Test Report No. 56S060706/02
dated 06 Nov 2006

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC Parts 15B & C : 2006
OF A
GPS TRACKING SYSTEM
[Model : TAG-T3]
[FCC ID : URE30-0710]

TEST FACILITY	TÜV SÜD PSB Corporation Pte Ltd, Telecoms & EMC, Testing Group, 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	Geonautics International Pty Ltd 60 Morely Street Coorparoo Queensland 4151 PO Box 1624 Coorparoo DC Queensland 4151, Australia Tel : 617 3324 2555 Fax : 617 3324 2566
QUOTATION NUMBER	56Q0600598
JOB NUMBER	56S060706
TEST PERIOD	23 Oct 2006 – 31 Oct 2006

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LA-2001-0212-A LA-2001-0213-F LA-2001-0214-E LA-2001-0215-B LA-2001-0216-G LA-2001-0217-G LA-2006-0355-C	The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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TEST SUMMARY

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

Test Results Summary

Test Standard	Description	Pass / Fail
FCC Part 15: 2006		
15.107(a), 15.207	Conducted Emissions	Pass
15.109(a), 15.205, 15.209	Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)	Pass
15.249(a)	Radiated Emissions (Fundamental and Harmonics)	Pass
	Maximum Permissible Exposure (MPE)	Pass
15.35(c)	Duty Cycle Factor Computation	Refer to page 22-25 for details

Notes

1. All test measurement procedures are according to ANSI C63.4: 2003.

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

3. Two channels as listed below, which respectively represent the transmitting channel of Main Unit and Remote Control Unit of the Equipment Under Test (EUT) were chosen and tested. The EUT was configured to operate in the test mode.

Transmit Channel	EUT
916.588MHz	Main Unit
916.351MHz	Remote Control Unit

Modifications

1. No modifications were made.

PRODUCT DESCRIPTION

Description	:	The Equipment Under Test (EUT) is a **GPS TRACKING SYSTEM.** The EUT consist of following units: 1 x Main Unit 1 x Remote Control Unit The Equipment Under Test (EUT) allows a received GPS data to be stored in the on-board storage of the main unit. The stored data can then be transferred to the remote control unit, which is connected to a host via a RF link (wireless link).
Manufacturer	:	Geonautics International Pty Ltd 60 Morely Street Coorparoo Queensland 4151 PO Box 1624 Coorparoo DC Queensland 4151, Australia
Model Number	:	TAG-T3
FCC ID	:	URE30-0710
Serial Number	:	Main Unit T3-107 (for radiated emissions test) T3-134 (for RF conducted test) Remote Control RF-5175 (for radiated emissions test) RF-5165 (for RF conducted test)
Microprocessor	:	Refer to manufacturer
Operating / Transmitting Frequency	:	916MHz – 916.7MHz
Clock / Oscillator Frequency	:	Refer to manufacturer
Modulation	:	ASK (Amplitude Shift Keying)
Port / Connectors	:	Refer to manufacturer's user manual / operating manual.
Rated Input Power	:	9Vdc (Main Unit) USB powered (Remote Control Unit)
Accessories	:	Nil

SUPPORTING EQUIPMENT DESCRIPTION

Equipment Description (Including Brand Name)	**Model, Serial & FCC ID Number**	**Cable Description** (List Length, Type & Purpose)
IBM Thinkpad Laptop	M/N: A31 S/N: 99-PGBXF02/11 FCC ID: ANOVNCBDC80211B	2.00m unshielded power cable 1.50m Shielded USB cable
Power Adapter (IBM Laptop)	M/N: 02K6747 S/N: 11S02K6747Z1Z2UH1AA99C FCC ID: Nil	2.00m unshielded power cable
Trimble GPS Antenna	M/N: 39265-50 S/N: 13265-50 FCC ID: Nil	2.00m RF cable

EUT OPERATING CONDITIONS

FCC Part 15
1. Conducted Emissions **2. Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)** **3. Radiated Emissions (Fundamental and Harmonics)** **4. Maximum Permissible Exposure** **5. Duty Cycle Factor Computation**
The EUT was exercised by operating in maximum continuous transmission in test mode. The transmitting channels used are shown below: - 916.599MHz (Main Unit) - 916.351MHz (Remote Control Unit)

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 2007
Schaffner LISN – LISN7 (for EUT)	NNB42	00008	15 May 2007

CONDUCTED EMISSION TEST

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

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

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

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

Sample Calculation Example

At 20 MHz Q-P limit (Class B) = 1000 μV = 60.0 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB

Q-P reading obtained directly from EMI Receiver = 40.0 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 40.0 - 60.0 = -20.0 i.e. **20.0 dB below Q-P limit**

Conducted 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 (Host AC power)	Relative Humidity	58%
EUT	Remote Control Unit	Atmospheric Pressure	1030mbar
Serial Number	RF-5175	Tested By	Kenneth Ler
Test Mode	Transmit		

Frequency (MHz)	Q-P Value (dBμV)	Q-P Margin (dB)	AV Value (dBμV)	AV Margin (dB)	Line
0.5929	43.7	-12.3	42.1	-3.9	Live
1.1016	41.0	-15.0	39.9	-6.1	Live
1.5258	41.5	-14.5	40.1	-5.9	Live
2.3744	41.4	-14.6	39.4	-6.6	Live
2.7964	42.0	-14.0	39.5	-6.5	Live
3.2249	41.5	-14.5	39.3	-6.7	Neutral

Test Input Power	110V 60Hz	Temperature	22°C
Line Under Test	AC Mains (Host AC power)	Relative Humidity	58%
EUT	Remote Control Unit	Atmospheric Pressure	1030mbar
Serial Number	RF-5175	Tested By	Kenneth Ler
Test Mode	Standby		

Frequency (MHz)	Q-P Value (dBμV)	Q-P Margin (dB)	AV Value (dBμV)	AV Margin (dB)	Line
0.3407	40.2	-19.0	39.3	-9.9	Live
0.5099	43.6	-12.4	42.2	-3.8	Live
0.6803	38.1	-17.9	35.3	-10.7	Neutral
0.8497	40.7	-15.3	39.6	-6.4	Live
1.5292	41.3	-14.7	40.4	-5.6	Live
2.8039	39.6	-16.4	37.6	-8.4	Live

CONDUCTED EMISSION TEST

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:
   9kHz - 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 (Average & Quasi-peak) is ±2.4dB.

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) – 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

RADIATED EMISSION TEST

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

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

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

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

Sample Calculation Example

At 300 MHz Q-P limit (Class B) = 200 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)

RADIATED EMISSION TEST

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

Test Input Power	9Vdc	Temperature	24°C
Test Distance	3m	Relative Humidity	59%
EUT	Main Unit	Atmospheric Pressure	1030mbar
Serial Number	TF-107	Tested By	Johnsen Tia

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
71.5599	11.0	-29.0	133	100	V
293.5799	26.3	-19.7	172	100	H
366.3399	24.1	-21.9	304	105	H
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Spurious Emissions above 1GHz

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

Test Input Power	USB Powered	Temperature	24°C
Test Distance	3m	Relative Humidity	59%
EUT	Remote Control Unit	Atmospheric Pressure	1030mbar
Serial Number	RF-5175	Tested By	Johnsen Tia

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
91.9100	30.2	-13.4	239	101	V
335.9500	35.0	-11.0	103	100	H
933.7999	25.7	-20.3	261	135	H
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--	--	--	--	--	--
--	--	--	--	--	--

Spurious Emissions above 1GHz

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

RADIATED EMISSION TEST

Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. The transmitting antenna was found to be in the worst case condition when it was orientated in a vertical position.
3. "--" indicates no emissions were found and shows compliance to the limits.
4. 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 measuring the absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
5. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
6. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   30MHz - 1GHz
   RBW: 120kHz VBW: 1MHz
   >1GHz
   RBW: 1MHz VBW: 1MHz

7. 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.

