

# **FCC TEST REPORT**

for

47 CFR, Part 15, Subpart C

Equipment : TRANSMITTER  
Model No. : TR-002A, TR-002B, TR-002C, TR-002D  
FCC ID : PAGTR-002  
Filing Type : Certification  
Applicant : **KAB ENTERPRISE CO., LTD.**  
21-1Fl., No. 33, Sec. 1, Min Sheng Rd., Panchiao City,  
Taipei Hsien, Taiwan, 220 R.O.C.

- ~~/~~ The test result refers exclusively to the test presented test model / sample.
- ~~/~~ Without the written authorization of the test lab., the Test Report may not be copied.
- ~~/~~ **Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.**

## ***SPORTON International Inc.***

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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# CERTIFICATE OF COMPLIANCE

for

## 47 CFR, Part 15, Subpart C

Equipment : TRANSMITTER  
Model No. : TR-002A, TR-002B, TR-002C, TR-002D  
FCC ID : PAGTR-002  
Applicant : **KAB ENTERPRISE CO., LTD.**  
21-1Fl., No. 33, Sec. 1, Min Sheng Rd., Panchiao City,  
Taipei Hsien, Taiwan, 220 R.O.C.

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was **passed** both radiated and conducted emission limits. Testing was carried out on May 22, 2001 at **SPORTON International Inc.** LAB. in Lin Kou.

  
K. J. Lin  
Manager

**SPORTON International Inc.**

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## **1. General Description of Equipment under Test**

### **1.1. Applicant**

KAB ENTERPRISE CO., LTD.  
21-1Fl., No. 33, Sec. 1, Min Sheng Rd., Panchiao City,  
Taipei Hsien, Taiwan, 220 R.O.C.

### **1.2. Manufacturer**

Same as 1.1.

### **1.3. Basic Description of Equipment under Test**

Equipment : TRANSMITTER  
Model No. : TR-002A, TR-002B, TR-002C, TR-002D  
FCC ID : PAGTR-002  
Trade Name : KAB  
Power Supply Type : From Battery (12V)  
Power Cord : N/A

### **1.4. Feature of Equipment under Test**

- ~~/~~ Frequency: 315MHz
- ~~/~~ Transmitter Power Input: DC 12V Alkaline Battery (size 23A)
- ~~/~~ Receiver Power Input: AC125V Electrical Outlet
- ~~/~~ Receiver Power Output:
  - 13 Amps / 125 Volts Resistive
  - 13 Amps / 125 Volts General Purpose
  - 1000W Tungsten

## 2. Test Configuration of Equipment under Test

### 2.1. Test Manner

- a. The EUT has been associated with peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The KAB receiver, which is designed to be used for EUT when market, with a load connected was used for EMI test.
- c. Frequency range investigated: radiation 30 MHz to 3160MHz.
- d. This application include four equipments: TR-002A, TR-002B, TR-002C and TR-002D. The equipment of TR-002A has two channels, TR-002B has three channels, TR-002C has four channels and TR-002D has one channel.. The circuit designs of four equipments are the same. The only difference is number of channel provided. The equipment with four channels, TR-002C, was selected as the test sample.
- e. The EUT, TR-002C, has 4 channels used to control 4 separate receivers. One time only one receiver can be controlled. So four test modes, for 4 different channel, were measured.
- f. The radiated emissions testing was made by rotating three orthogonal axes.(Normal mode, Horizontal mode, Vertical mode).
- g. The EUT employs a switch that will automatically deactivate the transmitter within no more than 5 seconds of being released.
- g. Pursuant to 15.231(c) of Part 15. Subpart C, the bandwidth of the emission at the 20dB point shall be no wider than 0.25% of the center frequency for EUT.

For Channel 1:

The carrier frequency of EUT is 314.393MHz

$314.393\text{MHz} * 0.25\% = 785.9\text{KHz}$

For 314.393MHz, the bandwidth is 455KHz (as shown in section 2.4 of this test report), which is less than 785.98KHz.

For Channel 2:

The carrier frequency of EUT is 314.393MHz

$314.393\text{MHz} * 0.25\% = 785.9\text{KHz}$

For 314.393MHz, the bandwidth is 456KHz (as shown in section 2.4 of this test report), which is less than 785.9KHz.

For Channel 3:

The carrier frequency of EUT is 314.393MHz

$314.393\text{MHz} * 0.25\% = 785.9\text{KHz}$

For 314.393MHz, the bandwidth is 460KHz (as shown in section 2.4 of this test report), which is less than 785.9KHz.

For Channel 4:

The carrier frequency of EUT is 314.4MHz

$314.4\text{MHz} * 0.25\% = 786\text{KHz}$

For 314.4 MHz, the bandwidth is 458KHz (as shown in section 2.4 of this test report), which is less than 786KHz.

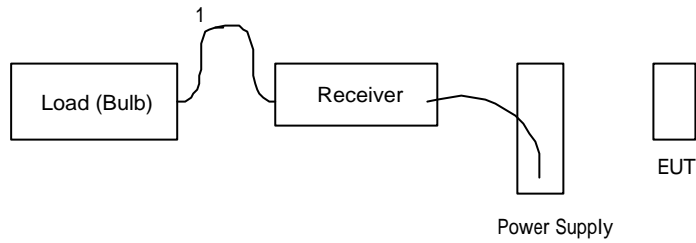
The EUT meet the 20dB point bandwidth requirement.

