

Messrs.					
Product Specification	Model:	AWG-F32240KFWHSGWT-A	Rev. No.	Issued Date.	Page.
			A	2008/11/20	1 / 1

**LIQUID CRYSTAL DISPLAY MODULE**  
**MODEL: AWG-F32240KFWHSGWT-A**  
**Customer's No.:**




Acceptance

,

,

,

Approved and Checked by

Approved by	Checked by		Made by
			

## RECORD OF REVISION

<b>Revision Date</b>	<b>Contents</b>	<b>Editor</b>
2008/11/20	New Release	TOM

## 1 FEATURES

- (1) Display format: 320 × 240 dot-matrix, 1/240 duty.
- (2) Construction: FSTN LCD, TAB type LCD driver, White LED Back-Light and PCB.
- (3) Display type: FSTN, transfective, 6 o'clock view.
- (4) **New Driving Method** CMOS LCD Driver for Low Power Consumption Driving; Common driver is IST3032 and Segment is IST3031.
- (5) 5V or 3.3V single power input. Built-in specific power supplies circuit for LCD driving. **Ultra Low Power Consumption.**
- (6) Extended temperature type.
- (7) Portrait (Default) or Landscape Display Type Selectable by Jumper Setting.
- (8) FFC length =170mm.
- (9) ROHS compliant.

## 2 MECHANICAL DATA

Parameter	Stand Value	Unit
Dot size	0.225(W) × 0.225(H)	mm
Dot pitch	0.24(W) × 0.24(H)	mm
Viewing area	81.8 (W) × 62.0 (H)	mm
Module size (w/ LED backlight)	93.6(W) × 73.3(H) × 7 max (T)	mm

## 3 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	
Logic Circuit Supply Voltage	VDD-VSS	-0.3	7.0	V	
LCD Driving Voltage	--	-0.3	26.0	V	
Input Voltage	VI	-0.3	VDD+0.3	V	
Extended temp. Type	Operating Temp.	TOP	-20	70	°C
	Storage Temp.	TSTG	-30	80	°C

## 4 ELECTRO-OPTICAL CHARACTERISTICS

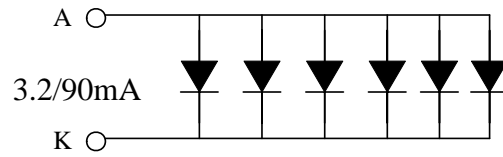
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
<b>----- Electronic Characteristics -----</b>							
Logic Circuit Supply Voltage	VDD-VSS	--	2.6	3.3	5.5	V	
LCD Driving Voltage	VCTL	-20 °C	0.37	0.44	0.52	V	Please keep VCTL between 0.35~1.2V(VCC=3.3V) Please keep VCTL >0.35 (VCC=5V)
		25 °C	0.38	0.47	0.58		
		70 °C	0.55	0.63	0.72		
Input Voltage	VIH	--	0.7 VDD	--	VDD	V	
	VIL	--	VSS	--	0.3 VDD	V	
Logic Supply Current	ICC	VCC = 3.3V	--	5	--	mA	
<b>----- Optical Characteristics -----</b>							
Contrast	CR	FSTN type		7			Note 1
Rise Time	tr	25°C	--	305	450	ms	Note 2
Fall Time	tf	25°C	--	120	180	ms	
Viewing Angle Range	θ f	25°C & CR≥2	--	40	--	Deg.	Note 3
	θ b		--	35	--		
	θ l		--	35	--		
	θ r		--	35	--		
Frame Frequency	fF	25°C	--	64	--	Hz	
<b>----- White LED Back-light Characteristics -----</b>							
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Forward Current	IF	--	--	90	120	mA	NOTE 4
LCM Luminous intensity		IF=60mA	--	10	--	cd/m <sup>2</sup>	NOTE 4
Forward Voltage	VF	IF=60mA	--	3.2	3.5	V	NOTE 5
LED C.I.E	X	IF=60mA	0.26	0.30	0.36		NOTE 6
	Y	IF=60mA	0.24	0.31	0.36		

(NOTE 4): Luminous intensity is decided by forward current of White LED.

