



**Neutron Engineering Inc.**

# 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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### **Declaration**

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## **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 24 Subpart E & ANSI C63.4 : 2009  
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-3-1301C260) 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 1900MHz approval part of the product.**

**2. SUMMARY OF TEST RESULTS**

Test procedures according to the technical standards:

FCC Part 24 Subpart E & Part 2				
Part	Standard Section	Test Item	Judgment	Remark
4.1	2.1047(d)	Modulation Characteristics	PASS	
4.2	2.1046/24.232	Radiated RF Output	PASS	
4.3	2.1049/24.238(b)	99% Occupied Bandwidth	PASS	
4.4	2.1051/24.238(a)	Spurious Emissions at Antenna Terminal	PASS	
4.5	2.1053/24.238(a)	Spurious Radiated Emissions	PASS	
4.6	24.238(b)	Band Edge	PASS	
4.7	2.1055/24.235	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  $y \pm U$ , where expanded 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	<p>The EUT is a Wireless GSM dialer (Smart Control).</p> <table border="1"> <tr> <td>Operation Frequency:</td><td>TX:1850.2MHz~1909.8MHz RX:1930.2MHz~1989.8MHz</td></tr> <tr> <td>Modulation Type:</td><td>GMSK;8PSK</td></tr> <tr> <td>Channel Band Width (99%)</td><td>248KHz</td></tr> <tr> <td>Antenna Type</td><td>Please see Note 3.</td></tr> <tr> <td>Conducted Output Power</td><td>GSM 1900: 24.97 dBm</td></tr> </table> <p>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.</p>	Operation Frequency:	TX:1850.2MHz~1909.8MHz RX:1930.2MHz~1989.8MHz	Modulation Type:	GMSK;8PSK	Channel Band Width (99%)	248KHz	Antenna Type	Please see Note 3.	Conducted Output Power	GSM 1900: 24.97 dBm
Operation Frequency:	TX:1850.2MHz~1909.8MHz RX:1930.2MHz~1989.8MHz										
Modulation Type:	GMSK;8PSK										
Channel Band Width (99%)	248KHz										
Antenna Type	Please see Note 3.										
Conducted Output Power	GSM 1900: 24.97 dBm										
Channel List	Please refer to the Note 2.										
Power Source	<p>#1 DC Voltage supplied from 4*AAA battery.</p> <p>#2 DC Voltage supplied from AC/DC adapter.</p> <p>Brand/Model name: R.S / RSS1001-143095-W2</p>										
Power Rating	<p>#1 DC 6V</p> <p>#2 I/P: AC 100-240V~ 50/60Hz 0.4A</p> <p>O/P: DC 9.5V 1.5A 14.25W MAX</p>										
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)	
1850.2MHz~1909.8MHz	512	Low	1850.2
	661	Mid	1880.0
	810	High	1909.8

#### 3. Table for Filed Antenna @GSM1900

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	skywave	WS210B	Integral	N/A	1.59





### 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly 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	512/661/810
Spurious Radiated Emissions	GSM	512/661/810
Band Edge Emissions	GSM	512/661/810
Frequency Stability	GSM	661
99% Occupied Bandwidth	GSM	512/661/810
Spurious Emissions at Antenna Terminal	GSM	512/661/810

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 positioning of each 3 axis. The worst case was found positioned on Z-plane. Therefore only the test data of this Z-plane was used for radiated emission measurement test.

### 3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

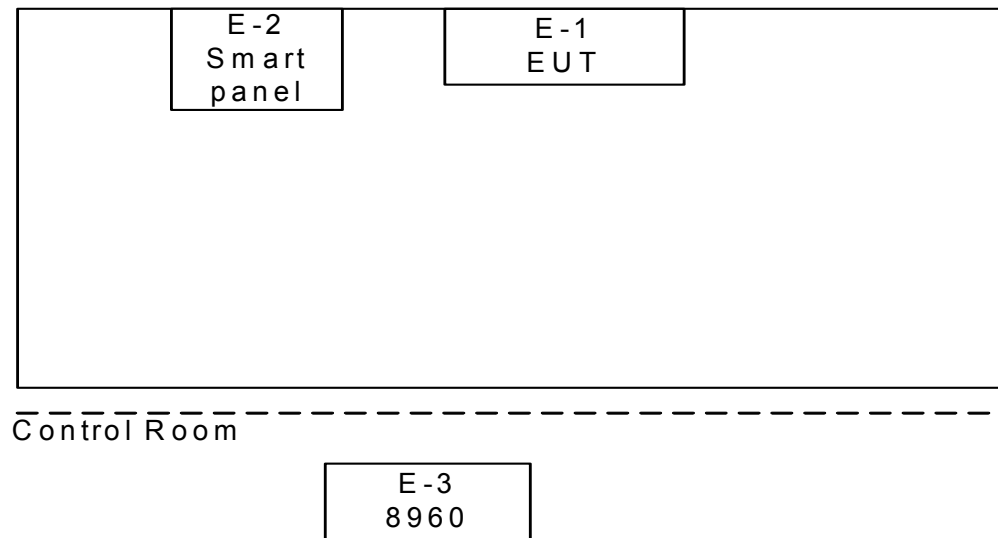
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final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

During the test, Power Control level was set to 0, it is chosen as the worst case.

