


**UNISONIC TECHNOLOGIES CO.,**
**UT912E**
**CMOS IC**

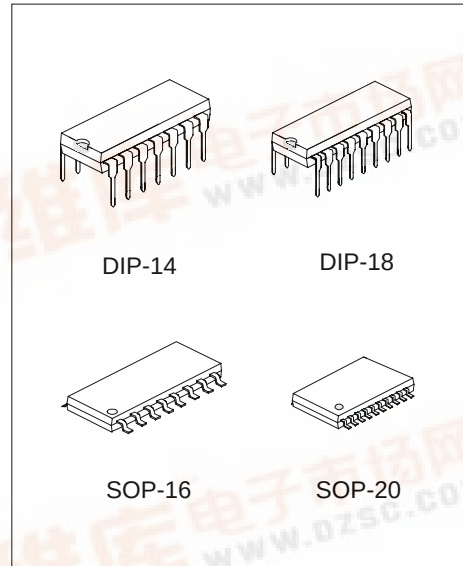
## ENCODER FOR REMOTE CONTROLLER

### ■ DESCRIPTION

The UTC **UT912E** of CMOS LSIs for remote control system applications is 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 by a RF or an infrared transmission medium upon receipt of a trigger signal.

### ■ FEATURES

- \* Operating voltage: 2.4V ~ 12V
- \* Low power and high noise immunity CMOS technology
- \* Low standby current (**0.1  $\mu$  A** (typ.) at  $V_{DD}=5V$ )
- \* Minimum transmission word (Four words)
- \* Built-in oscillator needs only 5% resistor
- \* Data code has positive polarity
- \* Minimal external components



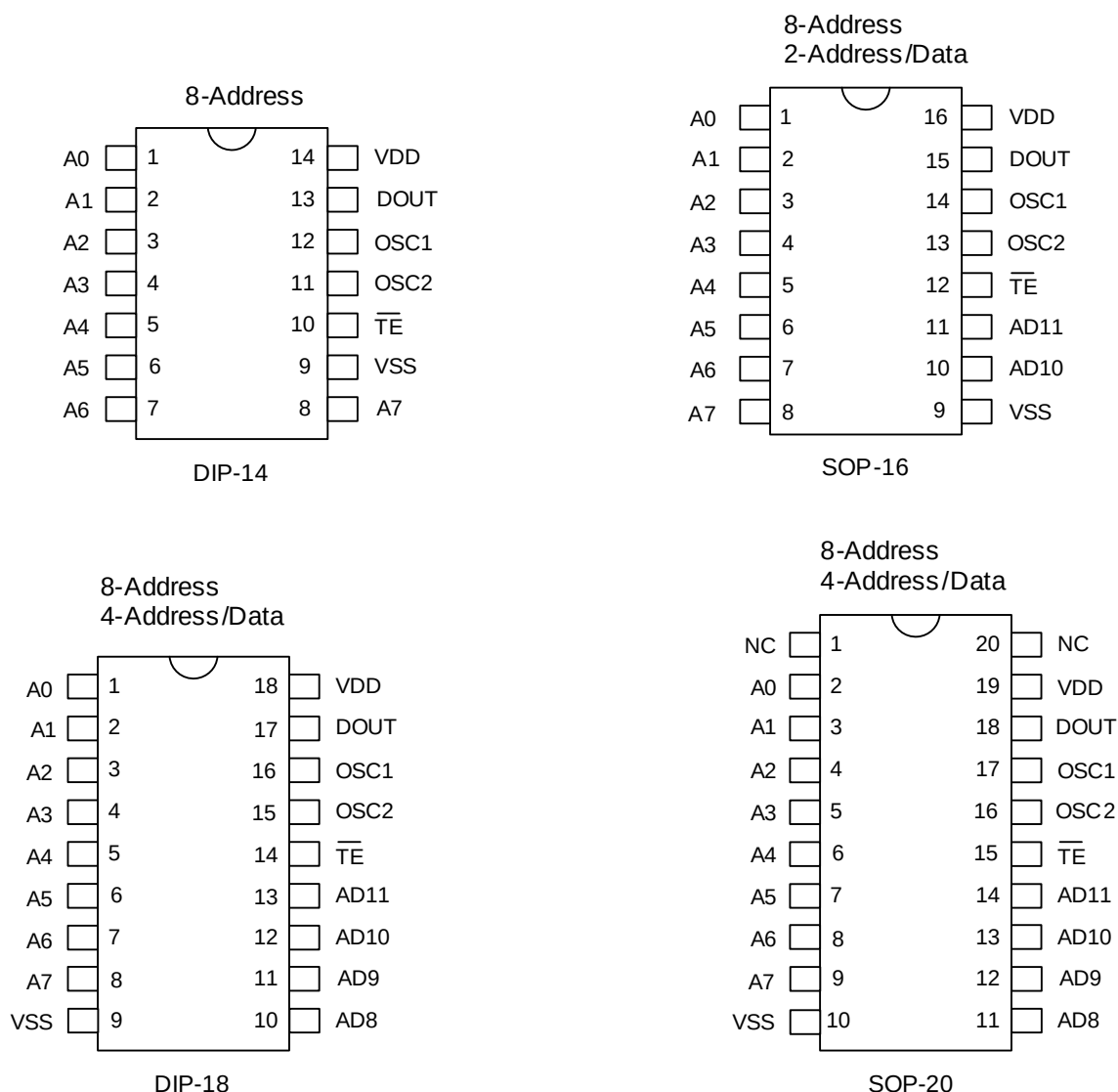
\*Pb-free plating product number: UT912EL

