

## MEASUREMENT/TECHNICAL REPORT

### FCC Part 15 Section 15-209-15.249

**Logos Av Com**

**FCC ID: OM4TLVKPD4K**

January 20th, 2000

This report concerns (check one): Original grant  X  Class II change \_\_\_\_\_

Equipment type: TELEVOTER VOTING KEYPAD (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.

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## 1 GENERAL INFORMATION

### 1.1 Product Description

EUT is a transceiver designed to be the keypad of a voting system; it works on 916.5 MHz frequency.

The voting pad is composed of the following elements:

a plastic container with antenna cover containing:

- an electronic card with logic, transmit and receive sections (transceiver) and TX/RX antenna mounted (welded to PCB),
- battery
- Keyboard with 10 numeric keys (0-9) and 2 function keys.

Each keypad has an identifying number from 1 to 4096.

The pressing of a key records its reference number on internal memory.

This equipment sends this number, identifying the pressed key, to the Televoter Controller (**FCC ID: OM4 TLVUCT4K**) when a voting session is opened, that is when the controller request data. The data is sent by air (radio TX mode), when the Controller carries out a polling operation on all present voters and calls up the identifying code of each voter.

### 1.2 Related Submittal(s)/Grant(s)

FCC ID: OM4TLVUCT4K

### 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
<b>US-KPD-4000 (1)</b> s/n 0201	<b>OM4TLVKPD4K</b>	<b>Televoter Voting Keypad</b>	<b>No cable provided</b>

Remotely connected to:

US-UCT-4000 s/n EMC-99-0319	OM4TLVUCT4K	Televoter controller	Unshielded power cord Shielded signal cable
Compaq Contura 420C s/n 7534HPE53700	CNT75MB2CC	Notebook	Unshielded power cord Shielded signal cables
Series 2862 s/n E4532433329T	None	AC adapter for notebook	Unshielded power cords
DM 119 s/n 3031602	DYKDM119	Printer, parallel I/F	Unshielded power cord Shielded signal cable

(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 QSL 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 March 25, 1997 submitted to your office, and accepted in a letter dated August 4, 1997 (31040/SIT-1300F2).

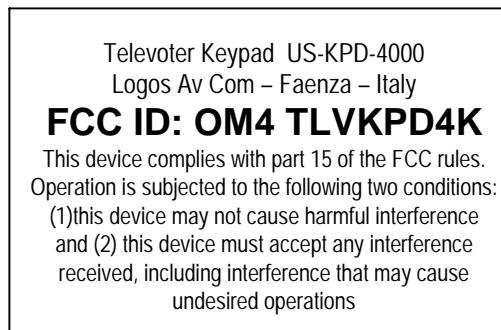
## **1.6 Test equipment list:**

Test receiver/spectrum anal.	HP 8568B+QP adapter	s/n 2601A02134
Biconical antenna	Tensor 4104	s/n 2222
Log-periodic antenna	Electro-metrix LPA-25	s/n 1117
Spectrum analyzer	HP 8562A	s/n 3043A05627
Horn antenna	EMCO 3115	s/n 3572

## 2 PRODUCT LABELING

**Figure 2.1 FCC ID Label**

See attached file:



**Figure 2.2 Location of the Label on EUT**

See attached file:

### 3 SYSTEM TEST CONFIGURATION

#### 3.1 Justification

The EUT was configured for testing in a typical fashion (as a customer would normally use it).

IT has been tested in stand alone mode; EUT is normally in receive mode, but when it receive a request to send, it become a transmitter and send the data stored in it

A Televoter controller (FCC ID: OM4TLVUCT4K) has been placed in the chamber, at a convenient distance, in order to operate the EUT, but not to interfere with testing.

Test conditions:

- a new battery has been installed
- modulation and operational frequency were fixed (no regulation are permitted by the operator or factory settings)
- during tests EUT has been rotate through the three orthogonal axes to determine which condition produces the highest emission with reference to the limits.

#### 3.2 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

The EUT has been tested in continuous transmission of data in both direction from US-KPD-4000 to US-UCT-4000 and return, in order to activate respectively the transmit and the receive section of EUT.

Software used:

The P.C. software is used to communicate to the Televoter controller the kind of polling, the numbers of keyswitches enable, the numbers of voting keypads enable, and the numbers of the keyboard enable. The Televoter controller transmits the request of poll to the voting keypads and waits to the answer. This operation is made for every number of the voting keypads enable from the software of P.C.

After receiving of all polls the Televoter controller transfers the polling to the P.C and goes to sleep mode. Its wake up is controlled from P.C when it needs to do a new polling.

The voting keypads, after transmission of its data, close the transmitter. In this status the receiver is active.

### **3.3 Special Accessories**

None.

