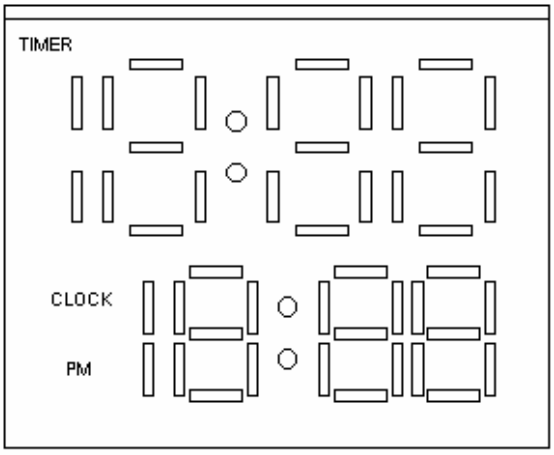
## Features

* Dual 3 1/2 digit (HH:MM) LCD display
* Real time clock
* 3/4 keys operation
* Max. timer range 15Hour 59minute or 19Hour 59minute bonding option
* 5minute, 10 minute pre-alarm
* Trigger timer output
* Recall Memory function
* 1/2 bias 1/3 duty LCD format
* Very low power consumption
* 32768 Crystal oscillator
* Single 1.5V operation.

## General Description

The LSI6022 is a dual 3 1/2 digit LCD watch and timer I.C.. The I.C. display the timer/clock on the upper/lower display. The timer range can be selected between 15:59 or 19:59 by bonding option. It provides 10 minutes and 5 minutes pre-alarm. It can be used as a car park timer and kitchen timer. The timer can be selected with 20minutes count up by bonding option. The keytone can also be bonding option select.

## LCD Drawing




DUAL DISPLAY

## Functional Description

**Counting Range**
The LS6022 is a count down timer with 4 digit display HH:MM at the upper display and a real time clock at the lower display. The maximum count down range is 19 Hour 59 minutes or 15Hour 59 minutes selected by bonding option.

## Four key operation
The LS6022 support 4 keys : KSET, KST, KHR, KMIN.

The LS6022 display the clock on the lower display and is always on. When the timer is in-active for 1 minute, the timer display(upper) is off. Press any of the KST, KHR, KMIN will wake up the timer.

When the timer is wake-up,
Press KMIN to set the counting minute.
Press KHR to set the counting hour.
Press KST to start the count down.

When the system is counting, press Kstart will pause the counting.
Press Kstart again to resume counting.

At any time, press KSET to enter set clock mode,
Press KMIN to set the real time clock minute.
Press KHR to set the real time clock hour.

## System Reset
When KHR and KMIN is pressed simultaneously, the timer resets to 0:00.

## Pre-alarm
At 10minutes, 5minutes before the alarm time, the system gives two pre-alarm signal.

## Auto-off
When there is no activities for 1 minute, the system will automatically power off the LCD.
Press any key will wake up the system again.

## Bonding Option
There are 3 bonding option the control the LS6022, BKEYTONE, BUP, B1519

| BKEYTONE | Description |
|---|---|
| VDD | With keytone |
| GND | No keytone |

| BUP | Description |
|---|---|
| VDD | 20 minute count up at end of count |
| GND | Stop at 0 at end of count |

| B1519 | Description |
|---|---|
| VDD | 15 Hour |
| GND | 19 Hour |

Trigger output

When the timer counts down to 0, R0 will provide a trigger output. The output duration is 1 minute if no key is pressed during this 1 minute. The trigger output can be aborted by pressing any key during this 1 minute interval.

