MEASUREMENT/TECHNICAL REPORT

FCC Part 15 Section 15-209

Honeywell

FCC ID: HS9-CTU-K03

March 06th, 2002

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

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1 GENERAL INFORMATION

1.1 Product Description

The CTU-K03 HID Prox Reader Module, with the CTUK03 controller, composes a terminal, designed for access control and time & attendance applications, that reads HID proximity cards.
The module is based on OEM HID reader part (code 4068A) joined with a 89C2051 microcontroller that manages 125KHz antenna coils switching. The module includes 2 green directional LED, RED LED and a buzzer.
The module is interfaced to the CTU-K03 controller via clock & data lines. The direction is coded using 0B<data>0F frame swapping.

From an FCC point of view the EUT in an intentional radiator module (125kHz tranceiver) mounted inside a class B verified equipment. According to customer request this approval will cover the complete unit CTU-K03 and therefore the FCC ID code will be place directly on case of the prox reader module.

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
CTU-K03 HID Prox Reader Module (1) s/n EMC-2001-294	**HS9-CTU-K03**	**Prox Reader Module**	**Unshielded power and signal cable**
CTU-K03 Controller S/n 37/20010150	Verified	Controller	Unshielded power cord Unshielded signal cables
AL20F S/n none	none	Toroidal transformer	Unshielded power cords
I/O simulator S/n none	None	Input/Output simulator	Unshielded signal cables

Connected through 10BaseT LAN to a remote:

Dell PPX Latitude C family S/n 99080	D.o.C.	Personal Computer	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-anechoic 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	02/03
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

Figure 2.1 FCC ID Label

See exhibit.

Figure 2.2 Location of the Label on EUT

See 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 mounted and connected to a RTU-K03 controller in a typical configuration and operated according to normal use. (see Figure 3.1).

The EUT has been tested in vertical position simulating real operating placement attached to a wall

Conducted emission testing was performed on the power mains cord of the toroidal transformer.

3.2 EUT Exercise Software

The complete terminal CTUK03 is normally in an idle condition, waiting for a card. When the cardholder places the HID card in front of the antenna reader, the card-ID is read by CTUK03 Module and the card code is sent to the CTUK03 controller for the manage.

3.3 Special Accessories

None.

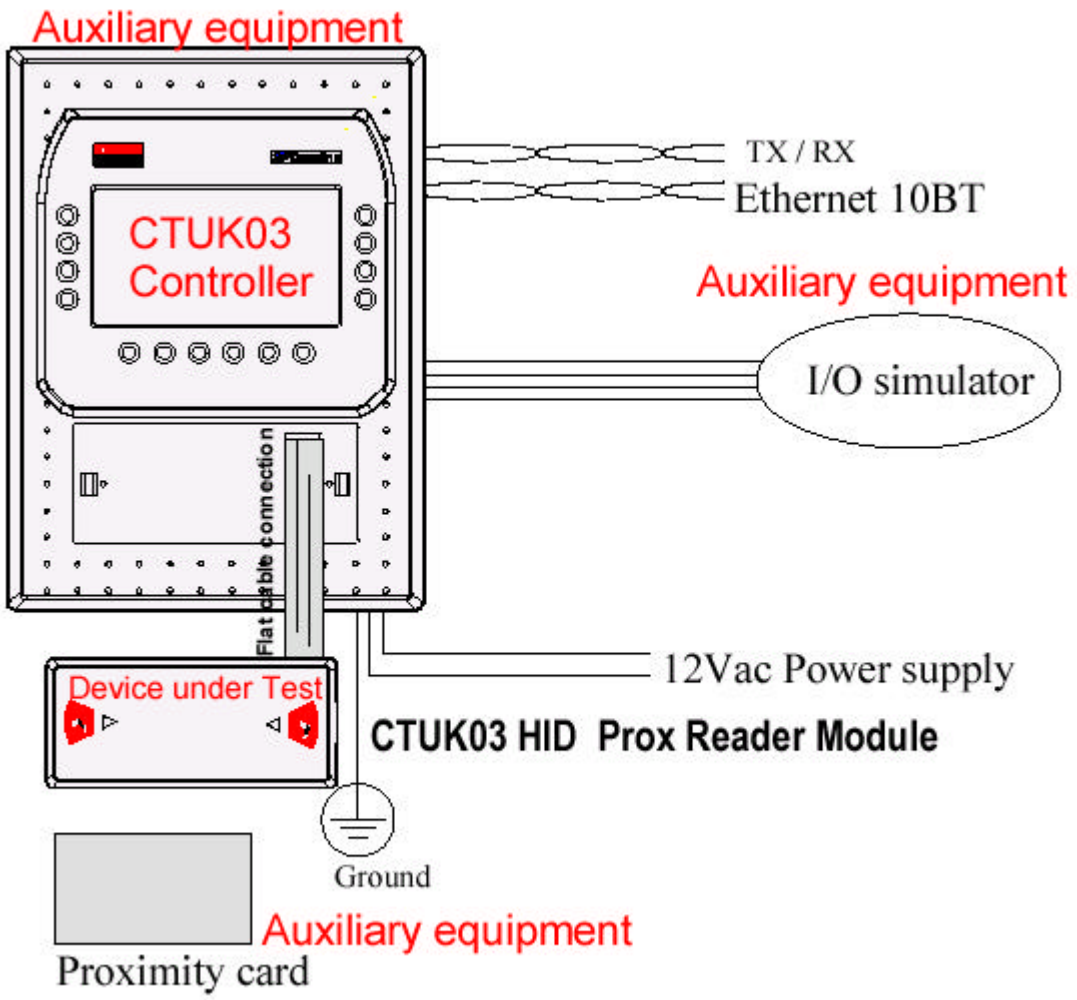
As shown in Figure 3.1 all interface cables used for compliance testing are unshielded as readily available on the market.

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



4 BLOCK DIAGRAM(S) OF THE EUT

4.1 Block Diagram Description

The **Board 51694AC** of the EUT is provided with:

Crystals and oscillators:

YT1: 8 MHz CPU

RF suppression devices:

VDC EMI Filters:
none

Input/Output signals EMI Filters:
none

Fig. 4.1 - Block Diagram of the EUT

See exhibit.

Fig. 4.2 - Block Diagram of Transceiver

See exhibit.

5 CONDUCTED AND RADIATED MEASUREMENT PHOTOS

See 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	0.63	14	48
	3.7	21	
	5.5	20	
	10	15	
	20	14	
	27.3	20	
line	0.63	13	48
	3.7	20	
	5.5	19	
	10	14	
	20	13	
	27.3	19	

* All readings are quasi-peak

Test Personnel:

Tester Signature  Date February 28, 2002

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 42.6 dB

Fundamental and harmonics (limits according to section 15.209).

Frequency (kHz)	Receiver* Corrected Reading (dBµV/m)	3 Meter Limit (dBµV/m)
125	77	136.7
250	53	95.6
375	37	92.1
625	34	87.7

Frequency (kHz)	Receiver* Corrected Reading (dBµV/m)	10 Meter Limit (dBµV/m)
125	48	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 3.1 dB

Frequency (MHz)	Polarity (V/H)	Receiver* Reading (dBµV)	Correction Factor (dB/m)	Corrected Reading (dBµV/m)	3 Meter Limit (dBµV/m)
60	V	19.3	10.7	30	40
96.3	V	21.2	13.3	34.5	43.5
180	V	12.9	19.6	32.5	43.5
500	V	19.1	23.3	42.4	46
580	H	18.2	24.2	42.4	46
680	V	15.6	27.3	42.9	46

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

Test Personnel:

Tester Signature -  Date February 28, 2002

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 19.3 dBμV is obtained. The Antenna and Cable Factor of 10.7 is added, giving a field strength of 30 dBμV/m. The 30 dBμV/m value was mathematically converted to its corresponding level in μV/m.

FS = 19.3 + 10.7 = 30 dBμV/m

Level in μV/m = Common Antilogarithm [(30 dBμV/m)/20]= 31.6 μV/m