### ■ ORDERING INFORMATION

| Ordering Number |                   | Package | Packing   |
|-----------------|-------------------|---------|-----------|
| Normal          | Lead Free Plating |         |           |
| UT912E-D14-T    | UT912EL-D14-T     | DIP-14  | Tube      |
| UT912E-D18-T    | UT912EL-D18-T     | DIP-18  | Tube      |
| UT912E-S16-T    | UT912EL-S16-T     | SOP-16  | Tube      |
| UT912E-S16-R    | UT912EL-S16-R     | SOP-16  | Tape Reel |
| UT912E-S20-T    | UT912EL-S20-T     | SOP-20  | Tube      |
| UT912E-S20-R    | UT912EL-S20-R     | SOP-20  | Tape Reel |



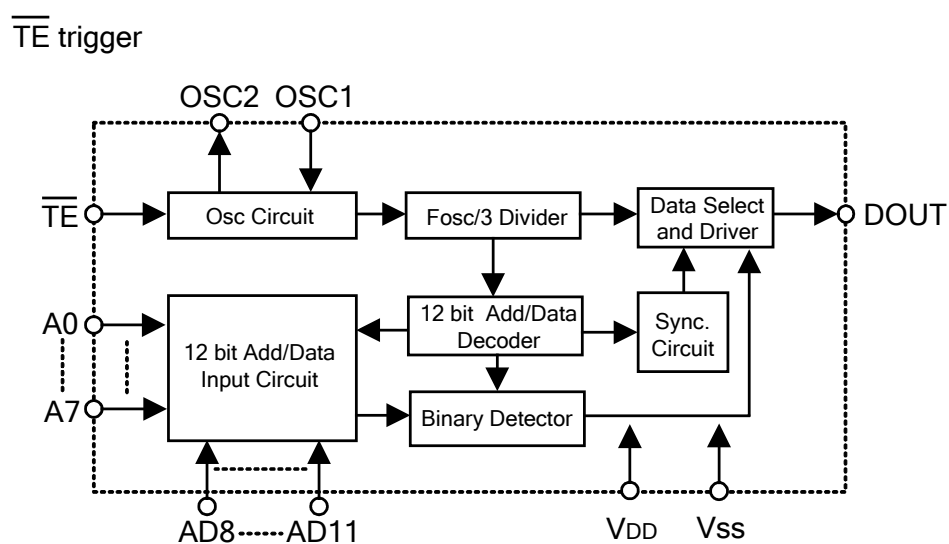
## PIN CONFIGURATION



## PIN DESCRIPTION

| PIN NAME        | I/O | INTERNAL CONNECTION                        | DESCRIPTION                                                                                            |
|-----------------|-----|--------------------------------------------|--------------------------------------------------------------------------------------------------------|
| A0 ~ A7         | I   | NMOS TRANSMISSION<br>GATE PROTECTION DIODE | Input pins for address A0 ~ A7 setting<br>These pins can be externally set to VSS or left open         |
| AD8 ~ AD11      | I   | NMOS TRANSMISSION<br>GATE PROTECTION DIODE | Input pins for address/data AD8 ~ AD11 setting<br>These pins can be externally set to VSS or left open |
| DOUT            | O   | CMOS OUT                                   | Encoder data serial transmission output                                                                |
