NHD-12864WG-CTFH-V#N

Graphic Liquid Crystal Display Module

NHD-	Newhaven Display
12864-	128 x 64 pixels
WG-	Display Type: Graphic
C-	Model
T-	White LED Backlight
F-	FSTN (+)
H-	Transflective, Wide Temperature (-20°C ~ +70°C) 6:00 view
V#N-	Built-in Negative Voltage
	RoHS Compliant

Document Revision History

Revision	Date	Description	Changed by
0	1/25/2008	Initial Release	-
1	11/24/2008	Backlight modification	-
2	8/11/2009	User guide reformat	BE
3	3/23/2010	Electrical/pin description update	BE
4	12/27/2010	Pin description update	AK
5	12/19/2012	Datasheet reformatted	AK

Functions and Features

- **128 x 64 pixels**
- **Built-in NT7108C controller**
- **+5.0V power supply**
- **1/64 duty cycle**
- **RoHS Compliant**

Mechanical Drawing

	Rev	Description		Date

Dimensions:
- 78.0±0.5
- 74.0
- 62.0(VA)
- 56.3(AA)
- P2.54*19=48.26
- 2.0
- 8.0
- 10.85
- 13.0
- 1.8
- 2.54
- 20-Ø1.0 PTH
- 20-Ø2.0 PAD
- 1, 20
- 7.4
- 13.0
- 15.81
- 70.0±0.5
- 55.2
- 44.0(VA)
- 38.38(AA)
- 128X64 Dots
- 64.92
- 2.54
- 5.0
- 68.0
- 4-Ø2.5 PTH
- 4-Ø5.0 PAD

Side view:
- 14.3Max
- 9.7
- 1.6

Dot size:
- 0.44
- 0.42
- 0.6
- 0.58

DOT SIZE
SCALE 10/1

PIN NO.	SYMBOL
1	CS1B
2	CS2B
3	VSS
4	VDD
5	V0
6	RS
7	R/W
8	E
9	DB0
10	DB1
11	DB2
12	DB3
13	DB4
14	DB5
15	DB6
16	DB7
17	/RST
18	VEE
19	LED+
20	LED-
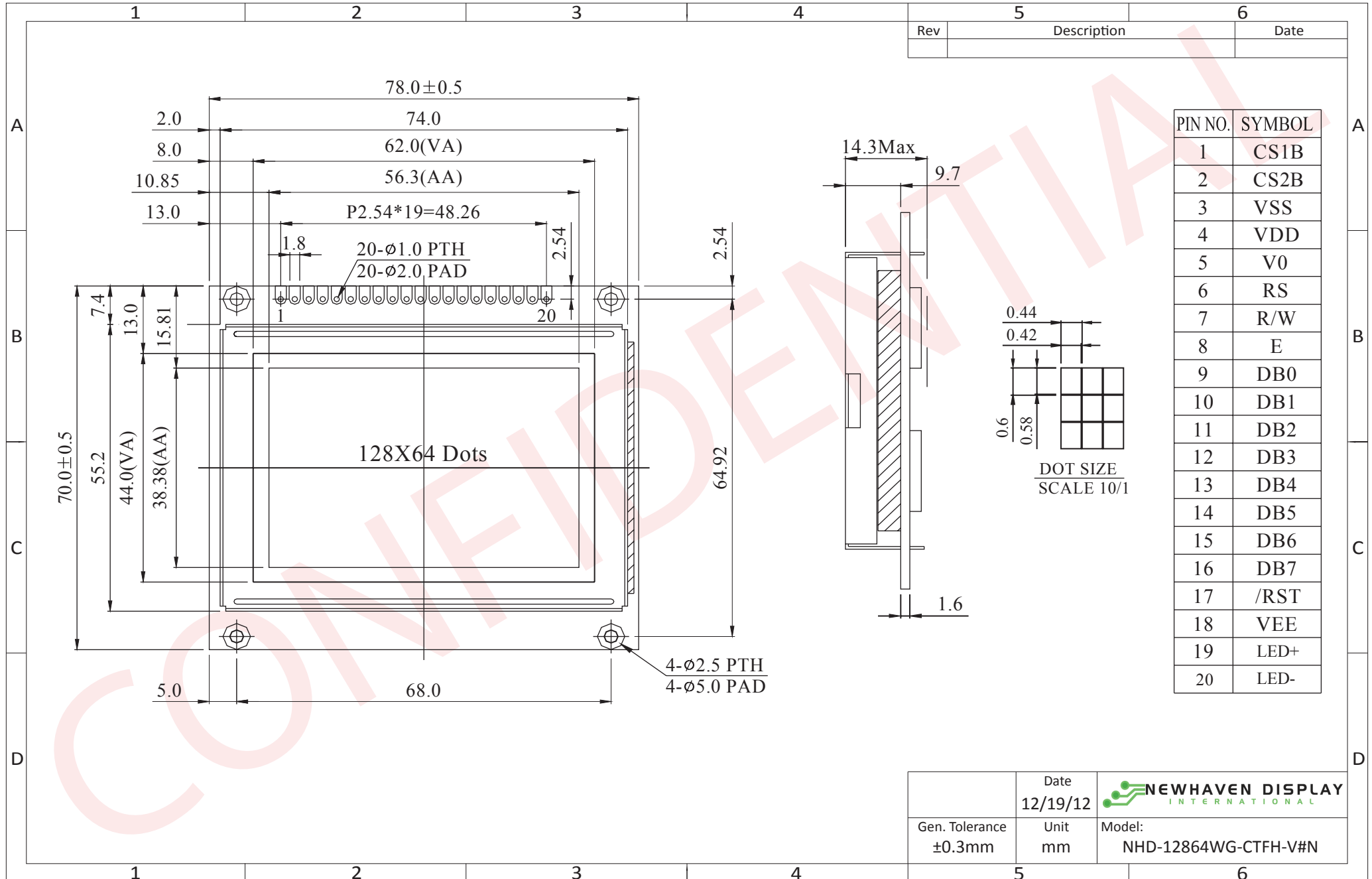
	Date 12/19/12	NEWHAVEN DISPLAY INTERNATIONAL
Gen. Tolerance ±0.3mm	Unit mm	Model: NHD-12864WG-CTFH-V#N

Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	CS1B	MPU	Chip Selection: CS1=H, CS2=L → select IC1(left side)
2	CS2B	MPU	CS1=L, CS2=H→ select IC2(right side)
3	VSS	Power Supply	Ground
4	VDD	Power Supply	Power supply for logic (+5.0V)
5	V0	Adj Power Supply	Operating voltage for LCD contrast (approx -3.5V)
6	RS	MPU	Register select: 1=Data, 0= Instruction
7	R/W	MPU	Read/Write select signal. R/W=1: Read R/W: =0: Write
8	E	MPU	Operation enable signal. Falling edge triggered.
9-16	DB0-DB7	MPU	Bi-directional 8-bit data bus
17	/RST	MPU	Active LOW Reset signal
18	VEE	Power Supply	Negative voltage output (-5V)
19	LED+	Power Supply	Power for LED Backlight (+3.5V with on-board resistor)
20	LED-	Power Supply	Ground for Backlight

Recommended LCD connector: 2.54mm pitch, pins Soldered to PCB
Backlight connector: On LCD connector   **Mates with**: -
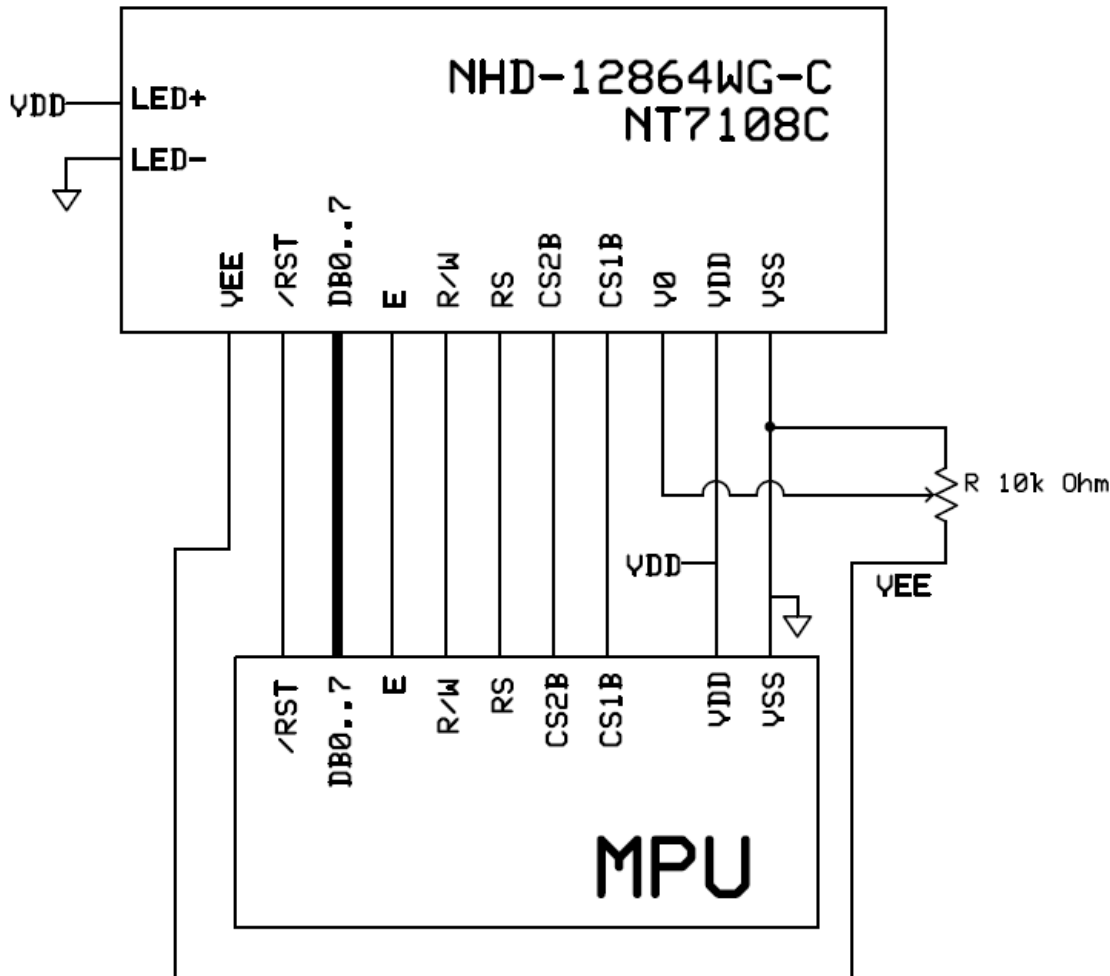
Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	ºC
Storage Temperature Range	Tst	Absolute Max	-30	-	+80	ºC
Supply Voltage	VDD		4.5	5.0	5.5	V
Supply Current	IDD	Ta=25°C, VDD=5.0V	2.0	2.5	4.0	mA
Supply for LCD (contrast)	VDD-V0	Ta=25°C	-	8.5	-	V
"H" Level input	VIH		2.0	-	VDD	V
"L" Level input	VIL	-	0	-	0.8	V
"H" Level output	VOH	-	2.4	-	-	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	57.6	64	100	mA

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle – Top			-	30	-	º
Viewing Angle – Bottom		Cr ≥ 2	-	60	-	º
Viewing Angle – Left			-	45	-	º
Viewing Angle – Right			-	45	-	º
Contrast Ratio	Cr		-	5	-	-
Response Time (rise)	Tr	-	-	200	300	ms
Response Time (fall)	Tf	-	-	150	200	ms

Controller Information

Built-in NT7108C controller.
Please download specification at http://www.newhavendisplay.com/app_notes/NT7108.pdf

Table of Commands

Instruction	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Display on/off	L	L	L	L	H	H	H	H	H	L/H	Controls the display on or off. Internal status and display RAM data is not affected. L:OFF, H:ON
Set address (Y address)	L	L	L	H	Y address (0-63)						Sets the Y address in the Y address counter.
Set page (X address)	L	L	H	L	H	H	H	Page (0-7)			Sets the X address at the X address register.
Display Start line (Z address)	L	L	H	H	Display start line (0-63)						Indicates the display data RAM displayed at the top of the screen.
Status read	L	H	Busy	L	On/Off	Reset	L	L	L	L	Read status. BUSY L: Ready H: In operation ON/OFF L: Display ON H: Display OFF RESET L: Normal H: Reset
Write display data	H	L	Write data								Writes data (DB0: 7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read display data	H	H	Read data								Reads data (DB0: 7) from display data RAM to the data bus.

Timing Characteristics

Characteristic	Symbol	Min	Type	Max	Unit
E cycle	t_C	1000	-	-	
E high level width	t_{WH}	450	-	-	
E low level width	t_{WL}	450	-	-	
E rise time	t_R	-	-	25	
E fall time	t_F	-	-	25	
Address set-up time	t_{ASU}	140	-	-	ns
Address hold time	t_{AH}	10	-	-	
Data set-up time	t_{DSU}	200	-	-	
Data delay time	t_D	-	-	320	
Data hold time (write)	t_{DHW}	10	-	-	
Data hold time (read)	t_{DHR}	20	-	-	
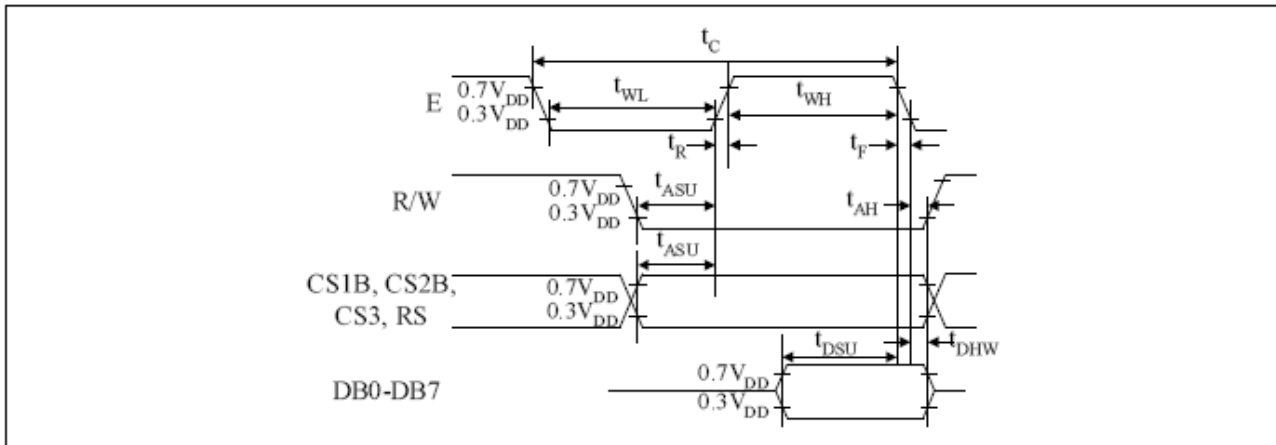
MPU Write Timing

MPU Read Timing

[7]
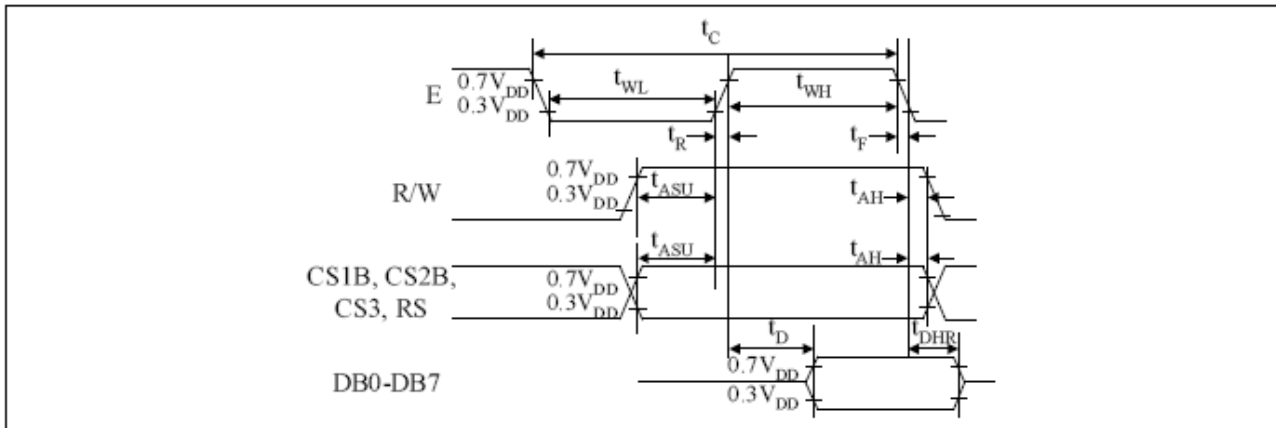
Example Initialization Program

```
void Comleft(CL)
{
        P1 = CL;
        CS2 = 1;
        RS = 0;
        E = 1;
        E = 0;
        CS2 = 0;
}

void Comright(CR)
{
        P1 = CR;
        CS1 = 1;
        RS = 0;
        E = 1;
        E = 0;
        CS1 = 0;
}

void Writeleft(WL)
{
        P1 = WL;
        CS2 = 1;
        RS = 1;
        E = 1;
        E = 0;
        CS2 = 0;
}

void Writeright(WR)
{
        P1 = WR;
        CS1 = 1;
        RS = 1;
        E = 1;
        E = 0;
        CS1 = 0;
}

void Init()
{
        RST = 0;
        RST = 1;
        E =0;
        RS = 0;
        RW = 0;
        CS2 = 0;
        CS1 = 0;
        Comleft(0x3F);
        Comright(0x3F);
}
```

[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	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