

**Product Specification**

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# NHD-7.0-800480EF-ASXN#

## TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

<b>NHD-</b>	Newhaven Display
<b>7.0-</b>	7.0" Diagonal
<b>800480-</b>	800xRGBX480 Pixels
<b>EF-</b>	Model
<b>A-</b>	Built-in Driver / No Controller
<b>S-</b>	Sunlight Readable
<b>X-</b>	TFT
<b>N-</b>	TN, Wide Temperature
<b>#-</b>	RoHS Compliant

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## Additional Resources

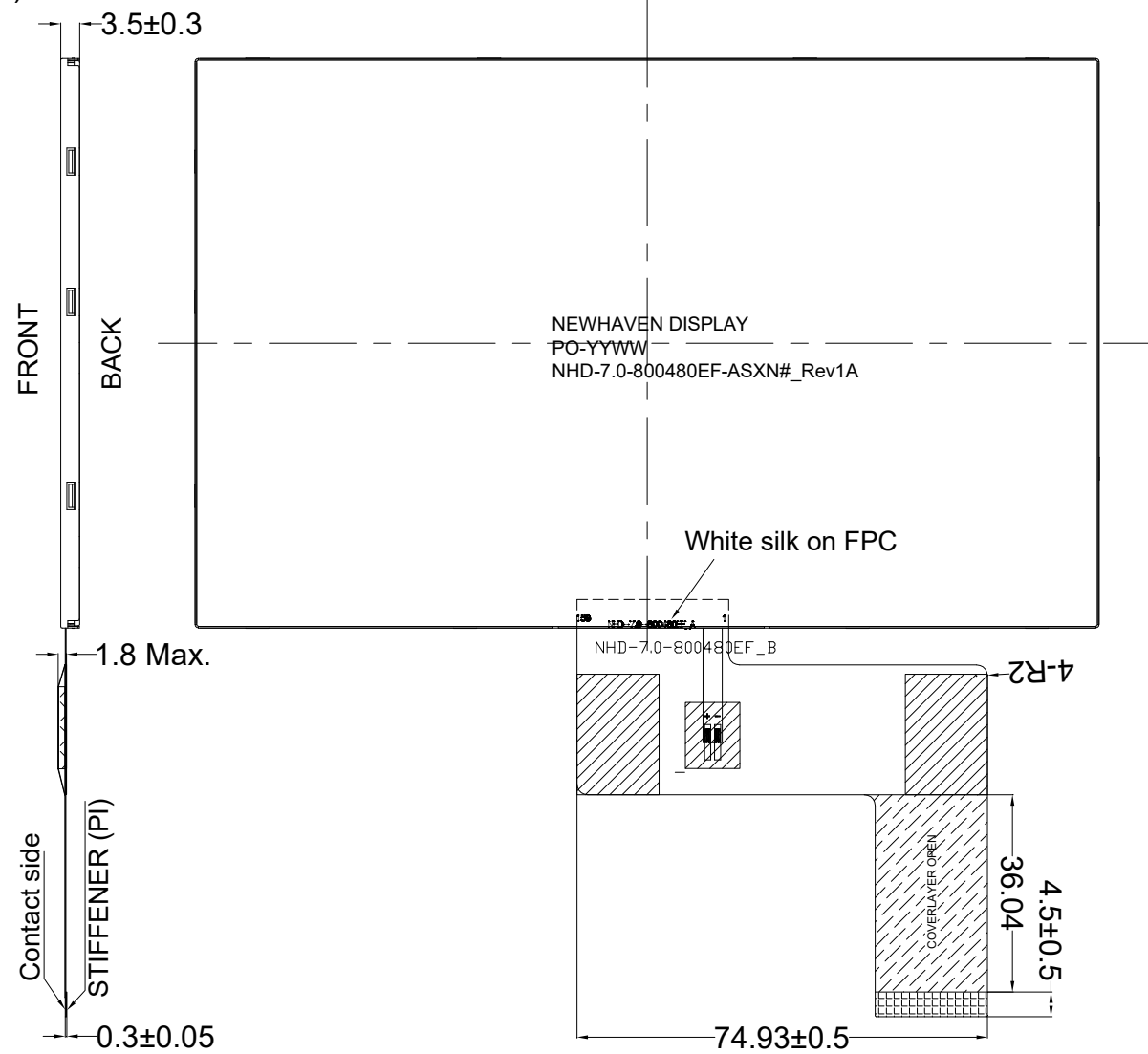
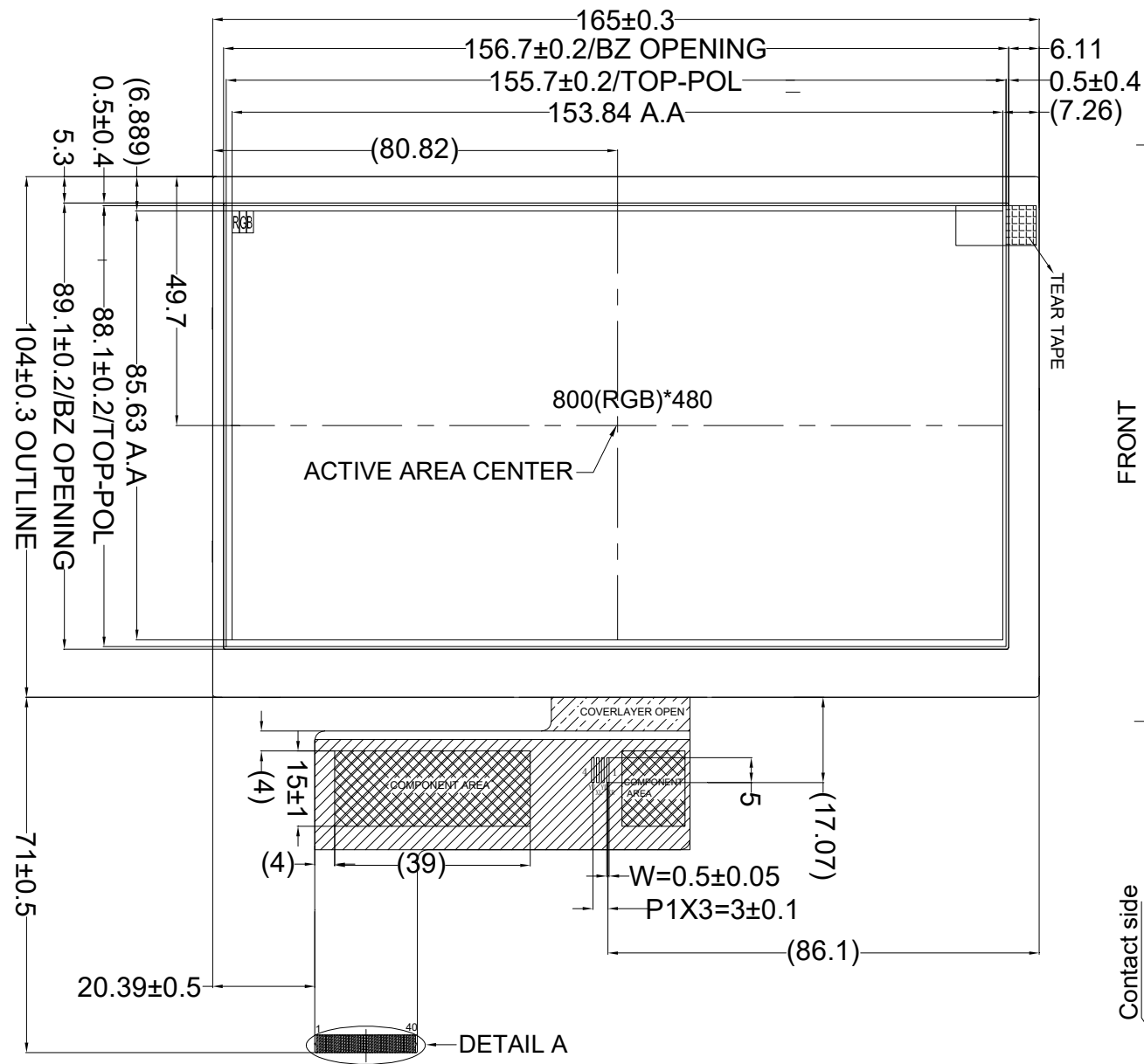
- **Support Forum:** <https://support.newhavendisplay.com/hc/en-us/community/topics>
- **GitHub:** <https://github.com/newhavendisplay>
- **Example Code:** <https://support.newhavendisplay.com/hc/en-us/categories/4409527834135-Example-Code/>
- **Knowledge Center:** [https://www.newhavendisplay.com/knowledge\\_center.html](https://www.newhavendisplay.com/knowledge_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>



