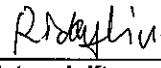
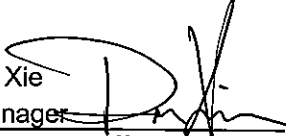
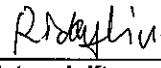
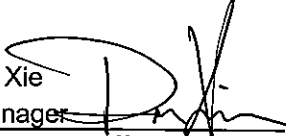
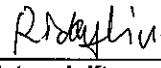
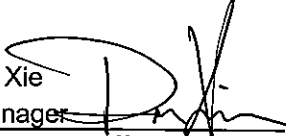


| | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|---|----------------------------------|---|-----------------------------------|--|---|-------------------------------|--|---|----------------------|------------------|--|--|
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| Auftraggeber: <i>Client:</i> | | Zhongshan K-mate General Elec. Co., Ltd. Fuwan Industrial Zone, Fuwan South Road, Sunwen East Road, East District, Zhongshan, Guangdong, P.R. China | | | | | | | | | | | | | | | |
| Gegenstand der Prüfung: <i>Test item:</i> | | Bluetooth Headset | | | | | | | | | | | | | | | |
| Bezeichnung: <i>Identification:</i> | | BTE004 | FCC ID: <i>FCC ID</i> | WAD-BTE004 | | | | | | | | | | | | | |
| Wareneingangs-Nr.: <i>Receipt No.:</i> | | 173043581 | Eingangsdatum: 20.Mar.2009 <i>Date of receipt:</i> | | | | | | | | | | | | | | |
| Prüfört: <i>Testing location:</i> | | TÜV Rheinland (Guangdong) Ltd. EMC Laboratory Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650, P. R. China | | Listed test laboratory according to FCC rules section 2.948 for measuring devices under Parts 15 | | | | | | | | | | | | | |
| Prüfgrundlage: <i>Test specification:</i> | | ANSI C63.4: 2003 FCC Part 15: July 10, 2008 Subpart C section 15.209 and 15.247 | | | | | | | | | | | | | | | |
| Prüfergebnis: <i>Test Result:</i> | | Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i> | | | | | | | | | | | | | | | |
| Prüflaboratorium: <i>Testing Laboratory:</i> | | TÜV Rheinland (Guangdong) Ltd. | | | | | | | | | | | | | | | |
| geprüft/ tested by: | | kontrolliert/ reviewed by: | | | | | | | | | | | | | | | |
| <table style="width:100%; border: none;"> <tr> <td style="width: 15%; text-align: center;">04. Nov. 2009</td> <td style="width: 35%;">Ricky Liu Project Manager</td> <td style="width: 15%; text-align: center;"></td> <td style="width: 15%; text-align: center;">25. Nov. 2009</td> <td style="width: 30%;">Liangdong Xie Project Manager</td> <td style="width: 10%; text-align: center;"></td> </tr> <tr> <td style="text-align: center;"><small>Datum Date</small></td> <td style="text-align: center;"><small>Name/Stellung Name/Position</small></td> <td style="text-align: center;"><small>Unterschrift Signature</small></td> <td style="text-align: center;"><small>Datum Date</small></td> <td style="text-align: center;"><small>Name/Stellung Name/Position</small></td> <td style="text-align: center;"><small>Unterschrift Signature</small></td> </tr> </table> | | 04. Nov. 2009 | Ricky Liu Project Manager |  | 25. Nov. 2009 | Liangdong Xie Project Manager |  | <small>Datum Date</small> | <small>Name/Stellung Name/Position</small> | <small>Unterschrift Signature</small> | <small>Datum Date</small> | <small>Name/Stellung Name/Position</small> | <small>Unterschrift Signature</small> | | | | |
| 04. Nov. 2009 | Ricky Liu Project Manager |  | 25. Nov. 2009 | Liangdong Xie Project Manager |  | | | | | | | | | | | | |
| <small>Datum Date</small> | <small>Name/Stellung Name/Position</small> | <small>Unterschrift Signature</small> | <small>Datum Date</small> | <small>Name/Stellung Name/Position</small> | <small>Unterschrift Signature</small> | | | | | | | | | | | | |
| Sonstiges/ Other Aspects: | | | | | | | | | | | | | | | | | |
| <table style="width:100%; border: none;"> <tr> <td style="width: 50%;">Abkürzungen:</td> <td style="width: 50%;">Abbreviations:</td> </tr> <tr> <td>P(ass) = entspricht Prüfgrundlage</td> <td>P(ass) = passed</td> </tr> <tr> <td>F(ail) = entspricht nicht Prüfgrundlage</td> <td>F(ail) = failed</td> </tr> <tr> <td>N/A = nicht anwendbar</td> <td>N/A = not applicable</td> </tr> <tr> <td>N/T = nicht getestet</td> <td>N/T = not tested</td> </tr> </table> | | | | | | Abkürzungen: | Abbreviations: | P(ass) = entspricht Prüfgrundlage | P(ass) = passed | F(ail) = entspricht nicht Prüfgrundlage | F(ail) = failed | N/A = nicht anwendbar | N/A = not applicable | N/T = nicht getestet | N/T = not tested | | |
| Abkürzungen: | Abbreviations: | | | | | | | | | | | | | | | | |
| P(ass) = entspricht Prüfgrundlage | P(ass) = passed | | | | | | | | | | | | | | | | |
| F(ail) = entspricht nicht Prüfgrundlage | F(ail) = failed | | | | | | | | | | | | | | | | |
| N/A = nicht anwendbar | N/A = not applicable | | | | | | | | | | | | | | | | |
| N/T = nicht getestet | N/T = not tested | | | | | | | | | | | | | | | | |
| <p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i></p> | | | | | | | | | | | | | | | | | |

