ON TAT INDUSTRIAL COMPANY

SPECIFICATION

Product Model: CH430WQ01-T (Rev.A)

Designed by	R&D Checked by	Quality Department by	Approved by

Approval by Customer

OK

NG，Problem survey:

Approved By _____

ON TAT INDUSTRIAL COMPANY

<u>Revision Record</u>

REV NO.	REV DATE	CONTENTS	Note
A	2015-01-27	NEW ISSUE	

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1. Numbering System

TBD

2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	4.3"TFT	--
Dot arrangement	480(RGB)×272	dots
Color filter array	RGB vertical stripe	--
Display mode	TN / Transmission / Normally White	--
Viewing Direction	12 o'clock	--
Driver IC	-	--
Module size	105.5(W)×67.2(H)×4.1(T)	mm
Active area	95.04(W)×53.856(H)	mm
Dot pitch	0.198 (W)×0.198 (H)	mm
Interface	24-bit Parallel RGB Interface	--
Operating temperature	-20 ~ +70	℃
Storage temperature	-30 ~ +80	℃
Back Light	7 White LED	--
Weight	TBD	g

3. External Dimensions

NOTES:
1. DISPLAY TYPE: 4.3"TFT
2. VIEWING DIRECTION: 6:00
3. LCD DRIVE IC:
4. POLARIZER MODE: TRANSMISSIVE/POSITIVE
5. OPERATING TEMP: -20° C~+70° C
6. STORAGE TEMP: -30° C~+80° C
7. UNMARKER TOLERANCE: ±0.20
8. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

BL CIRCUIT DIAGRAM
VF=21.7V,IF=20mA

VLED+
VLED−

4.3" TFT
480x3(RGB)X272 DOTS
VIEWING DIRECTION

黄色绝缘胶

Conductor
Stiffener
(FPC-PI)

PIN	SYMBOL
1	VLED-
2	VLED+
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	PCLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	XR
38	YD
39	XL
40	YU

MODEL	CH430WQ01-T			
DRAWING	LGZ	DATE	2015.01.27	
CHECK		DATE		
APPROVE		DATE		
TOLERANCE	.X ±0.3, .XX ±0.2			
SCALE		PAGE	1 of 1	
UNIT	mm	SIZE	A4	(3)

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4. Interface Description

Pin	Symbol	Description.
1	VLED-	LED backlight (Cathode).
2	VLED+	LED backlight (Anode).
3	GND	Ground.
4	VDD	Power supply.
5~12	R0~R7	Red Data.
13~20	G0~G7	Green Data.
21~28	B0~B7	Blue Data.
29	GND	Ground.
30	PCLK	Dot clock signal input. Latching input data at its rising edge.
31	DISP	Display on/off.
32	HSYNC	Horizontal sync input. Negative polarity.
33	VSYNC	Vertical sync input. Negative polarity.
34	DE	Data enable input. Active high to enable the input data bus.
35	NC	NC.
36	GND	Ground.
37	XR	TP Right.
38	YD	TP Bottom.
39	XL	TP Left.
40	YU	TP Up.

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Analog Supply Voltage	VDD	-0.3	5	V
Input Voltage	Vin	-0.3	VDD+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
Analog Supply Voltage	VDD	3.0	3.3	3.6	V	-
Input High Voltage	V_{IH}	0.7VDD	-	VDD	V	Digital input pins
Input Low Voltage	V_{IL}	GND	-	0.3VDD	V	Digital input pins
Output High Voltage	V_{OH}	VDD-0.4	-	VDD	V	Digital output pins
Output Low Voltage	V_{OL}	GND	-	VDD+0.4	V	Digital output pins
I/O Leak Current	I_{LI}	-1	-	1	uA	-

