



# EMC

## TEST REPORT

REPORT NO. : F87011413A

MODEL NO. : USB4000

DATE OF TEST : Nov. 16, 1998

FCC #101101

DEC 03 1998

PREPARED FOR : ACCTON TECHNOLOGY CORPORATION

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1.

**CERTIFICATION**

Issue Date: Nov. 19, 1998

Reference No.: 87011413

Product : USB HUB  
Trade Name : ACCTON  
Model No. : USB4000  
Applicant : ACCTON TECHNOLOGY CORPORATION  
Standard : FCC Part 15, Subpart B, Class B  
ANSI C63.4-1992  
CISPR 22: 1993 +A1+A2

We hereby certify that one sample of the designation has been tested in our facility on Nov. 16, 1998. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

The test results show that the EUT as described in this report is in compliance with the Class B limits of conducted and radiated emission of applicable standards

PREPARED BY: Rita Yi, DATE: 11/19/98  
( Rita Yi )

TESTED BY: Lance Tseng, DATE: 11/19/98  
( Lance Tseng )

APPROVED BY: Stephen W.F. Chen, DATE: 11/19/98  
( Stephen W.F. Chen )

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## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                |   |                      |
|----------------|---|----------------------|
| Product        | : | USB HUB              |
| Model No.      | : | USB4000              |
| Power Supply   | : | DC 5V (from adapter) |
| Power Cord     | : | Nonshielded (1.8m)   |
| USB Data Cable | : | Shielded (1.8m)      |

Note: The EUT is a standalone device that contains four downstream USB ports and one upstream USB port to a host or Hub. The EUT will consist of one USB Hub controller, USB port power management chips, and Line Suppressers. The device may be a bus powered HUB (draws power from USB host) or self powered with the use on an optional power supply brick.

This report is prepared for Class II Permissive Change. The main change is the followings:

1. Replace the spring finger between USB connector and PCB with EMI gasket.
2. Add following power adapter manufactured by SYN, their model names:
  - ◆ SYS1089-1305-W2
  - ◆ SYS1089-1305-W2E
  - ◆ SYS1089-1305-W3B

All added power adapters are same as each other except plug blade. So only SYS1089-1305-W2 was used to do final test.

For more detailed features, please refer to ATTACHMENT 1 - TECHNICAL DESCRIPTION OF EUT and User's Manual.



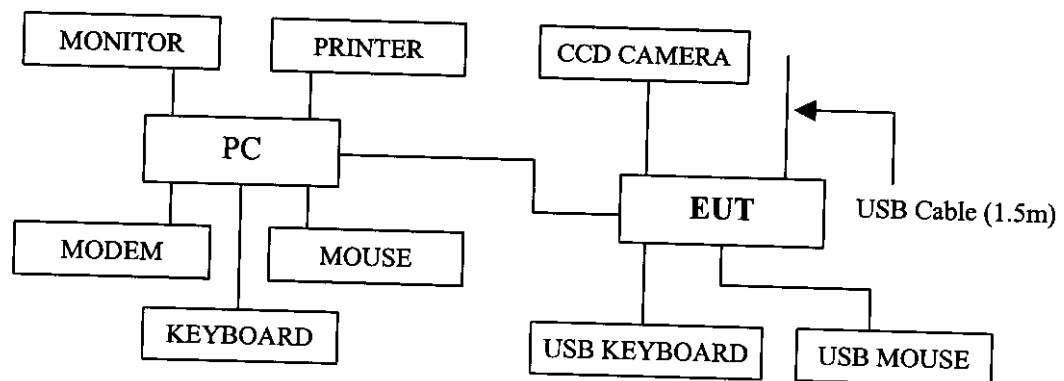
## 2.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories are used to form representative test configuration during the tests.

