

Clarity, a Division of Plantronics, Inc

Application
For
Certification

5.8GHz Frequency Hopping Spread Spectrum Cordless Phone with Caller
ID, Speakerphone, and Digital Answering Machine

(FCC ID: ACEC4230)

07167011
KS/ ac
November 29, 2007

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LIST OF EXHIBITS

INTRODUCTION

<i>EXHIBIT 1:</i>	Summary of Tests
<i>EXHIBIT 2:</i>	General Description
<i>EXHIBIT 3:</i>	System Test Configuration
<i>EXHIBIT 4:</i>	Measurement Results
<i>EXHIBIT 5:</i>	Equipment Photographs
<i>EXHIBIT 6:</i>	Product Labelling
<i>EXHIBIT 7:</i>	Technical Specifications
<i>EXHIBIT 8:</i>	Instruction Manual
<i>EXHIBIT 9:</i>	Security Code Information
<i>EXHIBIT 10:</i>	Letter of Agency
<i>EXHIBIT 11:</i>	Confidentiality Request

INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

Clarity, a Division of Plantronics, Inc - MODEL: C4230, C4230HS, C4220

FCC ID: ACEC4230

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

Equipment Type: DSS-Part 15 Spread Spectrum Transmitter

Deferred grant requested 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.

Transition Rules Request per 15.37? Yes No X

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [05-04-07 Edition] provision.

Report prepared by:

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Table of Contents

1.0 <u>Summary of Test</u>	2
2.0 <u>General Description</u>	4
2.1 Product Description	4
2.2 Related Submittal(s) Grants.....	5
2.3 Test Methodology	5
2.4 Test Facility	5
3.0 <u>System Test Configuration</u>	7
3.1 Justification.....	7
3.2 EUT Exercising Software.....	7
3.3 Details of EUT and Description of Peripherals	8
3.4 Measurement Uncertainty.....	9
3.5 Equipment Modification	9
4.0 <u>Measurement Results</u>	11
4.1 Maximum Conducted Output Power at Antenna Terminals.....	11
4.2 Maximum 20 dB RF Bandwidth	14
4.3 Minimum Number of Hopping Frequencies.....	17
4.4 Minimum Hopping Channel Carrier Frequency Separation	18
4.5 Average Channel Occupancy Time	20
4.6 Out of Band Conducted Emissions	21
4.7 Out of Band Radiated Emissions	22
4.8 Transmitter Radiated Emissions in Restricted Bands.....	23
4.9 Radiated Emissions from Transmitter	24
4.10 Field Strength Calculation.....	25
4.11 Radiated Emission Configuration Photograph - Base Unit	26
4.12 Radiated Emission Data - Base Unit.....	27
4.13 Radiated Emission Configuration Photograph - Handset	34
4.14 Radiated Emission Data - Handset.....	35
4.15 Transmitter Duty Cycle Calculation and Measurements.....	42
4.16 AC Line Conducted Emission	43
4.17 Line Conducted Configuration Photograph - Base Unit.....	44
4.18 Line Conducted Emission Data - Base Unit & Handset.....	45
4.19 Radio Frequency Radiation Exposure	46
5.0 <u>Equipment Photographs</u>	48
6.0 <u>Product Labelling</u>	50
7.0 <u>Technical Specifications</u>	52
8.0 <u>Instruction Manual</u>	54
9.0 <u>Security Code Information</u>	56
10.0 <u>Letter of Agency</u>	58
11.0 <u>Confidentiality Request</u>	60

