

5 August, 2011

Comat Electronic (Shenzhen) Co., Ltd
No.2 Lane 1, Xin'an 3rd 28 District Baoan
Shenzhen, Guangdong, China

Dear Xiaowen Zhang :

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: RTX-CM9628G).

For your reference, TCB will normally take another 5 days for reviewing the report. Approval will then be granted when no query is sorted.

Please contact me if you have any questions regarding the enclosed material.

Sincerely,



Shawn Xing
Manager

Enclosure

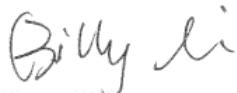
Comat Electronic (Shenzhen) Co., Ltd

Application
For
Certification
(FCC ID: RTX-CM9628G)

2.4G Wireless Laser Mouse

Model: CM9628G
2.4GHz Transceiver

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator,
Mention 47 CFR [10-1-10]



SZ11070227-2

Billy Li

5 August, 2011

- 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 is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
- 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.

TRF No.: FCC 15C_Txa
FCC ID: RTX-CM9628G

Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch

6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China

Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751 Website: www.china.intertek-etslsemko.com

INTERTEK TESTING SERVICES

LIST OF EXHIBITS

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INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

Comat Electronic (Shenzhen) Co., Ltd - Model: CM9628G

FCC ID: RTX-CM9628G

5 August, 2011

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

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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 [10-1-10 Edition] provision.

Report prepared by:

Shawn Xing
Intertek Testing Services Shenzhen Ltd.
Kejiyuan Branch
6F, Block D, Huahan Building, Langshan Road,
Nanshan District, Shenzhen, P. R. China
Phone: (86 755) 8601 6288
Fax: (86 755) 8601 6751

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List of attached file

Exhibit type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Report	Bandedge Plot	bandedge.pdf
Test Report	20dB BW Plot	bw.pdf
Test Report	Timing Plot	af.pdf
External Photo	External Photo	external photo.pdf
Internal Photo	Internal Photo	internal photo.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
Cover Letter	Confidentiality Request	request.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Letter of Agency	agency.pdf

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EXHIBIT 1

GENERAL DESCRIPTION

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1.0 General Description

1.1 Product Description

The Equipment under Test (EUT) is a 2.4G Wireless Laser Mouse unit, model: CM9628G operating at 2.4GHz band. It is powered by 2 X 1.5V AAA batteries.

Antenna Type: Integral antenna

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is an application for certification of a transceiver for the Wireless Laser Mouse unit, and the corresponding USB dongle unit (2.4GHz transceiver) is has been granted with FCC ID: RTX-CR703.

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1.3 Test Methodology

Radiated emission measurement was performed according to the procedures in ANSI C63.4 (2003). Radiated emission measurement was performed in semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the 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 Semi-Anechoic chamber used to collect the radiated data is **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. 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

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The EUT was powered by 2 new 1.5Vdc AAA batteries during the testing.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the centre of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the Engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

There was no special software to exercise the device.

2.3 Special Accessories

No special accessories used.

2.4 Equipment Modification

Any modifications installed previous to testing by Comat Electronic (Shenzhen) Co., Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch

2.5 Measurement Uncertainty

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

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2.6 Support Equipment List and Description

This product was tested in a standalone configuration.

All the items listed under section 2.0 of this report are

Confirmed by:

Shawn Xing
Manager
Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch
Agent for Comat Electronic (Shenzhen) Co., Ltd



Signature

5 August, 2011

Date

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EXHIBIT 3

EMISSION RESULTS

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3.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

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3.1 **Radiated Test Results**

A sample calculation, configuration photographs and data tables of the emissions are included.

3.1.1 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:

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

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.

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

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

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

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

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

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

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

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

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3.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

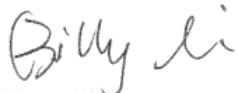
3.1.3 Radiated Emissions

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
945.852 MHz

Judgement: Passed by 9.4 dB

TEST PERSONNEL:



Signature

Billy Li, Team Leader
Typed/Printed Name

5 August, 2011

Date

INTERTEK TESTING SERVICES

Applicant: Comat Electronic (Shenzhen) Co., Ltd

Date of Test: 5 August, 2011

Model: CM9628G

Sample: 1/1

Worst Case Operating Mode: Transmit

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	152.314	39.5	20.0	8.0	27.5	43.5	-16.0
Horizontal	272.480	36.0	20.0	12.4	28.4	46.0	-17.6
Horizontal	678.842	31.8	20.0	20.0	31.8	46.0	-14.2
Vertical	72.450	42.8	20.0	7.3	30.1	40.0	-9.9
Vertical	152.354	41.8	20.0	8.0	29.8	43.5	-13.7
Vertical	945.852	32.9	20.0	23.7	36.6	46.0	-9.4

NOTES:

1. Quasi-Peak detector is used except for others stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic 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. All emissions are below the QP limit.

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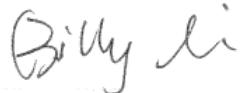
3.1.4 Transmitter Spurious Emissions (Radiated)

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
4810.000 MHz

Judgement: Passed by 11.9 dB

TEST PERSONNEL:



Signature

Billy Li, Team Leader

Typed/Printed Name

5 August, 2011

Date

INTERTEK TESTING SERVICES

Applicant: Comat Electronic (Shenzhen) Co., Ltd
 Model: CM9628G
 Sample: 1/1
 Worst Case Operating Mode: Transmit

Date of Test: 5 August, 2011

Table 2

Radiated Emissions

(2405.000MHz)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre- Amp	Antenna Factor	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
			Gain (dB)				
Horizontal	2405.000	92.9	36.7	28.1	84.3	114.0	-29.7
Horizontal	4810.000	65.4	36.1	32.8	62.1	74.0	-11.9
Horizontal	7215.000	50.3	36.2	36.5	50.6	74.0	-23.4

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre- Amp	Antenna Factor	Average Factor (-dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
			Gain (dB)					
Horizontal	2405.000	92.9	36.7	28.1	31.3	53.0	94.0	-41.0
Horizontal	4810.000	65.4	36.1	32.8	31.3	30.8	54.0	-23.2
Horizontal	7215.000	50.3	36.2	36.5	31.3	19.3	54.0	-34.7

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic 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 harmonic 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.

