

Test Report No. 53S062750/EMC/03

Dated : 17 Nov 2006



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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC Parts 2, 15 & 24 : 2006
OF A
WAVEON 606 MOBILE DATA ACQUISITION
[Model : Waveon 606e]
[FCC ID : UCW76W606A]

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

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

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QUOTATION NUMBER 53Q0600505

JOB NUMBER 53S062750

TEST PERIOD 16-Oct 2006 – 30 Oct 2006

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

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

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TEST SUMMARY

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

Test Results Summary

Test Standard	Description	Pass / Fail
FCC Parts 2, 15, 24: 2006		
24.232(b), 2.1046	RF Power Output	Pass
24.238(a), 2.1051	Out of Band Emissions	Pass
24.238(a)	Band Edge Compliance (Radiated)	Pass
15.109	Receiver Spurious Emissions	Pass
1.1310	Maximum Permissible Exposure	Pass

Notes

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

<u>Transmit Channel</u>	<u>Frequency (MHz)</u>
Channel 512	1850.2
Channel 661	1880.0
Channel 810	1909.8
- All the measurements in FCC Part 24 were done based on radiated measurements with test procedures as accordance to ANSI/TIA-603-B-2002. For receiver spurious emissions test, the test procedures were according to ANSI C63.4: 2003.
- The EUT is a Class B device when in non-transmitting state and meets the FCC Part15B Class B requirements.
- The RF module of the Equipment Under Test (EUT) is a qualified RF module, which bears the FCC ID: QPB-TR8000506. As such, only limited tests as mentioned above were evaluated.

Modifications

- No modifications were made.

PRODUCT DESCRIPTION

Description	: The Equipment Under Test (EUT) is a WAVEON 606 MOBILE DATA ACQUISITION.
Manufacturer	: Infowave Pte Ltd
FCC ID	: UCW76W606A
Model Number	: Waveon 606e
Serial Number	: 606e-0506-01232
Microprocessor	: Refer To Manufacturer
Operating Frequency	: 900MHz, 1800MHz, 1900MHz
Clock / Oscillator Frequency	: 23.104MHz, 32.768MHz, 13MHz
Transmitter Frequency	: 1850.2MHz - 1909.8MHz
Modulation	: 300KGXW
Port / Connectors	: 1X14 pin Communication Connections, 1XGPS Port & 1XGPRS port
Rated Input Power	: 12Vdc 0.3A
Accessories	: Nil

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SUPPORTING EQUIPMENT DESCRIPTION

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
Rohde & Schwarz Universal Radio Communication tester	M/N: CMU200 S/N: 837728/071 FCC ID: Nil	1.50m unshielded power cable
AS GSM (Dual Band) Antenna	M/N: ASP3561 S/N: 92099031 FCC ID: Nil	2.35m RF shielded cable

EUT OPERATING CONDITIONS

FCC Parts 2, 15 and 24
<ol style="list-style-type: none">1. RF Output Power2. Out of Band Spurious Emissions3. Band Edge Compliance (Radiated)4. Receiver Spurious Emissions5. Maximum Permissible Exposure
<p>The EUT was exercised by operating in continuous loopback mode with maximum transmission at lower, middle and upper channels one at a time. The R&S CMU200 was used as a PCS1900 base station.</p>

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RF OUTPUT POWER TEST

FCC Part 24.232(b) RF Output Power Limits

The EUT shows compliance to the requirements of this section, which states the mobile/portable stations are limited to 2 Watts EIRP peak power and the equipment must employ means to limits the power to the minimum necessary for successful communication.

FCC Parts 2.1046 and 24.232(b) RF Output Power Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz –26.5GHz) – ESMI1	ESMI	849182/003 848926/007	04 Jul 2007
EMCO Horn Antenna – H14	3115	0003-6087	19 May 2007
EMCO Horn Antenna – H15	3115	0003-6088	19 May 2007
Weinschel Corp 10dB Attenuator	47-10-43	BD8406	19 May 2007
Agilent Signal Generator	83620B	3844A01337	24 Jan 2007

RF OUTPUT POWER TEST

FCC Parts 2.1046 and 24.232(b) RF Output Power 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 antenna was set at the required test distance away from the EUT and supporting equipment boundary.

