PRODUCT   SPECIFICATION

LCM4004A

V1.1

April 25, 2013

REVISION RECORD

REV	DESCRIPTION	DATE
V1.0		April 21, 2008

CONTENTS

2. Type Number and Description

Type Number: C4004A-D-YSXFDYN-100

Description: 40 Characters   x   4 Lines

LCD Panel: Yellow-Green STN, Positive, Transflective

Duty and Bias: 1/16 duty; 1/5 bias

Operating Temperature: -20 ^{0}C – 70 ^{0}C

Storage Temperature: -30 ^{0}C – 80 ^{0}C

Viewing angle: 6H

BackLight: Bottom, Yellow-Green LED

Controller: ST7066U-0A or equivalent

IC Package: Bonding

Logic Voltage: 5.0V

3. Mechanical Specifications:

ITEM	STANDARD VALUE	UNIT
NUMBER OF CHARACTERS	40 CHARACTERS X 4 LINES	
CHARACTER FORMAT	5 X 7 DOTS with CURSOR	
MODULE DIMENSION	190.0(W) X 54.0(H) X13.0(T)	mm
EFFECTTVE DISPLAY AREA	147.0(W) X 29.5(H)	mm
CHARACTER SIZE	2.78(W) X 4.89(H)	mm
CHARACTER PITCH	3.53(W) X 6.09(H)	mm
DOT SIZE	0.50(W) X 0.55(H)	mm
DOT PITCH	0.57(W) X 0.62(H)	mm
APPROX WEIGHT	100	g
LCD TYPE	Yellow-Green STN, Positive, Transflective	
DUTY AND BIAS	1/16 DUTY; 1/5 BIAS	
VIEWING DIRECTION	6:00	
BACK LIGHT	Bottom, Yellow-Green LED	
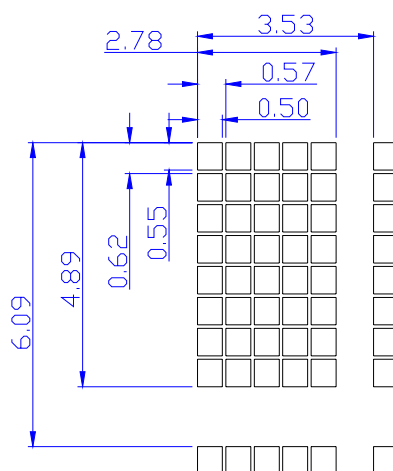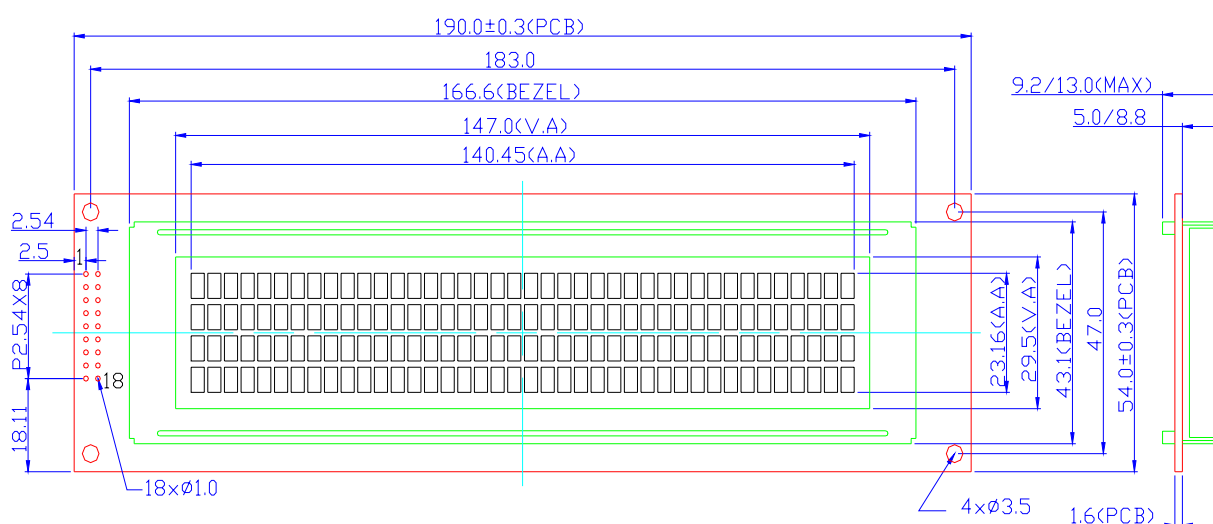
4. Electrical   Block   Diagram

