



PRODUCT SPECIFICATIONS

For Customer: _____ : APPROVAL FOR SPECIFICATION

Customer Model No. _____ : APPROVAL FOR SAMPLE

Module No.: LW050GURN2-02 Version: V1.0 Date : 2017-06-06

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For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
Jacky	Steven		



2. Revision Record

Date	Rev.No	Page	Revision Items	Prepared
2017-06-06	V1.0		The first release	Jacky



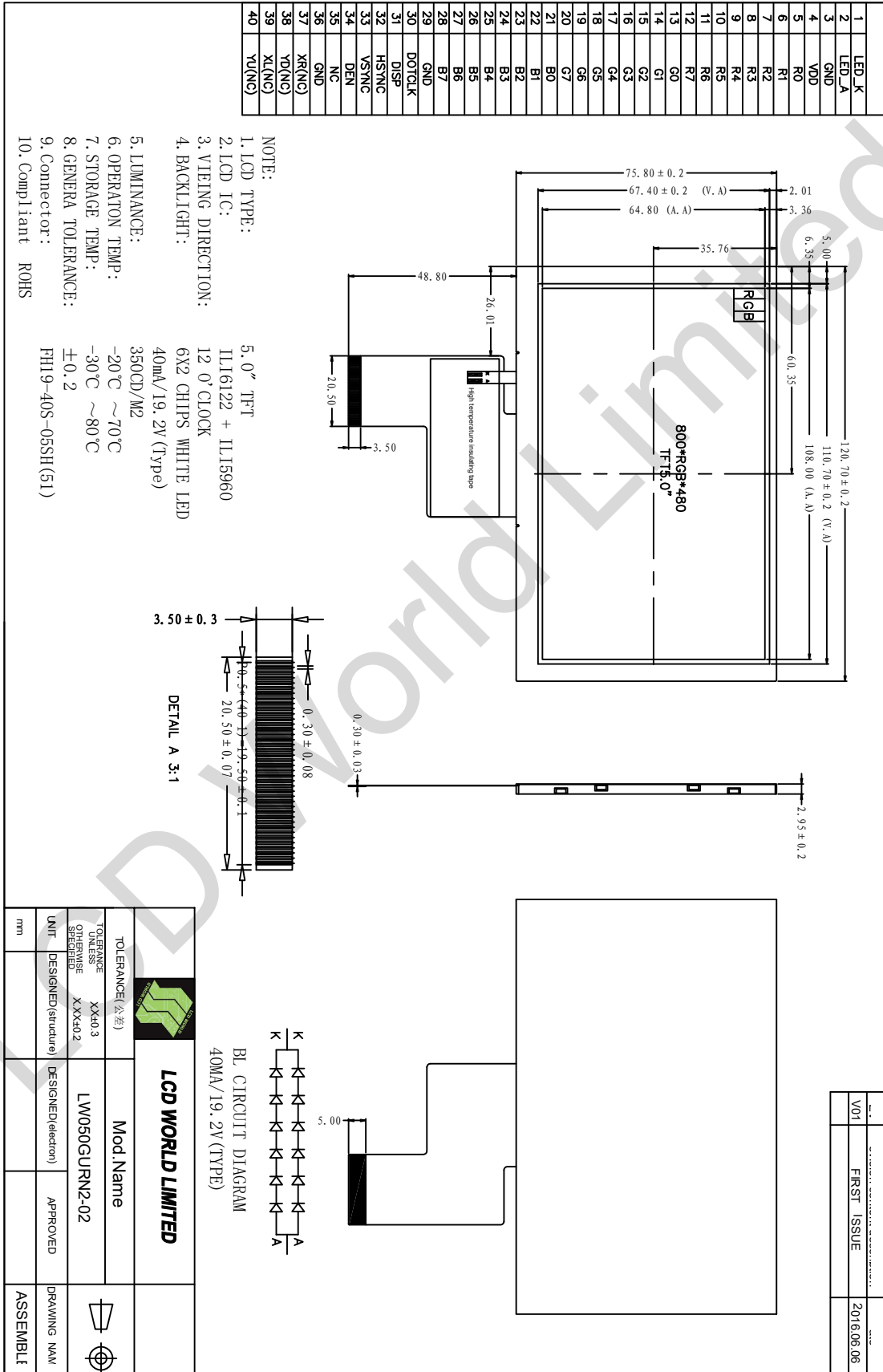
3. General Specifications

LW050GURN2-02 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, and backlight unit. The 5.0 inch display area contains 800x 480 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display Mode	TN Normally White Transmissive		
Gray Scale Inversion Direction	6:00	O'clock	
Best Viewing Direction	12:00	O'clock	
Surface treatment	--	-	
Driver IC	ILI5960+ILI6122	-	
Power Supply for LCD	3.3	V	
Interface	24 bits RGB	-	
Outline Dimensions	120.7*75.8*2.95	mm	
Active Area(W×H)	108*64.8	mm	
Dot Pitch(W×H)	0.135*0.135	mm	
Number of Dots	800(RGB)×480	dots	
Backlight	12-LEDs (white)	pcs	
Luminance for LCM	350	Cd/m ²	
Weight	---	G	
Touch Panel	--	-	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	