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List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operational Description	Technical Description	descri_C4220.pdf descri_C4230.pdf
Test Report	Maximum Output Power Plot	maxop_C4220.pdf maxop_C4230.pdf
Test Report	20 dB Bandwidth Plot	20dB_C4220.pdf 20dB_C4230.pdf
Test Report	Minimum Number of Hopping Frequencies	chno_C4230.pdf
Test Report	Minimum Hopping Channel Carrier Frequency Separation	fsepa_C4230.pdf
Test Report	Average Channel Occupancy Time	avetime_C4230.pdf
Test Report	Out Band Antenna Conducted Emission Plot	obantcon_C4220.pdf obantcon_C4230.pdf
Test Report	Duty Cycle Calculation and Measurement	dcc_C4220.pdf dcc_C4230.pdf
Test Report	Conducted Emission Test Result	conduct_C4220.pdf conduct_C4230.pdf
Test Setup Photos	Radiated & Conducted Emission for Base Unit	config photos.doc
Test Setup Photos	Radiated Emission for Handset	
External Photos	External Photo	external photos_C4220.doc external photos_C4230.doc
Internal Photos	Internal Photo	internal photos_C4220.doc internal photos_C4230.doc
Block Diagram	Block Diagram	block_C4220.pdf block_C4230.pdf
Schematics	Circuit Diagram	circuit_C4220.pdf circuit_C4230.pdf
ID Label/Location	Label Artwork and Location	label_C4220.pdf label_C4230.pdf
Users Manual	User Manual	manual_C4220.pdf manual_C4230.pdf
RF Exposure Info	RF Safety	RF exposure info_C4220.pdf RF exposure info_C4230.pdf
	SAR Report	SAR Report 1 of 3.pdf SAR Report 2 of 3.pdf SAR Report 3 of 3.pdf
Operational Description	Security Code Information	security code information_C4220.pdf security code information_C4230.pdf
Cover Letter	Letter of Agency	letter of agency.pdf
Cover Letter	Confidentiality Request	request.pdf

EXHIBIT 1
SUMMARY OF TEST RESULTS

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1.0 Summary of Test

Clarity, a Division of Plantronics, Inc - MODEL: C4230, C4230HS, C4220

FCC ID: ACEC4230

TEST	REFERENCE	RESULTS
Max. Output Power	15.247(b)	Pass
Maximum 20dB RF Bandwidth	15.247(a)(1)	Pass
Min. No. of Hopping Frequencies	15.247(a)(1)	Pass
Min. Hopping Channel Carrier Frequency Separation	15.247(a)(1)	Pass
Average Time of Occupancy	15.247(a)(1)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
Radiated Emission from Transmitter Part	15.209	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)
Radio Frequency Radiation Exposure	15.247(i)	Pass

Notes: The EUT uses a permanently attached antenna which, in accordance to Section 15.203, is considered sufficient to comply with the provisions of this section.

EXHIBIT 2
GENERAL DESCRIPTION

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2.0 **General Description**

2.1 Product Description

The C4230 is a 5.8GHz Frequency Hopping Spread Spectrum Cordless Phone with Caller ID, Speakerphone, and Digital Answering Machine, while C4220 is a 5.8GHz Frequency Hopping Spread Spectrum Cordless Phone with Caller ID. They operate at frequency range of 5725.809MHz to 5848.889MHz with 81 physical hopping frequencies and 75 logical hopping frequencies. They are capable of either tone or pulse dialing. Their internal power supply's isolation are accomplished through a power transformer having an adequate dielectric rating. Their circuit wiring are consistent under the requirement of part 68.

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

The Model: C4220 is the same as the Model: C4230 in hardware aspect except there is no digital answer machine and speakerphone.

The Model: C4230HS is a handset with an external charger only. And which is the same as the handset of the Model: C4230 and C4220 in hardware aspect.

The circuit description and frequency hopping algorithm is saved with filename: descri_C4220.pdf and descri_C4230.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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2.2 Related Submittal(s) Grants

This is an application for Certification of a DSS-Part 15 Spread Spectrum Cordless Telephone System. Three transmitters are included in this application. The device is also subject to Part 68 Registration.

2.3 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. Antenna port conducted measurements were performed according to FCC Public Notice DA 00-705. All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.4 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 3
SYSTEM TEST CONFIGURATION

3.0 **System Test Configuration**

3.1 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 (if any) 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.

Measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

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.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF*. The effective period (τ_{eff}) was 980 μs and 1 ms respectively as shown in the plots of Section 4.5. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3 dB, the pulse desensitization factor was 0 dB.

