

TEST REPORT



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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC Parts 15B & C : 2006
OF A
WIRELESS SOUND SYSTEM
[Model : SH-FX80]
[FCC IDs : ACJSEFX60 and ACJSEFX80A]

TEST FACILITY Telecoms & EMC, Testing Group, PSB Corporation Pte Ltd
1 Science Park Drive, Singapore 118221

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)

PREPARED FOR Panasonic AVC Networks Singapore Pte Ltd
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JOB NUMBER 56S060344

TEST PERIOD 09 Apr 2006 – 19 Apr 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

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 marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

TEST SUMMARY

PRODUCT DESCRIPTION

SUPPORTING EQUIPMENT DESCRIPTION

EUT OPERATING CONDITIONS

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

CARRIER FREQUENCY SEPARATION TEST

SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST

NUMBER OF HOPPING FREQUENCIES TEST

AVERAGE FREQUENCY DWELL TIME TEST

MAXIMUM PEAK POWER TEST

RF CONDUCTED SPURIOUS EMISSIONS TEST

BAND EDGE COMPLIANCE (CONDUCTED) TEST

BAND EDGE COMPLIANCE (RADIATED) TEST

PEAK POWER SPECTRAL DENSITY TEST

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

DUTY CYCLE FACTOR COMPUTATION

ANNEX A - EUT PHOTOGRAPHS / DIAGRAMS

ANNEX B - FCC LABEL & POSITION

ANNEX C - USER MANUAL, TECHNICAL DESCRIPTION, BLOCK & CIRCUIT DIAGRAMS

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
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 53 for details

Notes

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

Digital Transceiver

<u>Transmit Channel</u>	<u>Frequency (GHz)</u>
Channel 34	2.436
Channel 46	2.448
Channel 57	2.459

Wireless Sound System

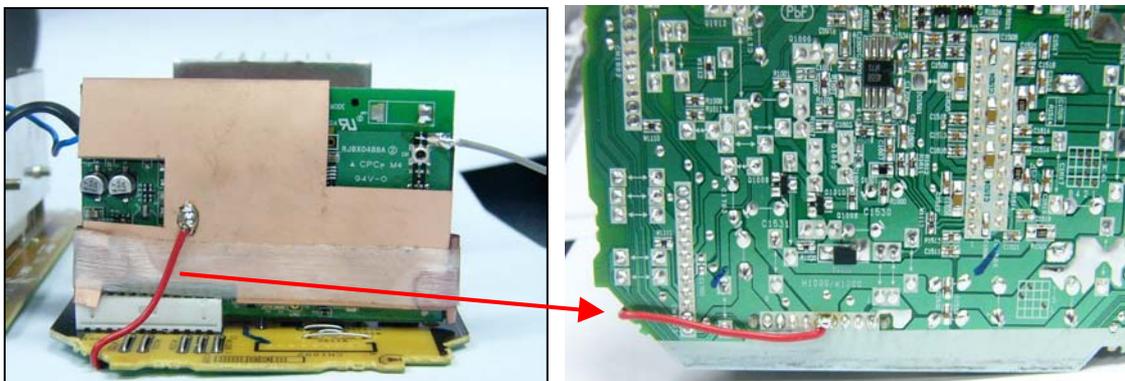
<u>Transmit Channel</u>	<u>Frequency (GHz)</u>
Channel 1	2.436
Channel 12	2.448
Channel 23	2.459

Following channels are not in use: 8, 17 (Wireless Sound System)

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. The Equipment Under Test (EUT) consists of a digital transceiver (Model: SH-FX80T) and wireless sound system (Model: SB-FX80). The digital transceiver is a FCC certified RF module and bears the FCC ID: ACJSEFX60. As the digital transceiver used in the system (EUT) is in exact modular form, as such, only Maximum Permissible Exposure test was evaluated for the digital transceiver. All tests were conducted for the wireless sound system.

Modifications

1. The EUT was brought to compliance to radiated emissions test by the following modifications on the Wireless Sound System (SB-FX80):
 - a. A copper shield was added to the main PCB board with an additional ground cable was connected between the shield and ground (see below the photographs for details).



Description	: The Equipment Under Test (EUT) is a Wireless Sound System . The EUT consists of the following units: - 1 x Digital Transceiver - 1 x Wireless Sound System Note: The digital transceiver is a FCC certified RF module and bears the FCC ID: ACJSEFX60
Manufacturer	: Panasonic AVC Networks Singapore Pte Ltd 202 Bedok South Avenue 1 Singapore 469332
Model Numbers	: SH-FX80 (whole system) SH-FX80T (Digital Transceiver) SB-FX80 (Wireless Sound System)
FCC IDs	: ACJSEFX60 (Digital Transceiver) ACJSEFX80A (Wireless Sound System)
Serial Number	: Nil (Digital Transceiver) Nil (Wireless Sound System)
Microprocessor	: S3F9454BZZ-SK94 (Digital Transceiver) S3F9454BZZ-SK94 (Wireless Sound System)
Operating / Transmitting Frequency	: <u>Digital Transceiver</u> 2.403GHz (lower channel) to 2.480GHz (upper channel) <u>Wireless Sound System</u> 2.436GHz (lower channel) to 2.459GHz (upper channel)
Clock / Oscillator Frequency	: 6MHz, 32MHz (Digital Transceiver) 6MHz, 32MHz (Wireless Sound System)
Modulation	: Gaussian Frequency Shift Keying (GFSK)
Port / Connectors	: Refer to manufacturers' user manual / operating manual.
Rated Input Power	: 5VDC from connected host's power) (Digital Transceiver) 110V 60Hz (Wireless Sound System)
Accessories	: Nil

SUPPORTING EQUIPMENT DESCRIPTION

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
Panasonic DVD Home Theatre System	M/N: SA-HT440 S/N: DE6BA001081R FCC ID: DoC	1.80m unshielded power cable

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**

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 (dBµV)	
	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
R&S Test Receiver – ESI1	ESI40	100010	04 Aug 2006
R&S Pulse Limiter – PL2	ESH3-Z2	100347	15 Apr 2007
Schaffner LISN (for EUT)	NNB42	04-10057	20 May 2006
Schaffner LISN – LISN7 (for supporting)	NNB42	00008	03 May 2006

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 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	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1030mbar
		Tested By	Zechs Ng Chee Siong

Frequency (MHz)	Q-P Value (dBμV)	Q-P Margin (dB)	AV Value (dBμV)	AV Margin (dB)	Line
0.2163	40.9	-22.1	35.0	-18.0	Neutral
0.3851	37.6	-20.6	14.9	-33.3	Live
0.3869	35.9	-22.2	14.4	-33.7	Neutral
0.8602	34.0	-22.0	9.8	-36.2	Live
0.9245	33.4	-22.6	9.4	-36.6	Live
1.0249	32.7	-23.3	10.5	-35.5	Neutral

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.
- 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 ±2.4dB.

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 (dBµV/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 2006
HP Preamplifier (100kHz-1.3GHz) – PA2	8447D	2944A08173	01 Apr 2007
MITEQ Preamplifier (0.1-26.5GHz) – PA4	NSP2650-N	604879	07 Nov 2006
Schaffner Bilog Antenna – BL9	CBL6143	5045	13 May 2006
EMCO Horn Antenna – H15	3115	0003-6088	19 May 2006
Bandstop Filter (2.4-2.5 GHz)	BRM50701	017	13 Aug 2006

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 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	110V 60Hz	Temperature	22°C
Test Distance	3m	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1040mbar
		Tested By	Dylan Lin / Zechs Ng / Anthony Toh

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
159.8600	38.7	-4.8	286	100	V	1
639.9700	43.7	-2.3	110	100	H	1
671.9700	44.2	-1.8	118	119	H	1
703.9700	45.1	-0.9	308	100	V	1
735.9700	42.5	-3.5	48	100	V	1
799.9700	41.2	-4.8	180	100	V	1

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dB μ V/m)	Average Value (dB μ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Channel
4.8733	61.6	48.4	-5.6	320	100	V	1
7.3111	62.6	49.4	-4.6	355	100	V	1
4.8966	64.8	51.6	-2.4	340	100	V	12
7.3444	63.1	49.9	-4.1	342	100	V	12
4.9166	65.7	52.5	-1.5	350	100	V	23
7.3777	65.2	52.0	-2.0	353	100	V	23

Notes

- 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.
- The transmitting antenna was found to be in the worst case condition when it was orientated in a vertical position.
- 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.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
 RBW: 120kHz VBW: 1MHz
>1GHz
 RBW: 1MHz VBW: 1MHz

6. 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.
7. The channel in the table refers to the transmit channel of the EUT.
8. 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 $\pm 4.3\text{dB}$ (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

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 2.435GHz and 2.438GHz.
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. 2.446GHz to 2.449075GHz
 - b. 2.457GHz to 2.460GHz

CARRIER FREQUENCY SEPARATION TEST



Carrier Frequency Separation Test Setup

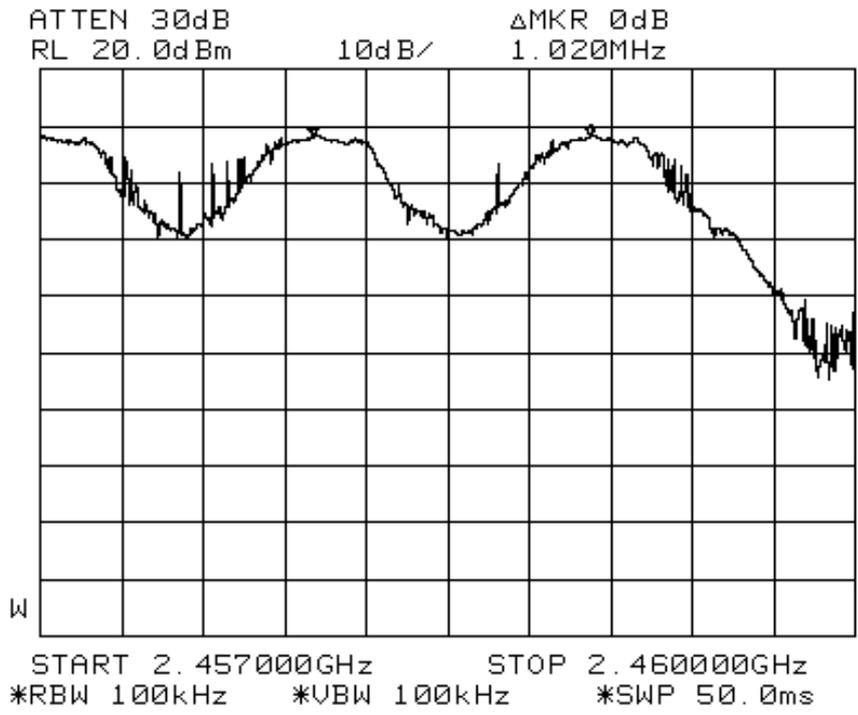
FCC Part 15.247(a)(1) Carrier Frequency Separation Results

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	1 - 3	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1029mbar
		Tested By	Chang Wai Kit

Adjacent Channels	Channel Separation (MHz)
1 and 2 (2.436GHz and 2.437GHz)	1.015
11 and 12 (2.447GHz and 2.448GHz)	1.051
22 and 23 (2.458GHz and 2.459GHz)	1.020

CARRIER FREQUENCY SEPARATION TEST

Carrier Frequency Separation Plots



Plot 3 - Channels 22 and 23 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 1 (2.436GHz).
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 12 (2.448GHz) and Channel 23 (2.459GHz) respectively.

SPECTRUM BANDWIDTH (20dB BANDWIDTH MEASUREMENT) TEST



Spectrum Bandwidth (20dB Bandwidth Measurement) Test Setup

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

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	4 - 6	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1029mbar
		Tested By	Chang Wai Kit

Channel	Channel Frequency (GHz)	20dB Bandwidth (MHz)
1	2.436	0.635
12	2.448	0.600
23	2.459	0.625

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 300kHz and 1000kHz.
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 2.435GHz and 2.448GHz.
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. 2.447GHz to 2.461GHz
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	110V 60Hz	Temperature	24°C
Attached Plots	7 - 8	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1029mbar
		Tested By	Chang Wai Kit

The EUT was found to have 21 hopping frequencies. Please refer to the attached plots.

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 3MHz.
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 2.436GHz 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 as below:

$$\text{Average Frequency Dwell Time} = \left[\frac{\text{measured time slot length} \times \text{hopping rate}}{\text{number of hopping channels}} \right] \times \left[0.4 \times \text{number of hopping channels} \right]$$

$$\begin{aligned} \text{where EUT hopping rate} &= 200 \text{ hops/s} \\ \text{Number of EUT hopping channels} &= 21 \text{ channels} \end{aligned}$$

5. The steps 2 to 4 were repeated with the center frequency of the spectrum analyser were set to 2.448GHz and 2.459GHz respectively.

AVERAGE FREQUENCY DWELL TIME TEST



Average Frequency Dwell Time Test Setup

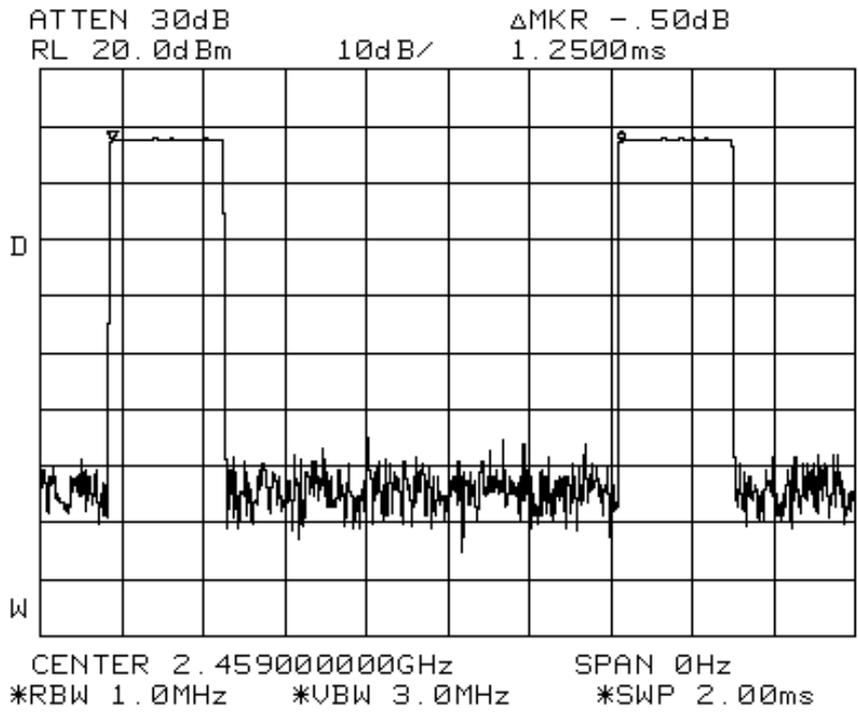
FCC Part 15.247(a)(1)(iii) Average Frequency Dwell Time Results

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	9 - 11	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1029mbar
Hopping Rate	200 hops / s	Tested By	Chang Wai Kit
Number of Hopping Channels	21 channels		

Channel	Channel Frequency (GHz)	Measured Time Slot Length (ms)	Average Frequency Dwell Time (s)	Average Occupancy Limit (s)
1	2.436	1.250	0.1	0.4
12	2.448	1.250	0.1	0.4
23	2.459	1.250	0.1	0.4

AVERAGE FREQUENCY DWELL TIME TEST

Average Frequency Dwell Time Plots



Plot 11 – Channel 23

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
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 1 (2.436GHz).
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 12 (2.448GHz) and Channel 23 (2.459GHz) respectively.

MAXIMUM PEAK POWER TEST



Maximum Peak Power Test Setup

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

Test Input Power	110V 60Hz	Temperature	24°C
Unit Under Test	Wireless Sound System (SB-FX80)	Relative Humidity	55%
		Atmospheric Pressure	1029mbar
		Tested By	Chang Wai Kit

Channel	Channel Frequency (GHz)	Maximum Peak Power (W)	Limit (W)
1	2.436	0.0043	0.125
12	2.448	0.0037	0.125
23	2.459	0.0035	0.125

Notes

1. 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 1 (2.436GHz).
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 12 (2.448GHz) and Channel 23 (2.459GHz) 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	110V 60Hz	Temperature	24°C
Attached Plots	12 - 17	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1029mbar
		Tested By	Chang Wai Kit

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

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	110V 60Hz	Temperature	24°C
Attached Plots	18 - 19	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1029mbar
		Tested By	Chang Wai Kit

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

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.

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 2006
HP Preamplifier (100kHz-1.3GHz) – PA2	8447D	2944A08173	01 Apr 2007
MITEQ Preamplifier (0.1-26.5GHz) – PA4	NSP2650-N	604879	07 Nov 2006
Schaffner Bilog Antenna – BL9	CBL6143	5045	13 May 2006
EMCO Horn Antenna – H15	3115	0003-6088	19 May 2006

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 specified modulation and data rate.
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

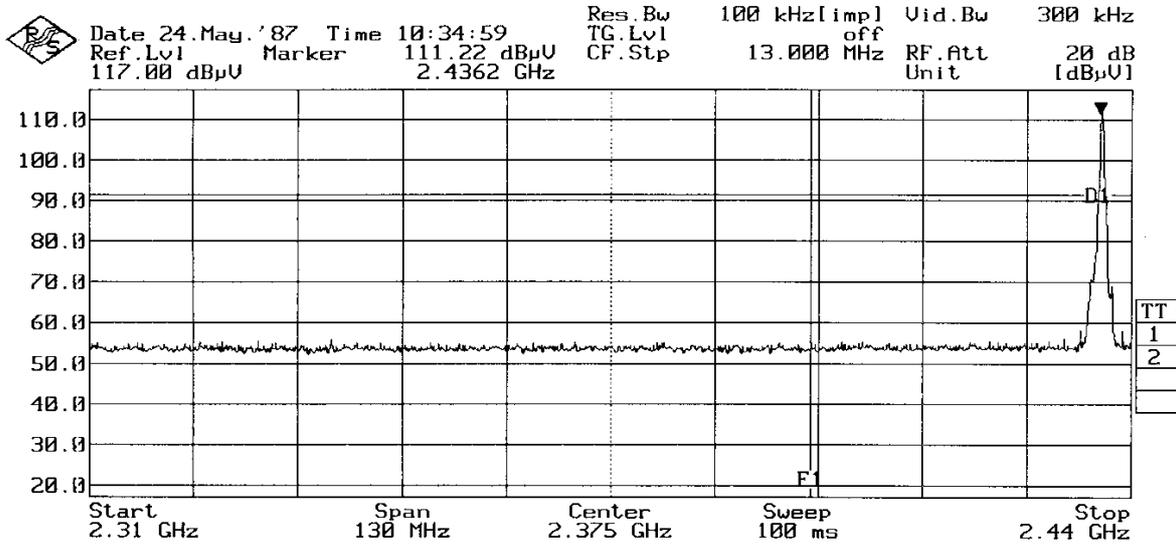
FCC Part 15.247(d) Band Edge Compliance (Radiated) Results

Test Input Power	110V 60Hz	Temperature	22°C
Attached Plots	20 - 25	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1040mbar
		Tested By	Dylan Lin / Zechs Ng / Anthony Toh

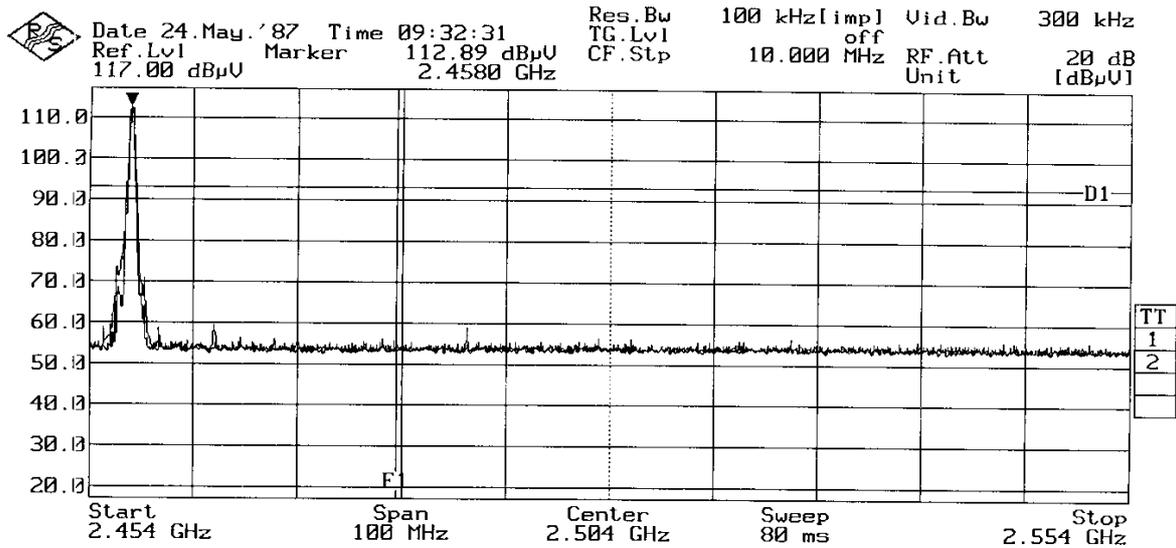
No significant signal was found and they were below the specified limit.

BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance Plots (20dB Delta from Carrier at Band Edge)



