



- Preliminary Specification
- Approval Specification

SPECIFICATION FOR LCD MODULE

Customer : _____
Product Model: AGO-043DS1-NN-N
Sample code : _____

Designed by	Checked by	Approved by
Sally	Leo.Li	Linda

Final Approval by Customer

☐ LCM Machinery OK Checked By ☐ LCM Display OK Checked By	☐ LCM OK ☐ NG , Problem survey: Approved By
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The specification of “TBD” should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.



Revision History

[illegible]



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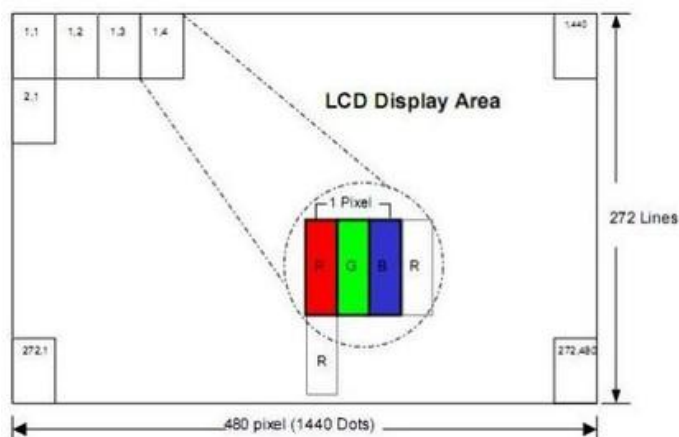
1. Numbering System

DS □□□ □□□ □□ □ -□□□

1 2 3 4 5 6

No	Definition	Specifications
(1)	TFT LCM Productor No.	AGT Displays
(2)	Display monitor opposite angle line size	Unit :Inch
(3)	ProductorTypes	AUO; BOE; CPT; HSD; Innolux ; LG;Panasonic ; Tianma;Samsung; IVO; CMI ; Sharp
(4)	Productor Development SeriesNo.	By two figures characters expression from 01 to 99
(5)	With Touch Panel Or Not	T----WithT/P ; N --- WithoutT/P
(6)	Productor Development edition No.	ByTheEnglishletters:001~ZZZ

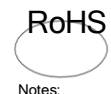
2. Block Diagram



3. Technology Specifications

Item	Specification	Unit
Outline Dimension	105.6 (H)x67.2 (V) x3.0 (D)	mm
Display area	95.04 (H) x 53.856 (V)	mm
Number of Pixel	480 RGB x 272	Dot
Sub pixel size	0.066(H) X 0.198(V)	
Pixel Configuration	RGB stripe	
Display mode	Normally white	
Backlight	White LED	
Viewing Direction	6 O'clock	

4 Outline Dimension



Notes:

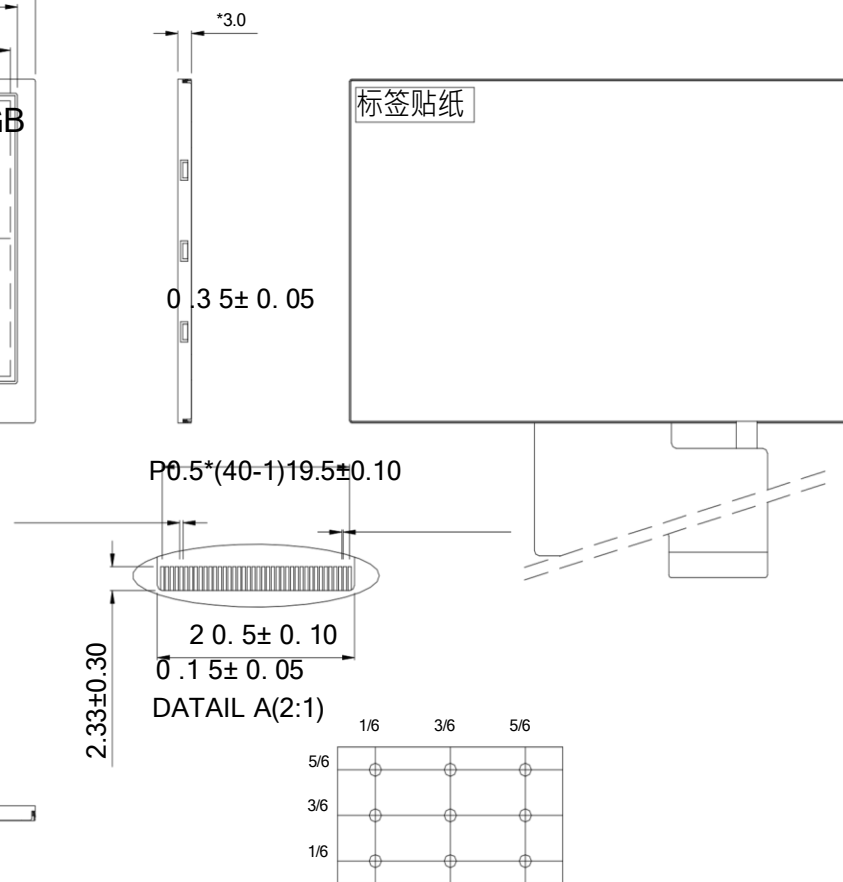
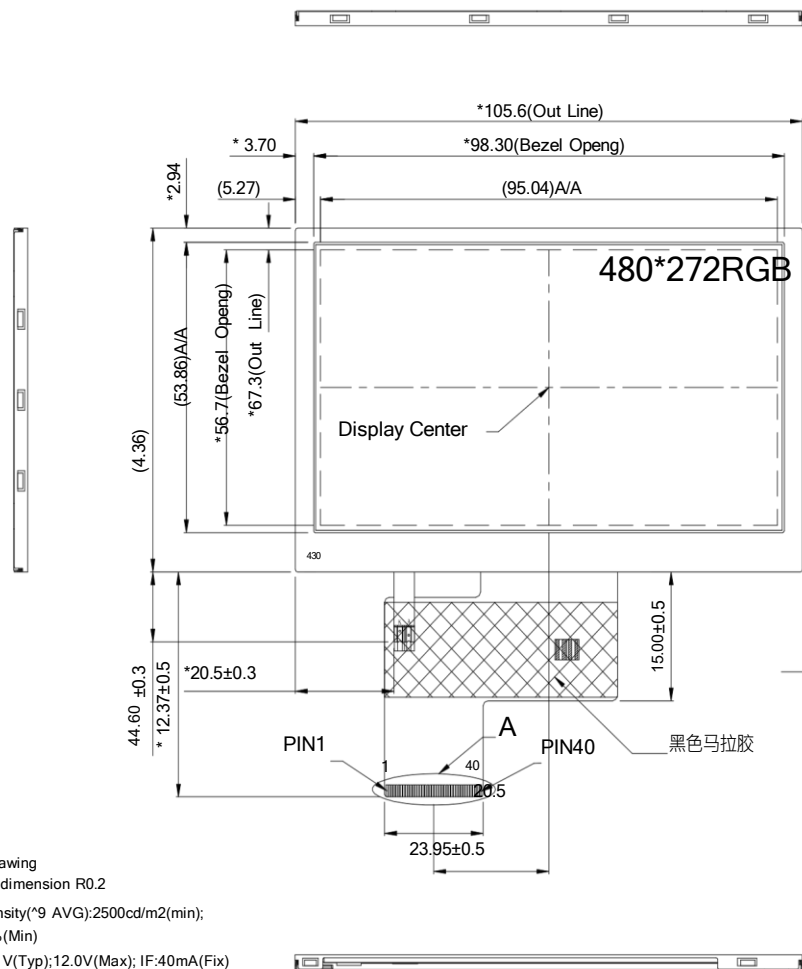
1. Unit: mm
2. Do not scale drawing
3. All radii without dimension R0.2
4. Luminous intensity(*9 AVG):2500cd/m2(min);
5. Uniformity :75%(Min)
- VF:21V(Min);23.1V(Typ);12.0V(Max); IF:40mA(Fix)
6. The color coordinates:

	MIN	TYP	MAX
x	0.30	0.32	0.34
y	0.32	0.34	0.36

where indicated.

