

A39H-T2G4A27S1a product manual

2.4GHz, 500mW wireless module

Frequency hopping, for lawn mower use only

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State: controlled state

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2.4GHz, 500mW wireless module

Frequency hopping, for lawn mower use only

一、Product Overview

A39H-T2G4A27S1a is a 2.4GHz, 500mW wireless data transmission module with high stability and industrial-grade features. It adopts a unique frequency hopping algorithm, which offers excellent anti-interference performance. The connection and pairing process is fast, and it can transmit a large amount of data. It is suitable for equipment such as lawn mowers and other related devices.



二、Product Features

- Having transparent transmission function
 - MD0 = 0 MD1 = 1 Normal working status
- Frequency hopping operation mode
 - MD0 = 1 MD1 = 0 Ditto
 - MD0 = 1 MD1 = 1 Ditto
- The receiving sensitivity is as high as -106 dBm, and the transmission distance is 8,000 meters
- The frequency range is 2400 to 2483 MHz, and it operates in a frequency-hopping mode.
- The single packet size of FLRC is 120 bytes.
 - Power supply voltage range
 - 3.0V~5.5V
 - Built-in LDO ensures stable power supply for the module, meeting the requirements of various systems.
- Transparent transmission ^[2]
- Built-in multiple exception handling mechanisms ensure the long-term stable operation of the module
 - Multiple-level transmission power
 - Ten-level adjustable power (0x0~0xF)
 - power range: 10~27dBm, Max 500mW
- Baud rate
 - Normal operating state baud rate 115200bps
 - Configure the working status baud rate 9600bps
- Three working states ^[1]
 - MD0 = 0 MD1 = 0 Configure working status

2.4GHz, 500mW wireless module

Frequency hopping, for lawn mower use only

Note :

[1] See details in Chapter 5 regarding pin definitions and pin functions.

[2] See the module function table in Chapter 7 for details.



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Product Details

三、Series Products

Module model	Carrier Frequency (GHz)	Core Chip	Size (mm)	Maximum Transmission Power (dBm)	Communication Distance (km)	Packa ging	Antenna Form
A39H-T2G4A20S1a	2.4G~2.483G	SX1281	20*36	20	5	Paster	lpx
A39H-T2G4A27S1a	2.4G~2.483G	SX1281	20*36	27	8	Paster	lpx

A39H All the models of the wireless modules in this series can communicate with each other.

四、Electric Parameter

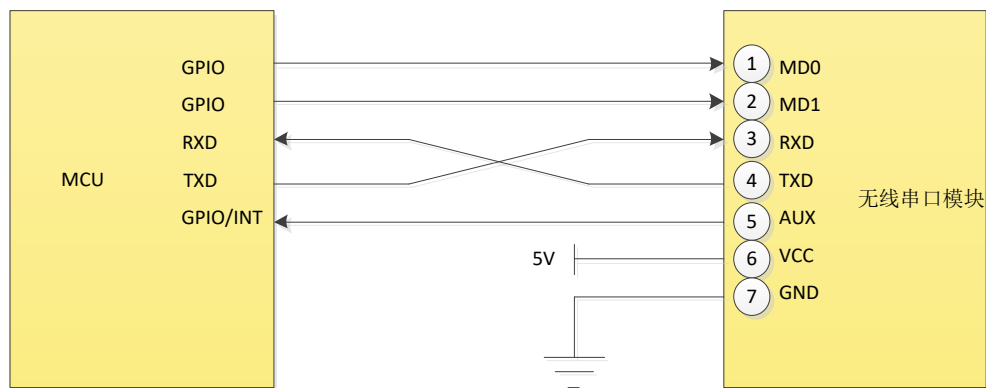
Condition: Tc = 25°C, VCC = 5.0V, 2.4GHz

Module model	Name of parameter	Explain	Min	Typ	Max	Unit
A39H-T2G4A27S1a	Supply voltage	When the power supply voltage is less than 3.6V, the output power will decrease, but the impact on the received power is relatively small.	3.0		5.5	V
A39H-T2G4A27S1a	Launch current	SendPower ^[1] = 0		210		mA
		SendPower = 1		250		mA
		SendPower = 2		340		mA
		SendPower = 3		660		mA
A39H-T2G4A27S1a	Receive current	Z operative mode (MD0=1, MD1=0)		18		mA
		Ditto (MD0=0, MD1=1)				mA
		Ditto (MD0=1, MD1=1)		18		mA
A39H-T2G4A27S1a	Standby current	Hibernation configuration working status (MD0=0, MD1=0)		2.5		uA
A39H-T2G4A27S1a	Operating frequency	2.4GHz~2.4835GHz, Default setting at factory 2.4GHz	2.4	2.4	2.4835	GHz
A39H-T2G4A27S1a	Transmitted power	SendPower = 0		18		dBm
		SendPower = 1		21		dBm
		SendPower = 2		24		dBm
		SendPower = 3		27		dBm
A39H-T2G4A27S1a	Receive sensitivity	The receiving sensitivity is independent of the serial port baud rate and delay time.		-106		dBm
A39H-T2G4A27S1a	Operating temperature	A39H-T2G4A27S1A Industrial products	-40		+85	°C
A39H-	Operating	Relative humidity, no condensation	10%		90%	

T2G4A27S1a	humidity				
A39H-T2G4A27S1a	Storage temperature		-40	+125	°C

五、Module function

5.1 Recommended connection diagram



P 5-1 Recommended connection diagram

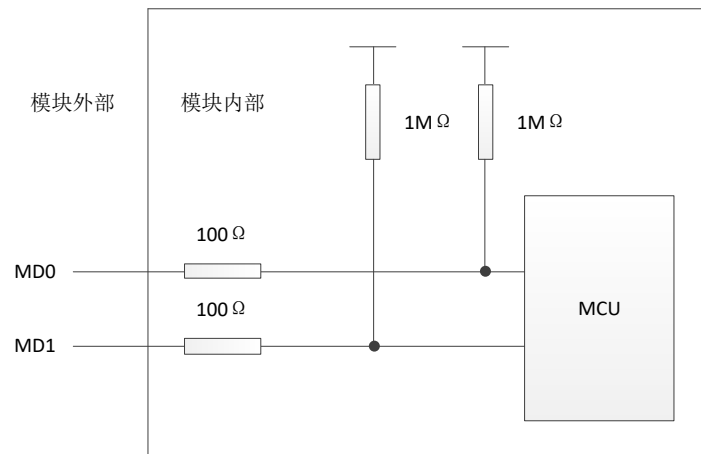
5.2 Pin definition

Pin Definition Table

Pin number	Pin name	Pin direction	Pin Usage
1	MD0	Input (Extremely Weak Pull-up)	In conjunction with the low-latency operation state pin MD1, the module's three operation states are determined.
2	MD1	Input (Extremely Weak Pull-up)	In conjunction with the low-latency operation state pin MD0, the module's three operation states are determined.
3	RXD	Input	TTL serial port input, connected to the external TXD output pin, can be configured as open drain or pull-up input. Please refer to the parameter configuration for details.
4	TXD	Output	TTL serial port output, connected to the external RXD input pin, can be configured as open drain or pull-up input. Please refer to the parameter configuration for details.
5	AUX	Output	It is used to indicate the working status of the module. When the user wakes up the external MCU, during the power-on self-check initialization period, it outputs a low level. It can be configured as a drain open-circuit output or a push-pull output. For details, please refer to the parameter settings.
6	VCC		Power supply, voltage range 3.0 to 5.5V
7	GND		Ground wire, connected to the power reference ground

5.3 Pin function

➤ The low-latency operation state pin functions of MD0 and MD1



P 5-2 MD0、MD1 Internal structure diagram of the pin

The free combination of high and low levels of the low-latency working state pins MD0 and MD1 can determine the three working states of the wireless serial port module, and these three states can be switched freely.

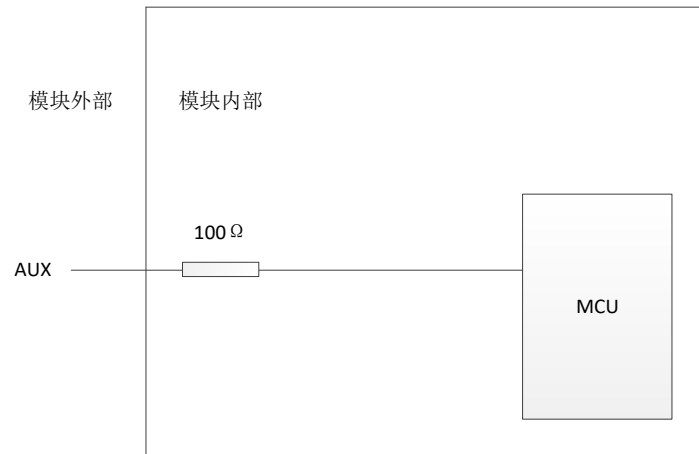
When switching between working states, please be aware of the following two special circumstances:

- 1、 If the module has not yet completed the reception and output of the wireless data, it will not enter the new state until the data output is completed.
- 2、 If the wireless data transmission of the module has not been completed yet, then the system will wait until the data transmission is finished before moving on to the next state.

Work Status Table

Operative mode	MD0	MD1	Introduction to Working Conditions
Configuration of working status	0	0	Parameters can only be configured via the serial port.
Normal working	0	1	Serial port is opened, wireless is enabled.
Normal working	1	0	Serial port is opened, wireless is enabled.
Normal working	1	1	Serial port is opened, wireless is enabled.

➤ AUX Pin function

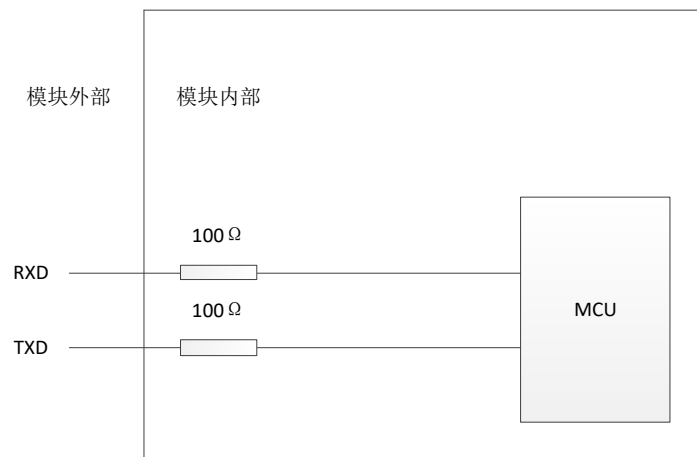


P 5-3 AUX Internal structure diagram of the pin

The AUX is used for wireless transmission and reception buffer indication as well as self-check indication. It indicates whether there is any data that has not been sent out via wireless, or whether the received data has been fully sent out via the serial port, or if the module is in the process of initializing the self-check.

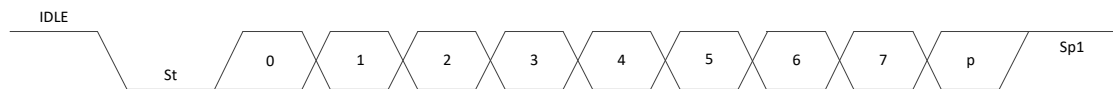
During the reset process, the module will reinitialize the parameters, and during this period, AUX remains at a low level.

➤ RXD and TXD Pin function



P 5-4 RXD、TXD The internal structure of the pin

RXD and TXD are the data receiving and transmitting pins for serial ports. Meanwhile, there are 8 commonly used baud rates available for the serial ports, and the supported baud rate range is from 1200 to 115200 (bps). The parity check methods for the serial ports include odd parity, even parity, and no parity check. The byte format for serial port transmission is as shown in the following figure:



P 5-5 Serial port transmission byte format

IDLE: High level when idle

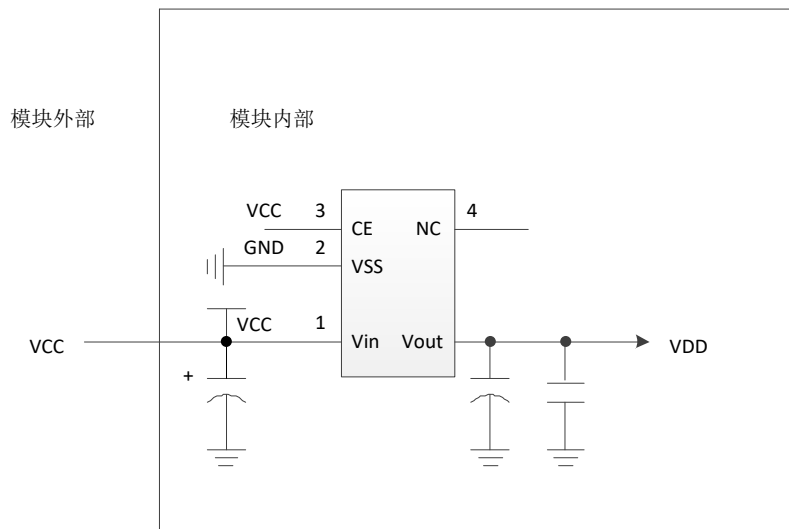
St: Start bit

P: Parity bit

Sp1: Stop bit

➤ VCC and GND Pin function

GND represents the grounding wire, VCC represents the power supply, and the module power supply itself has an LDO. The input voltage range is 3.0 to 5.5VDC. As shown in the following figure:



P 5-6 Power Linear Driver (LDO)

Note: The input power ripple coefficient should be controlled within 100mV, and it should be capable of providing a peak current of over 1000mA for a short period of time.

When the power supply voltage is lower than the critical value, the output power decreases, but the impact on the receiving performance is relatively small. The relationship between power and voltage is shown in Figure 5-7:

六、Module command

6.1 command format

The parameter configuration command only supports modifying parameters during the sleep operation state, that is, all the pins in the low-latency operation state are set to a low level (MD0 = 0, MD1 = 0). The detailed command is as follows:

Command Overview Table

No.	Order	Return	Command Function
1	0x00 0x18 0x04	0x00 0x18 0x04 0xid1 0xid2 0xid3 0xid4	Read the module ID
2	0x80 0x18 0x04 0xid1 0xid2 0xid3 0xid4	0x80 0x18 0x04	Set module ID
3	0x00 0x0A 0x01	0x00 0x0A 0x01 0xXX	Read module master-slave (XX = 0x01 - slave, XX = 0x00 - master)
4	0x80 0x0A 0x01 0x00	0x80 0x0A 0x01	Set the module as the host.
5	0x80 0x0A 0x01 0x01	0x80 0x0A 0x01	Set the module as a slave.
6	0x00 0x08 0x01	0x00 0x08 0x01 0xXX	Readout power (XX:

			Reference power meter)
7	0x80 0x08 0x01 0xXX	0x80 0x08 0x01	Set power (XX: Refer to power meter)
8	0x00 0x00 0x01	A39H-T2G4A27D1a-SHANK-E-V9.0x	Read the software version number (x: minor version number)

Power Settings Parameter Table	
Set the value of the power register	Corresponding power level (dBm)
0x00~0x06	10
0x07	12
0x08	14
0x09	16
0x0A	18
0x0B	20
0x0C	22
0x0D	24
0x0E	26
0x0F	27

Note: There may be an error of up to 1 dBm in the actual value of each power level.

6.2 Module factory settings

Factory Configuration List:

Register name	ID(0x18)	Master/Slave (0x0A)	Power (0x08)
Register parameters	0x12345678	0X01	0x0B

Module factory parameter table:

Module model	Operating frequency	ID address	Serial port speed	Serial port format	Modulation system	Transmitted power
A39H-T2G4A27S1a	Frequency hopping, with a working range of 2400~2483M Hz	0x12345678	115200bps	8N1	FLRC	500mW

七、Module function

7.1 Module Function Overview

Module Function List

Module function	The data format of the sender	Receiving party's data format	Function brief
Transparent transmission	User data	User data	The two modules need to be configured with the same ID, and one should be set as the master and the other as the slave. After the synchronization between the two modules is successful, any module can send data, and the module with the same ID can receive it. The data transmission is transparent; what is sent is received.

7.2 Detailed Explanation of Module Functions

7.2.1 Transparent transmission

➤ Function declaration

The two modules need to be configured with the same ID, and one should be set as the master and the other as the slave. After the synchronization between the two modules is successful, any module can send data, and the module with the same ID can receive it. The data transmission is transparent; what is sent is received.

➤ Module settings

- MD0 = 1, MD1 = 0 or MD0 = 0, MD1 = 1 or MD0 = 1, MD1 = 1
- Set the ID addresses of the sending module and the receiving module to the same value.
- The sending module and the receiving module are respectively set as the host and the slave machine.

➤ Illustration

Sender		Receiver	
Module address	0x12345678 (Factory default setting)	Module address	0x12345678 (Factory default setting)
Master/slave mode	0x00 (Factory default setting)	Master/slave mode	0x01 (Factory default setting)
Send data	User data	Send data	User data
	0x11 0x22 0x33		0x11 0x22 0x33

7.2.2 Frequency hopping function

➤ Functional specification

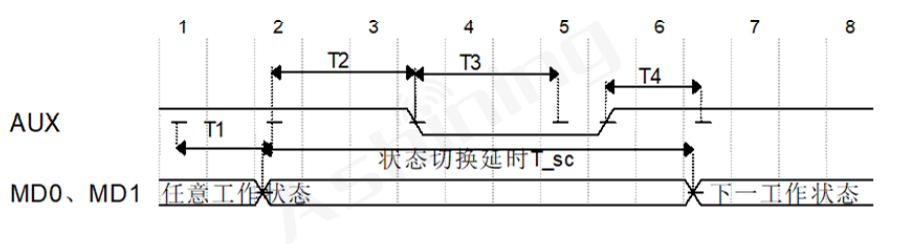
Frequency hopping is carried out according to the automatically generated hopping list for each group, at fixed intervals. The entire working frequency band is divided into 83 channels (not 83 channels for each hopping sequence), with a channel spacing of 1 MHz. Modules with the same ID form a group, and in the same scenario, the ID of each group must be unique.

When the frequency hopping starts to operate, it exchanges synchronization information at three common frequency points. After the interaction is completed, it resumes normal frequency hopping operation. If the operation becomes abnormal due to continuous interference, it will return to the common channel for re-synchronization. The entire process is completed by the module itself. During the synchronization process, no user data will be sent.

八、Sequence chart

8.1 State Transition Sequence Diagram

When the module switches from any working state to the next one, there will be a switching delay T_{sc} . After switching to the next working state, if the module does not perform any other switching operations for the working states, it will continue to operate in the newly switched working state. The switching of working states has nothing to do with the previous working state of the module. Users only need to set the state switching delay during the switching process, and then select the low-latency working state pins MD0 and MD1 for high and low level operations to switch to the desired working state.



Symbol	Explain	Min	Typical value	Max	Unit
T1	Wait until the last package of data has been sent completely, and ensure that the module is in a idle state.		2		ms
T2	Dithering delay		3		ms
T3	Start state transition		3		ms
T4	Check whether the state transition has been completed		2		ms
T_sc	State transition delay		300		us

Note :

[1] The work state switching can only be performed when AUX is at a high voltage level. At this time, the module is in an idle state. If AUX is at a low voltage level, it indicates that the module is busy, with data being sent (received) and not empty. The data transmission (reception) has not been completed yet. The user needs to add a delay and wait until the data transmission (reception) is completed before starting the work state switching.

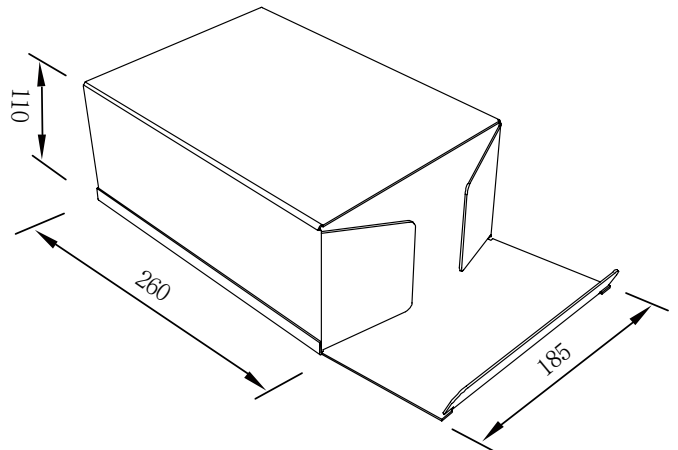
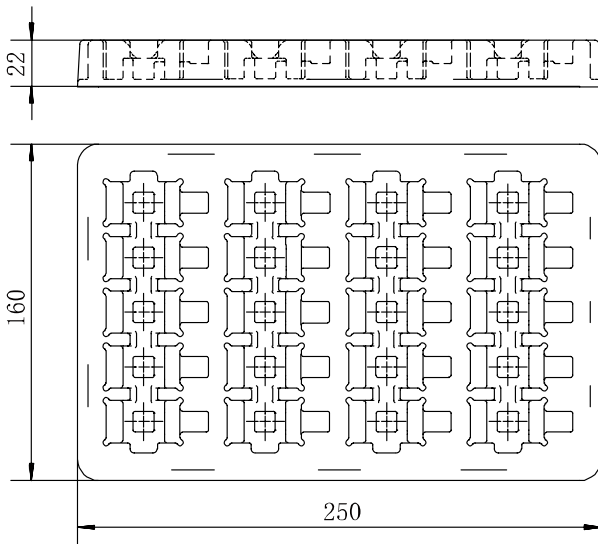
[2] The value measured by T_{sc} represents the time for the hardware state to switch.

十、Manner of packing

10.1 Electrostatic bag packaging



10.2 Palletizing (unit: mm)



Important Notice and Disclaimer

As the hardware and software of the product continue to be improved, this specification may be subject to changes. The final version should be based on the latest specification.

Users of this product are required to follow the product updates on the official website to obtain the latest information about the product in a timely manner.

The pictures and charts used in this specification are for explaining the functions of the product and are for reference only.

The measurement data in this specification were all obtained by our company under normal temperature conditions and are for reference only. Please refer to the actual measurement for the exact values.

Chengdu Ashining Technology Co., Ltd. reserves the final interpretation and modification rights for all contents in this specification.

FCC regulatory compliance statement

§15.19 Statement

This device complies with Part 15 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.

§15.21 Information to user

Warning: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

- List of applicable FCC rules:

47 CFR Part 15.247

- Summarize the specific operational use conditions

This module can be used in IOT devices, the input voltage to the module is nominally 5V.

- Limited module procedures

This module is a single module.

- Trace antenna designs

The antenna is not a trace antenna.

- RF exposure considerations

This Module complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- Antennas

If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

- Label and compliance information

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID: **2BDFV-A39H-27S1A**" any similar wording that expresses the same meaning may be used.

§ 15.19 Labelling requirements shall be complied on end user device.

Labelling rules for special device, please refer to §2.925, § 15.19 (a)(5) and relevant KDB publications. For E-label, please refer to §2.935.

- Information on test modes and additional testing requirements

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

The module is limited to installation in mobile application, a separate approval is required for all other operating configurations, including portable configurations with respect to §2.1093 and difference antenna configurations.

- FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer

This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.

Please note that For a Class B or Class A digital device or peripheral, the instructions furnished the user manual of the end-user product shall include statement set out in §15.105 *Information to the user* or such similar statement and place it in a prominent location in the text of host product manual. Original texts as following:

For Class B

Note: 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.*

ISED Compliance Statements

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Please notice that if the IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 33072-A39H27S1A" any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit: Contient IC : 33072-A39H27S1A est le numéro d'homologation du module.

RF Exposure Compliance

This equipment complies with FCC/IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet émetteur ne doit pas être colocalisé ou fonctionner en conjonction avec une autre antenne ou un autre émetteur. Cet équipement doit être installé et utilisé avec une distance minimale de 20cm entre le radiateur et votre corps.

This radio transmitter [IC: 33072-A39H27S1A] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

ANT1:

Antenna installation: Dipole antenna

Impedance: 50Ω

Antenna Gain: 3.47dBi Maximum

ANT2:

Antenna installation: Dipole antenna

Impedance: 50Ω

Antenna Gain: 2.12dBi Maximum

ANT3:

Antenna installation: Monopolo antenna

Impedance: 50Ω

Antenna Gain: 1.86dBi Maximum