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Test Summary

| FCC Rules | | Test items | Result |
|--|---------------|--|--------|
| Paragraph | Released Date | | |
| Part 15 Per Section 15.207(a) | July 10, 2008 | Conducted Emission | Pass |
| Part 15 Per Section 15.209(a) | July 10, 2008 | Radiated Spurious Emission | Pass |
| Part 15 Per Section 15.203 | July 10, 2008 | Antenna requirement | Pass |
| Part 15 Per Section 15.247(b)(1) | July 10, 2008 | Maximum Peak Output power | Pass |
| Part 15 Per Section 15.247(a)(1) | July 10, 2008 | 20dB Bandwidth | Pass |
| Part 15 Per Section 15.247(a)(1) | July 10, 2008 | Hopping Channel Carrier Frequency Separation | Pass |
| Part 15 Per Section 15.247(a)(1)(iii) | July 10, 2008 | Number of Hopping Frequency Used | Pass |
| Part 15 Per Section 15.247(a)(1)(iii) | July 10, 2008 | Time of Occupancy (Dwell Time) | Pass |
| Part 15 Per Section 15.247(d) | July 10, 2008 | Out-Of-Band Emission measurement | Pass |

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test result

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory

Guangzhou Auto Market, Yuan Gang Section of Guangshan Road
Guangzhou 510650

P. R. China

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

| Kind of Equipment | Type | Manufacturer | S/N | Calibrated until | Calibrated Interval |
|--------------------------------------|-------------------------|----------------------------|---------|------------------|---------------------|
| EMI Test Receiver | ESCI-3 | Rohde & Schwarz | 100216 | 26.Nov.2009 | 1 year |
| Spectrum Analyzer | FSP30 | Rohde & Schwarz | 100286 | 27.Aug.2009 | 1 year |
| Trilog-Broadband Antenna | VULB9168 (30MHz-1GHz) | SCHWARZBECK MESSELEKTRONIK | 209 | 07.Nov.2009 | 2 years |
| Double-Ridged Waveguide Horn Antenna | HF906 (1-18GHz) | Rohde & Schwarz | 100385 | 18.Jul.2009 | 2 years |
| Pre-amplifier | AFS42-00101800-25-S-42 | MITEQ | 1101599 | 31.Jul.2009 | 2 years |
| Band Reject Filter | BRM50702 | Micro-Tronics | 023 | 14.Mar.2010 | 2 years |
| Standard Gain Horn Antenna | 3160-09 (18-26.5GHz) | EMCO | 21642 | 26.Jun.2014 | 5 years |
| Pre-amplifier | AFS33-18002650-30-8P-44 | MITEQ | 1108282 | 31.Jul.2009 | 2 years |
| 3m Anechoic Chamber | N/A | Albatross Project GmbH | N/A | 10.Feb.2010 | 1 year |
| Loop Antenna | HFH2-Z2 (<30MHz) | Rohde & Schwarz | 100111 | 26-Nov-09 | 2 years |
| EMI Test Receiver | ESCS30 | Rohde & Schwarz | 100316 | 27.Mar.2010 | 1 year |
| Two-Line V-Network | ESH3-Z5 | Rohde & Schwarz | 100308 | 27.Mar.2010 | 1 year |
| Pulse Limiter | ESH3-Z2 | Rohde & Schwarz | 100701 | 27.Mar.2010 | 1 year |

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

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2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications.

2.5 Measurement Uncertainty

Uncertainty for conducted emissions measurements is $\pm 2.68\text{dB}$.

