

## 6 Functions 6 Digits Alarm Watch

The is a CMOS digital 6-function watch integrated circuit with alarm and autoranging chronograph function; designed for a 6-digit duplexed liquid crystal display, 7-day mark, date mark, AM/PM mark and colon. The BS6191 designed especially for use with 3V Li-battery.

With few external components the BS6191 can drive EL-lamp.

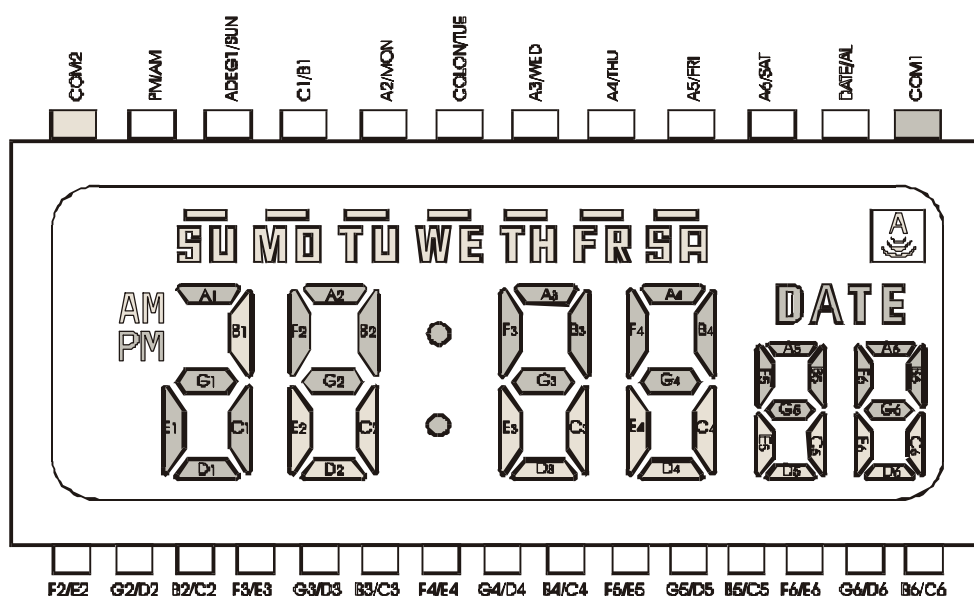
### FEATURES

- Drives 6-digit duplexed LCD with 7-day mark, AM/PM, date mark and alarm mark
- Colon display
- Direct drive of piezoelectric transducer
- 32,768Hz crystal frequency
- On chip oscillator, capacitor, resistor
- Single 3.0V batter operation
- Low power dissipation
- Debounce circuitry on switch inputs
- Protection against static discharge

### FUNCTIONS

- 6 Functions: Month, Date, Day-of-Week, Hour, Minute, Second
- 6-digit Chronograph: Autoranging after 30 minutes to hour, minute, second
- User selectable 12-hour/24-hour format
- 4-year calendar
- One-touch correction of time error within  $\pm 30$  seconds
- Fast advance for time and alarm time set
- Chime on every hour
- Backlight (EL) control outputs

### LCD FORMAT



### ABSOLUTE MAXIMUM RATINGS

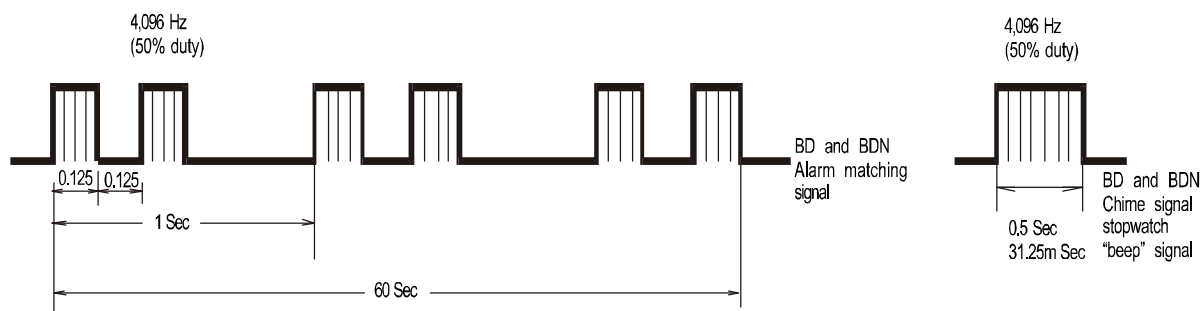
Characteristic	Symbol	Value	Unit
Supply Voltage, $V_{DD}$	$V_{DD}$	- 0.3 ~ + 4.0	V
Operating Temperature	$T_{opr}$	- 20 ~ + 70	°C
Storage Temperature	$T_{stg}$	- 55 ~ + 125	°C

