SPECIFICATION
FOR
LCD MODULE

Customer　　:　_____

Product Model:　　TJ320035A-00

Sample code:　_____

Designed by	Checked by	Approved by
蒋尚	李世佼	

Final Approval by Customer

☐ LCM Machinery OK

Checked By ____

☐ LCM Display OK

Checked By ____

☐ LCM OK

☐ NG，Problem survey:

Approved By _____

※The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

Revision History

Version	Contents	Date	Note
A	Original	2012-08-23	

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2 Scope

This specification applies to the TFT LCD module which is designed and manufactured by LCM Factory of Tianji industral Co.,Ltd.
It is capable of using 262K colors mode , 8bit MCU interface

3 Normative Reference

GB/T4619-1996 《 Liquid Crystal Display Test Method》
GB/T2424 《Basic environmental Testing Procedures for Electric and Electronic Products.》
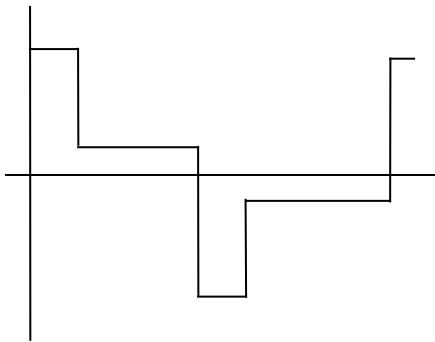GB/T2423 《Basic Testing Procedures for Electric and Electronic Products》
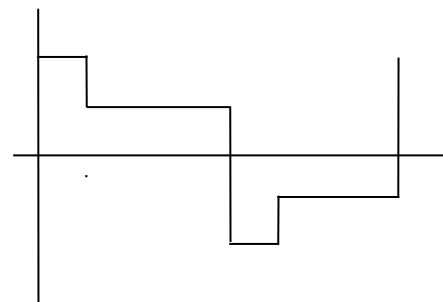IEC61747-1 《SIXTH PARTGB2828`2829-87《National Standard of PRC》

4 Definitions

4.1 Definitions of Vop

The definitions of threshold voltage Vth1, Vth2 the following typical waveforms are applied on liquid crystal by the method of equalized voltage for each duty and bias.

【 selected waveform 】　　　　　　　　【 non-selected waveform 】

① Vth1: The voltage which the brightness of segment indicates 50% of saturated value on the conditions of selected waveform
(f$_f$=80Hz, Φ=10°θ=270°at 25℃)

② Vth2: The voltage which the brightness of segment indicates 50% of saturated value on the conditions of non-selected waveform
(f$_f$=80Hz, Φ=10°θ=270°at 25℃)

③ Vop: (Vth1(50%)+Vth2(50%))/2   (f$_f$=80Hz, Φ=10°θ=270°at 25℃)

4.2 Definition of Response Time Tr, Td

①Tr: The time required which the brightness of segment becomes 10% from 100% when waveform is switched to selected one from non-selected one.   (f$_f$=80Hz, Φ=10°θ=270°at 25℃)

