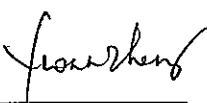



Prüfbericht - Nr.: <i>Test Report No.:</i>		16016886 001		Seite 1 von 31 <i>Page 1 of 31</i>	
Auftraggeber: <i>Client:</i>		Zhongshan K-mate General Elec. Co., Ltd. Fuwan Industrial Zone, Fuwan South Road, Sunwen East Road, East District, Zhongshan, Guangdong, P.R. China			
Gegenstand der Prüfung: <i>Test item:</i>		Bluetooth Audio Transmitter			
Bezeichnung: <i>Identification:</i>	BTT005	FCC ID: <i>FCC ID</i>	WAD-BTT005		
Wareneingangs-Nr.: <i>Receipt No.:</i>	173043827	Eingangsdatum: <i>Date of receipt:</i>	01.Apr, 2009		
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: 20, Sep. 2007 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:			
23.Apr.2009	Yvonne Zheng Project Manger		23.Apr.2009	Ricky Liu Project Manager	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
Sonstiges/ Other Aspects:					
Abkürzungen:		P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet		Abbreviations:	
				P(ass) = passed F(ail) = failed N/A = not applicable 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>					

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 2 von 31
Page 2 of 31

Test Summary

FCC Rules		Test items	Result
Paragraph	Released Date		
Part 15 Per Section 15.207(a)	20. Sep, 2007	Conducted Emission	Pass
Part 15 Per Section 15.209(a)	20. Sep, 2007	Radiated Spurious Emission	Pass
Part 15 Per Section 15.203	20. Sep, 2007	Antenna requirement	Pass
Part 15 Per Section 15.247(b)(1)	20. Sep, 2007	Maximum Peak Output power	Pass
Part 15 Per Section 15.247(a)(1)	20. Sep, 2007	20dB Bandwidth	Pass
Part 15 Per Section 15.247(a)(1)	20. Sep, 2007	Hopping Channel Carrier Frequency Separation	Pass
Part 15 Per Section 15.247(a)(1)(iii)	20. Sep, 2007	Number of Hopping Frequency Used	Pass
Part 15 Per Section 15.247(a)(1)(iii)	20. Sep, 2007	Time of Occupancy (Dwell Time)	Pass
Part 15 Per Section 15.247(d)	20. Sep, 2007	Out-Of-Band Emission measurement	Pass

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 3 von 31
Page 3 of 31

Contents

1	GENERAL REMARKS.....	5
1.1	COMPLEMENTARY MATERIALS	5
2	TEST SITES	5
2.1	TEST FACILITIES.....	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	6
2.3	TRACEABILITY	6
2.4	CALIBRATION.....	6
2.5	MEASUREMENT UNCERTAINTY	7
2.6	LOCATION OF ORIGINAL DATA.....	7
2.7	STATUS OF FACILITY USED FOR TESTING	7
3	GENERAL PRODUCT INFORMATION	8
3.1	PRODUCT FUNCTION AND INTENDED USE.....	8
3.2	RATINGS AND SYSTEM DETAILS	8
3.3	INDEPENDENT OPERATION MODES.....	9
3.4	SUBMITTED DOCUMENTS	9
4	TEST SET-UP AND OPERATION MODE.....	10
4.1	PRINCIPLE OF CONFIGURATION SELECTION.....	10
4.2	TEST OPERATION AND TEST SOFTWARE	10
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	10
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	10
4.5	TEST SET-UP.....	11
5	TEST RESULTS EMISSION	13
5.1	CONDUCTED EMISSION.....	13
5.2	RADIATED SPURIOUS EMISSION	15
5.3	ANTENNA REQUIREMENT.....	18
5.4	MAXIMUM PEAK OUTPUT POWER.....	19
5.5	20DB BANDWIDTH.....	20
5.6	HOPPING CHANNEL CARRIER FREQUENCY SEPARATION.....	21
5.7	NUMBER OF HOPPING FREQUENCY USED	23
5.8	TIME OF OCCUPANCY (DWELL TIME).....	24
5.9	OUT-OF-BAND EMISSION	26

Prüfbericht - Nr.:
*Test Report No.:***16016886 001****Seite 4 von 31**
Page 4 of 31

6	PHOTOGRAPHS OF THE TEST SET-UP	28
7	LIST OF TABLES	31
8	LIST OF PHOTOGRAPHS	31

Prüfbericht - Nr.: 16016886 001
Test Report No.:

Seite 5 von 31
Page 5 of 31

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	SCHWARZBECK MESS-ELEKTRONIK	210	08.May.2009	2 year
Double-Ridged Waveguide Horn Antenna	HF906	Rohde & Schwarz	100385	18.Jul.2009	2 year
Double-Ridged Waveguide Horn Antenna	HF906	Rohde & Schwarz	100407	08.May.2009	2 year
Pre-amplifier	AFS42-00101800-25-S-42	MITEQ	1101599	31.Jul.2009	2 year
Band Reject Filter	BRM50702	Micro-Tronics	023	14.Mar.2010	2 year
Standard Gain Horn Antenna	3160-09	EMCO	21642	N/A	N/A
Standard Gain Horn Antenna	3160-09	EMCO	21645	N/A	N/A
Pre-amplifier	AFS33-18002650-30-8P-44	MITEQ	1108282	31.Jul.2009	2 year
3m Anechoic Chamber	N/A	Albatross Project GmbH	N/A	10.Feb.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.

2.4 Calibration

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

Prüfbericht - Nr.: 16016886 001
Test Report No.:

Seite 7 von 31
Page 7 of 31

2.5 Measurement Uncertainty

Uncertainty for conducted emissions measurements is ± 2.51 dB.
Uncertainty for radiated emissions measurements is ± 4.94 dB (30M-1GHz) and ± 4.88 dB (> 1GHz)

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

Prüfbericht - Nr.: 16016886 001
Test Report No.:

Seite 8 von 31
Page 8 of 31

3 General Product Information

Brief description of the test sample:

The EUT is a Bluetooth Audio Transmitter.

Bluetooth function is provided which enable this device to be connected with a Bluetooth A2DP Sink device.

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) 5V, 150mA (USB power cable)
Ports :	USB charging port (No data communication), 3.5mm audio-in plug
Protection Class :	III

