SAMSUNG ELECTRONICS

Approval

SAMSUNG TFT-LCD

MODEL : **LTA320AP09-W**

Any Modification of Specification is not allowed without SEC's Permission.

NOTE :

Customer's *Approval*	
SIGNATURE	DATE

APPROVAED BY Kyunghwan Ko	DATE 21. Apr.2009
PREPARED BY Jinsu Jung	DATE 21.Apr.2009

LCD Business

Samsung Electronics Co . , LTD.

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Revision History

Date	Rev. No	Page	Summary
May 13, 2008	000	all	First issued

General Description

Description

LTA320AP09-W is a color active matrix liquid crystal display (LCD) that uses amorphous silicon TFT(Thin Film Transistor) as switching components. This model is composed of a TFT LCD panel, a driver circuit and a back light unit. The resolution of a 32.0“ is 1366 x 768 and this model can display up to 16.7 million colors with wide viewing angle of 89° or higher in all directions. This panel is intended to support applications to provide a excellent performance for Flat Panel Display such as Home-alone Multimedia TFT-LCD TV and High Definition TV.

Features

- RoHS compliance (Pb-free)
- High contrast & aperture ratio with wide color gamut
- PVA(Patterned Vertical Align) mode
- Wide viewing angle (±178°)
- High speed response
- HD resolution (16:9)
- Low Power consumption
- Direct Type 12 CCFLs (Cold Cathode Fluorescent Lamp)
- Sync Format: DE (Data Enable) mode
- LVDS (Low Voltage Differential Signaling) interface (1pixel/clock)

General Information

Items	Specification	Unit	Note
Module Size	760.0(H_{TYP}) x 450.0(V_{TYP})	mm	±1.0mm
	69.6(D_{MAX})		
Weight	6,500 (max)	g	
Pixel Pitch	0.51075(H) x 0.51075(W)	mm	
Active Display Area	697.6845(H) x 392.256(V)	mm	
Surface Treatment	Haze 14% , Hard-coating (3H)	-	
Display Colors	8 bit - 16.7M	colors	
Number of Pixels	1366 x 768	pixel	
Pixel Arrangement	RGB Horizontal stripe	-	
Display Mode	Normally Black	-	
Luminance of White	450 (Typ.)	cd/m²	

1. Absolute Maximum Ratings

If the condition exceeds maximum ratings, it can cause malfunction or unrecoverable damage to the device.

Item		Symbol	Min.	Max.	Unit	Note
Power Supply Voltage		V_{IN}	100	*240*	V	(1)
Storage temperature		T_{STG}	-20	60	℃	(2)
Glass surface temperature (Operation)	Center	T_{OPR}	0	50	℃	(2),(5)
	T. Uniformity	△T	-	10	℃	
Shock (non - operating)		S_{nop}	-	45	G	(3)
Vibration (non - operating)		V_{nop}	-	1.5	G	(4)

Note (1) AC Power supply
(2) Temperature and relative humidity range are shown in the figure below.
a. 90 % RH Max. (Ta ≤ 39 °C)
b. Relative Humidity is 90% or less. (Ta > 39 °C)
c. No condensation
(3) 20ms, sine wave, one time for ±X, ±Y, ±Z axis
(4) 10-300 Hz, Sweep rate 10min, 30min for X,Y,Z axis

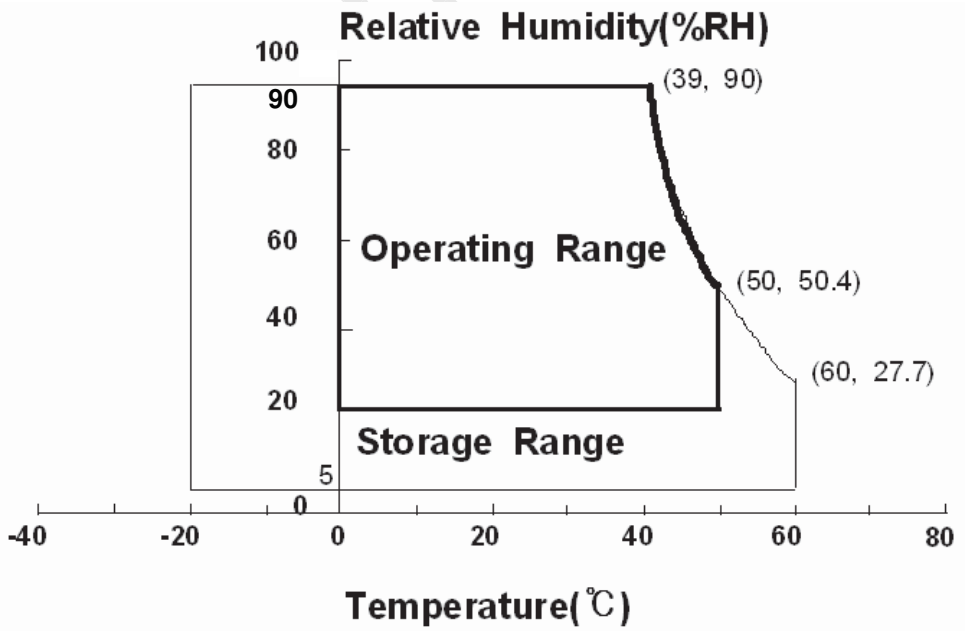
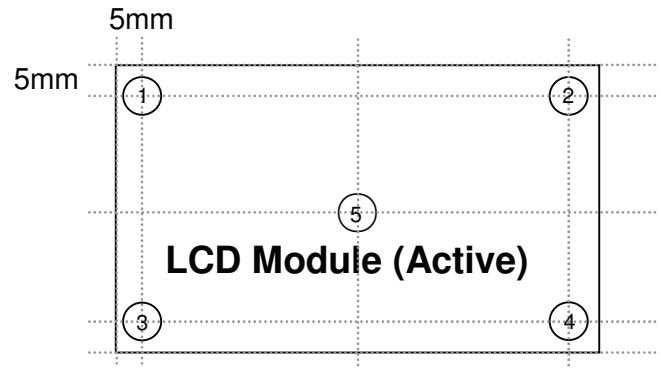