Uncertainty for radiated emissions measurements is $\pm 4.94\text{dB}$ (30M-1GHz) and $\pm 4.88\text{dB}$ ($> 1\text{GHz}$)

The reported expanded uncertainty is based on a standard uncertainty multiply by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

2.6 Location of original data

The original copies of test data taken during actual testing were attached at Appendix 1 of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Guangdong) file for certification follow-up purposes.

2.7 Status of facility used for testing

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory; Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650, P. R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements, the register no. 833845.

3 General Product Information

The submitted sample is a bluetooth mono headset powered by chargeable battery. It can be linked to bluetooth mobile phone to answer and dial the call.

For details, refer to technical document and the user manual.

3.1 Product Function and Intended Use

Refer to the Technical Documentation and user manual.

3.2 Ratings and System Details

| | | |
|-----------------------------------|---|--|
| Frequency range | : | 2402.0MHz – 2480.0MHz (unlicensed ISM band) |
| Number of employed channels | : | 79 channels |
| Total Number of channels | : | 79 channels |
| Modulation Type | : | Frequency Hopping Spread Spectrum |
| Type of antenna | : | Integral antenna |
| Power supply of Bluetooth headset | : | 3.7V DC, (built-in li-ion battery) |
| Ports | : | 5V DC charge input port |
| Protection Class | : | III |

Refer to the Technical Documentation for further information.

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3.3 Independent Operation Modes

Bluetooth: RF Transmitting and receiving

For further information refer to User Manual

3.4 Submitted Documents

Block Diagram
Schematics
Operation Description
Components List
FCC label and location
User Manual
Internal Photos
External Photos
Application form

4 Test Set-up and Operation Mode

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Refer to test set-up in chapter 5.

4.3 Special Accessories and Auxiliary Equipment

The products have been tested together with the following device:

| Device | Manufacture | Model | Serial no./ Version |
|-------------------------|-------------|----------|---------------------|
| Laptop notebook | IBM R40e | 2684 | 99-CYY55 |
| Bluetooth test Software | CSR | BlueTest | 1.24 |

4.4 Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the technical document. No additional measures were employed to achieve compliance.

4.5 Test set-up

Diagram 1 of Configuration for Testing Radiated Emission 30MHz-1 GHz

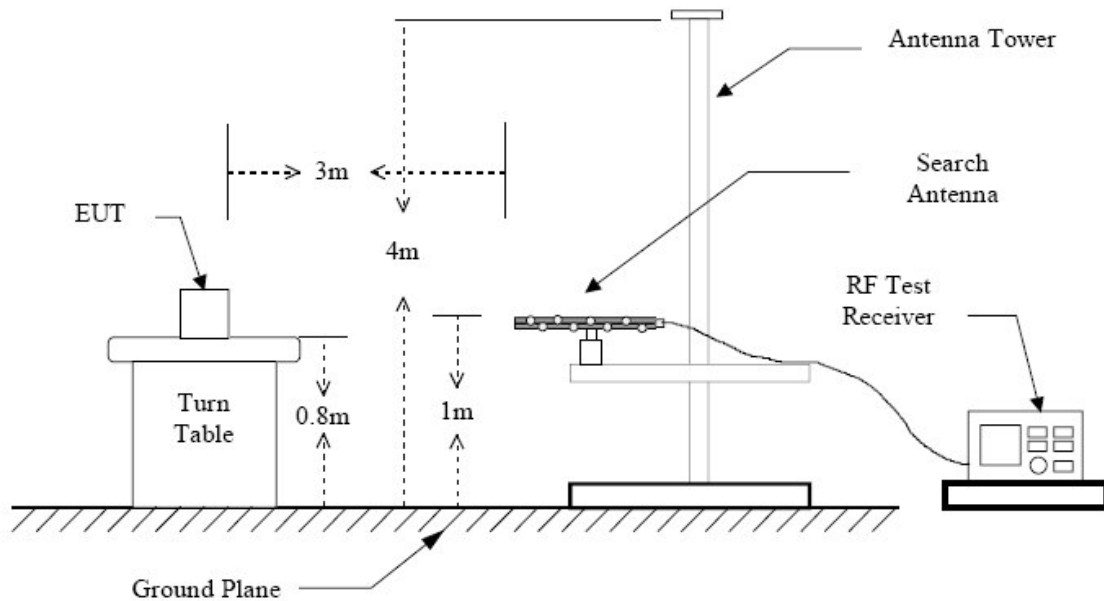
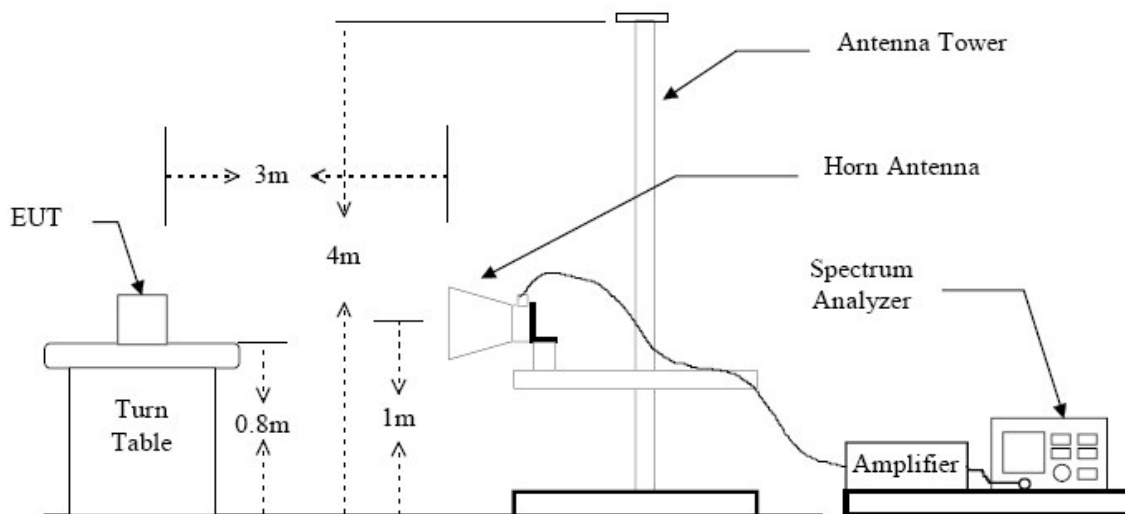


