Appendix A

The code :-

Project :control and mitigation of Drinking water losses in distribution system

```
Version :2.5.3
Date    : 20/09/2013
Author  : Adam Mohamed Ibrahim
Company : Sudan  University  of science and technology
Chip type             : ATmega32
Program type          : Application
AVR Core Clock frequency: 4.000000 MHz
Memory model          : Small
External RAM size     : 0
Data Stack size       : 512
/*****************************************************/

#include <mega32.h>

#include <delay.h>

// Alphanumeric LCD functions
#include <alcd.h>

// Standard Input/Output functions
#include <stdio.h>

// Timer 0 overflow interrupt service routine
interrupt [TIM0_OVF] void timer0_ovf_isr(void)
{
// Place your code here

}

#define ADC_VREF_TYPE 0x00

// Read the AD conversion result
unsigned int read_adc(unsigned char adc_input)
{
ADMUX=adc_input | (ADC_VREF_TYPE & 0xff);
```

```
// Delay needed for the stabilization of the ADC input voltage
delay_us(10);
// Start the AD conversion
ADCSRA|=0x40;
// Wait for the AD conversion to complete
while ((ADCSRA & 0x10)==0);
ADCSRA|=0x10;
return ADCW;
}
 unsigned adc_value;
   // Declare your global variables here

void main(void)
{

// Declare your local variables here

// Input/Output Ports initialization
// Port A initialization
// Func7=In Func6=In Func5=In Func4=In Func3=In Func2=In Func1=In
Func0=In
// State7=T State6=T State5=T State4=T State3=T State2=T State1=T
State0=T
PORTA=0x00;
DDRA=0x00;

// Port B initialization
// Func7=In Func6=Out Func5=Out Func4=Out Func3=Out Func2=Out
Func1=Out Func0=Out
// State7=T State6=0 State5=0 State4=0 State3=0 State2=0 State1=0
State0=0
PORTB=0x00;
DDRB=0x7F;
// Port C initialization
// Func7=In Func6=In Func5=In Func4=In Func3=In Func2=In Func1=In
Func0=In
// State7=T State6=T State5=T State4=T State3=T State2=T State1=T
State0=T
PORTC=0x00;
DDRC=0x00;
```

```
// Port D initialization
// Func7=Out Func6=Out Func5=Out Func4=Out Func3=Out Func2=Out
Func1=Out Func0=Out
// State7=0 State6=0 State5=0 State4=0 State3=0 State2=0 State1=0
State0=0
PORTD=0x00;
DDRD=0xFF;

// USART initialization
// Communication Parameters: 8 Data, 1 Stop, No Parity
// USART Receiver: On
// USART Transmitter: On
// USART Mode: Asynchronous
// USART Baud Rate: 9600
UCSRA=0x00;
UCSRB=0x18;
UCSRC=0x86;
UBRRH=0x00;
UBRRL=0x19;
// ADC initialization
// ADC Clock frequency: 1000.000 kHz
// ADC Voltage Reference: AREF pin
ADMUX=ADC_VREF_TYPE & 0xff;
ADCSRA=0x82;

// Alphanumeric LCD initialization
// Connections are specified in the
// Project|Configure|C Compiler|Libraries|Alphanumeric LCD menu:
// RS - PORTC Bit 0
// RD - PORTC Bit 1
// EN - PORTC Bit 2
// D4 - PORTC Bit 4
// D5 - PORTC Bit 5
// D6 - PORTC Bit 6
// D7 - PORTC Bit 7
// Characters/line: 16
lcd_init(16);
```

```
// Global enable interrupts
#asm("sei")
while (1)
      {
      adc_value=read_adc(0);
     if(adc_value>200&&adc_value<300)
   {PORTB.0=1;
     delay_us(1500);
      PORTB.0=0;
      lcd_putsf("pressure is meduim in sensor one");
      delay_ms(1000);
      lcd_clear();
      lcd_putsf("open the valve  one");
      delay_ms(1000);
      lcd_clear();
    }
   if(adc_value>=300)
      {
      PORTB.0=1;
      delay_us(2000);
      PORTB.0=0;
     lcd_putsf("pressure high in   sensor one");
      delay_ms(1000);
     lcd_clear();
     lcd_putsf("turn off valve   one");
     delay_ms(1000);
     lcd_clear();
     }
     if(adc_value<=200)
     {
     PORTB.0=1;
     delay_us(1000);
      PORTB.0=0;
     lcd_putsf("pressure is low in sensor one");
      delay_ms(1000);
       lcd_clear();
      lcd_putsf("turn on the valve one" );
       delay_ms(1000);
       lcd_clear();
     }
```

```
// *******The operation of the sensor two and valve  two********
 adc_value=read_adc(1);
if(adc_value>200&&adc_value<300)
{
PORTB.1=1;
delay_us(1500);
 PORTB.1=0;
lcd_putsf("pressure is meduim in sensor two");
delay_ms(1000);
 lcd_clear();
lcd_putsf("open the valve two or check");
 delay_ms(1000);
 lcd_clear();
}
 if(adc_value>=300)
 {
PORTB.1=1;
delay_us(2000);
 PORTB.1=0;
lcd_putsf("pressure is high in sensor two");
 delay_ms(1000);
 lcd_clear();
lcd_putsf("turn off valuve two");
 delay_ms(1000);
 lcd_clear();
}
if(adc_value<=200)
{
PORTB.1=1;
delay_us(1000);
 PORTB.1=0;
 lcd_clear();
 lcd_putsf("pressure is low in sensor two");
delay_ms(2000);
lcd_clear();
lcd_putsf("check the valve two for leak");
 delay_ms(1000);
 lcd_clear();
 }
```

```
// *******The operation of sensor and valve three *************
   adc_value=read_adc(2);
   if(adc_value>200&&adc_value<300)
   {
   PORTB.2=1;
   delay_us(1500);
    PORTB.2=0;
   lcd_putsf("pressure is meduim in sensor three");
    delay_ms(1000);
    lcd_clear();
   lcd_putsf("Open the valve  three or check for leak");
    delay_ms(1000);
    lcd_clear();
    }
   if(adc_value>=300)
   {
    PORTB.2=1;
   delay_us(2000);
    PORTB.2=0;
   lcd_putsf("pressure is high in sensor three");
   delay_ms(1000);
   lcd_clear();
   lcd_putsf("please turn off the valve three");
    delay_ms(1000);
    lcd_clear();
    }
    if(adc_value<=200)
    {
   PORTB.2=1;
   delay_us(1000);
    PORTB.2=0;
   lcd_putsf("pressure low in sensor three");
   delay_ms(1000);
     lcd_clear();
     lcd_putsf("check the valve3 for leak");
       delay_ms(1000);
      lcd_clear();}
   }
   }
```

Appendix B

liquid pressure sensor modeling cicruit:-

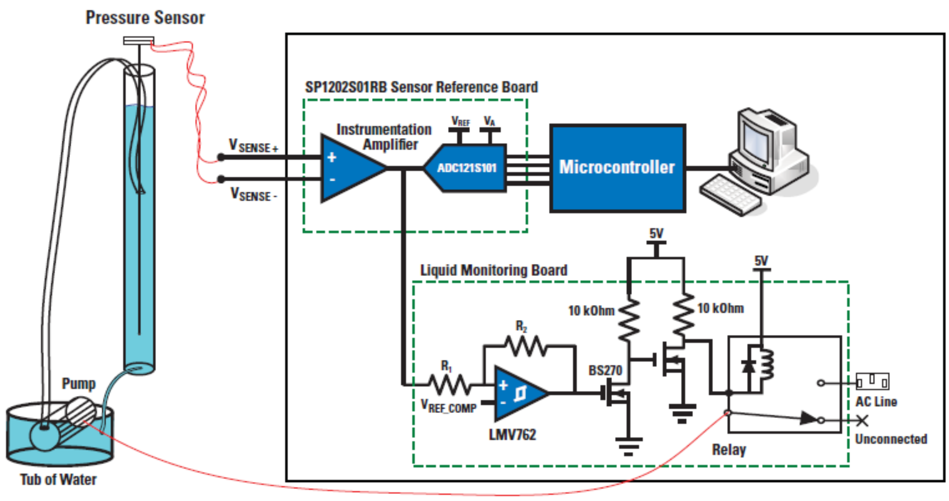


Figure 7. Liquid Monitoring System

Electrical Characteristics(1)

Parameter	Test Conditions	LM741A			LM741			LM741C			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$T_A = 25°C$										
	$R_S \le 10\ k\Omega$					1.0	5.0		2.0	6.0	mV
	$R_S \le 50\Omega$		0.8	3.0							
	$T_{AMIN} \le T_A \le T_{AMAX}$										
	$R_S \le 50\Omega$			4.0							mV
	$R_S \le 10\ k\Omega$						6.0			7.5	
Average Input Offset Voltage Drift				15							μV/°C

Electrical Characteristics[1] (continued)

Parameter	Test Conditions	LM741A			LM741			LM741C			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage Adjustment Range	T_A = 25°C, V_S = ±20V	±10				±15			±15		mV
Input Offset Current	T_A = 25°C		3.0	30		20	200		20	200	nA
	$T_{AMIN} \le T_A \le T_{AMAX}$			70		85	500			300	
Average Input Offset Current Drift				0.5							nA/°C
Input Bias Current	T_A = 25°C		30	80		80	500		80	500	nA
	$T_{AMIN} \le T_A \le T_{AMAX}$			0.210			1.5			0.8	μA
Input Resistance	T_A = 25°C, V_S = ±20V	1.0	6.0		0.3	2.0		0.3	2.0		MΩ
	$T_{AMIN} \le T_A \le T_{AMAX}$, V_S = ±20V	0.5									
Input Voltage Range	T_A = 25°C							±12	±13		V
	$T_{AMIN} \le T_A \le T_{AMAX}$				±12	±13					
Large Signal Voltage Gain	T_A = 25°C, $R_L \ge 2$ kΩ										V/mV
	V_S = ±20V, V_O = ±15V	50									
	V_S = ±15V, V_O = ±10V				50	200		20	200		
	$T_{AMIN} \le T_A \le T_{AMAX}$, $R_L \ge 2$ kΩ,										V/mV
	V_S = ±20V, V_O = ±15V	32									
	V_S = ±15V, V_O = ±10V				25			15			
	V_S = ±5V, V_O = ±2V	10									
Output Voltage Swing	V_S = ±20V										V
	$R_L \ge 10$ kΩ	±16									
	$R_L \ge 2$ kΩ	±15									
	V_S = ±15V										V
	$R_L \ge 10$ kΩ				±12	±14		±12	±14		
	$R_L \ge 2$ kΩ				±10	±13		±10	±13		
Output Short Circuit Current	T_A = 25°C	10	25	35		25			25		mA
	$T_{AMIN} \le T_A \le T_{AMAX}$	10		40							
Common-Mode Rejection Ratio	$T_{AMIN} \le T_A \le T_{AMAX}$										dB
	$R_S \le 10$ kΩ, V_{CM} = ±12V				70	90		70	90		
	$R_S \le 50\Omega$, V_{CM} = ±12V	80	95								
Supply Voltage Rejection Ratio	$T_{AMIN} \le T_A \le T_{AMAX}$,										dB
	V_S = ±20V to V_S = ±5V										
	$R_S \le 50\Omega$	86	96								
	$R_S \le 10$ kΩ				77	96		77	96		
Transient Response	T_A = 25°C, Unity Gain										
Rise Time			0.25	0.8		0.3			0.3		μs
Overshoot			6.0	20		5			5		%
Bandwidth [2]	T_A = 25°C	0.437	1.5								MHz
Slew Rate	T_A = 25°C, Unity Gain	0.3	0.7			0.5			0.5		V/μs
Supply Current	T_A = 25°C					1.7	2.8		1.7	2.8	mA
Power Consumption	T_A = 25°C										mW
	V_S = ±20V		80	150							
	V_S = ±15V					50	85		50	85	

Electrical Characteristics[1] (continued)

Parameter	Test Conditions	LM741A			LM741			LM741C			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
LM741A	V_S = ±20V										mW
	$T_A = T_{AMIN}$			165							
	$T_A = T_{AMAX}$			135							
LM741	V_S = ±15V										mW
	$T_A = T_{AMIN}$					60	100				
	$T_A = T_{AMAX}$					45	75				

Thermal Resistance	CDIP (NAB0008A)	PDIP (P0008E)	TO-99 (LMC0008C)	SO-8 (M)
θ_{jA} (Junction to Ambient)	100°C/W	100°C/W	170°C/W	195°C/W
θ_{jC} (Junction to Case)	N/A	N/A	25°C/W	N/A

OPERATING CHARACTERISTICS (V_S = 5.1 Vdc, T_A = 25°C unless otherwise noted, P1 > P2. Decoupling circuit shown in Figure 3 required to meet Electrical Specifications.)

Characteristic		Symbol	Min	Typ	Max	Unit
Pressure Range		P_{OP}	15	—	115	kPa
Supply Voltage[1]		V_S	4.85	5.1	5.35	Vdc
Supply Current		I_o	—	7.0	10	mAdc
Minimum Pressure Offset[2] @ V_S = 5.1 Volts	(0 to 85°C)	V_{off}	0.135	0.204	0.273	Vdc
Full Scale Output[3] @ V_S = 5.1 Volts	(0 to 85°C)	V_{FSO}	4.725	4.794	4.863	Vdc
Full Scale Span[4] @ V_S = 5.1 Volts	(0 to 85°C)	V_{FSS}	4.521	4.590	4.659	Vdc
Accuracy[5]	(0 to 85°C)	—	—	—	±1.5	$\%V_{FSS}$
Sensitivity		V/P	—	45.9	—	mV/kPa
Response Time[6]		t_R	—	1.0	—	ms
Output Source Current at Full Scale Output		I_{o+}	—	0.1	—	mAdc
Warm–Up Time[7]		—	—	20	—	ms
Offset Stability[8]		—	—	±0.5	—	$\%V_{FSS}$

Appendix D

Datasheet ASK transmitter &Receiver

HOLTEK

HT12A/HT12E
2^{12} Series of Encoders

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: 0.1μA (typ.) at V_{DD}=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

Applications

- Burglar alarm system
- Smoke and fire alarm system
- Garage door controllers
- Car door controllers
- Car alarm system
- Security system
- Cordless telephones
- Other remote control systems

General Description

The 2^{12} 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 $\overline{TE}$ trigger on the HT12E or a DATA trigger on the HT12A further enhances the application flexibility of the 2^{12} series of encoders. The HT12A additionally provides a 38kHz carrier for infrared systems.

Selection Table

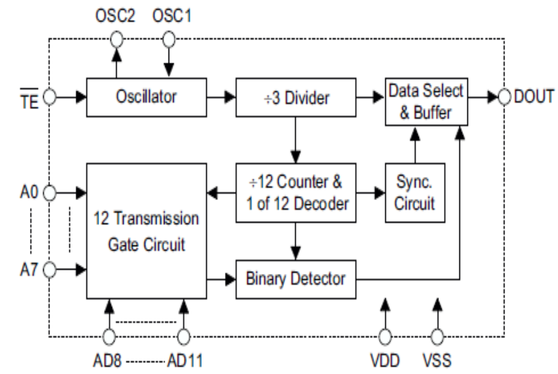
Function / Part No.	Address No.	Address/ Data No.	Data No.	Oscillator	Trigger	Package	Carrier Output	Negative Polarity
HT12A	8	0	4	455kHz resonator	D8~D11	18 DIP 20 SOP	38kHz	No
HT12E	8	4	0	RC oscillator	$\overline{TE}$	18 DIP 20 SOP	No	No

Note: Address/Data represents pins that can be address or data according to the decoder requirement.

