NHD-7.0-1024600AF-LSXP-CTP

IPS TFT Liquid Crystal Display Module

NHD-	Newhaven Display
7.0-	7.0” Diagonal
1024600-	1024xRGBx600 Pixels
AF-	Model
L-	LVDS Interface
S-	High Brightness, White LED Backlight
X-	TFT
P-	IPS, Wide Temperature
CTP-	Capacitive Touch Panel

Newhaven Display International, Inc.

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Elgin IL, 60124

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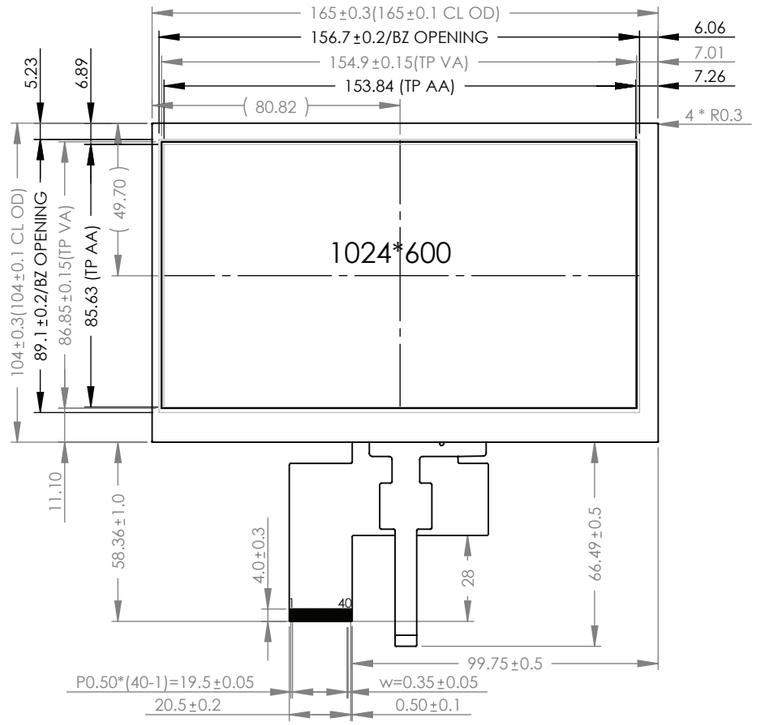
Document Revision History

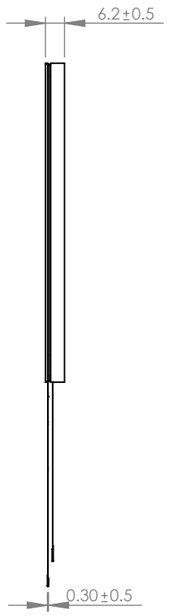
Revision	Date	Description	Changed by
-	4/22/19	Initial Release	PK
1	6/18/19	CTP Firmware ID & Backlight Characteristics Updated	SB
2	7/27/20	Included Horizontal & Vertical Timing Charts	AS

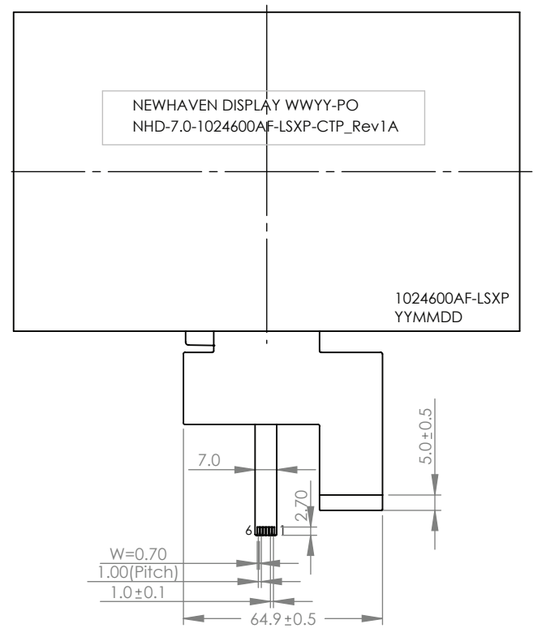
Functions and Features

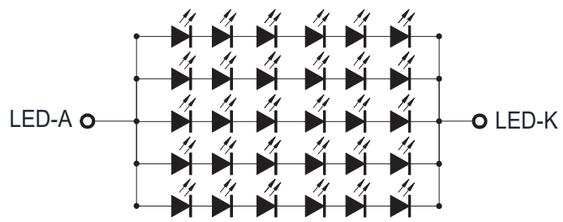
- **1024xRGBx600 Resolution**
- **IPS Type, Full Viewing Angles**
- **LED Backlight**
- **LVDS Interface**
    - **4 LVDS Channels**
- **16.7M Colors**
- **Capacitive touch panel with controller**
    - **10-point multi-touch input**
    - **Gesture input**
        - **Zoom In/Out**
        - **Swipe Up/Down/Left/Right**