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 ±4.3dB (for EUTs < 0.5m X 0.5m X 0.5m).

RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

FCC Part 15.249(a) 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) *
902 - 928	94.0	54.0
2400 - 2483.5	94.0	54.0
5725 - 5875	94.0	54.0
24000 - 24250	108.0	68.0
* Quasi peak detector was employed for frequency up to 1GHz. For above 1GHz frequency, average detector was used. A peak limit of 20dB above the average limit does apply.		

FCC Parts 15.249(a) Radiated Emission (Fundamental and Harmonics) 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

RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

FCC Part 15.249(a) 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 15.249(a) 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 10th 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

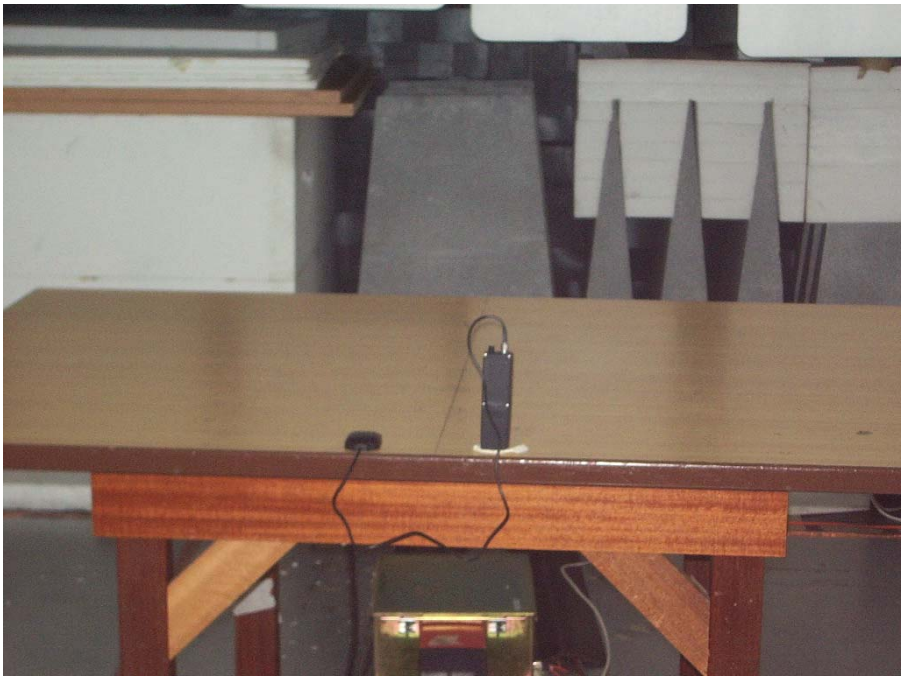
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

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 EMISSION (FUNDAMENTAL AND HARMONICS) TEST

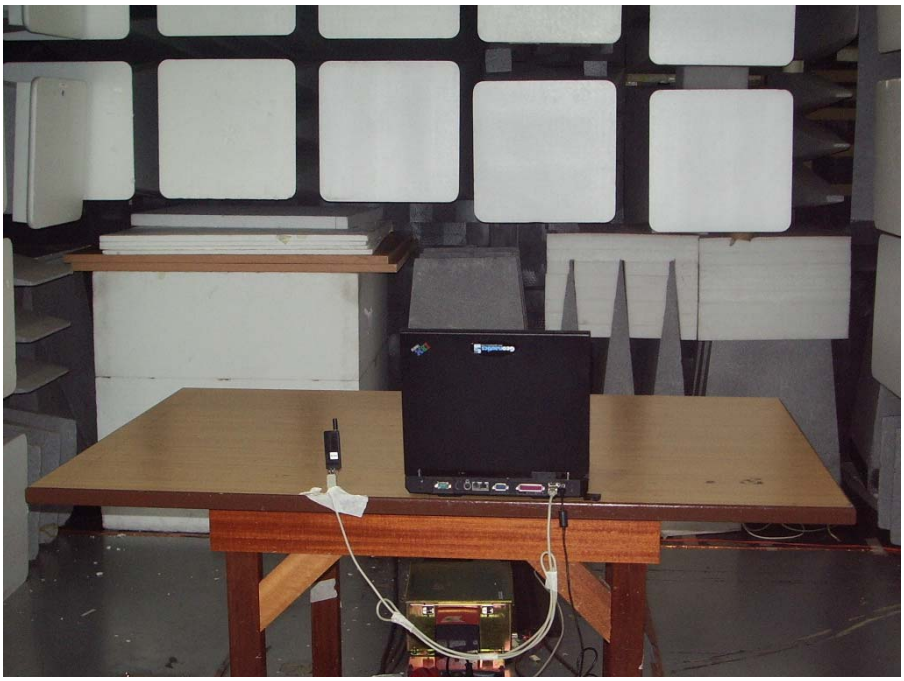
Radiated Emissions Test Setup (Front View) - Main Unit



Radiated Emissions Test Setup (Rear View)) - Main Unit

RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

Radiated Emissions Test Setup (Front View) - Remote Control Unit



Radiated Emissions Test Setup (Rear View)) - Remote Control Unit

RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

FCC Part 15.249(a) Radiated Emission (Fundamental and Harmonics) Results

Test Input Power	9Vdc	Temperature	23°C
Test Distance	3m	Relative Humidity	60%
EUT	Main Unit	Atmospheric Pressure	1030mbar
Serial Number	TS-107	Tested By	Johnsen Tia

Fundamental and harmonics field strengths up to 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Note
916.588	83.8	-10.2	0	100	V	Fundamental
--	--	--	--	--	--	Harmonics

Test Input Power	USB Powered (via connected host)	Temperature	23°C
Test Distance	3m	Relative Humidity	60%
EUT	Remote Control Unit	Atmospheric Pressure	1030mbar
Serial Number	RF-5175	Tested By	Johnsen Tia

Fundamental and harmonics field strengths up to 1GHz

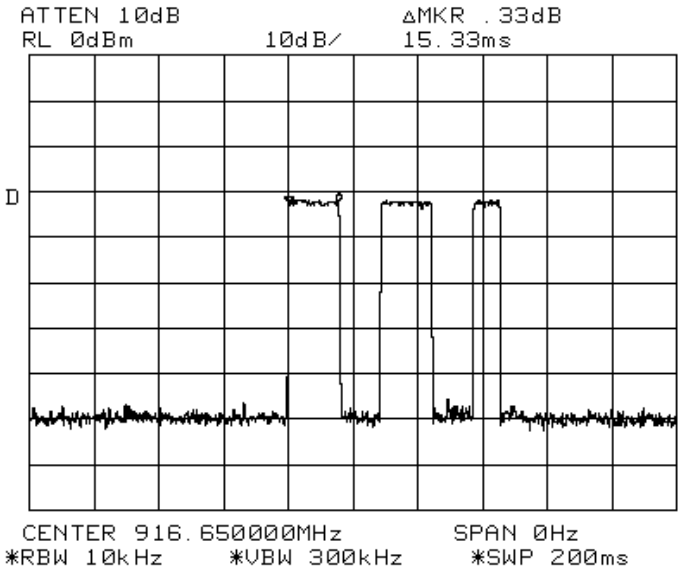
Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Note
916.351	84.8	-9.2	0	100	V	Fundamental
--	--	--	--	--	--	Harmonics

