Specification for Approval

Customer:_____

Model Name:_____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	Peng Jun		

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2015-12-02	NEW ISSUE	

Table of Contents

1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

2. General Information

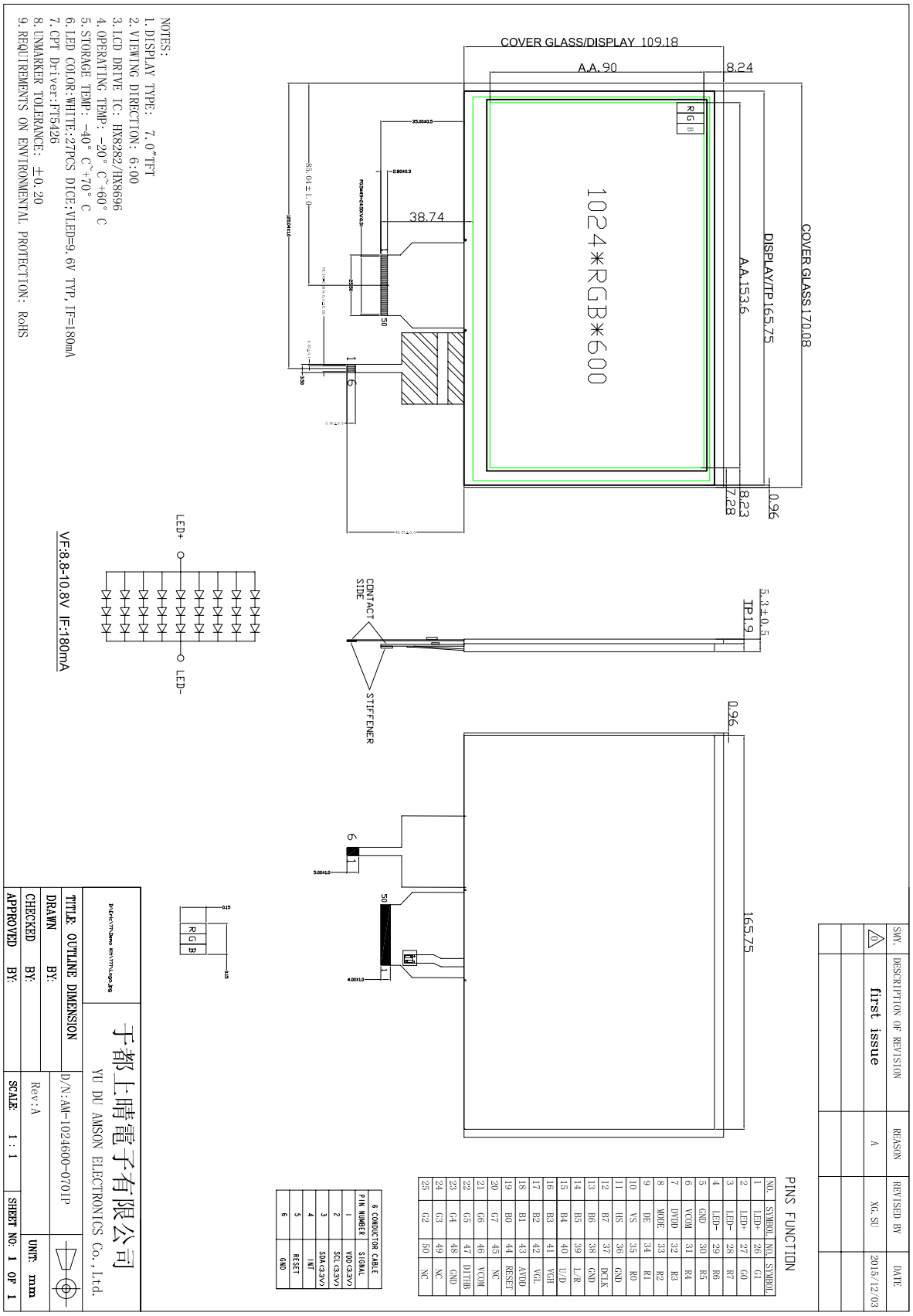
LCM

ITEM	STANDARD VALUES	UNITS
LCD type	7.0"TFT	--
Dot arrangement	1024×(RGB)×600	dots
Color filter array	RGB stripe	--
Display mode	TN / Transmission / Normally White	--
Viewing Direction	6 O'clock	--
Driver IC	HX8282 / HX8696	--
Module size	165.75(W)×105.39(H)×3.4(T)	mm
Active area	153.6(W)×90.0(H)	mm
Dot pitch	0.15(W)×0.15(H)	mm
Interface	RGB-24bit interface	--
Operating temperature	-20 ~ +60	°C
Storage temperature	-40 ~ +70	°C
Back Light	27 White LED	--
Weight	TBD	g

