SH5220C-00XX

PRELIMINARY

Talking Clock/Watch with LCD IC

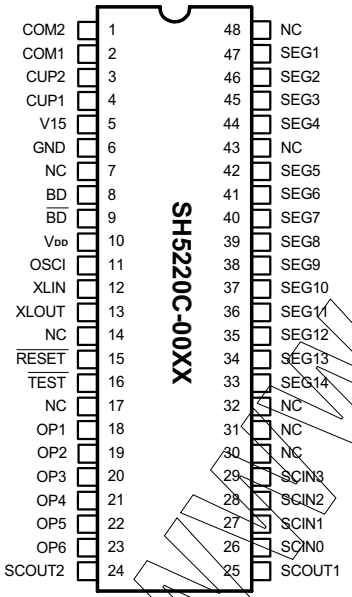
Features

- 3 1/2 Digits LCD clock/watch
- Operating Voltage Range: 2.4V - 3.4V
- Time/Alarm time adjustable, Alarm on/off function
- Hourly report function
- Real time & Chime report
- 10 minutes snooze function
- LCD display time & function status
- English, Japanese, German, Spanish, Chinese, French, Russian, Arabic above IC are available

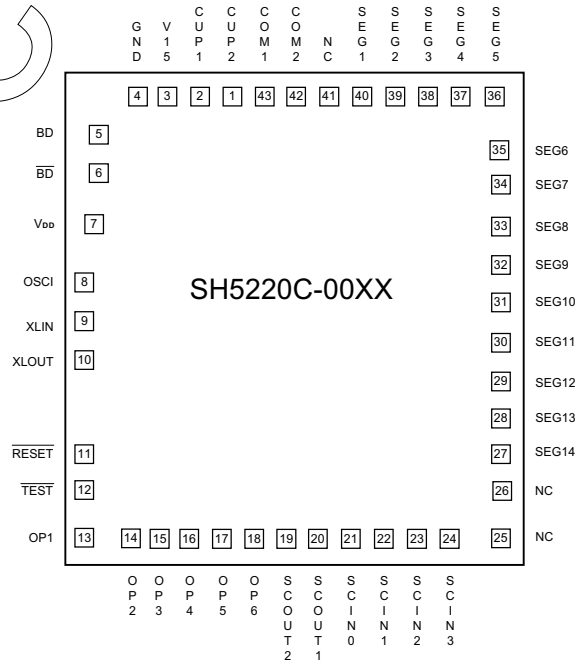
General Description

SH5220C-00XX is a single-chip voice synthesizer that is used on talking watch or clock with some specific functions. Furthermore, In the first place, it can show exact time and every kind of set status on 3 1/2 LCD, and some more useful functions, such as reporting the real time by pushing button, setting chime, 10 minutes snooze alarm for more sleep, and the alarm sound is optional. In addition, SH5220C-00XX just need few extra components to be a delicate watch or functional clock, so far we can offer 8 talking clock IC, There are English, Japanese, German, Spanish, Chinese, French, Russian and Arabic.

