TEST REPORT

Your Ref:

Date: 27 Oct 2005

Our Ref: 56S050914/01_CORR01

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC Parts 15B & C : 2005
OF A
RF REMOTE CONTROL
[Model : RC1534802/00]
[FCC ID : RCSBC15348]

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 (10m Anechoic Chamber)
PREPARED FOR	Philips Electronics Singapore Pte Ltd Remote Control Systems 620A Lorong 1 Toa Payoh Singapore 319762 Tel : 6882 3321 Fax : 6254 1691
JOB NUMBER	56S050914
TEST PERIOD	17 Oct 2005 – 20 Oct 2005

PREPARED BY

Quek Keng Huat
Associate Engineer

APPROVED BY

Lim Cher Hwee
Product Manager

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ISO 9001 JQA-QMA 10040

ilac-MRA ACCREDITED LABORATORY SAC-SINGLAS

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.

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

Test Results Summary

Test Standard	Description	Pass / Fail
FCC Part 15: 2005		
15.107(a), 15.207	Conducted Emissions	Not Applicable *See Note 2
15.109(a), 15.205, 15.209	Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)	Pass
15.231(b)	Radiated Emissions (Fundamental and Harmonics)	Pass
15.231(c)	20dB Bandwidth	Pass
15.231(d)	Band Edge Compliance	Not Applicable *See Note 3
15.231(d)	Frequency Stability Versus Temperature	Not Applicable *See Note 3
15.231(d)	Frequency Stability Versus Input Voltage	Not Applicable *See Note 3
15.35(c)	Duty Cycle Factor Computation	Refer to page 19-20 for details

Notes

1. The EUT is a Class B device when in non-transmitting state and meets the FCC Part15B Class B requirements.

2. The Equipment Under Test (EUT) is a battery-operated device and contains no provision for public utility connections.

3. The Band Edge and Frequency Tolerance tests are not applicable, as the carrier of the Equipment Under Test (EUT) is no in 40.66MHz - 40.70MHz band.

4. The declaration of Philips Electronics Singapore Pte Ltd is as following:

   The models **RC1534802/00, RC1534804/00** and **RC1534806/00** are identical models in term of components, circuitry design, PCB layout and mechanical structure, and the difference between the these models are:

   a. Printing on textplate, keymat and top part

   The model **RC1534802/00** is the worse case model between the two declared models in view of EMC, and if model **RC1534802/00** pass the EMC test, the model **RC1534804/00 and RC1534806/00** can be deemed to pass the same test.

5. Model **RC1534802/00** was tested and passed the EMC tests listed in the above table, therefore, the model **RC1534804/00 and RC1534806/00** can be deemed to pass the same tests based on the manufacturer's declaration.

Modifications

1. No modifications were made.

Description	:	The Equipment Under Test (EUT) is a **RF Remote Control.**
Manufacturer	:	Philips Electronics Singapore Pte Ltd – Remote Control Systems
Model Number	:	RC1534802/00
FCC ID	:	RCSBC15348
Serial Number	:	3139 228 67401
Microprocessor	:	Refer To Manufacturer
Operating / Transmitting Frequency	:	RF – 433.92MHz ± 14kHz
Clock / Oscillator Frequency	:	8MHz & 13.56MHz
Modulation	:	Frequency Shift Keying (FSK)
Port / Connectors	:	Refer to manufacturers' user manual / operating manual.
Rated Input Power	:	2.4VDC – 3.3VDC
Accessories	:	Nil

Equipment Description (Including Brand Name)	**Model, Serial & FCC ID Number**	**Cable Description** (List Length, Type & Purpose)
Dell Laptop	M/N: D400 S/N: 9741415168 FCC ID: E2K24GBRL	100m unshielded power cable
Power Adapter (Laptop)	M/N: PA1650 05D S/N: CN-05U092-71615-4B FCC ID: DoC	1.00m unshielded power cable
Dell Mouse	M/N: M-UVDEL1 S/N: LNA44055721 FCC ID: DoC	1.80m standard mouse cable
RF Dongle	M/N: OVU 500201/00RE S/N: 05063360 FCC ID: DoC	1.50m standard USB cable

FCC Part 15
1. Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement) **2. Radiated Emissions (Fundamental and Harmonics)** **3. 20dB Bandwidth** **4. Duty Cycle Factor Computation**
The EUT was exercised by operating in following modes: 1. RF mode with maximum continuous transmission in test mode, i.e transmitting at 433.92MHz

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) – ESMIE	ESMI	829214/006 829550/001	18 Apr 2006
Agilent Preamplifier (0.01-4GHz) – PA6	87405B	MY39500338	02 Aug 2006
Schaffner Bilog Antenna – BL9	CBL6143	5045	19 May 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.