(NOTE 5): White LEDs are with voltage tolerance

(NOTE 6): White LEDs are with color tolerance

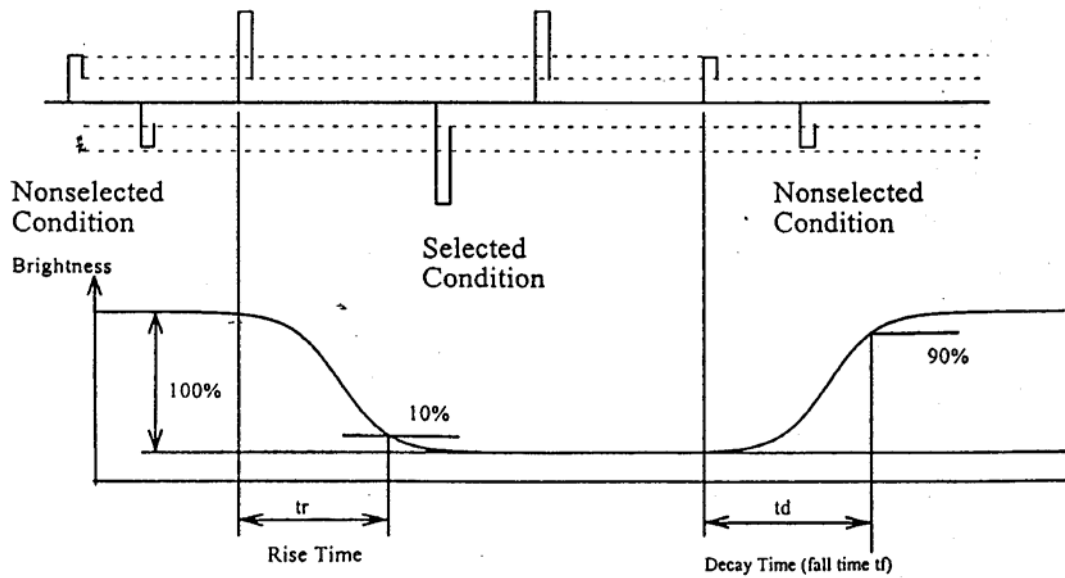
\* LED Dice number = 6



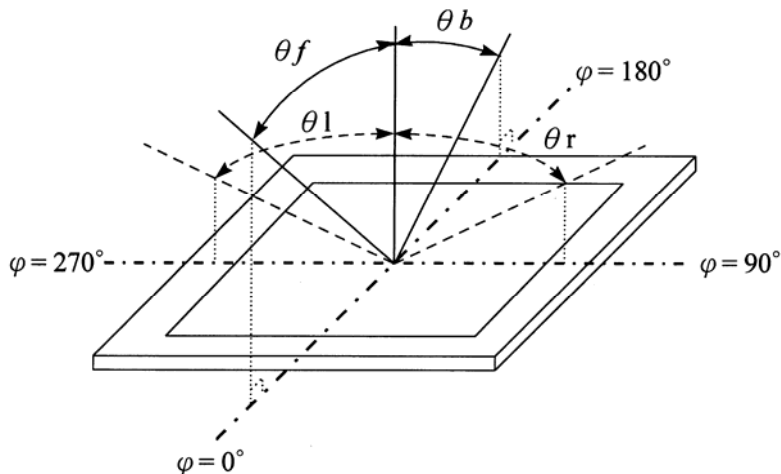
(NOTE 1) Contrast ratio :

$$CR = (\text{Brightness in OFF state}) / (\text{Brightness in ON state})$$

(NOTE 2) Response time :



(NOTE 3) Viewing angle





## 6 INTERFACE DEFINITION

CN1: LCM Interface for Driver with Touch Panel

PIN NO.	SIGNAL	LEVEL	FUNCTION
1~4	D0~D3	H/L	Data Input(4 bits)
5	/DISPOFF	H/L	H: Display ON L: Display OFF
6	FLM	H/L	First Line Marker
7	M	H/L	AC Alternative Signal(M Signal)
8	LP	H/L	Data Latch Signal
9	CP	H/L	Clock Signal
10	VDD	-	Power Supply for Logic(+3.3V)
11	VSS	-	Power Supply(Ground:0V)
12	NC	-	No Connection
13	VCTL	-	Contrast Adjustment Input:
14	/RESET	H/L	Reset Signal
15*	NC	-	Serial Clock Touch Panel Left Signal in X Axis
16*	NC	-	Data Output Touch Panel Right Signal in X Axis
17*	NC	-	Data In Touch Panel Upper Signal in Y Axis
18*	NC	-	Chip Select Touch Panel Lower Signal in X Axis
19*	NC	-	Interrupt
20	A	-	LED Anode (+)
21	K		LED Cathode (-)
22~24	NC		No Connection

\* \* 15~19 : SK, DO, DI, CS, INT for Touch Panel controller TSC2046

/ X1, X2, Y1, Y2 for Touch Panel (without TSC2046)