②Td: The time required which the brightness of segment becomes 90% from 10% when waveform is switched to selected one from selected one. (f$_f$=80Hz, Φ=10°θ=270°at
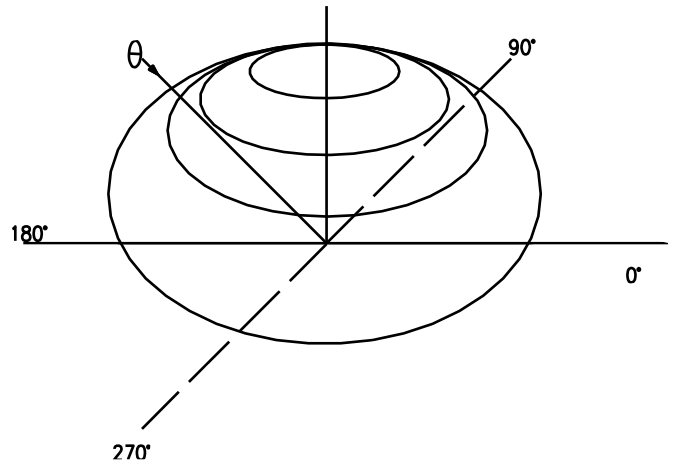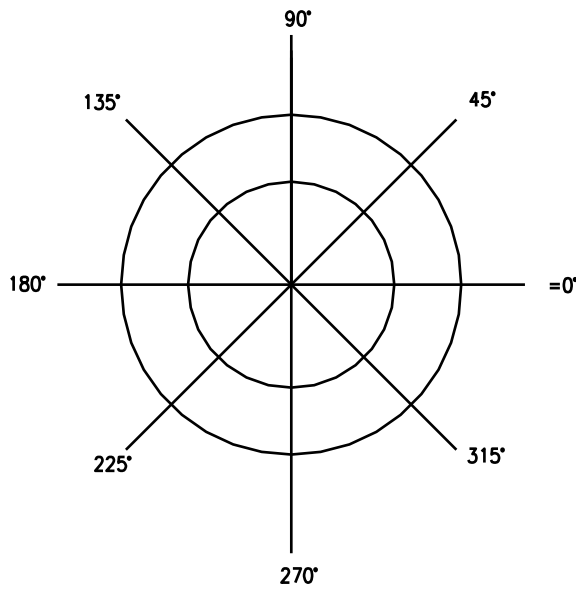
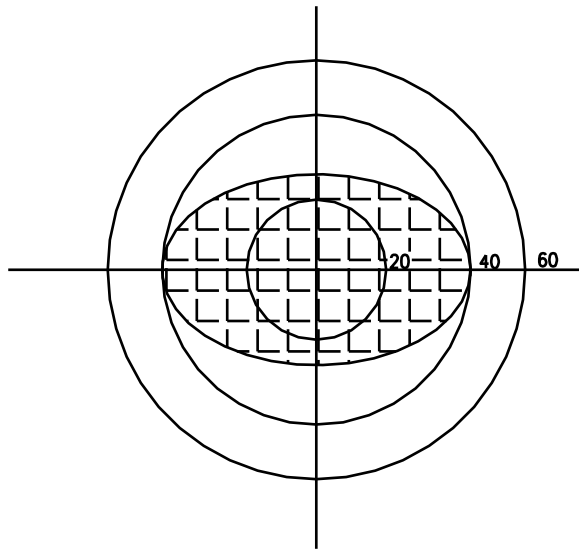　　　　　　　　　　　　REV.A

25℃)

4.3 Definition of Contrast Ratio Cr
Cr=A/B
1. A: Segments brightness in case of non-selected waveform
2. B: Segments brightness in case of selected waveform

4.4 Definition of Angle and Viewing Range

Angular Graph: Constrast Ratio

Such as:
Viewing Angle Range:
80(Cr>2) Horizontal
70(Cr>2) Vertical

5 Technology Specifications

5.1 Feature

Display operating Mode： Normally White
Display Color 　　　： 262K color

Display Format 　　： 240×400 Pixels

Input data 　　　： 8-bit MPU I/F

Viewing Direction ： 6 o'clock

LCD Driver 　　　： HX8352C

5.2 Mechanical Specifications

Item	Specifications	Unit
Dimensional outline	47.66(W) ×80.90(H)×2.3(T)	mm
Active area	41.76 (W) ×69.6 (H)	mm
Pixel size	0.174(W) ×0.174(H)	mm
Dot pitch	0.058(W) ×0.174(H)	mm

5.3 Absolute Max. Rating

Item	Symbol	Value			Unit	Remark
		Min	typ	Max		
Supply voltage	VCI	2.4		3.3	V	
Input voltage	V_{IN}	-0.3		VCI+0.3	V	
Operating temperature	T_{OPR}	-20		+70	℃	
Storage temperature	T_{STG}	-30		+80	℃	

