

FCC PART 15 SUBPART C MEASUREMENT AND TEST REPORT

For

ECORE TECHNOLOGY COMPANY LIMITED

North of Bingang East Road, Huahu Development Zone, Ezhou City, Hubei
Province, China

E.U.T.: Party Block

Model Name: HL2536

Brand Name: 

FCC ID: PXX-HL2536

Report Number: NTC1406755F-1

Test Date(s): May 30, 2014 to July 19, 2014

Report Date(s): July 19, 2014

Prepared by

Dongguan Nore Testing Center Co., Ltd.

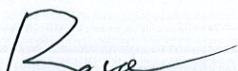
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Prepared By

Approved & Authorized Signer


Rose Hu / Engineer


Sunm Lv / Q.A. Director

Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Dongguan Nore Testing Center Co., Ltd. The test results referenced from this report are relevant only to the sample tested.

Table of Contents

| | |
|--|-----------|
| 1. GENERAL INFORMATION | 4 |
| 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST | 4 |
| 1.2 RELATED SUBMITTAL(S) / GRANT (S) | 4 |
| 1.3 TEST METHODOLOGY | 6 |
| 1.4 EQUIPMENT MODIFICATIONS | 6 |
| 1.5 SUPPORT DEVICE | 6 |
| 1.6 TEST FACILITY AND LOCATION | 6 |
| 1.7 SUMMARY OF TEST RESULTS | 7 |
| 2. SYSTEM TEST CONFIGURATION | 8 |
| 2.1 EUT CONFIGURATION | 8 |
| 2.2 SPECIAL ACCESSORIES | 8 |
| 2.3 DESCRIPTION OF TEST MODES | 8 |
| 2.4 EUT EXERCISE | 8 |
| 3. CONDUCTED EMISSIONS TEST | 9 |
| 3.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 9 |
| 3.2 TEST CONDITION | 9 |
| 3.3 MEASUREMENT RESULTS | 9 |
| 4. MAX. CONDUCTED OUTPUT POWER | 12 |
| 4.1 MEASUREMENT PROCEDURE | 12 |
| 4.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 12 |
| 4.3 MEASUREMENT RESULTS | 13 |
| 5. 6DB & 20DB BANDWIDTH | 15 |
| 5.1 MEASUREMENT PROCEDURE | 15 |
| 5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 15 |
| 5.3 MEASUREMENT RESULTS | 15 |
| 6. POWER SPECTRAL DENSITY | 19 |
| 6.1 MEASUREMENT PROCEDURE | 19 |
| 6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 19 |
| 6.3 MEASUREMENT RESULTS | 19 |
| 7. BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS | 22 |
| 7.1 REQUIREMENT AND MEASUREMENT PROCEDURE | 22 |
| 7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 22 |
| 7.3 MEASUREMENT RESULTS | 22 |



8. RADIATED SPURIOUS EMISSIONS AND RESTRICTED BANDS 29

 8.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....29

 8.2 MEASUREMENT PROCEDURE30

 8.3 LIMIT.....31

 8.4 MEASUREMENT RESULTS32

9. ANTENNA APPLICATION 37

 9.1 ANTENNA REQUIREMENT37

 9.2 MEASUREMENT RESULTS.....37

10. TEST EQUIPMENT LIST..... 38

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

This device is a multi-function BT speaker with wireless audio transmission, AUX IN, charging and BT functions. It's powered by DC 5V/12V come from adapter or DC 3.7V/7.4V Li-ion Battery. For more details features, please refer to User's Manual.

| | |
|--------------|--|
| Manufacturer | : ECORE TECHNOLOGY COMPANY LIMITED |
| Address | : North of Bingang East Road, Huahu Development Zone, Ezhou City, Hubei Province, China |
| Power Supply | : For host: DC 5V Come from Adapter Adapter M/N: BI20-050240-AdU Input: AC 100-240V 50/60Hz 0.5A Output: DC 5V 2.4A DC 3.7V 2000mAh; For Speaker: DC 12V Come from Adapter Adapter M/N: BI30-120200-AdU Input: AC 100-240V 50/60Hz 1.2A Output: DC 12V 2.0A DC 7.4V 4000mAh *2 |
| Model name | : HL2536 |
| Note: | : N/A |

Technical Specification

For BT function

| | |
|-------------------|---|
| BT Version | : BLE and backward compatible 3.0HS, 2.1+EDR version. We prepare version BLE and 2.1+EDR for RF test. |
| Frequency: | : 2402-2480MHz |
| Modulation | : For V2.1+EDR: GFSK, $\pi/4$ -DQPSK, 8DPSK For V4.0: GFSK |
| Number of Channel | : For V2.1+EDR: 79; For V4.0: 40 |
| Channel space | : For V2.1+EDR: 1MHz; For V4.0: 2MHz |
| Antenna Type | : PCB |
| Antenna Gain | : -0.61dBi (declaration by manufacturer) |
| Note | : N/A |

For wireless audio transmission function

| | |
|-------------------|--|
| Frequency range | : 5730~5805MHz |
| Modulation Type | : GFSK |
| Number of channel | : 10 |
| Antenna Type | : Integral |
| Antenna Gain | : 1.5dBi (declaration by manufacturer) |
| Note | : Speaker only for RX function. |

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: PXX-HL2536 filing to comply with Section 15.247 of the FCC Part 15(2013), Subpart C Rule.

1.3 Test Methodology

AC mains line-conducted, antenna port conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009) and KDB558074(v03r02). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters. All other measurements were made in accordance with the procedures in 47 CFR part 2.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

None

1.6 Test Facility and Location

Listed by FCC, August 02, 2011
The Certificate Registration Number is 665078.

Listed by Industry Canada, July 01, 2011
The Certificate Registration Number is 46405-9743.

Dongguan NTC Co., Ltd.

Building D, Gaosheng Science and Technology Park,
Hongtu Road, Nancheng District, Dongguan City,
Guangdong Province, China

1.7 Summary of Test Results

| FCC Rules | Description Of Test | Result |
|-----------------------------|--|------------|
| §15.207 (a) | AC Power Conducted Emission | Compliance |
| §15.247(b)(3) | Max. Conducted Output Power | Compliance |
| §15.247(a)(2) | 6dB &20dB Bandwidth | Compliance |
| §15.247(e) | Power Spectral Density | Compliance |
| §15.247(d) | Band Edge and Conducted Spurious Emissions | Compliance |
| §15.247(d),§15.209, §15.205 | Radiated Spurious Emissions and Restricted Bands | Compliance |
| §15.203 | Antenna Requirement | Compliance |

2. System Test Configuration

EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 Special Accessories

Not available for this EUT intended for grant.

2.3 Description of test modes

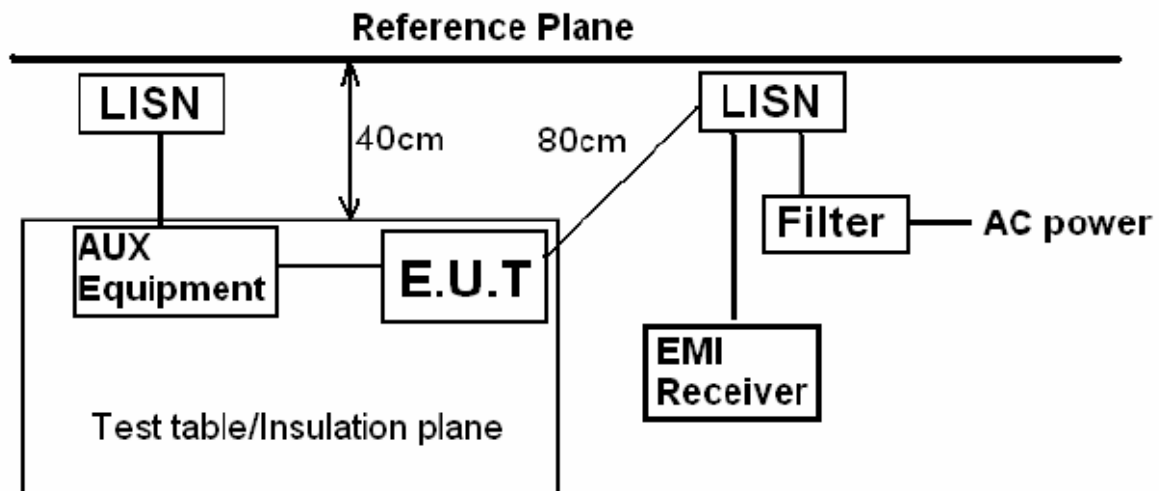
The EUT has been tested under continuous operating condition. Test program used to control the EUT staying in continuous transmitting mode. The Lowest, middle and highest channel were chosen for testing, and modulation type GFSK was tested, but only the worst case data is shown in this report.

