF$
- (4)The value of table is worst case during test condition, includes different combination s of  
transmitter rate, antenna polarity and temperature
- (5)The data in the above table are summarizing the following attachment spectrum analyzer hard  
copy.
- (6)ETSI (2400MHz ~ 2483.5MHz), FRANCE (2446.5 MHz ~ 2483.5MHz)

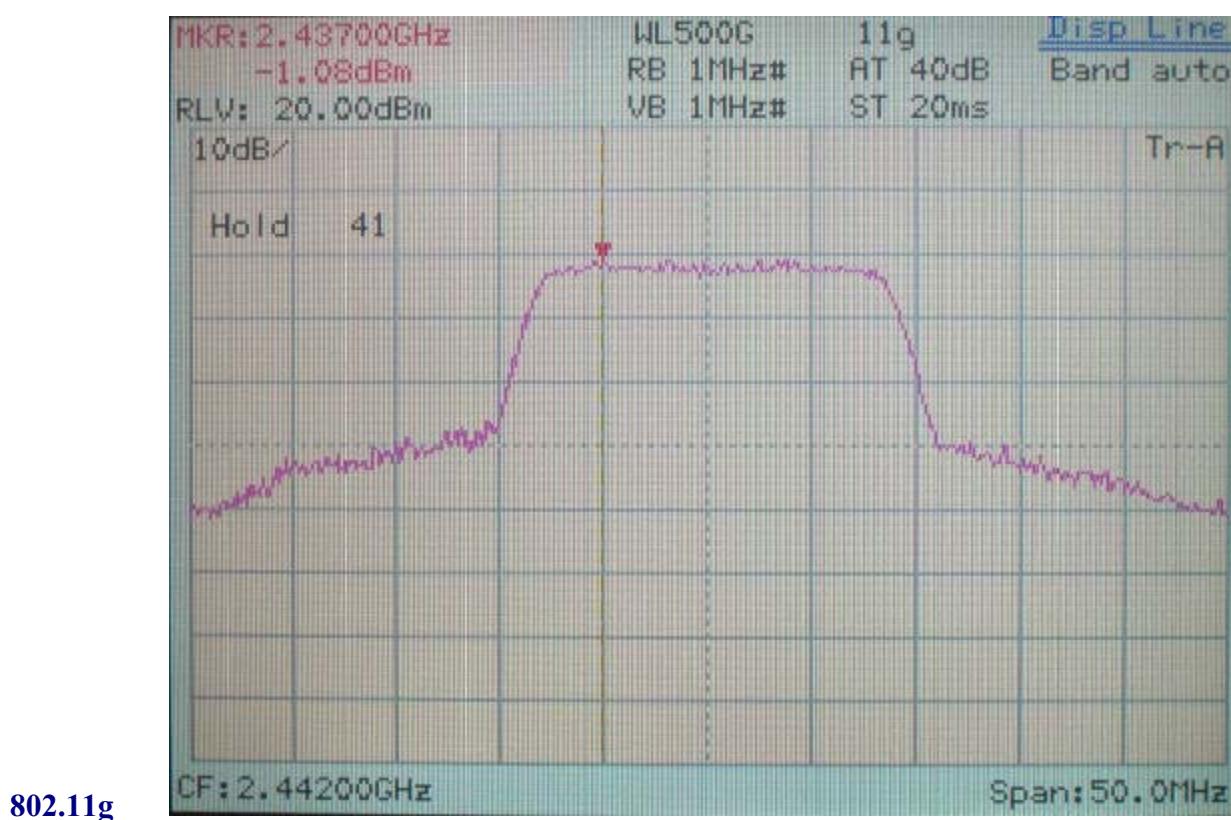
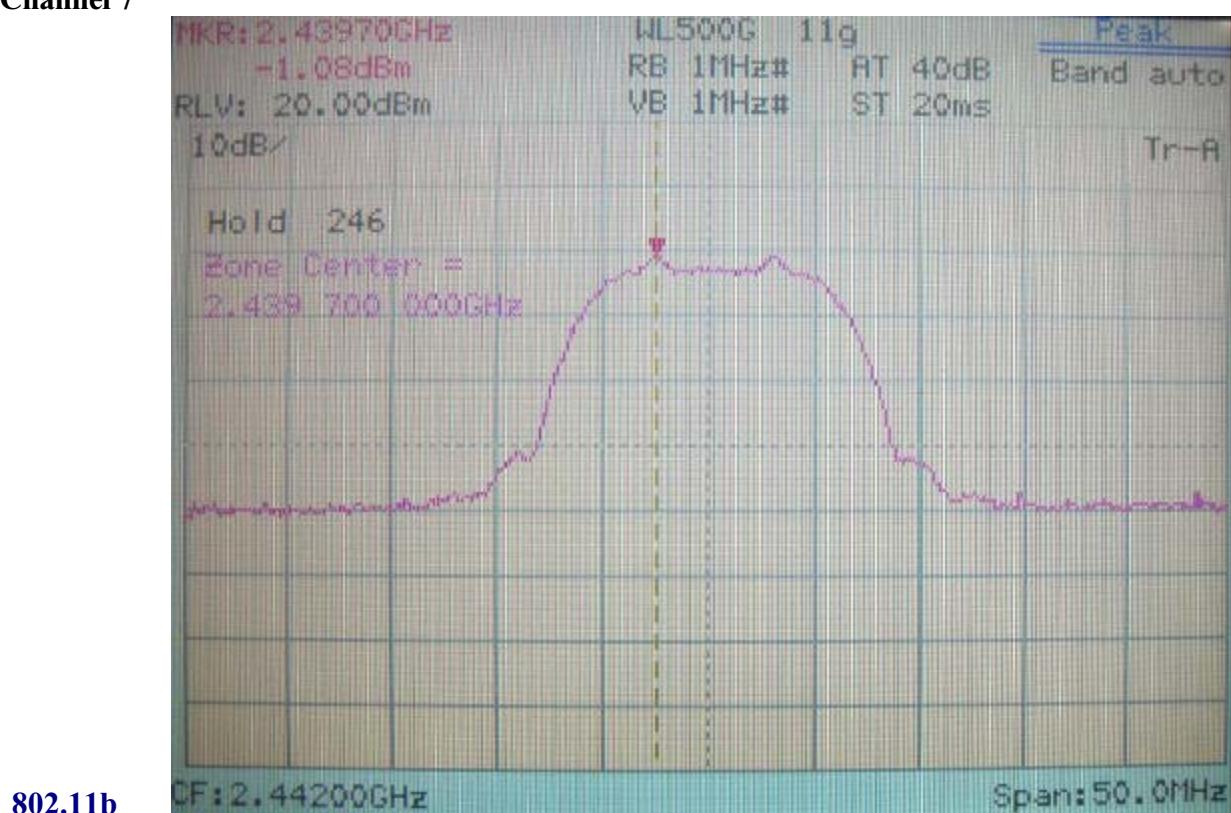
## Channel 1



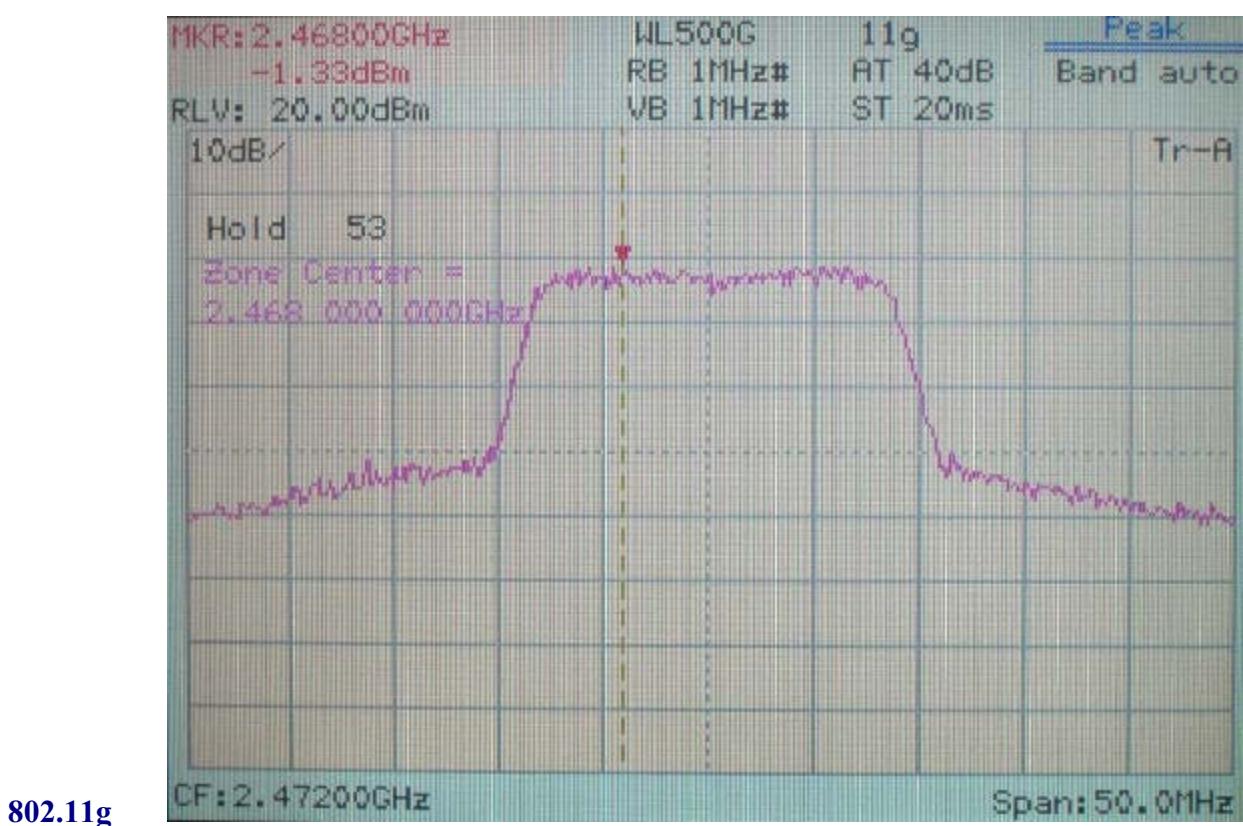
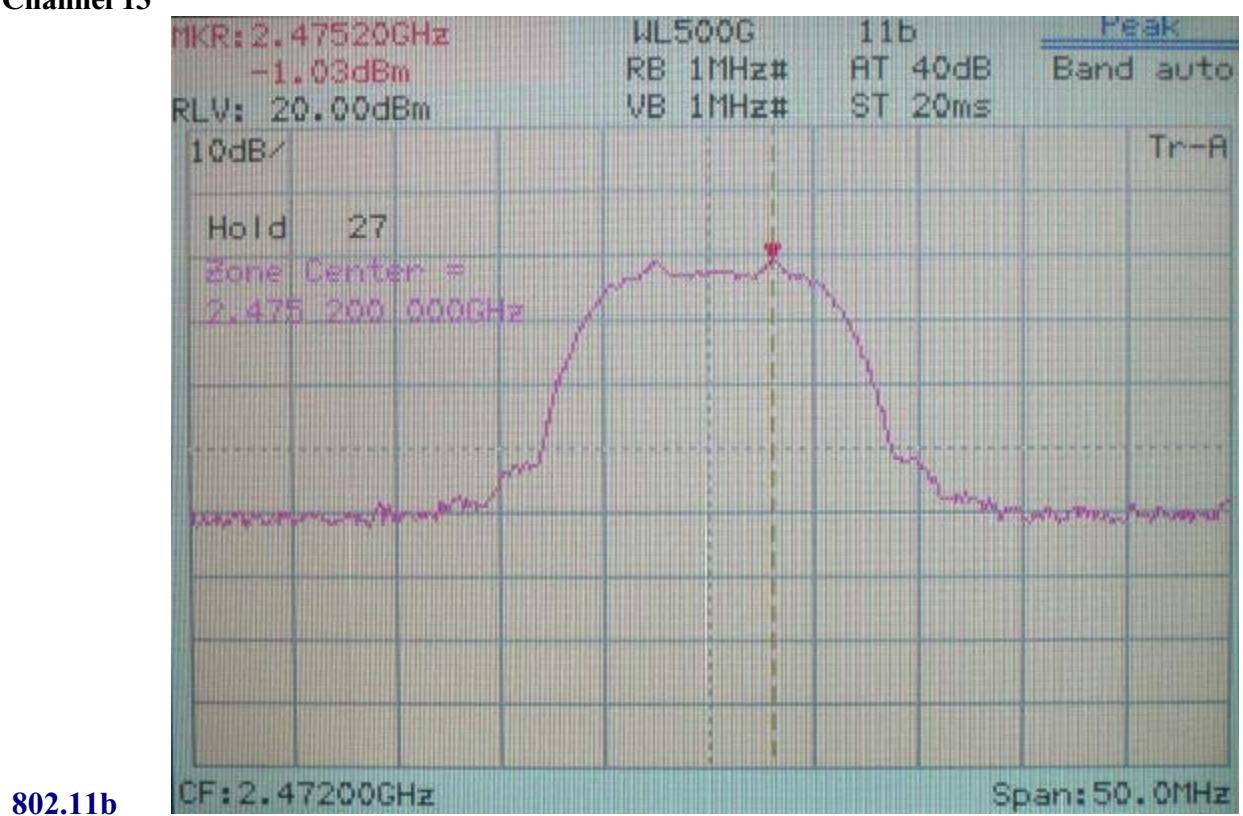
802.11b



## Channel 7



## Channel 13



## IV. Section 5.2.3 : Frequency Range

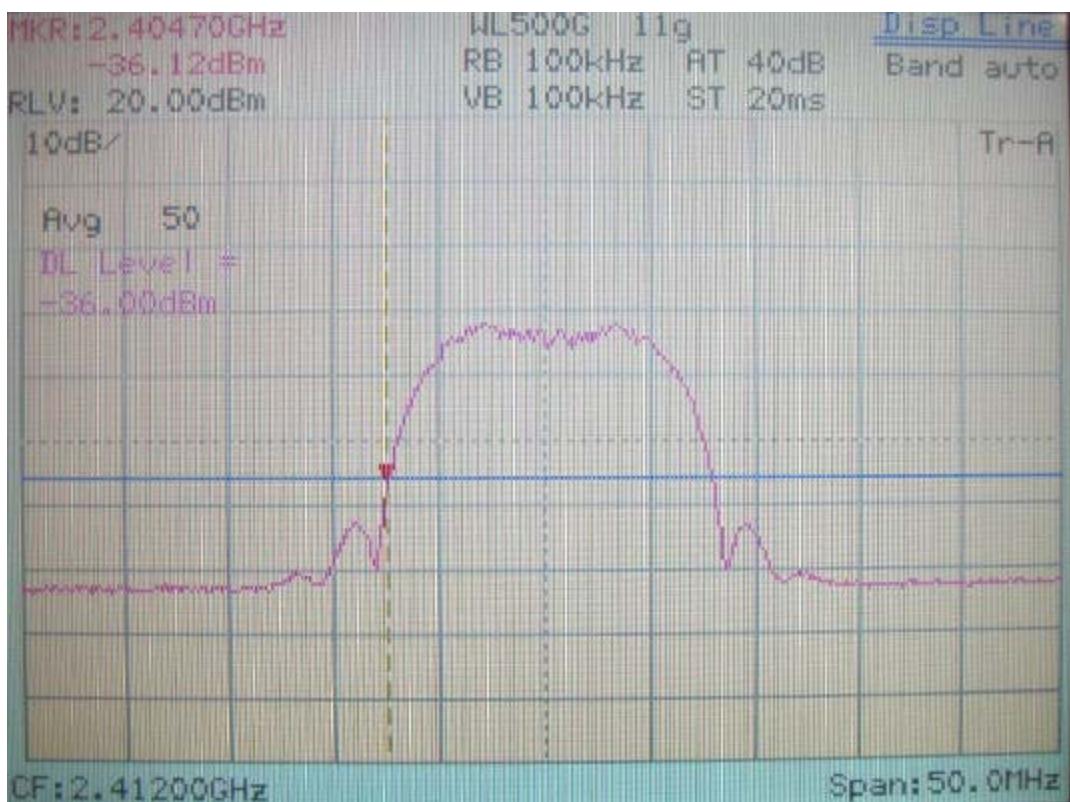
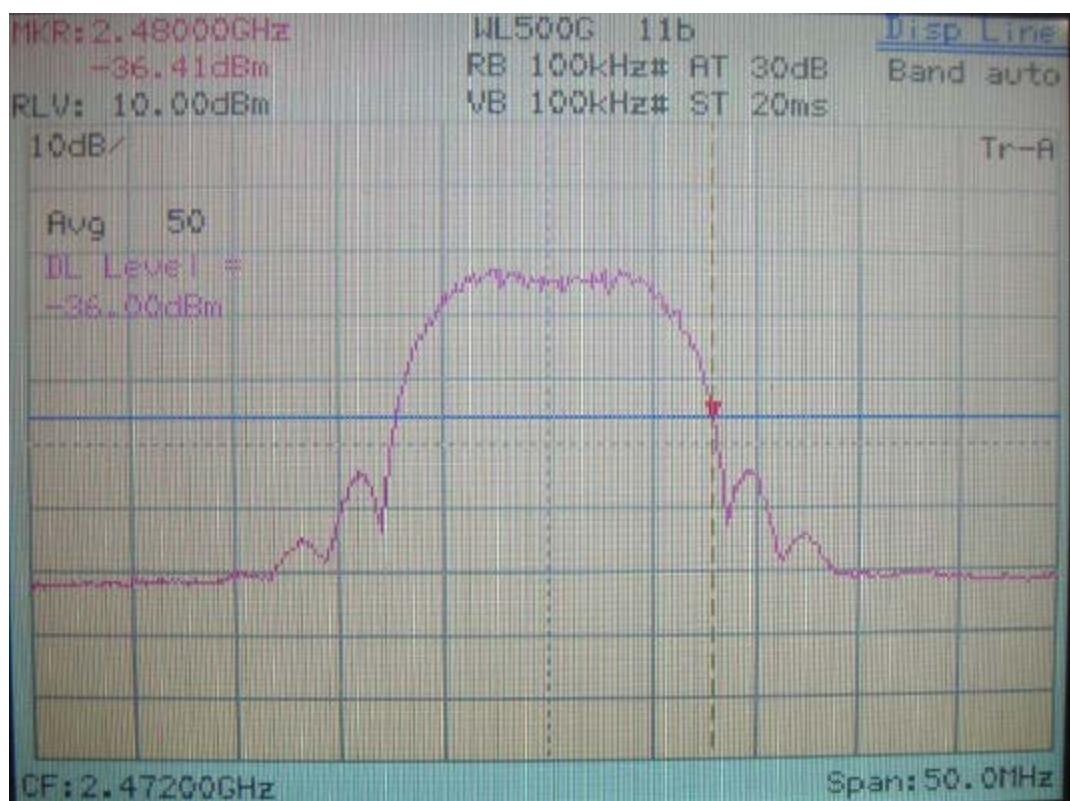
### 4.1 Test Result of Frequency Range for 802.11b

#### Transmitter Frequency Range – DSSS Equipment

TEST CONDITION	FREQUENCY(MHz)			
	Lowest Channel		Highest Channel	
	Channel 1		Channel 13	
	Frequency	Rate (Mbps)	Frequency	Rate (Mbps)
0°C	207 V	2404.80	11	2480.00
	253 V	2404.80	11	2480.00
25°C	230 V	2408.80	11	2480.00
35°C	207 V	2404.70	11	2480.00
	253 V	2404.80	11	2480.00
Measured frequencies (lowest and highest)	FL = 2404.70 MHz		FH = 2480.00 MHz	
Limit	FL > 2400MHz		FH < 2483.5MHz	

Note:

- (1) The E.U.T is a stand-alone radio device (see the clause 6.2.2). This is powered by the main. So, the AC power is used as the extreme voltage source. (see clause 6.3.2.1).
- (2) B: Battery, AC: AC Source, Rate: Transmitter Rate.
- (3) The value of table is worst case during test condition, includes different combinations of transmitter rate, antenna polarity and temperature.
- (4) The data in the above table are summarizing the following attachment spectrum analyzer hard copy.
- (5) ETSI(2400MHz~2483.5MHz), FRANCE(2446.5 MHz~2483.5MHz)

**Channel 1 (The lowest one in the frequency range)****Channel 13 (The greatest one in the frequency range)**

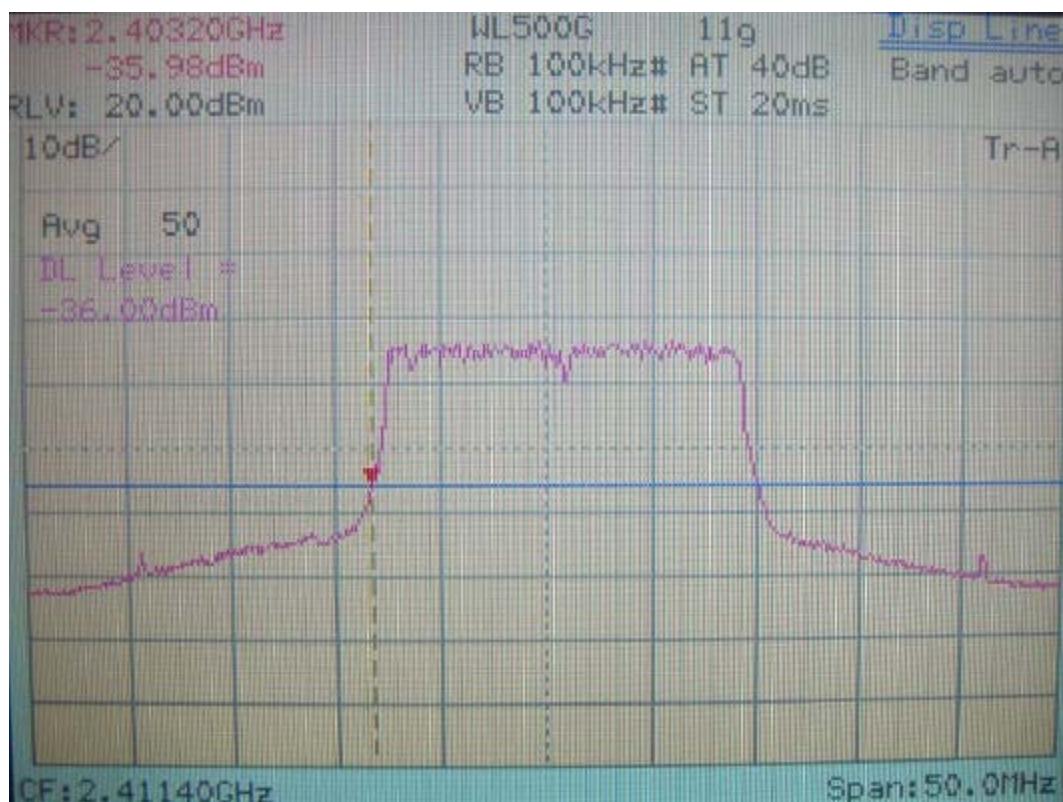
## 4.2 Test Result of Frequency Range for 802.11g

