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# RA-03-22225/A/EG

# E.M.C. test report

**standard to apply:**
**EN 301 489-5**

**Equipment under test:**
**4 W UHF TRANSMITTER**
**410-470 MHz**

**Company:**
**THALES NAVIGATION**

**DISTRIBUTION: Mr BREMAUD** **Company: THALES NAVIGATION**

**Number of pages: 9 + 2 Appendixes**

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| 0 | 26-Jun-03 | Creation | S. ROBIN | SR | Y. JUDEAUX | |

Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.

This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

| | |
|---|---|
| ***PRODUCT:*** | 4 W UHF TRANSMITTER 410-470 MHz |
| ***Reference / model:*** | UHF TRANSMITTER |
| ***Serial number:*** | ZE 1616 |
| ***MANUFACTURER:*** | THALES NAVIGATION |

***COMPANY SUBMITTING THE PRODUCT:***

| | |
|---|---|
| ***Company:*** | THALES NAVIGATION |
| ***Address:*** | ZAC de la Fleuriaye<br>BP 44474 CARQUEFOU CEDEX<br>FRANCE |
| ***Responsible:*** | Mr BREMAUD |
| ***DATE(S) OF TEST:*** | 16 June 2003 |
| ***TESTING LOCATION:*** | EMITECH ATLANTIQUE laboratory in ANGERS<br>(49) FRANCE |
| ***TESTED BY:*** | S. ROBIN |

# CONTENTS

**TITLE** **PAGE**

## *1. INTRODUCTION*

This document presents the result of E.M.C. test carried out on the following equipment: 4 W UHF TRANSMITTER 410-470 MHz in accordance with normative reference.

## *2.NORMATIVE REFERENCE*

| | |
|---|---|
| ETSI EN 301 489-5 V1.3.1 (02) | Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 5: Specific conditions for Private land Mobile Radio (PMR) and ancillary equipment (speech and non-speech) |
| ISO 7637 (90) | Road vehicles – Electrical disturbance by conducting and coupling. |
| EN 55022 (98) | Limits and methods of measurement of radio disturbance characteristics of information technology equipment. |
| EN 61000-4-2 (95) | Electromagnetic Compatibility (EMC) – Part 4: Testing and measurements techniques – Section 2: Electrostatic discharge immunity test. Basic EMC publication. |
| EN 61000-4-3 (96) | Electromagnetic Compatibility (EMC) – Part 4: Testing and measurements techniques – Section 3: Radiated, radio-frequency electromagnetic field immunity test. Basic EMC publication. |
| EN 61000-4-4 (95) | Electromagnetic Compatibility (EMC) – Part 4: Testing and measurements techniques – Section 4: Electrical fast transient burst immunity test. Basic EMC publication. |
| EN 61000-4-5 (95) | Electromagnetic Compatibility (EMC) – Part 4: Testing and measurements techniques – Section 5: Surge immunity test. |
| EN 61000-4-6 (96) | Electromagnetic Compatibility (EMC) – Part 4: Testing and measurements techniques – Section 6: Immunity to conducted disturbances induced by radio frequency fields. |
| EN 61000-4-11 (94) | Electromagnetic Compatibility (EMC) – Part 4: Testing and measurements techniques – Section 11:Voltage dips, short interruptions and voltage variations immunity tests. |
| EN 61000-3-2 (95) /A1 (98) /A2 (98) / A14 (00) | Electromagnetic compatibility (EMC) - Part 3: limits Section 2: limits for harmonic current emissions (equipment input ≤ 16 A per phase) |
| EN 61000-3-3 (95) | Electromagnetic compatibility (EMC) - Part 3: limits Section 3: limitation of voltage fluctuation and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A |

## *3.TEST UNIT CONFIGURATION*

| | |
|---|---|
| APPENDIX 1 | Photography of the equipment under test |
| APPENDIX 2 | Certification test questionnaire<br>(Questionnaire completed by the company submitting the material) |

