TEST REPORT

Report Number: 16061281HKG-002

Application
for
Original Grant of 47 CFR Part 15 Certification

4-Port Ethernet Router

FCC ID: EW780-0554-00

Prepared and Checked by:

Signed on File
Josie Yao
Engineer

Approved by:

Digitally signed
by Koo Wai Ip
Location: Intertek
Testing Services
Hong Kong Ltd.

Koo Wai Ip
Assistant Supervisor
September 01, 2016

GENERAL INFORMATION

Applicant Name:	VTech Telecommunications Ltd.
Applicant Address:	23/F., Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road, Tai Po, Hong Kong.
FCC Specification Standard:	FCC Part 15, October 1, 2014 Edition
FCC ID:	EW780-0554-00
FCC Model(s):	VNT832
Type of EUT:	Class B Personal Computers and Peripherals
Description of EUT:	4-Port Ethernet Router
Serial Number:	N/A
Sample Receipt Date:	June 20, 2016
Date of Test:	August 8, 2016
Report Date:	September 01, 2016
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Table of Contents

EXHIBIT 1
TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.0 Test Results Summary & Statement of Compliance

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	Results	Details see section
Radiated Emission from Class B Personal Computers and Peripherals	15.109	Pass	4.2
AC Power Line Conducted Emission	15.107	Pass	4.3

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, October 1, 2014 Edition

EXHIBIT 2
GENERAL DESCRIPTION

2.0 General Description

2.1 Product Description

The VNT832 is a 4-Port Ethernet Router.

The Equipment Under Test (EUT) operates at frequency range of 2412MHz to 2462MHz with 11 channels. For 802.11g mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can be up to 54Mbps. For 802.11n (with 20MHz bandwidth) mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65Mbps. For 802.11n (with 40MHz bandwidth) mode, it operates at frequency range of 2422.000MHz to 2452.000MHz with 7 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65Mbps.

It operates at frequency range of The EUT is power by a 100-240VAC to 12VDC 1.0A adaptor.

The antenna(s) used in the EUT is integral, and the test sample is a prototype.
The circuit description is saved with filename: descri.pdf.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2014). Preliminary radiated scans and all radiated measurements were performed in radiated emission test site. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.3 Test Facility

The radiated emission test site and AC power line conducted measurement facility used to collect the radiated data and AC Power Line conducted data are at Intertek Testing Services Hong Kong Ltd., which is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been fully placed on file with FCC.

EXHIBIT 3
SYSTEM TEST CONFIGURATION

3.0 System Test Configuration

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup normal mode to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by a 100-240VAC to 12VDC 1.0A adaptor.

As the Base unit can be powered by 2 different configurations (AC adaptor and PoE injector), all configurations have been checked. The data in this report represented the worst-case.

The EUT can support transmission of full slot and long slot. Both types of transmission were checked. The data in this report represented the worst-case.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational to simulate typical use.

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

For radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz.

Radiated emission measurement was performed from the frequency 30MHz to 1GHz.

Detector function for radiated emissions is in peak mode.

3.1 Justification - Cont'd

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes have been tested, and the worst case data was included in this report.

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.

3.3 Details of EUT and Description of Accessories

Details of EUT:

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

(1) An AC adaptor (100-240VAC to 12VDC 1.0A, Model: CS12N120100FUF) (Supplied by Client)

Description of Accessories:

(1) 1 X LAN cable of 1m in length (Supplied by Intertek)
(2) Notebook (HP Probook 430) (Provided by Intertek)
(3) 1 X 4GB USB flash drive (Provided by Intertek)

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are ± 5.3dB and ±0.99dB respectively. The value of the Measurement uncertainty for conducted emission test is ±4.2dB.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

EXHIBIT 4
TEST RESULTS

4.0 **Test 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.

