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Report No.: GZEM130900422201

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FCC ID: 2AA6LSMG9631

## **TEST REPORT**

<b>Application No.:</b>	GZEM1309004222RF
<b>Applicant:</b>	Bond Manufacturing CO INC
<b>FCC ID:</b>	2AA6LSMG9631
<b>Product Name:</b>	Moisture Meter
<b>Product Description:</b>	433.92MHz Transmitter
<b>Model No.:</b>	SMG9631
<b>Standards:</b>	47 CFR PART 15 SUBPART C:2012 section 231 ANSI C63.10:2009
<b>Date of Receipt:</b>	2013-09-09
<b>Date of Test:</b>	2013-11-11
<b>Date of Issue:</b>	2013-11-13
<b>Test Result :</b>	<b>PASS *</b>

\* In the configuration tested, the EUT detailed in this report complied with the standards specified above. Please refer to section 3 of this report for further details.



Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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## 2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2013-11-13		Original

Authorized for issue by:			
Tested By	 (Fred Zhu) /Project Engineer	2013-09-10 to 2013-11-11	Date
Prepared By	 (Fred Zhu) /Project Engineer	2013-11-11	Date
Checked By	 (Jeffrey Chen) /Reviewer	2013-11-13	Date

### 3 Test Summary

TEST	TEST REQUIREMENT	TEST METHOD	RESULT
Radiated Emission	FCC PART 15 section 15.231(e)	ANSI C 63.10: Clasue 6.4, 6.5 and 6.6	PASS
Occupied Bandwidth	FCC PART 15 section 15.231(c)	ANSI C 63.10: Clasue 6.9	PASS
Dwell Time	FCC PART 15 section 15.231(e)	FCC PART 15: Section 15.231(e)	PASS

**Remark:**

N/A: not applicable. Refer to the relative section for the details.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

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## 5 General Information

### 5.1 Client Information

Applicant: Bond Manufacturing CO INC  
Address of Applicant: 1700 W 4TH ST ANTIOCH CA 94509-1008

### 5.2 General Description of E.U.T.

Product Name: Moisture Meter  
Model No.: SMG9631

### 5.3 Details of E.U.T.

Modulation and Antenna Type: The Tx is a ASK modulation by internal signal with a integral antenna.  
Power Supply: DC 3.0 V (2 x 1.5 V 'AAA' batteries)  
Power cord: N/A

### 5.4 Description of Support Units

The EUT has been tested as an independent unit.

### 5.5 Deviation from Standards

None.

### 5.6 Abnormalities from Standard Conditions

None.

### 5.7 Other Information Requested by the Customer

None.

### 5.8 Test Location

All tests were performed at:  
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,  
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,  
Guangzhou, China 510663  
Tel: +86 20 82155555 Fax: +86 20 82075059  
No tests were sub-contracted.

## 5.9 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584, G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rule of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.

## 6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-08-30	2Y
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2014-05-06	1Y
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2014-03-04	1Y
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2014-05-09	1Y
EMC2025	Trilog Broadband Antenna 30-3000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9163	9163-450	2016-08-31	3Y
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2016-08-31	3Y
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2014-06-02	2Y
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2016-08-31	3Y
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2014-07-01	2Y
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2014-03-04	1Y
EMC2065	Amplifier	HP	8447F	N/A	2014-08-31	1Y
EMC2063	1-26GHz Pre Amplifier	Compliance Direction System Inc.	PAP-1G26-48	6279.628	2014-07-29	1Y
EMC0075	310N Amplifier	Sonama	310N	272683	2014-03-04	1Y
EMC0523	Active Loop Antenna	EMCO	6502	42963	2014-04-07	2Y
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2014-06-01	3Y
EMC2069	2.4GHz filter	Micro-Tronics	BRM 50702	149	2014-06-05	1Y
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2014-04-27	2Y

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0006	DMM	Fluke	73	70681569	2014-09-13	1Y
EMC0007	DMM	Fluke	73	70671122	2014-09-13	1Y

## 7 Test Results

### 7.1 E.U.T. test conditions

Test Voltage:	DC 3.0 V (new battery)
Requirements:	<b>15.31(e):</b> For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.
Operating Environment:	
Temperature:	22-25.0 °C
Humidity:	48-55% RH
Atmospheric Pressure:	1001-1010 mbar
Test frequencies and frequency range:	According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:  According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

#### Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

#### Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

Remark: Test frequency is 433.92MHz.