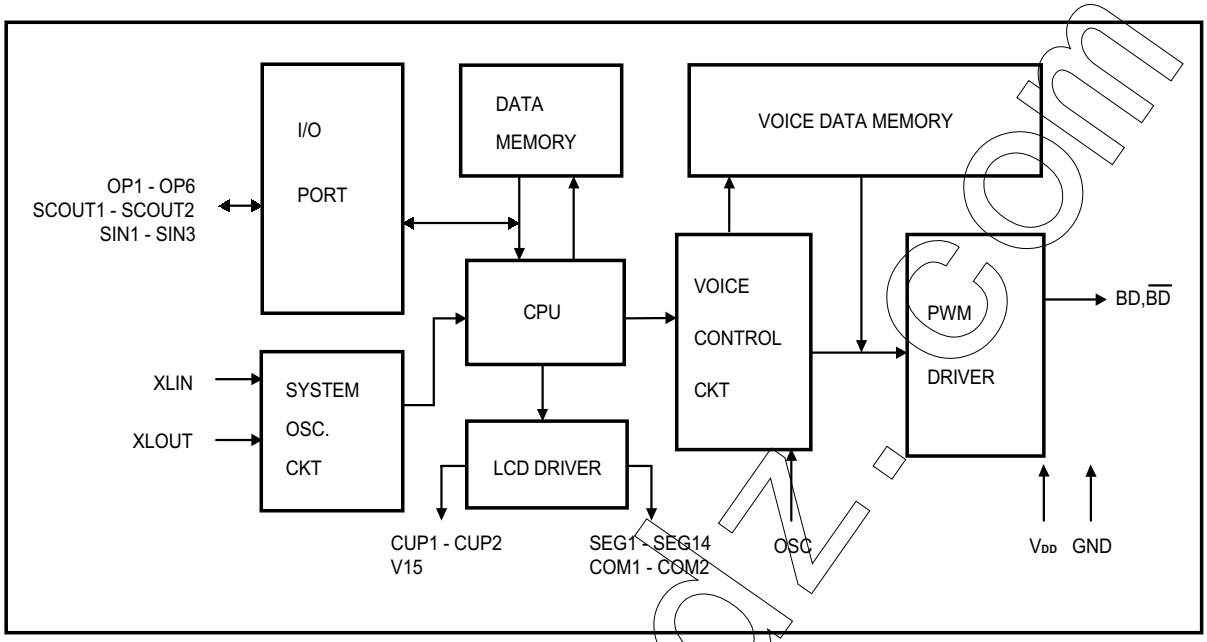
Pin Configuration



Pad Configuration



Block Diagram



Pin and Pad Descriptions

Pin No.	Pad No.	Designation	I/O	Description
1 - 2	42 - 43	COM1 - COM2	O	Common signal output for LCD
3 - 4	1 - 2	CUP1 - CUP2	I/O	Pin for connecting voltage step-down capacitor
5	3	V15	P	Power supply for LCD
6	4	GND	P	Power supply
7, 14, 17, 30 - 32, 43, 48	25 - 26, 41	NC		No connection
8	5	BD	O	PWM output of audio signal
9	6	$\overline{BD}$	O	PWM output of audio signal
10	7	V_{DD}	P	Power supply
11	8	OSCI	I	Oscillator connecting pin for voice synthesizer

Pin and Pad Descriptions (continued)

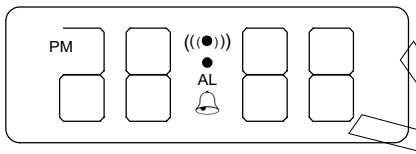
Pin No.	Pad No.	Designation	I/O	Description
12	9	XLIN	I	Crystal oscillator input
13	10	XLOUT	O	Crystal oscillator output
15	11	$\overline{\text{RESET}}$	I	System reset
16	12	$\overline{\text{TEST}}$		Test pin
18 - 23	13 - 18	OP1 - OP6	I/O	Programmable I/O
24 - 25	19 - 20	SCOUT1 - SCOUT2	I/O	Signal output pin
26 - 29	21 - 24	SCIN0 - SCIN3	I/O	Signal output pin
33 - 42, 44 - 47	27 - 40	SEG1 - SEG14	O	Segment signal output for LCD

Functional Description

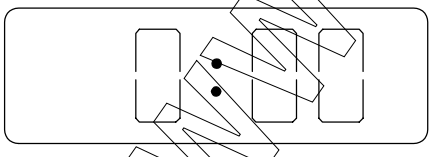
SH5220C-00XX has four kinds of working modes, they are NORMAL mode (alarm on), NORMAL mode (alarm off), NORMAL TIME SETTING mode, ALARM TIME SETTING mode respectively, as follows:

Power on Setting & Reset

When SH5220C-00XX is reset, IC will automatically set initial data, meanwhile, all the LCD segaments will flash for one second to confirm the application circuit.

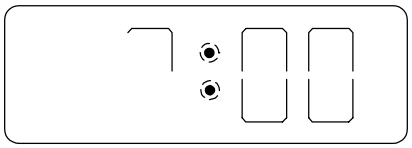


After the initial data setting, SH5220C-00XX will cmmediately become the NORMAL mode (alarm off) status, and the time will be reset as 00:00 and show on LCD.

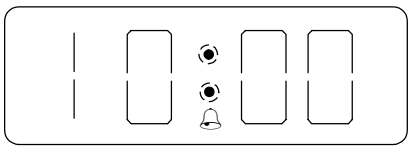


NORMAL Mode (Alarm off)

In the NORMAL mode status, SH5220C-00XX will show the real time. There are 2 kinds of alarm status available (on/off). Under the ALARM OFF mode, the alarm function will be cancelled temporarily and the sign of "🔔" will not appear on LCD.



