VNT6656GEV00

USB MINICARD MODULE SPEC

Revision 1.6

July 17, 2007

VIA TECHNOLOGIES, INC.

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Revision History

Release	Date	Revision	Initials
1.0	2006-09-08	Initial Release	RTW
1.1	2006-12-08	To modify the power consumption data	RTW
1.2	2007-01-10	To add the mechanical drawing	RTW
1.3	2007-01-24	To add the antenna kits list; Hardware information	RTW
1.4	2007-03-05	To modify the 11b criteria	RTW
1.5	2007-06-05	To modify the operating temperature conditions	TP
1.6	2007-07-17	To add the LED Status	AK

Table of Contents

1.0 Scope

1.1 Document

This document is to specify the product requirements for **802.11 b/g** USB minicard module(Model No.: VNT6656GEV00). The USB minicard module is based on **VIA** MAC/BBP(VT6656) and VIA RFIC(VT6635) chip solution. The VNT6656GEV00 product complied with IEEE 802.11b/g standard from 2.4~2.5GHz, and it can be used to provide up to 11Mbps for IEEE 802.11b and 54Mbps for 2.4GHz IEEE 802.11g to connect your wireless LAN.

VNT6656GEV00 offers absolute interoperability with different vendors' 802.11b/g access points through the wireless LAN with seamless roaming, fully interoperability, and advanced security with WEP/WPA1.0/WPA2.0 standard.

1.2 Product Features

- Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11b standard to provide wireless 11Mbps data rate
- Operation at 2.4 ~ 2.5GHz frequency band to meet worldwide regulations
- Dynamic date rate scaling at 6, 9, 12, 18, 24, 36, 48, 54Mbps for IEEE 802.11g
- Dynamic date rate scaling at 1, 2, 5.5, 11Mbps for IEEE 802.11b
- Maximum reliability, throughput and connectivity with automatic data rate switching
- Supports wireless data encryption with 64/128 bit WEP for security
- Supports infrastructure networks via Access Point and ad-hoc network via peer-to-peer communication
- Supports WPA enhanced security
- Friendly user configuration and utilities
- Drivers support Windows 98SE, ME, 2K, and XP

2.0 Requirements

The following sections identify the detailed requirements of the VNT6656GEV00

2.1 Functional Block Diagram

```
                                    ┌──────────────┐         ┌──────────────┐
            USB 1.1/2.0             │  802.11b/g   │         │  802.11b/g   │
  ┌─────┐  ◄──────────►            │   MAC/BBP    │◄───────►│    Radio     │
  │     │   LED Status             │              │         │ Transceiver  │
  │ PC  │  ◄──────────►            │   VT6656     │         │   VT6635     │
  │     │   Radio ON/OFF           └──────────────┘         └──────────────┘
  └─────┘  ◄──────────►
```
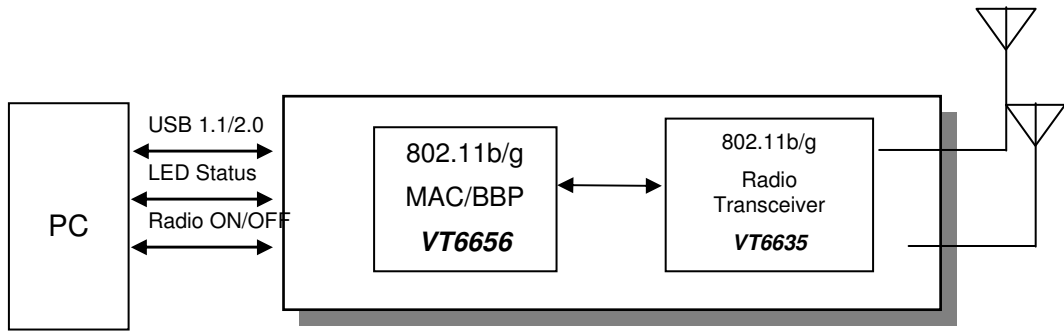
Fig. 2.1.1

