产品规格书

SPECIFICATION

Project No. 项目编号	YH035BQ5401
Customer 客户名称	
Module No. 客户型号	
Number of samples 样品数量	
Preparation Date 送样日期	

Signature by customer:

客户确认签章：

编　　制	电子审核	结构审核	品质审核	批　　准

Issue date：2018/05/14

1. REVISION STATUS

0.1	**First Revision**	**--**	**2018-05-17**

1.0. General Specification	4
2.0. Absolute Maximum Ratings	5
3.0. Optical characteristics	6
4.0. Interface pin connection	9
5.0. Back-light Unit	10
6.0. Electrical characteristics	11
7.0. Reliability test items	17
8.0. Outline dimension	18
9.0. BOM List	19
10.0. Lot mark	19
11.0. Package specification	20
12.0. General Precaution	21

1.0 GENERAL DESCRIPTION

1.1 Introduction

High Resolution: 230,400 Dots (320 RGB x 240).TC035BQS-V54 is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs, FPC, backlight unit.

1.2 Features

- **3.5(4:3diagonal) inch configuration**

Serial Interface 24-bit RGB

- **LED Backlight**
- **RoHS and Halogen-Free Compliance**

1.3 Applications

- **Security and protection**
- **Rear view mirror**
- **Pictorial Navigation Display**

1.4 General information

Item	Specification	Unit
Screen Size	3.5 inches	Diagonal
Number of Pixel	320 RGB (H) ×240(V)	Pixels
Display area	70.08(H) x 52.56(V)	mm
Outline Dimension	76.9(W) x 63.9(H) x 3.26(D)	mm
Display mode	Normally Black	--
Pixel arrangement	RGB Vertical stripe	--
View Angle direction	ALL	
Dot size	73x 219	um
Back-light	LED Side-light type	--
Surface treatment	Haze 20%	--
Interface	24-bit RGB	

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	76.7	76.9	77.1	mm
	Vertical (V)	63.7	63.9	64.1	mm
	Depth (D)	3	3.26	3.45	mm
Weight		--	160	180	g

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Note
Digital Supply Voltage	VDD	-0.3	4.0	V	GND=0
Input Signal Voltage Logic Output Voltage	Vin VOUT	-0.3 -0.3	VDD+0.3 VDD+0.3	V V	

Note:

1. Stresses above those listed under ”Absolute Maximum Rating” may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at indicated in the operational sections(6.1) of this specification.
2. Ta=25±2℃

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-30	80	°C	
Operating temperature	T_{OPR}	-20	70	°C	

Note: If users use the product out off the environmental operation range(temperature and humidity), it will have visual quality concerns.

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	70	80	-	Degree.	Note1, Note4
		θ_B		70	80	-		
		θ_L		70	80	-		
		θ_R		70	80	-		
Contrast Ratio		CR	Θ =0	640	800	-	-	Note1, Note2
Response Time		T_{ON}	25°C	-	10	20	ms	Note1, Note3
		T_{OFF}		-	15	30		
Chromaticity	White	X_W	Backlight is on	0.282	0.312	0.342	-	Note1, Note4
		Y_W		0.319	0.349	0.379	-	
	Red	X_R		0.609	0.639	0.669	-	
		Y_R		0.314	0.344	0.374	-	
	Green	X_G		0.264	0.294	0.324	-	
		Y_G		0.557	0.587	0.617	-	
	Blue	X_B		0.102	0.132	0.162	-	
		Y_B		0.106	0.136	0.166	-	
Uniformity		U		80	-	-	%	Note5
NTSC					60		%	Note5
Luminance		L		300	350			Note1, Note2

3.2 Measuring Condition

Measuring surrounding: dark room

LED current IL: 20mA

Ambient temperature: 25±2^{O}C

30min. warm-up time

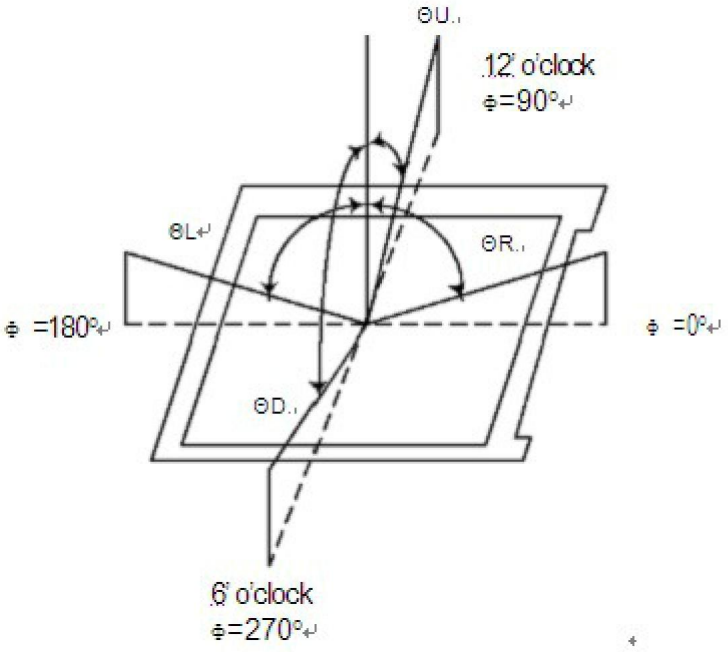
3.3 Measuring Equipment

BM-7 optical characteristics.

Measuring spot size: 50cm

Note (1)

Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o"clock direction and the vertical or 6, 12 o"clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).



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

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

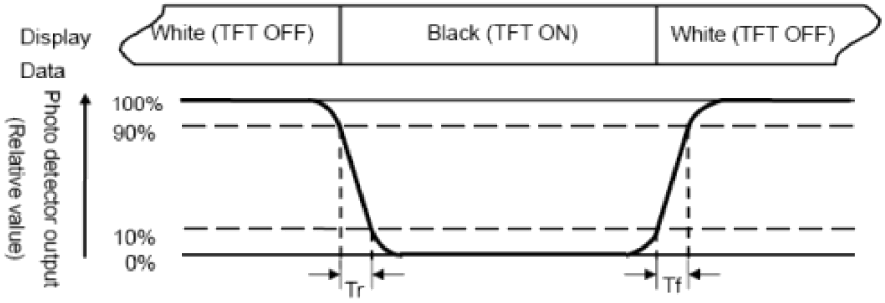


Fig. 3-3 Definition of response time

Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the “White” state}}{\text{Luminance measured when LCD on the “Black” state}}$$

Note 5: White Vi = V_{i50} ± 1.5V
Black Vi = V_{i50} ± 2.0V
“±” means that the analog input signal swings in phase with VCOM signal. “±”
means that the analog input signal swings out of phase with VCOM signal.
The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.
Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

$$\text{Note 8 : Uniformity (U)} = \frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$$

4.0 INTERFACE PIN CONNECTION

No.	Symbol	Description
1,2	LEDK	Backlight LED Cathode
3,4	LEDA	Backlight LED Anode.
5	YU	Touch panel up side
6	XR	Touch panel right side
7	NC	NC
8	RESET	Reset Signal pin (“Low” is enable)
9	SPENB	Chip select
10	SPCK	Serial Clock.
11	SPDA	Serial Data
12-19	B0~B7	Data bus
20-27	G0~G7	Data bus
28-35	R0~R7	Data bus
36	HSYNC	Line Synchronous Signal
37	VSYNC	Frame Synchronous Signal
38	DOTCLK	Dot-clock signal and oscillator source
39-40	NC	NC
41-42	VDD	Power supply for logic operation
43	YD	Touch panel bottom side
44	XL	Touch panel left side
45-47	NC	NC
48	NC	NC
49	NC	NC
50	NC	NC
51	NC	NC
52	DEN	Display enable signal
53-54	GND	System Ground

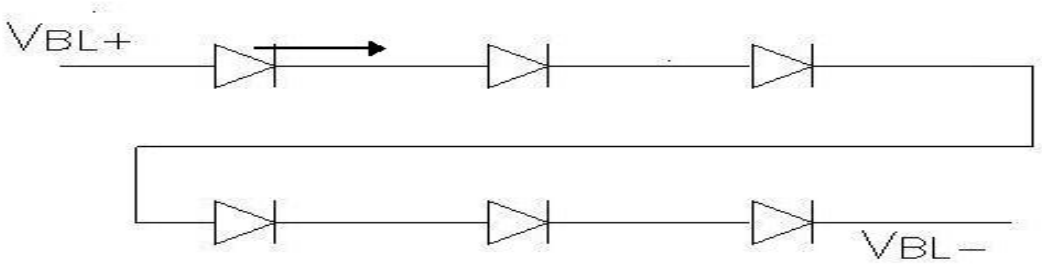
5.0 Back-Light Unit

The backlight system is an edge-lighting type with 6 LED.

The characteristics of the LED are shown in the following tables.

Item	Symbol	Min	Typ	Max	Unit	Note
LED current	IL		20	--	mA	
LED voltage	VL	18.6	19.8	21	V	
Operating LED life time	Hr	10000	-	-	Hour	(1)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 ℃, typical IL value indicated in the above table and the fL=50k Hz until the brightness becomes less than 50%.



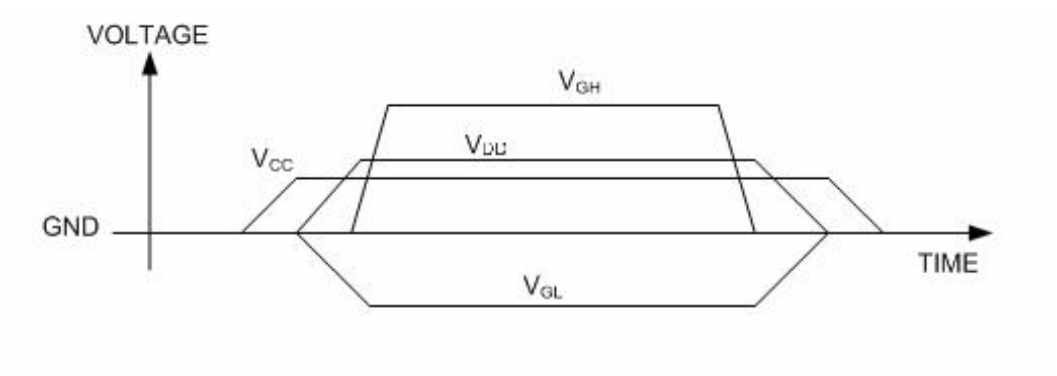
Vcom must be adjusted to optimize display quality _Cross talk, Contrast Ratio and etc.

6.0 ELECTRICAL CHARACTERISTICS

6.1 Operating conditions:

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	V_{cc}	3.0	3.3	3.6	V	
Digital Operation Current	Icc		8.6		mA	
Gate On Power	VGH	-	14.6	-	V	
Gate Off Power	VGL	-	-10.0	-	V	
Vcom Voltage	Vcom	-	0	-	V	Note1

Note1. Vcom must be adjusted to optimize display quality- Cross talk, Contrast Ratio and etc.



6.2 AC Electrical Characteristics

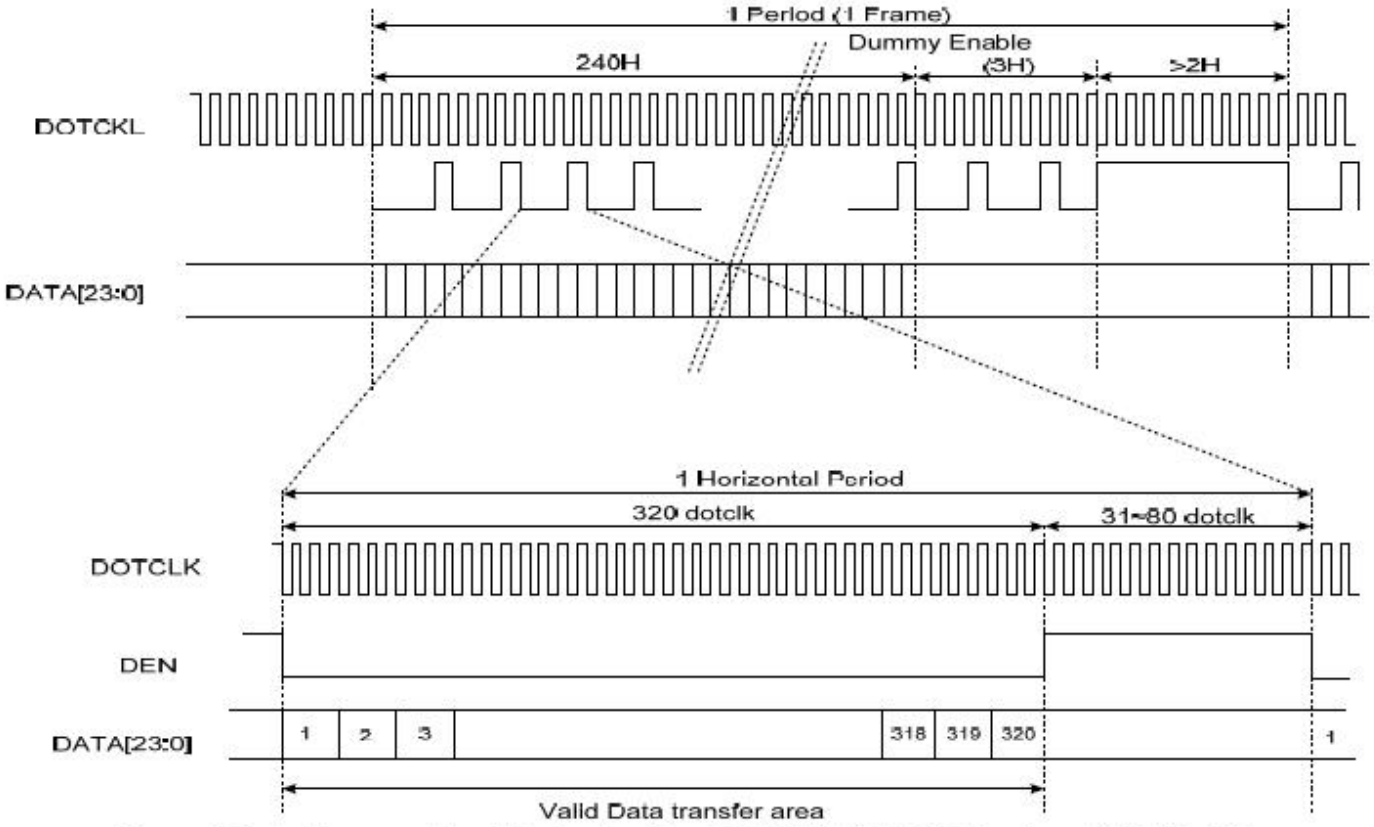
Serial 8-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

320RGB x 240 Resolution Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	15	18	21	MHz	
DCLK Period		Tclk	47	55	66	ns	
HSYNC	Period Time	Th	965	1011	1078	DCLK	
	Display Period	Thdisp		960		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
VSYNC	Period Time	Tv	244	260	289	HSYNC	
	Display Period	Tvdisp		240		HSYNC	
	Back Porch	Tvbp	2	12	12	HSYNC	By V_BLANKING setting
	Front Porch	Tvfp	2	8	37	HSYNC	
	Pulse Width	Tvw	2	4	12	HSYNC	

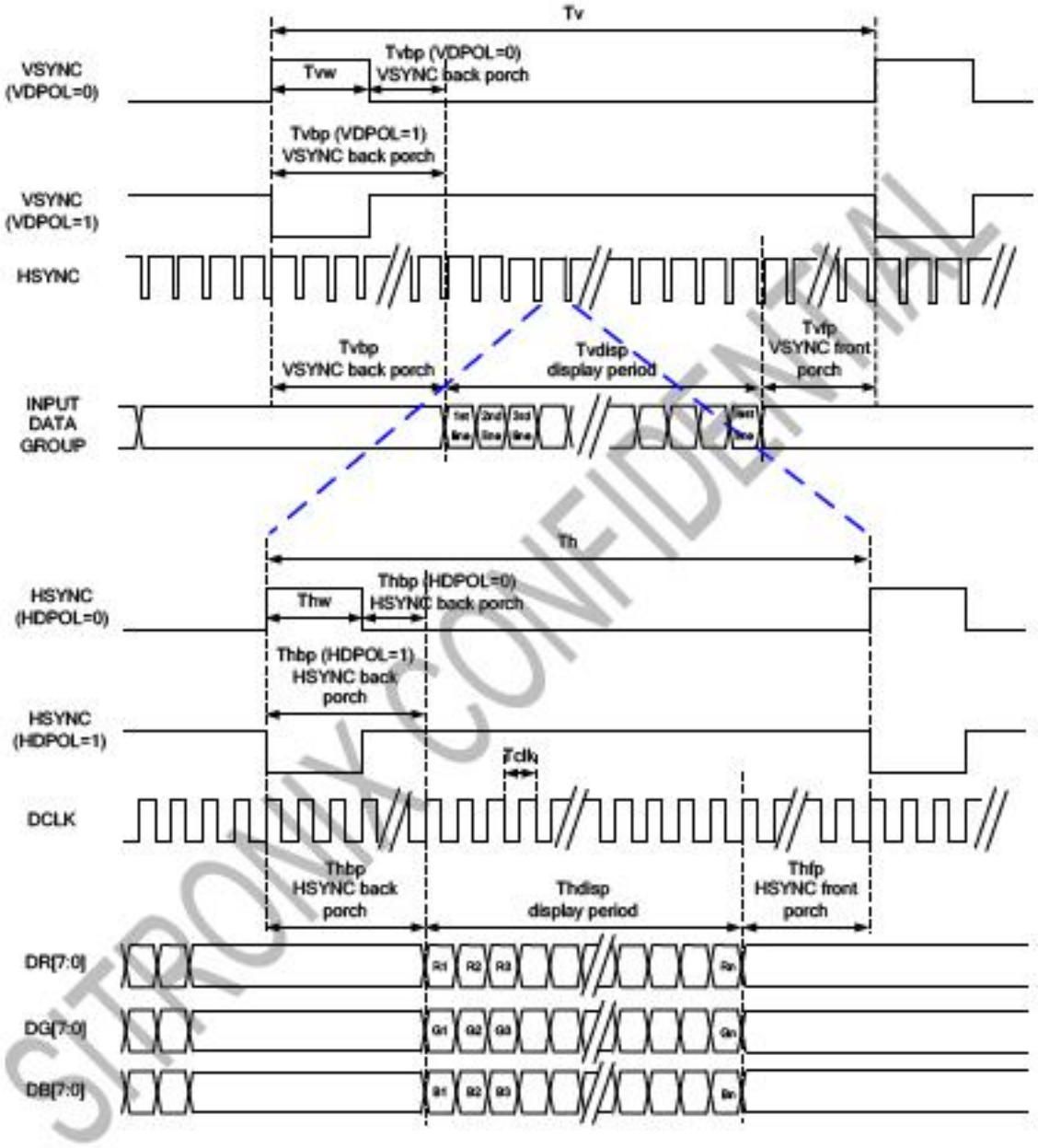
Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

E mode is unnecessary to keep it.

