

FCC Radio Test Report

FCC ID: WA5WH16H

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

Project No. : 1503C145
Equipment : Weather Station
Model Name : WH16H
Applicant : Fine Offset Electronics Co., LTD
Address : 2/F., Building no.3, Ping Shan Mingqi Industrial Park,
Xili Town, Nanshan Distri. Shenzhen, Guangdong,
China

Date of Receipt : Mar. 18, 2015
Date of Test : Mar. 18, 2015 ~ Mar. 31, 2015
Issued Date : Apr. 02, 2015
Tested by : BTL Inc.

Testing Engineer : David Mao
(David Mao)

Technical Manager : Leo Hung
(Leo Hung)

Authorized Signatory : Steven Lu
(Steven Lu)

B T L I N C .

No.3,Jinshagang 1st Road, Shixia,Dalang Town, Dongguan,
Guangdong, China.

TEL: +86-769-8318-3000FAX: +86-769-8319-6000



Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

BTL's reports must not be used by the client to claim product endorsement by the authorities or any agency of the Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL's** authorized written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

| Table of Contents | Page |
|--|-------------|
| 1 . CERTIFICATION | 6 |
| 2 . SUMMARY OF TEST RESULTS | 7 |
| 2.1 TEST FACILITY | 8 |
| 2.2 MEASUREMENT UNCERTAINTY | 8 |
| 3 . GENERAL INFORMATION | 9 |
| 3.1 GENERAL DESCRIPTION OF EUT | 9 |
| 3.2 DESCRIPTION OF TEST MODES | 10 |
| 3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED | 11 |
| 3.4 DESCRIPTION OF SUPPORT UNITS | 11 |
| 4 . EMC EMISSION TEST | 12 |
| 4.1 CONDUCTED EMISSION MEASUREMENT | 12 |
| 4.1.1 POWER LINE CONDUCTED EMISSION LIMITS | 12 |
| 4.1.2 TEST PROCEDURE | 12 |
| 4.1.3 DEVIATION FROM TEST STANDARD | 12 |
| 4.1.4 TEST SETUP | 13 |
| 4.1.5 EUT OPERATING CONDITIONS | 13 |
| 4.1.6 EUT TEST CONDITIONS | 13 |
| 4.1.7 TEST RESULTS | 13 |
| 4.2 RADIATED EMISSION MEASUREMENT | 14 |
| 4.2.1. FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT LIMIT 14 | |
| 4.2.2. MEASURING INSTRUMENTS AND SETTING (FIELD STRENGTH OF FUNDAMENTAL EMISSIONS) | 14 |
| 4.2.3 RADIATED EMISSIONS MEASUREMENT | 15 |
| 4.2.4. DWELL TIME OF PERIODIC OPERATION MEASUREMENT | 16 |
| 4.2.5. TEST PROCEDURE | 18 |
| 4.2.6. DEVIATION FROM TEST STANDARD | 18 |
| 4.2.7. TEST SETUP | 18 |
| 4.2.8. EUT OPERATING CONDITIONS | 19 |
| 4.2.9. EUT TEST CONDITIONS | 19 |
| 4.2.7 TEST RESULTS (9KHz to 30MHz) | 20 |
| 4.2.8 TEST RESULTS (30MHZ to 1000MHZ) | 20 |
| 4.2.8 TEST RESULTS (Above 1000 MHz) | 20 |
| 5. 20dB SPECTRUM BANDWIDTH MEASUREMENT | 21 |
| 5.1.MEASURING INSTRUMENTS AND SETTING | 21 |
| 5.2.TEST PROCEDURES | 21 |
| 5.3. TEST SETUP LAYOUT | 21 |
| 5.4. TEST DEVIATION | 21 |

| Table of Contents | Page |
|---|-------------|
| 5.5. EUT OPERATION DURING TEST | 22 |
| 5.6. EUT TEST CONDITIONS | 22 |
| 5.7. TEST RESULTS | 22 |
| 6. TIMING TESTING | 23 |
| Limit | 23 |
| 6.1. MEASURING INSTRUMENTS AND SETTING | 23 |
| 6.2. TEST PROCEDURES | 23 |
| 6.3. TEST SETUP LAYOUT | 23 |
| 6.4. TEST DEVIATION | 23 |
| 6.5. EUT OPERATION DURING TEST | 23 |
| 6.6. EUT OPERATION DURING TEST | 24 |
| 6.7. TEST RESULTS | 24 |
| 7. MEASUREMENT INSTRUMENTS LIST AND SETTING | 25 |
| 8. EUT TEST PHOTO | 26 |
| ATTACHMENT A - CONDUCTED EMISSION | 29 |
| ATTACHMENT B - RADIATED EMISSION (9KHz to 30MHz) | 30 |
| ATTACHMENT C - RADIATED EMISSION (30MHz to 1000MHz) | 32 |
| ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHz) | 37 |
| ATTACHMENT E - 20dB SPECTRUM BANDWIDTH | 40 |
| ATTACHMENT F - TIMING TESTING | 42 |

REPORT ISSUED HISTORY

| Issued No. | Description | Issued Date |
|---------------------|-----------------|---------------|
| BTL-FCCP-1-1503C145 | Original Issue. | Apr. 02, 2015 |

1. CERTIFICATION

Equipment : Weather Station
Trade Name : N/A
Model Name : WH16H
Applicant : Fine Offset Electronics Co., LTD
Manufacturer : Fine Offset Electronics Co., LTD
Address : 2/F., Building no.3, Ping Shan Mingqi Industrial Park, Xili Town, Nanshan
Distri. Shenzhen, Guangdong, China
Date of Test : Mar. 18, 2015 ~ Mar. 31, 2015
Test Sample : ENGINEERING SAMPLE
Standard(s) : FCC Part15, Subpart C(15.231)/ ANSI C63.4-2009

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1503C145) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| FCC Part15, Subpart C (15.231) | | | |
|---------------------------------------|-------------------------------------|----------|--------|
| Standard(s) Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | - | N/A |
| 15.209& 15.231(e) | Radiated Spurious Emission | PASS | |
| 15.231(c) | 20dB Occupied Bandwidth Measurement | PASS | |

NOTE:

- (1) "N/A" denotes test is not applicable in this test report.
- (2) EUT is used new battery.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-CB03** at the location of No.3,Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.523792
BTL's test firm number for FCC319330;

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. Radiated Measurement :

| Test Site | Method | Measurement Frequency Range | Ant. H / V | U,(dB) | Note |
|-----------|--------|-----------------------------|------------|--------|------|
| DG-CB03 | CISPR | 9KHz~30MHz | V | 3.79 | |
| | | 9KHz~30MHz | H | 3.57 | |
| | | 30MHz~200MHz | V | 3.82 | |
| | | 30MHz~200MHz | H | 3.60 | |
| | | 200MHz~ 1,000MHz | V | 3.86 | |
| | | 200MHz~ 1,000MHz | H | 3.94 | |
| | | 1GHz~18GHz | V | 3.12 | |
| | | 1GHz~18GHz | H | 3.68 | |
| | | 18GHz~40GHz | V | 4.15 | |
| | | 18GHz~40GHz | H | 4.14 | |

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | | |
|---------------------|------------------------|--------------------------------|
| Equipment | Weather Station | |
| Trade Name | N/A | |
| Model Name | WH16H | |
| Model Difference | N/A | |
| Product Description | Product Type | Low Power Communication Device |
| | Operation Frequency | 433.92 MHz |
| | Modulation Type | ASK |
| | Number Of Channel | 1CH, please see note 2. |
| | Antenna Designation | Integral antenna |
| | Field Strength | 71.23 dBuV/m (AV Max.) |
| Power Source | Supplied from battery. | |
| Power Rating | I/P DC 3V | |

Note:

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

| Channel | Frequency (MHz) |
|---------|-----------------|
| 01 | 433.92 |

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 possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|--------------|-----------------|
| Mode 1 | TX CH 433.92MHz |

| For Conducted Test | |
|--------------------|--|
| Final Test Mode | Description |
| - | "N/A" denotes test is not applicable in this test report |

| For Radiated Test | |
|-------------------|-----------------|
| Final Test Mode | Description |
| Mode 1 | TX CH 433.92MHz |

Note: EUT is used new battery.

