

EMC TEST REPORT  
for  
FSP Group Inc.  
Switching Power Supply

Model : (1)FSP150-50SNV(PF) (2)FSP200-50SNV(PF)

Prepared for : FSP Group Inc.  
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APPENDIX I (Photos of EUT)

APPENDIX II (Power Harmonic & Flicker Test Data) – (EUT within PC)

## TEST REPORT VERIFICATION

Applicant : FSP Group Inc.  
Manufacturer #1 : Shenzhen Huili Elec. Co., Ltd.  
Manufacturer #2 : Wellex Technology Co., Ltd.  
Manufacturer #3 : Fortron/Source (China)Corp.  
EUT Description : Switching Power Supply  
(A) MODEL NO. : (1)FSP150-50SNV(PF)  
(2)FSP200-50SNV(PF)  
(B) SERIAL NO. : N/A  
(C) POWER SUPPLY : AC 115/230V~, 60/50Hz

## Measurement Procedure Used:

EN 55022/1998 +A1/2000  
EN 61000-3-2/1995 +A1/1998 +A2/1998 +A14/2000, EN 61000-3-3/1995+A1/2001  
EN 55024/1998 (IEC 61000-4-2/1995+A1/1998+A2/2000, IEC 61000-4-3/1995 +A1/2001,  
IEC 61000-4-4/1995, IEC 61000-4-5/1995, IEC 61000-4-6/1996,  
IEC 61000-4-8/1993, IEC 61000-4-11/1994)

The device described above are tested by Taiwan Tokin EMC Eng. Corp. to determine the maximum emission levels emanating from the device and the severity levels of the device endured and its performance criterion. The measurement results were contained in this test report and Taiwan Tokin EMC Eng. Corp. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the EN 55022 official limits and EN 61000-3-2, -3、EN 55024 official requirement.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Taiwan Tokin EMC Eng. corp.

Date of Test : Jul. 23 ~ 25, 2002

Prepared by : Julie Hsu Aug. 05, 2002  
(Julie Hsu/Assistant Officer)

Test Engineer : Allen Wang Aug. 07, 2002  
(Allen Wang/Deputy Manager)

Approve & Authorized Signer : Jackie Deng 8/1/02  
(Jackie Deng/Assistant General Manager)

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

Description	:	Switching Power Supply
Model Number	:	(1)FSP150-50SNV(PF) (2)FSP200-50SNV(PF) Above models is the same appearance of style expect the watt & rating difference. The M/N FSP200-50SNV(PF) is representative selected in the test and included in this report.
Applicant	:	FSP Group Inc. No. 22, Jianguo E. Rd., Taoyuan City, Taiwan, R.O.C.
Manufacturer #1	:	Shenzhen Huili Elec., Co., Ltd. Blk. C, Bldg. 7, County 73, Baoan, Shenzhen, Guangdong, China.
Manufacturer #2	:	Wellex Technology Co., Ltd. Zhenlian Building, County 74, Baoan, Shenzhen, Guangdong, China.
Manufacturer #3	:	Fortron/Source (China) Corp. (1)Unit 25, Zone 37, Baoan County, Shenzhen, China. (2)The 2 <sup>nd</sup> Industrial Park Mabu Xi Xiang, Baoan District, Shenzhen, Guangdong, China.
M/N FSP150-50SNV(PF)		
AC Input	:	115/230V~, 6/3A, 60/50Hz
DC Output	:	150W +3.3V/12.0A, +5V/10.0A, +12V/4.0A +5Vsb/2.0A, -12V/0.3A, -5V/0.2A (Optional)
M/N FSP200-50SNV(PF)		
AC Input	:	115/230V~, 6/3A, 60/50Hz
DC Output	:	200W +3.3V/16.7A, +5V/16.0A, +12V/10.0A +5Vsb/2.0A, -12V/0.5A, -5V/0.3A (Optional) (+5V & +3.3V = 118W Max)

Date of Receipt of Sample : Jul. 23, 2002  
Date of Test : Jul. 23 ~ 25, 2002

## 1.2. Tested Supporting System Details

《For EMI Test》

### 1.2.1. PERSONAL COMPUTER

Model Number : HP VECTRA XE320  
Serial Number : SG21101919  
FCC ID : By DoC  
BSMI ID : 3912A318  
Brand : HP  
Manufacturer : First International Computer, Inc.  
**S.P.S. (EUT) : FSP, M/N FSP200-50SNV(PF)**  
Power Cord : Non-Shielded, Detachable, 1.8m

### 1.2.2. 15" LCD MONITOR

Model Number : D5063M  
Serial Number : CN206A6018  
FCC ID : ARSLM562H  
BSMI ID : R33037  
Manufacturer : Top Victory Electronics (Fujian) Co., Ltd.  
Data Cable (D-Sub) : Shielded, Detachable, 1.8m  
Bonded two ferrite cores  
Audio Cable(\*2EA) : Non-Shielded, Detachable, 1.2m  
AC Adapter : Delta, M/N ADP-40TB  
BSMI ID 3892D142  
Cord: Shielded, Undetachable, 1.8m  
Bonded a ferrite core  
Power Cord : Non-Shielded, Detachable, 1.8m

### 1.2.3. DOT MATRIX PRINTER

Model Number : KX-P2135  
Serial Number : 8DMCNC02144  
BSMI ID : 3872A371  
FCC ID : ACJ5Z6KX-P2135  
Brand : Panasonic  
Manufacturer : Matsushita  
Data Cable : Non-Shielded, Detachable, 1.5m  
Power Cord : Non-Shielded, Undetachable, 1.8m

## 1.2.4. KEYBOARD

Model Number : SK-2502C  
 Serial Number : M020236402  
 BSMI ID : 3872F107  
 FCC ID : by DoC  
 Manufacturer : Siltek (Brand: HP)  
 Data Cable : Shielded, Undetachable, 1.8m

## 1.2.5. MODEM #1

Model Number : DM-1414  
 Serial Number : 980034385  
 FCC ID : IFAXDM1414  
 Manufacturer : Accex  
 Data Cable : Shielded, Detachable, 1.2m  
 Power Adapter : Amigo, M/N AM-91000A  
 Non-Shielded, Undetachable, 1.8m

## 1.2.6. MODEM #2

Model Number : DM-1414  
 Serial Number : 980034383  
 FCC ID : IFAXDM1414  
 Manufacturer : Accex  
 Data Cable : Shielded, Detachable, 1.2m  
 Power Adapter : Amigo, M/N AM-91000A  
 Non-Shielded, Undetachable, 1.8m

## 1.2.7. PS2 MOUSE

Model Number : M-S48a  
 Serial Number : LZE20501538  
 FCC ID : JNZ201213  
 BSMI ID : 4882A001  
 Manufacturer : Logitech (Brand: HP)  
 Data Cable : Non-Shielded, Undetachable, 1.8m

## 1.2.8. USB MOUSE #1

Model Number : CREUBB  
 Serial Number : N/A  
 FCC ID : NHM-CREUBE  
 Manufacturer : CRE Technology Co., Ltd.  
 Data Cable : Shielded, Undetachable, 1.8m

## 1.2.9. USB MOUSE #2

Model Number : CREUBB  
 Serial Number : N/A  
 FCC ID : NHM-CREUBE  
 Manufacturer : CRE Technology Co., Ltd.  
 Data Cable : Shielded, Undetachable, 1.8m



## 1.2.10. MICROPHONE

Model Number : HD-303  
 Serial Number : N/A  
 Manufacturer : Multimedia Microphone System  
 Data Cable : Non-Shielded, Undetachable, 2.2m

## 1.2.11. WALKMAN

Model Number : RQ-P35LT-K  
 Serial Number : HA08473  
 Manufacturer : Panasonic  
 Data Cable : Non-Shielded, Detachable, 1.8m

## 1.2.12. EARPHONE #1

Model Number : N/A  
 Manufacturer : Panasonic  
 Earphone Cable : Non-Shielded, Undetachable, 1.1m

## 1.2.13. EARPHONE #2

Model Number : N/A  
 Manufacturer : Panasonic  
 Earphone Cable : Non-Shielded, Undetachable, 1.1m

## 1.2.14. 10/100 Fast Ethernet Switch

Model Number : DES-1005D  
 Serial Number : 0212G1A06038  
 FCC ID : by DoC  
 Manufacturer : D-Link  
 Power Adapter : I/P:120Vac,60Hz O/P: DC 7.5V  
 Power Cord : Non-Shielded, Undetachable, 1.8m

## 《For Harmonic &amp; Flicker Test》

## 1.2.15. ELECTRONIC LOAD #1

Model Number : 3301A-20202121  
 Serial Number : 81201A061  
 Manufacturer : Prodigit Electronics Co., Ltd.  
 Power Cord : Shielded, Detachable, 1.8m

## 1.2.16. ELECTRONIC LOAD #2

Model Number : 3301A-20202121  
 Serial Number : 81201A059  
 Manufacturer : Prodigit Electronics Co., Ltd.  
 Power Cord : Shielded, Detachable, 1.8m

## 1.2.17. SIMULATOR

Model Number : N/A  
 Manufacturer : N/A  
 Data Cable : Non-Shielded, Detachable, 0.9m

## 《For EMS Test》

## 1.2.18. PERSONAL COMPUTER

Mother Board	:	ASUS(VIA), M/N CUV4X, S/N 07Z7Y24102, FCC by DoC
CPU	:	Intel Pentium III 667MHz
RAM	:	128MB (PC-133)
Case	:	Enlight, M/N EN-7105A
Floppy Disk Drive 3.5"	:	Mitsumi, M/N D353M3, S/N 0G07BR0708
Hard Disk Drive	:	Maxtor (10.2GB), M/N 91021U2 S/N 90526178
VGA Card	:	CP, M/N CM64A, S/N C01H011207 FCC by DoC
<b>S.P.S. (EUT)</b>	:	<b>FSP, M/N FSP180-60AV(PF)</b>
Power Cord	:	Non-Shielded, Detachable, 1.8m

## 1.2.19. MONITOR

Model Number	:	PM36B
Serial Number	:	W821111454
FCC ID	:	IIBTC1
Manufacturer	:	Funai Electric Company of Taiwan
Data Cable	:	Shielded, Undetachable, 1.2m
Power Cord	:	Non-Shielded, Detachable, 1.5m

## 1.2.20. PRINTER

Model Number	:	2225C+
Serial Number	:	3007S68643
FCC ID	:	DSI6XU2225
Manufacturer	:	Hewlett Packard
Power Adapter	:	Hewlett Packard, M/N 82241A
Power Cord	:	Non-Shielded, Undetachable, 2.0m
Data Cable	:	Shielded, Detachable, 1.2m

## 1.2.21. KEYBOARD

Model Number	:	MCK-980
Serial Number	:	00020304
BSMI ID	:	3872A377
FCC ID	:	by DoC
Manufacturer	:	Optek (Brand: ASUS)
Data Cable	:	Shielded, Undetachable, 1.5m

## 1.2.22. MODEM

Model Number	:	DM-1417
Serial Number	:	8036022
FCC ID	:	IFAXDM1417
Manufacturer	:	Accex
Data Cable	:	Shielded, Detachable, 1.2m
Power Adapter	:	M/N SCP41-91000A Non-Shielded, Undetachable, 1.8m

## 1.2.23. PS2 MOUSE

Model Number	:	M-S35
Serial Number	:	LZA82103145
FCC ID	:	DZL211029
Manufacturer	:	Logitech
Data Cable	:	Non-Shielded, Undetachable, 1.8m

## 1.2.24. USB MOUSE #1

Model Number	:	CREUBB
Serial Number	:	N/A
FCC ID	:	NHM-CREUBE
Manufacturer	:	CRE Technology Co., Ltd.
Data Cable	:	Shielded, Undetachable, 1.8m

## 1.2.25. USB MOUSE #2

Model Number	:	CREUBB
Serial Number	:	N/A
FCC ID	:	NHM-CREUBE
Manufacturer	:	CRE Technology Co., Ltd.
Data Cable	:	Shielded, Undetachable, 1.8m

## 1.3. Test Facility

Site Description (C4/R5)	:	Taiwan Tokin EMC Eng. Corp. LINKOU LAB.
Name of Firm	:	Taiwan Tokin EMC Eng. Corp. 9th Fl., No. 38, Fushing N. Rd., Taiwan, R.O.C.
Site Location	:	No. 53-11, Tin-Fu Tsun, Lin-Kou, Taipei Hsien, Taiwan, R.O.C.
NVLAP Lab. Code	:	200077-0
DAR-Registration No.	:	DAT-P-092/99-00e

## 1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150KHz~30MHz	$\pm 2.66$ dB
Radiation Test (Distance: 10m)	30MHz~300MHz	+4.5dB / -4.5dB
	300MHz~1000MHz	+3.88dB / -3.84dB

Remark : Uncertainty =  $K\mu c(y)$

## 2. TESTED INSTRUMENTATION USED

### 2.1. For Conduction Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS10	844591/015	Feb.27, 02'	1 Year
2.	A.M.N.	Rohde & Schwarz	ENV4200	825358/003	Nov.12, 01'	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1430-5	Nov.12, 01'	1 Year

### 2.2. For Radiation Measurement (No. 5 Open Site)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8595E	3829A03778	Aug.17, 01'	1 Year
2.	Test Receiver	Rohde & Schwarz	ESVS10	849231/017	Dec.20, 01'	1 Year
3.	Amplifier	HP	8447D	2944A07185	N/A	N/A
4.	Broadband Antenna	Chase	VBA6106A	1227	Nov.27, 01'	1 Year
5.	Log Periodic Antenna	Chase	UPA6109	1061	Nov.27, 01'	1 Year

### 2.3. For Harmonic & Flicker Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Universal Power Analyzer	Voltech	PM3000A	6686-002	Jan.09, 02'	1 Year
2.	Programmable Power Source	Chroma	6590	65900086	Apr.17, 02'	1 Year

### 2.4. For ESD Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Discharger	Keytek	ESD-1	9508190	Oct.12, 01'	1 Year
2.	Power Supply	Keytek	PSC-1	9507471	Oct.12, 01'	1 Year
3.	Discharge Network	Keytek	DN-10	9505431	Oct.12, 01'	1 Year
4.	Current Injection Adapter	Keytek	CIA/V	9508177	Oct.12, 01'	1 Year
5.	Cable	Keytek	EC-1	9310273	Oct.12, 01'	1 Year

