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	2018-03-26	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.
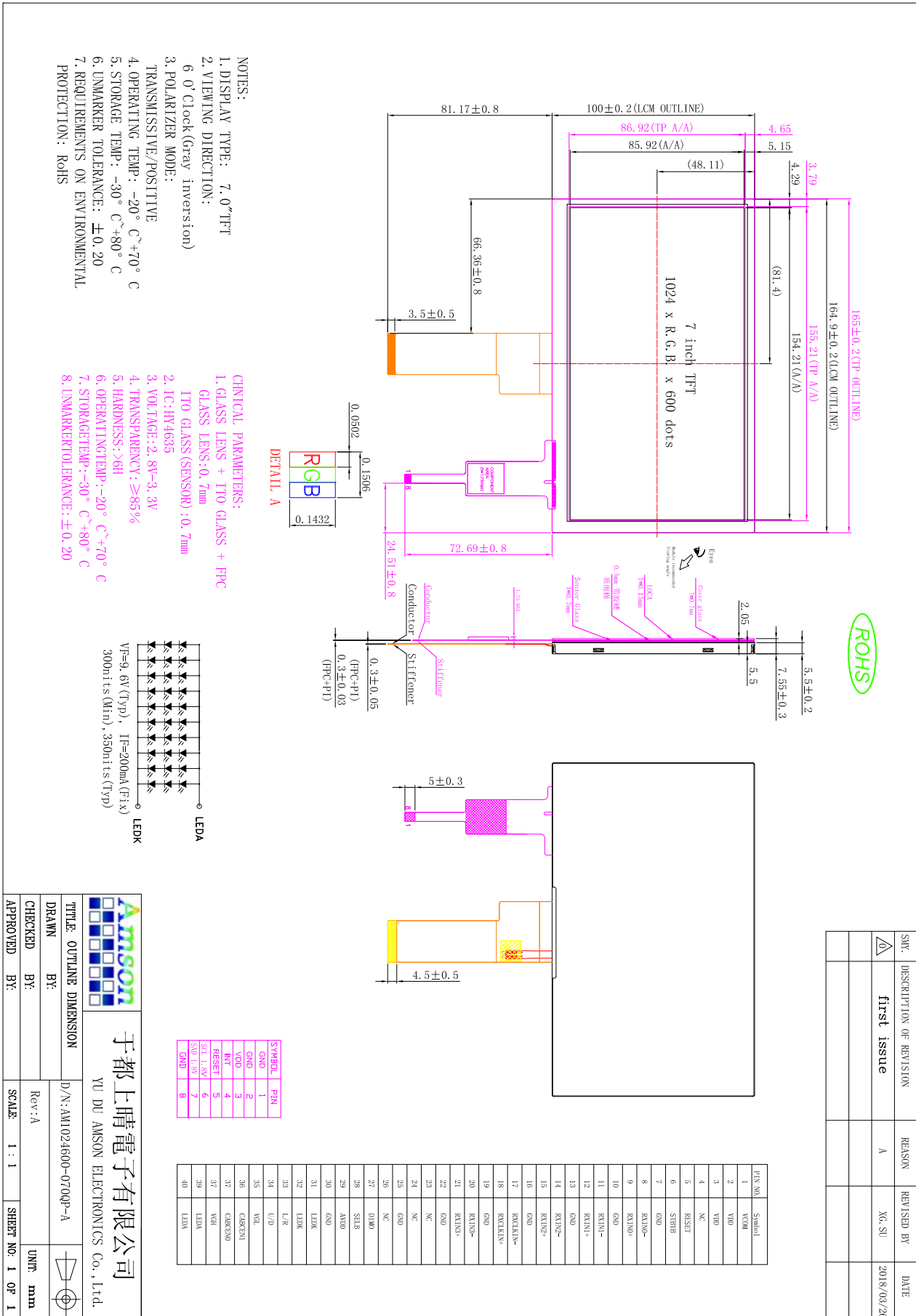
2. General Information

LCM

TITEM	STANDARD VALUES	UNITS
LCD type	7.0"TFT	--
Dot arrangement	1024(RGB)×600	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally White , Transmissive	-
Gray Scale Inversion Direction	6 o'clock	--
Eyes Viewing Direction	12 o'clock	--
Module size	165.0(W)×100(H)×5.6(T)	mm
Active area	153.6(W)×90(H)	mm
Dot pitch	0.15(W)×0.15(H)	mm
Interface	LVDS	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	30White LED	--
Weight	TBD	g

CTP

ITEM	STANDARD VALUES	UNITS
CTP type	Glass + SENSOR Glass +FPC	--
CTP Driver IC	HY4635	--
Surface hardness	7H	--
Transmittance	≥85％	--
CTP size	165.0 (W)×100.00(H)×2.0(T)	mm
CTP Viewing area	155.21(W)×86.92.00 (H)	mm
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
CTP Interface	I^2C	

3. External Dimensions

NOTES:
1. DISPLAY TYPE: 7.0"TFT
2. VIEWING DIRECTION:
6.0'Clock(Gray inversion)
3. POLARIZER MODE:
TRANSMISSIVE/POSITIVE
4. OPERATING TEMP: -20°C~+70°C
5. STORAGE TEMP: -30°C~+80°C
6. UNMARKER TOLERANCE: ±0.20
7. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

CRITICAL PARAMETERS:
1. GLASS LENS + ITO GLASS + FPC
GLASS LENS: 0.7mm
ITO GLASS(SENSOR): 0.7mm
2. IC: HY4635
3. VOLTAGE: 2.8V~3.3V
4. TRANSPARENCY: ≥85%
5. HARDNESS: >6H
6. OPERATINGTEMP: -20°C~+70°C
7. STORAGETEMP: -30°C~+80°C
8. UNMARKERTOLERANCE: ±0.20

VF=9.6V(Typ), IF=200mA(Fix)
300nits(Min), 350nits(Typ)

DETAIL A

RGB
0.0502
0.1506
0.1432

7 inch TFT
1024 x R.G.B. x 600 dots

ROHS

SYMBOL	PIN
GND	1
GND	2
VDD	3
INT	4
RESET	5
SCL 1.8V	6
SAD 1.8V	7
GND	8

PIN NO.	Symbol
1	VCOM
2	VDD
3	VDD
4	NC
5	RESET
6	STBYB
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RXCLKIN-
18	RXCLKIN+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	NC
24	NC
25	GND
26	GND
27	DUMO
28	SELB
29	AVDD
30	AVDD
31	LEDK
32	LEDK
33	L/R
34	U/D
35	VGL
36	CABC1N1
37	CABC1N0
38	VGH
39	LEDA
40	LEDA