## 7.2 Antenna Requirement

### Standard requirement

15.203 requirement:

For intentional device. According to 15.203. an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### EUT Antenna

The antenna is an integral Antenna on the main PCB and no consideration of replacement. The best case gain of the antenna is 2 dBi.



**Test result: The unit does meet the FCC requirements.**

### 7.3 Radiated Emissions

<b>Test Requirement:</b>	FCC Part15 C section 15.231(e)
<b>Test Method:</b>	ANSI C63.10: Clause 6.4, 6.5 and 6.6
<b>Measurement Distance:</b>	3 m (Semi-Anechoic Chamber)
<b>Test Status:</b>	Test in transmitting mode.
<b>Requirements:</b>	the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequency MHz	Field Strength of Fundamental (dB $\mu$ V/m @ 3 m)	Field Strength of Harmonics and Spurious Emissions (dB $\mu$ V/m @ 3 m)
40.66 to 40.70	60.00	40.00
70 to 130	53.98	33.98
130 to 174	53.98 to 63.52	33.98 to 43.52
174 to 260	63.52	43.52
260 to 470	63.52 to 73.98	43.52 to 53.98
Above 470	73.98	53.98
<b>Detector:</b>	Peak for pre-scan QP for 30MHz to 1000 MHz: 120 kHz resolution bandwidth Peak for Above 1 GHz: 1 MHz resolution bandwidth	

\*\* linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\mu$ V/m at 3 meters =  $22.72727(F) - 2454.545$ ; for the band 260-470 MHz,  $\mu$ V/m at 3 meters =  $16.6667(F) - 2833.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level]

The fundamental frequency of the EUT is 433.92 MHz

The limit for average or QP field strength dB $\mu$ V/m for the fundamental emission= 72.87 dB $\mu$ V/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dB $\mu$ V/m for the spurious emission= 52.87 dB $\mu$ V/m. Spurious in the restricted bands must be less than 52.87 dB $\mu$ V/m or 15.209, whichever limit permits a higher field strength.

**Test Procedure:**

## 1) 9 kHz to 30 MHz emissions:

For testing performed with the loop antenna. The center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

## 2) 30 MHz to 1 GHz emissions:

For testing performed with the bi-log type antenna. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

## 3) 1 GHz to 40 GHz emissions:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz.

For testing performed with the horn antenna. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

**Detector:** For PK value:

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

## For AV value:

For other unwanted emissions:

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW = 10Hz

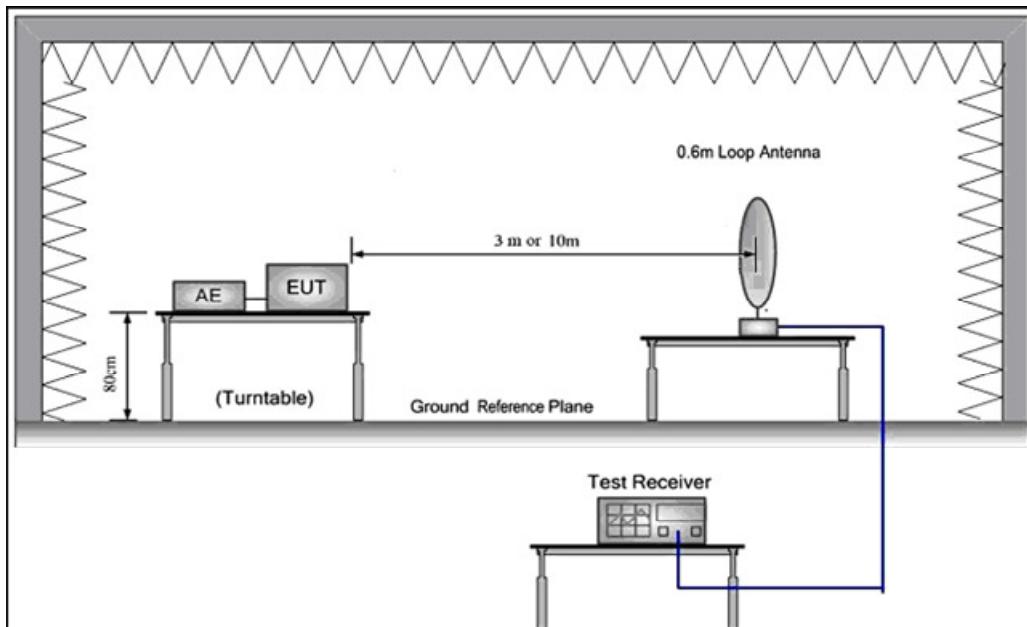
Sweep = auto

Detector function = peak

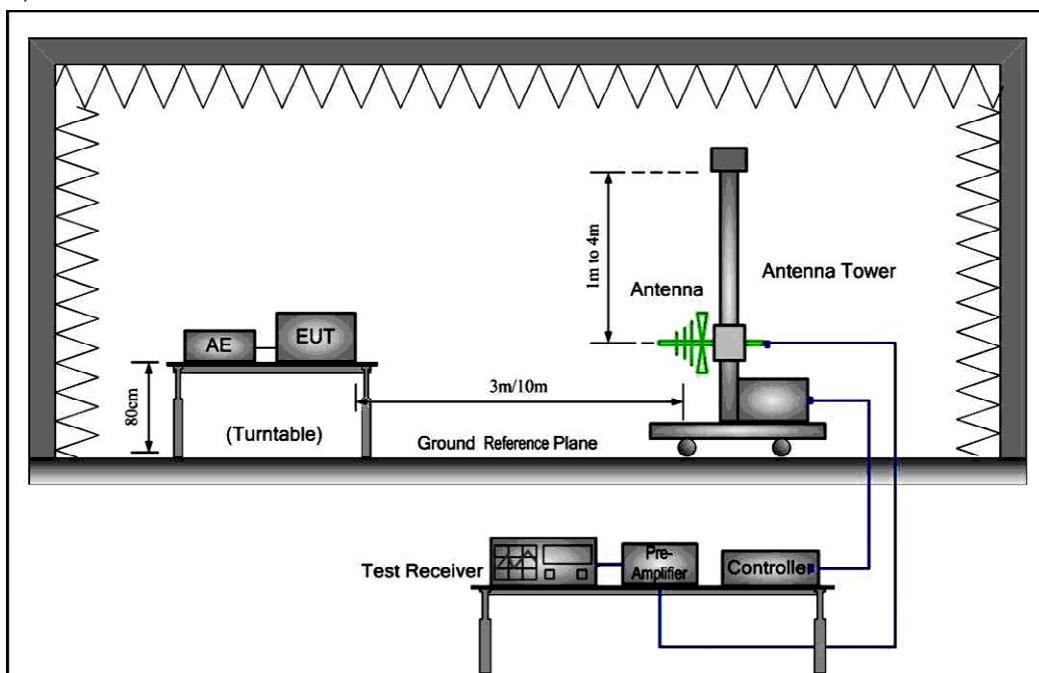
Trace = max hold

**Test Configuration:**

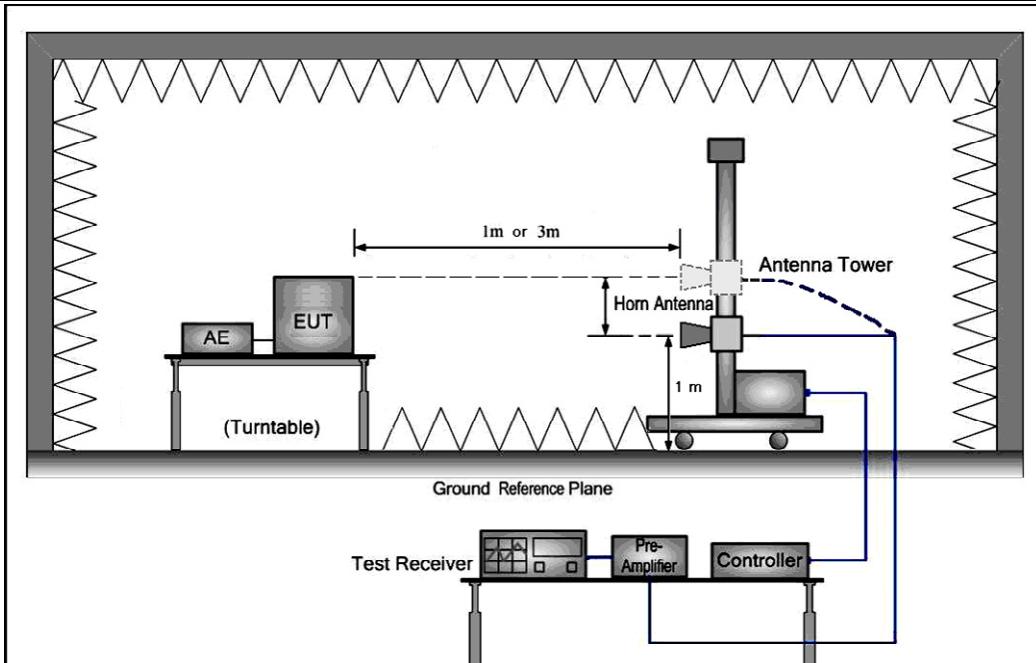
- 1) 9 kHz to 30 MHz emissions:



- 2) 30 MHz to 1 GHz emissions:



- 3) 1 GHz to 40 GHz emissions:



### 1) Fundamental emission:

#### Antenna polarization: Horizontal:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
433.92	83.18	16	1.8	27.86	73.12	92.87	-19.75	Peak
433.92	80.64	16	1.8	27.86	70.58	72.87	-2.29	Average

#### Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
433.92	77.16	16	1.8	27.86	67.10	92.87	-25.77	Peak
433.92	74.31	16	1.8	27.86	64.25	72.87	-8.62	Average

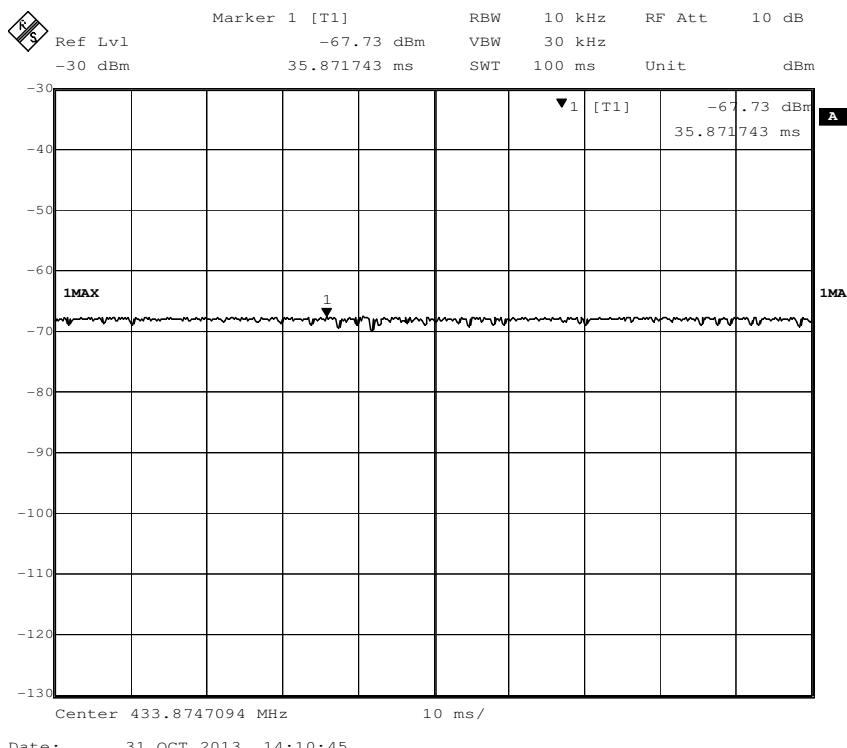
#### Antenna polarization: Vertical

Y: rotate EUT by 90° vertically.

