

iBT-06-02S

Bluetooth Module with HCI Interface

( **Bluetooth® Qualified QDID : B021756**)

FCC ID:ORP-IBT0602S

IC:11691A-IBT0602S

Doc. Name : iBT-06-02S-Rev0.5.02.doc
Date : 2013-11-21
Revision : 0.5.02

Copyright ©, 2013 by Engineering Department, Valence Semiconductor Design Limited.
All rights reserved. No part of this document may be reproduced, transmitted, transcribed,
stored in a retrieval system, or translated into any language, in any form or by any means
without the prior written permission of Valence Semiconductor Design Limited.

1. Overview

iBT-06-02S is a Class 2 Bluetooth module supporting Bluetooth v2.1 + EDR specification. It is implemented by using the RDA5876a chip. iBT-06-02S is designed to interface with an external MCU with HCI command control for supporting audio or data applications.

2. Features

- A single chip radio and baseband module for Bluetooth applications
- Fully Qualified Bluetooth v2.1+EDR
- Class 2 power output (10 meter minimum)
- Support for 2-wires / 3-wires 802.11 co-existence
- HCI Interface to external MCU
- Build-in PCB antenna
- Supply voltage : 3.3V to 4.2V
- RoHS compliant
- Dimension:
 - iBT-06-02S :21.5mm (L) x 14mm (W) x 2.2mm (H)

3. Applications

- Wireless speakers
- Stereo headset
- Hands-free car kit
- VoIP handsets
- Data Transfer
- Docking Stations

4. Pin Drawing

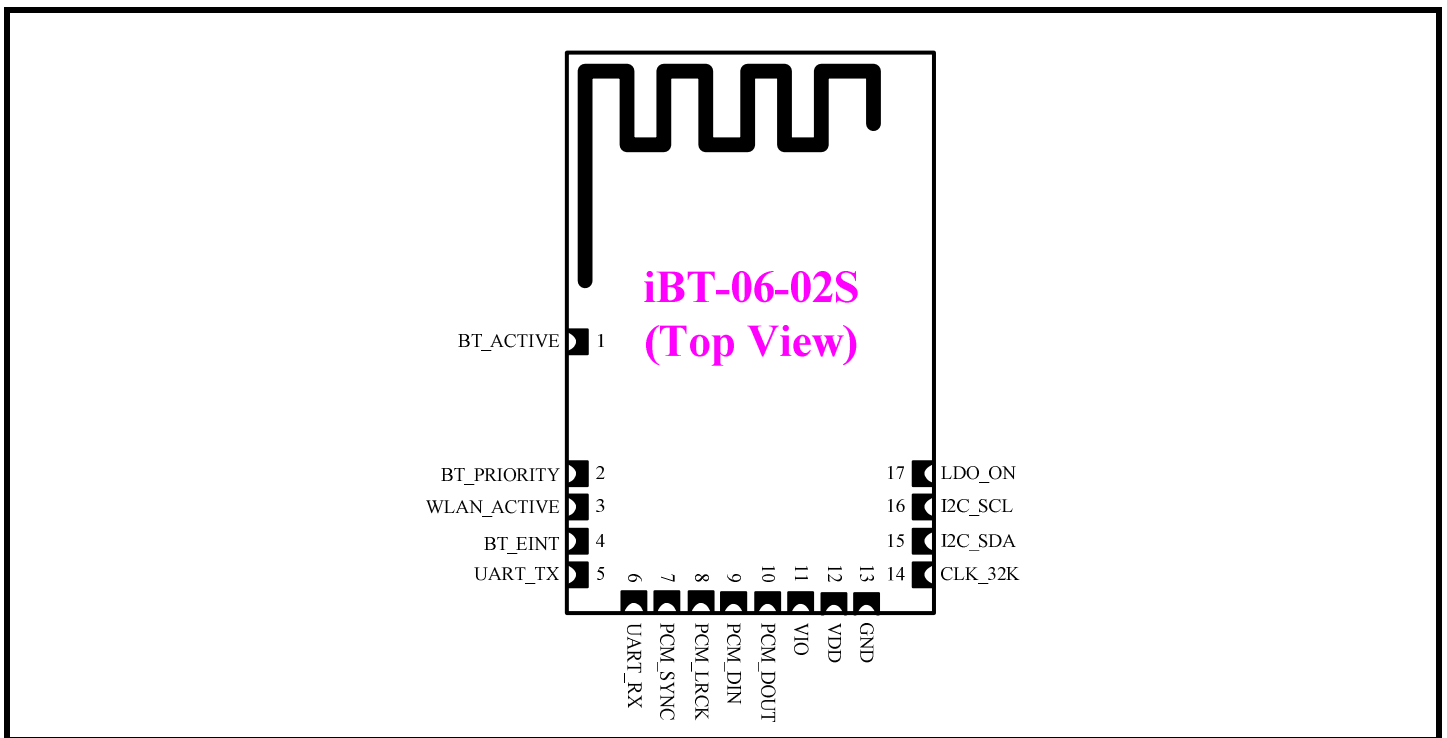


Figure 1 iBT-06-02S Pin Diagram

5. Block Diagram

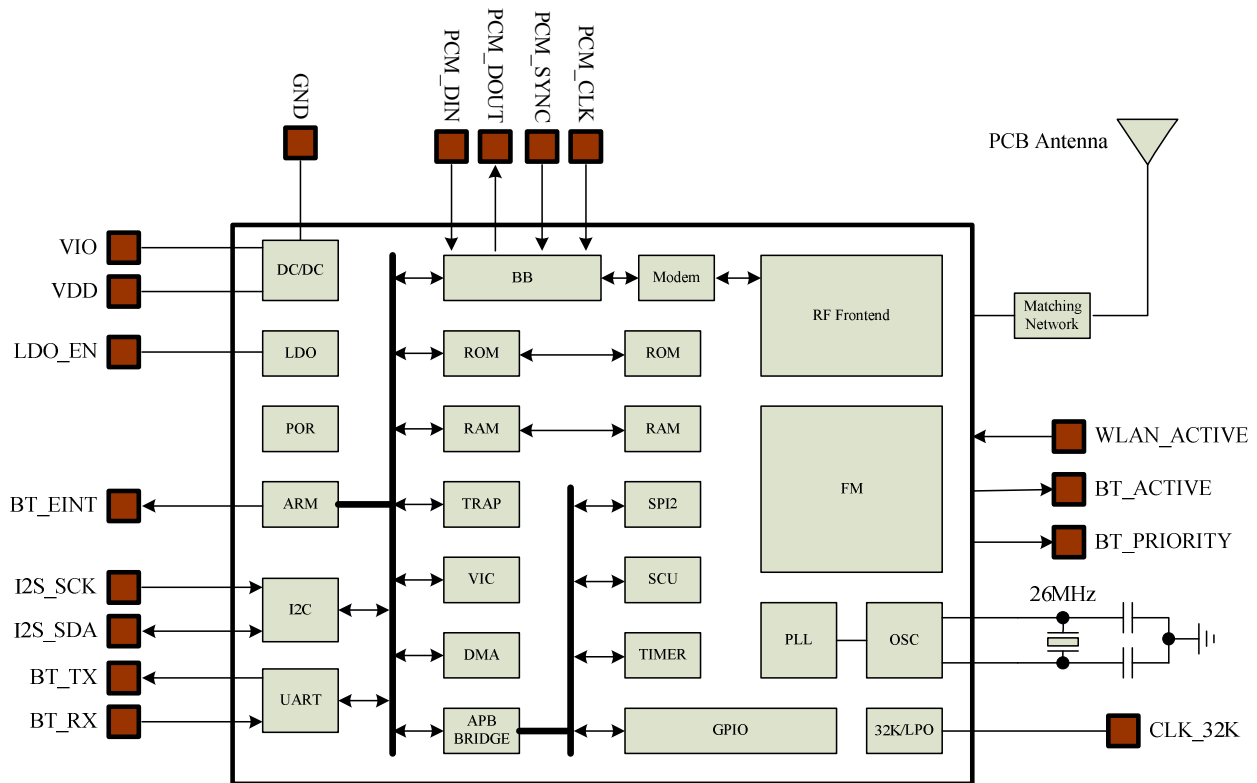


Figure 2 iBT-06-02S Block Diagram

6. Pin Description

Pin No	Pin Name	Pin Type	Pin Descriptions
1	BT_ACTIVE	O	A "1" indicates that BT is active transmitting data
2	BT_PRIORITY	O	A "1" indicates that BT request to have priority over WLAN
3	WLAN_ACTIVE	I	A "1" indicates that WLAN is active transmitting data
4	BT_EINT	O	Active high signal to interrupt external MCU
5	BT_TX	O	Bluetooth UART Data Output
6	BT_RX	I	Bluetooth UART Data Input
7	PCM_SYNC	I	PCM data sync
8	PCM_CLK	I	PCM data clock
9	PCM_DIN	I	PCM data input
10	PCM_DOUT	O	PCM data output
11	VIO		I/O Supply Voltage
12	VDD		Module Supply Voltage
13	GND		Module Ground
14	CLK_32K	I	External 32kHz Clock input
15	I2C_SDA	B	I2C Data Signal
16	I2C_SCL	I	I2C Clock Signal
17	LDO_ON	I	Control signal to enable/disable the internal LDO that provide power to the internal core. This control signal will also reset the internal core logic. '1' Enable LDO '0' LDO disable

O output pad
I Input

IA Analog Input
OA Analog Output

7. Electrical Specification

7.1. Absolute Maximum Rating

Item	Symbol	Rating	Unit
Module Supply Voltage	VDD	-0.4 to 4.5	V
I/O Supply Voltage	VIO	-0.4 – 4.0	V
Peak Current	I _{pk}	0 - 70	mA
Storage Temperature	T _{STG}	-20 to 85	°C

7.2. Recommended Operating Condition

Item	Symbol	Min	Typ	Max	Unit
Module Supply Voltage	VDD	3.3		4.2	V
I/O Supply Voltage	VIO	1.8		3.3	V
RF Operating Temperature		0	25	60	°C
Operating Temperature		0	25	55	°C

7.3. Digital Input / Output Port Characteristics

VDD=3.3V, VIO=3.3V, operating temperature = 25 °C unless specified otherwise

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Input Voltage Levels						
V _{IL}	Input low voltage		-0.3		0.25*VIO	V
V _{IH}	Input high voltage		0.7*VIO		VIO+0.3	V
V _{sch}	Schmitt voltage level		0.3*VIO		0.7*VIO	V
Output Voltage Levels						
V _{OL}	Output low voltage	I _{OL} = -4mA			0.125	V
V _{OH}	Output high voltage	I _{OH} = 4mA	0.75*VIO		VIO	V
Current Consumption						
Operating Current		Depends on profiles		25		mA
Standby Current					0.5	mA