**2.2. Description of Test System**

Support Unit 1. – Load-Bulb  
Spec. : 100W

Support Unit 2. – Receiver(KAB)  
Model No. : RC-001

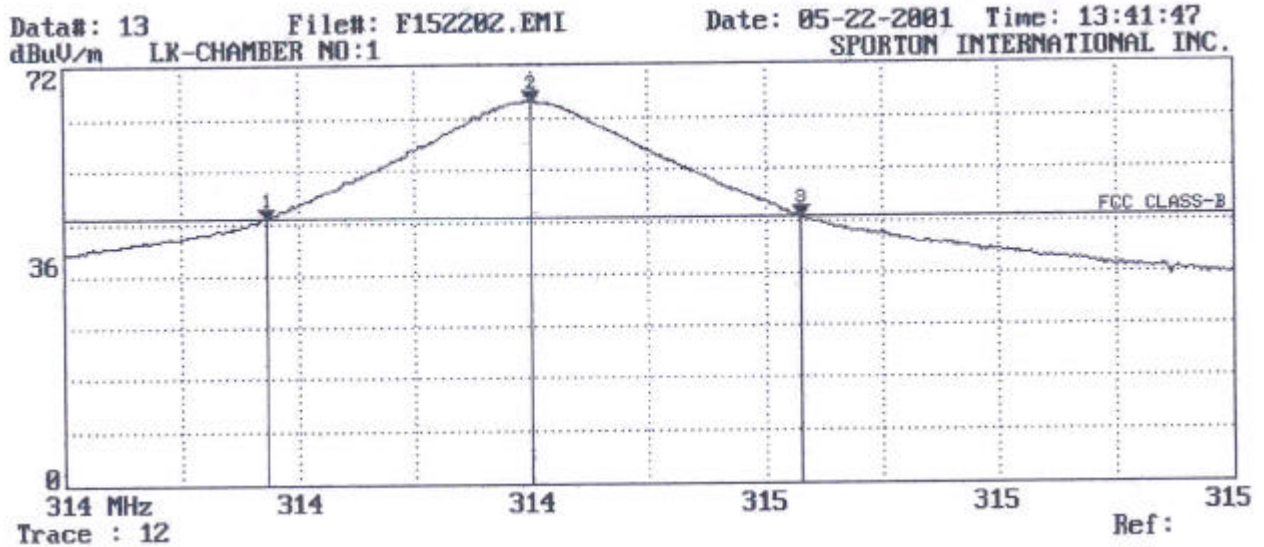
**2.3. Connection Diagram of Test System**



1. The I/O cable is connected from support unit 1 to the support unit 2.

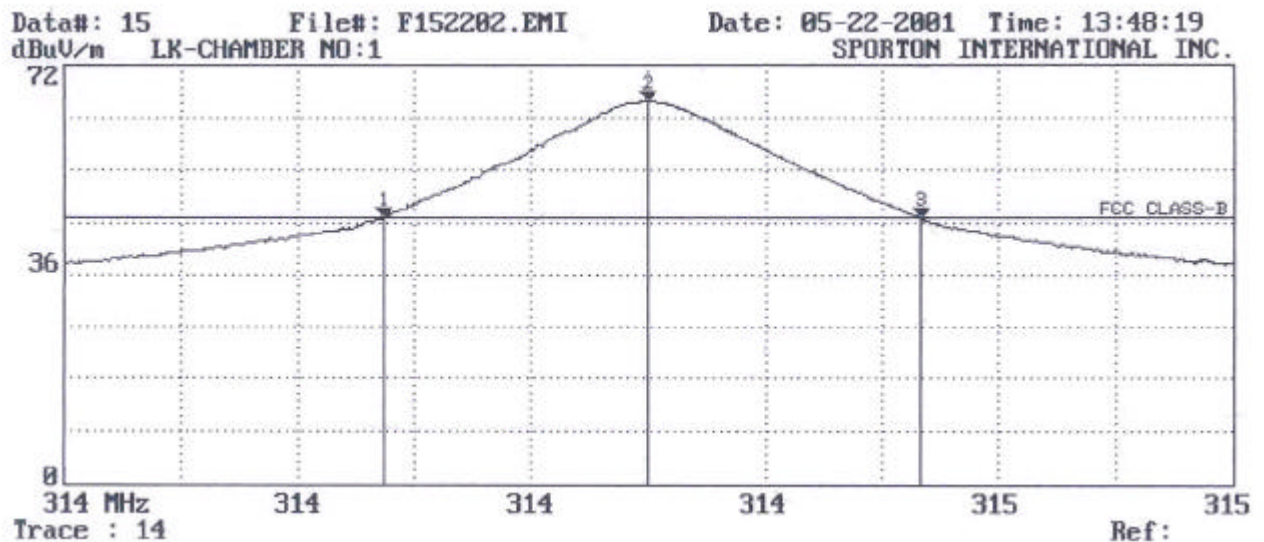
2.4. A plot shows the EUT meet the requirement of 15.231(c)

CHANNEL 4: 314.4MHz



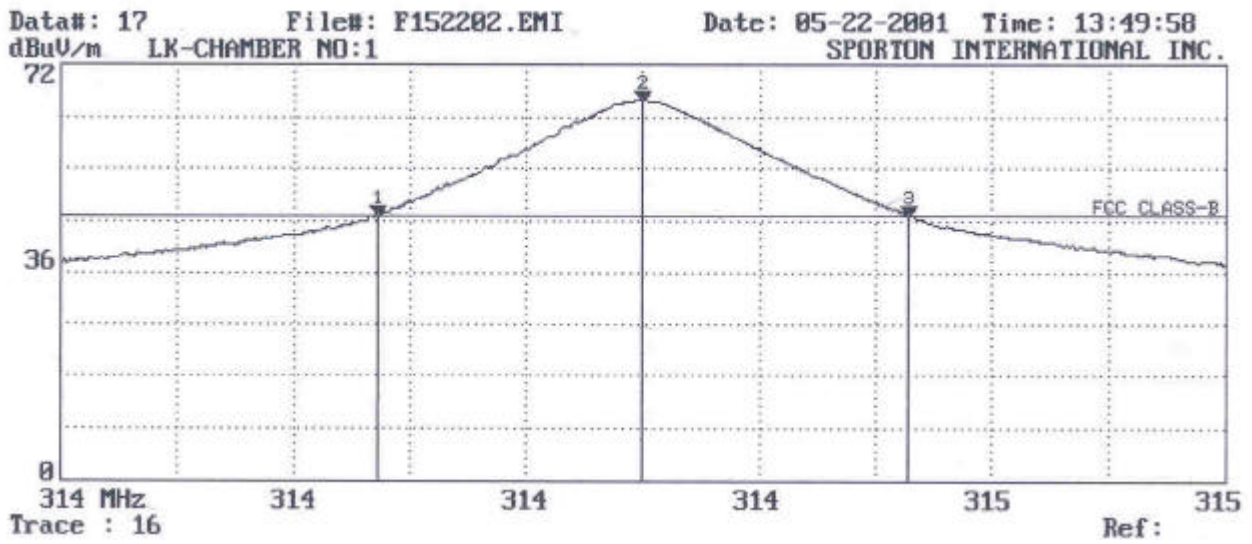
the bandwidth of the emission at the 20dB point is 458KHz

CHANNEL 3: 314.393MHz



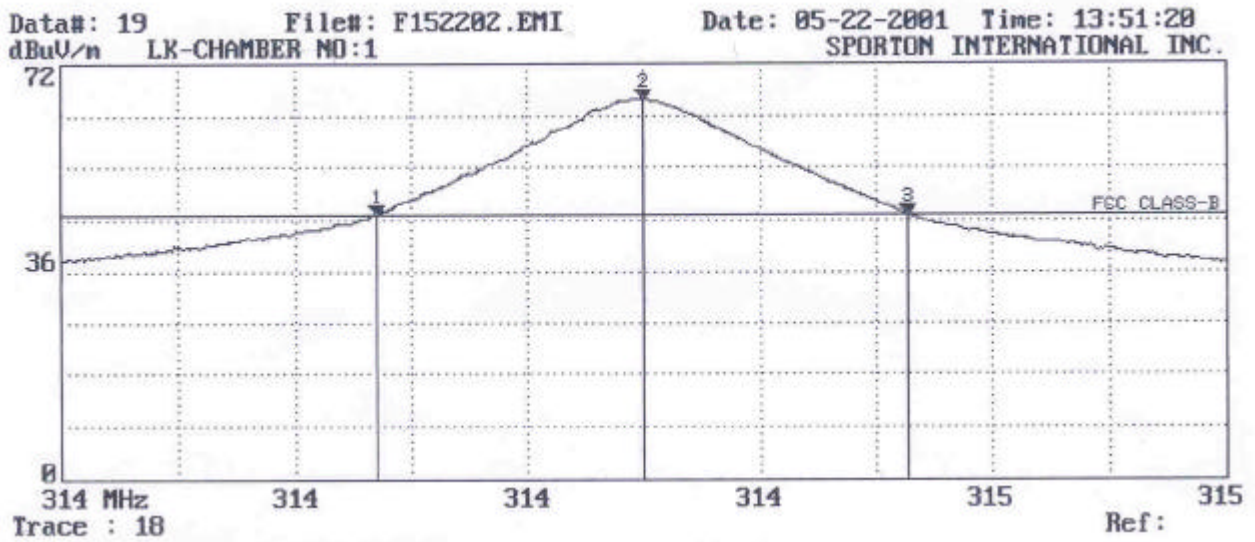
the bandwidth of the emission at the 20dB point is 460KHz

CHANNEL 2: 314.393MHz



the bandwidth of the emission at the 20dB point is 456KHz

CHANNEL 1: 314.393MHz



the bandwidth of the emission at the 20dB point is 455KHz



### **3. Test Software**

No test software was used during testing.

## **4. General Information of Test**

### **4.1. Test Facility**

This test was carried out by SPORTON International Inc.

Test Site Location : No. 30-2, Lin 6, Diing-Fwu Tsuen, Lin-Kou-Hsiang,  
Taipei Hsien, Taiwan, R.O.C.

TEL : 886-2-2601-1640

FAX : 886-2-2601-1695

### **4.2. Standard for Methods of Measurement**

ANSI C63.4-1992

### **4.3. Test in Compliance with**

FCC Part 15, Subpart C

### **4.4. Frequency Range Investigated**

- a. Conduction: from 450 kHz to 30 MHz
- b. Radiation : from 30 MHz to 3160 MHz

### **4.5. Test Distance**

The test distance of radiated emission from antenna to EUT is 3 M.

## **5. Test of Conducted Powerline**

The power supply of the EUT is from battery.

So Conducted Powerline test is not applicable to this equipment.

## 6. Test of Radiated Emission

Radiated emissions from 30 MHz to 3160 MHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

### 6.1. Major Measuring Instruments

#### 6.1.1. from 30MHz to 1GHz

<del>///</del> Amplifier	( HP 87405A )
Attenuation	0 dB
RF Gain	20 dB
Signal Input	10 MHz to 3 GHz
<del>///</del> Spectrum Analyzer	( ADVANTEST R3261C )
Attenuation	0 Db
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	9KHz to 2.6 GHz
<del>///</del> Test Receiver	( R&S ESEC30 )
Resolution Bandwidth	120 KHz
Frequency Band	9 KHz to 2.75 GHz
Quasi-Peak Detector	ON for Quasi-Peak Mode OFF for Peak Mode

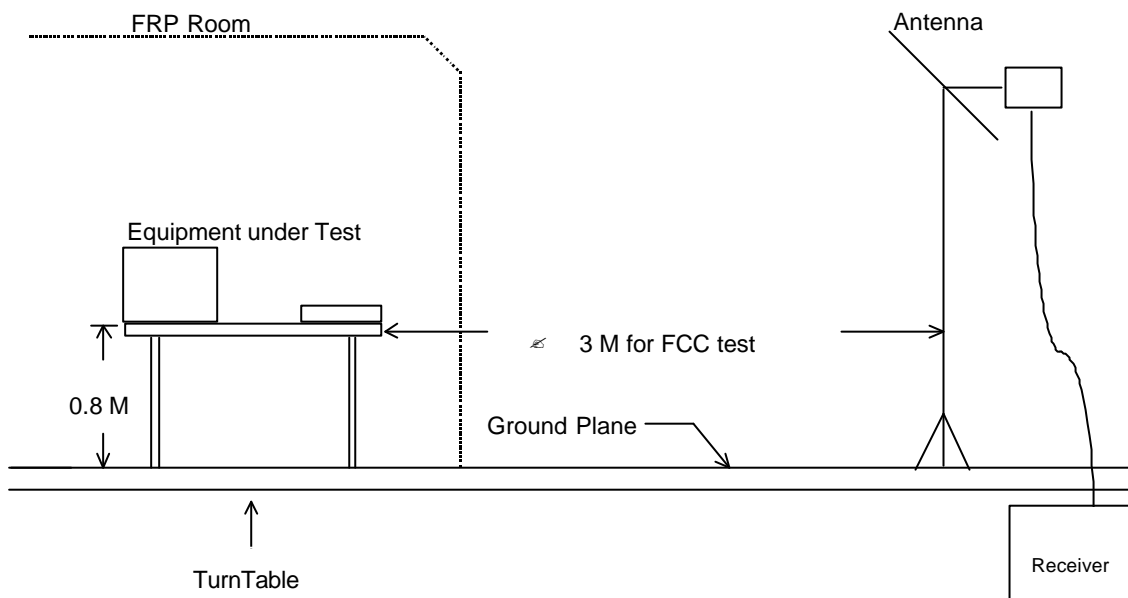
#### 6.1.2. from 1GHz to 3.16GHz

<del>///</del> Receiver	( HP 8546A )
Attenuation	0 dB
Start Frequency	1000 MHz
Stop Frequency	3160MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	9 KHz to 6.5 GHz

**6.2. Test Procedures**

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be repeated one by one using the quasi-peak method and reported.

### 6.3. Typical Test Setup Layout of Radiated Emission



**6.4. Test Result of Radiated Emission**

6.4.1. Test mode : CHANNEL 4, NORMAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**304.80 MHz / 38.79 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 55 °.**

✍ Test Distance : for 30MHz ~ 1GHz

Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
304.80	H	13.50	2.52	22.77	46.00	199.53	38.79	87.00	-7.21	Peak
591.20	H	19.03	3.78	9.26	46.00	199.53	32.07	40.13	-13.93	Peak
888.80	H	19.73	5.08	6.67	46.00	199.53	31.48	37.50	-14.52	Peak
914.40	H	20.11	5.14	5.69	46.00	199.53	30.94	35.24	-15.06	Peak
930.40	H	20.84	5.08	7.53	46.00	199.53	33.45	47.04	-12.55	Peak
590.40	V	19.02	3.78	9.17	46.00	199.53	31.97	39.67	-14.03	Peak

Fundamental Frequency and Spurious Emissions :

Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	43.58	75.60	6025.60	59.92	990.83	-15.68	Q.P.
629.00	H	19.11	3.91	1.51	55.60	602.56	24.53	16.85	-31.07	Q.P.
314.50	V	13.77	2.57	23.25	75.60	6025.60	39.59	95.39	-36.01	Q.P.
629.00	V	19.11	3.91	5.68	55.60	602.56	28.70	27.23	-26.90	Q.P.