5.4 Electrical Characteristics (VSS=0V,Ta=-20 to 70°C)

Item	Symbol	Condition	Min	Typ	Max	Unit
Input high voltage	V_{IH}	V_{DD}=1.8~3.3V	0.8 V_{DD}	-	V_{DD}	V
Input low voltage	V_{IN}	V_{DD}=1.8~3.3V	-0.3	-	0.2 V_{DD}	V
Output high voltage	V_{OH}	I_{OH}=-0.1mA	0.8 V_{DD}	-	-	V
Output low voltage	V_{OL}	V_{DD}=1.65~3.3V I_{OL}=0.1mA	-	-	0.2 V_{DD}	V
Current consumption for LCD	I_{DD1}	-	-0.1	-	0.1	uA

5.5 Optical specifications

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ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Luminance		L		180	200	-	cd/m^2	
Contrast Ratio		CR		150	200	-		Note 3
Response Time		Tr	$\theta = \psi = 0°$	-	12	16	ms	Note 4
		Tf		-	18	24	ms	
View angle	Upper	θ	CR$\geqq$5	55	60	-	°	Note 5
	Lower			-15	-20		°	
	Left	ϕ		-40	-45		°	
	Right			40	45		°	
Color Filter Chromacicity	R	x	$\theta = \psi = 0°$	0.588	0.608	0.628		Note 6
		y		0.306	0.316	0.326		
		Y		17.8	20.8	23.8		
	G	x		0.295	0.305	0.315		
		y		0.536	0.556	0.576		
		Y		57.6	61.6	65.6		
	B	x		0.125	0.135	0.145		
		y		0.122	0.137	0.152		
		Y		13.2	16.2	19.2		
	W	x		0.285	0.305	0.325		
		y		0.314	0.334	0.354		
		Y		28.9	32.9	36.9		

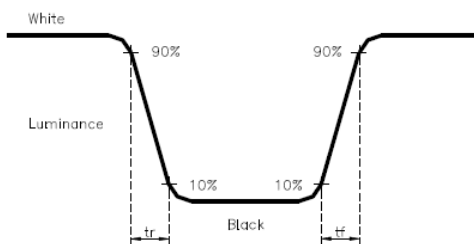Note 1. Ambient condition：25℃±2℃，60±10%RH，under 10 Lunx in the darkroom。
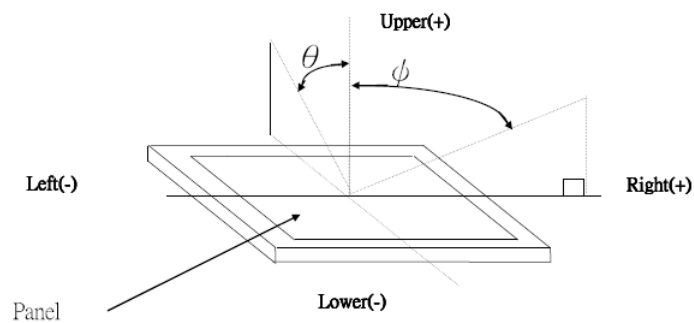Note 2. Measure device：BM-5A (TOPCON)，viewing cone=0.2°，I$_L$=15mA，after 10 minutes operation。
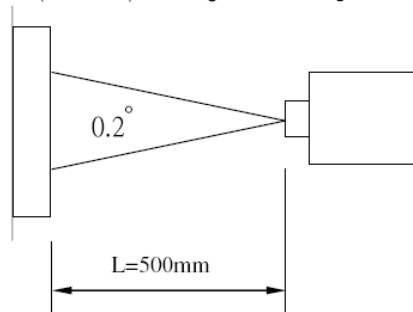
Note 3. Definition of Contrast Ratio：
CR = White Luminance (ON) / Black Luminance (OFF)

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)：


5.6 LED back light specification (6 White Chips)

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	Vf	If=90mA		3.2		V
Uniformity (with L/G)	$\triangle B_p$	If=90mA	90	-	-	%
Luminance for LCD	L_V	If=90mA	--	-	-	cd/m^2

