

EMC TEST REPORT

For

CAR CD AUDIO With BLUETOOTH

Model Number:CU3603

FCC ID: VNACU3603

Report Number : WT078002295

Test Laboratory : Shenzhen Academy of Metrology and
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TEST REPORT DECLARATION

Applicant : Autosound Electronic (HK) Limited
Address : 12/F., Meeco Ind. Bldg., 53-55 Au Pui Wan St., Fo Tan, Shatin,
N.T., Hong Kong
Manufacturer : Autosound Electronic (HK) Limited
Address : No.2, Fuk Lung Ind. Estates, Shuk Pai Town, Dongguan, China
EUT Description : CAR CD AUDIO With BLUETOOTH
Model Number : CU3603
FCC ID Number : VNACU3603

Test Standards:

FCC Part 15 15.247

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in fcc test method **DA 00-705** and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.247.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Tested by: Winnie Hou Date: Sep.15,2007
(Winnie Hou)

Checked by: Louis Lin Date: Sep.15,2007
(Louis Lin)

Approved by: Peter Lin Date: Sep.15,2007
(Peter Lin)

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

| Part 15 | Requirement | Result Pass/Fail | Comments |
|----------------------------|---|---------------------|----------|
| 15.207(a) | CONDUCTED Disturbance test | Pass | --- |
| 15.247(b)(1) | Maximum Peak Output Power | Pass | --- |
| 15.247(a)(1) | 20 dB Bandwidth | Pass | --- |
| 15.247 (c) | 100kHz Out of band & Band Edge measurements | Pass | --- |
| 15.209(a) (f) | Spurious Emission | Pass | --- |
| 15.247(a)(1) | Frequency Separation | Pass | --- |
| 15.247(a)(1)(iii) | Number of the Hopping Frequency | Pass | --- |
| 15.247(a)(1)(iii) | Time of Occupancy | Pass | --- |
| 15.203, 15.247(b)(4)(i) | Antenna Requirement | Pass | --- |

2. GENERAL INFORMATION

2.1. Report information

- 2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.
- 2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (**CNAS**) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (**FCC**), and the registration number are **97379**(open area test site) and **274801**(semi anechoic chamber).

The Laboratory is listed in Voluntary Control Council for Interference by Information Technology Equipment (**VCCI**), and the registration number are **R-1974**(open area test site) , **R-1966**(semi anechoic chamber), **C-2117**(mains ports conducted interference measurement) and **T-180**(telecommunication ports conducted interference measurement).

The Laboratory is registered to perform emission tests with Industry Canada (**IC**), and the registration number is **IC4174**.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is **E2024086Z02**.

Measurement Uncertainty

2.3. Measurement Uncertainty

Conducted Disturbance : 9kHz~30MHz 3.5dB

Radiated Disturbance: 30MHz~1000MHz 4.5dB
1GHz~18GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description : CAR CD AUDIO With BLUETOOTH

Manufacturer : Autosound Electronic (HK) Limited

Model Number : CU3603

Input Power : DC 12V supply by Battery

Operate Frequency : 2402-2480MHz

Channel Spacing : 1MHz

Antenna Designation : integrate

The EUT include a bluetooth module.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2402 – 2480MHz, 79 channels

B).. Modulation type: Frequency Hopping Spread Spectrum (FHSS)

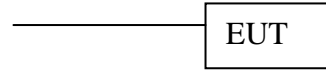
C). Antenna Designation: 1.0 dBi, Non-User Replaceable (Fixed)

The test report issued for Blue tooth function only.

3.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: VNACU3603 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

3.3. Block Diagram of EUT Configuration



3.4. Operating Condition of EUT

Mode 1: channel low (2402MHz)

Mode 2: channel low (2442MHz)

Mode 3: channel low (2480MHz)

3.5. Support Equipment List

Table 2 Support Equipment List

| Name | Model No | S/N | Manufacturer | Used “√” |
|------|----------|-----|--------------|-------------|
| --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- |

3.6. Test Conditions

Date of test: Sep11-14, 2007

Date of EUT Receive: Sep.11, 2007

Temperature: 24 °C

Relative Humidity: 55%

4. TEST EQUIPMENT USED

4.1. Test Equipment Used to Measure Conducted Disturbance

Table 3 Test Equipment List

| No. | Equipment | Manufacturer | Model No. | Last Cal. | Cal. Interval |
|-----------|--------------------------|--------------------|-------------|--------------|---------------|
| SB2603 | EMI Test Receiver | Rohde & Schwarz | ESCS30 | Jan.25, 2007 | 1 Year |
| SB3321 | AMN | Rohde & Schwarz | ESH2-Z5 | Jan.25, 2007 | 1 Year |
| SB2604 | AMN | Rohde & Schwarz | ESH3-Z5 | Jan.25, 2007 | 1 Year |
| SB3436 | EMI Test Receiver | Rohde & Schwarz | ESI26 | Jan.25, 2007 | 1 Year |
| SB3440 | Bilog Antenna | Chase | CBL6112B | Jan.25, 2007 | 1 Year |
| SB3435 | Horn Antenna | Rohde & Schwarz | HF906 | Jan.25, 2007 | 1 Year |
| SB3434 | Horn Antenna | Rohde & Schwarz | HF906 | Jan.25, 2007 | 1 Year |
| SB3435/01 | Amplifier(1-18GHz) | Rohde & Schwarz | --- | Jan.25, 2007 | 1 Year |
| SB3435/02 | Amplifier(18-40GHz) | Rohde & Schwarz | --- | May.05, 2007 | 1 Year |
| SB3435/03 | Horn Antenna | Rohde & Schwarz | AT4560 | May.05, 2007 | 1 Year |
| SB3450/01 | 3m Semi-anechoic chamber | Albatross Projects | 9X6X6 | Jan 25,2007 | 1 Year |
| SB2597/01 | Dipole Antenna | Schwarzbeck | VHAP | Jan 30,2005 | 3 Years |
| SB2597/02 | Dipole Antenna | Schwarzbeck | UHAP | Jan 30,2005 | 3 Years |
| SB3438 | Signal generator | Rohde & Schwarz | SMR20 | Jan.25, 2007 | 1Year |
| SB3732 | Tem Chamber | Qingsheng | THS-C7C±100 | Sep 25,2006 | 1Year |
| SB2599 | Spectrum Analyzer | Anritsu | MS2661C | Jan 25,2007 | 1 Year |
| SB3174 | Antenna | Schwarzbeck | VUBA9117 | Jan 25,2007 | 3 Year |
| SB3441 | Communication tester | Rohde & Schwarz | CMU200 | Apr.10,2007 | 1 Year |

5. CONDUCTED DISTURBANCE TEST

5.1. Test Standard and Limit

5.1.1. Test Standard

FCC Part 15 15.207

5.1.2. Test Limit

Table 4 Conducted Disturbance Test Limit (Class B)

| Frequency | Maximum RF Line Voltage (dB μ V) | |
|---------------|--------------------------------------|---------------|
| | Quasi-peak Level | Average Level |
| 150kHz~500kHz | 66 ~ 56 * | 56 ~ 46 * |
| 500kHz~5MHz | 56 | 46 |
| 5MHz~30MHz | 60 | 50 |

- Decreasing linearly with logarithm of the frequency
- The lower limit shall apply at the transition frequency.

5.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions form both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

5.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

5.4. Test Data

N/A

6. MAXIMUM PEAK OUTPUT POWER

6.1. Test Standard and Limit

6.1.1. Test Standard

FCC Part15 15.247 (b)

6.1.2. Test Limit

Table 5 Bandwidth Limit

| Frequency MHz | Channels | Types of Devices | Power |
|---------------|-----------|------------------|--------|
| 2400-2483.5 | ≥ 75 | Hopping | 1 Watt |

6.2. Test Procedure

Remove the antenna from the EUT and then connect the transmitter output to the power meter via a suitable attenuator. Set the EUT transmitting continuously to each of low, middle, and high frequency.

6.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

6.4. Test Data

Table 6 Test data

| Channel | Frequency (MHz) | Reading (dBm) | Limit | Result |
|---------|-----------------|---------------|------------|--------|
| Low | 2402 | -11.7 | 1W (30dBm) | Pass |
| Middle | 2442 | -11.9 | 1W (30dBm) | Pass |
| High | 2480 | -10.7 | 1W (30dBm) | Pass |

7. HOPPING CHANNEL 20 DB BANDWIDTH

7.1. Test Standard and Limit

7.1.1. Test Standard

FCC part 15 15.247 (a)

7.1.2. Test Limit

For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

7.2. Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Communication tester.
3. used the spectrum function to measure the bandwidth.

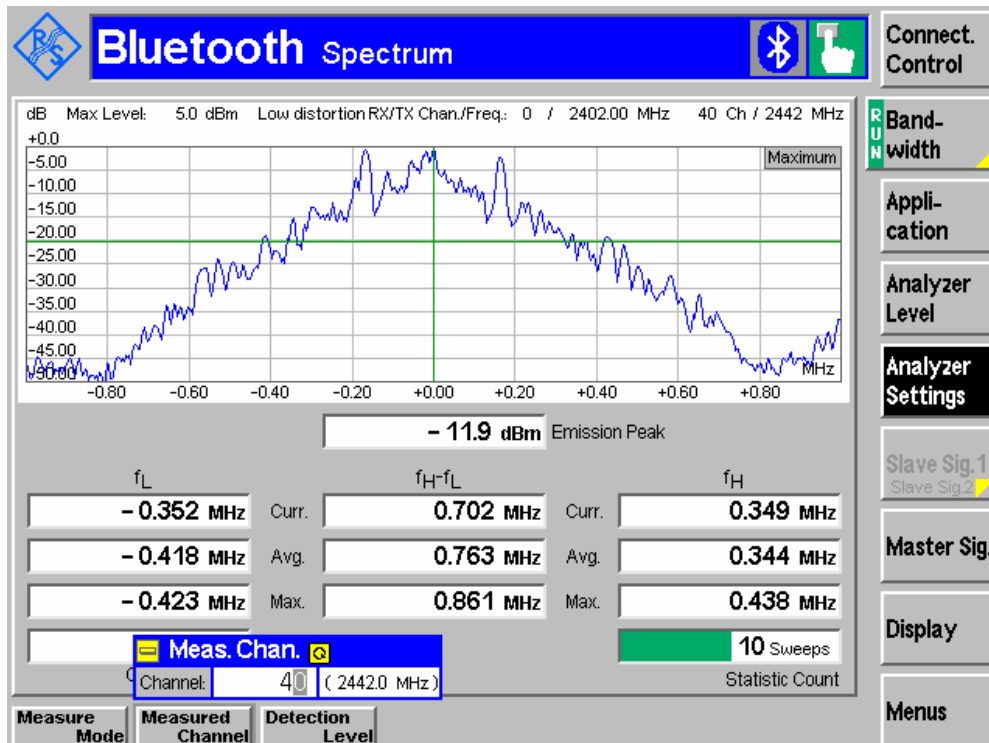
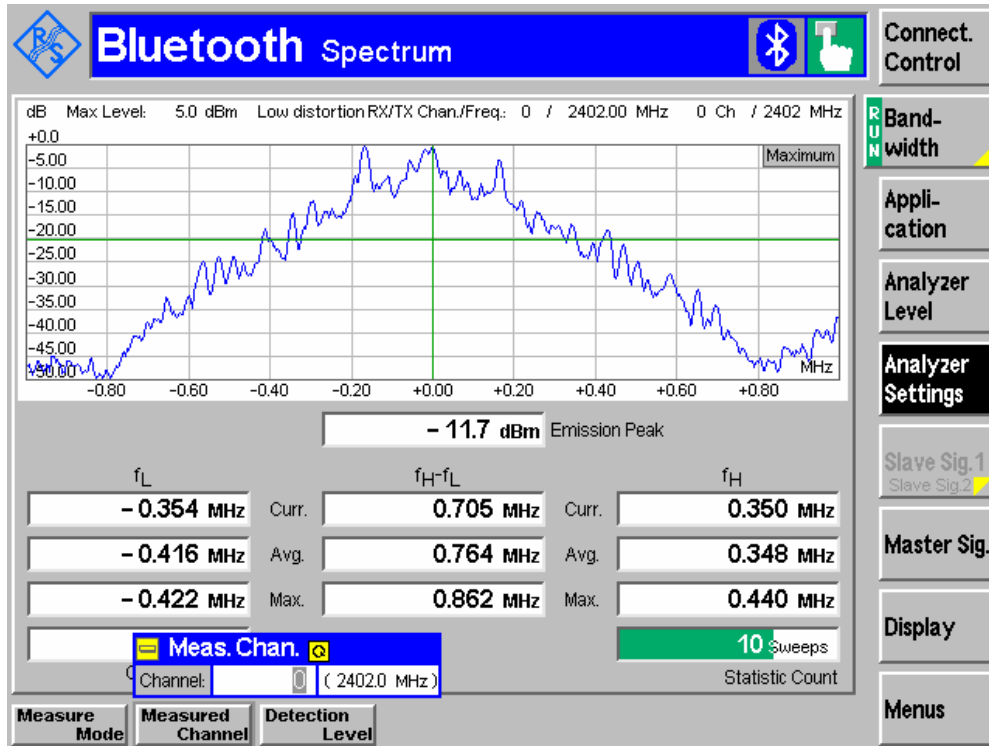
7.3. Test Arrangement