Test Engineer: Billy Li

INTERTEK TESTING SERVICES

Applicant: Comat Electronic (Shenzhen) Co., Ltd
Model: CM9628G
Sample: 1/1
Worst Case Operating Mode: Transmit

Date of Test: 5 August, 2011

Table 3

Radiated Emissions

(2439.000MHz)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	2439.000	93.4	36.7	28.1	84.8	114.0	-29.2
Horizontal	4878.000	61.3	36.1	35.5	60.7	74.0	-13.3
Horizontal	7317.000	50.4	36.3	37.2	51.3	74.0	-22.7

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	2439.000	93.4	36.7	28.1	31.3	53.5	94.0	-40.5
Horizontal	4878.000	61.3	36.1	35.5	31.3	29.4	54.0	-24.6
Horizontal	7317.000	50.4	36.3	37.2	31.3	20.0	54.0	-34.0

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic 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 harmonic 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.

Test Engineer: Billy Li

TRF No.: FCC 15C_Tx
FCC ID: RTX-CM9628G

INTERTEK TESTING SERVICES

Applicant: Comat Electronic (Shenzhen) Co., Ltd
 Model: CM9628G
 Sample: 1/1
 Worst Case Operating Mode: Transmit

Date of Test: 5 August, 2011

Table 4

Radiated Emissions

(2476.000MHz)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	2476.000	87.8	36.7	31.1	82.2	114.0	-31.8
Horizontal	4952.000	60.3	36.1	35.5	59.7	74.0	-14.3
Horizontal	7428.000	49.9	36.3	37.2	50.8	74.0	-23.2

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	2476.000	87.8	36.7	31.1	31.3	50.9	94.0	-43.1
Horizontal	4952.000	60.3	36.1	35.5	31.3	28.4	54.0	-25.6
Horizontal	7428.000	49.9	36.3	37.2	31.3	19.5	54.0	-34.5

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic 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 harmonic 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.

Test Engineer: Billy Li

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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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4.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photo.pdf & internal photo.pdf.

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EXHIBIT 5

PRODUCT LABELLING

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5.0 Product Labelling

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

EXHIBIT 6

TECHNICAL SPECIFICATIONS

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6.0 Technical Specifications

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

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EXHIBIT 7

INSTRUCTION MANUAL

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7.0 Instruction Manual

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

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

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EXHIBIT 8

MISCELLANEOUS INFORMATION

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8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandedge, the test procedure and calculation of factor such as pulse desensitization.

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8.1 Bandedge Plot

For electronic filing, the plot shows the fundamental emission when modulated is saved with filename: be.pdf. From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfills the requirement of 15.249(d).

Peak Measurement

Bandedge compliance is determined by applying marker-delta method, i.e (Bandedge Plot).

(i) Lower channel 2405.0000MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 84.3 \text{ dB}\mu\text{v/m} - 29.8 \text{ dB} \\ &= 54.5 \text{ dB}\mu\text{v/m} \end{aligned}$$

Average field strength	= 54.5 dB μ v/m - 31.3 dB μ v/m
	= 23.2 dB μ v/m

(ii) Upper channel 2476.0000MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 82.2 \text{ dB}\mu\text{v/m} - 49.1 \text{ dB} \\ &= 33.1 \text{ dB}\mu\text{v/m} \end{aligned}$$

Average field strength	= 33.1 dB μ v/m - 31.3 dB μ v/m
	= 1.8 dB μ v/m

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

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8.1 Bandedge Plot (cont'd)

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Figure 8.1 Bandwidth

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8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (T_{eff}) is approximately 0.24 ms for a digital "1" bit, as shown in the plots of Exhibit 8.3. With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB.

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8.3 Calculation of Average Factor

Averaging factor in dB = $20 \log (\text{duty cycle})$

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

A plot of the worst-case duty cycle as detected in this manner are saved with filename: af.pdf

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 8.8 ms
Effective period of the cycle = 0.24 ms

$$DC = 0.24 \text{ ms} / 8.8 \text{ ms} = 0.027 \text{ or } 2.7\%$$

Therefore, the averaging factor is found by $20 \log_{10} 0.027 = -31.3 \text{ dB}$

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8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2003.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjust through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings.

The frequency range scanned is from 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 40 GHz, whichever is lower.

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8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

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EXHIBIT 9
CONFIDENTIALITY REQUEST

INTERTEK TESTING SERVICES

9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

INTERTEK TESTING SERVICES

EXHIBIT 10

TEST EQUIPMENT LIST

INTERTEK TESTING SERVICES

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	15-Mar-2010	15-Sep-2011
SZ185-01	EMI Receiver	R&S	ESCI	100547	08-Mar-2011	08-Mar-2012
SZ061-08	Horn Antenna	ETS	3115	00092346	15-Mar-2010	15-Sep-2011
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	08-Mar-2011	08-Mar-2012
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	08-Mar-2011	08-Mar-2012
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	06-Mar-2011	06-Mar-2012
SZ062-02	RF Cable	RADIALL	RG 213U	--	16-Sep-2010	16-Sep-2011
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	16-Sep-2010	16-Sep-2011
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	16-Sep-2010	16-Sep-2011
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	16-Sep-2010	16-Sep-2011