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7. Timing Characteristics
7.1 Power ON/OFF Sequence
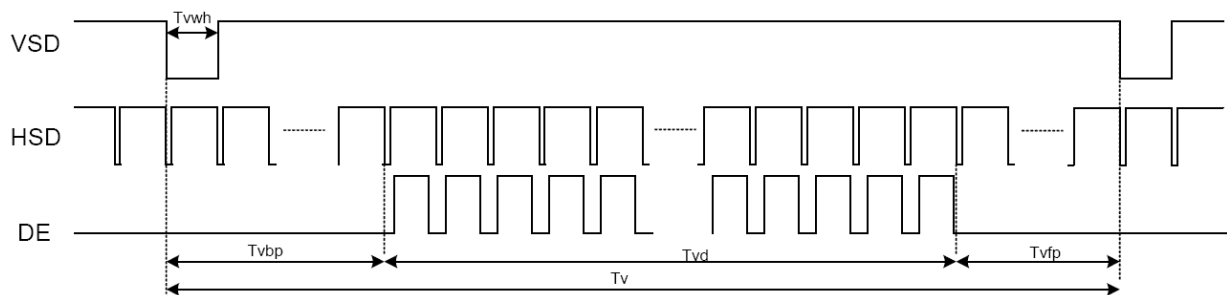### Power ON Sequence
