



PRODUCT SPECIFICATIONS

For Customer: _____ : APPROVAL FOR SPECIFICATION

Customer Model No. _____ : APPROVAL FOR SAMPLE

Module No.: LW070GURN3-01 Version: V1.0 Date : 2017-05-30

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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

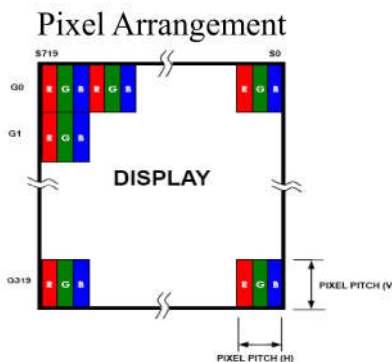
Date	Rev.No.	Page	Revision Items	Prepared
2017-05-30	V1.0		The first release	Jacky



3. General Specifications

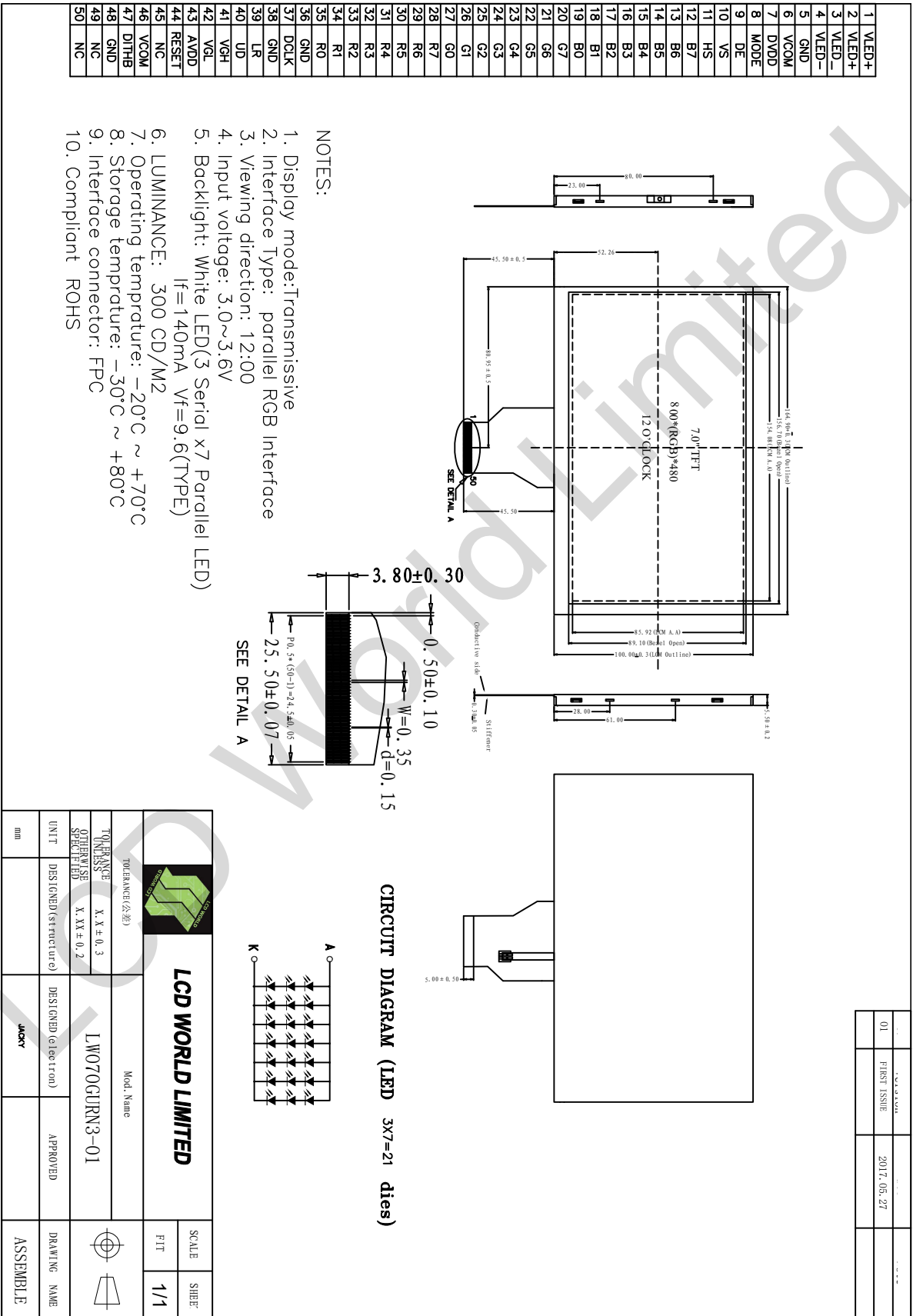
LW070GURN3-01 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, backlight unit. The 7.0 inch display area contains 800 x 480 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion

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	AG/3H	-	
Power Supply for LCD	3.3	V	
Interface	24Bits-RGB	-	
Outline Dimensions	164.90*100*5.5	mm	
Active Area(W×H)	154.08*85.92	mm	
Pixel Pitch(W×H)	0.0642*RGB*0.179	mm	
Pixel Arrangement	RGB Vertical Stripe	-	
Number of Dots	800(RGB)×480	dots	
Backlight	21-LEDs (white)	pcs	
Luminance for LCM	300	Cd/m2	
Weight	-	G	
Touch Panel	-	-	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	





4. Outline Drawing





4.1 Interface Signals

FPC Connector is used for the module electronics interface. The recommended model is FH12A-50S-0.5SH manufactured by Hirose.

Pin No.	Symbol	Function	Remark
1	LEDA	LED Anode	
2	LEDA	LED Anode	
3	LEDK	LED Cathode	
4	LEDK	LED Cathode	
5	GND	Ground	
6	VCOM	Common Voltage	
7	DVDD	Digital Power	
8	MODE	DE/SYNC Mode Select. Normally pull high H: DE Mode L: HSD/VSD mode	
9	DE	Date Enable Signal	
10	VS	Vertical sync input. Negative polarity	
11	HS	Horizontal sync input. Negative polarity	
12	B7	Blue data(MSB)	
13	B6	Blue data	
14	B5	Blue data	
15	B4	Blue data	
16	B3	Blue data	
17	B2	Blue data	
18	B1	Blue data	
19	B0	Blue date(LSB)	
20	G7	Green data(MSB)	
21	G6	Green data	
22	G5	Green data	
23	G4	Green data	
24	G3	Green data	
25	G2	Green data	
26	G1	Green data	
27	G0	Green data(LSB)	
28	R7	Red data(MSB)	
29	R6	Red data	
30	R5	Red data	
31	R4	Red data	
32	R3	Red data	
33	R2	Red data	
34	R1	Red data	



35	R0	Red data(LSB)	
36	GND	Power Ground	
37	DCLK	Clock Input	
38	GND	Ground	
39	L/R	Left or Right Display Control	Note1
40	U/D	Up or Down Display Control	Note1
41	VGH	Gate ON Voltage	
42	VGL	Gate OFF Voltage	
43	AVDD	Analog Power	
44	RESET	Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high(R=10K)	
45	NC	No connection	
46	VCOM	Common voltage	
47	DITHB	Dithering Setting: DITHB="H" 8bit resolution(default setting) DITHB="L" 6bit resolution(last 2 bit Of input data truncated)	
48	GND	Ground	
49	NC	No connection	
50	NC	No connection	

Note1: Selection of scanning mode:

U/D	L/R	Scanning direction
0	1	Up to down, left to right
1	0	Down to up, right to left
0	0	Up to down, right to left
1	1	Down to up, left to right