△ 7. n Modification rev.number.

8. draft angle 1.0°
9. Genral Tolerance:±0.2
10. Mark mold cavity indentification in recess approximately
11. *** For important dimension; () for reference dimention.
12. RoHs must be complied.(Use Lead-free process)





5.Interface Pin Assignment

FPC connector is used for electronics interface. The recommended model is FH19SC-40S-0.5SH (05) manufactured by HIROSE.

Pin No.	Symbol	I/O	Function	Remark
1	V _{LED-}	P	Power for LED backlight cathode	
2	V _{LED+}	P	Power for LED backlight anode	
3	GND	P	Power ground	
4	V _{DD}	P	Power voltage	
5	R0	I	Red data (LSB)	
6	R1	I	Red data	
7	R2	I	Red data	
8	R3	I	Red data	
9	R4	I	Red data	
10	R5	I	Red data	
11	R6	I	Red data	
12	R7	I	Red data (MSB)	
13	G0	I	Green data (LSB)	
14	G1	I	Green data	
15	G2	I	Green data	
16	G3	I	Green data	
17	G4	I	Green data	
18	G5	I	Green data	
19	G6	I	Green data	
20	G7	I	Green data (MSB)	



21	B0	I	Blue data (LSB)	
22	B1	I	Blue data	
23	B2	I	Blue data	
24	B3	I	Blue data	
25	B4	I	Blue data	
26	B5	I	Blue data	
27	B6	I	Blue data	
28	B7	I	Blue data (MSB)	
29	GND	P	Power ground	
30	CLK	I	Pixel clock	
31	DISP	I	Display on/off	
32	HS	I	HSYNC	
33	VS	I	VSYNC	
34	DE	I	Data Enable	
35	NC	-	No connection	
36	GND	P	Power ground	
37	XR	I	touch panel X-lighr	
38	YD	I	touch panel Y-bonom	
39	XL	I	touch oanel X-left	
40	YU	I	touch pru.1el Y-upl	

I: input, O: output, P: Power

6 .Absolute maximum ratings

6.1 Electrical Absolute Rating

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage	VDD	3.0	3.3	3.6	V	GND=0
Logic Signal Input Level	V	0.7VDD	-	VDD	V	

6.2 ELECTRICAL SPECIFICATION

Item	Symbol	Specification			Unit
		Min.	Typ.	Max.	
TFTgateonvoltage	VGH	-	-	-	V
TFTgateonvoltage	VGL	-	-	-	V
TFT common electrode voltage	Vcom(DC)	-	0(GND)	-	V

Note: (1) Vcom must be adjusted to optimize display quality: cross-talk, contrast ratio and etc.

(2) VGH is TFT gate operating voltage

(3) VGL is TFT gate operating voltage

(4) Environmental condition: 25±5

(5) Reference waveform for panel light on is as below: (release after sample output)

(6) Reference waveform timing for panel light on is as below:

6.2 Back-light Unit

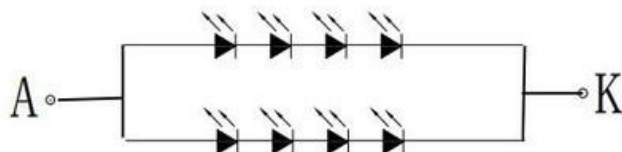
PARAMETER	Sym	Min.	Typ.	Max.	Unit	TestCondition	Note
LEDCurrent	IF	—	40	—	mA	—	—
LEDVoltage(Total)	VF	11.2	12	12.8	V	—	—
LifeTime		—	25000	—	Hr.	I≤40mA	—
Color	White						

Note (1) Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.

