Test Report No. S09EEC00456/01
dated 12 Mar 2009

PSB Singapore

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC Part 15B : 2008 (CLASS B)
OF A
WIRELESS BRIDGING ROUTER
[Model : IC-RTR100-00]
[FCC ID : W63-RWW023]

TEST FACILITY	TÜV SÜD PSB Pte Ltd, Electrical & Electronics Centre (EEC), Product Services, 1 Science Park Drive, Singapore 118221
FCC REG. NO.	90937 (3m & 10m OATS) 99142 (10m Semi-Anechoic Chamber) 871638 (3m Semi-Anechoic Chamber) 325572 (10m Semi-Anechoic Chamber)
IND. CANADA REG. NO.	2932I-1 (3m and 10m Semi-Anechoic Chambers)
PREPARED FOR	CEEDTec Sdn. Bhd. 303-4-5, 303-4-6, Krystal Point Corporation Park, Jin Sultan Azlan Shah, 11900 Bayan Lepas, Penang, Malaysia Tel : +60 4 643 4573 Fax : +60 4 644 4679
QUOTATION NUMBER	Q09EEC00499
JOB NUMBER	S09EEC00456
TEST PERIOD	04 Mar 2009 – 11 Mar 2009

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APPROVED BY

Lim Cher Hwee
Assistant Vice President

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LA-2007-0380-A
LA-2007-0380-A-1
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G
LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-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.

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 15B : 2008		
15.107	Conducted Emissions (Class B)	Pass
15.109	Radiated Emissions (Class B)	Pass

Notes

1. All test measurement procedures are according to ANSI C63.4: 2003.
2. The EUT contains a certified FCC RF module which bears the FCC ID: MK8CPX-05-WLM54G. The RF module was integrated into the EUT without modifications. As such, only the emissions of non-RF portion (digital portion) were evaluated.

Modifications

The Wireless Bridging Router (EUT) was brought to compliance to Radiated Emissions by following modifications: (See modification photo)

1. Add metallic coating.
2. LED cable twisted.
3. Add an ferrite bead part number (Fair-Rite 28B0686-2) was added to the DC jack end of the AC/DC power adaptor used.

PRODUCT DESCRIPTION

Description	:	The Equipment Under Test is a **WIRELESS BRIDGING ROUTER.** It supports both the wireless WIFI 802.11b/g and Ethernet 10/100Mbps interface.
Manufacturer	:	CEEDTec Sdn. Bhd. 303-4-5, 303-4-6, Krystal Point Corporation Park, Jin Sultan Azlan Shah, 11900 Bayan Lepas, Penang, Malaysia
Model Number	:	IC-RTR100-00
Generic Part Name	:	CT-RWW023-00
Serial Number	:	Nil
Microprocessor	:	Refer to manufacturer
Operating Frequency	:	32MHz (highest operating frequency on digital circuit)
Clock / Oscillator Frequency	:	32MHz (highest operating frequency on digital circuit)
Port / Connectors	:	USB mini type B connector & 10/100 Ethernet RJ45 port
Rated Input Power	:	110V 60Hz
Accessories	:	UEC Switching AC/DC Power Adapter Model GFP121U-1210 Input 100V-240V, 0.3A, 50Hz/60Hz Output 12Vdc, 1.0A

SUPPORTING EQUIPMENT DESCRIPTION

Equipment Description (Including Brand Name)	**Model, Serial & FCC ID Number**	**Cable Description** (List Length, Type & Purpose)
Fujitsu Laptop	M/N: LBS6130-AH051E0B0 S/N: R3Z02446 FCC ID: Nil	2.00m unshielded power cable 2.00m RJ45 LAN cable
Fujitsu Power Adapter (Laptop)	M/N: UJ8 S/N: 0529371286 FCC ID: Nil	2.00m unshielded power cable
Dell Laptop	M/N: Latitude D510 S/N: CN-0N8719-4863-625-0036 FCC ID: Nil	2.00m unshielded power cable 2.00m RJ45 LAN cable
JET Power Adapter (Laptop)	M/N: PA-1650-05DM S/N: CN-0FF171-71675-0FE9 FCC ID: Nil	2.00m unshielded power cable

