



**FCC 47 CFR PART 15 SUBPART B**

**TEST REPORT**

**FOR**

DC/DC Converter

MODEL: KW Series

Issued to

**Danube Enterprise Co., Ltd**

A2,NO.255,Fengren Rd., Renwu Shiang Kaohsiung County 814,  
Taiwan (R.O.C.)

Issue by

Global Certification Corp.

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EMS Test Site	His Chih office and Lab	No.112-3, Shiang Charng Rd.,Sec. 2, His Chih City,Taipei 221,Taiwan R.O.C.



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## 1. GENERAL INFORMATION

### 1.1 APPLICANT:

Danube Enterprise Co., Ltd.  
A2,NO.255,Fengren Rd., Renwu Shiang Kaohsiung County 814, Taiwan (R.O.C.)

### 1.2 MANUFACTURER:

**DANUBE ENTERPRISE CO., LTD.**  
A2,NO.255,Fengren Rd., Renwu Shiang Kaohsiung County 814, Taiwan (R.O.C.)

### EUT DESCRIPTION

The tested sample is a DC/DC Converter for general user. The samples were tested with the following configuration:

<b>Product</b>	DC/DC Converter
<b>Model</b>	KW Series
<b>Housing Type</b>	Plastic case
<b>EUT power Rating</b>	Please refer to input voltage of table 1.2.1

#### 1.2.1 Model Differences

<b>Model Name</b>	<b>Difference</b>
KWV-X1X2X3; KWV-X1X2X3A; KWV-X1X2X3-3K	V = Type of output voltage ( S = single or D = Dual ) X1 = input voltage ( 9 – 18 ; 18 – 36 ; 36 – 72 ; 9 – 27 ; 18 -54 ; 9-36 or 18 - 72V ) X2 = output voltage ( 3.3 ; 5 ; 9 ; 12 ; 15 ; 24 ; 27 ; +/- 5 ; +/- 12 ; +/- 15 or +/- 24V ) X3 = Sample sine ( without X3 = 2:1 ; X3 = G = 3:1;X3 = T = 4:1 ) A = Remote ON/OFF



**1.2.2 I/O port of the EUT**

I/O port type	Q'ty	Tested with
N/A	N/A	N/A

**1.3 TEST METHODOLOGY**

**EUT SYSTEM OPERATION**

1. Turn on the power of all equipment.

**DECISION OF FINAL TEST MODE**

- 1. The following test mode were scanned during the preliminary test:**

Mode 1:The DC power to EUT Full Load

Mode 2:The DC power to EUT half Load

- 2. After the preliminary scan, the following test mode was found to produce the highest emission level.**

Conduction: N/A

Radiation: Mode 1

Then, the EUT configuration and cable configuration of the above highest emission mode was chosen for all final test item



### 1.4 DESCRIPTION OF THE SUPPORT EQUIPMENTS

#### Setup Diagram

See test photographs attached in appendix 1 for the actual connections between EUT and support equipment.

#### Support Equipment

Peripherals Devices:

EMI							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
1	DC Source	GPC-3030 DQ	C680186	N/A	GW	N/A	Unshielded 1.5M
2	Resister	N/A	N/A	N/A	N/A	N/A	Unshielded 0.5M

EMS							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
1	DC Source	GPC-3030 DQ	C680186	N/A	GW	N/A	Unshielded 1.5M
2	Resister	N/A	N/A	N/A	N/A	N/A	Unshielded 0.5M

**Note:** All the above equipment /cable were placed in worse case position to maximize emission signals during emission test

**Grounding:** Grounding was in accordance with the manufacturer's requirement and conditions for the intended use.



## **2. GENERAL**

### **2.1 CERTIFICATION OF ACCURACY OF TEST DATA**

**Standards:** ANSI C63.4-2003, CFR 47 Part 15 Subpart B  
Section 15.107 and 15.109

**Equipment Tested:** DC/DC Converter

**Model:** KW Series

**Sample received Date:** 2006/11/14

**Final test Date :** refer to the date of test data

**Test Result** **PASS**

**Test Engineer:**

\_\_\_\_\_

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, Global Certification Corp.

The test results contained in this report accurately represent the radiated and power line conducted electromagnetic emissions generated by sample equipment under test at the time of the test.

The sample equipment tested as described in this report is in compliance with the limits of above standards.

