UM3203B

5-Function, 3 1/2-Digit, Multiplexed LCD Watch with Stopwatch

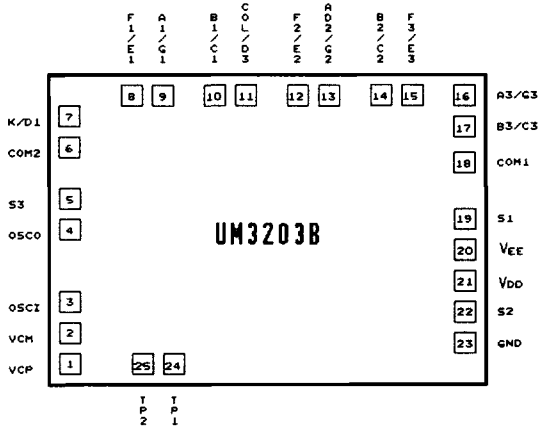
Features

- 5 functions (month, date, hour, minute and second.)
- A 15-minute, 1-second resolution stopwatch
- Direct driving of a standard 3 1/2-digit multiplexed liquid crystal display
- 32,768 Hz quartz crystal time base
- Built-in voltage doubler
- Single 1.5V battery operation
- 12-hour format
- 4-year calendar
- 3 push-button control
- On-chip debounce circuit
- Power-on reset and manual reset
- High speed test capability
- Low power dissipation

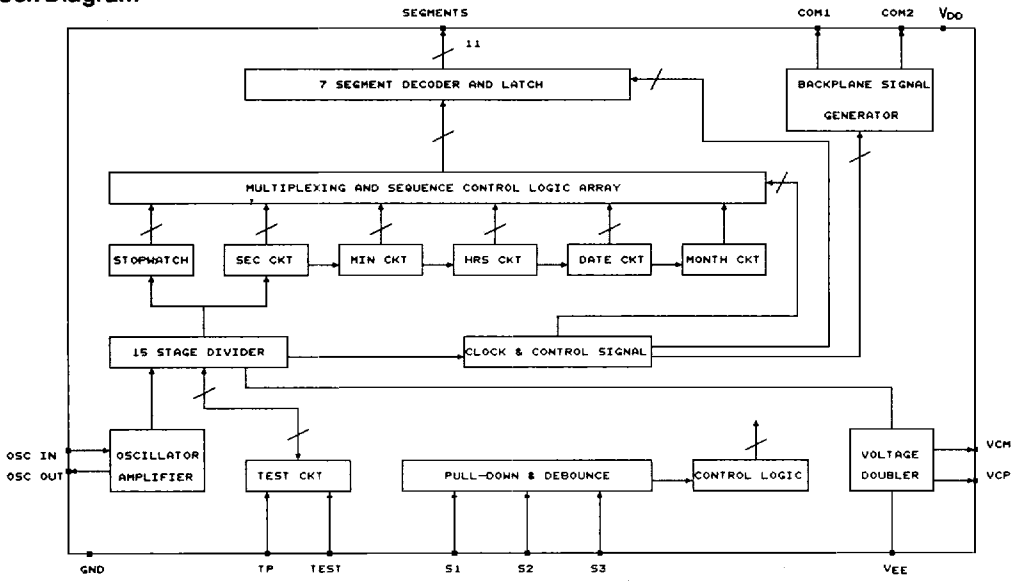
General Description

The UM3203B is a single chip CMOS watch circuit with five functions. It is designed to drive a standard 3 1/2- digit, multiplexed liquid crystal display. The watch circuit is based on a 32768Hz quartz crystal controlled oscillator, subsequent countdown logic and a display section to provide the HOUR/MINUTE, MONTH/DATE and SECOND readouts. The circuit also includes a 15-minute, 1-second resolution stopwatch. An oscillator capacitor is built in the chip. An external 32768Hz quartz crystal and trimmer capacitor is required to complete the oscillator circuit. The operation of the basic timekeeping functions is controlled via two switches, and the operation of the stopwatch is controlled via the third switch. With power on reset, or while simultaneously pressing switch S1 and S2, the watch will reset to January 1, 1:00 AM and 00 seconds. The circuit has a built-in voltage doubler (to drive the multiplexed LCD) which needs two external capacitors. Only one 1.5V battery is required to power the entire circuit. The UM3203B is supplied in chip form.

