ALC-057004-02-1

~ 5.7” High Brightness TFT LCD

2016/6/23

Engineering Specifications v.1.0

( ) Preliminary Specifications

(√) Final Specifications

[This specification is subject to change without notice.]

Company Confidential

Customer Name	Customer Approval

CiVUE Optotech Inc.		
Approved by	**Checked by**	**Prepared by**
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PROPRIETARY NOTICE

RECORD OF REVISION

Version	Date	Page	Original Description	New Description	ECN#
1.0	2016/6/23	All	First draft	All	N/A

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1. GENERAL DESCRIPTION

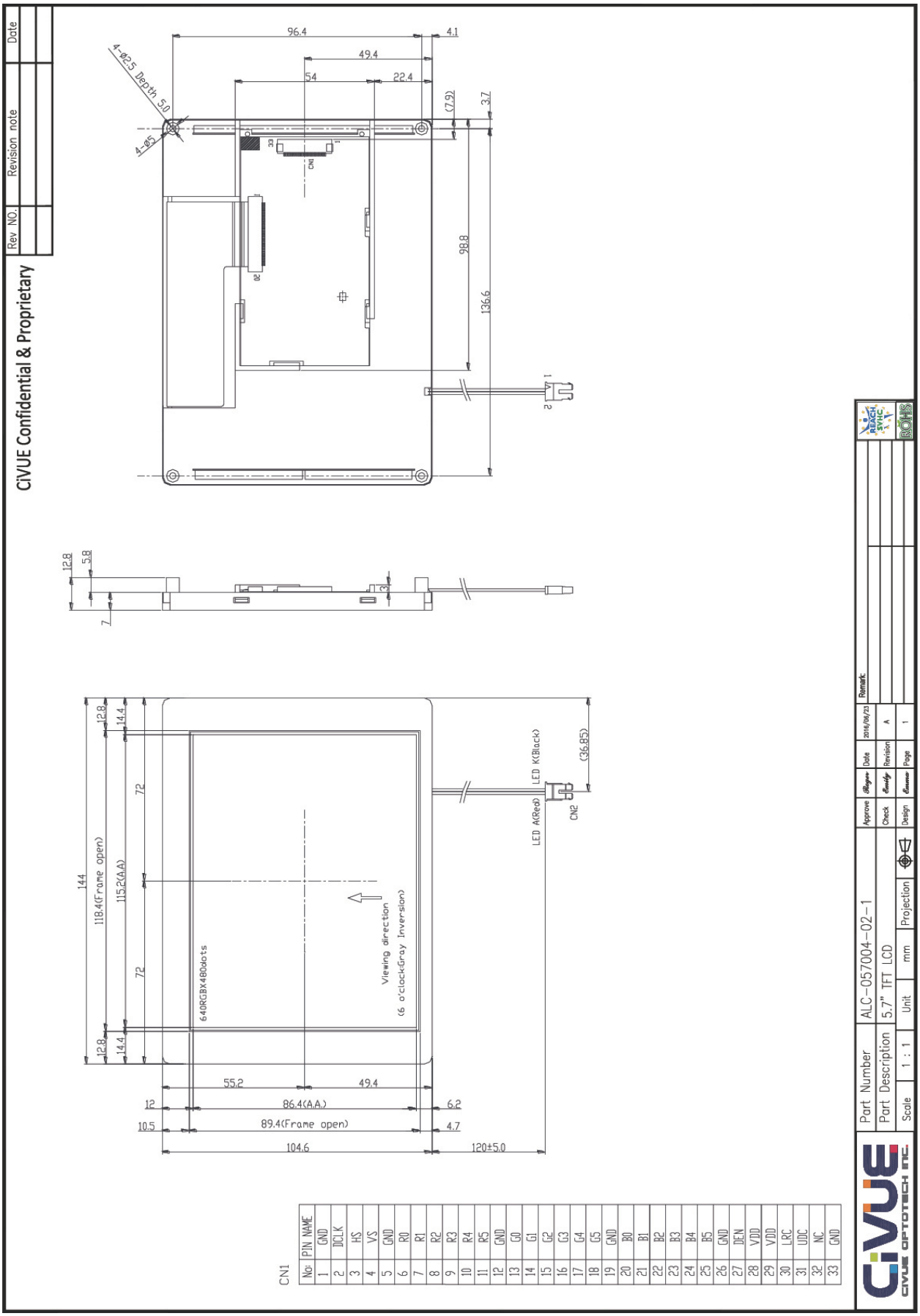
1.1 Description

This specification is for model ALC-057004-02-1, a color active matrix thin film transistor (TFT) liquid crystal display (LCD), which uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit, and a back light system. This TFT LCD has a 5.7 (4:3) inch diagonally measured active display area with VGA (640 horizontal by 480 vertical pixels) resolution.