## 7 TIMING CHARACTERISTICS

### AC Electrical Characteristics

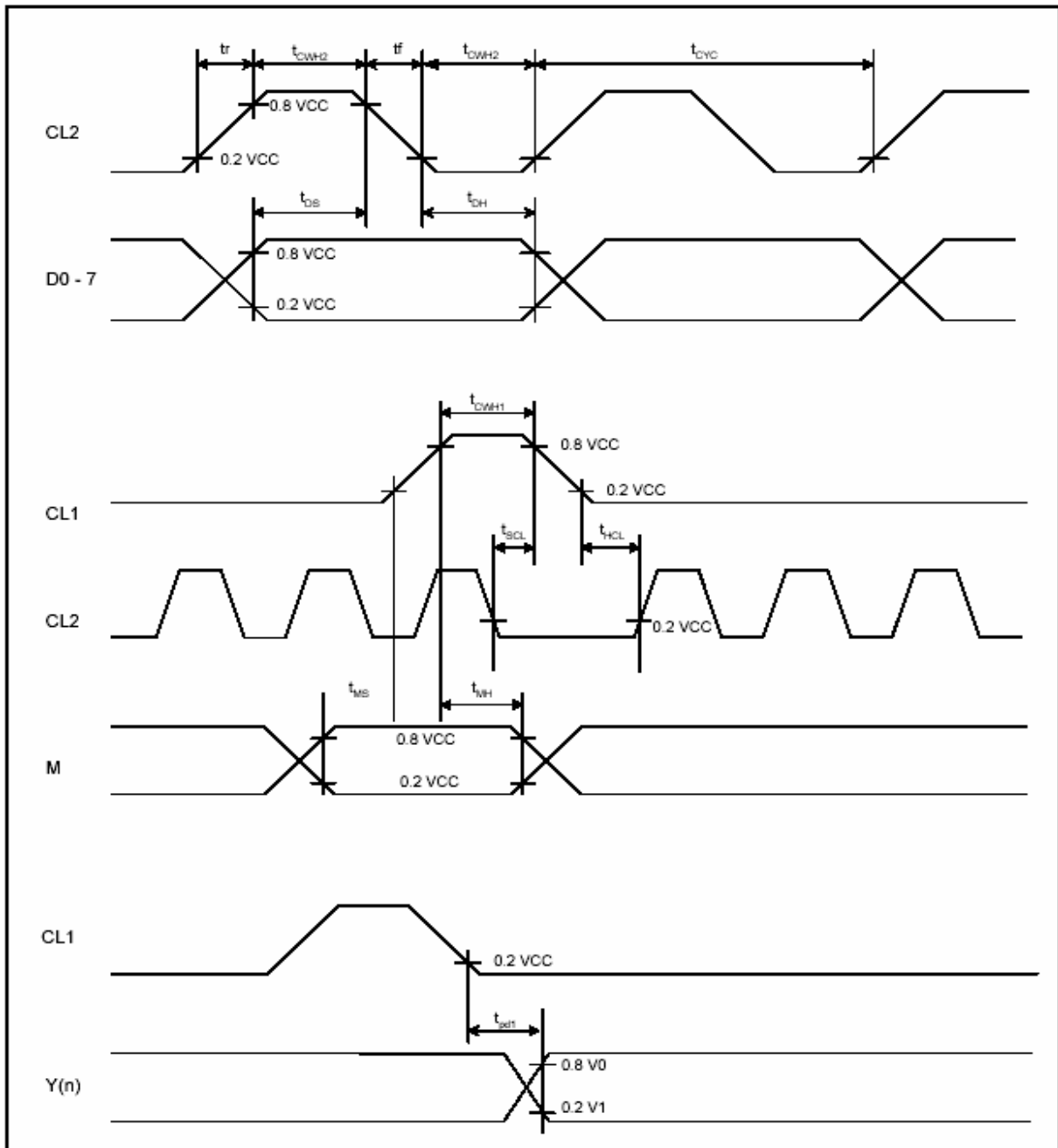
(VCC=2.5V to 4.5V, VO – GND = 2.6V to 5.5V, T<sub>A</sub> = -30°C to +75°C)

Item	Symbol	Pin	Min	Max	Unit
Clock Cycle Time	t <sub>CYC</sub>	CL2	152	-	ns
Clock High Pluse Width1	t <sub>CWH2</sub>	CL2	65	-	ns
Clock Low pluse Width1	t <sub>CWL2</sub>	CL2	65	-	ns
Clock high Pluse Width 2	t <sub>CWH1</sub>	CL1	65	-	ns
Clock Setup Time	t <sub>SCL</sub>	CL1,CL2	80	-	ns
Clock Hold Time	t <sub>HCL</sub>	CL1,CL2	80	-	ns
Clock Rise Time	Tr	CL1,CL2	-	30	ns
Clock Fall Time	Tf	CL1,CL2	-	30	ns
Data Setup Time	t <sub>DS</sub>	D0 to D3, CL2	50	-	ns
Data Hold Time	t <sub>DH</sub>	D0 to D3, CL2	50	-	ns
M Setup time	t <sub>MS</sub>	M,CL1	20	-	ns
M Hold Time	t <sub>MH</sub>	M,CL1	20	-	ns
Output Delay Time1	t <sub>PD1</sub>	CL1, Y1 to Y320	-	1000	ns