(2) Ta=25±2°C

(3) Test condition: LED Current 40mA





7. Signal Timing Characteristics

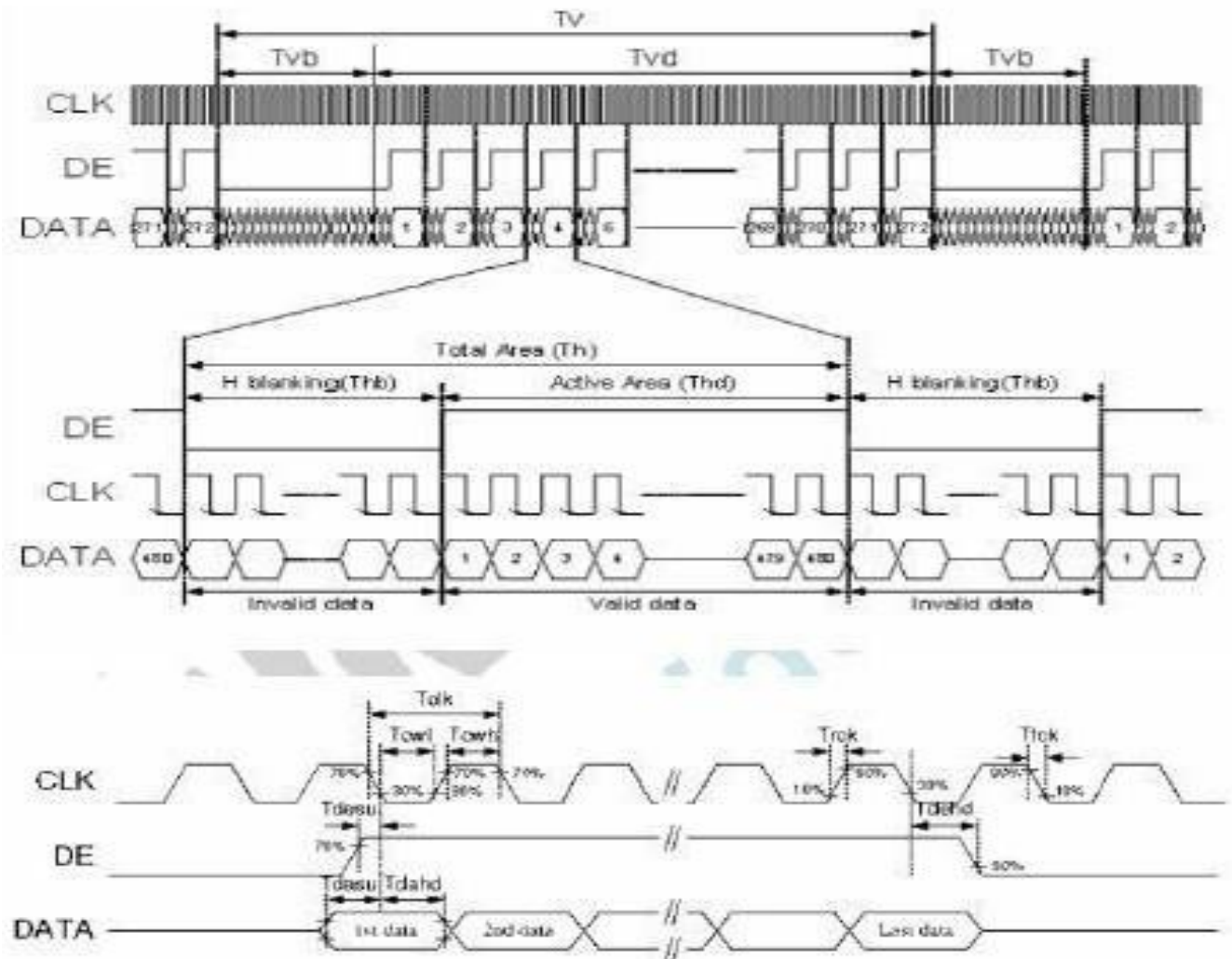
7.1 Timing Conditions

Parallel DE mode RGB input timing table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
CLK frequency	fclk	7	9	12	MHz
DEV period time	Tv	277	288	400	H
DEV display area	Tvd	272			H
DEV blanking	Tvb	5	16	128	H
DEH period time	Th	520	525	800	CLK
DEH display area	Thd	480			CLK
DEH blanking	Thb	40	45	320	CLK
CLK cycle time	Tclk	83	110	143	ns
Clock width of high level	Tcwh	40	50	60	%
Clock width of low level	Tcwl	40	50	60	%
Clock rising time	trck		-	9	ns
Clock falling time	tfck		-	9	ns
Data Setup Time	tdosu	10	-	-	ns
Data Hold Time	tdahd	10	-	-	ns
DE Setup Time	tdosu	10	-	-	ns
DE Hold Time	tdohd	10	-	-	ns



7.2 Timing Diagram