### Transmitter Frequency Range – DSSS Equipment

TEST CONDITION		FREQUENCY(MHz)			
		Lowest Channel		Highest Channel	
		Channel 1		Channel 13	
		Frequency	Rate (Mbps)	Frequency	Rate (Mbps)
0°C	207 V	2403.40	54	2481.40	54
	253 V	2403.30	54	2481.30	54
25°C	230 V	2403.20	54	2481.50	54
35°C	207 V	2403.20	54	2481.40	54
	253 V	2403.30	54	2481.50	54
Measured frequencies (lowest and highest)		FL = 2403.20 MHz		FH = 2481.50 MHz	
Limit		FL > 2400MHz		FH < 2483.5MHz	

Note:

- (1) The E.U.T is a stand-alone radio device (see the clause 6.2.2). This is powered by the main. So, the AC power is used as the extreme voltage source. (see clause 6.3.2.1).
- (2) B: Battery, AC: AC Source, Rate: Transmitter Rate.
- (3) The value of table is worst case during test condition, includes different combinations of transmitter rate, antenna polarity and temperature.
- (4) The data in the above table are summarizing the following attachment spectrum analyzer hard copy.
- (5) ETSI(2400MHz~2483.5MHz), FRANCE(2446.5 MHz~2483.5MHz)

**Channel 1 (The lowest one in the frequency range)****Channel 13 (The greatest one in the frequency range)**

## V. Section 5.2.4: Transmitter Spurious Emissions (Radiated)

### 5.1 Test Result of 802.11b

#### Channel 1 (30MHz to 1GHz)

Frequency (MHz)	A. P. (H/V)	LEVEL (dBm)	Limit (dBm)	Margin (dB)	Rate (Mbps)
438.01	H	-62.25	-36.00	-26.25	11
500.45	H	-59.65	-36.00	-23.65	11
624.73	H	-59.58	-36.00	-23.58	11
687.17	H	-57.52	-36.00	-21.52	11
718.09	H	-59.48	-36.00	-23.48	11
874.51	H	-59.18	-36.00	-23.18	11
122.15	V	-60.44	-36.00	-24.44	11
126.39	V	-61.54	-36.00	-25.54	11
176.11	V	-67.11	-36.00	-31.11	11
500.45	V	-64.37	-36.00	-28.37	11
600.48	V	-60.27	-36.00	-24.27	11
687.17	V	-63.10	-36.00	-27.10	11

Note:

- (1) A. P. means antenna polarization, horizontal and vertical.  
Amplitude means the fundamental emission measured  
C F. means Correct Factor, Rate means transmitter rate  
Corrected Factor (C. F.) = Cable Loss + Antenna Factor – Amplified Gain  
LEVEL = Amplitude + Corrected Factor
- (2) The margin is minus that means under limit.
- (3) The value of table is the worst case during test condition. This is including different combinations of transmitter rate antenna polarity and temperature.
- (4) ETSI (2400MHz~2483.5MHz), FRANCE (2446.5 MHz~2483.5MHz)

**Channel 13 (30MHz to 1GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
125.79	H	-63.01	-36.00	-27.01	11
375.56	H	-63.54	-36.00	-27.54	11
500.45	H	-59.32	-36.00	-23.32	11
624.73	H	-59.35	-36.00	-23.35	11
687.17	H	-58.01	-36.00	-22.01	11
874.51	H	-59.58	-36.00	-23.58	11
122.76	V	-60.27	-36.00	-24.27	11
126.39	V	-60.61	-36.00	-24.61	11
176.71	V	-66.88	-36.00	-30.88	11
500.45	V	-64.37	-36.00	-28.37	11
600.48	V	-60.37	-36.00	-24.37	11
687.17	V	-62.37	-36.00	-26.37	11

**Channel 1 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
2319.79	H	-51.40	-30.00	-21.40	11
2480.21	H	-52.23	-30.00	-22.23	11
4825.83	H	-63.19	-30.00	-33.19	11
7236.61	H	-61.70	-30.00	-31.70	11
2319.79	V	-55.24	-30.00	-25.24	11
4823.91	V	-65.03	-30.00	-35.03	11
7236.61	V	-60.37	-30.00	-30.37	11

**Channel 13 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
4937.92	H	-66.79	-30.00	-36.79	11
7424.67	H	-61.10	-30.00	-31.10	11
9887.25	H	-59.92	-30.00	-29.92	11
2319.79	V	-51.57	-30.00	-21.57	11
2400.00	V	-50.23	-30.00	-20.23	11
2560.42	V	-53.07	-30.00	-23.07	11
4954.83	V	-67.73	-30.00	-37.73	11
7424.67	V	-62.27	-30.00	-37.73	11
9887.25	V	-61.09	-30.00	-37.73	11

## 5.2 Test Result of 802.11g

### Channel 1 (30MHz to 1GHz)

Frequency (MHz)	A. P. (H/V)	LEVEL (dBm)	Limit (dBm)	Margin (dB)	Rate (Mbps)
122.15	H	-63.39	-36.00	-27.39	54
126.39	H	-62.86	-36.00	-26.86	54
375.56	H	-62.78	-36.00	-26.78	54
500.45	H	-57.93	-36.00	-21.93	54
687.17	H	-55.64	-36.00	-19.64	54
874.51	H	-58.79	-36.00	-22.79	54
122.15	V	-59.81	-36.00	-23.81	54
125.79	V	-60.27	-36.00	-24.27	54
201.57	V	-66.25	-36.00	-30.25	54
500.45	V	-62.98	-36.00	-26.98	54
600.48	V	-59.64	-36.00	-23.64	54
687.17	V	-61.22	-36.00	-25.22	54

**Channel 13 (30MHz to 1GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
122.15	H	-62.85	-36.00	-26.85	54
125.79	H	-62.13	-36.00	-26.13	54
438.01	H	-62.92	-36.00	-26.92	54
500.45	H	-59.01	-36.00	-23.01	54
687.17	H	-55.98	-36.00	-19.98	54
874.51	H	-58.14	-36.00	-22.14	54
122.15	V	-59.96	-36.00	-23.96	54
125.79	V	-61.02	-36.00	-25.02	54
375.56	V	-67.34	-36.00	-31.34	54
500.45	V	-63.16	-36.00	-27.16	54
601.09	V	-59.39	-36.00	-23.39	54
687.17	V	-62.50	-36.00	-26.50	54

**Channel 1 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
2319.79	H	-53.90	-30.00	-23.90	54
2480.21	H	-55.73	-30.00	-25.73	54
4817.08	H	-65.72	-30.00	-35.72	54
7333.44	H	-60.94	-30.00	-30.94	54
2319.79	V	-58.24	-30.00	-28.24	54
2480.21	V	-57.07	-30.00	-27.07	54
4832.19	V	-66.16	-30.00	-36.16	54
7333.44	V	-60.78	-30.00	-36.16	54

**Channel 13 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
2319.79	H	-58.24	-30.00	-28.24	54
2357.29	H	-58.59	-30.00	-28.59	54
2400.00	H	-58.07	-30.00	-28.07	54
4925.83	H	-64.16	-30.00	-34.16	54
7424.67	H	-61.60	-30.00	-31.60	54
2319.79	V	-49.90	-30.00	-19.90	54
2400.00	V	-49.23	-30.00	-19.23	54
2560.42	V	-52.57	-30.00	-22.57	54
4937.92	V	-67.12	-30.00	-37.12	54
7424.67	V	-62.43	-30.00	-32.43	54

### 5.3 Test Result of Standby mode

Frequency (MHz)	A. P. (H/V)	LEVEL (dBm)	Limit (dBm)	Margin (dB)	Rate (Mbps)
122.15	H	-63.17	-57.00	-6.17	11
125.79	H	-63.60	-57.00	-6.60	11
200.96	H	-63.02	-57.00	-6.02	11
375.56	H	-65.73	-57.00	-8.73	11
500.45	H	-59.46	-57.00	-2.46	11
601.09	H	-60.79	-57.00	-3.79	11
625.94	H	-60.95	-57.00	-3.95	11
687.17	H	-58.60	-57.00	-1.60	11
800.54	H	-61.26	-57.00	-4.26	11
874.51	H	-60.24	-57.00	-3.24	11
122.15	V	-59.31	-57.00	-2.31	11
125.79	V	-60.87	-57.00	-3.87	11
156.71	V	-66.65	-57.00	-9.65	11
200.96	V	-66.17	-57.00	-9.17	11
500.45	V	-66.17	-57.00	-9.17	11
600.48	V	-59.40	-57.00	-2.40	11
687.17	V	-61.65	-57.00	-4.65	11
874.51	V	-62.74	-57.00	-5.74	11
999.39	V	-59.43	-57.00	-2.43	11

## VI. Section 5.3.2: Receiver Spurious Emissions (Radiated)

### 6.1 Test Result of 802.11b

#### Channel 1 (30MHz to 1GHz)

Frequency (MHz)	A. P. (H/V)	LEVEL (dBm)	Limit (dBm)	Margin (dB)	Rate (Mbps)
122.15	H	-65.48	-57.00	-8.48	11
500.45	H	-65.28	-57.00	-8.28	11
600.48	H	-64.35	-57.00	-7.35	11
625.94	H	-64.27	-57.00	-7.27	11
687.17	H	-61.67	-57.00	-4.67	11
874.51	H	-63.61	-57.00	-6.61	11
122.15	V	-61.53	-57.00	-4.53	11
125.79	V	-62.64	-57.00	-5.64	11
375.56	V	-68.00	-57.00	-11.00	11
600.48	V	-63.98	-57.00	-6.98	11
687.17	V	-64.66	-57.00	-7.66	11
999.39	V	-59.31	-57.00	-2.31	11

Note:

- (1) A. P. means antenna polarization, horizontal and vertical.  
Amplitude means the fundamental emission measured.  
C F. means Correct Factor, Rate means transmitter rate  
Corrected Factor (C. F.) = Cable Loss + Antenna Factor – Amplified Gain  
LEVEL = Amplitude + Corrected Factor
- (2) The value of table is worst case during test condition, includes different combinations of transmitter rate antenna polarity and temperature
- (3) ETSI (2400MHz~2483.5MHz), FRANCE (2446.5 MHz~2483.5MHz)

**Channel 13 (30MHz to 1GHz)**

Frequency (MHz)	A. P. (H/V)	LEVEL (dBm)	Limit (dBm)	Margin (dB)	Rate (Mbps)
125.79	H	-66.51	-57.00	-9.51	11
500.45	H	-64.65	-57.00	-7.65	11
600.48	H	-64.35	-57.00	-7.35	11
625.34	H	-63.76	-57.00	-6.76	11
687.17	H	-62.17	-57.00	-5.17	11
874.51	H	-63.94	-57.00	-6.94	11
122.15	V	-60.62	-57.00	-3.62	11
125.79	V	-63.04	-57.00	-6.04	11
601.09	V	-63.68	-57.00	-6.68	11
624.73	V	-64.06	-57.00	-7.06	11
687.17	V	-64.07	-57.00	-7.07	11
999.39	V	-60.63	-57.00	-3.63	11

**Channel 1 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
1607.08	H	-61.66	-47.00	-14.66	11
1746.12	H	-65.34	-47.00	-18.34	11
1904.75	H	-64.43	-47.00	-17.43	11
2278.79	H	-65.46	-47.00	-18.46	11
3216.83	H	-62.70	-47.00	-15.70	11
1248.71	V	-66.50	-47.00	-19.50	11
1374.04	V	-66.48	-47.00	-19.48	11
1497.42	V	-63.81	-47.00	-16.81	11
1609.04	V	-65.98	-47.00	-18.98	11
1871.46	V	-66.71	-47.00	-19.71	11

**Channel 13 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
1648.21	H	-57.05	-47.00	-10.05	11
2239.62	H	-65.67	-47.00	-18.67	11
2408.04	H	-62.07	-47.00	-15.07	11
3297.12	H	-60.15	-47.00	-13.15	11
9984.83	H	-57.08	-47.00	-10.08	11
11629.83	H	-57.41	-47.00	-10.41	11
1248.71	V	-66.00	-47.00	-19.00	11
1497.42	V	-64.48	-47.00	-17.48	11
1648.21	V	-64.72	-47.00	-17.72	11
2120.17	V	-65.81	-47.00	-18.81	11
2868.25	V	-63.91	-47.00	-16.91	11

## 6.2 Test Result of 802.11g

### Channel 1 (30MHz to 1GHz)

Frequency (MHz)	A. P. (H/V)	LEVEL (dBm)	Limit (dBm)	Margin (dB)	Rate (Mbps)
42.73	H	-63.96	-57.00	-6.96	54
122.76	H	-65.36	-57.00	-8.36	54
501.66	H	-63.98	-57.00	-6.98	54
601.09	H	-65.48	-57.00	-8.48	54
687.17	H	-62.49	-57.00	-5.49	54
800.54	H	-63.85	-57.00	-6.85	54
122.15	V	-61.35	-57.00	-4.35	54
126.39	V	-63.43	-57.00	-6.43	54
500.45	V	-68.62	-57.00	-11.62	54
600.48	V	-63.75	-57.00	-6.75	54
687.17	V	-64.45	-57.00	-7.45	54
999.39	V	-60.05	-57.00	-3.05	54

Note:

- (1) A. P. means antenna polarization, horizontal and vertical.  
Amplitude means the fundamental emission measured.  
C F. means Correct Factor, Rate means transmitter rate  
Corrected Factor (C. F.) = Cable Loss + Antenna Factor – Amplified Gain  
LEVEL = Amplitude + Corrected Factor
- (2) The value of table is worst case during test condition, includes different combinations of transmitter rate antenna polarity and temperature
- (3) ETSI (2400MHz~2483.5MHz), FRANCE (2446.5 MHz~2483.5MHz)

**Channel 13 (30MHz to 1GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
43.34	H	-63.10	-57.00	-6.10	54
122.76	H	-65.51	-57.00	-8.51	54
501.66	H	-64.06	-57.00	-7.06	54
601.09	H	-64.19	-57.00	-7.19	54
687.17	H	-62.30	-57.00	-5.30	54
800.54	H	-64.93	-57.00	-7.93	54
122.76	V	-61.37	-57.00	-4.37	54
125.79	V	-63.06	-57.00	-6.06	54
500.45	V	-68.76	-57.00	-11.76	54
601.09	V	-64.24	-57.00	-7.24	54
687.17	V	-66.00	-57.00	-9.00	54
999.39	V	-59.57	-57.00	-2.57	54

**Channel 1 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
1607.08	H	-61.49	-47.00	-14.49	54
1746.12	H	-66.01	-47.00	-19.01	54
2157.37	H	-66.49	-47.00	-19.49	54
2319.92	H	-64.56	-47.00	-17.56	54
3216.83	H	-63.86	-47.00	-16.86	54
1497.42	V	-64.48	-47.00	-17.48	54
1622.75	V	-66.27	-47.00	-19.27	54
2120.17	V	-66.98	-47.00	-19.98	54
2866.29	V	-63.92	-47.00	-16.92	54
5345.54	V	-63.26	-47.00	-16.26	54

**Channel 13 (1GHz to 12.75GHz)**

<b>Frequency (MHz)</b>	<b>A. P. (H/V)</b>	<b>LEVEL (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Rate (Mbps)</b>
1099.87	H	-68.05	-47.00	-21.05	54
1360.33	H	-68.42	-47.00	-21.42	54
1648.21	H	-55.72	-47.00	-8.72	54
1746.12	H	-66.34	-47.00	-19.34	54
3297.12	H	-59.15	-47.00	-12.15	54
1248.71	V	-66.00	-47.00	-19.00	54
1374.04	V	-68.14	-47.00	-21.14	54
1497.42	V	-64.81	-47.00	-17.81	54
1648.21	V	-64.88	-47.00	-17.88	54
2705.71	V	-64.97	-47.00	-17.97	54

## VII. Instrument and Ancillaries Equipment of List

No.	Type of Equipment	Brand Name	Model No.	Serial No.
01	EMI Receiver	H P	8546A	3520A00242
02	RF Filter Section	H P	85460A	3448A00217
03	Auto Switch Box	TRC	ASB-01	9904-01
04	Spectrum Analyzer	H P	8564E	US36433002
05	Spectrum Analyzer	Anritsu	MS2665C	6200175476
06	Microwave Pre. Amp.	H P	83051A	3232A00347
07	Horn Antenna	EMCO	3115	9704 – 5178
08	EM Rad. Monitor	WG	EMC-20	Y-0026
09	E-Field Sensor 3GHz	WG	TYP-8	Z-0001
10	RF Power Meter	BOONTON	4532	117501
11	Signal Generator	HP	83711A	3429A00434
12	Bi-log Antenna	Schaffner	CBL6141A	4151
13	Temp.& Hum. Chamber	King Son	THS-ML1	240
14	EMC Analyzer	HP	8594EM	3710A00279
15	DC Power Supply	GW	GPC-3030D	8050381
16	AC Power Supply	Ch. Hong	CF-3000E	974302
17	Digital Multimeter	GW	GDM-8055	8080365
18	Small Bi-con. Ant.	Schwarzbeck	UBAA9114	127 (CE use)
19				128 (FCC use)

## *Appendix A*

### **Antenna Specification**

<b>NInput Output</b> Enterprise Corp.	<b>PRODUCT SPECIFICATION</b>	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： 埃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.

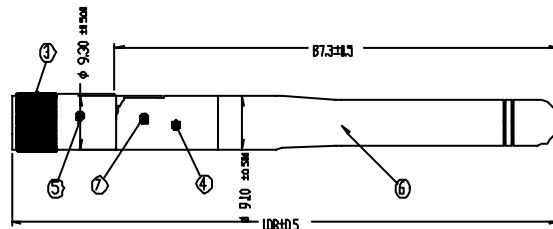
## PRODUCT SPECIFICATION

2.4 G ANTENNA WITH RP-SMA PLUG

DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C



WF%~??

### 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	鎖仔	Brass	鍍銀
6	帽套	TPR	Black
5	底座	ABS	Black
4	天線架	ABS	Black
3	RP SMA母頭	Brass	鍍銀
2	Contacter 端子	BeCopper	鍍金30μ"
1	RP SMA主體	Brass	鍍金4μ"

ITEM DESCRIPTION MATERIALS FINISHED

REV.	DESCRIPTION	ECN	DRAWN	DATE	REVISIONS	FILE		INPUT	OUTPUT
						NAME	DESIGNER	VER	DATE
A	Sample		Yang	07/30/2002		W201-108-D2	W201-108-D2	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

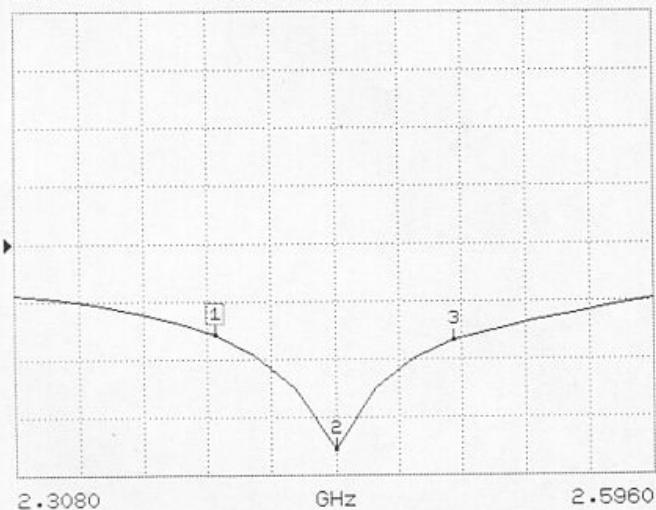
START: 2.3080 GHz GATE START: - ERROR CORR: REFL ONLY  
STOP: 2.5960 GHz GATE STOP: - AVERAGING: 1 PTS  
STEP: 0.0180 GHz GATE: - IF BNDWDTH: REDUCED  
WINDOW: -

-----CH1-----

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

S11 FORWARD REFLECTION

LOG MAG. ►REF=0.000dB 10.000dB/DIV



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

<b>NInput Output</b> Enterprise Corp.	<b>PRODUCT SPECIFICATION</b> 2.4 G ANTENNA WITH RP-SMA PLUG	DOC. No: WL-TL-17 DATE: 25-MAR-02 REV. : C
--	--	--

## **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°C ~ +50°C
- 2-5 Storage Temperature Range ..... -20°C ~ +50°C

## **10 ANTENNA PATTERN**

ANTENNA TEST NO.