1.2 Features:

No.	Item	Specification	Unit
1	Panel Size	5.7”	Inch
2	Number of Pixels	640 (W) x RGB x 480 (H)	Pixels
3	Active Area	115.2 (W) × 86.4 (H)	mm
4	Pixel Pitch	0.1815 (W) x 0.1815 (H)	mm
5	Outline Dimension	144 (W) × 104.6 (H) × 12.8 (T)	mm
6	Number of Colors	262K	- -
7	Display Mode	TN / Normally White / Transmissive	- -
8	View Direction	6 o’clock (Gray Inversion)	
9	Display Format	RGB vertical stripe	- -
10	Surface Treatment	Anti-Glare	- -
11	Contrast Ratio	500 (Typ.)	- -
12	Luminance (cd/m^2)	1200 (Typ.)	cd/m2
13	Interface	RGB 18bit Interface	- -
14	Backlight	White LED	- -
15	Operation Temperature	-20 ~ 70	°C
16	Storage Temperature	-30 ~ 80	°C
17	Weight	(TBD)	g

2. MECHANICAL SPECIFICATION



3. PIN DESCRIPTION

3.1 TFT LCD Module

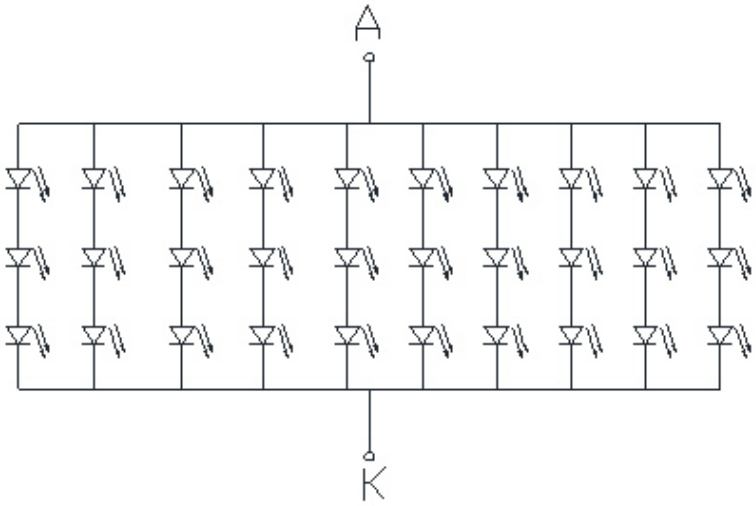
Pin	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	DCLK	I	Data Clock	
3	HS	I	Horizontal synchronous signal	
4	VS	I	Vertical synchronous signal	
5	GND	P	Ground	
6	R0	I	Red data signal (LSB)	
7	R1	I	Red data signal	
8	R2	I	Red data signal	
9	R3	I	Red data signal	
10	R4	I	Red data signal	
11	R5	I	Red data signal (MSB)	
12	GND	P	Ground	
13	G0	I	Green data signal (LSB)	
14	G1	I	Green data signal	
15	G2	I	Green data signal	
16	G3	I	Green data signal	
17	G4	I	Green data signal	
18	G5	I	Green data signal (MSB)	
19	GND	P	Ground	
20	B0	I	Blue data signal (LSB)	
21	B1	I	Blue data signal	
22	B2	I	Blue data signal	
23	B3	I	Blue data signal	
24	B4	I	Blue data signal	
25	B5	I	Blue data signal (MSB)	
26	GND	P	Ground	
27	DEN	I	Green data signal (LSB)	
28	VDD	P	Power Supply for system	
29	VDD	P	Power Supply for system	
30	LRC	I	Horizontal display mode select signal L: Left / Right reverse mode H: Normal	
31	UDC	I	Vertical display mode select signal L: Normal H: Up / Down reverse mode	
32	NC	-	No connection	
33	GND	P	Ground	

Note:

1. NC Pin must be floating

3.2 Backlight Unit

Pin No.	Symbol	Function	Remark
1	LEDA	Power Supply for LED backlight	RED
2	LEDK	GND for LED backlight	BLACK



4. ABSOLUTE MAXIMUM RATINGS

4.1 Electrical Absolute Rating

4.1.1TFT LCD Module

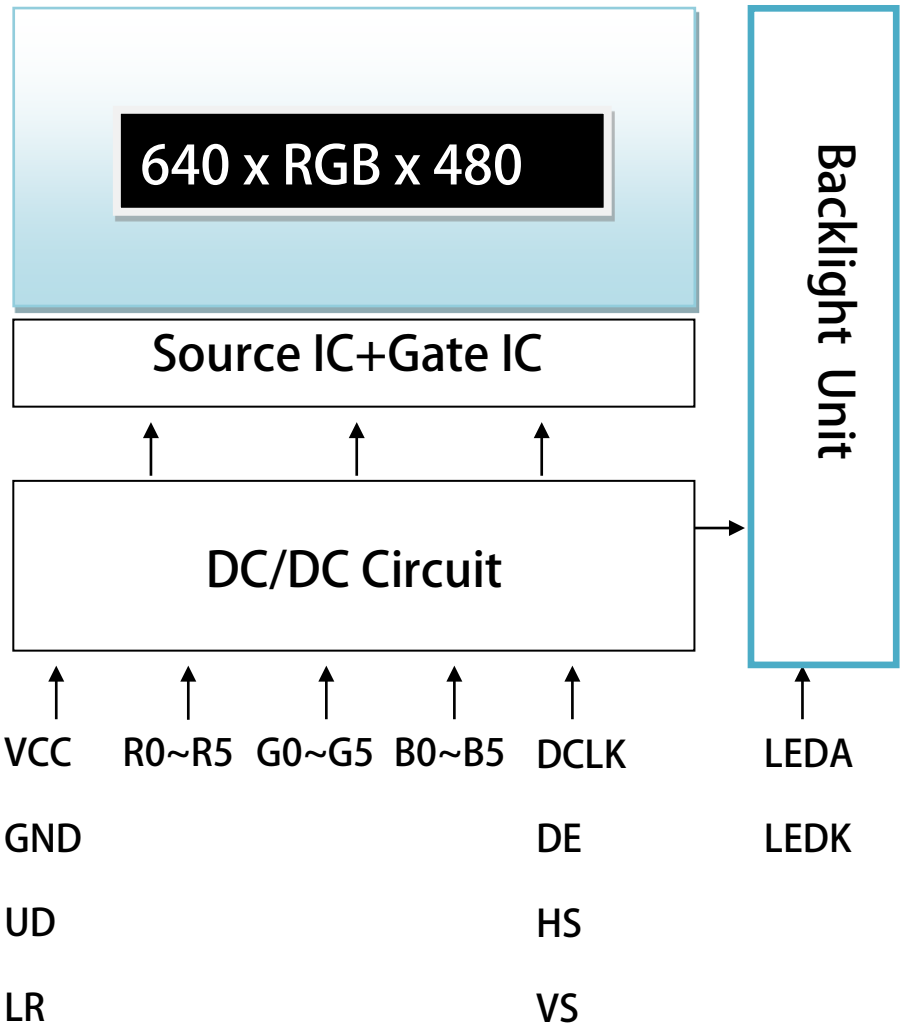
Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	VCC	-0.3	5.0	V	

4.1.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Topa	-20		70	°C	Ambient temperature
Storage Temperature	Tstg	-30		80	°C	

5. BLOCK DIAGRAM

5.1 TFT LCD Module



6. RELATIONSHIP BETWEEN DISPLAYED COLOR AND INPUT

6.1 6 bit

	Color & Gray Scale	Data Signal																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(31)	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the Combi
nation of total 18 bit data signals, the 262K-color display can be achieved on the screen.

7. ELECTRICAL CHARACTERISTICS

7.1 TFT LCD Module

Item		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power supply voltage		VDD	3.0	3.3	3.6	V	
Input Voltage for logic	H Level	VIH	0.7xVDD	-	VDD	V	
	L Level	VIL	0	-	0.3xVDD	V	
Digital Current		IDD	-	(150)	(220)	mA	Note1

Note 1: frame =60Hz , Ta=25°C , Display pattern : Black pattern

7.2 Backlight Unit

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	VL	(9.0)	(9.3)	(10.5)	V	
LED Current	IF	-	200	-	mA	3S10P
Power Consumption	PBL	-	1.86	-	W	
LED Life Time (25℃)	-	-	(50000)	-	hr	(1)

Note (1): The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ 60% RH.

7.3 INTERFACE SPECIFICATIONS

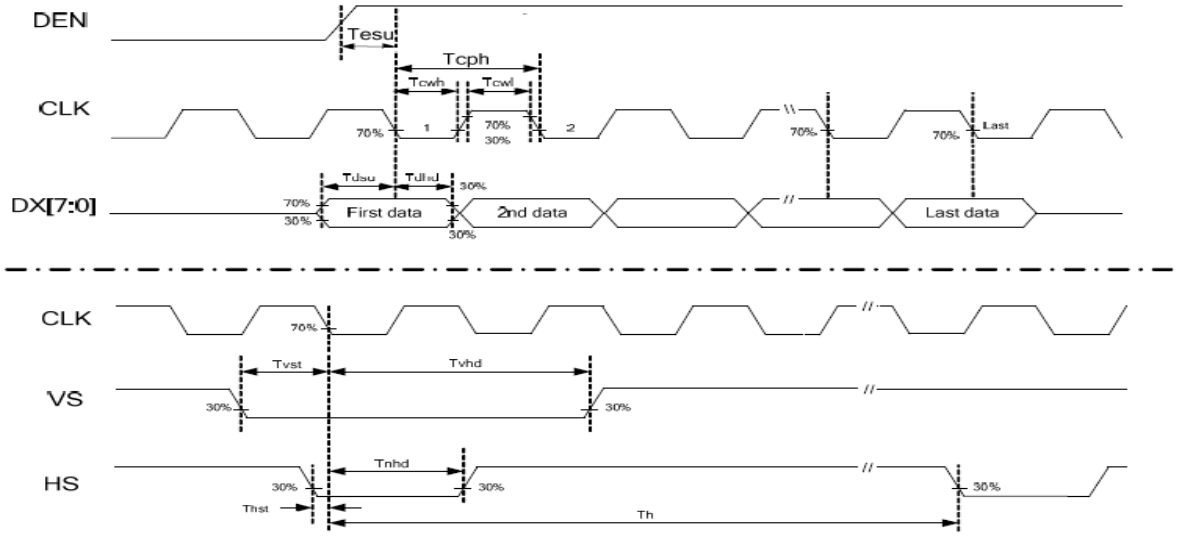
7.3.1 AC Timing characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit.	Note
CLK frequency	FCPH	22.66	25.175	27.69	MHZ	
CLK period	TCPH	36.11	39.7	44.13	ns	
CLK pulse duty	TCWH	40	50	60	%	
HS period	TH	750	800	850	TCPH	
HS pulse width	TWH	5	30	--	TCPH	
HS-first horizontal data time	THS	112	144	175	TCPH	
Display period	THA	--	640	--	TCPH	
HS setup time	THST	10	--	--	ns	
HS hold time	THHD	10	--	--	ns	
VS pulse width	TWV	1	3	5	TH	
First line data input time	TSTV	--	35	--	TH	
VS period	TV	515	525	535	TH	
VS setup time	TVST	10	--	--	ns	
VS hold time	TVHD	10	--	--	ns	

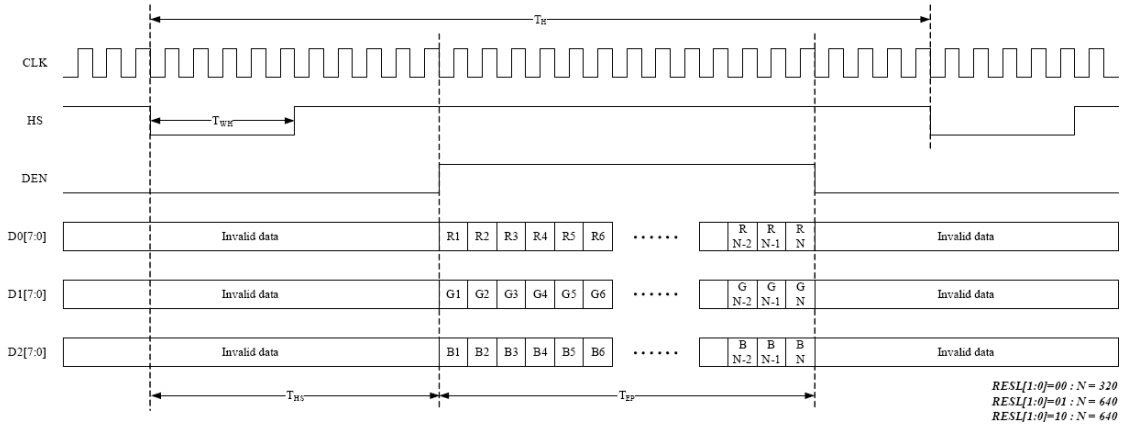
Note : When SYNC mode is used, 1st data start from 144th CLK after HS falling (when STHD[5:0]=00000)

Parameter	Symbol	Min.	Typ.	Max.	Unit.	Note
DEN Period	TDEN	--	800	--	TCPH	
DEN pulse width	TEP	--	640	--	TCPH	
DEN frame active time	TDEA	--	480	--	TDEN	
DEN frame blanking time	TDEB	--	45	--	TDEN	
DEN setup time	TESU	10	--	--	ns	

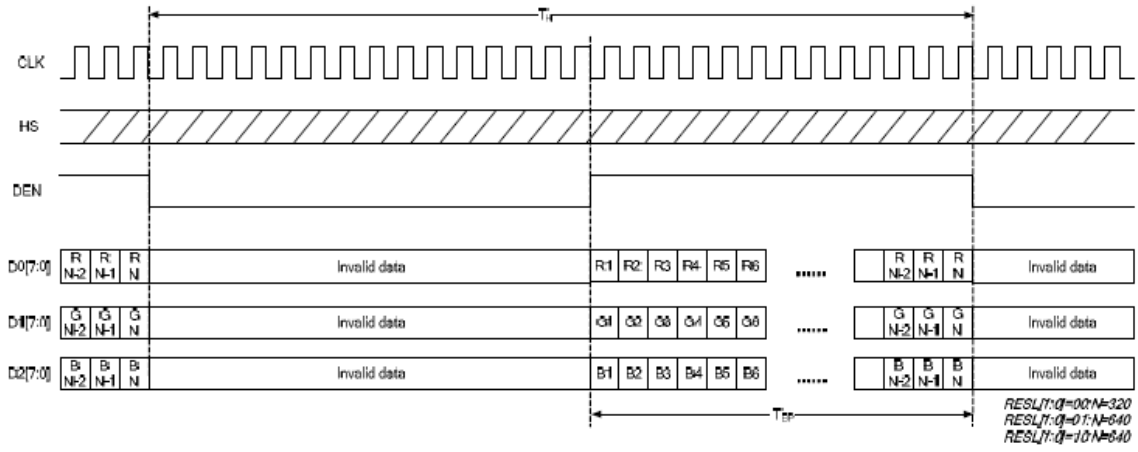
7.3.2 Clock and Data input waveforms



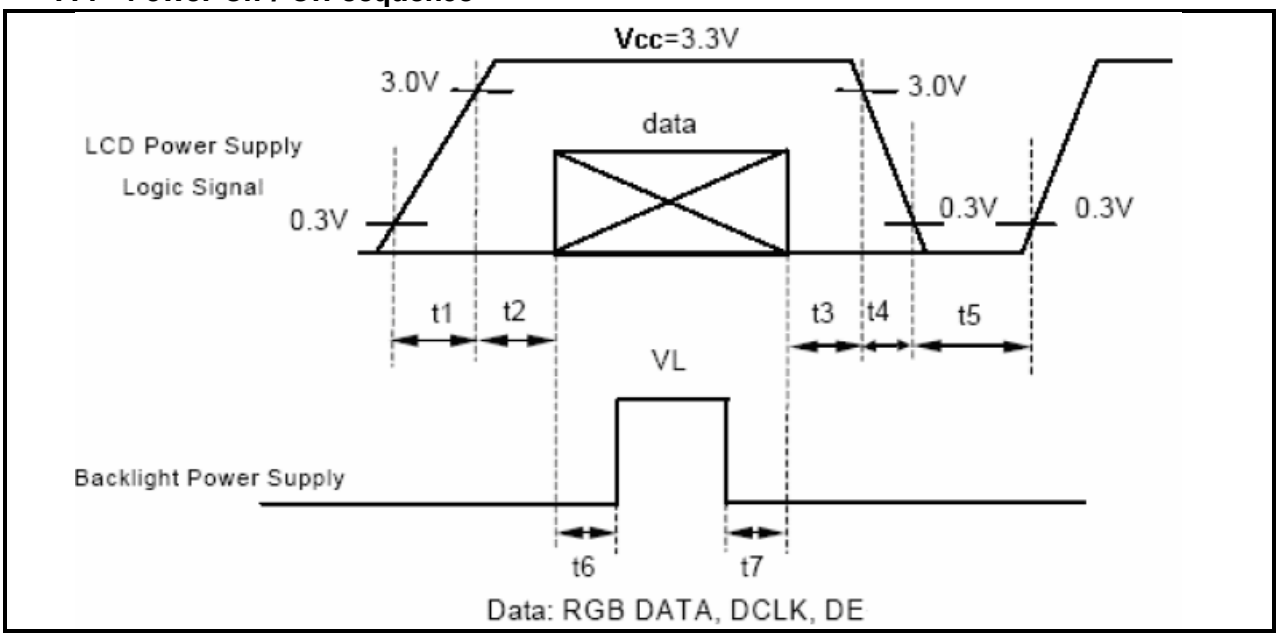
7.3.3 Parallel RGB SYNC Mode Horizontal Data Format



7.3.4 Parallel RGB DEN Mode Horizontal Data Format



7.4 Power On / Off Sequence



t1 ≤10ms : 1 sec≤ t5

50ms≤ t2 : 200ms ≤t6

0<t3 ≤50ms: 200ms≤ t7

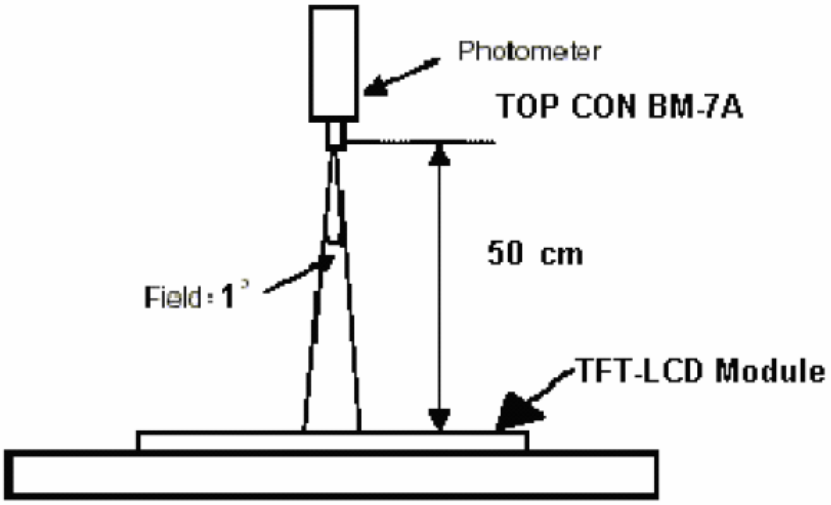
0<t4 ≤10ms

8. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Brightness		--	Note1, Note 3, (θ = 0°, Normal Viewing Angle)	1000	1200	--	cd/m2
Uniformity		B-uni		70	75	-	%
Contrast Ratio		CR		400	500	--	--
Response Time		Tr		--	15	20	ms
		Tf		--	25	35	ms
Color Chromaticity	White	Wx		0.260	0.310	0.360	--
		Wy		0.280	0.330	0.380	--
View angle	Horizontal	θ x+	Center CR≥10	55	65	--	
		θ x-		55	65	--	
	Vertical	θ Y+		40	50	--	
		θ Y-		55	65	--	
Image sticking		tis	2 hours	--	--	2	Sec

Note：The following optical specifications shall be measured in a darkroom or equivalent state(ambient luminance ≤1 lux, and at room temperature). The operation temperature is 25°C±2°C. The measurement method is shown in Note1.

