MEASUREMENT/TECHNICAL REPORT

FCC Part 15 Section 15-209

Honeywell

FCC ID: HS9-RTU-K03

December 19th, 2001

This report concerns (check one): Original grant __X__ Class II change____

Equipment type: ACCESS CONTROL TERMINAL (ex.: computer, printer, modem, etc.)

Deferred grant request per 47 CFR 0.457(d)(1)(ii)? yes _____ no __X__

If yes, defer until: _____
date

Company Name agrees to notify the Commission by _____
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by: Giuseppe MECCHIA

TÜV ITALIA S.R.L.
Via Montalenghe 12
10010 Scarmagno (TO) Italy

Phone : 0125 - 525441
Fax : 0125 – 525499

Table of Contents Page

1 GENERAL INFORMATION

1.1 Product Description

The RTU-K03 (sales name TK-C03) is a terminal for access control applications. It can be mounted on vertical (walls, doors) and horizontal (turnstiles, pedestals) surfaces.
The RTU-K03 includes an OEM proximity reader, made by HID Corporation that allows the user to read HID cards from up to 4cm away from the internal antenna. The HID OEM proxy reader is provided by HID without the antenna coil that is included in the CPU board (51790AA).
The RTU-K03 terminal includes an alphanumeric LCD display module (2 rows of 16 characters), a 16 key keyboard, a three-color LED and a buzzer to signal messages to the user.
During normal operation, the time and date are shown on the display and synchronized every minute by a specific broadcast message sent by the controller (CTU-A04).
The terminal offers 2 opto-coupled inputs: one is normally used to retrieve the status of the door and the other is used to receive an unconditional exit request from the emergency exit handle.
The terminal provides two relay outputs: one of them provides an short pulse to control an electrolock (or a turnstile), the other is normally used to drive a traffic-light lamp (gate engaged).
The RTU-K03 terminal communicates with the controller (CTU-A04) via an Echelon LonWorks™ network at a speed of 78 Kbps. The RTU-K03 terminal is powered by a DC 12V (+/-2V) power supply (provided by RTU-Q01).

Note: LonWorks™ is a registered trademark of Echelon™ Corporation

From an FCC point of view the EUT in an intentional radiator (125kHz tranceiver) mounted inside a class B verified equipment. According to customer request this approval will cover the complete unit and therefore the FCC ID code will be place directly on case of the terminal.

1.2 Related Submittal(s)/Grant(s)

None

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

Model & Serial No.	FCC ID	Description	Cable Descriptions
RTU-K03 (1) s/n EMC-2001-293	**HS9-RTU-K03**	**Access control Terminal**	**Unshielded power cord Unshielded signal cables**
RTU-Q01 S/n EMC-2001-286	Verified	Power supply	Unshielded power cord Unshielded signal cables
CTU-A04 S/n 1520096CA	Verified	Controller	Unshielded power cord Unshielded signal cables
Door simulator S/n none	None	Door simulator	Unshielded power cord Unshielded signal cables

(1) EUT submitted for grant.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the ANSI C63.4-1992 test procedures . Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

TÜV ITALIA test site No. 3 – semi-anechoich chamber

The semi-anechoic chamber test site and conducted measurement facility used to collect the radiated data are located at Via Montalenghe 12, Scarmagno, Italy. This site has been fully described in a report dated May 12, 2000 submitted to your office, and accepted in a letter dated May 30, 2000 (registration Number: 90860)

1.6 Test equipment list:

Description	Model	serial No.	Cal due date
Test receiver	Rohde & Sch.ESH3	s/n 881364/012	10/02
Spectrum analyzer	HP 8568B+QP adapter	s/n 2601A02134	04/02
LISN	Schwarzb.NNLA 8120	s/n 8120471A	02/02
Loop antenna	Rohde & Sch.HFH2-Z2	s/n 881058/6	07/02
Biconical antenna	Tensor 4104	s/n 2222	03/02
Log-periodic antenna	Electro-metrix LPA-25	s/n 1117	03/02

2 PRODUCT LABELING

See Label exhibit.

3 SYSTEM TEST CONFIGURATION

3.1 Justification

The EUT was configured for testing in a typical fashion (as a customer would normally use it).
In order to simulate a real application , the EUT has been connected to a power supply, a controller and a door simulator and operated according to normal use. (see Figure 3.1).

The EUT has been tested in both vertical and horizontal position simulating real operating placement:
- vertical on walls and doors and
- horizontal on turnstiles and pedestal surfaces.

Worst case for transmitter emissions has been determined to be the vertical position.

Conducted emission testing was performed on the power mains cord of the power supply RTU-Q01.

3.2 EUT Exercise Software

The HID proxy reader continuously sends bursts at 125KHz to the antenna coil short and acquires back (form the same antenna coil) any modulation on the transmitted carrier. If a card with a RF-TAG is placed near the RTU-C03 antenna coil, the 125KHz wave on the coil energises the TAG. The TAG then modulate the 125KHz with an encoded frame that include the identification code. That frame is then decoded by the HID reader module that sends the identification code via a synchronous serial interface (clock+data line).
The identification code is then sent to the controller (CTU-A04) via the LonWorks™ network message. When the controller receives that message, it verifies the access rights of the user. If the cardholder has the correct access rights, it sends a message to the RTU-K03 in order to switch on the relay that opens the door. Meanwhile, a specific message is sent to the RTU-K03 in order to display a specific message (i.e. access grant, access forbidden, invalid card, expired card, wrong time period, transit timeout, etc.) and turn on the LEDs (green/red) and buzzer accordingly.
When the transit is completed (the door switch returns closed), the door-closed message is sent from the RTU-K03. This event closes the transit, and the controller sends a command to the RTU-K03 that place it in a «awaiting a card» condition.

Note: LonWorks™ is a registered trademark of Echelon™ Corporation

3.3 Special Accessories

None.

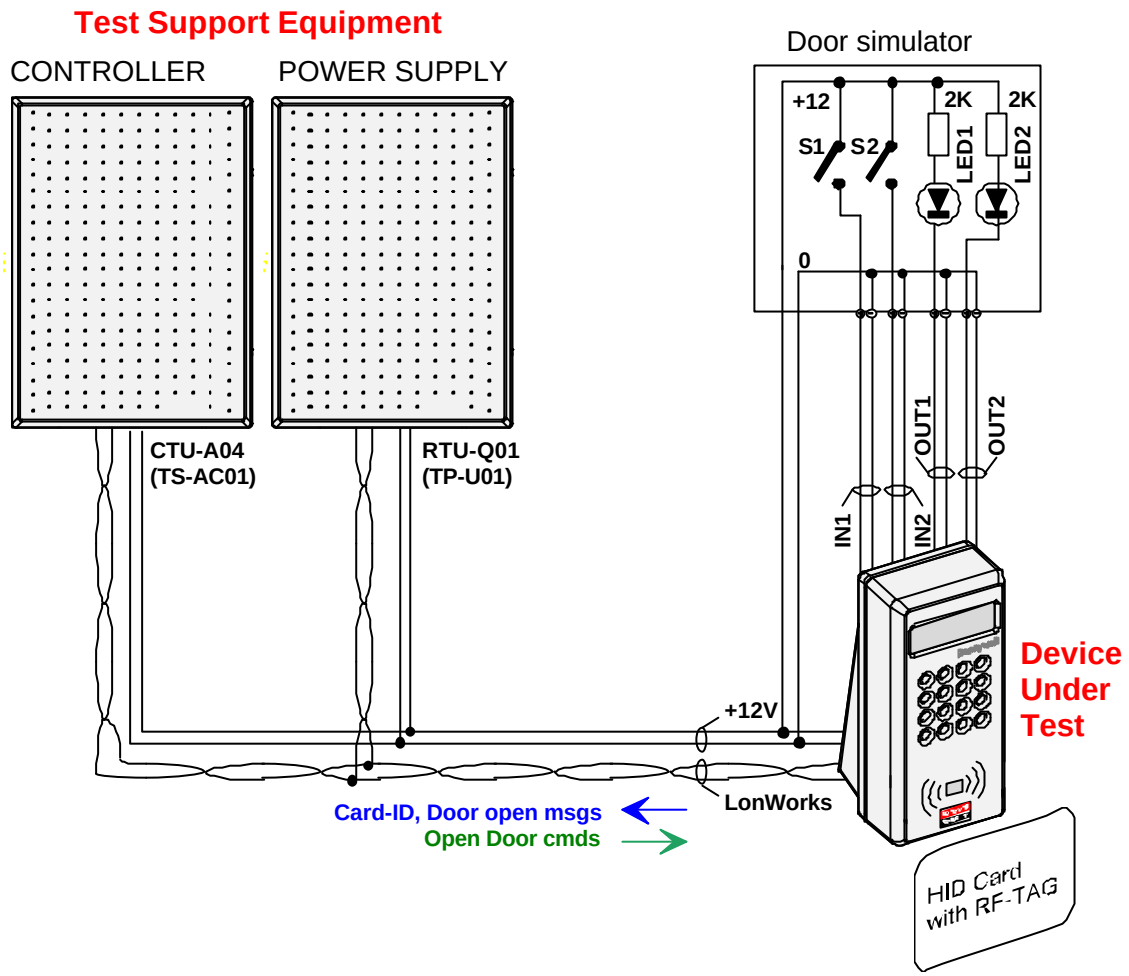
As shown in Figure 3.1 all interface cables used for compliance testing are unshielded as readily available on the market.

3.4 Equipment Modifications

To achieve compliance to Class B levels, no changes were made during compliance testing.

