

HomeLink®

Default Receiver Manual

Setup and Instructions

Applicable Module Version(s):

Hardware: 004

Software: 2.18

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Document Revision Control & Updates

Revision	Description/Changes	Date
1.0	Initial Release	11/14/2025

Device Warnings

- This product is intended for indoor use only.
- If the Default Receiver is used in a manner not specified in this manual, the protection provided by the receiver may be impaired.
- A low voltage double insulated source of electrical supply having limited energy and limited current is required for all connections to this equipment. Voltages shall be limited to 30 VDC and current shall be limited to 4 Amps by fusing or 5 Amps by inherently protected supplies, for all connections. Connections to certified ITE Equipment or certified USB chargers will normally comply with this requirement.
- Wear proper grounding equipment while handling the product to prevent ESD instances from occurring.
- The cable length used to power the default receiver must be a length of 3 meters or less.

Operating Ranges

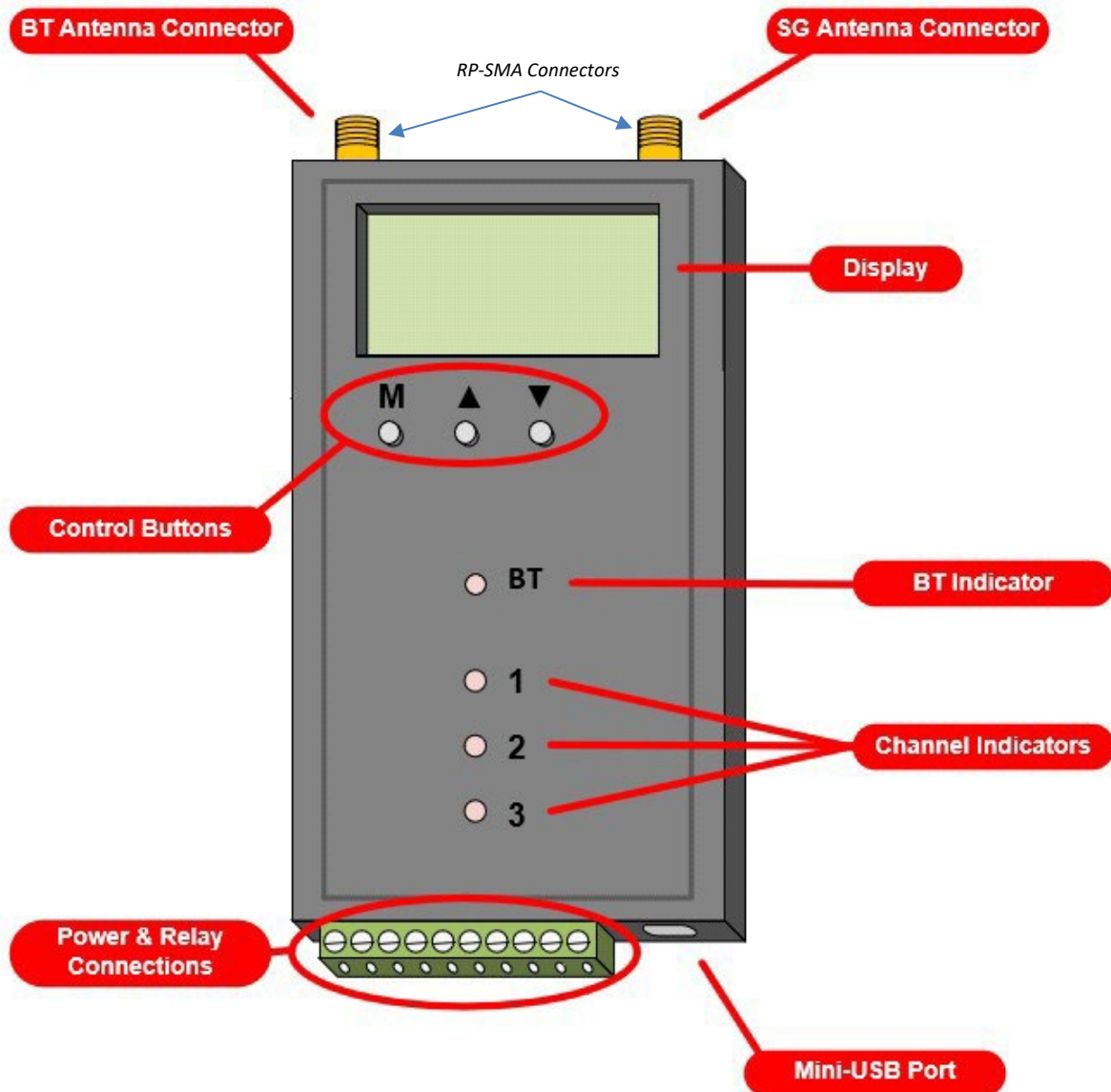
	Minimum	Maximum	
Storage Temperature	-20	70	°C
Operating Temperature	-20	45	°C
Supply Voltage ¹	7	14	V(DC)
Supply Current ¹	-	150	mA
Relay Switch Voltage ²	-	30 125	V(DC) V(AC)
Relay Switch Current ²	-	1 0.3	A(DC) A(AC)