4.1 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 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
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 reflects 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 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. 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 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBμV/m
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

4.2 Radiated Emissions

4.2.1 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at

50.370 MHz

The worst case radiated emission configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.2.2 Radiated Emission Data

The data in tables 1-2 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 5.2 dB margin

Mode: Normal - LAN Connect Only

Table 1

Radiated Emissions Data
Pursuant To FCC Part 15 Section 15.109
Emissions Requirements

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	42.852	39.3	16	10.0	33.3	40.0	-6.7
V	50.370	39.8	16	11.0	34.8	40.0	-5.2
V	86.017	39.0	16	8.0	31.0	40.0	-9.0
V	94.383	40.1	16	11.0	35.1	43.5	-8.4
V	119.361	37.4	16	14.0	35.4	43.5	-8.1
H	151.492	35.6	16	15.0	34.6	43.5	-8.9
H	199.871	30.2	16	16.0	30.2	43.5	-13.3
H	499.965	23.2	16	26.0	33.2	46.0	-12.8
H	959.987	16.0	16	33.0	33.0	46.0	-13.0

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Mode: Normal – Data Transfer via USB with LAN Connect

Table 2

Radiated Emissions Data
Pursuant To FCC Part 15 Section 15.109
Emissions Requirements

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	50.458	37.7	16	11.0	32.7	40.0	-7.3
V	58.359	37.0	16	11.0	32.0	40.0	-8.0
V	85.432	38.4	16	8.0	30.4	40.0	-9.6
V	100.936	37.2	16	12.0	33.2	43.5	-10.3
V	116.925	38.4	16	14.0	36.4	43.5	-7.1
H	499.948	23.5	16	26.0	33.5	46.0	-12.5
H	959.688	17.6	16	33.0	34.6	46.0	-11.4

NOTES:

5. Peak detector is used for the emission measurement.

6. All measurements were made at 3 meters.

7. Negative value in the margin column shows emission below limit.

8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

4.3 AC Power Line Conducted Emission

[ ] Not applicable – EUT is only powered by battery for operation.

[×] EUT connects to AC power line. Emission Data is listed in following pages.

[ ] Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.3.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

465 kHz

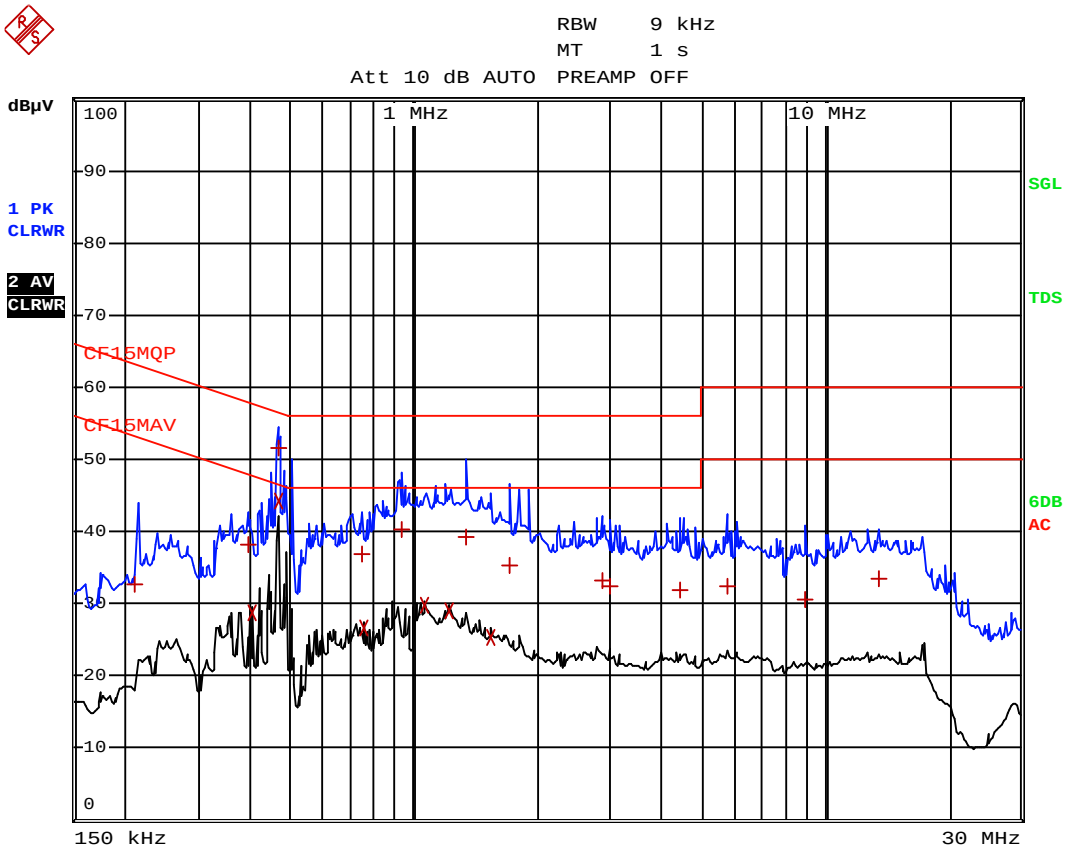
The worst case line conducted configuration photographs are saved with filename: config photos.pdf

4.3.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance

Passed by 2.48 dB margin compare with CISPR average limit

Worst Case: LAN Cable Connect Only



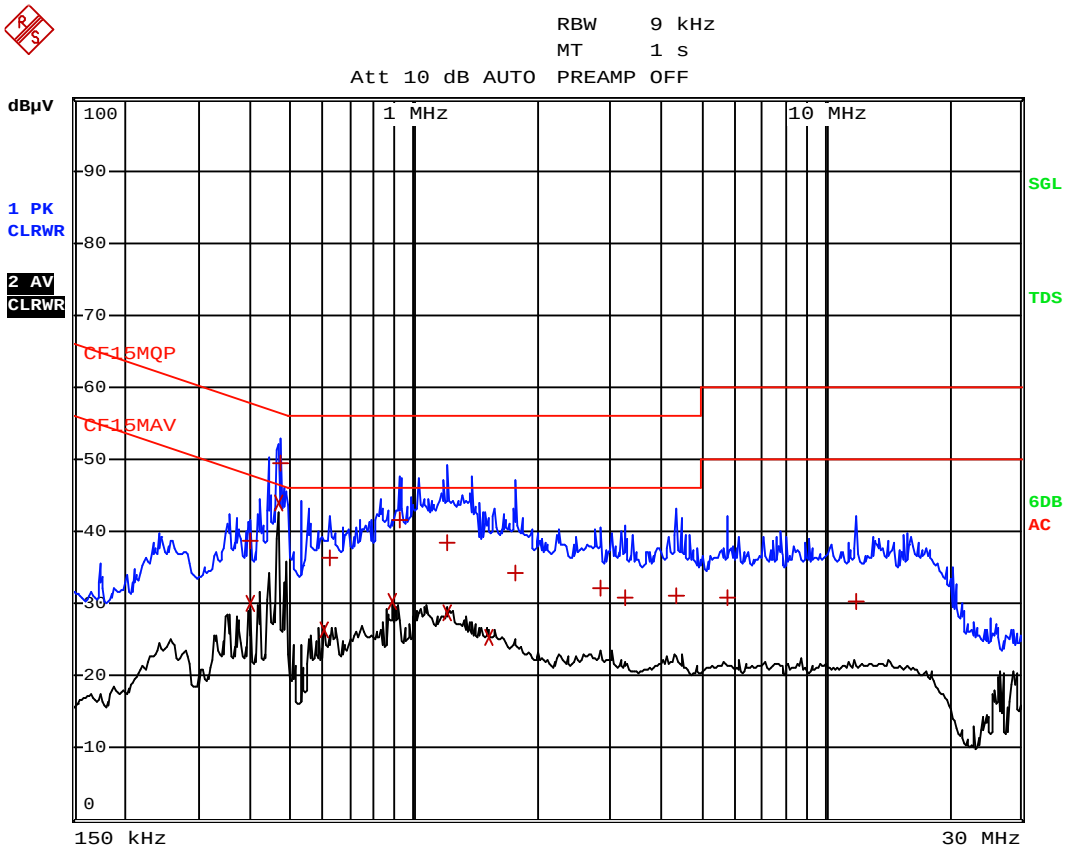
Worst Case: LAN Cable Connect Only

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	397.5 kHz	39.83	N	-18.07
2	CISPR Average	402 kHz	28.72	N	-19.08
2	CISPR Average	465 kHz	44.11	L1	-2.48
1	Quasi Peak	469.5 kHz	50.32	N	-6.20
2	CISPR Average	618 kHz	26.94	N	-19.05
1	Quasi Peak	645 kHz	36.24	L1	-19.75
2	CISPR Average	888 kHz	30.70	N	-15.29
1	Quasi Peak	933 kHz	41.75	L1	-14.24
1	Quasi Peak	1.2075 MHz	39.70	N	-16.29
2	CISPR Average	1.2075 MHz	28.83	L1	-17.16
1	Quasi Peak	1.5675 MHz	36.41	N	-19.58
2	CISPR Average	1.5675 MHz	25.82	N	-20.18
1	Quasi Peak	2.6745 MHz	32.73	N	-23.26
1	Quasi Peak	3.0255 MHz	32.35	N	-23.64
1	Quasi Peak	4.6905 MHz	32.08	N	-23.91
1	Quasi Peak	5.7975 MHz	32.60	N	-27.39
1	Quasi Peak	10.275 MHz	30.82	L1	-29.17

Worst Case: Data transfer via USB with LAN Cable Connect



Worst Case: Data transfer via USB with LAN Cable Connect

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	397.5 kHz	38.59	N	-19.31
2	CISPR Average	397.5 kHz	30.16	L1	-17.74
2	CISPR Average	465 kHz	43.90	L1	-2.70
1	Quasi Peak	469.5 kHz	49.54	L1	-6.97
