



VTech Telecommunications Ltd.

Application  
For  
Permissive Change Class II

5.8GHz/2.4GHz Frequency Hopping Spread Spectrum Cordless Phone  
with Caller ID - Base Unit

**(FCC ID: EW780-5656-00)**

07243291  
KS/ ac  
November 14, 2007

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**Intertek Testing Services Hong Kong Ltd.**

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INTERTEK TESTING SERVICES

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**MEASUREMENT/TECHNICAL REPORT**

**VTech Telecommunications Ltd.- MODEL: TL71208, TL71108,  
TL71308, TL71408**

**FCC ID: EW780-5656-00**

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

Equipment Type: DSS-Part 15 Spread Spectrum Transmitter

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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.

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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.

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Report prepared by:

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# INTERTEK TESTING SERVICES

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## INTERTEK TESTING SERVICES

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### List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Cover Letter	Purpose of Application	product change.pdf
Test Report	Out Band Antenna Conducted Emission Plot	obantcon.pdf
Test Report	Duty Cycle Calculation and Measurement	dcc.pdf
Test Setup Photo	Radiated & Conducted Emission for Base	config photos.doc
Test Report	Conducted Emission Test Result	conduct.pdf
External Photo	External Photo	external photos.doc
Internal Photo	Internal Photo	internal photos.doc
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Operation Description	Security Code Information	security code information.pdf
Cover Letter	Confidentiality Request	request.pdf

**EXHIBIT 1**  
**SUMMARY OF TEST RESULTS**

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INTERTEK TESTING SERVICES

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1.0 Summary of Test

**VTech Telecommunications Ltd.- MODEL: TL71208, TL71108,  
TL71308, TL71408**

**FCC ID: EW780-5656-00**

TEST	REFERENCE	RESULTS
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
AC Conducted Emission	15.207	Pass
Radiated Emission from Digital Part	15.109	Pass
Antenna Requirement	15.203	Pass (See Notes)

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**

## INTERTEK TESTING SERVICES

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### 2.0 **General Description**

#### 2.1 Product Description

The TL71208 is a 5.8GHz/2.4GHz Frequency Hopping Spread Spectrum Cordless Phone with Caller ID. Base Unit and Handset operate at frequency of 5744.736MHz to 5825.952MHz and 2401.056MHz to 2482.272MHz respectively. The Base Unit consists of 95 physical hopping frequencies and 85 logical hopping frequencies, and the Handset consists of 95 physical hopping frequencies and 17 logical hopping frequencies. 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 handset unit consists of a keypad with twelve standard keys (0,...9,\*,#), eleven function keys (CID, DIR, Menu/Select, Up, Down, Left, Right, Speaker, Mute/Remove, Redial/Pause, INT). A Phone key and an OFF key are provided to control pick/release telephone line in a toggle base.

The base unit has a page key, which is used to communicate with handset unit, together with answer machine control keys.

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

The Base of the Models: TL71108, TL71308, and TL71408 are the same as the Model: TL71208 in hardware aspect except different number of handsets in a package. The difference in model number serves as marketing strategy.

The circuit description and frequency hopping algorithm is saved with filename: descri.pdf. The receiver input bandwidth provided by the manufacturer is 864kHz.

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

## INTERTEK TESTING SERVICES

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### 2.2 Purpose of Application

The purpose of application is saved with filename: product change.pdf

The RF module and FHSS mechanism of the Base Unit are the same as the previous granted Model: mi6866. Enclosure and PCB layout are changed.

This is a single application for Certification of a base unit of a DSS-Part 15 Spread Spectrum Cordless Telephone System. The FCC ID of the associated handset is EW780-5656-01 and has been granted. A verification report has been prepared for the digital portion. 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. 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 were manipulated to produce worst case emissions.

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. Detector function is in peak mode. 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.

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.

#### 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.

## INTERTEK TESTING SERVICES

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### 3.3 Details of EUT and Description of Peripherals

#### Details of EUT:

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

- (1) Base Unit: An AC adaptor (117VAC to 9VDC 400mA, Model: U090040D)
- (2) Handset: A "Ni-MH" type rechargeable battery (3.6V 550mAh)

#### Description of Peripherals:

- (1) Telecommunication cable with RJ11C connectors (1m, unshielded), terminated
- (2) A headset for telephone use with 1.2m unshielded cable permanently affixed.
- (3) Handset, Model: TL71208, FCC ID: EW780-5656-01 (Supplied by Client)

## INTERTEK TESTING SERVICES

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### 3.4 Measurement Uncertainty

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

### 3.5 Equipment Modification

Any modifications installed previous to testing by VTech Telecommunications 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 3.0 of this report are confirmed by:

*Confirmed by:*

*Sit Kim Wai, Ken  
Supervisor  
Intertek Testing Services Hong Kong Ltd.  
Agent for VTech Telecommunications Ltd.*



\_\_\_\_\_  
Signature

\_\_\_\_\_  
November 14, 2007 Date

**EXHIBIT 4**  
**MEASUREMENT RESULTS**

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.0 **Measurement Results**

#### 4.1 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 B6a.1- B6a.2: Low Channel Emissions  
Plot B6b.1- B6b.2: Middle Channel Emissions  
Plot B6c.1- B6c.2: High Channel Emissions  
Plot B6d.1- B6d.2: Modulation Products Emissions\*

The plots showed the 2<sup>nd</sup> harmonic and modulation products at the band edges of 5725MHz and 5850MHz. In addition, all spurious emission and up to 40GHz was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

\*These 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.pdf

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.2 Out of Band Radiated Emissions (for emissions in 4.3 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 20 dB 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 20 dB below fundamental
- See attached data sheet

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.3 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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## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.4 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 $\mu$ 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

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 $\mu$ 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. 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 $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ 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

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.5 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission  
at  
11651.904 MHz

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

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.6 Radiated Emission Data - Base Unit

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

Judgement : Passed by 4.4 dB compare with the peak limit

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### **TEST PERSONNEL:**



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*Tester Signature*

Jess Tang, Lead Engineer  
*Typed/Printed Name*

November 14, 2007  
*Date*

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## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208  
Mode : TX-Channel 0

Date of Test: October 18-31, 2007

Table 1, Base Unit

### 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	*4803.812	62.2	33	34.9	64.1	28.6	35.5	54.0	-18.5
H	*11489.472	61.6	33	40.8	69.4	28.6	40.8	54.0	-13.2
H	*22978.944	45.3	33	38.3	50.6	28.6	22.0	54.0	-32.0

- 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.
- \* 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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## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208  
Mode : TX-Channel 47

Date of Test: October 18-31, 2007

Table 2, Base unit

### 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	*4883.362	62.5	33	34.9	64.4	28.6	35.8	54.0	-18.2
H	*5148.000	66.2	33	35.7	68.9	28.6	40.3	54.0	-13.7
H	*11570.688	61.7	33	40.5	69.2	28.6	40.6	54.0	-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.
- \* 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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## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208  
Mode : TX-Channel 94

Date of Test: October 18-31, 2007

Table 3, Base unit

### 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	*4103.286	67.6	33	34.8	69.4	28.6	40.8	54.0	-13.2
H	*4964.432	62.5	33	34.9	64.4	28.6	35.8	54.0	-18.2
H	*11651.904	62.1	33	40.5	69.6	28.6	41.0	54.0	-13.0

- 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.
- \* 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 4.4dB margin at 11651.904MHz.

Test Engineer: Jess Tang

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

4.7 AC Line Conducted Emission, FCC Rule 15.207:

Not required; battery operation only

Test data attached

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.8 Line Conducted Configuration Photograph - Base Unit

Worst Case Line-Conducted Configuration  
at  
0.950 MHz

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

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

### 4.9 Line Conducted Emission Data - Base Unit

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

Judgement : Passed by more than 14.2 dB margin

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

### **TEST PERSONNEL:**



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*Tester Signature*

Jess Tang, Lead Engineer  
*Typed/Printed Name*

November 14, 2007  
*Date*

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

4.10 Radiated Emissions from Digital Section of Transceiver (Transmitter), 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: VTech Telecommunications Ltd.  
Model: TL71208  
Mode: Talk

Date of Test: October 18-31, 2007

Table 4, Base

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	41.375	39.4	16	10.0	33.4	40.0	-6.6
V	82.950	41.6	16	7.0	32.6	40.0	-7.4
H	165.900	30.9	16	17.0	31.9	43.5	-11.6
H	207.375	32.4	16	17.0	33.4	43.5	-10.1
H	248.850	30.1	16	20.0	34.1	46.0	-11.9
H	290.325	27.6	16	22.0	33.6	46.0	-12.4
H	303.876	31.8	16	22.0	37.8	46.0	-8.2
H	343.259	31.6	16	24.0	39.6	46.0	-6.4
H	398.672	26.2	16	25.0	35.2	46.0	-10.8

- 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: Jess Tang

## INTERTEK TESTING SERVICES

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Company: VTech Telecommunications Ltd.  
Model: TL71208

Date of Test: October 18-31, 2007

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

$$\begin{aligned} \text{Duty cycle (DC)} &= \text{Maximum ON time in } 100\text{ms}/100\text{ms} \\ &= (0.920\text{ms} \times 4)/100\text{ms} \text{ for 4 handsets operation} \end{aligned}$$

$$\begin{aligned} \text{Duty cycle correction, dB} &= 20 * \log (\text{DC}) \\ &= 20 * \log (0.0368) \\ &= -28.6 \text{ dB} \end{aligned}$$

X	See attached spectrum analyzer chart (s) for transmitter timing Base Unit: Plot B7
	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

**EXHIBIT 5  
EQUIPMENT PHOTOGRAPHS**

5.0 **Equipment Photographs**

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

**EXHIBIT 6**  
**PRODUCT LABELLING**

6.0 **Product Labelling**

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

**EXHIBIT 7**  
**TECHNICAL SPECIFICATIONS**

7.0 **Technical Specifications**

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

**EXHIBIT 8**  
**INSTRUCTION MANUAL**

## INTERTEK TESTING SERVICES

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### 8.0 **Instruction Manual**

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

Please note that the required FCC Information to the User is on P.63 of Instruction Manual.

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 copy of the security code information is saved with filename: security code information.pdf

**EXHIBIT 10**  
**CONFIDENTIALITY REQUEST**

10.0 **Confidentiality Request**

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