

Replacing the KH2 Series with the KH3 Series

Application Note AN-00170



Introduction

With the discontinuation of the Holtek® encoders and decoders, the KH2 Series is also being discontinued. Linx has developed the KH3 Series as a replacement. The KH3 replaces the Holtek® parts with the Linx DS Series encoder / decoder. This offers full over-the-air compatibility and can be a drop-in replacement with most applications. There are some differences that can be applicable depending on how the modules are implemented in the system.

Physical Difference

The KH2 and KH3 Series are in the same package. The only physical differences are that the KH3 has no lid and three pins on one end. These pins are discussed later in this document.

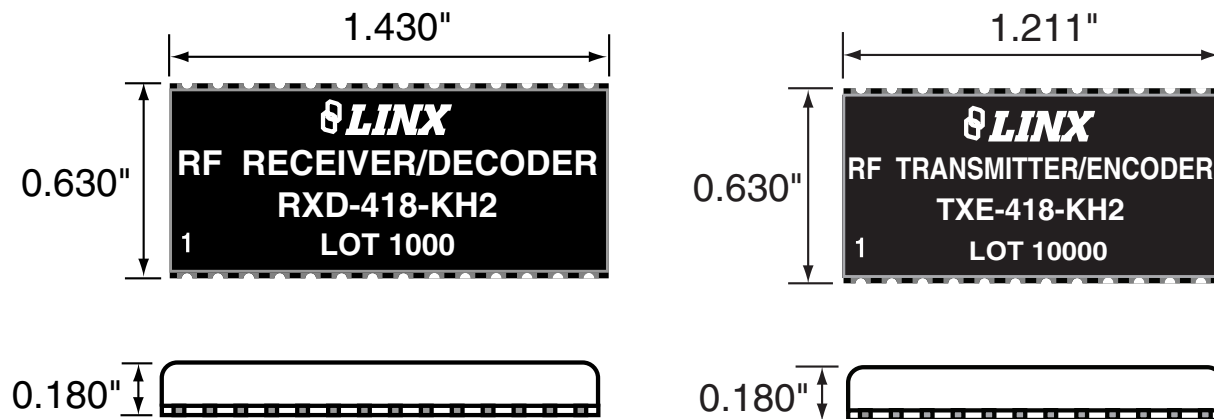


Figure 1: KH2 Series Transmitter and Receiver Dimensions

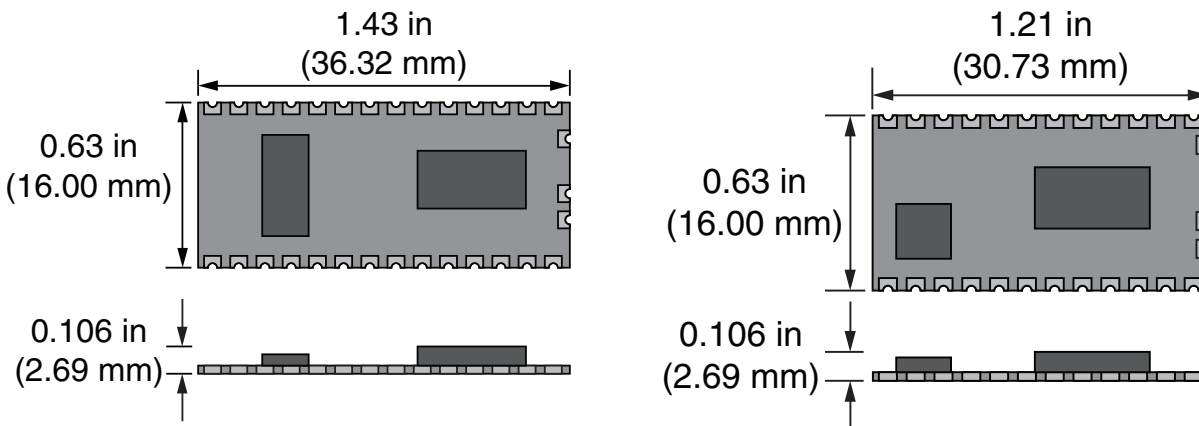


Figure 2: KH3 Series Transmitter and Receiver Dimensions



The physical size of the modules is the same, so the same PCB can be used with the new generation modules.

The footprints of the KH3 Series have three pins on one of the ends of the module. As will be discussed later, these pins can be left floating, depending on the implementation of the modules.

