SPECIFICATION

Product Model: PV07056Y0130H

DESIGNED	CHECKED	Approved
研发部 2021.05.25 Aleck	研发部 2021.05.25 Hones	研发部 2021.05.25 Mike

Approval by Customer:

Ok

NG, Problem survey

Approved By_____

Revision Record

REV NO.	REV DATE	CONTENTS	Note
V0	2021.05.25	NEW ISSUE	

Table of Contents

1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by Kingtech Group Co.,Ltd.

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

2. General Information

TITEM	STANDARD VALUES	UNITS
LCD type	7.0"TFT	--
Dot arrangement	1024(RGB)×600	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black , Transmissive	-
Gray Scale Inversion Direction	ALL	--
Eyes Viewing Direction	80/80/80/80	
Module size	164.8(W)×100(H)×2.8(T)	mm
Active area	154.21(W)×85.92(H)	mm
Dot pitch	0.1506(W)×0.1432(H)	mm
Interface	MIPI	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	24White LED	--
Weight	TBD	g

3. External Dimensions

Kingtech Group Co.,Ltd

MODEL NUMBER: **PV07056Y0130H**

REV.	DESCRIPTION	REVISER	DATE
V0	NEW	Aheck	20210525

UNITS: mm   Unspecified Tolerance: ±0.20

DESIGN BY:
CHECKED BY:
APPROVED BY:

SHEET: 1 of 1   DRAWING DESCRITUON: MODEL
PROJECTION

PIN ASSIGNMENT

No.	Pin
1	LEDA
2	LEDA
3	VGH
4	VGL
5	UP
6	LR
7	LEDK
8	LEDK
9	AVDD
10	GND
11	D3P
12	D3N
13	GND
14	D2P
15	D2N
16	GND
17	CLKP
18	CLKN
19	GND
20	D1P
21	D1N
22	GND
23	D0P
24	D0N
25	GND
26	STBYB
27	RESET
28	VDD
29	VDD
30	VCOM

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

164.8±0.3 (LCM OUTLINE)
156.4±0.3 (BEZEL OPEN)
155.6±0.2 (POL)
154.21 (A/A)
5.8±0.25
6.99±0.20
2.8±0.2

100±0.3 (LCM OUTLINE)
88.5±0.3 (BEZEL OPEN)
87.7±0.2 (POL)
85.92 (A/A)
3.5±0.25
4.62±0.20
72.99±0.5
58.61±0.5
5±0.5

W=0.35±0.05   P0.5*(30-1)=14.5±0.1
0.5   15.5±0.15
3.5±0.3

Stiffener (FPC+PI) 0.3±0.05
Conductor

RGB 0.0502 0.1432

DETAIL A

LEDA
LEDK
VF=9.6V(Typ), IF=160mA(Fix)
350nits(Min), 400nits(Typ.)

高温胶纸

NOTES:
1. DISPLAY TYPE: 7.0"TFT
2. VIEWING DIRECTION: ALL
3. POLARIZER MODE: TRANSMISSIVE//NEGATIVE
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

ROHS

All Pages Of This Edition Approved
Signature: Date:

4. Interface Description

PIN	PIN NAME	DESCRIPTION
1	LEDA	LED backlight (Anode).
2	LEDA	
3	VGH	Positive Power for TFT.
4	VGL	Negative Power for TFT.
5	UP	Up / Down Display Control.
6	LR	Left or Right Display Control.
7	LEDK	LED backlight (Cathode).
8	LEDK	
9	AVDD	Analog Power.
10	GND	Power ground.
11	D3P	MIPI differential data lane 3 input (Positive).
12	D3N	MIPI differential data lane 3 input (Negative) .
13	GND	Power ground.
14	D2P	MIPI differential data lane 2 input (Positive).
15	D2N	MIPI differential data lane 2 input (Negative) .
16	GND	Power ground.
17	CLKP	MIPI differential clock input (Positive).
18	CLKN	MIPI differential clock input (Negative).
19	GND	Power ground.
20	D1P	MIPI differential data lane 1 input (Positive).
21	D1N	MIPI differential data lane 1 input (Negative) .
22	GND	Power ground.
23	D0P	MIPI differential data lane 0 input (Positive).
24	D0N	MIPI differential data lane 0 input (Negative) .
25	GND	Power ground.
26	STBYB	Standby mode. STBYB = "H" ,normal operation(default) STBYB = "L" , timing controller, source driver will turn off, all output are High-Z.
27	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.(R=10KΩ, C=1μF)
28	VDD1.8	Digital Power 1.8V.
29	VDD1.8	Digital Power 1.8V.
30	VCOM	Common Voltage.

