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# FCC TEST REPORT

**REPORT NO.:** RF110303C19D  
**MODEL NO.:** SC900 (Refer to item 3.1 for more details)  
**FCC ID:** TQ2-SC900PDT-BWG  
**RECEIVED:** Jan. 31, 2012  
**TESTED:** Jul. 23 ~ Jul. 26, 2012  
**ISSUED:** Aug. 21, 2012

**APPLICANT:** Shin Chuan Computer Co., Ltd.

**ADDRESS:** 6F-2, No. 268, LianCheng Rd., Zhonghe District,  
New Taipei City 23553, Taiwan

**ISSUED BY:** Bureau Veritas Consumer Products Services  
(H.K.) Ltd., Taoyuan Branch

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,  
New Taipei City, Taiwan, R.O.C.

**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

| ISSUE NO.    | REASON FOR CHANGE | DATE ISSUED   |
|--------------|-------------------|---------------|
| RF110303C19D | Original release  | Aug. 21, 2012 |



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## 1. CERTIFICATION

**PRODUCT:** Portable Data Terminal

**MODEL NO.:** SC900 (Refer to item 3.1 for more details)

**BRAND:** SCC

**APPLICANT:** Shin Chuan Computer Co., Ltd.

**TESTED:** Jul. 23 ~ Jul. 26, 2012

**TEST SAMPLE:** ENGINEERING SAMPLE

**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)

ANSI C63.10-2009

This report is issued as a supplementary report of BV ADT report no.: **RF110303C19A** for adding model, barcode readers and data pin changing from 6pin to 10 pin. This report shall be used combining with its original report.

**PREPARED BY :** Ivy Lin , **DATE :** Aug. 21, 2012  
Ivy Lin / Specialist

**APPROVED BY :** Gary Chang , **DATE :** Aug. 21, 2012  
Gary Chang / Technical Manager

**NOTE:** The emission tests were performed for the addendum. Refer to original report for the other test data.

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C |   |        |  |
|--|---|--------|--|
| STANDARD SECTION                         | TEST TYPE AND LIMIT   | RESULT | REMARK   |
| 15.207                                   | AC Power Conducted Emission   | PASS   | Meet the requirement of limit. Minimum passing margin is -21.29dB at 0.15662MHz. |
| 15.247(a)(1) (iii)                       | Number of Hopping Frequency Used  | NA     | Refer to Note  |
| 15.247(a)(1) (iii)                       | Dwell Time on Each Channel  | NA     | Refer to Note  |
| 15.247(a)(1)                             | 1. Hopping Channel Separation<br>2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System | NA     | Refer to Note  |
| 15.247(b)                                | Maximum Peak Output Power   | NA     | Refer to Note  |
| 15.247(d)                                | Transmitter Radiated Emissions  | PASS   | Meet the requirement of limit. Minimum passing margin is -4.6dB at 45.45MHz.     |
| 15.247(d)                                | Band Edge Measurement   | NA     | Refer to Note  |
| 15.203                                   | Antenna Requirement   | PASS   | No antenna connector is used.  |

**NOTE:** The emission tests were performed for the addendum. Refer to original report for the other test data.

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT         | FREQUENCY       | UNCERTAINTY |
|---------------------|-----------------|-------------|
| Conducted emissions | 9kHz~30MHz      | 2.44 dB     |
| Radiated emissions  | 30MHz ~ 200MHz  | 3.19 dB     |
|                     | 200MHz ~1000MHz | 3.21 dB     |
|                     | 1GHz ~ 18GHz    | 2.26 dB     |
|                     | 18GHz ~ 40GHz   | 1.94 dB     |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                              |  |
|------------------------------|--|
| <b>EUT</b>                   | Portable Data Terminal   |
| <b>MODEL NO.</b>             | SC900 (Refer to Note for more details)                                 |
| <b>POWER SUPPLY</b>          | 3.7Vdc (Li-ion battery)<br>5.0Vdc (Adapter)<br>5.0Vdc (Host equipment) |
| <b>MODULATION TYPE</b>       | GFSK, $\pi/4$ -DQPSK, 8DPSK  |
| <b>MODULATION TECHNOLOGY</b> | FHSS   |
| <b>TRANSFER RATE</b>         | 1/2/3Mbps  |
| <b>OPERATING FREQUENCY</b>   | 2402 ~ 2480MHz   |
| <b>NUMBER OF CHANNEL</b>     | 79   |
| <b>MAX. OUTPUT POWER</b>     | 1.0mW  |
| <b>ANTENNA TYPE</b>          | Chip antenna with -0.5dBi gain   |
| <b>ANTENNA CONNECTOR</b>     | NA   |
| <b>I/O PORTS</b>             | 1.3m non-shielded USB cable with 2 cores                               |
| <b>DATA CABLE</b>            | Refer to user's manual   |
| <b>ACCESSORY DEVICES</b>     | Battery, Adapter,<br>Earphone (1.2m non-shielded cable)                |