✍ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer : 

Benny Lee

6.4.2. Test mode : CHANNEL 4, HORIZONTAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**303.20 MHz / 37.18 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 43 °.**

✍ Test Distance : for 30MHz ~ 1GHz

Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
303.20	H	13.48	2.52	21.18	46.00	199.53	37.18	72.28	-8.82	Peak
590.40	H	19.02	3.78	7.51	46.00	199.53	30.31	32.77	-15.69	Peak
884.80	H	19.83	5.05	4.33	46.00	199.53	29.21	28.87	-16.79	Peak
930.40	H	20.84	5.08	5.70	46.00	199.53	31.62	38.11	-14.38	Peak
593.60	V	19.06	3.79	6.50	46.00	199.53	29.35	29.34	-16.65	Peak
917.60	V	20.25	5.13	2.94	46.00	199.53	28.32	26.06	-17.68	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	31.58	75.60	6025.60	47.92	248.89	-27.68	Q.P.
629.00	H	19.11	3.91	2.35	55.60	602.56	25.37	18.56	-30.23	Q.P.
314.50	V	13.77	2.57	33.42	75.60	6025.60	49.76	307.61	-25.84	Q.P.
629.00	V	19.11	3.91	3.51	55.60	602.56	26.53	21.21	-29.07	Q.P.

✍ Test Distance : 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer : 

Benny Lee



6.4.3. Test mode : CHANNEL 4, VERTICAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**302.40 MHz / 38.06 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 52 °.**

✍ Test Distance : for 30MHz ~ 1GHz

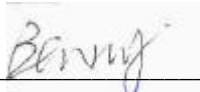
Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
302.40	H	13.48	2.51	22.07	46.00	199.53	38.06	79.98	-7.94	Peak
592.80	H	19.05	3.78	9.17	46.00	199.53	32.00	39.81	-14.00	Peak
932.80	H	20.98	5.07	6.87	46.00	199.53	32.92	44.26	-13.08	Peak
588.80	V	19.00	3.78	8.34	46.00	199.53	31.12	35.97	-14.88	Peak
618.40	V	19.12	3.87	6.50	46.00	199.53	29.49	29.82	-16.51	Peak
929.60	V	20.79	5.08	3.79	46.00	199.53	29.66	30.41	-16.34	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	30.28	75.60	6025.60	46.62	214.29	-28.98	Q.P.
629.00	H	19.11	3.91	2.68	55.60	602.56	25.70	19.28	-29.90	Q.P.
314.50	V	13.77	2.57	32.42	75.60	6025.60	48.76	274.16	-26.84	Q.P.
629.00	V	19.11	3.91	5.93	55.60	602.56	28.95	28.02	-26.65	Q.P.

✍ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer : 

Benny Lee

6.4.4. Test mode : CHANNEL 3, NORMAL MODE

- ~~/~~ Test Distance : 3 M
- ~~/~~ Temperature : 26°C
- ~~/~~ Relative Humidity : 63 %
- ~~/~~ Test Date : May 21, 2001
- ~~/~~ Emission level (dBuV/m) = 20 log Emission level (uV/m)
- ~~/~~ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**304.80 MHz / 38.62 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 50 °.**

~~/~~ Test Distance : for 30MHz ~ 1GHz

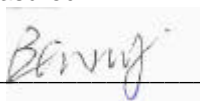
Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
304.80	H	13.50	2.52	22.60	46.00	199.53	38.62	85.31	-7.38	Peak
588.00	H	18.99	3.77	7.85	46.00	199.53	30.61	33.92	-15.39	Peak
888.00	H	19.73	5.08	5.34	46.00	199.53	30.15	32.17	-15.85	Peak
592.00	V	19.03	3.78	9.01	46.00	199.53	31.82	38.99	-14.18	Peak
888.80	V	19.73	5.08	4.00	46.00	199.53	28.81	27.57	-17.19	Peak
930.40	V	20.84	5.08	3.70	46.00	199.53	29.62	30.27	-16.38	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	43.58	75.60	6025.60	59.92	990.83	-15.68	Q.P.
629.00	H	19.11	3.91	1.18	55.60	602.56	24.20	16.22	-31.40	Q.P.
314.50	V	13.77	2.57	23.58	75.60	6025.60	39.92	99.08	-35.68	Q.P.
629.00	V	19.11	3.91	5.35	55.60	602.56	28.37	26.21	-27.23	Q.P.

~~/~~ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
Benny Lee

6.4.5. Test mode : CHANNEL 3, HORIZONTAL MODE

- ~~/~~ Test Distance : 3 M
- ~~/~~ Temperature : 26°C
- ~~/~~ Relative Humidity : 63 %
- ~~/~~ Test Date : May 21, 2001
- ~~/~~ Emission level (dBuV/m) = 20 log Emission level (uV/m)
- ~~/~~ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**304.00 MHz / 38.26 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 47 °.**

~~/~~ Test Distance : for 30MHz ~ 1GHz

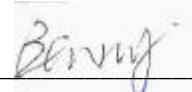
Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
304.00	H	13.48	2.52	22.26	46.00	199.53	38.26	81.85	-7.74	Peak
590.40	H	19.02	3.78	6.68	46.00	199.53	29.48	29.79	-16.52	Peak
884.00	H	19.85	5.04	3.50	46.00	199.53	28.39	26.27	-17.61	Peak
931.20	H	20.89	5.07	4.53	46.00	199.53	30.49	33.46	-15.51	Peak
592.00	V	19.03	3.78	6.85	46.00	199.53	29.66	30.41	-16.34	Peak
887.20	V	19.75	5.07	3.18	46.00	199.53	28.00	25.12	-18.00	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	31.75	75.60	6025.60	48.09	253.80	-27.51	Q.P.
629.00	H	19.11	3.91	3.01	55.60	602.56	26.03	20.02	-29.57	Q.P.
314.50	V	13.77	2.57	34.25	75.60	6025.60	50.59	338.45	-25.01	Q.P.
629.00	V	19.11	3.91	8.01	55.60	602.56	31.03	35.60	-24.57	Q.P.