<p>Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of Global.</p>
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## **2.2 APPLICANT INFORMATION**

**Applicant:** Danube Enterprise Co., Ltd

**Address:** A2,NO.255,Fengren Rd., Renwu Shiang Kaohsiung County 814,  
Taiwan (R.O.C.)

## **2.3 OPERATION ENVIRONMENT**

**Test Site:** Open Site 01; Conduction 01

**Test Distance** 10M

Temperature refer to each site test data

Humidity: refer to each site test data

**input power:** Conduction input power: N/A  
Radiation input power: 18VDC



### **3. POWERLINE CONDUCTED EMISSIONS**

#### **3.1 CONFIGURATION AND PROCEDURE**

##### **3.2.1 EUT Configuration**

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall was 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit of standards used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms impedance termination was connected to the test instrument. The excess length of the power cord was folded back and forth at the center of the lead to form a bundle 30cm to 40cm in length.

Any changes made to the configuration or modifications made to EUT during testing, are noted in the following test record.

If EUT has an extra auxiliary DC outlet which can provide power to an external monitor, all measurements will be made with the monitor power from EUT-mounted AC outlet and then from floor-mounted DC outlet.

##### **3.2.2 Test Procedure**

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on both hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

##### **3.2.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)**

Frequency Range:	150KHz~30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9KHz

#### **3.2 TEST DATA:**

The EUT power is from DC source, so it does not necessary to be tested.



## **4. OPEN FIELD RADIATED EMISSIONS**

### **4.1 CONFIGURATION AND PROCEDURE**

#### **4.2.1 EUT Configuration**

The equipment under test was set up on a non-conductive table 80cm above ground, on a 10 meter open field or 10 meter chamber. The excess length of the power cord was folded back and forth at the center of the lead to form a bundle 30cm to 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If EUT has an extra auxiliary AC outlet which can provide power to an external monitor, all measurements will be made with the monitor power from EUT-mounted AC outlet and then from floor-mounted AC outlet.

#### **4.2.2 Test Procedure**

The system was set up as described above, with the EMI diagnostic software running. The maximum emission was measured by varying the height of antenna and then by rotating the turntable. Both polarization of antenna, horizontal and vertical, were measured.

The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

The highest emissions of frequency higher than 1000 MHz was analyzed in peak mode and/or average mode to determine the precise amplitude of the emission.

#### **4.2.3 Spectrum Analyzer Configuration (for the frequencies tested)**

Frequency Range:	30MHz--1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120KHz
Frequency Range:	Above 1000Mhz
Detector Function:	Peak/Average Mode
Resolution Bandwidth:	1MHz





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**Radiated Emission Measurement**



Site: Open site #1	Polarization: <b>Horizontal</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 9-18VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-1224		
Note: Full Load : Vout = 24V ; R = 38.4Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1		41.6000	49.67	-40.76	8.91	30.00	-21.09	peak	0
2		48.5100	51.69	-39.60	12.09	30.00	-17.91	peak	0
3		59.1700	47.70	-33.24	14.46	30.00	-15.54	peak	0
4	*	67.3000	44.37	-29.62	14.75	30.00	-15.25	peak	0
5		79.8800	47.36	-33.40	13.96	30.00	-16.04	peak	0
6		110.3900	41.30	-28.79	12.51	30.00	-17.49	peak	0

\*:Maximum data x:Over limit f:over margin •Reference Only

Receiver: Spectrum Analyzer: FSP3  
 Antenna: factor:060920 Engineer Signature: Daniel  
 Amplifier:  
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**Radiated Emission Measurement**



Site: Open site #1	Polarization: <b>Horizontal</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 9-36VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-1205T		
Note: Full Load : Vout = 5V ; R = 1.7Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1		48.6700	48.90	-39.54	9.36	30.00	-20.64	peak	0
2		77.9200	47.17	-33.58	13.59	30.00	-16.41	peak	0
3		119.3600	36.10	-26.49	9.61	30.00	-20.39	peak	0
4		147.5000	31.20	-22.30	8.90	30.00	-21.10	peak	0
5	*	176.5100	37.13	-23.18	13.95	30.00	-16.05	peak	0
6		210.2900	31.07	-20.82	10.25	30.00	-19.75	peak	0

*:Maximum data	x:Over limit	! :over margin			•Reference Only
Receiver:			Spectrum Analyzer:	FSP3	
Antenna:	factor-060020		Engineer Signature:	Daniel	
Amplifier:					
File :6N14XX\1Data :#14			Page: 1		



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**Radiated Emission Measurement**



Site: Open site #1	Polarization: <b>Horizontal</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 18-36VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-2405		
Note: Full Load : Vout =5V ; R =1.7Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1		39.6800	49.82	-40.26	9.56	30.00	-20.44	peak	0
2	*	48.5100	51.07	-39.60	11.47	30.00	-18.53	peak	0
3		59.7100	41.28	-32.77	8.51	30.00	-21.49	peak	0
4		67.2900	41.08	-29.61	11.47	30.00	-18.53	peak	0
5		78.5100	43.29	-33.52	9.77	30.00	-20.23	peak	0
6		117.5700	39.07	-26.98	12.09	30.00	-17.91	peak	0