FCC Parts 2.1046 and 24.232(b) RF Output Power Test Method

1. The EUT was set to transmit at the maximum power at the lower channel with the modulation on at normal test condition.
2. The receiving antenna (test antenna) was set at vertical polarization with the height of 1m.
3. With the spectrum analyser was set to max hold enabled (peak detector mode), the level of the operating frequency (carrier emission) was recorded. For EUT which is a portable device, the carrier emission was carried out by rotating the EUT through three orthogonal axes to determine which attitude and equipment arrangement produces the highest emission.
4. The test antenna was then raised or lowered through the specified range of heights (1m – 4m) until a maximum signal level was detected on the test receiver.
5. The EUT was then rotated through 360° in the horizontal plane until the maximum signal was received. The maximum received signal level was recorded as A (in dBm).
6. The EUT was replaced with the substitution antenna with the antenna input was connected to the signal generator via a 10dB attenuator (if required).
7. The signal generator was set to the found carrier frequency. The output level of the signal generator was adjusted until the test receiver was at least 20dB above the level when the signal generator was switched off.
8. The test antenna was raised and lowered through the specified range of heights (1m – 4m) until the maximum signal level was received on the test receiver.
9. The substitution antenna was rotated until the maximum level was detected on the test receiver.
10. The output level of the signal generator was adjusted until the received signal level at the test receiver was equal to the level recorded in step 5 (A dBm). The signal generator output level was recorded as B (in dBm).
11. The spurious emission level, P (e.i.r.p) was computed as followed:

P (e.i.r.p)	=	B – C – D + E
where	C	= cable loss between the signal generator and the substitution
	D	= attenuation level if attenuator is used
	E	= substitution antenna gain
12. The steps 2 to 11 were repeated with the receiving antenna was set to horizontal polarization.
13. Comparison was made on both measured results with vertical and horizontal polarizations. The highest value out of vertical and horizontal polarizations was recorded.
14. The steps 1 to 13 were repeated with the EUT was set to operate at the middle and upper channels respectively.

RF OUTPUT POWER TEST



RF Output Power Test Setup

RF OUTPUT POWER TEST

FCC Parts 2.1046 and 24.232(b) RF Output Power Results

Operating Mode	PCS 1900 Transmit	Temperature	24°C
Test Input Power	12VDC	Relative Humidity	57%
Test Distance	3m	Atmospheric Pressure	1030mbar
		Tested By	Lucas Beh

Frequency (MHz)	Amplitude (dBW)	Limit (dBW)	Channel
1850.2	-0.2	3	512
1880.0	-2.9	3	661
1909.8	-1.2	3	810

Notes

1. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
>1GHz
RBW: 1MHz VBW: 1MHz
2. RF Output Power 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 is $\pm 4.3\text{dB}$ (for EUTs < 0.5m X 0.5m X 0.5m).

OUT OF BAND EMISSION TEST

FCC Part 24.238(a) Out of Band Emission Limits

The EUT shows compliance to the requirements of this section, which states the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power by, P by a factor of at least $43 + 10\log(P)$ dB.

FCC Parts 2.1051 and 24.238(a) Out of Band Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz –26.5GHz) – ESMI1	ESMI	849182/003 848926/007	04 Jul 2007
Schaffner Pre-Amplifier	CPA9231A	3422	01 Apr 2007
MITEQ Preamplifier (0.1-26.5GHz) – PA4	NSP2650-N	604879	07 Nov 2006
Schaffner Bilog Antenna –BL4	CBL6112B	2593	12 May 2007
EMCO Horn Antenna – H14	3115	0003-6087	19 May 2007
EMCO Horn Antenna – H15	3115	0003-6088	19 May 2007
Agilent Signal Generator	83620B	3844A01337	24 Jan 2007
K&L Microwave Variable Bandstop Filter	3TNF- 1000/2000/N/N	436	04 Aug 2007

OUT OF BAND EMISSION TEST

FCC Parts 2.1051 and 24.238(a) Out of Band 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 antenna was set at the required test distance away from the EUT and supporting equipment boundary.

FCC Parts 2.1051 and 24.238(a) Out of Band Emission Test Method

1. The EUT was set to transmit at the maximum power at the lower channel with the modulation on at normal test condition.
2. The receiving antenna (test antenna) was set at vertical polarization with the height of 1m.
3. With the spectrum analyser was set to max hold enabled (peak detector mode), the emissions outside the operating frequency range (spurious emissions) were searched and recorded. For EUT which is a portable device, the spurious emission search was carried out by rotating the EUT through three orthogonal axes to determine which attitude and equipment arrangement produces worst emissions.
4. For each spurious emission found, the test antenna was raised or lowered through the specified range of heights (1m – 4m) until a maximum signal level was detected on the test receiver.
5. The EUT was then rotated through 360° in the horizontal plane until the maximum signal was received. The maximum received signal level was recorded as A (in dBm).
6. The EUT was replaced with the substitution antenna with the antenna input was connected to the signal generator via a 10dB attenuator (if required).
7. The signal generator was set to the found spurious frequency. The output level of the signal generator was adjusted until the test receiver was at least 20dB above the level when the signal generator was switched off.
8. The test antenna was raised and lowered through the specified range of heights (1m – 4m) until the maximum signal level was received on the test receiver.
9. The substitution antenna was rotated until the maximum level was detected on the test receiver.
10. The output level of the signal generator was adjusted until the received signal level at the test receiver was equal to the level recorded in step 5 (A dBm). The signal generator output level was recorded as B (in dBm).
11. The spurious emission level, P (e.i.r.p) was computed as followed:

P (e.i.r.p)	=	B – C – D + E
where C	=	cable loss between the signal generator and the substitution
D	=	attenuation level if attenuator is used
E	=	substitution antenna gain
12. The steps 2 to 11 were repeated with the receiving antenna was set to horizontal polarization.
13. Comparison was made on both measured results with vertical and horizontal polarizations. The highest value out of vertical and horizontal polarizations was recorded.
14. The steps 2 to 13 were repeated until all the spurious emissions (up to 10th harmonics of the carrier frequency) were measured.
15. The steps 1 to 14 were repeated with the EUT was set to operate at the middle and upper channels respectively.

OUT OF BAND EMISSION TEST



Out of Band Emissions Test Setup (Front View)



Out of Band Emissions Test Setup (Rear View)

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OUT OF BAND EMISSION TEST

FCC Parts 2.1051 and 24.238(a) Out of Band Emission Results

Operating Mode	PCS1900 Transmit	Temperature	24°C
Test Input Power	12VDC	Relative Humidity	57%
Test Distance	3m	Atmospheric Pressure	1030mbar
		Tested By	Lucas Beh

Lower Channel

Frequency (MHz)	Amplitude (dBm)	Limit (dBm)
3.700273	-20.9	-13
5.550415	-24.7	-13
7.400535	-32.2	-13
9.250000	-34.8	-13
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Middle Channel

Frequency (MHz)	Amplitude (dBm)	Limit (dBm)
3.760122	-20.5	-13
5.639848	-26.5	-13
7.519762	-35.1	-13
9.399702	-34.2	-13
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Upper Channel

Frequency (MHz)	Amplitude (dBm)	Limit (dBm)
3.819742	-20.7	-13
5.729191	-24.2	-13
7.638937	-32.3	-13
9.549124	-35.8	-13
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OUT OF BAND EMISSION TEST

Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured. All other emissions were relatively insignificant.
2. “-” indicates no emissions were found and shows compliance to the limits.
3. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
RBW: 120kHz VBW: 1MHz
>1GHz
RBW: 1MHz VBW: 1MHz
4. The emissions were investigated up to 10th harmonics of the carrier frequency.
5. Out of Band 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 is $\pm 4.3\text{dB}$ (for EUTs < 0.5m X 0.5m X 0.5m).

BAND EDGE COMPLIANCE (RADIATED) TEST

FCC Part 24.238(a) Band Edge Compliance (Radiated) Limits

The EUT shows compliance to the requirements of this section, which states the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power by, P by a factor of at least $43 + 10\log(P)$ dB.

FCC Part 24.238(a) Band Edge Compliance (Radiated) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz –26.5GHz) – ESMI1	ESMI	849182/003 848926/007	04 Jul 2007
EMCO Horn Antenna – H14	3115	0003-6087	19 May 2007
Weinschel Corp 10dB Attenuator	47-10-43	BD8406	19 May 2007
Agilent Signal Generator	83620B	3844A01337	24 Jan 2007

BAND EDGE COMPLIANCE (RADIATED) TEST

FCC Part 24.238(a) Out of Band 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 antenna was set at the required test distance away from the EUT and supporting equipment boundary.

FCC Part 24.238(a) Out of Band Emission Test Method

1. The EUT was set to transmit at the maximum power at the lower channel with the modulation on at normal test condition.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band 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. The band edge spurious emissions plot was plotted.
4. The EUT was set to transmit at the maximum power at the upper channel with the modulation on at normal test condition.
5. 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 and any spurious emissions at the band-edge.

BAND EDGE COMPLIANCE (RADIATED) TEST



Band Edge Compliance (Radiated) Test Setup

BAND EDGE COMPLIANCE (RADIATED) TEST

FCC Part 24.238(a) Band Edge Compliance (Radiated) Results

Operating Mode	PCS1900 Transmit	Temperature	24°C
Test Input Power	12VDC	Relative Humidity	57%
Test Distance	3m	Atmospheric Pressure	1030mbar
Attached Plots	XX	Tested By	Lucas Beh