2.4 EUT Exercise

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

3. Conducted Emissions Test

3.1 Test SET-UP (Block Diagram of Configuration)



3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: BT Mode

3.3 Measurement Results

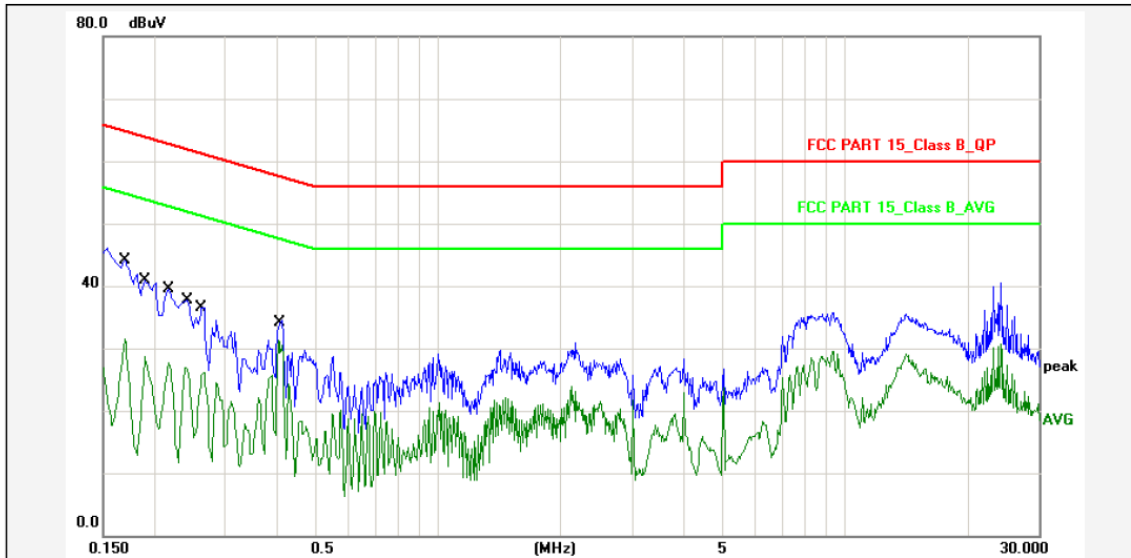
Please refer to following plots.



Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2014-6-19 20:27:19



Report No.: HL2536

Test Standard: FCC PART 15_Class B_QP

Test item: Conducted Emission

Phase: L1

Applicant: ECORE

Temp.()/Hum.(%): 26(C) / 60 %

Product: Party Block

Power Rating: AC 120V/60Hz

Model No.: HL2536

Test Engineer: Jason

Test Mode: BT Mode

Remark:

| No. | Frequency (MHz) | Factor (dBuV) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|---------------|----------------|--------------|--------------|-------------|----------|-----|--------|
| 1 | 0.1700 | 10.80 | 31.38 | 42.18 | 64.96 | -22.78 | QP | P | |
| 2 | 0.1700 | 10.80 | 20.68 | 31.48 | 54.96 | -23.48 | AVG | P | |
| 3 | 0.1900 | 10.80 | 28.11 | 38.91 | 64.03 | -25.12 | QP | P | |
| 4 | 0.1900 | 10.80 | 17.94 | 28.74 | 54.03 | -25.29 | AVG | P | |
| 5 | 0.2180 | 10.80 | 26.69 | 37.49 | 62.89 | -25.40 | QP | P | |
| 6 | 0.2180 | 10.80 | 16.95 | 27.75 | 52.89 | -25.14 | AVG | P | |
| 7 | 0.2420 | 10.80 | 24.93 | 35.73 | 62.02 | -26.29 | QP | P | |
| 8 | 0.2420 | 10.80 | 16.13 | 26.93 | 52.02 | -25.09 | AVG | P | |
| 9 | 0.2630 | 10.80 | 23.71 | 34.51 | 61.33 | -26.82 | QP | P | |
| 10 | 0.2630 | 10.80 | 14.97 | 25.77 | 51.33 | -25.56 | AVG | P | |
| 11 | 0.4060 | 10.80 | 21.72 | 32.52 | 57.73 | -25.21 | QP | P | |
| 12 | 0.4060 | 10.80 | 20.40 | 31.20 | 47.73 | -16.53 | AVG | P | |

Note: Level=Reading+Factor.

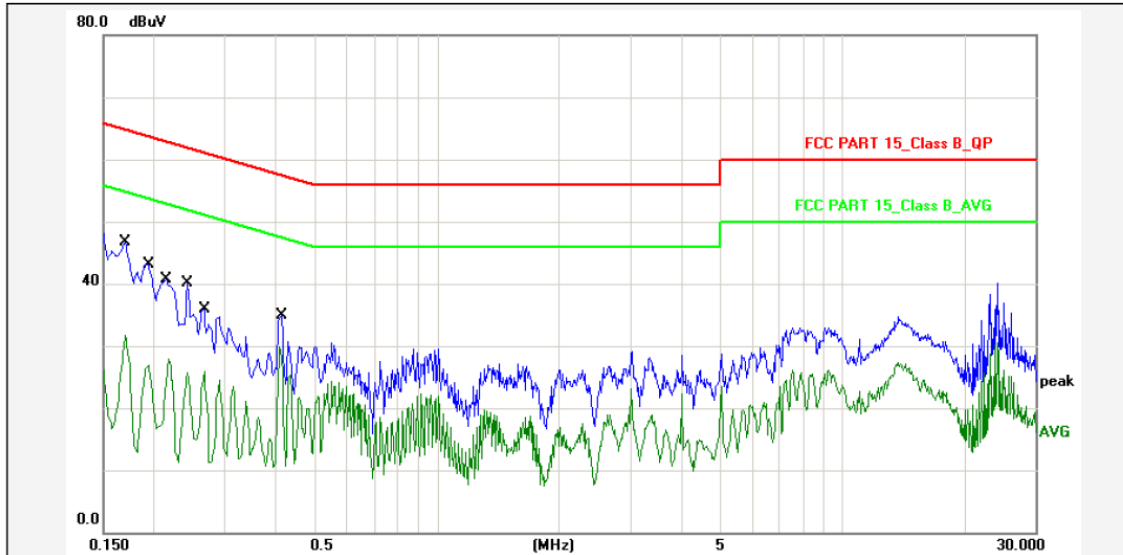
Margin=Limit-Level.



Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2014-6-19 20:30:12



Report No.: HL2536

Test Standard: FCC PART 15_Class B_QP

Test item: Conducted Emission

Phase: N

Applicant: ECORE

Temp.()/Hum.(%): 26(C) / 60 %

Product: Party Block

Power Rating: AC 120V/60Hz

Model No.: HL2536

Test Engineer: Jason

Test Mode: BT Mode

Remark:

| No. | Frequency (MHz) | Factor (dBuV) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|---------------|----------------|--------------|--------------|-------------|----------|-----|--------|
| 1 | 0.1700 | 10.80 | 34.00 | 44.80 | 64.96 | -20.16 | QP | P | |
| 2 | 0.1700 | 10.80 | 20.93 | 31.73 | 54.96 | -23.23 | AVG | P | |
| 3 | 0.1940 | 10.80 | 30.37 | 41.17 | 63.86 | -22.69 | QP | P | |
| 4 | 0.1940 | 10.80 | 16.13 | 26.93 | 53.86 | -26.93 | AVG | P | |
| 5 | 0.2162 | 10.80 | 27.24 | 38.04 | 62.96 | -24.92 | QP | P | |
| 6 | 0.2162 | 10.80 | 17.06 | 27.86 | 52.96 | -25.10 | AVG | P | |
| 7 | 0.2420 | 10.80 | 27.33 | 38.13 | 62.02 | -23.89 | QP | P | |
| 8 | 0.2420 | 10.80 | 14.91 | 25.71 | 52.02 | -26.31 | AVG | P | |
| 9 | 0.2660 | 10.80 | 23.19 | 33.99 | 61.24 | -27.25 | QP | P | |
| 10 | 0.2660 | 10.80 | 15.14 | 25.94 | 51.24 | -25.30 | AVG | P | |
| 11 | 0.4100 | 10.80 | 22.14 | 32.94 | 57.65 | -24.71 | QP | P | |
| 12 | 0.4100 | 10.80 | 19.03 | 29.83 | 47.65 | -17.82 | AVG | P | |

Note: Level=Reading+Factor.

Margin=Limit-Level.

4. Max. Conducted Output Power

4.1 Measurement Procedure

Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

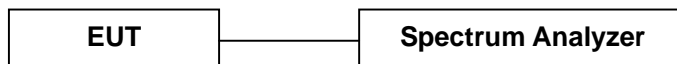
§15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth (see ANSIC63.10 for measurement guidance).

When using a spectrum analyzer to EMI receiver to perform these measurements, it shall be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span/RBW to set a bin-to-bin spacing of $\leq \text{RBW}/2$ so that narrowband signals are not lost between frequency bins.

Method AVGSA-1(trace averaging with the EUT transmitting at full power throughout each sweep)

1. Set span to at least 1.5 times the OBW.
2. Set RBW=1-5% of the OBW, not to exceed 1MHz.
3. Set VBW $\geq 3 \times \text{RBW}$.
4. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This gives bin-to-bin spacing $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
5. Sweep time= auto.
6. Detector=RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. If transmit duty cycle $< 98\%$, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously(i.e., with no off intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
8. Trace average at least 100 traces in power averaging(i.e.,RMS) mode.
9. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels(in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