Note 1: External Power Supply must be a clean, reliable source. Large voltage dips caused by inductive loads could result in Default Receiver resets.

Note 2: The maximum allowable switching power in each relay is 30W for a DC resistive load, or 37.5VA for an AC resistive load.

Description

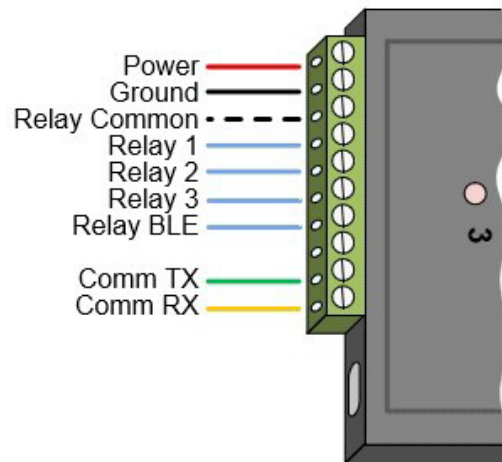
The Default Receiver is a diagnostic tool for HomeLink products. Originally designed for HomeLink 5, it has been upgraded to provide Bluetooth® capability as well as some of the Sub-GHz features developed in the previous version and forms a diagnostic platform for expanded use in the future.



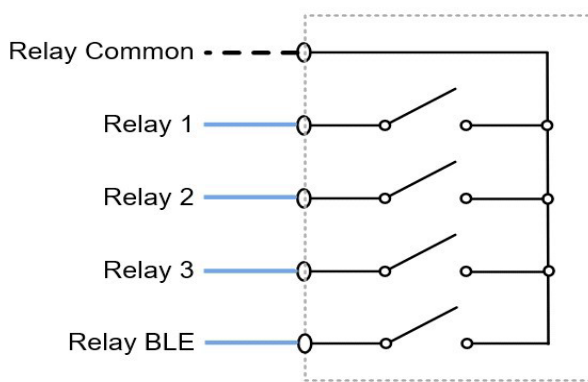
Power & Relay Connections	A detachable screw terminal plug provides connections to the module's internal relay switches, power, and communications connections.
Antenna Connector	Two reverse polarity SMA terminal connections (RP-SMA) for the module's antennas. The Default Receiver will only be used for operation in car dealerships, manufacturing plants, etc. (and is not available to the public).
Display	Displays channel status information and receiver signal strength data when the module is in operation.
Channel Indicators	Red LEDs that indicate which of the three HomeLink default channel signals are being received, and which of the three corresponding relays are active.
BT Indicator	A blue LED that indicates a successful Bluetooth connection.
Mini-USB Port	To provide module communication a mini-USB port provides a USB-to-serial interface to the module.
Control Buttons	These buttons provide the interface to set the receiver's sensitivity threshold. M Mode Select ▲ Increase Threshold ▼ Decrease Threshold

Connections

A removable terminal block on the bottom of the module housing provides contact points for power and relay connections.



