



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# NHD-3.5-320240MF-ASXV#-T

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

NHD-	Newhaven Display
3.5-	3.5" Diagonal
320240-	320xRGBx240 Pixels
MF-	Model
A-	Built-in Driver / No Controller
S-	High Brightness, White LED Backlight
X-	TFT
V-	MVA, Wide Temperature
#-	<b>RoHS Compliant</b>
T-	4-wire Resistive Touch Panel

### Newhaven Display International, Inc.

2661 Galvin Ct.

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

[www.newhavendisplay.com](http://www.newhavendisplay.com)

[nhtech@newhavendisplay.com](mailto:nhtech@newhavendisplay.com)

[nhsales@newhavendisplay.com](mailto:nhsales@newhavendisplay.com)

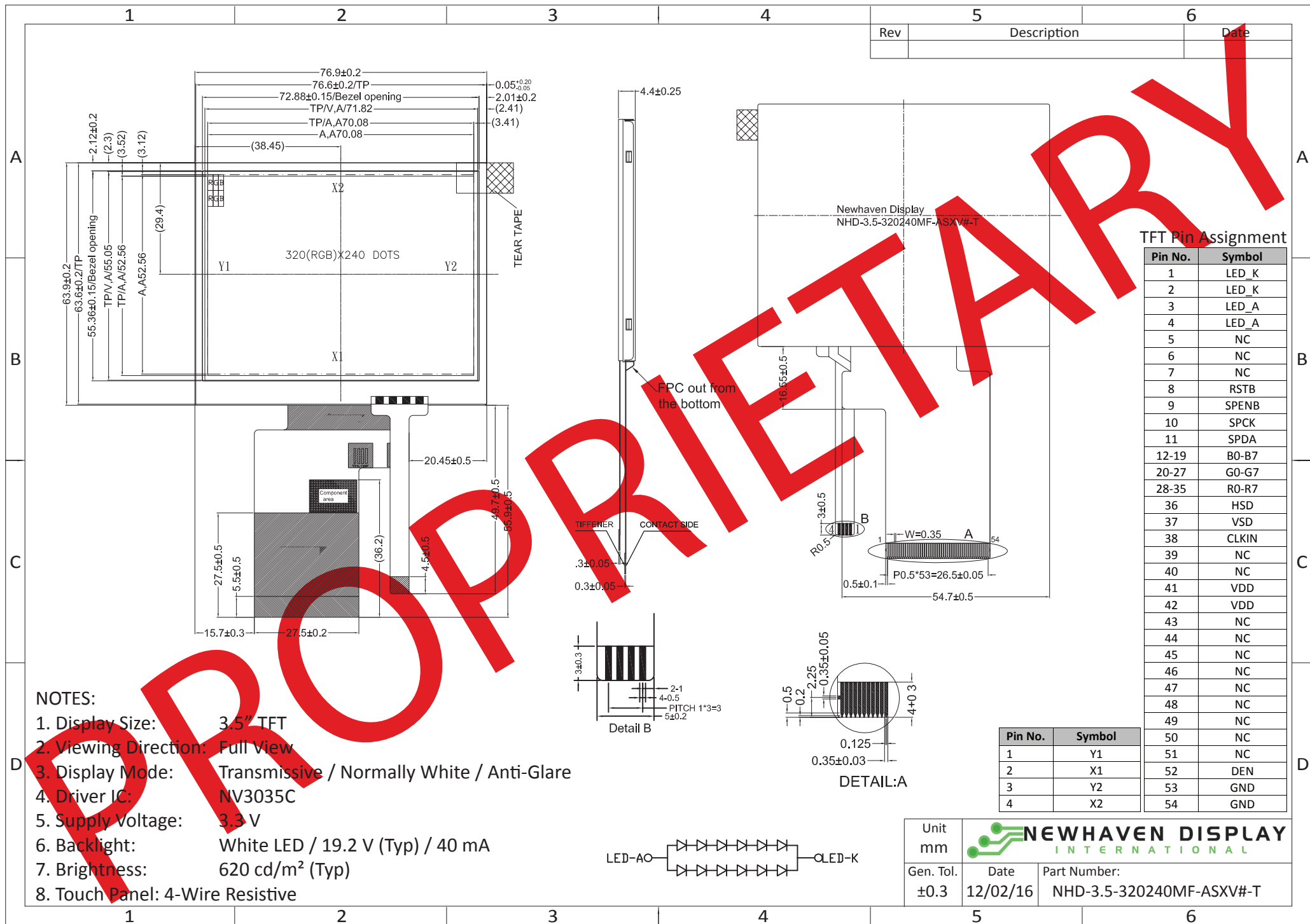
## Document Revision History

Revision	Date	Description	Changed by
0	4/29/16	Initial Release	SB
1	6/30/16	Added Chromaticity	SB
2	12/2/16	$I_{DD}$ , $I_{LED}$ , and Chromaticity Updated	SB

## Functions and Features

- 320xRGBx240 resolution
- LED backlight
- 24-bit Digital RGB interface (6.4MHz)
- 3.3V power supply
- With 4-Wire resistive Touch Panel
- Premium high brightness display
- Wide viewing angles

# Mechanical Drawing



**NOTES:**

1. Display Size: 3.5" TFT
2. Viewing Direction: Full View
3. Display Mode: Transmissive / Normally White / Anti-Glare
4. Driver IC: NV3035C
5. Supply Voltage: 3.3 V
6. Backlight: White LED / 19.2 V (Typ) / 40 mA
7. Brightness: 620 cd/m<sup>2</sup> (Typ)
