Linx TECHNOLOGIES

DS Keyfob Transmitter Evaluation Kit

User´s Guide

Wireless made simple®

Warning: Some customers may want Linx radio frequency ("RF") products to control machinery or devices remotely, including machinery or devices that can cause death, bodily injuries, and/or property damage if improperly or inadvertently triggered, particularly in industrial settings or other applications implicating life-safety concerns ("Life and Property Safety Situations").

NO OEM LINX REMOTE CONTROL OR FUNCTION MODULE SHOULD EVER BE USED IN LIFE AND PROPERTY SAFETY SITUATIONS. No OEM Linx Remote Control or Function Module should be modified for Life and Property Safety Situations. Such modification cannot provide sufficient safety and will void the product's regulatory certification and warranty.

Customers may use our (non-Function) Modules, Antenna and Connectors as part of other systems in Life Safety Situations, but only with necessary and industry appropriate redundancies and in compliance with applicable safety standards, including without limitation, ANSI and NFPA standards. It is solely the responsibility of any Linx customer who uses one or more of these products to incorporate appropriate redundancies and safety standards for the Life and Property Safety Situation application.

Do not use this or any Linx product to trigger an action directly from the data line or RSSI lines without a protocol or encoder/decoder to validate the data. Without validation, any signal from another unrelated transmitter in the environment received by the module could inadvertently trigger the action.

All RF products are susceptible to RF interference that can prevent communication. RF products without frequency agility or hopping implemented are more subject to interference. This module does not have a frequency hopping protocol built in.

Do not use any Linx product over the limits in this data guide. Excessive voltage or extended operation at the maximum voltage could cause product failure. Exceeding the reflow temperature profile could cause product failure which is not immediately evident.

Do not make any physical or electrical modifications to any Linx product. This will void the warranty and regulatory and UL certifications and may cause product failure which is not immediately evident.

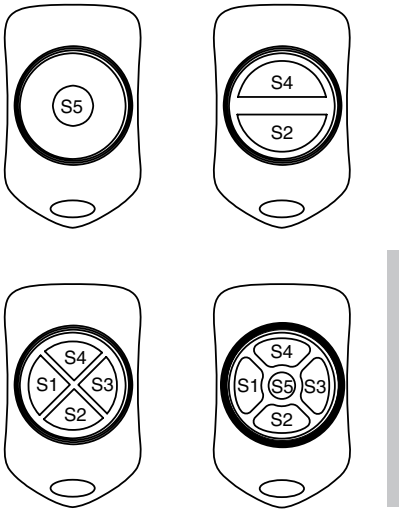
Ordering Information

Ordering Information	
Part Number	**Description**
EVAL-***-HH-KF-DS	DS Keyfob Basic Evaluation Kit

*** = 418 (Standard) or 433MHz

Figure 2: Ordering Information

Keyfob Transmitter Button Assignments



Button	Data Line
S1	D0
S2	D1
S3	D2
S4	D3
S5	D4

Figure 3: OTX-***-HH-KF#-DS Button Assignments

Theory of Operation

DS Keyfob Transmitters

DS Keyfob transmitters are a great way to quickly bring a remote control product to market. They are fully assembled and certified, eliminating the need for design, tooling, and certification. Linx can also customize the transmitters with customer specific art on the case and buttons.

The operation of the transmitter is straightforward. When a button(s) is pressed on the transmitter, the states of D0 to D4 are formatted into packets by an on-board encoder IC. These encoded packets are sent to a transmitter that, through the antenna, conveys the data into free space.

Receiver / Decoder Evaluation Board

The receiver board is powered by two AAA batteries. A Linx LR Series receiver is used for reception of the transmitted signal. This receiver provides exceptional sensitivity, allowing the transmitter and receiver to operate at distances of up to 750 feet (depending on signal conditions). The data recovered by the receiver is decoded by the DS Series set as a decoder. If the settings of the 10-position DIP switch on the receiver board match the address setting of the transmitter, the data line outputs are updated to match the states of the buttons on the transmitter. To demonstrate this, one data line on the evaluation board is used to drive a buzzer while the other lines activate LEDs. The board also has a prototyping area with all of the receiver and decoder lines brought out to a header.

Using the Kit

Using the kit is straightforward. Simply attach the antenna to the board and install the batteries. Set the address on the transmitter and on the board to the same settings, turn on the power to the board, and press a button on the transmitter. When D0 is pressed, the buzzer sounds; when S1–S4 are pressed, the LEDs turn on. When any button (D0–D4) is pressed on the transmitter, the corresponding decoder output (D0–D4) is active high (V_{CC}) on the prototyping header.

> Note: All switches (address, protocol select and interpretation configuration) must match on both the transmitter and the decoder / receiver board.

Input Interpretation Selection Switches

The DS Series was designed to replace an encoder and decoder from Holtek. These parts had tri-state lines, so the address and data lines could be high, low or floating. The DS can only be high or low, so these selection switches are included for backwards compatibility.

In the case of the DS Keyfob transmitter, these lines are ignored and can be set to any position.

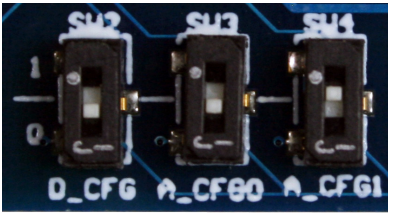


Figure 7: The Evaluation Board Input Interpretation Selection Switches

Selecting the Protocol

The DS Series encoder / decoder offers two over-the-air protocols: Holtek and serial. The Holtek selection is used when communicating with other Holtek devices. This is a legacy protocol that provides backwards compatibility with older products.

