

The DL2098 is a CMOS LSI implement a five function 3.5 digit LCD watch with twelve hours scale. The DL2098 generates special signals to drive EL-backlight panel with a few external components.

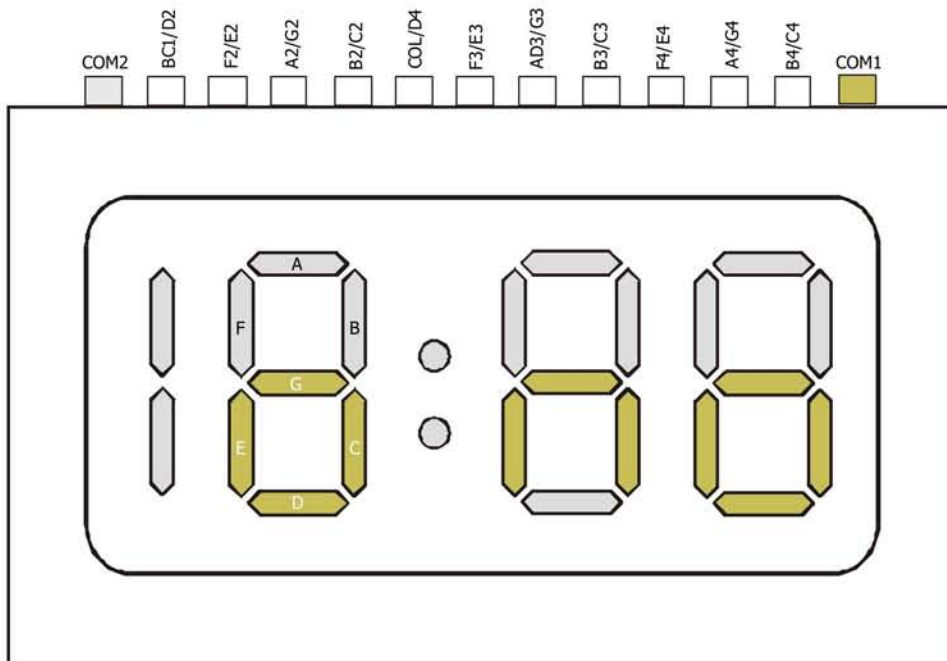
## FEATURES

- 5 functions: month, date, hour, minute and second
- Selective alternation of time-date display mode
- One-touch correction of time error within  $\pm 30$  seconds
- 2-switch sequential operation
- LCD test
- Backlight (EL) control outputs

## FUNCTIONS

- Single-chip CMOS constructions
- Drives 3.5-digit duplexed LCD
- Colon display
- 32,768Hz crystal controlled operation
- Single 3.0V battery operation
- Built-in crystal oscillator input capacitor

### 3.5-DIGIT LCD FORMAT





**ABSOLUTE MAXIMUM RATINGS** ( $T_a = 25^\circ\text{C}$ )

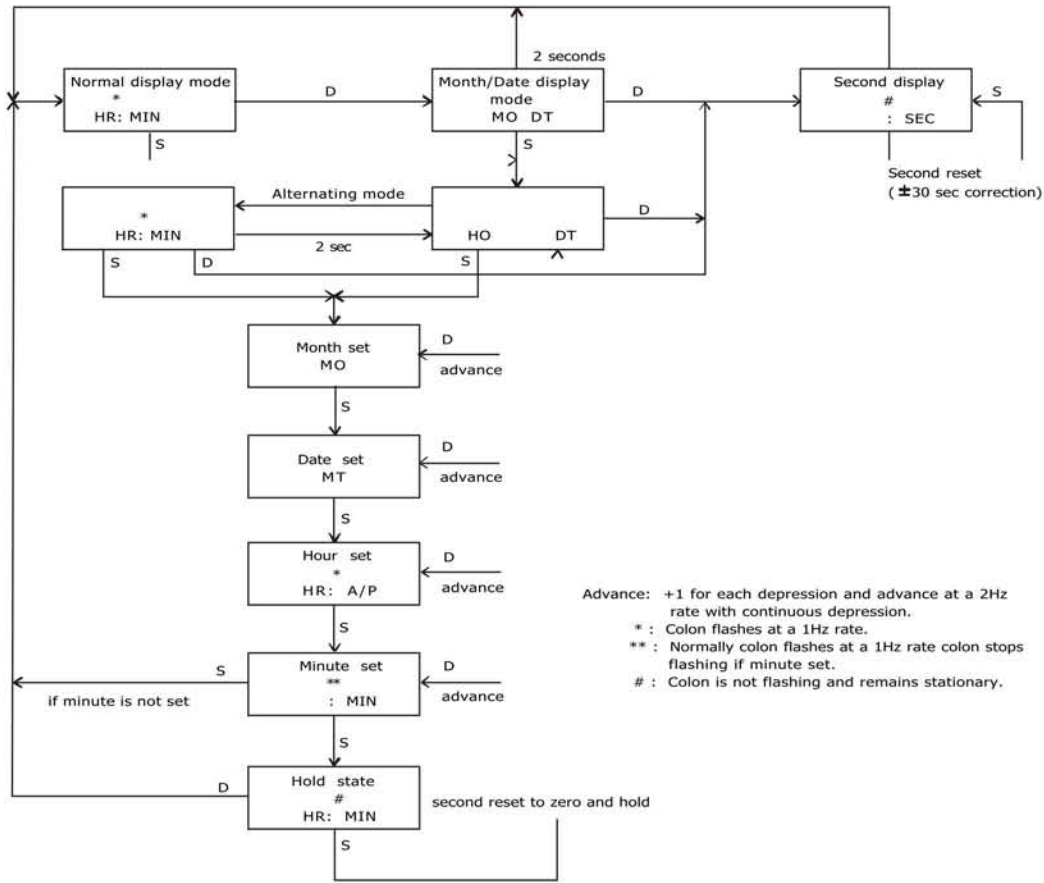
Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	- 0.3 ~ + 4.0	V
Operating Temperature	$T_{opr}$	- 20 ~ + 75	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	- 55 ~ + 125	$^\circ\text{C}$

\* Voltage greater than above may damage the circuit

**ELECTRICAL CHARACTERISTICS** ( $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ ,  $V_{CC} = 3.0\text{V}$ ; unless otherwise specified)

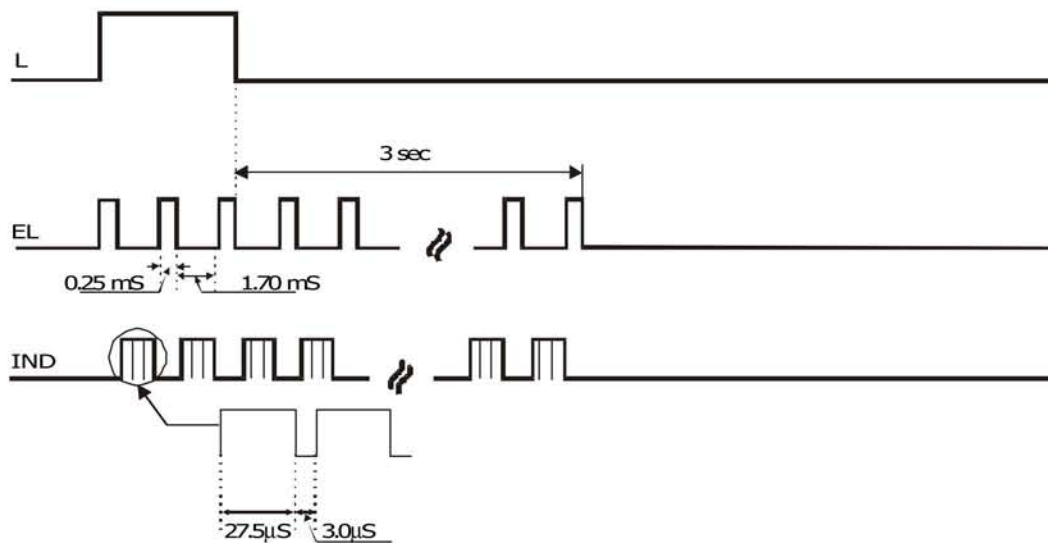
Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit	
Operating Voltage	$V_{CC}$		2.4	3.0	3.6	V	
Supply Current	$I_{CC}$	Without load		2.0	3.0	$\mu\text{A}$	
Output Current	IND	$I_{OH}$	$V_{OH} = 0.8\text{V}$	1.2	1.6	2.5	mA
	EL			0.35	0.6		
	IND	$I_{OL}$	$V_{OL} = 0.8\text{V}$	15	25		
	EL			1	2		
EL Frequency	$F_{EL}$	EL Output		512		Hz	
Pump Frequency	$F_{PUMP}$	IND Output		32,768		Hz	
Oscillator Start Voltage	$V_{OSC}$				2.7	V	
Oscillator Input and Output Capacitor	$C_{IN}, C_{OUT}$			20		pF	

## SETTING AND DISPLAY SEQUENCE

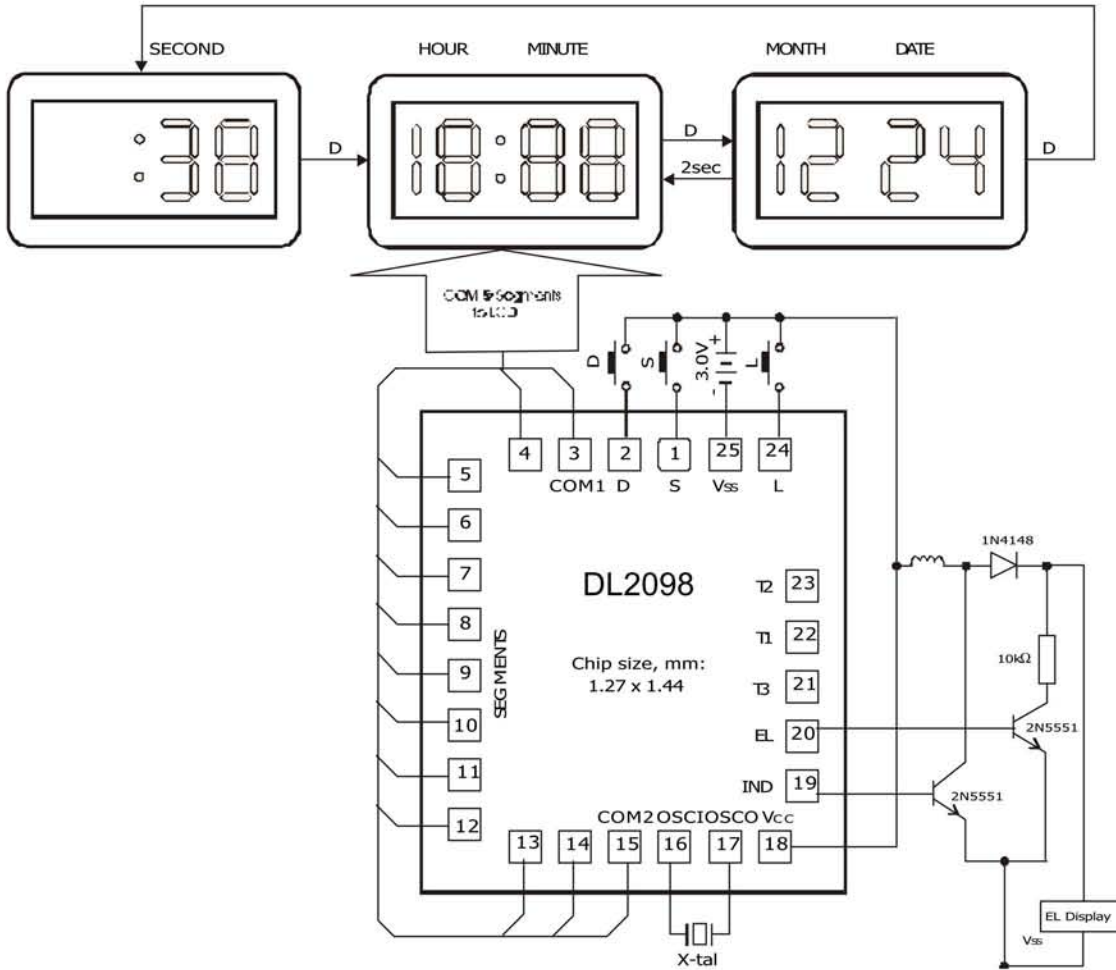


The signals to EL-driving are generated when L-input connects to V<sub>CC</sub> and delayed for 3.5 sec after disconnecting.

## CONTROL OUTPUTS WAVEFORM

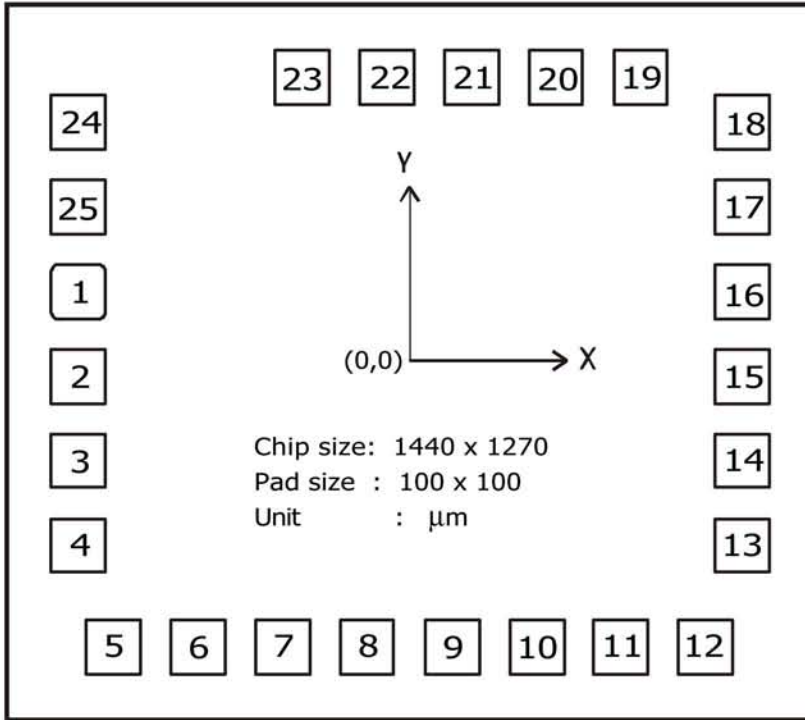


**APPLICATION CIRCUIT**



NOTE: The chip substrate is electrically connected to V<sub>SS</sub>.

## PAD DIAGRAM



## PAD LOCATION

Pad No.	Pad Name	X	Y	Pad No.	Pad Name	X	Y
1	S	-585	125	14	BC1/D2	590	-175
2	D	-585	-25	15	COM2	590	-25
3	COM1	-585	-175	16	OSCI	590	125
4	B4/C4	-585	-325	17	OSCO	590	275
5	A4/G4	-525	-505	18	V <sub>CC</sub>	590	425
6	F4/E4	-375	-505	19	IND	410	505
7	B3/C3	-225	-505	20	EL	260	505
8	AD3/G3	-75	-505	21	T3	110	505
9	F3/E3	75	-505	22	T1	-40	505
10	COL/D4	225	-505	23	T2	-190	505
11	B2/C2	375	-505	24	L	-585	425
12	A2/G2	525	-505	25	V <sub>SS</sub>	-585	275
13	F2/E2	590	-325				