

LSI

LS3103

Simple LCD micro-controller

Features :

- * 6 Input pad
- * EL driver output.
- * Direct drive buzzer output.
- * 1024x12 bit ROM
- * 73x4 bit of RAM.
- * 28x2, x3, or x4 LCD segment mask option
- * LCD ROM
- * 12 (of 28 segment) output mask option
- * 32768 Crystal/RC oscillator mask option
- * Single 3.0V operation.

General Description

The LS3103 is a simple micro-controller for LCD application. It has an internal ROM size of 1Kx12bit. A total of 73x4 bit RAM. LCD can be configured to be 1/2, 1/3, 1/4 duty mask option. A total of 28 segment PAD can be configured to be 28x2, 28x3 or 16x4 + 12x3 LCD segment. LCD bias is 1/2. Segment pad S17-S28 can be configured as output pad by mask option. The LS3103 also include a 16x12x3x4bit of data ROM. It has a total of 6 input pad, 2 EL/output pad (mask option) and 2 buzzer output pad. It has low power consumption.

Functional Description

1. RC Oscillator /Crystal

The LS3103 can use either a crystal oscillator or RC oscillator to provide the internal timing by mask option.

2. Program ROM

The LS3103 has internal 1Kx12 bit ROM providing simple operation. It has four internal stack.

3. Interrupt Control

The LS3103 has 5 different sources of interrupt, namely, POWERUP, F4HZ, F16HZA, F16HZA and F1HZ. The starting address of the interrupt are as follow :

Interrupt	Address
POWERUP	0x3ff
F1HZ	0x3fe
F4HZ	0x3fc
F16HZA	0x3f8
F16HZA	0x3f1

The system generates 16 interrupts for F16HZA in one second but only 11 interrupts for F16HZA. The other 5 interrupts goes to F4HZ (4) and F1HZ (1) interrupts.

3. RAM

The system has 73x4bit of program RAM with IO address as follows.

Address	Description	Initialize
0-0fH	RAM	undefined
10H-1fH	Display RAM	undefined
20-2fH	RAM	undefined
30H	rptrl	undefined
31H	rptrh	undefined
32H	rptrl	undefined
33H	Beep Control	0
34H-3fH	RAM	Undefined
54H-56H	Display RAM	Undefined
58H-5AH	Display RAM	Undefined
5CH-5EH	Display RAM	Undefined
73H	IOX Register	0

Address 31H:30H forms a 8 bit address for indirect read/write operation.

Address 32H:30H forms a 8 bit address for indirect read/write operation.

4. Buzzer Control/Tone Generator Control

The system can output 4khz/2khz alarm signal by mask option. The alarm signal is enabled to the output B0, B1 when the Beep Control Register: Bit[0] is high.

5. LCD driver

The system has 16 LCD segment pad with 2/3/4 common pads (mask option) providing 28x2, 28x3 or 16x4 + 12 x3 LCD segment output.

The LCD segment table is shown below :

	COM 1	COM2	COM3	COM4
SEG[1:4]	1CH:D[0:3]	18H:D[0:3]	14H:D[0:3]	10H:D[0:3]
SEG[5:8]	1DH:D[0:3]	19H:D[0:3]	15H:D[0:3]	11H:D[0:3]
SEG[9:12]	1EH:D[0:3]	1AH:D[0:3]	16H:D[0:3]	12H:D[0:3]
SEG[13:16]	1FH:D[0:3]	1BH:D[0:3]	17H:D[0:3]	13H:D[0:3]
SEG[17:20]	5CH:D[0:3]	58H:D[0:3]	54H:D[0:3]	Not implemented
SEG[21:24]	5DH:D[0:3]	59H:D[0:3]	55H:D[0:3]	Not implemented
SEG[25:28]	5EH:D[0:3]	5AH:D[0:3]	56H:D[0:3]	Not implemented

6. EL Driver

R0, R1 can be configured as general output or E.L. output.

7. Mask option

Name	description
BZ2K/4K	buzzer frequency
BZ[0], BZ[1]	buzzer control
FSYSPRB	Power Up Control

Pin Assignment

DESIGNATION	TYPE	DESCRIPTION
B [0:1]	OUTPUT	Buzzer output
VC1, VC2	OUTPUT	Halfer output
VEE	OUTPUT	Halfer voltage
T2, T1	INPUT (PL)	TEST pin
OO	OUTPUT	oscillator output
OI	INPUT	oscillator input
VDD	POWER	+3.0V power supply
GND	POWER	Ground
I[0:5]	INPUT(PL)	Input key/option
R[0:1]	OUTPUT	Output /EL output
C[1:3]	OUTPUT	LCD Common output
S[1:28]	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