4. Outline Drawing





4.1 Interface Signals FOR CN1

Pin No.	Symbol	Function	Remark
1	LEDK	LED Cathode	
2	LEDA	LED Anode	
3	GND	Ground	
4	VDD	Digital Power Supply(+3.3V)	
5	R0	Red data(LSB)	
6	R1	Red data	
7	R2	Red data	
8	R3	Red data	
9	R4	Red data	
10	R5	Red data	
11	R6	Red data	
12	R7	Red data(MSB)	
13	G0	Green data(LSB)	
14	G1	Green data	
15	G2	Green data	
16	G3	Green data	
17	G4	Green data	
18	G5	Green data	
19	G6	Green data	
20	G7	Green data(MSB)	
21	B0	Blue data(LSB)	
22	B1	Blue data	
23	B2	Blue data	
24	B3	Blue data	
25	B4	Blue data	
26	B5	Blue data	
27	B6	Blue data	
28	B7	Blue data(MSB)	
29	GND	Ground	
30	DCLK	Data Clock	
31	DISP	Display ON/OFF Control. Internally pulled high	
32	HS	Horizontal SYNC Input in RGB Mode	
33	VS	Vertical SYNC Input in RGB Mode	
34	DE	Data Enable	
35	NC	No Connection	
36	GND	Ground	



37	NC	No Connection	
38	NC	No Connection	
39	NC	No Connection	
40	NC	No Connection	

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5、 Operation Specifications

5.1 Absolute Maximum Ratings(Ta=25°C)

Item	Symbol	Min.	Max.	Unit	Note
Supply Voltage	VDD	-0.3	4.5	V	1,2
Operating Temperature	Top	-20	+70	°C	
Storage Temperature	Tst	-30	+80	°C	
LED Reverse Voltage (Each LED)	VR	-	5	V	
LED Forward Current (Each LED)	IF		40	mA	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. VR Conditions: Zener Diode 20mA.

5.2 Electrical characteristics (Ta=25°C)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Logic Power supply	VDD	Ta=25°C	3.0	3.3	3.6	V	
Input voltage	'H'	VIH	0.8VDD	-	VDD	V	
	'L'	VIL	0	-	0.2VDD	V	
Current Consumption	IVDD	Normal mode	-	17	25	mA	

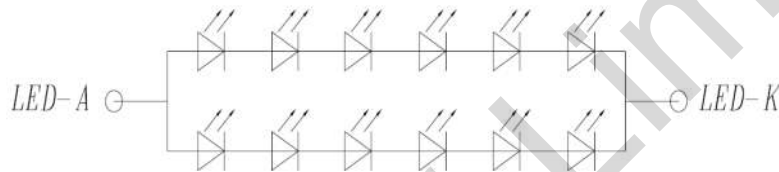


5.3 LED backlight specification(Ta=25°C, 60%RH±5%)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Forward Current	IF		40		mA	Total LED
Forward Voltage	VF	-	19.2	-	V	IF=40mA
Backlight Lifetime		-	20000	-	Hour	IF=40mA

Note: Backlight lifetime means brightness goes down to 50% initial brightness;
The lifetime of LED will be reduced if LED is driven by high current, high ambient temperature and humidity conditions;

LED CIRCUIT

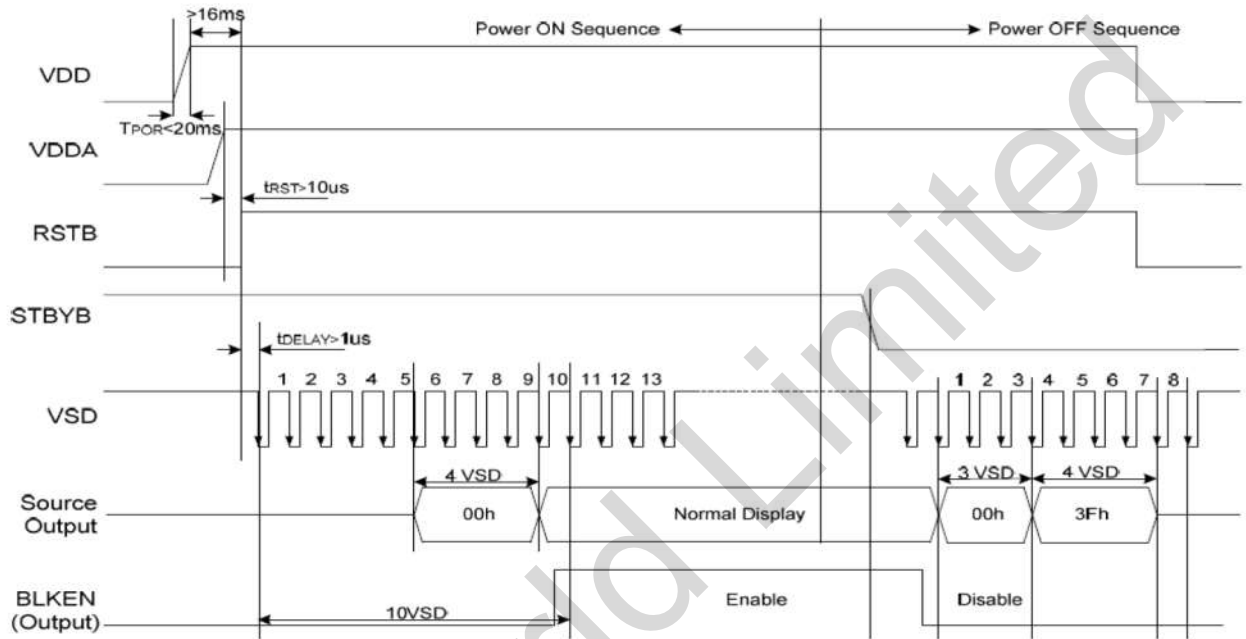




6 Interface Timing Chart

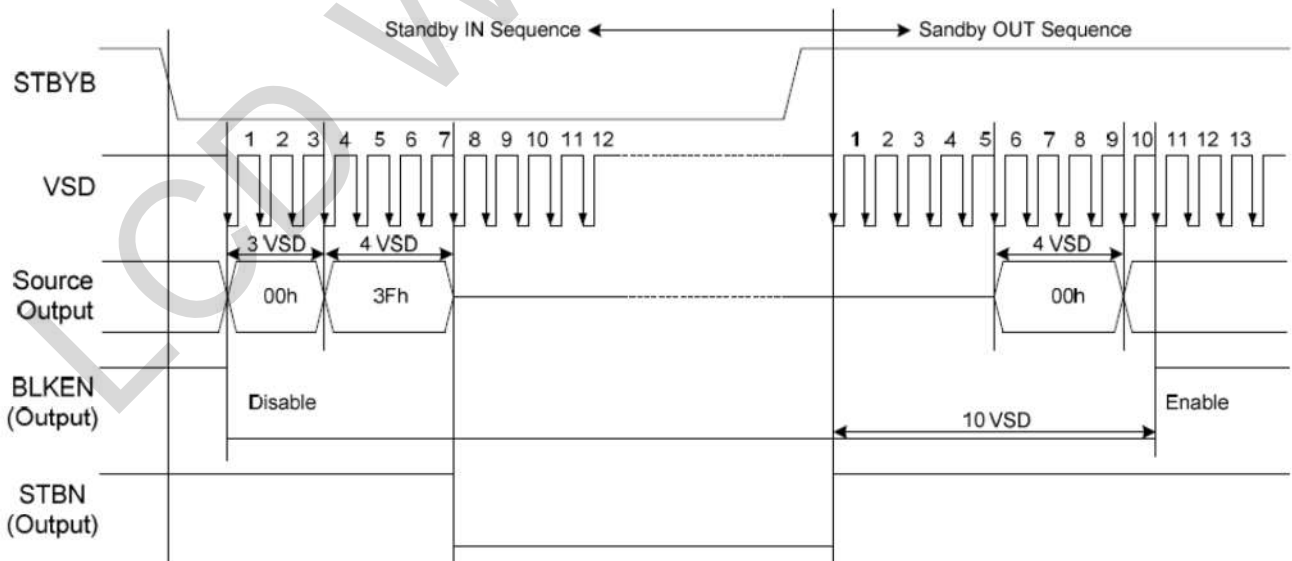
6.1 Power Sequence

6.1.1 Power On Sequence



Note: For prevent anormal operation, t_{RST} must be longer than 10us during Power ON sequence.