EUT OPERATING CONDITIONS

FCC Part 15B
1. Conducted Emissions **2. Radiated Emissions**
The Wireless Bridging Router (EUT) was exercising “Pinging” via the following modes: - Wi-Fi and LAN mode - Wi-Fi mode

CONDUCTED EMISSION TEST

FCC Part 15.107 Conducted Emission Limits (Class B)

AC Port

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 15.107 Conducted Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	06 Oct 2009
Agilent EMC Analyzer-SA7	E7403A	US41160167	20 May 2009
Schaffner LISN – LISN10 (for EUT)	NNB42	04/10055	03 Jul 2009
EMCO LISN (for supporting) – LISN6	3825/2	9309-2127	03 Jul 2009
Britz-Link AC Power Adapter	Nil	Nil	05 Nov 2009

CONDUCTED EMISSION TEST

AC Port

FCC 15.107 Conducted Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
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 15.107 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)

FCC 15.107 Conducted Emission Results

Operating Mode	Wi-Fi and LAN Mode (worst mode)	Temperature	21°C
Test Input Power	110V 60Hz	Relative Humidity	58%
Line Under Test	AC Mains	Atmospheric Pressure	1030mbar
Class	B	Tested By	Zhou Cheng Wen

Frequency (MHz)	Q-P Value (dBμV)	Q-P Margin (dB)	AV Value (dBμV)	AV Margin (dB)	Line
0.1940	48.4	-15.5	45.8	-8.1	Live
0.3895	42.9	-15.2	40.3	-7.8	Neutral
0.9733	38.8	-17.2	29.4	-16.6	Live
1.1601	43.4	-12.6	32.4	-13.6	Neutral
1.3594	39.2	-16.8	28.0	-18.0	Neutral
1.9418	42.5	-13.5	29.3	-16.7	Neutral

Notes

1. 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.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   150kHz - 30MHz
   RBW: 10kHz VBW: 30kHz
4. 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 is ±3.0dB.

FCC Part 15.109 Radiated Emission Limits (Class B)

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 Part 15.109 Radiated Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz –26.5GHz) – ESMI1 (Ref)	ESMI	849182/003 848926/007	21 Aug 2009
Schaffner Preamplifier (9kHz-2GHz) –PA13	CPA9231A	3422	13 Feb 2010
Schaffner Bilog Antenna – BL3 (Ref)	CBL6112B	2549	18 Dec 2009

FCC Part 15.109 Radiated Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
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 Part 15.109 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 altitude 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 5th harmonic of the highest frequency used or generated by the EUT, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

