

Test Report No. 56S061141/02
dated 27 Dec 2006



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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC Parts 15B & C : 2006
OF A
**CLARION BLUETOOTH DONGLE WITH IPOD ADAPTOR &
HANDSFREE BLUETOOTH RECEIVER**
[Models : BD03 & BS03]
[FCC IDs : AX206CMDGL370 & AX206CMBLT370]

TEST FACILITY Telecoms & EMC, Testing Group, PSB Corporation Pte Ltd
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FCC REG. NO. 90937 (3m & 10m OATS)
99142 (10m Anechoic Chamber)
871638 (5m Anechoic Chamber)
325572 (10m Anechoic Chamber)

IND. CANADA REG. NO. IC 4257 (3m and 10m Anechoic Chambers)

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QUOTATION NUMBER 56Q0600297 & 56Q0601397A

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TEST PERIOD 21 Aug 2006 – 15 Sep 2006 & 17 Dec 2006 - 22 Dec 2006

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LA-2001-0212-A
LA-2001-0213-F
LA-2001-0214-E
LA-2001-0215-B
LA-2001-0216-G
LA-2001-0217-G
LA-2006-0355-C

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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TEST SUMMARY

The product was tested in accordance with the customer's specifications.

Test Results Summary

Test Standard	Description	Pass / Fail
FCC Part 15: 2006		
15.107(a), 15.207	Conducted Emissions	Pass ^{*see Modification 1}
15.109(a), 15.205, 15.209	Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)	Pass
15.247(a)(1)	Carrier Frequency Separation	Pass
	Spectrum Bandwidth (20dB Bandwidth Measurement)	Pass
15.247(a)(1)(iii)	Number of Hopping Frequencies	Pass
	Average Frequency Dwell Time	Pass
15.247(b)(1)	Maximum Peak Power	Pass
15.247(d)	RF Conducted Spurious Emissions	Pass
15.247(d)	Band Edge Compliance (Conducted)	Pass
15.247(d)	Band Edge Compliance (Radiated)	Pass
15.247(e)	Peak Power Spectral Density	Pass
1.1310	Maximum Permissible Exposure	Pass
15.35(c)	Duty Cycle Factor Computation	Refer to page 76-81 for details

TEST SUMMARY

Notes

1. Three channels as listed below, which respectively represent the lower, middle and upper channels of the Equipment Under Test (EUT) were chosen and tested. For each channel, the EUT was configured to operate in the test mode.

<u>Transmit Channel</u>	<u>Frequency (GHz)</u>
Channel 0	2.402
Channel 39	2.441
Channel 78	2.480

2. All the measurements in section 15.247 were done based on conducted measurements.
3. The EUT is a Class B device when in non-transmitting state and meets the FCC Part15B Class B requirements.
4. All test measurement procedures are according to ANSI C63.4: 2003.

Modifications

The EUT was brought to compliance to Conducted Emissions by following modifications:

1. Adding a rectifier diode (1N4002) and a 100uH inductor in +12V input line.
2. Removed dangling serial cable from the PCB board.

PRODUCT DESCRIPTION

Description	: The Equipment Under Test (EUT) is a Clarion Bluetooth Dongle with iPod Adaptor (BD03) and Handsfree Bluetooth Receiver (BS03) .
Manufacturer	: Clarion (Malaysia) Sdn Bhd Phase 3, Free Industrial Zone, 11900 Bayan Lepas, Penang. Malaysia.
Model Number	: BD03 (Bluetooth Dongle with iPod Adaptor) BS03 (Handsfree Bluetooth Receiver)
FCC ID	: <u>BD03</u> AX206CMDGL370 <u>BS03</u> AX206CMBLT370
Serial Number	: Nil
Microprocessor	: Refer to manufacturer
Operating / Transmitting Frequency	: 2.402GHz (lower channel) to 2.480GHz (upper channel) 79 channels in total
Clock / Oscillator Frequency	: 12MHz, 36MHz & 72MHz
Modulation	: Gaussian Frequency Shift Keying (GFSK)
Port / Connectors	: <u>Bluetooth Dongle with iPod Adaptor</u> 1. Audio Jack Input 2. USB port <u>Handsfree Bluetooth Receiver</u> 1. Audio Jack Microphone Input
Rated Input Power	: 3.5VDC – 4.2VDC (Bluetooth Dongle) 8VDC – 18VDC (Handsfree Bluetooth Receiver)
Accessories	: Lithium ion battery



SUPPORTING EQUIPMENT DESCRIPTION

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
Compaq Laptop	M/N: 17XL261 S/N: 5Y07FHR6NA20 FCC ID: DoC	2.00m unshielded power adapter. 1.80m USB communication cable
Power Adapter (Laptop)	M/N: LPSS62 S/N: 17762S00 FCC ID: Nil	2.00m unshielded power adapter.



EUT OPERATING CONDITIONS

FCC Part 15

1. **Conducted Emissions**
2. **Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)**
3. **Spectrum Bandwidth (20dB Bandwidth Measurement)**
4. **Maximum Peak Power**
5. **RF Conducted Spurious Emissions**
6. **Peak Power Spectral Density**
7. **Maximum Permissible Exposure**
8. **Duty Cycle Factor Computation**

The EUT was exercised by operating in maximum continuous transmission with frequency hopping off, i.e transmitting at lower, middle and upper channels respectively at one time.

FCC Part 15

1. **Carrier Frequency Separation**
2. **Number of Hopping Frequencies**
3. **Average Frequency Dwell Time**
4. **Band Edge Compliance (Conducted)**
5. **Band Edge Compliance (Radiated)**

The EUT was exercised by operating in maximum continuous transmission with frequency hopping on.

CONDUCTED EMISSION TEST

FCC Parts 15.107(a) and 15.207 Conducted Emission Limits

Frequency Range (MHz)	Limit Values (dB μ V)	
	Quasi-peak (QP)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50

* Decreasing linearly with the logarithm of the frequency

FCC Parts 15.107(a) and 15.207 Conducted Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Schaffner EMI Receiver – SCR1	SCR 3501	238	23 Nov 2007
Agilent EMC Analyzer-SA7	E7403A	US41160167	22 May 2007
EMCO LISN (for EUT) – LISN9	3825/2	9309-2128	15 May 2007
R&S Pulse Limiter – PL2	ESH3-Z2	100347	15 Apr 2007



CONDUCTED EMISSION TEST

FCC Parts 15.107(a) and 15.207 Conducted Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another LISN.

FCC Parts 15.107(a) and 15.207 Conducted Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver.
3. High peaks, relative to the limit line, were then selected.
4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz. Both Quasi-peak and Average measurements were made.
5. Steps 2 to 4 were then repeated for the LIVE line.

Sample Calculation Example

At 20 MHz	Q-P limit (Class B) = 1000 μV = 60.0 dBμV
Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dBμV (Calibrated for system losses)	
Therefore, Q-P margin = 40.0 - 60.0 = -20.0	i.e. 20.0 dB below Q-P limit

CONDUCTED EMISSION TEST



Conducted Emissions Test Setup (Front View)



Conducted Emissions Test Setup (Rear View)

CONDUCTED EMISSION TEST

FCC Parts 15.107(a) and 15.207 Conducted Emission Results

Test Input Power	110V 60Hz	Temperature	22°C
Line Under Test	AC Mains	Relative Humidity	58%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
Test Mode	Transmit and Charging	Tested By	Kenneth Ler
Channel	Low (Worst Channel)		

Frequency (MHz)	Q-P Value (dB μ V)	Q-P Margin (dB)	AV Value (dB μ V)	AV Margin (dB)	Line
0.4566	39.0	-17.8	38.6	-8.2	Live
0.5135	39.6	-16.4	38.7	-7.3	Live
0.6848	39.9	-16.1	39.3	-6.7	Live
0.9131	39.0	-17.0	38.0	-8.0	Live
1.0279	39.2	-16.8	38.7	-7.3	Live
1.2547	39.9	-16.1	39.2	-6.8	Live

Notes

- All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- No test was conducted on the Handsfree Bluetooth receiver (EUT) as the unit is a 12VDC car battery powered device.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
9kHz - 30MHz
RBW: 10kHz VBW: 30kHz
- Conducted Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ± 2.4 dB.

RADIATED EMISSION TEST

FCC Part 15.205 Restricted Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	Above 38.6
13.36 - 13.41			

FCC Parts 15.109(a) and 15.209 Radiated Emission Limits

Frequency Range (MHz)	Quasi-Peak Limit Values (dB μ V/m) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0*

* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

FCC Parts 15.109(a) and 15.209 Radiated Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz-26.5GHz) – ESMI3	ESMI	829214/005 829550/004	04 Oct 2007
Schaffner Pre-Amplifier	CPA9231A	3422	01 Apr 2007
MITEQ Preamplifier (0.1-26.5GHz) – PA11	NSP2650-N	728231	01 Apr 2007
Schaffner Bilog Antenna –BL3	CBL6112B	2549	12 May 2007
EMCO Horn Antenna – H14	3115	0003-6087	19 May 2007
Bandstop Filter (2.4-2.5 GHz)	BRM50701	017	19 May 2007

RADIATED EMISSION TEST

FCC Parts 15.109(a) and 15.209 Radiated Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

FCC Parts 15.109(a) and 15.209 Radiated Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which attitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 30MHz to 10th harmonics of the EUT fundamental frequency, using the Bi-log antenna for frequencies from 30MHz up to 3GHz, and the Horn antenna above 3GHz.

Sample Calculation Example

At 300 MHz	Q-P limit (Class B) = 200 μ V/m = 46.0 dB μ V/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dB μ V/m (Calibrated level including antenna factors & cable losses)	
Therefore, Q-P margin = 40.0 - 46.0 = -6.0	i.e. 6 dB below Q-P limit

RADIATED EMISSION TEST



Radiated Emissions Test Setup (Front View)



Radiated Emissions Test Setup (Rear View)



RADIATED EMISSION TEST

FCC Parts 15.109(a), 15.205 and 15.209 Radiated Emission Results

Test Input Power	3.7VDC	Temperature	22°C
Test Distance	3m	Relative Humidity	58%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Kenneth Ler

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dB μ V/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Channel
339.4300	30.3	-15.7	0	100	V	78
416.0600	28.8	-17.2	0	100	V	78
433.5200	39.1	-6.9	0	100	V	78
469.4100	25.6	-20.4	0	100	V	78
505.3000	29.6	-16.4	0	100	V	78
578.0500	28.5	-17.5	0	100	V	78

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dB μ V/m)	Average Value (dB μ V/m)	Average Margin (dB) See Note 3	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Channel
4.8041	43.1	-	-10.9	182	100	H	0
4.8821	44.1	-	-9.9	168	100	H	39
4.9603	43.4	-	-10.6	178	100	H	78
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RADIATED EMISSION TEST

FCC Parts 15.109(a), 15.205 and 15.209 Radiated Emission Results

Test Input Power	12VDC	Temperature	22°C
Test Distance	3m	Relative Humidity	58%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Zechs Ng Chee Siong

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dB μ V/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Channel
360.4000	40.2	-5.8	252	100	V	0
396.4440	32.7	-13.3	111	100	V	0
432.4800	40.3	-5.7	92	228	H	0
504.5710	30.5	-15.5	117	100	V	0
576.6510	31.4	-14.6	206	128	H	0
828.9300	29.8	-16.2	260	100	H	0

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dB μ V/m)	Average Value (dB μ V/m)	Average Margin (dB) See Note 3	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Channel
1296.0000	43.3	-	-10.7	25	100	H	0
4.8041	39.1	-	-14.9	10	100	H	0
4.8821	38.2	-	-15.8	0	100	H	39
4.9603	38.5	-	-15.5	8	100	H	78
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RADIATED EMISSION TEST

Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. As the measured peak shows compliance to the average limit, as such no average measurement was required.
3. The average margin indicates the margin of the measured peak value below the average limit.
4. "--" indicates no emissions were found and shows compliance to the limits.
5. Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
6. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
7. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
RBW: 120kHz VBW: 1MHz
>1GHz
RBW: 1MHz VBW: 1MHz
8. The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
9. The channel in the table refers to the transmit channel of the EUT.
10. Radiated Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25GHz (QP only @ 3m & 10m) is ±4.3dB (for EUTs < 0.5m X 0.5m X 0.5m).

CARRIER FREQUENCY SEPARATION TEST

FCC Part 15.247(a)(1) Carrier Frequency Separation Limits

The EUT shows compliance to the requirements of this section, which states the adjacent carrier frequencies must be separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, the EUT may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW (21dBm).

FCC Part 15.247(a)(1) Carrier Frequency Separation Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007
R&S Universal Radio Communication Tester	CMU 200	837587/068	24 Mar 2007

FCC Part 15.247(a)(1) Carrier Frequency Separation Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 100kHz.
5. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(a)(1) Carrier Frequency Separation Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with frequency hopping sequence on.
2. The start and stop frequencies of the spectrum analyser were set to 2.401GHz and 2.404GHz.
3. The spectrum analyser was set to max hold to capture the two adjacent transmitting frequencies within the span. The signal capturing was continuous until no further signals were detected.
4. The carrier frequency separation of the two adjacent transmitting / operating frequency was measured by finding the carrier frequency difference between the two adjacent channels.
5. The steps 2 to 4 were repeated with the following start and stop frequencies settings:
 - a. 2.439GHz to 2.442GHz
 - b. 2.440GHz to 2.443GHz
 - c. 2.478GHz to 2.481GHz

CARRIER FREQUENCY SEPARATION TEST



Carrier Frequency Separation Test Setup



CARRIER FREQUENCY SEPARATION TEST

FCC Part 15.247(a)(1) Carrier Frequency Separation Results

Test Input Power	3.7VDC	Temperature	20°C
Attached Plots	1 - 4	Relative Humidity	55%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

Adjacent Channels	Channel Separation (MHz)
0 and 1 (2.402GHz and 2.403GHz)	1.010
38 and 39 (2.440GHz and 2.441GHz)	1.010
39 and 40 (2.441GHz and 2.442GHz)	1.010
77 and 78 (2.479GHz and 2.480GHz)	1.005

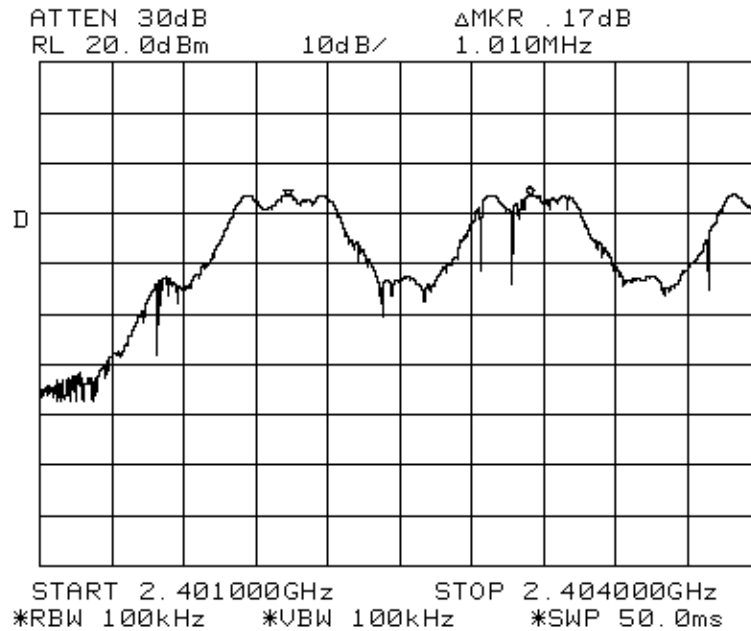
Test Input Power	12VDC	Temperature	20°C
Attached Plots	5 - 8	Relative Humidity	55%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

Adjacent Channels	Channel Separation (MHz)
0 and 1 (2.402GHz and 2.403GHz)	1.020
38 and 39 (2.440GHz and 2.441GHz)	1.025
39 and 40 (2.441GHz and 2.442GHz)	1.010
77 and 78 (2.479GHz and 2.480GHz)	1.020

