



# M. Flom Associates, Inc.

## International Compliance Testing Laboratory

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### Environmental Assessment

for

**Mobiles/Fixed Base Station**

**FCC ID: ROJEXPLORER-700**

Model: Explorer 700

to

**Federal Communications Commission**

**47 CFR 1.1310 (MPE)**

Radiofrequency Radiation Exposure Limits

**Date Of Report: April 20, 2006**

**On the Behalf of the Applicant:**

Thrane & Thrane A/S

**At the Request of:**

P.O. WT4-7-06

Thrane & Thrane A/S  
Lundtoftegardsvej 93D  
DK-2800 Lyngby, Denmark

Attention of:

Morten Becker Saul  
+45 39 55 8209  
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Supervised By:


David E. Lee, FCC/IC Compliance Manager

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Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) **Test Report (Supplemental)**

- b) Laboratory: M. Flom Associates, Inc.  
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107  
(Canada: IC 2044) Chandler, AZ 85225
- c) Report Number: d0640019
- d) Client: Thrane & Thrane A/S  
Lundtoftegardsvej 93D  
DK-2800 Lyngby, Denmark
- e) Identification: Explorer 700  
FCC ID: ROJEXPLORER-700  
Description: Imarsat Terminal
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: April 20, 2006  
EUT Received: April 17, 2006
- h, j, k): As indicated in individual tests.
- i) Sampling method: No sampling procedure used.
- l) Uncertainty: In accordance with MFA internal quality manual.
- m) Supervised by:   
David E. Lee, FCC/IC Compliance Manager
- n) Results: The results presented in this report relate only to the item tested.
- o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

### Identification of the Equipment Under Test (EUT)

**Name and Address of Applicant:**

Thrane & Thrane A/S  
Lundtoftegardsvej 93D  
DK-2800 Lyngby, Denmark

**Manufacturer:**

Thrane & Thrane A/S  
Lundtoftegardsvej 93D  
DK-2800 Lyngby, Denmark

**FCC ID:** ROJEXPLORER-700

**Model Number:** Explorer 700

**Description:** Imarsat Terminal

**Type of Emission:** 16QAM,  
42K0D1W, 84K0D1W, 200KD1W,  
QPSK  
21K0G1D, 42K0G1D, 84K0G1D, 200KG1D  
/ Bluetooth  
/ 802.11 a/b/g

**Frequency Range, MHz:** 1626.5 - 1660.5 1626.5 – 1660.5 / 2402 –  
2481.0 /  
2412.0 – 2462.0 / 5725.0 – 5850.0

**Power Rating, Watts (EIRP):** 100.0 (20dBW) / 0.10 / 0.10 / 0.50  
 Switchable                       Variable                       N/A

**Modulation:**

<input type="checkbox"/>	AMPS
<input type="checkbox"/>	TDMA
<input checked="" type="checkbox"/>	CDMA
<input checked="" type="checkbox"/>	OTHER

**Antenna:**

<input type="checkbox"/>	Helical
<input type="checkbox"/>	Monopole
<input type="checkbox"/>	Whip
<input checked="" type="checkbox"/>	Other

**Note:** For RF Safety test antenna gain taken at the upper range of expected gain (i.e. 14.9 dBi) and RF Power set to highest nominal power across all channels.

## Expository Statement

The following equipment configurations require variations to be made in the standard MPE testing reporting and labeling;

The EUT comprises two parts; the antenna assembly and the transceiver unit. These units can be operated in close proximity with the antenna base being used as the mounting for the transceiver. Alternatively the Imarsat antenna may be moved up to 70m away from the transceiver. This antenna contains active devices in the Imarsat transmit chain, powered by dc along the coax, and cannot therefore be treated as a remote mounted antenna. Conversely the transceiver unit cannot be treated as a "black box" as the WLAN and Bluetooth antennas are an integral part of the structure.

Testing was carried out in three modes:

- A) With the Imarsat antenna and the transceiver using the antenna base as a mounting tray. From the front the overpowering emission is from the Imarsat signal even with WLAN and Bluetooth operational. A safety distance of 1.0 m was used for this test. A 1.0 Safety Distance Warning label is mounted on the antenna assembly and that distance is included in the manual.
- B) As A) above but measured from the rear, where the Imarsat signal is attenuated by the pattern and the shielding affect of the antenna mounting. The intent here was to ensure that the emissions from WLAN and Bluetooth did not exceed the limits at 20cm even with the reflective effect of the Imarsat antenna backplane.
- C) With the transceiver unit remotely located from the Imarsat antenna. The transceiver was tested for compliance with the 20 cm Safety Distance from 4 sides. The warning statement has also been included in the manual.

During all three tests the WLAN (a or g) and Bluetooth were operated over their full frequency bands and the worst case results reported.

All tests were carried out with the Bluetooth operating at full power, and with the 802.11 unit operating at full power and at 54Mbps

Attested By:



David E. Lee, FCC/IC Compliance Manager




## Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992/2003, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.

 <p style="text-align: center;"><b>THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION</b></p> <p style="text-align: center;"><b>ACCREDITED LABORATORY</b></p> <p>AZLA has accredited <b>M. FLOM ASSOCIATES, INC.</b> Chandler, AZ</p> <p>for technical competence in the field of <b>Electrical Testing</b></p> <p><small>The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing.</small></p> <p><small>Presented this 14<sup>th</sup> day of June 2004</small></p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;">   <small>President For the Accreditation Council Certificate Number: 2152-01 Valid to August 31, 2006</small> </div> </div> <p><small>For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.</small></p>	<h3 style="text-align: center; text-decoration: underline;">A2LA</h3> <p>“A2LA has accredited M. Flom Associates, Inc. Chandler, AZ for technical competence in the field of Electrical Testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 'General Requirements for the Competence of Testing and Calibration Laboratories' and any additional program requirements in the identified field of testing.”</p> <hr/> <p style="text-align: center;">Certificate Number: <b>2152-01</b></p>
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**Name of Test:** Environmental Assessment

**Specification:** FCC: 47 CFR 1.1310

**Measurement Guide:** ANSI/IEEE C95.1 1992/2003

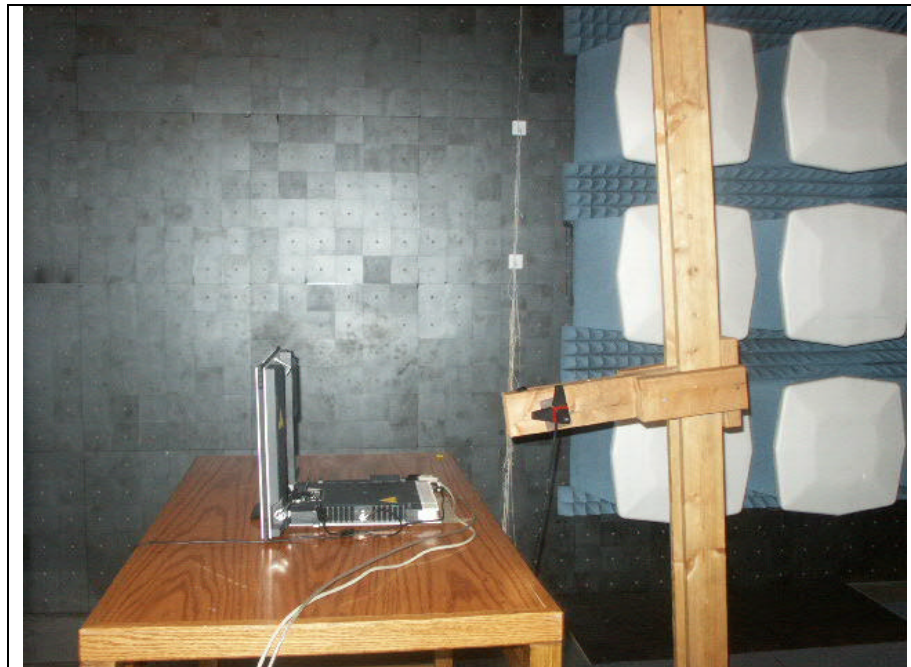
**Test Equipment:** Maximum Permissible Exposure (MPE) measurement system, consisting of:  
Amplifier Research FP6001 Electric Field Probe Kit  
(Calibrated July 2005)

**Measurement Procedure:**

1. The following measurements were performed with a probe using ANSI/IEEE C95.1 as a guide.
2. Prior to making any measurements, the measurements system was calibrated in accordance with the manufacturer's procedures.
3. The EUT's radiating element (antenna) was placed on a 1 m tall table for ease of testing. For equipment normally operated on a metal surface, a ground plane was used.
4. The remaining equipment necessary to operate the EUT was maintained at a distance from the measurement arrangement suitable to minimize interference with the measurements.
5. The minimum safe distance was calculated from the formula Power Density =  $EIRP / 4\pi R^2$  (Peak Watts/m<sup>2</sup>). The calculation is shown with the measurement data.
6. With the EUT operating at maximum power, a search was initiated for worst case emissions with the probe raised and lowered over a range of 0.2 to 2 meters in height and over a horizontal plane of 0° to 360°.
7. Average values were calculated for the whole body (0.2-2.0m), lower body (0.2-0.8m) and upper body (1.0-2.0m).

**Results:** Attached.

**Test Setup:** Maximum Permissible Exposure (MPE)





**Name of Test:** R.F. Radiation Exposure - Test Condition A

FCC Rules: 1.1307, 1.1310, 1.1311, 2.1091

Description, EUT: See page 2 of Test Report

Test Frequencies, MHz 1626.5 1643.5 1660.5  
 Power, Conducted, W = 35.45  
 Antenna Gain = 14.9 dBi (Integral Antenna)  
 Antenna Model Directional Panel

Pre-test Calculations (Imarsat)  
 $Power_{[W\ EIRP]} = P_{[conducted]} \times G_{[antenna]} = 105.0$   
 $Limit_{[mW/cm^2]} = 1.0$   
 $Limit_{[W/m^2]} = 10 \times Limit_{[mW/cm^2]} = 10.0$   
 $R_{[m]} = [P_{[W\ EIRP]} / (4\pi \times Limit_{[W/m^2]})]^{1/2} = 0.91$

Results at tested distances	Probe Height, m	Power Density, mW/cm <sup>2</sup>		
		Freq. 1626.5 MHz Distance 100 cm	Freq. 1643.0 MHz Distance 100 cm	Freq. 1660.5 MHz Distance 100 cm
	2.0	0.0074	0.0196	0.0141
	1.8	0.0031	0.0065	0.0096
	1.6	0.0347	0.0197	0.0098
	1.4	0.0148	0.0593	0.0484
	1.2	0.0832	0.2359	0.2396
	1.0	0.2328	0.4201	0.2376
	0.8	0.1599	0.3501	0.2458
	0.6	0.1424	0.2271	0.3587
	0.4	0.0808	0.0886	0.0600
	0.2	0.0514	0.0241	0.0122

Power Density Calculations: The measured power density readings were summed and the results divided by the number of readings to calculate the average.

	1626.5 MHz	1643.0 MHz	1660.5 MHz
Whole body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.0810	0.1451	0.1236
Lower body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.1086	0.1725	0.1692
Upper body average (1.0 - 2.0 m, mW/cm <sup>2</sup> ) =	0.0627	0.1268	0.0932

**Name of Test:** R.F. Radiation Exposure - Test Condition B

FCC Rules: 1.1307, 1.1310, 1.1311, 2.1091

Description, EUT: See page 2 of Test Report

Test Frequencies, MHz	1643.0	Rear of antenna	
Test Frequencies, MHz	2402.00	2441.00	2480.00
Power, Conducted, W	= 20.00		
Antenna Gain	= 0 dBi (Integral Antenna)		
Test Frequencies, MHz	2412.00	2437.00	2462.00
Power, Conducted, W	= 20.00		
Antenna Gain	= 0 dBi (Integral Antenna)		
Test Frequencies, MHz	5745.00	5785.00	5825.00
Power, Conducted, W	= 16.00		
Antenna Gain	= 0 dBi (Integral Antenna)		

Limit for all transmitters = 1.0 mW/cm<sup>2</sup>

Results at tested distances	Probe Height, m	Power Density, mW/cm <sup>2</sup>	
		Freq. 1643.0 MHz (Bluetooth + 802.11g) Distance 20 cm	Freq. 1643.0 MHz (Bluetooth + 802.11a) Distance 20 cm
	2.0	0.0059	0.0069
	1.8	0.0051	0.0060
	1.6	0.0088	0.0082
	1.4	0.0251	0.0193
	1.2	0.0068	0.0056
	1.0	0.0137	0.0106
	0.8	0.0127	0.0192
	0.6	0.0023	0.0152
	0.4	0.0111	0.0022
	0.2	0.0061	0.0056

Power Density Calculations: The measured power density readings were summed and the results divided by the number of readings to calculate the average.

	BT + WLAN g	BT + WLAN a
Whole body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.0097	0.0099
Lower body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.0081	0.0105
Upper body average (1.0 - 2.0 m, mW/cm <sup>2</sup> ) =	0.0109	0.0094

**Name of Test:** R.F. Radiation Exposure - Test Condition C (1)

FCC Rules: 1.1307, 1.1310, 1.1311, 2.1091

Description, EUT: See page 2 of Test Report

Test Frequencies, MHz 2402.00 2441.00 2480.00  
 Power, Conducted, W = 20.00  
 Antenna Gain = 0 dBi (Integral Antenna)

Test Frequencies, MHz 2412.00 2437.00 2462.00  
 Power, Conducted, W = 20.00  
 Antenna Gain = 0 dBi (Integral Antenna)

Limit for all transmitters = 1.0 mW/cm<sup>2</sup>

Results at tested distances	Probe Height, m	Power Density, mW/cm <sup>2</sup>			
		WLAN A + BT Battery Distance 20 cm	WLAN A + BT Left Distance 20 cm	WLAN A + BT Right Distance 20 cm	WLAN A + BT Handle Distance 20 cm
	2.0	0.0120	0.0124	0.0046	0.0069
	1.8	0.0097	0.0041	0.0069	0.0086
	1.6	0.0052	0.0071	0.0021	0.0135
	1.4	0.0190	0.0354	0.0129	0.0259
	1.2	0.0024	0.0054	0.0118	0.0015
	1.0	0.0107	0.0041	0.0048	0.0192
	0.8	0.0055	0.0272	0.0101	0.0093
	0.6	0.0251	0.0107	0.0068	0.0160
	0.4	0.0044	0.0019	0.0027	0.0044
	0.2	0.0073	0.0021	0.0059	0.0068

Power Density Calculations: The measured power density readings were summed and the results divided by the number of readings to calculate the average.

	Battery	Left	Right	Handle
Whole body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.0101	0.0110	0.0069	0.0112
Lower body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.0106	0.0105	0.0064	0.0091
Upper body average (1.0 - 2.0 m, mW/cm <sup>2</sup> ) =	0.0098	0.0114	0.0072	0.0126

**Name of Test:** R.F. Radiation Exposure - Test Condition C (2)

FCC Rules: 1.1307, 1.1310, 1.1311, 2.1091  
Description, EUT: See page 2 of Test Report

Test Frequencies, MHz 2402.00 2441.00 2480.00  
Power, Conducted, W = 20.00  
Antenna Gain = 0 dBi (Integral Antenna)

Test Frequencies, MHz 5745.00 5785.00 5825.00  
Power, Conducted, W = 20.00  
Antenna Gain = 0 dBi (Integral Antenna)

Limit for all transmitters = 1.0 mW/cm<sup>2</sup>

Results at tested distances	Probe Height, m	Power Density, mW/cm <sup>2</sup>			
		WLAN A + BT Battery Distance 20 cm	WLAN A + BT Left Distance 20 cm	WLAN A + BT Right Distance 20 cm	WLAN A + BT Handle Distance 20 cm
	2.0	0.0060	0.0455	0.0055	0.0086
	1.8	0.0026	0.0626	0.0117	0.0074
	1.6	0.0091	0.1654	0.0107	0.0058
	1.4	0.0182	0.2740	0.0421	0.0169
	1.2	0.0112	0.4130	0.0015	0.0052
	1.0	0.0140	0.5808	0.0226	0.0212
	0.8	0.0334	0.5393	0.0252	0.0085
	0.6	0.0107	0.3337	0.0038	0.0048
	0.4	0.0042	0.1828	0.0039	0.0042
	0.2	0.0116	0.1030	0.0022	0.0065

Power Density Calculations: The measured power density readings were summed and the results divided by the number of readings to calculate the average.

	Battery	Left	Right	Handle
Whole body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.0121	0.0114	0.0129	0.0089
Lower body average (0.2 - 0.8 m, mW/cm <sup>2</sup> ) =	0.0150	0.0160	0.0088	0.0060
Upper body average (1.0 - 2.0 m, mW/cm <sup>2</sup> ) =	0.0102	0.0084	0.0157	0.0108

END OF TEST REPORT

(The following will be placed in the Instruction Manual)

### Mandatory Safety Instructions to Installers & Users

Use only manufacturer-supplied antennas.

**Antenna Minimum Safe Distance from Main Antenna:** 100cm.

Antenna Gain: Directional, with maximum gain of 14.9dB reference to isotropic.

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy, which is below the OSHA (Occupational Safety and Health Act) limits.

**Antenna Mounting:** The antenna supplied by the manufacturer must not be located such that during radio transmission, any person or persons can come closer than the above indicated minimum safe distance to the antenna i.e. **100cm**.

To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance shown above, and in accordance with the requirements of the antenna manufacturer or supplier.

**Antenna Substitution:** Do not substitute any antenna for the models supplied or recommended by the manufacturer. You may be exposing person or persons to excess radio frequency radiation. You may contact the manufacturer for further instructions.

**Warning:** Maintain a separation distance from the antenna to a person(s) of at least **100cm**.

You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational/Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the front face of the antenna.

**Antenna Minimum Safe Distance from Transceiver Unit:** 20cm.

Antenna Gains: Omni-Directional, with maximum gain of 0dB reference to isotropic.

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy, which is below the OSHA (Occupational Safety and Health Act) limits. You must maintain the minimum separation distance of 20cm between the unit, yourself and nearby persons to satisfy RF Exposure compliance.

**Testimonial  
and  
Statement of Certification**

**This is to certify:**

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.



Certifying Engineer:

David E. Lee, FCC/IC Compliance Manager