6.3 Waveform

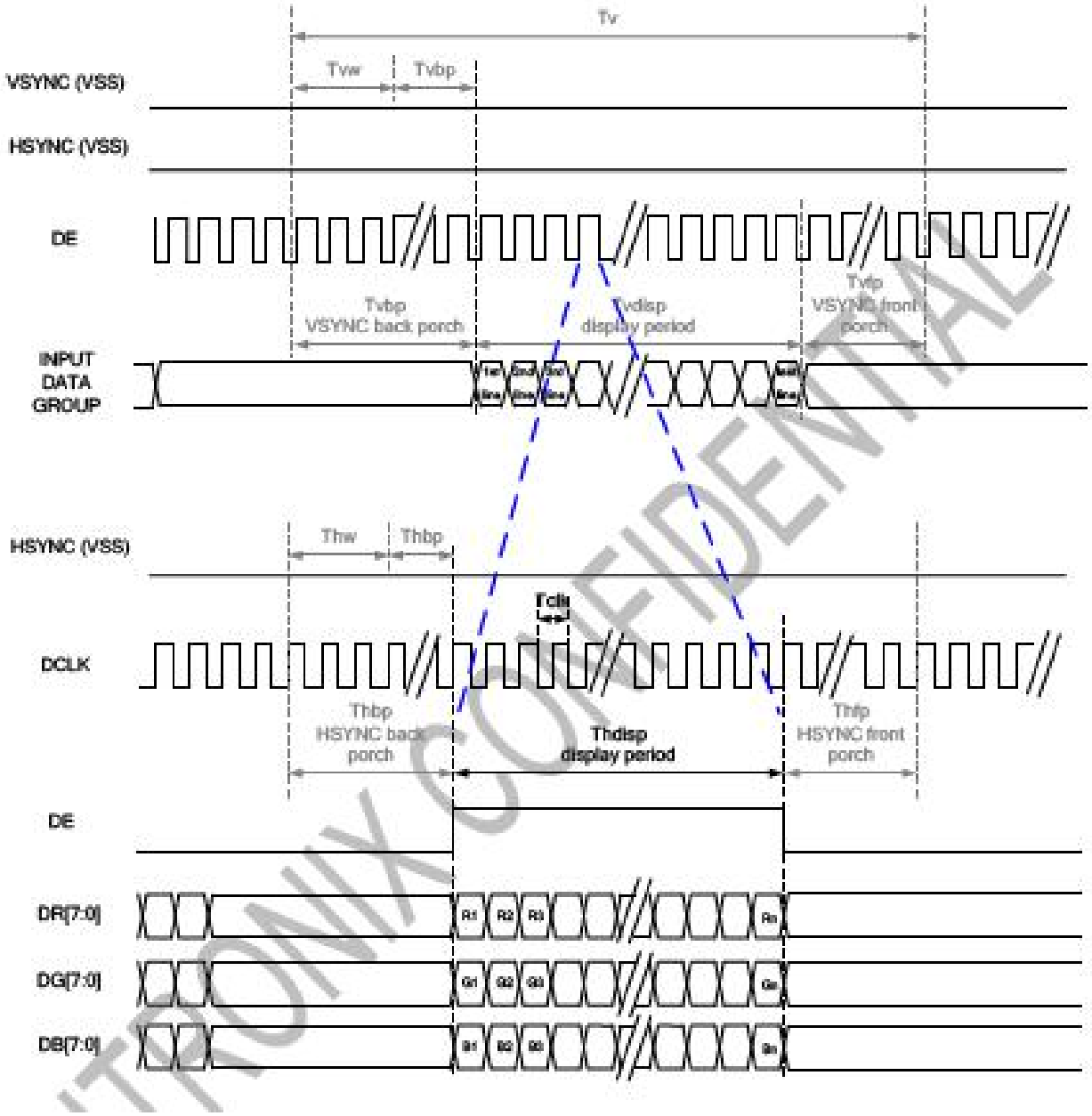

1 Period (1 Frame)
Dummy Enable
240H
(3H)
>2H
DOTCKL
DATA[23:0]
1 Horizontal Period
320 dotclk
31~80 dotclk
DOTCLK
DEN
DATA[23:0]
1
2
3
318
319
320
1
Valid Data transfer area

6.4 Vertical Timing Diagram (HV Mode)



STRONY CONFIDENTIAL

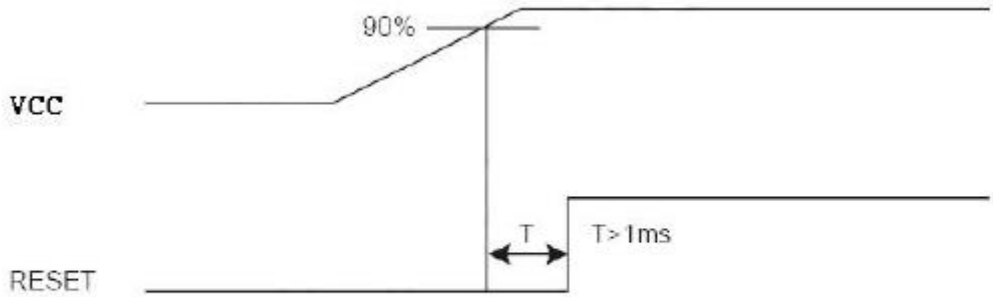
6.5 Vertical Timing Diagram (DE Mode)



TRONIX CONFIDENTIAL

6.6 Reset Timing Chart

The RESET input must be held at least 1ms after power is stable



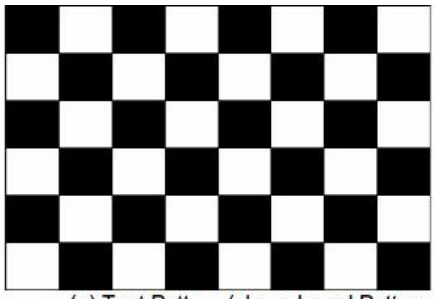
Reset timing

7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Notes
1	High Temperature Storage	Ta=+80℃, 240hrs	
2	Low Temperature Storage	Ta=-30℃, 240hrs	
3	High Temperature Operation	Ta=+70℃, 240hrs	
4	Low Temperature Operation	Ta=-20℃, 240hrs	
5	High Temperature and High Humidity(operation)	Ta=+60℃, 90%RH 240hrs	
6	Thermal cycling Test	-20℃/30 min ~ +70℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	
7	Vibration	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
8	Shock	100G, 6ms, ±X, ±Y, ±Z 3 time for each direction	
9	ESD	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: LCD glass and metal bezel
Note 2: IF connector pins
Note 3: Operation with test pattern sustained for 4hrs, then change to gray pattern immediately.