Refer to the Technical Documentation for further information

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 9 von 31
Page 9 of 31

3.3 Independent Operation Modes

Off/On

Operating: RF Transmitting and receiving
Charging: PC USB port

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 below 1 GHz

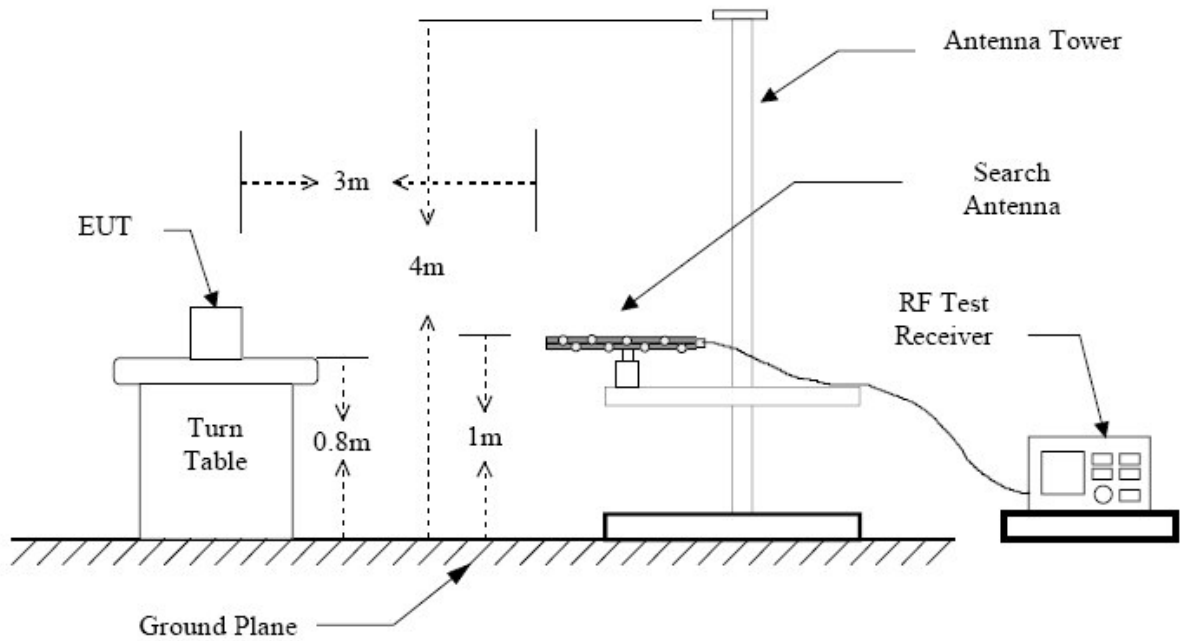


Diagram 2 of Configuration for Testing Radiated Emission above 1 GHz

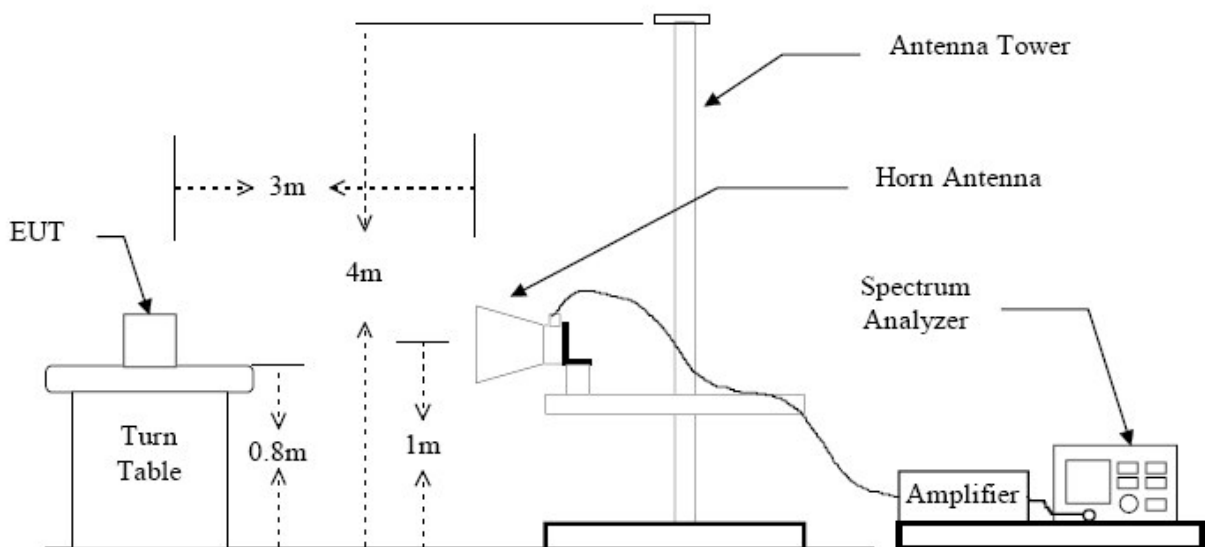


Diagram 3 of Measurement Equipment Configuration for Testing Conducted Emission

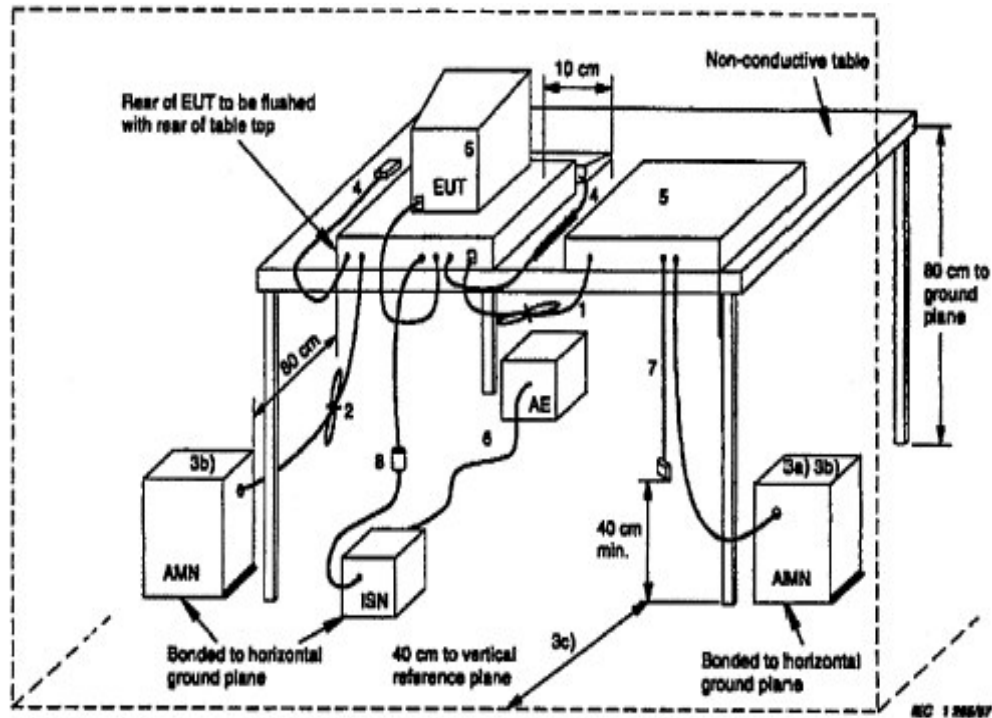
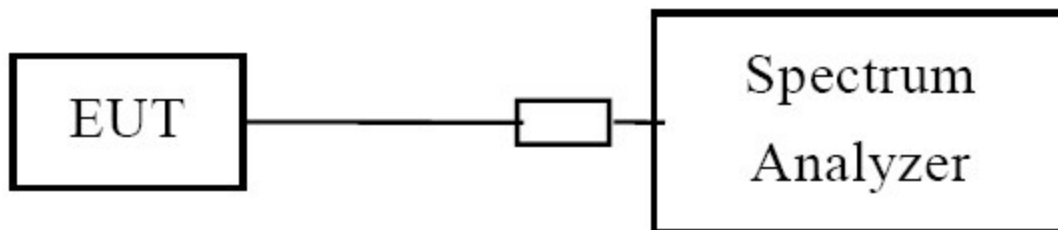