| No | Product           | Brand    | Model No.                         | FCC ID        | I/O Cable                                          |
|----|-------------------|----------|-----------------------------------|---------------|----------------------------------------------------|
| 1  | PERSONAL COMPUTER | HP       | VECTRA VL 5/166<br>MMX SERIES 5MT | B94VECTRA500T | Nonshielded Power (1.8m)                           |
| 2  | PRINTER           | HP       | C2642A                            | NY7961C1FQ    | Shielded Signal (1.2m)<br>Nonshielded Power (1.8m) |
| 3  | COLOR MONITOR     | ADI      | 937G                              | BR8937G       | Shielded Signal (1.5m)<br>Nonshielded Power (1.8m) |
| 4  | MODEM             | ACCEX    | 1414                              | IFAXDM1414    | Shielded Signal (1.2m)<br>Nonshielded Power (2.4m) |
| 5  | MOUSE             | LOGITECH | M-S35                             | DZL211029     | Shielded Signal (1.8m)                             |
| 6  | KEYBOARD          | FORWARD  | FDA-104GA                         | F4ZDA-104G    | Shielded Signal (1.4m)                             |
| 7  | USB KEYBOARD      | BTC      | 7932                              | E5XKBUCP10410 | Shielded Signal (1.5m)                             |
| 8  | USB MOUSE         | DEXIN    | S3U800A                           | NIYS3U800A    | Shielded Signal (1.5m)                             |
| 9  | CCD CAMERA        | COMPAQ   | YC72-CPQ                          | EDUYC72-PQ    | Shielded Signal (2.0m)                             |

Note: Item 7&9 were connected to the USB ports of EUT individually and one shielded USB cable (1.8m) was connected to the last USB device port of EUT to form open loop connection.

## 2.3 TEST METHODOLOGY AND CONFIGURATION



Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:1992. Radiated testing was performed at an antenna to EUT distance of 10m on an open area test site. Please refer to the photos of test configuration in Item 5.



### 3. TEST INSTRUMENTS

#### 3.1 TEST INSTRUMENTS (EMISSION)

##### RADIATED EMISSION MEASUREMENT

| Description & Manufacturer          | Model No.              | Serial No.  | Calibrated Until |
|-------------------------------------|------------------------|-------------|------------------|
| HP Spectrum Analyzer                | 8594E                  | 3710A04861  | Sept. 14, 1999   |
| CHASE RF Pre Amplifier              | CPA92320               | 1001        | June 01, 1999    |
| ROHDE & SCHWARZ<br>Test Receiver    | ESVS 10                | 846285/012  | Dec. 12, 1998    |
| CHASE Broadband Antenna             | CBL6112A               | 2343        | June 24, 1999    |
| ROHDE & SCHWARZ<br>Precision Dipole | HZ-12<br>(30~300MHz)   | 846932/0003 | June 06, 2000    |
| ROHDE & SCHWARZ<br>Precision Dipole | HZ-13<br>(300~1000MHz) | 846556/0007 | June 17, 2000    |
| HP Signal Generator                 | 8657A                  | 3225A05037  | Sep. 17, 1999    |
| EMCO Antenna Tower                  | 2075-2                 | 9712-2124   | N/A              |
| EMCO Turn Table                     | 2081-1.53              | 9712-2030   | N/A              |
| EMCO Controller                     | 2090                   | 9712-1283   | N/A              |
| CORCOM AC Filter                    | MRI2030                | 107/108     | N/A              |
| ANRITSU RF Switch                   | MP59B                  | M50867      | N/A              |
| BELDEN RF Signal Cable              | 9913 RG-8/U            | N/A         | N/A              |
| Open Field Test Site                | Site A                 | ADT-RA      | July 08, 1999    |

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months.  
And the calibrations are traceable to NML/ROC and NIST/USA.

##### CONDUCTED EMISSION MEASUREMENT

| Description & Manufacturer       | Model No. | Serial No. | Calibrated Until |
|----------------------------------|-----------|------------|------------------|
| ROHDE & SCHWARZ<br>Test Receiver | ESCS 30   | 847124/029 | Dec. 18, 1998    |
| ROHDE & SCHWARZ LISN             | ESHS-Z5   | 848773/004 | Nov. 25, 1998    |
| KYORITSU LISN                    | KNW-407   | 8/1395/12  | July 15, 1999    |
| Shielded Room                    | Con A     | ADT-CA     | N/A              |

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months.  
And the calibrations are traceable to NML/ROC and NIST/USA.