8. Touch Panel: 4-Wire Resistive



## Pin Description

### LCD:

Pin No.	Symbol	External Connection	Function Description
1	LED_K	Power Supply	Backlight Cathode (Ground)
2	LED_K	Power Supply	Backlight Cathode (Ground)
3	LED_A	Power Supply	Backlight Anode (40mA @ 19.2V)
4	LED_A	Power Supply	Backlight Anode (40mA @ 19.2V)
5	NC	-	No Connect
6	NC	-	No Connect
7	NC	-	No Connect
8	RSTB	MPU	Active LOW Reset signal
9	SPENB	MPU	Active LOW Serial Chip Select signal
10	SPCK	MPU	Serial Clock signal
11	SPDA	MPU	Serial Data signal
12-19	B0-B7	MPU	Blue Data signals
20-27	G0-G7	MPU	Green Data signals
28-35	R0-R7	MPU	Red Data signals
36	HSD	MPU	Horizontal (Line) Sync signal
37	VSD	MPU	Vertical (Frame) Sync signal
38	CLKIN	MPU	Dot Clock signal
39-40	NC	-	No Connect
41	V <sub>DD</sub>	Power Supply	Supply Voltage for LCD and logic (3.3V)
42	V <sub>DD</sub>	Power Supply	Supply Voltage for LCD and logic (3.3V)
43-51	NC	-	No Connect
52	DEN	-	Data Enable signal (No Connect)
53-54	GND	Power Supply	Ground

**Recommended connector:** 54pin, 0.5mm pitch, FFC connector. Molex P/N 51296-5494

### Resistive Touch Panel:

Pin No.	Symbol	External Connection	Function Description
1	Y1	Touch Controller	Left
2	X1	Touch Controller	Down
3	Y2	Touch Controller	Right
4	X2	Touch Controller	Up

**Recommended connector:** 4pin, 1.0mm pitch, FFC connector. Molex P/N 52207-0485

## Driver Information

Built-in NV3035C driver. No controller.