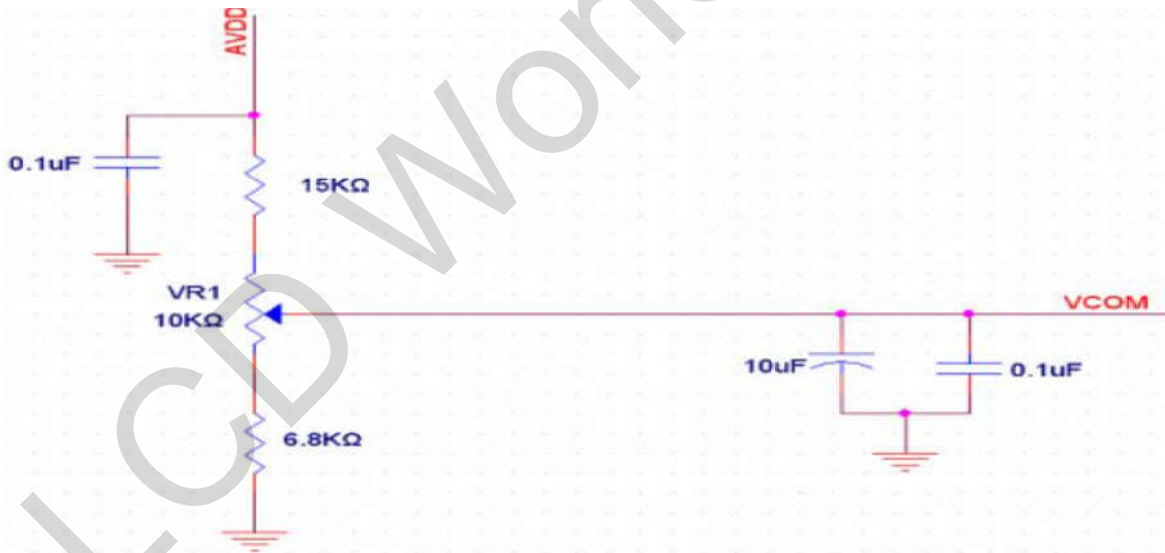
5、 Operation Specifications

5.1 Electrical Specification (Ta=25°C)

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Power Voltage	DVDD	3.0	3.3	3.6	V	Note 2
	AVDD	6.5	10.4	10.6	V	
	VGH	15.3	16	16.7	V	-
	VGL	-7.7	-7.0	-6.3	V	
Input Signal Voltage	VCOM	3.6	3.8	4.0	V	
Input Logic High Voltage	V _{IH}	0.7DVDD	-	DVDD	V	Note 4
Input Logic Low Voltage	V _{IL}	0	-	0.3DVDD	V	Note 3

Notes:

1. Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.
2. DVDD setting should match the signals output voltage(refer to Note 3) of customer's system board.
3. DCLK, HS, VS, RESET, U/D, L/R, DE, R0-R7, G0-G7, B0-B7, MODE, DITHB.
4. Typical VCOM is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.

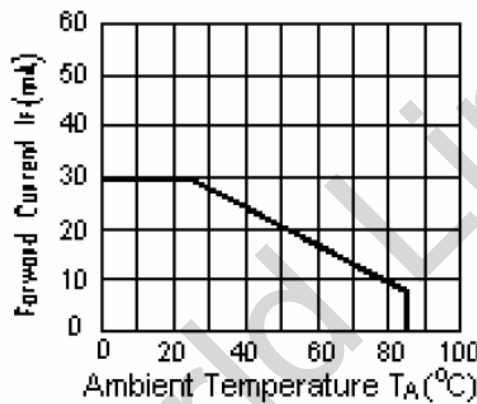




5.2 LED backlight specification(Ta=25°C, 60%RH±5%)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Forward Current	IF	-	140	-	mA	Total LED
Forward Voltage	VF	8.4	9.6	10.5	V	IF=140mA
Backlight Lifetime		25000	-	-	Hour	IF=140mA

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;