## 2.5. For RF Field Strength Susceptibility Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Maconi	2031	119530/015	Jan.04, 02'	1 Year
2.	Power Amplifier	A & R	25W1000M7	13261	N/A	N/A
3.	Field Monitor	A & R	FM2000	17629	N/A	N/A
4.	Field Sensor	A & R	FP2000	17653	May 09,02'	1 Year
5.	Power Antenna	A & R	AT1080	13002	N/A	N/A

## 2.6. For EFT Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Control Center	Keytek	E103	9506267	Jun.18, 02'	1 Year
2.	EFT Generator	Keytek	E411	9506182	Jun.18, 02'	1 Year
3.	EFT Coupler / Decoupler	Keytek	E4551	9506216	Jun.18, 02'	1 Year

## 2.7. For Surge Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Control Center	Keytek	E103	9506267	Jun.18, 02'	1 Year
2.	Surge Combination Wave	Keytek	E501A	9506272	Jun.18, 02'	1 Year
3.	Surge Coupler / Decoupler	Keytek	E4551	9506216	Jun.18, 02'	1 Year

## 2.8. For Injected Currents Susceptibility Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Maconi	2031	119530/015	Jan.04, 02'	1 Year
2.	Power Amplifier	A & R	100A250	17811	N/A	N/A
3.	Power Meter	HP	436A	2236A13620	Dec. 31, 01'	1 Year
4.	Power Sensor	HP	8482B	3318A05483	Dec. 31, 01'	1 Year
5.	Attenuator	Weinschel	40-6-34	LJ093	Jul. 08, 02'	1 Year
6.	CDN-M3	Fischer	FCC-801-M3-25A	9961	Nov. 22. 01'	1 Year

## 2.9. For Power Frequency Magnetic Field Immunity Measurement

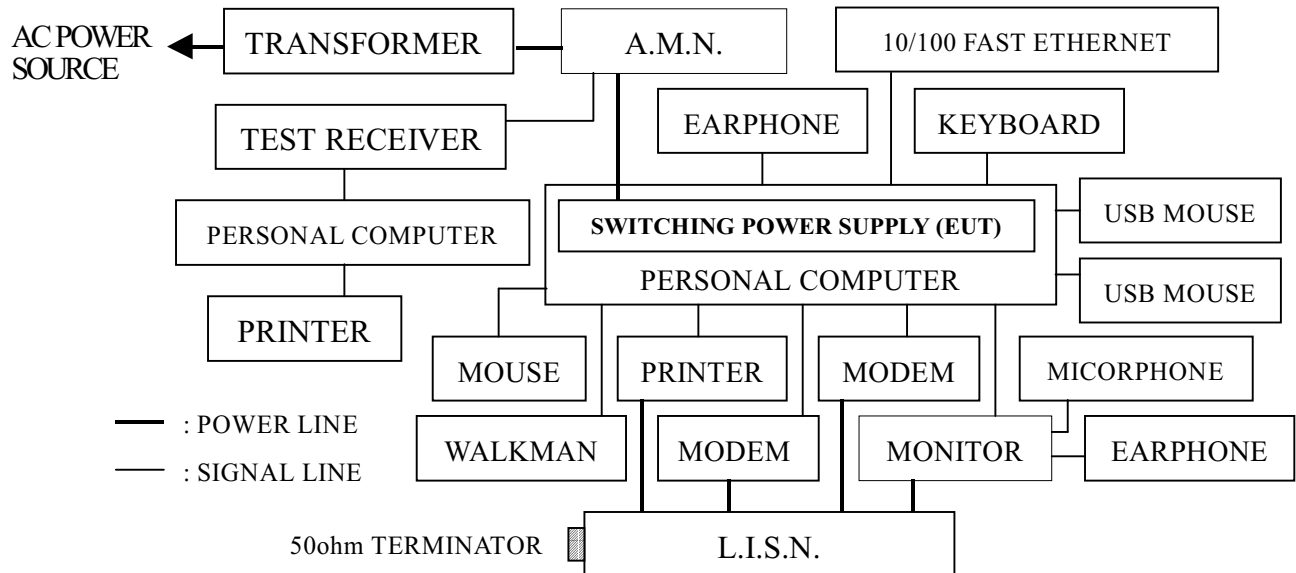
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field	Hafely	MAG 100.1	080015-01	Dec.01, 01'	1 Year

## 2.10.For Voltage Dips and Interruptions Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Universal Power Analyzer	Voltech	PM3000A	6686-002	Jan.09, 02'	1 Year
2.	Programmable Power Source	Chroma	6590	65900086	Apr.17, 02'	1 Year

### 3. POWERLINE CONDUCTED TEST

#### 3.1. Block Diagram of Test Setup



#### 3.2. Powerline Conducted Emission Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150KHz ~ 500KHz	66 ~ 56 dB	56 ~ 46 dB
500KHz ~ 5MHz	56 dB	46 dB
5MHz ~ 30MHz	60 dB	50 dB

#### 3.3. EUT's Configuration during Compliance Measurement

The following equipments were installed on RF LINE VOLTAGE measurement to meet EN 55022 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

##### 3.3.1. Switching Power Supply (EUT)

Model Number	:	FSP200-50SNV(PF)
Manufacturer #1	:	Shenzhen Huili Elec., Co., Ltd.
Manufacturer #2	:	Wellex Technology Co., Ltd.
Manufacturer #3	:	Fortron/Source (China) Corp.
AC Input	:	115/230V~, 6/3A, 60/50Hz
DC Output	:	200W
		+3.3V/16.7A, +5V/16.0A, +12V/10.0A
		+5Vsb/2.0A, -12V/0.5A, -5V/0.3A (Optional)
		(+5V & +3.3V = 118W Max)

##### 3.3.2. Supporting System

: As in Section 1.2



### 3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown on 3.1.
- 3.4.2. Turned on the power of all equipments.
- 3.4.3. Personal Computer (EUT inside) read data from disk.
- 3.4.4. Personal Computer running the self-test program "Hwin" by windows and sent "H" character to monitor, then the screen of monitor displayed and filled with "H" pattern.
- 3.4.5. Personal Computer read data from floppy disk and then wrote data into floppy disk.
- 3.4.6. The other peripheral devices were drove and operated in turn during all testing.
- 3.4.7. Repeat above procedures form 3.4.3. to 3.4.6.

### 3.5. Test Procedure

The EUT (within PC) was put on table which was above the ground by 80cm and its power cord connected to the AC mains through a Artificial Mains Network (A.M.N.). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provided a 50ohm coupling impedance for the tested equipments. Both sides of A.C. line were checked to find out the maximum conducted emission according to EN55022 (CISPR 22) Class B regulations during conducted emission measurement.

The bandwidth of the R&S Test Receiver ESHS10 was set at 10KHz.

The frequency range from 150KHz to 30MHz was checked.

All the test results are listed in section 3.6.

### 3.6. Test Results

**PASSED.** Please refer to the following pages.  
(All emissions not reported below are too low against the prescribed limits.)

Test Date : Jul. 23, 2002      Temperature : 28°C      Humidity : 74%

Test Model : FSP200-50SNV(PF)

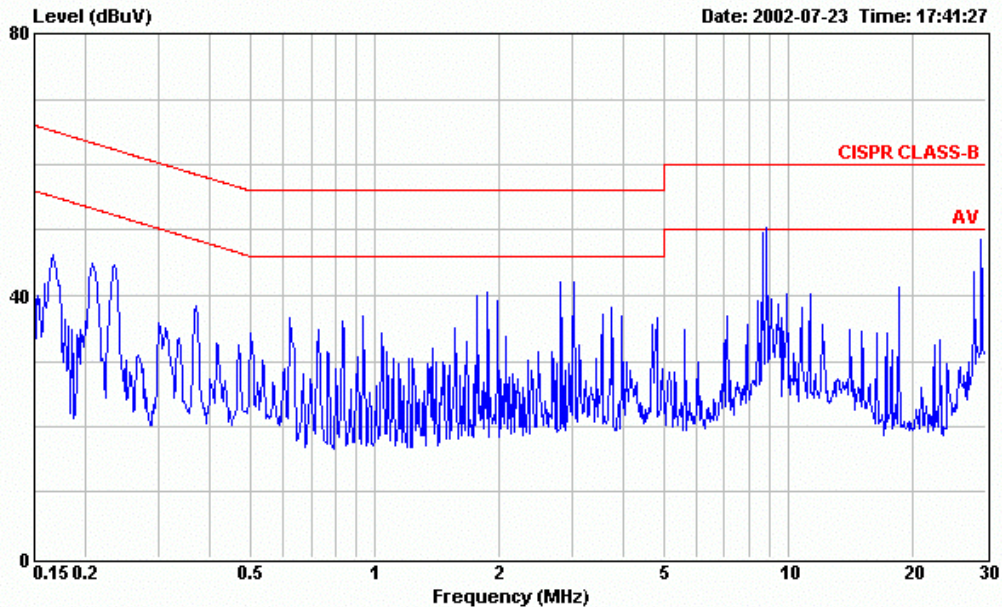
Reference Data # : # 19 (20, 21) # 22 (23, 24)



TAIWAN TOKIN EMC ENG. CORP.  
 台灣東金科技股份有限公司

No.53-11, Tin-fu Tsun, Lin-kou Hsiang,  
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 Tel:02-26092133 Fax:02-26099303  
 Email:ttemc@ttemc.com.tw

Data#: 19 File#: D:\Fsp-G91699.EMI



Site : No.4 Shielded room  
 Condition : CISPR CLASS-B ENV-4200 NEUTRAL  
 EUT : S.P.S. M/N:FSP200-50SNV(PF)  
 POWER : 230Vac/50Hz (28°C/74%)  
 MEMO : FULL SYSTEM

Data#: 20 File#: D:\Fsp-G91699.EMI Date: 2002-07-23 Time: 17:43:09

Site : No.4 Shielded room  
 Condition : CISPR CLASS-B ENV-4200 NEUTRAL  
 EUT : S.P.S. M/N:FSP200-50SNV(PF)  
 POWER : 230Vac/50Hz (28°C/74%)  
 MEMO : FULL SYSTEM

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.166	41.97	-23.20	65.17	31.47	10.30	0.20	QP
2	0.210	44.06	-19.15	63.21	33.57	10.29	0.20	QP
3	0.365	38.93	-19.68	58.61	28.52	10.21	0.20	QP
4	1.774	39.20	-16.80	56.00	28.70	10.10	0.40	QP
5	2.815	38.56	-17.44	56.00	28.06	10.10	0.40	QP
6	8.865	49.71	-10.29	60.00	38.92	10.19	0.60	QP

Data#: 21 File#: D:\Fsp-G91699.EMI

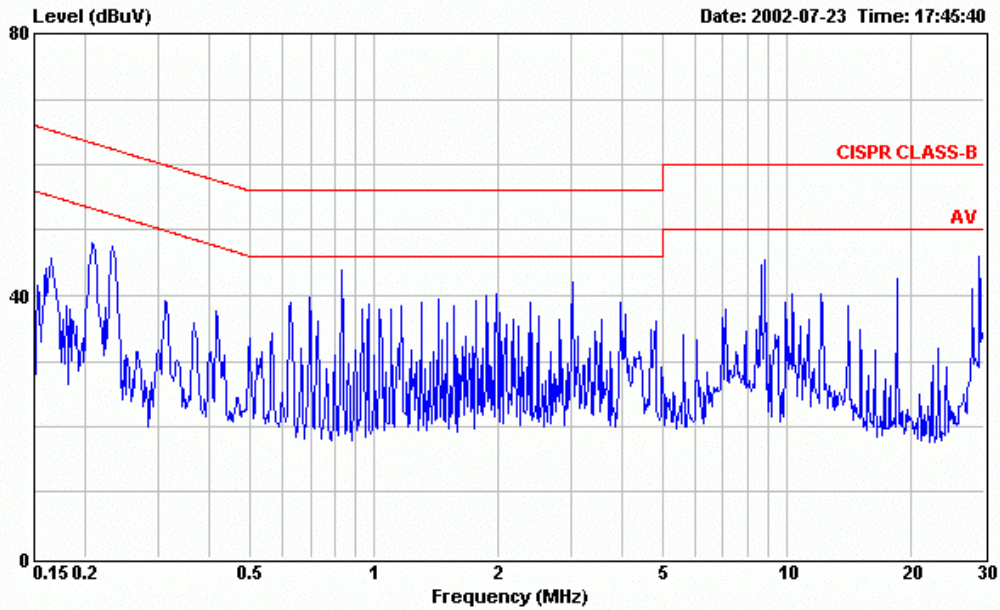
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.166	38.05	-17.12	55.17	27.55	10.30	0.20	Average
2	0.210	40.91	-12.30	53.21	30.42	10.29	0.20	Average
3	0.365	36.71	-11.90	48.61	26.30	10.21	0.20	Average
4	1.774	36.40	-9.60	46.00	25.90	10.10	0.40	Average
5	2.815	35.74	-10.26	46.00	25.24	10.10	0.40	Average
6	8.865	38.50	-11.50	50.00	27.71	10.19	0.60	Average



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 Email:ttemc@ttemc.com.tw

Data#: 22 File#: D:\Fsp-G91699.EMI



Site : No.4 Shielded room  
 Condition : CISPR CLASS-B ENV-4200 LINE  
 EUT : S.P.S. M/N:FSP200-50SNV(PF)  
 POWER : 230Vac/50Hz (28°C/74%)  
 MEMO : FULL SYSTEM

Data#: 23 File#: D:\Fsp-G91699.EMI

Date: 2002-07-23 Time: 17:47:07

Site : No.4 Shielded room  
 Condition : CISPR CLASS-B ENV-4200 LINE  
 EUT : S.P.S. M/N:FSP200-50SNV(PF)  
 POWER : 230Vac/50Hz (28°C/74%)  
 MEMO : FULL SYSTEM

