

# EMC TEST REPORT

For

Fingerprint capture/identification device with bluetooth

Model Number: BlueCheck  
FCC ID: TLDBLUECHECK

Report Number : WT068001564

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory Guangdong EMC Compliance Test Center
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**TEST REPORT DECLARATION**

Applicant : COGENT SYSTEM, INC.  
 Address : Fiyta Hi-tech Building, Gaoxinnanyi Avenue, Southern District of  
 Hi-tech Park, Nanshan District, Shenzhen China  
 Manufacturer : COGENT SYSTEM, INC.  
 Address : Fiyta Hi-tech Building, Gaoxinnanyi Avenue, Southern District of  
 Hi-tech Park, Nanshan District, Shenzhen China  
 EUT Description : Fingerprint capture/identification device with bluetooth  
 Model Number : BlueCheck

**FCC ID Number** TLDBBLUECHECK


Test Standards:

**FCC Part 15 15.247 :2006**

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.

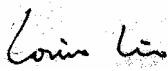
Tested by:

  
 (Dewelly Yang)

Date:

Sep. 18, 2006


Checked by:

  
 (Louis Lin)

Date:

Sep. 18, 2006

Approved by:

  
 (Peter Lin)

Date:

Sep. 18, 2006

## 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 Committee for Laboratories (**CNAL**) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is 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 : Fingerprint capture/identification device with bluetooth

Manufacturer : COGENT SYSTEM, INC.

Model Number : BlueCheck

Input Power : DC 3.6V supply by Li-ion battery

Operate Frequency : 2402-2480Mhz

Channel Spacing : 1MHz

Antenna Designation : integrate

Communication port : USB

The EUT include a bluetooth module.

A major technical descriptions of EUT is described as following:

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

B). Rated output power:2.35dBm

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

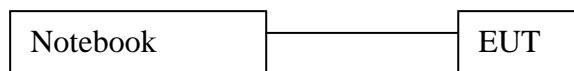
D). Antenna Designation: Chip Antenna, 0.85 dBi, Non-User Replaceable (Fixed)

E). Power Supply : 3.7Vdc re-chargeable battery

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

This submittal(s) (test report) is intended for FCC ID: TLDBLUECHECK 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 (2441MHz)  
 Mode 3: channel low (2480MHz)  
 Mode 4: Connect to pc(running test program)

### 3.5. Support Equipment List

Name	Model No	S/N	Manufacturer	Used “ ”
Notebook	2672	99-1N31N	IBM	
Adaptor for Notebook	02K6809	---	LITE	
Printer	BJC-265SP	EVX81604	CANON	
Adaptor for Printer	AD-300	--	CANON	
Modem	TM-EC5658V	03402406009	TP-Link	
Adaptor for Modem	MWY-0A220-AC0 90100	--	TP-Link	

### 3.6. Test Conditions

Date of test : Sep.7-20,2006  
 Date of EUT Receive : Sep.6,2006  
 Temperature: 24-26  
 Relative Humidity: 55-60%

## 4. TEST EQUIPMENT USED

### 4.1. Test Equipment Used to Measure Conducted Disturbance

Table 2 Test Equipment List

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jan.26, 2006	1 Year
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.26, 2006	1 Year
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Jan.26, 2006	1 Year
SB3612	Audio generator	KENWOOD	AD-203D	Jun.21, 2005	1 Year
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan.26, 2006	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Jan.26, 2006	1 Year
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan.26, 2006	1 Year
SB3434	Horn Antenna	Rohde & Schwarz	HF906	Jan.26, 2006	1 Year
SB3435/01	Amplifier(1-18GHz)	Rohde & Schwarz	---	Jan.26, 2006	1 Year
SB3435/02	Amplifier(18-40GHz)	Rohde & Schwarz	---	May.06, 2006	1 Year
SB3435/03	Horn Antenna	Rohde & Schwarz	AT4560	May.06, 2006	1 Year
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Jan 26,2006	1 Year
SB2541	RF Communication Tester(modulation analyzer)	HP	8920A	May 23,2006	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 26,2006	1 Year
SB3732	Tem Chamber	Qingsheng	THS-C7C±100	Sep 26,2005	1 Year
SB2599	Spectrum Analyzer	Anritsu	MS2661C	Jan 26,2006	1 Year
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan 26,2006	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Jan 26,2006	1 Year
SB3438	Signal Generator	Rohde & Schwarz	SMR20	Jan 26,2006	1 Year
SB3174	Antenna	Schwarzbeck	VUBA9117	Jan 26,2006	3 Year
SB3434	Horn Antenna	Rohde & Schwarz	HF906	Jan 26,2006	1 Year
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan 26,2006	1 Year
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Jan 26,2006	1 Year
SB2599	Spectrum Analyzer	Anritsu	MS2661C	Jan 26,2006	1 Year
SB2541	RF Communications Test SET	8920A	HP	Jan 26,2006	1 Year
SB3997	EMI Receiver	Rohde & Schwarz	ESPI3	Jan 26,2006	1 Year
SB3319	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jan 26,2006	1 Year
SB4357	AMN	Rohde & Schwarz	ESH3-Z5	Jan 26,2006	1 Year

SB2588	Power	CI	5001ix-CTS-400	Feb.20, 2006	1 Year
SB2588/01	Three Phase Harmonic flicker test system	CI	PACS-3	Feb.20, 2006	1 Year
SB2588/02	Power	CI	5001ix-CTS-400-NO	Feb.20, 2006	1 Year
SB2588/03	Power	CI	5001ix-CTS-400-NO	Feb.20, 2006	1 Year
SB2561	ESD tester	SCHNAFFNER	NSG435	Feb. 13, 2006	1 Year
SB4076	ESD tester	EMTEST	ESD30C	Sep. 27, 2005	1 Year
SB3433	Signal Generator	Rohde & Schwarz	SMT03	Jan.26, 2006	1 Year
SB3437/02	Voltage Probe	Rohde & Schwarz	URV5-Z2	Jan.26, 2006	1 Year
SB3173	Power Amplifier	AR	150W1000	Jan.26, 2006	1 Year
SB2622	Bilog Antenna	Chase	CBL6111C	Jan.26, 2006	1 Year
SB3070	Simulator	EMTEST	UCS500M4	Jan.26, 2006	1 Year
SB2605	CW sine Generator	EMTEST	CWS500	Jan.26, 2006	1 Year
SB2605/02	CDN	EMTEST	CDN-M3	Jan.26, 2006	1 Year
SB2617	Simulator	keytek	emcpro	Feb.16, 2006	1 Year
SB2541	RF Communication Tester	HP	8920A	May 23,2006	1 Year
SB3439	Audio analyzer	Rohde & Schwarz	UPL	Jan 25,2006	1year
SB3442/01	microphone	BK	BK-4192	Jan 25,2006	1year
SB3442/07	Audio box	Rohde & Schwarz	---	---	---

## 5. CONDUCTED DISTURBANCE TEST

### 5.1. Test Standard and Limit

#### 5.1.1. Test Standard

FCC Part 15:2006

#### 5.1.2. Test Limit

Table 4 Conducted Disturbance Test Limit (Class B)

Frequency	Maximum RF Line Voltage (dB $\mu$ 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**

Table 4 Conducted Disturbance Test Data

Model : Bluecheck							
Mode: 4							
Line							
Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
		Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)
0.162	10.1	49.8	59.9	65.3	40.0	50.1	55.3
0.247	10.2	38.3	48.5	61.8	29.1	39.3	51.8
2.269	10.3	34.9	35.2	56	15.9	26.2	46

**REMARKS:** 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)  
 2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)  
 3. The other emission levels were very low against the limit.