Please download specification at [http://www.newhavendisplay.com/app\\_notes/NV3035C.pdf](http://www.newhavendisplay.com/app_notes/NV3035C.pdf)

Note: To achieve optimum VCOM and VGL settings, the SPI interface may be used to set the following registers:

ROEh = 6Bh

ROFh = 24h

## 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
Digital 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	5	10	20	mA
"H" Level input	V <sub>IH</sub>	-	0.8*V <sub>DD</sub>	-	V <sub>DD</sub>	V
"L" Level input	V <sub>IL</sub>	-	V <sub>SS</sub>	-	0.2*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 Voltage	V <sub>LED</sub>	-	17.4	19.2	19.8	V
Backlight Supply Current	I <sub>LED</sub>	V <sub>LED</sub> =19.2V	30	40	50	mA
Backlight Lifetime*	-	I <sub>LED</sub> = 40 mA T <sub>OP</sub> = 25° C	20,000	50,000	-	Hrs.

\*Backlight lifetime is rated as Hours until **half-brightness**, under normal operating conditions.

## Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Optimal Viewing Angles	Top	CR ≥ 10	-	70	-	°	
	Bottom		-	70	-	°	
	Left		-	70	-	°	
	Right		-	70	-	°	
Contrast Ratio	CR	-	200	350	-	-	
Luminance	L <sub>V</sub>	I <sub>LED</sub> = 40 mA	500	620	-	cd/m <sup>2</sup>	
Response Time	Rise	T <sub>OP</sub> = 25° C	-	25	40	ms	
	Fall		-	25	40	ms	
Chromaticity	Red	X <sub>R</sub>	-	0.555	0.605	0.655	-
		Y <sub>R</sub>	-	0.297	0.347	0.397	-
	Green	X <sub>G</sub>	-	0.266	0.316	0.366	-
		Y <sub>G</sub>	-	0.552	0.602	0.652	-
	Blue	X <sub>B</sub>	-	0.094	0.144	0.194	-
		Y <sub>B</sub>	-	0.062	0.112	0.162	-
White	X <sub>W</sub>	-	0.234	0.284	0.334	-	
	Y <sub>W</sub>	-	0.280	0.330	0.380	-	

## Touch Panel Characteristics

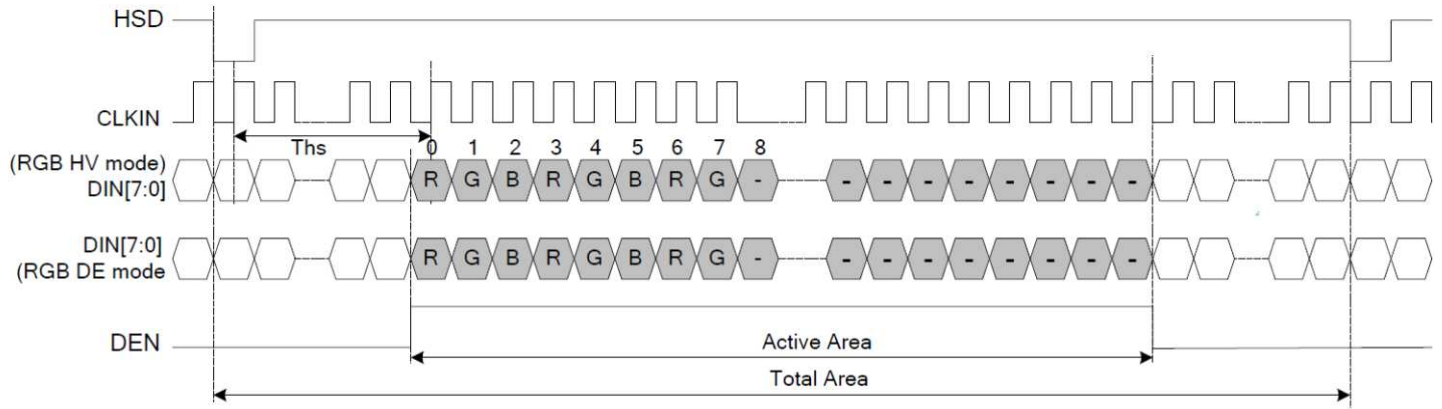
Item	Min.	Typ.	Max.	Unit
Linearity	-	-	1.5	%
Circuit Resistance – X-Axis	200	-	900	Ω
Circuit Resistance – Y-Axis	200	-	900	Ω
Insulation Resistance	20	-	-	MΩ
Operating Voltage	-	-	5	V
Chattering	-	-	10	Ms
Transmittance	75	-	-	%
Activation Force	70	-	120	g
Pen Writing Durability	100,000	-	-	Characters
Pitting Durability	1,000,000	-	-	Touches
Surface Hardness	3	-	-	H
Haze	-	7	-	%