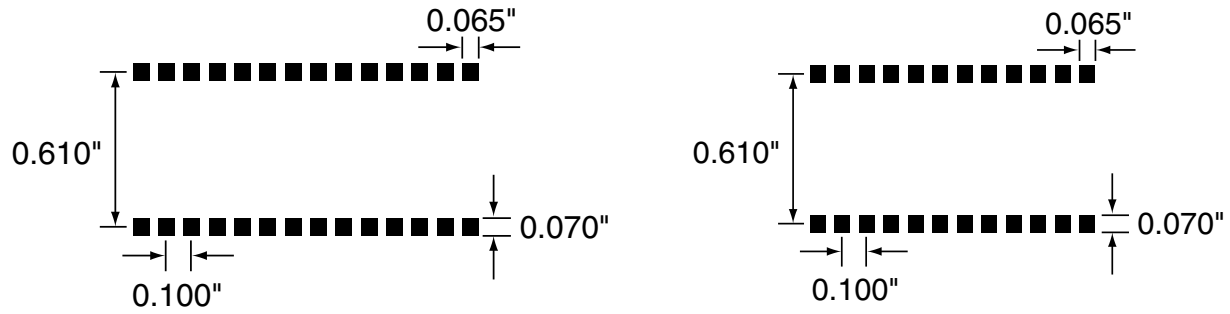


Figure 3: KH2 Series Transmitter and Receiver Footprints

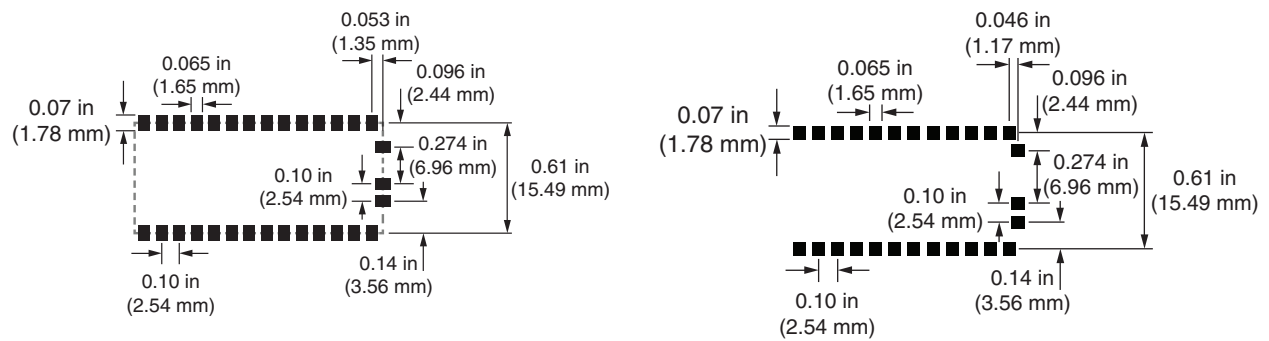


Figure 4: KH3 Series Transmitter and Receiver Footprints

Electrical Difference

The KH2 and KH3 Series have the same pin-out except for the three additional lines on the KH3 Series.