Note1: The method of optical measurement:

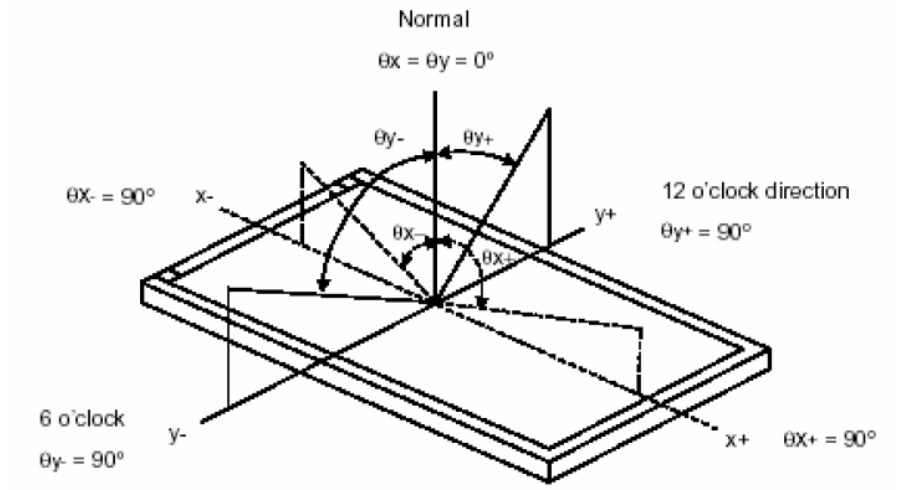


Note2: Measured at the center area of the panel and at the viewing angle of the θ x= θ y =0°

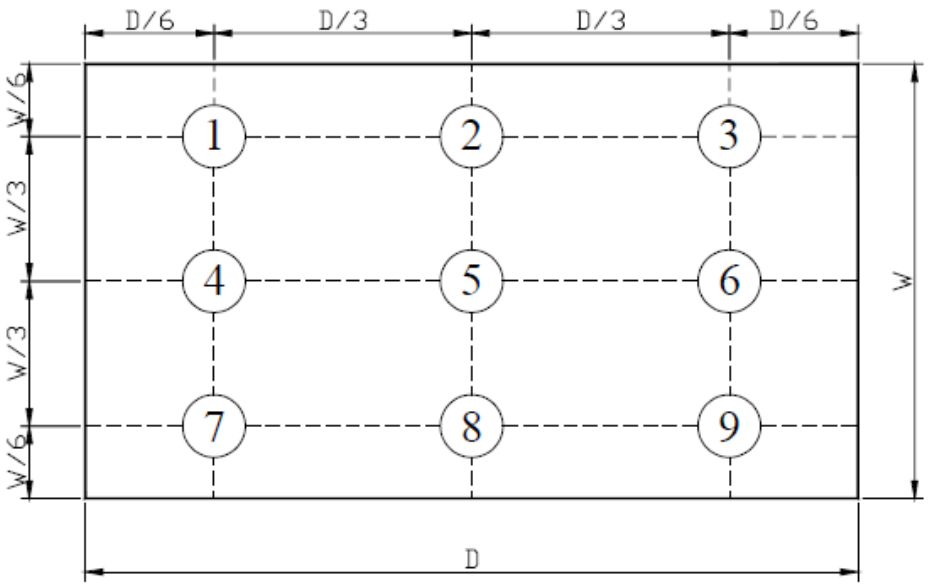
Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state ÷ Luminance with all pixels in Black state

Note4: Definition of Viewing Angle:



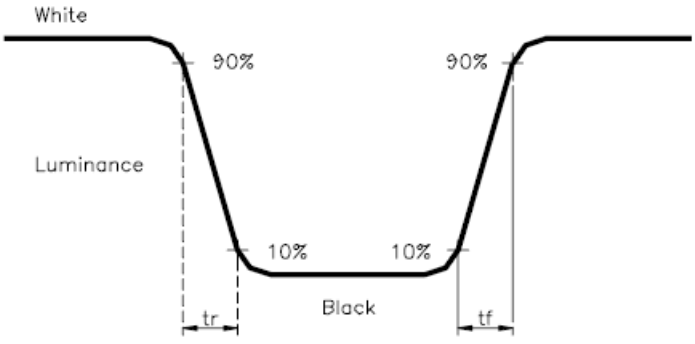
Note 5: Definition of Brightness Uniformity (B-uni):



