# **CE EMC Test Report**

Equipment : 802.11AG Mini Compact Flash Module with

antenna connectors

Model No. : SDC-MSD30AG

Brand Name : Summit Data Communications

Applicant : Summit Data Communications Inc.

Address : 526 South Main Street Suite 805, Akron, Ohio,

44311 United States

Standard : EN 301 489-1 V1.9.2 (2011.09)

EN 301 489-17 V2.2.1 (2012-09)

Received Date : Jun. 28, 2013

Tested Date : Jul. 02 ~ Jul. 04, 2013

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Kent Chen / Assistant Manager

lac MRA



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Tel: 886-3-271-8666 Fax: 886-3-318-0155

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Report No.: EH362805 Report Version: Rev. 01



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## **Release Record**

| Report No. | Version | Description   | Issued Date   |
|------------|---------|---------------|---------------|
| EH362805   | Rev. 01 | Initial issue | Jul. 08, 2013 |

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## **Summary of Test Results**

|                     | EN 301 489-1 Immunity Tests       |  |                   |  |  |  |  |
|---------------------|-----------------------------------|--|-------------------|--|--|--|--|
| Ref. Std.<br>Clause | Test Standard                     | Description of Test                        | Pass<br>Criterion |  |  |  |  |
| 9.3                 | EN 61000-4-2:2009                 | Electrostatic Discharge (ESD)              | В                 |  |  |  |  |
| 9.2                 | EN 61000-4-3:2006/A1:2008/A2:2010 | Radio Frequency Electromagnetic Field (RS) | Α                 |  |  |  |  |

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## 1 General Description

### 1.1 Information

#### 1.1.1 Product Details

The following models are provided to this EUT.

| Model Name  | Description   | Difference         |  |  |
|---|---|--------------------|--|--|
| SDC-MSD30AG   | 802.11AG Mini Compact Flash<br>Module with antenna connectors | with carrier board |  |  |
| SDC-SSD30AG   | 802.11AG Mini Compact Flash<br>Module with antenna connectors | module only        |  |  |
| → Above models, model SDC-MSD30AG was selected as representative one for the final test and only its<br>data was recorded in this report. |   |                    |  |  |

### 1.1.2 Specification of the Equipment under Test (EUT)

| Operating Frequency | 802.11b/g: 2412 MHz ~ 2472 MHz<br>802.11a: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz |
|---------------------|---|
| Antenna Type        | Refer to section 1.1.3.   |
| Modulaton Type      | 802.11b : DSSS (DBPSK / DQPSK / CCK)<br>802.11a/g : OFDM (BPSK / QPSK / 16QAM / 64QAM)                      |

#### 1.1.3 Antenna Details

| Ant. | Model                                     | Time Composter |             | Operating Frequencies (MHz) / Antenna Gain (dBi) |           |           |           |
|------|---|----------------|-------------|--|-----------|-----------|-----------|
| No.  | wodei                                     | Туре           | Connector   | 2400~2483.5                                      | 5150~5250 | 5250~5350 | 5470~5725 |
| 1    | Cisco<br>AIR-ANT 4941                     | Dipole         | RP-TNC plug | 2  |           |           |           |
| 2    | Summit<br>SDC-CF22G                       | Chip           | U.FL        | 0  |           |           |           |
| 3    | Cisco<br>Air-Ant 5135                     | Dipole         | RP-TNC plug |  | 3.5       |           |           |
| 4    | Radiall Larsen<br>R380.500.314            | Dipole         | RP-TNC plug | 1.6  | 5         |           |           |
| 5    | Huber & Suhner<br>SOA<br>2459/360/5/0/V_C | Monopole       | U.FL        | 3  | 3 6.5     |           |           |

### 1.1.4 EUT Operational Condition

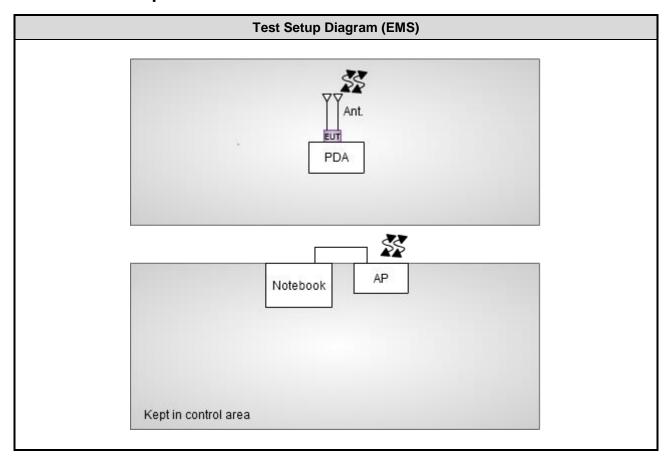
| Supply Voltage    | ☐ AC mains           | □ DC                |  |
|-------------------|----------------------|---------------------|--|
| Type of DC Source | ☐ Internal DC supply | External DC adapter |  |

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### 1.2 Local Support Equipment List

|     | Support Equipment List                         |        |                |               |  |  |
|-----|--|--------|----------------|---------------|--|--|
| No. | No. Equipment Brand Name Model Name Serial No. |        |                |               |  |  |
| 1   | PDA  | HP     | IPAQ           | HSTNH-L05C-BT |  |  |
| 2   | Notebook                                       | DELL   | Latitude E5430 | 6R4RWW1       |  |  |
| 3   | AP   | D-LINK | DIR-815        | 3000226       |  |  |

### 1.3 Test Setup Chart



## 1.4 Test Software and Operating Condition

- a. The EUT with fixture equipment connected to PDA.
- b. The PDA ran "SCU" program to enable WiFi function of EUT.
- c. The EUT linked with AP via WiFi.
- d. The notebook connected to AP via RJ45 cable.
- e. The notebook ran "ping" program to link up with EUT to transmit data via AP.

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### 1.5 Test Equipment and Calibration Data

| Test Item   | ESD                    | ESD       |            |                  |                   |  |  |
|---|------------------------|-----------|------------|------------------|-------------------|--|--|
| Test Site   | ESD room 1 / (ES01-WS) |           |            |                  |                   |  |  |
| Instrument  | Manufacturer           | Model No. | Serial No. | Calibration Date | Calibration Until |  |  |
| ESD Generator EMTest Dito V1248114239                               |                        |           |            | Dec. 05, 2012    | Dec. 04, 2013     |  |  |
| Note: Calibration Interval of instruments listed above is one year. |                        |           |            |                  |                   |  |  |

| Test Item             | Radiated Immunity (8           | 0 MHz - 6 GHz)        |            |                  |                   |  |
|-----------------------|--------------------------------|-----------------------|------------|------------------|-------------------|--|
| Test Site             | RS room 1 / (RS01-WS)          |                       |            |                  |                   |  |
| Instrument            | Manufacturer                   | Model No.             | Serial No. | Calibration Date | Calibration Until |  |
| Probe                 | ETS-Lindgren                   | HI-6105               | 00114784   | Nov.14, 2012     | Nov. 13, 2013     |  |
| Signal Generator      | R&S                            | SMB 100A              | 175727     | Jan. 14, 2013    | Jan. 13, 2014     |  |
| Power Sensor          | R&S                            | NRP-Z91               | 101094-UL  | Nov. 06, 2012    | Nov. 05, 2013     |  |
| Power Sensor          | R&S                            | NRP-Z91               | 101094-KY  | Nov. 06, 2012    | Nov. 05, 2013     |  |
| Power Amplifier       | BONN                           | BLWA<br>0810-160/100D | 107972A    | N/A              | N/A               |  |
| Power Amplifier       | BONN                           | BLWA 1060-100D        | 107972B    | N/A              | N/A               |  |
| Antenna               | SCHWARZBECK<br>MESS-ELEKTRONIK | STLP 9149             | 9149-073   | N/A              | N/A               |  |
| Antenna               | R&S                            | HL046E                | 100076-Cd  | N/A              | N/A               |  |
| UPV AUDIO<br>ANALYZER | R&S                            | UPV                   | 103144     | Jan. 30, 2013    | Jan. 29, 2014     |  |

## 1.6 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

EN 301 489-1 V1.9.2 (2011.09) EN 301 489-17 V2.2.1 (2012-09)

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## 2 Test Configuration

## 2.1 Testing Condition

| Test Item | Test Site | Ambient Condition | Tested By |
|-----------|-----------|-------------------|-----------|
| ESD       | ES01-WS   | 22°C/50%/ 97kPa   | Nick Liu  |
| RS        | RS01-WS   | 26°C/60%/ 97kPa   | JN Chen   |

## 2.2 The Worst Case Measurement Configuration

| The Worst Test Configurations   |                   |  |  |  |
|---------------------------------|-------------------|--|--|--|
| Test Mode Operating Description |                   |  |  |  |
| 1                               | Ant. 1, WLAN link |  |  |  |
| 2                               | Ant. 2, WLAN link |  |  |  |
| 3                               | Ant. 3, WLAN link |  |  |  |
| 4                               | Ant. 4, WLAN link |  |  |  |
| 5                               | Ant. 5, WLAN link |  |  |  |

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## 3 Immunity Tests

## 3.1 General Description

| Product Standard: EN 301 489-1, EN 301 489-17 |  |                      |  |  |
|---|--|----------------------|--|--|
| Basic Standard                                | Spec. Requirement  | Performance Criteria |  |  |
| EN 61000-4-2 (ESD)                            | Contact Discharge: ± 4 kV<br>Air Discharge: ± 8 kV                         | В                    |  |  |
| EN 61000-4-3 (RS)                             | 80-1000 MHz, 1400-2700 MHz<br>3 V/m, 1 kHz Sine Wave<br>80%, AM Modulation | А                    |  |  |

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#### **Performance Criteria Description** 3.2

| Performance Criteria   |   |  |  |  |
|--|---|--|--|--|
| Performance criteria for Continuous phenomena applied to Transmitters (CT) | The performance criteria A shall apply. |  |  |  |
| Performance criteria for Transient phenomena applied to Transmitters (TT)  | The performance criteria B shall apply. |  |  |  |
| Performance criteria for Continuous phenomena applied to Receivers (CR)    | The performance criteria A shall apply. |  |  |  |
| Performance criteria for Transient phenomena applied to Receivers (TR)     | The performance criteria B shall apply. |  |  |  |

|          | Performance Table   |   |  |  |  |  |  |
|----------|---|---|--|--|--|--|--|
| Criteria | During test   | After test  |  |  |  |  |  |
| А        | Shall operate as intended. May show degradation of performance (see note1). Shall be no loss of function. Shall be no unintentional transmissions.  | Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.                         |  |  |  |  |  |
| В        | May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.  | Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions. |  |  |  |  |  |
| С        | May be loss of function (one or more).  | Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).  |  |  |  |  |  |
| Note 1:  | Note 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.  If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.   |   |  |  |  |  |  |
| Note 2:  | Note 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect form the apparatus if used as intended. |   |  |  |  |  |  |

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### 3.3 Electrostatic Discharge (ESD)

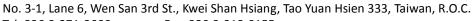
#### 3.3.1 Test Specification of Electrostatic Discharge (ESD)

| Basic Standard      | EN 61000-4-2   |
|---------------------|--|
| Discharge Voltage   | Contact Discharge: ± 2 kV / ± 4 kV<br>Air Discharge: ± 2 kV / ± 4 kV / ± 8 kV                                |
| Discharge Impedance | 330 ohm / 150 pF   |
| Number of Discharge | Air Discharge: minimum 20 times at each test point<br>Contact Discharge: minimum 20 times at each test point |
| Discharge Mode      | Single Discharge   |
| Discharge Period    | 1 second minimum   |

#### 3.3.2 Test Procedures

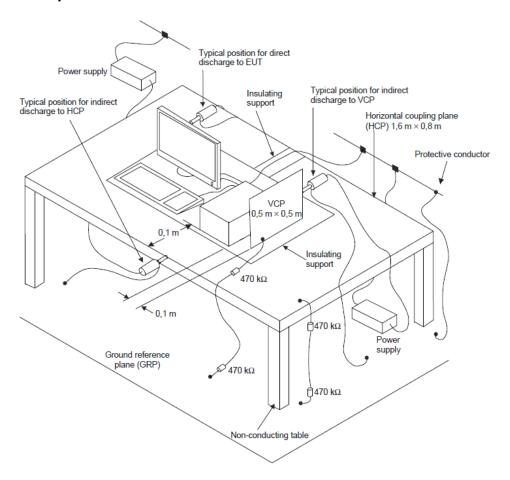
- a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
  - ambient temperature: 15°C to 35°C;
  - relative humidity: 30% to 60%;
  - atmospheric pressure: 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
- c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.
- d. The test shall be performed with both air discharge and contact discharge. On preselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On preselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on contact discharge.
- e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be determined whether a system failure has occurred.
- f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
- g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted:
  - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
  - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
  - The contact discharge test shall not be applied to such surfaces.
- h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

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#### 3.3.3 Test Setup



The test setup shall consist of a non-conductive table, (0.8  $\pm$  0.08) m high, standing on the ground reference plane.

A horizontal coupling plane (HCP), (1.6  $\pm$  0.02) m  $\times$  (0.8  $\pm$  0.02) m, shall be placed on the table. The EUT and its cables shall be isolated from the coupling plane by an insulating support (0.5  $\pm$  0.05) mm in thickness.

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### 3.3.4 Test Result of Electrostatic Discharge (ESD)

| Test Mode            | 1        |                                     |                                       |                                     |                         |
|----------------------|----------|-------------------------------------|---------------------------------------|-------------------------------------|-------------------------|
| Direct Application   |          |                                     |                                       |                                     |                         |
| Test Voltage<br>(kV) | Polarity | Test Point                          | Contact<br>Discharge                  | Air Discharge                       | Performance<br>Criteria |
| 2, 4, 8              | +/-      | 2, 3                                | N/A                                   | Note 1                              | Α                       |
| 2                    | +/-      | 1                                   | Note 1                                | N/A                                 | Α                       |
| 4                    | +/-      | 1                                   | Note 2                                | N/A                                 | В                       |
|                      |          | Indirect A                          | pplication                            |                                     |                         |
| Test Voltage<br>(kV) | Polarity | Test Point                          | Horizontal<br>Coupling Plane<br>(HCP) | Vertical<br>Coupling Plane<br>(VCP) | Performance<br>Criteria |
| 2, 4                 | +/-      | At front, rear, left and right side | Note 1                                | Note 1                              | А                       |

#### Note:

- 1) There was no abnormal situation during the test compared with initial operation.
- 2) The WLAN connection stopped during the test. After the test, the equipment continued to operate as intended without operator intervention.

| Test Mode            | 2                    |                                     |                                       |                                     |                         |
|----------------------|----------------------|-------------------------------------|---------------------------------------|-------------------------------------|-------------------------|
|                      | Indirect Application |                                     |                                       |                                     |                         |
| Test Voltage<br>(kV) | Polarity             | Test Point                          | Horizontal<br>Coupling Plane<br>(HCP) | Vertical<br>Coupling Plane<br>(VCP) | Performance<br>Criteria |
| 2, 4                 | +/-                  | At front, rear, left and right side | Note                                  | Note                                | А                       |

Note: There was no abnormal situation during the test compared with initial operation.

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| Test Mode            | 3  |                                     |                                       |                                     |                         |  |
|----------------------|--|-------------------------------------|---------------------------------------|-------------------------------------|-------------------------|--|
| Direct Application   |  |                                     |                                       |                                     |                         |  |
| Test Voltage<br>(kV) | Polarity Test Point Contact Discharge Air Discharge Performance Criteria |                                     |                                       |                                     |                         |  |
| 2, 4, 8              | +/-  | 3                                   | N/A                                   | Note 1                              | А                       |  |
| 2, 4                 | +/-  | 2                                   | Note 1                                | N/A                                 | Α                       |  |
| 2                    | +/-  | 1                                   | Note 1                                | N/A                                 | Α                       |  |
| 4                    | +/-  | 1                                   | Note 2                                | N/A                                 | В                       |  |
|                      |  | Indirect A                          | pplication                            |                                     |                         |  |
| Test Voltage<br>(kV) | Polarity   | Test Point                          | Horizontal<br>Coupling Plane<br>(HCP) | Vertical<br>Coupling Plane<br>(VCP) | Performance<br>Criteria |  |
| 2, 4                 | +/-  | At front, rear, left and right side | Note 1                                | Note 1                              | А                       |  |

#### Note:

- 1) There was no abnormal situation during the test compared with initial operation.
- 2) The WLAN connection stopped during the test. After the test, the equipment continued to operate as intended without operator intervention.

| Test Mode            | 4        |                                     |                                       |                                     |                         |
|----------------------|----------|-------------------------------------|---------------------------------------|-------------------------------------|-------------------------|
| Direct Application   |          |                                     |                                       |                                     |                         |
| Test Voltage<br>(kV) | Polarity | Test Point                          | Contact<br>Discharge                  | Air Discharge                       | Performance<br>Criteria |
| 2, 4, 8              | +/-      | 2, 3                                | N/A                                   | Note 1                              | А                       |
| 2                    | +/-      | 1                                   | Note 1                                | N/A                                 | А                       |
| 4                    | +/-      | 1                                   | Note 2                                | N/A                                 | В                       |
|                      |          | Indirect A                          | pplication                            |                                     |                         |
| Test Voltage<br>(kV) | Polarity | Test Point                          | Horizontal<br>Coupling Plane<br>(HCP) | Vertical<br>Coupling Plane<br>(VCP) | Performance<br>Criteria |
| 2, 4                 | +/-      | At front, rear, left and right side | Note 1                                | Note 1                              | А                       |

#### Note:

- 1) There was no abnormal situation during the test compared with initial operation.
- 2) The WLAN connection stopped during the test. After the test, the equipment continued to operate as intended without operator intervention.

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| Test Mode            | 5        |                                     |                                       |                                     |                         |
|----------------------|----------|-------------------------------------|---------------------------------------|-------------------------------------|-------------------------|
| Direct Application   |          |                                     |                                       |                                     |                         |
| Test Voltage (kV)    | Polarity | Test Point                          | Contact<br>Discharge                  | Air Discharge                       | Performance<br>Criteria |
| 2, 4                 | +/-      | 1, 2                                | Note                                  | N/A                                 | Α                       |
|                      |          | Indirect A                          | pplication                            |                                     |                         |
| Test Voltage<br>(kV) | Polarity | Test Point                          | Horizontal<br>Coupling Plane<br>(HCP) | Vertical<br>Coupling Plane<br>(VCP) | Performance<br>Criteria |
| 2, 4                 | +/-      | At front, rear, left and right side | Note                                  | Note                                | А                       |

Note: There was no abnormal situation during the test compared with initial operation.

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### 3.4 Radio Frequency Electromagnetic Field (RS)

#### 3.4.1 Test Specification of Radio Frequency Electromagnetic Field (RS)

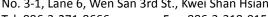
| Basic Standard      | EN 61000-4-3                            |
|---------------------|---|
| Frequency Range     | 80 MHz ~ 1000 MHz, 1400 MHz to 2700 MHz |
| Field Strength      | 3 V/m                                   |
| Modulation          | 1 kHz Sine Wave, 80%, AM Modulation     |
| Frequency Step      | 1 % of preceding frequency value        |
| Polarity of Antenna | Horizontal and Vertical                 |
| Antenna Height      | 1.5 m                                   |
| Dwell Time          | 3 seconds                               |

Note: The exclusion band for the transmitter and / or receiver part of the 2.45 GHz RLAN equipment under test shall extend from 2280 MHz to 2607.675 MHz.

#### 3.4.2 Test Procedures

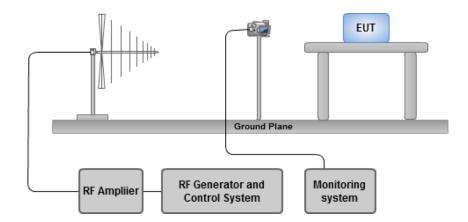
- a. The test level shall be 3 V/m (measured unmodulated). The test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1000 Hz. If the wanted signal is modulated at 1000 Hz, then an audio signal of 400 Hz shall be used.
- b. The test shall be performed over the frequency range 80 MHz to 1000 MHz & 1400MHz to 2700MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers, as appropriate.
- c. For receivers and transmitters the stepped frequency increments shall be 1 % frequency increment of the momentary used frequency, unless specified otherwise in the part of EN 301 489 series [i.13] dealing with the relevant type of radio equipment.
- d. Further product related spot frequency tests may be specified in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment.
- e. Responses on receivers occurring at discrete frequencies, which are narrow band responses, shall be disregarded from the test.
- f. The frequencies selected and used during the test shall be recorded in the test report.

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#### 3.4.3 Test Setup



Note: The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semi-anechoic chamber.

### 3.4.4 Test Result of Radio Frequency Electromagnetic Field (RS)

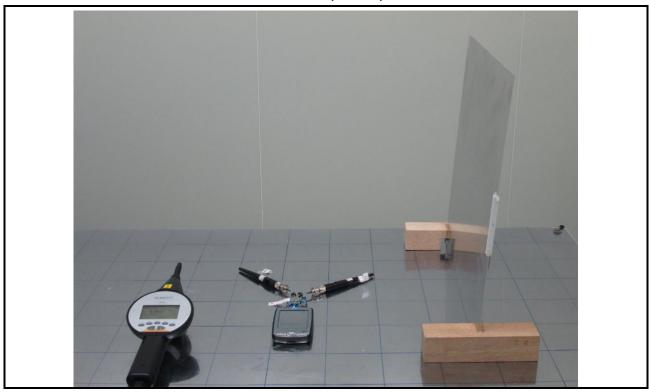
| Test Mode                | 1, 2, 3, 4, 5 |          |                              |             |                         |
|--------------------------|---------------|----------|------------------------------|-------------|-------------------------|
| Frequency<br>Range (MHz) | Azimuth       | Polarity | Test Field<br>Strength (V/m) | Observation | Performance<br>Criteria |
| 80 – 1000                | 0             | V&H      | 3                            | Note        | А                       |
| 80 – 1000                | 90            | V&H      | 3                            | Note        | А                       |
| 80 – 1000                | 180           | V&H      | 3                            | Note        | Α                       |
| 80 – 1000                | 270           | V&H      | 3                            | Note        | Α                       |
| 1400 – 2700              | 0             | V&H      | 3                            | Note        | Α                       |
| 1400 – 2700              | 90            | V&H      | 3                            | Note        | Α                       |
| 1400 – 2700              | 180           | V&H      | 3                            | Note        | А                       |
| 1400 – 2700              | 270           | V&H      | 3                            | Note        | А                       |

Note: There was no abnormal situation during the test compared with initial operation.

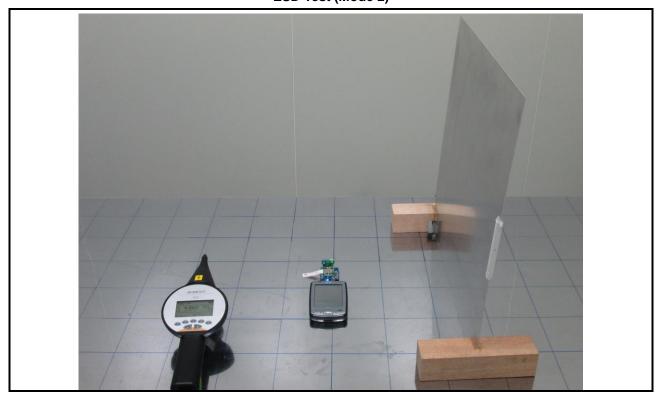
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## 4 Photographs of the Test Configuration

ESD Test (Mode 1)



ESD Test (Mode 2)



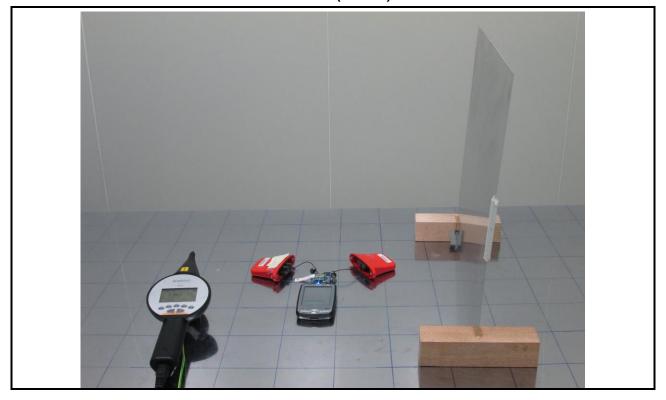
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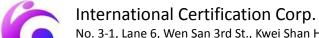
### **ESD Test (Mode 3)**



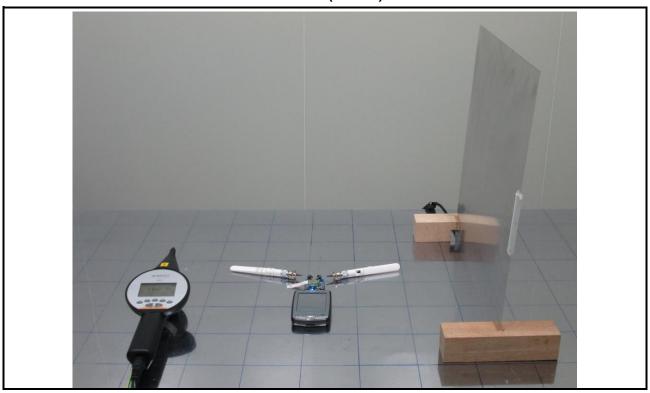
ESD Test (Mode 4)



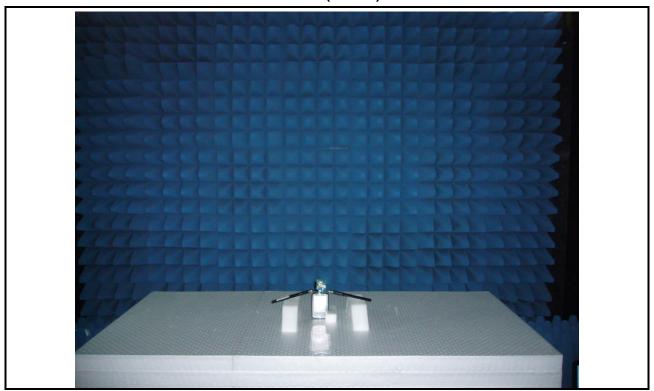
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### ESD Test (Mode 5)



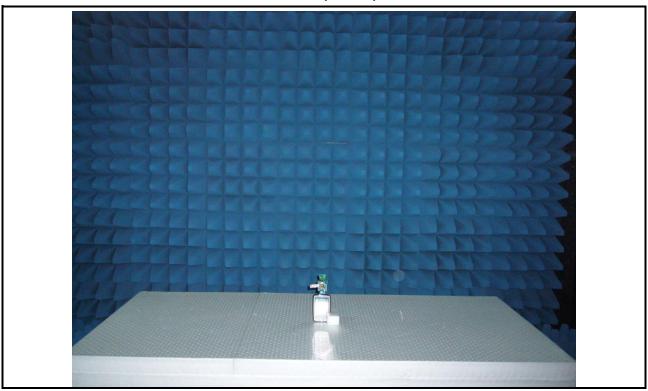
RS Test (Mode 1)



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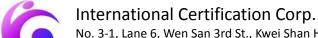
### RS Test (Mode 2)



RS Test (Mode 3)



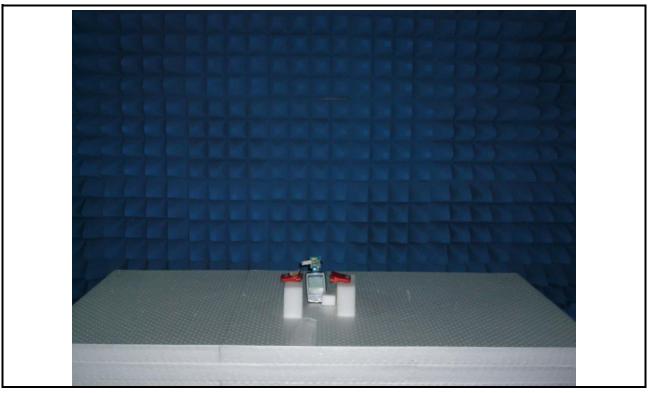
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No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

Tel: 886-3-271-8666 Fax: 886-3-318-0155

### RS Test (Mode 4)



RS Test (Mode 5)





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