Product Specification

Customer: _____

Model Name: **W070P40S01RNQB-8B**

Date: _____

Version: _____

■ **Preliminary Specification**

☐ **Final Specification**

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

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CERT. No. QAC0946535 (ISO9001)
CERT. No. HKG002005 (ISO14001)

Revision History

REVISION	DATE	COMMENT	REMARKS
1.0	21/02/2017	Initial Draft	Initial Draft Version

Table of Contents

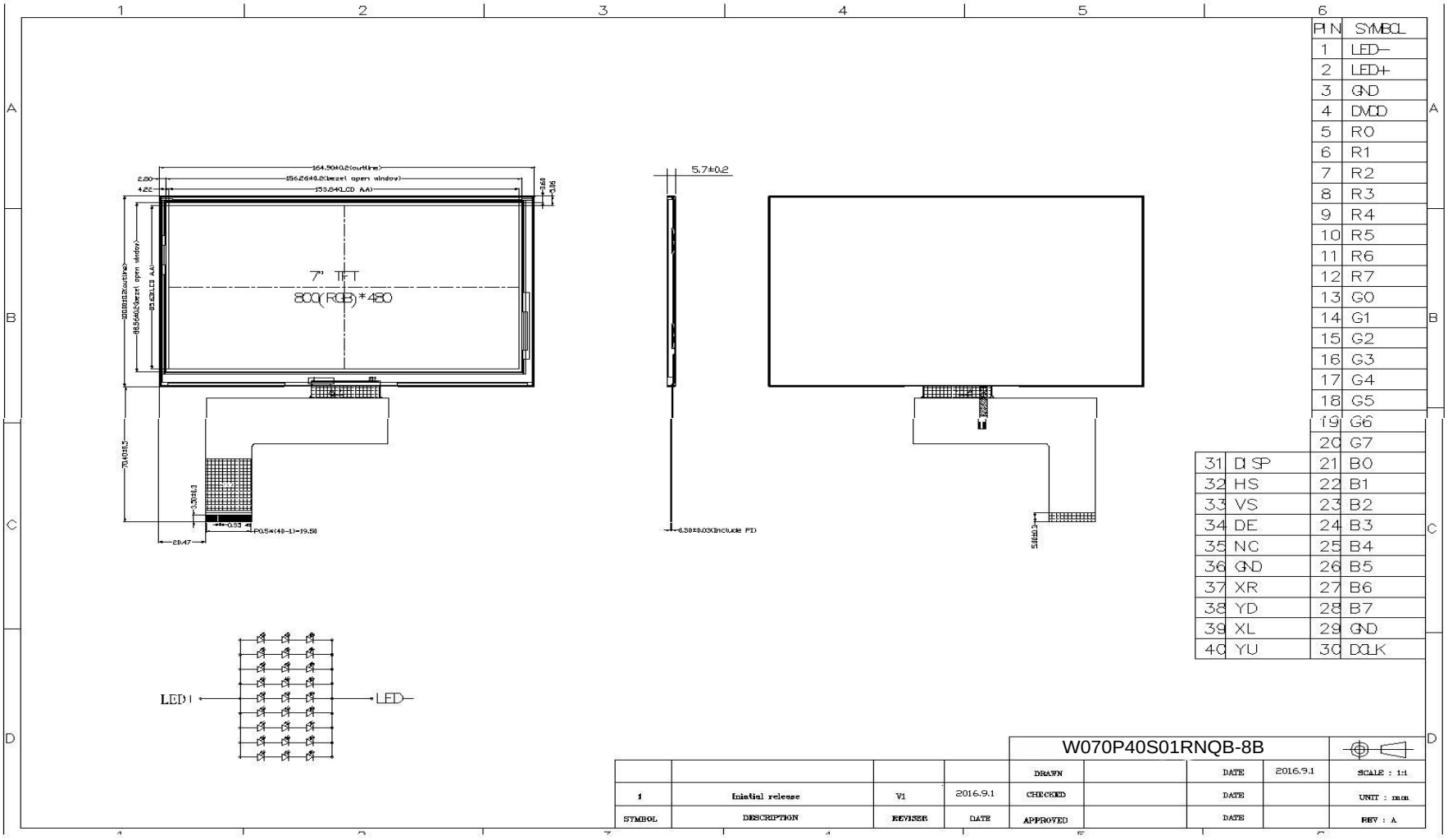
1. General Specification

W070P40S01RNQB -8B is a colour active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a colour TFT-LCD panel, driver IC, FPC and a back light unit and with/without a Resistive/Capacitive Touch Panel (RTP or CTP), and with/without a Cover Lens Bezel (CLB). The module display area contains 800 x 480 pixels. This product accords with RoHS environmental criterion.

ITEM	CONTENTS	UNIT
LCD Type	TFT / Transmissive / Normally white	
Size	7.0	Inch
Viewing Direction	12:00 (without image inversion)	O'Clock
Gray Scale Inversion Direction	6:00	O'Clock
LCD (W × H × D)	164.90 x 100.00 x5.7	mm
Active Area (W × H)	153.84 × 85.632	mm
Dot Pitch (W × H)	0.0641 × 0.1784	mm
Number of Dots (Pixels)	800 (RGB) × 480	
Driver IC	Source:EK73002 Gate:EK9716	
Backlight Type	27 LEDs	
Surface Luminance	Without TP: 800 (typical)	cd/m_2
Interface Type	TTL	
Color Depth	16.7M	
