



愛高實業(香港)有限公司
HICO INDUSTRIAL (HK) LIMITED

PRODUCT
SPECIFICATION

FITNESS

Product Code:	HCS-T015-1
Version:	1.3
Date:	February 5, 2004

Hong Kong 香港

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Fitness (HCS-T015-1)

DOCUMENT HISTORY

Date	Product Code	Version	Approved by	Revision Details
Feb. 5, 2004	HCS-T015-1	1.3		<ul style="list-style-type: none">• Revised VDC pin on circuit diagram• Added Document History• Changed Shenzhen office address
Mar. 5, 2002	HCS-T015-1	1.2	OBSOLETE	
Jan. 25, 2002	HCS-T015-1	1.1	OBSOLETE	
Sept. 29, 2001	HCS-T015-0	1.0	OBSOLETE	



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Fitness (HCS-T015-1)

GENERAL DESCRIPTION

The FITNESS is a single-chip micro-controller that is preprogrammed for digital watch and portable applications. Featured with Countdown Timer with automatic time setting, it could be a good companion for daily exercise in achieving a healthier life. By using LSI originated from Japan, quality, reliability and excellent performance could be ensured.

FEATURES

- LSI Used
 - SANYO Semiconductor LC573224A
- Real Time Clock
 - Hour, Minute, Second, Month, Date, Day of Week
 - 12 or 24 hour display format by key option
 - Hourly Chime
- Daily Alarms
 - Two daily alarms operated separately
- Countdown Timer
 - User adjustable time duration range from 1 minute up to 240 minutes
 - Short sound alerts for last 5 minutes, 1 minute, 50 seconds, 40 seconds, 30 seconds, 20 seconds, and each second in last 10 seconds
 - Long sound alert when countdown to zero
- Chronograph
 - Count up to 99 hours 59 minutes 59.99 seconds with 1/100 second resolution
 - Split time display
- Pacer
 - User adjustable beat rate from 60 BPM to 180 BPM



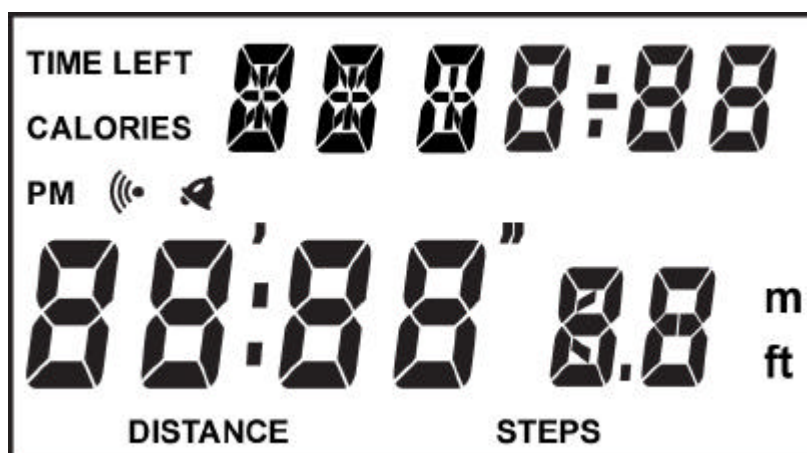
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Fitness (HCS-T015-1)

- Calories Burner
 - Ten built-in activities
 - Kickboxing, Jogging, Aerobics, Badminton, Tennis, Walking, Dancing, Swimming, Rope Jumping, Stair Climbing
 - One user preset activity
 - Automatically timer setting based on user's weight, activity selected and target calories to be consumed
 - Motion detector start/stop timer automatically (optionally)
 - Step counter with maximum count up to 999999 steps
 - Distance counter with user adjustable stride distance
 - Imperial or Metric system by bonding option
- Operates with 3 buttons
- Operates with 3V Lithium battery

LCD PATTERN



Duty: 1/5
Bias: 1/3
Vop: 4.5V

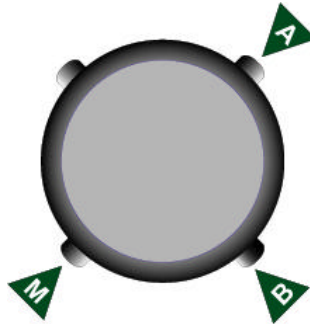


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Fitness (HCS-T015-1)

KEYBOARD LAYOUT

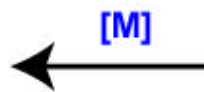


FUNCTIONAL FLOWCHART

Real Time Clock



Chronograph



Daily Alarms



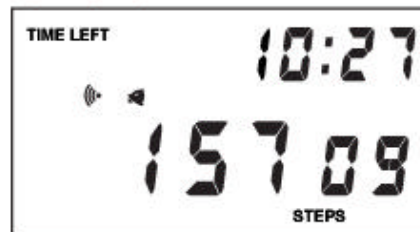
Pacer



Timer



Cal Burner





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Fitness (HCS-T015-1)

FUNCTIONAL DESCRIPTIONS

1. System Defaults

- System Defaults will be initialized upon system startup:

MODE	ELEMENT	SETTING
Real Time Clock	Time	12:00:00 AM
	Date	Sunday 01-01
	Display System	12-hour
Daily Alarms	Time	12:00 AM
	Alert	Off
Countdown Timer	Time Duration	1 minute
	Status	Stopped
Calories Burner	Weight	20 Kg (44 lb)
	Activity	01
	Target Calories	20
	Steps	0
	Stride Distance	0
	Distance	0
Pacer	Beat rate	60 BPM
	Status	Stopped
Chronograph	Total Time	0 hr 0 min 0 sec
	Status	Stopped

2. Auto Return

- Normal display will be resumed in any setting state if no key operation for 1 minute

3. Auto Advance

- In any setting state, press and hold [B] for more than 2 seconds will activate Auto Advance function. Digits being blinking will be adjusted at a rate of 10 steps per second until [B] is released.