### ELECTRICAL CHARACTERISTICS

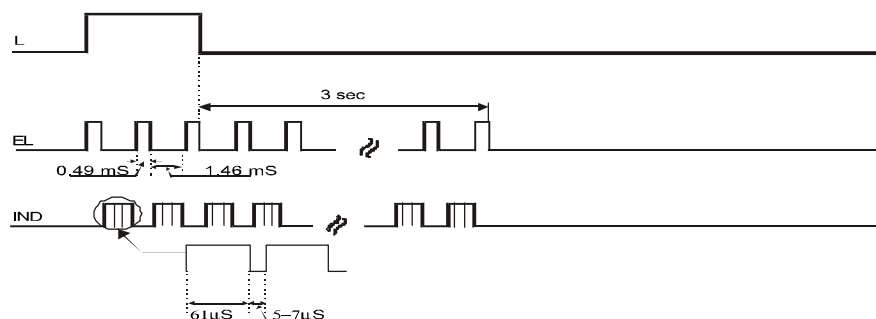
( $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ ,  $V_{CC} = 3.0\text{V}$  unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	$V_{CC}$		2.4	3.0	3.3	V
Supply Current	$I_{CC}$	Without load		1.5	2.5	$\mu\text{A}$
Oscillator Start Voltage	$V_{OSC}$				2.7	V
Alarm Drive Current (BD, BDN)	$I_O$	$V_{sat} = 0.5\text{V}$ (Both Direction)	1	2		mA
Output Current HIGH	IND	$V_{OH} = 0.8\text{V}$	1.2	1.6		mA
	EL		0.35	0.6		
Output Current LOW	IND	$V_{OL} = 0.8\text{V}$	10	20		mA
	EL		1	2		
EL Frequency	$F_{EL}$	EL Output		512		Hz
Pump Frequency	$F_{PUMP}$	IND Output		16,384		Hz
Oscillator Input and Output Capacitors	$C_{IN}, C_{OUT}$			20		pF