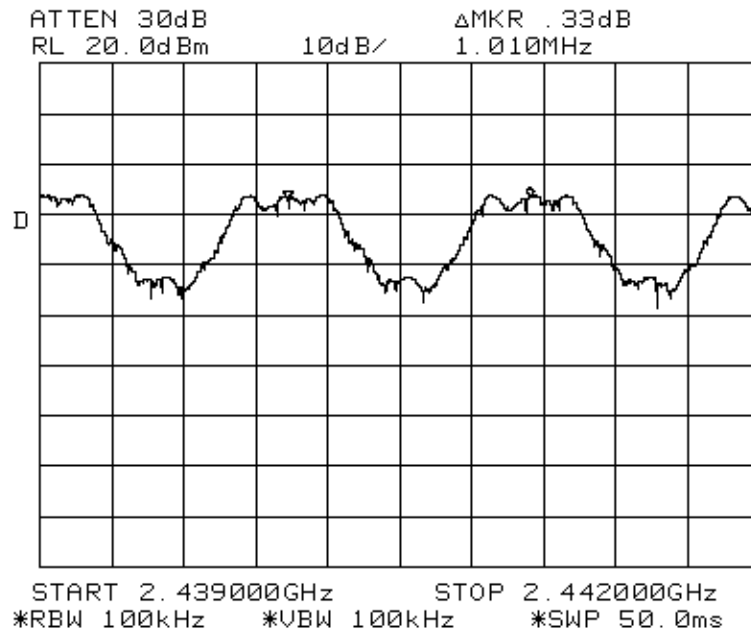


CARRIER FREQUENCY SEPARATION TEST

Carrier Frequency Separation Plots - Bluetooth Dongle



Plot 1 - Channels 0 and 1 Separation

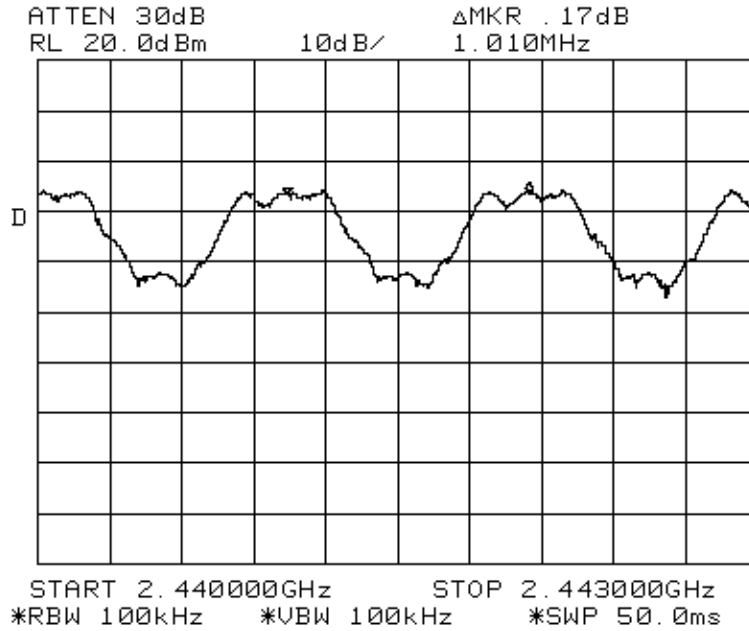


Plot 2 – Channels 38 and 39 Separation

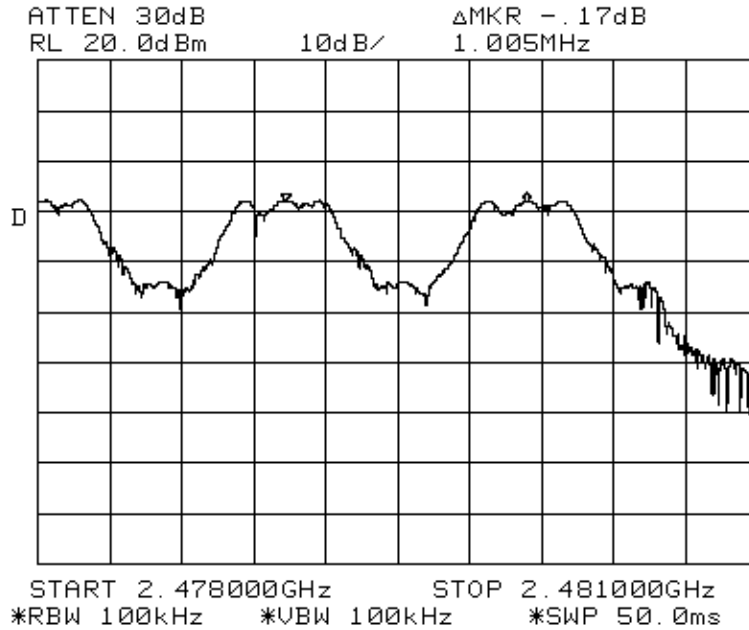


CARRIER FREQUENCY SEPARATION TEST

Carrier Frequency Separation Plots - Bluetooth Dongle



Plot 3 - Channels 39 and 40 Separation

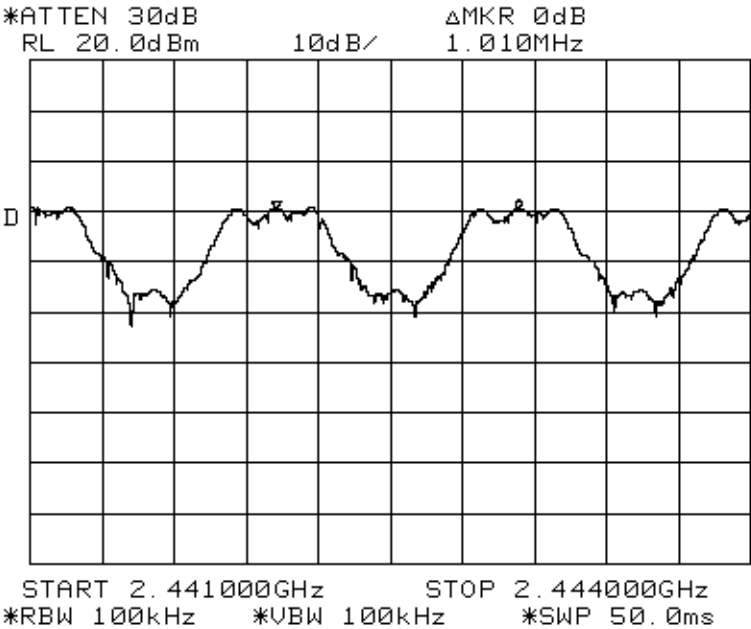


Plot 4 - Channels 77 and 78 Separation

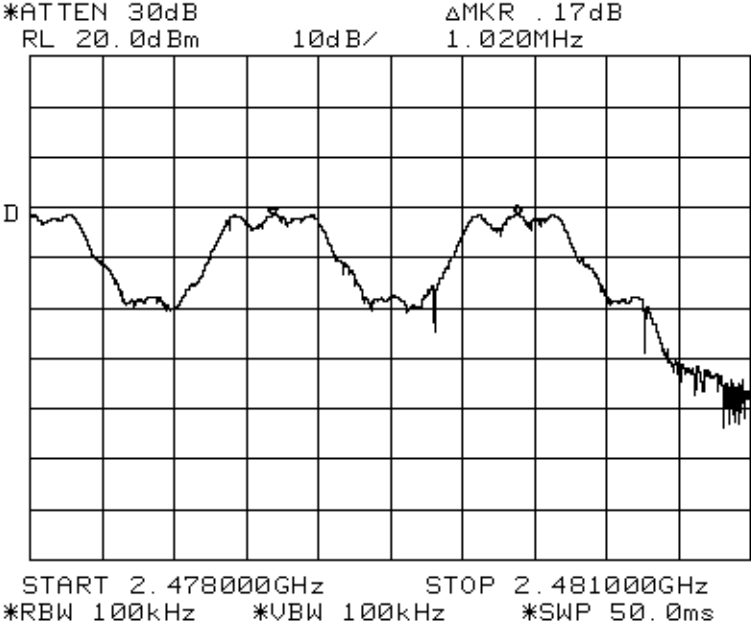


CARRIER FREQUENCY SEPARATION TEST

Carrier Frequency Separation Plots - Handsfree Bluetooth Receiver



Plot 7 - Channels 39 and 40 Separation



Plot 8 - Channels 77 and 78 Separation



SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST

FCC Part 15.247(a)(1) Spectrum Bandwidth (20dB Bandwidth Measurement) Limits

The EUT shows compliance to the requirements of this section, which states that the 20dB bandwidth of the hopping channel shall be the channel frequency separation by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

FCC Part 15.247(a)(1) Spectrum Bandwidth (20dB Bandwidth Measurement) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007

FCC Part 15.247(a)(1) Spectrum Bandwidth (20dB Bandwidth Measurement) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 10kHz and 30kHz.
5. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(a)(1) Spectrum Bandwidth (20dB Bandwidth Measurement) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, non-hopping with transmitting frequency at Channel 0 (2.402GHz).
2. The center frequency of the spectrum analyser was set to the transmitting frequency with the frequency span wide enough to capture the 20dB bandwidth of the transmitting frequency.
3. The spectrum analyser was set to max hold to capture the transmitting frequency. The signal capturing was continuous until no further changes were observed.
4. The peak of the transmitting frequency was detected with the marker peak function of the spectrum analyser. The frequencies below the 20dB peak frequency at lower (f_L) and upper (f_H) sides of the transmitting frequency were marked and measured by using the marker-delta function of the spectrum analyser.
5. The 20dB bandwidth of the transmitting frequency is the frequency difference between the marked lower and upper frequencies, $|f_H - f_L|$.
6. The steps 2 to 5 were repeated with the transmitting frequency was set to Channel 39 (2.441GHz) and Channel 78 (2.480GHz) respectively.

SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST



Spectrum Bandwidth (20dB Bandwidth Measurement) Test Setup



SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST

FCC Part 15.247(a)(1) Spectrum Bandwidth (20dB Bandwidth Measurement) Results

Test Input Power	3.7VDC	Temperature	20°C
Attached Plots	9 - 11	Relative Humidity	55%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

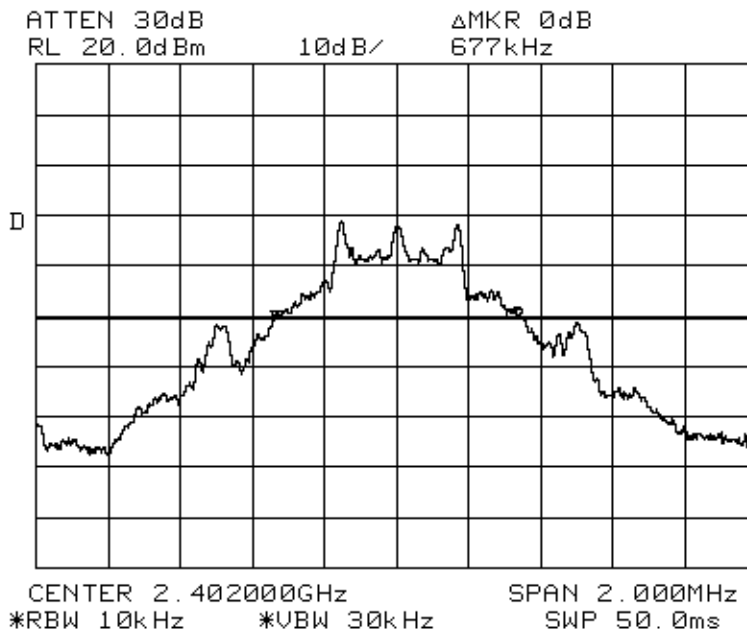
Channel	Channel Frequency (GHz)	20dB Bandwidth (MHz)
0	2.402	0.677
39	2.441	0.730
78	2.480	0.707

Test Input Power	12VDC	Temperature	20°C
Attached Plots	12 - 14	Relative Humidity	55%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

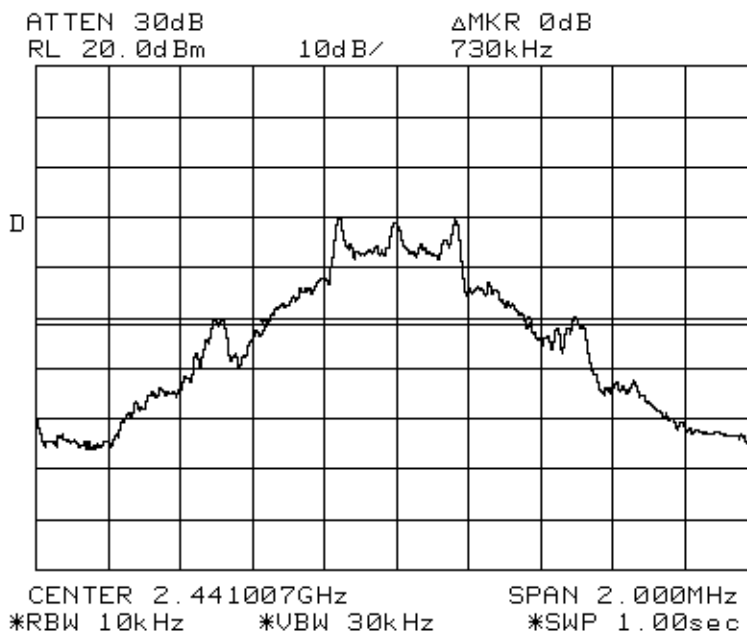
Channel	Channel Frequency (GHz)	20dB Bandwidth (MHz)
0	2.402	0.620
39	2.441	0.733
78	2.480	0.717

SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST

Spectrum Bandwidth (20dB Bandwidth Measurement) Plots - Bluetooth Dongle



Plot 9 – Channel 0

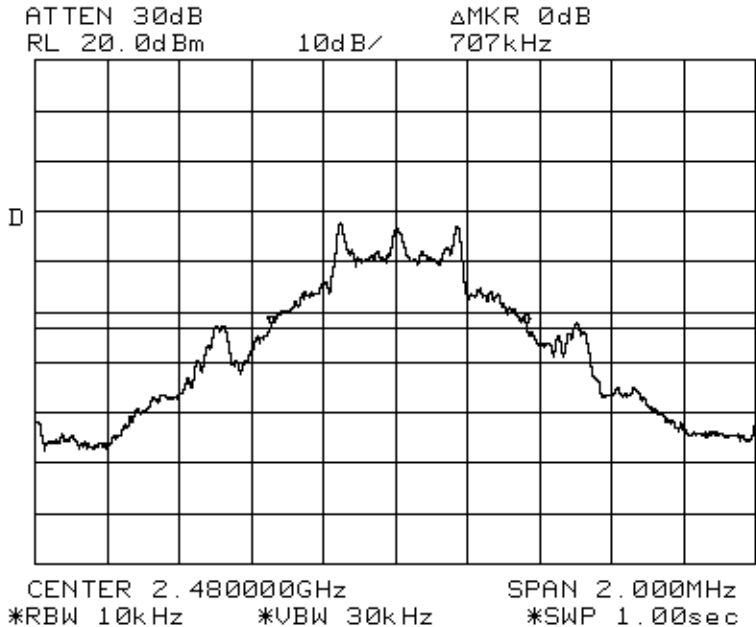


Plot 10 – Channel 39



SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST

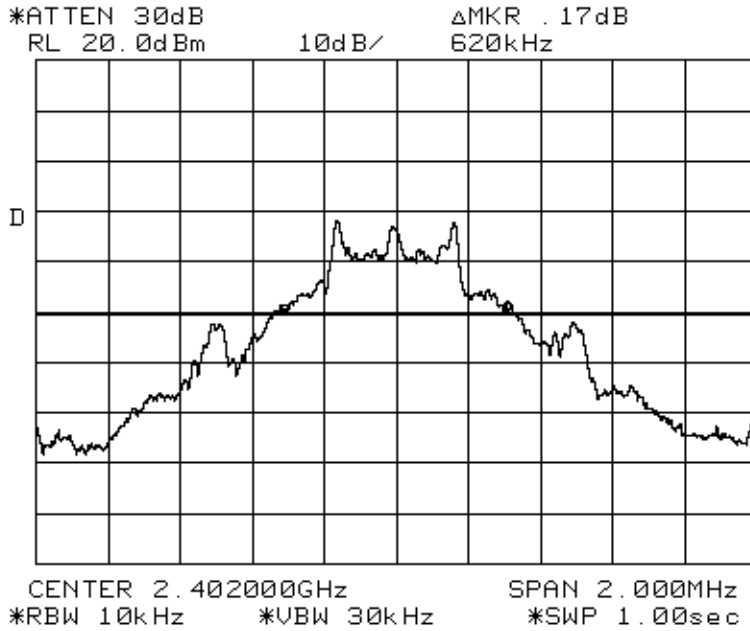
Spectrum Bandwidth (20dB Bandwidth Measurement) Plots - Bluetooth Dongle



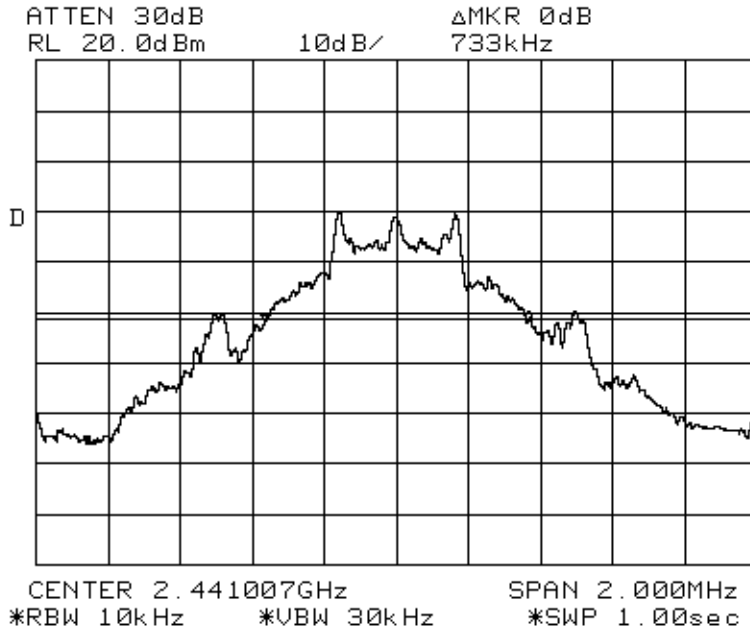
Plot 11 – Channel 78

SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST

Spectrum Bandwidth (20dB Bandwidth Measurement) Plots - Handsfree Bluetooth Receiver



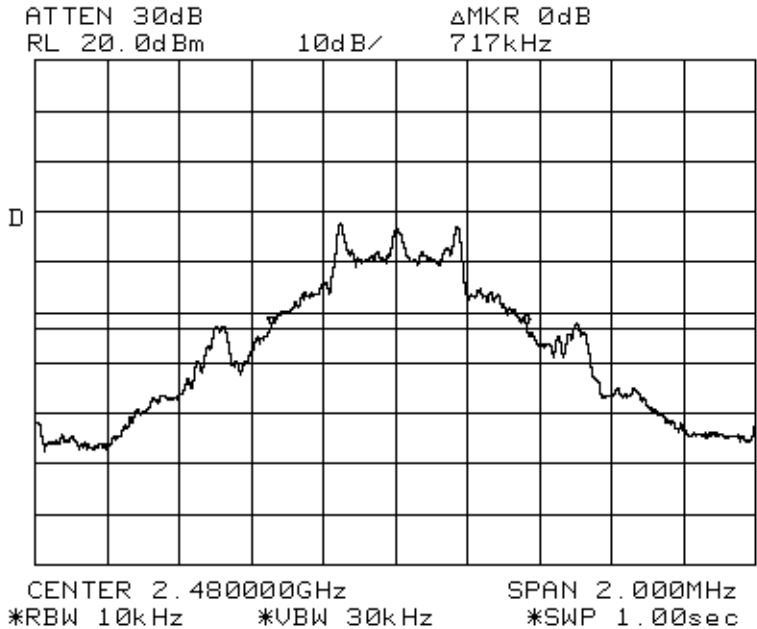
Plot 12 – Channel 0



Plot 13 – Channel 39

SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST

Spectrum Bandwidth (20dB Bandwidth Measurement) Plots - Handsfree Bluetooth Receiver



Plot 14 - Channel 78

NUMBER OF HOPPING FREQUENCIES TEST

FCC Part 15.247(a)(1)(iii) Number of Hopping Frequencies Limits

The EUT shows compliance to the requirements of this section, which states the EUT shall use at least 15 channels.

FCC Part 15.247(a)(1)(iii) Number of Hopping Frequencies Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007

FCC Part 15.247(a)(1)(iii) Number of Hopping Frequencies Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(a)(1)(iii) Number of Hopping Frequencies Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with frequency hopping sequence on.
2. The start and stop frequencies of the spectrum analyser were set to 2.40GHz and 2.421GHz.
3. The spectrum analyser was set to max hold to capture all the transmitting frequencies within the span. The signal capturing was continuous until all the transmitting frequencies were captured and no further signals were detected.
4. The numbers of transmitting frequencies were counted and recorded.
5. The steps 2 to 4 were repeated with the following start and stop frequencies settings:
 - a. 2.420GHz to 2.441GHz
 - b. 2.440GHz to 2.461GHz
 - c. 2.460GHz to 2.4835GHz
6. The total number of hopping frequencies is the sum of the number of the hopping frequencies found for each span.