### 3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION

#### LIMIT OF RADIATED EMISSION OF CISPR 22

| FREQUENCY<br>(MHz) | Class A (at 10m) | Class B (at 10m) |
|--------------------|------------------|------------------|
|                    | dBuV/m           | dBuV/m           |
| 30 - 230           | 40               | 30               |
| 230 - 1000         | 47               | 37               |

#### LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz

| FREQUENCY<br>(MHz) | Class A (at 10m) |        | Class B (at 3m) |        |
|--------------------|------------------|--------|-----------------|--------|
|                    | uV/m             | dBuV/m | uV/m            | dBuV/m |
| Above 1000         | 300              | 49.5   | 500             | 54.0   |

Note: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### LIMIT OF CONDUCTED EMISSION OF CISPR 22

| FREQUENCY<br>(MHz) | Class A (dBuV) |         | Class B (dBuV) |         |
|--------------------|----------------|---------|----------------|---------|
|                    | Quasi-peak     | Average | Quasi-peak     | Average |
| 0.15 - 0.5         | 79             | 66      | 66 - 56        | 56 - 46 |
| 0.50 - 5.0         | 73             | 60      | 56             | 46      |
| 5.0 - 30.0         | 73             | 60      | 60             | 50      |

Note: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



#### 4. TEST RESULTS (EMISSION)

##### 4.1 RADIO DISTURBANCE

Frequency Range : 0.15 - 30 MHz (Conducted Emission)  
30 - 1000 MHz (Radiated Emission)  
Input Voltage : 120 Vac, 60 Hz  
Temperature : 26 °C  
Humidity : 61 %  
Atmospheric Pressure : 987 mbar

| TEST RESULT | Remarks                                                                                                                                    |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| PASS        | Minimum passing margin of conducted emission: -15.32 dB at 0.153 MHz<br>Minimum passing margin of radiated emission: -2.1 dB at 192.01 MHz |

##### 4.1.1 EUT OPERATION CONDITION

1. Turn on the power of all equipments.
2. PC runs a test program to enable all functions.
3. PC reads and writes messages from FDD and HDD.
4. CCD camera captures images and sends image messages to PC via EUT.
5. PC sends image messages and "H" messages to monitor. Monitor displays image messages and "H" patterns simultaneously on screen.
6. PC sends "H" messages to modem.
7. PC sends "H" messages to printer, and the printer prints them on paper.
8. Repeat steps 3-8.



## 4.2 TEST DATA OF CONDUCTED EMISSION

EUT: USB HUBMODEL: USB40006 dB Bandwidth: 10 kHzTEST PERSONNEL: Lance Tong

| Freq.<br>[MHz] | L Level   |    | N Level   |    | Limit     |       | Margin [dB (μV)] |    |        |    |
|----------------|-----------|----|-----------|----|-----------|-------|------------------|----|--------|----|
|                | [dB (μV)] |    | [dB (μV)] |    | [dB (μV)] |       | L                |    | N      |    |
|                | QP        | AV | QP        | AV | QP        | AV    | QP               | AV | QP     | AV |
| 0.153          | 50.50     | -  | 46.20     | -  | 65.82     | 55.82 | -15.32           | -  | -19.62 | -  |
| 0.307          | 42.60     | -  | 37.90     | -  | 60.04     | 50.04 | -17.44           | -  | -22.14 | -  |
| 0.611          | 39.40     | -  | 36.50     | -  | 56.00     | 46.00 | -16.60           | -  | -19.50 | -  |
| 0.769          | 39.40     | -  | 38.10     | -  | 56.00     | 46.00 | -16.60           | -  | -17.90 | -  |
| 0.942          | 35.80     | -  | 36.40     | -  | 56.00     | 46.00 | -20.20           | -  | -19.60 | -  |
| 2.460          | 36.60     | -  | 35.30     | -  | 56.00     | 46.00 | -19.40           | -  | -20.70 | -  |

- Remarks:
1. "": Undetectable
  2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  4. The emission level of other frequencies were very low against the limit.
  5. Margin value = Emission level - Limit value

# ADT CORP. SHIELDED ROOM A CISPR 22 CLASS B

EUT: USB4000  
Test Spec: LISN : L  
Comment: 120V AC / 60Hz  
File name: EN\_22CB.SPC  
Date: 16. Nov 98 09:35

