

**Product Specification**

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# NHD-7.0-1024600AF-LSXP

## IPS TFT Liquid Crystal Display Module

<b>NHD -</b>	Newhaven Display
<b>7.0 -</b>	7.0" Diagonal
<b>1024600 -</b>	1024xRGBx600 Pixels
<b>AF -</b>	Model
<b>L -</b>	LVDS Interface
<b>S -</b>	High Brightness, White LED Backlight
<b>X -</b>	TFT
<b>P -</b>	IPS, Wide Temperature

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## Additional Resources

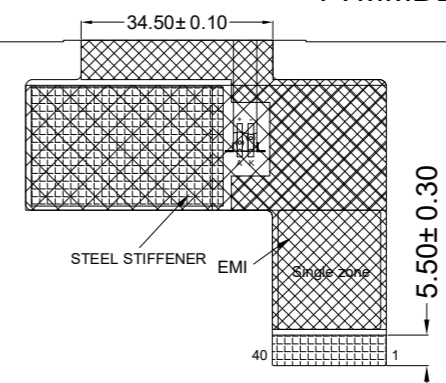
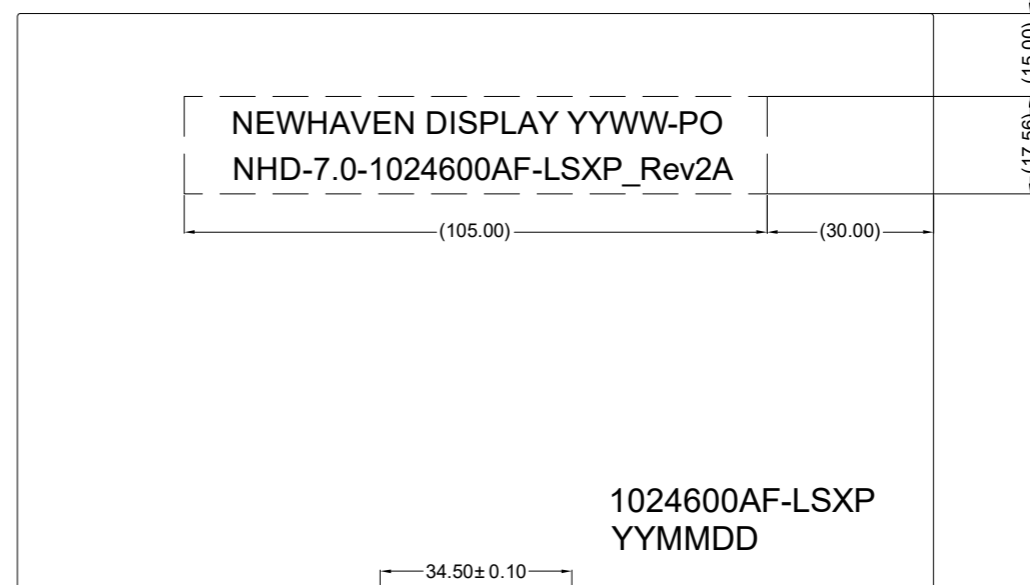
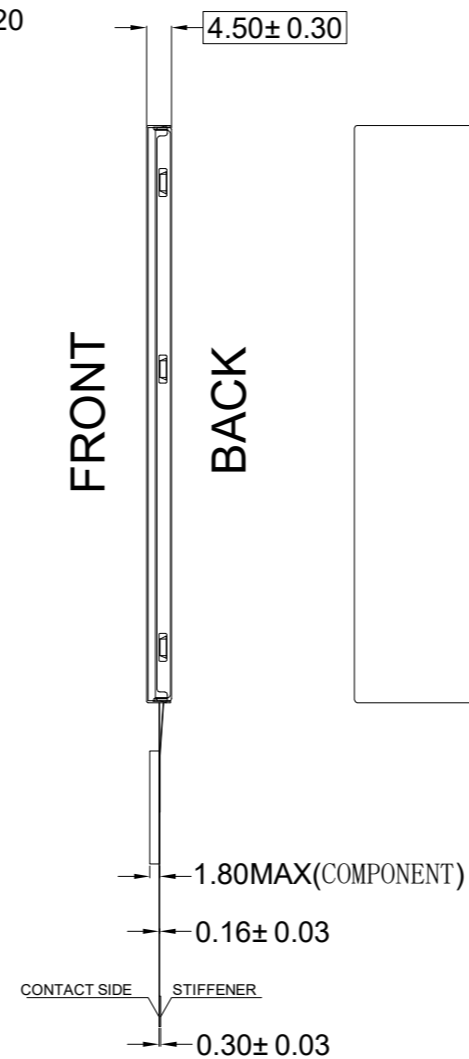
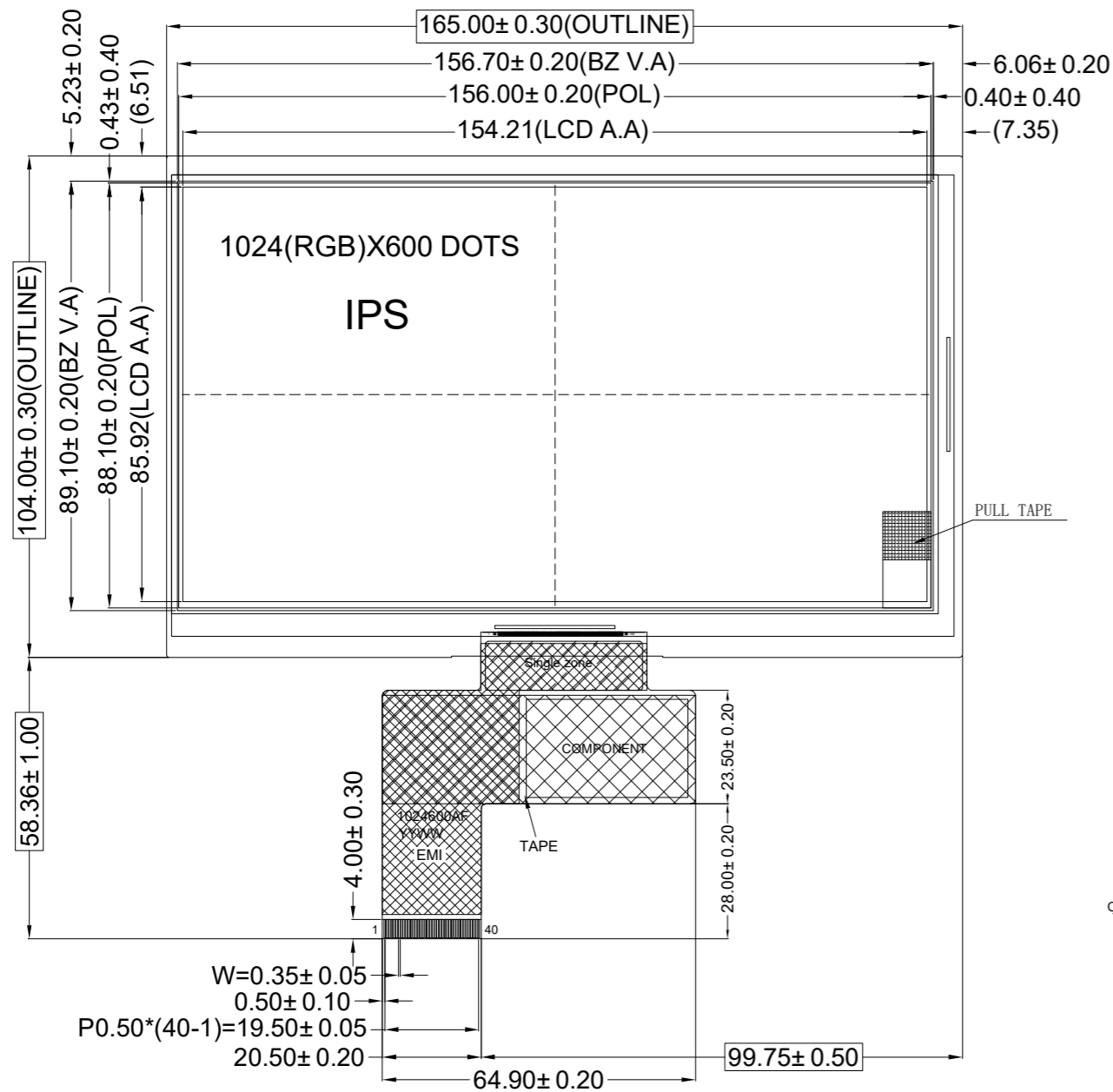
- **Support Forum:** <https://support.newhavendisplay.com/hc/en-us/community/topics>
- **GitHub:** <https://github.com/newhavendisplay>
- **Example Code:** <https://support.newhavendisplay.com/hc/en-us/categories/4409527834135-Example-Code/>
- **Knowledge Center:** [https://www.newhavendisplay.com/knowledge\\_center.html](https://www.newhavendisplay.com/knowledge_center.html)
- **Quality Center:** [https://www.newhavendisplay.com/quality\\_center.html](https://www.newhavendisplay.com/quality_center.html)
- **Precautions for using LCDs/LCMs:** <https://www.newhavendisplay.com/specs/precautions.pdf>
- **Warranty / Terms & Conditions:** <https://www.newhavendisplay.com/terms.html>



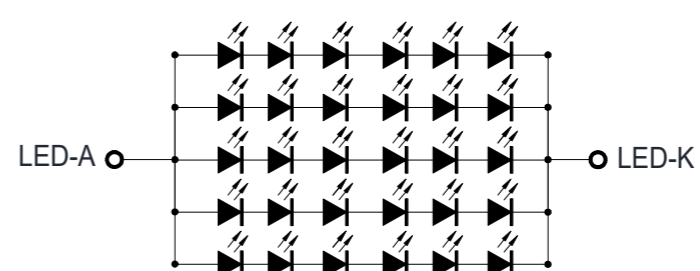
## Document Revision History

Revision	Date	Description	Changed By
-	04/22/2019	Initial Release	PK
1	06/18/2019	Backlight Characteristics Updated	SB
2	07/21/2020	Updated 2D Mechanical Drawing; Kapton Tape to Golden Fingers	AS
3	07/27/2020	Included Horizontal & Vertical Timing Charts	AS
4	04/27/2021	Updated the Electrical Characteristics	JT
5	08/12/2021	Updated Electrical, Optical Characteristics, and Mechanical Drawing. Part Revision updated to Rev2A.	JT
6	01/26/2022	Updated supply current for LCD, Chromaticity values, and Note section in Mechanical Drawing.	JT
7	03/10/2022	Updated Mechanical Drawing	CJ
8	06/28/2023	Date Code Format Updated on Mechanical Drawing	KL

# Mechanical Drawing



PIN	SYMBOL	PIN	SYMBOL
1	NC	21	Rin3+
2	VDD	22	GND
3	VDD	23	NC
4	NC	24	NC
5	/RES	25	GND
6	/STBYB	26	NC
7	GND	27	BIST
8	Rin0-	28	INSEL
9	Rin0+	29	NC
10	GND	30	GND
11	Rin1-	31	NC
12	Rin1+	32	NC
13	GND	33	SHLR
14	Rin2-	34	UPDN
15	Rin2+	35	NC
16	GND	36	LED-K
17	CLKIN-	37	LED-K
18	CLKIN+	38	NC
19	GND	39	LED-A
20	Rin3-	40	LED-A



Product Description: 7.0" 1024x600 IPS TFT

1. Driver IC: HX8282
2. Interface: LVDS
3. Power Requirement: 3.3V TFT, 19.2V/150mA Backlight
4. Optical Features: Transmissive, Normally Black, 1100cd/m<sup>2</sup>
5. Recommended FFC Connector: 40pin 0.5mm pitch; EX.Molex 54104-4031
6. EMI Shielded FPC

<b>Standard Tolerance:</b> (Unless otherwise specified)  Linear: ±0.3mm		
	Drawing/Part Number: <b>NHD-7.0-1024600AF-LSXP</b>	Revision: <b>2A</b>
<b>Unless otherwise specified:</b> • Dimensions are in Millimeters • Third Angle Projection	Drawn By: K. Lewis	Approved By: K. Lewis
	Drawn Date: 06/28/2023	Approved Date: 06/28/2023
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## Pin Description

Pin No.	Symbol	Connection	Function Description
1	NC	-	No connection
2-3	V <sub>DD</sub>	Power Supply	Supply voltage for LCD (+3.3V)
4	NC	-	No connection
5	/RES	MPU	Active LOW Reset signal (normally pull high)
6	/STBYB	MPU	Active LOW Standby signal (normally pull high)
7	GND	Power Supply	Power Ground
8	Rin0-	MPU	-LVDS differential data input CH0
9	Rin0+	MPU	+LVDS differential data input CH0
10	GND	Power Supply	Ground
11	Rin1-	MPU	-LVDS differential data input CH1
12	Rin1+	MPU	+LVDS differential data input CH1
13	GND	Power Supply	Ground
14	Rin2-	MPU	-LVDS differential data input CH2
15	Rin2+	MPU	+LVDS differential data input CH2
16	GND	Power Supply	Ground
17	CLKIN-	MPU	-LVDS differential Clock
18	CLKIN+	MPU	+LVDS differential Clock
19	GND	Power Supply	Ground
20	Rin3-	MPU	-LVDS differential data input CH3
21	Rin3+	MPU	+LVDS differential data input CH3
22	GND	Power Supply	Ground
23 - 24	NC	-	No connection
25	GND	Power Supply	Ground
26	NC	-	No Connection
27	BIST	MPU	Built in Self-Test BIST = H: Self-Test Enabled BIST = L: Normal Operation (Default)
28	INSEL	MPU	Data Input Format: INSEL = L 8-Bit LVDS Input (Default) INSEL = H 6-Bit LVDS Input
29	NC	-	No connection
30	GND	Power Supply	Power Ground
31-32	NC	-	No connection
33	SHLR	MPU	Gate Driver Left/Right Scan Setting: SHLR = H: Normal Scan (Default) SHLR = L: Reverse Scan
34	UPDN	MPU	Gate Driver Up/Down Scan Setting: UPDN = H: Reverse Scan UPDN = L: Normal Scan (Default)
35	NC	-	No Connection
36-37	LED-K	Power Supply	Backlight Cathode (Ground)
38	NC	-	No connection
39-40	LED-A	Power Supply	Backlight Anode (150mA @ 19.2V)

**Recommended LCD connector:** 40pin 0.5mm pitch FFC. Molex P/N: 54104-4031 (top contact)

## Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T <sub>OP</sub>	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T <sub>ST</sub>	Absolute Max	-30	-	+80	°C
Supply Voltage for LCD	V <sub>DD</sub>	-	3.0	3.3	3.6	V
Supply Current for LCD	I <sub>DD</sub>	V <sub>DD</sub> = 3.3V	58	87	131	mA
LVDS Differential input high Threshold voltage	RxVTH	RxVCM = 1.2V	-	-	+100	mV
LVDS Differential input low Threshold voltage	RxVTL		-100	-	-	mV
LVDS Differential input common mode voltage	RxVCM	-	VID /2	-	2.4-  VID /2	V
LVDS Differential voltage	VID	-	200	-	600	mV
Backlight Supply Current	I <sub>LED</sub>	-	125	150	180	mA
Backlight Supply Voltage	V <sub>LED</sub>	I <sub>LED</sub> = 150 mA T <sub>OP</sub> = 25° C	18	19.2	20.4	V
Backlight Lifetime*	-		30,000	-	-	Hrs.

\*Backlight lifetime is rated as Hours until **half-brightness**, under normal operating conditions. The LED of the backlight is driven by current drain; drive voltage is for reference only. Drive voltage must be selected to ensure backlight current drain is below MAX level stated

## Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Optimal Viewing Angles	Top	Cr ≥ 10	-	85	-	°	
	Bottom		-	85	-	°	
	Left		-	85	-	°	
	Right		-	85	-	°	
Contrast Ratio	CR	-	600	800	-	-	
Luminance	L <sub>V</sub>	I <sub>LED</sub> = 150mA	800	1100	1500	cd/m <sup>2</sup>	
Response Time	T <sub>R</sub> + T <sub>F</sub>	T <sub>OP</sub> = 25°C	-	30	40	ms	
Chromaticity	Red	X <sub>R</sub>	-	0.552	0.592	0.632	-
		Y <sub>R</sub>	-	0.305	0.345	0.385	-
	Green	X <sub>G</sub>	-	0.277	0.317	0.357	-
		Y <sub>G</sub>	-	0.515	0.555	0.595	-
	Blue	X <sub>B</sub>	-	0.101	0.141	0.181	-
		Y <sub>B</sub>	-	0.069	0.109	0.149	-
White	X <sub>W</sub>	-	0.26	0.30	0.34	-	
	Y <sub>W</sub>	-	0.27	0.31	0.35	-	

## Driver Information

Built-in HX8282 Source Driver: <https://support.newhavendisplay.com/hc/en-us/articles/4414530594583-HX8282-A11>

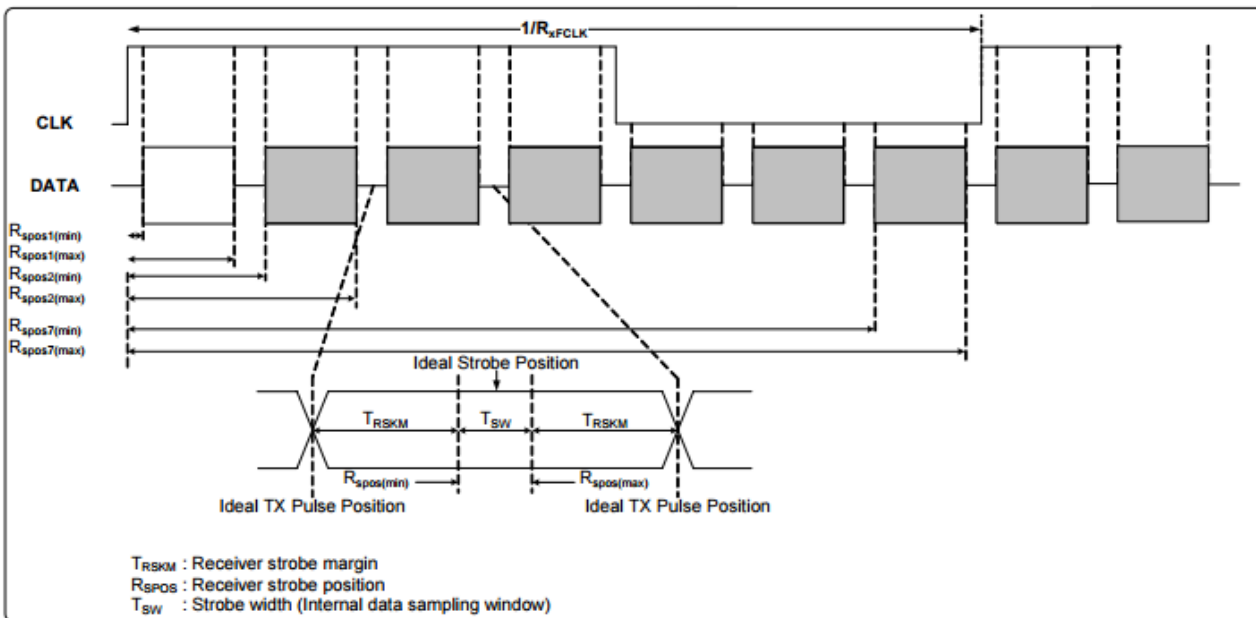
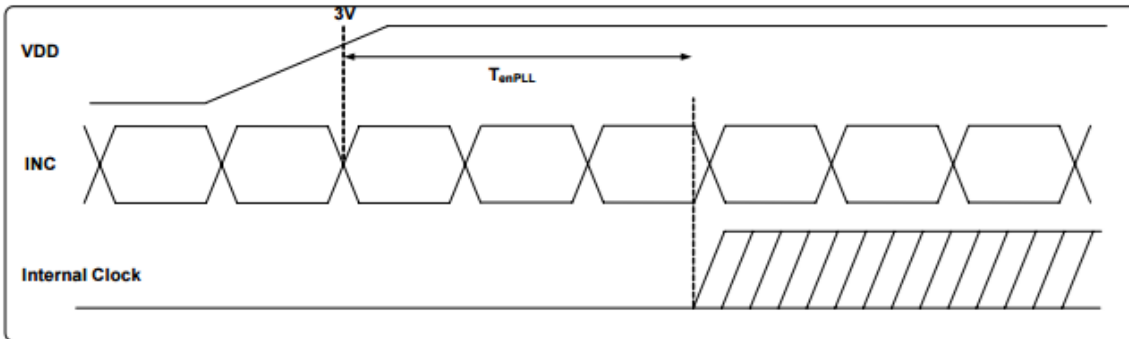
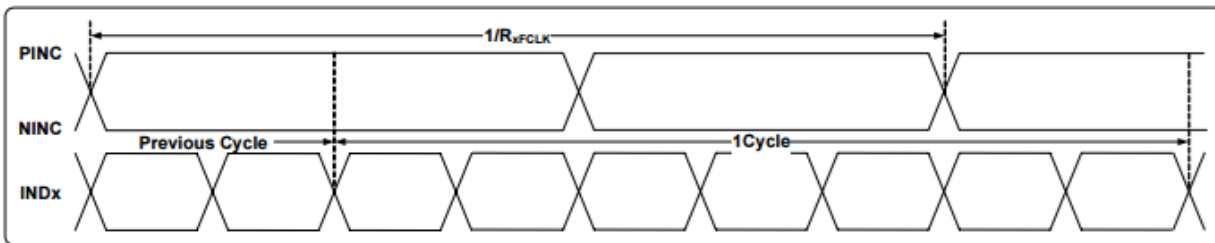
Built-in HX8696 Gate Driver: <https://support.newhavendisplay.com/hc/en-us/articles/4414548297367-HX8696-A>



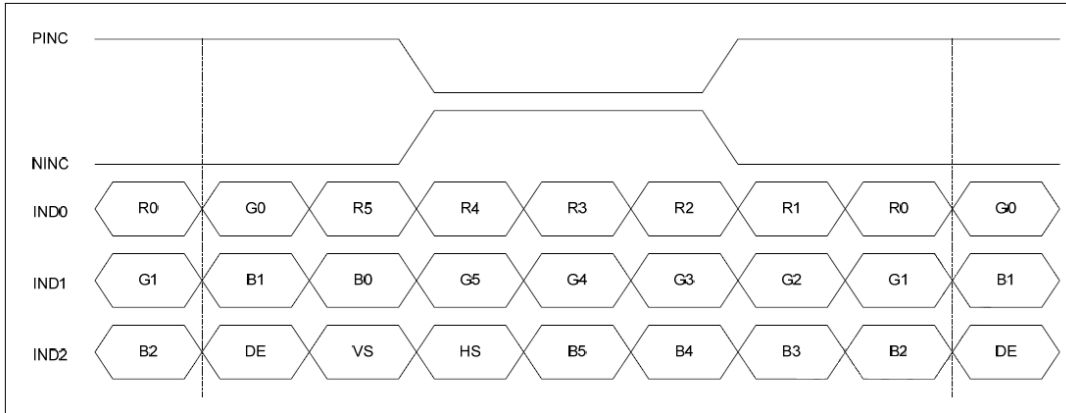
# Timing Characteristics

Parameter	Symbol	Spec			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R <sub>XFLK</sub>	20	-	71	MHz	-
Input data skew margin	T <sub>RSKM</sub>	500	-	-	pS	VID  = 400mV R <sub>XVCM</sub> = 1.2V R <sub>XFLK</sub> = 71MHz
Clock high time	T <sub>LVCH</sub>	-	4/(7 * R <sub>XFLK</sub> )	-	nS	-
Clock low time	T <sub>LVCL</sub>	-	3/(7 * R <sub>XFLK</sub> )	-	nS	-
PLL wake-up time	T <sub>emPLL</sub>	-	-	150	μS	-

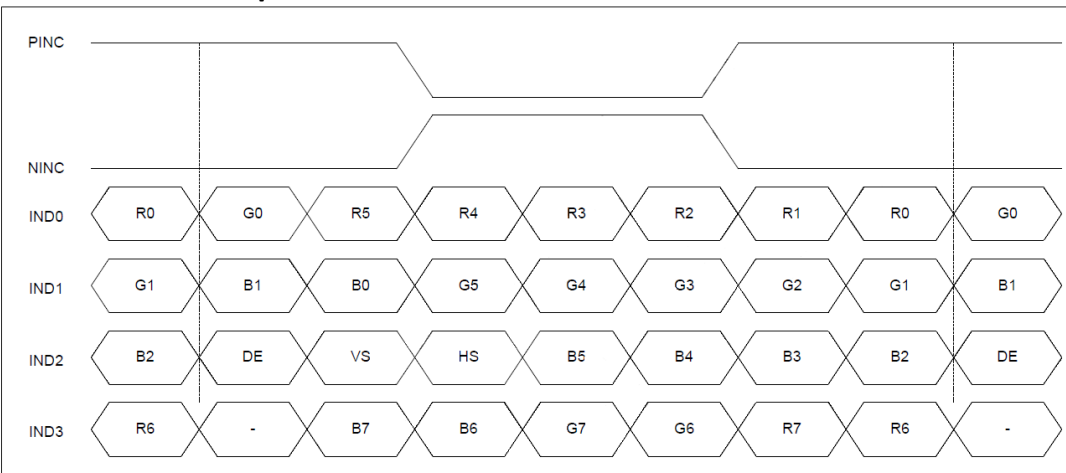
Parameter	Symbol	Spec			Unit	Condition
		Min.	Typ.	Max.		
Modulation Frequency	SSC <sub>MF</sub>	23	-	93	KHz	-
Modulation Rate	SSC <sub>MR</sub>	-	-	±3	%	LVDS Clock = 71 MHz



### 6-bit LVDS Data Input Format:



### 8-Bit LVDS Data Input Format:



### Horizontal & Vertical Timing (1024x600)

Item	Symbol	Spec.			Unit	
		Min.	Typ.	Max.		
DCLK Frequency	F <sub>CLK</sub>	44.9	51.2	63	MHz	
HSYNC	Horizontal Display Area	T <sub>HD</sub>			1024	DCLK
	HSD Period	T <sub>H</sub>	1200	1344	1400	DCLK
	HSD Pulse Width	T <sub>HPW</sub>	1	-	140	DCLK
	HSD Back Porch	T <sub>HBP</sub>	160			DCLK
	HSD Front Porch	T <sub>HFP</sub>	16	160	216	DCLK
VSYNC	Vertical Display Area	T <sub>VD</sub>			600	T <sub>H</sub>
	VSD Period	T <sub>V</sub>	624	635	750	T <sub>H</sub>
	VSD Pulse Width	T <sub>VPW</sub>	1	-	20	T <sub>H</sub>
	VSD Back Porch	T <sub>VBP</sub>	23			T <sub>H</sub>
	VSD Front Porch	T <sub>VFP</sub>	1	12	127	T <sub>H</sub>



## Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+80°C, 240 hrs.	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C, 240 hrs.	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C, 120 hrs.	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C, 120 hrs.	1,2
High Temperature / Humidity Operation	Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time.	+50°C, 90% RH, 120 hrs.	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-30°C, 30min->25°C, 10min -> 80°C, 30min 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	Frequency: 250 r/min Amplitude: 1 inch Time: 45min	3
Static electricity test	Endurance test applying electric static discharge.	Air: V <sub>s</sub> =±8KV, Contact: V <sub>s</sub> =±4KV 10 Times	

**Note 1:** No condensation to be observed.

**Note 2:** Conducted after 4 hours of storage at 25°C, 0%RH.

**Note 3:** Test performed on product itself, not inside a container.