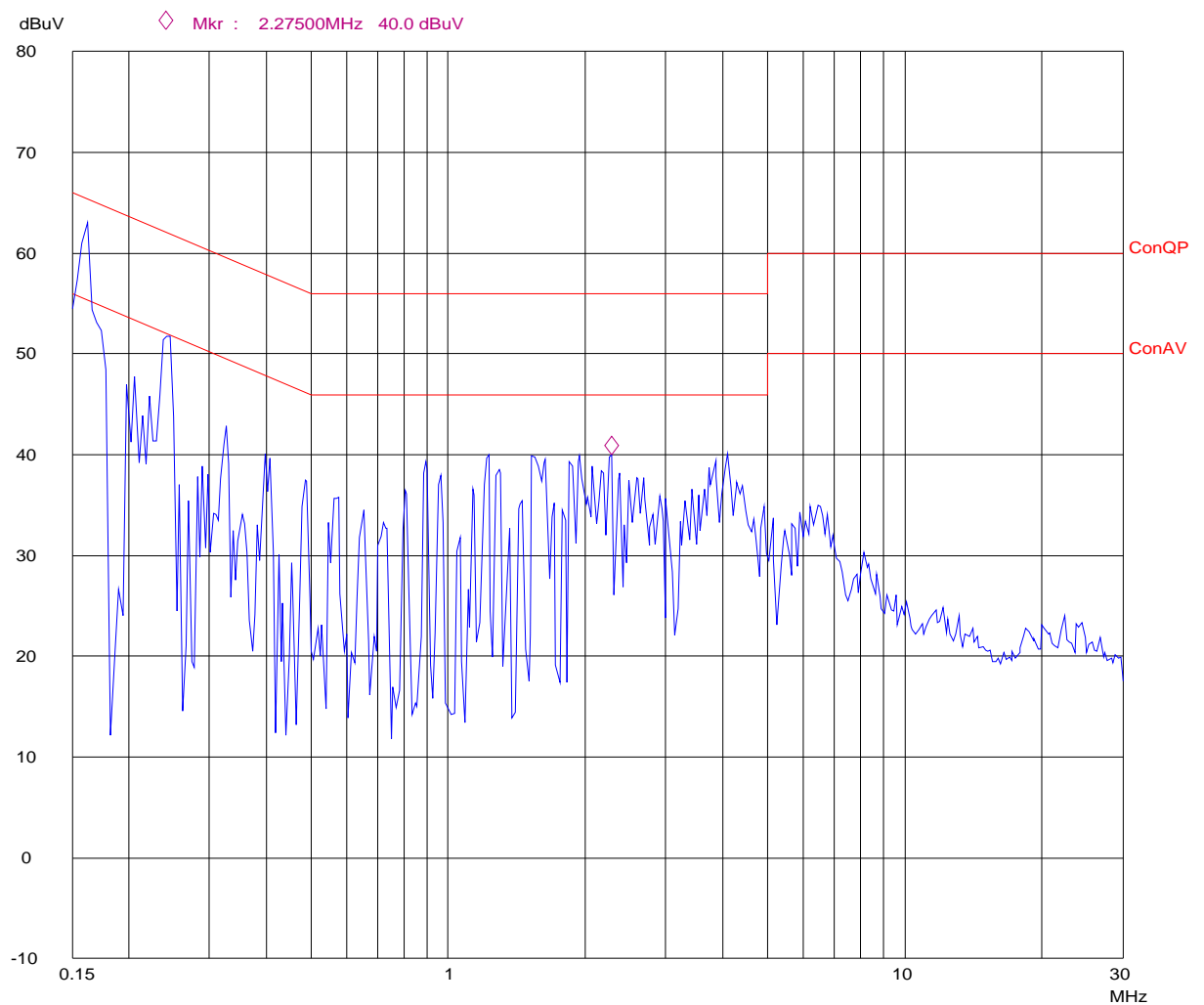
Table 5 Conducted Disturbance Test Data

Model : Bluecheck							
Mode: 4							
Neutral							
Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
		Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)
0.174	10.1	45.0	55.1	64.7	36.2	46.3	56.3
0.267	10.2	35.5	45.7	61.2	30.4	40.6	51.2
1.722	10.3	26.5	36.8	56	15.6	25.9	46

**REMARKS:** 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)  
 2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)  
 3. The other emission levels were very low against the limit.

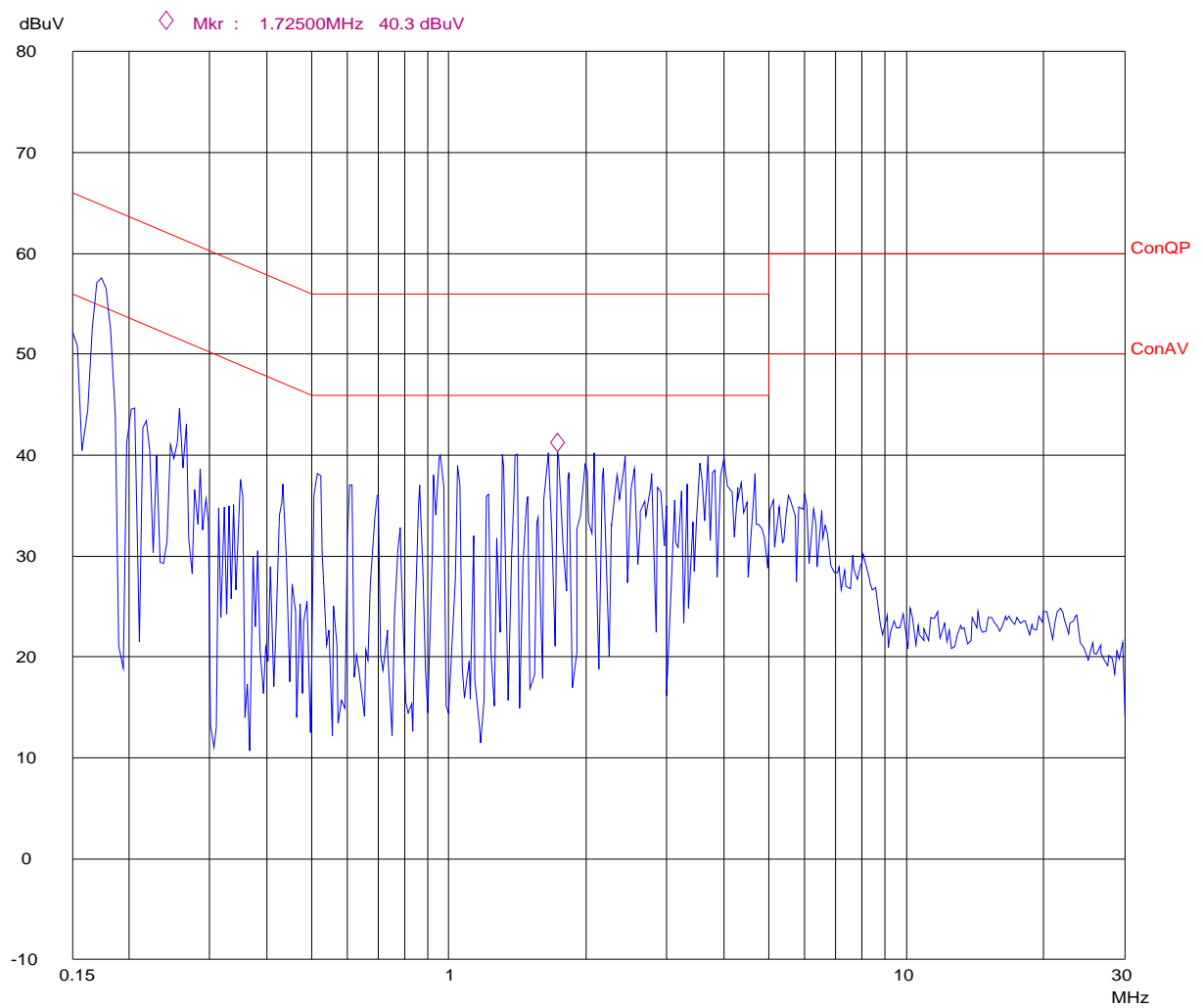
## Conducted Disturbance

EUT: M/N:Bluecheck  
Op Cond: Connect to pc  
Test Spec: L  
Comment: AC 230V/50Hz



## Conducted Disturbance

EUT: M/N:Bluecheck  
Op Cond: Connect to pc  
Test Spec: N  
Comment: AC 230V/50Hz