4. Interface Description

PIN	PIN NAME	DESCRIPTION
1	VCOM	Common voltage
2	VDD	Power for Digital Circuit
3	VDD	Power for Digital Circuit
4	NC	No connection
5	RESET	Global reset pin
6	STBYB	Standby mode, Normally pulled high STBYB="1", normal operation STBYB="0", timing controller, source Driver will turn off, all output are High-z
7	GND	Power ground
8	RXIN0-	-LVDS differential data pair
9	RXIN0+	+LVDS differential data pair
10	GND	Power ground
11	RXIN1-	-LVDS differential data pair
12	RXIN1+	+LVDS differential data pair
13	GND	Power ground
14	RXIN2-	-LVDS differential data pair
15	RXIN2+	+LVDS differential data pair
16	GND	Power ground
17	RXCLKIN-	-LVDS differential clock pair
18	RXCLKIN+	+LVDS differential clock pair
19	GND	Power ground
20	RXIN3-	-LVDS differential data pair
21	RXIN3+	+LVDS differential data pair
22	GND	Power ground
23	NC	No connection
24	NC	No connection
25	GND	Power ground
26	NC	No connection
27	DIM0	Backlight CABC controller signal output
28	SELB	6bit/8bit mode select
29	AVDD	Power for Analog Circuit
30	GND	Power ground
31	LEDK	LED backlight (Cathode).
32	LEDK	LED backlight (Cathode).
33	L/R	Horizontal inversion
34	U/D	Vertical inversion
35	VGL	Gate OFF Voltage
36	CABCEN1	CABC H/W enable

37	CABCEN0	CABC H/W enable
38	VGH	Gate ON Voltage
39	LEDA	LED backlight (Anode).
40	LEDA	LED backlight (Anode).

CTP

PIN NO.		PIN NAME
1	VDD	CTP Digital Power.
2	SCL	CTP I^{2}C_clock.
3	SDA	CTP I^{2}C_data
4	INT	CTP interruption signal.
5	RST	CTP reset pin. Active low to enter reset state.
6	GND	CTP Power ground

5. Electrical specification

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Input signal Voltage	VCOM	3.56	3.76	3.96	V	Note1
Logic Supply Voltage	DVDD	3	3.3	3.6	V	Note2
Analog Supply Voltage	AVDD	10.8	11	11.2	V	Note2
CTP Supply Voltage	VDD	2.8		3.6	V	
Low Supply Voltage	VGL	-10	-7	-4	V	Note2
High Supply Voltage	VGH	16	20	24	V	Note2
Output High Voltage	VIH	0.7XVDD	-	VDD	V	-
Output Low Voltage	VIL	0	-	0.3xVDD	V	-

Note 1:

1） Vcom value is available in the condition:

The ambient temperature is 25℃. The operation frequency is 60Hz

2） The gate IC is the NT52002H-D,the source IC is the NT51008CH-D.

Note 2:

1） Be sure to apply VCC and VGL to the LCD first, and then apply VGH

2） Be sure contrast ratio is 90% at least when VGL drifts 3v and VGH drifts 4v. Operation Frequency is @ 60Hz.

6. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	DVDD	-0.5	5	V
Analog Supply Voltage	AVDD	-0.5	15	V
CTP Supply Voltage	VDD	1.8	3.6	V
High Supply Voltage	VGH	-0.3	42	V
Low Supply Voltage	VGL	-20	0.3	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C

7. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
High Supply for Current	IGH	-	0.25	1	mA	VGH=20V
Low Supply for Current	IGL	-	0.25	1	mA	VGL=-7V
Logic Supply for Current	IDVDD	-	38	60	mA	DVDD=3.3V
Analog Supply for Current	IAVDD	-	20	30	mA	AVDD=11V

8. Timing Characteristics
8.1 Power Sequence

a. Power on:
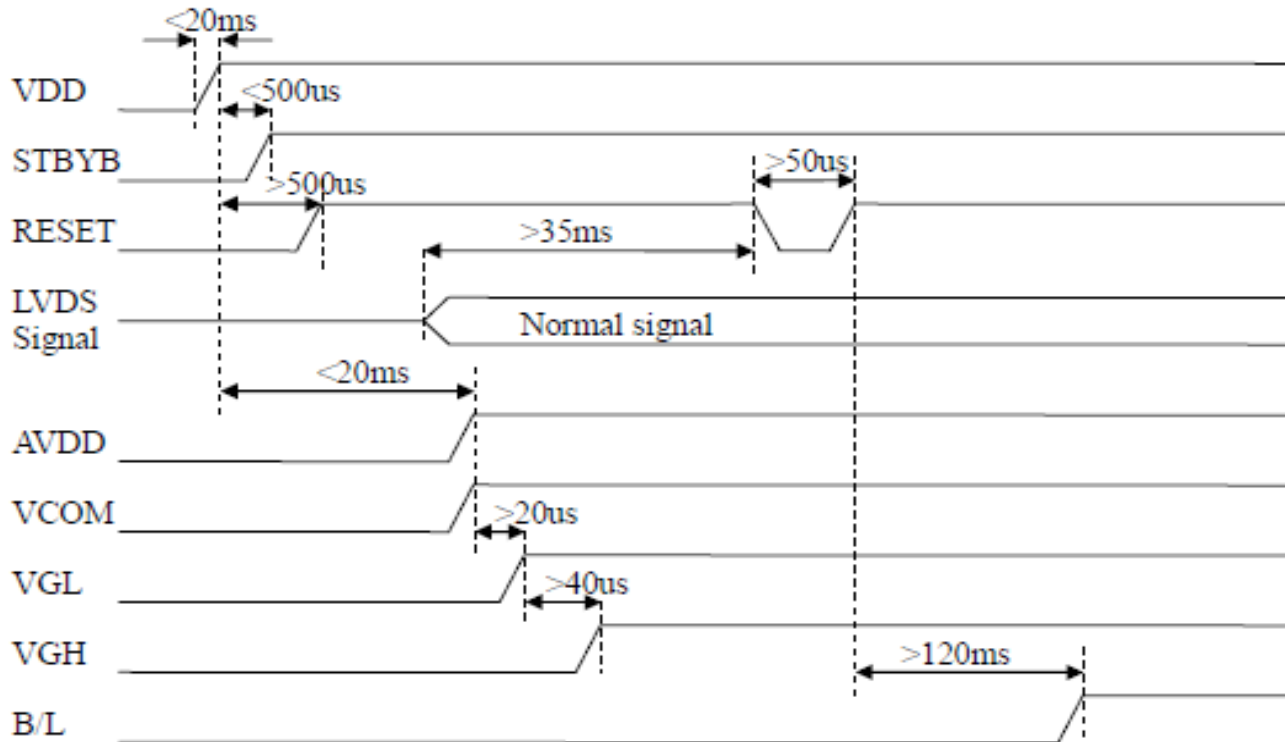
b. Power off:
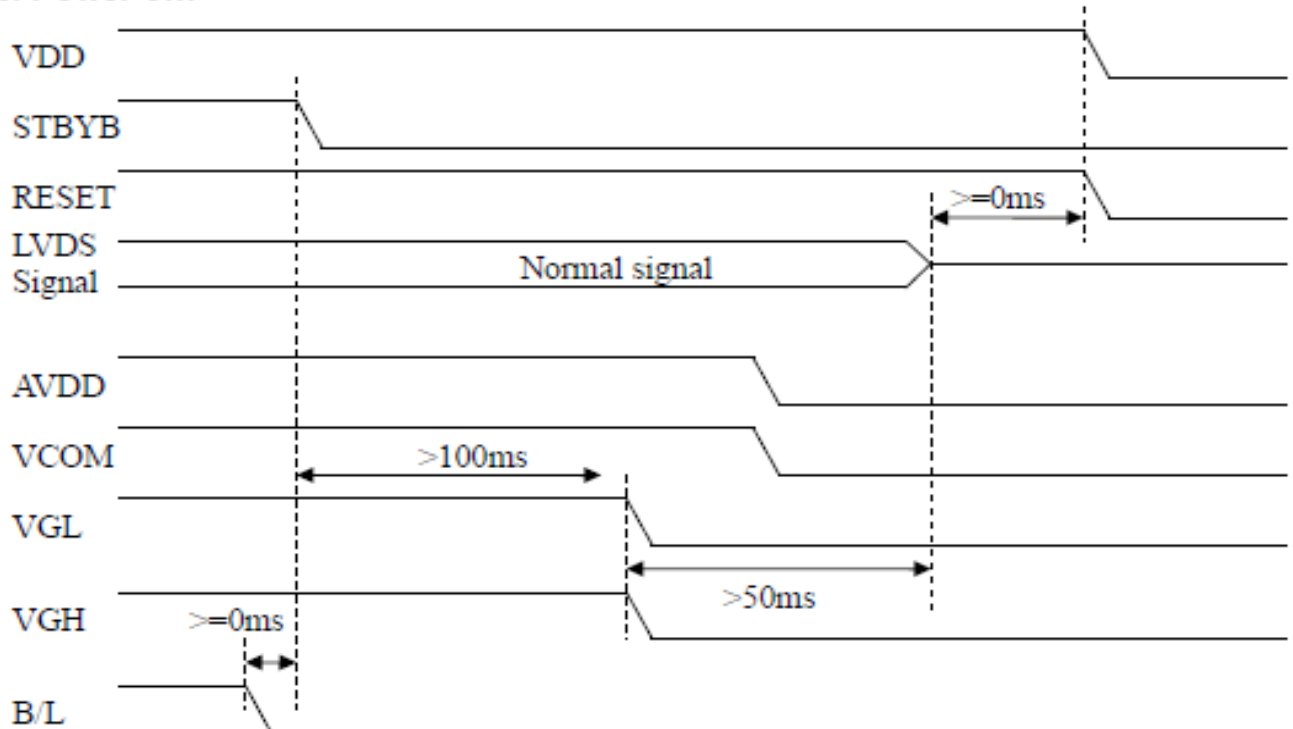
8.2 AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	R_{xFCLK}	40.8	51.2	67.2	MHz	
Input data skew margin	T_{RSKM}	500	-	-	ps	
Clock high time	T_{LVCH}	-	$4/(7* R_{xFCLK})$	-	ns	
Clock low time	T_{LVCL}	-	$3/(7* R_{xFCLK})$	-	ns	