Report No.: F87011413A

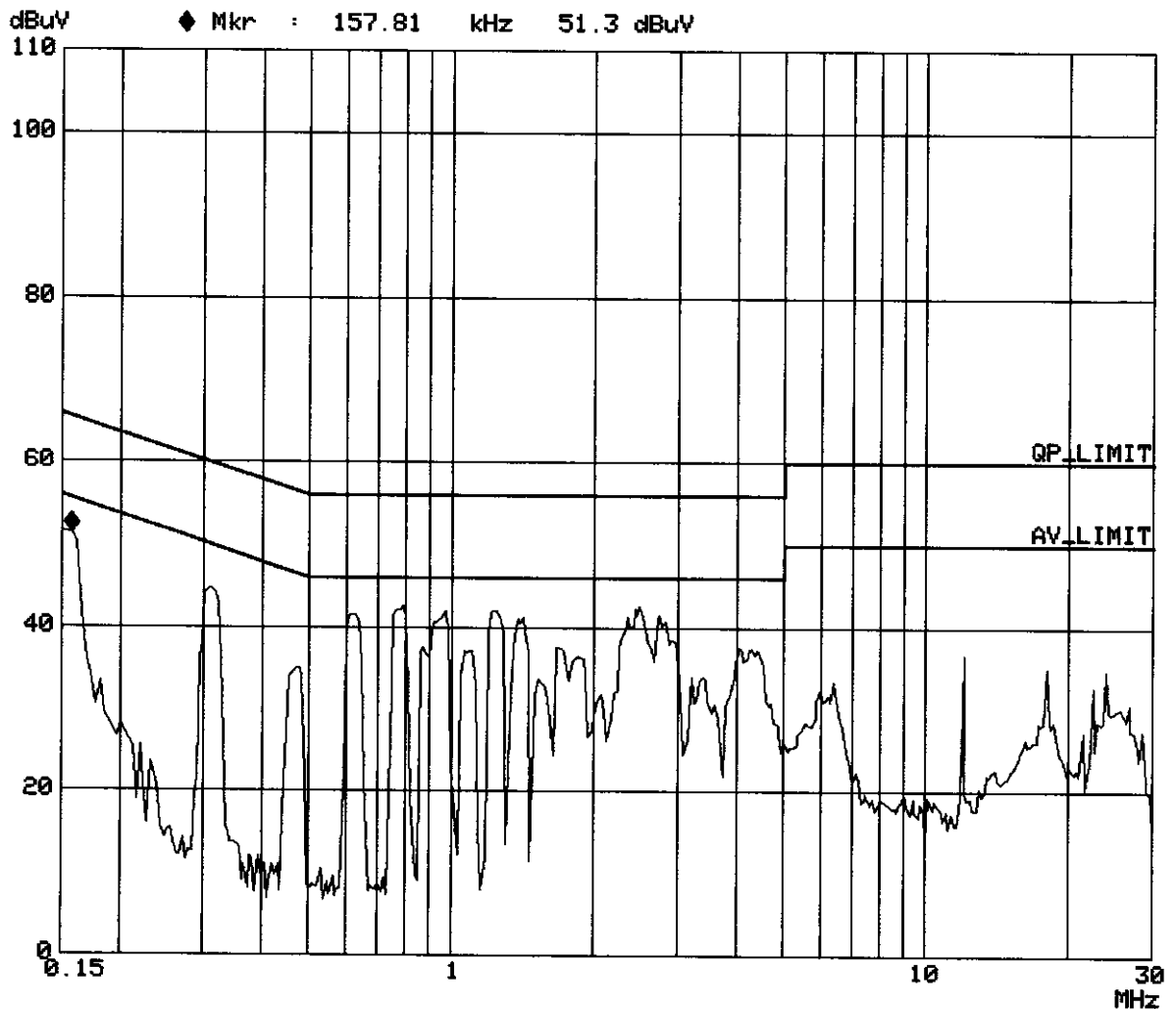
Page: 9-1

Test By: *Lance Toney*

## Overview Scan Settings (3 Ranges)

| Frequencies |      |          | Receiver Settings |          |        |        |              |
|-------------|------|----------|-------------------|----------|--------|--------|--------------|
| Start       | Stop | Step     | IF BW             | Detector | M-Time | Atten  | Preamplifier |
| 150k        | 3M   | 3.90625k | 9k                | PK       | 10ms   | 10dBLN | OFF          |
| 3M          | 10M  | 3.90625k | 9k                | PK       | 0.05ms | 10dBLN | OFF          |
| 10M         | 30M  | 3.90625k | 9k                | PK       | 0.05ms | 10dBLN | OFF          |

Transducer No. Start Stop Name  
1 150k 30M C\_CA\_01A



# ADT CORP. SHIELDED ROOM A

## CISPR 22 CLASS B

EUT: USB4000  
 Test Spec: LISN : N  
 Comment: 120V AC / 60Hz  
 File name: EN\_22CB.SPC  
 Date: 16. Nov 98 09:56

