

Giant Telecom Ltd.

Application
For
Certification

1.9GHz Digital Modulation Cordless Phone with Caller ID, Speakerphone
and Bluetooth System - Handset, Bluetooth Portion

(FCC ID: RAQ-PLUTO)

07031954
TL/ ac
May 15, 2007

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LIST OF EXHIBITS

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INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

Giant Telecom Ltd. - Model: Calisto D100
Calisto Pro Series D150

FCC ID: RAQ-PLUTO

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

Equipment Type : DXT - Pt 15 Low Pwr Transceiver, Rx Verified

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:

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List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri1.pdf, descri2.pdf
Test Setup Photo	Radiated & Conducted Emission	config photos.doc
Test Report	Emission Plot	emission.pdf
Test Report	Conducted Emission Test Result	conduct.pdf
Test Report	Duty Cycle Calculation and Measurement	dcc.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
Cover Letter	Confidentiality Request	request.pdf

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EXHIBIT 1 GENERAL DESCRIPTION

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1.0 General Description

1.1 Product Description

The Calisto D100 is a 1.9GHz Digital Modulation Cordless Phone with Caller ID, Speakerphone and Bluetooth System - Handset, Bluetooth Portion. The Bluetooth module operates at 2402.000MHz-2480.000MHz with 79 channels. 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 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.

The handset of Model: Calisto Pro Series D150 is the same as the Model: Calisto D100 in hardware aspect, and the Model: Calistor Pro Series D150, additionally equips USB port for VoIP feature. The difference in model number serves as marketing strategy.

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1.2 Related Submittal(s) Grants

This is an Application for Certification of a Bluetooth system Part.

Part of a system, DECT module operates with another device that requires a certification application. The related application has been filed at the same time as this application under FCC ID: RAQ-PLUTO.

A verification report has been prepared for its digital device portion.

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.

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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 base is remotely located as far from the antenna and the handset as possible to ensure full power transmission from the handset. Else, the handset 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

There was no special software to exercise the device. Once the button is depressed, the unit transmits the typical signal. For simplicity of testing, the unit was wired to transmit continuously.

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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:

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

- (1) Base Unit: An AC adaptor (100-240VAC to 7.5V 0.6A, Model: KSAB0750060W1US)
- (2) Handset Unit: A "Ni-MH type rechargeable battery (2.4V 750mAh)

CABLES:

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

OTHERS:

- (1) Headset, with 1.4m unshielded cable (Supplied by Client)
- (2) Base Unit, FCC ID: RAQ-PLUTO (Supplied by Client)

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2.4 Measurement Uncertainty

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

2.5 Equipment Modification

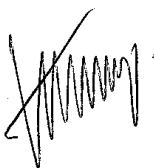
Any modifications installed previous to testing by Giant Telecom Ltd. will be incorporated in each production model sold/leased in the United States.

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:

*Leung Wai Leung, Tommy
Manager
Intertek Testing Services
Agent for Giant Telecom Ltd.*



Signature

May 15, 2007

Date

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EXHIBIT 3 EMISSION RESULTS

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3.0 Emission and Measurement 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 $\text{dB}\mu\text{V/m}$
 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 $\text{dB}\mu\text{V/m}$
 $RR = RA - AG$ 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 $32 \text{ dB}\mu\text{V/m}$. This value in $\text{dB}\mu\text{V/m}$ was converted to its corresponding level in $\mu\text{V/m}$.

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

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

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

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

$$FS = RR + LF$$

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

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

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

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

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

at 2441.000 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

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

Judgement : Passed by 13.6 dB margin compare with the peak limit

TEST PERSONNEL:



Tester Signature

Kenneth C. C. Lam, Assistant Supervisor
Typed/Printed Name

May 15, 2007
Date

INTERTEK TESTING SERVICES

Company: Giant Telecom Ltd.
Model: Calisto D100
Mode : TX-Channel 00

Date of Test: February 14 - April 17, 2007

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	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	2402.000	103.9	33	29.4	100.3	114.0	-13.7
H	*4804.000	53.7	33	34.9	55.6	74.0	-18.4
H	7206.000	42.0	33	37.9	46.9	74.0	-27.1
H	9608.000	38.8	33	40.4	46.2	74.0	-27.8