Diagram 2 of Configuration for Testing Radiated Emission above 1 GHz

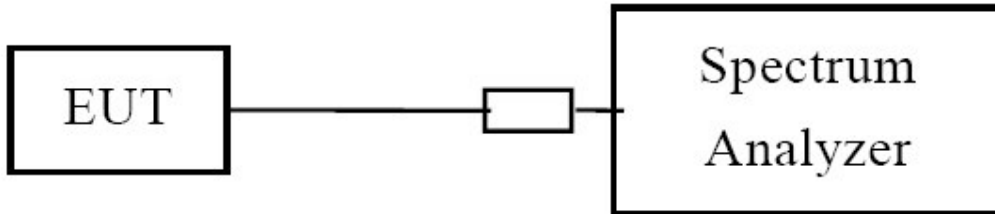


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Diagram 5 of Configuration for Testing other test items



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Test Results EMISSION

4.1 Conducted Emission

RESULT:

Pass

| | | |
|--|---|---|
| Date of testing | : | Oct.27.2009 |
| Test specification | : | FCC Part 15 Per Section 15.207(a)(c) |
| Limits | : | FCC Part 15 Per Section 15.207(a) |
| Test procedure | : | Procedure specified in ANSI C63.4 were followed |
| Deviations from Standard Test procedures | : | None |
| Kind of test site | : | Shielded room |
| Operation mode | : | On with charging |
| Power supply | : | DC 3.7V |
| Temperature | : | 21°C |
| Humidity | : | 50% |

Test procedure:

1. Place the EUT as specified in ANSI C63.4 Clause 7.2.1
2. Plug the LISN to a correct power source (pay attention to: AC/DC, voltage, frequency).
4. Connect the EUT to LISN and choose N or L1 on the LISN.
5. Connect measurement receiver and LISN with a 50-ohm coaxial cable and a pulse limiter then begin exploratory measurement as specified in ANSI C63.4 Clause 7.2.3
6. Make final measurement as specified in ANSI C63.4 Clause 7.2.4
7. Switch to the other line on the LISN and repeat step 4 to 6.

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Table 2: Disturbance Voltage on AC Mains

| Frequency [MHz] | Line L/N | QP [dB μ V] | AV [dB μ V] | Quasi Peak Limit [dB μ V] | Average Limit [dB μ V] |
|--------------------|-------------|--------------------|--------------------|----------------------------------|-------------------------------|
| 0.150 | L | 51.3 | / | 66.0 | / |
| 0.172 | L | 48.6 | / | 64.8 | / |
| 0.186 | N | 46.6 | / | 64.2 | / |
| 3.318 | L | 34.3 | / | 56.0 | / |
| 3.525 | L | 32.9 | / | 56.0 | / |
| 4.011 | L | 33.8 | / | 56.0 | / |
| 3.390 | N | / | 32.6 | / | 46.0 |
| 3.669 | N | / | 36.2 | / | 46.0 |
| 3.808 | N | / | 36.8 | / | 46.0 |
| 3.876 | N | / | 34.3 | / | 46.0 |
| 3.939 | L | / | 34.5 | / | 46.0 |
| 4.362 | N | / | 35.8 | / | 46.0 |
| *) | | | | | |

*) Measurement is made from 150 kHz to 30 MHz. Disturbances other than those mentioned above are small or not detectable.