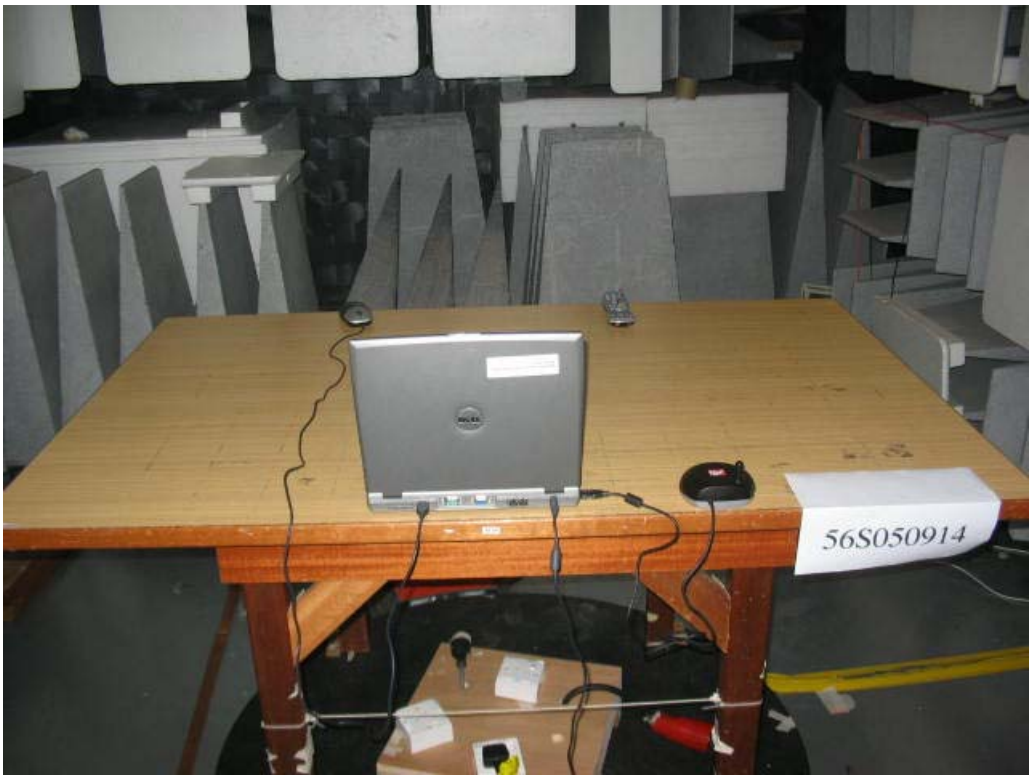
FCC Parts 15.109(a) and 15.209 Radiated Emission Test Method

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 μV/m = 46.0 dBμV/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dBμV/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)

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

Test Input Power	2 x 1.5V DC Battery	Temperature	22°C
Test Distance	3m	Relative Humidity	55%
Operating Mode	RF Mode	Atmospheric Pressure	1030mbar
		Tested By	Chua Choon Meng

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
486.1180	31.6	-14.4	28	100	V
569.2003	34.7	-11.3	0	100	V
601.9998	30.6	-15.4	303	100	V
632.0174	30.2	-15.8	267	100	V
876.4213	31.8	-14.2	175	100	V
903.0174	30.2	-15.8	267	100	V

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dBμV/m)	Average Value (dBμV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)
--	--	--	--	--	--	--
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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. "--" indicates no emissions were found and shows compliance to the limits.
3. 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.
4. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
5. 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. 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).

FCC Part 15.231(b) Radiated Emission (Fundamental and Harmonics) Limits

Fundamental Frequency (MHz)	Field Strength of Fundamental Limit Values @ 3m (dBµV/m) *	Field Strength of Harmonics Limit Values @ 3m (dBµV/m) *
40.66 - 40.70	67.0	47.0
70 - 130	62.0	42.0
130 - 174	62.0 to 71.5 **	42.0 to 51.5 **
174 - 260	71.5	51.5
260 - 470	71.5 to 82.0 **	51.5 to 62.0 **
Above 470	82.0	62.0
* Average detector employed. A peak limit of 20dB above the average limit does apply.		
** Liner interpolations (in µV/m).		

Note:
Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows. The maximum permitted unwanted emission level (harmonic) is 20dB below the maximum permitted fundamental level.

- Band 130MHz - 174MHz
  20 log [56.81818(F) - 6136.3636]
- Band 260MHz - 470MHz
  20 log [41.6667(F) - 7083.3333]

FCC Parts 15.231(b) Radiated Emission (Fundamental and Harmonics) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz-26.5GHz) – ESMIE	ESMI	829214/006 829550/001	18 Apr 2006
Agilent Preamplifier (0.01-4GHz) – PA6	87405B	MY39500338	02 Aug 2006
Schaffner Bilog Antenna – BL9	CBL6143	5045	19 May 2006
MITEQ Preamplifier (0.1-26.5GHz) – PA11	NSP2650-N	728231	01 Apr 2006
EMCO Horn Antenna – H15	3115	0003-6088	19 May 2006

FCC Part 15.231(b) Radiated Emission (Fundamental and Harmonics) 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 Part 15.231(b) Radiated Emission (Fundamental and Harmonics) 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 fundamental and harmonics 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 the EUT fundamental frequency until its 10^{th} harmonics, using the Bi-log antenna for frequencies from 30MHz up to 3GHz, and the Horn antenna above 3GHz.

