



**Clarity, A Division of Plantronics, Inc.**

Application  
For  
Certification

2.4GHz 20 Channel Analog Modulation Cordless Phone with Caller ID

**(FCC ID: ACEC600B)**

06205601  
KL/ Ann Choy  
October 4, 2006

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## INTERTEK TESTING SERVICES

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### LIST OF EXHIBITS

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- EXHIBIT 2:* System Test Configuration
- EXHIBIT 3:* Emission Results
- EXHIBIT 4:* Equipment Photographs
- EXHIBIT 5:* Product Labelling
- EXHIBIT 6:* Technical Specifications
- EXHIBIT 7:* Instruction Manual
- EXHIBIT 8:* Security Code Information

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## MEASUREMENT/TECHNICAL REPORT

**Clarity, A Division of Plantronics, Inc. - Model: C600  
C440**  
**FCC ID: ACEC600B**

This report concerns (check one:)      Original Grant       Class II Change

Equipment Type : DXT - Cordless Telephone

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Deferred grant requested per 47 CFR  
0.457(d)(1)(ii)?      Yes       No

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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Transition Rules Request per 15.37 ?      Yes       No

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [04-05-05  
Edition] Provision.

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### List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission for Base	config photos.doc
Test Setup Photo	Radiated Emission for Handset	config photos.doc
Test Report	Emission Plot	emission.pdf
Test Setup Photo	Conducted Emission	config photos.doc
Test Report	Conducted Emission Test Result	conduct.pdf
External Photo	External Photo	external photos.doc
Internal Photo	Internal Photo	internal photos.doc
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

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**EXHIBIT 1**  
**GENERAL DESCRIPTION**

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## 1.0 General Description

### 1.1 Product Description

The C600 is a 2.4GHz 20 Channel Analog Modulation Cordless Phone with Caller ID. The unit is capable of either tone or pulse dialing. The internal power supply's isolation is accomplished through a power transformer having an adequate dielectric rating. The circuit wiring is consistent under the requirement of part 68.

The handset unit consists of a keypad with twelve standard keys (0,...9,\*,#), eleven function keys (DEL/Channel, talk, mode, flash, mute, redial/pause, ringer on/off, boost, volume control, prog, enter). A Talk key is provided to control pick/release telephone line in a toggle base.

The base unit has a page key, which is used to page the handset unit.

The antennas used in base unit and handset are integral, and the tested sample is a prototype.

The Model: C440 is the same as the Model: C600 in hardware aspect except C600 contains a battery backup circuit in base while C440 does not. The difference in model number serves as marketing strategy.

The circuit description is saved with filename: descri.pdf

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

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### 1.2 Related Submittal(s) Grants

This is an Application for Certification of a cordless telephone system. Two transmitters are included in this Application. This specific report details the emission characteristics of each transmitter. The receivers are subject to the verification authorization process, in accordance with 15.101(b). A verification report has been prepared for the receiver sections of each device. The device is also subject to Part 68 Registration.

### 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). All measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

**EXHIBIT 2**  
**SYSTEM TEST CONFIGURATION**

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### 2.0 System Test Configuration

#### 2.1 Justification

For emissions testing, the equipment under test (EUT) was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The handset was powered by a fully charged battery.

For the measurements, the EUT is attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attaches to peripherals, they are connected and operational (as typical as possible). The handset is remotely located as far from the antenna and the base as possible to ensure full power transmission from the base. Else, the base is wired to transmit full power without modulation.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

#### 2.2 EUT Exercising 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.

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### 2.3 Support Equipment List and Description

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

#### *HARDWARE:*

The unit was operated standalone. An AC adaptor and a battery (provided with the unit) were used to power the device. Their description are listed below.

- (1) Base Unit: An AC adaptor (120VAC to 9.0VDC 400mA, Model: UD4120090040G) (Supplied by Client)
- (2) Handset: A "Ni-MH" type rechargeable battery (3.6V 600mAh) (Supplied by Client)

#### *CABLES:*

- (1) Telecommunication cable with RJ11C connectors (1m, unshielded), terminated (Supplied by Intertek)

#### *OTHERS:*

- (1) A headset for telephone use with 1.2m unshielded cable permanently affixed. (Supplied by Intertek)
- (2) Telephone Headset, Model: M175 (Supplied by Client)

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### 2.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

### 2.5 Equipment Modification

Any modifications installed previous to testing by Clarity, A Division of Plantronics, Inc. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by ETL Division, Intertek Testing Services Hong Kong Ltd.

All the items listed under section 2.0 of this report are confirmed by:

*Confirmed by:*

*Lam Chun Cheong, Kenneth  
Senior Lead Engineer  
Intertek Testing Services  
Agent for Clarity, A Division of Plantronics, Inc.*



Signature

October 4, 2006

Date

**EXHIBIT 3**  
**EMISSION RESULTS**

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### 3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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### 3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

where  $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

$RA$  = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$

$CF$  = Cable Attenuation Factor in dB

$AF$  = Antenna Factor in dB

$AG$  = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:-

$$FS = RR + LF$$

where  $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

$RR$  =  $RA - AG$  in  $\text{dB}\mu\text{V}$

$LF$  =  $CF + AF$  in dB

Assume a receiver reading of 52.0  $\text{dB}\mu\text{V}$  is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32  $\text{dB}\mu\text{V}/\text{m}$ . This value in  $\text{dB}\mu\text{V}/\text{m}$  was converted to its corresponding level in  $\mu\text{V}/\text{m}$ .