If the result of the measurement with the Quasi Peak detector is below the Average limit, the measurement with Average Detector may be omitted.

4.2 Radiated Spurious Emission

RESULT:

Pass

| | | |
|--|---|--|
| Date of testing | : | Sep.07, 2009 - Sep.30, 2009 |
| Test specification | : | FCC Part 15 Per Section 15.209(a) |
| Limits | : | FCC Part 15 Per Section 15.209(a) |
| Test procedure | : | Procedure specified in ANSI C63.4 |
| Deviations from Standard Test procedures | : | None |
| Kind of test site | : | 3m Semi-anechoic chamber |
| Operation mode | : | Bluetooth RF transmitting at fix channel with max power (High, Low, Mid) |
| Power supply | : | DC 3.7V |
| Temperature | : | 22°C |
| Humidity | : | 52% |

Test procedure:

1. The EUT was placed on the top of a rotatable table 0.8 meters above the ground with 3-orthogonal direction and be kept close enough to the receiving antenna. The table was rotated 360 degrees to determine the suspected emission frequency and the position of the worst radiation case with both horizontal and vertical antenna polarization.

2. The EUT was then set 3 meters away from the receiving antenna, which was mounted on a variable-height antenna tower.

3. For each suspected emission frequency recorded in step 1, the EUT was arranged to its worst case and:

for tests below 30MHz the loop antenna is positioned with its plane vertical and the center of it is 1m above the ground. During the tests it is rotated about its vertical axis for maximum response at each azimuth about the EUT;

for tests above 30MHz 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 read the maximum emission.

Note:

While testing, the EUT is connected with a serial port bridge board for test mode setup. The length of the communication cable between the EUT and the bridge board, which including Tx, Rx, GND serial pins, is minimized to reduce the unwanted influence to test result. The bridge board can be connected to a host computer with standard DB9 com port cable for running of the test setup software. After setup successfully, the EUT can keep the test mode with the host computer and the cable removed.

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Table 3: Radiated Emission (Bluetooth: Transmitting at channel low)

| Frequency | QP | AV | PK | Polarity | Limit | | |
|-----------|----------------|------|------|----------|----------------|------|------|
| | | | | | QP | AV | PK |
| [MHz] | [dB μ V/m] | | | (H/V) | [dB μ V/m] | | |
| 1602.0 | N/A | 37.0 | 41.8 | H | N/A | 54.0 | 74.0 |
| 9536.0 | N/A | 37.6 | 50.9 | H | N/A | 54.0 | 74.0 |
| 3203.5 | N/A | 35.3 | 48.5 | V | N/A | 54.0 | 74.0 |
| 4804.0 | N/A | 42.0 | 59.8 | V | N/A | 54.0 | 74.0 |
| 19221.5 | N/A | 39.8 | 52.5 | H | N/A | 54.0 | 74.0 |
| 21372.0 | N/A | 41.8 | 55.4 | H | N/A | 54.0 | 74.0 |
| 22762.5 | N/A | 44.8 | 58.0 | H | N/A | 54.0 | 74.0 |
| 24268.5 | N/A | 43.2 | 55.5 | H | N/A | 54.0 | 74.0 |
| *)--- | | | | | | | |

Table 4: Radiated Emission (Bluetooth: Transmitting at channel mid)

| Frequency | QP | AV | PK | Polarity | Limit | | |
|-----------|----------------|------|------|----------|----------------|------|------|
| | | | | | QP | AV | PK |
| [MHz] | [dB μ V/m] | | | (H/V) | [dB μ V/m] | | |
| 9723.0 | N/A | 35.5 | 48.7 | H | N/A | 54.0 | 74.0 |
| 1627.0 | N/A | 33.5 | 43.7 | V | N/A | 54.0 | 74.0 |
| 4882.0 | N/A | 41.0 | 56.3 | V | N/A | 54.0 | 74.0 |
| 18607.0 | N/A | 39.6 | 52.4 | H | N/A | 54.0 | 74.0 |
| 21230.5 | N/A | 40.5 | 52.6 | H | N/A | 54.0 | 74.0 |
| 21389.0 | N/A | 41.9 | 54.0 | H | N/A | 54.0 | 74.0 |
| 22704.0 | N/A | 44.6 | 57.2 | H | N/A | 54.0 | 74.0 |
| *)--- | | | | | | | |

