Product Specification

Product Name: T090KC02D01

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA

CONTENT

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
Y01	Initial Release	2015-7-17	
Y02	Package Specification Reliability	2015-7-23	P10，P11
Y03	Mechanical Drawing	2015-8-7	P5
Y04	Update Illustration of Product Name	2016-06-24	Page 19
Y05	Update Product Name	2016-08-01	Page 1

1 Overview

The specifications 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 IC, FPC, and a backlight unit.

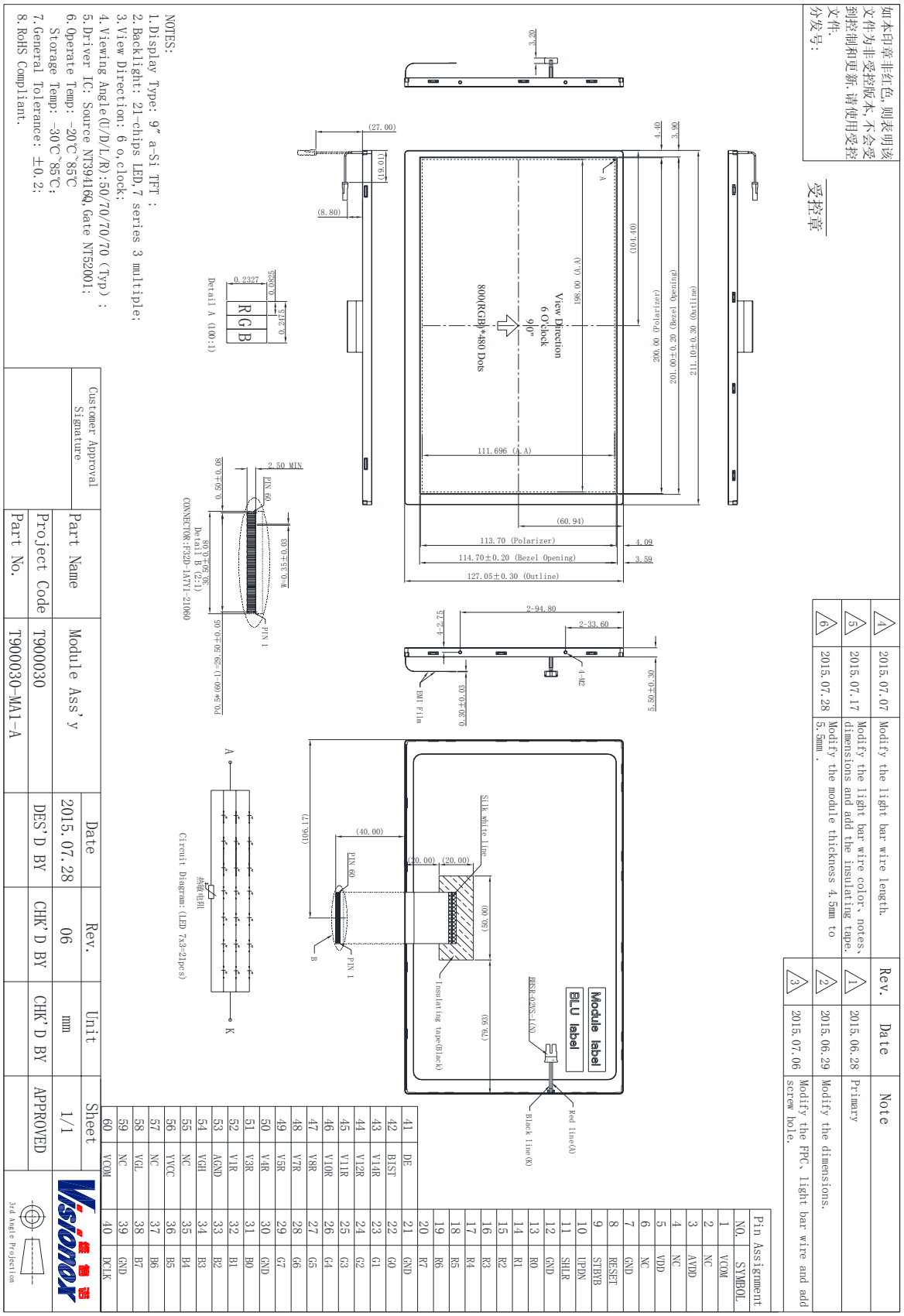
2 Features

- Panel Size: 9.0 inch
- Number of Pixels /Resolution: 800×RGB×480
- Interface: TTL
- RoHS and Halogen-Free Compliance
- Applications: Multimedia application and other hand application