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.165	43.70	-21.51	65.21	33.20	10.30	0.20	QP
2	0.206	46.64	-16.73	63.37	36.14	10.30	0.20	QP
3	0.698	38.99	-17.01	56.00	28.65	10.14	0.20	QP
4	0.831	42.36	-13.64	56.00	32.04	10.12	0.20	QP
5	3.963	39.68	-16.32	56.00	29.18	10.10	0.40	QP
6	8.866	47.40	-12.60	60.00	36.61	10.19	0.60	QP

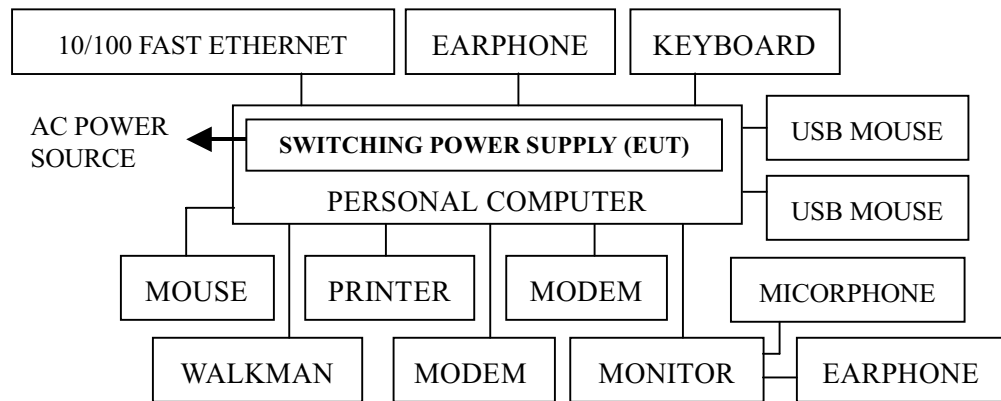
Data#: 24 File#: D:\Fsp-G91699.EMI

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.165	40.27	-14.94	55.21	29.77	10.30	0.20	Average
2	0.206	43.35	-10.02	53.37	32.85	10.30	0.20	Average
3	0.698	36.94	-9.06	46.00	26.60	10.14	0.20	Average
4	0.831	38.65	-7.35	46.00	28.33	10.12	0.20	Average
5	3.963	35.70	-10.30	46.00	25.20	10.10	0.40	Average
6	8.866	37.67	-12.33	50.00	26.88	10.19	0.60	Average

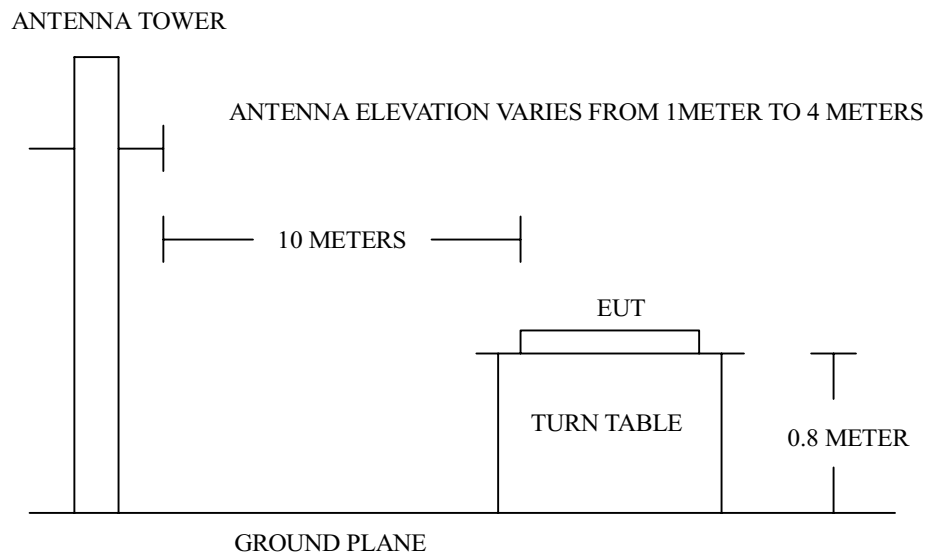
## 4. RADIATED EMISSION TEST

### 4.1. Block Diagram of Test Setup

#### 4.1.1. Block Diagram of connection between EUT and simulators



#### 4.1.2. Open Field Test Site Setup Diagram



## 4.2. Radiation Limit

All emanations from a class B computing devices or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dBuV/m)
30 ~ 230	10	30
230 ~ 1000	10	37

Note : (1) The tighter limit shall apply at the edge between two frequency bands.  
 (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the E.U.T.

## 4.3. EUT's Configuration during Compliance Measurement

The EN 55022 (CISPR Pub. 22, Class B) regulations test method must be used to find the maximum emission during radiated measurement.

The configuration of EUT is same as used in conducted measurement. Please refer to 3.3.

## 4.4. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 4.1.

## 4.5. Test Procedure

The EUT (within PC) was placed on a turn table which was 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT was set 10 meters away from the receiving antenna which was mounted on a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated biconical and log periodical antenna) were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement.

The bandwidth of the R&S Test Receiver ESVS10 was set at 120KHz.

The frequency range from 30MHz to 1000MHz was checked.

All the test results are listed in section 4.7.

## 4.6. Test Results

**PASSED.** Please refer to the following pages.

#### 4.7. Radiated Emission Measurement Results

All emissions not reported below are too low against the prescribed limits.

Date of Test : Jul. 23, 2002 Temperature : 26°C  
 EUT : Switching Power Supply Humidity : 55%  
 Test Model : FSP200-50SNV(PF)

Frequency MHz	Antenna		Meter Reading		Emission Level		Margin dB
	Factor dB/m	Cable Loss dB	Horizontal dBuV	Horizontal dBuV/m	Limits dBuV/m		
42.744	18.86	1.32	- 2.89	17.29	30.00	12.71	
66.814	12.51	1.68	3.95	18.14	30.00	11.86	
110.639	18.58	2.24	- 0.68	20.14	30.00	9.86	
139.236	20.11	2.54	- 2.51	20.14	30.00	9.86	
167.911	20.97	2.80	- 2.59	21.18	30.00	8.82	
196.508	21.70	3.05	- 2.35	22.40	30.00	7.60	
* 225.170	<b>22.02</b>	<b>3.28</b>	<b>- 2.61</b>	<b>22.69</b>	<b>30.00</b>	<b>7.31</b>	
253.742	22.65	3.47	- 0.53	25.59	37.00	11.41	
325.281	15.02	4.02	3.71	22.75	37.00	14.25	
396.897	16.79	4.54	0.58	21.91	37.00	15.09	
468.461	18.33	4.94	- 1.03	22.24	37.00	14.76	
540.026	19.35	5.32	- 0.92	23.75	37.00	13.25	
611.641	20.53	5.68	- 1.04	25.17	37.00	11.83	
683.257	22.09	6.08	- 1.41	26.76	37.00	10.24	

- Remark :
1. All reading are Quasi-Peak values.
  2. The worst emission is detected at 225.170MHz with corrected signal level of 22.69dBuV/m (limit is 30dBuV/m) when the antenna is at horizontal polarization and is at 4m high and the turn table is at 315° .
  3. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

Date of Test : Jul. 23, 2002                      Temperature : 26°C

EUT : Switching Power Supply                      Humidity : 55%

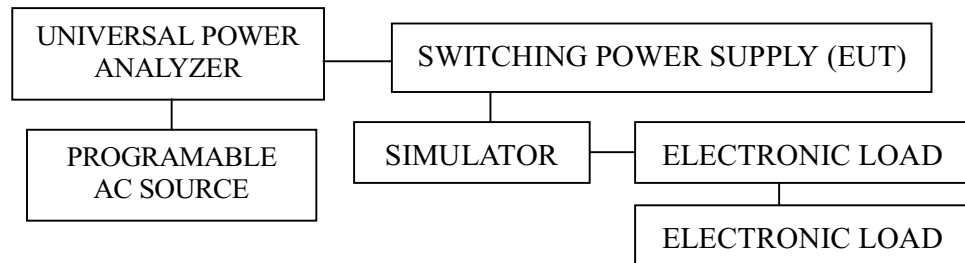
Test Model : FSP200-50SNV(PF)

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading		Emission Level		Margin dB
			Vertical dBuV	Vertical dBuV/m	Limits dBuV/m		
42.756	18.54	1.32	0.86	20.72	30.00	9.28	
66.832	13.44	1.68	4.91	20.03	30.00	9.97	
* 110.613	<b>16.74</b>	<b>2.24</b>	<b>3.78</b>	<b>22.76</b>	<b>30.00</b>	<b>7.24</b>	
139.267	20.44	2.54	- 1.47	21.51	30.00	8.49	
167.865	21.90	2.80	- 2.54	22.16	30.00	7.84	
196.539	21.19	3.05	- 2.52	21.72	30.00	8.28	
225.124	21.11	3.28	- 2.10	22.29	30.00	7.71	
253.798	23.15	3.47	- 0.55	26.07	37.00	10.93	
325.306	15.43	4.02	3.70	23.15	37.00	13.85	
396.921	17.51	4.54	0.63	22.68	37.00	14.32	
468.487	19.05	4.94	- 0.81	23.18	37.00	13.82	
540.102	19.06	5.32	- 0.93	23.45	37.00	13.55	
611.667	20.58	5.68	- 1.10	25.16	37.00	11.84	
683.282	22.56	6.08	- 1.44	27.20	37.00	9.80	

- Remark :
1. All reading are Quasi-Peak values.
  2. The worst emission is detected at 110.613MHz with corrected signal level of 22.76dBuV/m (limit is 30dBuV/m) when the antenna is at vertical polarization and is at 1m high and the turn table is at 30° .
  3. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

## 5. POWER HARMONIC & FLICKER MEASUREMENT

### 5.1. Block Diagram of Test Setup



### 5.2. Test Standard

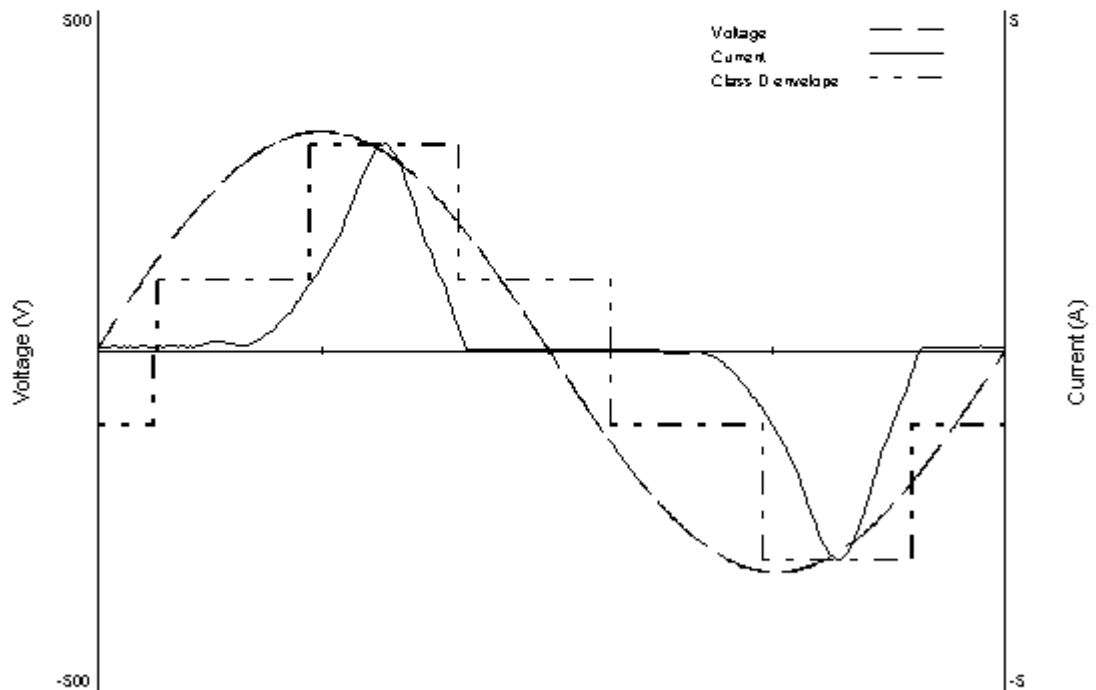
EN 61000-3-2/1995 +A1/1998 +A2/1998 +A14/2000 and  
EN 61000-3-3/1995 +A1/2001

### 5.3. Test Results

**PASSED.** Please refer to the following pages.



<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 5:58pm Page 1 of 1
Serial no:		
Description:	S.P.S MODE:FULL LOAD	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 5:31pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Waveform	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
	Waveform is Class D	



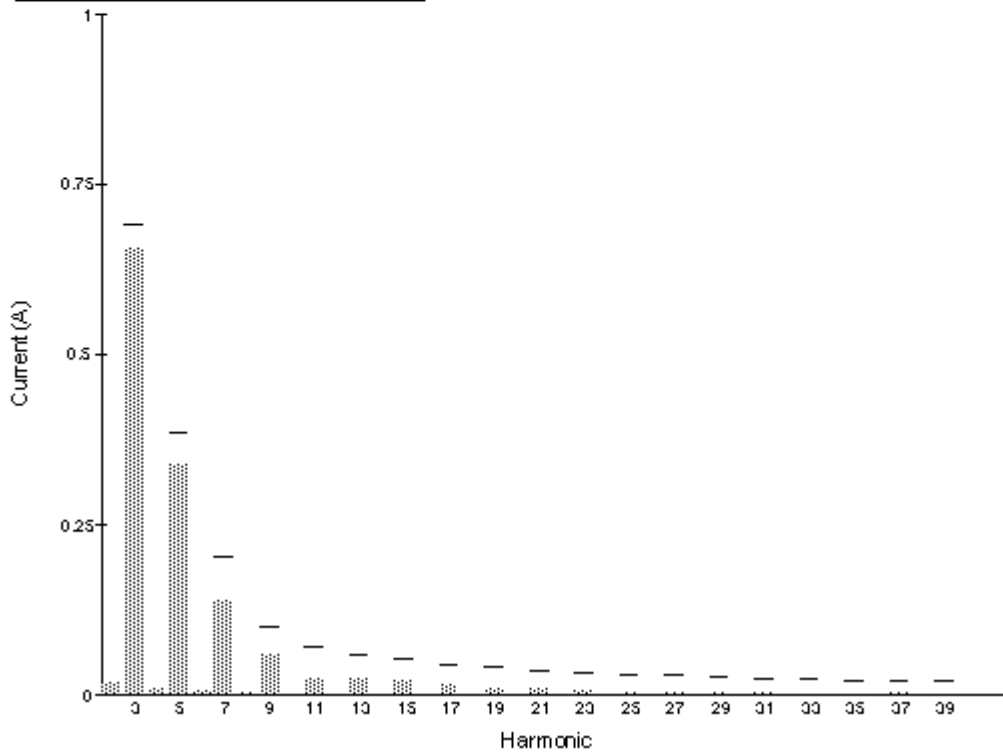
<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 5:59pm
Serial no:		Page 1 of 1
Description:	S.P.S MODE:FULL LOAD	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 5:30pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Steady State Harmonics Test - Table	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
<b>PASS</b>		