Block Diagram

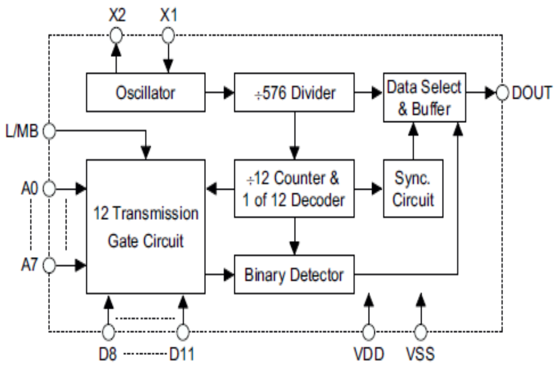
$\overline{TE}$ trigger

HT12E



DATA trigger

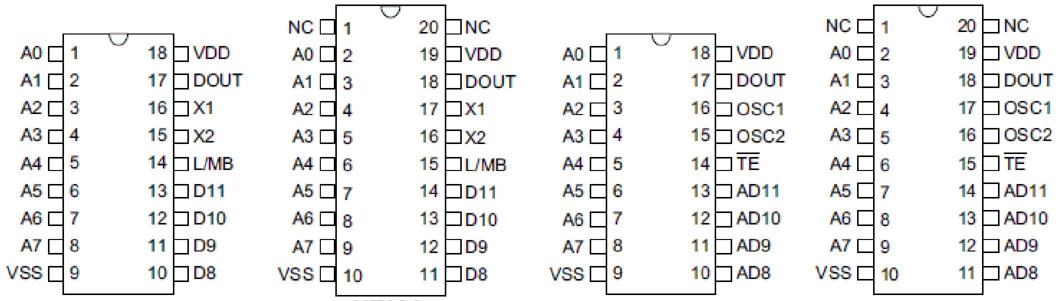
HT12A



Note: The address data pins are available in various combinations (refer to the address/data table).

Pin Assignment

8-Address 4-Data | 8-Address 4-Data | 8-Address 4-Address/Data | 8-Address 4-Address/Data



HT12A –18 DIP | HT12A –20 SOP | HT12E –18 DIP | HT12E –20 SOP

Pin Description

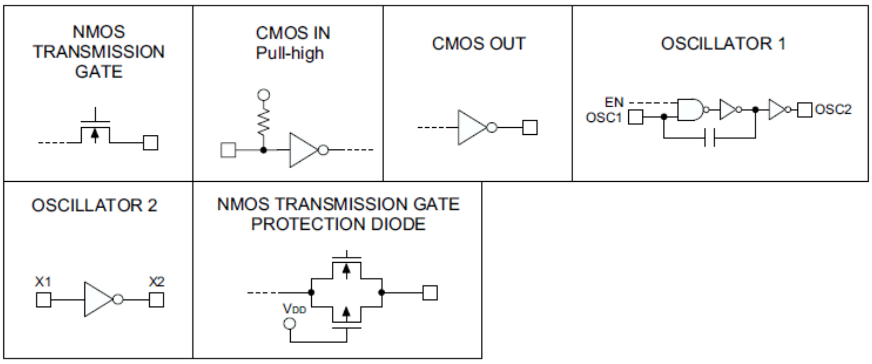
Pin Name	I/O	Internal Connection	Description
A0~A7	I	CMOS IN Pull-high (HT12A) NMOS TRANSMISSION GATE PROTECTION DIODE (HT12E)	Input pins for address A0~A7 setting These pins can be externally set to VSS or left open
AD8~AD11	I	NMOS TRANSMISSION GATE PROTECTION DIODE (HT12E)	Input pins for address/data AD8~AD11 setting These pins can be externally set to VSS or left open
D8~D11	I	CMOS IN Pull-high	Input pins for data D8~D11 setting and transmission enable, active low These pins should be externally set to VSS or left open (see Note)
DOUT	O	CMOS OUT	Encoder data serial transmission output
L/MB	I	CMOS IN Pull-high	Latch/Momentary transmission format selection pin: Latch: Floating or VDD Momentary: VSS

Appendix C

Pin Name	I/O	Internal Connection	Description
$\overline{\text{TE}}$	I	CMOS IN Pull-high	Transmission enable, active low (see Note)
OSC1	I	OSCILLATOR 1	Oscillator input pin
OSC2	O	OSCILLATOR 1	Oscillator output pin
X1	I	OSCILLATOR 2	455kHz resonator oscillator input
X2	O	OSCILLATOR 2	455kHz resonator oscillator output
VSS	I	—	Negative power supply, grounds
VDD	I	—	Positive power supply

Note: D8~D11 are all data input and transmission enable pins of the HT12A.
$\overline{\text{TE}}$ is a transmission enable pin of the HT12E.

Approximate internal connections



Absolute Maximum Ratings

Supply Voltage (HT12A) ....−0.3V to 5.5V

Input Voltage....................V_{SS}−0.3 to V_{DD}+0.3V

Operating Temperature...............−20°C to 75°C

Supply Voltage (HT12E) ....−0.3V to 13V

Storage Temperature.................−50°C to 125°C

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Electrical Characteristics

HT12A Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.4	3	5	V
I_{STB}	Standby Current	3V	Oscillator stops	—	0.1	1	μA
		5V		—	0.1	1	μA
I_{DD}	Operating Current	3V	No load f_{OSC}=455kHz	—	200	400	μA
		5V		—	400	800	μA
I_{DOUT}	Output Drive Current	5V	$V_{OH}=0.9V_{DD}$ (Source)	–1	–1.6	—	mA
			$V_{OL}=0.1V_{DD}$ (Sink)	2	3.2	—	mA
V_{IH}	"H" Input Voltage	—	—	$0.8V_{DD}$	—	V_{DD}	V
V_{IL}	"L" Input Voltage	—	—	0	—	$0.2V_{DD}$	V
R_{DATA}	D8~D11 Pull-high Resistance	5V	V_{DATA}=0V	—	150	300	kΩ