X: rotate EUT by 90° clockwise.

Z: EUT as Radiated Emission test setup photograph in section 6 of this report.

Remark: Radiated Emission test setup photograph in section 6 of this report is the worst case and reported.



Duty cycle=100%

## 2) other emissions:

The receive was scanned from the lowest frequency generated within the EUT to 5 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. The worst case emissions were reported.

An initial pre-scan was performed in the 3 m chamber using the spectrum analyzer in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bilog antenna with 2 orthogonal polarities.

The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Peramplifier Factor.

The following test results were performed on the EUT.

Test the EUT in transmitting mode.:

### 9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

### 30 MHz~5 GHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

Horizontal.

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
249.35	42.78	11.40	1.3	31.21	24.27	43.5	-19.23	QP
308.91	41.55	16.58	2.6	31.26	29.47	46	-16.53	QP
866.00	48.04	21.47	4.0	31.13	42.38	46	-3.62	QP
1302.060	77.08	25.53	4.98	49.83	57.76	74	-16.24	Peak
1302.060	72.98	25.53	4.98	49.83	53.66	54	-0.34	Average
2605.477	65.37	27.8	7.22	49.39	51	74	-23	Peak
2605.477	63.71	27.8	7.22	49.39	49.34	54	-4.66	Average
3040.803	62.02	28.57	8.01	49.3	49.3	74	-24.7	Peak
3040.803	59.86	28.57	8.01	49.3	47.14	54	-6.86	Average
3475.384	70.13	28.85	8.86	49.3	58.54	74	-15.46	Peak
3475.384	65.19	28.85	8.86	49.3	53.6	54	-0.4	Average
3914.953	66.72	29.76	10.71	49.3	57.89	74	-16.11	Peak
3914.953	61.97	29.76	10.71	49.3	53.14	54	-0.86	Average

Vertical.

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
179.24	32.54	11.93	0.90	31.53	13.84	43.5	-29.66	QP
284.63	41.21	14.50	2.50	31.11	27.10	46	-18.90	QP
866.22	48.29	20.62	3.90	31.03	41.78	46	-4.22	QP
1302.060	75.85	25.53	4.98	49.83	56.53	74	-17.47	Peak
1302.060	71.74	25.53	4.98	49.83	52.42	54	-1.58	Average
2001.041	65.14	26.13	6.35	49.56	48.06	74	-25.94	Peak
2001.041	63.08	26.13	6.35	49.56	46.00	54	-80.00	Average
2605.477	62.67	27.8	7.22	49.39	48.30	74	-25.70	Peak
2605.477	61.02	27.8	7.22	49.39	46.65	54	-7.35	Average
3475.384	68.30	28.85	8.86	49.3	56.71	74	-17.29	Peak
3475.384	65.04	28.85	8.86	49.3	53.45	54	-0.55	Average
3914.953	64.26	29.76	10.71	49.3	55.43	74	-18.57	Peak
3914.953	61.41	29.76	10.71	49.3	52.58	54	-1.42	Average

## Remark:

According to 15.35 (b) When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules, e.g., see Section 15.255.