Class	D
Class Multiplier	1
Power	203.7 W

Harmonic	Reading	Limit	Result	Harmonic	Reading	Limit	Result
2	17.19mA	None	Pass	3	656mA	693mA	Pass
4	9.89mA	None	Pass	5	340mA	387mA	Pass
6	7.80mA	None	Pass	7	139mA	204mA	Pass
8	5.19mA	None	Pass	9	60.48mA	102mA	Pass
10	2.00mA	None		11	25.37mA	71mA	Pass
12	1.52mA	None		13	24.99mA	60mA	Pass
14	0.86mA	None		15	19.69mA	52mA	Pass
16	0.58mA	None		17	16.20mA	46mA	Pass
18	0.23mA	None		19	8.93mA	41mA	Pass
20	0.39mA	None		21	10.14mA	37mA	Pass
22	0.43mA	None		23	7.52mA	34mA	Pass
24	0.15mA	None		25	5.10mA	31mA	Pass
26	0.29mA	None		27	4.24mA	29mA	
28	0.30mA	None		29	3.64mA	27mA	
30	0.28mA	None		31	2.77mA	25mA	
32	0.22mA	None		33	1.88mA	24mA	
34	0.08mA	None		35	1.93mA	22mA	
36	0.36mA	None		37	2.91mA	21mA	
38	0.20mA	None		39	2.03mA	20mA	
40	0.09mA	None					

<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 5:59pm
Serial no:		Page 1 of 1
Description:	S.P.S MODE:FULL LOAD	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 5:30pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Steady State Harmonics Test - Linear Bar Chart	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
<b>PASS</b>		

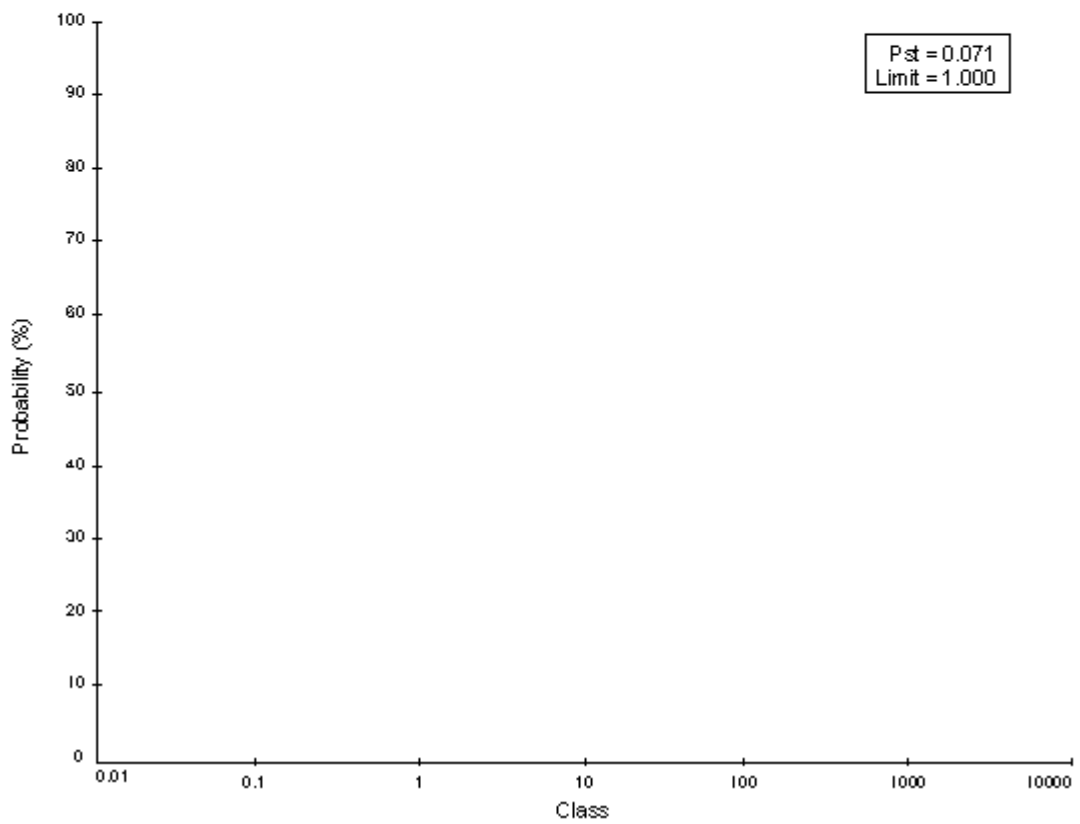
Class	D
Class Multiplier	1
Power	203.7 W



<b>FSP</b>				
Product:	M/N:FSP200-50SNV(PF)			2002 Jul 25 6:00pm
Serial no:				Page 1 of 1
Description:	S.P.S MODE:FULL LOAD			
Voltech IEC1000-3 Windows Software 2.02				Test Date: 2002 Jul 25 5:32pm
Result:	M/N:FSP200-50SNV(PF)			
Type of Test:	Flickermeter Test - Table			
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686			
AC Source:	Mains / Manual Source			
<b>PASS</b>	Measurement method - Voltage			
	Pst	dc (%)	dmax (%)	dt (ms)
Limit	1.000	3.000	4.000	200
Reading 1	0.071	0.009	0.023	0

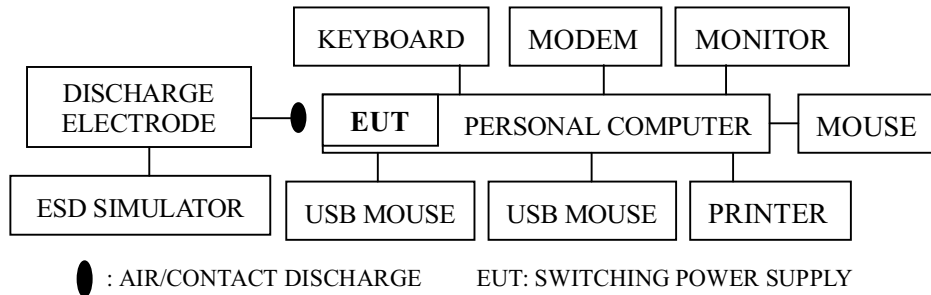
<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 6:00pm
Serial no:		Page 1 of 1
Description:	S.P.S MODE:FULL LOAD	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 5:32pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Flickermeter Test - Pst Curve	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
<b>PASS</b>	Measurement method - Voltage	

**Pst Curve 1**



## 6. ELECTROSTATIC DISCHARGE MEASUREMENT

### 6.1. Block Diagram of Test Setup



### 6.2. Test Standard

EN 55024/1998

(IEC 61000-4-2/1995 +A1/1998 +A2/2000, Severity Level : Contact 4KV, Air 8KV)

### 6.3. Severity Levels and Performance Criterion

#### 6.3.1. Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X	Special	Special

#### 6.3.2. Performance criterion : **B**

### 6.4. EUT's Configuration during Compliance Measurement

The configuration of EUT are listed in section 3.3.

### 6.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 6.1.

## 6.6. Test Procedure

### 6.6.1. Air Discharge :

This test was done on a non-conductive surfaces. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the ESD generator discharge electrode was removed from the EUT. The generator was then retriggered for a new single discharge and repeated 10 times for each preselected test point. This procedure was repeated until all the air discharge completed.

### 6.6.2. Contact Discharge :

All the procedure shall be same as 6.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

### 6.6.3. Indirect discharge for horizontal coupling plane

At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The ESD generator positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

### 6.6.4. Indirect discharge for vertical coupling plane

At least 50 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling planes, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

## 6.7. Test Results

**PASSED.** Please refer to the following page.

# Electrostatic Discharge Measurement Results

Taiwan Tokin EMC Eng. Corp.

Date : 07/30/2002

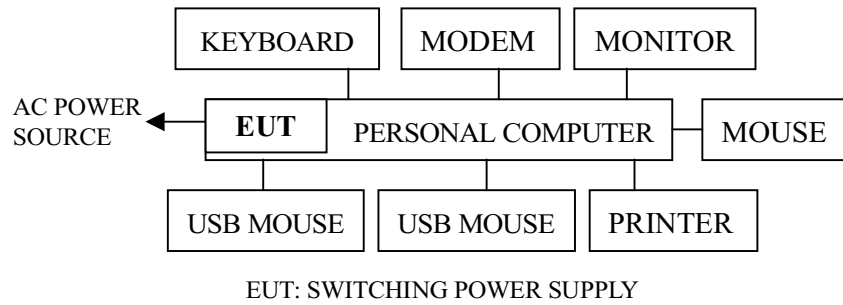
<i>Applicant</i> : <u>FSP Group Inc.</u>		<i>Test Date</i> : <u>Jul. 25, 2002</u>	
<i>EUT</i> : <u>Switching Power Supply</u>		<i>Temperature</i> : <u>24</u> °C	
<i>Power Supply</i> : <u>AC 230V, 50Hz</u>		<i>Humidity</i> : <u>46</u> %	
<i>Working Condition</i> : <u>See Section 3.4.</u>		<i>Test Model</i> : <u>FSP200-50SNV(PF)</u>	
<i>Item</i>	<i>Amount of Discharge</i>	<i>Voltage</i>	<i>Performance Criterion</i>
<i>Contact Discharge</i>	100	+2KV, +4KV -2KV, -4KV	<b>Pass, A</b> <b>Pass, A</b>
<i>Air Discharge</i>	0	+2KV, +4KV, +8KV -2KV, -4KV, -8KV	<b>Pass, A, Note</b> <b>Pass, A, Note</b>
<i>Indirect Discharge (HCP)</i>	50	+2KV, +4KV -2KV, -4KV	<b>Pass, A</b> <b>Pass, A</b>
<i>Indirect Discharge (VCP Front)</i>	50	+2KV, +4KV -2KV, -4KV	<b>Pass, A</b> <b>Pass, A</b>
<i>Indirect Discharge (VCP Left)</i>	50	+2KV, +4KV -2KV, -4KV	<b>Pass, A</b> <b>Pass, A</b>
<i>Indirect Discharge (VCP Back)</i>	50	+2KV, +4KV -2KV, -4KV	<b>Pass, A</b> <b>Pass, A</b>
<i>Indirect Discharge (VCP Right)</i>	50	+2KV, +4KV -2KV, -4KV	<b>Pass, A</b> <b>Pass, A</b>
<i>Measurement Position</i>	1. Metal Plate	Contact Discharge	2. Screw Contact Discharge
<i>Please refer to the Photos of ESD Test Points</i>			
<i>Note: The EUT is Conductive surface. It's not necessary to test Air discharge.</i>			



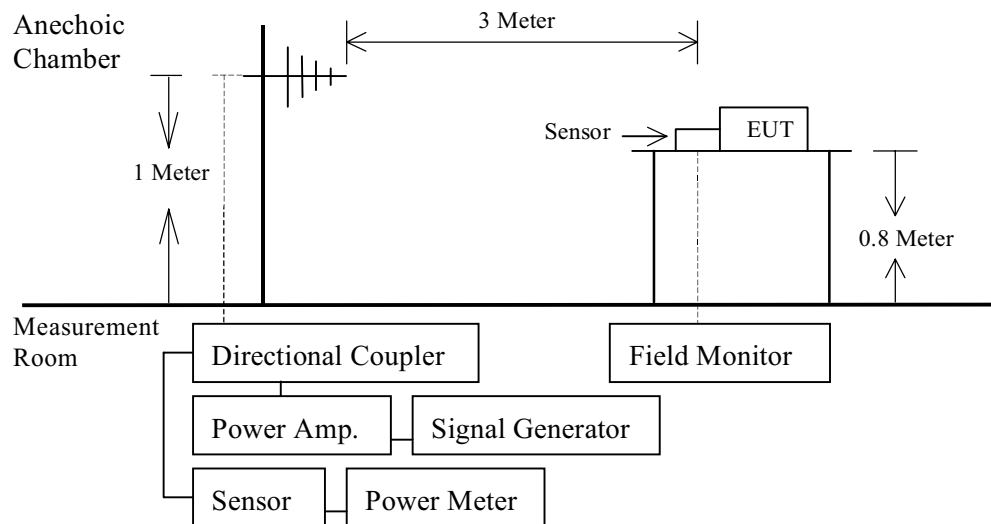
## 7. RF FIELD STRENGTH SUSCEPTIBILITY MEASUREMENT

### 7.1. Block Diagram of Test Setup

#### 7.1.1. Block Diagram of connection between EUT and simulators.



#### 7.1.2. R/S Test Setup



### 7.2. Test Standard

EN 55024/1998 (IEC 61000-4-3/1995 +A1/2001, Severity Level : 2, 3V/m)

### 7.3. Severity Levels and Performance Criterion

#### 7.3.1. Severity level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

#### 7.3.2. Performance criterion : A

### 7.4. EUT's Configuration during Compliance Measurement

The configuration of EUT are listed in section 3.3.