SYMBOL	REVISION	DATE









TFT

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

CTP

PIN	SYMBOL
1	VDD
2	GND
3	SCL
4	SDA
5	/INT
6	/RESET

Notes:

1. Display Size: 7.0” TFT
2. Optimal Viewing Direction: Full View (IPS)
3. Display Mode: Transmissive / Normally Black / Anti-Glare
4. Driver IC: HX8282-A11+HX8696-A00
5. Power Supply Voltage: 3.3V
6. Backlight: White LED / 19.2 V / 150 mA (Typ)
7. Brightness: 900cd/m² (Typ)
8. 3M Brightness Enhancement Film
9. Touch Panel: PCAP

STANDARD TOLERANCE:
(UNLESS OTHERWISE SPECIFIED)

LINEAR: ±0.3mm

NEWHAVEN DISPLAY INTERNATIONAL

DRAWING/PART NUMBER: NHD-7.0-1024600AF-LSXP-CTP

REVISION: -

UNLESS OTHERWISE SPECIFIED:
- DIMENSIONS ARE IN MILLIMETERS
- THIRD ANGLE PROJECTION

DRAWN BY: P. Bartek

APPROVED BY: M. LaVine

DRAWN DATE: 05/28/19

APPROVED DATE: 05/28/19

SIZE: A3

SCALE: 1:2

DO NOT SCALE DRAWING

SHEET 1 OF 1

Pin Description

TFT Display:

Pin No.	Symbol	External Connection	Function Description
1	NC	-	No connection
2-3	V_{DD}	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. NSEL = 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 Settings. 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: 40-pin 0.5mm pitch FFC. Molex P/N: 54104-4031 (top contact)

Capacitive Touch Panel:

Pin No.	Symbol	External Connection	Function Description
1	VDD	Power Supply	Supply voltage for operation
2	GND	Power Supply	Ground
3	SCL	MPU	Serial Clock input signal
4	SDA	MPU	Serial Data input signal
5	/INT	MPU	Interrupt signal from touch panel to host
6	/RESET	MPU	Active LOW Reset signal.

Recommended CTP connector: 6-pin 1.0mm pitch FFC. Molex P/N: 52271-0679 (bottom contact)

Electrical Characteristics

TFT:

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T_{OP}	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T_{ST}	Absolute Max	-30	-	+80	°C
Supply Voltage for LCD	V_{DD}	-	3.0	3.3	3.6	V
Supply Current for LCD	I_{DD}	V_{DD} = 3.3V	45	90	135	mA
LVDS Differential input high Threshold voltage	R_XVTH	R_XVCM = 1.2V	-	-	+100	mV
LVDS Differential input low Threshold voltage	R_XVTL		-100	-	-	mV
LVDS Differential input common mode voltage	R_XVCM	-	|VID|/2	-	2.4-|VID|/2	V
LVDS Differential voltage	|VID|	-	200	-	600	mV
Backlight Supply Current	I_{LED}	-	-	150	175	mA
Backlight Supply Voltage	V_{LED}	I_{LED} = 150 mA	18	19.2	20.4	V
Backlight Lifetime*	-	T_{OP} = 25° C	20,000	-	-	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

Capacitive Touch Panel:

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T_{OP}	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T_{ST}	Absolute Max	-30	-	+80	°C
Supply Voltage	V_{DD}	-	2.7	3.3	3.6	V
Supply Current – Operating	I_{DD}	V_{DD} = 3.3V	-	15.0	-	mA
Supply Current – Hibernate	I_{DD}	T_{OP} = 25°C	-	1.0	-	µA
"H" Level input	V_{IH}	-	0.7* V_{DD}	-	V_{DD}	V
"L" Level input	V_{IL}	-	V_{SS}	-	0.3* V_{DD}	V
"H" Level output	V_{OH}	-	0.8* V_{DD}	-	V_{DD}	V
"L" Level output	V_{OL}	-	V_{DD}	-	0.3* V_{DD}	V

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	Cr ≥ 10	-	85	-	º
	Bottom	φY-		-	85	-	º
	Left	θX-		-	85	-	º
	Right	θX+		-	85	-	º
Contrast Ratio		Cr	-	500	800	-	-
Luminance		L_V	-	660	900	-	cd/m^2
Response Time		$T_R + T_F$	T_{OP} = 25°C	-	25	40	ms
Chromaticity	Red	X_R	-	0.563	0.603	0.643	-
		Y_R	-	0.308	0.348	0.388	-
	Green	X_G	-	0.273	0.313	0.353	-
		Y_G	-	0.541	0.581	0.621	-
	Blue	X_B	-	0.118	0.158	0.198	-
		Y_B	-	0.066	0.106	0.146	-
	White	X_W	-	0.263	0.303	0.343	-
		Y_W	-	0.270	0.310	0.350	-