| $\overline{TE}$ | I   | CMOS IN Pull-high                          | Transmission enable, active low                                                                        |
| OSC1            | I   | OSCILLATOR 1                               | Oscillator input pin                                                                                   |
| OSC2            | O   | OSCILLATOR 1                               | Oscillator output pin                                                                                  |
| V <sub>SS</sub> | I   |                                            | Negative power supply (GND)                                                                            |
| V <sub>DD</sub> | I   |                                            | Positive power supply                                                                                  |

## ■ BLOCK DIAGRAM



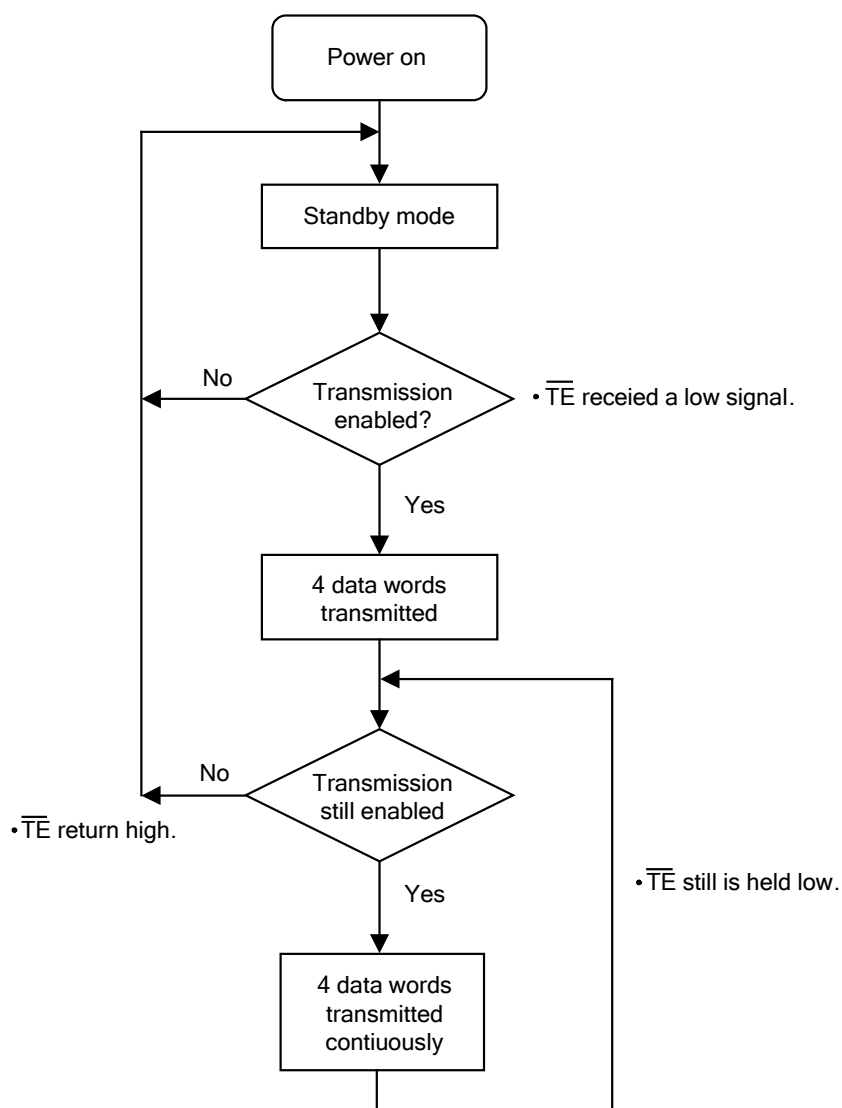
### ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER             | SYMBOL           | RATINGS                                     | UNIT |
|-----------------------|------------------|---------------------------------------------|------|
| Supply Voltage        | V <sub>DD</sub>  | -0.3 ~ +13                                  | V    |
| Input Voltage         | V <sub>IN</sub>  | V <sub>SS</sub> -0.3 ~ V <sub>DD</sub> +0.3 | V    |
| Operating Temperature | T <sub>OPR</sub> | 0 ~ +70                                     | °C   |
| Storage Temperature   | T <sub>STG</sub> | -40 ~ +150                                  | °C   |