2.2 General Requirements

2.2.1 IEEE 802.11b Section

Item	Feature	Detailed Description
2.2.1.1	Standard	• IEEE 802.11b
2.2.1.2	Radio and Modulation Schemes	• DQPSK, DBPSK, DSSS, and CCK
2.2.1.3	Operating Frequency	• 2400 ~ 2483.5MHz ISM band
2.2.1.4	Channel Numbers	• 11 channels for United States 13 channels for Europe/Japan Countries
2.2.1.5	Data Rate	• 11, 5.5, 2, and 1Mbps
2.2.1.6	Media Access Protocol	• CSMA/CA with ACK
2.2.1.7	Transmitter Output Power	• Typical 15dBm at 11, 5.5, 2, and 1Mbps at room temperature 25 degree C
2.2.1.8	Receiver Sensitivity	• Typical –83dBm for 11Mbps @ 8% PER
2.2.1.9	Throughput	• At least 5.1Mbps@ 11Mbps link rate, ideal environment

2.2.2 IEEE 802.11g Section

Item	Feature	Detailed Description
2.2.2.1	Standard	• IEEE 802.11g
2.2.2.2	Radio and Modulation Type	• BPSK, QPSK, 16QAM, 64QAM, OFDM
2.2.2.3	Operating Frequency	• 2400 ~ 2483.5MHz ISM band
2.2.2.4	Channel Numbers	• 11 channels for United States 13 channels for Europe/Japan Countries
2.2.2.5	Data Rate	• 6, 9, 12, 18, 24, 36, 48, 54Mbps
2.2.2.6	Media Access Protocol	• CSMA/CA with ACK
2.2.2.7	Transmitter Output Power	• Typical RF Output Power at each Data Rate and at room Temp. 25degree C

Item	Feature	Detailed Description
		• 13dBm at 54Mbps
2.2.2.8	Receiver Sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% • −68dBm at 54Mbps
2.2.2.9	Throughput	• At least 16Mbps@ 54Mbps link rate, ideal environment

2.2.4 General Section

Item	Feature	Detailed Description
2.2.4.1	Antenna connector Type	• Two(2) coaxial cable antenna connectors
2.2.4.2	Operating Voltage	• 3.3 VDC +/- 10%
2.2.4.3	Power Consumption	• 345 mA @ Tx mode/High speed • 320 mA @ Rx mode/High speed
2.2.4.4	Form Factor and Interface	• USB 1.1/2.0 interface

2.3 Software Requirements

The Configuration Software supports Microsoft Windows 98SE, ME, 2000, and XP. This configuration software includes the following functions:

- **Information**
  Information allows you to monitor network status.

- **Configuration**
  Configuration allows you to configure parameters for wireless networking.

- **Security**
  Supports enhanced security WEP, WPA1.0/2.0.

2.3.1 Information

Item	Feature	Detailed Description
2.3.1.1	General Information	• General Information shows the name of Wireless Adapter, Adapter MAC Address, Regulatory Domain, Firmware Version, and Utility Version.
2.3.1.2	Current Link Information	• Current Link Information shows the Current Setting ESSID, Channel Number, Associated BSSID, Network Type (infrastructure or Ad-hoc network), WEP Status (enable or disable), Link Status (Connect or Dis-connect), 802.11g Transmit Speed (6, 9, 12, 18, 24, 36, 48, 54Mbps), 802.11b Transmit Speed (1, 2, 5.5, 11Mbps), Signal Strength, and Link Quality.
2.3.1.3	Site survey	• To search the neighboring access points and display the information of all access points.

2.3.2 Configuration

Item	Feature	Detailed Description
2.3.2.1	ESS ID	• Input an SSID number if the roaming feature is enabled • Supports for ASCII printable characters.
2.3.2.2	Network Type	• Ad-hoc Mode and 802.11 Ad-hoc Mode for network configurations that do not have any access points • Infrastructure Mode for network configurations with access points
2.3.2.3	Power Save	• Extend the battery life of clients by allowing the client to sleep for short periods of time while the Access Point buffers the messages
2.3.2.4	RTS Threshold	• Set the number of bytes used for fragmentation boundary for messages
2.3.2.5	Fragment Threshold	• Set the number of bytes used for RTS/CTS boundary

Item	Feature	Detailed Description
2.3.2.6	Roaming	• Support Automatic or Manual Rescan to associate with access point.

2.3.3 Security

Item	Feature	Detailed Description
2.3.3.1	Encryption	• RC4 encryption algorithm • Support 64/128 bit WEP encryption • Support open system and shared key authentication
2.3.3.2	WEP Management	• Four WEP keys can be selected • STA with WEP off will never associate any AP with WEP enabled • WEP Key Format: Option for Hex/ASCII format
2.3.3.3	802.1x	• Support EAP-TLS,EAP-TTLS,EAP-PEAP and LEAP
2.3.3.4	WPA	• Support WPA-PSK and WPA-EAP • Support Cipher Mode TKIP

2.4 Mechanical Requirements

2.4.1 Information

Item	Feature	Detailed Description
2.4.1	Length	• 50.95mm
2.4.2	Width	• 30mm
2.4.3	Height	• 4.1mm

2.4.2 Mechanical Drawing

VIA Wireless LAN PCIe Minicard
VN159C_Dimensions

30.00 mm

2.90 mm

2.74 mm

50.95 mm

2.90 mm

3.10 mm

1.00 mm

CCAB06LP4500T4
802.11 bg Wireless Mini Card
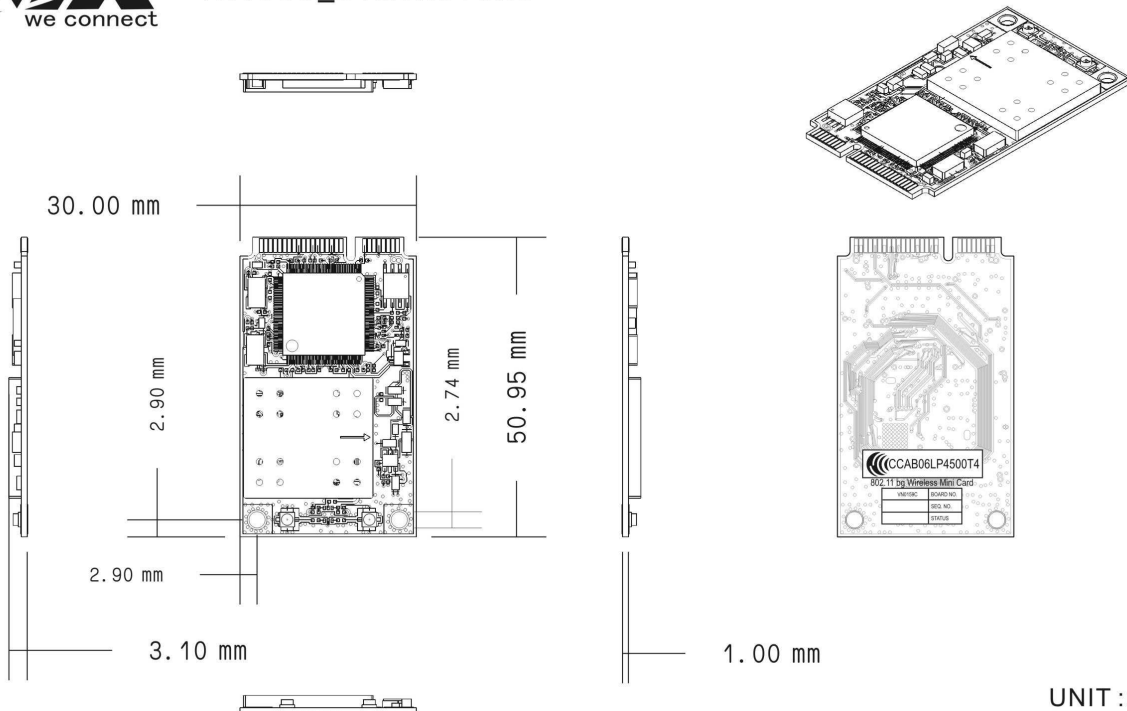
UNIT :mm
Size: A5
2007-01-10 v1.0

2.5 Requirements of Reliability, Maintainability and Quality

Item	Feature	Detailed Description
2.5.1	MTBF	• Mean Time Between Failure > 30,000 hours
2.5.2	Maintainability	• There is no scheduled preventive maintenance required
2.5.3	Quality	• The product quality is followed-up by VIA factory quality control system

2.6 Environmental Requirements

Item	Feature	Detailed Description
2.6.1	Operating Temperature Conditions	• The product is capable of continuous reliable operation when operating in ambient temperature of 0 ℃ to +80℃. <Note> Ambient temperature in immediate (<0.635cm) environment of minicard.

Item	Feature	Detailed Description
2.6.2	Non-Operating Temperature Conditions	• Neither subassemblies is damaged nor the operational performance is degraded when restored to the operating temperature after exposing to storage temperature in the range of −20 ℃ to +75 ℃.
2.6.3	Operating Humidity conditions	• The product is capable of continuous reliable operation when subjected to relative humidity in the range of 10% and 90% non-condensing.
2.6.4	Non-Operating Humidity Conditions	• The product is not damaged nor the performance is degraded after exposure to relative humidity ranging from 5% to 95% non-condensing

2.7 Module Pin Definition and Schematic Suggestion

2.7.1 VNT6656GEV00
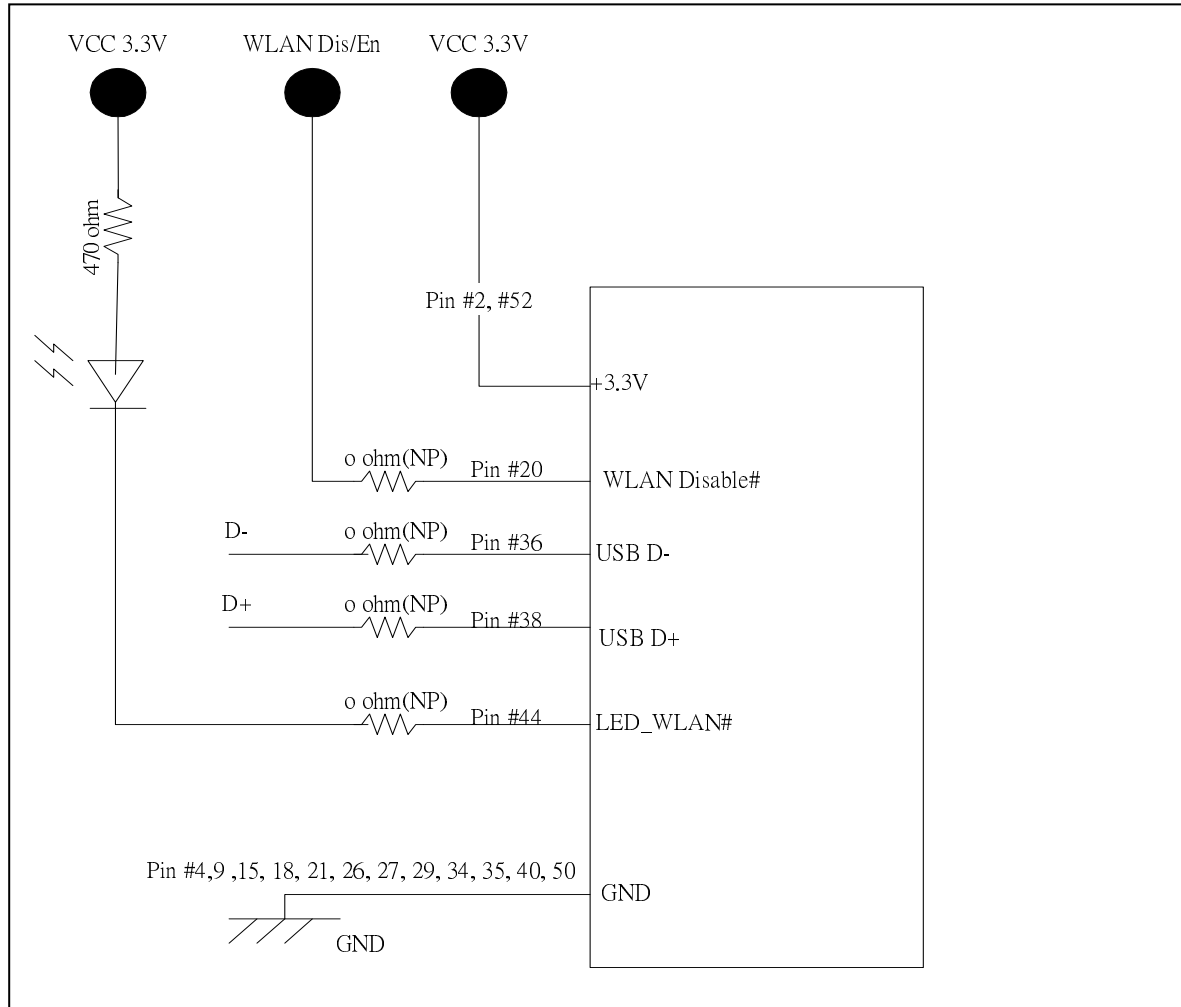
Fig. 2.7.1

Note:

1. When this design is adopted the USB WLAN mini-card, the resisters are put 0 ohm. While the design is adopted the PCI-E WLAN mini-card, the resisters are (NP).

2. If the co-layout design both adopted the "LED_WLAN#" and "WLAN Disable#" function, the 0 ohm of pin#20 and pin#44 could be omitted.

2.8 Hardware Information

2.8.1 PID/VID Information:

VID: 1106   ;PID: 3184

2.8.2 HW Version:

VN0159C

2.9 LED Status

LED STATUS	DESCRIPTION	WLAN STATUS DEFINITION	characterization
"**OFF**"	LED off	Not powered	
"**ON**"	LED stable on	Powered, associated, and authenticated but not Tx/ Rx	
"**Slow blink**"	LED flash at a steady but slow blink	Powered but not associated or authenticated; searching	250+/-25%ms "ON" period; 0.2+/-25% Hz blink rate
"**Intermittent Blink**"	LED is flashing intermittently proportional to activity on the interface	Activity proportional to Tx/Rx speed	50% duty cycle, 3Hz~20Hz blink rate

3.0 Appendix

3.1 Compliance List of Antenna Kits

No	Brand	Antenna report number	Antenna sample number	Type	Antenna Gain	Web Link	Web Link
1	FAVORTRON CO., LTD	6-23-7M59K-021	PIFA	IPX-MHF	576mm± 3mm	-0.01dBi (2.4GHz)	http://www.fvc.com.tw/
2	FAVORTRON CO., LTD	6-23-7M59K-011	PIFA	IPX-MHF	896mm± 3mm	-0.97dBi (2.4GHz)	http://www.fvc.com.tw/
3	VSO ELECTRIC CO., LTD	13-130-F14911	PIFA	IPX-MHF	383mm± 2mm	-4.4dBi (2.4GHz)	http://www.vso.com.tw
4	VSO ELECTRIC CO., LTD	13-130-F14931	PIFA	IPX-MHF	398mm± 3mm	-4.4dBi (2.4GHz)	http://www.vso.com.tw
5	VSO ELECTRIC CO., LTD	13-130-F53021	PIFA	IPX-MHF	Black 860 ±3mm / Grey 1065 ±3mm	-6.03dBi (2.4GHz) / -3.37dBi (2.4GHz)	http://www.vso.com.tw
6	VSO ELECTRIC CO., LTD	13-130-F62011	PIFA	IPX-MHF	543mm± 5mm	-0.22dBi (2.4GHz)	http://www.vso.com.tw
7	VSO ELECTRIC CO., LTD	13-130-F62021	PIFA	IPX-MHF	688.5mm ±5mm	-0.22dBi (2.4GHz)	http://www.vso.com.tw
8	VSO ELECTRIC CO., LTD	14-211-F66021	PIFA	IPX-MHF	550mm± 5mm	-0.31dBi (2.4GHz)	http://www.vso.com.tw
9	VSO ELECTRIC CO., LTD	14-211-F66041	PIFA	IPX-MHF	570mm± 5mm	-1.55dBi (2.4GHz)	http://www.vso.com.tw
10	FAVORTRON CO., LTD	K05008004451	PIFA	IPX-MHF	750mm± 2mm	0.79dBi (2.4GHz)	http://www.fvc.com.tw/
11	FAVORTRON CO., LTD	K05008004351	PIFA	IPX-MHF	530mm± 2mm	-0.80dBi (2.4GHz)	http://www.fvc.com.tw/
12	FAVORTRON CO., LTD	K05008003651	PIFA	IPX-MHF	820mm± 2mm	0.74dBi (2.4GHz)	http://www.fvc.com.tw/