Diagram 4 of Configuration for Testing other test items



Prüfbericht - Nr.: 16016886 001
Test Report No.:

Seite 13 von 31
Page 13 of 31

5 Test Results EMISSION

5.1 Conducted Emission for FCC Part 15 Per Section 15.207(a)

RESULT:

Pass

Date of testing	:	13.04.2009
Test specification	:	FCC Part 15 Per Section 15.207(a)
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	:	Transmitting, Charging
Power supply	:	AC 120V; 60Hz to the AC/DC adaptor of the host charge computer.
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.

Prüfbericht - Nr.: 16016886 001
Test Report No.:

Seite 14 von 31
Page 14 of 31

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]
0.2040	L	48.1	39.1	63.4	53.4
0.6180	L	32.8	30.7	56.0	46.0
1.9185	L	32.6	32.5	56.0	46.0
4.2495	L	40.8	30.3	56.0	46.0
5.2125	L	34.9	33.0	60.0	50.0
21.5295	L	34.2	31.1	60.0	50.0
0.2040	N	49.8	40.5	63.4	53.4
0.4155	N	29.7	29.8	57.5	47.5
2.0535	N	31.1	29.8	56.0	46.0
3.6960	N	36.8	32.2	56.0	46.0
5.6850	N	40.2	34.7	60.0	50.0
22.6815	N	29.4	27.3	60.0	50.0
*)					

*) 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.

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 15 von 31
Page 15 of 31

5.2 Radiated Spurious Emission

RESULT:**Pass**

Date of testing	:	Apr. 09, 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	:	RF transmitting at fix channel with max power (High, Low, Mid)
Power supply	:	DC 3.7V
Temperature	:	21°C
Humidity	:	50%

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 that 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.

Prüfbericht - Nr.: 16016886 001
Test Report No.:

Seite 16 von 31
Page 16 of 31

Table 3: Radiated Emission (Transmitting at channel low)

Frequency	QP	AV	PK	Polarity	Limit		
					QP	AV	PK
[MHz]	[dB μ V/m]			(H/V)	[dB μ V/m]		
160.0	25.6	N/A	N/A	H	43.5	N/A	N/A
352.0	31.1	N/A	N/A	H	46	N/A	N/A
1602.0	N/A	33.2	42.5	H	N/A	54.0	74.0
3204.0	N/A	29.5	42.1	H	N/A	54.0	74.0
4804.0	N/A	39.2	48.7	H	N/A	54.0	74.0
192.0	28.8	N/A	N/A	V	43.5	N/A	N/A
480.0	36.2	N/A	N/A	V	46	N/A	N/A
1601.0	N/A	29.6	38.2	V	N/A	54.0	74.0
3204.0	N/A	32.3	40.5	V	N/A	54.0	74.0
4804.0	N/A	43.1	53.4	V	N/A	54.0	74.0
*)---							