The removable terminal block has 10 screw terminals and their associated wire crimp openings, designed for simple connection to a piece of test equipment or wire harness. The block can be removed from the body of the module, facilitating installation.

Power ¹ Ground	The module is powered by a DC supply connected to these pins. There is no power switch; the module is on whenever power is applied via these two pins.
Relay Common Relay 1 Relay 2 Relay 3 Relay BLE	Connections to four internal relays are provided by these terminals. Each relay is normally open, and when closed provides a path from the common terminal to that relay's individual output terminal. 
Comm TX Comm RX	These terminals provide for a direct serial communication with the module.

Note 1: External Power Supply must be a clean, reliable source. Large voltage dips caused by inductive loads could result in resets of the Default Receiver.

Set Up

This section describes normal use of the Default Receiver module in manufacturing.

Power Supply

The Default Receiver is to be power by a commercially available, properly rated wall wart-style power supply. The power supply is to have a less than 3-foot power cable.

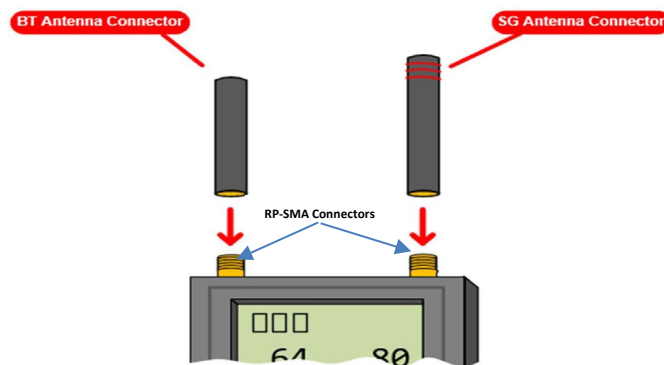
Software Versions

Upon power up, the Default Receiver will display the software version numbers on the LCD in the following sequence:

- BLE (318 – CHAM - <Date Code>)
- Sub GHz (318 – DFRV - <Date Code>)

Attach the Antennas

If the antennas are not already attached to the Reverse Polarity-SMA connectors on the top of the module, attach them by lining up the terminals and receptacles and hand-tightening the antenna snugly to each connector. The Sub-GHz antenna can be identified by the three red stripes. The BLE antenna can be identified by being shorter in length.



The recommended installation is for the default receiver to be free-standing, but if the installation is in a metal cabinet (e.g., inside an existing test fixture), 3-foot coaxial cable extensions with male-female adapters are available to extend the antennas to the outside of the cabinet (contact Gentex). The cable extensions should not be bent sharply. The FCC requires all connections between the device and the antenna connector to be non-standard. Therefore, if installation is to be in a metal cabinet or similar, please contact Gentex to provide the appropriate non-standard cables to be used.

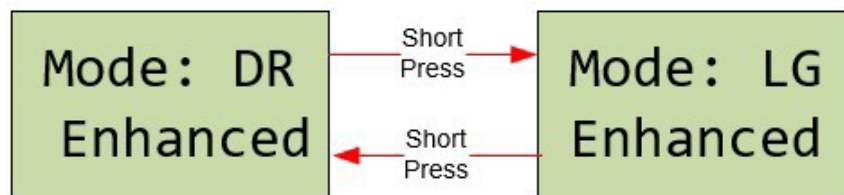
Calibration

The Default Receiver is calibrated at Gentex Corporation in Zeeland, MI, USA to accurately display the ambient noise level and received signal strength. However, if for any reason the module determines its calibration data is incorrect, the user will be alerted by the appearance of a 'C' on the LCD. The presence of a 'C' on the display indicates the module's signal strength measurements may not be accurate. If this occurs, contact Gentex at homelinksupport@gentex.com to arrange for recalibration.