Notes

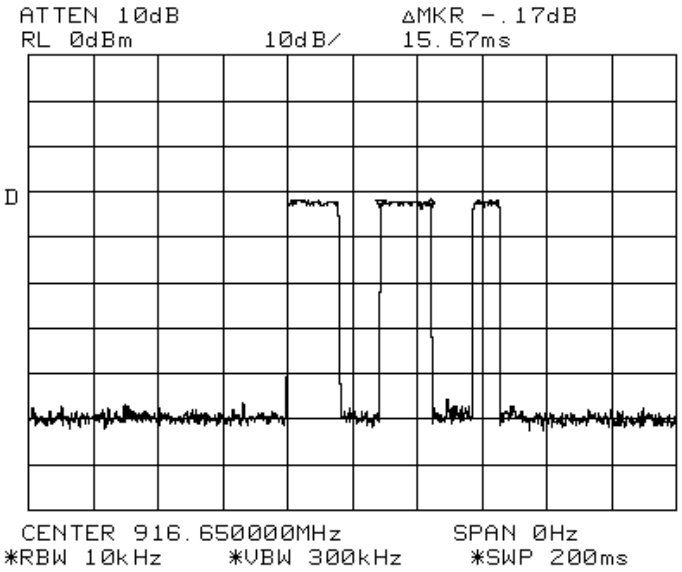
1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. "--" indicates no emissions were found and shows compliance to the limits.
3. A "-ve" margin indicates a 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. The channel in the table refers to the transmit channel of the EUT.
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).

DUTY CYCLE FACTOR COMPUTATION

FCC Part 15.35(c) Duty Cycle Correction Factor – Main Unit



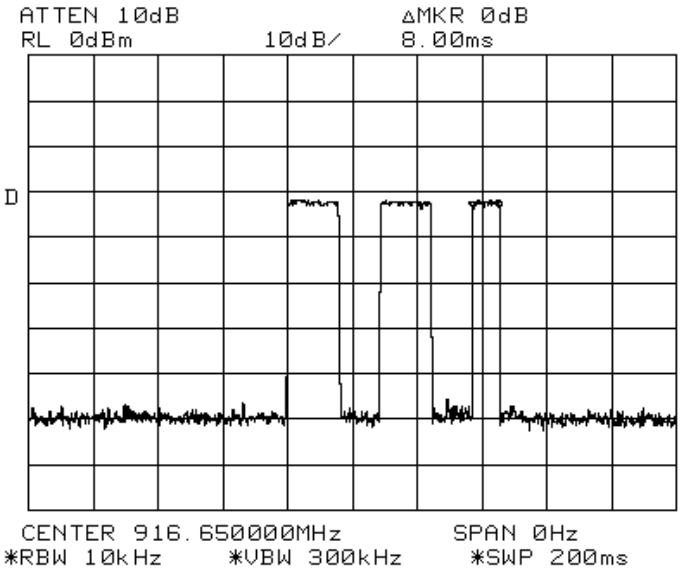
On time 1



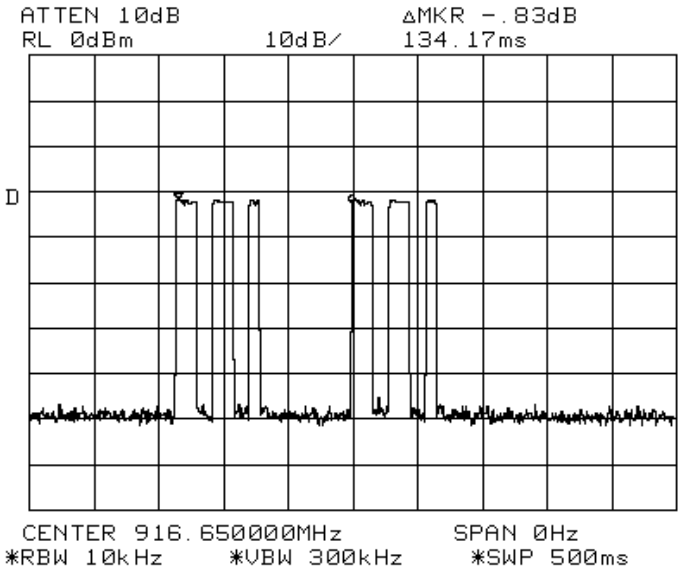
On time 2

DUTY CYCLE FACTOR COMPUTATION

FCC Part 15.35(c) Duty Cycle Correction Factor – Main Unit (Continued)



On time 3

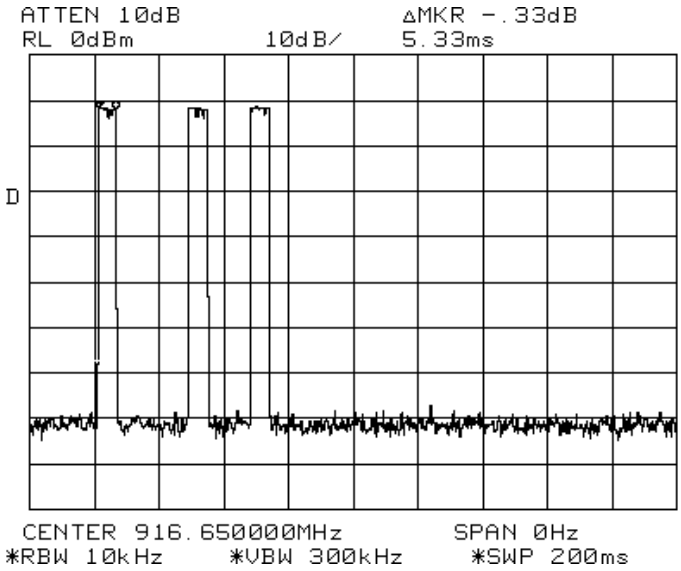


Period

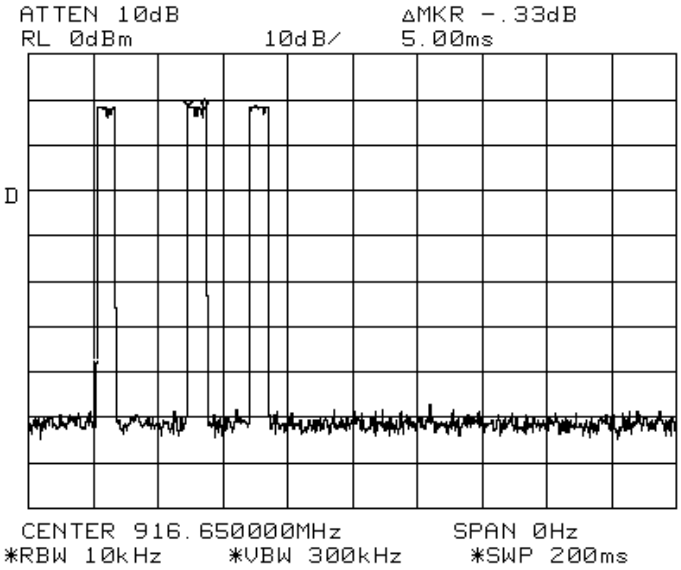
Duty Cycle Factor (worst- case) = 20 log [Total On time / Period]
= 20 log [(15.33 + 15.67 + 8.00) / 134.17]
= **-10.8dB**