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Fitness (HCS-T015-1)

OPERATIONAL INSTRUCTIONS

1. Real Time Clock

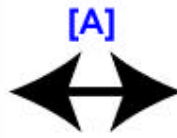
- Normal Display



e.g. 2:29:45 PM
Monday Jan 28
Daily Alarm enabled

- Operating the Real Time Clock
 - Press [A] to enable or disable Hourly Chime

Hourly Chime disabled

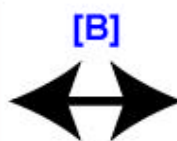


Hourly Chime enabled



- Press [B] to toggle between 12-hour and 24-hour display

12-hour display



24-hour display



- Adjusting the Real Time Clock
 - Press and hold [M] for 2 seconds to enter into setting state. SECOND digits will be blinked.
 - Press [A] to select the digits to be altered according to the below sequences:
Sec -> Min -> Hr -> Day of Week -> Month -> Date -> Sec



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- Press [B] to adjust the selected digits.
- Press [M] once to exit setting state.
- Validity of the adjusted date will be checked upon exiting the setting state. If invalid date is entered, the date will be adjusted automatically to the 1st day of the current month.
- There are 28 days in February during normal clock update. The 29th could be selected while in Setting State.

2. Daily Alarms

- Normal Display



Daily Alarm 1
- Alarm time 7:30AM
- Enabled



Daily Alarm 2
- Alarm time 10:45PM
- Disabled

- Operating the Daily Alarm
 - All Daily Alarms are operated identically.
 - Upon mode entry, the previous selected alarm will be displayed (Default is AL-1).
 - Use [B] to select the desired Daily Alarm to be shown.
 - Use [A] to enable or disable the selected Daily Alarm.



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Fitness (HCS-T015-1)

- Adjusting the Daily Alarms
 - Select the desired alarm to be adjusted by [B].
 - Press and hold [M] for 2 seconds to activate the setting state with MINUTE digits blinking.
 - Use [A] to select digits to be altered according to the following sequences:
Minutes -> Hour -> Minutes
 - Use [B] to adjust the selected digits.
 - Press [M] once to confirm the setting and exit to normal display.

- Daily Alarm Alert
 - Alert sound will be played for 20 seconds when the preset alarm time is reached.

3. Countdown Timer

- Normal Display



- Operating the Countdown Timer
 - Use [A] to start/stop the timer.
 - When timer stopped, press [B] once to reload the previous timer value. Press [B] subsequently to adjust the timer value from 1 minute to 240 minutes in 1-minute step.
 - Short alert tone will be heard when timer reaches last 5 minutes, 1 minute, 50 seconds, 40 seconds, 30 seconds, 20 seconds, and each second in last 10 seconds.
 - When timer reaches zero, counting will be stopped automatically and a long alert tone will be played.



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Fitness (HCS-T015-1)

4. Pacer

- Normal Display



- Operating the Pacer
 - Use [A] to start/stop the Pacer.
 - When Pacer stopped, press [B] to adjust the beat rate from 60BPM to 180BPM in 5BPM per step.
 - Beat sound will be played according to the selected beat rate under the following conditions:
 - No other alert sound being played
 - In Pacer Mode
 - In Chronograph running state
 - In Calories Burner running state

5. Chronograph

- Normal Display





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Fitness (HCS-T015-1)

- Operating the Chronograph
 - Use [A] to start/stop the Chronograph.
 - While Chronograph running, the ['] and [“] symbols will be blinked,
 - Press [B] to display the split time while Chronograph started.



- Normal display will be resumed, when:
 - No key operation for 10 seconds in Split Time Display
 - Upon mode entry
- While Chronograph stopped and in Split Time display, press and release [B] within 2 seconds to resume to Normal Display with total time being displayed.
- Press and hold [B] for 2 seconds while Chronograph stopped to reset the total time to zero.
- Maximum count is 99 hours 59 minutes 59.99 seconds. If maximum is reached, count will be continued with time reset to zero.



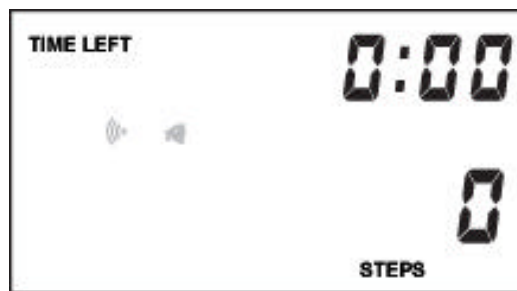
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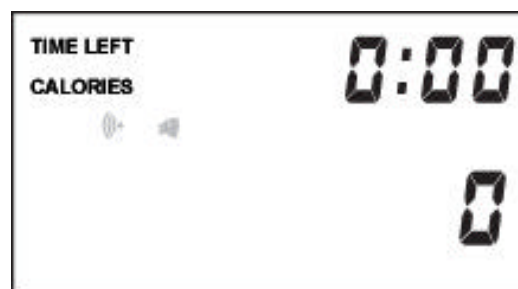
Fitness (HCS-T015-1)