Under the ALARM SETTING mode, the alarm function will be stared and the sign of "🔔" will appear on the middle of LCD, as showed beneath:



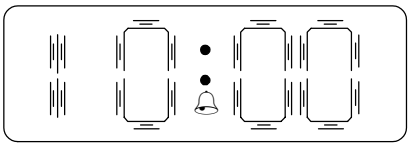
Normal TIME SETTING Mode

To adjust normal time, press "mode setting" key to the time what you want. the LCD will show as chart 1. When both of number and sign flash, pressing "hour" key and "min" key to adjust. After adjusting the time, it will return to the normal time by a Pressing "SET" key twice, or b. Waiting for flashing 8 times, then back to the normal time .

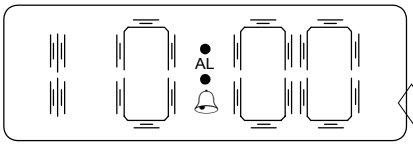
Alarm TIME SETTING Mode

To set alarm time, pressing the " SET " key when it's at the normal time mode, The LCD will show the alarm time as the chart 1 beneath. Different to the normal time mode, it will appear the sign of "AL" in the middle area. At that time, both numbers and sign will flash, using the "hour" and "min" key to adjust the alarm time. After setting, using press "SET" a key for one second, or b. wait for flashing for 8 times, then back to normal time.

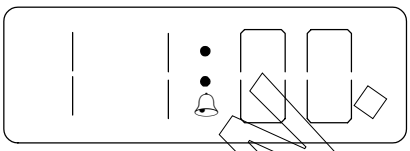
Normal Time Setting (Flashing)



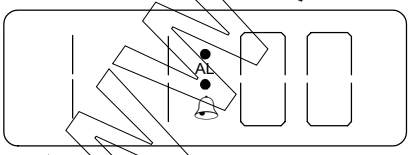
Alarm Time Setting (Flashing)



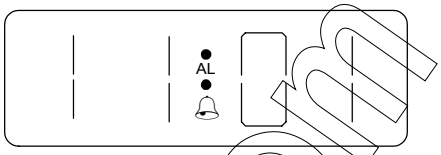
Hour Adjusting (Normal time)



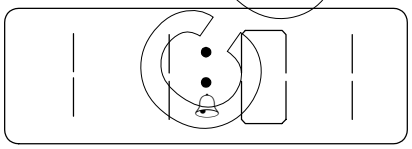
Hour Adjusting (Alarm time)



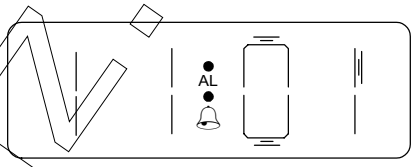
Minute Adjusting (Alarm time)



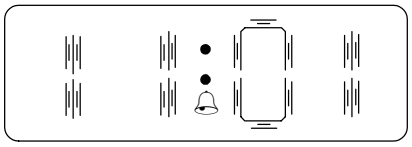
Minute Adjusting (Normal time)



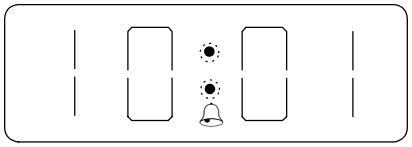
Alarm Time Setting (Flashing)



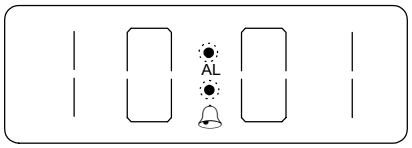
Normal Time Setting (Flashing)



Return to Normal Time Mode



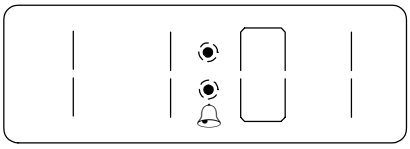
Return to Alarm Time Mode



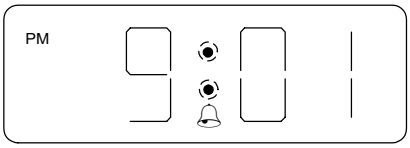
Timer Report

SH5220C-00XX will report the real time by pushing "talking" button. As following:

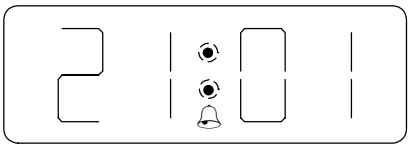
"Dom, Eleven O One AM"



"Dom, Nine O One PM"



or



Snooze Function

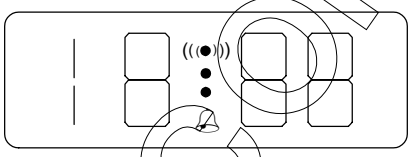
Under the alarm setting ON mode, when the normal time is same to the alarm time, the alarm function will active. Now, pressing "talking" key will enter the snooze function (the LCD will flash the sign of "🔔" in the middle area), the alarm sound will stop but the function will reactive 10 minutes later. You can push any other key to cancel it (if so, the sign of "🔔" will disappear), otherwise, the function will repeat each 10 minutes.

Alarm Sound Selection

The alarm function provides three kinds of alarm sound, there are "Bi Bi", "Co Co Co Co" and "Rooster sound". It can be chosen by pressing "Hour" key at the Normal time mode.

CHIME Mode

SH5220C-00XX has chime function, It has four kinds of work time range chose by OP1 And OP2. It can be set by pressing "hourly" key at the normal time, The LCD will appear the sigh of "(((●)))" in the middle area.



OP1	OP2	Chime Range
GND	OPEN	AM 05 : 00 - AM 00 : 00
OPEN	GND	AM 08 : 00 - PM 10 : 00
OPEN	OPEN	24 Hour OFF
GND	GND	24 Hour ON

Alarm Report Option

There are two kinds of report style can be assigned by OP3;
- OP3 Connects to GND: Repeat the alarm sound one time and real time.
- OP3 Open: Repeat the alarm sound two times.

24/12 Hours Display Option

SH5220C-00XX provides either 12 hours or 24 hours LCD display mode. It can be assigned by OP4;
- OP4 connects to GND: LCD display 24 hours.
- OP4 Open: LCD display 12 hours.

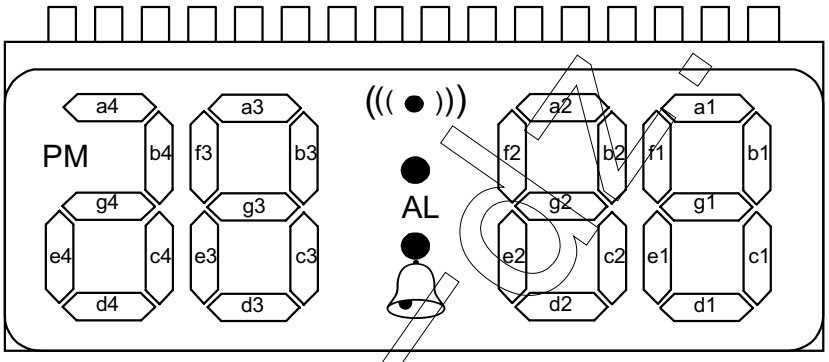
Speaker/Buzzer Option

SH5220C-00XX provides either speaker output or buzzer output , It can be assigned by OP5;

- OP5 connects to SCOUT2: The application is the Speaker output.
- OP5 Open: The application is the Buzzer output.

LCD Format

PAD	COM2	SEG1	SEG2	SEG3	SEG4	SEG5	SEG6	SEG7
COM1		PM	c4	d3	e3	g3	c3	d1
COM2		AL	a4 d4 e4 g4	b4	f3	a3	b3	:
PAD	SEG8	SEG9	SEG10	SEG11	SEG12	SEG13	SEG14	COM1
COM1	e2	g2	c2	e1	g1	c1		
COM2	f2	a2 d2	b2	f1	a1	b1		