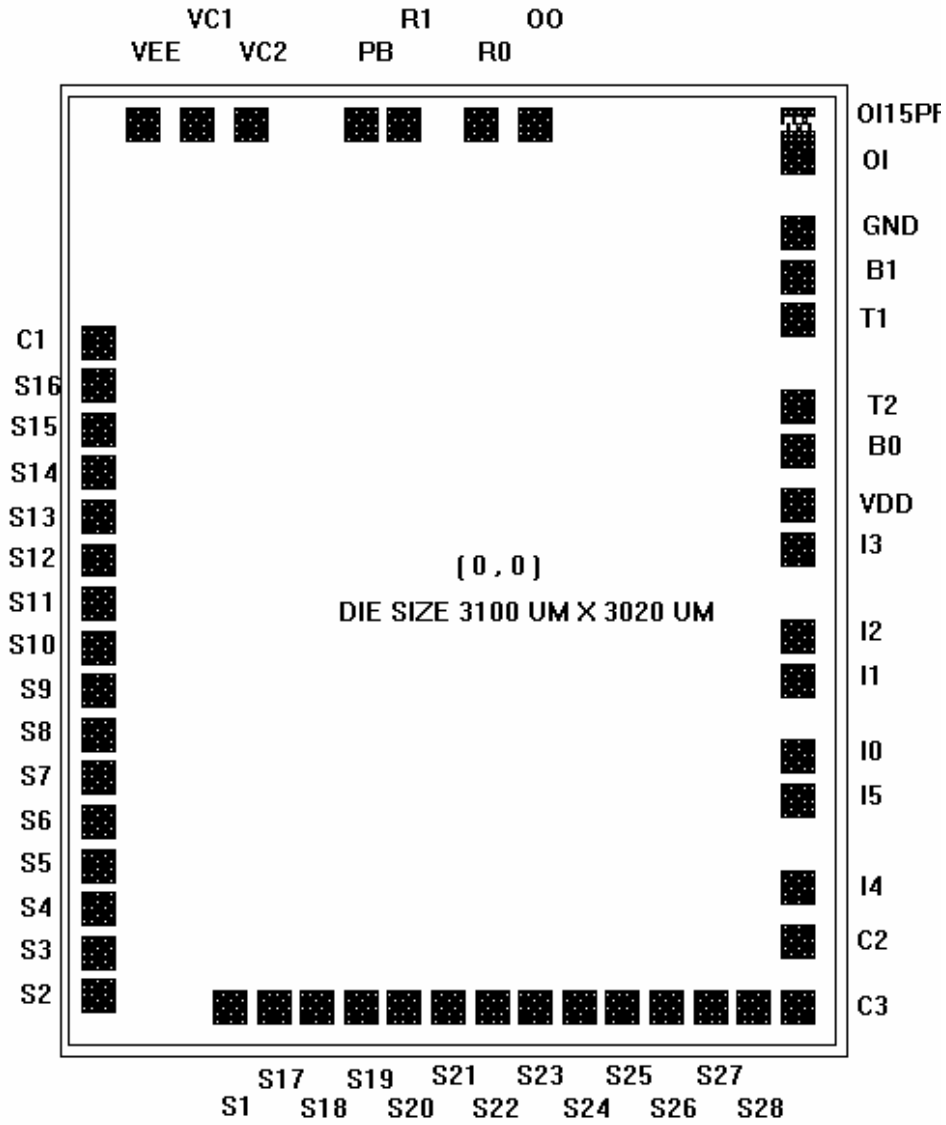
(GND = 0V, Vdd = 3.0V, Ta = 25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	Vdd	2.5	3.0	3.6	V	
Operating current	Idd	-	3	6	μA	No load
OSC. built-in cap	Cd	-	20	-	pF	
OSC. trimmer cap	Ctrim	5	-	35	pF	
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 Coordinate

PAD	X(μm)	Y(μm)	PAD	X(μm)	Y(μm)
C1	-1408.20	506.10	S26	942.20	-1513.90
S16	-1408.20	372.10	S27	1076.20	-1513.90
S15	-1408.20	238.10	S28	1210.20	-1513.90
S14	-1408.20	104.10	C3	1344.20	-1513.90
S13	-1408.20	-29.90	C2	1408.00	-1287.00
S12	-1408.20	-163.90	I4	1408.00	-1151.00
S11	-1408.20	-297.90	I5	1408.00	-741.60
S10	-1408.20	-431.90	I0	1408.00	-597.60
S9	-1408.20	-565.90	I1	1408.00	-188.20
S8	-1408.20	-699.90	I2	1408.00	-44.20
S7	-1408.20	-833.90	I3	1408.00	365.20
S6	-1408.20	-967.90	VDD	1408.00	509.20
S5	-1408.20	-1101.90	B0	1408.00	653.20
S4	-1408.20	-1235.90	T2	1408.00	797.20
S3	-1408.20	-1369.90	T1	1408.00	941.20
S2	-1408.20	-1503.90	B1	1408.00	1085.20
S1	-570.50	-1513.90	GND	1408.00	1229.20
S17	-436.50	-1513.90	OI	1400.30	1423.00
S18	-238.70	-1513.90	OI 15pF	1400.30	1513.00
S19	-104.70	-1513.90	OO	184.00	1499.30
S20	93.10	-1513.90	R0	-56.30	1499.30
S21	227.10	-1513.90	R1	-425.20	1499.30
S22	406.20	-1513.90	PB	-561.20	1499.30
S23	540.20	-1513.90	VC1	-1045.70	1499.30
S24	674.20	-1513.90	VC2	-1179.70	1499.30
S25	808.20	-1513.90	VEE	-1313.70	1499.30

Pad Location



Application Circuit (for watch)