6. Calories Burner

- The Calories Burner could be operated with the following factory options:
 - Imperial system with motion detector (Option 1)
 - Imperial system without motion detector (Option 2)
 - Metric system with motion detector (Option 3)
 - Metric system without motion detector (Option 4)
- Mode Entry Screen (Default Screen)
 - Option 1 and Option 3



- Option 2 and Option 4



- Setting User's Options
 - In Calories Burner, press and hold [M] for 2 seconds to set the User's Options. Once activated, the following screen will be shown:



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Fitness (HCS-T015-1)

- Option 1 and 2



- Option 3 and 4



- Press [M] at any time to abort setting and return to Default Screen.
- Press [B] to set the Weight from 44lb to 440 lb (20kg to 200kg).
- Press [A] in Option 1 and Option 3 to proceed for Stride Distance adjustment or to User Preset Activity if in Option 2 and Option 4.



'm' or 'ft' will be shown
based on the option selected

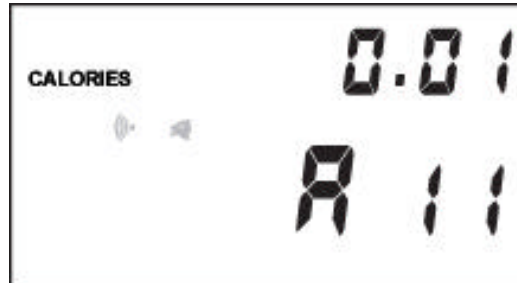
- Press [B] to set the Stride Distance from 0.1m to 1.5m (or 0.1ft to 4ft).
- Press [A] to adjust User Preset Activity.
- In adjusting the User Preset Activity, the following screen will be displayed:



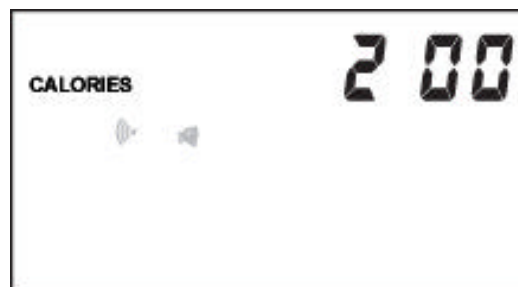
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Fitness (HCS-T015-1)



- Press [B] to set the Calories consumed per pound for each minute ranged from 0.01 to 0.99.
- Press [A] to confirm and return to Default Screen.
- Preparing for Exercise
 - Press and release [B] within 2 seconds in Default Screen while counting stopped to adjust per exercise setting. The following screen will be shown.



- Press [M] at any time to abort setting.
- Press [B] to set the target calories consumed from 20 to 400 in step of 10 kcal.
- Press [A] once to confirm the setting and proceed to select activity.
- In selecting activity, the below screen will be displayed:





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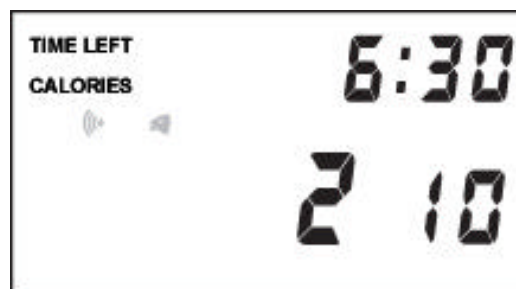
- Lists of Activities

No	Activity	No	Activity
A01	Kickboxing	A06	Swimming
A02	Walk Dog	A07	Aerobics
A03	Jogging	A08	Badminton
A04	Tennis	A09	Rope Jumping
A05	Dancing	A10	Stair Climbing

- Press [B] to select the desired activity. Activity '11' could not be selected if the User Preset Activity had not been set.
- Press [A] to confirm the setting and exit. Time duration (from 30 seconds to 999 minutes 30 seconds in step of 30 seconds) for exercise will be calculated automatically.
 - Option 1 and Option 3



- Option 2 and Option 4



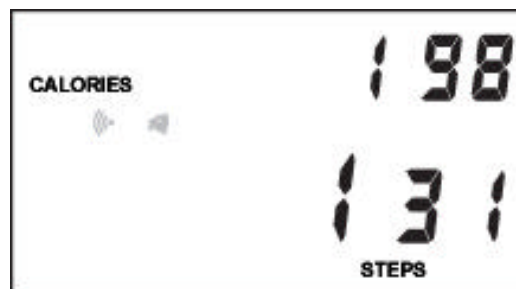


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Fitness (HCS-T015-1)

- Start Doing Exercise
 - For Option 1 and Option 3
 - With calculated time duration for exercise, press [A] to start doing exercise. Timer will start counting immediately after a motion detected by the motion detector.
 - Timer will stop counting down if no motion was detected for 10 seconds. Warning signal will be sounded for 10 seconds. The warning signal will be repeat every minute thereafter until the Timer is stopped by pressing [A] or when motion is being detected again.
 - While counting started, Time Left and Calories Remained will be shown on the display alternatively for each second.



- During timer counting down, press [B] to toggle between STEPS and DISTANCE display.



- When timer counts down to zero, alert signal will be played and timer will be stopped automatically.
- Maximum count for the Step Counter is 999999 steps. When maximum is reached, counting will restart from zero.