### 7.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 7.1.

### 7.6. Test Procedure

The field sensor is placed on the EUT table (0.8 meter above the ground) which is 3 meter away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength (3V/m measured by field sensor) around the EUT table from frequency range 80MHz to 1000MHz and records the signal generator's output level at the same time for whole measured frequency range. Then, put EUT and its simulators on the EUT turn table and keep them 3 meters away from the transmitting antenna which is mounted on an antenna tower and fixes at 1 meter height above the ground. Using the recorded signal generator's output level to measure the EUT from frequency range 80MHz to 1000MHz and both horizontal & vertical polarization of antenna must be set and measured. Each of the four sides of EUT must be faced this transmitting antenna and measures individually.

A CCD camera was put inside the chamber and through its display to monitor the EUT operational situation to judge the EUT performance criterion during measurement.

All the scanning conditions are as follows :

Condition of Test	Remarks
1. Fielded Strength	3 V/m (r.m.s, Unmodulated, Severity Level 2)
2. Amplitude Modulated	1KHz, 80%AM
3. Scanning Frequency	80 - 1000 MHz
4. Sweep time of radiated	0.0015 decade/s
5. Dwell Time	2 Sec.

## 7.7. Test Results

**PASSED.** Please refer to the following list.

## *RF Field Strength Susceptibility Measurement Results*

*Taiwan Tokin EMC Eng. Corp.*

*Date : 07/30/2002*

<i>Applicant : FSP Group Inc.</i>			<i>Test Date : Jul. 24, 2002</i>		
<i>EUT : Switching Power Supply</i>			<i>Temperature : 22 °C</i>		
<i>Power Supply : AC 230V, 50Hz</i>			<i>Humidity : 53 %</i>		
<i>Working Condition : See Section 3.4.</i>			<i>Test Model : FSP200-50SNV(PF)</i>		
<i>Frequency Range (MHz)</i>	<i>Position (Angle)</i>	<i>Polarity (H or V)</i>	<i>Field Strength (V/M)</i>	<i>Performance Criterion</i>	<i>Remark</i>
<i>80 ~ 1000</i>	<i>0°</i>	<i>H</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>80 ~ 1000</i>	<i>90°</i>	<i>H</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>80 ~ 1000</i>	<i>180°</i>	<i>H</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>80 ~ 1000</i>	<i>270°</i>	<i>H</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>80 ~ 1000</i>	<i>0°</i>	<i>V</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>80 ~ 1000</i>	<i>90°</i>	<i>V</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>80 ~ 1000</i>	<i>180°</i>	<i>V</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>80 ~ 1000</i>	<i>270°</i>	<i>V</i>	<i>3V(Modulated)</i>	<b><i>Pass, A</i></b>	
<i>Note:</i>					

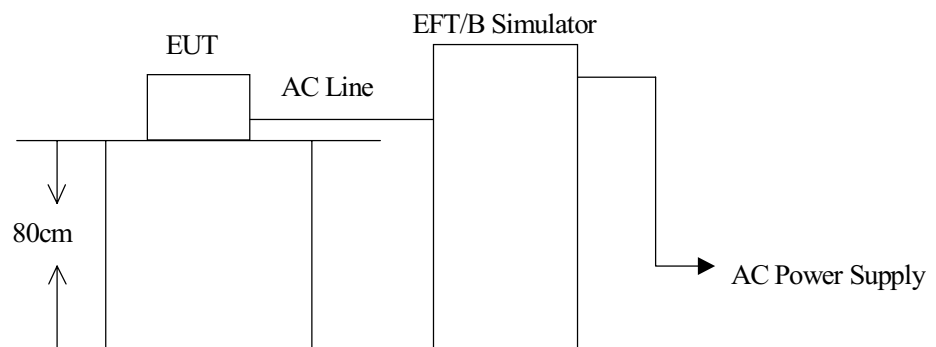
## 8. ELECTRICAL FAST TRANSIENT/BURST MEASUREMENT

### 8.1. Block Diagram of Test Setup

#### 8.1.1. Block Diagram of connection between EUT and simulators.

Same as Section 7.1.1.

#### 8.1.2. EFT Test Setup



### 8.2. Test Standard

EN 55024/1998 (IEC 61000-4-4/1995, Severity Level : 2, 1KV)

### 8.3. Severity Levels and Performance Criterion

#### 8.3.1. Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

#### 8.3.2. Performance criterion : **B**

### 8.4. EUT's Configuration during Compliance Measurement

The configuration of EUT are listed in section 3.3.

## 8.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 8.1.

## 8.6. Test Procedure

The EUT and its simulators shall be placed 0.8m high above the ground reference plane which was a min. 1m\*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

### 8.6.1. For input and output AC power ports :

The EUT was connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test can't less than 1min.

### 8.6.2. For signal lines and control lines ports :

No signal lines and control lines ports. It's unnecessary to measure.

### 8.6.3. For DC input and DC output power ports :

No DC ports. It's unnecessary to measure.

## 8.7. Test Results

**PASSED.** Please refer to the following page.

# Electrical Fast Transient/Burst Measurement Results

Taiwan Tokin EMC Eng. Corp.

Date : 07/30/2002

<i>Applicant</i> : <u>FSP Group Inc.</u>					<i>Test Date</i> : <u>Jul. 25, 2002</u>				
<i>EUT</i> : <u>Switching Power Supply</u>					<i>Temperature</i> : <u>24</u> °C				
<i>Power Supply</i> : <u>AC 230V, 50Hz</u>					<i>Humidity</i> : <u>46</u> %				
<i>Working Condition</i> : <u>See Section 3.4.</u>					<i>Test Model</i> : <u>FSP200-50SNV(PF)</u>				
<i>Inject Place</i> : Power Supply Line					<i>Inject Place</i> : I/O Cable				
<i>Inject Line</i>	<i>Voltage KV</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Performance Criterion</i>	<i>Inject Line</i>	<i>Voltage KV</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Performance Criterion</i>
<i>L1</i>	<i>+0.5, 1</i>	<i>120</i>	<i>Direct</i>	<b><i>Pass, A</i></b>				<i>Clamp</i>	
<i>L1</i>	<i>-0.5, 1</i>	<i>120</i>	<i>Direct</i>	<b><i>Pass, A</i></b>				<i>Clamp</i>	
<i>L2</i>	<i>+0.5, 1</i>	<i>120</i>	<i>Direct</i>	<b><i>Pass, A</i></b>				<i>Clamp</i>	
<i>L2</i>	<i>-0.5, 1</i>	<i>120</i>	<i>Direct</i>	<b><i>Pass, A</i></b>				<i>Clamp</i>	
<i>PE</i>	<i>+0.5, 1</i>	<i>120</i>	<i>Direct</i>	<b><i>Pass, A</i></b>				<i>Clamp</i>	
<i>PE</i>	<i>-0.5, 1</i>	<i>120</i>	<i>Direct</i>	<b><i>Pass, A</i></b>				<i>Clamp</i>	
<i>Note:</i>									

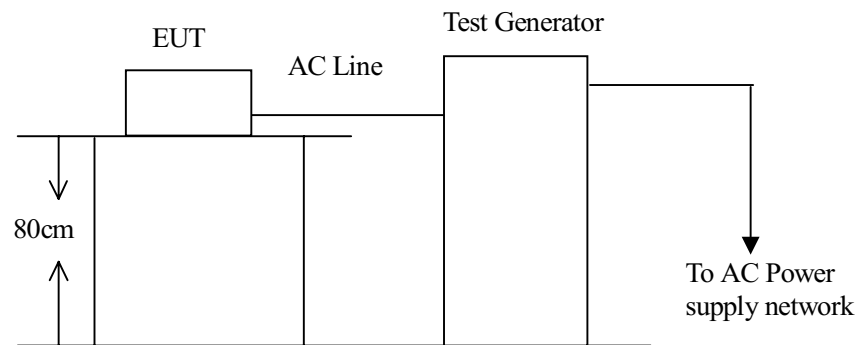
## 9. SURGES MEASUREMENT

### 9.1. Block Diagram of Test Setup

#### 9.1.1. Block Diagram of connection between EUT and simulators.

Same as Section 7.1.1.

#### 9.1.2. Test Setup



Remark: Combination wave generator and decoupling networks are included in test.

### 9.2. Test Standard

EN 55024/1998 【IEC 61000-4-5/1995, Test Level : line to earth -  $\pm 2\text{KV}$ , line to line -  $\pm 1\text{KV}$ , 1.2/50 (8/20) Tr/Th us.】

### 9.3. Test Levels and Performance Criterion

#### 9.3.1. Test Levels

Level	Open-circuit test Voltage +/- 10%, kV
1.	0.5
2.	1.0
3.	2.0
4.	4.0
X	Special

#### 9.3.2. Performance Criterion : **B**

### 9.4. EUT's Configuration during Compliance Measurement

The configuration of EUT are listed in section 3.3.

## 9.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 9.1.

## 9.6. Test Procedure

- 9.6.1. Set up the EUT and test generator as shown on section 9.1.
- 9.6.2. For line to line coupling mode, provided a 0.5KV/1KV 1.2/50us current surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 9.6.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate were conducted during test.
- 9.6.4. Different phase angles were done individually.
- 9.6.5. Repeat procedure 9.6.2. to 9.6.4. except the open-circuit test voltage change from 0.5KV/1KV/2KV for line to earth coupling mode test.
- 9.6.6. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

## 9.7. Test Results

**PASSED.** Please refer to the following page.



# Surge Immunity Measurement Results

Taiwan Tokin EMC Eng. Corp.

Date : 07/30/2002

Applicant : <u>FSP Group Inc.</u>			Test Date : <u>Jul. 25, 2002</u>		
EUT : <u>Switching Power Supply</u>			Temperature : <u>24</u> °C		
Power Supply : <u>AC 230V, 50Hz</u>			Humidity : <u>46</u> %		
Working Condition : <u>See Section 3.4.</u>			Test Model : <u>FSP200-50SNV(PF)</u>		
Input And Output AC Power Port					
Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage (KV)	Performance Criterion
L-N	+	0	5	0.5KV 1KV	Pass. A
	+	45	5	0.5KV 1KV	Pass. A
	+	90	5	0.5KV 1KV	Pass. A
	+	180	5	0.5KV 1KV	Pass. A
	+	270	5	0.5KV 1KV	Pass. A
	-	0	5	0.5KV 1KV	Pass. A
	-	45	5	0.5KV 1KV	Pass. A
	-	90	5	0.5KV 1KV	Pass. A
	-	180	5	0.5KV 1KV	Pass. A
	-	270	5	0.5KV 1KV	Pass. A
L-PE	+	0	5	0.5KV 1KV 2KV	Pass. A
	+	45	5	0.5KV 1KV 2KV	Pass. A
	+	90	5	0.5KV 1KV 2KV	Pass. A
	+	180	5	0.5KV 1KV 2KV	Pass. A
	+	270	5	0.5KV 1KV 2KV	Pass. A
	-	0	5	0.5KV 1KV 2KV	Pass. A
	-	45	5	0.5KV 1KV 2KV	Pass. A
	-	90	5	0.5KV 1KV 2KV	Pass. A
	-	180	5	0.5KV 1KV 2KV	Pass. A
	-	270	5	0.5KV 1KV 2KV	Pass. A
N-PE	+	0	5	0.5KV 1KV 2KV	Pass. A
	+	45	5	0.5KV 1KV 2KV	Pass. A
	+	90	5	0.5KV 1KV 2KV	Pass. A
	+	180	5	0.5KV 1KV 2KV	Pass. A
	+	270	5	0.5KV 1KV 2KV	Pass. A
	-	0	5	0.5KV 1KV 2KV	Pass. A
	-	45	5	0.5KV 1KV 2KV	Pass. A
	-	90	5	0.5KV 1KV 2KV	Pass. A
	-	180	5	0.5KV 1KV 2KV	Pass. A
	-	270	5	0.5KV 1KV 2KV	Pass. A
L, N-PE	+	0	5	0.5KV 1KV 2KV	Pass. A
	+	45	5	0.5KV 1KV 2KV	Pass. A
	+	90	5	0.5KV 1KV 2KV	Pass. A
	+	180	5	0.5KV 1KV 2KV	Pass. A
	+	270	5	0.5KV 1KV 2KV	Pass. A
	-	0	5	0.5KV 1KV 2KV	Pass. A
	-	45	5	0.5KV 1KV 2KV	Pass. A
	-	90	5	0.5KV 1KV 2KV	Pass. A
	-	180	5	0.5KV 1KV 2KV	Pass. A
	-	270	5	0.5KV 1KV 2KV	Pass. A
Note:					

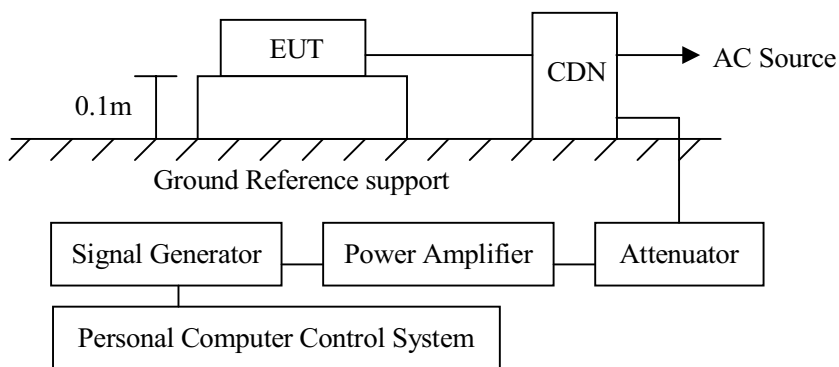
## 10.INJECTED CURRENTS MEASUREMENT

### 10.1.Block Diagram of Test Setup

10.1.1. Block Diagram of connection between EUT and simulators.

Same as Section 7.1.1.

10.1.2. Test Setup



### 10.2.Test Standard

EN 55024/1998

【IEC 61000-4-6/1996, Test Level : 0.15-80MHz, 3V, 80%AM (1KHz)】

### 10.3.Test Levels and Performance Criterion

10.3.1. Test Levels

Frequency range 0.15MH - 80MHz		
Level	Voltage level (e.m.f.)	
	U [dBuV]	U [V]
1.	120	1
2.	130	3
3.	140	10
X	Special	

10.3.2. Performance Criterion : A

### 10.4.EUT's Configuration during Compliance Measurement

The configuration of EUT are listed in section 3.3.