Selecting the Operating Mode

The system will change Default Receiver modes during operation upon recognizing a short button press of the Mode Select button:

- Default Receiver Enhanced Mode – Sub GHz and BT signals for HomeLink 6
- Legacy Enhanced Mode – Sub GHz only for HomeLink 5



The mode can be selected during operation by pressing the Mode Select button (**M**). Pressing the Mode Select button will display the new mode setting on the LCD (for as long as the button is held down) and, upon release of the button, that new mode will be active. In this way, it is possible to switch sequentially through each type of default reception by repeatedly pressing and releasing the Mode Select button.

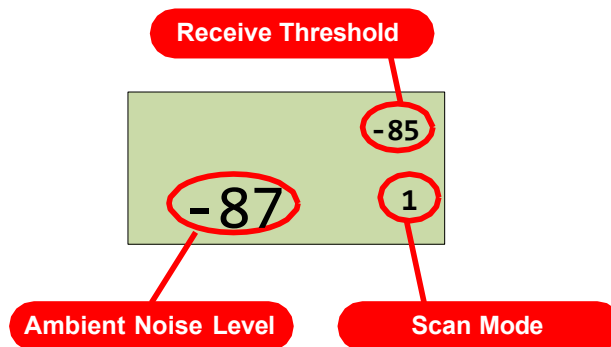
Legacy Enhanced Default Mode

The following sections describe Default Receiver operation after placing it in Legacy Enhanced Default Mode to test HomeLink 5 product. The Default Receiver receives the legacy default signal transmitted by the HomeLink 5 product in this mode.

Setting the Sub GHz Receive Threshold

The Default Receiver's Sub GHz receive threshold is adjustable. This value should be set to a value that is high enough to be above the ambient RF noise level of the area in which the receiver is placed, but not so high as to prevent reliable reception of the desired default signals. Experimentation may be necessary to determine the ideal value.

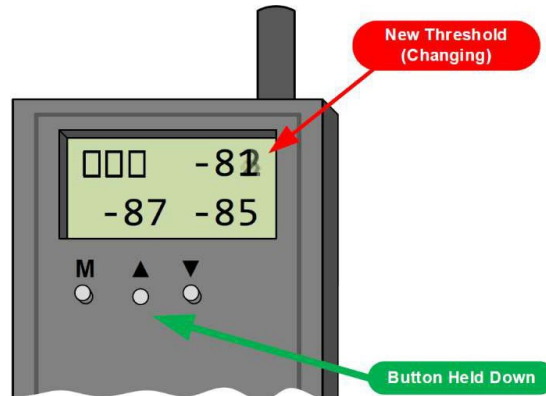
When the module is first powered, the ambient noise level can be found by observing the number in the lower left of the LCD. This number will change constantly, however it should be relatively consistent around an average value. For example, consider the following values:



In this case, the receive threshold (-85 dBm) is only marginally above the current ambient RF noise level (-87 dBm). This may not provide adequate noise rejection; raising the threshold may provide better performance.

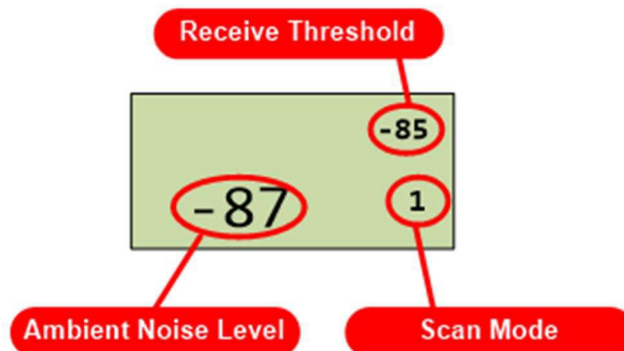
The receiver threshold is adjusted by the buttons on the front of the module beneath the LCD. To raise the threshold value, press the middle button (▲). To reduce it, press the rightmost button (▼). A single press and release will increase (or decrease) the threshold by 1 dBm. The new threshold value will be shown temporarily in the upper right of the LCD while it is being changed. Holding the button down will increase (or decrease) this new threshold repeatedly at a low speed. If the button continues to be held down after a change of 10 dBm the speed will increase.

