HM070WS101I

7.0" Color TFT-LCD

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1. General Specifications

Item	Specification
LCD size	7.0 inch(Diagonal)
Driver element	a-Si TFT active matrix
Resolution	1024 × 3(RGB) × 600
Display mode	Normally White, Transmissive
Pixel size	0.1506(W) × 0.1432(H) mm
Active area	154.2144(W) × 85.92(H) mm
Module size	164.9(W) ×100(H) ×4.8(D) mm
Surface treatment	Hard Coating
Color arrangement	RGB-stripe
Interface	LVDS
View direction(Gray Inversion)	6 O'Clock
Backlight power consumption	2.62 W (Typ.)
Panel power consumption	0.4 W (Typ.)
Weight	140g (Typ.)
Source Driver IC	NT51008xx
Gate Driver IC	NT52003xx

2. Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is FH12A-40S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	
5	Reset	I	Global reset pin	
6	STBYB	I	Standby mode, Normally pulled high STBYB = “1”, normal operation STBYB = “0”, timing controller, source driver will turn off, all output are High-Z	
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	- LVDS differential data input	
12	RXIN1+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	- LVDS differential data input	
15	RXIN2+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	- LVDS differential clock input	
18	RXCLKIN+	I	+ LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	- LVDS differential data input	
21	RXIN3+	I	+ LVDS differential data input	

22	GND	P	Ground	
23	NC	---	No connection	
24	NC	---	No connection	
25	GND	P	Ground	
26	NC	---	No connection	
27	DIMO	O	Backlight CABC controller signal output	
28	SELB	I	6bit/8bit mode select	Note1
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	L/R	I	Horizontal inversion	Note3
34	U/D	I	Vertical inversion	Note3
35	VGL	P	Gate OFF Voltage	
36	CABCEN1	I	CABC H/W enable	Note2
37	CABCEN0	I	CABC H/W enable	Note2
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

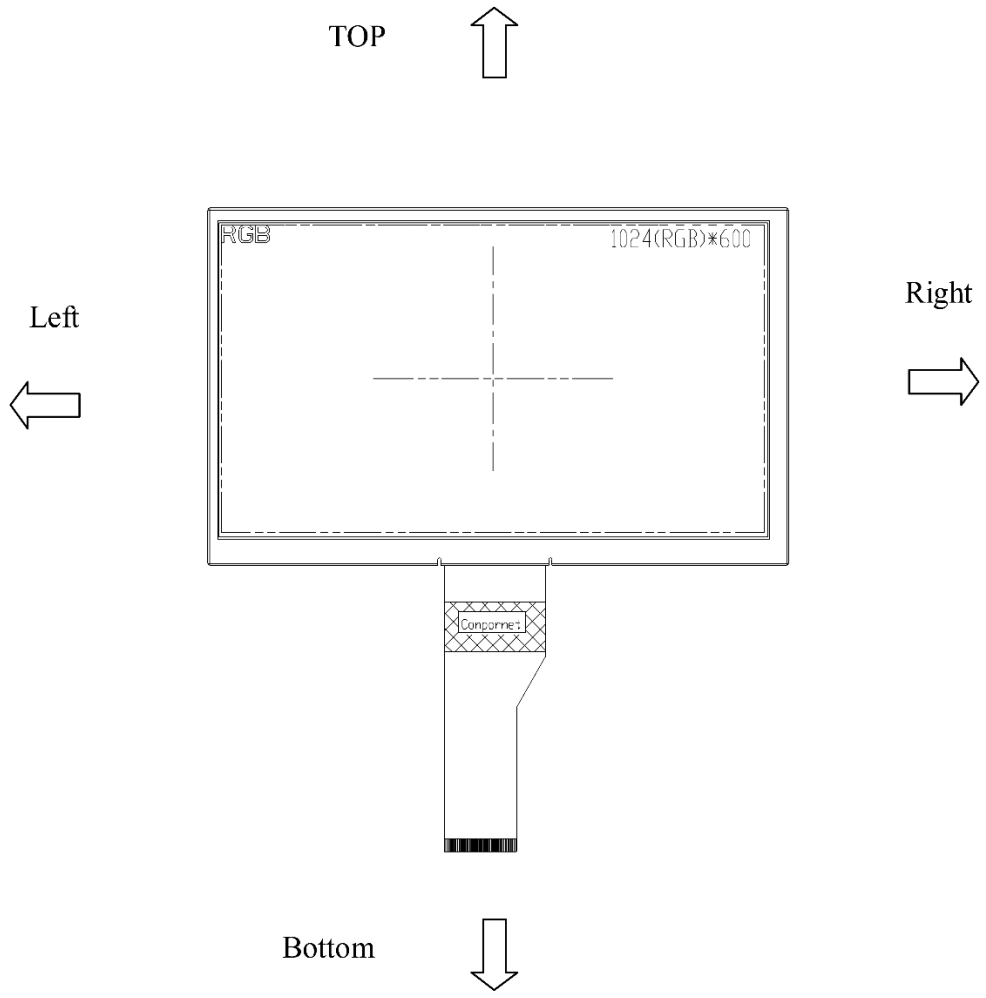
I: input, O: output, P: Power

Note1: If LVDS input data is 6 bits ,SELB must be set to High;
If LVDS input data is 8 bits ,SELB must be set to Low.

Note2: When CABC_EN=”00”, CABC OFF.
When CABC_EN=”01”, user interface image.
When CABC_EN=”10”, still picture.
When CABC_EN=”11”, moving image.
When CABC off, don’t connect DIMO, else connect it to backlight.

Note3: When L/R=”0”, set right to left scan direction.
When L/R=”1”, set left to right scan direction.
When U/D=”0”, set top to bottom scan direction.
When U/D=”1”, set bottom to top scan direction.

Note: Definition of scanning direction. Refer to the figure as below:



3. Operation Specifications

3.1 Absolute Maximum Ratings

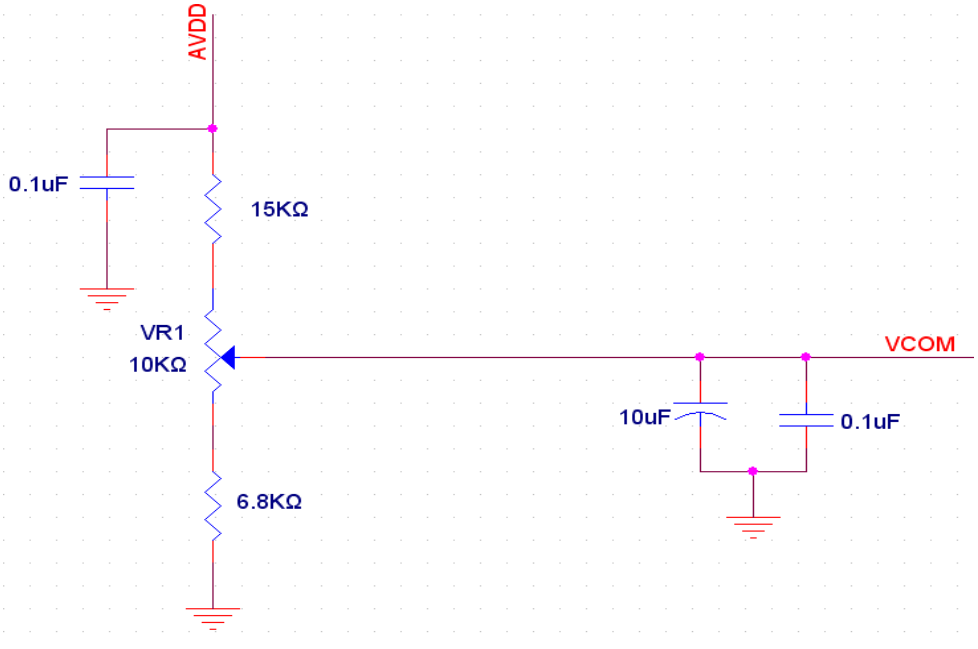
Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	6.5	13.5	V	
	V_{GH}	-0.3	42.0	V	
	V_{GL}	-20.0	0.3	V	
	V_{GH}-V_{GL}	-	40.0	V	
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
LED Reverse Voltage	V_R	-	5	V	Each LED
LED Forward Current	I_F	-	60	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.1.1 Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	10.8	11	11.2	V	
	V_{GH}	19.7	20	20.3	V	
	V_{GL}	-6.5	-6.8	-7.1	V	
Input signal voltage	V_{COM}	3.3	3.8	4.3	V	Note 4
Input logic high voltage	V_{IH}	0.7 DV_{DD}	-	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3 DV_{DD}	V	

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: LVDS, Reset.
Note 4: Typ. V_{COM} is only a reference value, it must be optimized according to each LCM. Be sure to use VR;



3.1.2 Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	0.26	1	mA	V_{GH} =20V
	I_{GL}	-	0.26	1	mA	V_{GL} = -6.8V
	IDV_{DD}	-	35	60	mA	DV_{DD} =3.3V
	IAV_{DD}	-	20	30	mA	AV_{DD} =11V

3.1.3 Backlight Driving Conditions

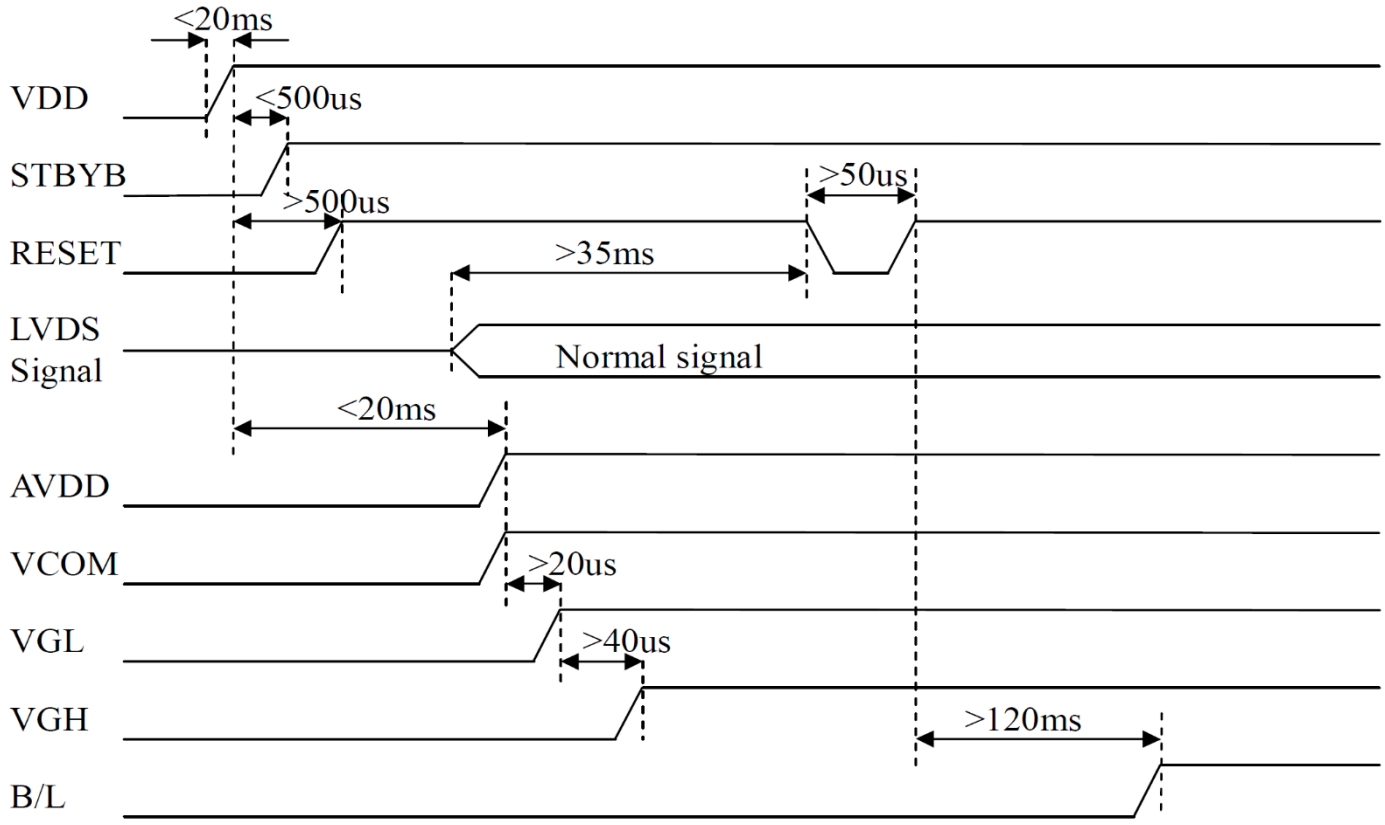
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	8.4	9.9	10.2	V	Note 1
Current for LED backlight	I_L	--	265	--	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =265mA.

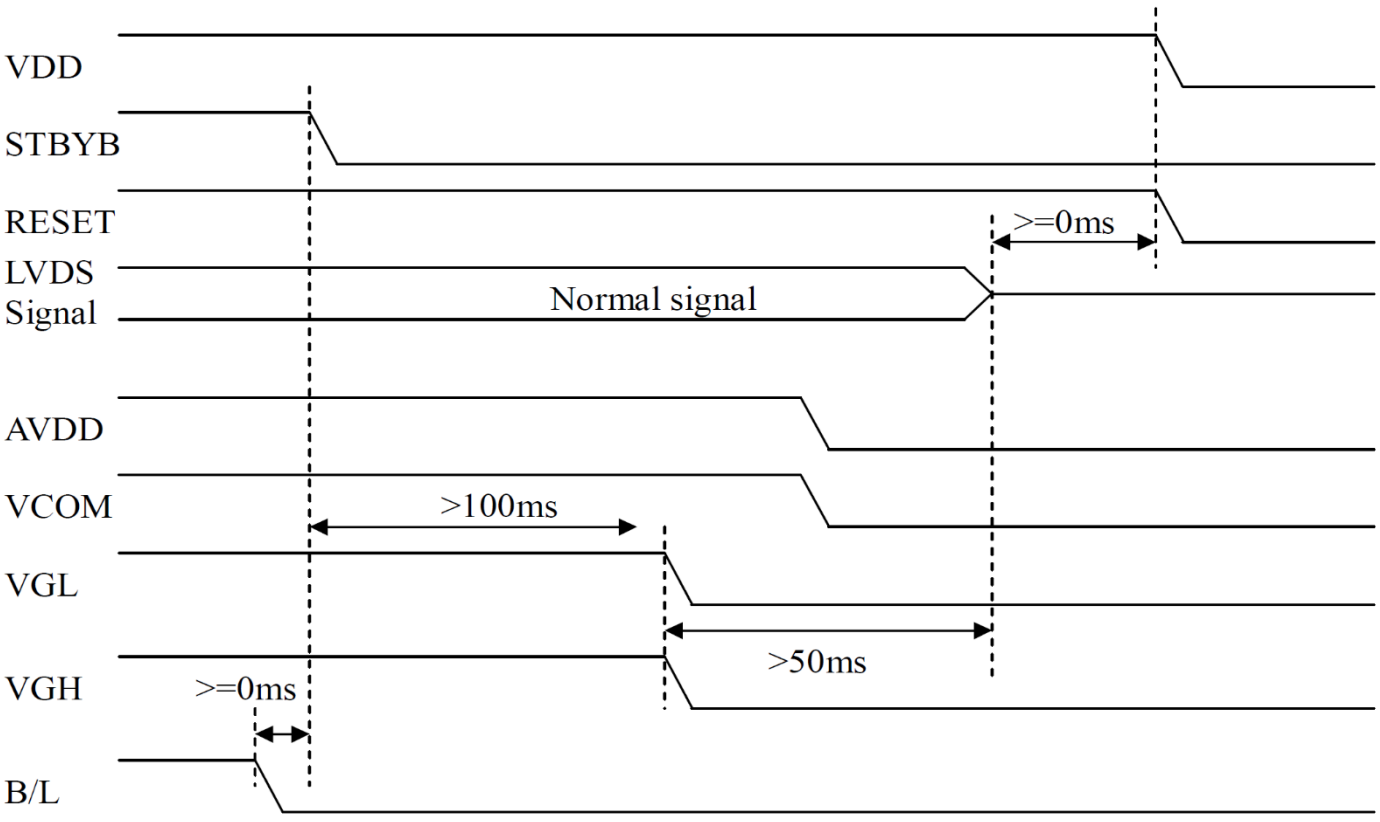
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =265mA. The LED lifetime could decrease if operating I_L is larger than 265mA.

Power Sequence

a. Power on:



b. Power off:

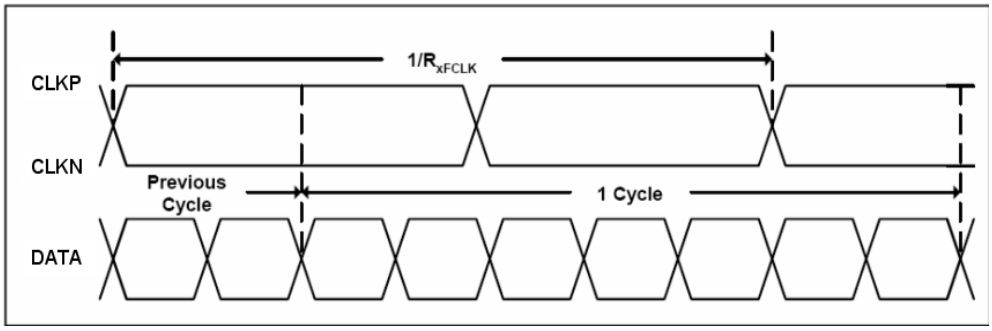


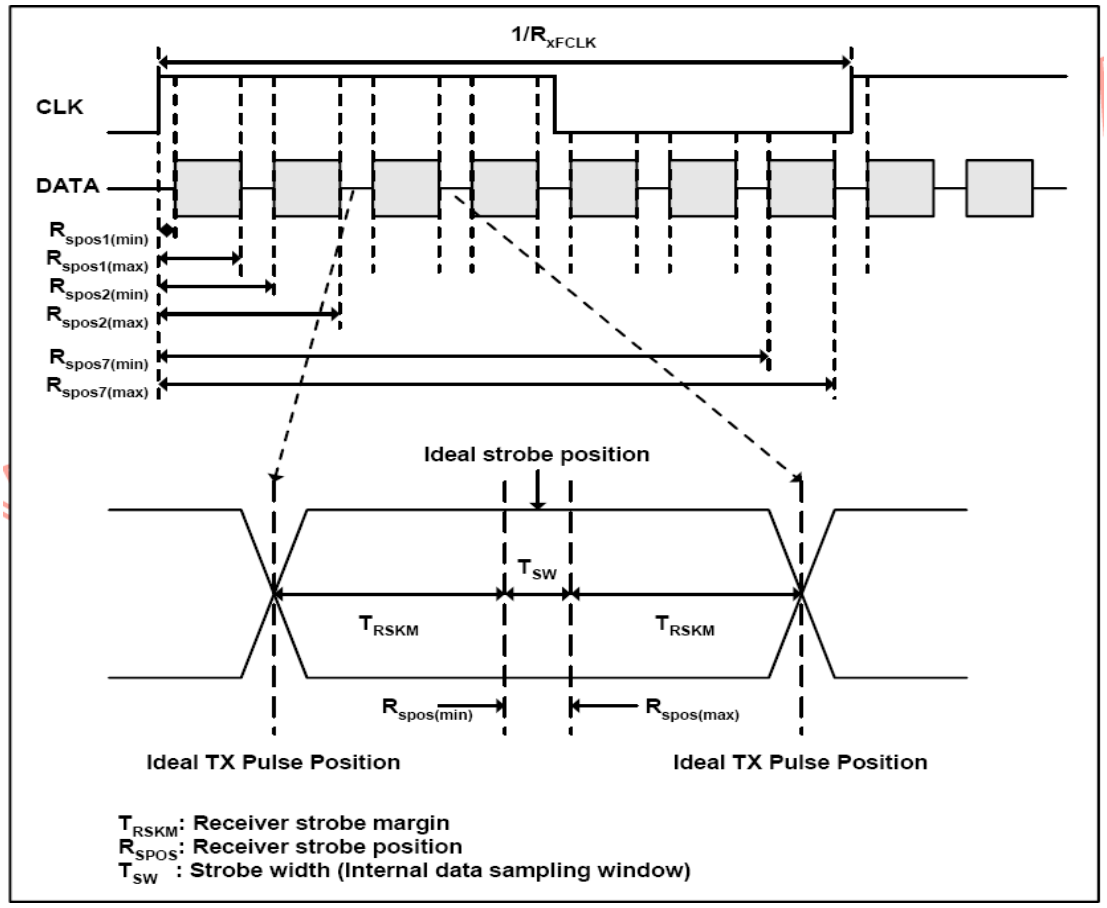
3.2 Timing Characteristics

AC Electrical Characteristics

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Clock frequency	R_{xFCLK}	40.8	51.2	67.2	MHz
Input data skew margin	T_{RSKM}	500	-	-	ps
Clock high time	T_{LVCH}	-	4/(7* R_{xFCLK})	-	ns
Clock low time	T_{LVCL}	-	3/(7* R_{xFCLK})	-	ns

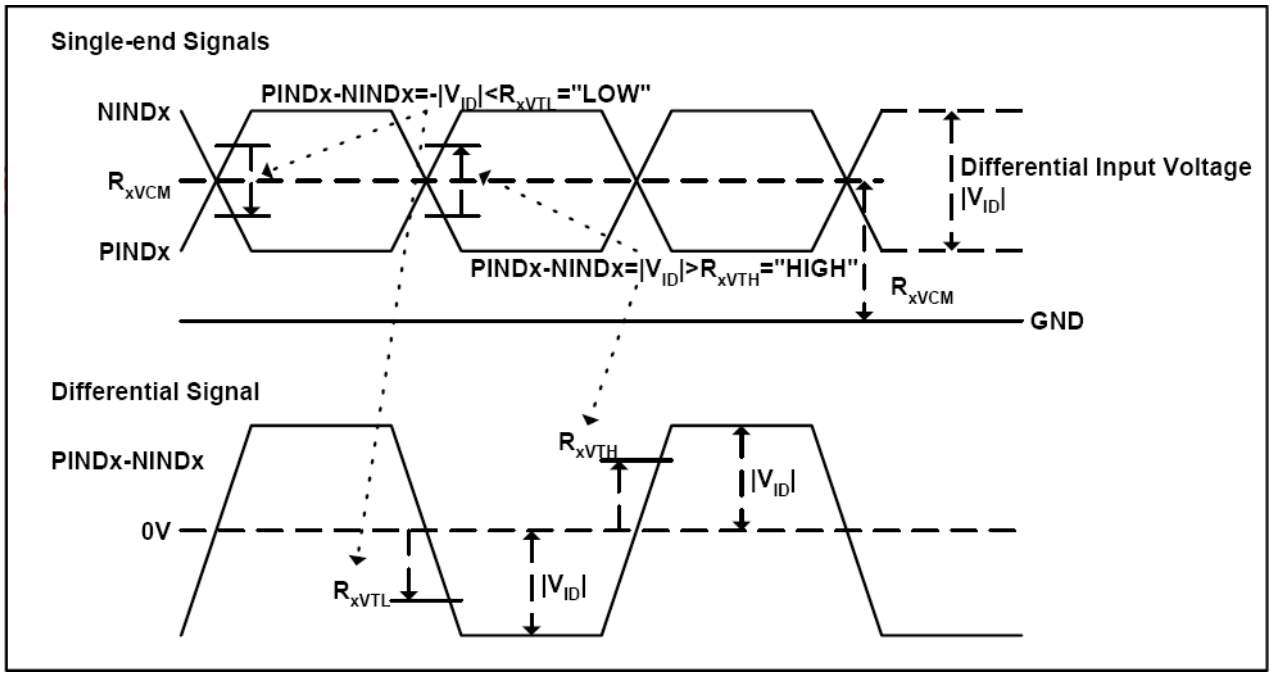
Input Clock and Data Timing Diagram





3.3 DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{xVTH}	-	-	+0.1	V	R_{XVCM}=1.2V
Differential input low Threshold voltage	R_{xVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{xVIN}	0	-	2.4	V	
Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	$2.4-\|V_{ID}\|/2$	V	
Differential voltage	$\|V_{ID}\|$	0.2	-	0.6	V	
Differential input leakage current	RV_{xliz}	-10	-	+10	uA	

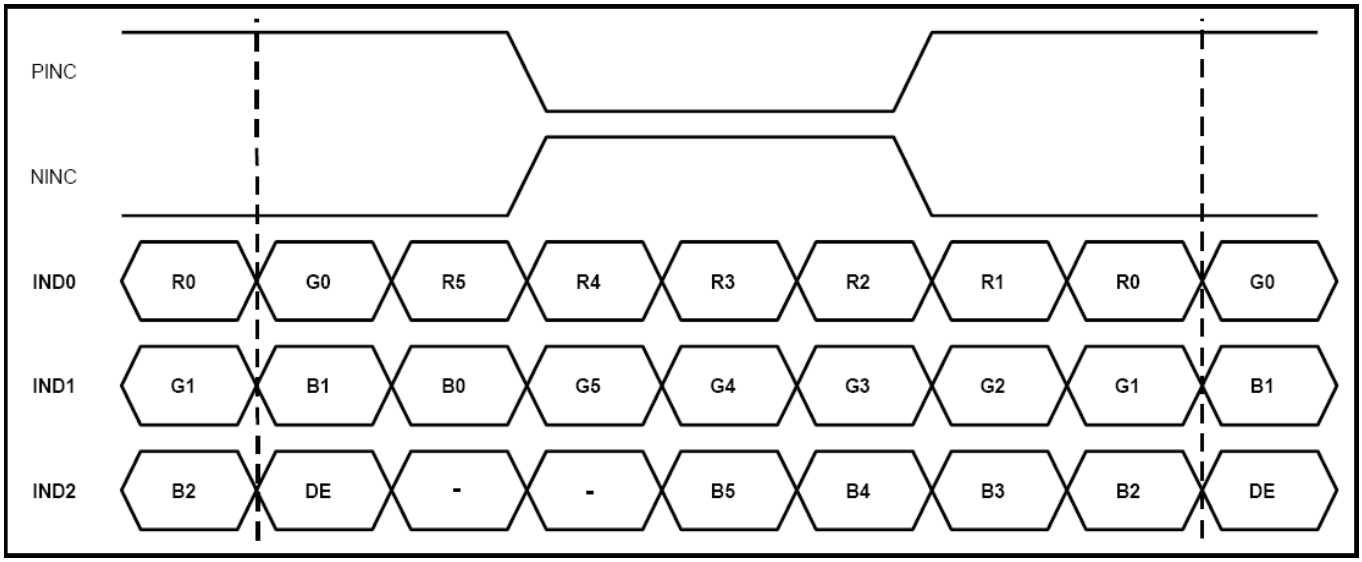


3.4 Timing

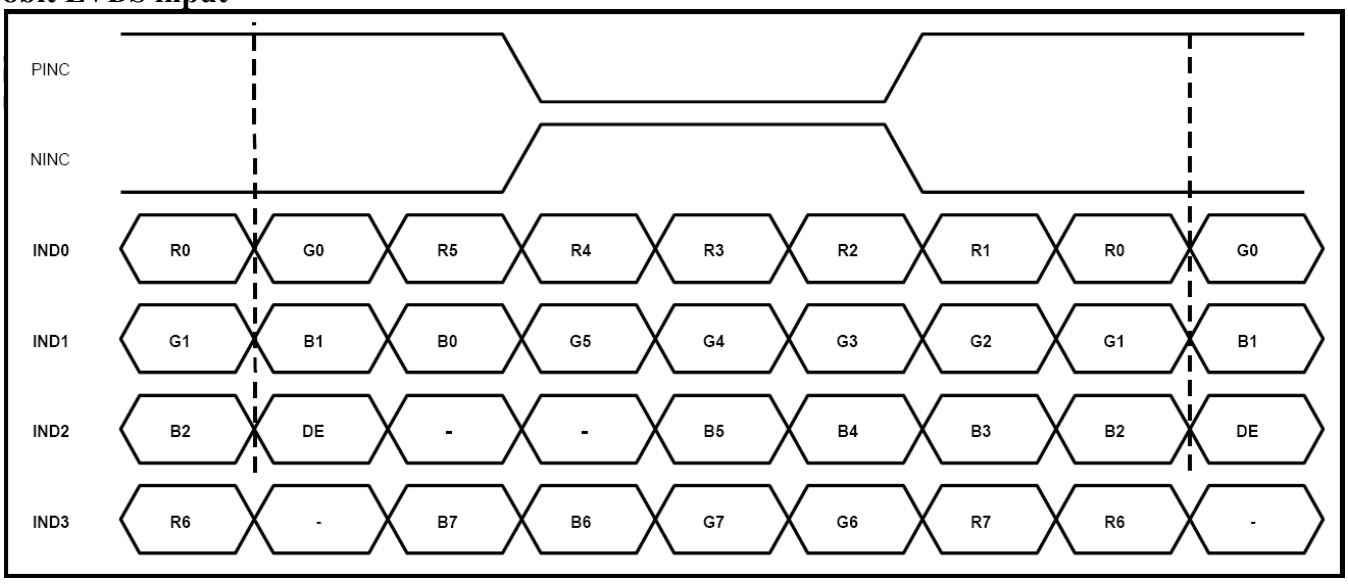
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd		1024		DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd		600		H	
VS period time	tv	610	635	800	H	
VS Blanking	thb	10	35	200	H	

3.5 Data Input Format

6bit LVDS input



8bit LVDS input

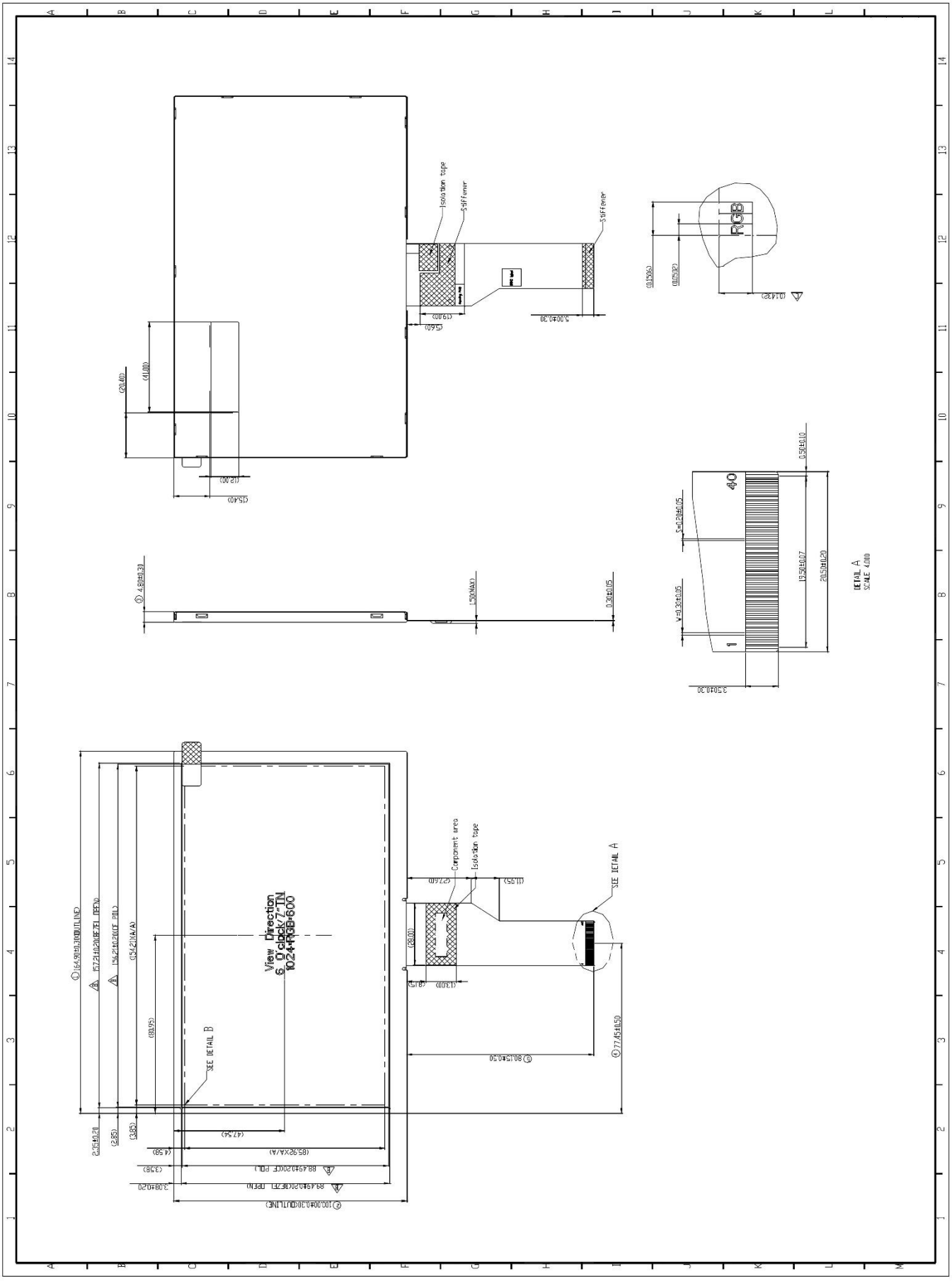


Note: Support DE timing mode only, SYNC mode not supported.

4. Optical Specifications

Item	Symbol	Condition	Values			Unit
			Min.	Typ.	Max.	
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	65	75	-	degree
	θ_R	Φ=0°(3 o'clock)	65	75	-	
	θ_T	Φ=90°(12 o'clock)	60	70	-	
	θ_B	Φ=270°(6 o'clock)	65	75	-	
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec
	T_{OFF}		-	15	30	msec
Contrast ratio	CR		500	800	-	-
Color chromaticity	W_X		0.26	0.31	0.36	-
	W_Y		0.28	0.33	0.38	-
Luminance	L		400	500	-	cd/m²
Luminance uniformity	Y_U		70	75	-	%

5. Reliability Test Items

Item	Test Conditions	
High Temperature Storage	Ta = 80℃	240hrs
Low Temperature Storage	Ta = -30℃	240hrs
High Temperature Operation	Ts = 70℃	240hrs
Low Temperature Operation	Ta = -20℃	240hrs
Operate at High Temperature and Humidity	+60℃, 90%RH	240hrs
Thermal Shock	[(-30℃ 30min)→(80℃ 30min)]/cycle，100cycles	
Vibration Test	Frequency: 10 ~55~10Hz; Sweep Mode: Log Sweep; Sweep time: 1Oct/min; Acceleration: 1.5G; Test time: 2hrs for each direction of X, Y, Z.	
Mechanical Shock	100G, 6ms, half sine wave, 3 times for each direction of ±X, ±Y, ±Z	
Package Vibration Test	Random Vibration : ISTA-3A 1Hz~200Hz,Grms=0.53 Half hours for direction of Z	
Package Drop Test	72cm(weight≦10kg), 60cm(weight＞10kg);1 times for 6-faces, 3-edges and 1-corner	
Electro Static Discharge	Contact mode：150pf，330Ω，±2KV Air mode：150pf，330Ω，±2KV	

6. Mechanical Drawing