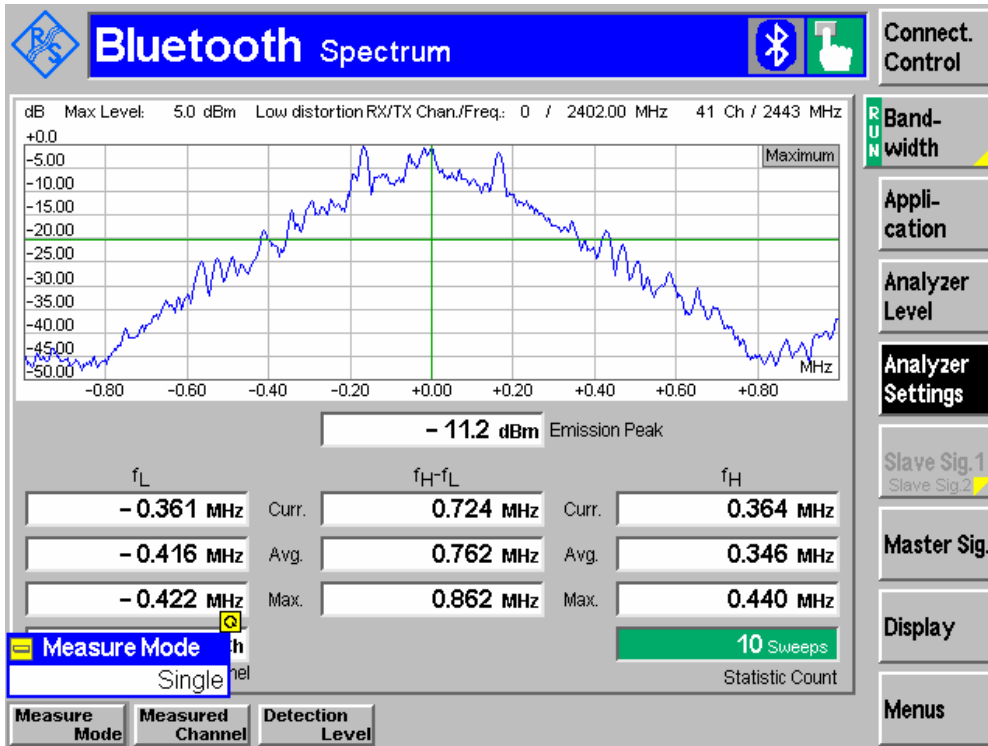
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

7.4. Test Data

Table 7 Test data

| Channel | Frequency (MHz) | 20 dB Bandwidth |
|---------|-----------------|-----------------|
| Low | 2402 | 0.862MHz |
| Mid | 2441 | 0.861MHz |
| High | 2480 | 0.862MHz |





8. 100KHZ BANDWIDTH OF BAND EDGES MEASUREMENT

8.1. Test Standard and Limit

8.1.1. Test Standard

FCC Part 15 15.247(c)

8.2. Band Edge FCC 15.247(c) Limit

According to § 15.247(c), in any 100 KHz bandwidth outside the frequency bands 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, In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

8.3. Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW=300kHz, VBW=1MHz, Span=20MHz, Sweep = auto Mark Peak, .
5. Repeat above procedures until all frequency measured were complete.