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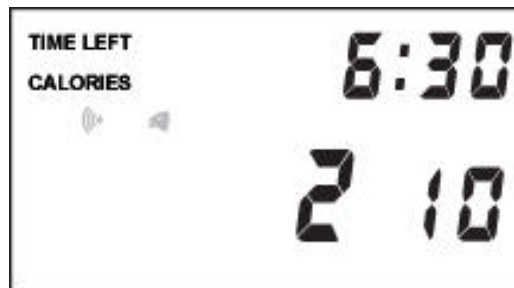
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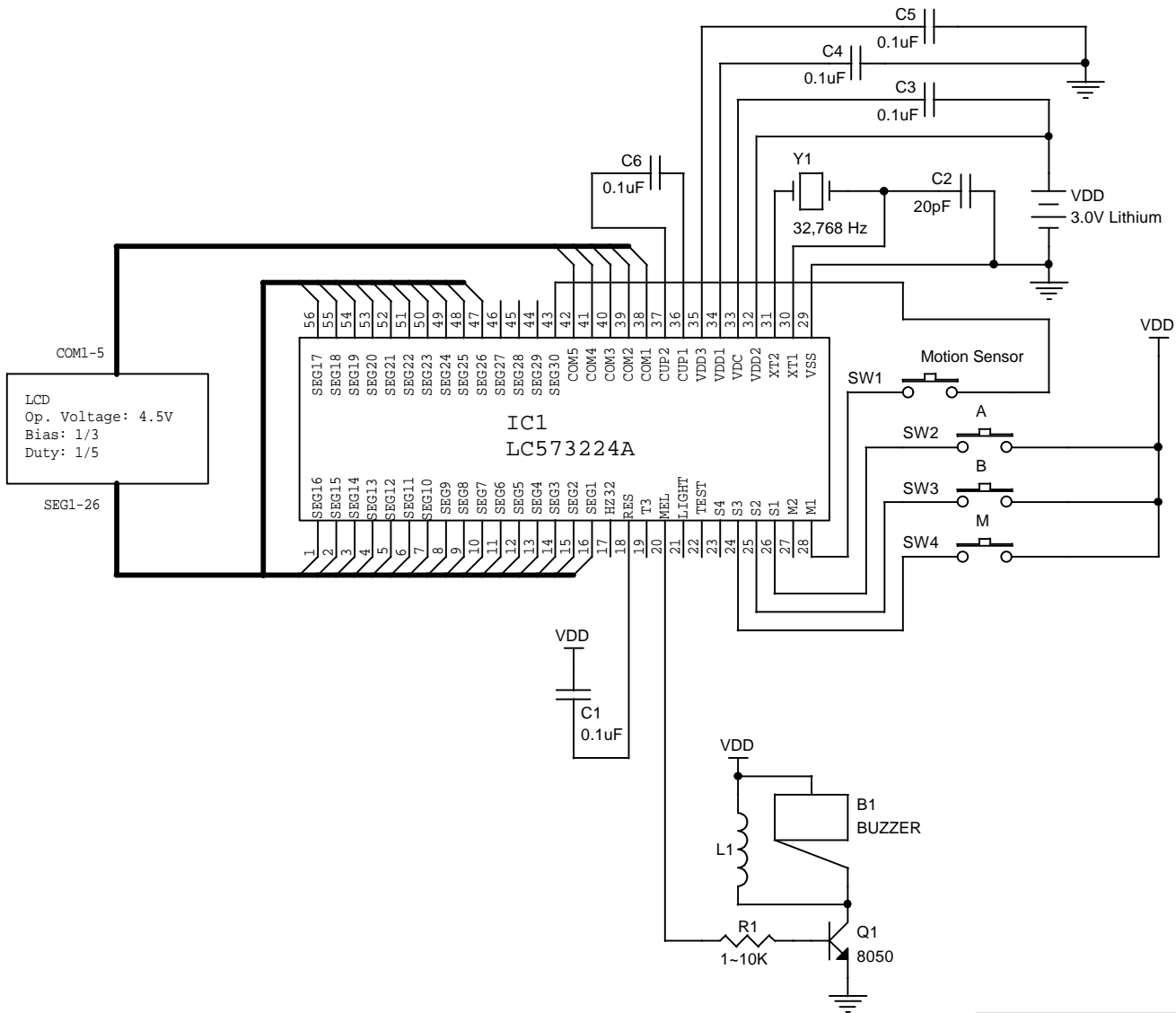
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Fitness (HCS-T015-1)

- Maximum count for Distance Counter is 99999.9m (or feet). When maximum is reached, counting will restart from zero.
- For Option 2 and 4
 - With calculated time duration for exercise, press [A] to start the timer. Timer will start counting down with both time left and calories remained being shown as follows:



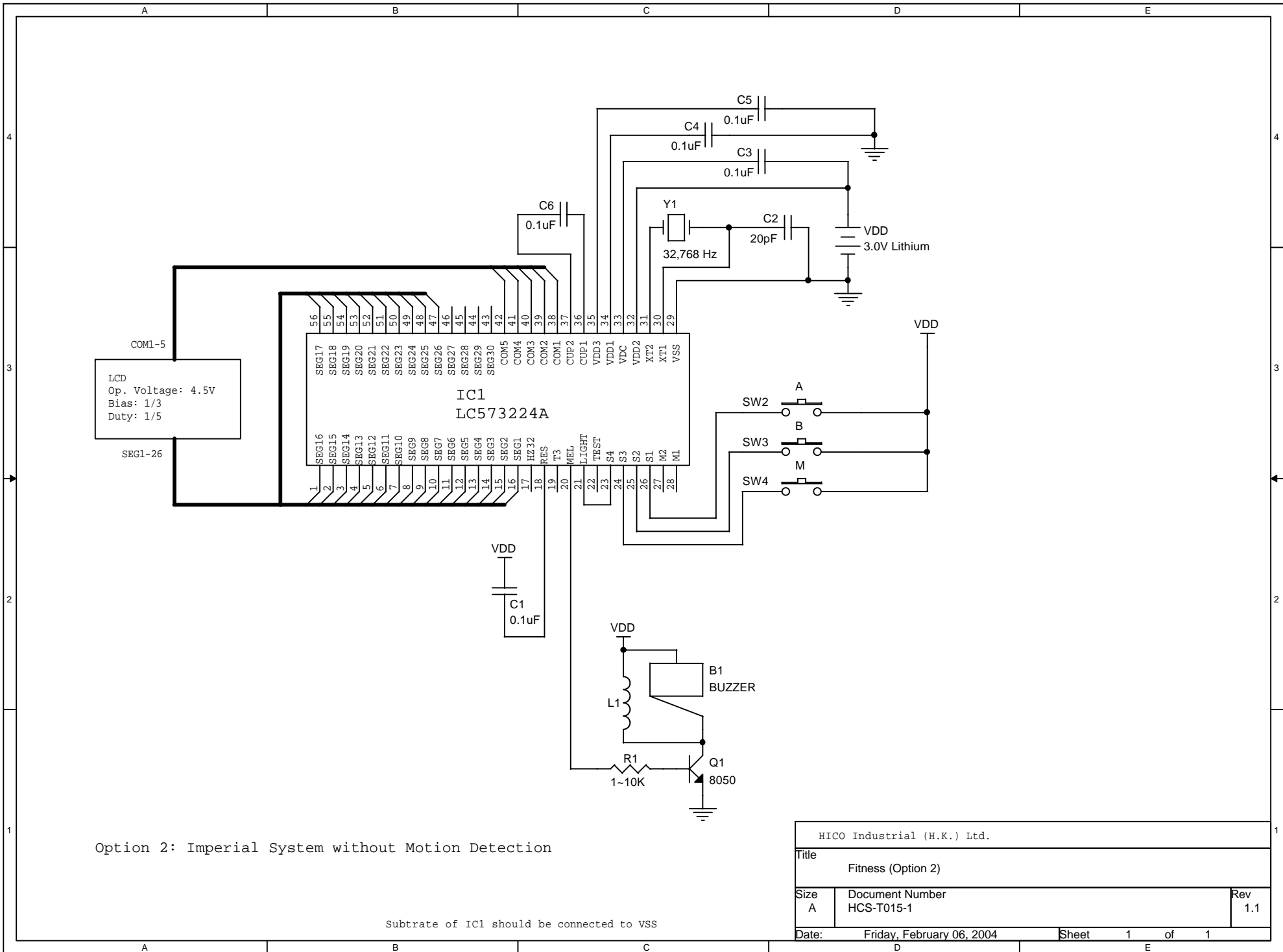
- Press [B] to stop the timer.
- When timer counts down to zero, alert signal will be played with timer automatically stopped.
- With timer in stopped state (either timeout or manually stopped), press and hold [B] for 2 seconds will reset timer value and all counters to zero, i.e. Default Screen.



Option 1: Imperial System with Motion Detection

Substrate of IC1 should be connected to VSS

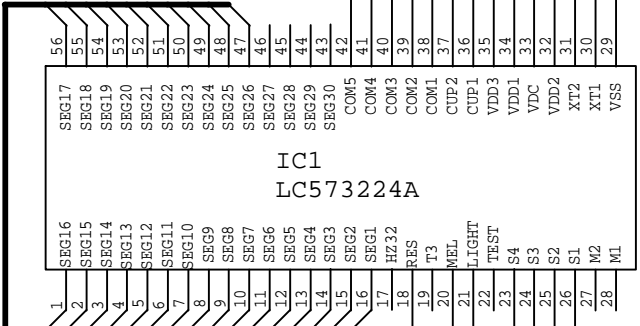
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Title Fitness (Option 1)		
Size A	Document Number HCS-T015-1	Rev 1.1
Date:	Friday, February 06, 2004	Sheet 1 of 1



COM1-5

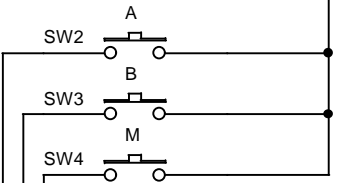
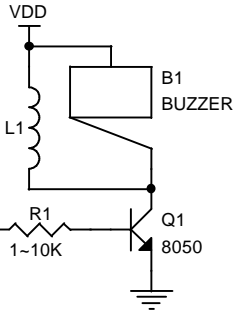
LCD
Op. Voltage: 4.5V
Bias: 1/3
Duty: 1/5

SEG1-26



VDD

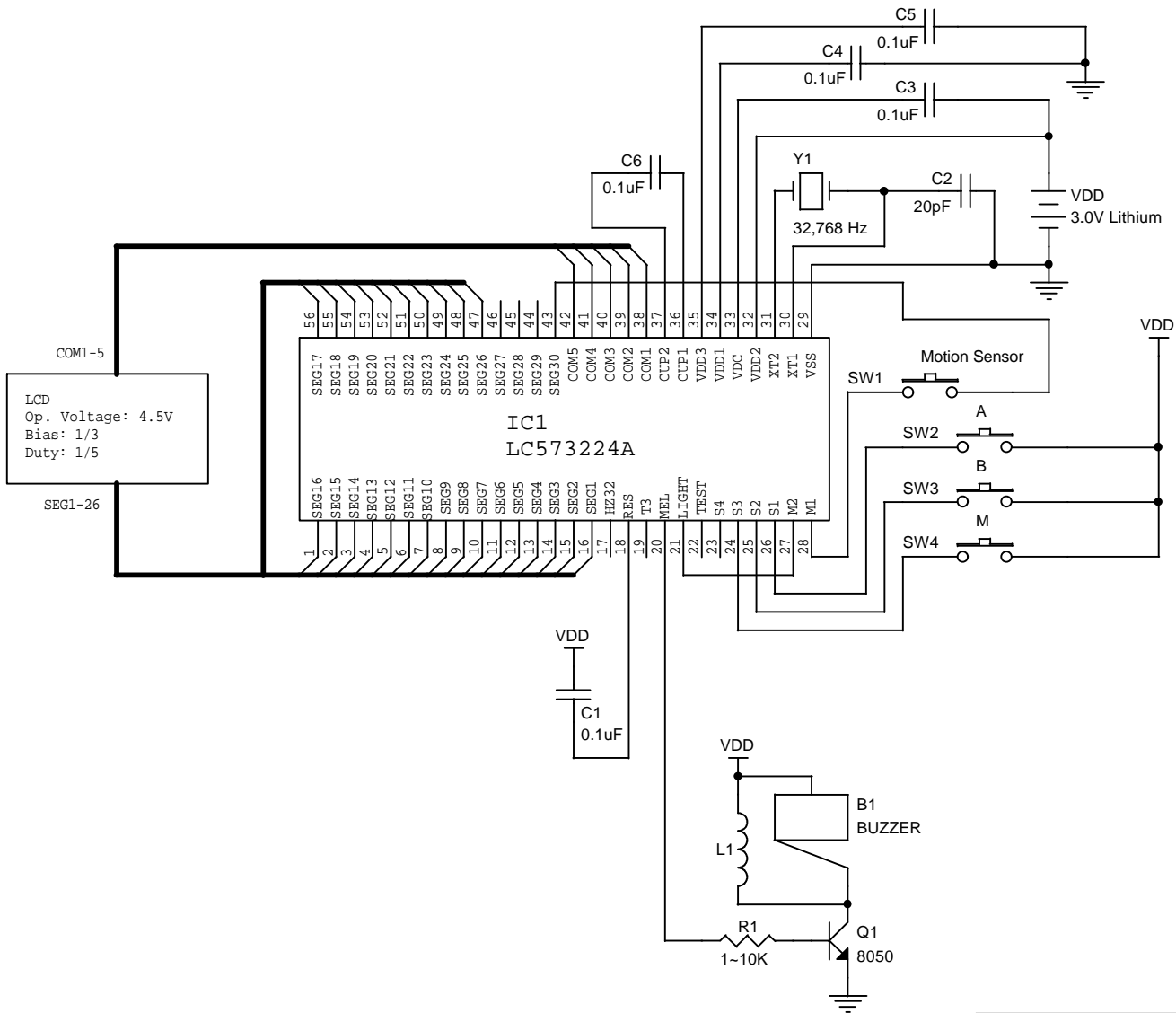
C1
0.1uF



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Title Fitness (Option 2)		
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Option 2: Imperial System without Motion Detection

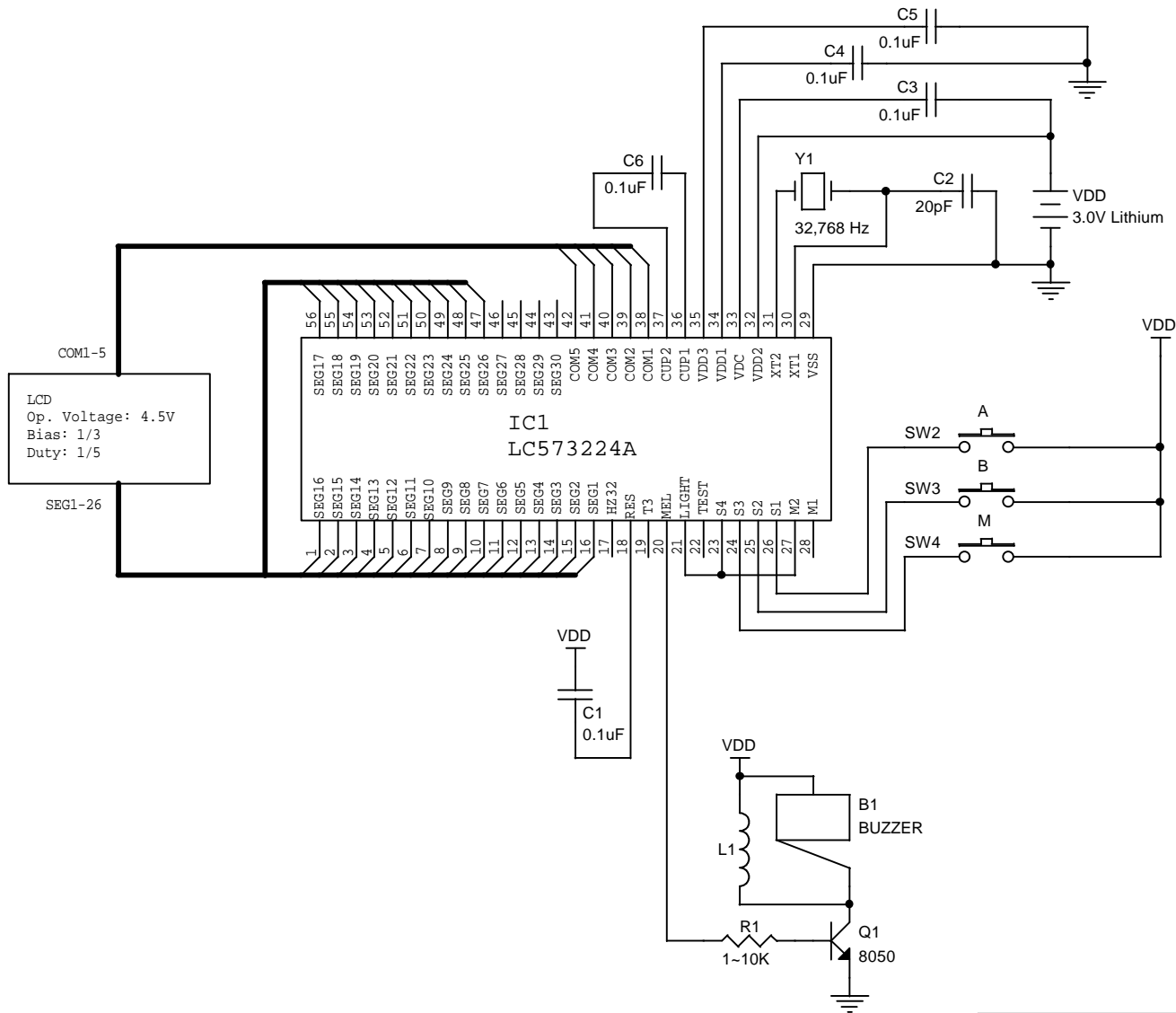
Substrate of IC1 should be connected to VSS