3 General Information

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	800(W)×480(H)	Pixels
2	Dot Pitch	0.2475 (W)×0.2327 (H)	mm
3	Active Area	198.00 (W)×111.696 (H)	mm
4	Module Size	211.10 (W)×127.05(H)×4.5(T)	mm
5	Module Weight	TBD	gram
6	Viewing Angle	6 O'clock	-
7	Driver IC	NT39416Q+NT52001	-

4 Mechanical Drawing



5 Module Interface

Connector Name / Designation

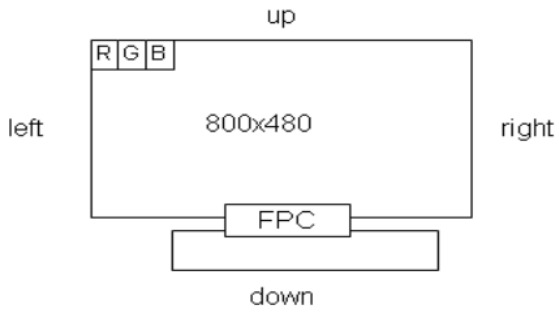
Item	Description
Type/Part Number	089H50-000000-G2-R

5.1 LCD Module

NO.	Symbol	Description
1	VCOM	Common voltage
2.	NC	No connection
3	AVDD	Power for Analog
4	NC	No connection
5	VDD	Power for Digital Circuit
6	NC	No connection
7	GND	Power Ground
8	RESET	Global Reset pin
9	STBYB	Standby mode
10	UPDN	Gate Up or Down scan control
11	SHLR	Source Right or Left sequence control
12	GND	Power Ground
13-20	R0-R7	Red data
21	GND	Power Ground
22-29	G0-G7	Green data
30	GND	Power Ground
31-38	B0-B7	Blue data
39	GND	Power Ground
40	DCLK	Sample clock
41	DE	Data Input Enable
42	BIST	Aging Mode High Enable
43	V14R	Gamma Voltage
44	V12R	Gamma Voltage
45	V11R	Gamma Voltage
46	V10R	Gamma Voltage
47	V8R	Gamma Voltage
48	V7R	Gamma Voltage
49	V5R	Gamma Voltage
50	V4R	Gamma Voltage
51	V3R	Gamma Voltage
52	V1R	Gamma Voltage
53	AGND	Power Ground
54	VGH	Gate ON Voltage
55	NC	No connection
56	YVCC	Power for Digital Circuit
57	NC	No connection
58	VGL	Gate ON Voltage
59	NC	No connection
60	VCOM	Common voltage

Note1: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.
Note2: Data shall be latched at falling edge of DCLK.
Note3: Selection of scanning mode

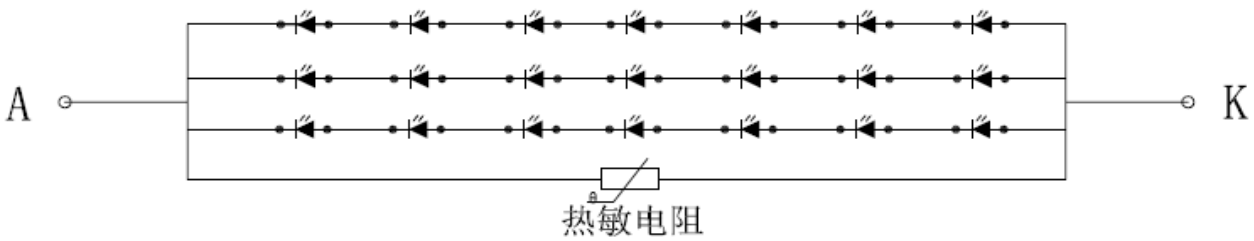
Setting of scan conteol		Scanning Direction
SHLR	UPDN	
VDD	GND	Left to Right , Up to Down
GND	GND	Right to Left, Up to Down
VDD	VDD	Left to Right , Down to Up
GND	VDD	Right to Left, Down to Up



5.2 Back-Light Unit

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	19.6	21	23.8	V	-	-
Supply Current	If	-	150	-	mA	-	-
Uniformity	-	75	80	-	%	-	-
Life Time	-	30,000	-	-	Hr	-	-

5.2.1 LED Backlight Block Diagram

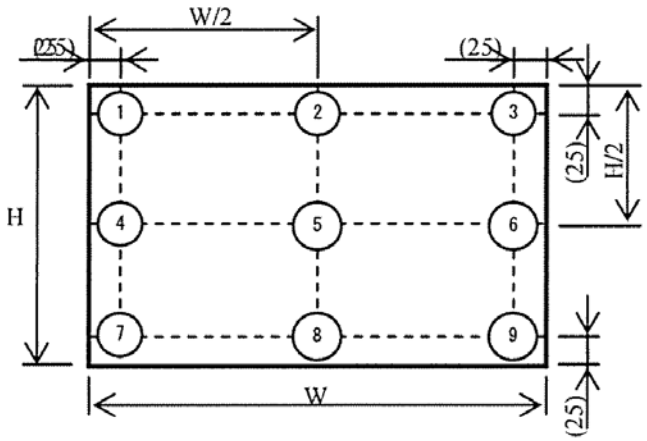


Circuit Diagram: (LED 7x3=21pcs)

