

NHD-3.5-320240MF-20 Test Board

TFT Controller Evaluation Board

NHD-	Newhaven Display
3.5-	3.5" Diagonal
320240-	320xRGBx240 pixels
MF-	Model
20-	20-POS FFC interface (8-bit data) SSD1963 Controller

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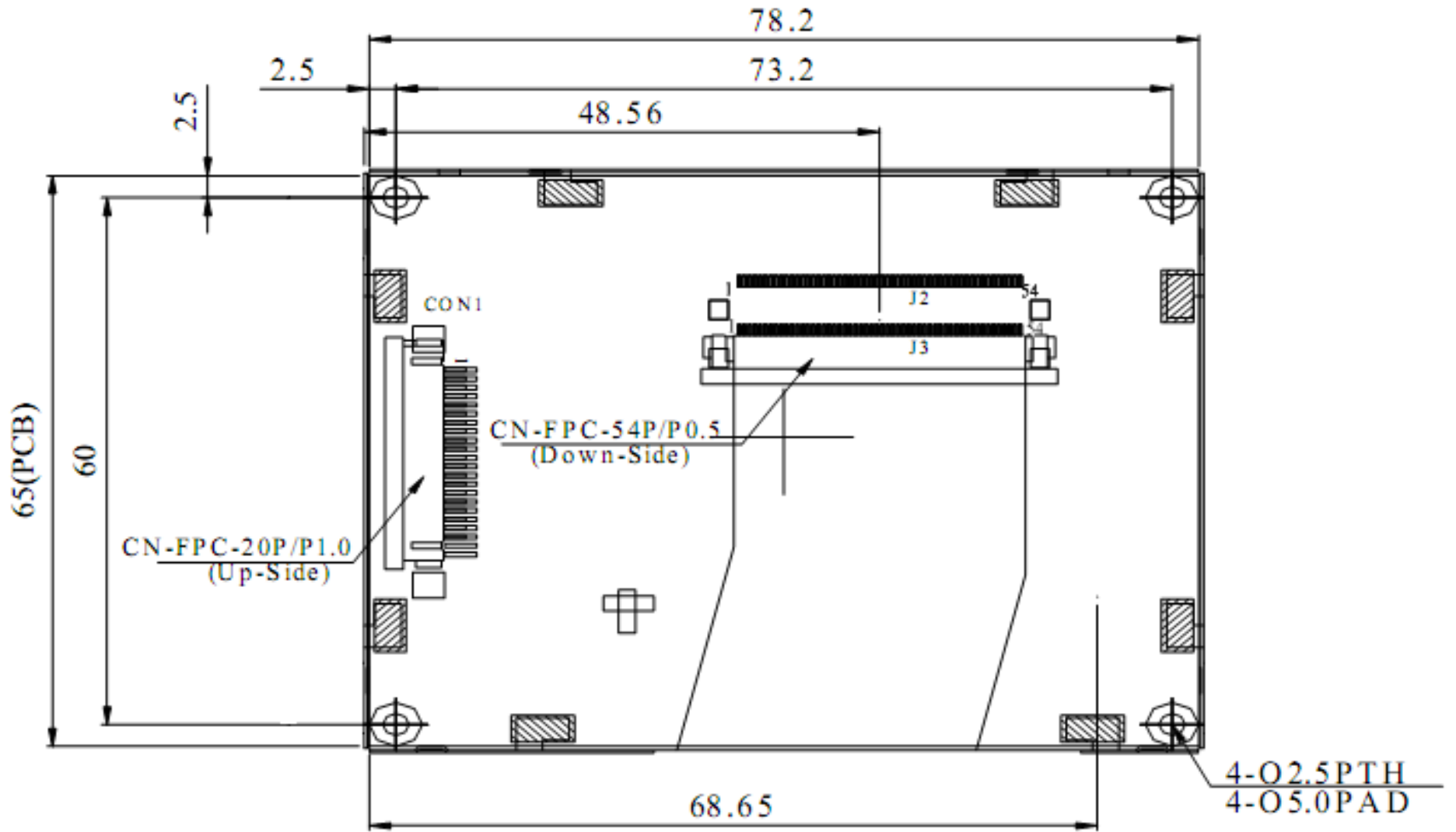
Document Revision History

Revision	Date	Description	Changed by
0	5/14/2007	Initial Release	CL

Functions and Features

- To use for testing, evaluating, or in final production with NHD-3.5-320240MF-A displays.

Mechanical Drawing NHD-3.5-320240MF Test Board



Note: CON1 has a 20-pos FFC connector assembled, pins 21,22 not connected.

Pin Description: CON1 (SSD1963 input from user's MPU)

Pin No.	Symbol	External Connection	Function Description
1	GND	Power Supply	GND
2	VCC	Power Supply	Power supply for LCD and logic (3.3V)
3	B/L Enable	Power Supply	Backlight Enable
4	RS	MPU	Register Select. RS=1: Command, RS=0: Data
5	WR	MPU	8080 MPU Write Signal active LOW
6	RD	MPU	8080 MPU Read Signal active LOW
7-14	DB0-DB7	MPU	8-bit bidirectional data bus
15	CS	MPU	Active LOW Chip Select signal
16	REST	MPU	Active LOW Reset signal
17	NC	-	No Connect
18	FGND	Power Supply	Frame Ground
19	NC	-	No Connect
20	NC	-	No Connect

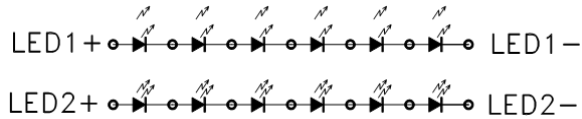
Pin Description: J2,J3 (SSD1963 output to display panel)

Pin No.	Symbol	External Connection	Function Description
1-2	LED-	LED Power Supply	Backlight GND
3-4	LED+	LED Power Supply	Backlight Power (32mA @ 20~22V)
5-6	NC	-	No Connect
7	POL	Output	Polarity signal to monitor VCOM signal
8	RESET	MPU	Active LOW Reset
9	CS	MPU	Active LOW Chip Select
10	SCL	MPU	Serial Clock (No Connect)
11	SDI	MPU	Serial Data In (No Connect)
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	HSYNC	MPU	Line synchronization signal
37	VSYNC	MPU	Frame synchronization signal
38	DCLK	MPU	Dot clock signal
39-40	NC	-	No Connect
41-42	VCC	Power Supply	Power supply for LCD and logic (3.3V)
43-44	NC	-	No Connect
45	ID	-	No Connect
46	SLEEP	MPU	Sleep mode select: 1=Sleep, 0=Normal Operation
47-51	NC	-	No Connect
52	DE	MPU	Data Enable (No Connect)
53-54	GND	Power Supply	GND

Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	°C
Storage Temperature Range	Tst	Absolute Max	-30	-	+80	°C
Supply Voltage	VDD		3.0	3.3	3.6	V
Digital Operating Current	IDD		-	8.6	-	mA
Input High Voltage	VIH		0.8*VDD	-	VDD	V
Input Low Voltage	VIL		0	-	0.2*VDD	V
Backlight Current	I _{LED}		-	20	25	mA
Power Consumption	P _{LED}		-	400	420	mW
Backlight Voltage	V _{LED}	I _{LED} =20mA	18.6	19.2	21	V
LED Lifetime		I _{LED} =20mA	50,000	-	-	Hr

Backlight diagram:



Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle – Top		Cr ≥ 10	-	40	-	°
Viewing Angle – Bottom		Cr ≥ 10	-	60	-	°
Viewing Angle – Left		Cr ≥ 10	-	60	-	°
Viewing Angle – Right		Cr ≥ 10	-	60	-	°
Contrast Ratio	Cr		-	350	-	
Luminance	YL		240	300	-	cd/m ²
Response Time (rise)	Tr	-	-	10	-	ms
Response Time (fall)	Tf	-	-	15	-	ms

Controller Information

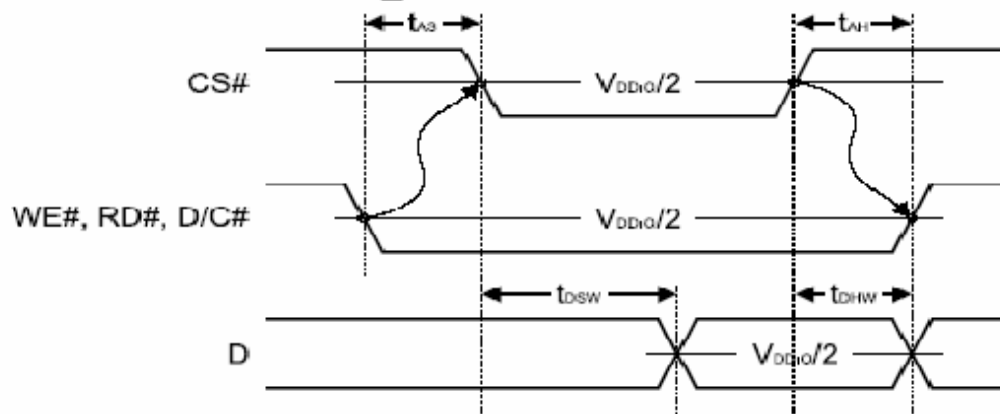
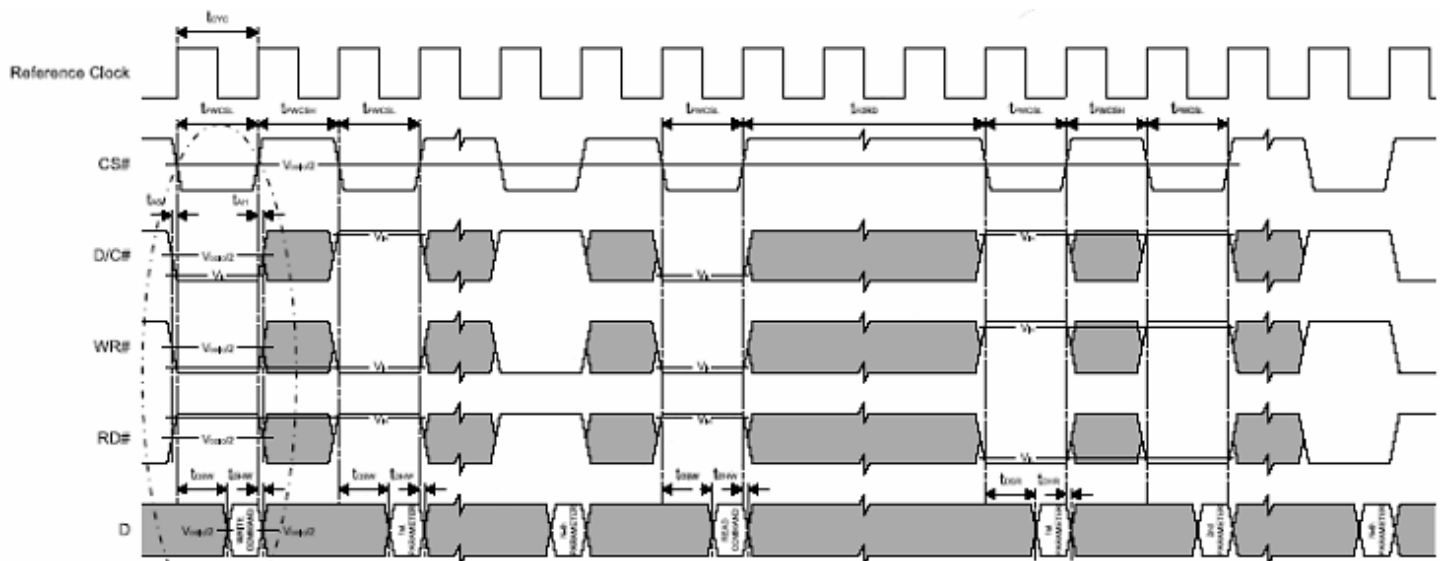
Built-in SSD1963

For specific timing and color information, please download specification at

http://www.newhavendisplay.com/app_notes/SSD1963.pdf

8080 Mode Timing:

Symbol	Parameter	Min	Typ	Max	Unit
t _{cy}	Reference Clock Cycle Time	9	-	-	ns
t _{PWCSL}	Pulse width CS# low	1	-	-	t _{CYC}
t _{PWCSH}	Pulse width CS# high	1	-	-	t _{CYC}
t _{FDRD}	First Read Data Delay	5	-	-	t _{CYC}
t _{AS}	Address Setup Time	1	-	-	ns
t _{AH}	Address Hold Time	1	-	-	ns
t _{DSW}	Data Setup Time	4	-	-	ns
t _{DHW}	Data Hold Time	1	-	-	ns
t _{DSR}	Data Access Time	-	-	5	ns
t _{DHR}	Output Hold time	1	-	-	ns



Pixel Data Format

Both 6800 and 8080 support 8-bit, 9-bit, 16-bit, 18-bit and 24-bit data bus. Depending on the width of the data bus, the display data are packed into the data bus in different ways.

Pixel Data Format :

Interface	Cycle	D[23]	D[22]	D[21]	D[20]	D[19]	D[18]	D[17]	D[16]	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
24 bits	1 st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
18 bits	1 st							R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
16 bits (565 format)	1 st									R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1 st									R5	R4	R3	R2	R1	R0	X	X	G5	G4	G3	G2	G1	G0	X	X
	2 nd									B5	B4	B3	B2	B1	B0	X	X	R5	R4	R3	R2	R1	R0	X	X
	3 rd									G5	G4	G3	G2	G1	G0	X	X	B5	B4	B3	B2	B1	B0	X	X
9 bits	1 st																R5	R4	R3	R2	R1	R0	G5	G4	G3
	2 nd																G2	G1	G0	B5	B4	B3	B2	B1	B0
8 bits	1 st																	R5	R4	R3	R2	R1	R0	X	X
	2 nd																	G5	G4	G3	G2	G1	G0	X	X
	3 rd																	B5	B4	B3	B2	B1	B0	X	X

X: Don't Care

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 , 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C 200hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 200hrs	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.	+60°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,30min -> 25°C,5min -> 70°C,30min = 1 cycle 10 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=800V, RS=1.5kΩ, CS=100pF One time	

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