TEST DATE: 10/10/02

TEST FREQUENCY: 2450GHz

TEST POLARIZATION: VERTICAL  
(H-PLANE)

TEST ANTENNA: HORN ANTENNA

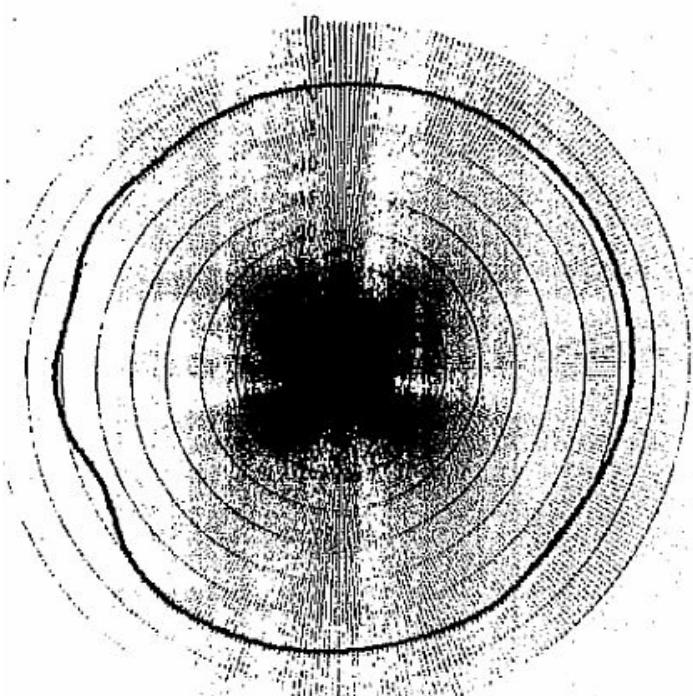
TEST CHAMBER: RF CHAMBER

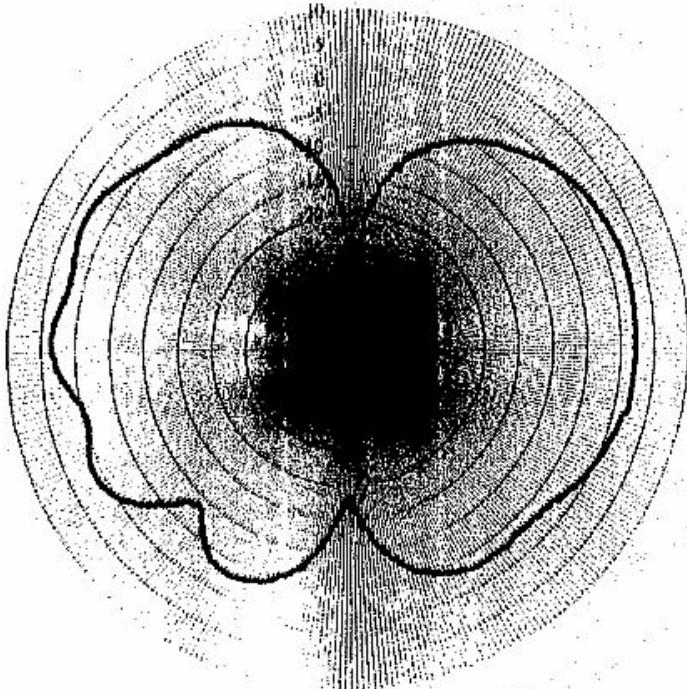
TEST PERSONNEL: Yang

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

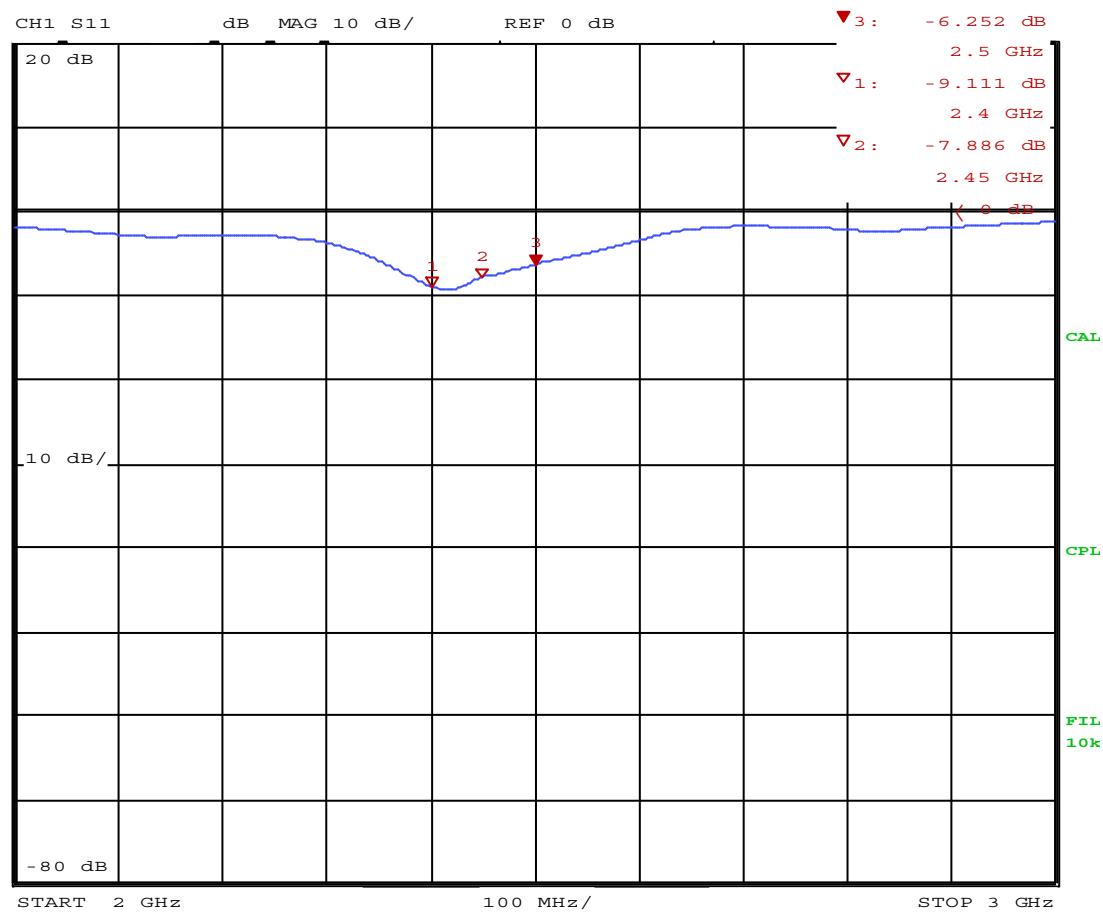
TEST PERSONNEL: Yang

MAX GAIN: 3.52 dBi

MIN GAIN: -35.06 dBi

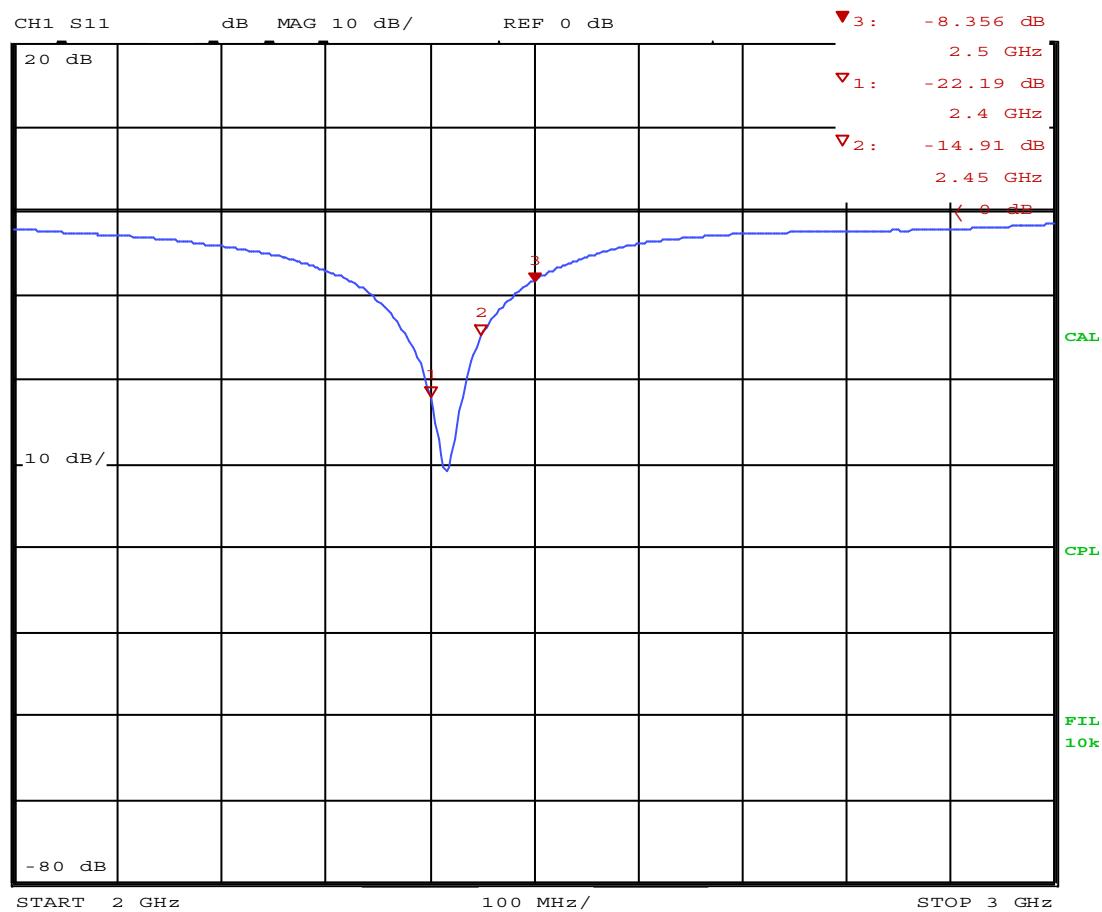
AVE GAIN: -3.38 dBi

return loss of small I-F antenna on main board (1058x932x16M wmf)

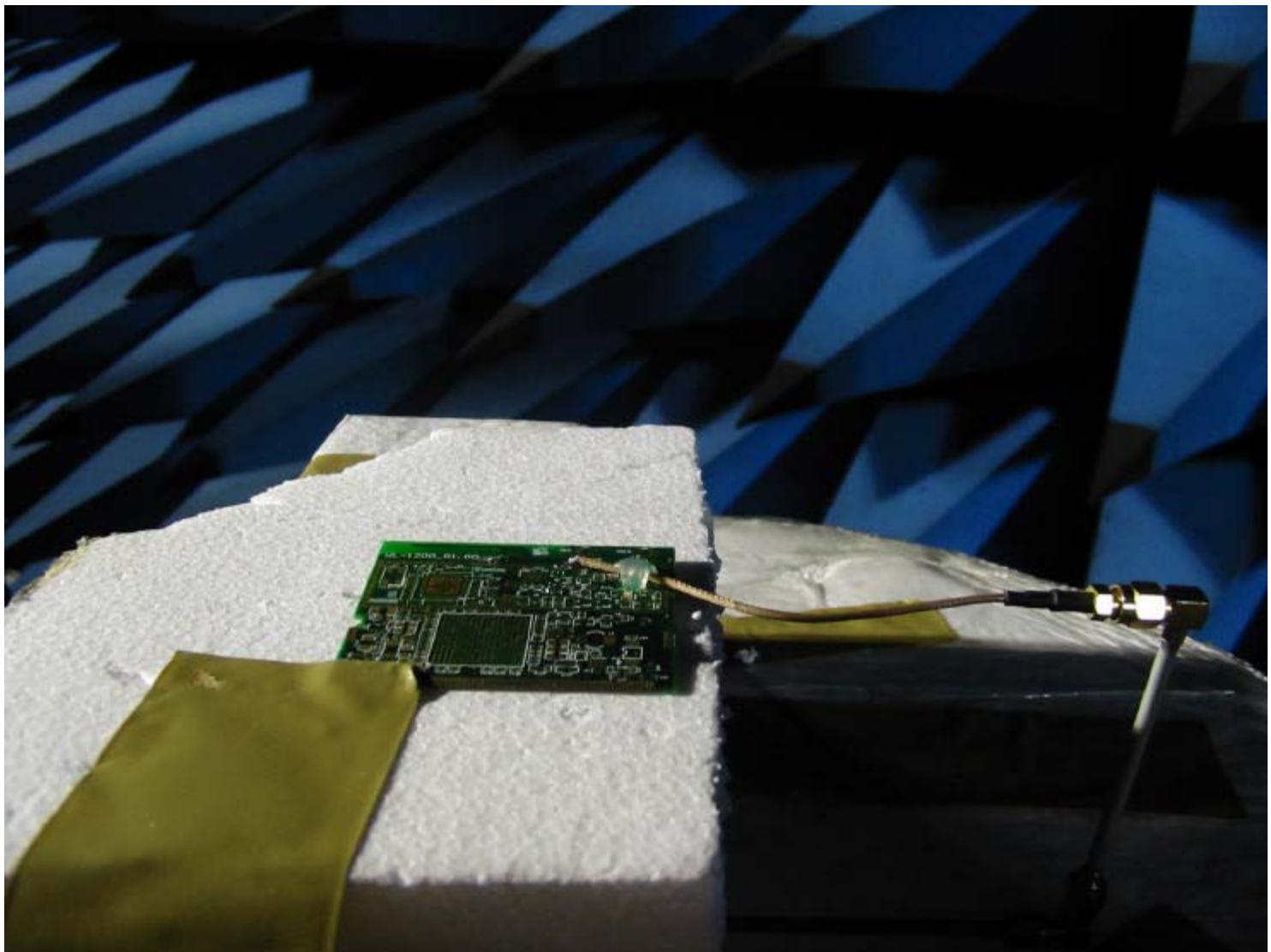


Date: 28 . MAR . 03 02 : 18 : 30

return loss of small I-F antenna (1058x932x16M wmf)

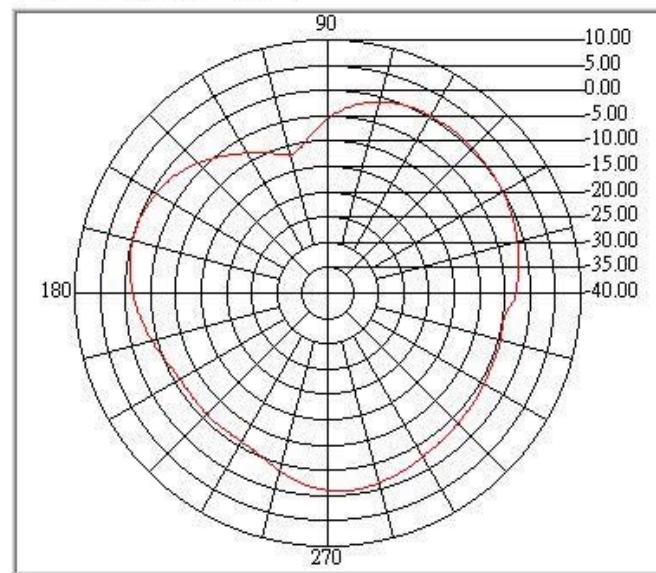


WL120G-X (1200x1600x16M.jpg)



**Model No:** WL120G-X      **Antenna Position:** Horizontal

**Frequency**  **MHz**



**Peak:** 0.55 dBi

**Peak Angle:** 49.59 Degree

**Average:** -3.28 dBi

Test engineer: \_\_\_\_\_

Test date: 2003/4/1 at AM 08:49

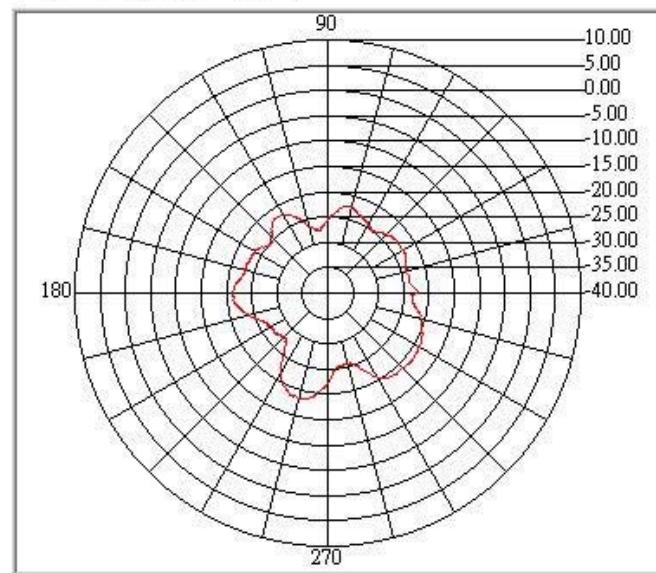
*Traininig Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

**Model No:** WL120G-X      **Antenna Position:** Vertical

**Frequency**  **MHz**



**Peak:** -18.39 dBi

**Peak Angle:** 254.08 Degree

**Average:** -23.06dBi

Test engineer: \_\_\_\_\_

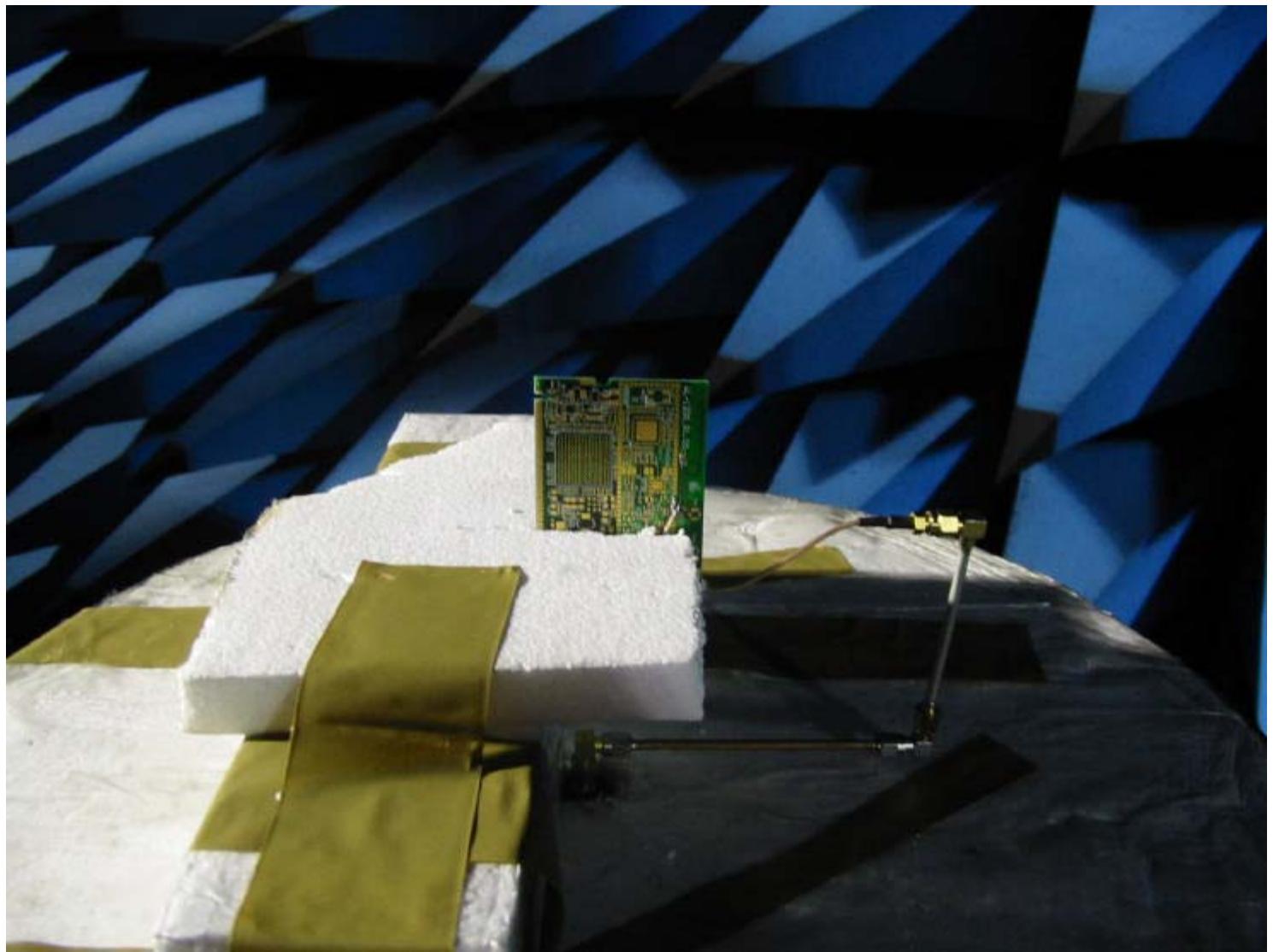
Test date: 2003/4/1      at AM 08:46

*Traininig Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

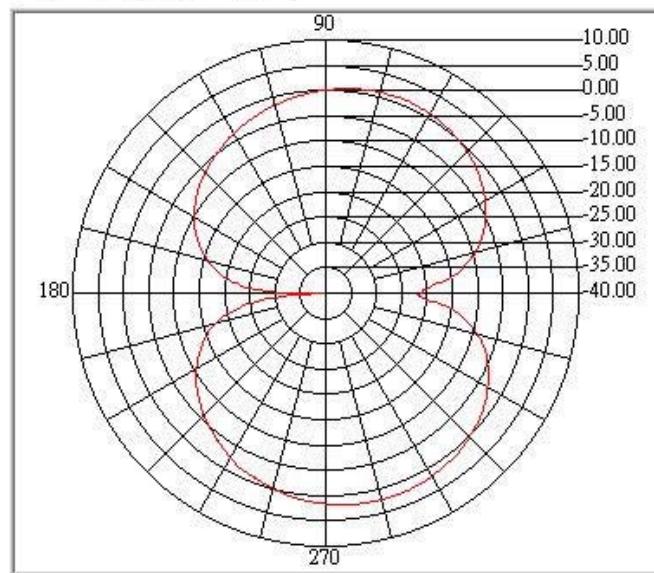
URL: <http://www.trclab.com.tw>

WL120G-Y (1200x1600x16M.jpg)



**Model No:** WL120G-Y      **Antenna Position:** Horizontal

**Frequency**  MHz



**Peak:** 2.24 dBi

**Peak Angle:** 284.69 Degree

**Average:** -5.91 dBi

Test engineer: \_\_\_\_\_

Test date: 2003/4/1 at AM 08:57

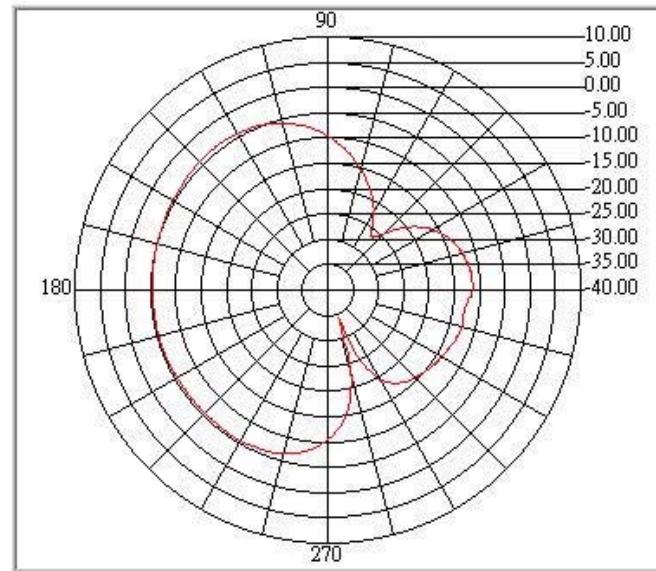
*Traininig Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