*:Maximum data	x:Over limit	f:over margin		•Reference Only
Receiver:			Spectrum Analyzer:	FSP3
Antenna:	factor-060920		Engineer Signature:	Daniel
Amplifier:				
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**Radiated Emission Measurement**



Site: Open site #1	Polarization: <b>Horizontal</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 18-72VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWD-2412T		
Note: Full Load : Vout1=+12V ; Vout2=-12V ; R1 & R2=19.2Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		47.1900	48.88	-40.05	8.83	30.00	-21.17	peak	0	
2		62.1000	43.98	-30.11	13.87	30.00	-16.13	peak	0	
3		79.0900	44.19	-33.47	10.72	30.00	-19.28	peak	0	
4	*	161.2000	34.69	-20.62	14.07	30.00	-15.93	peak	0	
5		198.1000	33.77	-23.03	10.74	30.00	-19.26	peak	0	
6		221.9800	31.43	-18.98	12.45	30.00	-17.55	peak	0	

\*:Maximum data x:Over limit f:over margin •Reference Only

Receiver: Spectrum Analyzer: FSP3  
 Antenna: factor:060920 Engineer Signature: Daniel  
 Amplifier:  
 File :6N14XX\Data :#17 Page: 1



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**Radiated Emission Measurement**



Site : Open site #1	Polarization: <b>Horizontal</b>	Temperature : 25.9 °C
Limit: CISPR22 Class B	Power: 36-72VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model : KWS-4824		
Note: Full Load : Vout =24V ; R =38.4Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		33.8700	38.39	-30.95	7.44	30.00	-22.56	peak	0	
2		42.1800	51.39	-40.77	10.62	30.00	-19.38	peak	0	
3		49.5100	50.28	-39.26	11.02	30.00	-18.98	peak	0	
4	*	59.4400	47.10	-33.00	14.10	30.00	-15.90	peak	0	
5		67.2900	38.17	-29.61	8.56	30.00	-21.44	peak	0	
6		79.5800	42.19	-33.43	8.76	30.00	-21.24	peak	0	

*:Maximum data	x:Over limit	f:over margin		•Reference Only
Receiver:			Spectrum Analyzer:	FSP3
Antenna:	factor-060920		Engineer Signature:	Daniel
Amplifier:				
File :6N14XX>Data :#12			Page :	1



**TABLE 4.2.2 RADIATED EMISSIONS (VERTICAL)**



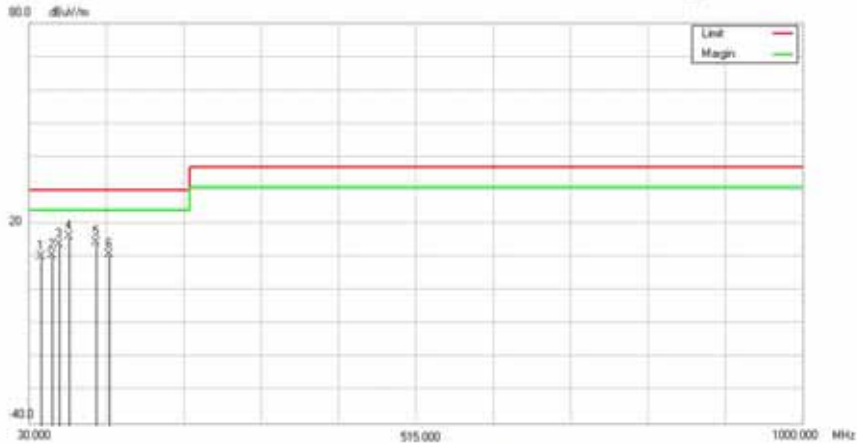


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**Radiated Emission Measurement**

File :6N14XX Data :#4 Date: 2006/11/22 Time: 上午 10:23:24



Site: Open site #1	Polarization: <b>Vertical</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 9-18VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-1224		
Note: Full Load : Vout = 24V ; R = 38.4Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		45.3700	44.39	-34.01	10.38	30.00	-19.62	peak	0	
2		57.3900	47.69	-37.15	10.54	30.00	-19.46	peak	0	
3		68.1000	51.36	-37.60	13.76	30.00	-16.24	peak	0	
4	*	79.1900	47.31	-31.00	16.31	30.00	-13.69	peak	0	
5		114.1000	37.61	-23.17	14.44	30.00	-15.56	peak	0	
6		129.5000	34.20	-23.50	10.7	30.00	-19.3	peak	0	

\*:Maximum data x:Over limit f:over margin ●Reference Only

Receiver: Spectrum Analyzer: FSP3  
Antenna: factor-060920 Engineer Signature: Daniel  
Amplifier:

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**Radiated Emission Measurement**



