

# Test report

**20071484300**

Based on:

FCC 47 CFR Part 15, Subpart C, sections 15.209 and 15.205

Steam Trap Management System/Trapan  
TLV  
TM6

## Contents

<b>MAIN MODULE.....</b>	<b>3</b>
1 INTRODUCTION .....	3
2 PRODUCT .....	4
3 TEST SCHEDULE .....	4
4 PRODUCT INFORMATION .....	5
4.1 Product description.....	5
4.2 Choice of operating frequency .....	5
4.3 Operating principles .....	5
4.4 Related submittal(s) or Grant(s) .....	5
4.5 Test methodology .....	5
4.6 Test facility.....	5
4.7 Product labeling.....	6
5 PRODUCT DOCUMENTATION.....	6
6 SYSTEM TEST CONFIGURATION.....	7
6.1 Justification .....	7
6.2 EUT operating mode .....	7
6.3 Special accessories .....	7
6.4 Equipment modifications.....	7
6.5 Equipment technical specifications .....	7
6.6 Block diagram of the EUT .....	7
6.7 Schematics of the EUT.....	7
6.8 Partlist of the EUT.....	7
7 OBSERVATIONS AND COMMENTS.....	8
8 SUMMARY.....	8
9 CONCLUSIONS.....	9
<b>TEST RESULTS MODULE.....</b>	<b>10</b>
1 SUMMARY.....	10
2 EMISSION TESTS .....	11
2.1 Radiated field strength measurement (30 - 1000 MHz, E-field) .....	11
2.2 Radiated field strength measurement (0.009 – 30 MHz, H-field) .....	12
2.3 Bandwidth plot of transmitter carrier .....	13
<b>USED TEST EQUIPMENT MODULE.....</b>	<b>14</b>

This report comprises of three modules.

## Main module

### 1 Introduction

This report contains the result of tests performed by:

Telefication B.V.  
Edisonstraat 12a  
6902 PK Zevenaar  
The Netherlands

Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:2005. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie). The contents of this test report, if reproduced, shall be copied in full, unless special consent in writing for reproduction in part is granted by Telefication. Copyright of this test report is reserved to Telefication.

Ordering party:

Company name : Taiyo Yuden Co., Ltd..  
Address : 5607-2 Nakamuroda-machi  
P.O. Box : 370-3347  
City/town : Takasaki-shi, Gunma  
Country : Japan  
Date of order : 9 May 2007

## 2 Product

A sample of the following product was submitted for testing:

Product category	:	Low power TX below 1.705 MHz
Manufacturer	:	TLV Co., Ltd..
Trade mark	:	TLV
Type designation	:	TM6
Hardware version	:	-
Software version	:	-
Serial number	:	ARE001
FCC ID	:	H3R00TM6001

## 3 Test schedule

Tests were carried out in accordance with the specification detailed in chapter 8 "Summary" of this report.

Tests were carried out at the following location:

- TNO Electronic Products & Services (EPS) B.V., Niekerk

The sample of the product was received on:

- 8 June 2007

Tests were carried out on the following date:

- 27-28 June 2007

## 4 Product information

### 4.1 Product description

The Steam Trap Management System/Trapan is designed to function as a RF-ID reader. By placing the Steam Trap Management System/Trapan in the proximity of an ID tag, the id of the tag will be shown on the display.

### 4.2 Choice of operating frequency

The operating frequency of the Steam Trap Management System/Trapan is 125 kHz.

### 4.3 Operating principles

The Steam Trap Management System/Trapan is a battery powered handheld device with integral antenna. The reader generates a RF-field at a frequency of 125 kHz (continuous carrier), which activates the electronics in a tag. The activated tag sends its information to the reader by modulating the RF-field.

### 4.4 Related submittal(s) or Grant(s)

The Steam Trap Management System/Trapan also contains a Bluetooth transceiver which will be filed at the same time to the TCB, and under the same FCC ID, as the application for the issue of the Grant for the Low power TX below 1.705 MHz part.

### 4.5 Test methodology

The test methodology is based on the requirements of FCC 47 CFR Part 15, issue of October 2006, sections 15.209 and 15.205.

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

Radiated emission tests above and below 30 MHz were performed at an open area test site. Below 30 MHz the radiated emissions test were carried out at a measurement distance of 3 meter (because of the low field strength output of the Steam Trap Management System/Trapan).

### 4.6 Test facility

All tests were carried out at the measurement facilities of TNO Electronic Products & Services (EPS) B.V.

TNO Electronic Products & Services (EPS) B.V.  
Smidshornerweg 18  
9822 TL Niekerk  
The Netherlands

FCC listed : 90828  
Industry Canada : IC3501A-1

## 4.7 Product labeling

In accordance with FCC 47 CFR Part 15.19 (a)(3) the following text shall be placed on a label, which is attached to 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 that may cause undesired operation.

The FCC ID of the EUT must be placed on a label, which is attached to the EUT.

For further details about the labeling requirements (size, legibility, etc.) as set by the Federal Communications Commission see FCC 47 CFR Part 15.19 (a)(3), FCC 47 CFR Part 15.19 (b)(2), FCC 47 CFR Part 15.19 (b)(4), FCC 47 CFR Part 2.925 and FCC 47 CFR Part 2.926.

## 5 Product documentation

For production of this report the following product documentation was used:

Description	Date
RN070427B_RFIDSpec.doc	-
Block diagram	2007-04-27
Schematics	2006-12-14

## 6 System test configuration

### 6.1 Justification

The system was configured for testing in a test mode. During all tests the EUT was set up to function in accordance with the manufacturer's instructions.

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

### 6.2 EUT operating mode

Radiated emission measurements were carried out when the EUT was active and generating a continuous transmitting signal.

### 6.3 Special accessories

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

### 6.4 Equipment modifications

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

### 6.5 Equipment technical specifications

Equipment utilization	: Steam Trap Management System/Trapan
Model number	: TM6
Part number	: --
FCC-ID	: H3R00TM6001
Frequency range	: 125 kHz, fixed frequency, continuous carrier
Description/details	: see section 4 of this test report
Power supply	: Battery powered 2x AA size Cell (2.4 volt Ni-MH)

### 6.6 Block diagram of the EUT

The block diagram is available in the technical documentation package as an addendum to this test report.

### 6.7 Schematics of the EUT

The Schematics are available in the technical documentation package as an addendum to this test report.

### 6.8 Partlist of the EUT

The partlist is available in the technical documentation package as an addendum to this test report.

## 7 Observations and comments

This report concerns: Original grant/certification ~~Class 2 change~~ ~~Verification~~

The data taken for this test and report herein was done in accordance with FCC 47 CFR Part 15 and the measurement data procedures of ANSI C63.4: 2003. Telefication at Zevenaar certifies that the data is accurate and contains a true representation of the emission of the equipment under test (EUT) on the test as noted in this test report.

## 8 Summary

The product is intended for use in the following application area:

Low power TX below 1.705 MHz

The sample was tested according to the following specification:

FCC 47 CFR Part 15, Subpart C, sections 15.209 and 15.205



## 9 Conclusions

The sample of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 8 of this report.

The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication does not accept any responsibility for the results stated in this report, with respect to the properties of product items not involved in these tests.

All tests are performed by:

name : ing. S. van Spijker

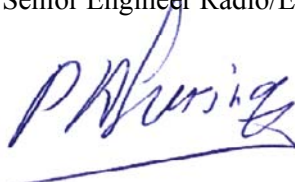
function : Test Engineer

signature : 

Review of test methods and report by:

name : ing. P.A. Suringa

function : Senior Engineer Radio/EMC

signature : 

The following signatory has verified the above conclusions:

date : 29 June 2007

name : J.P. van de Poll

function : Co-ordinator Test Group

signature : 

## Test results module

### 1 Summary

According to FCC 47 CFR Part 15, subpart C, sections 15.209 and 15.205 the following tests are performed:

Port	Reference	Result
Enclosure	Section 15.209	P
Enclosure	Section 15.205	P

Results:

P = Pass

F = Fail

NA = Not Applicable

NP = Not Performed

## 2 Emission tests

### 2.1 Radiated field strength measurement (30 - 1000 MHz, E-field)

Frequency (MHz)	Measurement results dB(μV)/m @ 3 meters Quasi-peak		Limits dB(μV)/m @ 3 meters Quasi-peak
	Vertical	Horizontal	
30 - 88	< 20.0	< 20.0	40.0
88 - 216	< 23.5	< 23.5	43.5
216 - 960	< 26.0	< 26.0	46.0
960 - 1000	< 34.0	< 34.0	54.0

Table 1

The results of the radiated emission tests, carried out in accordance with FCC 47 CFR Part 15, sections 15.209 and 15.205, with the EUT operating in continuous transmit mode on 125 kHz, are depicted in table 1.

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

Measurement equipment : 89, 90, 91, 92, 93, 94, 95, 96

(The numbers listed refer to the module 'Used test equipment module'.)

## 2.2 Radiated field strength measurement (0.009 – 30 MHz, H-field)

Freq (MHz)	RCVD Signal (dBµV/m) @ 3 meter	Dist. Corr. (dB)	Field Strength (dBµV/m) @300 meter (calculated)	Limit (dBµV/m)
0.009 - 0.125	<10	80	<<0	48.5 - 25.7 (300m)
0.125	60.5	80	-19.5	25.7 (300m)
0.250	35.4	80	-44.6	19.6 (300m)
0.375	<10	80	<<0	16.1 (300m)
0.375 - 0.490	<10	80	<<0	16.1 - 13.8 (300m)
0.490 - 1.705	<10	80	<<0	33.8 – 23.0 (30m)
1.705 - 30.00	<10	80	<<0	29.5 (30m)

Table 2

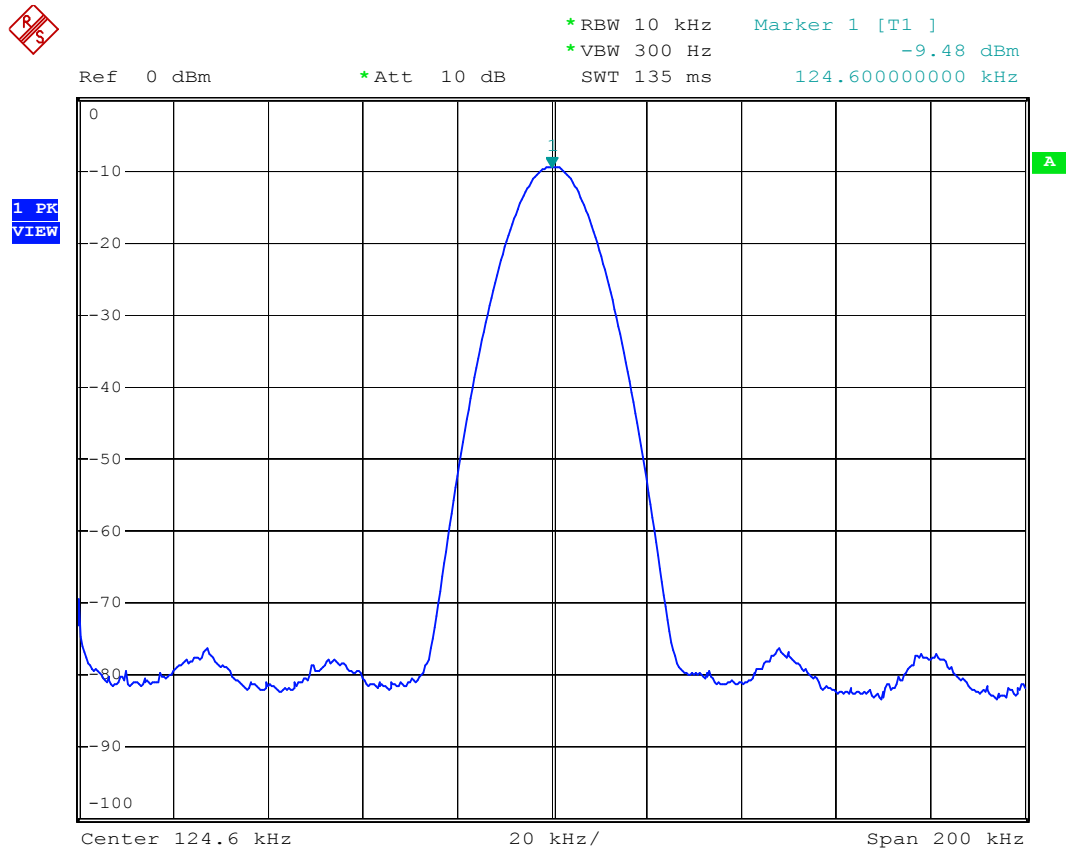
The results of the radiated emission tests, carried out in accordance with FCC 47 CFR Part 15, sections 15.209 and 15.205, with the EUT operating in continuous transmit mode on 125 kHz, are depicted in table 2.

- Notes:**
- Frequency range: 9-90 kHz Average detector used during measurements  
110-490 kHz Average detector used during measurements
  - The radiated field strengths were measured at a distance of 3 meters.
  - An extrapolation factor of the square of an inverse linear distance (40 dB/decade) as required by FCC 47 CFR Part 15.31 (f)(2) has been applied.
  - Field strength values of radiated emissions at frequencies not listed in table 2 are more than 20 dB below the applicable limit.

Measurement equipment : 89, 90, 91, 92, 93, 94, 95, 96

(The numbers listed refer to the module 'Used test equipment module'.)

### 2.3 Bandwidth plot of transmitter carrier



Date: 28.JUN.2007 16:43:49

Plot 1 – Bandwidth of transmitter carrier



## Used test equipment module

This module contains the total list of test equipment used.

The following measurement equipment is used at Telefication:

Ref	Description	ID	Manufacturer	Model
1	EFT generator	TE 00760	Keytek	E411
2	EFT/surge coupler	TE 00759	Keytek	E4551
3	Capacitive clamp	TE 00761	Keytek	CCL-4/S
4	Controller (A07)	TE 00023	Keytek	E103
5	ESD simulator	TE 00516	Keytek	MZ-15/EC
6	ESD air discharge tip	TE 00755	Keytek	TPA-2
7	ESD contact discharge tip	TE 00709	Keytek	TPC-2
8	Surge comb. wave generator	TE 00757	Keytek	E501A
9	Surge telecom wave gen.	TE 00022	Keytek	E502A
10	Surge coupler/decoupler	TE 00758	Keytek	E571
11	Logper/bow-tie antenna (Anec)	TE 00700	EMCO	3143
12	Biconical antenna	TE	Schwarzbeck	BBA 9106
13	RF amplifier	TE 00750	Kalmus	737FC
14	RF generator	TE 00474	Adret	7200A
15	Isotropic field sensor	TE 00748	Holaday	HI-4422
16	Fibre optic RS232 interface	--	Holaday	HI-4413G
17	System readout	TE 00749	Holaday	HI-4416
18	Antenna tower	--	HD	AS 620p
19	Turntable	--	HD	DS 412
20	Turntable controller	--	HD	HD 050
21	RF voltmeter	TE 00707	Boonton	9200B
22	40 dB coupler	TE 00752	Kalmus	DC100HHR
23	RF probe (2x)	TE 00753 TE 00754	Boonton	952001B
24	Artificial mains network	TE 00208	R & S	ESH2-Z5