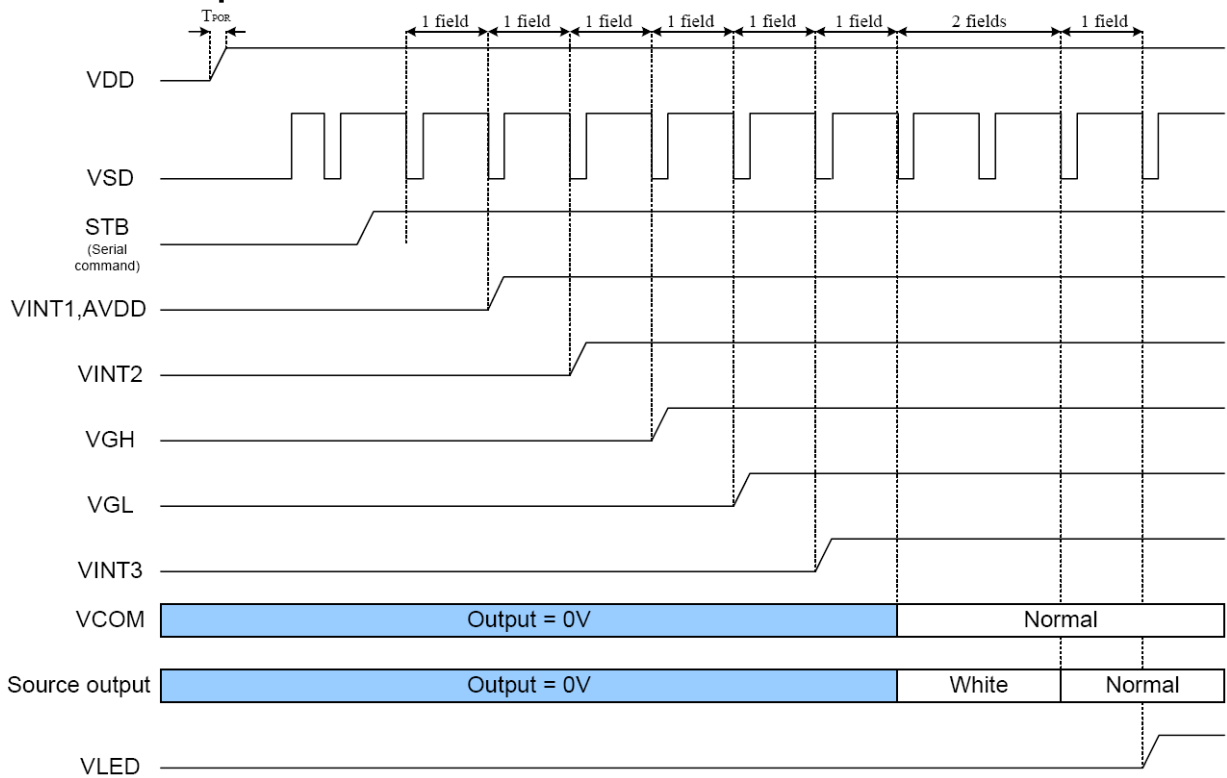
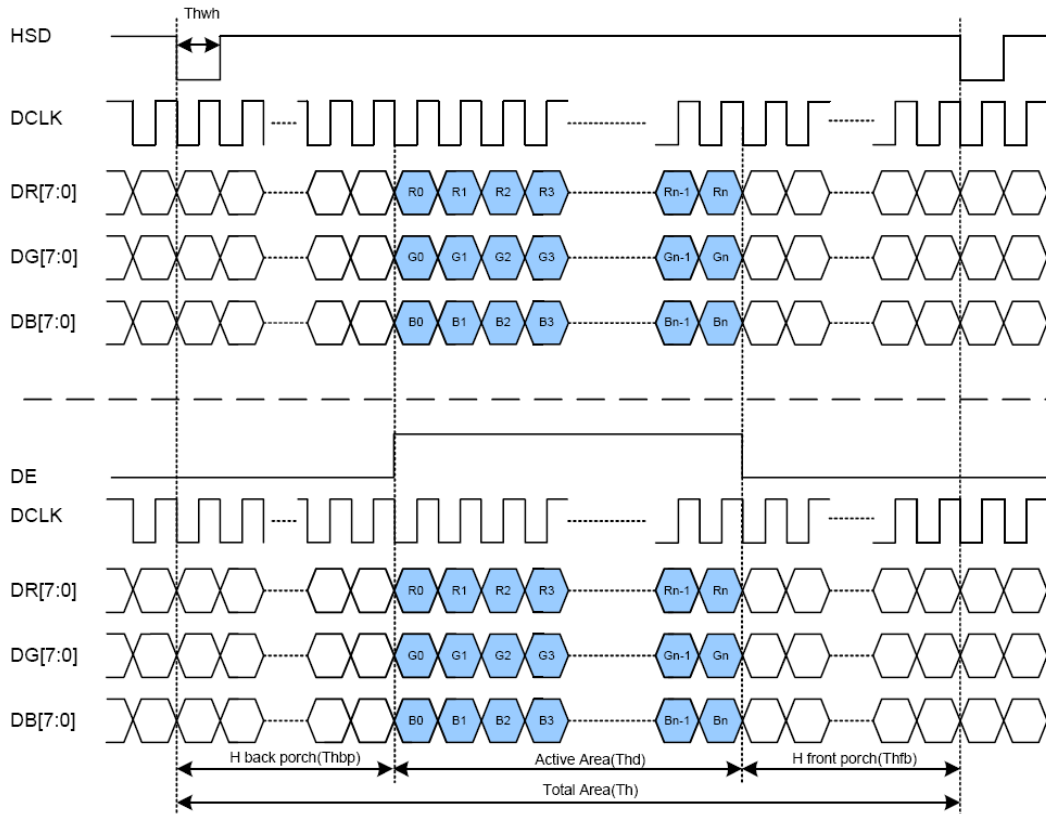### Power OFF Sequence
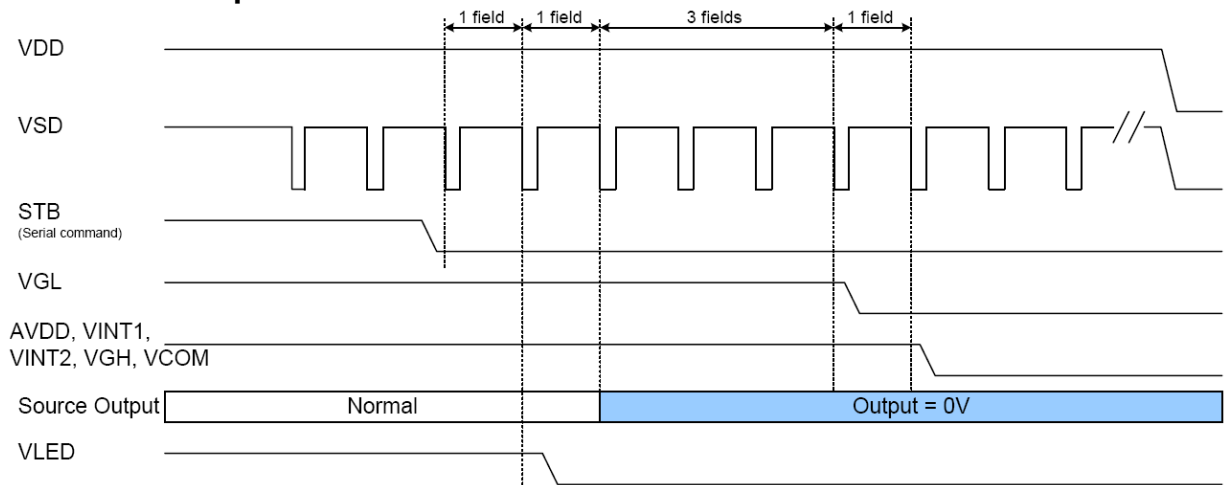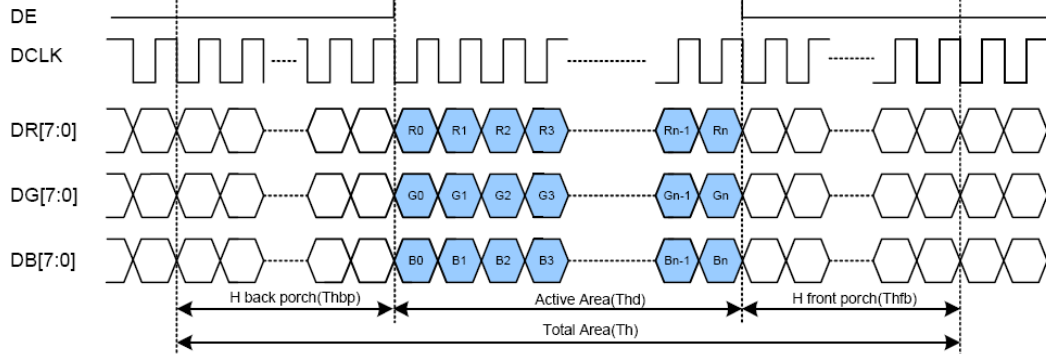