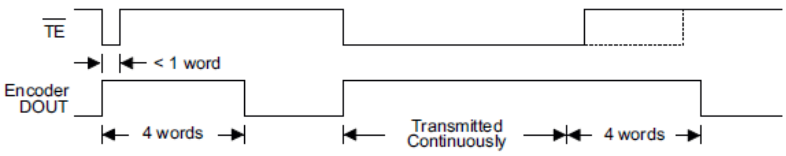
HT12E Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.4	5	12	V
I_{STB}	Standby Current	3V	Oscillator stops	—	0.1	1	μA
		12V		—	2	4	μA
I_{DD}	Operating Current	3V	No load f_{OSC}=3kHz	—	40	80	μA
		12V		—	150	300	μA
I_{DOUT}	Output Drive Current	5V	$V_{OH}=0.9V_{DD}$ (Source)	–1	–1.6	—	mA
			$V_{OL}=0.1V_{DD}$ (Sink)	1	1.6	—	mA
V_{IH}	"H" Input Voltage	—	—	$0.8V_{DD}$	—	V_{DD}	V
V_{IL}	"L" Input Voltage	—	—	0	—	$0.2V_{DD}$	V
f_{OSC}	Oscillator Frequency	5V	R_{OSC}=1.1MΩ	—	3	—	kHz
$R_{\overline{TE}}$	$\overline{TE}$ Pull-high Resistance	5V	$V_{\overline{TE}}$=0V	—	1.5	3	MΩ

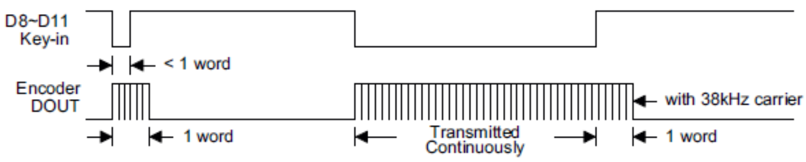
Functional Description

Operation

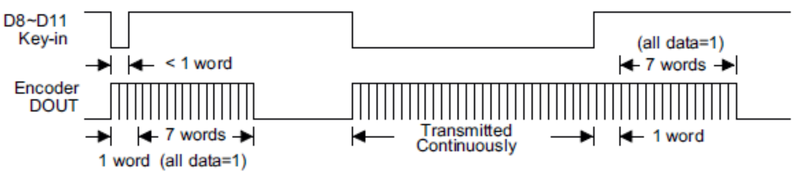
The 2^{12} series of encoders begin a 4-word transmission cycle upon receipt of a transmission enable ($\overline{TE}$ for the HT12E or $\overline{D8 \sim D11}$ for the HT12A, active low). This cycle will repeat itself as long as the transmission enable ($\overline{TE}$ or D8~D11) is held low. Once the transmission enable returns high the encoder output completes its final cycle and then stops as shown below.



Transmission timing for the HT12E



Transmission timing for the HT12A (L/MB=Floating or VDD)

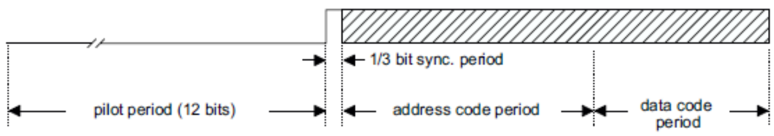


Transmission timing for the HT12A (L/MB=VSS)

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.

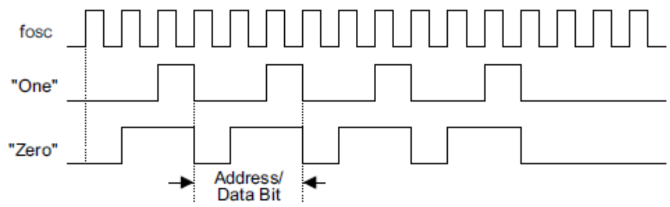
An information word consists of 4 periods as illustrated below.



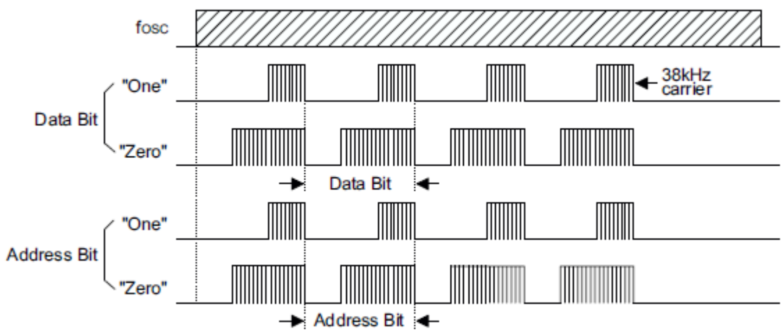
Composition of information

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 bit waveform for the HT12E



Address/Data bit waveform for the HT12A

The address/data bits of the HT12A are transmitted with a 38kHz carrier for infrared remote controller flexibility.

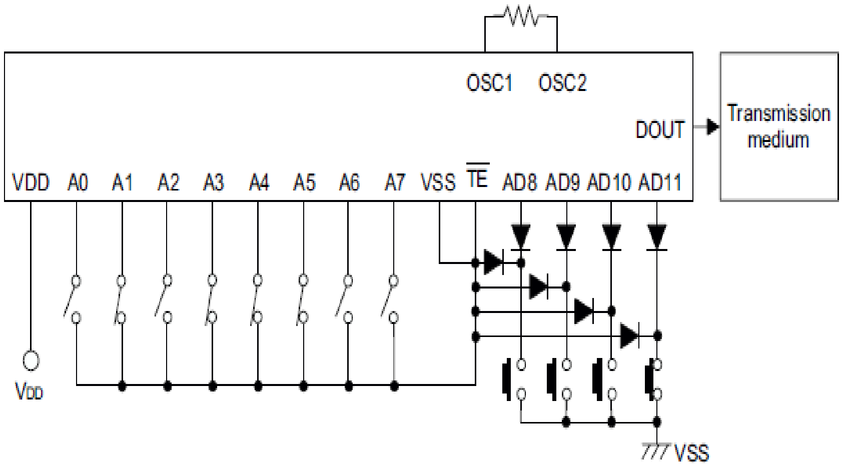
Address/data programming (preset)

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 HT12A encoder.