8. Optical specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR ≥ 10)	θ_L	$\Phi = 180^\circ$ (9 o'clock)	-	70	-	degree	Note 1
	θ_R	$\Phi = 0^\circ$ (3 o'clock)	-	70	-		
	θ_T	$\Phi = 90^\circ$ (12 o'clock)	-	50	-		
	θ_B	$\Phi = 270^\circ$ (6 o'clock)	-	60	-		
Response time Rise+Fall	TRT	Normal $\theta = \Phi = 0^\circ$	-	10	30	msec	Note 3
Contrast ratio	CR		480	500	-	-	Note 4
Color chromaticity	WX		0.28	0.30	0.32		Note 2
	WY		0.30	0.32	0.34		Note 5 Note 6
Luminance	L		-	500	-	-	Note 6
Threshold voltage	Vsat		-	2.7	-		Note 7
	Vth		-	1.7	-		Note 7
Optima View Direction	6 O'clock						

Note 1: Definition of viewing angle range

Normal line
 $\theta = \Phi = 0^\circ$

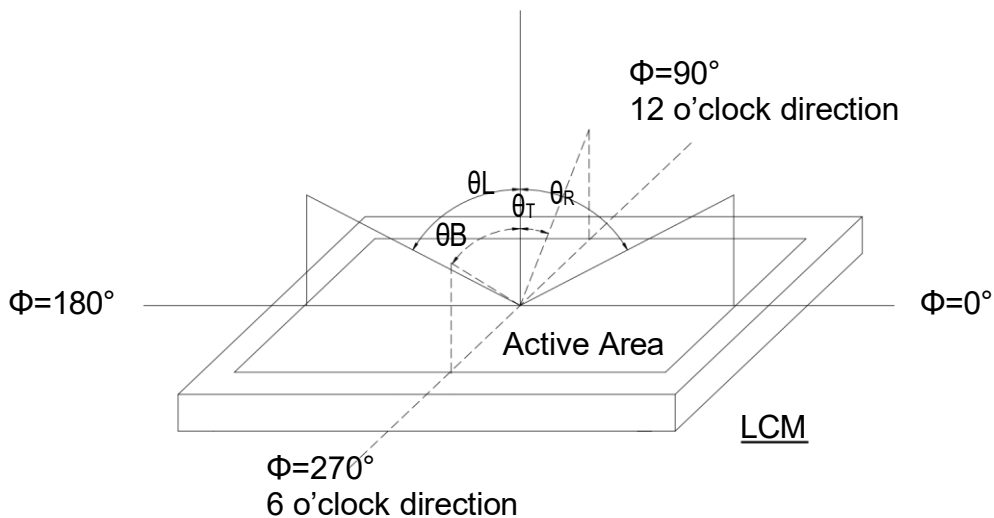


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm ,Response time is measured by Photo detector TOPCON BM-5A, other items are measured by BM-7A/Field of view: 1° /Height: 500mm.)

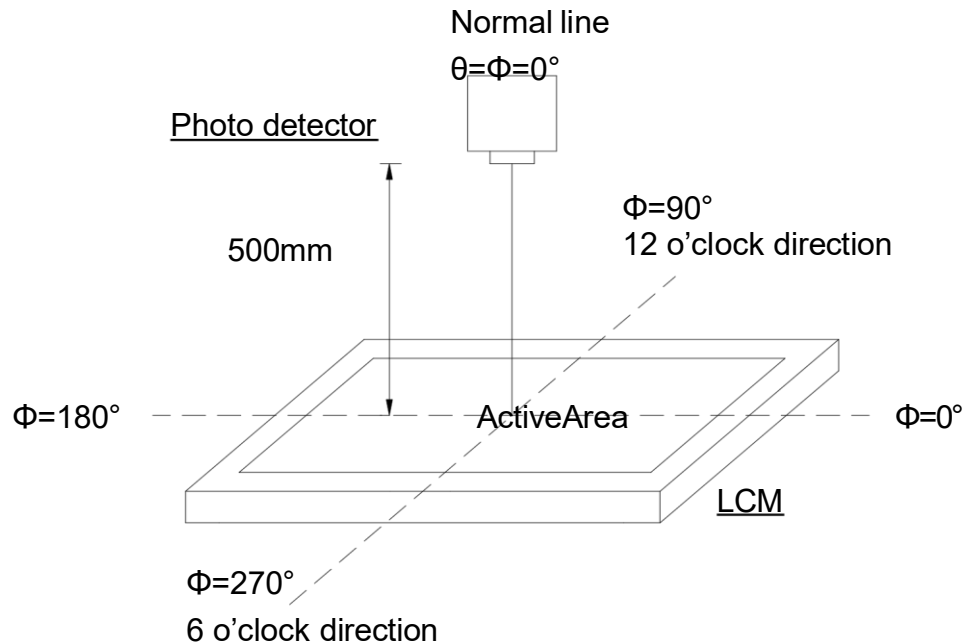


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

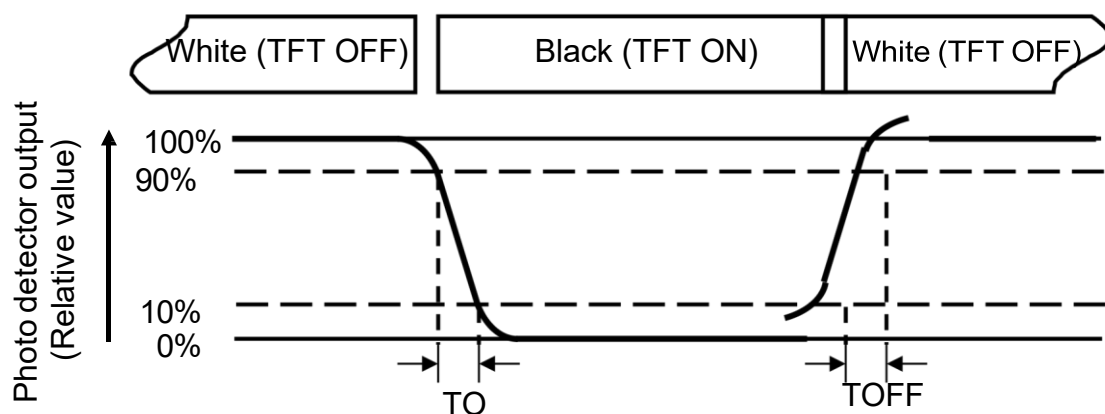


Fig. 4- 3 Definition of response time
Definition of response time

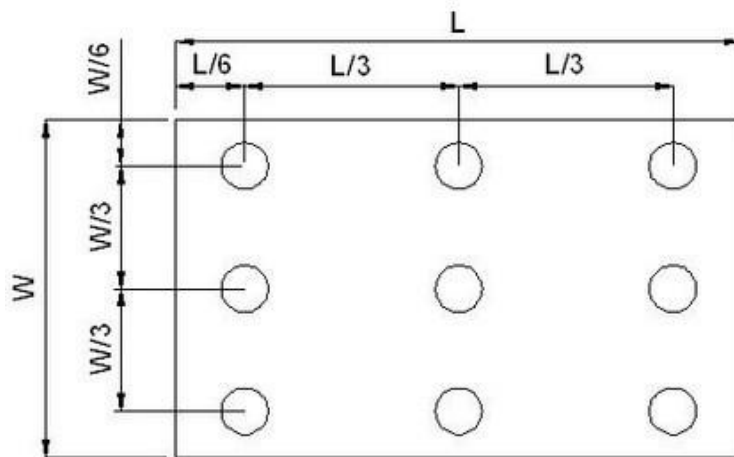
Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity ("White" state)
Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