Site: Open site #1	Polarization: <b>Vertical</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 9-18VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-1205		
Note: Full Load : Vout = 5V ; R = 1.7Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		31.2600	48.10	-36.67	11.43	30.00	-18.57	peak	0	
2	*	38.6100	49.21	-34.25	14.96	30.00	-15.04	peak	0	
3		43.6400	41.88	-33.92	7.96	30.00	-22.04	peak	0	
4		48.9700	48.64	-33.97	14.67	30.00	-15.33	peak	0	
5		67.3100	46.23	-37.95	8.28	30.00	-21.72	peak	0	
6		73.1000	49.11	-36.33	12.78	30.00	-17.22	peak	0	

\*:Maximum data x:Over limit !:over margin

•Reference Only

Receiver: Spectrum Analyzer: FSP3  
Antenna: factor-060020 Engineer Signature: Daniel  
Amplifier:

File:6N14XX\Data:#3

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**Radiated Emission Measurement**



Site: Open site #1	Polarization: <b>Vertical</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 9-36VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-1205T		
Note: Full Load ; Vout =5V ; R =1.7Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBUV	dB	dBUV/m	dBUV/m	dB	cm	degree	Comment
1		39.8100	45.39	-33.76	11.63	30.00	-18.37	peak	0	
2		57.6900	47.18	-37.14	10.04	30.00	-19.96	peak	0	
3		77.9800	44.11	-32.47	11.64	30.00	-18.36	peak	0	
4 *		110.3700	37.18	-23.02	14.16	30.00	-15.84	peak	0	
5		129.3700	37.17	-23.50	13.67	30.00	-16.33	peak	0	
6		150.7100	31.29	-21.31	9.98	30.00	-20.02	peak	0	

\*:Maximum data x:Over limit f:over margin ●Reference Only

Receiver: Spectrum Analyzer: FSP3

Antenna: factor-060920 Engineer Signature: Daniel

Amplifier:

File:6N140X>Data :#14 Page: 1

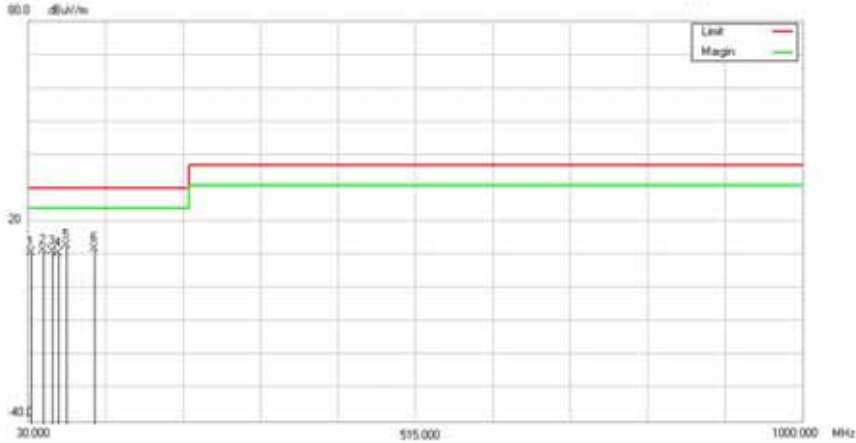


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**Radiated Emission Measurement**

File :6N14XX Data :#11 Date: 2006/11/22 Time: 下午 01:27:20



Site: Open site #1	Polarization: <b>Vertical</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 18-36VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-2405		
Note: Full Load : Vout =5V ; R =1.7Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		32.2900	47.29	-36.42	10.87	30.00	-19.13	peak	0	
2		47.5800	45.29	-33.98	11.31	30.00	-18.69	peak	0	
3		59.2700	48.11	-37.07	11.04	30.00	-18.96	peak	0	
4		67.8800	48.19	-37.69	10.50	30.00	-19.50	peak	0	
5	*	78.1900	45.07	-32.21	12.86	30.00	-17.14	peak	0	
6		112.8900	35.26	-23.12	12.14	30.00	-17.86	peak	0	

\*:Maximum data x:Over limit f:over margin ●Reference Only

Receiver: Spectrum Analyzer: FSP3  
 Antenna: factor-060920 Engineer Signature: Daniel  
 Amplifier:  
 File :6N14XX\1Data :#11 Page: 1