(VCC=4.5V to 5.5V, VO – GND = 2.6V to 5.5V, T<sub>A</sub> = -30°C to +75°C)

Item	Symbol	Pin	Min	Max	Unit
Clock Cycle Time	t <sub>CYC</sub>	CL2	125	-	ns
Clock High Pluse Width1	t <sub>CWH2</sub>	CL2	45	-	ns
Clock Low pluse Width1	t <sub>CWL2</sub>	CL2	45	-	ns
Clock high Pluse Width 2	t <sub>CWH1</sub>	CL1	45	-	ns
Clock Setup Time	t <sub>SCL</sub>	CL1,CL2	80	-	ns
Clock Hold Time	t <sub>HCL</sub>	CL1,CL2	80	-	ns
Clock Rise Time	Tr	CL1,CL2	-	20	ns
Clock Fall Time	Tf	CL1,CL2	-	20	ns
Data Setup Time	t <sub>DS</sub>	D0 to D3, CL2	20	-	ns
Data Hold Time	t <sub>DH</sub>	D0 to D3, CL2	20	-	ns
M Setup time	t <sub>MS</sub>	M,CL1	20	-	ns
M Hold Time	t <sub>MH</sub>	M,CL1	20	-	ns
Output Delay Time1	t <sub>PD1</sub>	CL1, Y1 to Y320	-	1000	ns



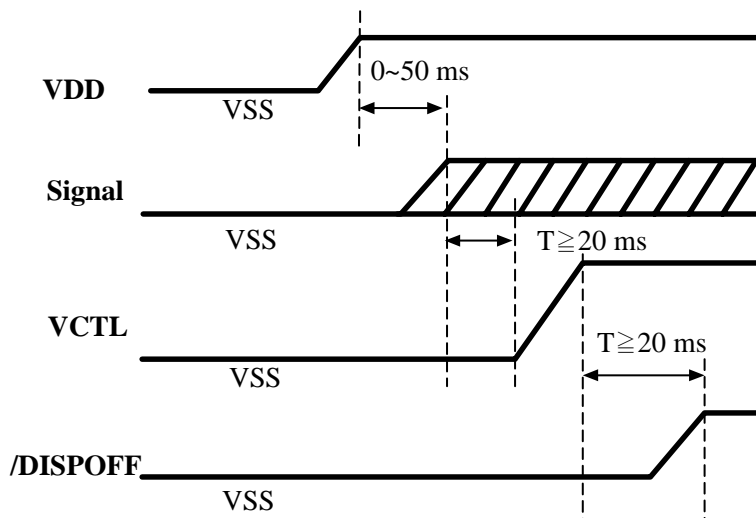


AC Electrical Characteristics

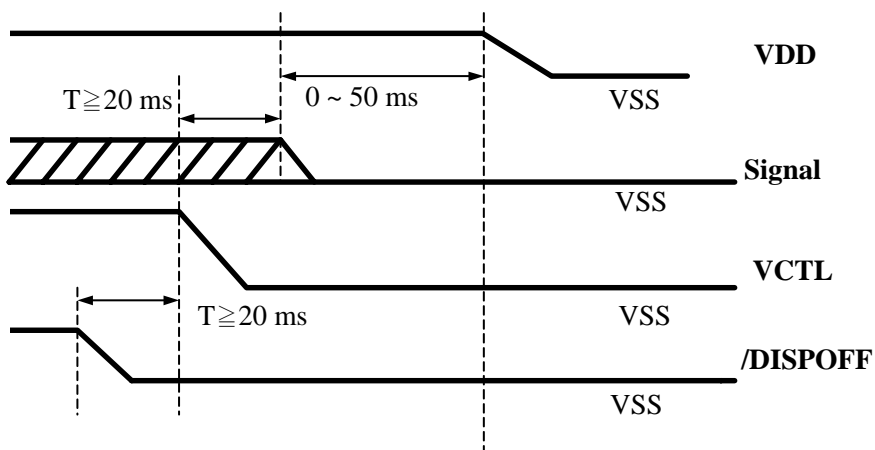
## 7.1 Power ON/OFF Sequence

Please maintain the blow sequence when turning on and off the power supply of the module. If /DISPOFF is supplied to the module while internal alter signal for LCD driving (M) is unstable, DC component will be supplied to the LCD panel. This may cause damage the LCD module.

