DELTA Test Report

TEST Reg. no. 19

EMC radiated immunity test from 1 to 2 GHz on transceiver system TT-3000C

Performed for Thrane & Thrane A/S

DANAK-1910349
Project no.: A505921-1

01 December 2008

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Title	EMC radiated immunity test from 1 to 2 GHz on transceiver system TT-3000C
Test object	Transceiver system TT-3000C
Report no.	DANAK-1910349
Project no.	A505921-1
Test period	27 November 2008
Client	Thrane & Thrane A/S Lundtoftegårdsvej 93D 2800 Kongens Lyngby Denmark Tel.: +45 39 55 88 00
Contact person	Morten Bondesen E-mail: mb@thrane.com
Manufacturer	Thrane & Thrane A/S
Specifications	EN/IEC 60945:2002
Results	The test objects were found to be in compliance with radiated immunity requirements in the range 1-2 GHz of the specification
Test personnel	Peter Wolf Frandsen
Date	01 December 2008

Project Manager

Peter Wolf Frandsen
Specialist, EMC
DELTA

Responsible

Michael Nielsen
Specialist, EMC
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1. Summary of tests

Test	Test method	Result
Immunity to radio frequency electro-magnetic fields	EN 61000-4-3:2006	Passed [1)]

1) Frequency range 1-2 GHz.

The given result is based on a shared risk principle with respect to the measurement uncertainty.

Conclusion

The test objects mentioned in this report meet the radiated immunity requirements in the range 1-2 GHz of the standard stated below.

- EN/IEC 60945:2002.

The test results relate only to the objects tested.

2. Test objects and auxiliary equipment

2.1 Test objects

Test object 2.1.1

Name of test object	Transceiver
Model / type	TT-3020C
Part no.	-
Serial no.	97203654
FCC ID	-
Manufacturer	Thrane & Thrane A/S
Supply voltage	24VDC
Software version	-
Cycle time	-
Comments	-

Test object 2.1.2

Name of test object	Power Supply
Model / type	TT-3680B
Part no.	-
Serial no.	-
FCC ID	-
Manufacturer	Thrane & Thrane A/S
Supply voltage	230 VAC
Software version	-
Cycle time	-
Comments	-

Test object 2.1.3

Name of test object	Antenna
Model / type	TT-3005M
Part no.	-
Serial no.	00836304
FCC ID	-
Manufacturer	Thrane & Thrane A/S
Supply voltage	-
Software version	-
Cycle time	-
Comments	-

Test object 2.1.4

Name of test object	Message Terminal
Model / type	TT-3606E
Part no.	-
Serial no.	03920371
FCC ID	-
Manufacturer	Thrane & Thrane A/S
Supply voltage	Internal voltage
Software version	-
Cycle time	-
Comments	-

Test object 2.1.5

Name of test object	Keyboard
Model / type	TT-3601E
Part no.	-
Serial no.	-
FCC ID	-
Manufacturer	Thrane & Thrane A/S
Supply voltage	Internal voltage
Software version	-
Cycle time	-
Comments	-

Test object 2.1.6

Name of test object	Transceiver system
Model / type	TT-3000C
Part no.	-
Serial no.	-
FCC ID	-
Manufacturer	Thrane & Thrane A/S
Supply voltage	230 VAC
Software version	-
Cycle time	-
Comments	This system contains test object 2.1.1, 2.1.2, 2.1.3, 2.1.4, and 2.1.5