Ref	Description	ID	Manufacturer	Model
25	Test receiver	TE 00205	R & S	ESH3
26	Pulse limiter	TE 00227	R & S	ESH3-Z2
27	Spectrum analyzer	TE 00094 TE 00095	R & S	FSB Display
28	Test receiver	TE 00091	R & S	ESV(P)
29	Antenna mast	--	EMCO	1070
30	Turn table	--	EMCO	1060-2M
31	Absorbing clamp	TE 00777	R & S	MDS 21
32	Anechoic chamber	--	Euroshield	RFD-F-100
33	Open Area Test Site	--	Telefication	--
34	Power/Arb waveform source	TE 00711	Keytek	EP72
35	Reference impedance	TE 00712	Keytek	ERI-1
36	Power analyzer	TE 00763	Xitron Technologies	2501AH
37	AC power simulator	TE 00762	Kikusui	PCR4000L
38	Signal generator	TE 00413	Marconi	2042
39	RF amplifier	TE 00515	Amplifier Research	25A250A
40	T-network	TE 00026	R & S	ESH3-Z4
41	Mains coupl./dec. network	TE 00766	Telefication	9403S1
42	Power meter	TE 00414	R & S	NRVS
43	Measurement probe	TE 00415	R & S	URV5-Z4
44	Attenuator 6 dB	TE 00514	Narda	766-6
45	Pulse generator	TE 00225	HP	8012 B
46	Coaxial coupl./dec. network	TE 00766	Telefication	CDN-S1
47	Voltage Swell/DIP/interrupt source	TE 00710	Keytek	EP62



Ref	Description	ID	Manufacturer	Model
48	Digital multimeter	TE 00329	Fluke	Fluke 87
49	--	--	--	--
50	EM clamp	TE 00764	Lüthi	EM101
51	Ferrite tube	TE 00765	Lüthi	FTC101
52	Distortion meter	TE 00416	HP	HP 8903 B
53	Artificial Mains Network	TE	Telefication	JOZ191194
54	Attenuator 3 dB, 100 W	TE 00751	Tenuline	8343-030
55	Logperiodic antenna	TE 00744	EMCO	3147
56	Modulation analyzer	TE 00412	R & S	FAM
57	Audio amplifier	TE 00517	Solar Electronics	6552-1A
58	Acoustic Pipe Coupler	TE 00775	Telefication	JOZ110395
59	Antenna	--	Kathrein	K 51164
60	Pulse modulator	TE 00708	Schaffner	CPM9830
61	RF power amplifier	TE 00714	Schaffner	CBA9546
62	Adjustable transformer	--	KSL	RU8
63	100 µF decoupling capacitor	TE 00769	Telefication	JOZ
64	Mains coupling/decoupling Network	TE 00767	Telefication	CDN-M2/M3
65	Coupling/decoupling device for screened cables	TE 00771	MEB	CDN-S25
66	Audio isolation transformer	TE 00772	Solar	6220-2
67	Current probe	TE 00773	Eaton	93686-2
68	Triple loop antenna	TE	Telefication	--
69	Pre-amplifier	TE 00344	R&S	ESV-Z3

Ref	Description	ID	Manufacturer	Model
70	800 mm strip line	--	Telefication	--
71	Measurement probe	TE 00009	R & S	URV5-Z2
72	Standard gain horn antenna	TE 00602	Scientific Atlanta	12-1.7
73	Frequency doubler	TE 00569	HP	11721A
74	Microwave amplifier	TE 00124	HP	8349A
75	Preamplifier	TE 00092	HP	8449B
76	Spectrum analyzer	TE 00481	HP	8563E
77	Controller (A010)	TE 00713	Keytek	E103
78	EMI test receiver	827864/001	R & S	ESVS 10
79	Biconilog antenna	EMC 116983	Schwarzbeck	VULB9161
80	Open Area Test Site Kema	--	--	--
81	Measurement receiver	TE 00066	R & S	ESH-2
82	Loop antenna 9 kHz - 30 MHz	TE 00746	R & S	HFH2-Z2

The following measurement equipment is used at TNO Electronic Products & Services (EPS) B.V.:

Ref	Description	Manufacturer	Model	ID
89	Plastic measurement room	Polyforce	--	12636
90	Open area Test Site	Comtest	--	13886
91	Antenna mast 4m	Heinrich Deisel	MA240	14277
92	Controller OATS	Heinrich Deisel	HD100	14278
93	Loop antenna	Chase	HLA6120	1107
94	Biconilog antenna 30 MHz – 1000 MHz	Chase	CBL6111B	15633
95	EMI test receiver	Rohde & Schwarz	ESCS 30	15667
96	Turntable OATS	Heinrich Deisel	HD050	99108