Sample Calculation Example

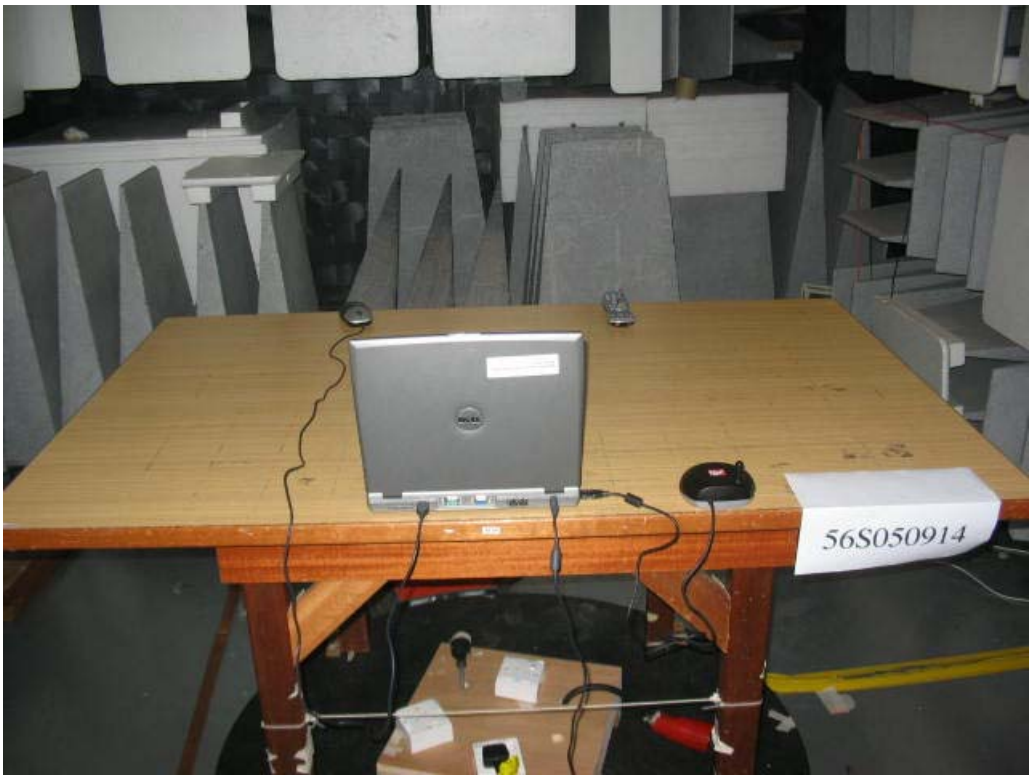
At 300 MHz Q-P limit (Class B) = 200 μV/m = 46.0 dBμV/m

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

Q-P reading obtained directly from EMI Receiver = 40.0 dBμV/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)

FCC Part 15.231(b) Radiated Emission (Fundamental and Harmonics) Results

Test Input Power	2 x 1.5V DC Battery	Temperature	22°C
Test Distance	3m	Relative Humidity	55%
Operating Mode	RF mode	Atmospheric Pressure	1030mbar
		Tested By	Chua Choon Meng

Frequency (GHz)	Peak Value (dBμV/m)	Average Value (dBμV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Note
433.9097	80.5	66.3	-9.9	153	158	V	Fundamental
867.7489	46.1	31.9	-22.8	315	100	V	Harmonics
1301.6498	56.0	41.8	-12.1	305	100	V	Harmonics
1735.8505	52.9	38.7	-14.5	233	100	V	Harmonics
2603.4203	53.8	39.6	-12.8	320	100	V	Harmonics
3037.2498	56.0	41.8	-10.2	280	100	V	Harmonics

Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the average and peak detectors, are reported. All other emissions were relatively insignificant.
2. 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.
3. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
4. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   30MHz - 1GHz
   RBW: 120kHz VBW: 1MHz
   >1GHz
   RBW: 1MHz VBW: 1MHz
5. 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.
6. 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).

FCC Part 15.231(c) 20dB Bandwidth Limits

The EUT shows compliance to the requirements of this section, which states that the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

FCC Part 15.231(c) 20dB Bandwidth Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz-26.5GHz) – ESMIE	ESMI	829214/006 829550/001	18 Apr 2006
Agilent Preamplifier (0.01-4GHz) – PA6	87405B	MY39500338	02 Aug 2006
Schaffner Bilog Antenna – BL9	CBL6143	5045	19 May 2006

FCC Part 15.231(c) 20dB Bandwidth 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 120kHz and 1MHz.
4. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.231(c) 20dB Bandwidth 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 433.92MHz.
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, $| f_H - f_L |$.