5.2.2 Definition of Luminance Uniformity

Measure the luminance of gray level 9 points

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of Back light}} \text{X100\%}$$



6 Absolute Maximum Rating

6.1Electrical Absolute Rating

Item	Symbol	Min	Max	Unit
Power Supply	VDD	2.7	3.6	V
Operating temperature	TOP	-20	85	℃
Storage temperature	TST	-30	85	℃
Humidity	RH	10	90%	RH
Supply current	I_{VCC}	-	-	mA

Note：When you apply the LCD module for OA system. Please make sure to keep the temperature of LCD module is less than 75℃.

7 Electrical Characteristics

7.1 DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	VGH	-	21.3	22	22.7	V
	VDD		3.0	3.3	3.6	V
	VCOM		4.0	4.2	4.4	V
	VGL		-5.7	-5	-4.3	V
	AVDD		11.97	12.12	12.27	V
Input Voltage	V_{IN}	-	0.7VCC	-	VCC	V
Supply current	I_{VCC}	Without LED	-	TBD	-	mA

Note: Voltage greater than above may damage the module.All voltages are specified relative to VSS=0V

7.2 AC Characteristics

Timing Characteristics

Synchronization Method : DE only

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
CLKIN cycle time	Tcph	20			ns	-
CLKIN pulse duty	Tcwh	40	50	60	%	-
Data set-up time	Tdsu	8	-	-	ns	-
Data hold time	Tdhd	8	-	-	ns	-
DE setup time	Tesu	8	-	-	ns	-
DE hold time	Tehd	8	-	-	ns	-
Output stable time	Tsst	-	-	6	us	-
DCLK Frequency	fclk	28	30	40	MHz	-
Horizontal Display Area	thd		800		DCLK	-
One Horizontal Line	th	908	928	1080	DCLK	-
H Blank Area	th-blank	108	128	280	DCLK	-
Vertical Display Area	tvd		480		H	-
V Period time	tv	517	525	704	H	-
V Blank Area	tv-blank	37	45	224	H	-

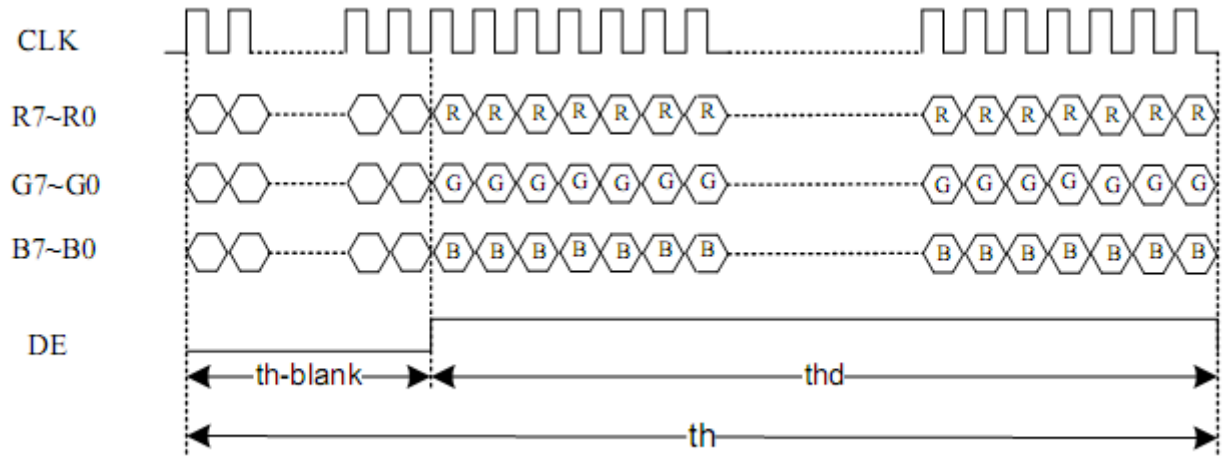
Note: H Blank area and V Blank area can not be changed at every frame