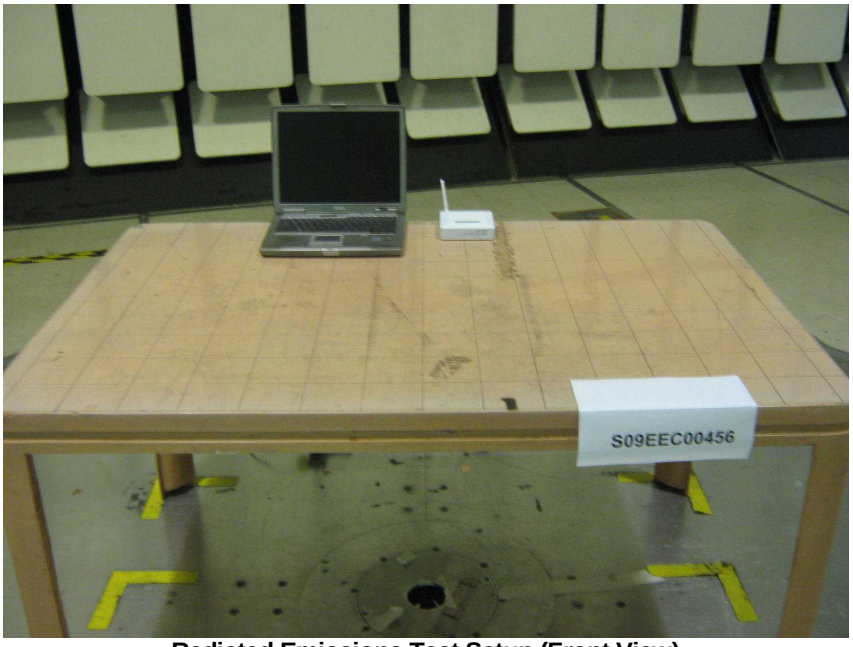
Sample Calculation Example

At 300 MHz Q-P limit (Class B) = 70.8 μV/m = 37.0 dBμV/m

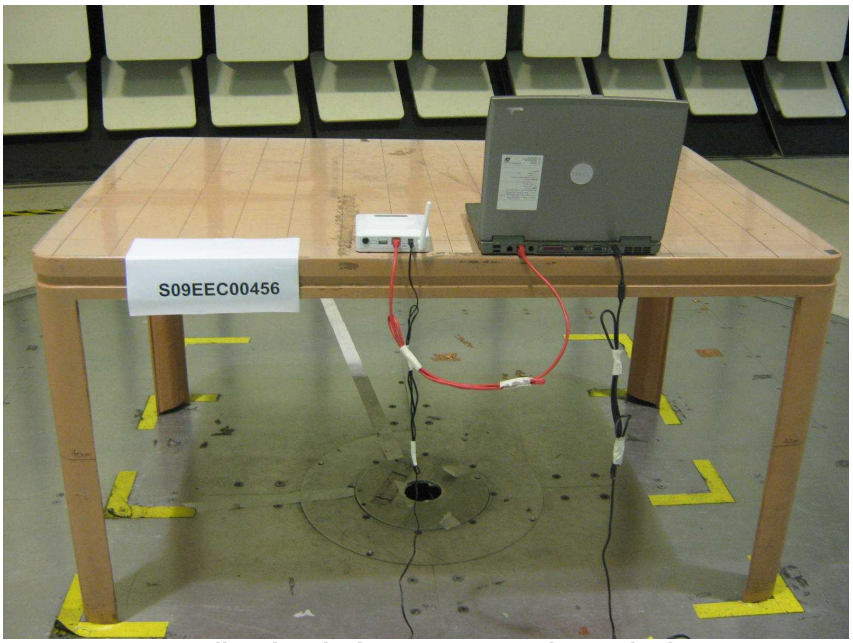
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 31.0 dBμV/m
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 31.0 - 37.0 = -6.0 i.e. **6 dB below Q-P limit**



Radiated Emissions Test Setup (Front View)



Radiated Emissions Test Setup (Rear View)

FCC Part 15.109 Radiated Emission Results

Operating Mode	Wi-Fi and LAN Mode	Temperature	23°C
Test Input Power	110V 60Hz	Relative Humidity	58%
Test Distance	3m	Atmospheric Pressure	1030mbar
Class	B	Tested By	Lucas Beh

Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
45.4530	28.7	-11.3	193	100	V
800.1930	24.7	-21.3	144	100	H
809.8260	34.5	-11.5	221	100	H
832.4660	15.8	-30.2	22	236	H
897.0220	37.4	-8.6	160	100	H
929.2300	35.7	-10.3	282	100	H

Operating Mode	Wi-Fi Mode	Temperature	23°C
Test Input Power	110V 60Hz	Relative Humidity	58%
Test Distance	3m	Atmospheric Pressure	1030mbar
Class	B	Tested By	Lucas Beh

Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
46.1230	34.6	-5.4	115	103	V
62.7420	30.5	-9.5	35	124	V
202.6960	33.1	-10.4	76	152	H
408.5600	20.0	-26.0	145	100	V
801.4440	15.9	-30.1	238	159	V
832.5150	19.2	-26.8	149	100	V

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. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   30MHz - 1GHz
   RBW: 120kHz VBW: 1MHz
   >1GHz
   RBW: 1MHz VBW: 1MHz
4. 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 – 25.0GHz is ±4.6dB.

