



Testing and certification of, consultancy and
research concerning, electronic and electric
appliances, systems, installations and
telecommunication systems

**TEST REPORT CONCERNING THE COMPLIANCE
OF A IDENTIFICATION AND TIMING SYSTEM,
BRAND AMB-IT, MODEL CHIPX DECODER WITH
47 CFR PART 15 (2006-08-14).**

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Industry Canada : IC3501
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

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Test specification(s): 47 CFR Part 15 (2006-08-14)
Description of EUT: Identification and timing system
Manufacturer: AMB-IT holding B.V.
Brand mark: AMB-IT
Model: CHIPX decoder
FCC ID: NXYCHIPX

MEASUREMENT/TECHNICAL REPORT

AMB-IT holding B.V.

Model : CHIPX decoder

FCC ID: NXYCHIPX

October 9, 2007

| | | | |
|---|---|---|-------------------------|
| This report concerns: | Original grant/certification | Class 2 change | Verification |
| Equipment type: | DCD, Identification and Timing system | | |
| Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ? | Yes | No | n.a. |
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 and the measurement procedures of ANSI C63.4-2003. TNO Electronic Products & Services (EPS) B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: October 9, 2007

Signature:

H.J. Pieters
Project Manager TNO Electronic Products & Services (EPS) B.V.





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Description of test item

Test item : Identification and timing system
Manufacturer : AMB-IT holding B.V.
Brand : AMB-IT
Model : CHIPX decoder
Serial number(s) : 0004B7020EAB
Revision : Not applicable
Receipt date : October 3, 2007

Applicant information

Applicant's representative : Mr. M.H.C. Gielen
Company : AMB-IT holding B.V.
Address : Zuiderhoutlaan 4
Postal code : 2012 PJ
City : Haarlem
PO-box : --
Postal code : --
City : --
Country : --
Telephone number : +31 23 5291893
Telefax number : +31 23 5290156

Test(s) performed

Location : Niekerk
Test(s) started : October 3, 2007
Test(s) completed : October 3, 2007
Purpose of test(s) : Equipment Authorisation (Certification).

Test specification(s) : 47 CFR Part 15 (2006-08-14)

Test engineers : R. van der Meer

Report written by : O.H. Hoekstra

Report date : October 9, 2007

This report is in conformity with NEN-EN-ISO/IEC 17025: 2005.

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The test results relate only to the item(s) tested.



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1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is a identification and timing system. It consists of a decoder, which transmits a 125 kHz signal via a loop antenna, which is typically buried under a finish line. The transmitted signal triggers a transponder, which sends an identification to the decoder. The Decode time stamps the reception of the transponder. The application is in sport events, such as auto racing and track and fiels

1.2 Related submittal(s) and/or Grant(s).

Not applicable.

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

| | | |
|----------------------|---|--|
| Test item | : | Identification and timing system |
| Manufacturer | : | AMB-IT holding B.V. |
| Brand | : | AMB-IT |
| Model | : | CHIPX |
| Serial number | : | 0004B7020EAB |
| Voltage input rating | : | 12 VDC |
| Current input rating | : | 500 mA |
| Antenna | : | External |
| Frequency | : | Tx 125 kHz, Rx = 6.78 MHz |
| Remarks | : | There are two different housings. Please refer to the External Photos exhibit. |

| | | |
|-----------------------|---|---------------|
| AE1 | : | AC/DC adapter |
| Manufacturer | : | DVE |
| Brand | : | DVE |
| Model | : | DSA-421S-12 |
| Serial number | : | - |
| Voltage input rating | : | 100-240 VAC |
| Current input rating | : | 1.2 A |
| Voltage output rating | : | +12 VDC |
| Current output rating | : | 2.7 A |
| Remarks | : | none |

| | | |
|---------------|---|----------------------------|
| AE2 | : | loop antenna |
| Manufacturer | : | AMB-IT holding B.V. |
| Brand | : | AMB-IT |
| Model | : | -- |
| Serial number | : | -- |
| Remarks | : | 12m (length), 0.6m (width) |



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AE3 : headphone
 Brand : Bandridge
 Impedance : 32 Ohms
 Serial number : --
 Remarks : Delivered with the product.

AE4 : dummy connection box
 Manufacturer : AMB-IT holding B.V.
 Brand : AMB-IT
 Model : --
 Serial number : --
 Remarks : With cable 1.50, intended to provide a RS-485 connection to the AUX input of the EUT.

AE5 : loop antenna
 Manufacturer : AMB-IT holding B.V.
 Brand : AMB-IT
 Model : --
 Serial number : --
 Remarks : 12m (length), 0.6m (width)

AE6 : Laptop
 Manufacturer : Dell Computer Corporation
 Brand : Dell
 Model : C600
 Serial number : TW-0791UH-12800-155-4387
 Voltage input rating : 100-240 VAC, 50-60 Hz
 Current input rating : 3.5 Amps max.
 Remarks : used on control port.

1.3.1 Description of input and output ports.

| Number | Ports | From | To | Length (metres) | Shielding | Remarks |
|--------|--------------|------|-----|-----------------|-----------|---------|
| 1 | DC input | AE1 | EUT | 1.5 | no | - |
| 2 | Ethernet | AE6 | EUT | 1.5 | no | - |
| 3 | RS-485 | AE4 | EUT | 1.5 | yes | - |
| 4 | USB | AE6 | EUT | 1.5 | yes | - |
| 5 | Antenne port | EUT | AE5 | > 3m | Yes | - |
| 6 | Headphone | EUT | AE3 | 1.5 | no | - |

1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (2006-08-14), sections 15.205, 15.207, and 15.209.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

Radiated emission tests below 30 MHz were performed at a measurement distance of 1 and/or 3 meters and/or 10 meters. To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the calculation in appendix 1 has been applied.



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The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.5 Test facility.

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at TNO Electronic Products & Services (EPS) B.V., located in Nieuwerkerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 23, 2000.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

1.6 Product labeling.

In accordance with 47 CFR Part 15.19 (a)(3) the following text shall be placed on a label, which is attached to the EUT:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

A label, in accordance with 47 CFR Part 15.19 (b)(1)(i), shall be attached to the EUT.

For further details about the labeling requirements (size, legibility, etc.) as set by the Federal Communications Commission see 47 CFR Part 15.19 (a)(3), 47 CFR Part 15.19 (b)(1), 47 CFR Part 15.19 (b)(2) and 47 CFR Part 15.19 (b)(4).



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2 System test configuration.

2.1 Justification.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2003.

2.2 EUT mode of operation.

The EUT transmits a 125 kHz signal. Upon reception the transponder triggers and sends out a message containing the transponder number..

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance with the appropriate sections of 47 CFR Part 15.

2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance with the appropriate sections of 47 CFR Part 15.

2.5 Block diagram of the EUT.

The block diagram is available in the technical documentation package which will be submitted to the Commission.

2.6 Schematics of the EUT.

The schematics are available in the technical documentation package which will be submitted to the Commission.

2.7 Part list of the EUT.

The part list is available in the technical documentation package which will be submitted to the Commission.



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3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field).

| Frequency (MHz) | Measurement results dB(μ V)/m @ 3 metres Quasi-peak | | Limits dB(μ V)/m @ 3 metres Quasi-peak | Margin (dB) Quasi-peak | | Result |
|-----------------|--|------------|---|------------------------|------------|--------|
| | Vertical | Horizontal | | Vertical | Horizontal | |
| 83.9 | 15.6 | 14.8 | 40.0 | -24.4 | -25.2 | PASS |

Table 1: Radiated emissions of the EUT.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, section 15.209, with the EUT tested in active mode.

Notes:

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

Test engineer

Signature :

Name : R. van der Meer

Date : October 9, 2007

3.2 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

| Frequency (MHz) | Measurement results dB μ V Quasi-peak | | Antenna factor dB | Cable loss dB | Measurement results dB(μ V)/m Quasi-peak (calculated) | Limits Part 15.209 dB(μ V)/m |
|-----------------|---|-----------|-------------------|---------------|--|-----------------------------------|
| | 3 meters | 10 meters | | | | |
| 0.009 - 0.125 | <20.0 | <20.0 | 20.5 | 1 | - | 48.5 – 13.8 (300 m) |
| 0.125 | 67.0 | < 30.0 | 20.5 | 1 | +8.5 | 25.7 (300 m) |
| 0.250 | 44.2 | < 20.0 | 20.5 | 1 | -14.3 | 19.6 (300 m) |
| 0.375 | 49.4 | < 20.0 | 20.0 | 1 | -9.6 | 16.1 (300 m) |
| 0.500 | 34.4 | < 20.0 | 20.2 | 1 | 15.6 | 33.6 (30 m) |
| 0.500 - 1.705 | < 10.0 | < 10.0 | 19.5 | 1 | - | 33.6 - 29.5 (30 m) |
| 1.705 – 30.0 | < 10.0 | < 10.0 | 19.5 | 1 | - | 29.5 (30 m) |

Table 2 Radiated emissions of the EUT.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205 and 15.209, with the EUT operating in continuous transmit mode on 125 kHz, are depicted in table 2.

Notes:

- The computation method for calculation of the field strength at different distances can be found in Appendix 1. The extrapolation factor of 40 dB/decade was used (80 dB for 3 to 300 m).
- Frequency range: 9-90 kHz Average detector used during measurements
- Frequency range: 110-490 kHz Average detector used during measurements
- n.a. indicates that no field strength values could be measured on the listed frequencies or in the listed frequency range
- Field strength values of radiated emissions at frequencies not listed in table 3 are more than 20 dB below the applicable limit
- The EUT was varied in three positions, the loop antenna was varied in two orientations. The reported value is the worst case found at the reported frequency.
- The emissions up to the 10th harmonic were investigated, in accordance with 47 CFR 15.33 (a)(1).
- The fundamental frequency component of the emission remains unaffected in frequency when varying supply voltage in accordance with 47 CFR 15.31 (e)

Test engineer

Signature :

Name : R. van der Meer

Date : October 9, 2007



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4 Conducted emission data.

4.1 Conducted emission data of the EUT.

| Frequency (MHz) | Measurement results dB(μ V) Neutral | | Measurement results dB(μ V) Line 1 | | Limits dB(μ V) | | Margin (dB) Neutral | | Margin (dB) Line 1 | | Result |
|-----------------|--|------|---|------|---------------------|------|---------------------|-------|--------------------|-------|--------|
| | QP | AV | QP | AV | QP | AV | QP | AV | QP | AV | |
| 0.18 | 49.1 | 34.5 | 48.2 | 33.6 | 64.4 | 54.4 | -15.3 | -19.9 | -16.2 | -20.8 | PASS |
| 0.24 | 42.9 | 34.3 | 41.1 | 34.0 | 62.1 | 52.1 | -19.2 | -17.8 | -21.0 | -18.1 | PASS |
| 0.30 | 38.8 | 30.8 | 37.6 | 37.5 | 60.3 | 50.3 | -21.5 | -19.5 | -22.7 | -12.8 | PASS |
| 0.36 | 34.0 | 24.3 | 35.4 | 26.2 | 58.7 | 48.7 | -24.7 | -24.4 | -23.3 | -22.5 | PASS |
| 0.42 | 34.7 | 22.6 | 30.1 | 19.3 | 57.5 | 47.5 | -22.8 | -24.9 | -27.4 | -28.2 | PASS |
| 0.48 | 33.7 | 20.5 | 27.6 | 16.1 | 56.3 | 46.3 | -22.6 | -25.8 | -28.7 | -30.2 | PASS |
| 0.55 | 34.5 | 21.6 | 27.0 | 16.5 | 56.0 | 46.0 | -21.5 | -24.4 | -29.0 | -29.5 | PASS |
| 1.44 | 32.8 | 21.3 | 32.0 | 20.2 | 56.0 | 46.0 | -23.2 | -24.7 | -24.0 | -25.8 | PASS |
| 1.74 | 33.3 | 20.7 | 28.4 | 17.5 | 56.0 | 46.0 | -22.7 | -25.3 | -27.6 | -28.5 | PASS |
| 6.78 | 18.1 | 14.0 | 19.0 | 15.2 | 60.0 | 50.0 | -41.9 | -36.0 | -41.0 | -34.8 | PASS |
| 12.48 | 20.3 | 17.4 | 21.9 | 18.2 | 60.0 | 50.0 | -39.7 | -32.6 | -38.1 | -31.8 | PASS |
| 19.20 | 12.9 | 8.5 | 10.6 | 6.5 | 60.0 | 50.0 | -47.1 | -41.5 | -49.4 | -43.5 | PASS |

Table 3: Conducted emission measurements.

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in table 3.

Notes:

- The conducted emissions on frequencies which are not listed in the table above were found to be below 25 dB μ V on both line 1 and line 2.

Test engineer

Signature : 

Name : R. van der Meer

Date : October 9, 2007



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5 List of utilized test equipment.

| inventory nr. | description | brand | model | serial | date last cal | date cal due |
|---------------|-------------------------|-----------------|----------|-------------|---------------|--------------|
| 12476 | Tripod | Emco | TR3 | - | - | - |
| 12491 | Measuring receiver | Rohde & Schwarz | ESH3 | 891806/004 | 25/02/2007 | 26/02/2008 |
| 12493 | Spectrum monitor ESH3 | Rohde & Schwarz | EZM | 891979/018 | - | - |
| 12512 | LISN FCC 50 uH / 50 ohm | Emco | 3725/2 | 8812-2027 | 29/11/2005 | 01/12/2007 |
| 12605 | Calibrated Dipole | Emco | 3121c | 300 | 11/09/2002 | 15/09/2007 |
| 13313 | Pulse limiter | Rohde & Schwarz | ESH3-Z2 | 357.8810.52 | 01/03/2007 | 01/03/2008 |
| 15633 | Biconilog OATS | Chase | CBL6111B | 1278 | 28/02/2007 | 29/02/2008 |
| 15667 | Measuring receiver | Rohde & Schwarz | ESCS30 | 123987 | 19/04/2007 | 19/04/2008 |
| 99077 | Variac 250V 6A | RFT | LTS006 | 831347 | - | - |
| 99112 | Tripod | Chase | CAS6012 | - | - | - |
| 99538 | Spectrum analyzer | Rohde & Schwarz | FSP40 | 100007 | 24/04/2007 | 24/04/2008 |



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Appendix 1

Calculated measurements results radiated field strength, H-Field

General Formula:

d_1 = short distance

d_2 = long distance

So: $(d_1/d_2)^n = H_{d2}/H_{d1}$
 $n \log(d_1/d_2) = \log(H_{d2}/H_{d1})$

Calculated field strength at 125 kHz (10m --> 300m):

$$n \log(d_1/d_2) = \log(H_{d2}/H_{d1}) \quad \Rightarrow \quad H_{d2} = H_{d1} (d_1/d_2)^n$$