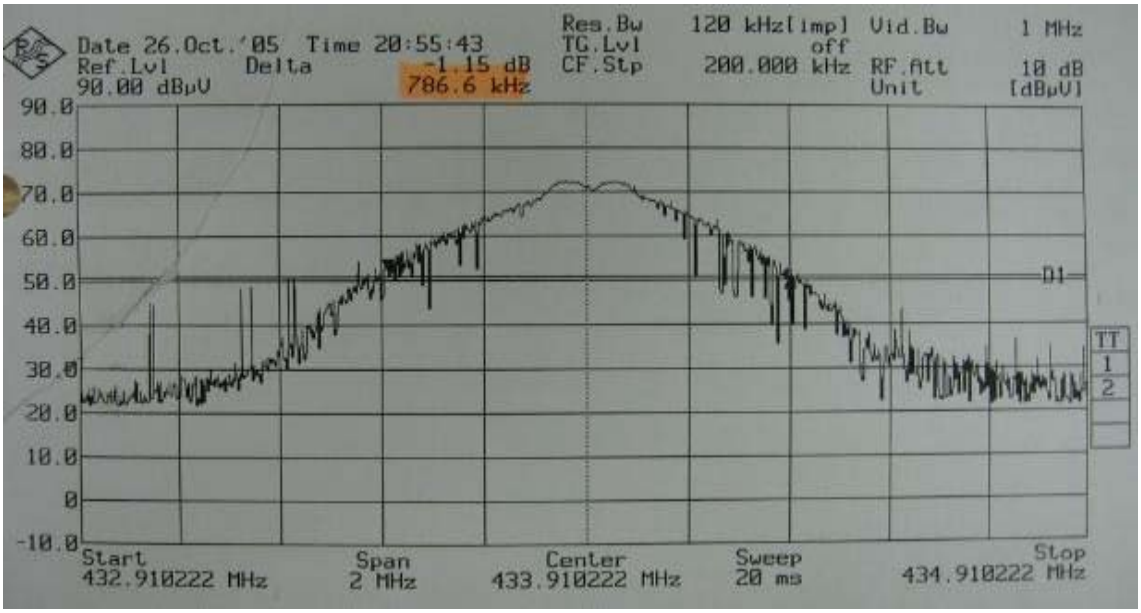
20dB Bandwidth Test Setup

FCC Part 15.231(c) 20dB Bandwidth Results

Test Input Power	110V 60Hz	Temperature	22°C
Test Distance	3m	Relative Humidity	55%
		Atmospheric Pressure	1030mbar
		Tested By	Chua Choon Meng

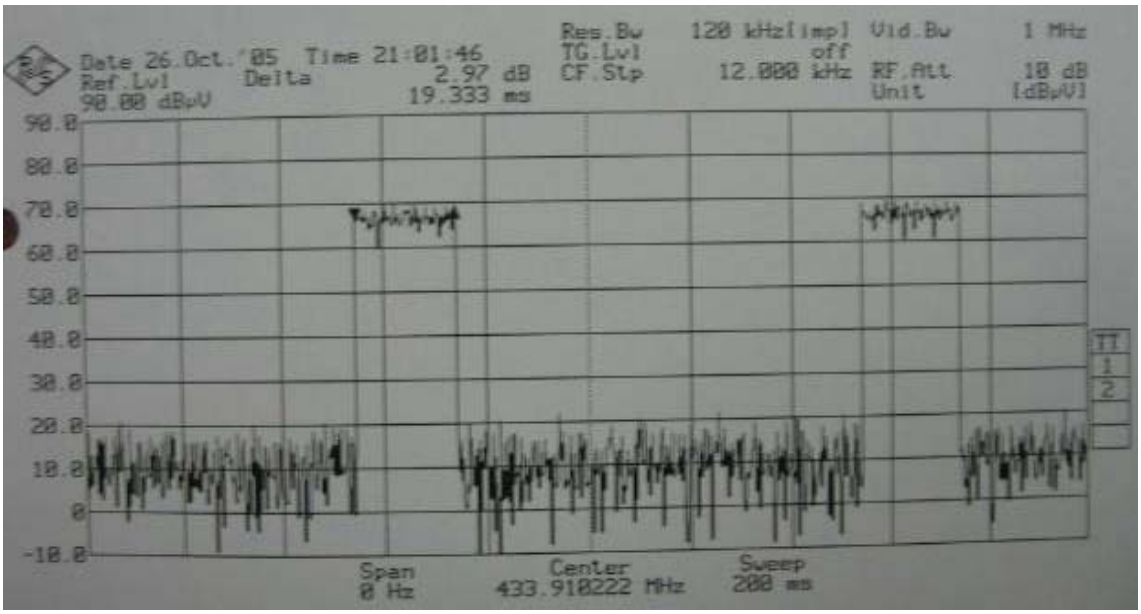
Channel Frequency (MHz)	20dB Bandwidth (MHz)
433.92	0.7866

