

Specification for Approval

Customer: _____

Model Name: _____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
<i>Peter</i>	Peng Jun		

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2012-03-15	NEW ISSUE	
B	2015-06-19	ADD 11.Inspection Criteria	
C	2016-03-02	Modify LCD Outline	
D	2017-06-06	FOG+B/L change	
E	2017-12-11	ADD Warranty period	
F	2018-08-10	Adjust the spacing between C10 and C11	
G	2021-09-29	Add Screen Printing : ASL-F; UL NUMBER: E301444	
H	2023-03-07	Change Tape Dimension: 20*10(blue color) → 20*8(green color)	

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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

ITEM	STANDARD VALUES	UNITS
LCD type	1.44”TFT	--
Dot arrangement	128(RGB)×128	dots
Color filter array	RGB vertical stripe	--
Display mode	TN / Transmissive / Normally White	--
Viewing Direction	12 o'clock(Gray scale inversion)	--
Driver IC	ILI9163	--
Module size	33.0 (W) * 36.0(H) * 2.7(T)	mm
Active area	25.5 (W) * 26.5 (H)	mm
Dot pitch	0.199 (W) * 0.207 (H)	mm
Interface	I80 8bits	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	1 White LED	--
Weight	TBD	g

3. External Dimensions

NOTES:

1. Display type: 262K/65K TFT
2. Driver IC: ILI9163
3. Operation Voltage: 2.8V-3.3V
4. Operating temperature: -20°~+70°
Storage temperature: -30°~+80°
5. TOLERANCE UNLESS: ±0.2
6. FPC Manufacturer: ALLSTAR TECH (ZHONGSHAN) CO LTD.
FPC: ASL-F; UL NUMBER: E301444

CONSTANT CURRENT
VF=3.0V-3.3V
IF=20MA

ROHS

SNr	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
△	first issue	A	XG.SI	2012/03/15
△	modify LCD outline	B	XG.SI	2016/03/01
△	modify FPC	C	XG.SI	2017/04/10
△	Add FPC UL	D	XG.SI	2021/09/10
△	Change Tape Dimension: 20*10(blue color)->20*9(green color)	E	XG.SI	2023/03/07

PIN	SYMBOL
1	VSS
2	RESET
3	VSS
4	D0
5	D1
6	D2
7	D3
8	D4
9	D6
10	D6
11	D7
12	VSS
13	/RD
14	/WR
15	/CS
16	/DC
17	TE
18	VCC
19	VDDIO
20	LED+
21	LED-
22	VSS

Amson 于都上晴电子有限公司
YU DU AMSON ELECTRONICS Co., Ltd.
D/N: AM-128128-015A
Rev: 1E
SCALE: 1:1
SHEET NO: 1 OF 1

4. Interface Description

Pin	Symbol	I/O	Function
1	VSS	--	Ground
2	REST	I	Reset pin
3	VSS	--	Ground
4	D0	I/O	Data Input:
5	D1	I/O	Data Input:
6	D2	I/O	Data Input:
7	D3	I/O	Data Input:
8	D4	I/O	Data Input:
9	D5	I/O	Data Input:
10	D6	I/O	Data Input:
11	D7	I/O	Data Input:
12	VSS	--	Ground
13	/RD	I	Read enable in 8080- parallel interface
14	/WR	I	Write enable in parallel interface
15	/CS	I	Chip select input pin("Low Active")
16	/DC	I	Display data/command selection pin D/CX='1':Display data D/CX='0':command data
17	TE	I	Tearing effect output pin to synchronies MCU to frame writing
18	VCC	--	Logic Supply Voltage
19	VDDIO	--	Logic Supply Voltage
20	LED+	P	Anode for LED backlighting
21	LED-	G	Cathode for LED backlighting
22	VSS	--	Ground

