A Brighter Solution

AMP DISPLAY INC.

SPECIFICATIONS

LCD MODULE

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	A T - 3 2 0 2 4 0 P F T C W - 0 0 H (N) (R)
APPROVED BY:	
DATE:	

☐ APPROVED FOR SPECIFICATIONS

☐ APPROVED FOR SPECIFICATION AND PROTOTYPES

AMP DISPLAY INC

9856 SIXTH STREET RANCHO CUCAMONGA CA 91730

TEL: 909-980-13410 FAX: 909-980-1419

WWW.AMPDISPLAY.COM

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2007/06/01		New Release.	**Tony**
2007/7/20		Modify T320240-66-0 to AT-320240PFTCW-00H(N)(R).	**Tony**

1 FEATURES

(1) Display format : 320 × 240 dot-matrix, 1/240 duty.

(2) Construction : LCD, Bezel, Zebra, whiteCCFL backlight, and PCB.

(3) Display type : FSTN LCD, Negative type , 6 o'clock view.

(4) Power : +5V for logic circuit

(5) Extended temperature type.

2 MECHANICAL DATA

Parameter	Stand Value	Unit
Dot size	0.345(W) × 0.345(H)	mm
Dot pitch	0.36(W) × 0.36(H)	mm
Viewing area	122.0(W) × 92.0(H)	mm
Module size	166.0(W) × 109.0(H) × 7.0 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		VEE-VSS	0	30	V
Input Voltage		V_I -0.3		VDD	V
Extended temp. type	Operating Temp.	T_{OP} -20		70	°C
	Storage Temp.	T_{STG} -30		80	°C

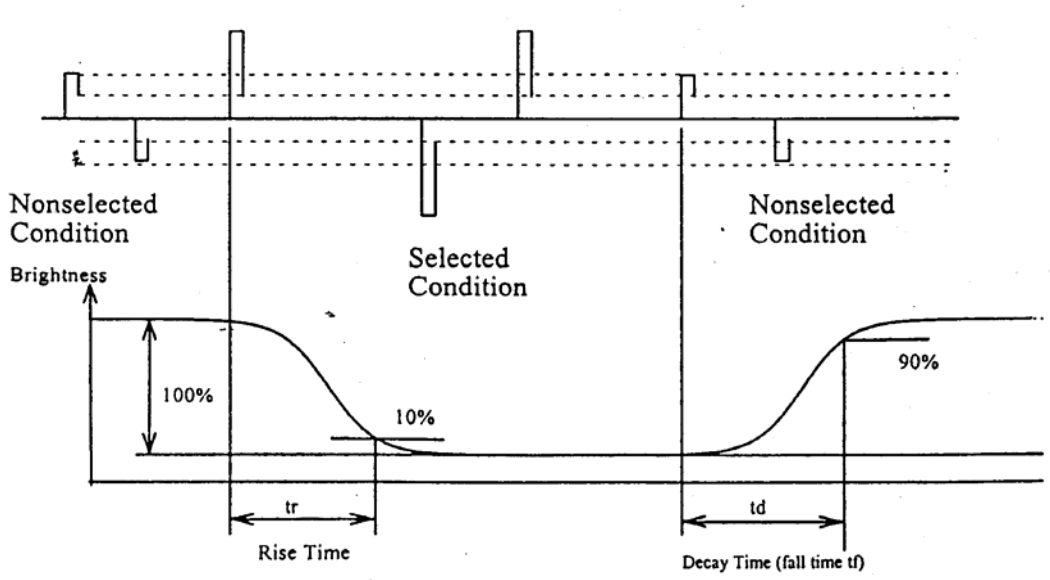
4 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	4.5	5.0	5.5	V	
LCD driving voltage	VEE-VSS	-20℃	21.6	22.8	23.9		
		0℃	21.0	22.6	23.7		
		25 °C	20.8	21.9	23.0		
		50℃	20.0	21.1	22.2		
		70℃	19.6	20.6	21.6		
Input Voltage	VIH	--	0.8 VDD	--	VDD	V	
	VIL	--	VSS	--	0.2 VDD	V	
Logic Supply Current	IDD	VDD = 5V	--	2.0	5.0	mA	
----- Optical Characteristics -----							
Contrast	CR	FSTN type	14	20	--		Note 1
Rise Time	tr	25°C	--	350	520	ms	Note 2
Fall Time	tf	25°C		150	220	ms	
Viewing Angle Range	θ f	25°C & CR≥2	--	40	--	Deg.	Note 3
	θ b		--	30	--		
	θ l		--	35	--		
	θ r		--	35	--		