NUMBER OF HOPPING FREQUENCIES TEST



Number of Hopping Frequencies Test Setup

FCC Part 15.247(a)(1)(iii) Number of Hopping Frequencies Results

Test Input Power	3.7VDC	Temperature	20°C
Attached Plots	15 - 18	Relative Humidity	55%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

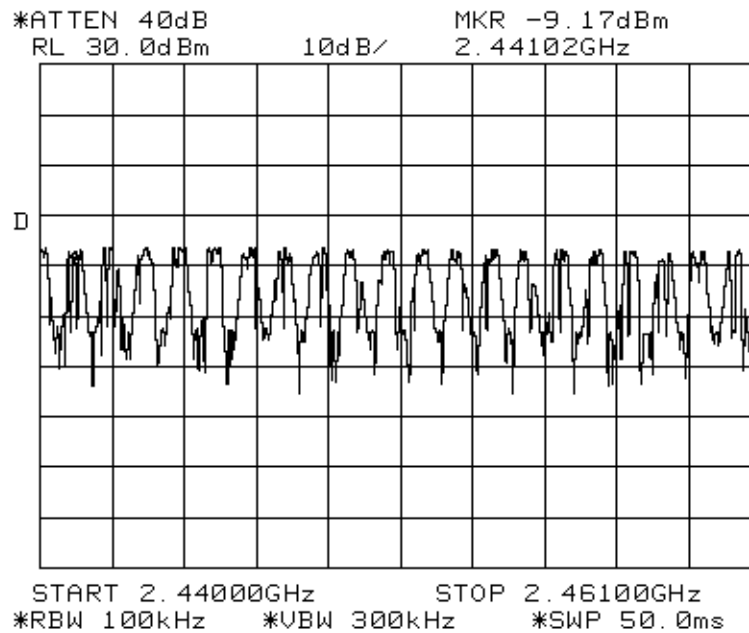
The EUT was found to have 79 hopping frequencies. Please refer to the attached plots.

Test Input Power	12VDC	Temperature	20°C
Attached Plots	19 - 22	Relative Humidity	55%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

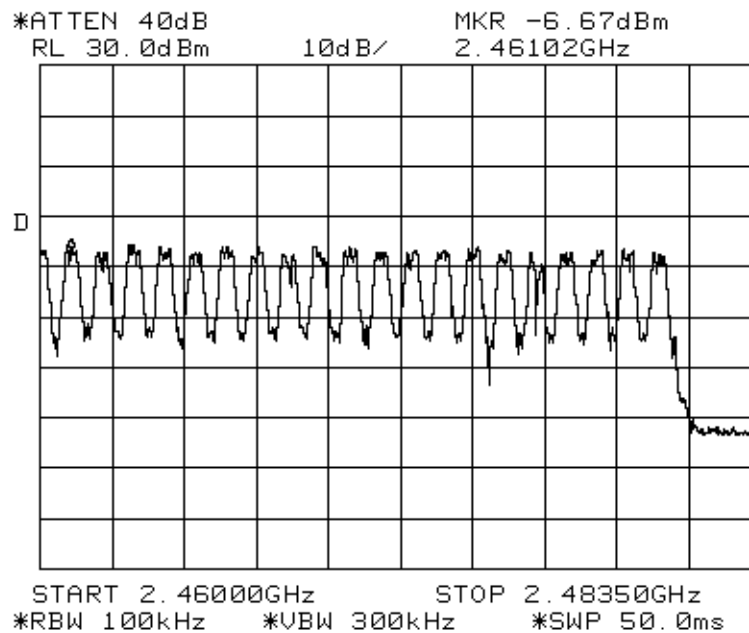
The EUT was found to have 79 hopping frequencies. Please refer to the attached plots.

NUMBER OF HOPPING FREQUENCIES TEST

Number Of Hopping Frequencies Plots - Bluetooth Dongle



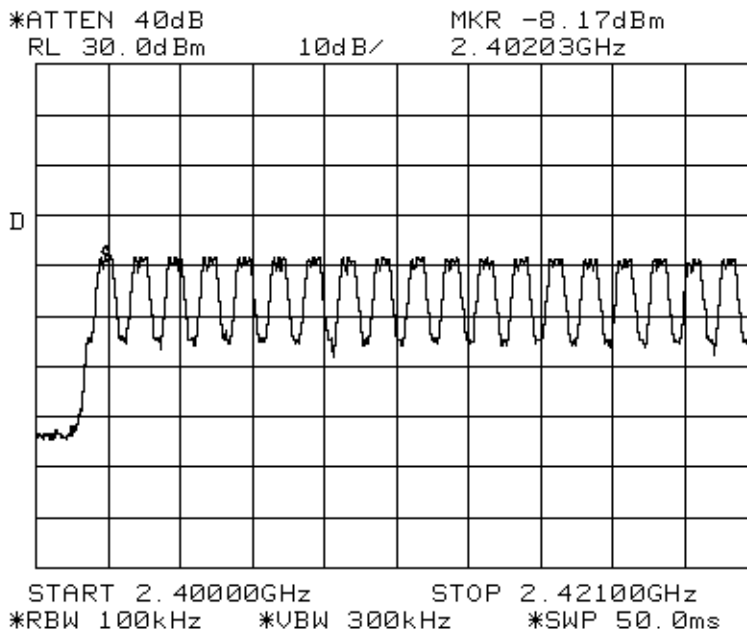
Plot 17 - Channels 39 to 58



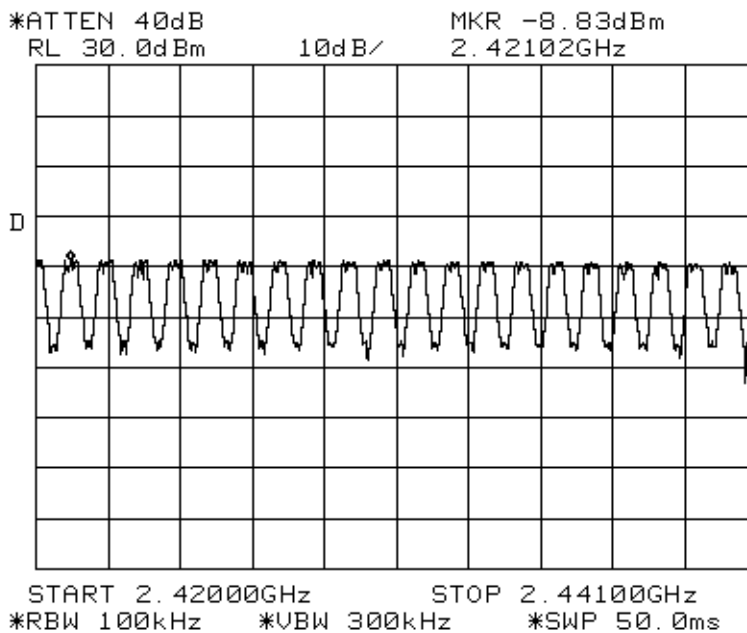
Plot 18 - Channels 59 to 78

NUMBER OF HOPPING FREQUENCIES TEST

Number Of Hopping Frequencies Plots - Handsfree Bluetooth Receiver



Plot 19 - Channels 0 to 18



Plot 20 - Channels 19 to 38



AVERAGE FREQUENCY DWELL TIME TEST

FCC Part 15.247(a)(1)(iii) Average Frequency Dwell Time Limits

The EUT shows compliance to the requirements of this section, which states the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

FCC Part 15.247(a)(1)(iii) Average Frequency Dwell Time Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007

FCC Part 15.247(a)(1)(iii) Average Frequency Dwell Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 1MHz and 1MHz.
5. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(a)(1)(iii) Average Frequency Dwell Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with frequency hopping sequence on.
2. The center frequency of the spectrum analyser was set to 2.402GHz with zero frequency span (spectrum analyser acts as an oscilloscope).
3. The sweep time of the spectrum analyser was adjusted until a stable signal can be seen on the spectrum analyser.
4. The duration (dwell time) of a packet was measured using the marker-delta function of the spectrum analyser. The average dwell time of the transmitting frequency was computed based on general expression as shown below:
Average Frequency Dwell Time = [measured time slot length x hopping rate / number of hopping channels] x [0.4 x number of hopping channels]
5. The steps 2 to 4 were repeated with the center frequency of the spectrum analyser were set to 2.441GHz and 2.480GHz respectively.

AVERAGE FREQUENCY DWELL TIME TEST



Average Frequency Dwell Time Test Setup

AVERAGE FREQUENCY DWELL TIME TEST

FCC Part 15.247(a)(1)(iii) Average Frequency Dwell Time Results

Test Input Power	3.7VDC	Temperature	20°C
Attached Plots	23 - 25	Relative Humidity	55%
Hopping Rate	1600 hops / s	Atmospheric Pressure	1030mbar
Number of Hopping Channels	79 channels	Tested By	Xu Quanqiang
EUT	Bluetooth Dongle		

Channel	Channel Frequency (GHz)	Average Frequency Dwell Time (s)	Average Occupancy Limit (s)
0	2.402	0.200208	0.4
39	2.441	0.200208	0.4
78	2.480	0.200208	0.4

Test Input Power	12VDC	Temperature	20°C
Attached Plots	26 - 28	Relative Humidity	55%
Hopping Rate	1600 hops / s	Atmospheric Pressure	1030mbar
Number of Hopping Channels	79 channels	Tested By	Xu Quanqiang
EUT	Handsfree Bluetooth Receiver		

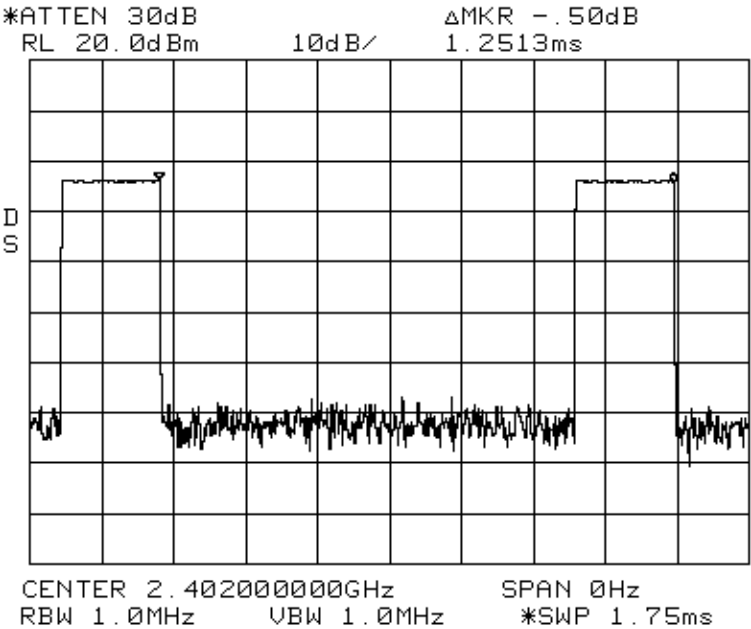
Channel	Channel Frequency (GHz)	Average Frequency Dwell Time (s)	Average Occupancy Limit (s)
0	2.402	0.200208	0.4
39	2.441	0.199728	0.4
78	2.480	0.200208	0.4

Notes

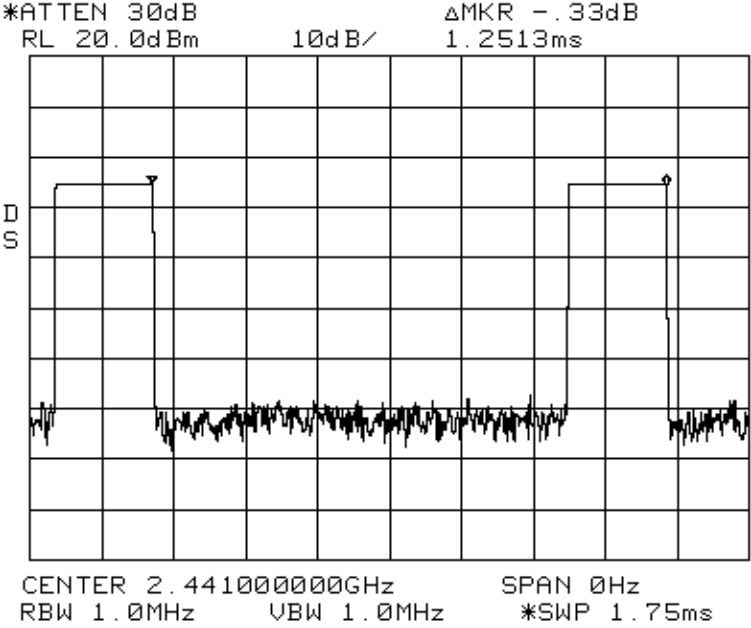
1. The EUT operates based on 1-slot transmission and 1-slot reception basis. As such, there are [$1600 / (1 + 1)$] transmissions per second and the time occupancy per channel is [measured time slot length / 2].
2. Average Frequency Dwell Time = [measured time slot length / 2 x hopping rate / 2 / number of hopping channels] x [0.4 x number of hopping channels]

AVERAGE FREQUENCY DWELL TIME TEST

Average Frequency Dwell Time Plots - Bluetooth Dongle



Plot 23 – Channel 0

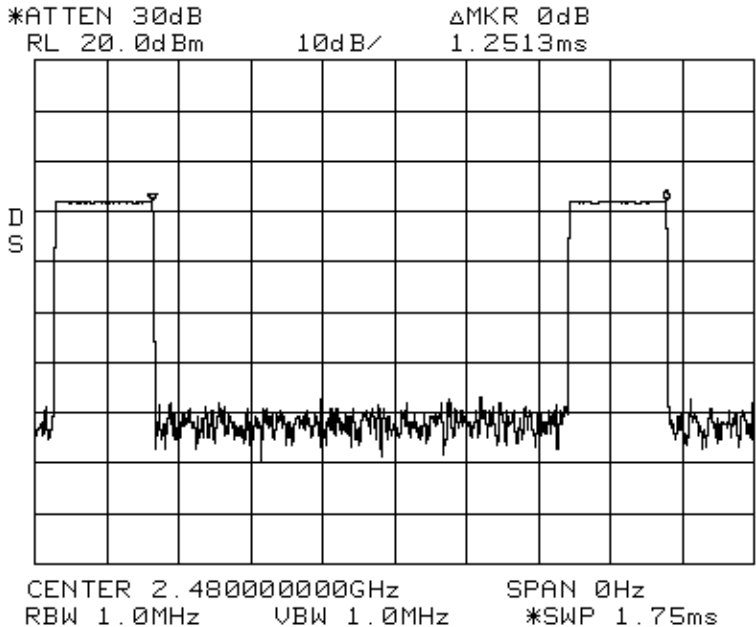


Plot 24 – Channel 39



AVERAGE FREQUENCY DWELL TIME TEST

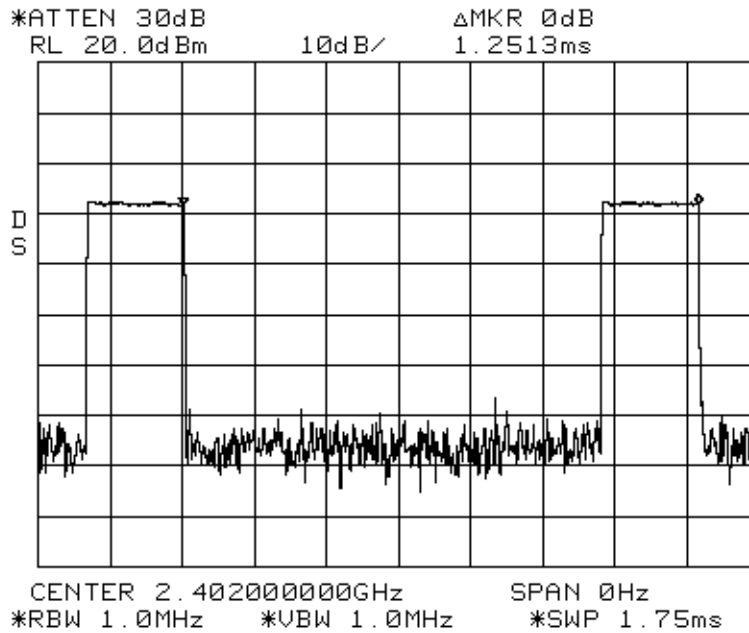
Average Frequency Dwell Time Plots - Bluetooth Dongle



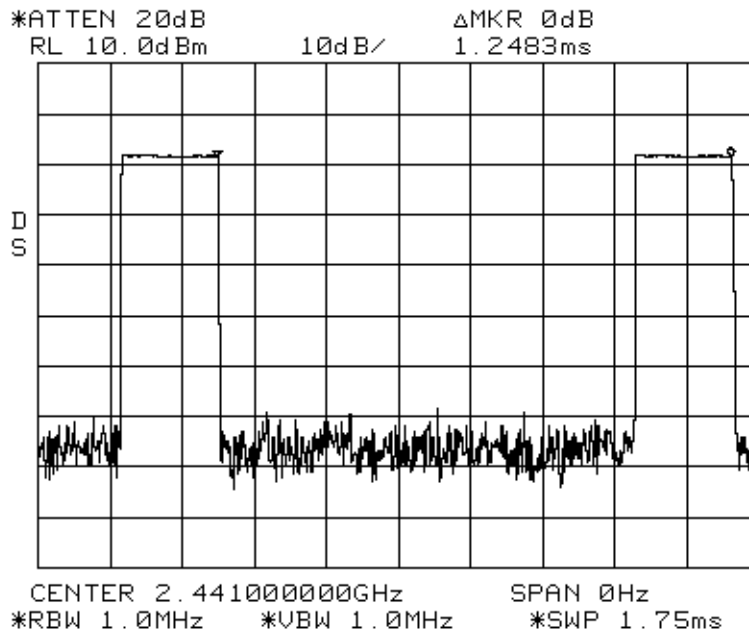
Plot 25 – Channel 78

AVERAGE FREQUENCY DWELL TIME TEST

Average Frequency Dwell Time Plots - Handsfree Bluetooth Receiver



Plot 26 – Channel 0

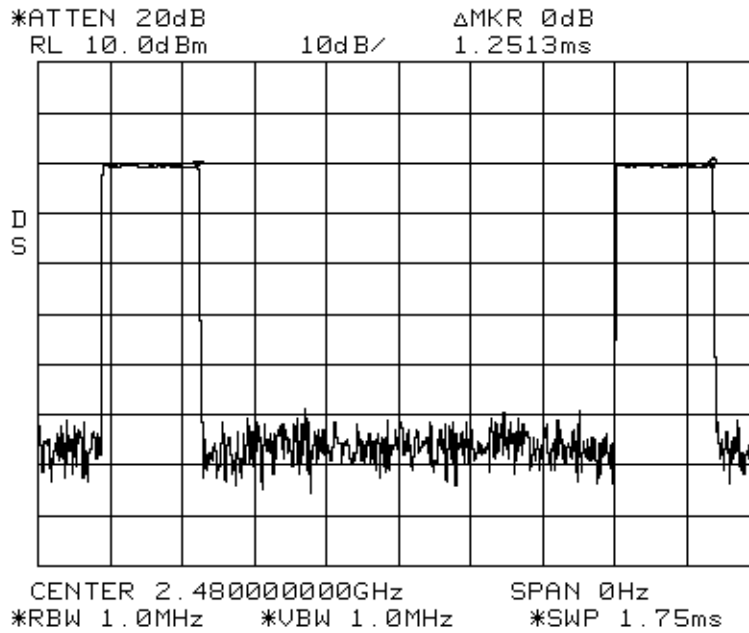


Plot 27 – Channel 39



AVERAGE FREQUENCY DWELL TIME TEST

Average Frequency Dwell Time Plots - Handsfree Bluetooth Receiver



Plot 28 – Channel 78

MAXIMUM PEAK POWER TEST

FCC Part 15.247(b)(1) Maximum Peak Power Limits

The EUT shows compliance to the requirements of this section, which states the EUT employing at least 75 non-overlapping hopping channels shall not exceed 1W (30dBm). For the EUT employs other frequency hopping systems, the peak power shall not greater than 0.125W (21dBm).