DUTY CYCLE FACTOR COMPUTATION

FCC Part 15.35(c) Duty Cycle Correction Factor – Remote Control Unit

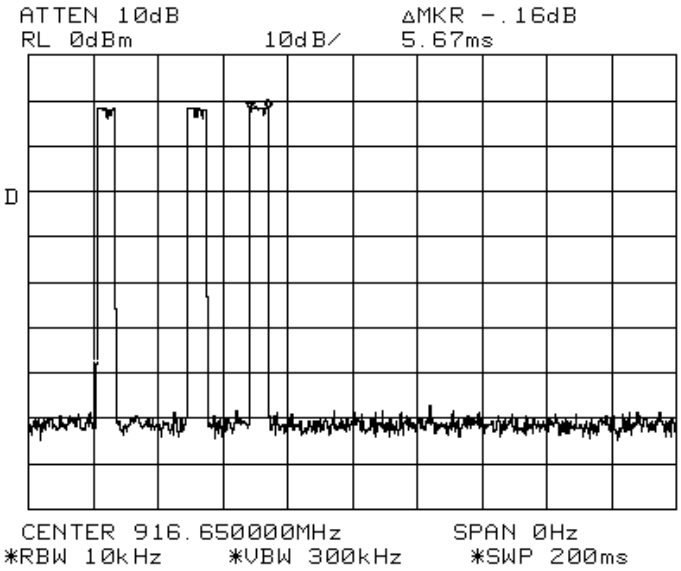


On time 1

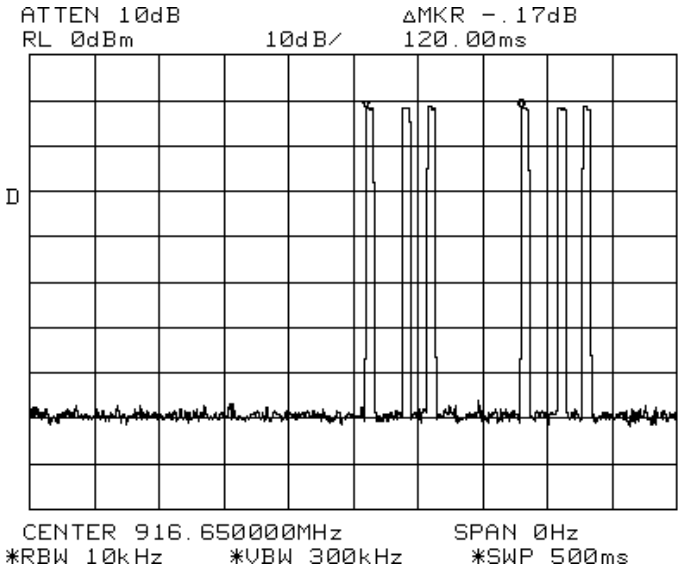


On time 2

DUTY CYCLE TEST



On time 3



Period

Duty Cycle Factor (worst- case) = 20 log [Total On time / Period]
= 20 log [(5.33 + 5.00 + 5.67) / 120]
= **-17.5dB**

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

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/cm^2) 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/cm^2

Power density reading obtained directly from field meter = 0.3 mW/cm^2 averaged over the required 30 minutes.

Therefore, margin = 0.3 – 1.0 = -0.7 mW/cm^2 i.e. **0.7 mW/cm^2 below limit**

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

Maximum Permissible Exposure (MPE) Test Setup (Main Unit)

Maximum Permissible Exposure (MPE) Test Setup (Remote Control Unit)

MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

FCC Part 1.1310 Maximum Permissible Exposure (MPE) Results

Test Input Power	9Vdc	Temperature	22°C
Test Distance	20cm	Relative Humidity	58%
EUT S/N	T3-107 (Main Unit)	Atmospheric Pressure	1030mbar
		Tested By	Kenneth Ler

Channel Frequency (GHz)	Power Density Value (mW/cm^2)	Margin (mW/cm^2)	Averaging Time (min)	Limit (mW/cm^2)
0.9166	0.0004	-0.9996	30	1.0

Test Input Power	USB Powered	Temperature	22°C
Test Distance	20cm	Relative Humidity	58%
EUT S/N	RF-5175 (Remote Control Unit)	Atmospheric Pressure	1030mbar
		Tested By	Kenneth Ler

Channel Frequency (GHz)	Power Density Value (mW/cm^2)	Margin (mW/cm^2)	Averaging Time (min)	Limit (mW/cm^2)
0.9166	0.0004	-0.9996	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 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 TÜV SÜD PSB Corporation approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD 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. TÜV SÜD 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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10. Unless otherwise stated, the tests are carried out in TÜV SÜD PSB Corporation Pte Ltd, No.1 Science Park Drive Singapore 118221.

October 2006

ANNEX A

EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

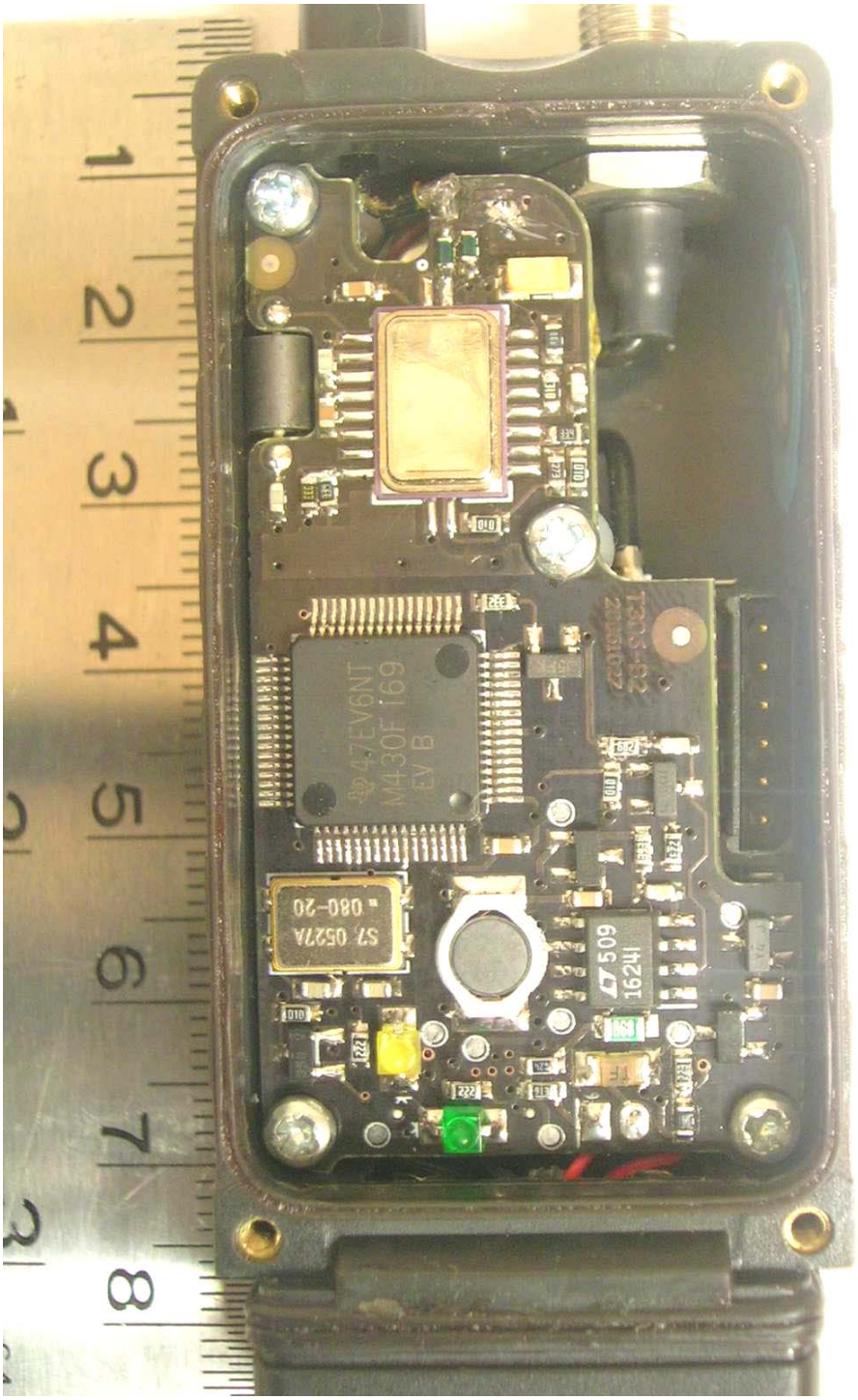
EUT PHOTOGRAPHS (MAIN UNIT)

