FCC PART 15, SUBPART B and C
TEST REPORT

for

GPS RECEIVER

MODEL: MobileMapper CE

Prepared for

THALES NAVIGATION, INC.
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DATE: MAY 12, 2005

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GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested:	GPS Receiver Model: MobileMapper CE S/N: N/A
Product Description:	See Expository Statement.
Modifications:	The EUT was not modified during the testing.
Manufacturer:	Thales Navigation, Inc. 960 Overland Court San Dimas, California 91773
Test Dates:	April 19, 21, and 22, 2005
Test Specifications:	EMI requirements CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247
Test Procedure:	ANSI C63.4: 2003
Test Deviations:	The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, section 15.207
2	Spurious Radiated RF Emissions, 30 MHz – 1000 MHz	Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, section 15.209
3	Spurious Radiated RF Emissions, 10 kHz – 30 MHz and 1000 MHz – 25000 MHz	Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, section 15.247(d)
4	Fundamental and Emissions produced by the intentional radiator in non-restricted bands, 10 kHz – 25 GHz	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247(d)
5	Emissions produced by the intentional radiator in restricted bands, 10 kHz – 25 GHz	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209 (a), and section 15.247 (d)
6	20 dB Bandwidth	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (a)(1)
7	Peak Power Output	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (b)(1)
8	RF Conducted Antenna Test	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (d)
9	Channel Hopping Separation	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1) and 15.247 (a)(1)(iii)
10	Average Time of Occupancy	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1)(iii)
11	Peak Power Spectral Density from the Intentional Radiator to the Antenna	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (f)

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the GPS Receiver Model: MobileMapper CE. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by CFR Title 47, Subpart C, sections 15.205, 15.207, 15.209, and 15.247.

Note: For the unintentional radiator portion of the test, the EUT was within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Thales Navigation, Inc.

Bill Wright	Consultant
Emile Yakoub	

Compatible Electronics, Inc.

Kyle Fujimoto	Test Engineer
Benigno Chavez	Test Engineer
Michael Christensen	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on April 19, 2005.

2.5 Disposition of the Test Sample

The sample has not been returned to Thales Navigation, Inc. as of May 2, 2005.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules - Radio frequency devices (including digital devices) – Intentional Radiators
ANSI C63.4 2003	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
FCC Title 47, Part 15 Subpart B	FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The GPS Receiver Model: MobileMapper CE (EUT) was connected to the laptop, USB hub, and AC Adapter via its mini-USB and serial; USB; and power ports, respectively. The laptop was also connected to the printer and AC Adapter via its parallel and power ports, respectively. The EUT was continuously transmitting or receiving depending on the test performed.

Operation of the EUT during the testing

For the intentional radiator portion of the test - The EUT used a program that locked one channel at a time so that the low, middle, and high channels could be tested. This allowed the EUT to be in a no hopping mode. The EUT was tested in three orthogonal axis. The carrier was modulated in the same way it would be when the EUT was in its normal frequency hopping mode.

For the unintentional radiator and conducted emission portion of the test - The EUT used a program that allowed the EUT to function as normal (the channels frequency hopping) on a continuous basis.

The final radiated as well as the conducted data was taken in the mode above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

Cable 1 This is a 1.8 meter foil shielded cable connecting the EUT to the USB dock. The cable has a USB type 'A' connector at the EUT end and a USB type 'B' connector at the USB dock end. The cable was bundled to a length of 1 meter. The shield of the cable was grounded to the chassis via the connectors.

Cable 2 This is a 1.9 meter unshielded cable connecting the EUT to the AC Adapter. It has a 1/8 inch power connector at the EUT end and is hard wired into the AC Adapter. The cable was bundled to a length of 1.4 meters. The cable had a molded ferrite at the EUT end.

Cable 3 This is a 1.9 meter foil shielded cable connecting the EUT to the laptop. The cable has a Mini-USB 2.0 connector at the EUT end and a USB type 'A' connector at the laptop end. The cable was bundled to a length of 1.1 meters. The shield of the cable was grounded to the chassis via the connectors.

Cable 4 This is a 2.75 meter braid shielded cable connecting the EUT to the laptop. The cable has a D-9 pin metallic connector at each end. The cable was bundled to a length of 1.15 meters. The shield of the cable was grounded to the chassis via the connectors.

Cable 5 This is a 1.5 meter braid and foil shielded cable connecting the laptop to the printer. The cable has a metallic Centronics type connector at the printer end and a D-25 pin metallic connector at the laptop end. The cable was bundled to a length of 80 centimeters. The shield of the cable was grounded to the chassis via the connectors.