3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.4 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 | Weather Station | N/A | WH2073 | N/A | N/A | - |

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

Note:

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

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 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.

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 |

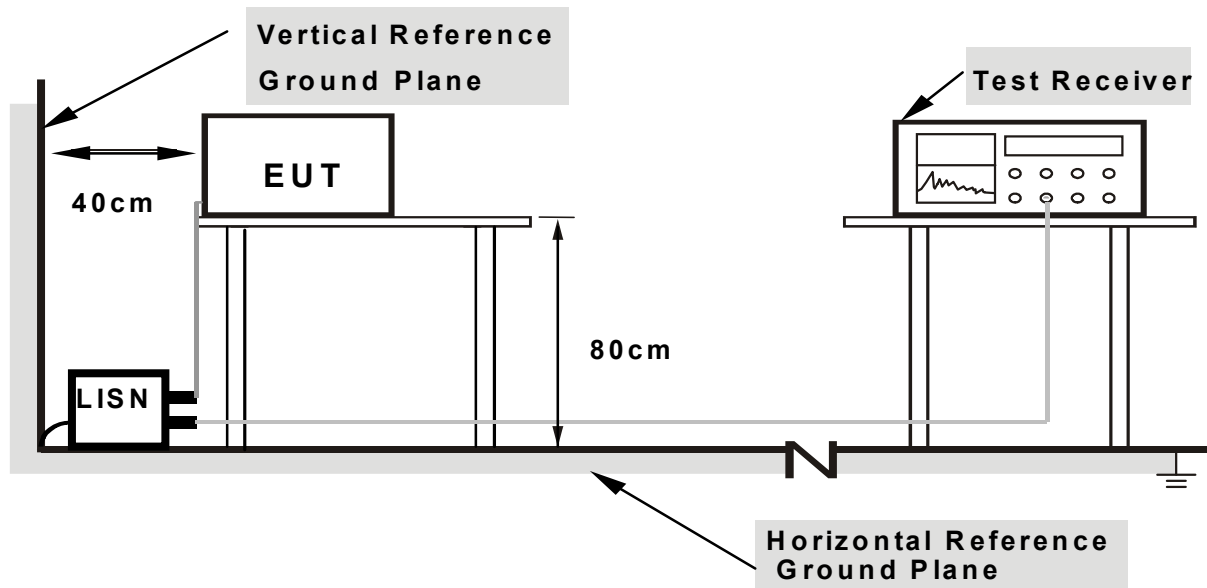
4.1.2 TESTPROCEDURE

- a. The EUT was placed 0.4 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 groundplane 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.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TESTSETUP



- 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

4.1.5EUT 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.

4.1.6EUT TEST CONDITIONS

Temperature: N/A
 Relative Humidity: N/A
 Test Voltage: N/A

4.1.7TEST RESULTS

Please refer to the Attachment A.

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

4.2 RADIATED EMISSION MEASUREMENT

4.2.1. FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT LIMIT

| Frequency Band (MHz) | Fundamental Emissions Limit (uV/m) at 3m |
|----------------------|--|
| 40.66-40.70 | 1000 |
| 70-130 | 500 |
| 130-174 | 500-1500(**) |
| 174-260 | 1500 |
| 260-470 | 1500-5000(**) |
| Above 470 | 5000 |

**1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1) for the band 130 - 174 MHz, $\mu\text{V/m}$ at 3 meters = $22.72727 \times (\text{operating frequency, MHz}) - 2454.545$;

(2) for the band 260 - 470 MHz, $\mu\text{V/m}$ at 3 meters = $16.6667 \times (\text{operating frequency, MHz}) - 2833.3333$.

So the field strength of emission limits have been calculated in below table.

| Carrier Frequency (MHz) | Fundamental Emissions Limit (dBuV/m) at 3m |
|-------------------------|--|
| 433.92 MHz | 72.87 (Average) |
| 433.92 MHz | 92.87 (Peak) |

4.2.2. MEASURING INSTRUMENTS AND SETTING (FIELD STRENGTH OF FUNDAMENTAL EMISSIONS)

| Receiver Parameter | Setting |
|--------------------|-----------------------|
| Attenuation | Auto |
| Center Frequency | Fundamental Frequency |
| RBW | 120 kHz |
| Detector | Peak / Average |

4.2.3 RADIATED EMISSIONS MEASUREMENT

Devices complying with 47 CFR FCC part 15 subpart C, section 15.231(e). The field strength of emissions from intentional radiators at 3 meters operated under this Section shall not exceed the following:

| Frequency Band (MHz) | Spurious Emissions Limit(μV/m) at 3m |
|----------------------|--------------------------------------|
| 40.66-40.70 | 100 |
| 70-130 | 50 |
| 130-174 | 50-150(**) |
| 174-260 | 150 |
| 260-470 | 150-500(**) |
| Above 470 | 500 |

**1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1) for the band 130 - 174 MHz, $\mu\text{V/m}$ at 3 meters = $22.72727 \times (\text{operating frequency, MHz}) - 2454.545$;

(2) for the band 260 - 470 MHz, $\mu\text{V/m}$ at 3 meters = $16.6667 \times (\text{operating frequency, MHz}) - 2833.3333$.

(3) The maximum permitted unwanted emissions level is 20 dB below the maximum permitted fundamental level. In addition field strength of any emissions which appear inside of the restriction band shall not exceed the general radiated emissions limits in Section 15.209(a).

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009~0.490 | $2400/F(\text{KHz})$ | 300 |
| 0.490~1.705 | $24000/F(\text{KHz})$ | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

| Receiver Parameter | Setting |
|------------------------|-----------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~90kHz for PK/AVG detector |
| Start ~ Stop Frequency | 90kHz~110kHz for QP detector |
| Start ~ Stop Frequency | 110kHz~490kHz for PK/AVG detector |
| Start ~ Stop Frequency | 490kHz~30MHz for QP detector |
| Start ~ Stop Frequency | 30MHz~1000MHz for QP detector |

| Spectrum Parameter | Setting |
|---------------------------------------|--|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (emission in restricted band) | 1MHz / 1MHz for Peak, for above 1GHz |
| RB / VB (other emission) | 100KHz / 100KHz for peak for 30MHz to 1GHz |

4.2.4. DWELL TIME OF PERIODIC OPERATION MEASUREMENT

$$\text{Duty Cycle} = T_{\text{ON}} / (T_{\text{ON}} + T_{\text{OFF}})$$

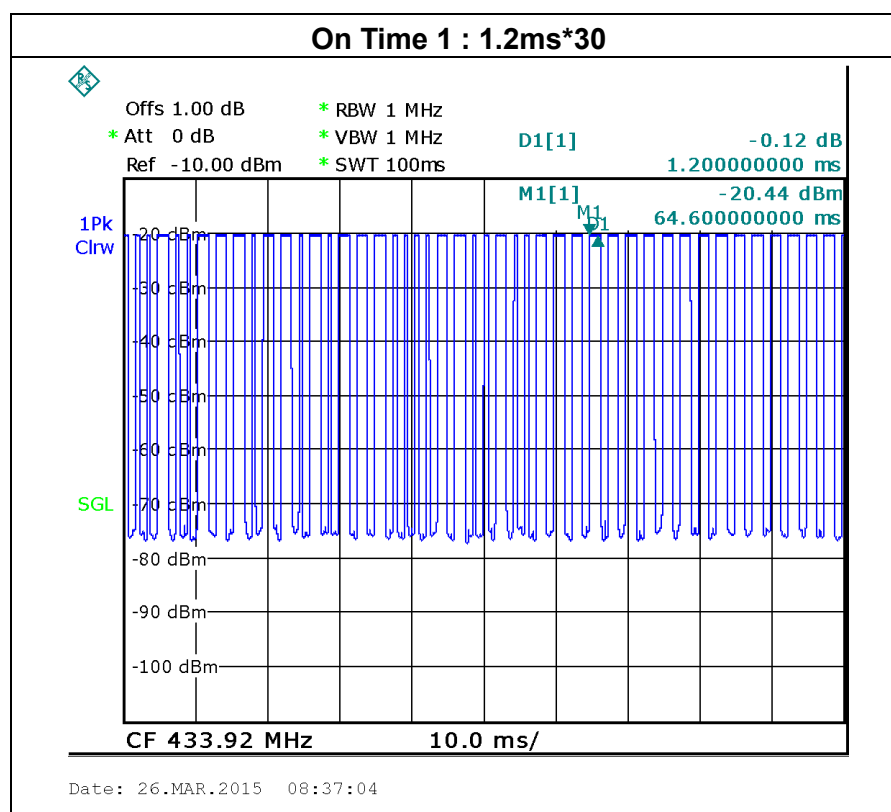
$$T_{\text{ON}}: 1.2 \times 30 + 0.6 \times 15 = 45 \text{ms}$$

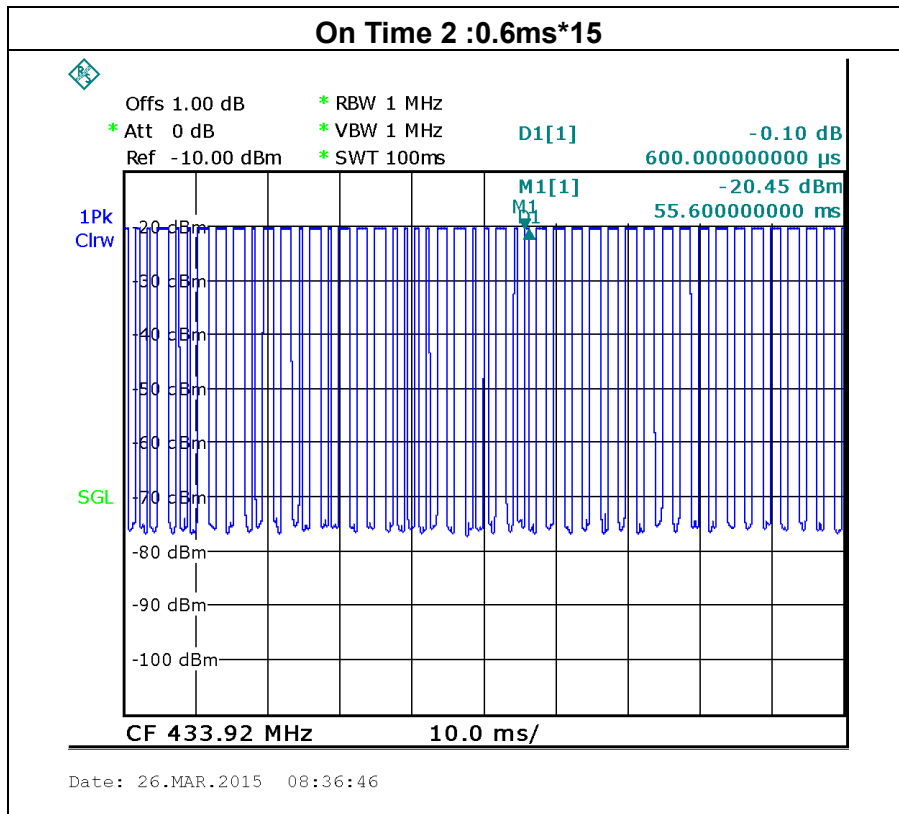
$$T_{\text{ON}} + T_{\text{OFF}} = (\text{total time}) = 100 \text{ms}$$

$$\text{Duty Cycle} = 45/100 \text{ms} = 45\%$$

$$AV = PK + 20 \log(\text{Duty Cycle})$$

$$AV = PK - 6.94$$





4.2.5. TEST PROCEDURE

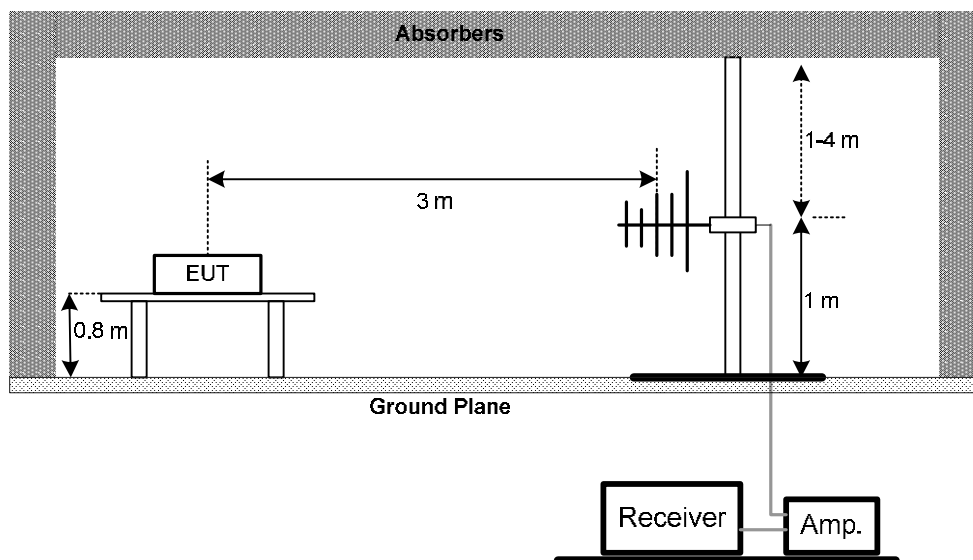
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3mmeter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
- G. For above 1GHz, the EUT was placed on the top of a rotating table 1.5m above the ground at a 3m full-anechoic chamber.

4.2.6. DEVIATIONFROMTESTSTANDARD

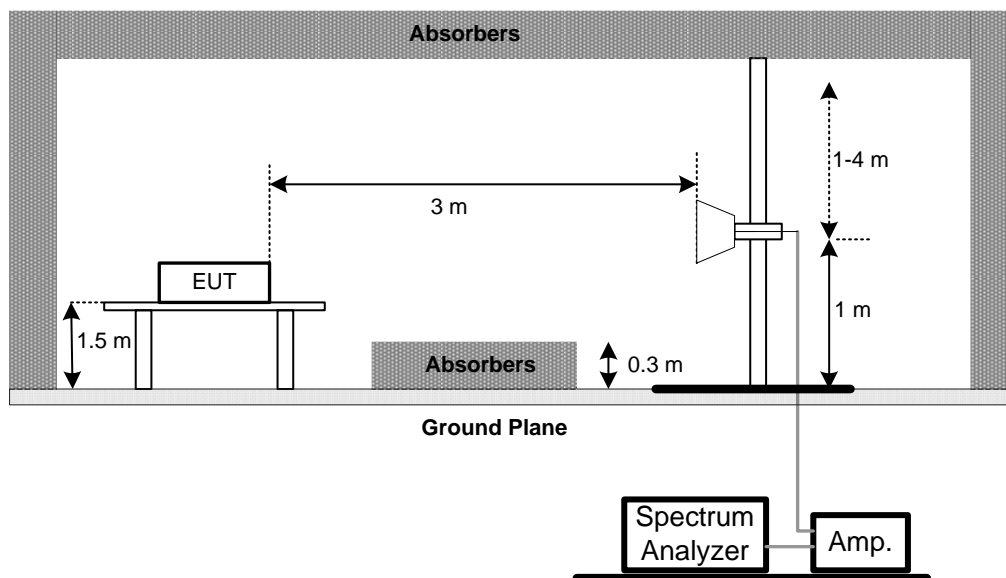
No deviation

4.2.7. TESTSETUP

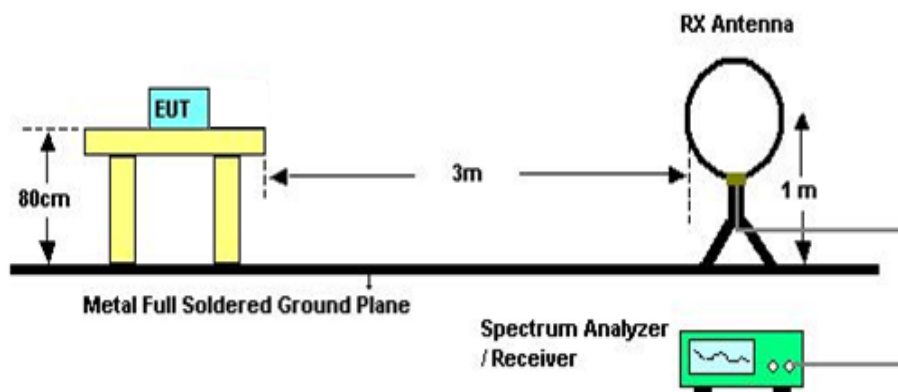
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) For radiated emissions below 30MHz



