

## Programmable Encoder/Decoder

### Features

- Single chip contains both Encoder and Decoder
- 3V to 11V operation
- On chip oscillator uses non-critical RC components
- Cross interference of receiver is virtually eliminated by circuitry which requires 4 valid words to be received, each within 64ms of the other
- Schmitt Trigger input provides excellent noise immunity
- Applications: alarm control system, security system, cordless telephone, remote control
- Interfaces with RF, ultrasonic, or infrared modulators and demodulators
- $2^{12} = 4096$  different codes

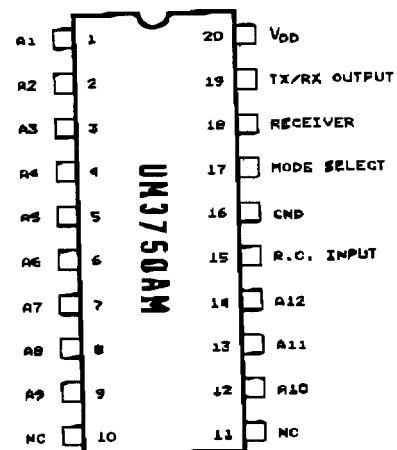
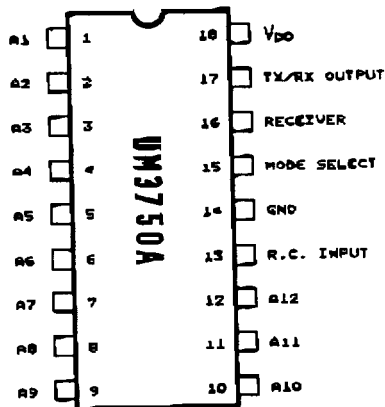
### General Description

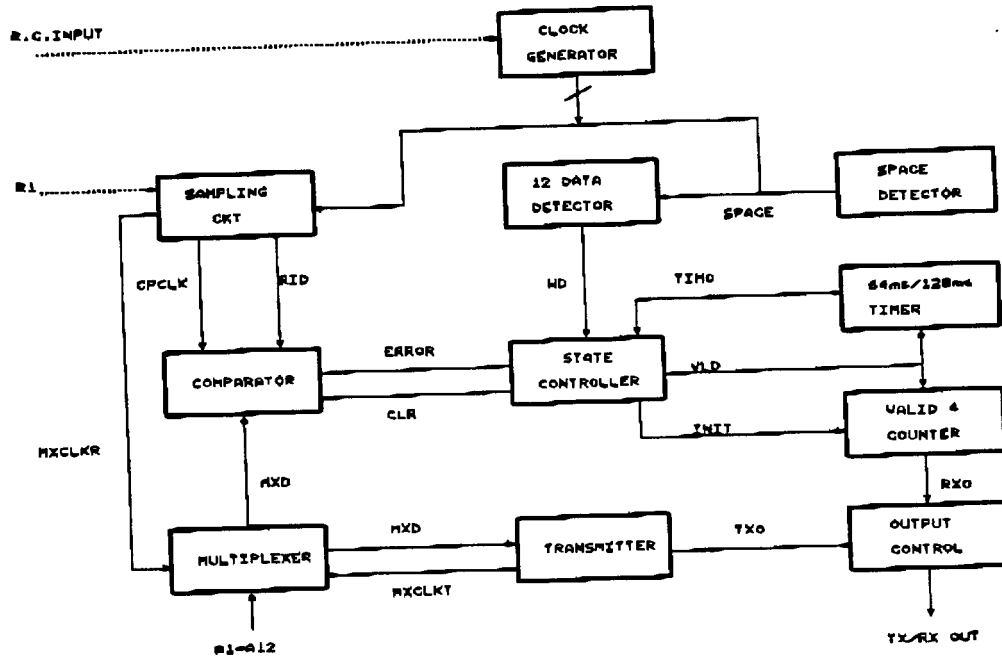
The UM3750A Encoder/Decoder is a CMOS/LSI digital code Transmitter-Receiver system. Working in the transmit (encoder) mode, the UM3750A will sequentially encode and transmit 12 bits of input. Each of the 12 bits may be 1 or 0 to allow 4096 different codes.

