

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

**Application  
For  
Certification**

**2.4GHz 20 Channel Analog Modulation Cordless Phone with Caller ID and  
Dual Speakerphone**

**(FCC ID: ACECLS45IC)**

06190601  
KL/ Ann Choy  
October 18, 2006

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reproduced except in full without prior authorization from Intertek Testing Services Hong Kong Limited.
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

---

## INTERTEK TESTING SERVICES

---

### LIST OF EXHIBITS

#### *INTRODUCTION*

- EXHIBIT 1:* General Description
- 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

# INTERTEK TESTING SERVICES

---

## MEASUREMENT/TECHNICAL REPORT

**Clarity, A Division of Plantronics, Inc. - Model: CLS45i**  
**FCC ID: ACECLS45IC**

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

Equipment Type : DXT - Cordless Telephone

---

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.

---

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.

---

Report prepared by:

Lam Chun Cheong, Kenneth  
Intertek Testing Services Hong Kong Ltd.  
2/F., Garment Centre,  
576 Castle Peak Road,  
Kowloon, Hong Kong.  
Phone : 852-2173-8474  
Fax: 852-2741-1693

---

# INTERTEK TESTING SERVICES

---

## Table of Contents

<b>1.0 General Description</b> .....	2
1.1 Product Description .....	2
1.2 Related Submittal(s) Grants .....	3
1.3 Test Methodology.....	3
1.4 Test Facility .....	3
<b>2.0 System Test Configuration</b> .....	5
2.1 Justification .....	5
2.2 EUT Exercising Software.....	5
2.3 Support Equipment List and Description .....	6
2.4 Measurement Uncertainty .....	7
2.5 Equipment Modification .....	7
<b>3.0 Emission Results</b> .....	9
3.1 Field Strength Calculation.....	10
3.2 Radiated Emission Configuration Photograph - Base Unit.....	11
3.3 Radiated Emission Data - Base Unit.....	12
3.4 Radiated Emission Configuration Photograph - Handset.....	14
3.5 Radiated Emission Data - Handset.....	15
3.6 Radiated Emission on the Bandedge.....	17
3.7 Line Conducted Configuration Photograph - Base Unit .....	18
3.8 Line Conducted Emission Data.....	19
<b>4.0 Equipment Photographs</b> .....	22
<b>5.0 Product Labelling</b> .....	24
<b>6.0 Technical Specifications</b> .....	26
<b>7.0 Instruction Manual</b> .....	28
<b>8.0 Security Code Information</b> .....	30

---

---

## INTERTEK TESTING SERVICES

---

### 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

---

---

**INTERTEK TESTING SERVICES**

---

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

# INTERTEK TESTING SERVICES

---

## 1.0 General Description

### 1.1 Product Description

The CLS45i is a 2.4GHz 20 Channel Analog Modulation Cordless Phone with Caller ID and Dual Speakerphone. 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 base unit consists of a keypad with twelve standard keys (0,...9,\*,#), thirteen function keys (M1/1, M2/2, M3/3, M4/4, ER5/5, ER6/6, ER7/7, PROG/P, INTERCOM/I, FLASH/F, REDIAL/R, SPEAKER/S, MUTE/M).

The handset unit consists of a keypad with twelve standard keys (0,...9,\*,#), eleven function keys (CALLER ID, DELETE/BACK, FLASH/EXT, SELECT up, SELECT down, REDIAL/FWD, SETUP/CHANNEL, AMPLIFY, SPEAKER, ENTER/INTERCOM, MEM), and one channel switch key. 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 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.

---

## INTERTEK TESTING SERVICES

---

### 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**

---

## INTERTEK TESTING SERVICES

---

### 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.

## INTERTEK TESTING SERVICES

---

### 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:*

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 9VDC 500mA, Model: AD-0950) (Supplied by Client)
- (2) Handset: A "Ni-MH" type rechargeable battery (3.6V 750mAh) (Supplied by Client)

#### *CABLES:*

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

#### *OTHERS:*

- (1) A headset for telephone use with 2.5mm unshielded cable permanently affixed. (Supplied by Intertek)
- (2) 3.5mm Speaker, Model: SC-A25, HS-AS-300 (Supplied by Intertek)
- (3) 3.5mm switch (Supplied by Intertek)
- (4) Backup Battery: 4 x "AA" size 1.5VDC battery (Supplied by Intertek)