Input Clock and Data Timing Diagram
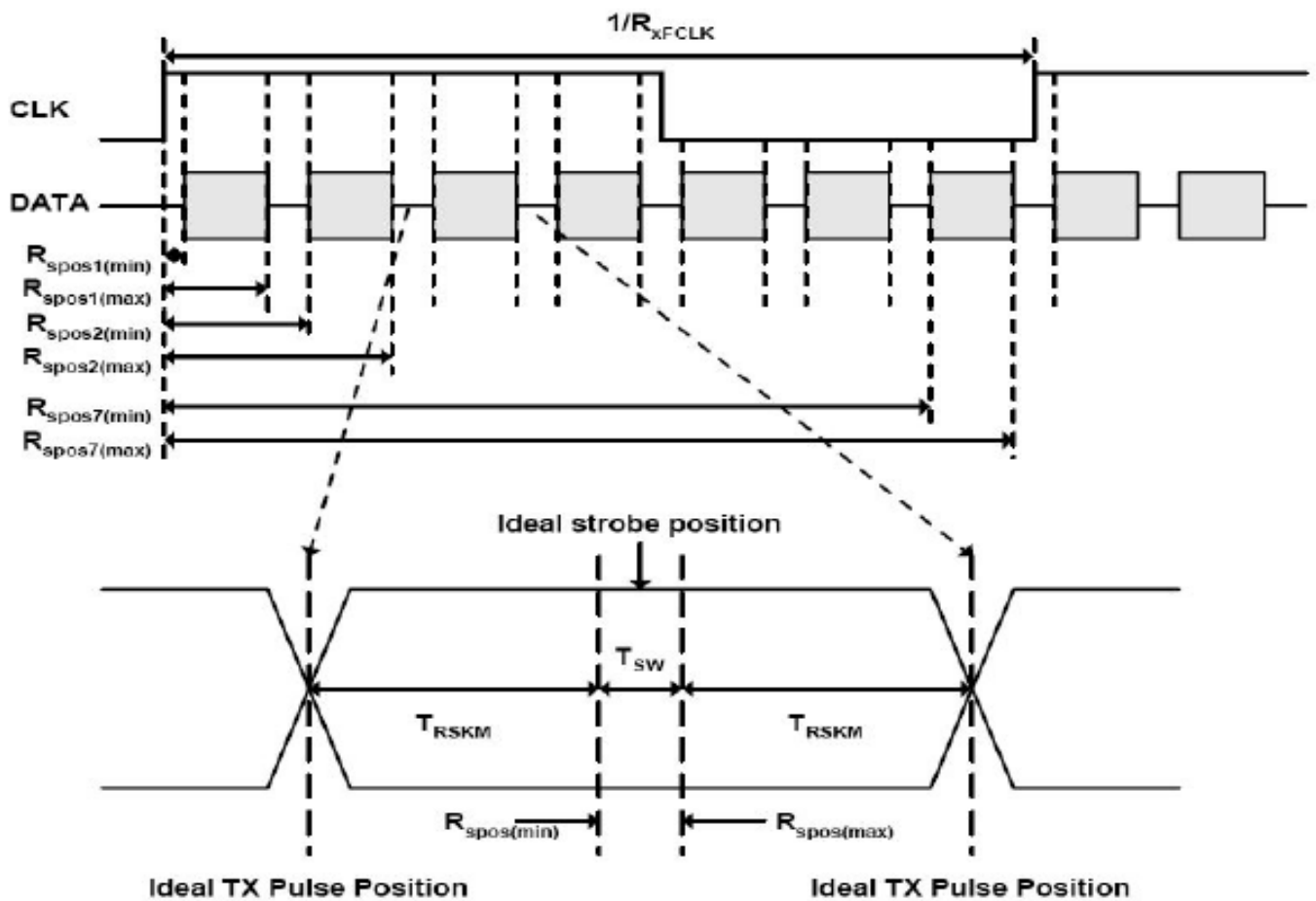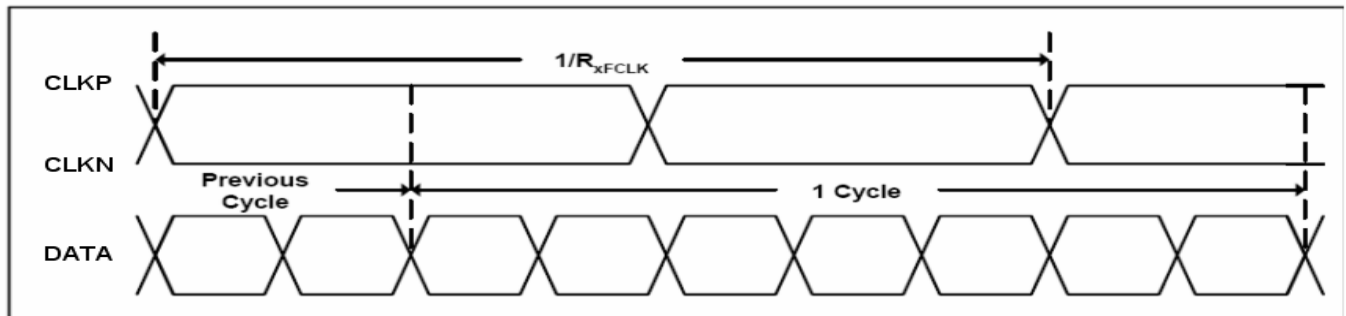
T_{RSKM}: Receiver strobe margin
R_{SPOS}: Receiver strobe position
T_{SW} : Strobe width (Internal data sampling window)