## Pin Assignment

| DESIGNATION | TYPE | DESCRIPTION |
|---|---|---|
| B0, B1 | OUTPUT | Buzzer output |
| F512, VCAP | OUTPUT | Doubler output |
| VEE | OUTPUT | -1.5V |
| T1, T2,<br>XT7,<br>XT8, XT9, XT10, XT11 | INPUT | TEST pin |
| COSCO | OUTPUT | 32KHz oscillator output |
| COSCI | INPUT | 32KHz oscillator input |
| VDD | POWER | +1.5V power supply |
| GND | POWER | Ground |
| BKEYTONE,B1519, BUP | INPUT(PH) | Bonding option |
| KST,KSET, KMIN, KHR | INPUT(PH) | Input key |
| PB | INPUT(PH) | Power up reset |
| C[1:3] | OUTPUT | LCD Common output |
| S[1:16] | OUTPUT | LCD Segment output |

Note: (PH) - pull high;

## Absolute Maximum Ratings

Supply voltage Vdd - Vss.....0 to 5V
Input voltage Vin.....Vss to Vdd
Operating temperature Top .....-10°C to 60°C
Storing temperature Tst .....-40°C to 70°C

## Comments

Stress above those listed under absolute Maximum Ratings" may cause permanent damage to the device. These are stress rating 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.

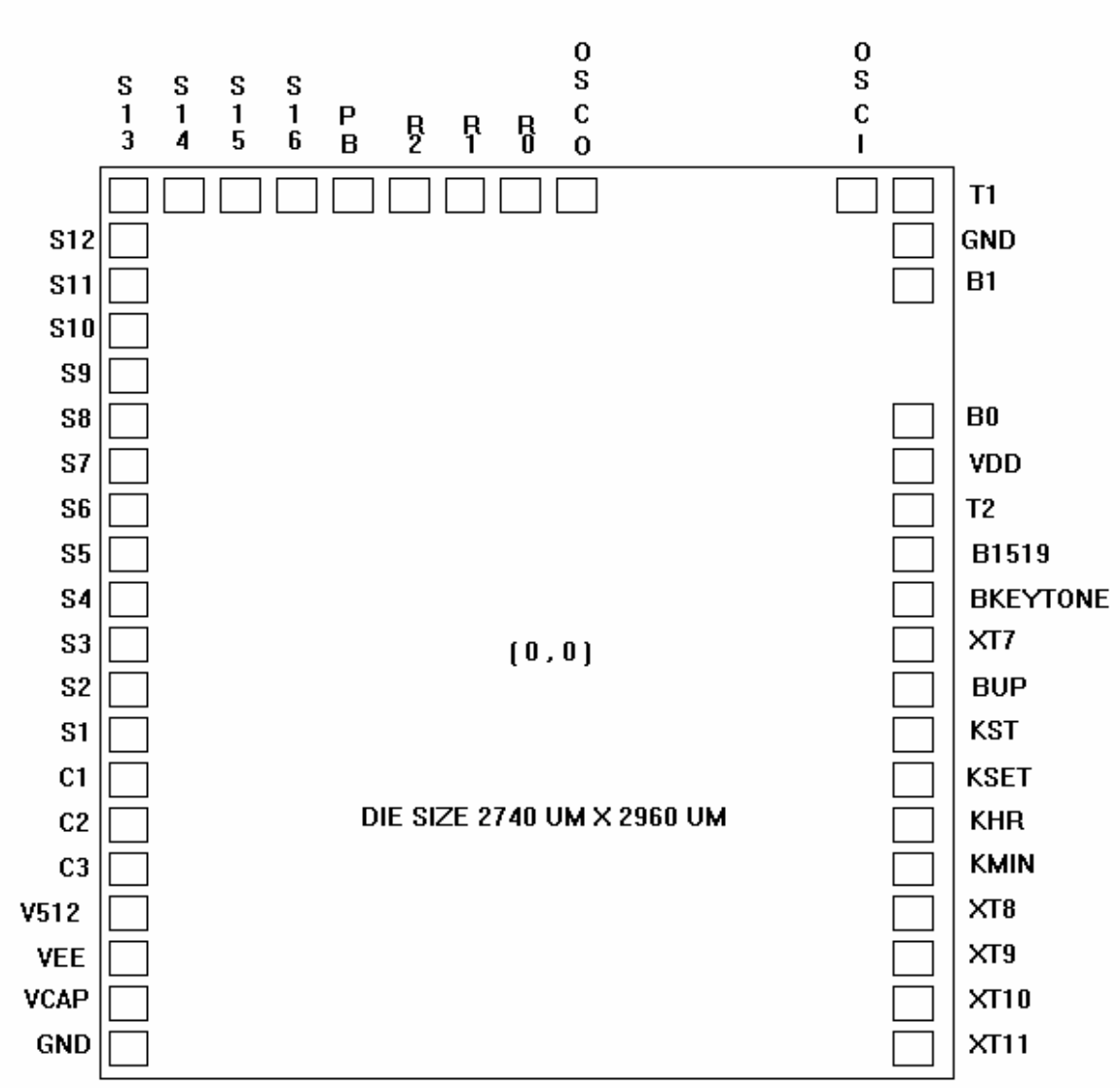
**D.C. Electrical Characteristics**
(GND = 0V, Vdd = 1.5V, Ta = 25°C unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Supply Voltage | Vdd | 1.2 | 1.5 | 1.8 | V | |
| Operating current | Idd | - | 2 | 5 | µA | No load |
| OSC. built-in cap | Cd | - | 20 | - | pF | |
| OSC. trimmer cap | Ctrim | 5 | - | 35 | pF | |
| Frequency stability | ^f/f | - | - | 10 | ppM | Vdd=1.6-1.4 |
| Buzzer output current | Ib | 500 | - | - | µA | Vbd-Vss=0.5 |
| LCD frequency | Flcd | - | 64 | - | Hz | |
| Segment current | Is | 0.15 | - | - | µA | Vseg=0.2V |
| Common current | Ic | 3.0 | - | - | µA | Vcom=0.2V |

