UMC

UA3730

Security Lock with Alarm

Features

- Single-chip CMOS construction.
- Operating voltage range — 3 to 6 V.
- Low current :
  Operating 4 mA (max.)
  Standby   5 μA (typ.)
- 12-digit password — providing 10^{12} combinations.
- Pulse and level type output due to keying correct password.
- Alarm and 60-second-wide pulse output due to an incorrect password.

- Built-in ON/OFF sensor pin for using traditional key.
- Built-in key-in echo.
- Built-in oscillator circuit using inexpensive RC components.
- Password changeable by the user.
- Auto-time-out without any key input in 1 minute.
- Application fields
  — Electronic door locks for homes, cars and others. Electronic locks for computers, burglar alarm systems and others.

General Description

The UA3730 is a single-chip CMOS Electronic lock IC which can accept 12-digit passwords (ie. 10^{12} combinations). If using the incorrect password, it will alarm and trigger an external burglar alarm system to alert the user or security system. UA3730 provides changing password functions for the user to change the password periodically to provide more security.

Pin and Keyboard Configuration
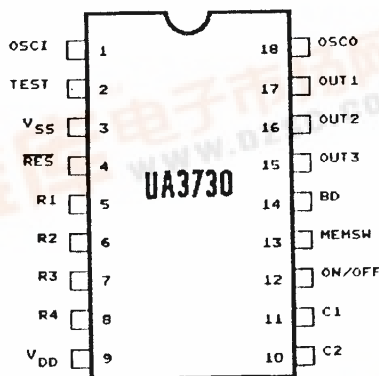
Absolute Maximum Ratings*

Power Supply Voltage . . . .–0.3V to 7.0V
Input Voltage (V_{IH1}) . . . .–0.3V to 15V
Input Voltage (V_{IH2}) . . . .–0.3V to V_{DD} + 0.3V
Output High Current (I_{OH}) . . . .–2 mA
Output Low Current (I_{OL}) 20mA
Operating Temperature (T_{OPG}) . . . . . .–30°C to 70°C
Storage Temperature (T_{STG}) . . . . . .–55°C to 125°C

*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 (T_{OPG} = 25°C, V_{DD} = 5.0 V, V_{SS} = 0.0 V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating Voltage	V_{DD}	3.0	5.0	6.0	V	
Current : Stand-by Operating	I_{SB} I_{DD}	– 1	5 –	30 4	μA mA	F_{OPG} = 400KHz
Operating Frequency	F_{OPG}	260	400	645	KHz	
Input Voltage — 'H' OUT1 to OUT3 Others	V_{IH1} V_{IH2}	0.7V_{DD} 0.7V_{DD}	– –	13.5 V_{DD}	V V	
Input Voltage — 'L'	V_{IL}	V_{SS}	–	0.3V_{DD}	V	
Output current — 'L' OUT1 to OUT3	I_{OL1}	–	–	15	mA	V_{IN} = 0.0V
Output Voltage — 'H' (V_{DD} = 4.5 to 5.5V)	V_{OH1} V_{OH2}	V_{DD} - 1.2 V_{DD} - 0.5	– –	– –	V V	I_{OH} = –50 μA I_{OH} = –10 μA
Output Voltage — 'L' (V_{DD} = 4.5 to 5.5V)	V_{OL1} V_{OL2}	– –	– –	1.5 0.4	V V	I_{OL} = 10mA I_{OL} = 1.8mA

Pin Description

Pin No.	Designation	Description
1	OSCI	Oscillator input pin
2	TEST	Test pin; normally connected to Vss
3	Vss	Ground
4	$\overline{\text{RES}}$	Reset pin; short to Vss when resetting
5	R1	Keyboard row line 1
6	R2	Keyboard row line 2
7	R3	Keyboard row line 3
8	R4	Keyboard row line 4
9	VDD	Positive voltage supply
10	C2	Keyboard column line 1
11	C1	Keyboard column line 2
12	ON/OFF	Input pin of ON/OFF sensor
13	MEMSW	Memory switch; short to Vss for enabling memory switch, floating for disabling the memory switch
14	BD	Alarm buzzer driver pin
15	OUT3*	Pulse output while 3 error keying
16	OUT2*	Power ON/OFF output for correct password
17	OUT1*	Pulse output for opening door while keying the correct password
18	OSCO	Oscillator output pin

* OUT1, OUT2 and OUT3 are all open drain output pins.