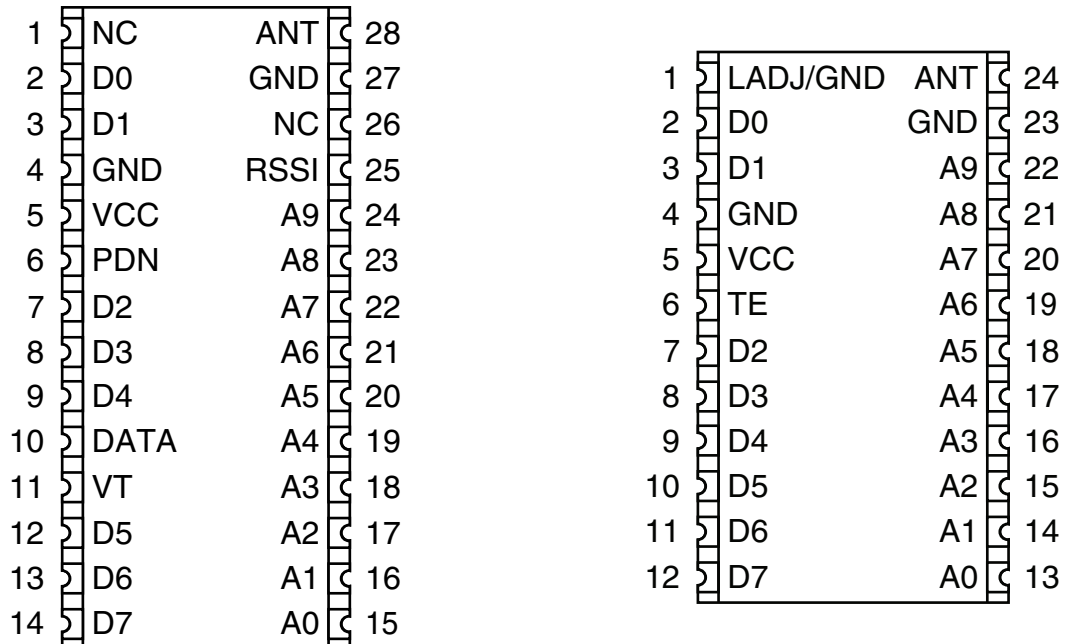


Figure 5: KH2 Series Transmitter and Receiver Pin-outs

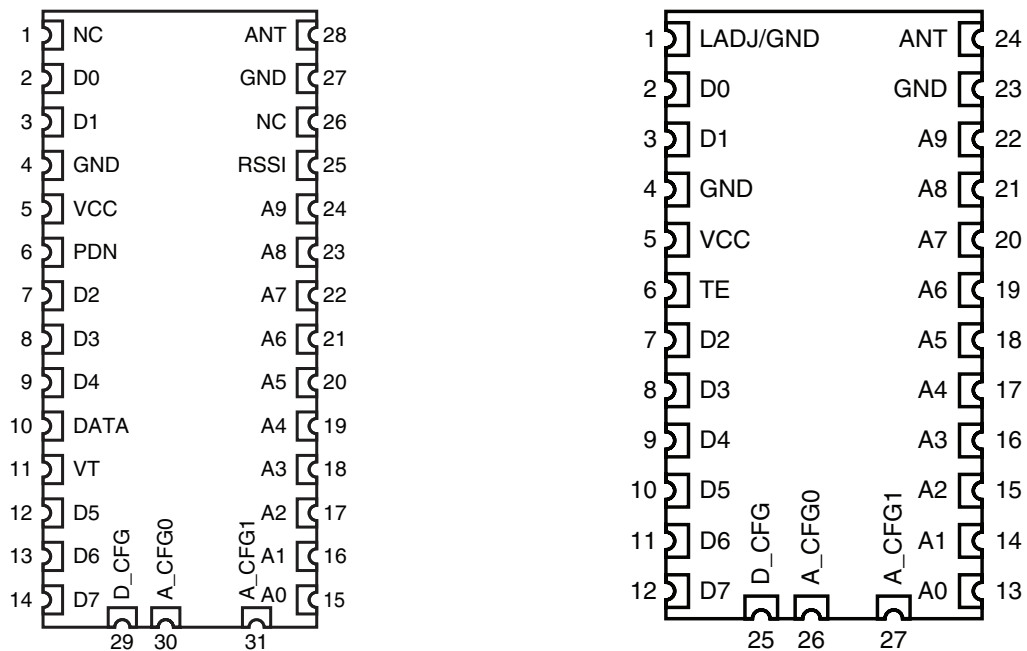


Figure 6: KH3 Series Transmitter and Receiver Pin-outs

Functional Difference

The difference between the KH2 Series and KH3 Series is that the Holtek® encoder and decoder are replaced by the DS Series encoder / decoder. The DS is specifically designed to be operable with previous generation products based on Holtek® encoders and decoders. The only exception is that the Holtek® encoders and decoders have tri-state input lines but the DS Series has bi-state lines. Tri-state inputs are connected to ground for zero bits, V_{CC} for one bits, or left unconnected for open bits. The DS Series lines must be connected to ground or V_{CC} ; they cannot be left floating.

Since the DS cannot match this operation the D_CFG, A_CFG0 and A_CFG1 lines are provided to select the desired interpretation. The settings must match on both ends.

Pulling the D_CFG line high configures the data bits as one and zero. A high on a data line on the transmitter is interpreted as a one bit and a low on the line is interpreted as a zero bit. Pulling D_CFG low configures the data bits as one and open. A high on a data line is interpreted as a one bit and a low on the line is interpreted as an open bit. The decoder outputs open data bits as logic low.

D_CFG Configuration		
Configuration D_CFG	Bit Interpretation	
	High	Low
0	One	Open
1	One	Zero

Figure 7: D_CFG Configuration

A_CFG0 and A_CFG1 are used to select the bit type for the address lines.

A_CFG0 and A_CFG1 Configuration			
Configuration		Bit Interpretation	
A_CFG1	A_CFG0	High	Low
0	0	One	Zero
0	1	One	Open
1	0	Open	Zero
1	1	One	Zero

Figure 8: A_CFG0 and A_CFG1 Configuration

D_CFG is pulled low internally so that a high on a data line is transmitted as a one bit and a low on the line is transmitted as an open bit. A_CFG0 is pulled low and A_CFG1 is pulled high internally so that a high on an address line is interpreted as an open bit and a low as a zero bit.

The addition of these lines provides the maximum compatibility with the Holtek encoders and decoders, but does make full compatibility dependent on how the modules are implemented.

Most implementations follow our typical application circuit and connect the address lines to a DIP switch and the data lines to buttons. This makes the address lines either ground or floating while the data lines are either high or floating.

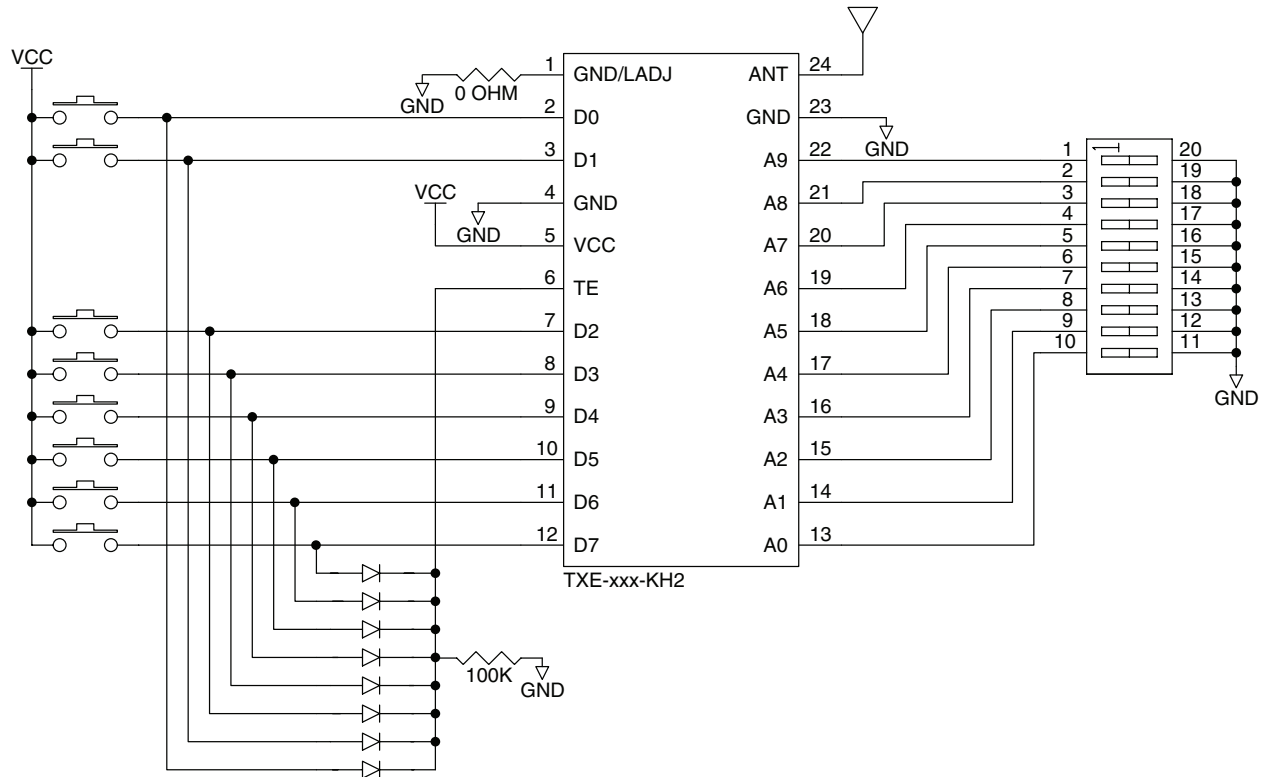


Figure 9: KH2 Series Transmitter Typical Application Circuit

The configuration lines on the KH3 match this implementation by default. This means that the KH3 can be placed on the same board used by the KH2 with the new lines left disconnected. No board changes are required.

This also matches the implementation with the Linx handheld and keyfob remote controls.

If the address lines are pulled to V_{CC} or the button lines pulled to ground, then the configuration lines on the KH3 modules need to be set appropriately. This implementation requires a board change or modification.

Addressing Differences

The DS Series has a small modification with regards to addressing. The decoder does not recognize the case where all of the address lines are high or all are low. At least one address line must be different from the rest.

This was implemented because many customers were using a default address with all switches set the same and had issues of crosstalk between different systems. Many cases this was a simple annoyance, but in some cases this represents a critical risk to safety. All customers are highly encouraged to set a unique address.

It should be noted that the transmitter does send a command with all lines high or all low, but the receiver does not accept that as a valid address and ignores the transmission.

Conclusion

The creation of the KH3 Series allows existing customers a migration path to maintain functionality with existing deployed systems. There are some differences that could apply depending on the module's implementation. Please contact Linx Technical Support with any questions or concerns.