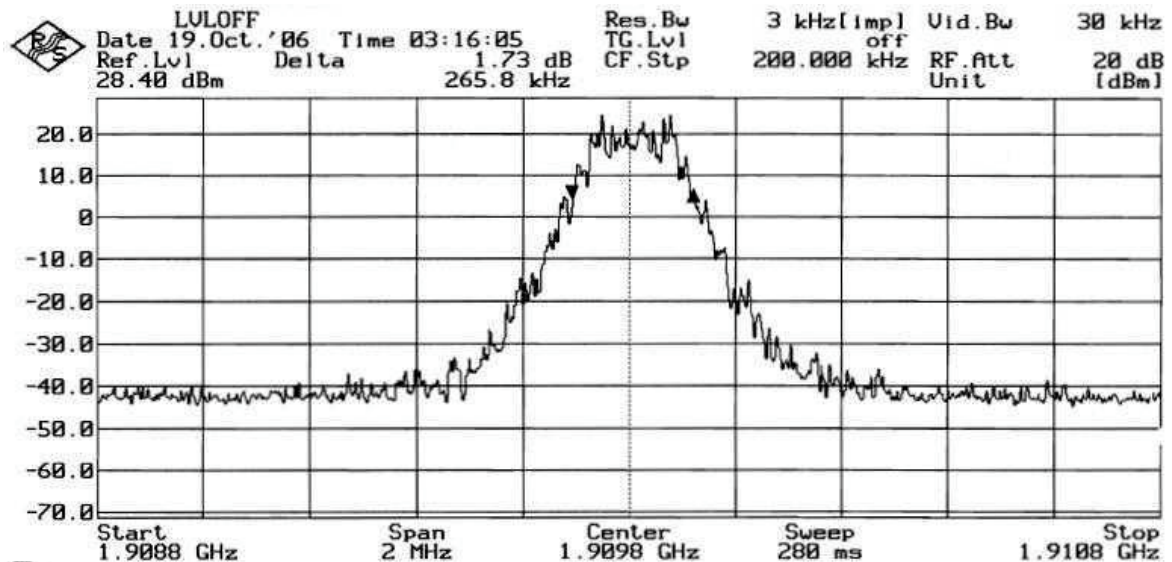
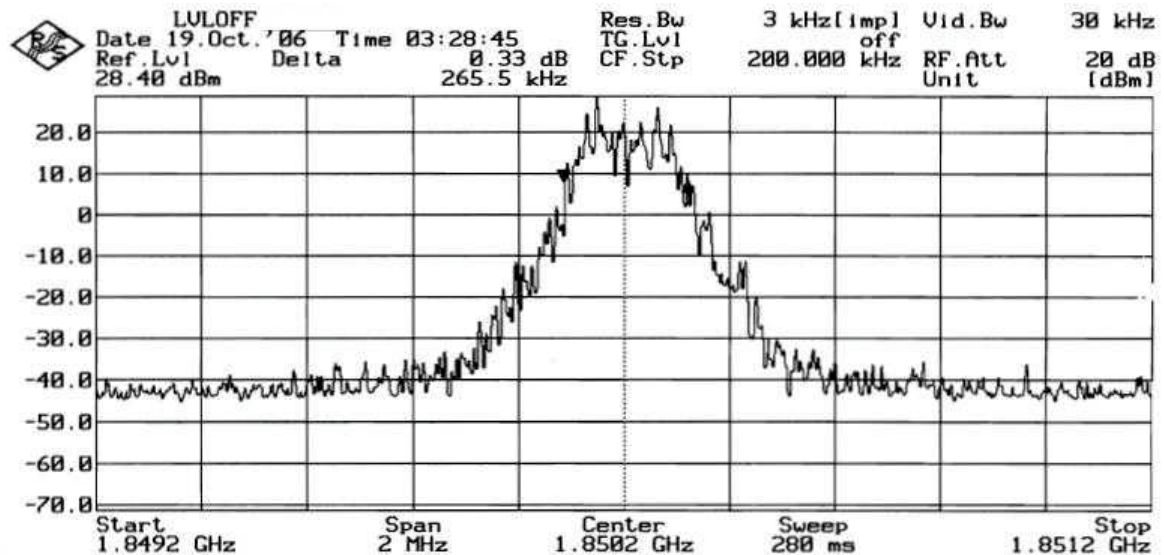
No significant signal was found and they were below the specified limit.

Notes

1. Refer to Plots 1 and 2 for lower and upper channels 26dB bandwidth.
2. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings (at least 1% of the 26dB of the channel under evaluation):
RBW: 100kHz VBW: 100kHz

