



**TEST REPORT CONCERNING THE COMPLIANCE  
OF A IDENTIFICATION AND TIMING SYSTEM,  
BRAND AMB-IT, MODEL CHIPX DECODER WITH 47  
CFR PART 15 (2006-02-01).**

FCC listed : 90828  
Industry Canada : IC3501  
VCCI registered : R-1518, C-1598

**TNO Electronic Products & Services (EPS) B.V.**  
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Test specification(s): 47 CFR Part 15 (2006-02-01)  
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**

April 20, 2006

This report concerns:	Original grant/certification	<del>Class 2 change</del>	Verification
Equipment type:	DCD, Identification and Timing system		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	<del>Yes</del>	<del>No</del>	n.a.
Report prepared by:	Name	: J. Schuurmans, B.Sc.E.E.	
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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: April 20, 2006

Signature:

P.A.J.M. Robben, B.Sc.E.E.  
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 : April 7, 2006

### **Applicant information**

Applicant's representative : Mr. M.H.C. Gielen  
Company : AMB-IT holding B.V.  
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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 : April 12, 2006  
Test(s) completed : April 13, 2006  
Purpose of test(s) : Equipment Authorisation (Certification).

Test specification(s) : 47 CFR Part 15 (2006-02-01)

Test engineers : J. Schuurmans, B. Sc.E.E.

Report written by : J. Schuurmans, B.Sc.E.E.

Report date : April 20, 2006

This report is in conformity with NEN-EN-ISO/IEC 17025: 2000.

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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 (2006-02-01), 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( $\mu$ V)/m @ 3 metres Quasi-peak		Limits dB( $\mu$ V)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
47.88	31.1	12.9	40.0	-8.9	-27.1	PASS
55.19	30.6	8.1	40.0	-9.5	-32.0	PASS
61.55	28.1	6.9	40.0	-11.9	-33.1	PASS
146.13	39.3	36.8	43.5	-4.2	-6.7	PASS
194.82	24.2	12.1	43.5	-19.4	-31.5	PASS
292.25	24.7	26.5	46.0	-21.3	-19.5	PASS
324.71	25.8	27.2	46.0	-20.2	-18.8	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

: J. Schuurmans

Date

: April 12, 2006



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

Frequency (MHz)	Measurement results dB $\mu$ V Quasi-peak		Antenna factor  dB	Cable loss  dB	Measurement results dB( $\mu$ V)/m Quasi-peak (calculated)	Limits Part 15.209 dB( $\mu$ V)/m
	3 meters	10 meters				
0.009 - 0.490	<10.0	n.a.	20.5	1	-	48.5 – 13.8 (300 m)
0.125	67.0	31.2	20.5	1	-48.6	25.7 ( 300 m)
0.250	< 10.0	n.a.	20.5	1	-	19.6 (300 m)
0.375	38.9	20.6	20.0	1	-9.8	16.1 (300 m)
0.490 - 1.705	<10.0	n.a.	19.5	1	-	33.8 - 22.9 (30 m)
1.705 – 30.0	< 10.0	n.a.	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:** -

- A example of a calculated measurement result can be found in Appendix 1.
- 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 10<sup>th</sup> 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 : J. Schuurmans

Date : April 12, 2005



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## 4 Conducted emission data.

### 4.1 Conducted emission data of the EUT.

Frequency (MHz)	Measurement results dB(μV) Neutral		Measurement results dB(μV) Line 1		Limits dB(μV)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.17	36.8	27.2	35.0	26.7	64.9	54.9	-28.1	-27.7	-29.9	-28.2	PASS
0.24	31.5	24.3	28.1	23.8	62.1	52.1	-30.6	-27.8	-34.0	-28.3	PASS
0.36	30.6	27.8	30.5	27.5	58.6	48.6	-28.0	-20.8	-28.1	-21.1	PASS
0.42	34.1	30.6	34.0	30.3	57.4	47.4	-23.3	-16.8	-23.4	-17.1	PASS
0.48	35.3	34.4	35.4	34.3	56.3	46.3	-21.0	-11.9	-20.9	-12.0	PASS
0.54	27.1	24.0	27.4	24.4	56.0	46.0	-28.9	-22.0	-28.6	-21.6	PASS
1.51	19.4	24.5	18.0	14.4	56.0	46.0	-36.6	-21.5	-38.0	-31.6	PASS
6.19	20.6	18.3	21.2	19.5	60.0	50.0	-39.4	-31.7	-38.8	-30.5	PASS
11.01	26.1	23.9	27.6	25.5	60.0	50.0	-33.9	-26.1	-32.4	-24.5	PASS
15.50	27.5	25.9	29.4	28.3	60.0	50.0	-32.5	-24.1	-30.6	-21.7	PASS
20.00	31.5	29.0	32.1	28.8	60.0	50.0	-28.5	-21.0	-27.9	-21.2	PASS
26.50	22.5	16.6	21.8	16.4	60.0	50.0	-37.5	-33.4	-38.2	-33.6	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:**

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

Test engineer

Signature

:

Name

: J. Schuurmans

Date

: April 12, 2006



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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	11/03/2005	12/03/2006
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
12636	OATS plastic cover	Polyforce	11088	-	-	-
13313	Pulse limiter	Rohde & Schwarz	ESH3-Z2	357.8810.52	22/02/2006	23/02/2007
15633	Biconilog OATS	Chase	CBL6111B	1278	14/07/2005	15/07/2006
15667	Measuring receiver	Rohde & Schwarz	ESCS30	123987	21/03/2005	22/03/2006
99055	Support 1 m	NMi Certin B.V.	-	-	-	-
99061	Support 150cm	NMi Certin B.V.	Support 150	-	-	-
99077	Variac 250V 6A	RFT	LTS006	831347	-	-
99112	Tripod	Chase	CAS6012	-	-	-
99538	Spectrum analyzer	Rohde & Schwarz	FSP40	100007	09/02/2006	10/02/2007



## Appendix 1

### Calculated measurements results radiated field strength, H-Field

#### General Formula:

$d_1$  = short distance

$d_2$  = long distance

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

#### Measured field strength at 125 kHz:

$$H_{3m} = 88.3 \text{ dB}\mu\text{V/m} = 26001 \text{ }\mu\text{V/m}$$

$$H_{10m} = 52.2 \text{ dB}\mu\text{V/m} = 421 \text{ }\mu\text{V/m}$$

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

$$n = \log(421/26001) / \log(3/10)$$

$$n = 3.4$$

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

$$H_{300m} = H_{d2}, H_{10m} = H_{d1}$$

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

$$H_{300} = 3.7 \text{ nV/m} = -48.6 \text{ dB}\mu\text{V/m}$$