DC Electrical

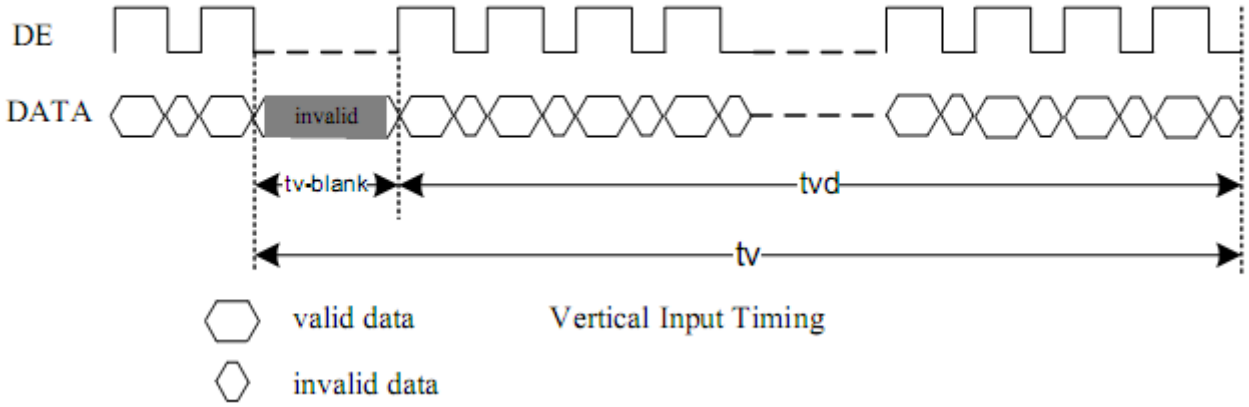
(VDD=2.7 to 3.6V ,TA=-20 to +85℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Low level input voltage	Vil	0	-	0.3*VDD	V	For the digital circuit
High level input voltage	Vih	0.7*VDD	-	VDD	V	For the digital circuit