B-uni ＝(Minimum luminance of 9 points÷Maximum luminance of 9points)X100%

Note 6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure

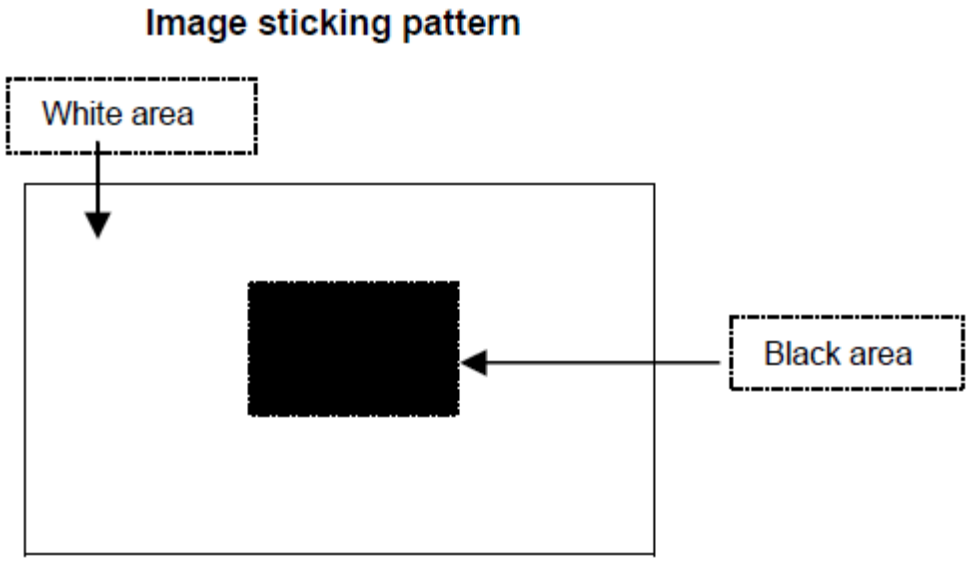


Note 7: Definition of Chromaticity:

The color coordinates (Wx,Wy),(Rx,Ry),(Gx,Gy),and (Bx,By) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

Note 8: Definition of Image sticking (tis):

Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C



9. RELIABILITY

9.1 Test Condition

9.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C
Humidity : 65 ± 5%

9.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

9.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

9.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

9.2 Tests

No.	ITEM	CONDITION CRITERION
1	High Temperature Storage	80°C, 120 hrs
2	Low Temperature Storage	-30°C, 120 hrs
3	High Temperature Operating	70°C, 120 hrs
4	Low Temperature Operating	-20°C, 120 hrs
5	High Temperature/Humidity Non-Operating	60°C, 90%RH, 120 hrs
6	Temperature Shock Non-Operating	-30°C ←→ 80°C (0.5hr each), 25 cycles
7	Vibration Test Non-Operating	Frequency:0 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z
8	Electro-static Discharge Non-Operating	150pF,330Ω Air:± 12KV;Contact: ±6KV 10 times/point;4 points/panel face

Note1: The test sample have recovery time for 24 hours at room temperature before the function check. In the standard conditions, there is no any touch panel function NG issue occurred.

10. PRECAUTION RELATING PRODUCT HANDLING

10.1 SAFETY

10.1.1 If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.

10.1.2 If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

10.2 HANDLING

10.2.1 Avoid any strong mechanical shock which can break the glass.

10.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.

10.2.3 Do not remove the panel or frame from the module.

10.2.4 The polarizing plate of the display is very fragile. So, please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass, tweezers, etc.)

10.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.

10.2.6 Do not touch the display area with bare hands, this will stain the display area.

10.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

10.2.8 To control temperature and time of soldering is 280 ± 10°C and 3-5 sec.

10.2.9 To avoid liquid (include organic solvent) stained on LCM.

10.3 STORAGE

10.3.1 Store the panel or module in a dark place where the temperature is 25°C ± 5°C and the humidity is below 65% RH.

10.3.2 Do not place the module near organics solvents or corrosive gases.

10.3.3 Do not crush, shake, or jolt the module.

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