20dB Bandwidth Plots

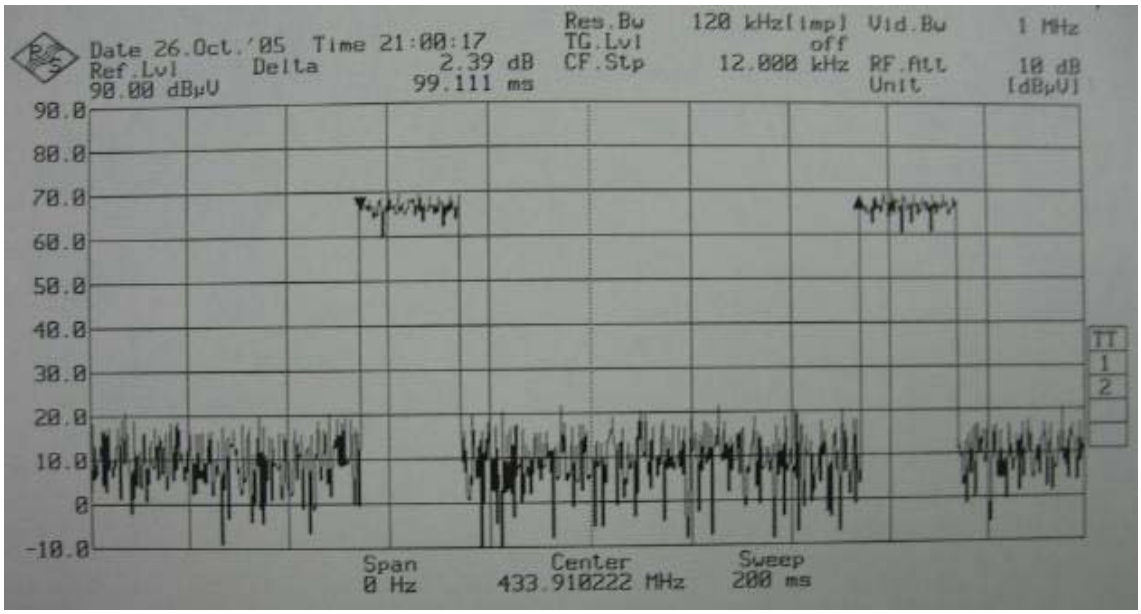


Channel Frequency 433.9MHz

FCC Part 15.35(c) Duty Cycle Correction Factor



On Time



Period

Duty Cycle Factor (worst- case) = 20 log [Total On time / Period]
= 20 log [(19.3330 / 99.1110)]
= **-14.2dB**

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.

4. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. PSB Corporation therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

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9. This report shall not be reproduced wholly or in parts and no reference shall be made by the Client to PSB Corporation or to the report or results furnished by PSB Corporation in any advertisements or sales promotion.