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 1μA 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:



The transmitted information is as shown:

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 2^{12} series of encoders. The correct device should be selected according to the individual address and data requirements.

Part No.	Address/Data Bits											
	0	1	2	3	4	5	6	7	8	9	10	11
HT12A	A0	A1	A2	A3	A4	A5	A6	A7	D8	D9	D10	D11
HT12E	A0	A1	A2	A3	A4	A5	A6	A7	AD8	AD9	AD10	AD11

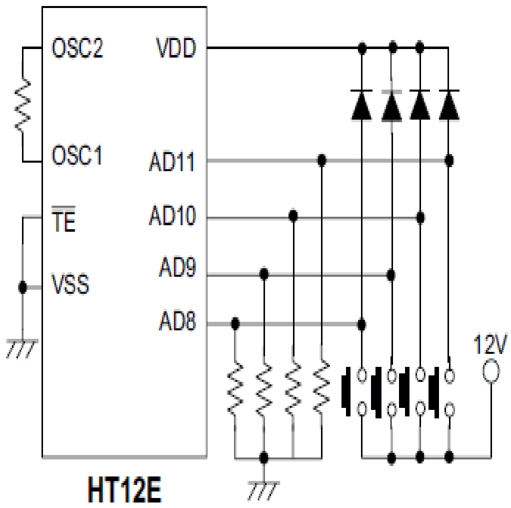
Transmission enable

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

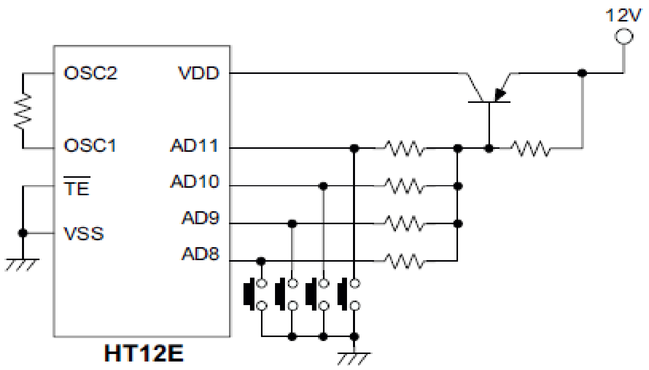
Two erroneous HT12E application circuits

The HT12E must follow closely the application circuits provided by Holtek (see the "Application circuits").