Fig. Temperature and Relative humidity range

(5) Definition of test point



△T should be less than *10* ℃ (△T = | T_{OPR} – T_{MAX}|)

T_{OPR} : Temperature of the center of the glass surface (Test point 5)
T1~ T4 : Temperature of each edge of the glass surface
T_{MAX} : The highest temperature of the glass surface

2. Optical Characteristics

The optical characteristics should be measured in a dark room or equivalent.
Measuring equipment : TOPCON RD-80S,TOPCON SR-3, ELDIM EZ-Contrast

(Ta = 25 ± 2°C, VDD=12V, fv= 60Hz, f_{DCLK}=78 , I_L = 8 mArms(Hot) / Duty 100%)

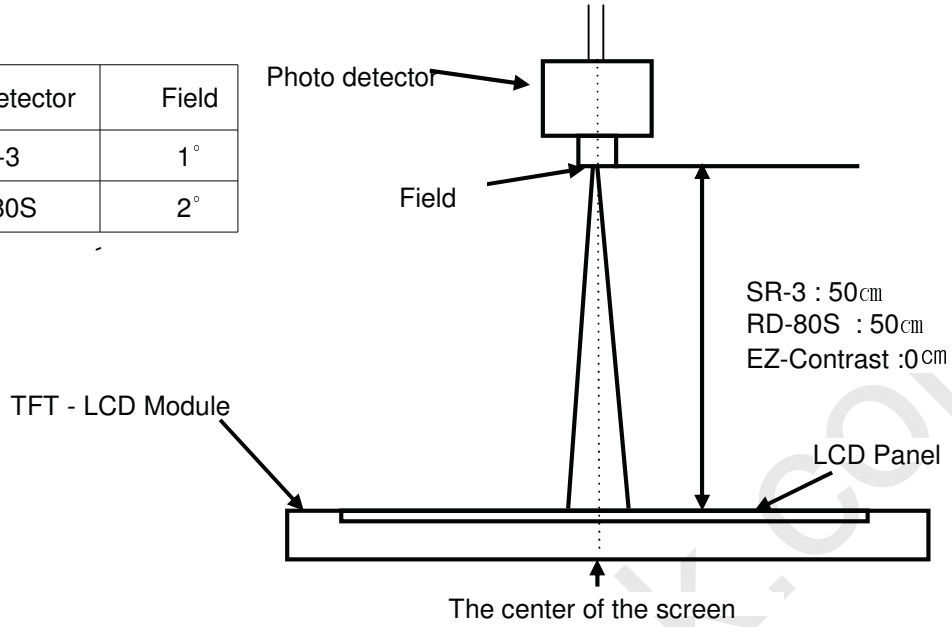
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R	Normal θL,R=0 θU,D=0 Viewing Angle	-	3,000	-		(1) SR-3
Response Time	G-to-G (Avg)	Tg		-	8	-	msec	(3) RD-80S
Luminance of White (Center of screen)		Y_L		-	450	-	cd/m²	(4) SR-3
Color Chromaticity (CIE 1931)	Red	Rx		TYP. -0.03	0.635	TYP. +0.03		(5),(6) SR-3
		Ry			0.335			
	Green	Gx			0.285			
		Gy			0.608			
	Blue	Bx			0.146			
		By			0.062			
	White	Wx			0.280			
		Wy			0.290			
Color Gamut		-		-	72	-	%	(5) SR-3
Color Temperature		-		-	10,000	-	K	(5) SR-3
Viewing Angle	Hor.	θ_L	C/R≥10	79	89	-	Degree	(6) EZ-Contrast
		θ_R		79	89	-		
	Ver.	θ_U		79	89	-		
		θ_D		79	89	-		
Brightness Uniformity (9 Points)		B_{uni}		-	-	25	%	(2) SR-3