### ■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified.)

| PARAMETER               |      | SYMBOL              | TEST CONDITIONS                              | MIN                | TYP  | MAX                | UNIT |
|-------------------------|------|---------------------|----------------------------------------------|--------------------|------|--------------------|------|
| Operating Voltage       |      | V <sub>DD</sub>     |                                              | 2.4                | 5    | 12                 | V    |
| Standby Current         |      | I <sub>STN-BY</sub> | Oscillator stops                             |                    | 0.1  | 1                  | μA   |
|                         |      |                     | V <sub>DD</sub> =3V                          |                    |      |                    |      |
|                         |      |                     | V <sub>DD</sub> =12V                         |                    | 2    | 4                  |      |
| Operating Current       |      | I <sub>OPR</sub>    | No load,<br>Fosc=3kHz                        |                    | 40   | 80                 | μA   |
|                         |      |                     | V <sub>DD</sub> =3V                          |                    |      |                    |      |
|                         |      |                     | V <sub>DD</sub> =12V                         |                    | 150  | 300                |      |
| Output Driver Current   |      | I <sub>DOUT</sub>   | V <sub>DD</sub> =5V                          |                    |      |                    | mA   |
|                         |      |                     | V <sub>OH</sub> =0.9V <sub>DD</sub> (Source) | -1                 | -1.6 |                    |      |
|                         |      |                     | V <sub>OL</sub> =0.1V <sub>DD</sub> (Sink)   | 1                  | 1.6  |                    |      |
| Input Voltage           | High | V <sub>IH</sub>     |                                              | 0.8V <sub>DD</sub> |      | V <sub>DD</sub>    | V    |
|                         | Low  | V <sub>IL</sub>     |                                              | 0                  |      | 0.2V <sub>DD</sub> | V    |
| Oscillator Frequency    |      | f <sub>osc</sub>    | R <sub>osc</sub> =1.1MΩ, V <sub>DD</sub> =5V |                    | 3    |                    | kHz  |
| TE Pull-high Resistance |      | R <sub>TE</sub>     | V <sub>TE</sub> =0V, V <sub>DD</sub> =5V     |                    | 1.5  | 3                  | MΩ   |

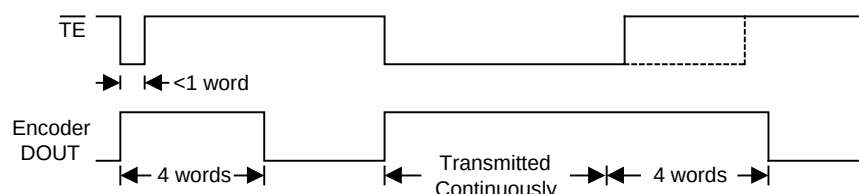
## ■ OPERATION FLOWCHART



## FUNCTIONAL DESCRIPTION

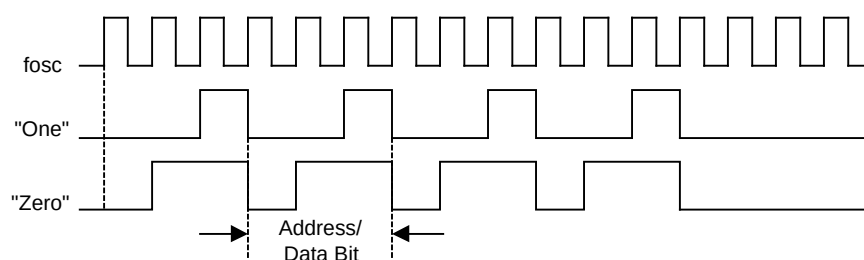
### Operation

The UTC **UT912E** start a cycle of 4-words transmission upon receipt of a transmission enable ( $\overline{TE}$ ). A completed cycle is showed as below. This cycle will repeat itself as long as the transmission enable is held low. While the transmission enable returns high the encoder output completes its final cycle and then stops.