3.5 Configuration of the Tested System

Figure 3.1 Configuration of the Tested System



Note:
Both the power supply and the LonWorks™ cables are not shielded. The LonWorks™ cable is a twisted pair. LonWorks™ is a registered trademark of Echelon™ Corporation

4 BLOCK DIAGRAM(S) OF THE EUT

4.1 Block Diagram Description

The **Board 51790AA (CPU)** of the EUT is provided with:

Crystals and oscillators:

X1: 10 MHz CPU

RF suppression devices:

VDC EMI Filters:
FL3: M2022-A Coilcraft
C31: 10nF SMD 10% 0805

Lonwork EMI Filter
FL4: M2022-A Coilcraft

Input signal EMI Filters:
FL1: M2022-A Coilcraft
C27,C28: 10nF SMD 10% 0805

Output signal EMI Filters:
FL2: M2022-A Coilcraft
C29,C30: 10nF SMD 10% 0805

EMS Shield:
Shield1: Shield component FTT10 custom Dating - code 3900698AA

Board 51500CA (I/O):

VDC EMI Filters:
FL2: RN102-2-02 Schaffner
L3,L4: Sumida WB2/1.5ZA OR R6H-1.5T-TCW
C6: 100nF 10% 50v cer. 2.54

Lonwork EMI Filter:
FL1: RN102-2-02 Schaffner

Fig. 4.1 - Block Diagram of the EUT

See Block Diagram exhibit.

Fig. 4.2 - Block Diagram of Transceiver
See Block Diagram exhibit.

5 CONDUCTED AND RADIATED MEASUREMENT PHOTOS

See TestSetup_photos exhibit.

6 CONDUCTED EMISSION DATA

6.1 Tests of the worst case configuration.

The conducted tests are performed with a receiver in quasi-peak mode.

	Frequency (MHz)	Measured* (dBµV)	Limit (dBµV)
neutral	0.47	45	48
	1.4	43	
	3.9	40	
	6.4	40	
	8.2	45	
	19.6	44	
line	0.47	44	48
	1.4	44	
	3.9	41	
	6.4	40	
	8.2	45	
	19.6	43	

* All readings are quasi-peak

Test Personnel:

Tester Signature  Date December 05, 2001

Typed/Printed Name Giuseppe MECCHIA .

7 RADIATED EMISSION DATA

- **frequency range 125 kHz – 1 GHz**
- **(from the lowest frequency generated to 1GHz: it includes a digital device)**

7.1 Tests of the worst case configuration

The following data list the significant emission frequencies, measured levels, correction factors (including cable and antenna corrections), the corrected reading, plus the limit. Field strenght calculation is given in paragraph 7.2.

Judgement: Passed by 49.1 dB

Fundamental and harmonics (limits according to section 15.209).

Frequency (kHz)	Receiver* Corrected Reading (dBµV/m)	3 Meter Limit (dBµV/m)
125	81	136.7
250	43	95.6
375	43	92.1
625	38	87.7

Frequency (kHz)	Receiver* Corrected Reading (dBµV/m)	10 Meter Limit (dBµV/m)
125	52	107.7

* below 30 MHz readings are quasi-peak with an IF bandwidth of 9 kHz,

Extrapolation data

Measurements were taken at the fundamental frequency of the intentional radiator with the Rohde & Schwarz loop antenna at the distances od 10 and 3 meters. The antenna was placed at a fixed height of 1 meter. **Measurements were taken in the three orthogonal orientation to find the maximum emission, vertical was observed to be worst case.** The turntable was rotate to maximize the emission. The first measurement was taken at 3 meters, then the antenna was moved to 10 meters and the emission was measured. These readings were then plotted to extrapolate the correct reading at a distance of 30 and 300 meters. The limit was then calculated using approximately a 60dB/decade falloff rate (exactly 59dB from 3 to 10 meters) to show the correct limit at a distance of 30 meters. This limits were then plotted on the graph to extrapolate the limits at 10 and 3 meters. Reference measurements standards Part 15 section 15.31(f)(2).

Spurious emissions (limits according to section 15.209).

Judgement: Passed by 1.4 dB

Frequency (MHz)	Polarity (V/H)	Receiver* Reading (dBµV)	Correction Factor (dB/m)	Corrected Reading (dBµV/m)	3 Meter Limit (dBµV/m)
48.7	V	19.5	12.5	32	40
64.8	H	24.3	8.1	32.4	40
76.2	V	24.3	6.6	30.9	40
94.9	V	29.1	11.7	40.8	40
135.1	V	28.9	13.2	42.1	43.5
380.8	H	22.8	17.8	40.6	46

* above 30 MHz readings are quasi-peak, with an IF bandwidth of 120 kHz,

Test Personnel:

Tester Signature  Date December 04, 2001

Typed/Printed Name Giuseppe MECCHIA .

7.2 Field Strength Calculation

7.2.1 The field strength is calculated by adding the Antenna and Cable Factor to the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF

where

FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 19.5 dBμV is obtained. The Antenna and Cable Factor of 12.5 is added, giving a field strength of 32 dBμV/m. The 32 dBμV/m value was mathematically converted to its corresponding level in μV/m.

FS = 19.5 + 12.5 = 32 dBμV/m

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20]= 39.8 μV/m