Polarization	Frequency (MHz)	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	2402.000	103.9	33	29.4	100.3	40	60.3	94.0	-33.7
H	*4804.000	53.7	33	34.9	55.6	40	15.6	54.0	-38.4
H	7206.000	42.0	33	37.9	46.9	40	6.9	54.0	-47.1
H	9608.000	38.8	33	40.4	46.2	40	6.2	54.0	-47.8

- 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: Kenneth C. C. Lam

INTERTEK TESTING SERVICES

Company: Giant Telecom Ltd.
Model: Calisto D100
Mode : TX-Channel 39

Date of Test: February 14 - April 17, 2007

Table 2

Radiated Emissions

Polarization	Frequency (MHz)	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	2441.000	104.0	33	29.4	100.4	114.0	-13.6
H	*4882.000	53.0	33	34.9	54.9	74.0	-19.1
H	7323.000	41.9	33	37.9	46.8	74.0	-27.2
H	9764.000	38.6	33	40.4	46.0	74.0	-28.0

Polarization	Frequency (MHz)	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	2441.000	104.0	33	29.4	100.4	40	60.4	94.0	-33.6
H	*4882.000	53.0	33	34.9	54.9	40	14.9	54.0	-39.1
H	7323.000	41.9	33	37.9	46.8	40	6.8	54.0	-47.2
H	9764.000	38.6	33	40.4	46.0	40	6.0	54.0	-48.0

- 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: Kenneth C. C. Lam

INTERTEK TESTING SERVICES

Company: Giant Telecom Ltd.
Model: Calisto D100
Mode : TX-Channel 79

Date of Test: February 14 - April 17, 2007

Table 3

Radiated Emissions

Polarization	Frequency (MHz)	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	2480.000	103.9	33	29.4	100.3	114.0	-13.7
H	*4960.000	53.4	33	34.9	55.3	74.0	-18.7
H	7440.000	42.0	33	37.9	46.9	74.0	-27.1
H	9920.000	38.7	33	40.4	46.1	74.0	-27.9

Polarization	Frequency (MHz)	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	2480.000	103.9	33	29.4	100.3	40	60.3	94.0	-33.7
H	*4960.000	53.4	33	34.9	55.3	40	15.3	54.0	-38.7
H	7440.000	42.0	33	37.9	46.9	40	6.9	54.0	-47.1
H	9920.000	38.7	33	40.4	46.1	40	6.1	54.0	-47.9

- 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 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: Kenneth C. C. Lam

INTERTEK TESTING SERVICES

Company: Giant Telecom Ltd.
Model: Calisto D100
Mode : Bluetooth Talking

Date of Test: February 14 - April 17, 2007

Table 4

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	32.405	37.1	16	10.0	31.1	40.0	-8.9
V	51.780	33.5	16	11.0	28.5	40.0	-11.5
V	60.000	34.9	16	10.0	28.9	40.0	-11.1
H	210.000	29.0	16	17.0	30.0	43.5	-13.5
H	331.780	20.0	16	24.0	28.0	46.0	-18.0
H	335.010	18.9	16	24.0	26.9	46.0	-19.1

- 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: Kenneth C. C. Lam

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3.4 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 *H1A - Low Channel Emissions

Plot **H1B - High Channel Emissions

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

* Bandedge compliance is determined by applying marker-delta method, i.e.

$$\begin{aligned}\text{Peak Resultant field strength} &= \text{Fundamental emissions} - \text{delta from the plot} \\ &= 100.3\text{dB}\mu\text{V/m} - 44.27\text{dB} \\ &= 56.03\text{dB}\mu\text{V/m}\end{aligned}$$

$$\begin{aligned}\text{Average Resultant field strength} &= \text{Fundamental emissions} - \text{delta from the plot} \\ &= 60.3\text{dB}\mu\text{V/m} - 44.27\text{dB} \\ &= 16.03\text{dB}\mu\text{V/m}\end{aligned}$$