## *4.TESTS AND CONCLUSIONS*

| Test procedure | Description of test | Criteria respected ? | | | | Comment |
|---|---|---|---|---|---|---|
| | | Yes | No | NAp | NAs | |
| EN 55022 | CONDUCTED DISTURBANCES MEASUREMENT | | | | X | Class B *Note 1* |
| EN 55022 | RADIATED ELECTRIC FIELD | | | | X | Class B *Note 1* |
| EN 61000-4-2 | ELECTROSTATIC DISCHARGES IMMUNITY<br>- Direct contact discharges<br>- Direct air discharges<br>- Indirect contact discharges - horizontal coupling<br>- Indirect contact discharges - vertical coupling | | | | <br>X<br>X<br>X<br>X | *Note 1* |
| EN 61000-4-3 | RADIATED RADIOFREQUENCY DISTURBANCES IMMUNITY | X | | | | |
| EN 61000-4-4 | FAST TRANSIENT BURST IMMUNITY<br>- Test on power supply lines<br>- Test on input / output lines | | | | <br>X<br>X | *Note 1* |
| EN 61000-4-5 | SURGE WAVE IMMUNITY<br>- Test on power supply lines | | | <br>X | | *Note 2* |
| EN 61000-4-6 | CONDUCTED RADIOFREQUENCY DISTURBANCES IMMUNITY<br>- Test on power supply lines<br>- Test on input / output lines | | | | <br>X<br>X | *Note 1* |
| EN 61000-4-11 | VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATION IMMUNITY | | | X | | *Note 2* |
| ISO 7637 | ROAD VEHICLES – ELECTRICAL DISTURBANCE BY CONDUCTING AND COUPLING | | | X | | *Note 3* |
| EN 61000-3-2 | HARMONIC CURRENT EMISSIONS | | | X | | *Note 2* |
| EN 61000-3-3 | VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT | | | X | | *Note 2* |

NAp: Not Applicable NAs: Not Asked

**Comments:**

*Note 1: the results of this tests are in the report RA-02-22156.*

*Note 2: equipment powered by DC power supply.*

*Note 3: the equipment is not made for road vehicle application.(not powered by a battery vehicle)*

**Conclusion:**

The sample of 4 W UHF TRANSMITTER 410-470 MHz submitted to the tests complies with the regulations of the standard ETSI EN 301 489-5 (02) in accordance with the limits or criteria defined in this report, for the EN 61000-4-3 test.

## *5.RADIATED RADIO-FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST*

**Standard:** ETSI EN 301 489-5 V1.3.1 (02)

**Test procedure:** EN 61000-4-3 (95)

**Test equipment:**

| TYPE | MARQUE | EMITECH NUMBER |
|---|---|---|
| Amplifier<br>80 to 1000 MHz 75 W | Milmega<br>ASM 1000-75R | 2555 |
| Millivoltmeter | Rohde & Schwarz URV 5 | 2296 |
| Millivoltmeter probe | Rohde & Schwarz<br>URV 5-Z2 | 2316 |
| Bilog antenna | EMCO 3142 | 2460 |
| Directional coupler | CMC 440175 | 1031 |
| Semi-anechoic chamber | SIDT C.A1 | 1089 |
| Directional coupler | HP778D | 1297 |
| Double Ridged guide antenna | ELECTRO-METRICS<br>EM 6961 | 1938 |
| Amplifier 1 GHz – 2 GHz | MILMEGA AS0820 - 100 | 2993 |
| Radiofrequency generator | Rohde & Schwarz SMY02 | 1243 |

**Software used:** IMCEM 1.8

**Test set up:**

The test set up consists in a wooden table 0.8 m high, standing on the ground plane. The field generating antenna is placed at 3 m of the equipment. The field in the plane of the equipment, is before hand calibrated. The test is carried out on the front side of the equipments.

**Frequency range:** 80 MHz to 1000 MHz and 1400 MHz to 2000 MHz

**Frequency step:** 1 % of the preceding frequency.

**Field polarization:** the test is carried out in horizontal and vertical polarization.

**Modulation:** 1 kHz (80 %) amplitude modulation.

**Specified level:** 3 V/m

**Frequency exclusion bandwidth:** from 438 MHz to 458 MHz

**Test duration for each frequency:** 2 s.

**Performance criteria:** A criteria of the ETSI EN 301 489-5 standard.

**Equipment under test operating condition:**

The UHF transmitter is activated by the GPS base station. One LED on the GPS base station indicates the UHF transmission (once per second).

**Equipment control procedure:**

Visual control of the LED indicating the UHF transmission.

**Susceptibility criteria:**

Not any change of the periodicity of the LED flash is accepted during the test.

**Results:**

Not any change has been observed during the test.

## *6.APPENDIXES*

***Appendix 1: "PHOTOGRAPHY OF THE EQUIPMENT UNDER TEST"***
This appendix contains 2 pages.

***Appendix 2: "CERTIFICATION TEST QUESTIONNAIRE"***
This appendix contains 4 pages.

□□□ End of report, 2 appendixes to be forwarded □□□

# APPENDIX 1

## PHOTOGRAPHY OF THE EQUIPMENT UNDER TEST

**PHOTOGRAPHY OF THE EQUIPMENT UNDER TEST**

# APPENDIX 2

## CERTIFICATION TEST QUESTIONNAIRE

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## Section 1 - Equipment under test:

Designation : 4 W UHF Transmitter 410-470MHz.....