5. Absolute Maximum Ratings

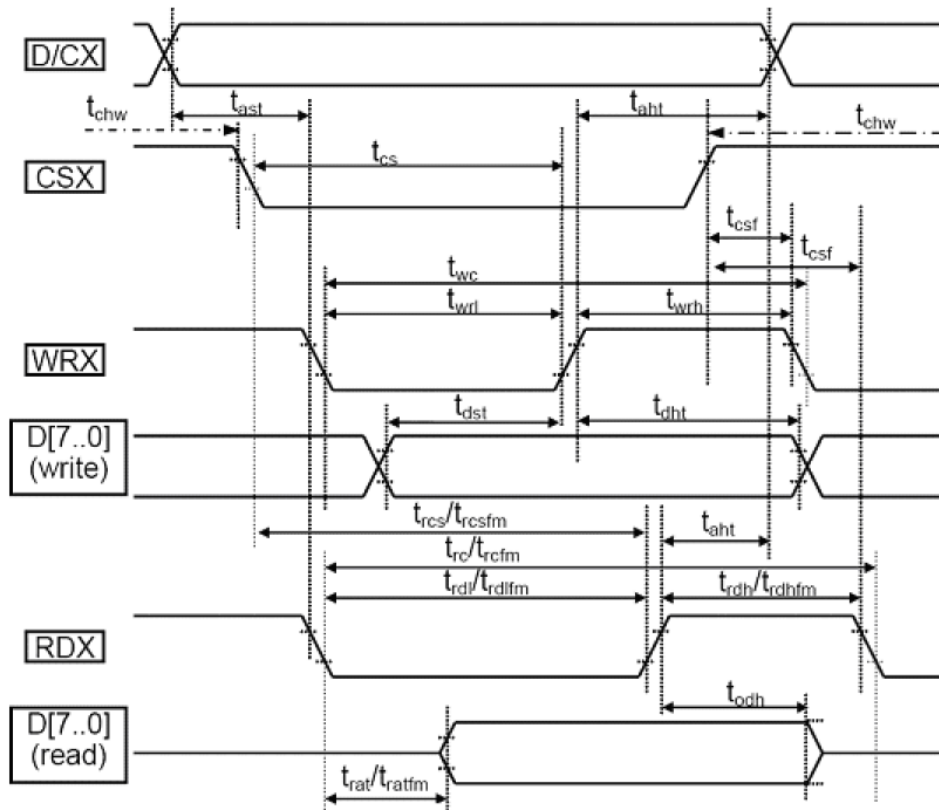
Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	IOVCC	-0.3	4.6	V
Input Voltage	V _{in}	-0.3	IOVCC+0.3	V
Operating Temperature	T _{OP}	-20	70	°C
Storage Temperature	T _{ST}	-30	80	°C
Storage Humidity	HD	20	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Logic Supply Voltage	IOVCC	2.8	--	3.3	V	--
Input High Voltage	V _{IH}	0.7IOVCC	--	IOVCC	V	Digital input pins
Input Low Voltage	V _{IL}	VSS	--	0.3IOVCC	V	Digital input pins
Output High Voltage	V _{OH}	0.8IOVCC	--	IOVCC	V	Digital output pins
Output Low Voltage	V _{OL}	VSS	--	0.2IOVCC	V	Digital output pins
I/O Leak Current	I _{LI}	-0.1	--	0.1	uA	--