Absolute Maximum Ratings*

DC Supply Voltage . . . . . -0.3V to +5V

Input/Output Voltage . . . . . GND-0.2V to V_{DD} +0.2V

Operating Ambient Temperature . . . . . -10°C to +60°C

Storage Temperature . . . . . -55°C to +125°C

***Comments**

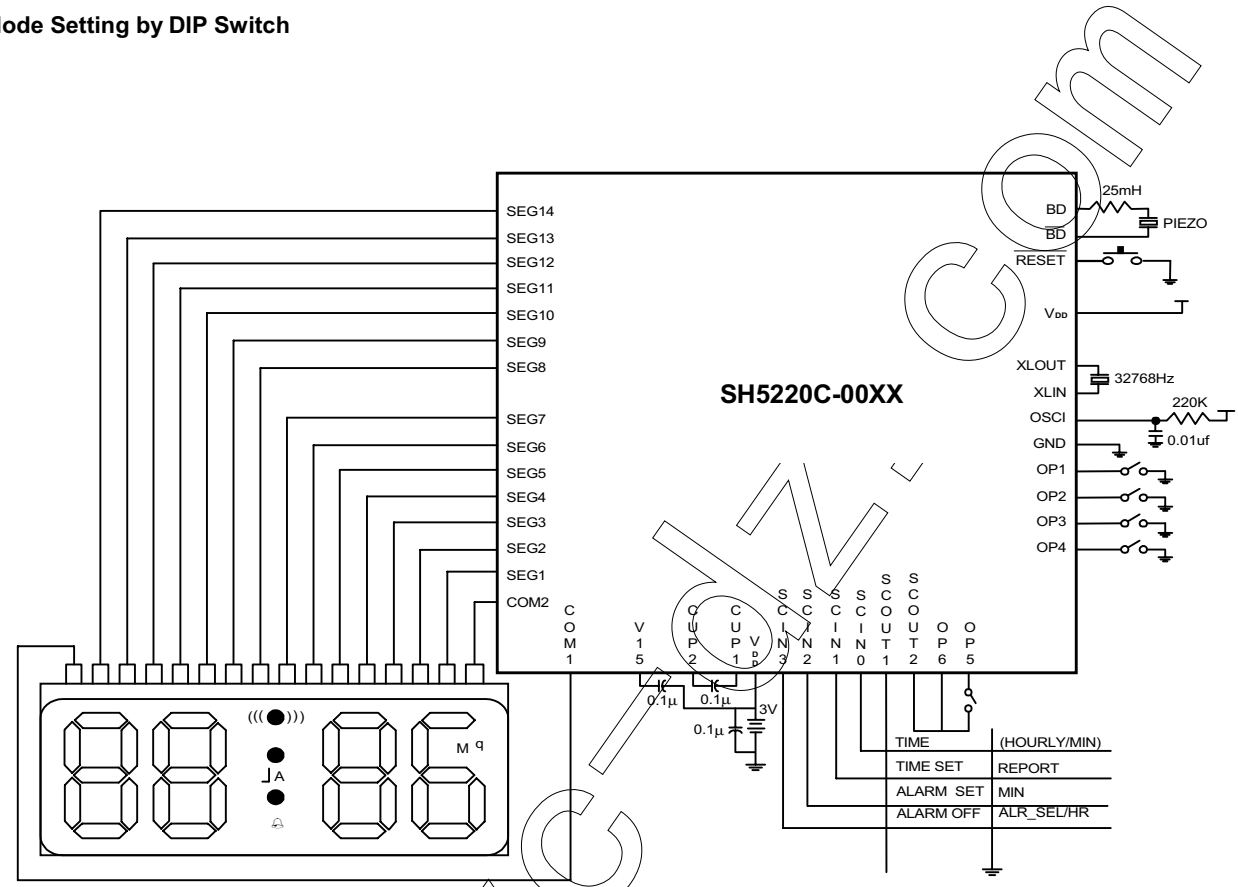
Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to this device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied or intended. Exposure to the absolute maximum rating conditions for extended periods may affect device reliability.

DC Electrical Characteristics (GND = 0V, T_A = 25°C, F_{OSC} = 32.768KHz, unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Conditions
V_{DD}	Operating Voltage	2.4	3.0	3.4	V	
I_{OP1}	Operating Current			800	μA	V_{DD} = 3.0V, no load (X'tal mode)
I_{OP2}	Operating Current			300	μA	V_{DD} = 3.0V, no load (RC mode)
I_{SB1}	Standby Current			2.0	μA	V_{DD} =3.0V, CPU stop (OSC. disabled), all output pins unloaded
I_{SB2}	Standby Current			5.0	μA	V_{DD} =3.0V, CPU halt (OSC. enabled), all output pins unloaded
I_{SB3}	Standby Current			2.0	μA	V_{DD} =3.0V, CPU stop (RC. disabled), all output pins unloaded
I_{SB4}	Standby Current			35	μA	V_{DD} =3.0V, CPU halt (RC. enabled), all output pins unloaded
Ii	Input Current	V_{DD}-0.5	30	50	μA	V_{DD} = 3.0V, V(input) = 0V
V_{IH}	Input High Voltage	0.7* V_{DD}		V_{DD}+0.3	V	
V_{IL}	Input Low Voltage	-0.3		GND+0.5	V	
V_{OL}	Output Low Voltage (Port) I_{OL} = 2.5 mA Sink		0.5	1	V	V_{DD} = 3.0V
V_{OH}	Output High Voltage (Port) I_{OH} = 25 μA Drive	2	2.5		V	V_{DD} = 3.0V
I_{OH} I_{OL}	BD, $\overline{BD}$ Output Current		30.0 30.0	55 55	mA mA	V_{OUT} = 2.5V, V_{DD} = 3.0V V_{OUT} = 0.5V, V_{DD} = 3.0V
ΔF/F	Frequency Stability			5	%	[F(3.0) - F(2.4)] / F(3.0)
ΔF/F	Frequency Variation			15	%	

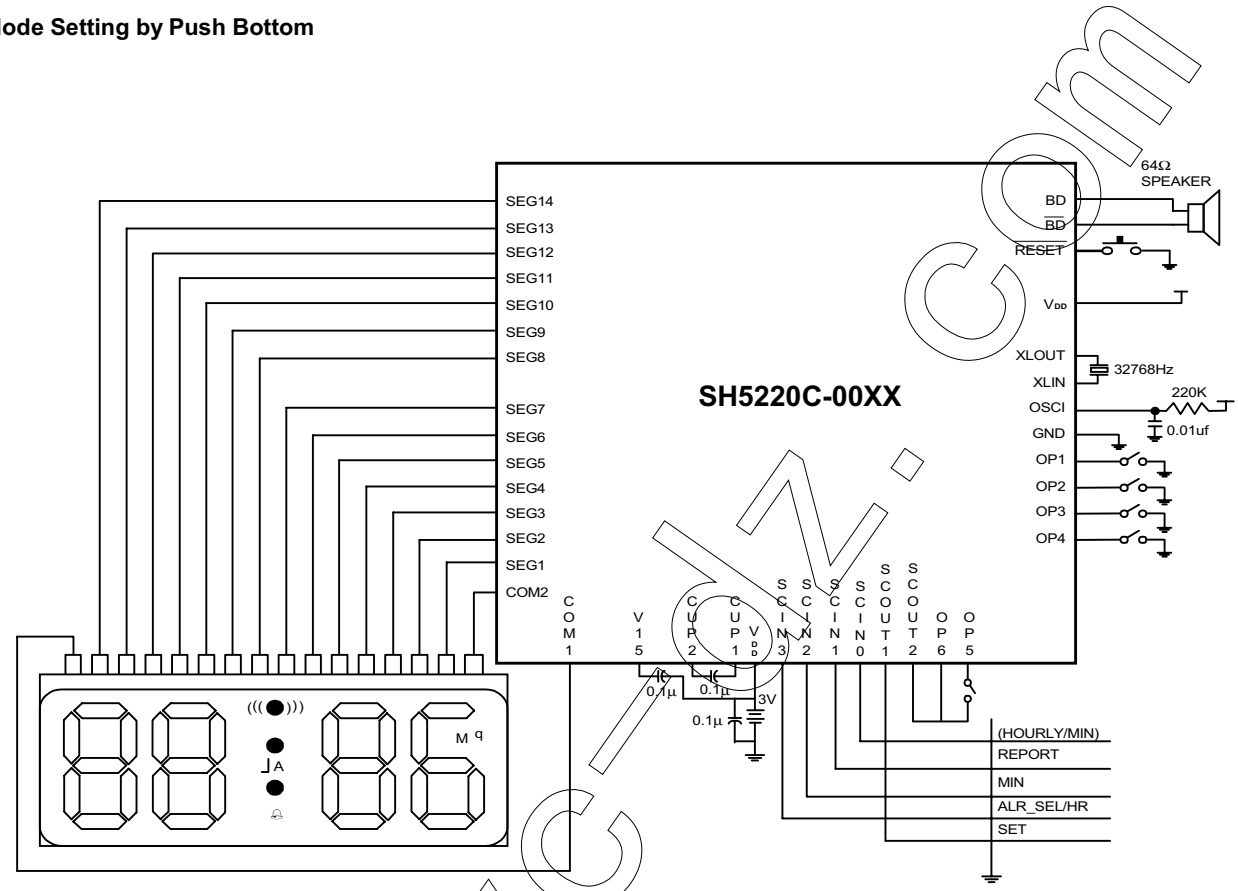
Application Circuit (for reference only)