8.3 DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{xVTH}	-	-	+0.1	V	R_{XVCM}=1.2V
Differential input low Threshold voltage	R_{xVTL}	-0.1	-	├	V	
Input voltage range (singled-end)	R_{xVIN}	0	-	2.4	V	
Differential input common mode voltage	R_{xVCM}	$|V_{ID}|/2$	-	$2.4-|V_{ID}|/2$	V	
Differential voltage	$|V_{ID}|$	0.2	-	0.6	V	
Differential input leakage current	RV_{xliz}	-10	-	+10	uA	
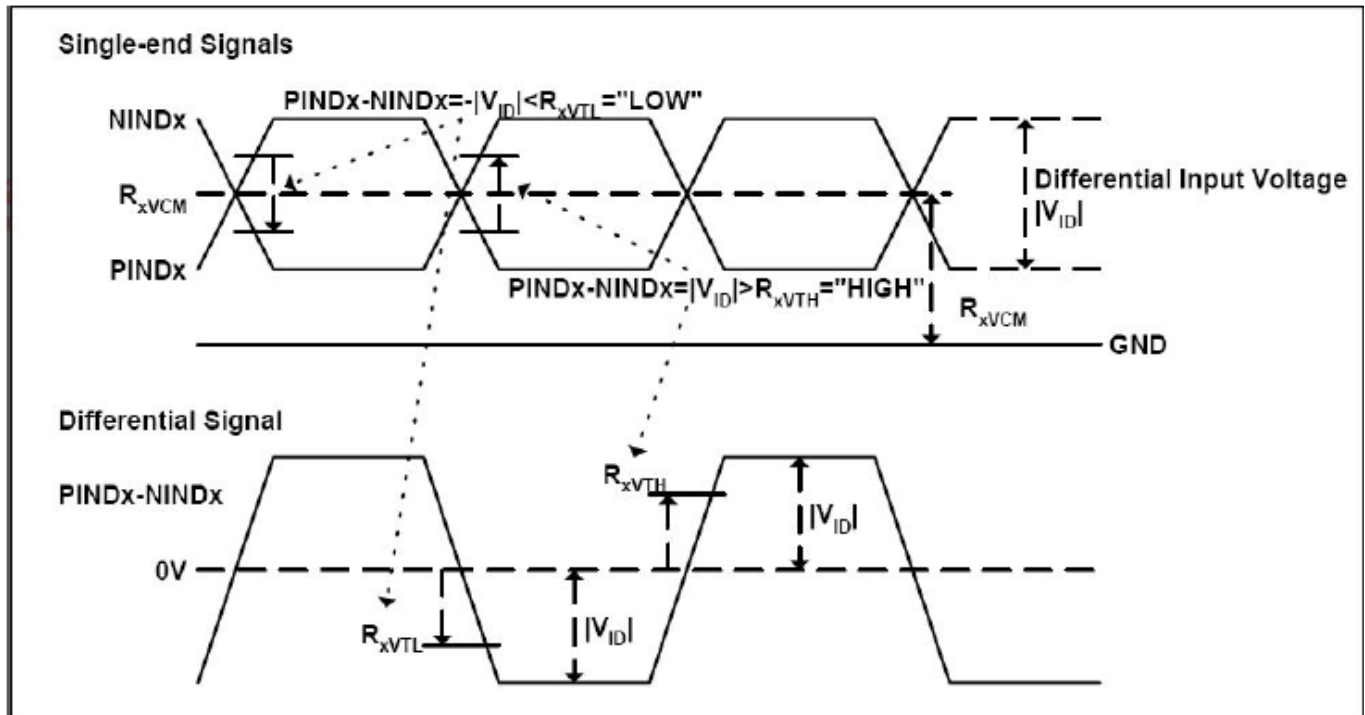
8.4 Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd		1024		DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd		600		H	
VS period time	tv	610	635	800	H	
VS Blanking	thb	10	35	200	H	

8.5 Data Input Format

6bit LVDS input
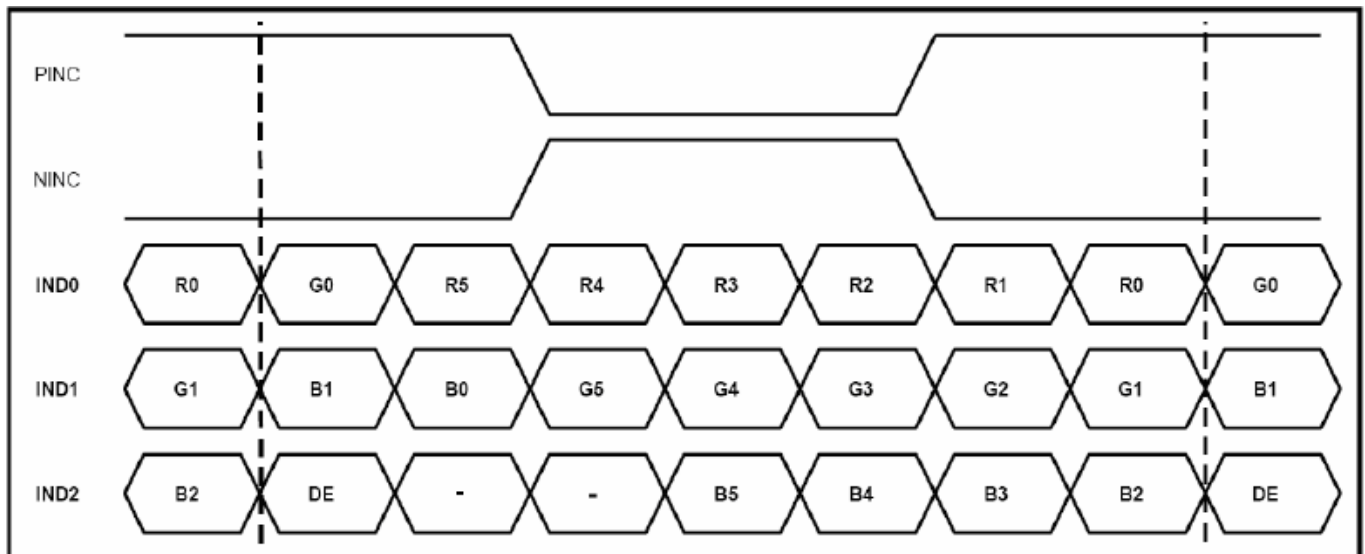
8bit LVDS input
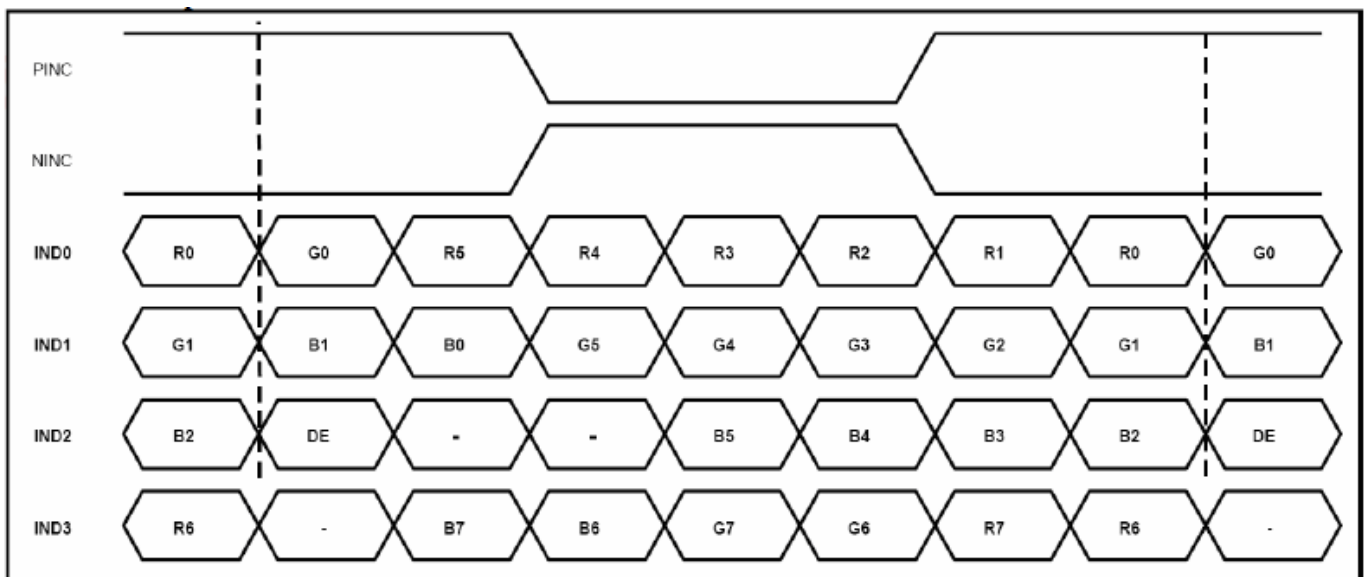
Note: Support DE timing mode only, SYNC mode not supported.