7. Timing Characteristics

7.1 8080-System 8 bits Interface Timing



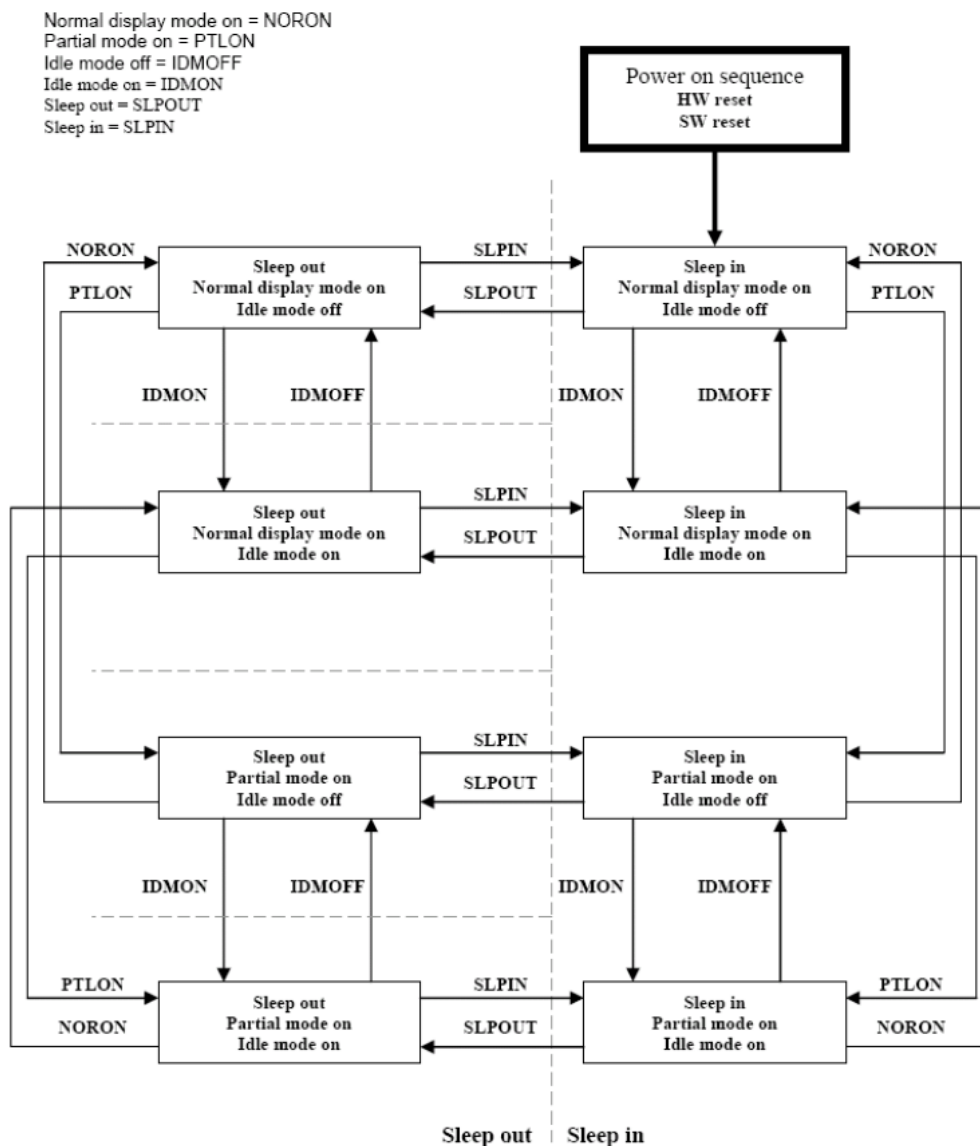
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

Signal	Symbol	Parameter	min	max	unit	description
D/CX	tast	Address setup time	0		ns	
	taht	Address hold time(Write/Read)	10		ns	
CSX	tchw	"S""H" Pulse Widch	0		ns	
	tcs	Chip Select setup time (Write)	10		ns	
	trcs	Chip Select setup time (Read ID)	45		ns	
	trcsfm	Chip Select setup time (Read FM)	355		ns	
	tcsf	Chip Select Wait time(Write/read)	10		ns	
WRX	twc	Write cycle	66		ns	
	twrh	Controlpulse H duration	15		ns	
	twrl	Control pulse L duration	15		ns	
RDX	trc	Read cycle (ID)	160		ns	When read ID

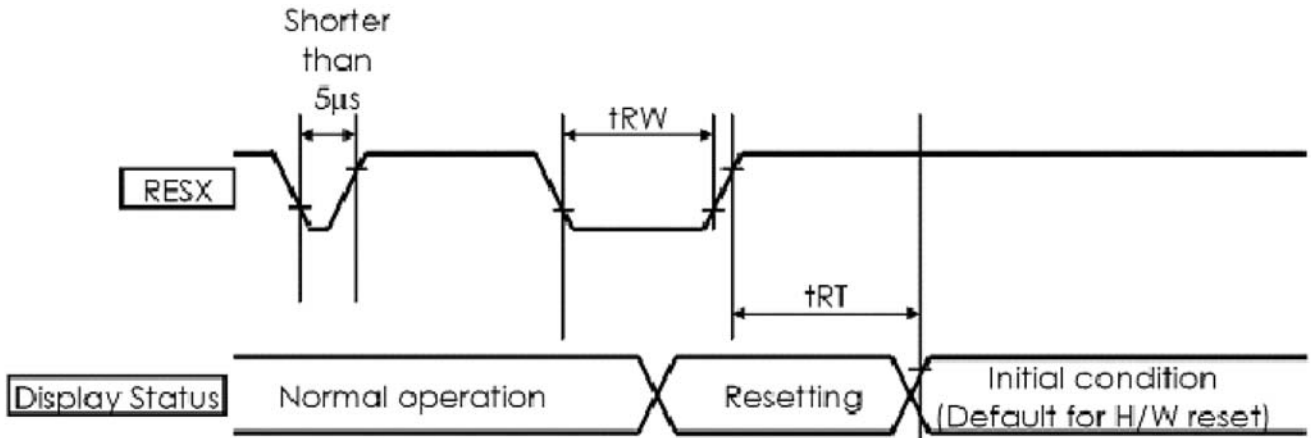
	trdh	Control pulse H duration(ID)	90		ns	data
	trdl	Control pulse L duration(ID)	45		ns	
RDX	trcfm	Read cycle (FM)	450		ns	When read from frame memory
	trdhfm	Control pulse H duration (FM)	90		ns	
	trdlfm	Control pulse L duration (FM)	355		ns	
D[17..0]	tdst	Data setup time	10		ns	For maximum CL = 30pF For minimum CL = 8pF
	tdht	Data hold time	10		ns	
	trat	Read access time (ID)		40	ns	
	tratfm	Read access time (FM)		340	ns	
	todh	Output disable time	20	80	ns	

