**APPENDIX C**

**RF**

**HT12E encoder**

**Features**

Operating voltage, 2.4V~5V for the HT12A, 2.4V~12V for the HT12E, Low power and high noise immunity CMOS technology, Low standby current: 0.1\_A (typ.) at VDD=5V, HT12A with a 38kHz carrier for infrared, transmission medium, Minimum transmission word, Four words for the HT12E, One word for the HT12A, Built-in oscillator needs only 5% resistor, Data code has positive polarity, Minimal external components, HT12A/E: 18-pin DIP/20-pin SOP package.

**General Description**

The 212 encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12\_N data bits. Each address/data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger on the HT12E or a DATA trigger on the HT12A further enhances the application

Flexibility of the 212 series of encoders. The HT12A additionally provides a 38kHz carrier for infrared systems.

**Block Diagram**

**Pin Assignment**





The 212 series of encoders begin a 4-word transmission cycle upon receipt of a Transmission enable (TE for the HT12E or D8~D11 for the HT12A, active low). This cycle will repeat itself as long as the transmission enable (TE or D8~D11) is held low. Once the transmission enables returns high the encoder output completes its final cycle and then stops as shown below.



**Information word**

If L/MB=1 the device is in the latch mode (for use with the latch type of data decoders). When the transmission enable is removed during a transmission, the DOUT pin outputs a complete word and then stops. On the other hand, if L/MB=0 the device is in the momentary mode (for use with the momentary type of data decoders). When the transmission enable is removed during a transmission, the DOUT outputs a complete word and then adds 7 words all with the \_1\_ data code.

An information word consists of 4 periods as illustrated below.

***Address/data waveform***

Each programmable address/data pin can be externally set to one of the following two logic states as shown below.

*Address/data programming (preset)*

The status of each address/data pin can be individually pre-set to logic \_high\_ or \_low\_. If a transmission-enable signal is applied, the encoder scans and transmits the status of the 12 bits of address/data serially in the order A0 to AD11 for the HT12E encoder and A0 to D11 for the HT12Aencoder.During information transmission these bits are transmitted with a preceding synchronization bit. Ifthe trigger signal is not applied, the chip enters the standby mode and consumes a reduced current of less than 1\_A for a supply voltage of 5V. Usual applications preset the address pins with individual security codes using DIP switches or PCB wiring, while the data is selected by push buttons or electronic switches. The following figure shows an application using the HT12E:





**Address/Data sequence**

The following provides the address/data sequence table for various models of the 212 series ofencoders. The correct device should be selected according to the individual address and data requirements. 

**Transmission enable**

For the HT12E encoders, transmission is enabled by applying a low signal to the TE pin. For the HT12A encoders, transmission is enabled by applying a low signal to one of the data pins D8~D11.

**Two erroneous HT12E application circuits**

The HT12E must follow closely the application circuits provided by Holtek .

Error: AD8~AD11 pins input voltage > VDD+0.3V Error: The IC\_s power source is activated by pins AD8~AD11