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Table 5: Radiated Emission (Bluetooth: Transmitting at channel high)

| Frequency | QP | AV | PK | Polarity | Limit | | |
|-----------|----------------|------|------|----------|----------------|------|------|
| | | | | | QP | AV | PK |
| [MHz] | [dB μ V/m] | | | (H/V) | [dB μ V/m] | | |
| 1652.0 | N/A | 28.1 | 40.6 | H | N/A | 54.0 | 74.0 |
| 3395.0 | N/A | 26.3 | 39.2 | H | N/A | 54.0 | 74.0 |
| 4960.0 | N/A | 43.5 | 57.0 | H | N/A | 54.0 | 74.0 |
| 7358.0 | N/A | 32.7 | 45.9 | H | N/A | 54.0 | 74.0 |
| 18543.5 | N/A | 39.1 | 52.5 | H | N/A | 54.0 | 74.0 |
| 20337.0 | N/A | 40.1 | 52.9 | H | N/A | 54.0 | 74.0 |
| 21371.5 | N/A | 41.9 | 54.6 | H | N/A | 54.0 | 74.0 |
| 22740.5 | N/A | 44.7 | 57.2 | H | N/A | 54.0 | 74.0 |
| 24231.0 | N/A | 43.2 | 55.3 | H | N/A | 54.0 | 74.0 |
| *)--- | | | | | | | |

*) Note:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200Hz at frequency from below 150 kHz

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz at frequency from 150 kHz to 1GHz.

The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz at frequency above 1GHz.

Measurement is made from 9 kHz to 25 GHz. Disturbances other than those mentioned above are small or not detectable.

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4.3 Antenna requirement

RESULT:

Pass

Date of testing : ---
Test specification : FCC Part 15 Per Section 15.203
FCC Part 15 Per Section 15.247(b)

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

And according to 15.247(b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by amount in dB than the directional gain of the antenna exceeds of 6dBi.

As the Bluetooth antenna is permanently printed on RF Board, there is no consideration of replacement.

And the max nominal gain of the antenna is 0dBi.

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4.4 Maximum Peak Output Power

RESULT:

Pass

Date of testing : Oct. 30, 2009
 Test specification : FCC Part 15 Per Section 15.247(b)(1)
 Limits : FCC Part 15 Per Section 15.247(b)(1)

For frequency hopping systems operating in the band 2400-2483.5 MHz employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

Deviations from Standard Test procedures : None
 Test procedure : Procedure specified in ANSI C63.4
 Kind of test site : Shielded room
 Operation mode : Bluetooth continuously transmitting on the measured channel.
 Power supply : DC 3.7V
 Temperature : 22°C
 Humidity : 52%

Table 6: Peak Conducted Power

| Channel | Frequency (MHz) | Power Reading(dBm) | Cable Loss (dB) | Output Power | | Limit (mW) * |
|---------|-----------------|--------------------|-----------------|--------------|------|-----------------|
| | | | | (dBm) | (mW) | |
| Low | 2401.8 | -1.78 | 0.40 | -1.38 | 0.73 | 1000 |
| Mid | 2440.8 | -2.82 | 0.40 | -2.42 | 0.57 | 1000 |
| High | 2479.8 | -4.08 | 0.40 | -3.68 | 0.43 | 1000 |

*Note: Refer to the test result of "Number of Hopping Channel Used" for the non-overlap channel number.

4.5 20dB Bandwidth

RESULT:

Pass

Date of testing : Oct. 30, 2009
Test specification : FCC Part 15 Per Section 15.247(a)(1)
Limits : FCC Part 15 Per Section 15.247(b)(1)

Frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.

Deviations from Standard Test procedures : None
Test procedure : Procedure specified in ANSI C63.4
Operation mode : Bluetooth continuously transmitting on the measured channel.
Kind of test site : Shielded room
Power supply : DC 3.7V
Temperature : 22°C
Humidity : 52%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency= measured channel, RBW=10kHz, VBW=30kHz.
4. Mark the peak power frequency point and the -20dB upper and lower frequency points.
5. Read the frequency delta value between the -20dB upper and lower frequency points.
6. Repeat step 2 to 5 until all the channels required are finished.

Table 7: 20dB Bandwidth

| Channel | Frequency (GHz) | Test Result (kHz) |
|---------|-----------------|-------------------|
| Low | 2402.0 | 848 |
| Mid | 2441.0 | 848 |
| High | 2480.0 | 816 |

Please refer to Appendix 1 for measurement data.