- Error: AD8~AD11 pins input voltage > V_{DD}+0.3V

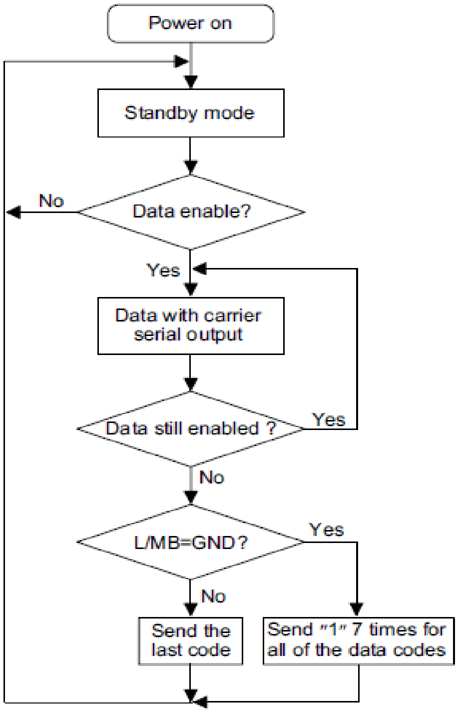


• Error: The IC's power source is activated by pins AD8~AD11

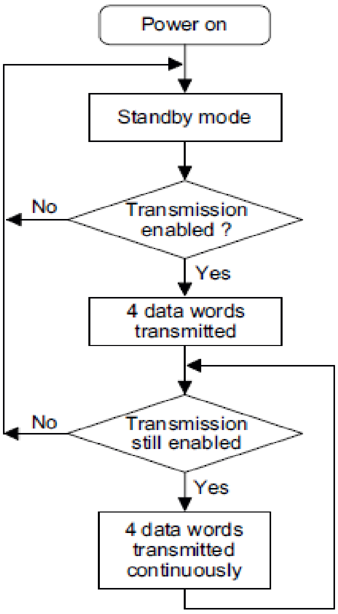


Flowchart

• HT12A

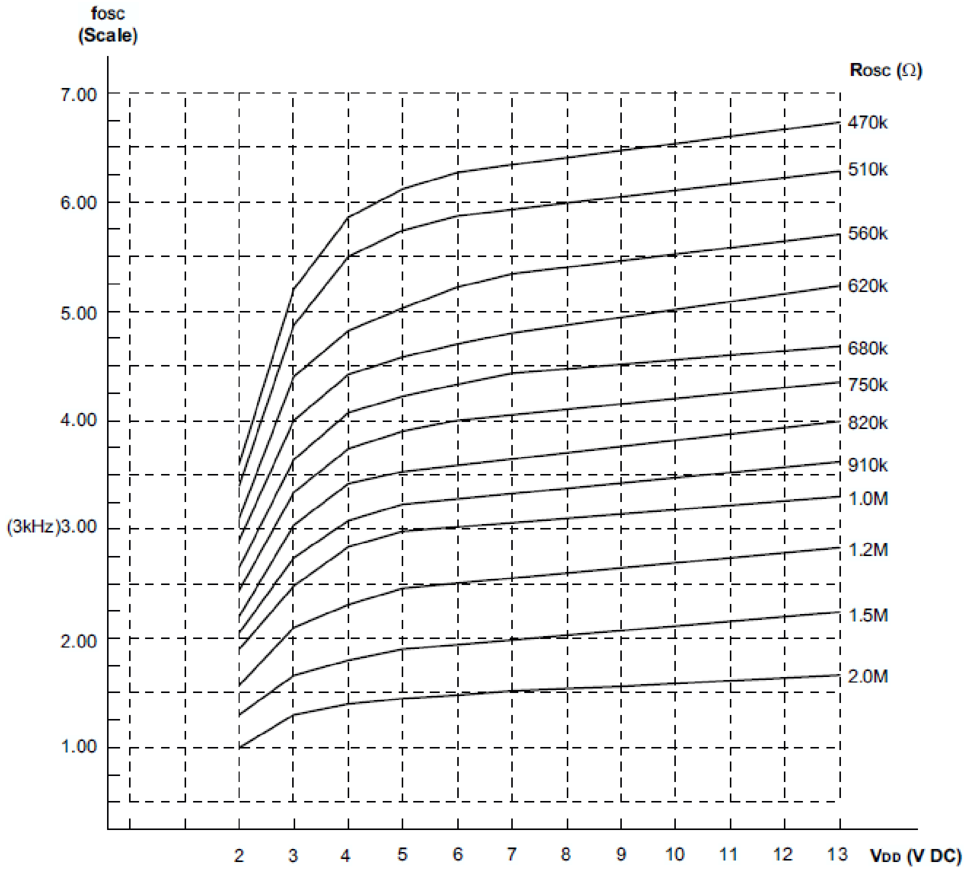


• HT12E



Note: D8~D11 are transmission enables of the HT12A.
$\overline{\text{TE}}$ is the transmission enable of the HT12E.

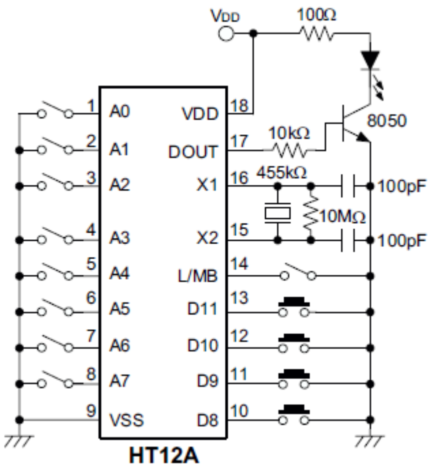
Oscillator frequency vs supply voltage



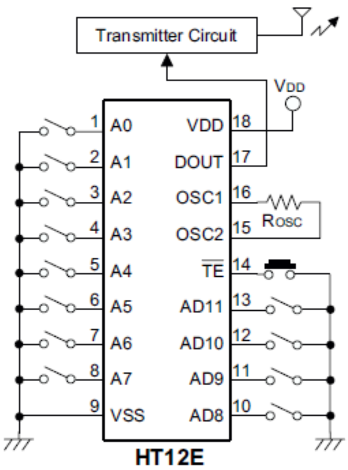
The recommended oscillator frequency is f_{OSCD} (decoder) $\cong 50\ f_{OSCE}$ (HT12E encoder)

$$\cong \frac{1}{3} f_{OSCE} \text{ (HT12A encoder)}$$

Application Circuits



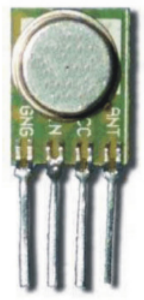
HT12A



HT12E

Note: Typical infrared diode: EL-1L2 (KODENSHI CORP.)
Typical RF transmitter: JR-220 (JUWA CORP.)

*Frequency Range: 433.92 MHz
*Modulate Mode: ASK
*Circuit Shape: SAW
*Date Rate: 8kbps
*Supply Voltage: 3~ 12 V
*Power Supply and All Input / Output Pins: -0.3 to +12.0 V
*Non-Operating Case Temperature: -20 to +85 ℃
*Soldering Temperature (10 Seconds) : 230 ℃ (10 Seconds)



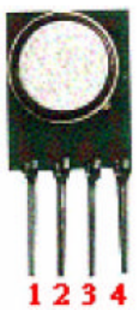
Absolute Maximum Ratings

Rating	Value	Unit
Power Supply and All Input/Output Pins	-0.3 to +12.0	V
Non-Operating Case Temperature	-20 to +85	℃
Soldering Temperature(10 seconds)	230	℃

Electrical Characteristics, T=25℃ , Vcc=3.6v, Freq=433.92MHz

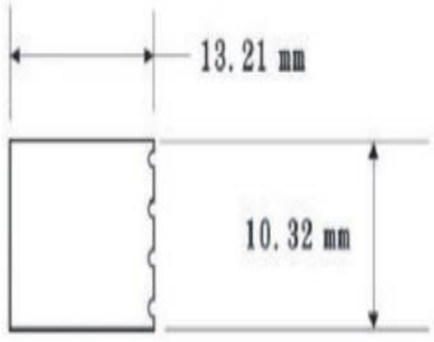
Characteristic	Sym	Min.	Typ.	Max.	Uint
Operating Frequency (200KHz)	Vcc		433.92		MHz
Data Rate	ASK			8K	Kbps
Transmitter Performance(OOK@2.4kbps)					
Peak Input Current,12 Vdc Supply	ITP			45	mA
Peak Output Power	PO		10		mW
Tum On/ Tum Off Time	T ON/T OFF			1	US
Power Supply Vo ltage Range	Vcc	3		12	VDC
Operating Ambient Temperature	TA	-20		+85	℃
Tx Antenna Out (3V) +2.4dB	Vcc				mA