7.4. RF Characteristics

VDD=4.0V, operating temperature = 27 °C unless specified otherwise

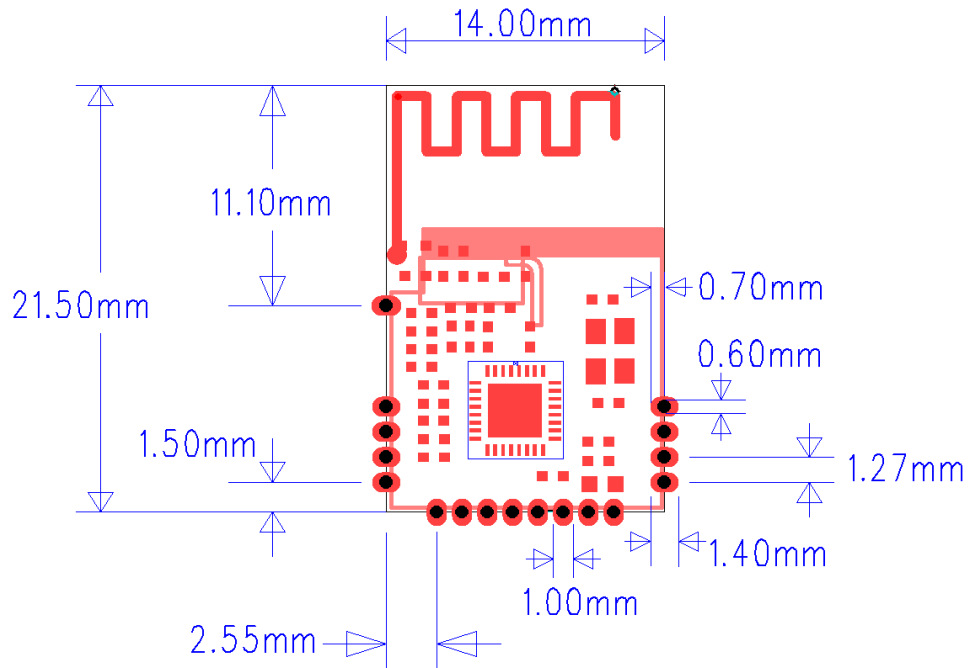
Receiver	Units	Min	Typ	Max	Bluetooth Spec
Sensitivity at 0.1% BER	dBm		-85		≤ -70
Maximum Receiver Signal at 0.1% BER	dBm	0			≥ -20
C/I Co-Channel	dB		10		≤ 11
Adjacent Channel Selectivity C/I +1MHz	dB			-5	≤ 0
Adjacent Channel Selectivity C/I -1MHz	dB			0	≤ 0
2 nd Adjacent Channel Selectivity C/I +2Mhz	dB			-33	≤ -30
2 nd Adjacent Channel Selectivity C/I -2Mhz	dB			-30	≤ -20
3 rd Adjacent Channel Selectivity C/I +3Mhz	dB			-45	≤ -40
3 rd Adjacent Channel Selectivity C/I -3Mhz	dB			-40	≤ -40

VDD=4.0V, operating temperature = 27 °C unless specified otherwise

Transmitter	Units	Min	Typ	Max	Bluetooth Spec
RF Output Power	dBm		1.6		-6 to +4
RF Power Control Range	dBm	-28		2.4	> 16
20dB Bandwidth for modulated Carrier	kHz		760		< 1000
Basic Data Rate Adjacent Channel Power					
2 nd Adjacent Channel (+/- 2Mhz)	dBm		-35		≤ -20
3 rd Adjacent Channel (+/- 3Mhz)	dBm		-40		≤ -40
Enhance Data Rate Adjacent Channel Power					
1 st Adjacent Channel (+/- 1MHz)	dBm		-37		≤ -29
2 nd Adjacent Channel (+/- 2Mhz)	dBm		-32		≤ -20
3 rd Adjacent Channel (+/- 3Mhz)	dBm		-40		≤ -40
Initial Carrier Frequency Tolerance	kHz	-0.25		4	-75 to +75

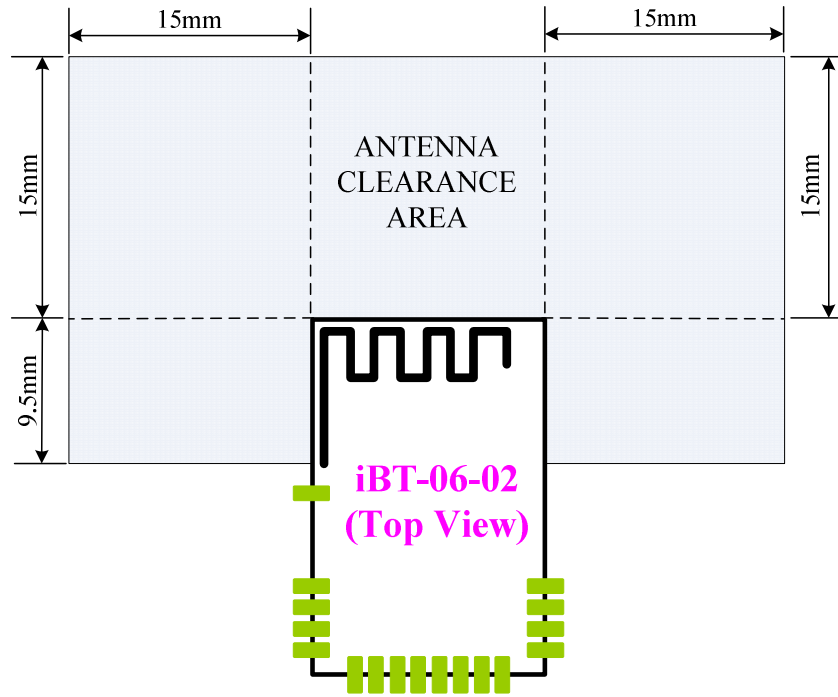
8. Module Dimension

8.1. iBT-06-02S Module Dimension

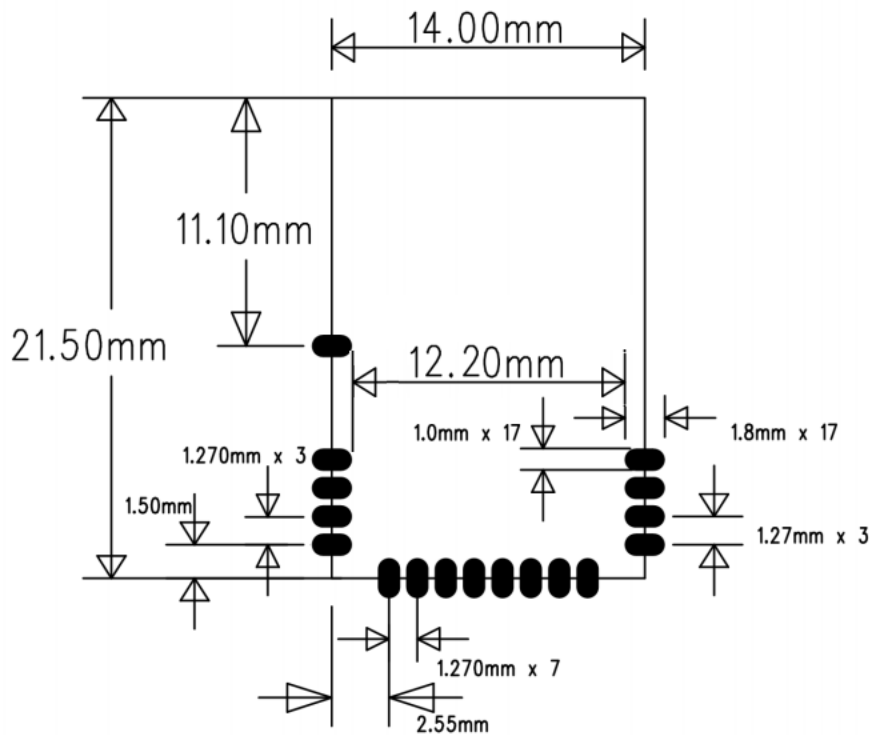


9. PCB Layout Guidelines

9.1. iBT-06-02S Antenna Clearance



9.2. iBT-06-02S PCB Landing Pattern



10. Regulatory Approval

This section outlines the regulatory information for the iBT-06-02S module for the following countries:

- United States
- Canada
- Japan

10.1. United States

The iBT-06-02S module has received Federal Communications Commission (FCC) CFR47 Telecommunications, Part 15 Subpart C “Intentional Radiators” modular approval in accordance with Part 15.212 Modular Transmitter approval. Modular approval allows the (OEM) Integrator to integrate the RN52 module in to a finished product without obtaining subsequent and separate FCC approvals for intentional radiation, provided no changes or modifications are made to the module circuitry. Changes or modifications could void the user’s authority to operate the equipment. The end user must comply with all of the instructions provided by the Grantee, which indicate installation and/or operating conditions necessary for compliance.

The finished product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion. For example, compliance must be demonstrated to regulations for other transmitter components within the host product; to requirements for unintentional radiators (Part 15 Subpart B “Unintentional Radiators”), such as digital devices, computer peripherals, radio receivers, etc.; and to additional authorization requirements for the non-transmitter functions on the transmitter module (i.e., Verification, or Declaration of Conformity) (e.g., transmitter modules may also contain digital logic functions) as appropriate.

10.1.1. Labeling and User Information Requirements

The iBT-06-02S module has been labeled with its own FCC ID number, and if the FCC ID is not visible when the module is installed inside another device, then the outside of the finished product into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording as follows:

Contains Transmitter Module FCC ID: ORP-IBT0602S

This device complies with Part15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

A user’s manual for the product should include the following statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

Additional information on labeling and user information requirements for Part 15 devices can be found in KDB Publication 784748 available at the FCC Office of Engineering and Technology (OET) Laboratory Division Knowledge Database (KDB) <http://apps.fcc.gov/oetcf/kdb/index.cfm>.

10.1.2. RF Exposure

All transmitters regulated by FCC must comply with RF exposure requirements. OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, provides assistance in determining whether proposed or existing transmitting facilities, operations or devices comply with limits for human exposure to Radio Frequency (RF) fields adopted by the Federal Communications Commission (FCC). The bulletin offers guidelines and suggestions for evaluating compliance.

If appropriate, compliance with exposure guidelines for mobile and unlicensed devices can be accomplished by the use of warning labels and by providing users with information concerning minimum separation distances from transmitting structures and proper installation of antennas.

The following statement must be included as a CAUTION statement in manuals and OEM products to alert users of FCC RF exposure compliance:

EUT has ultra-low output power so that it can be integrated in any host device without any specific RF exposure limitations

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

If the iBT-06-02S module is used in a portable application (i.e., the antenna is less than 20 cm from persons during operation), the integrator is responsible for performing Specific Absorption Rate (SAR) testing in accordance with FCC rules 2.1091.

10.1.3. Helpful Web Sites

Federal Communications Commission (FCC): <http://www.fcc.gov>

FCC Office of Engineering and Technology (OET) Laboratory Division Knowledge Database (KDB):

<http://apps.fcc.gov/oetcf/kdb/index.cfm>

10.2. Canada

The iBT-06-02S module has been certified for use in Canada under Industry Canada (IC) Radio Standards Specification (RSS) RSS-210 and RSSGen. Modular approval permits the installation of a module in a host device without the need to recertify the device.

10.2.1. Labeling and User Information Requirements

Labeling Requirements for the Host Device (from Section 3.2.1, RSS-Gen, Issue 3, December 2010): The host device shall be properly labeled to identify the module within the host device.

The Industry Canada certification label of a module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labeled to display the Industry Canada certification number of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Contains transmitter module IC: 11691A-IBT0602S

User Manual Notice for License-Exempt Radio Apparatus (from Section 7.1.3 RSS-Gen, Issue 3, December 2010): User manuals for license-exempt radio apparatus shall contain the following or equivalent notice in a conspicuous location in the user manual or alternatively on the device or both:

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Transmitter Antenna (from Section 7.1.2 RSS-Gen, Issue 3, December 2010): User manuals for transmitters shall display the following notice in a conspicuous location:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

The above notice may be affixed to the device instead of displayed in the user manual.

10.2.1. Helpful Web Sites

Industry Canada: <http://www.ic.gc.ca/>

Valence Semiconductor Design Ltd.
Unit 1, 20/F., APEC Plaza, 49 Hoi Yuen Road, Kwun Tong, Hong Kong
Tel: (852) 2797 3288 Fax: (852) 2776 7770
<http://www.valencetech.com>

The information in this publication is believed to be accurate in all respects at the time of publication but is subject to change without notice. Valence Semiconductor Design Ltd. assumes no responsibility for errors and omissions, and disclaims responsibility for any consequences resulting from the use of information included herein. Additionally, Valence Semiconductor Design Ltd. assumes no responsibility for the functioning of undocumented features or parameters.