Capacitive Touch Panel Material Characteristics:

Property	Requirement	Unit
IC	FT5426	-
ITO Glass thickness	0.55	mm
Surface Hardness	≥6	H
Light transmission	82%	-
Operating Humidity	20~90	RH
Storage Humidity	20~90	RH

Driver Information

TFT Display:

Built-in HX8282 Source Driver: http://www.newhavendisplay.com/appnotes/datasheets/LCDs/HX8282-A01.pdf
Built-in HX8696 Gate Driver: http://www.newhavendisplay.com/appnotes/datasheets/LCDs/HX8696-A.pdf

Capacitive Touch Panel:

Built-in FocalTech FT5426 controller.
Please download specification at http://www.newhavendisplay.com/appnotes/datasheets/touchpanel/FT5x26.pdf

Capacitive Touch Panel Registers

Register No.	Access	Register Name	Bits	Value	Description
01h	RO	Gesture ID	[7:0]	1Ch 14h 10h 18h 48h 49h 00	Swipe Up Swipe Down Swipe Left Swipe Right Zoom In Zoom Out No gesture
02h	RO	Touch Points	[7:0]	0-Ah	0: No touch detected A: 10 touch points detected
03h	RO	TOUCH1_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
03h	RO	TOUCH1_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
04h	RO	TOUCH1_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
05h	RO	TOUCH1_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
06h	RO	TOUCH1_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
07h	RO	TOUCH1_Weight	[7:0]		Touch Weight
08h	RO	TOUCH1_Misc	[3:0]	00-0Fh	Touch Area
09h	RO	TOUCH2_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
09h	RO	TOUCH1_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
0Ah	RO	TOUCH2_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
0Bh	RO	TOUCH2_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
0Ch	RO	TOUCH2_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
0Dh	RO	TOUCH2_Weight	[7:0]		Touch Weight
0Eh	RO	TOUCH2_Misc	[3:0]	00-0Fh	Touch Area
0Fh	RO	TOUCH3_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
0Fh	RO	TOUCH3_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
10	RO	TOUCH3_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
11h	RO	TOUCH3_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
12h	RO	TOUCH3_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
13h	RO	TOUCH3_Weight	[7:0]		Touch Weight
14h	RO	TOUCH3_Misc	[3:0]	00-0Fh	Touch Area
15h	RO	TOUCH4_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
15h	RO	TOUCH4_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
16h	RO	TOUCH4_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
17h	RO	TOUCH4_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
18h	RO	TOUCH4_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
1Ah	RO	TOUCH4_Misc	[3:0]	00-0Fh	Touch Area
1Bh	RO	TOUCH5_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved

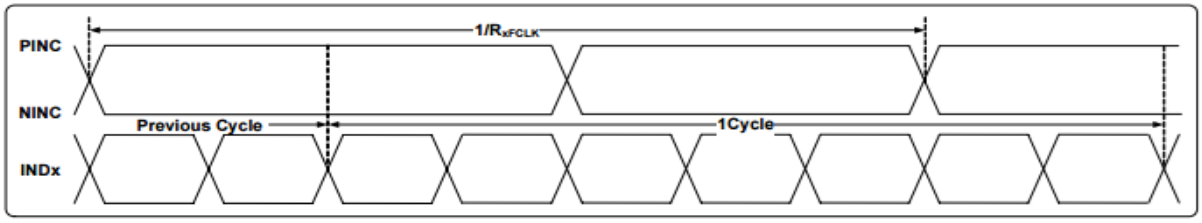
Register No.	Access	Register Name	Bits	Value	Description
1Bh	RO	TOUCH5_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
1Ch	RO	TOUCH5_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
1Dh	RO	TOUCH5_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
1Eh	RO	TOUCH5_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
1Fh	RO	TOUCH5_Weight	[7:0]		Touch Weight
20	RO	TOUCH5_Misc	[3:0]	00-0Fh	Touch Area
21h	RO	TOUCH6_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
21h	RO	TOUCH6_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
22h	RO	TOUCH6_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
23h	RO	TOUCH6_YH	[3:0]	0 -1	Upper 4 bits of Y touch coordinate
24h	RO	TOUCH6_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
25h	RO	TOUCH6_Weight	[7:0]		Touch Weight
26h	RO	TOUCH6_Misc	[3:0]	00-0Fh	Touch Area
27h	RO	TOUCH7_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
27h	RO	TOUCH7_XH	[3:0]	0 -1	Upper 4 bits of X touch coordinate
28h	RO	TOUCH7_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
29h	RO	TOUCH7_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
2Ah	RO	TOUCH7_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
2Bh	RO	TOUCH7_Weight	[7:0]		Touch Weight
2Ch	RO	TOUCH7_Misc	[3:0]	00-0Fh	Touch Area
2Dh	RO	TOUCH8_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
2Dh	RO	TOUCH8_XH	[3:0]	0 – 1	Upper 4 bits of X touch coordinate
2Eh	RO	TOUCH8_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
2Fh	RO	TOUCH8_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
30	RO	TOUCH8_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
31h	RO	TOUCH8_Weight	[7:0]		Touch Weight
32h	RO	TOUCH8_Misc	[3:0]	00-0Fh	Touch Area
33h	RO	TOUCH9_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
33h	RO	TOUCH9_XH	[3:0]	0 - 1	Upper 4 bits of X touch coordinate
34h	RO	TOUCH9_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
35h	RO	TOUCH9_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
36h	RO	TOUCH9_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate
37h	RO	TOUCH9_Weight	[7:0]		Touch Weight
38h	RO	TOUCH9_Misc	[3:0]	00 - 0Fh	Touch Area
39h	RO	TOUCH10_Event_Flag	[7:6]	0 1 2 3	Put Down Put Up Contact Reserved
39h	RO	TOUCH10_XH	[3:0]	0 – 1	Upper 4 bits of X touch coordinate
3Ah	RO	TOUCH10_XL	[7:0]	00 - FFh	Lower 8 bits of X touch coordinate
3Bh	RO	TOUCH10_YH	[3:0]	0 – 1	Upper 4 bits of Y touch coordinate
3Ch	RO	TOUCH10_YL	[7:0]	00 - FFh	Lower 8 bits of Y touch coordinate

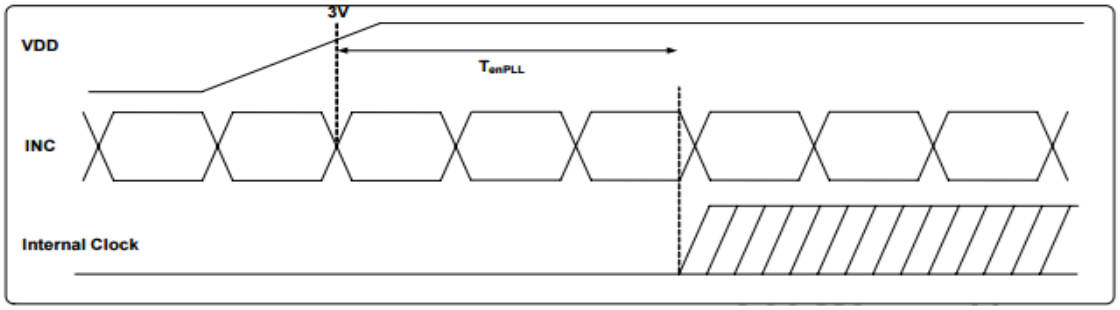
Register No.	Access	Register Name	Bits	Value	Description
3Dh	RO	TOUCH10_Weight	[7:0]	00-FFh	Touch Weight
3Eh	RO	TOUCH10_Misc	[3:0]	00-0Fh	Touch Area
80	RW	ID_G_MC_THGROUP	[7:0]	00-FFh	Mutual-Capacitive touch Threshold / 4 Default: 4Bh
81h	RW	ID_G_MC_THPEAK	[7:0]	00-FFh	Mutual-Capacitive Peak Threshold / 4 Default: 46h
85h	RW	ID_G_THDIFF	[7:0]	00-FFh	Points Filtering Range Threshold / 16 Default: A0
86h	RW	ID_G_CTRL	[1:0]	0-1	Allowed to switch to monitor mode or not (1: Allowed, 0: Not Allowed)
88h	RW	ID_G_PERIODACTIVE	[3:0]	3h-Eh	Period of Active Status
89h	RW	ID_G_PERIODMONITOR	[7:0]	1Eh-FFh	Timer to enter “idle” while in Monitor (ms)
A1h	RO	ID_G_LIB_VERSION_H	[7:0]	00-FFh	App library version high-byte Default: 0
A2h	RO	ID_G_LIB_VERSION_L	[7:0]	00-FFh	App library version low-byte Default: 2h
A3h	RO	ID_G_CHIPER_HIGH	[7:0]	00-FFh	Chip Vendor ID Default: 0x54
A4h	RW	ID_G_MODE	[0]	0 1	INT Trigger Mode INT Polling Mode
A5h	RW	ID_G_PMODE	[1:0]	0 1 3	Active Monitor Sleep
A6h	RO	ID_G_FIRMID	[7:0]	00-FFh	Firmware ID Number Default: 21h
A8h	RO	ID_G_VENODRID	[7:0]	00-FFh	CTPM Vendor’s Chip ID Default: 79h
C0h	RW	ID_G_GLOVE_MODE_EN	[0]	0 1	Glove Mode Switch Disable Glove Mode Switch Enable
C1h	RW	ID_G_COVER_MODE_EN	[0]	0 1	Cover Mode Switch Disable Cover Mode Switch Enable