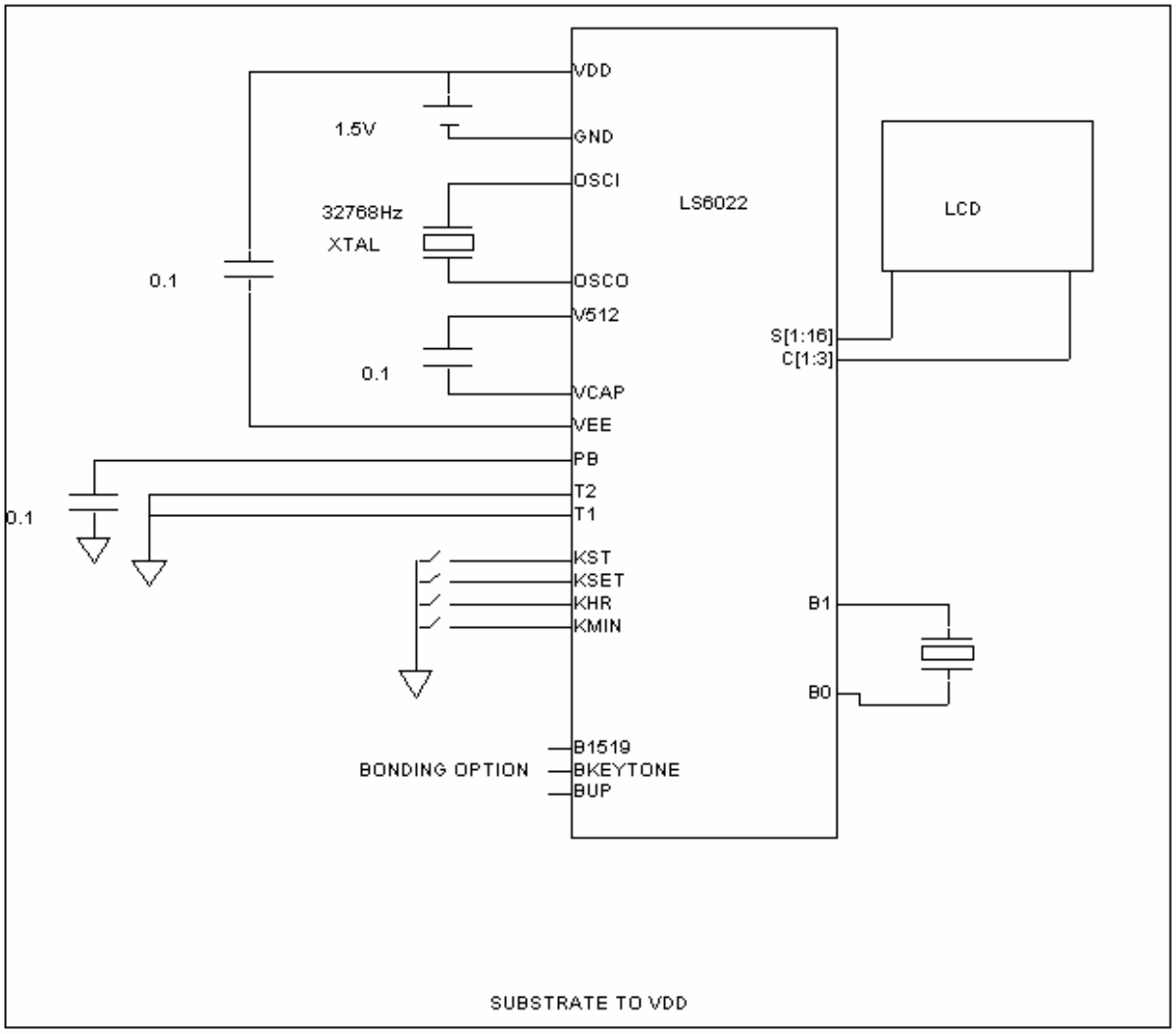
# Pad Coordinate

| PAD | X(µm) | Y(µm) | PAD | X(µm) | Y(µm) |
|---|---|---|---|---|---|
| GND | -1295.0 | -1394.0 | PB | -743.0 | +1350.0 |
| VCAP | -1295.0 | -1251.0 | R2 | -593.0 | +1350.0 |
| VEE | -1295.0 | -1110.0 | R1 | -449.0 | +1350.0 |
| V512 | -1295.0 | -965.0 | R0 | -225.0 | +1350.0 |
| C3 | -1295.0 | -825.0 | OSCO | -75.0 | +1350.0 |
| C2 | -1295.0 | -685.0 | OSCI | +1105.0 | +1340.0 |
| C1 | -1295.0 | -545.0 | T1 | +1246.0 | +1340.0 |
| S1 | -1295.0 | -400.0 | GND1 | +1246.0 | +1140.0 |
| S2 | -1295.0 | -260.0 | B1 | +1246.0 | +988.0 |
| S3 | -1295.0 | -120.0 | B0 | +1246.0 | +678.0 |
| S4 | -1295.0 | +20.0 | VDD | +1246.0 | +543.0 |
| S5 | -1295.0 | +160.0 | T2 | +1246.0 | +395.0 |
| S6 | -1295.0 | +300.0 | B1519 | +1246.0 | +226.0 |
| S7 | -1295.0 | +440.0 | BKEYTONE | +1246.0 | +78.0 |
| S8 | -1295.0 | +580.0 | XT7 | +1246.0 | -70.0 |
| S9 | -1295.0 | +720.0 | BUP | +1246.0 | -216.0 |
| S10 | -1295.0 | +860.0 | KSTART | +1246.0 | -365.0 |
| S11 | -1295.0 | +1000.0 | KSET | +1246.0 | -513.0 |
| S12 | -1295.0 | +1140.0 | KHR | +1246.0 | -661.0 |
| S13 | -1303.0 | +1350.0 | KMIN | +1246.0 | -809.0 |
| S14 | -1163.0 | +1350.0 | XT8 | +1246.0 | -957.0 |
| S15 | -1023.0 | +1350.0 | XT9 | +1246.0 | -1105.0 |
| S16 | -883.0 | +1350.0 | XT10 | +1246.0 | -1253.0 |
| | | | XT11 | +1246.0 | -1400.0 |

