

# NHD-3.5-320240MF-ATXL#-T-1

## 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
T-	White LED backlight
X-	TFT
L-	12:00 view, Wide Temp
#-	<b>RoHS Compliant</b>
T-1	Touch Panel

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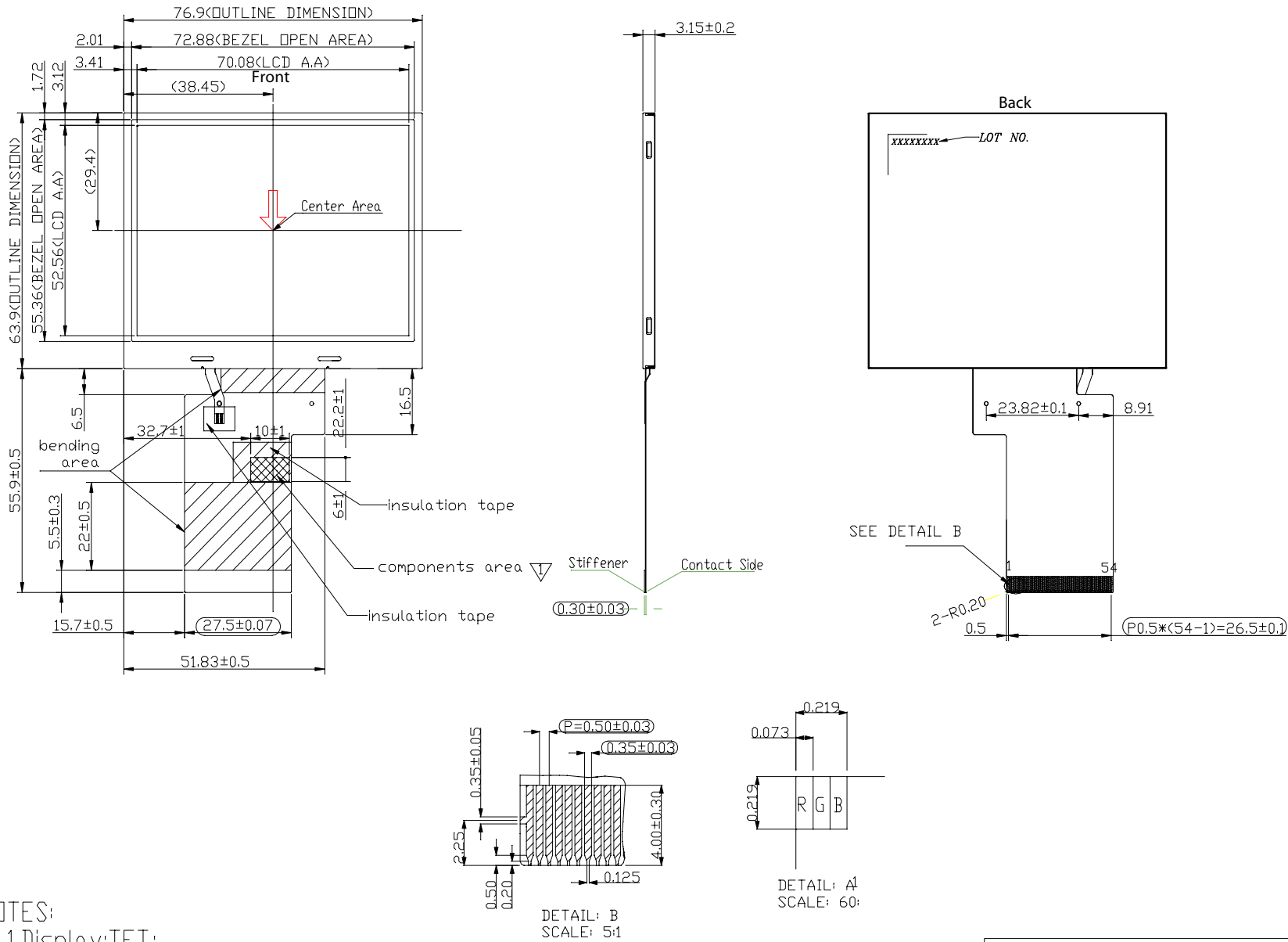
## Document Revision History

Revision	Date	Description	Changed by
0	7/8/2009	Initial Release	CL
1	7/29/2009	MECHANICAL DRAWING UPDATE	CL
2	5/27/2010	Touch Panel Characteristics Updated	BE
3	1/25/2011	Viewing angle updated	AK
4	1/26/2011	Mechanical Drawing updated	AK
5	3/31/2011	Pin description / Note updated	AK
6	4/8/2011	Contrast removed from electrical characteristics	BE
7	11/29/2011	Electrical characteristics updated	AK

