# FCC Radio Test Report

## FCC ID: N9KSMARTWS210

**This report concerns (check one):** ■ **Original Grant** □ **Class II Change**

| | |
|---|---|
| **Issued Date** | : Feb. 26, 2013 |
| **Project No.** | : 1301C260 |
| **Equipment** | : Wireless GSM dialer (Smart Control) |
| **Model Name** | : WS210 |
| **Applicant** | : Smart Technologies & Investment Ltd. |
| **Address** | : Units C & D, 18/F Spectrum Tower, No. 53 Hung To Road, Kwun Tong, Kowloon, Hong Kong |

**Tested by:**
Neutron Engineering Inc. EMC Laboratory
**Date of Receipt:** Jan. 24, 2013
**Date of Test:**
Jan. 24, 2013 ~ Feb. 25, 2013

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Table of Contents Page

1 . CERTIFICATION 5
2 . SUMMARY OF TEST RESULTS 6
2.1 TEST FACILITY 7
2.2 MEASUREMENT UNCERTAINTY 7
3 . GENERAL INFORMATION 8
3.1 GENERAL DESCRIPTION OF EUT 8
3.2 DESCRIPTION OF TEST MODES 9
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING 9
3.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED 10
3.5 DESCRIPTION OF SUPPORT UNITS 11
4 . TEST RESULT 12
4.1 RADIATED RF OUTPUT POWER MEASUREMENT 12
4.1.1 LIMIT 12
4.1.2 MEASURING INSTRUMENTS AND SETTING 12
4.1.3 TEST PROCEDURE 12
4.1.4 TEST SETUP LAYOUT 13
4.1.5 TEST DEVIATION 13
4.1.6 EUT OPERATION DURING TEST 13
4.1.7 TEST RESULT OF CONDUCTED RF OUTPUT POWER 14
4.1.8 TEST RESULT OF RADIATED RF OUTPUT POWER 15
4.2 99% OCCUPIED BANDWIDTH MEASUREMENT 16
4.2.1 LIMIT 16
4.2.2 MEASURING INSTRUMENTS AND SETTING 16
4.2.3 TEST PROCEDURE 16
4.2.4 TEST SETUP LAYOUT 16
4.2.5 TEST DEVIATION 16
4.2.6 EUT OPERATION DURING TEST 16
4.2.7 TEST RESULT OF 99% OCCUPIED BANDWIDTH 17
4.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS MEASUREMENT 17
4.3.1 LIMIT 17
4.3.2 MEASURING INSTRUMENTS AND SETTING 17
4.3.3 TEST PROCEDURES 17
4.3.4 TEST SETUP LAYOUT 17
4.3.5 TEST DEVIATION 17
4.3.6 EUT OPERATION DURING TEST 17
4.3.7 TEST RESULT OF SPURIOUS EMISSIONS AT ANTENNA TERMINALS 17
4.4 SPURIOUS RADIATED EMISSIONS MEASUREMENT 17
4.4.1 LIMIT 17

Table of Contents Page

4.4.2 MEASURING INSTRUMENTS AND SETTING 17
4.4.3 TEST PROCEDURES 17
4.4.4 TEST SETUP LAYOUT 17
4.4.5 TEST DEVIATION 17
4.4.6 EUT OPERATION DURING TEST 17
4.4.7 RESULTS OF TRANSMITTER SPURIOUS EMISSIONS BELOW 1GHZ 17
4.4.8 RESULTS OF TRANSMITTER SPURIOUS EMISSIONS ABOVE 1GHZ 17
4.5 BAND EDGE MEASUREMENT 17
4.5.1 LIMIT 17
4.5.2 MEASURING INSTRUMENTS AND SETTING 17
4.5.3 TEST PROCEDURES 17
4.5.4 TEST SETUP LAYOUT 17
4.5.5 TEST DEVIATION 17
4.5.6 EUT OPERATION DURING TEST 17
4.5.7 TEST RESULTS OF BAND EDGE 17
4.6 FREQUENCY STABILITY MEASUREMENT 17
4.6.1 LIMIT 17
4.6.2 MEASURING INSTRUMENTS AND SETTING 17
4.6.3 TEST PROCEDURES 17
4.6.4 TEST SETUP LAYOUT 17
4.6.5 TEST DEVIATION 17
4.6.6 EUT OPERATION DURING TEST 17
4.6.7 RESULTS OF FREQUENCY STABILITY 17
4.8 CONDUCTED EMISSION MEASUREMENT 17
4.8.1 POWER LINE CONDUCTED EMISSION LIMITS 17
4.8.2 MEASUREMENT INSTRUMENTS LIST AND SETTING 17
4.8.3 TEST PROCEDURE 17
4.8.4 DEVIATION FROM TEST STANDARD 17
4.8.5 TEST SETUP 17
4.8.6 EUT OPERATING CONDITIONS 17
4.8.7 TEST RESULTS 17
5. LIST OF MEASUREMENT EQUIPMENTS 17
6. EUT TEST PHOTO 17

## 1. CERTIFICATION

| | | |
|---|---|---|
| Equipment | : | Wireless GSM dialer (Smart Control) |
| Brand Name | : | Smartec |
| Model Name | : | WS210 |
| Applicant | : | Chaney Instrument Co. |
| Factory | : | Smart Electronic Industrial (Dongguan) Co., Ltd. |
| Address | : | Qing Long Road, Long Jian Tian-Cun, Huang Jiang-Zhen, Dong Guan, Guang Dong, China |
| Date of Test | : | Jan. 24, 2013 ~ Feb. 25, 2013 |
| Test Item | : | ENGINEERING SAMPLE |
| Standards | : | 47 CFR FCC Part 22 Subpart H & ANSI / C63.4 : 2009<br>47 CFR FCC Part 2 & ANSI / TIA-603-C-2004 |

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-2-1301C260) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).

**Test result included in this report is only for the GSM 850MHz approval part of the product.**

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| FCC Part 22 Subpart H & Part 2 | | | | |
|---|---|---|---|---|
| Part | Standard Section | Test Item | Judgment | Remark |
| 4.1 | 2.1047(d) | Modulation Characteristics | PASS | |
| 4.2 | 2.1046/22.913(a) | Radiated RF Output | PASS | |
| 4.3 | 2.1049(h) | 99% Occupied Bandwidth | PASS | |
| 4.4 | 2.1051/22.917 | Spurious Emissions at Antenna Terminal | PASS | |
| 4.5 | 2.1053/22.917 | Spurious Radiated Emissions | PASS | |
| 4.6 | 22.917 | Band Edge Emissions | PASS | |
| 4.7 | 2.1055/22.355 | Frequency Stability | PASS | |
| 4.8 | 15.207 | Conducted Emission | PASS | |

NOTE:

(1)" N/A" denotes test is not applicable in this test report.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C02/DG-CB02** at the location of No.3,Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.523792
Neutron's test firm number is 319330

## 2.2 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:

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

A. Conducted Measurement :

| Test Site | Method | Measurement Frequency Range | U，(dB) | NOTE |
|---|---|---|---|---|
| DG-C02 | CISPR | 150 KHz ~ 30MHz | 1.94 | |

B. Radiated Measurement :

| Test Site | Method | Measurement Frequency Range | Ant. H / V | U，(dB) | NOTE |
|---|---|---|---|---|---|
| DG-CB02 | CISPR | 30MHz ~ 200MHz | V | 3.82 | |
| | | 30MHz ~ 200MHz | H | 3.60 | |
| | | 200MHz ~ 1,000MHz | V | 3.86 | |
| | | 200MHz ~ 1,000MHz | H | 3.94 | |

# 3. GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Equipment | Wireless GSM dialer (Smart Control) |
| Brand Name | Smartec |
| Model Name | WS210 |
| Model Difference | N/A |
| Product Description | The EUT is a Wireless GSM dialer (Smart Control).<br><br>Operation Frequency: TX:824.2MHz~848.8MHz RX:869.2MHz~893.8MHz<br>Modulation Type: GMSK;8PSK<br>Channel Band Width (99%): 248KHz<br>Antenna Type: Please see Note 3.<br>Conducted Output Power: GSM850: 25.85 dBm<br><br>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual. |
| Channel List | Please refer to the Note 2. |
| Power Source | #1 DC Voltage supplied from 4*AAA battery.<br>#2 DC Voltage supplied from AC/DC adapter.<br>Brand/Model name: R.S / RSS1001-143095-W2 |
| Power Rating | #1 DC 6V<br>#2 I/P: AC 100-240V~ 50/60Hz 0.4A<br>O/P: DC 9.5V 1.5A 14.25W MAX |
| Connecting I/O Port(s) | Please refer to the User's Manual |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

| Band | Channel | Frequency (MHz) | |
|---|---|---|---|
| 824.2MHz~848.8MHz | 128 | Low | 824.2 |
| | 190 | Mid | 836.6 |
| | 251 | High | 848.8 |

3. Table for Filed Antenna @GSM850

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|
| 1 | skywave | WS210B | Integral | N/A | 1.38 |

## 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Test Items | Worst TX Mode | Channel |
|---|---|---|
| Radiated RF Output | GSM | 128/190/251 |
| Spurious Radiated Emissions | GSM | 128/190/251 |
| Band Edge | GSM | 128/251 |
| Frequency Stability | GSM | 128 |
| 99% Occupied Bandwidth | GSM | 128/190/251 |
| Spurious Emissions at Antenna Terminal | GSM | 128/190/251 |

| For Conducted Emission | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | GSM(GMSK) |

Note:

(1) The measurements are performed at the high, middle, low available channels.