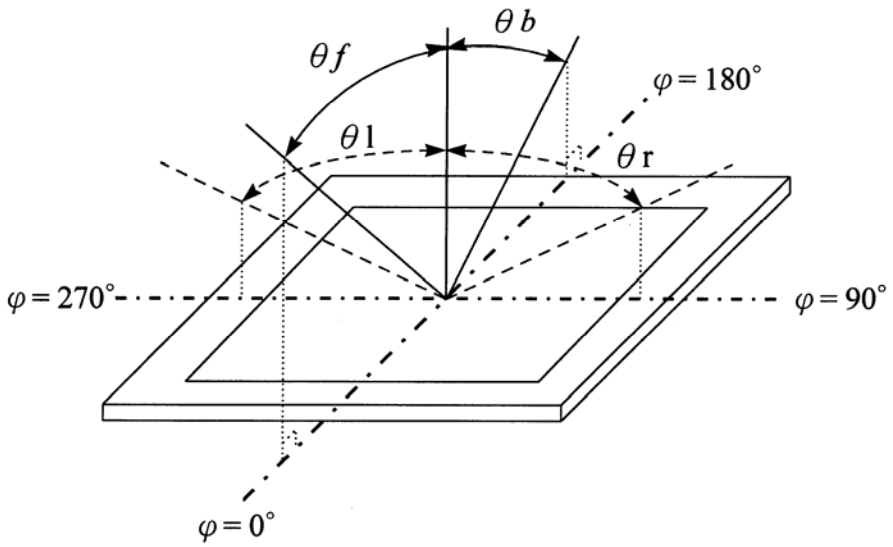
(NOTE 1) Contrast ratio :

CR = (Brightness in OFF state) / (Brightness in ON state)

(NOTE 2) Response time :



(NOTE 3) Viewing angle

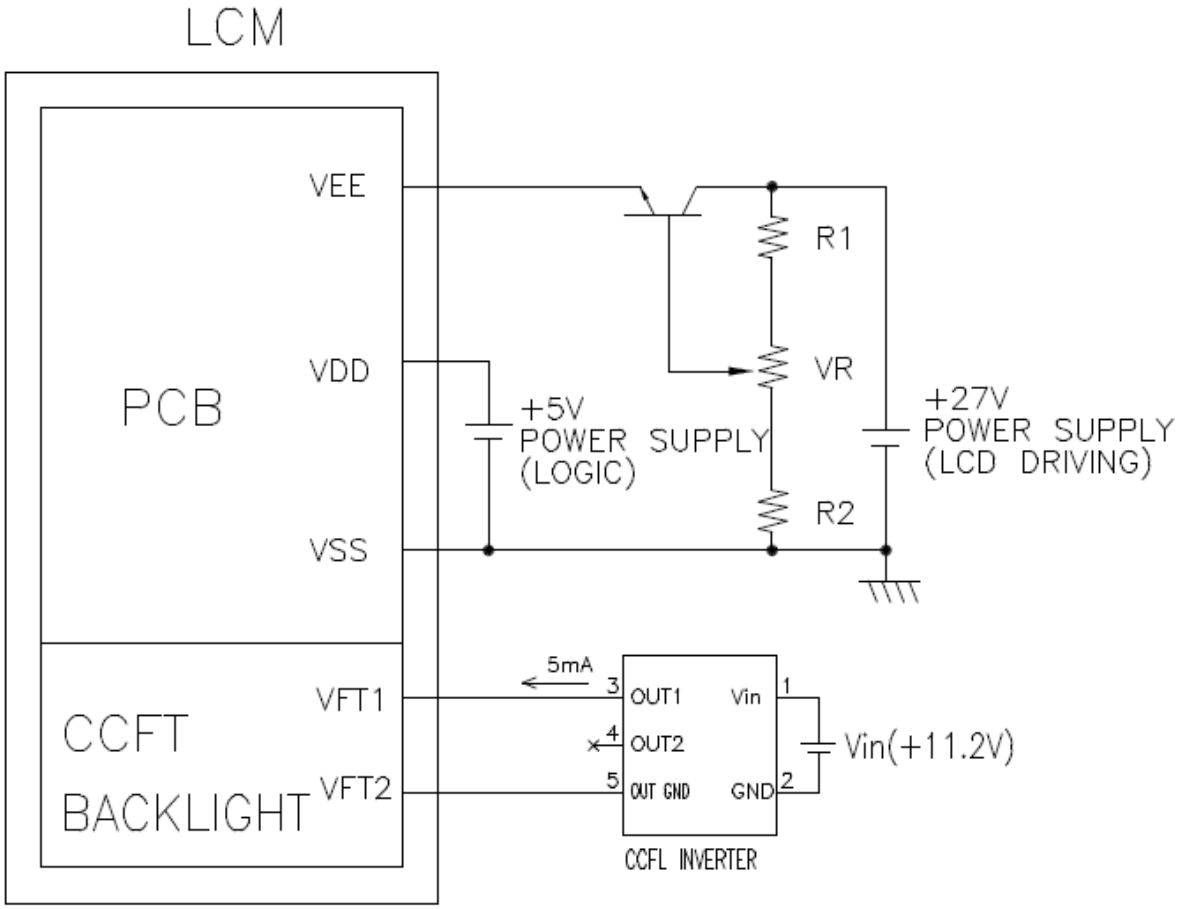


4.1 CCFL Back-light Electrical Specification

Parameter	Condition	Standard Value	Unit
Tube Voltage	Ta=25 °C	301	Vrms
Tube Current	Ta=25 °C	5	mArms
LCM brightness	--	150	Cd / m^2
Half-Brightness Life*	--	20,000	hour

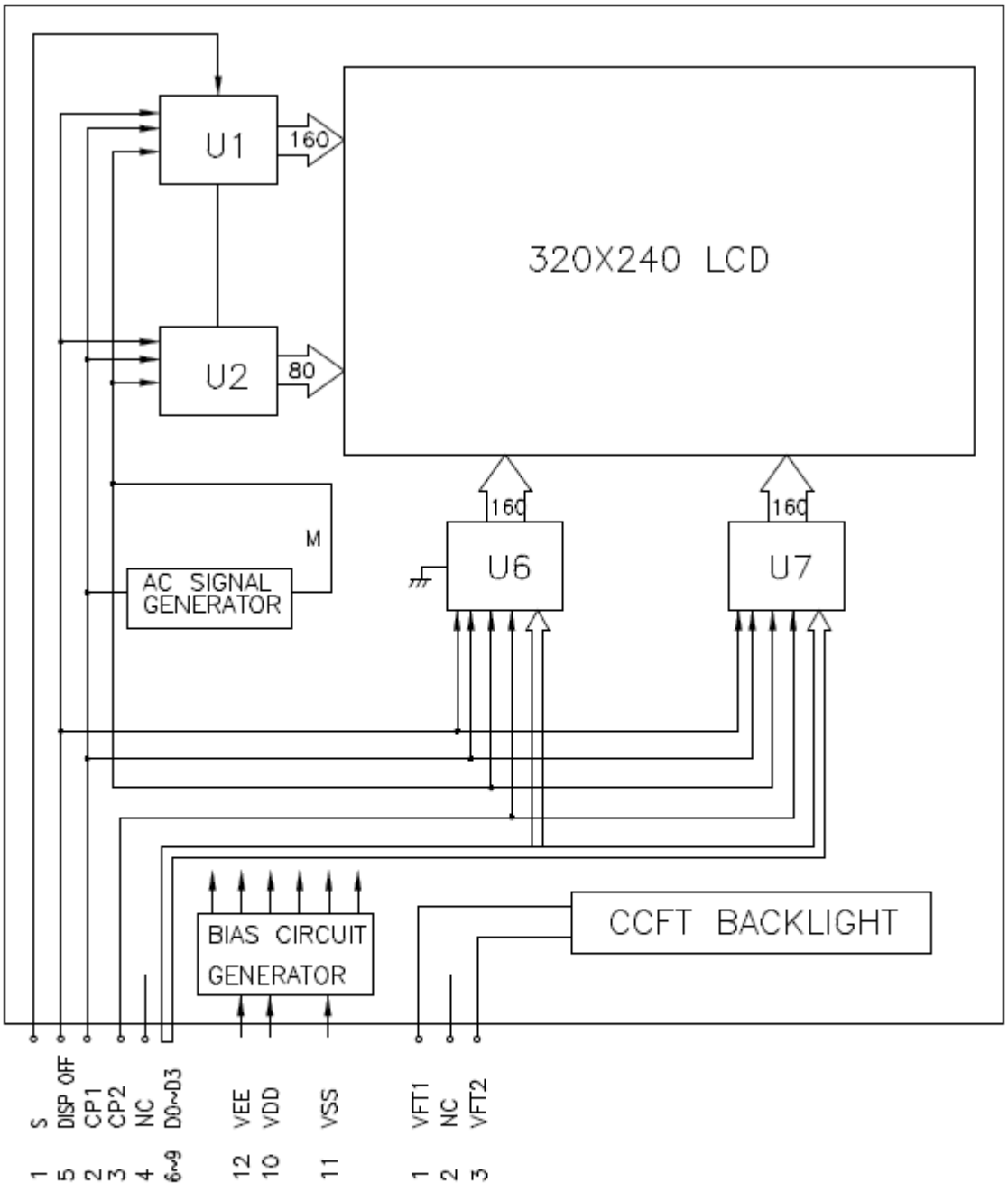
*The life-time of the average brightness reach to 50% of initial brightness

5 BLOCK DIAGRAM & POWER SUPPLY



1.R1+VR+R2=10K~20KΩ

2.RECOMMENDED CCFT INVERTER : TDK-L10L



* AC SIGNAL SETTING

J0	J1	J2	J3	J4	J5	J6	J7	J8
L	L	L	H	L	L	L	L	—

6 PIN CONNECTIONS

CN1 :

PIN NO.	SIGNAL	FUNCTION
1	S	Scan start-up signal
2	CP1	Input data latch signal
3	CP2	Data input clock signal
4	NC	No Connection
5	DISP OFF	Display control signal
6	D0	Display Data signal
7	D1	Display Data signal
8	D2	Display Data signal
9	D4	Display Data signal
10	VDD	Power supply for logic
11	VSS	Ground potential
12	VEE	Power supply for LCD drive

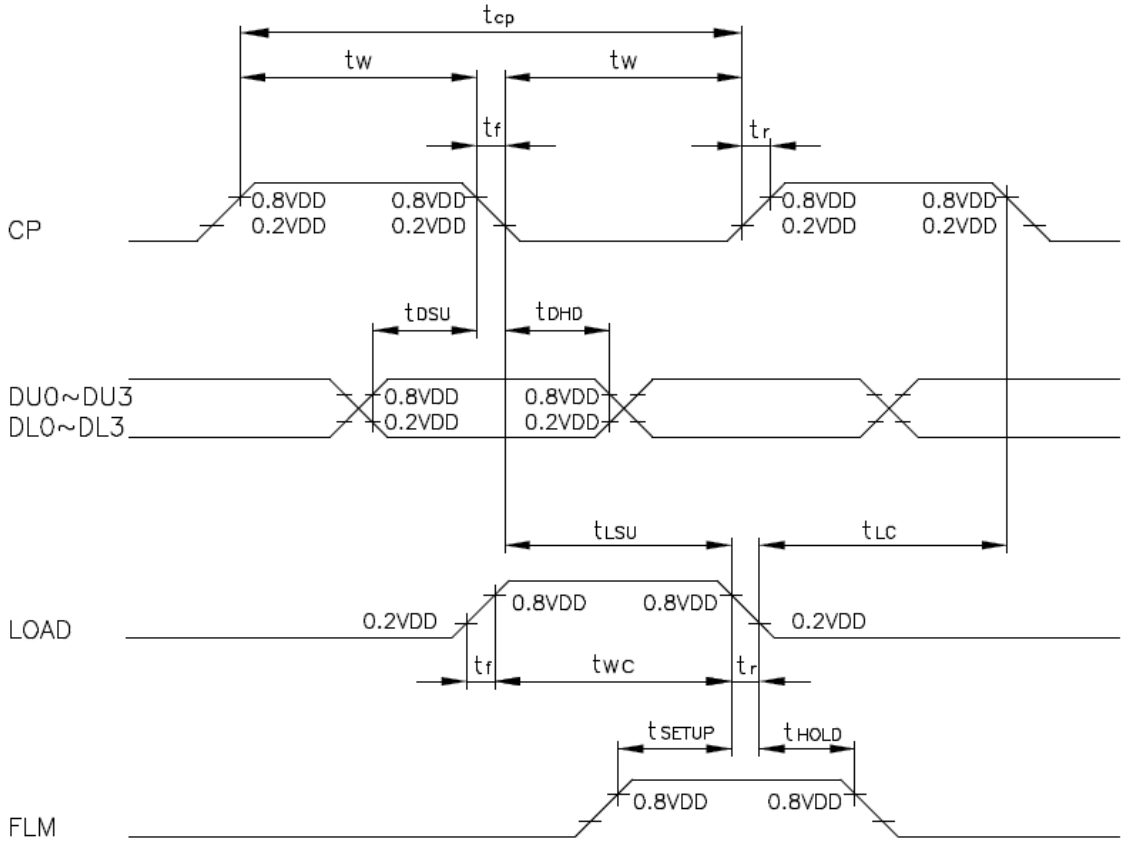
CN2 :

PIN NO.	SIGNAL	FUNCTION
1	VFT1	Power supply for CCFL Backlight
2	NC	No Connection
3	VFT2	Power supply for CCFL Backlight

7 TIMING CHARACTERISTICS

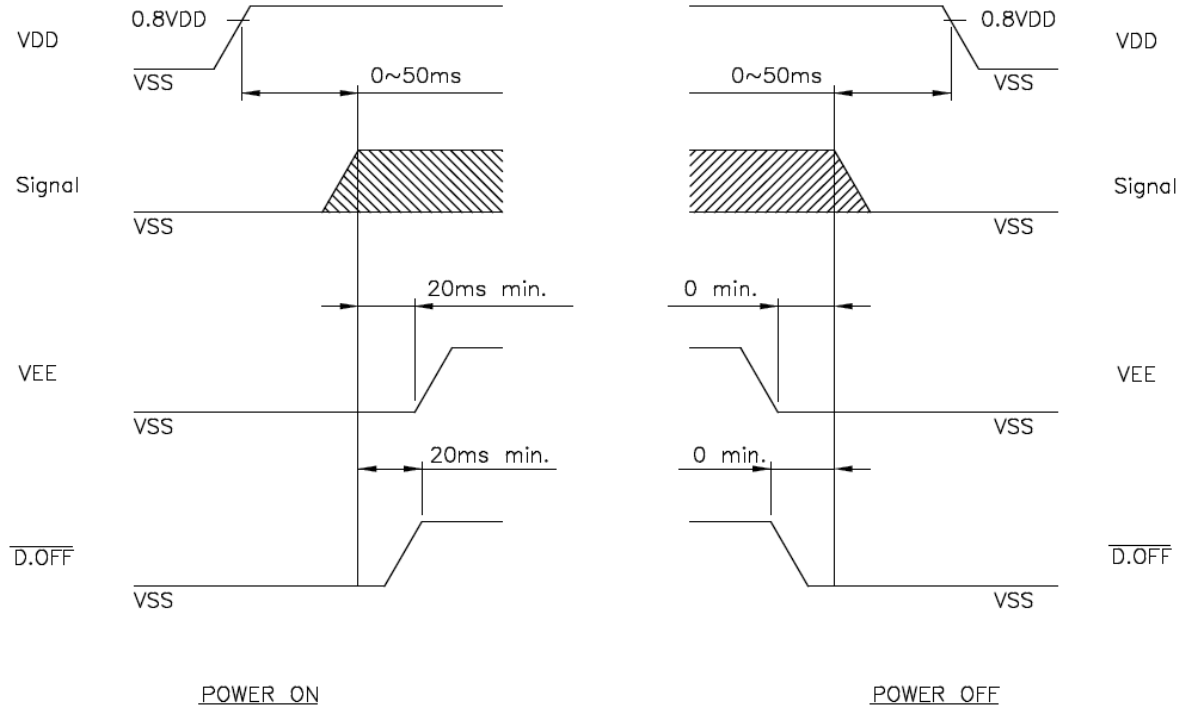
7.1 Interface Timing

Parameter	Symbol	Min	Max	Unit
Shift Clock Period	tcp	125		ns
"CP" Pulse Width	tw	51		ns
Clock Rise ,Fall Time	tr, tf	-	20	ns
Data Set Up Time	t_{DSU} 40			ns
Data Hold Time	t_{DHD} 30			ns
"CP"→"Load" Fall Time	t_{LSU} 51			ns
"Load"→" CP" Fall Time	t_{Lc} 51			ns
"FLM " Setup Time	tsetup	30		ns



7.2 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.



The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

8 QUALITY AND RELIABILITY

8.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

8.2 SAMPLING PLAN

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

8.3 ACCEPTABLE QUALITY LEVEL

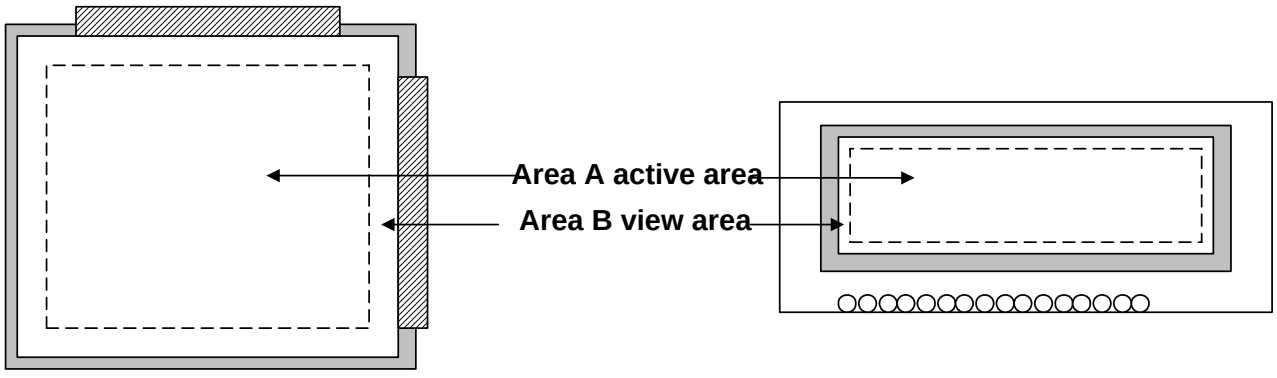
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant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

8.4 APPEARANCE

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

8.5 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≤0.2	Disregard			
	0.2<D≤0.3	3 4			
	0.3<D≤0.4	2 3			
	0.4<D 0		1		
Black lines	Width W, Length L	A	B	Minor 2.5	
	W≤0.03	disregard			
	0.03<W≤0.05	3 4			
	0.05<W≤0.07 , L≤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



8.6 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
Temperature Cycle	-20 °C ~ 25 °C ~ 70 °C 30 min. 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.

9 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.

10 OUTLINE DIMENSION