3.2 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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3.3 Details of EUT and Description of Peripherals

Details of EUT:

An AC adaptor and/or a battery (provided with the unit) were used to power the device. Their description are listed below.

- (1) Base Unit for Model: C4220 and C4230 - An AC adaptor (120VAC to 9VDC 500mA, Model: UD090050D) (Supplied by Client)
- (2) Handset: A "Ni-MH" type rechargeable battery (3.6V 780mAh) (Supplied by Client)
- (3) Extra Charger: An AC adaptor (120VAC to 9VDC 500mA, Model: UD090050D) (Supplied by Client)

Description of Peripherals:

- (1) Telecommunication cable with RJ11C connectors (1m, unshielded), terminated
- (2) Backup Battery for Base Unit of Model: C4230, 4 x "AA" size 1.5VDC battery (Supplied by Intertek)
- (3) Lamp Flasher, Model: C2210, for Base Unit of Model: C4230 (Supplied by Client)
- (4) Bed Shaker, Model: C2210, for Base Unit of Model: C4230 (Supplied by Client)
- (5) Neck Loop (Supplied by Client)

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3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of 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.

3.5 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 3.0 of this report are confirmed by:

Confirmed by:

*Sit Kim Wai, Ken
Supervisor
Intertek Testing Services Hong Kong Ltd.
Agent for Clarity, a Division of Plantronics, Inc*



Signature

November 29, 2007 Date

EXHIBIT 4
MEASUREMENT RESULTS

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1):

- ☐ The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.
- ☒ The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW>20dB bandwidth and power was read directly in dBm. External attenuation and cable loss were compensated for using the OFFSET function of the analyser.

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm).

(Base Unit) Antenna Gain = 0 dBi		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 5725.809	20.08	101.9
Middle Channel: 5789.132	20.00	100.0
High Channel: 5848.889	19.11	81.5

Cable loss : 0.5 dB External Attenuation : N/A dB

Cable loss, external attenuation: ☒ included in OFFSET function
☐ added to SA raw reading

dBm max. output level = 20.08 dBm (30dBm or less)

Please refer to the attached plots for details:

Plot B1A: Low Channel Output Power
Plot B1B: Middle Channel Output Power
Plot B1C: High Channel Output Power

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4220

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1) - Continued:

(Base Unit) Antenna Gain = 0 dBi		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 5725.809	20.10	102.3
Middle Channel: 5789.132	19.61	91.4
High Channel: 5848.889	19.05	80.4

Cable loss : 0.5 dB External Attenuation : N/A dB

Cable loss, external attenuation: [x] included in OFFSET function
[] added to SA raw reading

dBm max. output level = 20.10 dBm (30dBm or less)

Please refer to the attached plots for details:

Plot B1A: Low Channel Output Power
Plot B1B: Middle Channel Output Power
Plot B1C: High Channel Output Power

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1) - Continued:

(Handset Unit) Maximum Antenna Gain = 0 dBi		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 5725.809	22.65	184.1
Middle Channel: 5789.132	22.92	195.9
High Channel: 5848.889	22.16	164.4

Cable loss : 0.5 dB External Attenuation : N/A dB

Cable loss, external attenuation: [x] included in OFFSET function
[] added to SA raw reading

dBm max. output level = 22.92 dBm (30dBm or less)

Please refer to the attached plots for details:

Plot H1A: Low Channel Output Power
Plot H1B: Middle Channel Output Power
Plot H1C: High Channel Output Power

For electronic filing, the above plots are saved with filename: maxop_C4220.pdf and maxop_C4230.pdf

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.2 Maximum 20 dB RF Bandwidth, FCC Rule 15.247(a)(1)(ii):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.