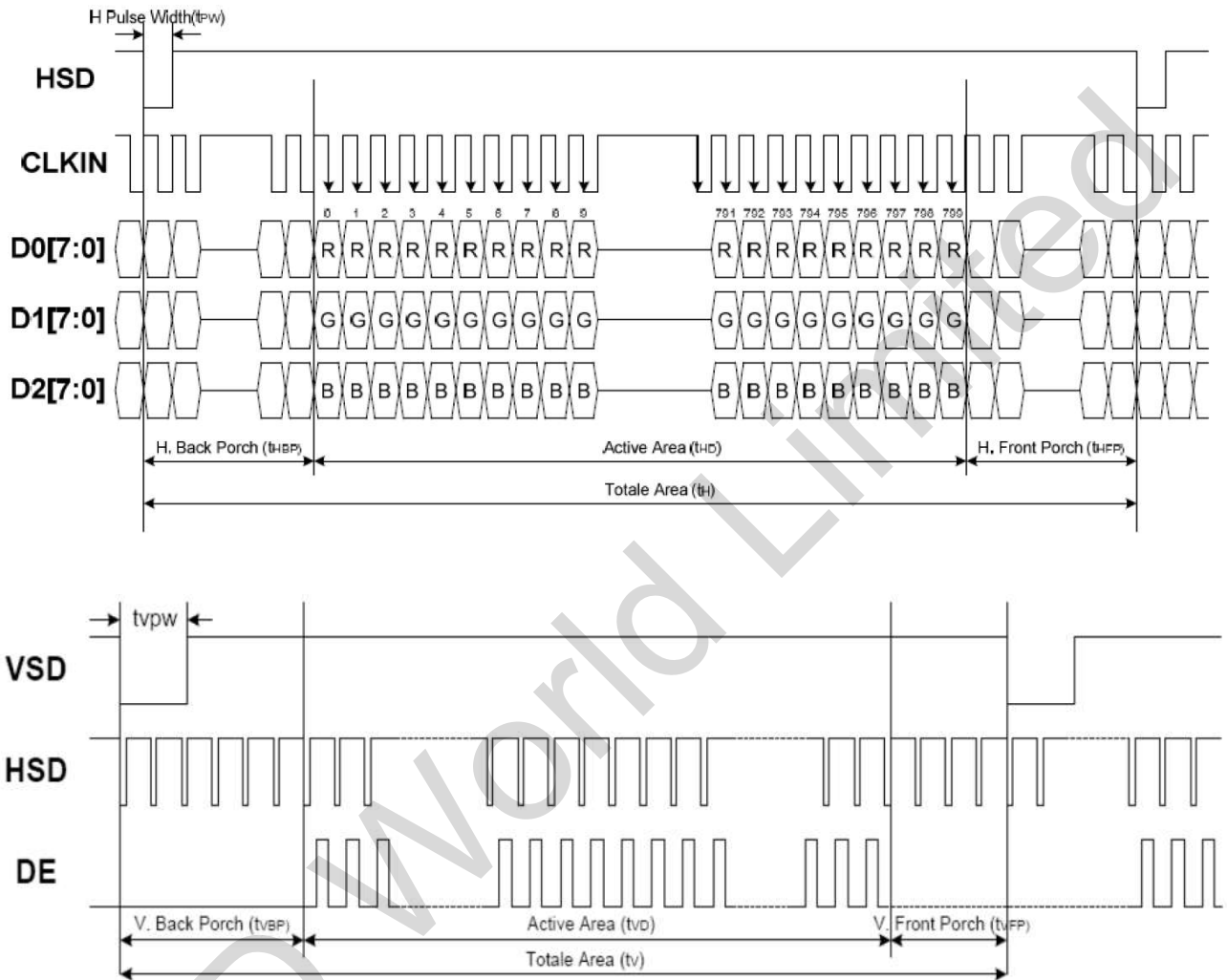
6.1.2 Power Off Sequence





6.2 Timing Characteristics

6.2.1 SYNC Mode





Timing Table:

Parameter	Symbol	Spec			Unit	Conditions
		Min.	Typ.	Max.		
VDD Power ON slew rate	t _{POB}	--	--	20	ms	0V ~ 0.9VDD
RSTB pulse width	t _{RST}	10	--	--	us	CLKIN=50MHz
CLKIN cycle time	t _{CPH}	20	--	--	ns	
CLKIN pulse duty	t _{CWH}	40	50	60	%	
VSD setup time	t _{VST}	8	--	--	ns	
VSD hold time	t _{VHD}	8	--	--	ns	
HSD setup time	t _{HST}	8	--	--	ns	
HSD hold time	t _{HHD}	8	--	--	ns	
Data setup time	t _{DST}	8	--	--	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
Data hold time	t _{DHD}	8	--	--	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
DE setup time	t _{EST}	8	--	--	ns	
DE hold time	t _{EHD}	8	--	--	ns	
Output stable time	t _{SST}	--	--	6	us	10% to 90% target voltage. CL=120pF, R=10KΩ
CLKIN frequency	f _{CLK}	--	40	50	MHz	VDD=3.0 ~ 3.6V
CLKIN cycle time	t _{CLK}	20	25	--	ns	
CLKIN pulse duty	t _{CWH}	40	50	60	%	T _{CLK}
Time from HSD to Source output	t _{HSO}	--	20	--	CLKIN	
Time from HSD to LD	t _{HLD}	--	20	--	CLKIN	Note (2)
Time from HSD to STV	t _{HSTV}	--	2	--	CLKIN	
Time from HSD to CKV	t _{HCKV}	--	20	--	CLKIN	
Time from HSD to OEV	t _{HOEV}	--	4	--	CLKIN	
LD pulse width	t _{WLD}	--	10	--	CLKIN	Note (2)
CKV pulse width	t _{WCKV}	--	66	--	CLKIN	
OEV pulse width	t _{WOEV}	--	74	--	CLKIN	

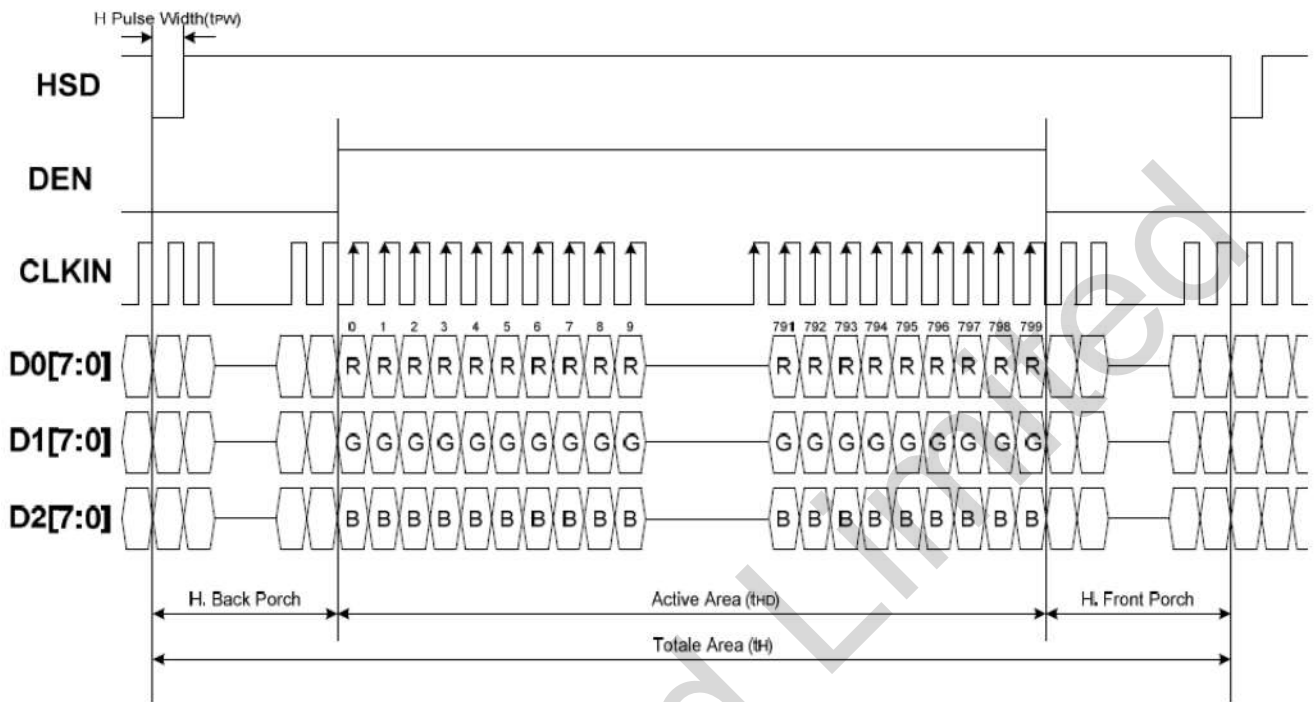
Note: (1) VDD=3.0 ~ 3.6V, VDDA=6.5~13.5V, DGND=AGND=0V, Ta=-20~+85°C

(2) The contents of the data register are transferred to the latch circuit at the rising edge of LD. Then the gray scale voltage is output from the device at the falling edge of LD.