5.7 Interface Pin Connections

| PIN NO.	Symbol	Description
1	LEDK2	LED backlight(Cathode)
2	LEDK1	LED backlight(Cathode)
3	LEDA	LED backlight(anode)
4	GND	Ground
5	DB8	DATA BUS
6	VCC(2.8V)	supply voltage
7	WR	Write execution control pin
8	RS	Command/Display data select pin
9	RESET	Reset pin.
10	CS	Chip select
11	RD	Read execution control pin
12	FMARK	Tearing Effect
13	VCC(2.8V)	supply voltage
14	DB15	DATA BUS
15	DB14	DATA BUS
16	DB13	DATA BUS
17	DB12	DATA BUS
18	DB11	DATA BUS
19	DB10	DATA BUS
20	DB9	DATA BUS
21	LEDK3	LED backlight(Cathode)
22	LEDK4	LED backlight(Cathode)
23	LEDK5	LED backlight(Cathode)
24	LEDK6	LED backlight(Cathode)

6 Signal timing diagram and Circuit block diagram
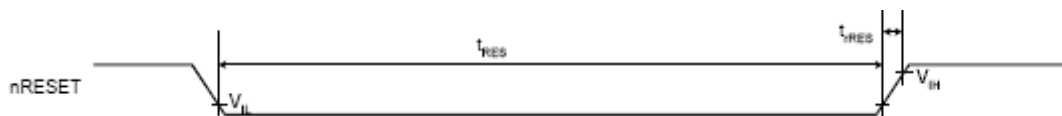
6.1 Circuit block diagram
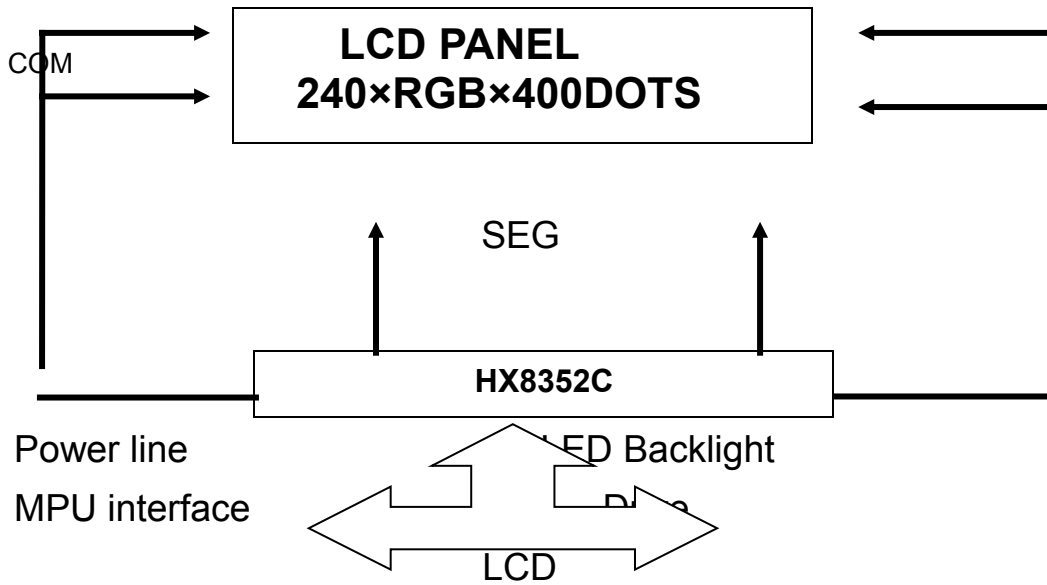
6.2 Signal Timing Diagram For Main LCD Driver HX8352C。