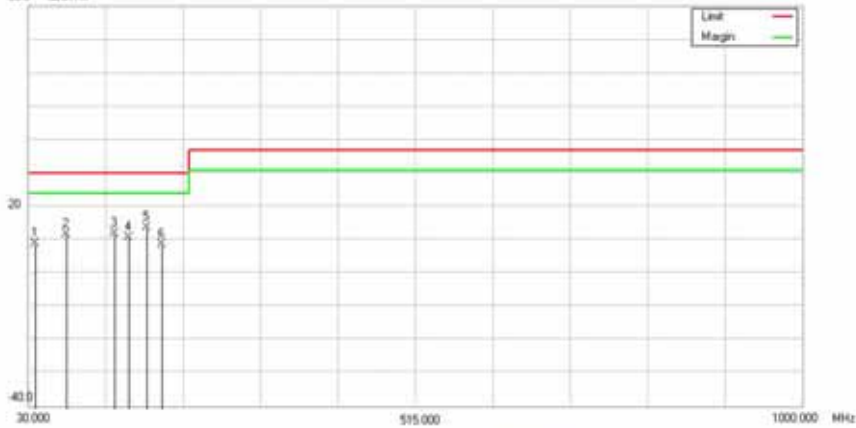


環球認證有限公司  
Global Certification Corp.

Address:No.112-3,Shiang Chang Rd.,Sec.2,  
Hsi Chin,Taipei Hsien 221,Taiwan,R.O.C.  
Tel:02-26426992 Fax:02-26487450

**Radiated Emission Measurement**

File :6N14XX Data :#18 Date: 2006/11/22 Time: 下午 02:58:54



Site: Open site #1	Polarization: <b>Vertical</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 18-72VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWD-2412T		
Note: Full Load : Vout1=+12V ; Vout2=-12V ; R1 & R2=19.2Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		39.1000	43.20	-34.05	9.15	30.00	-20.85	peak		0
2		77.1900	45.29	-33.43	11.86	30.00	-18.14	peak		0
3		137.0700	34.29	-22.12	12.17	30.00	-17.83	peak		0
4		155.4800	31.65	-20.76	10.89	30.00	-19.11	peak		0
5	*	178.6900	33.01	-19.29	13.72	30.00	-16.28	peak		0
6		197.6100	30.31	-21.57	8.74	30.00	-21.26	peak		0

\*:Maximum data x:Over limit f:over margin ●Reference Only

Receiver: Spectrum Analyzer: FSP3  
 Antenna: factor-060920 Engineer Signature: Daniel  
 Amplifier:  
 File :6N14XX\1Data :#18 Page: 1

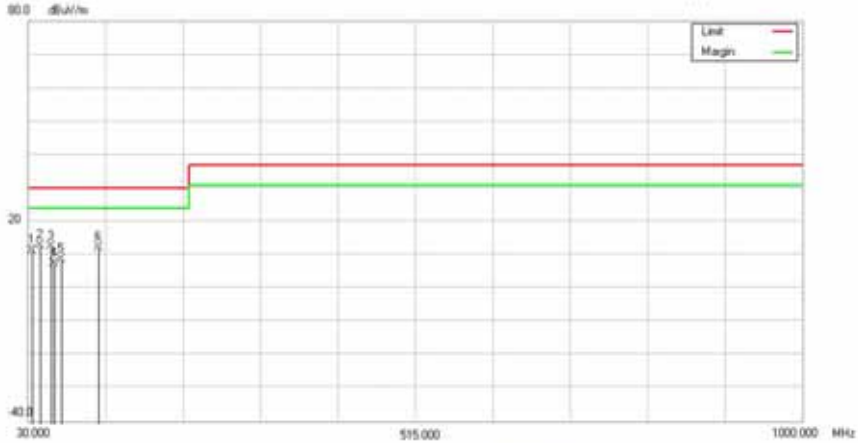


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**Radiated Emission Measurement**

File :6N14XX Data :#12 Date: 2006/11/22 Time: 下午 02:17:09



Site: Open site #1	Polarization: <b>Vertical</b>	Temperature: 25.9 °C
Limit: CISPR22 Class B	Power: 36-72VDC	Humidity: 68 %
Company:	Distance: 10M RBW: 100 KHz	
EUT: DC/DC Converter	VBW: 1000 KHz	Sweep Time: 100 ms
Model: KWS-4824		
Note: Full Load : Vout =24V ; R =38.4Ω		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		34.4400	47.39	-35.88	11.51	30.00	-18.49	peak		0	
2	*	44.3900	46.97	-33.97	13.00	30.00	-17.00	peak		0	
3		57.6700	49.69	-37.14	12.55	30.00	-17.45	peak		0	
4		61.6900	45.39	-37.70	7.69	30.00	-22.31	peak		0	
5		71.2900	45.39	-36.57	8.82	30.00	-21.18	peak		0	
6		118.2100	35.36	-22.94	12.42	30.00	-17.58	peak		0	

\*:Maximum data x:Over limit f:over margin ●Reference Only

Receiver: Spectrum Analyzer: FSP3  
 Antenna: factor-060920 Engineer Signature: **Daniel**  
 Amplifier:  
 File :6N14XX\1Data :#12 Page: 1



## APPENDIX

### 5. APPENDIX A: WARNING LABELS

#### Label Requirements

A Class B digital device subject to certification by the FCC shall carry a warning label which includes the following statement:

**\*\*\* WARNING \*\*\***

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.