Note 1: VDDI 1.65 to 3.3V, VCI=2.6 to 3.3V, AGND=GND=0V, Ta=-30 to 70 °C (to +85°C no damage)

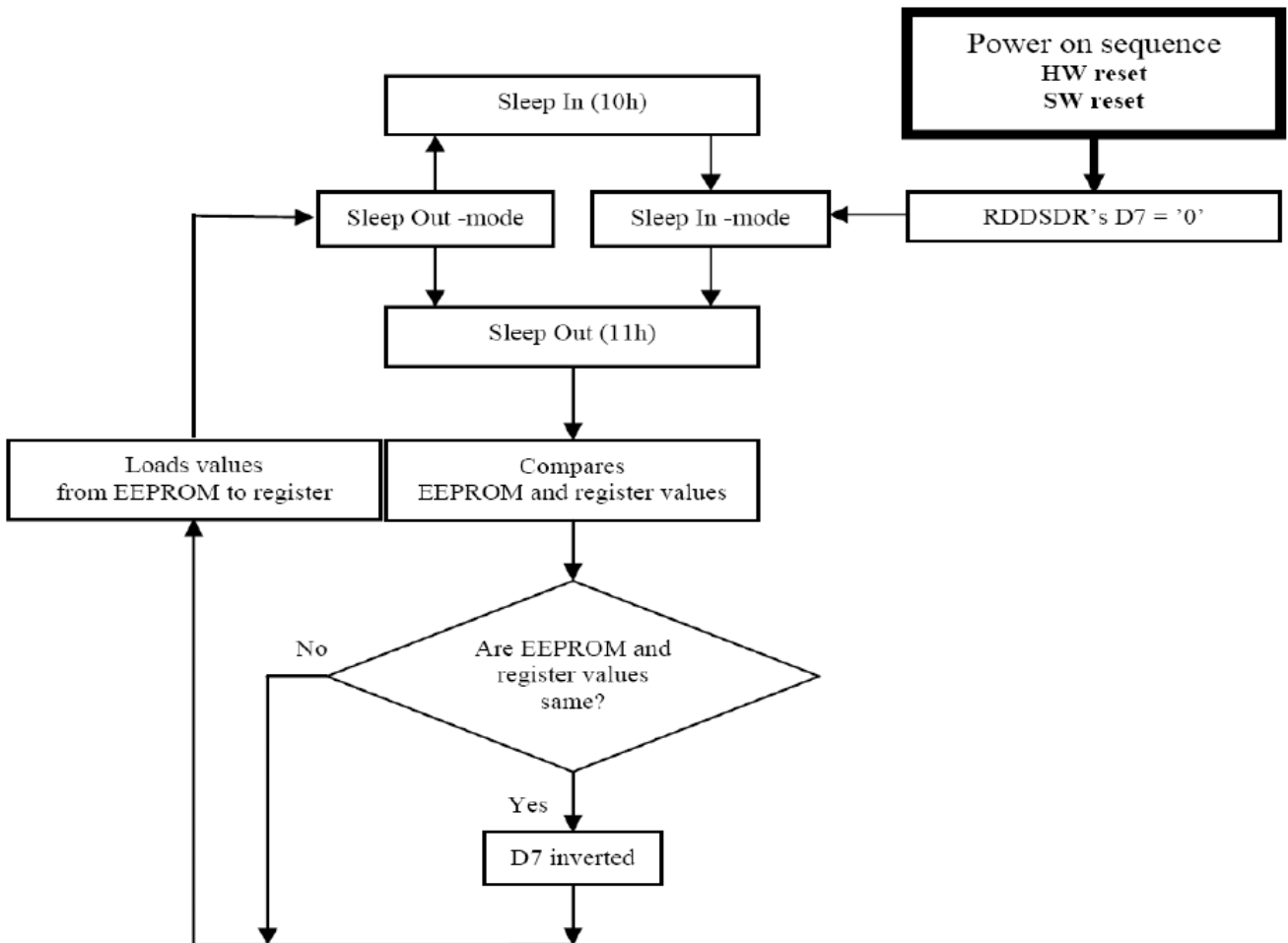
7.2 Power Flow Chart



7.3 Reset Timing



7.4 Sleep Out Flow Chart



Sured in dark room or equivalent state with the methods shown in Note

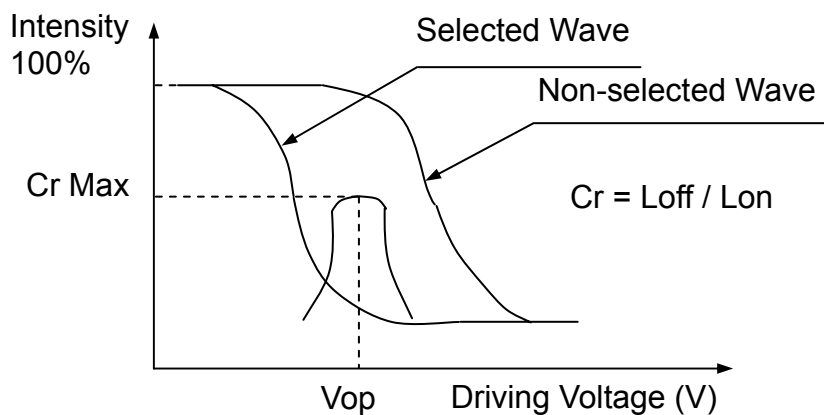
8. Backlight Characteristic

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	3.0	--	3.6	V	If=20mA
Supply Current	If	--	20	--	mA	--
Luminous Intensity for LCM	--	120	150	--	cd/m ²	If=20mA
Backlight Color	White					

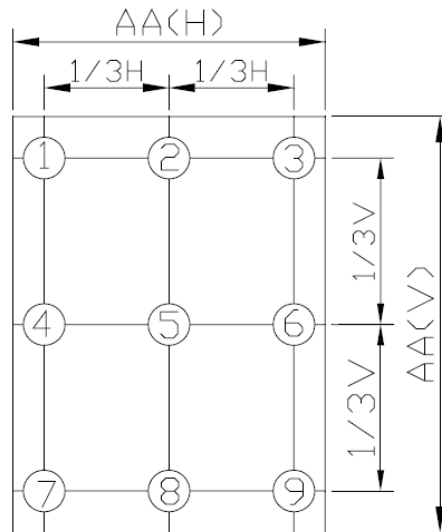
9. Optical Characteristics

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Brightness		BL	$\theta = \varphi = 0^\circ$	120	150	--	cd/m ²	Note2
Contrast Ratio		CR	$\theta = \varphi = 0^\circ$	300	350	--	--	Note3
Response Time		Tr+Tf	$\theta = \varphi = 0^\circ$	--	25	--	ms	Note4
Viewing Angle	Upper	θ	$CR \geq 10$	--	60	--	--	Note 5
	Down			--	50	--	--	
	Right	φ		--	60	--	--	
	Left			--	60	--	--	
Color Filter Chromaticity	White	X	$\theta = \varphi = 0^\circ$	--	(0.293)	--	--	Note 6
		y		--	(0.325)	--	--	

Note1: Definition of Operation Voltage (Vop)