~~/~~ Test Distance : 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
 Benny Lee

6.4.6. Test mode : CHANNEL 3, VERTICAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**300.80 MHz / 38.17 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 60 °.**

✍ Test Distance : for 30MHz ~ 1GHz

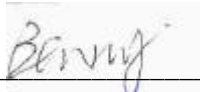
Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
300.80	H	13.40	2.50	22.27	46.00	199.53	38.17	81.00	-7.83	Peak
588.80	H	19.00	3.78	8.17	46.00	199.53	30.95	35.28	-15.05	Peak
888.00	H	19.73	5.08	5.34	46.00	199.53	30.15	32.17	-15.85	Peak
916.80	H	20.20	5.13	4.52	46.00	199.53	29.85	31.08	-16.15	Peak
932.80	H	20.98	5.07	5.87	46.00	199.53	31.92	39.45	-14.08	Peak
590.40	V	19.02	3.78	8.17	46.00	199.53	30.97	35.36	-15.03	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	37.25	75.60	6025.60	53.59	478.08	-22.01	Q.P.
629.00	H	19.11	3.91	2.85	55.60	602.56	25.87	19.66	-29.73	Q.P.
314.50	V	13.77	2.57	32.08	75.60	6025.60	48.42	263.63	-27.18	Q.P.
629.00	V	19.11	3.91	6.01	55.60	602.56	29.03	28.28	-26.57	Q.P.

✍ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
Benny Lee

6.4.7. Test mode : CHANNEL 2, NORMAL MODE

- ~~/~~ Test Distance : 3 M
- ~~/~~ Temperature : 26°C
- ~~/~~ Relative Humidity : 63 %
- ~~/~~ Test Date : May 21, 2001
- ~~/~~ Emission level (dBuV/m) = 20 log Emission level (uV/m)
- ~~/~~ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**303.20 MHz / 39.01 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 320 °.**

~~/~~ Test Distance : for 30MHz ~ 1GHz

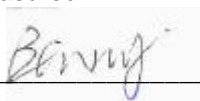
Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
303.20	H	13.48	2.52	23.01	46.00	199.53	39.01	89.23	-6.99	Peak
590.40	H	19.02	3.78	9.35	46.00	199.53	32.15	40.50	-13.85	Peak
884.80	H	19.83	5.05	5.33	46.00	199.53	30.21	32.40	-15.79	Peak
929.60	H	20.79	5.08	6.54	46.00	199.53	32.41	41.73	-13.59	Peak
591.20	V	19.03	3.78	8.76	46.00	199.53	31.57	37.89	-14.43	Peak
886.40	V	19.78	5.07	4.99	46.00	199.53	29.84	31.05	-16.16	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	44.08	75.60	6025.60	60.42	1049.54	-15.18	Q.P.
629.00	H	19.11	3.91	1.68	55.60	602.56	24.70	17.18	-30.90	Q.P.
314.50	V	13.77	2.57	25.08	75.60	6025.60	41.42	117.76	-34.18	Q.P.
629.00	V	19.11	3.91	4.18	55.60	602.56	27.20	22.91	-28.40	Q.P.

~~/~~ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
Benny Lee

6.4.8. Test mode : CHANNEL 2, HORIZONTAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**302.40 MHz / 38.23 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 45 °.**

✍ Test Distance : for 30MHz ~ 1GHz

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
302.40	H	13.45	2.51	22.27	46.00	199.53	38.23	81.56	-7.77	Peak
589.60	H	19.01	3.78	6.09	46.00	199.53	28.88	27.80	-17.12	Peak
884.00	H	19.85	5.04	3.34	46.00	199.53	28.23	25.79	-17.77	Peak
302.40	V	13.45	2.51	10.60	46.00	199.53	26.56	21.28	-19.44	Peak
589.60	V	19.01	3.78	7.00	46.00	199.53	29.79	30.87	-16.21	Peak
884.80	V	19.83	5.05	2.99	46.00	199.53	27.87	24.75	-18.13	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	31.58	75.60	6025.60	47.92	248.89	-27.68	Q.P.
629.00	H	19.11	3.91	2.01	55.60	602.56	25.03	17.84	-30.57	Q.P.
314.50	V	13.77	2.57	34.25	75.60	6025.60	50.59	338.45	-25.01	Q.P.
629.00	V	19.11	3.91	5.35	55.60	602.56	28.37	26.21	-27.23	Q.P.