**Model No:** WL120G-Y      **Antenna Position:** Vertical

**Frequency**  **MHz**



**Peak:** -4.04 dBi

**Peak Angle:** 127.96 Degree

**Average:** -11.11dBi

Test engineer: \_\_\_\_\_

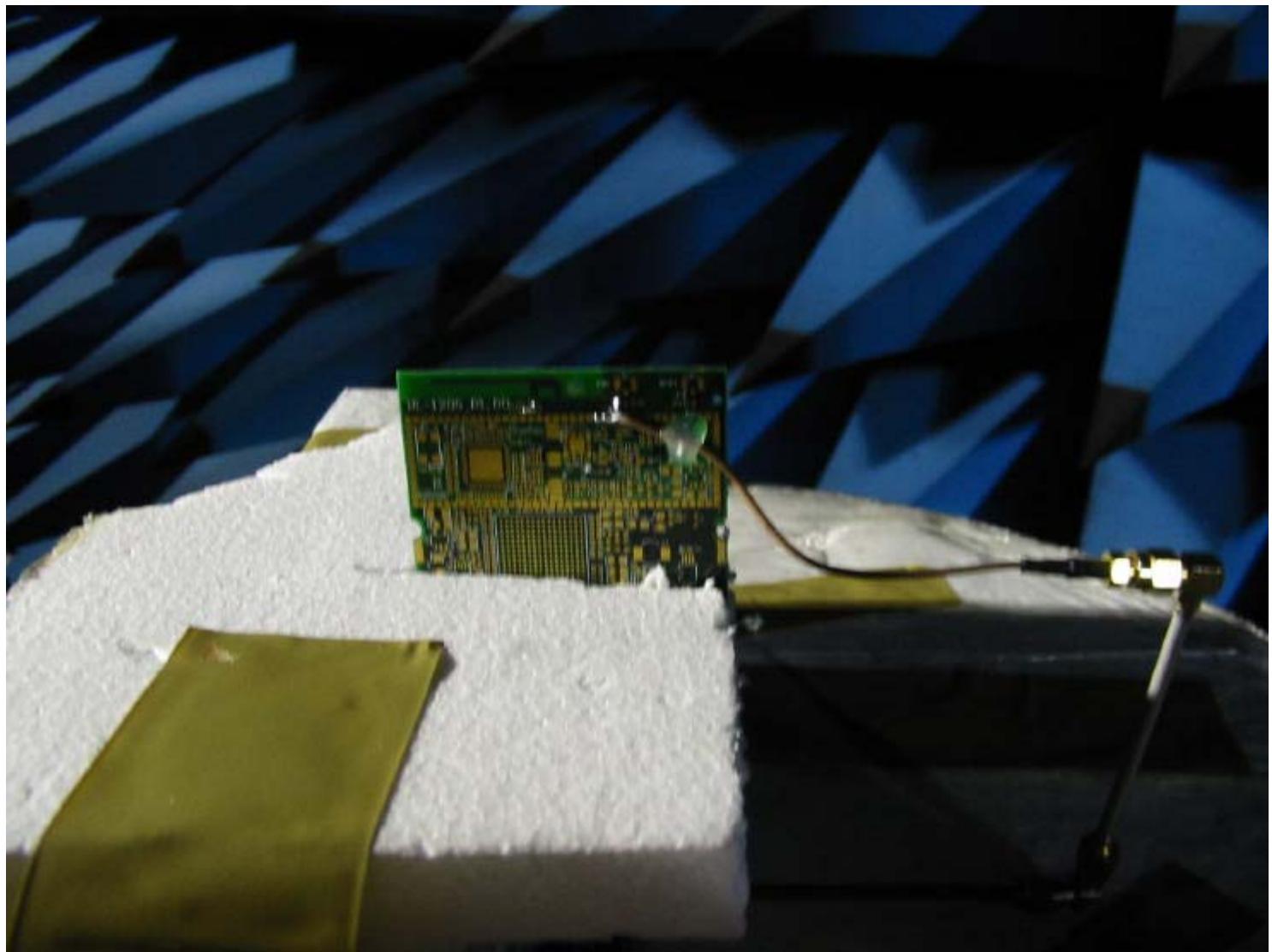
Test date: 2003/4/1 at AM 08:58

*Traininig Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

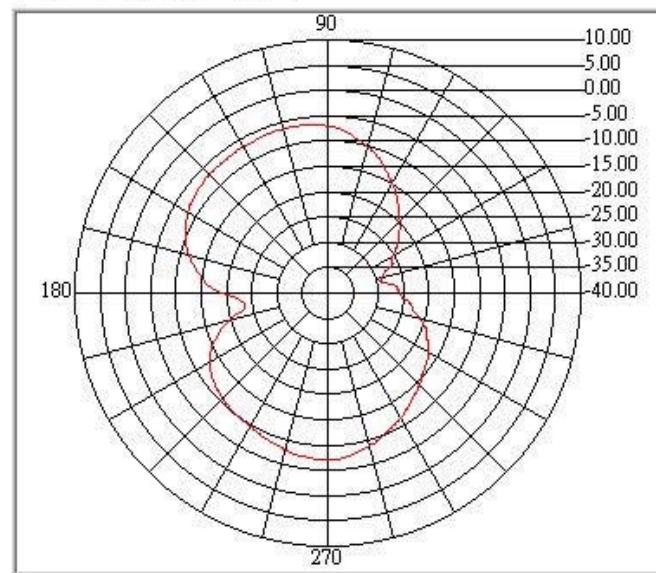
URL: <http://www.trclab.com.tw>

WL120G-Z (1200x1600x16M.jpg)



**Model No:** WL120G-Z      **Antenna Position:** Horizontal

**Frequency**  **MHz**



**Peak:** -6.37 dBi

**Peak Angle:** 105.88 Degree

**Average:** -13.80dBi

Test engineer: \_\_\_\_\_

Test date: 2003/4/1 at AM 09:03

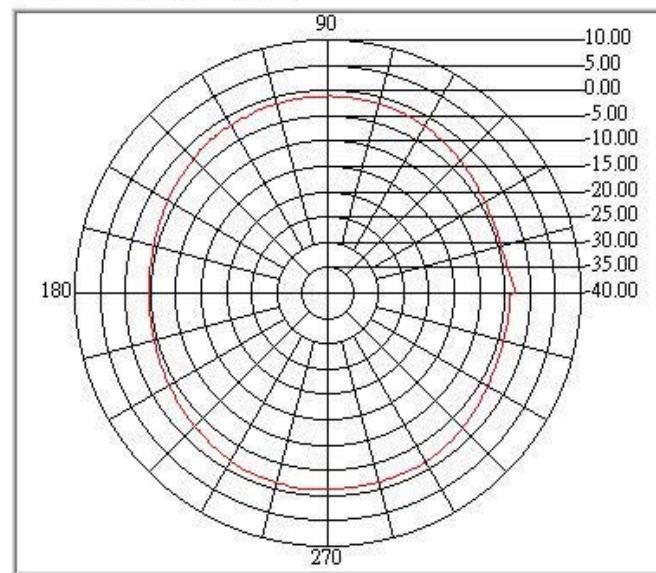
*Traininig Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

**Model No:** WL120G-Z      **Antenna Position:** Vertical

**Frequency**  **MHz**



**Peak:** -1.00 dBi

**Peak Angle:** 263.05 Degree

**Average:** -2.70 dBi

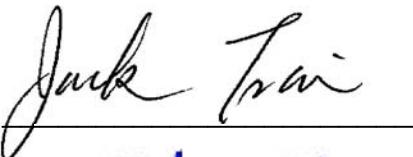
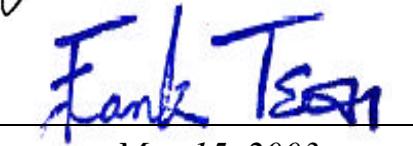
Test engineer: \_\_\_\_\_

Test date: 2003/4/1 at AM 09:01

*Traininig Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

Report No.	A54ET560
Specifications	ETSI EN 301 489-1 V1.4.1 (August, 2002) ETSI EN 301 489-17 V1.2.1 (August, 2002)
Applicant	ASUSTek Computer Inc.
Applicant address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.
Items tested	Wireless Router
Model No.	WL-500g (Sample # A54560)
Results	<b>Compliance</b> (As detailed within this report)
Date	04/04/2003 (month / day / year) (Sample received) 04/26/2003 (month / day / year) (Test)
Prepared by	 Project Engineer (Jack Tsai)
Authorized by	 General Manager (Frank Tsai)
Issue date	May 15, 2003 (month / day / year)
<b>Modifications</b>	<b>None</b>
Tested by	Training Research Co., Ltd.
Office at	No. 255, Nan Yang Street, Shijr City, Taipei Hsien 221, Taiwan
Laboratory at	1F, No. 255, Nan Yang Street, Shijr City, Taipei Hsien 221, Taiwan
Open site at	No. 15, Lane 530, Balian Rd., Sec. 1, Shijr City, Taipei Hsien 221, Taiwan

**Conditions of issue:**

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.

★ Aut. No. ELA 131

***Generally Statement:***

**The results appear in the following order:**

Electromagnetic compatibility and radio spectrum matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services;

**Part 1:** Common Technical requirements

**Part 17:** Specific conditions for Wideband data and HIPERLAN equipment.

The results exhibits below only apply to particular samples tested and to the specific tests carried out, as detailed in this Test Report. The issue of this Test Report does not indicate any measure of Approval, Certification, Supervision, Control or Surveillance by Training Research Co., Ltd. of any product. No extract, abridgement or abstraction from a Test Report may be published or used to advertise a product without the written consent of the Director, Training Research Co., Ltd. who reserves the absolute right to agree or reject all or any of the details of any item of publicity for which consent may be sought.

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## ***Chapter 0 Emission and Susceptibility Standards***

### ***Emission Standards***

Emission Standard	European Standard	International Standard
( )	EN 61000-6-3/2001	IEC 61000-6-1/1996
( )	EN 61000-6-4/2001	IEC 61000-6-1/1997
( )	EN 50081-1/1992	
( )	EN 50081-1/8.93	
( )	EN 55014/4.93	CISPR 14: 1993
( )	EN 55015/12.93	CISPR 15: 1992
( )	EN 55011/91	CISPR 11: 1990
( X )	EN 55022/98	CISPR 22: 1997
( X )	EN 61000-3-2/2000	IEC 61000-3-2: 2000 (Modified)
( X )	EN 61000-3-3/1995	IEC 61000-3-3: 1994 + A1/2001

### ***Susceptibility Standards***

Susceptibility Standard	European Standard	International Standard
( )	EN 61000-6-1/2001	IEC 61000-6-1/1997
( )	EN 61000-6-2/2001	IEC 61000-6-1/1999
( )	EN 50082-1/1997	
( )	EN 50082-2/1994	
( )	EN 55024/1998	CISPR 24/1997
( )	EN 55020/2002	CISPR 20/2002
( X )	EN 61000-4-2:1995	IEC 61000-4-2:1995
( X )	EN 61000-4-3:1996	IEC 61000-4-3:1995
( X )	EN 61000-4-4:1995	IEC 61000-4-4:1995
( X )	EN 61000-4-5:1995	IEC 61000-4-5:1995
( X )	EN 61000-4-6:1996	IEC 61000-4-6:1996
( )	EN 61000-4-8:1993	IEC 61000-4-8:1993
( X )	EN 61000-4-11:1994	IEC 61000-4-11:1994
( )	EN 55014-2:1993	CISPR/F (Sec) 159

## ***Chapter 1 Introduction***

### ***Description of EUT***

<b>Product Name</b>	: Wireless Router
<b>Model Name</b>	: WL-500g
<b>Frequency Range</b>	: 2.400GHz ~ 2.4835GHz
<b>Operating Frequency</b>	: 2.412GHz ~ 2.472GHz
<b>Support Channel</b>	: 13 Channel
<b>Modulation Skill</b>	: DBPSK, DQPSK, CCK, OFDM
<b>Power Type</b>	: Switching Power Adaptor Mfg.: DVE M/N: DSA-0101F-05 A I/P: 100-240Vac, 50-60Hz; 0.3A, 15VA O/P: 5Vdc, 2.0A, 10W
<b>Power Cable</b>	: 185cm long, non-shielded, incorporates a ferrite core
<b>Data Cable</b>	: RJ45 cable x 4: 1.2m, non-shielded, no ferrite core RJ45 cable x 1: 30m, non-shielded, no ferrite core USB cable x 1: 271cm, shielded, no ferrite core Parallel data cable x 1: 170cm, shielded, no ferrite core

### ***Test Method***

1. Using the LAN port of far-end computer and software provided by the manufacturer to control the EUT. The test is performed under those specific conditions.
2. Then making EUT to the following mode.
  - (a) EMI testing: making EUT to the linking, image display, and printing mode with support equipments
  - (b) EMS testing: same as above

## ***List of Support Equipment***

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

<b>PC</b>	<b>: HP Pavilion 500</b>
Model No.	: P8574A
Serial No.	: TW219204335, TW219204345
FCC ID	: N/A, DoC (Declaration of Confirmation) 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
<b>Monitor</b>	<b>: HP 15' Color Monitor</b>
Model No.	: D2827A, D2832A
Serial No.	: KR91161719, MY90615892
FCC ID	: C5F7NFCMC1518X, N/A (DoC Approved)
檢磁	: 3872B039, 4872A167
Power type	: 100 ~ 240 VAC / 50 ~ 60 Hz, Switching
Power cord	: Shielded, 1.80m long, No ferrite core
Data cable	: Shielded, 1.50m long, with two ferrite cores
<b>Keyboard</b>	<b>: HP</b>
Model No.	: 5181, SK-2501K
Serial No.	: BE21700405, M981216213
FCC ID	: Doc Approved, GYUR38SK
檢磁	: 3892C981, 3862A621
Power type	: By PC
Data cable	: Shielded, 1.70m length, with ferrite core
<b>Mouse</b>	<b>: HP</b>
Model No.	: M-UR89, M-S34
Serial No.	: LZS21750238, LZC84446151
FCC ID	: Doc Approved, DZL211029
檢磁	: 3892D767, 4862A011
Power type	: By PC
Power cord	: Shielded, 1.80m length, 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

**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

**USB**

**Gamepad** : **Rockfire**  
 Model No. : QF-337uv  
 Serial No. : 10600545  
 FCC ID : None (CE approval)  
 檢磁 : 3862A574  
 Power type : By computer  
 Data Cable : Shielded, 1.81m long, Plastic, with ferrite core

**WLAN Card** : **Gemtek Technology Co., Ltd.**

Model No. : C911003

FCC ID : MXF-C911003

**Notebook** : **ASUSTek Computer**

Model No. : AB00F

Serial No. : 24NP016370

FCC ID : Doc Approved

BSMI : 41016012

Power type : 100 ~ 240VAC, 1A 50/60 Hz, Switching

**Power Adaptor** : **LITE-ON Electronics, Inc.**

Model No. : PA-1530-01

Serial No. : 00153468

FCC ID : Doc Approved

檢磁 : 3882B259

Power cable : Non-shielded, 1.72m length, Plastic hood, No ferrite core  
(Between power adaptor to and AC power source)

Power cable : Shielded, 1.48m length, Plastic hood, with ferrite core  
(Between power adaptor and notebook)

**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

## ***Chapter 2 Emission and Immunity Requirements Overview***

### ***Emission (ETSI EN 301 489-1)***

Phenomenon	Application	Equipment test requirement			Reference Subclause in the present document
		Radio and ancillary equipment for fixed use (base station equipment)	Radio and ancillary equipment for vehicular use (mobile equipment)	Radio and ancillary equipment for portable use (portable equipment)	
Radiated emission	Enclosure of ancillary equipment	Applicable for stand alone testing	Applicable for stand alone testing	Applicable for stand alone testing	8.2
Conducted emission	DC power input/output port	Applicable	Applicable	Not applicable	8.3
Conducted emission	AC mains input/output port	Applicable	Not applicable	Not applicable	8.4
Harmonic current emissions	AC mains input port	Applicable	Not applicable	Not applicable	8.5
Voltage fluctuations and flicker	AC mains input port	Applicable	Not applicable	Not applicable	8.6

**Immunity (ETSI EN 301 489-1)**

Phenomenon	Application	Equipment test requirement			Reference Subclause in the present document
		Radio and ancillary equipment for fixed use (base station equipment)	Radio and ancillary equipment for vehicular use (mobile equipment)	Radio and ancillary equipment for portable use (portable equipment)	
RF electromagnetic field ( 80MHz to 1GHz)	Enclosure	Applicable	Applicable	Applicable	9.2
Electrostatic discharge	Enclosure	Applicable	Applicable	Applicable	9.3
Fast transients common mode	Signal, telecommunication and control ports, DC and AC power ports	Applicable	Not applicable	Not applicable	9.4
RF common mode 0.15 MHz to 80MHz	Signal, telecommunication and control ports, DC and AC power ports	Applicable	Applicable	Not applicable	9.5
Transients and surges	DC power input ports	Not applicable	Applicable	Not applicable	9.6
Voltage dips and interruptions	AC mains power input ports	Applicable	Not applicable	Not applicable	9.7
Surges, line to line and line ground	AC mains power input ports, telecommunication ports	Applicable	Not applicable	Not applicable	9.8

## Chapter 3 Performance Criteria

### *ETSI EN 301 489-17, Subclause 6.2*

**Table 1 Performance criteria**

<b>Criteria</b>	<b>During test</b>	<b>After test</b>
<b>A</b>	Shall operate as intended May show degradation of performance ( <b>NOTE 1</b> ) Shall be no loss of function Shall be no unintentional transmissions	Shall operate as intended Shall be no degradation of performance ( <b>NOTE 2</b> ) Shall be no loss of function Shall be no loss of stored data or user programmable functions
<b>B</b>	May show loss of function (one or more) May show degradation of performance ( <b>NOTE 1</b> ) No unintentional transmissions	Function shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance ( <b>NOTE 2</b> ) Shall be no loss of stored data or user programmable functions
<b>C</b>	May be loss of function (one or more)	Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance ( <b>NOTE 2</b> )

**NOTE 1:**

Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

**NOTE 2:**

No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

**ETSI EN 301 489-1****Performance criteria for Continuous phenomena applied Transmitters (CT)**

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance criteria for continuous phenomena* shall apply.

**During and after the test:**

The apparatus shall continue to operate as intended. No *degradation of performance or loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

**During the test:**

The EUT shall not unintentionally transmit or change its actual operating state and stored data. If the *minimum performance level* or the *permissible loss* is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

**Performance criteria for Transient phenomena applied Transmitters (TT)**

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance criteria for transient phenomena* shall apply.

**After the test:**

The apparatus shall continue to operate as intended. No *degradation of performance or loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

**During the test:**

The EMC exposure to an electromagnetic phenomenon, a *degradation of performance* is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible loss is not specified by the manufacturer, Then either of these may be deduced from the product description and documentation and what the user may reasonably expect form the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

### **Performance criteria for Continuous phenomena applied Receivers (CR)**

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance* criteria for continuous phenomena shall apply.

#### **During and after the test:**

The apparatus shall continue to operate as intended. No *degradation of performance or loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intends. In some cases this permissible performance level may be replaced by a permissible loss of performance.

#### **During the test:**

The EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect form the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

**Performance criteria for Transient phenomena applied Receivers (TR)**

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance* criteria for transient phenomena shall apply.

**After the test:**

The apparatus shall continue to operate as intended. No *degradation of performance or loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

**During the test:**

The EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

## **ETSI EN 301 489-17**

### **Performance criteria for Continuous phenomena applied Transmitters (CT)**

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **Performance criteria for Transient phenomena applied Transmitters (TT)**

The performance criteria B shall apply, except for voltage dips of 100ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In system using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **Performance criteria for Continuous phenomena applied Receivers (CR)**

The performance criteria A shall apply.

Where the EUT is a *transceiver*, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of test is correctly interpreted.

### **Performance criteria for Transient phenomena applied Receivers (TR)**

The performance criteria B shall apply, except for voltage dips of 100ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply.

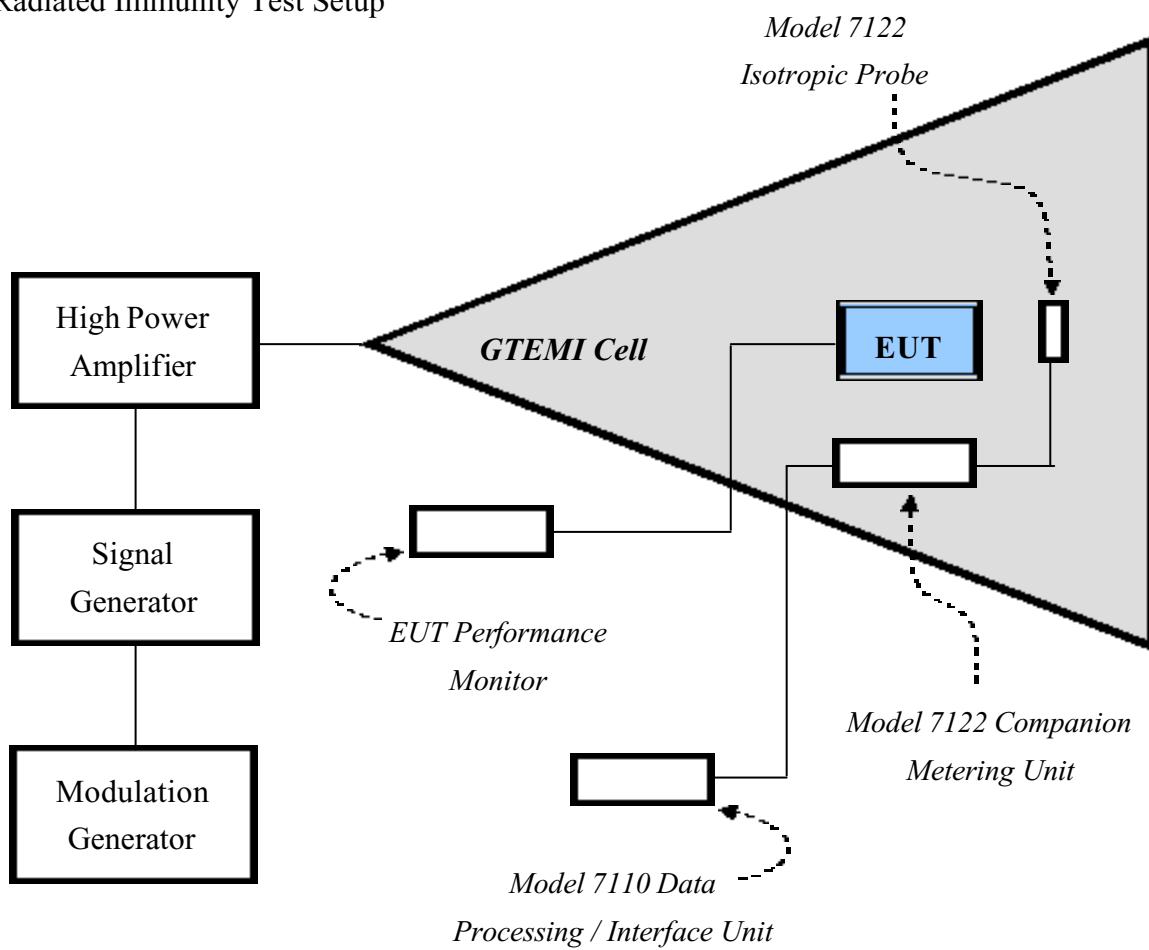
Where the EUT is a *transceiver*, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of test is correctly interpreted.