8.4. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

8.5. Test Data

Frequency Hopping

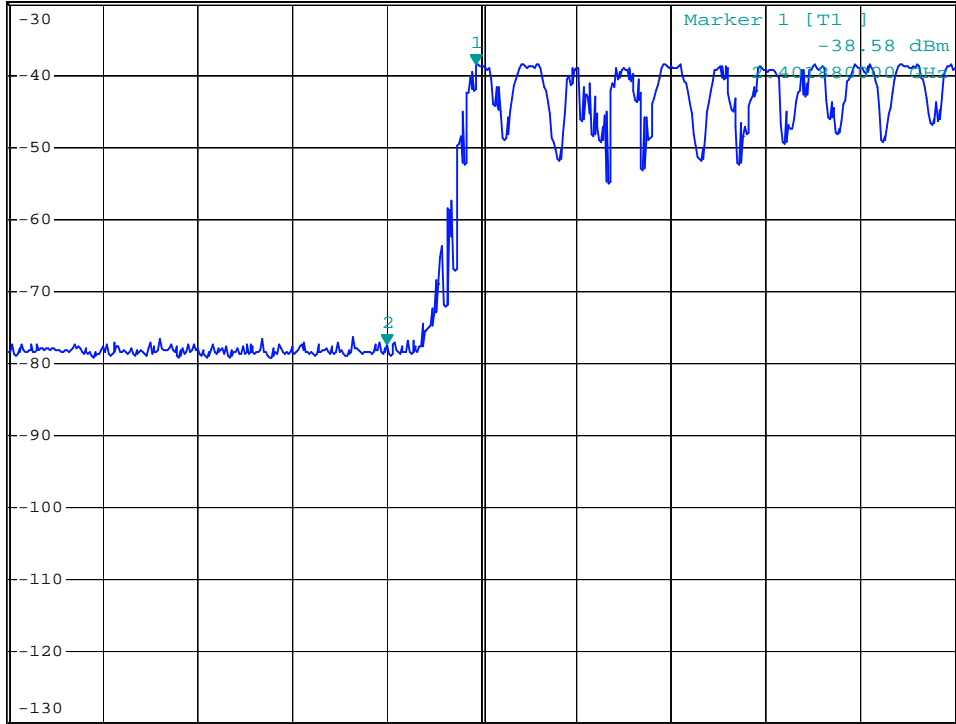


*RBW 300 kHz Marker 2 [T1]
VBW 1 MHz -77.47 dBm
SWT 2.5 ms 2.40000000 GHz

Ref -30 dBm

Att 10 dB

1 PK
VIEW



Center 2.402 GHz

2 MHz/

Span 20 MHz

UB-8H

Date: 6.AUG.2007 21:08:55

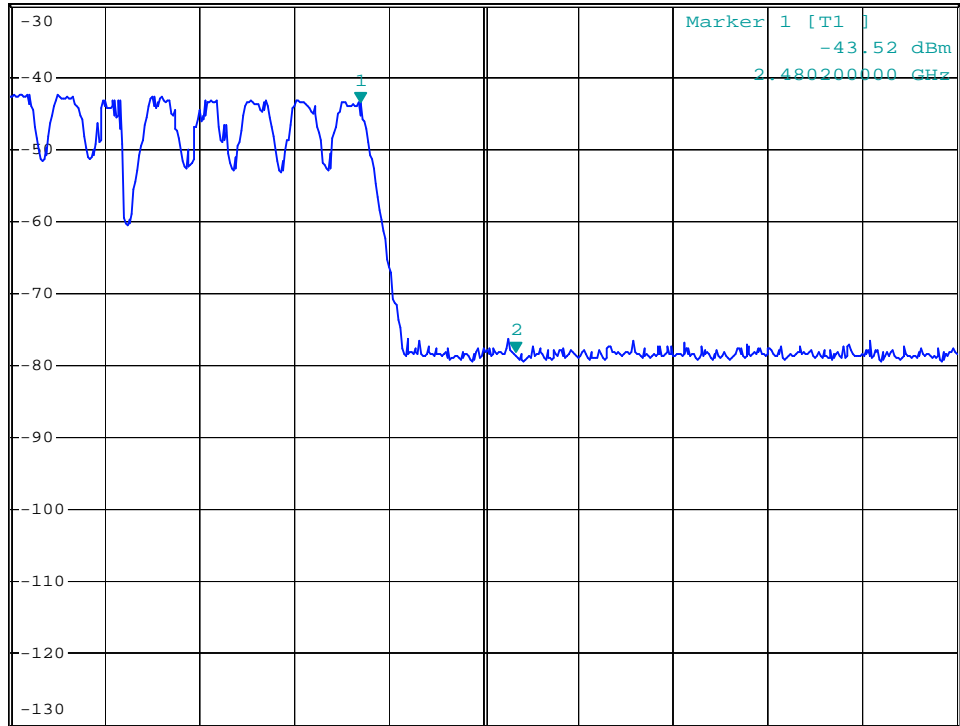


*RBW 300 kHz Marker 2 [T1]
VBW 1 MHz -78.05 dBm
SWT 2.5 ms 2.483480000 GHz

Ref -30 dBm

Att 10 dB

1 PK
VIEW



Center 2.4828 GHz

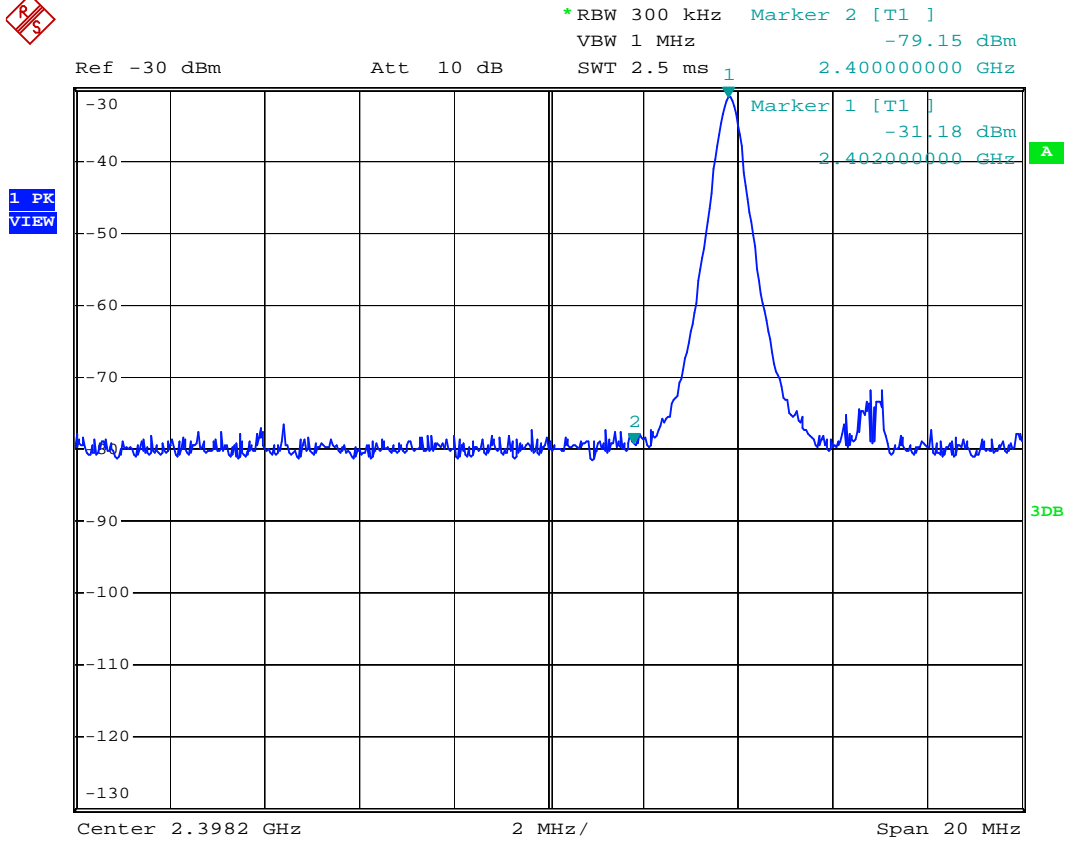
2 MHz/

Span 20 MHz

UB-8H

Date: 6.AUG.2007 21:12:02

Frequency Hopping Stop



UB-8H

Date: 6.AUG.2007 21:17:01

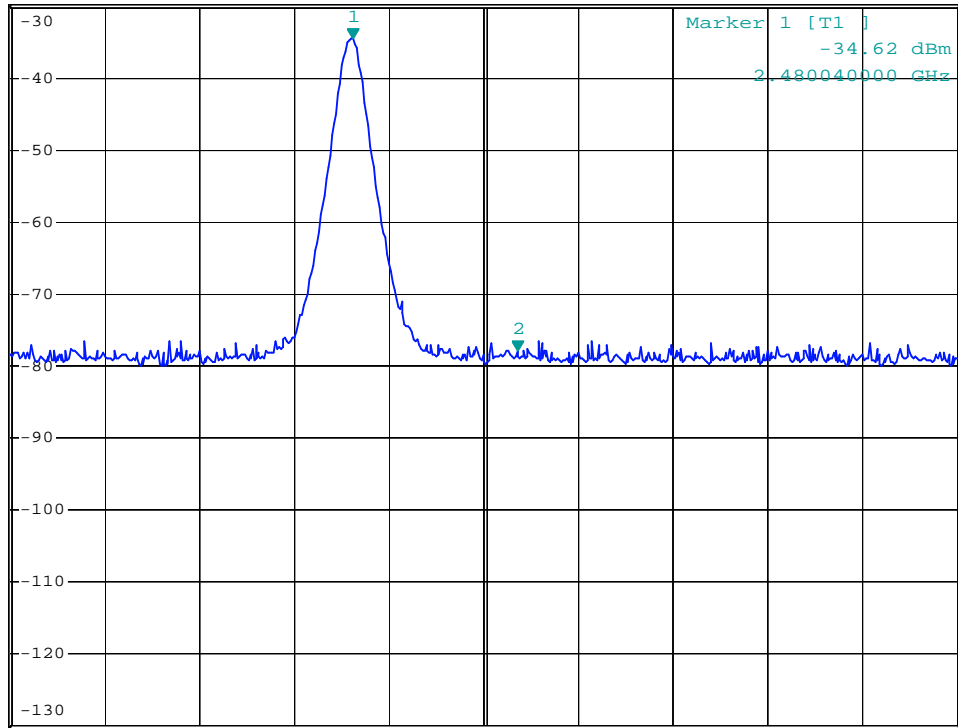


*RBW 300 kHz Marker 2 [T1]
VBW 1 MHz -77.99 dBm
SWT 2.5 ms 2.483520000 GHz

Ref -30 dBm

Att 10 dB

1 PK
MAXH



Center 2.4828 GHz

2 MHz/

Span 20 MHz

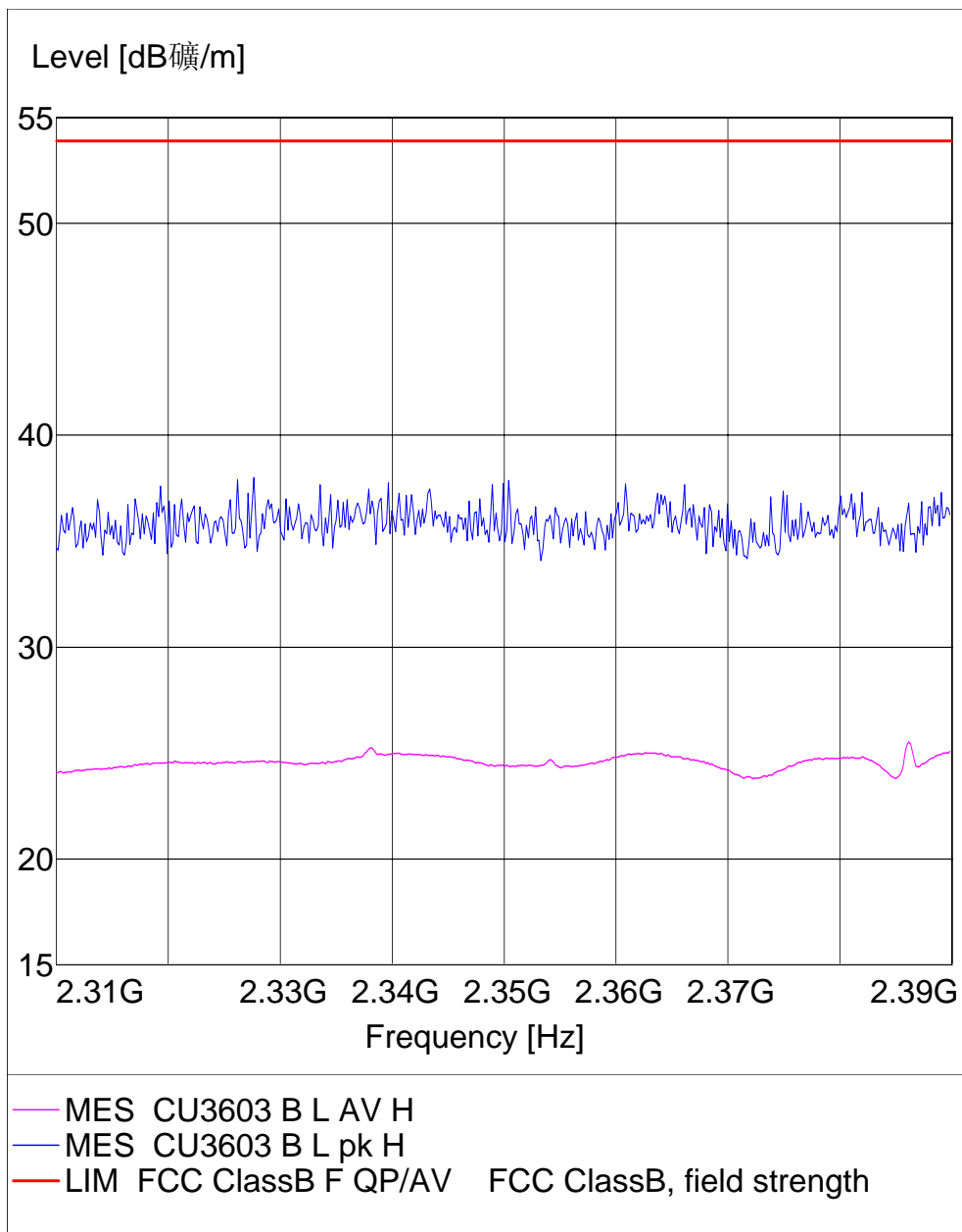
UB-8H

Date: 6.AUG.2007 21:15:59

The setting of the spectrum analyzer is
Detector=Peak RBW=1MHz RBW=3MHz
Detector=AV RBW=1MHz RBW=10Hz

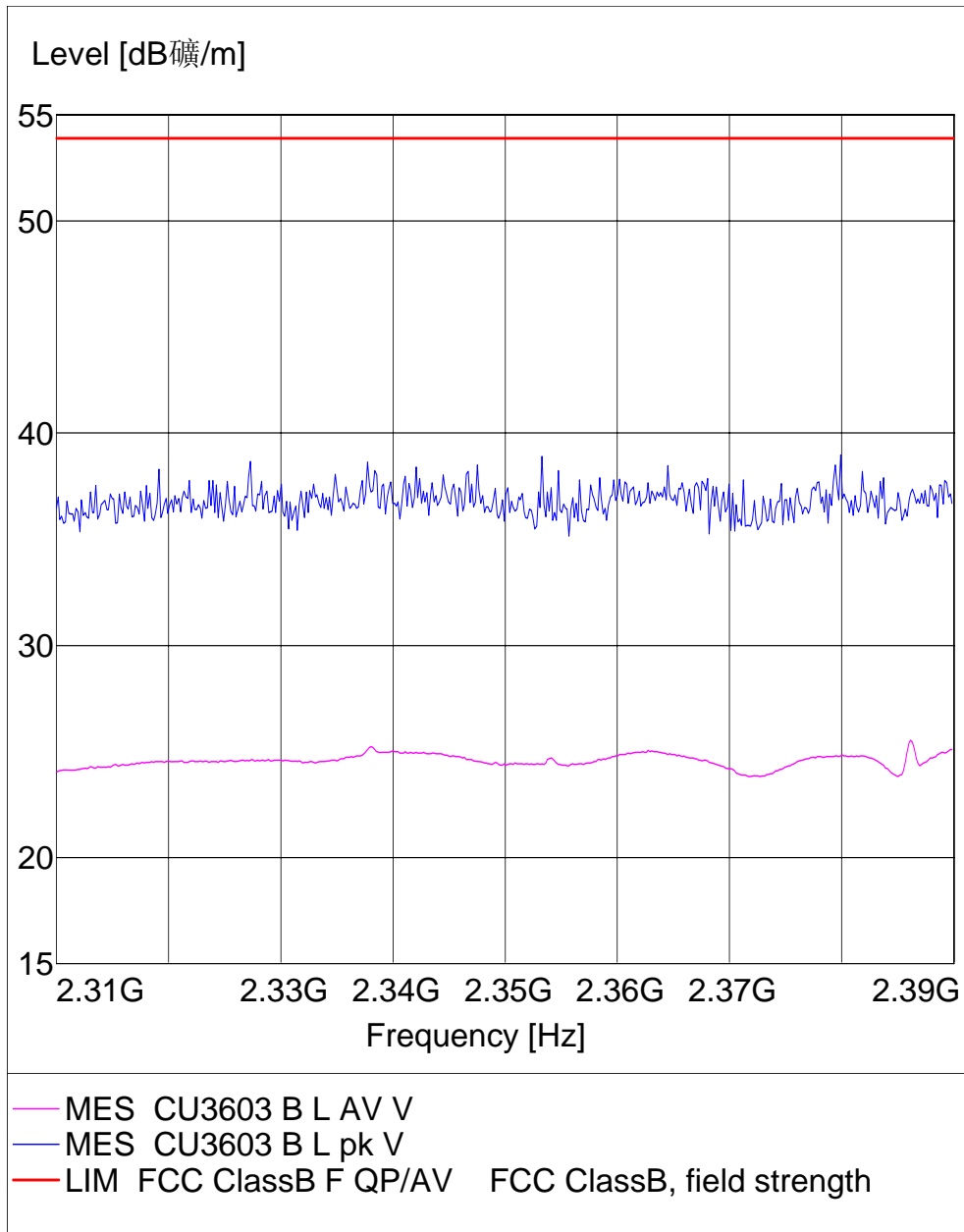
RADIATED EMISSION

EUT: CU3603
Manufacturer:
Operating Condition: TX 2402MHz
Test Specification: Horizontal



