UMC

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# UM3758 Series

PRELIMINARY

## Tri-State Programmable Encoder/Decoder

### Features

- Single-chip CMOS construction
- Single-chip encoder/decoder selected by jump wire
- Wide operating voltage range —— $V_{DD}$ = 3 to 12 Volts
- Built-in RC oscillator (can use 5 % resistor)
- Easy interface with RF, Infrared(IR) and Ultrasonic transmission media
- Tri-state(0, 1, open) address codes, some of address codes used as data codes or as internal addresses by mask option.
- Internal address code is 18-bit, ie $3^{18}$ = 387,420, 489 different codes at most.
- Decoder has 8-bit latch data.
- Series IC for various application.
- UM3758-120A pin out compatible to UM3750.

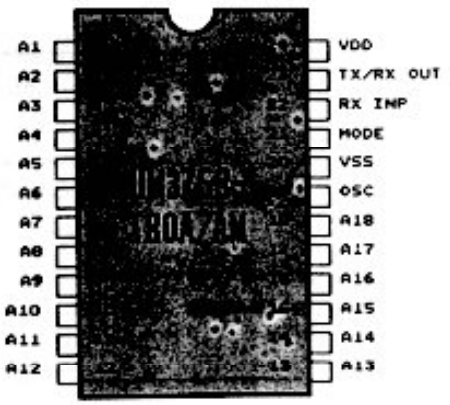
### General Description

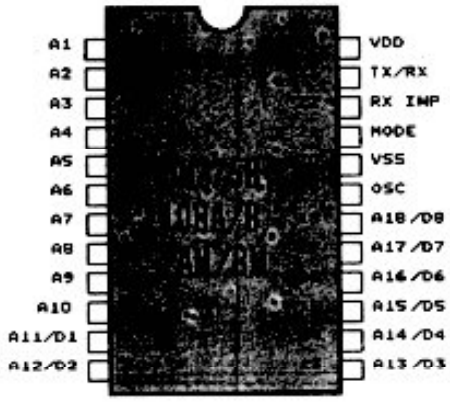
The UM3758 series are single-chip programmable encoder /decoder ICs, fabricated in CMOS structure for low power consumption. They are enhanced for new stage encoder/decoder ICs to provide many more combinations for higher security.

Most combinations are achieved by UM3758-180A, providing $3^{18}$ = 387,420,489 combinations. Some ICs of this series provide 4 to 8 data bits for controlling.

According to the following information, The internal address bits, 18 bits/24-pin and 12 bits/18-pin package, can be assigned by customer in advance for much higher security and confidentiality. Whenever the address codes of transmitter transmits, the receiver will check the address codes with his own the successive two matched address codes will generate low pulse. If there were any data bits, the receiver will latch these data bits at the corresponding pins for controlling.

### Pin Configurations



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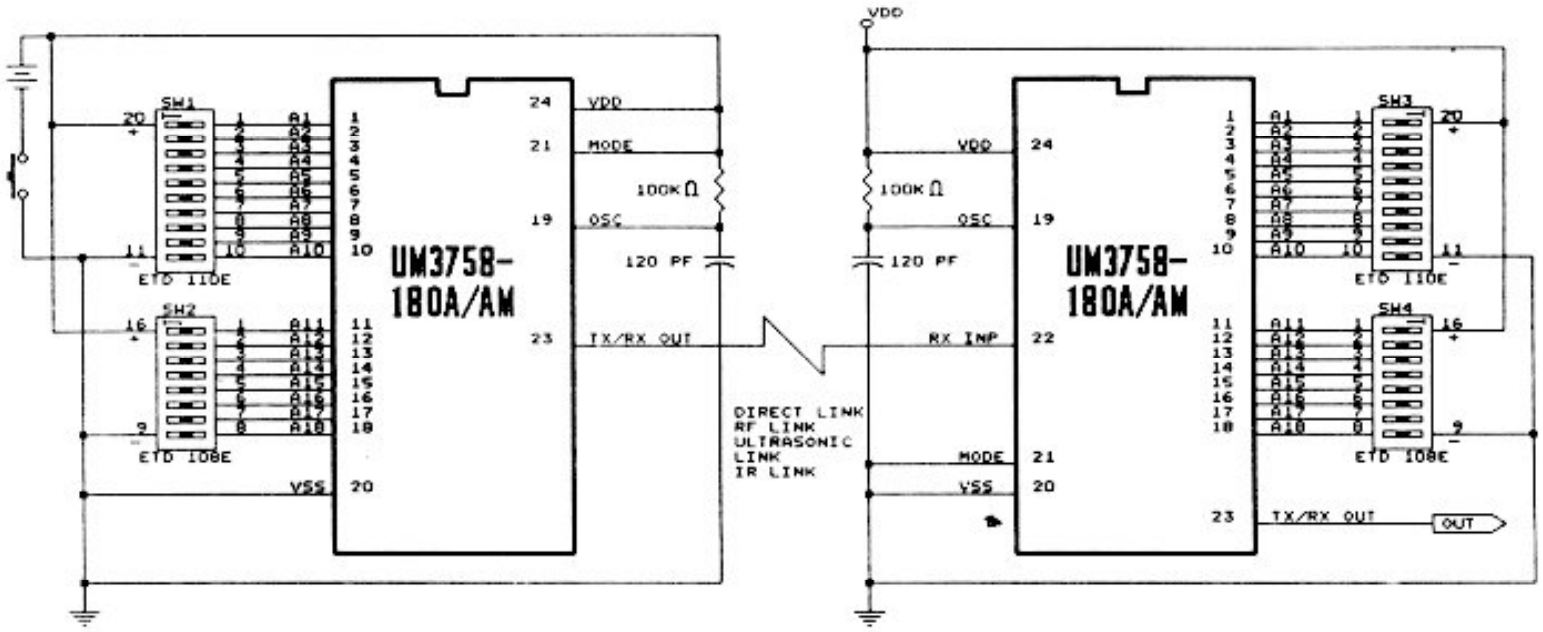
UMC has no sales or service functions in the U.S.A. and therefore does not intend to sell its products in this market.