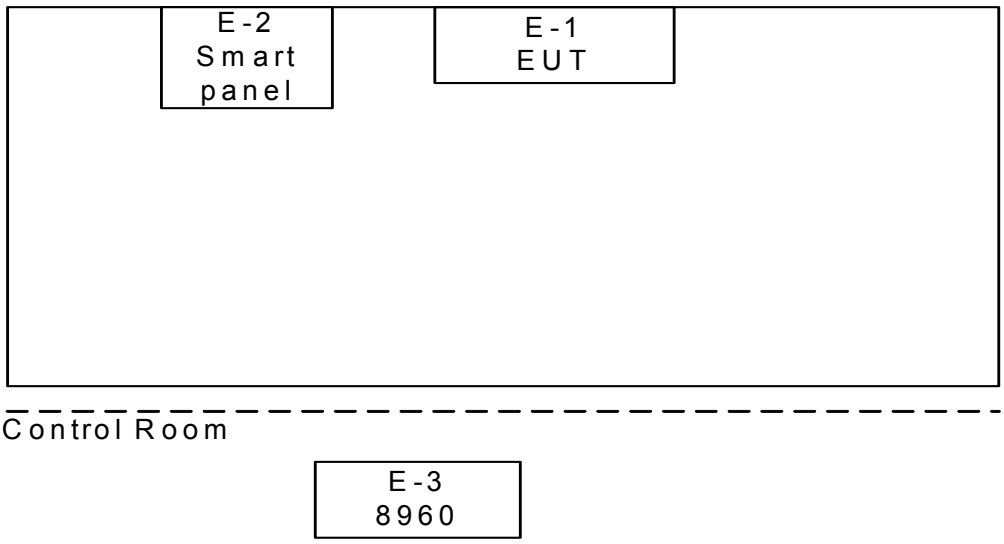
(2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

## 3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

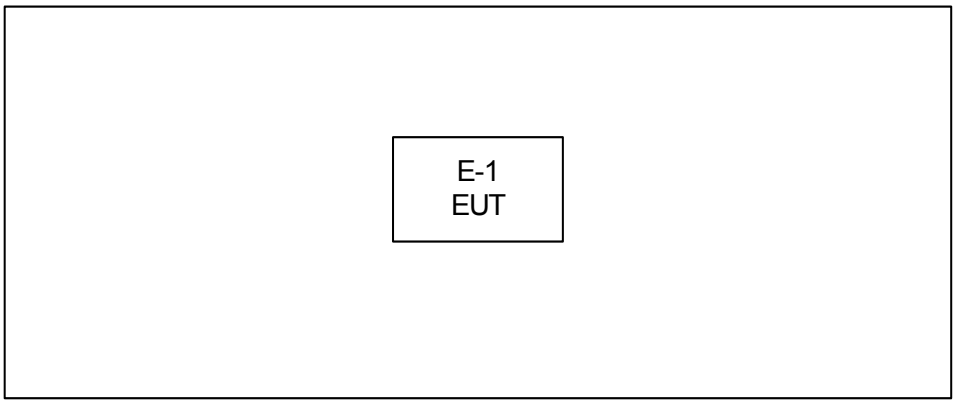
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of GSM.

### 3.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted:




Radiated:



### 3.5 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 were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. | Note |
|---|---|---|---|---|---|---|
| E-1 | Wireless GSM dialer (Smart Control) | Smartec | WS210 | N9KSMARTWS210 | N/A | EUT |
| E-2 | Smart panel | Smart | N/A | NA | NA | |
| E-3 | WIRELESS COMMUNICATION TEST SET | Agilent | 8960 SERIES 10(E5515C) | NA | GB－47390193 | |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| - | - | - | - | |

Note:

(1) For detachable type I/O cable should be specified the length in cm in『Length』column.

# 4. TEST RESULT

## 4.1 RADIATED RF OUTPUT POWER MEASUREMENT

### 4.1.1 LIMIT

The Radiated Peak Output Power shall be according to the specific rule Part 22.913(a) that "Mobile/Portable station are limited to 7 watts e.r.p." and 22.913(a) specifed that "Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.

### 4.1.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

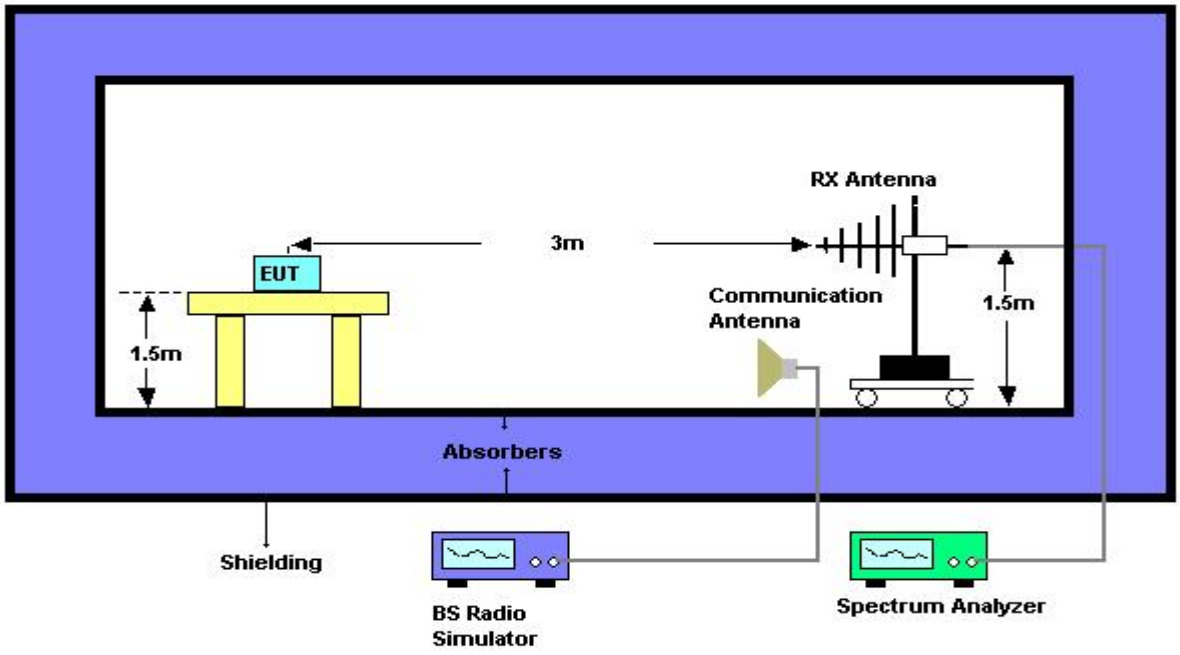
| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Center Frequency | Low / middle / high channels |
| Span Frequency | 10MHz |
| RB / VB | 3MHz / 3MHz for Peak |

### 4.1.3 TEST PROCEDURE

1. Connect the equipment with the EUT's antenna in center of the turn table.
2. Adjust the settings of the Digital Radio Communication Tester to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency.Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360 degree.Record the peak level in dBm (LVL).
5. Replace the EUT with a vertically polarized half wave dipole or know gain antenna.
   The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal genaerator with known output power and record the path loss in dB (LOSS). LOSS=Generator Output Power (dBm) –Analyzer reading (dBm).
7. Determine the ERP using the following equation:
   ERP (dBm) = LVL (dBm) + LOSS (dB)
8. Determine the EIRP using the following equation:
   EIRP (dBm) = ERP (dBm) +2.14 (dB)
9. GMSK mode mearsurements are performed in GSM 1uplink slot configuaration.