4.2.8.EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

4.2.9.EUT TEST CONDITIONS

- Temperature: 25°C
- Relative Humidity: 55%
- Test Voltage: DC 3V

4.2.7 TEST RESULTS (9KHz to 30MHz)

Please refer to the Attachment B.

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = $40 \log$ (specific distance / test distance) (dB);
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor..

4.2.8 TEST RESULTS(30MHZ to 1000MHZ)

Please refer to the Attachment C.

Remark:

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (3) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (4) EUT Orthogonal Axis:
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (5) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (6) The EUT orthogonal axis x, y,z are tested, only worse result ("x" axis) are reported.

4.2.8 TEST RESULTS(Above 1000 MHz)

Please refer to the Attachment D.

Remark:

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (3) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (4) EUT Orthogonal Axis:
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (5) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (6) The EUT orthogonal axis x, y,z are tested, only worse result ("x" axis) are reported.

5. 20dB SPECTRUM BANDWIDTH MEASUREMENT

Limit

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. So the emission bandwidth limits have been calculated in below table.

| Fundamental Frequency | 20dB Bandwidth Limits (MHz) |
|-----------------------|-----------------------------|
| 433.92 MHz | 1.0848 |

5.1.MEASURING INSTRUMENTS AND SETTING

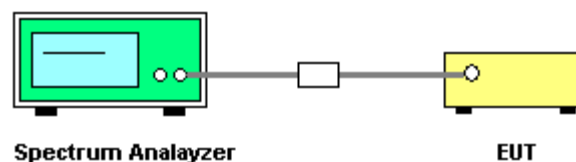
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---------------------|------------------|
| Attenuation | Auto |
| Span Frequency | > 20dB Bandwidth |
| RB | 10 kHz |
| VB | 10 kHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

5.2.TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 10 kHz and the video bandwidth of 10 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

5.3. TEST SETUP LAYOUT



5.4. TEST DEVIATION

There is no deviation with the original standard.

5.5. EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

5.6. EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: DC 3V

5.7. TEST RESULTS

Please refer to the Attachment E.

.

6. TIMING TESTING

Limit

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.

6.1. MEASURING INSTRUMENTS AND SETTING

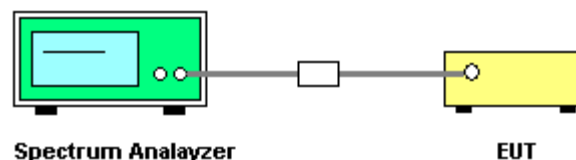
Please refer to section 6 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---------------------|-------------|
| Attenuation | Auto |
| Span Frequency | Zero Span |
| RB | 1MHz |
| VB | 1MHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | 300 seconds |

6.2. TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 1MHz and the video bandwidth of 1MHz were used.

6.3. TEST SETUP LAYOUT



6.4. TEST DEVIATION

There is no deviation with the original standard.

6.5. EUT OPERATION DURING TEST

The EUT was programmed to be in normal mode.

6.6. EUT OPERATION DURING TEST

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: DC 3V

6.7 TEST RESULTS

Please refer to the Attachment F.

·
·

7. MEASUREMENT INSTRUMENTS LIST AND SETTING

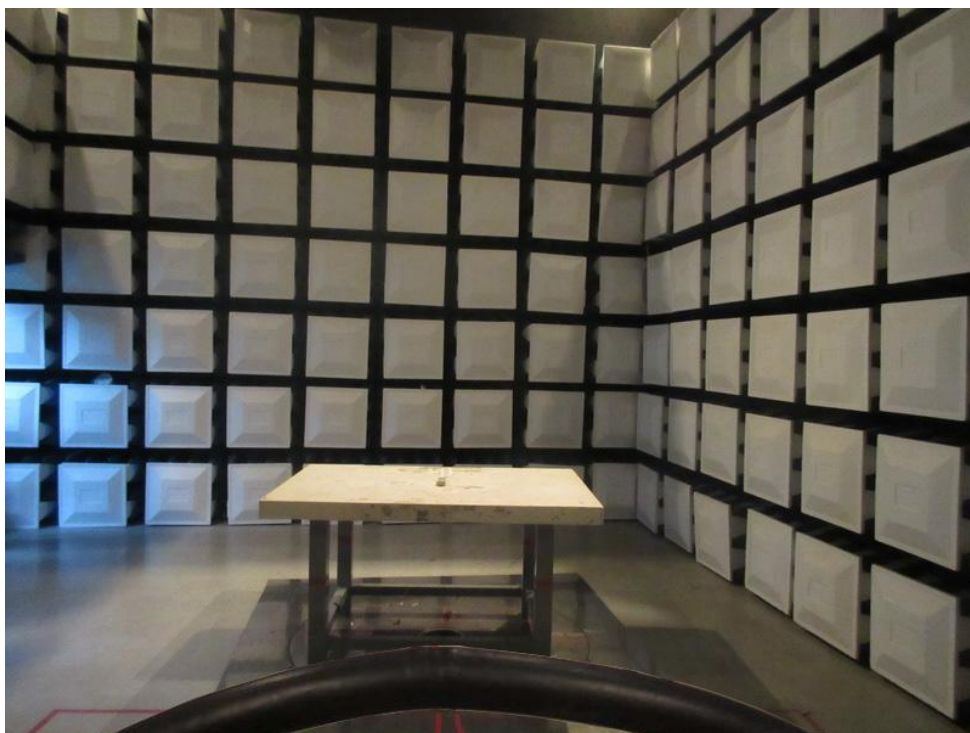
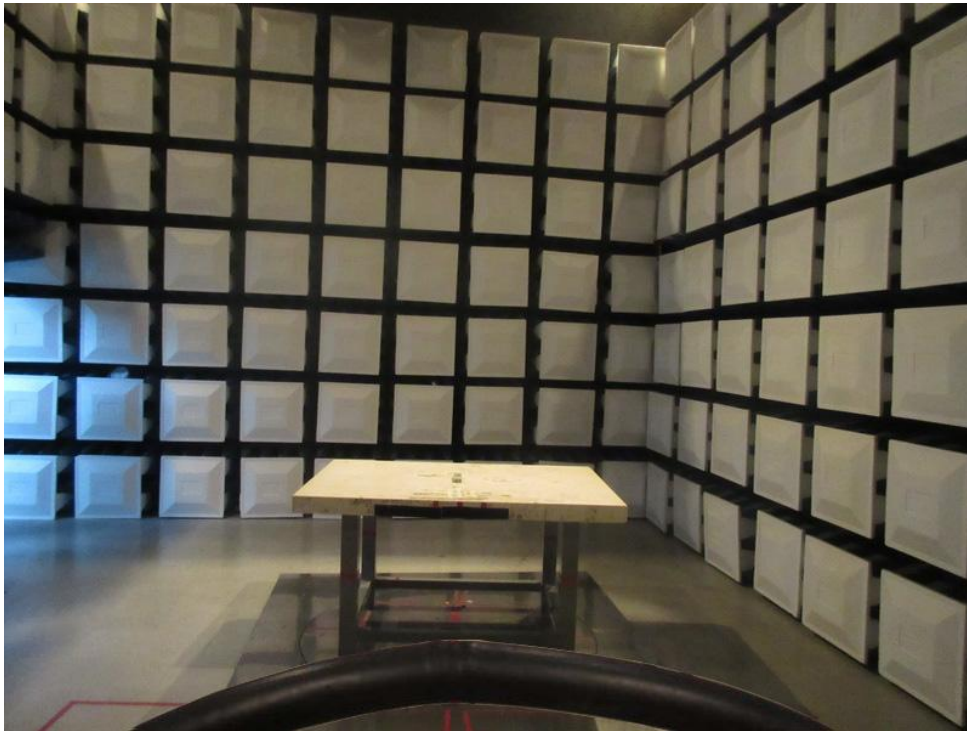
| Radiated Emission Measurement | | | | | |
|-------------------------------|-------------------------|--------------|-----------|------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | Antenna | Schwarzbeck | VULB9160 | 9160-3232 | Mar. 28, 2016 |
| 2 | Amplifier | HP | 8447D | 2944A09673 | Mar. 28, 2016 |
| 3 | Receiver | AGILENT | N9038A | MY52130039 | Aug. 23,2015 |
| 4 | Test Cable | N/A | C-01_CB03 | N/A | Jul. 01, 2015 |
| 5 | Antenna | ETS | 3115 | 00075789 | Mar. 28, 2016 |
| 6 | Amplifier | Agilent | 8449B | 3008A02274 | Mar. 28, 2016 |
| 7 | Receiver | AGILENT | N9038A | MY52130039 | Aug. 23,2015 |
| 8 | Test Cable | HUBER+SUHNER | C-48 | N/A | Apr. 30,2015 |
| 9 | Controller | CT | SC100 | N/A | N/A |
| 10 | Horn Antenna | EMCO | 3115 | 9605-4803 | Mar. 28, 2016 |
| 11 | Broad-Band Horn Antenna | Schwarzbeck | BBHA 9170 | 9170319 | Mar. 26, 2016 |
| 12 | Active Loop Antenna | R&S | HFH2-Z2 | 830749/020 | Mar. 28, 2016 |