4.1   PINS DEFINITION

PIN	SYMBOL	FUNCTION
1-8	DB0-DB7	Data Bus Line
9	E1	Enable Signal(UP)
10	R/W	L: Write ; H: Read
11	RS	Instruction/Data Register Select
12	Vo	Contrast Adjust
13	VSS	Power Supply(GND)
14	Vdd	Power Supply(+5V)
15	E2	Enable Signal(DOWN)
16	NC	NO Connect
17	A	Power Supply for LED B/L(+)
18	K	Power Supply for LED B/L(-)

17   18

4.2 ELECTRICAL BLOCK DIAGRAM
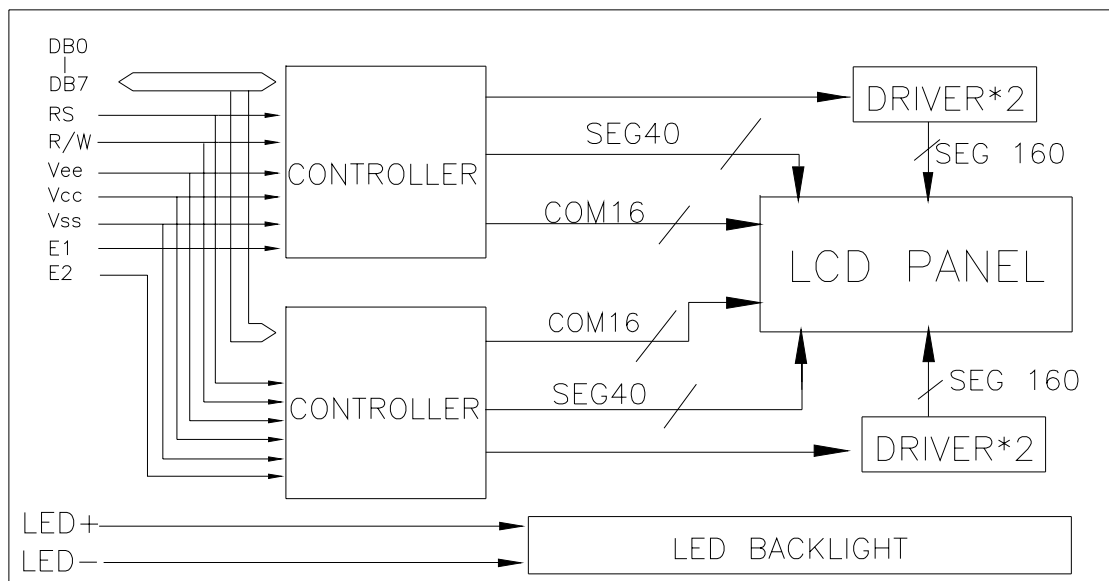
4.3   DISPLAY CHARACTER ADDRESS CODE

DISPLAY	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	28	30	31	32	33	34	35	36	37	38	39	40
IC1 DDRAM	LINE1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
	LINE2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67
IC2 DDRAM	LINE3	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
	LINE4	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67

5. Absolute   Maximum   Ratings

5.1 Electrical Maximum Ratings (Ta=25deg C)

ITEM	SYMBOL	CONDITION	MIN	MAX	UNIT
Supply Voltage (Logic)	Vdd – Vss	-	0	7.0	V
Supply Voltage (LCD Drive)	Vdd – V0	-	0	11.5	V
Input Voltage	Vi	-	-0.3	Vdd +0.3	V