- Test Equipment Setup

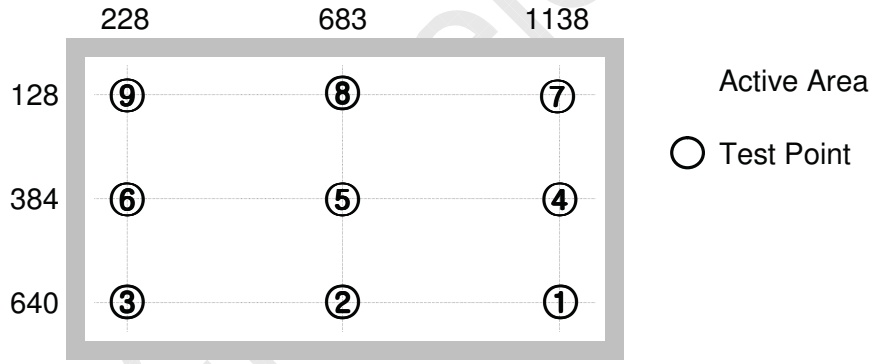
The measurement should be executed in a stable, windless and dark room between 40min and 60min after lighting the back light at 25 ± 2°C for stabilization of the back light. This should be measured in the center of screen.

Single lamp current : 8 mA (Hot)
Environment condition : Ta = 25 ± 2 °C

Photo detector	Field
SR-3	1°
RD-80S	2°



- Definition of test point



Note (1) Definition of Contrast Ratio (C/R)
: Ratio of gray max (Gmax) & gray min (Gmin) at the center point ⑤ of the panel

$$C/R = \frac{G\max}{G\min}$$

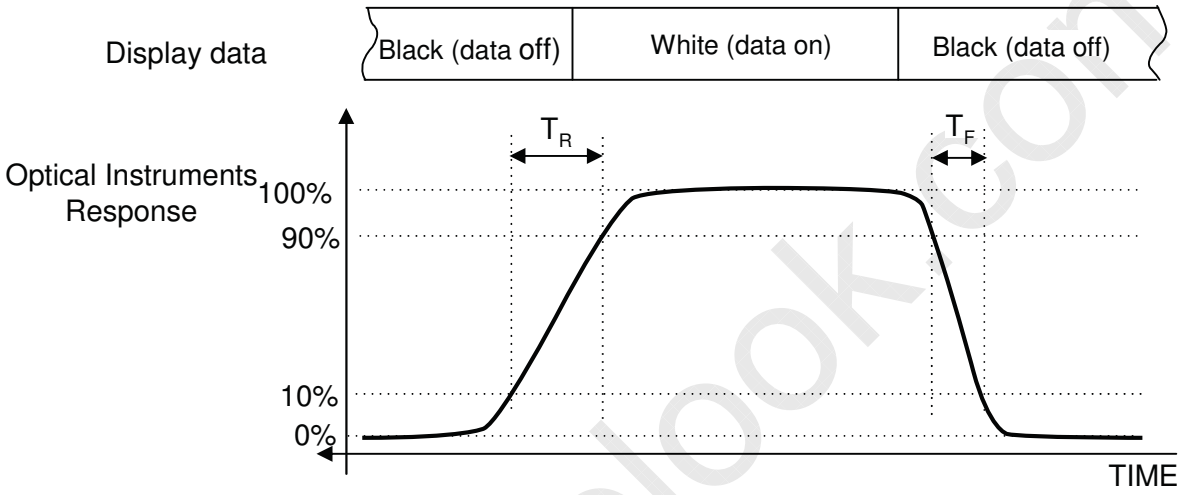
Gmax : Luminance with all pixels white
Gmin : Luminance with all pixels black

Note (2) Definition of 9 points brightness uniformity (Test pattern : Full White)

$$Buni = 100 * \frac{(B\max - B\min)}{B\max}$$

Bmax : Maximum brightness
Bmin : Minimum brightness

Note (3) Definition of Response time : Sum of Tr, Tf

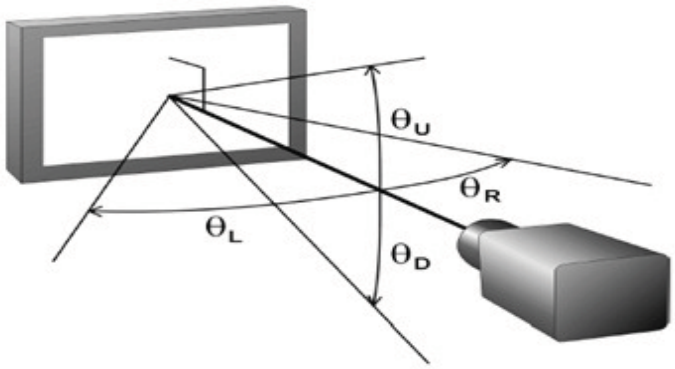


※ G-to-G : Average response time between Gray to gray (scale)

Note (4) Definition of Luminance of White : Luminance of white at center point ⑤

Note (5) Definition of Color Chromaticity (CIE 1931)
Color coordinate of Red, Green, Blue & White at center point ⑤

Note (6) Definition of Viewing Angle
: Viewing angle range (C/R ≥10)

