



## **Panasonic Corporation of North America**

Application  
For  
Certification

Bluetooth Handsfree

**(FCC ID: ACJRPBT10R)**

07039361

KL/ ac

March 31, 2007

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# INTERTEK TESTING SERVICES

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# INTERTEK TESTING SERVICES

## MEASUREMENT/TECHNICAL REPORT

**Panasonic Corporation of North America - Model: RP-BT10R**  
**FCC ID: ACJRPBT10R**

This report concerns (check one:)		Original Grant <input checked="" type="checkbox"/>	Class II Change <input type="checkbox"/>
Equipment Type : <u>DXT - Pt 15 Low Pwr Transceiver, Rx Verified</u>			
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
		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 <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [04-05-05 Edition] Provision.			
Report prepared by:	Lam Chun Cheong, Kenneth Intertek Testing Services Hong Kong Ltd. 2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. Phone : 852-2173-8474 Fax: 852-2741-1693		

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# INTERTEK TESTING SERVICES

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List of attached file

Exhibit type	File Description	filename
Cover Letter	Confidentiality Request	request.pdf
Cover Letter	Letter of Justification	justification.pdf
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	config photos.doc
Test Report	Emission Plot	emission.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

# **INTERTEK TESTING SERVICES**

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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 Bluetooth Handsfree operating at 2402.000MHz to 2480.000MHz. The EUT is powered by a 1.2V 650mAh Ni-MH type rechargeable battery (model: Panasonic RP-BP65H). An AC adaptor and an USB cable are used to recharge the rechargeable battery for charging purpose only. The EUT consists six function keys (Backward, Forward, +, -, Play/Pause, and Power on/Power off/mic button). After power on the unit, it transmits a user's voice to a corresponding paired Bluetooth enable phone. It is also a receiver to receive an audio or a voice from the corresponding paired Bluetooth dongle or phone.

The antenna used in EUT is integral, and the tested sample is a prototype.

The circuit description is saved with filename: descri.pdf

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### 1.2 Related Submittal(s) Grants

This is an application for certification of a transmitter. The receiver, associated with this transmitter which is a Bluetooth Dongle, has FCC ID: ACJRPBT10T and has been filed at the same time. The receiver of the transceiver is subject to the verification authorization process, in accordance with 15.101(b). A verification report has been prepared for the receiver section of this device.

### 1.3 Test Methodology

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

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

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

#### 2.2 EUT Exercising Software

The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to a typical use.

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### 2.3 Support Equipment List and Description

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

#### *HARDWARE:*

A rechargeable battery (provided with the unit) was used to power the device. Its description is listed below.

- (1) A "Ni-MH" type rechargeable battery (1.2V 650mAh, Model: Panasonic RP-BP65H)

#### *CABLES:*

There are no special accessories necessary for compliance of this product.

#### *OTHERS:*

- (1) Stereo Earphones with 0.5m long (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 Panasonic Corporation of North America will be incorporated in each production model sold/leased in the United States.

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

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

*Confirmed by:*

*Lam Chun Cheong, Kenneth  
Assistant Supervisor  
Intertek Testing Services  
Agent for Panasonic Corporation of North America*



\_\_\_\_\_  
Signature

\_\_\_\_\_  
March 31, 2007

\_\_\_\_\_  
Date

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**EXHIBIT 3  
EMISSION RESULTS**

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### 3.0 Emission Results

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

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### 3.1 Field Strength Calculation

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

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

where      FS = Field Strength in dB $\mu$ V/m  
              RA = Receiver Amplitude (including preamplifier) in dB $\mu$ 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 dB $\mu$ V/m  
              RR = RA - AG in dB $\mu$ V  
              LF = CF + AF in dB

Assume a receiver reading of 52.0 dB $\mu$ 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 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
AF = 7.4 dB  
CF = 1.6 dB  
AG = 29.0 dB  
FS = RR + LF  
FS = 23 + 9 = 32 dB $\mu$ V/m

RR = 23.0 dB $\mu$ V  
LF = 9.0 dB

Level in  $\mu$ V/m = Common Antilogarithm [(32 dB $\mu$ V/m)/20] = 39.8  $\mu$ 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 14.4 dB margin compare with the peak limit

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#### **TEST PERSONNEL:**



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*Tester Signature*

Jess Tang, Lead Engineer  
*Typed/Printed Name*

March 31, 2007

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*Date*

## INTERTEK TESTING SERVICES

Company: Panasonic Corporation of North America Date of Test: February 15-March 22, 2007  
 Model: RP-BT10R  
 Mode : TX-Channel 0

Table 1

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (-dB)	Calculated at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2402.000	102.8	33	29.4	99.2	30.0	69.2	94.0	-24.8
H	*1601.333	51.2	33	27.2	45.4	30.0	15.4	54.0	-38.6
H	3202.667	45.3	33	31.9	44.2	30.0	14.2	54.0	-39.8
H	*4804.000	47.5	33	34.9	49.4	30.0	19.4	54.0	-34.6
H	7206.000	38.5	33	37.9	43.4	30.0	13.4	54.0	-40.6
H	9608.000	35.6	33	40.4	43.0	30.0	13.0	54.0	-41.0