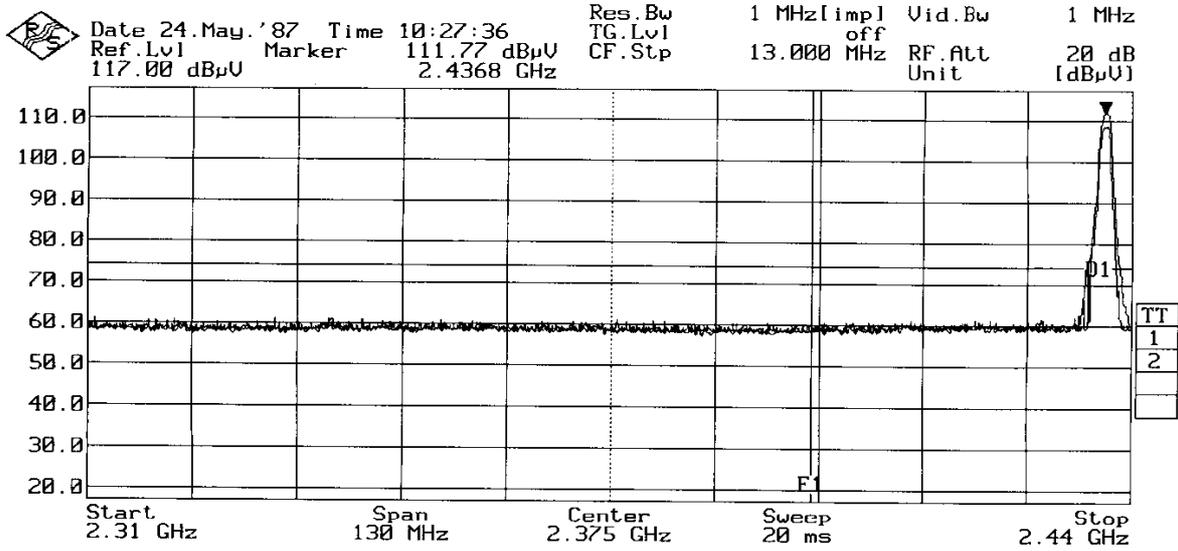
Plot 20 – Lower Band Edge at 2.400GHz



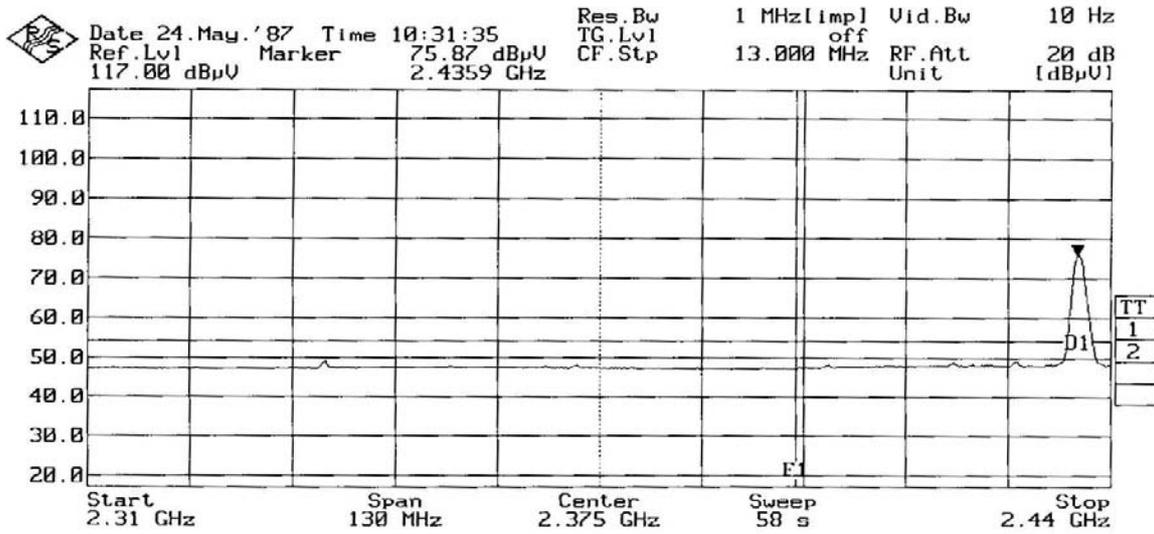
Plot 21 – Upper Band Edge at 2.4835GHz

BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance Plots (Restricted Band)



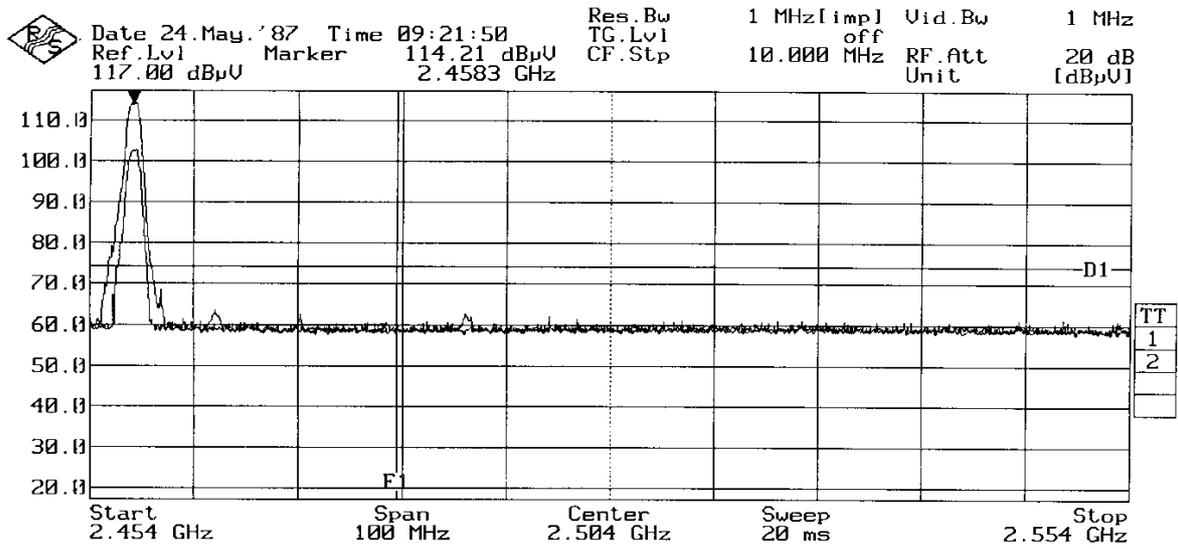
Plot 22 – Peak Plot for Lower Band Edge



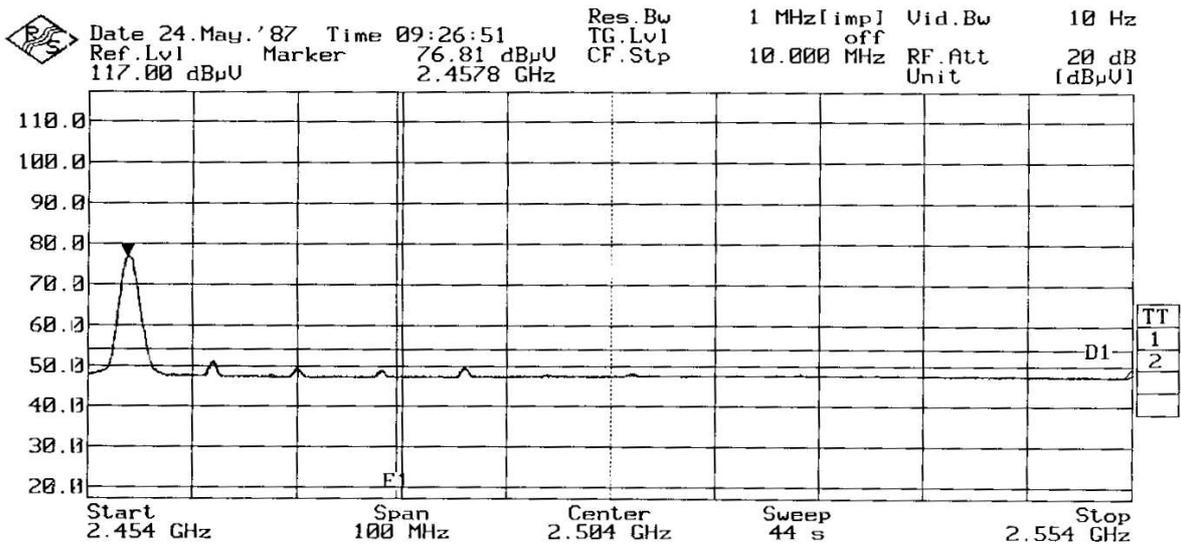
Plot 23 – Average Plot for Lower Band Edge

BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance Plots (Restricted Band)



Plot 24 – Peak Plot for Upper Band Edge



Plot 25 – Average Plot for Upper Band Edge

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

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 1 (2.436GHz).
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 12 (2.448GHz) and Channel 23 (2.459GHz) respectively.

PEAK POWER SPECTRAL DENSITY TEST



Peak Power Spectral Density Test Setup

FCC Part 15.247(e) Peak Power Spectral Density Results

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	26 - 28	Relative Humidity	55%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1029mbar
		Tested By	Chang Wai Kit

Channel	Channel Frequency (GHz)	Peak Power Spectral Density (mW)	Limit (mW)
1	2.436	1.585	6.3
12	2.448	0.764	6.3
23	2.459	1.259	6.3

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
Narda Field Probe Meter	EMR-20	BN 2244/70	20 Aug 2006
Narda E-Field Probe	2244/90.21	BB-0033	20 Aug 2006

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

At 2400 MHz, limit = 1.0 mW/cm²

Power density reading obtained directly from field meter = 0.3 mW/cm² averaged over the required 30 minutes.

Therefore, margin = 0.3 – 1.0 = -0.7 mW/cm² i.e. **0.7 mW/cm² below limit**

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST



Maximum Permissible Exposure (MPE) Test Setup (Digital Transceiver)



Maximum Permissible Exposure (MPE) Test Setup (Wireless Sound System)

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Results

Test Input Power	110V 60Hz	Temperature	24°C
Test Distance	20cm	Relative Humidity	56%
Unit Under Test	Digital Transceiver (SH-FX80T)	Atmospheric Pressure	1030mbar
		Tested By	Lim Cher Hwee

Channel	Channel Frequency (GHz)	Power Density Value (mW/cm ²)	Margin (mW/cm ²)	Averaging Time (min)	Limit (mW/cm ²)
34	2.436	0.0050	-0.9950	30	1.0
46	2.448	0.0047	-0.9953	30	1.0
57	2.459	0.0049	-0.9951	30	1.0

Test Input Power	110V 60Hz	Temperature	24°C
Test Distance	20cm	Relative Humidity	56%
Unit Under Test	Wireless Sound System (SB-FX80)	Atmospheric Pressure	1030mbar
		Tested By	Lim Cher Hwee

Channel	Channel Frequency (GHz)	Power Density Value (mW/cm ²)	Margin (mW/cm ²)	Averaging Time (min)	Limit (mW/cm ²)
1	2.436	0.0031	-0.9969	30	1.0
12	2.448	0.0027	-0.9973	30	1.0
23	2.459	0.0030	-0.9970	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%.

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.
3. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that PSB Corporation approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that PSB Corporation in any way "guarantees" the later performance of the product/equipment.
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May 2005