Timing Characteristics



Horizontal Input Timing



valid data

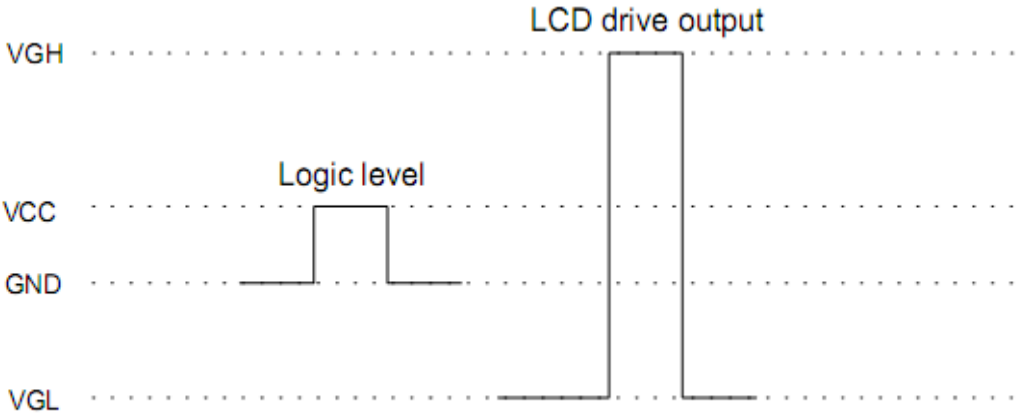
invalid data

Vertical Input Timing

8 Power ON/OFF Sequence

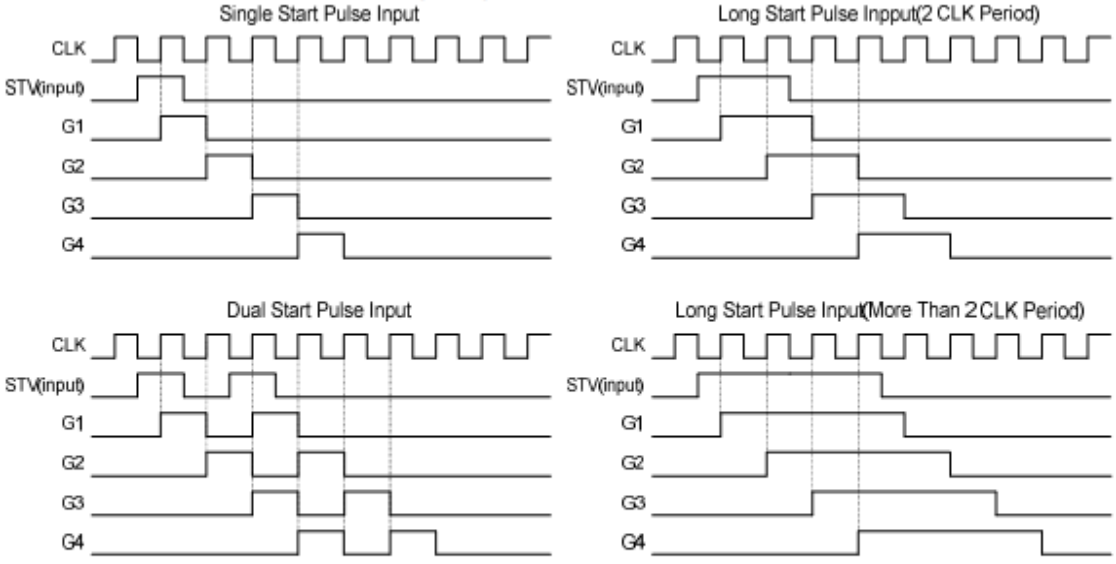
8.1 Power ON/OFF Sequence

VDD power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Note1: For the input signals: CLK, MODE, XON, SEL, OE, U_D, STVD & STVU, "High" level = VCC, "Low" level = GND.

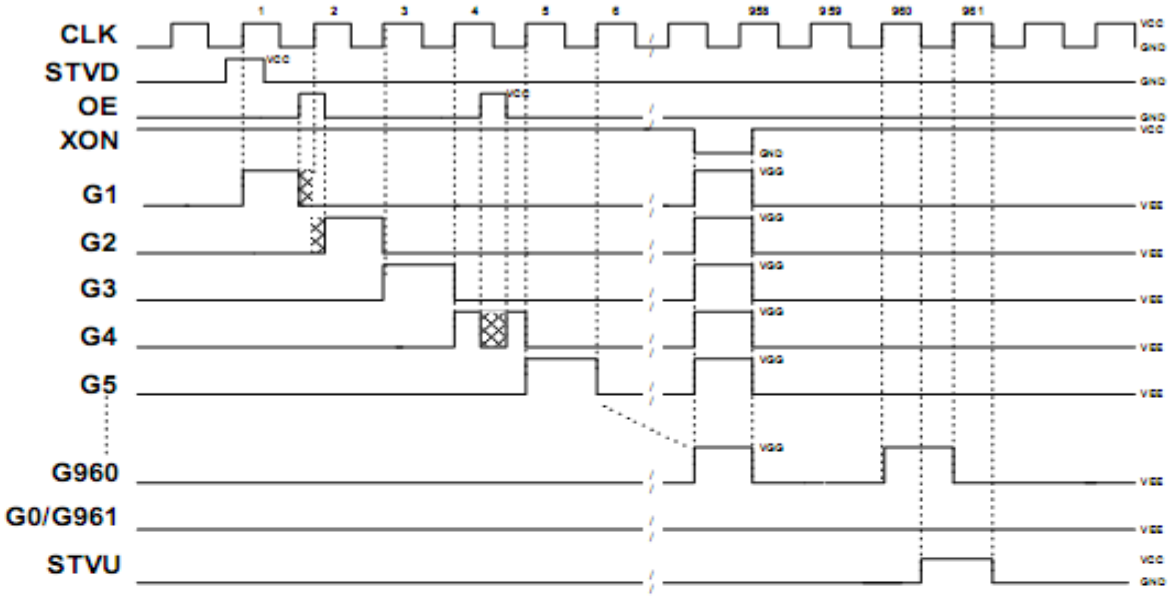
The available start pulse is in the following diagram.