## Chapter 4 Radio Frequency Immunity Test (RS)

### RS Test information:

Test setup: GTEM cell

Radiated Immunity Test Setup



Test levels: **(Apply Level 2)**

Level	Test Field Strength (V/m)
1	1
2	3
3	10
X	Special

NOTE: the "X" is an open test level. This level may be given in the product specification.

**Field strength:**       3V/m at 80 ~ 800 MHz  
                           10V/m at 800 ~ 960 MHz  
                           3V/m at 960 ~ 1000 MHz  
                           10V/m at 1400 ~ 2000 MHz

**Modulation:**       FM %  
                           80% AM Modulation with 1KHz  
                           80% AM Modulation with 400Hz when signal is modulated at 1kHz  
                           900 KHz± 5 KHz with PM 200 Hz and 100% depth

**Step size:**       1% step size

**Sweep time:**       2.5 Second

**Test mode:** Ref. Test method of Chapter 1

**Test instruments:**

Name	Model Number	Serial Number	Selected
EMCO GTEM	5317	9411-1123	X
EMCO Probe	7122	9406-1194	X
EMCO METERING UNIT	7122	9406-1194	X
EMCO data interface	7110	9410-1273	X
HP Personal Computer	D3178A	3438S00486	X
HP Signal Generator	8657B	2928U00286	X
HP Signal Generator	83711A	3429A00434	X
IFI Wideband Amplifier	SMX50	467-0795	X
Min-circuit Amplifier	GFL-2500VH	N/A	X
WG radiation meters	EMC-20	BN2244129	X
WG E-filed	2244 / 90.20	Z-0001	X
HP Transmission Test Set	4935A	3115A24046	X
B & K Precision Sound Level Meter	Type 2232	1810564	X

**Comment:**

Performance Criteria: **(According to ETSI EN 301 489-1)**

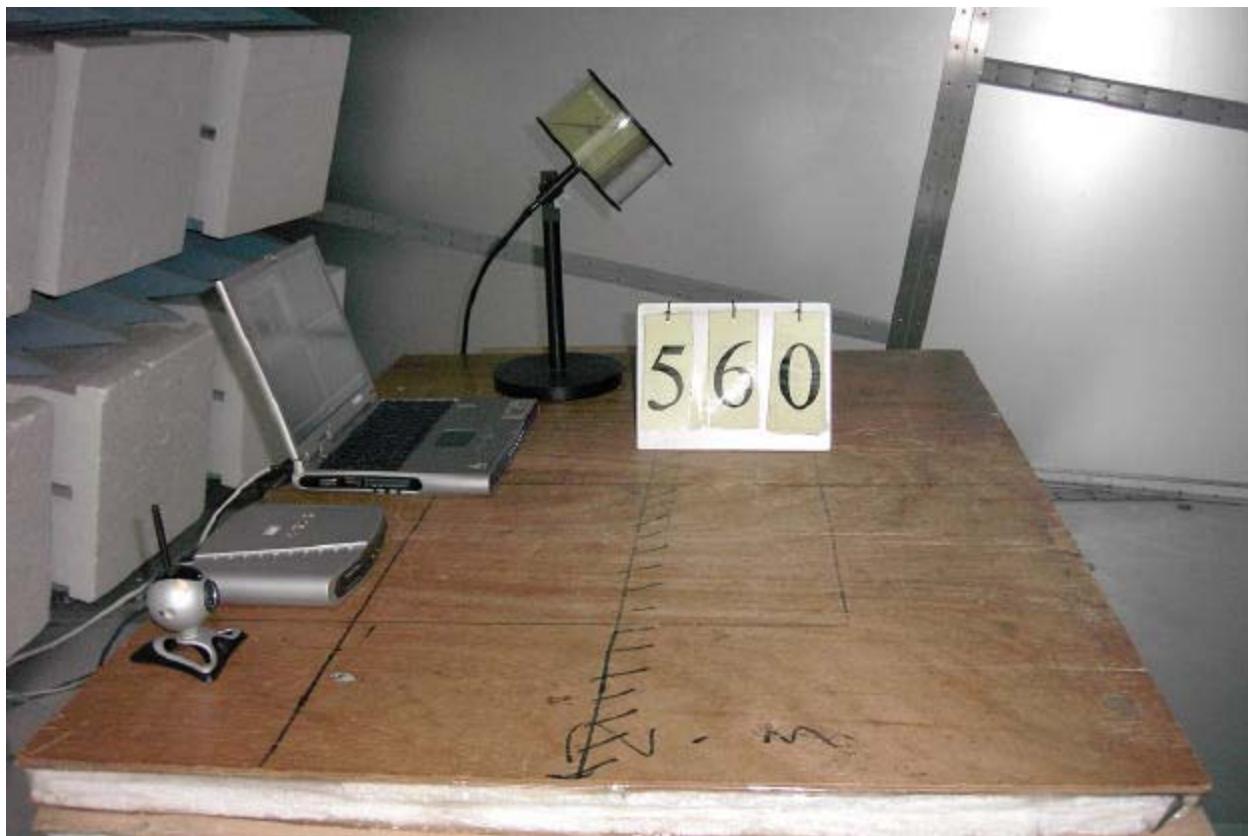
Enclosure     CT     TT     CR     TR

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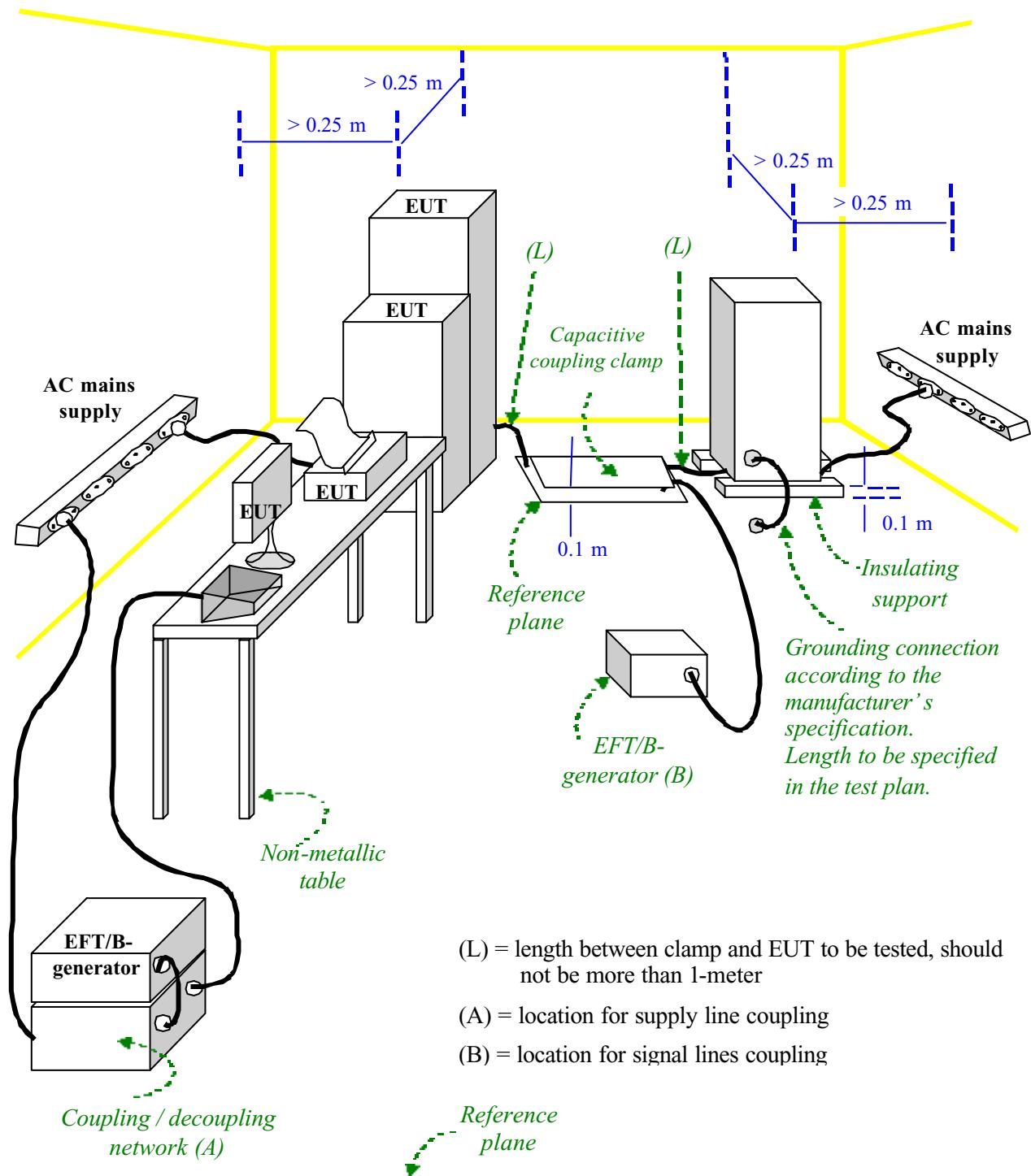
**EN 61000-4-3 PHOTO OF TEST SET-UP**



## Chapter 5 Electric Fast Transient/Burst Requirements Test

### EFT Test information:

General test set-up for laboratory type tests:



**Test levels: (Apply Level 2)**

Open-circuit output test voltage ( $\pm 10\%$ ) and repetition rate of the impulses ( $\pm 20\%$ )				
Level	On power supply port, PE		On input/output signal, data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
1	0.5	5	0.25	5
2	1	5	0.5	5
3	2	5	1	5
4	4	2.5	2	5
X	Special	Special	Special	Special

NOTE: the "X" is an open level. The level has to be specified in the dedicated equipment specification

**Test setup:** According to EN 61000-4-4

**Test Voltage:** DC Power line ( ) 0.5 KV, 5 KH

AC Power line ( X ) 1 KV, 5 KHz

Signal & Control line ( X ) 0.5 KV, 5 KHz; ( ) 1 KV, 5 KHz

**Polarity:** ( X ) Positive ( X ) Negative

**Test Duration:** ( X ) 1 minute ( ) 3 minutes

**Connected lines:** ( ) Power line shielded ( X ) Power line non-shielded  
( X ) Signal & Control line non-shielded ( ) Signal & Control line shielded

**Test mode:** Ref. Test method of Chapter 1.

**Test instrument:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
KeyTek Instrument EFT Test system	E412	9505206/505207	X

**Comment:**

Performance Criteria: (According to ETSI EN 301 489-1)

( X ) Signal and control ports	( )CT	( X )TT	( )CR	( X )TR
( ) DC power input ports	( )CT	( )TT	( )CR	( )TR
( X ) AC mains input ports	( )CT	( X )TT	( )CR	( X )TR

**EN 61000-4-4 PHOTO OF TEST SET-UP**

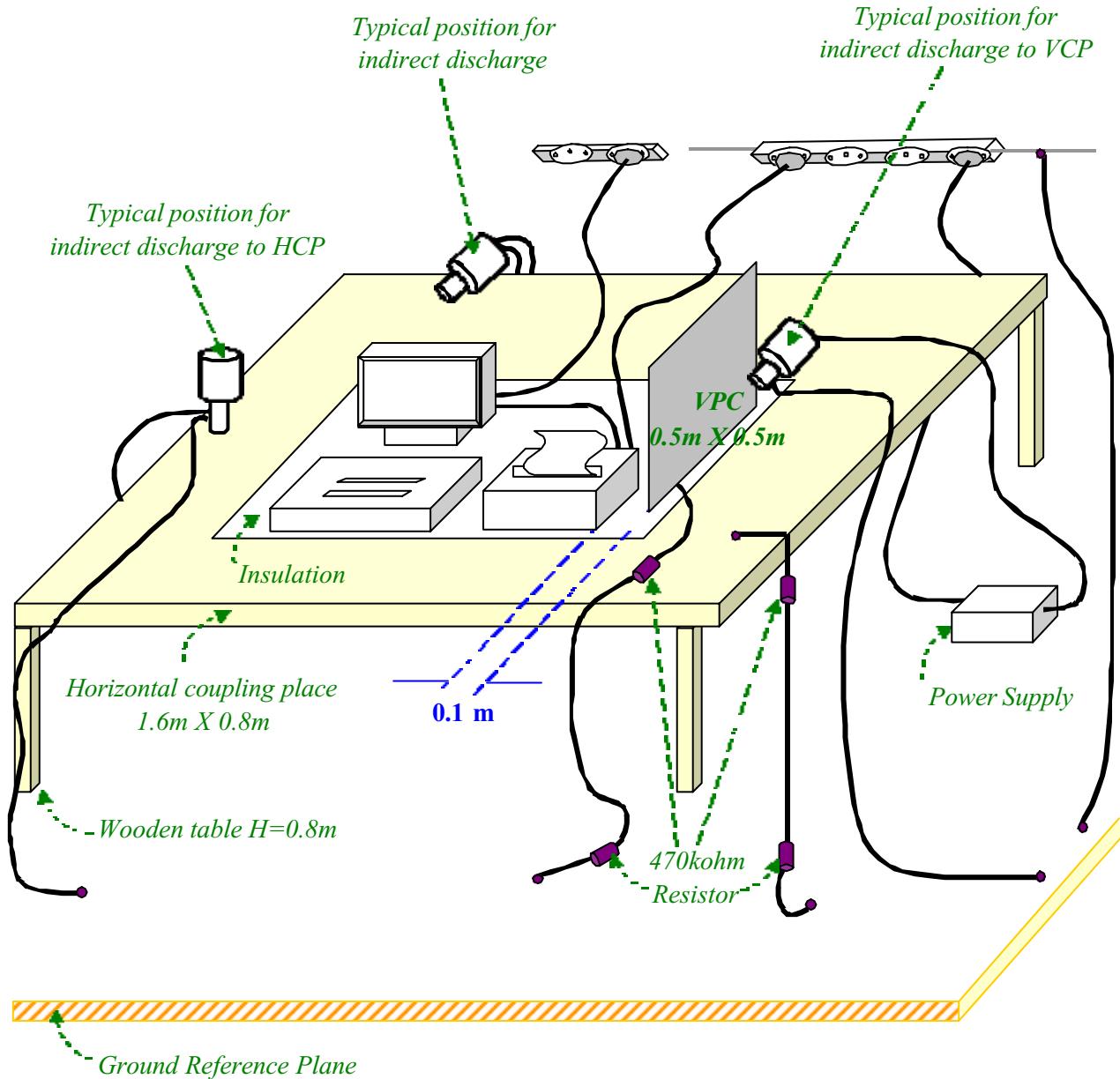


## Chapter 6 Electrostatic Discharges Immunity Test

### ESD Test information:

Test setup: Shielded room, According to EN 61000-4-2

Test setup for table-top equipment at laboratory tests:



**Test levels: (Apply Level 2 and Level 3)**

1a —Contact discharge		1b —Air discharge	
Level	Test voltage (kV)	Level	Test voltage (kV)
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
X	Special	X	Special

NOTE: "X" is an open level. The level has to be specified in the dedicated equipment specification. If higher voltages than those shown are specified, special test equipment may be needed.

**Test Voltage:**  4KV contact discharge  8KV air discharge

**Indirect Discharges:**  HCP  VCP

**Polarity:**  Positive  Negative

**Test mode:** Ref. Test method of Chapter 1

**Test points:** Each connector and enclosure of EUT.

**Test instruments:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
KeyTek Instrument ESD Test system	Series 2000	9204303/9204310 9209226/9301395	X
NoiseKen Electrostatic Discharge Simulator	ESS-100L(A)	2100C03605	
NoiseKen Electrostatic Discharge Gun	TC-815P	2100C03566	

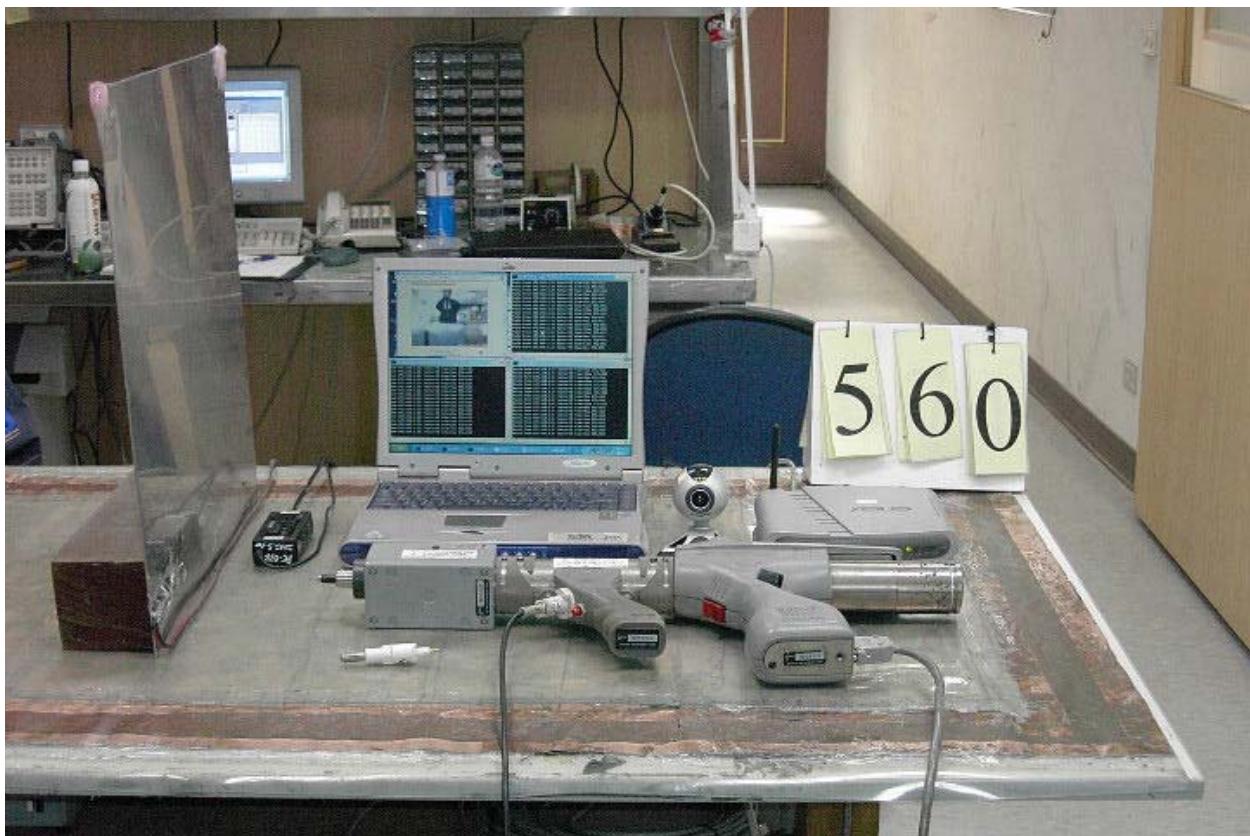
**Comment:**

Performance Criteria: **(According to ETSI EN 301 489-1)**

<input checked="" type="checkbox"/> Enclosure	<input type="checkbox"/> CT	<input checked="" type="checkbox"/> TT	<input type="checkbox"/> CR	<input checked="" type="checkbox"/> TR
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<input checked="" type="checkbox"/> Signal and control ports	<input type="checkbox"/> CT	<input checked="" type="checkbox"/> TT	<input type="checkbox"/> CR	<input checked="" type="checkbox"/> TR
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**EN 61000-4-2 PHOTO OF TEST SET-UP**



## Chapter 7 Surge Immunity Test

### **Surge Test information:**

**Test setup:** According to EN 61000-4-5

**Test levels:** (Apply Level 2 and Level 3)

Level	Test Field Strength (kV)
1	0.5
2	1.0
3	2.0
4	4.0
X	Special

NOTE: the “X” is an open class. This level may be specified in the product specification.