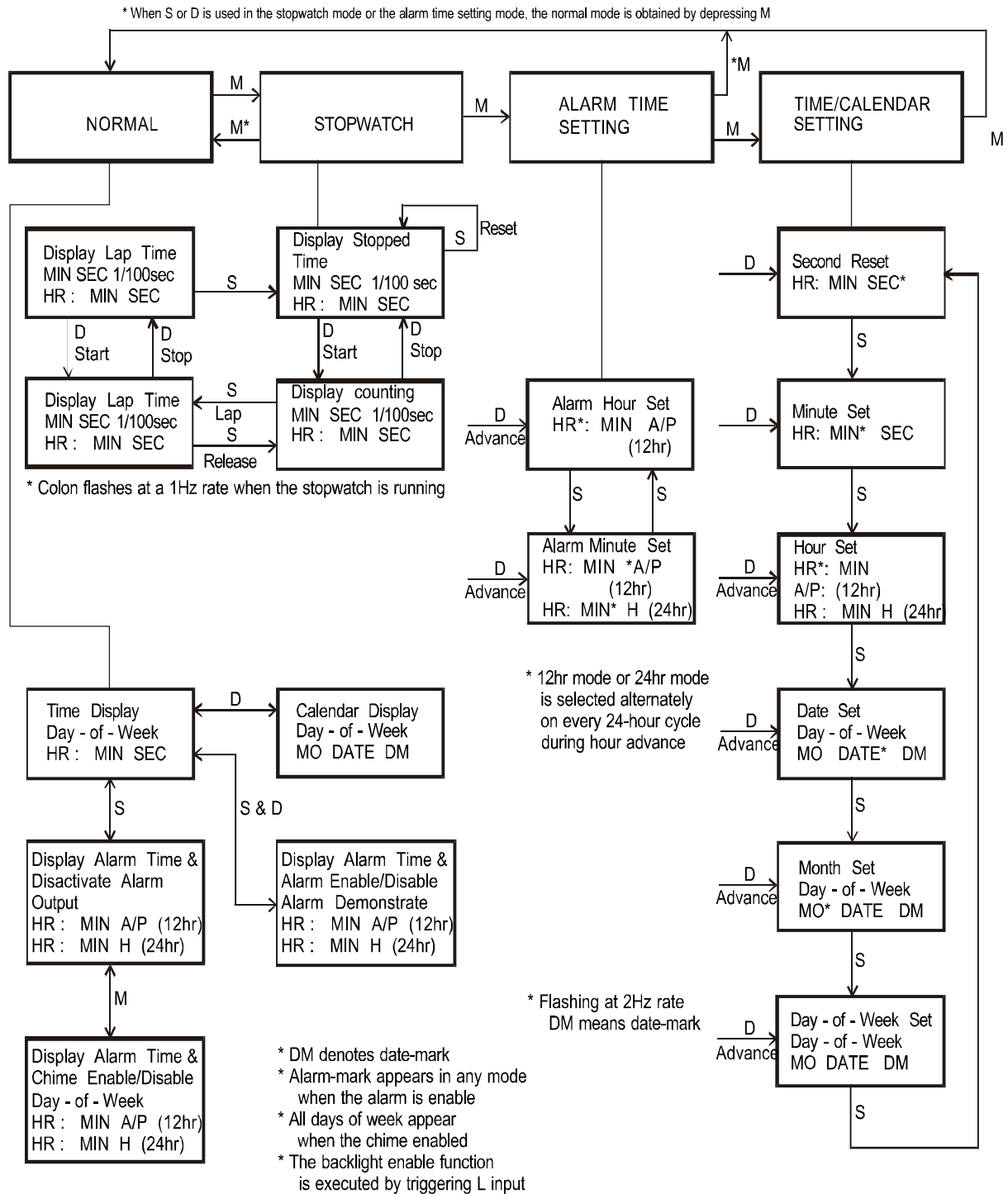
### ALARM OUTPUT WAVEFORM



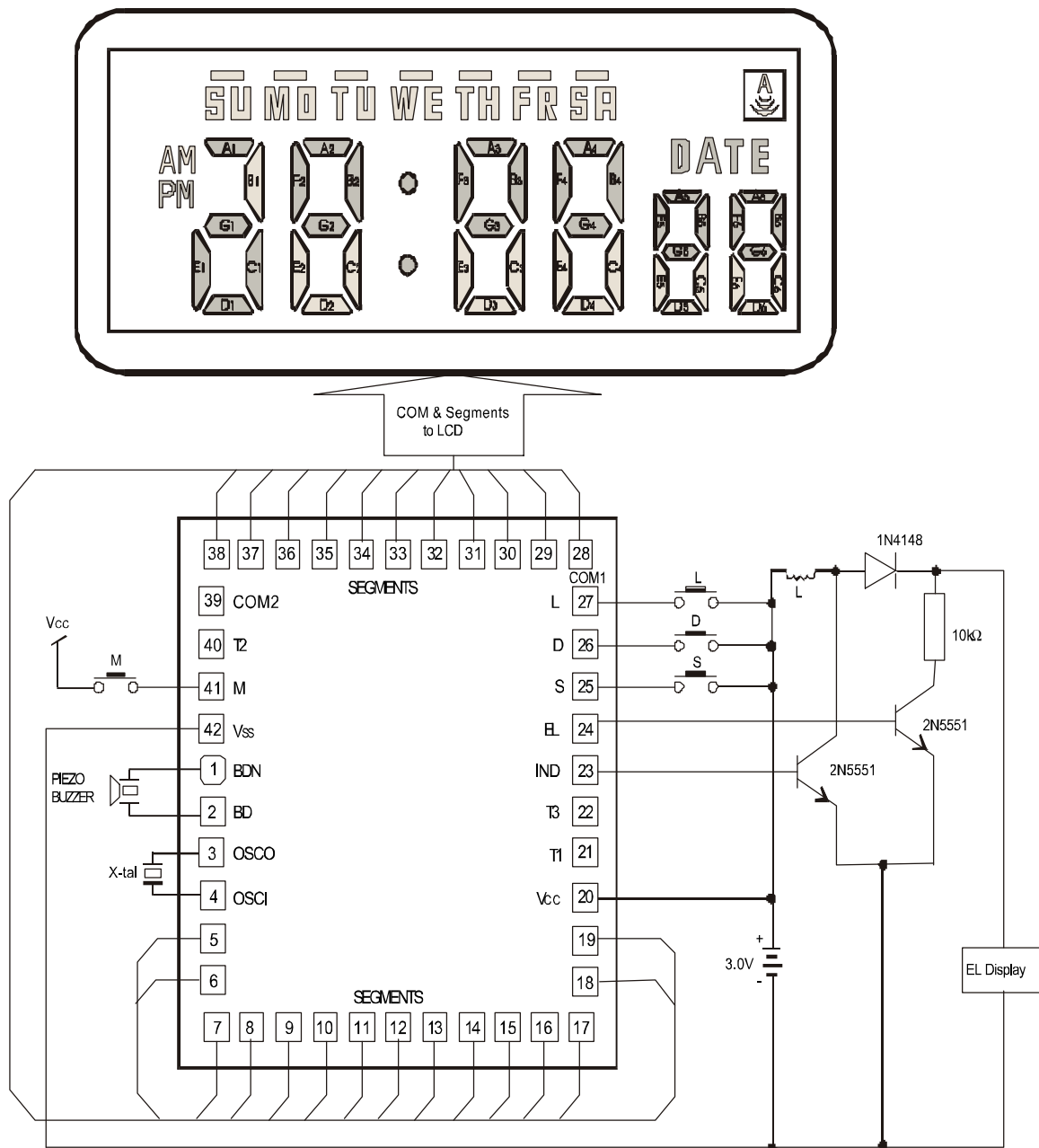
### CONTROL OUTPUTS WAVEFORM



## SETTING SEQUENCE AND SWITCH OPERATION

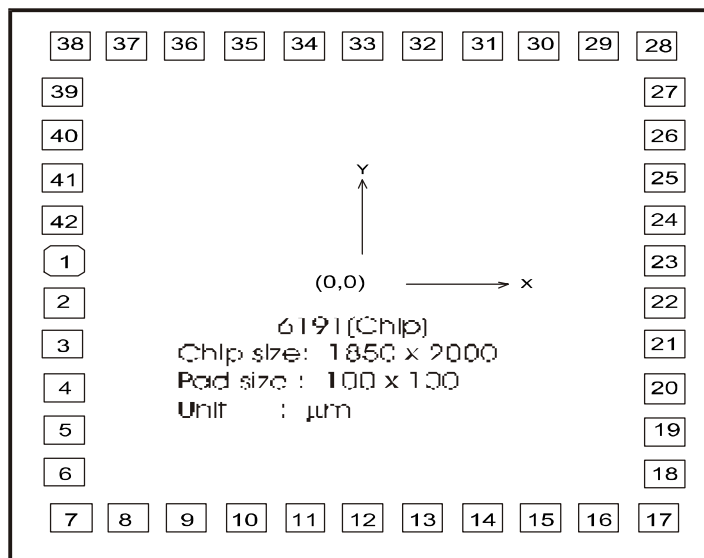


APPLICATION CIRCUIT



NOTE : The chip substrate is electrically connected to  $V_{SS}$ .

### PAD DIAGRAM



### PAD LOCATION

Pad No.	Pad Name	X	Y	Pad No.	Pad Name	X	Y	Pad No.	Pad Name	X	Y
1	BDN	-795	80	15	G5/D5	465	-870	29	DATE/AL	620	870
2	BD	-795	-75	16	B5/C5	620	-870	30	A6/SAT	465	870
3	OSCO	-795	-230	17	F6/E6	775	-870	31	A5/FRI	310	870
4	OSCI	-795	-385	18	G6/D6	795	-695	32	A4/THU	155	870
5	F2/E2	-795	-540	19	B6/C6	795	-540	33	A3/WED	0	870
6	G2/D2	-795	-695	20	V <sub>CC</sub>	795	-385	34	COLON/TUE	-155	870
7	B2/C2	-775	-870	21	T1	795	-230	35	A2/MON	-310	870
8	F3/E3	-620	-870	22	T3	795	-75	36	C1/B1	-465	870
9	G3/D3	-465	-870	23	IND	795	80	37	ADEG1/SUN	-620	870
10	B3/C3	-310	-870	24	EL	795	235	38	PM/AM	-775	870
11	F4/E4	-155	-870	25	S	795	390	39	COM2	-795	700
12	G4/D4	0	-870	26	D	795	545	40	T2	-795	545
13	B4/C4	155	-870	27	L	795	700	41	M	-795	390
14	F5/E5	310	-870	28	COM1	775	870	42	V <sub>SS</sub>	-795	235