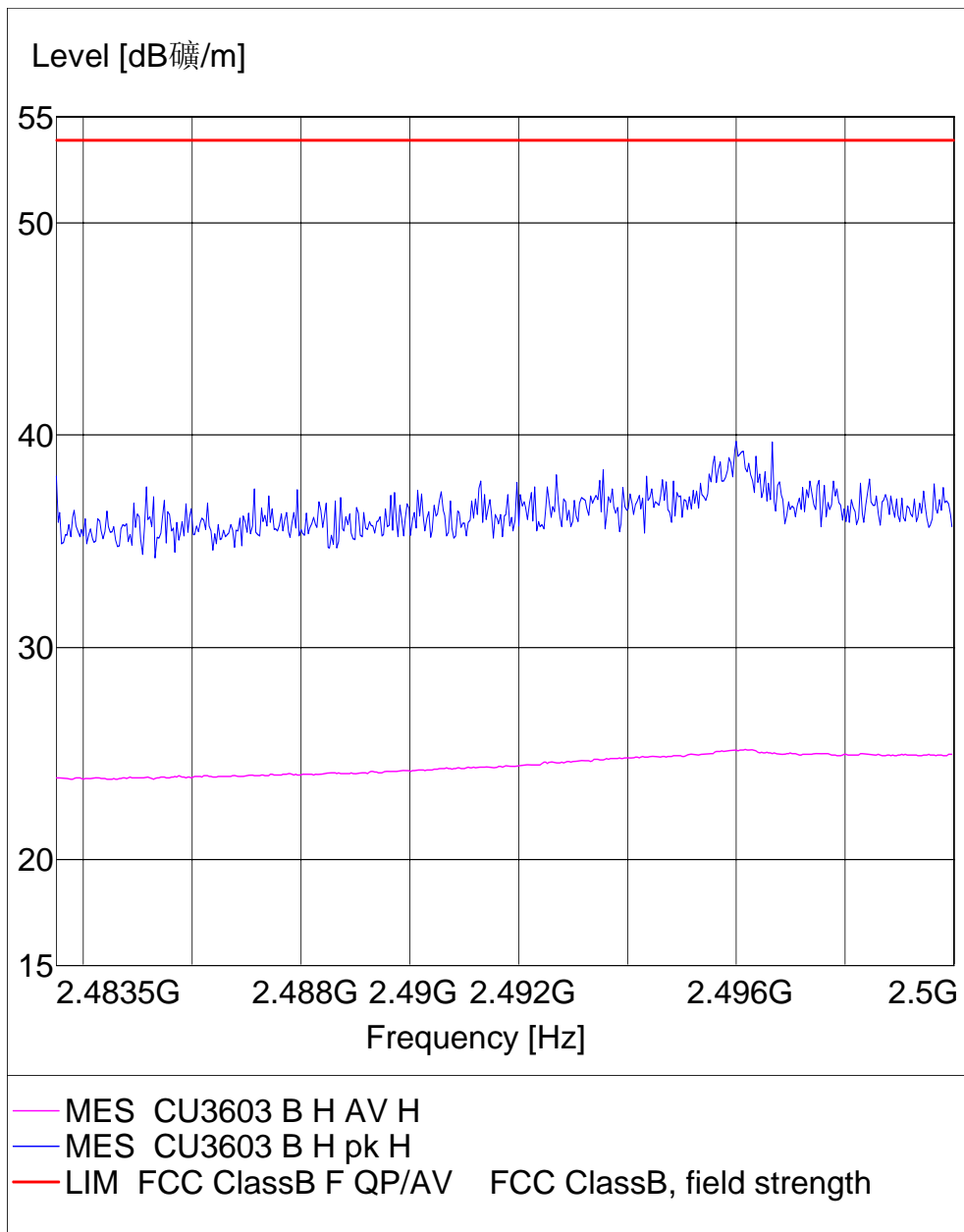
RADIATED EMISSION

EUT: CU3603
Manufacturer:
Operating Condition: TX 2402MHz
Test Specification: Vertical



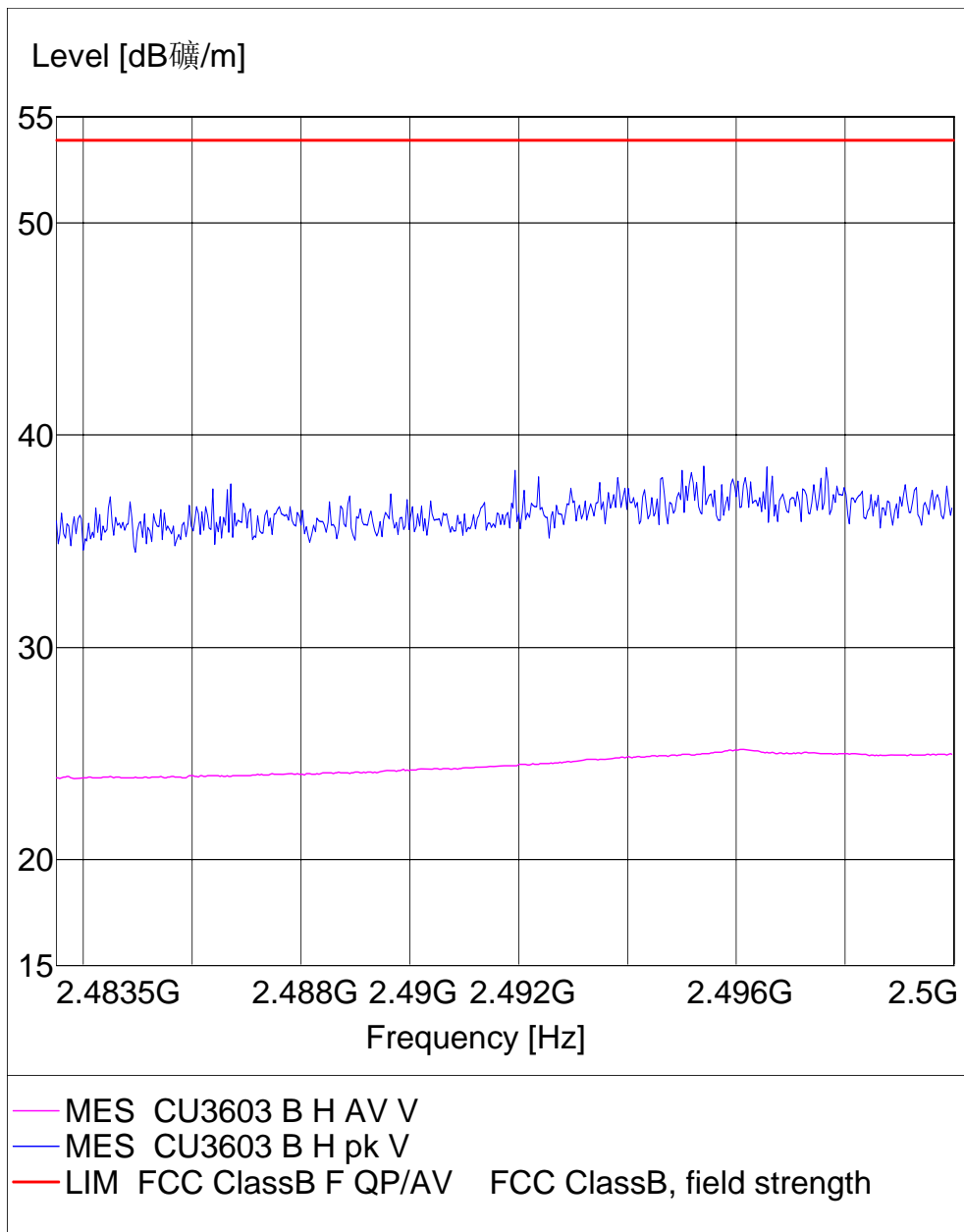
RADIATED EMISSION

EUT: CU3603
Manufacturer:
Operating Condition: TX 2480MHz
Test Specification: HORIZONTAL



RADIATED EMISSION

EUT: CU3603
Manufacturer:
Operating Condition: TX 2480MHz
Test Specification: Vertical



9. SPURIOUS RADIATED EMISSION TEST

9.1. Test Standard and Limit

9.1.1. Test Standard

FCC Part 15 15.247(c)

9.2. Band Edge FCC 15.247(c) Limit

According to § 15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in § 15.209(a). And according to § 15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

9.3. Test Procedure

1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-2003.
2. The EUT was put in the front of the test table. The peripherals was placed on the side of the host system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The spacing between the peripherals was 10 centimeters.
4. External I/O cables were draped along the edge of the test table and bundle when necessary.
5. the setting of the EMI test receiver is
30-1000MHz Detector=QP RBW=120kHz VBW=300kHz
1-25GHz Detector=Peak RBW=1MHz RBW=3MHz
Detector=AV RBW=1MHz RBW=10Hz

9.4. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

9.5. Test Data

Radiated Emission Data :

Table 8 Test data

Low Channel (2402MHz)

| Ambient temperature: 24° C | | | | | | |
|-----------------------------------|------------------------------|------------------------------|---|--------------------------|----------------------------|-----------------|
| Relative humidity: 53 % | | | | | | |
| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarizatio n | Limits (dBuV/m) | Detector |
| 32.300 | 35.3 | 16.8 | 18.5 | V | 40.0 | QP |
| 79.700 | 34.0 | 23.6 | 10.4 | V | 40.0 | QP |
| 323.100 | 33.0 | 15.7 | 17.3 | V | 46.0 | QP |
| 456.100 | 34.0 | 13.5 | 20.5 | V | 46.0 | QP |
| 168.100 | 30.0 | 17.2 | 12.8 | H | 43.5 | QP |
| 600.889 | 33.4 | 10.5 | 22.9 | H | 46.0 | QP |
| 4804.120 | 45.6 | 43.3 | 2.3 | H | 74.0 | Peak |
| 4804.120 | 40.6 | 38.3 | 2.3 | H | 54.0 | AV |
| 4804.121 | 45.0 | 42.7 | 2.3 | V | 74.0 | Peak |
| 4804.121 | 40.0 | 37.7 | 2.3 | V | 54.0 | AV |
| 7206.300 | 47.7 | 39.6 | 8.1 | H | 74.0 | Peak |
| 7206.300 | 43.2 | 35.1 | 8.1 | H | 54.0 | AV |
| 7206.300 | 47.0 | 38.9 | 8.1 | V | 74.0 | Peak |
| 7206.300 | 42.5 | 34.4 | 8.1 | V | 54.0 | AV |
| 9608.230 | 49.3 | 40.0 | 9.3 | H | 74.0 | Peak |
| 9608.230 | 45.0 | 35.7 | 9.3 | H | 54.0 | AV |
| 9608.230 | 48.8 | 39.5 | 9.3 | V | 74.0 | Peak |
| 9608.230 | 44.5 | 35.2 | 9.3 | V | 54.0 | AV |

Note :

1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)
3. The other emission levels were very low against the limit(>15dB to limit).