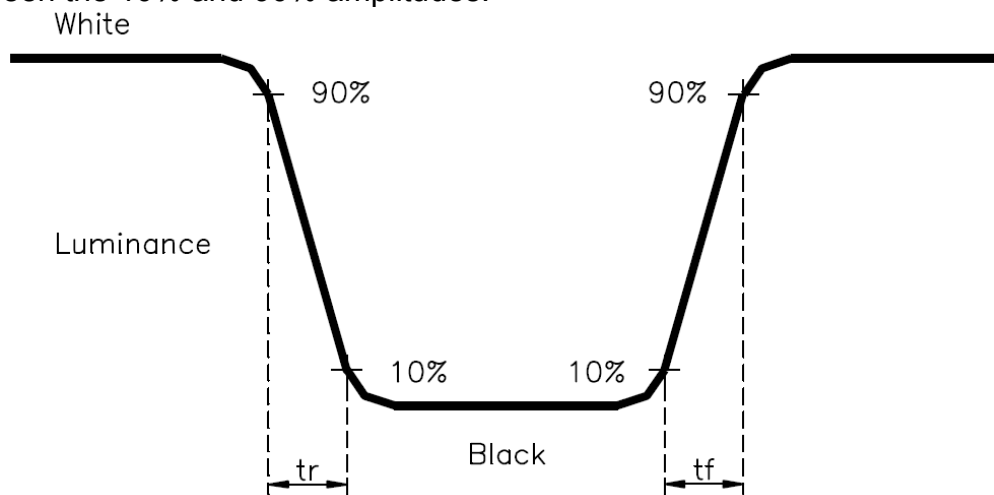
Note2: Definition of Luminance Uniformity : $L = L(\text{MIN}) / L(\text{MAX}) \times 100\%$



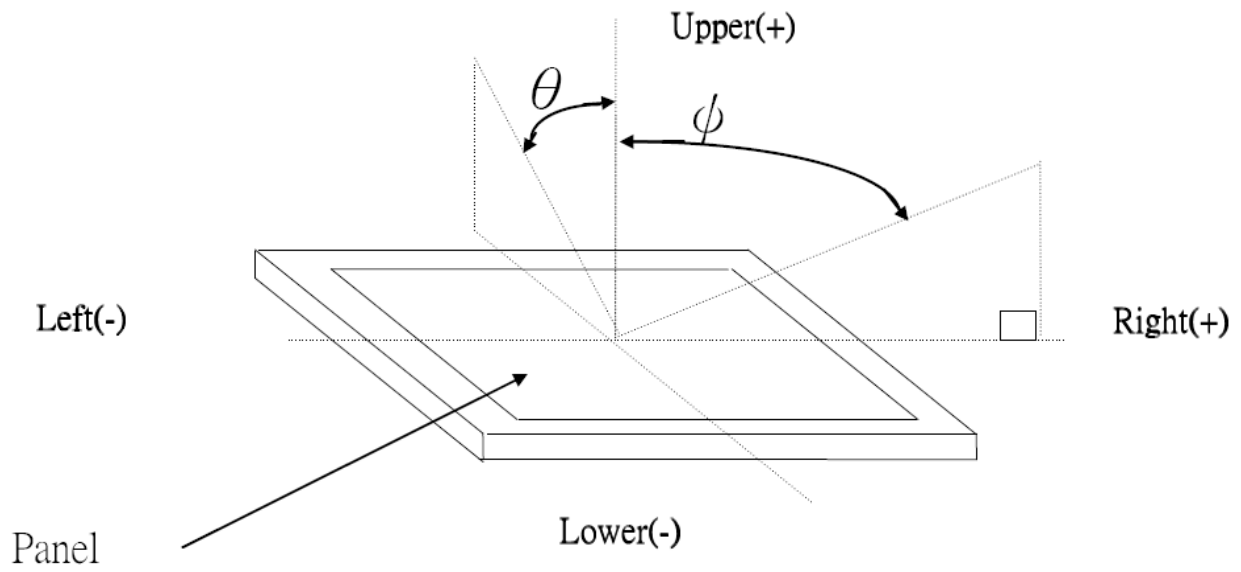
Note 3. Definition of Contrast Ratio :

$$CR = \text{White Luminance (ON)} / \text{Black Luminance (OFF)}$$

Note 4. Definition of response time: The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle(θ , ψ):



Note 6. Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD.