#### NOTE:

1. This report is issued as a supplementary report of RF110303C19A. This report shall be combined together with its original report.
2. This report is prepared for FCC class II permissive change. Differences compared with the original report are adding model, barcode readers and data pin changing from 6pin to 10 pin.
3. The following models are provided to the EUT. (New models are marked in boldface.)

| BRAND NAME | MODEL NO.  | DIFFERENCE                   |               |
|------------|------------|------------------------------|---------------|
|            |            | USB PORT                     | EARPHONE PORT |
| SCC        | SC900      | With                         | Without       |
|            | M1000      | Without                      | With          |
| <b>SCC</b> | <b>H25</b> | <b>Based on model: SC900</b> |               |
| <b>SCC</b> | <b>CX3</b> |                              |               |
|            |            | <b>Marketing purpose</b>     |               |

4. The following barcode readers are provided to EUT.

| For model: SC900 |         |                | For model: M1000 |        |                |
|------------------|---------|----------------|------------------|--------|----------------|
| Brand            | Model   | Barcode Reader | Brand            | Model  | Barcode Reader |
| MDI              | MDI2350 | 2D image       | Motorola         | SE4500 | 2D image       |

\*After pre-testing, model: SC900 is the worst case for final test.

5. The EUT provides one completed transmitter and one receiver.

| MODULATION MODE | TX FUNCTION |
|-----------------|-------------|
| 802.11b         | 1TX         |
| 802.11g         | 1TX         |
| 802.11a         | 1TX         |

6. The EUT uses following adapter and battery.

| ADAPTER      |                             |
|--------------|-----------------------------|
| Brand        | Powertron Electronics Corp. |
| Model        | PA1008-050SI100             |
| Input Power  | 100-240Vac, 50-60Hz, 0.3A   |
| Output Power | 5Vdc, 1.0A, 5W Max.         |

| Li-ion Battery |                        |
|----------------|------------------------|
| Brand          | ETI CA                 |
| Power Rating   | 3.7Vdc, 1840mAh/ 6.8Wh |

7. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

| CHANNEL | FREQ.<br>(MHz) | CHANNEL | FREQ.<br>(MHz) | CHANNEL | FREQ.<br>(MHz) | CHANNEL | FREQ.<br>(MHz) |
|---------|----------------|---------|----------------|---------|----------------|---------|----------------|
| 0       | 2402           | 20      | 2422           | 40      | 2442           | 60      | 2462           |
| 1       | 2403           | 21      | 2423           | 41      | 2443           | 61      | 2463           |
| 2       | 2404           | 22      | 2424           | 42      | 2444           | 62      | 2464           |
| 3       | 2405           | 23      | 2425           | 43      | 2445           | 63      | 2465           |
| 4       | 2406           | 24      | 2426           | 44      | 2446           | 64      | 2466           |
| 5       | 2407           | 25      | 2427           | 45      | 2447           | 65      | 2467           |
| 6       | 2408           | 26      | 2428           | 46      | 2448           | 66      | 2468           |
| 7       | 2409           | 27      | 2429           | 47      | 2449           | 67      | 2469           |
| 8       | 2410           | 28      | 2430           | 48      | 2450           | 68      | 2470           |
| 9       | 2411           | 29      | 2431           | 49      | 2451           | 69      | 2471           |
| 10      | 2412           | 30      | 2432           | 50      | 2452           | 70      | 2472           |
| 11      | 2413           | 31      | 2433           | 51      | 2453           | 71      | 2473           |
| 12      | 2414           | 32      | 2434           | 52      | 2454           | 72      | 2474           |
| 13      | 2415           | 33      | 2435           | 53      | 2455           | 73      | 2475           |
| 14      | 2416           | 34      | 2436           | 54      | 2456           | 74      | 2476           |
| 15      | 2417           | 35      | 2437           | 55      | 2457           | 75      | 2477           |
| 16      | 2418           | 36      | 2438           | 56      | 2458           | 76      | 2478           |
| 17      | 2419           | 37      | 2439           | 57      | 2459           | 77      | 2479           |
| 18      | 2420           | 38      | 2440           | 58      | 2460           | 78      | 2480           |
| 19      | 2421           | 39      | 2441           | 59      | 2461           |         |                |



### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT<br>CONFIGURE<br>MODE | APPLICABLE TO |       |     | DESCRIPTION |
|--------------------------|---------------|-------|-----|-------------|
|                          | RE $\geq$ 1G  | RE<1G | PLC |             |
| -                        | √             | √     | √   | -           |

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission

**NOTE:**  
The EUT was positioned on **Y-plane**, based on the original worst axis.

#### RADIATED EMISSION TEST (ABOVE 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | PACKET TYPE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|-------------|
| -                        | 0 to 78              | 0                 | FHSS                     | 8DPSK              | DH5         |

#### RADIATED EMISSION TEST (BELOW 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | PACKET TYPE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|-------------|
| -                        | 0 to 78              | 39                | FHSS                     | 8DPSK              | DH5         |

#### POWER LINE CONDUCTED EMISSION TEST:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | PACKET TYPE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|-------------|
| -                        | 0 to 78              | 39                | FHSS                     | 8DPSK              | DH5         |

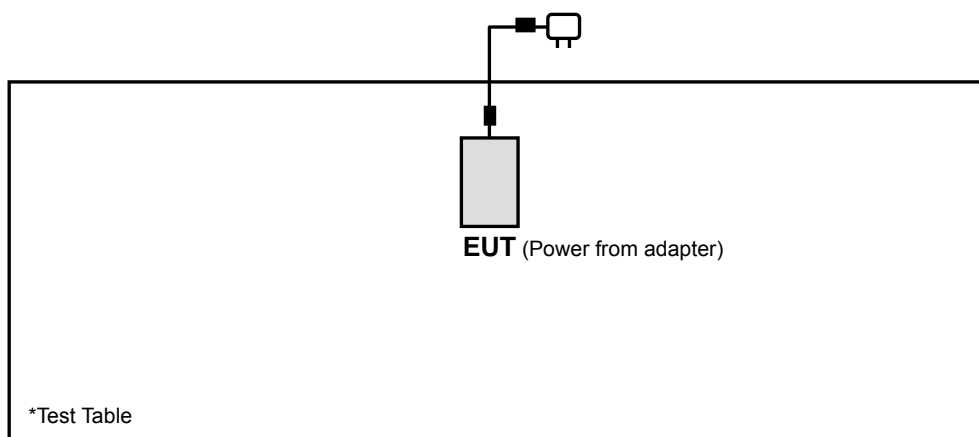
#### TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER  | TESTED BY |
|---------------|--------------------------|--------------|-----------|
| RE $\geq$ 1G  | 26deg. C, 69%RH          | 120Vac, 60Hz | Alan Wu   |
| RE<1G         | 26deg. C, 69%RH          | 120Vac, 60Hz | Alan Wu   |
| PLC           | 25deg. C, 60%RH          | 120Vac, 60Hz | Hero Su   |