Front View

Rear View

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

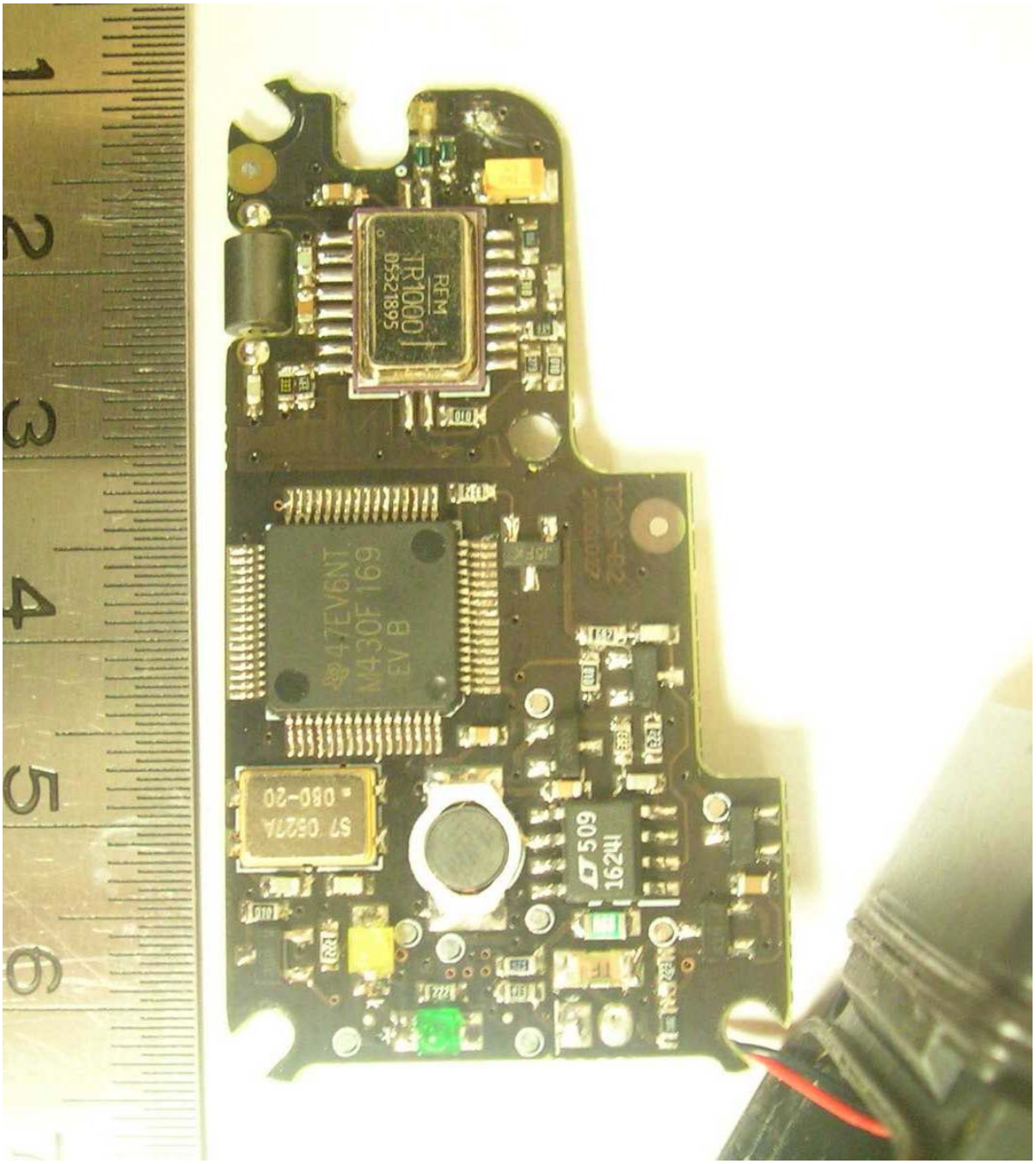
EUT PHOTOGRAPHS (MAIN UNIT)