CPT

ITEM	STANDARD VALUES	UNITS
CTP type	Cover Glass+Loca+ITO Glass+FPC	--
CTP Driver IC	FT5426DQ8(COF)	--
Surface hardness	7H	--
Transmittance	≥83%	--
Operation Voltage	3.3	V
CTP size	170.08(W)×109.18 (H)×1.97(T)	mm
CTP Viewing area	155.2W)×91.6(H)	mm
CTP Interface	I²C	-
Pointing Stick	10	-

3. External Dimensions



4. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	V_{LED+}	Power for LED backliht(Anode)
2	V_{LED+}	Power for LED backliht(Anode)
3	V_{LED-}	Power for LED backliht(Cathode)
4	V_{LED-}	Power for LED backliht(Cathode)
5	GND	Power ground
6	V_{COM}	Common voltage
7	DV_{DD}	Power for Digital Circuit
8	MODE	DE/SYNC mode select
9	DE	Data Input Enable
10	VS	Vertical Sync Input
11	HS	Horizontal Sync Input
12	B7	Blue data(MSB)
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data
20	G7	Green data(MSB)
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data
27	G0	Green data(LSB)
28	R7	Red data(MSB)
29	R6	Red data

30	R5	Red data
31	R4	Red data
32	R3	Red data
33	R2	Red data
34	R1	Red data
35	R0	Red data(LSB)
36	GND	Power ground
37	DCLK	Sample clock
38	GND	Power ground
39	L/R	Left/right selection
40	U/D	Up/down selection
41	V_{GH}	Gate ON Voltage
42	V_{GL}	Gate OFF Voltage
43	AV_{DD}	Power for Analog Circuit
44	RESET	Global reset pin.
45	NC	No connection
46	V_{COM}	Common Voltage
47	DITHB	Dithering function
48	GND	Power ground
49	NC	No connection
50	NC	No connection

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Digital Power Voltage	DVDD	-0.3	5.0	V
Operating Temperature	TOP	-20	60	°C
Storage Temperature	TST	-40	70	°C
Storage Humidity	HD	20	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Analog Supply Voltage	AVDD	-	8.8	-	V	-
TFT Gate ON Voltage	VGH	-	18.4	-	V	-
TFT Gate OFF Voltage	VGL	-	-6	-	V	-
TFT Common Electrode Voltage	VCOM	-	2.5	-	V	-

Notes:

1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality,as Crosstalk and Contrast Ratio etc.
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC.

7. Timing Characteristics

7.1 Parallel RGB Input Timing Table

DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd		600		T_H
VSD Period	tv	610	635	800	T_H
VSD Blanking	tvbp+ tvfp	10	35	200	T_H

HV mode

Horizontal timing

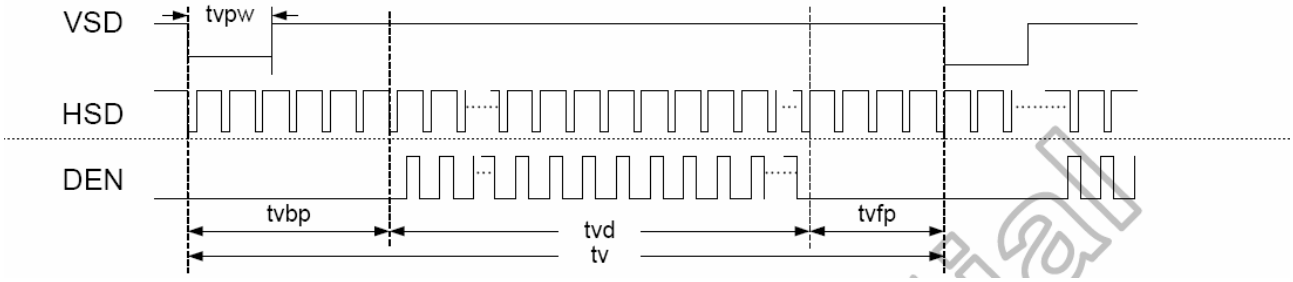
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp		160		DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Vertical Timing