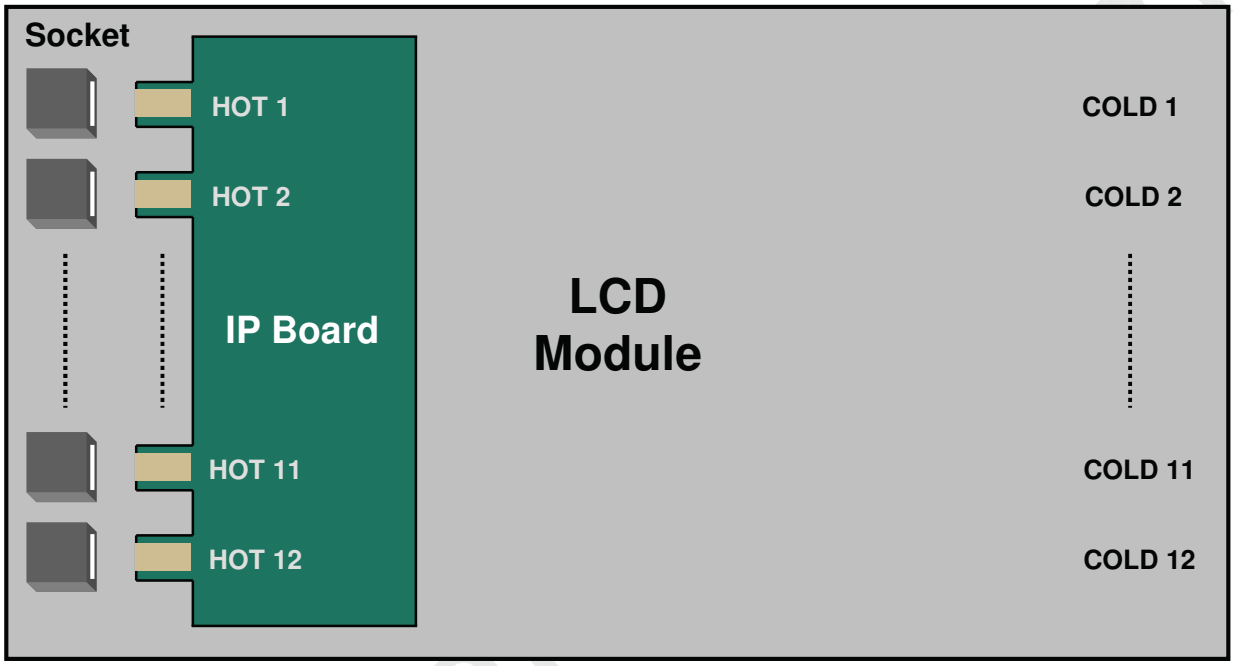


3. Electrical Characteristics

3.1 Back Light Unit

The back light unit consists of 12 direct-lighting type CCFLs (Cold Cathode Fluorescent Lamp).