** Bandedge compliance is determined by applying marker-delta method, i.e.

$$\begin{aligned}\text{Peak Resultant field strength} &= \text{Fundamental emissions} - \text{delta from the plot} \\ &= 100.3\text{dB}\mu\text{V/m} - 48.86\text{dB} \\ &= 51.44\text{dB}\mu\text{V/m}\end{aligned}$$

$$\begin{aligned}\text{Average Resultant field strength} &= \text{Fundamental emissions} - \text{delta from the plot} \\ &= 60.3\text{dB}\mu\text{V/m} - 48.86\text{dB} \\ &= 11.44\text{dB}\mu\text{V/m}\end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 54dB μ V/m (average limit) and 74dB μ V/m (peak limit).

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3.5 Line Conducted Configuration Photograph

Worst Case Line-Conducted Configuration

at 0.500 MHz

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

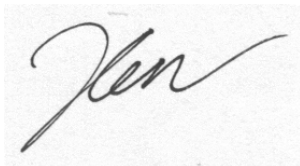
INTERTEK TESTING SERVICES

3.6 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 4.4 dB margin

TEST PERSONNEL:



Tester Signature

Kenneth C. C. Lam, Assistant Supervisor
Typed/Printed Name

May 15, 2007

Date

INTERTEK TESTING SERVICES

Company: Giant Telecom Ltd.
Model: Calisto D100

Date of Test: February 14 - April 17, 2007

Conducted Emissions

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

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Company: Giant Telecom Ltd.
Model: Calisto D100

Date of Test: February 14 - April 17, 2007

Graph 1

Conducted Emissions
FCC Part 15 Section 15.107 Requirements

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Company: Giant Telecom Ltd.
Model: Calisto D100

Date of Test: February 14 - April 17, 2007

Table 5

Conducted Emissions
FCC Part 15 Section 15.107 Requirements

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Company: Giant Telecom Ltd.
Model: Calisto D100

Date of Test: February 14 - April 17, 2007

Graph 2

Conducted Emissions
FCC Part 15 Section 15.107 Requirements

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Company: Giant Telecom Ltd.
Model: Calisto D100

Date of Test: February 14 - April 17, 2007

Table 6

Conducted Emissions
FCC Part 15 Section 15.107 Requirements

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Company: Giant Telecom Ltd.
Model: Calisto D100

Date of Test: February 14 - April 17, 2007

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

The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The transmitter ON time was determined from the resultant time-amplitude display:

Talk:

$$\begin{aligned}\text{Duty cycle (DC)} &= \text{Maximum ON time in } 98.75\text{ms}/98.75\text{ms} \\ &= (0.420\text{ms} \times 1)/98.75\text{ms}\end{aligned}$$

$$\begin{aligned}\text{Duty cycle correction, dB} &= 20 \times \log (\text{DC}) \\ &= 20 \times \log (0.00425) \\ &= -47.4 \text{ dB}\end{aligned}$$

X	See attached spectrum analyzer chart (s) for transmitter timing Plot B7B
	See transmitter timing diagram provided by manufacturer
	Not applicable, duty cycle was not used.

Paging:

$$\begin{aligned}\text{Duty cycle (DC)} &= \text{Maximum ON time in } 20\text{ms}/20\text{ms} \\ &= (0.100\text{ms} \times 2)/20\text{ms}\end{aligned}$$

$$\begin{aligned}\text{Duty cycle correction, dB} &= 20 \times \log (\text{DC}) \\ &= 20 \times \log (0.01) \\ &= -40.0 \text{ dB}\end{aligned}$$

X	See attached spectrum analyzer chart (s) for transmitter timing Plot B7A
	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.pdf

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EXHIBIT 4 EQUIPMENT PHOTOGRAPHS

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4.0 Equipment Photographs

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

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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

INTERTEK TESTING SERVICES

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.47, P.49 of the Instruction Manual.

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

INTERTEK TESTING SERVICES

EXHIBIT 8 CONFIDENTIALITY REQUEST

INTERTEK TESTING SERVICES

8.0 Confidentiality Request

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