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

May 2005

ANNEX A

EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

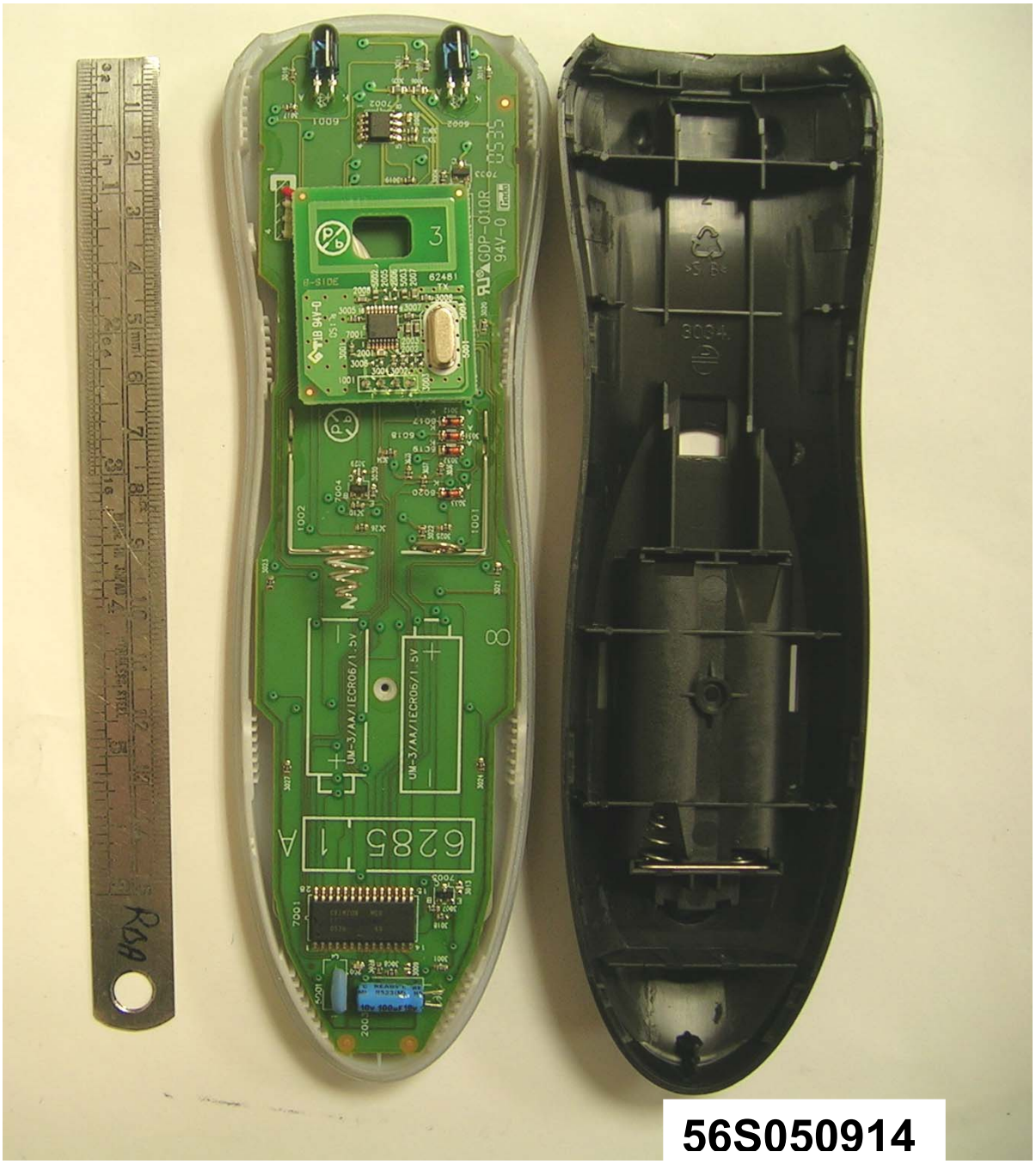
EUT PHOTOGRAPHS

Front View

Rear View

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

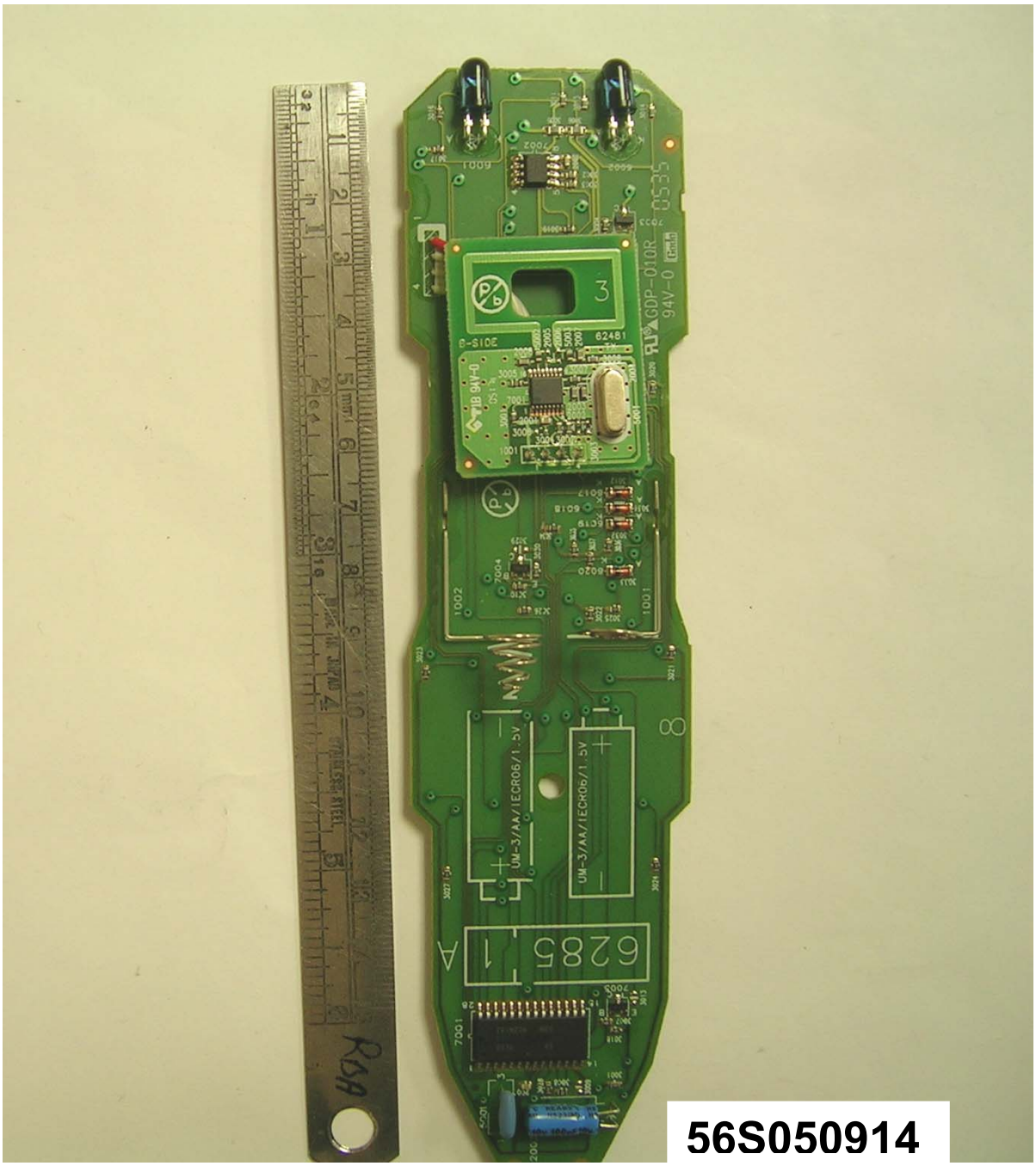