ANNEX A

EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS - Digital Transceiver

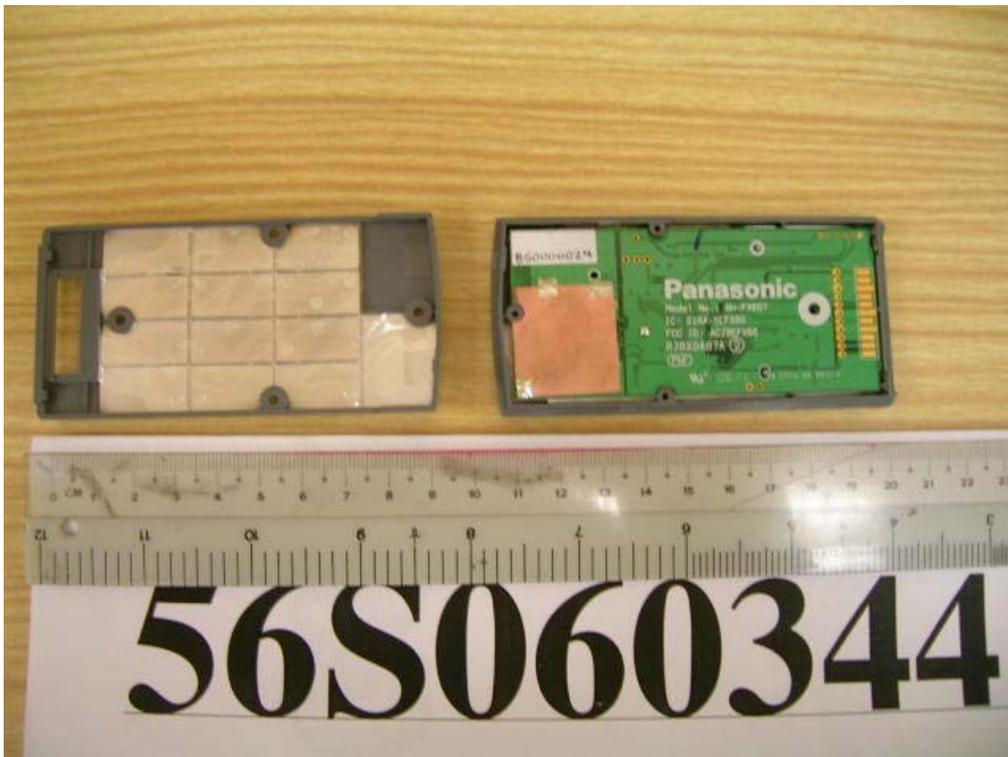


Front View



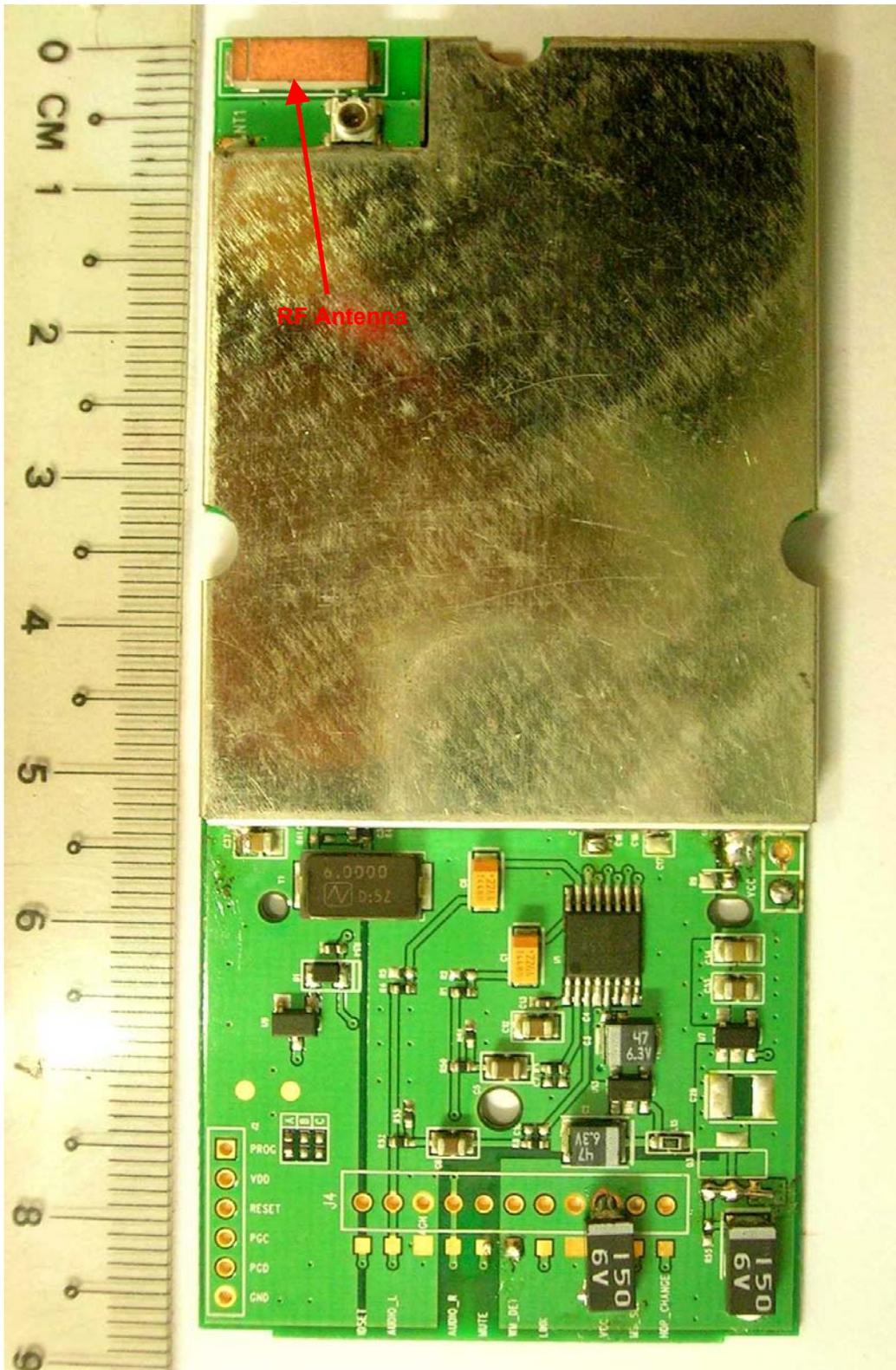
Rear View

EUT PHOTOGRAPHS - Digital Transceiver



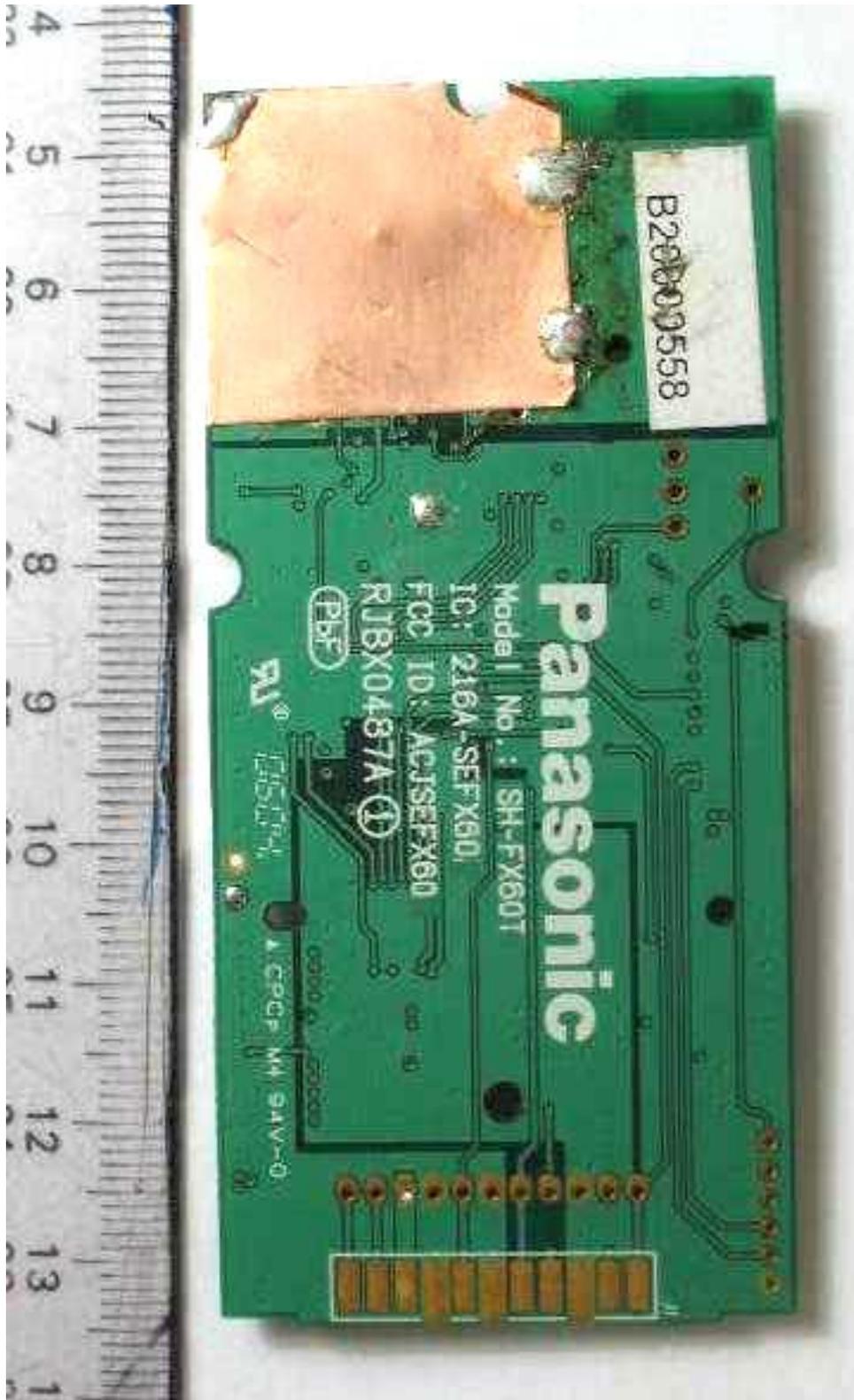
Internal View

EUT PHOTOGRAPHS - Digital Transceiver



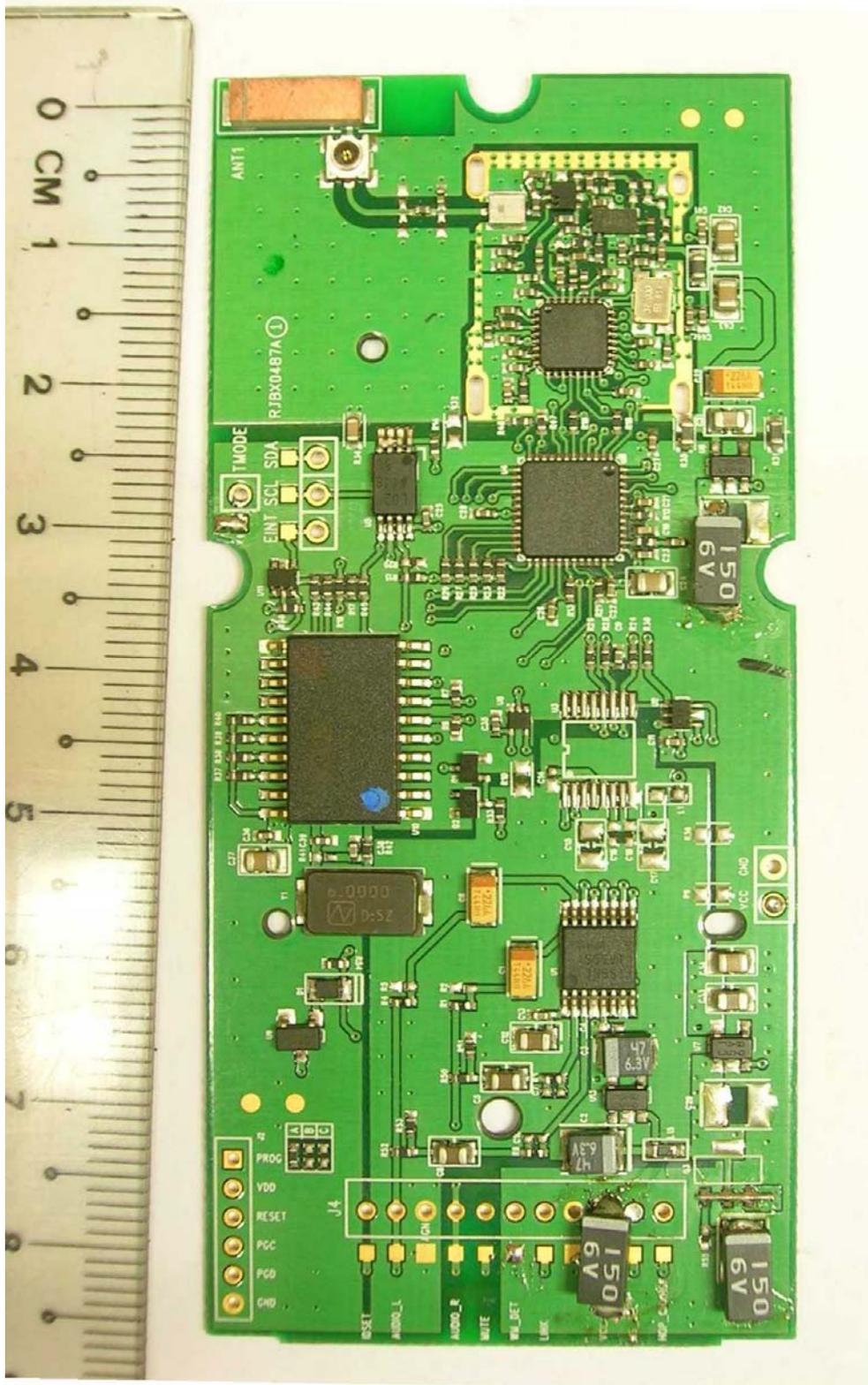
Front View (with RF Shield)

EUT PHOTOGRAPHS - Digital Transceiver



Rear View (with RF Shield)

EUT PHOTOGRAPHS - Digital Transceiver



Front View (RF Shield Removed)

EUT PHOTOGRAPHS - Digital Transceiver



Rear View (RF Shield Removed)

EUT PHOTOGRAPHS - Wireless Sound System



Front View



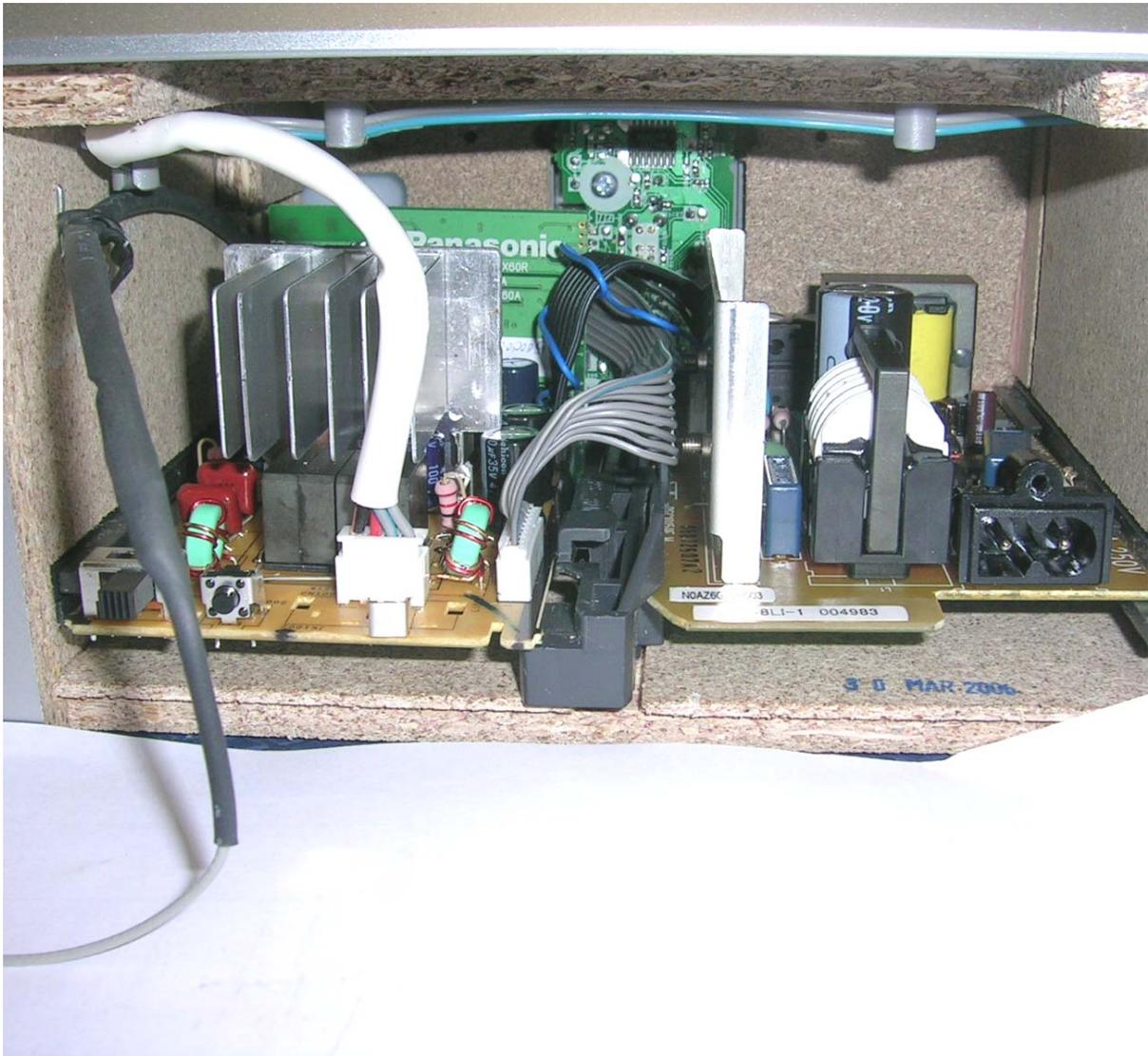
Rear View

EUT PHOTOGRAPHS - Wireless Sound System



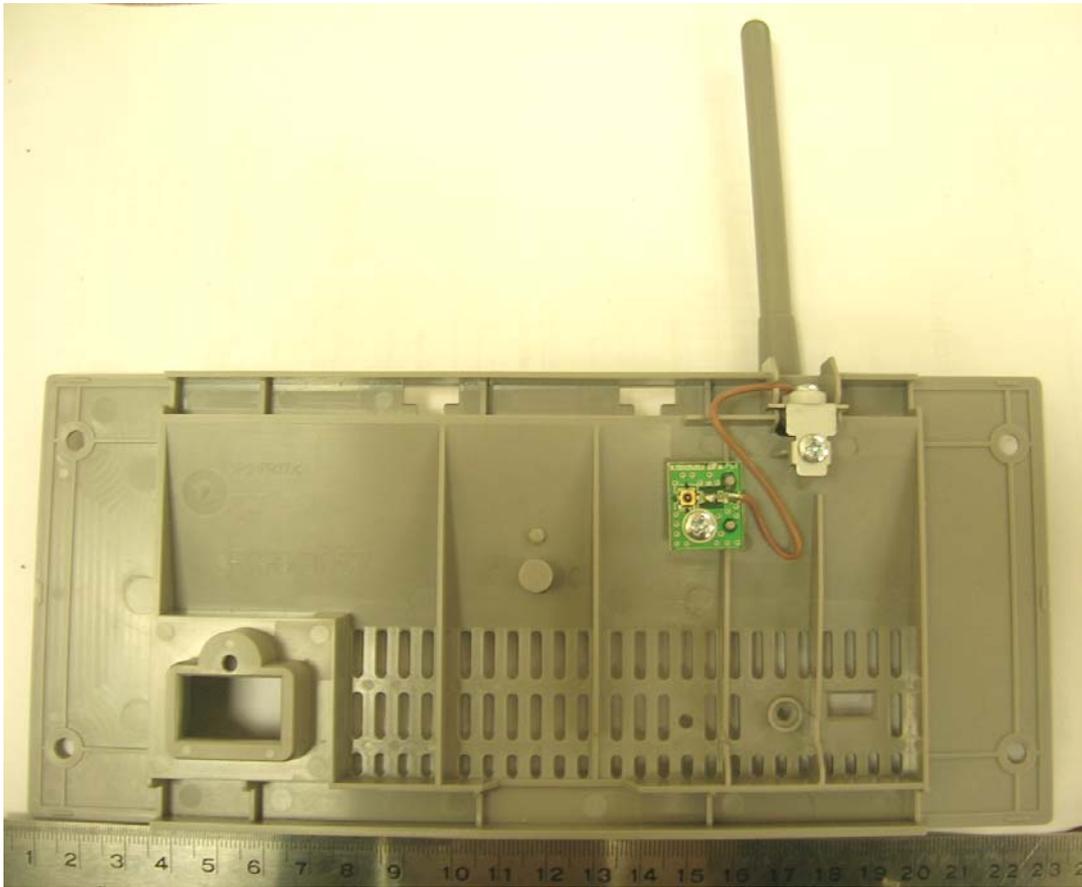
External Antenna View

EUT PHOTOGRAPHS - Wireless Sound System



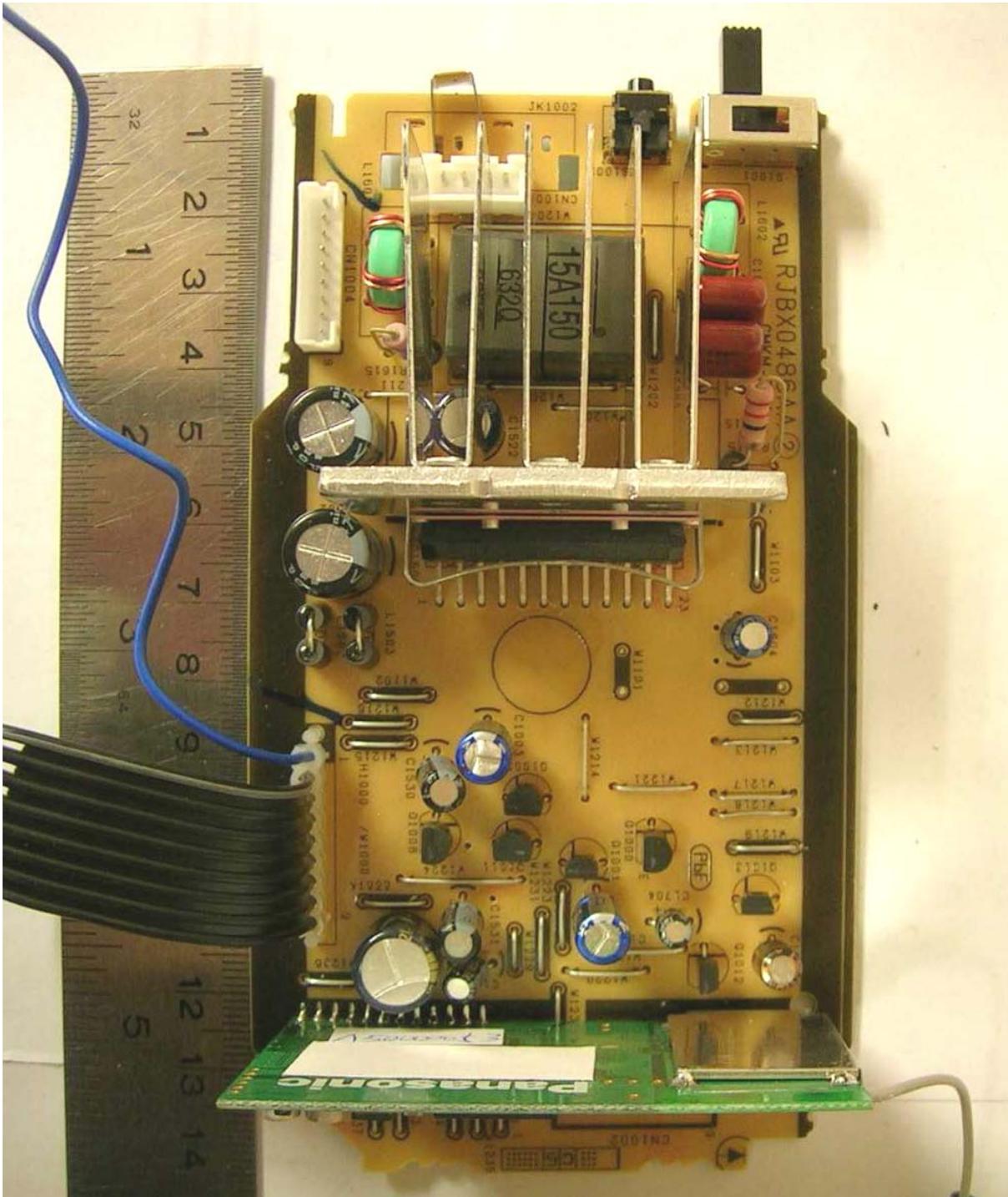
Internal Layout 1

EUT PHOTOGRAPHS - Wireless Sound System



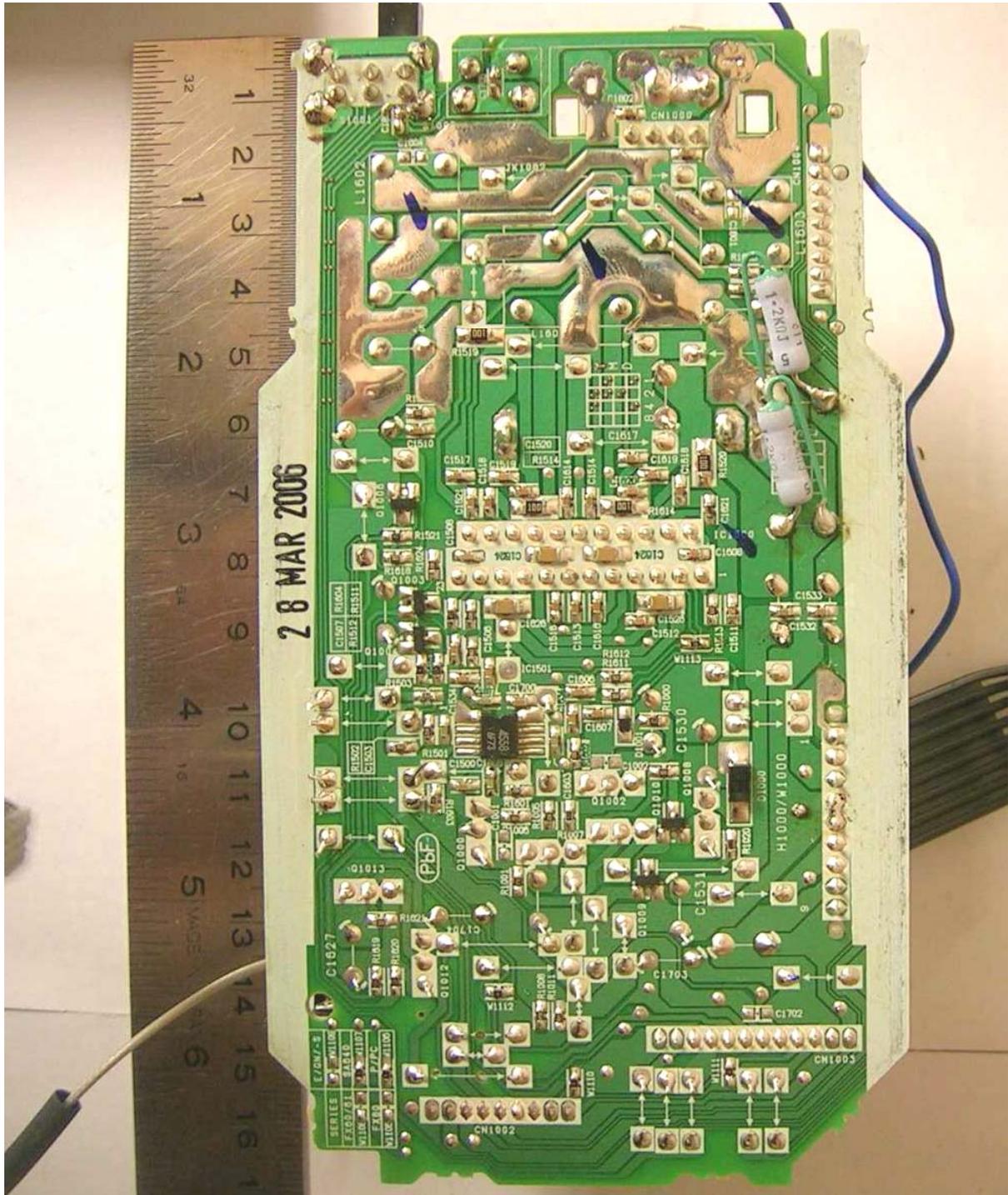
Internal Layout 2

EUT PHOTOGRAPHS - Wireless Sound System



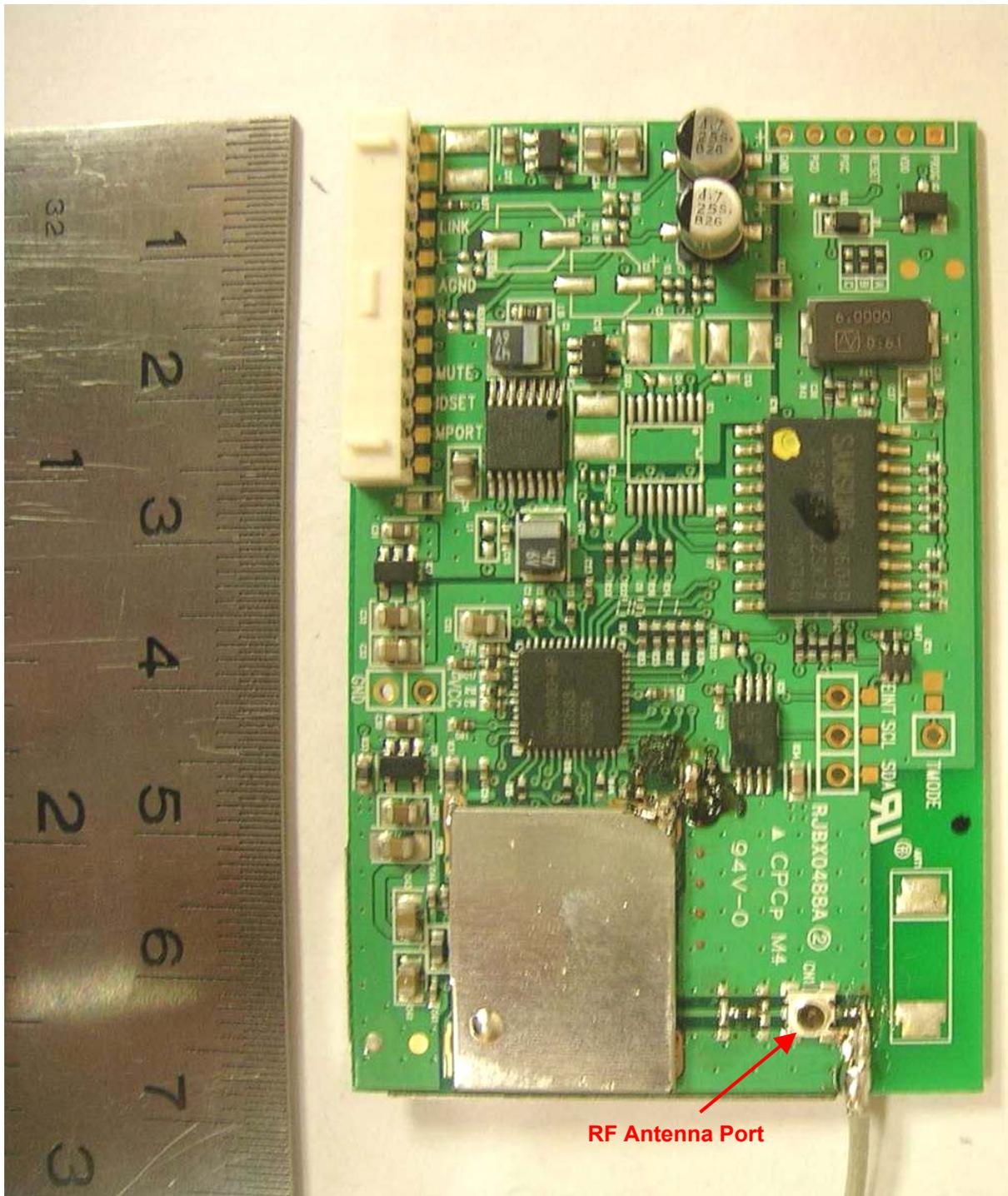
Main Board - Component Side

EUT PHOTOGRAPHS - Wireless Sound System



Main-Board - Trace Side

EUT PHOTOGRAPHS - Wireless Sound System



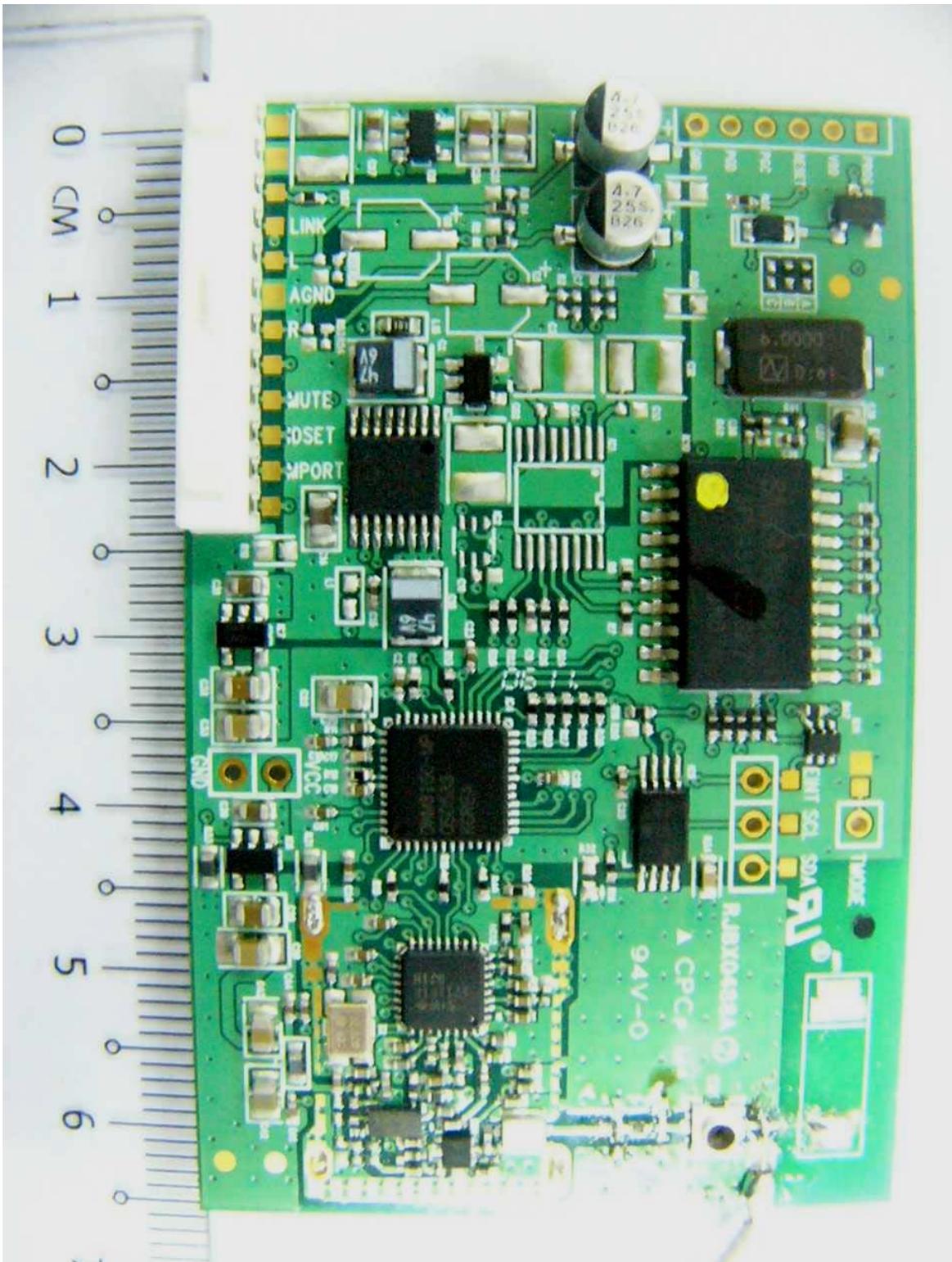
RF Module - Component Side

EUT PHOTOGRAPHS - Wireless Sound System



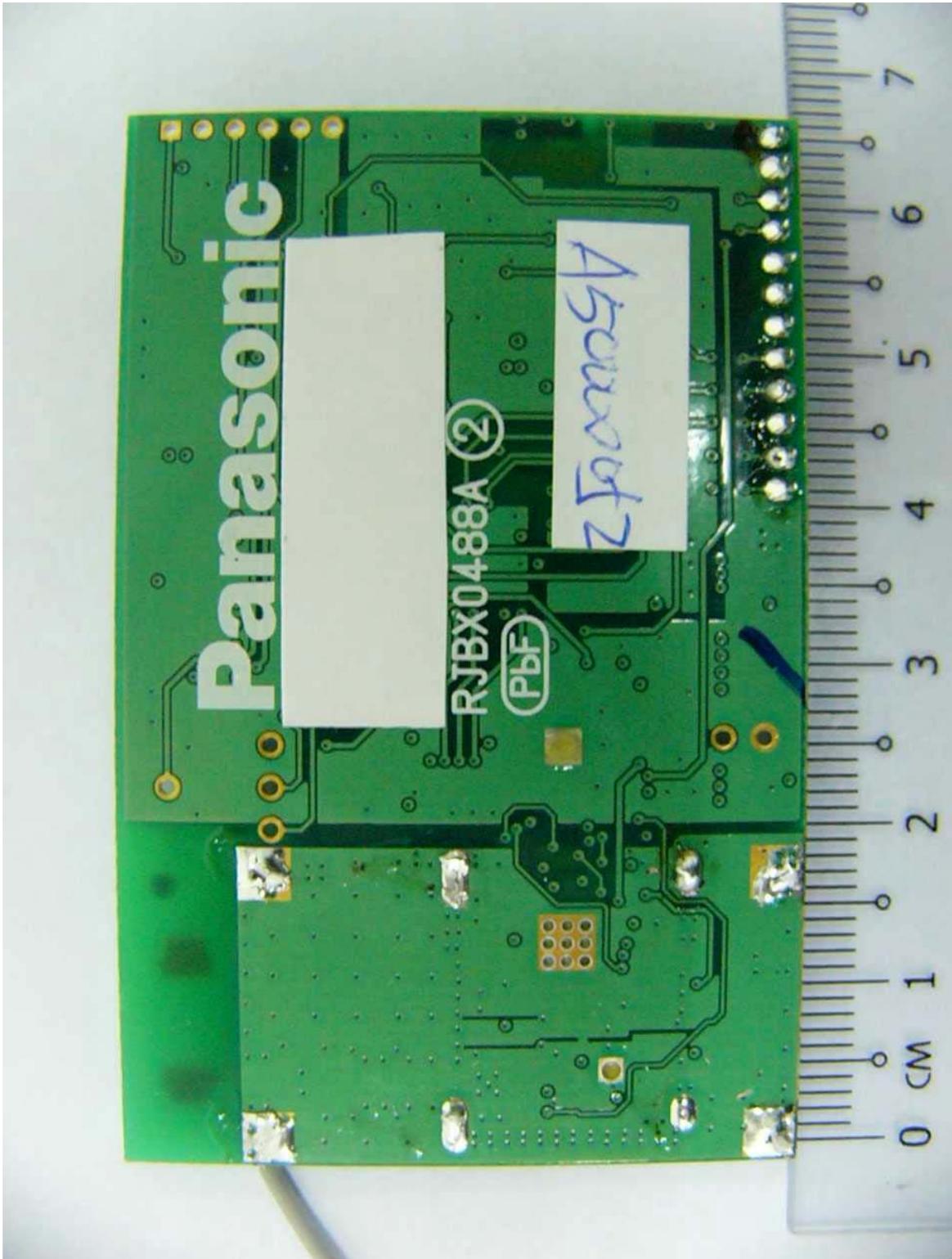
RF Module - Trace Side

EUT PHOTOGRAPHS - Wireless Sound System



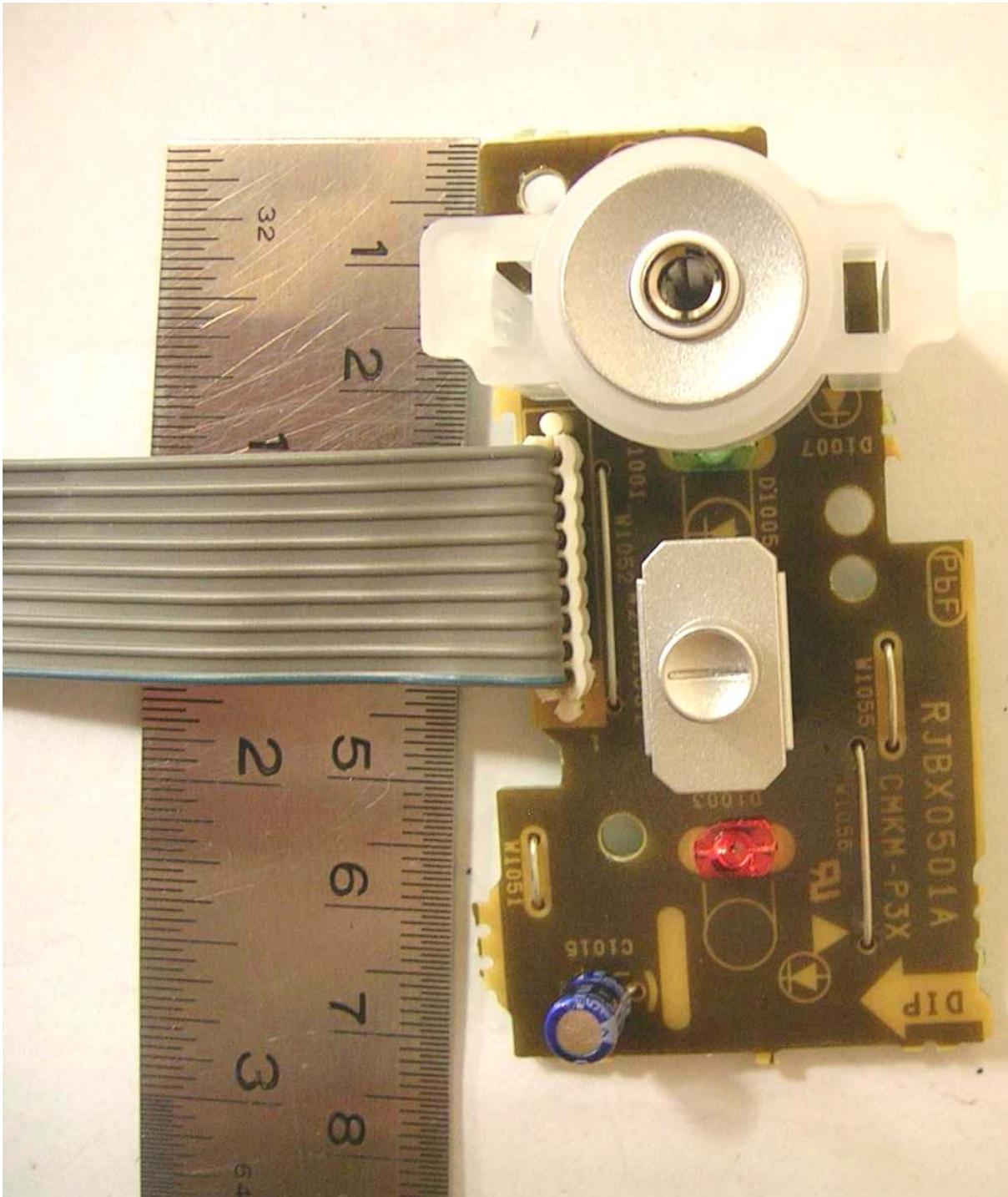
RF Module - Component Side (With RF Shield Removed)

EUT PHOTOGRAPHS - Wireless Sound System



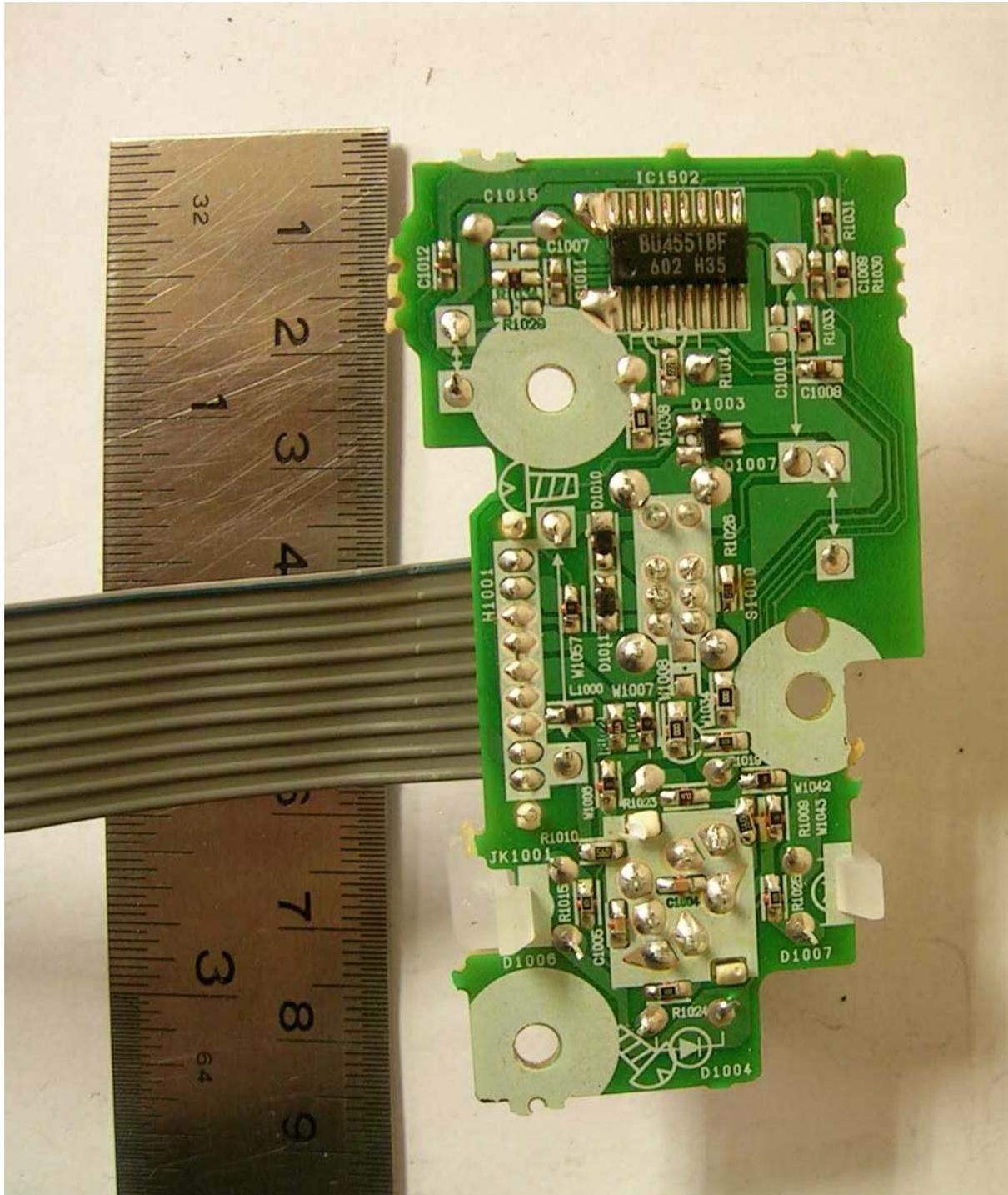
RF Module - Trace Side (With RF Shield Removed)

EUT PHOTOGRAPHS - Wireless Sound System



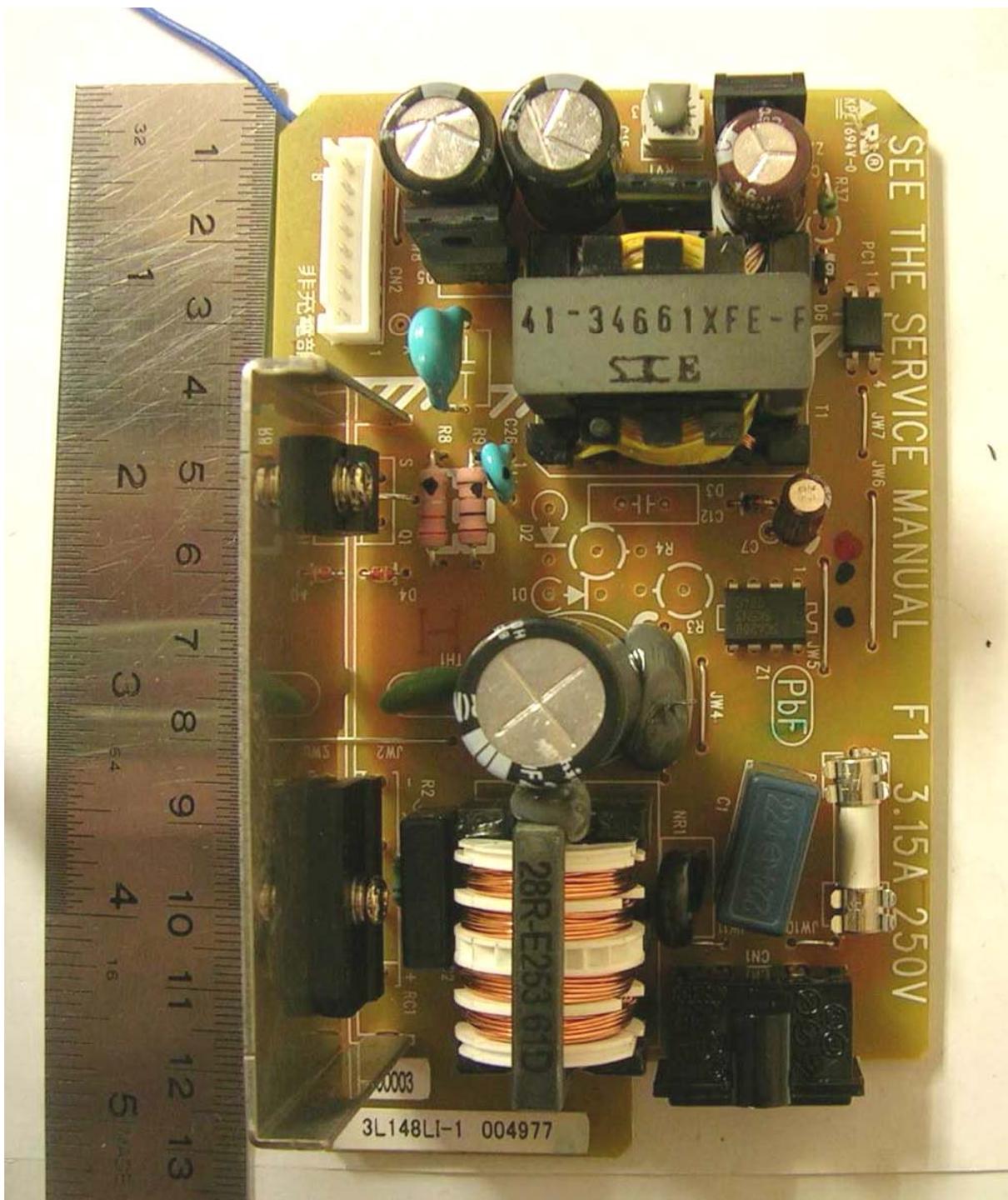
Front Panel Board - Component Side

EUT PHOTOGRAPHS - Wireless Sound System



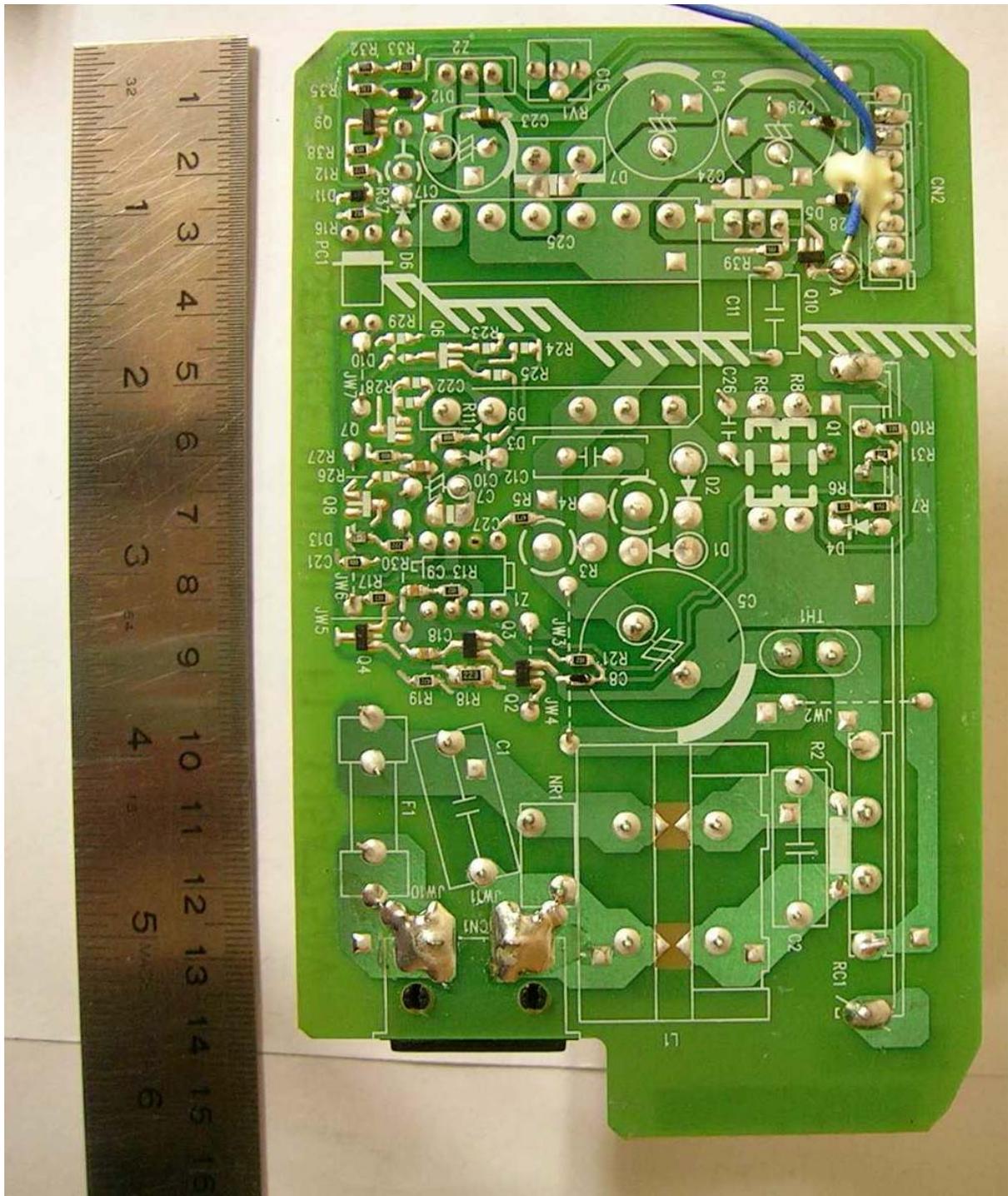
Front Panel Board - Trace Side

EUT PHOTOGRAPHS - Wireless Sound System



Power Supply - Component Side

EUT PHOTOGRAPHS - Wireless Sound System



Front Panel Board - Trace Side

ANNEX B
FCC LABEL & POSITION

FCC LABEL & POSITION**ANNEX B**Labelling requirements per Section 2.925 & 15.19

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.



Sample Label and Physical Location of FCC Label (Digital Transceiver)

FCC LABEL & POSITION

ANNEX B

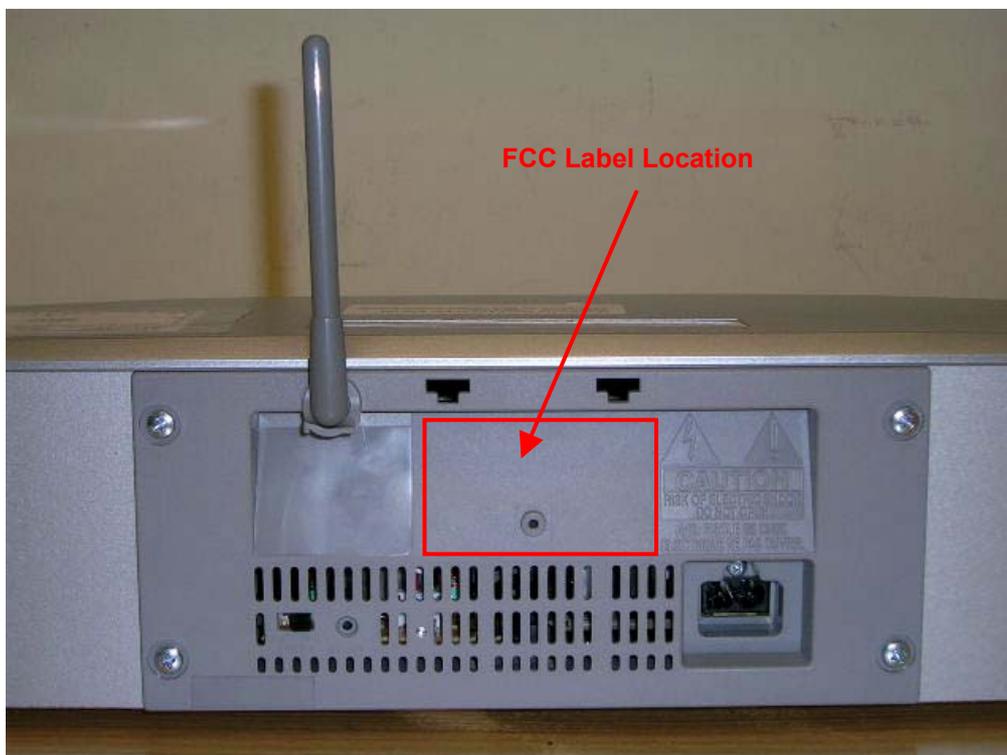
Labelling requirements per Section 2.925 & 15.19

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.

Panasonic 
Model No. SB-FX80
WIRELESS SOUND SYSTEM
AC ~ 120V 30W 60Hz
Panasonic AVC Networks
Singapore Pte. Ltd.
Singapore
Made in Singapore
FCC ID: ACJSEFX80A **Part No. RGNX0365-3**


LISTED
55LA

Sample Label (Wireless Sound System)



Physical Location of FCC Label on EUT

ANNEX C

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

(Please refer to manufacturer for details)