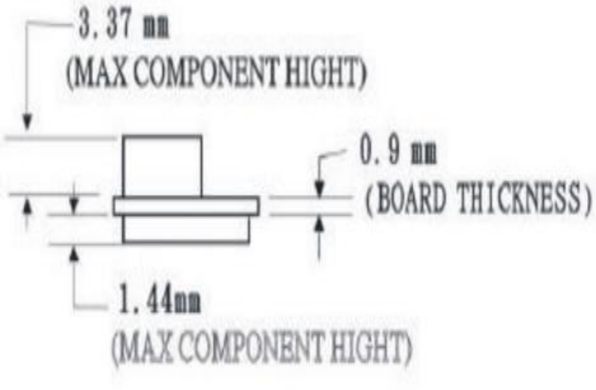
Application Note:

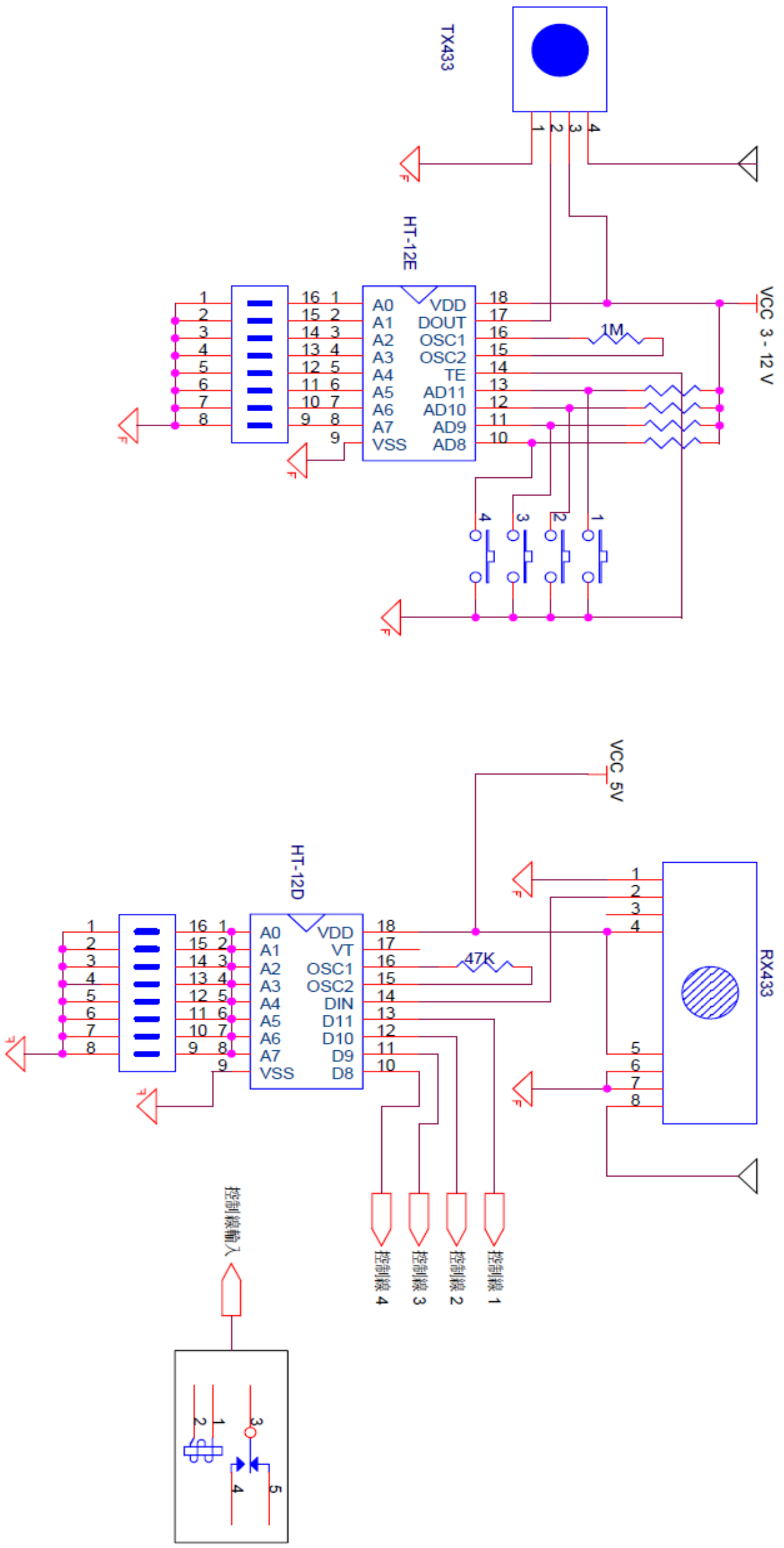


pin 1 : GND
pin 2 : Data in
pin 3 : VCC
pin 4 : ANT

Application Note:






TX433
HT-12E
A0
A1
A2
A3
A4
A5
A6
A7
VSS
VDD
DOUT
OSC1
OSC2
TE
AD11
AD10
AD9
AD8
1M
VCC 3 - 12 V
VCC 5V
HT-12D
VT
DIN
D11
D10
D9
D8
47K
RX433
控制線 1
控制線 2
控制線 3
控制線 4
控制線輸入