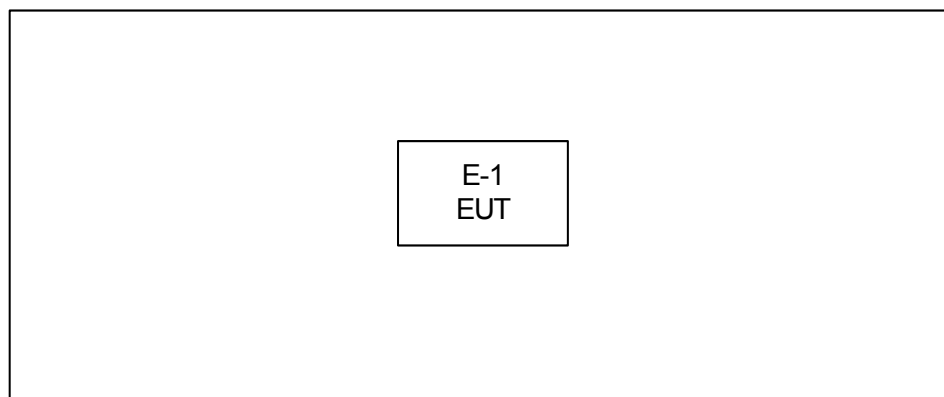


### 3.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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 24.232(b) that "Mobile/Portable station are limited to 2 watts e.i.r.p." and 24.232(c) specified 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.

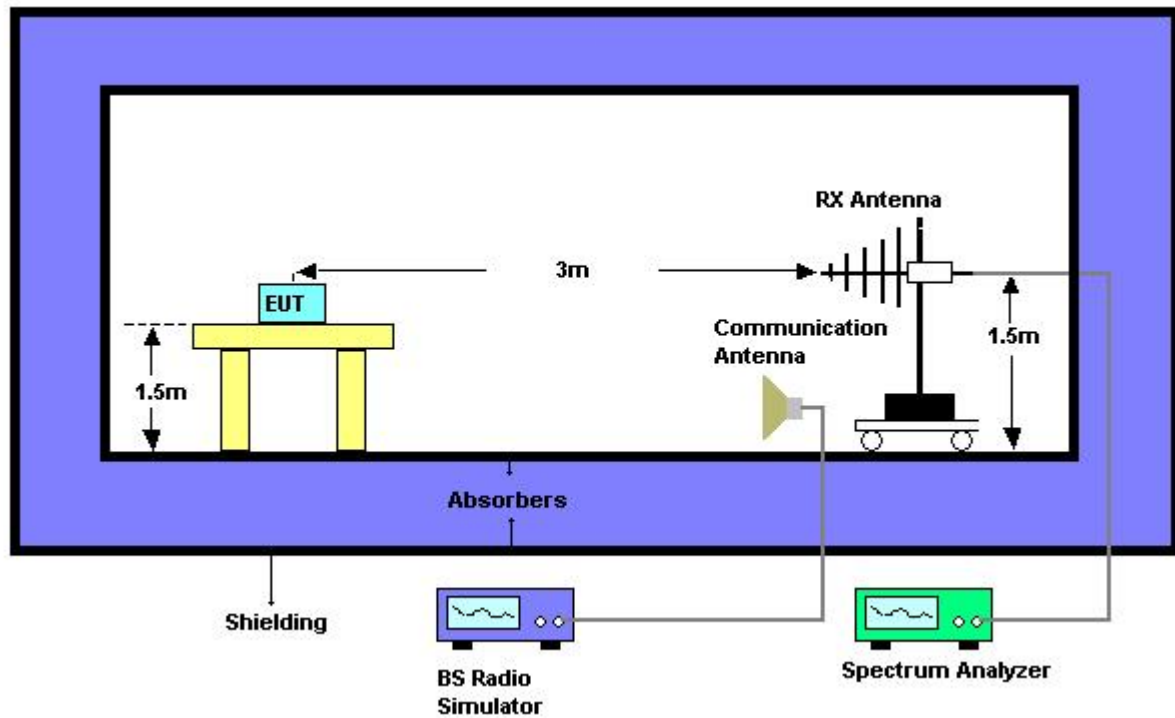
<b>Spectrum Parameters</b>	<b>Setting</b>
Attenuation	Auto
Center Frequency	Low / middle / high channels
Span Frequency	10MHz
RB / VB	3MHz / 3MHz for Peak

#### **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 generator with known output power and record the path loss in dB (LOSS).  $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$ .
7. Determine the ERP using the following equation:  
 $ERP \text{ (dBm)} = LVL \text{ (dBm)} + LOSS \text{ (dB)}$
8. Determine the EIRP using the following equation:  
 $EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.14 \text{ (dB)}$
9. GMSK mode measurements are performed in GSM 1uplink slot configuration.

#### 4.1.4 TEST SETUP LAYOUT

##### EIRP 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 °C	Relative Humidity:	51 %
Pressure:	1010 hPa	Test Voltage:	DC 6V
Test Mode:	TX CH 512/661/810		

GSM 1900	Conducted Power(dBm)			Result
	Channel 512	Channel 661	Channel 810	
GSM	<b>24.97</b>	<b>24.14</b>	<b>24.02</b>	<b>Complies</b>



#### 4.1.8 TEST RESULT OF RADIATED RF OUTPUT POWER

EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Pressure:	1010 hPa	Test Voltage:	DC 6V
Test Mode:	TX CH 512/661/810		

#### GSM 1900:

GSM 1900	EIPR Power(dBm)			Max. Limit (dBm)	Result
	Channel 512	Channel 661	Channel 810		
GSM	25.02	25.10	24.98	33	Complies

## 4.2 99% OCCUPIED BANDWIDTH MEASUREMENT

### 4.2.1 LIMIT

According to FCC 24.238(b) 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

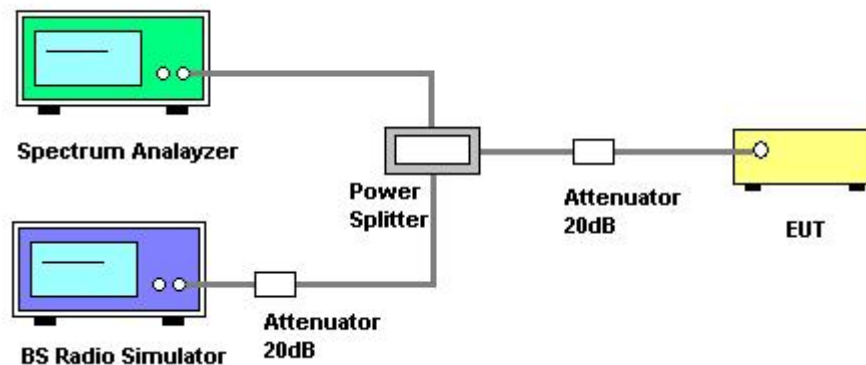
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

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.





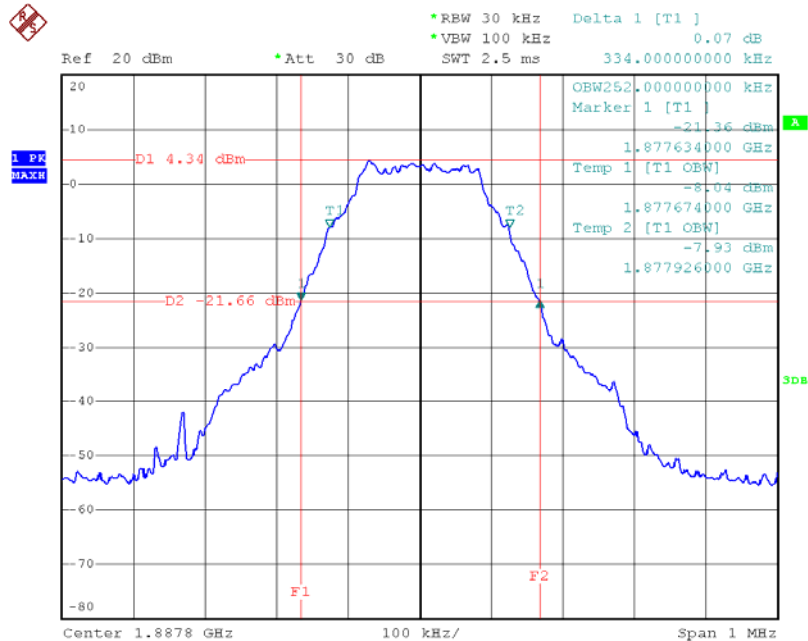
EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Pressure:	1010 hPa	Test Voltage:	DC 6V
Test Mode:	TX CH 512/661/810		

Channel	Frequency	99% OBW (KHz)	-26dBc Bandwidth	Result
512	1850.20MHz	250.00	340.00	Complies
661	1880.00 MHz	252.00	334.00	Complies
810	1909.80 MHz	250.00	334.00	Complies



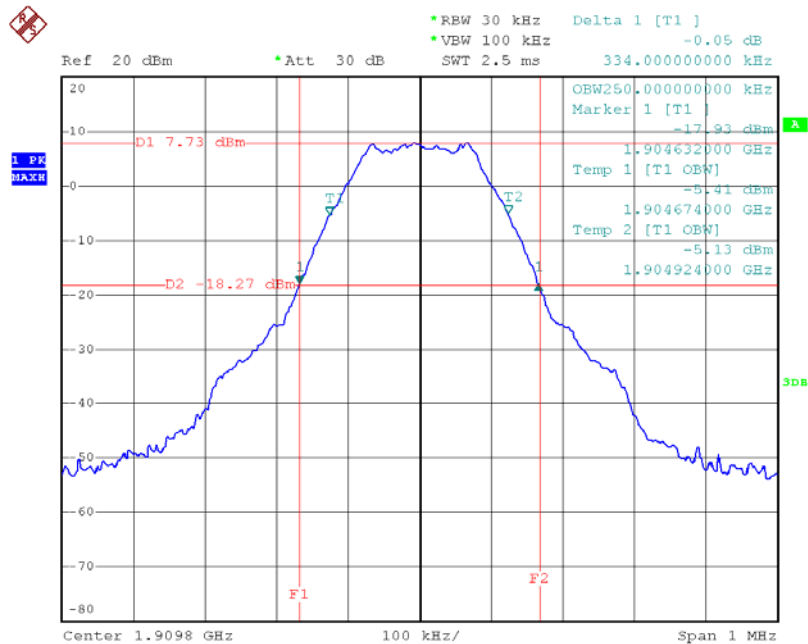


### 99% Occupied Bandwidth channel 661



Date: 23.FEB.2013 16:28:50

### 99% Occupied Bandwidth channel 810



Date: 23.FEB.2013 16:31:54

## 4.3 SPURIOUS EMISSIONS AT ANTENNA WIRELESS GSM DIALER (SMART CONTROL)S MEASUREMENT

### 4.3.1 LIMIT

In the FCC 24.238(a), 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 (1 to 0.001W). At 1W(Power Control Level 0) the specified minimum attenuation becomes 43dB and the limit of emission equal to  $-13\text{dBm}$ .