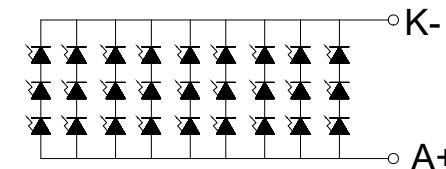
## Document Revision History

Revision	Date	Description	Changed By
0	03/10/2016	Initial Release	SB
1	06/30/2016	Added Chromaticity	SB
2	09/15/2017	Backlight Characteristics Updated	SB
3	03/09/2020	LCD Driver Changed to EK9716	SB
4	06/04/2020	Updated 2D Mechanical Drawing, Viewing Angles, Quality Information	AS
5	03/02/2021	Updated Silkscreen on FPC	AS
6	05/24/2021	Updated Mechanical Drawing	JT
7	06/19/2023	Date Code Format Updated on Mechanical Drawing	KL

# Mechanical Drawing

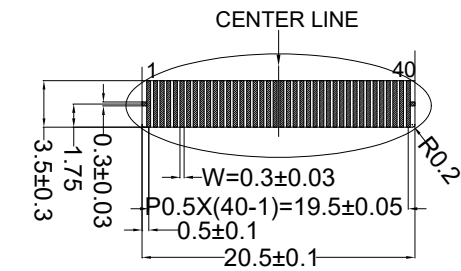


PIN	SYMBOL
1	LED-K
2	LED-A
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	DCLK
31	DISP
32	HSYNC
33	VSYNC
34	DEN
35	NC
36	GND
37	NC(XR)
38	NC(YD)
39	NC(XL)
40	NC(YU)



LED CIRCUIT

- Product Description: 7.0" 800x480 Sunlight Readable TFT
1. Driver IC: EK9716B
  2. Interface: 24-bit Parallel RGB TFT
  3. Power Requirement: 3.3V TFT, 9.3V/180mA Backlight
  4. Optical Features: Normally White, Transmissive, Anti-Glare, 1000cd/m<sup>2</sup>
  5. Recommended FFC Connector: 40pin 0.5mm pitch; Ex. Molex 54104-4031



<b>Standard Tolerance:</b> (Unless otherwise specified)  Linear: ±0.3mm		
	Drawing/Part Number: <b>NHD-7.0-800480EF-ASXN#</b>	Revision: 1A
<b>Unless otherwise specified:</b> • Dimensions are in Millimeters • Third Angle Projection	Drawn By: K. Lewis	Approved By: K. Lewis
	Drawn Date: 06/19/2023	Approved Date: 06/19/2023
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## Pin Description