Function Description

1. Input Mode

(1) Input correct password then press the "K" key,
- OUT1 outputs a 2-second-wide pulse to open the door.
- OUT2 change state, HIGH < = = > LOW to turn ON (or OFF) the power.

(2) Input incorrect password then press the "K" key,
- 1st incorrect time — Alarm buzzer sounds 0.2 second.
- 2nd incorrect time — Alarm buzzer sounds 0.2 second.
- 3rd incorrect time — Alarm buzzer sounds 60 seconds and OUT3 pin outputs one 60-second-wide pulse to trigger external burglar alarm system.

(3) Disable alarm
- Input the correct password, then press "K" key to disable OUT3 output.

2. Change Password Mode

(1) Product1 (without memory switch) :
- Key in old, but correct, password.
- Press "M" key to input old password.
- Key in the new password.
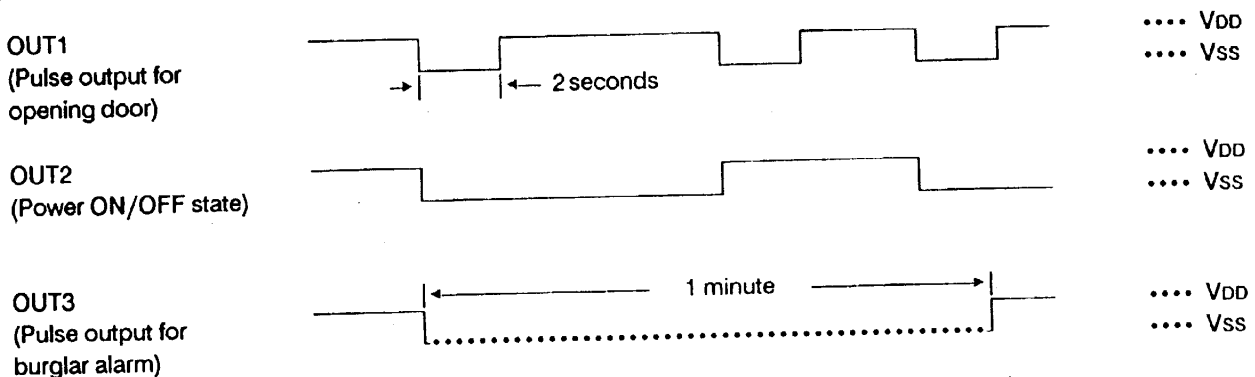- Press "M" key again to input the new password.

(2) Product2 (with memory switch) :
- Turn on the memory switch.
- Key in the new password.
- Press "M" key to input the new password.

3. Miscellaneous

(1) Using with ON/OFF sensor :
- While unlocking this electronic lock without keying the correct password, this ON/OFF pin will output a 60 second-wide pulse to trigger the external burglar alarm.
- Keep ON/OFF pin floating if this ON/OFF sensor is unnecessary.

(2) Auto-time-out :
- UA3730 enters standby condition without any key input in 1 minute when the ON/OFF sensor is inactive.
- If the ON/OFF sensor is active, UA3730 does not execute auto-time-out.

(3) Key-in echo :
- Pressing any key will make UA3730 sound a key-in echo to confirm this key-in.

(4) Power-on-reset :
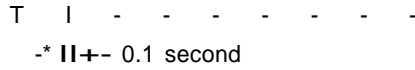- Password will reset to 0 and all output pins are HIGH after power-on-reset.
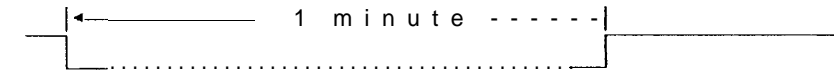
Function Waveform

OUT1
(Pulse output for opening door)

→| |← 2 seconds

.... VDD
.... VSS

OUT2
(Power ON/OFF state)

.... VDD
.... VSS

OUT3
(Pulse output for burglar alarm)

|←———— 1 minute ————→|

.... VDD
.... VSS

BD Output Waveform

Key-in echo

```
T   |  -   -   -   -   -   -   -
    -* II+- 0.1 second
```

1st and 2nd
wrong time

```
→ ||← 0.2 second
```

3rd wrong
time

```
→|    |← 0.5 second
```

OUT3

```
|←——————————— 1  m i n u t e  - - - - - -|
```

Typical Application Circuits

OPTIONS :

PROOUCTI : SHORT 'MEMSW' TO 'BD'
PRODUCT 2 : CONNECT 'MEMSW' TO MEMORY SWITCH

UA3730

1 OSCI   OSCO 18
2 TEST   *OUT1 17 → PULSE FOR OPENING DOOR
3 VSS   OUT2 16 → POWER ON/OFF STATE
4 RES   *OUT3 15 → PULSE FOR BURGLAR ALARM
          ■ OUT1, OUT2 AND OUT3 ARE ALL OPEN DRAIN OUTPUT PINS
5 R1   BD 14
6 R2   MEMSW 13
7 IR3   ON/OFF 12
8 R4   C1 11
9 VDD   C2 10

270pF ±5%
12K ±1%
1uF
4.7K   4K Hz BUZZER
VDD

MEMORY SWITCH : ON — ENABLE
                OFF — DISABLE

ON/OFF SENSOR
DOOR OPEN :SWITCH ON
DOOR CLOSE:SWITCH OFF
(KEEP 'ON/OFF' PIN FLOATING
WHEN NOT USING ON/OFF SENSOR)

1N4148 X 3

NOTES : ALL OUTPUT PINS ARE NORMAL HIGH AND ACTIVE LOW

Package Information

P-DIP 18L Outline Dimension
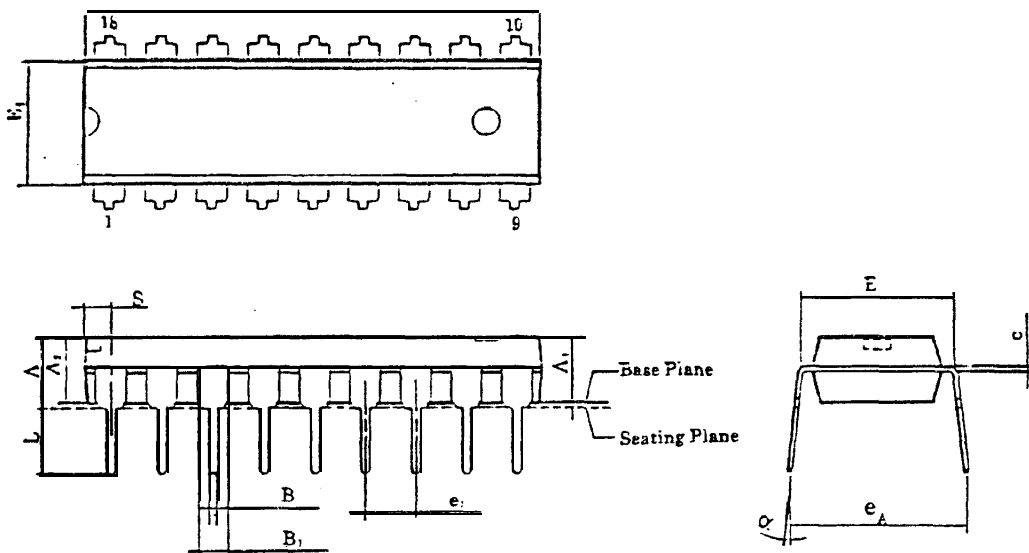
Symbol	Dimensions in inch	Dimensions in mm
A	0.175 Max.	4.45 Max.
A₁	0.010 Min.	0.25 Min.
A₂	0.130 ± 0.005	3.30 ± 0.13
B	0.018 $_{-0.002}^{+0.004}$	0.46 $_{-0.10}^{+0.05}$
B₁	0.060 $_{-0.0004}^{+0.002}$	1.52 $_{-0.10}^{+0.05}$
C	0.010 $_{-0.002}^{+0.004}$	0.25 $_{-0.05}^{+0.10}$
D	0.900TYP (0.910Max.)	22.86TYP (23.11Max.)
E	0.300 ± 0.010	7.62 ± 0.25
E₁	0.250 ± 0.005	6.35 ± 0.13
e₁	0.100 ± 0.010	2.54 ± 0.25
L	0.130 ± 0.010	3.30 ± 0.25
α	0°~15°	0°~15°
e_A	0.355 ± 0.020	9.02 ± 0.51
S	0.055 Max.	1.40 Max.

Note:
1. The max value of dimension D includes end flash.
2. The dimension E₁ doesn't include resin fins.
3. The dimension S includes end flash.
4. All dimensions are based on British system.