8.6 CTP Timing Characteristics

8.6.1 Serial Interface
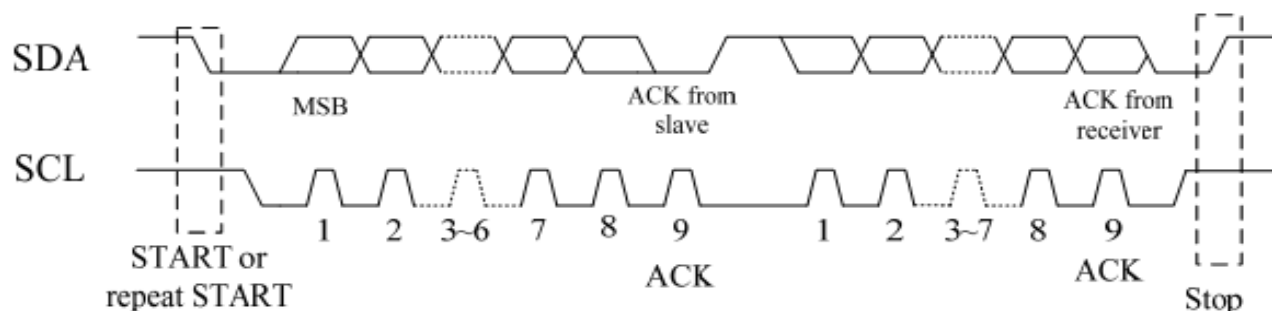
I^2C Serial Data Transfer Format

I^2C master write, slave read
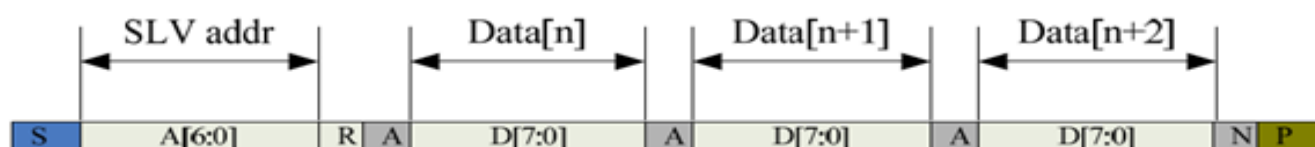
I^2C master read, slave write

Mnemonics Description

Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address A[6:0]: address bits are identical to those of I2CADDR [7:1] register.
R/ W	'1' for read, '0'for write
A(N)	ACK(NACK)
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)

Timing Characteristics

Parameter	Unit	Min	Max
SCL frequency	KHz	0	400
Bus free time between a STOP and START condition	us	4.7	\
Hold time (repeated) START condition	us	4.0	\
Data setup time	ns	250	\
Setup time for a repeated START condition	us	4.7	\
Setup Time for STOP condition	us	4.0	\

8.6.2 POWER NO /Reset/Wake Sequence

Reset should be pulled down to be low before powering on and powering down. INT signal will be sent to the host after initializing all parameters and then start to report points to the host.
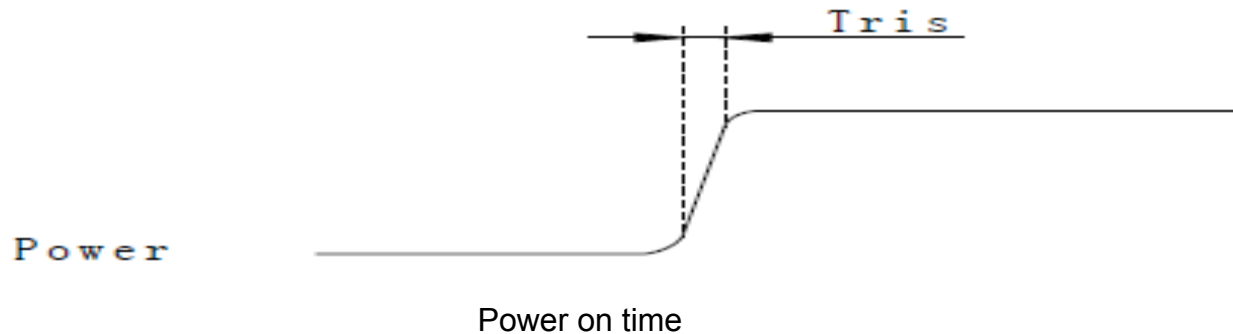
Power on time