### 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

#### 3.3.1 CONFIGURATION OF SYSTEM UNDER TEST



### 3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. (15.247)**

**FCC Public Notice DA 00-705**

**ANSI C63.10-2009**

All test items have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

| FREQUENCIES (MHz) | FIELD STRENGTH (microvolts/meter) | MEASUREMENT DISTANCE (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490     | $2400/F(\text{kHz})$              | 300                           |
| 0.490 ~ 1.705     | $24000/F(\text{kHz})$             | 30                            |
| 1.705 ~ 30.0      | 30                                | 30                            |
| 30 ~ 88           | 100                               | 3                             |
| 88 ~ 216          | 150                               | 3                             |
| 216 ~ 960         | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) =  $20 \log$  Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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#### 4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER                 | MODEL NO.                    | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|--|------------------------------|------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ           | ESI7                         | 838496/016 | Jan. 03, 2012       | Jan. 02, 2013           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ       | FSU43                        | 100115     | Sep. 05, 2011       | Sep. 04, 2012           |
| BILOG Antenna<br>SCHWARZBECK               | VULB9168                     | 9168-155   | Apr. 06, 2012       | Apr. 05, 2013           |
| HORN Antenna<br>SCHWARZBECK                | BBHA 9120D                   | 9120D-408  | Jan. 05, 2012       | Jan. 04, 2013           |
| HORN Antenna<br>SCHWARZBECK                | BBHA 9170                    | 148        | Jul. 11, 2012       | Jul. 10, 2013           |
| Preamplifier<br>Agilent                    | 8449B                        | 3008A01961 | Oct. 29, 2011       | Oct. 28, 2012           |
| Preamplifier<br>Agilent                    | 8447D                        | 2944A10738 | Oct. 29, 2011       | Oct. 28, 2012           |
| RF signal cable<br>HUBER+SUHNNER           | SUCOFLEX 104                 | 309220/4   | Nov. 03, 2011       | Nov. 02, 2012           |
| RF signal cable<br>HUBER+SUHNNER           | SUCOFLEX 104                 | 250724/4   | Nov. 03, 2011       | Nov. 02, 2012           |
| RF signal cable<br>HUBER+SUHNNER           | SUCOFLEX 104                 | 295012/4   | Nov. 03, 2011       | Nov. 02, 2012           |
| Software<br>ADT                            | ADT_Radiated_<br>V7.6.15.9.2 | NA         | NA                  | NA                      |
| Antenna Tower<br>inn-co GmbH               | MA 4000                      | 010303     | NA                  | NA                      |
| Antenna Tower<br>Controller<br>inn-co GmbH | CO2000                       | 019303     | NA                  | NA                      |
| Turn Table<br>ADT                          | TT100.                       | TT93021704 | NA                  | NA                      |
| Turn Table Controller<br>ADT               | SC100.                       | SC93021704 | NA                  | NA                      |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 4.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 460141.
  5. The IC Site Registration No. is IC7450F-4.

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

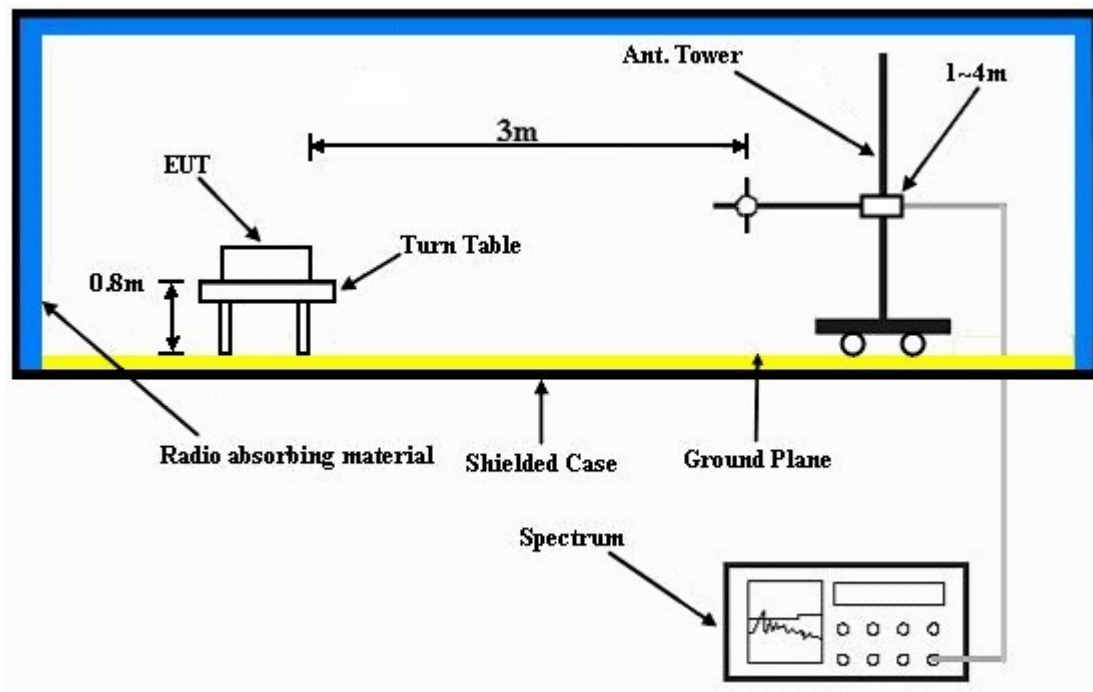
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.