## 6. MAXIMUM PEAK OUTPUT POWER

### 6.1. Test Standard and Limit

#### 6.1.1. Test Standard

FCC 15.247 (b) :2006

#### 6.1.2. Test Limit

Table 9 Bandwidth Limit

Frequency MHz	Channels	Types of Devices	Power
2400-2483.5	$\geq 75$	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

Channel	Frequency (MHz)	Reading (dBm)	Limit	Result
Low	2402	-13.4	1W (30dBm)	Pass
Middle	2441	-14.5	1W (30dBm)	Pass
High	2480	-13.6	1W (30dBm)	Pass

## 7. HOPPING CHANNEL 20 DB BANDWIDTH

### 7.1. Test Standard and Limit

#### 7.1.1. Test Standard

FCC 15.247 (a) :2006

#### 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

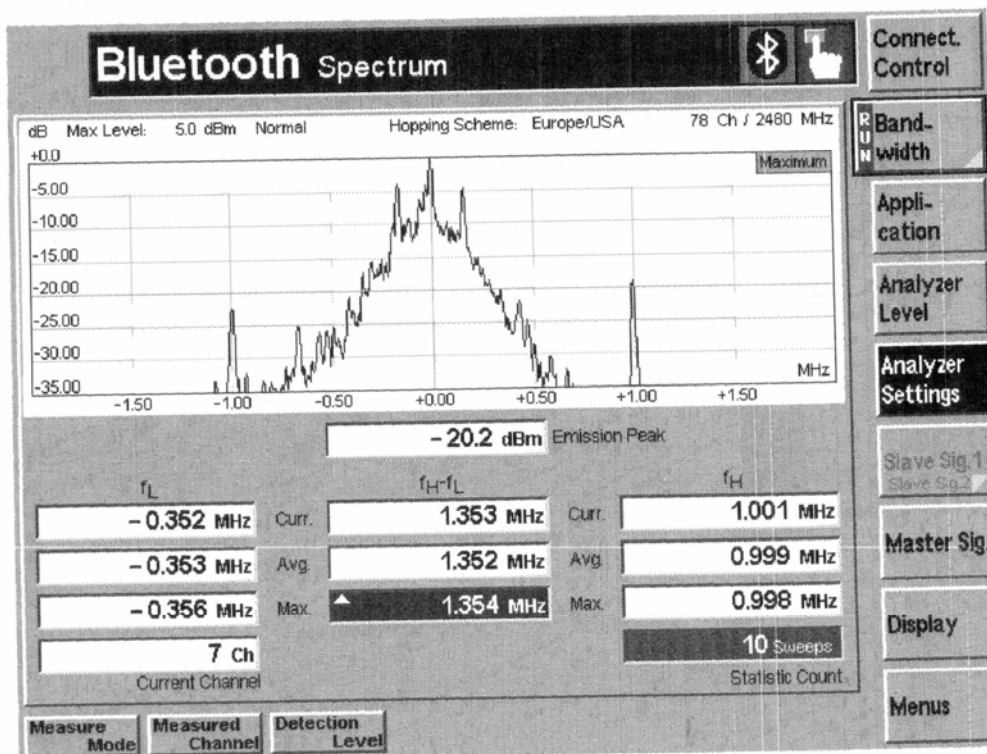
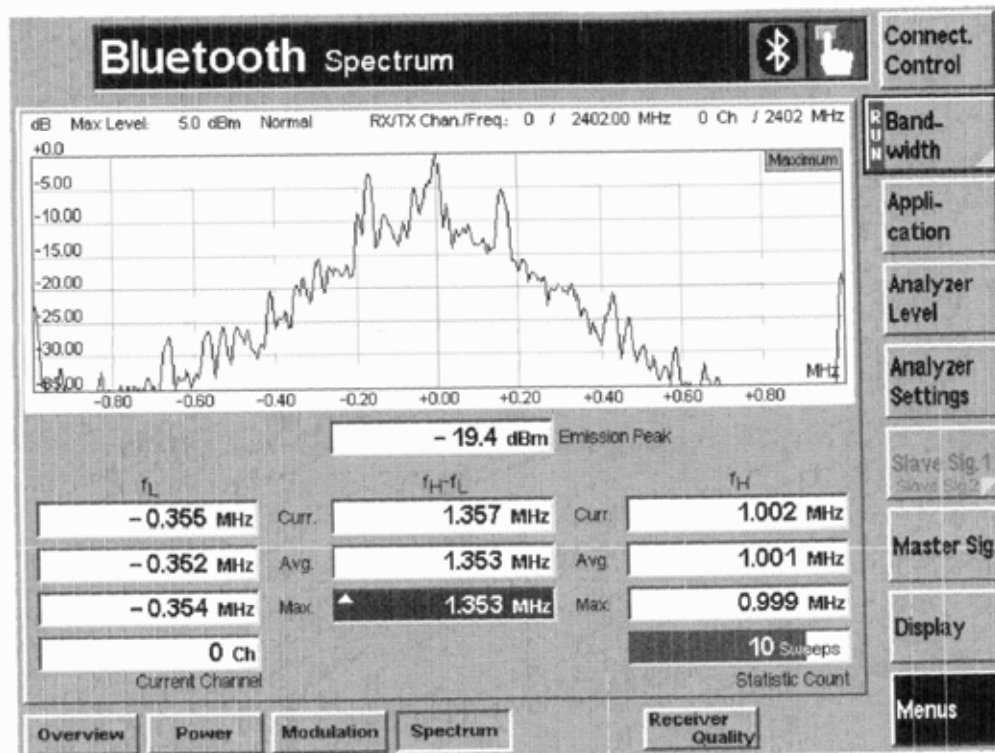
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=10KHz (1 % of Bandwidth.), Span= 3MHz, Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

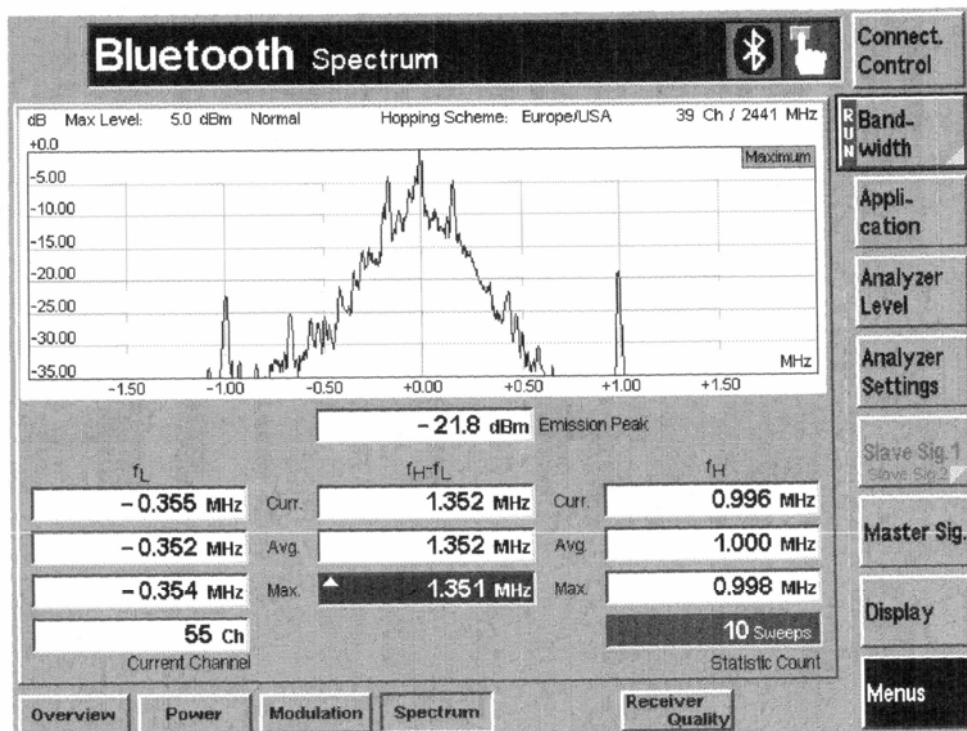
### 7.3. Test Arrangement

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

Channel	Frequency (MHz)	20 dB Bandwidth
Low	2402	1.353MHz
Mid	2441	1.351MHz
High	2480	1.354MHz





## **8. 100KHZ BANDWIDTH OF BAND EDGES MEASUREMENT**

### **8.1. Test Standard and Limit**

#### **8.1.1. Test Standard**

FCC Part 15 15.247(c) :2006

### **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**

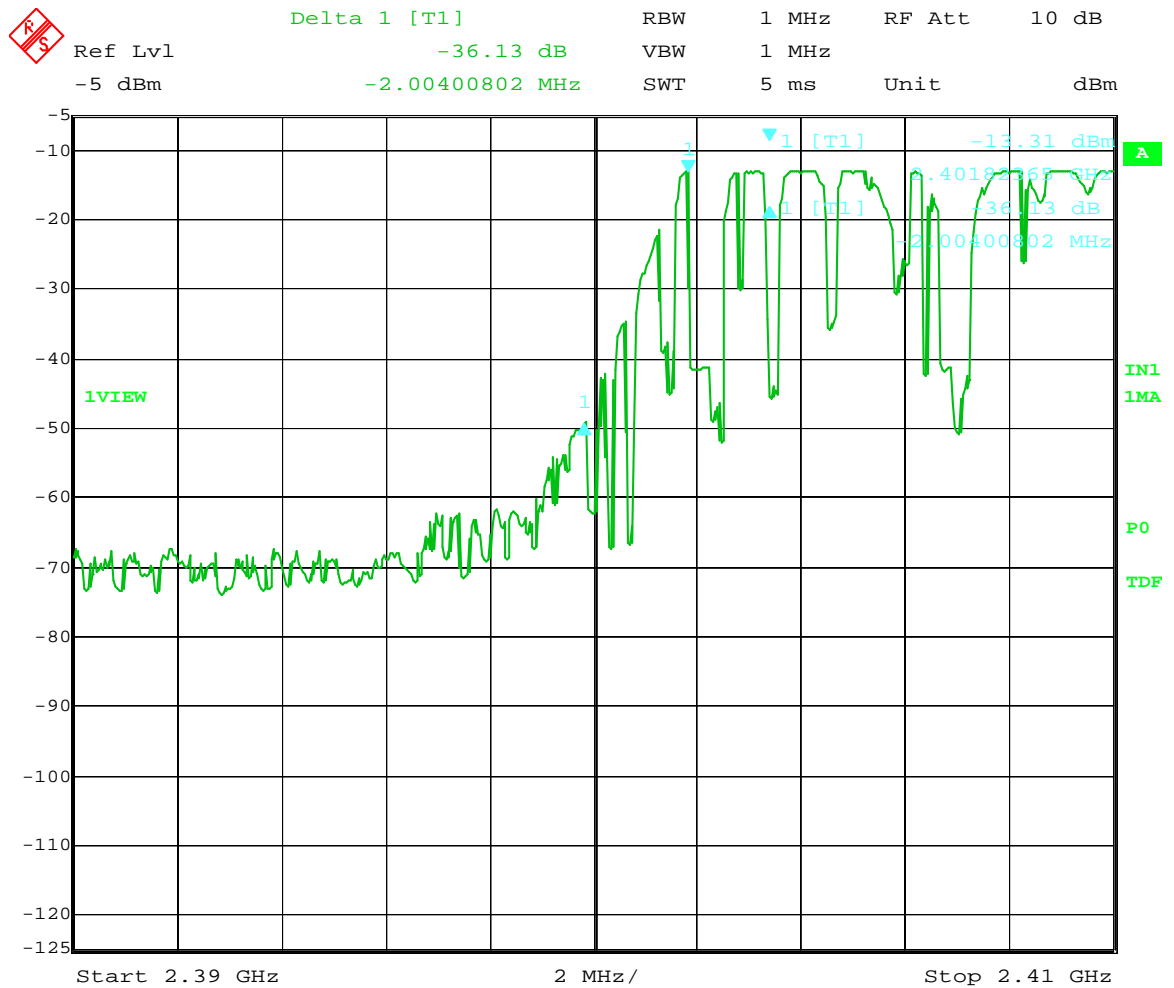
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span=20MHz,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

### **8.4. Test Arrangement**

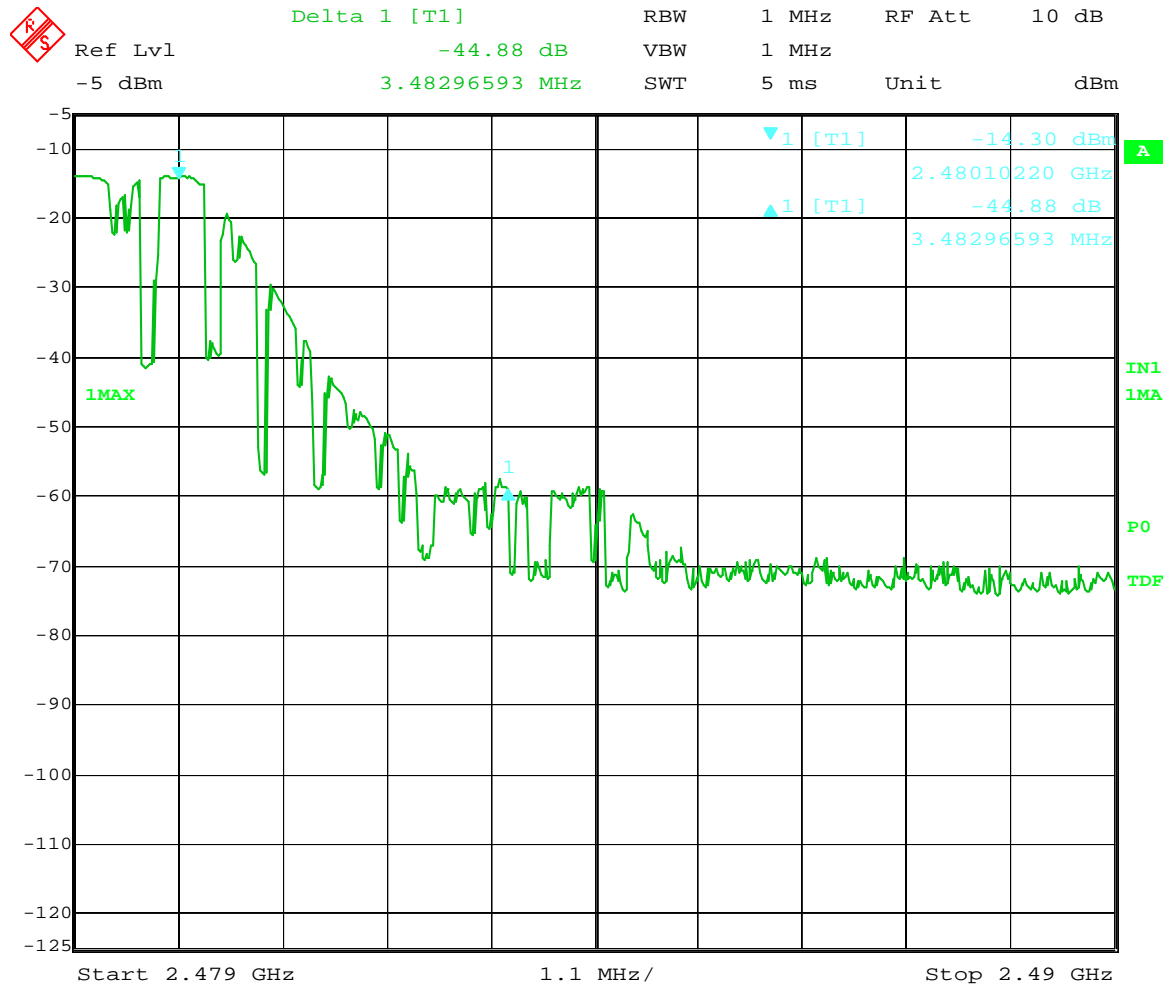
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

### **8.5. Test Data**

## Frequency Hopping

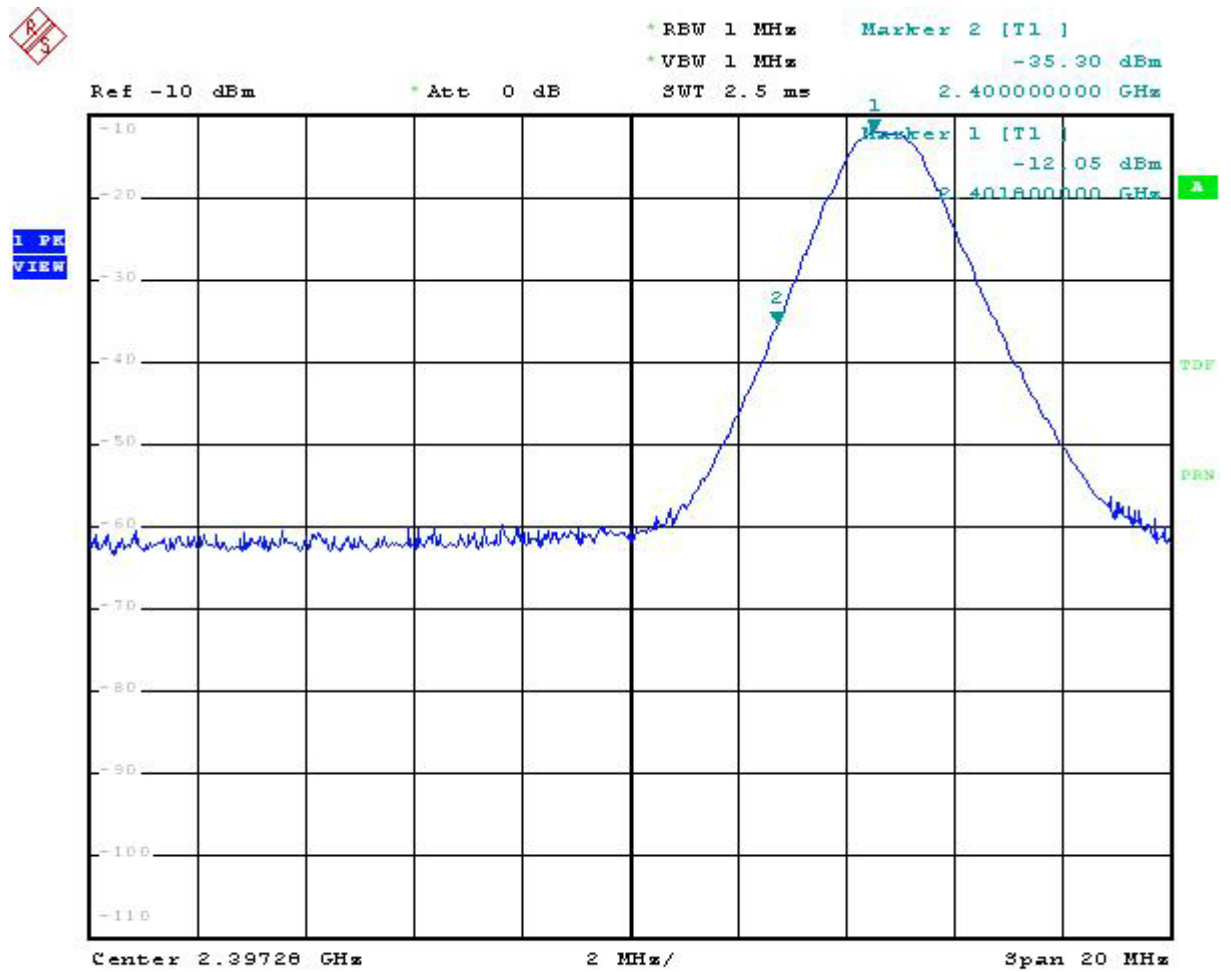


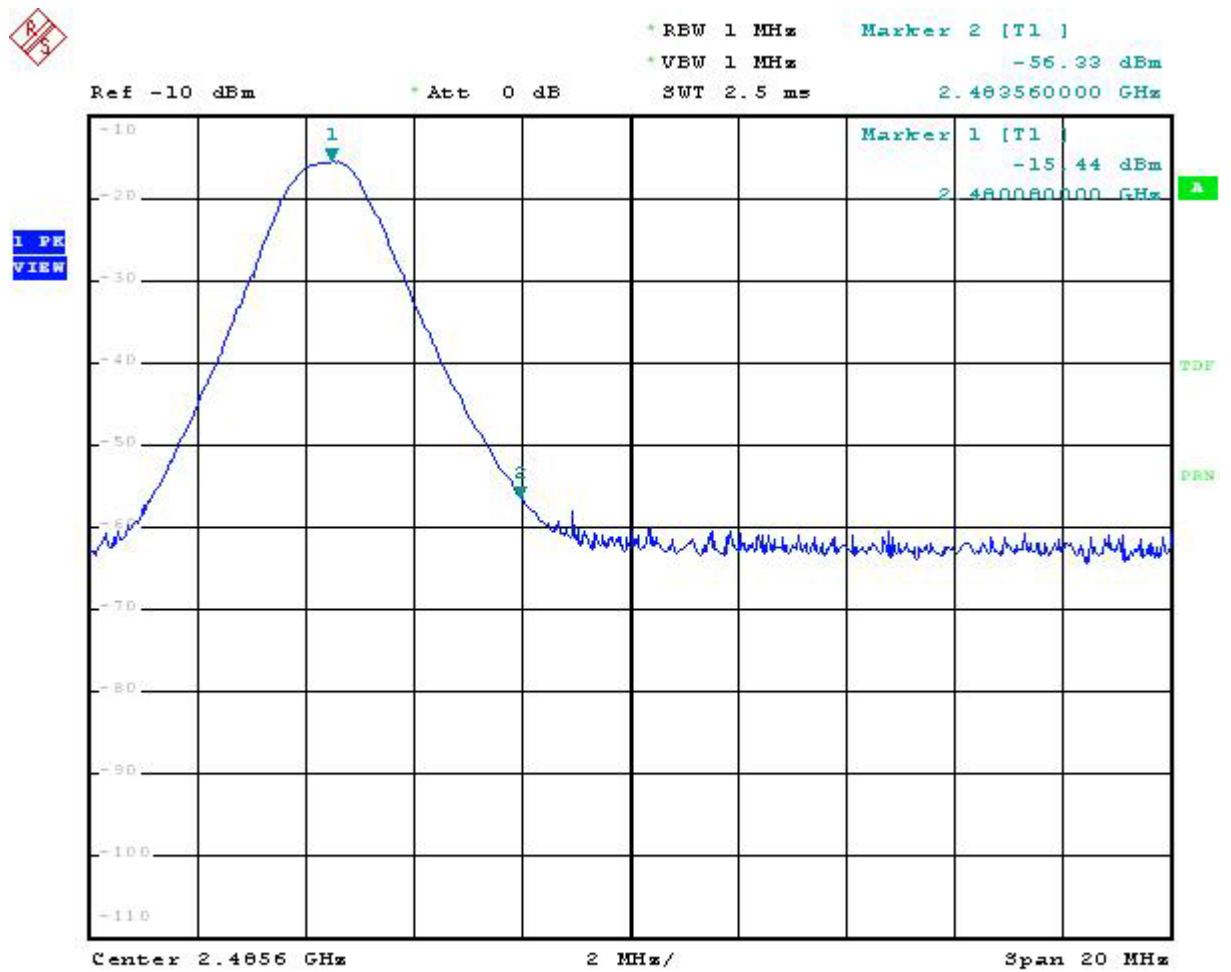
Date: 12.SEP.2006 13:09:35



Date: 12.SEP.2006 13:21:51

## Frequency Hopping Stop





## **9. SPURIOUS RADIATED EMISSION TEST**

### **9.1. Test Standard and Limit**

#### **9.1.1. Test Standard**

FCC Part 15 15.247(c) :2006

### **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 host PC system was connected with 110Vac/60Hz power source.

### **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 :

## Low Channel (2402MHz)

<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>Polarization</i>	<i>Limits (dBuV/m)</i>	<i>Note</i>
265.210	28.8	12.8	16.0	horizontal	46.0	---
354.629	29.5	10.4	19.1	horizontal	46.0	---
442.104	30.6	10.3	20.3	horizontal	46.0	---
486.813	30.4	9.1	21.3	horizontal	46.0	---
4804.100	39.0	36.7	2.3	horizontal	54.0	---
4804.100	40.0	37.7	2.3	Vertical	54.0	---

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).

*Mid Channel (2441MHz)*

<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>Note</i>
265.210	28.7	12.7	16.0	horizontal	46.0	---
354.627	29.3	10.2	19.1	horizontal	46.0	---
442.105	30.5	10.2	20.3	horizontal	46.0	---
486.813	30.4	9.1	21.3	horizontal	46.0	---
4882.050	38.5	36.2	2.3	horizontal	54.0	---
4882.050	39.3	37.0	2.3	Vertical	54.0	---

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).

*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>Polarization</i>	<i>Limits (dBuV/m)</i>	<i>Note</i>
<i>265.211</i>	<i>28.9</i>	<i>12.9</i>	<i>16.0</i>	<i>horizontal</i>	<i>46.0</i>	<i>---</i>
<i>354.627</i>	<i>29.3</i>	<i>10.2</i>	<i>19.1</i>	<i>horizontal</i>	<i>46.0</i>	<i>---</i>
<i>442.109</i>	<i>30.5</i>	<i>10.2</i>	<i>20.3</i>	<i>horizontal</i>	<i>46.0</i>	<i>---</i>
<i>486.815</i>	<i>30.4</i>	<i>9.1</i>	<i>21.3</i>	<i>horizontal</i>	<i>46.0</i>	<i>---</i>
<i>4960.050</i>	<i>38.0</i>	<i>36.2</i>	<i>1.8</i>	<i>horizontal</i>	<i>54.0</i>	<i>---</i>
<i>4960.050</i>	<i>39.0</i>	<i>37.0</i>	<i>2.0</i>	<i>Vertical</i>	<i>54.0</i>	<i>---</i>

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).

*Connect to PC*

<b>Ambient temperature: 24° C</b>						
<b>Relative humidity: 53 %</b>						
<b>Frequency MHz</b>	<b>Emission (dBuV/m)</b>	<b>Read Value (dBuV)</b>	<b>Correction Factor (dB/m)</b>	<b>Polarization</b>	<b>Limits (dBuV/m)</b>	<b>Note</b>
41.663	24.5	10.5	14.0	horizontal	40.0	---
198.534	34.3	21.6	12.7	horizontal	43.5	---
111.471	31.2	16.5	14.7	horizontal	43.5	---
288.537	30.6	14.2	16.4	horizontal	46.0	---
455.710	31.0	10.5	20.5	horizontal	46.0	---
576.232	23.2	0.6	22.6	Vertical	46.0	---

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).

## 10. NUMBER OF HOPPING FREQUENCY

### 10.1. Test Standard and Limit

#### 10.1.1. Test Standard

FCC Part 15 15.247(c) :2006

### 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,VBW=100KHz,
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

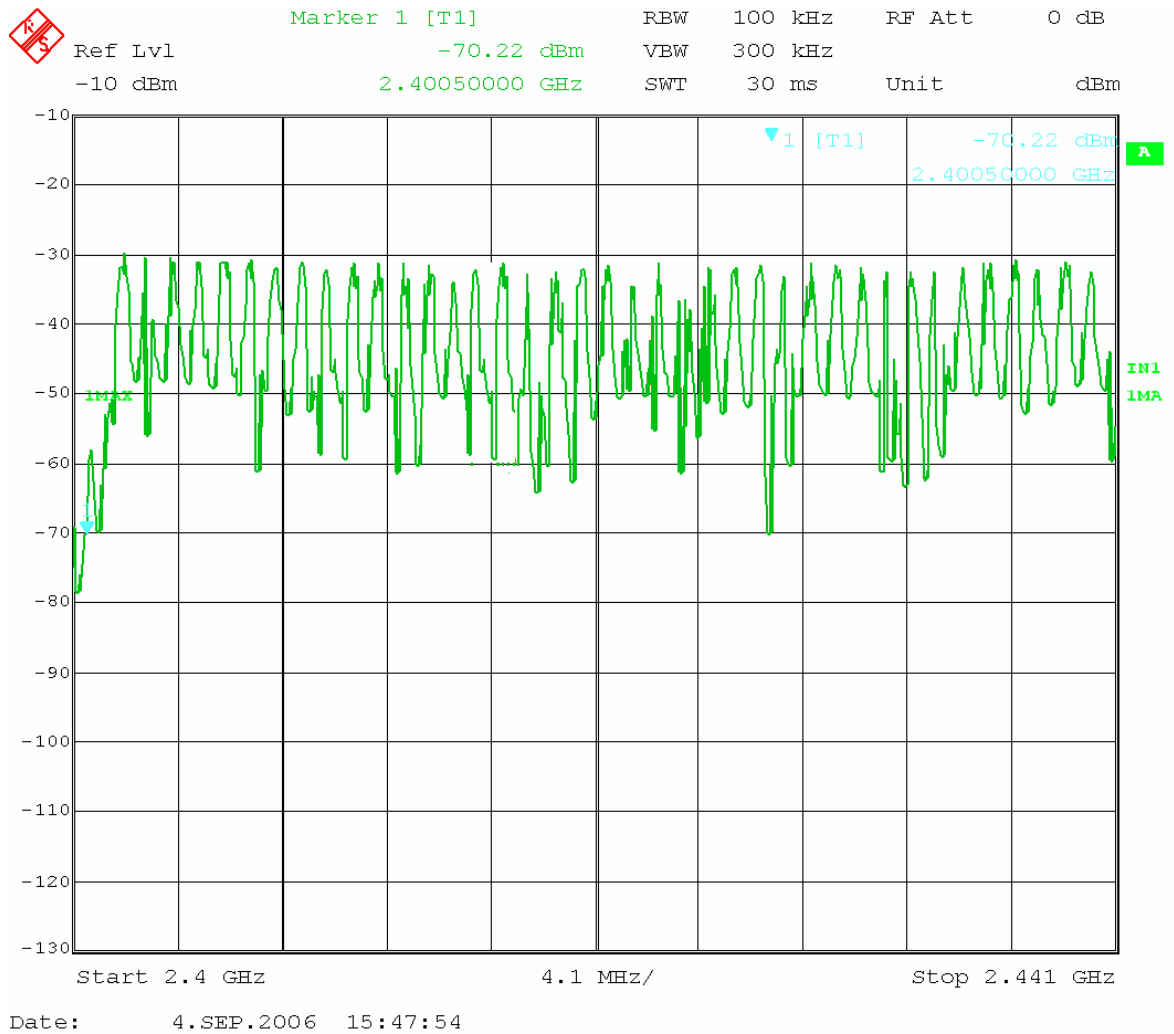
The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

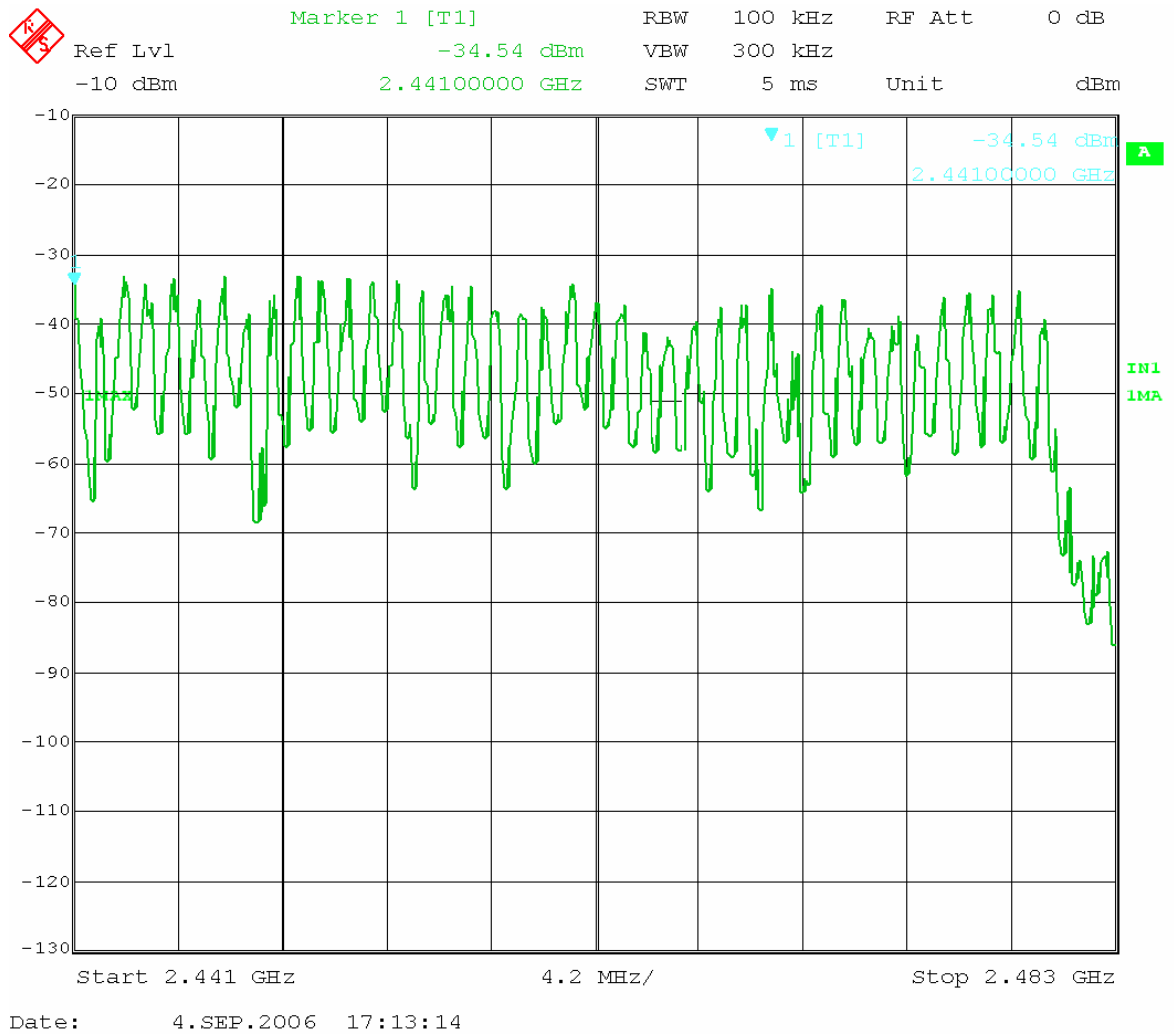
The maximum “initial carrier frequency tolerance” which is allowed for Bluetooth is  $f_{center} = 75 \text{ kHz}$ .

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

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

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





## 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

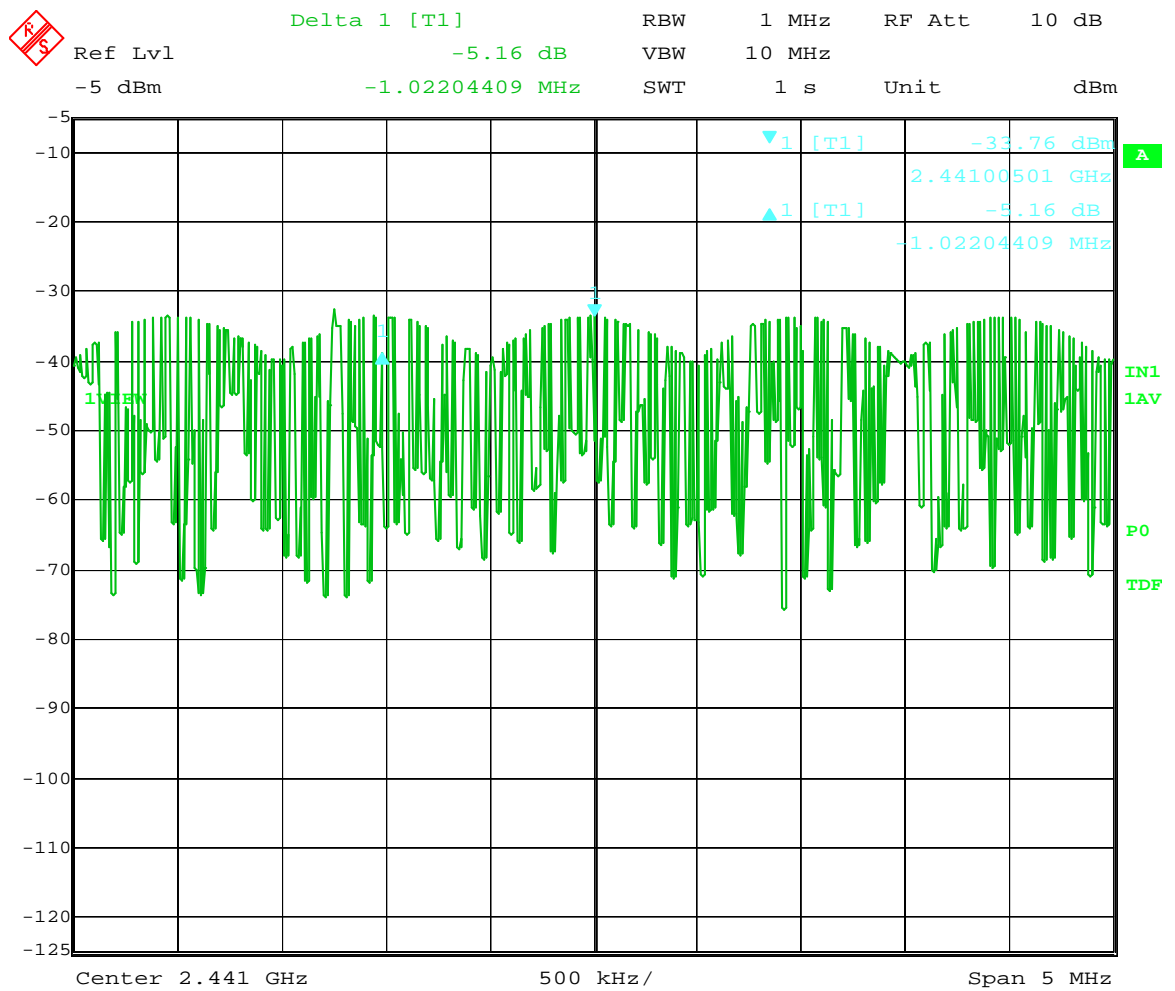
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100KHz, 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

Channel separation	Limit	Result
MHz	kHz	
1	$\geq 25\text{KHz}$ or $2/3 * 20\text{ dB bandwidth}$	Pass



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## 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 = 30s.
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.

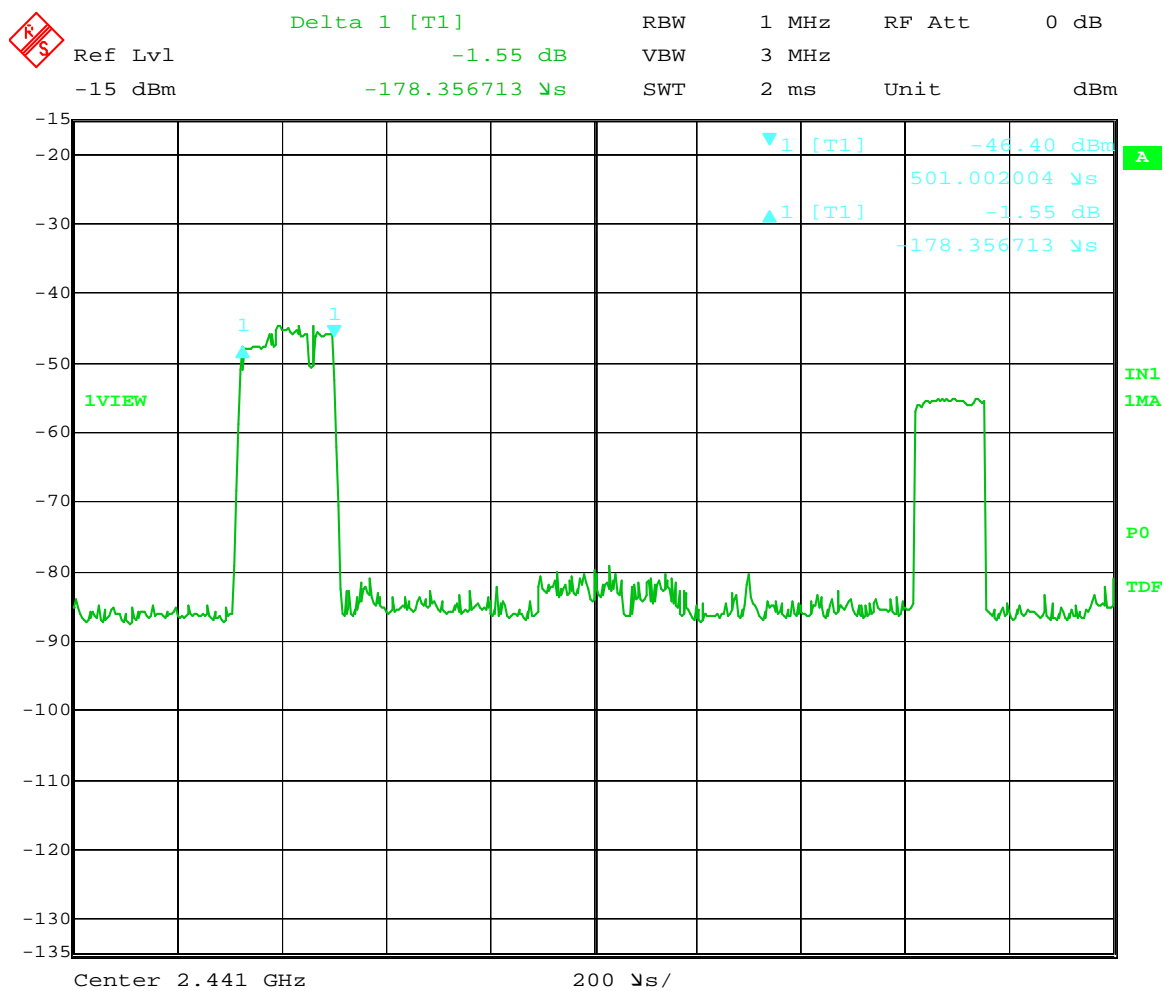
The dwell time of 0.178 s within a 30 second period in data mode is independent from the packet

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 = 0.178 (ms) \* (1600/(2\*79)) \* 31.6 = 56.9 (ms)



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## **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.

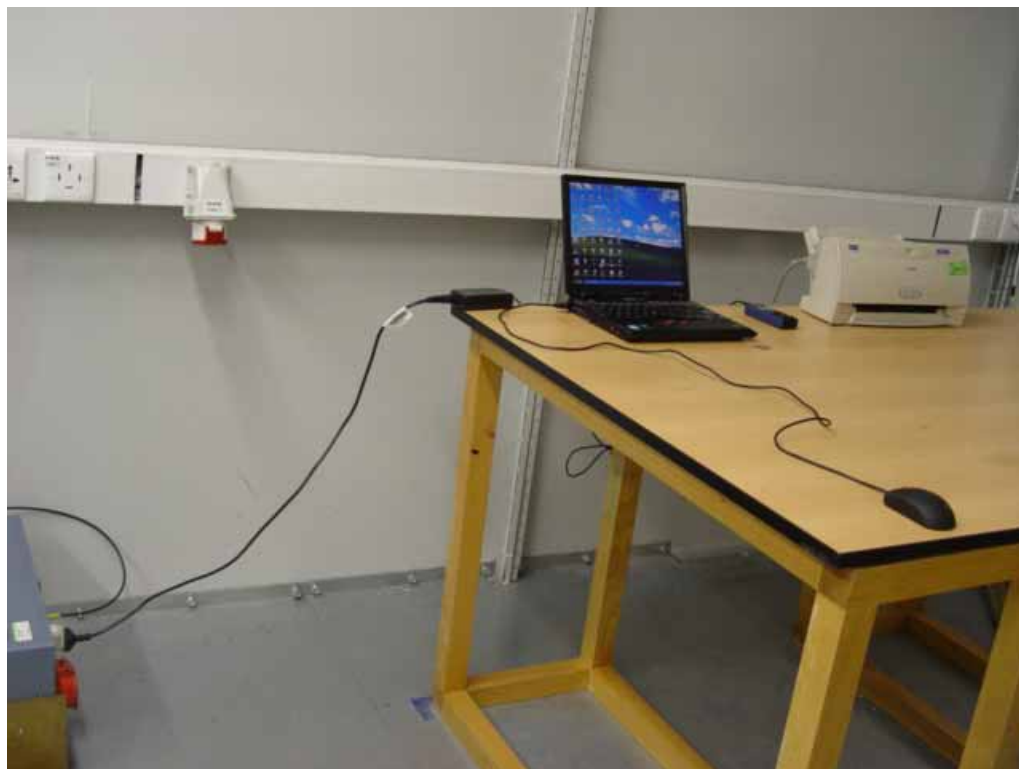
### **13.2. Antenna Connected Construction**

The directional gains of antenna used for transmitting is 0.85 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 Conducted Emission Test**



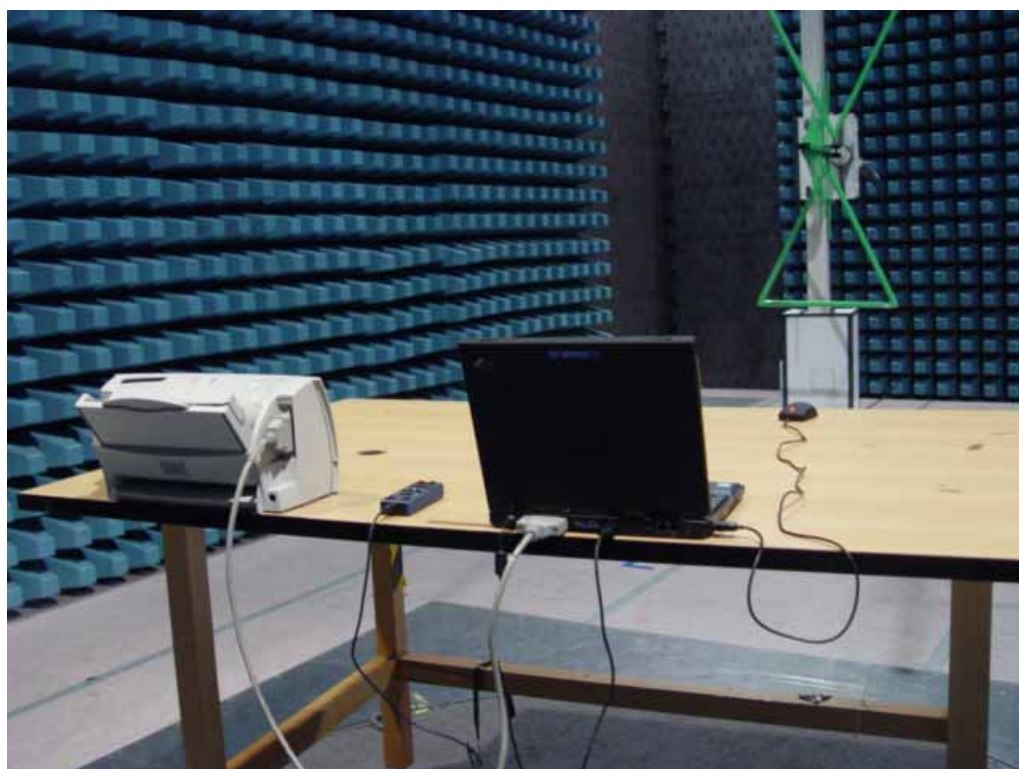
**Photo 2 Conducted Emission Test**



**Photo 3 Radiated Emission Test**



**Photo 4 Radiated Emission Test**



## **APPENDIX II EUT PHOTO**

**Photo 1 Appearance of EUT**



**Photo 2 Appearance of EUT**



**Photo 3 Inside of EUT**



**Photo 4 Inside of EUT**



**Photo 5 Inside of EUT**