### Address/data bit waveform

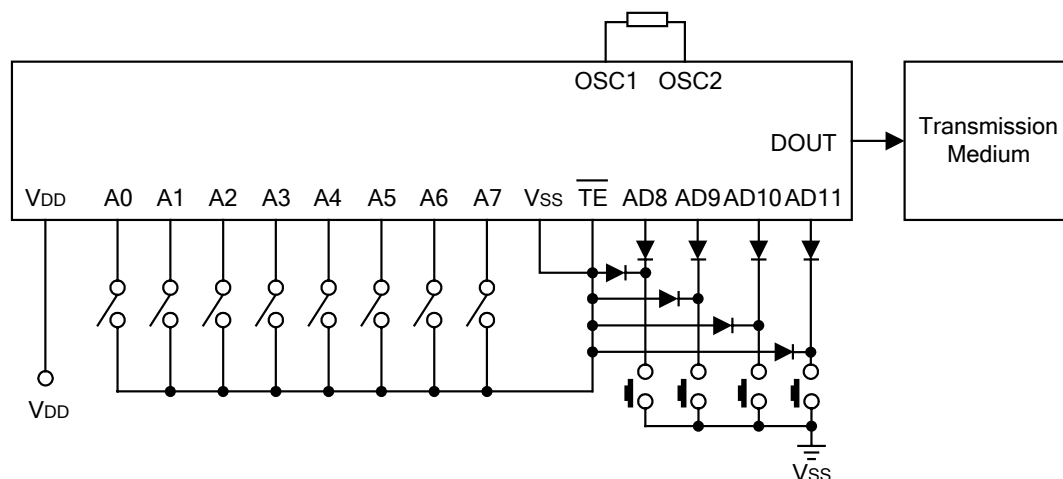
Each programmable address/data pin can be externally set to one of the following two logic states as shown below.



### 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. During information transmission these bits are transmitted with a preceding synchronization bit. If the trigger signal is not applied, the chip enters the standby mode and consumes a reduced current of less than  $1\mu A$  for a supply voltage of 5V.

The following figure shows an application using the UTC **UT912E**:



Transmitted information:

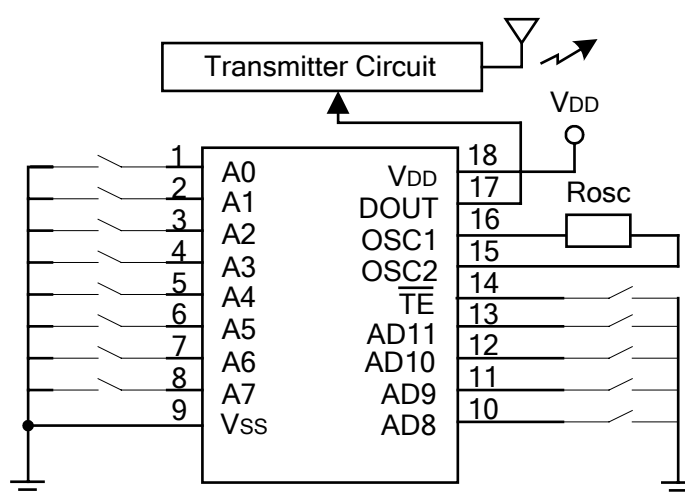
| Pilot & Sync. | A0 | A1 | A2 | A3 | A4 | A5 | A6 | A7 | AD8 | AD9 | AD10 | AD11 |
|---------------|----|----|----|----|----|----|----|----|-----|-----|------|------|
|               | 1  | 0  | 1  | 0  | 0  | 0  | 1  | 1  | 1   | 1   | 1    | 0    |