## Functions and Features

- 320xRGBx240 resolution
- LED backlight
- 24-bit Digital RGB interface (6.5MHz)
- 3.3V power supply
- With 4-Wire resistive Touch Panel

# Mechanical Drawing



NO.	PIN NAME
1	LED Cathode
2	LED Cathode
3	LED Anode
4	LED Anode
5	NC
6	NC
7	NC
8	RESET
9	SPENA
10	SPCK
11	SPDA
12	D01
13	D02
14	D03
15	D04
16	D05
17	D06
18	D07
19	D08
20	D09
21	D10
22	D11
23	D12
24	D13
25	D14
26	D15
27	D16
28	D17
29	D18
30	D19
31	D20
32	D21
33	D22
34	D23
35	D24
36	HSYNC
37	VSYNC
38	DOTCLK
39	NC
40	NC
41	VDD
42	VDD
43	NC
44	NC
45	NC
46	NC
47	NC
48	NC
49	NC
50	NC
51	NC
52	DEN
53	GND
54	GND

## NOTES:

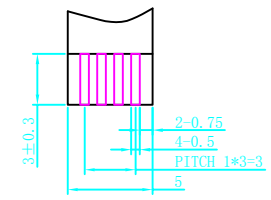
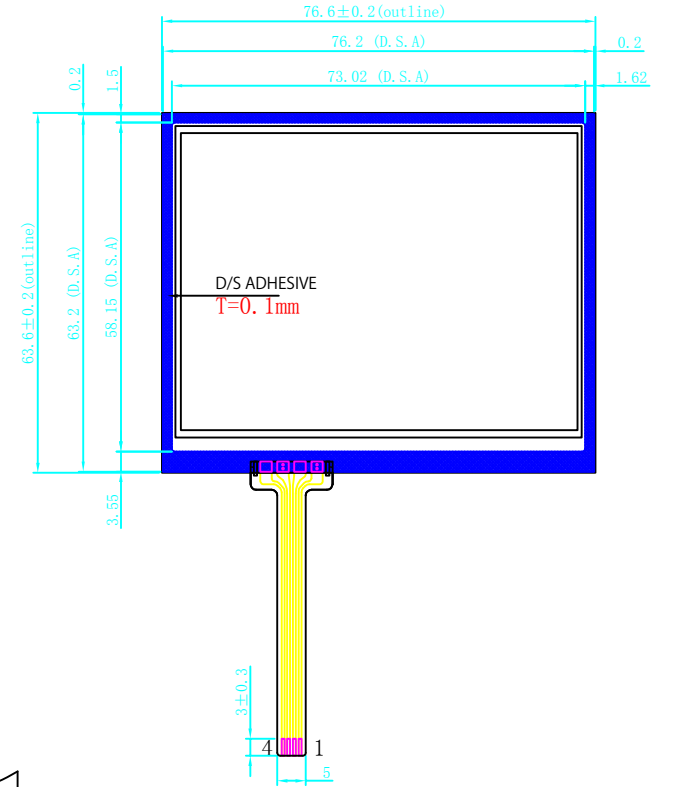
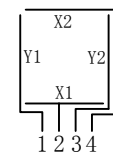
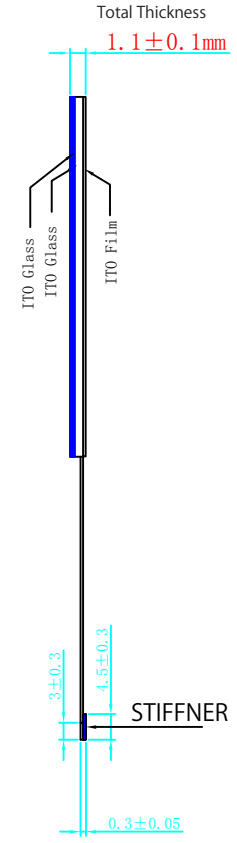
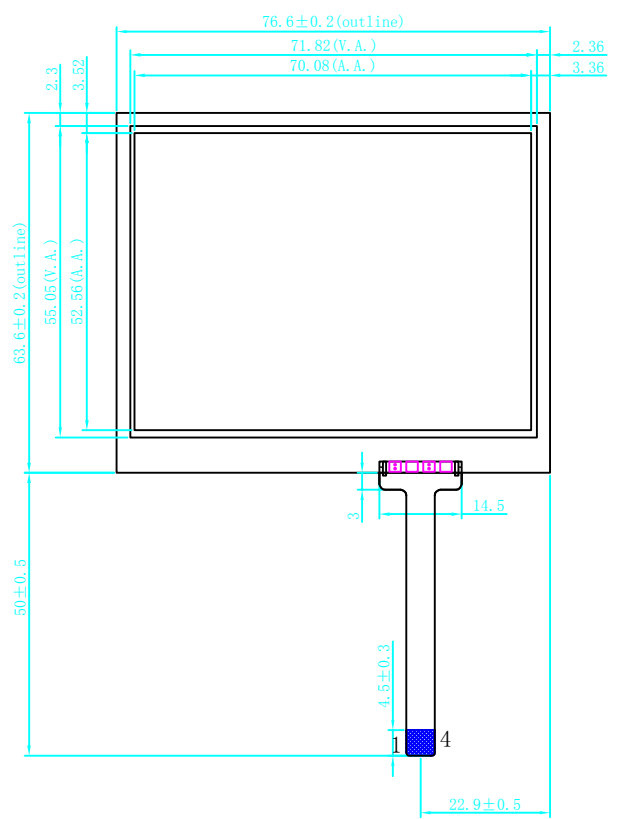
1. Display: TFT;
2. Viewing Direction: 12:00;
3. General Tolerance: ±0.20;
4. IC: NT39016D

Newhaven Display

NHD-3.5-320240MF-ATXL#-T-1

# Touch Panel Mechanical Drawing

RevNo	Revision note	Date	Signature	Checked
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FPC DETAIL (1:3)

- GLASS THICKNESS: 0.7mm
- Operating Temperature:  $-10^{\circ}\text{C} \sim +60^{\circ}$ , Storage Temperature:  $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$
- Linearity:  $\leq \pm 5\%$
- Transmittance:  $>75\%$
- Circuit Resistance: X:200~900  $\Omega$ , Y:200~900  $\Omega$
- Surface Hardness:  $\geq 3\text{H}$
- Durability:  $>1,000,000$  Touches
- RoHS

THIRD ANGLE PROJECTION		Dimensions	Scale	Newhaven Display International
		mm	1:1	
NAME		DATE		
APPROVE		2010.03.31		
CHECK		2010.03.31		
DESIGN		2010.03.30		
DRAWN		2010.03.30		
Dwg Name			Dwg No.	TSTFT3.5Z
Touch Panel				
Customer Name			Customer No.	

## Pin Description

Pin No.	Symbol	External Connection	Function Description
1	LED-	Power Supply	Cathode for LED backlight
2	LED-	Power Supply	Cathode for LED backlight
3	LED+	Power Supply	Anode for LED backlight (19.2V @ 20mA)
4	LED+	Power Supply	Anode for LED backlight (19.2V @ 20mA)
5	NC	NC	No Connect
6	NC	NC	No Connect
7	NC	NC	No Connect
8	/RESET	MPU	Reset – active low
9	CS	MPU	Serial interface chip select
10	SCL	MPU	Serial interface clock
11	SDI	MPU	Serial interface data
12-19	DB0-DB7	MPU	Blue signal data bus
20-27	DB8-DB15	MPU	Green signal data bus
28-35	DB16-DB23	MPU	Red signal data bus
36	HSYNC	MPU	Horizontal sync signal
37	VSYNC	MPU	Vertical sync signal
38	DCLK	MPU	Dot clock signal
39	NC	NC	No Connect
40	NC	NC	No Connect
41	VDD	Power Supply	Power for LCD and logic (3.3V)
42	VDD	Power Supply	Power for LCD and logic (3.3V)
43	NC	NC	No Connect
44	NC	NC	No Connect
45	ID	NC	No Connect
46	NC	NC	No Connect
47	NC	NC	No Connect
48	NC	NC	No Connect
49	NC	NC	No Connect
50	NC	NC	No Connect
51	NC	NC	No Connect
52	DE	NC	Data Enable signal
53	GND	Power Supply	Ground
54	GND	Power Supply	Ground

**Recommended LCD connector:** 0.5mm pitch, 54 conductor – Molex 51296-5494

**Backlight connector:** on LCD connector, **Mates with:** ---

## Touch Panel Pin Description

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 Touch panel connector:** 1.0mm pitch, 4 conductor – Molex 52207-0485

## Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-10	25	+60	°C
Storage Temperature Range	Tst	Absolute Max	-20	25	+70	°C
Digital Supply Voltage	VDD		3.0	3.3	3.6	V
Supply Current	IDD	VDD=3.3V		8.6		mA
"H" Level input	Vih		0.7VCC		VCC	V
"L" Level input	Vil		0		0.3VCC	V
"H" Level output	Voh		0.7VCC		VCC	V
"L" Level output	Vol		0		0.3VCC	V
Backlight Supply Voltage	Vled		18.6	19.2	21	V
Backlight Supply Current	Iled	Vled=19.2V		20	25	mA
Brightness			240	300		cd/m2

## Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle – Top	VA	Cr ≥ 10	-	60	-	°
Viewing Angle - Bottom	VA	Cr ≥ 10	-	40	-	°
Viewing Angle – Left	VH	Cr ≥ 10	-	60	-	°
Viewing Angle – Right	VH	Cr ≥ 10	-	60	-	°
Contrast Ratio	Cr	3.3V, 25°C	-	350	-	
Response Time (rise)	Tr		-	10	-	ms
Response Time (fall)	Tf		-	15	-	ms

## Touch Panel Characteristics

Item	Symbol	Condition	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		%

# Driver Information

Built-in NT39016D driver; no controller.

See specification at [http://www.newhavendisplay.com/app\\_notes/NT39016D.pdf](http://www.newhavendisplay.com/app_notes/NT39016D.pdf)

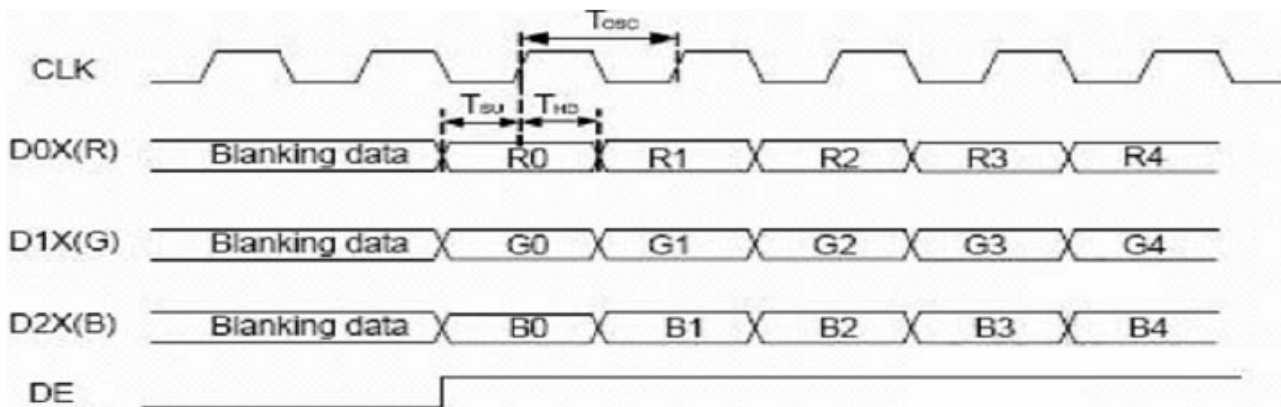
Note: To achieve optimum VCOM and VGL settings, the SPI interface may be used to set the following registers:

R0Eh = 6Bh

R0Fh = 24h

## Digital Parallel RGB interface

Signal	Item	Symbol	Min	Typ	Max	Unit
Dclk	Frequency	Tosc	-	156	-	ns
	High Time	Tch	-	78	-	ns
	Low Time	Tcl	-	78	-	ns
Data	Setup Time	Tsu	12	-	-	ns
	Hold Time	Thd	12	-	-	ns
Hsync	Period	TH	-	408	-	Tosc
	Pulse Width	THS	5	30	-	Tosc
	Back-Porch	Thb	-	38	-	Tosc
	Display Period	TEP	-	320	-	Tosc
	Hsync-den time	THE	36	68	88	
	Front-Porch	Thf	-	20	-	Tosc
Vsync	Period	Tv	-	262	-	TH
	Pulse Width	Tvs	1	3	5	TH
	Back-Porch	Tvb	-	15	-	TH
	Display Period	Tvd	-	240	-	TH
	Front-Porch	Tvf	2	4	-	TH



## 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.newhavendisplay.com/specs/precautions.pdf](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information and Terms & Conditions

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