When the button is released, the module will hold the temporary threshold value for a moment (providing time to adjust it further) before accepting it, at which point the temporary value disappears and the threshold itself is updated with the new value.



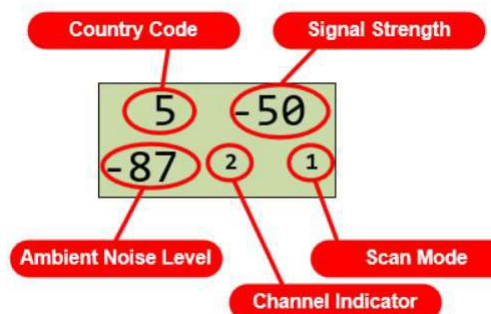
The maximum possible value of the threshold is 0 dBm. The lowest possible value is -128 dBm, however it should be noted that setting the receive threshold to a value lower than the ambient noise level can produce erratic behavior.

For example, consider the following values:



In this case, the receive threshold (-85 dBm) is only marginally above the current ambient noise level (-87 dBm). This may not provide adequate noise rejection; raising the threshold may provide better performance.

Receiving Default Signals



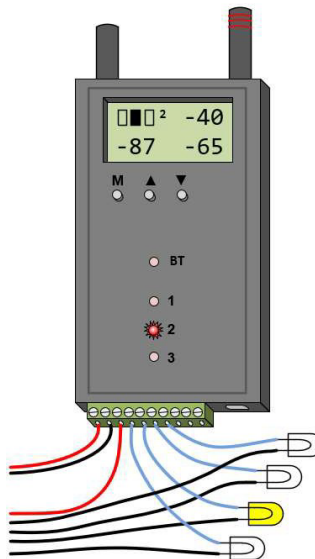
When a default message is received, the display updates as shown above. In this example, a Channel 2 message is being received, as indicated by a small numeral “2” in the center of the bottom row on the LCD. The receiver also displays the country code of the transmitting HomeLink on the upper left, as well as the signal strength of the received message in the upper right in place of the receiver threshold value. The strength of a received signal is shown in large digits, instead of the smaller digits used for the threshold. This value reflects the signal strength of a single message and will vary as each message is received and processed.

The country codes for HomeLink are outlined in the following table:

Code	Country/Region
1	Germany
5	North America
8	Global
9	China

In most cases, the HomeLink will be configured with a Country Code of 5, with the vehicle being sold in North America (Canada, Mexico and the United States). If the vehicle is intended for operation outside of this market, one of the other codes may be applicable.

The internal relays are also activated in conjunction with each channel that is received. This can be used to trigger external equipment based on incoming default message signals (e.g. larger indicator bulbs, or PLC inputs). As with the LEDs, the relay corresponding to each default channel will be active (closed) for as long as that channel’s signal is being received by the module.



Enhanced Default Mode

The following sections describe the Default Receiver operation after placing it in Enhanced Default Mode to test HomeLink 6 product. The Default Receiver receives both the legacy and Bluetooth default signals transmitted by the HomeLink 6 product in this mode.