(Base Unit)	
Frequency (MHz)	20 dB Bandwidth (kHz)
5789.132 & 5848.889	612

Refer to the following plots for 20 dB bandwidth sharp:

Plot B2A: Low Channel 20 dB RF Bandwidth

Plot B2B: Middle Channel 20 dB RF Bandwidth

Plot B2C: High Channel 20 dB RF Bandwidth

Requirement: the maximum 20dB bandwidth is 1MHz

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4220

4.2 Maximum 20 dB RF Bandwidth, FCC Rule 15.247(a)(1)(ii) - Continued:

(Base Unit)	
Frequency (MHz)	20 dB Bandwidth (kHz)
5848.889	604

Refer to the following plots for 20 dB bandwidth sharp:

Plot B2A: Low Channel 20 dB RF Bandwidth

Plot B2B: Middle Channel 20 dB RF Bandwidth

Plot B2C: High Channel 20 dB RF Bandwidth

Requirement: the maximum 20dB bandwidth is 1MHz

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.2 Maximum 20 dB RF Bandwidth, FCC Rule 15.247(a)(1)(ii) - Continued:

(Handset Unit)	
Frequency (MHz)	20 dB Bandwidth (kHz)
5789.132	728

Refer to the following plots for 20 dB bandwidth sharp:

Plot H2A: Low Channel 20 dB RF Bandwidth

Plot H2B: Middle Channel 20 dB RF Bandwidth

Plot H2C: High Channel 20 dB RF Bandwidth

Requirement: the maximum 20dBm bandwidth is 1MHz

For electronic filing, the above plots are saved with filename: 20dB_C4220.pdf and 20dB_C4230.pdf

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.3 Minimum Number of Hopping Frequencies, FCC Rule 15.247(a)(1)(ii):

The RF passband of the EUT was divided into 7 approximately equal bands. With the analyzer set to MAX HOLD readings were taken for 2-3 minutes in each band. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

Base Unit and Handset	
No. of hopping channels	75

Minimum Requirements: at least 75 hopping channels for 5725MHz-5850MHz.

For electronic filing, the above plots are saved with filename: chno_C4230.pdf

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc
Model: C4230

Date of Test: August 17-October 29, 2007

4.4 Minimum Hopping Channel Carrier Frequency Separation, FCC Ref: 15.247(a)(1):

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and compared against the limit.

[] 25 kHz [x] 20 dB bandwidth of hopping channel: 612 kHz

Base Unit	
Channel Separation	888 kHz

Plot B4: Channel 38 and Channel 39

Requirement: The frequency separation is more than 20dB bandwidth of hopping channel.

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.4 Minimum Hopping Channel Carrier Frequency Separation, FCC Ref: 15.247(a)(1) - Continued:

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and compared against the limit.

[] 25 kHz [x] 20 dB bandwidth of hopping channel: 728 kHz

Handset	
Channel Separation	888 kHz

Plot H4: Channel 38 and Channel 39

Requirement: The frequency separation is more than 20dB bandwidth of hopping channel.

For electronic filing, the above plots are saved with filename: fsepa_C4230.pdf

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.5 Average Channel Occupancy Time, FCC Ref: 15.247(a)(1)(ii):

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 10ms, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmission so captured was measured with the MARKER DELTA function.

The SWEEP was then set to the time required by the regulation (20 seconds for 902-928 MHz devices, if the 20dB bandwidth is less than 250kHz, 10 seconds for 902-928 MHz if the 20dB bandwidth is or greater than 250kHz, "0.4 seconds x Number of hopping channels employed" seconds for 2400-2483.5 MHz, 30 seconds for 5725-5850 MHz). The analyzer was set to SINGLE SWEEP, the total ON time was added and compared against the limit (0.4 seconds).

Average 0.4 seconds maximum occupancy in 30 seconds for 5725MHz-5850MHz.

Base Unit (worst-case: 4 Handsets Operation)	
Average Occupancy Time = $0.980\text{ms} \times 4 \times 40$	156.8 ms

Refer to attached spectrum analyzer plots B5A-C.

Handset Unit (worst-case: Double-Slots Operation)	
Average Occupancy Time = $1\text{ms} \times 2 \times 40$	80 ms

Refer to attached spectrum analyzer plots H5A-C

For electronic filing, the above plots are saved with filename: avetime_C4230.pdf

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.6 Out of Band Conducted Emissions, FCC Rule 15.247(d):

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the following plots for out of band conducted emissions data:

Plot B6A1 - B6A2: Low Channel Emissions
Plot B6B1 - B6B2: Middle Channel Emissions
Plot B6C1 - B6C2: High Channel Emissions
Plot B6D1 - B6D2: Modulation Products Emission*
Plot H6A1 - H6A2: Low Channel Emissions
Plot H6B1 - H6B2: Middle Channel Emissions
Plot H6C1 - H6C2: High Channel Emissions
Plot H6D1 - H6D2: Modulation Products Emissions*

The plots showed the 2nd harmonic and modulation products at the band edges of 5725 MHz and 5850 MHz. In addition, all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

*These 2 plots are shown the worst-case which has been already considered between enable and disable the hopping function of the EUT.

For electronic filing, the above plots are saved with filenames: obantcon_C4220.pdf and obantcon_C4230.pdf

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.7 Out of Band Radiated Emissions (for emissions in 4.6 above that are less than 20 dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

- ☒ Not required, all emissions more than 20dB below fundamental
- ☐ See attached data sheet

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.8 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

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. All measurements were performed with peak detection unless otherwise specified.

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

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.9 Radiated Emissions from Transmitter, FCC Ref: 15.209

☐ Not required - No digital part

☒ Test results are attached

☐ Included in the separated DOC report.

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Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.10 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

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

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

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

Example

Assume a receiver reading of 62.0 dB μ 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. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

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

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

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

$$PD = 0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

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

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.11 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission
at
for Model: C4230 - 11451.619 MHz

for Model: C4220 - 11451.619 MHz

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

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.12 Radiated Emission Data - Base Unit

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

Judgement

for Model: C4230 - Passed by 4.6 dB margin compare with the peak limit

for Model: C4220 - Passed by 0.2 dB margin compare with the peak limit

TEST PERSONNEL:



Tester Signature

Melvin Nip, Lead Engineer
Typed/Printed Name

November 29, 2007
Date

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230
Mode : TX-Channel 1

Table 1, Base Unit

Radiated Emissions

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	*11451.619	61.6	33	40.8	69.4	28.2	41.2	54.0	-12.8
H	*22903.237	54.9	33	38.3	60.2	28.2	32.0	54.0	-22.0

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	*11451.619	61.6	33	40.8	69.4	74.0	-4.6
H	*22903.237	54.9	33	38.3	60.2	74.0	-13.8

- 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230
Mode : TX-Channel 41

Table 2, Base unit

Radiated Emissions

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	*11578.264	61.8	33	40.5	69.3	28.2	41.1	54.0	-12.9

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	*11578.264	61.8	33	40.5	69.3	74.0	-4.7

- 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230
Mode : TX-Channel 81

Table 3, Base unit

Radiated Emissions

Polarization	Frequency	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Average Factor (dB)	Calculated at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	*11697.778	61.7	33	40.5	69.2	28.2	41.0	54.0	-13.0

Polarization	Frequency	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
V	*11697.778	61.7	33	40.5	69.2	74.0	-4.8

- 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
 Model: C4220
 Mode : TX-Channel 1

Table 4, Base Unit

Radiated Emissions

Polarization	Frequency	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Average Factor (dB)	Calculated at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
H	*11451.619	66.0	33	40.8	73.8	28.2	45.6	54.0	-8.4
H	*22903.237	55.1	33	38.3	60.4	28.2	32.2	54.0	-21.8
H	*31525.630	51.1	33	40.4	58.5	28.2	30.3	54.0	-23.7

Polarization	Frequency	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
H	*11451.619	66.0	33	40.8	73.8	74.0	-0.2
H	*22903.237	55.1	33	38.3	60.4	74.0	-13.6
H	*31525.630	51.1	33	40.4	58.5	74.0	-15.5

- 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4220
Mode : TX-Channel 41

Table 5, Base unit

Radiated Emissions

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	*11578.264	66.1	33	40.5	73.6	28.2	45.4	54.0	-8.6

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	*11578.264	66.1	33	40.5	73.6	74.0	-0.4

- 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4220
Mode : TX-Channel 81

Table 6, Base unit

Radiated Emissions

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	*11697.778	66.2	33	40.5	73.7	28.2	45.5	54.0	-8.5

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	*11697.778	66.2	33	40.5	73.7	74.0	-0.3

- 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.
 5. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.13 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission
at
11697.778 MHz

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

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230

4.14 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 5.5 dB margin compare with the peak limit

TEST PERSONNEL:



Tester Signature

Melvin Nip, Lead Engineer
Typed/Printed Name

November 29, 2007
Date

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007

Model: C4230

Mode : TX-Channel 1

Table 7, Handset

Radiated Emissions

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
H	*11451.619	60.1	33	40.8	67.9	34	33.9	54.0	-20.1
H	*22903.237	54.1	33	38.3	59.4	34	25.4	54.0	-28.6

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	*11451.619	60.1	33	40.8	67.9	74.0	-6.1
H	*22903.237	54.1	33	38.3	59.4	74.0	-14.6

- 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007

Model: C4230

Mode : TX-Channel 41

Table 8, Handset

Radiated Emissions

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
H	*11578.264	60.6	33	40.5	68.1	34	34.1	54.0	-19.9

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	*11578.264	60.6	33	40.5	68.1	74.0	-5.9

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 used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230
Mode : TX-Channel 81

Table 9, Handset

Radiated Emissions

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
H	*11697.778	61.0	33	40.5	68.5	34	34.5	54.0	-19.5

Polarization	Frequency	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	*11697.778	61.0	33	40.5	68.5	74.0	-5.5

- 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230
Mode: Talking

Table 10, Base Unit

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	34.829	40.2	16	10.0	34.2	40.0	-5.8
V	48.256	38.9	16	11.0	33.9	40.0	-6.1
V	65.389	39.8	16	9.0	32.8	40.0	-7.2
H	121.609	35.1	16	14.0	33.1	43.5	-10.4
H	135.831	34.8	16	14.0	32.8	43.5	-10.7
H	186.485	32.0	16	16.0	32.0	43.5	-11.5

- NOTES: 1. Quasi-peak detector is used for the emission below or equal to 1000 MHz.
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.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4220
Mode: Talking

Table 11, Base Unit

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	41.750	35.8	16	10.0	29.8	40.0	-10.2
V	55.300	36.9	16	11.0	31.9	40.0	-8.1
V	82.950	42.8	16	7.0	33.8	40.0	-6.2
V	124.425	35.6	16	14.0	33.6	43.5	-9.9
V	138.250	34.8	16	14.0	32.8	43.5	-10.7
V	165.900	31.0	16	17.0	32.0	43.5	-11.5

- NOTES: 1. Quasi-peak detector is used for the emission below or equal to 1000 MHz.
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.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230
Mode: Talking

Table 12, Handset

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	34.306	40.1	16	10.0	34.1	40.0	-5.9
V	48.254	38.9	16	11.0	33.9	40.0	-6.1
V	65.649	39.8	16	9.0	32.8	40.0	-7.2
H	122.831	35.9	16	14.0	33.9	43.5	-9.6
H	136.372	34.6	16	14.0	32.6	43.5	-10.9
H	185.681	32.0	16	16.0	32.0	43.5	-11.5

- NOTES: 1. Quasi-peak detector is used for the emission below or equal to 1000 MHz.
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.

Test Engineer: Melvin Nip

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.15 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEPT function on the analyzer was set to ZERO SPAN. The transmitter ON time was determined from the resultant time-amplitude display:

Base Unit:

Duty cycle (DC) = Maximum ON time in 100ms/100ms
= (0.980 x 4)ms/100ms for 4 handsets operation

Duty cycle correction, dB = $20 \times \log(\text{DC})$
= $20 \times \log(0.0392)$
= -28.2 dB

Handset:

Duty cycle (DC) = Maximum ON time in 100ms/100ms
= (1ms x 2)ms/100ms for double-slots operation

Duty cycle correction, dB = $20 \times \log(\text{DC})$
= $20 \times \log(0.02)$
= -34.0 dB

X	See attached spectrum analyzer chart (s) for transmitter timing Base Unit: Plot B7, Handset: Plot H7
	See transmitter timing diagram provided by manufacturer
	Not applicable, duty cycle was not used.