EUT Internal View

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

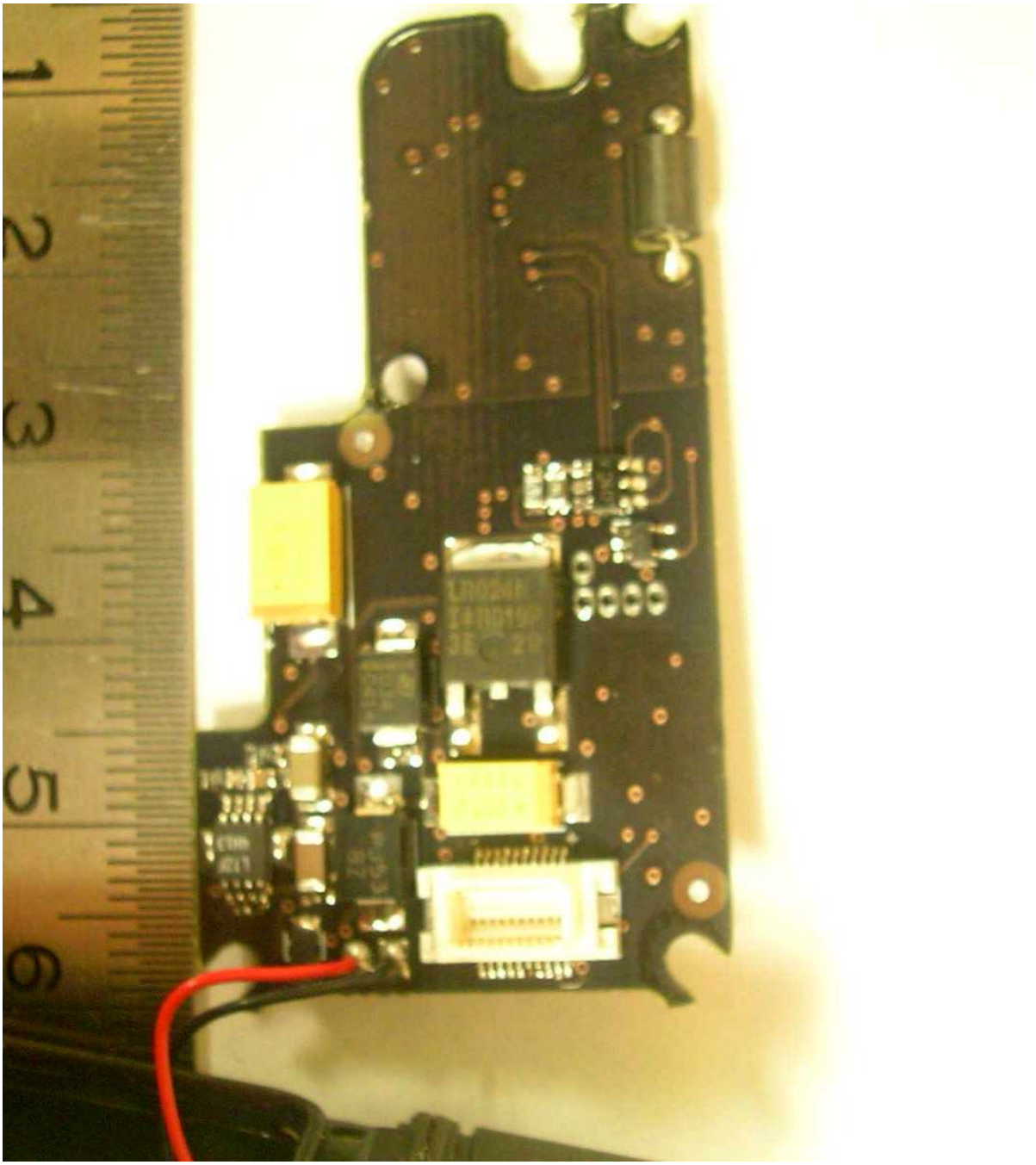
EUT PHOTOGRAPHS (MAIN UNIT)



Main-Board - PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

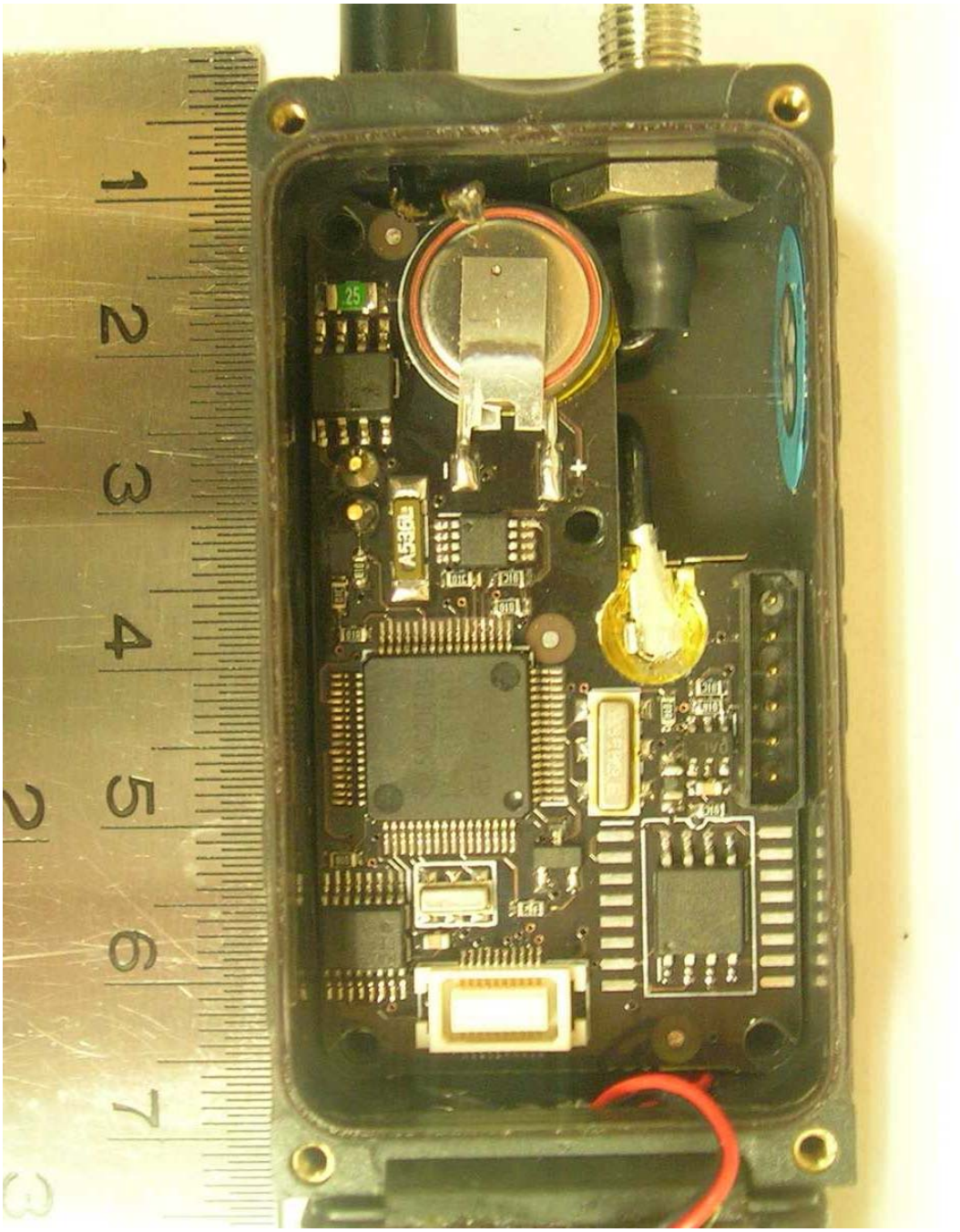
EUT PHOTOGRAPHS (MAIN UNIT)



Main-Board - PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

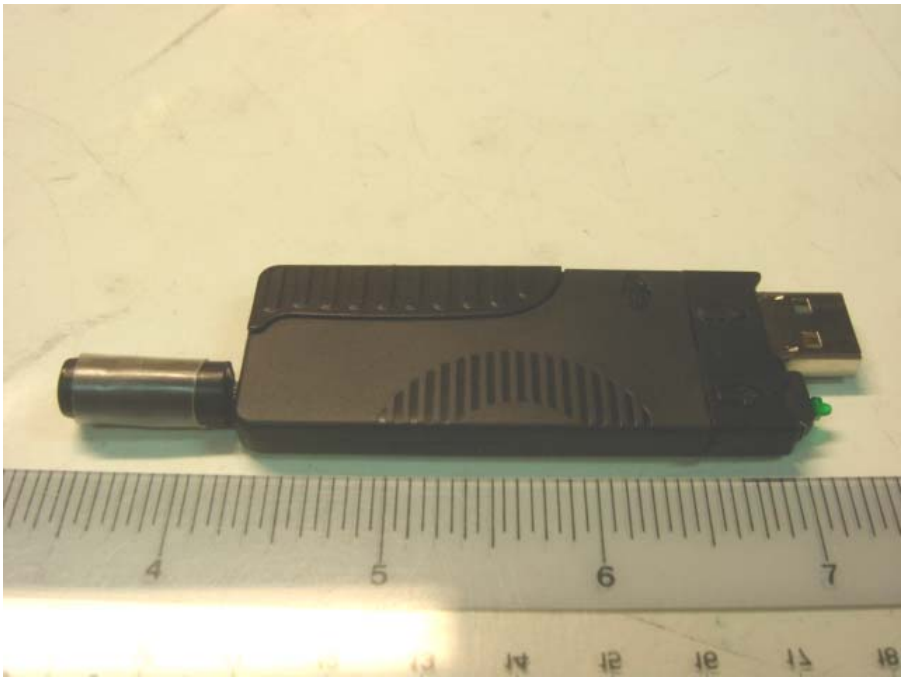
EUT PHOTOGRAPHS (MAIN UNIT)