Table 4: Radiated Emission (Transmitting at channel mid)

Frequency	QP	AV	PK	Polarity	Limit		
					QP	AV	PK
[MHz]	[dB μ V/m]			(H/V)	[dB μ V/m]		
288.0	32.6	N/A	N/A	H	46	N/A	N/A
448.0	37.2	N/A	N/A	H	46	N/A	N/A
1624.0	N/A	29.8	42.5	H	N/A	54.0	74.0
3253.5	N/A	37.4	45.5	H	N/A	54.0	74.0
4882.0	N/A	40.2	51.8	H	N/A	54.0	74.0
181.1	11.2	N/A	N/A	V	46	N/A	N/A
391.8	16.5	N/A	N/A	V	46	N/A	N/A
1627.0	N/A	26.5	35.5	V	N/A	54.0	74.0
3253.0	N/A	28.3	43.5	V	N/A	54.0	74.0
4882.0	N/A	40.1	53.3	V	N/A	54.0	74.0
*)---							

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 17 von 31
Page 17 of 31

Table 5: Radiated Emission (Transmitting at channel high)

Frequency	QP	AV	PK	Polarity	Limit		
					QP	AV	PK
[MHz]	[dB μ V/m]			(H/V)	[dB μ V/m]		
320.0	35.2	N/A	N/A	H	46	N/A	N/A
480.0	36.2	N/A	N/A	H	46	N/A	N/A
1652.5	N/A	33.2	42.2	H	N/A	54	74
3305.5	N/A	31.3	45.3	H	N/A	54	74
4960.0	N/A	36.7	48.2	H	N/A	54	74
132.0	9.6	N/A	N/A	V	43.5	N/A	N/A
544.0	22.6	N/A	N/A	V	46	N/A	N/A
1652.5	N/A	28.8	38.6	V	N/A	54	74
3439.5	N/A	29.6	41.3	V	N/A	54	74
4960.0	N/A	37.4	48.2	V	N/A	54	74
*)---							

*) Note:

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

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

Measurement is made from 30 MHz to 26 GHz. Disturbances other than those mentioned above are small or not detectable.

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 18 von 31
Page 18 of 31

5.3 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 antenna is permanently mounted on RF Board, there is no consideration of replacement.

And the max gain of the antenna is 0dBi.

5.4 Maximum Peak Output Power

RESULT:
Pass

Date of testing : Apr. 2, 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 : Continuously transmitting on the measured channel.
 Power supply : DC 5V
 Temperature : 21°C
 Humidity : 50%

Table 6: Peak Conducted Power

Channel	Frequency (MHz)	Power Reading(dBm)	Cable Loss (dB)	Output Power		Limit (mW) *
				(dBm)	(mW)	
Low	2402.0	3.22	0.40	3.64	2.31	1000
Mid	2441.0	2.29	0.40	2.69	1.86	1000
High	2480.0	0.84	0.40	1.24	1.33	1000

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

5.5 20dB Bandwidth

RESULT:
Pass

Date of testing : Apr. 03, 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 : Continuously transmitting on the measured channel.
 Kind of test site : Shielded room
 Power supply : DC 5V
 Temperature : 21°C
 Humidity : 50%

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=30kHz, VBW=100kHz.
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	932
Mid	2441.0	942
High	2480.0	936

Please refer to Appendix 1 for measurement data.

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 21 von 31
Page 21 of 31

5.6 Hopping Channel Carrier Frequency Separation

RESULT:**Pass**

Date of testing : Apr. 03, 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 : Transmitting with hopping at the full channel set
Power supply : DC 5V
Temperature : 21°C
Humidity : 50%

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 = 10 kHz, VBW = 30 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.

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 22 von 31
Page 22 of 31

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	990	
High	1002	

Please refer to Appendix 1 for measurement data.

Prüfbericht - Nr.: 16016886 001
Test Report No.:

Seite 23 von 31
Page 23 of 31

5.7 Number of Hopping Frequency Used

RESULT:

Pass

Date of testing : Apr. 3, 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 : Transmitting with hopping at the full channel set
 Power supply : DC 5V
 Temperature : 21°C
 Humidity : 50%

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: 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.

Prüfbericht - Nr.: 16016886 001
*Test Report No.:*Seite 24 von 31
Page 24 of 31

5.8 Time of Occupancy (Dwell Time)

RESULT:**Pass**

Date of testing : Apr. 3, 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 : Transmitting with hopping at the full channel set (DH5 mode)
Power supply : DC 5V
Temperature : 21°C
Humidity : 50%

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 = 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.

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 25 von 31
Page 25 of 31

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	2.980	$(2.980 \times \mathbf{106.81}) = 318.293$	400
Mid	2.441	2.980	$(2.980 \times \mathbf{106.81}) = 318.293$	400
High	2.480	2.980	$(2.980 \times \mathbf{106.81}) = 318.293$	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.

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 26 von 31
Page 26 of 31

5.9 Out-of-Band Emission

RESULT:

Pass

Date of testing : Apr. 3, 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 : Transmitting at the highest and lowest channel (band edge)
Power supply : DC 5V
Temperature : 21°C
Humidity : 50%

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: RBW = 100 kHz, VBW \geq 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.

Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 27 von 31
Page 27 of 31

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]
2483.5MHz	57.15	36.38	---	H	74	54

NOTE:

1. The Peak carrier field strength of the lowest channel is 92.95dBuV/m.
The Peak carrier field strength of the highest channel is 93.53dBuV/m
The above field strength levels were measured in horizontal polarity 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:

$$\text{PK value of band edge emission} = \text{Peak carrier field strength} - \text{dBc value in item 2}$$

*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.

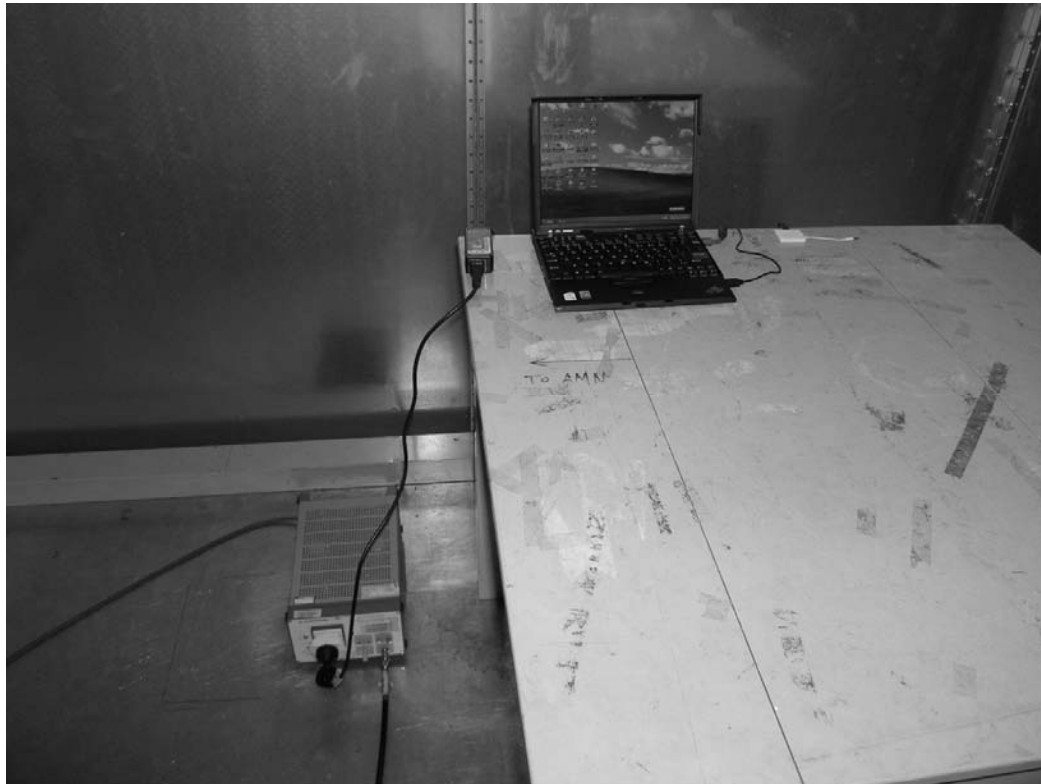
Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 28 von 31
Page 28 of 31

6 Photographs of the Test Set-Up

Photograph 1: Set-up for Conducted Emission

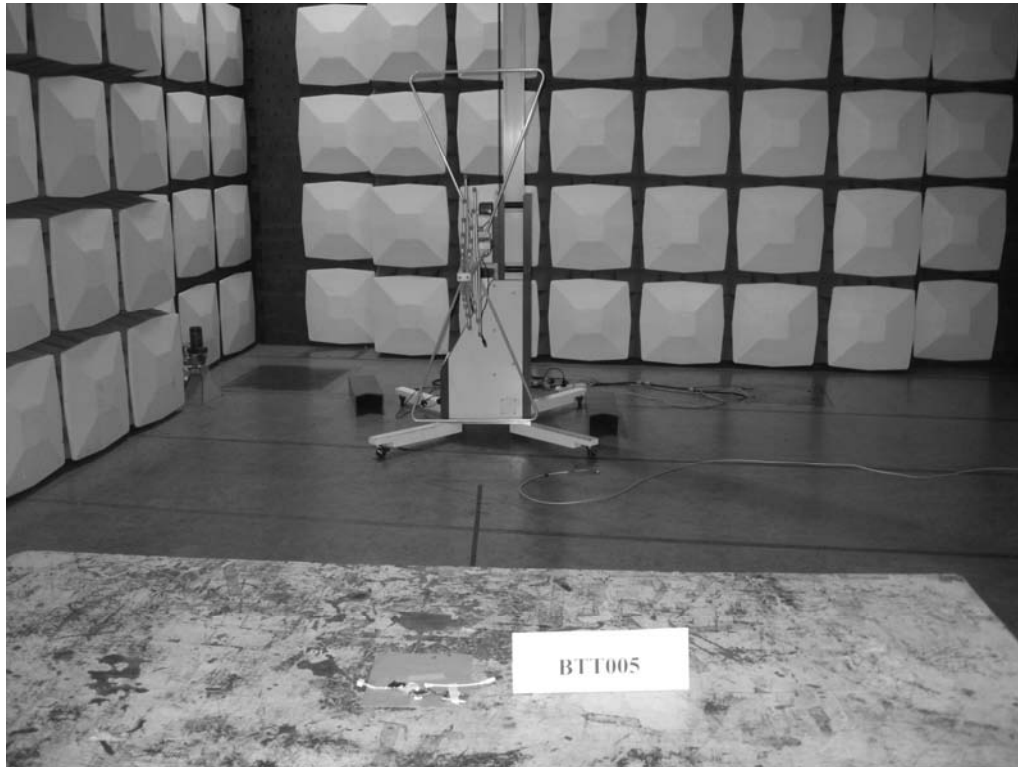


Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 29 von 31
Page 29 of 31

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

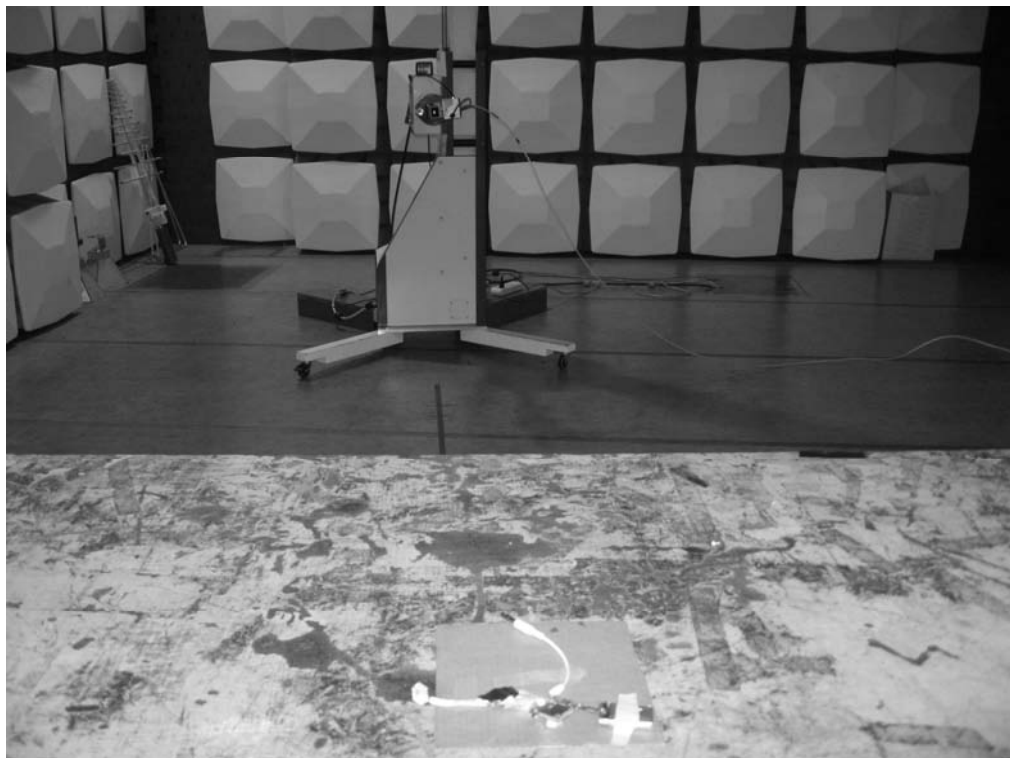
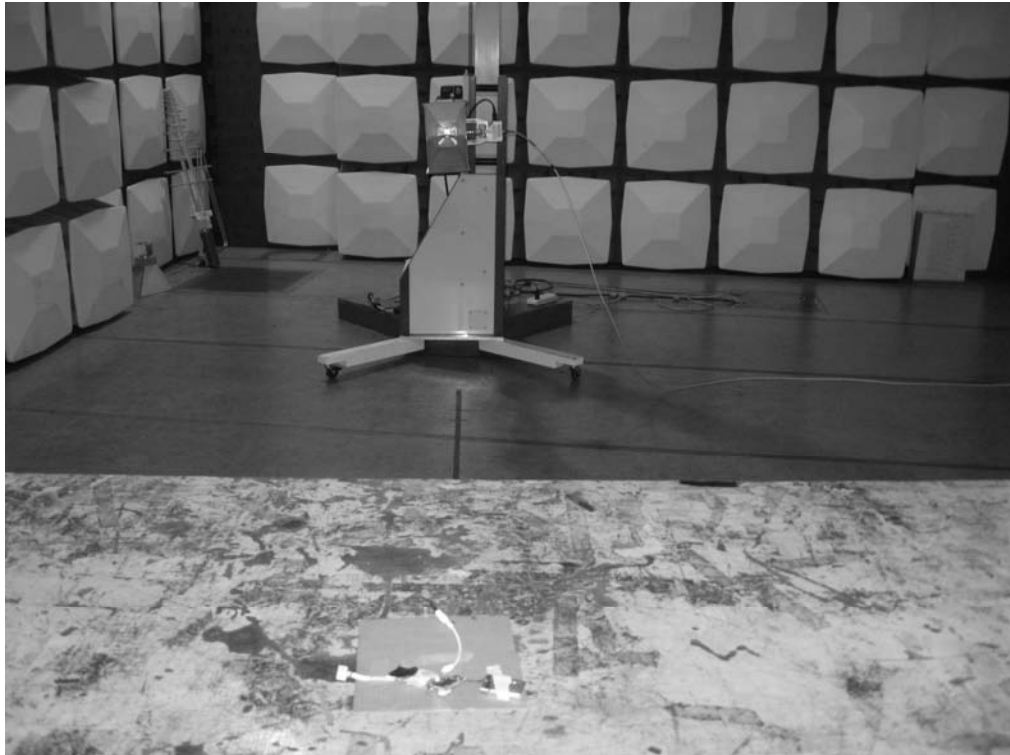


Prüfbericht - Nr.:
Test Report No.:

16016886 001

Seite 30 von 31
Page 30 of 31

Photograph 3: Set-up for Radiation Measurement above 1GHz



7 List of Tables

Table 1: List of Test and Measurement Equipment	6
Table 2: Conducted Emission on AC mains.....	16
Table 3: Radiated Emission (Transmitting at channel low)	16
Table 4: Radiated Emission (Transmitting at channel mid)	16
Table 5: Radiated Emission (Transmitting at channel high).....	17
Table 6: Peak Conducted Power.....	19
Table 7: 20dB Bandwidth	20
Table 8: Hopping Channel Carrier Frequency Separation	22
Table 9: Number of hopping frequency	23
Table 10: Dwell Time (DH5 mode).....	25
Table 11: Out-Of-Band Emission measurement (conducted).....	27
Table 12: Band Edges Emission in the Restricted Bands by Marker Delta Method	27

8 List of Photographs

Photograph 1: Set-up for Conducted Emission.....	28
Photograph 2: Set-up for Radiation Measurement below 1GHz	29
Photograph 3: Set-up for Radiation Measurement above 1GHz.....	30