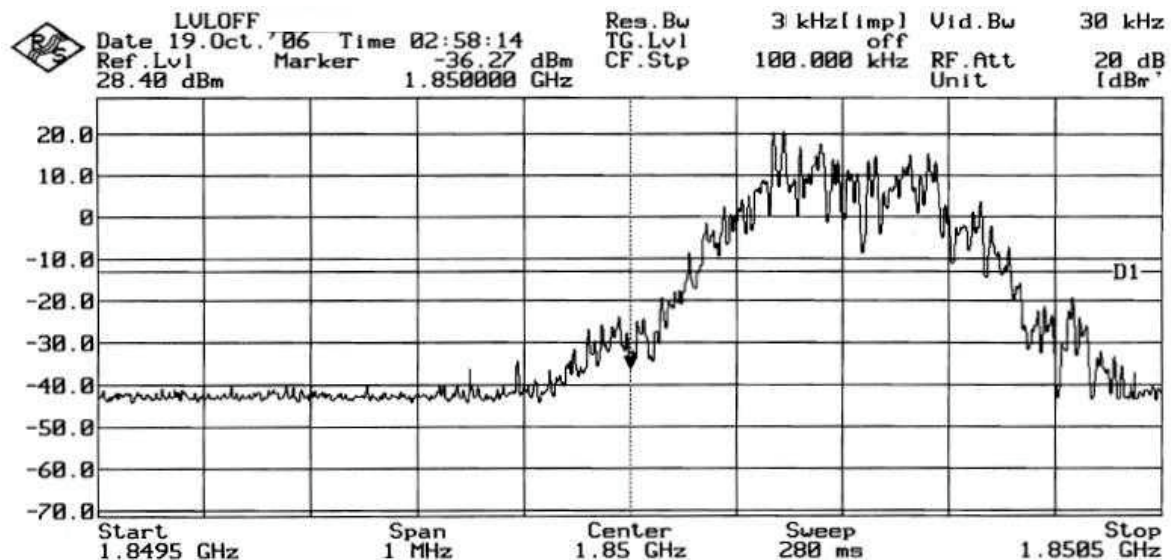
BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (26dB Bandwidth)

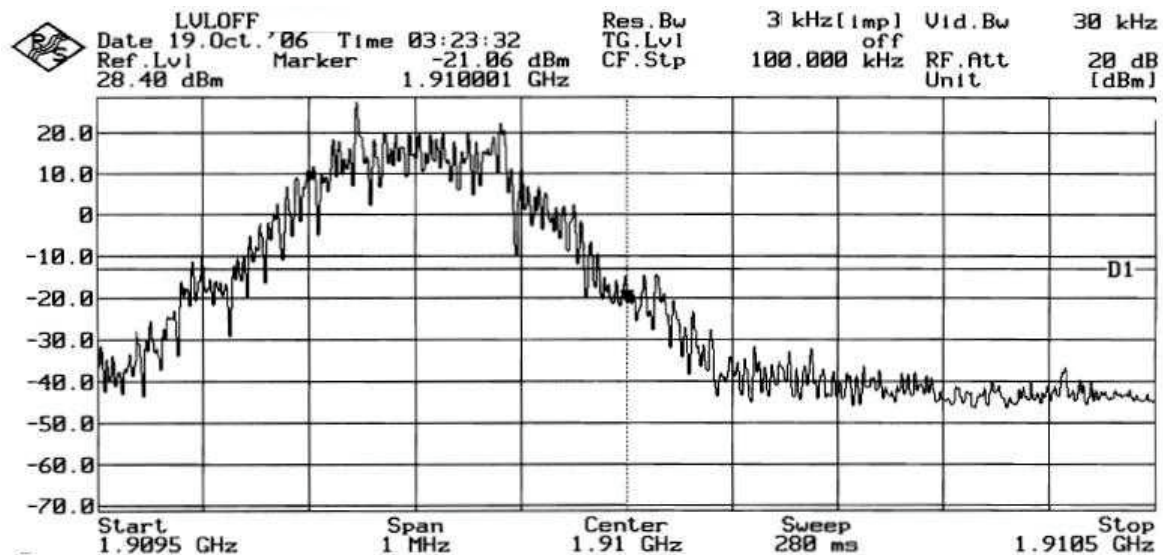


BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots



Plot 3 – Lower Band Edge



Plot 4 – Upper Band Edge

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RECEIVER SPURIOUS EMISSION TEST

FCC Part 15.109 Receiver Spurious 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 Receiver Spurious Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz –26.5GHz) – ESMI1	ESMI	849182/003 848926/007	04 Jul 2007
Schaffner Pre-Amplifier	CPA9231A	3422	01 Apr 2007
MITEQ Preamplifier (0.1-26.5GHz) – PA4	NSP2650-N	604879	07 Nov 2006
Schaffner Bilog Antenna –BL4	CBL6112B	2593	12 May 2007
EMCO Horn Antenna – H14	3115	0003-6087	19 May 2007
K&L Microwave Variable Bandstop Filter	3TNF- 1000/2000/N/N	436	04 Aug 2007

RECEIVER SPURIOUS EMISSION TEST

FCC Part 15.109 Receiver Spurious 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 Receiver Spurious 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 harmonic of the highest frequency used or generated by the EUT, 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) = 70.8 μ V/m = 37.0 dB μ V/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB	
Q-P reading obtained directly from EMI Receiver = 31.0 dB μ V/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

RECEIVER SPURIOUS EMISSION TEST



Receiver Spurious Emissions Test Setup (Front View)



Receiver Spurious Emissions Test Setup (Rear View)