ILED VS TEMP

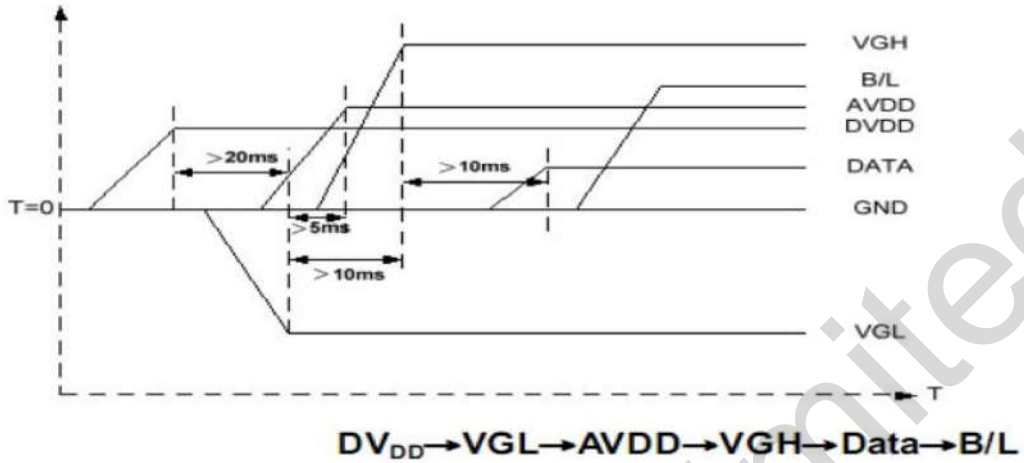
5.3 Electrical characteristics (Ta=25°C)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Gate on power current	IVGH	VGH=16V	-	0.2	1.0	mA	-
Gate off power current	IVGL	VGL=-7.0V	-	0.2	1.0	mA	-
Analog power current	IVDD	VDD=3.3V	-	4.0	10	mA	-
Analog power current	IAVDD	AVDD=10.4V	-	20	50	mA	-

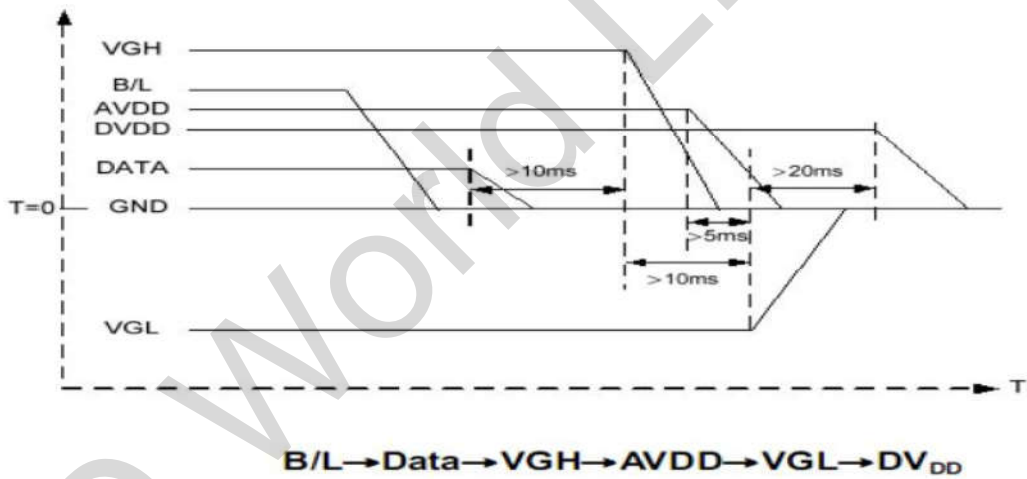


5.4 Power Sequence

Power ON:



Power OFF:



Note: Data include R0-R7, B0-B7, GO-G7, U/D, L/R, DCLK, HS,VS,DE.