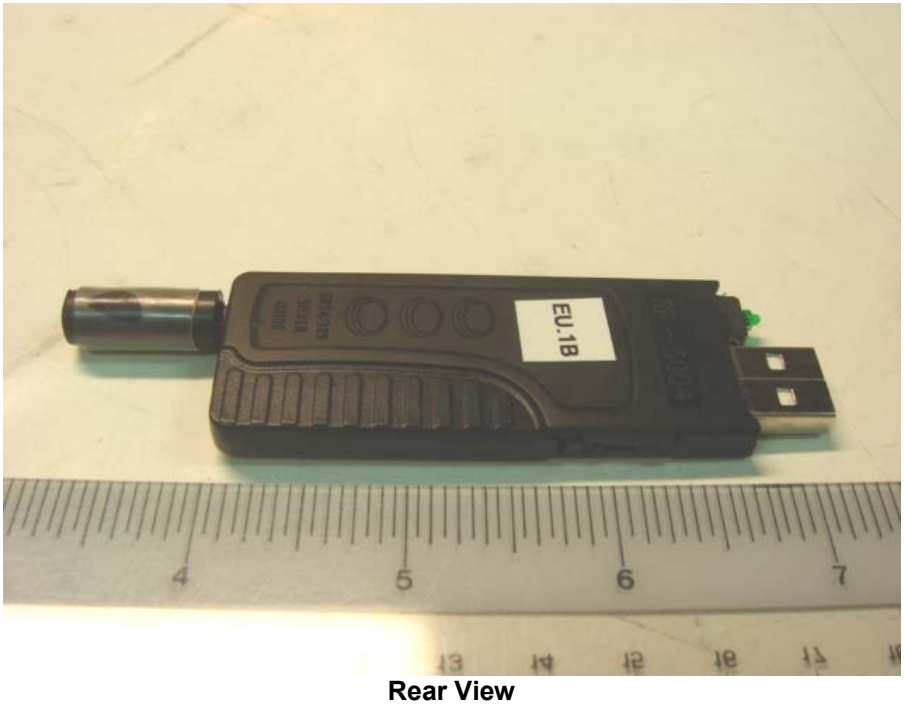
Sub-Board - Component Side

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

EUT PHOTOGRAPHS (REMOTE CONTROL UNIT)