Pin No.	Symbol	Connection	Function Description
1	LED-K	Power Supply	Backlight Cathode (Ground)
2	LED-A	Power Supply	Backlight Anode (180mA @ 9.3V)
3	GND	Power Supply	Ground
4	VDD	Power Supply	Supply Voltage for LCD and Logic (3.3V)
5-12	[R0-R7]	MPU	Red Data signals
13-20	[G0-G7]	MPU	Green Data signals
21-28	[B0-B7]	MPU	Blue Data signals
29	GND	Power Supply	Ground
30	DCLK	MPU	Dot data Clock (Falling Edge Triggered)
31	DISP	MPU	Display ON/OFF signal. DISP=1 : Display ON
32	HSYNC	MPU	Line synchronization signal
33	VSYNC	MPU	Frame synchronization signal
34	DEN	MPU	Data Enable signal
35	NC	-	No Connect
36	GND	Power Supply	Ground
37	NC(XR)	-	No Connect
38	NC(YD)	-	No Connect
39	NC(XL)	-	No Connect
40	NC(YU)	-	No Connect

**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	V <sub>DD</sub>	-	3.0	3.3	3.6	V
Supply Current	I <sub>DD</sub>	V <sub>DD</sub> =3.3V, 25°C	45	90	135	mA
"H" Level Input	V <sub>IH</sub>	-	0.7 * V <sub>DD</sub>	-	V <sub>DD</sub>	V
"L" Level Input	V <sub>IL</sub>	-	V <sub>SS</sub>	-	0.3 * V <sub>DD</sub>	V
"H" Level Output	V <sub>OH</sub>	-	V <sub>DD</sub> -0.4	-	V <sub>DD</sub>	V
"L" Level Output	V <sub>OL</sub>	-	V <sub>SS</sub>	-	V <sub>SS</sub> + 0.4	V
Backlight Supply Current	I <sub>LED</sub>	-	90	180	225	mA
Backlight Supply Voltage	V <sub>LED</sub>	I <sub>LED</sub> = 180 mA	8.4	9.3	10.2	V
Backlight Lifetime	-	T <sub>OP</sub> = 25° C	20,000	50,000	-	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	φY+	CR ≥10	50	60	-	°
	Bottom	φY-		60	70	-	°
	Left	θX-		60	70	-	°
	Right	θX+		60	70	-	°
Contrast Ratio		CR	-	-	500	-	-
Luminance		L <sub>V</sub>	I <sub>LED</sub> = 180 mA	800	1000	-	cd/m <sup>2</sup>
Response Time		T <sub>R</sub> + T <sub>F</sub>	T <sub>OP</sub> = 25°C	-	25	-	ms
Chromaticity	Red	X <sub>R</sub>	-	0.532	0.582	0.632	-
		Y <sub>R</sub>	-	0.292	0.342	0.392	-
	Green	X <sub>G</sub>	-	0.285	0.335	0.385	-
		Y <sub>G</sub>	-	0.574	0.624	0.674	-
	Blue	X <sub>B</sub>	-	0.104	0.154	0.204	-
		Y <sub>B</sub>	-	0.092	0.142	0.192	-
	White	X <sub>W</sub>	-	0.257	0.307	0.357	-
		Y <sub>W</sub>	-	0.334	0.384	0.434	-

## Driver Information

Built-in EK9716B Source Driver: <https://support.newhavendisplay.com/hc/en-us/articles/4414491960599-EK9716B>

Built-in EK73002AB2 Gate Driver: <https://support.newhavendisplay.com/hc/en-us/articles/4414491516183-EK73002AB2>