5.2 Environmental Conditions

ITEM	SYMBOL	CONDITION	MIN	MAX	UNIT
Operating Temp	Topr	-	-20	70	deg C
Storage Temp	Ttsg	-	-30	80	deg C
Humidity Endurance	RH	no condensation Ta</=40 deg	-	95	%
Vibration	-	3 directions	see note (a)		-
Shock	-	3 directions	see note (b)		-

note (a):   frequency :   varying from 10 Hz in a 1-minute cycle

amplitude :   1.5mm

duration :   120 cycles, each lasting 1 minute,

for each of the 3 directions, x,y,z

note (b):   nutually perpendicular directions

direction normal to surface of LCD glass

80G, half-sine pulse of duration 11ms

other 2 directions

100G, half-sine pulse of duration 11ms

6. Electrical   Specifications

6.1 Electrical Characteristics at Ta=25 deg C, Vdd = 5V + / - 5%

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Supply Voltage (logic)	Vdd-Vss	-	4.5	5.0	5.5	V
Supply Voltage (LCD)	Vdd-V0	Vdd = 5V	4.5	4.7	4.9	V
Input signal voltage (for E, DB0-7,R/W,RS)	V-ih	"H" level	2.2	-	Vdd	V
	V-il	"L" level	0	-	0.6	V
Supply Current (logic)	Icc	-	-	1	1.2	mA
Supply Current (LCD)	Io	-	0.15	0.22	0.27	mA
Supply Voltage (LED)	V-bl	-	4.0	4.2	4.5	V
Supply Current (LED)	I-bl	-	-	500	1000	mA

6.2 Timing Specifications at Ta = 25 deg C, Vdd = 5V+/-10%, Vss =0V

6.2.1   Write mode

ITEM	SYMBOL	MIN	MAX	UNIT
E cycle time	tc	1200	-	ns
E rise time	tR	-	25	ns
E fall time	tF	-	25	ns
E-pulse width (H, L)	tw	140	-	ns
R/W and RS set-up time	tsul	0	-	ns
R/W and RS hold time	tH1	10	-	ns
Data set-up time	tsu2	40	-	ns
Data hold time	tH2	10	-	ns

6.2.2   Read mode

ITEM	SYMBOL	MIN	MAX	UNIT
E cycle time	tc	1200	-	ns
E rise time	tR	-	25	ns
E fall time	tF	-	25	ns
E-pulse width (H, L)	tw	140	-	ns
R/W and RS set-up time	tsu	0	-	ns
R/W and RS hold time	tH	10	-	ns
Data output delay	tD	-	100	ns
Data hold time	tDH	10	-	ns

6.2.3   Timing   Diagram

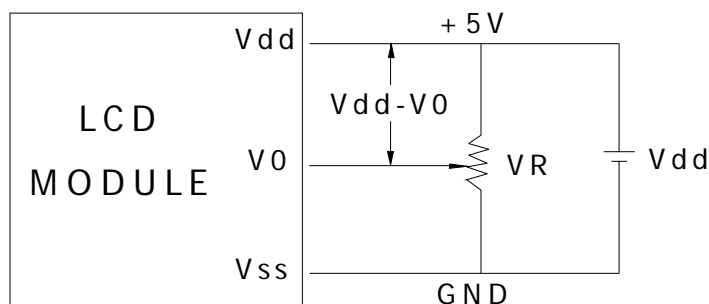### WRITE MODE TIMING DIAGRAM
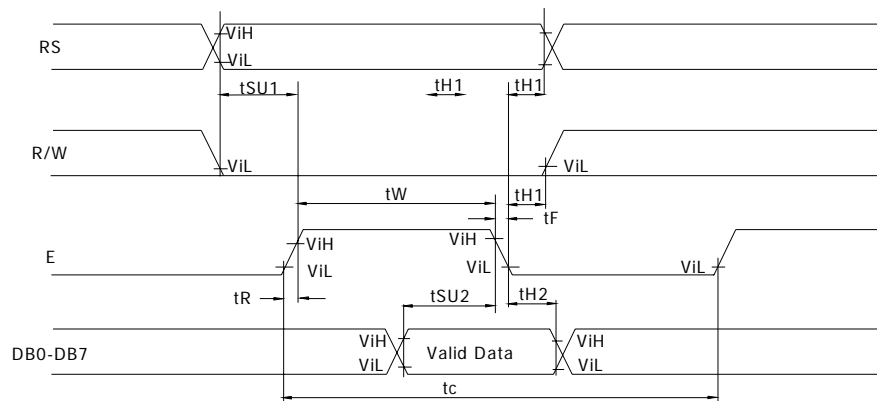
READ MODE TIMING DIAGRAM
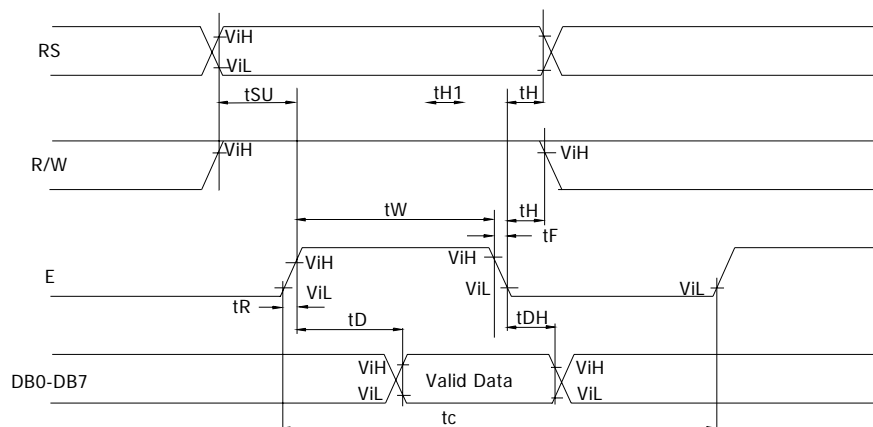
7.   Power   Supply   for   LCD   Module

```
                            + 5 V
         Vdd
                    Vdd-V0
LCD
MODULE    V0              VR        Vdd

         Vss
                     GND
```