(3) Output loading condition :



6.2.2 DE Mode



Please refer to ILI6122 data sheet for more details.

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Horizontal display area	thd	800			DCLK
DCLK frequency	Fclk	-	33	50	MHZ
1 Horizontal line	th	1056			DCLK
HSYNC pulse width	thpw	1		40	
HSYNC Back Porch (blanking)	thb	-	46	-	
HSYNC front porch	thfp	16	210	354	
Vertical display area	tvd	480			H
VSD period time	tv	510	525	650	
VSD pulse width	tvpw	1	-	20	
VSD Back Porch (blanking)	tvb	-	23	-	
VSD front porch	tvfp	7	22	147	



7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp	$\theta=0^\circ$		350	-	Cd/m ²	1
Uniformity	ΔBp	$\Phi=0^\circ$	70	75	-	%	1,2
Viewing Angle	3:00	Cr \geq 10	-	70	-	Deg	3
	6:00		-	70	-		
	9:00		-	70	-		
	12:00		-	50	-		
Contrast Ratio	Cr	$\theta=0^\circ$ $\Phi=0^\circ$	500	700	-	-	4
Response Time	T _r		-	10	20	ms	5
	T _f		-	10	20	ms	
Color of CIE Coordinate	W	x	0.26	0.31	0.36	-	1,6
		y	0.28	0.33	0.38	-	
	R	x	-	-	-	-	
		y	-	-	-	-	
	G	x	-	-	-	-	
		y	-	-	-	-	
	B	x	-	-	-	-	
		y	-	-	-	-	

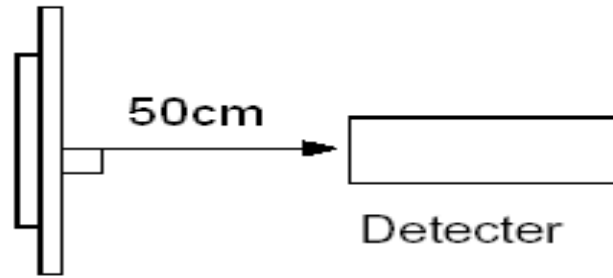
Note: The parameter is slightly changed by temperature, driving voltage and material

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots.

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25°C.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

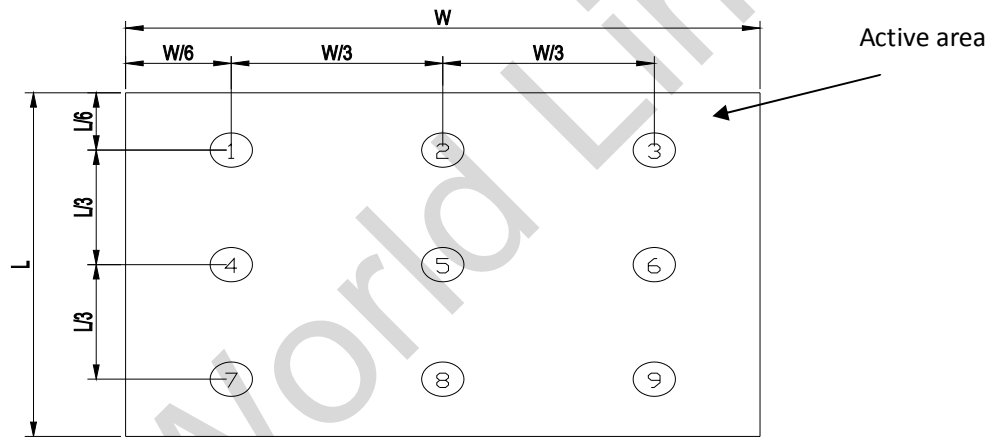


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$$

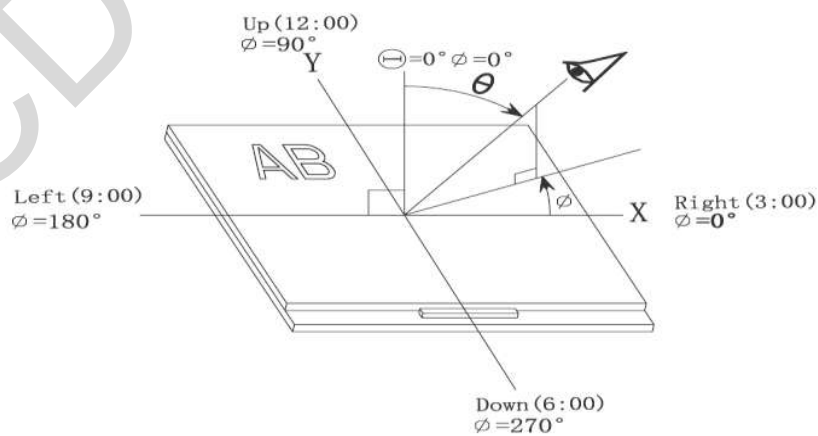
Bp (Max.) = Maximum brightness in 9 measured spots

Bp (Min.) = Minimum brightness in 9 measured spots.