The DS Keyfob uses the serial protocol, which is a much more reliable protocol that offers better range and response time. The protocols are not interoperable, so the evaluation board must be set to use the serial protocol. The protocol is selected by the Protocol Select Switch on the evaluation board, as shown in Figure 8.

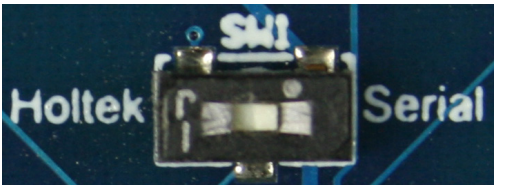


Figure 8: The Evaluation Board Protocol Selection Switch

Range Testing

Complex mathematical models exist for determining path loss in many environments. These models vary as the transmitter and receiver are moved from indoor operation to outdoor operation. Although these models can provide an estimation of range performance in the field, the most reliable method is to simply perform range tests using the transmitter and receiver in the intended usage environment.

Simple range testing can be performed with the transmitter and receiver evaluation board. To prepare the board for range testing, simply turn it on by switching the power switch to the ON position. Pressing D0 on the transmitter activates the buzzer on the receiver board, while D1 activates the LED.

As the maximum range of the link in an area is approached, it is not uncommon for the signal to cut in and out as the transmitter moves. This is normal and can result from other interfering sources or fluctuating signal levels due to multipath. Multipath results in cancellation of the transmitted signal as direct and reflected signals arrive at the receiver at differing times and phases. The areas in which this occurs are commonly called “nulls” and simply walking a little further usually restores the signal. If this does not restore the signal, then the maximum effective range of the link has been reached.

To achieve maximum range, keep objects such as your hand away from the antenna and ensure that the antenna on the transmitter has a clear and unobstructed line-of-sight path to the receiver board. Range performance is determined by many interdependent factors. If the range you are able to achieve is significantly less than what is specified for the products being tested, then there is likely a problem either with the board or the ambient RF environment in which the board is operating. First, check the battery, switch positions, address settings, and antenna connection. Next, measure the receiver's RSSI voltage with the transmitter turned off to determine if ambient interference is present. If this fails to resolve the issue, please contact Linx technical support.

DS Series Decoder Evaluation Board Schematic

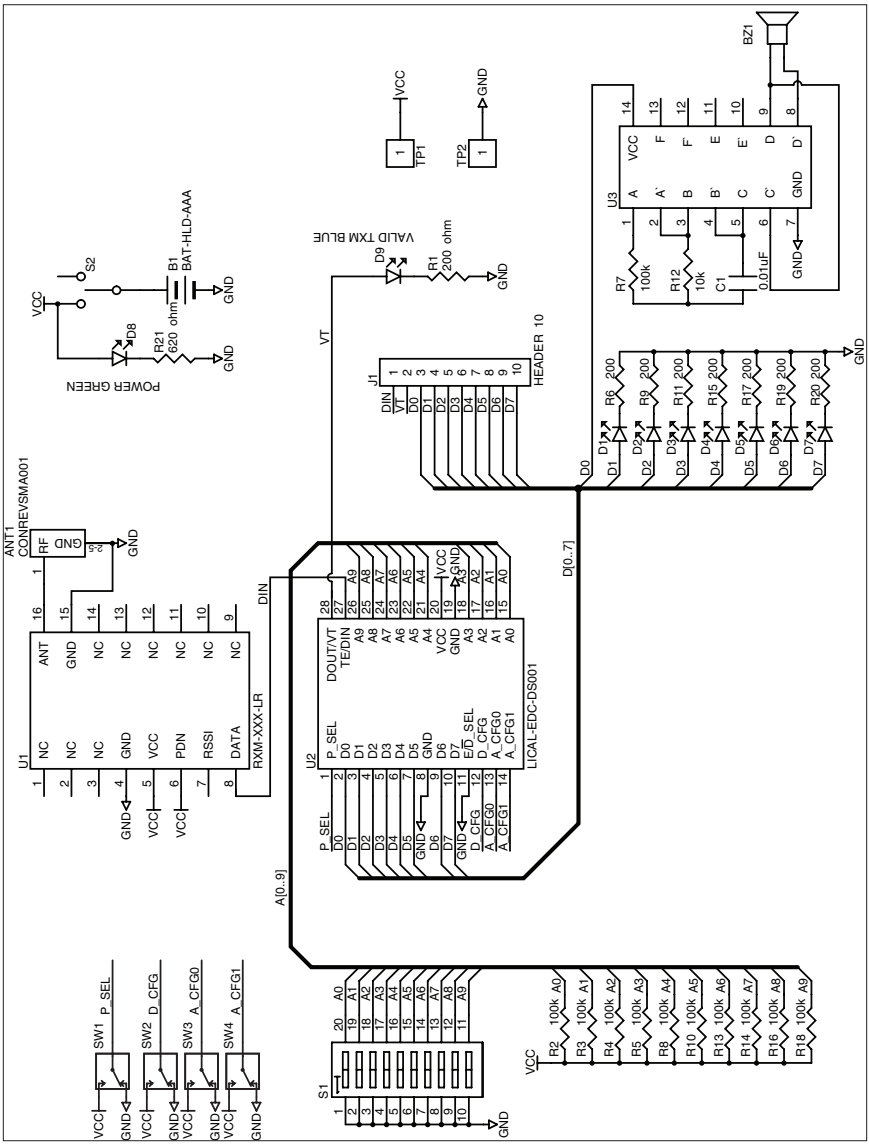


Figure 9: DS Series Decoder Board Schematic

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