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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10. Unless otherwise stated, the tests are carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

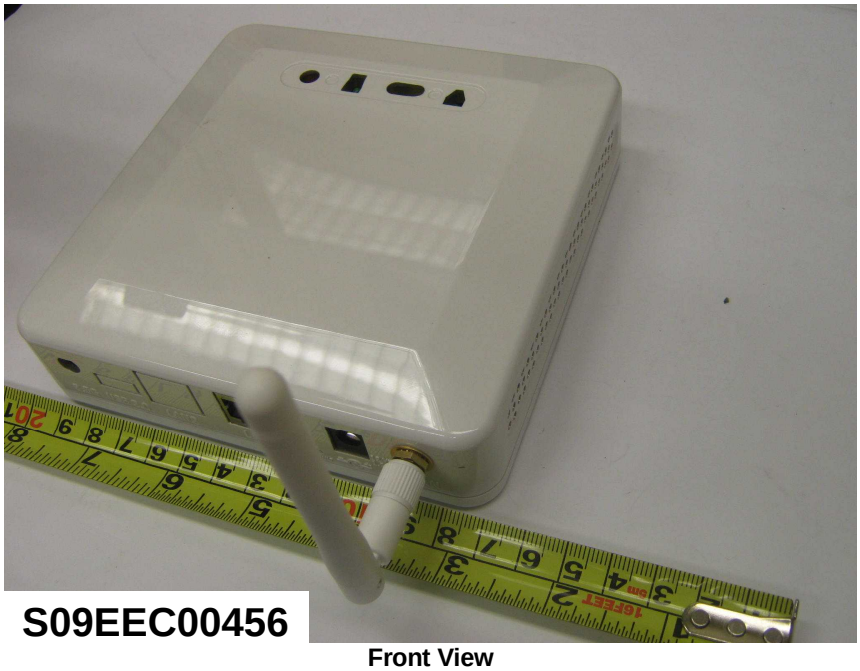
January 2008

ANNEX A

EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS



Front View

Rear View

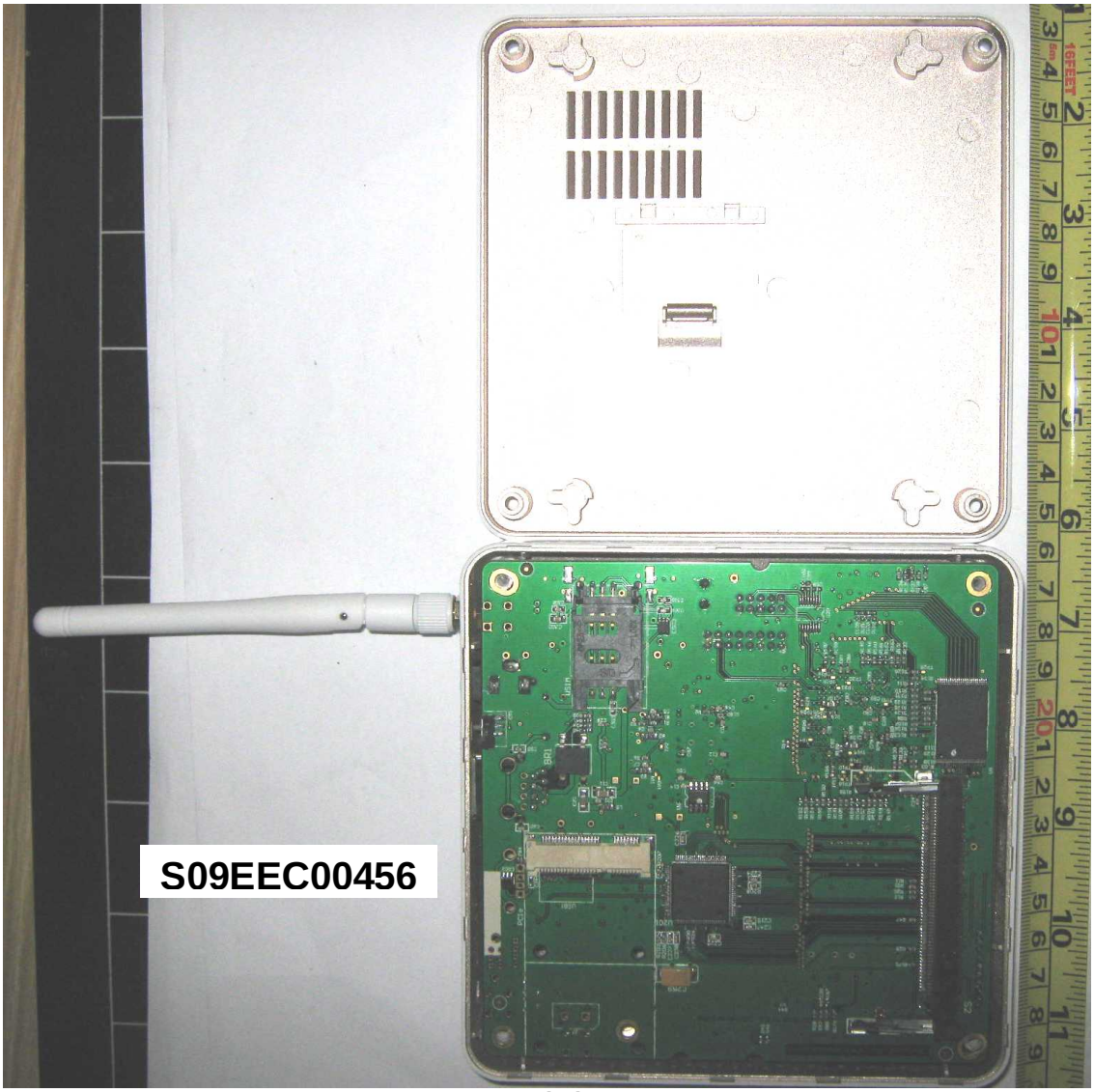
EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS

Bottom View

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

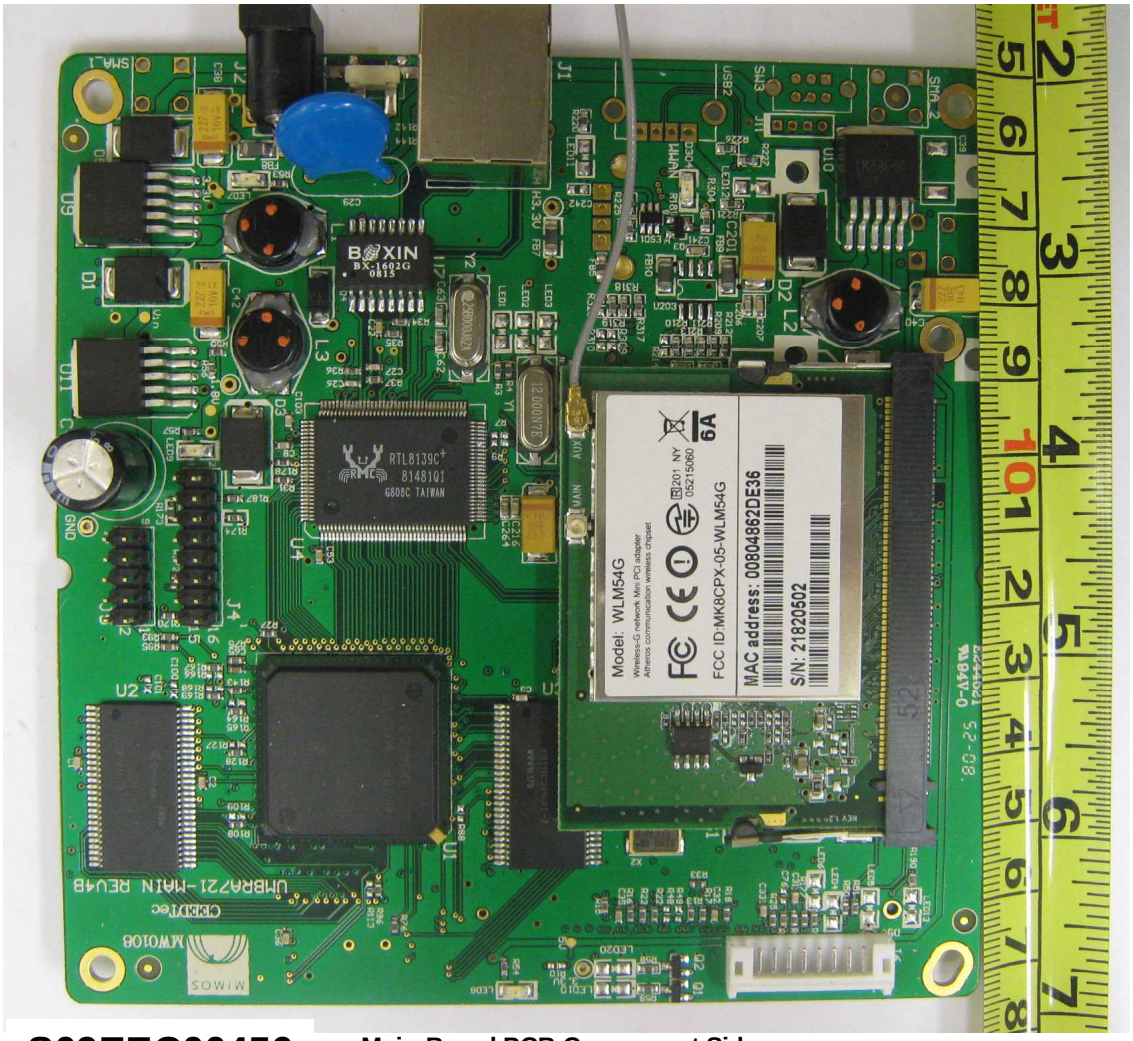
EUT PHOTOGRAPHS



Internal View

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

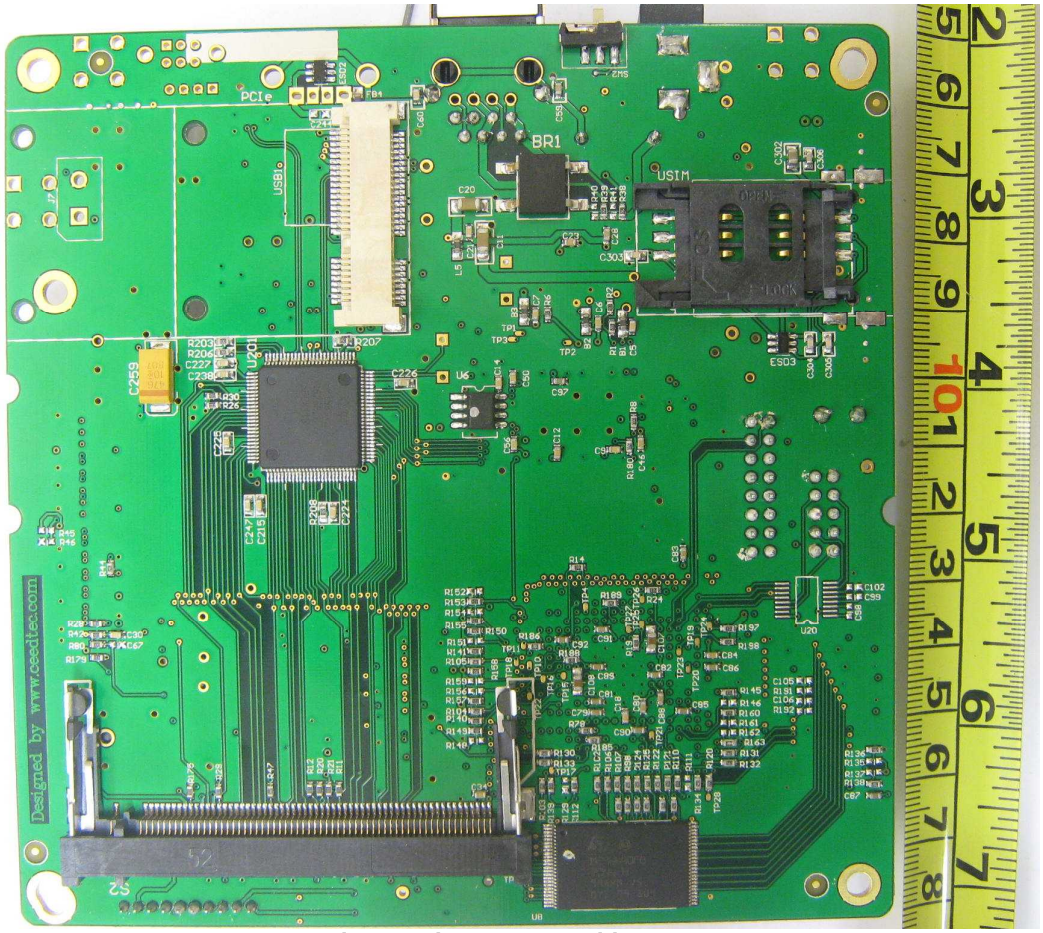
EUT PHOTOGRAPHS



S09EEC00456 **Main-Board PCB Component Side**

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS



Main-Board PCB Trace Side

S09EEC00456

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

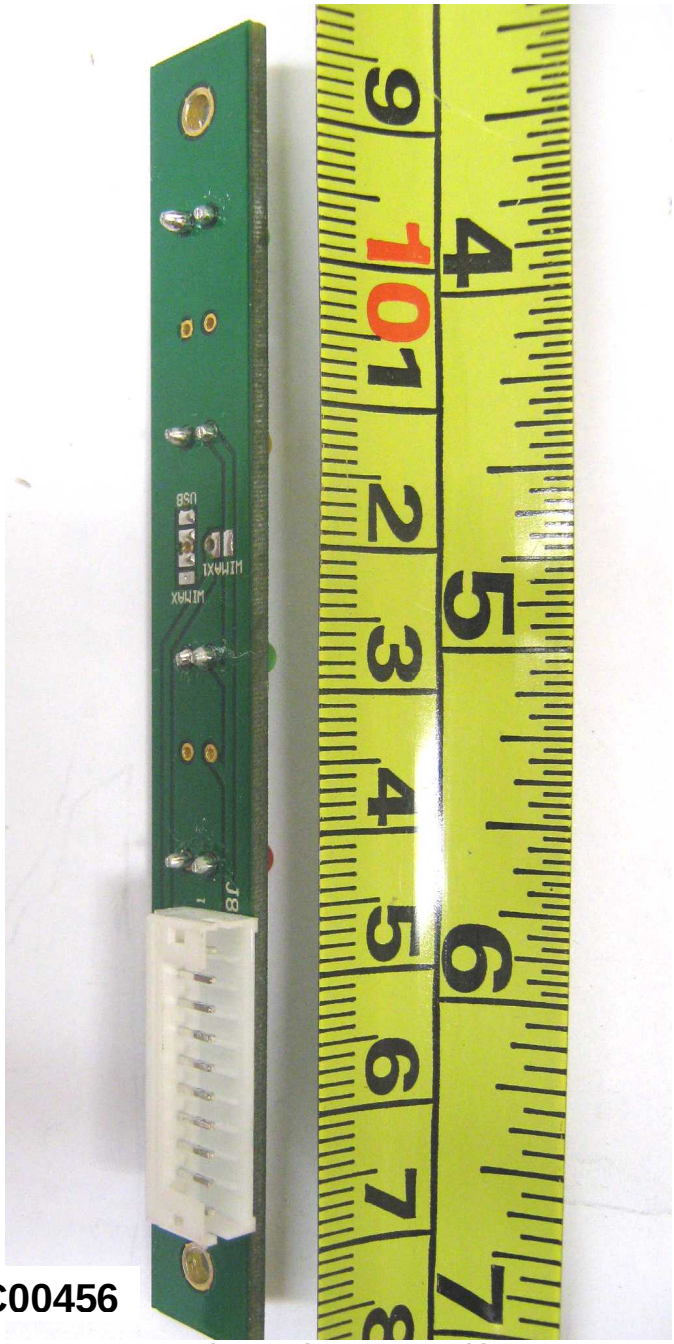
EUT PHOTOGRAPHS

S09EEC00456

LED Board PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS



Main-Board PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS

Power Adapter Front View

Power Adapter Rear View