Type (or commercial reference): UHF Transmitter.....

Serial number : ZE1616 .....

Manufacturer: Thales Navigation.....
Address: ZAC de la Fleuriaye BP44474 Carquefou Cedex.....

Company presenting the equipment: Thales Navigation.....
Address: ZAC de la Fleuriaye BP44474 Carquefou Cedex.....

Name of the Person in charge of the Product: Mohamed Abousalem.....

State of development: o prototype o pre-serial X serial

Alimentation : (If several types of supply, indicate all of them)

o single phase Voltage: ..... Vac
o three phases Voltage: ..... Vac

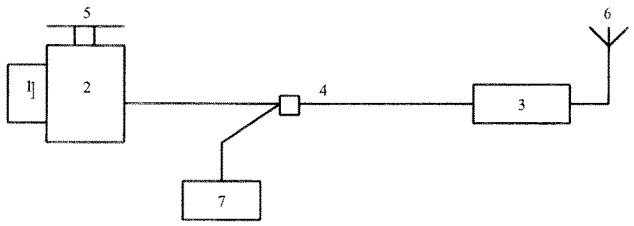
X continuous Voltage: 10 to 16..... Vdc
o AC/DC adapter Voltage: .....Vac / ..... Vdc

Power o greater than 1kW
X less than 1kW
X Equipment for professional use only
X Equipment other than lighting appliances with power < 75W

Dimensions : (height x length x width in mm) : approx : 200x65x70mm .....

## Section 2 – Diagram of the configuration & Interconnection cables:

Please draw the configuration with the cables that might be connected and precise their length.




Please list all interconnection cables (1) and their characteristics (recommended max. length, type…) :

1 : Battery pack 2: GPS receiver 3 : UHF 4W Thales Transmitter.....

4 : 10 meter RS422/power cable for 4W Thales transmitter 5 : GPS antenna.....

6 : UHF transmitter antenna 7 : 12V car battery (not provided by the manufacturer).....

.....

*(1) Cables likely to be connected to the equipment and not only the one furnished by the manufacturer*

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## Section 3 : Control procedure to be used during immunity tests

This section is to describe how it's possible to verify if the equipment is working correctly during the tests.

Procedure (description of the implementation of control means):

The GPS receiver is controlled by led on the front panel. The first led on the right provide the number of satellite received. The number of satellite should not change during immunity tests.....

The third on the right indicates the UHF transmission once per second. The periodicity of flash of this led should not change during immunity tests.....

.....

.....

.....

List of equipment used to realize the control according to the procedure above (except adverse information, equipment allowing to verify the acceptance criteria are to the client charge)

None. .....

.....

.....

.....

.....

Important: During immunity tests, it might be necessary to protect the control equipment from the disturbance applied during the test. Therefore, it's better to provide interconnection cables with a big length (minimal 5m). In case of impossibility, contact us about this.

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## Section 4 : Susceptibility criteria

In this section, please indicate which function(s) must not be damaged (or up to witch level it can) when the equipment is disturbed:

By a continuous disturbance (equipment near a transmitter for example)

Idem immunity tests .....

.....

.....

.....

By a transient disturbance (electrostatic discharge for example)

Idem immunity tests .....

.....

.....

.....

I assess that the informations included in this questionnaire are right.

***Signature of the person presenting the equipment:***
*(Date and signature)*

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**TO BE COMPLETED IN CASE OF RADIOCOMMUNICATION EQUIPMENT**

**Frequency of the transmitter: UHF : 448MHz** .....

**Frequency of the receiver:** .....

**Type of antenna: UHF transmitter : dipole antenna** .....

**Radiated power: 4W** .....

**Type of modulated signal (speech, data): data** .....

**Type of modulation (AM, FM, ...): UHF transmitter : GMSK** .....

**Bandwidth of the intermediate frequency filter (located just before the demodulator - this bandwith is required for identifying the narrow band responses of receivers): GPS :** .....

**For FM audio transmissions, please indicate the maximum deviation:** ..... **kHz**

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## Section 6 - Radio tests for radio approval:

**Please precise if those tests are: ☒ Already performed o Ongoing o Not realised**
**For systems including several sub-systems (example: dissociated transmitter and receiver) please indicate the approved sub-system(s).**

**4W UHF Thales Transmitter**

**Location of radio tests: Emitech (Angers)** .....

**Date of the approval:** XXXXXXX .....

**Reference of the approval report:** XXXXXXXX .....

**Type of tests done (standard used): ETS 300-113** .....

I assess that the informations included in this questionnaire are right

***Signature of the personn presenting the equipment :***
*(Date and signature)*