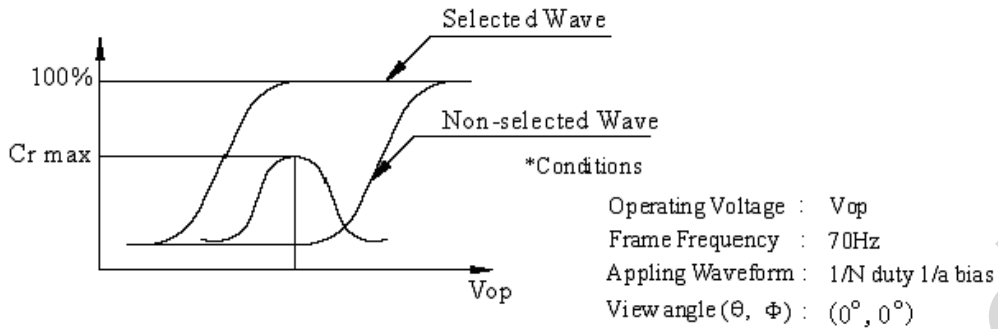
Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ





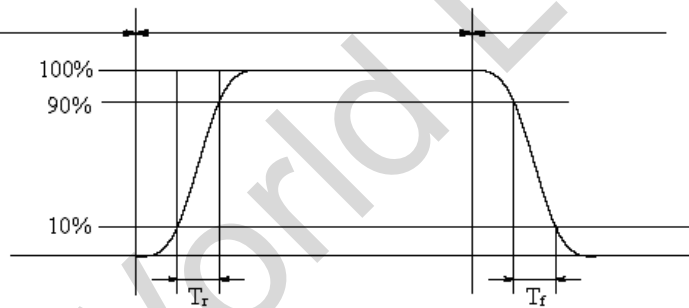
Note 4: Definition of contrast ratio.



$$\text{Contrast ratio } Cr = \frac{\text{Brightness of selected dots}}{\text{Brightness of non selected dots}}$$

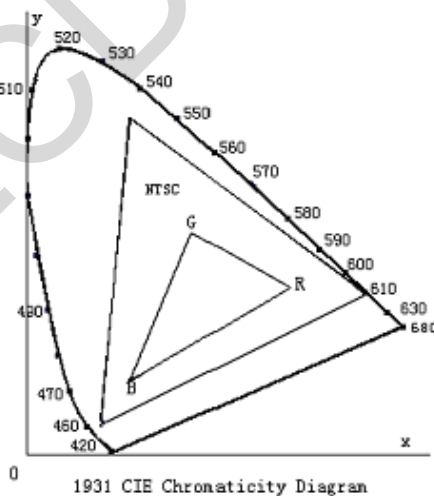
Note 5: Definition of Response time.

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.



Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$



8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80°C±2°C 96H Restore 2H at 25°C Power off	Note
2	Low Temperature Storage	-30°C±2°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	70°C±2°C96H Restore 2H at 25°C Power on	
4	Low Temperature Operation	-20°C±2°C96H Restore 4H at 25°C Power on	
5	High Temperature and Humidity Operation	40°C±2°C 85%RH 96H Power on	
6	Thermal Shock	-10°C → +25°C → +50°C, 100 cycles 30min 5min 30min Restore 2H at 25°C Power off	
7	Vibration Test	10Hz~150Hz, 100m/s ² , 120min	
8	Shock Test	Half- sine wave, 300m/s ² , 11ms	