4.2 Test SET-UP (Block Diagram of Configuration)



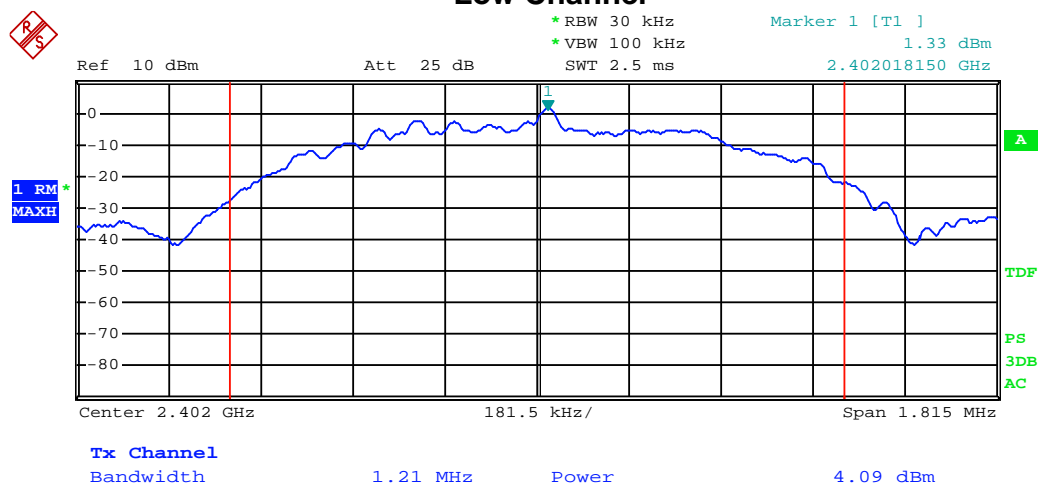
4.3 Measurement Results

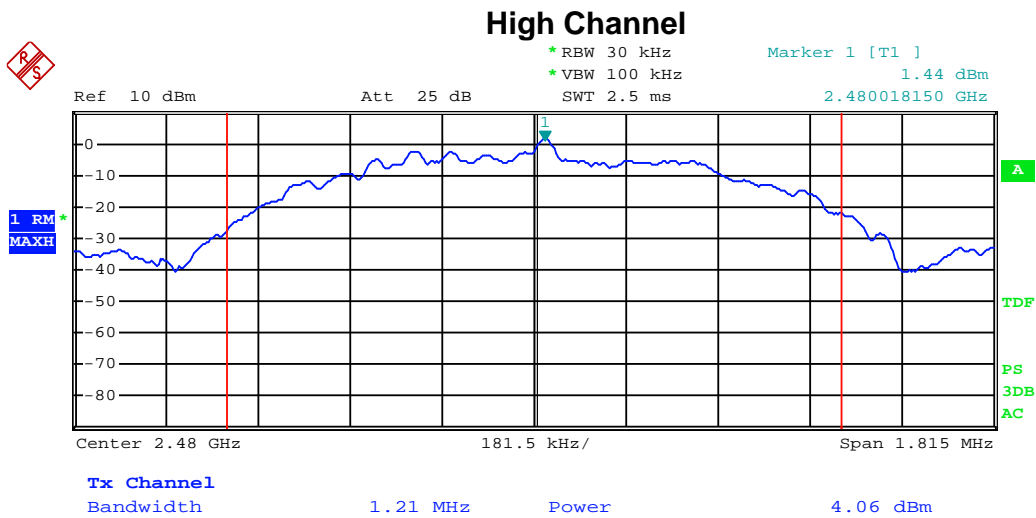
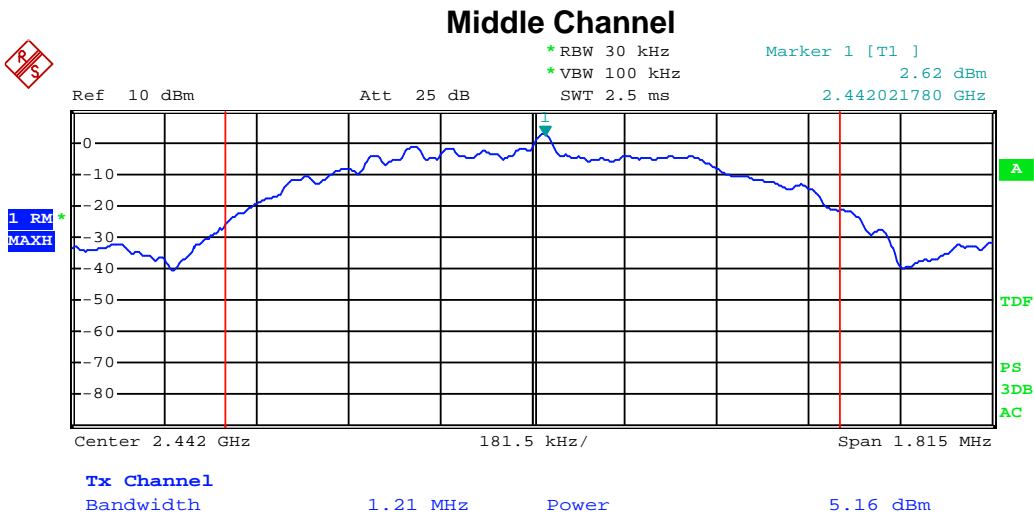
Please refer to following table and plots.

| | | | |
|---------------|-------|-------------|---------------|
| Modulation: | GFSK | Humidity : | 50 % |
| Temperature : | 22 °C | Test Date : | Jul. 03, 2014 |
| Test By: | Sance | | |
| Test Result: | PASS | | |

| Frequency MHz | Data Rate Mbps | AV Output Power dBm | Limit dBm |
|----------------------|----------------|---------------------|-----------|
| Low Channel: 2402 | 1 | 4.09 | 30 |
| Middle Channel: 2442 | 1 | 5.16 | 30 |
| High Channel: 2480 | 1 | 4.06 | 30 |

Maximum Average Conducted Output Power Low Channel





5. 6dB & 20dB Bandwidth

5.1 Measurement Procedure

DTS 6dB & 20dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v03r02):

1. Set the RBW = 100KHz.
2. Set the VBW $\geq 3 \times$ RBW
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB & 20dB relative to the maximum level measured in the fundamental emission.

5.2 Test SET-UP (Block Diagram of Configuration)



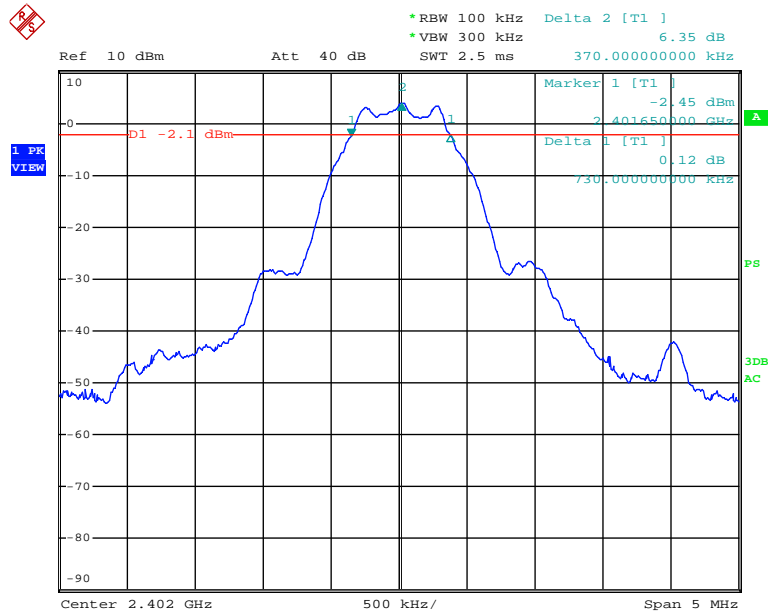
5.3 Measurement Results

Please refer to following table and plots.

| | | | |
|---------------|-------|-------------|---------------|
| Modulation: | GFSK | Humidity : | 50 % |
| Temperature : | 22 °C | Test Date : | Jul. 03, 2014 |
| Test By: | Sance | | |
| Test Result: | PASS | | |

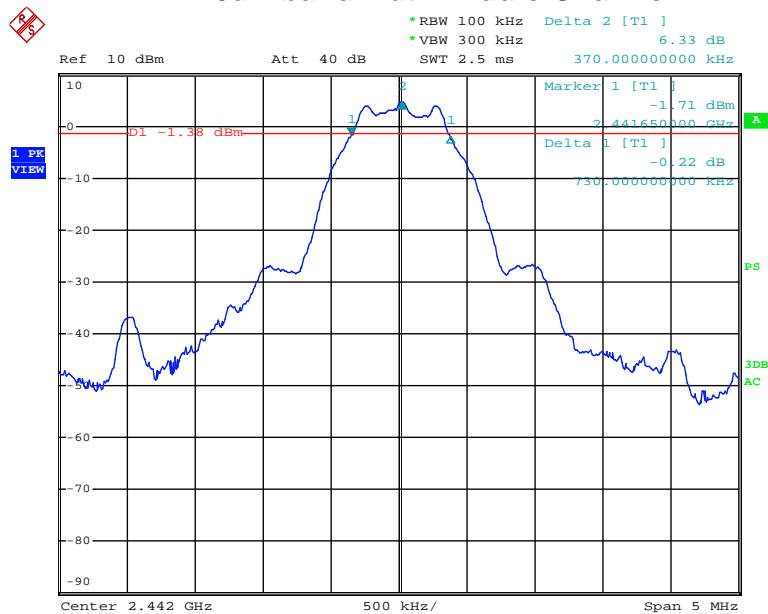
| Frequency MHz | Data Rate Mbps | 6dB Bandwidth KHz | 20dB Bandwidth KHz | Limit |
|----------------------|----------------------|-------------------------|--------------------------|---------|
| Low Channel: 2402 | 1 | 730 | 1210 | >500KHz |
| Middle Channel: 2442 | 1 | 730 | 1210 | >500KHz |
| High Channel: 2480 | 1 | 730 | 1210 | >500KHz |

6dB bandwidth Low Channel



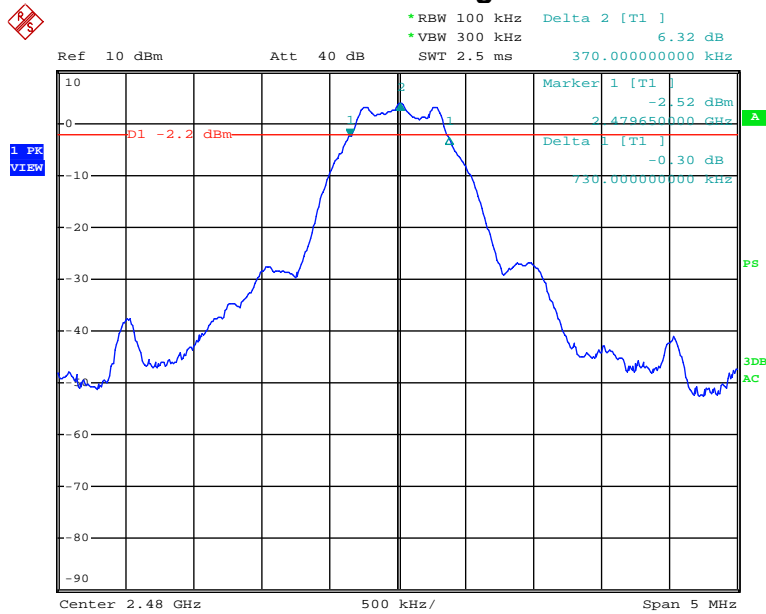
Date: 3.JUL.2014 19:41:46

6dB bandwidth Middle Channel



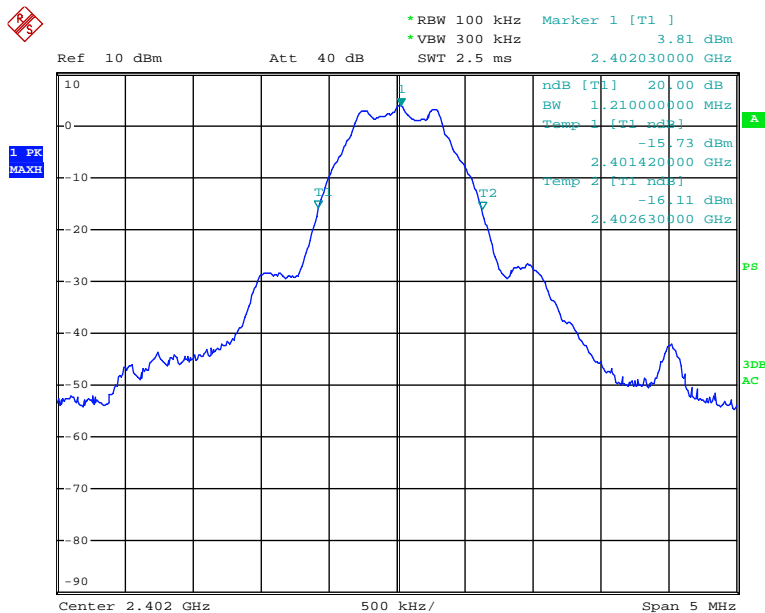
Date: 3.JUL.2014 19:43:31

6dB bandwidth High Channel



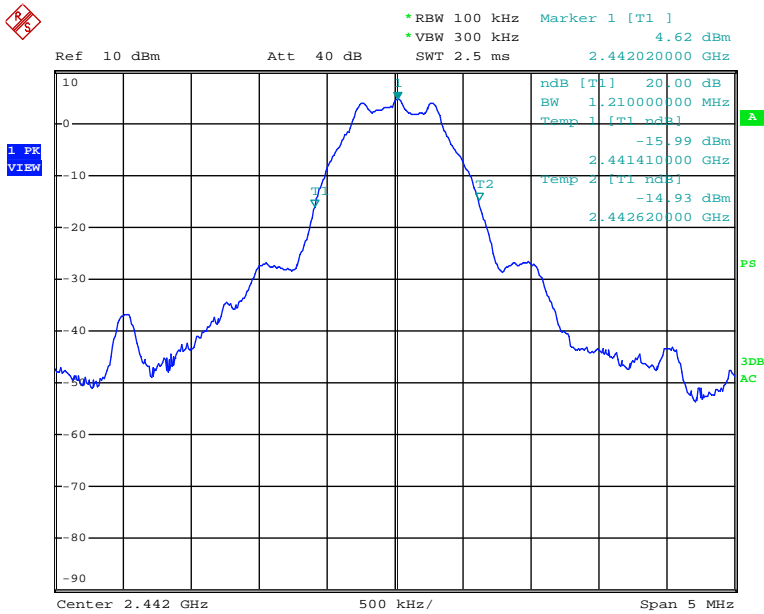
Date: 3.JUL.2014 19:45:03

20dB bandwidth Low Channel



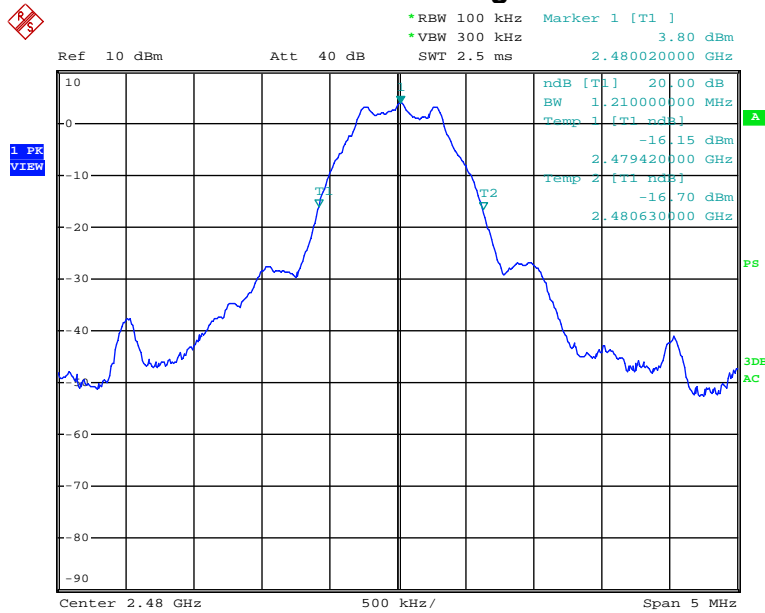
Date: 3.JUL.2014 19:39:18

20dB bandwidth Middle Channel



Date: 3.JUL.2014 19:42:53

20dB bandwidth High Channel



Date: 3.JUL.2014 19:44:14

6. Power Spectral Density

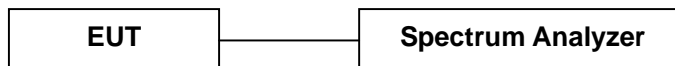
6.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v03r02):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{KHz}$
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.2 Test SET-UP (Block Diagram of Configuration)



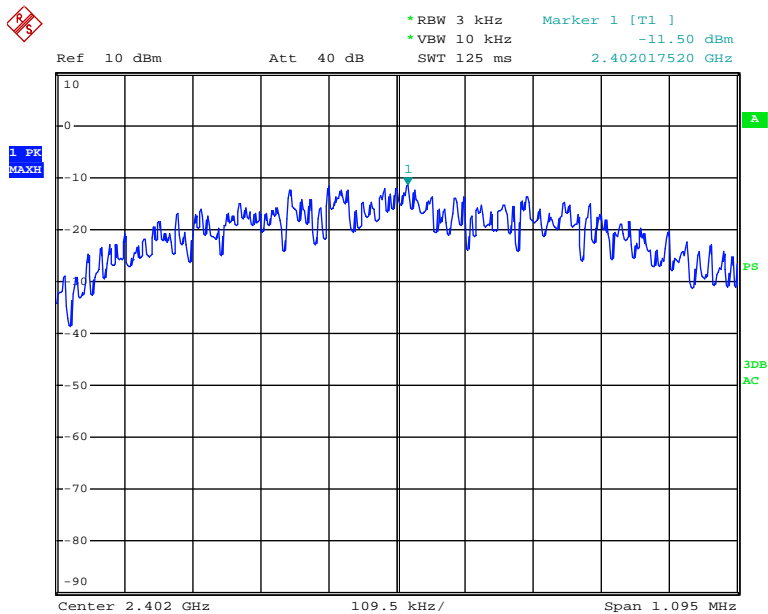
6.3 Measurement Results

Please refer to following table and plots.

| | | | |
|---------------|-------|-------------|---------------|
| Modulation: | GFSK | | |
| Temperature : | 22 °C | Humidity : | 50 % |
| Test By: | Sance | Test Date : | Jul. 03, 2014 |
| Test Result: | PASS | | |

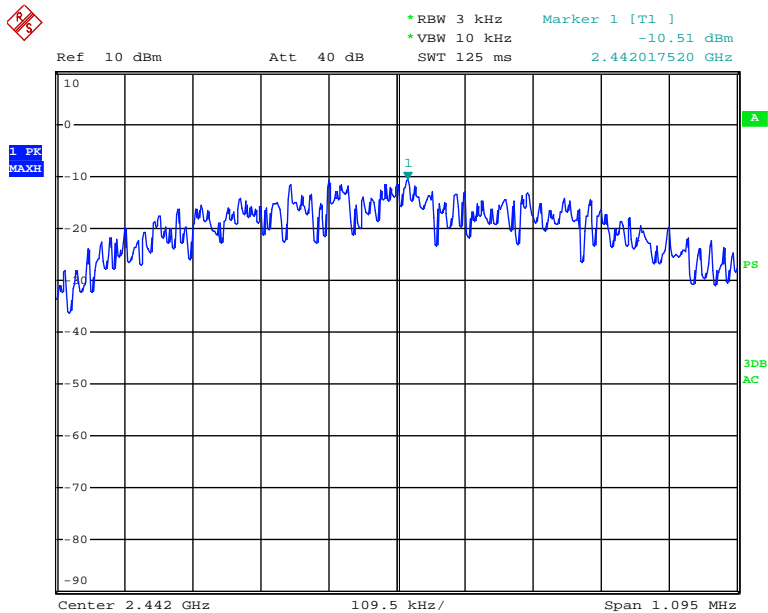
| Frequency MHz | Data Rate Mbps | PSD dBm | Limit dBm |
|----------------------|-------------------|------------|--------------|
| Low Channel: 2402 | 1 | -11.50 | 8 |
| Middle Channel: 2442 | 1 | -10.51 | 8 |
| High Channel: 2480 | 1 | -11.77 | 8 |

Low Channel



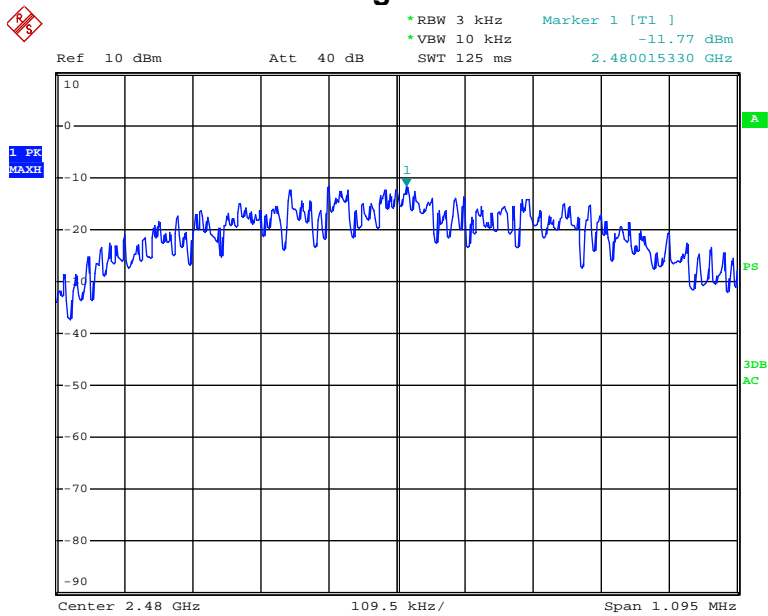
Date: 3.JUL.2014 19:52:53

Middle Channel



Date: 3.JUL.2014 19:53:13

High Channel



Date: 3.JUL.2014 19:53:26

7. Band Edge and Conducted Spurious Emissions

7.1 Requirement and Measurement Procedure

In any 100KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set according to FCC KDB558074(v03r02) clause 11.3.

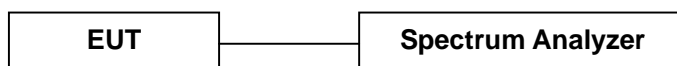
A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

- 1.The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300KHz for Quasi-peak detection at frequency below 1GHz.
- 2.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for average detection(AV) at below at frequency above 1GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Function | Resolution Bandwidth | Video Bandwidth |
|----------------------|----------|----------------------|-----------------|
| 30 to 1000 | QP | 120 kHz | 300 kHz |
| Above 1000 | Peak | 1 MHz | 3 MHz |
| | Average | 1 MHz | 10 Hz |

7.2 Test SET-UP (Block Diagram of Configuration)

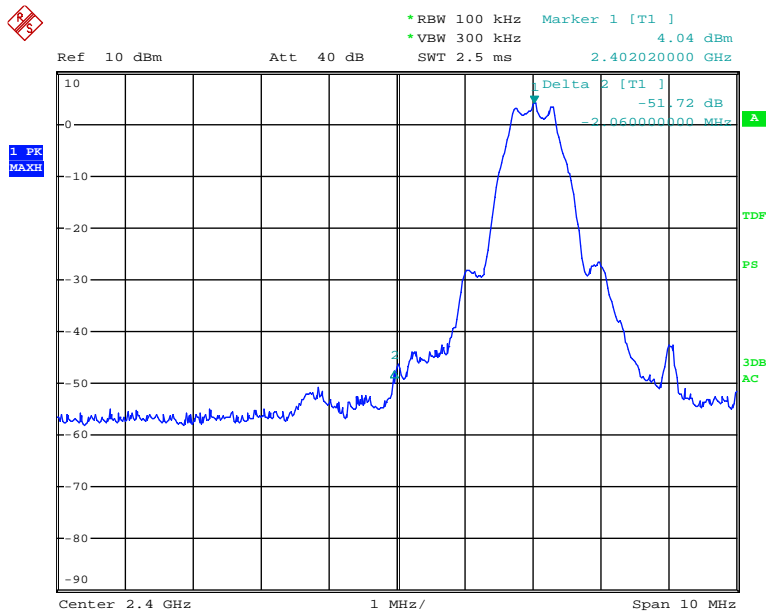


7.3 Measurement Results

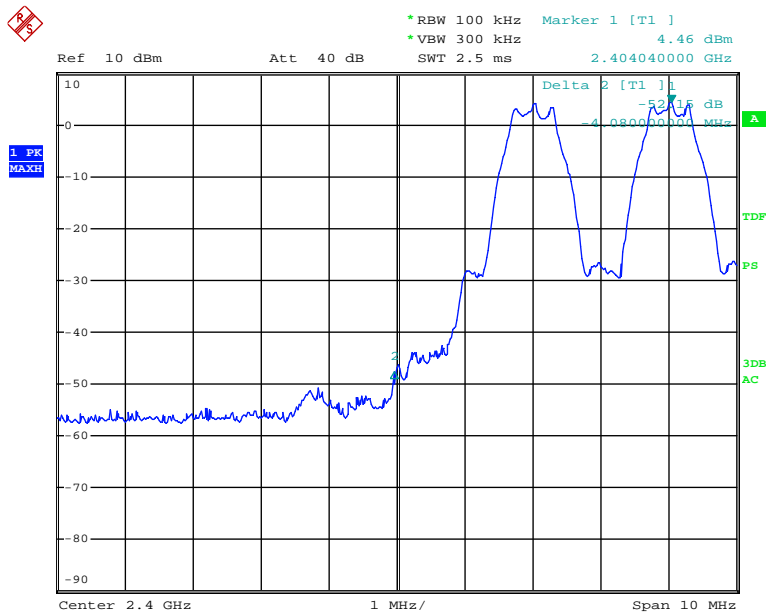
The test plots and table showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below plots.

| Freq. (MHz) | Ant. Pol. | Emission Level (dBuV) | | Limit 3m (dBuV/m) | | Margin (dB) | |
|----------------|--------------|--------------------------|-------|-------------------------|-------|----------------|--------|
| | | Peak | AV | Peak | AV | Peak | AV |
| 2397.760 | H | 59.72 | 40.53 | 74.00 | 54.00 | -14.28 | -13.47 |
| 2396.690 | V | 58.27 | 40.76 | 74.00 | 54.00 | -15.73 | -13.24 |
| 2484.770 | H | 39.22 | 28.37 | 74.00 | 54.00 | -34.78 | -25.63 |
| 2485.760 | V | 41.76 | 27.86 | 74.00 | 54.00 | -32.24 | -26.14 |

Band Edge
Low Channel

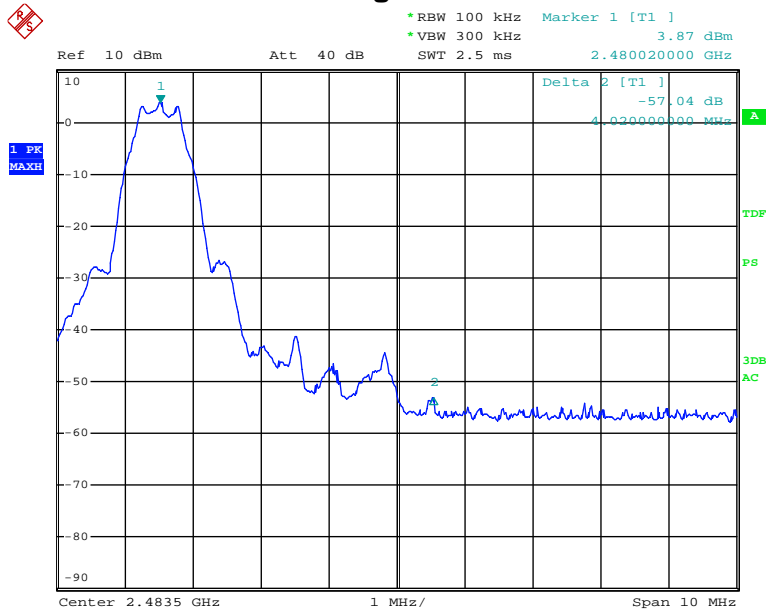


Date: 3.JUL.2014 19:55:23

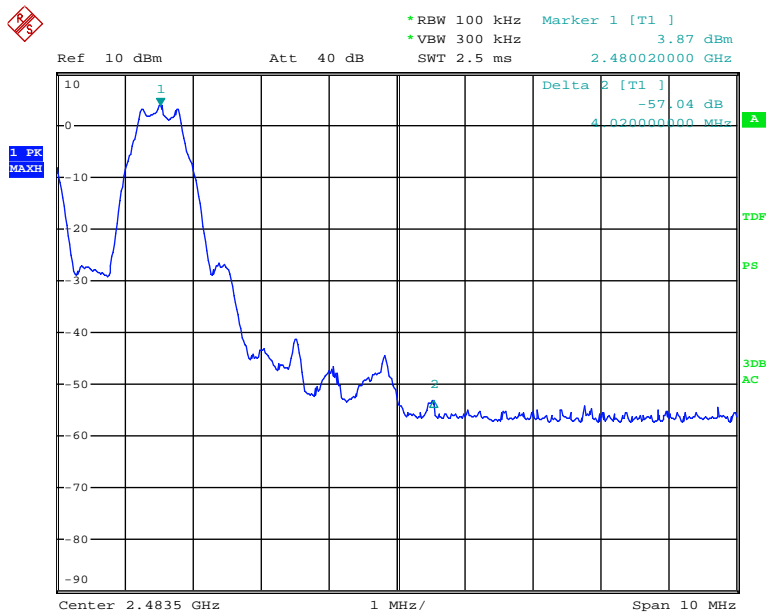


Date: 3.JUL.2014 19:55:44

High Channel

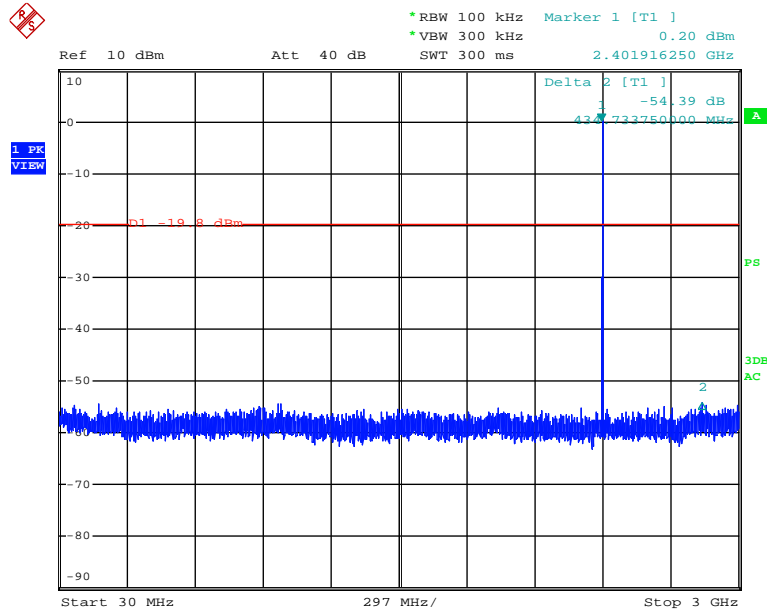


Date: 3.JUL.2014 19:56:31

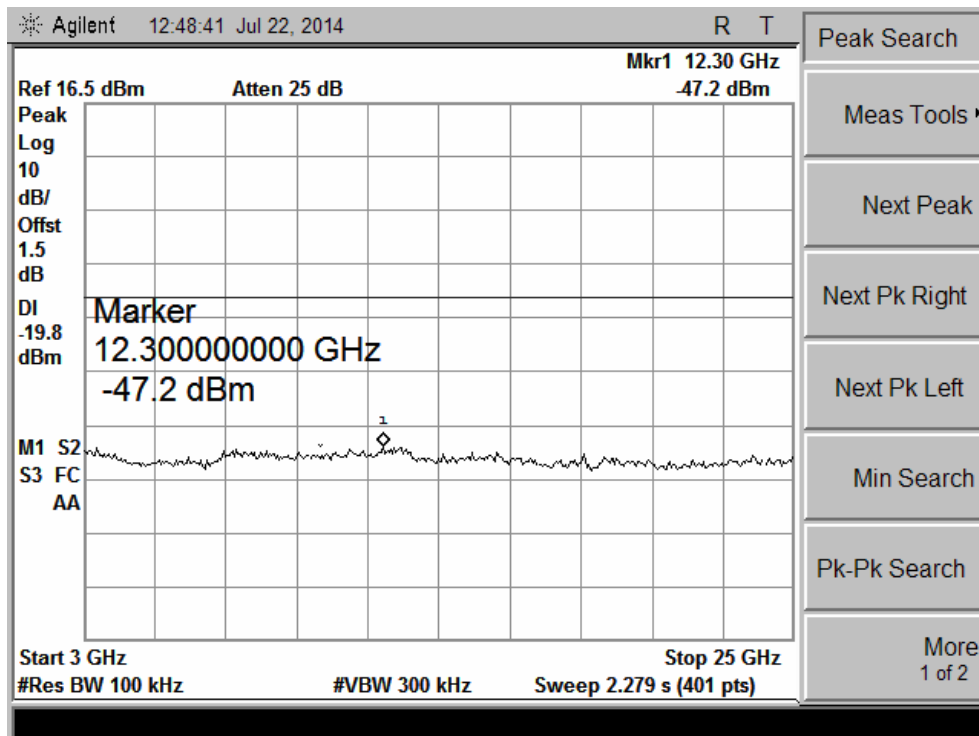


Date: 3.JUL.2014 19:56:54

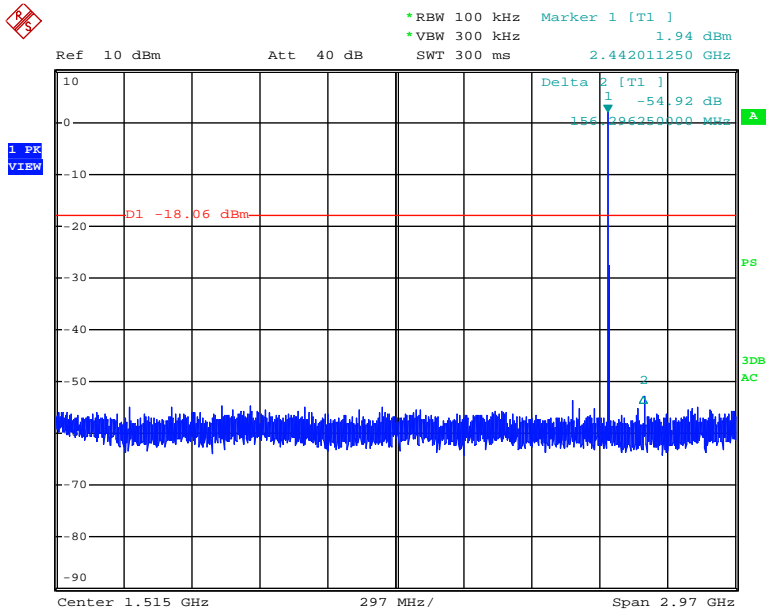
Conducted Spurious Emissions Low Channel



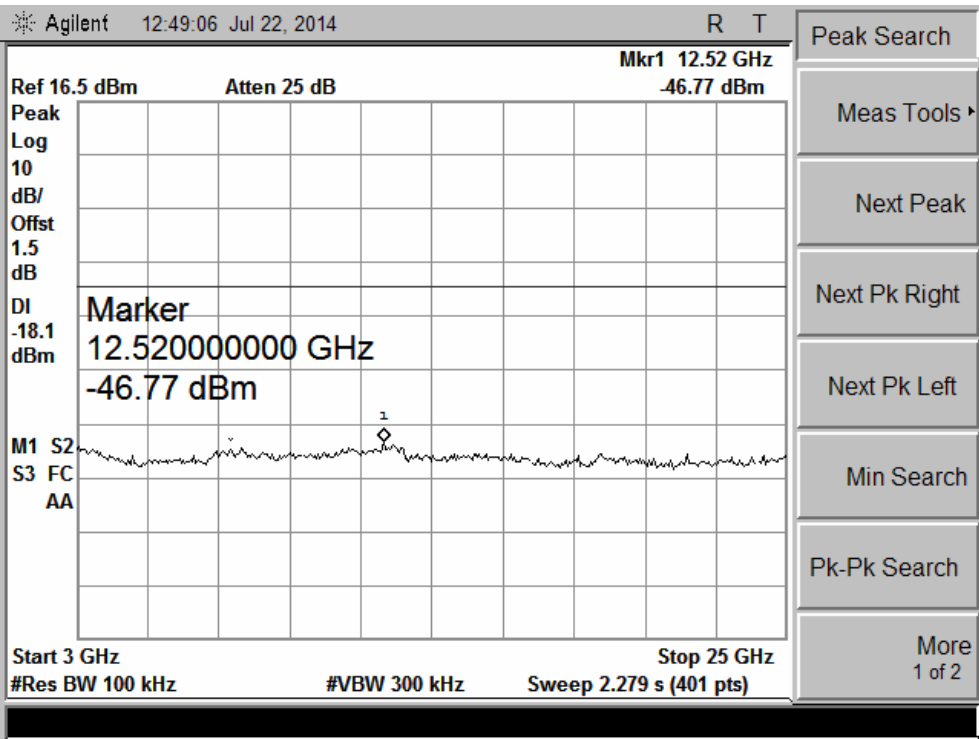
Date: 3.JUL.2014 19:36:15



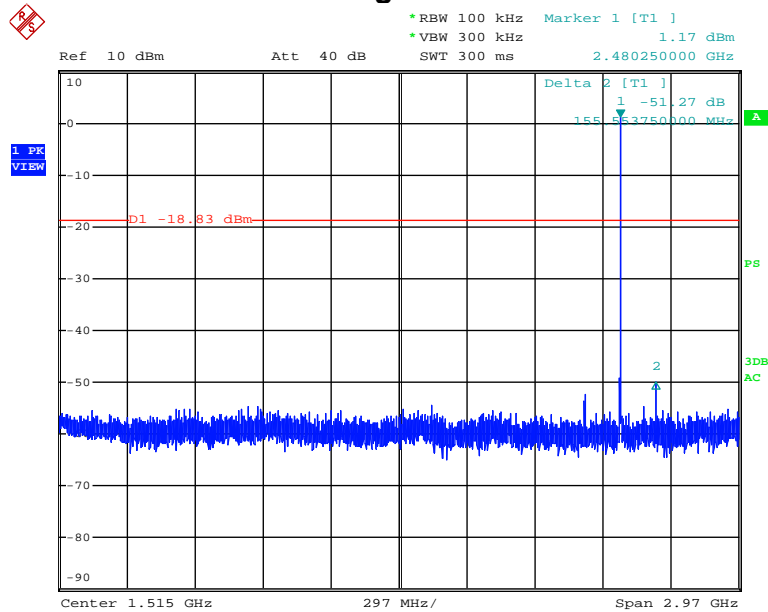
Middle Channel



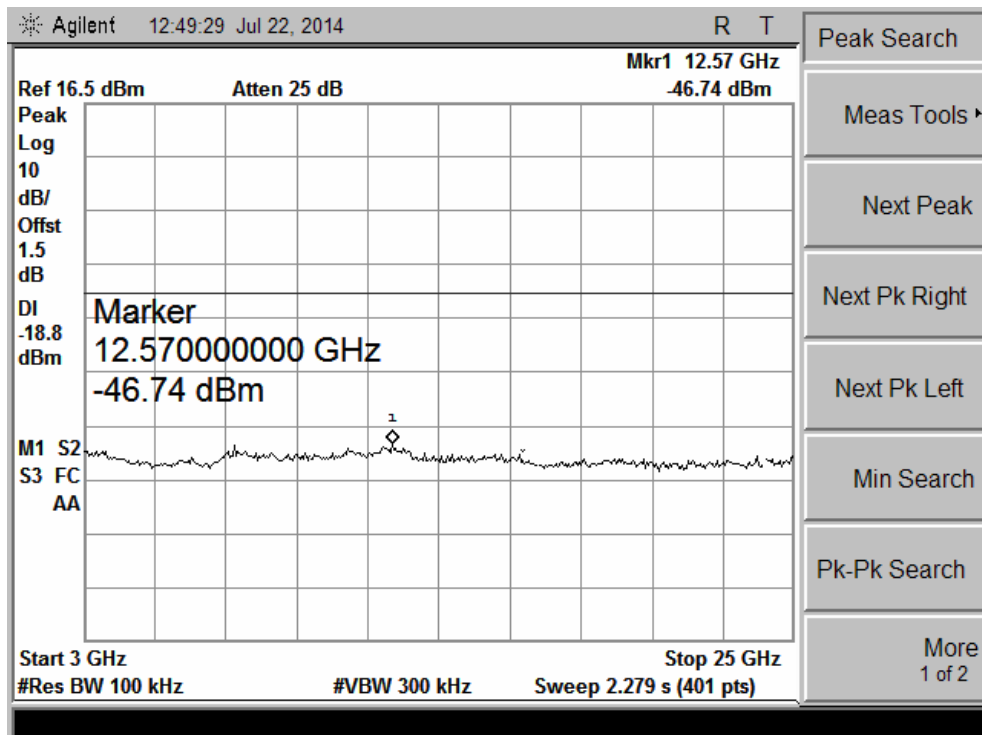
Date: 3.JUL.2014 19:37:31



High Channel



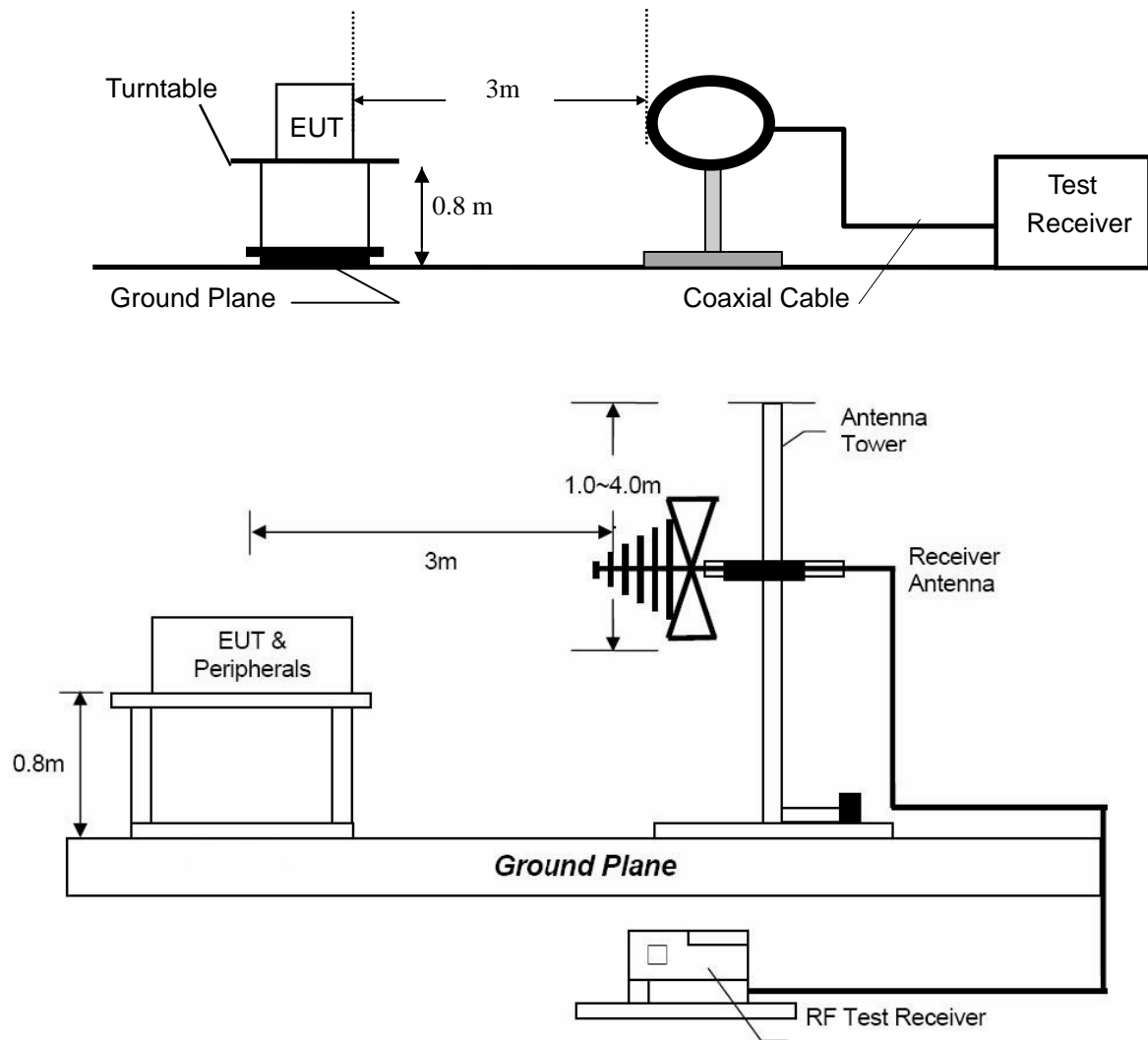
Date: 3.JUL.2014 19:38:08



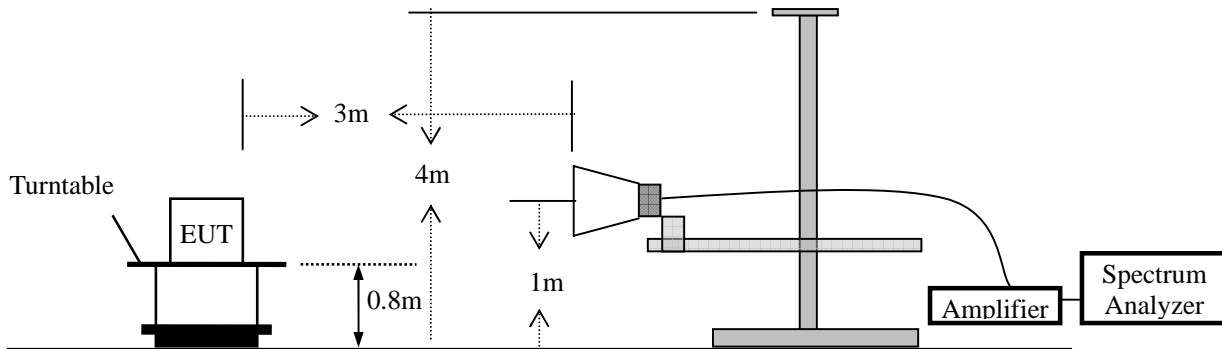
8. Radiated Spurious Emissions and Restricted Bands

8.1 Test SET-UP (Block Diagram of Configuration)

8.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



8.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



8.2 Measurement Procedure

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.
 - The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300KHz for Quasi-peak detection at frequency below 1GHz.
 - The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
 - The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for average detection(AV) at below at frequency above 1GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Function | Resolution Bandwidth | Video Bandwidth |
|----------------------|----------|----------------------|-----------------|
| 30 to 1000 | QP | 120 kHz | 300 kHz |
| Above 1000 | Peak | 1 MHz | 3 MHz |
| | Average | 1 MHz | 10 Hz |

8.3 Limit

| Frequency range MHz | Distance Meters | Field Strengths Limit (15.209) |
|---------------------|-----------------|--------------------------------|
| | | $\mu\text{V/m}$ |
| 0.009 ~ 0.490 | 300 | $2400/F(\text{kHz})$ |
| 0.490 ~ 1.705 | 30 | $24000/F(\text{kHz})$ |
| 1.705 ~ 30 | 30 | 30 |
| 30 ~ 88 | 3 | 100 |
| 88 ~ 216 | 3 | 150 |
| 216 ~ 960 | 3 | 200 |
| Above 960 | 3 | 500 |

- Remark : (1) Emission level (dB) μV = 20 log Emission level $\mu\text{V/m}$
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
(4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
(5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

8.4 Measurement Results

Operation Mode: TX
Frequency Range: 9KHz~1GHz
Test Result: PASS
Measured Distance: 3m
Test Date: June 20, 2014

Temperature: 22 °C
Humidity: 55 %
Test By: Sance

| Freq. (MHz) | Ant.Pol. H/V | Emission Level (dBuV/m) | Limit 3m (dBuV/m) | Margin (dB) | Note |
|----------------|-----------------|-------------------------------|-------------------------|----------------|------|
| 94.0199 | V | 40.12 | 43.50 | -3.38 | QP |
| 273.7600 | V | 44.20 | 46.00 | -1.80 | QP |
| --- | | | | | |
| --- | | | | | |
| --- | | | | | |
| --- | | | | | |
| 94.0199 | H | 32.70 | 43.50 | -10.80 | QP |
| 233.7000 | H | 39.80 | 46.00 | -6.20 | QP |
| 272.87800 | H | 40.20 | 46.00 | -5.80 | QP |
| --- | | | | | |
| --- | | | | | |
| --- | | | | | |

Other emissions are lower than 10dB below the allowable limit.

- Note:**
- (1) Emission Level= Reading Level + Factor
 - (2) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (3) Measurement uncertainty : $\pm 3.4\text{dB}$
 - (4) Loop antenna used for the emission below 30MHz.
 - (5) Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.

Modulation: GFSK
(Low Frequency: 2402MHz)
Operation Mode: TX Mode (Low) Test Date : June 20, 2014
Frequency Range: 1-25GHz Temperature : 22 °C
Test Result: PASS Humidity : 55 %
Measured Distance: 3m Test By: Sance

| Freq. (MHz) | Ant. Pol. | Emission Level (dBuV) | | Limit 3m (dBuV/m) | | Margin (dB) | |
|----------------|--------------|--------------------------|-------|-------------------------|-------|----------------|--------|
| | | Peak | AV | Peak | AV | Peak | AV |
| 4804 | V | 55.62 | 47.13 | 74.00 | 54.00 | -18.38 | -6.87 |
| 7206 | V | 62.43 | 50.40 | 74.00 | 54.00 | -11.57 | -3.60 |
| --- | | | | | | | |
| --- | | | | | | | |
| 4804 | H | 52.76 | 42.39 | 74.00 | 54.00 | -21.24 | -11.61 |
| 7206 | H | 66.52 | 51.30 | 74.00 | 54.00 | -7.48 | -2.70 |
| --- | | | | | | | |
| --- | | | | | | | |

Other harmonics emissions are lower than 10dB below the allowable limit.

- Note:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level + Factor
 - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (4) Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
 - (5) Measurement uncertainty : $\pm 3.7\text{dB}$.
 - (6) Horn antenna used for the emission over 1000MHz.

| | | | |
|--------------------|----------------------------------|---------------|---------------|
| Modulation: | GFSK (Mid Frequency: 2442MHz) | | |
| Operation Mode: | TX Mode (Mid) | Test Date : | June 20, 2014 |
| Frequency Range: | 1-25GHz | Temperature : | 22 °C |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | Sance |

| Freq. (MHz) | Ant. Pol. | Emission Level (dBuV) | | Limit 3m (dBuV/m) | | Margin (dB) | |
|----------------|--------------|--------------------------|-------|-------------------------|-------|----------------|--------|
| | | Peak | AV | Peak | AV | Peak | AV |
| 4884 | V | 50.45 | 38.96 | 74.00 | 54.00 | -23.55 | -15.04 |
| 7326 | V | 63.76 | 51.12 | 74.00 | 54.00 | -10.24 | -2.88 |
| --- | | | | | | | |
| --- | | | | | | | |
| 4884 | H | 54.19 | 39.33 | 74.00 | 54.00 | -19.81 | -14.67 |
| 7326 | H | 66.42 | 51.38 | 74.00 | 54.00 | -7.58 | -2.62 |
| --- | | | | | | | |
| --- | | | | | | | |

Other harmonics emissions are lower than 10dB below the allowable limit.

- Note:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level + Factor
 - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (4) Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
 - (5) Measurement uncertainty : ± 3.7 dB.
 - (6) Horn antenna used for the emission over 1000MHz.

| | | | |
|--------------------|-----------------------------------|---------------|---------------|
| Modulation: | GFSK (High Frequency: 2480MHz) | | |
| Operation Mode: | TX Mode (High) | Test Date : | June 20, 2014 |
| Frequency Range: | 1-25GHz | Temperature : | 22 °C |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | Sance |

| Freq. (MHz) | Ant. Pol. | Emission Level (dBuV) | | Limit 3m (dBuV/m) | | Margin (dB) | |
|----------------|--------------|--------------------------|-------|-------------------------|-------|----------------|--------|
| | | Peak | AV | Peak | AV | Peak | AV |
| 4960 | V | 54.76 | 43.72 | 74.00 | 54.00 | -19.24 | -10.28 |
| 7440 | V | 60.12 | 50.39 | 74.00 | 54.00 | -13.88 | -3.61 |
| --- | | | | | | | |
| --- | | | | | | | |
| 4960 | H | 52.33 | 39.76 | 74.00 | 54.00 | -21.67 | -14.24 |
| 7440 | H | 62.62 | 51.53 | 74.00 | 54.00 | -11.38 | -2.47 |
| --- | | | | | | | |
| --- | | | | | | | |

Other harmonics emissions are lower than 10dB below the allowable limit.

- Note:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level + Factor
 - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
 - (5) Measurement uncertainty : $\pm 3.7\text{dB}$.
 - (6) Horn antenna used for the emission over 1000MHz.

Spurious Emission in restricted band:

| | | | |
|--------------------|------------|---------------|---------------|
| Operation Mode: | TX | Test Date : | June 20, 2014 |
| Frequency Range: | Above 1GHz | Temperature : | 22 °C |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | Sance |

| Freq. (MHz) | Ant. Pol. | Emission Level (dBuV) | | Limit 3m (dBuV/m) | | Margin (dB) | |
|----------------|--------------|--------------------------|-------|-------------------------|-------|----------------|--------|
| | | Peak | AV | Peak | AV | Peak | AV |
| 2397.760 | H | 59.72 | 40.53 | 74.00 | 54.00 | -14.28 | -13.47 |
| 2396.690 | V | 58.27 | 40.76 | 74.00 | 54.00 | -15.73 | -13.24 |
| 2485.760 | H | 41.76 | 27.86 | 74.00 | 54.00 | -32.24 | -26.14 |
| 2484.770 | V | 39.22 | 28.37 | 74.00 | 54.00 | -34.78 | -25.63 |

Other harmonics emissions are lower than 10dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
 (2) Emission Level= Reading Level+Probe Factor +Cable Loss
 (3) Measurement uncertainty : ± 3.7 dB

9. Antenna Application

9.1 Antenna requirement

According to of FCC part 15C section 15.203 and 15.240:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

9.2 Measurement Results

The antenna is integrated on the main PCB and no consideration of replacement, and the best case gain of the antenna is -0.61dBi. So, the antenna is considered meet the requirement.

10. Test Equipment List

| Description | Manufacturer | Model Number | Serial Number | Characteristics | Calibration Date | Calibration Due Date |
|--------------------------------|-----------------|--------------|---------------|-----------------|------------------|----------------------|
| Test Receiver | Rohde & Schwarz | ESCI7 | 100837 | 9KHz~7GHz | Nov. 25, 2013 | Nov. 24, 2014 |
| Antenna | Schwarzbeck | VULB9162 | 9162-010 | 30MHz~7GHz | Nov. 28, 2013 | Nov. 27, 2014 |
| Positioning Controller | UC | UC 3000 | N/A | 0~360° , 1-4m | N/A | N/A |
| Color Monitor | SUNSP0 | SP-140A | N/A | N/A | N/A | N/A |
| Single Phase Power Line Filter | SAEMC | PF201A-32 | 110210 | 32A | N/A | N/A |
| 3 Phase Power Line Filter | SAEMC | PF401A-200 | 110318 | 200A | N/A | N/A |
| DC Power Filter | SAEMC | PF301A-200 | 110245 | 200A | N/A | N/A |
| Cable | Huber+Suhner | CBL2-NN-1M | 22390001 | 9KHz~7GHz | Nov. 09, 2013 | Nov. 08, 2014 |
| Cable | Huber+Suhner | CIL02 | N/A | 9KHz~7GHz | Nov. 09, 2013 | Nov. 08, 2014 |
| Power Amplifier | HP | HP 8447D | 1145A00203 | 100KHz~1.3GHz | Nov. 09, 2013 | Nov. 08, 2014 |
| Horn Antenna | Schwarzbeck | BBHA9170 | 9170-372 | 15GHz~26.5GHz | Oct.24, 2013 | Oct.23, 2014 |
| Horn Antenna | Com-Power | AH-118 | 071078 | 1GHz~18GHz | Nov. 07, 2013 | Nov. 06, 2014 |
| Loop antenna | Daze | ZA30900A | 0708 | 9KHz~30MHz | Oct.11, 2013 | Oct.10, 2014 |
| Spectrum Analyzer | Agilent | E4408B | MY414407D | 9KHz~26.5GHz | Nov. 05, 2013 | Nov. 04, 2014 |
| Pre-Amplifier | Agilent | 8449B | 3008A02964 | 1GHz~26.5GHz | Nov. 05, 2013 | Nov. 04, 2014 |
| L.I.S.N. | Rohde & Schwarz | ENV 216 | 101317 | 9KHz~30MHz | Nov. 09, 2013 | Nov. 08, 2014 |

---End of report---