| 20dB Spectrum Bandwidth Measurement | | | | | |
|-------------------------------------|-------------------|--------------|----------|------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | Spectrum Analyzer | R&S | FSP 40 | 100185 | Nov. 02, 2015 |

| Timing Testing | | | | | |
|----------------|-------------------|--------------|----------|------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | Spectrum Analyzer | R&S | FSP 40 | 100185 | Nov. 02, 2015 |

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

8.EUT TEST PHOTO**Radiated Measurement Photos
9K~30MHz**

**Radiated Measurement Photos
30~1000MHz**



**Radiated Measurement Photos
Above 1000MHz**



ATTACHMENT A - CONDUCTED EMISSION

Test Mode: N/A

Note: "N/A" denotes test is not applicable in this test report.

ATTACHMENT B - RADIATED EMISSION (9KHz to30MHZ)

| | |
|------------|---------|
| Test Mode: | TX Mode |
|------------|---------|

| Freq. (MHz) | Ant. 0°/90° | Reading(RA) (dBuV) | Corr.Factor(CF) (dB) | Measured(FS) (dBuV/m) | Limits (dBuV/m) | Over (dB) | Note |
|-------------|-------------|--------------------|----------------------|-----------------------|-----------------|-----------|------|
| 0.0166 | 0° | 3.24 | 24.52 | 27.76 | 123.20 | -95.44 | AVG |
| 0.0166 | 0° | 5.67 | 24.52 | 30.19 | 143.20 | -113.01 | PK |
| 0.0215 | 0° | 6.83 | 24.21 | 31.04 | 120.96 | -89.92 | AVG |
| 0.0215 | 0° | 8.11 | 24.21 | 32.32 | 140.96 | -108.64 | PK |
| 0.0443 | 0° | 5.09 | 22.76 | 27.85 | 114.68 | -86.83 | AVG |
| 0.0443 | 0° | 7.32 | 22.76 | 30.08 | 134.68 | -104.60 | PK |
| 0.0721 | 0° | 4.52 | 21.96 | 26.48 | 110.45 | -83.97 | AVG |
| 0.0721 | 0° | 6.72 | 21.96 | 28.68 | 130.45 | -101.77 | PK |
| 1.7254 | 0° | 14.51 | 19.53 | 34.04 | 69.54 | -35.50 | QP |
| 2.3108 | 0° | 19.83 | 19.31 | 39.14 | 69.54 | -30.40 | QP |

| Freq. (MHz) | Ant. 0°/90° | Reading(RA) (dBuV) | Corr.Factor(CF) (dB) | Measured(FS) (dBuV/m) | Limits (dBuV/m) | Over (dB) | Note |
|-------------|-------------|--------------------|----------------------|-----------------------|-----------------|-----------|------|
| 0.0126 | 90° | 2.98 | 24.30 | 27.28 | 125.60 | -98.32 | AVG |
| 0.0126 | 90° | 4.12 | 24.30 | 28.42 | 145.60 | -117.18 | PK |
| 0.0278 | 90° | 5.64 | 23.81 | 29.45 | 118.72 | -89.27 | AVG |
| 0.0278 | 90° | 7.22 | 23.81 | 31.03 | 138.72 | -107.69 | PK |
| 0.0350 | 90° | 3.37 | 23.35 | 26.72 | 116.72 | -90.00 | AVG |
| 0.0350 | 90° | 5.89 | 23.35 | 29.24 | 136.72 | -107.48 | PK |
| 0.0714 | 90° | 4.46 | 21.97 | 26.43 | 110.53 | -84.10 | AVG |
| 0.0714 | 90° | 6.02 | 21.97 | 27.99 | 130.53 | -102.54 | PK |
| 1.0247 | 90° | 16.28 | 19.60 | 35.88 | 67.39 | -31.51 | QP |
| 3.1805 | 90° | 21.76 | 19.45 | 41.21 | 69.54 | -28.33 | QP |

ATTACHMENT C - RADIATED EMISSION(30MHZ to 1000MHZ)

About the duty cycle correction factor calculated, please refer to the page 16~17