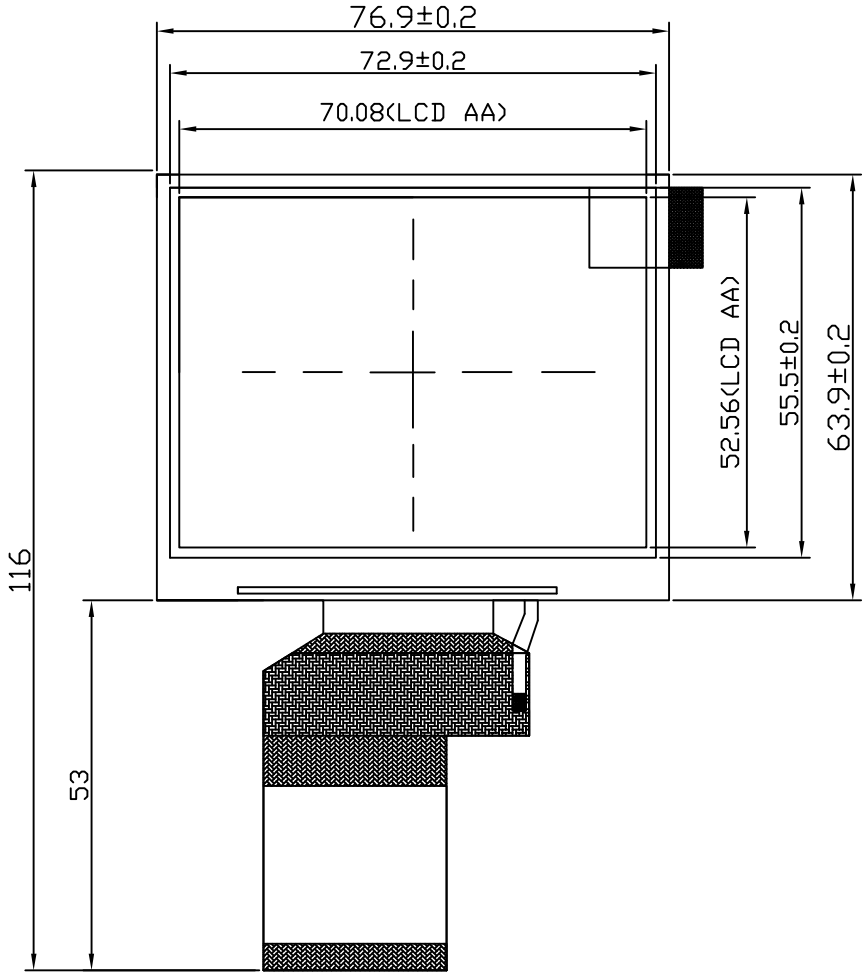
\\

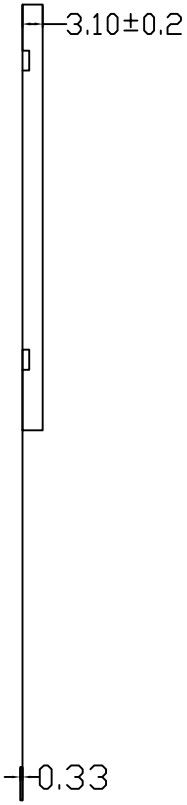


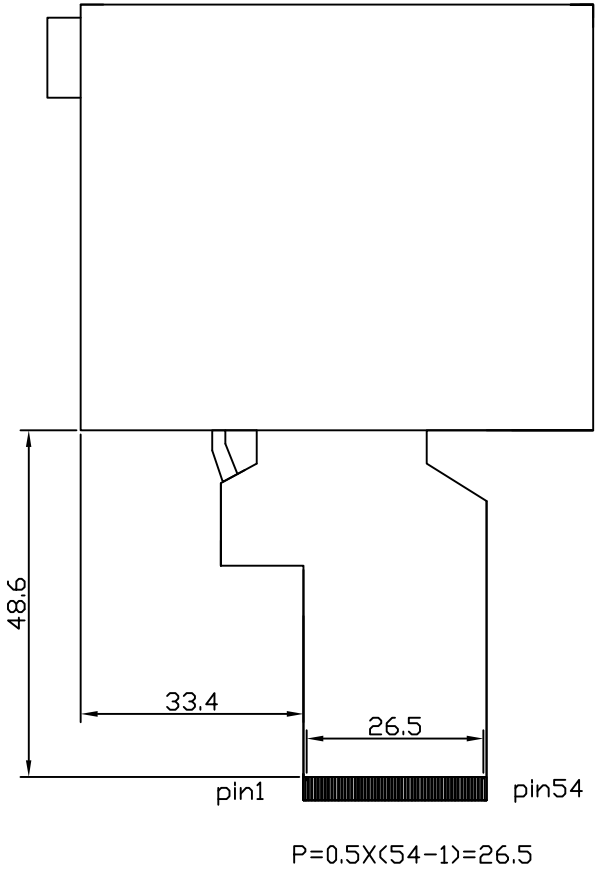
(a) Test Pattern (chess board Pattern)

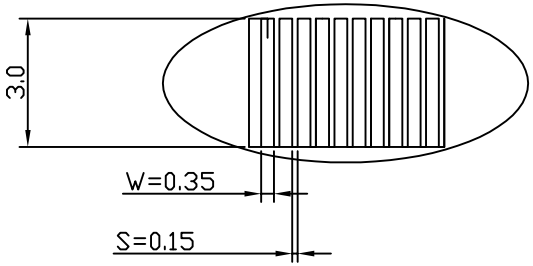
(b) Gray Pattern

REV	DESCRIPTION:	DATE
		2018-04-20









NOTES:

1. VIEWING DIRECTION : ALL 'CLOCK
2. POLARIZER MODE : TRANSMISSIVE
3. OPERATING TEMP : −20°C~+70°C
4. STORAGE TEMP : −30°C~+80°C
5. DRIVER IC ST7272
6. CONNECTOR :

SCALE:				
VERSION: A				
GENERAL TOL: ± 0.2	UNIT mm			
APPROVALS	DATE	MODEL NUMBER :		PART NO:
APP:				FW035-TFT
CHK:				
DWN:		DO NOT SCALE THIS DRAWING.	PROJECTION	

9.0 BOM LIST

（TBD）

10 LOT MARK

Location of Lot Mark

Location: The label is attached to the backside of the LCD module.

Detail of the Mark: as attached below.