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#### 4.1.7 TEST RESULTS

##### ABOVE 1GHz WORST-CASE DATA : 8DPSK

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 0       | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60Hz    | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 69%RH | TESTED BY          | Alan Wu                   |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 2390.00     | 34.1 PK                 | 74.0           | -39.9       | 1.82 H             | 323                  | 2.10             | 32.00                    |
| 2   | 2390.00     | 22.3 AV                 | 54.0           | -31.7       | 1.82 H             | 323                  | -9.70            | 32.00                    |
| 3   | #2398.00    | 39.2 PK                 | 61.1           | -21.9       | 1.82 H             | 323                  | 7.20             | 32.00                    |
| 4   | #2398.00    | 25.8 AV                 | 31.0           | -5.2        | 1.82 H             | 323                  | -6.20            | 32.00                    |
| 5   | #2400.00    | 30.5 PK                 | 61.1           | -30.6       | 1.82 H             | 323                  | -1.50            | 32.00                    |
| 6   | #2400.00    | 0.4 AV                  | 31.0           | -30.6       | 1.82 H             | 323                  | -31.60           | 32.00                    |
| 7   | *2402.00    | 81.1 PK                 |                |             | 1.82 H             | 323                  | 49.10            | 32.00                    |
| 8   | *2402.00    | 51.0 AV                 |                |             | 1.82 H             | 323                  | 19.00            | 32.00                    |
| 9   | 4804.00     | 41.7 PK                 | 74.0           | -32.3       | 1.00 H             | 17                   | 3.40             | 38.30                    |
| 10  | 4804.00     | 11.6 AV                 | 54.0           | -42.4       | 1.00 H             | 17                   | -26.70           | 38.30                    |

#### REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on  $0.625 * 5$  per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB.
7. Average value = peak reading +  $20\log(\text{duty cycle})$ .



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| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |                           |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL                  | Channel 0       | FREQUENCY RANGE    | 1 ~ 25GHz                 |
| INPUT POWER (SYSTEM)     | 120Vac, 60Hz    | DETECTOR FUNCTION  | Peak (PK)<br>Average (AV) |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 69%RH | TESTED BY          | Alan Wu                   |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 2390.00     | 36.2 PK                 | 74.0           | -37.8       | 1.16 V             | 35                   | 4.20             | 32.00                    |
| 2   | 2390.00     | 22.2 AV                 | 54.0           | -31.8       | 1.16 V             | 35                   | -9.80            | 32.00                    |
| 3   | #2398.00    | 41.1 PK                 | 64.4           | -23.3       | 1.16 V             | 35                   | 9.10             | 32.00                    |
| 4   | #2398.00    | 27.5 AV                 | 34.3           | -6.8        | 1.16 V             | 35                   | -4.50            | 32.00                    |
| 5   | #2400.00    | 30.7 PK                 | 64.4           | -33.7       | 1.16 V             | 35                   | -1.30            | 32.00                    |
| 6   | #2400.00    | 0.6 AV                  | 34.3           | -33.7       | 1.16 V             | 35                   | -31.40           | 32.00                    |
| 7   | *2402.00    | 84.4 PK                 |                |             | 1.16 V             | 35                   | 52.40            | 32.00                    |
| 8   | *2402.00    | 54.3 AV                 |                |             | 1.16 V             | 35                   | 22.30            | 32.00                    |
| 9   | 4804.00     | 42.8 PK                 | 74.0           | -31.2       | 1.00 V             | 7                    | 4.50             | 38.30                    |
| 10  | 4804.00     | 12.7 AV                 | 54.0           | -41.3       | 1.00 V             | 7                    | -25.60           | 38.30                    |

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 \* 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB.
7. Average value = peak reading +  $20\log(\text{duty cycle})$ .
8. "#": The radiated frequency is out the restricted band.