Power on Sequence

Reset time must be enough to guarantee reliable reset, The time of starting to report point after resetting approach to the time of starting to report point after powering on.
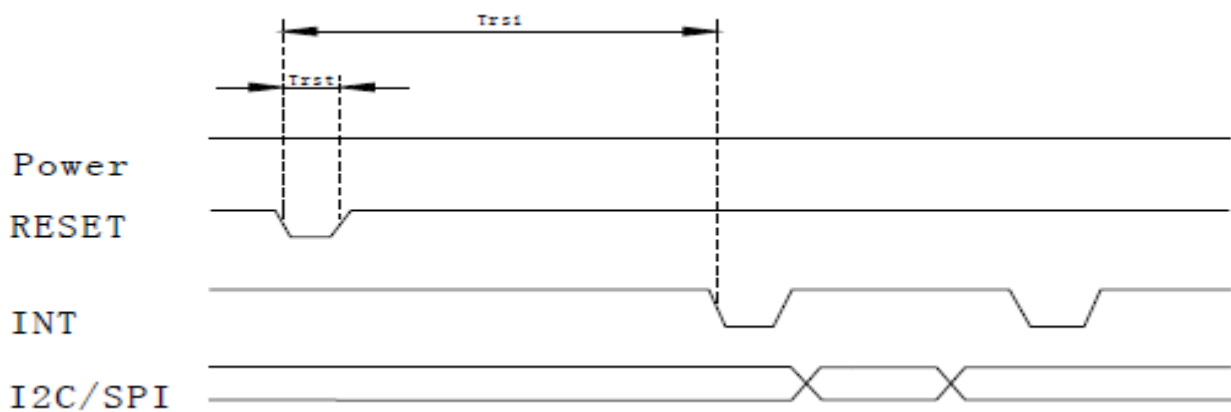
Reset Sequence

9. Backlight Characteristics
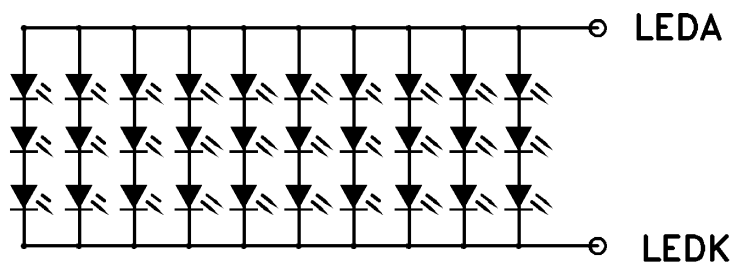
VF=9.6V(Typ), IF=200mA(Fix)
300nits(Min),350nits(Typ)

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	8.7	9.6	10.5	V	If=200mA
Supply Current	If	-	200	-	mA	-
Luminous Intensity for LCM	-	300	350	-	cd/m^2	If=200mA
Uniformity for LCM	-	80	-	-	％	If=200mA
Life Time	-	-	50000	-	Hr	If=200mA
Backlight Color	White					

10. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	70	-	degree	(1),(2),(6)
		θR	-	70	-		
	Vertical	θT	-	50	-		
		θB	-	70	-		
Contrast Ratio	Center		300	350	-	-	(1),(3),(6)
Response Time	Rising		-	10	20	ms	(1),(4),(6)
	Falling		-	15	30		
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.05	TBD	Typ. +0.05	-	(1), (6)
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x			TBD		-	
	White y			TBD		-	

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.
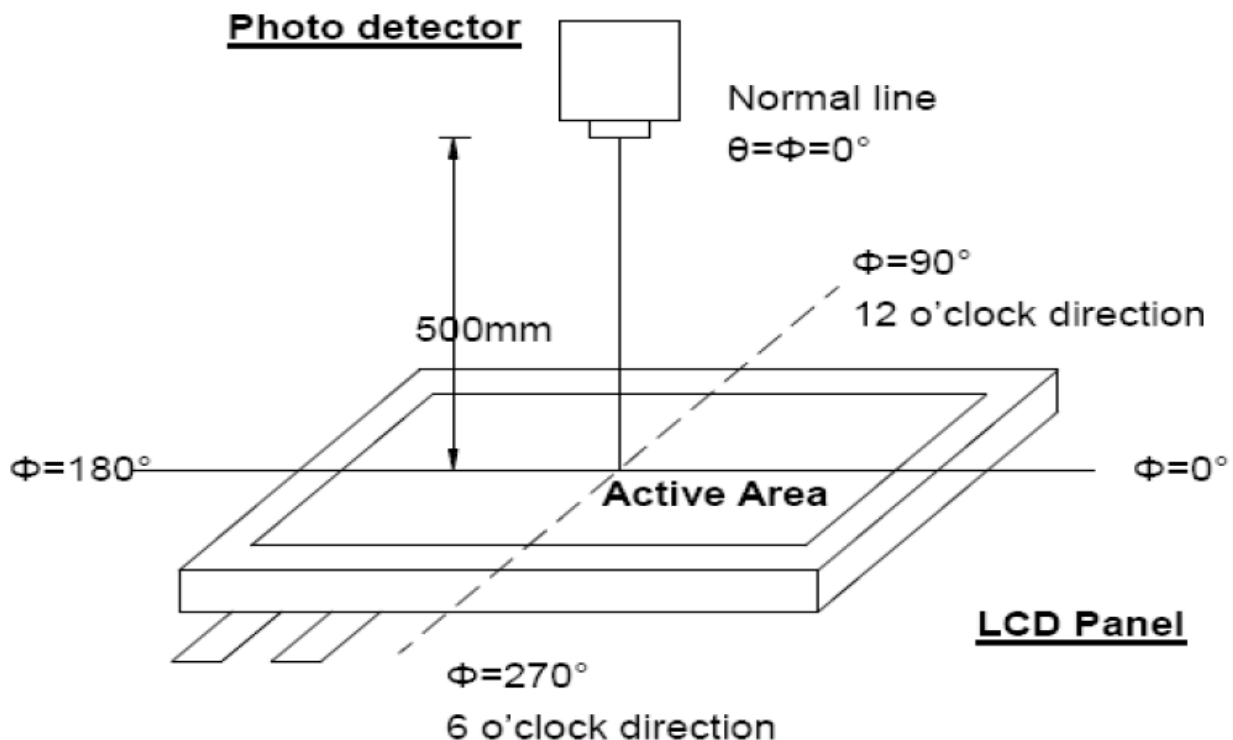
Note (2) Definition of Viewing Angle
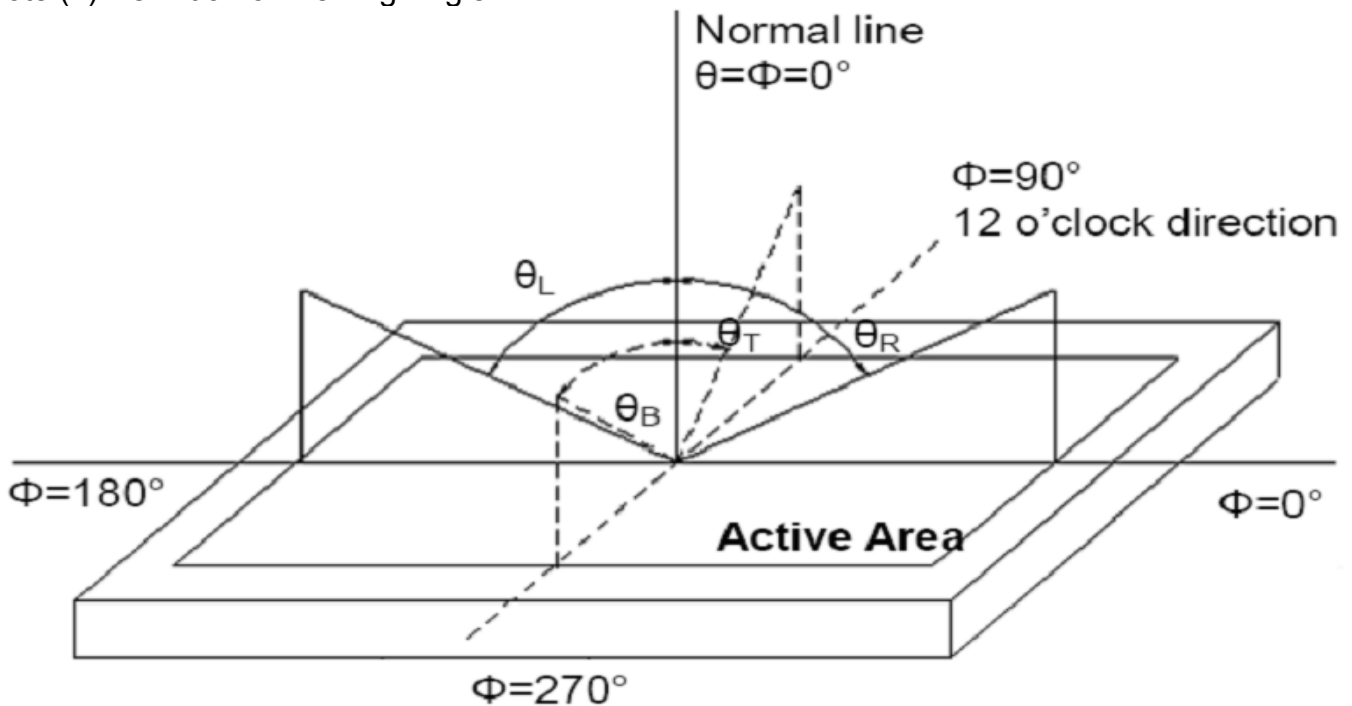
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63, L0: Luminance of gray level 0