### 4.3.2 MEASURING INSTRUMENTS AND SETTING

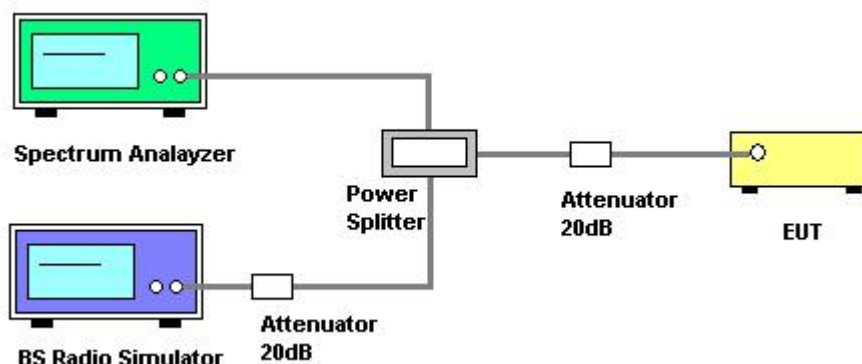
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

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, 512,661,810(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 4.5dB in the transmitted path track.
3. When the spectrum scanned from 9kHz 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

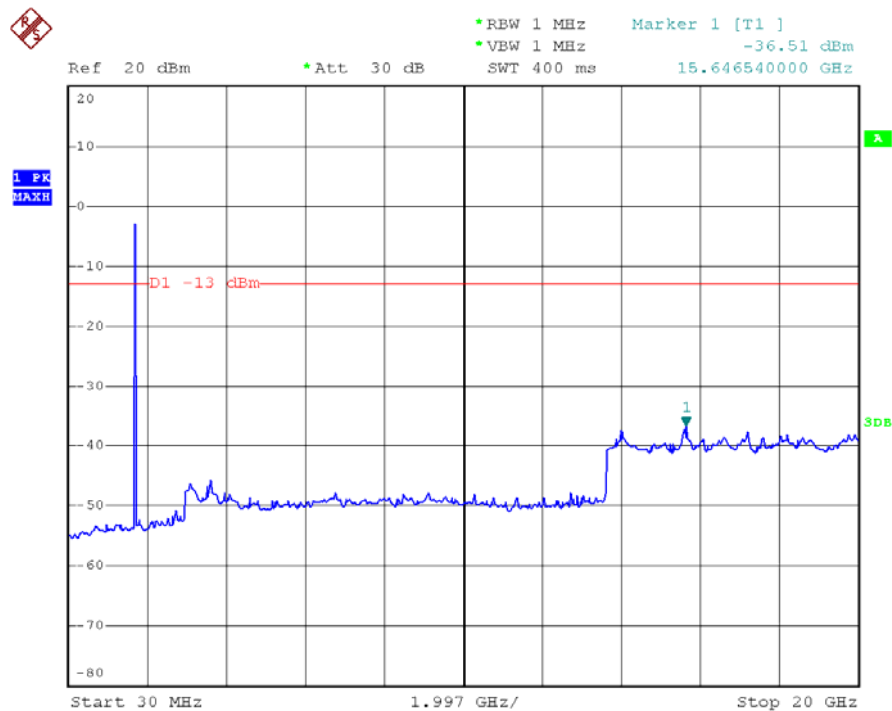
The BS simulator was used to set the TX channel and power level and modulate the TX signal.



#### 4.3.7 TEST RESULT OF SPURIOUS EMISSIONS AT ANTENNA WIRELESS GSM DIALER (SMART CONTROL)S

EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Pressure:	1010 hPa	Test Voltage:	DC 6V
Test Mode:	TX CH 512		

##### Conducted Spurious of Configuration GSM(GMSK) channel 512

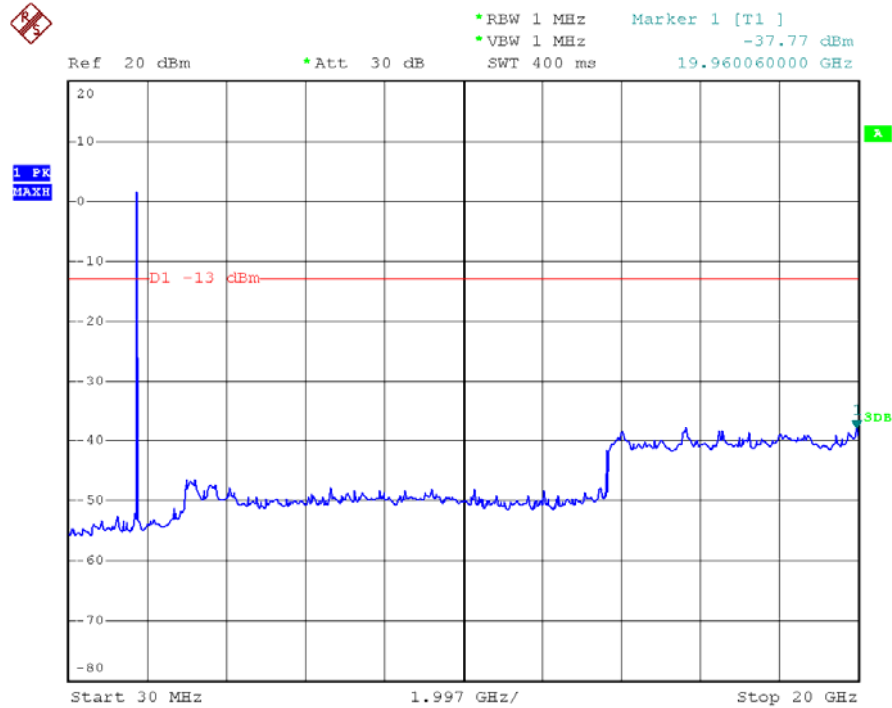


Date: 23.FEB.2013 16:39:07



EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Pressure:	1010 hPa	Test Voltage:	DC 6V
Test Mode:	TX CH 661		

**Conducted Spurious of Configuration GSM(GMSK) channel 661**

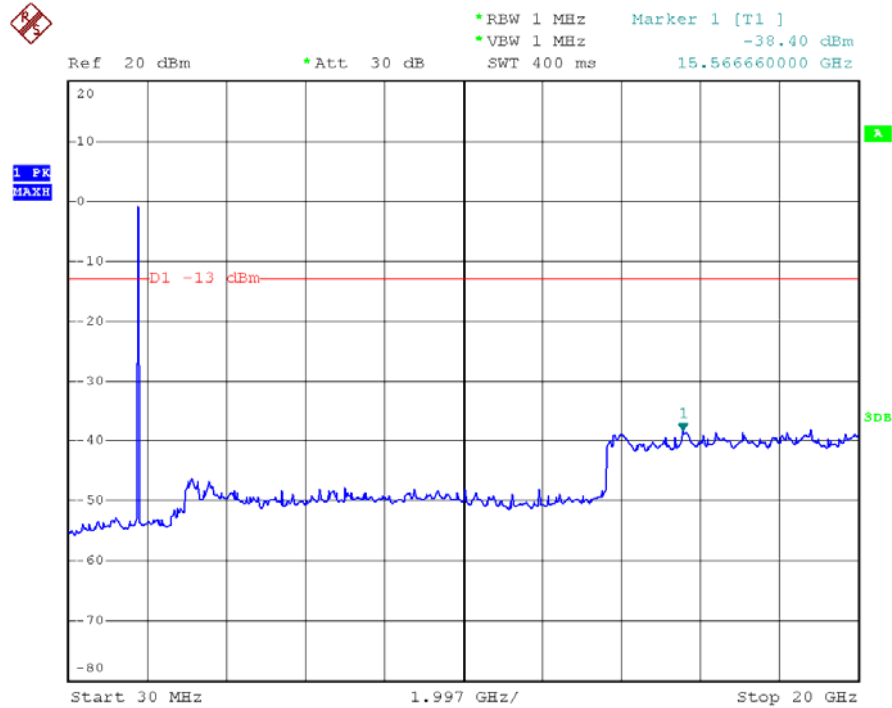


Date: 23.FEB.2013 16:39:46



EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Pressure:	1010 hPa	Test Voltage:	DC 6V
Test Mode:	TX CH 810		

**Conducted Spurious of Configuration GSM(GMSK) channel 810**



Date: 23.FEB.2013 16:40:24



#### **4.4 SPURIOUS RADIATED EMISSIONS MEASUREMENT**

##### **4.4.1 LIMIT**

In the FCC 24.238(a), 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 (1 to 0.001W). At 1W(Power Control Level 0) the specified minimum attenuation becomes 43dB and the limit of emission equal to  $-13\text{dBm}$ . At 0.001W(Power Control Level 15) the specified minimum attenuation becomes 13dB and the emission of limit equal to  $-13\text{dBm}$ . So the limit of emission is the same absolute specified line.

##### **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.

<b>Spectrum Parameters</b>	<b>Setting</b>
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).  $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$ .
7. Determine the level of spurious emissions using the following equation:  
 $\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:  
 $\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$
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-

$$\text{EIRP (dBm)} = \text{Signal Generator setting (dBm)} - \text{Cable Loss (dB)} + \text{Antenna Gain (dBi)}$$

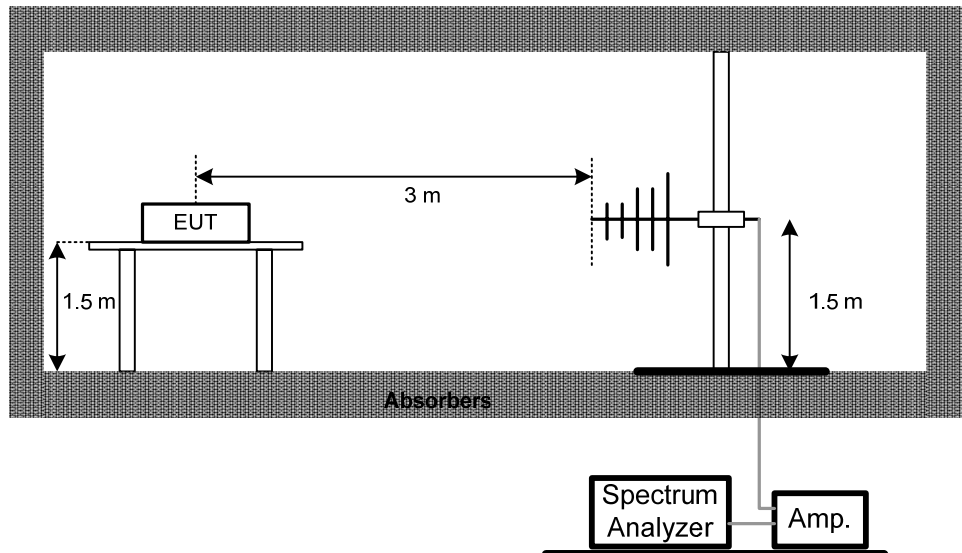
Example:

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

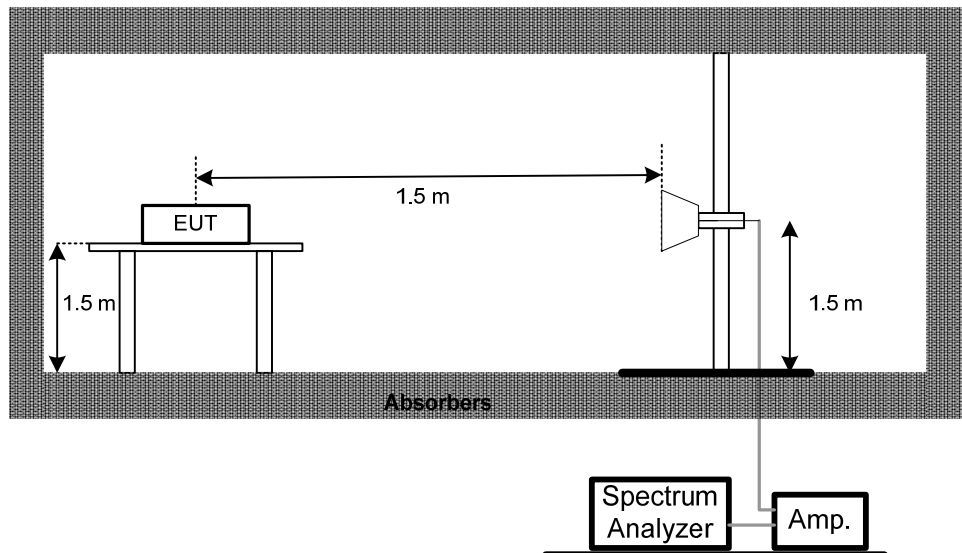


#### 4.4.5 TEST SETUP LAYOUT

##### 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 °C	Relative Humidity:	51 %
Test Voltage:	DC 6V	Phase:	Veitical
Test Mode:	TX CH512/661/810 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	1850.2	-	1880.0	-	1909.8	-
2	35.82	-57.71	49.40	-54.70	51.34	-58.55
3	101.78	-59.37	95.96	-60.05	94.02	-63.06
4	202.66	-67.24	208.48	-65.03	231.76	-67.37
5	246.40	-68.42	588.72	-66.26	596.48	-66.88
6	501.42	-68.27	831.22	-60.57	821.52	-60.03
7	854.50	-59.70	968.96	-61.13	939.86	-60.92
NF = Noise Floor						



EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Test Voltage:	DC 6V	Phase:	Horizontal
Test Mode:	TX CH512/661/810 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	1850.2	-	1880.0	-	1909.8	-
2	35.82	-56.25	59.10	-55.58	49.40	-56.88
3	95.96	-58.58	-115.36	-60.96	159.98	-61.91
4	123.12	-61.17	-503.36	-67.11	233.70	-65.08
5	641.10	-63.14	-596.48	-62.50	677.96	-63.51
6	763.32	-58.94	-683.78	-60.87	788.54	-57.97
7	965.08	-56.21	-891.36	-57.29	910.76	-56.14
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 °C	Relative Humidity:	51 %
Test Voltage:	DC 6V	Phase:	Veitical
Test Mode:	TX CH512/661/810 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	1850.2	-	1880.0	-	1909.8	-
2	3700.00	-40.67	3775.60	-43.00	3819.74	-41.87
3	5550.60	NF	5640.00	NF	5729.40	NF
4	7400.80	NF	7520.00	NF	7639.20	NF
5	9251.00	NF	9400.00	NF	9549.00	NF
6	11101.20	NF	11280.00	NF	11458.80	NF
7	12951.40	NF	13160.00	NF	13368.60	NF
8	14801.60	NF	15040.00	NF	15278.40	NF
9	16651.80	NF	16920.00	NF	17188.20	NF
10	18502.00	NF	18800.00	NF	19098.00	NF
NF = Noise Floor						



EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Test Voltage:	DC 6V	Phase:	Horizontal
Test Mode:	TX CH512/661/810 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	1850.2	-	1880.0	-	1909.8	-
2	3700.00	-43.65	3775.60	-43.56	3819.74	-42.50
3	5550.60	NF	5640.00	NF	5729.40	NF
4	7400.80	NF	7520.00	NF	7639.20	NF
5	9251.00	NF	9400.00	NF	9549.00	NF
6	11101.20	NF	11280.00	NF	11458.80	NF
7	12951.40	NF	13160.00	NF	13368.60	NF
8	14801.60	NF	15040.00	NF	15278.40	NF
9	16651.80	NF	16920.00	NF	17188.20	NF
10	18502.00	NF	18800.00	NF	19098.00	NF
NF = Noise Floor						



## **4.5 BAND EDGE MEASUREMENT**

### **4.5.1 LIMIT**

The PCS frequency bands refer to the FCC 24.229 rule. According to FCC 24.238(b) specified that power of any emission 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 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.

<b>Spectrum Parameters</b>	<b>Setting</b>
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 link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 512 and 810 (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 5 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**

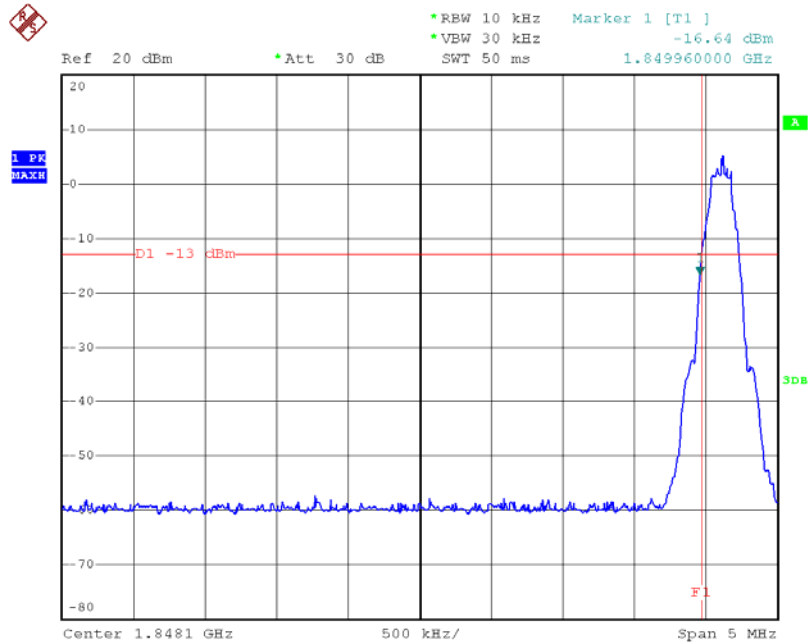
The BS simulator was used to set the TX channel and power level and modulate the TX signal.





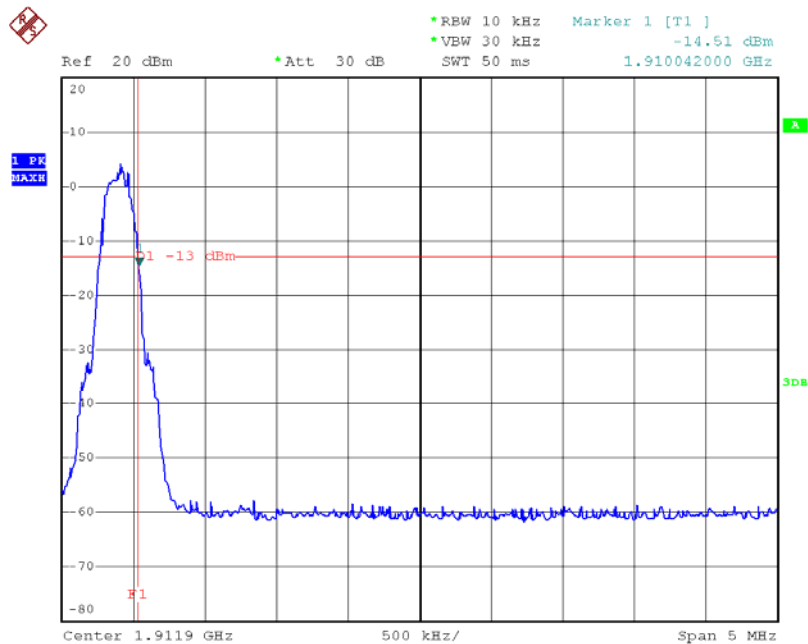
#### 4.5.7 TEST RESULTS OF BAND EDGE

##### Band Edge on Configuration GSM(GMSK) / Channel 512-CONDUCTED MODE



Date: 23.FEB.2013 16:37:57

##### Band Edge on Configuration GSM(GMSK) / Channel 810-CONDUCTED MODE



Date: 23.FEB.2013 16:33:44

## 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 0.1 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)  $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$ .

### 4.6.2 MEASURING INSTRUMENTS AND SETTING

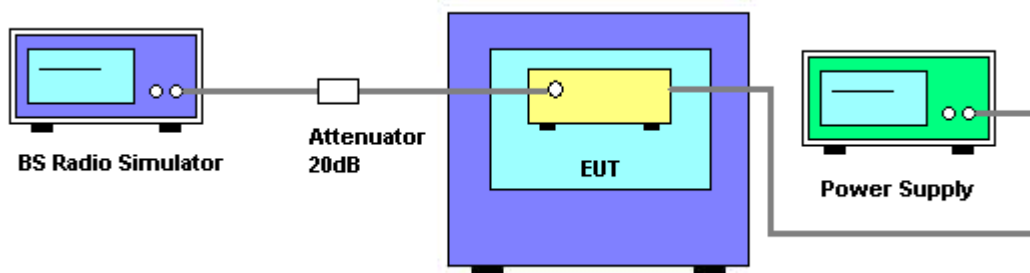
Please refer to section 5 in this report. The following table is the setting of the BS Simulator.

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  $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$ .

### 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 °C	Relative Humidity:	51 %
Pressure:	1010 hPa	Test Voltage:	DC 6V
Test Mode:	TX CH512 GSM(GMSK)		

##### Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
5.1	15	0.008107232	0.1
5.3	13	0.007026267	0.1
5.5	13	0.007026267	0.1
5.7	11	0.005945303	0.1
5.9	10	0.005404821	0.1
6.1	14	0.00756675	0.1
6.3	12	0.006485785	0.1
6.5	14	0.00756675	0.1
6.7	15	0.008107232	0.1
<b>6.9</b>	<b>13</b>	<b>0.007026267</b>	<b>0.1</b>
Max. Deviation (ppm)	<b>13</b>	<b>0.007026267</b>	<b>0.1</b>

##### Temperature vs. Frequency Stability

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
<b>50</b>	<b>18</b>	<b>0.009728678</b>	<b>0.1</b>
40	18	0.009728678	0.1
30	15	0.008107232	0.1
20	10	0.005404821	0.1
10	16	0.008647714	0.1
0	16	0.008647714	0.1
-10	15	0.008107232	0.1
-20	15	0.008107232	0.1
-30	14	0.00756675	0.1
Max. Deviation (ppm)	<b>18</b>	<b>0.009728678</b>	<b>0.1</b>



#### 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

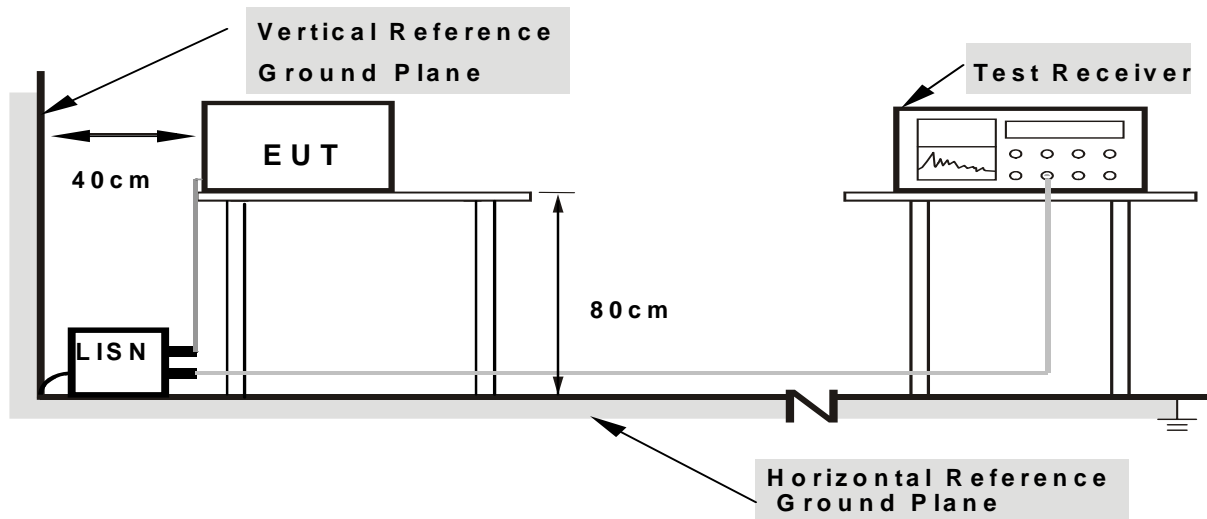
#### 4.8.3 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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 cm 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.

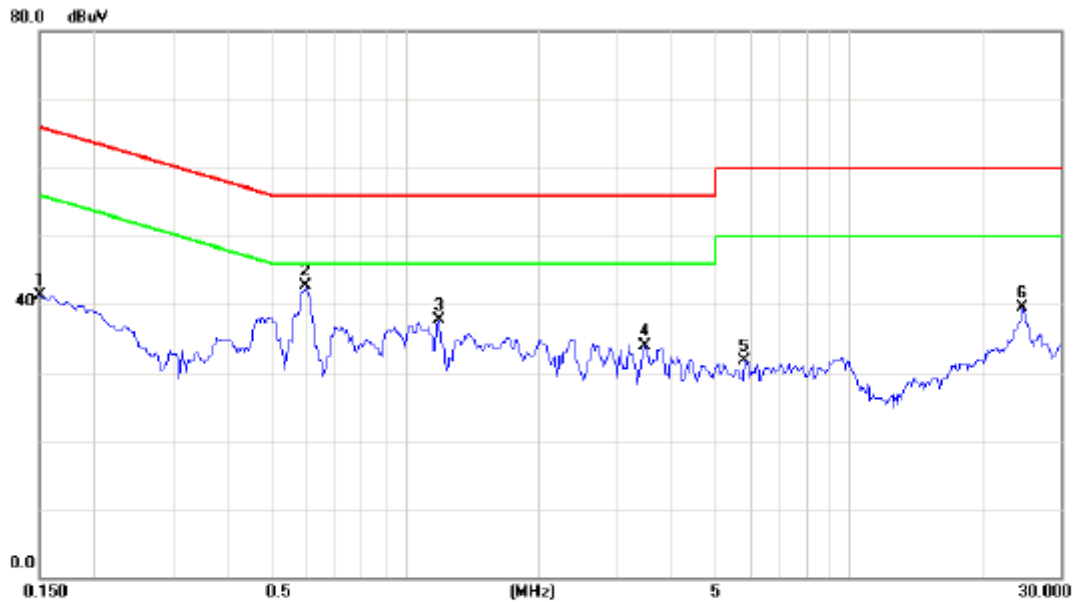
#### **4.8.7 TEST RESULTS**

##### **Remark**

- (1) All readings are QP Mode value unless otherwise stated AVG in column of <sup>ff</sup>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 °



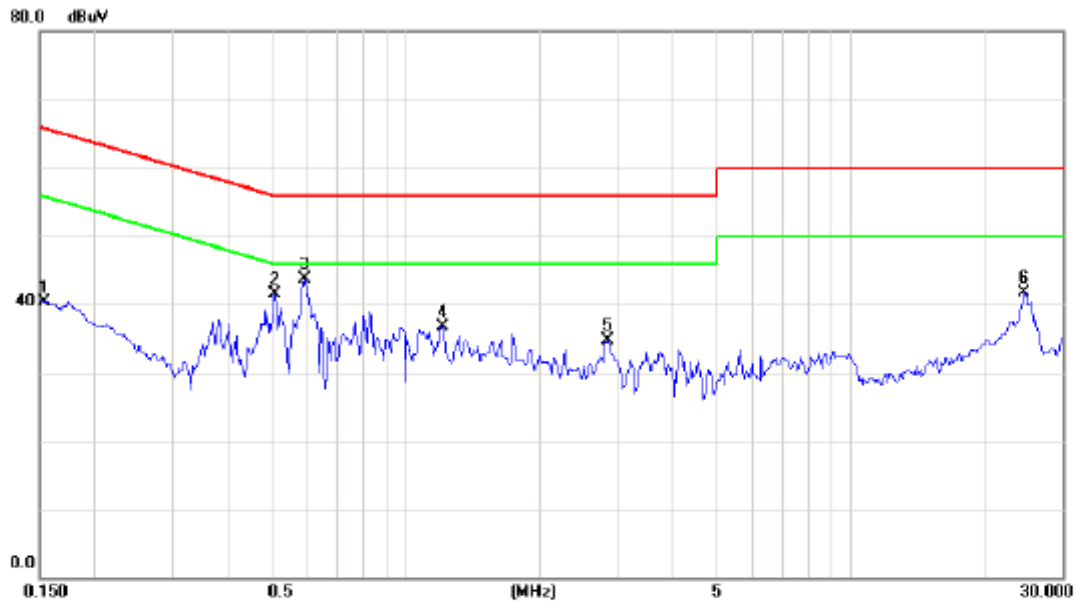
EUT:	Wireless GSM dialer (Smart Control)	Model Name:	WS210
Temperature:	23 °C	Relative Humidity:	51 %
Test Voltage:	AC 120V/60Hz	Phase:	Line
Test Mode:	GSM		



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over 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 °C	Relative Humidity:	51 %
Test Voltage:	AC 120V/60Hz	Phase:	Neutral
Test Mode:	GSM		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over 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**

