

Features

- A 4-year calendar
- Alarm/Chime enable/disable operation
- Chimes output on every hour
- 30-second alarm sound
- Directly drive a piezo
- Real time (hour/minute) adjustable
- Alarm time (hour/minute) adjustable
- Month and date adjustable
- Zero second calibration
- Directly drive an LCD (3V, 1/2 bias, 1/2 duty)
- 1.5 volt battery operation
- An internal voltage doubler
- 32768Hz crystal oscillator
- 12-hour or 24-hour format.

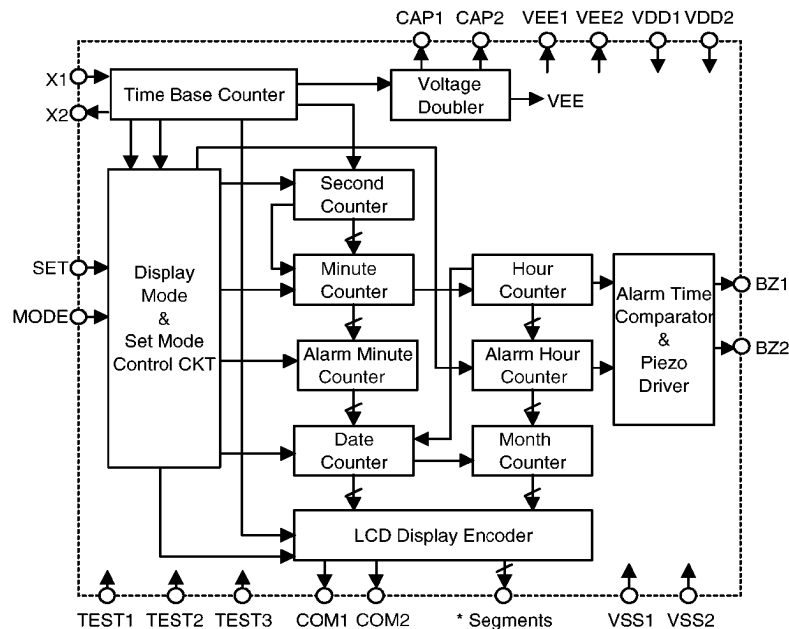
General Description

The HT1340 is a CMOS fabricated LSI chip designed to drive a 4-digit bplexed LCD for applications on watches. The HT1340 contains many functions in addition to displaying the real time. It can also display the alarm time,

seconds, month, date, use 12-hour/24-hour format, and generate chime sounds every hour.

These modes can be displayed and adjusted by pressing the MODE and SET keys. The HT1340 can generate chimes every hour.

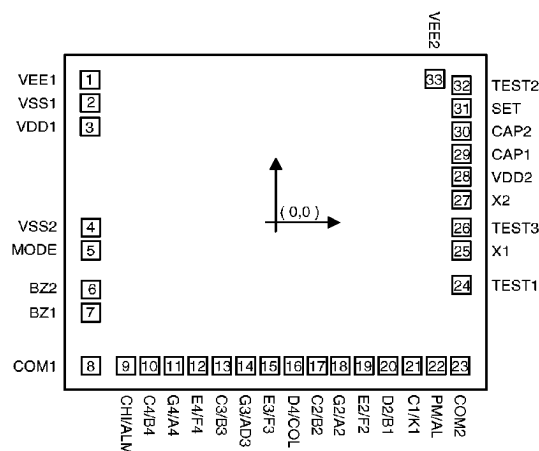
Block Diagram



*Note: These segments are CHI/ALM, C4/B4, G4/A4, E4/F4, C3/B3, G3/AD3, E3/F3, D4/COL, C2/B2, G2/A2, E2/F2, D2/B1, C1/K1, and PM/AL.

Pad Coordinates

Unit: mil



Chip size: $131 \times 108 \text{ (mil)}^2$

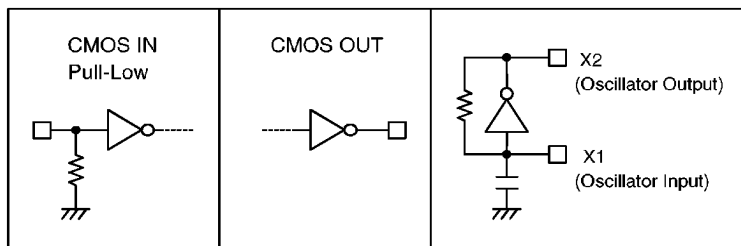
* The IC substrate should be connected to VDD in the PCB layout artwork.

Pad No.	X	Y	Pad No.	X	Y
1	-59.29	47.56	18	20.61	-47.90
2	-59.29	39.91	19	28.26	-47.90
3	-59.29	32.00	20	35.91	-47.90
4	-58.99	-1.79	21	43.56	-47.90
5	-58.99	-9.44	22	51.21	-47.90
6	-58.99	-22.53	23	58.86	-47.90
7	-58.99	-30.18	24	59.29	-20.87
8	-58.99	-47.90	25	59.29	-9.41
9	-47.81	-47.90	26	59.29	-1.66
10	-40.16	-47.90	27	59.29	7.61
11	-32.51	-47.90	28	59.29	15.26
12	-24.86	-47.90	29	59.29	22.91
13	-17.21	-47.90	30	59.29	30.56
14	-9.56	-47.90	31	59.29	38.21
15	-1.91	-47.90	32	59.29	45.86
16	5.74	-47.90	33	50.79	47.90
17	13.26	-47.90			

Pad Description

Pad No.	Pad Name	I/O	Internal Connection	Description
1	VEE1	O	—	LCD power supply (negative)
2	VSS1	I	—	Negative power supply
3	VDD1	I	—	Power supply (positive)
4	VSS2	I	—	Negative power supply
5	MODE	I	CMOS with Pull-Low	For alarm/chime selection and data/time adjustment (refer to the functional description.)
6	BZ2	O	CMOS	Piezo drive signal output
7	BZ1	O	CMOS	Piezo drive signal output
8	COM1	O	CMOS	Output for LCD panel common
9	CHI/ALM	O	CMOS	LCD segment output driver
10	C4/B4	O	CMOS	LCD segment output driver
11	G4/A4	O	CMOS	LCD segment output driver
12	E4/F4	O	CMOS	LCD segment output driver
13	C3/B3	O	CMOS	LCD segment output driver

Pad No.	Pad Name	I/O	Internal Connection	Description
14	G3/AD3	O	CMOS	LCD segment output driver
15	E3/F3	O	CMOS	LCD segment output driver
16	D4/COL	O	CMOS	LCD panel segment driver
17	C2/B2	O	CMOS	LCD panel segment driver
18	G2/A2	O	CMOS	LCD panel segment driver
19	E2/F2	O	CMOS	LCD panel segment driver
20	D2/B1	O	CMOS	LCD panel segment driver
21	C1/K1	O	CMOS	LCD panel segment driver
22	PM/AL	O	CMOS	LCD panel segment driver
23	COM2	O	CMOS	Output for LCD panel common
24	TEST1	I	CMOS with Pull-Low	For IC test only
25	X1	I	CMOS	Oscillator input
26	TEST3	I	CMOS with Pull-Low	For IC test only
27	X2	O	CMOS	Oscillator output
28	VDD2	I	—	Power supply (positive)
29	CAP1	O	CMOS	Voltage doubling capacitor
30	CAP2	O	—	Voltage doubling capacitor
31	SET	I	CMOS with Pull-Low	Operating mode selection input pad Refer to the functional description.
32	TEST2	I	CMOS with Pull-Low	For IC test only
33	VEE2	O	—	LCD power supply (negative)

Approximate internal connection circuits

Absolute Maximum Ratings

Supply Voltage -0.3V to 5.5V Storage Temperature..... -50°C to 125°C
 Input Voltage..... $V_{SS}-0.3V$ to $V_{DD}+0.3V$ Operating Temperature..... 0°C to 70°C

Electrical Characteristics

(Ta=25°C)

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
		V _{DD}	Condition				
V _{DD}	Supply Voltage	—	—	1.3	1.5	1.7	V
V _{EE}	Display Voltage	1.5V	—	-1.2	-1.5	-1.7	V
I _{DD}	Operating Current	1.5V	F _{OSC} =32768Hz No load	—	1.2	2.0	μA
V _{IL}	Input Low Voltage	1.5V	—	—	—	0.3	V
V _{IH}	Input High Voltage	1.5V	—	1.2	—	—	V
I _{OL}	Piezo Output Sink Current	1.5V	V _{OL} =0.15V	170	240	—	μA
I _{OH}	Piezo Output Source Current	1.5V	V _{OH} =1.35V	-170	-240	—	μA
*F _{ALM}	Alarm Sound Output Frequency	1.5V	F _{OSC} =32768Hz	—	4096	—	Hz
F _{CHI}	Chime Sound Output Frequency	1.5V	F _{OSC} =32768Hz	—	4096	—	Hz
F _{OSC}	System Frequency	1.5V	—	—	32768	—	Hz

*Note: The alarm sound is intermittently generated. It is sustained for 30 seconds with a 4096Hz audio frequency. Refer to the functional description for the waveforms.

Operational flow chart



- Initial states

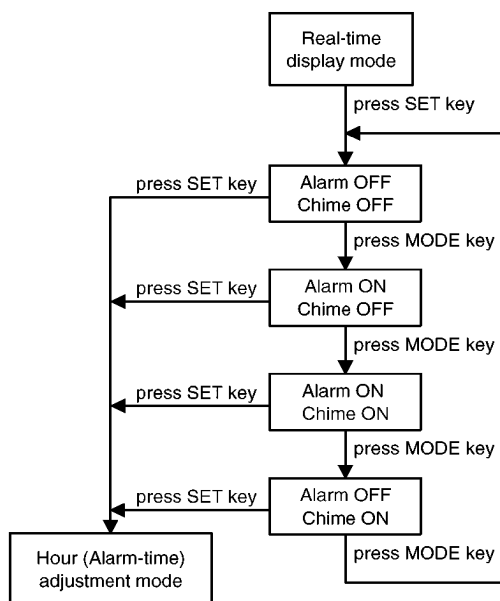
After the battery voltage is supplied, the internal state of the LSI will become as follows:

- * Hour: Minute (real time) → 1:00 (AM)
- * Hour: Minute (alarm time) → 1:00 (AM)
- * Second → 00
- * Month → 1
- * Date → 1
- * Alarm sound → OFF
- * Chime sound → OFF

- Alarm/Chime ON/OFF mode

When the SET key is pressed to enter the Set mode, the LCD panel will display the alarm sign and flashing hours and minutes. At this point the mode key can be pressed to set the ON/OFF states of the alarm and chime functions.

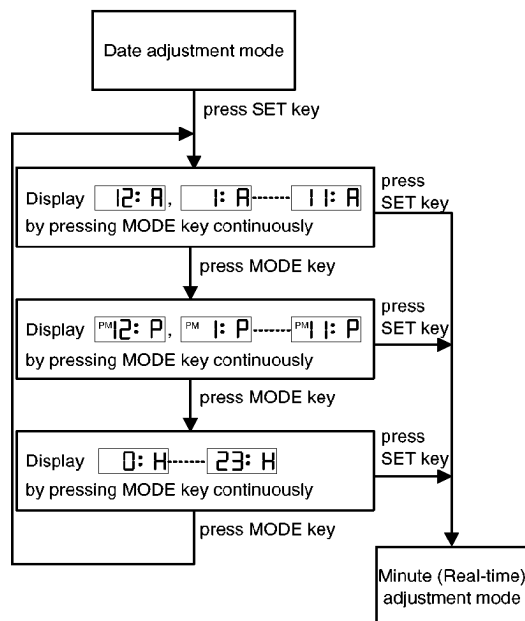
The state diagram is as shown:



- 12-hour/24-hour format

Selection of 12-hour or 24-hour format is available for display. When the IC enters the hour (Real-time) adjustment mode, the format can be changed circularly by pressing the MODE key.

* The state diagram is shown below:



* Note: The "A" denotes the ante meridiem (A.M.) of 12-hour format.

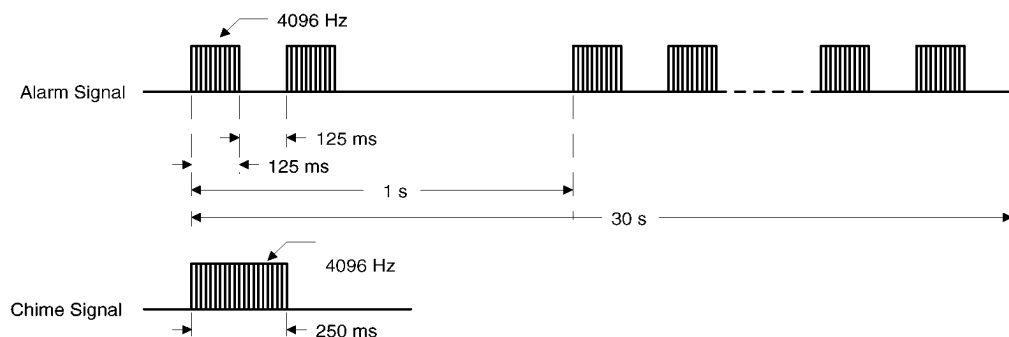
The "P" denotes the post meridiem (P.M.) of 12-hour format.

The "H" denotes the 24-hour format.

If the MODE key is pressed over 1 second, the hour digit will increase at a rate of 2Hz.

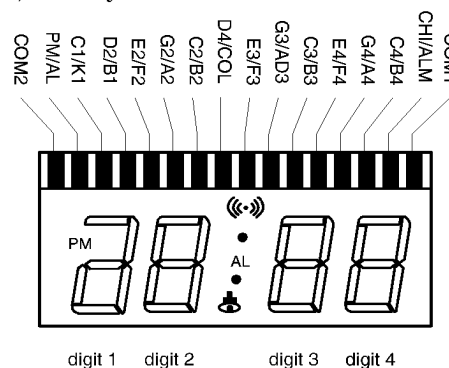
* Alarm and chime output signal waveforms

The waveforms of the alarm and chime signals are as shown:



The alarm sound will be sustained for 30 seconds and then stop automatically. Or pressing the MODE or SET key can also stop the sound output.

* LCD panel (1/2 bias, 1/2 duty)



Common	Segment													
COM1	PM	C1	D2	E2	G2	C2	D4	E3	G3	C3	E4	G4	C4	
COM2	AL	K1	B1	F2	A2	B2		F3	AD3	B3	F4	A4	B4	

- * Note:
- " C1 " denotes the segment C of digit 1.
 - " AD3 " denotes the segment A and segment D of digit 3.
 - " K1 " denotes the segment A,D,E and G of digit 1.
 - " CHI " denotes the sign: 
 - " ALM " denotes the sign: 
 - " COL " denotes the sign: 

Application Circuit