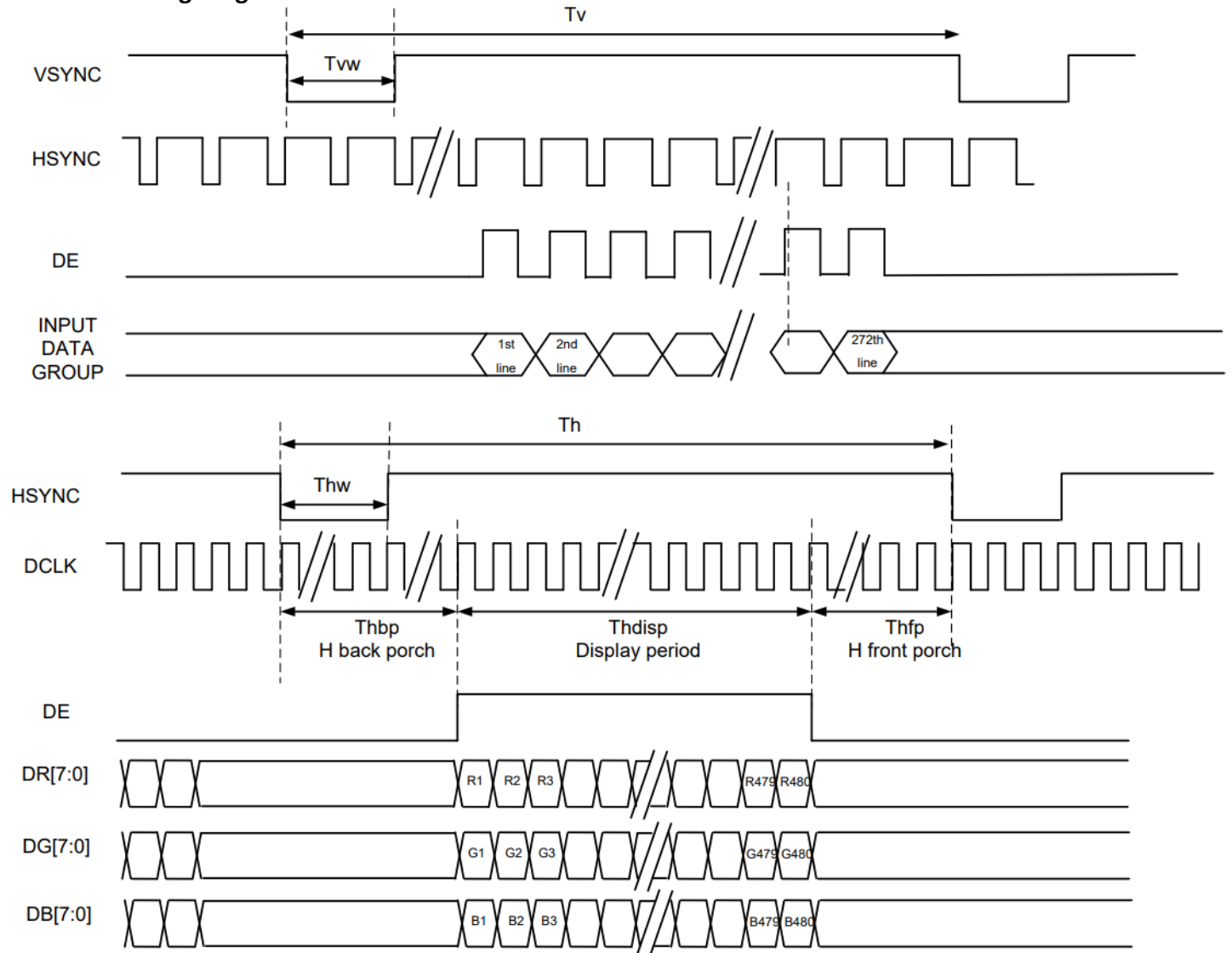


# Timing Characteristics

## Parallel RGB Input Timing Requirements

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		$F_{clk}$	28.2	29.2	40	MHz	-
DLCK Period		$T_{clk}$	25	34	-	ns	-
HSYNC	Period Time	$T_h$	908	928	1088	DCLK	$T_{hw} + T_{hbp} = 88$ DLCK is fixed
	Display Period	$T_{hdisp}$	800			DCLK	
	Pulse Width	$T_{hw}$	1	48	87	DCLK	
	Back Porch	$T_{hbp}$	87	40	1	DCLK	
	Front Porch	$T_{hfp}$	20	40	200	DCLK	-
VSYNC	Display Period	$T_{vdisp}$	480			H	$T_{vw} + T_{vbp} = 32$ H is fixed
	Period Time	$T_v$	517	525	613	H	
	Pulse Width	$T_{vw}$	1	1	3	H	
	Back Porch	$T_{vbp}$	31	31	29	H	
	Front Porch	$T_{vfp}$	5	13	101	H	-

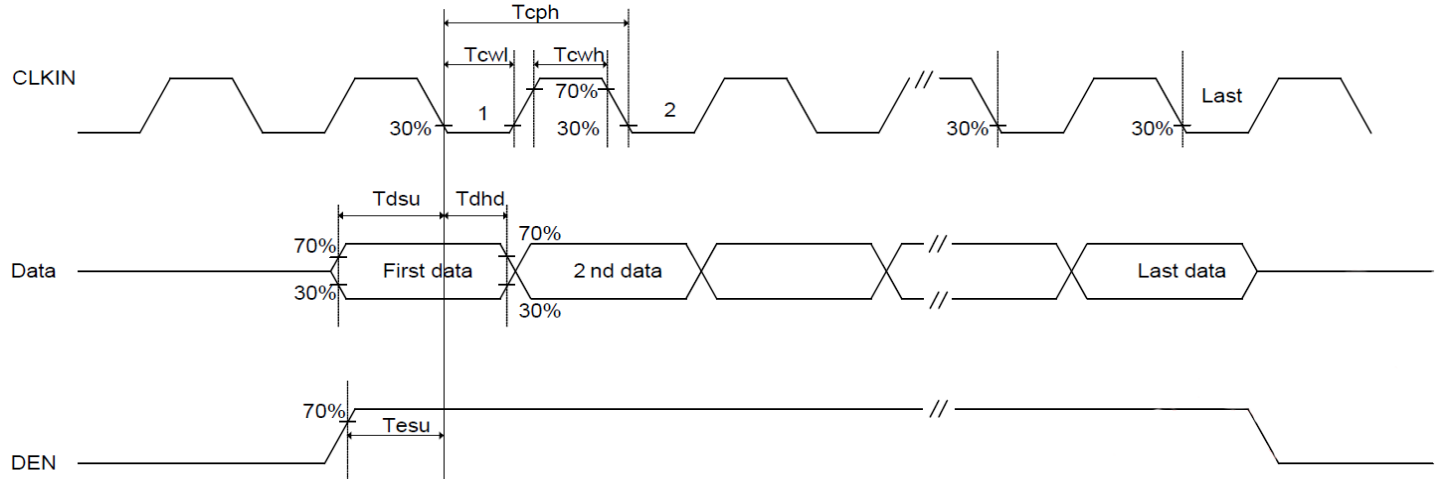
## DE Mode Timing Diagram



### Input Setup Timing Requirements

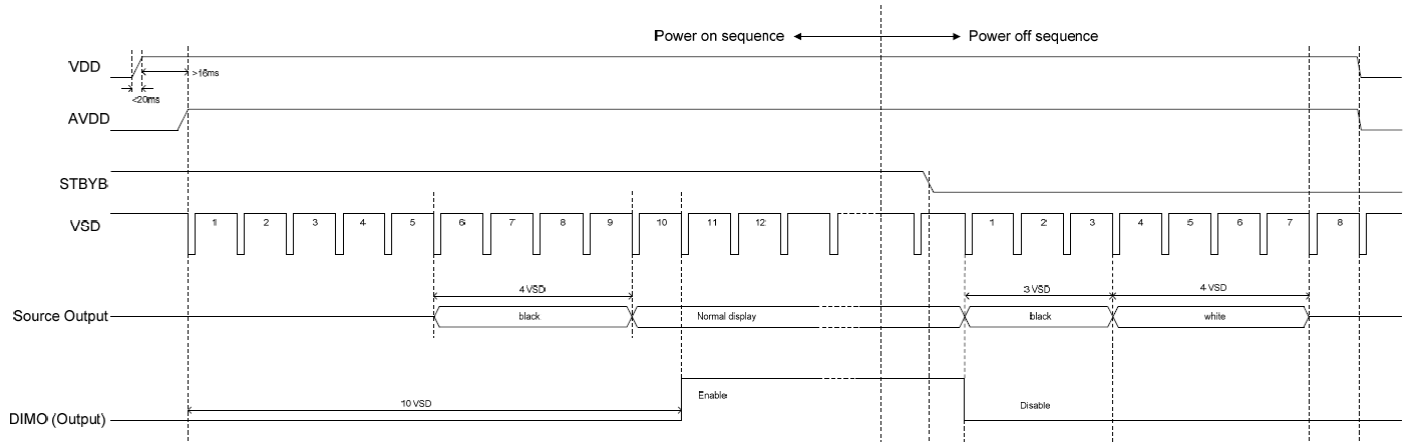
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
V <sub>DD</sub> Power Source Slew Time	T <sub>por</sub>	-	-	20	ms	From 0V to 90% V <sub>DD</sub>
CLK cycle time	T <sub>cph</sub>	20	-	-	ns	-
CLK pulse duty	T <sub>cwh</sub>	40	50	60	%	-
Data setup time	T <sub>dsu</sub>	8	-	-	ns	-
Data hold time	T <sub>dhhd</sub>	8	-	-	ns	-
DEN setup time	T <sub>esu</sub>	8	-	-	ns	-
DEN hold time	T <sub>ehd</sub>	8	-	-	ns	-

### Input Setup Timing Diagram

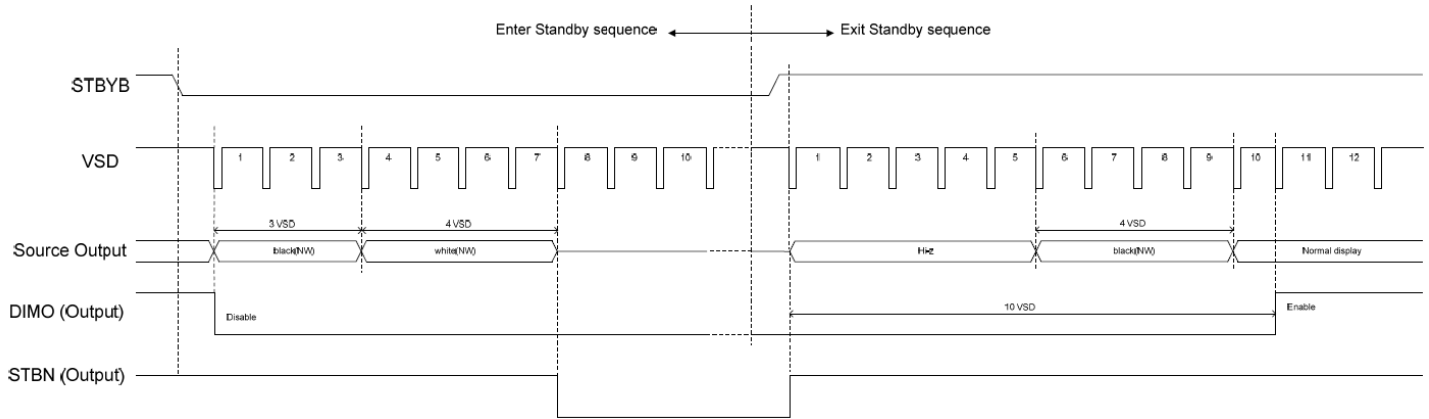




## Power ON/OFF Sequence



## Enter/Exit Standby Mode Sequence



## 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, 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C, 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C, 96hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C, 96hrs	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, 96hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-20°C, 60min -> 70°C, 60min = 1 cycle For 20 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-50Hz, 5G amplitude. 30 min in each of 3 directions: X, Y, Z	3
Static electricity test	Endurance test applying electric static discharge.	Air: ±8KV 150pf/330Ω 5 Times	
		Contact: ±4KV 150pf/330Ω 5 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.