6 Interface Timing Chart

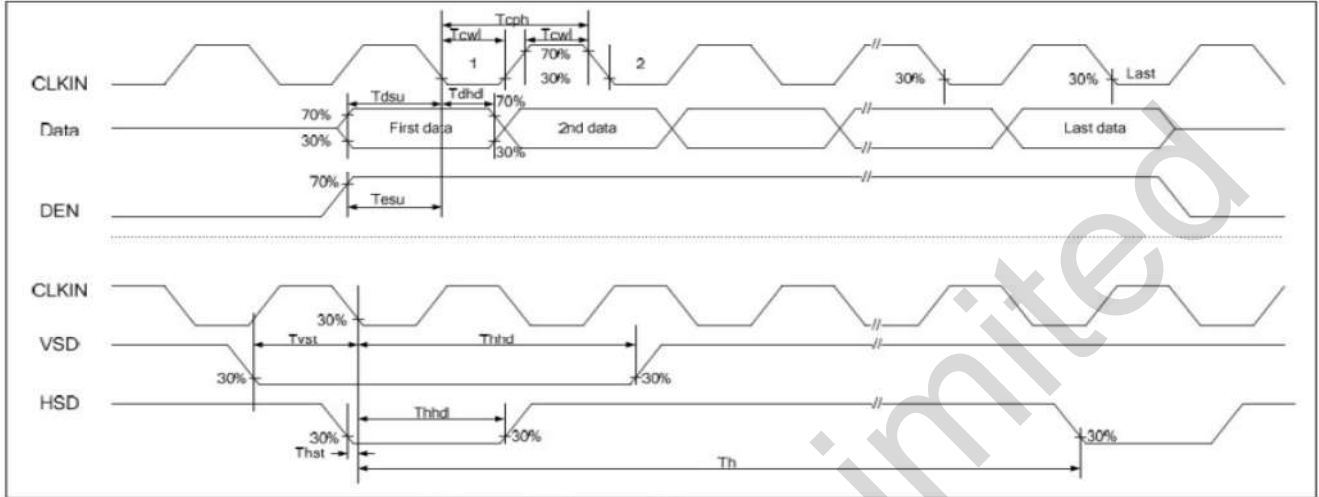
6.1 AC Electrical Characteristics

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
HS setup time	T _{HST}	8			ns
HS hold time	T _{HHD}	8			ns
VS setup time	T _{VST}	8			ns
VS hold time	T _{VHD}	8			ns
Data setup time	T _{DSU}	8			ns
Data hold time	T _{DHD}	8			ns
DE setup time	T _{ESU}	8			ns
DE hold time	T _{EHD}	8			ns
DVDD power on slew rate	T _{POR}	-		20	ms
RESET pulse width	T _{RST}	1			ms
DCLK cycle time	T _{COH}	20			ns
DCLK pulse duty	T _{CWH}	40	50	60	%



6.2 Timing Diagram

6.2.1 Input Clock and Data Timing Diagram



6.2.2 Timing

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd	-	800	-	DCLK
DCLK Frequency	fclk	26.4	33.3	46.8	MHz
One Horizontal Line	th	862	1056	1200	DCLK
HS pulse width	thpw	1	-	40	DCLK
HS Blanking	thb	46	46	46	DCLK
HS Front Porch	thfp	16	210	354	DCLK

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	-	480	-	TH
VS period time	tv	510	525	650	TH
VS pulse width	tvpw	1	-	20	TH
VS Blanking	tvb	23	23	23	TH
VS Front Porch	tvfp	7	22	147	TH