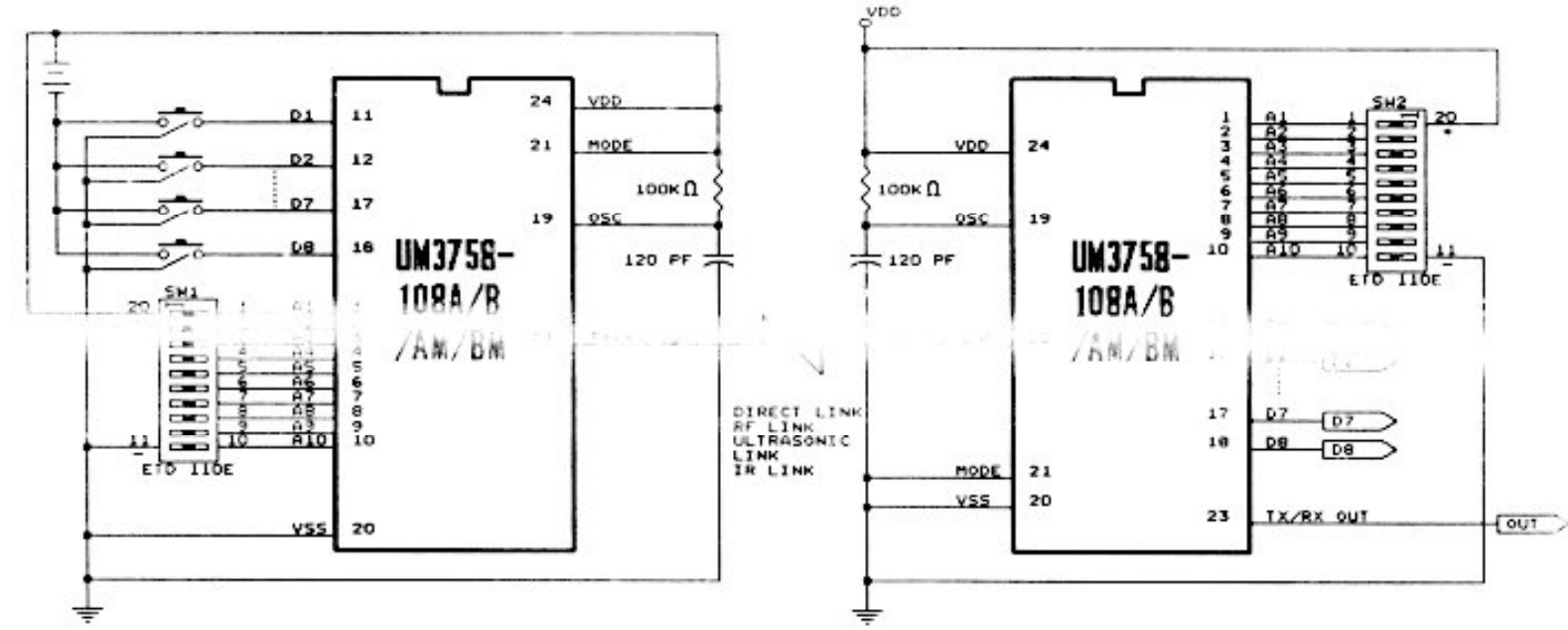
## Ordering Information

| Part No. | Address | Data | Data Output Type | Package Type |
|---|---|---|---|---|
| UM3758-180A | 18 | 0 | — | 24L DIP |
| UM3758-180AM | 18 | 0 | — | 24L SOP |
| UM3758-108A | 10 | 8 | LATCHED | 24L DIP |
| UM3758-108AM | 10 | 8 | LATCHED | 24L SOP |
| UM3758-108B | 10 | 8 | MOMENTARY | 24L DIP |
| UM3758-108BM | 10 | 8 | MOMENTARY | 24L SOP |
| UM3758-120A | 12 | 0 | — | 18L DIP |
| UM3758-120AM | 12 | 0 | — | 20L SOP |
| UM3758-084A | 8 | 4 | LATCHED | 18L DIP |
| UM3758-084AM | 8 | 4 | LATCHED | 20L SOP |
| UM3758-084B | 8 | 4 | MOMENTARY | 18L DIP |
| UM3758-084BM | 8 | 4 | MOMENTARY | 20L SOP |

## Application Circuit (Without Data Bit)



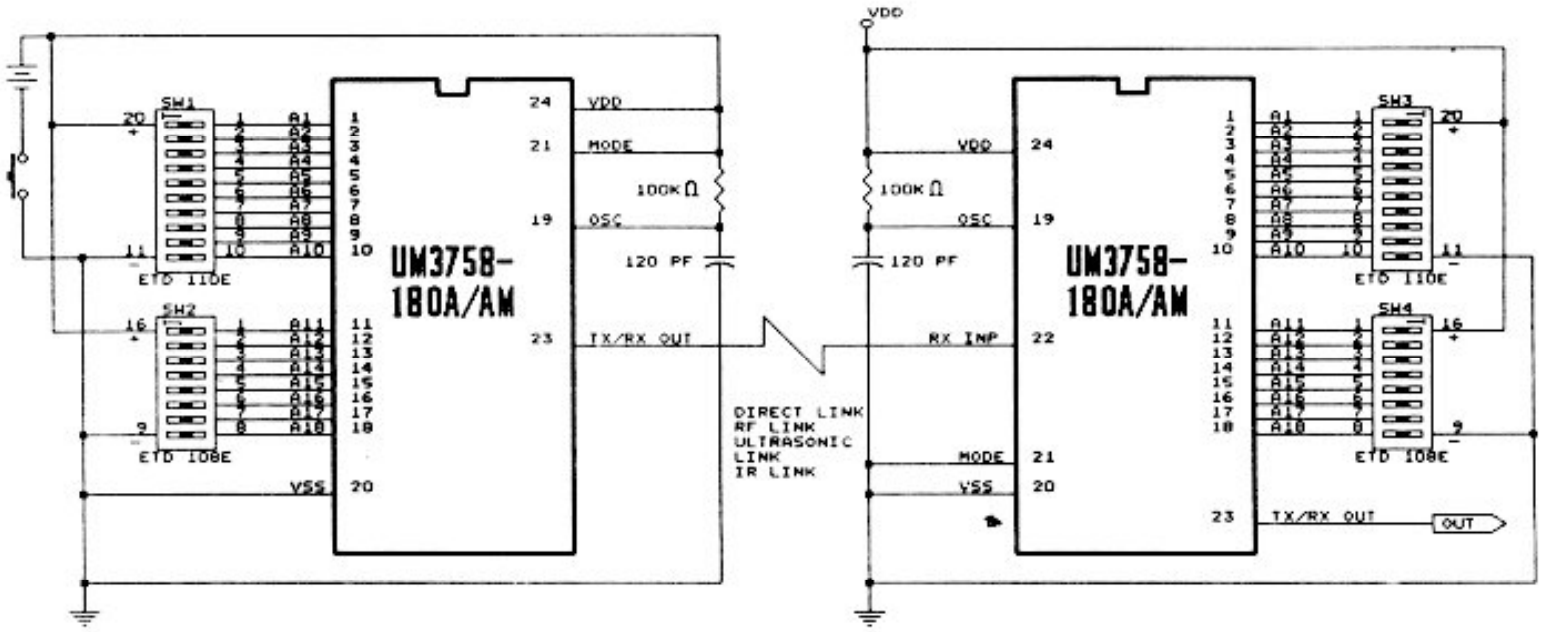

## Application Circuit (With Data Bit)



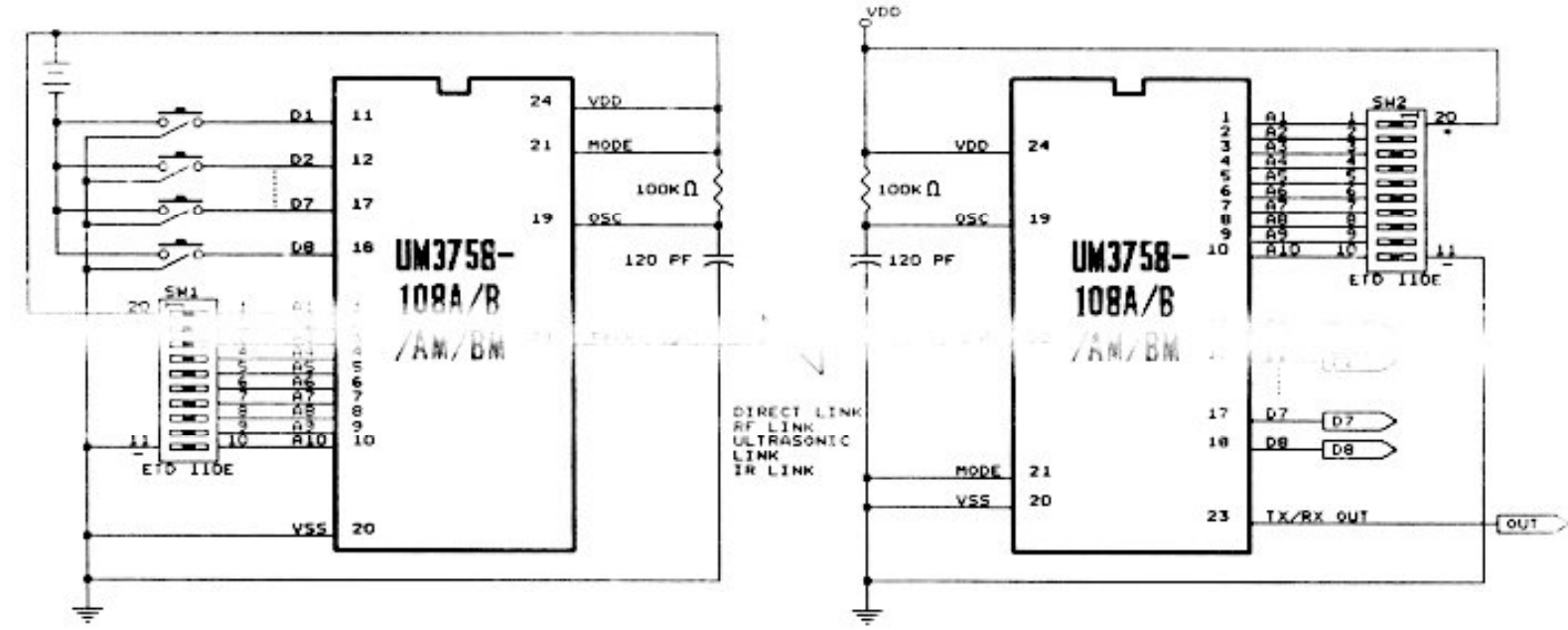

Note: ETD 108E — 8-Pin Tri – State DIP switch made by EXCEL CELL ELECTRONIC CO., LTD. IN TAIWAN R.O.C.

ETD 110E — 10-Pin Tri – State DIP switch made by EXCEL CELL ELECTRONIC CO., LTD. IN TAIWAN R.O.C.

## Application Circuit (Without Data Bit)



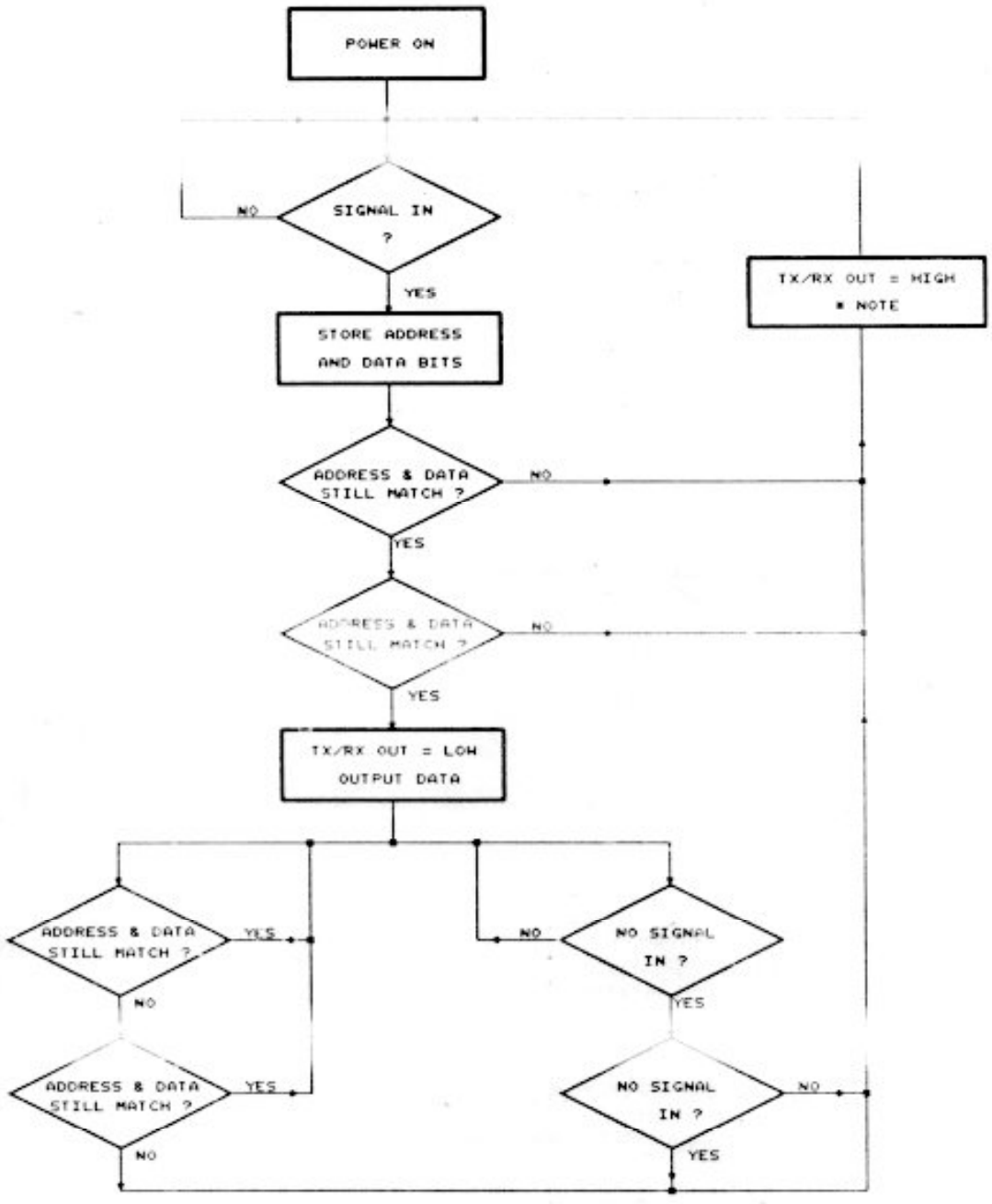

## Application Circuit (With Data Bit)




Note: ETD 108E — 8-Pin Tri – State DIP switch made by EXCEL CELL ELECTRONIC CO., LTD. IN TAIWAN R.O.C.

ETD 110E — 10-Pin Tri – State DIP switch made by EXCEL CELL ELECTRONIC CO., LTD. IN TAIWAN R.O.C.

## UM3758 Operation Flowchart (With Data Bit)




Note : LATCH Type ———————— Update latched data
MOMENTARY Type ——— Tri-state data output

## Tri-State Encoded Pulses

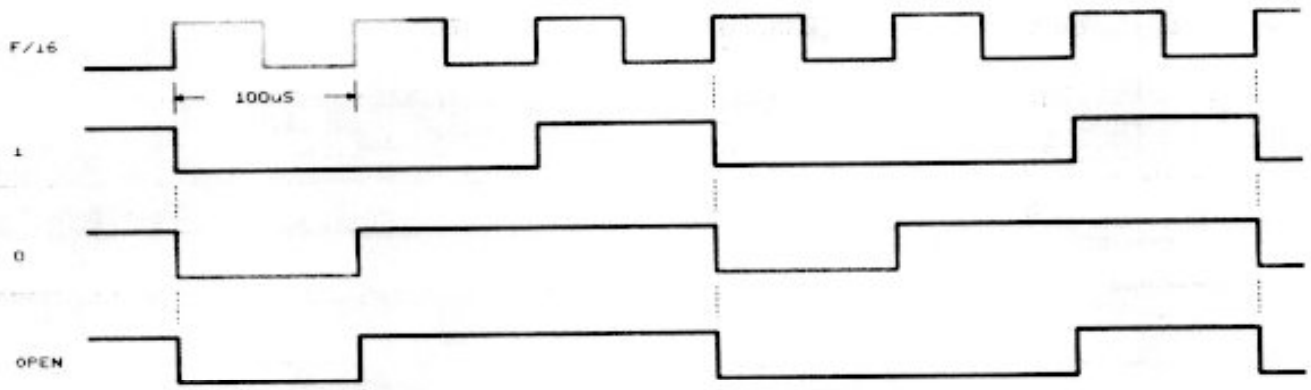



Fig. 1

## Encoder Mode

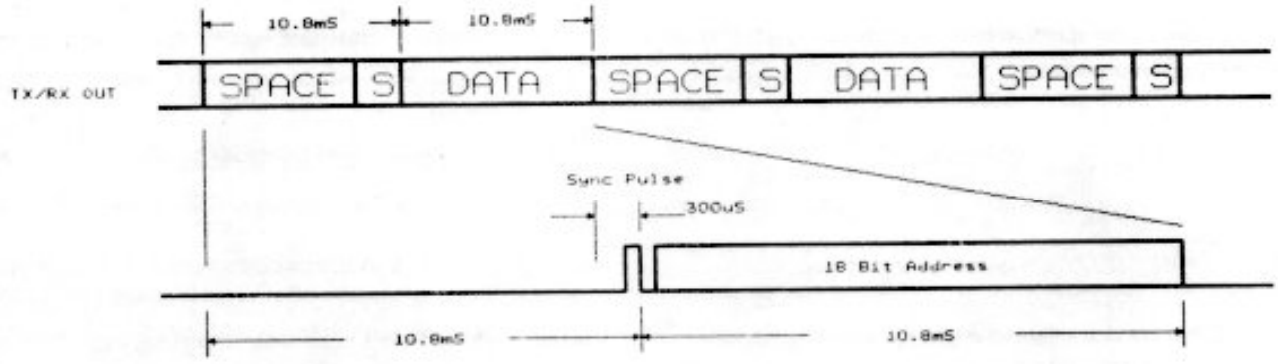



Fig. 2

## Decoder Mode (Without Data) :

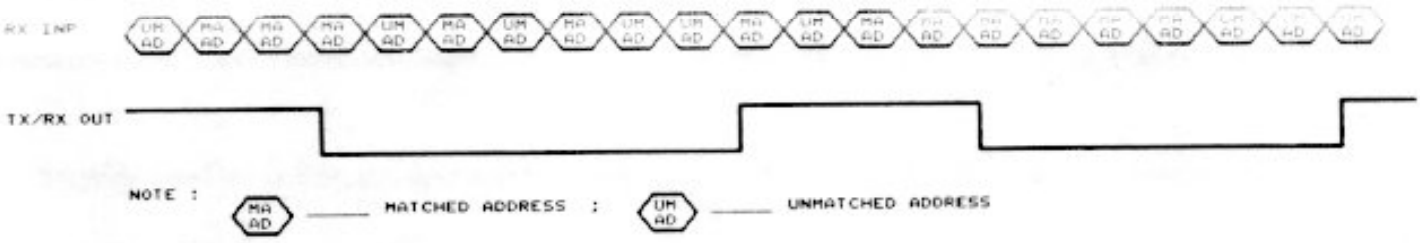



Fig. 3-1

| Part Number | Address Bits | Address Combinations | Data Bits | Data Combinations |
|---|---|---|---|---|
| UM3758-108A/ B/AM/BM | 10 | 59,049 | 8 | 256 |
| UM3758-084A/ B/AM/BM | 8 | 6,561 | 4 | 16 |

**Table1**

## Decoder Mode

The decoder mode is selected by connecting "MODE" pin to Vss.
The decoder receives the serial data from the detect circuit and outputs the comparison result or data, if it is valid. The received data may include two types — without data and with data.

For decoder without data IC , such as UM3758-180A and UM3758-120A the address word is examined bit by bit as received; if two successive address words match the address bits of decoder, the "TX/RX OUT" pin will switch to LOW and two successive unmatched address words will cause "TX/RX OUT" pin to return to HIGH (see Fig. 3-1).

For decoder with data IC, such as UM3758-108A/B and UM3758-084A/B, the address word with data word are examined bit by bit as received. The first 10 bits (ex. UM3758-108A/B) are assumed to be address bits. If the address bits match the address bits from detect circuit, the next eight data bits are stored and matched to the last valid data stored. When the second word with data is received, the address bits must match again, and if it does, the data bits are checked against the previous stored data bits, if the two words (eight bits data each) of data match, the data is transferred to the output data pins (D1, D2 to D8). If the decoder is momentary type, the data pins will latch the data till the "TX/RX OUT" pin switches to HIGH; for latch decoder, the data pins will latch the data till the next valid data appears (see Fig. 3-2). Although the address bits are tri-state (0, 1, open), the data information must be either one or zero. An open state will be decoded as a logic one. The above table (Table 1) also describes these (decoder with data).

## DC Electrical Characteristics

($T_A$ = 25°C , $V_{DD}$ = 9 Volts , Vss = 0V unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Operating voltage | $V_{DD}$ | 3.0 | – | 12 | V | |
| Operating current | Iop | – | – | 1.2 | mA | |
| Schmitt Trigger input level | Vsh<br>Vsl | 4<br>– | –<br>– | –<br>2 | V<br>V | HIGH<br>LOW |
| Other pins input level | Vih<br>Vil | 8.5<br>0 | –<br>– | 9<br>0.5 | V<br>V | HIGH<br>LOW |
| Output pin logic level | Voh<br>Vol | 8.5<br>0 | –<br>– | 9<br>1 | V<br>V | HIGH<br>LOW |
| DATA output current<br>HIGH level<br>LOW level | <br>Iohd<br>Iold | <br>10<br>10 | <br>–<br>– | <br>–<br>– | <br>mA<br>mA | $V_{DD}$ = 12V<br>Voh = 6V<br>Vol = 6V |
| TX/RX OUTput current<br>HIGH level<br>LOW level | <br>Ioht<br>Iolt | <br>40<br>20 | <br>–<br>– | <br>–<br>– | <br>mA<br>mA | $V_{DD}$ = 12V<br>Voh = 6V<br>Vol = 6V |
| Operating frequency | F | – | 160 | – | KHz | +15% exclusive of external part |

## Function Description

### General

The operating mode of the UM3758 series is controlled by the MODE pin. When the "MODE" pin is connected to $V_{DD}$ the circuit will automatically switch to encoder mode, then "TX/RX OUT" pin acts as data out pin and "RX INP" pin act as an idle pin; when "MODE" pin is connected to Vss the circuit will switch to decoder mode, then "TX/RX OUT" pin will switch to LOW if comparison is OK, otherwise this pin will keep HIGH, and "RX/INP" receives waveform from detect circuit.

### Encoder Mode

The encoder mode is selected by connecting "MODE" pin to $V_{DD}$.

The transmit sequence is initiated by the power connection and continuously transmits till power down. Each transmitted address bit is encoded into address pulses (see Fig. 1). A logic zero is encoded as two consecutive long pulses, a logic one as two consecutive short pulses and an open as a long pulse followed by a short pulse. Each transmitted data bit is encoded into logic zero or one and the data pulse is the same as the address pulse (see Fig. 1), ie., the state of data pin is either one or zero; the data is one when connected to $V_{DD}$ or open and zero when connected to Vss.

The UM3758-180A samples the 18 bit tri-state address and encodes this parallel address data for transmitting. These 18 address pins may be in either of three states (0, 1, open) allowing $3^{18}$ = 387,420,489 possible combinations then the UM3758-120A provides 12-bit address and allows $3^{12}$ = 531,441 possible combinations.

The UM3758-108A/B and UM3758-084A/B provide address bits and data bits, as described in Table 1.

## Pin Descriptions (Continued)

| Pin Number | | | Designation | Description |
|---|---|---|---|---|
| UM3758 -108A/B /AM/BM | UM3758 -084 A/B | UM3758 -084AM /BM | | |
| 11 | – | – | D1 | Data output pin 1, their states are either HIGH (1 or open) or LOW (0). |
| 12 | 9 | 9 | D2 | Data output pin 2, their states are either HIGH (1 or open) or LOW (0). |
| – | – | 10 | NC | No connection |
| – | – | 11 | NC | No connection |
| 13 | – | – | D3 | Data output pin 3, their states are either HIGH (1 or open) or LOW (0). |
| 14 | – | – | D4 | Data output pin 4, their states are either HIGH (1 or open) or LOW (0). |
| 15 | 10 | 12 | D5 | Data output pin 5, their states are either HIGH (1 or open) or LOW (0). |
| 16 | 11 | 13 | D6 | Data output pin 6, their states are either HIGH (1 or open) or LOW (0). |
| 17 | 12 | 14 | D7 | Data output pin 7, their states are either HIGH (1 or open) or LOW (0). |
| 18 | – | – | D8 | Data output pin 8, their states are either HIGH (1 or open) or LOW (0). |
| 19 | 13 | 15 | OSC | R.C. input pin for single pin oscillator,A resistor is connected from this pin to $V_{DD}$ and a capacitor to $V_{SS}$. |
| 20 | 14 | 16 | $V_{SS}$ | The ground pin for UM3758 |
| 21 | 15 | 17 | MODE | This pin is used to select transmit or receive mode.<br>MODE — $V_{DD}$ : Encoder mode<br>MODE — $V_{SS}$ : Decoder mode |
| 22 | 16 | 18 | RXINP | Receiver input pin. Receives waveform from the detect circuit. |
| 23 | 17 | 19 | TX/RX OUT | In encoder mode, this pin will transmit waveform; in decoder mode, this pin will switch to LOW if comparison is OK. |
| 24 | 18 | 20 | $V_{DD}$ | The positive power supply of UM3758 |

## Pin Descriptions (Continued)

| Pin Number | | | Designation | Description |
|---|---|---|---|---|
| UM3758 -180A /AM | UM3758 -120A | UM3758 -120AM | | |
| 22 | 16 | 18 | RXINP | Receiver input pin. Receives waveform from the detect circuit. |
| 23 | 17 | 19 | TX/RX OUT | In encoder mode, this pin will transmit waveform; in decoder mode, this pin will switch to LOW if comparison is OK. |
| 24 | 18 | 20 | $V_{DD}$ | The positive power supply of UM3758 |

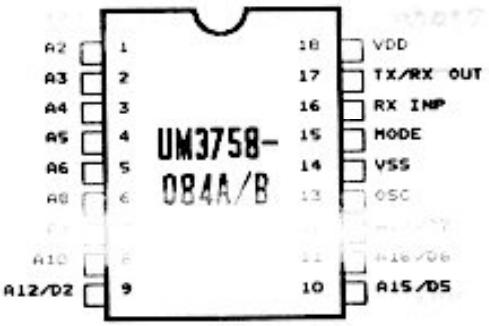
## Pin Descriptions
## 2. UM3758-108A/B/AM/BM, UM3758-084A/B and UM3758-084AM/BM

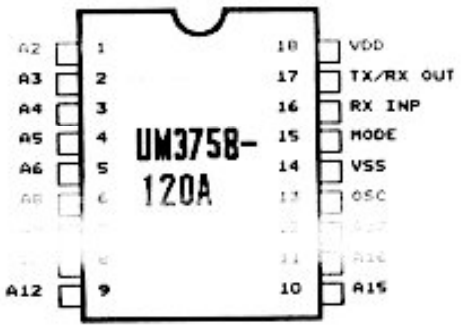
| Pin Number | | | Designation | Description |
|---|---|---|---|---|
| UM3758 -108A/B /AM/BM | UM3758 -084 A/B | UM3758 -084AM /BM | | |
| 1 | – | – | A1 | Address select line 1 is tri-state indicated as 0, 1 and open. |
| 2 | 1 | 1 | A2 | Address select line 2 is tri-state indicated as 0, 1 and open. |
| 3 | 2 | 2 | A3 | Address select line 3 is tri-state indicated as 0, 1 and open. |
| 4 | 3 | 3 | A4 | Address select line 4 is tri-state indicated as 0, 1 and open. |
| 5 | 4 | 4 | A5 | Address select line 5 is tri-state indicated as 0, 1 and open. |
| 6 | 5 | 5 | A6 | Address select line 6 is tri-state indicated as 0, 1 and open. |
| 7 | – | – | A7 | Address select line 7 is tri-state indicated as 0, 1 and open. |
| 8 | 6 | 6 | A8 | Address select line 8 is tri-state indicated as 0, 1 and open. |
| 9 | 7 | 7 | A9 | Address select line 9 is tri-state indicated as 0, 1 and open. |
| 10 | 8 | 8 | A10 | Address select line 10 is tri-state indicated as 0,1 and open. |

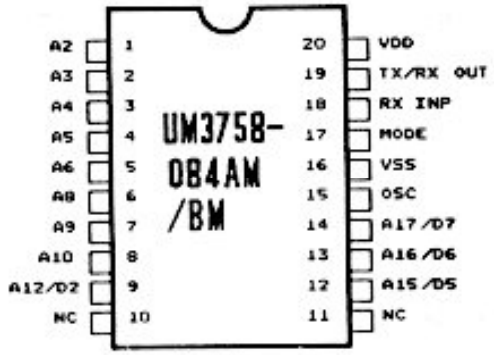
## Pin Descriptions (Continued)

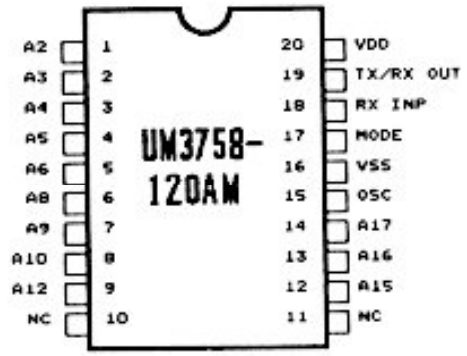
| Pin Number | | | Designation | Description |
|---|---|---|---|---|
| UM3758 -180A /AM | UM3758 -120A | UM3758 -120AM | | |
| 8 | 6 | 6 | A8 | Address select line 8 is tri-state indicated as 0, 1 and open. |
| 9 | 7 | 7 | A9 | Address select line 9 is tri-state indicated as 0, 1 and open. |
| 10 | 8 | 8 | A10 | Address select line 10 is tri-state indicated as 0, 1 and open. |
| 11 | – | – | A11 | Address select line 11 is tri-state indicated as 0, 1 and open. |
| 12 | 9 | 9 | A12 | Address select line 12 is tri-state indicated as 0, 1 and open. |
| – | – | 10 | NC | No connection |
| – | – | 11 | NC | No connection |
| 13 | – | – | A13 | Address select line 13 is tri-state indicated as 0, 1 and open. |
| 14 | – | – | A14 | Address select line 14 is tri-state indicated as 0, 1 and open. |
| 15 | 10 | 12 | A15 | Address select line 15 is tri-state indicated as 0, 1 and open. |
| 16 | 11 | 13 | A16 | Address select line 16 is tri-state indicated as 0, 1 and open. |
| 17 | 12 | 14 | A17 | Address select line 17 is tri-state indicated as 0, 1 and open. |
| 18 | – | – | A18 | Address select line 18 is tri-state indicated as 0, 1 and open. |
| 19 | 13 | 15 | OSC | R.C. input pin for single pin oscillator,A resistor is connected from this pin to $V_{DD}$ and a capacitor to Vss. |
| 20 | 14 | 16 | Vss | The ground pin for UM3758 |
| 21 | 15 | 17 | MODE | This pin is used to select transmit or receive mode.<br>MODE — $V_{DD}$ : Encoder mode<br>MODE — Vss : Decoder mode |

## Pin Configurations (Continued)




## Pin Descriptions

### 1. UM3758-180A/AM, UM3758-120A and UM3758-120AM

| Pin Number | | | Designation | Description |
|---|---|---|---|---|
| UM3758 -180A /AM | UM3758 -120A | UM3758 -120AM | | |
| 1 | – | – | A1 | Address select lines 1 is tri-state indicated as 0, 1 and open. |
| 2 | 1 | 1 | A2 | Address select lines 2 is tri-state indicated as 0, 1 and open. |
| 3 | 2 | 2 | A3 | Address select line 3 is tri-state indicated as 0, 1 and open. |
| 4 | 3 | 3 | A4 | Address select line 4 is tri-state indicated as 0, 1 and open. |
| 5 | 4 | 4 | A5 | Address select line 5 is tri-state indicated as 0, 1 and open. |
| 6 | 5 | 5 | A6 | Address select line 6 is tri-state indicated as 0, 1 and open. |
| 7 | – | – | A7 | Address select line 7 is tri-state indicated as 0, 1 and open. |