Report No.: F87011413A

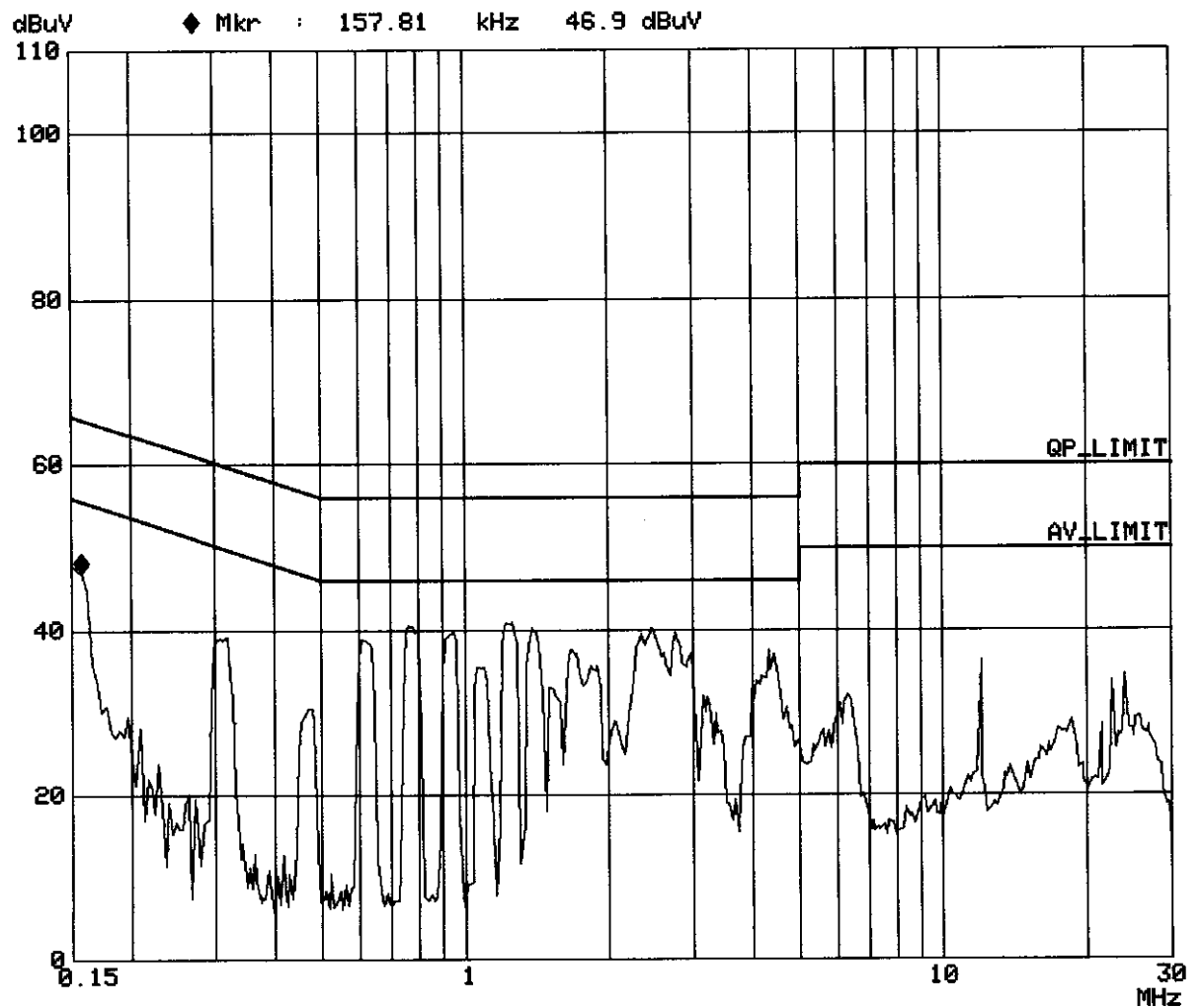
Page: 9-2

Test By: *Charles Tsen*

### Overview Scan Settings (3 Ranges)

| Frequencies |      |          | Receiver Settings |          |        |        |        |
|-------------|------|----------|-------------------|----------|--------|--------|--------|
| Start       | Stop | Step     | IF BW             | Detector | M-Time | Atten  | Preamp |
| 150k        | 3M   | 3.90625k | 9k                | PK       | 10ms   | 10dBLN | OFF    |
| 3M          | 10M  | 3.90625k | 9k                | PK       | 0.10ms | 10dBLN | OFF    |
| 10M         | 30M  | 3.90625k | 9k                | PK       | 0.10ms | 10dBLN | OFF    |

| Transducer No. | Start | Stop | Name     |
|----------------|-------|------|----------|
| 1              | 150k  | 30M  | C_CA_01A |