EUT PHOTOGRAPHS



EUT Layout View

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

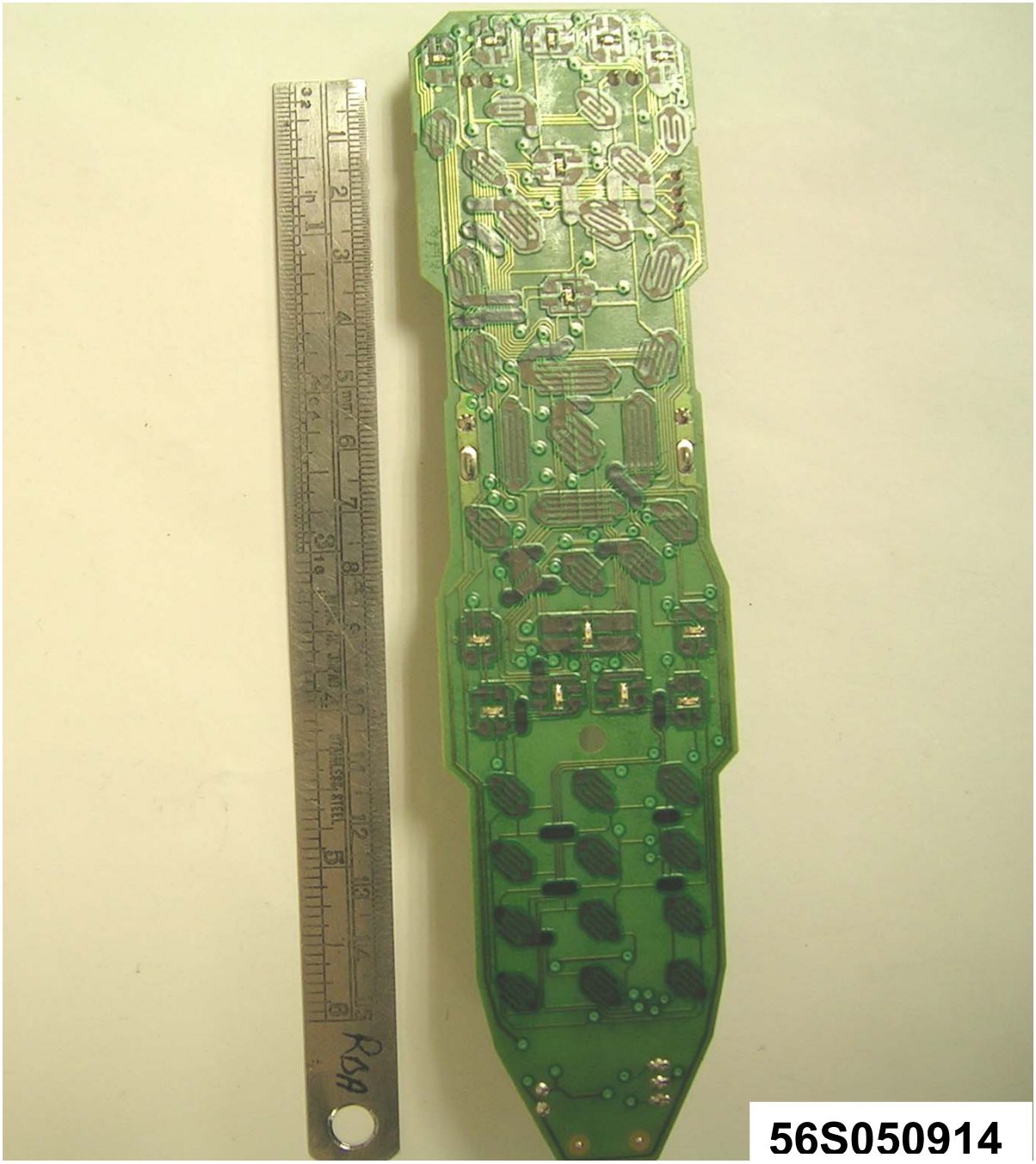
EUT PHOTOGRAPHS



EUT PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

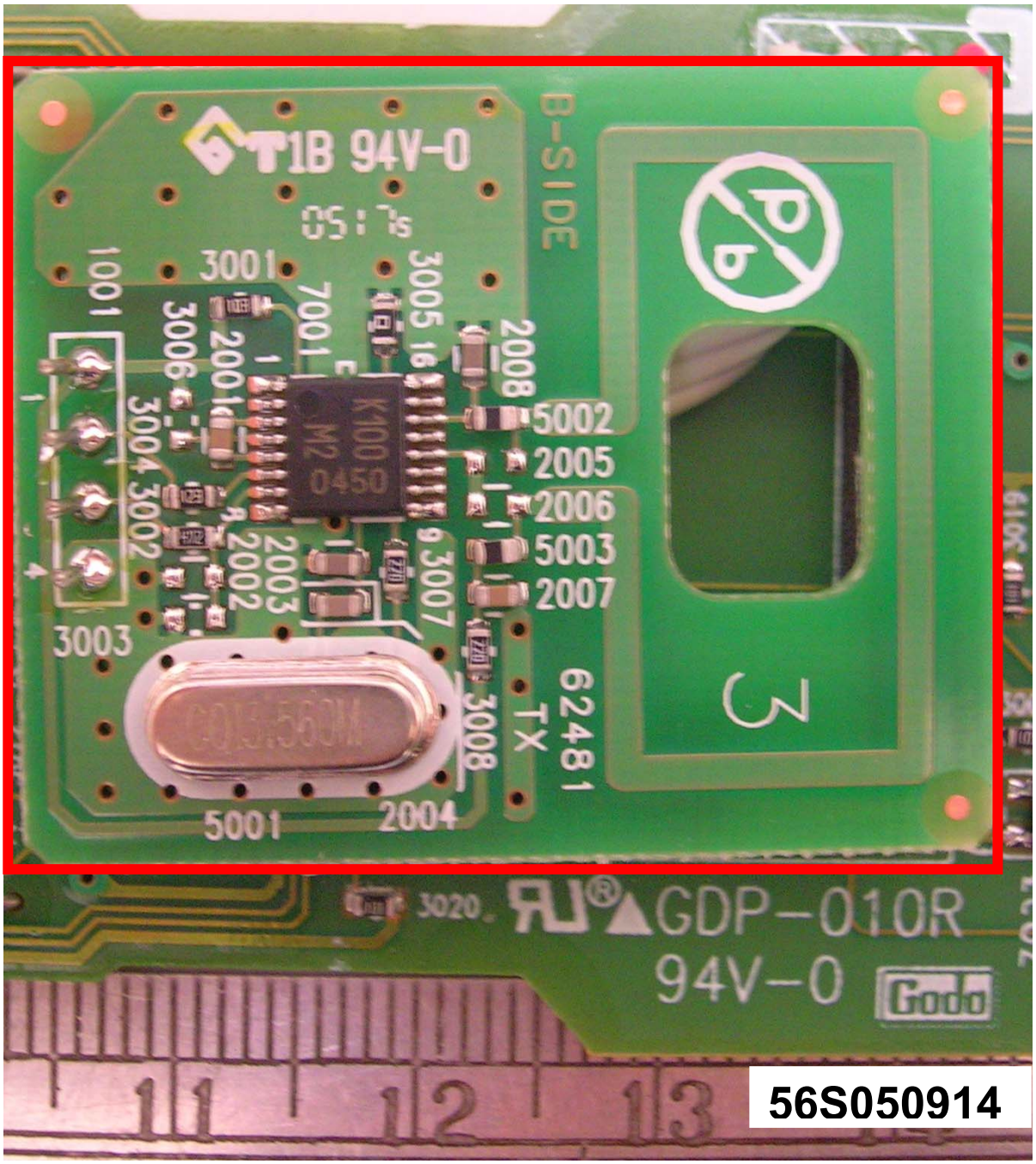
EUT PHOTOGRAPHS



EUT PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