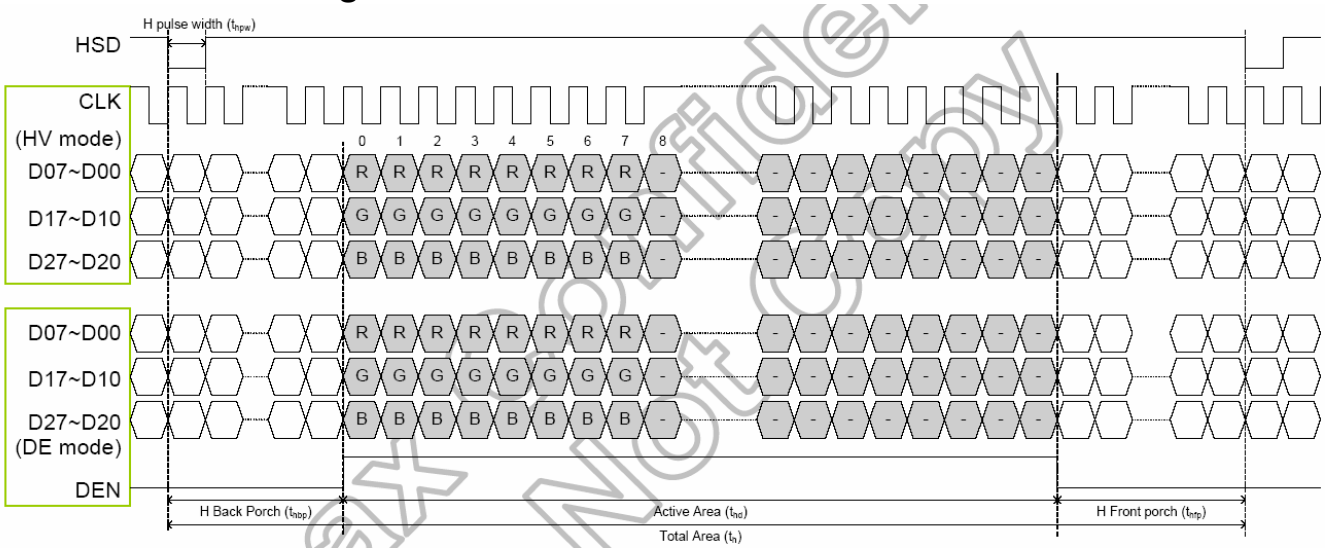
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		600		T_H
VSD Period	tv	624	635	750	T_H
VSD Pulse Width	tvpw	1	-	20	T_H
VSD Back Porch	tvbp		23		T_H
VSD Front Porch	tvfp	1	12	127	T_H