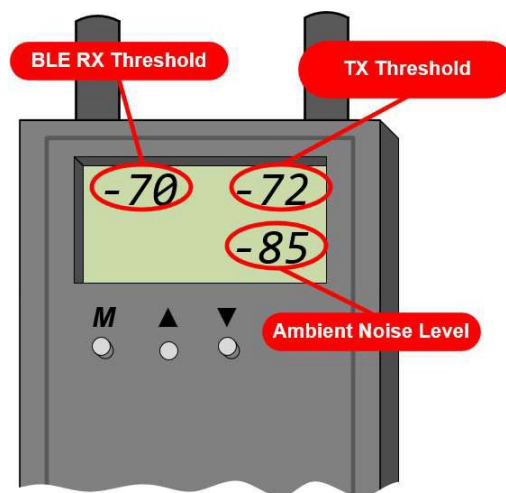
Care must be taken when more than one default receiver is being used in proximity to each other. The desired DUT's MAC address must be programmed into the default receiver prior to testing to make sure that it will only connect and test that device. If a default receiver is in the vicinity and does not have a MAC programmed, it will connect to any default signal's present, potentially disrupting other tests in process. If a default receiver mistakenly connects to a default message intended for another receiver, the intended receiver will still receive and indicate success for the Sub-GHz signal but will not be able to connect to and will not indicate the BLE signal, failing the overall test.

Setting the BT Thresholds

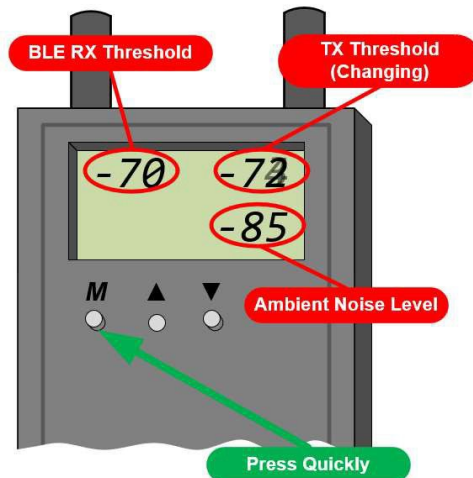
In addition to setting the Sub GHz Receive Threshold, there are two Bluetooth adjustable thresholds allowing verification of both message reception and transmission. Both thresholds should be set above the ambient RF noise in the test area but lower than HomeLink's expected BT signal strength.

The RX RSSI refers to the received RSSI value the HomeLink measures upon being sent the read request of the RSSI characteristic (sent back to the Default Receiver in the read response). The TX RSSI refers to the received value the Default Receiver measures from the RSSI characteristic response from the HomeLink.

The LCD will display the thresholds and allow adjustment by pressing the Mode Select button (**M**) greater than 1s but less than 5s while in Enhanced Default Mode. The Default Receiver will return to Enhanced Default Mode by another press of the Mode Select button (**M**) greater than 1s but less than 5s.



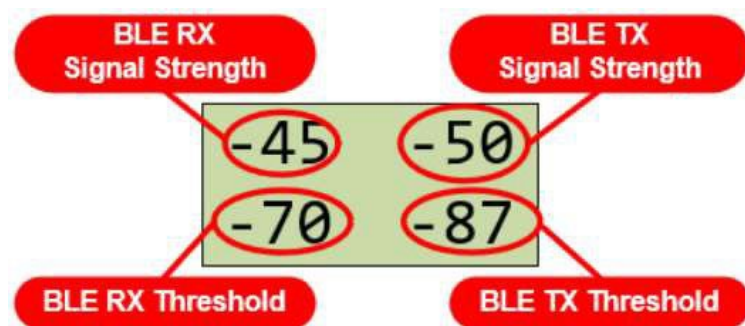
Press the Mode Select button momentarily to enter the Adjustment Screen. The threshold to be adjusted will flash. Select the threshold to be adjusted by pressing the Mode Select button momentarily. To raise the threshold value, press the Up-Arrow button. To reduce it, press the Down-Arrow button. A single press and release will increase (or decrease) the threshold by 1 dBm. Holding the button down will increase (or decrease) this new threshold repeatedly at a low speed. A short press of the Mode Select button will return to the Threshold Display screen.