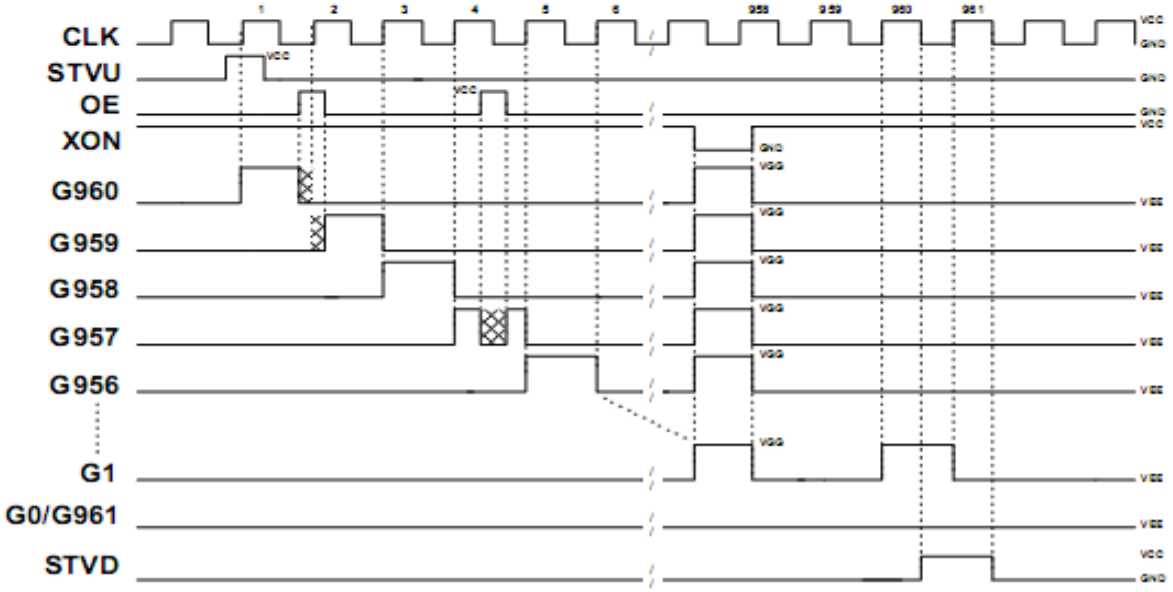
Note2: The Output Turn-On Timing will change following by Start Pulse Waveform.
Note3: For Dual Start Pulse Input, the space of STV between two pulse must be 1 CLK period.
Note4: For Long Start Pulse Input (more than 2 CLK Period),the Length of Start Pulse must be less than the Length of 6 CLK Period.

Operating Condution

1. U/D = "H"



2. U/D = "L"



8.2 Recommended Software Initialization

TBD

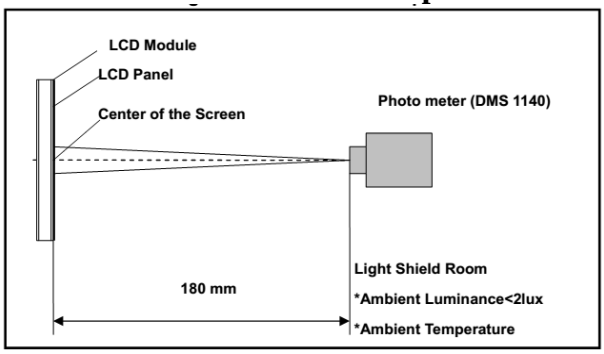
9 Optical characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_L	60	70	-	degree	(1)(2)(3)
		θ_R	60	70	-		
	Vertical	θ_T	40	50	-		
		θ_B	60	70	-		
Contrast Ratio	Center		400	500	-	-	(1)(2)(4)
Response Time	Rising + Falling		-	35	35	ms	(1)(2)(5)
Color Chromaticity (CIE1931)	Red x		Typ. -0.05	TBD	Typ. +0.05	-	(1)(2) θ=Φ=0°
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x		-	TBD	-	-	
	White y		-	TBD	-	-	
White Luminance	-		600	650	-	cd/m^2	(1)(2)(6)

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25℃) 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.

Measurement Setup



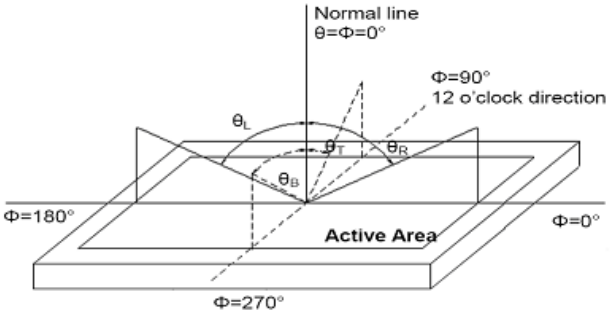
Note (2) The LED input parameter setting as:

V_LED: 21V

PWM_LED: duty 100 %

Note (3) Definition of Viewing Angle

Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

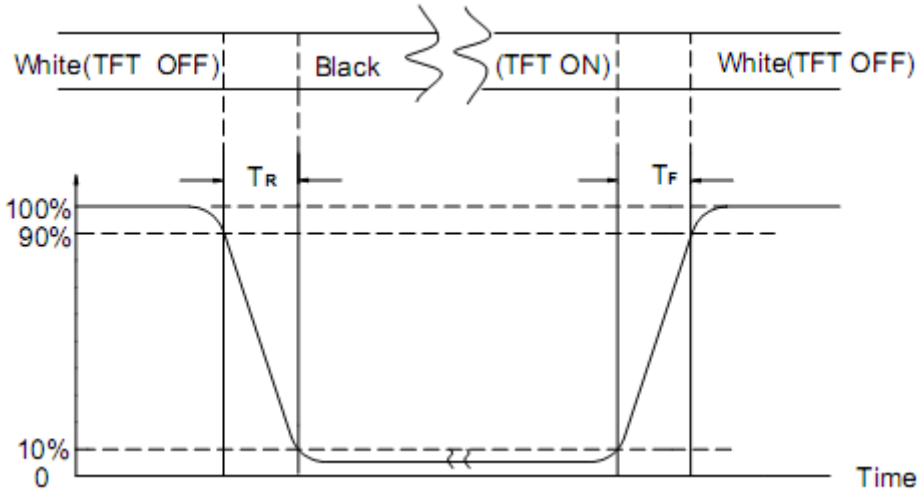
The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (5) Definition Of Response Time (TR, TF)