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 23 + 9 = 32 \text{ dB}\mu\text{V}/\text{m}$$

$$RR = 23.0 \text{ dB}\mu\text{V}$$

$$LF = 9.0 \text{ dB}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

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### 3.2 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission

at 800.333 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: config photos.doc

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### 3.3 Radiated Emission Data - Base Unit

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 5.9 dB margin

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#### **TEST PERSONNEL:**



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*Tester Signature*

Felix Ng, Lead Engineer  
*Typed/Printed Name*

October 4, 2006  
*Date*

## INTERTEK TESTING SERVICES

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Company: Clarity, A Division of Plantronics, Inc. Date of Test: September 18-27, 2006  
Model: C600  
Mode : TX-Channel 10

Table 1, Base unit

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre- Amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2401.000	87.5	33	29.4	83.9	94.0	-10.1
V	800.333	25.1	16	31.0	40.1	46.0	-5.9
H	*1600.667	49.6	33	27.2	43.8	54.0	-10.2
H	3201.333	45.0	33	31.9	43.9	54.0	-10.1
H	*4802.000	40.9	33	34.9	42.8	54.0	-11.2
H	7203.000	37.7	33	37.9	42.6	54.0	-11.4

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

\* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Felix Ng

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### 3.4 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission

at 1654.667 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: config photos.doc

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### 3.5 Radiated Emission Data - Handset

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 8.2 dB margin

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#### **TEST PERSONNEL:**



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*Tester Signature*

Felix Ng, Lead Engineer

*Typed/Printed Name*

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October 4, 2006

*Date*

## INTERTEK TESTING SERVICES

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Company: Clarity, A Division of Plantronics, Inc. Date of Test: September 18-27, 2006  
Model: C600  
Mode : TX-Channel 10

Table 2, Handset

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2482.000	76.5	33	29.4	72.9	94.0	-21.1
V	827.333	19.0	16	31.0	34.0	46.0	-12.0
V	1654.667	51.6	33	27.2	45.8	54.0	-8.2
V	3309.333	45.3	33	31.9	44.2	54.0	-9.8
V	*4964.000	41.7	33	34.9	43.6	54.0	-10.4
V	*7446.000	38.3	33	37.9	43.2	54.0	-10.8

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

\* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Felix Ng

## **INTERTEK TESTING SERVICES**

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### **3.6 Radiated Emission on the Bandedge**

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz and 2483MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2003) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

Please refer to the following plots for radiated emission on the bandedge:

Plot B1A: Base Unit - Low Channel Emissions

Plot B1B: Base Unit - High Channel Emissions

Plot H1A: Handset - Low Channel Emissions

Plot H1B: Handset - High Channel Emissions

The above plots are saved with filename: emission.pdf

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### 3.7 Line Conducted Configuration Photograph - Base Unit

#### Worst Case Line-Conducted Configuration

For electronic filing, the worst case line conducted configuration photographs are saved with filename: config photos.doc

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### 3.8 Line Conducted Emission Data

The data on the following pages list the significant emission frequencies, the limit, and the margin of compliance.

Judgement : Passed by more than 20 dB margin

#### **TEST PERSONNEL:**



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*Tester Signature*

Felix Ng, Lead Engineer

*Typed/Printed Name*

October 4, 2006

*Date*

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## INTERTEK TESTING SERVICES

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Company: Clarity, A Division of Plantronics, Inc. Date of Test: September 18-27, 2006  
Model: C600

### Conducted Emissions

The conducted emission test result is saved with filename: conduct.pdf

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**EXHIBIT 4**  
**EQUIPMENT PHOTOGRAPHS**

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## INTERTEK TESTING SERVICES

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### 4.0 Equipment Photographs

The photographs are saved with filename: external photos.doc & internal photos.doc

**EXHIBIT 5**  
**PRODUCT LABELLING**

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### 5.0 Product Labelling

The FCC ID label artwork and location is saved with filename: label.pdf

**EXHIBIT 6**  
**TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

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### 6.0 Technical Specifications

The block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

**EXHIBIT 7**  
**INSTRUCTION MANUAL**

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### 7.0 Instruction Manual

A preliminary copy of the Instruction Manual is saved with filename: manual.pdf

The required FCC Information to the User is stated on P.42-43 of the Instruction Manual.

This manual will be provided to the end-user with each unit sold/leased in the United States.

**EXHIBIT 8**  
**SECURITY CODE INFORMATION**

## INTERTEK TESTING SERVICES

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### 8.0 Security Code Information

The telephone has an internal security code with 65,000 possible combinations. Each time the HANDSET is placed on the BASE UNIT, the code is randomly set to a new combination.

Communication between HANDSET and BASE UNIT may not be possible in any of the following situation:

1. After a power failure.
2. After relocation the BASE UNIT by disconnecting the AC adaptor.
3. After replacing the HANDSET battery.

To reset, place the HANDSET on the BASE UNIT for 5 to 10 seconds.