10. Reliability Test Conditions and Methods

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Operating	60°C 240 hrs	<ul style="list-style-type: none"> ◦ No Defect Of Operational Function In Room Temperature Are Allowable. ◦ Leakage current should be below double of initial value.
2	Low Temperature Operating	0°C 240 hrs	
3	High Temperature Non-Operating	70°C 240 hrs	
4	Low Temperature Non-Operating	-20°C 240 hrs	
5	High Temperature/ Humidity Non-Operating	60°C ,90%RH 240 hrs	
6	Temperature Shock Non-Operating	-20°C (30min) 70°C (30min) (5min) (30min) 100 CYCLES	
7	Electrostatic Discharge Test Non-Operating	HBM:±2kV	

Note 1: Test after 24 hours in room temperature.

Note 2: The sampling above is individually for each reliability testing condition.

Note 3: The color fading of polarizing filter should not care.

Note 4: All of the reliability testing chamber above, is using D.I. water.(Min value: 1.0 MΩ-cm)

Note 5: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

11. Inspection Criteria

11.1 Inspection Conditions

11.1.1 Environmental conditions

The environmental conditions for inspection shall be as follows

Room temperature: $23 \pm 5^\circ\text{C}$

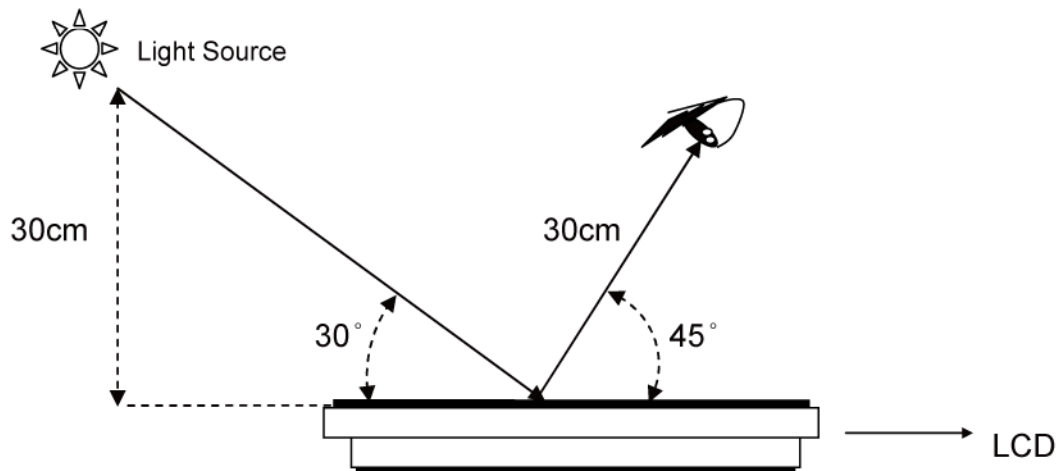
Humidity: $50 \pm 20\% \text{RH}$

11.1.2 The external visual inspection

With 1000 ± 200 lux fluorescent lamp as the light source, the inspection was in the distance of 30cm or more from the LCD to the inspector's eyes .

11.2 Light Method

1. Inspection is implemented over 30cm vertical distance and 30° incidence under 1000(200 lux. (As showed below)
2. Viewing direction for inspection over 30) far and is 45° against from LCD (As showed below)



11.3 Classification Of Defects

11.3.1 Major defect

A major defect refers to a defect that may substantially degrade usability for product applications.

11.3.2 Minor defect

A minor defect refers to a defect which is not considered to be able substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation.

Notes: If the LCD/LCM's cosmetic and display performance do not specify in "inspection criterion", it should be based on these delivered samples.