Option 3: Metric System with Motion Detection

Substrate of IC1 should be connected to VSS

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Title Fitness (Option 3)		
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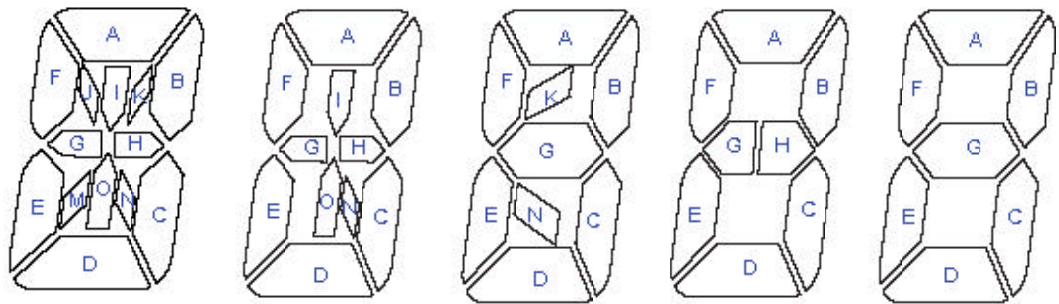
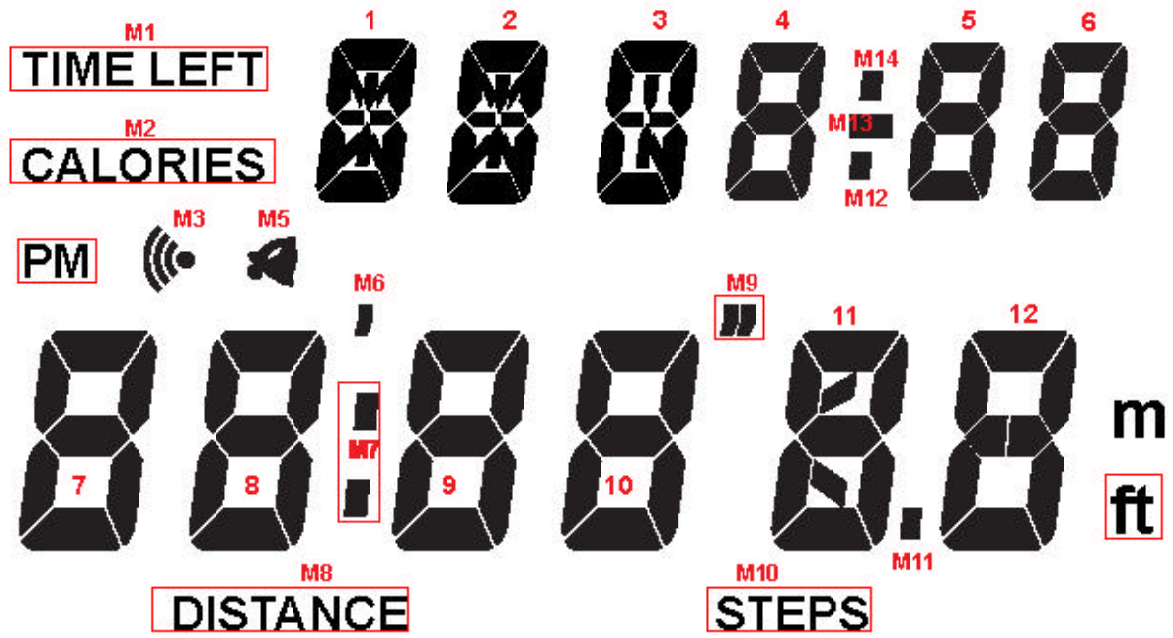