FCC Part 15.247(b)(1) Maximum Peak Power Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007
R&S Universal Radio Communication Tester	CMU 200	837587/068	24 Mar 2007

FCC Part 15.247(b)(1) Maximum Peak Power Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the Universal Radio Communication Tester, which set into power analyser mode via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(b)(1) Maximum Peak Power Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, non-hopping with transmitting frequency at Channel 0 (2.402GHz).
2. The maximum peak power of the transmitting frequency was detected and recorded.
3. The step 2 was repeated with the transmitting frequency was set to Channel 39 (2.441GHz) and Channel 78 (2.480GHz) respectively.

MAXIMUM PEAK POWER TEST



Maximum Peak Power Test Setup

MAXIMUM PEAK POWER TEST

FCC Part 15.247(b)(1) Maximum Peak Power Results

Test Input Power	3.7VDC	Temperature	20°C
EUT	Bluetooth Dongle	Relative Humidity	55%
		Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

Channel	Channel Frequency (GHz)	Maximum Peak Power (W)	Limit (W)
0	2.402	0.0012	1
39	2.441	0.0011	1
78	2.480	0.0014	1

Test Input Power	12VDC	Temperature	20°C
EUT	Handsfree Bluetooth Receiver	Relative Humidity	55%
		Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

Channel	Channel Frequency (GHz)	Maximum Peak Power (W)	Limit (W)
0	2.402	0.0011	1
39	2.441	0.0012	1
78	2.480	0.0011	1

Notes

- Power analyser of Universal Radio Communication Tester was used for power measurement with peak detection as mode of measurement. The power analyser mode supports a wideband power measurement ranging from 100kHz to 2700MHz.



RF CONDUCTED SPURIOUS EMISSIONS TEST

FCC Part 15.247(d) RF Conducted Spurious Emissions Limits

The EUT shows compliance to the requirements of this section, which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

FCC Part 15.247(d) RF Conducted Spurious Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007

FCC Part 15.247(d) RF Conducted Spurious Emissions Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(d) RF Conducted Spurious Emissions Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, non-hopping with transmitting frequency at Channel 0 (2.402GHz).
2. The start and stop frequencies of the spectrum analyser were set to 30MHz and 10GHz.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with frequency span was set from 10GHz to 25GHz.
5. The steps 2 to 4 were repeated with the transmitting frequency was set to Channel 39 (2.441GHz) and Channel 78 (2.480GHz) respectively.

RF CONDUCTED SPURIOUS EMISSIONS TEST



RF Conducted Spurious Emissions Test Setup

FCC Part 15.247(d) RF Conducted Spurious Emissions Results

Test Input Power	3.7VDC	Temperature	20°C
Attached Plots	29 – 34	Relative Humidity	55%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

All spurious signals found were below the specified limit. Please refer to the attached plots.

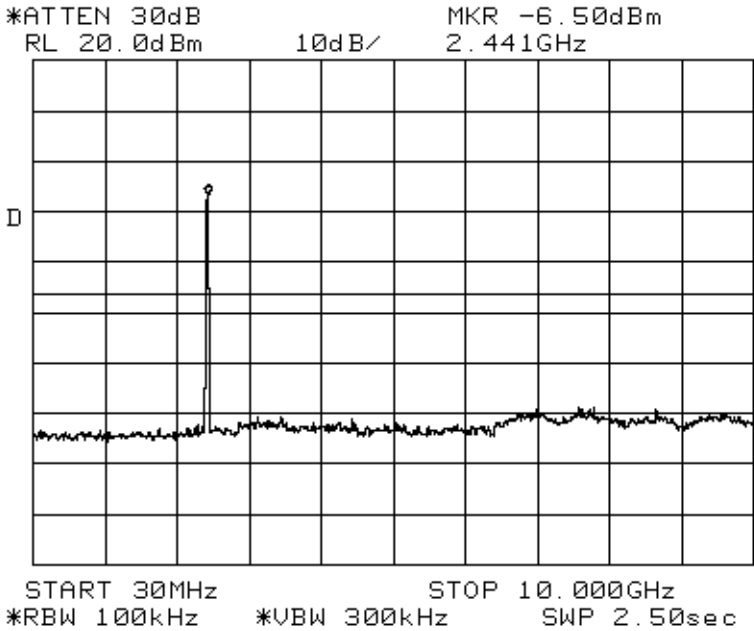
Test Input Power	12VDC	Temperature	20°C
Attached Plots	35 – 40	Relative Humidity	55%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

All spurious signals found were below the specified limit. Please refer to the attached plots.

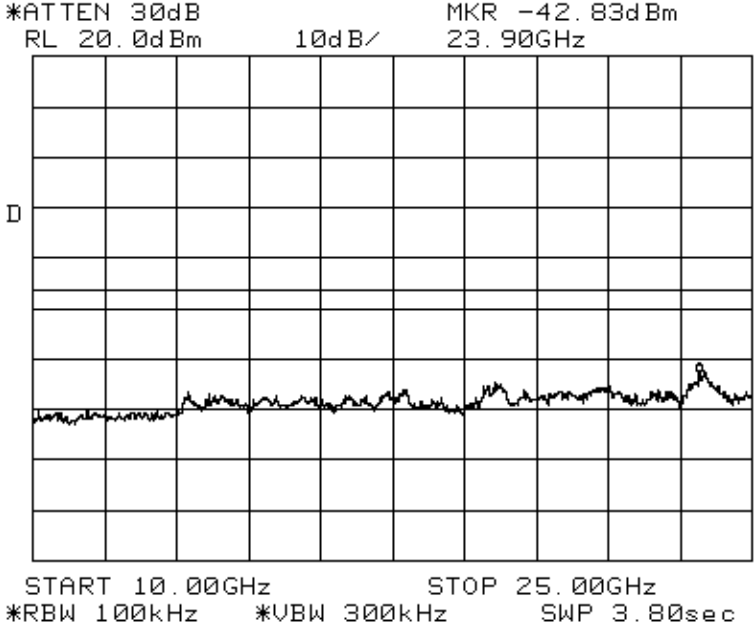


RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots - Bluetooth Dongle



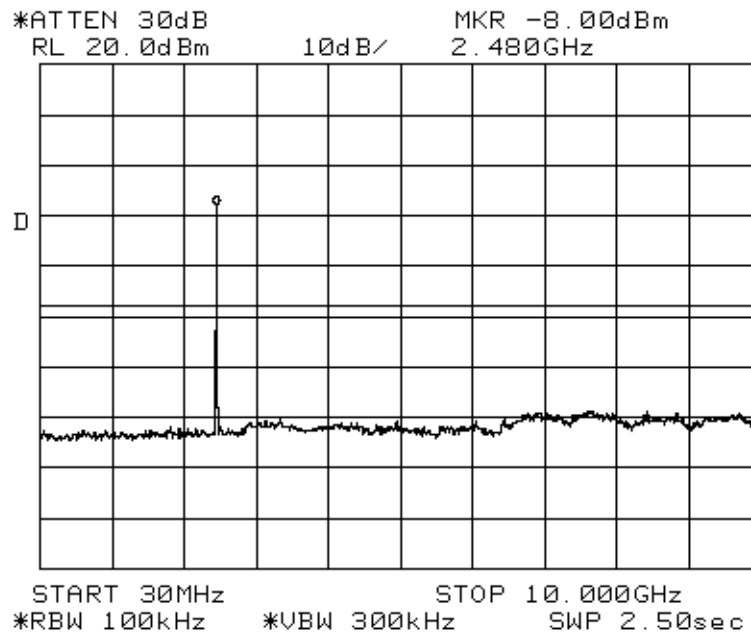
Plot 31 - Channel 39



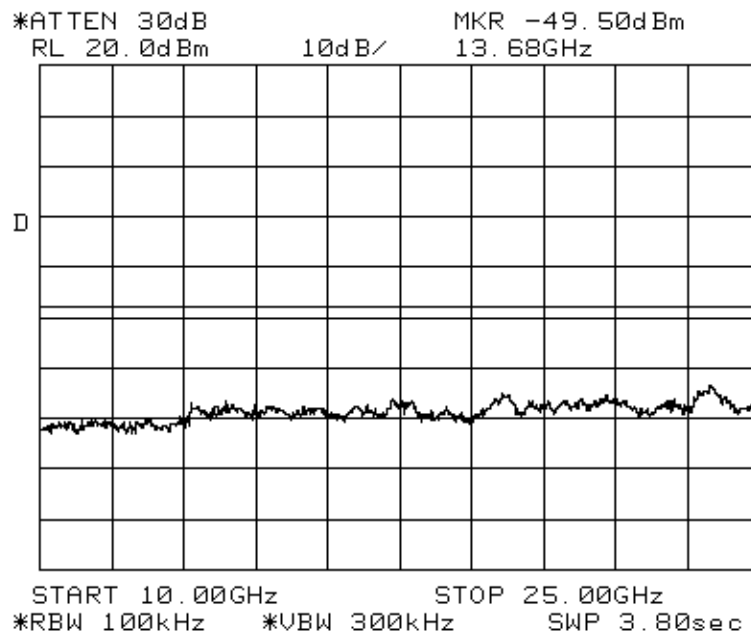
Plot 32 - Channel 39

RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots - Bluetooth Dongle



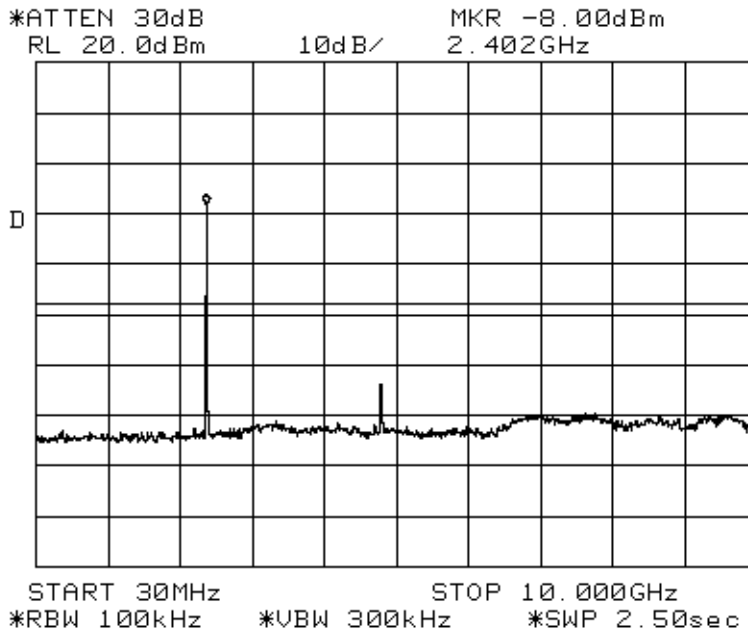
Plot 33 – Channel 78



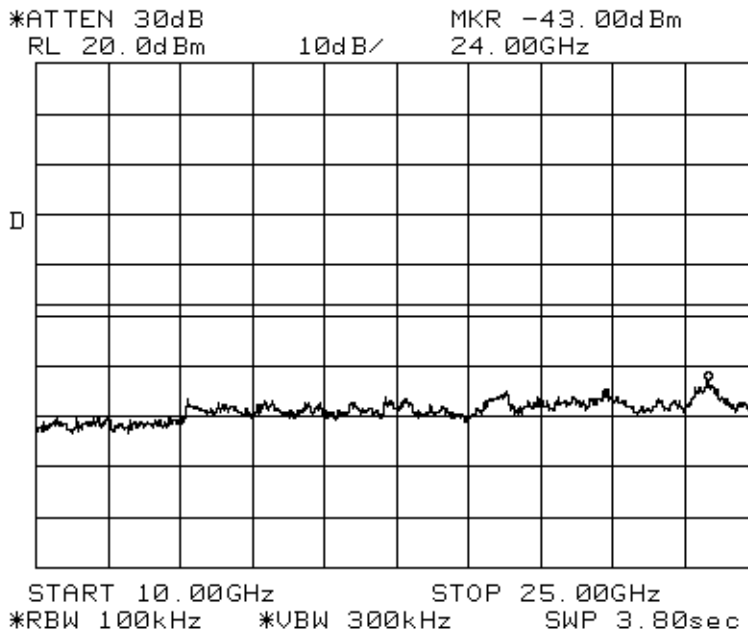
Plot 34 – Channel 78

RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots - Handsfree Bluetooth Receiver



Plot 35 - Channel 0

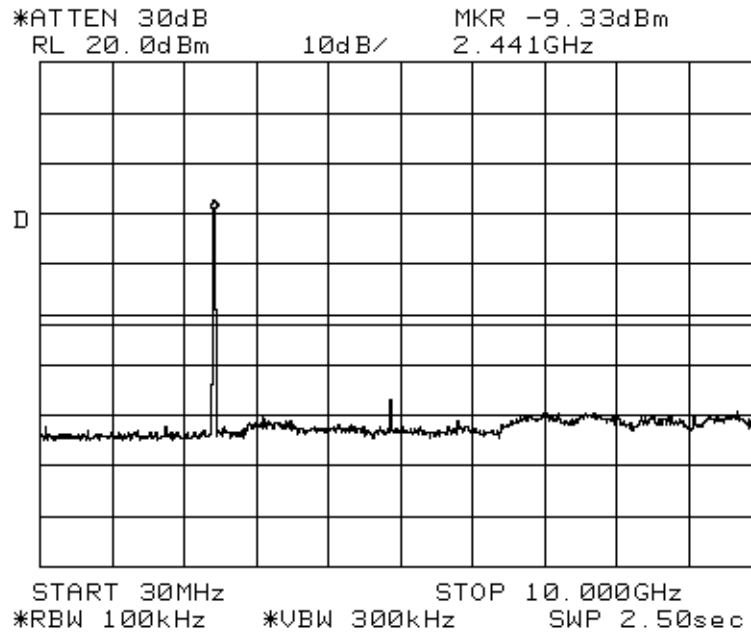


Plot 36 - Channel 0

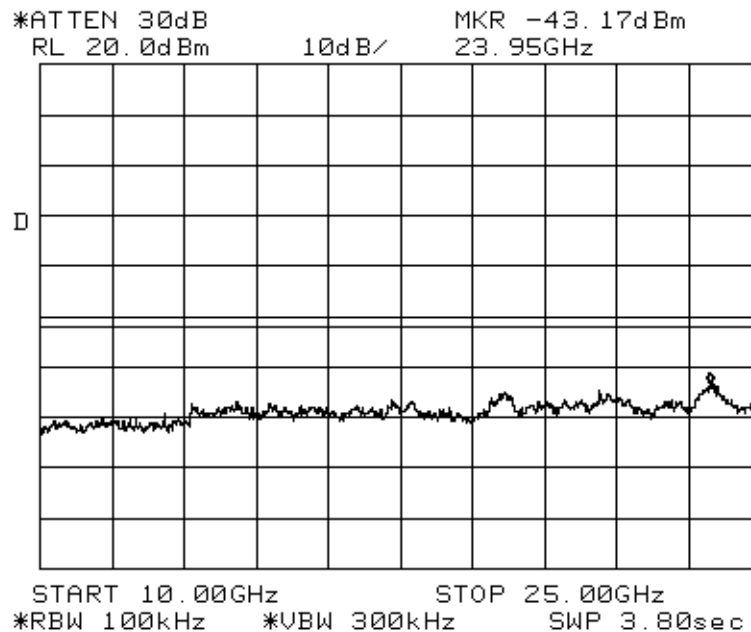


RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots - Handsfree Bluetooth Receiver



Plot 37 – Channel 39

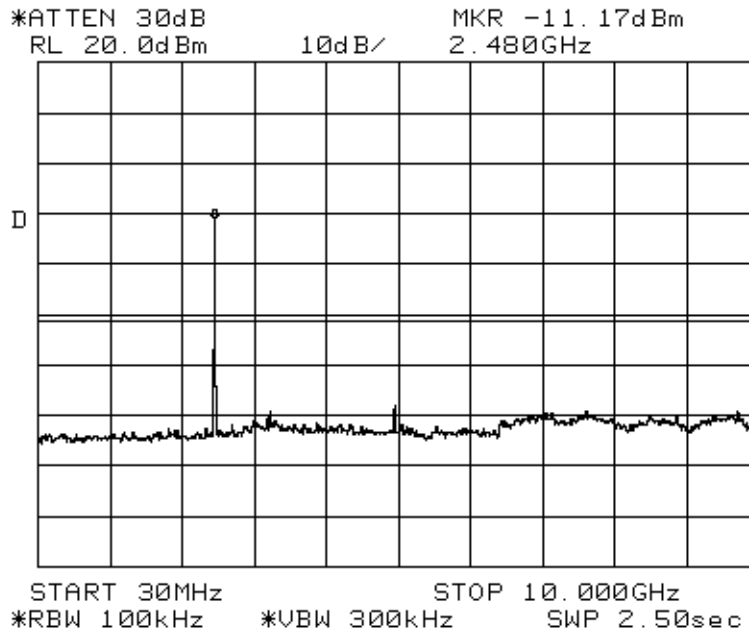


Plot 38 – Channel 39

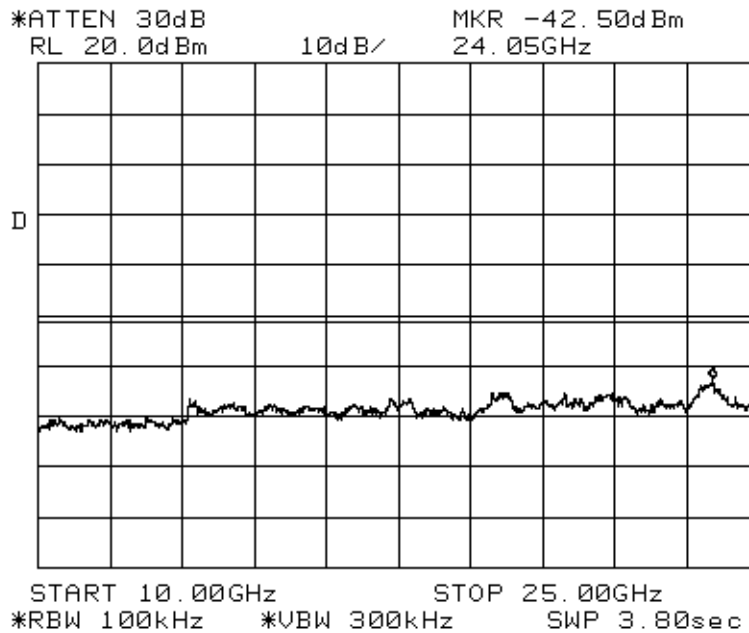


RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots - Handsfree Bluetooth Receiver



Plot 39 – Channel 78



Plot 40 – Channel 78



BAND EDGE COMPLIANCE (CONDUCTED) TEST

FCC Part 15.247(d) Band Edge Compliance (Conducted) Limits

The EUT shows compliance to the requirements of this section, which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

FCC Part 15.247(d) Band Edge Compliance (Conducted) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007

FCC Part 15.247(d) Band Edge Compliance (Conducted) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(d) Band Edge Compliance (Conducted) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with frequency hopping sequence on.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band, 2.400GHz and any spurious emissions at the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the transmission band, 2.4835GHz and the any spurious emissions at the band-edge.

BAND EDGE COMPLIANCE (CONDUCTED) TEST



Band Edge Compliance (Conducted) Test Setup

FCC Part 15.247(d) Band Edge Compliance (Conducted) Results

Test Input Power	3.7VDC	Temperature	20°C
Attached Plots	41 – 42	Relative Humidity	55%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

No significant signal was found and they were below the specified limit.

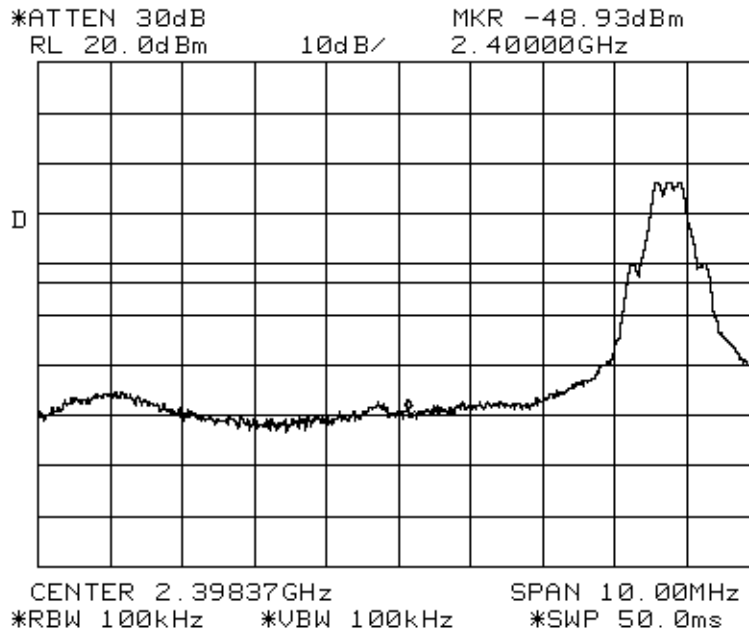
Test Input Power	12VDC	Temperature	20°C
Attached Plots	43 – 44	Relative Humidity	55%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

No significant signal was found and they were below the specified limit.

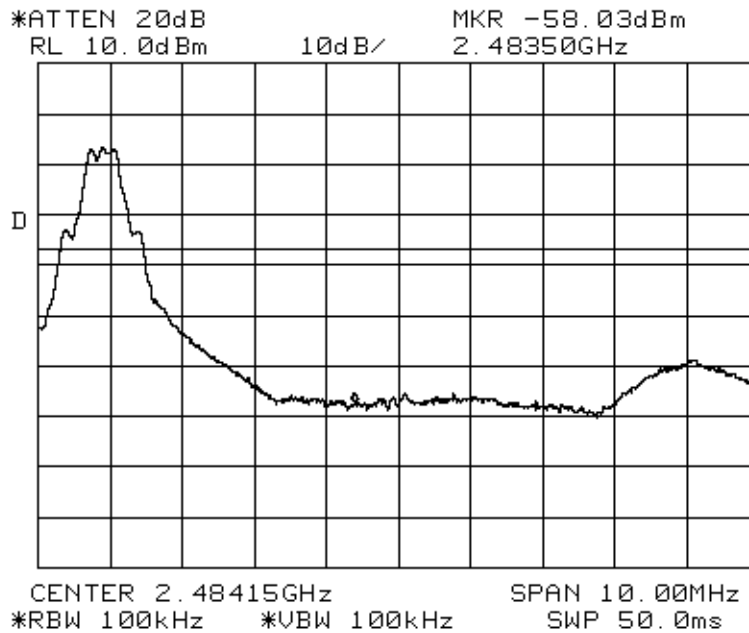


BAND EDGE COMPLIANCE (CONDUCTED) TEST

Band Edge Compliance (Conducted) Plots - Bluetooth Dongle



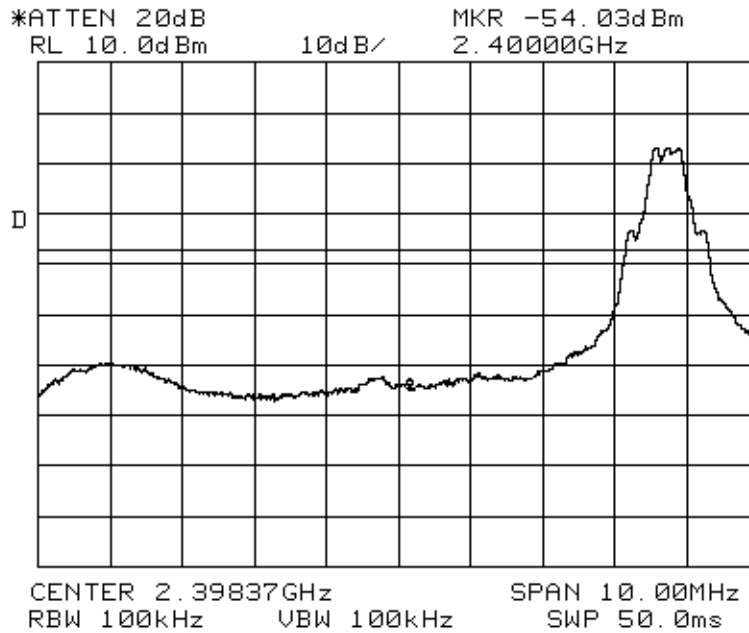
Plot 41 – Lower Band Edge at 2.4000GHz



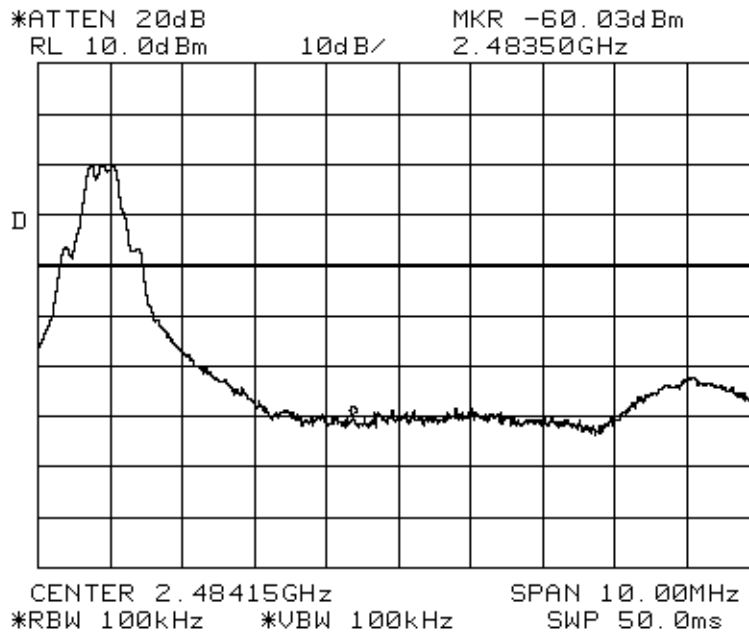
Plot 42 – Upper Band Edge at 2.4835GHz

BAND EDGE COMPLIANCE (CONDUCTED) TEST

Band Edge Compliance (Conducted) Plots - Handsfree Bluetooth Receiver



Plot 43 – Lower Band Edge at 2.4000GHz



Plot 44 – Upper Band Edge at 2.4835GHz

BAND EDGE COMPLIANCE (RADIATED) TEST

FCC Part 15.247(d) Band Edge Compliance (Radiated) Limits

The EUT shows compliance to the requirements of this section, which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power. In addition, radiated emissions which fall in the restricted bands shall comply to the radiated emission limits specified in 15.209.

FCC Part 15.247(d) Band Edge Compliance (Radiated) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz-26.5GHz) – ESMI3	ESMI	829214/005 829550/004	04 Oct 2007
Schaffner Pre-Amplifier	CPA9231A	3422	01 Apr 2007
MITEQ Preamplifier (0.1-26.5GHz) – PA11	NSP2650-N	728231	01 Apr 2007
Schaffner Bilog Antenna –BL3	CBL6112B	2549	12 May 2007
EMCO Horn Antenna – H14	3115	0003-6087	19 May 2007
Bandstop Filter (2.4-2.5 GHz)	BRM50701	017	04 Sep 2007

FCC Part 15.247(d) Band Edge Compliance (Radiated) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz to show compliance of spurious at band edges are at least 20dB below the carriers. For restricted band spurious at band edges, peak and average measurement plots were taken using the following setting:
 - a. Peak Plot:
RBW = VBW = 1MHz
 - b. Average Plot
RBW = 1MHz, VBW = 10Hz
4. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(d) Band Edge Compliance (Radiated) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with frequency hopping sequence on.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band, 2.400GHz and any spurious emissions at the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the transmission band, 2.4835GHz and the any spurious emissions at the band-edge.

BAND EDGE COMPLIANCE (RADIATED) TEST



Band Edge Compliance (Radiated) Test Setup

FCC Part 15.247(d) Band Edge Compliance (Radiated) Results

Test Input Power	3.7VDC	Temperature	22°C
Attached Plots	45 - 50	Relative Humidity	58
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Kenneth Ler

No significant signal was found and they were below the specified limit.

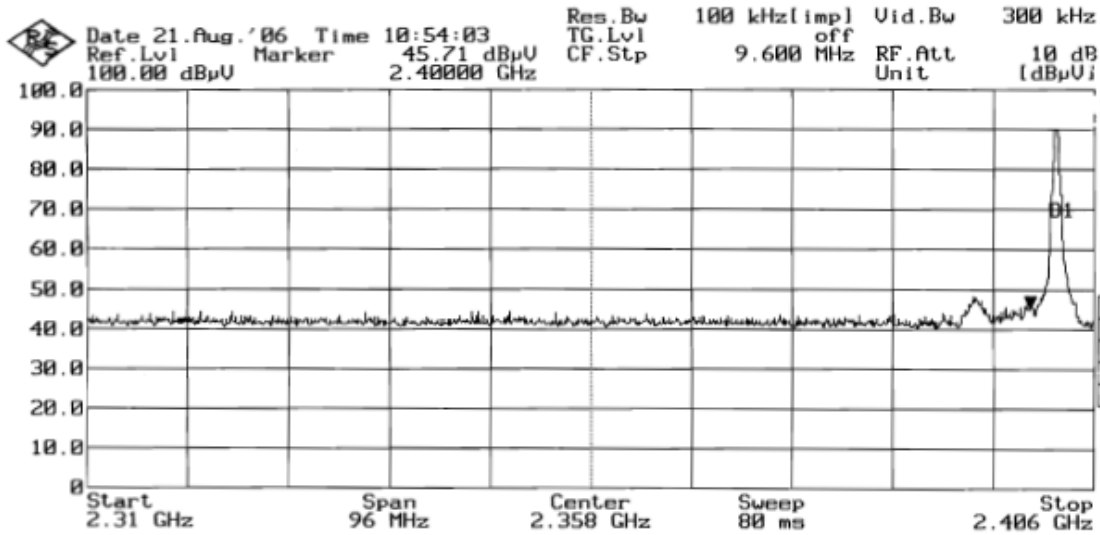
Test Input Power	12VDC	Temperature	23°C
Attached Plots	51 - 56	Relative Humidity	56%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Zechs Ng Chee Siong

No significant signal was found and they were below the specified limit.

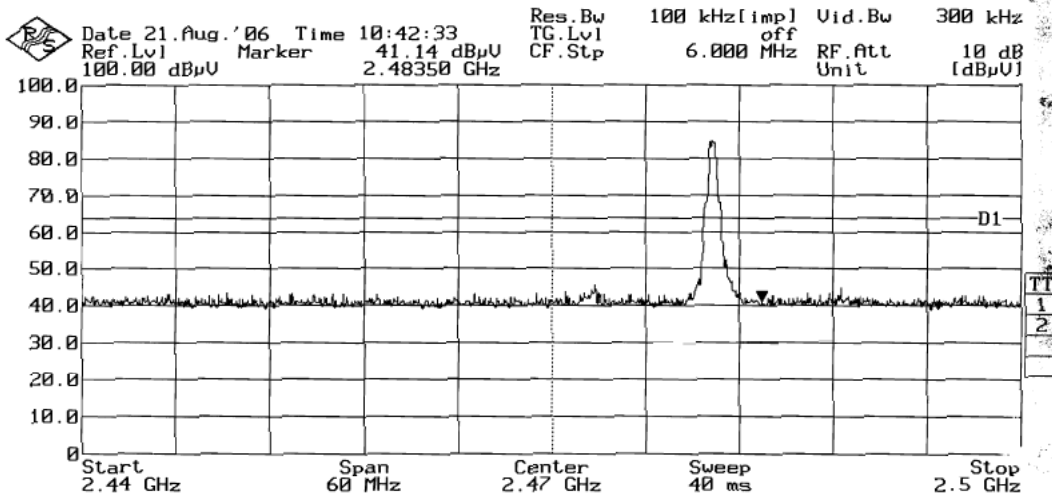


BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (20dB Delta from Carrier at Band Edge) - Bluetooth Dongle



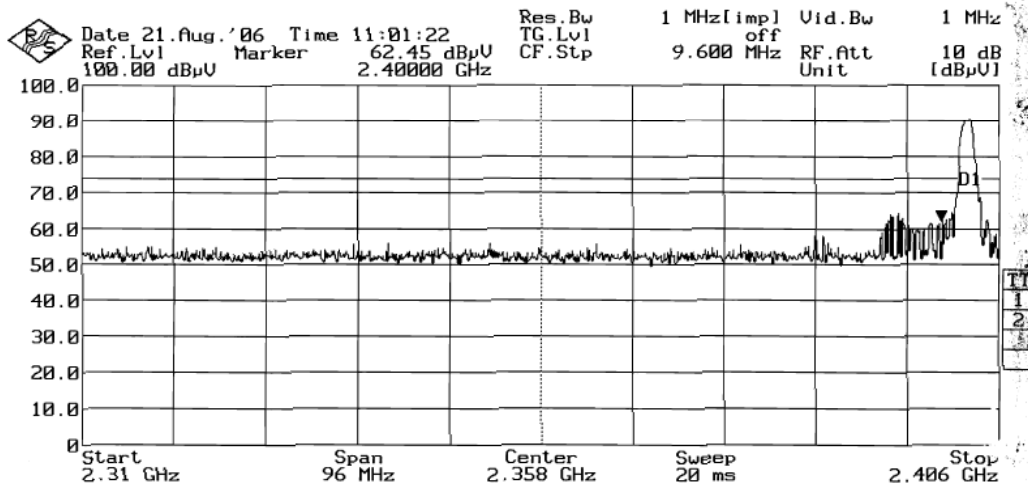
Plot 45 - Lower Band Edge at 2.4000GHz



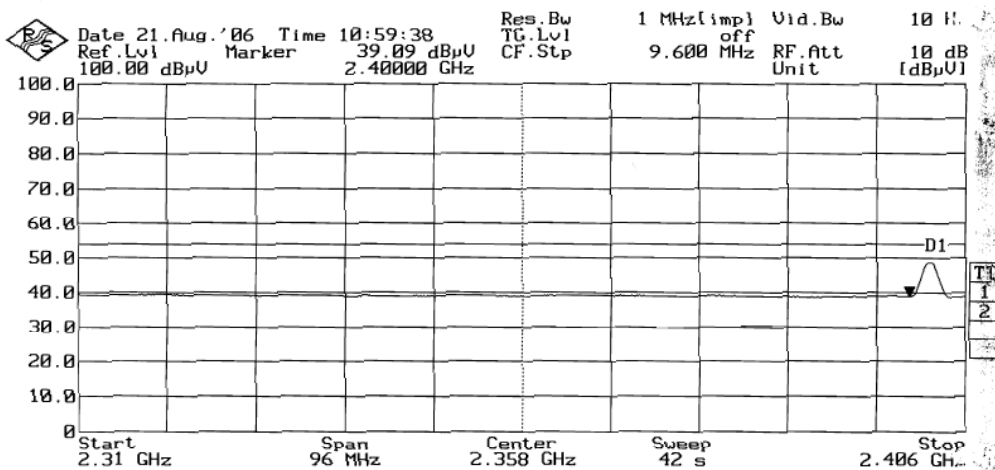
Plot 46 - Upper Band Edge at 2.4835GHz

BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (Restricted Band) - Bluetooth Dongle



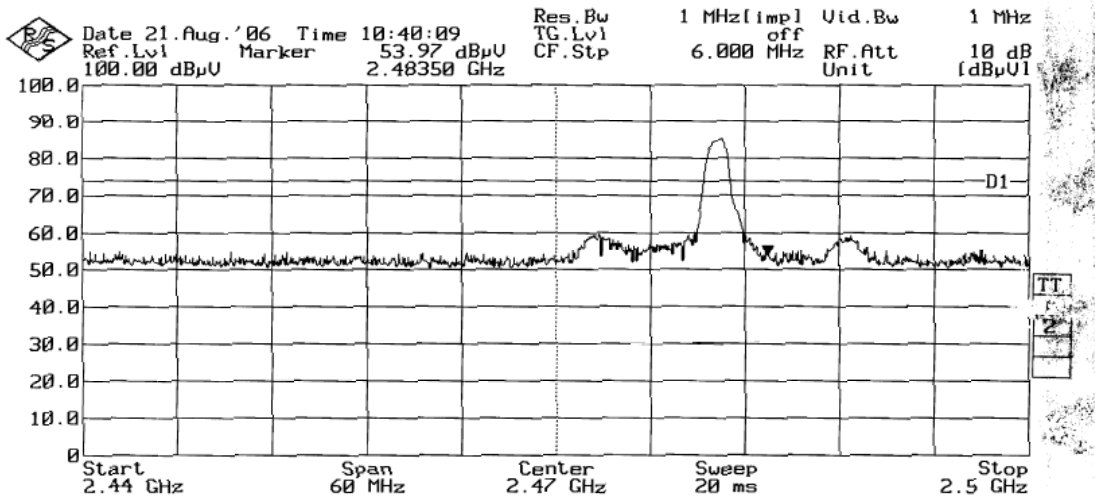
Plot 47 - Peak Plot at Lower Band Edge at 2.4000GHz



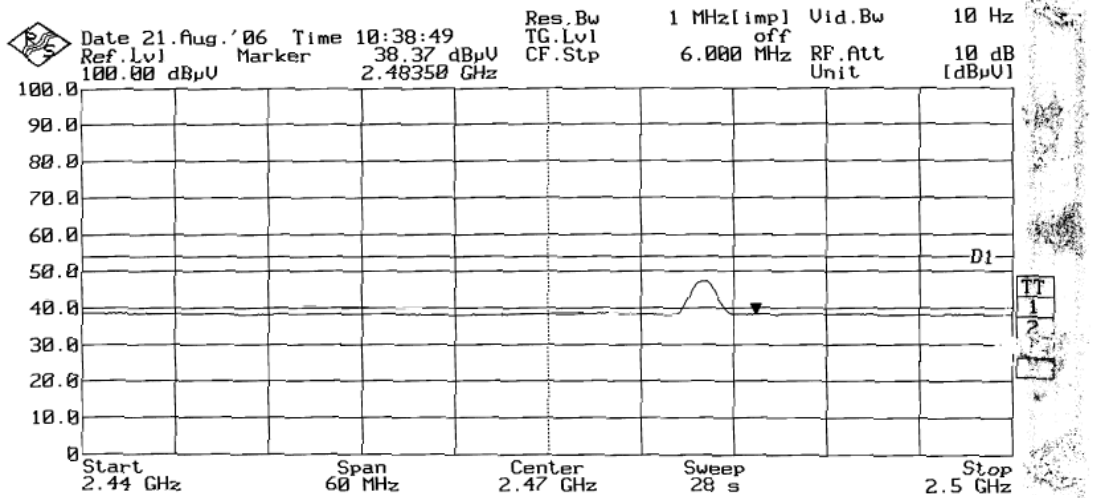
Plot 48 - Average Plot at Lower Band Edge at 2.4000GHz

BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (Restricted Band) - Bluetooth Dongle



Plot 49 - Peak Plot at Upper Band Edge at 2.4835GHz

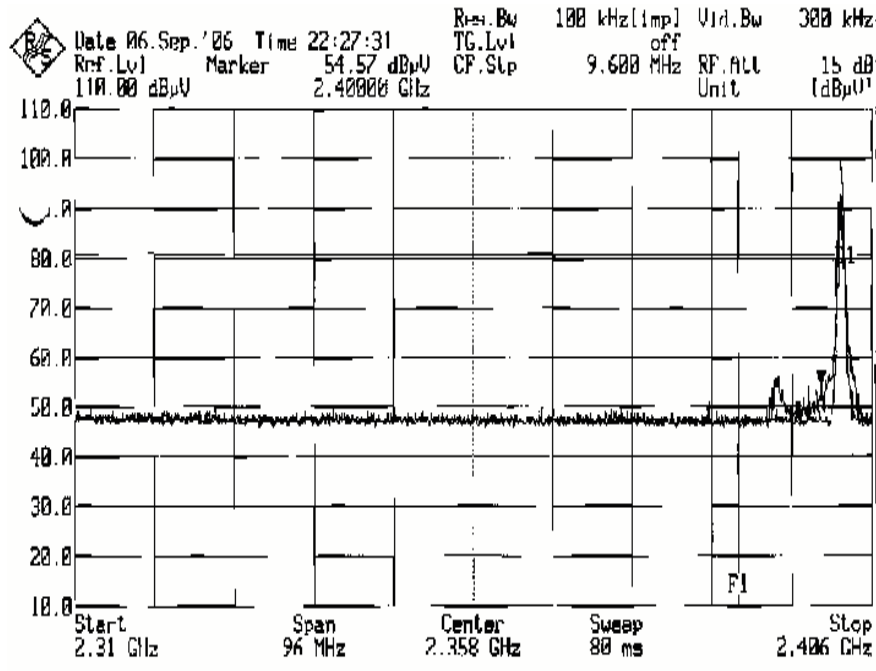


Plot 50 - Average Plot at Upper Band Edge at 2.4835GHz

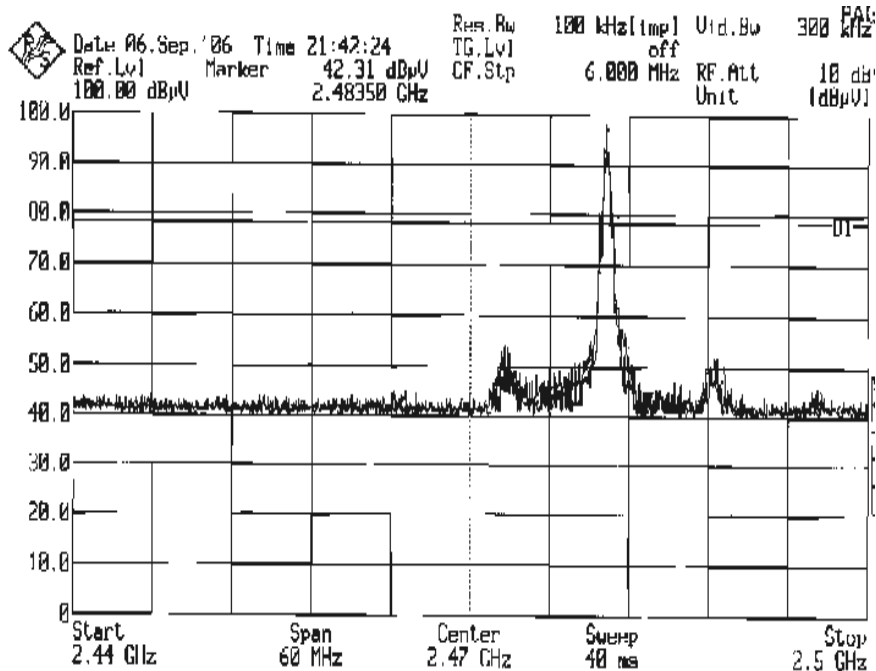


BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (20dB Delta from Carrier at Band Edge) - Handsfree Bluetooth Receiver



Plot 51 – Lower Band Edge at 2.4000GHz

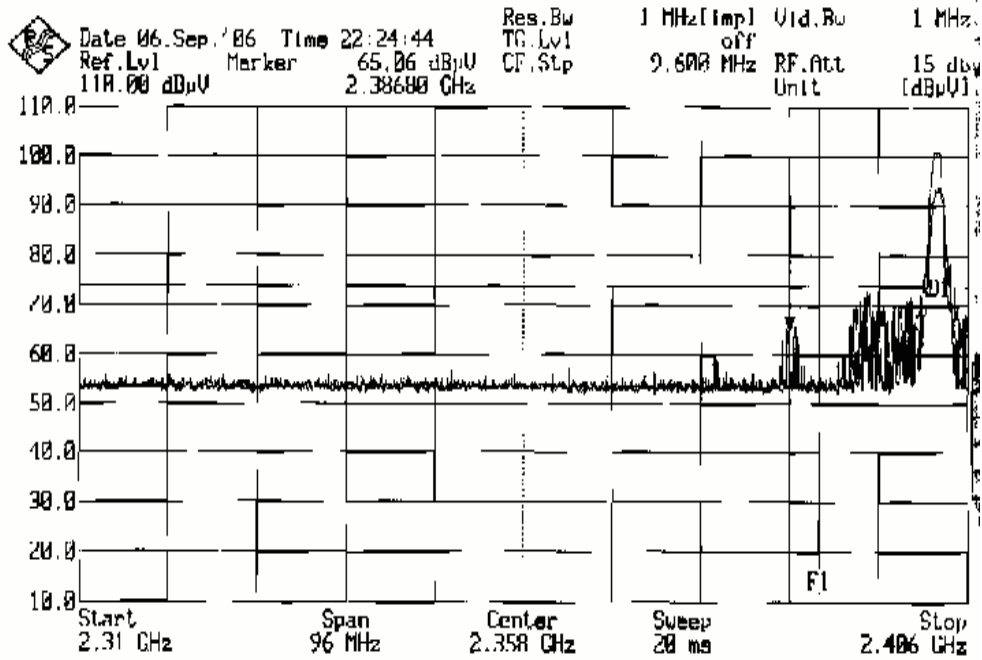


Plot 52 – Upper Band Edge at 2.4835GHz

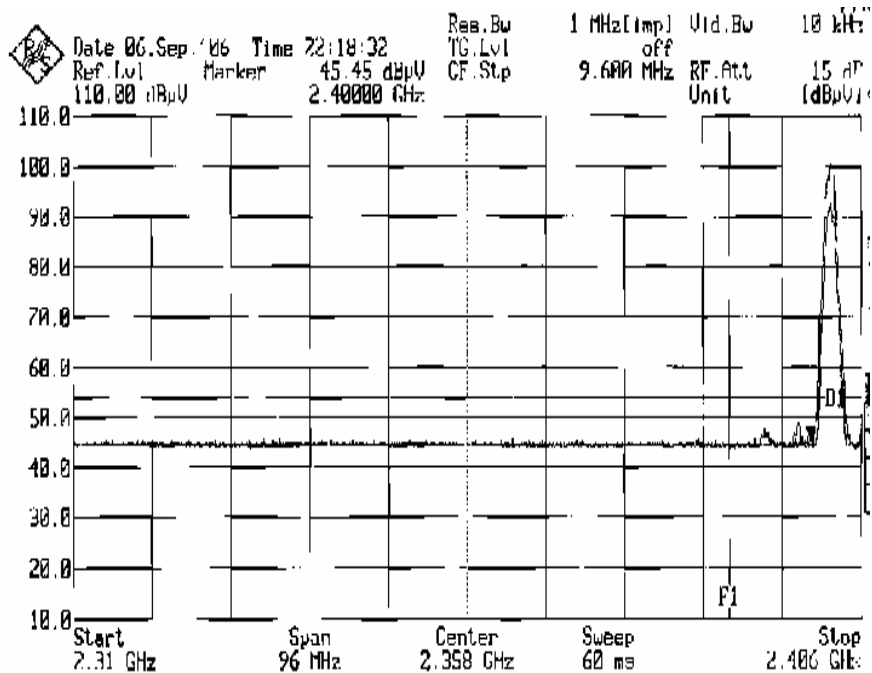


BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (Restricted Band) - Handsfree Bluetooth Receiver



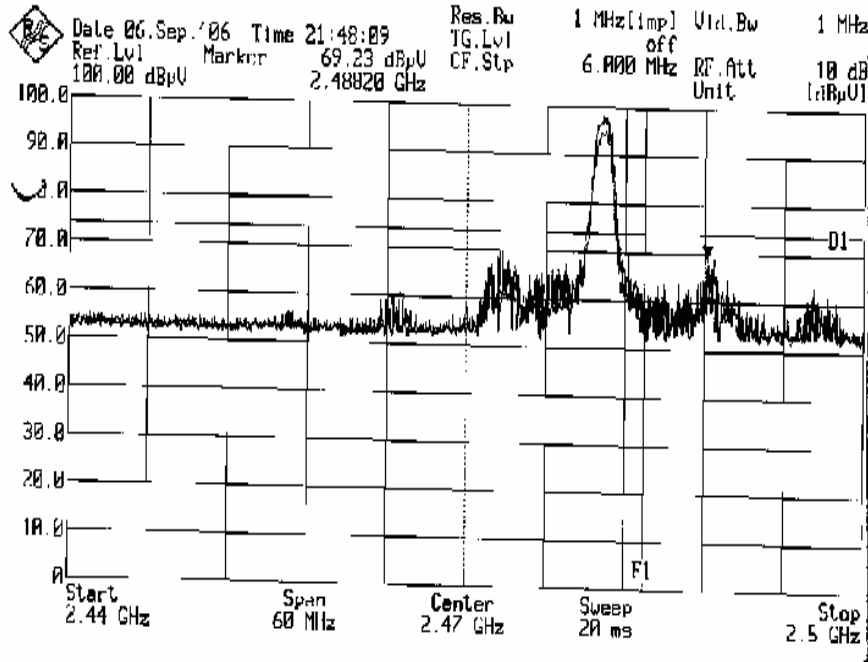
Plot 53 – Peak Plot at Lower Band Edge at 2.400GHz



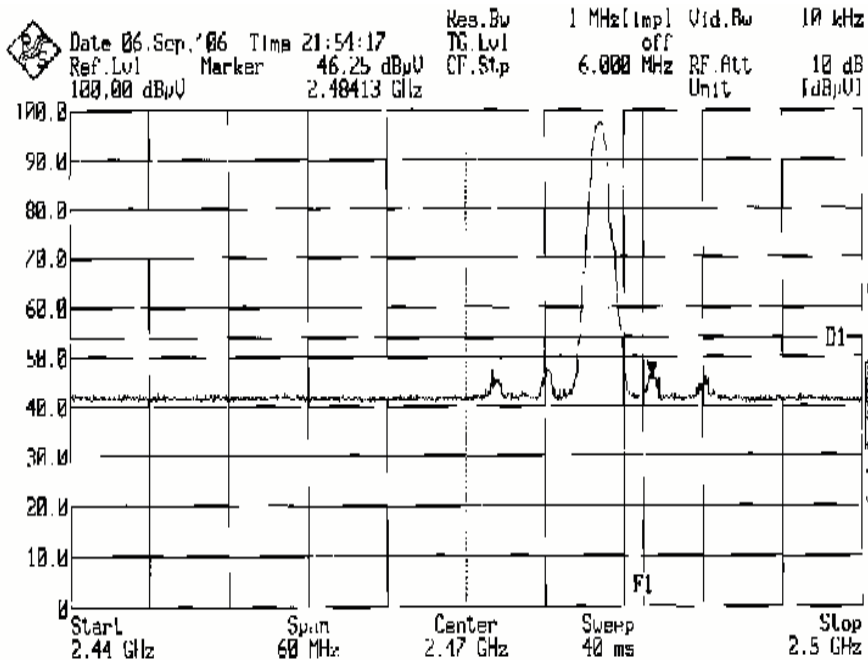
Plot 54 – Average Plot at Lower Band Edge at 2.400GHz

BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (Restricted Band) - Handsfree Bluetooth Receiver



Plot 55 – Peak Plot at Upper Band Edge at 2.4835GHz



Plot 56 – Average Plot at Upper Band Edge at 2.4835GHz

PEAK POWER SPECTRAL DENSITY TEST

FCC Part 15.247(e) Peak Power Spectral Density Limits

The EUT shows compliance to the requirements of this section, which states the peak power spectral density conducted from the intentional radiator (EUT) to the antenna shall not be greater than 8dBm (6.3mW) in any 3kHz band during any time interval of continuous transmission.

FCC Part 15.247(e) Peak Power Spectral Density Test Instrumentation

Instrument	Model	S/No	Cal Due Date
HP Spectrum Analyzer	8564E	3846A01433	08 Apr 2007
R&S Universal Radio Communication Tester	CMU 200	837587/068	24 Mar 2007

FCC Part 15.247(e) Peak Power Spectral Density Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 3kHz and 10kHz.
5. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.247(e) Peak Power Spectral Density Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, non-hopping with transmitting frequency at Channel 0 (2.402GHz).
2. The sweep time of the spectrum analyser was set to the value of the ratio of the frequency span divided by the RBW.
3. The peak power density of the transmitting frequency was detected and recorded.
4. The step 3 was repeated with the transmitting frequency was set to Channel 39 (2.441GHz) and Channel 78 (2.480GHz) respectively.

PEAK POWER SPECTRAL DENSITY TEST



Peak Power Spectral Density Test Setup



PEAK POWER SPECTRAL DENSITY TEST

FCC Part 15.247(e) Peak Power Spectral Density Results

Test Input Power	3.7VDC	Temperature	20°C
Attached Plots	57 – 59	Relative Humidity	55%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

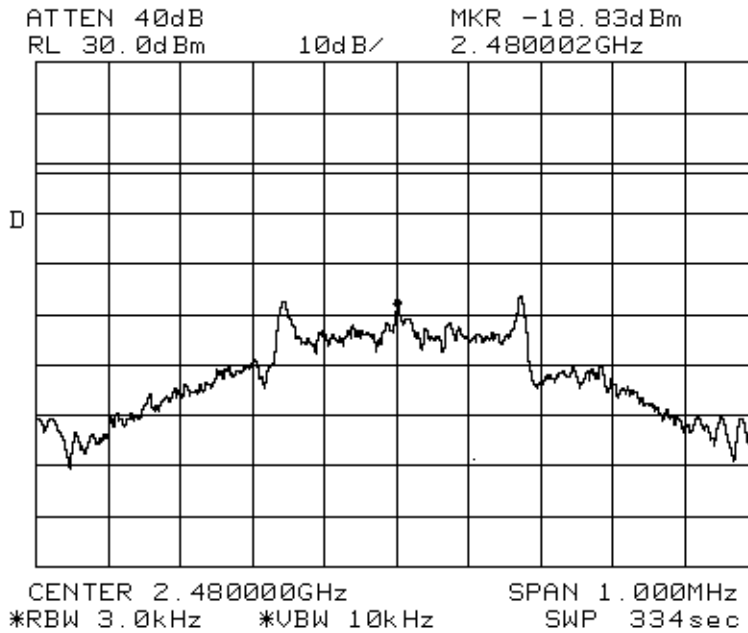
Channel	Channel Frequency (GHz)	Peak Power Spectral Density (mW)	Limit (mW)
0	2.402	0.030	6.3
39	2.441	0.017	6.3
78	2.480	0.013	6.3

Test Input Power	12VDC	Temperature	20°C
Attached Plots	60 – 62	Relative Humidity	55%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

Channel	Channel Frequency (GHz)	Peak Power Spectral Density (mW)	Limit (mW)
0	2.402	0.010	6.3
39	2.441	0.006	6.3
78	2.480	0.007	6.3

PEAK POWER SPECTRAL DENSITY TEST

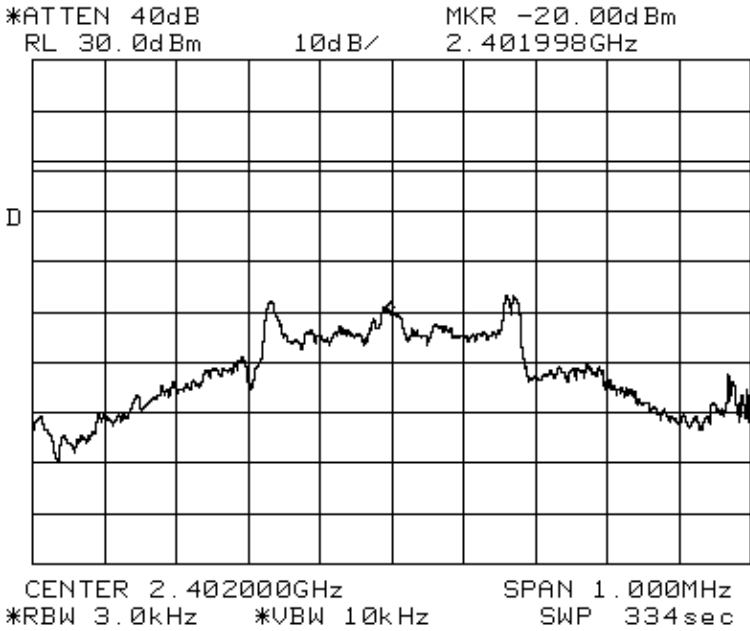
Peak Power Spectral Density Plots - Bluetooth Dongle



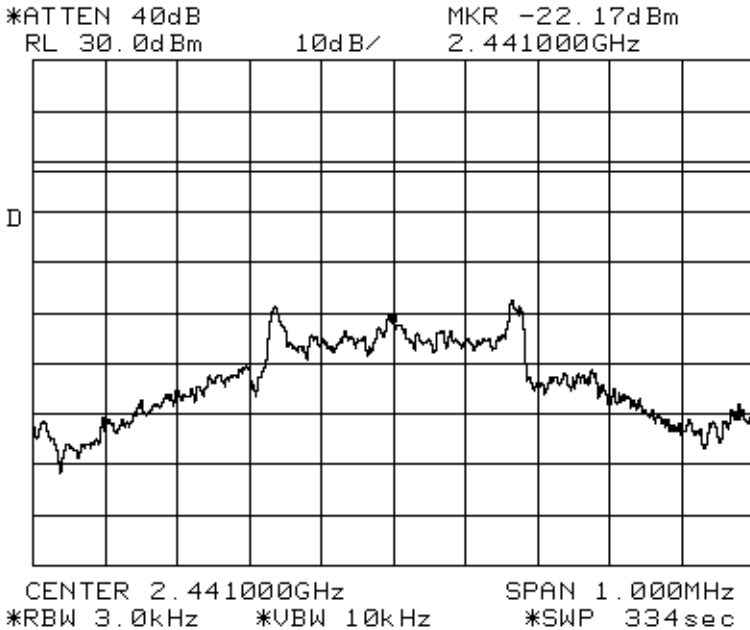
Plot 59 – Channel 78

PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots - Handsfree Bluetooth Receiver



Plot 60 – Channel 0

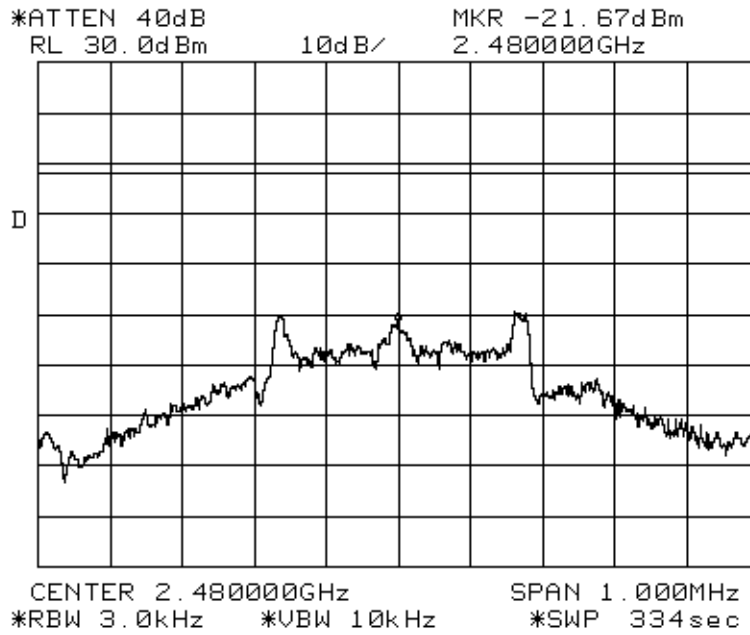


Plot 61 – Channel 39



PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots - Handsfree Bluetooth Receiver



Plot 62 – Channel 78

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Limits

The EUT shows compliance to the requirements of this section, which states the MPE limits for general population / uncontrolled exposure are as shown below:

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (min)
0.3 - 1.34	614	1.63	100 ^{Note 2}	30
1.34 - 30	824 / f	2.19 / f	180 / f ² ^{Note 2}	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f / 1500	30
1500 - 100000	-	-	1.0	30
Notes				
1. f = frequency in MHz				
2. Plane wave equivalent power density				

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
PMM 8053 Portable Field Meter	8053	0220J10308	17 Apr 2007
PMM Electric and Magnetic Field Analyzer	EHP-50A	1311L10515	17 Apr 2007

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Test Setup

1. The EUT and supporting equipment were set up as shown on the setup photo.
2. The relevant field probe was positioned at least 20cm away from the EUT and supporting equipment boundary.

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was first carried out at one of the positions / sides of the EUT.
3. Power density measurement (mW/cm²) was made using the field meter set to the required averaging time.
4. Steps 2 and 3 were repeated for the next position and its associate EUT operating mode, until all possible positions and modes were measured.

Sample Calculation Example

<p>At 2400 MHz, limit = 1.0 mW/cm²</p> <p>Power density reading obtained directly from field meter = 0.3 mW/cm² averaged over the required 30 minutes.</p> <p>Therefore, margin = 0.3 – 1.0 = -0.7 mW/cm² i.e. 0.7 mW/cm² below limit</p>

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST



Maximum Permissible Exposure (MPE) Test Setup



MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Results

Test Input Power	3.7VDC	Temperature	20°C
Test Distance	20cm	Relative Humidity	55%
EUT	Bluetooth Dongle	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

Channel	Channel Frequency (GHz)	Power Density Value (mW/cm ²)	Margin (mW/cm ²)	Averaging Time (min)	Limit (mW/cm ²)
0	2.402	0.0001	-0.9999	30	1.0
39	2.441	0.0001	-0.9999	30	1.0
78	2.480	0.0001	-0.9999	30	1.0

Test Input Power	12VDC	Temperature	20°C
Test Distance	20cm	Relative Humidity	55%
EUT	Handsfree Bluetooth Receiver	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanqiang

Channel	Channel Frequency (GHz)	Power Density Value (mW/cm ²)	Margin (mW/cm ²)	Averaging Time (min)	Limit (mW/cm ²)
0	2.402	0.0001	-0.9999	30	1.0
39	2.441	0.0001	-0.9999	30	1.0
78	2.480	0.0001	-0.9999	30	1.0

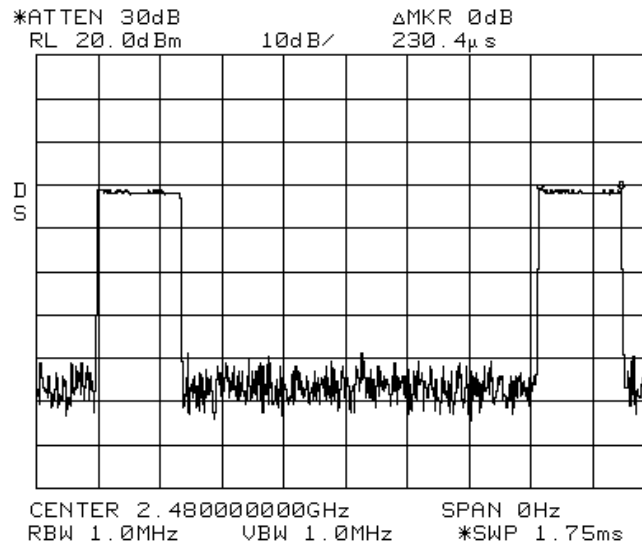
Notes

- All possible modes of operation were investigated. Only the worst case highest radiation levels were measured. Measurements were taken at the required averaging time. All other radiation levels were relatively insignificant.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 0.1MHz – 3GHz is ±15% .

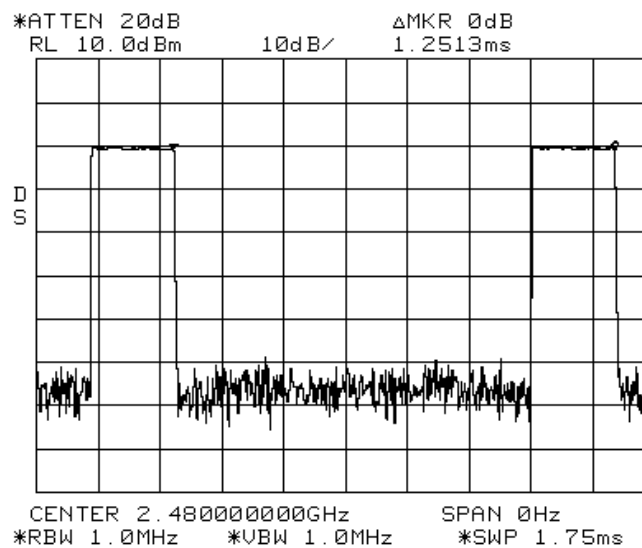
DUTY CYCLE FACTOR COMPUTATION

FCC Part 15.35(c) Duty Cycle Correction Factor

Handsfree Bluetooth Receiver



On Time



Period

Duty Cycle Factor (worst- case) = $20 \log [\text{Total On time} / \text{Period}]$
= $20 \log [(0.2304 / 1.2513)]$
= **-14.7dB**

Test Report No. 56S061141/02
dated 27 Dec 2006



This Report is issued under the following conditions:

1. Results of the testing/calibration in the form of a report will be issued immediately after the service has been completed or terminated.
2. Unless otherwise requested, a report shall contain only technical results. Analysis and interpretation of the results and professional opinion and recommendations expressed thereupon, if required, shall be clearly indicated and additional fee paid for, by the Client.
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October 2006



ANNEX A

EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR BLUETOOTH DONGLE



Front View



Rear View

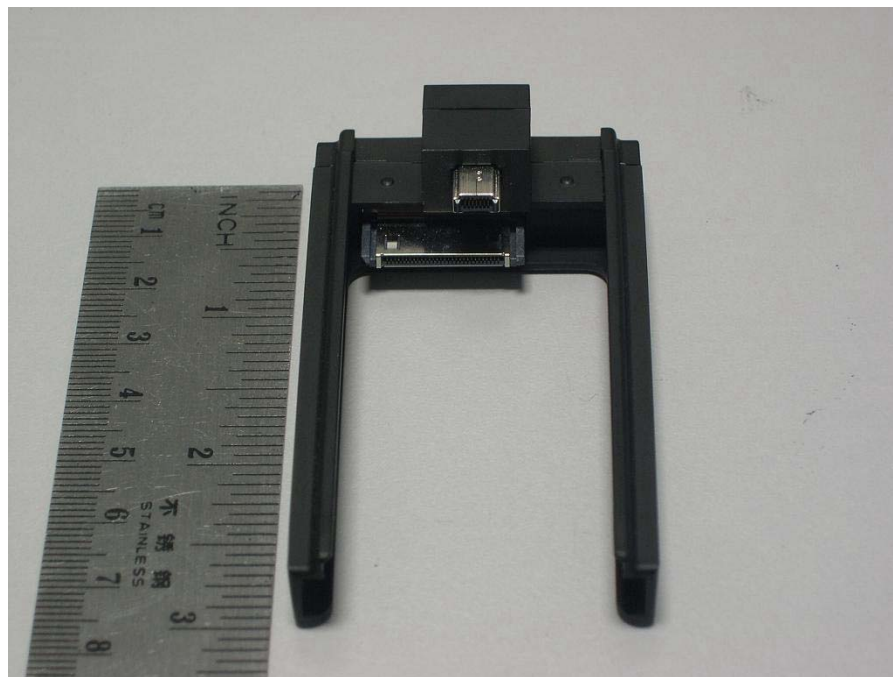
EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR BLUETOOTH DONGLE



Front View

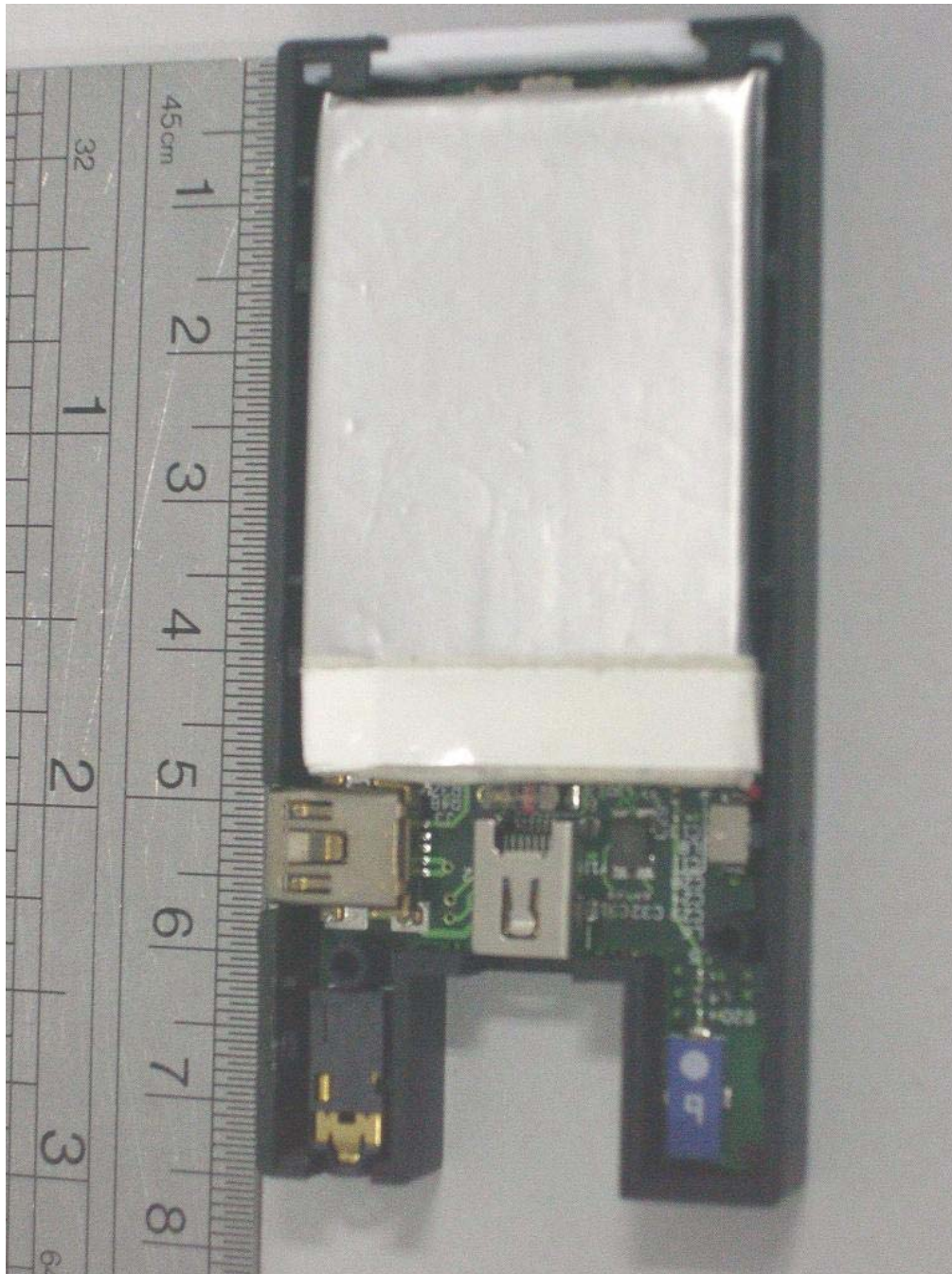


Rear View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR BLUETOOTH DONGLE

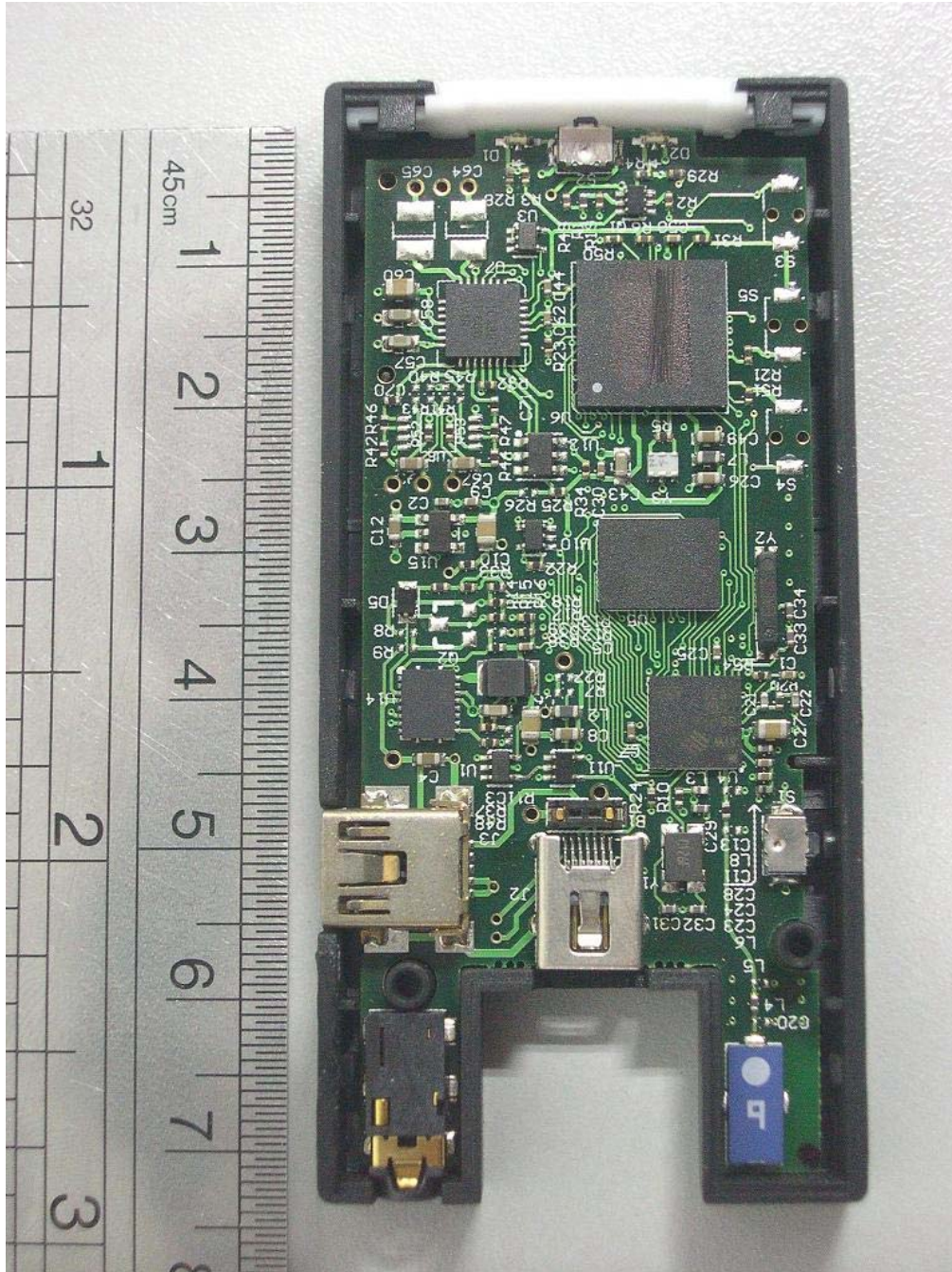


EUT Internal View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR BLUETOOTH DONGLE