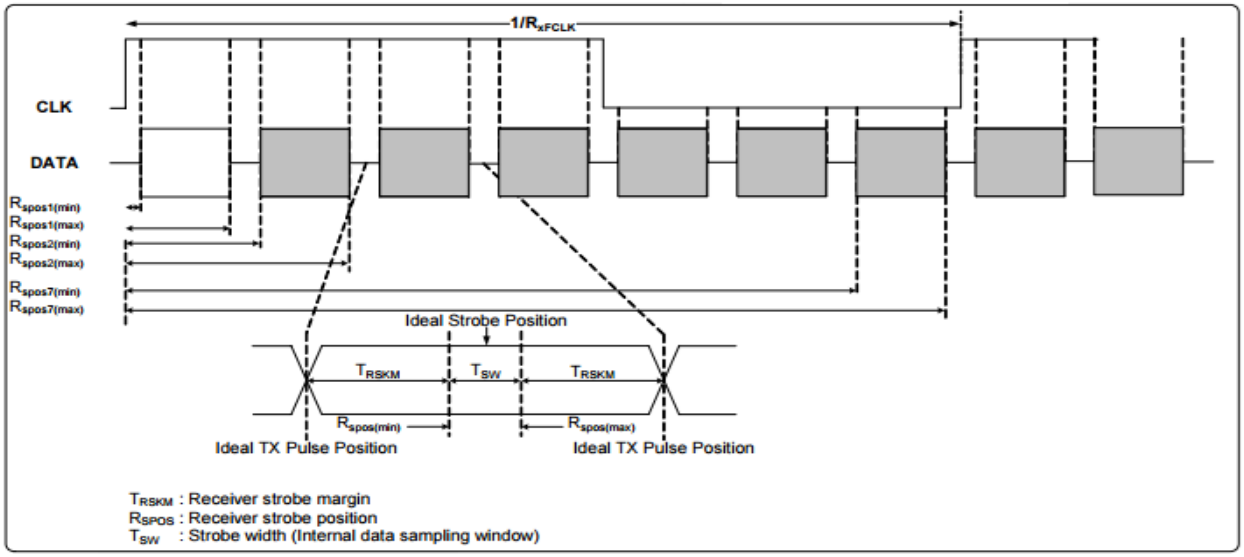
Timing Characteristics – TFT Display

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

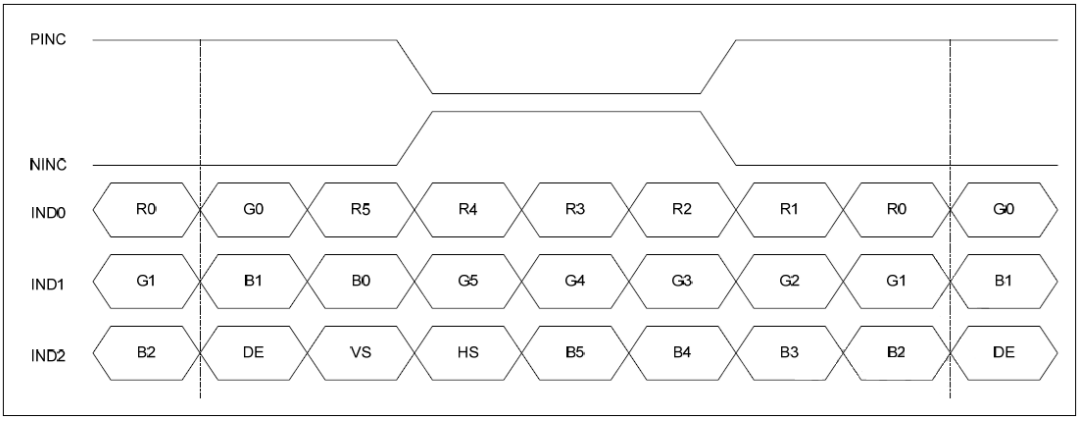
Parameter	Symbol	Spec			Unit	Condition
		Min.	Typ.	Max.		
Modulation Frequency	SSC_{MF}	23	-	93	KHz	-
Modulation Rate	SSC_{MR}	-	-	±3	%	LVDS Clock = 71 MHz