Note (4) Definition of response time
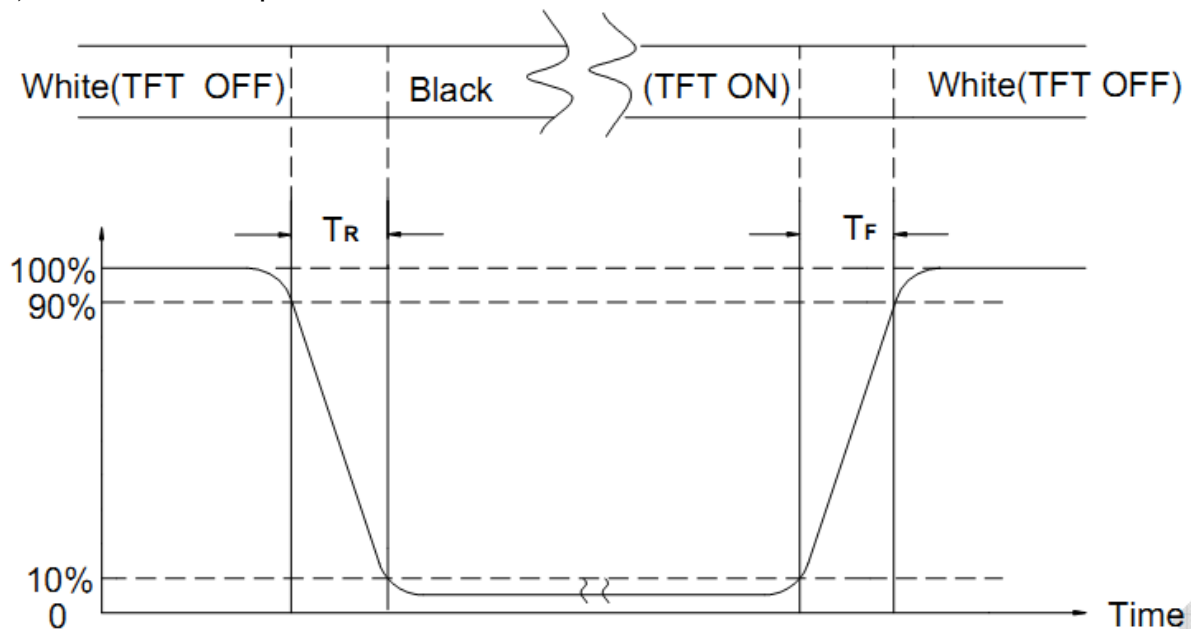
Note (5) Definition of Transmittance (Module is without signal input)

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

11. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
	High Temperature Storage	80°C±2°C×96Hours	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.
	Low Temperature Storage	-30°C±2°C×96Hours	
	High Temperature Operating	70°C±2°C×96Hours	
	Low Temperature Operating	-20°C±2°C×120Hours	
	Temperature Cycle(Storage)	-20°C ⟷ 25°C ⟷ 70°C (30min) (5min) (30min) 1cycle Total 10cycle	
	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	
	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
	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.

12. Inspection Standard

12.1. QUALITY :

THE QUALITY OF GOODS SUPPLIED TO PURCHASER SHALL COME UP TO THE FOLLOWING STANDARD.

12.1.1. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM AMSON TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10℃ TO 40℃ ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

12.1.2. INCOMING INSPECTION

(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 (SAME AS MIL-STD-105E) , LEVEL II SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %
TOTAL	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

12.1.3. WARRANTY POLICY

AMSON WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. AMSON WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF AMSON.

12.2. CHECKING CONDITION
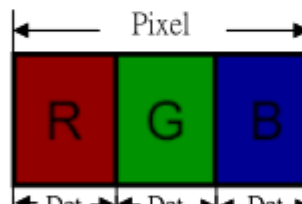
12.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.
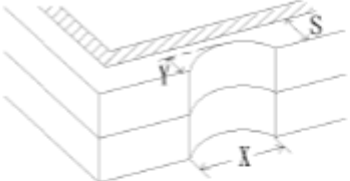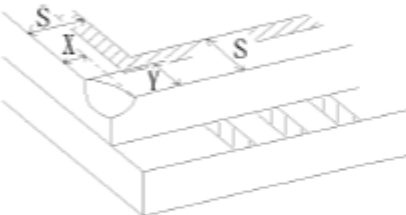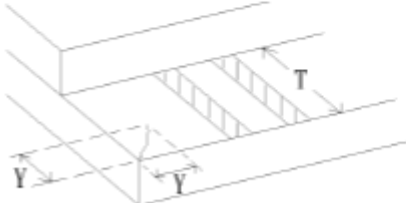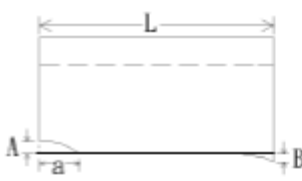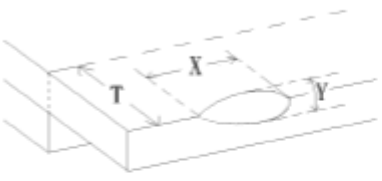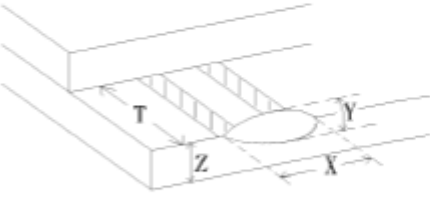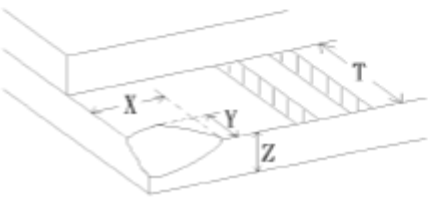
12.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