Pad Configuration



Block Diagram



Absolute Maximum Ratings*

Supply Voltage V_{DD} - GND . . . . . 0V to 6V
Supply Voltage V_{DD} - V_{EE} . . . . . 0V to 6V
Input Voltage . . . . . GND to V_{DD}
Operating Temperature . . . . . 0°C to 70°C
Storage Temperature . . . . . -20°C to 70°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.

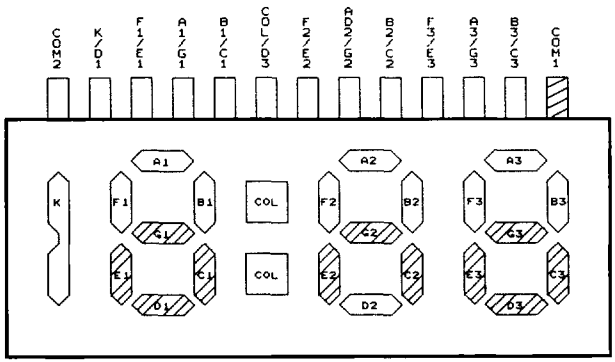
DC Electrical Characteristics (T_A =25°C, GND = 0V, V_{DD} = 1.5V, F_{OSC} = 32768Hz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	V_{DD}	1.3	1.5	1.6	V	-
Supply Current	I_{DD}	-	1.5	2	μA	No load
Generated Display	- V_{EE}	1.4	-	-	V	I_{EE} = 1μA
Switch Input Current	I_{IN}	1	-	100	μA	V_{IN} = V_{DD}
Start Oscillation Voltage	V_{START}	-	-	1.35	V	-
Switch Input Debounce Time	T_{DB}	-	62.5	-	ms	-
Oscillator Input Built-in Capacitance	C_{IN}	-	5	-	pF	-
Oscillator Output Built-in Capacitance	C_{OUT}	-	20	-	pF	-