## INTERTEK TESTING SERVICES

## 2.4 Measurement Uncertainty

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

## 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.*

Ken

Signature

October 18, 2006 Date

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

## INTERTEK TESTING SERVICES

---

### 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.

---

## INTERTEK TESTING SERVICES

---

### 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  $\mu\text{V}/\text{m}$ .

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

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

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

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

$$FS = RR + LF$$

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

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

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

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

---

## INTERTEK TESTING SERVICES

---

### 3.2 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission

at 5602.333 MHz

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

## INTERTEK TESTING SERVICES

---

### 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 9.8 dB margin

\*\*\*\*\*

#### **TEST PERSONNEL:**



---

*Tester Signature*

Jess Tang, Lead Engineer

*Typed/Printed Name*

---

October 18, 2006

*Date*

## INTERTEK TESTING SERVICES

---

Company: Clarity, A Division of Plantronics, Inc. Date of Test: September 1-12, 2006  
Model: CLS45i  
Mode : TX-Channel 10 with Speaker

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	82.5	33	29.4	78.9	94.0	-15.1
V	800.333	18.9	16	31.0	33.9	46.0	-12.1
V	*1600.667	49.9	33	27.2	44.1	54.0	-9.9
H	3201.333	44.7	33	31.9	43.6	54.0	-10.4
H	*4802.000	41.3	33	34.9	43.2	54.0	-10.8
H	5602.333	40.6	33	36.6	44.2	54.0	-9.8
H	7203.000	35.9	33	37.9	40.8	54.0	-13.2

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: Jess Tang

---

---

## INTERTEK TESTING SERVICES

---

### 3.4 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission

at 2482.000 MHz

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

## INTERTEK TESTING SERVICES

---

### 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 8.9 dB margin

\*\*\*\*\*

#### **TEST PERSONNEL:**



---

*Tester Signature*

Jess Tang, Lead Engineer  
Typed/Printed Name

---

October 18, 2006  
Date

## INTERTEK TESTING SERVICES

---

Company: Clarity, A Division of Plantronics, Inc. Date of Test: September 1-12, 2006  
Model: CLS45i  
Mode : TX-Channel 10 with Speaker, Switch and Headset

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	88.7	33	29.4	85.1	94.0	-8.9
V	827.333	18.9	16	31.0	33.9	46.0	-12.1
V	1654.667	50.4	33	27.2	44.6	54.0	-9.4
V	3309.333	45.0	33	31.9	43.9	54.0	-10.1
V	*4136.667	41.4	33	34.8	43.2	54.0	-10.8
V	*4964.000	42.2	33	34.9	44.1	54.0	-9.9
H	5791.333	40.0	33	36.6	43.6	54.0	-10.4
H	6618.667	38.9	33	36.9	42.8	54.0	-11.2

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: Jess Tang

## INTERTEK TESTING SERVICES

---

### 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 2483.5MHz). 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

For electronic filing, the above plots are saved with filename: emission.pdf

---

## INTERTEK TESTING SERVICES

---

### 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

## INTERTEK TESTING SERVICES

---

### 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:**



---

*Tester Signature*

Jess Tang, Lead Engineer

*Typed/Printed Name*

October 18, 2006

*Date*

---

## INTERTEK TESTING SERVICES

---

Company: Clarity, A Division of Plantronics, Inc. Date of Test: September 1-12, 2006  
Model: CLS45i

### Conducted Emissions

For electronic filing, the conducted emission test result is saved with filename:  
conduct.pdf

---

---

**INTERTEK TESTING SERVICES**

---

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

---

## INTERTEK TESTING SERVICES

---

### 4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.doc & internal photos.doc

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

---

---

## INTERTEK TESTING SERVICES

---

### 5.0 Product Labelling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf

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

## INTERTEK TESTING SERVICES

---

### 6.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

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

## INTERTEK TESTING SERVICES

---

### 7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

The required FCC Information to the User is stated on P.27-28 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

---

### 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 and automatically set to a new combination.

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