For electronic filing, the above plots are saved with filenames: dcc_C4220.pdf and dcc_C4230.pdf

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.16 AC Line Conducted Emission, FCC Rule 15.207:

☐ Not required; battery operation only

☒ Test data attached

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.17 Line Conducted Configuration Photograph - Base Unit

Worst Case Line-Conducted Configuration
at

for Model: C4220 - 13.825 MHz

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

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.18 Line Conducted Emission Data - Base Unit & Handset

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

Judgement

for Model: C4230 (Base Unit) - Passed by more than 20 dB margin

for Model: C4230 (Handset) - Passed by more than 20 dB margin

for Model: C4220 (Base Unit) - Passed by 6.9 dB margin

For electronic filing, the worst case line conducted emission data are saved with filename: conduct.pdf

TEST PERSONNEL:



Tester Signature

Melvin Nip, Lead Engineer

Typed/Printed Name

November 29, 2007

Date

INTERTEK TESTING SERVICES

Company: Clarity, a Division of Plantronics, Inc Date of Test: August 17-October 29, 2007
Model: C4230, C4220

4.19 Radio Frequency Radiation Exposure, FCC Rule 15.247(i):

EUT is subject to the radio frequency exposure requirements specified in FCC Rule §§ 1.1307. It shall be considered to operate in a “general population / uncontrolled” environment.

- [x] Handset Unit: Output power is greater than the applicable low threshold from TCB Exclusions List (17 July 2002). EUT was evaluated for Specific Absorption Rate (SAR) evaluation compliance according to OET Bulletin 65, Supplement C (Edition 01-01) and SAR Measurement Requirements for 3-6GHz (October 2006, Revised). It is in compliance with the SAR evaluation requirements. The caution statement specified in the user manual. A SAR test report was submitted at the same time and saved as SAR report 1 of 3.pdf, SAR report 2 of 3.pdf and SAR Report 3 of 3.pdf
- [x] Base Unit: EUT was evaluated for Maximum Permissible Exposure (MPE) evaluation compliance according to OET Bulletin 65, Supplement C (Edition 01-01). The evaluation calculation results are saved as filename: RF exposure info.pdf.

INTERTEK TESTING SERVICES

EXHIBIT 5
EQUIPMENT PHOTOGRAPHS

5.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: external photos_C4220.doc, external photos_C4230.doc and internal photos_C4220.doc, internal photos_C4230.doc

EXHIBIT 6
PRODUCT LABELLING

6.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and location is saved with filename:
label_C4220.pdf and label C4230.pdf

EXHIBIT 7
TECHNICAL SPECIFICATIONS

7.0 **Technical Specifications**

For electronic filing, the block diagram and circuit diagram are saved with filename: block_C4220.pdf, block_C4230.pdf and circuit_C4220.pdf, circuit_C4230.pdf respectively.

EXHIBIT 8
INSTRUCTION MANUAL

8.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual_C4220.pdf and manual_C4230.pdf

Please note that the required FCC Information to the User is attached on P.46 of the Instruction Manual for the Model: C4230, P.34 of Instruction Manual for the Model: C4220.

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

EXHIBIT 9
SECURITY CODE INFORMATION

9.0 **Security Code Information**

For electronic filing, a security code information is saved with filename: security code information_C4220.pdf and security code information_C4230.pdf

EXHIBIT 10
LETTER OF AGENCY

10.0 **Letter of Agency**

For electronic filing, a letter of agency is saved with filename: letter of agency.pdf.

EXHIBIT 11
CONFIDENTIALITY REQUEST

11.0 **Confidentiality Request**

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.