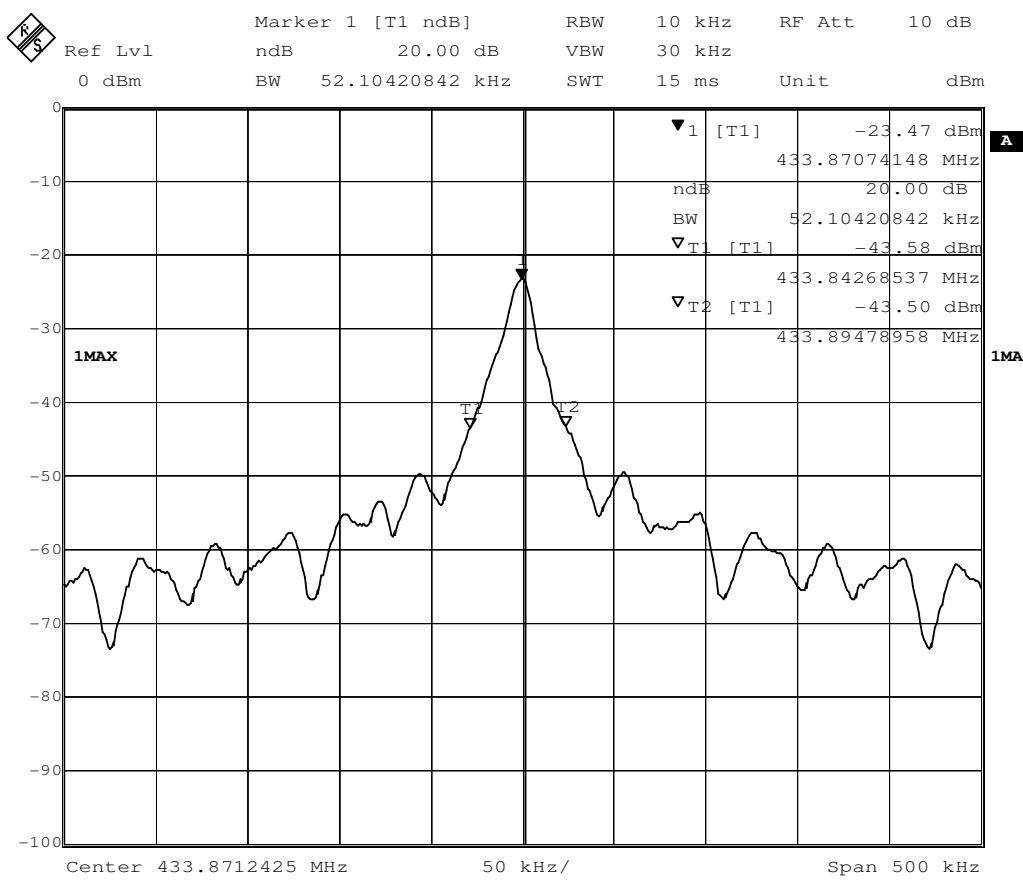
## 7.4 Occupied Bandwidth

Test Requirement: FCC Part 15 C section 15.231 (c)  
Test Method: ANSI C63.10: Clause 6.9  
Test Status: Test in transmitting mode at lowest and highest channel.  
Requirements: 15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.  
Method of measurement: The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector. Record the 20 dB bandwidth of the carrier.

Test result:

Test Channel	bandwidth	Limit
433.92MHz	52.10 kHz	1.08 MHz

Test plot:



Date: 23.SEP.2013 14:11:42

## 7.5 Dwell Time:

Test Requirement: FCC Part 15 C section 15.231(e)

Test Method: FCC Part 15 C section 15.231(e)

Test Status: Test in transmitting mode.

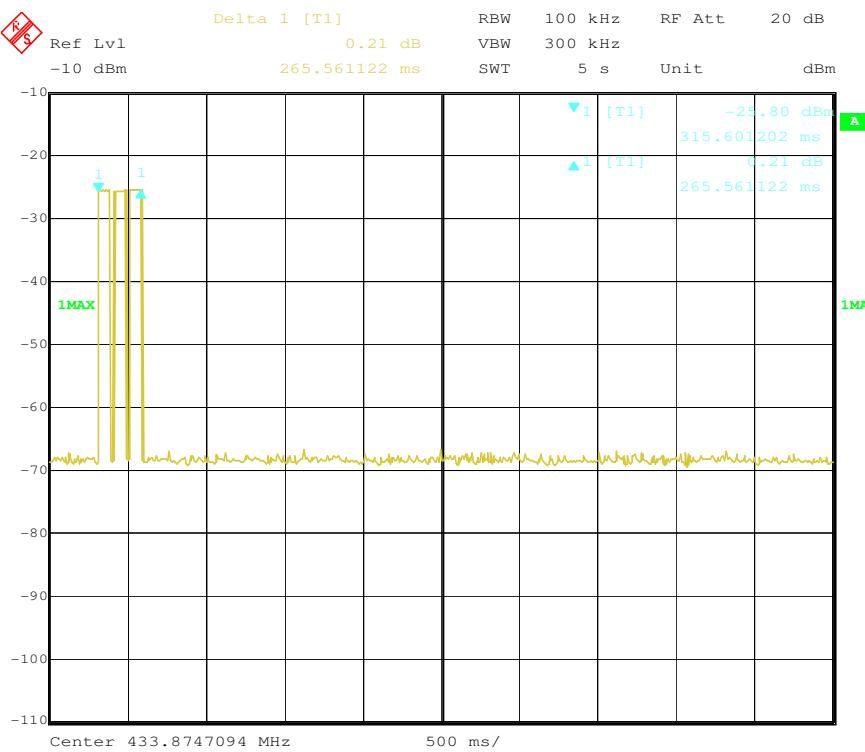
### Requirements:

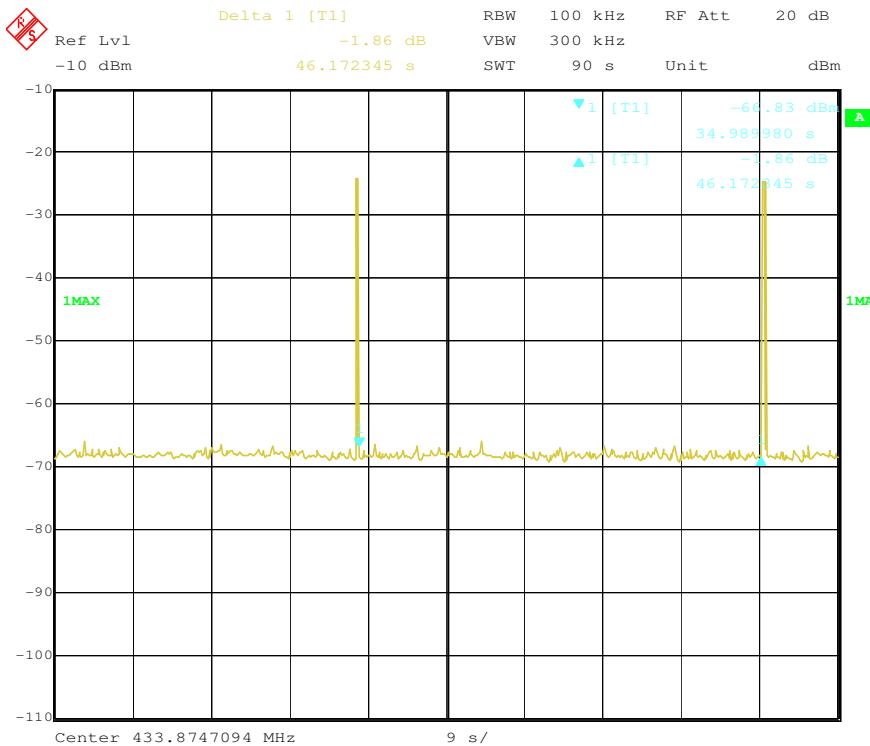
**1. Regulation 15.231 (e)** In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### Result:

Item	Duration of each transmission (Td)	Silent period between transmissions(Ts)
Time	0.27 s	46.17 s
Limit	$\leq 1$ s	$\geq 10$ s and $30^*Td$

Result plot as follows:





--The End of Report--