## Timing Characteristics

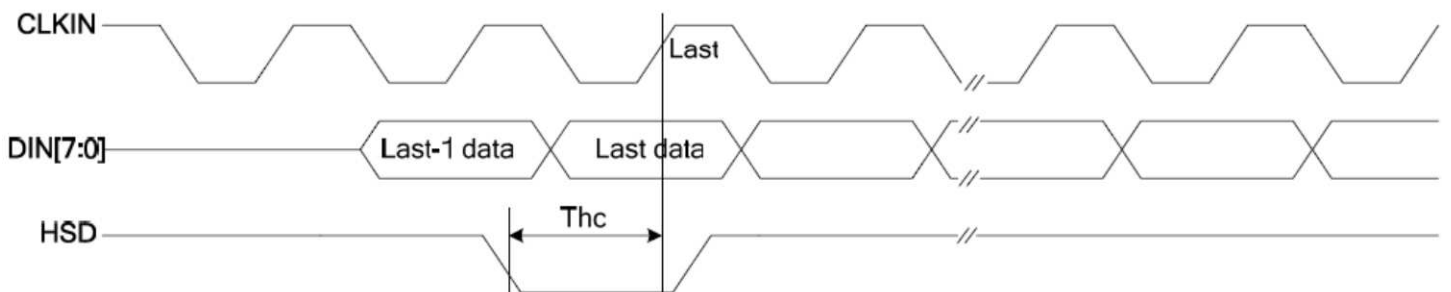
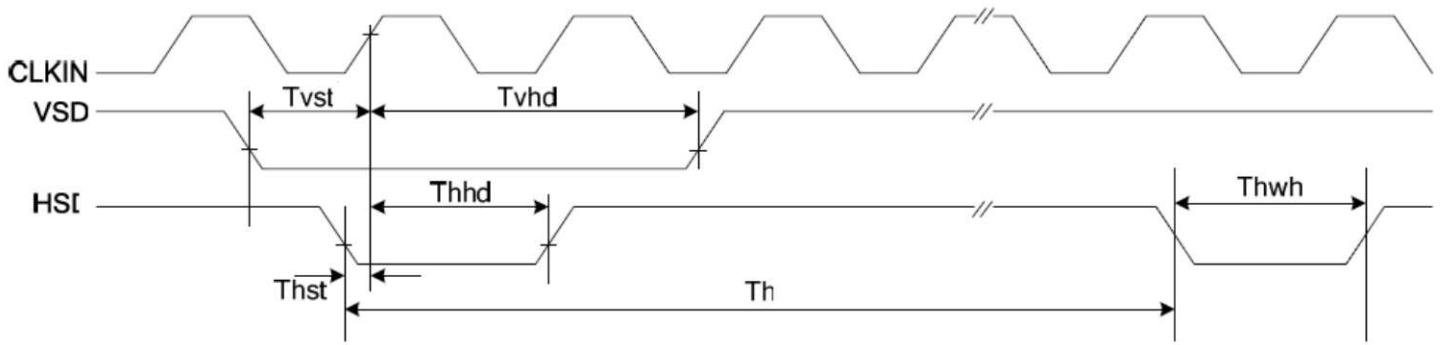
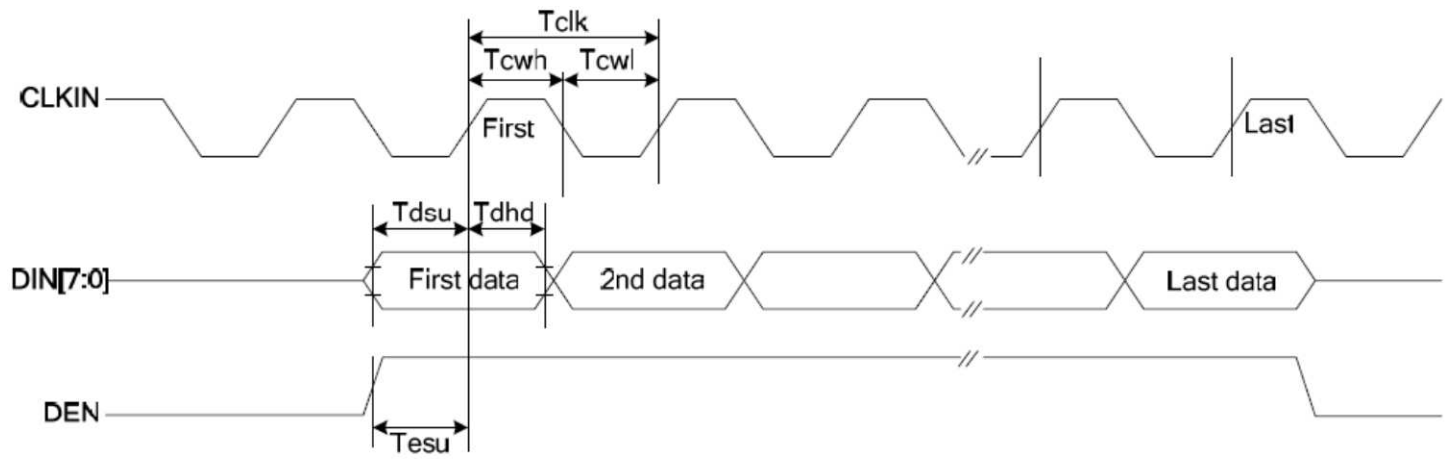
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
<b>System Operation Timing</b>						
VDD power source slew time	T <sub>POR</sub>			1000	us	From 0V to 90% VDD
RSTB active pulse width	T <sub>RSTB</sub>	40			us	VDD=3.3V
<b>Input Output Timing</b>						
CLKIN clock time	T <sub>clk</sub>	-		35.7	ns	Please refer to timing table(P25)
HSD to CLKIN	T <sub>hc</sub>	-	-	1	CLKIN	
HSD width	T <sub>hwh</sub>	1	-	-	CLKIN	
VSD width	T <sub>vwh</sub>	1	-	-	Th	
HSD period time	T <sub>h</sub>	60	63.56	67	us	
VSD setup time	T <sub>vst</sub>	12	-	-	ns	
VSD hold time	T <sub>vhd</sub>	12	-	-	ns	
HSD setup time	T <sub>hst</sub>	12	-	-	ns	
HSD hold time	T <sub>hhd</sub>	12	-	-	ns	
Data set-up time	T <sub>dsu</sub>	12	-	-	ns	DIN[23:0] to CLKIN
Data hold time	T <sub>dhd</sub>	12	-	-	ns	DIN[23:0] to CLKIN
DEN setup time	T <sub>esd</sub>	12	-	-	ns	DEN to CLKIN
Time that VSD to 1 <sup>st</sup> line data input	T <sub>vs</sub>	2	13	127	Th	@CIR601/8bit RGB HV mode Control by HDLY[6:0] setting T <sub>vs</sub> =HDLY[6:0]
Time that CCIR_V to 1 <sup>st</sup> line data input	T <sub>vs</sub>	12	20	28	Th	@CCIR656 NTSC mode Control by HDLY[6:0] setting T <sub>vs</sub> =HDLY[6:0]
Time that CCIR_V to 1 <sup>st</sup> line data input	T <sub>vs</sub>	17	25	33	Th	@CCIR656 PAL mode Control by HDLY[6:0] setting T <sub>vs</sub> =HDLY[6:0]
Time that VSD to 1 <sup>st</sup> line data input	T <sub>vs</sub>	2	13	127	Th	@24bit RGB HV mode Control by HDLY[6:0] setting T <sub>vs</sub> =HDLY[6:0]
Source output stable time 1	T <sub>st</sub>	-	25	30	us	96% final, CL=30pF, RL=2K
Gate output stable time	T <sub>gst</sub>	-	500	1000	ns	96% final, CL=40pF
VCOMOUT output stable time	T <sub>est</sub>	-	4	8	us	96% final, CL=33nF, RL=100ohm
<b>3-wire serial communication AC timing</b>						
Serial clock	T <sub>spck</sub>	320	-	-	ns	
SPCK pulse duty	T <sub>scdut</sub>	40	50	60	%	T <sub>ckh</sub> /T <sub>spck</sub>
Serial data setup time	T <sub>isu</sub>	120	-	-	ns	
Serial data hold time	T <sub>ihd</sub>	120	-	-	ns	
Serial clock high/low	T <sub>ssw</sub>	120	-	-	ns	
Chip select distinguish	T <sub>cd</sub>	1	-	-	us	
SPENA to VSD	T <sub>cv</sub>	1	-	-	us	
SPENB input setup time	T <sub>eck</sub>	150	-	-	Ns	
SPENB input hold time	T <sub>cke</sub>	150	-	-	ns	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLKIN frequency	F <sub>clk</sub>	6.1	6.4	8.0	MHz	VDD=3.0~3.6V
CLKIN cycle time	T <sub>clk</sub>	125	156	164	ns	
CLKIN pulse duty	T <sub>cwh</sub>	40	50	60	%	T <sub>clk</sub>
Time that HSD to 1 <sup>st</sup> data input(NTSC)	T <sub>hs</sub>	40	70	255	CLKIN	DDLY=70,Offset=0(fixed)

## Input Data Format

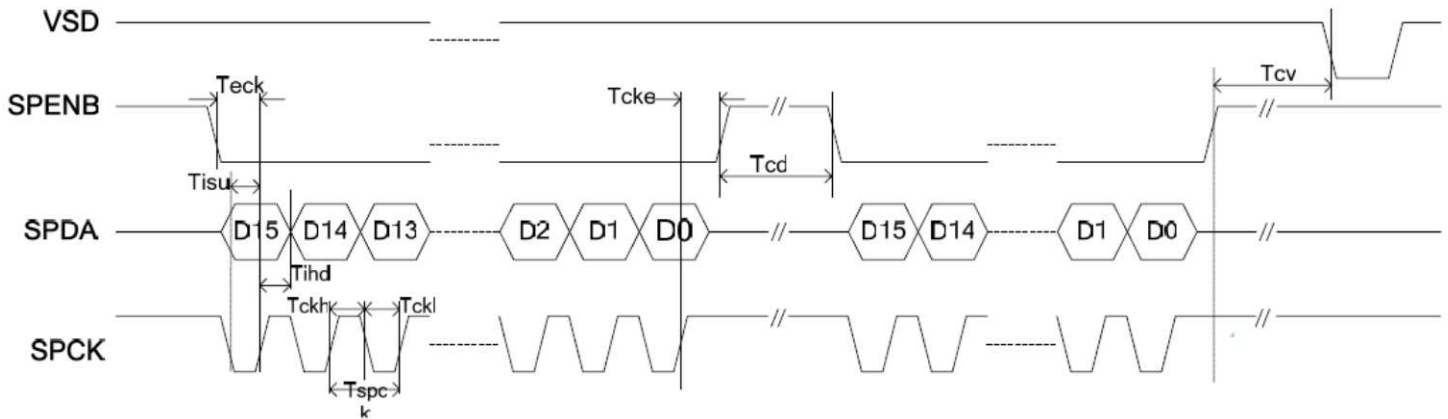


## Clock and Data Input Timing Diagram

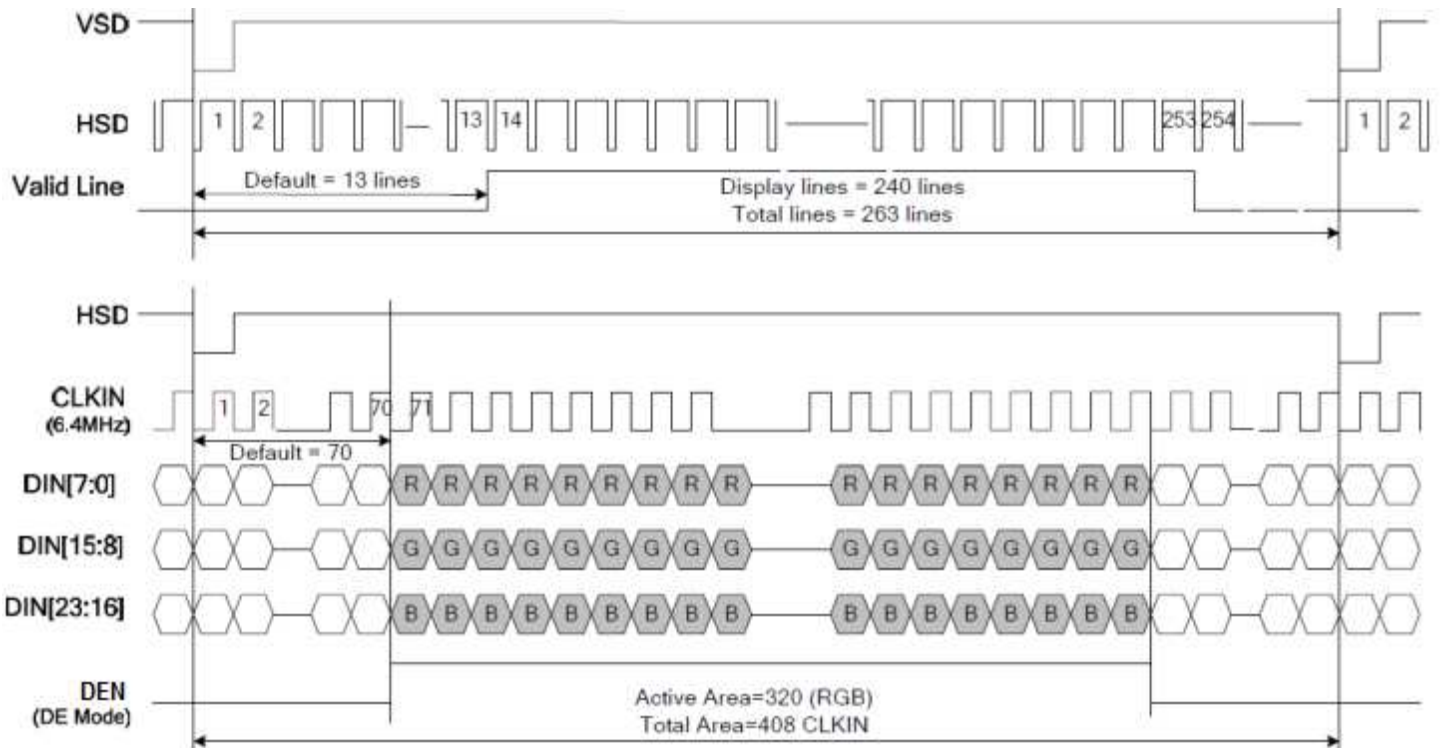




### 3-wire Timing Diagram



### Input Data Timing



## Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+70°C , 240hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-20°C , 240hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+60°C , 240hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-10°C , 240hrs	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 , 160hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-20°C,30min -> 25°C,5min -> 70°C,30min = 1 cycle 100 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz , 15mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	VS=4KV, RS=330kΩ, CS=150pF Five 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.newhavendisply.com/specs/precautions.pdf](http://www.newhavendisply.com/specs/precautions.pdf)

## Warranty Information and Terms & Conditions

[http://www.newhavendisply.com/index.php?main\\_page=terms](http://www.newhavendisply.com/index.php?main_page=terms)