In the receive (decoder) mode, the incoming signal is compared to the local code in a sequential manner. Once an error is detected the system will reset and

begin its comparison on the next word. If all 12 bits are received correctly, a "valid" signal is generated. This signal clears a 64ms counter and triggers a 3-stage counter. The 3-stage counter counts the "valid" pulses and when 4 pulses have been detected, the TX/RX output pin goes low. After the TX/RX output pin goes low, the next "valid" must be received within 128ms, otherwise, the TX/RX output will be disabled.

### Pin Configurations



**Block Diagram**

**Block Diagram Description**

**CPLK:** CLK of Comparator  
**MXCLKR:** CLK of Multiplexer when in Receiver mode  
**MXCLKT:** CLK of Multiplexer when in Transmitter mode  
**MXD:** Output data of Multiplexer (one of A1, A2, .. A12)  
**RID:** Sampled data by Sampling CKT  
**VLD:** "Valid" signal. Used to trigger Valid 4 Counter and reset 64ms/128ms Timer

**CLR:** Clear signal of Comparator  
**ERROR:** Error signal from Comparator  
**TIMO:** TIMER time-out signal (64ms or 128ms)  
**TX/RX OUT:** Transmitter/Receiver output pin  
**INIT:** Reset signal of Valid 4 Counter  
**WD:** Word detected signal  
**TXO:** Transmitter output  
**RXO:** Receiver output

**Absolute Maximum Ratings\***

Power Supply Voltage. . . . .	-0.3V to 11V
Operating Temperature . . . . .	-20°C +70°C
Storage Temperature (Tstg) . . . . .	-55°C +150°C
Applied Voltage on any Pin . . . . .	
..... GND	-0.3V < VIN < VDD +0.3V

**\*Comments**

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

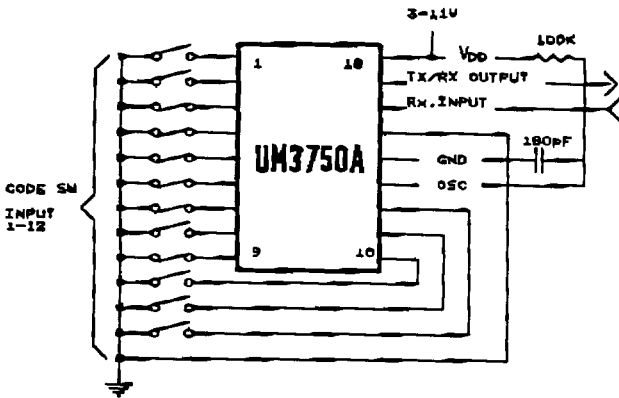
**DC Electrical Characteristics** (TA = 25°C, VDD = 9V, unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating Voltage	VDD	3.0	-	11	V	
Operating Current	IOD	-	-	1.2	mA	
Schmitt Trigger Input Level	-	-	5 1.5	-	V	Level 1 Level 0
Other Pins Input Level	VIH VIL	VDD - 0.5	-	GND + 0.5	V	Level 1 Level 0
Output Pin Logic Level	VOH VOL	VDD - 0.5	-	GND + 1	V	Isource = 5 µA Isink = 2 mA
Input Resistor to VDD	-	200K	-	1.2M	Ω	
Oscillator Frequency	F	-	100	-	KHz	15% exclusive of external part (For Reference)