✍ Test Distance : 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer : 

Benny Lee

6.4.9. Test mode : CHANNEL 2, VERTICAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**303.20 MHz / 38.18 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 50 °.**

✍ Test Distance : for 30MHz ~ 1GHz

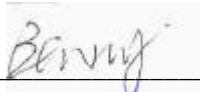
Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
303.20	H	13.48	2.52	22.18	46.00	199.53	38.18	81.10	-7.82	Peak
589.60	H	19.01	3.78	7.75	46.00	199.53	30.54	33.65	-15.46	Peak
884.80	H	19.83	5.05	4.33	46.00	199.53	29.21	28.87	-16.79	Peak
302.40	V	13.45	2.51	10.77	46.00	199.53	26.73	21.70	-19.27	Peak
589.60	V	19.01	3.78	8.67	46.00	199.53	31.46	37.41	-14.54	Peak
881.60	V	19.90	5.02	4.25	46.00	199.53	29.17	28.74	-16.83	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	31.75	75.60	6025.60	48.09	253.80	-27.51	Q.P.
629.00	H	19.11	3.91	2.01	55.60	602.56	25.03	17.84	-30.57	Q.P.
314.50	V	13.77	2.57	32.25	75.60	6025.60	48.59	268.84	-27.01	Q.P.
629.00	V	19.11	3.91	4.43	55.60	602.56	27.45	23.58	-28.15	Q.P.

✍ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
Benny Lee

6.4.10. Test mode : CHANNEL 1, NORMAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**304.00 MHz / 39.76 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 45 °.**

✍ Test Distance : for 30MHz ~ 1GHz

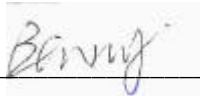
Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
304.00	H	13.48	2.52	23.76	46.00	199.53	39.76	97.27	-6.24	Peak
590.40	H	19.02	3.78	10.01	46.00	199.53	32.81	43.70	-13.19	Peak
880.00	H	19.95	5.00	7.34	46.00	199.53	32.29	41.16	-13.71	Peak
305.60	V	13.53	2.53	14.26	46.00	199.53	30.32	32.81	-15.68	Peak
593.60	V	19.06	3.79	9.25	46.00	199.53	32.10	40.27	-13.90	Peak
888.00	V	19.73	5.08	5.67	46.00	199.53	30.48	33.42	-15.52	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	48.42	75.60	6025.60	64.76	1729.82	-10.84	Q.P.
629.00	H	19.11	3.91	1.85	55.60	602.56	24.87	17.52	-30.73	Q.P.
314.50	V	13.77	2.57	29.25	75.60	6025.60	45.59	190.33	-30.01	Q.P.
629.00	V	19.11	3.91	5.01	55.60	602.56	28.03	25.21	-27.57	Q.P.

✍ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
Benny Lee



6.4.11. Test mode : CHANNEL 1, HORIZONTAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**304.00 MHz / 39.43 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 40 °.**

✍ Test Distance : for 30MHz ~ 1GHz

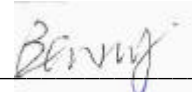
Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
304.00	H	13.48	2.52	23.43	46.00	199.53	39.43	93.65	-6.57	Peak
592.00	H	19.03	3.78	7.68	46.00	199.53	30.49	33.46	-15.51	Peak
881.60	H	19.90	5.02	6.17	46.00	199.53	31.09	35.85	-14.91	Peak
306.40	V	13.55	2.53	13.44	46.00	199.53	29.52	29.92	-16.48	Peak
592.00	V	19.03	3.78	9.35	46.00	199.53	32.16	40.55	-13.84	Peak
888.80	V	19.73	5.08	5.34	46.00	199.53	30.15	32.17	-15.85	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Antenna Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	40.92	75.60	6025.60	57.26	729.46	-18.34	Q.P.
629.00	H	19.11	3.91	1.68	55.60	602.56	24.70	17.18	-30.90	Q.P.
314.50	V	13.77	2.57	36.42	75.60	6025.60	52.76	434.51	-22.84	Q.P.
629.00	V	19.11	3.91	7.85	55.60	602.56	30.87	34.95	-24.73	Q.P.

✍ Test Distance : 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
Benny Lee

6.4.12. Test mode : CHANNEL 1, VERTICAL MODE

✍ Test Distance : 3 M

✍ Temperature : 26°C

✍ Relative Humidity : 63 %

✍ Test Date : May 21, 2001

✍ Emission level (dBuV/m) = 20 log Emission level (uV/m)

✍ Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**302.40 MHz / 38.06 dBuV (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 70 °.**

✍ Test Distance : for 30MHz ~ 1GHz

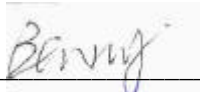
Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
303.20	H	13.48	2.52	22.18	46.00	199.53	38.18	81.10	-7.82	Peak
591.20	H	19.03	3.78	7.43	46.00	199.53	30.24	32.51	-15.76	Peak
882.40	H	19.88	5.03	4.16	46.00	199.53	29.07	28.41	-16.93	Peak
302.40	V	13.45	2.51	9.27	46.00	199.53	25.23	18.26	-20.77	Peak
588.00	V	18.99	3.77	8.85	46.00	199.53	31.61	38.06	-14.39	Peak
884.80	V	19.83	5.05	3.16	46.00	199.53	28.04	25.23	-17.96	Peak

**Fundamental Frequency and Spurious Emissions :**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	Emission ( uV/m )	Level ( dBuV/m )	Margin ( uV/m )	Detect ( dB )	Mode
314.50	H	13.77	2.57	33.08	75.60	6025.60	49.42	295.80	-26.18	Q.P.
629.00	H	19.11	3.91	3.18	55.60	602.56	26.20	20.42	-29.40	Q.P.
314.50	V	13.77	2.57	32.75	75.60	6025.60	49.09	284.77	-26.51	Q.P.
629.00	V	19.11	3.91	6.35	55.60	602.56	29.37	29.41	-26.23	Q.P.