7.2 Data Input Format
7.2.1 Vertical input timing

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7.2.2 Parallel RGB Mode Data format

（HV Mode)

（DE Mode)

7.2.3 Parallel RGB input timing table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	93	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd		480		DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

8. Backlight Charasterics
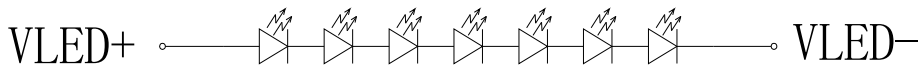
Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	20.3	22.4	24.5	V	If=20mA
Supply Current	If	-	20	30	mA	-
Luminous Intensity for LCM	-	150	200	-	Cd/m^2	If=20mA
Uniformity for LCM	-	80	-	-	％	If=20mA
Life Time	-	20000	-	-	Hr	If=20mA
Backlight Color			White			

9. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Threshold voltage		Vsat		—	2.4	—		(1)
		Vth		—	1.4	—		(1)
Transmittance (Without PZ)		T		—	19.1	—	%	
Contrast		CR		480	600	—		(2)(3)
Response time	Rising	T_R		—	3	6	msec	(2)(4)
	Falling	T_F		—	7	14		
Color gamut		S		—	50	—	%	C light
Color chromaticity (CIE1931)	White	W_x	Θ=0 Normal viewing angle	0.292	0.307	0.322		(2)(5) CF Glass C light
		W_y		0.333	0.348	0.363		
	Red	R_x		0.616	0.631	0.646		
		R_y		0.327	0.342	0.357		
	Green	G_x		0.306	0.321	0.336		
		G_y		0.538	0.553	0.568		
	Blue	B_x		0.134	0.149	0.164		
		B_y		0.168	0.183	0.198		
Viewing angle (With EWV PZ)	Hor.	Θ_L	CR>10	65	75	—		
		Θ_R		65	75	—		
	Ver.	Θ_U		50	60	—		
		Θ_D		60	70	—		
Optima View Direction			6 O' clock					(6)

Measuring Condition:
   Dark room, 25±2℃, 15min. warm-up time.
Measuring Equipment
   FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics. Measuring spot size: 20 ~ 21 mm.

Note (1) Definition of Viewing Angle :
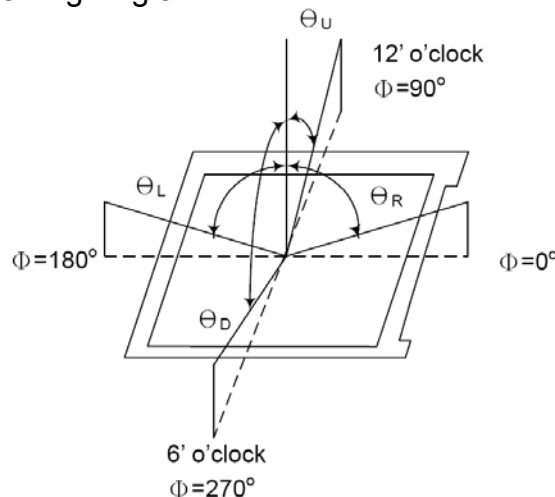
Note (2) Definition of Contrast Ratio(CR) :
    Measured at the center point of panel

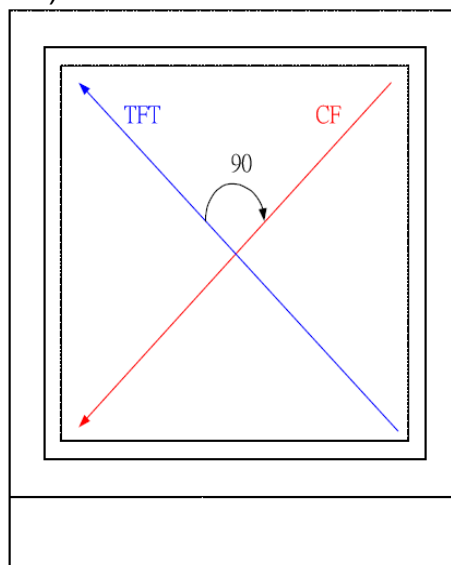   CR = Luminance with all pixels white / Luminance with all pixels black

Note (3) Definition of Response Time : Sum of T_R and T_F

white(TFT OFF)	black	(TFT ON)	white(TFT OFF)

Optical

response
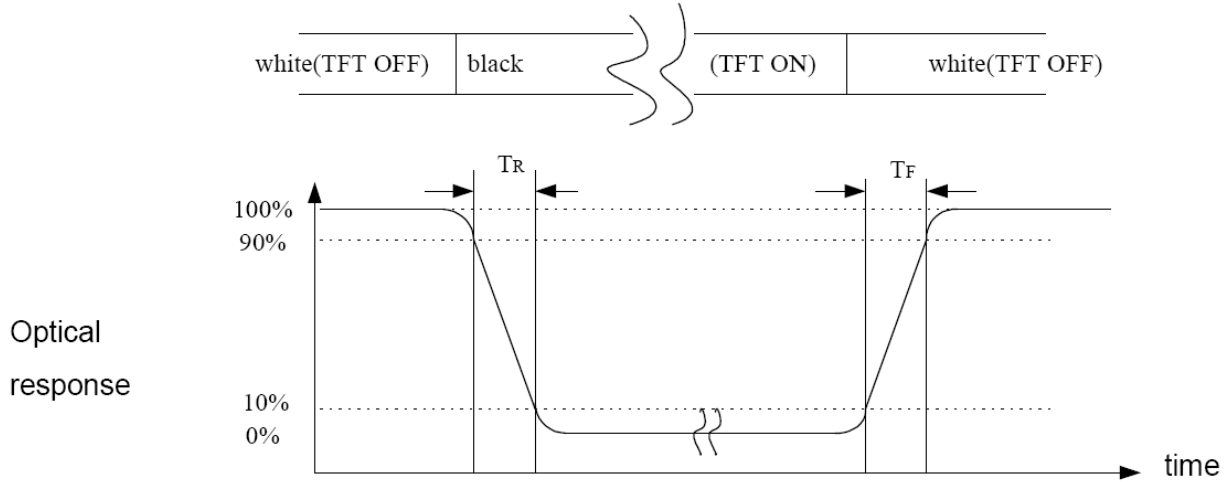
Note (4) Definition of optical measurement setup
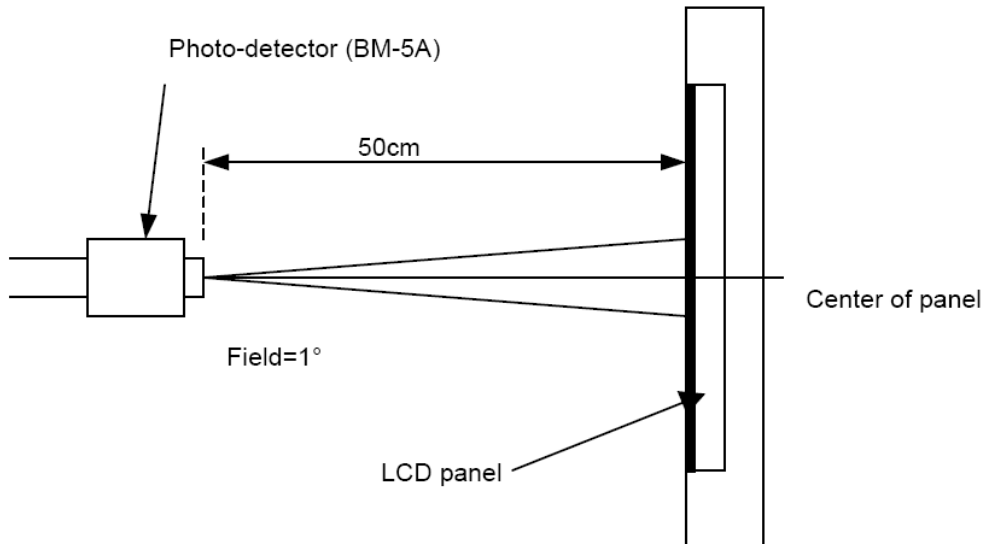
Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction).   TFT Face UP

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10. Reliability Test Conditions And Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80℃±2℃×200Hours	Inspection after 2~4hours storage at room temperature,the samples should be free from defects: 1,Air bublle in the LCD. 2,Sealleak. 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 charateristic requirements shall be satisfied.
②	Low Temperature Storage	-30℃±2℃×200Hours	
③	High Temperature Operating	70℃±2℃×120Hours	
④	Low Temperature Operating	-20℃±2℃×120Hours	
⑤	Temperature Cycle(Storage)	-20℃ ⟺ 25℃ ⟺ 70℃ (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50℃±5℃×90%RH×120Hours	
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 excepted 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.

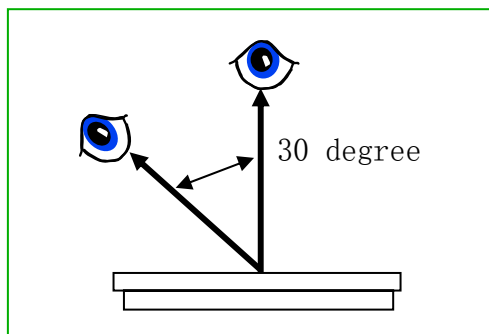# 11. Inspection Standard

This standard apply to C-STN/TFT module

1. **Spot check plan：**

According to spot check level Ⅱ,MIL-STD-105D Level Ⅱ,the rank of accept or reject is below:

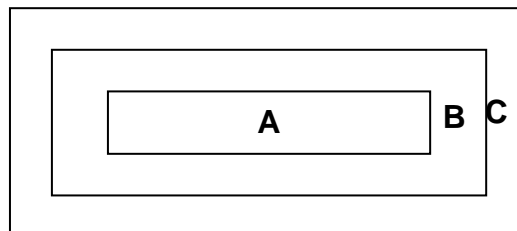3A 级、2A 级：major non-conformance：AQL 0.25 minor non-conformance：AQL 0.4

A 级：major non-conformance： AQL 0.65　　minor non-conformance： AQL 1.

2. **Inspection condition：**

30 degree

Under daylight lamp 20～40W，product distance inspector'eye 30cm,incline degree 30°。

3. **LCD area define：**

A　　B　C

Area A：display area

Area B：VA area

Area C：out of VA area,not in sight after assemby
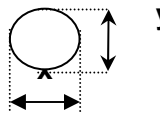
Remark :non-conformance at area C,but is OK that isn't influence raliability of product & assembly by customer.
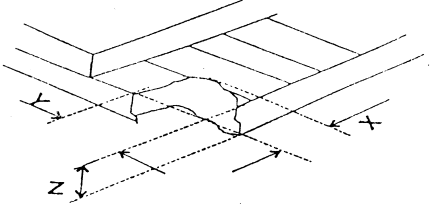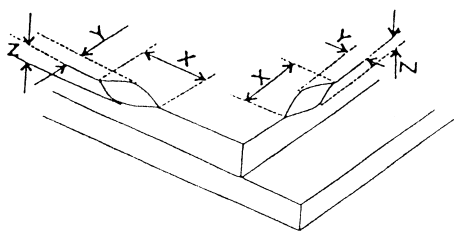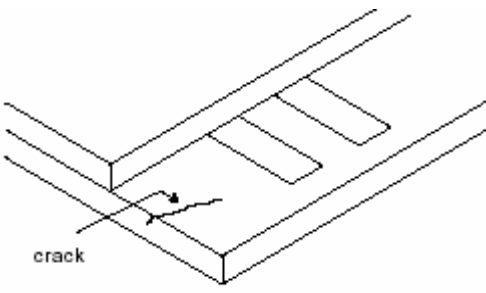
4. Inspection standard
4.1 Major non-conformance

NO.	Item	Inspection standard	Rate	
4.1.1	**Function non-confor mance**	1) No display,display abnormaly 2) Miss line, short 3) B/L no function or function abnormaly 4) TP no function	**major**	
4.1.2	**miss**	No matter miss what component		
4.1.3	**Out of size**	Module dimension out of spec		

4.2 Appearance non-conformance

NO.	Item	Inspection standard	Rate	
4.2.1	**Black or white spot（power on）**	**dot non-conformance define Φ** $$\Phi = \frac{(x+y)}{2}$$ **A grade** 	area / size（mm）	Most approve q'ty A	B	C
Φ≤0.10	ignore		
0.10＜Φ≤0.15	3		
0.15＜Φ≤0.20	2		ignore
0.20＜Φ≤0.3	1		
0.3＜Φ	0			 **Most approve 4 damages, dot to dot ≥10mm**	**Minor**	
4.2.2	**Black or white line（power on）**	**A grade** | Size(mm) L(length）	W(width)	Most approve q'ty A	B	C
ignore	W≤0.03	ignore		
L≤5.0	0.03＜W≤0.05	2		ignore
L≤3.0	0.05＜W≤0.07	1		
	0.07＜W	Treat with dot non-conformance		| **Most approve 3 damages, line to line ≥10mm**	**Minor**	

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4.2.3	**Polarizer position**	1) polarizer attach meet drawing,disallow out of LCD. 2) polarizer must cover display area（special require unless）	**Minor**	
4.2.4	**LCD non-conformance**	**(i) crash at side（remark: S=ITO length）** | X	Y	Z | |---|---|---| | ≤3.0 | ≤S | ignore | **Crash disallow extend to ITO or seal.** **(ii) commonly surface scathe** | X | Y | Z | |---|---|---| | ≤2.0 | <frame edge | ignore | **(iii) crack** **Disallow extend crack** crack	**Minor**	
4.2.5	**Contrast voltage warp**	**VOP/Vlcd voltage of confirmed sample±0.15V**	**Minor**	
4.2.6	**color**	**Color & luminance of module scope reference spec**	**Minor**	
4.2.7	**Cross talk**	**Reference confirmed limit sample**	**Minor**	

12. Handling Precautions

12.1 Mounting method

The LCD panel of SC LCD 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.

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) , Salfur (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), Salfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended 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.

12.4 packing

- Module employ 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

12.5 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.
- 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.

12.6 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

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 GT LCD , 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

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2194 862 460 905 02-LDR20 02-LDR21 02-LDR22 02-LDR23 1008 1020 1031