Pixel Arrangement	RGB Vertical Stripe	
Surface Treatment	AG	
Input Voltage		V
With/Without TP (Touch Panel)	W070P40S01RNQB-8B - Without TP W070P40S01RNQB-8B-CLB – Without TP, with CLB W070P40S01RNQB-8BRT – With Resistive Touch W070P40S01RNQB-8BCT – Capacitive Touch CLB	
Weight	-	g

Note 1: RoHS compliant
Note 2: LCD weight tolerance: ± 5%.

2. TFT LCD Display Drawing (Non Touch Version)



PIN	SYMBOL
1	LED-
2	LED+
3	GND
4	DVDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	DCLK
31	DISP
32	HS
33	VS
34	DE
35	NC
36	GND
37	XR
38	YD
39	XL
40	YU

				DRAWN		DATE	2016.9.1	SCALE : 1:1
1	Initial release	V1	2016.9.1	CHECKED		DATE		UNIT : mm
SYMBOL	DESCRIPTION	REVISER	DATE	APPROVED		DATE		REV : A

W070P40S01RNQB-8B

6. Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage for LCD Logic	VDD/VCC	-0.3	9	V
Supply Voltage for TP Logic	VDD/VCC-VSS	-	-	V
Input Voltage for Logic	VIN	VSS-0.5	VDD	V
LED forward voltage (each LED)	IF	-	30	mA
Operating Temperature	TOP	-20	70	°C
Storage Temperature	TST	-30	80	°C
Humidity	RH	-	90% (Max 60°C)	RH

7. Electrical Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Power Voltage	VDD/DCC	3	3.3	3.6	V
Input Current	IVDD	-	-	-	mA
Input Voltage 'H' Level	VIH	0.7 VDD	-	VDD	V
Input Voltage 'L' Level	VIL	0	-	0.3 VDD	V
Positive Power for TFT	VGH	15.3	16	18	V
Negative Power for TFT	VGL	- 8.5	-8	- 7.5	V
Analog Power	AVDD	10.2	10.3	10.4	V
Common Voltage	VCOM	3.2	3.38	3.5	V

8. Electro-Optical Characteristics

ITEM		SYM	CONDITION	MIN	TYP	MAX	UNIT	REMARK
Response Time		Tr+Tf	θ=0	-	25	-	ms	Figure 1 (4)
Contrast Ratio		Cr	°	350	500	-	-	Figure 2 (1)
Luminance Uniformity		δ WHITE	Ø=0	75	80	-	%	Figure 2 (3)
Surface Luminance		Lv	°	750	800	-	cd/m2	Figure 2 (2)
Viewing Angle Range		θ	Ø = 90°	60	70	-	deg	Figure 3 (6)
			Ø = 270°	60	70	-	deg	
			Ø = 0°	50	60	-	deg	
			Ø = 180°	60	70	-	deg	
CIE (x,y) Cromacity	Red	x	Ø=0° Ta=25	0.562	0.592	0.622		Figure 2 (5)
		y		0.289	0.319	0.349		
	Green	x		0.279	0.309	0.339		
		y		0.537	0.567	0.597		
	Blue	x		0.117	0.147	0.177		
		y		0.120	0.150	0.180		
	White	x		0.269	0.299	0.329		
		y		0.308	0.338	0.368		

9. Backlight Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Voltage for LED backlight	V	8.6	9	9.9	V
Current for LED backlight	I_I	-	270	360	mA
LED Life Time	-	40000	-	-	Hrs

Note: The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C.

Note 1: Contrast Ratio(CR) is defined mathematically as below, for more information see Figure 1.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

Note 2: Surface luminance is the LCD surface from the surface with all pixels displaying white.
For more information, see Figure 2.

Lv = Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)

Note 3: The uniformity in surface luminance δ WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information, see Figure 2.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

Note 4: Response time is the time required for the display to transition from white to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see FIG 1. The test equipment is Autronic-Melchers ConoScope series.

Note 5: CIE (x, y) chromaticity, the x, y value is determined by measuring luminance at each test position 1 through 5, and then make average value.

Note 6: Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information, see Figure3.

Note 7: For viewing angle and response time testing, the testing data is based on Autronic-Melchers ConoScope series. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, CIE the test data is based on TOPCONs BM-5 photo detector.

Figure 1. The definition of response time

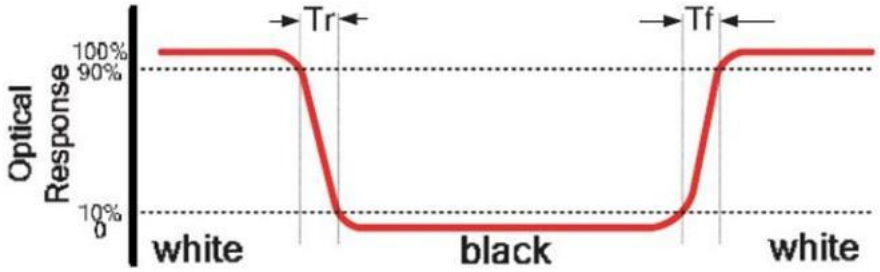


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

A : 5 mm
B : 5 mm
H, V : Active Area
Light spot size ∅=5mm, 500mm distance from the LCD surface to detector lens
measurement instrument is TOPCON's luminance meter BM-5

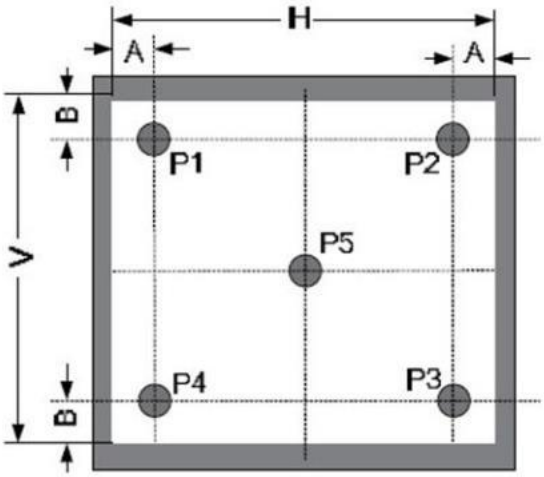
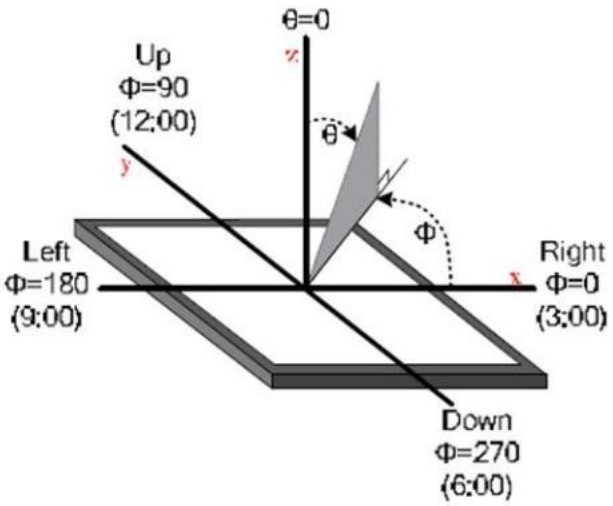


Figure 3. The definition of viewing angle



10. Interface Descriptions

10.1. LCD Interface

PIN NO.	SYMBOL	DESCRIPTION	REMARK
1	LED-	Cathode of LED Backlight	
2	LED+	Anode of LED Backlight	
3	GND	Ground	
4	DVDD	Power supply	
5	R0	Red data input R0.	
6	R1	Red data input R1.	
7	R2	Red data input R2.	
8	R3	Red data input R3.	
9	R4	Red data input R4.	
10	R5	Red data input R5.	
11	R6	Red data input R6.	
12	R7	Red data input R7.	
13	G0	Green data input G0.	
14	G1	Green data input G1.	
15	G2	Green data input G2.	
16	G3	Green data input G3.	
17	G4	Green data input G4.	
18	G5	Green data input G5.	
19	G6	Green data input G6.	
20	G7	Green data input G7.	
21	B0	Blue data input B0.	
22	B1	Blue data input B1.	
23	B2	Blue data input B2.	
24	B3	Blue data input B3.	
25	B4	Blue data input B4.	
26	B5	Blue data input B5.	
27	B6	Blue data input B6.	
28	B7	Blue data input B7.	
29	GND	Ground	
30	DCLK	Clock for input data. Data latched at rising/falling edge of this signal. Default is falling edge.	
31	DISP	Standby mode control.(Normally pull high) STBYB=”L”, enter standby mode for power saving. Timing controller source driver will turn off, all outputs are Hi-Z. STBYB=”H”, normal operation.	
32	HS	Horizontal sync input	
33	VS	Vertical sync input	
34	DE	Input data enable control. When DE mode, active High to enable data input(Normally pull low)	
35	NC	No Connect	
36	GND	Ground	
37	XR	The touch panel X right pin	
38	YD	The touch panel Y down pin	
39	XL	The touch panel X left pin	
40	YU	The touch panel Y up pin	

10.2 CTP Interface (Model: RXA-PG07018)

PIN No.	SYMBOL	DESCRIPTION	REMARK
1	VDD	Power Supply (3.3V)	Only connected to the CTP Panel, not connected to the LCD itself
2	SCL	I2C SCL	
3	SDA	I2C SDA	
4	GND	Ground	
5	INT	Interrupt signal from CTP	
6	RST	Reset pin	

The Capacitive Touch is driven by a **Focaltech FT5316** capacitive touch driver IC, which utilizes an I2C interface, and is capable of 5-point touch.

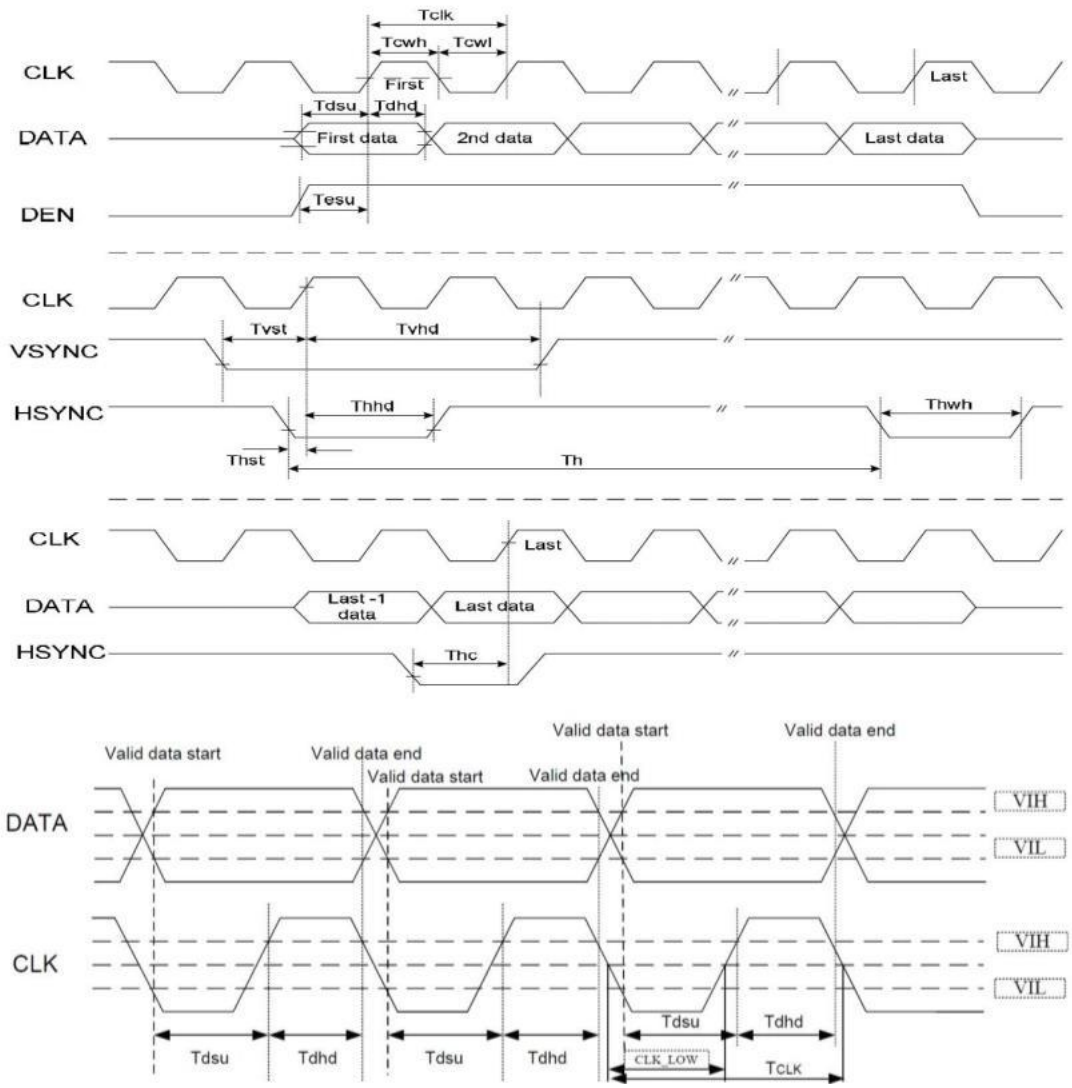
For different requirements, we can recommend different CTP for your choice. If you want other different CTP, please contactwith us and tell us your requirements.

11. LCD Timing Details

11.1. Timing Chart

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITION
CLK Clock Time	T_{clk}	1/Max(F_{CLK})	-	CLK	ns	-
CLK Pulse Duty	T_{chw}	40	50	1/Min(F)	%	T
HSYNC to CLK	T_{hc}	-	-	60	CLK	CLK
HSYNC Width	T_{hwh}	1	-	1	CLK	-
VSYNC Width	T_{vwh}	1	-	-	ns	-
HSYNC Period Time	T_h	60	63.56	-	ns	-
VSYNC Set-up Time	T_{vst}	12	-	67	ns	-
VSYNC Hold Time	T_{vhd}	12	-	-	ns	-
HSYNC Setup Time	T_{hst}	12	-	-	ns	-
HSYNC Hold Time	T_{hhd}	12	-	-	ns	-
Data Set-up Time	T_{dsu}	12	-	-	ns	-
Data Hold Time	T_{dhd}	12	-	-	ns	D00~D23 to CLK
DEN Set-up Time	T_{esu}	12	-	-	ns	D00~D23 to CLK DEN to CLK

Timing parameter (VDD=3.3V, GND=0V, Ta=25˚C)

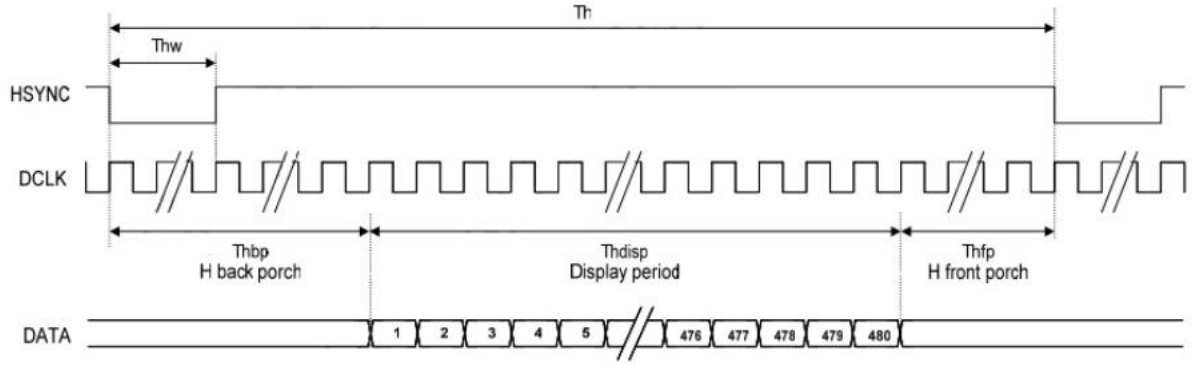


Timing parameter (VDD=3.3V, GND=0V, Ta=25˚C)

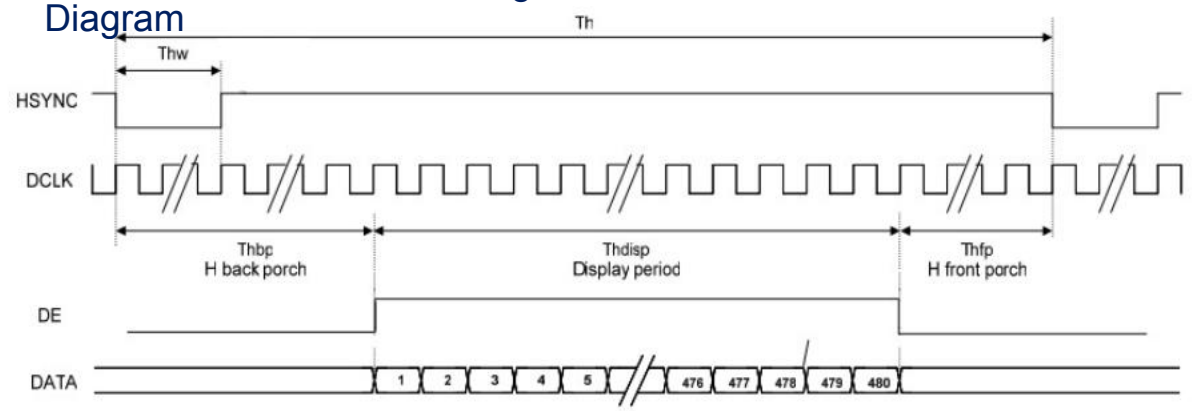
11.2 Timing Characteristic

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	
DCLK Frequency		Fclk	20	33.3	50	MHz	
DCLK Period		Tclk	-	-	-	Ns	
Hsync	Period Time	Th	908	928	1088	DCLK	
	Display Period	Thdisp		800	-	DCLK	
	To 1st Data input	Thbp	1	40	87	DCLK	By H BLANKING setting
	Front Porch	Thfp	20	40	200	DCLK	
	Pulse Width	Thw	1	48	87	DCLK	
Vsync	Period Time	Tv	517	525	712	H	
	Display Period	Tvdisp	-	480	-	H	
	Delay to 1st Gate output	Tvbp	29	31	31	H	By V BLANKING setting
	Front Porch	Tvfp	5	13	200	H	
	Pulse Width	Tvw	1	1	3	H	

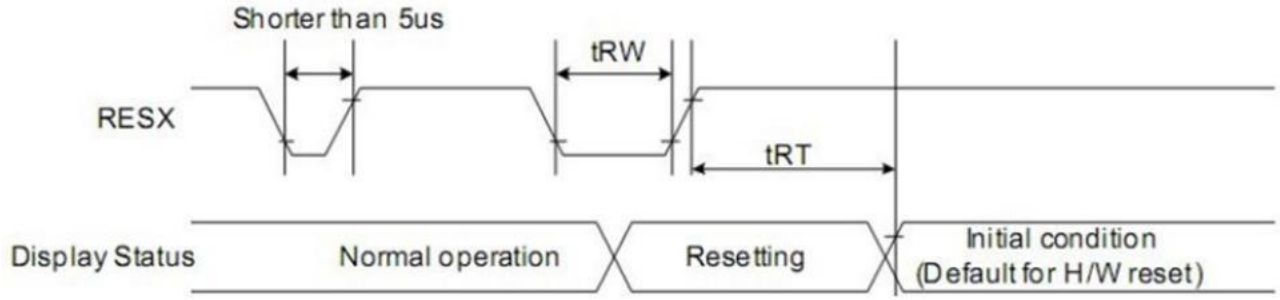
11.3 SYNC Mode Timing Diagram



11.4 SYNC-DE Mode Timing Diagram



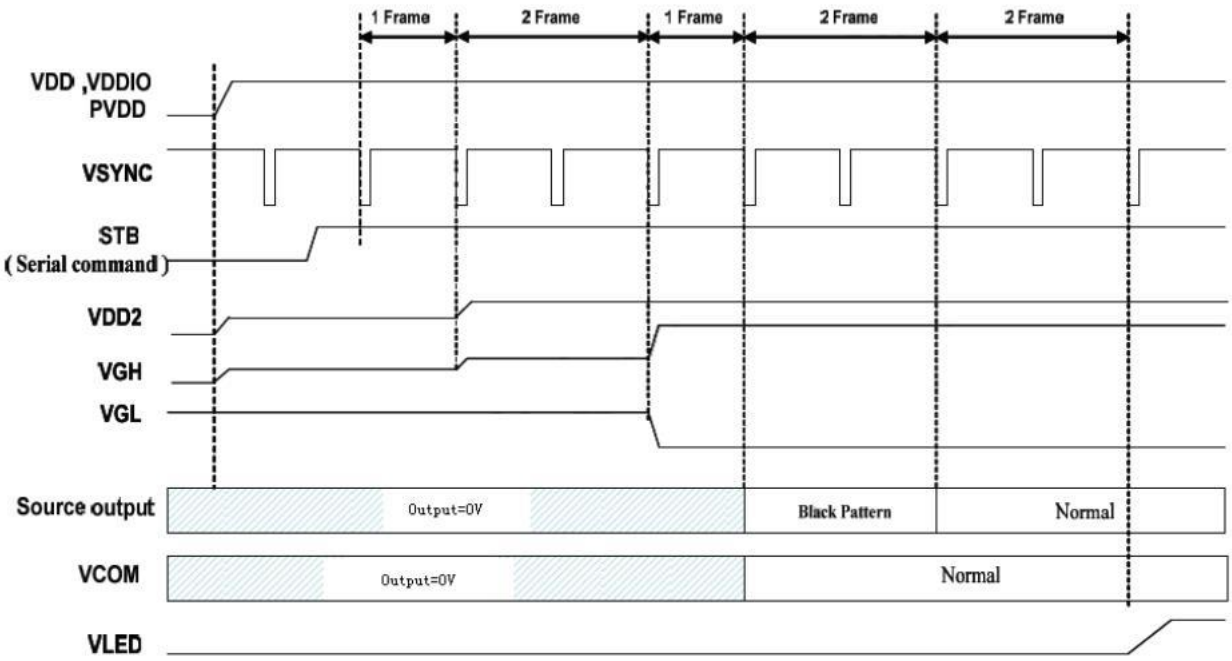
11.5 Reset Timing



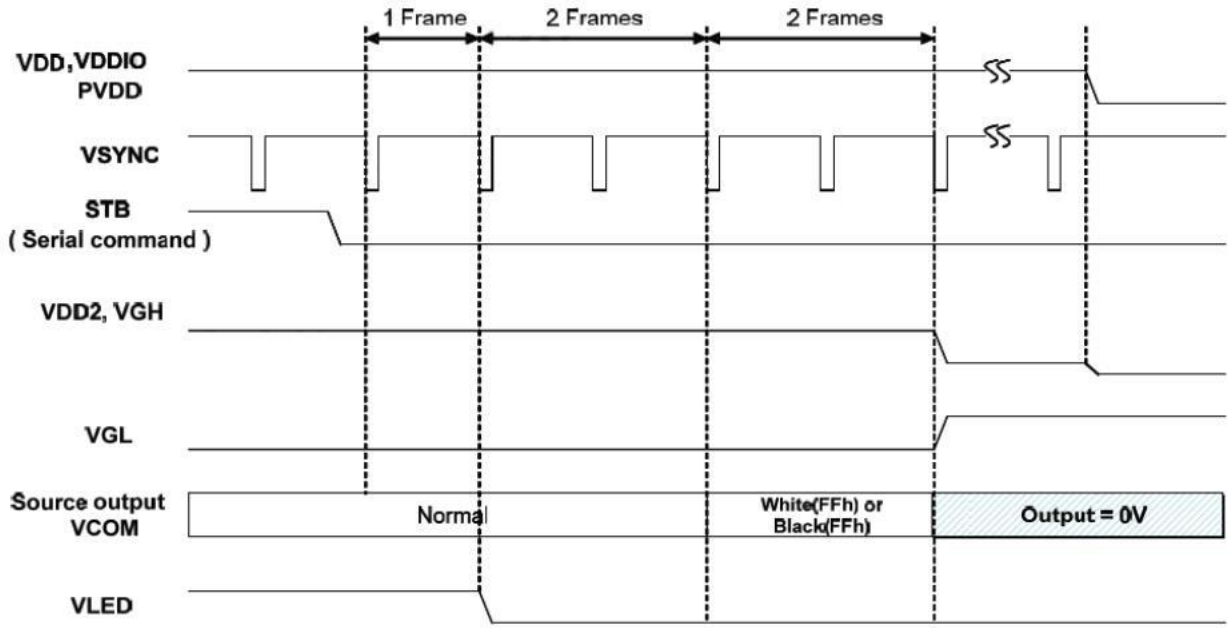
SIGNAL	SYMBOL	PARAMETER	MIN	MAX	UNIT
RESET	tRW	Reset low pulse width	40	-	us
	tRT	Reset complete time	-	5 (note1)	ms
			-	120 (note2)	ms

Note 1: When reset applied during SLPIN mode
Note 2: When reset applied during SLPOUT mode.

11.6 Power On Sequence



11.7 Power-off Sequence



Note:
When normally-black LC is used, please send black pattern to discharge the panel.
When normally-white LC is used, please send white pattern to discharge the panel

12 Reliability Test

No.	SYMBOL	TEST CONDITION	REMARK
1	High Temperature Storage	80℃±2℃ 96H Restore 2H at 25℃ Power off	After test cosmetic and electrical defects should not happen.
2	Low Temperature Storage	-30℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	70℃±2℃ 96H Power on	
4	Low Temperature Operation	-20℃±2℃ 96H Power on	
5	High Temperature & Humidity Operation	60℃±2℃ 90%RH 96H Power on	
6	Temperature Cycle	-20℃←→25℃←→70℃ 30min 5min 30min After 10 cycles, restore 2H at 25℃ Power off	
7	Vibration Test	10Hz~150Hz, 100m/s^2, 120min	
8	Shock Test	Half-sinewave, 300m/s^2, 11ms	