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4.6 Hopping Channel Carrier Frequency Separation

RESULT:

Pass

Date of testing : Oct. 30, 2009
Test specification : FCC Part 15 Per Section 15.247(a)(1)
Limits : FCC Part 15 Per Section 15.247(a)(1)

Frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.

Deviations from Standard Test procedures : None
Test procedure : Procedure specified in ANSI C63.4
Kind of test site : Shielded room
Operation mode : Bluetooth transmitting with hopping at the full channel set
Power supply : DC 3.7V
Temperature : 22°C
Humidity : 55%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency = measured channel, RBW = 30 kHz, VBW = 100 kHz, Frequency Span = wide enough to cover the adjacent channel.
4. Mark the peak power frequency point of the measured channel and its adjacent channel(s)
5. Read the frequency delta value between the measured channel and its adjacent channel(s)
6. Repeat step 3 to 5 until all the channels measured are finished.

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Table 8: Hopping Channel Carrier Frequency Separation

| Channel | Adjacent Hopping channel separation (kHz) | Limit |
|----------------|--|--|
| Low | 1002 | At least 25kHz or tow-thirds of the 20dB bandwidth of the hopping channel, whichever is greater. Note: refer to table 6 for the value of 20dB bandwidth |
| Mid | 996 | |
| High | 1002 | |

Please refer to Appendix 1 for measurement data.

4.7 Number of Hopping Frequency Used

RESULT:

Pass

Date of testing : Oct. 30, 2009
Test specification : FCC Part 15 Per Section 15.247(a)(1)(iii)
Limits : FCC Part 15 Per Section 15.247(a)(1)(iii)

Frequency hopping system in the 2400-2483.5 MHz band shall use at least 15 non-overlapping channels

Deviations from Standard Test procedures

: None
Test procedure : Procedure specified in ANSI C63.4
Kind of test site : Shielded room
Operation mode : Bluetooth transmitting with hopping at the full channel set
Power supply : DC 3.7V
Temperature : 22°C
Humidity : 55%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low loss cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: RBW = 100 kHz, VBW ≥ RBW, Frequency Span = wide enough to cover the channels to be plotted.
4. Set the spectrum analyzer to Max-hold mode and plot the result(s) with record of all hopping channel.

Table 9: Number of hopping frequency

| | |
|------------------------------|--------------------------------------|
| Number of hopping frequency: | 79 |
| Limit: | At least 15 non-overlapping channels |

Please refer to Appendix 1 for measurement data.

4.8 Time of Occupancy (Dwell Time)

RESULT:

Pass

Date of testing : Oct. 30, 2009
Test specification : FCC Part 15 Per Section 15.247(a)(1)(iii)
Limits : FCC Part 15 Per Section 15.247(a)(1)(iii)

For frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Deviations from Standard Test procedures : None
Test Procedure : Procedure specified in ANSI C63.4
Kind of test site : Shielded room
Operation mode : Bluetooth transmitting with hopping at the full channel set (DH5 mode)
Power supply : DC 3.7V
Temperature : 22°C
Humidity : 55%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low loss cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency = measured channel, RBW = 1MHz, VBW \geq RBW, Frequency Span = 0 Hz.
4. Set sweep time properly to capture the entire dwell time per hopping channel.
5. Set detector type to Peak and trace mode to Max Hold and make the measurement.
6. Repeat step 3-5 until all channels measured were complete.

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Table 10: Dwell Time (DH5 mode)

| channel | Frequency (GHz) | Dwell time of one signal Burst (ms) | Total Dwell Time (ms) | Limit (ms) |
|---------|-----------------|-------------------------------------|-----------------------------------|------------|
| Low | 2.402 | 3.000 | (3.000 x 106.81) = 320.43 | 400 |
| Mid | 2.441 | 2.980 | (2.980 x 106.81) = 318.29 | 400 |
| High | 2.480 | 2.980 | (2.980 x 106.81) = 318.29 | 400 |

Note :

Period = 0.4 (seconds) x 79 (channels) = 31.6 seconds

For Bluetooth system, there are 1600 timeslots in one second. The DH5 mode operates on a 5-slot transmission and 1-slot receiving basis. Thus there are $1600 / (5+1) = 266.7$ transmission per second. In one period for each particular channel there are $(266.7/79) \times 31.6 = 106.81$ times of transmission.

Dwell Time in one period(ms) = Dwell time of one-slot transmission(ms) multiplexes **106.81**

Please refer to Appendix 1 for measurement data.