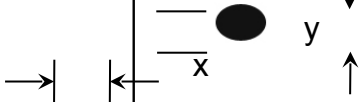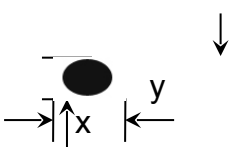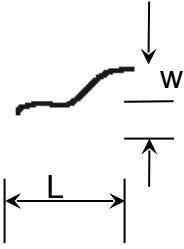Read/write Characteristics (8080-series Parallel mode)
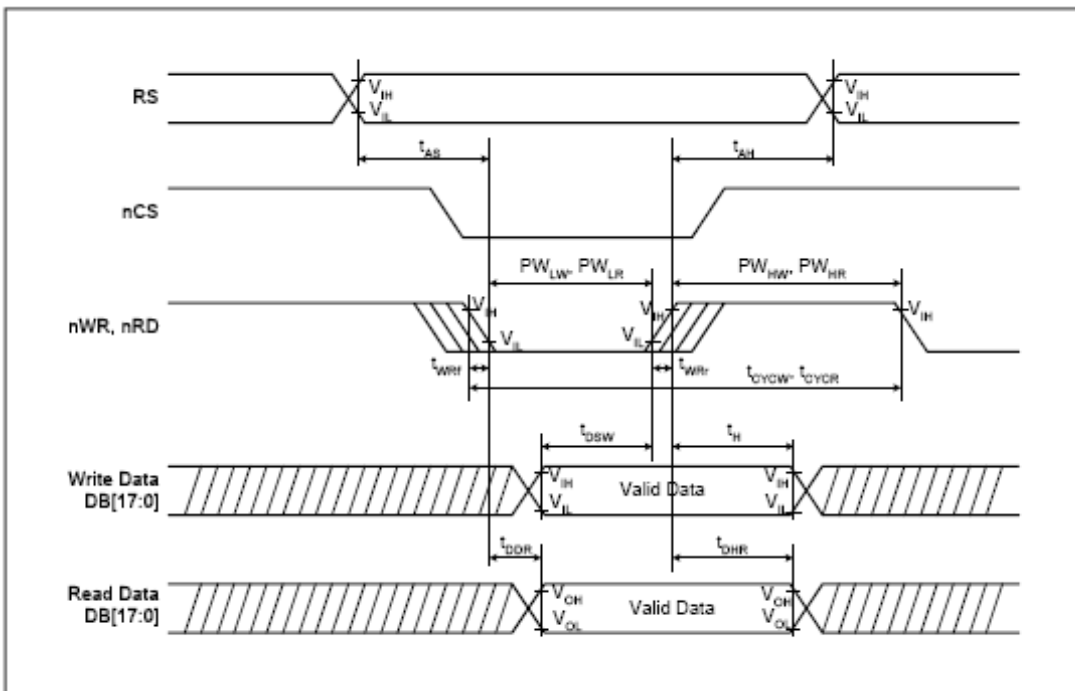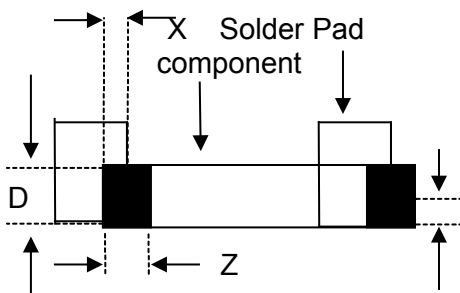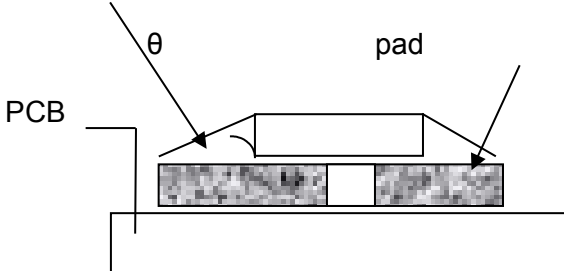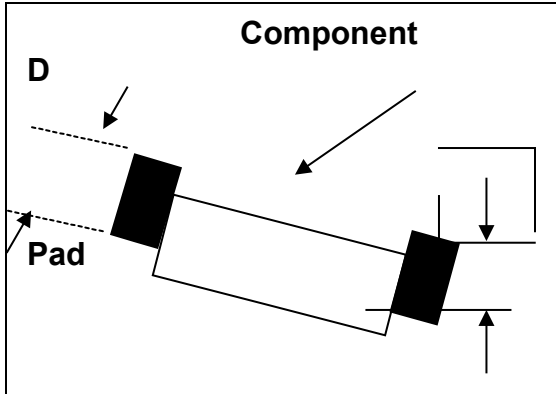