Vdd-V0: LCD Driving Voltage
VR: 10K - 20K

8. Electro-Optical Characteristic

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REF.
Contrast	CR	25℃	--	12	--		note 1
Rise Time	tr	25℃	--	160	240	ms	note 2
Fall Time	tf	25℃	--	100	150	ms	note 2
Viewing Angle	$\theta 1 - \theta 2$	25℃	--	--	60	DEG	note 3
	Ø1, Ø2		-40	--	40		
Frame Frequency	Ff	25℃	--	64	--	Hz	note 2

Note(1): Contrast ratio is defined under the following condition:

CR= <u>brightness of non-selected condition</u>

brightness of selected condition

(a). Temperature------------25C

(b). Frame Frequency------64Hz

(c). Viewing angle---------- θ =0, Ø=0

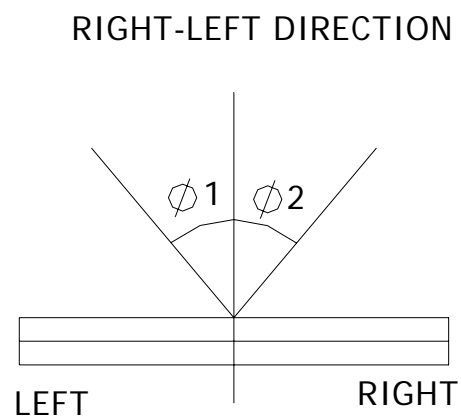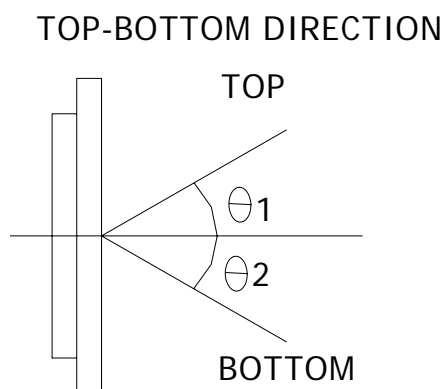(d). Operating Voltage---4.7V