- 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. 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. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Test Engineer: Jess Tang

## INTERTEK TESTING SERVICES

Company: Panasonic Corporation of North America Date of Test: February 15-March 22, 2007  
 Model: RP-BT10R  
 Mode : TX-Channel 39

Table 2

### Radiated Emissions

Polari- zation	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (-dB)	Calculated at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2441.000	103.2	33	29.4	99.6	30.0	69.6	94.0	-24.4
H	1627.333	51.6	33	27.2	45.8	30.0	15.8	54.0	-38.2
H	3254.667	45.2	33	31.9	44.1	30.0	14.1	54.0	-39.9
H	*4882.000	47.9	33	34.9	49.8	30.0	19.8	54.0	-34.2
H	*7323.000	38.3	33	37.9	43.2	30.0	13.2	54.0	-40.8
H	9764.000	35.6	33	40.4	43.0	30.0	13.0	54.0	-41.0

- 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. 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. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function, and this is the worst-case of 14.4dB margin at 2441.000MHz.

Test Engineer: Jess Tang

## INTERTEK TESTING SERVICES

Company: Panasonic Corporation of North America Date of Test: February 15-March 22, 2007  
 Model: RP-BT10R  
 Mode : TX-Channel 78

Table 3

### Radiated Emissions

Polari- zation	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (-dB)	Calculated at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2480.000	102.9	33	29.4	99.3	30.0	69.3	94.0	-24.7
H	1653.333	51.4	33	27.2	45.6	30.0	15.6	54.0	-38.4
H	3306.667	45.2	33	31.9	44.1	30.0	14.1	54.0	-39.9
H	*4960.000	47.7	33	34.9	49.6	30.0	19.6	54.0	-34.4
H	*7440.000	39.1	33	37.9	44.0	30.0	14.0	54.0	-40.0
H	9920.000	35.8	33	40.4	43.2	30.0	13.2	54.0	-40.8

- 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. 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. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Test Engineer: Jess Tang

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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.

Low Channel:

Resultant field strength in peak value = Fundamental emissions - delta from the plot  
= 99.2dB $\mu$ V/m - 43.7dB  
= 55.5dB $\mu$ V/m

Resultant field strength in average value = Resultant field strength in peak value -  
average factor  
= 55.5dB $\mu$ V/m - 30dB  
= 25.5dB $\mu$ V/m

High Channel:

Resultant field strength in peak value = Fundamental emissions - delta from the plot  
= 99.3dB $\mu$ V/m - 46.1dB  
= 53.2dB $\mu$ V/m

Resultant field strength in average value = Resultant field strength in peak value -  
average factor  
= 53.2dB $\mu$ V/m - 30dB  
= 23.2dB $\mu$ V/m

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 54dB $\mu$ V/m in average or 74dB $\mu$ V/m in peak.

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Company: Panasonic Corporation of North America Date of Test: February 15-March 22, 2007  
Model: RP-BT10R

### 3.5 Radiated Emissions from Digital Portion of EUT, FCC Ref: 15.109

Not required - No digital part

Test results are attached

Included in the separated DOC report.

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## INTERTEK TESTING SERVICES

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Company: Panasonic Corporation of North America Date of Test: February 15-March 22, 2007  
Model: RP-BT10R  
Mode : Handsfree Online

Table 4

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre- Amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	60.002	34.9	16	10.0	28.9	40.0	-11.1
H	240.000	26.8	16	19.0	29.8	46.0	-16.2
H	252.000	27.9	16	20.0	31.9	46.0	-14.1
H	276.007	27.2	16	22.0	33.2	46.0	-12.8
H	288.006	27.1	16	22.0	33.1	46.0	-12.9
H	300.005	26.6	16	22.0	32.6	46.0	-13.4

- 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.

Test Engineer: Jess Tang

## INTERTEK TESTING SERVICES

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Company: Panasonic Corporation of North America Date of Test: February 15-March 22, 2007  
Model: RP-BT10R

### 3.6 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 SWEP function on the analyzer was set to ZERO SPAN. The transmitter ON time was determined from the resultant time-amplitude display:

Talk Operation:

Duty cycle (DC) = Maximum ON time in 25ms/25ms  
= (0.395 x 2)ms/25ms for double-slots operation

Duty cycle correction, dB =  $20 * \log(\text{DC})$   
=  $20 * \log(0.0316)$   
= -30.0 dB

X	See attached spectrum analyzer chart (s) for transmitter timing Handsfree: Plot H2A
	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**

## INTERTEK TESTING SERVICES

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### 4.0 Equipment Photographs

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

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 5 PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

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### 5.0 Product Labelling

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

The label location justification letter is saved with filename: justification.pdf

**INTERTEK TESTING SERVICES**

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**EXHIBIT 6  
TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

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### 6.0 Technical Specifications

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

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**EXHIBIT 7  
INSTRUCTION MANUAL**

## INTERTEK TESTING SERVICES

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### 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.4 of the Instruction Manual.

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

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**EXHIBIT 8  
CONFIDENTIALITY REQUEST**

## INTERTEK TESTING SERVICES

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### 8.0 Confidentiality Request

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