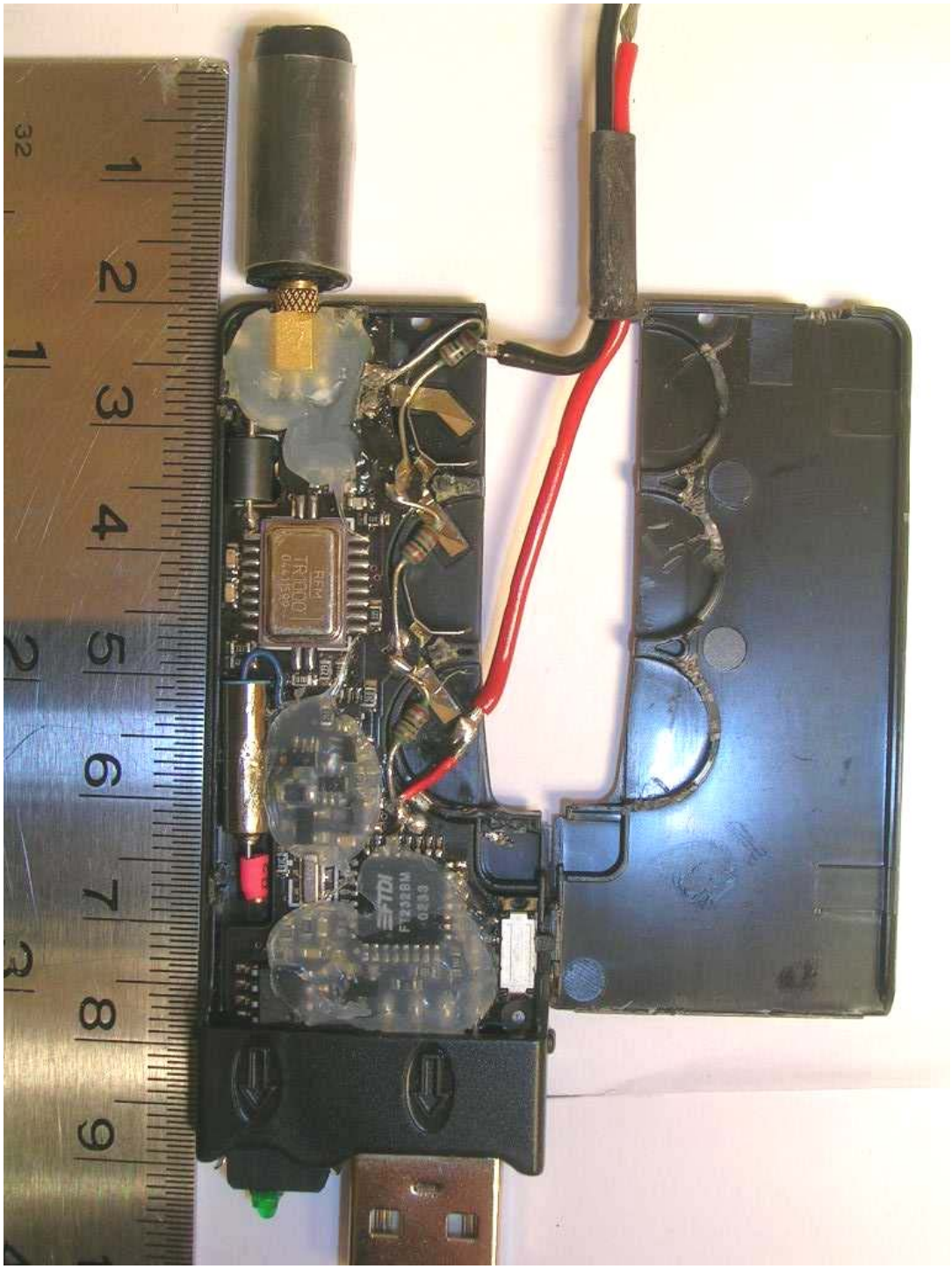
Front View



Rear View

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

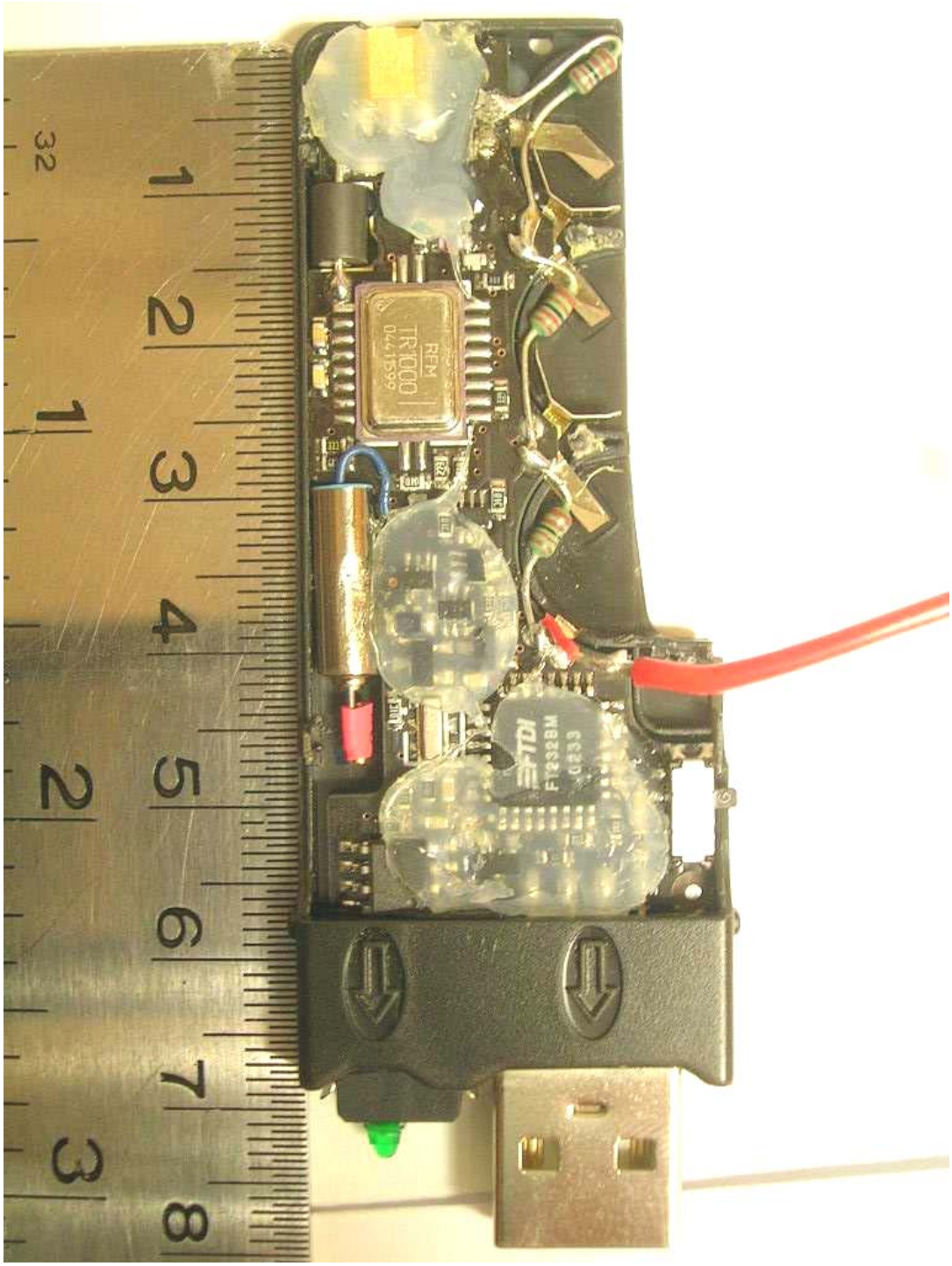
EUT PHOTOGRAPHS



EUT Internal View

EUT PHOTOGRAPHS / DIAGRAMS ANNEX A

EUT PHOTOGRAPHS



Main-Board - Component Side

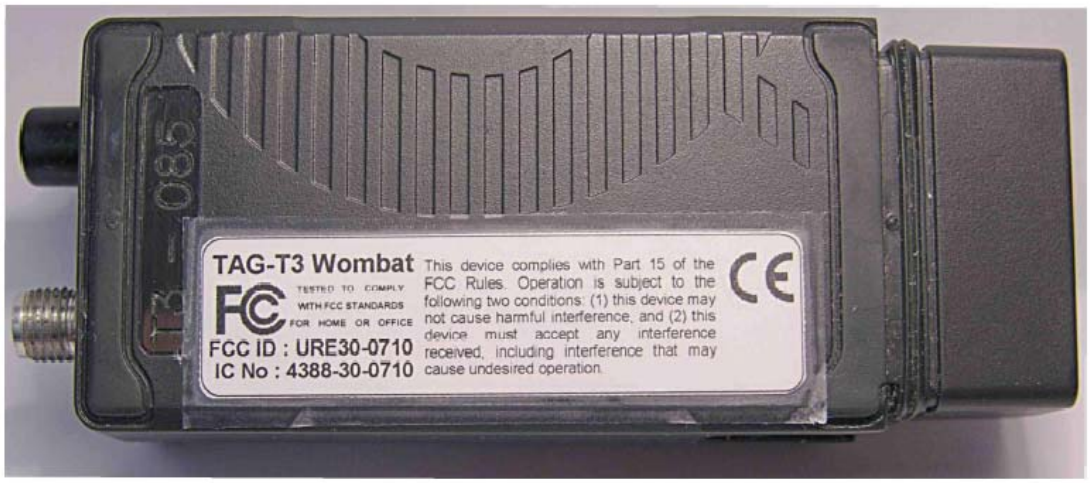
ANNEX B

FCC LABEL & POSITION

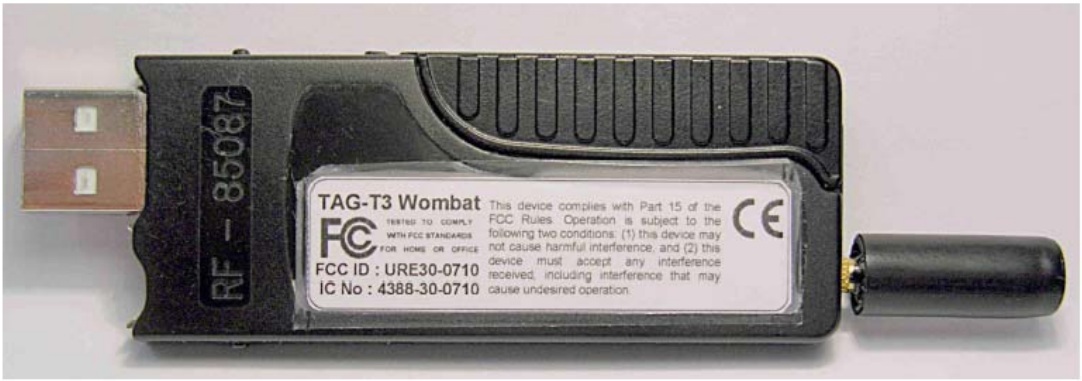
FCC LABEL & POSITION ANNEX B

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 & Physical Location of FCC Label on EUT (Main Unit)



Sample Label & Physical Location of FCC Label on EUT (Remote Control Unit)

ANNEX C

USER MANUAL
TECHNICAL DESCRIPTION
BLOCK & CIRCUIT DIAGRAMS

(Please refer to manufacturer for details)