Definition of Response Time



Note (6) Definition Of Luminance White

Measure the luminance of gray level 255 at center point (Ref.: Active Area)

Display Luminance=L1

H—Active area length, V—Active area width, L—Luminance

10 Package Specification

Packing Process(1)~(6)

(1) Part No.: T900030-MA1-A
1pcs LCM+1pcs PE bag.

(2) Put the LCM in the PE bag, the mouth sealed with adhesive tape.

(3) FPC face down, put the LCM in the EPE card slot, total 15PCS, 15pcs/inner carton.

(4) Cover EPE cap.

(5) Put the EPE box in the inner carton.

(6) Package QTY:
LCM 30pcs/master carton.

1、The inner carton and master carton must be sealed with adhesive tape.

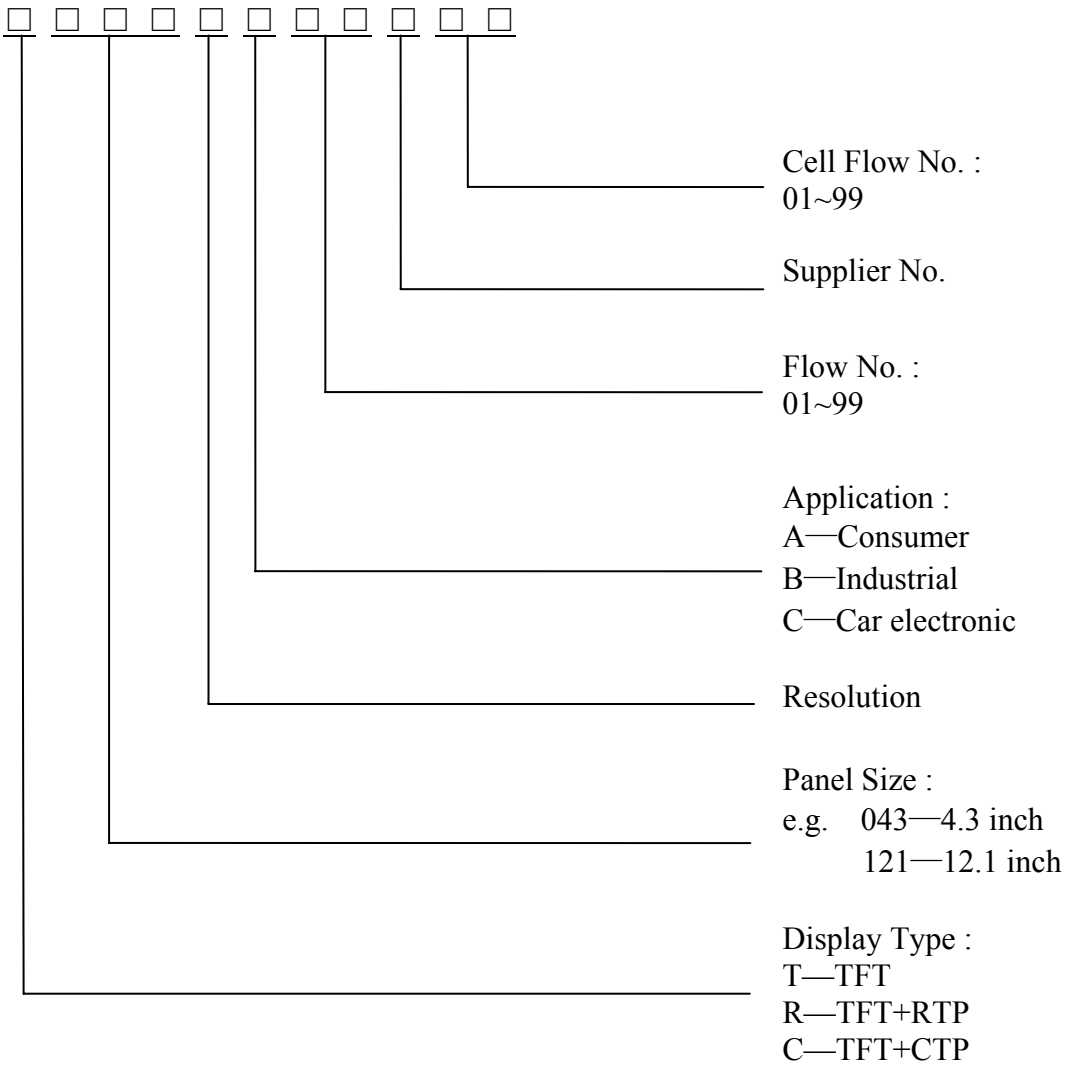
2、If there is a gap please add the EPE.