### 4.1.4 TEST SETUP LAYOUT

**ERP Power Measurement**




### 4.1.5 TEST DEVIATION

There is no deviation with the original standard.

### 4.1.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

### 4.1.7 TEST RESULT OF CONDUCTED RF OUTPUT POWER

| | | | |
|---|---|---|---|
| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Pressure: | 1010 hPa | Test Voltage: | DC 6V |
| Test Mode: | TX CH 128/190/251 | | |

| GSM 850 | Conducted Power(dBm) | | | Result |
|---|---|---|---|---|
| | Channel 128 | Channel 190 | Channel 251 | |
| GSM | **25.85** | **25.34** | **25.55** | **Complies** |

### 4.1.8 TEST RESULT OF RADIATED RF OUTPUT POWER

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Pressure: | 1010 hPa | Test Voltage: | DC 6V |
| Test Mode: | TX CH 128/190/251 | | |

**GSM 850**

| GSM 850 | ERP Power(dBm) | | | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|
| | Channel 128 | Channel 190 | Channel 251 | | |
| GSM | **24.91** | **24.55** | **24.79** | **38.45** | **Complies** |

## 4.2 99% OCCUPIED BANDWIDTH MEASUREMENT

### 4.2.1 LIMIT

According to FCC 2.1049(h) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### 4.2.2 MEASURING INSTRUMENTS AND SETTING

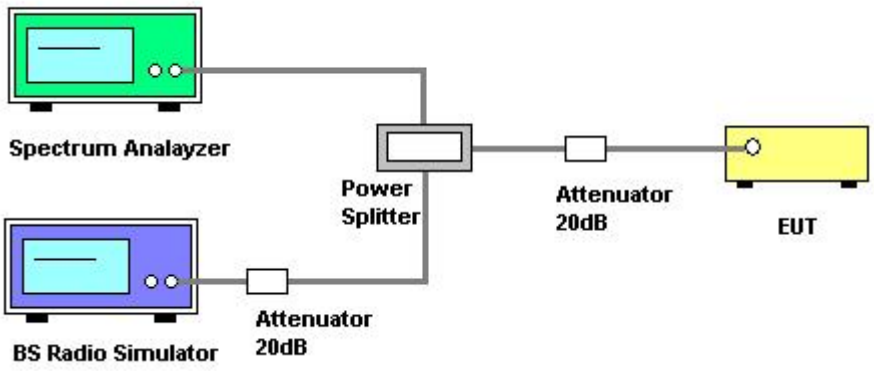
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | Encompass the entire emissions bandwidth (EBW) of the signal |
| RB | 30 kHz |
| VB | 100 kHz |
| Trace | Max Hold |

### 4.2.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Used measurement function of spectrum to measure the 99% occupied bandwidth..

### 4.2.4 TEST SETUP LAYOUT




### 4.2.5 TEST DEVIATION

There is no deviation with the original standard.

### 4.2.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

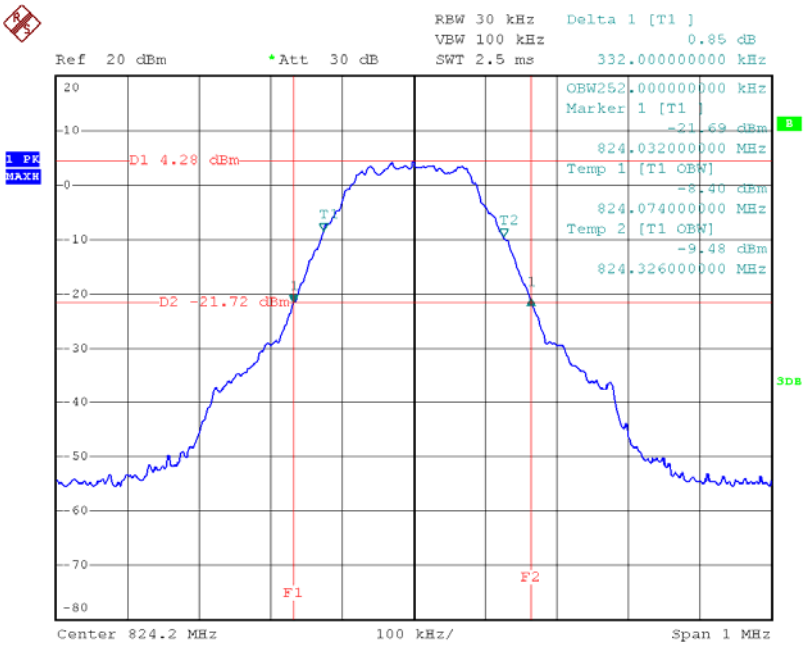
### 4.2.7 TEST RESULT OF 99% OCCUPIED BANDWIDTH

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Pressure: | 1010 hPa | Test Voltage: | DC 6V |
| Test Mode: | TX CH 128/190/251 | | |

**Configuration GSM(GMSK)**

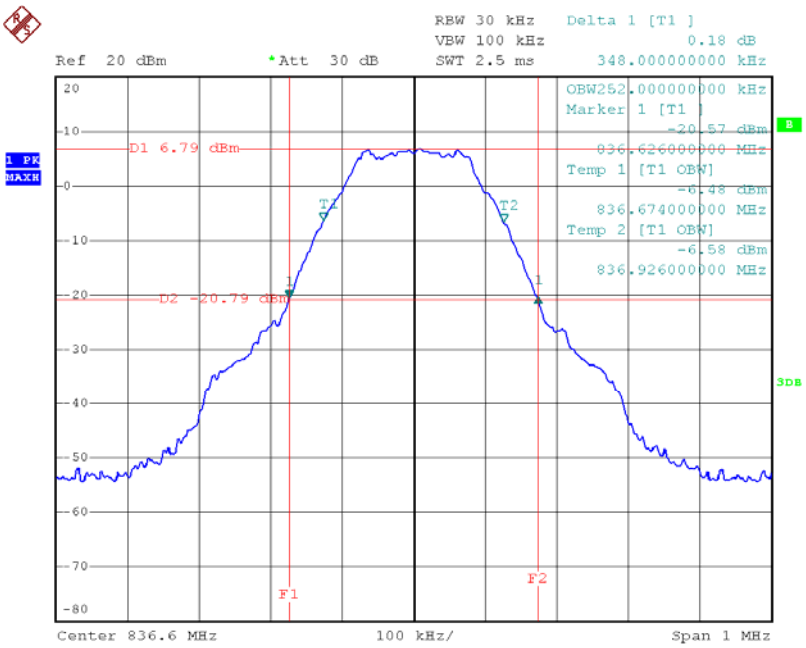
| Channel | Frequency | 99% OBW (kHz) | -26dBc Bandwidth | Result |
|---|---|---|---|---|
| 128 | 824.20 MHz | 252.00 | 332.00 | **Complies** |
| 190 | 836.60 MHz | 252.00 | 348.00 | **Complies** |
| 251 | 848.80 MHz | 256.00 | 344.00 | **Complies** |

**99% Occupied Bandwidth channel 128**



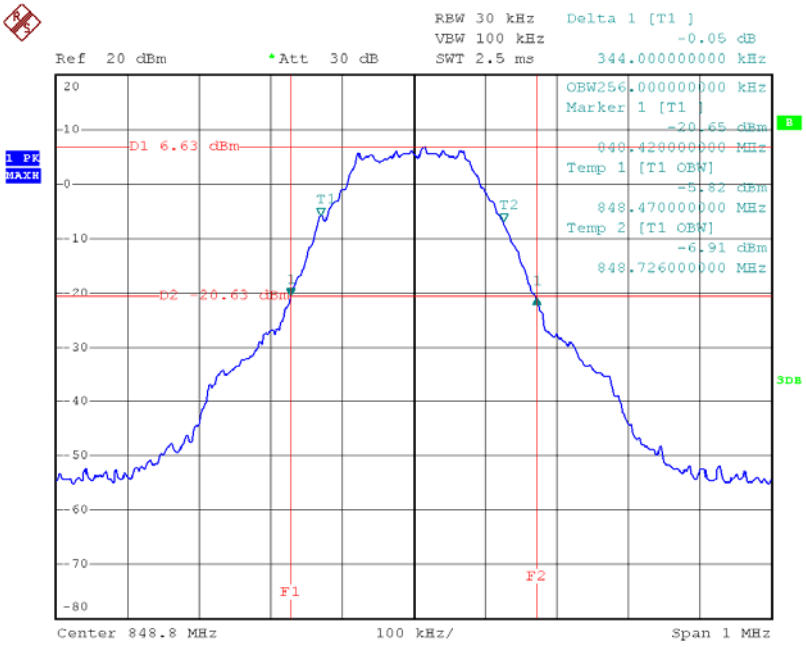

Date: 23.FEB.2013 16:59:47

## 99% Occupied Bandwidth channel 190




Date: 23.FEB.2013 17:31:01

## 99% Occupied Bandwidth channel 251




Date: 23.FEB.2013 17:06:45

## 4.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS MEASUREMENT

### 4.3.1 LIMIT

In the FCC 22.917, on any frequency outside a licensee's frequency block within GSM spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. The limit translates in the relevant power range (2 to 0.003W). At 2W(Power Control Level 5) the specified minimum attenuation becomes 43dB and the limit of emission equal to –13dBm

### 4.3.2 MEASURING INSTRUMENTS AND SETTING

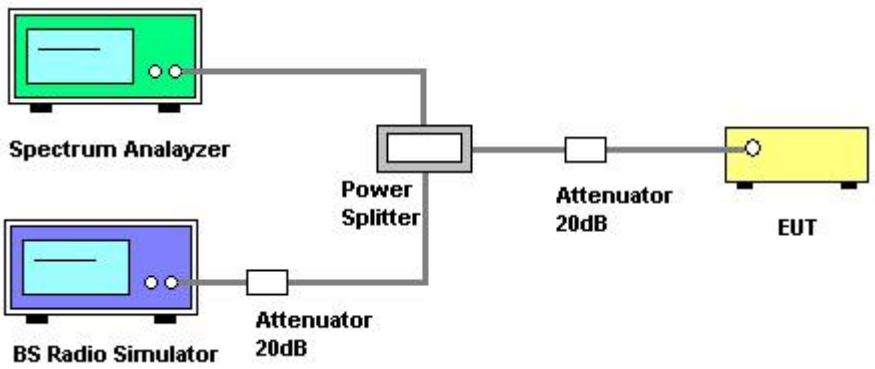
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 30MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB | 1 MHz / 1MHz for Peak |

### 4.3.3 TEST PROCEDURES

1. The EUT was set up for the maximum peak power with **GSM/EGPRS** link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 128, 190 and 251(low, middle and high operational frequency range.)
2. The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 4dB in the transmitted path track.
3. When the spectrum scanned from 30MHz to 3GHz, it shall be connected to the band reject filter attenuated the carried frequency. The spectrum set RB/VB 1MHz.
4. When the spectrum scanned from 3GHz to 10GHz, it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB/VB 1MHz.

### 4.3.4 TEST SETUP LAYOUT




### 4.3.5 TEST DEVIATION

There is no deviation with the original standard.

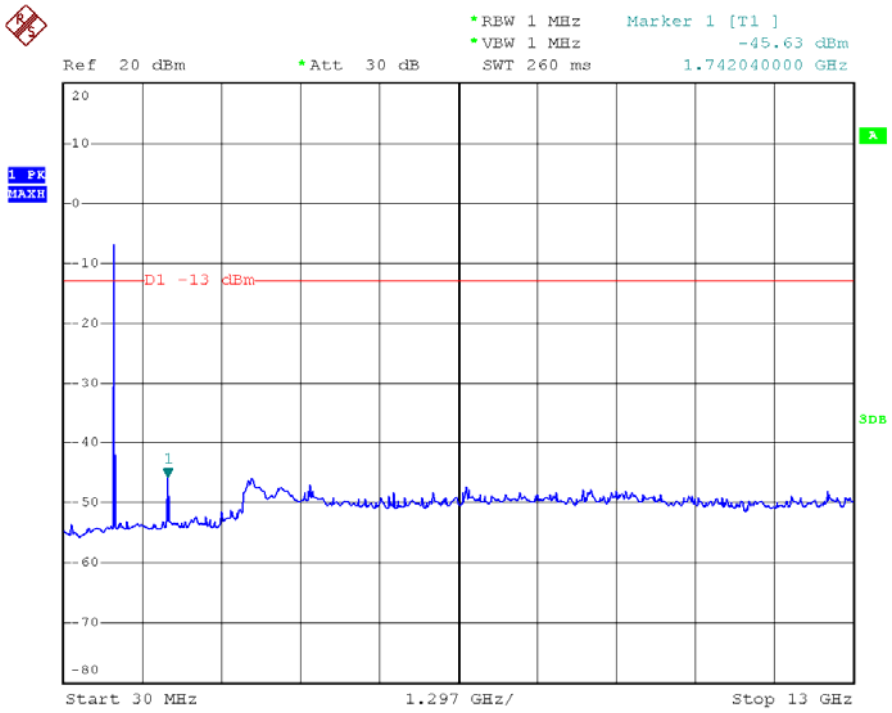
### 4.3.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

### 4.3.7 TEST RESULT OF SPURIOUS EMISSIONS AT ANTENNA TERMINALS

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Pressure: | 1010 hPa | Test Voltage: | DC 6V |
| Test Mode: | TX CH 128 | | |

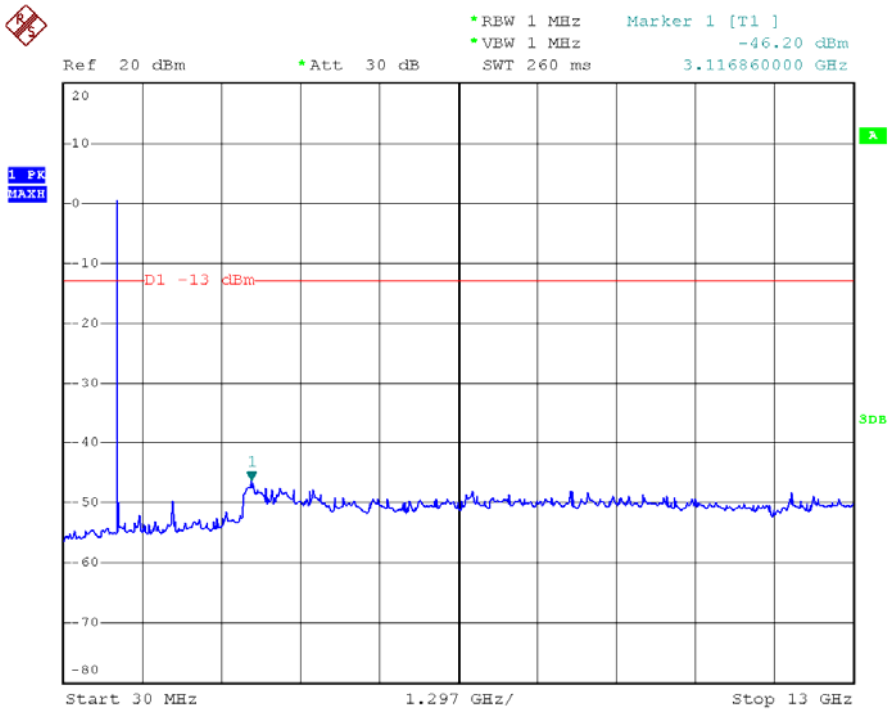
**Conducted Spurious of Configuration GSM(GSMK) channel 128**




Date: 23.FEB.2013 16:56:16

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Pressure: | 1010 hPa | Test Voltage: | DC 6V |
| Test Mode: | TX CH 190 | | |

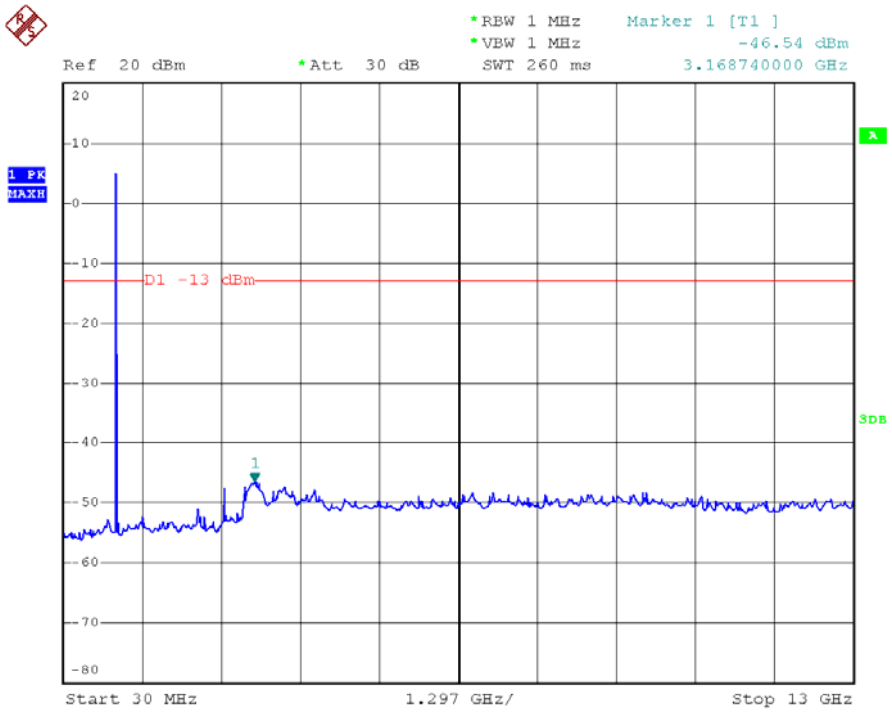
**Conducted Spurious of Configuration GSM(GSMK) channel 190**




Date: 23.FEB.2013 17:07:49

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Pressure: | 1010 hPa | Test Voltage: | DC 6V |
| Test Mode: | TX CH 251 | | |

**Conducted Spurious of Configuration GSM(GSMK) channel 251**



## 4.4 SPURIOUS RADIATED EMISSIONS MEASUREMENT

### 4.4.1 LIMIT

Out of band emissions, The power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside the frequency block. The spurious emissions of limit equal to –13dBm.

### 4.4.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 30 MHz |
| Stop Frequency | 10th carrier harmonic |
| Detector | Positive Peak |
| Span | 100 MHz |
| Sweep Time | 1s |
| RB / VB | 1 MHz / 1MHz |
| Attenuation | Positive Peak |

### 4.4.3 TEST PROCEDURES

1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital RadioCommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. Place the measurement antenna in a horizontal orientation. Rotate the EUT 360 . Measure and record all spurious emissions (LVL) up to the tenth harmonic of the carrier frequency.
5. Replace the EUT with a horizontally polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (LOSS). LOSS = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the level of spurious emissions using the following equation:
   Spurious (dBm) = LVL (dBm) + LOSS (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:
   Spurious (dBm) = LVL (dBm) + LOSS (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
    (Note: Steps 5 and 6 above are performed prior to testing and LOSS is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

### 4.4.4 POWER MEASUREMENTS USING SUBSTITUTION PROCEDURE

.

The measurement on the Spectrum Analyzer is used as a basis for the Substitution procedure. The EUT is replaced with a Signal Generator and an antenna. The setting on the Signal Generator is varied until the Spectrum Analyzer displays the original reading. EIRP is calculated as-

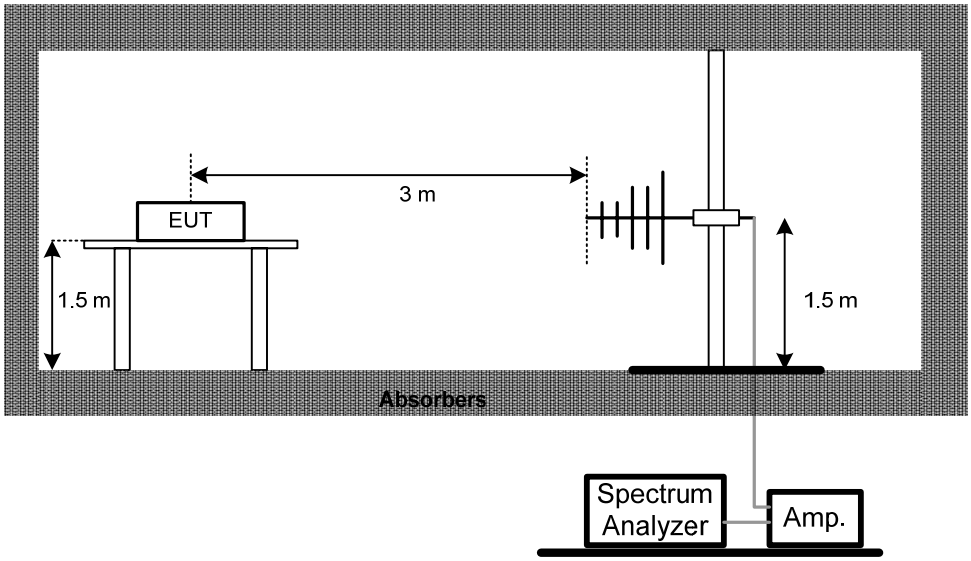
EIRP (dBm)= Signal Generator setting (dBm)- Cable Loss (dB)+ Antenna Gain (dBi)

Example:

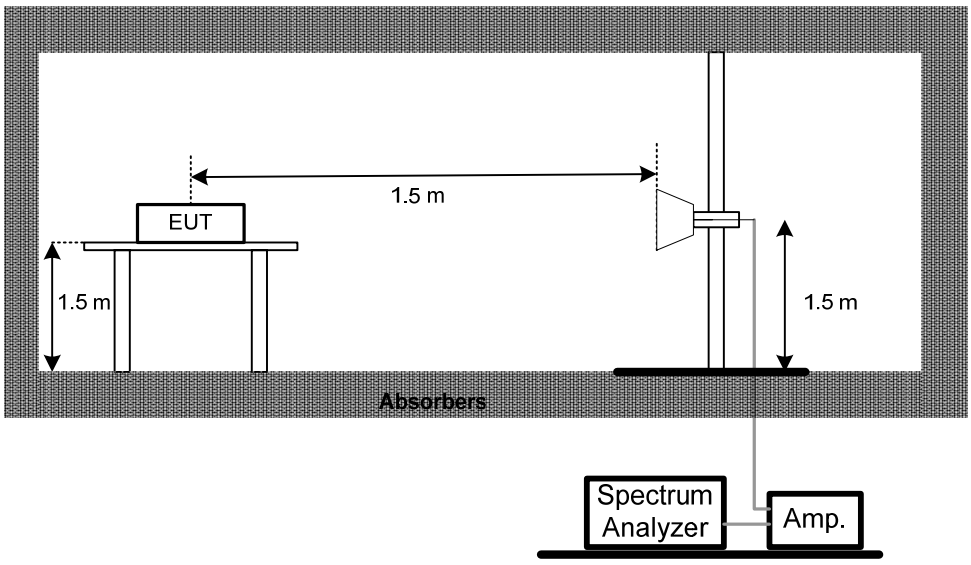
| Frequency (MHz) | Measured SA (dBμV) | Signal Generator setting (dBm) | Antenna Gain (dBi) | Dipole Gain (dBd) | Cable Loss (dB) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 1000 | 95.5 | 24.5 | 6.5 | 0 | 3.5 | 27.5 |

### 4.4.5 TEST SETUP LAYOUT

A. Radiated Emission Test Set-Up Frequency 30MHz ~ 1 GHz




B. Radiated Emission Test Set-Up Frequency Above 1 GHz



### 4.4.6 TEST DEVIATION

There is no deviation with the original standard.

### 4.4.7 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

### 4.4.8 RESULTS OF TRANSMITTER SPURIOUS EMISSIONS BELOW 1GHZ

Remark：

(1) Reading in which marked as Peak means measurements by using is Peak Mode with Detector SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz。

(2) Measuring frequency range from 30MHz to 1000MHz。

(3) If the peak scan value lower limit more than 20dB, then this signal data does not show in table。

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Test Voltage: | DC 6V | Phase: | Veitical |
| Test Mode: | TX CH128/190/251 GSM(GMSK) | EUT Axis: | X |

| Harmonic | Tx ch-128 Freq. (MHz) | Level (dBm) | Tx ch-190 Freq. (MHz) | Level (dBm) | Tx ch-251 Freq. (MHz) | Level (dBm) |
|---|---|---|---|---|---|---|
| **1** | 824.2 | - | 836.6 | - | 848.8 | - |
| **2** | 35.82 | -51.71 | 41.64 | -57.34 | 35.82 | -57.21 |
| **3** | 95.96 | -58.55 | 101.78 | -56.87 | 103.72 | -60.28 |
| **4** | 202.66 | -66.74 | 128.94 | -59.60 | 208.48 | -66.03 |
| **5** | 596.48 | -66.88 | 204.60 | -65.13 | 596.48 | -66.88 |
| **6** | 778.84 | -61.50 | 602.30 | -66.60 | 778.84 | -62.00 |
| **7** | 858.38 | -61.39 | 769.14 | -62.54 | 870.02 | -60.16 |
| NF = Noise Floor | | | | | | |

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Test Voltage: | DC 6V | Phase: | Horizontal |
| Test Mode: | TX CH128/190/251 GSM(GMSK) | EUT Axis: | X |

| Harmonic | Tx ch-128 Freq. (MHz) | Level (dBm) | Tx ch-190 Freq. (MHz) | Level (dBm) | Tx ch-251 Freq. (MHz) | Level (dBm) |
|---|---|---|---|---|---|---|
| **1** | 824.2 | - | 836.6 | - | 848.8 | - |
| **2** | 59.10 | -44.58 | 59.10 | -57.08 | 57.16 | -55.18 |
| **3** | 86.26 | -55.21 | 88.20 | -57.60 | 97.90 | -60.32 |
| **4** | 241.46 | -61.57 | 159.98 | -62.41 | 233.70 | -63.58 |
| **5** | 716.76 | -59.43 | 625.58 | -62.06 | 617.82 | -62.98 |
| **6** | 759.44 | -59.35 | 765.26 | -59.07 | 782.72 | -60.01 |
| **7** | 965.08 | -55.71 | 947.62 | -57.87 | 914.64 | -57.28 |
| NF = Noise Floor | | | | | | |

### 4.4.9 RESULTS OF TRANSMITTER SPURIOUS EMISSIONS ABOVE 1GHZ

Remark：

(1) Reading in which marked as Peak means measurements by using is Peak Mode with Detector SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz。

(2) Measuring frequency range from 1GHz to 10GHz。

(3) If the peak scan value lower limit more than 20dB, then this signal data does not show in table。

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Test Voltage: | DC 6V | Phase: | Veitical |
| Test Mode: | TX CH128/190/251 GSM(GMSK) | EUT Axis: | X |

| Harmonic | Tx ch-128 Freq. (MHz) | Level (dBm) | Tx ch-190 Freq. (MHz) | Level (dBm) | Tx ch-251 Freq. (MHz) | Level (dBm) |
|---|---|---|---|---|---|---|
| **1** | 824.2 | - | 836.6 | - | 848.8 | - |
| **2** | 1648.10 | -41.41 | 1666.38 | -41.27 | 1684.23 | -41.99 |
| **3** | 2472.95 | -38.82 | 2511.68 | -33.73 | 2549.13 | -36.06 |
| **4** | 3296.80 | NF | 3346.40 | NF | 3395.20 | NF |
| **5** | 4121.00 | NF | 4183.00 | NF | 4244.00 | NF |
| **6** | 4945.20 | NF | 5019.60 | NF | 5092.80 | NF |
| **7** | 5769.40 | NF | 5856.20 | NF | 5941.60 | NF |
| **8** | 6593.60 | NF | 6692.80 | NF | 6790.40 | NF |
| **9** | 7417.80 | NF | 7529.40 | NF | 7639.20 | NF |
| **10** | 8242.00 | NF | 8366.00 | NF | 8488.00 | NF |
| NF = Noise Floor | | | | | | |

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Test Voltage: | DC 6V | Phase: | Horizontal |
| Test Mode: | TX CH128/190/251 GSM(GMSK) | EUT Axis: | X |

| Harmonic | Tx ch-128 Freq. (MHz) | Level (dBm) | Tx ch-190 Freq. (MHz) | Level (dBm) | Tx ch-251 Freq. (MHz) | Level (dBm) |
|---|---|---|---|---|---|---|
| **1** | 824.2 | - | 836.6 | - | 848.8 | - |
| **2** | 1648.14 | -46.35 | 1665.42 | -43.62 | 1684.23 | -42.75 |
| **3** | 2497.12 | -40.96 | 2505.62 | -39.22 | 2549.23 | -39.91 |
| **4** | 3296.80 | NF | 3346.40 | NF | 3395.20 | NF |
| **5** | 4121.00 | NF | 4183.00 | NF | 4244.00 | NF |
| **6** | 4945.20 | NF | 5019.60 | NF | 5092.80 | NF |
| **7** | 5769.40 | NF | 5856.20 | NF | 5941.60 | NF |
| **8** | 6593.60 | NF | 6692.80 | NF | 6790.40 | NF |
| **9** | 7417.80 | NF | 7529.40 | NF | 7639.20 | NF |
| **10** | 8242.00 | NF | 8366.00 | NF | 8488.00 | NF |
| NF = Noise Floor | | | | | | |

## 4.5 BAND EDGE MEASUREMENT

### 4.5.1 LIMIT

According to FCC 22.917 specified that power of any emission outside of the authorized operating frequency rangesmust be attenuated below the transmitting power (P) by a factor of at least 43 +10 log(P) dB . In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Then we measure that the bandwidth is about 300kHz and the resolution bandwidth is 3kHz.

### 4.5.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | 5 MHz |
| RB / VB | 10 kHz /30 kHz |
| Trace | Sample |
| Sweep Time | Auto |

### 4.5.3 TEST PROCEDURES

1. The EUT was set up for the maximum peak power with **GSM/EGPRS** link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 128 and 251(low and high operational frequency range.)
2. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The splitter loss and cable loss are the worst loss 4dB in the transmitted path track.
3. The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 10kHz and VB of the spectrum is 30KHz.
4. Record the Sample trace plot into the test report.

### 4.5.4 TEST SETUP LAYOUT

This test setup layout is the same as that shown in section 4.2.4.

### 4.5.5 TEST DEVIATION

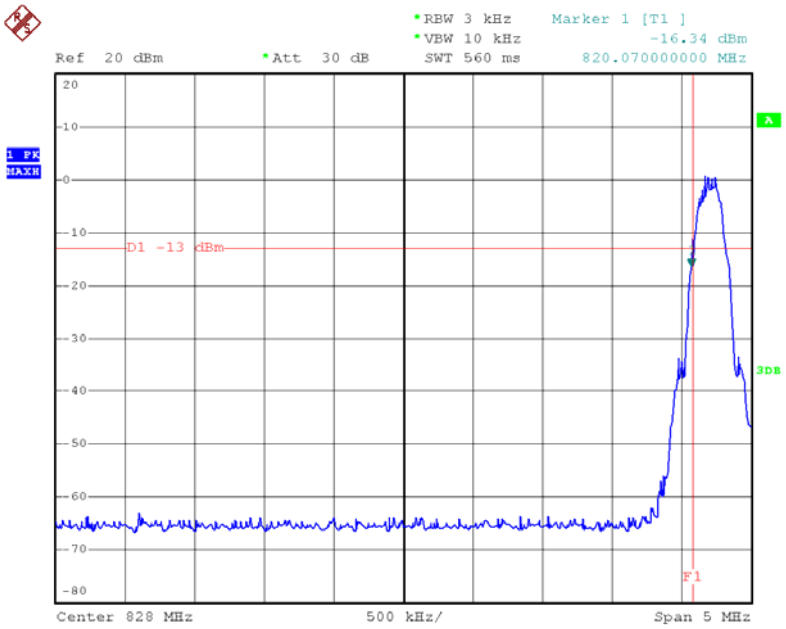
There is no deviation with the original standard.

### 4.5.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

## 4.5.7 TEST RESULTS OF BAND EDGE

**Band Edge on Configuration GSM(GMSK) / Channel 128-CONDUCTED MODE**

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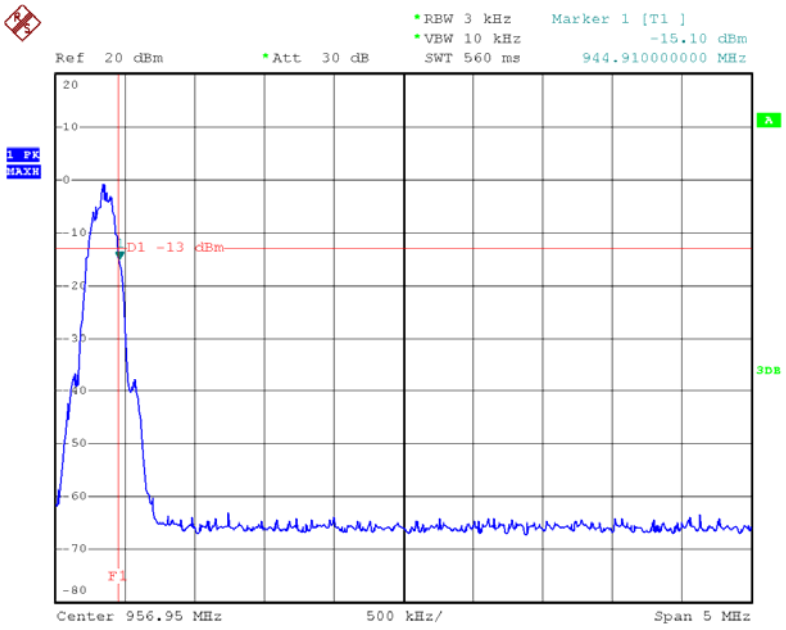
**Band Edge on Configuration GSM(GMSK) / Channel 251-CONDUCTED MODE**

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## 4.6 FREQUENCY STABILITY MEASUREMENT

### 4.6.1 LIMIT

According to the FCC part 2.4235 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The frequency error rate is according to the JTC standard that the frequency error rate shall be accurate to within 2.5 ppm of the received frequency from the base station. The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with the 2.1055(a)(1) –30℃~50℃.

### 4.6.2 MEASURING INSTRUMENTS AND SETTING

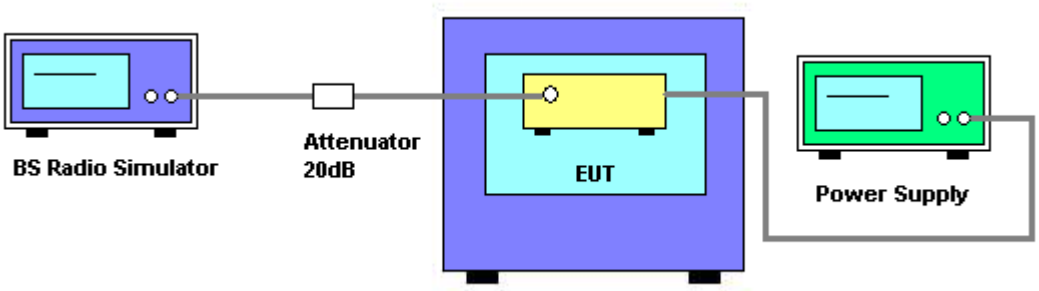
Please refer to section 5 in this report. The following table is the setting of the BS Simulator.

| Spectrum Parameters | Setting |
|---|---|
| Frequency Error | The maximum of transmit frequency error |

### 4.6.3 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the BS Simulator.
2. The BS simulator was used to set the TX channel and power level and modulate the TX signal with different bit patterns.
3. BS simulator used the frequency error function and measured the peak frequency error.
   Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.
   The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.
4. EUT is connected the external power supply to control the DC input power. The various Volts from the minimum 3.1 Volts to 4.3 Volts. Each step shall be record the frequency error rate.
5. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
6. Extreme temperature rule is -30°C~50°C.

### 4.6.4 TEST SETUP LAYOUT




### 4.6.5 TEST DEVIATION

There is no deviation with the original standard.

### 4.6.6 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

### 4.6.7 RESULTS OF FREQUENCY STABILITY

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Pressure: | 1010 hPa | Test Voltage: | DC 6V |
| Test Mode: | TX CH 128 GSM(GMSK) | | |

**Voltage vs. Frequency Stability**

| Voltage(Volts) | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|---|---|---|---|
| 5.1 | 11 | 0.013346275 | 0.1 |
| 5.3 | 13 | 0.015772871 | 0.1 |
| 5.5 | 12 | 0.014559573 | 0.1 |
| 5.7 | 12 | 0.014559573 | 0.1 |
| 5.9 | 13 | 0.015772871 | 0.1 |
| 6.1 | 11 | 0.013346275 | 0.1 |
| 6.3 | 14 | 0.016986168 | 0.1 |
| 6.5 | 17 | 0.020626062 | 0.1 |
| 6.7 | 18 | 0.021839359 | 0.1 |
| **6.9** | **20** | **0.024265955** | **0.1** |
| Max. Deviation (ppm) | **20** | **0.024265955** | **0.1** |

**Temperature vs. Frequency Stability**

| Temperature(℃) | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|---|---|---|---|
| 50 | 19 | 0.023052657 | 0.1 |
| 40 | 18 | 0.021839359 | 0.1 |
| 30 | 18 | 0.021839359 | 0.1 |
| 20 | 13 | 0.015772871 | 0.1 |
| 10 | 17 | 0.020626062 | 0.1 |
| 0 | 18 | 0.021839359 | 0.1 |
| -10 | 22 | 0.02669255 | 0.1 |
| -20 | 26 | 0.031545741 | 0.1 |
| **-30** | **26** | **0.031545741** | **0.1** |
| Max. Deviation (ppm) | **27** | **0.031545741** | **0.1** |

## 4.8 CONDUCTED EMISSION MEASUREMENT

### 4.8.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | | Standard |
|---|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average | |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * | CISPR |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 | CISPR |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 | CISPR |

| | | | | | |
|---|---|---|---|---|---|
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * | FCC |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 | FCC |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 | FCC |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

### 4.8.2 MEASUREMENT INSTRUMENTS LIST AND SETTING

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | LISN | EMCO | 3816/2 | 00052765 | May.04.2013 |
| 2 | LISN | R&S | ENV216 | 100087 | May.04.2013 |
| 3 | Test Cable | N/A | C_17 | N/A | Mar.28.2013 |
| 4 | EMI TEST RECEIVER | R&S | ESCS30 | 826547/022 | May.04.2013 |
| 5 | 50Ω Terminator | SHX | TF2-3G-A | 08122902 | May.04.2013 |

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

The following table is the setting of the receiver

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

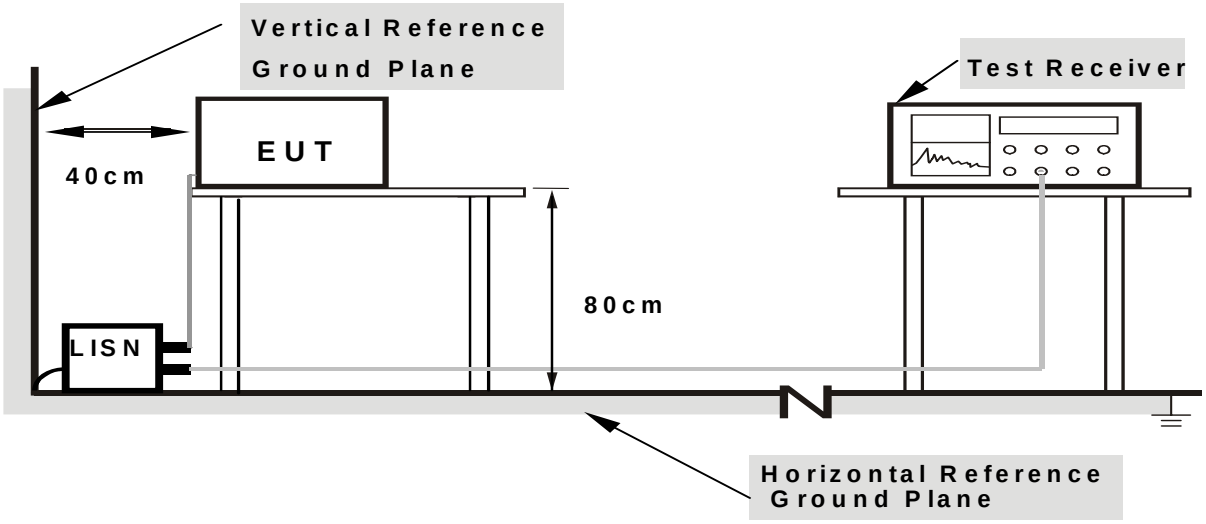
### 4.8.3 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 4.8.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.8.5 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**

### 4.8.6 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

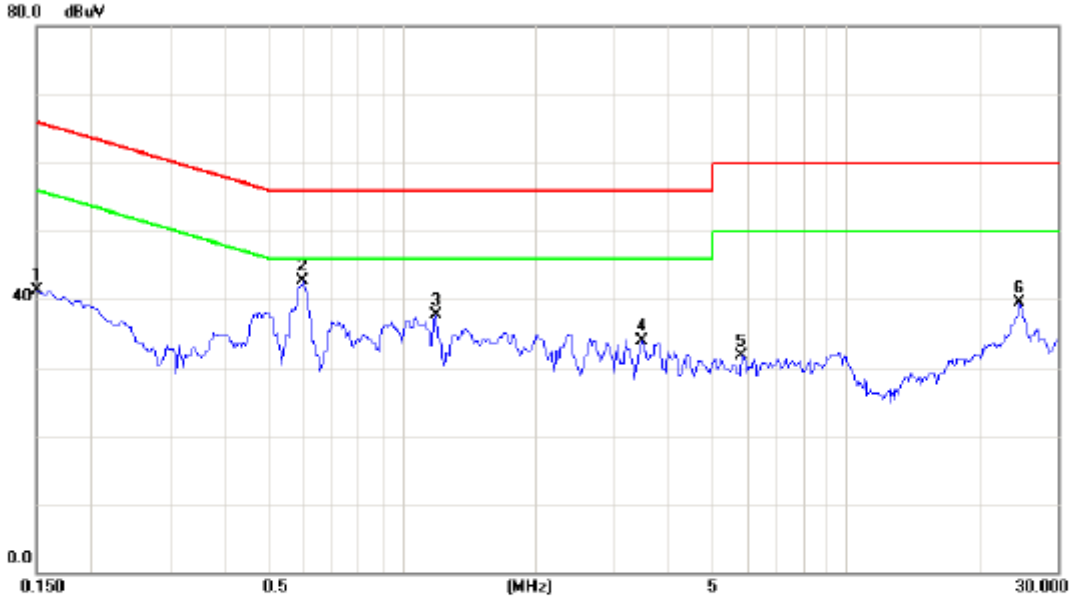
### 4.8.7 TEST RESULTS

Remark

(1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform。In this case, a " * " marked in AVG Mode column of Interference Voltage Measured。

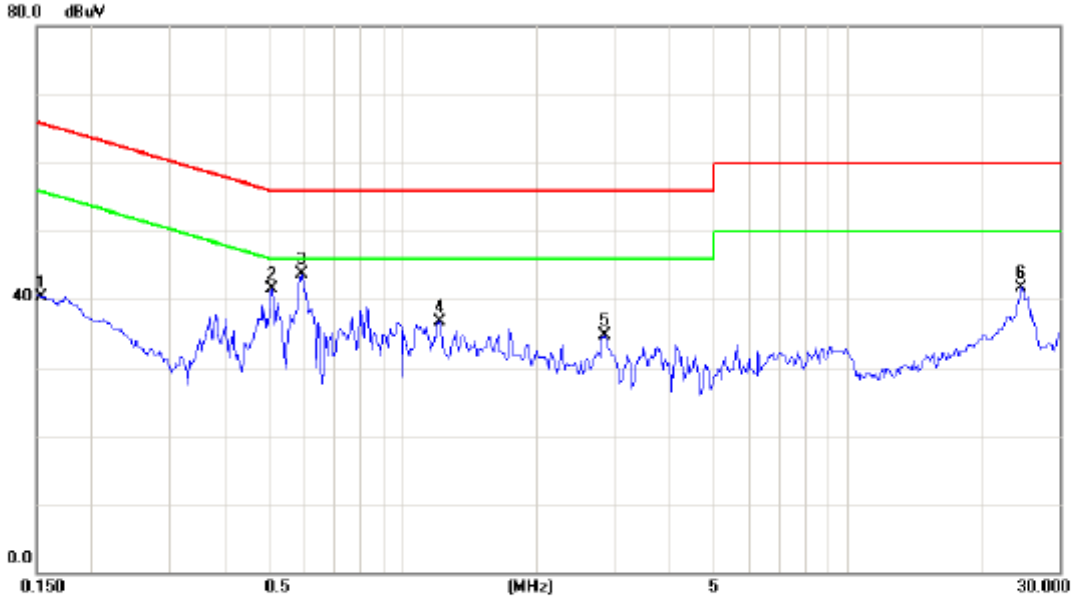
(2) Measuring frequency range from 150KHz to 30MHz。

| | | | |
|---|---|---|---|
| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Test Voltage: | AC 120V/60Hz | Phase: | Line |
| Test Mode: | GSM | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1500 | 31.72 | 9.65 | 41.37 | 66.00 | -24.63 | peak | |
| 2 | * | 0.5990 | 33.00 | 9.70 | 42.70 | 56.00 | -13.30 | peak | |
| 3 | | 1.1930 | 28.06 | 9.72 | 37.78 | 56.00 | -18.22 | peak | |
| 4 | | 3.4725 | 24.17 | 9.80 | 33.97 | 56.00 | -22.03 | peak | |
| 5 | | 5.8320 | 21.89 | 9.90 | 31.79 | 60.00 | -28.21 | peak | |
| 6 | | 24.6093 | 28.79 | 10.77 | 39.56 | 60.00 | -20.44 | peak | |

| EUT: | Wireless GSM dialer (Smart Control) | Model Name: | WS210 |
|---|---|---|---|
| Temperature: | 23 ℃ | Relative Humidity: | 51 % |
| Test Voltage: | AC 120V/60Hz | Phase: | Neutral |
| Test Mode: | GSM | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1540 | 30.71 | 9.68 | 40.39 | 65.78 | -25.39 | peak | |
| 2 | | 0.5070 | 31.80 | 9.69 | 41.49 | 56.00 | -14.51 | peak | |
| 3 | * | 0.5916 | 34.00 | 9.70 | 43.70 | 56.00 | -12.30 | peak | |
| 4 | | 1.2120 | 26.88 | 9.74 | 36.62 | 56.00 | -19.38 | peak | |
| 5 | | 2.8451 | 24.88 | 9.80 | 34.68 | 56.00 | -21.32 | peak | |
| 6 | | 24.6560 | 30.72 | 10.92 | 41.64 | 60.00 | -18.36 | peak | |

## 5. LIST OF MEASUREMENT EQUIPMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP 40 | 100185 | Nov. 16.2013 |
| 2 | Signal Generator | R&S | SMR 40 | 3008A02274 | May.04.2013 |
| 3 | Signal Generator | HP | 8648A | 3636A02964 | May.04.2013 |
| 4 | Amplifier | Agilent | 8447D | 2944A11203 | May.04.2013 |
| 5 | Amplifier | Agilent | 8449B | 3008A02274 | May.04.2013 |
| 6 | Double Ridged Guide Antenna | ETS·LINDGREN | 3115 | 00075846 | May.25.2013 |
| 7 | Antenna | SCHWARZBECK | VULB 9160 | 9160-3231 | May.25.2013 |
| 8 | Test Cable | N/A | CL-CB02-001 | N/A | Dec.05.2013 |
| 9 | Test Cable | N/A | CL-CB02-004 | N/A | Dec.05.2013 |
| 10 | Test Cable | N/A | CL-CB02-006 | N/A | Dec.05.2013 |
| 11 | Controller | CT | SC100 | N/A | N/A |
| 12 | P-series Power meter | Agilent | N1911A | MY45100473 | May.04.2013 |
| 13 | Wireband Power sensor | Agilent | N1921A | MY51100041 | May.04.2013 |
| 14 | DC power supply | GW Instek | GPC-30300N | EK880675 | Oct.15.2013 |
| 15 | Temp. & Humid. Chamber | GIANT FORCE | ITH-225-20-S | IAB0309-001 | Dec.05.2013 |
| 16 | WIRELESS COMMUNICATION TEST SET | Agilent | 8960 SERIES 10(E5515C) | N/A | N/A |

## 6. EUT TEST PHOTO

**Conducted Measurement Photos**

**Radiated Measurement Photos**