● Reset Operation

7 Reliability Test Conditions And Methods

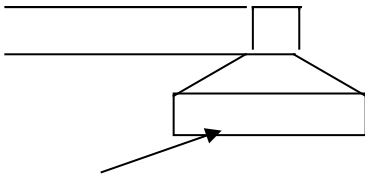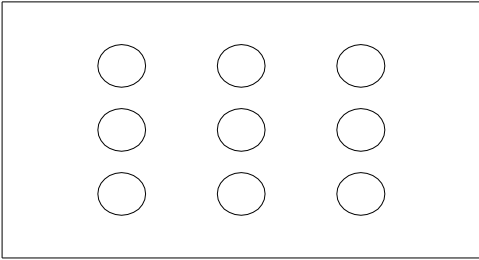| NO	Item	Condition	Method
1	High / Low Temperature Storage	80℃/-30℃ 120hrs	Check and record every 48Hrs
2	High / Low Temperature Life	70℃/-20℃ 120hrs (operating mode)	Check and record every 48Hrs
3	High Temperature、High Humidity Operating	60℃,90% RH, 96Hrs	Check and record every 48hrs
4	Thermal Shock	-30℃(30Min)⟶25℃(5Min) ⟶ 80℃(30Min) (conversion time, : 5 sec) 20 cycles	Each 10 cycles end , check
5	Vibration	10Hz~55Hz~10Hz Amplitude: 1.5mm 2hrs for each direction(X,Y,Z)	Each direction end, Check the Appearance and Electrical Characteristics
6	Static Electricity	Gap mood: ±1KV~±8KV (10 times air discharge with positive/negative voltage voltage gap : 1kv) Touch mood: ±1KV~±4KV	Each discharge end, Check the Electrical Characteristics
7	Curve	60 Thousand times, 40 times/min 150°(according to die if exist)	Check and record every 2~4 thousand times
8	Slump	Free faller movement for each side、cording、angle (75cm High、6 sides、2 angle、2 cording)	End

8 Inspection standard

No	Item	Criterion	
01	Outline Dimension	In accord with drawing	
02	Position-finding Dimension Assemble Dimension	In accord with drawing	
03	LCD black spots, white spots (Round type)	(see below)	

Round type: non display
3.1 Small area LCD   Unit : mm

Dimension	Qualified Quantity
D≤0.1	Ignore
0.1＜D≤0.15	2
D＞0.15	0

3.2 Large area LCD

Dimension	Qualified Quantity
D≤0.1	Ignore
0.1＜D≤0.15	2
0.15＜D≤0.20	1
D＞0.20	0

C-STN : if D＞0.1 , unqualified

| | | 4.1 Small area LCD　　　Unit : mm | | | |

4.1 Small area LCD　　　Unit : mm

Length	Width	Qualified Quantity
-	≤0.015	Ignore
≤1.0	0.015＜W≤0.025	2
≤2.0		1
≤1.0	0.025＜W≤0.05	1
-	D＞0.05	According to circle

4.2 Large area LCD

Length	Width	Qualified Quantity
-	≤0.015	Ignore
≤2.0	0.015＜W≤0.025	2
≤1.0	0.025＜W≤0.05	1
-	D＞0.05	According to circle

L　L

CSTN : If W ≥ 0.015 , unqualified
Ignore beyond viewing area

04	LCD black spots, white spots (Line Style)		
05	LCD Scratch 、 Threadlike Fiber	Same to NO.3 circle sightline and surface of LCD is vertical (2)Same to NO.3 line style	
06	POL	It is not admissible that POL is beyond the edge of glass, else, unqualified. It is essential that POL is over the 50 percent of width of frame , else ,unqualified. According to the drawing in case of special definition.	

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07	IC/FPC Bonding	Scratch	Reject	
		Intensity Of Adhesion	If lower than specification, reject	
		Gold Fold Twist	Reject	
07	IC/FPC Bonding	Silicon	According to outline, no gold outside, seal can not be higher than LCD	
		FPC Gold Sever	Reject	
08	SMT	Lack of Component、Polarity Inverse	If exist, reject	
		Leak Solder、Virtual Solder	If exist, reject	
		Short Circuit In Solder Point	If exist, reject	
		Tin Ball	If exist, reject	
		Tin Acumination	If visual, reject	
		Height Solder Point	If higher 0.5mm than component. reject	
		Height of component	Either side higher 0.5mm than component, reject	