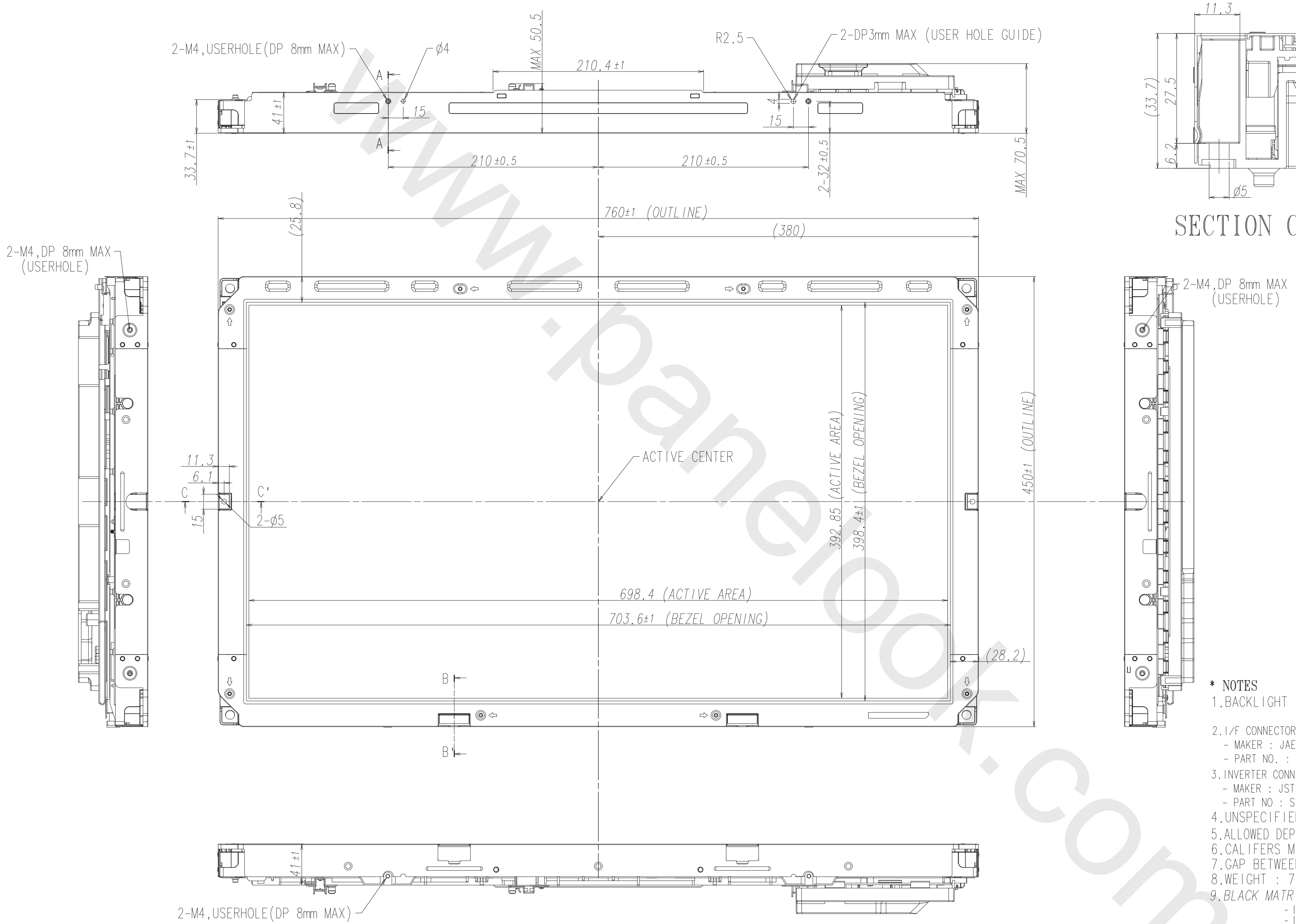
Ta=25 ± 2°C

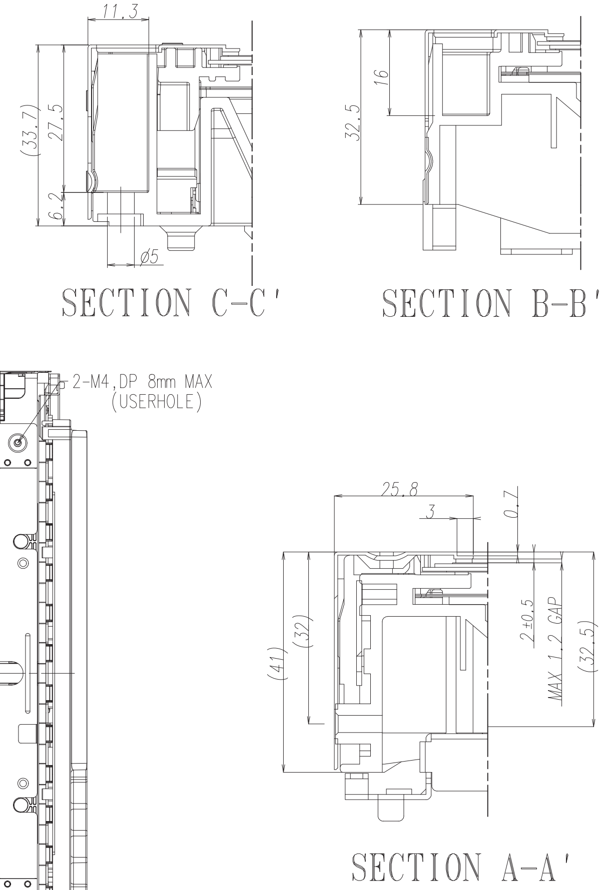


Item	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Life Time	Hr	50,000	-	-	Hour	(1)

Note (1) It is defined as the time to take until the brightness reduces to 50% of its original value.
[Operating condition : Ta = 25±2℃, I_L = 8 mArms(Hot.), For single lamp only.]

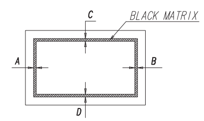
NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	SPEC NO	REMARK
1	OULINE DIMENSION	-	LTF320AP01-101	1		





* NOTES

1. BACKLIGHT : 12 COLD CATHODE FLUORESCENT LAMPS.
2. I/F CONNECTOR SPECIFICATION.
   - MAKER : JAE
   - PART NO. : FI-RE51S-HF
3. INVERTER CONNECTOR SPECIFICATION
   - MAKER : JST
   - PART NO : S14B-PHA-SM
4. UNSPECIFIED TORLERANCE TO BE ±0.5.
5. ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 8.0 MAX
6. CALIFERS MEASURING FORCE : 750 ±250 gf
7. GAP BETWEEN TOP CHASSIS AND GLASS IS 1.2 mm MAX
8. WEIGHT : 7.0 Kg (Max 7.5Kg)
9. BLACK MATRIX SPEC
   - |A - B| ≤ 2.0 mm
   - |C - D| ≤ 2.0 mm



GENERAL TOLERANCE

STEP	LEVEL 1	LEVEL 2	LEVEL 3
0 < X <= 4	±0.05	±0.1	±0.2
4 < X <= 16	±0.08	±0.15	± 0.3
16 < X <= 64	± 0.12	± 0.25	± 0.5
64 < X <= 256	± 0.25	± 0.4	± 0.8

REV	DATE	DESCRIPTION OF REVISION			REASON	CHK'D BY
UNIT	mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY	
SCALE	1/2		S.Y.YUN		J.H.CHUN	
TOLERANCE LEVEL 3			08. 05. 09			
MODEL NAME	LTF320AP01-101					
PART/SHEET NAME	OUTLINE DIM.(FRONT)	SHEET	1/2			
SPEC. NO	CODE NO.	-	VER.			

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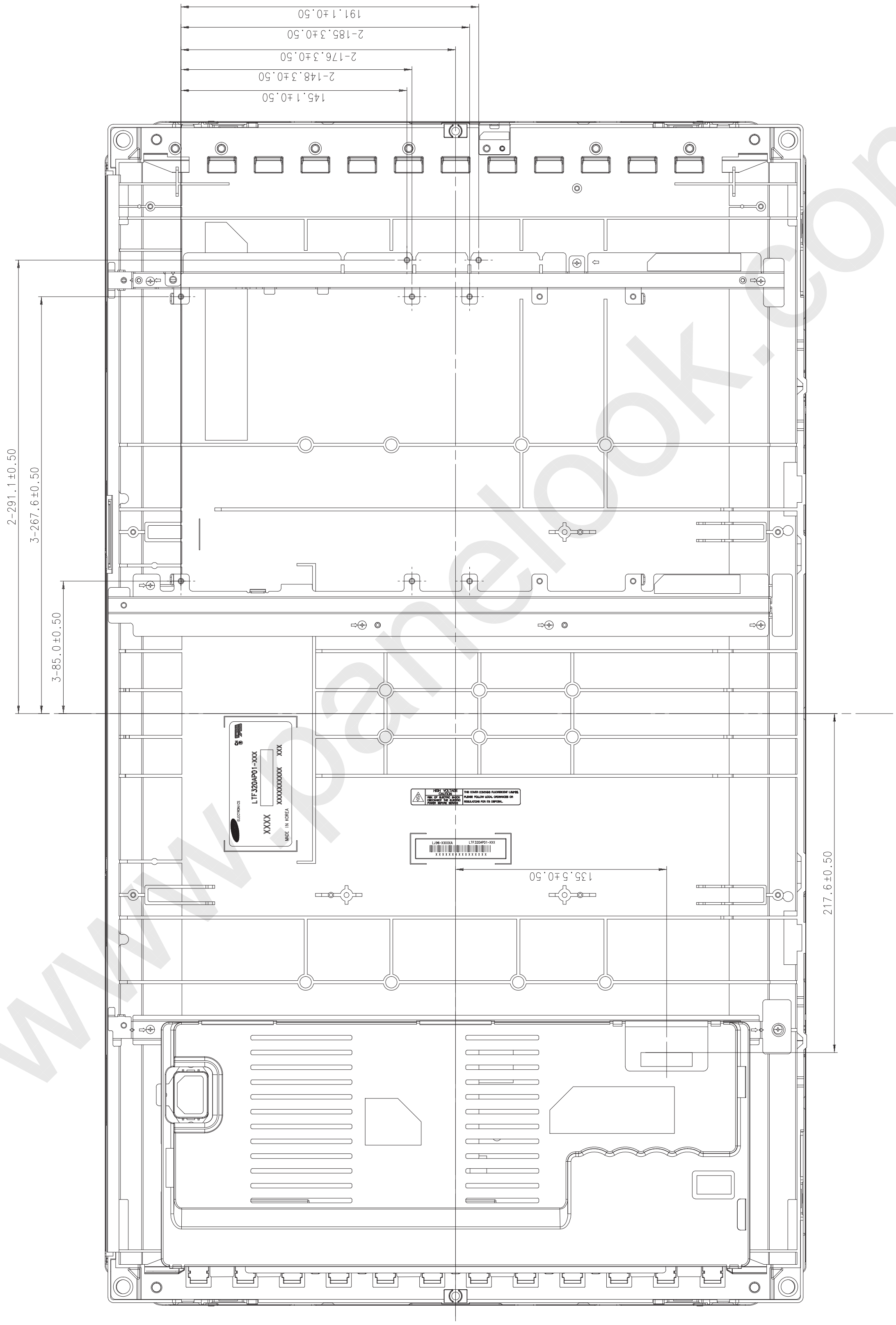
NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	SPEC NO	REMARK
	OUTLINE DIMENISON	-	LTF320AP01-101	1		



GENERAL TOLERANCE

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REV	DATE	DESCRIPTION OF REVISION	REASON	CHG'D BY

UNIT	mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY
SCALE	1/2		S.Y.YUN		J.H.CHUN
TOLERANCE		. .	08. 05. 09		