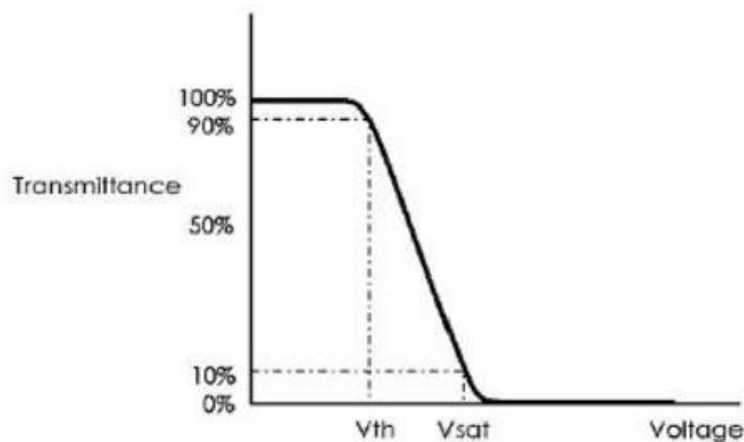
$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$



Definition of measuring points

Bmax: The measured maximum luminance of all measurement position.
Bmin: The measured minimum luminance of all measurement position.

Note 7 : Definition of Vsat and Vth (at 20°C)





9. Reliability Test Conditions And Methods

NO	Item	Conditions	Remar
1	HighTemperatureStorage	Ta=+80°C,96hrs	
2	LowTemperatureStorage	Ta=-30°C,96hrs	
3	HighTemperatureOperation	Ta=+70°C,96hrs	
4	LowTemperatureOperation	Ta=-20°C,96hrs	
5	HighTemperatureandHigh Humidity (operation)	Ta=+60°C,90%RH,96hrs	
6	ThermalCyclingTest(non oper atio n)	-20°C(0.5hr)→+70°C(0.5hr),200cycles	
7	Vibrat io n	1. Random:1.04G,10-500HZ,X,Y,Zdirection 30min/each direction 2. Sweep sine:1.5G, 5~500Hz, X/Y/Z,30min/each direction	
8	Sho ck	100G,6ms, ±X, ±Y, ±Z 3 time for each direction	JIS C7021, A-10 (Condition A)
9	Vibration (with carton)	Random:1.04Grms, 10~500Hz, X/Y/Z 45min/each direction Fixed:5Hz,1.5Grms,X/Y/Z 45min/each dir ecti on	
10	Drop (with carton)	Height:60cm 1corner,3edges,6surfaces	JIS Z0202
11	Electrostatic Discharge	±200V,200PF,0Ω1time/eachterminal	

Note: All tests above are practiced at module type. the cosmetic specification is
There is no display function NG issue occurred,
All judged before the reliability stress.

10. Handling Precautions

10.1 Mounting method

The LCD panel of AGT module consists of two thin glass plates with polarizers which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

10.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent
[recommended below] and wipe lightly
Isopropyl alcohol
Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

Water
Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:
Soldering flux
Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happens by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

10.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend that you:
Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

10.4 packing

Module employs LCD elements and must be treated as such.

Avoid intense shock and falls from a height.

To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity

10.5 Caution for operation

It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life.

An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.

Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.



- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.

A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

10.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.

Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.

Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

10.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later. When any liquid leaked out of a damaged glass cell comes in contact with your
- hands, please wash it off well with soap and water

11. Precaution for use

11.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

11.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

When a question is arisen in this specification When a new problem is arisen which is not specified in this specifications When an inspection specifications change or operating condition change in customer is reported to AGT , and some problem is arisen in this specification due to the change When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

12 Packing form