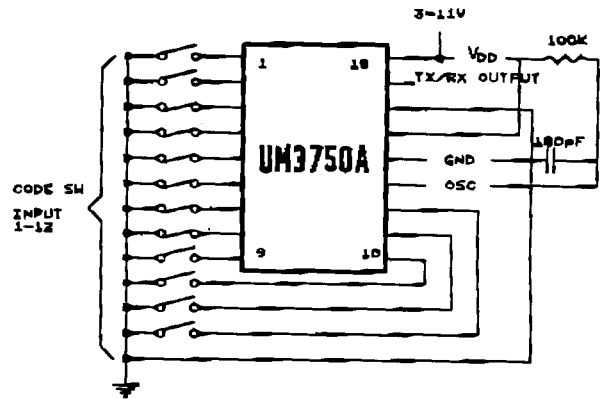
**Pin Description (for UM3750A)**

Pin No.	Designation	Description
1 - 12	A1 - A12	These data select lines are used to set the addresses of the encoder/decoder pair. They have on-chip pull-up resistors
13	R.C.INPUT	R.C. input pin for single pin oscillator. A resistor is connected from this pin to VDD and a capacitor from this pin to GND. The frequency = 2/RC
14	GND	Ground pin
15	MODE SELECT	This pin changes the IC from Receive mode to Transmit mode. By grounding this pin the IC is put into the Receive mode. By connecting to VDD the IC is put into the Transmit mode
16	RECEIVER	The receiver input receives the digital PCM waveform from the detect circuit
17	TX/RX OUTPUT	In the transmit mode, this output pin produces the PCM waveform for transmitting. In the receive mode, this output pin provides the comparison result and detects low if comparison is ok
18	VDD	The positive power supply pin of the UM3750A

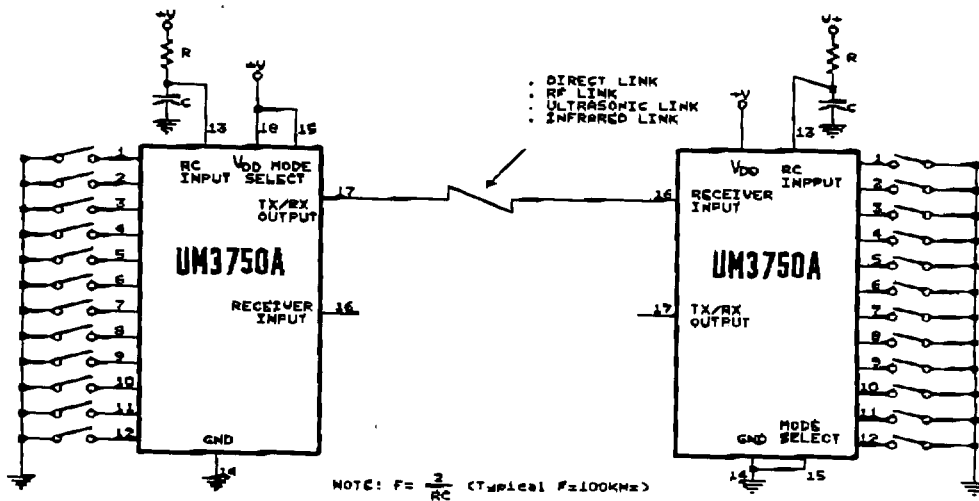
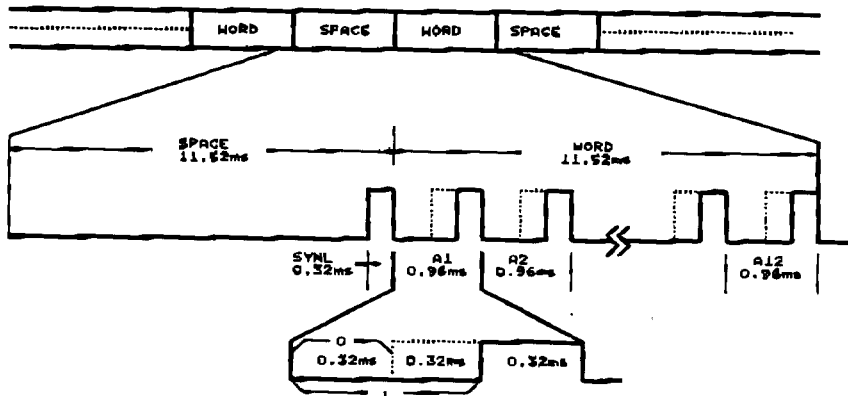
Note: The only difference between UM3750A and UM3750AM is that the latter has two extra NC pins.