13	FAVORTRON CO., LTD	K05008003751	PIFA	IPX-MHF	570mm± 2mm	0.18dBi (2.4GHz)	http://www.fvc.com.tw/
14	FAVORTRON CO., LTD	K05004002251	PIFA	IPX-MHF	Black 500 ±3mm	2.80dBi (2.4GHz)	http://www.fvc.com.tw/
					Grey 710± 3mm	1.68dBi (2.4GHz)	http://www.fvc.com.tw/
15	FAVORTRON CO., LTD	K05004002351	PIFA	IPX-MHF	Black 525 ±3mm	0.93dBi (2.4GHz)	http://www.fvc.com.tw/
					Grey 843± 3mm	1.26dBi (2.4GHz)	http://www.fvc.com.tw/
16	Hon Hai Precision Industry Co.,Ltd (Brand:FOXCONN)	WDAN-U1L41001-DF	PIFA	IPX-MHF	Black 745 ±3mm	-1.38dBi (2.4GHz)	http://www.foxconn.com/about/introduction.asp
					Grey 530± 3mm	0dBi (2.4GHz)	http://www.foxconn.com/about/introduction.asp
17	Hon Hai Precision Industry Co.,Ltd (Brand:FOXCONN)	WDAN-U1L51002-DF	PIFA	IPX-MHF	Black 820 ±3mm	-1.99dBi (2.4GHz)	http://www.foxconn.com/about/introduction.asp
					Grey 570± 3mm	-1.4dBi (2.4GHz)	http://www.foxconn.com/about/introduction.asp

3.2 FCC/CE DoC Document

TCB

GRANT OF EQUIPMENT
AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

American TCB, Inc.
6731 Whittier Avenue Suite C110
McLean, VA 22101

Date of Grant: 01/10/2007

Application Dated: 01/10/2007

VIA Technologies, Inc.
8F, 533, Chung-Cheng Rd.
Hsin-Tien, Taipei,
Taiwan

Attention: Dennis Chang , Manager

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and
is VALID ONLY for the equipment identified hereon for use under the
Commission's Rules and Regulations listed below.

FCC IDENTIFIER: NCI-VNT6656GEV0X
Name of Grantee: VIA Technologies, Inc.
Equipment Class: Digital Transmission System
Notes: 802.11 BG Wireless Module

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	2412.0 - 2462.0	0.177		

Modular Approval. Power Output listed is conducted. Approval is limited to OEM
installation only. The antenna(s) used for this transmitter must be installed to provide a
separation distance of at least 20 cm from all persons and must not be co-located or
operating in conjunction with any other antenna or transmitter. This equipment must be
installed and operated with the specified antennas listed in this report. OEM integrators
must be provided with antenna installation instructions. OEM integrators and end-users
must be provided with transmitter operation conditions for satisfying RF exposure
compliance. This grant is valid only when the device is sold to OEM integrators and the
OEM integrators are instructed to ensure that the end user has no manual instructions
to remove or install the device.

INTERNATIONAL STANDARDS LABORATORY

ISL

No. 65, Ku Dai Keng St., Hsichih, Taipei 221, R.O. C.   Tel: 886-2-2646-2550 FAX: 886-2-26464641
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd. Lung-Tan Hsiang,
Tao Yuan County 325, Taiwan, R.O.C.   Tel: 886-3-407-1718
FAX:886-3-407-1738

Certificate

Test Report No.: ISL-07LR001E328
Date: 2007/01/08

Product Name:	802.11 BG Wireless Module
Model Number(s):	**VNT6656GEV00**
Responsible Party:	**VIA Technologies, Inc.**
Address:	8F,533,Chung-Cheng Road
	Hsin-Tien,Taipei 23, Taiwan, R. O. C.
Contact Person:	Dennis Chang

We, **International Standards Laboratory**, hereby certify that:

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in R&TTE Directive 99/5/EC. The device was passed the test performed according to :

ETSI EN300 328 V1.6.1: ERM; wideband transmission systems; data transmission equipment operating in the 2.4Ghz ISM band and using spread spectrum modulation techniques.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Eddy Hsiung

Eddy Hsiung/Director
International Standards Laboratory