3、If the customer has special needs with the RoHS making, the inner carton and master carton need adhesive new RoHS marking at ◎.

11 Reliability

Item		Test Conditions	Remark
RA Test	High Temp. Operating	85℃,300hrs Judge,/500hrs Reference;	
	High Temp. Storage	85℃,300hrs Judge,/500hrs Reference;	
	Low Temp. Operating	-20℃,300hrs Judge,/500hrs Reference;	
	Low Temp. Storage	-30℃,300hrs Judge,/500hrs Reference;	
	High Temp. High Humidity Operating	60℃,85%RH,300hrs Judge,/500hrs Reference;	
	High Temp. High Humidity Storage	60℃,90%RH,300hrs Judge,/500hrs Reference;	
	Thermal Shock Non-operating Test	-20℃~85℃, 60min/each cycle,100 cyc，	
		200cyc for reference	
	Thermal Cycle	-20~85°C,20%~90%RH, 4cycle,29hrs/cycle	
		(25°C/50%→85°C/20%,1hrs; 85°C/20%,6hrs;	
		85°C/20%→60°C/90%,1hrs; 60°C/90%,6hrs	
		60°C/90%→-20°C/0%,2hrs; -20°C/0%,12hrs;	
		-20°C/0%→25°C/50%,1hrs;)	
	Image Sticking	Normal temperature chessboard 7*5,change 50% Gray pattern ;	
		CheckPoint: 2hrs(10s,8%),4hrs(10s,8%),8hrs(2min,8%),24hrs Reference (5min,8%)	
		High Temperature65°C, chessboard 7*5,change 50% Gray pattern ;	Reference
		CheckPoint:	
		2H (10s,8%), 4H (10s,8%)	
	ESD	Operating: Contact: ±8KV(module)Class B	Reference
		Air:±8KV(module),Class B	
		±15KV(Module),Classic C	
	Shock	100G，6ms，sine wave， ±XYZx3times，Total 18times	Module
	Vibration Test	Hakf-sine Frequency：8Hz~33Hz Stroke：1.3mm Sweep：2.9G 33.3Hz~400Hz X,Z Cycle：15 minutes 2 hrs for each direction of X,Z; 4 hours for Y direction	Module
		Random 0.015G2/Hz from 5-200Hz -6Db/octave from 200-500Hz 1hrs for X/Y/Z，total 3hrs	Package
	Drop Test	1 cornor，3axis，6sides，65cm	Package

12 Illustration of Product Name



13 Precautions for operation and Storage

13.1 Precautions for Operation

(1) Since the display panel is made of glass, do not apply any mechanical shock or impact or excessive force to it when installing the module. Any strong mechanical impact due to falling dropping etc. may cause damage (breakage or cracking).

(2) If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

(3) The polarizer on the display surface is made of soft material and is easily scratched. Please take most care when handing. When the display surface is contaminated, please wipe it off gently by using moisten soft cloth with isopropyl alcohol, do not use water, ketone or aromatics. If still not completely clear, moisten cloth with isopropyl alcohol or ethyl alcohol solvents.

(4) When handling the LCD module, please be sure that the body and the tools are properly grounded. And do not touch I/O pins with bare hands or contaminate I/O pins, it will cause disconnection or defective insulation of terminals.

(5) Do not attempt to disassemble or process the LCD module.

(6) The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

(7) Do not put one product on the other .Otherwise, it may cause the product to bescratched and/or change on cosmetic occur (ex. Newton ring).

13.2 Soldering

(1) Soldering should be performed only on the I/O terminals.

(2) Use soldering irons with proper grounding and no leakage.

(3) Iron: no higher than 300℃ and 3~4 sec during soldering.

13.3 Precautions for Storage

(1) Please store LCD module in a dark place. Avoid exposure to sunlight, the light of fluorescent lamp or any ultraviolet ray.

(2) Keep the environment temperature between 0℃ and 40℃ and the relative humidity less than 80%.Avoid high temperature and high humidity.

(3) Keep the LCD modules stored in the room without acid ,alkali and harmful gas.

13.4 Warranty period

Visionox warrants for a period of 12 months from the shipping date when stored or used under normal condition.

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