7.2 TTL Mode data input format

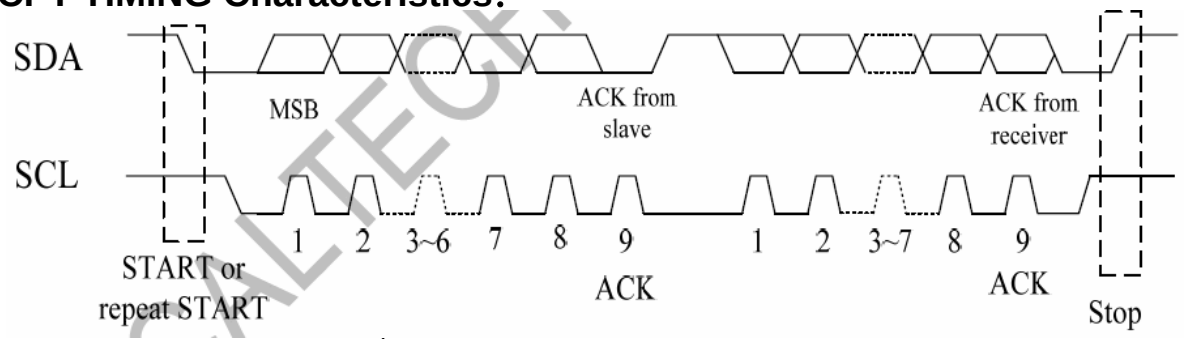
Vertical Timing



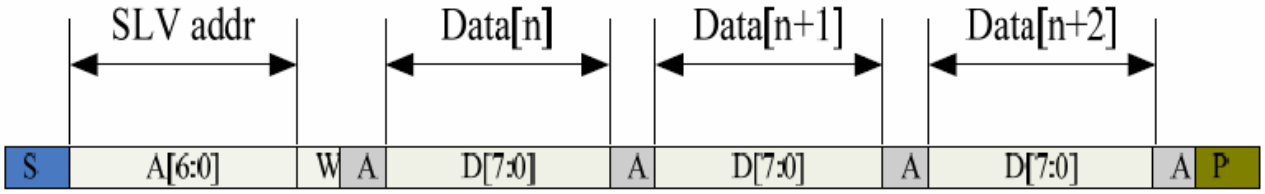
Horizontal Timing



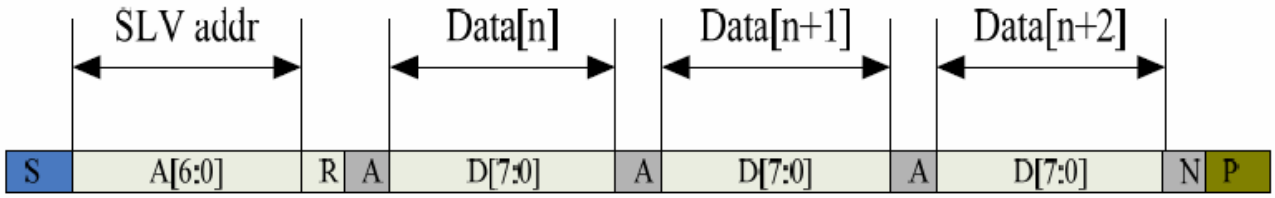
7.3 CPT TIMING Characteristics：



I²C Serial Data Transfer Format



I²C master write, slave read



I²C master read, slave write

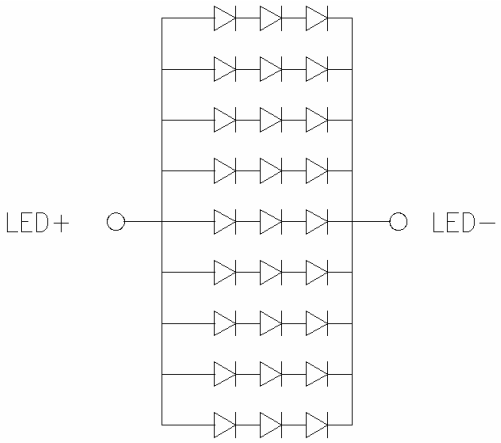
Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address
R/ W	READ/WRITE bit, '1' for read, '0'for write
A(N)	ACK(NACK) bit
P	STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

Mnemonics Description

Parameter	Min	Max	Unit
SCL frequency	0	400	KHz
Bus free time between a STOP and START condition	1.3		us
Hold time (repeated) START condition	0.6		us
Data setup time	100		ns
Setup time for a repeated START condition	0.6		us
Setup Time for STOP condition	0.6		us

Timing Characteristics

8. Backlight Characteristic

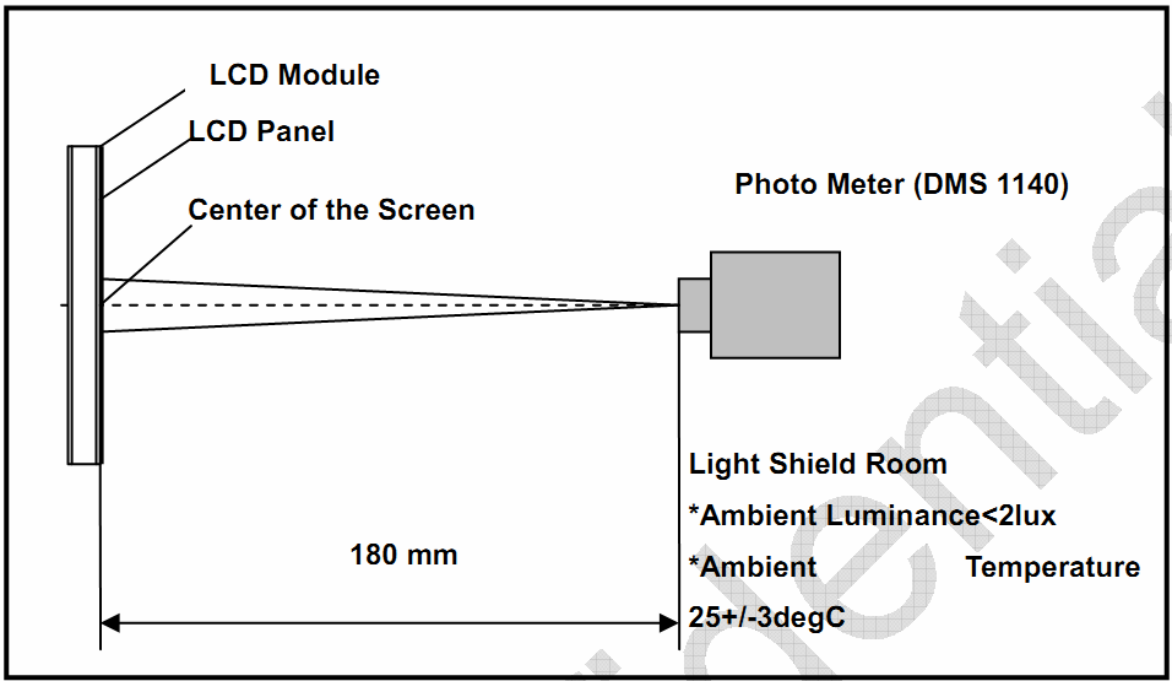


Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	9.0	(9.6)	12.9	V	If=180mA
Supply Current	If	-	(180)	-	mA	-
Luminous Intensity for LCM+CPT	-	320	400	-	Cd/m^2	If=180mA
Uniformity for LCM+CPT	-	70	-	-	%	If=180mA
Life Time	-			-	Hr	If=180mA
Backlight Color	White					

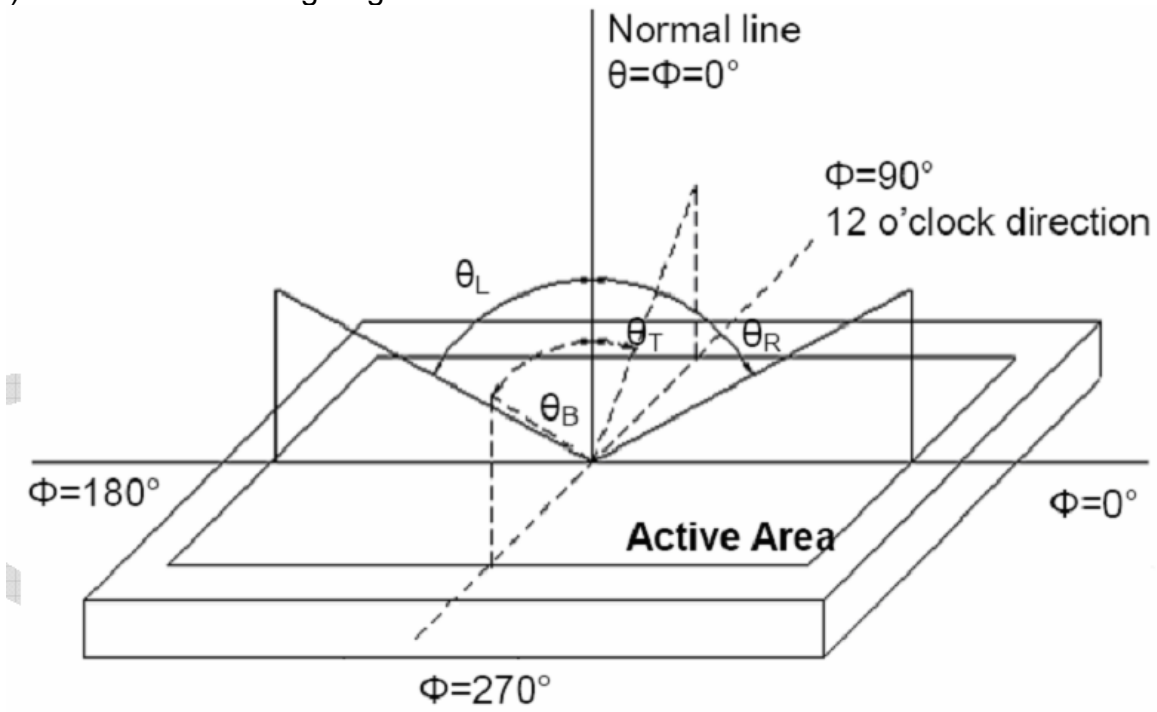
9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	-	70	-	degree	(1),(2),(6)
		θ_R	-	70	-		
	Vertical	θ_T	-	65	-		
		θ_B	-	65	-		
Contrast Ratio	Center		500	700	-	-	(1),(3),(6)
Response Time	Rising+Falling		-	20		ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	Red x		0.578	0.608	0.638	-	(1), (6)
	Red y		0.296	0.326	0.356	-	
	Green x		0.267	0.297	0.327	-	
	Green y		0.538	0.568	0.598	-	
	Blue x		0.114	0.144	0.174	-	
	Blue y		0.145	0.175	0.205	-	
	White x		0.273	0.303	0.333	-	
	White y		0.309	0.339	0.369	-	
Transmittance			-	4.9	-	%	(1),(6)