## 10.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 10.1.

## 10.6. Test Procedure

- 10.6.1. Set up the EUT, CDN and test generators as shown on section 10.1.
- 10.6.2. The EUT and supporting equipments were placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) was placed on the ground plane making direct contact with it at about 0.1-0.3m from EUT. Cables between CDN and EUT were as short as possible.
- 10.6.3. The disturbance signal described below was injected to EUT through CDN.
- 10.6.4. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 10.6.5. The frequency range was swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sinewave.
- 10.6.6. The rate of sweep shall not exceed  $1.5 \times 10^3$  decades/s. Where the frequency was swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 10.6.7. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

## 10.7. Test Results

**PASSED.** Please refer to the following page.

# Injected Currents Susceptibility Measurement Results

Taiwan Tokin EMC Eng. Corp.

Date : 07/30/2002

<i>Applicant</i> : <u>FSP Group Inc.</u>		<i>Test Date</i> : <u>Jul. 24, 2002</u>		
<i>EUT</i> : <u>Switching Power Supply</u>		<i>Temperature</i> : <u>22</u> °C		
<i>Power Supply</i> : <u>AC 230V, 50Hz</u>		<i>Humidity</i> : <u>53</u> %		
<i>Working Condition</i> : <u>See Section 3.4.</u>		<i>Test Model</i> : <u>FSP200-50SNV(PF)</u>		
<i>Frequency Range (MHz)</i>	<i>Injected Position</i>	<i>Strength</i>	<i>Performance Criterion</i>	<i>Remark</i>
0.15MHz ~ 80MHz	Common Mode	3V(rms) Modulated	<b>Pass, A</b>	
<i>Remark</i> : Modulation Signal:1KHz 80% AM				

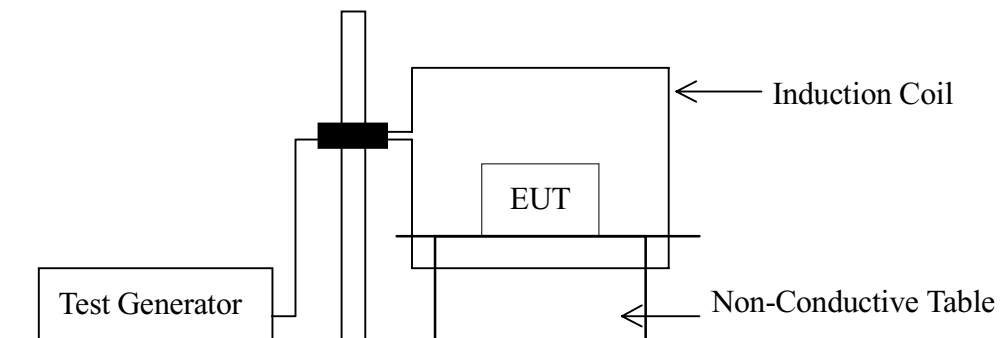
## 11. POWER FREQUENCY MAGNETIC FIELD TEST

### 11.1. Block Diagram of Test Setup

11.1.1. Block Diagram of connection between EUT and simulators.

Same as section 7.1.1.

11.1.2. Test Setup



### 11.2. Test Standard

EN 55024/1998 (IEC 61000-4-8/1993, Severity Level : 2)

### 11.3. Severity Levels and Performance Criterion

11.3.1. Severity level

Level	Magnetic Field Strength Continuous Field A/m
1.	1
2.	3
3.	10
4.	30
5.	100
X	Special

11.3.2. Performance criterion : A

### 11.4. EUT's Configuration during Compliance Measurement

The configuration of EUT are listed in section 3.3.

### 11.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 11.1

### 11.6. Test Procedure

The EUT placed on 1m high table that above the ground reference plane which the min. size 1m x 1m and 0.65mm thickness metallic. And subjected to the test magnetic field by using the induction coil of standard dimensions (1m x 1m). The induction coil rotated by 90 degrees in order to expose the EUT to the test field with different orientations. All cables of EUT exposed to magnetic field for 1m of their length.

### 11.7. Test Results

**PASSED.** Please refer to the following list.

## *Power Frequency Magnetic Field Immunity Test Results*

*Taiwan Tokin EMC Eng. Corp.*

Date : 07/30/2002

<i>Applicant</i> : <u>FSP Group Inc.</u>		<i>Test Date</i> : <u>Jul. 25, 2002</u>		
<i>EUT</i> : <u>Switching Power Supply</u>		<i>Temperature</i> : <u>24</u> °C		
<i>Power Supply</i> : <u>AC 230V, 50Hz</u>		<i>Humidity</i> : <u>46</u> %		
<i>Working Condition</i> : <u>See Section 3.4.</u>		<i>Test Model</i> : <u>FSP200-50SNV(PF)</u>		
<i>Power Frequency Magnetic Field</i>	<i>Testing Duration</i>	<i>Coil Orientation</i>	<i>Performance Criterion</i>	<i>Remark</i>
50Hz, 1 A/m	1 Min	X-axis	<b>Pass, A</b>	
50Hz, 1 A/m	1 Min	Y-axis	<b>Pass, A</b>	
50Hz, 1 A/m	1 Min	Z-axis	<b>Pass, A</b>	
<i>Note</i> :				

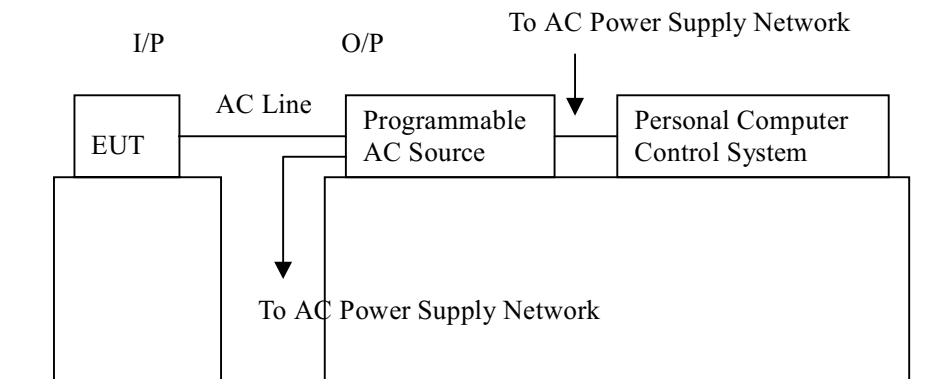
## 12.VOLTAGE DIPS AND INTERRUPTIONS MEASUREMENT

### 12.1.Block Diagram of Test Setup

#### 12.1.1. Block Diagram of connection between EUT and simulators.

Same as Section 7.1.1.

#### 12.1.2. Test Setup



### 12.2.Test Standard

EN 55024/1998 (IEC 61000-4-11/1994, Test Level : Voltage dips : >95% reduction, 0.5 Period ; 30% reduction, 25 Periods ; Voltage interruptions : >95% reduction , 250 Periods)

### 12.3.Test Levels and Performance Criterion

#### 12.3.1. Test Levels

Test level %U <sub>T</sub>	Voltage dip and short interruptions %U <sub>T</sub>	Duration (in period)
0	100	0.5 * 1 5
40	60	10 25
70	30	50 x

\* For 0.5 period, the test shall be made in positive and negative polarity, i.e. starting at 0 and 180 respectively

### 12.3.2. Performance Criterion :

- 1) Voltage dips >95% reduction performance criterion **B**.
- 2) Voltage dips 30% reduction performance criterion **C**.
- 3) Voltage interruption >95% reduction performance criterion **C**.

### 12.4.EUT's Configuration during Compliance Measurement

The configuration of EUT were listed in section 3.3.

### 12.5.Operating Condition of EUT

Same as conducted measurement which was listed in 3.4. except the test set up replaced by section 12.1.

### 12.6.Test Procedure

- 12.6.1. Set up the EUT and test generator as shown on section 12.1.
- 12.6.2. The interruptions was introduced at selected phase angles with specified duration. There was a 10s minimum interval between each test event.
- 12.6.3. After each test a full functional check was performed before the next test.
- 12.6.4. Repeat procedures 12.6.2. & 12.6.3. for voltage dips, only the test level and duration was changed.
- 12.6.5. Record any degradation of performance.

### 12.7.Test Results

**PASSED.** Please refer to the following page.



# Voltage Dips And Interruptions Measurement Results

Taiwan Tokin EMC Eng. Corp.

Date : 07/30/2002

Applicant : <u>FSP Group Inc.</u> EUT : <u>Switching Power Supply</u> Power Supply : <u>AC 230V, 50Hz</u> Working Condition : <u>See Section 3.4.</u>	Test Date : <u>Jul. 25, 2002</u> Temperature : <u>24</u> °C Humidity : <u>46</u> % Test Model : <u>FSP200-50SNV(PF)</u>
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## Single Test Voltage

Type of Test	Test Voltage	Phase Angle	% Reduction	Period	Performance Criterion
Voltage Interruptions	230	0	> 95 %	250	Pass, C, Note
		45	> 95 %	250	Pass, C, Note
		90	> 95 %	250	Pass, C, Note
		135	> 95 %	250	Pass, C, Note
		180	> 95 %	250	Pass, C, Note
		225	> 95 %	250	Pass, C, Note
		270	> 95 %	250	Pass, C, Note
		315	> 95 %	250	Pass, C, Note
Voltage Dips	230	0	30	25	Pass, A
		45	30	25	Pass, A
		90	30	25	Pass, A
		135	30	25	Pass, A
		180	30	25	Pass, A
		225	30	25	Pass, A
		270	30	25	Pass, A
		315	30	25	Pass, A
		0	> 95 %	0.5	Pass, A
		45	> 95 %	0.5	Pass, A
		90	> 95 %	0.5	Pass, A
		135	> 95 %	0.5	Pass, A
		180	> 95 %	0.5	Pass, A
		225	> 95 %	0.5	Pass, A
		270	> 95 %	0.5	Pass, A
		315	> 95 %	0.5	Pass, A

Note : During the Interruption test the EUT were stopped operation temporary. It needs reset by operator.

## 13. PHOTOGRAPHS

### 13.1. Photos of Powerline Conducted Measurement



FRONT VIEW OF CONDUCTED TEST



BACK VIEW OF CONDUCTED TEST

### 13.2.Photos of Radiated Measurement at Open Field Test Site



FRONT VIEW OF RADIATED TEST



BACK VIEW OF RADIATED TEST



SETUP WITH MAXIMUM DETECTED EMISSION AT HORIZONTAL POLARIZATION



SETUP WITH MAXIMUM DETECTED EMISSION AT VERTICAL POLARIZATION

### 13.3.Photos of Harmonic & Flicker Measurement



### 13.4. Photos of Electrostatic Discharge Measurement



Photos of Points



### 13.5.Photos of RF Strength Susceptibility Measurement



FRONT VIEW OF R/S TEST



BACK VIEW OF R/S TEST



### 13.6.Photos of Electrical Fast Transient/Burst Measurement



### 13.7.Photos of Surge Immunity Test



### 13.8.Photos of Injected Currents Measurement



### 13.9.Photos of Power Frequency Magnetic Field Immunity Measurement



### 13.10. Photos of Voltage Dips and Interruptions Test



# APPENDIX I (Photos of EUT)

Total Page : 7

Figure 1  
General Appearance (Front View)



Figure 2  
General Appearance (Rear View)



Figure 3  
General Appearance (Label)



Figure 4  
Open the Top Cover (Internal View)

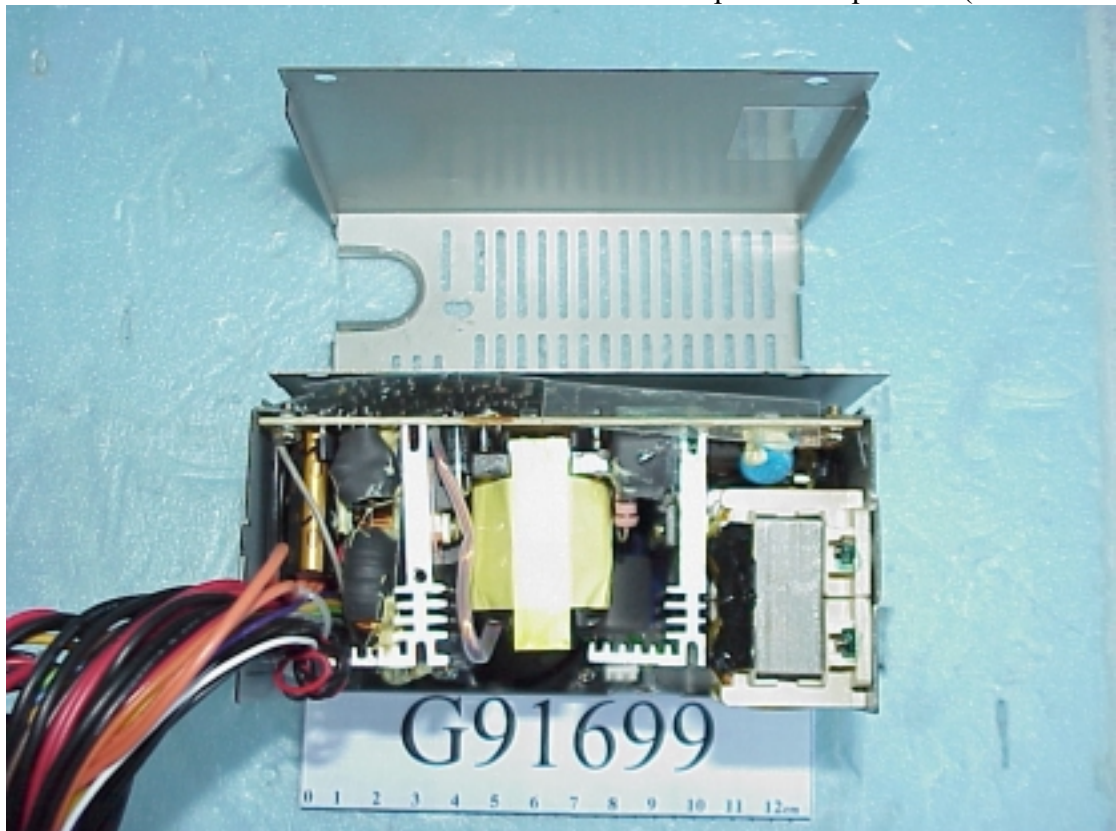


Figure 5  
Internal View (Main Board I/Component Side)



Figure 6  
Internal View (Main Board I/Foil Side)

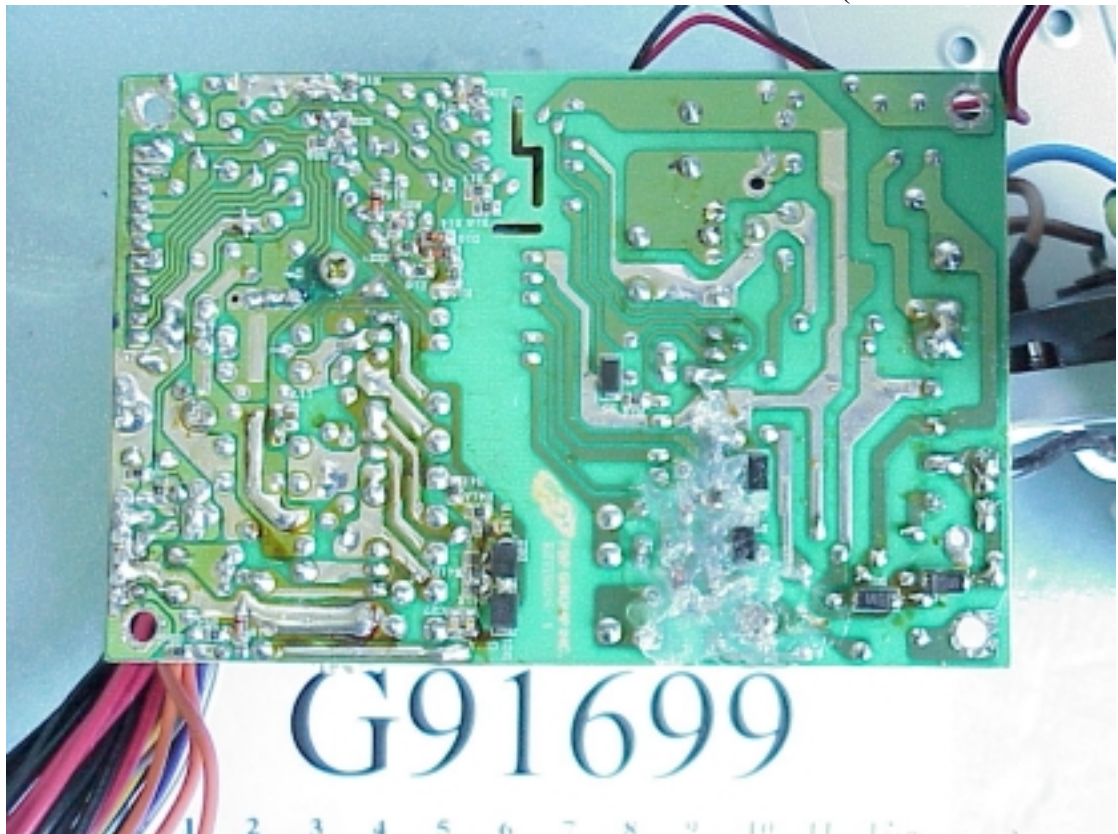


Figure 7  
Internal View (Main Board II/Component Side)

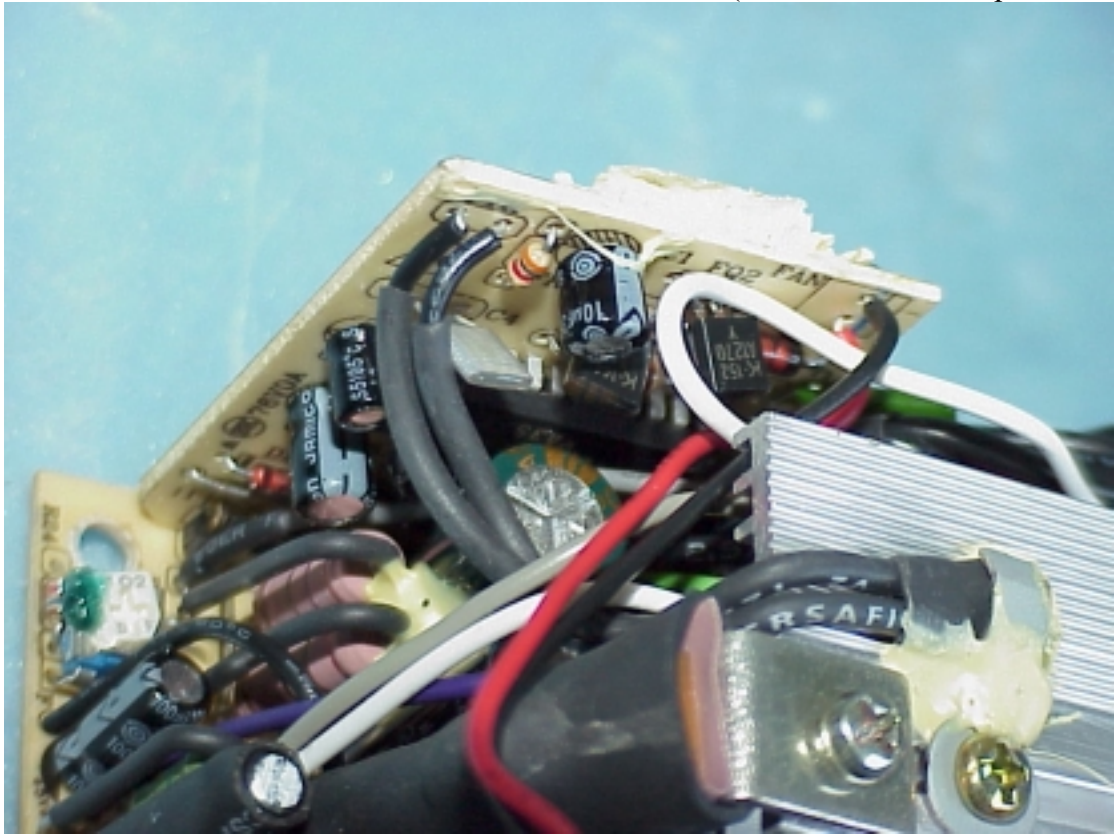


Figure 8  
Internal View (Main Board II/Foil Side)

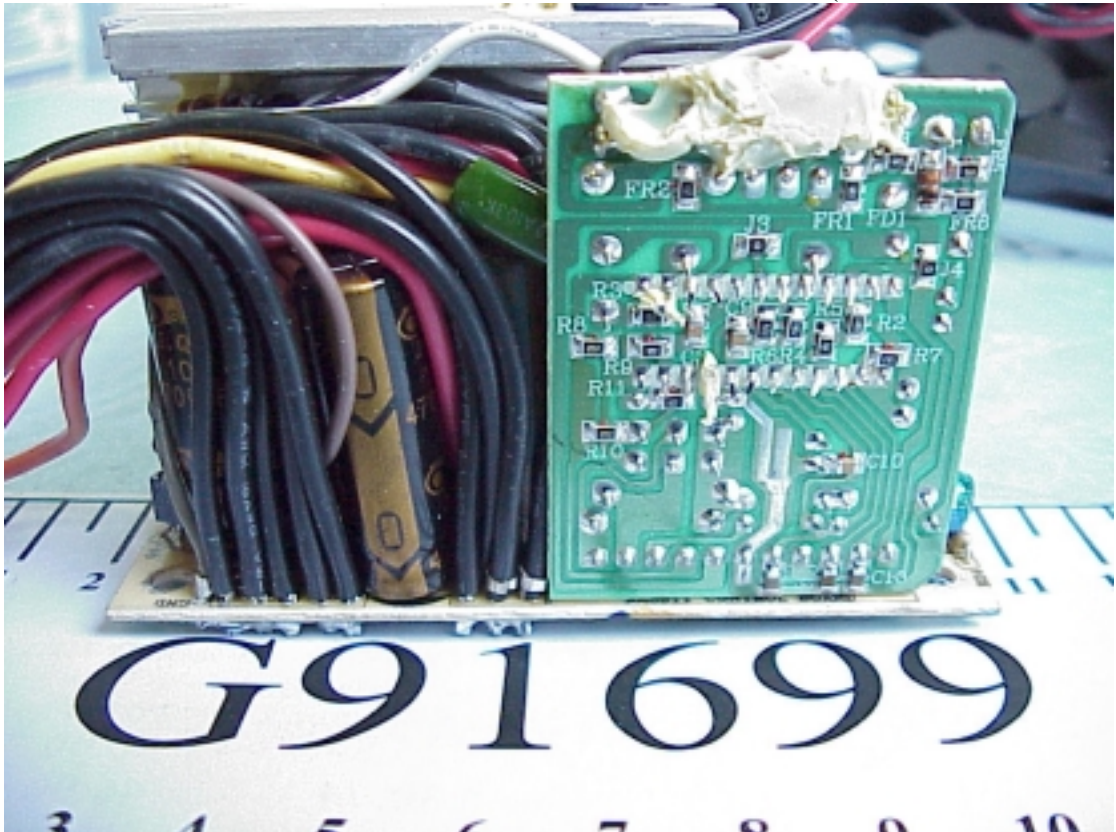




Figure 9  
Internal View (Filter Board/Component Side)

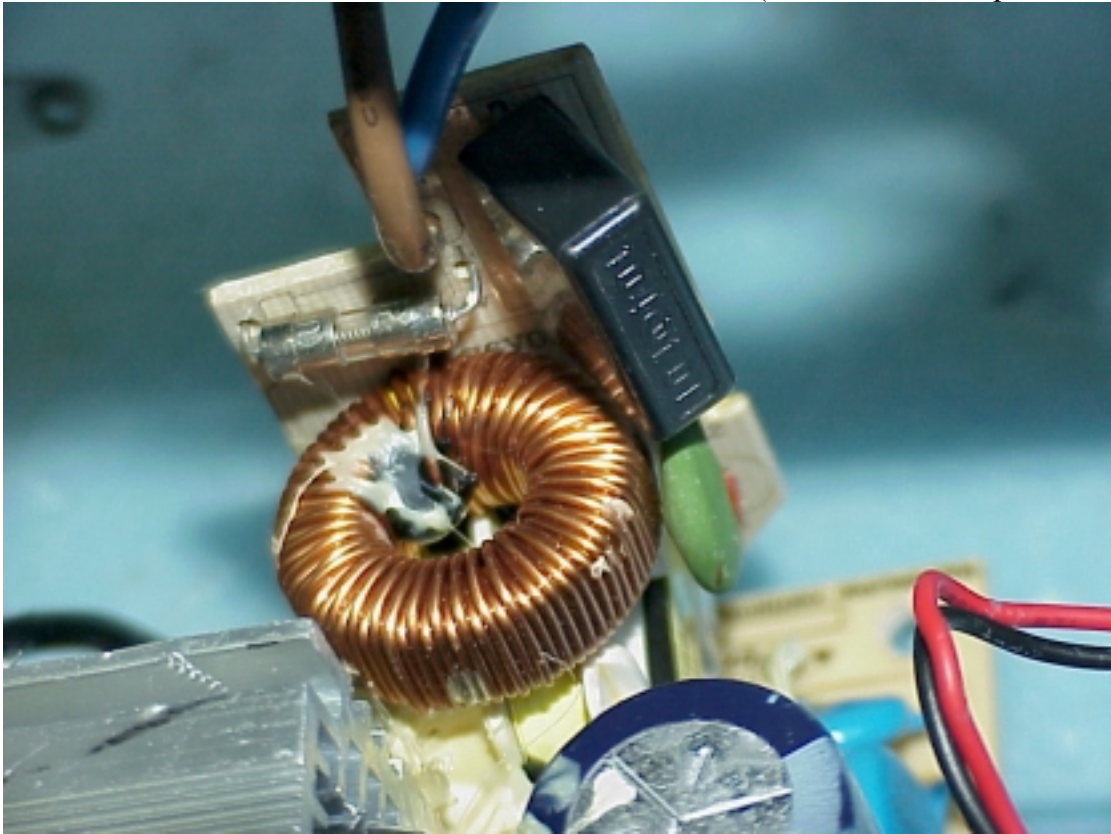


Figure 10  
Internal View (Filter Board/Foil Side)

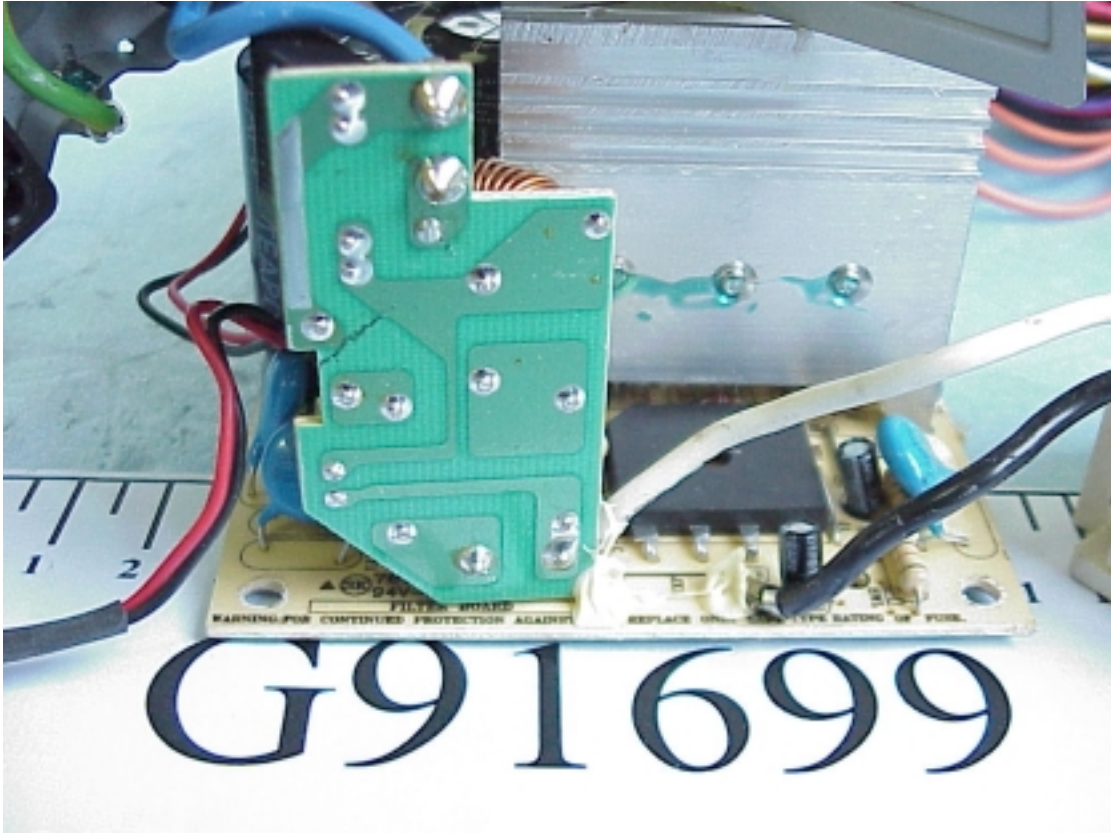


Figure 11  
Internal View (PFC Choke/Front View)



Figure 12  
Internal View (PFC Choke/Back View)



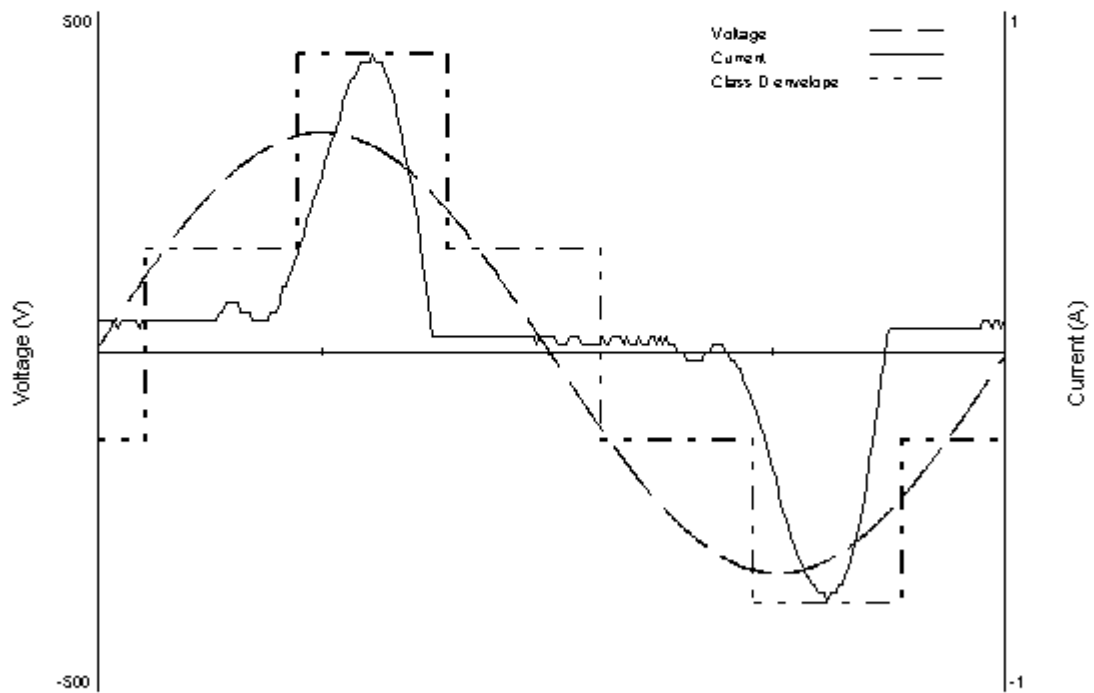
Figure 13  
Internal View (DC FAN)



APPENDIX II  
(Power Harmonic & Flicker Test Data)  
(EUT within PC)

Total Page : 5

<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 1:49pm
Serial no:		Page 1 of 1
Description:	S.P.S MODE:FULL SYSTEM	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 1:36pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Waveform	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
	Waveform is Class D	



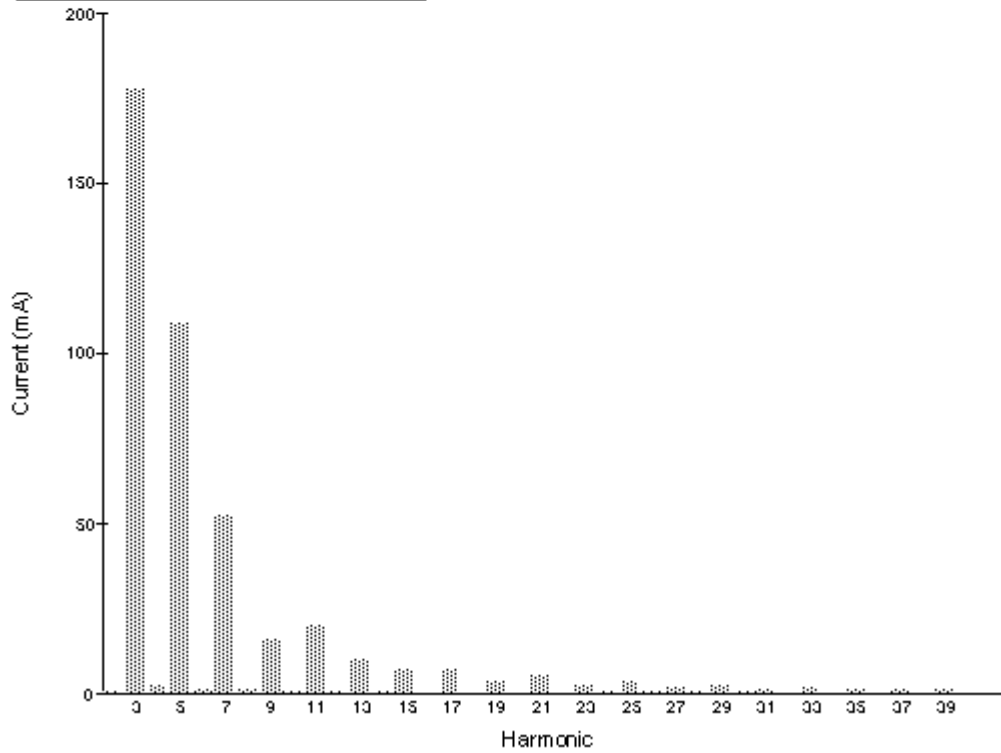
<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 1:50pm
Serial no:		Page 1 of 1
Description:	S.P.S MODE:FULL SYSTEM	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 1:36pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Steady State Harmonics Test - Table	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
<b>PASS</b>	Below Class D power limit	

Class	D
Class Multiplier	1
Power	55.5W

Harmonic	Reading	Limit	Result	Harmonic	Reading	Limit	Result
2	0.79mA	None		3	178mA	None	Pass
4	2.31mA	None		5	109mA	None	Pass
6	1.08mA	None		7	52.32mA	None	Pass
8	1.16mA	None		9	16.35mA	None	Pass
10	0.64mA	None		11	19.91mA	None	Pass
12	0.91mA	None		13	10.04mA	None	Pass
14	0.55mA	None		15	7.30mA	None	Pass
16	0.36mA	None		17	7.52mA	None	Pass
18	0.33mA	None		19	3.61mA	None	
20	0.32mA	None		21	5.52mA	None	Pass
22	0.28mA	None		23	2.78mA	None	
24	0.46mA	None		25	3.37mA	None	
26	0.66mA	None		27	2.23mA	None	
28	0.89mA	None		29	2.31mA	None	
30	0.69mA	None		31	1.61mA	None	
32	0.42mA	None		33	1.86mA	None	
34	0.34mA	None		35	1.14mA	None	
36	0.39mA	None		37	1.16mA	None	
38	0.45mA	None		39	1.11mA	None	
40	0.20mA	None					

<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 1:50pm
Serial no:		Page 1 of 1
Description:	S.P.S MODE:FULL SYSTEM	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 1:36pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Steady State Harmonics Test - Linear Bar Chart	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
<b>PASS</b>	Below Class D power limit	

Class	D
Class Multiplier	1
Power	55.5W

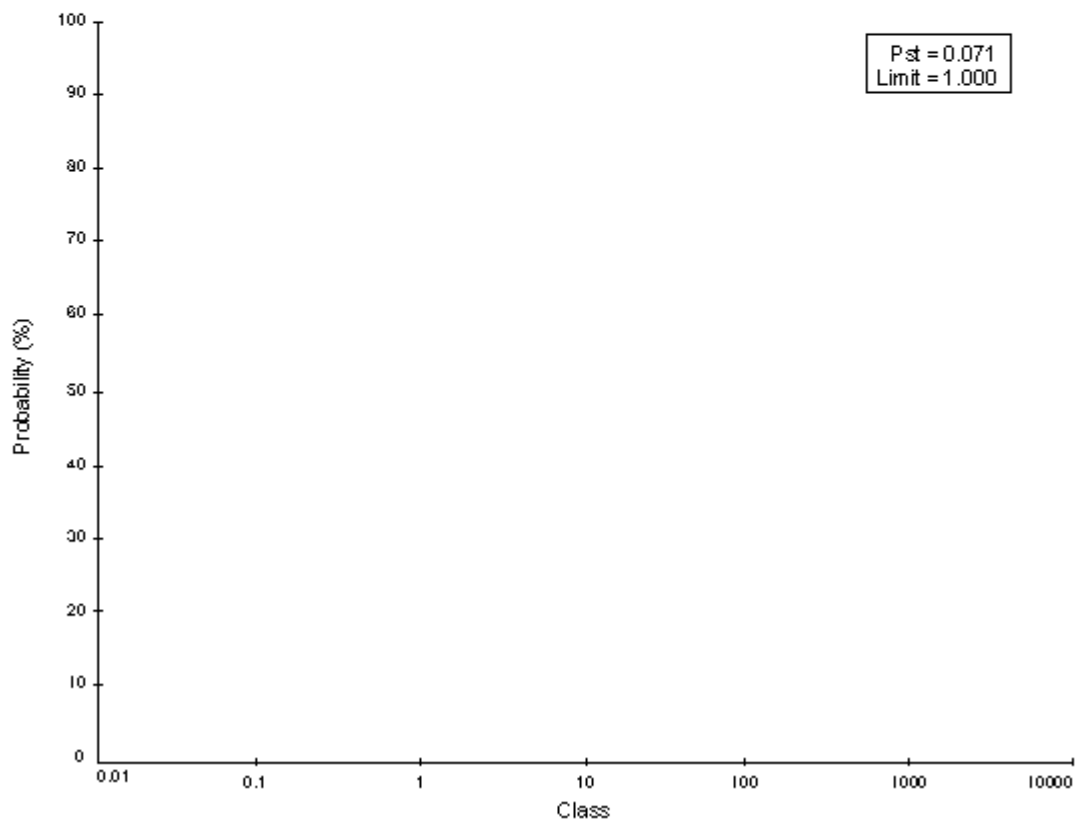


<b>FSP</b>				
Product:	M/N:FSP200-50SNV(PF)			2002 Jul 25 1:51pm
Serial no:				Page 1 of 1
Description:	S.P.S MODE:FULL SYSTEM			
Voltech IEC1000-3 Windows Software 2.02			Test Date: 2002 Jul 25 1:37pm	
Result:	M/N:FSP200-50SNV(PF)			
Type of Test:	Flickermeter Test - Table			
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686			
AC Source:	Mains / Manual Source			
<b>PASS</b>	Measurement method - Voltage			
	Pst	dc (%)	dmax (%)	dt (ms)
Limit	1.000	3.000	4.000	200
Reading 1	0.071	0.009	0.023	0



<b>FSP</b>		
Product:	M/N:FSP200-50SNV(PF)	2002 Jul 25 1:51pm
Serial no:		Page 1 of 1
Description:	S.P.S MODE:FULL SYSTEM	
Voltech IEC1000-3 Windows Software 2.02		Test Date: 2002 Jul 25 1:37pm
Result:	M/N:FSP200-50SNV(PF)	
Type of Test:	Flickermeter Test - Pst Curve	
Power Analyzer:	Voltech PM3000A v1.67 s/n 6686	
AC Source:	Mains / Manual Source	
<b>PASS</b>	Measurement method - Voltage	

**Pst Curve 1**





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## Technical Compliance Statement

No. ATM-E91122

The following products has been tested by us with the listed standards and found in compliance with the council EMC directive 89/336/EEC. It is possible to use CE marking to demonstrate the compliance with this EMC Directive.

**Submittor :** FSP Group Inc.  
 No. 22, Jianguo E. Rd., Taoyuan City,  
 Taiwan, R.O.C.

**Product :** Switching Power Supply  
 M/N (1)FSP150-50SNV(PF) (2)FSP200-50SNV(PF)

Test Standards		
EN 55022/1998 +A1/2000	Limits and methods of measurement of radio disturbance characteristics of information technology equipment	
EN 61000-3-2/1995 +A1/1998 +A2/1998 +A14/2000	Part 3 : Limits -Section 2 : Limits for harmonic current emission (equipment input current <=16A phase)	
EN 61000-3-3/1995 +A1/2001	Part 3 : Limits -Section 3 : Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current <=16A	
EN 55024/1998	Information technology equipment-Immunity characteristics Limits and methods of measurement	
	IEC 61000-4-2/1995 +A1/1998+A2/2000	Electrostatic discharge immunity test
	IEC 61000-4-3/1995 +A1/2001	Radiated, radio-frequency electromagnetic field immunity test
	IEC 61000-4-4/1995	Electrical fast transient / burst immunity test
	IEC 61000-4-5/1995	Surge immunity test
	IEC 61000-4-6/1996	Immunity to conducted disturbances, induced by radio-frequency fields
	IEC 61000-4-8/1993	Power frequency magnetic field immunity test
	IEC 61000-4-11/1994	Voltage dips, short interruptions and voltage variations immunity tests



.....  
 Jackie Deng  
 Assistant General Manager

The verification is based on a single evaluation of one sample of above mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab. logo.