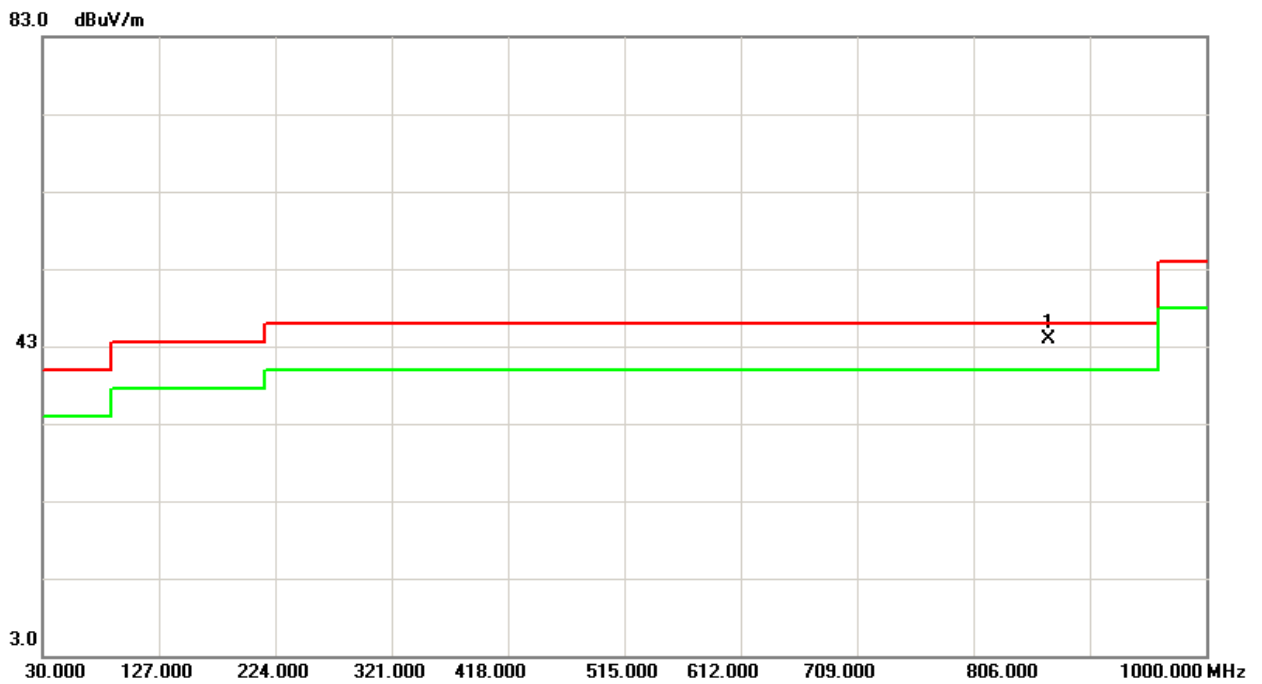
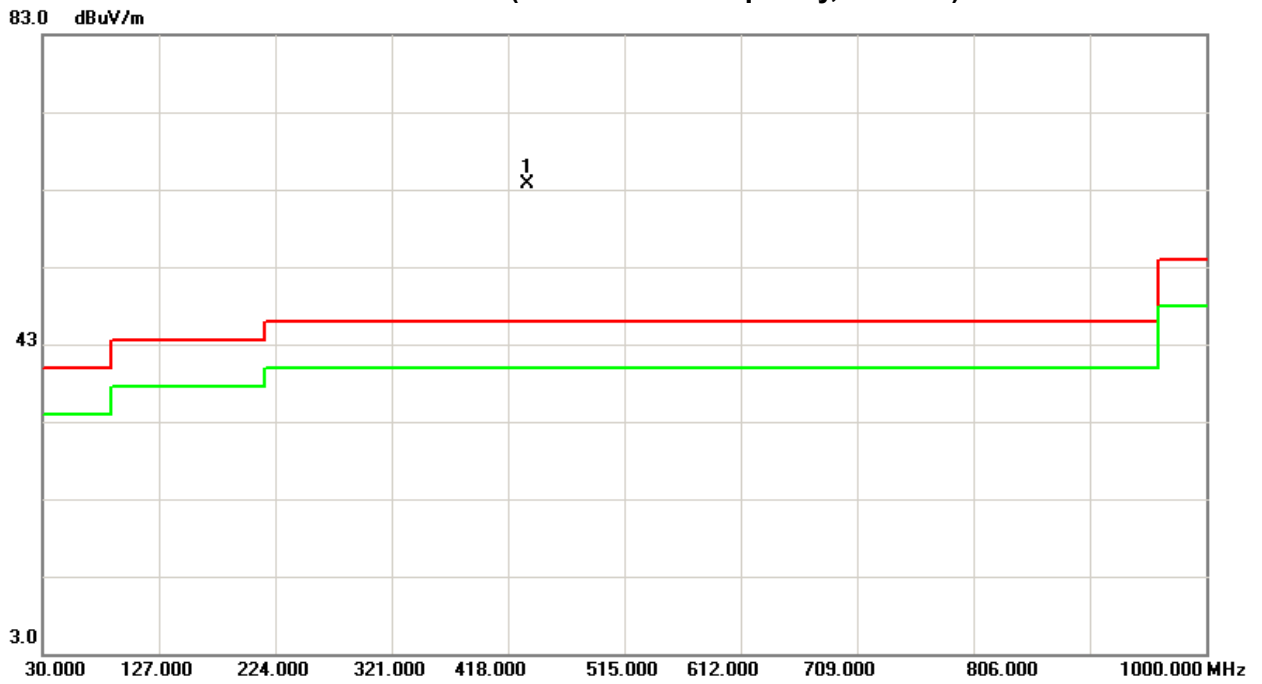
| | |
|-------------|-----------------|
| Test Power: | DC 3V |
| Test Mode: | TX CH 433.92MHz |

| Freq. (MHz) | Ant.Pol. H/V | Reading | | Ant./CF CF(dB) | Act. | | Limit | | Result |
|----------------|-----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|------------|
| | | Peak (dBuV) | AV (dBuV) | | Peak (dBuV/m) | AV (dBuV/m) | Peak (dBuV/m) | AV (dBuV/m) | |
| 433.92 | V | 72.72 | | -8.92 | 63.80 | 56.86 | 92.86 | 72.86 | X/F |
| 868.08 | V | 46.49 | | -2.56 | 43.93 | 36.99 | 92.86 | 72.86 | X/H |

Remark :

- (1) The average value of fundamental frequency is:
 Average = Peak value + 20log(Duty cycle), Final AV=PK-6.94

Orthogonal Axis : X
TX 433.92 MHz (Fundamental frequency, Vertical)