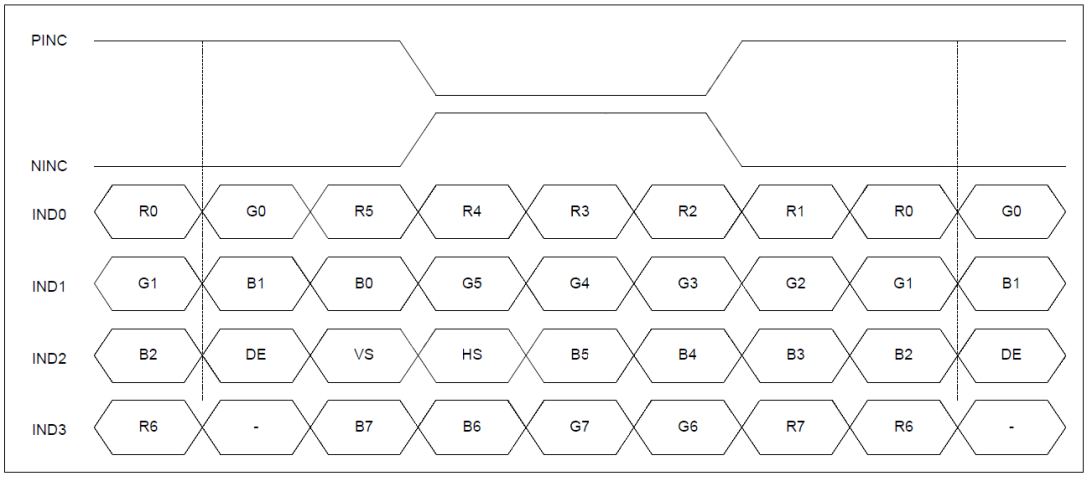




6-bit LVDS data input format:



8-Bit LVDS Data Input Format:

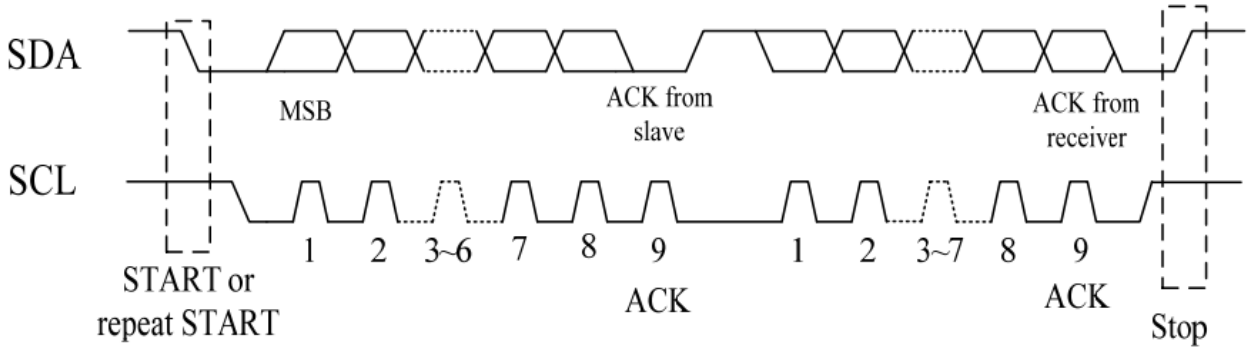


Horizontal & Vertical Timing (1024x600)

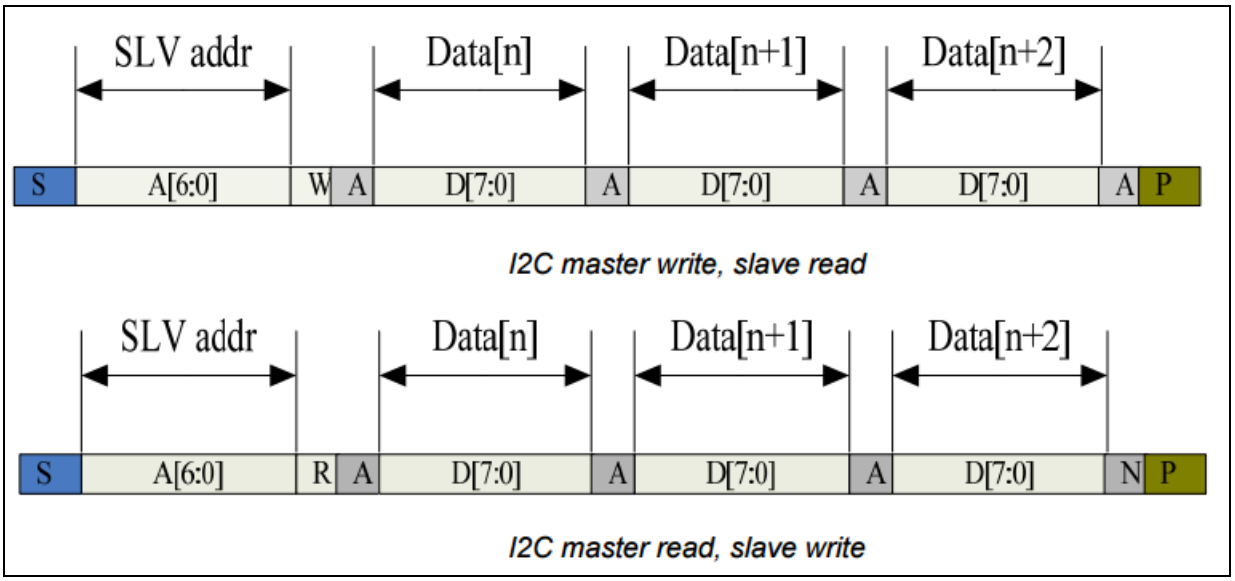
Item		Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DCLK Frequency		F_{CLK}	44.9	51.2	63	MHz
HSYNC	Horizontal Display Area	T_{HD}		1024		DCLK
	HSD Period	T_H	1200	1344	1400	DCLK
	HSD Pulse Width	T_{HPW}	1	-	140	DCLK
	HSD Back Porch	T_{HBP}		160		DCLK
	HSD Front Porch	T_{HFP}	16	160	216	DCLK
VSYNC	Vertical Display Area	T_{VD}		600		T_H
	VSD Period	T_V	624	635	750	T_H
	VSD Pulse Width	T_{VPW}	1	-	20	T_H
	VSD Back Porch	T_{VBP}		23		T_H
	VSD Front Porch	T_{VFP}	1	12	127	T_H

Timing Characteristics – Capacitive Touch Panel

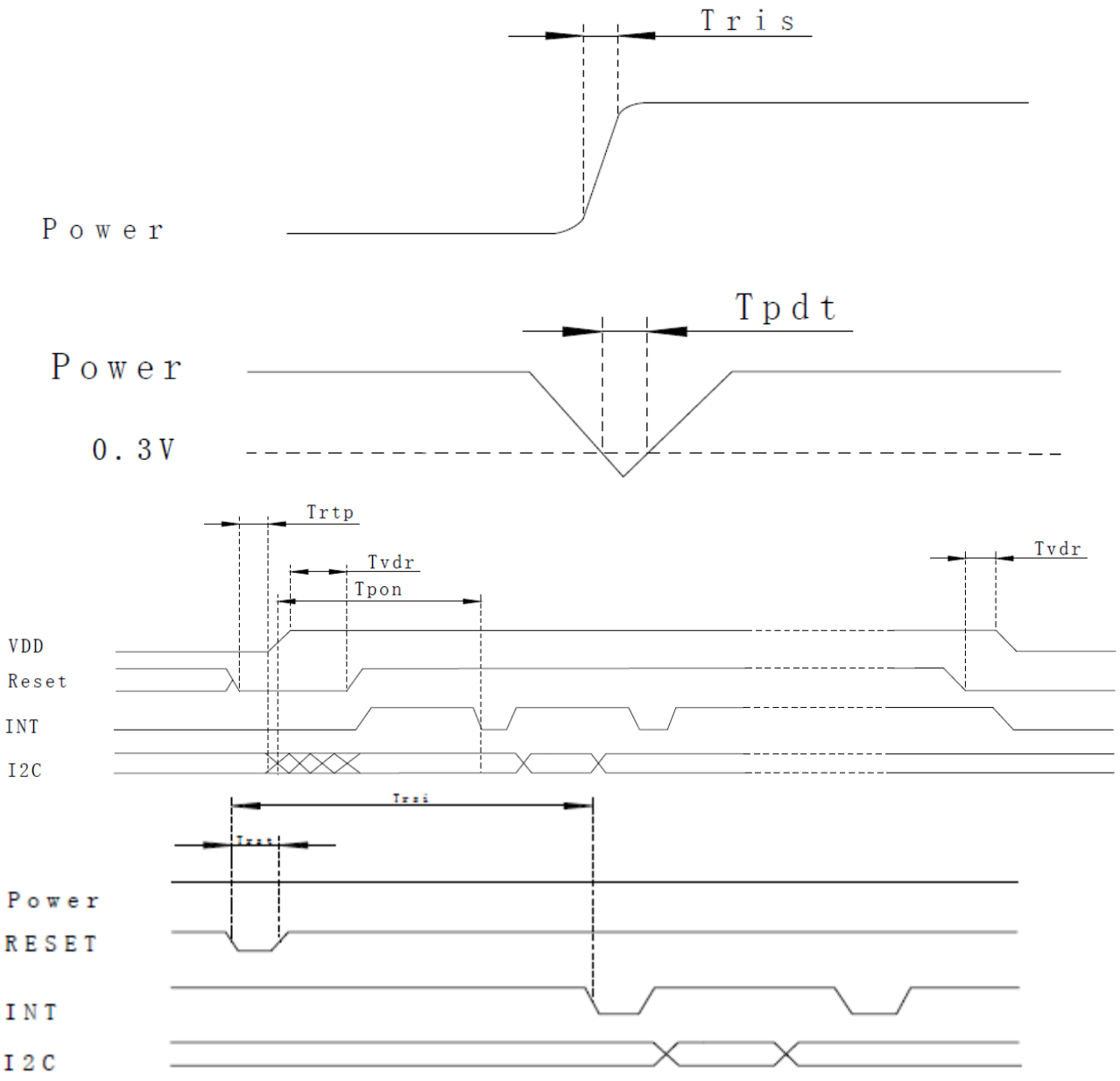
Data Transfer Format



Parameter	Min	Max	Unit
SCL Frequency	0	400	KHz
Bus free time between a STOP & START condition	1.3	-	µs
Hold time Repeated START condition	0.6	-	µs
Data Setup Time	100	-	ns
Setup time for a repeated START condition	0.6	-	µs
Setup time for a STOP condition	0.6	-	µs

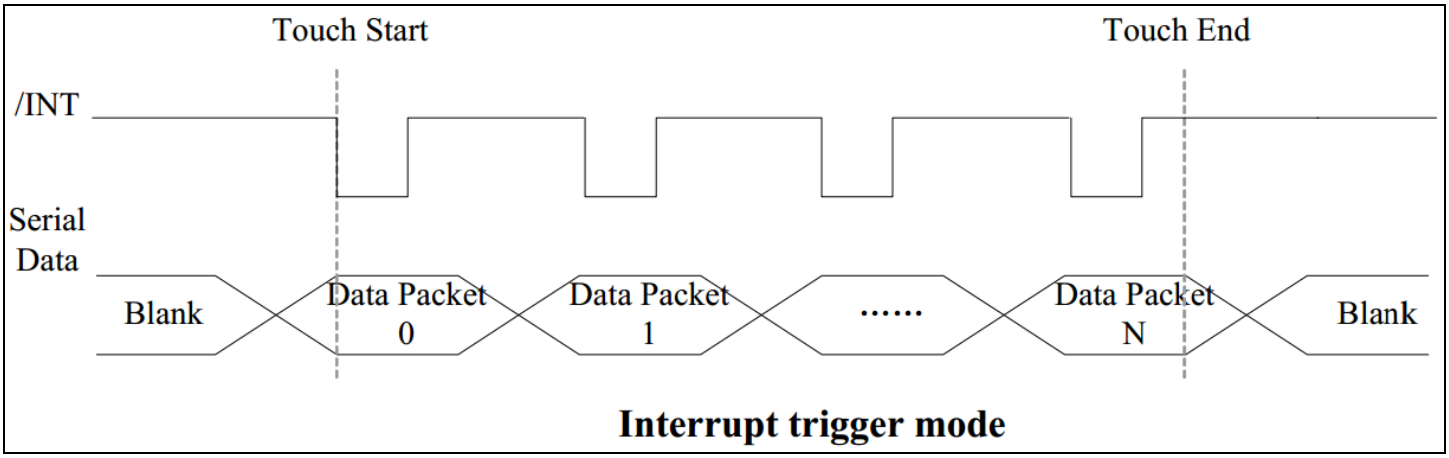


Power ON/Reset Sequence



Reset sequence

Parameter	Description	Min	Max	Unit
Tris	Rise time from 0.1V_{DD} to 0.9V_{DD}	-	5	ms
Tpdt	Time of the voltage of supply being below 0.3V	5	-	ms
Trtp	Time of resetting to be low before powering on	100	-	µs
Tpon	Time to start reporting after power on	-	200	ms
Tvdr	Reset time after applying V_{DD}	1	-	ms
Trsi	Time to start reporting after reset	-	200	ms
Trst	Reset Time	1	-	ms



Interrupt trigger mode

Sample code to read touch data:

```
i2c_start();
i2c_tx(0x70);        //Slave Address (Write)
i2c_tx(0x00);        //Start reading address
i2c_stop();

i2c_start();
i2c_tx(0x71);        //Slave Address (Read)
for(i=0x00;i<0x1F;i++)
{touchdata_buffer[i] = i2c_rx(1);}
i2c_stop();
```

Sample code to overwrite default register values:

```
i2c_start();
i2c_tx(0x70);        //Slave Address (Write)
i2c_tx(0xA4);        //ID_G_Mode
i2c_tx(0x01);        //Disable interrupt status to host
i2c_stop();
```

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_S=8KV, Contact: V_S=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.

Precautions for using LCDs/LCMs

See Precautions at www.newhavendisplay.com/specs/precautions.pdf

Warranty Information and Terms & Conditions

http://www.newhavendisplay.com/index.php?main_page=terms