5. Electrical specification

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Input signal Voltage	VCOM	-	4.55	-	V	-
Logic Supply Voltage	DVDD	2.3	3.3	3.6	V	-
Analog Supply Voltage	AVDD	-	12.0	-	V	
Low Supply Voltage	VGL	-	-7	-	V	
High Supply Voltage	VGH	-	17	-	V	
Output High Voltage	VIH	0.7XVDD	-	VDD	V	-
Output Low Voltage	VIL	0	-	0.3xVDD	V	-

Note 1: Please adjust VCOM to make the flicker level be minimum. Typ VCOM 电压值
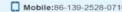只做参考，具体以实际效果为准（根据FLICKER 状态可调整）

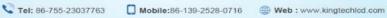Note 2: The gate IC is the EK73217A, The source IC is the EK79007

6. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	DVDD	-0.5	5	V
Analog Supply Voltage	AVDD	-0.5	12.5	V
High Supply Voltage	VGH	-0.3	40	V
Low Supply Voltage	VGL	-20	0.3	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C

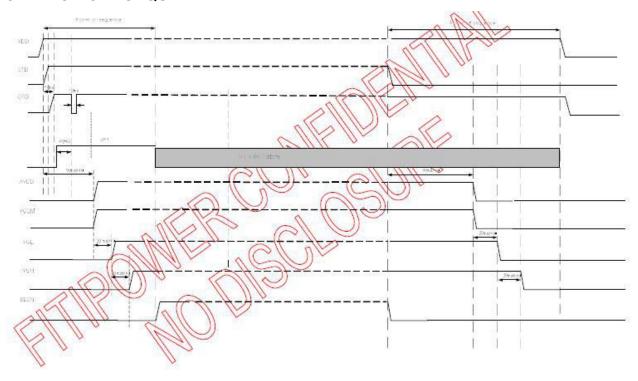# 7. Timing Characteristics

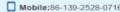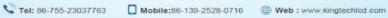## 7.1 POWER ON/OFF SEQUENCE

Note: CLK and Data Lanes should keep in LP11(stop state) before GRB.
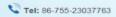
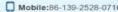## 7.2 INPUT SIGNAL TIMING

7.2.1 Basic DC Characteristic
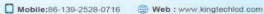
(VDD=VDD_IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND_IF=0V)

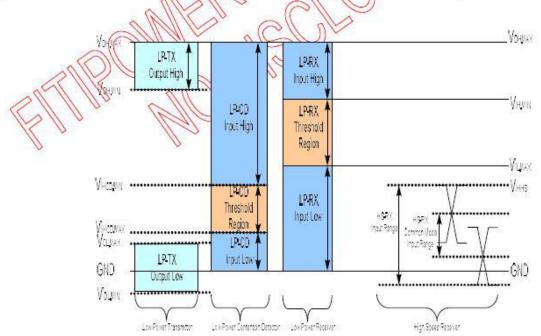| Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Low level input voltage	Vil	For the digital circuit	0	-	0.3×VDD	V
High level input voltage	Vih	For the digital circuit	0.7×VDD	-	VDD	V
Input leakage current	Ii	For the digital circuit	-	-	±1	µA
High level output voltage	Voh	Ioh= -400 µA	VDD - 0.4	-	-	V
Low level output voltage	Vol	Iol= +400 µA	-	-	GND+0.4	V
Pull low/high resistor	Ri	For the digital input pin @ VDD_IF=1.8V	200K	250K	300K	ohm
Digital Operation current	Idd	Fclk=51.2MHz, VDD=VDD_IF=1.8V	-	TBD	-	mA
Digital HW Stand-by current	Ist1	Clock and all functions are stopped	-	50		µA
Analog Operating Current	Idda	No load, Fclk=51.2MHz, @AVDD=13.5V,V1=13.4V, V14=0.1V	-	10	12	mA
Analog Stand-by current	Ist2	No load, clock and all functions are stopped	-	10	50	µA
Input level of V1 ~ V7	Vref1	Gamma correction voltage input	0.4*AVDD	-	AVDD-0.1	V
Input level of V8 ~ V14	Vref2	Gamma correction voltage input	0.1	-	0.6*AVDD	V
Output Voltage deviation	Vod1	Vo = AGND+0.1V ~ AGND+0.5V and Vo = AVDD-0.5V ~ AVDD-0.1V	-	±20	±35	mV
Output Voltage deviation	Vod2	Vo = AGND+0.5V ~ AVDD-0.5V	-	±15	±20	mV
Output Voltage Offset between Chips	Voc	Vo = AGND+0.5V ~ AVDD-0.5V	-	-	±20	mV
Dynamic Range of Output	Vdr	SO1 ~ 1536	0.1	-	AVDD-0.1	V
Sinking Current of Outputs	IOLy	SO1 ~ 1536; Vo=0.1V v.s 1.0V , AVDD=13.5V	80	-	-	uA
Driving Current of Outputs	IOHy	SO1 ~ 1536; Vo=13.4V v.s 12.5V , AVDD=13.5V	80	-	-	uA
Resistance of Gamma Table	Rg	Rn: Internal gamma resistor	0.7*Rn	1.0*Rn	1.3*Rn	ohm