# BELOW 1GHz WORST-CASE DATA : 8DPSK

| EUT TEST CONDITION       |                 | MEASUREMENT DETAIL |               |
|--------------------------|-----------------|--------------------|---------------|
| CHANNEL                  | Channel 39      | FREQUENCY RANGE    | Below 1000MHz |
| INPUT POWER (SYSTEM)     | 120Vac, 60Hz    | DETECTOR FUNCTION  | Quasi-Peak    |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 69%RH | TESTED BY          | Alan Wu       |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 331.26      | 37.6 QP                 | 46.0           | -8.4        | 1.00 H             | 62                   | 21.00            | 16.60                    |
| 2   | 370.15      | 41.0 QP                 | 46.0           | -5.0        | 1.00 H             | 74                   | 23.40            | 17.60                    |
| 3   | 409.04      | 39.5 QP                 | 46.0           | -6.5        | 1.00 H             | 75                   | 20.80            | 18.70                    |
| 4   | 506.25      | 39.5 QP                 | 46.0           | -6.5        | 1.49 H             | 122                  | 18.30            | 21.20                    |
| 5   | 702.62      | 36.9 QP                 | 46.0           | -9.1        | 1.00 H             | 65                   | 12.50            | 24.40                    |
| 6   | 935.94      | 39.3 QP                 | 46.0           | -6.7        | 1.49 H             | 83                   | 10.30            | 29.00                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 45.45       | 35.4 QP                 | 40.0           | -4.6        | 1.24 V             | 2                    | 21.40            | 14.00                    |
| 2   | 64.90       | 32.2 QP                 | 40.0           | -7.8        | 1.24 V             | 288                  | 19.20            | 13.00                    |
| 3   | 370.15      | 37.7 QP                 | 46.0           | -8.3        | 1.49 V             | 139                  | 20.10            | 17.60                    |
| 4   | 409.04      | 40.0 QP                 | 46.0           | -6.0        | 1.49 V             | 142                  | 21.30            | 18.70                    |
| 5   | 447.92      | 39.7 QP                 | 46.0           | -6.3        | 1.49 V             | 145                  | 20.00            | 19.70                    |
| 6   | 780.40      | 34.9 QP                 | 46.0           | -11.1       | 1.24 V             | 192                  | 8.30             | 26.60                    |

## REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

## 4.2 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dBμV) |          |
|-----------------------------|------------------------|----------|
|                             | Quasi-peak             | Average  |
| 0.15 ~ 0.5                  | 66 to 56               | 56 to 46 |
| 0.5 ~ 5                     | 56                     | 46       |
| 5 ~ 30                      | 60                     | 50       |

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations 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.

### 4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER              | MODEL NO.                | SERIAL NO.     | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|--------------------------|----------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ        | ESCS30                   | 100291         | Nov. 23, 2011       | Nov. 22, 2012           |
| RF signal cable<br>Woken                | 5D-FB                    | Cable-HYC01-01 | Dec. 29, 2011       | Dec. 28, 2012           |
| LISN<br>ROHDE & SCHWARZ<br>(Peripheral) | ESH3-Z5                  | 100312         | Jul. 02, 2012       | Jul. 01, 2013           |
| LISN<br>ROHDE & SCHWARZ<br>(EUT)        | ESH3-Z5                  | 835239/001     | Feb. 07, 2012       | Feb. 06, 2013           |
| Software<br>ADT                         | BV ADT_Cond_<br>V7.3.7.3 | NA             | NA                  | NA                      |

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 TEST PROCEDURES

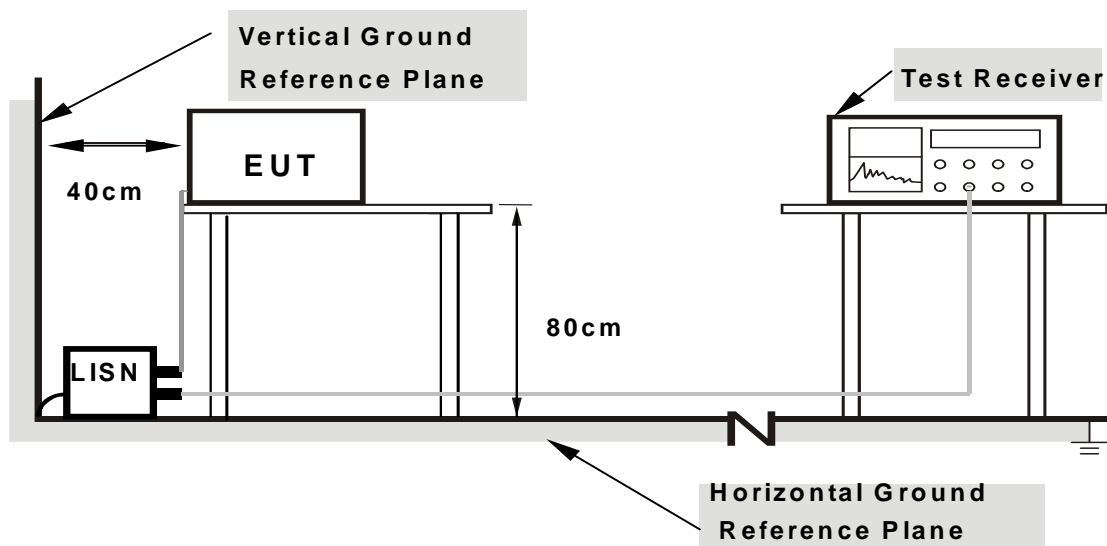
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



**Note: 1.Support units were connected to second LISN.**

**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

## 4.2.7 TEST RESULTS

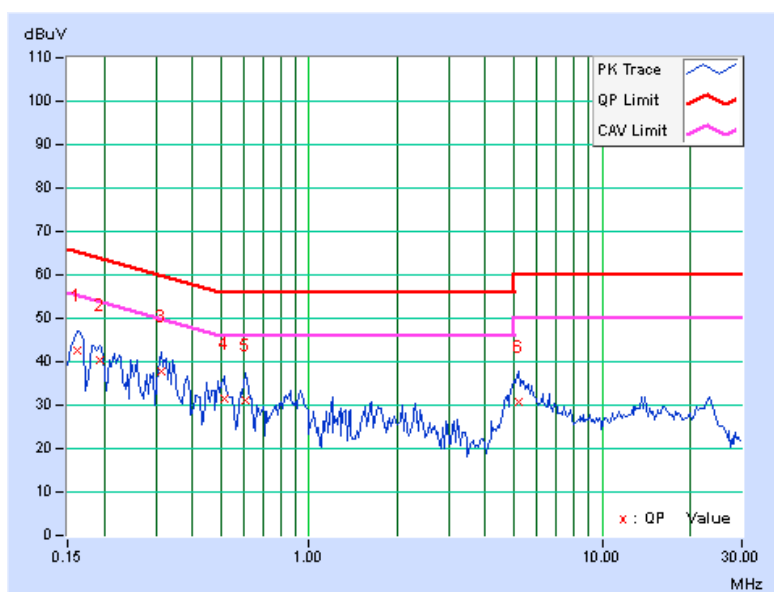
### CONDUCTED WORST-CASE DATA : 8DPSK

|       |        |               |      |
|-------|--------|---------------|------|
| PHASE | Line 1 | 6dB BANDWIDTH | 9kHz |
|-------|--------|---------------|------|

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |       | Emission Level |       | Limit     |       | Margin |        |
|----|----------------|-------------------------|---------------|-------|----------------|-------|-----------|-------|--------|--------|
|    |                |                         | [dB (uV)]     |       | [dB (uV)]      |       | [dB (uV)] |       | (dB)   |        |
|    |                |                         | Q.P.          | AV.   | Q.P.           | AV.   | Q.P.      | AV.   | Q.P.   | AV.    |
| 1  | 0.16172        | 0.16                    | 42.53         | 26.89 | 42.69          | 27.05 | 65.38     | 55.38 | -22.69 | -28.33 |
| 2  | 0.19297        | 0.22                    | 40.06         | 24.21 | 40.28          | 24.43 | 63.91     | 53.91 | -23.63 | -29.48 |
| 3  | 0.31406        | 0.19                    | 37.64         | 22.42 | 37.83          | 22.61 | 59.86     | 49.86 | -22.03 | -27.25 |
| 4  | 0.51328        | 0.17                    | 31.45         | 22.33 | 31.62          | 22.50 | 56.00     | 46.00 | -24.38 | -23.50 |
| 5  | 0.60703        | 0.18                    | 31.02         | 22.11 | 31.20          | 22.29 | 56.00     | 46.00 | -24.80 | -23.71 |
| 6  | 5.17969        | 0.39                    | 30.17         | 22.05 | 30.56          | 22.44 | 60.00     | 50.00 | -29.44 | -27.56 |

### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

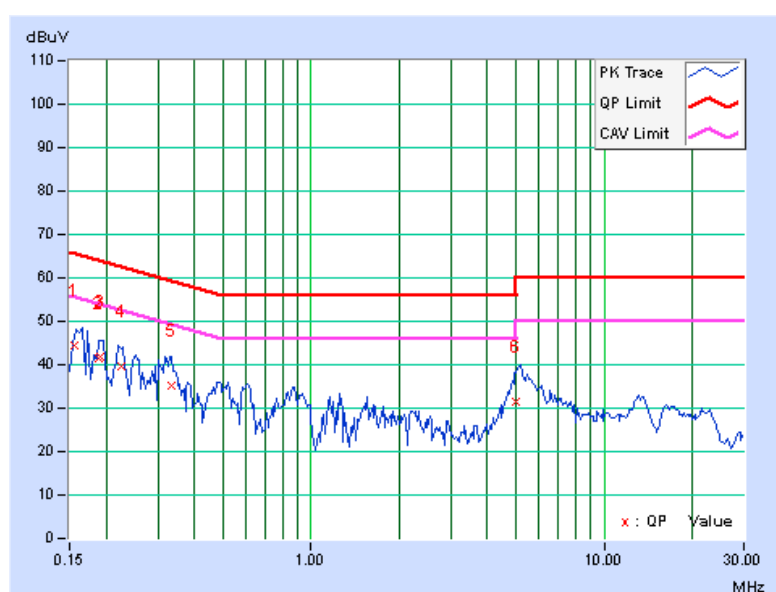


|       |        |               |      |
|-------|--------|---------------|------|
| PHASE | Line 2 | 6dB BANDWIDTH | 9kHz |
|-------|--------|---------------|------|

| No | Freq.   | Corr. Factor | Reading Value |       | Emission Level |       | Limit     |       | Margin |        |
|----|---------|--------------|---------------|-------|----------------|-------|-----------|-------|--------|--------|
|    | [MHz]   | (dB)         | [dB (uV)]     |       | [dB (uV)]      |       | [dB (uV)] |       | (dB)   |        |
|    |         |              | Q.P.          | AV.   | Q.P.           | AV.   | Q.P.      | AV.   | Q.P.   | AV.    |
| 1  | 0.15662 | 0.24         | 44.11         | 29.42 | 44.35          | 29.66 | 65.64     | 55.64 | -21.29 | -25.98 |
| 2  | 0.18906 | 0.29         | 41.23         | 25.90 | 41.52          | 26.19 | 64.08     | 54.08 | -22.55 | -27.88 |
| 3  | 0.18996 | 0.29         | 41.49         | 25.82 | 41.78          | 26.11 | 64.04     | 54.04 | -22.25 | -27.92 |
| 4  | 0.22413 | 0.30         | 39.33         | 24.09 | 39.63          | 24.39 | 62.66     | 52.66 | -23.03 | -28.27 |
| 5  | 0.33359 | 0.27         | 35.00         | 20.54 | 35.27          | 20.81 | 59.36     | 49.36 | -24.09 | -28.55 |
| 6  | 5.00000 | 0.48         | 31.16         | 24.13 | 31.64          | 24.61 | 56.00     | 46.00 | -24.36 | -21.39 |

# REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

## 6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

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**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.





A D T

## **7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**--- END ---**