## **5.1 APPENDIX B: WARNING STATEMENT**

### **Statement Requirements**

The operators manual for a Class B digital device shall contain the following statements or their equivalent:

**\*\*\* WARNING \*\*\***

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and uses in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notice: The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equivalent.

\* \* \* \* \*

If the EUT was tested with special shielded cables the operators manual for such product shall also contain the following statements or their equivalent:



## 5.2

### **APPENDIX C: MEASUREMENT PROCEDURE FOR POWERLINE CONDUCTED EMISSIONS**

The measurements are performed in a global room, which referred as Conduction 01 test site, or a 2m x 2m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.



## **5.3 APPENDIX D: TEST PROCEDURE FOR RADIATED EMISSIONS**

### **Preliminary Measurements in the Anechoic Chamber**

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT. The test setup in anechoic chamber is the same as open site. The turntable rotated 360°. The antenna height is varied from 1-2.5m. The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude. The initial scan is made with the spectrum analyzer in automatic sweep mode. The spectrum peaks are then measured manually to determine the exact frequencies.

### **Measurements on the Open Site or 10m EMC Chamber**

The radiated emissions test will then be repeated on the open site or 10m EMC chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of 3 or 10 meter open field sites. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both readings are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector. For frequency above 1 GHz, the reading is recorded with peak detector or average detector with 1 MHz bandwidth.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.



## 6. INSTRUMENT AND CALIBRATION

### 6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 6.2 TEST AND MEASUREMENT EQUIPMENT

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of the CISPR 16-1, ANSI C63.2 and. Other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

**TABLE 1 LIST OF TEST AND MEASUREMENT EQUIPMENT**

Instrument	Manufacturer	Model No.	Serial No.	Calibration Due Date
Test Receiver	AFJ	ER55C	55090502270	Apr.10.2007
Test Receiver	AFJ	ER55R	55300508277	May.18.2007
LISN	SCHAFFNER	NNB41	03/10026	Jun.04.2007
LISN	SCHAFFNER	NNB41	03/10015	Jun.04.2007
Power Filter	CORCOM	MR12030	N/A	N/A
Power Amplifier	SCHAFFNER	CBA9413B	4039	N/A
Bilog Antenna	SUNOL	JB1	A052104	SEP.25.2007



Antenna	EMC-PARTNER	MF-1000	739	OCT.11.2007
Turn table	EMCO	2080	9508-1805	N/A
Controller	EMCO	2090	9804-1328	N/A
RF Cable	MIYAZAKI	5D-F8	E037	Jun.01.2007
Thermo-Hygro meter	WISEWIND	N/A	N/A	OCT.11.2007
Decoupling network	Frankonia	M2+M3	A3011055	N/A
Decoupling network	Frankonia	RJ45	A3023009	N/A
EM Injection Clamp	FCC	F-203I-23MM	471	N/A
Signal Generator	IFR	2023A	202305/561	SEP.10.2007
POWER METER	BOONTON	4231A	110602	SEP.10.2007
Electric Field probe	ETS-LINDGREEN	00029837	305650	MAY/29/2007
Amplifier	G.W	GAP-801	EF150001	Aug.03.2007
EMC Analyzer	AGILENT	E7401A	MY42000145	Jun.06.2007
Thermo-Hygro meter	WISEWIND	4-IN-1	0412	Apr.07.2007

Note: the measurement uncertainty is less than +/- 2.83dB, Which is evaluated as per the NAMAS NIS 81 and CISP/A/291/CDV.  
Calibration interval of instruments listed above is one year



**PROCEDURE OF PRELIMINARY TEST**

- ◆ The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- ◆ Support equipment, if need, was placed as per ANSI C63.4.
- ◆ All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
- ◆ The EUT received DC power source, from the outlet socket under the turntable. All support equipment received power from another socket under the turntable.
- ◆ The antenna was placed at 10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- ◆ The analyzer / Receiver quickly scanned from 30MHz to 8000MHz. the EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- ◆ The test mode(s) described in Item 3.2 were scanned during the preliminary test:
- ◆ After the preliminary scan, we found the test mode described in Item 3.2 producing the highest emission level.
- ◆ The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.



### **6.3 TEST PERFORMED**

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver which bandwidth is set at 9KHz.

Radiated emissions were investigated over the frequency range from 30MHz to 1000MHz using a receiver which bandwidth is set at 120KHz. Radiated measurement was performed at distance that from an antenna to EUT is 10meters.

### **6.4 APPENDIX**

#### **APPENDIX A: MEASUREMENT PROCEDURE FOR MAIN POWER PORT CONDUCTED EMISSIONS**

The measurements are performed in a Global lab room,. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.