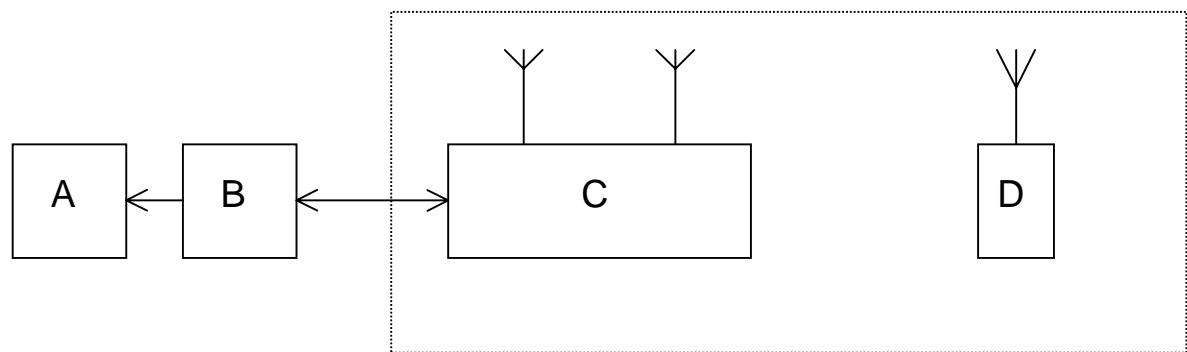
EUT is housed in a plastic box,  
No interface cable are provided.

### **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**



**D = EUT Voting keypad**

Remote peripherals:

**A = Printer**

**B = P.C**

**C = Televoter controller**

## 4 BLOCK DIAGRAM(S) OF THE EUT

### 4.1 Block Diagram Description

The Controller Board of the EUT is provided with:

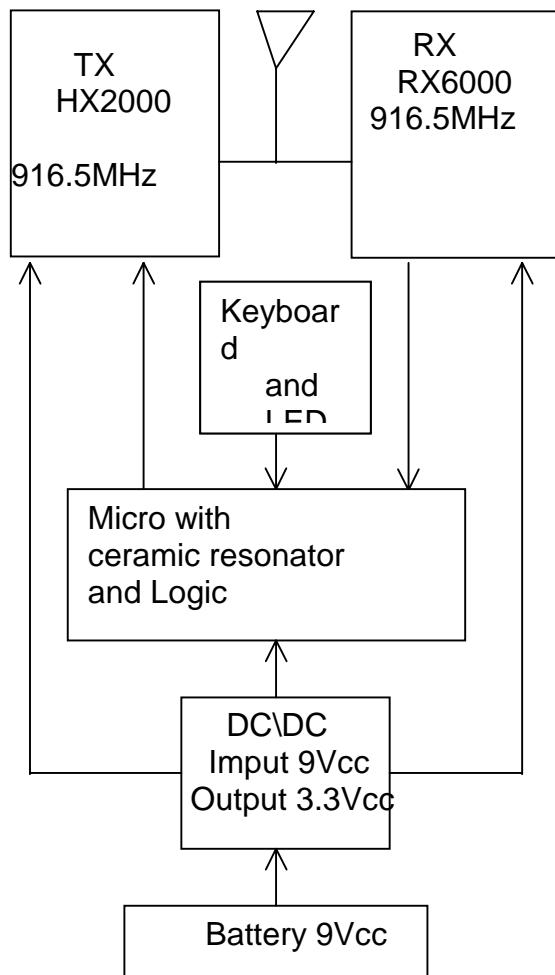
Crystals and oscillators:

- Ceramic oscillator model MURATA CSTCC4.00MG-TC 4MHz
- Tx hybrid model RFM HX2000 916.5MHz
- Rx hybrid model RFM RX6000 916.5MHz

RF suppression devices:

- None

**Fig. 4.1 - Block Diagram of the EUT**



## 5 RADIATED MEASUREMENT PHOTOS

See attached files : kpdradfront.jpg  
kpdradback.jpg

## 7 RADIATED EMISSION DATA

- frequency range 30 MHz – 10 GHz (10<sup>th</sup> Harmonic of highest fundamental frequency generated).

### 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 strength calculation is given in paragraph 7.2.

Judgement: Passed by 2.5 dB

Spurious emissions (limits according to section 15.209).

No spurious emissions detected

Fundamental and harmonics (limits according to section 15.249).

Frequency (MHz)	Polarity (V/H)	Receiver* Reading (dB $\mu$ V)	Correction Factor (dB/m)	Corrected Reading (dB $\mu$ V/m)	3 Meter Limit (dB $\mu$ V/m)
916.5	V	52.5	30.5	83	94
1833	V	24.9	27.6	52.5	54
3666	V	19.2	32	51.2	54
4582.5	V	16	34	50.2	54
5499	V	16.4	35	51.4	54
6415.5	V	14.2	36	50.2	54

\* below 1 GHz readings are quasi-peak, with an IF bandwidth of 120 kHz,  
above 1 GHz are peak with an IF bandwidth of 1 MHz.

Test Personnel:

Tester Signature



Date December 22, 1999

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 52.5 dB $\mu$ V is obtained. The Antenna and Cable Factor of 30.5 is added, giving a field strength of 83 dB $\mu$ V/m. The 83 dB $\mu$ V/m value was mathematically converted to its corresponding level in  $\mu$ V/m.

$$FS = 52.5 + 30.5 = 83 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(86 \text{ dB}\mu\text{V/m})/20] = 14,100 \mu\text{V/m}$$

## 8 PHOTOS OF TESTED EUT

**Fig. 8.1 Front view**

**Fig. 8.2 Rear view**

**Fig. 8.3 Internal view with cover removed**

**Fig. 8.4 Electronic board - components side**

**Fig. 8.5 Electronic board - foil side**

See attached files: reference picture 8.1 to 8.5

# User Manual

See attached file : KPD manual.doc