		Component Shift	 X<3/4Z reject y＞1/3D reject	
08	SMT	Few Tin	 If θ≤20° reject	
		Component Deflection	 If Y >1/3D reject	
		Component Carcass Sideways	Reject	

08	SMT	Component Carcass Sideways	If exist with visual inspection , reject	
		Lot Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: Tin accrete the solder side completely , full circle arc , ok C: Jointing include whole solder side, height of tin>50 percent of height of component, reject	
		Few Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: height of tin > 1/3 of solder side of component , ok C: height of tin ≤ 1/3 of solder side of component, reject	
		Normal Jointing side		
09	Light	Short circuit 、 Open circuit	Forbid	
		Quality of CSTN Display	1、Rolling strake with visual inspection, forbid 2、Differentness of color in viewing area with visual inspection (full white、red 、green、blue), forbid 3 、 Display change with visual inspection , forbid	

10	Color Of CIE Coordinate		x	y	Drive LCD under normal condition, 25℃ Φ=0 θ=0 Test white、red、green blue with DMS Record	
		white	±0.05	±0.05		
		Red	±0.05	±0.05		
		Green	±0.05	±0.05		
		Blue	±0.05	±0.05		
		According to the specification or sample customer have approved				
11	Brightness	In accord with product specification			Drive condition is according to specification Measure location is in Follow Picture 3、Adjust brightness instrument tozero , burrow against the surface of LCD , press "measure" , record when the display is steady. (YOKOGAWA-3298) Measure location	
12	CR (Max)	According to specification			According to product specification Measure instrument (DMS-501)	
13	Response time	According to specification			According to product specification Measure instrument (DMS-501)	
14	Viewing angle	According to specification			According to product specification Measure instrument (DMS-501)	
15	Vibration、Ring	Compare with the sample customer supply			Compare with the sample customer supply when assemble	
16	Frequency Of FPC Bend	According to the use of product (main FPC of foldaway cell phone ≥6 thousand)			Measure instrument Bend angle : 150° Fix FPC in the casement when customer supply	

9 Handling Precautions

9.1 Mounting method

The LCD panel of Daxian 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.

9.2 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.

9.3 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.

9.4 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

9.5 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.

9.6 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

9.7 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

10 Precaution for use

10.1

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.

10.2

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 Daxian , 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.