11.4 Sampling & Acceptable Quality Level

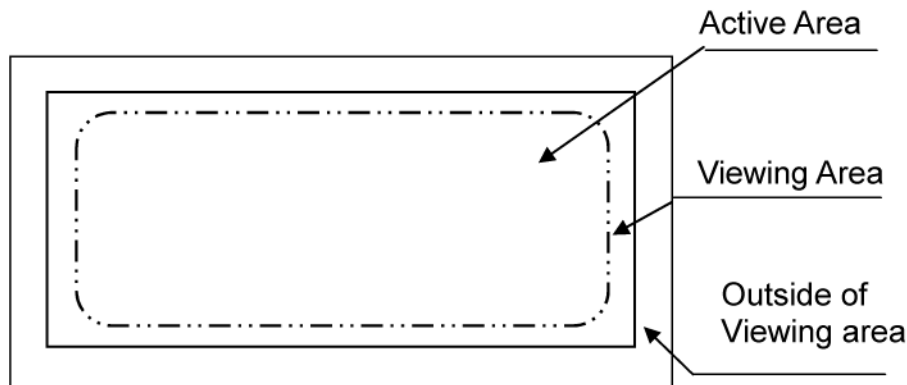
Level II, MIL-STD-105E

Inspection Item	Major defect	Minor defect
Appearance	4.0%	4.0%
Electrical test	4.0%	4.0%

11.5 Definition Of Inspection Area

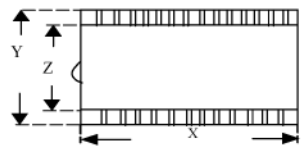
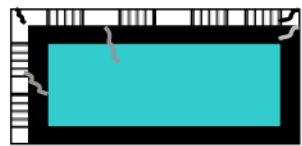
V.A: Viewing Area

A.A: Active Area



11.6 Items And Criteria

11.6.1 Visual inspection criterion in cosmetic

Glass defect			
No	Item	Criteria	Remark
1	Dimension (Minor)	By engineering diagram	
2	Crack (Major)	Extensive crack * Reject+	

LCD appearance defect				
No	Item	Criteria		Remark
1	Dirty Spots, Round type (Minor)	Defect Spec.	Permissible Q'ty	1: $= (L+W)/2$, L: Length, W: Width 2: Disregard if out of A.A.
		0.1mm<, - 0.5mm	12	
2	Fiber, Scratches (Minor)	Defect Spec.	Permissible Q'ty	1: L: Length, W: Width 2: Disregard if out of A.A.
		0.5. L- 3.0mm	9	
		0.1. W- 0.5mm		
3	Polarizer bubble (Minor)	Defect Spec.	Permissible Q'ty	1: $= (L+W)/2$, L: Length, W: Width 2: Disregard if out of A.A.
		0.1mm<, - 1mm	12	

FPC				
No	Item	Criteria		Remark
1	Copper peeling (Minor)	Copper peeling * Reject+		
2	No release film or Peeling (Minor)	No release film or peeling * Reject+		
3	Finger Spots, Impurities defect (Minor)	Defect Spec.	Permissible Q'ty	1. No bridge 2. Disregard if the dirty removed
		, - 0.35mm	2	
		, >0.35mm	0	

Silicon			
No	Item	Criteria	Remark
1	Amount of silicon (Minor)	ITO exposed * Reject+	

11.6.2 Visual inspection criterion in electrical display

Electrical test within V.A.				
No	Item	Criteria	Remark	
1	Open, Short (Major)	Not allowable		
2	No display (Major)	Not allowable		
3	Darker or lighter line (Minor)	Darker or lighter line * Reject+	Judging by ND filter 2%	
4	Flicker of pattern (Major)	Not allowable		
5	High current (Major)	Current consumption exceeds product spec. * Reject+		
6	High voltage (Major)	Voltage exceeds product spec. * Reject+		
7	Mura (Minor)	Spec.	Permissible Q'ty	Judging by ND filter 2%
		L- 4.0mm, W- 1.0mm	3	
		L0 4.0mm, W0 1.0mm	0	

Electrical test within V.A.				
8	Point defect (Major)	Bright	Total points defects 0 7 * Reject+	1: 1dot= 1R or 1G or 1B 2: 2 or more dots in adjacent are not allowed
		Dark		
9	Noise display (Major)	Not allowable		

11.6.3 Others

- Issues that are not defined in this document shall be discussed and agreed with both parties. (Customer and supplier)
- Unless otherwise agreed upon in writing, the criteria shall be applied to both parties. (Customer and supplier)

12. Handling Precautions

12.1 Mounting method

The LCD panel of AMSON TFT 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.

The warranty period is 1 year.

12.2 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.

12.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend 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.

12.4 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

12.5 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.
- 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.

12.6 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

12.7 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

13. Precaution for Use

13.1

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.

13.2

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.

14. Packing Method

TBD