## **APPENDIX B: TEST PROCEDURE FOR RADIATED EMISSIONS**

### **Preliminary Measurements in the Anechoic Chamber**

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT.

The test setup in anechoic chamber is the same as open site. The turntable rotated 360°C. The antenna height is varied from 1-2.5m.

The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude.

The initial scan is made with the spectrum analyzer in automatic sweep mode.

The spectrum peaks are then measured manually to determine the exact frequencies.

### **Measurements on the Open Site or Chamber**

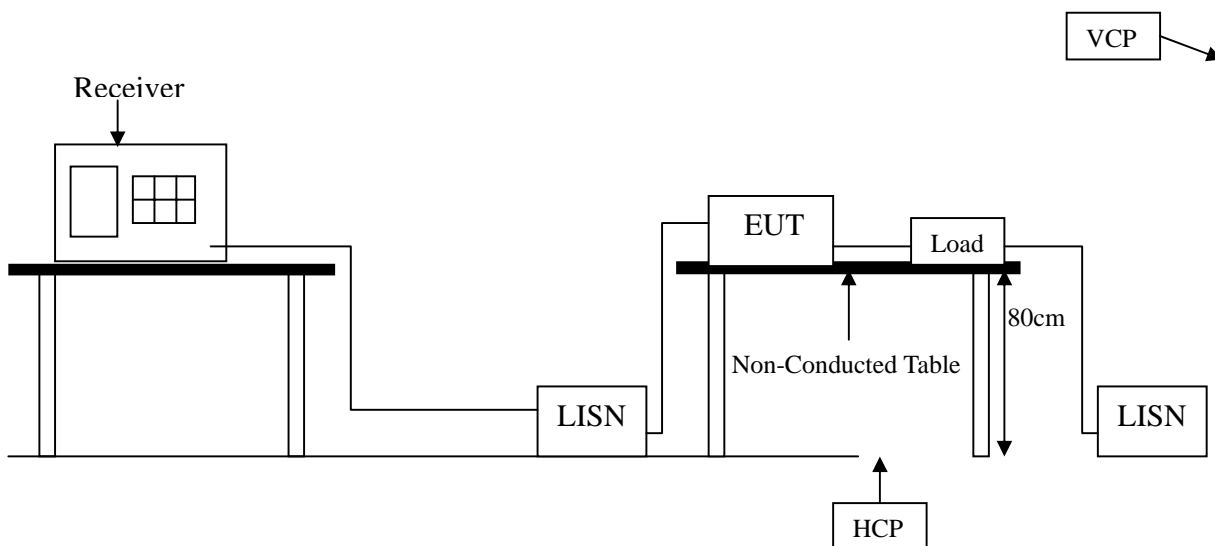
The radiated emissions test will then be repeated on the open site or chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipments are set up on the turntable. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both reading are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

## 7. CONDUCTED EMISSION MEASUREMENT

### 7.1 TEST SET-UP



### 7.2 LIMIT

Frequency MHz	Limit(dB $\mu$ V)			
	Class A		Class B	
	Quasi Peak	Average	Quasi Peak	Average
0.15 ~ 0.50	79	66	66~56	56~46
0.50 ~ 5.0	73	60	56	46
5.0 ~30.0	73	60	60	50

Remark: In the above table, the tighter limit applies at the band edges.



### **7.3 TEST PROCEDURE**

The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). It provides a 50 ohm / 50  $\mu$ H coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm / 50  $\mu$ H coupling impedance with 50 ohm termination. (Please refer to the block diagram of the test setup and photograph.)

Both sides of DC line are checked for the maximum conducted emission interference. In order to find the maximum emissions, the relating positions of equipment and all of the interference cables must be changed according to part 15 of the FCC Rules regulation: The measurement procedure on conducted emission interference.

The resolution bandwidth of the field strength meter is set at 9KHz.

### **7.4 TEST SPECIFICATION**

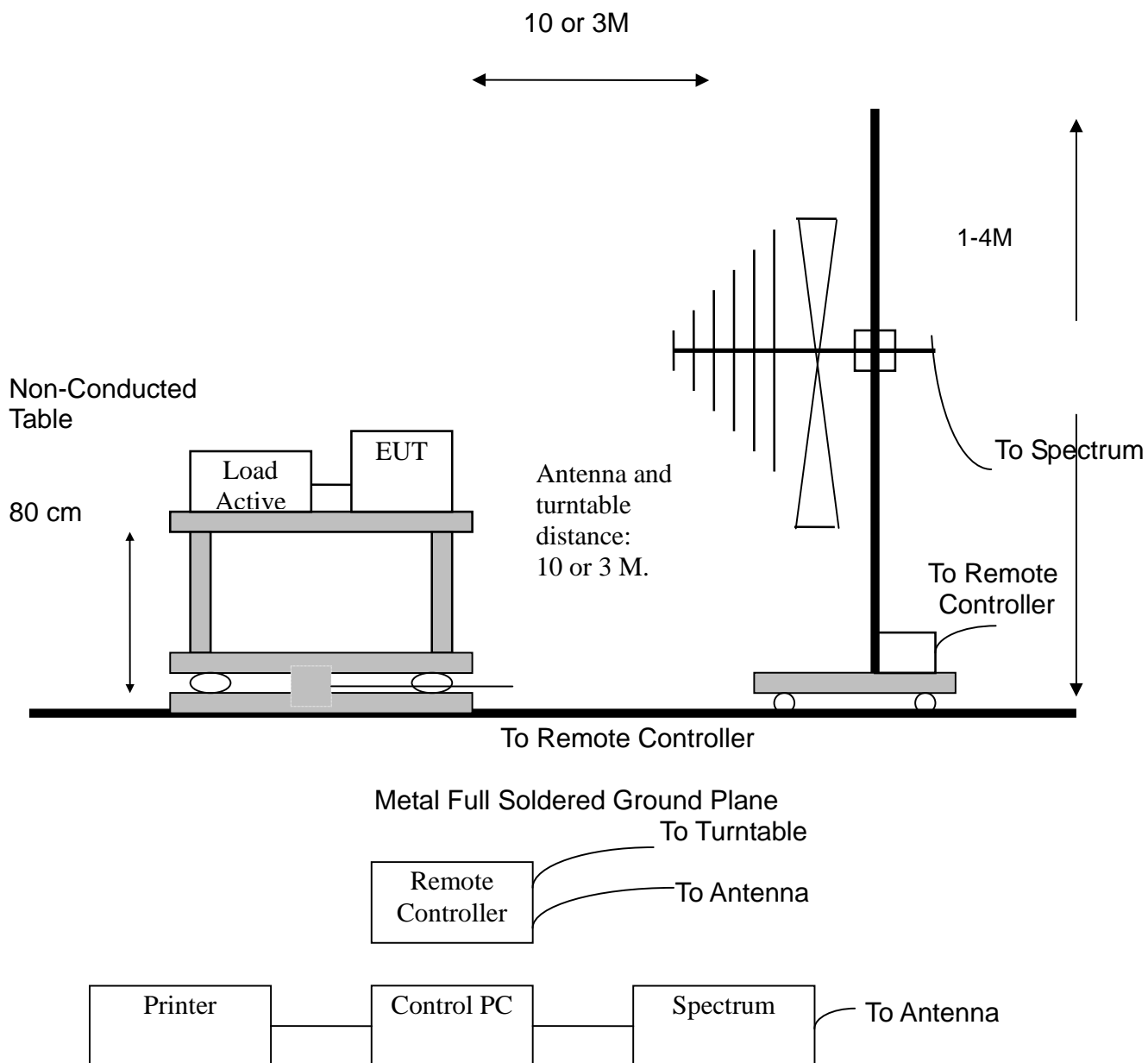
According to the part 15 of the FCC Rules

### **7.5 TEST RESULT**

The emissions that come from the EUT were below the specified limits. The worst case of conducted emissions measurement are shown in the appendix A. The acceptance criterion was met and the EUT has pass the measurement.

## 8. RADIATED EMISSION MEASUREMENT

### 8.1 TEST SETUP





## 8.2 LIMIT

Frequency MHz	Class A		Class B	
	Distance (Meter)	Limit (dB $\mu$ V)	Distance (Meter)	Limit (dB $\mu$ V)
30 ~ 230	10	40	10	30
230 ~ 1000	10	47	10	37

Remark: In the above table, the tighter limit applies at the band edges

## 8.3 TEST PROCEDURE

The EUT and its simulators are placed on turn table, non-ducted and wooden, which is 0.8 meter above ground. The turn table rotates 360 degree to determine the position of the maximum emission level. The EUT was positioned such that distance from antenna to the EUT is 10 meters.

The antenna is moved up and down between 1 meter to 4 meter to receive the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interference cables must be manipulated according to part 15 of the FCC Rules regulation: the test procedure of the radiated emission measurement.

The bandwidth set on the field strength is 120KHz when the frequency range is below 1GHz

## 8.4 TEST SPECIFICATION

According to part 15 of the FCC Rules

## 8.5 TEST RESULT

The emissions that come from the EUT was below the specified limits. The worst case of conducted emissions measurement are shown in the appendix A. The acceptance criterion was met and the EUT has pass the measurement.

**9.APPENDIX I – PHOTOGRAPHS OF TEST SETUP**

**Radiated emission test**