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RECEIVER SPURIOUS EMISSION TEST

FCC Part 15.109 Receiver Spurious Emission Results

Operating Mode	PCS 1900 Receive	Temperature	24°C
Test Input Power	12VDC	Relative Humidity	57%
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)
149.3100	30.9	-12.6	215	100	V
170.6500	28.1	-15.4	17	100	V
215.2700	33.7	-9.8	74	100	H
235.6400	30.4	-15.6	14	100	H
260.8600	27.9	-18.1	56	100	H
284.1400	29.0	-17.0	80	100	H

Emissions above 1GHz

Frequency (GHz)	Peak Value (dBμV/m)	Average Value (dBμV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Channel
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

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.
- 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
- 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 (QP only @ 3m & 10m) is ±4.3dB (for EUTs < 0.5m X 0.5m X 0.5m).

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Limits

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

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

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
PMM 8053 Portable Field Meter	8053	0220J10308	16 Apr 2007
PMM Electric and Magnetic Field Analyzer	EHP-50A	1311L10515	16 Apr 2007

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

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. Prior the measurement, the minimum safe distance between the EUT and field probe was computed from the following formula:
$$P = (E^2) / (30G)$$

where P = Power density, W/m²
E = Electric field strength, V/m
d = Test distance, m
G = Numerical isotropic gain
3. The relevant field probe was then positioned at least at the computed test distance 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

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Results

Operating Mode	PCS1900 Transmit	Temperature	20°C
Test Input Power	12VDC	Relative Humidity	55%
Test Distance	30cm	Atmospheric Pressure	1030mbar
		Tested By	Xu Quanghai

Channel	Channel Frequency (GHz)	Power Density Value (mW/cm ²)	Margin (mW/cm ²)	Averaging Time (min)	Limit (mW/cm ²)
512	1850.2000	0.07	-0.93	30	1.0
661	1880.0000	0.06	-0.94	30	1.0
810	1909.8000	0.06	-0.94	30	1.0

Notes

1. 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.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. The EUT shall maintain a minimum distance separation of 30cm from users during operation.
4. 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% .

Test Report No. 53S062750/EMC/03
Dated 17 Nov 2006



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1. Results of the testing/calibration in the form of a report will be issued immediately after the service has been completed or terminated.
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October 2006



EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

ANNEX A

EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



Front View



Rear View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS

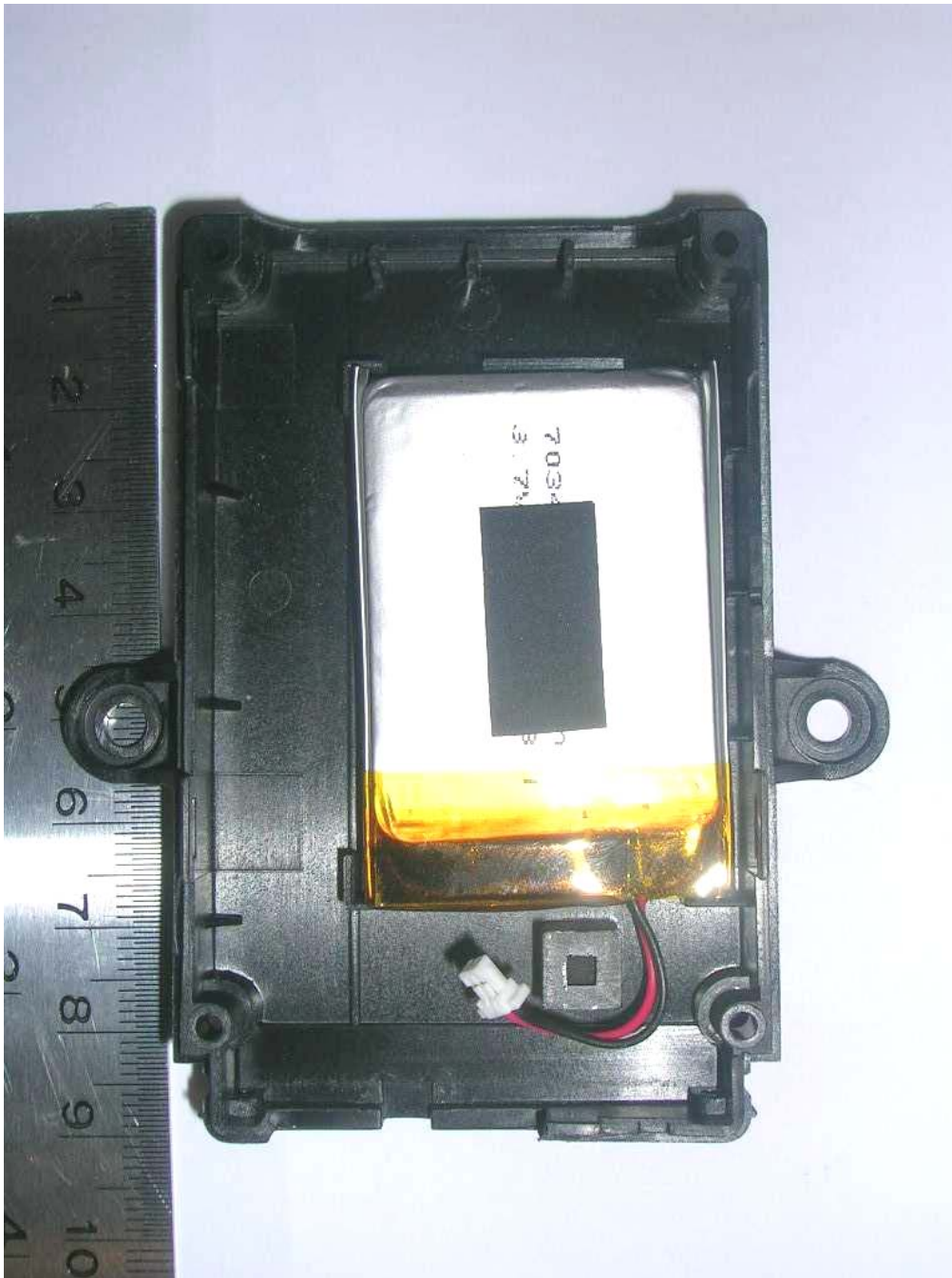


Internal View – Top Cover

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



Internal View – Bottom Cover

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ANNEX A

EUT PHOTOGRAPHS

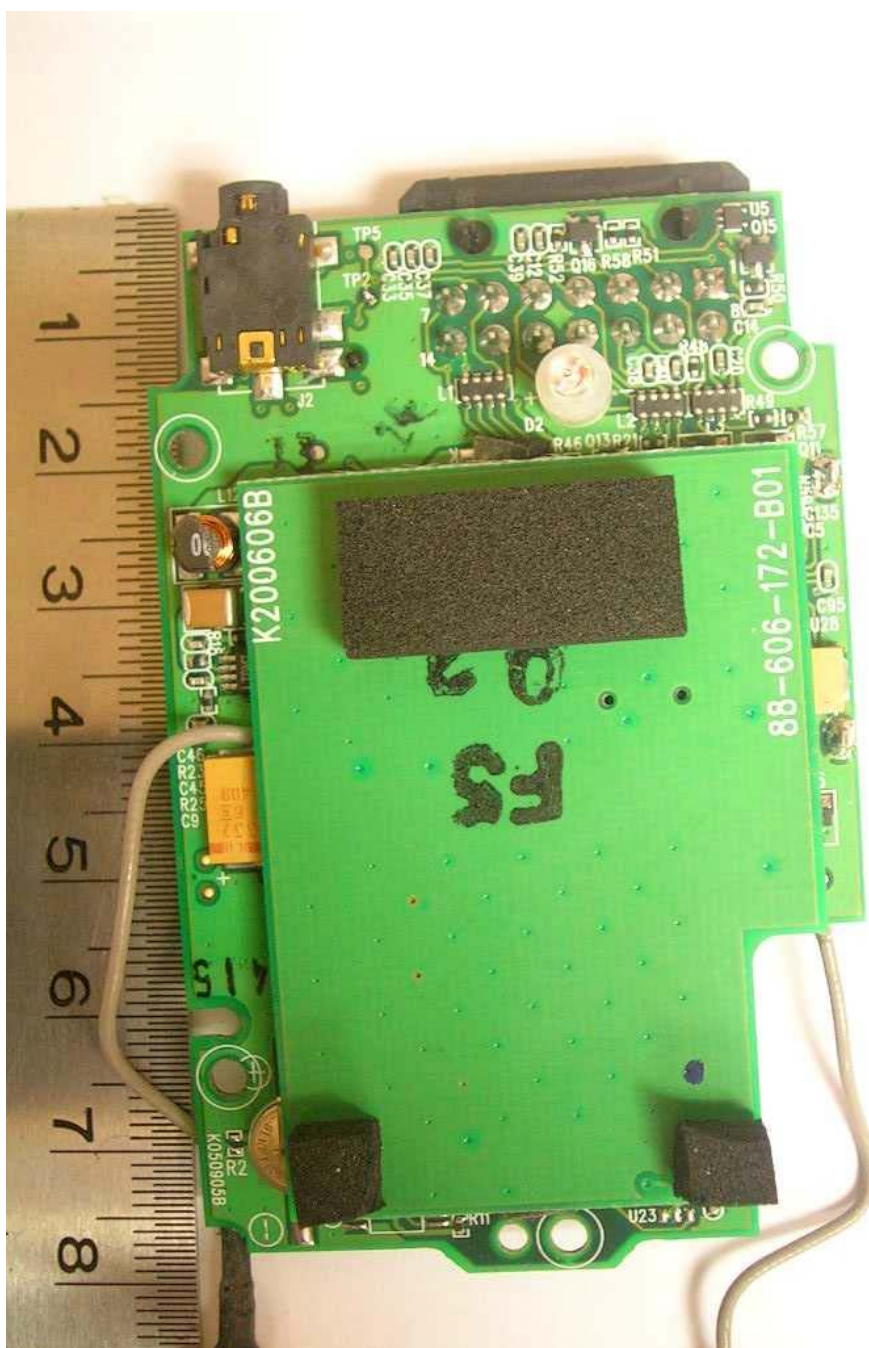


