

# LSI

# *LS5015*

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*Simple LCD micro-controller*

## **Features :**

- \* 6 Input pad, 4 output pad
- \* Direct drive buzzer output.
- \* 512x11 bit ROM
- \* 20x4 bit of RAM.
- \* 4 digit plus 2 dot LCD
- \* 10x3 LCD segment
- \* 32768 Crystal/RC oscillator mask option
- \* Single 1.5V operation.
- \* Low cost and low price.

## **General Description**

The LS5015 is a simple micro-controller for LCD application. It has an internal ROM size of 512x11bit. A 20x4 bit of RAM. 4 digit plus 2 dot LCD format on 10x3 led segment.

**Functional Description**

## 1. RC Oscillator /Crystal

The LS5015 can use either a crystal oscillator or RC oscillator to provide the internal timing by mask option.

## 2. Program ROM

The LS5015 has internal 512x12 bit ROM providing simple operation. It has four internal stack.

## 3. Program RAM

The system has 20x4bit of program RAM (00H to 13H).

## 4. Buzzer Control

The system can output 2khz alarm signal. Buzzer control address at 4H.

## 5. LCD driver

The system has 10 LCD segment pad with 3 common pads providing 10x3 LCD segment output. It can only support 4 digit plus 2 dot LCD format. The LCD decode the data at RAM 0,1,2,3 for the 4 digit LCD display. The 2 dot (named: AA, BB) is controlled by RAM 12H:D2 as AA and 12H:D3 as BB.

## 6. I/O pad

The LS5015 has 6 input pad, I[0:5], and 4 output pad O[0:3]. The input pads can be selected (by mask option) with/without internal pull-low resistor. The output pads can be selected by mask option to be CMOS or OPEN DRAIN output.

**Pin Assignment**

<b>DESIGNATION</b>	<b>TYPE</b>	<b>DESCRIPTION</b>
B [0:1]	OUTPUT	Buzzer output
V1, V2	OUTPUT	Doubler output
VEE	OUTPUT	-1.5V
T2, T1	INPUT (PL)	TEST pin
OO	OUTPUT	32KHz oscillator output
OI	INPUT	32KHz oscillator input
VDD	POWER	+1.5V power supply
GND	POWER	Ground
I[0:5]	INPUT(PL)	Input key/option
O[0:3]	OUTPUT	Trigger output (O[0:2])
C[1:3]	OUTPUT	LCD Common output
S[1:10]	OUTPUT	LCD Segment output

Note: (PL) – pull low  
(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**

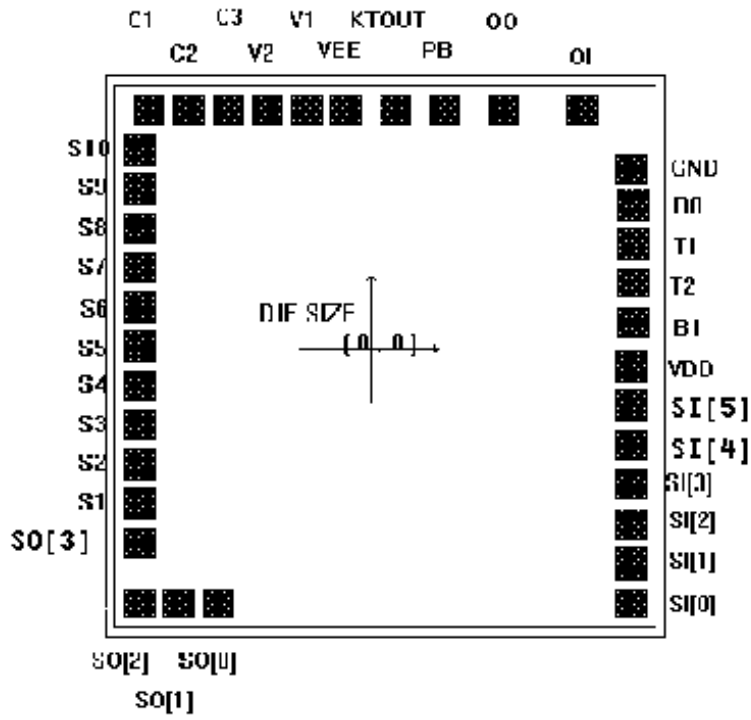
Stress above those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress rating only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to 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	1.24	1.5	1.75	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	$\Delta f/f$	-	-	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
Trigger output current	Ir	100	-	-	μA	Vr-Vss=0.5

Pad location

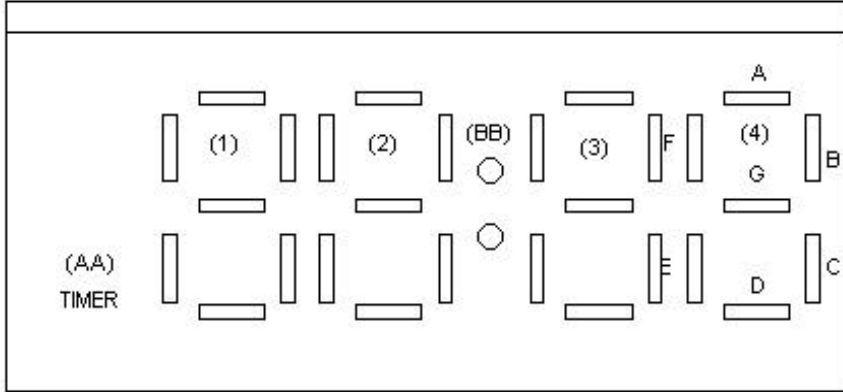


## Pad Coordinate

PAD	X(mm)	Y(mm)	PAD	X(mm)	Y(mm)
SO[2]	-1063.00	-909.50	VEE	-358.00	909.50
SO[1]	-922.75	-909.50	KOUT	-123.50	909.50
SO[0]	-731.25	-909.50	PB	20.25	909.50
SO[3]	-1063.00	-703.50	OO	321.75	909.50
S1	-1063.00	-568.50	OI	874.75	909.50
S2	-1063.00	-433.50	GND	1062.75	717.00
S3	-1063.00	-298.50	BD[0]	945.25	547.50
S4	-1063.00	-163.50	T1	945.25	412.50
S5	-1063.00	-28.50	T2	945.25	277.50
S6	-1063.00	163.00	B[1]	945.25	142.50
S7	-1063.00	298.00	VDD	1062.75	-27.00
S8	-1063.00	433.00	SI[5]	1062.75	-162.00
S9	-1063.00	568.00	SI[4]	1062.75	-300.50
S10	-1063.00	703.00	SI[3]	1062.75	-444.50
C1	-1033.00	909.50	SI[2]	1062.75	-583.00
C2	-898.00	909.50	SI[1]	1062.75	-727.00
C3	-763.00	909.50	SI[0]	1062.75	-865.00
V2	-628.00	909.50			
V1	-493.00	909.50			

LCD DRAWING

PIN 1.....



PIN	SIG	C1	C2	C3
1	C3			COM3
2	C2		COM2	
3	C1	COM1		
4	S1	1F	1E	AA
5	S2	1A	1G	1D
6	S3	2F	1B	1C
7	S4	2A	2G	2E
8	S5	2B	2C	2D
9	S6	3F	BB	3E
10	S7	3A	3G	3D
11	S8	3B	3C	4E
12	S9	4F	4G	4D
13	S10	4A	4B	4C