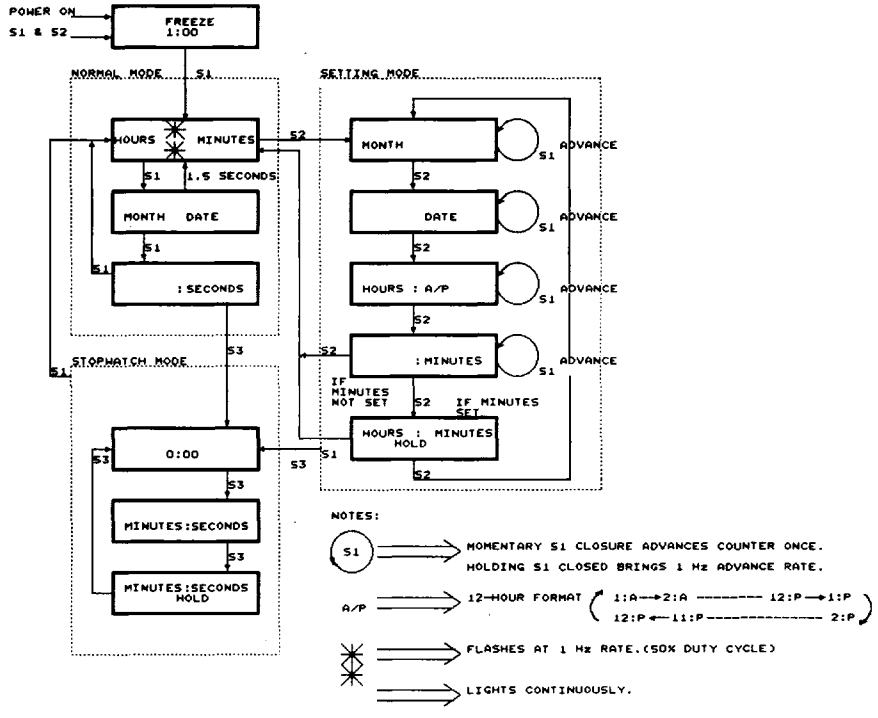
Pad Description

Pad No.	Symbol	Description
1	VCP	Voltage Doubler Capacitor Positive
2	VCM	Voltage Doubler Capacitor Negative
3	OSCI	Oscillator Input
4	OSCO	Oscillator Output
5	S3	Switch 2
6	COM2	LCD Segment Drive
7	K/D1	
8	F1/E1	
9	A1/G1	
10	B1/C1	
11	COL/D3	
12	F2/E2	
13	AD2/G2	
14	B2/C2	
15	F3/E3	
16	A3/G3	
17	B3/C3	
18	COM1	
19	S1	Switch 1
20	VEE	Voltage Doubler Supply
21	VDD	Positive Power Supply
22	S2	Switch 2
23	GND	Ground
24	TP1	Test Pad 1
25	TP2	Test Pad 2

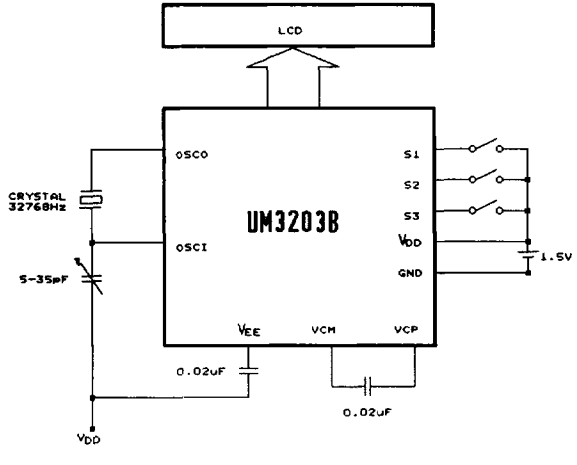
LCD Format



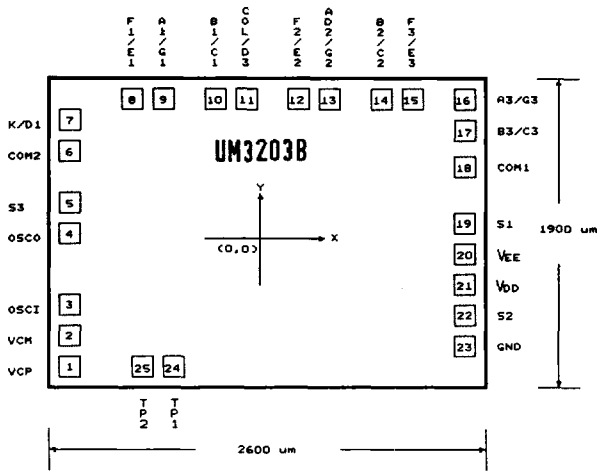
Operation Flow Chart



Application Circuit (for reference only)



Bonding Diagram



* Substrate connect to V_{DD}.

unit: μm

Pad No.	Designation	X	Y	Pad No.	Designation	X	Y
1	VCP	-1145.29	-841.25	14	B2/C2	669.29	834.14
2	VCM	-1145.29	-656.34	15	F3/E3	819.91	833.12
3	OSCI	-1145.29	-487.68	16	A3/G3	1145.03	834.90
4	OSCO	-1145.29	- 8.38	17	B3/C3	1144.02	668.27
5	S3	-1145.29	161.04	18	COM1	1141.98	419.61
6	COM2	-1154.68	456.95	19	S1	1154.94	0.76
7	K/D1	-1155.19	619.00	20	V_{EE}	1154.94	-212.60
8	F1/E1	-736.9	834.14	21	V_{DD}	1154.94	-415.54
9	A1/G1	-587.25	833.12	22	S2	1154.94	-598.42
10	B1/C1	-271.02	834.14	23	GND	1154.94	-836.17
11	COL/D3	-118.87	833.12	24	TP1	-495.81	-824.23
12	F2/E2	200.15	834.14	25	TP2	-643.89	-824.23
13	AD2/G2	350.52	833.12				

Notes:
1. Pad number is assigned clockwise from the lower left corner of the chip.
2. All bond pad dimensions are 102 X 102μm.
3. Chip size: 2.6mm X 1.9mm.

Ordering Information

Part No.	Package
UM3203B	CHIP FORM