



HOSPITALITY & SPECIALTY
COMMUNICATIONS

AVDB

Advanced Vehicle Detector Board

Installation Instructions

HM ELECTRONICS, INC.

2848 Whiptail Loop, Carlsbad, CA 92010 USA
Phone: 1-800-848-4468 Fax: 858-552-0172
Website: www.hme.com Email: support@hme.com

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US Patent 9,885,799

REGULATORY LABEL PLACEMENT

The Regulatory Label included in the installation package **must** be placed on the side of either the Base Station or TSP (depending upon which of the two the AVDB board is installed).

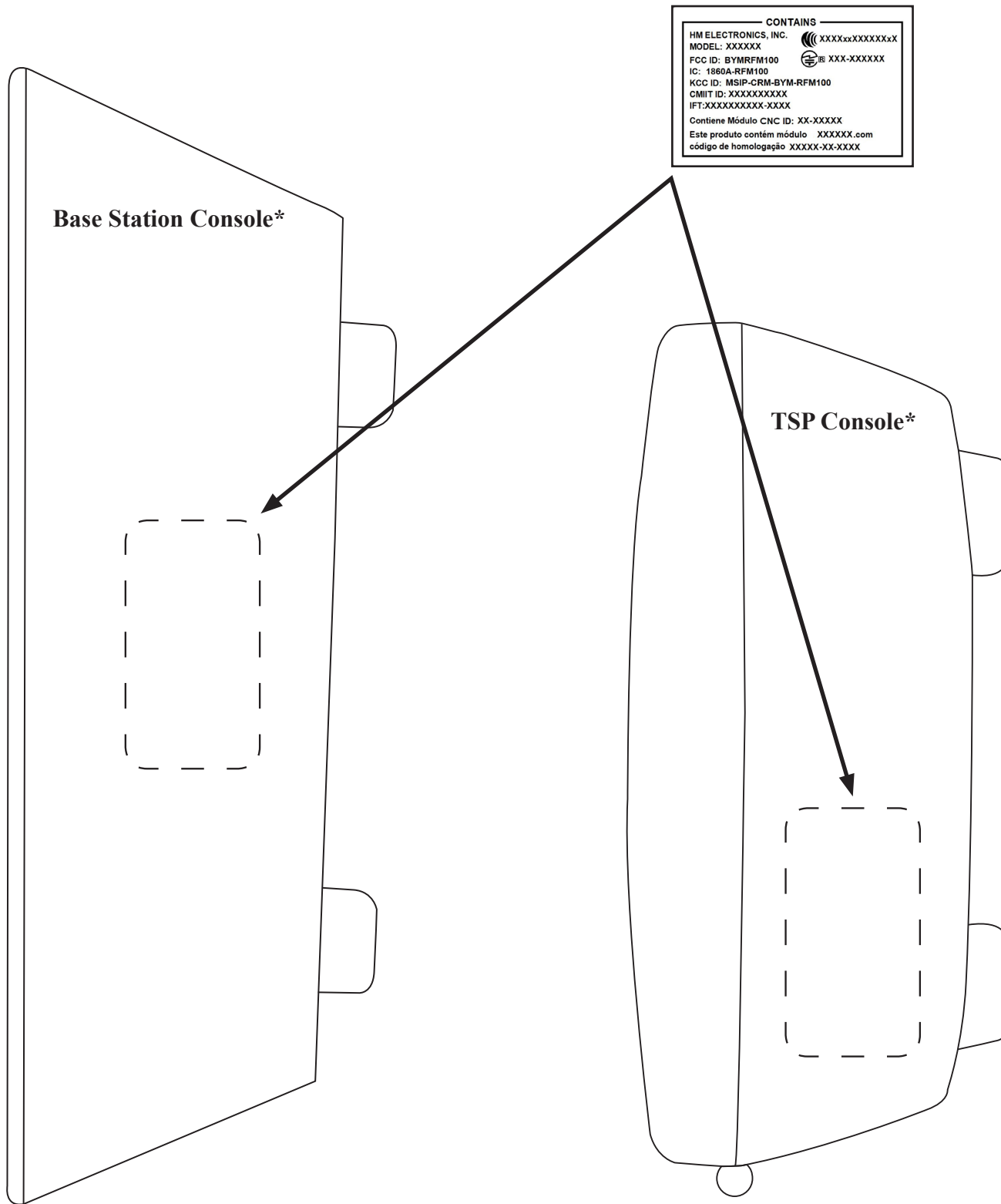


Figure 2. Regulatory Label Placement

*The label may be placed on either side of the console (top, middle or bottom).

AVDB THEORY OF OPERATION

The AVDB uses digital signal processing techniques to assess parameters inherent to inductive ground loops in order to evaluate loop status and signal vehicle detection. As a loop operator, this technology gives you the benefit of understanding the quality of your loop in real-time with advanced foresight and warning of deteriorating conditions.

This allows preventative measures to be taken to avoid down time and situations in which your drive-thru technologies and services are hindered or incapacitated due to a failed or failing loop. While these events are unlikely, the advanced warning system of the AVDB offers peace of mind that drive-thru operations will continue to be uninterrupted.

Through continuous measurement of the inductive ground loop, the AVDB determines the inherent electrical characteristics of the loop which include: loop condition, connection quality, and the inductance of the loop. These three parameters are evaluated to determine the Loop Status as seen in [Figure 4](#), page 6. In the case of a deteriorating loop, the AVDB offers insight into the underlying cause and the course of action to help troubleshoot your issue.

The vehicle detection portion of the AVDB operates through analysis of loop response to a stimulus provided by the detector, which characterizes the inductance of a loop. The presence of a vehicle over the loop electromagnetically interacts with the loop causing a change in inductance. The AVDB monitors these small inductance changes in order to signal vehicle detection.

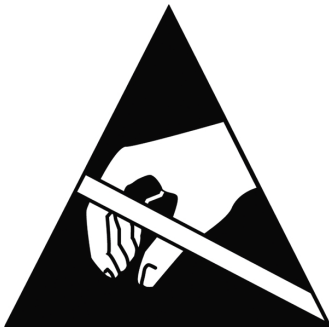
LOOP FAILURE AND INTERFERENCE

Inductive ground loops may eventually fail. The AVDB can remove the surprise of failure from operation and allows you to prepare for such an event well in advance. Loop failure is the result of damage to the loop which can include, but is not limited to: damage to area surrounding loop, severed loop or lead in wires, or insulation damage as a result of aging and other environmental factors.

In addition, deteriorating connections between the loop and the AVDB can cause detection failure even though the loop itself is in good condition.

The AVDB is essentially a large metal detector. Do not install the loop over any metallic object, surface, or area. This includes installing the loop over rebar. Failure to adhere to this installation recommendation will result in unexpected loop behavior.

ESD HANDLING INSTRUCTIONS



CAUTION

Contains parts and assemblies susceptible to damage by Electrostatic Discharge (ESD)

This device is sensitive to electrostatic discharge and should be installed by personnel trained in ESD awareness. Proper handling procedures include wearing anti-static wrist straps

NOTE: Adjust switches as needed before installing the AVDB. If it is necessary to change the functions of the AVDB, refer to the DIP switch settings on the next page. Normally, no changes will be required.

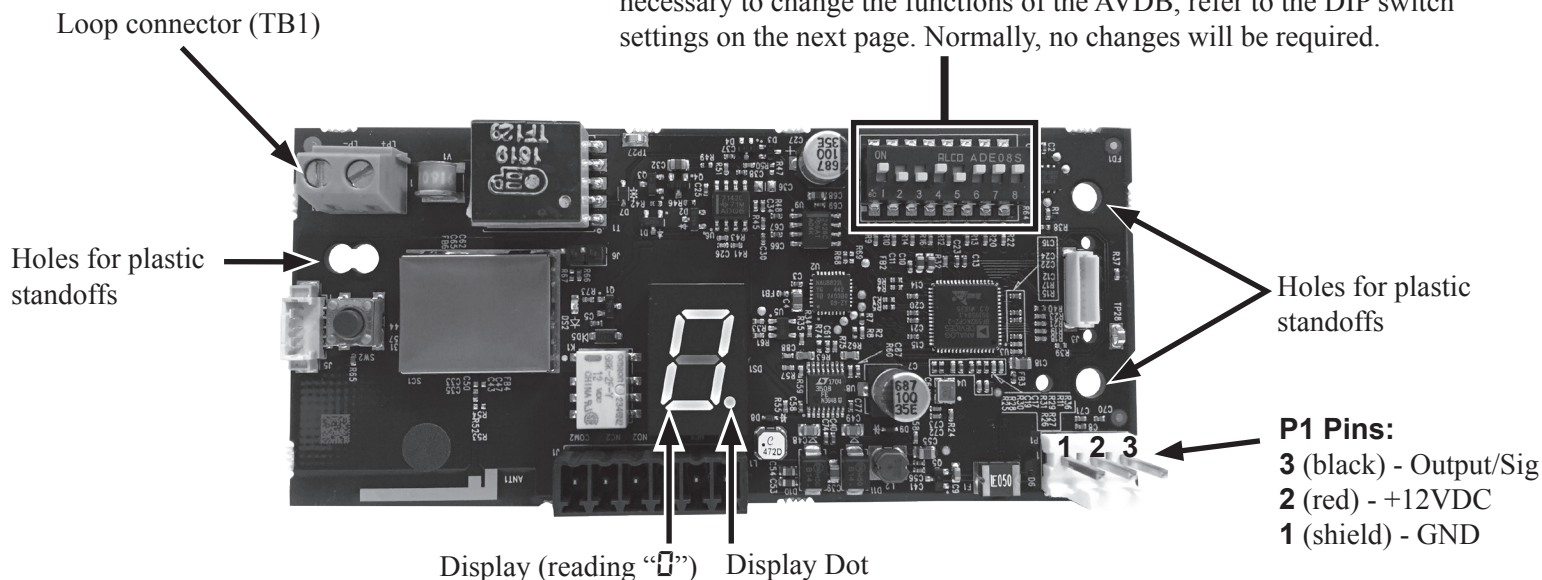


Figure 1. Advanced Vehicle Detector Board (AVDB)

INSTALLATION

If you're replacing an existing board, begin at **Step 1**. If no previous AVDB board exists, begin at **Step 6**.

1. When handling the AVDB, wear an **anti-static wrist strap** to avoid electrical damage to the board.
2. Disconnect the drive-thru audio or timer system power adapter from its electrical outlet.
3. Disconnect the loop cable from TB1 on the existing board to be replaced.
4. Disconnect interconnect cable from its connector (P1) on the base station or control unit circuit board. Note the connector and its location.
5. Remove the existing board by lifting it off the plastic standoffs that hold it in place.
6. Connect the loop cable to TB1 at the upper left corner of the AVDB. See **Figure 1**, above.
7. Position the AVDB over the three plastic standoffs on the base station or control unit circuit board and press it firmly until the standoffs snap through the holes on the AVDB. See **Figure 1** for hole locations.
8. Connect the AVDB interconnect cable to P1, at the lower right corner of the AVDB. See **Figure 1**. Be certain the plastic catches on the cable connector are aligned with the plastic catches on the P1 connector. The color-coded connector wires must also match the pin positions shown on **Figure 1**.
9. Connect the other end of the interconnect cable to the circuit board in the base station or control unit per installation instructions from the drive-thru audio or timer system.
 - If the installation instructions are not available, visit hme.com to obtain the manual PDF file or call HME at 1-800-848-4468.
10. Reconnect the drive-thru or timer system power adapter to its electrical outlet.
11. During boot up, "b" (for 'booting') will display for a few seconds. The Display on the AVDB should then read "b" or "f", indicating that the loop is signaling properly. If the Display does not read "b" or "f", be certain all connections are tight. If it still does not indicate "b" or "f", see [Figure 4](#), page 6.
12. Drive a car onto the loop. The Dot on the Display should illuminate when a car is present over the loop.

DIP SWITCH SETTINGS

Before installing the AVDB, the following six functions can be set by switching/moving the switches as indicated below. Refer to **Figure 3**, below.

* = factory setting

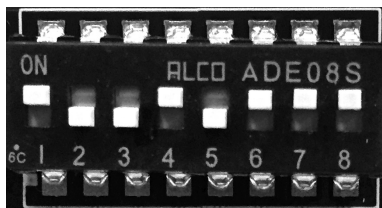


Figure 3. SW1 DIP switch on AVDB circuit board (Default pin positions displayed)

Clears vehicle detection after 20 minutes.

Switch #1	Vehicle Presence Auto Reset
OFF	No Timeout
ON	20 minute timeout for vehicle presence *

Lower detection sensitivity corresponds to slower detection at the risk of small fluctuations causing missed detections.

Switch #2	Detection Sensitivity
OFF	Normal Sensitivity *
ON	Low Sensitivity

Release Sensitivity correlates to how quickly the AVDB will signal vehicle departure (higher sensitivity means departures trigger more easily).

Switch #3	Switch #4	Release Sensitivity
OFF	OFF	Low
OFF	ON	Medium *
ON	OFF	High
ON	ON	Extra High

Verifies connection between AVDB and Base.

Switch #5	Diagnostic Mode
OFF	Normal AVDB Operation *
ON	Detection is Suspended - DSP firmware scrolls, and car presence is cycled every 10 seconds (On 10 seconds, Off 10 seconds)

Controls the delay between detection and the actual signaling of detection.

Switch #6	Switch #7	Delay
OFF	OFF	6 seconds
OFF	ON	4 seconds
ON	OFF	2 seconds
ON	ON	0 seconds *

ON is the default setting. Do not change.

Switch #8	
OFF	Daily Log
ON	Weekly Log *

TROUBLESHOOTING

Release Sensitivity

- Set to **Low** if multiple detections or dropouts occur frequently at **Normal**.
- Set to **High** or **Extra High** to compensate for improperly positioned loops where run-ons occur.
- Set as low as practical. Check for run-ons or dropouts and set for best operation.

RESET PROCEDURE

If the detector is stuck indicating a vehicle present continuously or is otherwise unresponsive, follow the reset steps below:

With **no vehicle** present over the vehicle detector loop:

- Press and hold the **Reset** switch in the base station or timer for 1 second and then release. The AVDB display will go blank for a few seconds and then should show “b” for a second or two.
- Reset is complete when the AVDB display shows a code other than “b” or “F”.

DETECTOR FUNCTION

To verify proper detector board function, disconnect one of the wires to the detector loop and verify that the board display changes to “d”. Then reconnect the wire and the display should change back to one of the normal codes. If the display was originally showing “d”, short the two loop terminals and watch for the display to change to “L”.

SELF DIAGNOSTICS

If an abnormal condition with the loop or detector occurs, the LED display will show a number or letter (see below). Follow the recommendations appropriate for the code that is displayed.

Display	Description	Troubleshooting
0	Loop is healthy	
1	Loop is in good condition	If experiencing problems with detection, reassess DIP switch settings or call HME* for guidance with settings.
2	Loop is in moderate condition	
3	Loop is approaching a critical condition	
4	Loop is close to failure	Severe weather may exacerbate problem. Loop replacement is recommended. Call HME* for guidance
5	Loop is close to failure	Severe weather may make the loop fail. Loop replacement is necessary.
5	Loop is healthy, but connection from the loop to the AVDB is bad	Check electrical connections to loop and to AVDB as well as any cable splices. Call HME* if problem persists.
6	Loop is in good condition, but connection from the loop to the AVDB is bad	
7	Loop is in moderate condition, but connection from the loop to the AVDB is bad	
8	Loop is approaching a critical condition, but connection from the loop to the AVDB is bad	Check electrical connections to loop and to AVDB as well as any cable splices. Loop replacement is recommended. Call HME* for guidance.
9	Loop is close to failure, but connection from the loop to the AVDB is bad	Check electrical connections to loop and to AVDB as well as any cable splices. Loop replacement is necessary.
E	Loop Shorted	Disconnect loop from lead-in cable outside the building and re check. If still shorted, the cable is bad. If open (code “d”), loop replacement is indicated.
d	Loop disconnected from AVDB	Check electrical connections at AVDB, loop, and any splices in the cable.
L	Loop inductance is outside of operable range	Schedule loop replacement.
U	Loop inductance is outside of range, and connection from the loop to the AVDB is bad	Check all electrical connections and re test. Loop replacement may be necessary.
F	AVDB has failed	Call HME* for replacement AVDB.
b	AVDB booting	Normal to appear for a few seconds after reset. Call HME* for replacement AVDB if code persists.

*1-800-848-4468

Figure 4. Loop Status Indication Table

REGULATORY COMPLIANCE APPROVALS

HME is committed to compliance with the laws and regulations of each country where HME markets the product below.

Applicant Name : HM Electronics, Inc.
Applicant Address : 2848 Whiptail Loop, Carlsbad, CA 92010 USA
Manufacturer Name : HM Electronics, Inc.
Manufacturer Address : 2848 Whiptail Loop, Carlsbad, CA 92010 USA
Country of Origin : USA
Brand : HME
Product Name : Advanced Vehicle Detection Board
Product Regulatory Model Number : RFM100

This document was prepared in the English language. In case this document is translated into another language and a discrepancy arises between languages, the English version shall prevail as being the version which best expresses the intent of the parties. Any notice or communication given in conjunction with this document must include an English version.

- Caution:** All products are compliant with regulatory requirements detailed in this document when the user follows all the installation instructions and operating conditions per HME specifications.
- Caution:** Product modifications not expressly approved by the party responsible for compliance can void the user's authority to operate the equipment.
- Cause:** Use of accessories and peripherals other than those recommended by HME may void the product's compliance as well as the user's authority to operate the equipment.
- Caution:** Operating or storing the product outside the specified temperature range of 0-50° Celsius can damage it.

RF Exposure Notice

This module transmitter complies with radiation exposure limits set forth for the general public (uncontrolled environment) per FCC, IC and EC rules and guidelines. This module transmitter must be installed to operate with a minimum separation distance of 7.87 inches (20 cm) from all persons. To avoid the possibility of exceeding radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm.

Avis d'exposition RF

Ce module émetteur est conforme aux limites d'exposition aux radiations énoncées pour le grand public (environnement incontrôlé) selon les règles et directives FCC, IC et EC. Ce module émetteur doit être installé de façon à fonctionner avec une distance de séparation minimale de 20 cm (7,87 pouces) de toutes personnes. Pour éviter la possibilité de dépasser les limites d'exposition aux fréquences radio, la proximité humaine de l'antenne ne doit pas dépasser 20 cm.

US Compliance Notice

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.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Model RFM100 is a module transmitter that is installed inside a host or finished product. It was certified with single modular approval per Federal Communications Commission (FCC) CFR47 Telecommunications, Part 15.212 under Subpart C Intentional Radiators. Single modular approval does not necessarily eliminate FCC testing on the finished product. For example, FCC Part 15 B requirement for the digital device (unintentional radiator) of a composite system, RF Exposure and/or Co-location requirement may still be applicable to the finished product.

The host integrator is responsible to ensure that the finished product complies with all applicable FCC equipment authorization regulations.

The FCC certification of the module transmitter is voided if the host integrator does not follow its FCC's grant notes and operation condition/installation instructions.

This module transmitter contains an integrated antenna, which is also integral to its FCC certification, so using any other antenna would void its FCC certification.

This module transmitter must not collocate or operate simultaneously with any other antenna or transmitter within a host device, except in accordance with FCC multi-transmitter procedures.

If the FCC ID of this module transmitter is not visible when the module transmitter is installed inside a host or finished product, then the exterior surface of the host or finished product must also display a label with the following or similar wording: "Contains FCC ID: BYMRFM100".

European Union (CE mark)



Hereby, HME declares that the Advanced Vehicle Detector Board (Regulatory Model RFM100) is in compliance with the following directives and standards:

Directives:

Radio Equipment Directive 2014/53/EU
RoHS Directive 2011/65/EU

Standards:

EN 300 328
EN 300 330
EN 301 489

Canada Compliance Notice

This device complies with Industry Canada's license-exempt RSSs. 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.

This license-exempt transmitter is equipped with an integrated antenna. This license-exempt transmitter is not allowed to operate with any other antenna.

This module transmitter must not collocate or operate simultaneously with any other antenna or transmitter within a host device, except in accordance with multi-transmitter procedures.

The host product shall be properly labeled to identify the modules within the host product.

The Innovation, Science and Economic Development Canada certification label of a module shall be clearly visible at all times when installed in the host product; otherwise, the host product must be labeled to display the Innovation, Science and Economic Development Canada certification number for the module, preceded by the word "Contains" or similar wording expressing the same meaning, as follows: "Contains IC: 1860A-RFM100".

This device complies with Industry Canada's RSS-310. Operation is subject to the condition that this device must not cause harmful interference and must accept any interference, including interference that may cause undesired operation of the device.

RFM100's Category II transmitter:

- Carrier Freq 12-75Khz
- Field strength 48.57dBuV/m
- Measurement Distance 3 meters

Avis de conformité pour le Canada

Cet appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est soumise aux deux conditions suivantes:

- (1) cet appareil ne doit pas provoquer d'interférence, et
- (2) cet appareil doit accepter toute interférence radioélectrique subie, même si l'interférence est susceptible d'en compromettre le fonctionnement.

Cet émetteur exempt de licence est équipé d'une antenne intégrée. Cet émetteur exempt de licence n'est pas autorisé à fonctionner avec une autre antenne.

Cet émetteur de module ne doit pas colocaliser ou fonctionner simultanément avec une autre antenne ou émetteur dans un dispositif hôte, sauf conformément aux procédures multi-émetteurs.

Le produit doit être correctement étiqueté pour identifier les modules inclus dans le produit hôte.

L'étiquette d'Innovation et de Sciences et Développement économique Canada du module doit être clairement visible en tout temps lorsqu'elle est affichée sur le produit; dans d'autres cas, le produit doit être étiqueté pour afficher le numéro d'Innovation et de Sciences et Développement économique Canada pour le module, précédé du mot "Contient" ou un libellé similaire exprimant la même signification, comme suit: "Contient IC: 1860A-RFM100"

Cet appareil est conforme au CNR-310 d'Industrie Canada. Le fonctionnement est soumis à la condition que cet appareil ne doit pas causer d'interférences nuisibles et doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

Émetteur de catégorie II de RFM100:

- Fréq. porteuse 12-75kHz
- Force de terrain 48.57dBuV / m
- Distance de mesure 3 mètres

Japan Giteki



001-A11720

China SRRC

CMIIT ID: 2017DJ6415(M)

Taiwan NCC



CCFA17LP0030T9

NCC Warning in Chinese

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。 ”

NCC Warning in English

According to "Administrative Regulations on Low Power Radio Waves Radiated Devices", without permission granted by the NCC, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power or alter original characteristic as well as performance of an approved low power radiofrequency devices. The low power radio-frequency device shall not influence aircraft security and interfere legal communications. If found, the user shall cease operating immediately until no interference is achieved. The stated legal communication means radio communications is operated in compliance with the Telecommunications Act. The low power radio-frequency device must be susceptible to the interference from legal communications or ISM radio wave radiated devices.

Singapore IMDA

Complies with
IMDA Standards

Mexico IFETEL

IFT: RCPHMR17-1630

La operación de este equipo está sujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Waste Electrical and Electronic Equipment (WEEE)

The European Union (EU) WEEE Directive (2012/19/EU) places an obligation on producers (manufacturers, distributors and/or retailers) to take-back electronic products at the end of their useful life. The WEEE Directive covers most HME products being sold into the EU as of August 13, 2005. Manufacturers, distributors and retailers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.



Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging which indicates that this product was put on the market after August 13, 2005 and must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of the user's waste equipment by handing it over to a designated collection point for the recycling of WEEE. The separate collection and recycling of waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local authority, your household waste disposal service or the seller from whom you purchased the product.