9. Precautions for Use of LCD Modules

9.1 Handling Precautions

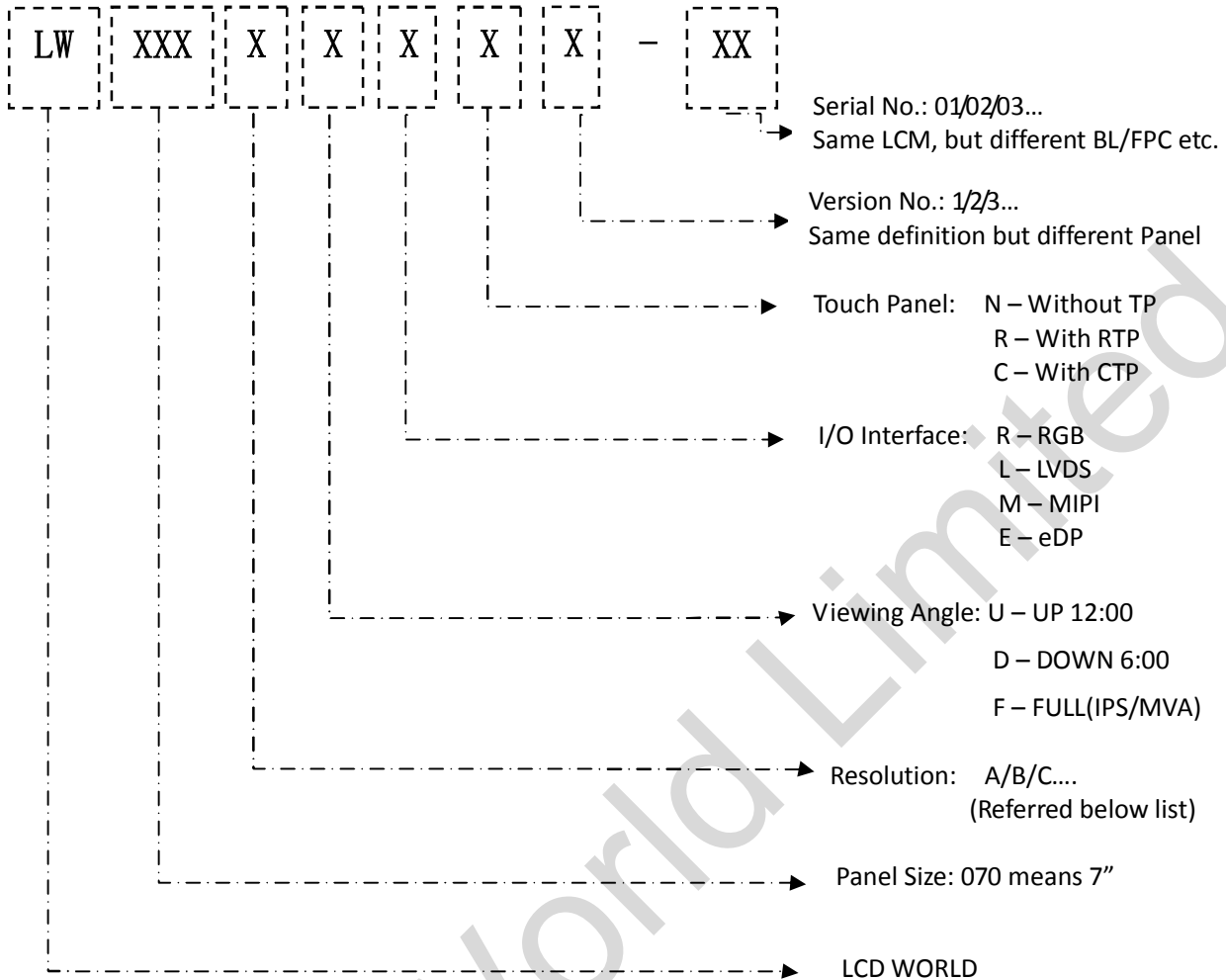
- 9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- 9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcoholSolvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
 - Water
 - Ketone
 - Aromatic solvents
- 9.1.6 Do not attempt to disassemble the LCD Module.
- 9.1.7 If the logic circuit power is off, do not apply the input signals.
- 9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - a. Be sure to ground the body when handling the LCD Modules.
 - b. Tools required for assembly, such as soldering irons, must be properly ground.
 - c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - d. 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.

9.2 Storage precautions

- 9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- 9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
 - Temperature : 0°C ~ 40°C
 - Relatively humidity: ≤80%
- 9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.
- 9.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.



10. LCDW P/N Coding System



	Resolution	Code
QQVGA	128*160	A
QCIF	176*220	B
QVGA	320*240	C
WQVGA	272*480	D
HVGA	320*480	E
VGA	480*640	F
WVGA	800*480	G
SVGA	800*600	H
WSVGA	1024*600	J
XGA	1024*768	K
HD	1280*720	L
WXGA	1280*800	M
SXGA	1280*960	N
WSXGA	1680*1024	P
UGA	1600*1200	Q
FHD	1920*1080	R
WUXGA	1920*1200	S

END