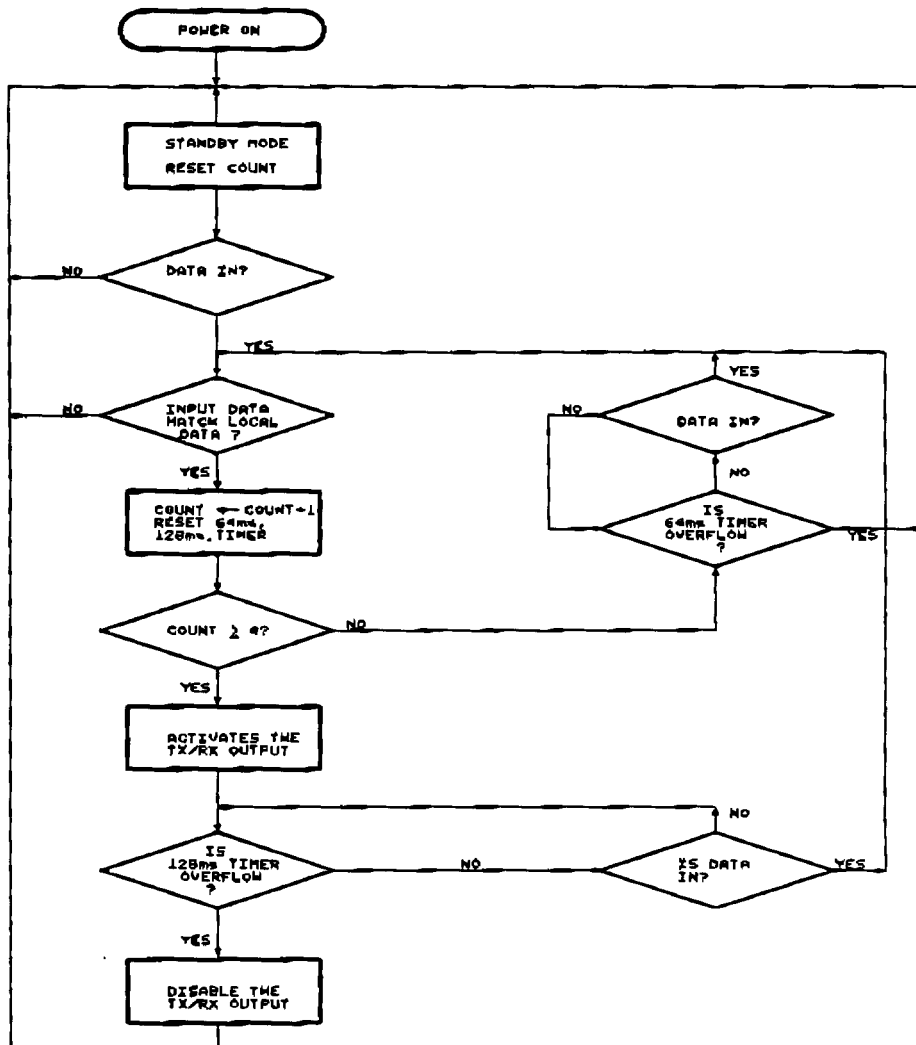
**Application Circuits (for reference only)**


Pin Connections for Receiver Mode



Pin Connections for Transmit Mode


**Output Waveform (based on 100 KHz)**


**Decoder Flowchart**

**Ordering Information**

Part No.	Package
UM3750A	18L DIP
UM3750AM	20L SOP