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NHD-320240WG-ATMI-TZ#

Graphic Liquid Crystal Display Module

NHD-   Newhaven Display
320240-   320 x 240 pixels
WG-   Display Type: Graphic
A-   Model
T-   White LED Backlight
M-   STN-Blue (-)
I-   Transmissive, 6:00 Optimal View, Wide Temperature
TZ#-   Built-in Negative Voltage and Temperature Compensation
            RoHS Compliant

Newhaven Display International, Inc.
2661 Galvin Ct.
Elgin IL, 60124
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www.newhavendisplay.com
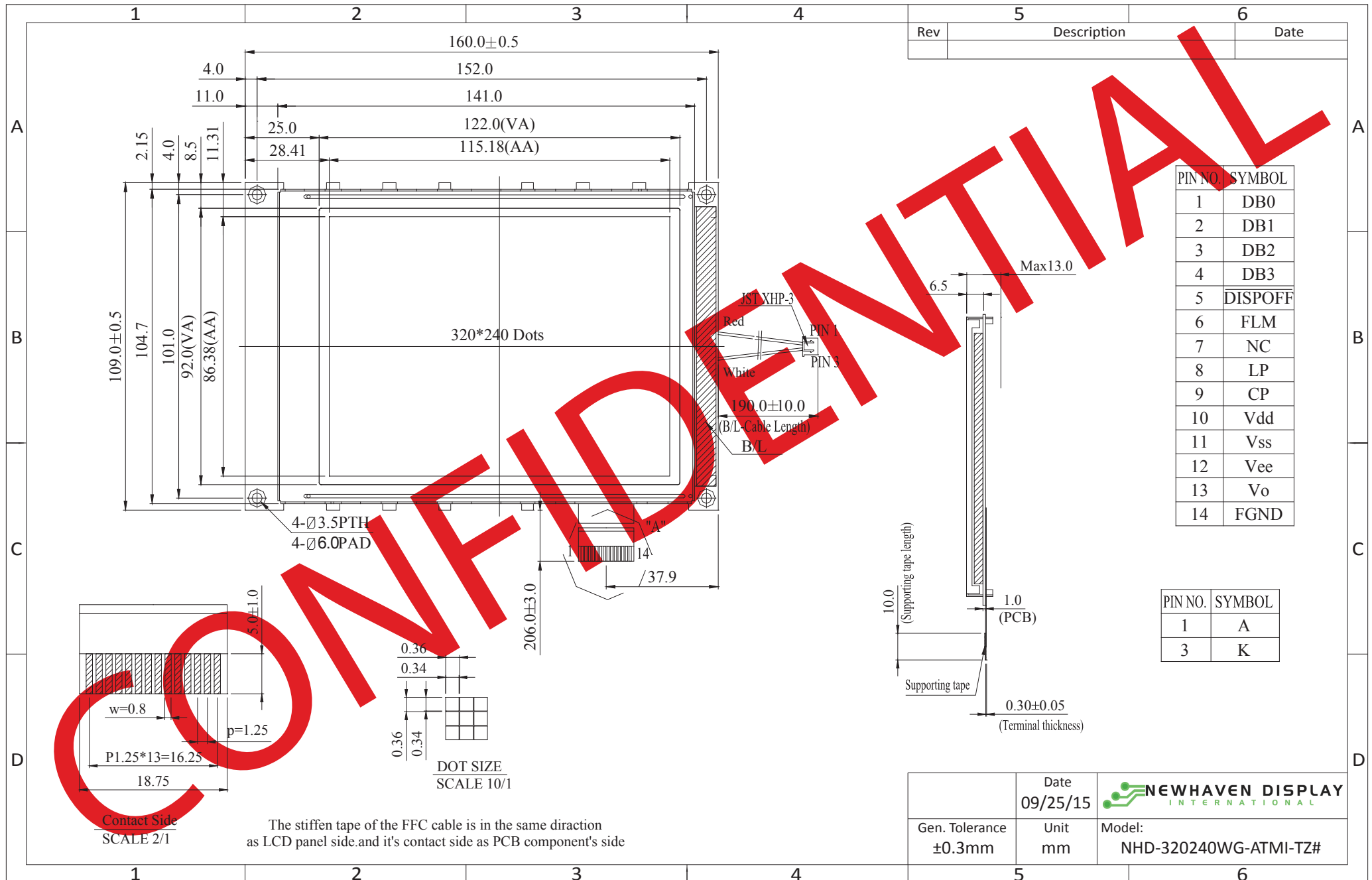**nhtech@newhavendisplay.com   nhsales@newhavendisplay.com**

Document Revision History

Revision	Date	Description	Changed by
0	9/25/15	Initial Release	SB

Functions and Features

- **320 x 240 pixels**
- **Built-in Negative Voltage**
- **No Controller**
- **NT7086 Driver**
- **+5.0V power supply**
- **RoHS Compliant**
- **Built-in Temperature Compensation Circuit**

Mechanical Drawing

160.0±0.5
152.0
141.0
122.0(VA)
115.18(AA)
4.0
11.0
25.0
28.41
2.15
4.0
8.5
11.31

109.0±0.5
104.7
101.0
92.0(VA)
86.38(AA)

320*240 Dots

Max13.0
6.5

JST XHP-3
Red
PIN 1
White
PIN 3
190.0±10.0
(B/L Cable Length)
B/L

4-Ø3.5PTH
4-Ø6.0PAD

1   14
"A"
37.9
206.0±3.0

10.0 (Supporting tape length)

1.0 (PCB)

Supporting tape

0.30±0.05
(Terminal thickness)

PIN NO.	SYMBOL
1	DB0
2	DB1
3	DB2
4	DB3
5	DISPOFF
6	FLM
7	NC
8	LP
9	CP
10	Vdd
11	Vss
12	Vee
13	Vo
14	FGND

PIN NO.	SYMBOL
1	A
3	K

5.0±1.0
0.36
0.34
0.36
0.34

DOT SIZE
SCALE 10/1

w=0.8
p=1.25
P1.25*13=16.25
18.75

Contact Side
SCALE 2/1

The stiffen tape of the FFC cable is in the same diraction
as LCD panel side.and it's contact side as PCB component's side

Rev	Description	Date

	Date 09/25/15	NEWHAVEN DISPLAY INTERNATIONAL
Gen. Tolerance ±0.3mm	Unit mm	Model: NHD-320240WG-ATMI-TZ#

[3]

Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1-4	DB0-DB3	MPU	Signal data bus
5	DISP OFF	MPU	Display On/Off
6	FLM	MPU	Scan Start-up signal
7	M	-	No Connect
8	LP	MPU	Data latch pulse
9	CP	MPU	Data shift pulse
10	VDD	Power Supply	Supply voltage for logic (+5.0V)
11	VSS	Power Supply	Ground
12	VEE	Power Supply	Negative voltage output (-25V)
13	V0	Adj. Power Supply	Supply voltage for contrast (approx. -18.6V)
14	FGND	-	No Connect
A	LED +	Power Supply	Backlight Anode (+3.5V)
K	LED -	Power Supply	Backlight Cathode (Ground)

Recommended LCD connector: 1.25mm pitch, 14-pos FFC connector   **Mates with**: Molex p/n 0039532144
Backlight connector: JST p/n: XHP-3   **Mates with**: JST p/n: B 3B-XH-A
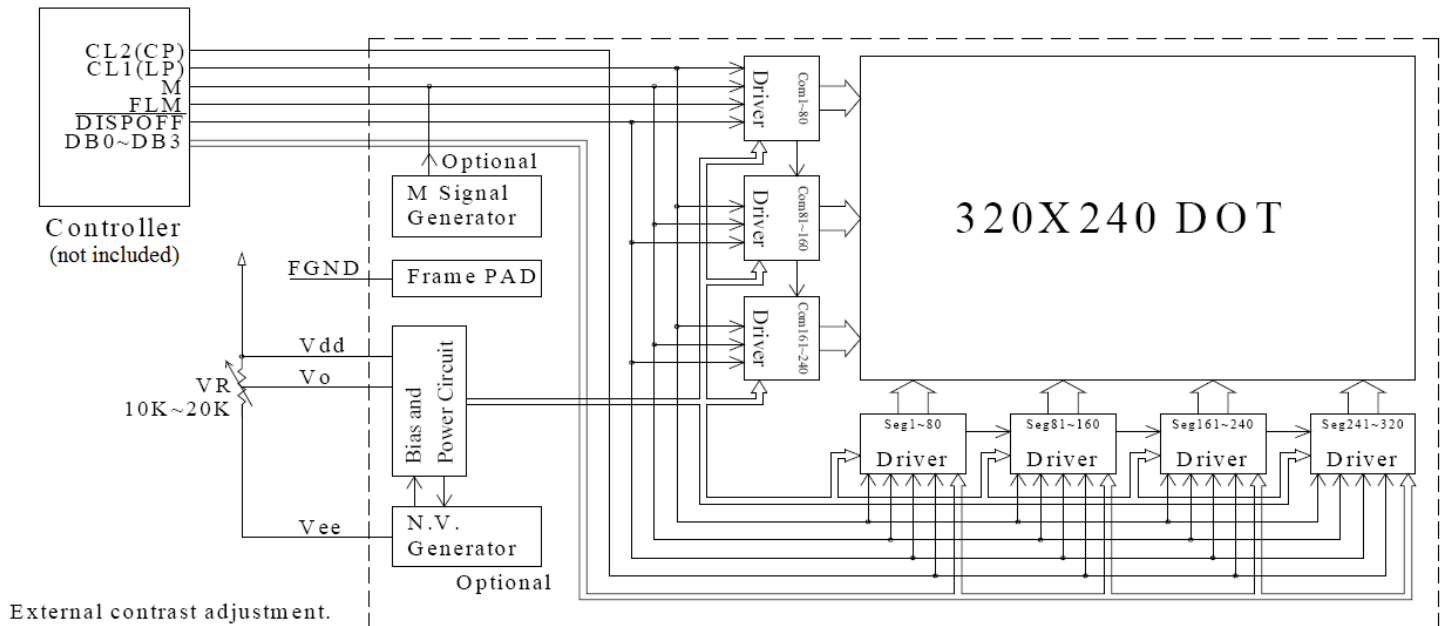
Electrical Characteristics

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		2.7	5.0	5.5	V
Supply Current	IDD	Ta=25°C, VDD=5.0V	60	75	80	mA
Supply for LCD (contrast)	VDD-V0	Ta=25°C	23	23.6	24.2	V
"H" Level input	VIH		0.8*VDD	-	VDD	V
"L" Level input	VIL	-	0	-	0.2*VDD	V
"H" Level output	VOH	-	VDD-0.4	-	VDD	V
"L" Level output	VOL	-	-	-	0.4	V
Backlight Supply Voltage	VLED		3.4	3.5	3.6	V
Backlight Supply Current	ILED	VLED=3.5V	-	128	160	mA

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle – Top			-	20	-	°
Viewing Angle – Bottom		Cr ≥ 2	-	40	-	°
Viewing Angle – Left			-	30	-	°
Viewing Angle – Right			-	30	-	°
Contrast Ratio	Cr		-	3	-	
Response Time (rise)	Tr	-	-	200	300	ms
Response Time (fall)	Tf	-	-	250	350	ms

Driver Information

Built-in NT7086 driver.
Please download specification at http://www.newhavendisplay.com/app_notes/NT7086.pdf

Timing Characteristics

(1) Segment Driver Application

Characteristic	Symbol	Test condition	(1) VDD=5V±10%			(2) VDD=3V±10%			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Clock cycle time	t_{CY}	Duty=50%	125	-	-	250	-	-	ns
Clock pulse width	t_{WCK}	-	45	-	-	95	-	-	
Clock rise/ fall time	t_R / t_F	-	-	-	-	-	-	30	
Data set-up time	t_{DS}	-	30	-		65	-	-	
Data hold time	t_{DH}	-	30	-		65	-	-	
Clock set-up time	t_{CS}	-	80	-		120	-	-	ns
Clock hold time	t_{CH}	-	80	-		120	-	-	
Propagation delay time	t_{PHL}	ELB output		-	60		-	125	
		ERB output			60			125	
ELB,ERB set-up time	t_{PSU}	ELB input	30		-	65	-	-	
		ERB input	30			65			
DISPOFFB low pulse width	t_{WDL}	-	1.2	-	-	1.2	-	-	μs
DISPOFFB clear time	t_{CD}	-	100	-	-	100	-	-	ns
M − OUT propagation delay time	t_{PD1}		-	-	1.0	-	-	1.2	
CL1 − OUT propagation delay time	t_{PD2}	C_L=15pF	-	-	1.0	-	-	1.2	μs
DISPOFFB − OUT propagation delay time	t_{PD3}		-	-	1.0	-	-	-	

(2) Common Driver Application

Characteristic	Symbol	Test condition	(1) VDD=5V±10%			(2) VDD=3V±10%			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Clock cycle time	t_{CY}	Duty=50%	250	-	-	500	-	-	
Clock pulse width	t_{WCK}	-	45	-	-	95	-	-	
Clock rise/ fall time	t_R / t_F	-	-	-	50	-	-	50	ns
Data set-up time	t_{DS}	-	30	-		65	-	-	
Data hold time	T_{DH}	-	30	-		65	-	-	
DISPOFFB low pulse width	t_{WDL}	-	1.2	-	-	1.2	-	-	μs
DISPOFFB clear time	t_{CD}	-	100	-	-	100	-	-	ns
Output delay time	t_{DL}		-	-	200	-	-	250	
M − OUT propagation delay time	t_{PD1}		-	-	1.0	-	-	1.2	
CL1 − OUT propagation delay time	t_{PD2}	C_L=15pF	-	-	1.0	-	-	1.2	μs
DISPOFFB − OUT propagation delay time	t_{PD3}		-	-	1.0	-	-	1.2	

(3) Segment Driver Application Timing
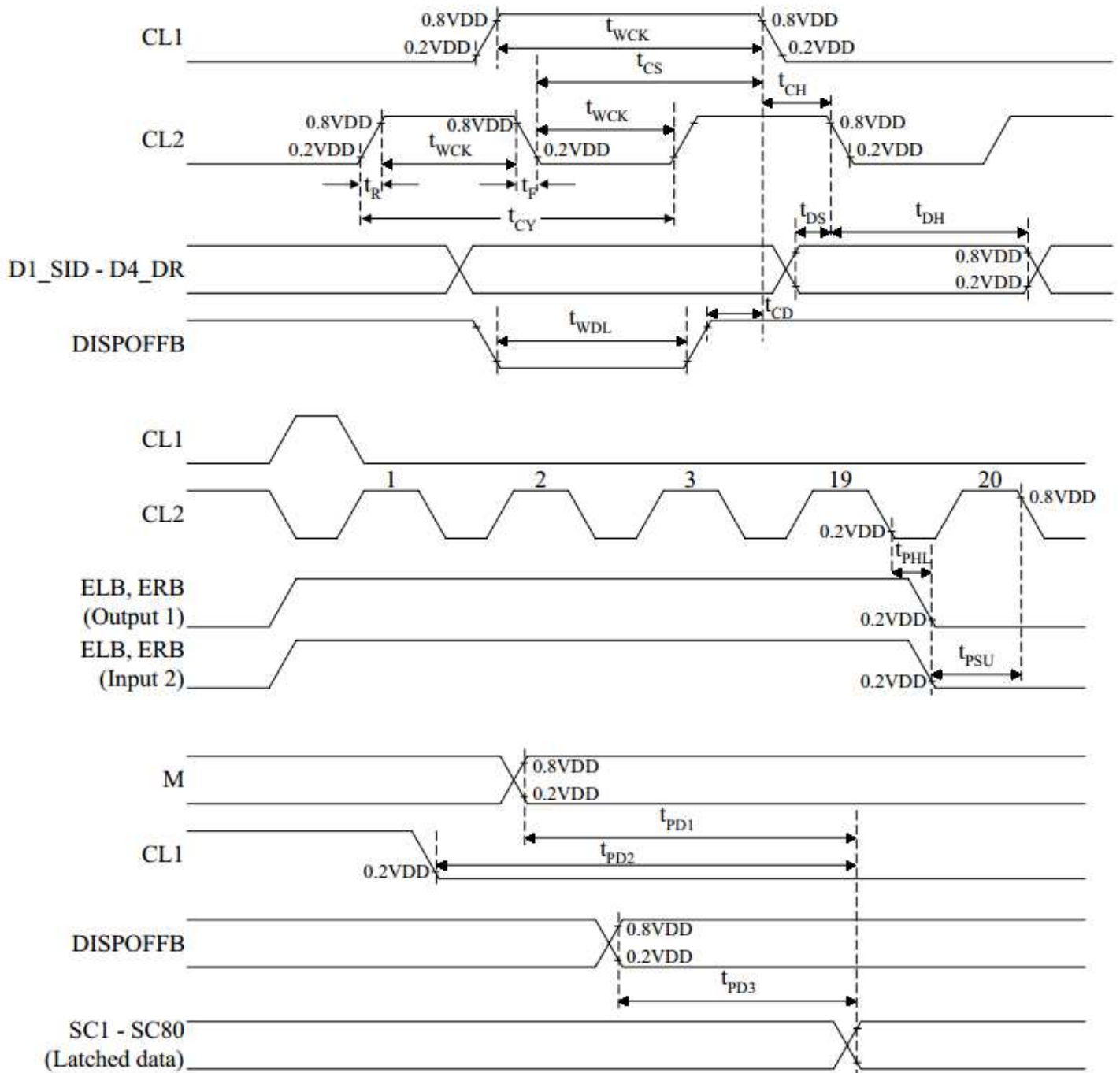
(4) Common Driver Application Timing
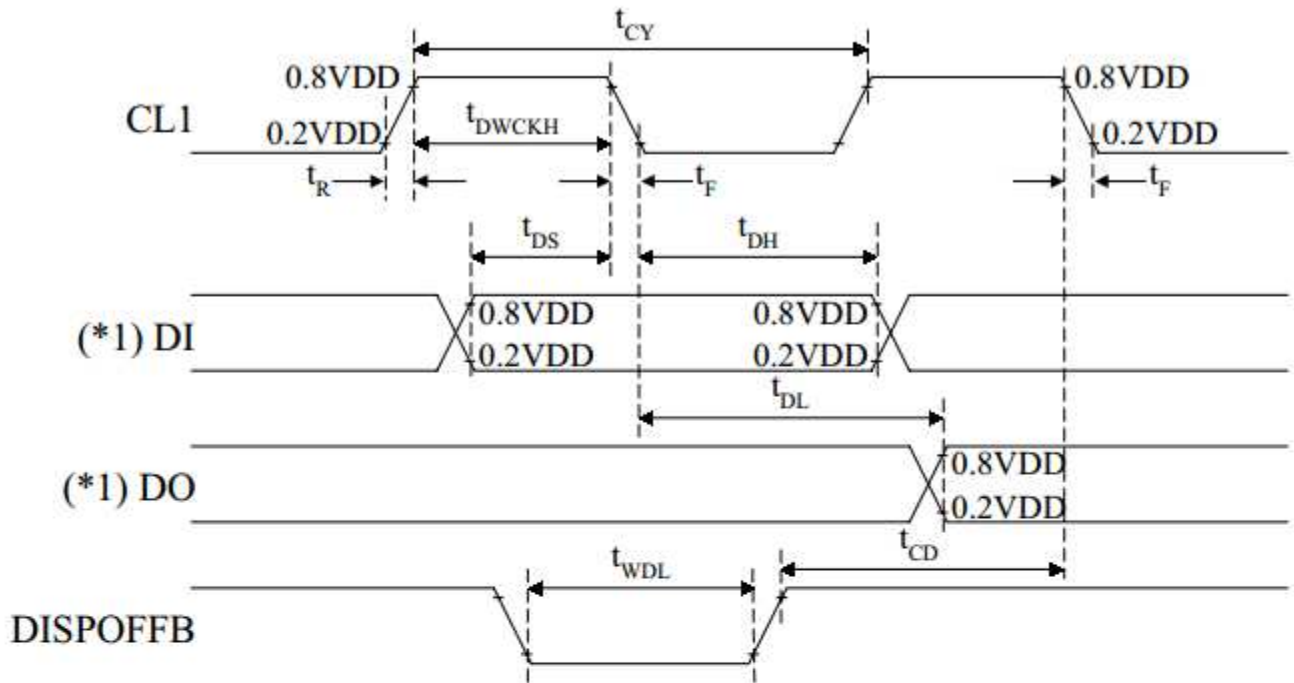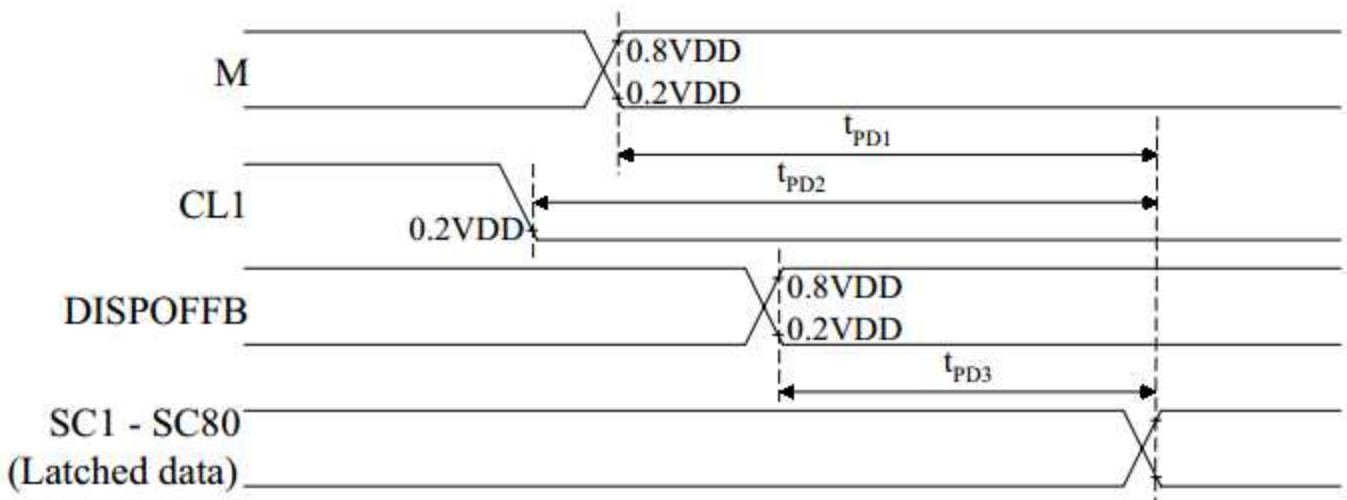

(*1) When in single-type interface mode
DI=>DDL(SHL=L), D4_DR(SHL=H)
DO=>D4_DR(SHL=L), D2_DL(SHL=H)
When in dual-type interface mode
DI=>D2_DL and D3_DM(SHL=L),D4_DR and D3_DM(SHL=H)
DO=>D4_DR(SHL=L), D2_DL(SHL=H)

[8]

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	
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 200hrs	1
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