EUT PHOTOGRAPHS



RF Module Circuit

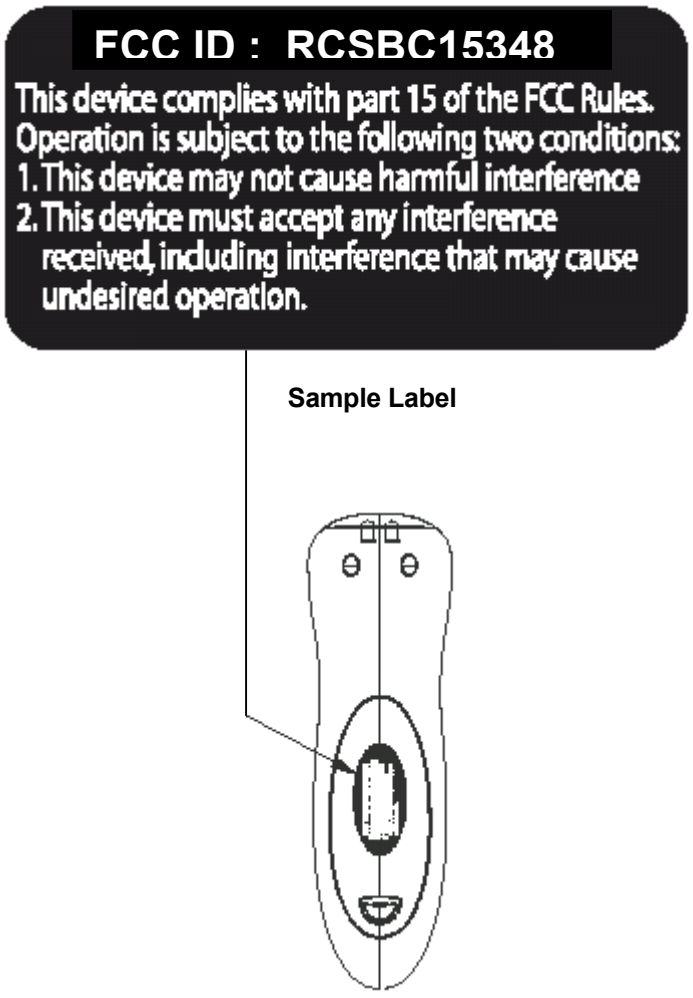
ANNEX B

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

Physical Location of FCC Label on EUT

ANNEX C

USER MANUAL
TECHNICAL DESCRIPTION
BLOCK & CIRCUIT DIAGRAMS

(Please refer to manufacturer for details)