**Test Voltage:** DC Power line ( ) 0.5 KV  
                  AC Power line ( ) Line – Line: 1KV  
                  ( ) Line – Ground: 2KV  
                  ( X ) Line – Line: 0.5KV  
                  ( X ) Line – Ground: 1KV  
                  Control line ( ) 0.5 KV  
                  Signal ( ) 1 KV, ( ) 0.5KV

**Time:** ( X ) 1.2/50μs (8/20μs)

**Polarity:** ( X ) Positive ( X ) Negative

**Connected lines:** ( ) Power line shielded  
                  ( X ) Power line non-shielded  
                  ( ) Signal & Control line non-shielded  
                  ( ) Signal & Control line shielded

**Test mode:** Ref. Test method of Chapter 1.

**Test instrument:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
KeyTek Pulsed-EMI Test System	E103, 501B, E502B, E503, E505A, E4552A	0008260 ~0008264, 0008254	X

**Comment:**

Performance Criteria: (According to ETSI EN 301 489-1)

<input checked="" type="checkbox"/> AC mains input ports	<input type="checkbox"/> CT	<input checked="" type="checkbox"/> TT	<input type="checkbox"/> CR	<input checked="" type="checkbox"/> TR
<input type="checkbox"/> Signal and control ports	<input type="checkbox"/> CT	<input type="checkbox"/> TT	<input type="checkbox"/> CR	<input type="checkbox"/> TR

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**EN 61000-4-5 PHOTO OF TEST SET-UP**

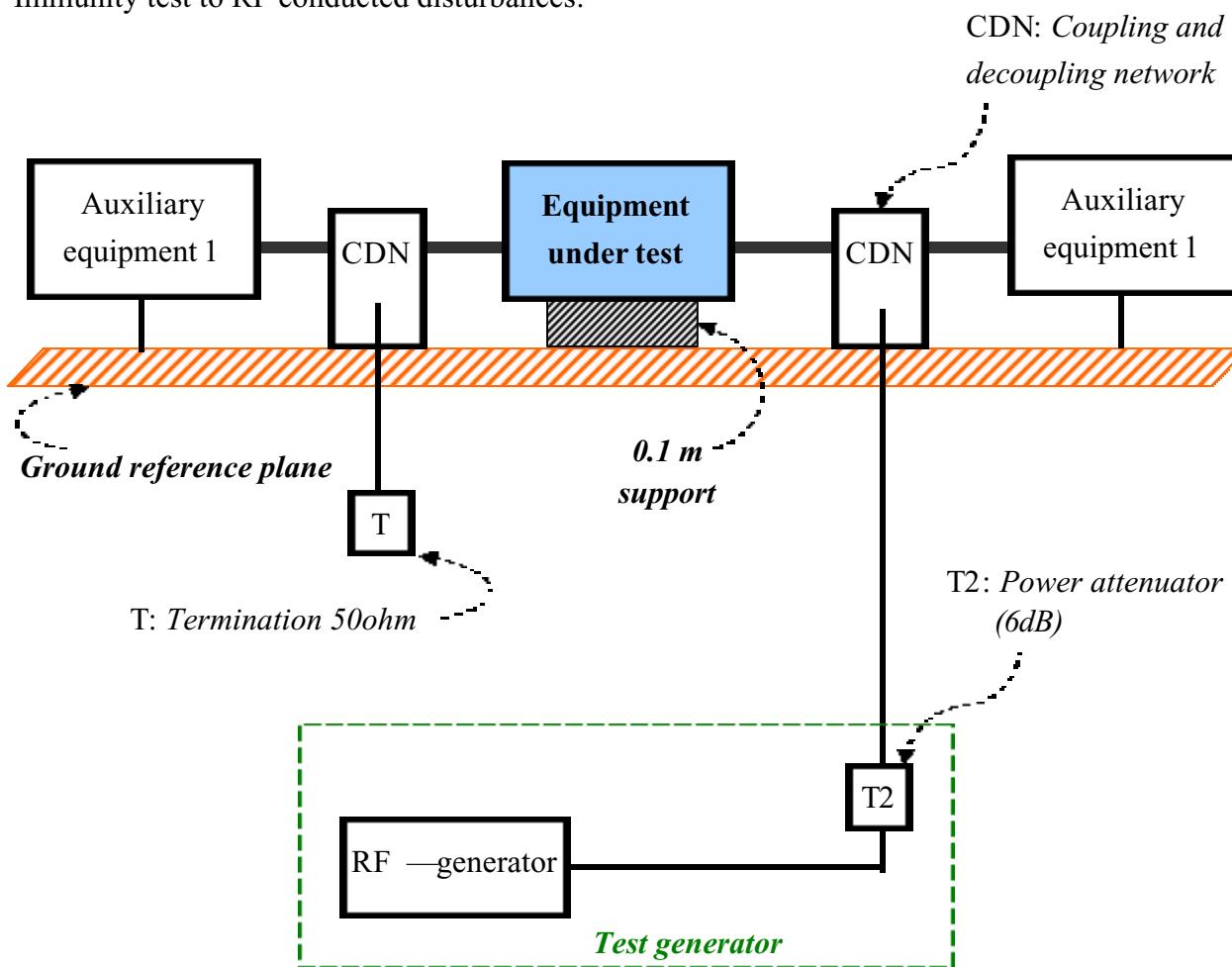


## Chapter 8    Continuous Wave Voltage Immunity Test

### **CS Test information:**

**Test setup:** According to EN 61000-4-6

Immunity test to RF conducted disturbances:



### **Test levels: (Apply Level 2)**

Frequency range 150kHz to 80MHz		
Level	Voltage level (e.m.f.)	
	$U_o$ [dB( $\mu$ V)]	$U_o$ [V]
1	120	1
2	130	3
3	140	10
X	Special	

NOTE: the "X" is an open test level.

**Test Frequency:** ( X ) 0.15 ~ 80MHz

**Modulation:** ( ) FM %  
( X ) 80% AM Modulation with 1kHz  
( ) 80% AM Modulation with 400Hz when signal is modulated at 1kHz  
( ) 900 MHz± 5 MHz with PM 200 Hz and 50% duty cycle

**Step size:** ( X ) 50kHz step size in the frequency range 150kHz to 5MHz and  
1% frequency increment of the momentary frequency in the frequency  
range 5MHz to 80MHz  
( ) 500kHz step size in the frequency range 150kHz to 5MHz and  
10% frequency increment of the momentary frequency in the frequency  
range 5MHz to 80MHz for **non-continuous duty cycle**

**Field strength:** ( ) 1Vrms ( X ) 3Vrms ( ) 10Vrms

**Connected lines:** ( ) Power line shielded  
( X ) Power line non-shielded  
( X ) Signal & Control line non-shielded  
( ) Signal & Control line shielded

**Test mode:** Ref. Test method of Chapter 1

**Test instruments:**

Name	Model Number	Serial Number	Selected
FRANKONIA EMV-Mess-System	CIT-10	103A3113	X
FRANKONIA CDN	M2+M3	A3011015	X
FRANKONIA CDN	T2-801	A3010002	
FRANKONIA CDN	T4-801	A3015004	X
FRANKONIA CDN	S1-801	A3005002	
SCHAFFNER FM-Koppelzange	KEMZ 801	17045	
SCHAFFNER RF-SYNTHESIZERIAMP21FIER	NSG 2070-1	1020	
SCHAFFNER CDN	M325	13773	
SCHAFFNER CDN	M216	15604	
SCHAFFNER CDN	T004	15230	
SCHAFFNER CDN	S501	15167	
SCHAFFNER FM-Koppelzange	KEMZ 801	14301	
HP Transmission Test Set	4935A	3115A24046	
B & K Precision Sound Level Meter	Type 2232	1810564	

**Comment:****Performance Criteria: (According to ETSI EN 301 489-1)**

( ) Antenna port	( ) CT	( ) TT	( ) CR	( ) TR
( X ) Signal and control ports	( X ) CT	( ) TT	( X ) CR	( ) TR
( ) DC power input ports	( ) CT	( ) TT	( ) CR	( ) TR
( X ) AC mains input ports	( X ) CT	( ) TT	( X ) CR	( ) TR

**EN 61000-4-6 PHOTO OF TEST SET-UP**



## Chapter 9      Voltage DIP / Interruption Test

### **DIP Test information:**

**Test setup:** According to EN 61000-4-11

**Voltage dips:**            ( X ) 30%, 0.01 Second  
                               (    ) 60%, 0.1 Second

**Voltage interruptions:** ( X ) > 95%, 5 Seconds

**Test mode:** Ref. Test method of Chapter 1

### **Test instruments:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
Partner EMS Tester	Transienter-1000	PIO	X

### **Comment:**

#### **Performance Criteria: (According to ETSI EN 301 489-1)**

Dips 30%:            ( X ) CT            (    ) TT            ( X ) CR            (    ) TR

Dips 60%:            (    ) CT            (    ) TT            (    ) CR            (    ) TR

Interruptions >95%: (    ) CT            (    ) TT            (    ) CR            (    ) TR

No unintentional responses shall occur at the end of the test;

(    ) Event of loss of function(s)            (    ) Event of loss of user stored data

#### **Performance Criteria: (According to ETSI EN 301 489-17)**

Dips 60%, 100 ms :            (    ) A            (    ) B            ( X ) C

Interruptions >95%, 5 000 ms:            (    ) A            (    ) B            ( X ) C

**EN 61000-4-11 PHOTO OF TEST SET-UP**



## ***Chapter 10 Harmonics Test***

**Test information:**

**Test setup:** According to EN 61000-3-2

**Test item:** Quasi – stationary & Fluctuating Current Harmonics Test.

**Test mode:** Ref. Test method of Chapter 1

**Test instrument:**

Name	Model Number	Serial Number	Selected
Harmonic/Flicker Test System	HP 6842A	3531A-00102	X

Test Equipment Settings:	Quasi-stationary Current Harmonics Test	Fluctuating Current Harmonics Test
Line Voltage	230VAC	230VAC
Line Frequency	50Hz	50Hz
Device Class	D	D
Test Limit Overrides	None	None
Total Number of Failures:	None	None
Total Number of Errors:	None	None

**Test Result: Pass**

## ***Chapter 11 Voltage Fluctuation and Flicker Test***

**Test information:**

**Test setup:** According to EN 61000-3-3

**Test mode:** Ref. Test method of Chapter 1

**Test instrument:**

Name	Model Number	Serial Number	Selected
Harmonic/Flicker Test System	HP 6842A	3531A-00102	X

**Test Equipment Settings:**

Line Voltage	230VAC
Line Frequency	50Hz
Test Limit Overrides	None
Total Number of Failures:	Pst: (0), Plt: (0)
	Dc: (0), Dmax (0), Dt (0)
Total Number of Errors:	None

**Test Result: Pass**

## ***Chapter 12 Conducted Emission Test***

### ***Test condition and setup***

All the equipment is placed and setup according to ***EN 55022***.

#### (1) Mains power:

The EUT is assembled on a wooden table, which is 80 cm high and placed 40 cm from the back-wall, which is a vertical conducting plane. One LISN is for EUT, the other LISN is for support equipment. They are all placed on the conductive ground. The EUT's LISN connect a line switch box for selecting L1 or L2, then connect to a preamplifier and spectrum.

#### (2) Telecommunication port:

The EUT is place as mains disturbance test. The communication line connected to ISN and then the measuring receiver connected to the ISN to measured the level of voltage disturbance.

The spectrum scans from 150KHz to 30MHz. Conducted emission levels are detected at *maximum peak mode*. But if the maximum peak mode failed or over *average limit*, it will be measured by *average detection mode*.

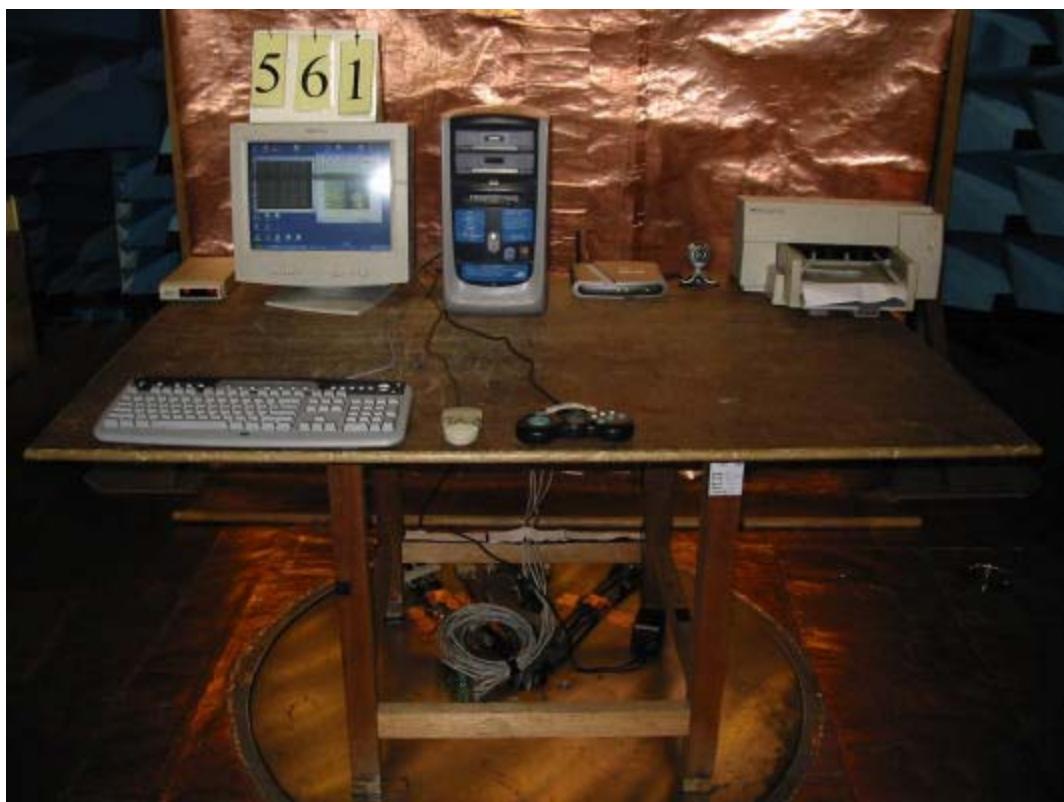
While testing the worst-emission plot printed in the *peak detection mode*, and there are up to 6 highest emissions to be recorded. The plot is kept as the original data and not included in the test report.

### ***List of test Instrument***

<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Serial No.</u>	<u>Calibration Date</u>	
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
ISN	ISN T400	Schaffner	16596	10/16/02	10/16/03
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  $\pm 2.02$  dB.

**CONDUCTED EMISSION PHOTO OF TEST SET-UP**



***Test Result of Conducted Emissions for Mains power***

Test Conditions: Temperature : 26.0 °C Humidity : 53.8 % RH

**802.11b**

<b>Power Connected Emissions</b>					<b>Class B</b>		
<b>Conductor</b>	<b>Frequency (KHz)</b>	<b>Peak (dBμV)</b>	<b>QP (dBμV)</b>	<b>Average (dBμV)</b>	<b>QP-limit (dBμV)</b>	<b>AVG-limit (dBμV)</b>	<b>Margin (dB)</b>
Line 1	185.650	57.88	57.03	48.51	64.83	54.83	-6.32
	384.000	43.23	---	---	59.31	49.31	-6.08
	858.000	42.61	---	---	56.00	46.00	-3.39
	945.000	42.88	---	---	56.00	46.00	-3.12
	1397.270	44.98	41.61	25.92	56.00	46.00	-14.39
	2012.000	42.06	---	---	56.00	46.00	-3.94
	2558.000	41.16	---	---	56.00	46.00	-4.84
	3317.000	41.75	---	---	56.00	46.00	-4.25
	4445.000	38.35	---	---	56.00	46.00	-7.65
	5490.000	36.28	---	---	60.00	50.00	-13.72
Line 2	185.490	59.51	59.04	50.61	64.83	54.83	-4.22
	380.000	42.90	---	---	59.43	49.43	-6.53
	751.120	43.61	40.73	26.79	56.00	46.00	-15.27
	862.000	44.36	40.23	18.31	56.00	46.00	-15.77
	930.270	43.50	42.76	31.09	56.00	46.00	-13.24
	1392.370	45.50	43.88	29.83	56.00	46.00	-12.12
	1947.480	44.08	42.50	25.65	56.00	46.00	-13.50
	2558.000	41.61	---	---	56.00	46.00	-4.39
	3168.350	43.57	38.82	21.12	56.00	46.00	-17.18
	5490.000	40.57	---	---	60.00	50.00	-9.43

**\*The reading amplitudes are all under limit.**

**802.11g**

<i>Conductor</i>	<i>Frequency (KHz)</i>	<i>Peak (dBμV)</i>	<i>Emissions</i>		<i>Class B</i>		
			<i>QP (dBμV)</i>	<i>Average (dBμV)</i>	<i>QP-limit (dBμV)</i>	<i>AVG-limit (dBμV)</i>	<i>Margin (dB)</i>
Line 1	196.370	58.24	53.71	43.80	65.77	54.83	3.05
	405.000	41.36	---	---	64.49	49.31	-6.08
	824.000	41.17	---	---	61.31	46.00	-3.39
	946.680	43.76	42.11	32.37	56.71	46.00	-3.12
	1134.000	42.46	---	---	56.00	46.00	-1.02
	1534.000	42.96	---	---	56.00	46.00	-3.94
	1748.000	42.67	---	---	56.00	46.00	-4.84
	3253.000	39.76	---	---	56.00	46.00	-4.25
	3702.000	10.38	---	---	56.00	46.00	-7.65
	5050.000	38.44	---	---	60.00	50.00	-13.72
Line 2	195.870	58.33	56.02	44.72	64.40	54.40	-8.38
	384.000	44.94	---	---	59.31	49.31	-4.37
	927.870	45.95	43.22	35.66	61.31	51.31	-10.34
	1033.550	46.49	44.49	35.92	56.71	46.71	-10.08
	1554.820	45.86	44.23	33.06	56.00	46.00	-11.77
	1652.700	46.09	44.69	34.55	56.00	46.00	-11.31
	2012.580	44.23	37.87	18.36	56.00	46.00	-18.13
	2899.000	42.27	---	---	56.00	46.00	-3.73
	3588.540	44.41	39.65	19.15	56.00	46.00	-16.35
	4809.000	41.25	---	---	56.00	46.00	-4.75

*\*The reading amplitudes are all under limit.*

**Standby mode**

<i>Conductor</i>	<i>Power</i>	<i>Connected</i>	<i>Emissions</i>		<i>Class B</i>		
	<i>Frequency (KHz)</i>	<i>Peak (dBμV)</i>	<i>QP (dBμV)</i>	<i>Average (dBμV)</i>	<i>QP-limit (dBμV)</i>	<i>AVG-limit (dBμV)</i>	<i>Margin (dB)</i>
Line 1	205.500	56.51	54.86	47.91	64.40	54.40	-6.49
	413.000	41.09	---	---	58.49	48.49	-7.40
	537.000	39.42	---	---	56.00	46.00	-6.58
	937.000	42.41	---	---	56.00	46.00	-3.59
	1113.000	39.46	---	---	56.00	46.00	-6.54
	1534.000	42.17	---	---	56.00	46.00	-3.83
	1703.690	43.25	41.31	25.16	56.00	46.00	-14.69
	1818.000	42.01	---	---	56.00	46.00	-3.99
	2351.000	42.83	---	---	56.00	46.00	-3.17
	3638.000	38.10	---	---	56.00	46.00	-7.90
Line 2	207.000	59.21	53.71	43.80	64.43	54.43	-2.63
	405.000	42.71	---	---	58.71	48.71	-6.00
	518.000	41.64	---	---	56.00	46.00	-4.36
	826.120	43.66	40.91	25.06	56.00	46.00	-15.09
	959.330	45.21	43.31	31.22	56.00	46.00	-12.69
	1021.800	45.19	42.70	30.18	56.00	46.00	-13.30
	2351.070	43.99	40.15	23.94	56.00	46.00	-15.85
	2925.000	41.78	---	---	56.00	46.00	-4.22
	3494.280	43.52	41.13	25.46	56.00	46.00	-14.87
	5310.000	40.03	---	---	60.00	50.00	-9.97

**\*The reading amplitudes are all under limit.**

***Test Result of Conducted Emissions for Telecommunication port***

Test Conditions: Temperature : 20.8 °C Humidity : 62.1 % RH

**RJ45-10Mbps**

Frequency (KHz)	READING AMPLITUDE			LIMIT		Margin (dB)
	Peak (dB $\mu$ V)	Quasi-Peak (dB $\mu$ V)	Average (dB $\mu$ V)	Q-Peak (dB $\mu$ V)	Average (dB $\mu$ V)	
164.320	71.50	70.35	61.25	74.00	64.00	-2.75
16230.000	60.62	---	---	74.00	64.00	-3.38
17710.000	60.34	---	---	74.00	64.00	-3.66
20200.000	58.90	---	---	74.00	64.00	-5.10
23120.000	59.57	---	---	74.00	64.00	-4.43
26100.000	59.80	---	---	74.00	64.00	-4.20
28650.000	59.33	---	---	74.00	64.00	-4.67

\*The reading amplitudes are all under limit.**RJ45-100Mbps**

Frequency (KHz)	READING AMPLITUDE			LIMIT		Margin (dB)
	Peak (dB $\mu$ V)	Quasi-Peak (dB $\mu$ V)	Average (dB $\mu$ V)	Q-Peak (dB $\mu$ V)	Average (dB $\mu$ V)	
165.110	71.33	70.28	60.53	74.00	64.00	-3.47
13290.000	55.23	---	---	74.00	64.00	-8.77
16230.000	60.90	---	---	74.00	64.00	-3.10
17710.000	59.92	---	---	74.00	64.00	-4.08
21630.000	60.06	---	---	74.00	64.00	-3.94
23120.600	61.65	---	---	74.00	64.00	-2.35
26540.000	60.06	---	---	74.00	64.00	-3.94

\*The reading amplitudes are all under limit.

## ***Chapter 13 Radiated Emission Test***

### ***Test condition and setup***

**Pretest:** Prior to the final test (OATS test), the EUT is placed in a shielded enclosure, and scan from 30MHz to 1GHz. This is done to ensure the radiation is exactly emitted from the EUT. **Final test:** Final radiation measurements are made on a **10 – meter**, open-field test site. The EUT is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. The entire placement is according to EN 55022.

The whole range antenna is used to measure frequency from 30 MHz to 1GHz. The final test is used the spectrum analyzer (EMI Receiver). Measure more than six top marked frequencies generated form pretest by computer step by step at each frequency.

The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading .The spectrum analyzer's 6dB bandwidth is set to 120 kHz, and the EUT is measured at quasi-peak (below 1GHz) mode.

If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from shielded room will be taken as the final data.

### ***List of test Instrument***

<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Serial No.</u>	<u>Calibration Date</u>	
				Last time	Next time
Spectrum analyzer	8568B	H P	3004A18617	06/19/02	06/19/03
Quasi-peak Adapter	85650A	H P	2521A00984	06/20/02	06/20/03
RF Pre-selector	85685A	H P	2947A01011	06/20/02	06/20/03
Antenna	CBL6141A	SCHAFFNER	4188	11/29/02	11/28/03
Open test side (Antenna, Amplify, Cable calibrated together)				05/16/02	05/15/03

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

**Test Result of 802.11b Spurious Radiated Emissions**

Test Conditions: Temperature : 26.2 ° C Humidity : 58.3 % RH

**802.11b radiated emissions for 30MHz to 1GHz [Antenna polarity Horizontal]**

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB $\mu$ V/m)	Class B (10 m)	
Frequency (MHz)	Amplitude (dB $\mu$ V)	Ant. H. (m)	Table (°)			Limit (dB $\mu$ V/m)	Margin (dB)
126.39	26.62	1.00	255	-1.53	25.09	30.00	-4.91
300.39	30.31	1.00	54	-2.35	27.96	37.00	-9.04
374.41	30.89	1.00	7	-0.48	30.41	37.00	-6.59
686.41	19.68	1.00	175	11.35	31.03	37.00	-5.97
747.61	18.39	1.00	179	12.10	30.49	37.00	-6.51
748.81	20.01	1.00	190	12.71	32.72	37.00	-4.28

**802.11b radiated emissions for 30MHz to 1GHz [Antenna polarity Vertical]**

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB $\mu$ V/m)	Class B (10 m)	
Frequency (MHz)	Amplitude (dB $\mu$ V)	Ant. H. (m)	Table (°)			Limit (dB $\mu$ V/m)	Margin (dB)
62.40	17.30	1.00	304	2.88	20.18	30.00	-9.82
124.80	28.27	1.00	282	-1.47	26.80	30.00	-3.20
200.96	25.71	1.00	203	-2.68	23.03	30.00	-6.97
500.45	20.24	1.00	101	4.58	24.82	37.00	-12.18
624.01	17.22	1.00	86	9.45	26.67	37.00	-10.33
686.41	21.55	1.00	274	11.35	32.90	37.00	-4.10

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)

***Test Result of 802.11g Spurious Radiated Emissions***

Test Conditions: Temperature : 26.2 ° C Humidity : 58.3 % RH

***802.11g radiated emissions for 30MHz to 1GHz [Antenna polarity Horizontal]***

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB $\mu$ V/m)	Class B (10 m)	
Frequency (MHz)	Amplitude (dB $\mu$ V)	Ant. H. (m)	Table (°)			Limit (dB $\mu$ V/m)	Margin (dB)
125.18	26.93	1.00	245	-1.48	25.45	30.00	-4.55
374.41	32.92	1.00	15	-0.48	32.44	37.00	-4.56
438.01	26.19	1.00	302	2.20	28.39	37.00	-8.61
500.45	22.78	1.00	32	4.58	27.36	37.00	-9.64
686.41	22.45	1.00	305	11.35	33.80	37.00	-3.20
714.05	15.59	1.00	185	12.03	27.62	37.00	-9.38

***802.11g radiated emissions for 30MHz to 1GHz [Antenna polarity Vertical]***

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dB $\mu$ V/m)	Class B (10 m)	
Frequency (MHz)	Amplitude (dB $\mu$ V)	Ant. H. (m)	Table (°)			Limit (dB $\mu$ V/m)	Margin (dB)
124.80	30.72	1.00	95	-1.47	29.25	30.00	-0.75
201.57	25.85	1.00	210	-2.68	23.17	30.00	-6.83
499.84	21.04	1.00	70	4.55	25.59	37.00	-11.41
624.73	19.01	1.00	215	9.48	28.49	37.00	-8.51
686.41	18.45	1.00	276	11.35	29.80	37.00	-7.20
717.61	17.10	1.00	122	12.10	29.20	37.00	-7.80

# **LVD REPORT**

**Applicant : ASUSTEK COMPUTER INC.**

**Model No : WL-500g**

**Report No:A54LV562**

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**Lily Technology Co., Ltd.**



No. 3, Alley 5, Lane 217, Chung Hsiao E. Rd., Sec 3  
Taipei, Taiwan

TEL : 886-2-8773-6799

FAX : 886-2-8773-6794

Report No	A54LV562
Applicant	ASUSTeK COMPUTER INC. 4F1., No.150, Li-Te Rd., Taipei, Taiwan, R.O.C.
Test item	Low Voltage Directive
Items tested	Asus SpaceLink 802.11b/g Wireless AP
Model No.	WL-500g
Sample No.	# A54562
Rating	SELV
Sample received date	05/26/2003
Specifications	EN60950, 2000 / IEC 60950, 3 <sup>rd</sup> Ed, 1999
Results	As detailed within this report
Prepared by	<u>Flora Shih</u> project engineer
Authorized by	<u>Tony Chen</u>
Issue date	May / 23 / 2003 Laboratory Manager (month / day / year)
<b>Modifications</b>	<b>None</b>
Tested by	Lily Technology Co., Ltd.
Office at	No. 3, Alley 5, Lane 217, Chung Hsiao E. Road, Sec.3, Taipei Taiwan

**Conditions of issue:**

**This test report shall not be reproduced except in full, without written approval of LTC. And the test result contained within this report only relate to the sample submitted for testing.**

## **SAFETY TEST RESULTS**

The results appear in the following order:

EN60950, 2000 / IEC 60950, 3<sup>rd</sup> Ed, 1999

Safety of information technology equipment –

The results contained herein apply only to the particular samples tested and to the specific tests carried out, as detailed in this Test Report. The issuing of this Test Report does not indicate any measure of Approval, Certification, Supervision, Control or Surveillance by Lily Technology Co., Ltd. of any product. No extract, abridgement or abstraction from a Test Report may be published or used to advertise a product without the written consent of the Director, Lily Technology Co., Ltd. who reserves the absolute right to agree or reject all or any of the details of any items of publicity for which consent may be sought.

Test Report EN 60950, 2000 / IEC 60950, 3<sup>rd</sup> Ed, 1999

Equipment mobility. ....: Movable

Operating condition. ....: Continuous

Tested for IT power systems. ....: No

IT testing, phase-phase voltage (V). ....: N/A

Class of equipment. ....: Class III

Mass of equipment (kg). ....: <18kg

Protection against ingress of water. ....: N/A

Possible test case verdicts:

- test case does not apply to the test object. ....: N
- test object does meet the requirement. ....: P
- test object does not meet the requirements. ....: F

General remarks

“ (see appended table) ” refers to a table appended the report.

Throughout this report a point is used as the decimal separator.

1. Safety Strategy

- The equipment is powered from SELV by a certified DC Adaptor.

2. Testing Environment:

All testing was conducted at:

- An ambient temperature in the range 25 °C to 35 °C.
- A relative humidity in the range 25% to 75%
- An air pressure in the range 86KPa to 106Kpa

## RESULTS

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
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1.	<b>GENERAL</b>		
1.1	<b>SCOPE</b>		
1.1.1	Equipment covered by this standard.	The product is within the scope of IEC 60950	--
1.1.2	Additional requirements:		
	Exposure to extreme temperatures, excessive dust, moisture or vibration; to flammable gases; to corrosive or explosive atmospheres.	This equipment is not intended to operate in a “normal” environment. (Offices and homes).	--
	Electro medical equipment connected to the patient.	This equipment is not an electromedical equipment intended to be physically connected to a patient.	--
	Equipment used in vehicles, ships or aircrafts, in tropical countries, or at elevations > 2000m.	This equipment is intended to operate in a “normal ” environment. (Office and homes)	--
	Equipment intended for use where ingress of water is possible.	This equipment is intended to be used in applications where ingress of water is not regarded possible. The equipment is non- protected according to IEC 60529	--
	IP-classification (IEC 60529) (IP)	IP X0.	--

1.2.2	<b>OPERATING CONDITIONS</b>		
1.2.2.1	Normal load as described in Annex L or as close as possible to the most severe normal use.	The unit is running to Communicate and transmit data.	--
1.2.2.2	Rated operating time as assigned by the Manufacturer.	The manufacturer has not declared a rated operating time.	--
1.2.2.3	- 1.2.2.5 Continuous operation / Shot-time operation / Inter mitten operation.	The equipment is regarded to be for continuous operation.	--

Clause	Requirement – Test	Result - Remark	Verdict
1.5.	<b>COMPONENTS</b>		
1.5.1	General	Components which were found to affect safety aspects comply with the requirements of this standard or within the safety aspects of the relevant IEC component standards. (see appended tables)	P
1.5.2	Evaluation and testing components	Components which are certified to IEC and / or national standards are used correctly within their ratings. components not covered by IEC standards are tested under the conditions present in the equipment.	P
	Dimensions (mm) of mains plug for direct plug-in equipment	Not direct plug-in equipment.	N
	Torque and pull test of mains plug for direct plug-in; torque (Nm); pull (N)		--
1.5.3	Thermal controls		N
1.5.4	Transformers	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard.	N
1.5.5	Interconnecting cables	No interconnection cables.	N
1.5.6	Capacitors in primary circuits	No X-capacitor.	N
1.5.7.1	-1.5.7.3 Double or reinforced insulation bridged by components.		N
1.5.8	Components in equipment for IT power system		N
1.6.	<b>POWER INTERFACE</b>	Class III equipment	N
1.6.1	AC power distribution systems		N

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
1.6.2	Input current		N
	Test voltage (at each rated voltage or at each end of a rated voltage range)		--
	Measured current		--
	Deviation		--
1.6.3	Voltage limit of hand – held equipments (max. 250V)		N
1.6.4	Neutral conductor		N

<b>1.7.</b>	<b>MARKING AND INSTRUCTIONS</b>		<b>P</b>
1.7.1	Power rating	The equipment marking is located on outside surface of the equipment.	P
	Rated voltage (s) or voltage range(s)	5 VDC	--
	Symbol of nature of supply for d.c. .....		--
	Rated frequency or frequency range		--
	Rated current (A) .....	2.0A	--
	Manufacturer .....	ASUSTeK COMPUTER INC.	--
	Trademark .....	ASUS	--
	Type/model .....	WL-500G	--
	Symbol of Class II .....	Class III	--
	Certification marks .....	CE mark	--
1.7.2	Safety instructions	The user's manual contains information for operation, installation, servicing, transport, storage and technical data. Continuous operation.	P

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
1.7.3	Short duty cycles		N
1.7.4	Supply voltage adjustment	Class III equipment.	N
1.7.5	Power outlets on the equipment	Class III equipment.	N
1.7.6	Fuse identification	No primary fuse.	N
1.7.7	Wiring terminals		N
1.7.7.1	Protective earthing and bonding terminals	Class III equipment	N
1.7.7.2	Terminal for ac. mains supply conductors	Class III equipment	N
1.7.8	Controls and indicators		N
1.7.8.1	Identification, location and marking		N
1.7.8.2	Colours	For functional indication LED lights when the equipment is operating.	P
1.7.8.3	Symbols	There are no mains switches in the equipment.	N
1.7.8.4	Markings using figures	No indicators for different positions.	N
1.7.9	Isolation of multiple power sources		N
1.7.10	IT power system		N
1.7.11	Thermostats and other regulating devices		N
1.7.12	Language	User's manual and marking were provided in English Versions in other language will be provided when the equipment will be applied for other national certificated.	P
	Language .....	English	--
1.7.13	Durability	The marking withstands required tests.	N
1.7.14	Removable parts		N
1.7.15	Replaceable batteries	No lithium batteries	N
1.7.16	Operator access with a tool	No operator access area with tool.	N
1.7.17	Equipment for restricted access location	Equipment not intended for installation in RAL.	N

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
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2..	<b>PROTECTION FORM HAZARDS</b>		<b>P</b>
2.1.	<b>PROTECTION AGAINST ELECTRIC SHOCK AND ENERGY HAZARDS</b>		<b>P</b>
2.1.1	Protection in operator access areas		<b>N</b>
2.1.1.1	Access to energized parts	Class III equipment.	<b>N</b>
2.1.1.2	Battery compartments		<b>N</b>
2.1.1.3	Access to ELV wiring		<b>N</b>
2.1.1.4	Access to hazardous voltage circuit wiring		<b>N</b>
2.1.1.5	Energy hazards	Class III equipment.	<b>N</b>
2.1.1.6	Manual controls		<b>N</b>
2.1.1.7	Discharge of capacitors in the primary circuit		<b>N</b>
	Time-constant (s)		
2.1.2	Protection in service access areas		<b>N</b>
2.1.3	Protection in restricted access locations		<b>N</b>

2.2.	<b>SELV CIRCUITS</b>		<b>N</b>
2.2.1	General requirement	SELV limits are not exceeded under normal condition and after a single fault.	<b>P</b>
2.2.2	Voltage under normal conditions	Within SELV limits	<b>P</b>
2.2.3	Voltage under fault condition	Moreover a limit of 71 V peak, or 120 V dc. shall not be exceeded.	<b>P</b>
2.2.3.1	-2.2.3.3 Method used for separation	Class III equipment.	<b>N</b>
2.2.4	Connection of SELV circuits to other circuits	SELV circuits are only connected to other SELV circuits.	<b>P</b>

Clause	Requirement – Test	Result - Remark	Verdict
2.3	<b>TNV CIRCUITS</b>	No TNV circuits.	--
2.3.1	Limits		
	Type of TNV circuits		N
2.3.2	Separation from other circuits and from accessible parts	Supplementary insulation.	N
2.3.3	Separation from hazardous voltage	No hazardous voltage.	N
2.3.4	Connection of TNV circuits to other circuits	Supplementary insulation.	N
2.3.5	Test for operating voltage generated externally	Test is conducted.	N
2.4.	<b>LIMITED CURRENT CIRCUIT:</b>	2.4.1-2.4.3;No limited current circuits.	N
2.5	<b>LIMITED POWER SOURCE</b>	No Limited power source.	N
2.6.	<b>PROVISIONS FOR EARTHING AND BONDING</b>	2.6.1-2.6.5.8; Class III equipment.	N
2.7.	<b>OVERCURRENT AND EARTH FAULT PROTECTION IN PRIMARY CIRCUITS</b>	Class III equipment	N
2.8.	<b>SAFETY INTERLOCKS</b>	2.8.1-2.8.8; No safety interlocks.	N
2.9	<b>ELECTRICAL INSULATION</b>		
2.9.1	Properties of insulating materials		N
2.9.2	Humidity conditioning	Humidity treatment performed at 25 for 47hrs at 91-95%	N
2.9.3	Requirements for insulation	Please refer to 4.5.1, 5.2 and 2.10	N

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
2.9.4	Insulation parameters	Application complies with sub-clauses 4.5.1, 5.2 and 2.10	<b>P</b>
2.9.5	Categories of insulation	Insulation is consider to be supplementary insulation.	<b>P</b>

2.10	<b>CLEARANCES, CREEPAGE DISTANCES AND DISTANCE THOUGH INSULATION</b>		
	Normal voltage		--
	Pollution degree		--
	CTI rating		--
2.10.1	General	Considered. see the following clauses:	--
2.10.2	Determination of working voltages		<b>P</b>
2.10.3	Clearances	See table 2.10	<b>P</b>
2.10.3.1	General	Refer below:	--
	10mm air gap between hazardous voltage and accessible conductive parts of enclosure.		<b>N</b>
	2mm air gap between hazardous voltage and earthed accessible conductive parts of enclosure.		<b>N</b>
2.10.3.2	Clearances in primary circuits	Not applicable.	<b>N</b>
2.10.3.3	Clearances in secondary circuits	See table 2.10	<b>P</b>
2.10.3.4	Measurement of transient levels	Measurement not relevant	<b>P</b>
2.10.4	Creepage distances	Considered	<b>P</b>
2.10.5	Solid insulation	Refer below:	--
2.10.5.1	Minimum distances through insulation	Considered when transformer approval.	<b>P</b>
2.10.5.2	Thin sheet material		<b>N</b>
2.10.5.3	Printed boards	PCB does not serve as insulation barrier.	<b>N</b>

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
2.10.5.4	Wound components	No wound components without interleaved insulation.	<b>N</b>
	Two wires in contact inside component	No wound components used.	--
2.10.6	Coated printed boards	No special coating in order to reduce distances.	<b>N</b>
2.10.6.1	General		
2.10.6.2	Sample preparation and preliminary inspection		--
2.10.6.3	Thermal cycling		--
2.10.6.4	Thermal ageing		--
2.10.6.5	Electric strength test		--
2.10.6.6	Abrasion resistance test		--
2.10.7	Enclose and sealed parts	No enclosed hermetically sealed components.	<b>N</b>
2.10.8	Spacing filled by insulating compound		<b>N</b>
2.10.9	Components external terminations		<b>P</b>
2.10.10	Insulation with varying dimensions	No such transformer used.	<b>N</b>

<b>3..</b>	<b>WIRING, CONNECTIONS AND SUPPLY</b>		
------------	---------------------------------------	--	--

<b>3.1.</b>	<b>GENERAL</b>		
3.1.1	Current rating and overcurrent protection	No internal wiring/ interconnection cables.	<b>N</b>
3.1.2	Protection against mechanical damage	No internal wiring.	<b>N</b>
3.1.3	Securing of internal wiring	No internal wiring.	<b>N</b>

Clause	Requirement – Test	Result - Remark	Verdict
3.1.4	Insulation of conductors	No internal wiring.	N
3.1.5	Beads and ceramic insulators	Not used.	N
3.1.6	Screws for electrical contact pressure	No electric screw connection.	N
3.1.7	Non-metallic materials in electrical connections	No contact pressure through insulation material.	N
3.1.8	Self-tapping and spaced thread screws	Thread-cutting or space thread screws are not used for electrical connections.	N
3.1.9	Termination of conductors	Termination can not become displaced so that clearances and creepage distances can be reduced.	P
	10 N force test		P
3.1.10	Sleeving on wring	No internal wiring.	N
3.2.	<b>CONNECTION TO A.C. MAINS SUPPLIES</b>	Class III equipment. No direct connection to mains.	N
3.3.	<b>WIRING TERMINALS FOR CONNECTION OF EXTERNAL CONDUCTORS</b>	3.3.1-3.3.8; Class III equipment. No direct connection to mains.	N
3.4.	<b>DISCONNECTION FROM THE A.C. MAINS SUPPLY</b>	Class III equipment. No direct connection to mains.	N
3.5	<b>INTERCONNECTION OF EQUIPMENT</b>		
3.5.1	General requirements	See below	--
3.5.2	Type of interconnection circuits	No TNV circuits.	--
3.5.3	ELV circuits as interconnection circuits	No ELV interconnection	N

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
4..	<b>PHYSICAL REQUIAEMENTS</b>		
4.1.	Stability	Refer below:	--
	Angle of 10°	Unit does not overbalance at 10°	<b>P</b>
	Test: force (20% of the weight of the unit, max. 250N)	Not floor standing.	<b>N</b>
	Test: force (800N)	Not floor standing.	<b>N</b>
4.2.	<b>MECHANICAL STRENGTH</b>		<b>P</b>
4.2.2	Steady force test, 10 N	No hazard, ref. Comment in table 2.10.	<b>P</b>
4.2.3	Internal enclosures 30N 3 ; 5	No internal enclosure.	<b>N</b>
4.2.4	External enclosures 250N 10 ; 5	No hazard. The test is performed at 250N.	<b>P</b>
4.2.5	Impact test	Refer below:	<b>N</b>
	Fall test	No hazard as result form the steel sphere fall test.	<b>N</b>
	Swing test	No hazard as result form the steel sphere swing test.	<b>N</b>
4.2.6	Drop test	Drop test not applicable.	<b>N</b>
4.2.7	Stress relief	The enclosure is metal.	<b>N</b>
4.2.8	Cathode ray tubes	CRT is not used in the equipment.	<b>N</b>
4.2.9	High pressure lamps	No high pressure lamps in the equipment.	<b>N</b>
4.2.10	Well or ceiling mounted equipment	Not intended to be mounted on a wall or ceiling.	<b>N</b>
4.3.	<b>DESIGN AND CONSTRUCTION</b>		
4.3.1	Edges and corners	All edges and corners are rounded and/or smoothed.	<b>P</b>
4.3.2	Handles and manual controls	No knobs, grips, handles, lever etc.	<b>N</b>
4.3.3	Adjustable controls	No hazardous adjustable controls.	<b>N</b>

Clause	Requirement – Test	Result - Remark	Verdict
4.3.4	Securing of parts	No loosening of parts impairing creepage distances or clearances is likely to occur.	P
4.3.5	Connection of plugs and sockets	SELV and TNV connectors do not comply with IEC 60320 or IEC 60083.	P
4.3.6	Direct plug-in equipment	Not intended to plug directly into a wall socket-outlet.	N
	Torque (Nm)	Nm	
4.3.7	Heating elements in earthed equipment	No heating elements provided.	N
4.3.8	Batteries	No lithium batteries.	N
4.3.9	Oil and grease	Insulation not in contact with oil or grease.	N
4.3.10	Dust, powders, liquids or gases	The equipment does not generate ionising radiation or use a laser, and does not contain flammable liquids or gases.	N
4.3.11	Containers for liquids or gases	No containers for liquids or gases in the equipment.	N
4.3.12	Flammable liquids.	The equipment dose not contain flammable liquid.	N
	Quantity of liquid	L	
	Flash point		
4.3.13	Radiation	Diffusion LED only.	N

4.4	<b>PROTECTION AGAINST HAZARDOUS MOVING PARTS</b>		
4.4.1	General	Adequate protection against risk of personal injury.	P
4.4.2	Protection in operator access areas	No moving parts.	N
4.4.3	Protection in restricted access areas location.	Not intended for installation in RAL.	N
4.4.4	Protection in service access areas	Unintentional contact is not likely in service access areas.	P

Clause	Requirement – Test	Result - Remark	Verdict
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4.5	<b>THERMAL REQUIREMENTS</b>		
4.5.1	Temper rises	(see appended table)	<b>P</b>
4.5.2	Resistance to abnormal heat		<b>N</b>

4.6	<b>OPENING IN ENCLOSURE</b>		
4.6.1	Top and side openings	Refer below:	
	Top openings	Openings in top are not located above bare parts at hazardous voltage.	<b>P</b>
	Dimensions (mm) .....		--
	Front, side and rear openings	Openings in top are not located above bare parts at hazardous voltage.	--
	Dimensions (mm) .....		--
4. 6.2	Bottom of fire enclosures	Protection against emission of flame, molten metal, flaming or glowing particles or drops by the fire enclosure with no bottom opening.	<b>P</b>
4.6.3	Doors and covers in fire enclosure	No door or cover.	<b>N</b>
4.6.4	Opening in transportable equipment		<b>N</b>
4.6.5	Adhesives for constructional purposes	No barrier secured by adhesive inside enclosure.	<b>N</b>
	Conditioning temperature/time	/week(s).	--

4.7.	<b>RESISTANCE TO FIRE</b>		
4.7.1	Reducing the risk of ignition and spread of flame	Method 1 is used.	<b>N</b>
4.7.2	Condition for a fire enclosure	Refer below:	<b>P</b>
4.7.2.1	Parts requiring a fire enclosure	The fire enclosure is required to cover all parts.	<b>P</b>
4.7.2.2	Parts not requiring a fire enclosure	The fire enclosure is required to cover all parts.	<b>N</b>
4.7.3	Materials	Components and materials have adequate flammability classification, Refer to "List of Critical Components".	<b>N</b>
4.7.3.1	General	Considered.	<b>P</b>
4.7.3.2	Materials for fire enclosure	That is fire enclosure.	<b>N</b>

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
4.7.3.3	Material for components and other parts outside fire enclosure	No parts outside the fire enclosure.	N
4.7.3.4	Materials for components and other parts inside fire enclosure	Other materials inside fire enclosure are minimum 94V-2 material.	P
4.7.3.5	Materials for air filter assemblies	No air filter assemblies	N
4.7.3.6	Materials used in high-voltage components	No used high-voltage components.	N

<b>5.</b>	<b>ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS</b>		
-----------	--	--	--

5.1	Touch current and simulated abnormal conductions	Class III equipment.	N
5.1.1	General	No applicable.	N
5.1.2	Equipment under test (EUT)		N
5.1.3	Test circuit	Tested for connection to IT power distribution system. (also relevant for TN or TT power distribution system)	--
5.1.4	Application of measuring instrument		N
5.1.5	Test procedure		N
5.1.6	Test measurements		N
	Test voltage		--
	Measured current	mA	--
	Max. allowed current	mA	--
5.1.7	Equipment with earth leakage current exceeding 3.5 A		N
5.1.8	Touch currents to and form telecommunication network.		N

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
5.1.8.1	Limitation of the touch current to a telecommunication network	None of the values measured shall exceed 0.25 mA r.m.s	N
	Test voltage		
	Measured current		
	Max. allowed current	0.25 mA	
5.1.8.2	Summation of touch currents from telecommunication networks		N
5.2.	<b>ELECTRIC STRENGTH</b>		
5.2.1	-5.2.2 General. Test procedure		P
5.3.	<b>ABNORMAL OPERATING AND FAULT CONDITIONS</b>		
5.3.1	Protection against overload and abnormal operation		N
5.3.2	Motors	No motors.	N
5.3.3	Transformers		N
5.3.4	Functional insulation	Refer to 5.3.8	N
5.3.5	Electromechanical components	Refer to 5.3.8	N
5.3.6	Simulation of faults		N
5.3.7	Unattended equipment		N
5.3.8	Compliance criteria for abnormal operating and fault conditions	Refer below:	--
5.3.8.1	During the tests	No fire or molten metal occurred and no deformation of enclosure during the tests.	N
5.3.8.2	After the tests	No reduction of clearance and creepage distances, Electric strength test is made on basic and supplementary insulation.	N

Clause	Requirement – Test	Result - Remark	Verdict
6.	<b>CONNECTION TO TELECOMMUNICATION NETWORKS</b>	No TNV circuits.	--
6.1.	<b>PROTECTION OF TELECOMMUNICATION NETWORK SERVICE PERSONNEL, AND USERS OF OTHER EQUIPMENT CONNECTED TO THE NETWORK, FROM HAZARDS IN THE EQUIPMENT.</b>		
6.1.1	Protection from hazardous voltages		<b>N</b>
6.1.2	Separation of the telecommunication network form earth	Refer below:	--
6.1.2.1	Requirements	There are no connections to protective earth.	<b>N</b>
	Test voltage	V	--
	Current in the test circuit	mA	--
6.1.2.2	Exclusions	No exclusions are applicable.	<b>P</b>
6.2	<b>PROTECTION OF THE EQUIPMENT USERS FROM VOLTAGES ON THE TELECOMMUNICATION NETWORKS.</b>		
6.2.1	Separation requirement		<b>N</b>
6.2.2	Electric strength test procedure	6.2.2.2 applied.	<b>N</b>
6.2.2.1	Impulse test	Not applicable, ref. Sub-clause 6.2.2.2	<b>N</b>
6.2.2.2	Steady-state test		<b>N</b>

<b>Clause</b>	<b>Requirement – Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
6.2.2.3	Compliance criteria	No breakdown of insulation during above tests.	<b>N</b>
6.3.	<b>PROTECTION OF TELECOMMUNICATION WIRING SYSTEM FROM OVERHEATING</b>		<b>N</b>
	Maximum output current	A	--
	Current limiting method		--

Clause	Requirement - Test	Result – Remark	Verdict
Annex A	<b>TESTS FOR RESISTANCE TO HEAT ND FIRE</b>	All materials have suitable flame class, no testing required.	<b>N</b>
A.1	Flammability test for fire enclosures of moveable equipment having a total mass exceeding 18kg, and of stationary equipment.		<b>N</b>
A.2	Flammability test for fire enclosures of moveable equipment having a total mass not exceeding 18kg, and for materials located within fire enclosure.		<b>N</b>
A	Tested material		<b>N</b>
	Mounting of samples during test;;		--
	Wall thickness		--
	Sample 1 burning time		<b>N</b>
	Sample 2 burning time		<b>N</b>
	Sample 3 burning time		<b>N</b>
	Material: compliance with the requirements		<b>N</b>
	Manufacturer of tested material		--
	Type of tested material		--
	Additional information		--

<b>Clause</b>	<b>Requirement - Test</b>	<b>Result – Remark</b>	<b>Verdict</b>
Annex B	<b>MOTOR TESTS UNDER ABNORMAL CONDITIONS</b>	No motors in the equipment.	<b>N</b>
	Position		--
	Manufacturer		--
	Type		--
	Rated voltage (V) or current (A)		--
B.2	Max. Temperatures		<b>N</b>
B.4	Running overload test		<b>N</b>
B.5	Locked-rotor overload test		<b>N</b>
	Test duration (days)		--
	Electric strength test: test voltage (V)		--
B.6	Running overload test for DC motor in secondary circuits		<b>N</b>
B.7	Locked-rotor overload test for DC motor in secondary circuits		<b>N</b>
B.7.2	Alternative test procedure; test time (h)		<b>N</b>
B.7.3	Electric strength test		<b>N</b>
B.8	Test for motors with capacitors		<b>N</b>
B.9	Test for three-phase motor		<b>N</b>
B.10	Test for series motors operating voltage (V)		<b>N</b>

Clause	Requirement - Test	Result – Remark	Verdict
Annex C	<b>TRANSFORMERS</b>		<b>N</b>
	Position		--
	Manufacturer		
	Type		--
	Rated values		--
	Method of protection		<b>N</b>
C.1	Overload test	Approved transformer used.	<b>N</b>
	Linear transformer		--
	Ferro-resonant transformer		--
	Transform for switch mode power supply		--
	Type of thermal cut-out		--
C.2	Insulation	The insulation fulfil the requirements in 2.10 and relevant tests of 5.2.2	<b>N</b>
	Precautions taken	See the attached specification for the transformer.	<b>N</b>
	Retaining of end turns of all windings	Secured to the soldering pins with wrapping.	<b>N</b>
	Earthed screen for protective purposes	No earthed screen for protective purposes.	<b>N</b>

**APPENDED TABLES**

<b>1.5</b>	<b>List of critical components</b>				<b>P</b>
Object/part No	Manufacturer/ Trademark	Type / model	Technical Data		Mark(s) of Conformity
Plastic enclosure	Applicant' s Spec.	---	94V-HB or batter		UL R/C
Switch Adaptor	DVE	DSA-0101F-05A	I/P: 100~240VAC 50-60Hz O/P: 5V DC 2.0A		UL/CE
Main PCB	Recognized	---	94V-0		UL R/C

<b>1.6</b>	<b>Input Test</b>					<b>P</b>
Operating Condition	Input Condition		Input Current (A)		Average Power Watts	
	Volts	DC	Rated	Measured		
Max. Normal Load	5.0		2.0	1.1	5.5	

<b>2.10</b>	<b>Clearance and creepage distance measurements</b>					<b>P</b>
Type of insulation	Position/Location	Working voltage		Clearance 2.10.3		Comm.
		Up	U rms	Required	Measured	
B/S	PCB TNV SELV	<120V	<120V	1.0mm	>1.0mm	

<b>2.10</b>	<b>Clearance and creepage distance measurements</b>					<b>P</b>
Type of insulation	Position/Location	Working voltage		Creepage distance 2.10.4		Comm.
		Up	U rms	Required	Measured	
B/S	PCB TNV SELV	<120V	<120V	1.5mm	>1.5mm	

<b>4.5</b>	<b>Temperature measurements</b>			<b>P</b>
	Test voltage (V) .....	5 VDC		-
	t1 ( °C) .....			-
Temperature rise dT of part/at:		TEST POINT	Dt (K)	Required dT (K)
T1 body		CH01	8.7	60
U3 body		CH02	23.9	60
U11 body		CH03	35.5	60
U30 body		CH04	17.9	60
U8 body		CH05	13.7	60
L15 body		CH06	14.1	60
C183 body		CH07	9.6	60
RF model body		CH08	12.9	60
Outside enclosure		CH09	7.3	60
Ambient		CH10	27.6	/

<b>4.7</b>	<b>Resistance to Fire</b>		<b>P</b>
Item	UL Recognized	Declared Rating	
PCB		V-0	

**APPENDIX –TEST INSTRUMENTS**

<b>Inst. ID</b>	<b>Instrument No.</b>	<b>Range Used</b>	<b>Instruments Type</b>
LTC01	THS-ML1	Temperature : 70 °C R. Humidity : . 60%	Temperature Humidity Chambers
LTC02	GPI-615	Cutoff Current:10mA: Voltage:1500VAC	Withstand Voltage Tester
LTC03	GDM-8039	VAC	Digital Multimeter
LTC04	HP OSCILLO SCOPE	DC/AC 0-500 V	54600A
LTC05	CHITAI 2402A	Auto	Digital Power Meter (DC/AC)
LTC06	CHENHWA DC Electronic Load	60V/60A	2600
LTC07	IMADA FB-50	50 KG Resolution: 0.5N	Portable Force Indicator
LTC08	N/A	Ball Impact Test H.: 1.30 m	Steel Sphere
LTC09	OVEN	50-300	Thermal Oven
LTC10	YOKOGAWA HR1300	CH1-CH20	HYBRID Recorder
LTC11	ED&D LT-952HC	20 Ma, 2 mA	Leakage Current Tester
LTC12	GW GFG-813	100 Hz – 10 KHz	13 MHz Function Generator
LTC13	APC AFC-3KB	90V-260V 47-63Hz, 3KVA	AC Power Source
LTC14	GDM 8055	200 Ma (DC A)	Digital Multimeter
LTC15	GDM 8055	20 VAC	Digital Multimeter
LTC16	B&K 4155	12.5 mV/Pa	Microphone
LTC17	B&K ZC0020	Gain: 0dB	Pre-Amplifier
LTC18	B&K TYPE 2230	70-140 dBspl	Precision Sound Level Meter
LTC19	1036-AF	ANSI S3.7-1973	Acoustic Coupling
LTC20	TRC 1102	Press T1 V1	Surge Testor
LTC21	OTS	All	Overvoltage Test Simulator
LTC22	GDM-8039	VAC	Digital Multimeter
LTC23	Lufkin 5m/16'	1 Meter 1.3 Meter	Roll Ruler
LTC24	GW GCT-630	Ohm.& A.	Ground Continuity Tester

## **PHOTO OF EUT**



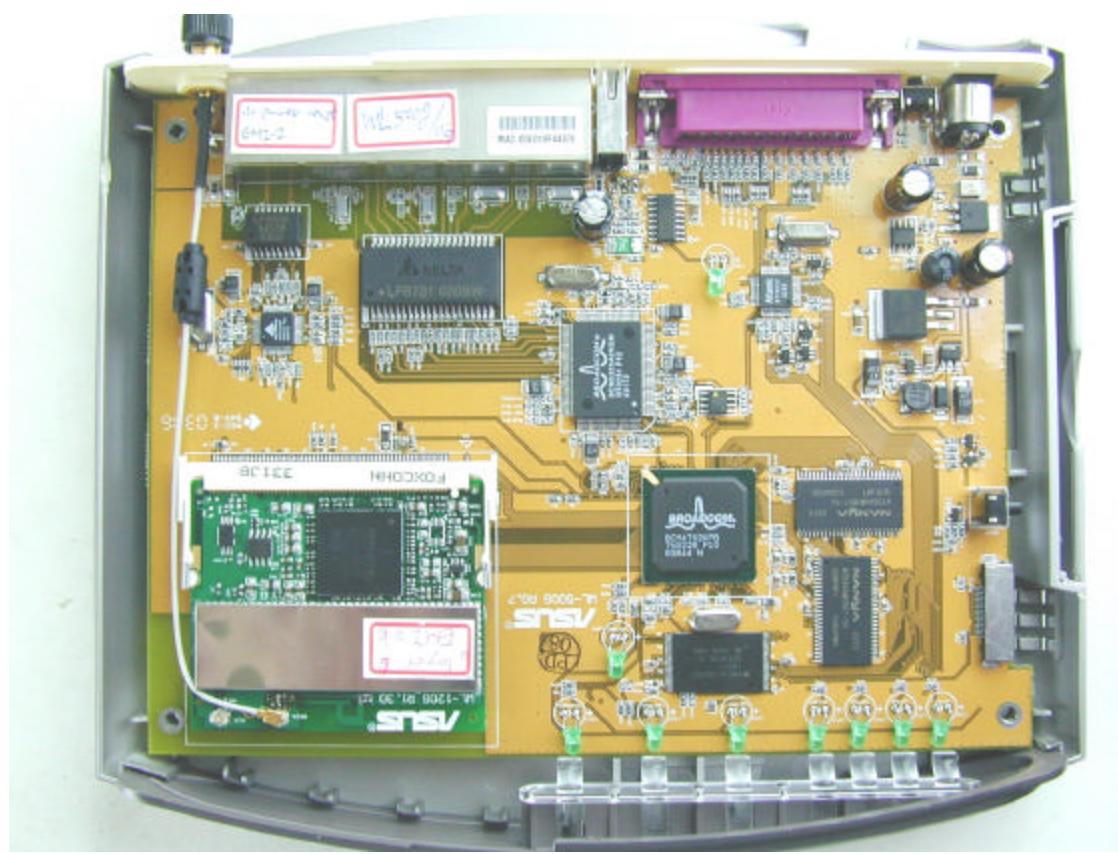
**Report No. : A54LV562**

**Test date : 05/21/2003, Lily Technology Co ., Ltd., TEL : 886-2-8773-6799 , Fax : 886-2-8773-6794**



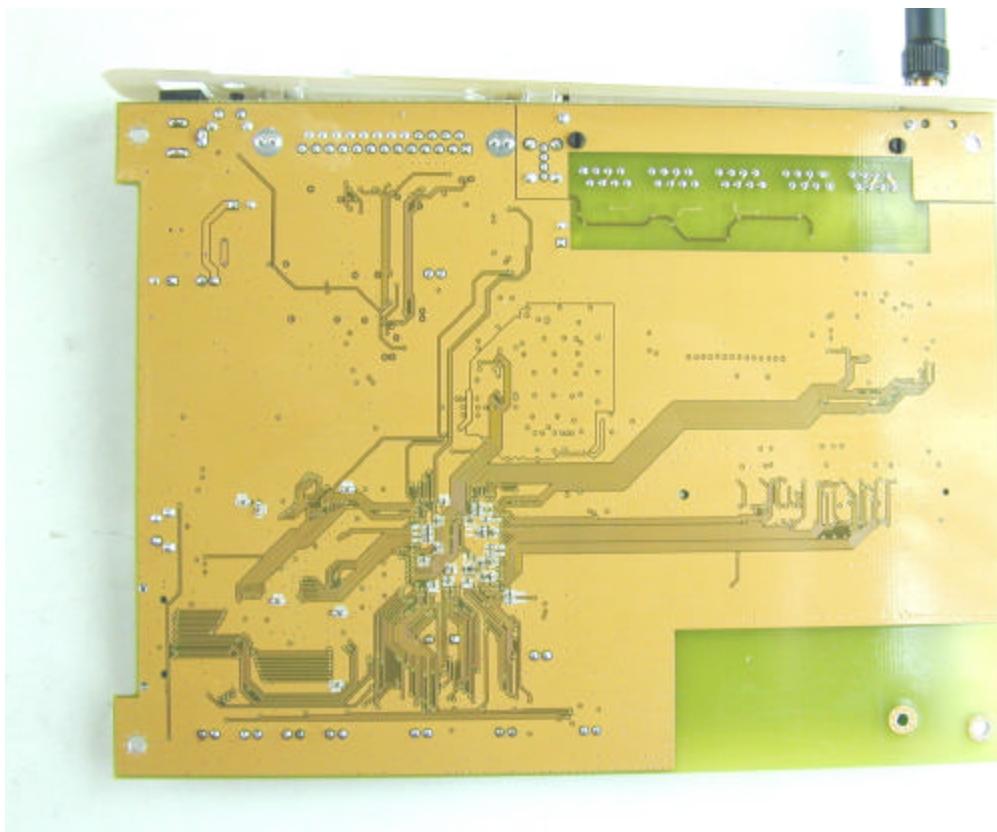
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**Test date : 05/21/2003, Lily Technology Co ., Ltd., TEL : 886-2-8773-6799 , Fax : 886-2-8773-6794**



**Report No. : A54LV562**

**Test date : 05/21/2003, Lily Technology Co., Ltd., TEL : 886-2-8773-6799 , Fax : 886-2-8773-6794**



**Copy of the R&TTE Declaration of  
Conformity (DoC)**

# Declaration of Conformity

We, the under signed,

<b>Company</b>	ASUSTeK Computer Inc.
<b>Address, City</b>	4/F, 150, Li-Te Rd., Peitou, Taipei,
<b>Country</b>	Taiwan 112
<b>Phone number</b>	886-2-28943447
<b>Fax number</b>	886-2-28950113
<b>E-mail</b>	lawrence_yu@asus.com.tw

certify and declare under our sole responsibility that the following equipment:

<b>Product Description / Supplementary Info</b>	Wireless Router
<b>Manufacturer</b>	ASUSTeK COMPUTER INC.
<b>Brand</b>	ASUS
<b>Type</b>	WL-500g

is tested to and conforms with the essential radio test suites included in the following standards:

<b>Standard</b>	<b>Issue date</b>
ETSI EN 300 328-1	V1.3.1 Dec. 2001
ETSI EN 300 328-2	V1.2.1 Dec. 2001
ETSI EN 301 489-1	V1.4.1 Aug. 2002
ETSI EN 301 489-17	V1.2.1 Aug. 2002
EN 60950	2000

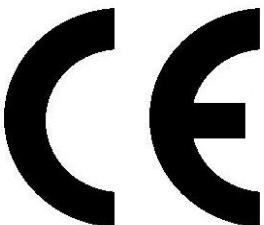
and therefore complies with the essential requirements and provisions of the **R&TTE directive 1999/5/EC** of the European Parliament and of the council of 9March 1999 on radio equipment and Telecommunications Terminal Equipment and the mutual recognition of their conformity and the requirements of Annex IV (conformity Assessment procedure referred to in article 10(4)).

The following Notified Bodies have been consulted in the Conformity Assessment procedure:

<b>Notified Body number</b>	<b>Name and address</b>

The technical documentation as required by the Conformity Assessment procedure is kept at the following address:

<b>Company</b>	ASUSTeK Computer Inc.
<b>Address, City</b>	4/F, 150, Li-Te Rd., Peitou, Taipei,
<b>Country</b>	Taiwan 112
<b>Phone number</b>	886-2-28943447
<b>Fax number</b>	886-2-28950113
<b>E-mail</b>	lawrence_yu@asus.com.tw



<b>Draw up in</b>	Taiwan, R.O.C.
<b>Data</b>	2003/5/22
ASUSTek Computer Inc. 4/F, 150, Li-Te Rd., Peitou, Taipei, Taiwan 112	
<b>Signature &amp; company stamp</b>	LawrenceYu / R&D Engineer

# **Product Quality Assurance Documents**

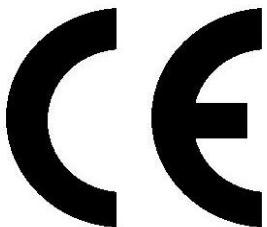
# Declaration of Product Quality Assurance

In accordance with the Conformity Assessment procedure referred to in article 10(3) of R&TTE Directive 1999/5/EC of the European Parliament and the council of 9 march 1999 on the Radio equipment and Telecommunication Terminal Equipment and their mutual recognition of their conformity (R&TTE directive) the following manufacture:

<b>Company</b>	ASUSTeK Computer Inc.
<b>Address, City</b>	4/F, 150, Li-Te Rd., Peitou, Taipei,
<b>Country</b>	Taiwan 112
<b>Phone number</b>	886-2-28943447
<b>Fax number</b>	886-2-28950113
<b>E-mail</b>	lawrence_yu@asus.com.tw

declares under its sole responsibility that it had taken the following measures in order to achieve that the manufacturing process ensures compliance of the manufactured products with the technical documentation as established by ASUSTeK Computer Inc. under the requirements of the R&TTE directive and with the requirements of R&TTE directive that apply to them:

<b>Number</b>	<b>Measures taken in order to achieve that the manufacturing process ensures compliance of the manufactured products</b>
01	Manufacturing of the equipment is subcontracted by ASUSTEK COMPUTER INC. located at 150, Li-te Rd., Peitou, Taipei 112, Taiwan, Taiwan, R.O.C. who is ISO 9001 certified for development, production and distribution of radio products. (See copy of ISO 9001 certification attached)



<b>Draw up in</b>	Taiwan, R.O.C.
<b>Data</b>	2003/4/29
ASUSTek Computer Inc. 4/F, 150, Li-Te Rd., Peitou, Taipei, Taiwan 112	
<b>Signature &amp; company stamp</b>	LawrenceYu / R&D Engineer



## DET NORSKE VERITAS MANAGEMENT SYSTEM CERTIFICATE

Certificate No. 1300-1998-AE-RGC-RvA

*This is to certify that  
the Environmental Management System  
of*

**ASUSTeK COMPUTER INC.**

*at*

- 1) No. 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.
- 2) No. 76, Li-Gong St., Peitou, Taipei, Taiwan, R.O.C.
- 3) 5F, No. 76, Li-gong St., Peitou, Taipei, Taiwan, R.O.C.
- 4) No. 5, Shing Yeh St., Kwei Shan Hsiang, Taoyuan Hsien, Taiwan, R.O.C.
- 5) No. 151, Sec. 1, Nan-Kan Rd., Lu-Chu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.
- 6) No. 10, Lane 17, Sec. 3, Nan-Shan Rd., Lu-Chu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.

*has been found to conform to the Environmental Management System Standard:  
ISO 14001:1996*

*This Certificate is valid concerning all activities related to:  
DESIGN, MANUFACTURE, SALES AND SERVICE OF MOTHERBOARDS, OPTICAL DRIVES,  
ADD-ON CARDS, PERSONAL COMPUTERS, NOTEBOOK COMPUTERS, SERVERS, MODEMS  
AND WIRELESS COMMUNICATION PRODUCTS*

*Original Certification date:  
November 11<sup>th</sup>, 1998*

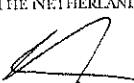
*Place and date:  
Hong Kong, March 22<sup>nd</sup>, 2002*

*This Certificate is valid until:  
November 11<sup>th</sup>, 2004*

*for the Accredited Unit:  
DNV CERTIFICATION B.V.,  
THE NETHERLANDS*



*Accredited  
by the RvA*

  
K. S. Cheung  
*Management Representative*

*Compliance to the Standard in respect to the indicated scope is  
verified by the DNV approved registered Team Leader:*

Garry Hsiao-Tsa Wu  
*Lead Auditor*

Lack of fulfilment of conditions as set out in the Appendix may render this Certificate invalid.  
CERT E 2000-07-01  
DNV CERTIFICATION B.V. Haastrechtstraat 7, 3070 DC Rotterdam, The Netherlands, TEL INT: +31 10 2922 688, FAX: +31 10 4796 768