Option 4: Metric System without Motion Detection

Substrate of IC1 should be connected to VSS

HICO Industrial (H.K.) Ltd.		
Title Fitness (Option 4)		
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HCS-T015 FITNESS



HCS-5015 LCD ASSIGNMENT TABLE

PIN NO	COM1	COM2	COM3	COM4	COM5
1	ft	M	6C	6B	6A
2	12C	12B	6D	6G	6F
3	12D	12H	12A	6E	5A
4	12E	12G	12F	5C	5B
5	M11	11B	11A	5D	5G
6	11C	11G	11K	5E	5F
7	11D	11N	11F	M12	M14
8	M10	11E	M9	M13	-----
9	10C	10B	4D	4C	4B
10	10D	10G	10A	4E	4G
11	10E	10F	3C	4F	4A
12	9C	9B	3N	3H	3B
13	9D	9G	3D	3O,3I	3A
14	7D	7C	1N	1H	1K
15	PM	M2	M1	-----	-----
16	7F	M3	1E	1F	-----
17	7E	7A	1M	1G	1J
18	7G	7B	1D	1O,1I	1A
19	8F	M5	1C	1B	-----
20	8E	8A	2E	2F	-----
21	8G	8B	2M	2G	2J
22	8D	8C	2D	2O,2I	2A
23	M8	M6	2N	2H	2K
24	9E	M7	2C	2B	-----
25	9F	9A	3E	3G	3F
26	-----	-----	-----	-----	COM5
27	-----	-----	-----	COM4	-----
28	-----	-----	COM3	-----	-----
29	-----	COM2	-----	-----	-----
30	COM1	-----	-----	-----	-----

HCS-T015 LCD TO LSI CONNECTION TABLE

LCD PIN NO	LC573224A PAD NO	PAD NAME
1	15	SEG2
2	14	SEG3
3	13	SEG4
4	12	SEG5
5	11	SEG6
6	10	SEG7
7	9	SEG8
8	8	SEG9
9	7	SEG10
10	6	SEG11
11	5	SEG12
12	4	SEG13
13	3	SEG14
14	2	SEG15
15	1	SEG16
16	56	SEG17
17	55	SEG18
18	54	SEG19
19	53	SEG20
20	52	SEG21
21	51	SEG22
22	50	SEG23
23	49	SEG24
24	48	SEG25
25	47	SEG26
26	42	COM5
27	41	COM4
28	40	COM3
29	39	COM2
30	38	COM1

■パッド配置案

- ・パッドピッチ : 110 μm (Min.)
- ・パッドサイズ : 100 μm × 100 μm
- ・パッド開口部 : 80 μm × 80 μm (ジャケット開口)
- ・チップサイズ : 2.4mm × 3.37mm (?)

SEG17	56	SEG16
SEG18	55	SEG15
SEG19	54	SEG14
SEG20	53	SEG13
SEG21	52	SEG12
SEG22	51	SEG11
SEG23	50	SEG10
SEG24	49	SEG9
SEG25	48	SEG8
SEG26	47	SEG7
SEG27	46	SEG6
SEG28	45	SEG5
SEG29	44	SEG4
SEG30	43	SEG3
COM5	42	SEG2
COM4	41	SEG1
COM3	40	HZ32
COM2	39	RES
COM1	38	T3
CUP2	37	MEL
CUP1	36	LIGHT
VDD3	35	TEST
VDD1	34	S4
VDC	33	S3
VDD2	32	S2
XT2	31	S1
XT1	30	M2
VSS	29	M1
		1
		2
		3
		4
		5
		6
		7
		8
		9
		10
		11
		12
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		25
		26
		27
		28

LC573224A PAD Coordinates

November , 21 , 2001

PIN No.	P I N NAME	Coordinates	
		" X " μ m	" Y " μ m
1	SEG16	-995	1502
2	SEG15	-995	1392
3	SEG14	-995	1282
4	SEG13	-995	1172
5	SEG12	-995	1062
6	SEG11	-995	952
7	SEG10	-995	842
8	SEG09	-995	732
9	SEG08	-995	622
10	SEG07	-995	512
11	SEG06	-995	402
12	SEG05	-995	292
13	SEG04	-995	182
14	SEG03	-995	72
15	SEG02	-995	-38
16	SEG01	-995	-148
17	HZ32	-995	-278
18	RES	-995	-388
19	T3	-995	-498
20	MEL	-995	-608
21	LIGHT	-995	-718
22	TEST	-995	-828
23	S4	-995	-938
24	S3	-995	-1048
25	S2	-995	-1158
26	S1	-995	-1268
27	M2	-995	-1378
28	M1	-995	-1488

P I N No.	P I N NAME	Coordinates	
		" X " μ m	" Y " μ m
29	VSS	995	-1515
30	XT1	995	-1405
31	XT2	995	-1295
32	VDD2	995	-1185
33	VDC	995	-1055
34	VDD1	995	-925
35	VDD3	995	-795
36	CUP1	995	-685
37	CUP2	995	-575
38	COM1	995	-465
39	COM2	995	-355
40	COM3	995	-245
41	COM4	995	-135
42	COM5	995	-25
43	SEG30	995	85
44	SEG29	995	195
45	SEG28	995	305
46	SEG27	995	415
47	SEG26	995	525
48	SEG25	995	635
49	SEG24	995	745
50	SEG23	995	855
51	SEG22	995	965
52	SEG21	995	1075
53	SEG20	995	1185
54	SEG19	995	1295
55	SEG18	995	1405
56	SEG17	995	1515

CHIP SIZE = 2.40 x 3.37