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4.9 Out-of-Band Emission

RESULT:

Pass

Date of testing : Oct. 30, 2009
Test specification : FCC Part 15 Per Section 15.247(d)
Limits : FCC Part 15 Per Section 15.247(d)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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.

In addition:

FCC Part 15 - radiated emission which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

Deviations from Standard Test procedures

: None
Test Procedure : Procedure specified in ANSI C63.4
Kind of test site : Shielded room
Operation mode : Bluetooth transmitting at the highest and lowest channel (band edge)
Power supply : DC 3.7V
Temperature : 22°C
Humidity : 55%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low loss cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: RBW = 100 kHz, VBW ≥ RBW.
4. Set proper frequency span respectively for out-of-band emission measurement of the band edge and the whole range (up to 10 times of the carrier frequency.)
5. Set the trace mode to Max Hold and mark the peak reading of any spurious emission recorded.

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Table 11: Out-Of-Band Emission measurement (conducted)

| Emission (Carrier operating at Channel low, mid and high) | Attenuation | Limit (dB) |
|--|--|-----------------------|
| 30MHz to 25GHz | All emission in this 100kHz bandwidth are attenuated more than 20dB from the carrier | $\Delta \geq 20$ |

Note: Refer to Appendix 1 for measurement data.

Table 12: Band Edges Emission in the Restricted Bands by Marker Delta Method

| Frequency [MHz] | dBc [dB] | PK [dBμV/m] | AV [dBμV/m] | Polarity (H/V) | PK limit [dBμV/m] | AV limit [dBμV/m] |
|----------------------------|---------------------|---------------------------------------|---------------------------------------|---------------------------|---|---|
| 2484.4 | 47.18 | 36.49 | --- | H | 74 | 54 |
| 2376.2 | 57.69 | 30.70 | | V | 74 | 54 |

NOTE:

1. The Peak carrier field strength of the lowest channel and highest channel is 88.39dBuV/m (vertical) and 83.67dBuV/m (horizontal). The above field strength levels were measured in polarity of which is the worst case.

2. The dBc value between the carrier maximum power and band edge emission power of the frequency listed in the table is calculated from the test record showed in Appendix 1.

3. Peak value of the low band edge emission listed in the table is calculated by the below formula:
PK value of band edge emission = Peak carrier field strength – dBc value in item2

*Note: Please refer to Appendix 1 for measurement data. Disturbances other than those mentioned above are small or not detectable. Please refer to the Appendix 1 for the noise floor of the band edge emission.

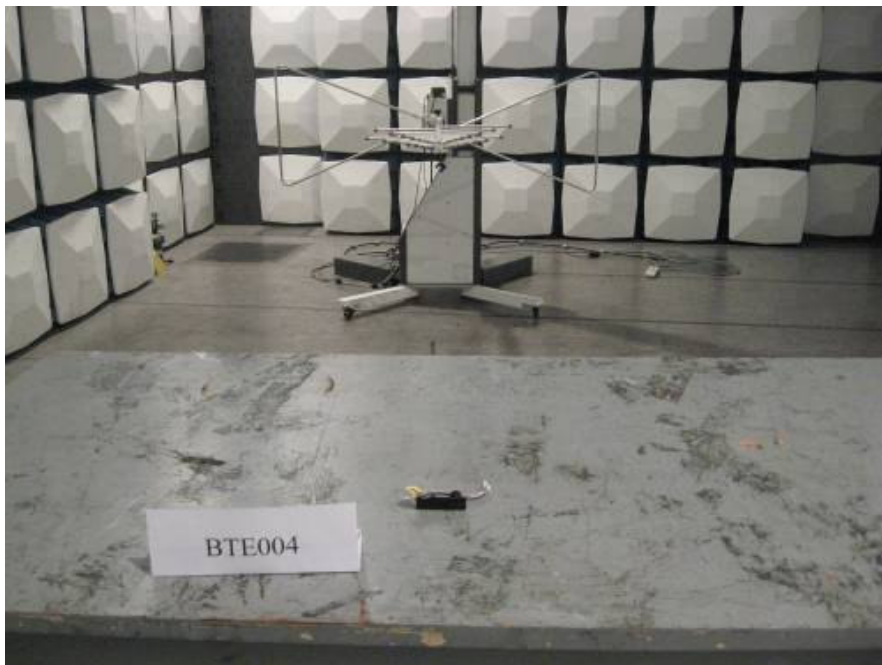
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5 Photographs of the Test Set-Up

Photograph 1: Set-up for Radiation Measurement below 1GHz



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Photograph 2: Set-up for Radiation Measurement above 1GHz



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Photograph 3: Set-up for Conducted Emission



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