Cable 6 This is a 1.8 meter unshielded cable connecting the laptop to the AC Adapter. It has a 1/8 inch power connector at the laptop end and is hard wired into the AC Adapter. The cable was bundled to a length of 1 meter.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
GPS RECEIVER (EUT)	THALES NAVIGATION, INC.	MobileMapper CE	N/A	**TBD**
AC ADAPTER (EUT)	THALES NAVIGATION, INC.	TESA1-120100d	0422	**N/A**
USB DOCK	IBM	P/N: 5508800	N/A	**N/A**
LAPTOP	TOSHIBA	PA12410	87142725-1	**DoC**
AC ADAPTER (LAPTOP)	TOSHIBA	PA24500	UA0423P02	**N/A**
PRINTER	CITIZEN	LSP-10	1184398-72	**DLK66TLSP-10**

5.2 EMI Test Equipment for Brea Facility – Part 1

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Radiated Emissions Manual Test – Radiated	Compatible Electronics	N/A	N/A	N/A	N/A
Conducted Emissions Test Program	Compatible Electronics	N/A	N/A	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	3638A08768	June 24, 2004	June 24, 2005
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	3701A22262	June 24, 2004	June 24, 2005
Quasi-Peak Adapter	Hewlett Packard	85650A	2811A01363	June 24, 2004	June 24, 2005
Preamplifier	Com-Power	PA-103	1582	February 3, 2005	Feb. 3, 2006
Biconical Antenna	Com Power	AB-900	15250	March 11, 2005	March 11, 2006
Log Periodic Antenna	Com Power	AL-100	16060	September 27, 2004	Sept. 27, 2005
Computer	Hewlett Packard	D5251A 888	US74458128	N/A	N/A
Monitor	Hewlett Packard	D5258A	DK74889705	N/A	N/A
LISN	Com Power	LI-215	12090	October 26, 2004	Oct. 26, 2005
LISN	Com Power	LI-215	12076	October 26, 2004	Oct. 26, 2005
Transient Limiter	Seaward	252A910	K39-0220	September 20, 2004	Sept. 20, 2005

5.3 EMI Test Equipment for Brea Facility – Part 2

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
EMI Receiver	Rohde & Schwarz	ESIB40	100172	October 28, 2004	Oct. 28, 2005
Loop Antenna	Com-Power	AL-130	17089	September 3, 2004	Sept. 3, 2005
Horn Antenna	Com-Power	AH826	0071957	November 5, 2003	Nov. 5, 2005
Horn Antenna	Antenna Research	DRG-118/A	1053	January 16, 2004	Jan. 16, 2006
Microwave Preamplifier	Com Power	PA-122	25195	February 25, 2005	Feb. 25, 2006
Microwave Preamplifier	Com Power	PA-840	711013	February 25, 2005	Feb. 25, 2006
RF Peak Power Meter / Analyzer	Boonton Electronics Corp.	4500A-01-30	1282	February 23, 2004	Feb. 23, 2006
Peak Power Sensor	Boonton Electronics Corp.	57318	3723	February 23, 2004	Feb. 23, 2006
RF Attenuator	Weinschel Corporation	2	BJ6396	August 12, 2004	August 12, 2005

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

There are a total of 79 channels. The low channel is at 2402.0 MHz and the high channel is at 2480.0 MHz. There is a 1 MHz separation between channels.

Channel 1: 2402 MHz
Channel 2: 2403 MHz
(Etc.)

7.2 Antenna Gain

The antenna is 2 dBi.

8. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

8.1 RF Emissions

8.1.1 Conducted Emissions Test

The spectrum analyzer was used as a measuring meter. The data was collected with the spectrum analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A transient limiter was used for the protection of the spectrum analyzer input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the spectrum analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 2003. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix E.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, Section 15.207 for conducted emissions.

8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The EMI Receiver and spectrum analyzer were used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, the Com-Power Microwave Preamplifier Model: PA-122 was used for frequencies from 1 GHz to 18 GHz, and the Microwave Preamplifier Model: PA-840 was used for frequencies above 18 GHz. The spectrum analyzer and EMI Receiver were used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps.

The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets.

The frequencies above 1 GHz were averaged manually by narrowing the video filter down to 10 Hz and putting the sweep time on AUTO on the spectrum analyzer to keep the amplitude reading calibrated.

After the readings above 1 GHz were average manually, the reading was further adjusted by a “duty cycle correction factor”, derived from 20 log (dwell time / 100 ms). Since the duty cycle was below 10%, the maximum allowed 20 dB was subtracted from the peak reading. The duty cycle correction factor is explained in Appendix E.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 25 GHz	1 MHz	Horn Antenna

Radiated Emissions (Spurious and Harmonics) Test (con't)

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 2003. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT by the Radiated Emission Manual Test software. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance from 10 kHz to 25 GHz to obtain final test data.

Test Results:

The EUT complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.247 for radiated emissions.

8.2 20 dB Bandwidth

The 20 dB Bandwidth was measured using the spectrum analyzer. The bandwidth was measured after taking the field strength reading of the fundamental at 3 meters on the Lab D test site. The resolution and video bandwidths were >= 1% of the 20 dB bandwidth.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1). The 20 dB bandwidth is less than the separation between channels. Please see the data sheets located in Appendix E.

8.3 Peak Output Power

Since antenna conducted tests could not be performed on the EUT due to a lack of an antenna connector on the EUT, the peak output power was calculated by the following equation:

P = [(E*D)^2] / (30 G)
P = Power in Watts for which you are solving
E = the measured maximum field strength in V/m utilizing the widest available RBW.
G = the numeric gain of the transmitting antenna over an isotropic radiator.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (b)(1). The maximum peak output power is less than 1 watt. Please see the results in section 7.1 of this test report.

8.4 RF Antenna Conducted Test

Since antenna conducted tests could not be performed on the EUT due to a lack of an antenna connector on the EUT, all emissions were tested using the radiated emissions test procedure located in section 8.1.2 of this test report.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d). The RF power that is produced by the intentional radiator is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. Please see the radiated emission data sheets located in Appendix E.

8.5 RF Band Edges

The RF band edges were taken at the edges of the ISM spectrum (2400 MHz when the EUT was on the low channel and 2483.5 MHz when the EUT was on the high channel) using the spectrum analyzer. A preamplifier was used to boost the signal level, with the plots being taken at a 3 meter test distance. The frequencies below 2390 MHz were also averaged manually by narrowing the video filter down to 10 Hz and putting the sweep time on AUTO on the spectrum analyzer to keep the amplitude reading calibrated. A data sheet is also included, which compares the reading from the spectrum analyzer to the spec limit. The EUT was tested in DH5 mode, which is the worst case.

The frequencies between 2483.5 MHz and 2485.5 MHz were determined for compliance by using the Marker-Delta method based on Public Notice DA 00-705 released by the FCC.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d). The RF power at the band edges at 2400 MHz and 2483.5 MHz meet the limits of section 15.209. Please see the data sheets located in Appendix E.

8.6 Carrier Frequency Separation

The Channel Hopping Separation Test was measured using the spectrum analyzer. The EUT was operating in its normal operating mode. The resolution bandwidth was 100 kHz, and the video bandwidth 100 kHz. The frequency span was wide enough to include the peaks of two adjacent channels.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1) and 15.247 (a)(1)(iii). The Channel Hopping Separation is greater than the 20 dB bandwidth. Please see the data sheets located in Appendix D.

8.7 Number of Hopping Frequencies

The Channel Hopping Separation Test was measured using the spectrum analyzer. The EUT was operating in its normal operating mode. The resolution bandwidth was 1 MHz, and the video bandwidth 1 MHz. The frequency span was wide enough to include all of the peaks in the frequency band of operation.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1) and 15.247 (a)(1)(iii). The number of hopping frequencies is 79. Please see the data sheets located in Appendix E.

8.8 Average Time of Occupancy Test

The Average Time of Occupancy Test was measured using the spectrum analyzer. The EUT was operating in normal operating mode. The frequency span was taken to 0 Hz with a sweep time of 20 msec to determine the time for each transmission. The EUT was tested in DH5 mode, which was the worst case.

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. This means the time of occupancy of any one channel cannot be greater than 0.4 seconds in a 31.6 second period (0.4 seconds * 79 channels).

The sweep time was then changed to 11 seconds and the number of pulses taken. The number of pulses was then multiplied by 2.8727 to determine the number of pulses in a 31.6 second period**.** The number of pulses was then multiplied by the time for each pulse to determine the average time of occupancy.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1)(iii). The EUT does not transmit for more than 400 msec during a 31.6 second period on any frequency. Please see the data sheets located in Appendix E.

8.9 Spectral Density Test

Since antenna conducted tests could not be performed on the EUT due to a lack of an antenna connector on the EUT, the spectral density was measured as follows:

A. The spectrum analyzer was tuned to the highest point of the maximized fundamental emission based on the procedure used in section 8.1.2. The spectrum analyzer was then set to an RBW of 3 kHz, VBW of 10 kHz, frequency span of 300 kHz, and a sweep time of 100 seconds. Using these settings, the peak level was obtained.

B. Using the peak level obtained in step 1, the field strength, E, was derived by applying the appropriate antenna factor, cable loss, and pre-amp gain for that frequency.

C. The following equation was then used to calculate the power level for comparison to the +8 dBm limit:

P = [(E*D)^2] / (30 G)
P = Power in Watts for which you are solving
E = the field strength in V/m obtained in step 2.
G = the numeric gain of the transmitting antenna over an isotropic radiator.
Note: The lowest gain of the antenna was used, as this gives the worst-case for spectral density.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (f). The spectral density output does not exceed +8 dBm based on the procedure mentioned above. Please see the data sheets located in Appendix E.

9. CONCLUSIONS

The GPS Receiver meets all of the specification limits defined in FCC Title 47, Part 15, Subpart C, sections 15.205, 15.207, 15.209, and 15.247.

Note: For the unintentional radiator portion of the test for conducted emissions and for radiated emissions from 30 MHz to 1000 MHz, the EUT was within the are within the Class B specification limits defined by CFR Title 47, Part 15, Subpart B.

APPENDIX A

LABORATORY RECOGNITIONS

LABORATORY RECOGNITIONS

Compatible Electronics has the following agency accreditations:

National Voluntary Laboratory Accreditation Program - Lab Code: 200528-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

Compatible Electronics is recognized or on file with the following agencies:

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.247 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT during the testing.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

GPS Receiver
Model: MobileMapper CE
S/N: N/A

There were no additional models covered under this report.

APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

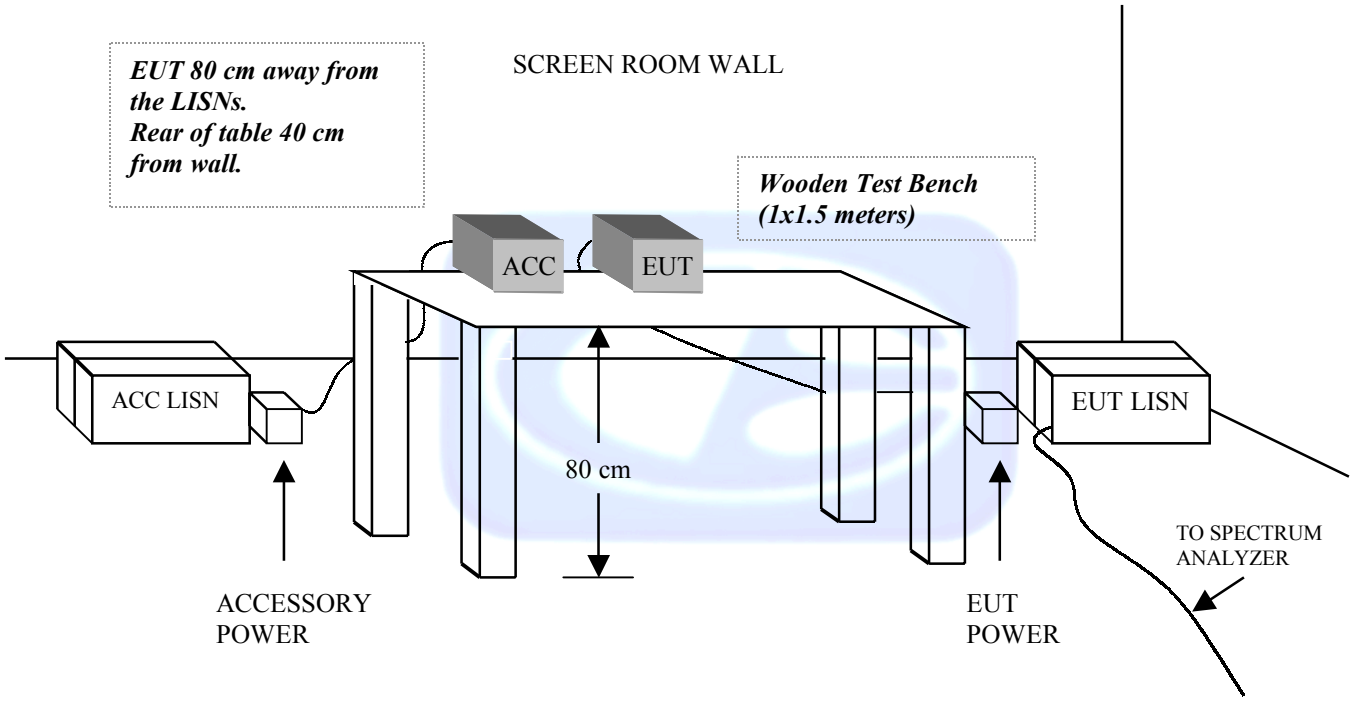
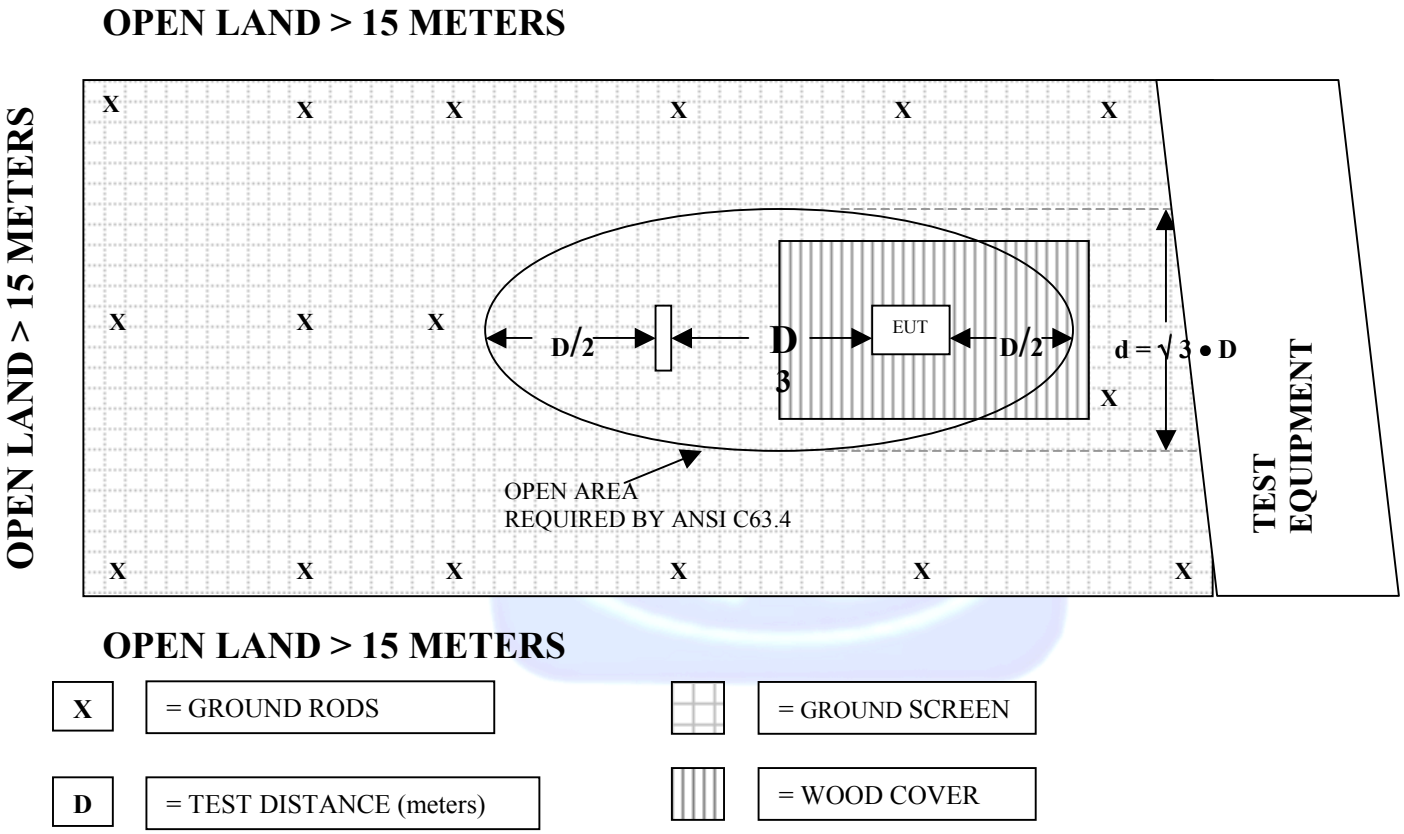


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE



COM-POWER AB-900

BICONICAL ANTENNA

S/N: 15250

CALIBRATION DATE: MARCH 11, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	10.90	120	13.10
35	10.90	125	12.40
40	10.90	140	11.90
45	10.30	150	11.80
50	11.40	160	13.30
60	10.40	175	15.40
70	7.40	180	14.60
80	6.20	200	15.70
90	8.20	250	16.50
100	10.10	300	19.20

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 16060

CALIBRATION DATE: SEPTEMBER 27, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	12.30	700	19.20
400	14.10	800	21.30
500	15.20	900	21.90
600	15.90	1000	25.20

COM-POWER PA-103

PREAMPLIFIER

S/N: 1582

CALIBRATION DATE: FEBRUARY 3, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	33.2	300	33.0
40	33.0	350	32.8
50	33.1	400	32.8
60	33.0	450	32.8
70	33.2	500	32.5
80	33.2	550	32.5
90	33.1	600	32.4
100	33.2	650	32.4
125	33.1	700	32.3
150	33.0	750	32.2
175	33.0	800	32.2
200	33.0	850	32.4
225	33.0	900	31.8
250	33.0	950	32.3
275	32.9	1000	32.0

COM-POWER PA-122

MICROWAVE PREAMPLIFIER

S/N: 25195

CALIBRATION DATE: FEBRUARY 25, 2005

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	31.45	6.0	31.35
1.1	31.34	6.5	31.10
1.2	31.29	7.0	30.54
1.3	31.28	7.5	29.72
1.4	31.25	8.0	29.22
1.5	31.21	8.5	28.75
1.6	31.14	9.0	28.67
1.7	31.07	9.5	29.14
1.8	31.12	10.0	30.12
1.9	31.04	11.0	29.30
2.0	31.20	12.0	29.86
2.5	31.56	13.0	30.57
3.0	32.17	14.0	29.90
3.5	32.56	15.0	30.14
4.0	32.51	16.0	31.13
4.5	32.52	17.0	29.97
5.0	32.33	18.0	28.77
5.5	31.60		

COM-POWER PA-840

MICROWAVE PREAMPLIFIER

S/N: 711013

CALIBRATION DATE: FEBRUARY 25, 2005

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	27.193	29.5	28.341
18.5	26.721	30.0	28.166
19.0	25.938	30.5	28.259
19.5	25.678	31.0	27.227
20.0	25.192	31.5	27.134
20.5	24.643	32.0	27.349
21.0	23.898	32.5	26.701
21.5	24.261	33.0	26.965
22.0	24.544	33.5	27.326
22.5	24.984	34.0	26.536
23.0	25.008	34.5	26.753
23.5	25.268	35.0	26.133
24.0	25.697	35.5	25.759
24.5	26.304	36.0	25.538
25.0	26.716	36.5	26.126
25.5	26.939	37.0	26.719
26.0	27.009	37.5	26.713
26.5	27.299	38.0	26.035
27.0	27.931	38.5	24.438
27.5	27.516	39.0	24.013
28.0	27.402	39.5	23.474
28.5	27.457	40.0	24.467
29.0	27.926		

ANTENNA RESEARCH DRG-118/A

HORN ANTENNA

S/N: 1053

CALIBRATION DATE: JANUARY 16, 2004

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.4	10.0	38.7
1.5	25.2	10.5	39.0
2.0	28.2	11.0	38.9
2.5	28.5	11.5	41.3
3.0	30.1	12.0	40.5
3.5	31.0	12.5	40.0
4.0	31.2	13.0	40.2
4.5	31.9	13.5	40.5
5.0	33.2	14.0	41.6
5.5	33.7	14.5	44.8
6.0	34.3	15.0	41.4
6.5	35.0	15.5	39.2
7.0	36.7	16.0	39.4
7.5	37.3	16.5	40.9
8.0	37.1	17.0	42.6
8.5	37.3	17.5	45.1
9.0	37.7	18.0	41.7
9.5	38.6		

COM-POWER AL-130

LOOP ANTENNA

S/N: 17089

CALIBRATION DATE: SEPTEMBER 3, 2004

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-40.8	10.7
0.01	-40.9	10.6
0.02	-41.8	9.7
0.05	-42.0	9.5
0.07	-41.5	10.0
0.1	-41.7	9.8
0.2	-44.1	7.4
0.3	-41.6	9.9
0.5	-41.5	10.0
0.7	-41.4	10.1
1	-41.0	10.5
2	-40.6	10.9
3	-40.8	10.7
4	-41.0	10.5
5	-40.4	11.1
10	-40.7	10.8
15	-41.6	9.9
20	-41.3	10.2
25	-43.0	8.5
30	-42.6	8.9

COM-POWER AH826

HORN ANTENNA

S/N: 0071957

CALIBRATION DATE: NOVEMBER 05, 2003

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	33.3	22.5	32.9
18.5	32.9	23.0	33.0
19.0	32.7	23.5	33.6
19.5	32.6	24.0	33.6
20.0	32.7	24.5	33.5
20.5	33.0	25.0	33.5
21.0	33.0	25.5	33.7
21.5	33.2	26.0	34.1
22.0	32.9	26.5	34.5

FRONT VIEW

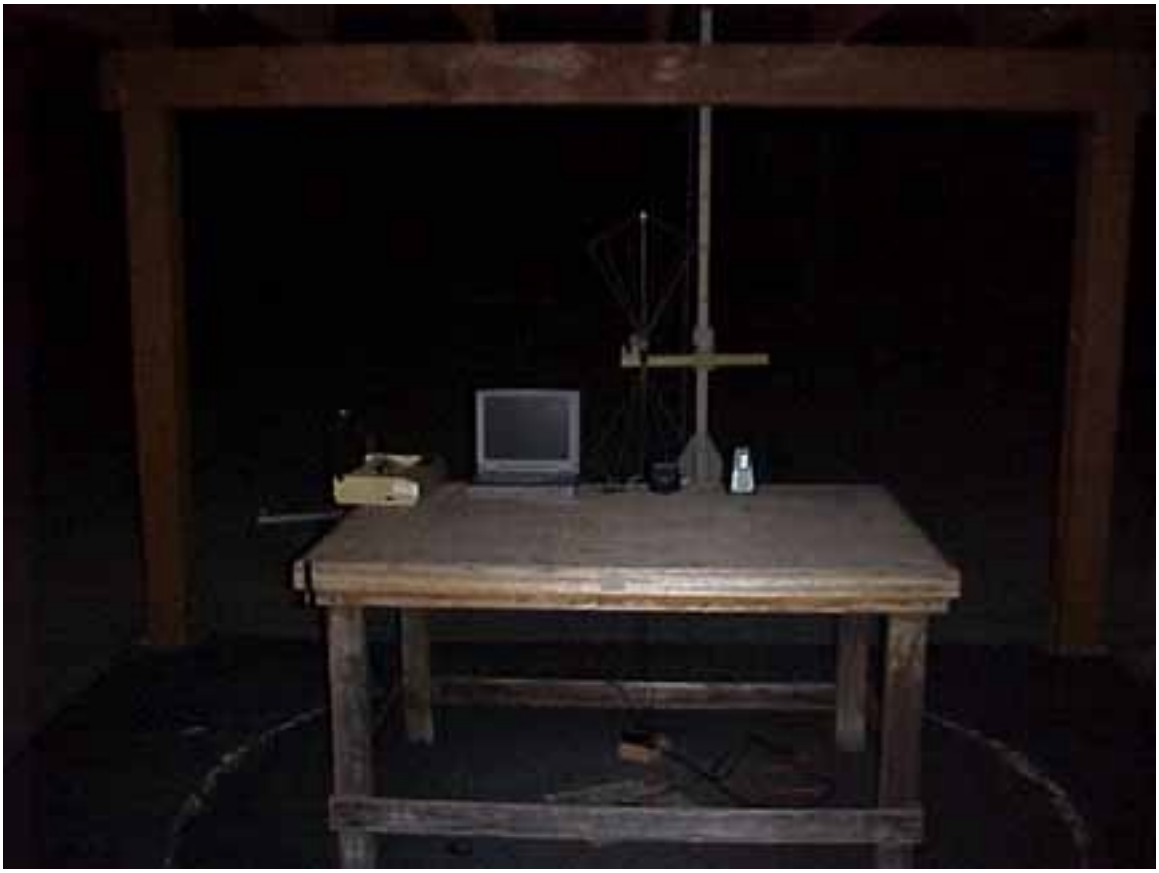
THALES NAVIGATION, INC.
GPS RECEIVER
MODEL: MobileMapper CE
FCC SUBPART B AND C – LAB B – RADIATED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

THALES NAVIGATION, INC.
GPS RECEIVER
MODEL: MobileMapper CE
FCC SUBPART B AND C – LAB B – RADIATED EMISSIONS

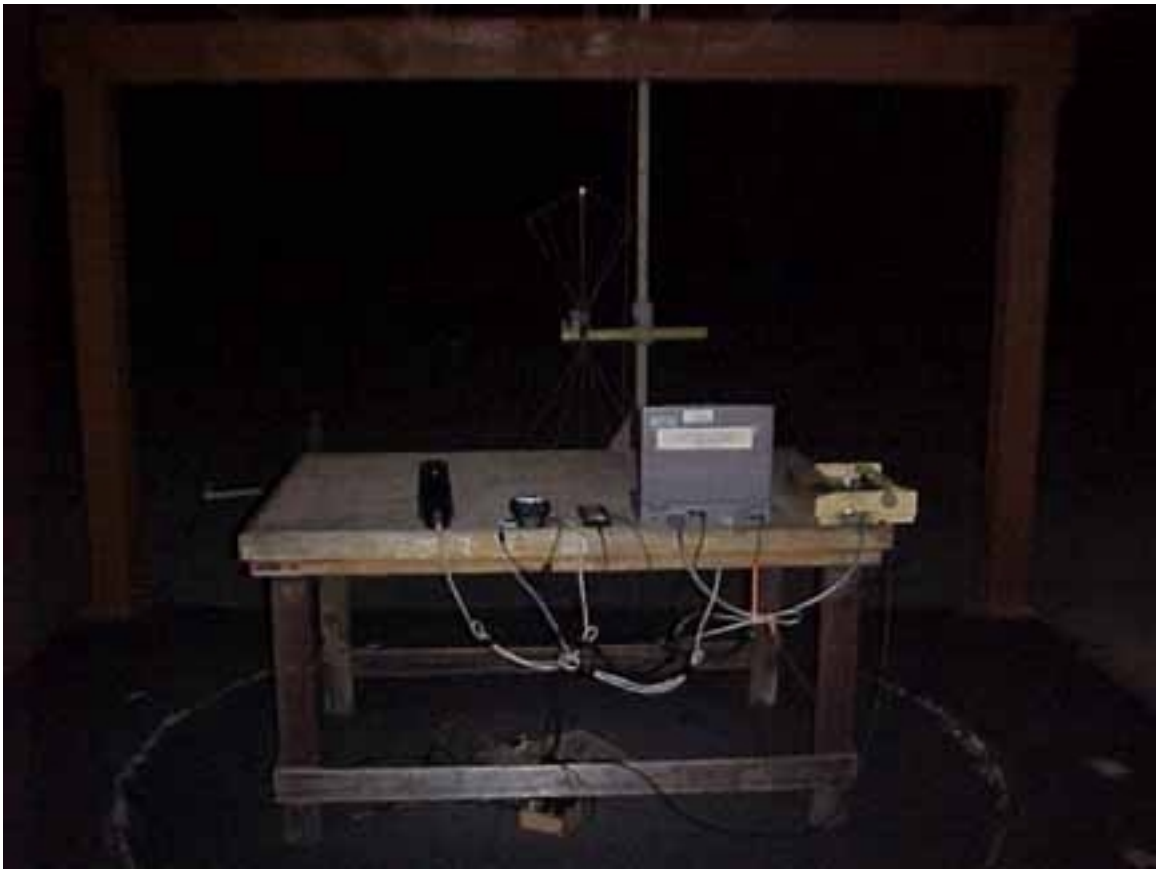
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

THALES NAVIGATION, INC.
GPS RECEIVER
MODEL: MobileMapper CE
FCC SUBPART B AND C – LAB A – RADIATED EMISSIONS

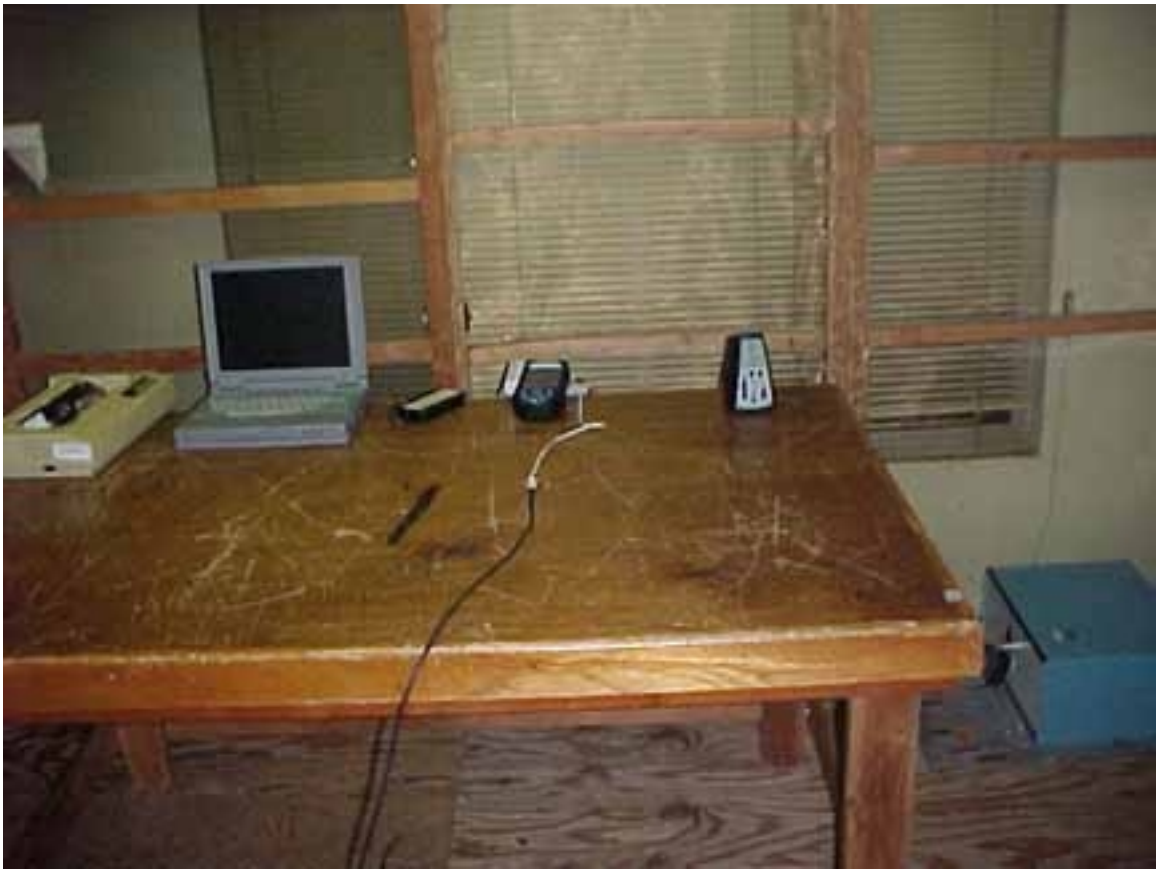
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

THALES NAVIGATION, INC.
GPS RECEIVER
MODEL: MobileMapper CE
FCC SUBPART B AND C – LAB A – RADIATED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

THALES NAVIGATION, INC.
GPS RECEIVER
MODEL: MobileMapper CE
FCC SUBPART B AND C – LAB A – CONDUCTED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

THALES NAVIGATION, INC.
GPS RECEIVER
MODEL: MobileMapper CE
FCC SUBPART B AND C – LAB A – CONDUCTED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS