UMC

UM3205

3½-Digit Countdown Timer

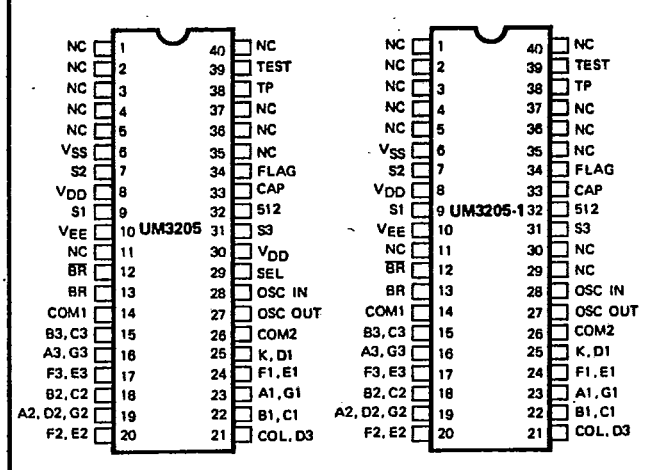
Features

- 16-hour adjustable range setting (15:59 →0:00)
- Forecast alarm function
- 32768 Hz quartz crystal controlled oscillator
- Automatic recycle or manual reset
- Single 1.5V battery option
- Power-on reset
- Automatic display shut-off after 1 minute of non-use.
- Piezo buzzer direct drive or transistor drive.
- 3 button control of all functions
- Alarm enabled when depressing S_2 and S_3 simultaneously
- Single input high speed test capability
- Sends out a DC signal to trigger off-chip circuitry while timer counts down.

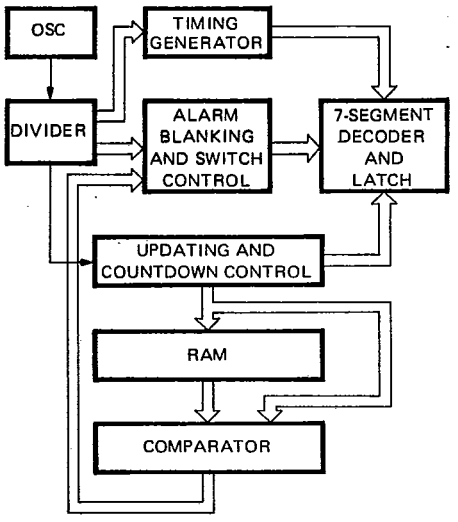
General Description

The UM3205 is a CMOS chip designed to drive a standard 3½-digit biplexed LCD for countdown timer applications. The watch circuit is based on a 32768 Hz quartz crystal controlled oscillator The maximum timing period of 16 hours can be set within 1 minute accuracy. When the countdown is finished, the timer can either automatically recycle the preset time or manually reset the desired time depending on bond-pad options selected. Forecast alarm generates 4 alarm sounds 10 minutes before setting time and 8 alarm sounds 5 minutes before setting time. The UM3205 can be used as a parking timer, alarm timer, pill box timer, kitchen timer, sports timer, etc.

Pin Configuration



Block Diagram



Absolute Maximum Ratings*

Supply Voltage $V_{DD} \sim V_{SS}$ . . . . . 0 to +6V

Supply Voltage $V_{DD} \sim V_{EE}$ . . . . . 0 to +6V

Input Voltage . . . . . V_{SS} to V_{DD}

Operating Temperature . . . . . −10 to +60°C

Storage Temperature . . . . . −40 to +70°C

*Comments

Stress 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.

Electrical Characteristics

(T_A = 25°C, V_{DD} = 1.55V, V_{SS} = 0V, F_S = 32768 Hz, OSC Cin, Cout Built-In unless otherwise specified.)

Parameter	Symbol	Limits			Unit	Test Conditions
		Min.	Typ.	Max.		
Supply Voltage	V_{DD}	1.35	1.55	1.65	V	
Supply Current	I_{DD}	–	–	2	μA	no load,,alarm off
General Display	$-V_{EE}$	1.2	1.5	1.65	V	V_{DD} = 1.35~1.65V
Switch Input Current	I_{IN}	5	–	50	μA	$V_{IN} = V_{DD}$
OSC Starting Voltage	V_{START}	1.45	–	–	V	with 3 sec.
Frequency Stability	Δf/f	–	–	1	PPM	V_{DD} = 1.35V~1.65V ΔV_{DD} = 0.1V
Alarm Output Drive Current	I_{OH}	300	–	–	μA	V_{OH} = 1.35V V_{DD} = 1.55V
Alarm Output Frequency	Fout	–	2048	–	Hz	
Flag Output Drive Current	I_{DH}	150	–	–	μA	V_{OH} = 1.35V V_{DD} = 1.55V

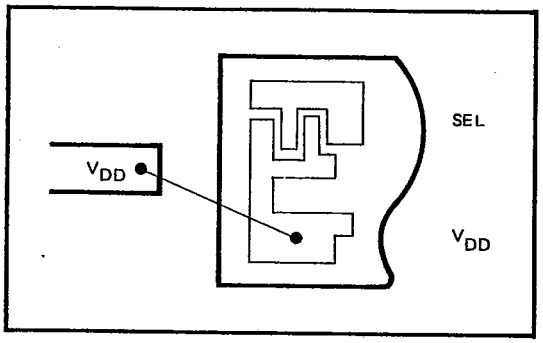
Timekeeping

Operation and Function Description

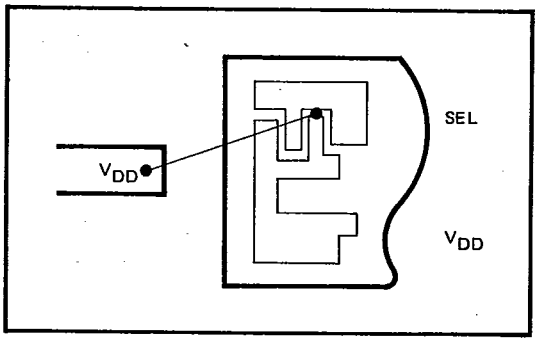
Operating Mode

Operating Mode I or Mode II can be selected by using bond-pad options as follows:

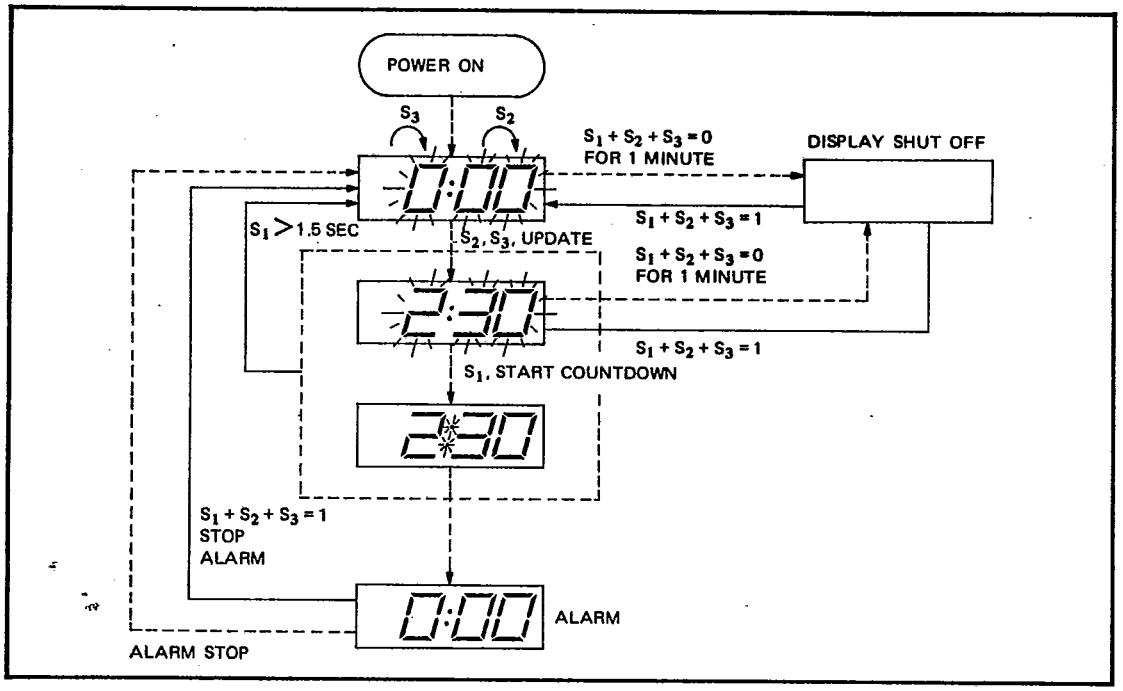
MODE 1: SEL PAD IS OPENED



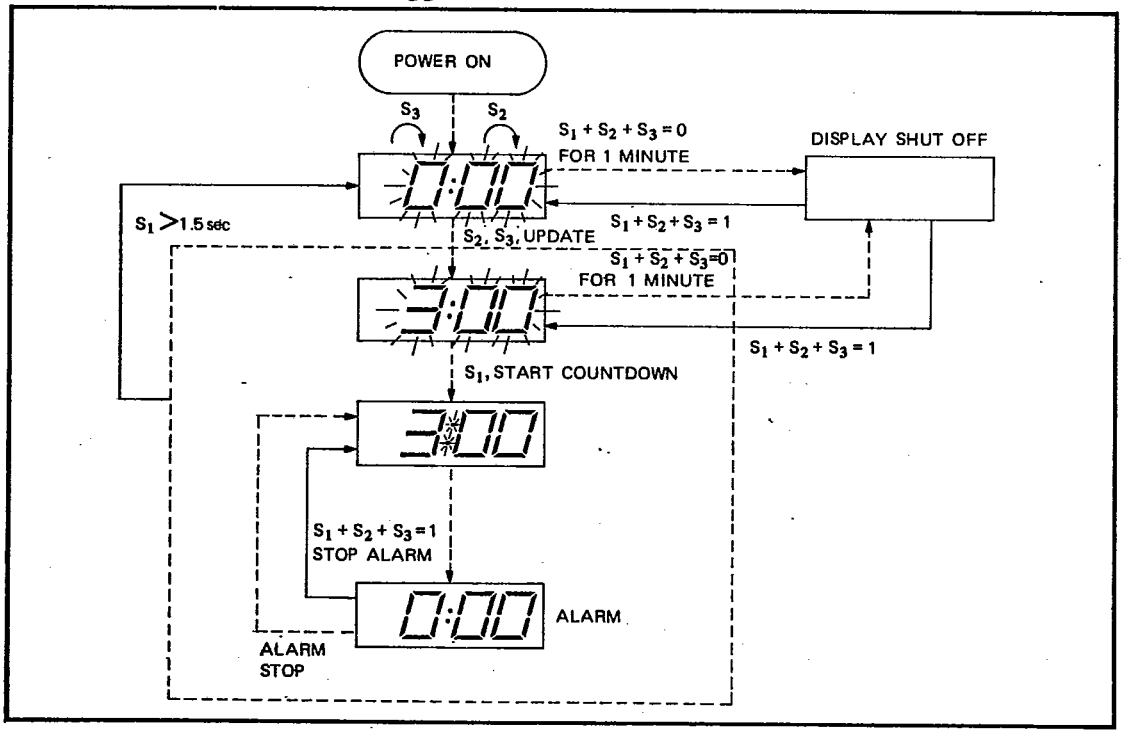
MODE 2: SEL PAD IS CONNECTED TO V_{DD}



MODE 1: SEL PAD OPENED



MODE 2: SEL PAD CONNECTED TO V_{DD}



Alarm Function

(a) The timer alarm sounds during countdown as follows:
   1. 10 minutes before set time is up, 4 sounds are generated.
   2. 5 minutes before set time is up, 8 sounds are generated.
   3. When set time is up, alarm countinues for 20 seconds, then timer automatically returns to its original state.

(b) Depressing any one of inputs S_1 or S_2 or S_3 will stop the alarm.

(c) The alarm is sounded when S_2 and S_3 are depressed simultaneously.

(d) In the setting state, both fast test and alarm are provided at the same time when depressing S_2 and S_3 first, and then depressing S_1.

Operation Notes

(a) Depress S_3 for setting hours, S_2 for setting minutes and S_1 for start or reset.

(b) Depressing S_2 or S_3 for more than 1 second will advance digits at a 4Hz rate.

(c) At the end of countdown, the display will appear for 1 minute and automatically shut off.

(d) After timing is set, depressing S_1 will start the countdown.

(e) During countdown the color will flash at a 1 Hz rate.

Legend

(a) ⟹ Flashes at 0.5 sec/0.5 sec rate.

(b) ⟹ Solid lines denote display change from depressing specified switch and hold at the new display format.

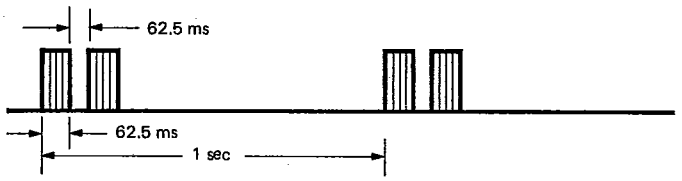
(c) ⟹ Broken lines denote automatic state change without any external operation.

(d) ⟹ Denotes advance.

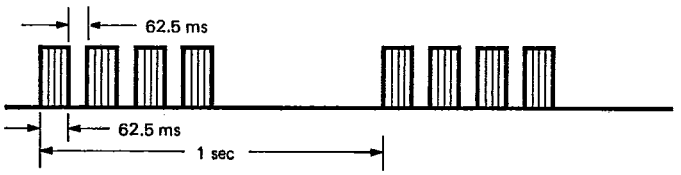
Output Waveform

Alarm Output (2KHz x 8Hz x 1 Hz)

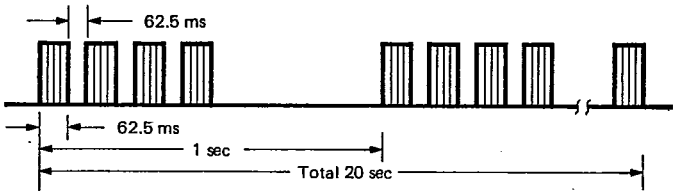
(a) 10 minutes before set time is up



(b) 5 minutes before set time is up

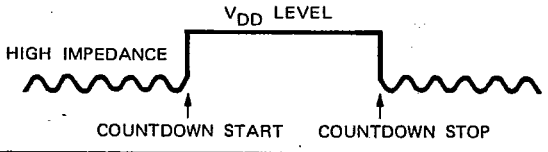


(C) Time is up



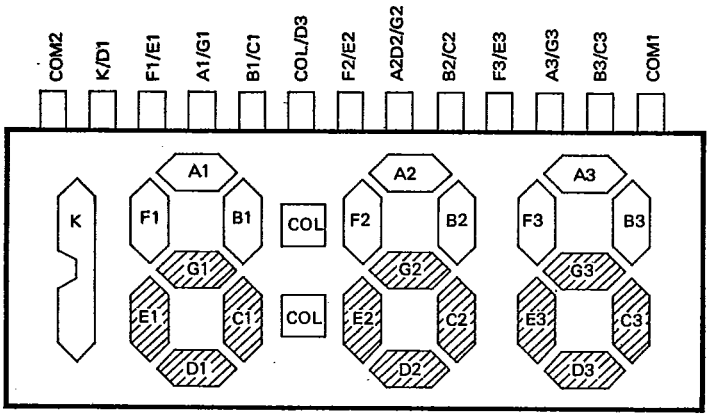
Timer DC Output

The flag output is set at V_{DD} level from the beginning to set the end of timer countdown and is set at high impedance state after timer stops.

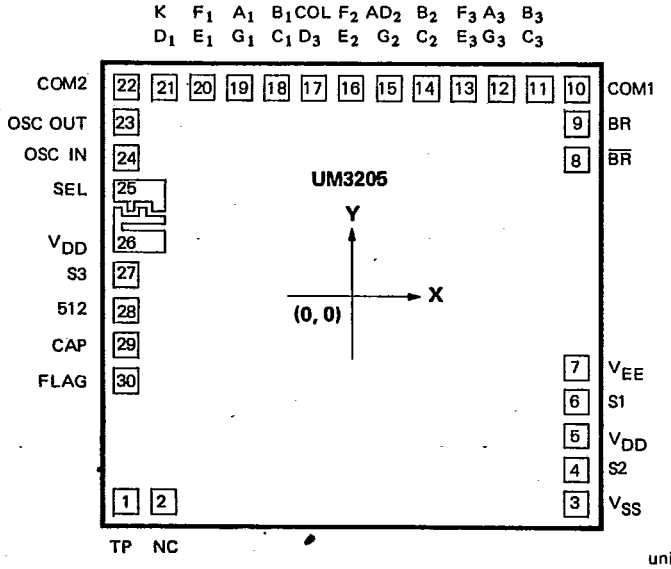


Timekeeping

LCD Format



Bonding Diagram



unit: μm

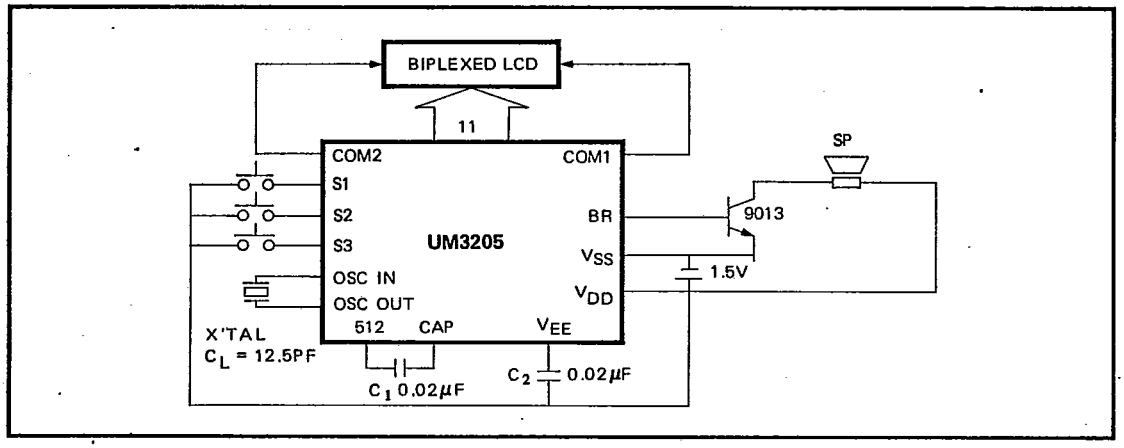
Pad No.	Designation	X	Y	Pad No.	Designation	X	Y
1	TP	−1168.4	−1112.52	16	F2, E2	− 12.7	1214.12
2	NC	− 977.9	−1112.52	17	COL, D3	− 203.2	1214.12
3	V_{SS}	1155.7	−1209.04	18	B1, C1	− 393.7	1214.12
4	S2	1155.7	−1018.54	19	A1, G1	− 584.2	1214.12
5	V_{DD}	1155.7	− 828.04	20	F1, E1	− 774.7	1214.12
6	S1	1155.7	− 637.54	21	K, D1	− 965.2	1214.12
7	V_{EE}	1155.7	− 447.04	22	COM2	−1155.7	1214.12
8	$\overline{BR}$	1155.7	767.08	23	OSC OUT	−1155.7	957.58
9	BR	1155.7	957.58	24	OSC IN	−1155.7	767.08
10	COM1	1155.7	1214.12	25	SEL	−1155.7	571.5
11	B3, C3	939.8	1214.12	26	V_{DD}	−1155.7	411.48
12	A3, G3	749.3	1214.12	27	S3	−1155.7	220.98
13	F3, E3	558.8	1214.12	28	512	−1155.7	30.48
14	B2, C2	368.3	1214.12	29	CAP	−1155.7	− 160.02
15	AD2, G2	177.8	1214.12	30	FLAG	− 393.7	− 350.52

Pin Designation

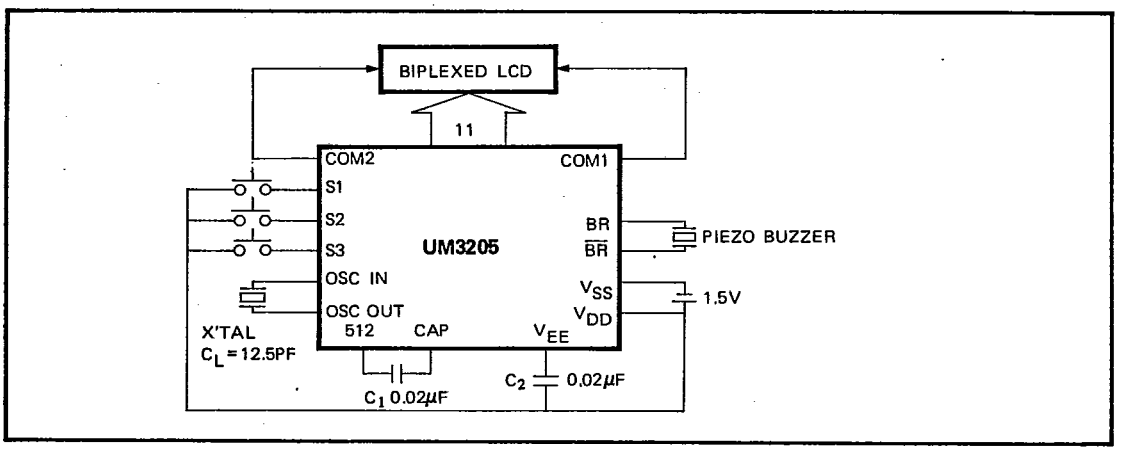
Pin No.	Designation	Function
1	TP	Fast-test Signal Input Port
2	NC	Fast-test Control, Internal Pull-down
3	V_{SS}	Negative low voltage supply
4	S2	Switch for updating
5	V_{DD}	Ground
6	S1	Switch for start or reset
7	V_{EE}	Negative high voltage supply
8	$\overline{BR}$	Buzzer driving
9	BR	Buzzer driving
10	COM1	Backplane Common
11	B3, C3	Segment Drive
12	A3, G3	Segment Drive
13	F3, E3	Segment Drive
14	B2, C2	Segment Drive
15	AD2, G2	Segment Drive
16	F2, E2	Segment Drive
17	COL, D3	Segment Drive
18	B1, C1	Segment Drive
19	A1, G1	Segment Drive
20	F1, E1	Segment Drive
21	K, D1	Segment Drive
22	COM2	Backplane Common 2
23	OSC OUT	OSCπ - network output port
24	OSC IN	OSCπ - network input port
25	SEL	Mode selection
26	V_{DD}	Ground
27	S3	Switch for updating
28	512	For voltage doubler capacitor positive pin
29	CAP	For voltage doubler capacitor negative pin
30	FLAG	DC level output or high impedance

Typical Application Circuits

SPEAKER DRIVING



PIEZO BUZZER DIRECT DRIVING



PIEZO BUZZER WITH TRANSISTOR DRIVING