# Vtech Communications Limited

Class II Permissive Change

900MHz 30 Channels Analog Modulation Cordless Telephone

**(FCC ID: EW79108)**

WO# 0002410
WL/at
April 28, 2000



FCC ID: EW79108


**Intertek Testing Services Hong Kong Ltd.**

2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2741 1693

# LIST OF EXHIBITS

# MEASUREMENT/TECHNICAL REPORT

## Vtech Communications Limited - MODEL: 9116
## FCC ID: EW79108

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

Equipment Type : Cordless Telephone (example : computer, modem, transmitter, etc.)

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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 [10-1-98 Edition] Provision.

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Report prepared by:

Wilson Loke
Intertek Testing Services.
2/F., Garment Centre,
576 Castle Peak Road,
Kowloon, Hong Kong.
Phone : 852-2173-8888
Fax: 852-2741-1693

## Table of Contents

List of attached file

| Exhibit type | File Description | filename |
|---|---|---|
| Cover Letter | Letter of Agency | Nletter.pdf |
| Cover Letter | Letter to FCC | Nletter2.pdf |
| Test Report | Test Report | Nreport.doc |
| Operation Description | Technical Description | Ndescri.pdf |
| Test Setup Photo | Radiated Emission for Base | Nbase1.jpg, Nbase2.jpg |
| Test Setup Photo | Radiated Emission for Handset | Nhandset1.jpg, Nhandset2.jpg |
| Test Report | Emission Plot | Nemission.pdf |
| Test Setup Photo | Conducted Emission | Nconduct1.jpg - Nconduct3.jpg |
| Test Report | Conducted Emission Test Result | Nconduct.pdf |
| External Photo | External Photo | Nophoto1.jpg, Nophoto2.jpg |
| Internal Photo | Internal Photo | Niphoto1.jpg to Niphoto7.jpg |
| Block Diagram | Block Diagram | Nblock.pdf |
| Schematics | Circuit Diagram | Ncircuit.pdf |
| ID Label/Location | Label Artwork and Location | Nlabel.pdf |
| User Manual | User Manual | Nmanual.pdf |

# EXHIBIT 1
# GENERAL DESCRIPTION

## 1.0 General Description

### 1.1 Product Description

The 9116 is a 900MHz 30 Channels Analog Modulation Cordless Telephone. 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,*,#), Four function keys (Off, Program, Memory, Redial), and one channel switch key. A Phone key is provided to control pick/release telephone line in a toggle base.

The base unit has a page key, which is used to page the handset unit.

The circuit description is saved with filename: Ndescri.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.

### 1.2 Purpose of Application

The purpose of this application is to report changes in the basic model (FCC ID: EW79108) which include modifications in the charging circuitry and the addition of the headset feature.

## 1.3 Related Submittal(s) Grants

This is an Application for Certification of a cordless telephone system. Two transmitters are included in this Application. This specific report details the emission characteristics of each transmitter. The receivers are subject to the verification authorization process, in accordance with 15.101(b). A verification report has been prepared for the receiver sections of each device. The device is also subject to Part 68 Registration.

## 1.4 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). 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.

## 1.5 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 2
# SYSTEM TEST CONFIGURATION

## 2.0 System Test Configuration

### 2.1 Justification

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). 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 cardboard box 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.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater. All emissions greater than 20 dBµV/m are recorded.

Radiated emission measurement were performed from 30 MHz to tenth harmonics.

### 2.2 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.

For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

2.3 Support Equipment List and Description

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system (included inserted cards, which have grants) are:

*HARDWARE:*

The unit was operated standalone. An AC adapter (provided with the unit) was used to power the device. Its description is listed below.

(1) AC adapter with two meter unshielded power cord permanently affixed.

*CABLES*:

(1) Telecommunication cable with RJ11C connectors (1m, unshielded), terminated

*OTHERS*:

(1) A headset for telephone use with 1.2m unshielded cable permanently affixed.

2.4 Equipment Modification

Any modifications installed previous to testing by Vtech Communications Limited 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:*

*Wilson Loke*
*Manager*
*Intertek Testing Services*
*Agent for Vtech Communications Limited*

_____Signature

April 28, 2000 Date

# EXHIBIT 3
# EMISSION RESULTS

## 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.

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 dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
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 dBμV/m
RR = RA - AG in dBμV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBμV 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 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dBμV/m

RR = 23.0 dBμV
LF = 9.0 dB

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

3.2 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission

at 902.300 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: Nbase1.jpg and Nbase2.jpg

3.3 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 9.5 dB

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***TEST PERSONNEL:***

*Tester Signature*

H. Y. Vu, Engineer
*Typed/Printed Name*

April 27, 2000
*Date*

Company: Vtech Communications Limited Date of Test: April 11, 2000
Model: 9116
Mode : TX-Channel 1

Table 1, Base unit

**Radiated Emissions**

| Polarity | Frequency (MHz) | Reading (dBµV) | Antenna Factor (dB) | Pre-Amp Gain (dB) | Net at 3m (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 902.300 | 84.5 | 32.0 | 32 | 84.5 | 94 | -9.5 |
| V | 1804.600 | 44.6 | 26.5 | 34 | 37.1 | 54 | -16.9 |
| V | *2706.900 | 43.4 | 29.1 | 34 | 38.5 | 54 | -15.5 |
| V | *3609.200 | 36.2 | 32.8 | 34 | 35.0 | 54 | -19.0 |
| V | *4511.500 | 34.1 | 34.0 | 34 | 34.1 | 54 | -19.9 |

NOTES: 1. Peak Detector data

2. All measurements were made at 3 meters. 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 and average detector are used for the emission over 1000MHz.

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

Test Engineer: H. Y. Vu

Company: Vtech Communications Limited Date of Test: April 11, 2000
Model: 9116
Mode : TX-Channel 18

Table 2, Base unit

**Radiated Emissions**

| Polarity | Frequency (MHz) | Reading (dBµV) | Antenna Factor (dB) | Pre-Amp Gain (dB) | Net at 3m (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 906.650 | 67.1 | 32.0 | 16 | 83.1 | 94 | -10.9 |
| V | 1813.300 | 45.5 | 26.5 | 34 | 38.0 | 54 | -16.0 |
| V | *2719.950 | 44.4 | 29.1 | 34 | 39.5 | 54 | -14.5 |
| V | *3626.600 | 36.4 | 32.8 | 34 | 35.2 | 54 | -18.8 |
| V | *4533.250 | 34.0 | 34.0 | 34 | 34.0 | 54 | -20.0 |

NOTES: 1. Peak Detector data

2. All measurements were made at 3 meters. 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 and average detector are used for the emission over 1000MHz.

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

Test Engineer: H. Y. Vu

3.4 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission

at 927.750 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: Nhandset1.jpg and Nhandset2.jpg

3.5 Radiated Emission Data - Handset

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

Judgement : Passed by 7.1 dB

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***TEST PERSONNEL:***

*Tester Signature*

H. Y. Vu, Engineer
*Typed/Printed Name*

April 27, 2000
*Date*

Company: Vtech Communications Limited Date of Test: April 11, 2000
Model: 9116
Mode : TX-Channel 8

Table 3, Handset

**Radiated Emissions**

| Polarity | Frequency (MHz) | Reading (dBµV) | Antenna Factor (dB) | Pre-Amp Gain (dB) | Net at 3m (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 923.100 | 69.4 | 33.0 | 16 | 86.4 | 94 | -7.6 |
| H | 1846.200 | 45.3 | 26.5 | 34 | 37.8 | 54 | -16.2 |
| H | *2769.300 | 42.1 | 29.1 | 34 | 37.2 | 54 | -16.8 |
| H | *3692.400 | 37.7 | 32.8 | 34 | 36.5 | 54 | -17.5 |

NOTES: 1. Peak Detector data

2. All measurements were made at 3 meters. 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 and average detector are used for the emission over 1000MHz.

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

Test Engineer: H. Y. Vu

Company: Vtech Communications Limited Date of Test: April 11, 2000
Model: 9116
Mode : TX-Channel 25

Table 4, Handset

**Radiated Emissions**

| Polarity | Frequency (MHz) | Reading (dBµV) | Antenna Factor (dB) | Pre-Amp Gain (dB) | Net at 3m (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 927.750 | 69.9 | 33 | 16 | 86.9 | 94 | -7.1 |
| H | 1855.500 | 46.3 | 26.5 | 34 | 38.8 | 54 | -15.2 |
| H | *2783.250 | 42.5 | 29.1 | 34 | 37.6 | 54 | -16.4 |
| H | *3711.100 | 37.4 | 32.8 | 34 | 36.2 | 54 | -17.8 |

NOTES: 1. Peak Detector data

2. All measurements were made at 3 meters. 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 and average detector are used for the emission over 1000MHz.

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

Test Engineer: H. Y. Vu

3.6 Radiated Emission on the bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band and they are at least 50 dB below the carrier level at band edge (902 and 928 MHz). It meets the requirement of section 15.249(c).

## Emission Plot

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

3.7 Line Conducted Configuration Photograph - Base Unit

Worst Case Line-Conducted Configuration

at 15.875 MHz

For electronic filing, the worst case line conducted configuration photographs are saved with filename: Nconduct1.jpg to Nconduct3.jpg

3.8 Line Conducted Emission Configuration Data

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

Judgement : Passed by 3.3 dB

***TEST PERSONNEL:***

*Tester Signature*

H. Y. Vu, Engineer
*Typed/Printed Name*

April 27, 2000
*Date*

Company: VTECH COMMUNICATIONS LIMITED Date of Test: April 11, 2000
Model: 9116

**Conducted Emissions**

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

# EXHIBIT 4
## EQUIPMENT PHOTOGRAPHS

## 4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: Nophoto1.jpg to Nophoto2.jpg & Niphoto1.jpg to Niphoto7.jpg

# EXHIBIT 5
# PRODUCT LABELLING

## 5.0 **Product Labelling**

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

# EXHIBIT 6
# TECHNICAL SPECIFICATIONS

## 6.0 **Technical Specifications**

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

# EXHIBIT 7
# INSTRUCTION MANUAL

7.0 Instruction Manual

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

Please note that the required FCC Information to the User can be found on Page 4 of 4 of this manual.

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

# EXHIBIT 8
# SECURITY CODE INFORMATION

8.0 Security code information

All data communication over the RF link will include a security code as required by FCC Part 15. When a data packet is received over the RF link, the security code contained in the packet will be verified before any data is processed. This prevents the handset from receiving commands form another base unit and vice-versa.

The handset and base units will use an identical, 16-bit digital security codes. The security code is stored in the non-volatile memory in the base and handset unit and factory defaulted I production. During production, all units will be passed through a test jig in pair. The test jig will test some parameters of the unit pair and write the security code into the memory once all test parameters passed. The test jig will count on the security code (Totally 65536 - 16 bit buffer and reset after the buffer full) and write to the unit pair.