12.3. INSPECTION PLAN :

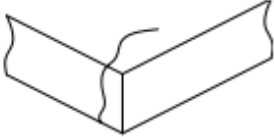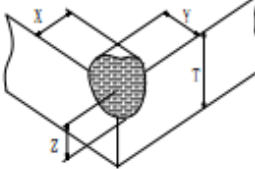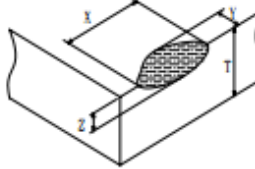| CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED...............REJECTED QUANTITY SHORT OR OVER......REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE ON THE PRODUCT	Major
ASSEMBLY	4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT.	ACCORDING TO SPECIFICATION OR DRAWING.	Major
APPEARANCE	5. VIEWING AREA	POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA ....REJECTED	Minor
	6. BLEMISH、BLACK SPOT、WHITE SPOT IN THE LCD AND LCD GLASS CRACKS	ACCORDING TO STANDARD OF VISUAL INSPECTION(INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH ON THE POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION(INSIDE VIEWING AREA)	Minor
	8. BUBBLE IN POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION(INSIDE VIEWING AREA)	Minor
	9. LCD'S RAINBOW COLOR	STRONG DEVIATION COLOR (OR NEWTON RING) OF LCD......REJECTED. OR ACCORDING TO LIMITED SAMPLE (IF NEEDED, AND INSIDE VIEWING AREA)	Minor
ELECTRICAL	10. ELECTRICAL AND OPTICAL CHARACTERISTICS (CONTRAST、VOP、CHROMATICITY ... ETC)	ACCORDING TO SPECIFICATION OR DRAWING . (INSIDE VIEWING AREA)	Critical
	11.MISSING LINE	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、WRONG PATTERN DISPLAY	NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION...... REJECTED	Critical
	13. DOT DEFECT (FOR COLOR AND TFT)	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

12.4 STANDARD OF VISUAL INSPECTION:

NO.	CLASS	ITEM	JUDGEMENT
12.4.1	MINOR	BLACK AND WHITE SPOT FOREIGN MATERIEL DUST IN THE CELL BLEMISH SCRATCH	(A) ROUND TYPE: unit : mm. **DIAMETER (mm.) — ACCEPTABLE Q'TY** $\Phi \leq 0.15$ — Distance≥1mm $0.15 < \Phi \leq 0.5$ — 3 (Distance>15mm) $0.5 < \Phi$ — 0 NOTE: Φ=(LENGTH+WIDTH)/2 (B) LINEAR TYPE: unit : mm. **LENGTH — WIDTH — ACCEPTABLE Q'TY** ------ , $W \leq 0.03$ — Distance>1mm $L \leq 4.0$, $0.03 < W \leq 0.05$ — 3 (Distance>15mm) ------ , $0.05 < W$ — FOLLOW ROUND TYPE
12.4.2	MINOR	BUBBLE IN POLARIZER DENT ON POLARIZER	unit : mm. **DIAMETER — ACCEPTABLE Q'TY** $\Phi \leq 0.2$ — Distance≥1mm $0.2 < \Phi \leq 0.5$ — 3 (Distance>15mm) $0.5 < \Phi$ — 0
12.4.3	MINOR	Dot Defect	**Items — ACC. Q'TY** Bright dot — N≤2 (Distance≥15mm) Dark dot — N≤3 (Distance≥15mm) Pixel Define : Note 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot. Definittion:<1/2dot and visible by 6% ND filter N≤5 Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern. Note 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.
12.4.4	MINOR	Mura	Not visible thriugh 6% ND filter in 50% gray or judge by limit sample if necessary

NO.	CLASS	ITEM	JUDGEMENT	
12.4.4	MINOR	LCD GLASS CHIPPING		$Y > S$ Reject
12.4.5	MINOR	LCD GLASS CHIPPING		X or $Y > S$ Reject
12.4.6	MAJOR	LCD GLASS GLASS CRACK		$Y > (1/2) T$ Reject
12.4.7	MAJOR	LCD GLASS SCRIBE DEFECT		1. $a > L/3$, $A > 1.5mm$. Reject 2. B : ACCORDING TO DIMENSION
12.4.8	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL AREA)		$\Phi = (x+y)/2 > 2.5$ mm Reject
12.4.9	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL SURFACE)		$Y > (1/3) T$ Reject
12.4.10	MINOR	LCD GLASS CHIPPING		$Y > T$ Reject

12.5 INSPECTION STANDARD OF TOUCH PANEL

NO.	CLASS	ITEMS		JUDGEMENT	
12.5.1	MAJOR	Touch Panel Crack			Reject
12.5.2	MINOR	Touch Panel Chipping	Corner	$X \leqq 2mm$, $Y \leqq 2mm$, $Z < 1/2T$	Accept
			Edge	$X \leqq 3mm$, $Y \leqq 3mm$, $Z < 1/2T$	Accept
12.5.3	MINOR	Scratch Dust and Foreign materiel (Linear Type)		$W \leqq 0.05$, $L \leqq 20mm$	Accept
				$0.05mm < W \leqq 0.07mm$: $L \leqq 10.0mm$ Distance between seratch $> 5.0mm$	Accept 3 ea Max.
				$W > 0.07mm$	Reject
12.5.4	MINOR	Scratch Dust and Foreign materiel (Round Type: Φ=(Length+Width)/2)		$\Phi \leqq 0.25mm$	Accept
				$0.25mm < \Phi \leqq 0.35mm$ Distance between spots $> 5.0mm$	Accept 5 ea Max.
				$\Phi > 0.35mm$	Reject
12.5.5	MINOR	Touch Panel Dent / Fish Eyes		$\Phi \leqq 0.35mm$	Accept
				$0.35mm < \Phi \leqq 1.0mm$ Distance $> 5.0mm$	Accept 3 ea Max.
				$\Phi > 1.0mm$	Reject
12.5.6	MINOR	Touch Panel Air Bubble		$\Phi \leqq 0.2mm$	Accept
				$0.2mm < \Phi \leqq 0.5mm$ Distance between bubbles $> 5.0mm$	Accept 3 ea Max.
				$\Phi > 0.5mm$	Reject
12.5.7	MINOR	Touch Panel Printing area Scratch		$W \leqq 0.05mm$, $L \leqq 5mm$ Distance between scratch $> 5.0mm$	Accept 3 ea Max.
				$W > 0.05mm$ or $L > 5mm$ ($W > 0.05$ Follow 11.5.4 Round type)	Reject
12.5.8	MINOR	Touch Panel White Haze Mark / Dust		Can not be removed	Reject

13. Handling Precautions

13.1 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.

13.2 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 (CI) , 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 happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

13.3 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.

13.4 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

13.5 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.

13.6 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.

13.7 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.

14. Precaution for Use

14.1

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.

14.2

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 this is not specified in this specification.
- 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.

15. Packing Method
TBD