## Address/Data sequence

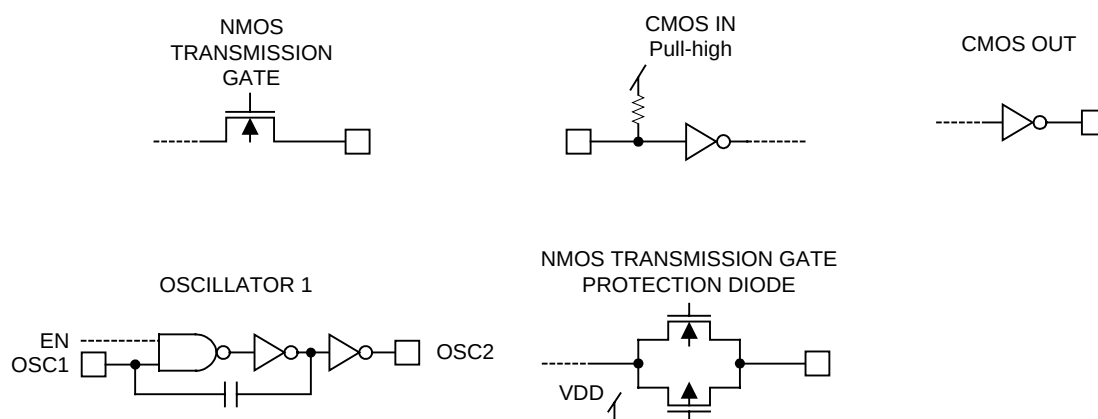
The following provides the address/data sequence table for various models of the UTC UT912E encoders. The correct device should be selected according to the individual address and data requirements.

| Bits             | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8   | 9   | 10   | 11   |
|------------------|----|----|----|----|----|----|----|----|-----|-----|------|------|
| Address/<br>Date | A0 | A1 | A2 | A3 | A4 | A5 | A6 | A7 | AD8 | AD9 | AD10 | AD11 |

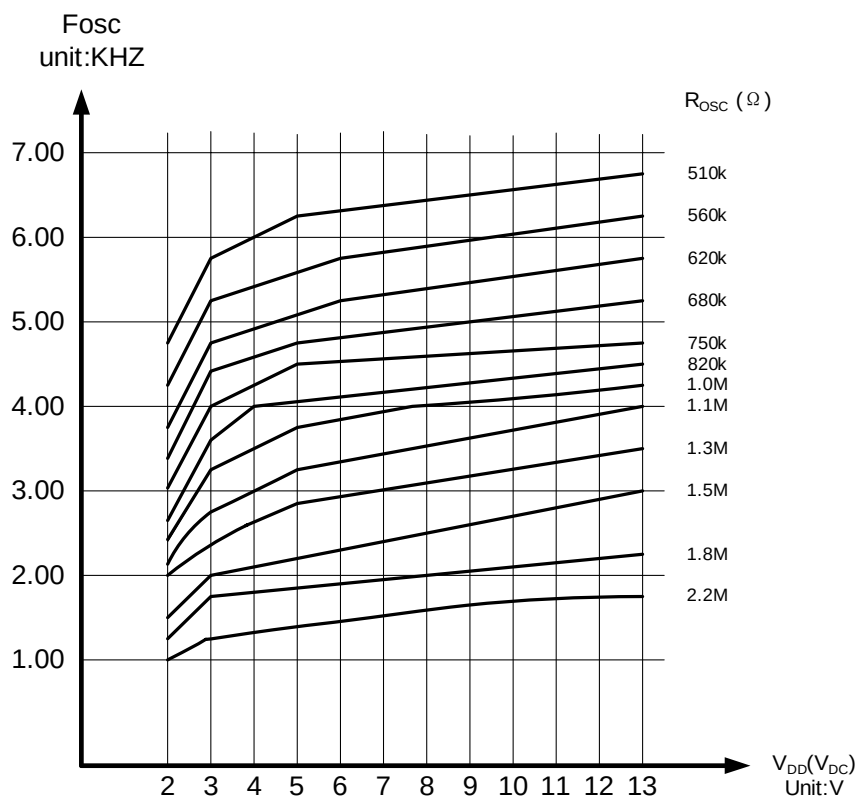
## TYPICAL APPLICATION CIRCUIT



## APPROXIMATE INTERNAL CONNECTIONS



# ■ OSCILLATOR FREQUENCY VS SUPPLY VOLTAGE



The recommended oscillator frequency is  $f_{OSCD} \text{ (decoder)} \cong 50f_{OSCE} \text{ (UT912E encoder)}$

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