11 Dimensional Outline
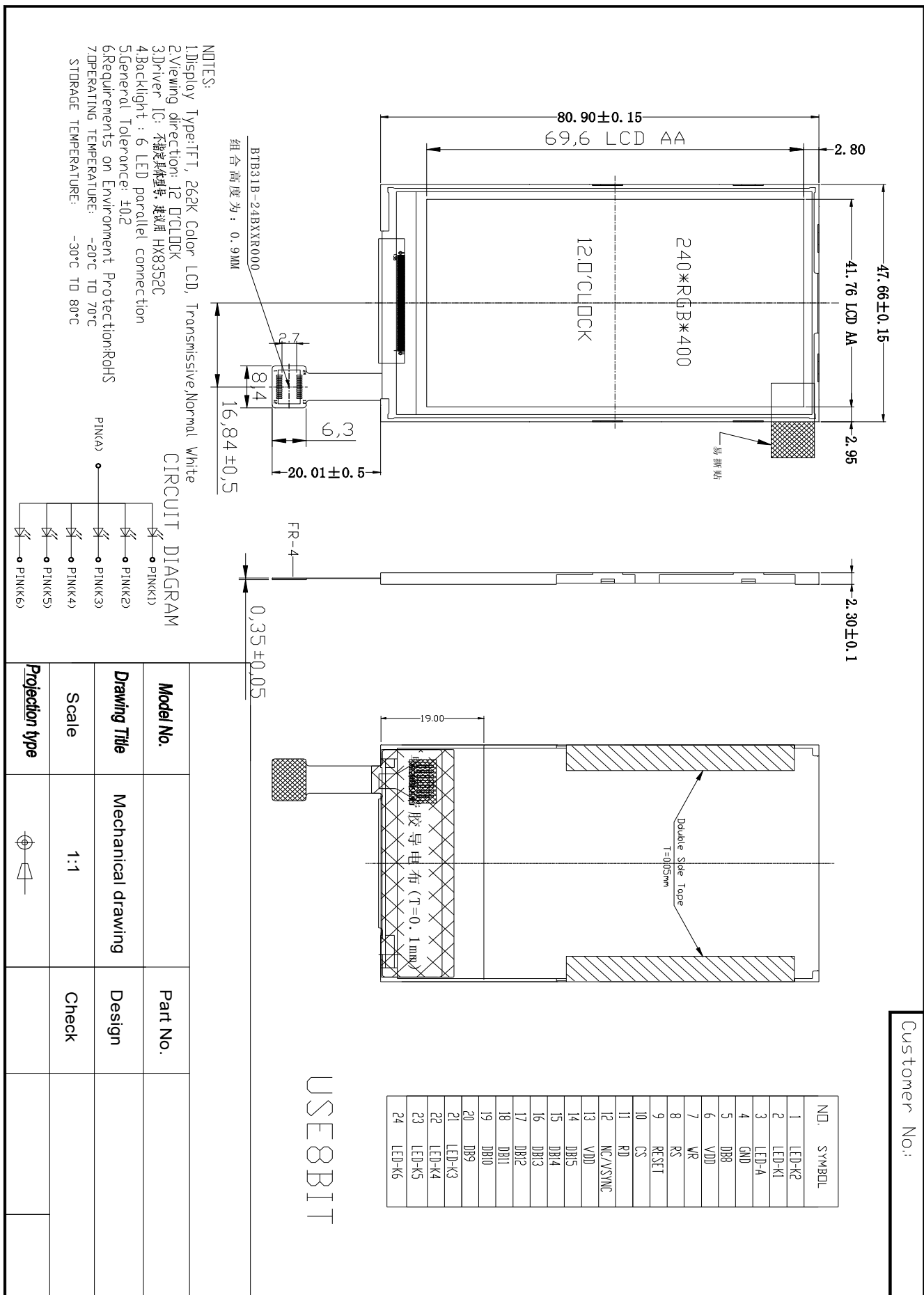
NOTES:
1.Display Type:TFT, 262K Color LCD, Transmissive,Normal White
2.Viewing direction:12 O'CLOCK
3.Driver IC: 不能丝印型号,建议用 HX8352C
4.Backlight : 6 LED parallel connection
5.General Tolerance: ±0.2
6.Requirements on Environment Protection:RoHS
7.OPERATING TEMPERATURE: -20°C TO 70°C
  STORAGE TEMPERATURE: -30°C TO 80°C

组合高度为: 0.9MM

BTB31B-24BXXR000

CIRCUIT DIAGRAM

PIN(A)

PIN(K1)
PIN(K2)
PIN(K3)
PIN(K4)
PIN(K5)
PIN(K6)

80.90±0.15
69.6 LCD AA
2.80

12.O'CLOCK
240*RGB*400

47.66±0.15
41.76 LCD AA
2.95

易撕贴

2.7
8.4
16.84±0.5
6.3
20.01±0.5

FR-4

0.35±0.05

2.30±0.1

19.00

胶导电布(T=0.1mm)

Double Side Tape
T=0.05mm
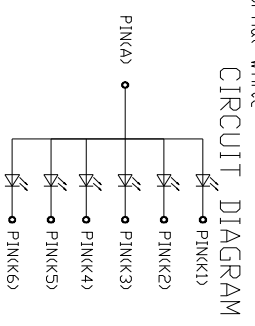
USE8BIT

Model No.		
Drawing Title	Mechanical drawing	
Scale	1:1	Check
Projection type		
	Part No.	
	Design	

NO.	SYMBOL
1	LED-K2
2	LED-K1
3	LED-A
4	GND
5	DB8
6	VDD
7	WR
8	RS
9	RESET
10	CS
11	RD
12	NC/VSYNC
13	VDD
14	DB15
15	DB14
16	DB13
17	DB12
18	DB11
19	DB10
20	DB9
21	LED-K3
22	LED-K4
23	LED-K5
24	LED-K6

Customer No.: