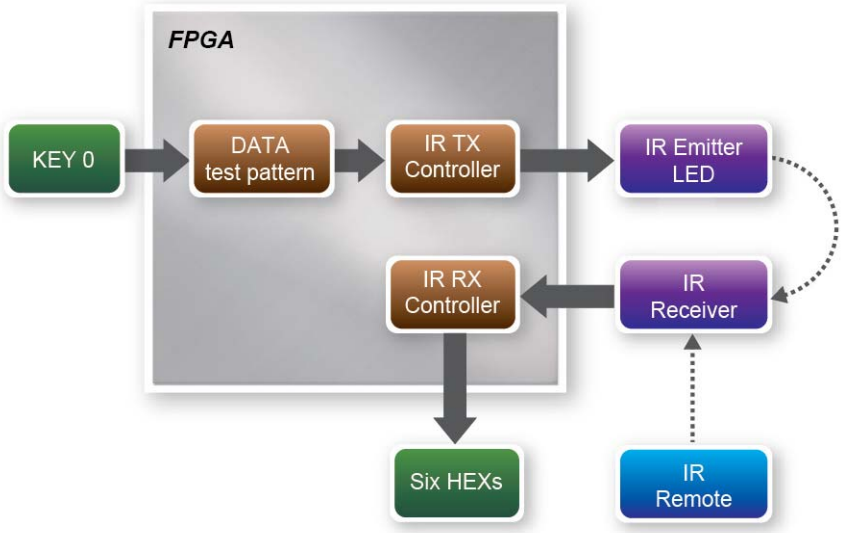

Figure 5-12 Block diagram of the IR emitter LED and receiver demonstration

Figure 5-12 shows the block diagram of the design. It implements a IR TX Controller and a IR RX Controller. When KEY0 is pressed, data test pattern generator will generate data to the IR TX Controller continuously. When IR TX Controller is active, it will format the data to be compatible with NEC IR transmission protocol and send it out through the IR emitter LED. The IR receiver will decode the received data and display it on the six HEXs. Users can also use a remote to send data to the IR Receiver. The main function of IR TX /RX controller and IR remote in this demonstration is described in the following sections.

■ IR TX Controller

Users can input 8-bit address and 8-bit command into the IR TX Controller. The IR TX Controller will encode the address and command first before sending it out according to NEC IR transmission protocol through the IR emitter LED. The input clock of IR TX Controller should be 50MHz.

The NEC IR transmission protocol uses pulse distance to encode the message bits. Each pulse burst is 562.5µs in length with a carrier frequency of 38kHz (26.3µs).

Figure 5-13 shows the duration of logical “1” and “0”. Logical bits are transmitted as follows:

- Logical '0' – a 562.5µs pulse burst followed by a 562.5µs space with a total transmit time of 1.125ms

- Logical '1' – a 562.5µs pulse burst followed by a 1.6875ms space with a total transmit time of 2.25ms

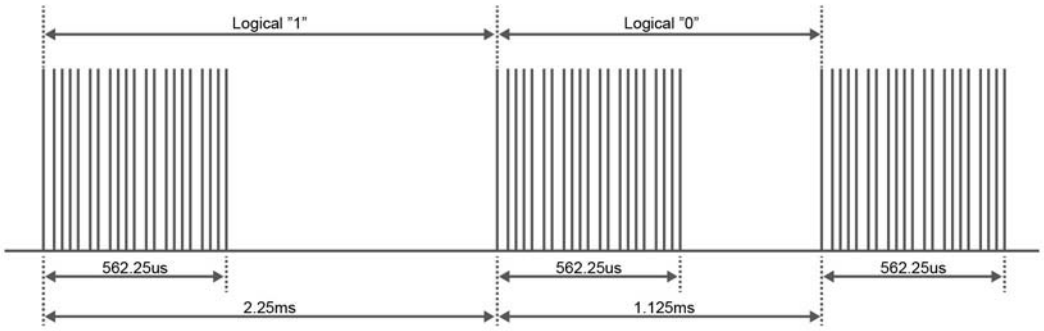

Figure 5-13 Duration of logical “1”and logical “0”

Figure 5-14 shows a frame of the protocol. Protocol sends a lead code first, which is a 9ms leading pulse burst, followed by a 4.5ms window. The second inversed data is sent to verify the accuracy of the information received. A final 562.5µs pulse burst is sent to signify the end of message transmission. Because the data is sent in pair (original and inverted) according to the protocol, the overall transmission time is constant.

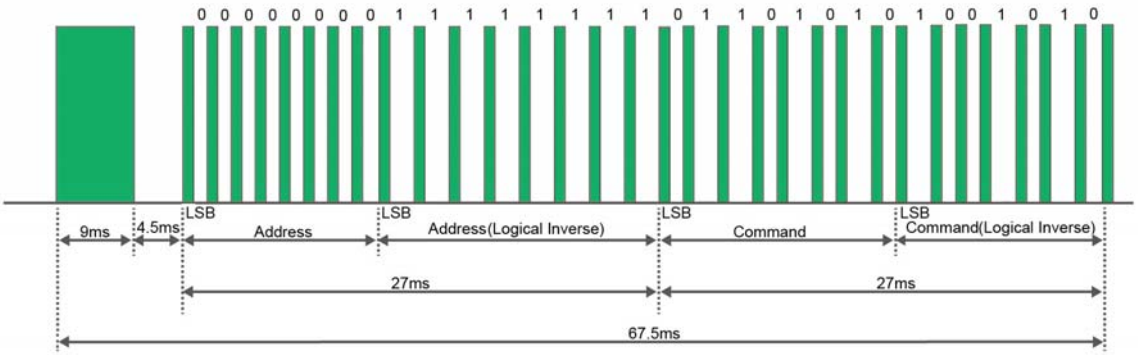

Figure 5-14 Typical frame of NEC protocol

Note: The signal received by IR Receiver is inverted. For instance, if IR TX Controller sends a lead code 9 ms high and then 4.5 ms low, IR Receiver will receive a 9 ms low and then 4.5 ms high lead code.