MODEL NAME: LTF320AP01-101

PART/SHEET NAME: OUTLINE DIMENISON

SHEET 2/2

SPEC. NO

CODE NO. -

VER. 000

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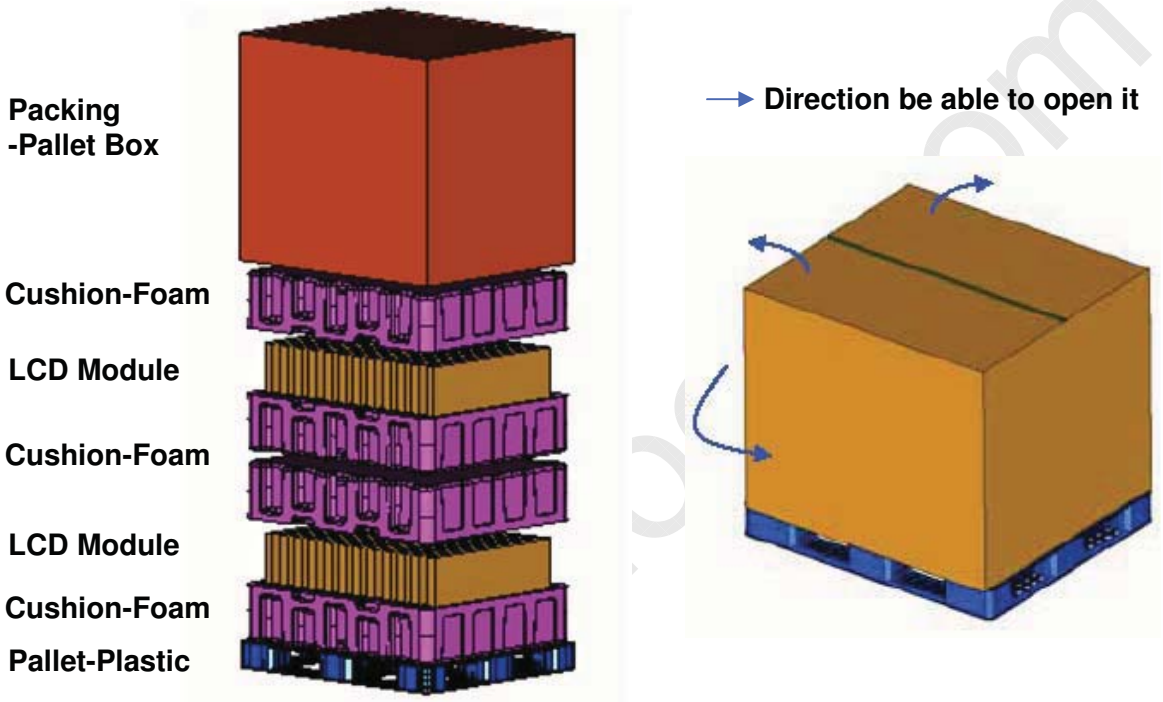
8. PACKING

8.1 CARTON (Internal Package)

(1) Packing Form

Corrugated fiberboard box and corrugated cardboard as shock absorber

(2) Packing Method



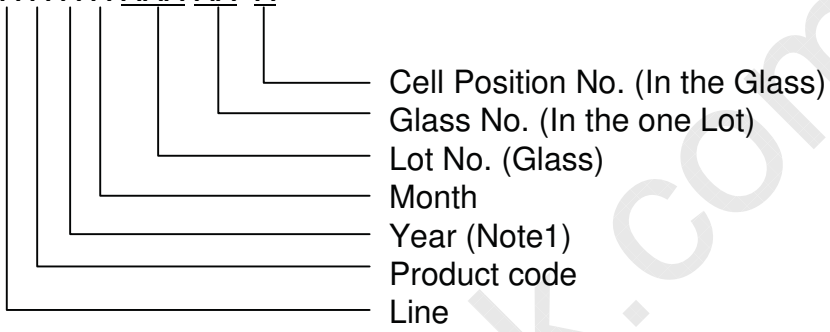
8.2 Packing Specification

Item	Specification	Remark
LCD Packing	22ea / (Packing-Pallet Box)	1. 132 Kg / LCD (22ea) 2. 14 Kg / Cushion-pallet (4ea) 3. 8.8 Kg / Packing-Pallet Box (1ea) 4. Cushion-pallet Material : EPS 5. Packing-Pallet Box Material : DW4
Pallet	1Box / Pallet	1.Pallet weight = 8kg 2. 8Kg/Pallet
Packing Direction	Vertical	-
Total Pallet Size	H x V x height	1150mm(H) x 985mm(V) x 1161mm(height)
Total Pallet Weight	162.8 kg	Pallet(8kg) + Module(6*22=132) + Cushion(up+botton=14kg) + Pallet-BOX(8.8kg)