✍ Test Distance : for 1GHz ~ 3.16GHz

Remark: Frequency from 1000MHz to 3160MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :   
Benny Lee

**7. Antenna Factor & Cable Loss**

Frequency ( Mhz )	Antenna Factor ( dB )	Cable Loss ( dB )
30	17.8	0.8
35	16.3	0.9
40	15.7	1.0
45	12.7	1.1
50	10.0	1.2
55	8.1	1.2
60	6.2	1.2
65	6.2	1.2
70	6.2	1.2
75	6.7	1.2
80	7.3	1.2
85	8.3	1.4
90	9.4	1.5
95	9.7	1.4
100	10.0	1.3
110	11.4	1.3
120	12.7	1.3
130	12.8	1.5
140	11.9	1.7
150	10.3	1.8
160	9.4	1.8
170	9.1	1.9
180	9.2	2.0
190	9.2	1.9
200	9.2	1.8
220	10.2	2.0
240	11.1	2.2
260	12.0	2.3
280	12.7	2.3
300	13.4	2.5
320	13.9	2.6
340	14.5	2.7
360	15.0	2.8
380	15.5	2.9
400	15.9	3.0
450	16.9	3.2
500	17.7	3.5
550	18.6	3.7
600	19.1	3.8
650	19.1	4.0
700	18.6	4.3
750	18.5	4.5
800	20.0	4.7
850	20.7	4.8
900	19.4	5.2
950	21.7	5.5
1000	20.1	5.5
1000	24.3	4.1
2000	28.1	5.8
3000	30.3	7.2
4000	32.8	8.6
5000	33.6	10.0

## **8. EMI Suppression Component List**

No EMI Suppression Component

**9. List of Measuring Equipments Used**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer (Site 6)	HP	8560E	3728A03186	9KHz – 2.6GHz	Sep. 15, 2000	Radiation
Receiver (Site 6)	R&S	ESCS30	847793/003	9 K – 2.75 GHz	Dec. 27, 2000	Radiation
Amplifier (Site 6)	HP	87405A	3207A01437	100K - 3GHz	Aug. 03, 2000	Radiation
Bilog Antenna (Site 6)	CHASE	CBL6112A	2442	30MHz -2GHz	Jun. 23, 2000	Radiation
Half-wave dipole antenna (Site 6)	EMCO	3121C	9705-1285	28 M - 1GHz	May 16, 2001	Radiation
Turn Table (site 6)	EMCO	2080	9711-2021	0 ? 360 degree	N/A	Radiation
Antenna Mast (site 6)	EMCO	2075	9711-2115	1 m- 4 m	N/A	Radiation
Receiver	HP	8546A	3325A00108	9KHz~6.5GHz	Dec.15, 2000	Radiation
Horn Antenna	EMCO	3115	4976	1GHz~18GHz	Jun. 21, 2000	Radiation

Calibration Interval of instruments listed above is one year.

### 10. Uncertainty of Test Site

#### Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2.5
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR ? 1=0.09 LISN VSWR ? 2=0.33 Uncertainty=20log(1-? 1*? 2)	U-shaped	0.2
<b>combined standard uncertainty Ue(y)</b>	<b>normal</b>	<b>±1.7</b>
<b>Measuring uncertainty for a level of confidence of 95% U=2Ue(y)</b>	<b>normal (k=2)</b>	<b>±3.4</b>

$$U= \{(0.3/2)^2 +(2.5^2+1.5^2+0.2^2)/3+(0.2)^2/2\}=1.7$$

#### Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m	10m
Antenna factor calibration	normal(k=2)	±1.6	±1.6
cable loss calibration	normal(k=2)	±0.3	±0.3
RCV/SPA specification	rectangular	±2.5	±2.5
Antenna Directivity	rectangular	±3	±0.5
Antenna Factor V.S. Height	rectangular	±2	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25	±0.25
site imperfection	rectangular	±2	±2
Mismatch Receiver VSWR ? 1=0.09 Antenna VSWR ? 2=0.67 Uncertainty=20log(1-? 1*? 2)	U-shaped	±0.54	±0.54
<b>combined standard uncertainty Ue(y)</b>	<b>normal</b>	<b>±2.9</b>	<b>±2.4</b>
<b>Measuring uncertainty for a level of confidence of 95% U=2Ue(y)</b>	<b>normal (k=2)</b>	<b>±5.8</b>	<b>±4.8</b>

$$U= \{(1.6/2)^2+(0.3/2)^2+(3^2+0.5^2+2^2+0.25^2+2^2)/3+(0.54)^2/2\}=2.4 \text{ for 10m test distance}$$

$$U= \{(1.6/2)^2+(0.3/2)^2+(3^2+3^2+2^2+0.25^2+2^2)/3+(0.54)^2/2\}=2.9 \text{ for 3m test distance}$$