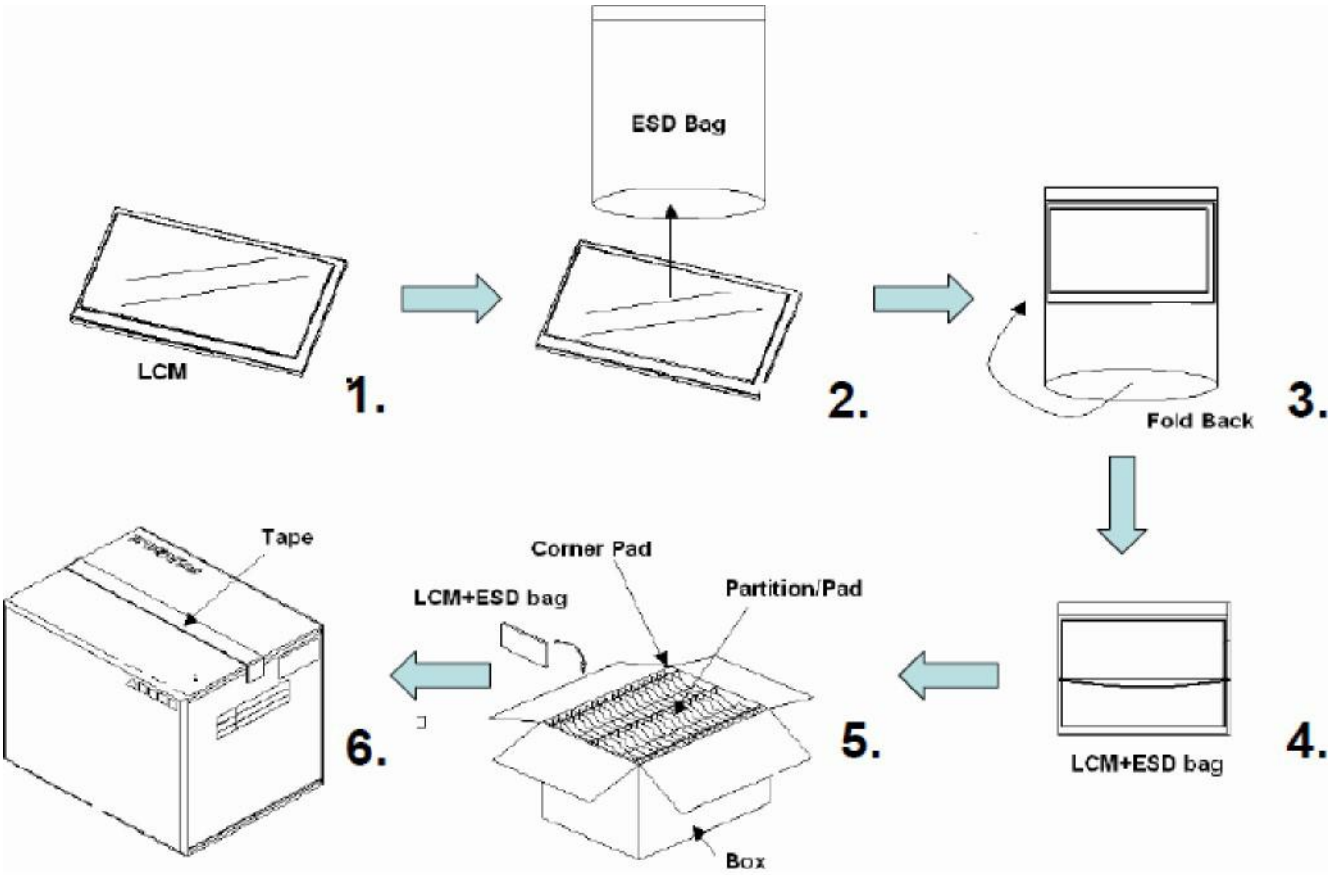
This is subject to change without prior notice.

11.0 PACKAGE SPECIFICATION

11.1 Packing form

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Note
035QHI0626-A3 V.2	300 pcs/box	460±5 x 360±5 x 175±5	

11.2 Packing assembly drawings



Items	Material	Notice
Box	Corrugated Paper Board	AB Flute
Partition/Pad	Corrugated Paper Board	B Flute
Corner Pad	Corrugated Paper Board	AB Flute
ESD bag	PE	

12.0 GENERAL PRECAUTION

12.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

12.2 Assembly Precaution

12.2.1 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.

12.2.2. Please design display housing in accordance with the following guide lines.

12.2.2.1 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.

12.2.2.2 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

12.2.3 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands.(Polarizer film, surface of LCD panel is easy to be flawed.)

12.2.4 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module, If pressing rear part is unavoidable, handle the LCD module with care not to damage them.

12.2.5 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.

12.2.6 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.

12.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

12.3 **Disassembling or Modification**

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Century does not warrant the module, if customers disassemble or modify the module.

12.4 Breakage of LCD Panel

12.4.1.If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

12.4.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

12.4.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

12.4.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

12.5 Absolute Maximum Ratings and Power Protection Circuit

12.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

12.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

12.5.3. It's recommended to employ protection circuit for power supply.

12.6 **Operation**

12.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

12.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

12.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

12.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

12.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

12.7 Static Electricity

12.7.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

12.7.2. Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.

12.7.3 Persons who handle the module should be grounded through adequate methods.

12.8 **Disposal**

When disposing LCD module, obey the local environmental regulations.

12.9 Others

12.9.1 A strong incident light into LCD panel might cause display characteristics' changing inferior because of Polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land Strong UV rays.

12.9.2 Please pay attention to a panel side of LCD module not to contact with other materials in pressing it alone.

12.9.3 For the packaging box, please pay attention to the followings:

12.9.3.1 Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.

12.9.3.2 Please do not pile them up more than 6 boxes(They are not designed so) And please do not turn over.

12.9.3.3 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.

12.9.3.4 Packing box and inner case for LCDs are made of cardboard, So please pay attention not to get them wet(Such like keeping them in high humidity or wet place can occur getting them wet.)