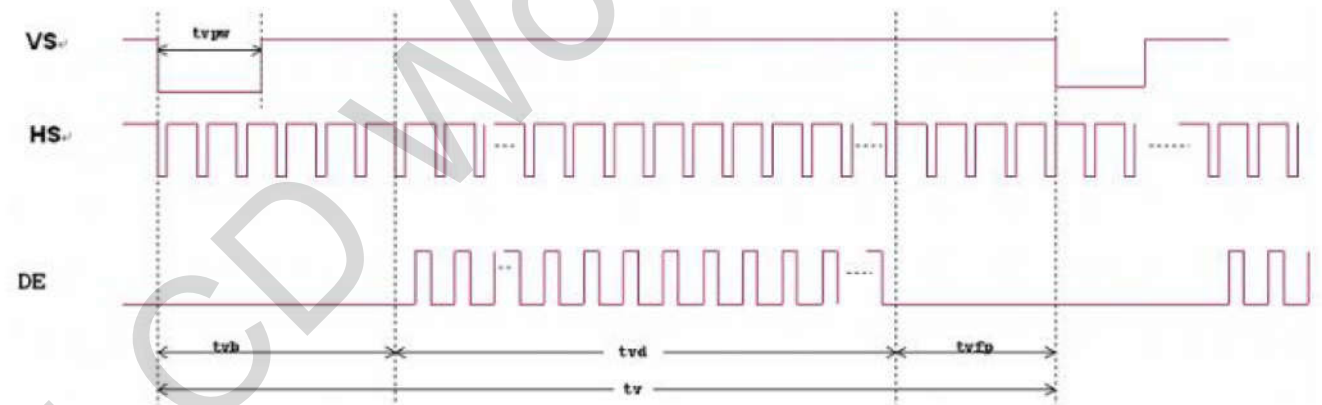


6.3 Data Input Format

Horizontal input timing diagram



Vertical input timing diagram





7. Optical Characteristics (Ta=25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness(IF=140mA)	Bp	$\theta=0^\circ$	-	300	-	Cd/m ²	1
Uniformity	Δ Bp	$\Phi=0^\circ$	75	80	-	%	1,2
Viewing Angle	3:00	Cr \geq 10	60	70	-	Deg	3
	6:00		60	70	-		
	9:00		60	70	-		
	12:00		40	50	-		
Contrast Ratio	Cr	$\theta=0^\circ$ $\Phi=0^\circ$	400	500	-	-	4
Response Time	T _r		-	10	20	ms	5
	T _f		-	10	30	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	-	-	-	-	
Color Saturation	NTSC	-	-	50	-	%	

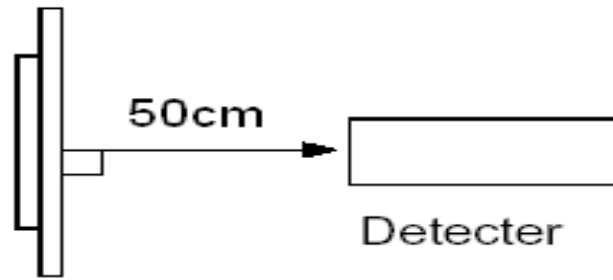
Note: The parameter is slightly changed by temperature, driving voltage and material

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.

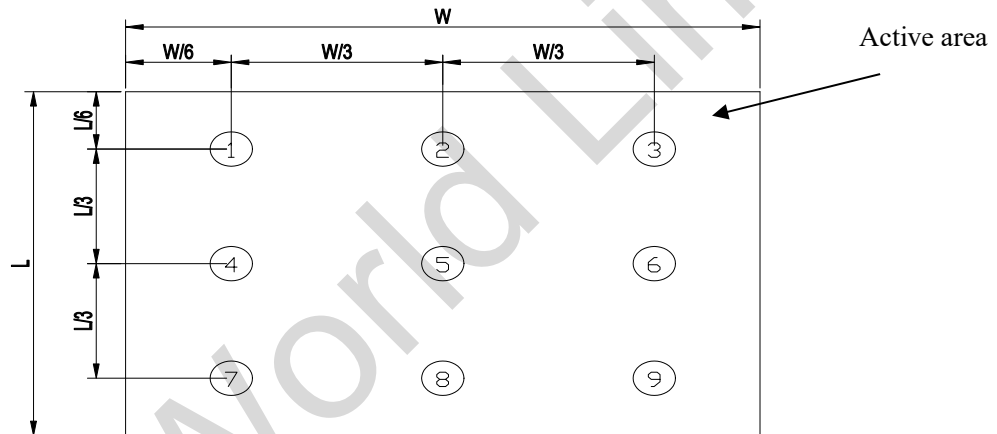


Note 2: The luminance uniformity is calculated by using following formula.

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

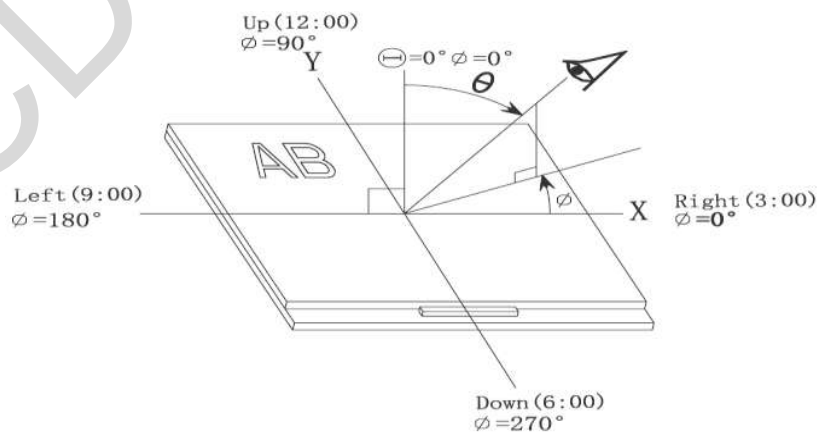
Bp (Max.) = Maximum brightness in 9 measured spots

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



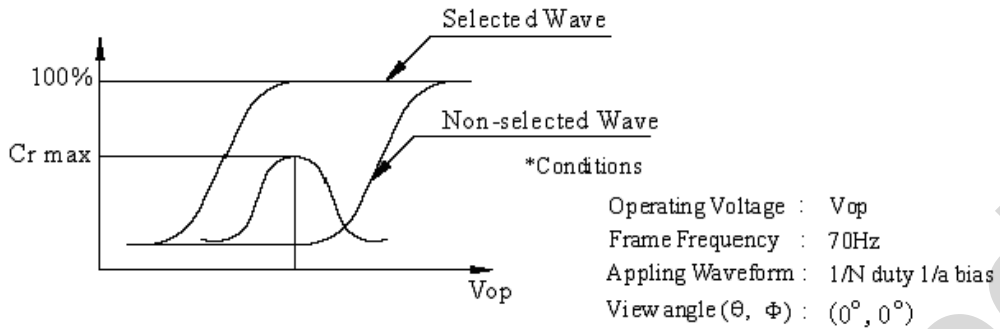
Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ





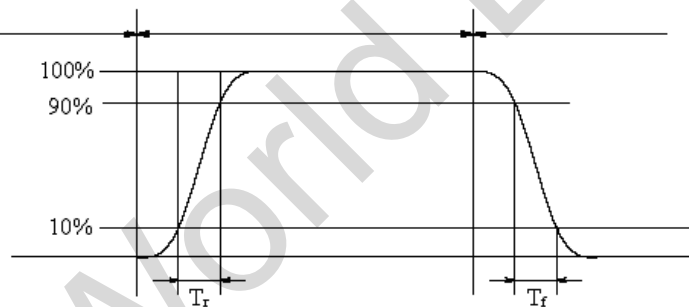
Note 4: Definition of contrast ratio.



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

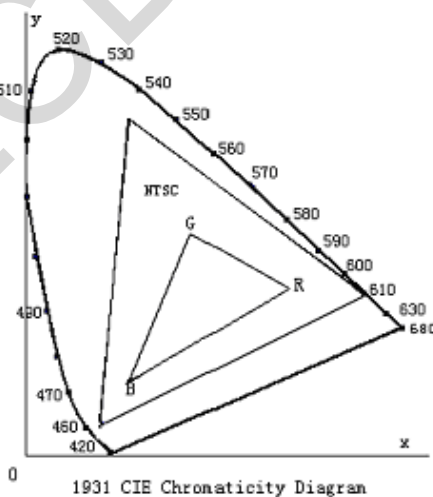
Note 5: Definition of Response time.

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.

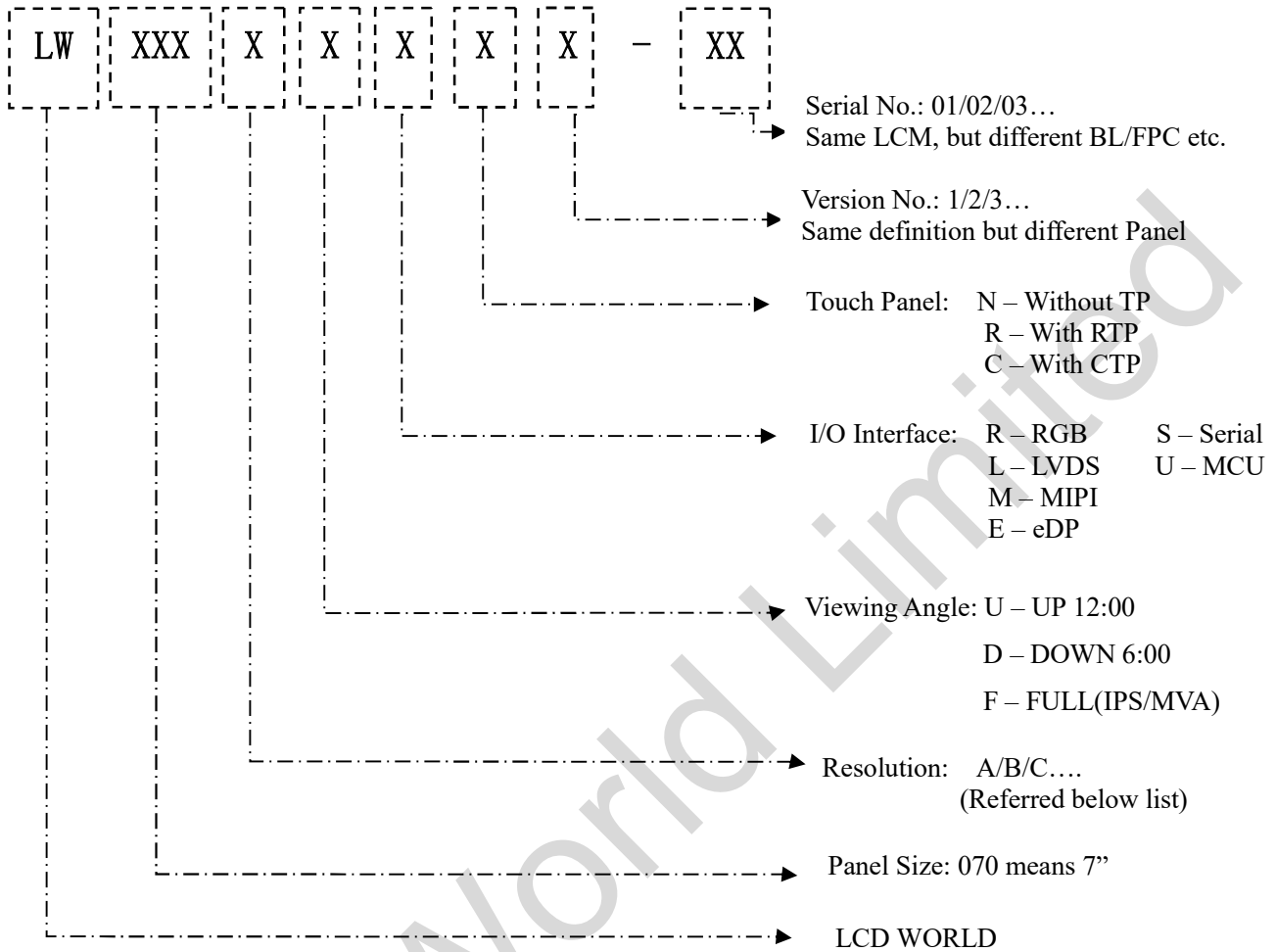
9.2 Storage precautions

- 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