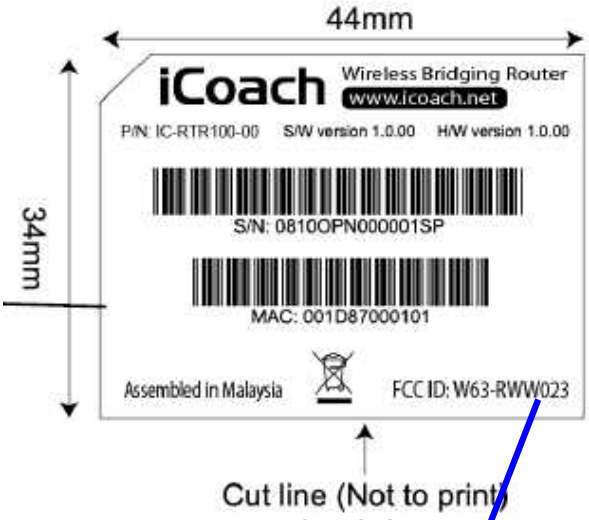
ANNEX B

FCC LABEL & POSITION

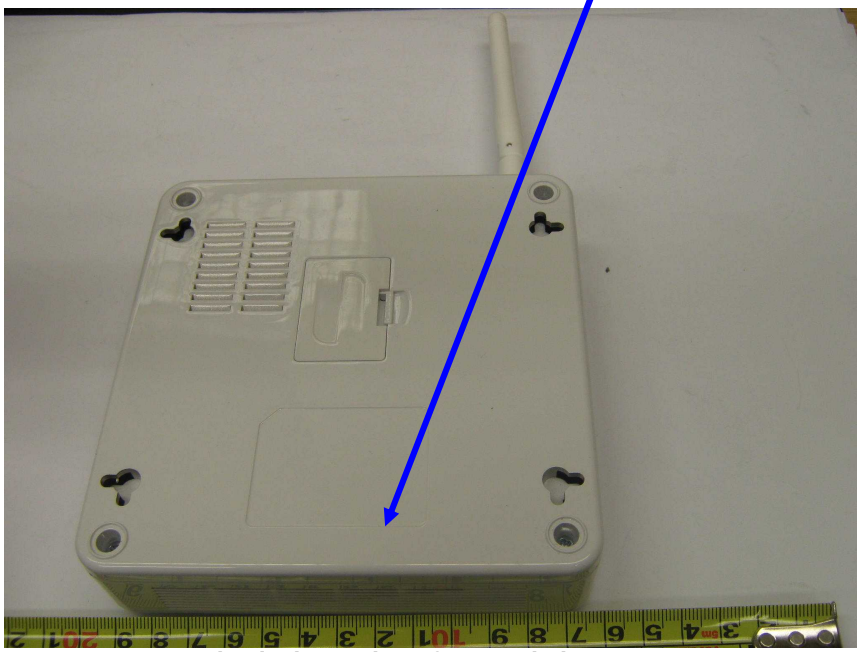
FCC LABEL & POSITION — ANNEX B

Labeling 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



Physical Location of FCC Label on EUT

ANNEX C

USER MANUAL
TECHNICAL DESCRIPTION
BLOCK & CIRCUIT DIAGRAMS

(Please refer to manufacturer for details)