Main-Board - PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS

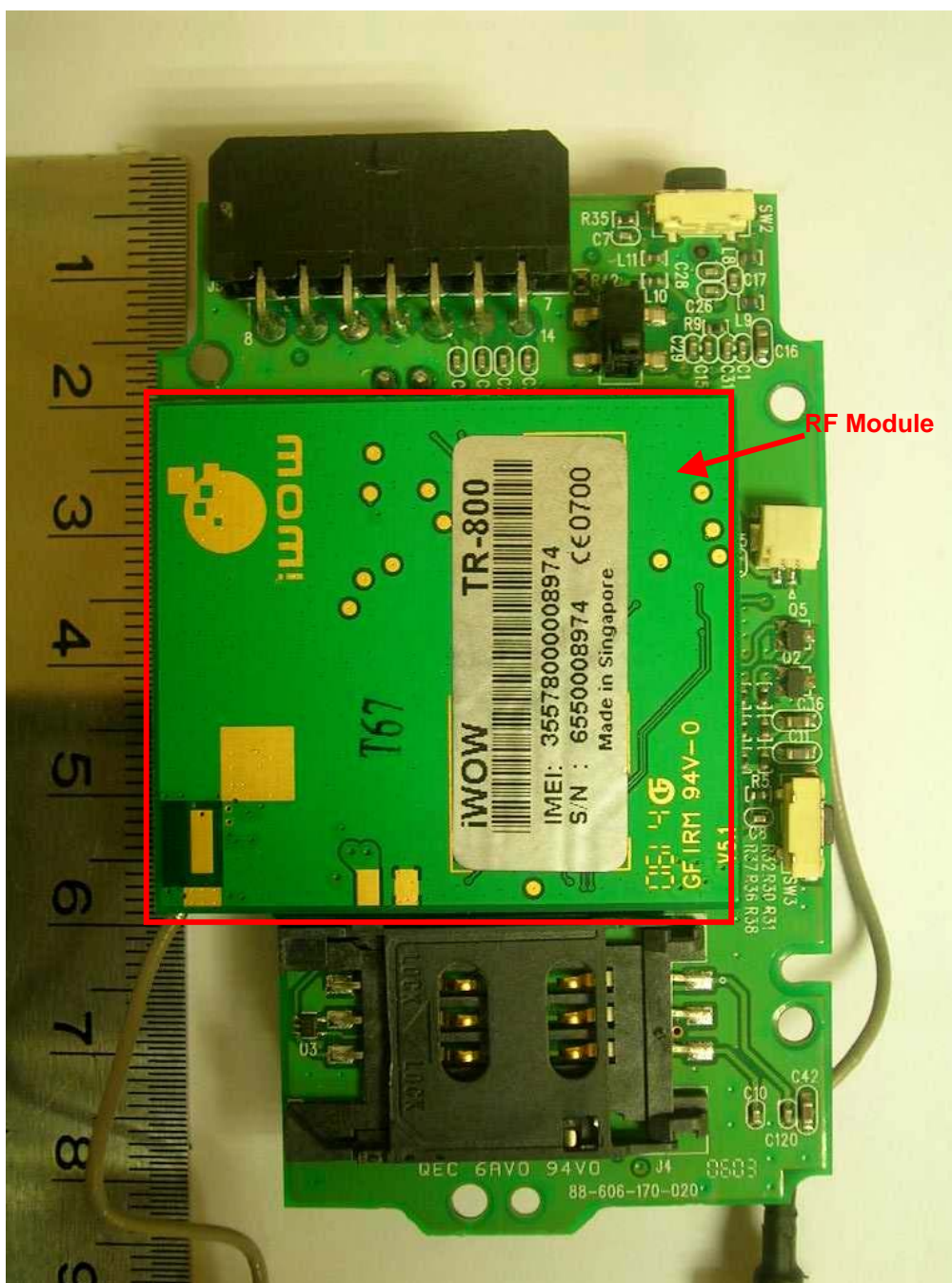


Main-Board - PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



RF Module Circuit with RF Shield Removed



FCC LABEL & POSITION

ANNEX B

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



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

ANNEX C

ANNEX C

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