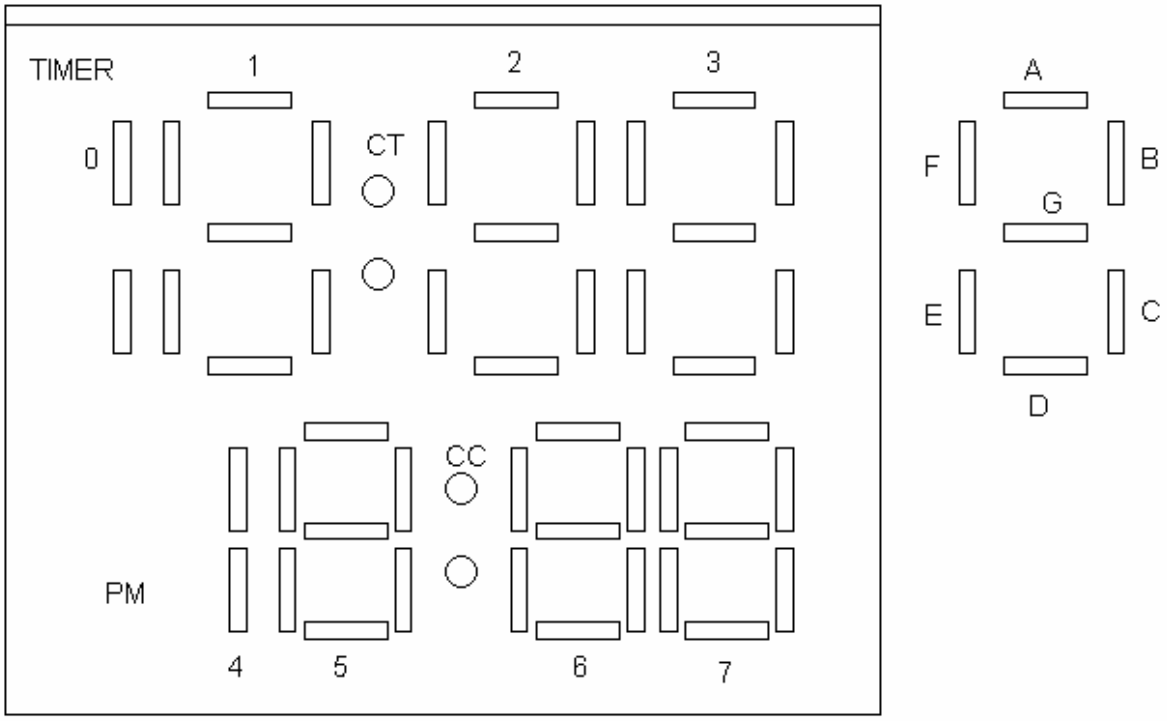
# Pad Location



# Application Circuit



# LCD Drawing




| | S16 | S15 | S14 | S13 | S12 | S11 | S10 | S9 | S8 | S7 | S6 | S5 | S4 | S3 | S2 | S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COM1: | 3B | 3G | 3C | 3D | 2B | 2G | 2C | 2D | 1B | 1G | 1C | 1D | 5B | 5G | 5C | 5D |
| COM2: | 3A | 3F | 3E | OFF | 2A | 2F | 2E | CT | 1A | 1F | 1E | 0BC | 5A | 5F | 5E | 4BC |
| COM3: | 7D | 7C | 7G | 7B | 7A | 7F | 7E | TIM | 6C | 6B | 6AD | CC | 6F | 6G | 6E | PM |