### 4.3 TEST DATA OF RADIATED EMISSION

EUT: USB HUBMODEL: USB4000ANTENNA: CHASE BILOG CBL6112APOLARITY: HorizontalDETECTOR FUNCTION: Quasi-peak6 dB BANDWIDTH: 120 kHzFREQUENCY RANGE: 30-1000 MHzMEASURED DISTANCE: 10 MTEST PERSONNEL: Lance Terry

| Frequency<br>(MHz) | Correction<br>Factor<br>(dB/m) | Reading<br>Data<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------|--------------------------------|---------------------------|-------------------------------|-------------------|----------------|
| 120.01             | 13.2                           | 11.2                      | 24.4                          | 30.0              | -5.6           |
| 137.47             | 12.0                           | 9.9                       | 21.9                          | 30.0              | -8.1           |
| 144.00             | 11.8                           | 12.6                      | 24.4                          | 30.0              | -5.6           |
| 144.63             | 11.8                           | 11.7                      | 23.5                          | 30.0              | -6.5           |
| 209.76             | 10.3                           | 17.4                      | 27.7                          | 30.0              | -2.3           |
| 216.02             | 10.0                           | 15.1                      | 25.1                          | 30.0              | -4.9           |

- REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) + Meter Reading (dBuV).
  2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level - Limit value

**TEST DATA OF RADIATED EMISSION**EUT: USB HUBMODEL: USB4000ANTENNA: CHASE BILOG CBL6112APOLARITY: VerticalDETECTOR FUNCTION: Quasi-peak6 dB BANDWIDTH: 120 kHzFREQUENCY RANGE: 30-1000 MHzMEASURED DISTANCE: 10 MTEST PERSONNEL: Wang Terry

| Frequency<br>(MHz) | Correction<br>Factor<br>(dB/m) | Reading<br>Data<br>dBuV | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------|--------------------------------|-------------------------|-------------------------------|-------------------|----------------|
| 61.85              | 6.5                            | 13.5                    | 20.0                          | 30.0              | -10.0          |
| 71.38              | 6.6                            | 20.5                    | 27.1                          | 30.0              | -2.9           |
| 72.21              | 6.7                            | 15.2                    | 21.9                          | 30.0              | -8.1           |
| 192.01             | 11.3                           | 16.6                    | 27.9                          | 30.0              | -2.1           |
| 216.02             | 11.2                           | 14.5                    | 25.7                          | 30.0              | -4.3           |
| 217.26             | 11.2                           | 16.0                    | 27.2                          | 30.0              | -2.8           |

- REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) + Meter Reading (dBuV).
  2. Correction Factor(dB/m) = Ant. Factor(dB/m) + Cable loss(dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level - Limit value



## 6. ATTACHMENT 1 - TECHNICAL DESCRIPTION OF EUT

### Specifications:

- Cable Wiring**
- \*  $90\Omega \pm 15\%$  Unshielded for low speed devices
  - \*  $90\Omega \pm 15\%$  Shielded for full speed devices
  - \* Wiring Topology:
    - Tiered star, point to point connection
  - \* Access Method:
    - Differential and bi-directional per USB spec 1.0
    - 12 Mbps full speed and 1.25Mbps low speed
    - The hub supports both full and low speeds
    - The hub is considered as a full speed device
  - \* Maximum Hubs in Daisy Chain:
    - 5 Hubs (six cables end to end maximum)
  - \* Maximum Devices
    - 127
- Interfaces**
- \* 4 USB A Type connectors for device ports
  - \* 1 USB B Type connector for uplink port
- Dimensions**
- \* 120mm x 96mm x 28mm (4.74" x 3.78" x 1.10")
- Hub Power Requirements**
- \* Bus-Powered
    - 2.5Watts, 5V@  $\frac{1}{2}$  amp. Via USB cable
  - \* Self-Powered
    - 11Watts, 5.25V@2.1 amps
    - via Optional Power Supply
  - \* Hub Power usage
    - 0.5Watt, 5V@1/10 amp
- Optional External 14 Watt Power Supply**
- +5.25VDC @ 2.5Amp
  - 90-140VAC or 90-240VAC 50/60hz
- Temperature**
- 0° to 50° C operating
  - 20° to 75° C Storage
- Humidity**
- 5% to 95% Non-condensing