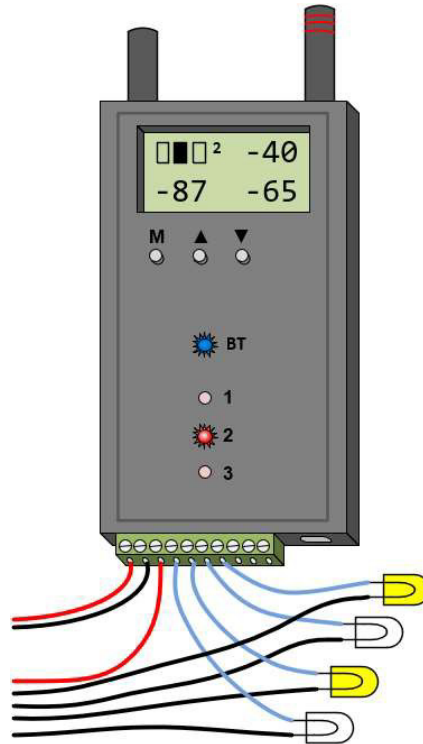
Receiving Default Signals

The Default Receiver scans for both the Sub GHz and Bluetooth default signals transmitted by the HomeLink being tested. When the Sub GHz signal is received, the LCD display is much the same as described in the Legacy Enhanced Default mode section.

If the corresponding Bluetooth default signal is received, the LCD will display both received and transmitted thresholds and signal strengths.



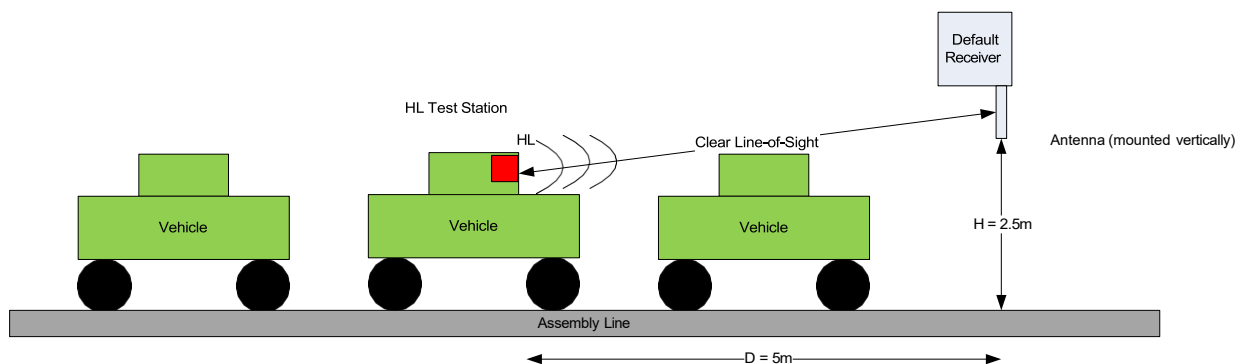
The internal relays will activate first for the Sub GHz channel and then the Bluetooth indication.



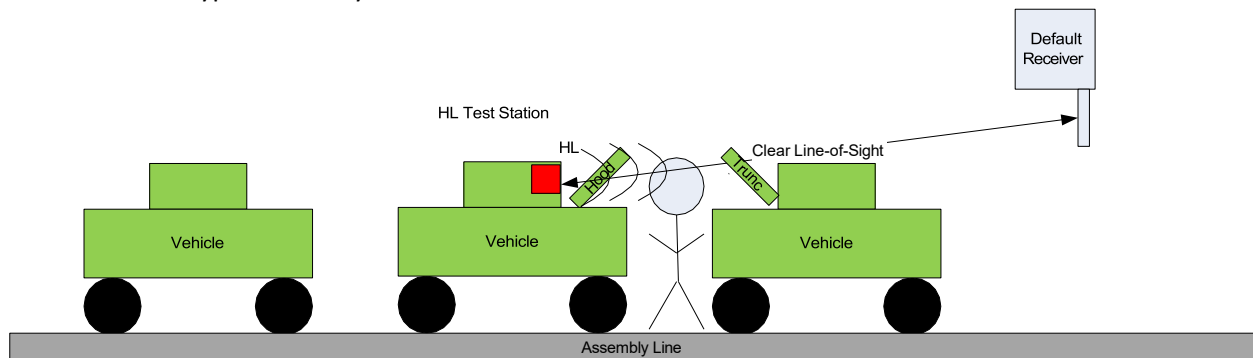
Installation Guidelines

The purpose of this test is not for absolute range, but rather, typically a functional check to verify the connections of the wiring harness and terminal block.

The antenna should be oriented vertically, either up or down. Height should be approximately 2.5 meters (like the mounting height of a motorized garage door opener). The range should be a maximum of 5 meters from the station on the assembly line where the operator pushes the HomeLink button to the location of the Default Receiver antenna.



There must be a clear line-of-sight from the vehicle's windshield to the Default Receiver's antenna. In other words, the operator pressing the HomeLink button during the test should be able to see the default receiver antenna from the test station. Large metal objects such as the vehicle roof or open trunk/hoods may affect reception. People walking in and out of the assembly line between the HomeLink module and the Default Receiver also will affect reception. Pick a location on the assembly line where this type of activity does not occur.



The signal transmitted/received is at 433.92MHz. There may be other devices that operate at this frequency in the vicinity such as Tire Pressure Monitoring Systems and Key FOB's. Installation near fluorescent lights can also affect performance. Do not perform the HomeLink testing in the same location as these devices.

In the device set up, special care must be taken to observe ambient noise and to set the receive threshold correctly. If the ambient noise is too high, a different location on the assembly line may need to be chosen. Typically setting the Receive Threshold 20 dBm above the Ambient Noise Level readings gives some margin to prevent false readings. Reducing this setting closer to the Ambient Noise Level results in greater range. The Receive Threshold and Distance (D) must be adjusted to give "consistent positive readings" and no "false positive readings" due to noise.

Multiple default receiver installations (more than one assembly line) within 100m also depend on proper receive threshold set up. In this case the ambient noise could be randomly higher (depending on the test time of the other line). Best practice would be to locate the test locations on each line at more than 100 meters of separation.

Regulatory Information:

This device complies with FCC rules part 15 and Innovation, Science, and Economic Development Canada RSS-210. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference that may be received including interference that may cause undesired operation. **WARNING:** The transmitter has been tested and complies with FCC and ISDE rules. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the device.

Only use the antenna provided with this device. Unauthorized antennas may violate regulatory limits and regulations. The maximum antenna gain for this device is 1.8 dBi, and it shall not be modified or replaced by the user.

This device has been evaluated to comply with the FCC and ISDE Canada radio frequency exposure Guidelines. The device can be used in portable exposure conditions without restriction.

Cet appareil est conforme aux règlements de la FCC, section 15, et au CNR-210 d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est assujéti aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférences nuisibles et (2) cet appareil doit accepter toute interférence reçue, y compris celle qui pourrait entraîner un dysfonctionnement. **MISE EN GARDE :** L'émetteur a subi des tests et est conforme aux règlements de la FCC et d'ISDE. Les changements ou modifications non approuvés explicitement par la partie responsable de la conformité pourraient rendre caduque l'autorisation de l'utilisateur de se servir du dispositif.

Utilisez uniquement l'antenne fournie avec cet appareil. Les antennes non autorisées peuvent violer les limites et réglementations en vigueur. Le gain maximal de l'antenne pour cet appareil est de 1,8 dBi, et elle ne doit pas être modifiée ou remplacée par l'utilisateur.

Cet appareil a été évalué pour être conforme aux directives d'exposition aux radiofréquences de la FCC et d'ISDE Canada. L'appareil peut être utilisé dans des conditions d'exposition portables sans restriction.

“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



Hecho en USA