Note(2): definition of response time:
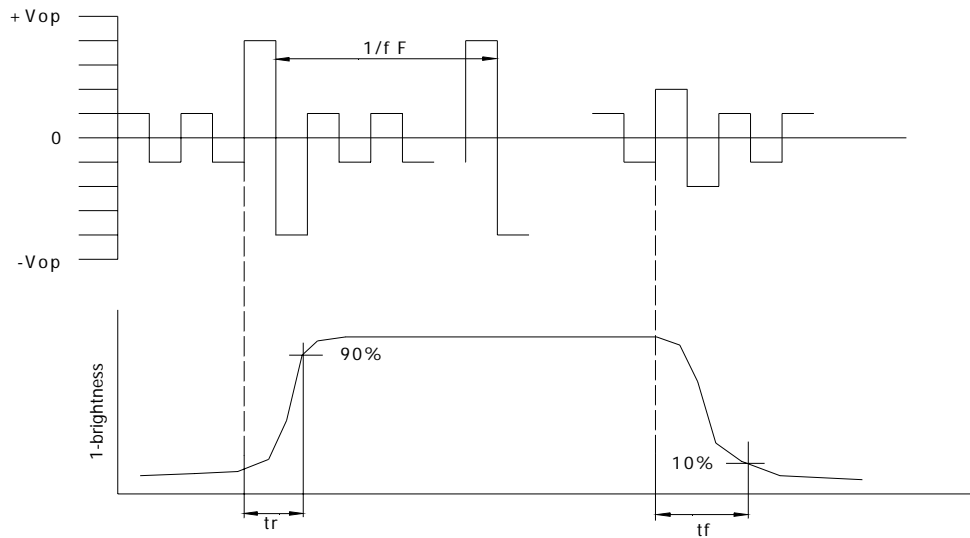
Condition:

(a).   Temperature------------25C

(b).   Frame Frequency------64Hz

(c).   Viewing angle---------- θ =0, Ø=0

(d).   Operating Voltage---4.7V

Note(3): definition of view angle:

9. Instruction Table

Instruction	Instruction Code										Description	Execution time (fosc= 270KHz)
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM. and set DDRAM address to "00H" from AC.	1.52 ms
Return Home	0	0	0	0	0	0	0	0	1	X	Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.52 ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	SH	Assign cursor moving direction and make shift of entire dispaly enable.	37 μs
Display ON/OFF Control	0	0	0	0	0	0	1	D	C	B	Set display(D), cursor(C), and blinking of cursor(B) on/off control bit.	37 μs
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	X	X	Set cursor moving and display shift control bit, and the direction, without changing DDRAM data.	37 μs
Function Set	0	0	0	0	1	DL	N	F	X	X	Set interface data length (DL : 4-bit/8-bit), numbers of display line (N : 1-line/2-line), display font type(F : 5 X 8 dots/ 5 X 11 dots)	37 μs
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter.	37 μs
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter.	37 μs
Read Busy Flag and Address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.	0 μs
Write Data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM).	43 μs
Read Data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM).	43 μs

- "X" : don't care

10. Standard character pattern

11. Precaution For Using LCM

1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handing,

(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degredation, polarizer peel off or bubble.

(2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface. Wipe gently with cotton. Chamois or other soft material soaked in petroleum benzin.

(3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.

(4). Glass can be easily chipped or cracked from rough handing. especially at corners and edges.

(5). Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

(1). Do not tamper in any way with the tabs on the tabs on the metal frame.

(2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattem.

(3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).

(4). When mounting a LCM make sure that the PCB is not under any tress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

(5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

(1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.

(2). The modules should be kept in antistatic bags or other containers resistant to static for storage.

(3). Only properly grounded soldering irons should be used.

(4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5). The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.

(6). Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3. Soldering

(1). Solder only to the I/O terminals.

(2). Use only soldering irons with proper grounding and no leakage.

(3). Soldering temperature: 280 ℃±10℃

(4). Soldering time: 3 to 4 sec.

(5). Use eutectic solder with resin flux fill.

(6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

2.4. Operation

(1). The viewing angle can be adjusted by varying the LCD driving voltage V0.

(2). Driving voltage should be kept within specified range; excess voltage shortens display life.

(3). Response time increases with decrease in temperature.

(4). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".

(5). Mechanical disturbance during operation (such as pressing on the viewing area) nay cause the segments to appear "fractured".

2.5. Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

2.6. Limited Warranty

Unless otherwise agreed between EASTERNTRONIC and customer, EASTERNTRONIC will replace or repair any of its LCD and LC, which is found to be defective electrically and visually when inspected in accordance with EASTERNTRONIC acceptance standards, for a period on one year from data of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of EASTERNTRONIC is limited to repair and/or replacement on the terms set forth above. EASTERNTRONIC will not responsible for any subsequent or consequential events.