3. General test conditions

3.1 Test setup during test

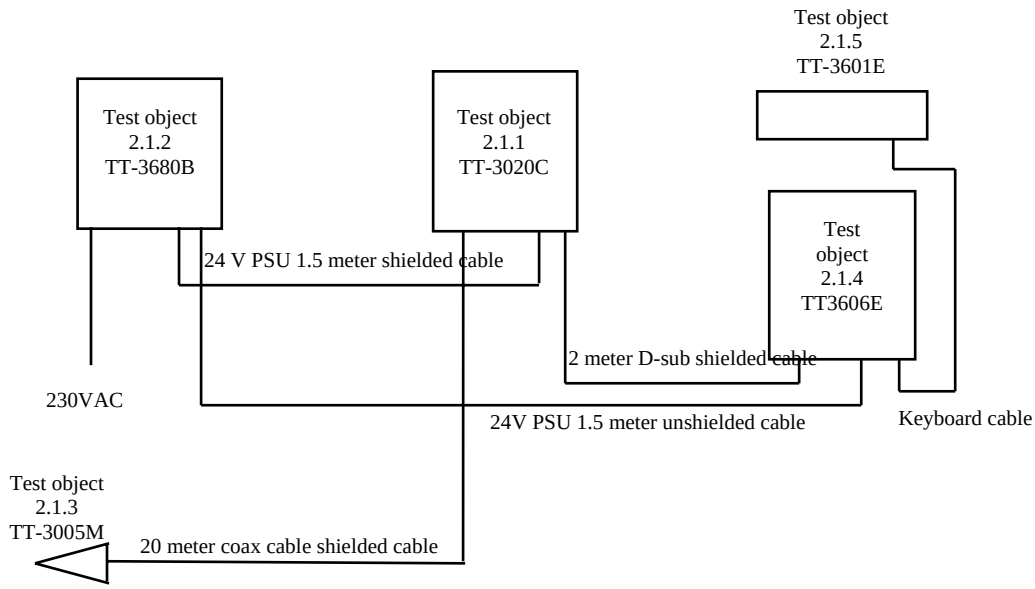

Figure 3.1.1 Block diagram of test objects with cables and auxiliary equipment.

Two different test setups were used during the radiated immunity test.

Setup 1

The antenna was placed inside the semi-anechoic chamber together with the rest of the transceiver system. No satellite link was possible.

Setup 2

The antenna was placed outside the semi-anechoic chamber. During test, a communication link to a satellite was established.

In order to verify performance during immunity test, a status screen of hardware and software were used. The hardware information screen displayed the status of synthesisers, local oscillators and the antenna port. The software information screen displayed the status of the currently available information about satellite link (synchronization, CNo and BB error rate). During the immunity test, the status screen was visually controlled by the client and DELTA test personnel.

For radio receiver equipment the frequencies in the exclusion band, together with any narrow band receiver responses, are excluded from the radiated disturbance.

3.2 Criteria for compliance during immunity test

Performance criteria according to corresponding standard were applied during immunity tests as follows:

General

The test object shall not become dangerous or unsafe as a result of the application of the tests.

Performance criterion A

The test object shall continue to operate as intended during and after the test.

No error or warning signals from the modules are allowed.

The test object is not allowed to change operating mode.

During continuous radio frequency test, the test object shall meet performance criterion A.

4. Test results

4.1 Immunity to radio frequency electromagnetic field, 1-2 GHz

Test object	Transceiver system	Sheet	RF Field-1
Type	TT-3000C	Project no.	A505921-1
Serial no.	-	Date	27 Nov. 2008
Client	Thrane & Thrane A/S	Initials	PWF
Specification	EN/IEC 60945:2002	Required Perf. criter.	A

Test method	EN 61000-4-3:2006	Temperature	21 °C
Characteristics	16 point pre-calibration	Humidity	40 % RH
Test equipm.	EMC room 1 Hørsholm 29691 29984 29342 49000, 49001 29694 Uncertainty: +/-1.7dB		

Frequency range	Modulation	Field direction	Amplitude [V/m]	Re-sponse	Remarks
1-2 GHz	80 % AM 400 Hz	Vertical	10	No	Ok, Note 1, Note 3
1-2 GHz	80 % AM 400 Hz	Horizontal	10	No	Ok, Note 1, Note 3
1-2 GHz	80 % AM 400 Hz	Horizontal	10	No	Ok, Note 2, Note 3
1-2 GHz	80 % AM 400 Hz	Vertical	10	No	Ok, Note 2, Note 3
1-2 GHz	80 % AM 400 Hz	Vertical	10	No	Ok, Note 1, Note 4
1-2 GHz	80 % AM 400 Hz	Horizontal	10	No	Ok, Note 1, Note 4
1-2 GHz	80 % AM 400 Hz	Horizontal	10	No	Ok, Note 2, Note 4
1-2 GHz	80 % AM 400 Hz	Vertical	10	No	Ok, Note 2, Note 4

Note 1: Front of the test object points at the antenna
Note 2: Side of the test object points at the antenna
Note 3: No satellite link
Note 4: With satellite link

Criteria for compliance: See section 3.2

Test result: The radio frequency electromagnetic field caused no malfunctions

Compliant: Yes

Setup comments: Frequency step: 1 %, dwell time: 3 seconds

Comments: None

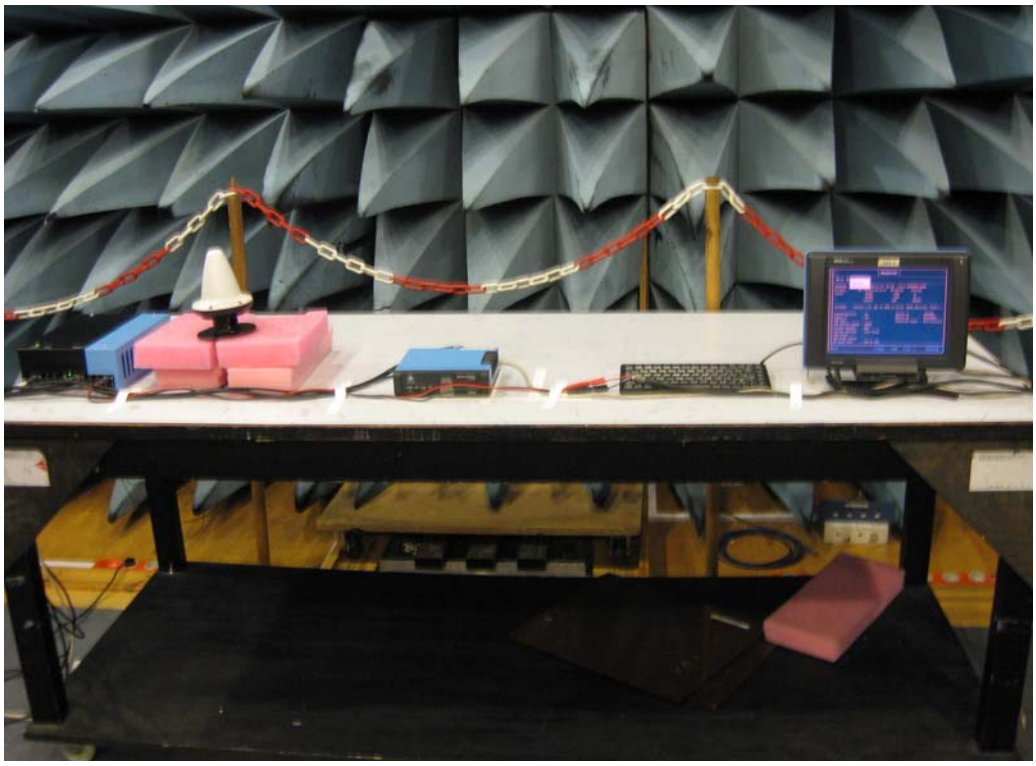

Photo 4.1.1 Test setup regarding immunity to radio frequency electromagnetic field.

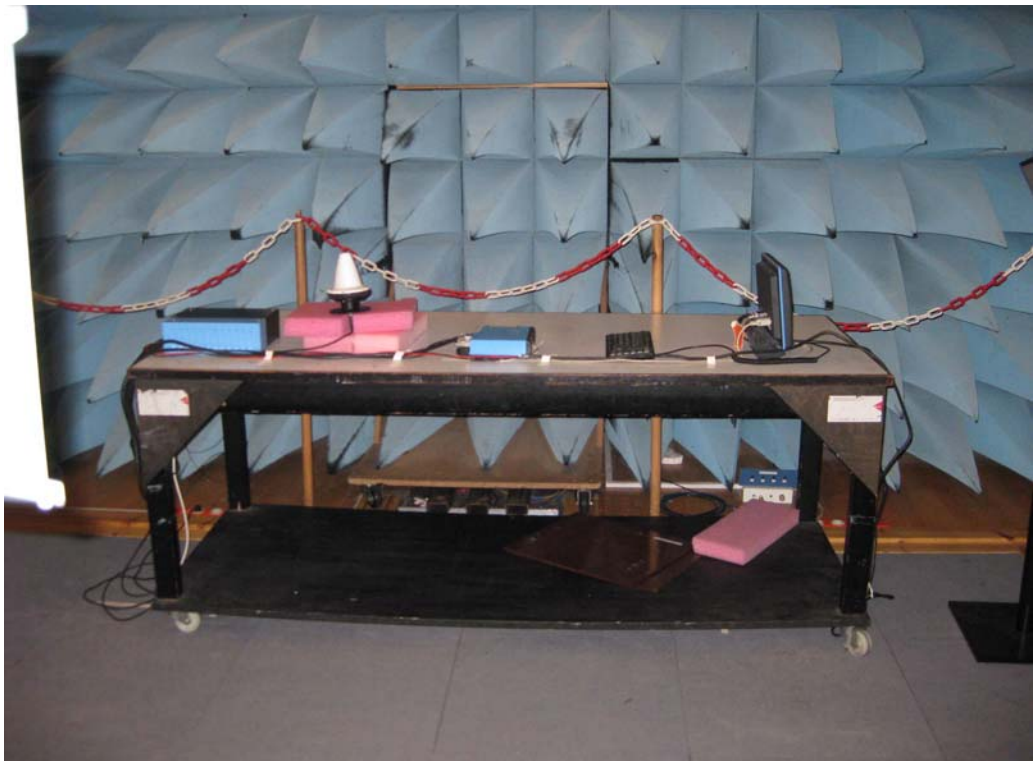

Photo 4.1.2 Test setup regarding immunity to radio frequency electromagnetic field.

Photo 4.1.3 Test setup regarding immunity to radio frequency electromagnetic field.

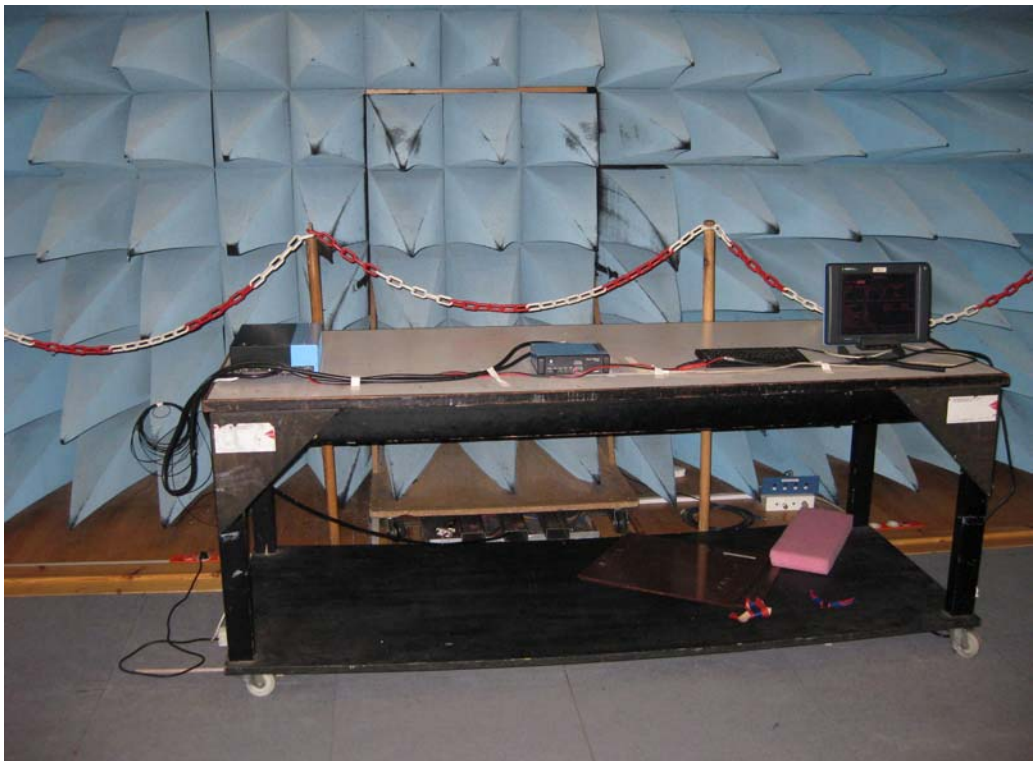

Photo 4.1.4 Test setup regarding immunity to radio frequency electromagnetic field.

5. National registrations and accreditations

5.1 FCC Registrations

Organization: Federal Communications Commission, USA

Registration Number: 90529

Facilities:
OATS Hørsholm (EMC-0)
EMC room 2 Hørsholm (EMC-2)
EMC room 3 Hørsholm (EMC-3)
EMC room 4 Hørsholm (EMC-4)
EMI room Hørsholm (EMC-5)

5.2 VCCI Registrations

Organization: Voluntary Control Council for Interference by Information Technology, Japan

Member Number: 910

Facilities:

OATS Hørsholm (EMC-0):	R-691
EMC room 2 Hørsholm (EMC-2):	C-707 and T-246
EMC room 3 Hørsholm (EMC-3):	C-2532 and T-247
EMC room 4 Hørsholm (EMC-4):	C-2533 and T-248
EMI room Hørsholm (EMC-5):	R-1180, C-706 and T-249

5.3 IC Registrations

Organization: Industry Canada, Certification and Engineering Bureau

Registration Number: IC4187-5

Facilities: EMI room Hørsholm (EMC-5)

5.4 DANAK Accreditation

Organization: Danish Accreditation and Metrology Fund - DANAK, see www.danak.dk and www.ilac.org

Registration Number: 19C

DANAK is part of ILAC (International Laboratory Accreditation Cooperation) including its MRA (Mutual Recognition Arrangement). The MRA includes the Australian NATA and Canadian SCC.

CISPR 22 is equivalent to AS/NZS CISPR 22, and therefore this report can be used for applying the **Australian C-Tick mark** for IT equipment, when this test has been passed.

CISPR 22:2002 is equivalent to ICES-003:2004, and therefore this report can be used for approval in Canada for IT equipment, when this test has been passed.

6. List of instruments

NO.	DESCRIPTION	MANUFACTURER	TYPE NO.
29342	REFLECTOMETER COUPLER, 600-4200 MHz	ROHDE & SCHWARZ	ZPD
29691	0.01 - 20 GHz SYNTH. SWEEPER	HEWLETT-PACKARD	83620A
29694	1-12 GHz HORN ANTENNA.	LOGIMETRICS	AN 8200 F
29984	RF POWER AMPLIFIER, 0.8-2.2 GHz, 200 W	MILMEGA	AS0822-200
49000	SINGLE CHANNEL POWER METER DISPLAY UNIT	ROHDE & SCHWARZ	NRVS
49001	THERMAL POWER SENSOR, DC-18 GHz	ROHDE & SCHWARZ	NRV-Z51