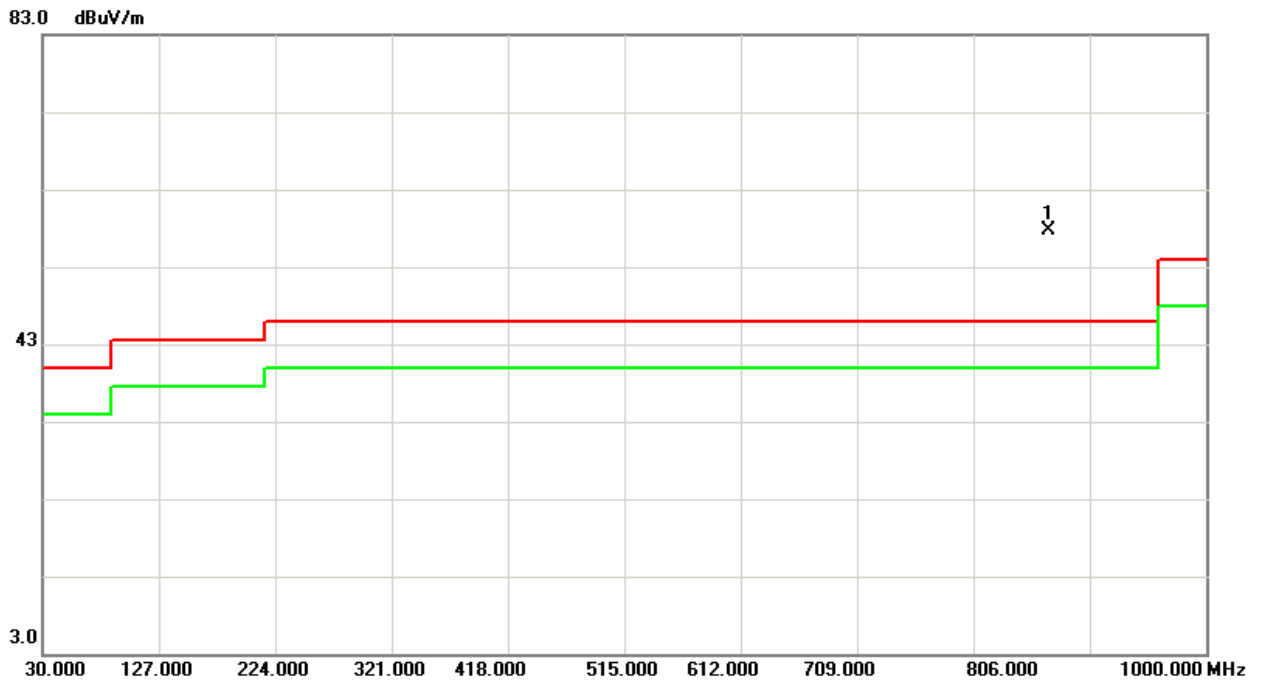
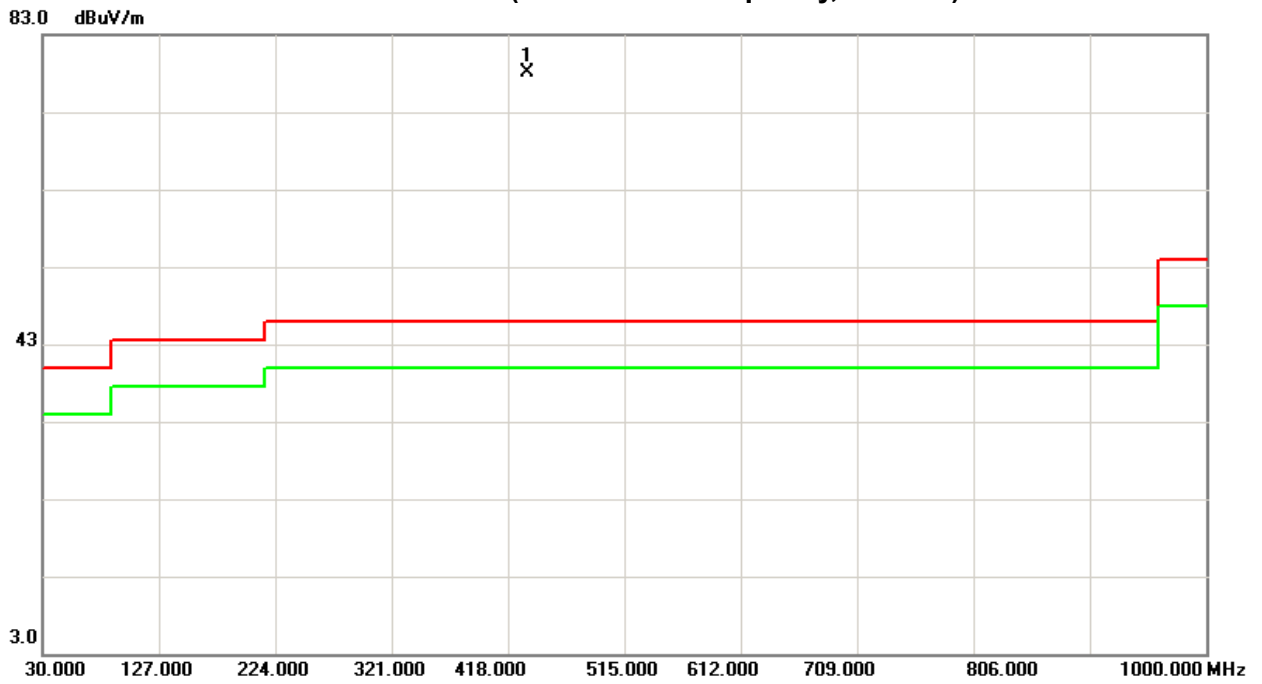
| | |
|-------------|-----------------|
| Test Power: | DC 3V |
| Test Mode: | TX CH 433.92MHz |

| Freq. (MHz) | Ant.Pol. H/V | Reading | | Ant./CF CF(dB) | Act. | | Limit | | Result |
|----------------|-----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|------------|
| | | Peak (dBuV) | AV (dBuV) | | Peak (dBuV/m) | AV (dBuV/m) | Peak (dBuV/m) | AV (dBuV/m) | |
| 433.92 | H | 87.09 | | -8.92 | 78.17 | 71.23 | 92.86 | 72.86 | X/F |
| 868.08 | H | 60.19 | | -2.56 | 57.63 | 50.69 | 92.86 | 72.86 | X/H |

Remark :

- (1) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle), Final AV=PK-6.94

Orthogonal Axis : X
 TX 433.92 MHz (Fundamental frequency, Vertical)



ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

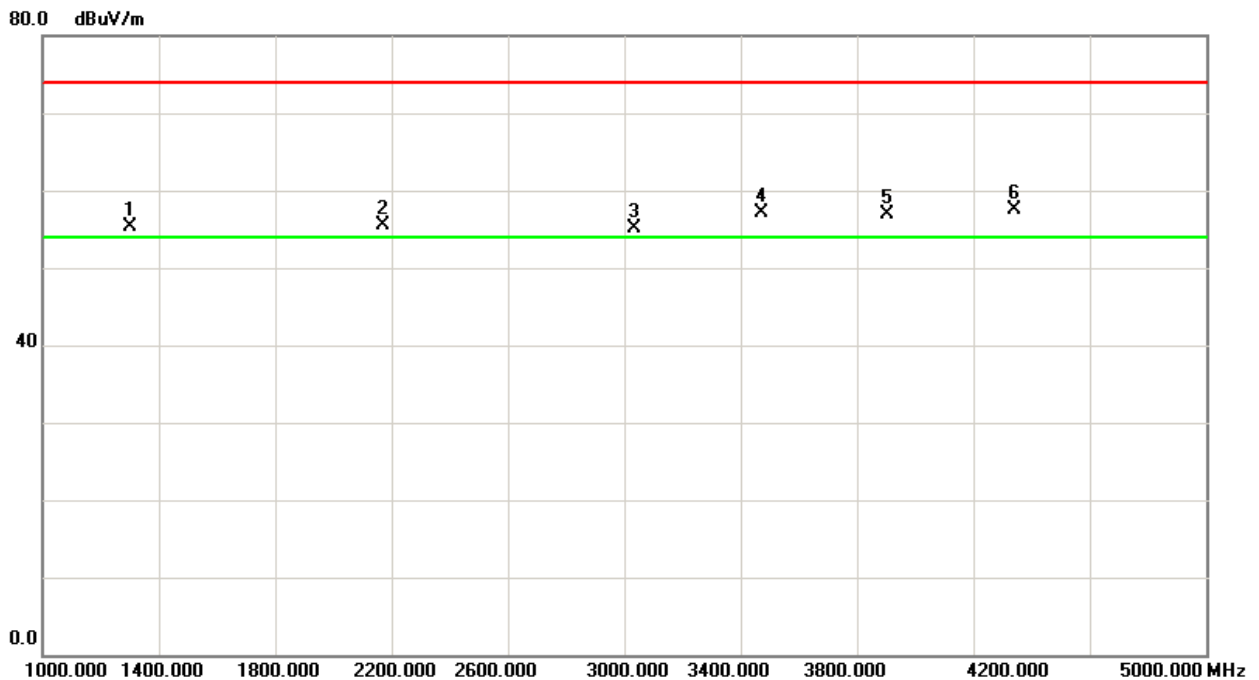
About the duty cycle correction factor calculated, please refer to the page 16~17

| | |
|-------------|-----------------|
| Test Power: | DC 3V |
| Test Mode: | TX CH 433.92MHz |

| Freq. (MHz) | Ant.Pol. H/V | Reading | | Ant./CF CF(dB) | Act. | | Limit | | Result |
|----------------|-----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|--------|
| | | Peak (dBuV) | AV (dBuV) | | Peak (dBuV/m) | AV (dBuV/m) | Peak (dBuV/m) | AV (dBuV/m) | |
| 1300.00 | V | 62.47 | 55.53 | -7.18 | 55.29 | 48.35 | 74.00 | 54.00 | X/H |
| 2168.00 | V | 58.34 | 51.40 | -2.75 | 55.59 | 48.65 | 74.00 | 54.00 | X/H |
| 3036.00 | V | 55.08 | 48.14 | -0.04 | 55.04 | 48.10 | 74.00 | 54.00 | X/H |
| 3472.00 | V | 55.71 | 48.77 | 1.32 | 57.03 | 50.09 | 74.00 | 54.00 | X/H |
| 3904.00 | V | 54.44 | 47.50 | 2.51 | 56.95 | 50.01 | 74.00 | 54.00 | X/H |
| 4340.00 | V | 54.59 | 47.65 | 2.92 | 57.51 | 50.57 | 74.00 | 54.00 | X/H |

Remark :

- (1) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle), Final AV=PK-6.94

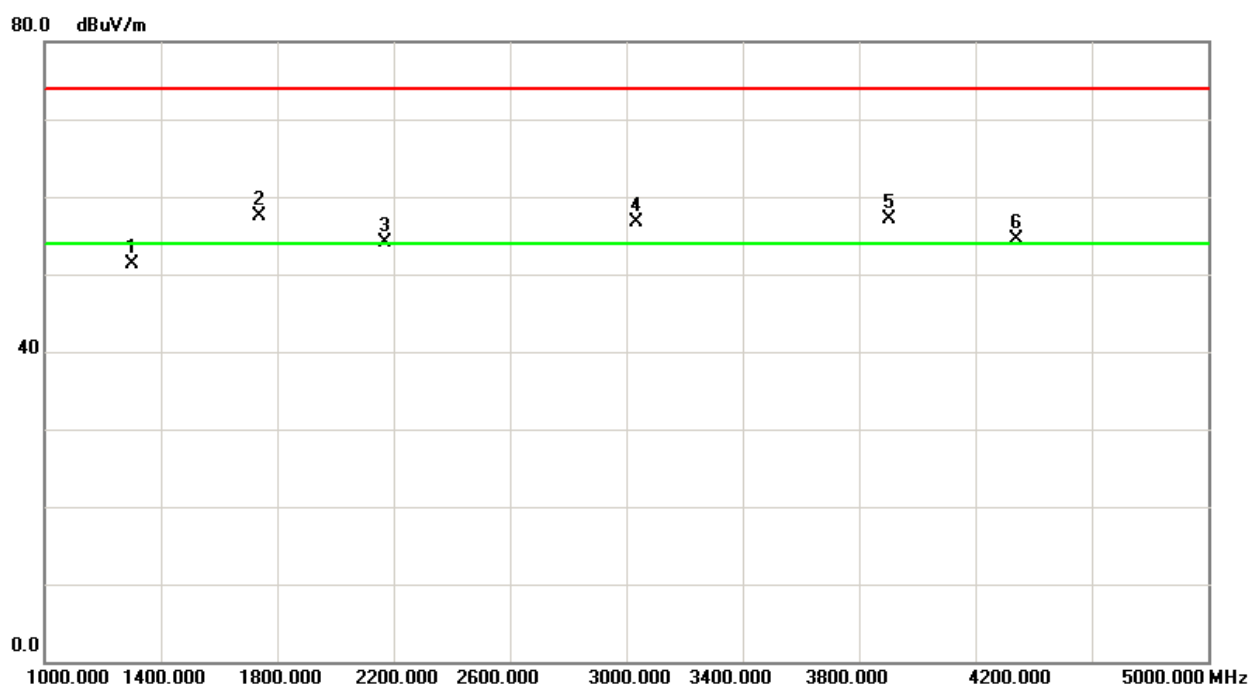


| | |
|-------------|-----------------|
| Test Power: | DC 3V |
| Test Mode: | TX CH 433.92MHz |

| Freq. (MHz) | Ant.Pol. H/V | Reading | | Ant./CF CF(dB) | Act. | | Limit | | Result |
|----------------|-----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|--------|
| | | Peak (dBuV) | AV (dBuV) | | Peak (dBuV/m) | AV (dBuV/m) | Peak (dBuV/m) | AV (dBuV/m) | |
| 1300.00 | H | 58.48 | 51.54 | -7.18 | 51.30 | 44.36 | 74.00 | 54.00 | X/H |
| 1736.00 | H | 61.86 | 54.92 | -4.42 | 57.44 | 50.50 | 74.00 | 54.00 | X/H |
| 2168.00 | H | 56.93 | 49.99 | -2.75 | 54.18 | 47.24 | 74.00 | 54.00 | X/H |
| 3036.00 | H | 56.68 | 49.74 | -0.04 | 56.64 | 49.70 | 74.00 | 54.00 | X/H |
| 3904.00 | H | 54.58 | 47.64 | 2.51 | 57.09 | 50.15 | 74.00 | 54.00 | X/H |
| 4340.00 | H | 51.63 | 44.69 | 2.92 | 54.55 | 47.61 | 74.00 | 54.00 | X/H |

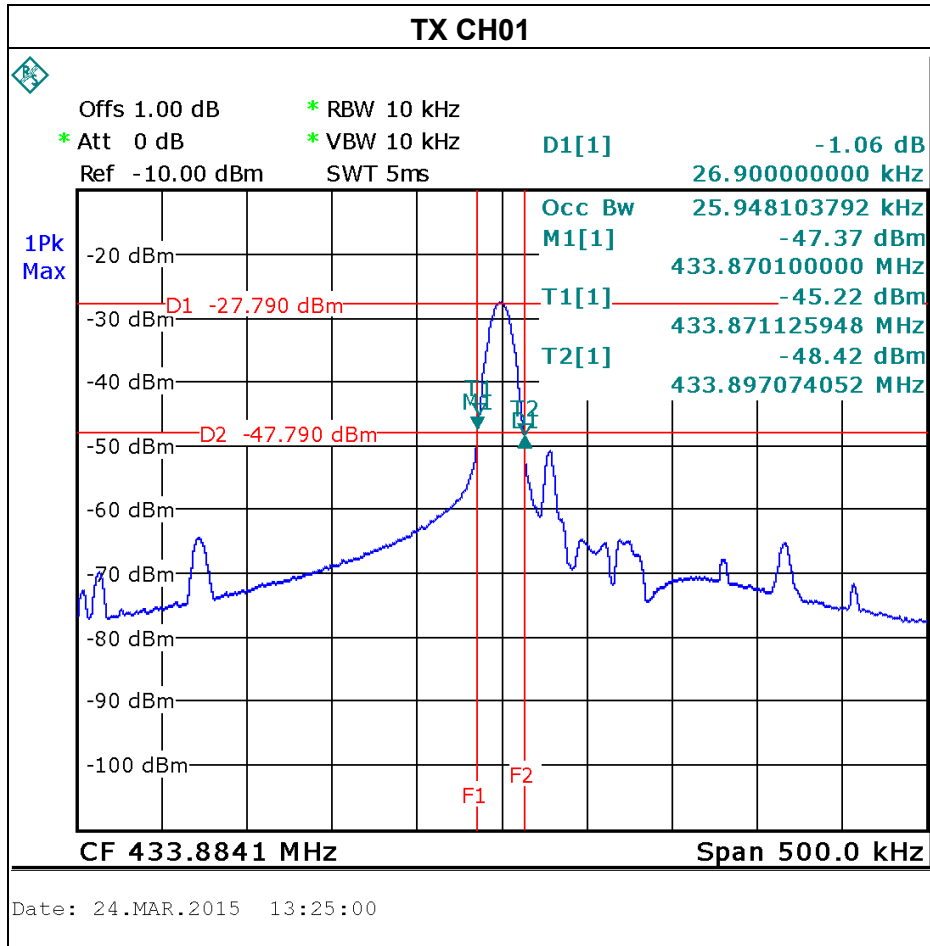
Remark :

(1) Peak value is much lower than the limit, so AV value isn't shown on this test item.



ATTACHMENT E - 20dB SPECTRUMBANDWIDTH

Test Mode: TX CH 01



Result: 20dB Bandwidth 26.90 kHz < 1.0848 MHz Pass
 99% bandwidth is 25.95 kHz

ATTACHMENT F - TIMING TESTING

| | |
|------------|---------|
| Test Mode: | TX Mode |
|------------|---------|

| Test Channel | Frequency (MHz) | Silent period (seconds) | Silent period limit (seconds) | Result |
|--------------|-----------------|-------------------------|-------------------------------|--------|
| CH01 | 433.92 | 45.80 | > 10 | PASS |

Silent period =45.80s >30* 0.22 s = 6.6s