2	CISPR Average	604.5 kHz	26.49	L1	-19.50
1	Quasi Peak	622.5 kHz	36.40	L1	-19.59
2	CISPR Average	883.5 kHz	30.35	L1	-15.64
1	Quasi Peak	924 kHz	41.67	L1	-14.32
1	Quasi Peak	1.2075 MHz	38.47	L1	-17.52
2	CISPR Average	1.2075 MHz	28.86	N	-17.13
2	CISPR Average	1.527 MHz	25.31	L1	-20.68
1	Quasi Peak	1.77 MHz	34.35	N	-21.64
1	Quasi Peak	2.85 MHz	32.15	L1	-23.84
1	Quasi Peak	3.2685 MHz	30.91	L1	-25.08
1	Quasi Peak	4.335 MHz	31.12	L1	-24.87
1	Quasi Peak	5.82 MHz	30.90	N	-29.09
1	Quasi Peak	11.9625 MHz	30.43	N	-29.56

EXHIBIT 5
EQUIPMENT LIST

5.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer
Registration No.	EW-3156	EW-2466
Manufacturer	R&S	R&S
Model No.	ESR26	FSP30
Calibration Date	Nov. 03, 2015	Sep. 16, 2015
Calibration Due Date	Nov. 03, 2016	Aug. 20, 2016

Equipment	Biconical Antenna	Log Periodic Antenna	Double Ridged Guide Antenna
Registration No.	EW-0571	EW-0447	EW-1133
Manufacturer	EMCO	EMCO	EMCO
Model No.	3104C	3146	3115
Calibration Date	Jun. 23, 2015	Mar. 16, 2015	Nov. 05, 2015
Calibration Due Date	Dec. 23, 2016	Sep. 16, 2016	May 05, 2017

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2500	EW-2501
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Jan. 28, 2016	Jan. 28, 2016
Calibration Due Date	Jan. 28, 2017	Jan. 28, 2017

END OF TEST REPORT