7.2.1 MIPI Interface DC Characteristic

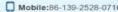(VDD=VDD_IF=1.8V,AVDD=8 to 13.5V,GND=AGND=GND_IF=0V,TA=-20℃ to 85℃)

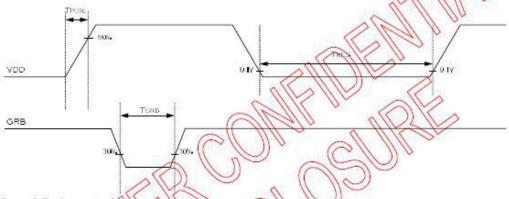| Parameter	Symbol	Min.	Typ.	Max.	Unit
MIPI Characteristics for High Speed Receiver					
Single-ended input low voltage	VILHS	-40	-	-	mV
Single-ended input high voltage	VIHHS	-	-	460	mV
Common-mode voltage	VCDRXDC	70	-	330	mV
Differential input impedance	ZID		100		ohm
HS transmit differential voltage(VOD=VDP-VDN)	|VOD|	140	200	250	mV
MIPI Characteristics for Low Power Mode					
Pad signal voltage range	VI	-50	-	1350	mV
Ground shift	VGNDSH	-50	-	50	mV
Logic 0 input threshold	VIL	0	-	550	mV
Logic 1 input threshold	VIH	880	-	1350	mV
Input hysteresis	VHYST	25	-	-	mV
Output low level	VOL	-50	-	50	mV
Output high level	VOH	1.1	1.2	1.3	V
Output impedance of Low Power Transmitter	ZOLP	80	100	125	ohm
Logic 0 contention threshold	VILCD,MAX	-	-	200	mV
Logic 0 contention threshold	VIHCD,MIN	450	-	-	mV

7.3 AC ELECTRICAL CHARACTERISTICS
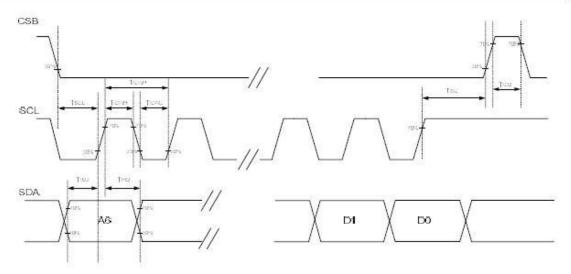## 7.3.1 Basic AC Characteristic

(VDD=VDD_IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND_IF=0V,TA=-20 to +85℃)
VDD/GRB AC characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
VDD power slew rate	T_{POR}	-	-	20	ms	From 0 to 90% VDD
GRB active pulse width	T_{GRB}	1	-	-	ms	VDD=VDD_IF= 1.8V
VDD resettle time	T_{RES}	1	-	-	s	

3-wire interface AC characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit
CSB falling to SCL rising time	T_{SCL}	200	-	-	ns
SCL pulse high period	T_{ICWH}	100	-	-	ns
SCL pulse low period	T_{ICWL}	100	-	-	ns
SCL pulse width	T_{ICWP}	250	-	-	ns
SDA data input setup time	T_{ISU}	100	-	-	ns
SDA data input hold time	T_{IED}	100	-	-	ns
SCL to CSB rising time	T_{ISC}	250	-	-	ns
CSB rising to failing time	T_{ICD}	1	-	-	us

7.3.2 MIPI AC Characteristic
LP Transmitter AC Specification

Parameter		Symbol	Min	Typ	Max	Units	Notes
15%~85% rising time and falling time		T_{RLP} /T_{FLP}	-	-	25	ns	-
30%~85% rising time and falling time		T_{REOT}	-	-	35	ns	-
Pulse width of LP exclusive-OR clock	First LP EXOR clock pulse after STOP state or Last pulse before stop state	$T_{LP-PULSE-TX}$	40	-	-	ns	-
	All other pulses		20	-	-	ns	-
Period of the LP EXOR clock		$T_{LP-PER-TX}$	90	-	-	mV/ns	-
Slew Rate @C_{LOAD} =0pF		$\delta V/\delta t_{SR}$	30	-	500	mV/ns	-
Slew Rate @C_{LOAD} =5pF			30	-	200	mV/ns	-
Slew Rate @C_{LOAD} =20pF			30	-	150	mV/ns	-
Slew Rate @C_{LOAD} =70pF			30	-	100	mV/ns	-
Load Capacitance		T_{RLP}	-	-	70	pF	-

High speed transmission

Parameter	Symbol	Min	Typ	Max	Units
UI instantaneous	UI_{INST}	2	-	12.5	ns
Data to Clock Skew(measured at transmitter)	$T_{SKEW(TX)}$	-0.15	-	0.15	UI_{INST}
Data to Clock Setup time(measured at receiver)	$T_{SETUP(RX)}$	0.15	-	-	UI_{INST}
Data to Clock Hold time(measured at receiver)	$T_{HOLD(RX)}$	0.15	-	-	UI_{INST}
20%~80% rise time and fall time	T_R, T_F	150	-		ps
		-	-	0.3	UI_{INST}

8. Backlight Characteristic

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	8.1	9.0	10.2	V	If=160mA
Supply Current	If	-	160	-	mA	-
Luminous Intensity for LCM	-	350	400	-	cd/m²	If=160mA
Uniformity for LCM	-	80	-	-	%	If=160mA
Life Time	-	20000	-	-	Hr	If=160mA
Backlight Color	White					

9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	80	-	-	degree	(1),(2),(6)
		θR	80	-	-		
	Vertical	θT	80	-	-		
		θB	80	-	-		
Contrast Ratio	Center		800	1000	-	-	(1),(3),(6)
Response Time	Rising		-	25	35	ms	(1),(4),(6)
	Falling						
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.
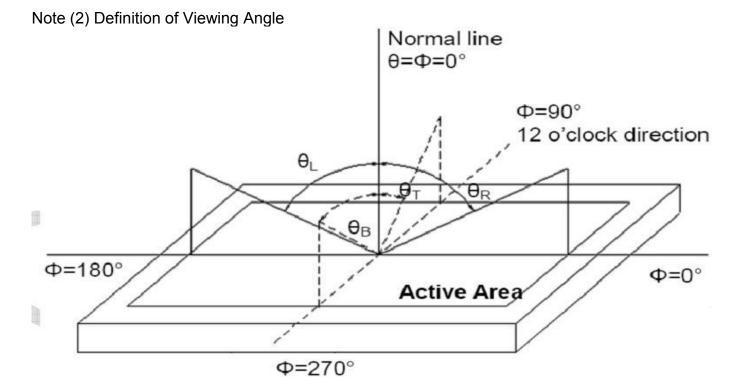
Note (2) Definition of Viewing Angle

Normal line
$\theta=\Phi=0°$

$\Phi=90°$
12 o'clock direction

θ_L

θ_T θ_R

θ_B

$\Phi=180°$

$\Phi=0°$
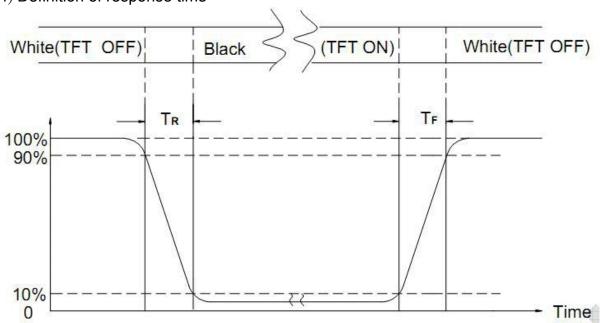
Active Area

$\Phi=270°$

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

White(TFT OFF)   Black   (TFT ON)   White(TFT OFF)

T_R T_F

100%
90%

10%
0

Time

Note (5) Definition of Transmittance (Module is without signal input)
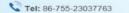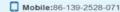   Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

    Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods11. Inspection Standard

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°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.
②	Low Temperature Storage	-30°C×96Hours	
③	High Temperature Operating	60°C×96Hours	
④	Low Temperature Operating	-10°C×96Hours	
⑤	Temperature Cycle(Storage)	-30°C ⟷ 25°C ⟷ 80°C (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C×90%RH×96Hours	
⑦	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)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
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.

11.1. QUALITY :

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

11.1.1. INSPECTIONTOOLS AND INSTRUMENTS

Vernier calipers, film scales, multimeter, magnifying eyepiece, ND5%, luminance meter and so on.

11.1.2. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM KINGTECH 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.

11.1.3. 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

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	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.

11.1.4. WARRANTY POLICY

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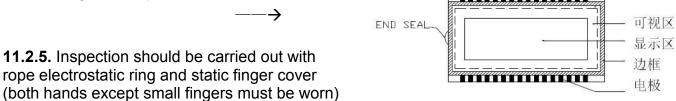
11.2. CHECKING CONDITION

11.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

11.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE

11.2.3. Ambient Illumination:

0 ~30 Lux for functional inspection

500 ~ 1200 Lux for external appearance inspection.

11.2.4. TEST AREA：

END SEAL — 可视区 — 显示区 — 边框 — 电极

11.2.5. Inspection should be carried out with rope electrostatic ring and static finger cover (both hands except small fingers must be worn)

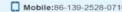**11.2.6.** The inspector may make a visual inspection or a comparative examination with a film

ruler and a magnifying eyepiece. Individual defects shall be determined according to the limited samples.

11.2.7. Functional testing uses electrical testing fixtures or test fixtures required by customers.

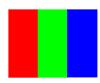**11.2.8.** the ion fan should be used when testing.

11.2.9. the principle of judgment

11.3.1   If the defect outside the visual area does
  not affect the assembly and display,
    it will be judged as a good product.

11.3.2   Poor definition

Pixel:
A combination of three sub-pixels
  (Red + Green + Blue).

Dot:
Any of the sub-pixels
  (Red or Green or Blue).

Bright and dark dots:
    A point pixel (sub-pixel: R, G, B pixels) is lit or turned off during the display function test.
Highlights:
        Usually considered to be shown on a black screen.
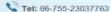**Dark spots:**
        They are generally considered to be shown on R, G, B solid colors or white images.
Neighborhood:
          Two or three adjacent point pixels (dot: sub-pixel) connected together (R, G or G, B or B, R or RGB).
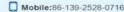
11.3. INSPECTION PLAN :

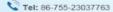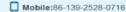| CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED...............REJECTED QUANTITY SHORT OR OVER......REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL 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

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KINGTECH

Professional LCD Module Manufacturer since 2003

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NO.	CLASS	ITEM	JUDGEMENT
11.4.1	MINOR	BLACK AND WHITE SPOT FOREIGN MATERIEL DUST IN THE CELL BLEMISH SCRATCH	(A) ROUND TYPE: unit : mm. DIAMETER (mm.) / ACCEPTABLE Q'TY: Φ ≤ 0.15 → Distance≥1mm 0.15 < Φ ≤ 0.4 → 3 (Distance>15mm) 0.4 < Φ → 0 NOTE: Φ=(LENGTH+WIDTH)/2 (B) LINEAR TYPE: unit : mm. LENGTH / WIDTH / ACCEPTABLE Q'TY: ------ W ≤0.03 → Distance≥1mm L ≤ 4.0 0.03 < W ≤0.05 → 3 (Distance>15mm) ------ 0.05 < W → FOLLOW ROUND TYPE
11.4.2	MINOR	BUBBLE IN POLARIZER DENT ON POLARIZER	unit : mm. DIAMETER / ACCEPTABLE Q'TY: Φ ≤ 0.2 → Distance≥1mm 0.2 < Φ ≤ 0.5 → 3 (Distance>15mm) 0.5 < Φ → 0
11.4.3	MINOR	Dot Defect	Items / ACC. Q'TY: Bright dot → N≤2 (Distance≥15mm) Dark dot → N≤3 (Distance>15mm) Pixel Define: R G B ← Dot → ← Dot → ← Dot → 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 5% 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.
11.4.4	MINOR	Mura	Not visible thriugh 5% ND filter in 50% gray or judge by limit sample if necessary

NO.	CLASS	ITEM	JUDGEMENT	
11.4.4	MINOR	LCD GLASS CHIPPING	$Y > S$	Reject
11.4.5	MINOR	LCD GLASS CHIPPING	X or $Y > S$	Reject
11.4.6	MAJOR	LCD GLASS GLASS CRACK	$Y > (1/2) T$	Reject
11.4.7	MAJOR	LCD GLASS SCRIBE DEFECT	1. $a > L/3$, $A > 1.5mm$. Reject 2. B : ACCORDING TO DIMENSION	
11.4.8	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL AREA)	$\Phi = (x+y)/2 > 2.5$ mm	Reject
11.4.9	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL SURFACE)	$Y > (1/3) T$	Reject
11.4.10	MINOR	LCD GLASS CHIPPING	$Y > T$	Reject

12. Handling Precautions

12.1 Mounting method

The LCD panel of KINGTECH 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.

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 (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.

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 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 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.
- 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 KINGTECH 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