Table 9 Test data

Mid Channel (2442MHz)

| Ambient temperature: 24° C | | | | | | |
|-----------------------------------|------------------------------|------------------------------|---|--------------------------|----------------------------|-------------|
| Relative humidity: 53 % | | | | | | |
| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarizatio n | Limits (dBuV/m) | Note |
| 32.310 | 35.3 | 16.8 | 18.5 | V | 40.0 | QP |
| 79.702 | 34.2 | 23.8 | 10.4 | V | 40.0 | QP |
| 323.100 | 33.0 | 15.7 | 17.3 | V | 46.0 | QP |
| 456.120 | 34.0 | 13.5 | 20.5 | V | 46.0 | QP |
| 168.100 | 30.4 | 17.6 | 12.8 | H | 43.5 | QP |
| 600.902 | 33.4 | 10.5 | 22.9 | H | 46.0 | QP |
| 4884.150 | 45.7 | 43.4 | 2.3 | H | 74.0 | Peak |
| 4884.150 | 40.7 | 38.4 | 2.3 | H | 54.0 | AV |
| 4884.150 | 45.1 | 42.8 | 2.3 | V | 74.0 | Peak |
| 4884.150 | 40.1 | 37.8 | 2.3 | V | 54.0 | AV |
| 7326.305 | 47.7 | 39.5 | 8.1 | H | 74.0 | Peak |
| 7326.305 | 43.2 | 35.1 | 8.1 | H | 54.0 | AV |
| 7326.305 | 46.9 | 38.8 | 8.1 | V | 74.0 | Peak |
| 7326.305 | 42.4 | 34.3 | 8.1 | V | 54.0 | AV |
| 9768.302 | 49.4 | 40.1 | 9.3 | H | 74.0 | Peak |
| 9768.302 | 45.1 | 35.8 | 9.3 | H | 54.0 | AV |
| 9768.302 | 48.7 | 39.4 | 9.3 | V | 74.0 | Peak |
| 9768.302 | 44.4 | 35.1 | 9.3 | V | 54.0 | AV |

Note :

1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)
3. The other emission levels were very low against the limit(>15dB to limit).

Table 10 Test data

High Channel (2480M)

| <i>Ambient temperature: 24° C</i> | | | | | | |
|-----------------------------------|------------------------------|------------------------------|---|--------------------------|----------------------------|-----------|
| <i>Relative humidity: 53 %</i> | | | | | | |
| <i>Frequency MHz</i> | <i>Emission (dBuV/m)</i> | <i>Read Value (dBuV)</i> | <i>Correction Factor (dB/m)</i> | <i>Polarizatio n</i> | <i>Limits (dBuV/m)</i> | <i>QP</i> |
| 32.310 | 35.3 | 16.8 | 18.5 | V | 40.0 | QP |
| 79.720 | 34.3 | 23.9 | 10.4 | V | 40.0 | QP |
| 323.120 | 33.0 | 15.7 | 17.3 | V | 46.0 | QP |
| 456.100 | 34.3 | 13.8 | 20.5 | V | 46.0 | QP |
| 168.110 | 30.5 | 17.7 | 12.8 | H | 43.5 | QP |
| 600.889 | 33.3 | 10.4 | 22.9 | H | 46.0 | Peak |
| 4960.100 | 45.6 | 43.3 | 2.3 | H | 74.0 | AV |
| 4960.100 | 40.6 | 38.3 | 2.3 | H | 54.0 | Peak |
| 4960.100 | 45.0 | 42.7 | 2.3 | V | 74.0 | AV |
| 4960.100 | 40.0 | 37.7 | 2.3 | V | 54.0 | Peak |
| 7440.300 | 47.3 | 39.2 | 8.1 | H | 74.0 | AV |
| 7440.300 | 43.0 | 34.9 | 8.1 | H | 54.0 | Peak |
| 7440.300 | 46.8 | 38.7 | 8.1 | V | 74.0 | AV |
| 7440.300 | 42.5 | 34.4 | 8.1 | V | 54.0 | Peak |
| 9920.250 | 49.6 | 40.3 | 9.3 | H | 74.0 | AV |
| 9920.250 | 45.1 | 35.8 | 9.3 | H | 54.0 | Peak |
| 9920.250 | 49.0 | 39.7 | 9.3 | V | 74.0 | AV |
| 9920.250 | 44.5 | 35.2 | 9.3 | V | 54.0 | QP |

Note :

1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)
3. The other emission levels were very low against the limit(>15dB to limit).

Table 11 **Restricted Band Radiated Emission Data**

| MHz | MHz | MHz | GHz |
|-------------------|-----------------------|-----------------|---------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | |
| 12.51975 - | 240 - 285 | 3345.8 - 3358 | |
| 12.52025 | 322 - 335.4 | 3600 - 4400 | |
| 12.57675 - | | | |
| 12.57725 | | | |
| 13.36 - 13.41 | | | |

All the emission of the above band were less than the limit 20dB.

10. NUMBER OF HOPPING FREQUENCY

10.1. Test Standard and Limit

10.1.1. Test Standard

FCC Part 15 15.247(c)

10.2. Band Edge FCC 15.247(c) Limit

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

10.3. Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW=300kHz, VBW=1MHz,
5. Max hold, view and count how many channel in the band.

10.4. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

10.5. Test Data

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

The maximum “initial carrier frequency tolerance” which is allowed for Bluetooth is $f_{center} = 75 \text{ kHz}$.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2442, 2480 MHz).

Additionally an example for the channel separation is given in the test report

Table 12 Test data

| Total No of hopping channel | Limit (CH) | Measurement result (CH) | Result |
|-----------------------------|------------|-------------------------|--------|
| | >15 | 79 | Pass |



*RBW 300 kHz Marker 1 [T1]
VBW 1 MHz -16.25 dBm
SWT 2.5 ms 2.418040000 GHz

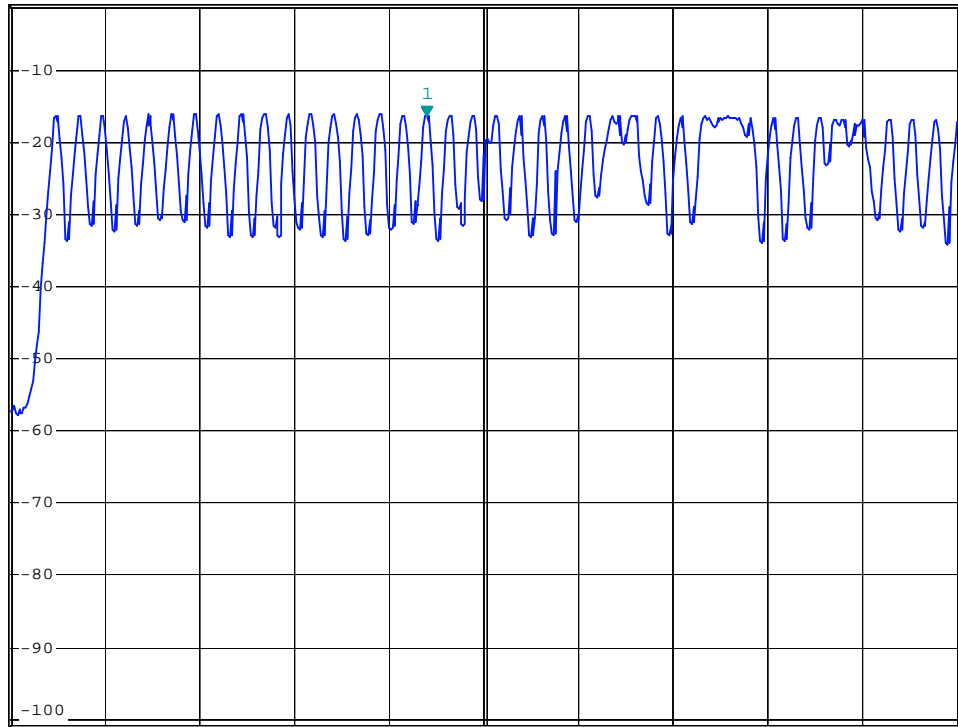
Ref -1 dBm

Att 30 dB

SWT 2.5 ms

2.418040000 GHz

1 PK
MAXH



Start 2.4 GHz

4.1 MHz/

Stop 2.441 GHz

UB-8H

Date: 18.JUL.2007 12:28:03

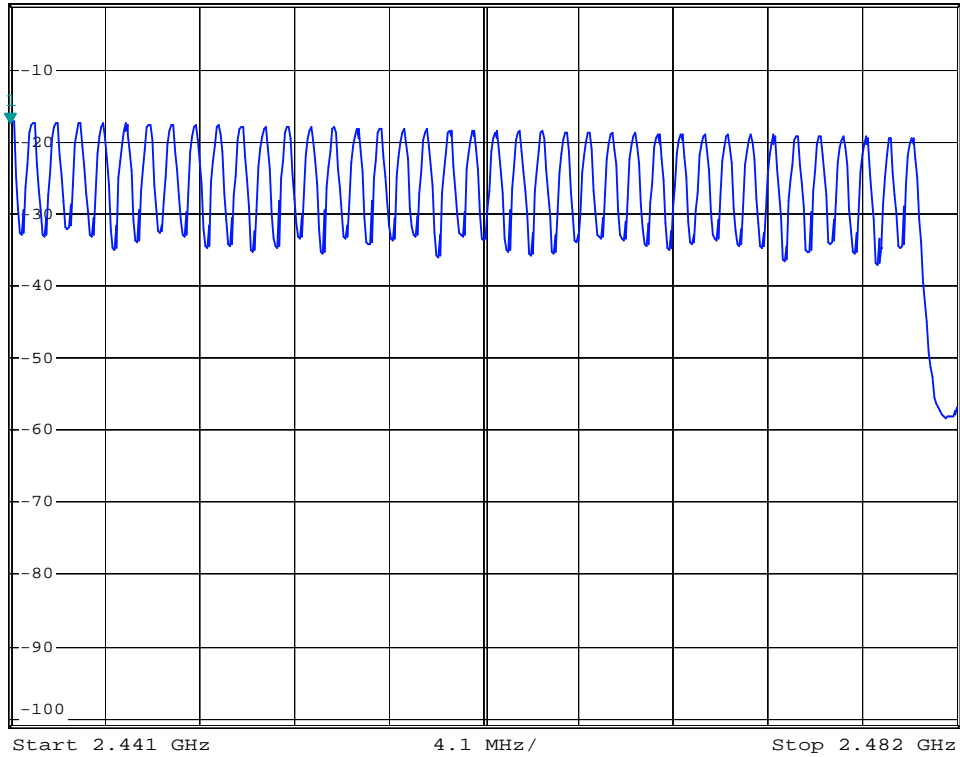


*RBW 300 kHz Marker 1 [T1]
VBW 1 MHz -17.53 dBm
SWT 2.5 ms 2.441000000 GHz

Ref -1 dBm

Att 30 dB

1 PK
MAXH



A

3DB

UB-8H

Date: 18.JUL.2007 12:32:10

11. FREQUENCY SEPARATION

11.1. Test Standard and Limit

11.1.1. Test Standard

FCC Part 15 15.247(c) :2006

11.2. Band Edge FCC 15.247(c) Limit

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

11.3. Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW=300kHz, VBW=1MHz, Adjust Span to 5 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

11.4. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

11.5. Test Data

Table 13 Test data

| Channel separation | Limit | Result |
|--------------------|---|--------|
| MHz | kHz | |
| 1.010 | $\geq 25\text{KHz}$ or $2/3 * 20\text{ dB}$ bandwidth | Pass |

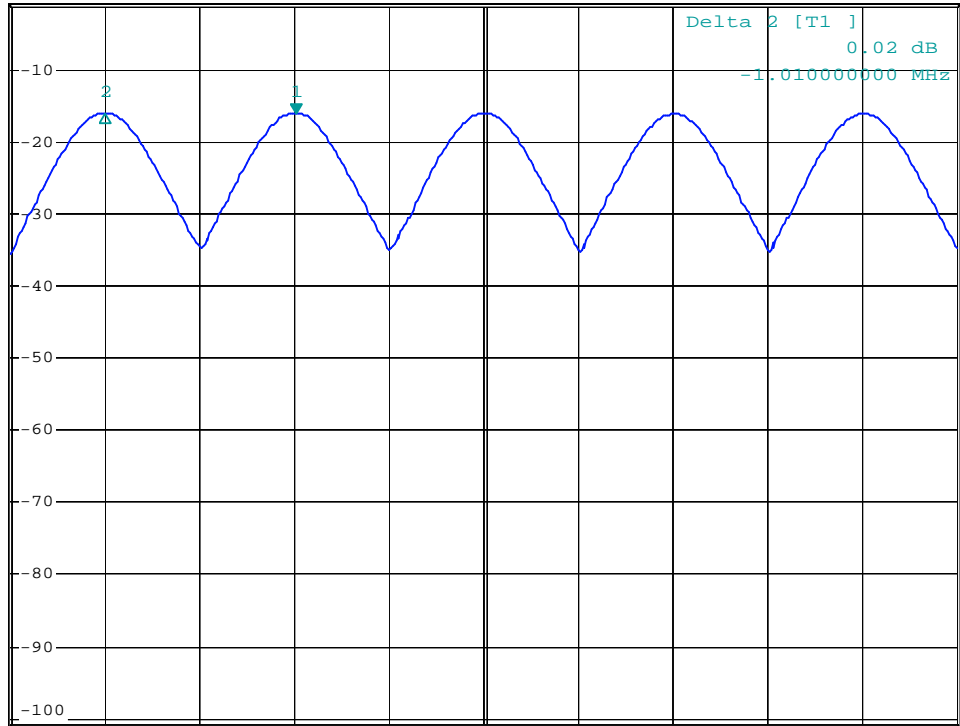


*RBW 300 kHz Marker 1 [T1]
VBW 1 MHz -16.00 dBm
SWT 2.5 ms 2.440010000 GHz

Ref -1 dBm

*Att 10 dB

1 PK
MAXH



Center 2.441 GHz

500 kHz/

Span 5 MHz

UB-8H

Date: 18.JUL.2007 12:40:36

12. TIME OF OCCUPANCY (DWELL TIME)

12.1. Test Standard and Limit

12.1.1. Test Standard

FCC Part 15 15.247(c):2006

12.2. Band Edge FCC 15.247(c) Limit

According to § 15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz.

The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds

multiplied by the number of hopping channel employed.

12.3. Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz, Span = 0Hz , Adjust Sweep = 2.5ms.
5. Repeat above procedures until all frequency measured were complete.

12.4. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

12.5. Test Data

The EUT working on DH1 mode only.

The dwell time of 0.172 s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is a follows:

Dwell time = time slot length * hop rate / number of hopping channels *30s

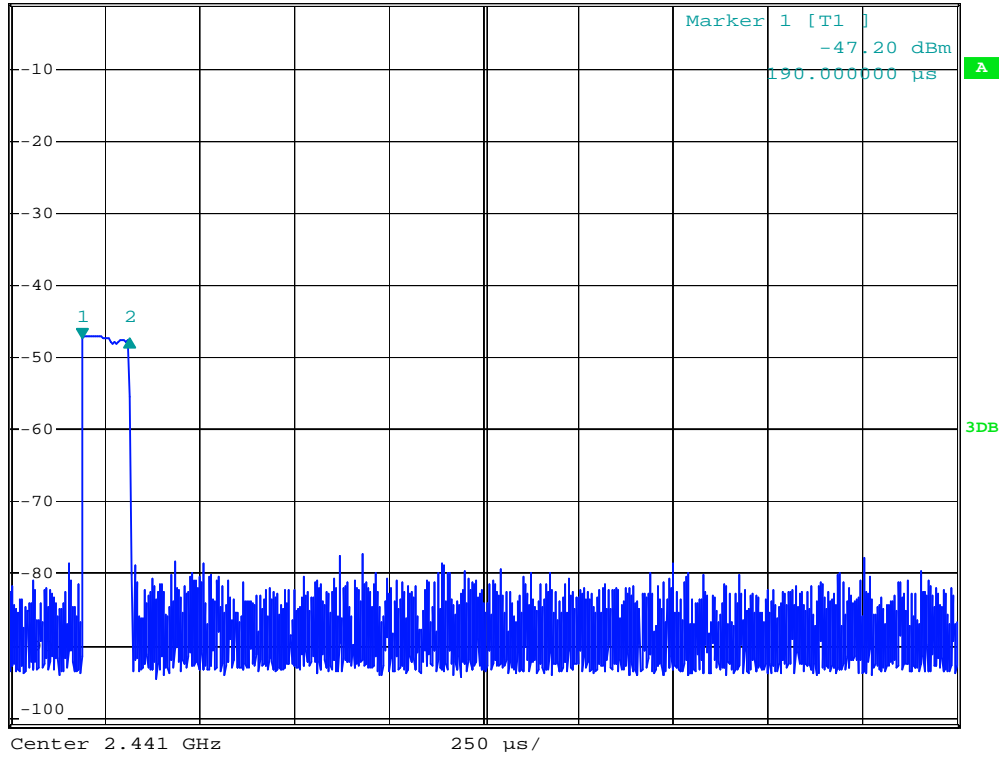
A period time = 0.4 (ms) * 79 = 31.6 (s)

DH1 time slot = 0.125 (ms) * (1600/(2*79)) * 31.6 = 40.0 (ms)



Ref -1 dBm *Att 10 dB RBW 300 kHz Delta 2 [T1]
VBW 1 MHz -0.07 dB
SWT 2.5 ms 125.000000 μ s

1 AP
VIEW



UB-8H

Date: 18.JUL.2007 12:38:29

13. ANTENNA REQUIREMENT

13.1. Standard Applicable

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

And according to § 15.247(4)(1), system operating in the 2400-2483.5MHz bands 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 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

13.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 1.0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

APPENDIX I TEST PHOTO

Photo 1 Radiated Emission Test



APPENDIX II EUT PHOTO

Photo 1 Appearance of EUT



Photo 2 Appearance of EUT

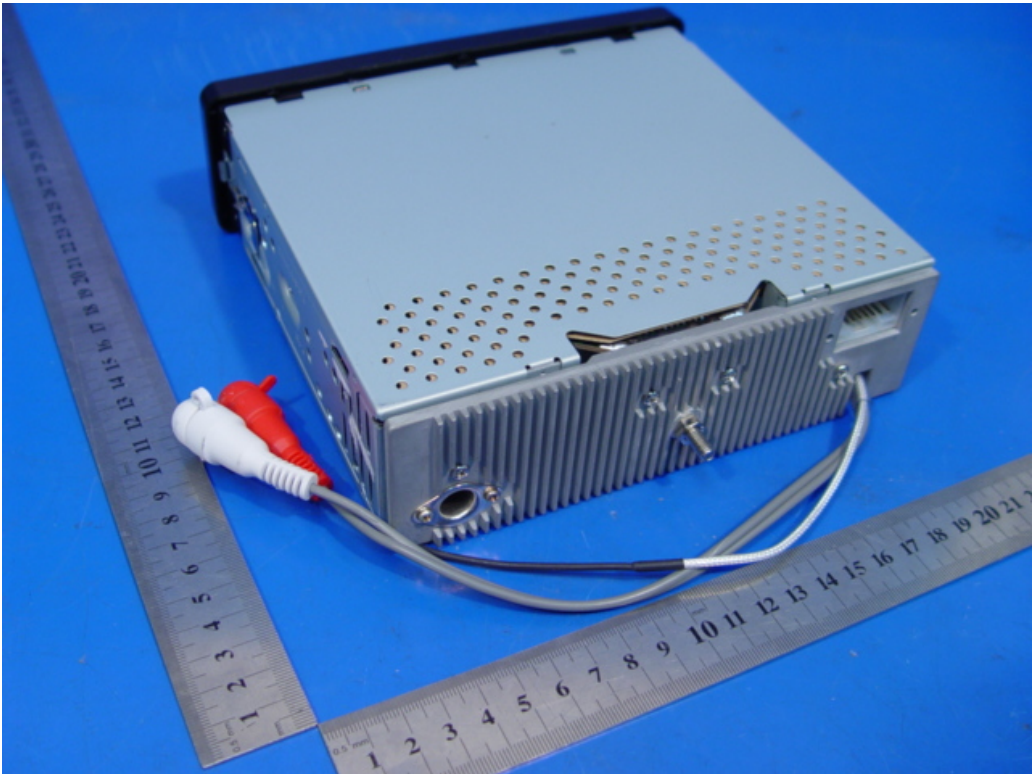


Photo 4 Inside of EUT

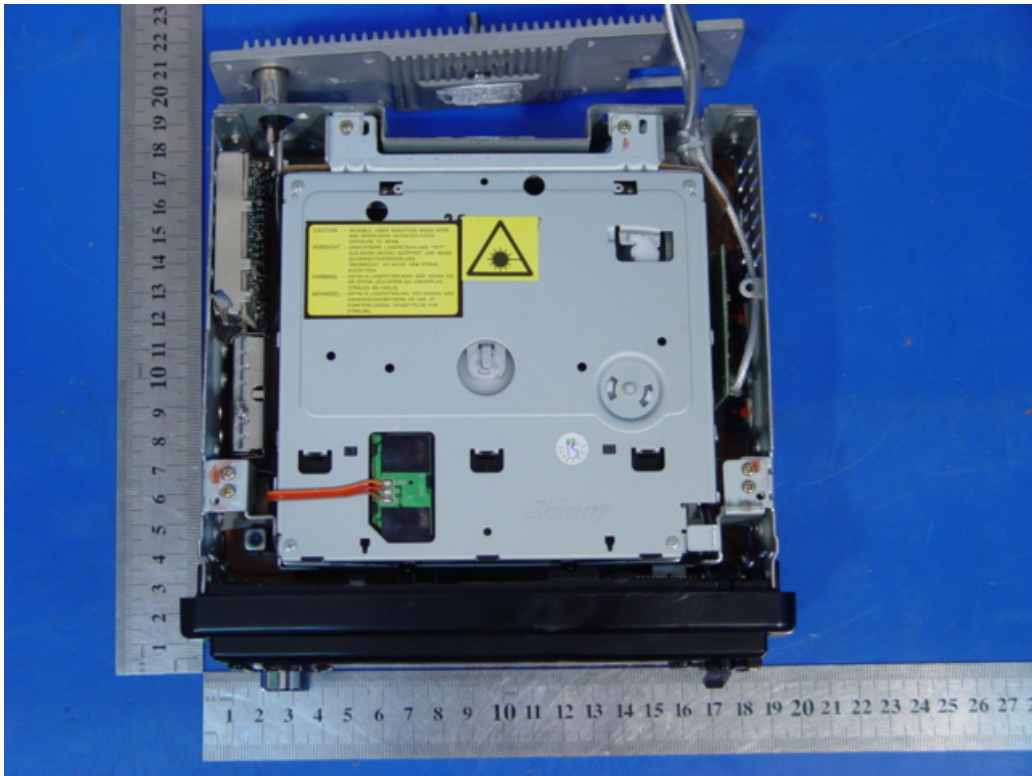


Photo 5 Inside of EUT



Photo 6 Inside of EUT

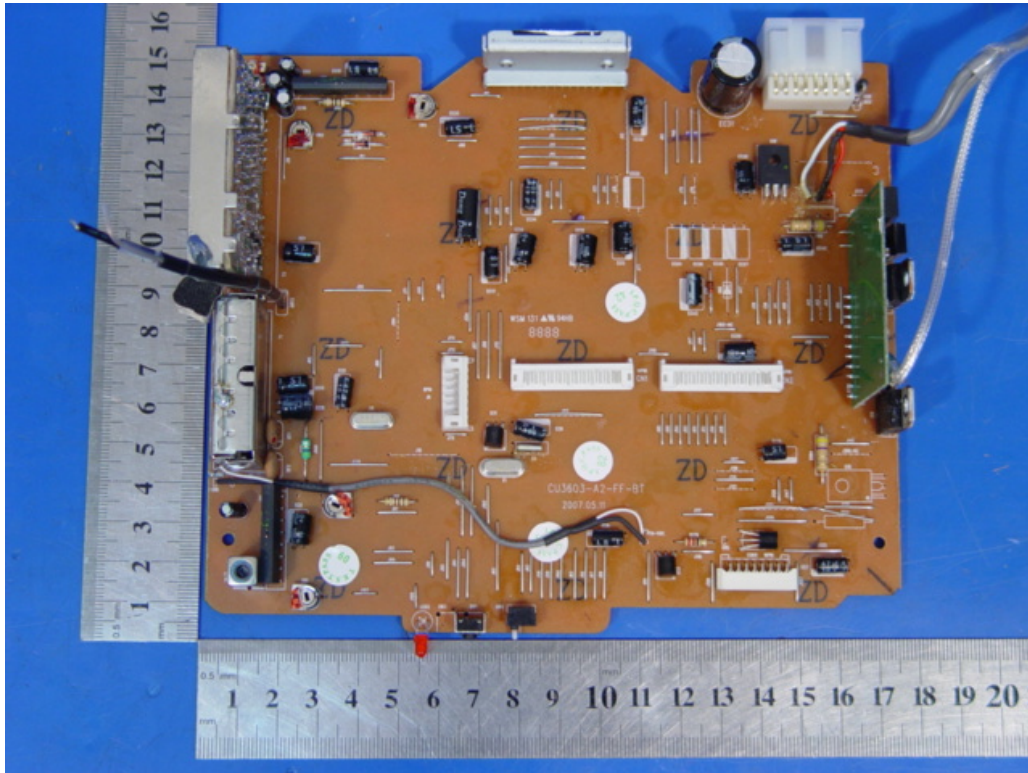


Photo 7 Inside of EUT

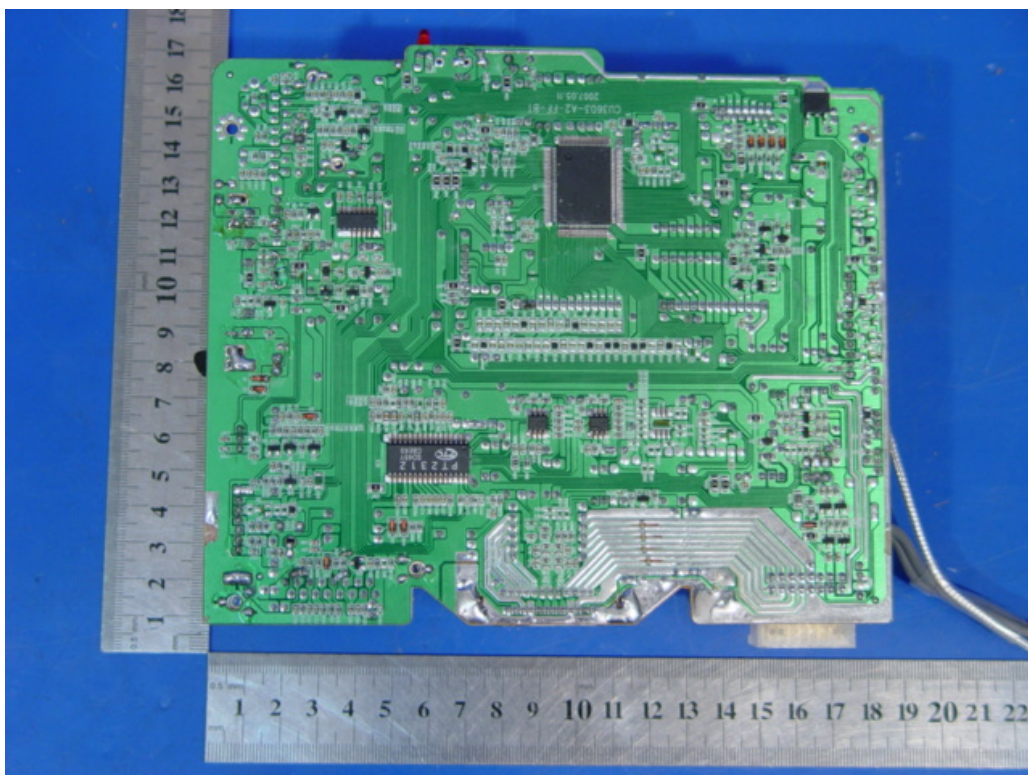


Photo 8 Inside of EUT

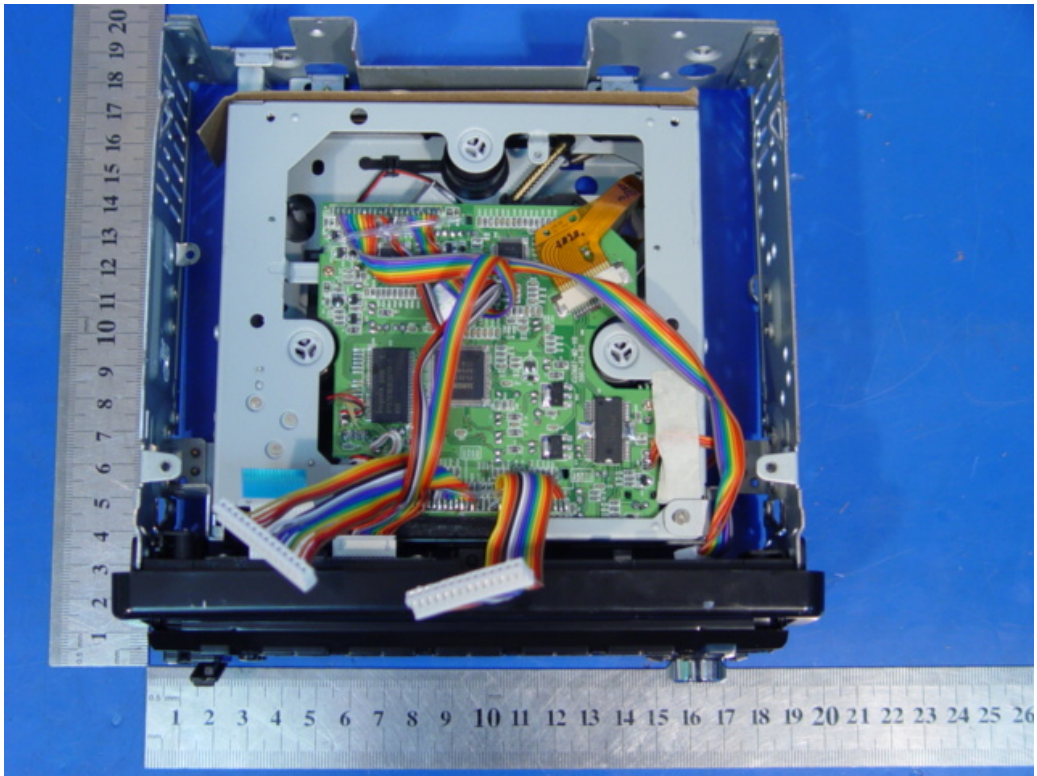


Photo 9 Inside of EUT

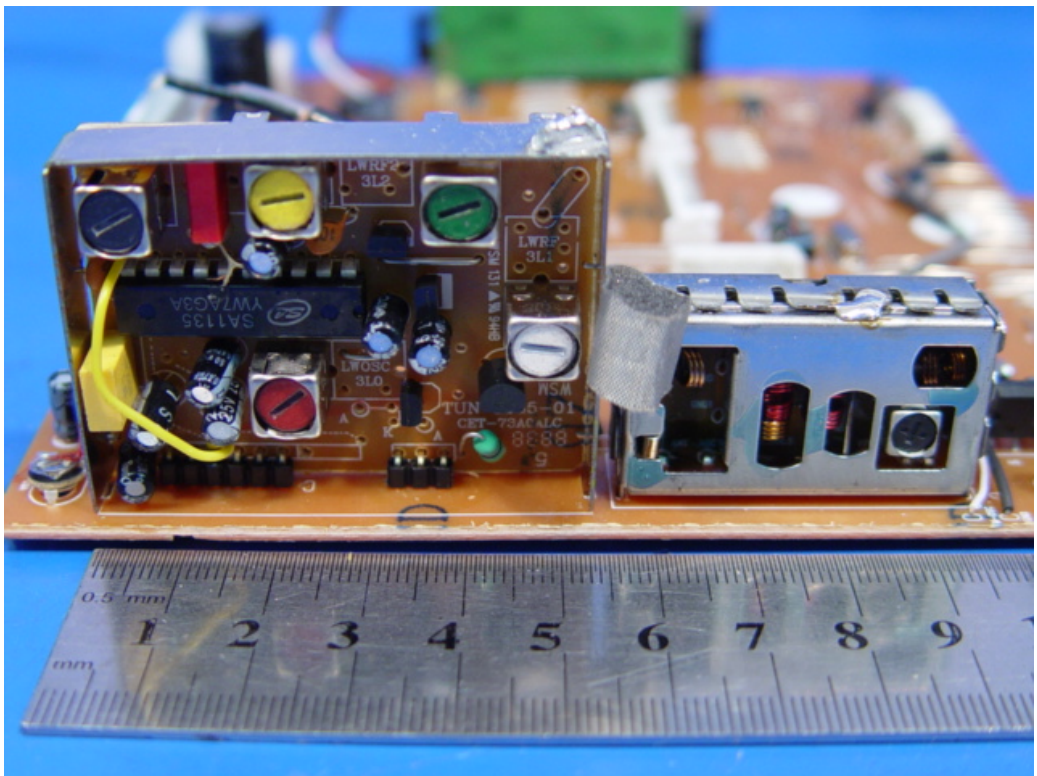


Photo 10 Inside of EUT

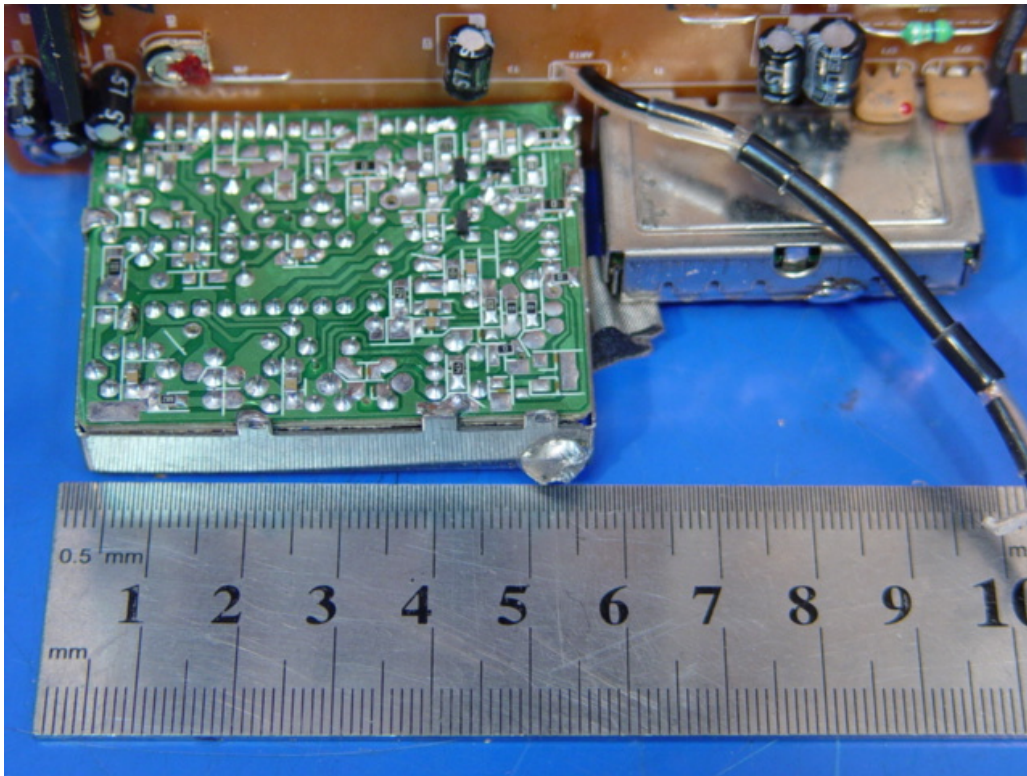


Photo 11 Inside of EUT

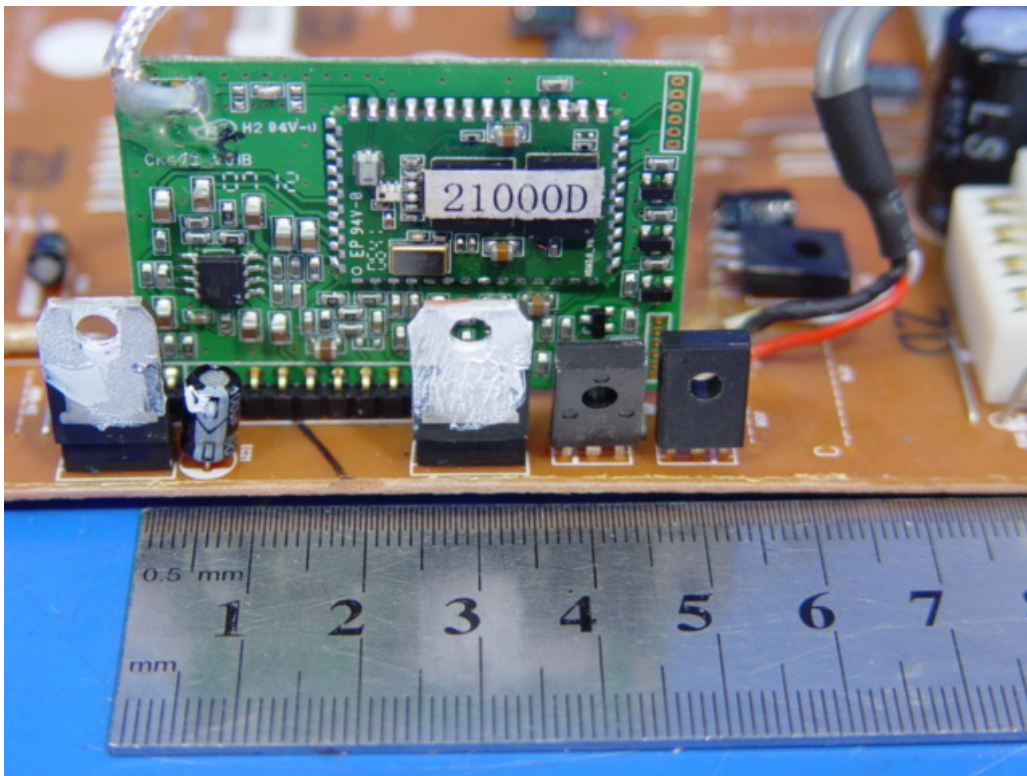


Photo 12 Inside of EUT

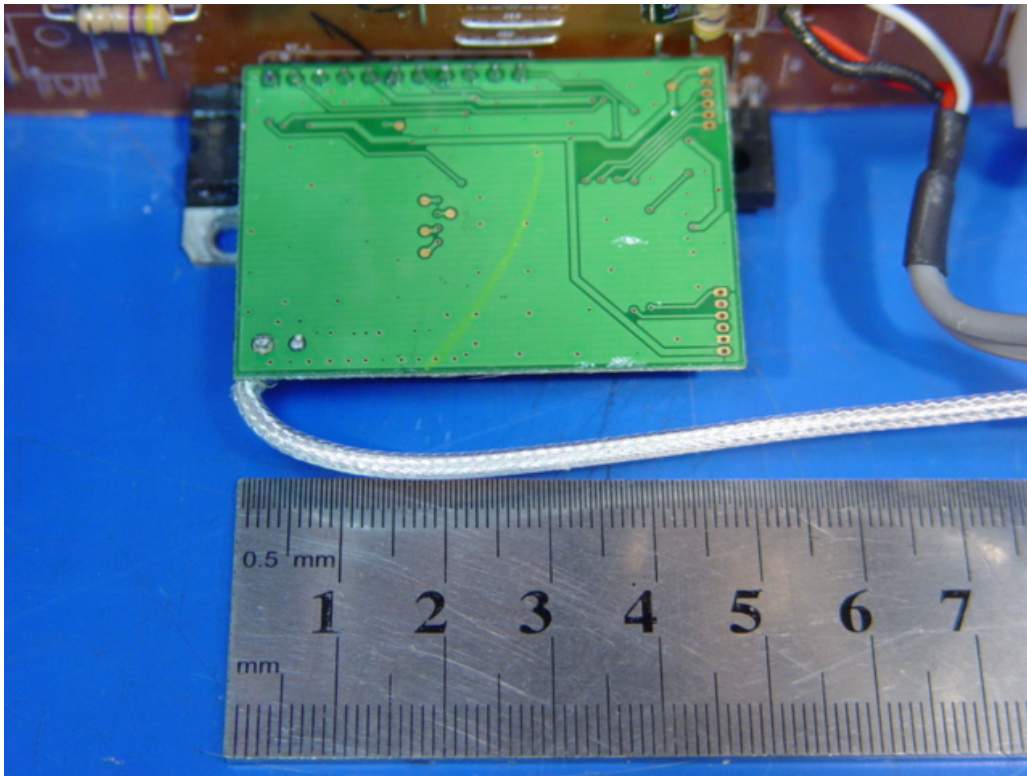


Photo 13 Inside of EUT

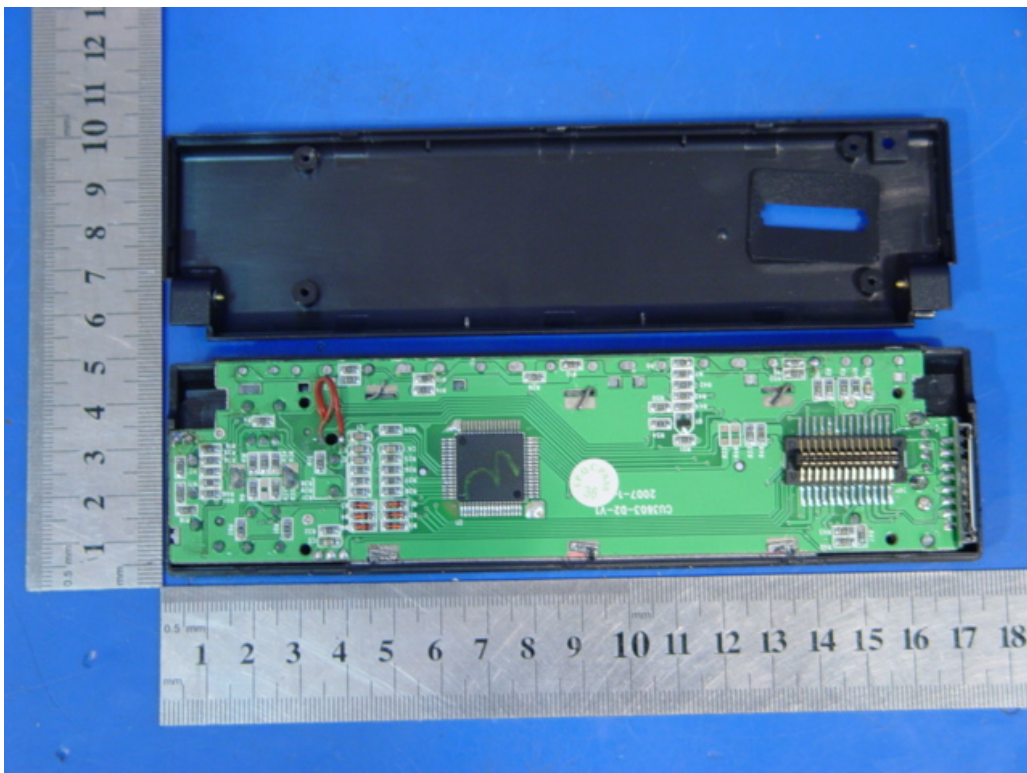


Photo 14 Inside of EUT

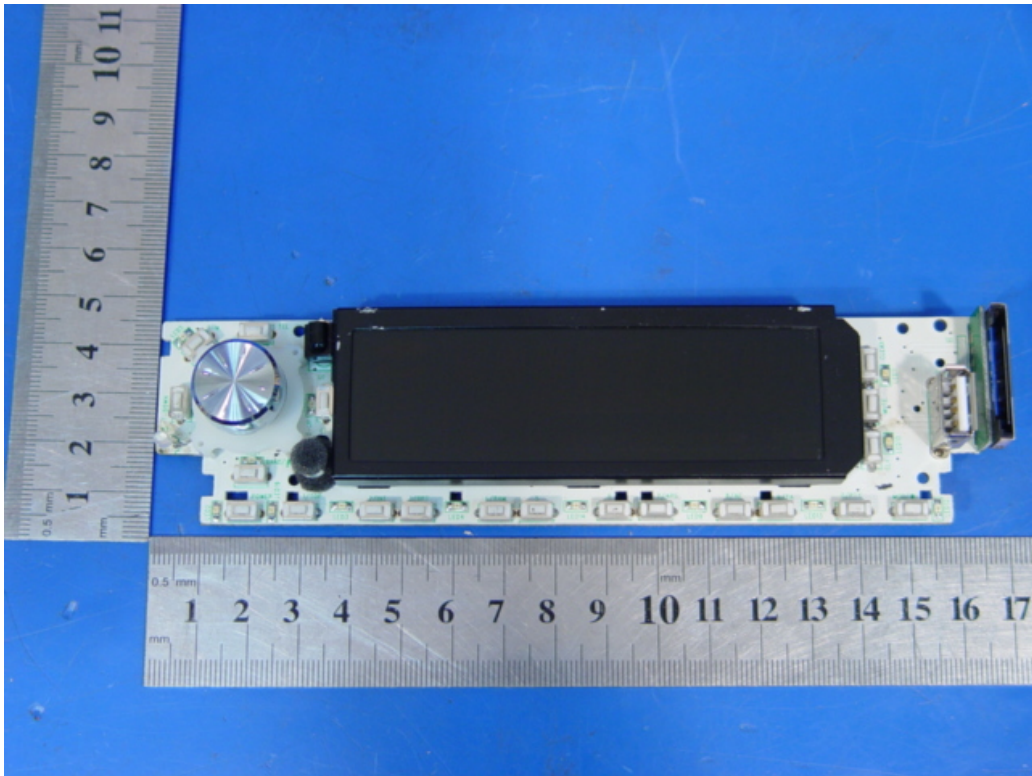


Photo 15 Inside of EUT