Mode Setting by DIP Switch



Application Circuit (for reference only)

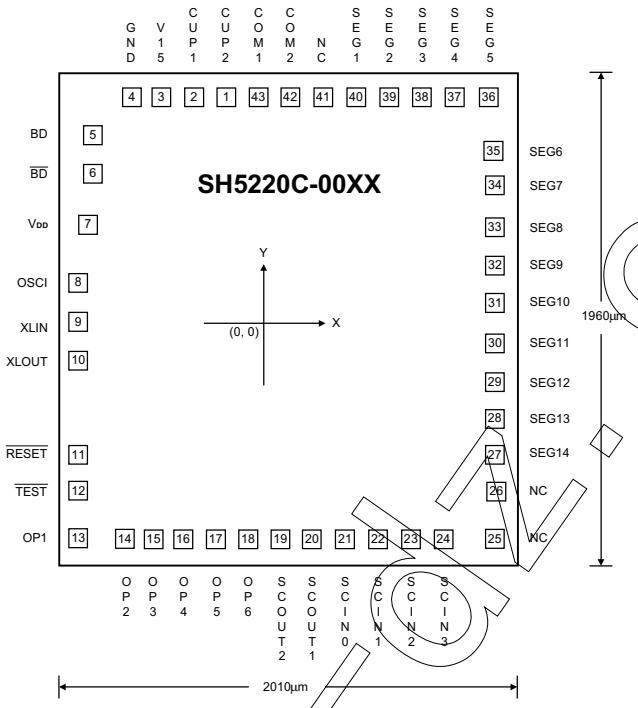
Mode Setting by Push Bottom



Code List

Part No.	Designation
SH5220C-0012	English
SH5220C-0013	Japanese
SH5220C-0014	German
SH5220C-0015	Spanish
SH5220C-0016	Chinese
SH5220C-0018	French
SH5220C-0019	Russian
SH5220C-0021	Arabic

Bonding Diagram



* Substrate Connect to GND

unit: µm

Pad No.	Designation	X	Y	Pad No.	Designation	X	Y
1	CUP2	-256	834	22	SCIN1	400	-840
2	CUP1	-382	834	23	SCIN2	530	-840
3	V15	-514	834	24	SCIN3	661	-840
4	GND	-647	834	25	NC	863	-840
5	BD	-823	656	26	NC	863	-647
6	$\overline{BD}$	-823	530	27	SEG14	863	-504
7	V_{DD}	-823	291	28	SEG13	863	-364
8	OSCI	-863	125	29	SEG12	863	-226
9	XLIN	-860	5	30	SEG11	863	-90
10	XLOUT	-860	-137	31	SEG10	863	48
11	$\overline{RESET}$	-860	-485	32	SEG9	863	180
12	$\overline{TEST}$	-860	-624	33	SEG8	863	329
13	OP1	-860	-840	34	SEG7	863	471
14	OP2	-642	-840	35	SEG6	863	612
15	OP3	-511	-840	36	SEG5	863	834
16	OP4	-375	-840	37	SEG4	656	834
17	OP5	-237	-840	38	SEG3	525	834
18	OP6	-113	-840	39	SEG2	394	834
19	SCOUT2	10	-840	40	SEG1	270	834
20	SCOUT1	144	-840	41	NC	138	834
21	SCIN0	277	-840	42	COM2	8	834
				43	COM1	-120	834

Ordering Information

Part No.	Package
SH5220CH-00XX	CHIP FORM
SH5220CL-00XX	48 PIN DIP

Package Information

DIP 48L Outline Dimensions

unit: inches/mm