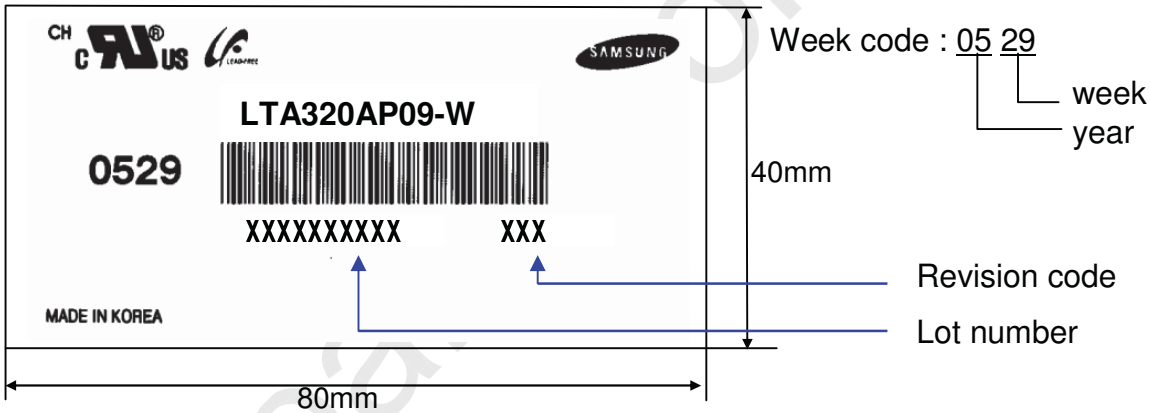
9. MARKING & OTHERS

A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

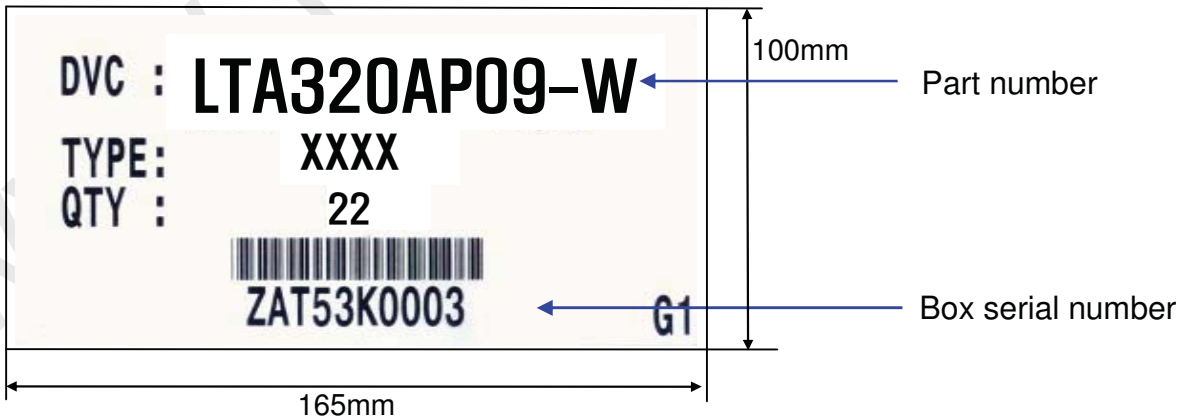
(1) Parts number : LTA320AP09-W
(2) Revision: Three letters
(3) Lot number : X X X X XXX XX X



(4) Nameplate Indication



(5) Packing box attach



(6) Others

1. After service part
   Lamps cannot be replaced because of the narrow bezel structure.

10. General Precautions

10.1 Handling

(a) When the Module is assembled, it should be attached to the system firmly using all mounting holes. Be careful not to twist and bend the Module.

(b) Because the inverter use high voltage, it should be disconnected from power before it is assembled or disassembled.

(c) Refrain from strong mechanical shock and / or any force to the Module. In addition to damage, this may cause improper operation or damage to the Module and CCFL back light.

(d) Note that polarizers are very fragile and could be damage easily. Do not press or scratch the surface harder than a HB pencil lead.

(e) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining or discoloration may occur.

(f) If the surface of the polarizer is dirty, clean it using absorbent cotton or soft cloth.

(g) Desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane. Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(h) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth . In case of contact with hands, legs or clothes, it must be washed away with soap thoroughly.

(i) Protect the module from Electrostatic discharge. Otherwise the ASIC IC or Semiconductor would be damaged.

(j) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(k) Do not disassemble the Module.

(l) Do not disassemble shield case of inverter & LVDS board.

(m) Do not connect N.C pins. (Samsung internal use only)

(n) Protection film for polarizer on the Module should be slowly peeled off just before use so that the electrostatic charge can be minimized. Must put on antistatic glove while handle a module

(o) Pins of I/F connector should not be touched directly with bare hands.

10.2 Storage

(a) Do not leave the Module in high temperature, and high humidity for a long time. It is highly recommended to store the Module with temperature from 0 to 35℃ and relative humidity of less than 70%.

(b) Do not store the TFT-LCD Module in direct sunlight.

(c) The Module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storing.

10.3 Operation

(a) Do not connect or disconnect the Module in the "Power On" condition.

(b) Power supply should always be turned on/off by the "Power on/off sequence"

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(d) The cable between the back light connector and its inverter power supply should be connected directly with a minimized length. A longer cable between the back light and the inverter may cause lower luminance of lamp(CCFT) and may require higher startup voltage(Vs).

10.4 Operation Condition Guide

(a) The LCD product should be operated under normal conditions.
Normal condition is defined as below;
- Temperature : 20±15℃
- Humidity : 55±20%
- Display pattern : continually changing pattern (Not stationary)

(b) If the product will be used in extreme conditions such as high temperature, humidity, display patterns or operation time etc.., It is strongly recommended to contact SEC for Application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at Airports, Transit Stations, Banks, Stock market, and Controlling systems.

10.5 Others

(a) Ultra-violet ray filter is necessary for outdoor operation.

(b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.

(c) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on)
Otherwise the Module may be damaged.

(d) If the Module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.
To avoid image sticking, it is recommended to use a screen saver.

(e) This Module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

(f) Please contact SEC in advance when you display the same pattern for a long time.