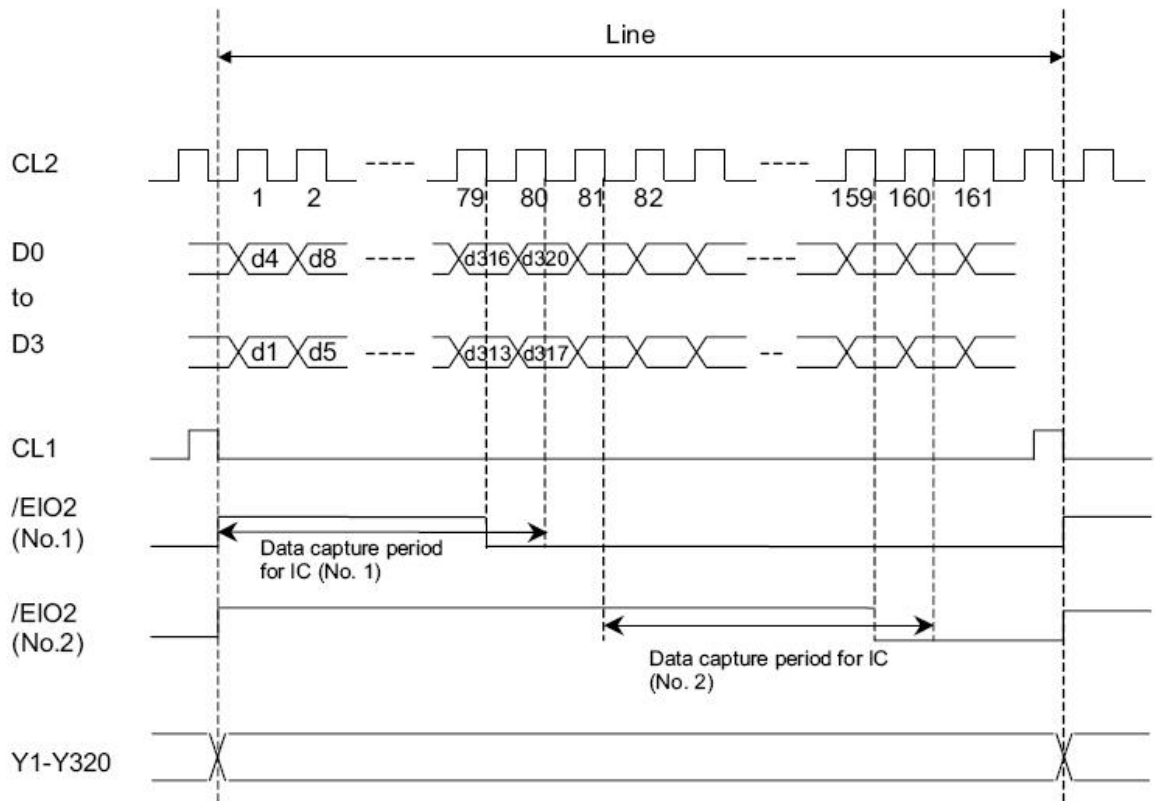
### POWER ON SEQUENCE



### POWER OFF SEQUENCE



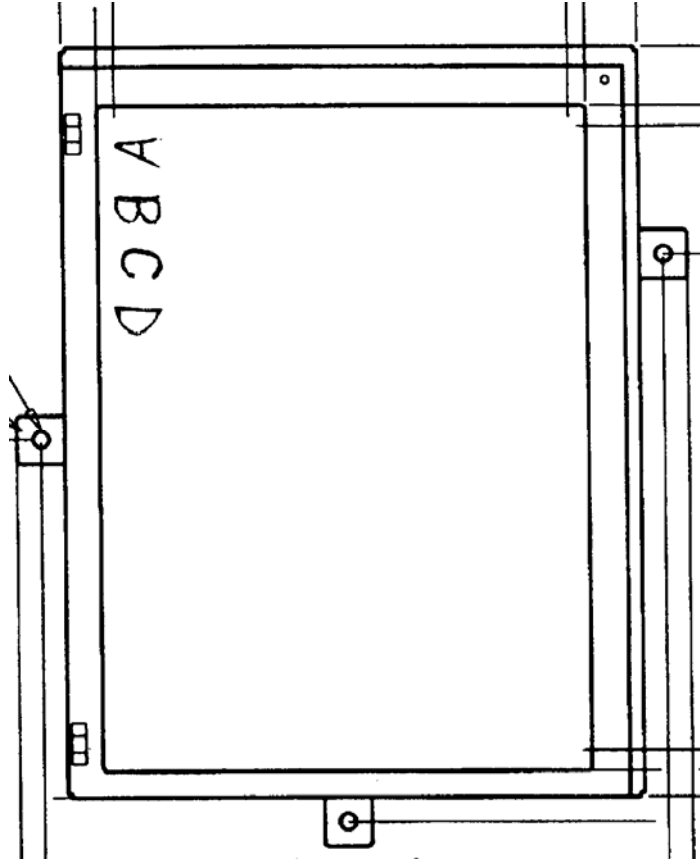
## 7.2 Interface Timing Chart



# 8 INNER DATA FORMAT

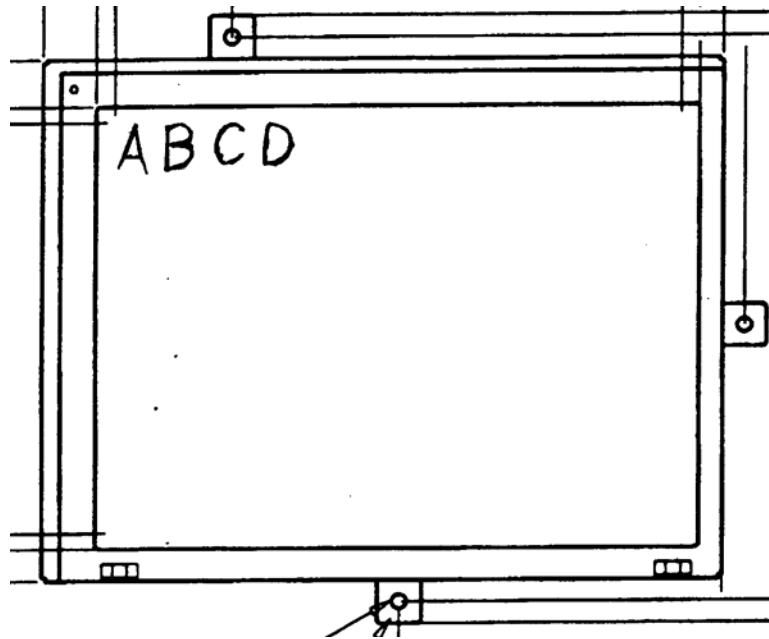
	COM1							COM240	
#1	D3	D3	D3						D3
#2	D2	D2	D2						D2
	D1	D1	D1						D1
	D0	D0	D0						D0
	D3								D3
	D2	D2							D2
	D1	D1							D1
#320	D0	D0							D0

Portrait Display Type (Top View)



	SEG1								SEG320							
#1	D3	D2	D1	D0	D3	D2			-			D3	D2	D1	D0	
#2	D3	D2	D1	D0	D3	D2						D3	D2	D1	D0	
#240	D3	D2	D1	D0	D3	D2						D3	D2	D1	D0	

**Landscape Display Type(Top View)**



\* Regardless Portrait or Landscape type, both are 1/240 duty. The only difference is the opposite scan direction on Common driver. The character mode of RA8835 could only be used on Landscape type. The character will be Mirrored on Portrait type.

## 9 JUMPER SETTING

Item	Option	Jumper Setting	Remark
Display Type	Portrait (default)	Pin 1,2 short on JP1&JP2	
	Landscape	Pin 2,3 short on JP1&JP2	

## **10 QUALITY AND RELIABILITY**

### **10.1 TEST CONDITIONS**

Tests should be conducted under the following conditions :

Ambient temperature :  $25 \pm 5^{\circ}\text{C}$

Humidity :  $60 \pm 25\% \text{ RH}$ .

### **10.2 SAMPLING PLAN**

Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

### **10.3 ACCEPTABLE QUALITY LEVEL**

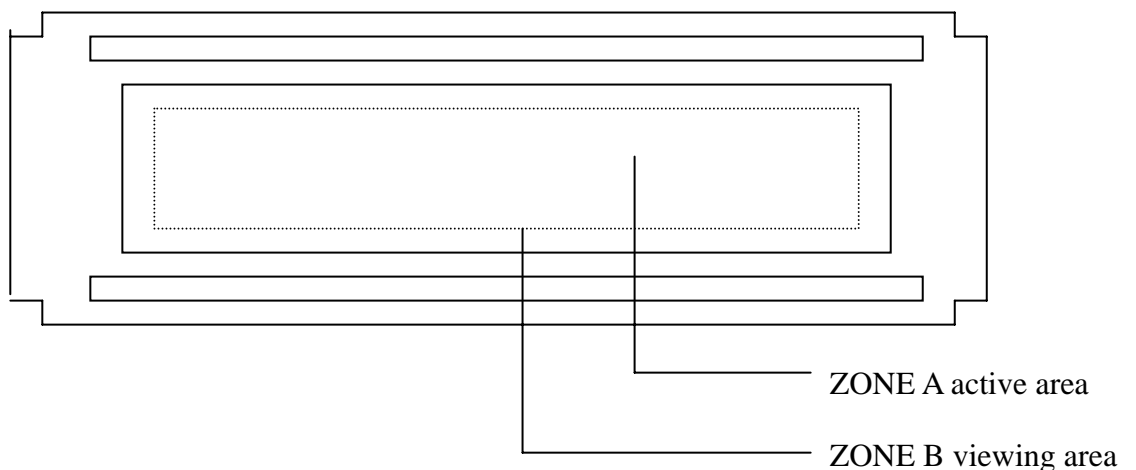
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

### **10.4 APPEARANCE**

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under fluorescent light. The inspection area of LCD panel shall be within the range of following limits.

## 10.5 INSPECTION QUALITY CRITERIA

Item	Description of defects			Class of Defects	Acceptable level (%)
Function	Short circuit or Pattern cut			Major	0.65
Dimension	Deviation from drawings			Major	1.5
Black spots	Ave . dia . D	area A	area B	Minor	2.5
	$D \leq 0.2$	Disregard			
	$0.2 < D \leq 0.3$	3	4		
	$0.3 < D \leq 0.4$	2	3		
	$0.4 < D$	0	1		
Black lines	Width W, Length L	A	B	Minor	2.5
	$W \leq 0.03$	disregard			
	$0.03 < W \leq 0.05$	3	4		
	$0.05 < W \leq 0.07, L \leq 3.0$	1	1		
	See line criteria				
Bubbles in polarizer	Average diameter D $0.2 < D < 0.5$ mm for N = 4 , D > 0.5 for N = 1			Minor	2.5
Color uniformity	Rainbow color or Newton ring.			Minor	2.5
Glass Scratches	Obvious visible damage.			Minor	2.5
Contrast ratio	See note 1			Minor	2.5
Response time	See note 2			Minor	2.5
Viewing angle	See note 3			Minor	2.5



## 10.6 RELIABILITY

Test Item	Test Conditions		Note
	Normal Temp. type	Extended Temp. type	
High Temperature Operation	50±3°C , t=96 hrs	70±3°C , t=96 hrs	
Low Temperature Operation	0±3°C , t=96 hrs	-20±3°C , t=96 hrs	
High Temperature Storage	70±3°C , t=96 hrs	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-20±3°C , t=96 hrs	-30±3°C , t=96 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. ( 1 cycle ) Total 5 cycle	-30°C ~ 25°C ~ 80°C 30 min. 5 min. 30 min. ( 1 cycle ) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs		1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis		2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions  
(15-35°C , 45-65%RH).

Definitions of life end point :

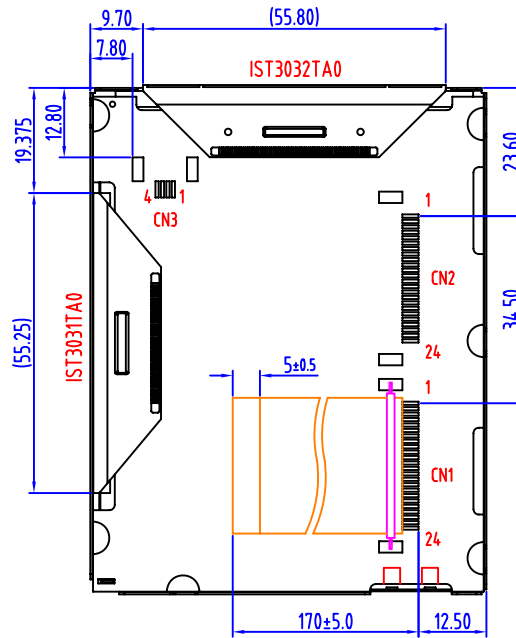
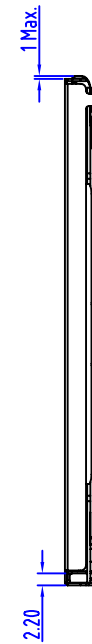
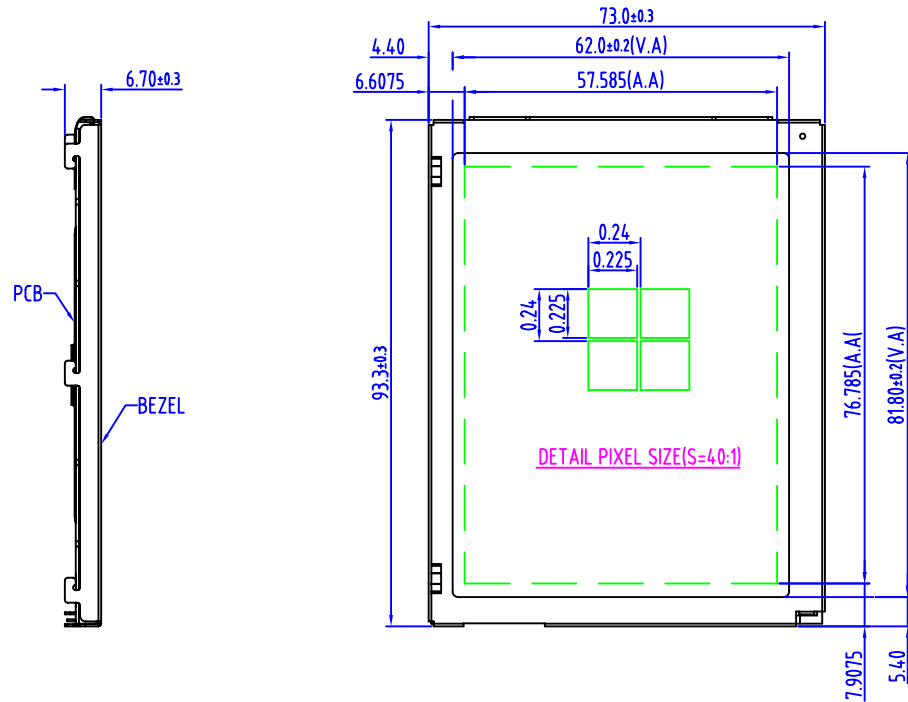
- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.



## **11 HANDLING PRECAUTIONS**

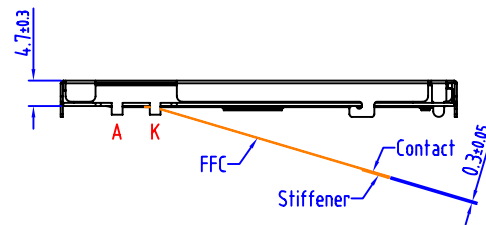
- (1) A LCD module is a fragile item and should not be subjected to strong mechanical shocks.
- (2) Avoid applying pressure to the module surface. This will distort the glass and cause a change in color.
- (3) Under no circumstances should the position of the bezel tabs or their shape be modified.
- (4) Do not modify the display PCB in either shape or positioning of components.
- (5) Do not modify or move location of the zebra or heat seal connectors.
- (6) The device should only be soldered to during interfacing. Modification to other areas of the board should not be carried out.
- (7) In the event of LCD breakage and resultant leakage of fluid do not inhale, ingest or make contact with the skin. If contact is made rinse immediately.
- (8) When cleaning the module use a soft damp cloth with a mild solvent, such as Isopropyl or Ethyl alcohol. The use of water, ketone or aromatic is not permitted.
- (9) Prior to initial power up input signals should not be applied.
- (10) Protect the module against static electricity and observe appropriate anti-static precautions.

REV	DESCRIPTION	DRAWER	CHECKER	DATE



Note:  
 LCD T=1.9±0.3  
 Bezel T=0.4  
 LED T=1.5Max.  
 PCB T=0.6

CN1 PIN ASSIGNMENT			
1	D0	13	VCTL
2	D1	14	/RESET
3	D2	15	NC.
4	D3	16	NC.
5	/DISPOFF	17	NC.
6	FLM	18	NC.
7	M	19	NC.
8	LP	20	LEDA
9	CP	21	LEDK
10	VDD	22	NC.
11	VSS	23	NC.
12	NC.	24	NC.



TOLERANCE GRADE(±)	A	B
~6	0.05	0.1
6~18	0.08	0.18
18~50	0.1	0.25
50~180	0.2	0.4
180~	0.3	0.5

Recommend	Company	Parts No.
CN1	Molex.	52207-2490
	AMP.	2487951-4

Note:  
 1. Unless indicated, Tolerance Grade "B" is adopted.

TITLE	LCD MODULE	UNIT: mm	Product :
DATE	2008.11.17	SCALE: 1/1	32240KA
		SHEET: 1/1	DRW NO : 32240KA-01
			REV:

UNLESS OTHERWISE SPECIFIED TOLERANCE IS ±0.1FRACTIONS DECIMALS ANGLES IS ±0.5°