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle



Note (3) Definition Of Contrast Ratio (CR)

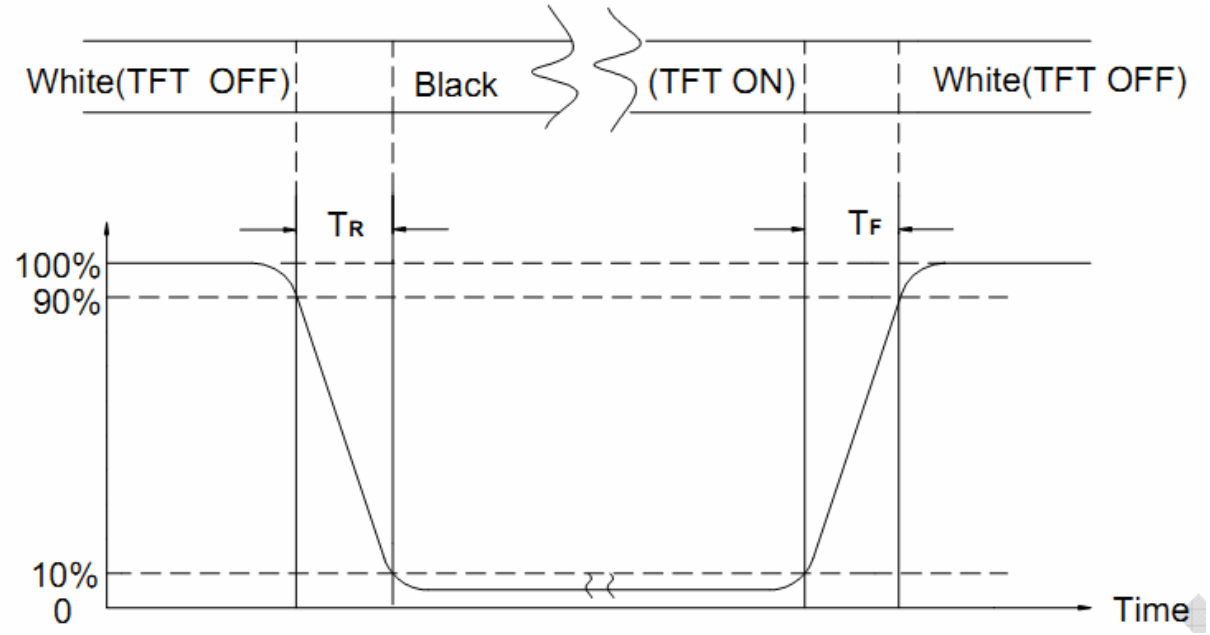
The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) =A / B

A: Luminance when displaying a white raster

B: Luminance when displaying a black raster

Note (4) Definition of response time



Note (5) Definition of Transmittance (Module is without signal input)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°C±2°C×240Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
②	Low Temperature Storage	-30°C±2°C×240Hours	
③	High Temperature Operating	70°C±2°C×240Hours	
④	Low Temperature Operating	-20°C±2°C×240Hours	
⑤	Temperature Cycle(Storage)	-20°C ⟺ 25°C ⟺ 70°C (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C±5°C×90%RH×240Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

REMARK:
1, The Test samples should be applied to only one test item.
2, Sample side for each test item is 5~10pcs.
3,For Damp Proof Test, Pure water(Resistance > 10MΩ)should be used.
4,In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11. Handling Precautions

11.1 Mounting method

The LCD panel of AMSON TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in 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.

11.2 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 sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

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

11.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to POWER or GROUND, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

11.4 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 direct to sunshine or high temperature/humidity

11.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause 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 then the operating temperature range and on the other hand at higher temperature LCD's how 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.
- 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.

11.6 storing

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

11.7 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

12. Precaution for Use

12.1

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.

12.2

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 AMSON TFT , 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.

13. Packing Method

TBD