Main-Board - PCB Component Side

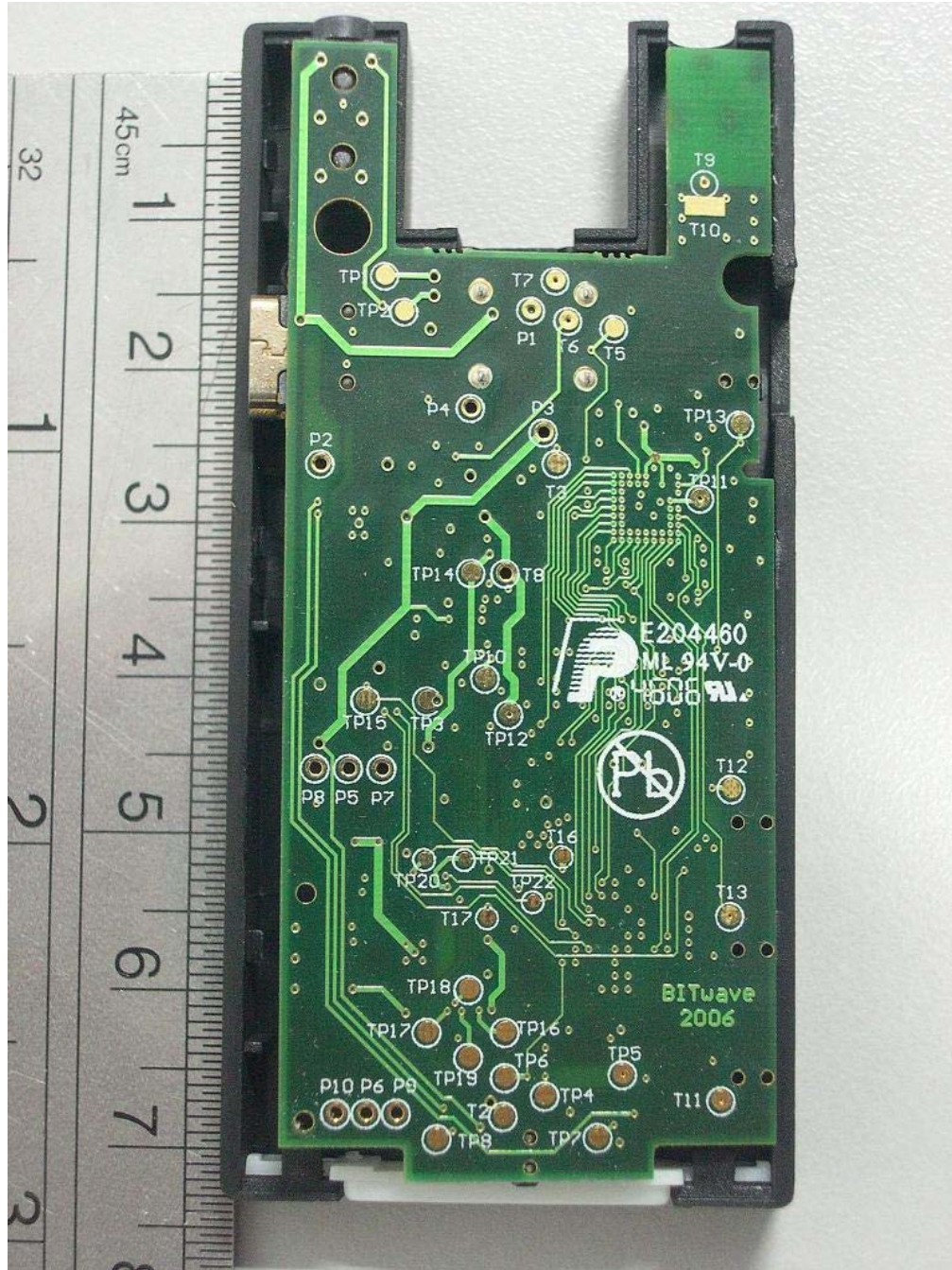


RF Antenna

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR BLUETOOTH DONGLE



Main-Board - PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR HANDSFREE BLUETOOTH RECEIVER



Front View

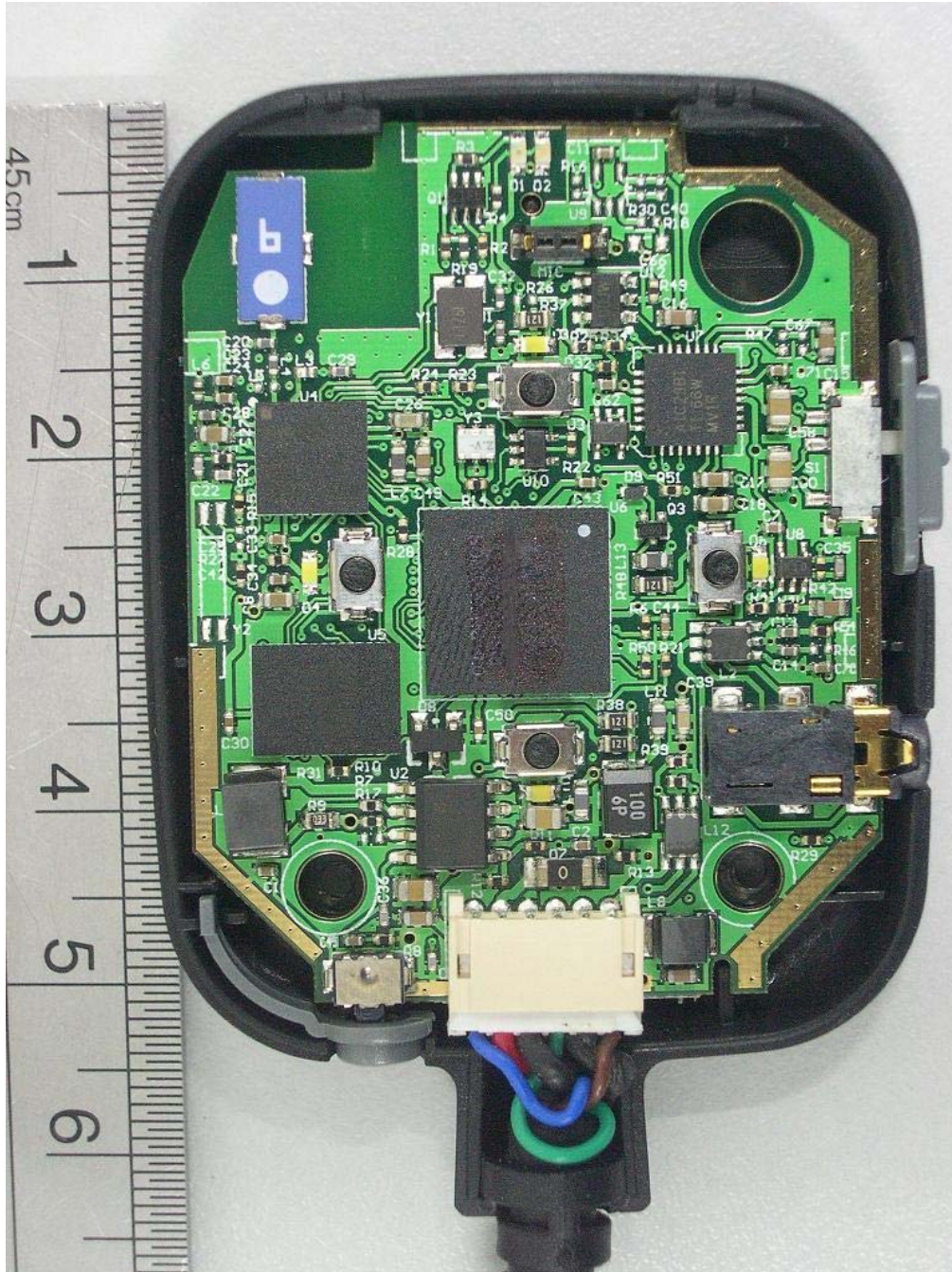


Rear View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR HANDSFREE BLUETOOTH RECEIVER

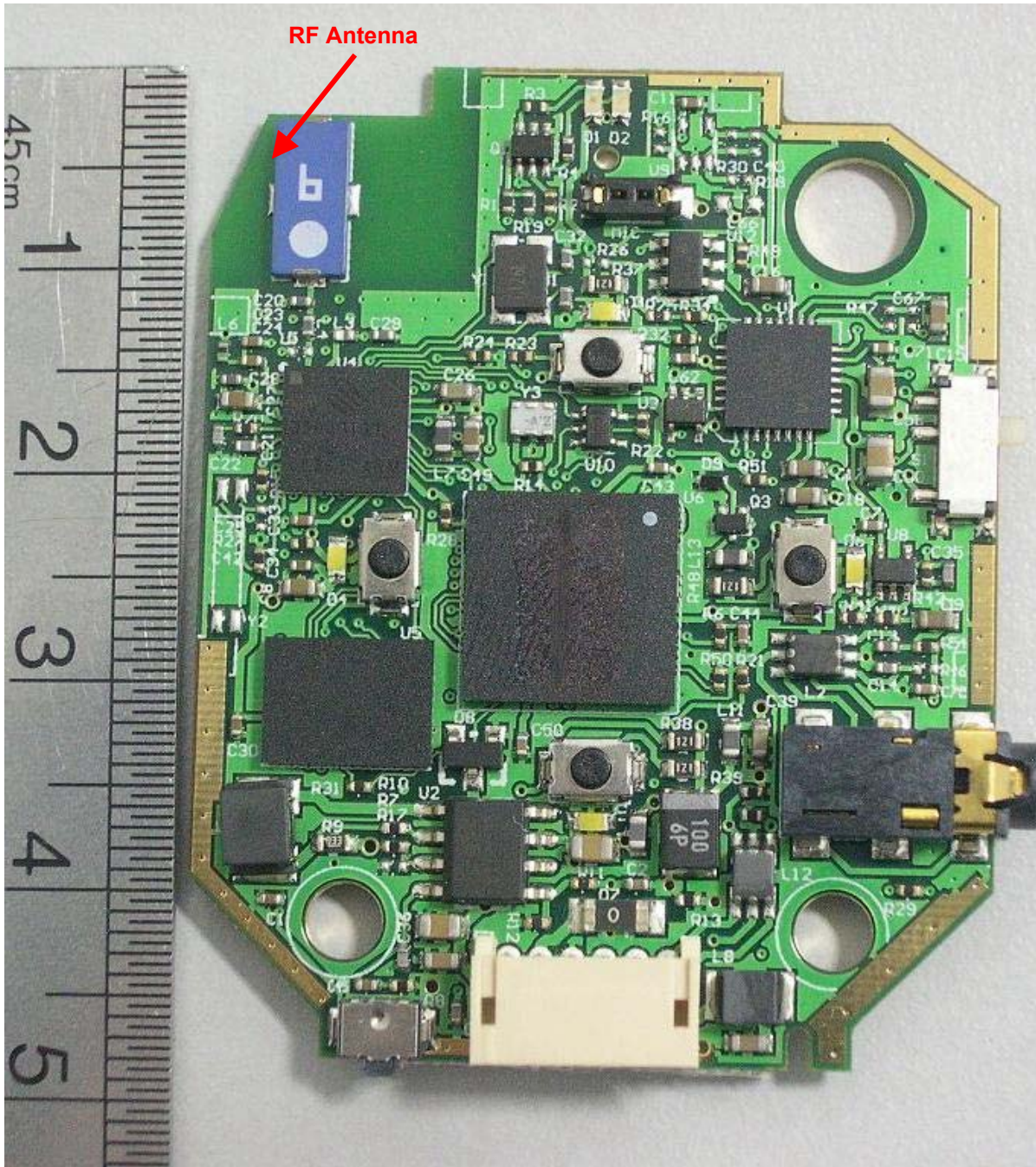


EUT Internal View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR HANDSFREE BLUETOOTH RECEIVER

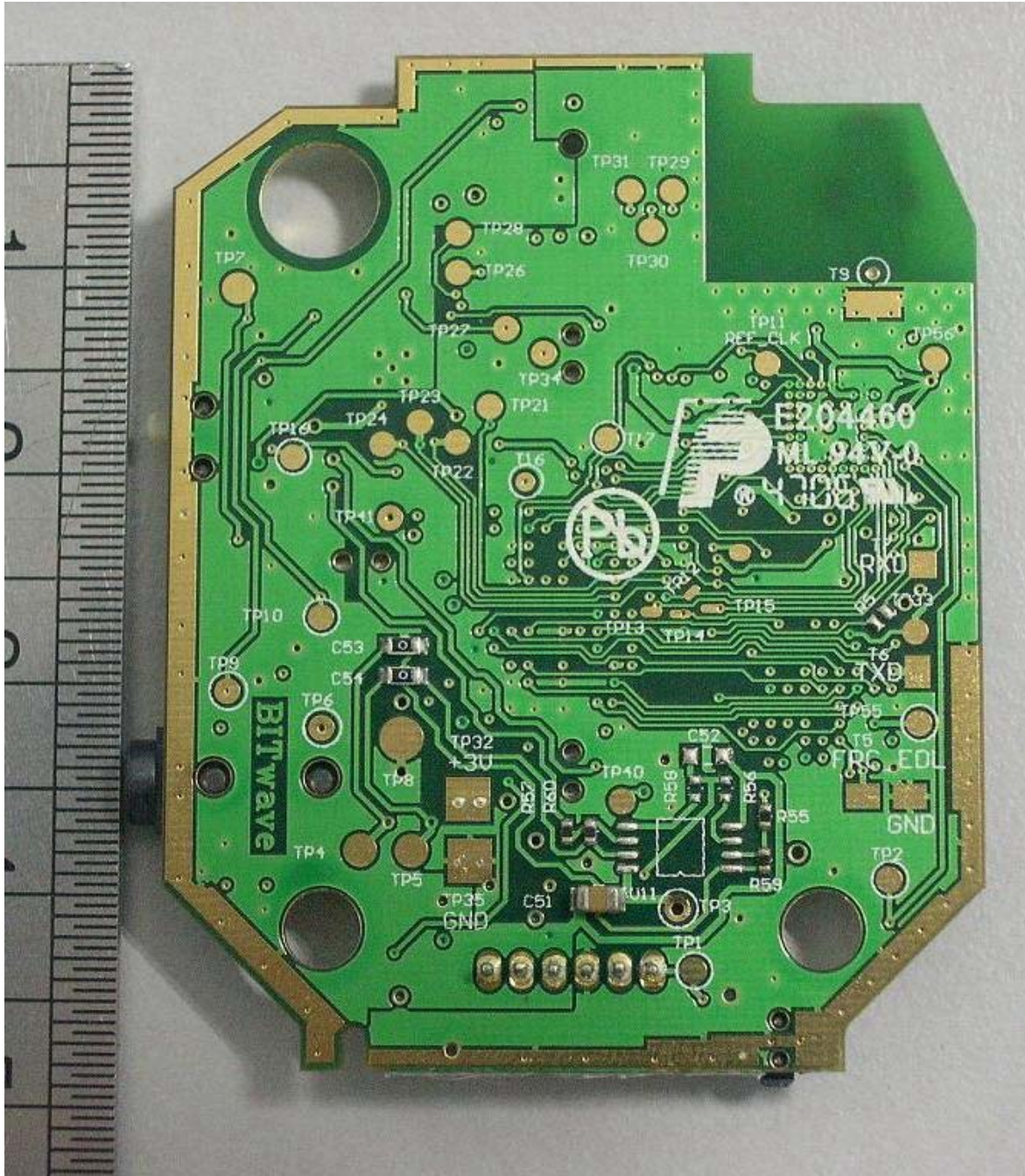


Main-Board - PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS FOR HANDSFREE BLUETOOTH RECEIVER



Main-Board - PCB Trace Side



FCC LABEL & POSITION

ANNEX B

ANNEX B

FCC LABEL & POSITION

FCC LABEL & POSITION

ANNEX B

Labeling requirements per Section 2.925 & 15.19 For Model – BS003

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.



Setplate for BLT370

Sample Label



Physical Location of FCC Label on EUT

FCC LABEL & POSITION

ANNEX B

Labeling requirements per Section 2.925 & 15.19 For Model – BD003

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.



Setplate for DGL370

Sample Label



Physical Location of FCC Label on EUT



**USER MANUAL TECHNICAL DESCRIPTION BLOCK
& CIRCUIT DIAGRAMS**

ANNEX C

ANNEX C

**USER MANUAL
TECHNICAL DESCRIPTION
BLOCK & CIRCUIT DIAGRAMS**
(Please refer to manufacturer for details)